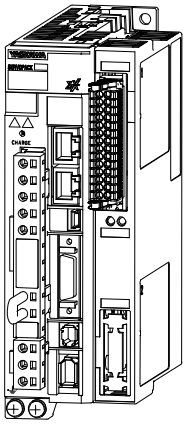
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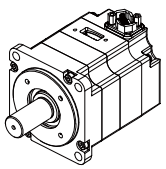
Σ-X-Series AC Servo Drive

Advanced Safety Module with Safety over EtherCAT (FSoE) Communications References

Product Manual

Model: SGDXS-OSAA0A, -OSAA1A





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i.1 About This Manual

This manual provides the information needed for the selection, installation, wiring, operation, and maintenance of the advanced safety module for Σ-X-series AC servo drives (ASM-X).

Read and understand this manual to ensure correct usage of the Σ-X-series AC servo drives. Keep this manual in a safe place so that it can be referred to whenever necessary.

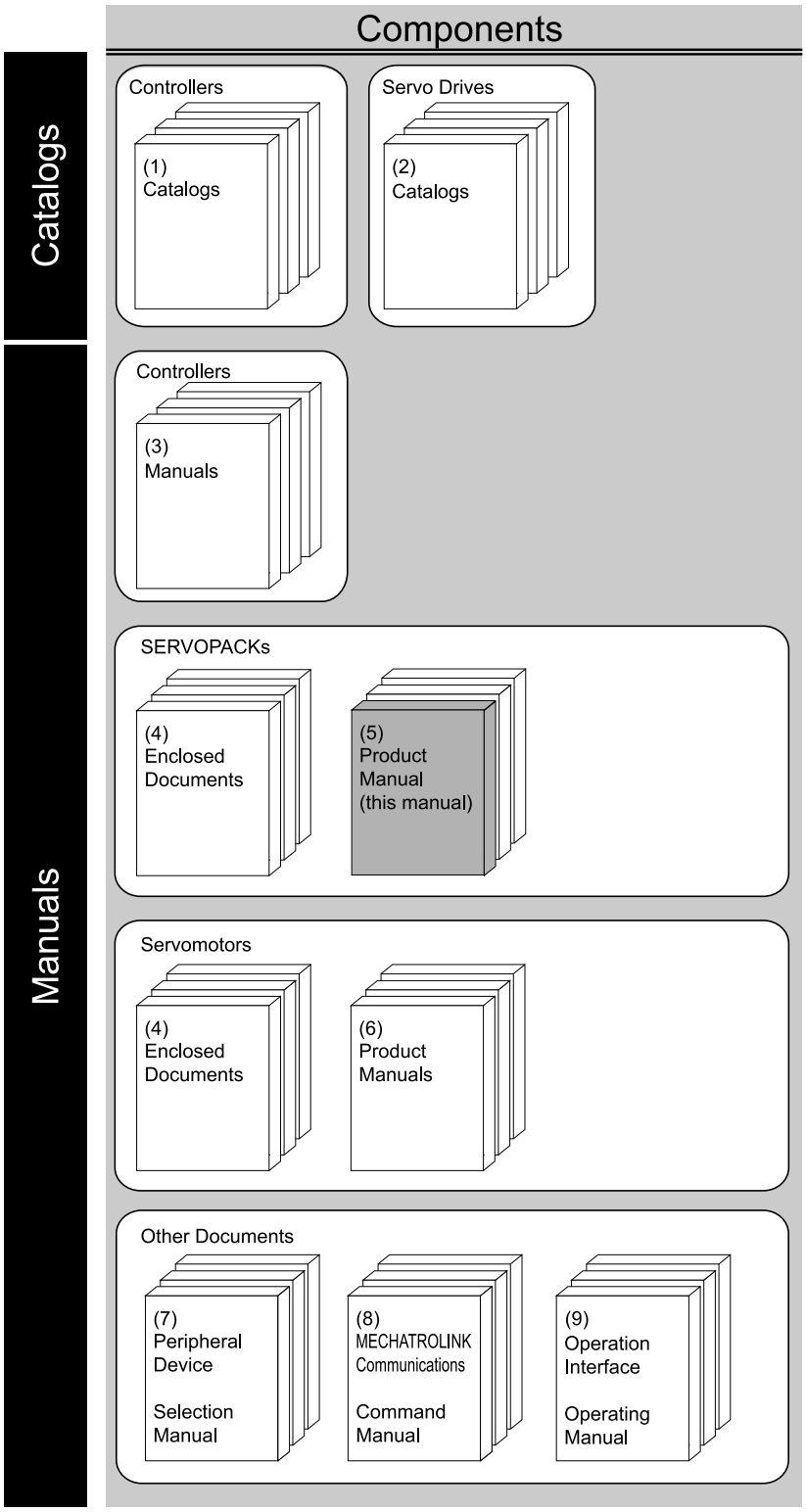
i.2 Outline of Manual

The contents of the chapters of this manual are described in the following table. Refer to these chapters as required.

Chapter	Chapter Title	Contents
1	Basic Information on the ASM-X	Provides information on SERVOPACK models and servomotor combinations that allow ASM-X operation.
2	Basic Specifications of the ASM-X	Provides information on the ASM-X, such as specifications, a block diagram, dimensional drawings, and connection examples.
3	Installation	Provides information on installing a SERVOPACK to which the ASM-X is mounted in a required location.
4	Wiring and Connections	Provides information on wiring and connecting the ASM-X to power supplies and peripheral devices.
5	Precautions and Restrictions before Operation	Provides the precautions and restrictions you must be aware of before operating the servo system.
6	Basic Settings before Operation	Provides information on items that must be set before operating the servo system and the setting methods.
7	Safety Functions	Provides detailed information on the safety functions of the ASM-X.
8	Monitoring	Provides information on monitoring the product information and status of the ASM-X and SERVOPACK.
9	Object Dictionary	Provides an overview and details on the object dictionary.
10	Maintenance	Provides information on the meaning of, causes of, and corrections for alarms and warnings.
11	Parameter and Object Lists	Provides information on parameters and objects.
12	Appendices	Provides information on the maximum value of the difference that occurs between the encoder position calculated by the ASM-X and the actual encoder position (i.e., the maximum position) using the results calculated under typical conditions.

i.3 Related Documents

The relationships between the documents that are related to the Servo Drives are shown in the following figure. The numbers in the figure correspond to the numbers in the table on the following pages. Refer to these documents as required.



i.3.1 Related Documents

(1) Machine Controllers Catalogs

You can check for products related to YASKAWA machine controllers. Refer to these documents as required.

(2) Servo Drives Catalogs

Document Name	Document No.	Description
AC Servo Drive Σ-X Series	KAEP C710812 03	Provides detailed information on Σ-X-series AC servo drives, including features and specifications.
AC Servo Drive Large-Capacity Σ-X Series	KAEP C710812 35	Provides detailed information on large-capacity Σ-X-series AC servo drives, including features and specifications.

(3) Machine Controllers Manuals

The machine controller to use depends on the SERVOPACK that is used. Refer to the manual for the machine controller as required.

(4) Enclosed Documents

Document Name	Document No.	Description
Σ-X-Series AC Servo Drive Σ-XS/Σ-XW SERVOPACK Safety Precautions	TOMP C710812 00	Provide detailed information for the safe usage of Σ-X-series SERVOPACKs.
Σ-X-Series AC Servo Drive Σ-XT SERVOPACK Safety Precautions	TOMP C710812 16	
Σ-X-Series AC Servo Drive Large-Capacity Σ-XS SERVOPACK Safety Precautions	TOMP C710812 35	Provides detailed information for the safe usage of Σ-X-series large-capacity Σ-XS SERVOPACKs.
Σ-X-Series AC Servo Drive Advanced Safety Module Safety Precautions	TOMP C710812 25	Provides detailed information for the safe usage of the advanced safety module.
Σ-X-Series AC Servo Drive Advanced Safety Module Installation Guide	TOMP C710812 26	Provides detailed procedures for installing the advanced safety module in a SERVOPACK.
Σ-X-Series AC Servo Drive Σ-LINK II Sensor Hub Instructions	TOMP C710812 06	Provides detailed information for the safe usage of the Σ-LINK II sensor hub, as well as specifications, installation, and connection information.
Σ-X-Series AC Servo Drive Σ-LINK II Booster Unit Instructions	TOMP C710812 08	Provides detailed information for the safe usage of the Σ-LINK II booster unit, as well as specifications, installation, and connection information.
Σ-V-Series/Σ-V-Series for Large-Capacity Models/Σ-7-Series/Σ-X-Series Installation Guide Fully-closed Module	TOBP C720829 03	Provides detailed procedures for installing the fully-closed module in a SERVOPACK.
AC Servo Drive Rotary Servomotor Safety Precautions	TOBP C230260 00	Provides detailed information for the safe usage of rotary servomotors and direct drive servomotors.

Continued on next page.

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Document Name	Document No.	Description
Σ-X-Series Rotary Feedback Unit Safety Precautions	TOBP C770100 00	Provides detailed information for the safe usage of the rotary feedback unit.
Σ-X-Series Serial Converter Unit/Encoder Unit Safety Precautions	TOBP C230821 00	Provides detailed information for the safe usage of the serial converter unit and encoder unit.

(5) SERVOPACK Product Manuals

Document Name	Document No.	Description
Σ-X-Series AC Servo Drive Σ-XS SERVOPACK with MECHATROLINK-4/III Communications References Product Manual	SIEP C710812 01	Provide detailed information on selecting Σ-X-series Σ-XS or Σ-XW SERVOPACKs; installing, connecting, setting, testing in trial operation, tuning, monitoring, and maintaining servo drives; and other information.
Σ-X-Series AC Servo Drive Σ-XS SERVOPACK with EtherCAT Communications References Product Manual	SIEP C710812 02	
Σ-X-Series AC Servo Drive Σ-XS SERVOPACK with Analog Voltage/Pulse Train References Product Manual	SIEP C710812 03	
Σ-X-Series AC Servo Drive Σ-XW SERVOPACK with MECHATROLINK-4/III Communications References Product Manual	SIEP C710812 04	
Σ-X-Series AC Servo Drive Σ-XW SERVOPACK with EtherCAT Communications References Product Manual	SIEP C710812 05	
Σ-X-Series AC Servo Drive Σ-XT SERVOPACK with MECHATROLINK-4/III Communications References Product Manual	SIEP C710812 16	Provide detailed information on selecting Σ-X-series Σ-XT SERVOPACKs; installing, connecting, setting, testing in trial operation, tuning, monitoring, and maintaining servo drives; and other information.
Σ-X-Series AC Servo Drive Σ-XT SERVOPACK with EtherCAT Communications References Product Manual	SIEP C710812 17	

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Document Name	Document No.	Description
Σ-X-Series AC Servo Drive Large-Capacity Σ-XS SERVOPACK with MECHATROLINK-4/III Communications References Product Manual	SIEP C710812 35	Provide detailed information on selecting Σ-X-series large-capacity Σ-XS SERVOPACKs; installing, connecting, setting, testing in trial operation, tuning, monitoring, and maintaining servo drives; and other information.
Σ-X-Series AC Servo Drive Large-Capacity Σ-XS SERVOPACK with EtherCAT Communications References Product Manual	SIEP C710812 36	
Σ-X-Series AC Servo Drive Large-Capacity Σ-XS SERVOPACK with Analog Voltage/Pulse Train References Product Manual	SIEP C710812 37	
Σ-X-Series AC Servo Drive Advanced Safety Module with Safety over EtherCAT (FSoE) Communications References Product Manual	SIEP C710812 25	Provide detailed information on selecting the advanced safety module; installing, connecting, setting, testing in trial operation, tuning, monitoring, and maintaining servo drives; and other information.
Σ-X-Series AC Servo Drive Advanced Safety Module Digital I/O Product Manual	SIEP C710812 26	
Σ-X-Series AC Servo Drive Σ-XW/Σ-XT SERVOPACK Hardware Option Specifications HWBB Function Product Manual	SIEP C710812 13	Provides information on servo drives equipped with the HWBB safety function (SGDXW-□□□□40□1000, SGDXW-□□□□A0□1000, SGDXT-□□□□40□1000, and SGDXT-□□□□A0□1000)). The differences in specifications from SERVOPACKs not equipped with the HWBB are given in this manual.
Σ-X-Series AC Servo Drive Σ-XS/Σ-XW/Σ-XT SERVOPACK Hardware Option Specifications Dynamic Brake Product Manual	SIEP C710812 14	Provides information on Σ-X-series AC servo drives (SGDX□-□□□□□□□0020) with the dynamic brake option. The differences in specifications from SERVOPACKs without the dynamic brake option are given in this manual.
Σ-X-Series AC Servo Drive Σ-XS/Σ-XW SERVOPACK with MECHATROLINK-4/III Communications References FT Specification for Gantry Applications Product Manual	SIEP C710812 19	Provide information on the gantry application function and torque/force assistance in the Σ-X-series Σ-XS/Σ-XW SERVOPACK.
Σ-X-Series AC Servo Drive Σ-XS/Σ-XW SERVOPACK with EtherCAT Communications References FT Specification for Gantry Applications Product Manual	SIEP C710812 20	

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Document Name	Document No.	Description
Σ-X-Series AC Servo Drive Σ-XS SERVOPACK with MECHATROLINK-4/III Communications References FT Specification for Press and Injection Molding Applications Product Manual	SIEP C710812 22	Provide information on the press and injection molding function in the Σ-X-series Σ-XS SERVOPACK.
Σ-X-Series AC Servo Drive Σ-XS SERVOPACK with EtherCAT Communications References FT Specification for Press and Injection Molding Applications Product Manual	SIEP C710812 23	
Σ-X-Series AC Servo Drive Σ-XS SERVOPACK with FT Specification Customized Sensing Data Function Option Product Manual	SIEP C710812 18	Provides information on the customized sensing data function in the Σ-X-series Σ-XS SERVOPACK.
Σ-X-Series AC Servo Drive Σ-XS SERVOPACK with FT Specification Customized Sensing Data Function Option (with Custom Motion Function) Product Manual	SIEP C710812 21	Provides information on the customized sensing data function (with custom motion function) in the Σ-X-series Σ-XS SERVOPACK.
Σ-X-Series AC Servo Drive Σ-XS SERVOPACK with FT Specification Customized Sensing Data Function Option (with Standalone Custom Motion Function) Product Manual	SIEP C710812 32	Provides information on the customized sensing data function (with standalone custom motion function) in the Σ-X-series Σ-XS SERVOPACK.
Σ-X-Series AC Servo Drive Σ-XS SERVOPACK with FT/EX Specification for Indexing Application Product Manual	SIEP C710812 34	Provides information on the indexing application function in the Σ-X-series Σ-XS SERVOPACK.
Σ-X-Series AC Servo Drive Σ-XS SERVOPACK with MECHATROLINK-4/III Communications References FT Specification for Semi-/Fully-Closed Loop Control Online Switching Function Option Product Manual	SIEP C710812 31	Provide information on the semi-/fully-closed loop control online switching function in the Σ-X-series Σ-XS SERVOPACK.
Σ-X-Series AC Servo Drive Σ-XS SERVOPACK with EtherCAT Communications References FT Specification for Semi-/Fully-Closed Loop Control Online Switching Function Option Product Manual	SIEP C710812 41	

(6) Servomotor Product Manuals

Document Name	Document No.	Description
Σ-X-Series AC Servo Drive Rotary Servomotor Product Manual	SIEP C230210 00	Provides detailed information on selecting, installing, and connecting the Σ-X-series servomotors.
Σ-X-Series AC Servo Drive Large-Capacity Rotary Servomotor Product Manual	SIEP C230301 00	Provides detailed information on selecting, installing, and connecting the Σ-X-series large-capacity servomotors.

(7) Peripheral Device Selection Manual

Document Name	Document No.	Description
Σ-X-Series AC Servo Drive Peripheral Device Selection Manual	SIEP C710812 12	Provides the following information in detail for Σ-X-series servo systems. • Cables: Models, dimensions, wiring materials, connector models, and connection specifications • Peripheral devices: Models, specifications, diagrams, and selection (calculation) methods

(8) MECHATROLINK Communications Command Manuals

Document Name	Document No.	Description
Σ-7/Σ-X-Series AC Servo Drive MECHATROLINK-III Communications Standard Servo Profile Command Manual	SIEP S800001 31	Provides detailed information on the MECHATROLINK-III communications standard servo profile commands that are used for a Σ-7/Σ-X-series servo system.
Σ-7/Σ-X-Series AC Servo Drive MECHATROLINK-4 Communications Standard Servo Profile Command Manual	SIEP S800002 32	Provides detailed information on the MECHATROLINK-4 communications standard servo profile commands that are used for a Σ-7/Σ-X-series servo system.

(9) Operation Interface Operating Manuals

Document Name	Document No.	Description
System Integrated Engineering Tool MPE720 Ver. 7 User's Manual	SIEP C880761 03	Describes in detail how to operate the MPE720 version 7.
Σ-7/Σ-X-Series AC Servo Drive Digital Operator Operating Manual	SIEP S800001 33	Describes the operating procedures for a digital operator for a Σ-7/Σ-X-series servo system.
AC Servo Drive Engineering Tool SigmaWin+ Operation Manual	SIET S800001 34	Provides detailed operating procedures for the SigmaWin + engineering tool for a Σ-7/Σ-X series servo system.
AC Servo Drive Engineering Tool SigmaWin+ Application Editor Operation Manual	SIEP C710812 33	Describes in detail how to operate the SigmaWin+ Application Editor.

i.4 Using This Manual

i.4.1 Technical Terms Used in This Manual

The following terms are used in this manual.

Term	Meaning
ASM-X	Advanced Safety Module for Σ-X (model: SGDX□-OSA□□□)
servomotor	A generic term for a rotary servomotor or linear servomotor that can be driven by a SERVOPACK.
SERVOPACK	A Σ-X-series Σ-XS servo amplifier.
servo drive	The combination of a servomotor and SERVOPACK.
servo ON	Supplying power to the motor.
servo OFF	Not supplying power to the motor.
main circuit cable	One of the cables that connect to the main circuit terminals, including the main circuit power supply cable, control power supply cable, and servomotor main circuit cable.
SigmaWin+	The engineering tool for setting up and tuning servo drives or a computer in which the engineering tool is installed. Note that the "Σ" notation in this manual is spelled out as "Sigma" in the SigmaWin+.
digital operator	The portable operator connected to the SERVOPACK.
Σ-X safety drive system	The combination of a SERVOPACK, servomotor, and ASM-X.
safety option module	A generic term for an option module that implements safety functions to be mounted to a SERVOPACK.
safety module	An option module that implements the safety functions defined in this manual.
HWBB function	An abbreviation for the hard wire base block function which is designed to shut OFF the current to the servomotor with a hardwired circuit.
encoder with functional safety	An encoder that complies with the IEC 61800-5-3 safety standard. An encoder with functional safety has two modes: non-safety mode and safety mode. Use the SigmaWin+ to set the mode. (Default value: Non-safety mode) • Non-safety mode: The mode to use for a SERVOPACK that is not equipped with the ASM-X. • Safety mode: The mode to use for a SERVOPACK that is equipped with the ASM-X.
normal encoder	An encoder other than an encoder with functional safety that can be combined with the ASM-X to use safety functions.
servomotor with functional safety	A servomotor equipped with an encoder with functional safety.
Σ-LINK I	A protocol for communications between SERVOPACKs and encoders.
Σ-LINK II	A protocol for communications between SERVOPACKs, encoders, and sensor hubs.
safety encoder communications	Safety communications between the ASM-X and an encoder with functional safety.
safety fieldbus	A fieldbus that complies with the IEC 61784-3 safety standard for safety fieldbuses.
safety function slot	The unit for executing a single safety function.
safety-related module parameter	A parameter that sets the operation of the safety module.
safety-related servo parameter	A parameter that is managed by the safety module and is information related to the safety functions of the SERVOPACK and servomotor.
safe output signal	A signal output by the ASM-X to execute a safety function from outside the ASM-X. (SSMOS and SBCOS are safe output signals.)
diagnostic output signal	A signal output by the ASM-X to have an external device perform a diagnostic on the ASM-X. (EDM is a diagnostic output signal.)

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Term	Meaning
diagnostic input signal	A signal input to the ASM-X to have the ASM-X perform a diagnostic on an external device. (SBCIS is a diagnostic input signal.)
primary encoder position	Of the encoder feedback in redundant systems received by the ASM-X, this position data is used to monitor and operate the safety functions. This data serves as the basis for the motor position calculated in the ASM-X.
secondary encoder position	Of the encoder feedback in redundant systems received by the ASM-X, this position data is used to diagnose the correctness of the primary encoder position.
failure detection time	The time from when a failure occurs in a part to when the Σ-X safety drive system enters the safe state (STO state). This time is included the time from when the ASM-X detects the failure to when the Σ-X safety drive system enters the safe state (STO state).
DI	An abbreviation for digital input. This is used as a generic term for a digital input on the ASM-X.
DIA	An abbreviation for digital input port A. This refers to the port A redundant inputs (channel 1 and channel 2).
DIA1	An abbreviation for digital input port A, channel 1. This refers to channel 1 of port A.
DIA2	An abbreviation for digital input port A, channel 2. This refers to channel 2 of port A.
DIB	An abbreviation for digital input port B. This refers to the port B redundant inputs (channel 1 and channel 2).
DIB1	An abbreviation for digital input port B, channel 1. This refers to channel 1 of port B.
DIB2	An abbreviation for digital input port B, channel 2. This refers to channel 2 of port B.
DIC	An abbreviation for digital input port C. This refers to the port C redundant inputs (channel 1 and channel 2).
DIC1	An abbreviation for digital input port C, channel 1. This refers to channel 1 of port C.
DIC2	An abbreviation for digital input port C, channel 2. This refers to channel 2 of port C.
DID	An abbreviation for digital input port D. This refers to the port D redundant inputs (channel 1 and channel 2).
DID1	An abbreviation for digital input port D, channel 1. This refers to channel 1 of port D.
DID2	An abbreviation for digital input port D, channel 2. This refers to channel 2 of port D.
DIE	An abbreviation for digital input port E. This refers to the port E redundant inputs (channel 1 and channel 2).
DIE1	An abbreviation for digital input port E, channel 1. This refers to channel 1 of port E.
DIE2	An abbreviation for digital input port E, channel 2. This refers to channel 2 of port E.
DO	An abbreviation for digital output. This is used as a generic term for a digital output on the ASM-X.
DOA	An abbreviation for digital output port A. This refers to the port A redundant outputs (channel 1 and channel 2).

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Term	Meaning
DOA1	An abbreviation for digital output port A, channel 1. This refers to channel 1 of port A.
DOA2	An abbreviation for digital output port A, channel 2. This refers to channel 2 of port A.
DOB	An abbreviation for digital output port B. This refers to the port B redundant outputs (channel 1 and channel 2).
DOB1	An abbreviation for digital output port B, channel 1. This refers to channel 1 of port B.
DOB2	An abbreviation for digital output port B, channel 2. This refers to channel 2 of port B.
DOC	An abbreviation for digital output port C. This refers to the port C redundant outputs (channel 1 and channel 2).
DOC1	An abbreviation for digital output port C, channel 1. This refers to channel 1 of port C.
DOC2	An abbreviation for digital output port C, channel 2. This refers to channel 2 of port C.
DOD	An abbreviation for digital output port D. This refers to the port D redundant outputs (channel 1 and channel 2).
DOD1	An abbreviation for digital output port D, channel 1. This refers to channel 1 of port D.
DOD2	An abbreviation for digital output port D, channel 2. This refers to channel 2 of port D.
DOE	An abbreviation for digital output port E. This refers to the port E redundant outputs (channel 1 and channel 2).
DOE1	An abbreviation for digital output port E, channel 1. This refers to channel 1 of port E.
DOE2	An abbreviation for digital output port E, channel 2. This refers to channel 2 of port E.
DICOM	An abbreviation for digital input common.
DOCOM	An abbreviation for digital output common.
VI	An abbreviation for virtual input. This is an input signal the ASM-X receives over safety fieldbus communications.
VI0 to VI15	Abbreviations for virtual input 0 to virtual input 15. These are bit 0 to bit 15 of the input signal the ASM-X receives over safety fieldbus communications.
VO	An abbreviation for virtual output. This is an output signal the ASM-X sends over safety fieldbus communications.
VO0 to VO15	Abbreviations for virtual output 0 to virtual output 15. These are bit 0 to bit 15 of the output signal the ASM-X sends over safety fieldbus communications.
SRIS	An abbreviation for the Safety Request Input Signal. This is the signal that starts the safety functions.
SDIS	An abbreviation for the Safety Data Input Signal. This is the signal that controls a running safety function.
EDM	An abbreviation for External Device Monitor. This is the signal that outputs the execution state of the safety functions.
SBCOS	An abbreviation for the SBC Output Signal. This is the output signal from the ASM-X in the SBC function that controls the power supply for the motor brake.

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Term	Meaning	
SBCIS	An abbreviation for the SBC Input Signal. This is the input signal to the ASM-X in the SBC function that diagnoses the control section of the power supply for the motor brake.	
SSMOS	An abbreviation for the SSM Output Signal. This is the output signal from the ASM-X in the SSM function that provides notification of the limit violation state.	
SCAOS	An abbreviation for the Safe CAM Output Signal. This is the output signal from the ASM-X in the SCA function that provides notification of the limit violation state.	
CoE	An abbreviation for CAN application protocol over EtherCAT.	
EoE	An abbreviation for Ethernet over EtherCAT. This protocol exchanges Ethernet data over EtherCAT segments.	
FSoE	A generic term for Safety over EtherCAT. This is a communications protocol in which safety control data exists in a mixed manner on the EtherCAT communication path.	
SPDU	An abbreviation for safe process data unit. This is the unit of data handled by the safety communications protocol.	
FSoE MDevice command	A command sent from the FSoE MDevice to the FSoE SubDevice (command data).	
FSoE MainDevice command	The meaning is the same as FSoE MDevice command (term used in objects).	
FSoE SubDevice command	A command sent from the FSoE SubDevice to the FSoE MDevice (response data).	
safe state	The meaning depends on the type of safety function.	
	STO function	HWBB (STO) state
	SS1-r function	HWBB (STO) state
	SS1-t function	HWBB (STO) state
	SS2-r function	Position is being monitored or HWBB (STO) state
	SS2-t function	Position is being monitored or HWBB (STO) state
	SOS function	Position is being monitored or HWBB (STO) state
	SLS function	Constant speed is being monitored or HWBB (STO) state
	SLA function	Acceleration is being monitored or HWBB (STO) state
	SSR function	Speed is being monitored or HWBB (STO) state
	SSM function	Speed is being monitored
	SBC function	SBCOS is ON (request to energize relay coil state)
	SLP function	Position is being monitored or HWBB (STO) state
	SLI function	Position is being monitored or HWBB (STO) state
	SDI-p function	Operation direction is being monitored or HWBB (STO) state
	SDI-n function	Operation direction is being monitored or HWBB (STO) state
	SCA function	Position is being monitored
	SHP function	Safe home position setting complete

The following abbreviations are used for the safety functions.

Abbreviation	Name	Description	Remarks
STO	Safe Torque OFF	This function shuts OFF the power to the servomotor by blocking the base drive signal in the SERVOPACK.	Conforms to EN 61800-5-2
SS1-r	Safe Stop 1 Ramp Monitored	This function monitors servomotor deceleration. This function executes the STO function after the set time has elapsed. If the speed during deceleration exceeds the set value, it executes the STO function even within the set time.	Conforms to EN 61800-5-2
SS1-t	Safe Stop 1 Time Controlled	This function executes the STO function after the set time has elapsed.	Conforms to EN 61800-5-2
SS2-r	Safe Stop 2 Ramp Monitored	This function monitors servomotor deceleration. This function executes the SOS function after the set time has elapsed. If the speed during deceleration exceeds the set value, it executes the STO function even within the set time.	Conforms to EN 61800-5-2
SS2-t	Safe Stop 2 Time Controlled	This function executes the SOS function after the set time has elapsed.	Conforms to EN 61800-5-2
SOS	Safe Operating Stop	This function monitors the position of the servomotor to ensure it is within the setting range based on the position when SRIS was turned ON. If outside that range, it executes the STO function.	Conforms to EN 61800-5-2
SLS	Safely-Limited Speed	This function monitors the speed of the servomotor to ensure it does not exceed the specified upper limit value. If outside that range, it executes the STO function.	Conforms to EN 61800-5-2
SLA	Safely-Limited Acceleration	This function monitors the acceleration of the servomotor to ensure it is within the setting range. If outside that range, it executes the STO function.	Conforms to EN 61800-5-2
SSR	Safe Speed Range	This function monitors the speed of the servomotor to ensure it is within the range of the specified upper and lower limit values. If outside that range, it executes the STO function.	Conforms to EN 61800-5-2
SSM	Safe Speed Monitor	This function monitors the speed of the servomotor to ensure it is within the specified range and outputs that state. Even if the speed is outside that range, the function does not execute the STO function.	Conforms to EN 61800-5-2
SBC	Safe Brake Control	This function controls the power supply for the brake with the safe output signals.	Conforms to EN 61800-5-2
SLP *1	Safely-Limited Position	This function monitors the position of the servomotor from its safe home position to ensure it is within the setting range. If outside that range, it executes the STO function.	Conforms to EN 61800-5-2
SLI *1	Safely-Limited Incremental	This function monitors the position of the servomotor to ensure it is a travel amount within the set range.	Conforms to EN 61800-5-2
SDI-p *1	Safe Direction, positive direction forbidden	This function monitors the movement direction of the servomotor. Only movement in the forward direction is prohibited. If the servomotor moves in the forward direction, this function executes the STO function.	Conforms to EN 61800-5-2
SDI-n *1	Safe Direction, negative direction forbidden	This function monitors the movement direction of the servomotor. Only movement in the reverse direction is prohibited. If the servomotor moves in the reverse direction, this function executes the STO function.	Conforms to EN 61800-5-2
SCA *1	Safe CAM	This function monitors the position of the servomotor from its safe home position to ensure it is within the setting range and outputs that state. Even if the position is outside that range, the function does not execute the STO function.	Conforms to EN 61800-5-2
SHP *1	Safe Home Position	This function sets the safe home position for the SLP and SCA functions.	This function is unique to Yaskawa.

*1 This function is available in ASM-X software version 003 or later.

i.4.2 Notation Used in this Manual

(1) Notation for Reverse Signals

The names of reverse signals (i.e., ones that are valid when low) are written with a forward slash (/) before the signal abbreviation.

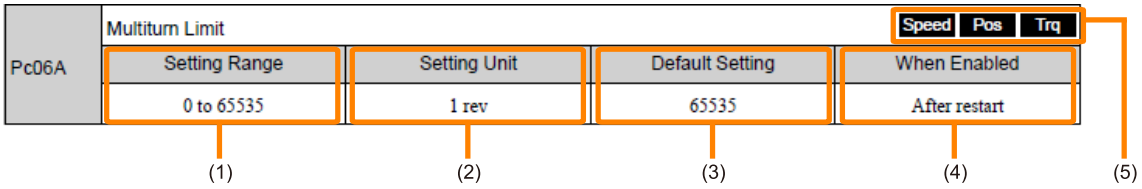
Notation Example

$\overline{BK}$ is written as /BK.

(2) Notation for Parameters

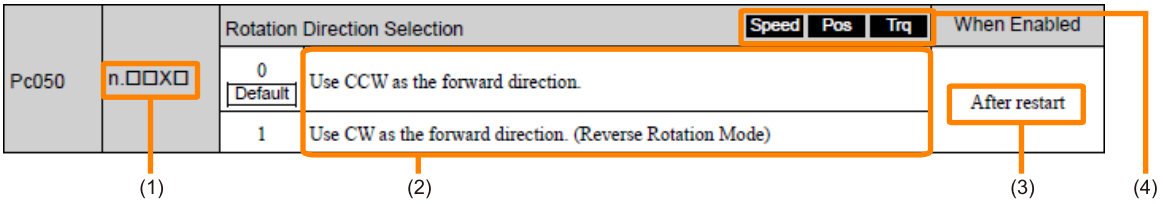
The notation depends on whether the parameter requires a numeric setting (parameter for numeric setting) or requires the selection of a function (parameter for selecting functions).

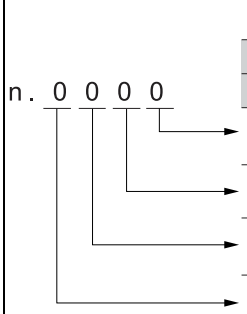
(a) Parameters for Numeric Settings



No.	Description
(1)	This is the setting range for the parameter.
(2)	This is the setting unit (setting increment) that you can set for the parameter.
(3)	This is the parameter setting before shipment.
(4)	This is when any change made to the parameter will become effective.
(5)	The control methods for which the parameters apply are given. Speed: A parameter that can be used in speed control. Pos: A parameter that can be used in position control. Trq: A parameter that can be used in torque control. "Torque" is used even for linear servomotor parameters. Grayed-out icons (Speed, Pos, Trq) indicate parameters that cannot be used in the corresponding control method.

(b) Parameters for Selecting Functions



<table>
<tr><th>No.</th><th>Description</th></tr>
<tr><td>(1)</td><td>
The notation “n.□□□□” indicates a parameter for selecting functions. The digit shown as "X" is the content being explained in this parameter.
Notation Example


(Pc050 notation example)
<table>
<tr><th colspan="2">Digit Notation</th><th colspan="2">Setting Notation</th></tr>
<tr><th>Notation</th><th>Meaning</th><th>Notation</th><th>Meaning</th></tr>
<tr><td>Pc050 = n.□□□X</td><td>Signifies the first digit from the right for Pc050.</td><td>Pc050 = n.□□□1</td><td>Signifies that the first digit from the right for Pc050 is “1”.</td></tr>
<tr><td>Pc050 = n.□□X□</td><td>Signifies the second digit from the right for Pc050.</td><td>Pc050 = n.□□1□</td><td>Signifies that the second digit from the right for Pc050 is “1”.</td></tr>
<tr><td>Pc050 = n.□X□□</td><td>Signifies the third digit from the right for Pc050.</td><td>Pc050 = n.□1□□</td><td>Signifies that the third digit from the right for Pc050 is “1”.</td></tr>
<tr><td>Pc050 = n.X□□□</td><td>Signifies the fourth digit from the right for Pc050.</td><td>Pc050= n.1□□□</td><td>Signifies that the fourth digit from the right for Pc050 is “1”.</td></tr>
</table>
</td></tr>
<tr><td>(2)</td><td>This column explains the selections for the function.
In the above example, the first line gives an explanation of when Pc050 = n.□□0□ is set.</td></tr>
<tr><td>(3)</td><td>This is when any change made to the parameter will become effective.</td></tr>
<tr><td>(4)</td><td>
The control methods for which the parameters apply are given.
Speed: A parameter that can be used in speed control.
Pos: A parameter that can be used in position control.
Trq: A parameter that can be used in torque control. "Torque" is used even for linear servomotor parameters.
Grayed-out icons (Speed, Pos, Trq) indicate parameters that cannot be used in the corresponding control method.
</td></tr>
</table>

i.5 Engineering Tools Used in This Manual

This manual uses the interfaces of the SigmaWin+ for descriptions.

The interfaces and procedures contained in this manual are currently in development and may differ from the actual specifications.

i.6 Trademarks

- EtherCAT® and Safety over EtherCAT® are registered trademarks and patented technologies, licensed by Beckhoff Automation GmbH, Germany.
- Σ-LINK is a trademark of the MECHATROLINK Members Association.
- QR code is a trademark of Denso Wave Inc.
- Other product names and company names are the trademarks or registered trademarks of their respective companies. “TM” and the ® mark do not appear with product or company names in this manual.

i.7 Visual Aids

The following aids are used to indicate certain types of information for easier reference.



Important

Indicates precautions or restrictions that must be observed.
Also indicates alarm displays and other precautions that will not result in machine damage.



Term

Indicates definitions of difficult terms or terms that have not been previously explained in this manual.

Information Indicates supplemental information to deepen understanding or useful information.

i.8 Safety Precautions

i.8.1 Safety Information

To prevent personal injury and equipment damage in advance, the following signal words are used to indicate safety precautions in this document. The signal words are used to classify the hazards and the degree of damage or injury that may occur if a product is used incorrectly. Information marked as shown below is important for safety. Always read this information and heed the precautions that are provided.

⚠ DANGER

This signal word identifies a hazard that will cause serious injury or death if you do not prevent it.

⚠ WARNING

This signal word identifies a hazard that can cause death or serious injuries if you do not prevent it.

⚠ CAUTION

This signal word identifies a hazard that can cause moderate injuries if you do not prevent it.

NOTICE

This signal word identifies a property damage message that is not related to personal injury.

i.8.2 Safety Precautions That Must Always Be Observed

(1) General Precautions

⚠ DANGER

Make sure to observe all information related to safety contained in this manual.

If you fail to observe these warnings, there is a risk of equipment damage or product failure. There is also a risk of injury, fire, or electric shock that causes death or serious injury.

Yaskawa bears no responsibility to you or your customers for injuries and equipment damage that occur from failing to observe the warnings and precautions listed in this manual.

Keep this manual in a safe, convenient place so that it can be referred to whenever necessary. Make sure that it is delivered to the final user of the product.

Install and remove covers, cables, connectors, and optional devices when the power is turned OFF.

There is a risk of equipment damage or product failure. There is also a risk of fire or electric shock that causes death or serious injury. Additionally, there is a risk of death or serious injury due to unexpected machine operation.

⚠ WARNING

Use a power supply with specifications (number of phases, voltage, frequency, and AC/DC type) that are appropriate for the product. Always check the power supply specifications in this manual.

If you do not use the product with the correct power supply specifications, there is a risk of thermal damage, fire, or electric shock because of product overheating due to the application of high voltage or leakage current, and these may cause death or serious injury.

Make sure to connect the ground terminals on the SERVOPACK and servomotor to ground poles in the state shown below.

- **SERVOPACK with 200-VAC power supply input: 100 Ω max.**
- **SERVOPACK with 400-VAC power supply input: 10 Ω max.**

There is a risk of product failure. A fire or electric shock may also occur resulting in death or serious injury.

A SERVOPACK with 400-VAC power supply input can be used only in a power system with grounded neutral. Make sure to connect the SERVOPACK to a power supply with grounded neutral.

If the SERVOPACK is connected to a power supply without a grounded neutral, there is a risk of electric shock and product failure. A fire or electric shock may also occur resulting in death or serious injury.

Do not modify or alter the product in any manner that is not described in this manual.

If you modify or alter the product, there is a risk of fire or electric shock that causes death or serious injury.

Repairs for product damage caused by modifying or altering the product in a manner not described in this manual are outside the scope of the Yaskawa warranty. Yaskawa bears no responsibility for product alterations performed by you or your customers.

For a 24-VDC power supply, use a power supply device with double insulation or reinforced insulation.

There is a risk of injury, fire, or electric shock that causes death or serious injury when a short circuit or ground fault occurs due to insulation deterioration in the device.

Do not damage, pull on, apply excessive force to, place heavy objects on, or pinch cables.

There is a risk of fire or electric shock due to cable failure or damage that causes death or serious injury.

The person who designs the system that uses the safety function and the person who is responsible for its maintenance must have a complete knowledge of the related safety standards and a complete understanding of the instructions in this document.

If the safety design of the system is insufficient, there is a risk of equipment damage. There is also a risk of death or serious injury due to unexpected machine operation.

Do not place the product in locations where it is subject to water, corrosive gases, flammable gases, potentially explosive atmospheres, or near flammable materials.

There is a risk of product failure. A fire or electric shock may also occur resulting in death or serious injury.

Install external emergency stop circuits that can turn OFF the power and stop operation immediately in case an error occurs.

There is a risk of equipment damage and death or serious injury due to unexpected machine operation.

Always use a servomotor and SERVOPACK in one of the specified combinations.

There is a risk of product failure. There is also a risk of fire that causes death or serious injury. Additionally, there is a risk of death or serious injury due to unexpected machine operation.

Do not touch a SERVOPACK or servomotor with wet hands.

There is a risk of product failure if the SERVOPACK and servomotor get wet. A fire or electric shock may also occur resulting in death or serious injury.

⚠ CAUTION

The SERVOPACK heat sinks, regenerative resistors, external dynamic brake resistors, servomotors, and other components can be very hot while power is ON or soon after the power is turned OFF. Implement safety measures, such as installing covers, so that hands and parts such as cables do not come into contact with hot components.

There is a risk of burns from touching hot components.

NOTICE

Do not attempt to use a SERVOPACK or servomotor that is damaged or that has missing parts.

There is a risk that the product may not function correctly.

In environments with unstable power supply, install the necessary protective devices (such as AC reactors) to ensure that the input power is supplied within the specified voltage range.

There is a risk of product failure.

Minimize the effects of electromagnetic interference by connecting a device, such as a noise filter.

There is a risk of equipment or product malfunction.

(2) Storage Precautions

⚠ WARNING

Do not place an excessive load on the product. Follow the labels on the shipping box regarding product loading.

There is a risk of the product falling and causing product damage or failure. There is also a risk of death or serious injury.

Do not install or store the product in any of the following locations.

- **Locations that are subject to direct sunlight**
- **Locations that are subject to surrounding air temperatures that exceed product specifications**
- **Locations that are subject to relative humidities that exceed product specifications**
- **Locations that are subject to condensation as the result of extreme changes in temperature**
- **Locations that are subject to corrosive or flammable gases**
- **Locations that are near flammable materials**
- **Locations that are subject to dust, salts, or iron powder**
- **Locations that are subject to water, oil, or chemicals**
- **Locations that are subject to vibration or shock that exceeds product specifications**
- **Locations that are subject to radiation**

If you store or install the product in any of the above locations, there is a risk of product failure. A fire or electric shock may also occur resulting in death or serious injury.

(3) Transportation Precautions

⚠ WARNING

Transport the product in a way that is suitable to the mass of the product.

There is a risk of the product falling and causing product damage or failure. There is also a risk of death or serious injury.

Do not use the lifting hardware on a SERVOPACK or servomotor to move the entire machine.

There is a risk of the product falling due to improper use of lifting hardware and causing product and equipment damage or failure. There is also a risk of death or serious injury.

Do not place an excessive load on the product. Follow the labels on the shipping box regarding product loading.

There is a risk of the product falling and causing product damage or failure. There is also a risk of death or serious injury.

Do not overtighten the lifting hardware on the SERVOPACK and servomotor.

If you use a tool to overtighten the lifting hardware, the product may be damaged. The product may also be damaged and fall causing death or serious injury.

⚠ CAUTION

When you handle a SERVOPACK or servomotor, be careful of sharp edges, such as the corners.

There is a risk of injury.

When you move the SERVOPACK, hold the main body directly and not the front cover or connectors.

If you move the SERVOPACK by holding the front cover or connectors, those parts may break off and cause product damage, product failure, or injury.

NOTICE

A SERVOPACK or servomotor is a precision device. Do not drop it or subject it to impact or excessive force.

There is a risk of product damage or failure.

Avoid applying mechanical shock or impact to connectors.

There is a risk of product damage or failure.

If disinfectants or insecticides must be used to treat packing materials such as wooden frames, plywood, or pallets, use a method other than fumigation.

For example, use heat sterilization (core temperature of 56°C or higher for 30 minutes or longer).

Treat the packing materials before the product is packaged instead of using a method that treats the entire packaged product.

If the electronic products, which include stand-alone products and products installed in machines, are packed with fumigated wooden materials, the electrical components may be greatly damaged by the gases or fumes resulting from the fumigation process. In particular, disinfectants containing halogen, which includes chlorine, fluorine, bromine, or iodine, can contribute to product failure by corroding the insides of capacitors.

(4) Installation Precautions

⚠ WARNING

Install the SERVOPACK and the servomotor using mounting that can support their mass. Check the masses of the SERVOPACK and the servomotor in the respective instruction manuals, and install the SERVOPACK and the servomotor by following the chapters related to installation in the respective product manuals.

In case of improper installation, there is a risk of the SERVOPACK and servomotor falling and causing damage or failure to equipment and the product. There is also a risk of death or serious injury.

Install SERVOPACKs, servomotors, regenerative resistors, and external dynamic brake resistors on nonflammable materials.

Installation directly onto or near flammable materials may result in fire that causes death or serious injury.

Provide the specified clearances between the SERVOPACK and the control panel and other devices. Refer to "Mounting Interval" in this manual for the specified clearances.

There is a risk of product failure if the SERVOPACK temperature and the temperature around the SERVOPACK locally exceed the surrounding air temperature range. There is also a risk of fire that causes death or serious injury.

Install the SERVOPACK in the specified orientation.

There is a risk of product failure if the SERVOPACK temperature and the temperature around the SERVOPACK locally exceed the surrounding air temperature range. There is also a risk of fire that causes death or serious injury.

Do not allow any foreign matter to enter the SERVOPACK or servomotor.

There is a risk of product failure. There is also a risk of fire that causes death or serious injury.

Do not install or store the product in any of the following locations.

- **Locations that are subject to direct sunlight**
- **Locations that are subject to surrounding air temperatures that exceed product specifications**
- **Locations that are subject to relative humidities that exceed product specifications**
- **Locations that are subject to condensation as the result of extreme changes in temperature**
- **Locations that are subject to corrosive or flammable gases**
- **Locations that are near flammable materials**
- **Locations that are subject to dust, salts, or iron powder**
- **Locations that are subject to water, oil, or chemicals**
- **Locations that are subject to vibration or shock that exceeds product specifications**
- **Locations that are subject to radiation**

If you store or install the product in any of the above locations, there is a risk of product failure. A fire or electric shock may also occur resulting in death or serious injury.

⚠ CAUTION

Do not step on or place a heavy object on the product.

There is a risk of product damage or failure because the product cannot withstand the load.

NOTICE

Use the product in an environment that is appropriate for the product specifications.

There is a risk of product damage or failure if you use the product in an environment that exceeds the product specifications.

A SERVOPACK or servomotor is a precision device. Do not drop it or subject it to impact or excessive force.

There is a risk of product damage or failure.

NOTICE

Always install a SERVOPACK in a control panel.

Do not allow any foreign matter to enter a SERVOPACK or a servomotor with a cooling fan and do not cover the outlet from the servomotor's cooling fan.

There is a risk of product failure.

(5) Wiring Precautions

⚠ DANGER

Do not change any wiring while power is being supplied.

There is a risk of equipment damage or product failure. There is also a risk of fire or electric shock that causes death or serious injury. Additionally, there is a risk of death or serious injury due to unexpected machine operation.

Wait for at least 20 minutes (or 100 minutes when using DC power supply input) after turning OFF the power and then make sure that the CHARGE indicator is not lit before starting wiring or inspection work. Do not touch the main circuit terminals while the CHARGE indicator is lit because high voltage may still remain in the SERVOPACK even after turning OFF the power.

There is a risk of electric shock that causes death or serious injury.

⚠ WARNING

Wiring and inspections must be performed only by qualified engineers.

If work is performed by a worker who is not a qualified engineer, there is a risk of fire or electric shock that causes death or serious injury.

Check all wiring and power supplies carefully.

Incorrect wiring or incorrect voltage application to the output circuits may cause short-circuit failures. If this failure occurs, there is a risk of fire that causes death or serious injury. There is also a risk of equipment and product damage because the holding brake may fail to operate properly.

Always use the specified terminals to connect the SERVOPACK and peripheral devices. For the power supply in particular, confirm that the connections are made to the terminals shown below.

200-V power supply input SERVOPACK:

- **AC power supply: L1, L2, L3, L1C, L2C terminals on the SERVOPACK**
- **DC power supply: B1/⊕, ⊖2, L1C, L2C terminals on the SERVOPACK**

400-V power supply input SERVOPACK:

- **AC power supply: L1, L2, L3 terminals on the SERVOPACK**
- **DC power supply: B1/⊕, ⊖2 terminals on the SERVOPACK**
- **24-VDC control power supply: 24-V and 0-V terminals (same whether the main circuit power supply wiring is an AC power supply or a DC power supply)**

Refer to "Terminal Symbols and Terminal Names" in the product manual for your SERVOPACK for details on terminals.

If you ignore these precautions, there is a risk of equipment failure or product failure due to fire. There is also a risk of fire that causes death or serious injury.

If you use a SERVOPACK with the dynamic brake hardware option, connect an external dynamic brake resistor that is suitable for the machine and equipment specifications to the specified terminals.

There is a risk of equipment damage due to unintended machine operation during an emergency stop. There is also a risk of injury or fire that causes death or serious injury.

⚠ WARNING

Observe the precautions and instructions for wiring and trial operation precisely as described in "Wiring" and "Holding Brake" in the product manual for your SERVOPACK.

If a mistake is made in wiring or trial operation, there is a risk of product failure due to incorrect wiring or incorrect voltage application in the brake circuit. A fire or electric shock may also occur resulting in death or serious injury. Additionally, there is a risk of death or serious injury due to unexpected machine operation.

Check the wiring to be sure it has been performed correctly. Connectors and pin layouts may vary depending on the model. Always confirm the pin layout examples in the chapter related to pin layouts in the product manual for your model.

If the wiring is not performed correctly, there is a risk of product failure. There is also a risk of fire or electric shock that causes death or serious injury. Additionally, there is a risk of death or serious injury due to unexpected machine operation.

Connect wires to main circuit terminals and motor connection terminals securely with the specified methods and tightening torque. Refer to "SERVOPACK Main Circuit Wires" in the peripheral selection manual for your SERVOPACK for the specified methods and tightening torque.

Insufficient tightening may cause wires and terminal blocks to generate heat due to poor contact, possibly resulting in product failure. There is also a risk of fire that causes death or serious injury.

Make sure the cables do not exceed the following lengths:

- **SERVOPACK I/O signal cable: 3 m max.**
- **ASM-X I/O signal cable: 5 m max.**
- **Servomotor main circuit cable: 50 m max.**
- **Encoder cable: 50 m max.**
- **Control power supply cable for 400-V power supply input SERVOPACK (+24 V and 0 V): 10 m max.**

If a cable is longer than the specified length, there is a risk of equipment damage due to product malfunction that causes death or serious injury. There is also a risk of electric shock due to a short circuit or ground fault that causes death or serious injury.

Observe the following precautions when wiring the SERVOPACK's main circuit terminals.

- **Turn ON the power to the SERVOPACK only after all wiring, including the main circuit terminals, has been completed.**
- **If a connector is used for the main circuit terminals, remove the main circuit connector from the SERVOPACK before you wire it.**
- **Insert only one wire per insertion hole in the main circuit terminals.**
- **When you insert a wire, make sure that the conductor wire (e.g., whiskers) does not come into contact with adjacent wires and cause a short-circuit.**

If the SERVOPACK power is turned ON with incorrect wiring, there is a risk of fire due to electric shock or product failure that causes death or serious injury.

Install molded-case circuit breakers and other safety measures to provide protection against short circuits in external wiring.

There is a risk of fire or electric shock due to product failure that causes death or serious injury.

Install a battery at either the host controller or on the encoder cable.

If you install batteries both at the host controller and on the encoder cable at the same time, you will create a loop circuit between the batteries, and this may result in a fire from product failure or damage that causes death or serious injury.

When connecting a battery, connect the polarity correctly.

There is a risk of encoder failure if the battery ruptures and a risk of fire that causes death or serious injury.

⚠ CAUTION

Use shielded twisted-pair cables or shielded multi-core twisted-pair cables for I/O signal cables and encoder cables.

There is a risk of injury from product malfunction.

NOTICE

Use the cables specified by Yaskawa. If you use any other cables, confirm the rated current and application environment of your model and use the wiring materials specified by Yaskawa or equivalent materials. Refer to the peripheral selection manual for your SERVOPACK for Yaskawa-specified cables and wiring materials.

Securely tighten connector screws and lock mechanisms.

Insufficient tightening may result in connectors falling off during operation.

Pay careful attention to the following points when wiring power lines (e.g., the main circuit cable) and signal lines (e.g., the I/O signal cables or encoder cables).

- **Do not bundle power lines and signal lines together or run them through the same duct.**
- **Do not route power lines and signal lines in parallel. Separate them as much as possible by using different routing paths or other suitable measures.**

There is a risk that the product may not function correctly due to the effects of noise on signal lines.

(6) Operation Precautions

⚠ WARNING

Before starting operation with a machine connected, configure the settings of the switches and parameters to match the machine. Always check the settings of the switches and parameters in this manual.

If operation is performed without configuring the settings, there is a risk of equipment damage and death or serious injury due to unexpected machine operation.

Do not significantly change the settings of the parameters.

There is a risk of equipment damage and death or serious injury due to unexpected machine operation.

Install safety equipment (e.g., limit switches or stoppers) in an appropriate manner at the ends of the moving parts of the machine to prevent unexpected accidents.

If safety equipment is not installed in an appropriate manner, there is a risk of equipment damage and death or serious injury due to unexpected machine operation.

For trial operation, securely mount the servomotor and disconnect it from the machine.

There is a risk of equipment damage and death or serious injury due to unexpected machine operation.

Forced stops for overtravel is disabled when the Jog, Origin Search, or Easy FFT utility function is executed. Ensure that appropriate safety measures are in place around moving parts.

There is a risk of equipment damage and death or serious injury due to unexpected machine operation.

When an alarm occurs, the servomotor will coast to a stop or stop with the dynamic brake according to the SERVOPACK option and settings. The coasting distance will change with the moment of inertia of the load and the external dynamic brake resistance. Check the coasting distance during trial operation and implement suitable safety measures on the machine.

Refer to the product manual for your SERVOPACK for the specifications of SERVOPACK options.

There is a risk of equipment damage and death or serious injury due to unexpected machine operation.

⚠ WARNING

Do not enter the machine's range of motion during operation.

There is a risk of death or serious injury from entrapment or the machine making contact with your body due to unexpected equipment or system operation.

Do not touch the moving parts of the servomotor or machine during operation.

There is a risk of death or serious injury from entrapment or the machine making contact with your body due to unexpected equipment or system operation.

Perform the correct operation with the servomotor connected to the machine.

There is a risk of equipment damage or product damage. There is also a risk of fire that causes death or serious injury.

Design the system to ensure safety even when problems, such as broken signal lines, occur. For example, the SERVOPACK's P-OT (Forward Drive Prohibit Input) and N-OT (Reverse Drive Prohibit Input) signals are set in the default settings to operate on the safe side if a signal line breaks. Do not change the polarity of this type of signal. Refer to "Overtravel Function and Settings" in the product manual for your SERVOPACK for the P-OT and N-OT signals.

If there is poor contact or a cable break occurs when safety is neglected or the signal polarities are changed, there is a risk of equipment damage because the SERVOPACK will not stop when the P-OT and N-OT signals are input. There is also a risk of death or serious injury due to unexpected machine operation.

When overtravel occurs, the power to the motor is turned OFF and the brake is released. If you use the servomotor to drive a vertical load, set the servomotor to enter a zero-clamped state after the servomotor stops. Also, install safety devices (such as an external brake or counterweight) to prevent the moving parts of the machine from falling.

There is a risk of equipment damage and death or serious injury due to the moving parts of the machine falling.

Use the dynamic brake only for emergency stop applications.

If used for any other applications, there is a risk of rapid deterioration of internal components in the SERVOPACK as well as equipment or product damage. There is also a risk of fire that causes death or serious injury.

In the following situations, use the SigmaWin+ to back up the settings of the SERVOPACK parameters, and then apply the backed up parameter settings after the SERVOPACK is replaced.

- **Before replacement or shipment when shipping a SERVOPACK to Yaskawa for SERVOPACK or part replacement**
- **After you complete tuning and trial operation of the machine and facilities**

Refer to the SigmaWin+ Operation Manual for saving parameter settings to a file and applying saved parameter settings.

If you fail to perform these operations, the SERVOPACK may not operate normally after replacement or after trial operation, and there is a risk of equipment damage. There is also a risk of death or serious injury due to unexpected machine operation.

NOTICE

Always turn OFF the servo before you turn OFF the power. If you turn OFF the main circuit power or control power during operation before you turn OFF the servo, the servomotor stopping method will be executed as follows regardless of the stopping method set in the parameter.

- **If you turn OFF the main circuit power during operation without turning OFF the servo, the servomotor will stop abruptly with the dynamic brake.**
- **If you turn OFF the control power without turning OFF the servo, the stopping method that is used by the servomotor depends on the model of the SERVOPACK. For details, refer to the manual for your SERVOPACK.**
- **If you use a SERVOPACK with the dynamic brake hardware option, the servomotor stopping methods will be different from the stopping methods used without the option or with other hardware options. For details, refer to the manual for your SERVOPACK.**

Depending on the usage conditions of the servomotor, there is a risk of equipment damage.

When you adjust the gain during system commissioning, use a measuring instrument to monitor the torque waveform and speed waveform and confirm that there is no vibration.

If a high gain causes vibration, the servomotor will be damaged quickly.

Do not frequently turn the power ON and OFF. After you have started actual operation, allow at least one hour between turning the power ON and OFF (for reference only). Do not use the product in applications that require the power to be turned ON and OFF frequently.

Frequently turning the power ON and OFF may rapidly deteriorate internal components in the SERVOPACK or cause the product to fail.

An alarm or warning may occur if communications are performed with the host controller while the SigmaWin+ or digital operator is operating.

If an alarm or warning occurs, it may interrupt the current process and stop the system.

(7) Maintenance and Inspection Precautions

⚠ DANGER

Do not change any wiring while power is being supplied.

There is a risk of equipment damage or product failure. There is also a risk of fire or electric shock that causes death or serious injury. Additionally, there is a risk of death or serious injury due to unexpected machine operation.

Wait for at least 20 minutes (or 100 minutes when using DC power supply input) after turning OFF the power and then make sure that the CHARGE indicator is not lit before starting wiring or inspection work. Do not touch the main circuit terminals while the CHARGE indicator is lit because high voltage may still remain in the SERVOPACK even after turning OFF the power.

There is a risk of electric shock that causes death or serious injury.

⚠ WARNING

Wiring and inspections must be performed only by qualified engineers.

If work is performed by a worker who is not a qualified engineer, there is a risk of fire or electric shock that causes death or serious injury.

When shipping a SERVOPACK to Yaskawa for SERVOPACK or part replacement, use the SigmaWin+ to back up the settings of the SERVOPACK parameters. Apply the backed up parameter settings before using the replaced SERVOPACK. Refer to the SigmaWin+ Operation Manual for saving parameter settings to a file and applying saved parameter settings.

The parameters of any SERVOPACKs that are sent to Yaskawa for part replacement are reset to the factory settings before they are returned to you. If you fail to perform these operations, there is a risk of equipment damage and death or serious injury due to unexpected machine operation.

NOTICE

Discharge all static electricity from your body before you operate any of the buttons or switches inside the front cover of the SERVOPACK.

There is a risk of equipment damage or product failure.

(8) Troubleshooting Precautions

⚠ DANGER

If the safety device (molded-case circuit breaker or fuse) installed in the power line operates, repair or replace the SERVOPACK, check the wiring, and remove the factor that caused the safety device to operate. After you confirm that the factor was removed, supply power to the SERVOPACK.

There is a risk of equipment damage or product failure. There is also a risk of fire or electric shock that causes death or serious injury. Additionally, there is a risk of death or serious injury due to unexpected machine operation.

⚠ WARNING

The product may suddenly start to operate when the power supply is recovered after a momentary power interruption. Design the machine to ensure human safety when operation restarts.

There is a risk of equipment damage and death or serious injury due to unexpected machine operation.

When an alarm occurs, remove the cause of the alarm and ensure safety. Then reset the alarm or turn the power OFF and ON again to restart operation.

There is a risk of equipment damage or product failure. There is also a risk of injury, fire, or electric shock that causes death or serious injury.

If the Servo ON signal is input to the SERVOPACK and an alarm is reset, the servomotor may suddenly restart operation. Make sure to confirm that the servo is OFF and ensure safety before you reset an alarm.

There is a risk of equipment damage and death or serious injury due to unexpected machine operation.

Always insert a magnetic contactor in the line between the main circuit power supply and the main circuit terminals on the SERVOPACK so that the power can be turned OFF at the main circuit power supply.

There is a risk of fire due to internal component failure in the SERVOPACK that causes death or serious injury.

⚠ WARNING

If an alarm occurs, turn OFF the main circuit power supply.

There is a risk of fire and death or serious injury due to a regenerative resistor overheating as the result of regenerative transistor failure.

Install a ground fault detector against overloads and short-circuiting or install a molded-case circuit breaker combined with a ground fault detector.

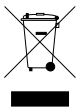
If a ground fault occurs, there is a risk of injury, fire, or electric shock due to SERVOPACK failure that causes death or serious injury.

The holding brake alone on a servomotor will not ensure safety if there is the possibility that an external force (including gravity) may move the current position and create a hazardous situation when power is interrupted or an error occurs. To ensure safety, make sure to install an external braking mechanism.

There is a risk of equipment damage and death or serious injury due to unexpected machine operation.

(9) Disposal Precautions

- Correctly discard the product as stipulated by regional, local, and municipal laws and regulations. Be sure to include these contents in all labelling and warning notifications on the final product as necessary.



(10) General Precautions

- Figures provided in this manual are typical examples or conceptual representations. There may be differences between them and actual wiring, circuits, and products.
- The products shown in illustrations in this manual are sometimes shown with their covers or protective guards removed to illustrate detail. Always replace all covers and protective guards before you use the product.
- If you need a new copy of this manual because it has been lost or damaged, contact your nearest Yaskawa representative or one of the offices listed on the back of this manual.
- This manual is subject to change without notice for product improvements, specifications changes, and improvements to the manual itself. We will update the manual number of the manual and issue revisions when changes are made.
- Any and all quality guarantees provided by Yaskawa are null and void if the customer modifies the product in any way. Yaskawa disavows any responsibility for damages or losses that are caused by modified products.

i.9 Warranty

i.9.1 Details of Warranty

(1) Warranty Period

The warranty period for a product that was purchased (hereinafter called the “delivered product”) is one year from the time of delivery to the location specified by the customer or 18 months from the time of shipment from the Yaskawa factory, whichever is sooner.

(2) Warranty Scope

Yaskawa shall replace or repair a defective product free of charge if a defect attributable to Yaskawa occurs during the above warranty period. This warranty does not cover defects caused by the delivered product reaching the end of its service life and replacement of parts that require replacement or that have a limited service life.

This warranty does not cover failures that result from any of the following causes.

- Improper handling, abuse, or use in unsuitable conditions or in environments not described in product catalogs or manuals, or in any separately agreed-upon specifications
- Causes not attributable to the delivered product itself
- Modifications or repairs not performed by Yaskawa
- Use of the delivered product in a manner in which it was not originally intended
- Causes that were not foreseeable with the scientific and technological understanding at the time of shipment from Yaskawa
- Events for which Yaskawa is not responsible, such as natural or human-made disasters

i.9.2 Limitations of Liability

- Yaskawa shall in no event be responsible for any damage or loss of opportunity to the customer that arises due to failure of the delivered product.
- Yaskawa shall not be responsible for any programs (including parameter settings) or the results of program execution of the programs provided by the user or by a third party for use with programmable Yaskawa products.
- The information described in product catalogs or manuals is provided for the purpose of the customer purchasing the appropriate product for the intended application. The use thereof does not guarantee that there are no infringements of intellectual property rights or other proprietary rights of Yaskawa or third parties, nor does it construe a license.
- Yaskawa shall not be responsible for any damage arising from infringements of intellectual property rights or other proprietary rights of third parties as a result of using the information described in catalogs or manuals.

i.9.3 Suitability for Use

- It is the customer’s responsibility to confirm conformity with any standards, codes, or regulations that apply if the Yaskawa product is used in combination with any other products.
- The customer must confirm that the Yaskawa product is suitable for the systems, machines, and equipment used by the customer.
- Consult with Yaskawa to determine whether use in the following applications is acceptable. If use in the application is acceptable, use the product with extra allowance in ratings and specifications, and provide safety measures to minimize hazards in the event of failure.
  - Outdoor use, use involving potential chemical contamination or electrical interference, or use in conditions or environments not described in product catalogs or manuals

  - Nuclear energy control systems, combustion systems, railroad systems, aviation systems, vehicle systems, medical equipment, amusement machines, and installations subject to separate industry or government regulations
  - Systems, machines, and equipment that may present a risk to life or property
  - Systems that require a high degree of reliability, such as systems that supply gas, water, or electricity, or systems that operate continuously 24 hours a day
  - Other systems that require a similar high degree of safety
- Never use the product for an application involving serious risk to life or property without first ensuring that the system is designed to secure the required level of safety with risk warnings and redundancy, and that the Yaskawa product is properly rated and installed.
- The circuit examples and other application examples described in product catalogs and manuals are for reference. Check the functionality and safety of the actual devices and equipment to be used before using the product.
- Read and understand all use prohibitions and precautions, and operate the Yaskawa product correctly to prevent accidental harm to third parties.

i.9.4 Specifications Change

The names, specifications, appearance, and accessories of products in product catalogs and manuals may be changed at any time based on improvements and other reasons. The next editions of the revised catalogs or manuals will be published with updated code numbers. Consult with your Yaskawa representative to confirm the actual specifications before purchasing a product.

i.10 Compliance with UL Standards, EU Directives, and Other Safety Standards

Certification marks for the standards for which the product has been certified by certification bodies are shown on nameplate. Products that do not have the marks are not certified for the standards.

Refer to the servomotor manual for compliant standards of servomotors.

i.10.1 North American Safety Standards (UL)

Product	Model	North American Safety Standards (UL File No.)
SERVOPACK	SGDXS	UL 61800-5-1 (E147823) CSA C22.2 No. 274

Note:

The applicable standards for when the ASM-X is mounted to a SERVOPACK with EtherCAT communications references.

i.10.2 EU Directives

Product	Model	EU Directives	Harmonized Standards
SERVOPACK	SGDXS	Machinery Directive 2006/42/EC	EN ISO 13849-1 (PL e (Category 3)) EN 62061 (Maximum SIL3) EN 61800-5-2 (SIL 3)
		EMC Directive 2014/30/EU	EN 55011 (group 1, class A) EN 61000-6-2 EN 61000-6-4 EN 61800-3 (Category C2, Second environment)
		Low Voltage Directive 2014/35/EU	EN 61800-5-1
		RoHS Directive 2011/65/EU	EN IEC 63000
		WEEE Directive 2012/19/EU	-

Note:

- We declared the CE Marking based on the harmonized standards in the above table. These products complied with the corresponding IEC standards. Refer to the declaration of conformity for details.
- These products are for industrial use. In home environments, these products may cause electromagnetic interference and additional noise reduction measures may be necessary.
- The applicable standards for when the ASM-X is mounted to a SERVOPACK with EtherCAT communications references.

i.10.3 Safety Standards

Product	Model	Standards
SERVOPACK	SGDXS	EN ISO 13849-1 EN IEC 62061 EN 61800-5-2 EN 61000-6-7 EN 61326-3-1 EN 61508 series

Note:

• These products complied with the corresponding IEC standards. Refer to the declaration of conformity for details.

• The applicable standards for when the ASM-X is mounted to a SERVOPACK with EtherCAT communications references.

- Safety Parameters

Item	Standards	Performance Level
Safety Integrity Level	IEC 61508	SIL3 *1*
	IEC 62061	Maximum SIL3 *1*
Mission Time	IEC 61508	20 years
Probability of Dangerous Failure per Hour	IEC 61508 IEC 62061	PFH = 22.90 × 10^{-9} [1/h] (22.90% of SIL3) *2* PFH = 22.78 × 10^{-9} [1/h] (22.78% of SIL3) *3* PFH = 29.47 × 10^{-9} [1/h] (29.47% of SIL3) *4* PFH = 29.35 × 10^{-9} [1/h] (29.35% of SIL3) *5* PFH = 5.57 × 10^{-8} [1/h] (5.57% of SIL2) *6* PFH = 7.72 × 10^{-8} [1/h] (7.72% of SIL2) *7* PFH = 8.01 × 10^{-8} [1/h] (8.01% of SIL2) *8* PFH = 6.23 × 10^{-8} [1/h] (6.23% of SIL2) *9* PFH = 8.38 × 10^{-8} [1/h] (8.38% of SIL2) *10* PFH = 8.67 × 10^{-8} [1/h] (8.67% of SIL2) *11*
Performance Level	EN ISO 13849-1	PL e (Category 3) *1*
Mean Time to Dangerous Failure of Each Channel	EN ISO 13849-1	MTTFd: High
Average Diagnostic Coverage	EN ISO 13849-1	DCavg: Medium
Stop Category	IEC 60204-1	Stop category 0/1/2
Safety Function	IEC 61800-5-2	STO, SS1-r, SS1-t, SS2-r, SS2-t, SOS, SLS, SLA, SSR, SSM, SBC, SLP, SLI, SDI-p, SDI-n, SCA
Hardware Fault Tolerance	IEC 61508	HFT = 1
Subsystem	IEC 61508	B

*1 The performance level depends on the servomotor that is used with the SERVOPACK. Refer to the following section for details.
☞ *1.6.2 Servomotor Combinations on page 58*
*2 SGDXS-OSAA0A + Σ-XS SERVOPACK + servomotor (batteryless encoder with functional safety)
*3 SGDXS-OSAA0A + Σ-XS SERVOPACK + servomotor (encoder with functional safety and battery)
*4 SGDXS-OSAA1A + Σ-XS SERVOPACK + servomotor (batteryless encoder with functional safety)
*5 SGDXS-OSAA1A + Σ-XS SERVOPACK + servomotor (encoder with functional safety and battery)
*6 SGDXS-OSAA0A + Σ-XS SERVOPACK + servomotor (batteryless encoder)
*7 SGDXS-OSAA0A + Σ-XS SERVOPACK + servomotor (encoder with battery)
*8 SGDXS-OSAA0A + Σ-XS SERVOPACK + servomotor (compact batteryless encoder)
*9 SGDXS-OSAA1A + Σ-XS SERVOPACK + servomotor (batteryless encoder)
*10 SGDXS-OSAA1A + Σ-XS SERVOPACK + servomotor (encoder with battery)
*11 SGDXS-OSAA1A + Σ-XS SERVOPACK + servomotor (compact batteryless encoder)

Note:

Mission time is a parameter used in the statistic calculation required by functional safety standards. Mission time is not related to the warranty period.

1

Basic Information on the ASM-X

This chapter provides information on SERVOPACK models and servomotor combinations that allow ASM-X operation.

1.1 Introduction to the ASM-X 50

1.2 Checking the Product at Delivery 51

1.2.1 ASM-X 51

1.2.2 Option Case Kit 52

1.2.3 I/O Connector 53

1.3 Interpreting the Nameplate 54

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1.6.1 SERVOPACK Combinations 58

1.6.2 Servomotor Combinations 58

1.7 Functions 60

1.1 Introduction to the ASM-X

The ASM-X is a safety option module for Σ-X-series SERVOPACKs that is equipped with safety functions to monitor the position, speed, and acceleration of a servomotor. Its key features are listed below.

- A maximum of 10 *1 safety functions can be executed at the same time, which allows executing different types of safety functions at the same time, and switching the monitoring threshold between safety functions of the same type.
  *1 Eleven safety functions can be executed when the HWBB in the SERVOPACK is used at the same time.
- There are safe output signals that can control the power supply for the brake in the servomotor when combined with safety relays.
- The safety functions in the ASM-X can be started using FSoE communications.

1.2 Checking the Product at Delivery

This product is packed with the components listed below. Check the product when it is delivered.

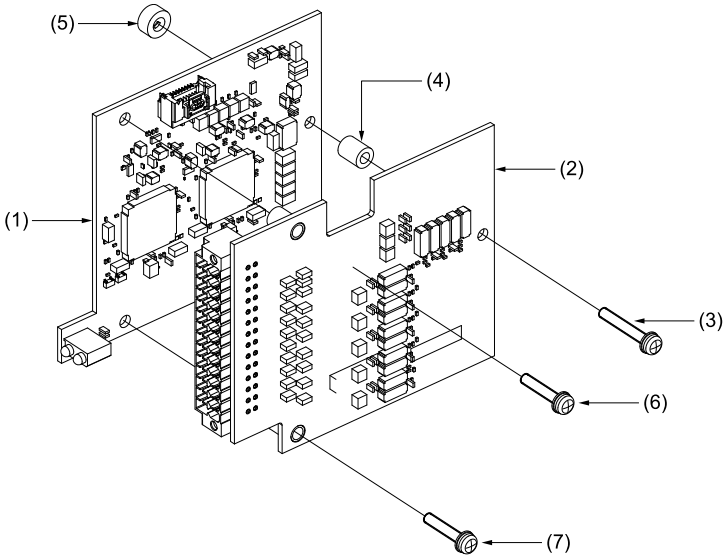
- ASM-X
- I/O connector (FSoE communications references and digital I/O model only)
- Nameplate

Refer to the included ASM-X Installation Guide for mounting the ASM-X on a SERVOPACK.

> Important
>
> The option case kit is not included as an accessory. Purchase the option case kit separately.

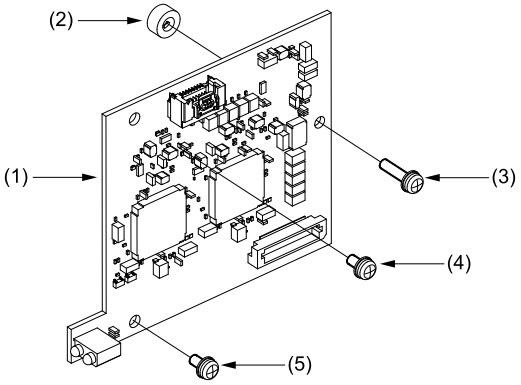
1.2.1 ASM-X

(1) FSoE Communications References and Digital I/O Model (SGDXS-OSAA1A)



No.	Name	Description
1	CPU board	–
2	I/O board	–
3	Joint screw for boards	M3×20 mm, 1 screw
4	Spacer (long)	White, 5 mm
5	Spacer (short)	Gray, 3 mm
6	Mounting plate set screw	M3×16 mm, 1 screw
7	Mounting plate set screw	M3×16 mm, 1 screw

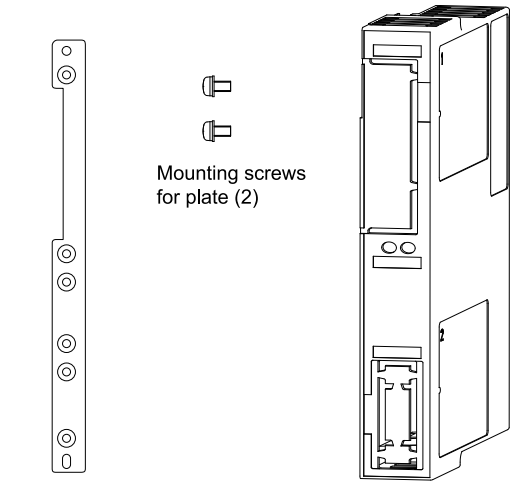
(2) FSoE Communications References Model (SGDXS-OSAA0A)



No.	Name	Description
1	CPU board	–
2	Spacer (short)	Gray, 3 mm
3	Joint screw for boards	M3×12 mm, 1 screw
4	Mounting plate set screw	M3×6 mm, 1 screw
5	Mounting plate set screw	M3×6 mm, 1 screw

1.2.2 Option Case Kit

Name: Option case kit
Model: SGDXS-OZA01A



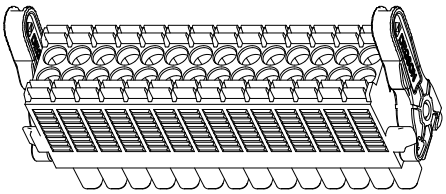
1.2.3 I/O Connector

Name: Plug

Model: 15EDGKNHG-3.5-28P-14-00A(H)

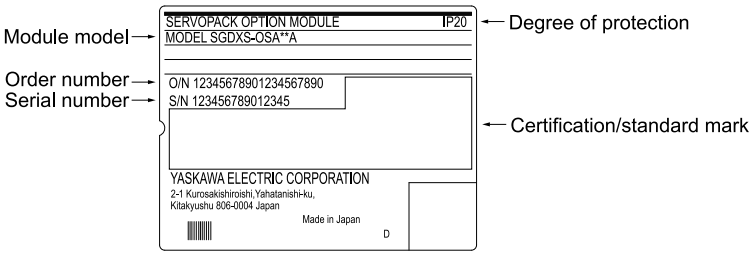
Manufacturer: NINGBO DEGSON ELECTRICAL CO., LTD.

Number of pins: 28

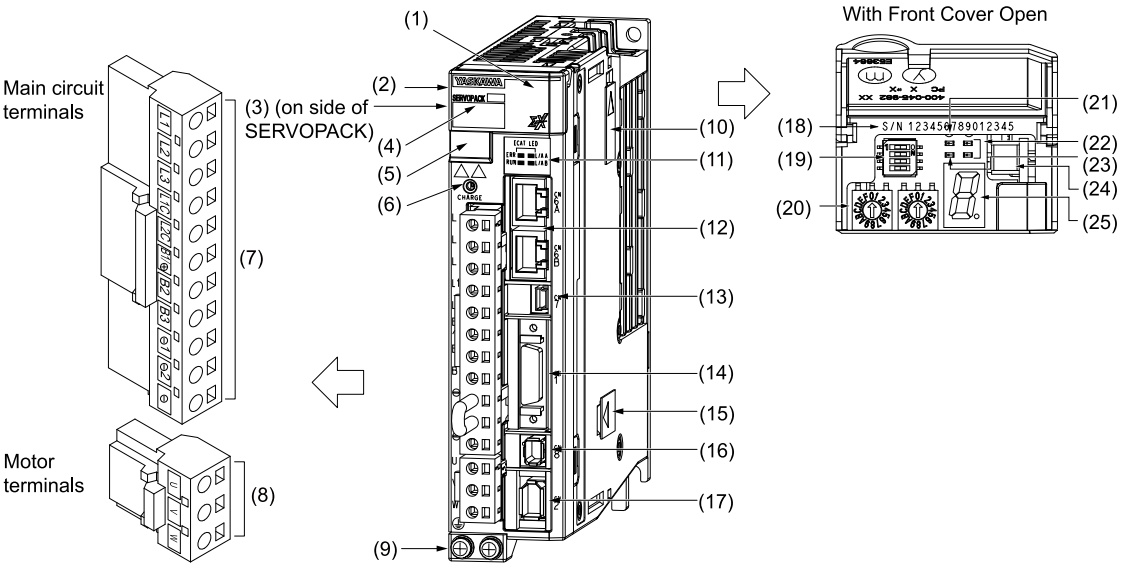


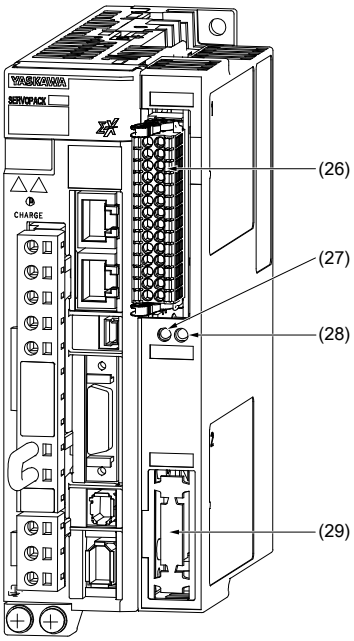
1.3 Interpreting the Nameplate

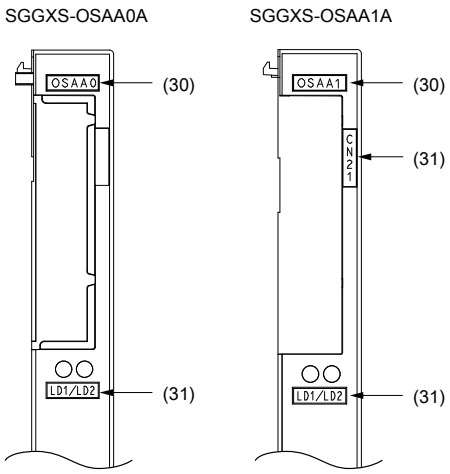
The following basic information is provided on the nameplate.



1.4 Part Names







No.	Name	Description	Reference
(1)	Front cover	–	–
(2)	Input voltage	–	–
(3)	Nameplate	Indicates the SERVOPACK model and ratings.	–
(4)	Model	The model of the SERVOPACK.	–
(5)	QR code	The QR code that is used by the MechatroCloud service.	–
(6)	CHARGE	Lits while the main circuit power is being supplied. **Note:** Even if you turn OFF the main circuit power supply, this indicator will be lit as long as the internal capacitor remains charged. Do not touch the main circuit or motor terminals while this indicator is lit. There is a risk of electric shock.	–
(7)	Main circuit terminals	The terminals depend on the main circuit power supply input specifications of the SERVOPACK.	–

Continued on next page.

Continued from previous page.

No.	Name		Description	Reference
(8)	Servomotor terminals (U, V, and W)		The connection terminals for the servomotor main circuit cable (power line).	–
(9)	Ground terminals (⏚)		The ground terminals to prevent electric shock. Always connect this terminal.	–
(10)	Safety option module connector (CN11)		Connects to a safety option module (currently in development).	–
(11)	Communications LED indicator array		Displays the LED indicator array for EtherCAT communications inside the front cover.	–
(12)	EtherCAT communications connectors (ETHERCAT IN: CN6A, ETHERCAT OUT: CN6B)		Connects to EtherCAT devices.	–
(13)	Computer connector (CN7)		A USB connector to connect a personal computer. The digital operator can also be connected.	–
(14)	I/O signal connector (CN1)		Connects to sequence I/O signals.	–
(15)	Feedback option module connector (CN12)		Connects to a feedback option module.	–
(16)	Safety connector (CN8)		Connects to a safety function device.	–
(17)	Connector for encoder cable (CN2)		This connector is used for the following purposes. • Rotary servomotor: Connects to the encoder in the servomotor. • Connects to Σ-LINK II-compatible sensors and the Σ-LINK II sensor hub.	–
(18)	Serial number		–	–
(19)	DIP switch (S3)		Not used.	–
(20)	ID selector (S1, S2)		This switch is used for identification of the EtherCAT SubDevice.	–
(21)	Communications indicators	ERR	Shows the error status of EtherCAT communications.	–
(22)		L/A A	Shows whether the communications cable is connected to the CN6A connector and whether communications are active.	
		L/A B	Shows whether the communications cable is connected to the CN6B connector and whether communications are active.	
(23)		RUN	Shows the status of EtherCAT communications.	
(24)	Analog monitor connector (CN5)		You can use a special cable (peripheral device) to monitor the motor speed, torque reference, or other values.	–
(25)	Panel display		Displays the servo status with a seven-segment LED.	–
(26)	I/O signal connector (CN21)		Used to monitor the execution of safety functions and the status of the ASM-X.	87
(27)	LED indicator (red)		Shows the status of the ASM-X in combination with the LED indicator (green).	62
(28)	LED indicator (green)		Shows the status of the ASM-X in combination with the LED indicator (red).	62
(29)	External encoder connector (CN31)		Used for fully-closed loop control. This connector is not used with the safety functions.	–
(30)	Nameplate (model)		The nameplate of the ASM-X.	–
(31)	Device label		–	–

1.5 Interpreting Model Numbers

This section describes how to interpret ASM-X model numbers.

SGDXS - OSA A1 A

Σ-X-Series
Σ-XS model

1st+2nd+3rd digits

4th+5th digits

6th digit

1st+2nd+3rd digits Option Module Type

Code	Specification
OSA	Safety option

4th+5th digits Interface

Code	Specification
A0	FSoE (Safety over EtherCAT) communications references
A1	FSoE communications references and digital I/O

6th digit Design Revision Order

A

1.6 Applicable Device Combinations

The following lists give the SERVOPACKs and rotary servomotors that can be combined with the ASM-X.

1.6.1 SERVOPACK Combinations

SERVOPACK Model	
SERVOPACK with EtherCAT communications references	SGDXS-□□□AA0A

Note:

If the ASM-X is combined with a SERVOPACK not listed above, alarm A.EC3 (Safety Module - Unsupported SERVOPACK) will occur.

Combinations of ASM-X and SERVOPACK Software Versions

Depending on the combination of ASM-X and SERVOPACK software versions, there are restrictions on the safety functions that you can use.

- When an Encoder with Functional Safety Is Connected

SERVOPACK Software Version	ASM-X Software Version	
	Version 0001, Version 0002	Version 0003 or Later
Version 0011 to 0017	STO, SS1-r, SS1-t, SS2-r, SS2-t, SOS, SLS, SLA, SSR, SSM, SBC	STO, SS1-r, SS1-t, SS2-r, SS2-t, SOS, SLS, SLA, SSR, SSM, SBC, SDI-p, SDI-n, SLI, SLP *1*, SCA *1*, SHP *1*
Version 0018 or later		STO, SS1-r, SS1-t, SS2-r, SS2-t, SOS, SLS, SLA, SSR, SSM, SBC, SDI-p, SDI-n, SLI, SLP, SCA, SHP

*1 When Pc068 is set to n.0□□□ (Use encoder as an incremental encoder), certain monitoring functions with the SigmaWin+ are limited.

- When a Normal Encoder Is Connected

SERVOPACK Software Version	ASM-X Software Version	
	Version 0001, Version 0002	Version 0003 or Later
Version 0011 to 0017	STO, SS1-t, SBC	STO, SS1-t, SBC
Version 0018 or later		STO, SS1-r, SS1-t, SS2-r, SS2-t, SOS, SLS, SLA, SSR, SSM, SBC, SDI-p, SDI-n, SLI, SLP, SCA, SHP

1.6.2 Servomotor Combinations

Type	Possible Servomotor Model Combinations	Compatible ASM-X Software Version
Σ-X-series rotary servomotor and encoder with functional safety	SGMXJ-□□□□□□□□3 (standard specification with functional safety) SGMXJ-□□□□□□□□4 (Σ-7-compatible specification with functional safety) SGMXA-□□□□□□□□3 (standard specification with functional safety) SGMXA-□□□□□□□□4 (Σ-7-compatible specification with functional safety) SGMXP-□□□□□□□□3 (standard specification with functional safety) SGMXP-□□□□□□□□4 (Σ-7-compatible specification with functional safety) SGMXG-□□□□□□□□3 (standard specification with functional safety) SGMXG-□□□□□□□□4 (Σ-7-compatible specification with functional safety)	Refer to the following section. ☞ *1.6.1 SERVOPACK Combinations on page 58*
Σ-X-series rotary servomotor and normal encoder	SGMX□-□□□U□□□□2 (Σ-7-compatible specification) SGMX□-□□□W□□□□2 (Σ-7-compatible specification) SGMX□-□□□H□□□□2 (Σ-7-compatible specification)	

Note:

Servomotors other than those listed above (e.g., direct drive servomotors and linear servomotors) can use only the STO, SS1-t, and SBC functions.

The safety performance level of the safety functions depends on your servomotor and encoder.

Safety Function	Σ-X-Series Rotary Servomotor and Encoder with Functional Safety	Σ-X-Series Rotary Servomotor and Normal Encoder	Servomotor Other than Those Listed to Left (E.g., Direct Drive Servomotor and Linear Servomotor)
STO	SIL3, PL e (Category 3)	SIL3, PL e (Category 3)	SIL3, PL e (Category 3)
SS1-r	SIL3, PL e (Category 3)	SIL2, PL d (Category 2)	Invalid combination *1
SS1-t	SIL3, PL e (Category 3)	SIL3, PL e (Category 3)	SIL3, PL e (Category 3)
SS2-r	SIL3, PL e (Category 3)	SIL2, PL d (Category 2)	Invalid combination *1
SS2-t	SIL3, PL e (Category 3)	SIL2, PL d (Category 2)	Invalid combination *1
SOS	SIL3, PL e (Category 3)	SIL2, PL d (Category 2)	Invalid combination *1
SLA	SIL3, PL e (Category 3)	SIL2, PL d (Category 2)	Invalid combination *1
SLS	SIL3, PL e (Category 3)	SIL2, PL d (Category 2)	Invalid combination *1
SSR	SIL3, PL e (Category 3)	SIL2, PL d (Category 2)	Invalid combination *1
SLP	SIL3, PL e (Category 3)	SIL2, PL d (Category 2)	Invalid combination *1
SLI	SIL3, PL e (Category 3)	SIL2, PL d (Category 2)	Invalid combination *1
SDI-p	SIL3, PL e (Category 3)	SIL2, PL d (Category 2)	Invalid combination *1
SDI-n	SIL3, PL e (Category 3)	SIL2, PL d (Category 2)	Invalid combination *1
SCA	SIL3, PL e (Category 3)	SIL2, PL d (Category 2)	Invalid combination *1
SSM	SIL3, PL e (Category 3)	SIL2, PL d (Category 2)	Invalid combination *1
SBC	SIL3, PL e (Category 3)	SIL3, PL e (Category 3)	SIL3, PL e (Category 3)
SHP	SIL3, PL e (Category 3)	SIL2, PL d (Category 2)	Invalid combination *1

*1 Even if an alarm does not occur when devices are combined, this combination cannot be used.

1.7 Functions

This section lists the safety functions in the ASM-X.

Abbreviation	Name	Overview of Functions	Remarks
STO	Safe Torque OFF	This function shuts OFF the power to the servomotor by blocking the base drive signal in the SERVOPACK.	Conforms to EN 61800-5-2
SS1-r	Safe Stop 1 Ramp Monitored	This function monitors servomotor deceleration. This function executes the STO function after the set time has elapsed. If the speed during deceleration exceeds the set value, it executes the STO function even within the set time.	Conforms to EN 61800-5-2
SS1-t	Safe Stop 1 Time Controlled	This function executes the STO function after the set time has elapsed.	Conforms to EN 61800-5-2
SS2-r	Safe Stop 2 Ramp Monitored	This function monitors servomotor deceleration. This function executes the SOS function after the set time has elapsed. If the speed during deceleration exceeds the set value, it executes the STO function even within the set time.	Conforms to EN 61800-5-2
SS2-t	Safe Stop 2 Time Controlled	This function executes the SOS function after the set time has elapsed.	Conforms to EN 61800-5-2
SOS	Safe Operating Stop	This function monitors the position of the servomotor to ensure it is within the setting range based on the position when SRIS was turned ON. If outside that range, it executes the STO function.	Conforms to EN 61800-5-2
SLS	Safely-Limited Speed	This function monitors the speed of the servomotor to ensure it does not exceed the specified upper limit value. If outside that range, it executes the STO function.	Conforms to EN 61800-5-2
SLA	Safely-Limited Acceleration	This function monitors the acceleration of the servomotor to ensure it is within the setting range. If outside that range, it executes the STO function.	Conforms to EN 61800-5-2
SSR	Safe Speed Range	This function monitors the speed of the servomotor to ensure it is within the range of the specified upper and lower limit values. If outside that range, it executes the STO function.	Conforms to EN 61800-5-2
SSM	Safe Speed Monitor	This function monitors the speed of the servomotor to ensure it is within the specified range and outputs that state. Even if the speed is outside that range, the function does not execute the STO function.	Conforms to EN 61800-5-2
SBC	Safe Brake Control	This function controls the power supply for the brake with the safe output signals.	Conforms to EN 61800-5-2
SLP *1	Safely-Limited Position	This function monitors the position of the servomotor from its safe home position to ensure it is within the setting range. If outside that range, it executes the STO function.	Conforms to EN 61800-5-2
SLI *1	Safely-Limited Incremental	This function monitors the position of the servomotor to ensure it is a travel amount within the set range.	Conforms to EN 61800-5-2
SDI-p *1	Safe Direction, positive direction forbidden	This function monitors the movement direction of the servomotor. Only movement in the forward direction is prohibited. If the servomotor moves in the forward direction, this function executes the STO function.	Conforms to EN 61800-5-2
SDI-n *1	Safe Direction, negative direction forbidden	This function monitors the movement direction of the servomotor. Only movement in the reverse direction is prohibited. If the servomotor moves in the reverse direction, this function executes the STO function.	Conforms to EN 61800-5-2
SCA *1	Safe CAM	This function monitors the position of the servomotor from its safe home position to ensure it is within the setting range and outputs that state. Even if the position is outside that range, the function does not execute the STO function.	Conforms to EN 61800-5-2
SHP *1	Safe Home Position	This function sets the safe home position for the SLP and SCA functions.	This function is unique to Yaskawa.

*1 This function is available in ASM-X software version 003 or later.

2

Basic Specifications of the ASM-X

This chapter provides information on the ASM-X, such as specifications, a block diagram, dimensional drawings, and connection examples.

2.1 Specifications 62
2.1.1 Environmental Conditions 62
2.1.2 Indicators 62
2.1.3 Safety Performance 63
2.2 Internal Block Diagram 65
2.2.1 FSoE Communications References and Digital I/O Model 65
2.2.2 FSoE Communications References Model 66
2.3 External Dimensions 67
2.3.1 Detached Board 67
2.3.2 When Mounted to a SERVOPACK 67

2.1 Specifications

2.1.1 Environmental Conditions

Item	Specification
Surrounding Air Temperature	-5°C to 60°C
Storage Temperature	-20°C to 85°C
Surrounding Air Humidity	95% relative humidity max. (with no freezing or condensation)
Storage Humidity	95% relative humidity max. (with no freezing or condensation)
Vibration Resistance	When there is continuous vibration: 10 Hz to 55 Hz, acceleration amplitude 5.9 m/s^2 (0.6G)
Impact Resistance	19.6 m/s^2
Degree of Protection *1	ASM-X (alone): IP20 The degree of protection depends on the SERVOPACK. Refer to the SERVOPACK manual for more information.
Pollution Degree	2 • Must be no corrosive or flammable gases. • Must be no exposure to water, oil, or chemicals. • Must be no dust, salts, or iron dust. Gas resistance: 3C2 (IEC 60721-3-3) Dust resistance: 3S2 (IEC 60721-3-3)
Altitude	2000 m max.
Others	Do not use the SERVOPACK in the following locations: Locations subject to static electricity noise, strong electromagnetic/magnetic fields, or radioactivity

*1 Install the SERVOPACK in an IP54 control panel that conforms to IEC 60529.

2.1.2 Indicators

LED Indicator (Red) (LD1)	LED Indicator (Green) (LD2)	Status	Details
Not lit	Not lit	Power OFF	-
Not lit	Lit	Normal	No safety function was executed.
Blinking	Lit	Normal	A safety function is being executed.
Lit	Lit	Normal	Safe State (STO)
Lit	Not lit	Error	Alarm status
Blinking	Not lit	Error	Alarm status (the setup confirmation alarm has occurred)

2.1.3 Safety Performance

Item		Specification	Remarks
STO shutoff response time	When activated from a digital input signal *1	15 ms + input signal filter time (parameter setting) maximum	Refer to the following section for details on parameter settings. ☞ *7.4.5 Settings for Digital Input Signals on page 144*
	When activated from an FSoE input signal *2	13 ms + FSoE SubDevice watchdog time (113 ms maximum)	The watchdog time is set from the FSoE MDevice, and the value can be checked in object E9091h:4 (Watchdog time).
STO shutoff delay time (SS1)		0 ms to 100000 ms	Setting for Waiting Time (t1) (parameter setting)
Failure detection time for digital input signal (Related alarms: A.E11, A.E12, A.E13, A.E14, and A.E15)		24.75 ms + input signal filter time (parameter setting) maximum	The failure detection time is the time from when a failure occurs in an input signal to when the Σ-X safety drive system enters the safe state (STO state). Refer to the following section for the parameter settings. ☞ *7.4.5 Settings for Digital Input Signals on page 144*
Failure detection time for digital output signal diagnostic (Related alarms: A.E78, A.E79, A.E7A, A.E7B, and A.E7C)	When using the diagnostic output (test pulses) function	• When the test pulse width (parameter setting) is less than 10 ms 532 ms + (1.25 × test pulse width) maximum • When the test pulse width (parameter setting) is greater than or equal to 10 ms 542 ms + (0.25 × test pulse width) maximum	The failure detection time is the time from when a failure occurs in an output signal to when the Σ-X safety drive system enters the safe state (STO state). Refer to the following section for the parameter settings. ☞ *7.5.5 Settings for Digital Output Signals on page 155*
	When not using the diagnostic output (test pulses) function	22 ms + (ON delay time (parameter setting) or OFF delay time (parameter setting), whichever is longer) maximum	
SBC failure detection time (Related alarm: A.E3E)		27.75 ms + (brake hold delay time (parameter setting) or brake release delay time (parameter setting), whichever is longer) maximum	The failure detection time is the time from when a failure occurs in a safety relay to when the Σ-X safety drive system enters the safe state (STO state). Refer to the following section for the parameter settings. ☞ *7.17 SBC (Safe Brake Control) on page 217*
Failure detection time for encoder diagnostic (Related alarm: A.E2B)		25 ms + encoder deviation window (parameter setting) maximum	The failure detection time is the time from when a failure occurs in an encoder to when the Σ-X safety drive system enters the safe state (STO state). Refer to the following section for the parameter settings. ☞ *(1) Encoder Diagnostic Function on page 108*
Failure detection time for normal encoder diagnostic (Related alarm: A.E29)		25 ms max.	The failure detection time is the time from when a failure occurs in an encoder to when the Σ-X safety drive system enters the safe state (STO state).
Speed Monitoring Range		1 min^{-1} to maximum rotation speed of motor	–
Speed Monitoring Resolution		1 min^{-1}	–
Acceleration Monitoring Range		-2147483648 to 2147483648 [user acceleration reference unit]	–
Acceleration Monitoring Resolution		High-resolution mode: 0.033 r/s^2 Normal mode: 3.4 r/s^2	–

Continued on next page.

Continued from previous page.

Item		Specification	Remarks
Position Monitoring Range		-2147483648 to 2147483648 [user position reference unit]	–
Position Monitoring Resolution	Encoder with functional safety	High-resolution mode: 20 bits/rev Normal mode: 15 bits/rev	*5
	Normal encoder	20 bits/rev	Update Cycle for Position/Speed/Acceleration • Typical value: 3 ms • Maximum value: 3 ms max.
Position Monitoring Failure Detection Resolution *3		High-resolution mode: 10 bits/rev Normal mode: 2 bits/rev	–
Unit Conversion		The units can be converted to the following units by setting user unit conversion parameters. *4	–
Number of Simultaneously Executable Safety Functions		10	–
FSoE Watchdog Time		30 ms to 65534 ms	–

*1 When the STO function is selected for the safety function, the time is from when the safety request input signal (SRIS) is input to the ASM-X to when the SERVOPACK switches to the HWBB (STO) state.

*2 When the STO function is selected for the safety function, the time is from when the safety request input signal (SRIS) is sent from the FSoE MDevice to the ASM-X to when the SERVOPACK switches to the HWBB (STO) state.

*3 The minimum resolution at which a failure can be detected when an encoder failure occurs.

*4 Conversion examples

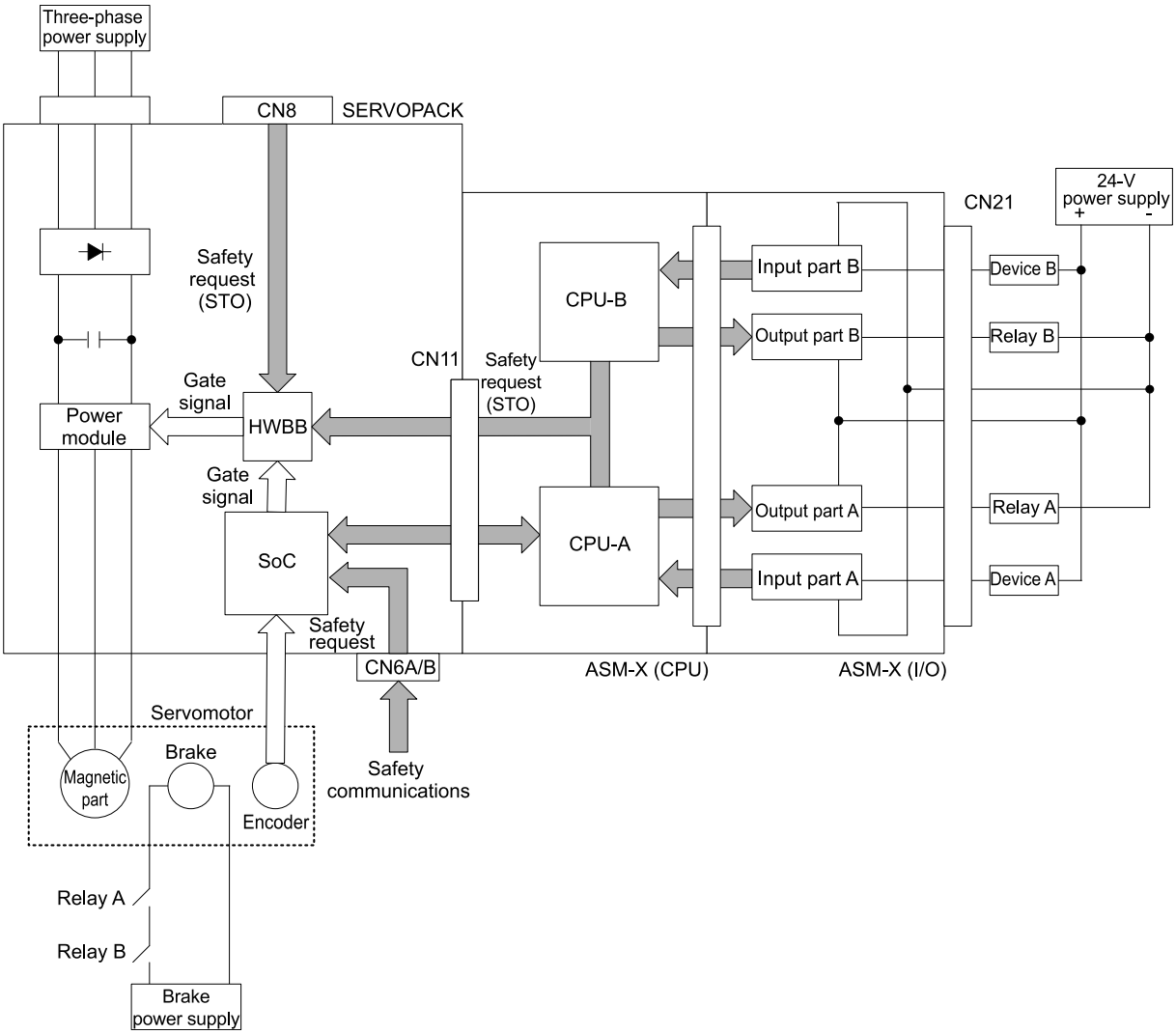
	Rotational Unit	Linear Unit
User position reference unit	deg	mm
User speed reference unit	min^{-1}	mm/s
User acceleration reference unit	r/s^2	mm/s^2

*5 Relationship of the settings of Pc170 = n.□□□X (Safety Function Monitoring Resolution Mode) and Pc170 = n.□□X□ (Safety Function Monitoring Response Mode) to the update cycle for position, speed, and acceleration

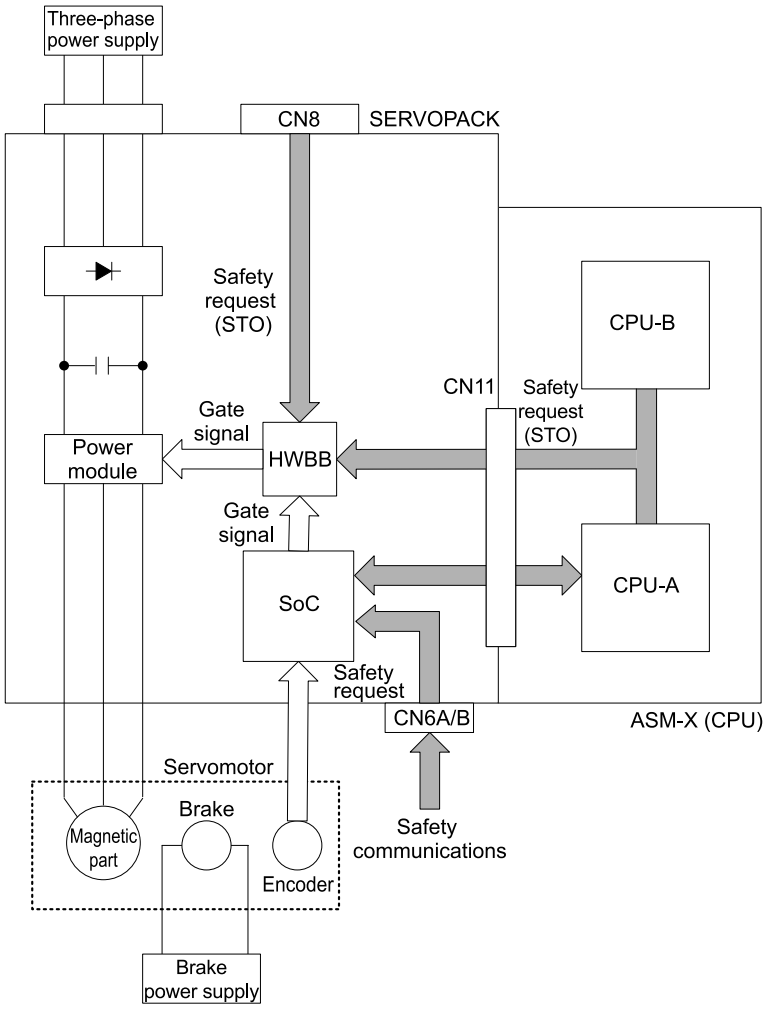
Pc170 = n.□□□X (Safety Function Monitoring Resolution Mode)	Pc170 = n.□□X□ (Safety Function Monitoring Response Mode)	Update Cycle for Position/Speed/Acceleration [ms]	
		Typical Value	Maximum Value
0	0	3	6
	1	3	9
1	0	6	12
	1	6	18

2.2 Internal Block Diagram

2.2.1 FSoE Communications References and Digital I/O Model

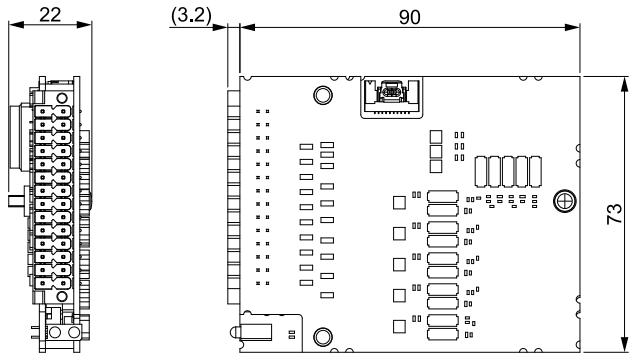


2.2.2 FSoE Communications References Model



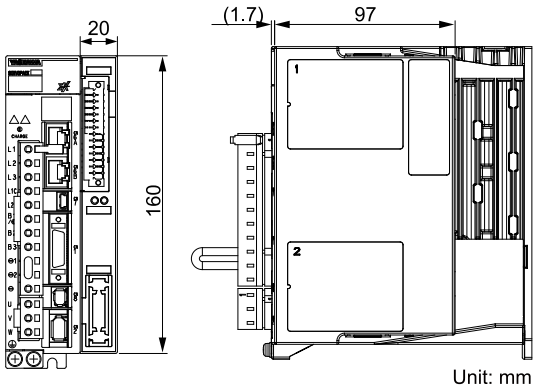
2.3 External Dimensions

2.3.1 Detached Board



Approx. mass
SGDXS-OSAA0A: 0.10 kg
SGDXS-OSAA1A: 0.15 kg
Unit: mm

2.3.2 When Mounted to a SERVOPACK



Unit: mm

3

Installation

This chapter provides information on installing a SERVOPACK to which the ASM-X is mounted in a required location.

3.1 Installation Precautions 70

3.2 SERVOPACK Mounting Types and Orientation 71

3.3 Mounting Hole Dimensions 72

3.4 Mounting Interval 73

3.4.1 Installing One SERVOPACK in a Control Panel 73

3.4.2 Installing More Than One SERVOPACK in a Control Panel 73

3.5 Monitoring the Installation Environment 74

3.6 EMC Installation Conditions 75

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3.6.2 Single-Phase, 200 VAC 76

3.6.3 270 VDC 77

3.6.4 Three-Phase, 400 VAC 78

3.1 Installation Precautions

NOTICE

Always install a SERVOPACK in a control panel.

Refer to the following section for the surrounding installation conditions.

☞ *2.1.1 Environmental Conditions on page 62*

- Installation Near Sources of Heat
  Implement measures to prevent temperature increases caused by radiant or convection heat from heat sources so that the surrounding temperature of the SERVOPACK meets the surrounding conditions.
- Installation Near Sources of Vibration
  Install a vibration absorber on the installation surface of the SERVOPACK so that the SERVOPACK will not be subjected to vibration.
- Others
  Do not install the SERVOPACK in a location subject to high temperatures, high humidity, water drops, cutting oil, excessive dust, excessive dirt, excessive iron powder, corrosive gasses, or radioactivity.

3.2 SERVOPACK Mounting Types and Orientation

The SERVOPACKs come in the following mounting types: base-mounted, rack-mounted, and duct-ventilated types.

The SERVOPACKs that can be used with the mounting types depend on the model. Refer to the SERVOPACK manual for more information.

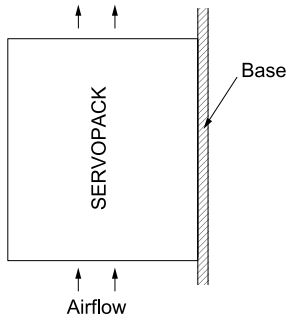
Regardless of the mounting type, mount the SERVOPACK vertically, as shown in the following figures.

Also, mount the SERVOPACK so that the front panel is facing toward the operator.

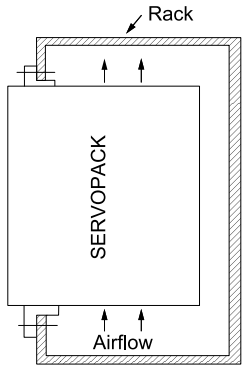
Note:

Prepare two to four mounting holes for the SERVOPACK and mount it securely in the mounting holes. (The number of mounting holes depends on the capacity of the SERVOPACK.)

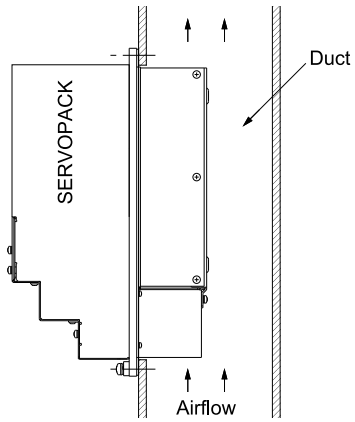
- Base-mounted SERVOPACK



- Rack-mounted SERVOPACK



- Duct-ventilated SERVOPACK



3.3 Mounting Hole Dimensions

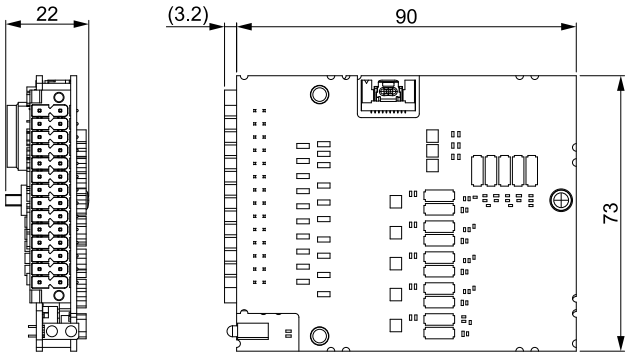
Use mounting holes to securely mount the SERVOPACK to the mounting surface.

The mounting hole dimensions depend on the SERVOPACK model. Refer to the SERVOPACK manual for more information.

3.4 Mounting Interval

3.4.1 Installing One SERVOPACK in a Control Panel

Provide the following spaces around the SERVOPACK.

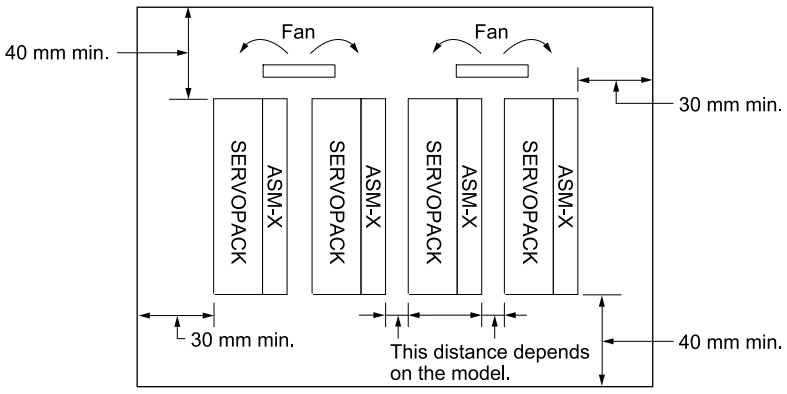


Approx. mass
SGDXS-OSAA0A: 0.10 kg
SGDXS-OSAA1A: 0.15 kg
Unit: mm

*1 For this dimension, ignore items protruding from the main body of the SERVOPACK.

3.4.2 Installing More Than One SERVOPACK in a Control Panel

When multiple SERVOPACKs are installed close together in an enclosed space, the surrounding temperature of the SERVOPACKs may locally exceed the surrounding air temperature range, and air circulation due to natural convection may be insufficient. In this case, you must take measures to disperse the localized hot spots, such as using fans. When using fans, install them as shown below.



*1 For this dimension, ignore items protruding from the main body of the SERVOPACK.

Space Required on the Right Side of a SERVOPACK (Front View)	Cooling Fan Installation Conditions
	10 mm above SERVOPACK's Top Surface
The space depends on the SERVOPACK model. Refer to the SERVOPACK manual for more information.	Air speed: 1.0 m/s min.

3.5 Monitoring the Installation Environment

You can use the SERVOPACK Installation Environment Monitor to check the operating conditions of the SERVOPACK in the installation environment.

You can check the SERVOPACK installation environment monitor with either of the following methods.

- Using the SigmaWin+: [Life Monitor] - [Installation Environment Monitor] - [SERVOPACK]
- Using a digital operator: Un025 (Installation Environment Monitor [%])

Implement one or more of the following actions if the monitor value exceeds 100%.

- Lower the surrounding temperature.
- Decrease the load.
- Increase the spacing between SERVOPACKs.
- Make the air around the SERVOPACK circulate by convection.

Information The value of the SERVOPACK Installation Environment Monitor will increase by about 10% for each 10°C increase in the surrounding temperature.



Important Always observe the surrounding air temperature given in the SERVOPACK environment conditions. Even if the monitor value is 100% or lower, you cannot use a SERVOPACK in a location that exceeds the specified surrounding air temperature.

3.6 EMC Installation Conditions

This section gives the installation conditions that were used for EMC certification testing.

The EMC installation conditions that are given here are the conditions that were used to pass testing criteria at Yaskawa. The EMC level may change under other conditions, such as the actual installation structure and wiring conditions. These Yaskawa products are designed to be built into equipment. Therefore, you must implement EMC measures and confirm compliance for the final equipment.

The applicable standards are EN 55011 group 1 class A, EN 61000-6-2, EN 61000-6-4, and EN 61800-3 (category C2, second environment).

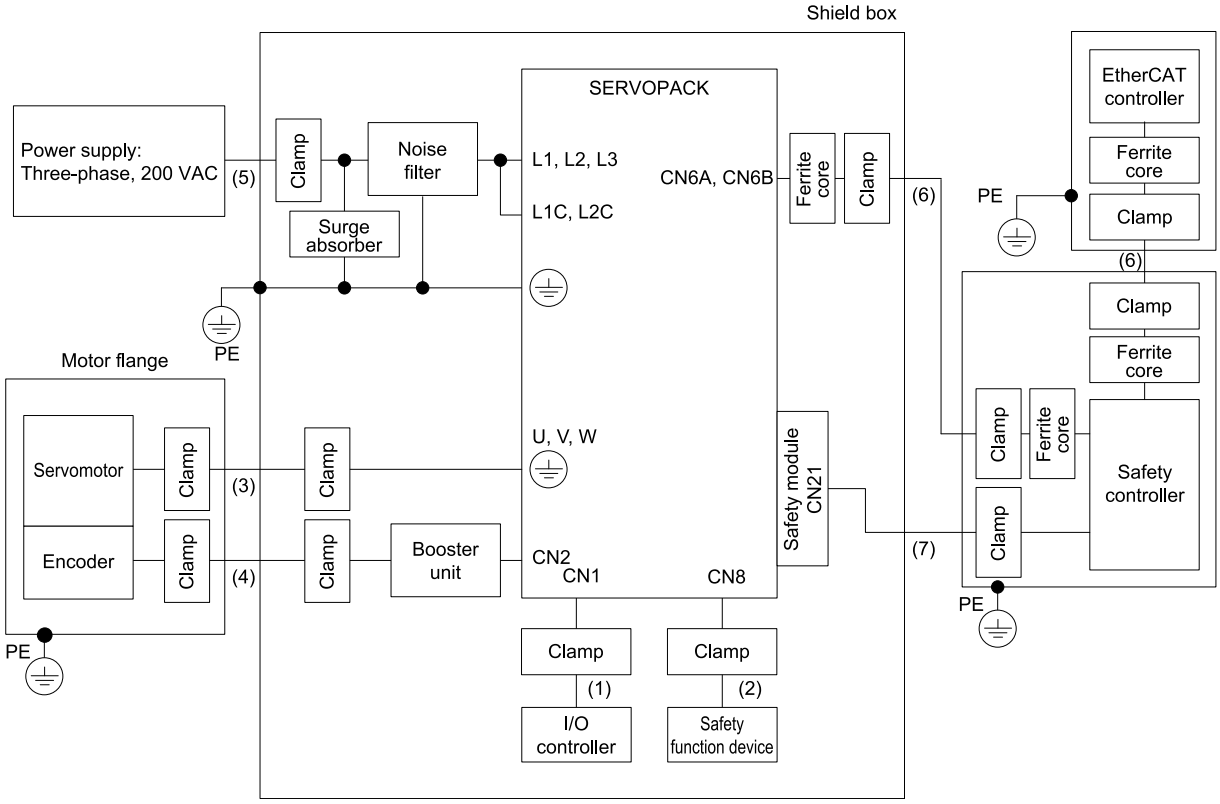
⚠ WARNING

In a domestic environment, this product may cause radio interference in which case supplementary mitigation measures may be required.

⚠ CAUTION

This equipment is not intended for use in residential environments and may not provide adequate protection to radio reception in such environments.

3.6.1 Three-Phase, 200 VAC



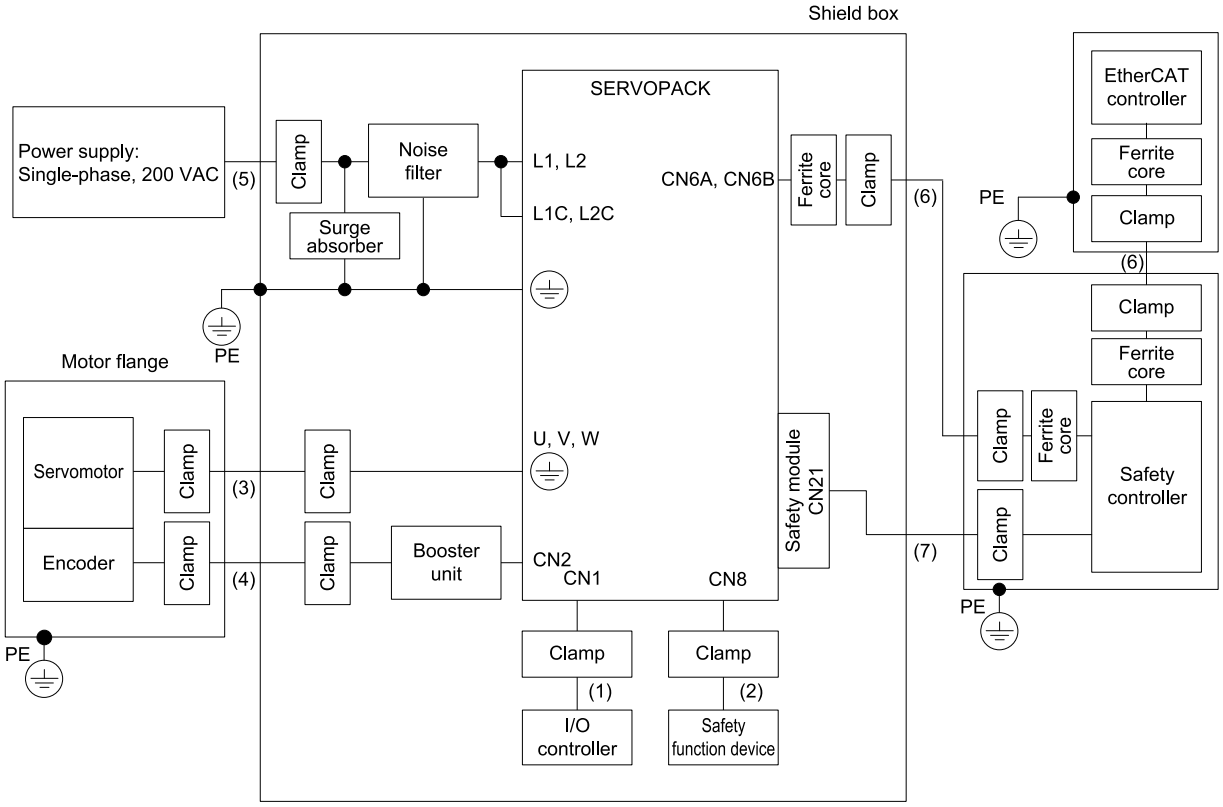
Symbol	Cable Name	Specification
(1)	I/O signal cable	Shielded cable
(2)	Safety function device cable	Shielded cable
(3)	Servomotor main circuit cable	Shielded cable
(4)	Encoder cable	Shielded cable

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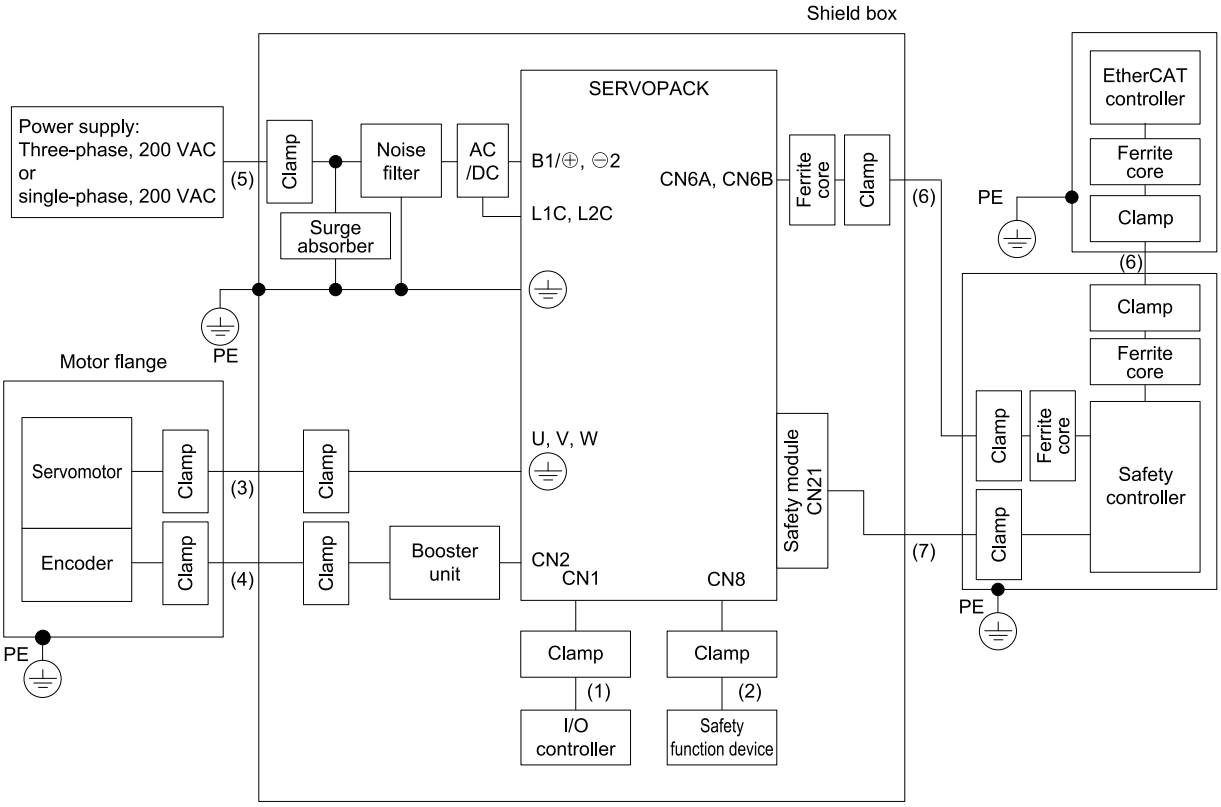
Symbol	Cable Name	Specification
(5)	Main circuit power cable	Shielded cable
(6)	EtherCAT cable	Shielded cable
(7)	Safety signals cable	Shielded cable

3.6.2 Single-Phase, 200 VAC



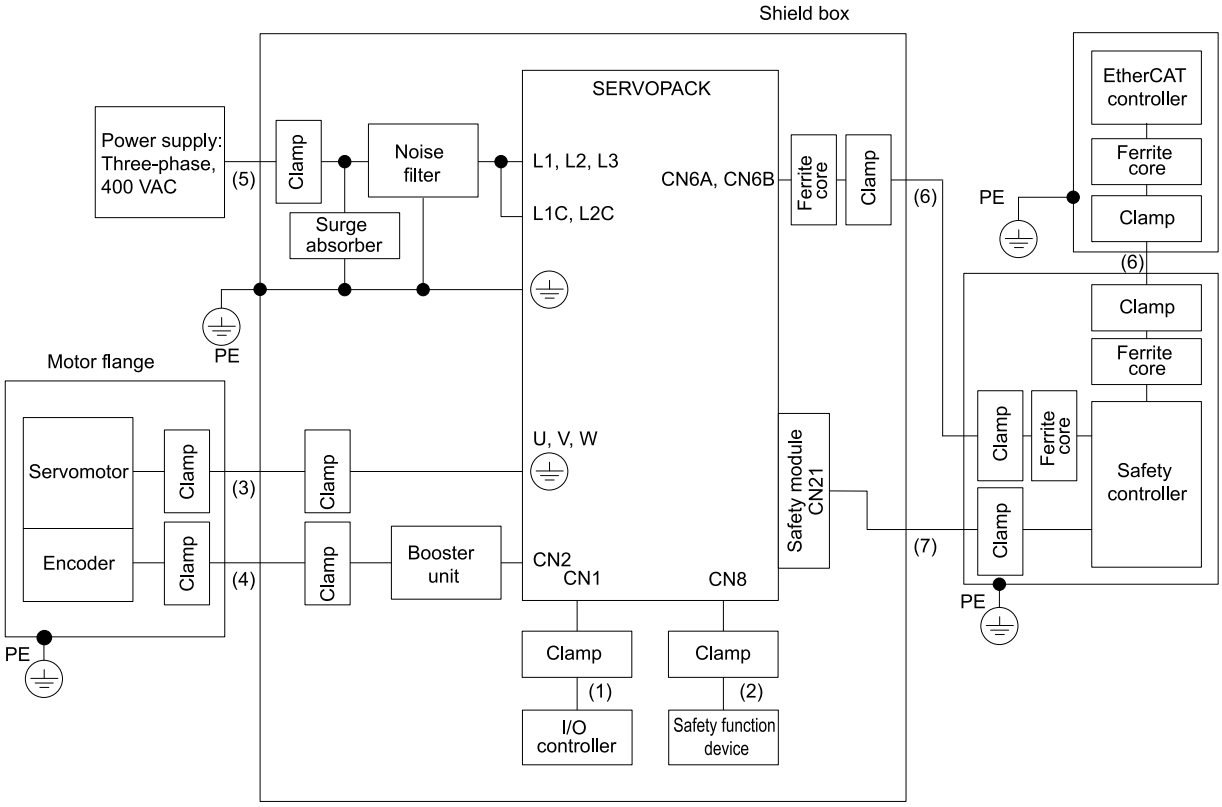
Symbol	Cable Name	Specification
(1)	I/O signal cable	Shielded cable
(2)	Safety function device cable	Shielded cable
(3)	Servomotor main circuit cable	Shielded cable
(4)	Encoder cable	Shielded cable
(5)	Main circuit power cable	Shielded cable
(6)	EtherCAT cable	Shielded cable
(7)	Safety signals cable	Shielded cable

3.6.3 270 VDC



Symbol	Cable Name	Specification
(1)	I/O signal cable	Shielded cable
(2)	Safety function device cable	Shielded cable
(3)	Servomotor main circuit cable	Shielded cable
(4)	Encoder cable	Shielded cable
(5)	Main circuit power cable	Shielded cable
(6)	EtherCAT cable	Shielded cable
(7)	Safety signals cable	Shielded cable

3.6.4 Three-Phase, 400 VAC



No.	Cable Name	Specification
(1)	I/O signal cable	Shielded cable
(2)	Safety function device cable	Shielded cable
(3)	Servomotor main circuit cable	Shielded cable
(4)	Encoder cable	Shielded cable
(5)	Main circuit power cable	Shielded cable
(6)	EtherCAT cable	Shielded cable
(7)	Safety signals cable	Shielded cable

4

Wiring and Connections

This chapter provides information on wiring and connecting the ASM-X to power supplies and peripheral devices.

4.1 Wiring Precautions 80

4.1.1 General Precautions 80

4.2 System Configuration Example 83

4.2.1 FSoE Communications References and Digital I/O Model 83

4.2.2 FSoE Communications References Model 84

4.2.3 Encoder Connection Configurations 85

4.3 I/O Signal Connections 87

4.3.1 I/O Signal Connector (CN21) Names, Functions, and Pin Layout 87

4.3.2 I/O Circuits 88

4.3.3 Connection Example of an Input Circuit 89

4.3.4 Connection Examples of Output Circuits 89

4.3.5 Connecting EtherCAT Communications Cables 90

4.1 Wiring Precautions

4.1.1 General Precautions

⚠ DANGER

Do not change any wiring while power is being supplied.

There is a risk of equipment damage or product failure. There is also a risk of fire or electric shock that causes death or serious injury. Additionally, there is a risk of death or serious injury due to unexpected machine operation.

Wait for at least 20 minutes (or 100 minutes when using DC power supply input) after turning OFF the power and then make sure that the CHARGE indicator is not lit before starting wiring or inspection work. Do not touch the main circuit terminals while the CHARGE indicator is lit because high voltage may still remain in the SERVOPACK even after turning OFF the power.

There is a risk of electric shock that causes death or serious injury.

⚠ WARNING

Wiring and inspections must be performed only by qualified engineers.

If work is performed by a worker who is not a qualified engineer, there is a risk of fire or electric shock that causes death or serious injury.

Check all wiring and power supplies carefully.

Incorrect wiring or incorrect voltage application to the output circuits may cause short-circuit failures. If this failure occurs, there is a risk of fire that causes death or serious injury. There is also a risk of equipment and product damage because the holding brake may fail to operate properly.

Always use the specified terminals to connect the SERVOPACK and peripheral devices. For the power supply in particular, confirm that the connections are made to the terminals shown below.

200-V power supply input SERVOPACK:

- **AC power supply: L1, L2, L3, L1C, L2C terminals on the SERVOPACK**
- **DC power supply: B1/⊕, ⊖2, L1C, L2C terminals on the SERVOPACK**

400-V power supply input SERVOPACK:

- **AC power supply: L1, L2, L3 terminals on the SERVOPACK**
- **DC power supply: B1/⊕, ⊖2 terminals on the SERVOPACK**
- **24-VDC control power supply: 24-V and 0-V terminals (same whether the main circuit power supply wiring is an AC power supply or a DC power supply)**

Refer to "Terminal Symbols and Terminal Names" in the product manual for your SERVOPACK for details on terminals.

If you ignore these precautions, there is a risk of equipment failure or product failure due to fire. There is also a risk of fire that causes death or serious injury.

If you use a SERVOPACK with the dynamic brake hardware option, connect an external dynamic brake resistor that is suitable for the machine and equipment specifications to the specified terminals.

There is a risk of equipment damage due to unintended machine operation during an emergency stop. There is also a risk of injury or fire that causes death or serious injury.

Observe the precautions and instructions for wiring and trial operation precisely as described in "Wiring" and "Holding Brake" in the product manual for your SERVOPACK.

If a mistake is made in wiring or trial operation, there is a risk of product failure due to incorrect wiring or incorrect voltage application in the brake circuit. A fire or electric shock may also occur resulting in death or serious injury. Additionally, there is a risk of death or serious injury due to unexpected machine operation.

⚠ WARNING

Check the wiring to be sure it has been performed correctly. Connectors and pin layouts may vary depending on the model. Always confirm the pin layout examples in the chapter related to pin layouts in the product manual for your model.

If the wiring is not performed correctly, there is a risk of product failure. There is also a risk of fire or electric shock that causes death or serious injury. Additionally, there is a risk of death or serious injury due to unexpected machine operation.

Connect wires to main circuit terminals and motor connection terminals securely with the specified methods and tightening torque. Refer to "SERVOPACK Main Circuit Wires" in the peripheral selection manual for your SERVOPACK for the specified methods and tightening torque.

Insufficient tightening may cause wires and terminal blocks to generate heat due to poor contact, possibly resulting in product failure. There is also a risk of fire that causes death or serious injury.

Make sure the cables do not exceed the following lengths:

- **SERVOPACK I/O signal cable: 3 m max.**
- **ASM-X I/O signal cable: 5 m max.**
- **Servomotor main circuit cable: 50 m max.**
- **Encoder cable: 50 m max.**
- **Control power supply cable for 400-V power supply input SERVOPACK (+24 V and 0 V): 10 m max.**

If a cable is longer than the specified length, there is a risk of equipment damage due to product malfunction that causes death or serious injury. There is also a risk of electric shock due to a short circuit or ground fault that causes death or serious injury.

Observe the following precautions when wiring the SERVOPACK's main circuit terminals.

- **Turn ON the power to the SERVOPACK only after all wiring, including the main circuit terminals, has been completed.**
- **If a connector is used for the main circuit terminals, remove the main circuit connector from the SERVOPACK before you wire it.**
- **Insert only one wire per insertion hole in the main circuit terminals.**
- **When you insert a wire, make sure that the conductor wire (e.g., whiskers) does not come into contact with adjacent wires and cause a short-circuit.**

If the SERVOPACK power is turned ON with incorrect wiring, there is a risk of fire due to electric shock or product failure that causes death or serious injury.

Install molded-case circuit breakers and other safety measures to provide protection against short circuits in external wiring.

There is a risk of fire or electric shock due to product failure that causes death or serious injury.

Install a battery at either the host controller or on the encoder cable.

If you install batteries both at the host controller and on the encoder cable at the same time, you will create a loop circuit between the batteries, and this may result in a fire from product failure or damage that causes death or serious injury.

When connecting a battery, connect the polarity correctly.

There is a risk of encoder failure if the battery ruptures and a risk of fire that causes death or serious injury.

⚠ CAUTION

Use shielded twisted-pair cables or shielded multi-core twisted-pair cables for I/O signal cables and encoder cables.

There is a risk of injury from product malfunction.

NOTICE

Use the cables specified by Yaskawa. If you use any other cables, confirm the rated current and application environment of your model and use the wiring materials specified by Yaskawa or equivalent materials. Refer to the peripheral selection manual for your SERVOPACK for Yaskawa-specified cables and wiring materials.

Securely tighten connector screws and lock mechanisms.

Insufficient tightening may result in connectors falling off during operation.

Pay careful attention to the following points when wiring power lines (e.g., the main circuit cable) and signal lines (e.g., the I/O signal cables or encoder cables).

- **Do not bundle power lines and signal lines together or run them through the same duct.**
- **Do not route power lines and signal lines in parallel. Separate them as much as possible by using different routing paths or other suitable measures.**

There is a risk that the product may not function correctly due to the effects of noise on signal lines.

Important

- Use a molded-case circuit breaker or fuse to protect the main circuit.
  The SERVOPACK connects directly to a commercial power supply; it is not isolated through a transformer or other device. Always use a molded-case circuit breaker or fuse to protect the servo system from accidents involving different power system voltages or other accidents.
- Install an earth leakage breaker.
  The SERVOPACK does not have a built-in ground fault protective circuit. To configure a safer system, install a ground fault detector against overloads and short-circuiting, or install a ground fault detector combined with a molded-case circuit breaker.
- Do not turn the power ON and OFF more than necessary.
  - Do not use the SERVOPACK for applications that require the power to be turned ON and OFF frequently. Such applications will cause elements in the SERVOPACK to deteriorate.
  - After you have started actual operation, allow at least one hour between turning the power ON and OFF (as a guideline).

To ensure safe, stable application of the servo system, observe the following precautions when wiring.

- Use the cables specified by Yaskawa. Design and arrange the system so that each cable is as short as possible. Refer to the following manual or catalog for information on the specified cables.

  Σ-X-Series Catalog (Catalog No.: KAEP C710812 03)

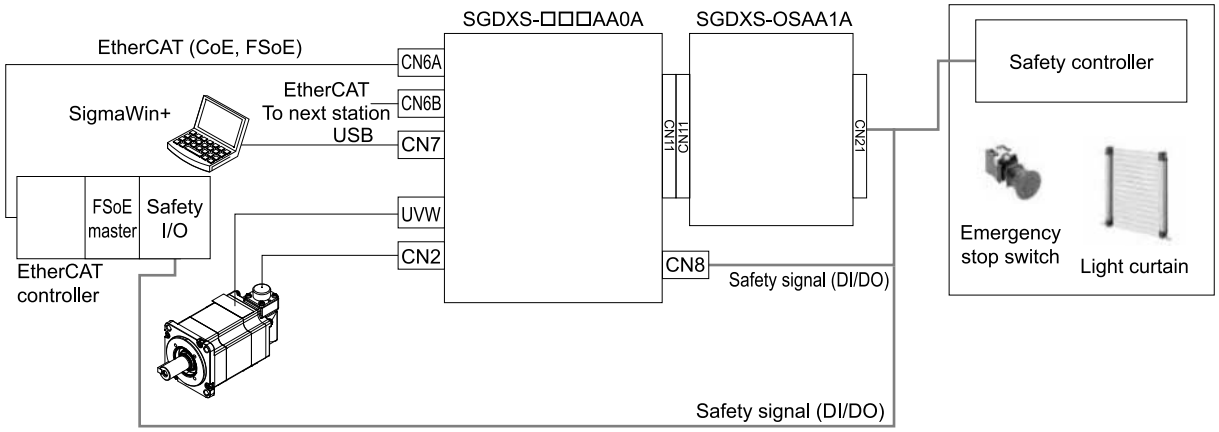
  Σ-X-Series Peripheral Device Selection Manual (Manual No.: SIEP C710812 12)
- The signal cable conductors are as thin as 0.2 mm^2 or 0.3 mm^2. Do not subject them to excessive bending stress or tension.

4.2 System Configuration Example

4.2.1 FSoE Communications References and Digital I/O Model

- Safety signals: Connect to CN21 on the ASM-X.
- Safety communications: FSoE (The EtherCAT cable connection is not changed. CoE and FSoE messages are transmitted over EtherCAT communications.)
- Parameter settings for the ASM-X and encoder with functional safety: Use the SigmaWin+. (USB connection to CN7 on the SERVOPACK)
- The achievable safety performance level of the safety functions that monitor position, speed, and acceleration depends on your encoder.
  - When using an encoder with functional safety: SIL3 or PL e (Category 3)
  - When using a normal encoder: SIL2 or PL d (Category 2)
- Peripheral devices: If this system will be used at the achievable safety performance level, use peripheral devices (e.g., safety I/O device and safety controller) designed for the achievable safety performance level or higher. Select peripheral devices with a safety level suited to the customer's system performance level.
- Diagnose digital outputs from the ASM-X on the customer's output device.
- When using a motor with a brake, check the opening and closing operation of the brake at a regular interval.
- Conduct a risk assessment on the equipment and confirm that it satisfies the safety level of the conformance standards.
- Prepare a surge protection circuit in the external circuit because the circuit inside the ASM-X lacks a surge protection circuit.
- Secondary-side failures of photocouplers in the customer's circuit are to be diagnosed by the customer.
- When using a relay in an output circuit, select the external power supply and relay with consideration to the output ON voltage of the ASM-X (4.1 V or more).
- When using safety relays, select the output power supply with consideration to the output ON voltage of the ASM-X (4.1 V or more).

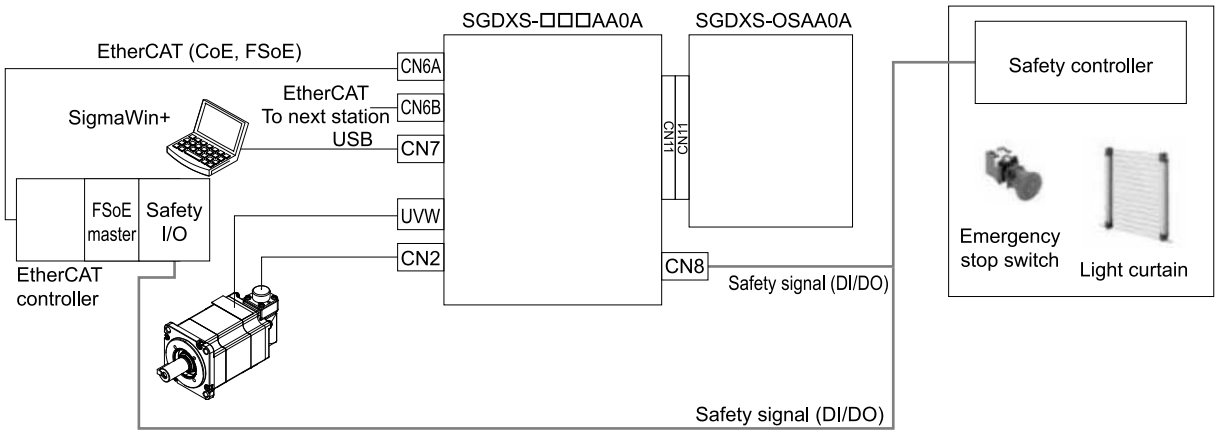
The following figure shows the system configuration diagram for the ASM-X with FSoE communications references and digital I/O.



4.2.2 FSoE Communications References Model

- Safety signals: Connect the safety signals to the safety I/O section of the EtherCAT controller.
  The safety signals can also be connected to CN8 on the SERVOPACK. To use the HWBB by using CN8 on the SERVOPACK, disconnect the jumper connectors on CN8 and wire the signals in the correct manner. If you will not use CN8, connect the jumper connectors. For details on wiring CN8, refer to the SERVOPACK product manual.
- Safety communications: FSoE (The EtherCAT cable connection is not changed. CoE and FSoE messages are transmitted over EtherCAT communications.)
- Parameter settings for the ASM-X and encoder with functional safety: Use the SigmaWin+. (USB connection to CN7 on the SERVOPACK)
- The achievable safety performance level of the safety functions that monitor position, speed, and acceleration depends on your encoder.
  - When using an encoder with functional safety: SIL3 or PL e (Category 3)
  - When using a normal encoder: SIL2 or PL d (Category 2)
- Peripheral devices: If this system will be used at the achievable safety performance level, use peripheral devices (e.g., safety I/O device and safety controller) designed for the achievable safety performance level or higher. Select peripheral devices with a safety level suited to the customer's system performance level.
- When using a motor with a brake, check the opening and closing operation of the brake at a regular interval.
- Conduct a risk assessment on the equipment and confirm that it satisfies the safety level of the conformance standards.
- Prepare a surge protection circuit in the external circuit because the circuit inside the ASM-X lacks a surge protection circuit.
- Secondary-side failures of photocouplers in the customer's circuit are to be diagnosed by the customer.

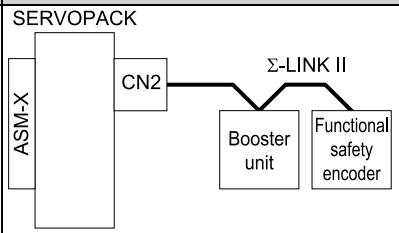
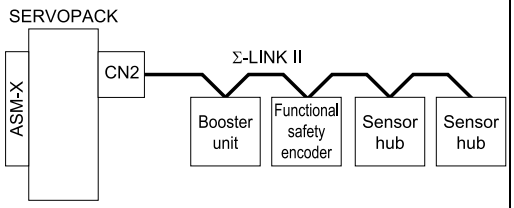
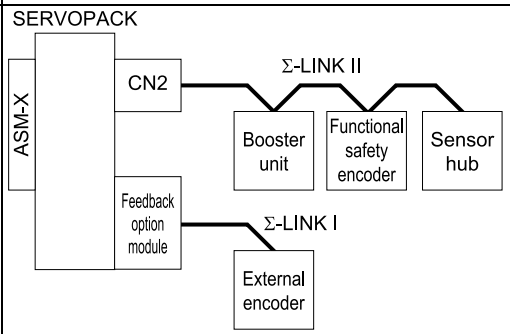
The following figure shows the system configuration diagram for the ASM-X with FSoE communications references.



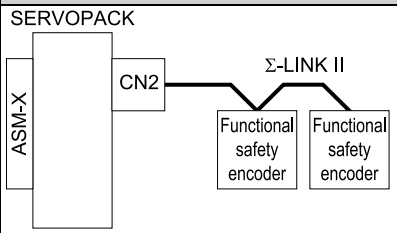
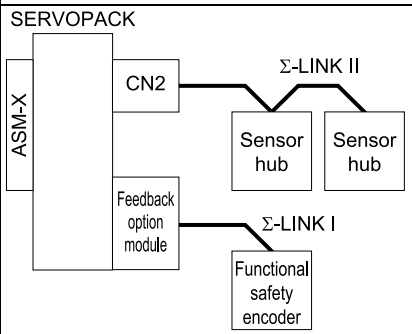
4.2.3 Encoder Connection Configurations

(1) For an Encoder with Functional Safety

Configuration examples are shown below.

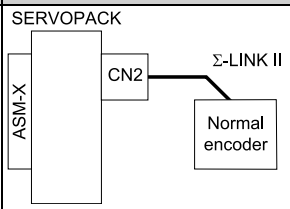
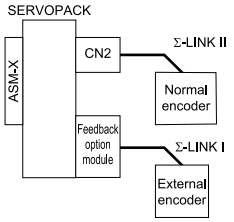
Case	Encoder Communications Configuration	Description	Remarks
When one encoder with functional safety is connected to the SERVOPACK		Monitoring target: Encoder with functional safety	A booster unit can be connected.
When one encoder with functional safety and two sensor hubs are connected to the SERVOPACK (maximum number of nodes per Σ-LINK II circuit)		Monitoring target: Encoder with functional safety	A booster unit can be connected. An external encoder that supports Σ-LINK II can also be connected to the CN2 circuit.
When the feedback option module is used		The encoder with functional safety and sensor hub are connected to the SERVOPACK. An external encoder is connected to the feedback option module. Monitoring target: Encoder with functional safety	A booster unit can be connected. The ASM-X does not use information from the external encoder.

Information The following system configurations are invalid.

Case	Encoder Communications Configuration	Description	Remarks
When multiple encoders with functional safety are connected to the SERVOPACK		The Σ-LINK II specifications for the SERVOPACK allow only one encoder to be connected to the same circuit.	A.EC4 (Safety Module - Encoder Configuration Error) will be output.
When an encoder with functional safety is connected to the feedback option module.		A servomotor with functional safety must be connected to CN2 on the SERVOPACK.	Σ-LINK II configuration in the SigmaWin+ will fail when executed.

(2) For a Normal Encoder

Configuration examples are shown below.

Case	Encoder Communications Configuration	Description
When one normal encoder is connected to the SERVOPACK		Monitoring target: Normal encoder
When one normal encoder is connected to the SERVOPACK and the feedback option module is used		An external encoder is connected to the feedback option module. Monitoring target: Normal encoder

Note:

The system configurations for cases other than those listed above are invalid.

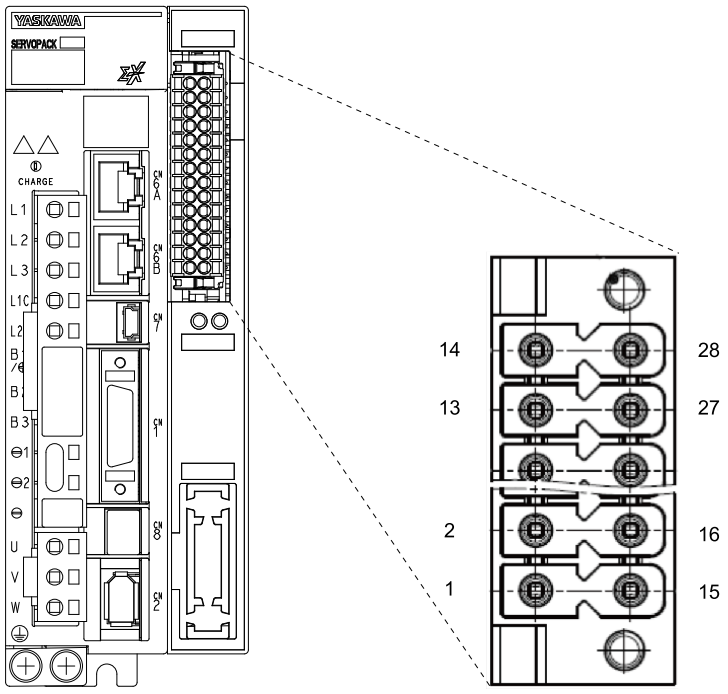
4.3 I/O Signal Connections

4.3.1 I/O Signal Connector (CN21) Names, Functions, and Pin Layout

As the I/O connector, a connector of a type in which the socket (board side) and the plug (cable side) can be separated is used.

The following table gives the pin numbers, names, and details of the I/O signal connector.

No.	Signal	Details	No.	Signal	Details
14	DOA1	Digital output port A, channel 1	28	DIA1	Digital input port A, channel 1
13	DOB1	Digital output port B, channel 1	27	DIB1	Digital input port B, channel 1
12	DOC1	Digital output port C, channel 1	26	DIC1	Digital input port C, channel 1
11	DOD1	Digital output port D, channel 1	25	DID1	Digital input port D, channel 1
10	DOE1	Digital output port E, channel 1	24	DIE1	Digital input port E, channel 1
9	DOA2	Digital output port A, channel 2	23	DIA2	Digital input port A, channel 2
8	DOB2	Digital output port B, channel 2	22	DIB2	Digital input port B, channel 2
7	DOC2	Digital output port C, channel 2	21	DIC2	Digital input port C, channel 2
6	DOD2	Digital output port D, channel 2	20	DID2	Digital input port D, channel 2
5	DOE2	Digital output port E, channel 2	19	DIE2	Digital input port E, channel 2
4	DOCOM	Digital output common	18	DICOM	Digital input common
3	N.C.	–	17	N.C.	–
2	N.C.	–	16	N.C.	–
1	N.C.	–	15	N.C.	–



Important

The maximum cable length is 5 m. We recommend using a shielded cable as a countermeasure against noise. (Ground the cable on the external device.)

Wire size: AWG26 to AWG16 (0.2 mm^2 to 1.5 mm^2)

4.3.2 I/O Circuits

(1) Basic Specifications

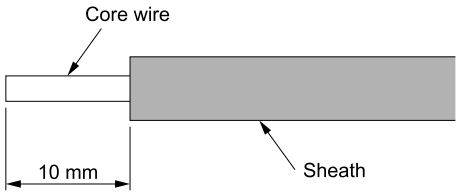
The basic specifications of the I/O circuits on the ASM-X are shown below.

I/O	Specification		Signal	Application	Remarks
Digital input	No. of points	10	DIA1 to DIE1 DIA2 to DIE2	Safe input signals 5 ports × 2 channels	Parameter settings are required for use.
	Current	7 mA (max.) per point			
	Input type	Sink			
Power supply for digital inputs	Voltage	24 VDC ±20%	DICOM and each input signal	_	ON/OFF range conforms to Type 1/Type 2 in IEC 611311-2. Use an SELV 24-V power supply.
	Capacity	2 W or more			
Digital output	No. of points	10	DOA1 to DOE1 DOA2 to DOE2	Safe output signals (redundant) 5 ports × 2 channels or single output	Parameter settings are required for use.
	Current	50 mA (max.) per point			
	Output type	Source			
Power supply for digital outputs	Voltage	30 VDC (max.)	DOCOM and each output signal	_	Use an SELV power supply.
	Capacity	15 W (max.)			

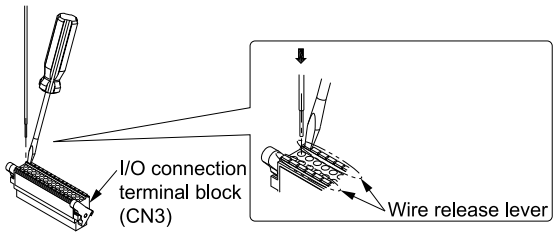
(2) Connecting a Wire to the I/O Connection Terminal Block

Use a cable with a wire size of AWG24 to AWG16 (0.2 mm^2 to 1.5 mm^2).

1. **Expose the conductor by stripping the sheath at the tip of the cable by about 10 mm.**

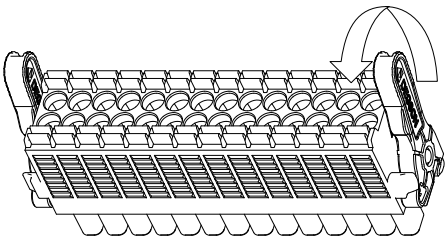


2. **While pressing the wire release lever with a flat-blade screwdriver, fully insert the conductor into the terminal on the plug. The connection will be made with the spring inside the terminal.**



(3) Connecting the I/O Signal Connector (CN21)

The socket on the board side and the plug on the wiring side of the I/O signal connector can be separated. To remove the plug-side connector from the socket, first unlock the ejector levers.

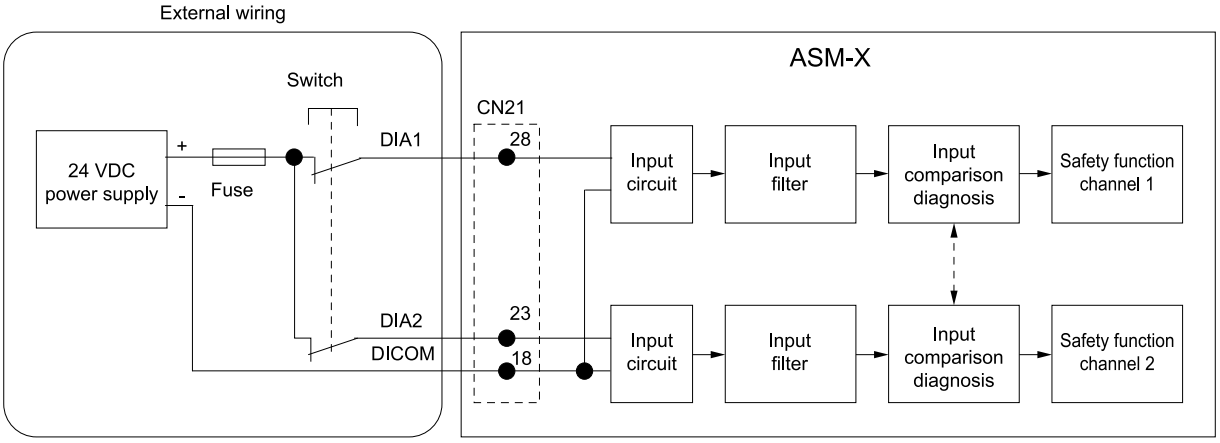


4.3.3 Connection Example of an Input Circuit

The digital input signals are two redundant inputs and can be used as safe input signals.

Port A (DIA) is shown as an example below. Connect digital input port A (DIA1 and DIA2) as sink inputs when viewed from the SERVOPACK side. Make the connections this way because a safe failure will occur if the DIA1 and DIA2 signals are connected to 0 V.

The connected input signals are connected to the safety function after passing through the input filter and the input comparison diagnostic for each of channel 1 and channel 2.



The input filter is set in ASM-X parameters.

Refer to the following section for the setting procedure.

☞ *7.4.5 Settings for Digital Input Signals on page 144*

In the above diagram, test pulses are not added to the port A input signals. However, digital input signals input to the ASM-X may contain test pulses inserted to the signals. Test pulses are not necessary for the ASM-X, and the effect of the test pulses can be eliminated by setting the input filter so there is no effect on the operation of the ASM-X.

The input comparison diagnostic is set in ASM-X parameters.

Refer to the following section for the setting procedure.

☞ *7.4.5 Settings for Digital Input Signals on page 144*

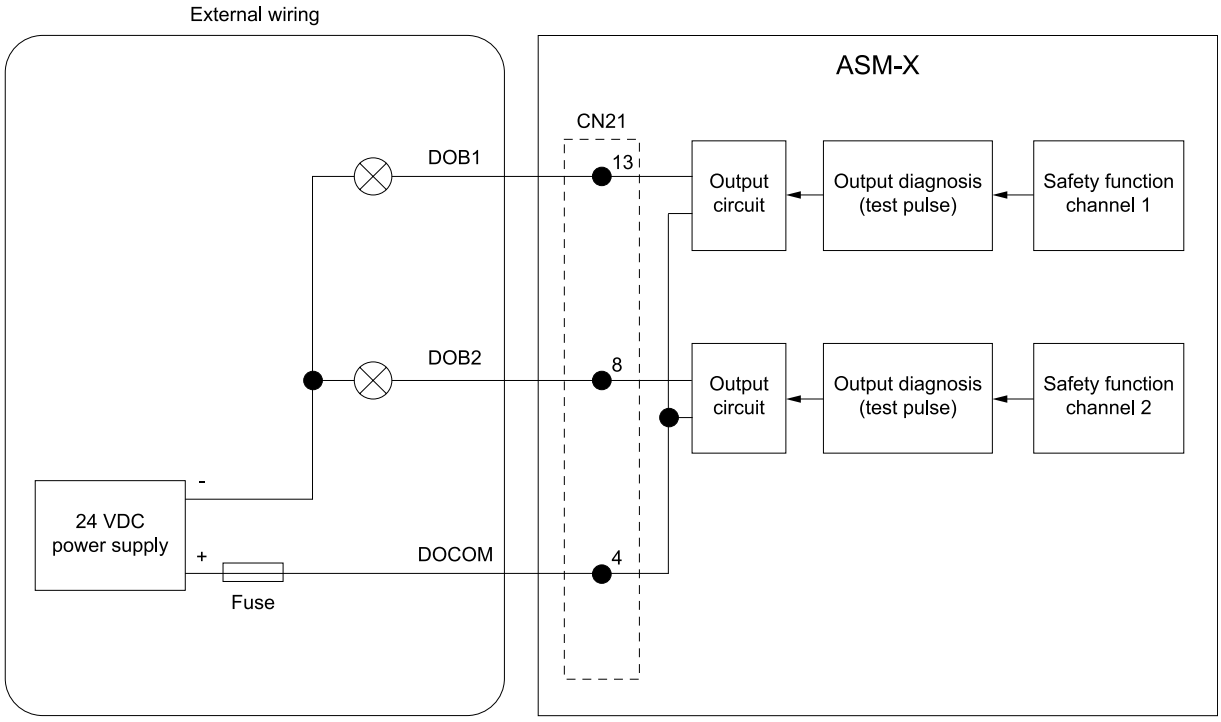
4.3.4 Connection Examples of Output Circuits

(1) Using Outputs as a Safe Output Signal

The digital output signals are two redundant outputs and can be used as safe output signals because diagnostics are performed using test pulses. Also when EDM is used as a redundant signal, this configuration should be used.

To use EDM as a digital output signal, make the external wiring as shown below. To make a short-circuit failure a safe failure, ground the load side of the external wiring to the power supply.

The following diagram shows an example of using port B as safe output signal.

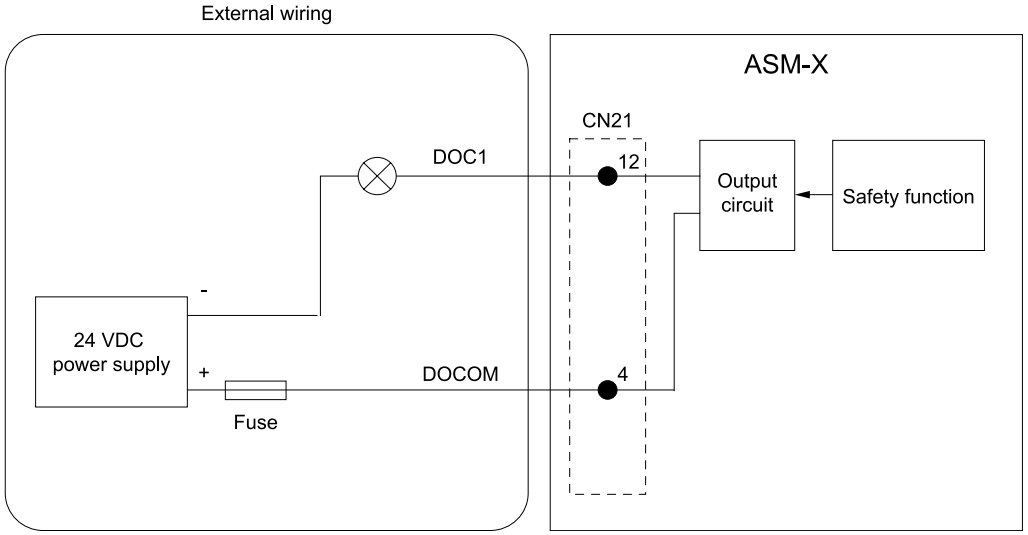


(2) Using an Output as a Single Output Signal (Non-Safety)

EDM is the signal that outputs the status of the safety functions. It can be used as a single output signal. In this case, the test pulse diagnostic will not be performed.

To use EDM as a single output signal, make the external wiring as shown below.

The following diagram shows an example of using port C1 as EDM. If port C is assigned to EDM, DOC1 and DOC2 can be assigned to different EDM safety functions because they are single output signals.



4.3.5 Connecting EtherCAT Communications Cables

An EtherCAT communications cable must be connected to perform FSoE communications.

Refer to the following manual for details.

Σ-XS SERVOPACK with EtherCAT Communications References Product Manual (Manual No.: SIEP C710812 02)

5

Precautions and Restrictions before Operation

This chapter gives the precautions and restrictions you must be aware of before operating the servo system. Carefully read and understand the safety precautions, risk assessment, and restrictions before using the ASM-X.

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5.2 Risk Assessment 93

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5.2.2 Calculation Example 94

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5.3.3 Other Restrictions 97

5.4 /S-RDY (Servo Ready Output) Signal 98

5.4.1 /S-RDY (Servo Ready Output) Signal Output Conditions 98

5.4.2 Power ON Sequence 98

5.1 Precautions When Using the ASM-X

⚠ DANGER

Only qualified personnel should install, disassemble, or repair this product.

There is a risk of electric shock or injury.

The safety functions in the ASM-X do not turn OFF the power to the SERVOPACK or electrically isolate it. Implement measures to turn OFF the power to the SERVOPACK before you perform inspection and maintenance on it.

There is a risk of electric shock.

⚠ WARNING

When creating the safety design of the mechanical system that uses the safety functions in the ASM-X, you must conduct a risk assessment of the mechanical system with the residual risks taken into consideration.

There is a risk of injury or equipment damage.

The dynamic brake is not a safety-related element. You must design the system so that dynamic brake failures will not cause a hazardous condition while the ASM-X safety functions are operating.

There is a risk of injury or equipment damage.

Connect devices that satisfy the safety-related standards to the connector for the Safety Request Input Signal.

There is a risk of injury or equipment damage.

The safety functions in the ASM-X are not an emergency stop function. If a safety function is used as an emergency stop function, you must design the system so that the power to the servomotor from the electrical machinery section is turned OFF in a separate manner.

There is a risk of injury or equipment damage.

Always check the content for safety-related parameters before using the safety functions in the ASM-X.

There is a risk of injury or equipment damage.

When commissioning the servo system or when replacing the ASM-X or SERVOPACK during inspection and maintenance, make sure to check the operation of the safety functions to use after wiring.

There is a risk of injury or equipment damage.

The person who designs the system that uses the safety function and the person who is responsible for its maintenance must have a complete knowledge of the related safety standards and a complete understanding of the instructions in this document.

If the safety design of the system is insufficient, there is a risk of equipment damage. There is also a risk of death or serious injury due to unexpected machine operation.

5.2 Risk Assessment

When using the ASM-X, you must perform a risk assessment of the servo system in advance to confirm that the safety level of the standards is satisfied.

Refer to the following section for details on the standards.

☞ *i.10 Compliance with UL Standards, EU Directives, and Other Safety Standards on page 46*

The following residual risks exist even when the safety functions are operating. These residual risks must be included in the risk assessment.

- If an external force (e.g., the force of gravity on a vertical axis) acts on the servomotor when STO function in the ASM-X is operating, the servomotor will move from that external force. Implement measures to hold the servomotor, such as installing a separate mechanical brake.
- If the SERVOPACK fails when STO function in the ASM-X is operating, the servomotor may move within an electrical angle of 180°. Ensure safety even if the servomotor moves.
  The number of rotations of a rotary servomotor is 1/6 rotation max. (rotational angle calculated at the motor shaft).
- Take into consideration the failure detection time listed in "*2.1.3 Safety Performance on page 63*" and design the servo system so that when a fault occurs the overall time to detect the fault and to bring the machine to a non-hazardous condition is shorter than the time to reach the hazard.
- When the servomotor is operating, a difference will occur between the encoder position monitored by the ASM-X and the actual encoder position. Ensure that this difference in positions does not become a danger. Refer to the following section for the procedure to check the difference.
  ☞ *5.2.1 Checking Maximum Position on page 93*

5.2.1 Checking Maximum Position

1. **Calculate the maximum acceleration of the servomotor.**

$$\text{Max. acceleration [rad/s}^2\text{]} = \frac{\text{MaxTrq [Nm]}}{J_M\ [\text{kgm}^2] + J_L\ [\text{kgm}^2]} \quad \cdots\cdots \text{(Formula 1)}$$

MaxTrq:	Maximum torque Servomotor rated torque × (internal torque limit or external torque limit) or the servomotor instantaneous maximum torque, whichever is lower Example: If rated torque = 1.27 [N·m], internal torque limit value = 250%, and servomotor instantaneous maximum torque = 4.47 [N·m] Rated torque × 2.5 (= 3.175 [N·m]) is less than servomotor instantaneous maximum torque (= 4.47 [N·m]). Therefore, (Formula 1) is calculated with MaxTrq = 3.175 [N·m].
J_M:	Servomotor moment of inertia
J_L :	Load-side moment of inertia

2. **Calculate the maximum speed when the servomotor continues to accelerate in one direction at the maximum acceleration.**

$$\text{Max. speed [min}^{-1}\text{]} = \text{Max. acceleration [rad/s}^2\text{]} \times T_1\ [\text{s}] \times 60 \times \frac{180}{\pi} \times \frac{1}{360} \quad \cdots\cdots \text{(Formula 2)}$$

Maximum speed:	Speed at arrival when the servomotor has accelerated for time T_1 at the maximum acceleration. Calculate the maximum speed using 120% of the maximum motor speed [min^{-1}] as the upper limit.
T_1:	When using a normal encoder: 0.006 s When using an encoder with functional safety: Determined by the setting in ASM-X parameter Pc710 (Safety Function Application Selection).

Pc170 = n.□□XX (Valid only when an encoder with functional safety is connected)	**00**	**10**	**01**	**11**
T_1 [s]	0.006	0.009	0.012	0.018

3. **Calculate the maximum position to move at the maximum speed.**

$$\text{Max. position [deg]} = \text{Max. speed [min}^{-1}\text{]} \times \frac{1}{60} \times T_1\text{[s]} \times 360 \quad \cdots\cdots \text{(Formula 3)}$$

Maximum speed:	Travel amount when the servomotor moved for time T_1 at the maximum speed calculated in Formula 2.
T_1:	Same as for Formula 2.

5.2.2 Calculation Example

A calculation example is given below.

Refer to the following section for typical calculation results.

☞ *12 Appendices on page 537*

(1) Calculation Example Conditions

- Used servomotor: SGMXJ-04AUA21A3

Item	Value	Remarks
Rated torque [N·m]	1.27	-
Instantaneous maximum torque [N·m]	4.46	-
Maximum motor speed [min^{-1}]	6000	-
Rotor moment of inertia [× 10^{-4} kg·m^2]	0.486	No holding brake

- Torque limit settings of used SERVOPACK

Parameter Item	Value	Remarks
Forward Torque Limit (Pn402) [1%]	150	-
Reverse Torque Limit (Pn403) [1%]	200	-
Forward External Torque Limit (Pn404) [1%]	800	-
Reverse External Torque Limit (Pn405) [1%]	800	-

- Equipment specification

Item	Value	Remarks
Moment of inertia ratio	5	Ratio of moment of inertia on equipment (load) side (J_L) to servomotor rotor moment of inertia (J_M) Moment of inertia ratio = (J_L/J_M)

- Setting in ASM-X parameter Pc710 (Safety Function Application Selection)

Item	Value	Remarks
Pc170 = n.□□□X Safety Function Monitoring Resolution Mode Selection	0 (normal mode)	-
Pc170 = n.□□X□ Safety Function Monitoring Response Mode Selection	1 (disable high response mode)	-

- Calculation of maximum acceleration

  1. Judgment of maximum applicable torque value

Item to Check	Torque Value [N·m]	Remarks
Servomotor instantaneous maximum torque	4.46	-
Servomotor rated torque × Forward internal torque limit value	1.91	-
Servomotor rated torque × Reverse internal torque limit value	2.54	-
Servomotor rated torque × Forward external torque limit value	10.16	Servomotor instantaneous maximum torque is applicable.
Servomotor rated torque × Reverse external torque limit value	10.16	Servomotor instantaneous maximum torque is applicable.

If the internal torque limit is used, a difference between forward and reverse will occur, such as that shown above, because the limit value can be set for both forward and reverse. In this case, the torque values during forward and reverse are lower than the instantaneous maximum torque, so these values are applied to the calculation. This example is calculated for the reverse direction only.

2. Calculation of maximum acceleration

$$\text{Max. acceleration [rad/s}^2\text{]} = \frac{\text{MaxTrq [N·m]}}{J_M\ [\text{kg·m}^2] + J_L\ [\text{kg·m}^2]}$$

$$= \frac{2.54}{0.486 \times (1 + 5) \times 10^{-4}}$$

$$= 8711$$

3. Calculation of maximum speed

$$\text{Max. speed [min}^{-1}\text{]} = \text{Max. acceleration [rad/s}^2\text{]} \times T_1\ [\text{s}] \times 60 \times \frac{180}{\pi} \times \frac{1}{360}$$

T_1 is determined by the setting in ASM-X parameter Pc170 (Safety Function Application Selection). This calculation example is calculated with Pc170 = n.0010.

Pc170 = n.□□XX	00	10	01	11
T_1 [s]	0.006	0.009	0.012	0.018

$$\text{Max. speed [min}^{-1}\text{]} = 8711 \times 0.009 \times 60 \times \frac{180}{\pi} \times \frac{1}{360}$$

$$= 749$$

4. Calculation of maximum position

$$\text{Max. position [deg]} = \text{Max. speed [min}^{-1}\text{]} \times \frac{1}{60} \times T_1\ [\text{s}] \times 360$$

$$= 749 \times \frac{1}{60} \times 0.009 \times 360$$

$$= 40.4$$

5.2.3 Precautions When Using the Acceleration Filter

Remember the following points when using the acceleration filter (Pc173).

- Delay in Acceleration Value from the Moving Average Filter Time
  A delay of the set moving average time applied to the unfiltered acceleration occurs in the filtered acceleration. Use the filter only when this delay time can be allowed.
- Decrease in Acceleration Peak Value from the Moving Average Filter
  When the actual change in acceleration is faster than the moving average time, the peak value of the filtered acceleration will be lower than that of the unfiltered acceleration. Check operation with the actual equipment and confirm that the SLA function operates correctly.

5.2.4 Precautions When Reverting to the ProcessData State from the FailSafeData State

When the FSoE command becomes FailSafeData during safety function operation, turn OFF SRIS once before reverting to ProcessData. If SRIS is not turned OFF, safety function activation will be different than the user's intention, which may result in a hazardous situation.

Refer to the following section for details.

☞ *7.4.7 Operation When the FailSafeData Command Is Received on page 147*

5.3 Restrictions

5.3.1 Restrictions on Using a Test without a Motor

You cannot use the ASM-X safety functions and the SERVOPACK test without a motor at the same time.

To use the safety functions, disable the SERVOPACK test without a motor.

To use the test without a motor, you must disable all ASM-X safety functions. Set the following 10 parameters.

- Set Pc300, Pc340, Pc380, Pc3C0, Pc400, Pc440, Pc480, Pc4C0, and Pc500 = n.□□XX (Safety Function Selection) to "00 (Disabled)."
- Set Pc540 = n.□□□X (SBC Function Selection) to "0 (Do not use SBC function)."

Refer to the following section for details on the safety function slots.

☞ *7.3 Safety Function Slots on page 138*

5.3.2 Restrictions on Using an External Encoder

If you use an external encoder, the ASM-X will monitor the position, speed, and acceleration of the motor end encoder. Note that the external encoder will not be monitored.

5.3.3 Other Restrictions

There are restrictions on the SERVOPACKs and servomotors that can be combined with the ASM-X.

Refer to the following section for details.

☞ *1.6 Applicable Device Combinations on page 58*

5.4 /S-RDY (Servo Ready Output) Signal

5.4.1 /S-RDY (Servo Ready Output) Signal Output Conditions

The /S-RDY (Servo Ready Output) signal turns ON when the SERVOPACK is ready to accept the Servo ON command (Enable Operation command).

The /S-RDY signal is turned ON under the following conditions.

- The main circuit power must be ON.
- There is no hard wire base block state.
- There must be no alarms.
- There is no forced stop state (the Forced Stop Input (FSTP) signal is ON).
- If a servomotor without a polarity sensor is used, polarity detection has been completed.

  Note:

  Do not include this condition if the Servo ON command (Enable Operation command) is input for the first time after the control power was turned ON. In that case, when the first Servo ON command (Enable Operation command) is input, polarity detection is started immediately and the /S-RDY signal turns ON at the completion of polarity detection.
- When the ASM-X is connected, ASM-X preparations have completed (initialization processing has completed).
  (When the ASM-X software version is 0003 or later and the SERVOPACK software version is 0017 or later.)

  Note:

  ASM-X initialization completion time depends on the parameter settings, such as initial stuck diagnosis and SBC diagnosis. The listed number is the maximum time by combining parameters.

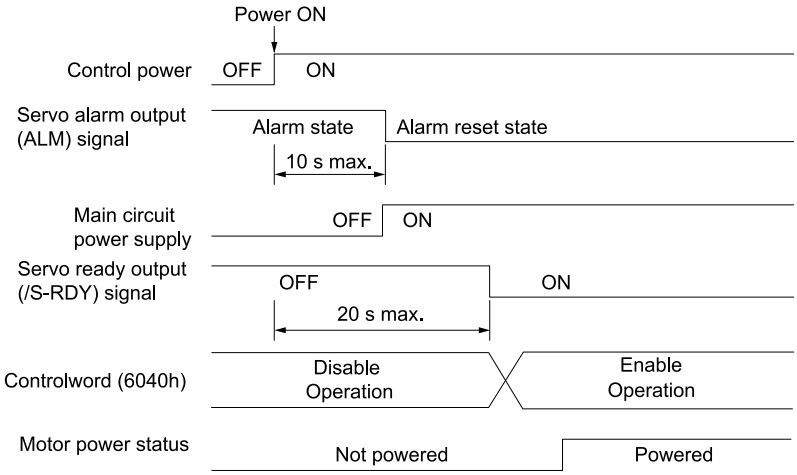
Refer to the following manual for the procedure to allocate the /S-RDY signal.

Σ-X-Series AC Servo Drive Σ-XS SERVOPACK with EtherCAT Communications References Product Manual (Manual No.: SIEP C710812 02)

5.4.2 Power ON Sequence

The power ON sequence is shown below.

For the input of the Servo ON command (Enable Operation command) after the control power is turned ON, input the command after confirming that the ALM signal is OFF (alarms are reset) and the /S-RDY (Servo Ready Output) signal is ON.



6

Basic Settings before Operation

This chapter describes the items that must be set before you start servo system operation and the setting methods.

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6.1 Setup Flow

6.1.1 Using an ASM-X for the First Time (Factory Default State)

Step	Task	Reference
1	Mount the ASM-X to the SERVOPACK.	Advanced Safety Module Installation Guide(Manual No.: TOMP C710812 26)
2	Wire the ASM-X.	*4 Wiring and Connections on page 79*
3	Register a user and log in with the SigmaWin+. **Note:** If user registration is already finished, log in with the registered account.	Engineering Tool SigmaWin+ Operation Manual (Manual No.: SIET S800001 34) *6.5.6 User Management on page 121*
4	Connect the SigmaWin+ with a cable to the SERVOPACK, and start the SigmaWin+ in online mode. **Note:** Alarms may occur on the SERVOPACK, but you can proceed to the next step as is.	Engineering Tool SigmaWin+ Operation Manual (Manual No.: SIET S800001 34) *6.1.4 Reference Information: Identifying an Individual SERVOPACK on page 103*
5	Set the ASM-X write password with the SigmaWin+, and then turn the power OFF and ON again.	Engineering Tool SigmaWin+ Operation Manual (Manual No.: SIET S800001 34) *6.5.6 User Management on page 121*
6	If the write password for the encoder with functional safety is not set, set the password with the SigmaWin+. **Note:** The default value for the encoder with functional safety is non-safety mode, but this operation sets it to safety mode.	Engineering Tool SigmaWin+ Operation Manual (Manual No.: SIET S800001 34) *6.5.6 User Management on page 121*
7	Display the ASM-X parameters by executing [Read Parameters] with the SigmaWin+, and then set the following two types of parameters. • safety-related servo parameter **Note:** The following parameter setting is required when using an encoder with functional safety. Pc068 = n.□□□1 • safety-related module parameter We recommend first setting the safety function monitoring resolution mode (Pc170 = n.□□□X) and the user units (Pc180 to Pc192), and then setting the units in the monitoring parameters for position, speed, and acceleration to set for the safety function slots.	Engineering Tool SigmaWin+ Operation Manual (Manual No.: SIET S800001 34) *6.4 Safety-Related Servo Parameters on page 113* *6.4.6 First Encoder Information (Pc068) on page 115* *6.3 safety-related module parameter on page 106* *(1) Safety Function Monitoring Resolution Mode Selection (Only When an Encoder with Functional Safety Is Connected) on page 106* *6.3.3 User Units on page 109*
8	Export the set parameters as a container file with the SigmaWin+.	Engineering Tool SigmaWin+ Operation Manual (Manual No.: SIET S800001 34)
9	Write the container file exported in step 8 to the ASM-X with the SigmaWin+. When you execute [Write Parameters] in the SigmaWin+, you will be asked to verify the encoder with functional safety password and the ASM-X password during the write operation, so enter the correct passwords that were set.	*6.3 safety-related module parameter on page 106* *6.4 Safety-Related Servo Parameters on page 113* Engineering Tool SigmaWin+ Operation Manual (Manual No.: SIET S800001 34)
10	Turn the power OFF and ON again. **Note:** If A.EC1 occurs after the power is turned OFF and ON again, execute [Compare] - [Safety-Related Servo Parameter Mismatch Check] in the SigmaWin+, check the parameter that caused the alarm, and correct the setting. After the setting is corrected, redo the procedure from step 8.	Engineering Tool SigmaWin+ Operation Manual (Manual No.: SIET S800001 34) *6.4 Safety-Related Servo Parameters on page 113*
11	Perform trial operation.	–
12	Perform actual operation.	–
13	Perform maintenance.	*10 Maintenance on page 347*

6.1.2 Discontinuing Use of the ASM-X and Using Only the SERVOPACK

Step	Task	Reference
1	Remove the ASM-X from the SERVOPACK.	🕮 Advanced Safety Module Installation Guide(Manual No.: TOMP C710812 26)
2	Clear option module detection failure alarms with the SigmaWin+.	🕮 Engineering Tool SigmaWin+ Operation Manual (Manual No.: SIET S800001 34)
3	Initialize the encoder with functional safety. **Note:** Initializing the encoder sets it to non-safety mode.	🕮 Engineering Tool SigmaWin+ Operation Manual (Manual No.: SIET S800001 34)

6.1.3 Removing an ASM-X Being Used and Using It with Another SERVOPACK

Use the following procedure when you replace the SERVOPACK being used together with the ASM-X.

Step	Task	Reference
1	Export the ASM-X parameters container file with the SigmaWin+.	🕮 Engineering Tool SigmaWin+ Operation Manual (Manual No.: SIET S800001 34)
2	Remove the ASM-X from the SERVOPACK.	🕮 Advanced Safety Module Installation Guide(Manual No.: TOMP C710812 26)
3	Connect the SigmaWin+ with a cable to the SERVOPACK from which the ASM-X was removed, and clear the option module detection failure alarms.	🕮 Engineering Tool SigmaWin+ Operation Manual (Manual No.: SIET S800001 34)
4	Mount the ASM-X to another SERVOPACK.	🕮 Advanced Safety Module Installation Guide(Manual No.: TOMP C710812 26)
5	Wire the ASM-X.	☞ *4 Wiring and Connections on page 79*
6	Register a user and log in with the SigmaWin+. **Note:** If user registration is already finished, log in with the registered account.	🕮 Engineering Tool SigmaWin+ Operation Manual (Manual No.: SIET S800001 34) ☞ *6.5.6 User Management on page 121*
7	Connect the SigmaWin+ with a cable to the SERVOPACK, and start the SigmaWin+ in online mode. **Note:** Alarms may occur on the SERVOPACK, but you can proceed to the next step as is.	🕮 Engineering Tool SigmaWin+ Operation Manual (Manual No.: SIET S800001 34) ☞ *6.1.4 Reference Information: Identifying an Individual SERVOPACK on page 103*
8	Initialize the ASM-X with the SigmaWin+, and then turn the power OFF and ON again.	🕮 Engineering Tool SigmaWin+ Operation Manual (Manual No.: SIET S800001 34)
9	Set the ASM-X write password with the SigmaWin+, and then turn the power OFF and ON again.	🕮 Engineering Tool SigmaWin+ Operation Manual (Manual No.: SIET S800001 34) ☞ *6.5.6 User Management on page 121*
10	Write the container file exported in step 1 to the ASM-X with the SigmaWin+. When you execute [Write Parameters] in the SigmaWin+, you will be asked to verify the encoder with functional safety password and the ASM-X password during the write operation, so enter the correct passwords that were set.	🕮 Engineering Tool SigmaWin+ Operation Manual (Manual No.: SIET S800001 34)
11	Turn the power OFF and ON again.	🕮 Engineering Tool SigmaWin+ Operation Manual (Manual No.: SIET S800001 34)
12	Perform trial operation.	–
13	Perform actual operation.	–
14	Perform maintenance.	☞ *10 Maintenance on page 347*

6.1.4 Reference Information: Identifying an Individual SERVOPACK

The ASM-X saves the serial number of the SERVOPACK to which it was first mounted in EEPROM, and then checks if the SERVOPACK serial number matches the value in EEPROM each time the power is turned ON.

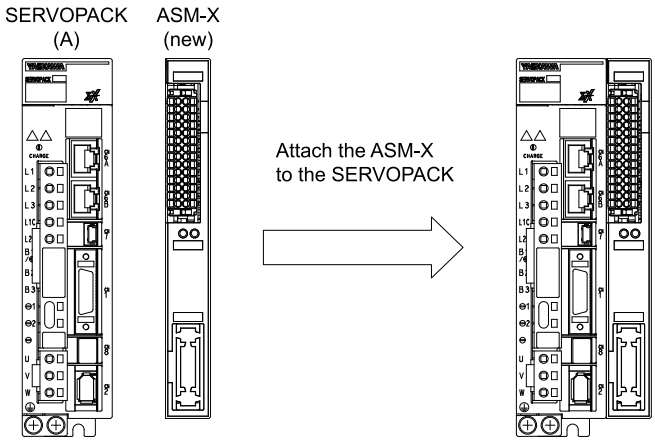
If the serial number does not match, alarm A.EC0 (Setup Confirmation Alarm) will occur.

If A.EC0 is displayed, use the SigmaWin+ to initialize the ASM-X.

(1) Using an ASM-X for the First Time (Factory Default State)

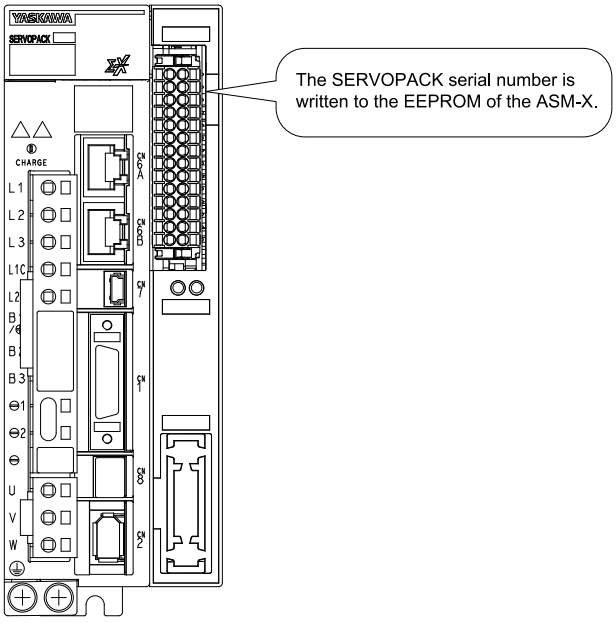
Information To make this explanation easier to understand, only the procedure to identify an individual SERVOPACK is described.

1. **Mount the ASM-X to SERVOPACK (A).**



2. **Turn ON the power.**

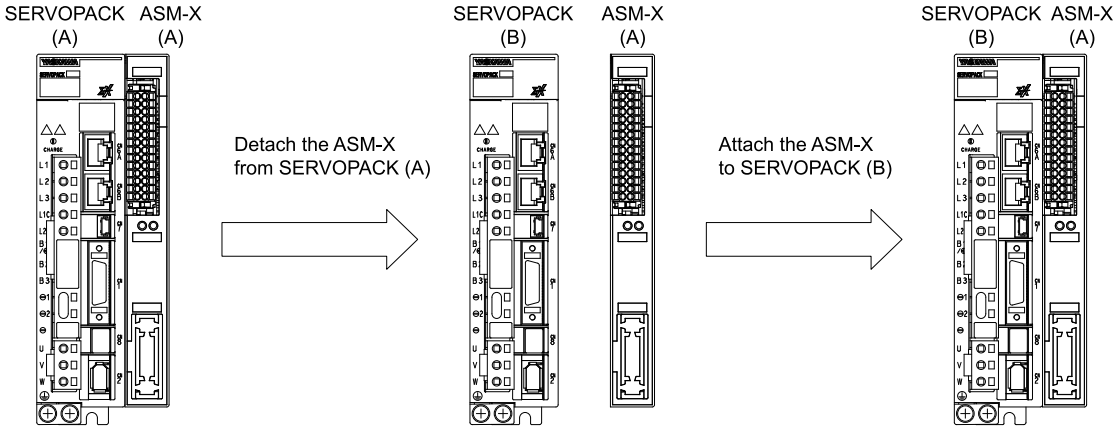
When you turn ON the power, the SERVOPACK's serial number will be written to the EEPROM in the ASM-X. From this point on, only this combination of devices can be used.



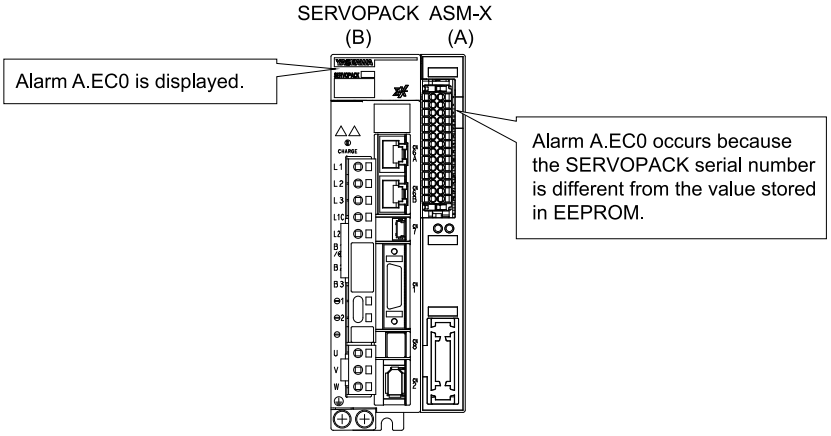
(2) Removing an ASM-X Being Used and Mounting It to Another SERVOPACK

Information To make this explanation easier to understand, only the procedure to identify an individual SERVOPACK is described.

1. **Remove ASM-X (A) from SERVOPACK (A) and mount it to SERVOPACK (B).**



2. **Turn ON the power. Alarm A.EC0 (Setup Confirmation Alarm) will be displayed on the SERVOPACK.**

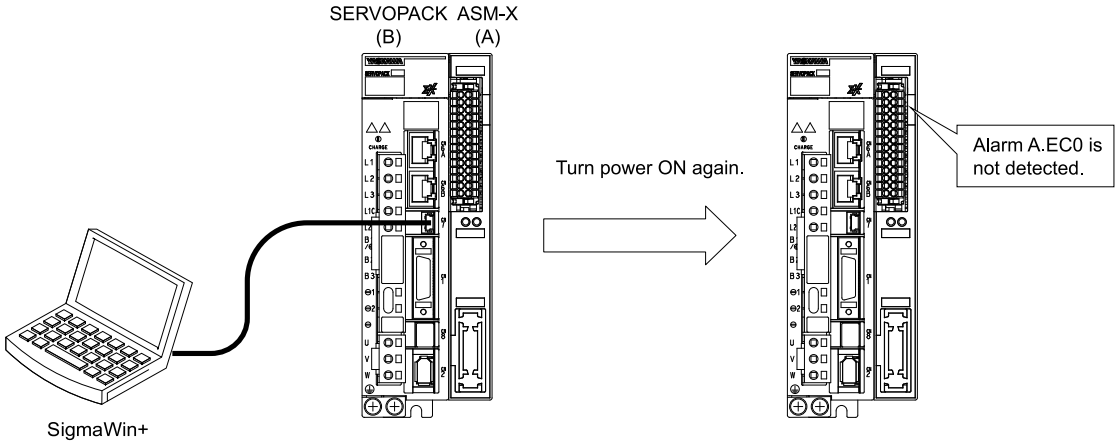


3. **Initialize ASM-X (A).**

Information Refer to the following manual for the initialization procedure.

Engineering Tool SigmaWin+ Operation Manual(Manual No.: SIET S800001 34)

4. **Turn the power to the SERVOPACK OFF and ON again.**



5. **Set the password and write the parameters to the ASM-X. This allows you to use the combination of SEROVPACK (B) and ASM-X (A).**

6.2 Parameter Settings

6.2.1 Parameter Types

To use the ASM-X, you must set the parameters according to your servo system. There are two types of parameters in the ASM-X.

Type	Description
Safety-related module parameters	These parameters are used to set the safety functions. These parameters are special parameters for the ASM-X.
Safety-related servo parameters	These parameters are related to the safety functions of the SERVOPACK, the servomotor, and the encoder with functional safety. This is information held by the SERVOPACK and the encoder with functional safety, and the same information is also managed in the ASM-X as ASM-X parameters. The parameter settings for the ASM-X must be matched to the SERVOPACK, the parameter settings for the encoder with functional safety, and the servomotor type.

6.2.2 Operating Procedure

Use the SigmaWin+ engineering tool to set the parameters. Refer to the following section for details on the operating procedure.

☞ *6.5 Engineering Tool on page 119*

When the parameters are written from the engineering tool, alarm A.EB9 (Safety Module - Parameter Modification Alarm) will occur in the ASM-X. This alarm does not indicate an error. It is a reminder to turn the power OFF and ON again. Turn the power OFF and ON again to clear the alarm.

6.2.3 Correction for When the Parameters Version Is Mismatched

If the parameters version of a container file created in the past is different than the ASM-X parameters version currently being used, those parameters cannot be written to the ASM-X.

In this case, first import the container file or parameter information file into the SigmaWin+, commit the parameter settings, and then export the parameters to a new container file. This new container file can then be written to the ASM-X.

When you commit the parameter settings, make sure to confirm that there are no problems with the values of the corresponding parameter settings. Refer to the following section for details.

☞ *11.3.3 Parameters Revision History on page 525*

Refer to the following section for the ASM-X parameters version.

☞ *11.3.1 Viewing the Parameters Version on page 525*

Refer to the following manual for details on importing, exporting, and committing parameters, as well as for the procedure to check the parameters version of container files and parameter information files.

🕮 Engineering Tool SigmaWin+ Operation Manual (Manual No.: SIET S800001 34)

6.3 safety-related module parameter

The safety-related module parameters are organized into the following groups. Configure the parameter settings by group.

Parameter Group	Description	Has Parameters?		Parameter No.	Reference
		SGDXS-OSAA0A	SGDXS-OSAA1A		
Digital I/O	Set whether to use digital input signals and digital output signals as well as the operating specifications (e.g., filtering time, discrepancy allowable time, and test pulse length).	×	○	Pc0C0 to Pc0FB	*7.4 Input Signals on page 142*, *7.5 Output Signals on page 152*
Safety fieldbus	Set the FSoE station address, operation selection, and SPDU selection.	○	○	Pc120 to Pc122	*7.2 Safety Fieldbus Specifications on page 131*
Encoder	Set the deviation tolerance and deviation window related to encoder diagnostics. Or set the safe home position offset for position monitoring.	○	○	Pc150, Pc152, and Pc160	*(1) Encoder Diagnostic Function on page 108*
Safety functions (common)	Set the operation mode and limit violation deactivation delay time used in common by the safety functions.	○	○	Pc170 to Pc173	*6.3.1 Safety Functions (Common) on page 106*
User units	Set the unit system for the position, speed, and acceleration of the encoder according to the machine specifications.	○	○	Pc180 to Pc192	*6.3.3 User Units on page 109* *(3) Limit Violation Deactivation Delay Time on page 107*
Safety function slot	Set the function selection, input or output terminal selection, and other parameters individually for safety function slots 1 to 10.	○	○	Pc300 to Pc553	*7.3 Safety Function Slots on page 138*

○: Has parameters, ×: Does not have parameters

6.3.1 Safety Functions (Common)

(1) Safety Function Monitoring Resolution Mode Selection (Only When an Encoder with Functional Safety Is Connected)

The resolution of the encoder pulse unit changes according to the setting of Safety Function Monitoring Resolution Mode Selection (Pc170 = n.□□□X) as shown below. If the setting of Safety Function Monitoring Resolution Mode Selection is changed, you must correct the user reference unit parameters.

Pc170 = n.□□□X	Resolution of an encoder with functional safety.
0 (normal mode)	32768 s_inc/rev *1
1 (high resolution mode)	1048576 s_inc/rev *1

*1 s_inc/rev: pulse unit per revolution of encoder with functional safety

When performing speed monitoring, monitoring can be performed at a resolution of 1 min^{-1} or less in both normal mode and high resolution mode.

When performing acceleration monitoring, high resolution mode allows monitoring at a higher resolution. However, the update cycle of encoder data will increase when high resolution mode is enabled.

Note:

When using a normal encoder, the encoder resolution is 20 bits and this setting is disabled.

Refer to the following section for performance information.

☞ *2.1.3 Safety Performance on page 63*

(2) Safety Function Monitoring Response Mode Selection (Only When an Encoder with Functional Safety Is Connected)

The selection of the safety function monitoring response mode affects the update cycle of the encoder data used to monitor the safety functions.

Pc170 = n.□□X□	Safety Function Monitoring Response Mode
0	Enable high response mode
1	Disable high response mode

Note:

When using a normal encoder, this setting is disabled.

When high response mode is disabled, alarm A.E29 (Safety Module - Encoder Error) may occur less frequently for alarms caused by noise, but the update cycle of the encoder data will increase.

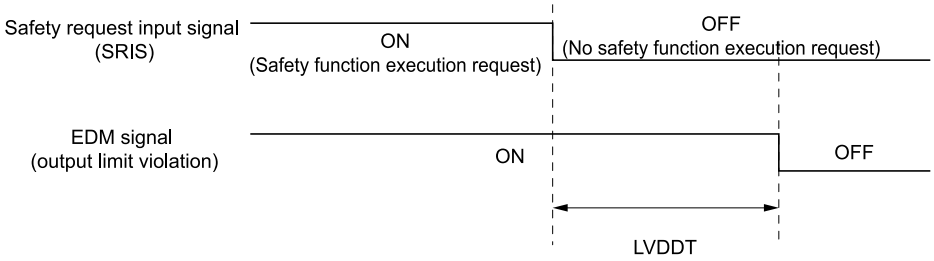
We recommend using high response mode when alarm A.E29 does not occur while high response mode is enabled.

Refer to the following section for the relationship between the update cycle of encoder data and the settings for the Safety Function Monitoring Resolution Mode and Safety Function Monitoring Response Mode.

☞ *2.1.3 Safety Performance on page 63*

(3) Limit Violation Deactivation Delay Time

When outputting the limit violation state to EDM, you can delay when EDM turns OFF so that the device receiving EDM can identify the signal status.



Set delay time LVDDT in Pc172 (Limit Violation Deactivation Delay Time). This setting is common to all safety functions.

(4) Acceleration Filter (Pc173)

You can apply a moving average filter to the acceleration of the servomotor to monitor with the SLA (safety-limited acceleration) function.

The SLA function monitors servomotor acceleration after this filter is applied.

Note:

This function is available in ASM-X software version 0003 or later.

Pc173	Acceleration Filter Time			Speed Pos Trq
	Setting Range	Setting Unit	Default Setting	When Enabled
	0 to 30	1 ms	0	After restart

Important

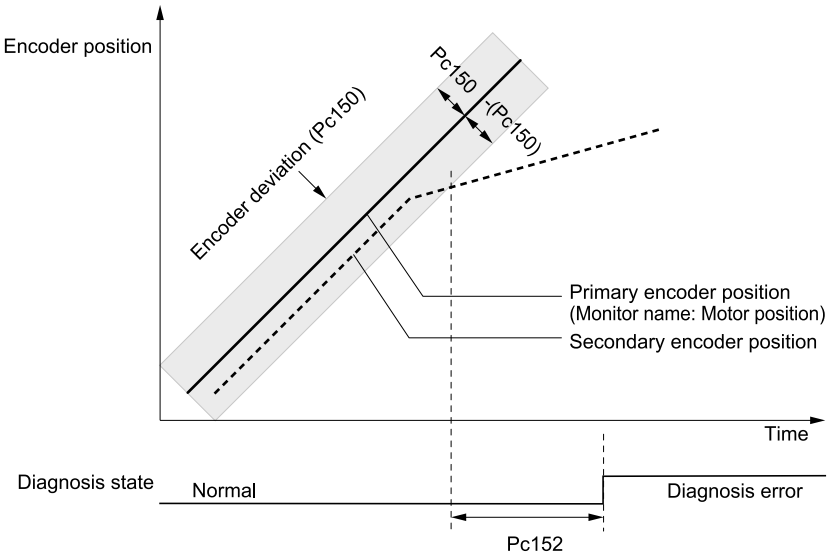
Remember the following points when using this function.

- The filter's sampling cycle is 3 ms. Therefore, the filter is not used when the value is 0 to 2.
- Delay in Acceleration Value from the Moving Average Filter Time
  A delay of the set moving average time applied to the unfiltered acceleration occurs in the filtered acceleration. Use the filter only when this delay time can be allowed.
- Decrease in Acceleration Peak Value from the Moving Average Filter
  When the actual change in acceleration is faster than the moving average time, the peak value of the filtered acceleration will be lower than that of the unfiltered acceleration. Check operation with the actual equipment and confirm that the SLA function operates correctly.

6.3.2 Encoder-Related Information

(1) Encoder Diagnostic Function

The ASM-X receives feedback data in redundant systems from the encoder and checks whether the encoder is operating correctly by comparing that data.



Pc150	Encoder Deviation			Speed Pos Trq
	Setting Range	Setting Unit	Default Setting	When Enabled
	0 to 1073741823	User position reference unit	16384	After restart
Pc152	Encoder Deviation Window			Speed Pos Trq
	Setting Range	Setting Unit	Default Setting	When Enabled
	0 to 65535	1 ms	0	After restart

Set the deviation tolerance between the primary encoder position and the secondary encoder position in Pc150. Set the time to delay the diagnostic error when the deviation becomes greater than the tolerance in Pc152.

You can view the encoder position information (primary and secondary) by monitoring or tracing in the Sigma-Win+.

If a diagnostic error occurs, alarm A.E2B (Exceeded Encoder Deviation) will occur.

However, the alarm will occur only when the following three conditions are satisfied.

- An encoder with functional safety is being used.
- Pc068 is set to n.□0□□ (When using an encoder with functional safety or when using STO, SS1-t, and SBC functions only).
- Pc088 is set to a value that is not 0 (Safety Encoder - Safe Address ≠ 0).

(2) Safe Home Position Offset

Set the safe home position offset for position monitoring.

Pc160	Safe Home Position Offset			Speed Pos Trq
	Setting Range	Setting Unit	Default Setting	When Enabled
	-1073741823 to 1073741823	User position reference unit	0	After restart

Refer to the following section for the safe home position.

☞ *7.23 SHP (Safe Home Position) on page 256*

6.3.3 User Units

The position, speed, and acceleration data in the ASM-X can be matched to the specifications of the machine by using the user reference unit parameters. The ASM-X also monitors the operation of safety functions by using the position, speed, and acceleration that were converted to the user units.

If the setting of Safety Function Monitoring Resolution Mode Selection (Pc170 = n.□□□X) is changed, you must correct the user reference unit parameters.

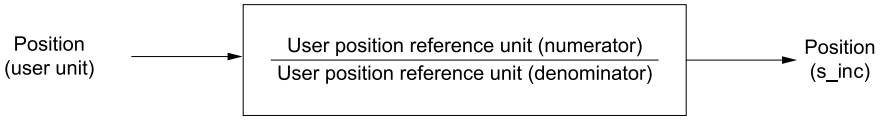
> Important
>
> Set the user units within the following range.
>
> 1/262144 ≤ (User reference unit numerator / User reference unit denominator) ≤ 262144
>
> If a value is set outside this range, alarm A.EB2 (Parameter Setting Error) will occur.

(1) Related Parameters

Pc180	Safety Module: User Position Reference Unit (Numerator)			Speed Pos Trq
	Setting Range	Setting Unit	Default Setting	When Enabled
	1 to 1073741824	–	1	After restart
Pc182	Safety Module: User Position Reference Unit (Denominator)			Speed Pos Trq
	Setting Range	Setting Unit	Default Setting	When Enabled
	1 to 1073741824	–	1	After restart
Pc188	Safety Module: User Speed Reference Unit (Numerator)			Speed Pos Trq
	Setting Range	Setting Unit	Default Setting	When Enabled
	1 to 1073741824	–	1	After restart
Pc18A	Safety Module: User Speed Reference Unit (Denominator)			Speed Pos Trq
	Setting Range	Setting Unit	Default Setting	When Enabled
	1 to 1073741824	–	1	After restart
Pc190	Safety Module: User Acceleration Ref. Unit (Numerator)			Speed Pos Trq
	Setting Range	Setting Unit	Default Setting	When Enabled
	1 to 1073741824	–	1	After restart
Pc192	Safety Module: User Acceleration Ref. Unit (Denominator)			Speed Pos Trq
	Setting Range	Setting Unit	Default Setting	When Enabled
	1 to 1073741824	–	1	After restart

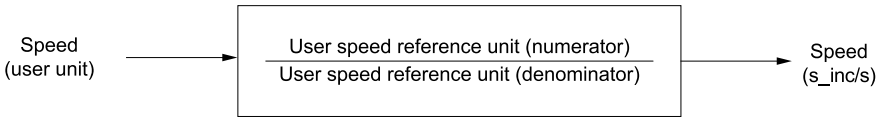
(2) User position reference unit

The following figure illustrates the concept of the user position reference unit. Set the conversion factors to convert position (user unit) to position (s_inc) as the numerator and the denominator.



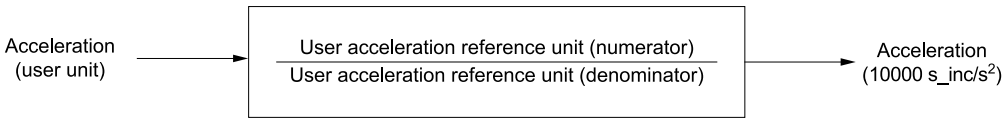
(3) User speed reference unit

The following figure illustrates the concept of the user speed reference unit. Set the speed (user unit) to be speed (s_inc/s).



(4) User Acceleration Reference Unit

The following figure illustrates the concept of the user acceleration reference unit. Set the acceleration (user unit) to be acceleration (10000 s_inc/s^2).



(5) Examples of Setting User Units

Examples of setting user units are shown next.

(a) When the Safety Function Monitoring Resolution Mode is set to Normal Mode (Pc170 = n.□□□0)

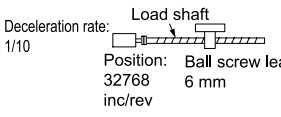
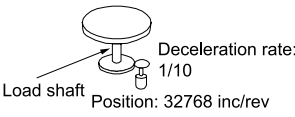
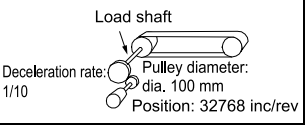
◆ User position reference unit

Step	Description	Machine Configuration		
		Ball Screw	Rotary Table	Belt and Pulley
		User position reference unit: 0.1 mm Deceleration rate: 1/10 Load shaft Position: 32768 inc/rev Ball screw lead: 6 mm	User position reference unit: 0.1° Deceleration rate: 1/10 Load shaft Position: 32768 inc/rev	User position reference unit: 1 mm Load shaft Deceleration rate: 1/10 Pulley diameter: dia. 100 mm Position: 32768 inc/rev
1	Machine specifications	• Ball screw lead: 6 mm • Gear ratio: 1/10	• Rotational angle per revolution: 360° • Gear ratio: 1/10	• Pulley dia.: 100 mm (pulley circumference: 314 mm) • Gear ratio: 1/10
2	Encoder resolution	32768 s_inc/rev	32768 s_inc/rev	32768 s_inc/rev
3	User position reference unit	0.1 mm	0.1°	1 mm
4	Travel distance per load shaft revolution (user position reference units)	6 mm/0.1 mm = 60	360°/0.1° = 3600	314 mm/1 mm = 314
5	Calculation of user position reference unit	$\frac{32768}{60} \times \frac{10}{1}$	$\frac{32768}{3600} \times \frac{10}{1}$	$\frac{32768}{314} \times \frac{10}{1}$
6	Parameters	Pc180 = 32768 Pc182 = 6	Pc180 = 32768 Pc182 = 360	Pc180 = 327680 Pc182 = 314

◆ User speed reference unit

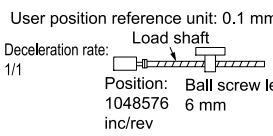
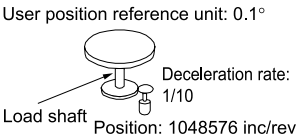
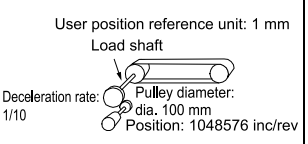
Step	Description	Machine Configuration		
		Ball Screw	Rotary Table	Belt and Pulley
		Deceleration rate: 1/10 Load shaft Position: 32768 inc/rev Ball screw lead: 6 mm	Deceleration rate: 1/10 Load shaft Position: 32768 inc/rev	Load shaft Deceleration rate: 1/10 Pulley diameter: dia. 100 mm Position: 32768 inc/rev
1	Machine Specifications	• Ball screw lead: 6 mm • Gear ratio: 1/10	• Rotational angle per revolution: 360° • Gear ratio: 1/10	• Pulley dia.: 100 mm (pulley circumference: 314 mm) • Gear ratio: 1/10
2	Encoder Resolution	32768 s_inc/rev	32768 s_inc/rev	32768 s_inc/rev
3	User speed reference unit	1 mm/s	1 min^{-1}	1 mm/s
4	Calculation of user speed reference unit	$\frac{32768\ [\text{inc}]}{6\ [\text{mm}]} \times \frac{10}{1} \times 1\ [\text{mm/s}]$	$\frac{32768\ [\text{inc}]}{1\ [\text{rev}]} \times \frac{10}{1} \times \frac{1}{60}\ [\text{rev/s}]$	$\frac{32768\ [\text{inc}]}{314\ [\text{mm}]} \times \frac{10}{1} \times 1\ [\text{mm/s}]$
5	Parameter	Pc188 = 327680 Pc18A = 6	Pc188 = 327680 Pc18A = 60	Pc188 = 327680 Pc18A = 314

◆ User Acceleration Reference Unit

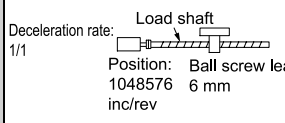
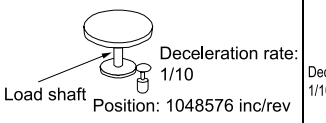
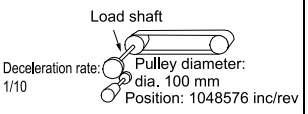
Step	Description	Machine Configuration		
		Ball Screw	Rotary Table	Belt and Pulley
				
1	Machine specifications	• Ball screw lead: 6 mm • Gear ratio: 1/10	• Rotational angle per revolution: 360° • Gear ratio: 1/10	• Pulley dia.: 100 mm (pulley circumference: 314 mm) • Gear ratio: 1/10
2	Encoder resolution	32768 s_inc/rev	32768 s_inc/rev	32768 s_inc/rev
3	User acceleration reference unit	0.1 mm/s^2	1 r/s^2	1 mm/s
4	Calculation of user acceleration reference unit	$\frac{32768\ [inc]}{6\ [mm]} \times \frac{10}{1} \times 0.1\ [mm/s^2] \times 10^{-4}$	$\frac{32768\ [inc]}{1\ [rev]} \times \frac{10}{1} \times 1\ [rev/s^2] \times 10^{-4}$	$\frac{32768\ [inc]}{314\ [mm]} \times \frac{10}{1} \times 1\ [mm/s] \times 10^{-4}$
5	Parameters	Pc190 = 32768 Pc192 = 60000	Pc190 = 32768 Pc192 = 1000	Pc190 = 32768 Pc192 = 314000

(b) When the Safety Function Monitoring Resolution Mode is set to High Resolution Mode Pc170 = n.□□□1)

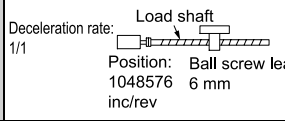
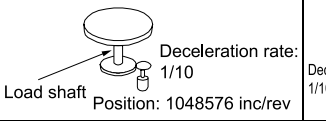
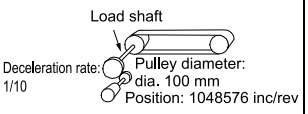
◆ User position reference unit

Step	Description	Machine Configuration		
		Ball Screw	Rotary Table	Belt and Pulley
				
1	Machine specifications	• Ball screw lead: 6 mm • Gear ratio: 1/1	• Rotational angle per revolution: 360° • Gear ratio: 1/10	• Pulley dia.: 100 mm (pulley circumference: 314 mm) • Gear ratio: 1/10
2	Encoder resolution	1048576 s_inc/rev	1048576 s_inc/rev	1048576 s_inc/rev
3	User position reference unit	0.1 mm	0.1°	1 mm
4	Travel distance per load shaft revolution (user position reference units)	6 mm/0.1 mm = 60	360°/0.1° = 3600	314 mm/1 mm = 314
5	Calculation of user position reference unit	$\frac{1048576}{60} \times \frac{1}{1}$	$\frac{1048576}{3600} \times \frac{10}{1}$	$\frac{1048576}{314} \times \frac{10}{1}$
6	Parameters	Pc180 = 1048576 Pc182 = 60	Pc180 = 1048576 Pc182 = 360	Pc180 = 10485760 Pc182 = 314

◆ User speed reference unit

Step	Description	Machine Configuration		
		Ball Screw	Rotary Table	Belt and Pulley
				
1	Machine specifications	• Ball screw lead: 6 mm • Gear ratio: 1/1	• Rotational angle per revolution: 360° • Gear ratio: 1/10	• Pulley dia.: 100 mm (pulley circumference: 314 mm) • Gear ratio: 1/10
2	Encoder resolution	1048576 s_inc/rev	1048576 s_inc/rev	1048576 s_inc/rev
3	User speed reference unit	1 mm/s	1 min^{-1}	1 mm/s
4	Calculation of user speed reference unit	$\frac{1048576\ [inc]}{6\ [mm]} \times \frac{1}{1} \times 1\ [mm/s]$	$\frac{1048576\ [inc]}{1\ [rev]} \times \frac{10}{1} \times \frac{1}{60}\ [rev/s]$	$\frac{1048576\ [inc]}{314\ [mm]} \times \frac{10}{1} \times 1\ [mm/s]$
5	Parameters	Pc188 = 1048576 Pc18A = 6	Pc188 = 1048576 Pc18A = 6	Pc188 = 10485760 Pc18A = 314

◆ User Acceleration Reference Unit

Step	Description	Machine Configuration		
		Ball Screw	Rotary Table	Belt and Pulley
				
1	Machine specifications	• Ball screw lead: 6 mm • Gear ratio: 1/1	• Rotational angle per revolution: 360° • Gear ratio: 1/10	• Pulley dia.: 100 mm (pulley circumference: 314 mm) • Gear ratio: 1/10
2	Encoder resolution	1048576 s_inc/rev	1048576 s_inc/rev	1048576 s_inc/rev
3	User acceleration reference unit	1 mm/s^2	1 r/s^2	1 mm/s
4	Calculation of user acceleration reference unit	$\frac{1048576\ [inc]}{6\ [mm]} \times \frac{1}{1} \times 1\ [mm/s^2] \times 10^{-4}$	$\frac{1048576\ [inc]}{1\ [rev]} \times \frac{10}{1} \times 1\ [rev/s^2] \times 10^{-4}$	$\frac{1048576\ [inc]}{314\ [mm]} \times \frac{10}{1} \times 1\ [mm/s] \times 10^{-4}$
5	Parameters	Pc190 = 1048576 Pc192 = 60000	Pc190 = 1048576 Pc192 = 1000	Pc190 = 1048576 Pc192 = 314000

6.4 Safety-Related Servo Parameters

This section describes the safety-related servo parameters.

6.4.1 Motor Setting Switch (Pc050)

Pc050	n.□□□X	Motor Types	Speed Pos Trq	When Enabled
		0 Default	Rotary servomotor	After restart
		1	Reserved (Do not use.)	
Pc050	n.□□X□	Rotation Direction Selection	Speed Pos Trq	When Enabled
		0 Default	Use CCW as the forward direction.	After restart
		1	Use CW as the forward direction. (Reverse Rotation Mode)	

Set the same value as Pn000 = n.□□□X (Rotation Direction Selection) in the SERVOPACK. If the values are different, alarm A.EC1 (Safety-Related Servo Parameter Mismatch) will occur.

6.4.2 Function Selection (Pc051)

Pc051	n.□□□X	Function Selection for Test without a Motor	Speed Pos Trq	When Enabled
		0 Default	Disable tests without a motor.	After restart
		1	Enable tests without a motor.	

Set the same value as Pn00C = n.□□□X (Function Selection for Test without a Motor) in the SERVOPACK. If the values are different, alarm A.EC1 (Safety-Related Servo Parameter Mismatch) will occur.

Note:

When the test without a motor is enabled, alarm A.EB2 (Parameter Setting Error) will occur. To use the test without a motor, set all ASM-X safety functions to "Do not use."

6.4.3 Encoder Configuration Setting 1 (Pc060)

Pc060	Encoder Data Configuration Setting 1			Speed Pos Trq
	Setting Range	Setting Unit	Default Setting	When Enabled
	0 to 32	1 bit	26	After restart

Set the number of bits of the motor encoder.

Refer to the following section for more information on encoder configuration settings.

☞ *6.4.10 Combinations of Encoder-Related Parameters on page 116*

6.4.4 Maximum Motor Speed (Pc062)

Pc062	n.□□XX	Mantissa Part of Maximum Motor Rotation Speed	Speed Pos Trq	When Enabled
		–	0 to 255	After restart
Pc062	n.XX□□	Exponent Part of Maximum Motor Speed	Speed Pos Trq	When Enabled
		03	10^3	After restart
		02	10^2	
		01 Default	10^1	
		00	10^0	
		FF	10^{-1}	
		FE	10^{-2}	
		FD	10^{-3}	

Set the maximum speed of the servomotor to be combined with the ASM-X as the significand and the exponent.

Maximum Servomotor Speed [min^{-1}]	Setting of Pc062	Servomotor Model (Example)
7000	n.0107 (exponent = 1, significand = 7)	SGMXJ, SGMXP SGMXA-A5 to 10
6000	n.0106 (exponent = 1, significand = 6)	SGMXA-15 to 70
4000	n.0104 (exponent = 1, significand = 4)	SGMXG-03 to 75
3000	n.0103 (exponent = 1, significand = 3)	SGMXG-1A, -1E

(1) Reference Information: Calculation Method of Mantissa and Exponent Settings

When Pc062 (Maximum Motor Speed) is set with the SigmaWin+, this parameter operates differently from the other parameters and the list of settings is not displayed. Directly enter the four-digit value. If the servomotor model is not listed above, use the following procedure to calculate the four-digit value to enter by splitting the value into the upper two digits and lower two digits.

1. Calculate the maximum motor speed with the following equations.
   □ × $10^{■}$ × 100 min^{-1}
2. Convert the value of □ found in step 1 to hexadecimal (two digits).
3. Refer to the following section and calculate the setting from the value of ■ found in step 1.
   ☞ *6.4.4 Maximum Motor Speed (Pc062) on page 114*
4. Write down the values of step 3 and step 2 in that order. These values are the values to enter.

Specific examples of calculating the input values are shown below.

Step		Example 1: When the Maximum Rotation Speed of the Motor Is 7000 min^{-1}	Example 2: When the Maximum Rotation Speed of the Motor Is 123 min^{-1}	Example 3: When the Maximum Rotation Speed of the Motor Is 50 min^{-1}
1	Calculate the maximum rotation speed of the motor	7 × 10^1 × 100 min^{-1}	123 × 10^{-2} × 100 min^{-1}	5 × 10^{-1} × 100 min^{-1}
2	Convert to hexadecimal	7 (decimal) → 07 (hexadecimal)	123 (decimal) → 7B (hexadecimal)	5 (decimal) → 05 (hexadecimal)
3	Convert the exponent of 10	10^1 → 01	10^{-2} → FE	10^{-1} → FF
4	Calculate input values from steps 2 and 3	Input value is "0107"	Input value is "FE7B"	Input value is "FF05"

6.4.5 Number of Encoder Pulses (Pc066)

Pc066	Number of Encoder Pulses			Speed Pos Trq
	Setting Range	Setting Unit	Default Setting	When Enabled
	0 to 1073741824	1 pulse/rev	0	After restart

Set the number of pulses per rotation of the rotary encoder.

6.4.6 First Encoder Information (Pc068)

Pc068	n.□□□X	Encoder Data Configuration Setting 2		Speed Pos Trq	When Enabled
		0 Default	Incremental encoder		After restart
		1	Absolute encoder		
Pc068	n.□□X□	Encoder Data Configuration Setting 3		Speed Pos Trq	When Enabled
		0 Default	No reverse connection		After restart
		1	Reserved (Do not use.)		

Set the type of encoder to be used. To use a Σ-X-series rotary servomotor, set Pc068 to n.□□01.

Pc068	n.□X□□	Encoder Data Configuration Setting 4	Speed Pos Trq	When Enabled
		0	When using an encoder with functional safety or when using STO, SS1-t, and SBC functions only	After restart
		1 Default	Rotary encoder compatible with Σ-LINK II (Σ-X series)	
		2 to 4	Reserved (Do not use.)	

Set the encoder as shown below.

Usage	Pc068 n. = □×□□	Pc088 (Safety Encoder - Safe Address)
When using the following safety functions with an encoder with functional safety: SS1-r, SS2-r, SS2-t, SOS, SLS, SLA, SSR, SSM, SDI-p, SDI-n, SLI, SLP, SCA, and SHP functions	0	≠ 0
When using the following safety functions with a normal encoder: SS1-r, SS2-r, SS2-t, SOS, SLS, SLA, SSR, SSM, SDI-p, SDI-n, SLI, SLP, SCA, and SHP functions	1	0
When using the following safety functions only: STO, SS1-t, and SBC functions	0	0

Pc068	n.X□□□	Encoder Usage	Speed Pos Trq	When Enabled
		0 Default	Use the encoder as an incremental encoder.	After restart
		1	Use the encoder as an absolute encoder.	

When Pc068 = n.□□□0 (incremental encoder), the encoder operates as an incremental encoder regardless of the setting of Pc068 = n.×□□□ (Encoder Usage).

If multi-turn data is required in the SLP, SCA, and SHP functions, set Pc068 = n.1□□□.

6.4.7 Encoder Data Configuration Setting 5 (Pc069)

Pc069	n.□□XX	Least Significant Bit Position in Encoder Position Data	Speed Pos Trq	When Enabled
		–	0 to 255	After restart
Pc069	n.XX□□	Most Significant Bit Position in Encoder Position Data	Speed Pos Trq	When Enabled
		–	0 to 255	After restart

Set the information to identify where the position data is located in the encoder communications frame.

Refer to the following section for details on the settings.

☞ *6.4.10 Combinations of Encoder-Related Parameters on page 116*

6.4.8 Multi-Turn Limit (Pc061)

Pc06A	Multiturn Limit			Speed Pos Trq
	Setting Range	Setting Unit	Default Setting	When Enabled
	0 to 65535	1 rev	65535	After restart

Even if the value of Pc06A and the value of SERVOPACK parameter Pn205 (Multiturn Limit) are different, an alarm will not occur.

6.4.9 Safety Encoder - Safe Address (Pc088)

Pc088	Safety Encoder - Safe address			Speed Pos Trq
	Setting Range	Setting Unit	Default Setting	When Enabled
	0000h to 003Fh	–	0001h	After restart

Set this parameter to the same value as the parameter for the encoder with functional safety in the motor to use (= Safe Address). If the values are different, alarm A.EC1 (Safety-Related Servo Parameter Mismatch) will occur.

Refer to the following section for details on the settings.

☞ *6.4.6 First Encoder Information (Pc068) on page 115*

6.4.10 Combinations of Encoder-Related Parameters

This section lists the combinations of parameter settings for each connected encoder.

(1) When an Encoder with Functional Safety Is Connected

The parameter settings when an encoder with functional safety is connected are shown below.

Pc No.	Name	Setting	Remarks
Pc050 = n.□□□X	Motor Type	0: Rotary servomotor	–
Pc060	Encoder Data Configuration Setting 1	26	–
Pc062	Maximum Motor Speed	*1	–
Pc066	Number of Encoder Pulses	67108864	Do not use
Pc068 = n.□□□X	Encoder Data Configuration Setting 2	1: Absolute encoder	Encoder with functional safety is absolute only

Continued on next page.

Continued from previous page.

Pc No.	Name	Setting	Remarks
Pc068 = n.□□X□	Encoder Data Configuration Setting 3	0	Do not use
Pc068 = n.□X□□	Encoder Data Configuration Setting 4	0	–
Pc069	Encoder Data Configuration Setting 5	5238h	–

*1 The following table lists the combinations of rotary motor and maximum speed.

Motor Model	Power Supply Voltage	Capacity	Pc062 = n.□□XX	Pc062 = n.XX□□	Remarks
SGMXJ	200 VAC	A5A (50 W) to 08A (750 W)	0x07	0x01	–
SGMXA	200 VAC	A5A (50 W) to 10A (1.0 kW)	0x07	0x01	–
		15A (1.5 kW) to 70A (7.0 kW)	0x06	0x01	–
	400 VAC	15D (1.5 kW) to 50D (5.0 kW)	0x06	0x01	–
SGMXP	200 VAC	01A (100 W) to 15A (1.5 kW)	0x07	0x01	–
	400 VAC	01D (100 W) to 15D (1.5 kW)	0x07	0x01	–
SGMXG	200 VAC	03A□A (0.3 kW) to 75A□A (7.5 kW)	0x04	0x01	1500-revolution specification
		1AA□A (11 kW) to 1EA□A (15 kW)	0x03	0x01	
		03A□B (0.3 kW) to 55A□B (5.5 kW)	0x02	0x01	1000-revolution specification
	400 VAC	05D□A (0.45 kW) to 75D□A (7.5 kW)	0x04	0x01	–
		1AD□A (11 kW) to 1ED□A (15 kW)	0x03	0x01	–

(2) When a Rotary Normal Encoder Is Connected

The parameter settings when a rotary normal encoder is connected are shown below.

Pc No.	Name	Setting	Remarks
Pc050 = n.□□□X	Motor Type	0: Rotary servomotor	–
Pc060	Encoder Data Configuration Setting 1	26	–
Pc062	Maximum Motor Speed	*1*	–
Pc066	Number of Encoder Pulses	67108864	–
Pc068 = n.□□□X	Encoder Data Configuration Setting 2	1: Absolute encoder	–
Pc068 = n.□□X□	Encoder Data Configuration Setting 3	0	–
Pc068 = n.□X□□	Encoder Data Configuration Setting 4	0	–
Pc069	Encoder Data Configuration Setting 5	5238h	–

*1 The following table lists the combinations of rotary motor and maximum speed.

Motor Model	Power Supply Voltage	Capacity	Pc062 = n.□□XX	Pc062 = n.XX□□	Remarks
SGMXJ	200 VAC	A5A (50 W) to 08A (750 W)	0x07	0x01	–
SGMXA	200 VAC	A5A (50 W) to 10A (1.0 kW)	0x07	0x01	–
		15A (1.5 kW) to 70A (7.0 kW)	0x06	0x01	–
	400 VAC	15D (1.5 kW) to 50D (5.0 kW)	0x06	0x01	–
SGMXP	200 VAC	01A (100 W) to 15A (1.5 kW)	0x07	0x01	–
	400 VAC	01D (100 W) to 15D (1.5 kW)	0x07	0x01	–
SGMXG	200 VAC	03A□A (0.3 kW) to 75A□A (7.5 kW)	0x04	0x01	1500-revolution specification
		1AA□A (11 kW) to 1EA□A (15 kW)	0x03	0x01	
		03A□B (0.3 kW) to 55A□B (5.5 kW)	0x02	0x01	1000-revolution specification
	400 VAC	05D□A (0.45 kW) to 75D□A (7.5 kW)	0x04	0x01	–
		1AD□A (11 kW) to 1ED□A (15 kW)	0x03	0x01	–

(3) When an Encoder Other Than Those Listed Above Is Connected

When an encoder other than those listed above is connected, only the following safety functions that do not use encoder data can be used.

- STO function
- SS1-t function
- SBC function

Set Pc068 = n.□X□□ (Encoder Data Configuration Setting 4) to 0.

6.5 Engineering Tool

6.5.1 Overview of Functions

Use the SigmaWin+ to set up the ASM-X and the servomotor with functional safety, configure the safety function settings, and perform troubleshooting. Use the SigmaWin+ Ver. 7.5 or later. Also add the ASM-X model information file to the SigmaWin+.

Information You can display product information, alarms, and monitors on the digital operator. However, you cannot use the digital operator for setup tasks, such as to set up the ASM-X and encoder with functional safety.

6.5.2 Reference Manual

This manual provides only an overview of the SigmaWin+ engineering tool. Refer to the following manual for details on functions and operating procedures.

Engineering Tool SigmaWin+ Operation Manual (Manual No.: SIET S800001 34)

Information Details on the ASM-X are primarily described in the "Setting Up Servo Drives" - "Setting Up a SERVOPACK to which the Advanced Safety Module (ASM-X) Is Mounted" section in the SigmaWin+ Operation Manual.

6.5.3 Editing the Parameters in the ASM-X and the Encoder with Functional Safety

The only engineering tool that can edit the ASM-X and the encoder with functional safety parameters is the SigmaWin+.

You can use the SigmaWin+ to perform the following operations related to setting the parameters.

Important
- If you are using ASM-X software version 0003 or later, use the SigmaWin+ version 7.54 or later.
- Before performing the following operations, confirm that the safety request input signals (SRIS) and safety data input signals (SDIS) for the safety functions are OFF.

- Read parameters saved in the ASM-X and the encoder with functional safety

  Important To check or edit the parameters in the connected ASM-X, make sure to click the [Read Parameters] button first, and then edit the parameters. The parameter values displayed when the [Edit Parameters] window is opened are the default values and not the parameter values in the connected ASM-X.

- Write parameters to the ASM-X and the encoder with functional safety
- Comparison operations
  - Compare the parameters saved in the ASM-X to the default settings
  - Compare the parameters saved in the ASM-X to the parameters being edited
  - Compare the parameters saved in a file to the parameters being edited
- Import (read parameter settings saved in a file)
- Export (save edited parameters to a file)

Note:

When the parameters are written to the ASM-X, alarm A.EB9 (Safety Module - Parameter Modification Alarm) will occur in the ASM-X. This alarm does not indicate an error. It is a reminder to turn the power OFF and ON again. Turn the power OFF and ON again to clear the alarm.

6.5.4 Initializing the ASM-X and the Encoder With Functional Safety

ASM-X initialization and encoder with functional safety initialization initialize the following content and reset the settings to the default values.

Item	Initialized Content
ASM-X initialization	Set values of parameters in the ASM-X
	Password saved in the ASM-X
Encoder with functional safety initialization	Set values of parameters in the encoder with functional safety
	Password saved in the encoder with functional safety

Note:

When the parameters are initialized, alarm A.EB9 (Safety Module - Parameter Modification Alarm) will occur in the ASM-X. This alarm does not indicate an error. It is a reminder to turn the power OFF and ON again. Turn the power OFF and ON again to clear the alarm.

6.5.5 Checking Mismatched Safety-Related Servo Parameters

When the power is turned ON, the set values of the safety-related servo parameters set in the ASM-X are compared to the set values of the actual servomotor or SERVOPACK parameters. If there are differences in the set values, alarm A.EC1 (Safety Module - Safety-Related Servo Parameter Mismatch) will occur.

Use this function to display mismatched parameters when alarm A.EC1 occurs on the ASM-X.

This function can be executed with [Compare] - [Safety-Related Servo Parameter Mismatch Check] on the ASM-X [Edit Parameters] window.

Refer to the following section for guidance on setting the safety-related servo parameters.

☞ *6.4 Safety-Related Servo Parameters on page 113*

If there are mismatched parameters, apply the SERVOPACK parameter values on the [Comparison Result] window to the parameter values on the [Edit Parameters] window.

The following table lists the parameters with which alarm A.EC1 (Safety Module - Safety-Related Servo Parameter Mismatch) occurs.

Pc No.	Name	Remarks
Pc050 = n.□□□X	Motor Type	–
Pc050 = n.□□X□	Rotation Direction Selection	*1
Pc051 = n.□□□X	Function Selection for Test without a Motor	–
Pc060	Encoder Data Configuration Setting 1	*1
Pc062 = n.□□XX	Mantissa Part of Maximum Motor Speed	–
Pc062 = n.XX□□	Exponent Part of Maximum Motor Speed	–
Pc066	Number of Encoder Pulses	–
Pc068 = n.□□□X	Encoder Data Configuration Setting 2	*1
Pc068 = n.□□X□	Encoder Data Configuration Setting 3	*1
Pc068 = n.□X□□	Encoder Data Configuration Setting 4	*1, *2
Pc069 = n.□□XX	Least Significant Bit Position in Encoder Position Data	*1
Pc069 = n.XX□□	Most Significant Bit Position in Encoder Position Data	*1
Pc06A	Multiturn Limit	*1

*1 The alarm is detected with ASM-X software version 0003 or later and SERVOPACK software version 0018 or later.

*2 The alarm is not detected when Pc068 = n.□0□□ (When using an encoder with functional safety or when using STO, SS1-t, and SBC functions only) and Pc088 = 0 (Safety Encoder - Safe Address = 0).

6.5.6 User Management

To prevent malfunction in safety functions due to unintended operations, access restrictions have been implemented on the use of functions on [Safety Functions Menu] in the SigmaWin+ and on writing parameters to the ASM-X and the encoder with functional safety (i.e., safety parameters).

The administrator must first set the following three items.

Setting Item	Description
Set a user (administrator authorization)	You must log in to configure the safety-related functions using the functions on [Safety Functions Menu] in the SigmaWin+. Set the ID and password for this.
Write password for the ASM-X	This password is required to write parameters to the ASM-X.
Write password for the encoder with functional safety	This password is required to write parameters to the encoder with functional safety.

Later, the administrator should create a user ID with developer authorization as necessary, and give the relevant worker the necessary information according to that worker's education, training, and experience level. The administrator must also manage accounts and passwords so that the account information is not leaked.

The following table shows the restrictions on using functions on [Safety Functions Menu] due to the access restrictions (login authorization/password).

Item	Access Restriction		Restriction on Using Functions on [Safety Functions Menu]		
	Login Authorization	Authorization to Set Password for ASM-X/Encoder with Functional Safety	Display Menu	Safety Parameters	
				Read	Write
Administrator	Administrator authorization	Yes (as set by the administrator)	Allowed	Allowed	Allowed
Worker A	Developer authorization	No	Allowed	Allowed	Not allowed *1
Worker B	No login authorization *2	–	Not allowed	Not allowed	Not allowed

*1 Parameters can also be written with developer authorization if the administrator gives the password for the ASM-X/encoder with functional safety.

*2 You cannot use safety-related operations if you do not log in. Operations related to the SERVOPACK are also restricted (e.g., if not logged in, SERVOPACK parameters can be read, but they cannot be written).

6.6 Validation of the Safety Functions

Perform a validation of the safety functions in the following cases. It is recommended that you keep the confirmation results as a record.

- When commissioning the equipment
- When a SERVOPACK, ASM-X, or servomotor was replaced
- When the wiring was changed
- When the parameter settings in the ASM-X or encoder with functional safety were changed

Even if these cases do not apply, perform a validation at least once a month for equipment in which the safety functions are not activated on a regular basis.

6.6.1 Preparations

Before you check the operation of the safety functions, confirm that there are no problems in the following items.

Item	Reference
SERVOPACK and servomotor installation and wiring	Product manual for the relevant AC servo drive Refer to the following section for the product manuals. ☞ *i.3.1 Related Documents on page 17*
Mounting of the ASM-X to the SERVOPACK	🕮 Σ-X Series Advanced Safety Module Installation Guide (Manual No.: TOMP C710812 26)
ASM-X wiring	☞ *4.3 I/O Signal Connections on page 87*

6.6.2 Checking STO Operation

Turn ON the power to the SERVOPACk and confirm that an alarm does not occur.

After the power to the SEROVPACK is turned ON, the ASM-X uses the automatic diagnostic function to evaluate the SERVOPACK's HWBB circuits. If a circuit has failed, A.EB3 (Safety Module - HWBB Circuit Monitoring Error) will occur.

Note:

- When checking this operation, do not use the HWBB switch connected to CN8 on the SERVOPACK.
- The diagnosis of the HWBB circuit in the SERVOPACK takes a maximum of 10 seconds from when the control power for the SERVOPACK is turned ON. Configure the system to input the servo ON command from the host controller after the diagnosis of the HWBB circuit is finished.

6.6.3 Checking the Operation of the Safety Functions

Activate the safety functions and check their operation.

- Does the EDM signal for the digital output or FSoE virtual output operate as configured?
- Do the monitoring parameters set for the used safety functions work correctly?
  We recommend that you check the operation of a safety function when a limit violation occurs by tracing with the SigmaWin+ or by using a measuring instrument (e.g., tachometer or oscilloscope).

Refer to the following sections for the operation of the safety functions.

☞ *7.7 STO (Safe Torque OFF) on page 163*
☞ *7.8 SS1-r (Safe Stop 1, Ramp Monitored) on page 168*
☞ *7.9 SS1-t (Safe Stop 1, Time Controlled) on page 175*
☞ *7.10 SS2-r (Safe Stop 2, Ramp Monitored) on page 179*
☞ *7.11 SS2-t (Safe Stop 2, Time Controlled) on page 185*
☞ *7.12 SOS (Safe Operating Stop) on page 191*

☞ *7.13 SLS (Safely-Limited Speed) on page 197*
☞ *7.14 SLA (Safely-Limited Acceleration) on page 202*
☞ *7.15 SSR (Safe Speed Range) on page 207*
☞ *7.16 SSM (Safe Speed Monitor) on page 212*
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7

Safety Functions

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7.1 Outline

7.1.1 Overview of Functions

The ASM-X executes a safety function when the Safety Request Input Signal (SRIS) for the safety function that was input from a digital input port or safety fieldbus is ON.

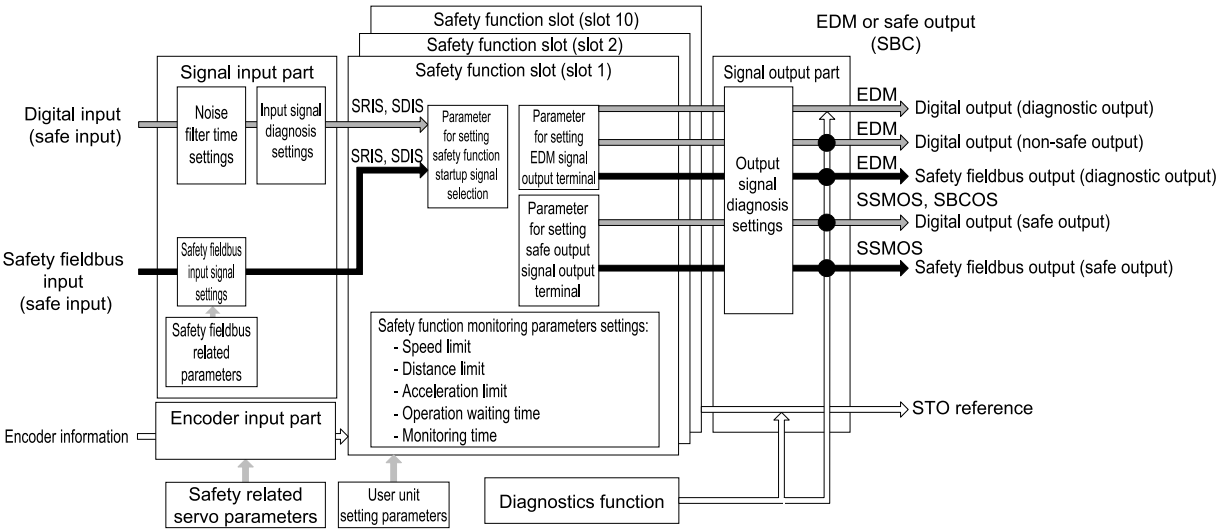
The unit for executing a single safety function in the ASM-X is called a "slot." A slot consists of a safety function selection, I/O signal selection, and monitoring parameters, and the safety function is executed with the set conditions. The ASM-X is equipped with 10 safety function slots.

The result of executing a safety function is output with one of the following signals:

- External Device Monitor (EDM)
- SSM Output Signal (SSMOS)
- SBC Output Signal (SBCOS)

If a transition must be made to the STO state as a result of executing a safety function, the SERVOPACK's HWBB is activated to set the STO state.

The STO state is also set if an error is discovered in the diagnostic functions executed in the ASM-X.



Note:

You can use CN8 on the SERVOPACK even when the ASM-X is mounted to the SERVOPACK. If you will use CN8 on the SERVOPACK, wire the connector according to the explanation of the HWBB in your SERVOPACK.

7.1.2 List of Safety Functions

Safety Function		Related section in IEC 61800-5-2	Type
STO	Safe Torque OFF	4.2.3.2	Stopping function
SS1-r	Safe Stop 1 Ramp Monitored	4.2.3.3 (b)	Stopping function
SS1-t	Safe Stop 1 Time Controlled	4.2.3.3 (c)	Stopping function
SS2-r	Safe Stop 2 Ramp Monitored	4.2.3.4 (b)	Stopping function
SS2-t	Safe Stop 2 Time Controlled	4.2.3.4 (c)	Stopping function
SOS	Safe Operating Stop	4.2.4.2	Monitoring function
SLS	Safely-Limited Speed	4.2.4.5	Monitoring function
SLA	Safely-Limited Acceleration	4.2.4.3	Monitoring function

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Safety Function		Related section in IEC 61800-5-2	Type
SSR	Safe Speed Range	4.2.4.6	Monitoring function
SSM	Safe Speed Monitor	4.2.4.14	Monitoring function
SBC	Safe Brake Control	4.2.5	Output function
SLP	Safely-Limited Position	4.2.4.9	Monitoring function
SLI	Safely-Limited Incremental	4.2.4.10	Monitoring function
SDI-p	Safe Direction, positive direction forbidden	4.2.4.11	Monitoring function
SDI-n	Safe Direction, negative direction forbidden	4.2.4.11	Monitoring function
SCA	Safe CAM	4.2.4.13	Monitoring function
SHP	Safe Home Position	- (Unique Yaskawa specification)	-

7.2 Safety Fieldbus Specifications

7.2.1 FSoE Telegram

A Σ-X SERVOPACK with EtherCAT communications references can be made to support the SubDevice function in the Safety over EtherCAT (FSoE) protocol by adding the ASM-X.

In FSoE, communications are performed between the FSoE MDevice and the FSoE SubDevice by using a portion of the EtherCAT transmission frame.

FSoE safety process data unit (SPDU) receiving is assigned to RxPDO transmission by SM2 (Sync Manager 2) in the SERVOPACK. FSoE SPDU sending is assigned to TxPDO transmission by SM3 (Sync Manager 3).

The ASM-X has two types of SPDU (1st SPDU and 2nd SPDU).

7.2.2 Safety Process Data Unit (1st SPDU)

The specifications of the SPDU are given next.

The SPDU performs communications only when PDO communications are possible because the SPDU communicates with EtherCAT RxPDO/TxPDO.

The SPDU sends and receives data between the FSoE MDevice and the FSoE SubDevice (ASM-X) during the data communications state in FSoE communications.

(1) SPDU Receive Data

The specifications of the SPDU receive data are given next.

Item	Specification	Details	Remarks
PDO size	88 bits (11 bytes)	–	FSoE frame size
PDO structure	Fixed assignment	☞ *(3) FSoE Receive PDU on page 132*	–
SRIS	16	VI0 to VI15	**1*
SDIS	16	VI0 to VI15	**1*
Safety monitor selection code inputs	One type can be read from five types	MPD0 to MPD3: Selects monitor target	–
Error reset input signal	1	ErrAck	–

*1 You can use VI0 to VI15 for both SRIS and SDIS. Set these signals in the parameters for safety function slots.

(2) SPDU Send Data

The specifications of the SPDU send data are given next.

Item	Specification	Details	Remarks
PDO size	248 bits (31 bytes)	–	FSoE frame size
PDO structure	Fixed assignment	☞ *(4) FSoE Send PDU on page 132*	–
EDM	16	VO0 to VO15	–
Digital I/O status monitors	Port A to E status monitors	–	–
Safety monitor selection code outputs	Output status code	MPA0 to MPA3: Monitor output status	–
Safety monitor	Two can be read at the same time	–	–
Error status output	1	Error	–

(3) FSoE Receive PDU

The specifications of the FSoE receive PDU are given next.

Octet	Name	Description							
0	Command	FSoE MainDevice command							
1	Safe Data [0]	VI7	VI6	VI5	VI4	VI3	VI2	VI1	VI0
2	Safe Data [1]	VI15	VI14	VI13	VI12	VI11	VI10	VI9	VI8
3	CRC_0_Lo	CRC0							
4	CRC_0_Hi								
5	Safe Data [2]	ErrAck	Padding			MPD3	MPD2	MPD1	MPD0
6	Safe Data [3]	Padding							
7	CRC_1_Lo	CRC1							
8	CRC_1_Hi								
9	Conn_id_Lo	Connection ID							
10	Conn_id_Hi								

- FSoE protocol data
  - Command: FSoE MDevice command
  - CRC_x_Lo, Hi: CRC for FSoE communications
  - Connection ID: ID for FSoE communications
- Application data (Safe Data [0] to [3])
  - VI0 to VI15: Virtual inputs
  - MPD0 to MPD3: Refer to the following table for details.
    ☞ *(5) Output Specifications of the Safety Monitor on page 133*
  - ErrAck: Error reset input (error reset request triggered by a change from 0 to 1)
    Only ASM-X internal errors can be reset by ErrAck. To clear alarms displayed on the SERVOPACK, use bit 7 (Fault reset) of Controlword (6040h) over EtherCAT or reset the alarm using the SigmaWin+.
  - Padding: For adjusting the address

(4) FSoE Send PDU

The specifications of the FSoE send PDU are given next.

Octet	Name	Description							
0	Command	FSoE SubDevice command							
1	Safe Data [0]	VO7	VO6	VO5	VO4	VO3	VO2	VO1	VO0
2	Safe Data [1]	VO15	VO14	VO13	VO12	VO11	VO10	VO9	VO8
3	CRC_0_Lo	CRC0							
4	CRC_0_Hi								
5	Safe Data [2]	SF 8	SF 7	SF 6	SF 5	SF 4	SF 3	SF 2	SF 1
6	Safe Data [3]	DIA2	DIE1	DID1	DIC1	DIB1	DIA1	SF 10	SF 9
7	CRC_1_Lo	CRC1							
8	CRC_1_Hi								
9	Safe Data [4]	MPA3	MPA2	MPA1	MPA0	DIE2	DID2	DIC2	DIB2
10	Safe Data [5]	Error	SHP *1	STOS *1	Padding				
11	CRC_2_Lo	CRC2							
12	CRC_2_Hi								

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Octet	Name	Description
13	Safe Data [6]	Monitor val1 (1st word)
14	Safe Data [7]	
15	CRC_3_Lo	CRC3
16	CRC_3_Hi	
17	Safe Data [8]	Monitor val1 (2nd word)
18	Safe Data [9]	
19	CRC_4_Lo	CRC4
20	CRC_4_Hi	
21	Safe Data [10]	Monitor val2 (1st word)
22	Safe Data [11]	
23	CRC_5_Lo	CRC5
24	CRC_5_Hi	
25	Safe Data [12]	Monitor val2 (2nd word)
26	Safe Data [13]	
27	CRC_6_Lo	CRC6
28	CRC_6_Hi	
29	Conn_id_Lo	Connection ID
30	Conn_id_Hi	

*1 This function is available in ASM-X software version 0003 or later.

- FSoE protocol data
  - Command: FSoE SubDevice command
  - CRC_x_Lo, Hi: CRC for FSoE communications
  - Connection ID: ID for FSoE communications
- Application data (Safe Data [0] to [5])
  - VO0 to VO15: Virtual outputs
  - SF1 to SF10: Limit violation status (slots 1 to 10)
  - DI*1, DI*2: Digital input status monitors (*: A to E)
  - MPA0 to MPA3: Safety monitor selection code outputs. Refer to the following table for details.
    ☞ *(5) Output Specifications of the Safety Monitor on page 133*
  - Error: Error status output (0: normal, 1: error occurring)
  - STOS: STO state (0: Not STO state, 1: STO state)
    1 when STO is executed, there is a safety function limit violation, or an alarm occurs.
  - SHP: SHP execution completion status (0: not completed, 1: completed)
  - Padding: For adjusting the address

(5) Output Specifications of the Safety Monitor

The output specifications of the safety monitor are shown below.

Monitor Selection Code *1 x = D: Input, x = A: Output				Monitor Val 1 (Monitor 1)		Monitor Val 2 (Monitor 2)	
MPx3	MPx2	MPx1	MPx0	Upper Word (1st Word)	Lower Word (2nd Word)	Upper Word (1st Word)	Lower Word (2nd Word)
0	0	0	0	Actual Speed		Actual Position	
0	0	0	1	Actual Acceleration		Actual Position	
1	0	0	0	Actual Position		Actual Speed	
1	0	0	1	Actual Acceleration		Actual Speed	
1	1	1	1	Actual Position		Actual Position Encoder2 *2	

*1 When a monitor selection code is set that is not found in the table, Monitor Val 1 and Monitor Val 2 are set to 0.
*2 secondary encoder position

(6) Output Units of the Safety Monitor

The output units of the safety monitor are shown below.

Monitor Items	Unit
Actual Position, Actual Position Encoder2	User position reference unit
Actual Speed	User speed reference unit
Actual Acceleration	User acceleration reference unit

Refer to the following section for the user reference units.

☞ *6.3.3 User Units on page 109*

7.2.3 Safety Process Data Unit (2nd SPDU)

The 2nd SPDU has a smaller message size that is attained by deleting safety monitor-related data.
The specifications of the 2nd SPDU are given next.

(1) SPDU Receive Data

The specifications of the SPDU receive data are given next.

Item	Specification	Details	Remarks
PDO size	88 bits (11 bytes)	–	FSoE frame size
PDO structure	Fixed assignment	☞ *(3) FSoE Receive PDU on page 135*	–
SRIS	16	VI0 to VI15	*1
SDIS	16	VI0 to VI15	*1
Error reset input signal	1	ErrAck	–

*1 You can use VI0 to VI15 for both SRIS and SDIS. Set the parameters for safety function slots accordingly.

(2) SPDU Send Data

The specifications of the SPDU send data are given next.

Item	Specification	Details	Remarks
PDO size	88 bits (11 bytes)	–	FSoE frame size
PDO structure	Fixed assignment	☞ *(4) FSoE Send PDU on page 135*	–

Continued on next page.

Continued from previous page.

Item	Specification	Details	Remarks
EDM	16	VO0 to VO15	–
Error status output	1	Error	–

(3) FSoE Receive PDU

The specifications of the FSoE receive PDU are given next.

Octet	Name	Description							
0	Command	FSoE MainDevice command							
1	Safe Data [0]	VI7	VI6	VI5	VI4	VI3	VI2	VI1	VI0
2	Safe Data [1]	VI15	VI14	VI13	VI12	VI11	VI10	VI9	VI8
3	CRC_0_Lo	CRC0							
4	CRC_0_Hi								
5	Safe Data [2]	ErrAck	Padding						
6	Safe Data [3]	Padding							
7	CRC_1_Lo	CRC1							
8	CRC_1_Hi								
9	Conn_id_Lo	Connection ID							
10	Conn_id_Hi								

- FSoE protocol data
  - Command: FSoE MDevice command
  - CRC_x_Lo, Hi: CRC for FSoE communications
  - Connection ID: ID for FSoE communications
- Application data (Safe Data [0] to [3])
  - VI0 to VI15: Virtual inputs
  - ErrAck: Error reset input (error reset request triggered by a change from 0 to 1)
    Only ASM-X internal errors can be reset by ErrAck. To clear alarms displayed on the SERVOPACK, use bit 7 (Fault reset) of Controlword (6040h) over EtherCAT or reset the alarm using the SigmaWin+.
  - Padding: For adjusting the address

(4) FSoE Send PDU

The specifications of the FSoE send PDU are given next.

Octet	Name	Description							
0	Command	FSoE SubDevice command							
1	Safe Data [0]	VO7	VO6	VO5	VO4	VO3	VO2	VO1	VO0
2	Safe Data [1]	VO15	VO14	VO13	VO12	VO11	VO10	VO9	VO8
3	CRC_0_Lo	CRC0							
4	CRC_0_Hi								
5	Safe Data [2]	SF 8	SF 7	SF 6	SF 5	SF 4	SF 3	SF 2	SF 1
6	Safe Data [3]	Error	SHP *1	STOS *1	Padding			SF 10	SF 9
7	CRC_1_Lo	CRC1							
8	CRC_1_Hi								

Continued on next page.

Continued from previous page.

Octet	Name	Description
9	Conn_id_Lo	Connection ID
10	Conn_id_Hi	

*1 This function is available in ASM-X software version 0003 or later.

- FSoE protocol data
  - Command: FSoE SubDevice command
  - CRC_x_Lo, Hi: CRC for FSoE communications
  - Connection ID: ID for FSoE communications
- Application data
  - VO0 to VO15: Virtual outputs
  - SF1 to SF10: Limit violation status (slots 1 to 10)
  - Error: Error status output (0: normal, 1: error occurring)
  - STOS: STO state (0: Not STO state, 1: STO state)
    1 when STO is executed, there is a safety function limit violation, or an alarm occurs.
  - SHP: SHP execution completion status (0: not completed, 1: completed)
  - Padding: For adjusting the address

7.2.4 Switching SPDUs

Switching between the 1st SPDU and the 2nd SPDU is set with Pc121 = n.□□X□ (SPDU Selection) and objects 1C12h and 1C13h (Sync Manager PDO Assignment).

		SPDU selection Speed Pos Trq		When Enabled
Pc121	n.□□X□	0	1st SPDU (moduleident:0x02200A01)	After restart
		1	2nd SPDU (moduleident:0x02200A02)	
		2	1st SPDU (moduleident:0x02200A03)	
		3 Default	2nd SPDU (moduleident:0x02200A04)	

Note:

- When the SERVOPACK software version is 0017 or earlier, alarm A.A47 (Loading Servo Information Error) will occur when Pc121 is set to n.□□2□ or n.□□3□.
- When the ASM-X software version is 0002 or earlier or the SERVOPACK software version is 0017 or earlier, set Pc121 to n.□□0□ or n.□□1□.
- If you are using safety fieldbus specifications that were added with ASM-X software version 0003, set Pc121 to n.□□2□ or n.□□3□.

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
1C12h	0	Number of assigned PDOs	USINT	RW	No	0 to 3 (default: 1)	Yes
	1	Index of assigned RxPDO 1	UINT	RW	No	0x1600 to 0x1609 (default: 0x1601)	Yes
	2	Index of assigned RxPDO 2	UINT	RW	No	0x1600 to 0x1609 (default: 0x1600)	Yes
	3	Index of assigned RxPDO 3	UINT	RW	No	0x1600 to 0x1609 (default: 0x1602)	Yes
1C13h	0	Number of assigned PDOs	USINT	RW	No	0 to 3 (default: 1)	Yes
	1	Index of assigned TxPDO 1	UINT	RW	No	0x1A00 to 0x1A09 (default: 0x1A01)	Yes
	2	Index of assigned TxPDO 2	UINT	RW	No	0x1A00 to 0x1A09 (default: 0x1A00)	Yes
	3	Index of assigned TxPDO 3	UINT	RW	No	0x1A00 to 0x1A09 (default: 0x1A02)	Yes

Setting examples are given below.

To Use the 1st SPDU

- Set Pc121 to n.□□0□ or n.□□2□ (1st SPDU).
- Set one of the subindexes 1 to 3 of object 1C12h to 0x1608. Set subindex 0 to the number of PDOs to use.
- Set one of the subindexes 1 to 3 of object 1C13h to 0x1A08. Set subindex 0 to the number of PDOs to use.
- Turn the power OFF and ON again.

To Use the 2nd SPDU

- Set Pc121 to n.□□1□ or n.□□3□ (2nd SPDU).
- Set one of the subindexes 1 to 3 of object 1C12h to 0x1609. Set subindex 0 to the number of PDOs to use.
- Set one of the subindexes 1 to 3 of object 1C13h to 0x1A09. Set subindex 0 to the number of PDOs to use.
- Turn the power OFF and ON again.

7.3 Safety Function Slots

The ASM-X is equipped with 10 safety function slots. Slots 1 to 9 are general purpose slots and slot 10 is a special slot for the SBC function. The SBC function is available in the FSoE communications references and digital I/O model only.

7.3.1 Settings for Safety Function Slots 1 to 9

The parameter numbers depend on the slot. Refer to the following section for details.

☞ *7.3.3 Parameters for Safety Function Slot Settings on page 140*

Refer to the section on each safety function in this chapter for details on the settings of each parameter.

Parameter Name		Description	Remarks
Safety Function Configuration I			
	Safety Function Selection	Select from the following. Disabled (default setting), STO, SS1-r, SS1-t, SS2-r, SS2-t, SOS, SLS, SLA, SSR, SSM, SLP, SLI, SDI-p, SDI-n, SCA, SHP	–
Safety Function Configuration II			
	Terminal Port Selection for Safety Request Input Signal	Select from the following. • Disabled (default setting) • DIA to DIE • VI0 to VI15 • Slots 1 to 10 limit violation status • Safety fieldbus virtual input not usable state	The safety fieldbus virtual input not usable state can be set for the SS1-r, SS1-t, SS2-r, and SS2-t functions only.
	Terminal Port Selection for Safety Data Input Signal	Select from the following. • Disabled (default setting) • DIA to DIE • VI0 to VI15	Select "Disabled" for functions other than SLI and SHP.
Safety Function Configuration III			
	Terminal Port Selection for EDM Signal	Select from the following. • Disabled (default setting) • DOA to DOE (Redundant Outputs) • DOA1 to DOE2 (Single Output) • VO0 to VO15	–
	EDM Signal Behavior	Select from the following. • Disabled (default setting) • In Operation • Working Safety Function • After Limit Violation • HWBB (STO) State	–
Safety Function Configuration IV			
	Terminal Port Selection for Safe Output Signal	Select from the following. • Disabled (default setting) • DOA to DOE (Redundant Outputs) • VO0 to VO15	Can be set for the SSM function and SCA function only.

Parameter Name	Unit	Sign	Setting Range	Application
Monitoring Parameter				
Waiting Time (t1)	10 ms	No	0 to 10000 (default setting: 0)	Refer to the following section because this depends on each safety function. ☞ *7.1.2 List of Safety Functions on page 129*
Monitoring Time (t2)	10 ms	No	0 to 10000 (default setting: 0)	
Speed Limit (s1)	User speed reference unit	No	0 to 4294967295 (default setting: 0)	
Speed Limit (s2)	User speed reference unit	No	0 to 4294967295 (default setting: 0)	
Acceleration Limit (a1)	User acceleration reference unit	Yes	-2147483648 to 2147483647 (default setting: 0)	
Distance Limit (p1)	User position reference unit	Yes	-2147483648 to 2147483647 (default setting: 0)	
Distance Limit (p2)	User position reference unit	Yes	-2147483648 to 2147483647 (default setting: 0)	
Distance Limit (p3)	User position reference unit	No	0 to 4294967295 (default setting: 0)	

7.3.2 Settings for Safety Function Slot 10 (For SBC Function)

The parameter numbers depend on the slot. Refer to the following section for details.

☞ *7.3.3 Parameters for Safety Function Slot Settings on page 140*

Refer to the following section for details on the settings of each parameter.

☞ *7.17 SBC (Safe Brake Control) on page 217*

Parameter Name		Description
Safety Function Configuration I		
	SBC Function Selection	Select from the following. • Use the SBC function. • Do not use the SBC function. (Default setting)
	SBC Activation Selection	Select from the following. • Activate with STO state. (Default setting) • Activate with STO state or start of SS1-t/SS1-r.
Safety Function Configuration II		
	Terminal Port Selection for SBC Output Signal (SBCOS)	Select the output terminal for SBCOS that drives the safety relays. • Disabled (default setting) • DOA to DOE
	Terminal Port Selection for SBC Input Signal (SBCIS)	Select the terminal to which SBCIS from the safety relays is input. • Disabled (default setting) • DIA to DIE
Safety Function Configuration III		

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Parameter Name		Description
	Terminal Port Selection for EDM Signal	Select from the following. • Disabled (default setting) • DOA to DOE (Redundant Outputs) • DOA1 to DOE2 (Single Output) • VO0 to VO15
	EDM Signal Behavior	Select from the following. • Disabled (default setting) • In Operation • Working Safety Function

Parameter Name	Unit	Sign	Setting Range	Application
Monitoring Parameter				
Brake Hold Delay Time (Tw_bkh)	ms	No	0 to 10000 (default setting: 0)	The delay time between activation of the SS1-r function, the SS1-r function activated by activation of the SS1-t function, or the SS1-t function and turning ON (OFF) of SBCOS.
Brake Release Delay Time (Tw_bkr)	ms	No	0 to 10000 (default setting: 0)	The delay time from when the reason for execution of the SBC function is eliminated to when SBCOS is turned OFF (ON).
FB Signal Discrep. Allow. Time at Brake Hold (Td_bkh)	ms	No	0 to 300 (default setting: 30)	The allowable time for a mismatched state between the relay operation reference and SBCIS during brake operation.
FB Signal Discrep. Allow. Time at Brake Release (Td_bkr)	ms	No	0 to 300 (default setting: 30)	The allowable time for a mismatched state between the relay operation reference and SBCIS during brake release.

7.3.3 Parameters for Safety Function Slot Settings

(1) Slots 1 to 9

Parameter	Parameter No.								
	Slot 1	Slot 2	Slot 3	Slot 4	Slot 5	Slot 6	Slot 7	Slot 8	Slot 9
Safety Function Configuration I	Pc300	Pc340	Pc380	Pc3C0	Pc400	Pc440	Pc480	Pc4C0	Pc500
Safety Function Configuration II	Pc301	Pc341	Pc381	Pc3C1	Pc401	Pc441	Pc481	Pc4C1	Pc501
Safety Function Configuration III	Pc302	Pc342	Pc382	Pc3C2	Pc402	Pc442	Pc482	Pc4C2	Pc502

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Parameter	Parameter No.								
	Slot 1	Slot 2	Slot 3	Slot 4	Slot 5	Slot 6	Slot 7	Slot 8	Slot 9
Safety Function Configuration IV	Pc303	Pc343	Pc383	Pc3C3	Pc403	Pc443	Pc483	Pc4C3	Pc503
Waiting Time (t1)	Pc310	Pc350	Pc390	Pc3D0	Pc410	Pc450	Pc490	Pc4D0	Pc510
Monitoring Time (t2)	Pc311	Pc351	Pc391	Pc3D1	Pc411	Pc451	Pc491	Pc4D1	Pc511
Speed Limit (s1)	Pc312	Pc352	Pc392	Pc3D2	Pc412	Pc452	Pc492	Pc4D2	Pc512
Speed Limit (s2)	Pc314	Pc354	Pc394	Pc3D4	Pc414	Pc454	Pc494	Pc4D4	Pc514
Acceleration Limit (a1)	Pc316	Pc356	Pc396	Pc3D6	Pc416	Pc456	Pc496	Pc4D6	Pc516
Distance Limit (p1)	Pc318	Pc358	Pc398	Pc3D8	Pc418	Pc458	Pc498	Pc4D8	Pc518
Distance Limit (p2)	Pc31A	Pc35A	Pc39A	Pc3DA	Pc41A	Pc45A	Pc49A	Pc4DA	Pc51A
Distance Limit (p3)	Pc31C	Pc35C	Pc39C	Pc3DC	Pc41C	Pc45C	Pc49C	Pc4DC	Pc51C

(2) Slot 10

Parameter	Parameter No.
Safety Function Configuration I	Pc540
Safety Function Configuration II	Pc541
Safety Function Configuration III	Pc542
Brake Hold Delay Time (t1)	Pc550
Brake Release Delay Time (t2)	Pc551
FB Signal Discrep. Allow. Time at Brake Hold (Td_bkh)	Pc552
FB Signal Discrep. Allow. Time at Brake Release (Td_bkr)	Pc553
Brake Hold Delay Time (t1)	Pc554

7.4 Input Signals

7.4.1 Input Signal Types

The types of input signals that are input to the ASM-X are shown below.

Signal	Settable Signal	
	Digital input	Safety Fieldbus Input
Safety Request Input Signal (SRIS)	Yes	Yes
Safety Data Input Signal (SDIS)	Yes	Yes
SBC Feedback Input Signal (SBCIS)	Yes	No

7.4.2 Safety Request Input Signal (SRIS)

SRIS is the signal that requests operation of the safety function.
You can use both a digital input signal and a safety fieldbus input signal.

(1) Definition of SRIS

Signal Status	Definition
ON	Activates the safety function.
OFF	Ends the safety function.

(2) Relationship between SRIS Status and Digital Input Status

SRIS Status	Digital Input Status	Operation
ON	Circuit open	Clear request to execute the safety function.
OFF	Circuit closed	Request to execute the safety function.

Digital inputs must be redundant inputs.

(3) Relationship between SRIS Status and Safety Fieldbus Input Status

- When Pc121 = n.□0□□ (The SRIS is ON when the Virtual input is 1)

SRIS Status	Safety Fieldbus Input Status	Operation
ON	1	Request to execute the safety function.
OFF	0	Clear request to execute the safety function.

- When Pc121 = n.□1□□ (The SRIS is ON when the Virtual input is 0) (Default Setting)

SRIS Status	Safety Fieldbus Input Status	Operation
ON	0	Request to execute the safety function.
OFF	1	Clear request to execute the safety function.

For a fieldbus input, one bit from VI0 to VI15 is used.
Use Pc121 = n.□X□□ to switch the ON/OFF logic of the safety fieldbus virtual input.

Pc121	n.□X□□	ON/OFF Logic Selection for Safety Fieldbus Virtual Input Speed Pos Trq		When Enabled
		0	The SRIS is ON when the Virtual input is 1.	After restart
		1 Default	The SRIS is ON when the Virtual input is 0.	

7.4.3 Safety Data Input Signal (SDIS)

The SDIS signal changes the operation status in the SLI and SHP functions.

You can use both a digital input signal and a safety fieldbus input signal.

(1) Definition of SDIS

Signal Status	Definition
ON	Changes the operation status. *1
OFF	Continues operation.

*1 SLI function: This signal is the trigger to transition from the SOS function to the SLP function.
SHP function: This signal is the trigger to set the safe home position.

(2) Relationship between SDIS Status and Digital Input Status

SDIS Status	Digital Input Status	Operation
ON	Circuit open	Request to operate the safety function.
OFF	Circuit closed	Clear request to operate the safety function.

(3) Relationship between SDIS Status and Safety Fieldbus Input Status

- When Pc121 = n.□0□□ (The SDIS is ON when the Virtual input is 1)

SDIS Status	Safety Fieldbus Input Status	Operation
ON	1	Request to operate the safety function.
OFF	0	Clear request to operate the safety function.

- When Pc121 = n.□1□□ (The SDIS is ON when the Virtual input is 0) (Default Setting)

SDIS Status	Safety Fieldbus Input Status	Operation
ON	0	Request to operate the safety function.
OFF	1	Clear request to operate the safety function.

For a fieldbus input, one bit from VI0 to VI15 is used.

Use Pc121 = n.□X□□ to switch the ON/OFF logic of the safety fieldbus virtual input. This parameter switches the logic of both SRIS and SDIS.

7.4.4 SBC Feedback Signal (SBCIS)

SBCIS is used when the SBC function is used. This inputs the feedback signal of the safety relays the ASM-X controls.

Refer to the following section for details on operation.

☞ *7.17 SBC (Safe Brake Control) on page 217*

You can use a digital input signal (redundant inputs).

(1) Definition of SBCIS

Signal Status	Definition
ON	The relay coil for brake power supply control is energized.
OFF	The relay coil for brake power supply control is de-energized.

(2) Relationship between SBCIS Status and Digital Input Status

SBCIS Status	Digital Input Status	Operation
ON	Circuit open	The relay coil for brake power supply control is energized.
OFF	Circuit closed	The relay coil for brake power supply control is de-energized.

Digital inputs must be redundant inputs.

7.4.5 Settings for Digital Input Signals

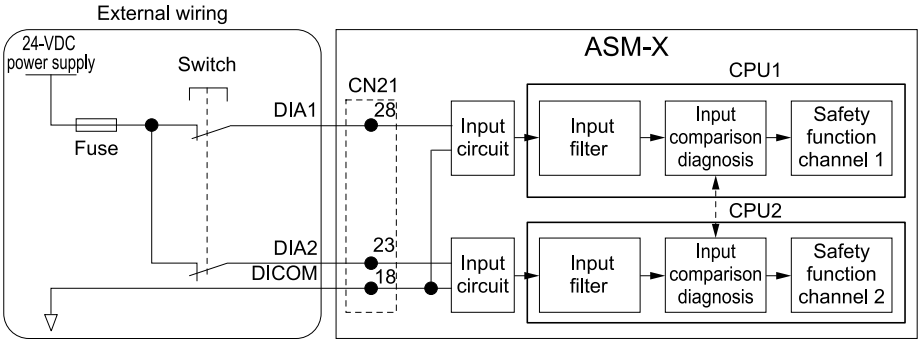
The settings for the digital input signals are set in the following parameters. Set the selection for the port to use, the input filtering time, and the discrepancy allowable time for the input comparison diagnostic.

(1) List of Parameter Settings for Digital Input Signals

Parameter No.	Name	Unit	Setting Range	Default Setting
Pc0C0 = n.□□□X	Digital Input Port A (DIA) Selection 0: Do not use, 1: Use	–	0, 1	0
Pc0C1	Digital Input Port A (DIA) - Filtering Time	1 ms	0 to 1000	0
Pc0C2	Digital Input Port A (DIA) - Discrepancy Allowable Time	1 ms	15 to 1000	15
Pc0C5 = n.□□□X	Digital Input Port B (DIB) Selection 0: Do not use, 1: Use	–	0, 1	0
Pc0C6	Digital Input Port B (DIB) - Filtering Time	1 ms	0 to 1000	0
Pc0C7	Digital Input Port B (DIB) - Discrepancy Allowable Time	1 ms	15 to 1000	15
Pc0CA = n.□□□X	Digital Input Port C (DIC) Selection 0: Do not use, 1: Use	–	0, 1	0
Pc0CB	Digital Input Port C (DIC) - Filtering Time	1 ms	0 to 1000	0
Pc0CC	Digital Input Port C (DIC) - Discrepancy Allowable Time	1 ms	15 to 1000	15
Pc0CF = n.□□□X	Digital Input Port D (DID) Selection 0: Do not use, 1: Use	–	0, 1	0
Pc0D0	Digital Input Port D (DID) - Filtering Time	1 ms	0 to 1000	0
Pc0D1	Digital Input Port D (DID) - Discrepancy Allowable Time	1 ms	15 to 1000	15
Pc0D4 = n.□□□X	Digital Input Port E (DIE) Selection 0: Do not use, 1: Use	–	0, 1	0
Pc0D5	Digital Input Port E (DIE) - Filtering Time	1 ms	0 to 1000	0
Pc0D6	Digital Input Port E (DIE) - Discrepancy Allowable Time	1 ms	15 to 1000	15

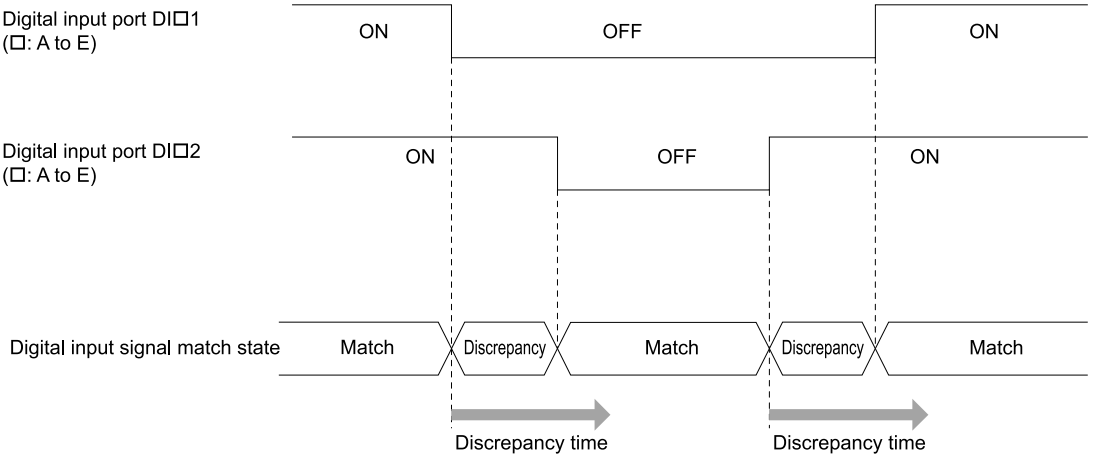
(2) Input Circuit Block Diagram

The following figure shows an example of the DIA input circuit block diagram.

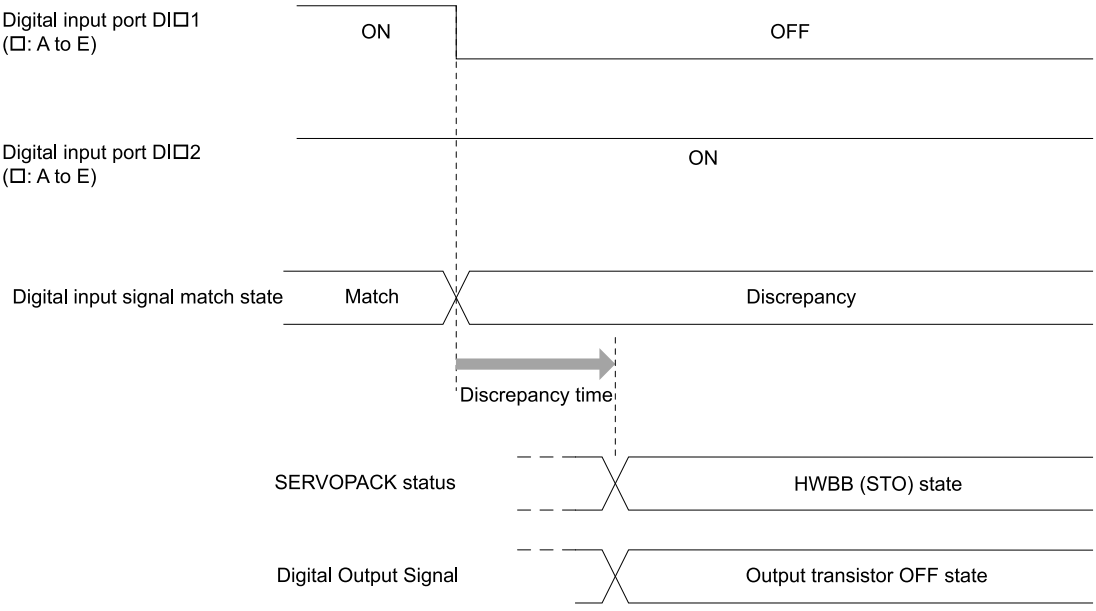


(3) Input Signal Comparison Diagnostic

The ASM-X performs a diagnostic to determine if the statuses of channel 1 (DI□1) and channel 2 (DI□2) of a digital input port are matched. If you set the discrepancy allowable time for a digital input port, the alarm will not occur if the statuses of channel 1 and channel 2 are matched within the set amount of time, even if they were once unmatched.



If the duration of discrepancy exceeds the discrepancy allowable time, alarm A.E11 to A.E15 (Safety Module - DI□ (□: A to E) Diagnostic Error) will occur. The SERVOPACK will enter the STO state and the ASM-X output signals will turn OFF.



(a) Related Alarms

Alarm Number	Alarm Name	Alarm Meaning
A.E11	Safety Module - DIA Diagnostic Error	The statuses of DIA1 and DIA2 did not match within the specified time.
A.E12	Safety Module - DIB Diagnostic Error	The statuses of DIB1 and DIB2 did not match within the specified time.
A.E13	Safety Module - DIC Diagnostic Error	The statuses of DIC1 and DIC2 did not match within the specified time.
A.E14	Safety Module - DID Diagnostic Error	The statuses of DID1 and DID2 did not match within the specified time.
A.E15	Safety Module - DIE Diagnostic Error	The statuses of DIE1 and DIE2 did not match within the specified time.

(b) Recovering from the Alarm Status

After the statuses of channel 1 and channel 2 match, reset the alarm in the SERVOPACK. The SERVOPACK will return to the normal operation status.

7.4.6 Safety Fieldbus Input Signals

This section gives the details on the input signals (VI0 to VI15) in the safety fieldbus SPDU.

(1) SPDU

Byte	Name	Description							
0	Command	FSoE MainDevice command (=ProcessData)							
1	Safe Data[0]	VI7	VI6	VI5	VI4	VI3	VI2	VI1	VI0
2	Safe Data[1]	VI15	VI14	VI13	VI12	VI11	VI10	VI9	VI8
3	CRC_0_Lo	CRC0							
4	CRC_0_Hi								
5	Safe Data[2]	ErrAck	Padding			MPD3	MPD2	MPD1	MPD0
6	Safe Data[3]	Padding							
7	CRC_1_Lo	CRC1							
8	CRC_1_Hi								
9	Conn_id_Lo	Connection ID							
10	Conn_id_Hi								

(2) Safety Function Operation Selection at Initial State

Set the operation of safety functions from power ON to the data state in the following parameter.

The data state means the state from power ON to when safety data communications becomes possible in the safety fieldbus state transitions.

Even if the STO state is not forced, the STO state may occur due to other reasons.

Pc No.	Name	Unit	Setting Range	Default Setting
Pc121 = n.□□□X	Safety function operation selection at initial state 0: After power ON, the STO state will not be forced until safe data communications become possible. 1: After power ON, the STO state will be forced until safe data communications become possible.	None	0, 1	0

Note:
If you are using ASM-X software version 0001 or version 0002, select 0.

(3) State Transitions in Safety Fieldbus

After the power is turned ON, execution starts from the FSoE Reset state, and transitions are made through the states in the following order: Session → Connection → Parameter → Data. When the transition is made to the Data state, SPDU transmissions become possible and the ASM-X safety functions can be controlled.

The state may go down under the following conditions.

- The state returns to the Session state due to a command from the FSoE MDevice.
- The state returns to the Reset state due to an FSoE communications error.

State	Operation
Reset	Executed to initialize the FSoE connection after the power is turned ON or after an FSoE communications error occurs.
Session	The ASM-X performs communications with the FSoE MDevice using Pc120 (Safety Fieldbus Station Address).
Connection	The ASM-X performs communications with the FSoE MDevice using Connection ID issued by the FSoE MDevice.
Parameter	The FSoE MDevice sets communications parameters (e.g., watchdog time) for the ASM-X.
Data	The ASM-X performs safety PDU communications with the FSoE MDevice. The ASM-X safety functions can be controlled by the safety PDU. During the Data state, SPDU updates are monitored using the watchdog time in both the FSoE MDevice and ASM-X (FSoE SubDevice). The state returns to the Reset state if the watchdog time is exceeded.

7.4.7 Operation When the FailSafeData Command Is Received

In the safety fieldbus Data state, the FSoE MDevice sends the ProcessData command or the FailSafeData command to the ASM-X.

The ProcessData command is sent when the FSoE device is operating normally, and this makes it so the ASM-X can use the virtual inputs.

Refer to the following section for details on the ProcessData command.

☞ *(1) SPDU on page 146*

The FailSafeData command is sent when the FSoE device experiences some kind of failure, and this makes it so the ASM-X can no longer use all of SafeData (virtual inputs VI0 to VI15, MPD0 to MPD3, and ErrAck). The send PDU is changed from the FailSafeData command to the ProcessData command in ASM-X software versions 0003 and later because the ASM-X cannot control safety functions that use virtual inputs when the FailSafeData command is received.

The details on the operation when the FailSafeData command is received are described next.

(1) Response Command After the FailSafeData Command Is Received

The following table gives the differences in the response command due to the ASM-X software version.

Condition	ASM-X Software Version	
	Version 0001, Version 0002	Version 0003 or Later
Response command to send after the ASM-X receives the FailSafeData command	FailSafeData	ProcessData

(2) Operation When the FailSafeData Command Is Received

The following table gives the differences in operation due to the ASM-X software version when the FailSafeData command is received.

Safe Data	ASM-X Software Version	
	Version 0001, Version 0002	Version 0003 or Later
Virtual Input VI0 to VI15	The safety function cannot be activated while the FailSafeData command is being received. Execution of running safety functions is ended.	Receiving the FailSafeData command acts as the trigger to activate the safety function set in the parameter. ☞ *(3) Activating a Safety Function Triggered by Receiving the FailSafeData Command on page 148* Execution of running safety functions is ended.
MPD0 to MPD3	Since the FSoE SubDevice command to send from the ASM-X is FailSafeData, the monitor selection (MPA0 and MPA3) and monitor data cannot be sent to the FSoE MDevice.	0 is assumed to be input. In the FSoE SubDevice command, MPA0 to MPA3 = 0 is sent as the monitor data in response to the FSoE MDevice. ☞ *(5) Output Specifications of the Safety Monitor on page 133*
ErrAck	0 is assumed to be input. ASM-X alarm reset by ErrAck cannot be performed.	0 is assumed to be input. ASM-X alarm reset by ErrAck cannot be performed.

(3) Activating a Safety Function Triggered by Receiving the FailSafeData Command

When the FailSafeData command is received, the safety function set in Pc122 = n.□□□X will be activated.

		Selection of Operation When Safety Fieldbus Virtual Input Not Usable Speed Pos Trq		When Enabled
Pc122	n.□□□X	0 Default	Execute STO function.	After restart
		1	Execute SS1 function or SS2 function set for safety slot 1.	
		2	Execute SS1 function or SS2 function set for safety slot 2.	
		3	Execute SS1 function or SS2 function set for safety slot 3.	
		4	Execute SS1 function or SS2 function set for safety slot 4.	
		5	Execute SS1 function or SS2 function set for safety slot 5.	
		6	Execute SS1 function or SS2 function set for safety slot 6.	
		7	Execute SS1 function or SS2 function set for safety slot 7.	
		8	Execute SS1 function or SS2 function set for safety slot 8.	
		9	Execute SS1 function or SS2 function set for safety slot 9.	

- When Pc122 is set to n.□□□0
  You do not need to set a safety function slot.

  Information The EDM signal from a safety function slot cannot be used, but you can check for the STO state by using STOS in the send PDU. Refer to the following section for details on STOS.

  ☞ *(4) FSoE Send PDU on page 132*

- When Pc122 is set to n.□□□1 to n.□□□9
  The specified safety function slot must be set in a manner that satisfies the following conditions. If the conditions are not satisfied, alarm A.EB2h (Safety Module - Parameter Setting Error) will occur.
  Conditions
  - The safety function to set is one of the following: SS1-r, SS1-t, SS2-r, or SS2-t.
  - Terminal Port Selection for Safety Request Input Signal is set to "Safety fieldbus virtual input not usable state."

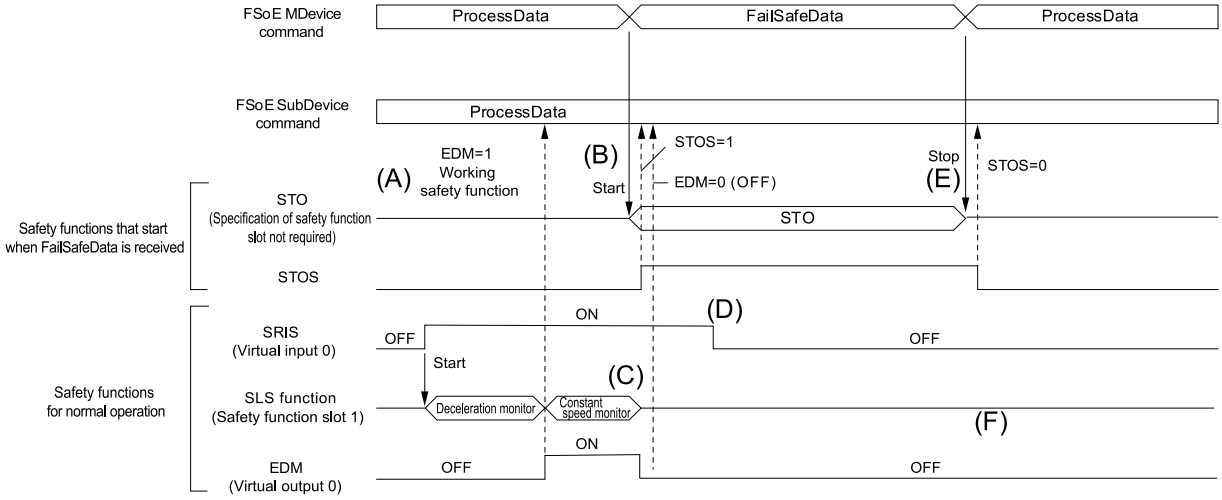
(4) Operation Examples

The following example shows STO function execution when the FailSafeData command was received.

In this example, the running SLS function is ended before the FailSafeData command is received.

Parameter Settings

- Pc122 = n.□□□0 (Activate STO function)
- Safety function slot 1
  Pc300 = n.□□08 (Safety function: SLS)
  Pc301 = n.□□10 (Terminal Port Selection for Safety Request Input Signal: Virtual Input 0)
  Pc302 = n.□□20 (Terminal Port Selection for EDM Signal: Virtual Output 0)
  Pc302 = n.02□□ (EDM Signal Behavior: Working Safety Function)

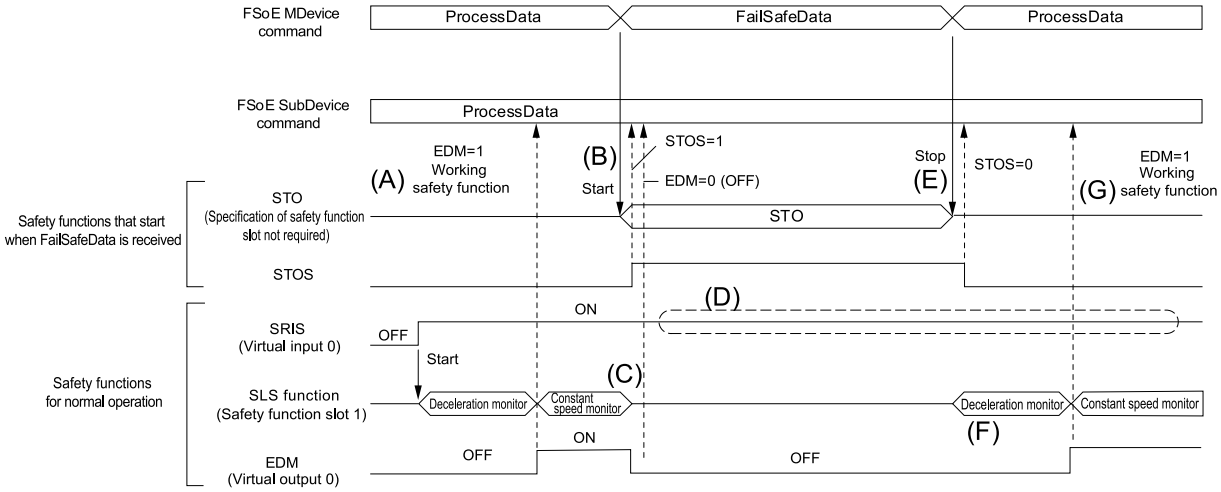


Symbol	Description
(A)	During normal operation: The SLS function is activated by virtual input 0 in the ProcessData command. EDM = 1 (Working Safety Function) is output to virtual output 0 because the monitoring operation switched to constant speed monitoring.
(B)	Failure occurs: The ASM-X activates the STO function because the FSoE MDevice command changed to FailSafeData. When the STO state is entered, STOS in the FSoE SubDevice command changes to 1.
(C)	When the FailSafeData command is received, the ASM-X ends SLS function operation. The EDM output signal (virtual output 0) is also turned OFF.
(D)	SRIS (virtual input 0) must be turned OFF before the FSoE MDevice command reverts to ProcessData from FailSafeData. **Important** If SRIS was not turned OFF before the FSoE MDevice command reverts to ProcessData, safety function activation will be different than the user's intention, which may result in a hazardous situation. Make sure SRIS is turned OFF. Refer to the following section for an example of the operation when SRIS is not turned OFF. ☞ *(a) Example of Operation When SRIS Was Not Turned OFF Before the FSoE MDevice Command Reverts to ProcessData on page 149*
(E)	Recovery: The ASM-X ends the STO function because the FSoE MDevice command reverted to ProcessData. When the STO state ends, STOS in the FSoE SubDevice command changes to 0.
(F)	When SRIS (virtual input 0) is OFF after the FSoE MDevice command reverted to ProcessData, the SLS function is not reactivated because it was ended in (C).

(a) Example of Operation When SRIS Was Not Turned OFF Before the FSoE MDevice Command Reverts to ProcessData

If the FSoE MDevice did not turn OFF SRIS (virtual input 0) in (D), the SLS function is reactivated in (F). However, this SLS function is newly activated and does not inherit the state before the FailSafeData command was received. An example of this operation is shown below.

Important Activation of the safety function by this operation will be different than the user's intention, which may result in a hazardous situation. Make sure SRIS is turned OFF once before the FSoE command reverts to ProcessData from FailSafeData to avoid this kind of situation.



Symbol	Description
(A)	During normal operation: The SLS function is activated by virtual input 0 in the ProcessData command. EDM = 1 (Working Safety Function) is output to virtual output 0 because the monitoring operation switched to constant speed monitoring.
(B)	Failure occurs: The ASM-X activates the STO function because the FSoE MDevice command changed to FailSafeData. When the STO state is entered, STOS in the FSoE SubDevice command changes to 1.
(C)	When the FailSafeData command is received, the ASM-X ends SLS function operation. The EDM output signal (virtual output 0) is also turned OFF.
(D)	SRIS (virtual input 0) remains ON when the FSoE MDevice command is returned to ProcessData from FailSafeData.
(E)	Recovery: The ASM-X ends the STO function because the FSoE MDevice command reverted to ProcessData. When the STO state ends, STOS in the FSoE SubDevice command changes to 0.
(F)	When SRIS (virtual input 0) is ON after the FSoE MDevice command reverted to ProcessData, the SLS function is activated.
(G)	When the SLS function starts constant speed monitoring, EDM = 1 (Working Safety Function) is output to virtual output 0.

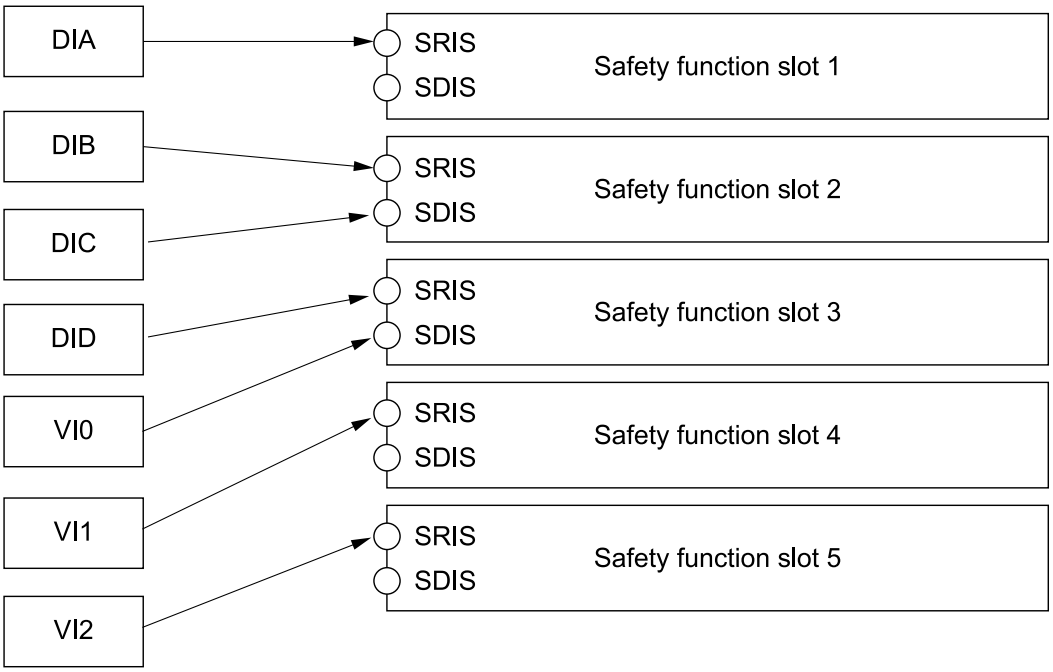
7.4.8 Examples of Using Input Signals

(1) Using a Different Safety Request Input Signal (SRIS) for Each Safety Function Slot

The following example shows safety function slots 1 to 5 being controlled using digital input ports A to D (DIA to DID) and safety fieldbus input signals (VI0 to VI2).

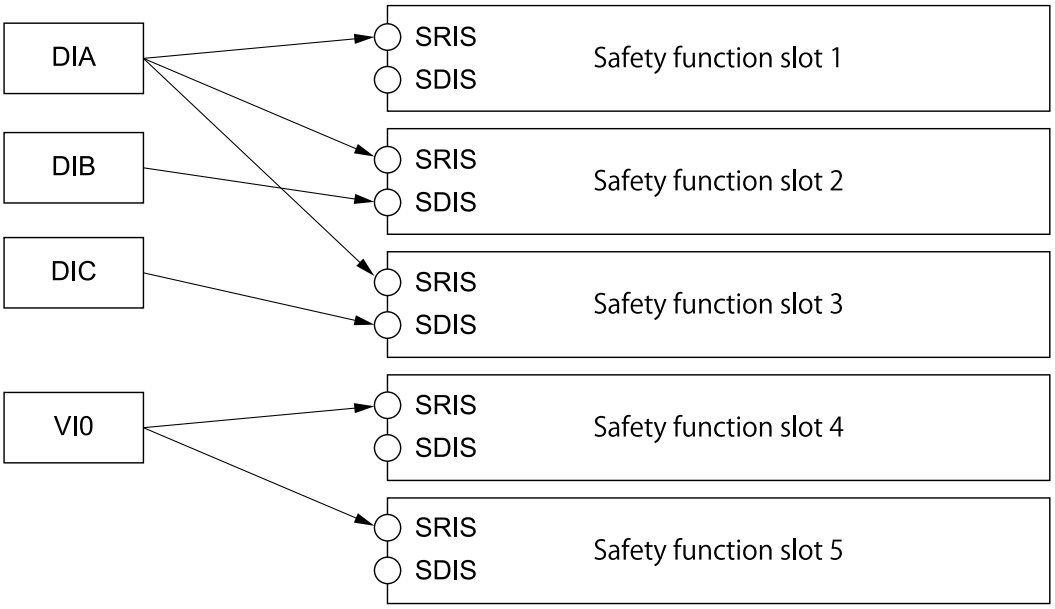
In this example, each SRIS is input from a different terminal, and this allows the activation timing of each function to be individually controlled.

Each SDIS is also input from a different terminal, and this allows the operation timing to be individually controlled.



(2) Using SRIS Shared between Multiple Safety Function Slots

The following example shows SRIS being shared on DIA between safety function slots 1 to 3 and VI0 between safety function slots 4 and 5. When safety function slots 1 to 3 and safety function slots 4 and 5 are activated at the same time, you can reduce the signal terminals used by sharing signals in this manner.



7.5 Output Signals

7.5.1 Output Signal Types

The types of output signals that are output from the ASM-X are shown below.

Signal	Settable Signal	
	Digital Output	Safety Fieldbus Output
Safety Function Status Output Signal (EDM: Redundant Outputs)	Yes	Yes
Safety Function Status Output Signal (EDM: Single Output)	Yes	Yes
SSM Output Signal (SSMOS)	Yes	Yes
SBC Output Signal (SBCOS)	Yes	No

7.5.2 Safety Function Status Output Signal (EDM)

EDM is a diagnostic signal that outputs the status of the safety function.

There are the following four types of safety function statuses it can output. These types are set in parameters.

You can select whether to output the status to a digital output signal or a safety fieldbus output signal, and you can also select Safe Output or Non-Safe Output.

(1) Definition of EDM

Safety Function		Definition
Type of Status Output	Status	
In Operation	ON	The safety function is operating.
	OFF	The safety function is not operating.
Working Safety Function *1	ON	The safety function is being executed in the safe state.
	OFF	The safety function is not being executed in the safe state.
After Limit Violation	ON	A limit violation for the monitoring threshold has occurred.
	OFF	A limit violation for the monitoring threshold has not occurred.
HWBB (STO) State *2	ON	The safety function has entered the STO state.
	OFF	The safety function has not entered the STO state.

*1 Check the operating specifications of the safety functions for details.

*2 This state includes the following two cases:

- The STO state is always set after the Monitoring Time (t2) has elapsed after the activation signal for a safety function, such as the SS1-t function, is enabled.
- When the STO function has operated normally after the STO function is activated because a safety function has a limit violation.

(2) EDM Destination Types

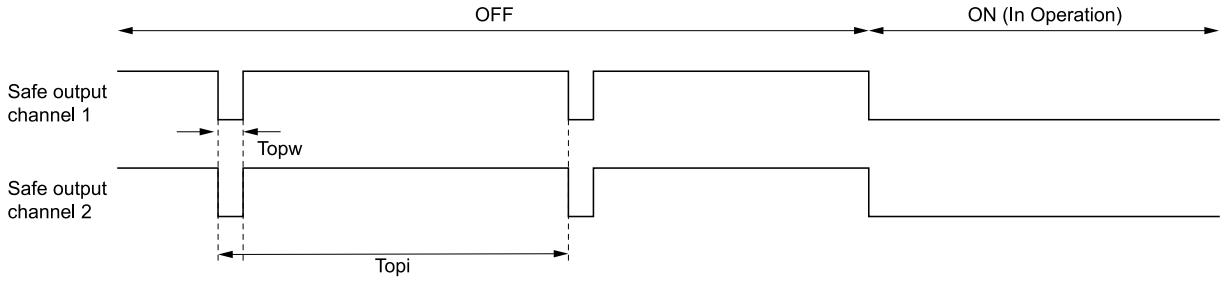
Output Destination	Specification
Digital output signal	Redundant outputs (two outputs)
	Single output
Safety fieldbus output signal	Single output

(3) Specifications of the Digital Output Diagnostic Output (Test Pulses) Signal

The specifications for using EDM as a digital signal (redundant outputs) are shown below.

The following example shows when "In Operation" is output to EDM.

Safety Function Status	Output Status	Remarks
ON (In Operation)	Output transistor OFF	–
OFF	Output transistor ON	Includes test pulses.



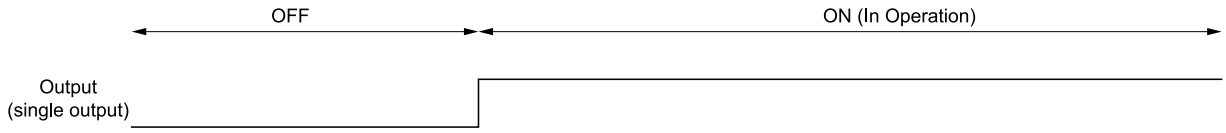
Topw: Test pulse width (1 ms to 20 ms, settable with parameter)
Topi: Test pulse interval (approx. 100 ms, not settable with parameter)

(4) Specifications of the Digital Output Diagnostic Output (Single Output)

The specifications for using EDM as a digital signal (single output) are shown below.

The following example shows when "In Operation" is output to EDM.

Safety Function Status	Output Status	Remarks
ON (In Operation)	Output transistor ON	No test pulse output
OFF	Output transistor OFF	–



(5) Specifications of the Safe Output Signal for Safety Fieldbus Output

The specifications for using EDM as a safety fieldbus output signal are shown below.

The following example shows when "In Operation" is output to EDM.

Safety Function Status	Output Status	Remarks
ON (In Operation)	1	–
OFF	0	–

7.5.3 SSM Output Signal (SSMOS)

SSMOS is the safe output signal that is output from the SSM function.

Single signal output cannot be used because this is a safe output signal. Redundant outputs are required.

If the SSM function detects the limit violation state, SSMOS is turned ON.

(1) Definition of SSMOS

Signal Status	Definition
ON	A limit violation was detected in the SSM function.
OFF	A limit violation was not detected in the SSM function.

(2) Specifications for Use as a Digital Signal

The specifications for using SSMOS as a digital signal are shown below.

The test pulses specifications are the same as those for EDM.

Refer to the following section for EDM.

☞ *(3) Specifications of the Digital Output Diagnostic Output (Test Pulses) Signal on page 153*

Safety Function Status	Output Status	Remarks
ON	Output transistor OFF	–
OFF	Output transistor ON	Includes test pulses.

(3) Specifications for Use as a Safety Fieldbus Output Signal

The specifications for using SSMOS as a safety fieldbus output signal are shown below.

Safety Function Status	Output Status	Remarks
ON	1	–
OFF	0	–

7.5.4 SBC Output Signal (SBCOS)

SBCOS is the signal output from the SBC function for driving relays.

Single signal output cannot be used because this is a safe output signal. Redundant outputs are required.

Refer to the following section for details on operation.

☞ *7.17 SBC (Safe Brake Control) on page 217*

This signal can be used only with digital output.

To keep the safety relays driven by SBCOS from operating with the test pulses output by the ASM-X, disable the test pulses in the output signal settings.

(1) Definition of SBCOS

Signal Status	Definition
ON	No request to energize the relay coil for brake power supply control
OFF	Request to energize the relay coil for brake power supply control

(2) Specifications of SBCOS

SBCOS Status	Output Status	Operation
ON	Output transistor OFF	Sets the relay coil for brake power supply control to the de-energized state.
OFF	Output transistor ON	Sets the relay coil for brake power supply control to the energized state.

7.5.5 Settings for Digital Output Signals

The settings for the digital output signals are set in the following parameters. Set the selection of the output port to use, the usage selection, the initial stuck diagnosis selection, the test pulse diagnosis selection, the test pulse length, and the delay times when the output signal is ON and OFF.

(1) List of Parameter Settings for Digital Output Signals

Parameter No.	Name	Unit	Setting Range	Default Setting
Pc0E0 = n.□□□X	Digital Output Port A (DOA) - Selection 0: Do not use, 1: Use	–	0, 1	0
Pc0E0 = n.□□X□	Digital Output Port A (DOA) - Usage Selection 0: EDM (Redundant Outputs), 1: EDM (Single Output), 2: SSMOS, 3: Reserved (do not set), 4: SBCOS	–	0 to 4	0
Pc0E0 = n.□X□□	Digital Output Port A (DOA) - Initial Stuck Diagnosis Selection *1 0: Disable, 1: Enable	–	0, 1	1
Pc0E0 = n.X□□□	Digital Output Port A (DOA) - Test Pulse Diagnosis Selection *2 0: Disable, 1: Enable	–	0, 1	1
Pc0E1	Digital Output Port A (DOA) - Test Pulse Length	1 ms	2 to 20	2
Pc0E2	Digital Output Port A (DOA) - ON Delay Time *3	1 ms	30 to 300	30
Pc0E3	Digital Output Port A (DOA) - OFF Delay Time *3	1 ms	30 to 300	30
Pc0E6 = n.□□□X	Digital Output Port B (DOB) - Selection 0: Do not use, 1: Use	–	0, 1	0
Pc0E6 = n.□□X□	Digital Output Port B (DOB) - Usage Selection 0: EDM (Redundant Outputs), 1: EDM (Single Output), 2: SSMOS, 3: Reserved (do not set), 4: SBCOS	–	0 to 4	0
Pc0E6 = n.□X□□	Digital Output Port B (DOB) - Initial Stuck Diagnosis Selection *1 0: Disable, 1: Enable	–	0, 1	1
Pc0E6 = n.X□□□	Digital Output Port B (DOB) - Test Pulse Diagnosis Selection *2 0: Disable, 1: Enable	–	0, 1	1
Pc0E7	Digital Output Port B (DOB) - Test Pulse Length	1 ms	2 to 20	2
Pc0E8	Digital Output Port B (DOB) - ON Delay Time *3	1 ms	30 to 300	30
Pc0E9	Digital Output Port B (DOB) - OFF Delay Time *3	1 ms	30 to 300	30
Pc0EC. = n.□□□X	Digital Output Port C (DOC) - Selection 0: Do not use, 1: Use	–	0, 1	0
Pc0EC = n.□□X□	Digital Output Port C (DOC) - Usage Selection 0: EDM (Redundant Outputs), 1: EDM (Single Output), 2: SSMOS, 3: Reserved (do not set), 4: SBCOS	–	0 to 4	0
Pc0EC = n.□X□□	Digital Output Port C (DOC) - Initial Stuck Diagnosis Selection *1 0: Disable, 1: Enable	–	0, 1	1
Pc0EC = n.X□□□	Digital Output Port C (DOC) - Test Pulse Diagnosis Selection *2 0: Disable, 1: Enable	–	0, 1	1
Pc0ED	Digital Output Port C (DOC) - Test Pulse Length	1 ms	2 to 20	2
Pc0EE	Digital Output Port C (DOC) - ON Delay Time *3	1 ms	30 to 300	30
Pc0EF	Digital Output Port C (DOC) - OFF Delay Time *3	1 ms	30 to 300	30
Pc0F2 = n.□□□X	Digital Output Port D (DOD) - Selection 0: Do not use, 1: Use	–	0, 1	0

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Parameter No.	Name	Unit	Setting Range	Default Setting
Pc0F2 = n.□□X□	Digital Output Port D (DOD) - Usage Selection 0: EDM (Redundant Outputs), 1: EDM (Single Output), 2: SSMOS, 3: Reserved (do not set), 4: SBCOS	–	0 to 4	0
Pc0F2 = n.□X□□	Digital Output Port D (DOD) - Initial Stuck Diagnosis Selection *1 0: Disable, 1: Enable	–	0, 1	1
Pc0F2 = n.X□□□	Digital Output Port D (DOD) - Test Pulse Diagnosis Selection *2 0: Disable, 1: Enable	–	0, 1	1
Pc0F3	Digital Output Port D (DOD) - Test Pulse Length	1 ms	2 to 20	2
Pc0F4	Digital Output Port D (DOD) - ON Delay Time *3	1 ms	30 to 300	30
Pc0F5	Digital Output Port D (DOD) - OFF Delay Time *3	1 ms	30 to 300	30
Pc0F8 = n.□□□X	Digital Output Port E (DOE) - Selection 0: Do not use, 1: Use	–	0, 1	0
Pc0F8 = n.□□X□	Digital Output Port E (DOE) - Usage Selection 0: EDM (Redundant Outputs), 1: EDM (Single Output), 2: SSMOS, 3: Reserved (do not set), 4: SBCOS	–	0 to 4	0
Pc0F8 = n.□X□□	Digital Output Port E (DOE) - Initial Stuck Diagnosis Selection *1 0: Disable, 1: Enable	–	0, 1	1
Pc0F8 = n.X□□□	Digital Output Port E (DOE) - Test Pulse Diagnosis Selection *2 0: Disable, 1: Enable	–	0, 1	1
Pc0F9	Digital Output Port E (DOE) - Test Pulse Length	1 ms	2 to 20	2
Pc0FA	Digital Output Port E (DOE) - ON Delay Time *3	1 ms	30 to 300	30
Pc0FB	Digital Output Port E (DOE) - OFF Delay Time *3	1 ms	30 to 300	30

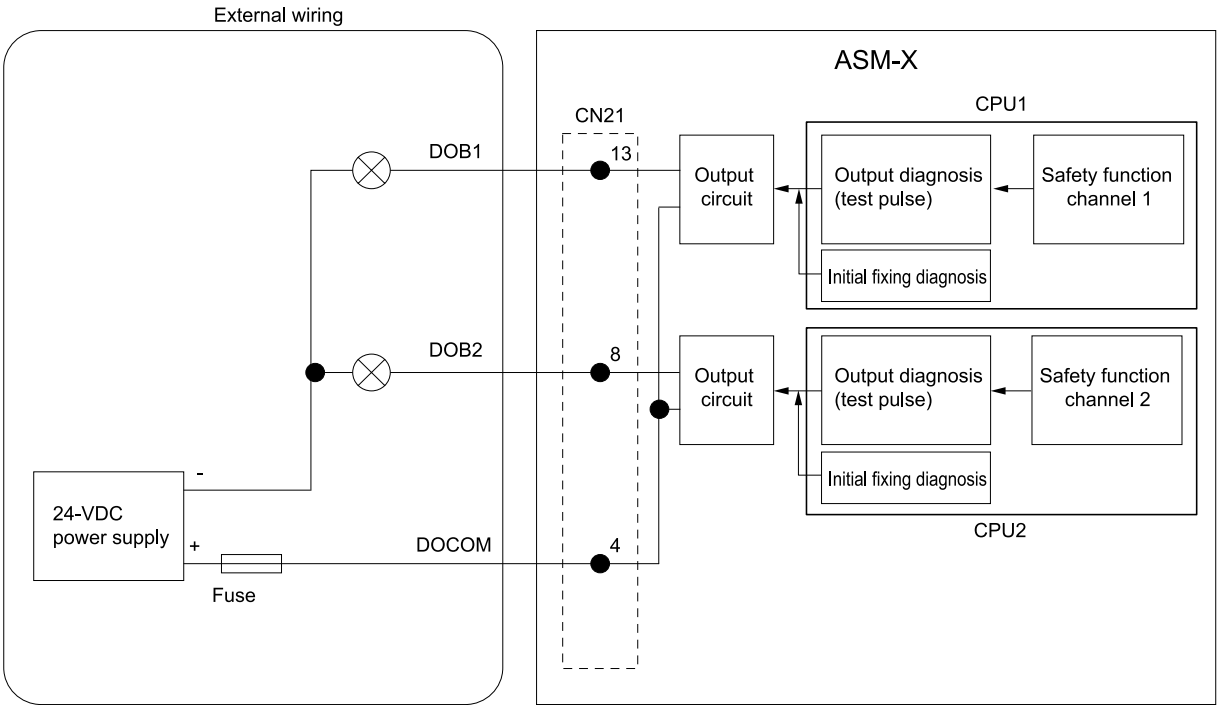
*1 If an output port is set not to be used or if the usage is set to EDM (Single Output), the initial stuck diagnosis will not be performed regardless of the initial stuck diagnosis selection setting.

*2 If an output port is set not to be used or if the usage is set to EDM (Single Output), test pulses will not be output regardless of the test pulse output selection setting.

*3 Set the response time of the load to be connected to the digital output port. Set the minimum value if there is no resistance load or other delay time. If the output signal does not change within the set ON delay and OFF delay times, alarms A.E78 to A.E7C (Safety Module - DO□ Diagnostic Error) will occur.

(2) Output Circuit Block Diagram

The following figure shows an example of the DOB output circuit block diagram.

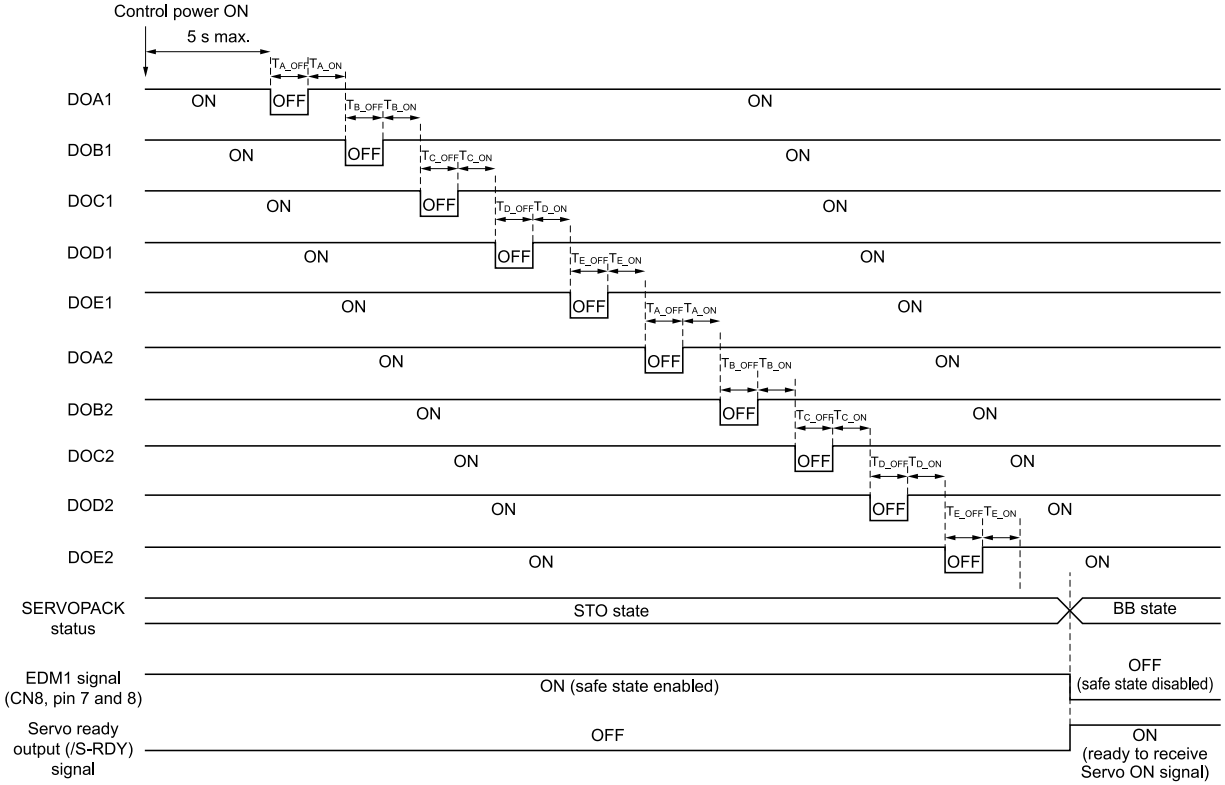


7.5.6 Initial Stuck Diagnosis for Digital Output

If using a digital output, the stuck diagnosis of the digital output is performed after the power is turned ON.

During the stuck diagnosis, the ASM-X forces the output signal ON and OFF, and measures must be implemented to prevent malfunction due to this change in the signal in devices that receive the digital output.

During the stuck diagnosis, the STO state is set, and when the initial stuck diagnosis is completed, the STO state is automatically cleared unless the STO command is given. Afterward, the EDM1 signal on CN8 of the SERVOPACK is turned OFF, the Servo Ready signal is turned ON, and the Servo ON reference (Enable Operation command) can be received.

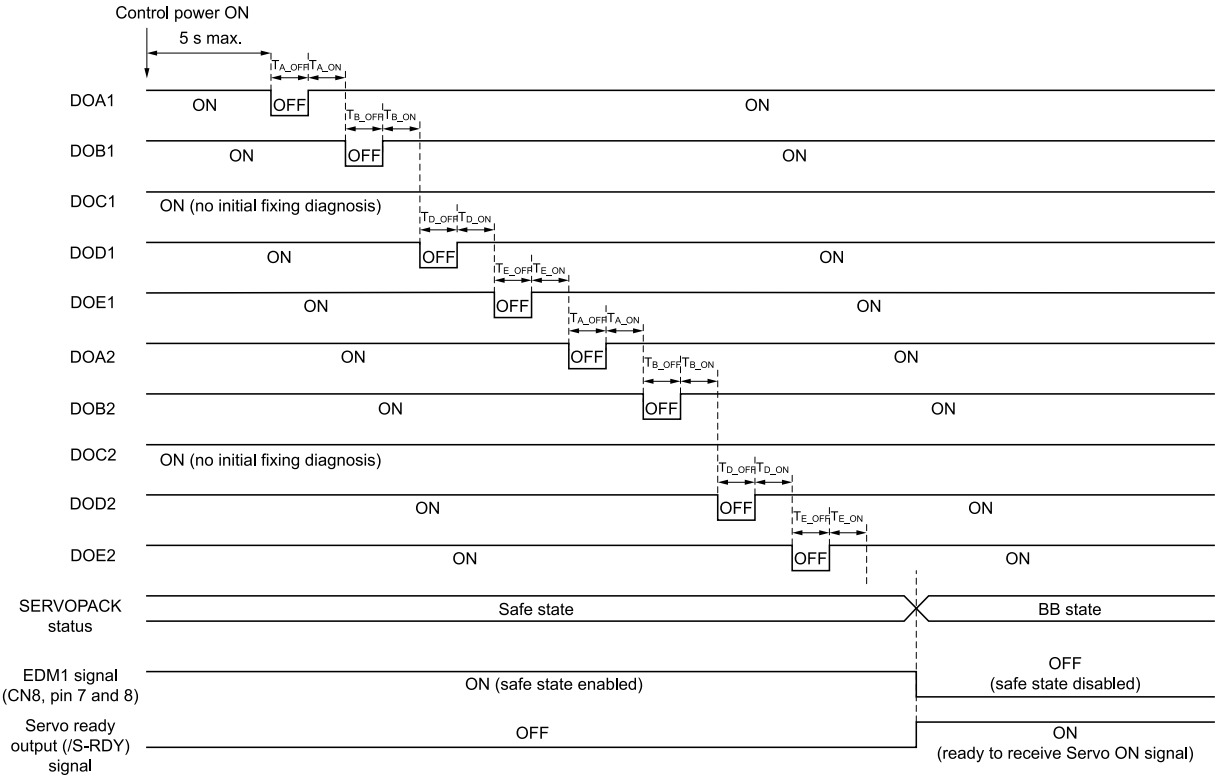


Refer to the following section for T_{A_ON} (ON delay time) to T_{E_OFF} (OFF delay time).

☞ *7.5.5 Settings for Digital Output Signals on page 155*

Output signals that are set not to perform the stuck diagnosis in the parameter settings are skipped.

The following chart shows an example of diagnosis execution with the initial stuck diagnosis for DOC skipped.



7.5.7 Periodic Initial Stuck Diagnosis for Digital Output

After the initial stuck diagnosis is completed, a stuck diagnosis is performed for digital output signals when a digital output changes due to EDM or other signal output.

This stuck diagnosis checks if the rising or falling digital output signal is output within the ON delay and OFF delay times for the digital output signal.

If an error is detected, alarm A.E78 to A.E7C (Safety Module - DO□ Diagnostic Error) will occur.

This diagnosis function cannot be turned OFF.

If alarm A.E78 to A.E7C occurs due to a delay in the signal changing from the load on the external wiring of the digital output signal, adjust the ON delay and OFF delay times for the output signal.

7.5.8 Safety Fieldbus Output Signals

This section gives the details on the output signals (VO0 to VO15) in the safety fieldbus SPDU.

Octet	Name	Description							
0	Command	FSoE SubDevice command							
1	Safe Data[0]	VO7	VO6	VO5	VO4	VO3	VO2	VO1	VO0
2	Safe Data[1]	VO15	VO14	VO13	VO12	VO11	VO10	VO9	VO8
3	CRC_0_Lo	CRC0							
4	CRC_0_Hi								
5	Safe Data[2]	SF 8	SF 7	SF 6	SF 5	SF 4	SF 3	SF 2	SF 1
6	Safe Data[3]	DIA2	DIE1	DID1	DIC1	DIB1	DIA1	SF 10	SF 9

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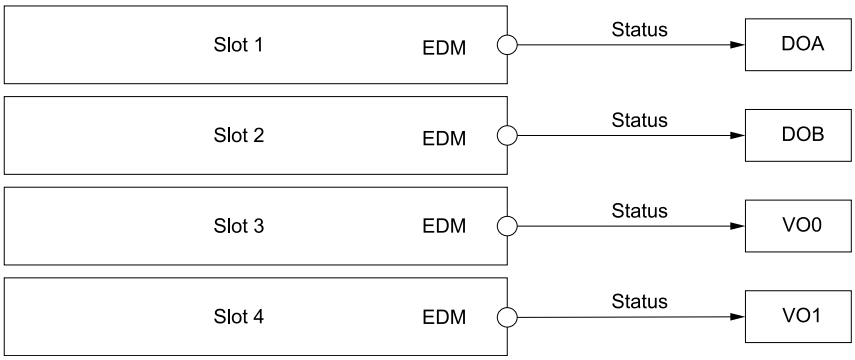
Octet	Name	Description							
7	CRC_1_Lo	CRC1							
8	CRC_1_Hi								
9	Safe Data[4]	MPA3	MPA2	MPA1	MPA0	DIE2	DID2	DIC2	DIB2
10	Safe Data[5]	Error	Reserved	Padding					
11	CRC_2_Lo	CRC2							
12	CRC_2_Hi								
13	Safe Data[6]	Monitor val1 (1st word)							
14	Safe Data[7]								
15	CRC_3_Lo	CRC3							
16	CRC_3_Hi								
17	Safe Data[8]	Monitor val1 (2nd word)							
18	Safe Data[9]								
19	CRC_4_Lo	CRC4							
20	CRC_4_Hi								
21	Safe Data [10]	Monitor val2 (1st word)							
22	Safe Data [11]								
23	CRC_5_Lo	CRC5							
24	CRC_5_Hi								
25	Safe Data [12]	Monitor val2 (2nd word)							
26	Safe Data [13]								
27	CRC_6_Lo	CRC6							
28	CRC_6_Hi								
29	Conn_id_Lo	Connection ID							
30	Conn_id_Hi								

7.5.9 Examples of Using Output Signals

(1) To Output EDMs from Safety Function Slots Each to a Different Terminal

The following example shows the EDMs from safety function slots being output to digital output signals (DOA and DOB) and safety fieldbus output signals (VO0 and VO1).

In this example, the status of the safety functions can be read for each slot because each EDM is output to a different terminal.



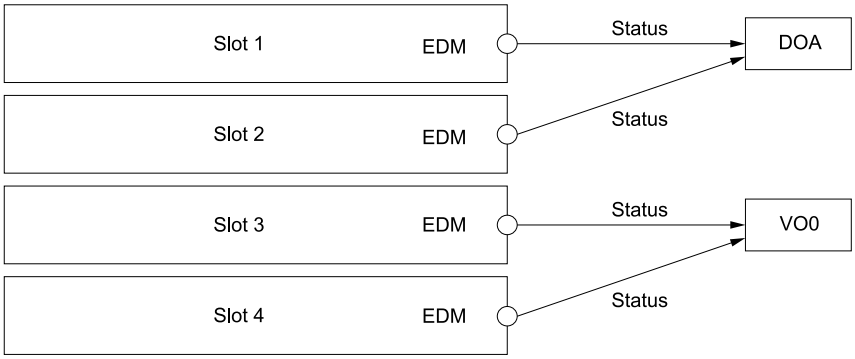
(2) To Output EDM from Safety Function Slots to the Same Terminal

You can output EDM from multiple slots to the same output signal terminal.

The following examples shows EDM from slot 1 and slot 2 output to DOA and EDM from slot 3 and slot 4 output to VO0.

In this case, DOA is output using OR of slot 1 and slot 2, and VO0 is output using OR of slot 3 and slot 4.

To output EDM from multiple slots to the same output terminal in this way, we recommend that you make the statuses to output the same. (No alarm will occur even if the output statuses are not made the same.)



The relationship between the EDM statuses of slot 1 and slot 2 and the status of DOA is shown below.

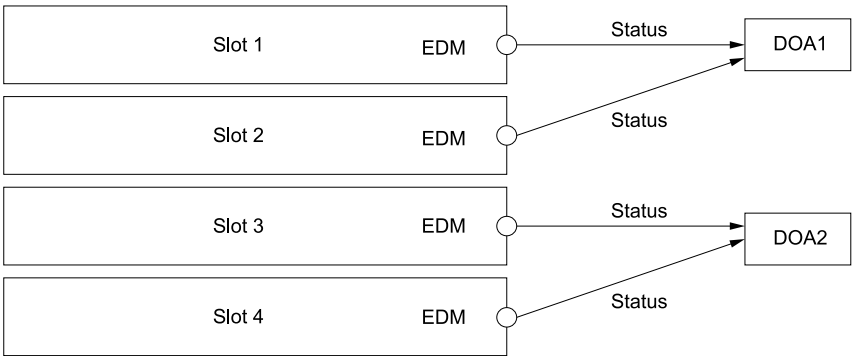
Slot 1 EDM Status	Slot 2 EDM Status	DOA Status (Signal Level)
OFF	OFF	OFF (output transistor is ON)
ON	OFF	ON (output transistor is OFF)
OFF	ON	ON (output transistor is OFF)
ON	ON	ON (output transistor is OFF)

The relationship between the EDM statuses of slot 3 and slot 4 and the status of VO0 is shown below.

Slot 3 EDM Status	Slot 4 EDM Status	VO0 Status (Signal Level)
OFF	OFF	OFF (0)
ON	OFF	ON (1)
OFF	ON	ON (1)
ON	ON	ON (1)

(3) To Output EDMs (Single Output) from Safety Function Slots to the Same Terminal

Even if EDMs are single outputs, you can output the EDMs to the same output signal terminal. The output status is the OR of those slots.



The relationship between the EDM statuses of slot 1 and slot 2 and the status of DOA1 is shown below.

Slot 1 EDM Status	Slot 2 EDM Status	DOA1 Status (Signal Level)
OFF	OFF	OFF (output transistor is OFF)
ON	OFF	ON (output transistor is ON)
OFF	ON	ON (output transistor is ON)
ON	ON	ON (output transistor is ON)

The relationship between the EDM statuses of slot 3 and slot 4 and the status of DOA2 is shown below.

Slot 3 EDM Status	Slot 4 EDM Status	DOA2 Status (Signal Level)
OFF	OFF	OFF (output transistor is OFF)
ON	OFF	ON (output transistor is ON)
OFF	ON	ON (output transistor is ON)
ON	ON	ON (output transistor is ON)

7.6 Warnings during Limit Violation

A limit violation warning will occur if a limit violation is detected while a safety function is running.

Warning Number	Warning Name	Warning Meaning
A.9C0	Safety Module - Safety Slot 1 Limit Violation	A limit violation was detected in the monitoring operation of safety slot 1.
A.9C1	Safety Module - Safety Slot 2 Limit Violation	A limit violation was detected in the monitoring operation of safety slot 2.
A.9C2	Safety Module - Safety Slot 3 Limit Violation	A limit violation was detected in the monitoring operation of safety slot 3.
A.9C3	Safety Module - Safety Slot 4 Limit Violation	A limit violation was detected in the monitoring operation of safety slot 4.
A.9C4	Safety Module - Safety Slot 5 Limit Violation	A limit violation was detected in the monitoring operation of safety slot 5.
A.9C5	Safety Module - Safety Slot 6 Limit Violation	A limit violation was detected in the monitoring operation of safety slot 6.
A.9C6	Safety Module - Safety Slot 7 Limit Violation	A limit violation was detected in the monitoring operation of safety slot 7.
A.9C7	Safety Module - Safety Slot 8 Limit Violation	A limit violation was detected in the monitoring operation of safety slot 8.
A.9C8	Safety Module - Safety Slot 9 Limit Violation	A limit violation was detected in the monitoring operation of safety slot 9.

The warning status is cleared by ending the safety function and resetting the alarm in the SERVOPACK.

Refer to the following manual for the procedure to reset an alarm.

Σ-XS SERVOPACK with EtherCAT Communications References Product Manual (Manual No.: SIEP C710812 02)

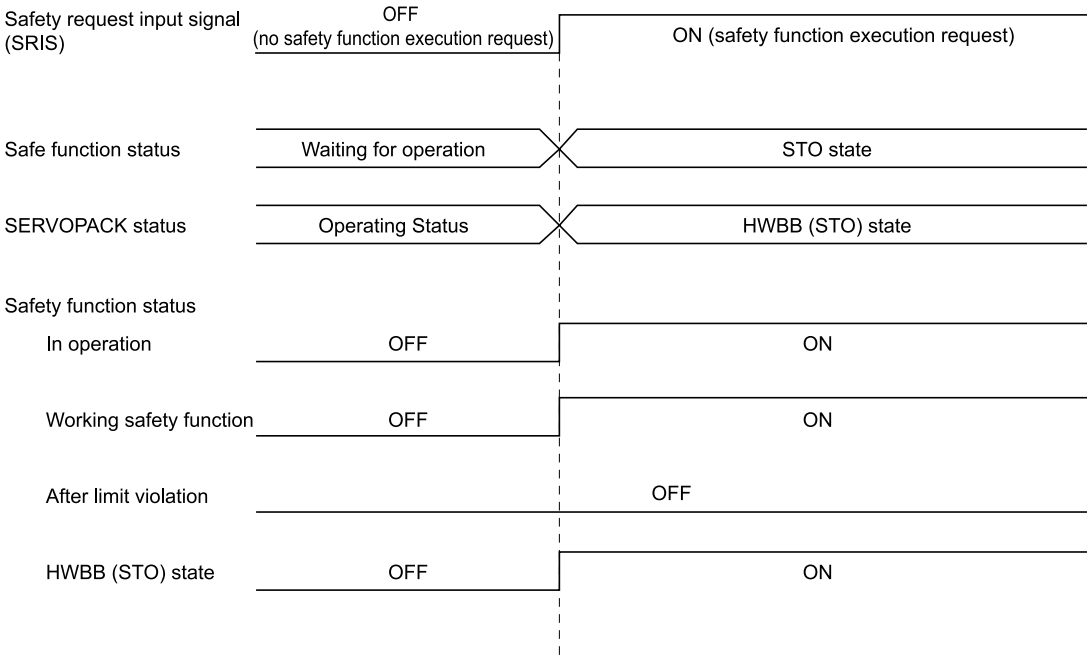
Important

To reset an ASM-X alarm, the SERVOPACK alarm must be reset twice.

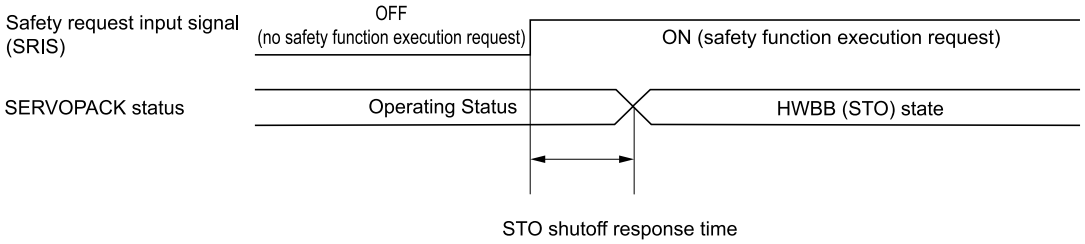
7.7 STO (Safe Torque OFF)

7.7.1 Function Description

When the Safety Request Input Signal (SRIS) is turned ON, the STO function activates the HWBB in the SERVOPACK to shut OFF the servomotor's torque.



The time from when SRIS is turned ON to when the SERVOPACK enters the HWBB (STO) state is called "STO shutoff response time."



The specifications of the STO shutoff response time are given next.

Safety Performance	Specifications
STO shutoff response time	15 ms or less + input signal filter time (parameter setting)

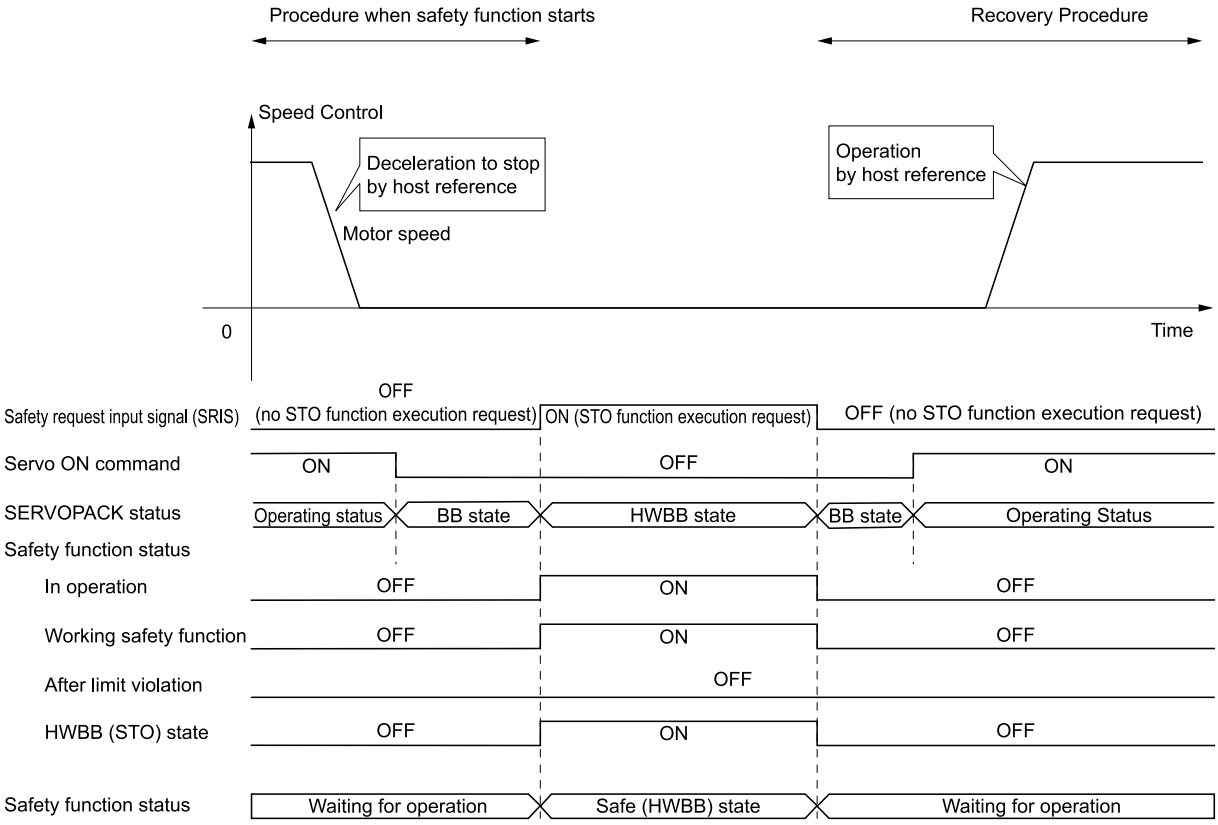
7.7.2 Operation during Limit Violation

A limit violation will not occur because the STO function has no monitoring target.

7.7.3 Operation Examples

(1) When the STO Function Is Executed After the Servo Is Turned OFF

The following chart shows the sequence until normal operation resumes after the STO function was executed and the HWBB state was set after the servo was turned OFF.



(2) When the STO Function Is Executed during Servomotor Operation

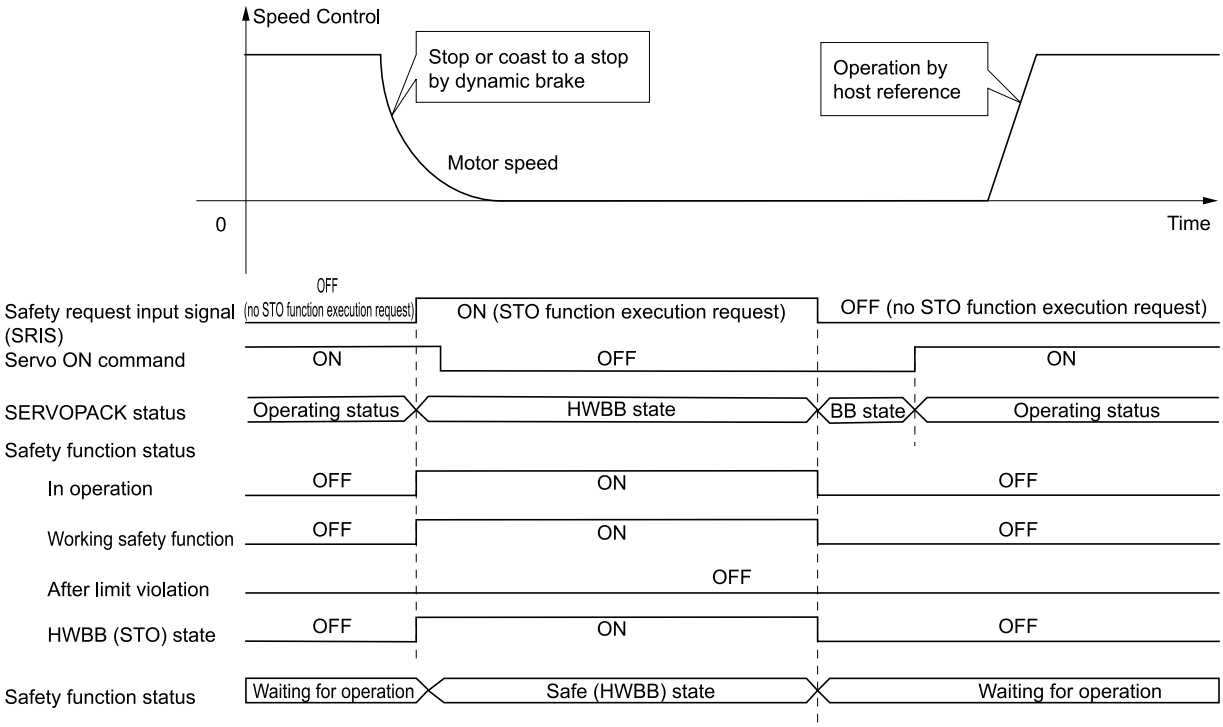
The following chart shows the sequence until normal operation resumes after the STO function was executed during servomotor operation and the HWBB state was set.

The motor stopping method after the SERVOPACK enters the HWBB (STO) state is the setting of Pn001 = n.□□□X (Motor Stopping Method for Servo OFF). Note that if you set Pn001 = n.□□□0 or n.□□□1 (stop the motor by applying the dynamic brake), the following precautions must be observed.

Important

- The dynamic brake is not a safety-related element. You must design the system so that a hazardous condition does not occur even if the servomotor coasts to a stop in the STO state.
- Normally, create a sequence that sets the STO state after the motor is stopped by a command.
  If the application frequently uses the STO function, use a sequence that sets the STO state after stopping the motor because stopping the motor with the dynamic brake may result in the deterioration of elements in the SERVOPACK.

To set the SERVOPACK from the HWBB state to the BB state after the STO function was executed, you must give the Servo OFF command (Disable Operation command).



7.7.4 Activation Method

(1) Parameter Settings

(a) For the FSoE Communications References and Digital I/O Model (SGDXS-OSAA1A)

The STO function settings are configured in the following parameters.

The parameter numbers depend on the slot. Refer to the following section for details.

☞ *7.3.3 Parameters for Safety Function Slot Settings on page 140*

Parameter Name		Description	Remarks
Safety Function Configuration I			
	Safety Function Selection	Select "STO."	–
Safety Function Configuration II			
	Terminal Port Selection for Safety Request Input Signal	Select from the following. • DIA to DIE • VI0 to VI15	When you select a digital input signal (DIA to DIE), confirm that the same input port is set to "Use" in the input signal setting parameter *1 as the input port selected in this parameter.
	Terminal Port Selection for Safety Data Input Signal	Select "Disabled" (default setting).	–
Safety Function Configuration III			

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Parameter Name		Description	Remarks
	Terminal Port Selection for EDM Signal	Select from the following. • Disabled • DOA to DOE (Redundant Outputs) • DOA1 to DOE2 (Single Output) • VO0 to VO15	• When you select "Disabled," select "Disabled" for EDM Signal Behavior below as well. • When you select a digital output signal (DOA to DOE or DOA1 to DOE2), confirm that the same output port is set to "Use" in the output signal setting parameter *2 as the output port selected in this parameter.
	EDM Signal Behavior	Select from the following. • Disabled • In Operation • Working Safety Function • After Limit Violation • HWBB (STO) State	–
Safety Function Configuration IV			
	Terminal Port Selection for Safe Output Signal	Select "Disabled" (default setting).	–

*1 Refer to the following section for details on the input signal setting parameters.
☞ *7.4.5 Settings for Digital Input Signals on page 144*

*2 Refer to the following section for details on the output signal setting parameters.
☞ *7.5.5 Settings for Digital Output Signals on page 155*

Parameter Name	Unit	Sign	Setting Range	Remarks
Monitoring Parameter				
Waiting Time (t1)	10 ms	No	0 to 10000	Not used. Set this parameter to the default setting.
Monitoring Time (t2)	10 ms	No	0 to 10000	
Speed Limit (s1)	User speed reference unit	No	0 to 4294967295	
Speed Limit (s2)	User speed reference unit	No	0 to 4294967295	
Acceleration Limit (a1)	User acceleration reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p1)	User position reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p2)	User position reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p3)	User position reference unit	No	0 to 4294967295	

(b) For the FSoE Communications References Model (SGDXS-OSAA0A)

The STO function settings are configured in the following parameters.

The parameter numbers depend on the slot. Refer to the following section for details.

☞ *7.3.3 Parameters for Safety Function Slot Settings on page 140*

Parameter Name		Description	Remarks
Safety Function Configuration I			
	Safety Function Selection	Select "STO."	–
Safety Function Configuration II			
	Terminal Port Selection for Safety Request Input Signal	Select from the following. • VI0 to VI15	–
	Terminal Port Selection for Safety Data Input Signal	Select "Disabled" (default setting).	–

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Continued from previous page.

Parameter Name		Description	Remarks
Safety Function Configuration III			
	Terminal Port Selection for EDM Signal	Select from the following. • Disabled • VO0 to VO15	When you select "Disabled," select "Disabled" for EDM Signal Behavior below as well.
	EDM Signal Behavior	Select from the following. • Disabled • In Operation • Working Safety Function • After Limit Violation • HWBB (STO) State	–
Safety Function Configuration IV			
	Terminal Port Selection for Safe Output Signal	Select "Disabled" (default setting).	–

Parameter Name	Unit	Sign	Setting Range	Remarks
Monitoring Parameter				
Waiting Time (t1)	10 ms	No	0 to 10000	Not used. Set this parameter to the default setting.
Monitoring Time (t2)	10 ms	No	0 to 10000	
Speed Limit (s1)	User speed reference unit	No	0 to 4294967295	
Speed Limit (s2)	User speed reference unit	No	0 to 4294967295	
Acceleration Limit (a1)	User acceleration reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p1)	User position reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p2)	User position reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p3)	User position reference unit	No	0 to 4294967295	

(2) Signal Operation

Turn ON SRIS.

7.7.5 Returning to Normal Operation

(1) Signal Operation

Turn OFF SRIS.

(2) Conditions for Returning to Normal SERVOPACK Operation

After the STO function operates and the SERVOPACK is set to the HWBB state, you must set the SERVOPACK to the BB state to return to normal operation. The conditions required to set the BB state are given below.

Item	Condition
Servo ON reference (Enable Operation command) to SERVOPACK	This reference is not input.
Polarity Detection Request reference to SERVOPACK	This reference is not input.
Utility functions in the SERVOPACK that turn ON the servo (e.g., Fn002: Jog and Fn003: Origin Search)	These utility functions have ended.

7.8 SS1-r (Safe Stop 1, Ramp Monitored)

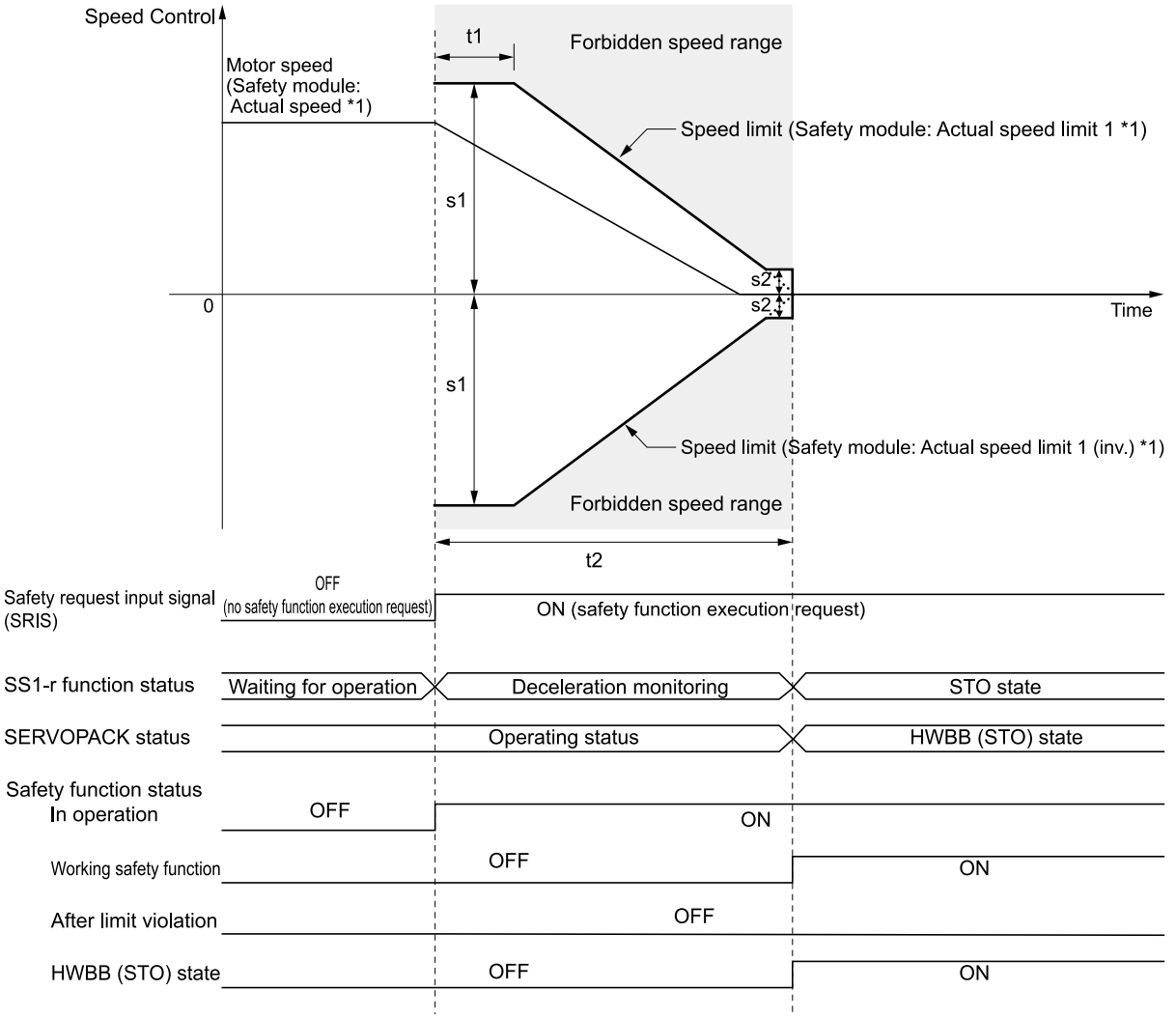
7.8.1 Function Description

When the Safety Request Input Signal (SRIS) is turned ON, the SS1-r function monitors servomotor deceleration until the Monitoring Time (t2) has elapsed, and then it activates the HWBB in the SERVOPACK to shut OFF the servomotor's torque.

The speed limit during deceleration monitoring is shown below with the edge of the SRIS signal set as t = 0.

The speed limits (s1 and s2) are parameter settings. Enter these as positive values. The speed limit is set for both forward and reverse.

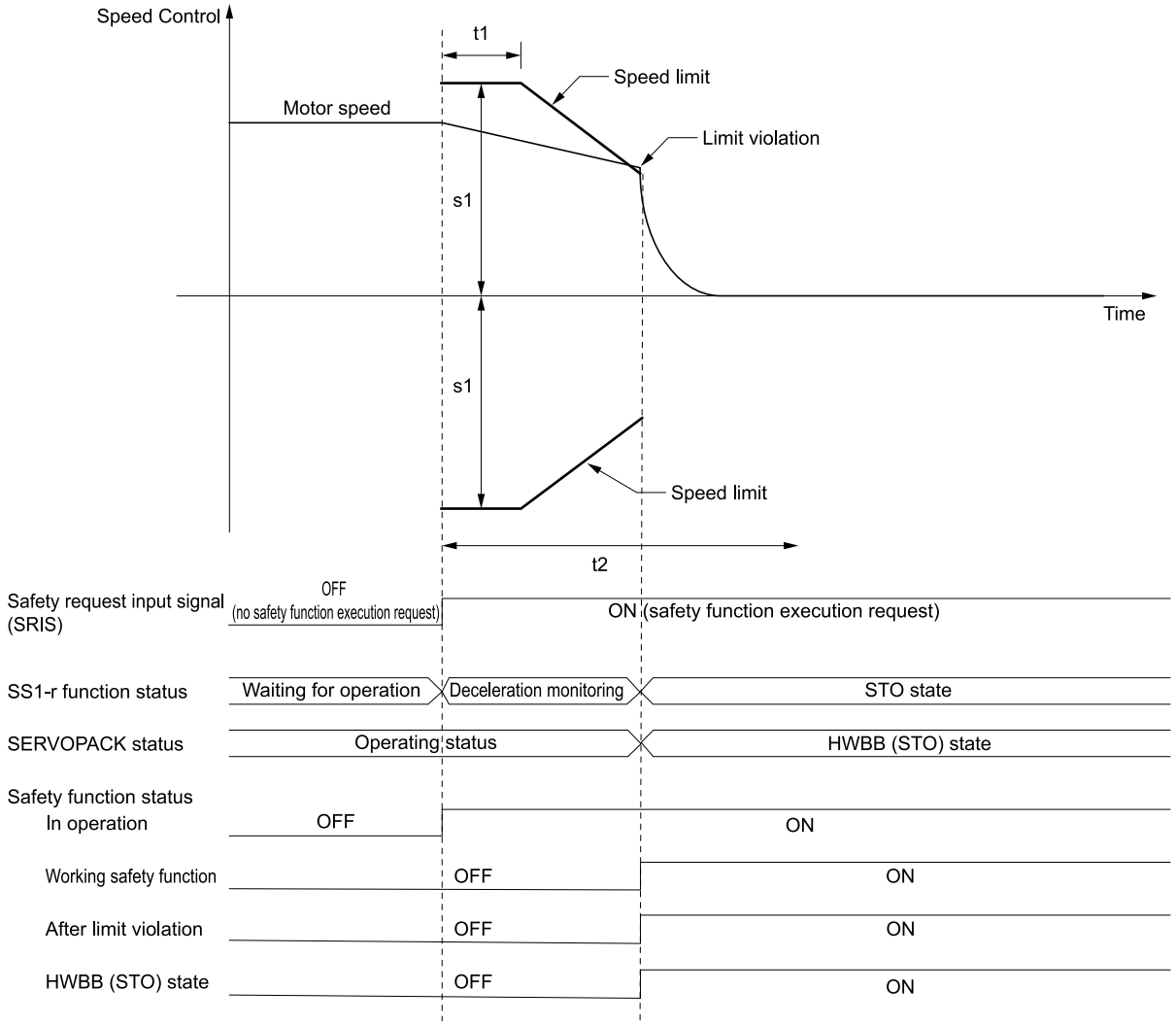
Monitoring Conditions	Limit Violation Conditions	Remarks
t < t1	| Motor speed | > | s1 |	Speed monitoring
t1 ≤ t < t2	| Motor speed | > | Max { s1 * (t2 – t) / (t2 – t1), s2 } |	Speed monitoring
t ≥ t2	Activate STO function	Not monitored



*1 Displayed on the [Trace] window in the SigmaWin+.

7.8.2 Operation during Limit Violation

If the motor speed exceeds the speed monitoring value, a limit violation state occurs. If a limit violation state occurs, the SS1-r function stops monitoring and activates the STO function.



7.8.3 Operation Examples

We recommend using a sequence in which the host controller decelerates the servomotor to a stop and then turns OFF the servo before the STO state is set by the SS1-r function.

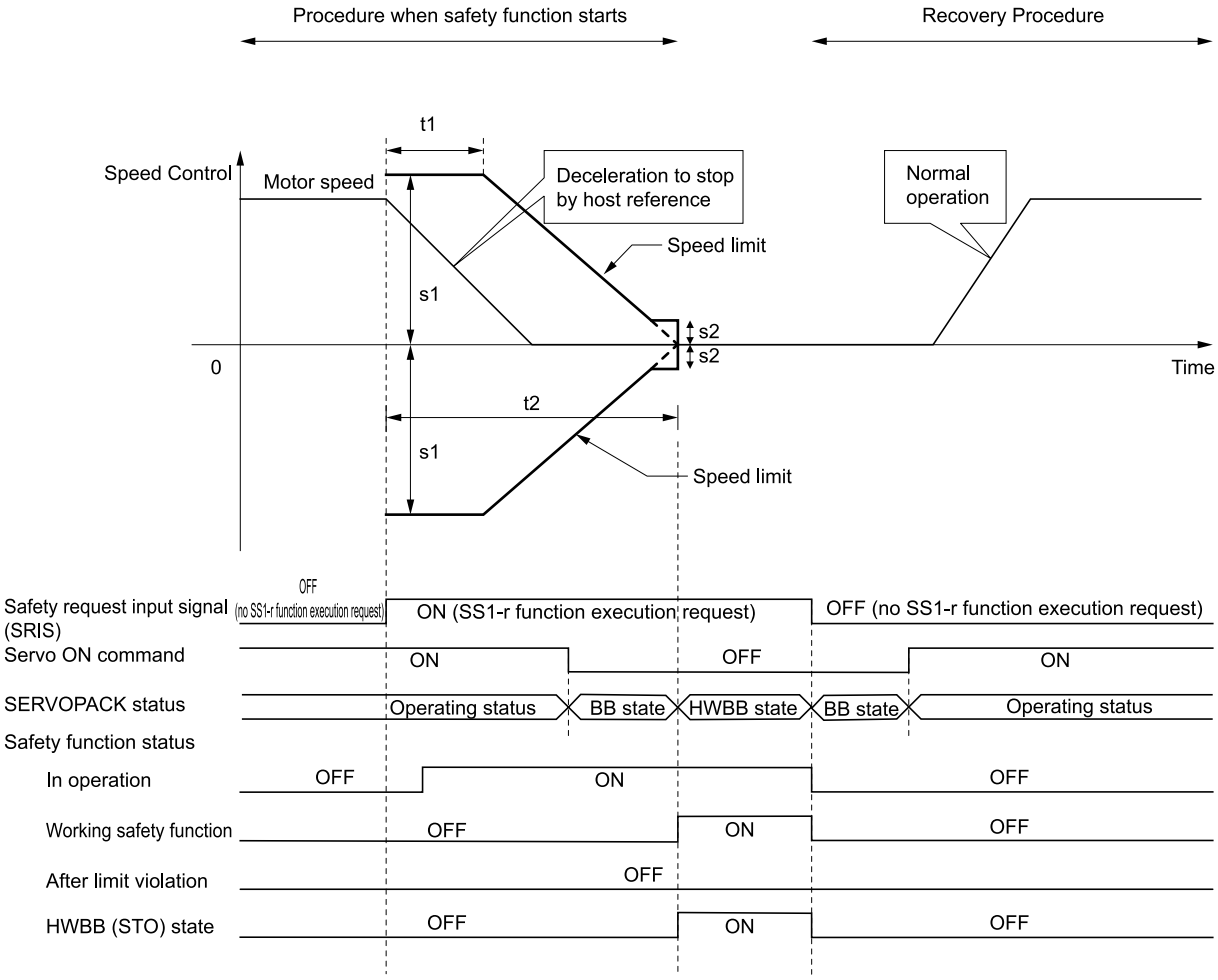
The following chart shows the operation that is performed when SRIS is turned ON during servomotor operation.

The SS1-r function monitors the deceleration of the servomotor until t2 has elapsed. During this period, the host controller decelerates the servomotor to a stop and inputs the Servo OFF reference (Disable Operation command) after the servomotor stops.

After t2 has elapsed, SS1-r activates the HWBB in the SERVOPACK to shut OFF the servomotor's torque.

When SRIS is turned OFF, the HWBB state changes to the BB state.

Normal operation can be restored by inputting the Servo ON reference (Enable Operation command) during the BB state.

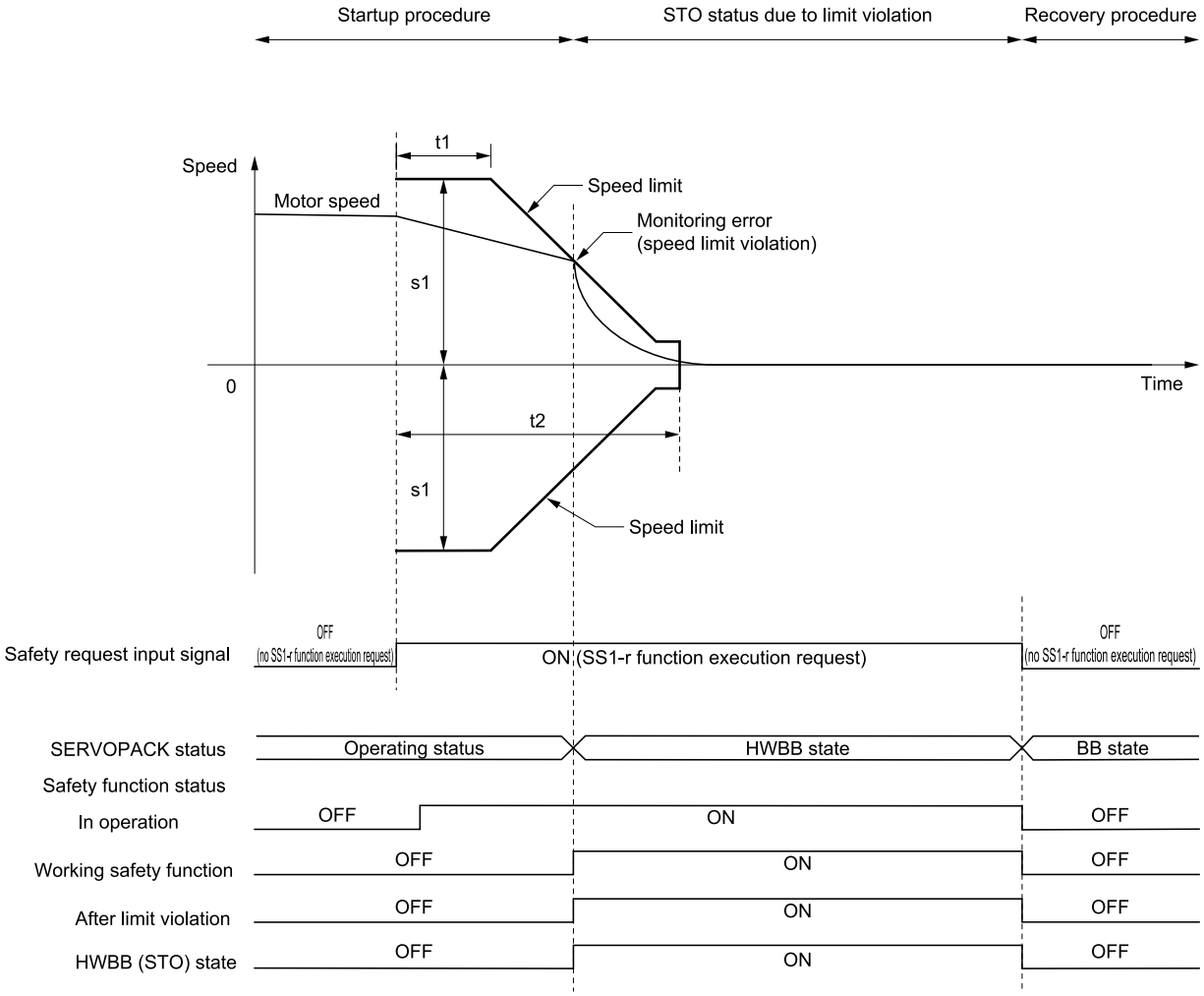


The following chart shows the operation that is performed when a limit violation occurs during deceleration monitoring after the safety function is activated.

If a limit violation occurs, the ASM-X shuts OFF the servomotor's torque by giving the STO function command to the SERVOPACK to set the HWBB state.

If SRIS is turned OFF during the limit violation state, the limit violation state is cleared and changes to the BB state.

Normal operation can be restored by inputting the Servo ON reference (Enable Operation command) during the BB state.



7.8.4 Activation Method

(1) Parameter Settings

(a) For the FSoE Communications References and Digital I/O Model (SGDXS-OSAA1A)

The SS1-r function settings are configured in the following parameters.

The parameter numbers depend on the slot. Refer to the following section for details.

☞ *7.3.3 Parameters for Safety Function Slot Settings on page 140*

Parameter Name		Description	Remarks
Safety Function Configuration I			
	Safety Function Selection	Select "SS1-r."	–
Safety Function Configuration II			

Continued on next page.

Continued from previous page.

Parameter Name		Description	Remarks
	Terminal Port Selection for Safety Request Input Signal	Select from the following. • DIA to DIE • VI0 to VI15 • Slots 1 to 10 limit violation status • Safety fieldbus virtual input not usable state	• When you select a digital input signal (DIA to DIE), confirm that the same input port is set to "Use" in the input signal setting parameter *1 as the input port selected in this parameter. • When you select "Slots 1 to 10 limit violation status," confirm that the Safety Function Selection parameter in the slot specified by this parameter is set to one of the following functions: SOS, SLS, SLA, SSR, SDI-p, SDI-n, SLP, and SLI functions.
	Terminal Port Selection for Safety Data Input Signal	Select "Disabled" (default setting).	–
Safety Function Configuration III			
	Terminal Port Selection for EDM Signal	Select from the following. • Disabled • DOA to DOE (Redundant Outputs) • DOA1 to DOE2 (Single Output) • VO0 to VO15	• When you select "Disabled," select "Disabled" for EDM Signal Behavior below as well. • When you select a digital output signal (DOA to DOE or DOA1 to DOE2), confirm that the same output port is set to "Use" in the output signal setting parameter *2 as the output port selected in this parameter.
	EDM Signal Behavior	Select from the following. • Disabled • In Operation • Working Safety Function • After Limit Violation • HWBB (STO) State	–
Safety Function Configuration IV			
	Terminal Port Selection for Safe Output Signal	Select "Disabled" (default setting).	–

*1 Refer to the following section for details on the input signal setting parameters.
☞ 7.4.5 Settings for Digital Input Signals on page 144

*2 Refer to the following section for details on the output signal setting parameters.
☞ 7.5.5 Settings for Digital Output Signals on page 155

Parameter Name	Unit	Sign	Setting Range	Remarks
Monitoring Parameter				
Waiting Time (t1)	10 ms	No	0 to 10000	Set the parameter as shown below. • t1 ≤ t2
Monitoring Time (t2)	10 ms	No	0 to 10000	
Speed Limit (s1)	User speed reference unit	No	0 to 4294967295	• Dual polarity *1 • Set the parameter as shown below. – s1 ≥ s2 – s1 ≤ Maximum Motor Speed (Pc062) *2
Speed Limit (s2)	User speed reference unit	No	0 to 4294967295	
Acceleration Limit (a1)	User acceleration reference unit	Yes	-2147483648 to 2147483647	Not used. Set this parameter to the default setting.
Distance Limit (p1)	User position reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p2)	User position reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p3)	User position reference unit	No	0 to 4294967295	

*1 The monitoring speed is set as an absolute value without a sign, but the speed is monitored in both the forward and reverse directions.
*2 This comparison is made with the value of Pc062 converted to user speed units. Refer to the following section for details on unit conversion.
☞ *(3) Reference Information: Speed Limit (S1) and Maximum Motor Speed Unit Conversion on page 174*

(b) For the FSoE Communications References Model (SGDXS-OSAA0A)

The SS1-r function settings are configured in the following parameters.

The parameter numbers depend on the slot. Refer to the following section for details.

☞ *7.3.3 Parameters for Safety Function Slot Settings on page 140*

Parameter Name		Description	Remarks
Safety Function Configuration I			
	Safety Function Selection	Select "SS1-r."	–
Safety Function Configuration II			
	Terminal Port Selection for Safety Request Input Signal	Select from the following. • VI0 to VI15 • Slots 1 to 10 limit violation status • Safety fieldbus virtual input not usable state	When you select "Slots 1 to 10 limit violation status," confirm that the Safety Function Selection parameter in the slot specified by this parameter is set to one of the following functions: SOS, SLS, SLA, SSR, SDI-p, SDI-n, SLP, and SLI functions.
	Terminal Port Selection for Safety Data Input Signal	Select "Disabled" (default setting).	–
Safety Function Configuration III			
	Terminal Port Selection for EDM Signal	Select from the following. • Disabled • VO0 to VO15	When you select "Disabled," select "Disabled" for EDM Signal Behavior below as well.
	EDM Signal Behavior	Select from the following. • Disabled • In Operation • Working Safety Function • After Limit Violation • HWBB (STO) State	–
Safety Function Configuration IV			
	Terminal Port Selection for Safe Output Signal	Select "Disabled" (default setting).	–

Parameter Name	Unit	Sign	Setting Range	Remarks
Monitoring Parameter				
Waiting Time (t1)	10 ms	No	0 to 10000	Set the parameter as shown below. • t1 ≤ t2
Monitoring Time (t2)	10 ms	No	0 to 10000	
Speed Limit (s1)	User speed reference unit	No	0 to 4294967295	• Dual polarity *1* • Set the parameter as shown below. – s1 ≥ s2 – s1 ≤ Maximum Motor Speed (Pc062) *2*
Speed Limit (s2)	User speed reference unit	No	0 to 4294967295	

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Parameter Name	Unit	Sign	Setting Range	Remarks
Acceleration Limit (a1)	User acceleration reference unit	Yes	-2147483648 to 2147483647	Not used. Set this parameter to the default setting.
Distance Limit (p1)	User position reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p2)	User position reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p3)	User position reference unit	No	0 to 4294967295	

*1 The monitoring speed is set as an absolute value without a sign, but the speed is monitored in both the forward and reverse directions.
*2 This comparison is made with the value of Pc062 converted to user speed units. Refer to the following section for details on unit conversion.
☞ *(3) Reference Information: Speed Limit (S1) and Maximum Motor Speed Unit Conversion on page 174*

(2) Signal Operation

Turn ON SRIS.

(3) Reference Information: Speed Limit (S1) and Maximum Motor Speed Unit Conversion

The speed limit (s1) and maximum motor speed must be compared by converting both units to [pulses/ms].

This section describes the procedure to convert both units to [pulses/ms].

- Converting the speed limit (s1) unit to [pulses/ms]
  Speed limit (s1) [pulses/ms] = (Speed limit (s1) setting) × (User speed unit (numerator)) / (User speed unit (denominator)) / 1000
  = (Speed limit (s1) setting) × (Pc188 setting / Pc18A setting) / 1000
- Converting the maximum motor speed unit to [pulses/ms]
  Maximum motor speed [pulses/ms] = (Maximum motor speed [min^{-1}] + 0.5) / 60 / 1000 × Resolution of the encoder with functional safety *1*
  *1 The resolution of the encoder with functional safety is determined by the setting of Pc170 = n.□□□X (Safety Function Monitoring Resolution Mode Selection). Refer to the following section for details.
  ☞ *(1) Safety Function Monitoring Resolution Mode Selection (Only When an Encoder with Functional Safety Is Connected) on page 106*

7.8.5 Returning to Normal Operation

(1) Signal Operation

Turn OFF SRIS.

(2) Conditions for Returning to Normal SERVOPACK Operation

After the SERVOPACK is set to the HWBB state, the conditions to return to normal operation are the same as those for the STO function.

Refer to the following sections for details.

☞ *(2) Conditions for Returning to Normal SERVOPACK Operation on page 167*

7.9 SS1-t (Safe Stop 1, Time Controlled)

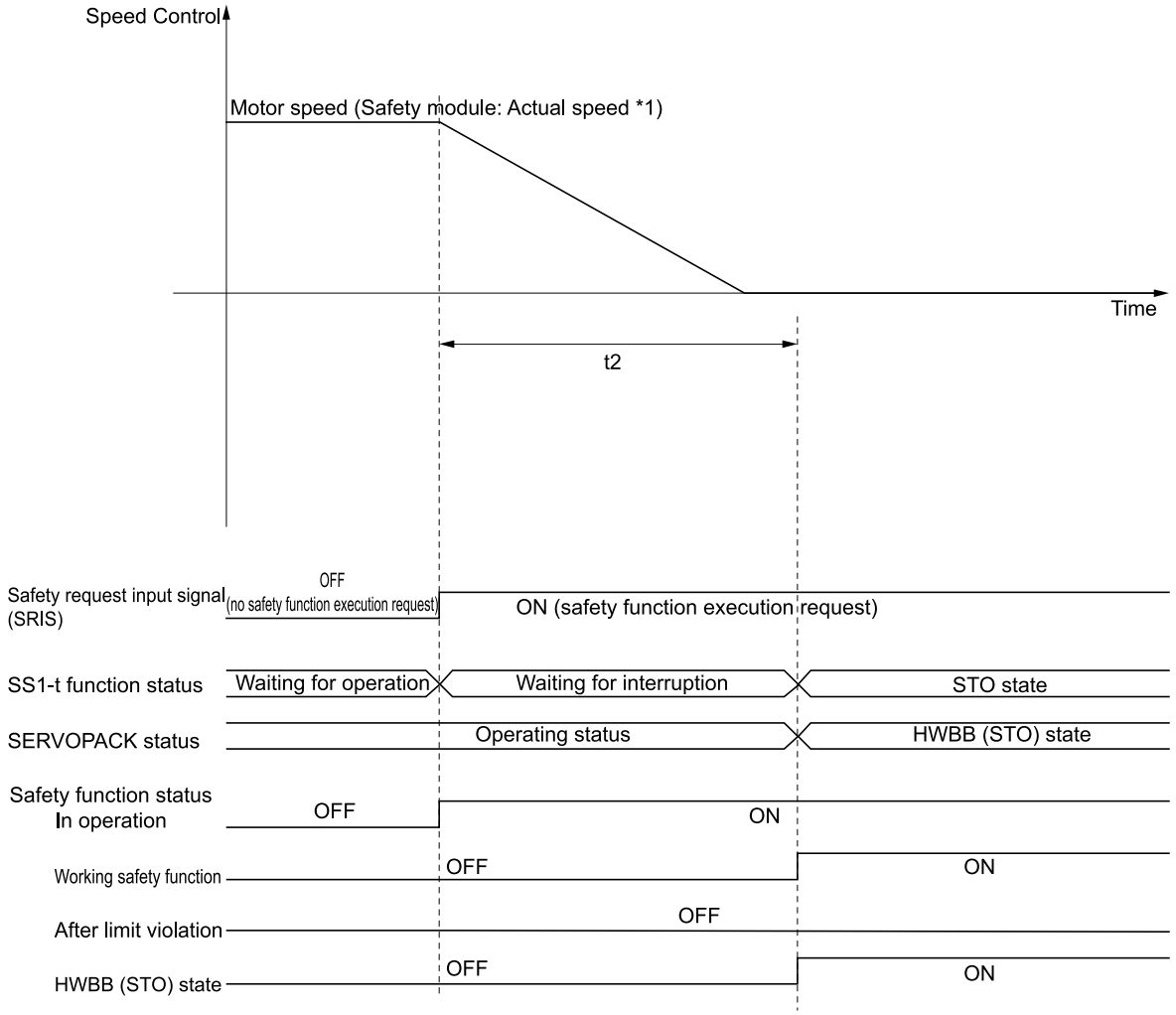
7.9.1 Function Description

When the Safety Request Input Signal (SRIS) is turned ON, the SS1-t function activates the HWBB in the SERVOPACK to shut OFF the servomotor's torque after the time set in Monitoring Time (t2) has elapsed.

The limit violation state will always be OFF because the SS1-t function does not monitor speed.

We recommend using a sequence in which the host controller decelerates the servomotor to a stop and then turns OFF the servo before the STO state is set by the SS1-t function.

Monitoring Conditions	Limit Violation Conditions	Remarks
t < t2	STO function is not activated.	Not monitored
t ≥ t2	STO function is activated.	Not monitored



*1 Displayed on the [Trace] window in the SigmaWin+.

7.9.2 Operation during Limit Violation

A limit violation will not occur because the SS1-t function has no monitoring target.

7.9.3 Activation Method

(1) Parameter Settings

(a) For the FSoE Communications References and Digital I/O Model (SGDXS-OSAA1A)

The SS1-t function settings are configured in the following parameters.

The parameter numbers depend on the slot. Refer to the following section for details.

☞ *7.3.3 Parameters for Safety Function Slot Settings on page 140*

Parameter Name		Description	Remarks
Safety Function Configuration I			
	Safety Function Selection	Select "SS1-t."	–
Safety Function Configuration II			
	Terminal Port Selection for Safety Request Input Signal	Select from the following. • DIA to DIE • VI0 to VI15 • Slots 1 to 10 limit violation status • Safety fieldbus virtual input not usable state	• When you select a digital input signal (DIA to DIE), confirm that the same input port is set to "Use" in the input signal setting parameter *1 as the input port selected in this parameter. • When you select "Slots 1 to 10 limit violation status," confirm that the Safety Function Selection parameter in the slot specified by this parameter is set to one of the following functions: SOS, SLS, SLA, SSR, SDI-p, SDI-n, SLP, and SLI functions.
	Terminal Port Selection for Safety Data Input Signal	Select "Disabled" (default setting).	–
Safety Function Configuration III			
	Terminal Port Selection for EDM Signal	Select from the following. • Disabled • DOA to DOE (Redundant Outputs) • DOA1 to DOE2 (Single Output) • VO0 to VO15	• When you select "Disabled," select "Disabled" for EDM Signal Behavior below as well. • When you select a digital output signal (DOA to DOE or DOA1 to DOE2), confirm that the same output port is set to "Use" in the output signal setting parameter *2 as the output port selected in this parameter.
	EDM Signal Behavior	Select from the following. • Disabled • In Operation • Working Safety Function • After Limit Violation • HWBB (STO) State	–
Safety Function Configuration IV			
	Terminal Port Selection for Safe Output Signal	Select "Disabled" (default setting).	–

*1 Refer to the following section for details on the input signal setting parameters.
☞ *7.4.5 Settings for Digital Input Signals on page 144*

*2 Refer to the following section for details on the output signal setting parameters.
☞ *7.5.5 Settings for Digital Output Signals on page 155*

Parameter Name	Unit	Sign	Setting Range	Remarks
Monitoring Parameter				
Waiting Time (t1)	10 ms	No	0 to 10000	Not used. Set this parameter to the default setting.

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Parameter Name	Unit	Sign	Setting Range	Remarks
Monitoring Time (t2)	10 ms	No	0 to 10000	–
Speed Limit (s1)	User speed reference unit	No	0 to 4294967295	Not used. Set this parameter to the default setting.
Speed Limit (s2)	User speed reference unit	No	0 to 4294967295	
Acceleration Limit (a1)	User acceleration reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p1)	User position reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p2)	User position reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p3)	User position reference unit	No	0 to 4294967295	

(b) For the FSoE Communications References Model (SGDXS-OSAA0A)

The SS1-t function settings are configured in the following parameters.

The parameter numbers depend on the slot. Refer to the following section for details.

☞ *7.3.3 Parameters for Safety Function Slot Settings on page 140*

Parameter Name		Description	Remarks
Safety Function Configuration I			
	Safety Function Selection	Select "SS1-t."	–
Safety Function Configuration II			
	Terminal Port Selection for Safety Request Input Signal	Select from the following. • VI0 to VI15 • Slots 1 to 10 limit violation status • Safety fieldbus virtual input not usable state	When you select "Slots 1 to 10 limit violation status," confirm that the Safety Function Selection parameter in the slot specified by this parameter is set to one of the following functions: SOS, SLS, SLA, SSR, SDI-p, SDI-n, SLP, and SLI functions.
	Terminal Port Selection for Safety Data Input Signal	Select "Disabled" (default setting).	–
Safety Function Configuration III			
	Terminal Port Selection for EDM Signal	Select from the following. • Disabled • VO0 to VO15	When you select "Disabled," select "Disabled" for EDM Signal Behavior below as well.
	EDM Signal Behavior	Select from the following. • Disabled • In Operation • Working Safety Function • After Limit Violation • HWBB (STO) State	–
Safety Function Configuration IV			
	Terminal Port Selection for Safe Output Signal	Select "Disabled" (default setting).	–

Parameter Name	Unit	Sign	Setting Range	Remarks
Monitoring Parameter				
Waiting Time (t1)	10 ms	No	0 to 10000	Not used. Set this parameter to the default setting.
Monitoring Time (t2)	10 ms	No	0 to 10000	–

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Parameter Name	Unit	Sign	Setting Range	Remarks
Speed Limit (s1)	User speed reference unit	No	0 to 4294967295	Not used. Set this parameter to the default setting.
Speed Limit (s2)	User speed reference unit	No	0 to 4294967295	
Acceleration Limit (a1)	User acceleration reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p1)	User position reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p2)	User position reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p3)	User position reference unit	No	0 to 4294967295	

(2) Signal Operation

Turn ON SRIS.

7.9.4 Returning to Normal Operation

(1) Signal Operation

Turn OFF SRIS.

(2) Conditions for Returning to Normal SERVOPACK Operation

After the STO function operates after monitoring parameter t2 has elapsed and the SERVOPACK is set to the HWBB state, the conditions to return to normal operation are the same as those for the STO function.

Refer to the following sections for details.

☞ *(2) Conditions for Returning to Normal SERVOPACK Operation on page 167*

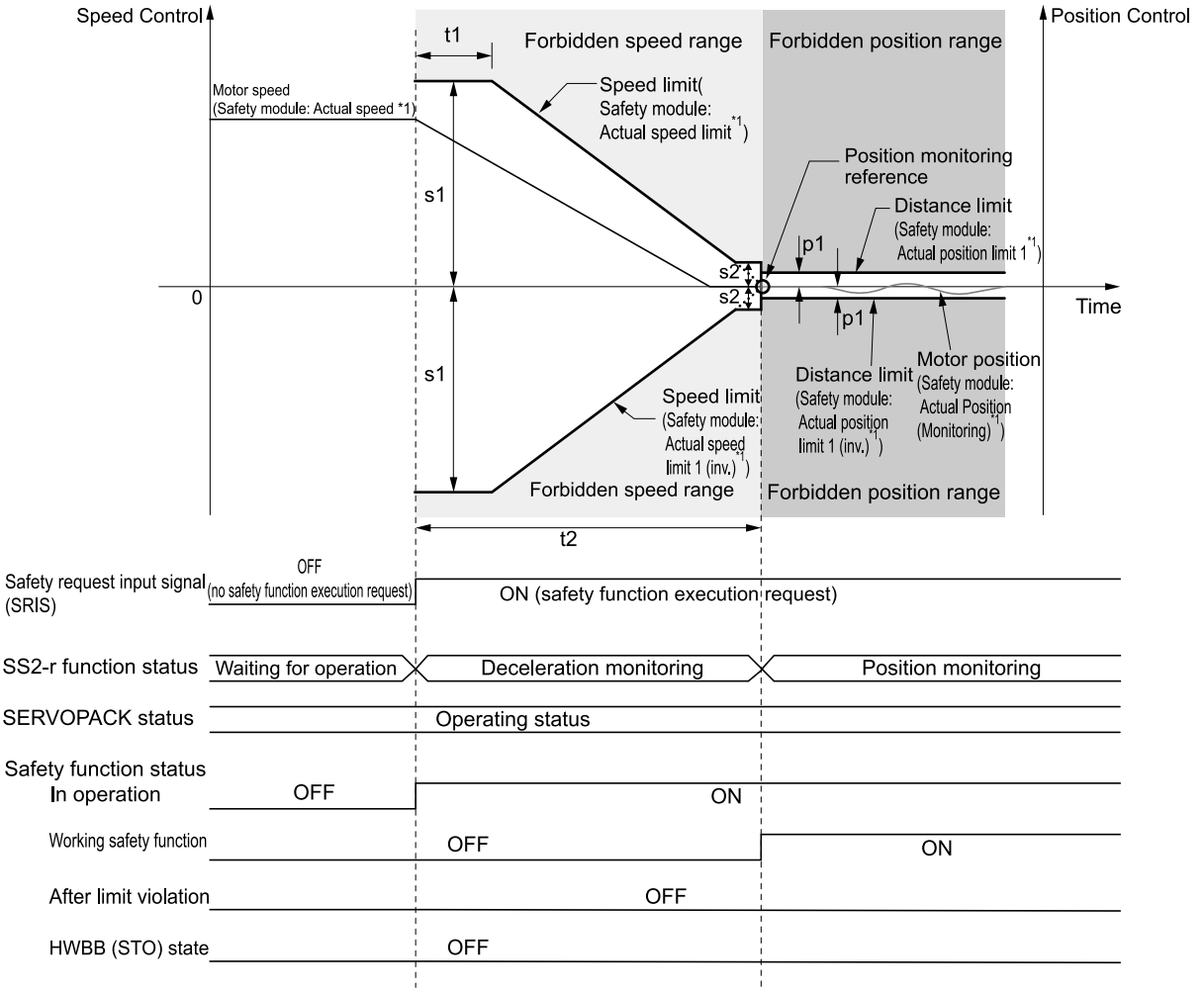
7.10 SS2-r (Safe Stop 2, Ramp Monitored)

7.10.1 Function Description

When the Safety Request Input Signal (SRIS) is turned ON, the SS2-r function monitors servomotor deceleration until the Monitoring Time (t2) has elapsed, and then it executes position monitoring of the servomotor with the SOS function.

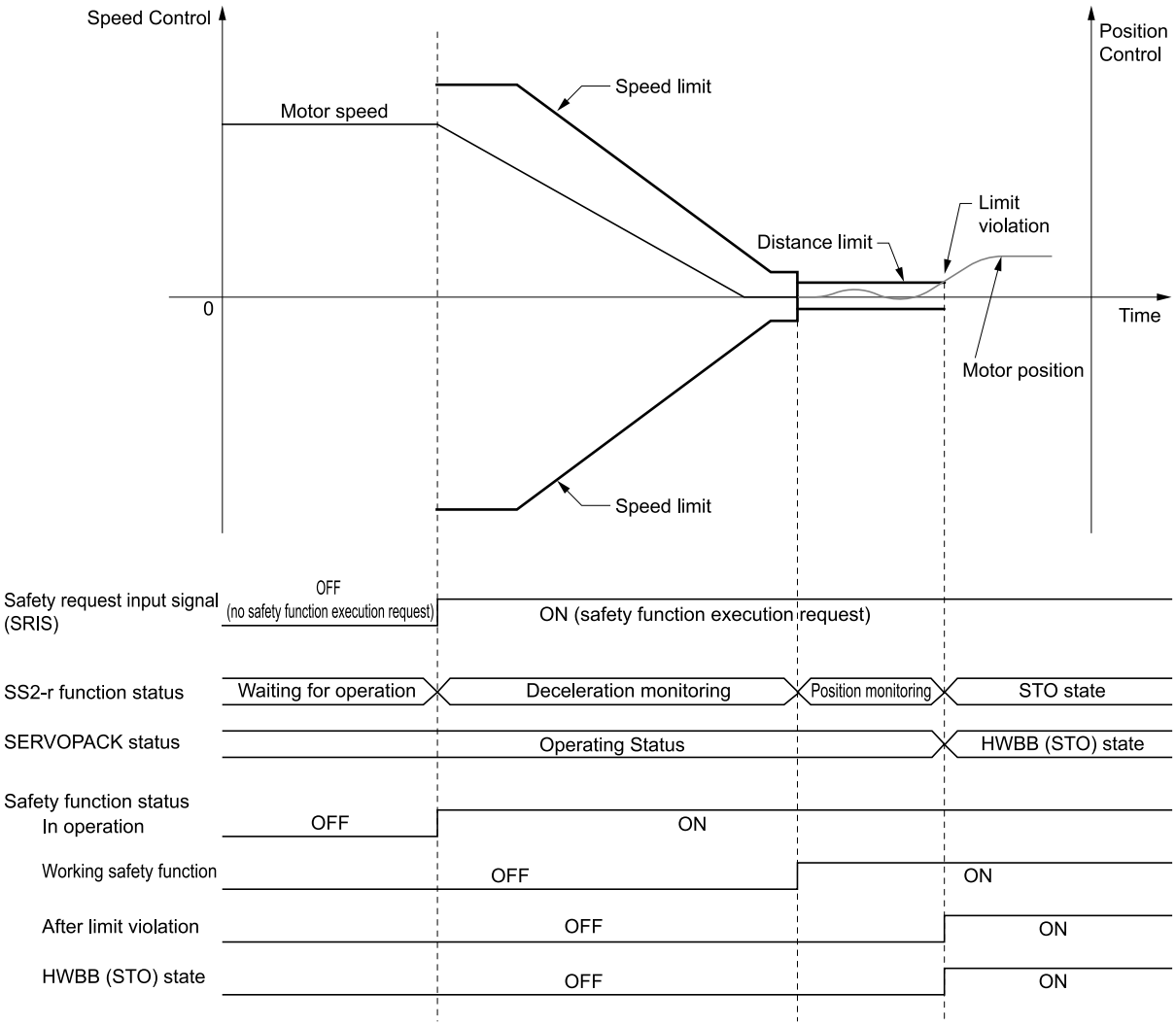
If a limit violation occurs during monitoring, the STO function is activated to shut OFF the servomotor's torque.

Monitoring Conditions	Limit Violation Conditions	Remarks
t < t1	| Motor speed | > | s1 |	Speed monitoring
t1 ≤ t < t2	| Motor speed | > | Max { s1 * (t2 – t) / (t2 – t1), s2 } |	Speed monitoring
t = t2	-	The motor position is latched as the position monitoring reference.
t ≥ t2	| (Motor position - Position monitoring reference) | > | p1 |	Position monitoring



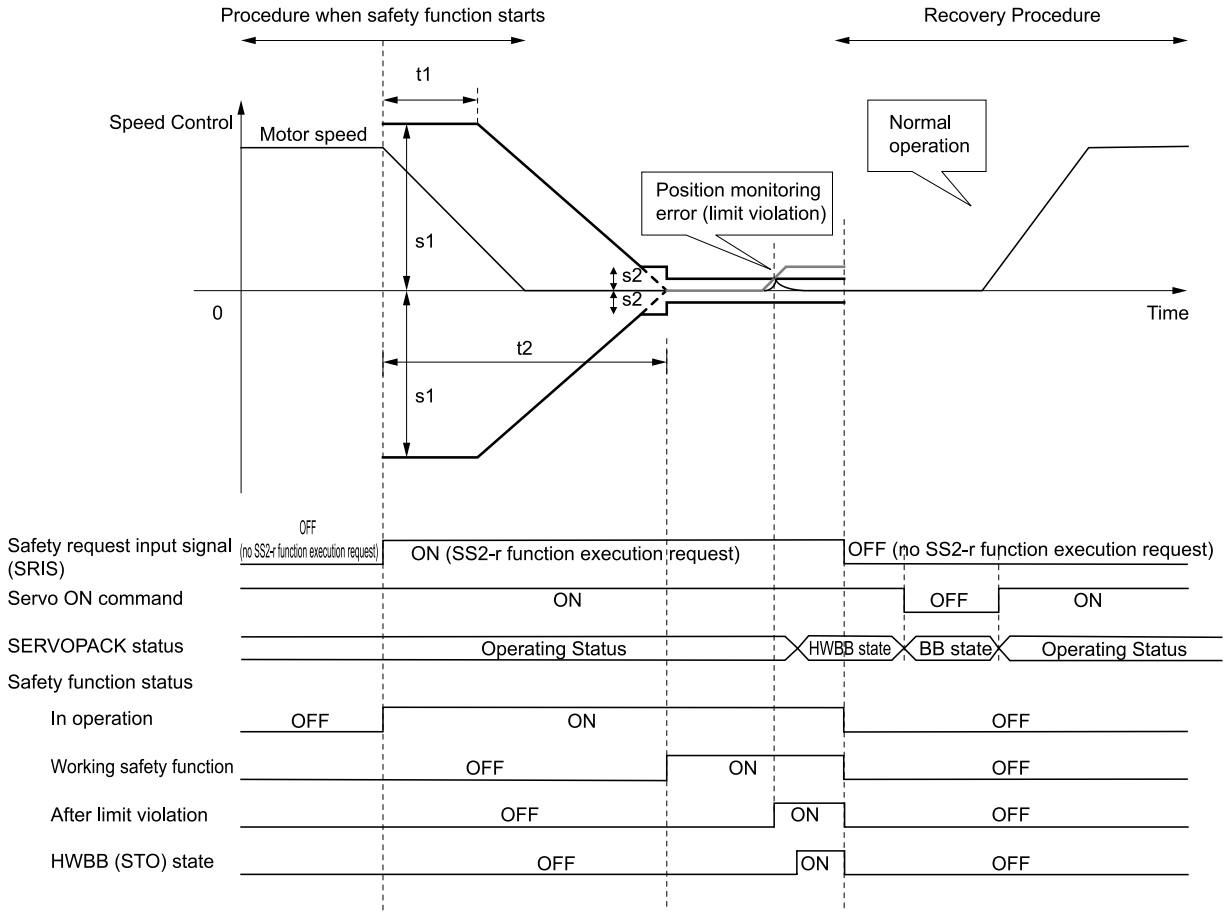
*1 Displayed on the [Trace] window in the SigmaWin+.

7.10.2 Operation during Limit Violation



7.10.3 Operation Examples

The following chart shows the operation that is performed when the servomotor accelerates during position monitoring by the SS2-r function and a position monitoring error occurs.



7.10.4 Activation Method

(1) Parameter Settings

(a) For the FSoE Communications References and Digital I/O Model (SGDXS-OSAA1A)

The SS2-r function settings are configured in the following parameters.

The parameter numbers depend on the slot. Refer to the following section for details.

☞ *7.3.3 Parameters for Safety Function Slot Settings on page 140*

Parameter Name		Description	Remarks
Safety Function Configuration I			
	Safety Function Selection	Select "SS2-r."	–
Safety Function Configuration II			

Continued on next page.

Continued from previous page.

Parameter Name		Description	Remarks
	Terminal Port Selection for Safety Request Input Signal	Select from the following. • DIA to DIE • VI0 to VI15 • Slots 1 to 10 limit violation status • Safety fieldbus virtual input not usable state	• When you select a digital input signal (DIA to DIE), confirm that the same input port is set to "Use" in the input signal setting parameter *1 as the input port selected in this parameter. • When you select "Slots 1 to 10 limit violation status," confirm that the Safety Function Selection parameter in the slot specified by this parameter is set to one of the following functions: SOS, SLS, SLA, SSR, SDI-p, SDI-n, SLP, and SLI functions.
	Terminal Port Selection for Safety Data Input Signal	Select "Disabled" (default setting).	–
Safety Function Configuration III			
	Terminal Port Selection for EDM Signal	Select from the following. • Disabled • DOA to DOE (Redundant Outputs) • DOA1 to DOE2 (Single Output) • VO0 to VO15	• When you select "Disabled," select "Disabled" for EDM Signal Behavior below as well. • When you select a digital output signal (DOA to DOE or DOA1 to DOE2), confirm that the same output port is set to "Use" in the output signal setting parameter *2 as the output port selected in this parameter.
	EDM Signal Behavior	Select from the following. • Disabled • In Operation • Working Safety Function • After Limit Violation • HWBB (STO) State	–
Safety Function Configuration IV			
	Terminal Port Selection for Safe Output Signal	Select "Disabled" (default setting).	–

*1 Refer to the following section for details on the input signal setting parameters.
☞ *7.4.5 Settings for Digital Input Signals on page 144*

*2 Refer to the following section for details on the output signal setting parameters.
☞ *7.5.5 Settings for Digital Output Signals on page 155*

Parameter Name	Unit	Sign	Setting Range	Remarks
Monitoring Parameter				
Waiting Time (t1)	10 ms	No	0 to 10000	Set the parameter as shown below. • t1 ≤ t2
Monitoring Time (t2)	10 ms	No	0 to 10000	
Speed Limit (s1)	User speed reference unit	No	0 to 4294967295	• Dual polarity • Set the parameter as shown below. – s1 ≥ s2 – s1 ≤ Maximum Motor Speed (Pc062) *1
Speed Limit (s2)	User speed reference unit	No	0 to 4294967295	
Acceleration Limit (a1)	User acceleration reference unit	Yes	-2147483648 to 2147483647	Not used. Set this parameter to the default setting.

Continued on next page.

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Parameter Name	Unit	Sign	Setting Range	Remarks
Distance Limit (p1)	User position reference unit	Yes	0 to 2147483647	• Dual polarity (only a positive value can be set in this function) • Set the parameter as shown below. – p1 ≥ 0
Distance Limit (p2)	User position reference unit	Yes	-2147483648 to 2147483647	Not used. Set this parameter to the default setting.
Distance Limit (p3)	User position reference unit	No	0 to 4294967295	

*1 This comparison is made with the value of Pc062 converted to user speed units. The details on the conversion of the unit are the same as the SS1-r function. Refer to the following section.

☞ *(3) Reference Information: Speed Limit (S1) and Maximum Motor Speed Unit Conversion on page 174*

(b) For the FSoE Communications References Model (SGDXS-OSAA0A)

The SS2-r function settings are configured in the following parameters.

The parameter numbers depend on the slot. Refer to the following section for details.

☞ *7.3.3 Parameters for Safety Function Slot Settings on page 140*

Parameter Name		Description	Remarks
Safety Function Configuration I			
	Safety Function Selection	Select "SS2-r."	–
Safety Function Configuration II			
	Terminal Port Selection for Safety Request Input Signal	Select from the following. • VI0 to VI15 • Slots 1 to 10 limit violation status • Safety fieldbus virtual input not usable state	When you select "Slots 1 to 10 limit violation status," confirm that the Safety Function Selection parameter in the slot specified by this parameter is set to one of the following functions: SOS, SLS, SLA, SSR, SDI-p, SDI-n, SLP, and SLI functions.
	Terminal Port Selection for Safety Data Input Signal	Select "Disabled" (default setting).	–
Safety Function Configuration III			
	Terminal Port Selection for EDM Signal	Select from the following. • Disabled • VO0 to VO15	When you select "Disabled," select "Disabled" for EDM Signal Behavior below as well.
	EDM Signal Behavior	Select from the following. • Disabled • In Operation • Working Safety Function • After Limit Violation • HWBB (STO) State	–
Safety Function Configuration IV			
	Terminal Port Selection for Safe Output Signal	Select "Disabled" (default setting).	–

Parameter Name	Unit	Sign	Setting Range	Remarks
Monitoring Parameter				
Waiting Time (t1)	10 ms	No	0 to 10000	Set the parameter as shown below. • t1 ≤ t2
Monitoring Time (t2)	10 ms	No	0 to 10000	

Continued on next page.

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Parameter Name	Unit	Sign	Setting Range	Remarks
Speed Limit (s1)	User speed reference unit	No	0 to 4294967295	• Dual polarity • Set the parameter as shown below. – s1 ≥ s2 – s1 ≤ Maximum Motor Speed (Pc062) *1
Speed Limit (s2)	User speed reference unit	No	0 to 4294967295	
Acceleration Limit (a1)	User acceleration reference unit	Yes	-2147483648 to 2147483647	Not used. Set this parameter to the default setting.
Distance Limit (p1)	User position reference unit	Yes	0 to 2147483647	• Dual polarity (only a positive value can be set in this function) • Set the parameter as shown below. – p1 ≥ 0
Distance Limit (p2)	User position reference unit	Yes	-2147483648 to 2147483647	Not used. Set this parameter to the default setting.
Distance Limit (p3)	User position reference unit	No	0 to 4294967295	

*1 This comparison is made with the value of Pc062 converted to user speed units. The details on the conversion of the unit are the same as the SS1-r function. Refer to the following section.

☞ *(3) Reference Information: Speed Limit (S1) and Maximum Motor Speed Unit Conversion on page 174*

(2) Signal Operation

Turn ON SRIS.

7.10.5 Returning to Normal Operation

(1) Signal Operation

Turn OFF SRIS.

(2) Conditions for Returning to Normal SERVOPACK Operation

After the monitoring error occurs and the SERVOPACK is set to the HWBB state, the conditions to return to normal operation are the same as those for the STO function.

Refer to the following section for details.

☞ *(2) Conditions for Returning to Normal SERVOPACK Operation on page 167*

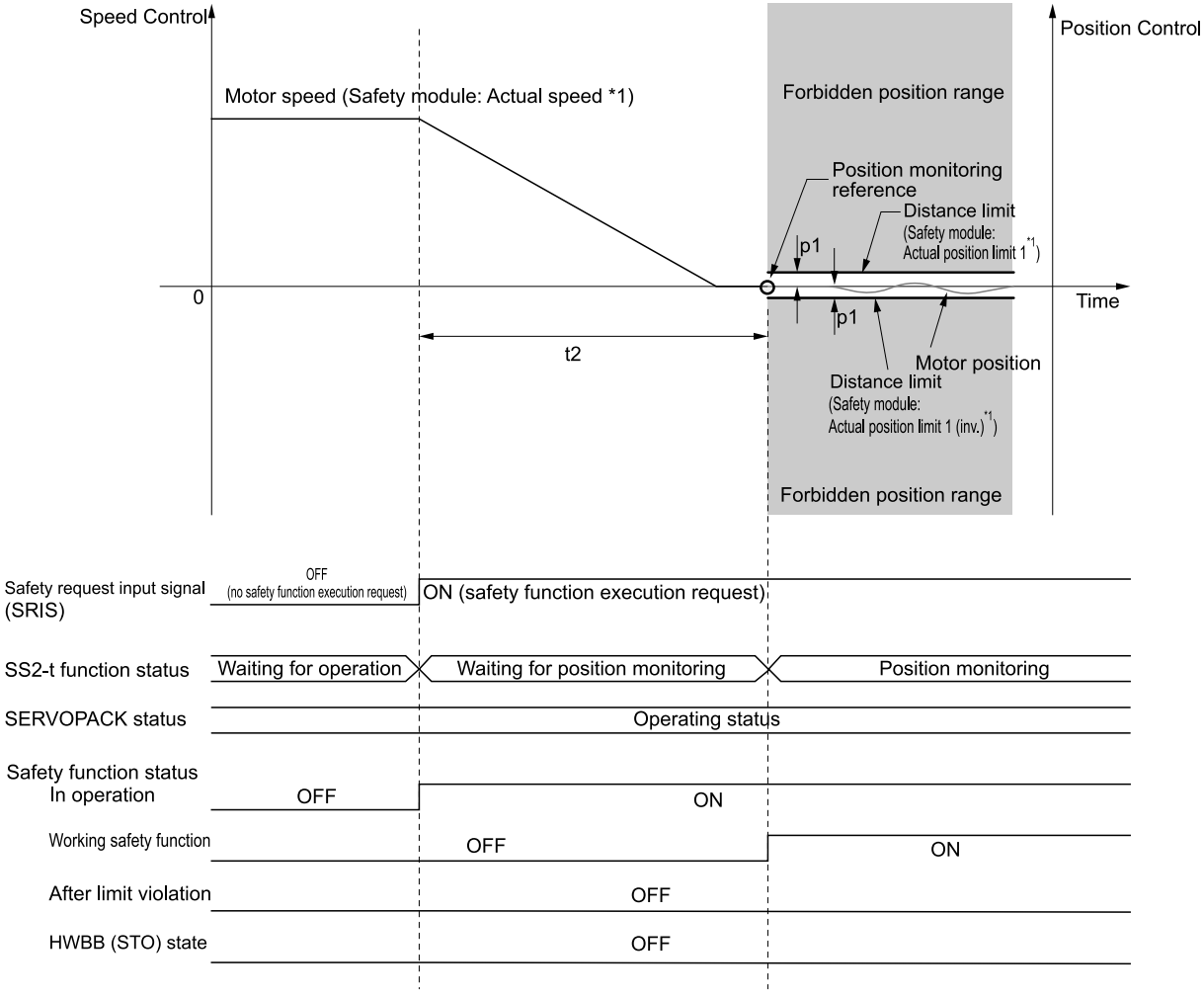
7.11 SS2-t (Safe Stop 2, Time Controlled)

7.11.1 Function Description

When the Safety Request Input Signal (SRIS) is turned ON, the SS2-t function executes servomotor position monitoring with the SOS function after the time set in Monitoring Time (t2) has elapsed.

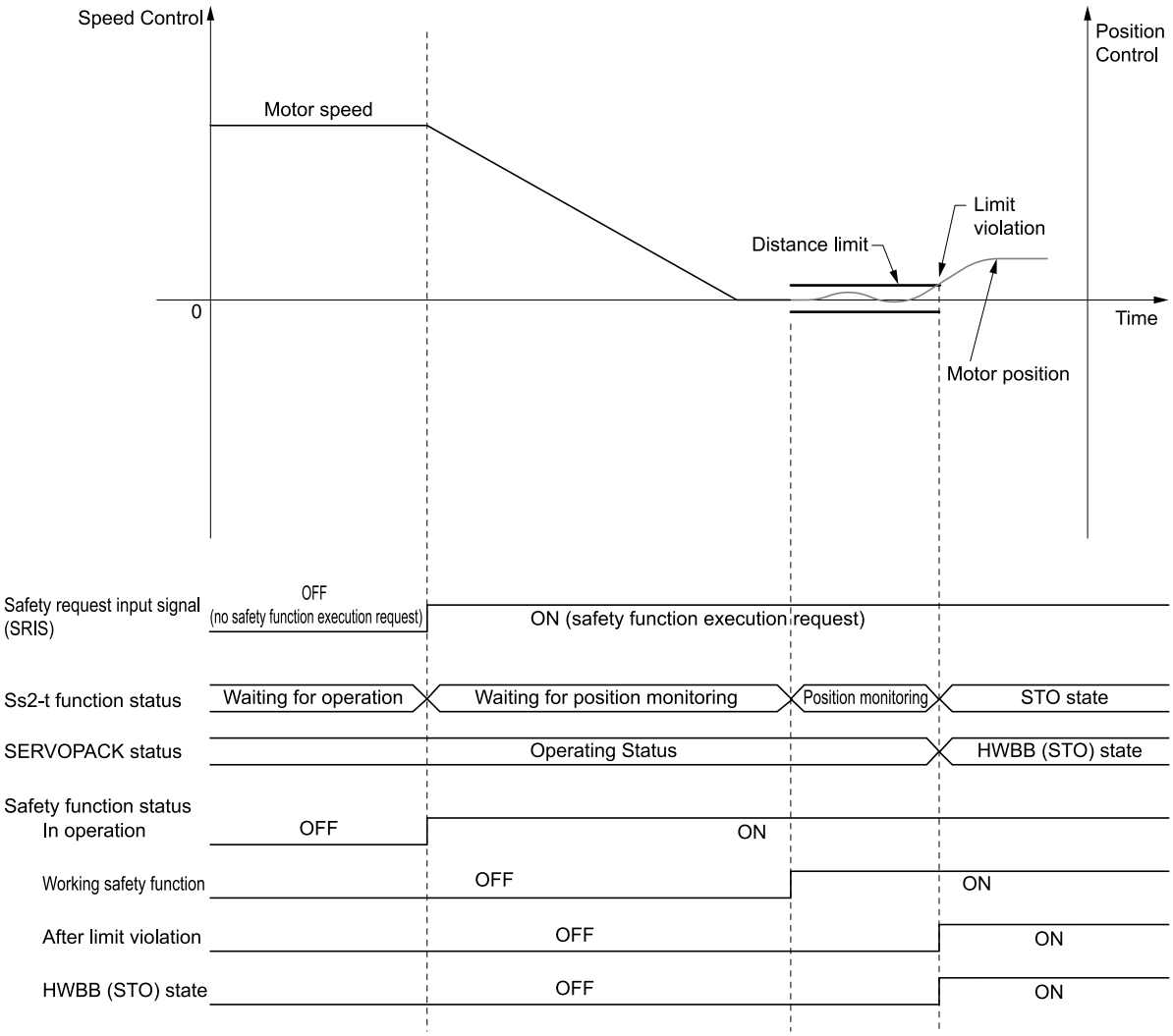
If a limit violation occurs during monitoring, the STO function is activated to shut OFF the servomotor's torque.

Monitoring Conditions	Limit Violation Conditions	Remarks
t = t2	-	The motor position is latched as the position monitoring reference.
t > t2	| (Motor position - Position monitoring reference) | > | p1 |	Position monitoring



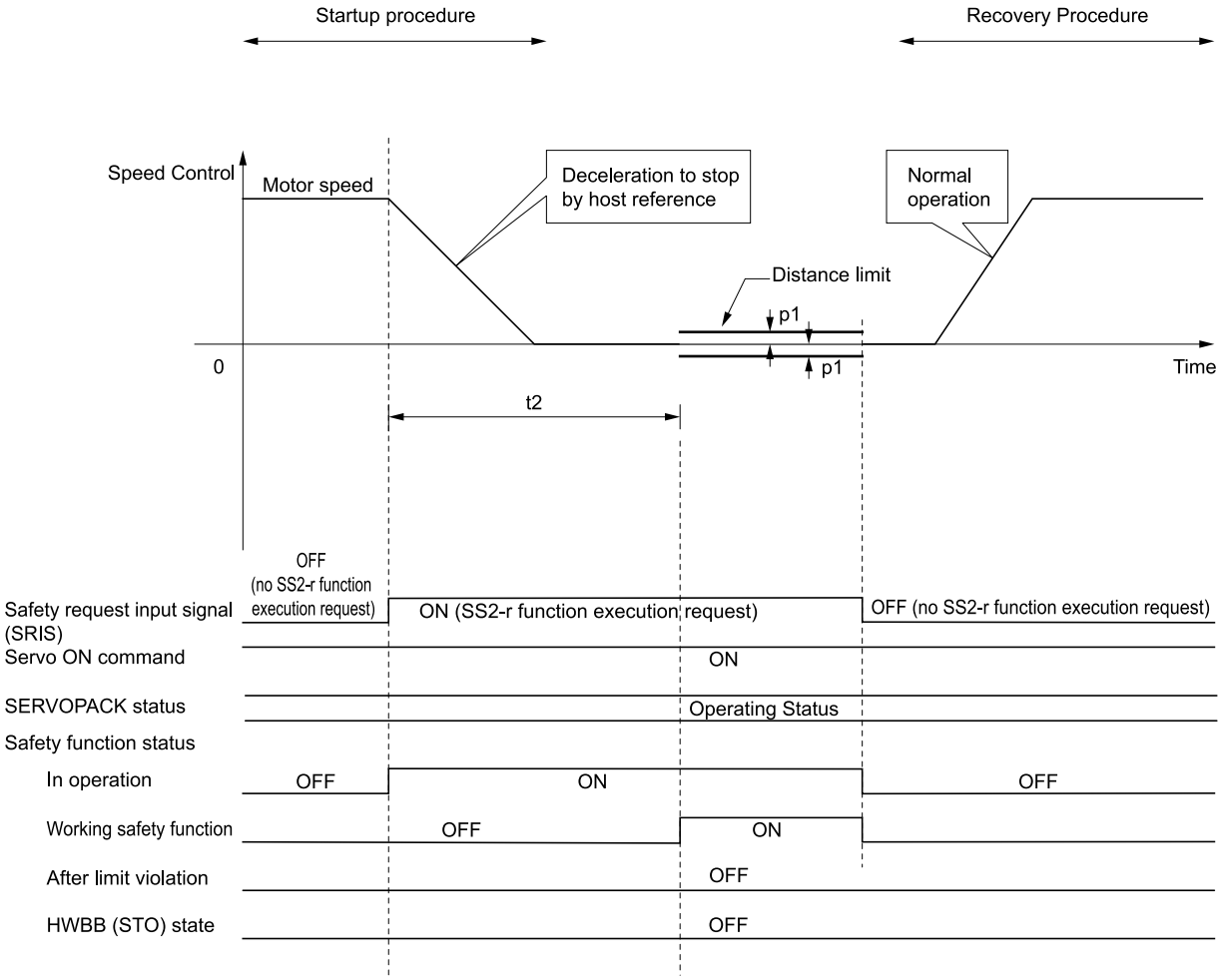
*1 Displayed on the [Trace] window in the SigmaWin+.

7.11.2 Operation during Limit Violation



7.11.3 Operation Examples

The following chart shows the operation that is performed when SRIS is turned ON during servomotor operation.



7.11.4 Activation Method

(1) Parameter Settings

(a) For the FSoE Communications References and Digital I/O Model (SGDXS-OSAA1A)

The SS2-t function settings are configured in the following parameters.

The parameter numbers depend on the slot. Refer to the following section for details.

☞ *7.3.3 Parameters for Safety Function Slot Settings on page 140*

Parameter Name		Description	Remarks
Safety Function Configuration I			
	Safety Function Selection	Select "SS2-t."	–
Safety Function Configuration II			

Continued on next page.

Continued from previous page.

Parameter Name		Description	Remarks
	Terminal Port Selection for Safety Request Input Signal	Select from the following. • DIA to DIE • VI0 to VI15 • Slots 1 to 10 limit violation status • Safety fieldbus virtual input not usable state	• When you select a digital input signal (DIA to DIE), confirm that the same input port is set to "Use" in the input signal setting parameter *1 as the input port selected in this parameter. • When you select "Slots 1 to 10 limit violation status," confirm that the Safety Function Selection parameter in the slot specified by this parameter is set to one of the following functions: SOS, SLS, SLA, SSR, SDI-p, SDI-n, SLP, and SLI functions.
	Terminal Port Selection for Safety Data Input Signal	Select "Disabled" (default setting).	–
Safety Function Configuration III			
	Terminal Port Selection for EDM Signal	Select from the following. • Disabled • DOA to DOE (Redundant Outputs) • DOA1 to DOE2 (Single Output) • VO0 to VO15	• When you select "Disabled," select "Disabled" for EDM Signal Behavior below as well. • When you select a digital output signal (DOA to DOE or DOA1 to DOE2), confirm that the same output port is set to "Use" in the output signal setting parameter *2 as the output port selected in this parameter.
	EDM Signal Behavior	Select from the following. • Disabled • In Operation • Working Safety Function • After Limit Violation • HWBB (STO) State	–
Safety Function Configuration IV			
	Terminal Port Selection for Safe Output Signal	Select "Disabled" (default setting).	–

*1 Refer to the following section for details on the input signal setting parameters.
☞ 7.4.5 Settings for Digital Input Signals on page 144

*2 Refer to the following section for details on the output signal setting parameters.
☞ 7.5.5 Settings for Digital Output Signals on page 155

Parameter Name	Unit	Sign	Setting Range	Remarks
Monitoring Parameter				
Waiting Time (t1)	10 ms	No	0 to 10000	Not used. Set this parameter to the default setting.
Monitoring Time (t2)	10 ms	No	0 to 10000	–
Speed Limit (s1)	User speed reference unit	No	0 to 4294967295	Not used. Set this parameter to the default setting.
Speed Limit (s2)	User speed reference unit	No	0 to 4294967295	
Acceleration Limit (a1)	User acceleration reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p1)	User position reference unit	Yes	0 to 2147483647	• Dual polarity (only a positive value can be set in this function) • Set the parameter as shown below. – $p1 \geq 0$

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Parameter Name	Unit	Sign	Setting Range	Remarks
Distance Limit (p2)	User position reference unit	Yes	-2147483648 to 2147483647	Not used. Set this parameter to the default setting.
Distance Limit (p3)	User position reference unit	No	0 to 4294967295	

(b) For the FSoE Communications References Model (SGDXS-OSAA0A)

The SS2-t function settings are configured in the following parameters.

The parameter numbers depend on the slot. Refer to the following section for details.

☞ *7.3.3 Parameters for Safety Function Slot Settings on page 140*

Parameter Name		Description	Remarks
Safety Function Configuration I			
	Safety Function Selection	Select "SS2-t."	–
Safety Function Configuration II			
	Terminal Port Selection for Safety Request Input Signal	Select from the following. • VI0 to VI15 • Slots 1 to 10 limit violation status • Safety fieldbus virtual input not usable state	When you select "Slots 1 to 10 limit violation status," confirm that the Safety Function Selection parameter in the slot specified by this parameter is set to one of the following functions: SOS, SLS, SLA, SSR, SDI-p, SDI-n, SLP, and SLI functions.
	Terminal Port Selection for Safety Data Input Signal	Select "Disabled" (default setting).	–
Safety Function Configuration III			
	Terminal Port Selection for EDM Signal	Select from the following. • Disabled • VO0 to VO15	When you select "Disabled," select "Disabled" for EDM Signal Behavior below as well.
	EDM Signal Behavior	Select from the following. • Disabled • In Operation • Working Safety Function • After Limit Violation • HWBB (STO) State	–
Safety Function Configuration IV			
	Terminal Port Selection for Safe Output Signal	Select "Disabled" (default setting).	–

Parameter Name	Unit	Sign	Setting Range	Remarks
Monitoring Parameter				
Waiting Time (t1)	10 ms	No	0 to 10000	Not used. Set this parameter to the default setting.
Monitoring Time (t2)	10 ms	No	0 to 10000	–
Speed Limit (s1)	User speed reference unit	No	0 to 4294967295	Not used. Set this parameter to the default setting.
Speed Limit (s2)	User speed reference unit	No	0 to 4294967295	
Acceleration Limit (a1)	User acceleration reference unit	Yes	-2147483648 to 2147483647	

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Parameter Name	Unit	Sign	Setting Range	Remarks
Distance Limit (p1)	User position reference unit	Yes	0 to 2147483647	• Dual polarity (only a positive value can be set in this function) • Set the parameter as shown below. – $p1 \geq 0$
Distance Limit (p2)	User position reference unit	Yes	-2147483648 to 2147483647	Not used. Set this parameter to the default setting.
Distance Limit (p3)	User position reference unit	No	0 to 4294967295	

(2) Signal Operation

Turn ON SRIS.

7.11.5 Returning to Normal Operation

(1) Signal Operation

Turn OFF SRIS.

(2) Conditions for Returning to Normal SERVOPACK Operation

After the monitoring error occurs and the SERVOPACK is set to the HWBB state, the conditions to return to normal operation are the same as those for the STO function.

Refer to the following section for details.

☞ *(2) Conditions for Returning to Normal SERVOPACK Operation on page 167*

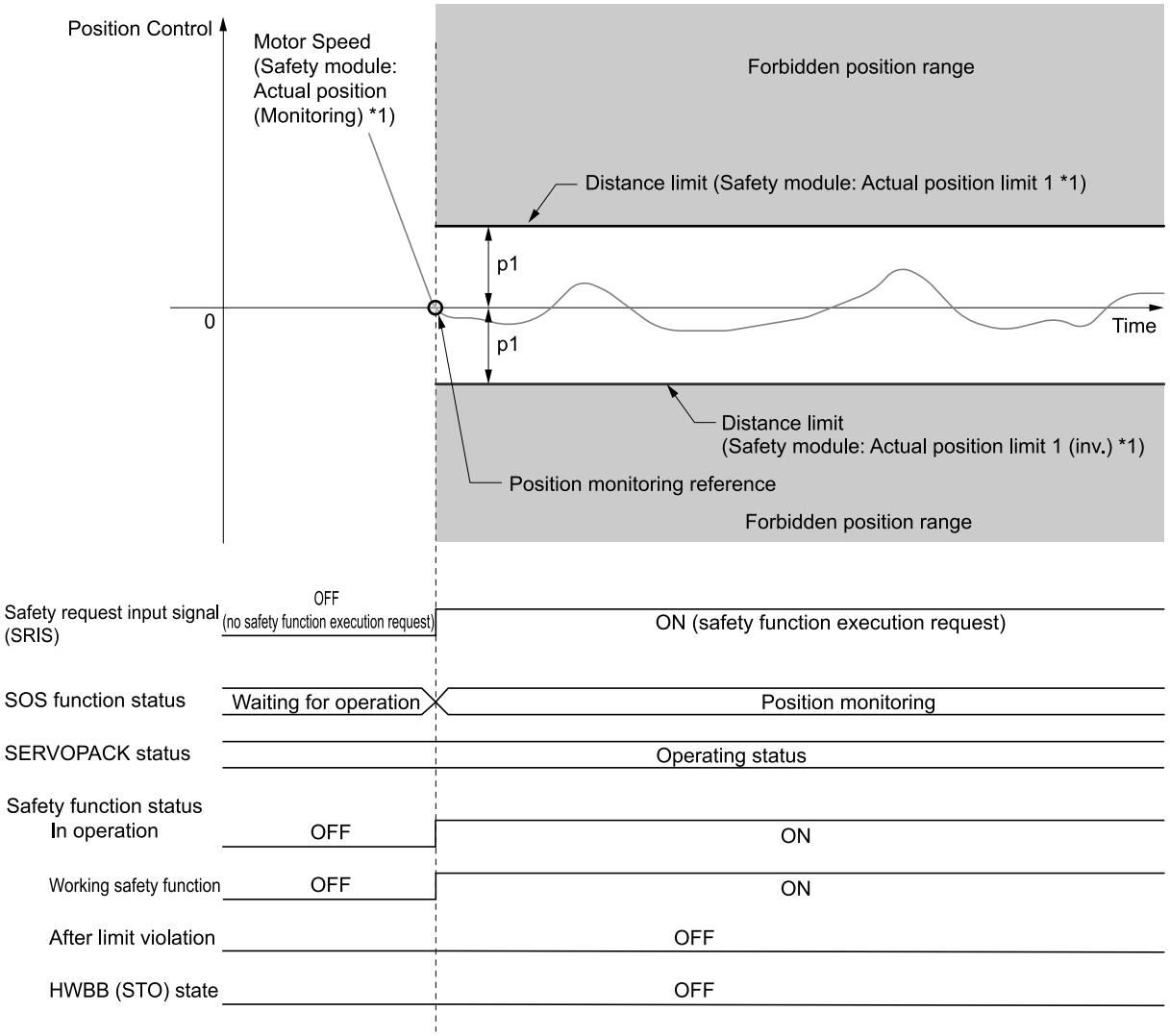
7.12 SOS (Safe Operating Stop)

7.12.1 Function Description

When the Safety Request Input Signal (SRIS) is turned ON, the SOS function monitors the position of the servomotor based on the position where it was when SRIS was turned ON.

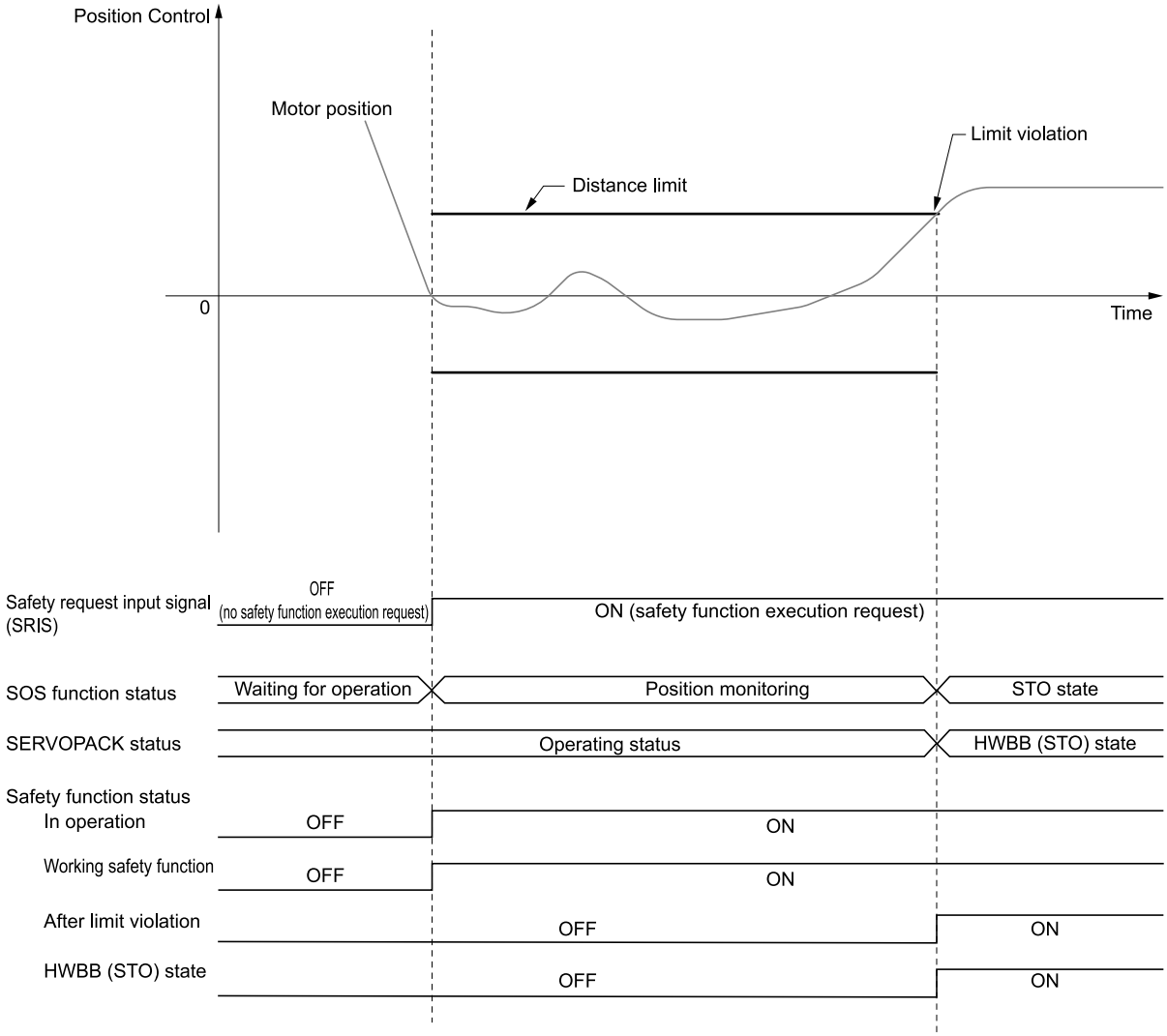
If a limit violation occurs during monitoring, the STO function is activated to shut OFF the servomotor's torque.

Monitoring Conditions	Limit Violation Conditions	Remarks
When the SOS function is activated.	-	The motor position is latched as the position monitoring reference.
After the SOS function is activated.	| (Motor position - Position monitoring reference) | > | p1 |	Position monitoring



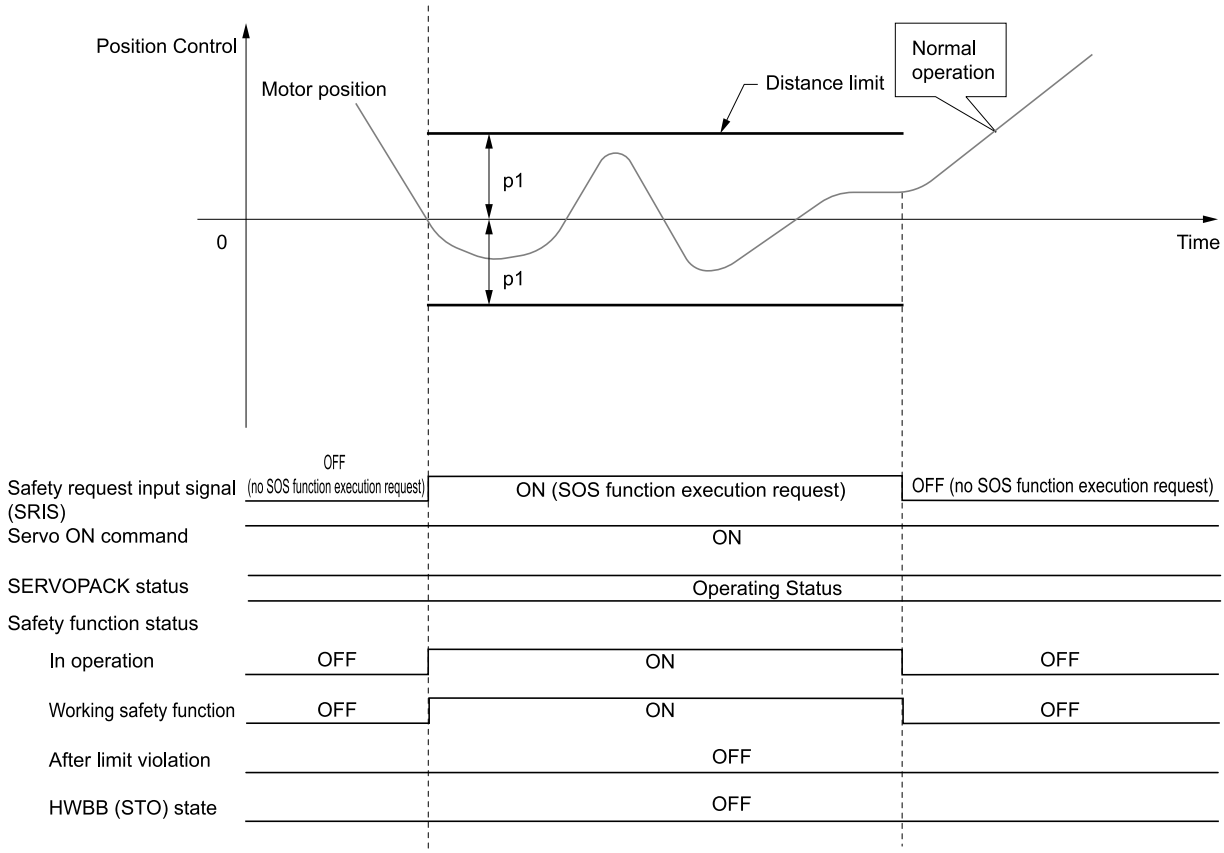
*1 Displayed on the [Trace] window in the SigmaWin+.

7.12.2 Operation during Limit Violation



7.12.3 Operation Examples

The following chart shows the operation that is performed when SRIS is turned ON during servomotor operation.



7.12.4 Activation Method

(1) Parameter Settings

(a) For the FSoE Communications References and Digital I/O Model (SGDXS-OSAA1A)

The SOS function settings are configured in the following parameters.

The parameter numbers depend on the slot. Refer to the following section for details.

☞ *7.3.3 Parameters for Safety Function Slot Settings on page 140*

Parameter Name		Description	Remarks
Safety Function Configuration I			
	Safety Function Selection	Select "SOS."	–
Safety Function Configuration II			
	Terminal Port Selection for Safety Request Input Signal	Select from the following. • DIA to DIE • VI0 to VI15	When you select a digital input signal (DIA to DIE), confirm that the same input port is set to "Use" in the input signal setting parameter *1 as the input port selected in this parameter.
	Terminal Port Selection for Safety Data Input Signal	Select "Disabled" (default setting).	–
Safety Function Configuration III			

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Parameter Name		Description	Remarks
	Terminal Port Selection for EDM Signal	Select from the following. • Disabled • DOA to DOE (Redundant Outputs) • DOA1 to DOE2 (Single Output) • VO0 to VO15	• When you select "Disabled," select "Disabled" for EDM Signal Behavior below as well. • When you select a digital output signal (DOA to DOE or DOA1 to DOE2), confirm that the same output port is set to "Use" in the output signal setting parameter *2 as the output port selected in this parameter.
	EDM Signal Behavior	Select from the following. • Disabled • In Operation • Working Safety Function • After Limit Violation • HWBB (STO) State	–
Safety Function Configuration IV			
	Terminal Port Selection for Safe Output Signal	Select "Disabled" (default setting).	–

*1 Refer to the following section for details on the input signal setting parameters.
☞ *7.4.5 Settings for Digital Input Signals on page 144*

*2 Refer to the following section for details on the output signal setting parameters.
☞ *7.5.5 Settings for Digital Output Signals on page 155*

Parameter Name	Unit	Sign	Setting Range	Remarks
Monitoring Parameter				
Waiting Time (t1)	10 ms	No	0 to 10000	Not used. Set this parameter to the default setting.
Monitoring Time (t2)	10 ms	No	0 to 10000	
Speed Limit (s1)	User speed reference unit	No	0 to 4294967295	
Speed Limit (s2)	User speed reference unit	No	0 to 4294967295	
Acceleration Limit (a1)	User acceleration reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p1)	User position reference unit	Yes	0 to 2147483647	• Dual polarity (only a positive value can be set in this function) • Set the parameter as shown below. – p1 ≥ 0
Distance Limit (p2)	User position reference unit	Yes	-2147483648 to 2147483647	Not used. Set this parameter to the default setting.
Distance Limit (p3)	User position reference unit	No	0 to 4294967295	

(b) For the FSoE Communications References Model (SGDXS-OSAA0A)

The SOS function settings are configured in the following parameters.

The parameter numbers depend on the slot. Refer to the following section for details.

☞ *7.3.3 Parameters for Safety Function Slot Settings on page 140*

Parameter Name		Description	Remarks
Safety Function Configuration I			
	Safety Function Selection	Select "SOS."	–
Safety Function Configuration II			

Continued on next page.

Continued from previous page.

Parameter Name		Description	Remarks
	Terminal Port Selection for Safety Request Input Signal	Select from the following. • VI0 to VI15	–
	Terminal Port Selection for Safety Data Input Signal	Select "Disabled" (default setting).	–
Safety Function Configuration III			
	Terminal Port Selection for EDM Signal	Select from the following. • Disabled • VO0 to VO15	When you select "Disabled," select "Disabled" for EDM Signal Behavior below as well.
	EDM Signal Behavior	Select from the following. • Disabled • In Operation • Working Safety Function • After Limit Violation • HWBB (STO) State	–
Safety Function Configuration IV			
	Terminal Port Selection for Safe Output Signal	Select "Disabled" (default setting).	–

Parameter Name	Unit	Sign	Setting Range	Remarks
Monitoring Parameter				
Waiting Time (t1)	10 ms	No	0 to 10000	Not used. Set this parameter to the default setting.
Monitoring Time (t2)	10 ms	No	0 to 10000	
Speed Limit (s1)	User speed reference unit	No	0 to 4294967295	
Speed Limit (s2)	User speed reference unit	No	0 to 4294967295	
Acceleration Limit (a1)	User acceleration reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p1)	User position reference unit	Yes	0 to 2147483647	• Dual polarity (only a positive value can be set in this function) • Set the parameter as shown below. – $p1 \geq 0$
Distance Limit (p2)	User position reference unit	Yes	-2147483648 to 2147483647	Not used. Set this parameter to the default setting.
Distance Limit (p3)	User position reference unit	No	0 to 4294967295	

(2) Signal Operation

Turn ON SRIS.

7.12.5 Returning to Normal Operation

(1) Signal Operation

Turn OFF SRIS.

(2) Conditions for Returning to Normal SERVOPACK Operation

After the monitoring error occurs and the SERVOPACK is set to the HWBB state, the conditions to return to normal operation are the same as those for the STO function.

Refer to the following section for details.

☞ *(2) Conditions for Returning to Normal SERVOPACK Operation on page 167*

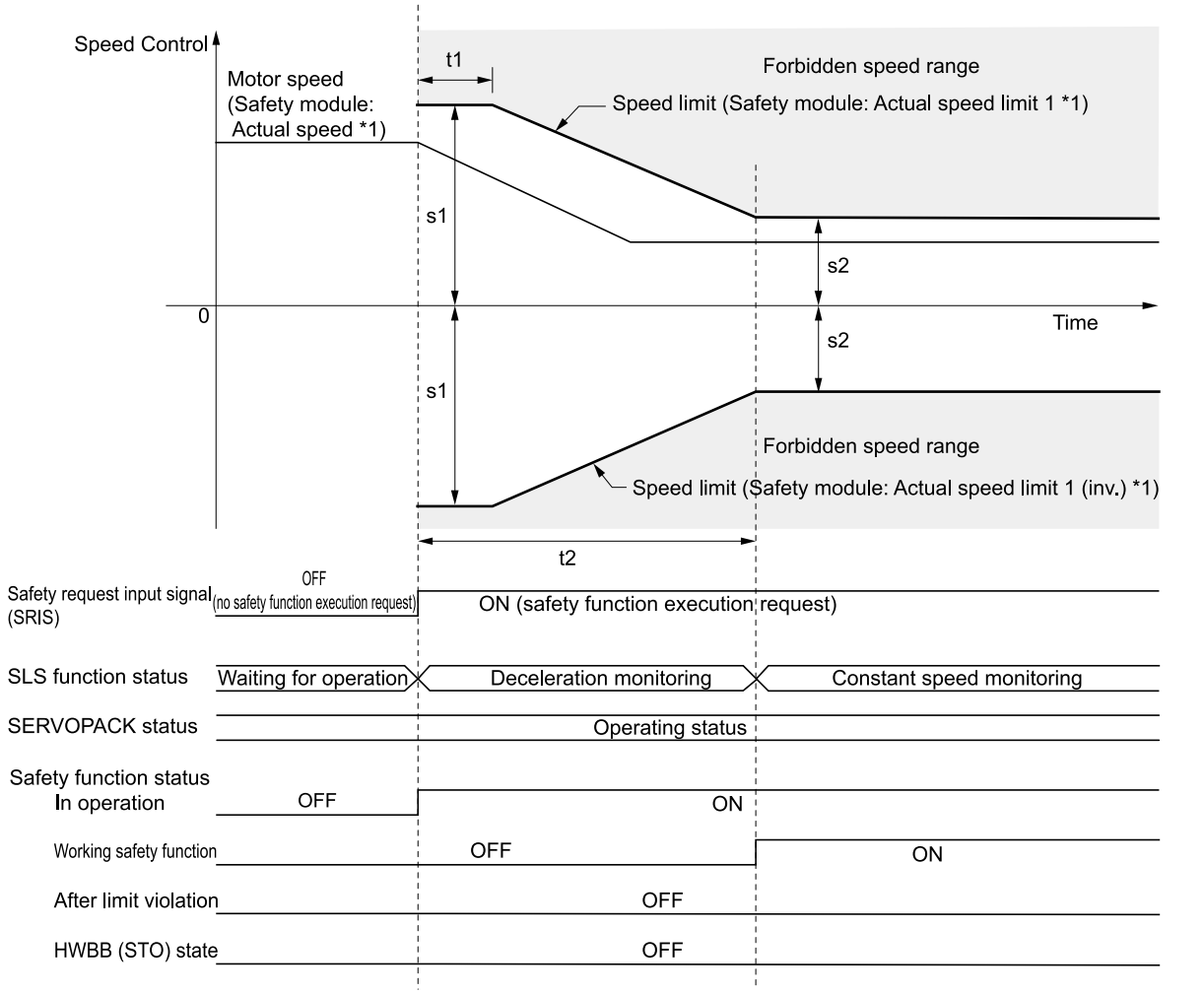
7.13 SLS (Safely-Limited Speed)

7.13.1 Function Description

When the Safety Request Input Signal (SRIS) is turned ON, the SLS function monitors the speed against speed limit (s1) until the Waiting Time (t1) has elapsed, and then it monitors deceleration against the deceleration rate found from s1, s2, t1, and t2 until the Monitoring Time (t2) has elapsed. After the Monitoring Time (t2) has elapsed, it monitors the constant speed against the speed limit (s2).

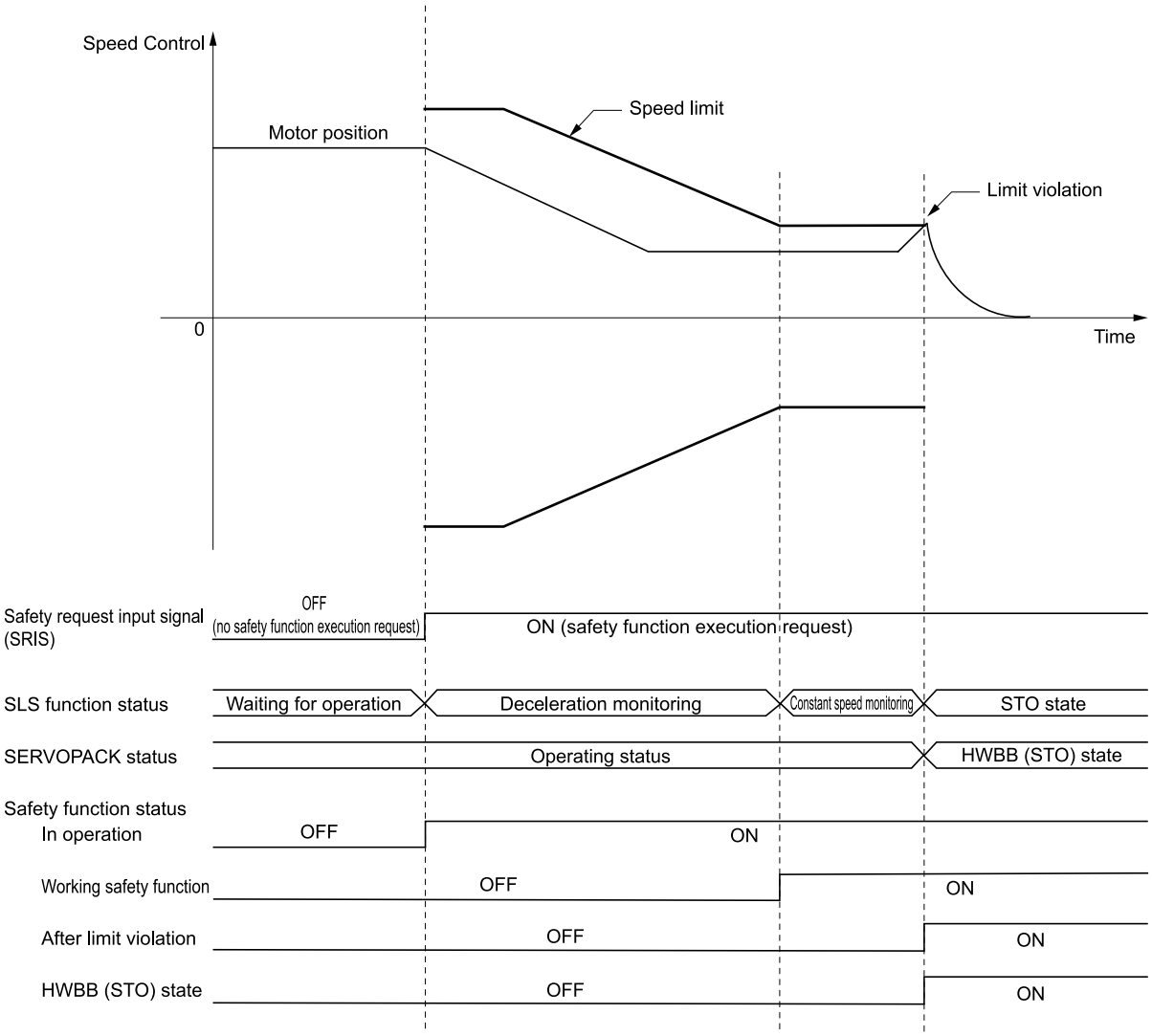
If a limit violation occurs during monitoring, the STO function is activated to shut OFF the servomotor's torque.

Monitoring Conditions	Limit Violation Conditions	Remarks
$t < t1$	$\lvert$ Motor speed $\rvert > \lvert s1 \rvert$	Speed monitoring
$t1 \leq t < t2$	$\lvert$ Motor speed $\rvert > \lvert (s1 - s2) * (t2 - t) / (t2 - t1) + s2 \rvert$	Speed monitoring
$t \geq t2$	$\lvert$ Motor speed $\rvert > \lvert s2 \rvert$	Speed monitoring



*1 Displayed on the [Trace] window in the SigmaWin+.

7.13.2 Operation during Limit Violation



7.13.3 Activation Method

(1) Parameter Settings

(a) For the FSoE Communications References and Digital I/O Model (SGDXS-OSAA1A)

The SLS function settings are configured in the following parameters.

The parameter numbers depend on the slot. Refer to the following section for details.

☞ *7.3.3 Parameters for Safety Function Slot Settings on page 140*

Parameter Name		Description	Remarks
Safety Function Configuration I			
	Safety Function Selection	Select "SLS."	–
Safety Function Configuration II			

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Parameter Name		Description	Remarks
	Terminal Port Selection for Safety Request Input Signal	Select from the following. • DIA to DIE • VI0 to VI15	When you select a digital input signal (DIA to DIE), confirm that the same input port is set to "Use" in the input signal setting parameter *1 as the input port selected in this parameter.
	Terminal Port Selection for Safety Data Input Signal	Select "Disabled" (default setting).	–
Safety Function Configuration III			
	Terminal Port Selection for EDM Signal	Select from the following. • Disabled • DOA to DOE (Redundant Outputs) • DOA1 to DOE2 (Single Output) • VO0 to VO15	• When you select "Disabled," select "Disabled" for EDM Signal Behavior below as well. • When you select a digital output signal (DOA to DOE or DOA1 to DOE2), confirm that the same output port is set to "Use" in the output signal setting parameter *2 as the output port selected in this parameter.
	EDM Signal Behavior	Select from the following. • Disabled • In Operation • Working Safety Function • After Limit Violation • HWBB (STO) State	–
Safety Function Configuration IV			
	Terminal Port Selection for Safe Output Signal	Select "Disabled" (default setting).	–

*1 Refer to the following section for details on the input signal setting parameters.
☞ 7.4.5 Settings for Digital Input Signals on page 144

*2 Refer to the following section for details on the output signal setting parameters.
☞ 7.5.5 Settings for Digital Output Signals on page 155

Parameter Name	Unit	Sign	Setting Range	Remarks
Monitoring Parameter				
Waiting Time (t1)	10 ms	No	0 to 10000	Set the parameter as shown below. • t1 ≤ t2
Monitoring Time (t2)	10 ms	No	0 to 10000	
Speed Limit (s1)	User speed reference unit	No	0 to 4294967295	• Dual polarity • Set the parameter as shown below. – s1 ≥ s2 – s1 ≤ Maximum Motor Speed (Pc062) *1
Speed Limit (s2)	User speed reference unit	No	0 to 4294967295	
Acceleration Limit (a1)	User acceleration reference unit	Yes	-2147483648 to 2147483647	Not used. Set this parameter to the default setting.
Distance Limit (p1)	User position reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p2)	User position reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p3)	User position reference unit	No	0 to 4294967295	

*1 This comparison is made with the value of Pc062 converted to user speed units. The details on the conversion of the unit are the same as the SS1-r function. Refer to the following section.
☞ (3) Reference Information: Speed Limit (S1) and Maximum Motor Speed Unit Conversion on page 174

(b) For the FSoE Communications References Model (SGDXS-OSAA0A)

The SLS function settings are configured in the following parameters.

The parameter numbers depend on the slot. Refer to the following section for details.

☞ *7.3.3 Parameters for Safety Function Slot Settings on page 140*

Parameter Name		Description	Remarks
Safety Function Configuration I			
	Safety Function Selection	Select "SLS."	–
Safety Function Configuration II			
	Terminal Port Selection for Safety Request Input Signal	Select from the following. • VI0 to VI15	–
	Terminal Port Selection for Safety Data Input Signal	Select "Disabled" (default setting).	–
Safety Function Configuration III			
	Terminal Port Selection for EDM Signal	Select from the following. • Disabled • VO0 to VO15	When you select "Disabled," select "Disabled" for EDM Signal Behavior below as well.
	EDM Signal Behavior	Select from the following. • Disabled • In Operation • Working Safety Function • After Limit Violation • HWBB (STO) State	–
Safety Function Configuration IV			
	Terminal Port Selection for Safe Output Signal	Select "Disabled" (default setting).	–

Parameter Name	Unit	Sign	Setting Range	Remarks
Monitoring Parameter				
Waiting Time (t1)	10 ms	No	0 to 10000	Set the parameter as shown below. • t1 ≤ t2
Monitoring Time (t2)	10 ms	No	0 to 10000	
Speed Limit (s1)	User speed reference unit	No	0 to 4294967295	• Dual polarity • Set the parameter as shown below. – s1 ≥ s2 – s1 ≤ Maximum Motor Speed (Pc062) *1
Speed Limit (s2)	User speed reference unit	No	0 to 4294967295	
Acceleration Limit (a1)	User acceleration reference unit	Yes	-2147483648 to 2147483647	Not used. Set this parameter to the default setting.
Distance Limit (p1)	User position reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p2)	User position reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p3)	User position reference unit	No	0 to 4294967295	

*1 This comparison is made with the value of Pc062 converted to user speed units. The details on the conversion of the unit are the same as the SS1-r function. Refer to the following section.

☞ *(3) Reference Information: Speed Limit (S1) and Maximum Motor Speed Unit Conversion on page 174*

(2) Signal Operation

Turn ON SRIS.

7.13.4 Returning to Normal Operation

(1) Signal Operation

Turn OFF SRIS.

(2) Conditions for Returning to Normal SERVOPACK Operation

After the monitoring error occurs and the SERVOPACK is set to the HWBB state, the conditions to return to normal operation are the same as those for the STO function.

Refer to the following section for details.

☞ *(2) Conditions for Returning to Normal SERVOPACK Operation on page 167*

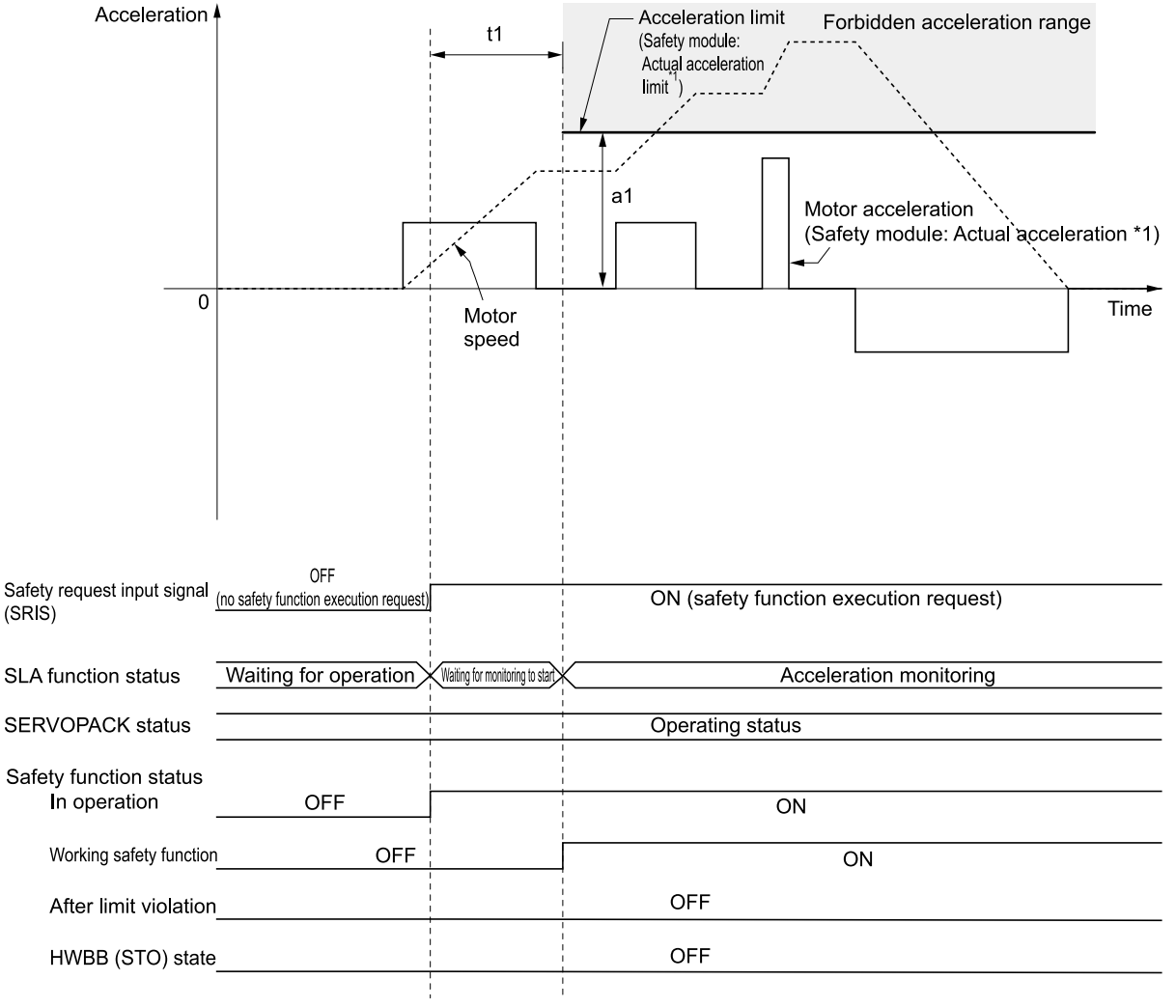
7.14 SLA (Safely-Limited Acceleration)

7.14.1 Function Description

When the Safety Request Input Signal (SRIS) is turned ON, the SLA function monitors the acceleration of the servomotor after the Waiting Time (t1) has elapsed. Note that only acceleration with the same sign as the set sign will be monitored because the acceleration limit (a1) does not have dual polarity.

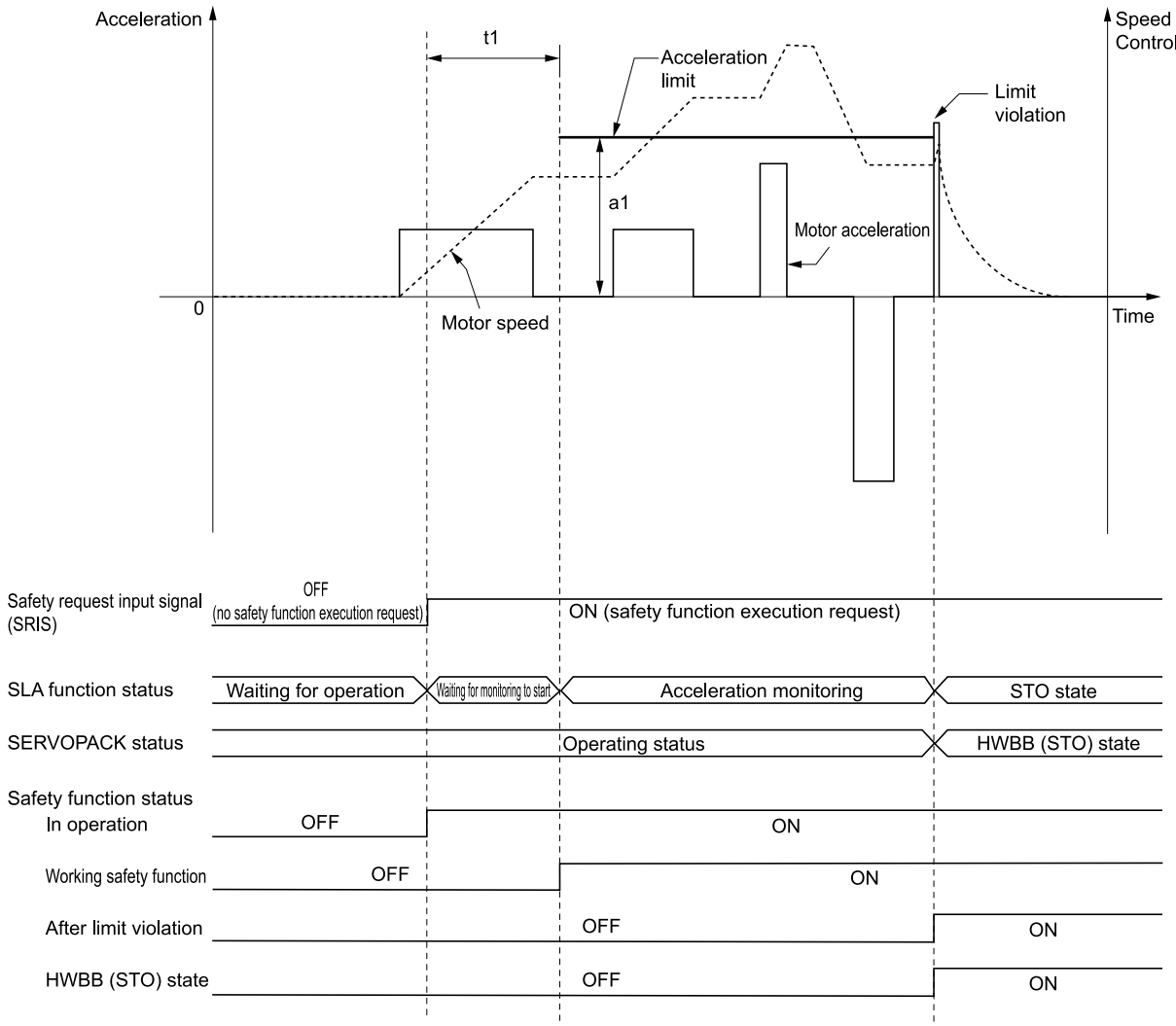
If a limit violation occurs during monitoring, the STO function is activated to shut OFF the servomotor's torque.

Monitoring Conditions	Limit Violation Conditions			Remarks
t < t1	Not monitored			–
t ≥ t1	a1 ≥ 0	Motor acceleration ≥ 0	| Motor acceleration | > | a1 |	Acceleration monitoring
		Motor acceleration < 0	Not monitored	–
	a1 < 0	Motor acceleration ≥ 0	Not monitored	–
		Motor acceleration < 0	| Motor acceleration | > | a1 |	Acceleration monitoring



*1 Displayed on the [Trace] window in the SigmaWin+.

7.14.2 Operation during Limit Violation



7.14.3 Activation Method

(1) Parameter Settings

(a) For the FSoE Communications References and Digital I/O Model (SGDXS-OSAA1A)

The SLA function settings are configured in the following parameters.

The parameter numbers depend on the slot. Refer to the following section for details.

☞ *7.3.3 Parameters for Safety Function Slot Settings on page 140*

Parameter Name		Description	Remarks
Safety Function Configuration I			
	Safety Function Selection	Select "SLA."	–
Safety Function Configuration II			

Continued on next page.

Continued from previous page.

Parameter Name		Description	Remarks
	Terminal Port Selection for Safety Request Input Signal	Select from the following. • DIA to DIE • VI0 to VI15	When you select a digital input signal (DIA to DIE), confirm that the same input port is set to "Use" in the input signal setting parameter *1 as the input port selected in this parameter.
	Terminal Port Selection for Safety Data Input Signal	Select "Disabled" (default setting).	–
Safety Function Configuration III			
	Terminal Port Selection for EDM Signal	Select from the following. • Disabled • DOA to DOE (Redundant Outputs) • DOA1 to DOE2 (Single Output) • VO0 to VO15	• When you select "Disabled," select "Disabled" for EDM Signal Behavior below as well. • When you select a digital output signal (DOA to DOE or DOA1 to DOE2), confirm that the same output port is set to "Use" in the output signal setting parameter *2 as the output port selected in this parameter.
	EDM Signal Behavior	Select from the following. • Disabled • In Operation • Working Safety Function • After Limit Violation • HWBB (STO) State	–
Safety Function Configuration IV			
	Terminal Port Selection for Safe Output Signal	Select "Disabled" (default setting).	–

*1 Refer to the following section for details on the input signal setting parameters.
☞ *7.4.5 Settings for Digital Input Signals on page 144*

*2 Refer to the following section for details on the output signal setting parameters.
☞ *7.5.5 Settings for Digital Output Signals on page 155*

Parameter Name	Unit	Sign	Setting Range	Remarks
Monitoring Parameter				
Waiting Time (t1)	10 ms	No	0 to 10000	–
Monitoring Time (t2)	10 ms	No	0 to 10000	Not used. Set this parameter to the default setting.
Speed Limit (s1)	User speed reference unit	No	0 to 4294967295	
Speed Limit (s2)	User speed reference unit	No	0 to 4294967295	
Acceleration Limit (a1)	User acceleration reference unit	Yes	-2147483648 to 2147483647	No polarity The monitoring target is acceleration with the same sign as the set sign.
Distance Limit (p1)	User position reference unit	Yes	-2147483648 to 2147483647	Not used. Set this parameter to the default setting.
Distance Limit (p2)	User position reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p3)	User position reference unit	No	0 to 4294967295	

(b) For the FSoE Communications References Model (SGDXS-OSAA0A)

The SLA function settings are configured in the following parameters.

The parameter numbers depend on the slot. Refer to the following section for details.

☞ *7.3.3 Parameters for Safety Function Slot Settings on page 140*

Parameter Name		Description	Remarks
Safety Function Configuration I			
	Safety Function Selection	Select "SLA."	–
Safety Function Configuration II			
	Terminal Port Selection for Safety Request Input Signal	Select from the following. • VI0 to VI15	–
	Terminal Port Selection for Safety Data Input Signal	Select "Disabled" (default setting).	–
Safety Function Configuration III			
	Terminal Port Selection for EDM Signal	Select from the following. • Disabled • VO0 to VO15	When you select "Disabled," select "Disabled" for EDM Signal Behavior below as well.
	EDM Signal Behavior	Select from the following. • Disabled • In Operation • Working Safety Function • After Limit Violation • HWBB (STO) State	–
Safety Function Configuration IV			
	Terminal Port Selection for Safe Output Signal	Select "Disabled" (default setting).	–

Parameter Name	Unit	Sign	Setting Range	Remarks
Monitoring Parameter				
Waiting Time (t1)	10 ms	No	0 to 10000	–
Monitoring Time (t2)	10 ms	No	0 to 10000	Not used. Set this parameter to the default setting.
Speed Limit (s1)	User speed reference unit	No	0 to 4294967295	
Speed Limit (s2)	User speed reference unit	No	0 to 4294967295	
Acceleration Limit (a1)	User acceleration reference unit	Yes	-2147483648 to 2147483647	No polarity The monitoring target is acceleration with the same sign as the set sign.
Distance Limit (p1)	User position reference unit	Yes	-2147483648 to 2147483647	Not used. Set this parameter to the default setting.
Distance Limit (p2)	User position reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p3)	User position reference unit	No	0 to 4294967295	

(2) Signal Operation

Turn ON SRIS.

7.14.4 Returning to Normal Operation

(1) Signal Operation

Turn OFF SRIS.

(2) Conditions for Returning to Normal SERVOPACK Operation

After the monitoring error occurs and the SERVOPACK is set to the HWBB state, the conditions to return to normal operation are the same as those for the STO function.

Refer to the following section for details.

☞ *(2) Conditions for Returning to Normal SERVOPACK Operation on page 167*

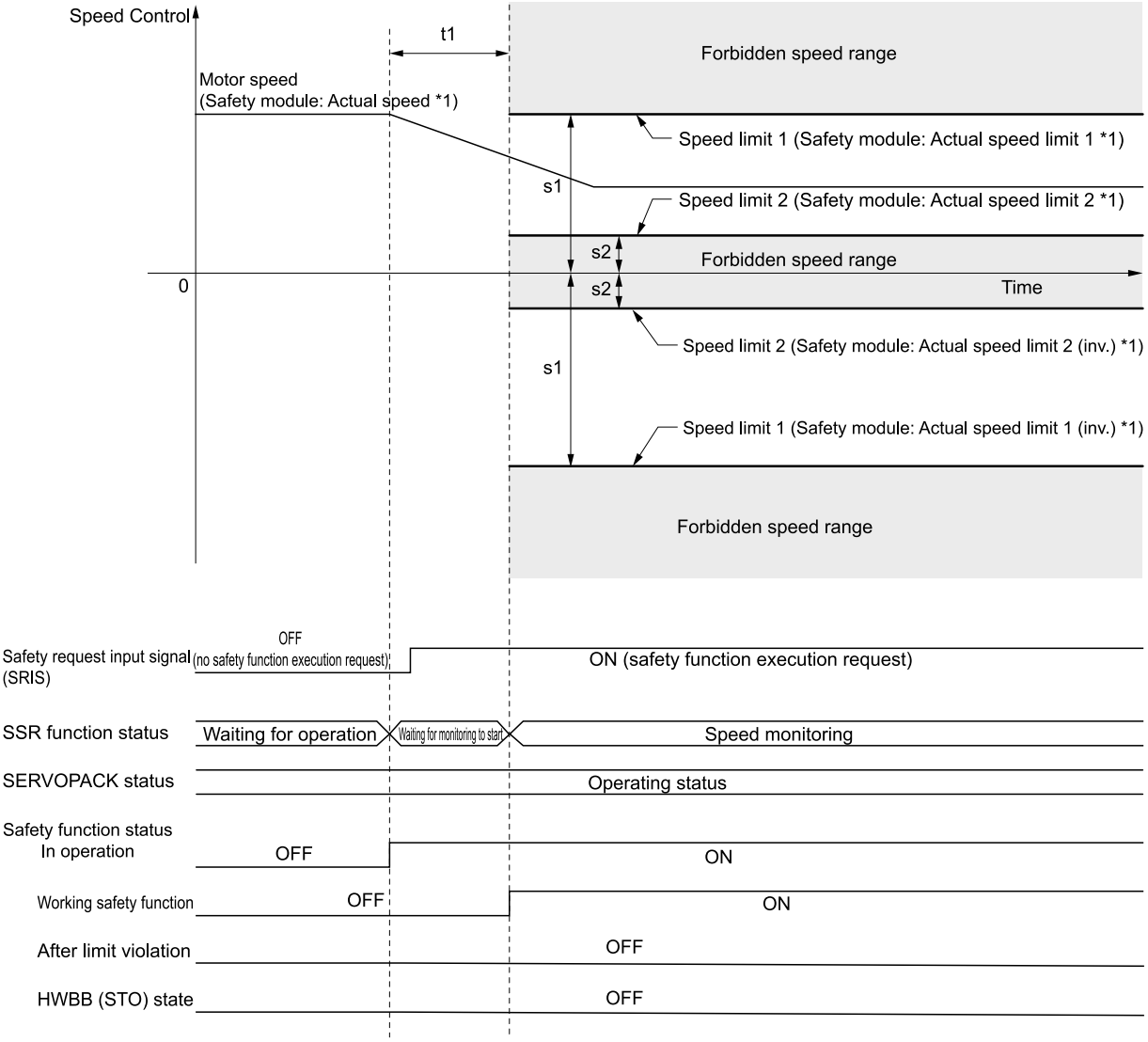
7.15 SSR (Safe Speed Range)

7.15.1 Function Description

When the Safety Request Input Signal (SRIS) is turned ON, the SSR function monitors if the motor speed is between the speed limit (s1) and the speed limit (s2) after the Waiting Time (t1) has elapsed. The speed limits (s1 and s2) have dual polarity, so reverse is also monitored.

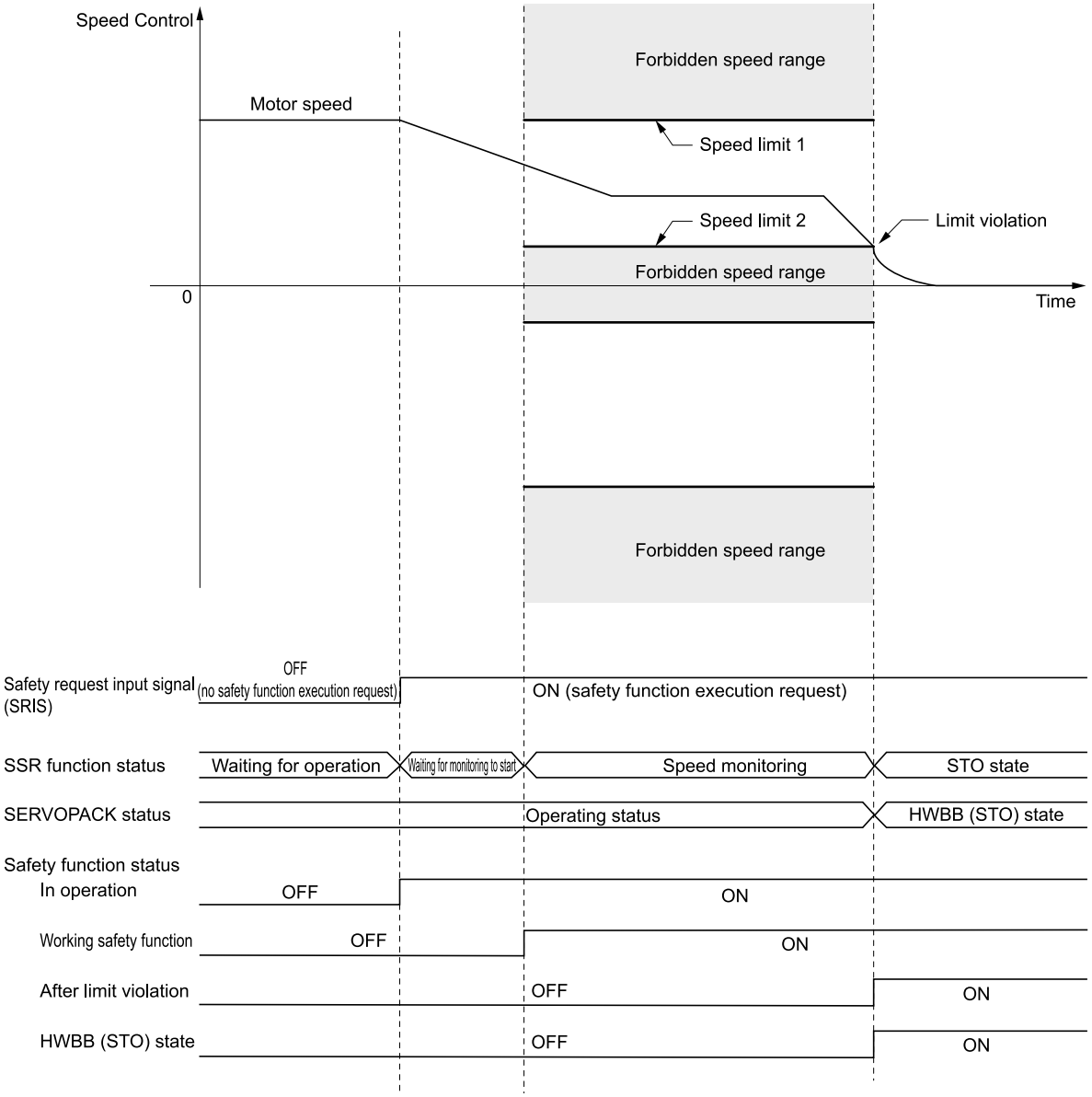
If a limit violation occurs during monitoring, the STO function is activated to shut OFF the servomotor's torque.

Monitoring Conditions	Limit Violation Conditions	Remarks
t < t1	Not monitored	–
t ≥ t1	| s1 | < | Motor speed | < | s2 |	Speed monitoring



*1 Displayed on the [Trace] window in the SigmaWin+.

7.15.2 Operation during Limit Violation



7.15.3 Activation Method

(1) Parameter Settings

(a) For the FSoE Communications References and Digital I/O Model (SGDXS-OSAA1A)

The SSR function settings are configured in the following parameters.

The parameter numbers depend on the slot. Refer to the following section for details.

☞ *7.3.3 Parameters for Safety Function Slot Settings on page 140*

Parameter Name		Description	Remarks
Safety Function Configuration I			
	Safety Function Selection	Select "SSR."	–
Safety Function Configuration II			

Continued on next page.

Continued from previous page.

Parameter Name		Description	Remarks
	Terminal Port Selection for Safety Request Input Signal	Select from the following. • DIA to DIE • VI0 to VI15	When you select a digital input signal (DIA to DIE), confirm that the same input port is set to "Use" in the input signal setting parameter *1 as the input port selected in this parameter.
	Terminal Port Selection for Safety Data Input Signal	Select "Disabled" (default setting).	–
Safety Function Configuration III			
	Terminal Port Selection for EDM Signal	Select from the following. • Disabled • DOA to DOE (Redundant Outputs) • DOA1 to DOE2 (Single Output) • VO0 to VO15	• When you select "Disabled," select "Disabled" for EDM Signal Behavior below as well. • When you select a digital output signal (DOA to DOE or DOA1 to DOE2), confirm that the same output port is set to "Use" in the output signal setting parameter *2 as the output port selected in this parameter.
	EDM Signal Behavior	Select from the following. • Disabled • In Operation • Working Safety Function • After Limit Violation • HWBB (STO) State	–
Safety Function Configuration IV			
	Terminal Port Selection for Safe Output Signal	Select "Disabled" (default setting).	–

*1 Refer to the following section for details on the input signal setting parameters.
☞ 7.4.5 Settings for Digital Input Signals on page 144

*2 Refer to the following section for details on the output signal setting parameters.
☞ 7.5.5 Settings for Digital Output Signals on page 155

Parameter Name	Unit	Sign	Setting Range	Remarks
Monitoring Parameter				
Waiting Time (t1)	10 ms	No	0 to 10000	Set the parameter as shown below. • t1 ≤ t2
Monitoring Time (t2)	10 ms	No	0 to 10000	Not used. Set this parameter to the default setting.
Speed Limit (s1)	User speed reference unit	No	0 to 4294967295	• Dual polarity • Set the parameter as shown below. – s1 ≥ s2 – s1 ≤ Maximum Motor Speed (Pc062) *1
Speed Limit (s2)	User speed reference unit	No	0 to 4294967295	
Acceleration Limit (a1)	User acceleration reference unit	Yes	-2147483648 to 2147483647	Not used. Set this parameter to the default setting.
Distance Limit (p1)	User position reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p2)	User position reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p3)	User position reference unit	No	0 to 4294967295	

*1 This comparison is made with the value of Pc062 converted to user speed units. The details on the conversion of the unit are the same as the SS1-r function. Refer to the following section.
☞ (3) Reference Information: Speed Limit (S1) and Maximum Motor Speed Unit Conversion on page 174

(b) For the FSoE Communications References Model (SGDXS-OSAA0A)

The SSR function settings are configured in the following parameters.

The parameter numbers depend on the slot. Refer to the following section for details.

☞ *7.3.3 Parameters for Safety Function Slot Settings on page 140*

Parameter Name		Description	Remarks
Safety Function Configuration I			
	Safety Function Selection	Select "SSR."	–
Safety Function Configuration II			
	Terminal Port Selection for Safety Request Input Signal	Select from the following. • VI0 to VI15	–
	Terminal Port Selection for Safety Data Input Signal	Select "Disabled" (default setting).	–
Safety Function Configuration III			
	Terminal Port Selection for EDM Signal	Select from the following. • Disabled • VO0 to VO15	When you select "Disabled," select "Disabled" for EDM Signal Behavior below as well.
	EDM Signal Behavior	Select from the following. • Disabled • In Operation • Working Safety Function • After Limit Violation • HWBB (STO) State	–
Safety Function Configuration IV			
	Terminal Port Selection for Safe Output Signal	Select "Disabled" (default setting).	–

Parameter Name	Unit	Sign	Setting Range	Remarks
Monitoring Parameter				
Waiting Time (t1)	10 ms	No	0 to 10000	Set the parameter as shown below. • t1 ≤ t2
Monitoring Time (t2)	10 ms	No	0 to 10000	Not used. Set this parameter to the default setting.
Speed Limit (s1)	User speed reference unit	No	0 to 4294967295	• Dual polarity • Set the parameter as shown below. – s1 ≥ s2 – s1 ≤ Maximum Motor Speed (Pc062) *1
Speed Limit (s2)	User speed reference unit	No	0 to 4294967295	
Acceleration Limit (a1)	User acceleration reference unit	Yes	-2147483648 to 2147483647	Not used. Set this parameter to the default setting.
Distance Limit (p1)	User position reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p2)	User position reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p3)	User position reference unit	No	0 to 4294967295	

*1 This comparison is made with the value of Pc062 converted to user speed units. The details on the conversion of the unit are the same as the SS1-r function. Refer to the following section.

☞ *(3) Reference Information: Speed Limit (S1) and Maximum Motor Speed Unit Conversion on page 174*

(2) Signal Operation

Turn ON SRIS.

7.15.4 Returning to Normal Operation

(1) Signal Operation

Turn OFF SRIS.

(2) Conditions for Returning to Normal SERVOPACK Operation

After the monitoring error occurs and the SERVOPACK is set to the HWBB state, the conditions to return to normal operation are the same as those for the STO function.

Refer to the following section for details.

☞ *(2) Conditions for Returning to Normal SERVOPACK Operation on page 167*

7.16 SSM (Safe Speed Monitor)

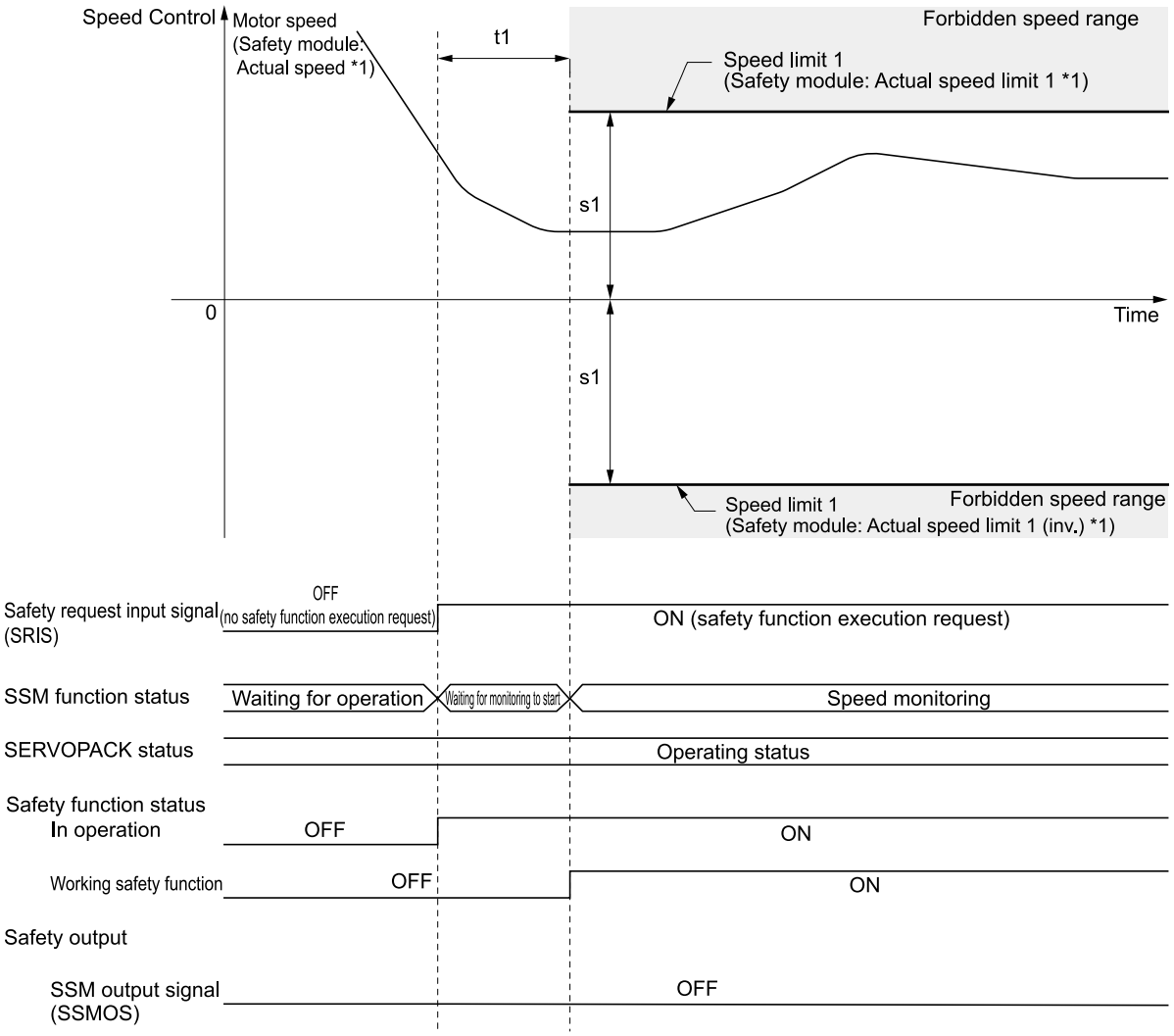
7.16.1 Function Description

When the Safety Request Input Signal (SRIS) is turned ON, the SSM function monitors the speed of the servomotor after the Waiting Time (t1) has elapsed.

If a limit violation occurs during speed monitoring, the function continues monitoring by narrowing the speed limit for forward to s1 - s2 and that for reverse to -s1 + s2.

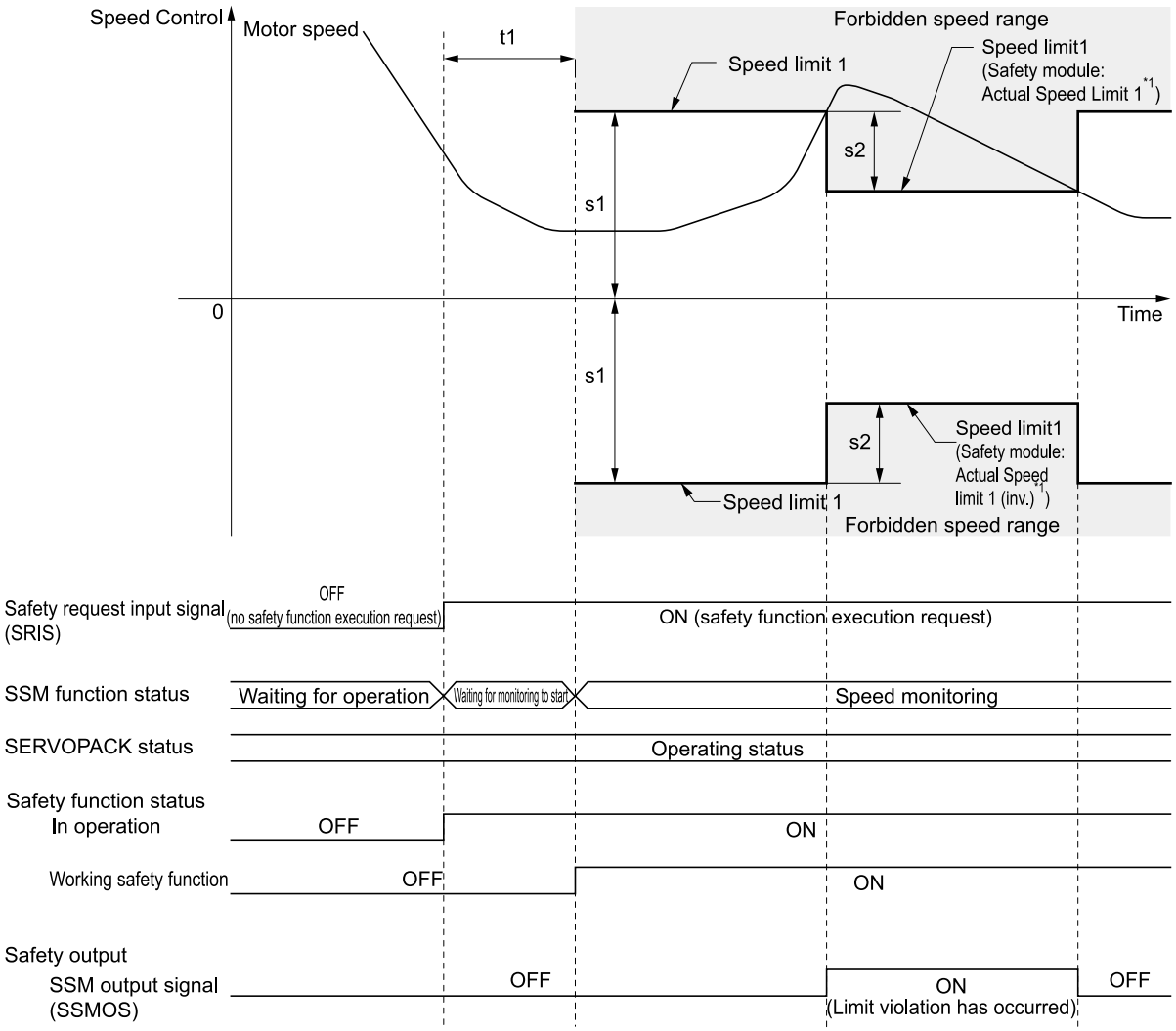
The STO function is not activated even if a limit violation occurs.

Monitoring Conditions	Monitoring Status	Limit Violation Conditions	Remarks
t < t1	–	Not monitored	–
t ≥ t1	Before limit violation	| Motor speed | > | s1 | If the above condition is satisfied, the limit violation state is turned ON and the monitoring status changes to "After limit violation."	Speed monitoring
	After limit violation	| Motor speed | > | (s1 – s2) | If the above condition is not satisfied, the limit violation state is turned OFF and the monitoring status changes to "Before limit violation."	Speed monitoring



*1 Displayed on the [Trace] window in the SigmaWin+.

7.16.2 Operation during Limit Violation



*1 Displayed on the [Trace] window in the SigmaWin+.

7.16.3 Activation Method

(1) Parameter Settings

(a) For the FSoE Communications References and Digital I/O Model (SGDXS-OSAA1A)

The SSM function settings are configured in the following parameters.

The parameter numbers depend on the slot. Refer to the following section for details.

☞ *7.3.3 Parameters for Safety Function Slot Settings on page 140*

Parameter Name		Description	Remarks
Safety Function Configuration I			
	Safety Function Selection	Select "SSM."	–
Safety Function Configuration II			

Continued on next page.

Continued from previous page.

Parameter Name		Description	Remarks
	Terminal Port Selection for Safety Request Input Signal	Select from the following. • DIA to DIE • VI0 to VI15	When you select a digital input signal (DIA to DIE), confirm that the same input port is set to "Use" in the input signal setting parameter *1 as the input port selected in this parameter.
	Terminal Port Selection for Safety Data Input Signal	Select "Disabled" (default setting).	–
Safety Function Configuration III			
	Terminal Port Selection for EDM Signal	Select from the following. • Disabled • DOA to DOE (Redundant Outputs) • DOA1 to DOE2 (Single Output) • VO0 to VO15	• When you select "Disabled," select "Disabled" for EDM Signal Behavior below as well. • When you select a digital output signal (DOA to DOE or DOA1 to DOE2), confirm that the same output port is set to "Use" in the output signal setting parameter *2 as the output port selected in this parameter.
	EDM Signal Behavior	Select from the following. • Disabled • In Operation • Working Safety Function	–
Safety Function Configuration IV			
	Terminal Port Selection for Safe Output Signal	Select from the following. • DOA to DOE (Redundant Outputs) • VO0 to VO15	Set the terminal to output the SSMOS signal.

*1 Refer to the following section for details on the input signal setting parameters.
☞ 7.4.5 Settings for Digital Input Signals on page 144

*2 Refer to the following section for details on the output signal setting parameters.
☞ 7.5.5 Settings for Digital Output Signals on page 155

Parameter Name	Unit	Sign	Setting Range	Remarks
Monitoring Parameter				
Waiting Time (t1)	10 ms	No	0 to 10000	–
Monitoring Time (t2)	10 ms	No	0 to 10000	Not used. Set this parameter to the default setting.
Speed Limit (s1)	User speed reference unit	No	0 to 4294967295	• Dual polarity • Set the parameter as shown below. – s1 ≥ s2 – s1 ≤ Maximum Motor Speed (Pc062) *1
Speed Limit (s2)	User speed reference unit	No	0 to 4294967295	
Acceleration Limit (a1)	User acceleration reference unit	Yes	-2147483648 to 2147483647	Not used. Set this parameter to the default setting.
Distance Limit (p1)	User position reference unit	Yes	0 to 2147483647	
Distance Limit (p2)	User position reference unit	Yes	0 to 2147483647	
Distance Limit (p3)	User position reference unit	No	0 to 4294967295	

*1 This comparison is made with the value of Pc062 converted to user speed units. The details on the conversion of the unit are the same as the SS1-r function. Refer to the following section.
☞ (3) Reference Information: Speed Limit (S1) and Maximum Motor Speed Unit Conversion on page 174

(b) For the FSoE Communications References Model (SGDXS-OSAA0A)

The SSM function settings are configured in the following parameters.

The parameter numbers depend on the slot. Refer to the following section for details.

☞ *7.3.3 Parameters for Safety Function Slot Settings on page 140*

Parameter Name		Description	Remarks
Safety Function Configuration I			
	Safety Function Selection	Select "SSM."	–
Safety Function Configuration II			
	Terminal Port Selection for Safety Request Input Signal	Select from the following. • VI0 to VI15	–
	Terminal Port Selection for Safety Data Input Signal	Select "Disabled" (default setting).	–
Safety Function Configuration III			
	Terminal Port Selection for EDM Signal	Select from the following. • Disabled • VO0 to VO15	When you select "Disabled," select "Disabled" for EDM Signal Behavior below as well.
	EDM Signal Behavior	Select from the following. • Disabled • In Operation • Working Safety Function	–
Safety Function Configuration IV			
	Terminal Port Selection for Safe Output Signal	Select from the following. • VO0 to VO15	Set the terminal to output the SSMOS signal.

Parameter Name	Unit	Sign	Setting Range	Remarks
Monitoring Parameter				
Waiting Time (t1)	10 ms	No	0 to 10000	–
Monitoring Time (t2)	10 ms	No	0 to 10000	Not used. Set this parameter to the default setting.
Speed Limit (s1)	User speed reference unit	No	0 to 4294967295	• Dual polarity • Set the parameter as shown below. – s1 ≥ s2 – s1 ≤ Maximum Motor Speed (Pc062) *1
Speed Limit (s2)	User speed reference unit	No	0 to 4294967295	
Acceleration Limit (a1)	User acceleration reference unit	Yes	-2147483648 to 2147483647	Not used. Set this parameter to the default setting.
Distance Limit (p1)	User position reference unit	Yes	0 to 2147483647	
Distance Limit (p2)	User position reference unit	Yes	0 to 2147483647	
Distance Limit (p3)	User position reference unit	No	0 to 4294967295	

*1 This comparison is made with the value of Pc062 converted to user speed units. The details on the conversion of the unit are the same as the SS1-r function. Refer to the following section.

☞ *(3) Reference Information: Speed Limit (S1) and Maximum Motor Speed Unit Conversion on page 174*

(2) Signal Operation

Turn ON SRIS.

7.16.4 Returning to Normal Operation

(1) Signal Operation

Turn OFF SRIS.

(2) Conditions for Returning to Normal SERVOPACK Operation

After the monitoring error occurs and the SERVOPACK is set to the HWBB state, the conditions to return to normal operation are the same as those for the STO function.

Refer to the following section for details.

☞ *(2) Conditions for Returning to Normal SERVOPACK Operation on page 167*

7.17 SBC (Safe Brake Control)

7.17.1 Function Description

The SBC function controls the relays for the brake power supply (safety relays) connected to the ASM-X by using the safe output signals in the ASM-X. The safety relays are not provided by Yaskawa.

The SBC function guarantees that the relays are operating normally, but it does not detect brake wear or if the brake actually opens or closes.

The SBC function is not directly activated from the Safety Request Input Signal (SRIS). Instead, it works together with the following conditions:

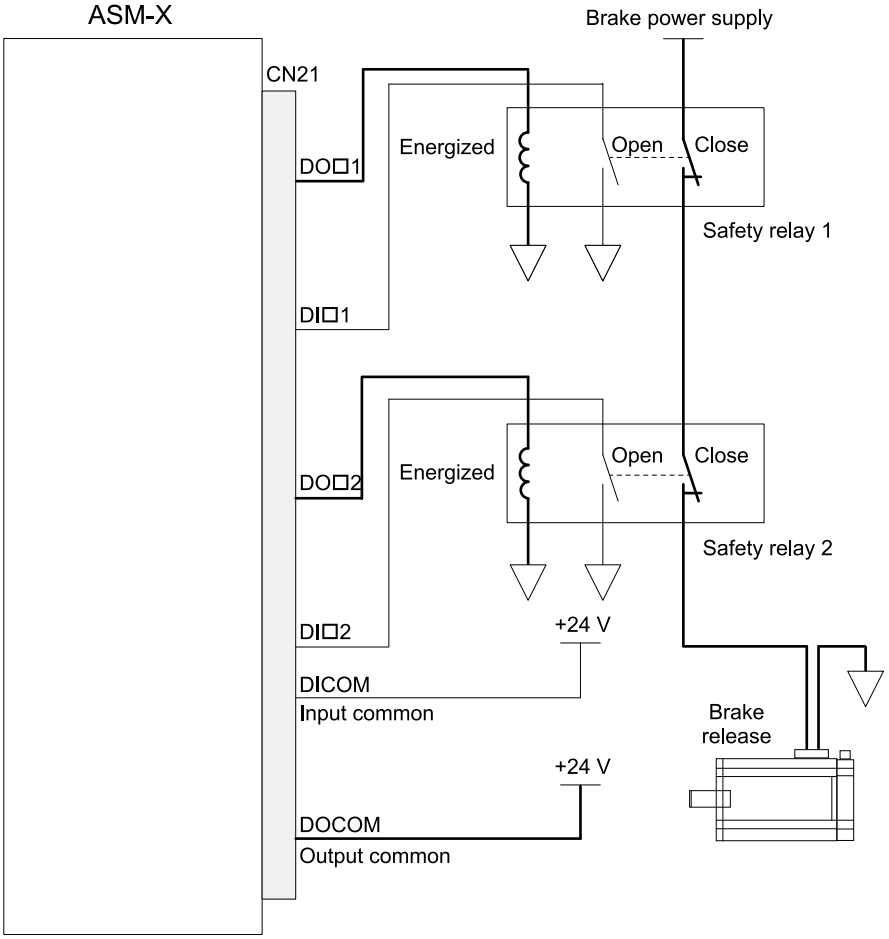
- Initial diagnosis
- Activation of the SS1-r and SS1-t functions
- STO state due to activation of the STO function
- STO state due to limit violation that occurs during execution of a safety function
- STO state due to ASM-X diagnostic error

Note:

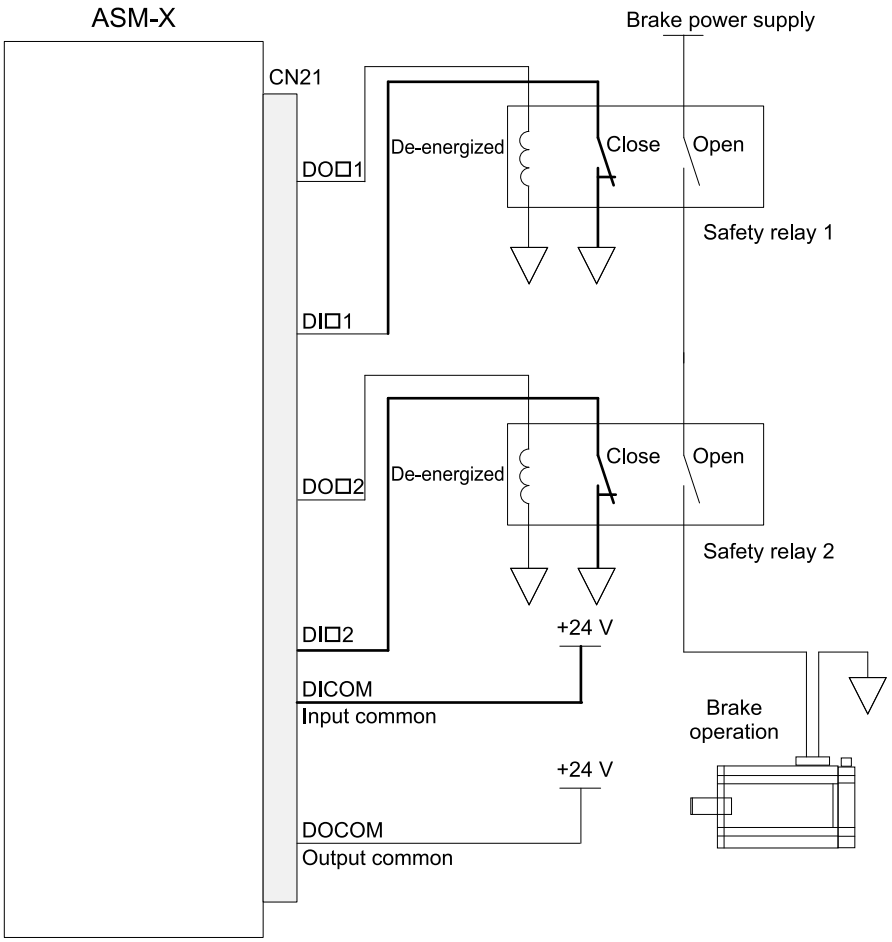
The SBC function does not operate when the HWBB is executed from CN8 on the SERVOPACK. To operate this function with the activation of the STO function, use the ASM-X STO function.

(1) System Configuration for SBC Function

- At Brake Release



- At Brake Operation



Relay control in the SBC function is shown below.

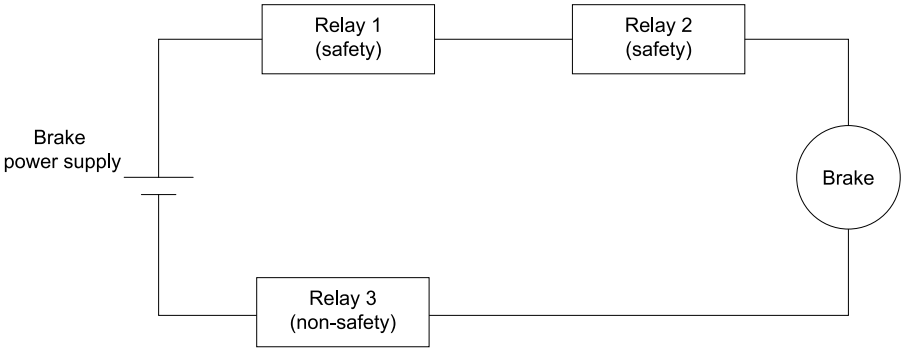
Select the safety relays based on the specifications of the holding brake for your servomotor.

Σ-X-Series Rotary Servomotor Product Manual (Manual No.: SIEP C230210 00)

SBC Output (ASM-X → Relay Coil)		Relay Coil Status	SBC Input (Relay Feedback → ASM-X)		Motor Brake Status
Output Signal (DO□1, DO□2) Status	SBCOS Status		Input Signal (DI□1, DI□2) Status	SBCIS Status	
Output transistor ON	OFF	Energized	Input circuit open	ON	Release
Output transistor OFF	ON	De-energized	Input circuit closed	OFF	Hold

As shown below, the relays for the brake power supply consist of relay 1 (safety), relay 2 (safety), and relay 3 (non-safety: not a safety-related element), which are controlled by the SBC function. The brake operates when any of these relays becomes de-energized.

Relay 3 is controlled by the alarm signal or the SERVOPACK's brake control signal.



The SBC function is available in the FSoE communications references and digital I/O model only because this function uses the digital inputs and outputs in the ASM-X.

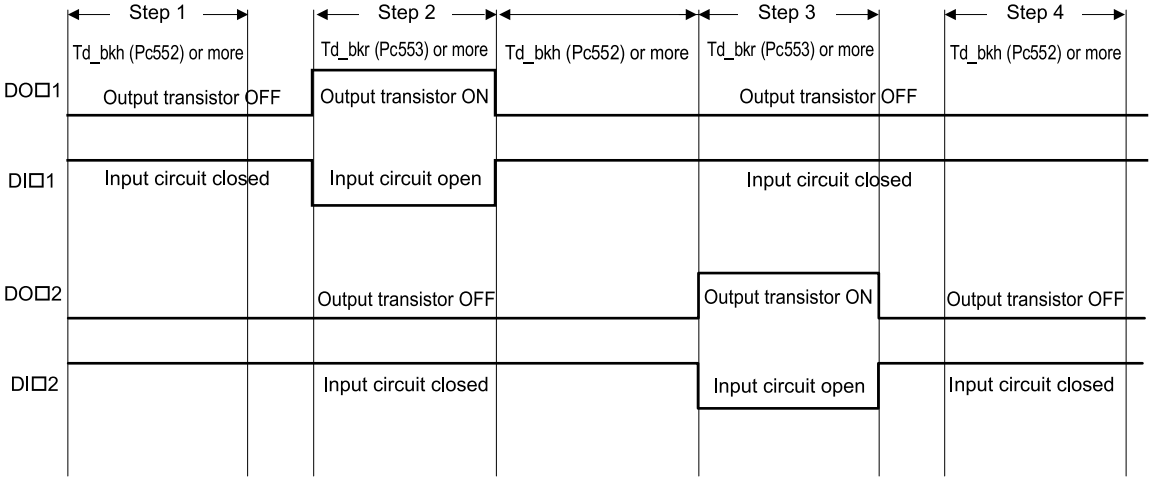
The SBC function is not available in the model equipped with only safety fieldbus.

(2) SBC Function Initial Diagnosis

When the SBC function is used, SBC function initial diagnosis is performed after the power is turned ON.

SBC initial diagnosis checks if a relay is stuck without releasing the brake by forcing safety relay 1 and safety relay 2 ON and OFF one at a time. The diagnosis time changes in conjunction with the settings in Pc552 (Slot 10 - Feedback signal discrepancy allowable time at brake hold (Td_bkh)) and Pc553 (Slot 10 - Feedback signal discrepancy allowable time at brake release (Td_bkr)).

Step	Output Signal Statuses		Input Signal Statuses		Remarks
	DO□1	DO□2	DI□1	DI□2	Motor Brake Status
1	Output transistor OFF	Output transistor OFF	Input circuit closed	Input circuit closed	Hold
2	Output transistor ON	Output transistor OFF	Input circuit open	Input circuit closed	Hold
3	Output transistor OFF	Output transistor ON	Input circuit closed	Input circuit open	Hold
4	Output transistor OFF	Output transistor OFF	Input circuit closed	Input circuit closed	Hold

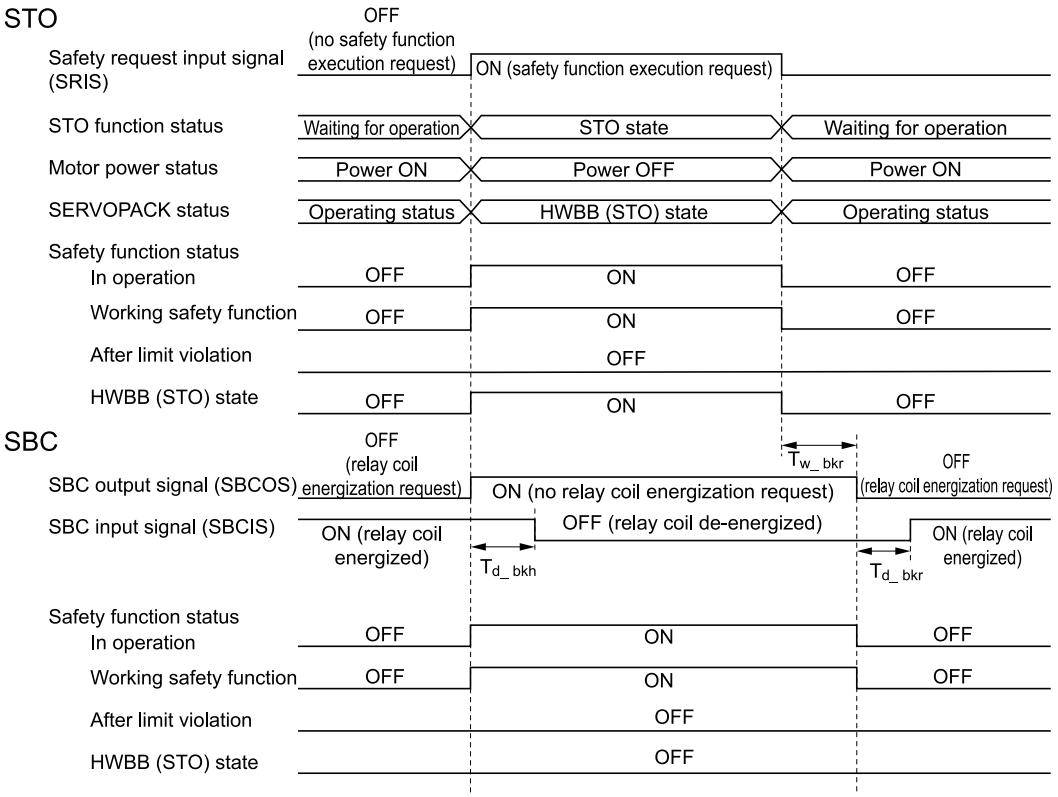


(3) Operation: Activated When STO State Is Set

When the STO state is set, the safe output signal for relay control changes from OFF to ON, the relays turn OFF (de-energized), the power supply for the motor brake is shut OFF, and the brake operates.

The ASM-X monitors the relay status with the SBC Input Signal (SBCIS) and compares the status of the safe output signal based on relay control to the SBC feedback status. If there is a mismatch, the SBC function sets the limit violation state, alarm A.E3E (SBC Feedback Signal Error) occurs, the STO state is set, and the safe output signal is turned ON (OFF).

After recovering from the STO state to the normal operation state, the brake release can be delayed by parameter Tw_bkr. For a shaft that moves up and down, you can prevent the shaft from falling by turning ON the servo during Tw_bkr. You do not need to use Tw_bkr if you can control the brake release timing with relays in a non-safety-related element, as in the motor brake control relay configuration. In this case, set Tw_bkr to 0.



The parameters for the feedback match diagnostic are shown below.

Parameter Name	Setting Range	Default Setting
FB Signal Discrep. Allow. Time at Brake Hold (Td_bkh)	0 ms to 300 ms	30 ms
FB Signal Discrep. Allow. Time at Brake Release (Td_bkr)	0 ms to 300 ms	30 ms

The brake release waiting parameter is shown below.

Parameter Name	Setting Range	Default Setting
Brake Release Delay Time (Tw_bkr)	0 ms to 10000 ms	0 ms

(4) Operation: Activated by SS1 Function Activation

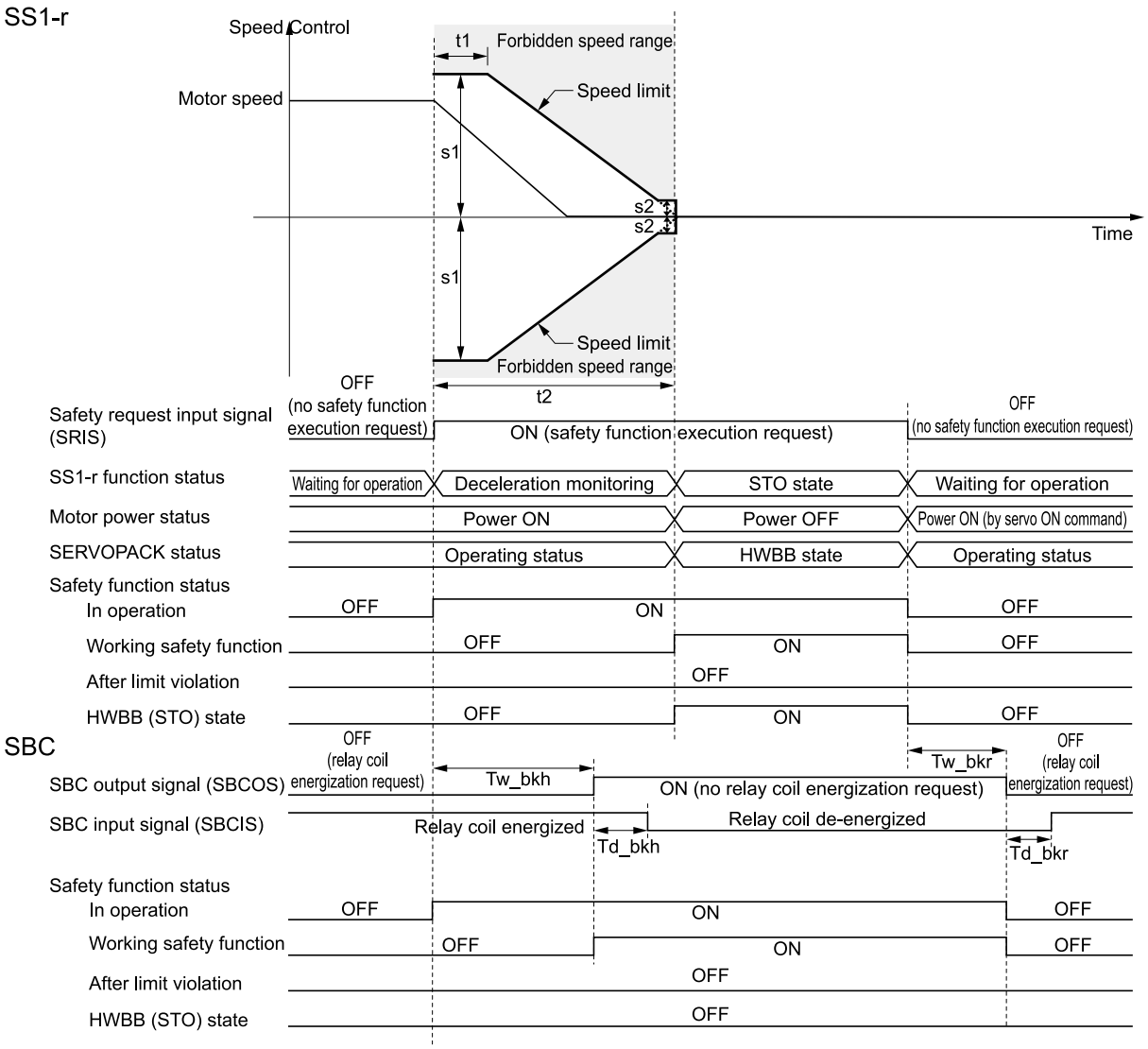
The following chart shows an example of the SBC function being activated by the activation of the SS1-r function.

The SS1 function is a safety function that sets the STO state after parameter t2 elapses.

When the SS1 function is activated during servomotor operation, the servomotor is typically controlled to a stop within t2, and if the brake operation timing by the SBC function is set to "Motor stopping time < Tw_bkh < t2 (SS1)," the STO state can be set after brake is activated by the SBC function after the servomotor stops.

The operation after the STO state is set is the same as when activated by the STO function.

The SBCIS diagnostic is also executed in the same manner as when activated by the STO function.

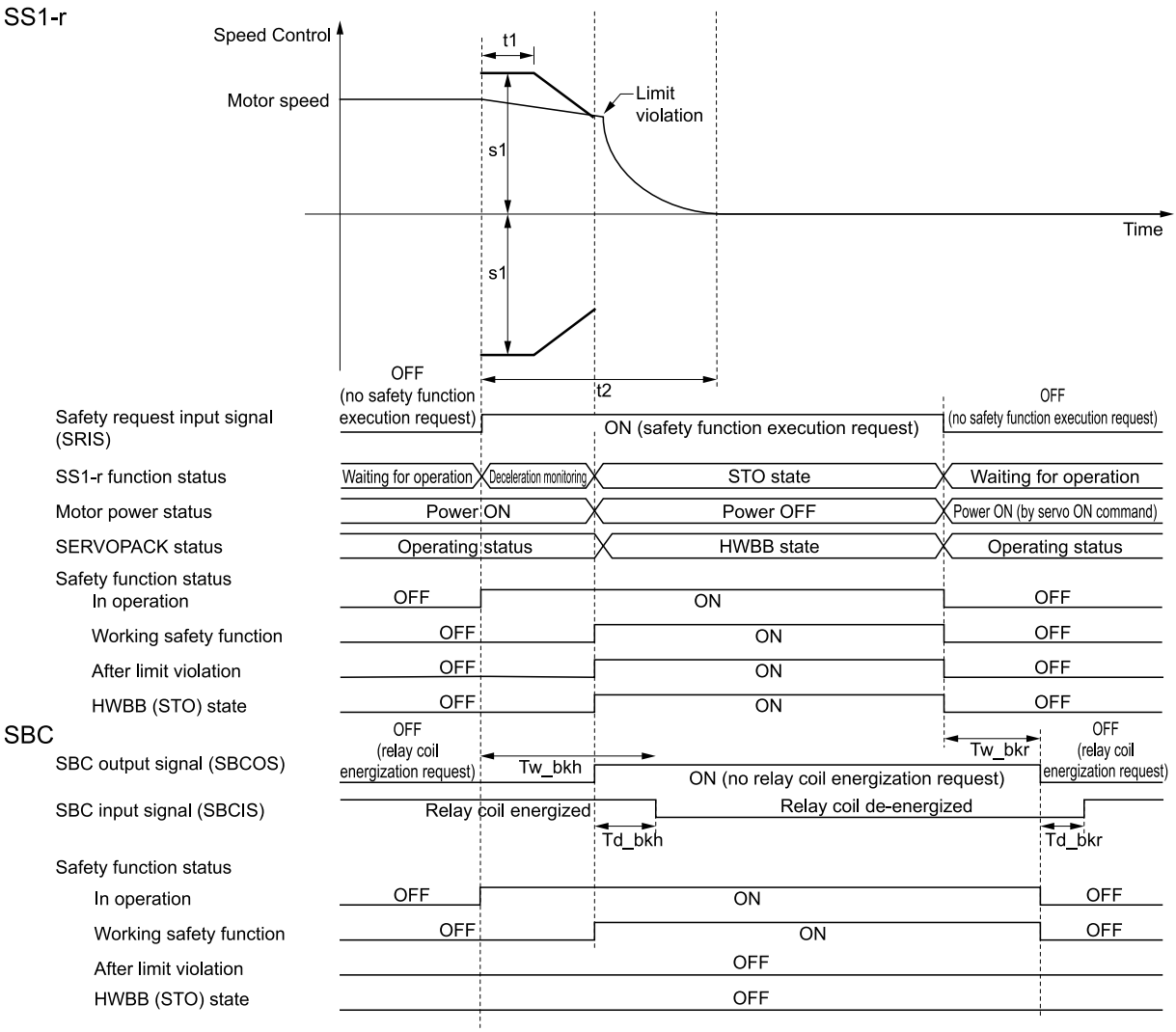


The brake operation waiting parameter is shown below.

Parameter Name	Setting Range	Default Setting
Brake Hold Delay Time (Tw_bkh)	0 ms to 10000 ms	0 ms

(5) Operation: Activated by SS1 Function Activation (When Limit Violation Occurs)

The following chart shows an example in which a limit violation occurs in the SS1-r function after it is activated, the STO state is set, the brake operation wait time Tw_bkh is disabled, and the SBC function is activated by the STO function.



7.17.2 Activation Method

(1) Parameter Settings

(a) For the FSoE Communications References and Digital I/O Model (SGDXS-OSAA1A)

The SBC function settings are configured in the following parameters.

The parameter numbers depend on the slot. Refer to the following section for details.

☞ *7.3.3 Parameters for Safety Function Slot Settings on page 140*

Parameter Name		Description	Remarks
Safety Function Configuration I			
	SBC Function Selection	Select "Use."	–
	SBC Function Activation Selection	Select from the following. • Activate with STO state. • Activate with STO state or start of SS1-t/SS1-r.	–
Safety Function Configuration II			

Continued on next page.

Continued from previous page.

Parameter Name		Description	Remarks
	Terminal Port Selection for SBC Output Signal (SBCOS)	Select the output terminal for SBCOS that drives the safety relays. • DOA to DOE	• The default setting is "Disabled." Make sure to select one of the digital output signals (DOA to DOE). • Confirm that the same output port is set to "Use" in the output signal setting parameter *2 as the output port selected in this parameter.
	Terminal Port Selection for SBC Input Signal (SBCIS)	Select the terminal to which SBCIS from the safety relays is input. • DIA to DIE	• The default setting is "Disabled." Make sure to select one of the digital input signals (DIA to DIE). • Confirm that the same input port is set to "Use" in the input signal setting parameter *1 as the input port selected in this parameter.
Safety Function Configuration III			
	Terminal Port Selection for EDM Signal	Select from the following. • Disabled • DOA to DOE (Redundant Outputs) • DOA1 to DOE2 (Single Output) • VO0 to VO15	• When you select "Disabled," select "Disabled" for EDM Signal Behavior below as well. • When you select a digital output signal (DOA to DOE or DOA1 to DOE2), confirm that the same output port is set to "Use" in the output signal setting parameter *2 as the output port selected in this parameter.
	EDM Signal Behavior	Select from the following. • Disabled • In Operation • Working Safety Function • After Limit Violation • HWBB (STO) State	–

*1 Refer to the following section for details on the input signal setting parameters.
☞ 7.4.5 Settings for Digital Input Signals on page 144

*2 Refer to the following section for details on the output signal setting parameters.
☞ 7.5.5 Settings for Digital Output Signals on page 155

Parameter Name	Unit	Sign	Setting Range	Application
Monitoring Parameter				
Brake Hold Delay Time (Tw_bkh)	ms	No	0 to 10000	The delay time between activation of the SS1-r function, the SS1-r function activated by activation of the SS1-t function, or the SS1-t function and turning ON (OFF) of SBCOS.
Brake Release Delay Time (Tw_bkr)	ms	No	0 to 10000	The delay time from when the reason for execution of the SBC function is eliminated to when SBCOS is turned OFF (ON).

Continued on next page.

Continued from previous page.

Parameter Name	Unit	Sign	Setting Range	Application
FB Signal Discrep. Allow. Time at Brake Hold (Td_bkh)	ms	No	0 to 300	The allowable time for a mismatched state between the relay operation reference and SBCIS during brake operation.
FB Signal Discrep. Allow. Time at Brake Release (Td_bkr)	ms	No	0 to 300	The allowable time for a mismatched state between the relay operation reference and SBCIS during brake release.

(b) For the FSoE Communications References Model (SGDXS-OSAA0A)

The SBC function is not available in the model with FSoE communications references.

(2) Signal Operation

The Safety Request Input Signal (SRIS) does not need to be turned ON or OFF.

7.17.3 Returning to Normal Operation

(1) Signal Operation

Signal operations are not necessary because there is no SRIS that directly activates the SBC function.

Returning to normal operation from the STO state occurs automatically.

7.18 SLP (Safely-Limited Position)

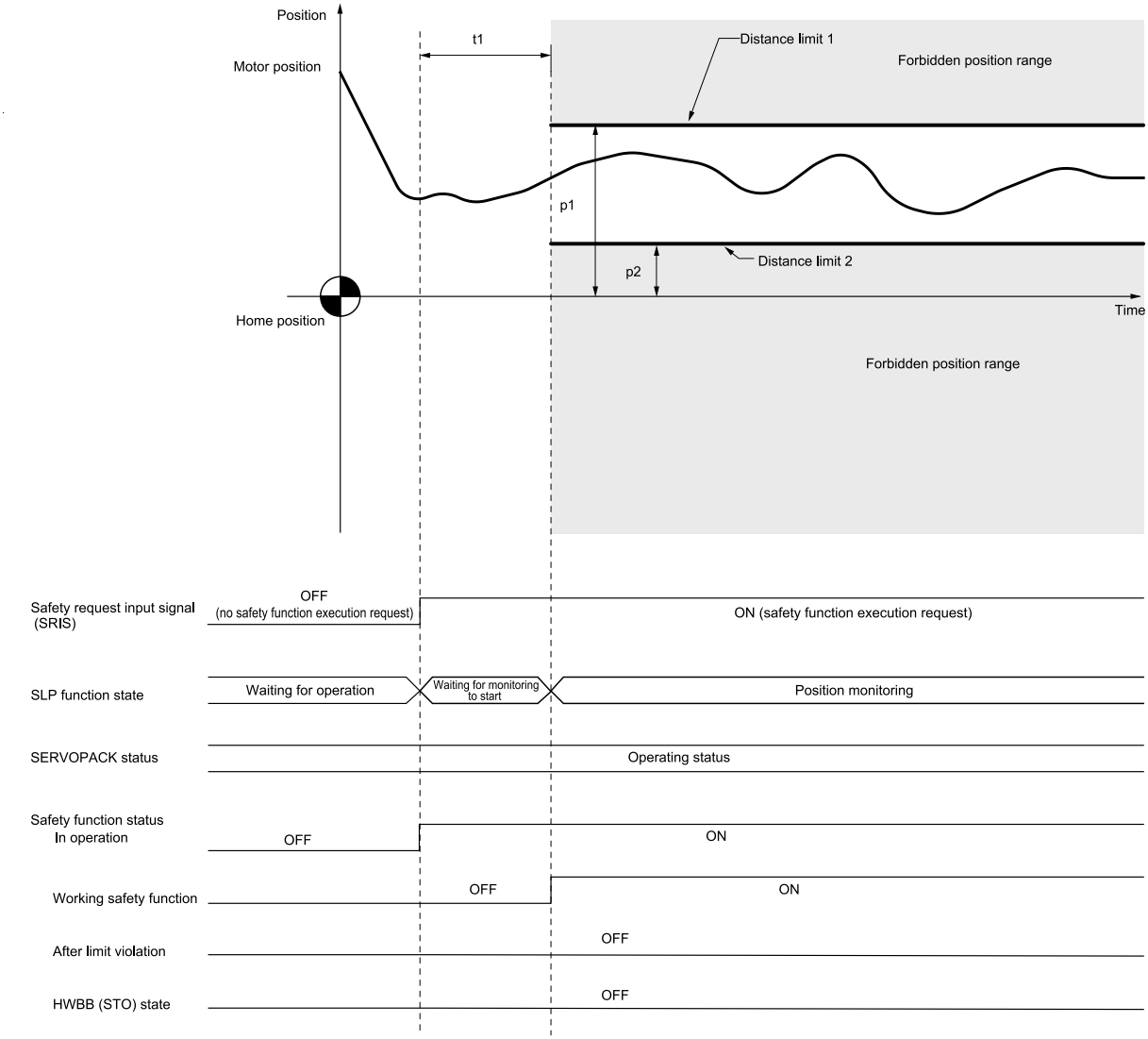
7.18.1 Function Description

When the Safety Request Input Signal (SRIS) is turned ON, the SLP function monitors the position of the servomotor after the Waiting Time (t1) has elapsed. Position monitoring is performed based on the safe home position set with the SHP function. This means that to use the SLP function, you must use the SHP function to set the safe home position. Refer to the following section for details on setting the safe home position.

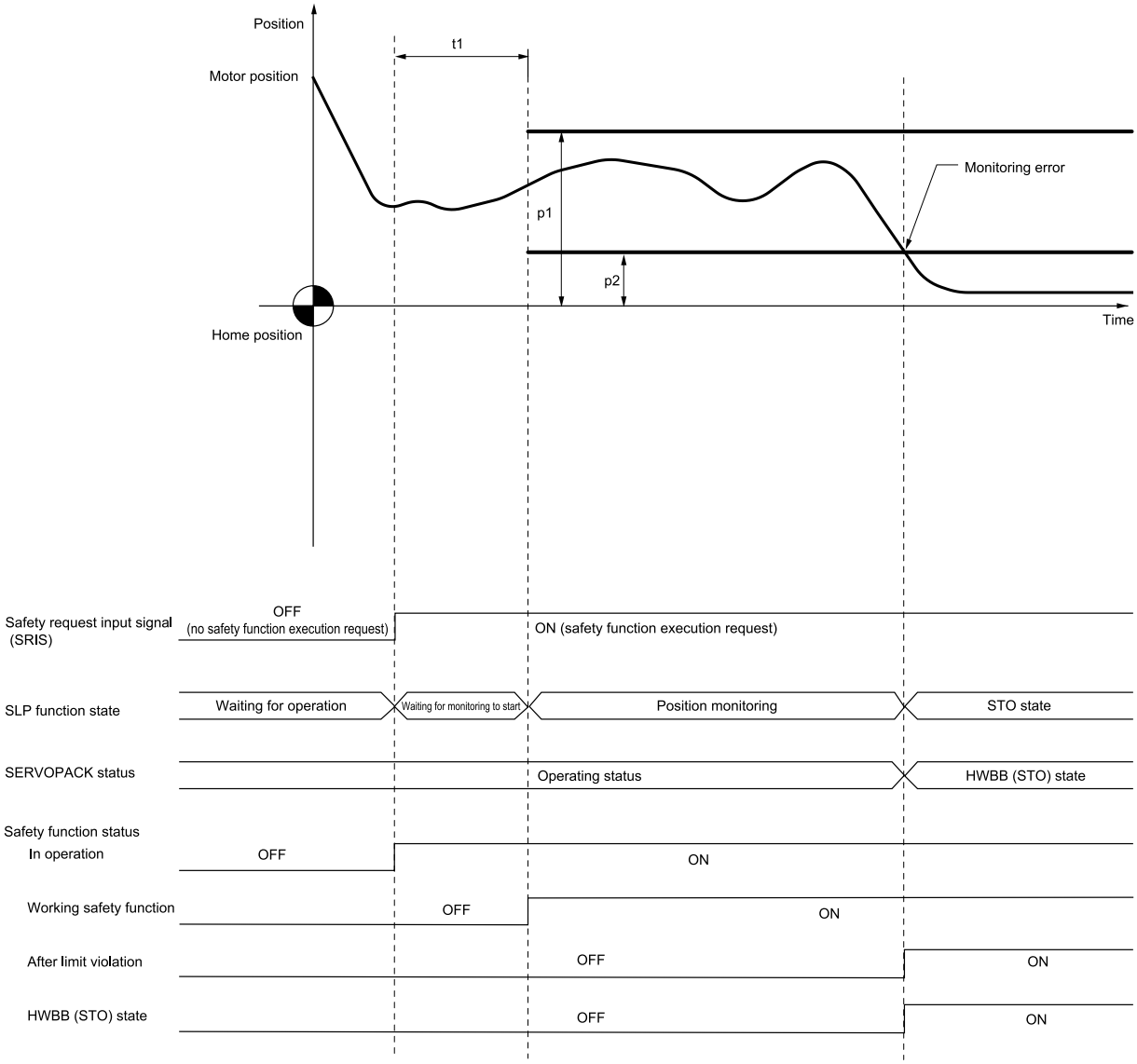
☞ *7.23 SHP (Safe Home Position) on page 256*

If a limit violation occurs during monitoring, the STO function is activated to shut OFF the servomotor's torque.

Monitoring Conditions	Limit Violation Conditions	Remarks
t < t1	Not monitored	–
t ≥ t1	(Motor position - Safe home position) > p1 or (Motor position - Safe home position) < p2	Position monitoring



7.18.2 Operation during Limit Violation



7.18.3 Activation Method

(1) Parameter Settings

(a) For the FSoE Communications References and Digital I/O Model (SGDXS-OSAA1A)

The SLP function settings are configured in the following parameters.

The parameter numbers depend on the slot. Refer to the following section for details.

☞ *7.3.3 Parameters for Safety Function Slot Settings on page 140*

Parameter Name		Description	Remarks
Safety Function Configuration I			
	Safety Function Selection	Select "SLP."	–
Safety Function Configuration II			

Continued on next page.

Continued from previous page.

Parameter Name		Description	Remarks
	Terminal Port Selection for Safety Request Input Signal	Select from the following. • DIA to DIE • VI0 to VI15	When you select a digital input signal (DIA to DIE), confirm that the same input port is set to "Use" in the input signal setting parameter *1 as the input port selected in this parameter.
	Terminal Port Selection for Safety Data Input Signal	Select "Disabled" (default setting).	–
Safety Function Configuration III			
	Terminal Port Selection for EDM Signal	Select from the following. • Disabled • DOA to DOE (Redundant Outputs) • DOA1 to DOE2 (Single Output) • VO0 to VO15	• When you select "Disabled," select "Disabled" for EDM Signal Behavior below as well. • When you select a digital output signal (DOA to DOE or DOA1 to DOE2), confirm that the same output port is set to "Use" in the output signal setting parameter *2 as the output port selected in this parameter.
	EDM Signal Behavior	Select from the following. • Disabled • In Operation • Working Safety Function • After Limit Violation • HWBB (STO) State	–
Safety Function Configuration IV			
	Terminal Port Selection for Safe Output Signal	Select "Disabled" (default setting).	–

*1 Refer to the following section for details on the input signal setting parameters.
☞ 7.4.5 Settings for Digital Input Signals on page 144

*2 Refer to the following section for details on the output signal setting parameters.
☞ 7.5.5 Settings for Digital Output Signals on page 155

Parameter Name	Unit	Sign	Setting Range	Remarks
Monitoring Parameter				
Waiting Time (t1)	10 ms	No	0 to 10000	-
Monitoring Time (t2)	10 ms	No	0 to 10000	Not used. Set this parameter to the default setting.
Speed Limit (s1)	User speed reference unit	No	0 to 4294967295	
Speed Limit (s2)	User speed reference unit	No	0 to 4294967295	
Acceleration Limit (a1)	User acceleration reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p1)	User position reference unit	Yes	-2147483648 to 2147483647	Set the parameter as shown below. • p2 ≤ p1 If a value is set other than the above, alarm A.EB2 (Parameter Setting Error) will occur.
Distance Limit (p2)	User position reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p3)	User position reference unit	No	0 to 4294967295	Not used. Set this parameter to the default setting.

(b) For the FSoE Communications References Model (SGDXS-OSAA0A)

The SLP function settings are configured in the following parameters.

The parameter numbers depend on the slot. Refer to the following section for details.

☞ 7.3.3 Parameters for Safety Function Slot Settings on page 140

Parameter Name		Description	Remarks
Safety Function Configuration I			
	Safety Function Selection	Select "SLP."	–
Safety Function Configuration II			
	Terminal Port Selection for Safety Request Input Signal	Select from the following. • VI0 to VI15	–
	Terminal Port Selection for Safety Data Input Signal	Select "Disabled" (default setting).	–
Safety Function Configuration III			
	Terminal Port Selection for EDM Signal	Select from the following. • Disabled • VO0 to VO15	When you select "Disabled," select "Disabled" for EDM Signal Behavior below as well.
	EDM Signal Behavior	Select from the following. • Disabled • In Operation • Working Safety Function • After Limit Violation • HWBB (STO) State	–
Safety Function Configuration IV			
	Terminal Port Selection for Safe Output Signal	Select "Disabled" (default setting).	–

Parameter Name	Unit	Sign	Setting Range	Remarks
Monitoring Parameter				
Waiting Time (t1)	10 ms	No	0 to 10000	-
Monitoring Time (t2)	10 ms	No	0 to 10000	Not used. Set this parameter to the default setting.
Speed Limit (s1)	User speed reference unit	No	0 to 4294967295	
Speed Limit (s2)	User speed reference unit	No	0 to 4294967295	
Acceleration Limit (a1)	User acceleration reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p1)	User position reference unit	Yes	-2147483648 to 2147483647	Set the parameter as shown below. • $p2 \leq p1$ If a value is set other than the above, alarm A.EB2 (Parameter Setting Error) will occur.
Distance Limit (p2)	User position reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p3)	User position reference unit	No	0 to 4294967295	Not used. Set this parameter to the default setting.

(2) Signal Operation

Turn ON SRIS.

If the SLP function was started in the safe home position not set state (when the SHP function is OFF), alarm A.E2D (Safety Module - Safe Home Position Not Set) will occur after the Waiting Time (t1) has elapsed. In this case, turn OFF SRIS and reset the alarm.

7.18.4 Returning to Normal Operation

(1) Signal Operation

Turn OFF SRIS.

(2) Conditions for Returning to Normal SERVOPACK Operation

After the monitoring error occurs and the SERVOPACK is set to the HWBB state, the conditions to return to normal operation are the same as those for the STO function.

Refer to the following section for details.

☞ *(2) Conditions for Returning to Normal SERVOPACK Operation on page 167*

7.19 SLI (Safely-Limited Incremental)

7.19.1 Function Description

When the Safety Request Input Signal (SRIS) is turned ON, the SLI function monitors servomotor movement in the set range. The direction for movement monitoring (forward or backward) can be changed with the sign of the distance limit (p2).

(1) When Distance Limit (p2) Is Positive

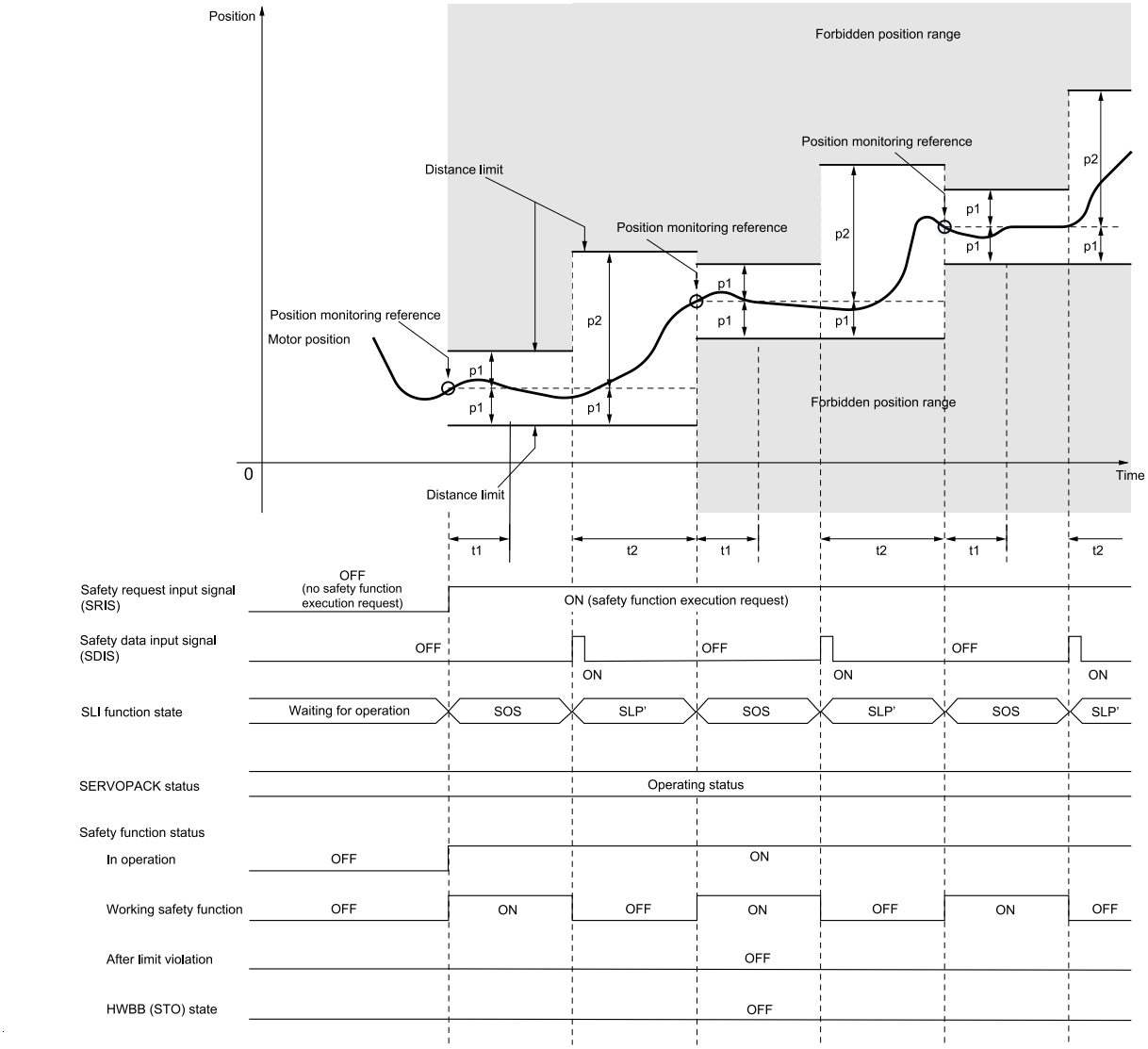
When the distance limit (p2) is set as a positive number, the position when the servomotor moves in the forward direction is monitored.

Step	Monitoring Conditions	Limit Violation Conditions	Remarks
1	Time until SDIS is turned ON after SRIS was turned ON	| (Motor position - Position monitoring reference) | > p1	Position monitoring: SOS function *1 While t < t1, SDIS is ignored.
2	While t < t2 after SDIS was turned ON	(Motor position - Position monitoring reference) > p2 or (Motor position - Position monitoring reference) < p1	Position monitoring: SLP' function *2
3	Time until SDIS is turned ON after step 2	| (Motor position - Position monitoring reference) | > p1	Position monitoring: SOS function *1 While t < t1, SDIS is ignored.
4	While t < t2 after SDIS was turned ON	(Motor position - Position monitoring reference) > p2 or (Motor position - Position monitoring reference) < p1	Position monitoring: SLP' function *2
Repeat steps 3 and 4.			

*1 The reference position for position monitoring is the position when the SOS functions starts to be executed. In the above table, this is the start positions in steps 1 and 3.

*2 The SLP function monitors the position of the servomotor based on the position when the SOS functions starts to be executed. The range for position monitoring is changed with the sign of p2.

Information The SLP function monitors the position of the servomotor based on the home position set with the SHP function. The position is monitored within the set range so that p1 ≥ p2.



(2) When Distance Limit (p2) Is Negative

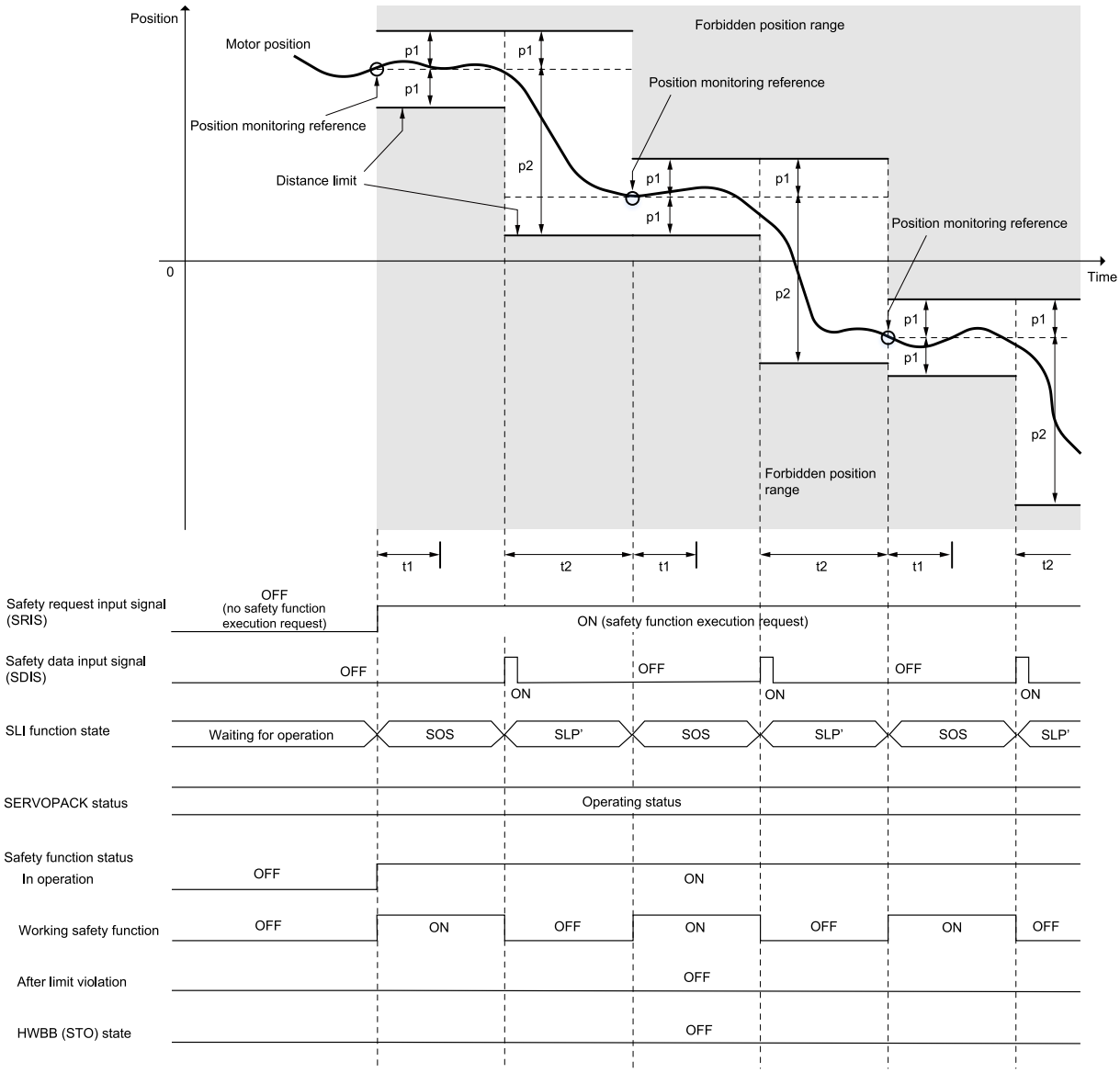
When the distance limit (p2) is set as a negative number, the position when the servomotor moves in the reverse direction is monitored.

Step	Monitoring Conditions	Limit Violation Conditions	Remarks
1	Time until SDIS is turned ON after SRIS was turned ON	| (Motor position - Position monitoring reference) | > p1	Position monitoring: SOS function *1 While t < t1, SDIS is ignored.
2	While t < t2 after SDIS was turned ON	(Motor position - Position monitoring reference) > p1 or (Motor position - Position monitoring reference) < p2	Position monitoring: SLP' function *2
3	Time until SRIS is turned ON after step 2	| (Motor position - Position monitoring reference) | > p1	Position monitoring: SOS function *1 While t < t1, SDIS is ignored.
4	While t < t2 after SRIS was turned ON	(Motor position - Position monitoring reference) > p1 or (Motor position - Position monitoring reference) < p2	Position monitoring: SLP' function *2
Repeat steps 3 and 4.			

*1 The reference position for position monitoring is the position when the SOS functions starts to be executed. In the above table, this is the start positions in steps 1 and 3.

*2 The SLP' function monitors the position of the servomotor based on the position where SDIS was turned ON or the position after the Waiting Time (t1) has elapsed. The range for position monitoring is changed with the sign of p2.

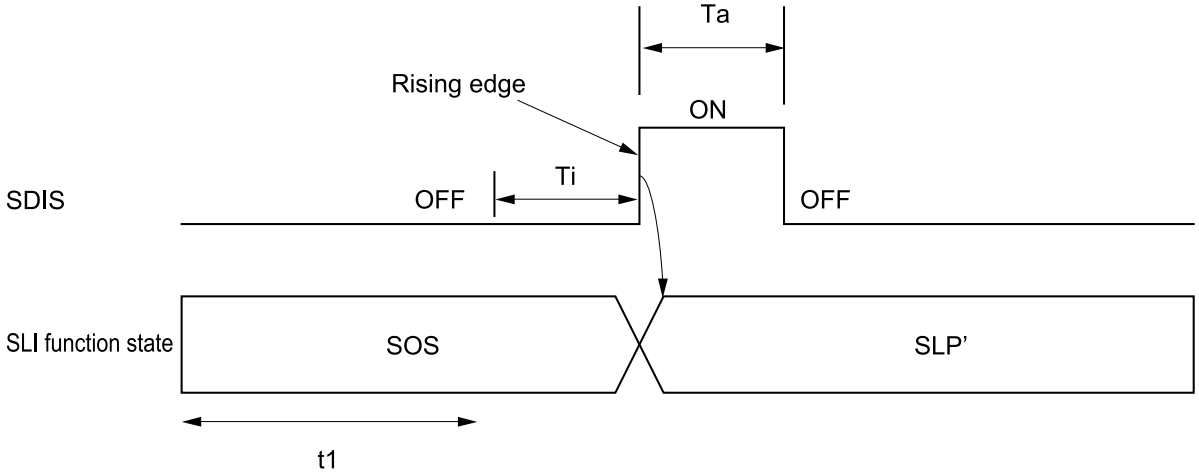
Information The SLP function monitors the position of the servomotor based on the home position set with the SHP function. The position is monitored within the set range so that p1 ≥ p2.



(3) Specifications of SDIS

SDIS is used as the trigger in the SLI function to transition from the SOS function to the SLP' function.
Note the following two precautions when using SDIS.

- The transition is made from the SOS function to the SLP' function on the rising edge of SDIS.



When SDIS is input, ensure an OFF level time (Ti) and ON level time (Ta) as shown below.

– When using a digital input signal

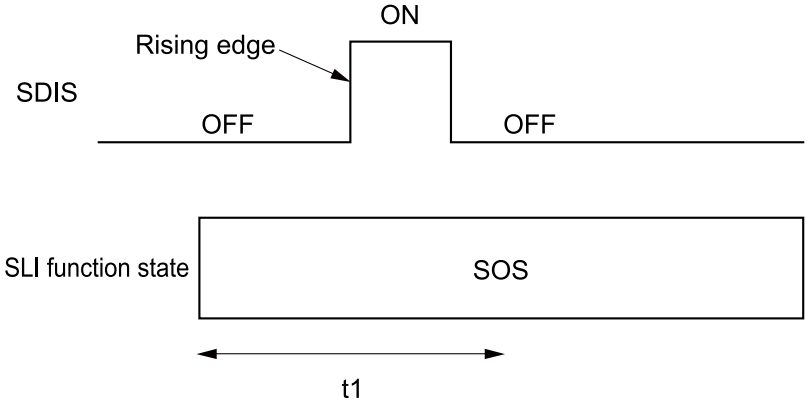
Ti = Ta = Filter time of digital input port + 10 [ms]

– When using a virtual input
Ti = Ta = 8 [ms]

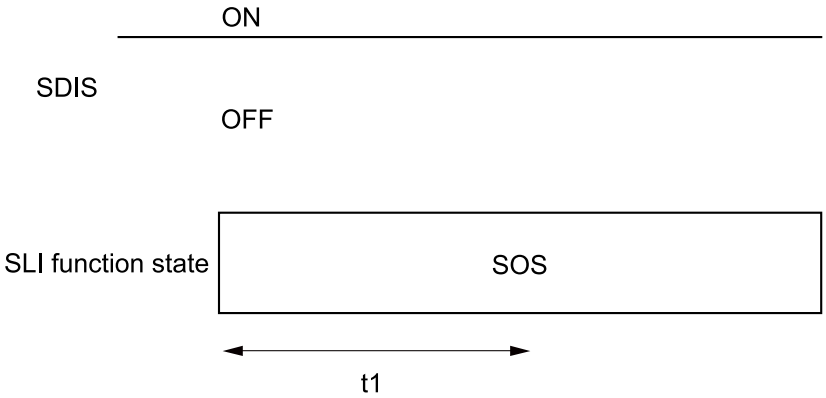
Refer to the following section for the filter time of the digital input port.
☞ *(1) List of Parameter Settings for Digital Input Signals on page 144*

- Switch SDIS from OFF to ON after the Waiting Time (t1) has elapsed.
In cases such as the following, no transition will be made from the SOS function to the SLP' function.

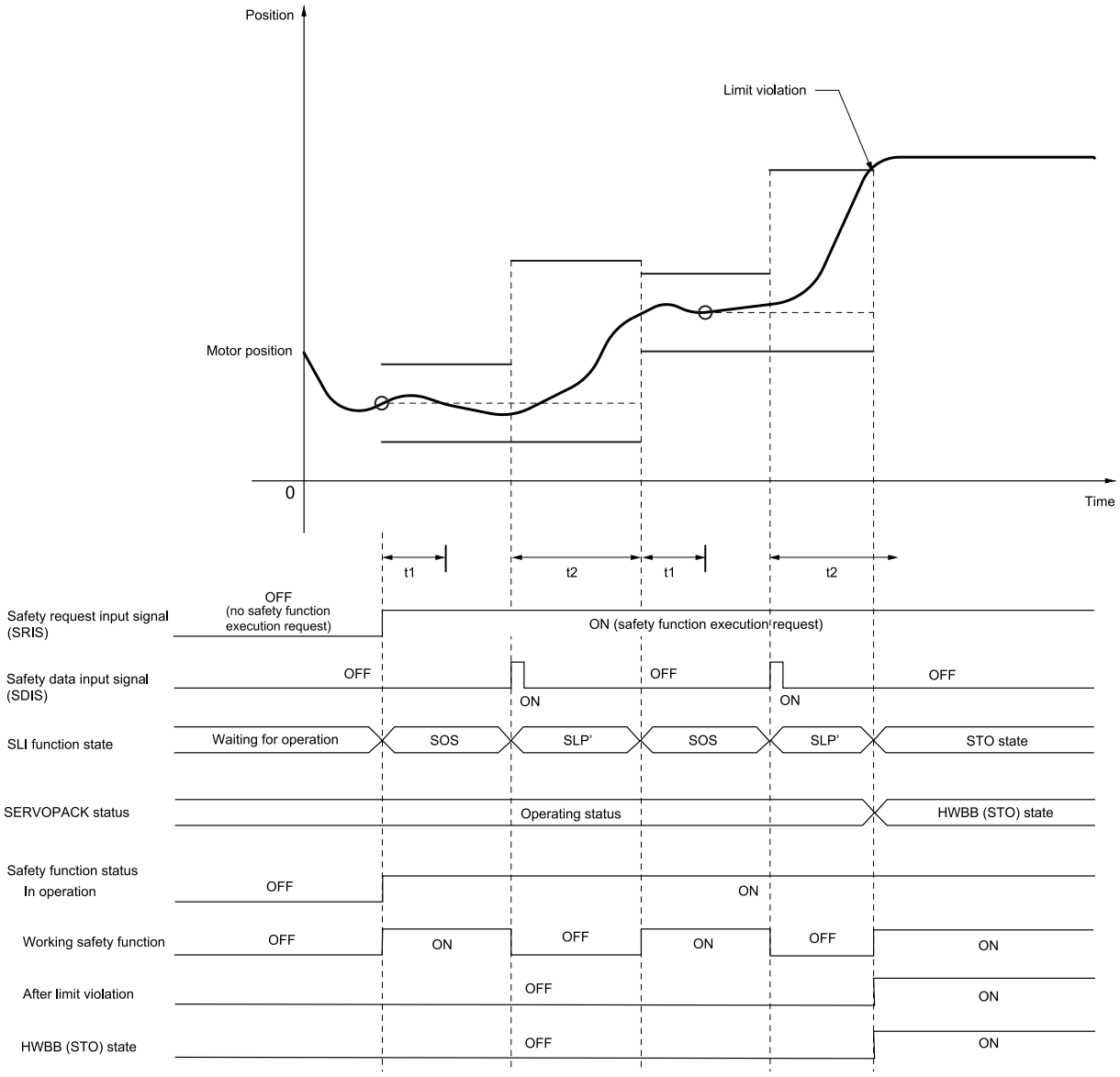
– When SDIS is switched from OFF to ON before the Waiting Time (t1) has elapsed



– When SDIS is always ON



7.19.2 Operation during Limit Violation



7.19.3 Activation Method

(1) Parameter Settings

(a) For the FSoE Communications References and Digital I/O Model (SGDXS-OSAA1A)

The SLI function settings are configured in the following parameters.

The parameter numbers depend on the slot. Refer to the following section for details.

☞ *7.3.3 Parameters for Safety Function Slot Settings on page 140*

Parameter Name		Description	Remarks
Safety Function Configuration I			
	Safety Function Selection	Select "SLI."	–
Safety Function Configuration II			

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Parameter Name		Description	Remarks
	Terminal Port Selection for Safety Request Input Signal	Select from the following. • DIA to DIE • VI0 to VI15	When you select a digital input signal (DIA to DIE), confirm that the same input port is set to "Use" in the input signal setting parameter *1 as the input port selected in this parameter.
	Terminal Port Selection for Safety Data Input Signal	Select from the following. • DIA to DIE • VI0 to VI15	
Safety Function Configuration III			
	Terminal Port Selection for EDM Signal	Select from the following. • Disabled • DOA to DOE (Redundant Outputs) • DOA1 to DOE2 (Single Output) • VO0 to VO15	• When you select "Disabled," select "Disabled" for EDM Signal Behavior below as well. • When you select a digital output signal (DOA to DOE or DOA1 to DOE2), confirm that the same output port is set to "Use" in the output signal setting parameter *2 as the output port selected in this parameter.
	EDM Signal Behavior	Select from the following. • Disabled • In Operation • Working Safety Function • After Limit Violation • HWBB (STO) State	–
Safety Function Configuration IV			
	Terminal Port Selection for Safe Output Signal	Select "Disabled" (default setting).	–

*1 Refer to the following section for details on the input signal setting parameters.
☞ 7.4.5 Settings for Digital Input Signals on page 144

*2 Refer to the following section for details on the output signal setting parameters.
☞ 7.5.5 Settings for Digital Output Signals on page 155

Parameter Name	Unit	Sign	Setting Range	Remarks
Monitoring Parameter				
Waiting Time (t1)	10 ms	No	0 to 10000	–
Monitoring Time (t2)	10 ms	No	0 to 10000	
Speed Limit (s1)	User speed reference unit	No	0 to 4294967295	Not used. Set this parameter to the default setting.
Speed Limit (s2)	User speed reference unit	No	0 to 4294967295	
Acceleration Limit (a1)	User acceleration reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p1)	User position reference unit	Yes	0 to 2147483647	-
Distance Limit (p2)	User position reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p3)	User position reference unit	No	0 to 4294967295	Not used. Set this parameter to the default setting.

(b) For the FSoE Communications References Model (SGDXS-OSAA0A)

The SLI function settings are configured in the following parameters.

The parameter numbers depend on the slot. Refer to the following section for details.

☞ 7.3.3 Parameters for Safety Function Slot Settings on page 140

Parameter Name		Description	Remarks
Safety Function Configuration I			
	Safety Function Selection	Select "SLI."	–
Safety Function Configuration II			
	Terminal Port Selection for Safety Request Input Signal	Select from the following. • VI0 to VI15	–
	Terminal Port Selection for Safety Data Input Signal	Select from the following. • VI0 to VI15	–
Safety Function Configuration III			
	Terminal Port Selection for EDM Signal	Select from the following. • Disabled • VO0 to VO15	When you select "Disabled," select "Disabled" for EDM Signal Behavior below as well.
	EDM Signal Behavior	Select from the following. • Disabled • In Operation • Working Safety Function • After Limit Violation • HWBB (STO) State	–
Safety Function Configuration IV			
	Terminal Port Selection for Safe Output Signal	Select "Disabled" (default setting).	–

Parameter Name	Unit	Sign	Setting Range	Remarks
Monitoring Parameter				
Waiting Time (t1)	10 ms	No	0 to 10000	—
Monitoring Time (t2)	10 ms	No	0 to 10000	
Speed Limit (s1)	User speed reference unit	No	0 to 4294967295	Not used. Set this parameter to the default setting.
Speed Limit (s2)	User speed reference unit	No	0 to 4294967295	
Acceleration Limit (a1)	User acceleration reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p1)	User position reference unit	Yes	0 to 2147483647	—
Distance Limit (p2)	User position reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p3)	User position reference unit	No	0 to 4294967295	Not used. Set this parameter to the default setting.

(2) Signal Operation

Turn ON SRIS.

7.19.4 Returning to Normal Operation

(1) Signal Operation

Turn OFF SRIS.

(2) Conditions for Returning to Normal SERVOPACK Operation

After the monitoring error occurs and the SERVOPACK is set to the HWBB state, the conditions to return to normal operation are the same as those for the STO function.

Refer to the following section for details.

☞ *(2) Conditions for Returning to Normal SERVOPACK Operation on page 167*

7.20 SDI-p (Safe Direction, Positive Direction Forbidden)

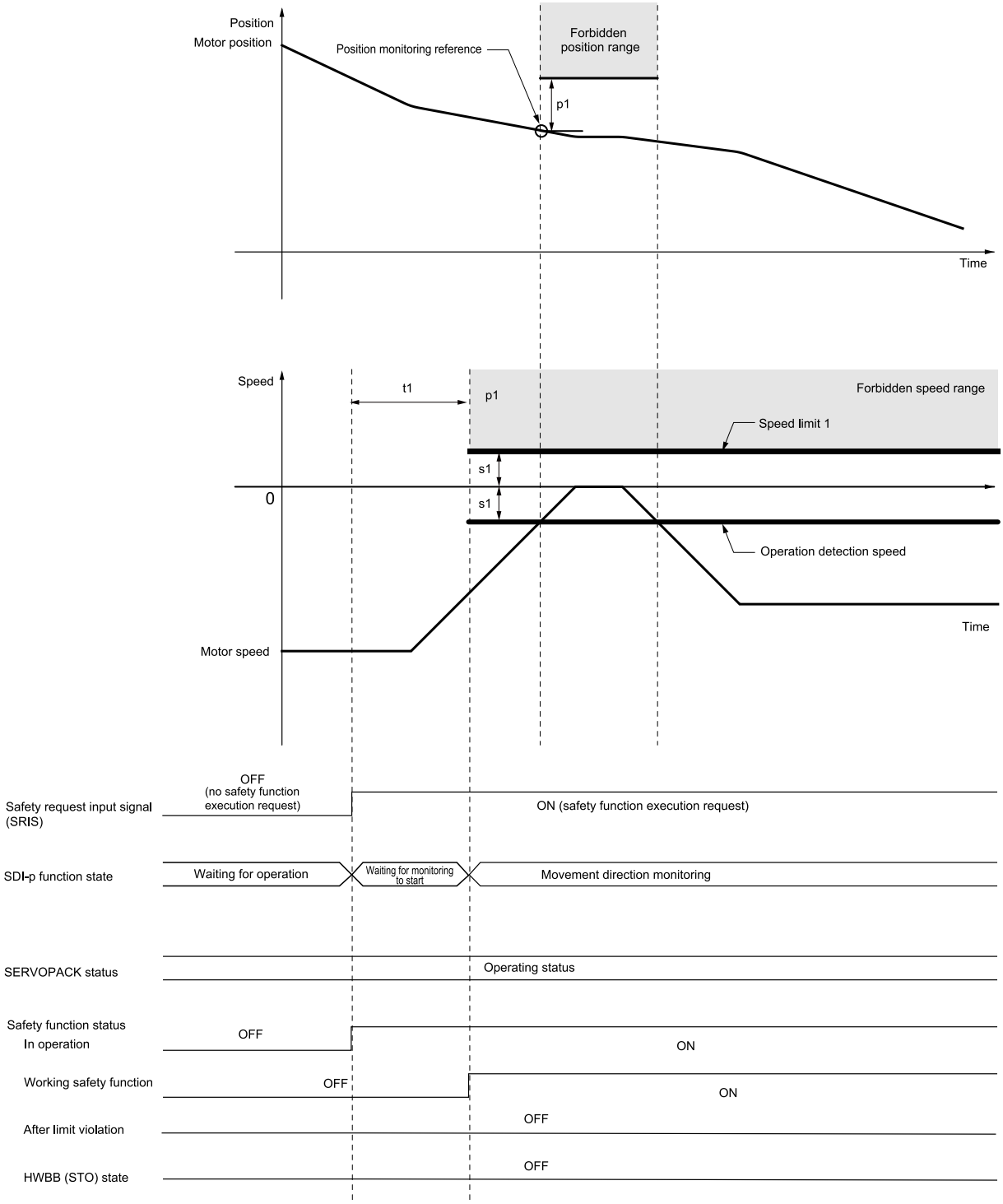
7.20.1 Function Description

When the Safety Request Input Signal (SRIS) is turned ON, the SDI-p function monitors the direction of the servomotor after the Waiting Time (t1) has elapsed. The SDI-p function prohibits movement in the forward direction and allows movement only in the reverse direction.

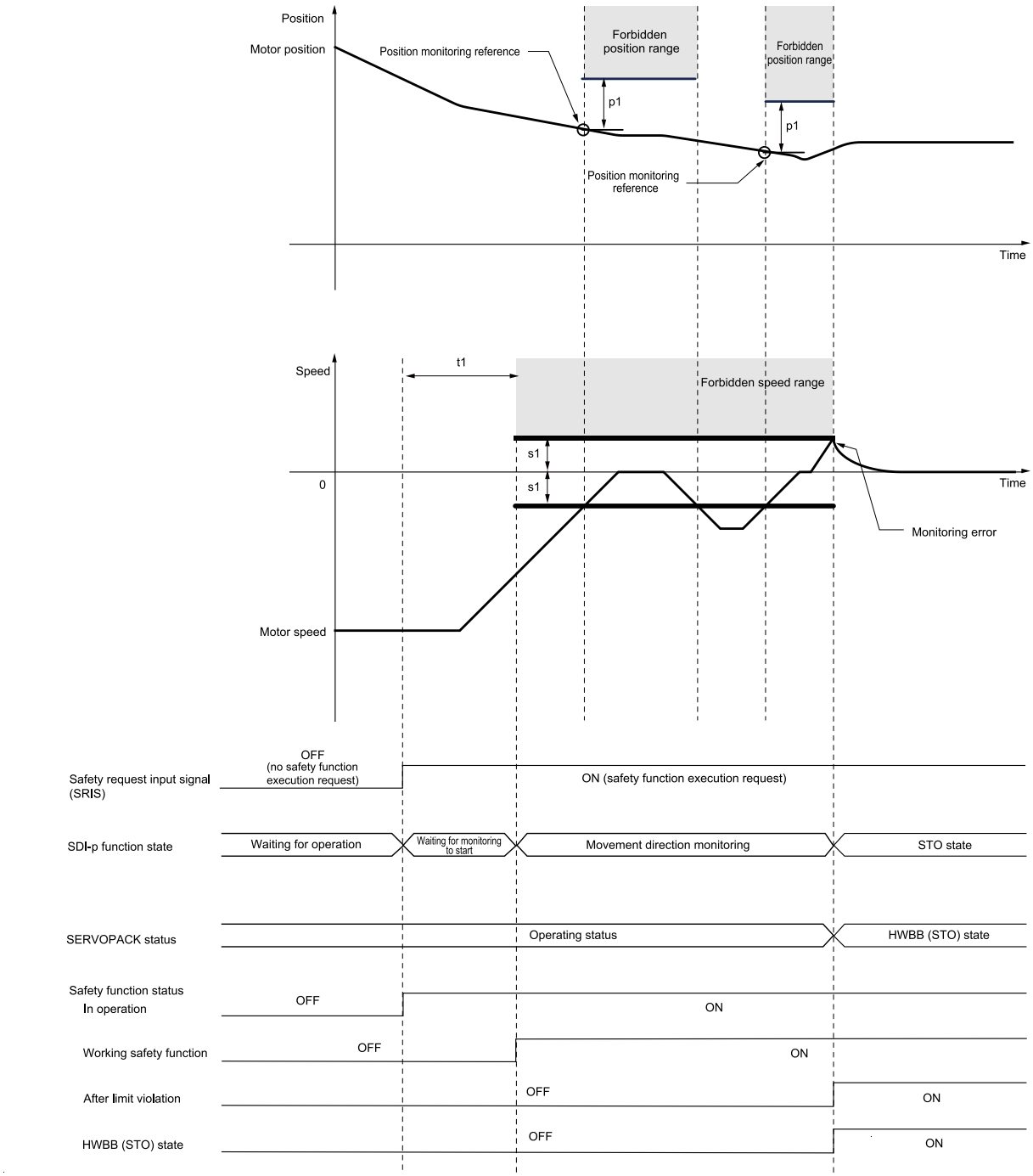
- If the servomotor speed exceeds the range of the speed limit (s1), the function detects a limit violation.
- When -s1 ≤ motor speed ≤ s1, the function judges this as the servomotor stopped state, and it latches the servomotor's position. The function monitors movement direction by position using the latched position as the position monitoring reference, and it detects a limit violation when (motor position - position monitoring reference) exceeds the range of the distance limit (p1).

If a limit violation occurs during monitoring, the STO function is activated to shut OFF the servomotor's torque.

Monitoring Conditions	Limit Violation Conditions	Remarks
t < t1	Not monitored	–
t ≥ t1	Motor speed < -s1	Operation is possible
	Motor speed > s1	Limit violation state
	Immediately after -s1 ≤ Motor speed ≤ s1	Motor position is latched **Note:** If this status occurs when this function is activated, the servomotor position at activation is latched.
	{ -s1 ≤ Motor speed ≤ s1 } && { (Motor position - Position monitoring reference) > p1 }	Direction monitoring by position


Position
Motor position
Position monitoring reference
Forbidden position range
p1
Time
Speed
t1
p1
Forbidden speed range
Speed limit 1
s1
0
s1
Operation detection speed
Time
Motor speed
Safety request input signal (SRIS)
OFF (no safety function execution request)
ON (safety function execution request)
SDI-p function state
Waiting for operation
Waiting for monitoring to start
Movement direction monitoring
SERVOPACK status
Operating status
Safety function status
In operation
OFF
ON
Working safety function
OFF
ON
After limit violation
OFF
HWBB (STO) state
OFF

7.20.2 Operation during Limit Violation



7.20.3 Activation Method

(1) Parameter Settings

(a) For the FSoE Communications References and Digital I/O Model (SGDXS-OSAA1A)

The SDI-p function settings are configured in the following parameters.

The parameter numbers depend on the slot. Refer to the following section for details.

☞ *7.3.3 Parameters for Safety Function Slot Settings on page 140*

Parameter Name		Description	Remarks
Safety Function Configuration I			
	Safety Function Selection	Select "SDI-p."	–
Safety Function Configuration II			
	Terminal Port Selection for Safety Request Input Signal	Select from the following. • DIA to DIE • VI0 to VI15	When you select a digital input signal (DIA to DIE), confirm that the same input port is set to "Use" in the input signal setting parameter *1 as the input port selected in this parameter.
	Terminal Port Selection for Safety Data Input Signal	Select "Disabled" (default setting).	–
Safety Function Configuration III			
	Terminal Port Selection for EDM Signal	Select from the following. • Disabled • DOA to DOE (Redundant Outputs) • DOA1 to DOE2 (Single Output) • VO0 to VO15	• When you select "Disabled," select "Disabled" for EDM Signal Behavior below as well. • When you select a digital output signal (DOA to DOE or DOA1 to DOE2), confirm that the same output port is set to "Use" in the output signal setting parameter *2 as the output port selected in this parameter.
	EDM Signal Behavior	Select from the following. • Disabled • In Operation • Working Safety Function • After Limit Violation • HWBB (STO) State	–
Safety Function Configuration IV			
	Terminal Port Selection for Safe Output Signal	Select "Disabled" (default setting).	–

*1 Refer to the following section for details on the input signal setting parameters.
☞ 7.4.5 Settings for Digital Input Signals on page 144

*2 Refer to the following section for details on the output signal setting parameters.
☞ 7.5.5 Settings for Digital Output Signals on page 155

Parameter Name	Unit	Sign	Setting Range	Remarks
Monitoring Parameter				
Waiting Time (t1)	10 ms	No	0 to 10000	–
Monitoring Time (t2)	10 ms	No	0 to 10000	Not used. Set this parameter to the default setting.
Speed Limit (s1)	User speed reference unit	No	0 to 4294967295	Dual polarity
Speed Limit (s2)	User speed reference unit	No	0 to 4294967295	Not used. Set this parameter to the default setting.
Acceleration Limit (a1)	User acceleration reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p1)	User position reference unit	Yes	0 to 2147483647	–
Distance Limit (p2)	User position reference unit	Yes	-2147483648 to 2147483647	Not used. Set this parameter to the default setting.
Distance Limit (p3)	User position reference unit	No	0 to 4294967295	

(b) For the FSoE Communications References Model (SGDXS-OSAA0A)

The SDI-p function settings are configured in the following parameters.

The parameter numbers depend on the slot. Refer to the following section for details.

☞ *7.3.3 Parameters for Safety Function Slot Settings on page 140*

Parameter Name		Description	Remarks
Safety Function Configuration I			
	Safety Function Selection	Select "SDI-p."	–
Safety Function Configuration II			
	Terminal Port Selection for Safety Request Input Signal	Select from the following. • VI0 to VI15	–
	Terminal Port Selection for Safety Data Input Signal	Select "Disabled" (default setting).	–
Safety Function Configuration III			
	Terminal Port Selection for EDM Signal	Select from the following. • Disabled • VO0 to VO15	When you select "Disabled," select "Disabled" for EDM Signal Behavior below as well.
	EDM Signal Behavior	Select from the following. • Disabled • In Operation • Working Safety Function • After Limit Violation • HWBB (STO) State	–
Safety Function Configuration IV			
	Terminal Port Selection for Safe Output Signal	Select "Disabled" (default setting).	–

Parameter Name	Unit	Sign	Setting Range	Remarks
Monitoring Parameter				
Waiting Time (t1)	10 ms	No	0 to 10000	–
Monitoring Time (t2)	10 ms	No	0 to 10000	Not used. Set this parameter to the default setting.
Speed Limit (s1)	User speed reference unit	No	0 to 4294967295	Dual polarity
Speed Limit (s2)	User speed reference unit	No	0 to 4294967295	Not used. Set this parameter to the default setting.
Acceleration Limit (a1)	User acceleration reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p1)	User position reference unit	Yes	0 to 2147483647	–
Distance Limit (p2)	User position reference unit	Yes	-2147483648 to 2147483647	Not used. Set this parameter to the default setting.
Distance Limit (p3)	User position reference unit	No	0 to 4294967295	

(2) Signal Operation

Turn ON SRIS.

7.20.4 Returning to Normal Operation

(1) Signal Operation

Turn OFF SRIS.

(2) Conditions for Returning to Normal SERVOPACK Operation

After the monitoring error occurs and the SERVOPACK is set to the HWBB state, the conditions to return to normal operation are the same as those for the STO function.

Refer to the following section for details.

☞ *(2) Conditions for Returning to Normal SERVOPACK Operation on page 167*

7.21 SDI-n (Safe Direction, Negative Direction Forbidden)

7.21.1 Function Description

When the Safety Request Input Signal (SRIS) is turned ON, the SDI-n function monitors the direction of the servomotor after the Waiting Time (t1) has elapsed. The SDI-n function prohibits movement in the reverse direction and allows movement only in the forward direction.

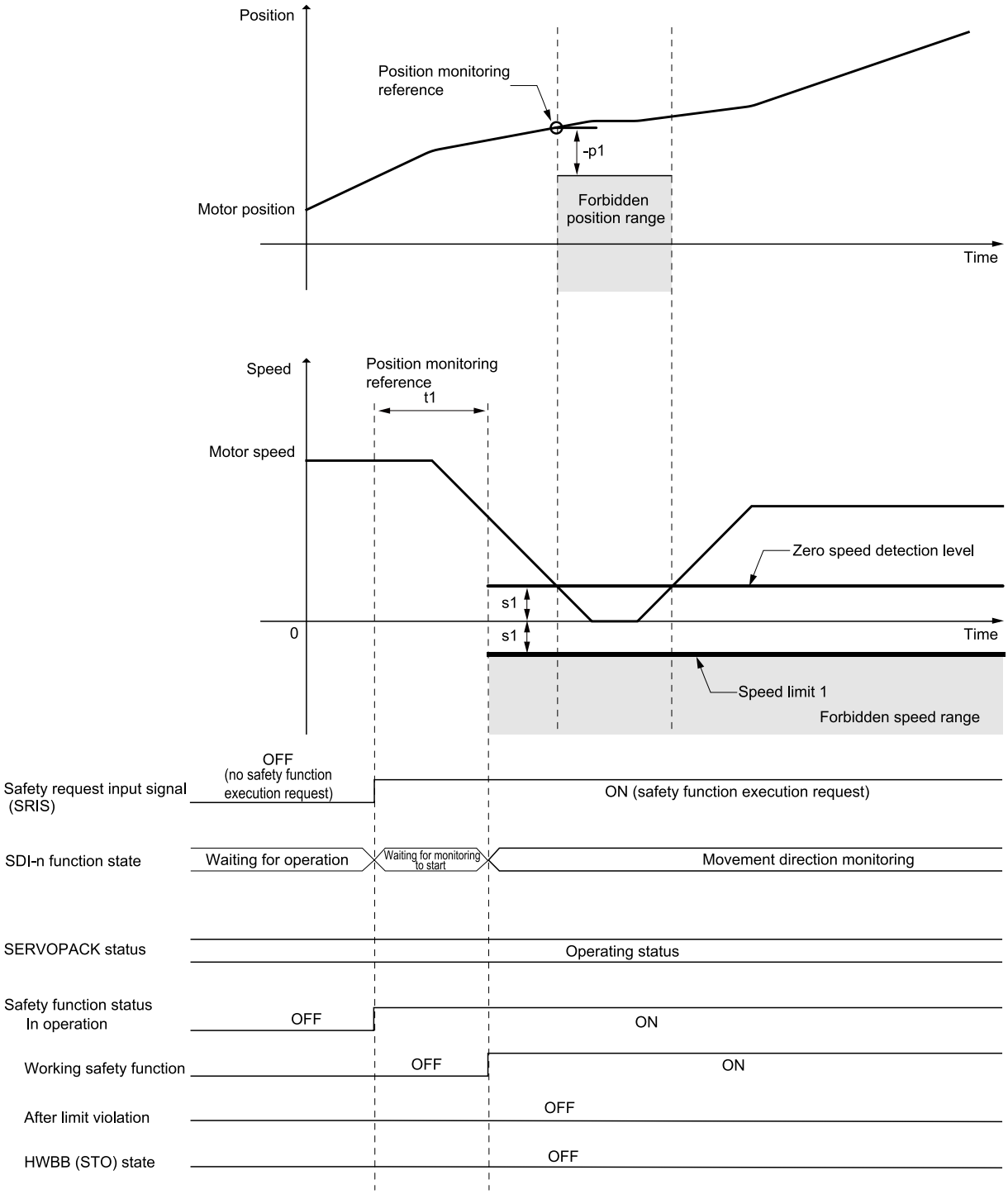
- If the servomotor speed exceeds the range of the speed limit (-s1), the function detects a limit violation.
- When -s1 ≤ motor speed ≤ s1, the function judges this as the servomotor stopped state, and it latches the servomotor's position. The function monitors movement direction by position using the latched position as the position monitoring reference, and it detects a limit violation when (motor position - position monitoring reference) becomes less than the range of the distance limit (-p1).

  Note:

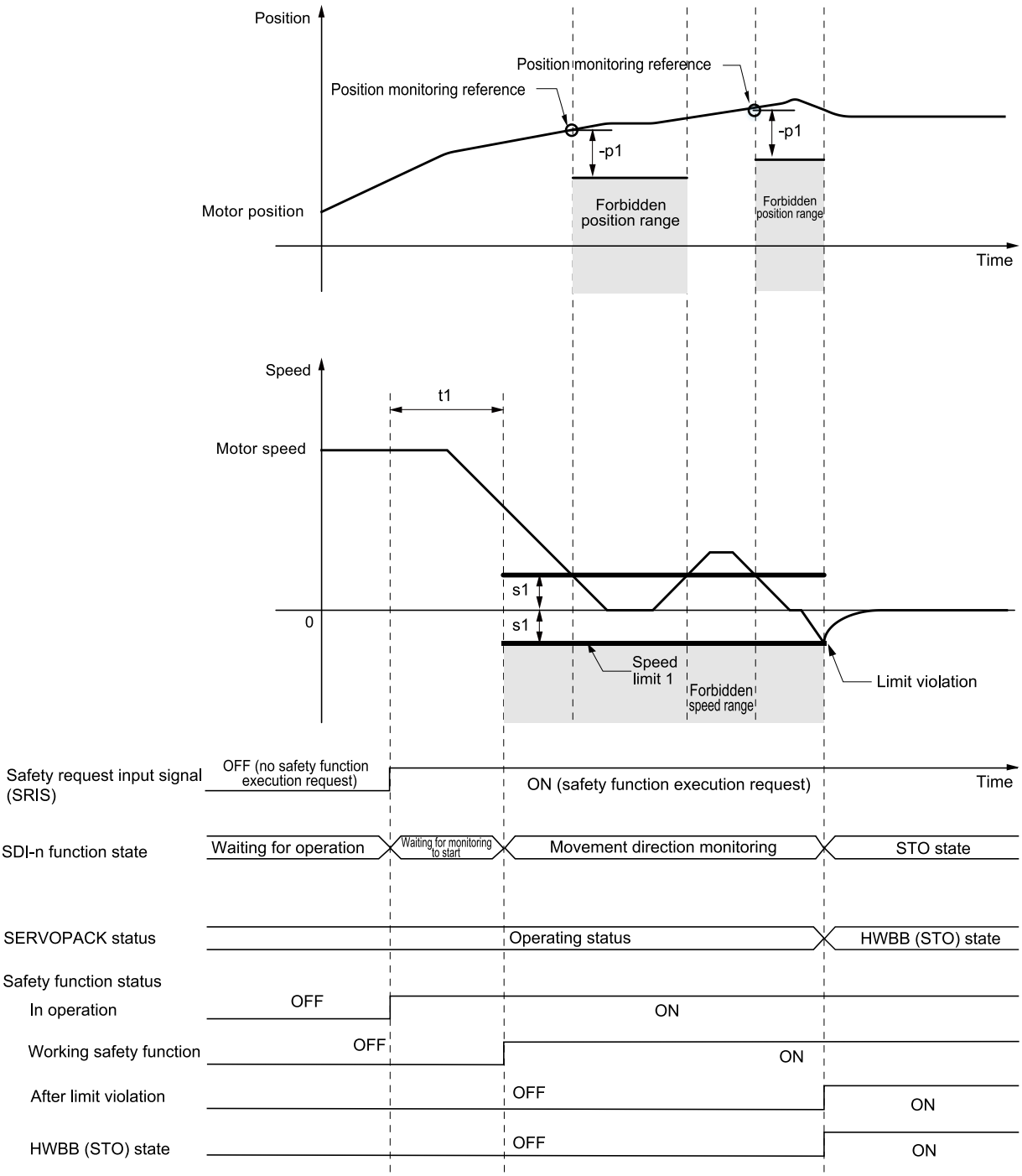
  Set p1 as a positive value.

If a limit violation occurs during monitoring, the STO function is activated to shut OFF the servomotor's torque.

Monitoring Conditions	Limit Violation Conditions	Remarks
t < t1	Not monitored	–
t ≥ t1	Motor speed > s1	Operation is possible
	Motor speed < -s1	Limit violation state
	Immediately after -s1 ≤ Motor speed ≤ s1	Motor position is latched **Note:** If this status occurs when this function is activated, the servomotor position at activation is latched.
	{ -s1 ≤ Motor speed ≤ s1 } && { (Motor position - Position monitoring reference) < -p1 }	Direction monitoring by position


Position
Position monitoring reference
-p1
Motor position
Forbidden position range
Time
Speed
Position monitoring reference
t1
Motor speed
Zero speed detection level
s1
0
s1
Time
Speed limit 1
Forbidden speed range
Safety request input signal (SRIS)
OFF (no safety function execution request)
ON (safety function execution request)
SDI-n function state
Waiting for operation
Waiting for monitoring to start
Movement direction monitoring
SERVOPACK status
Operating status
Safety function status In operation
OFF
ON
Working safety function
OFF
ON
After limit violation
OFF
HWBB (STO) state
OFF

7.21.2 Operation during Limit Violation



7.21.3 Activation Method

(1) Parameter Settings

(a) For the FSoE Communications References and Digital I/O Model (SGDXS-OSAA1A)

The SDI-n function settings are configured in the following parameters.

The parameter numbers depend on the slot. Refer to the following section for details.

☞ *7.3.3 Parameters for Safety Function Slot Settings on page 140*

Parameter Name		Description	Remarks
Safety Function Configuration I			
	Safety Function Selection	Select "SDI-n."	–
Safety Function Configuration II			
	Terminal Port Selection for Safety Request Input Signal	Select from the following. • DIA to DIE • VI0 to VI15	When you select a digital input signal (DIA to DIE), confirm that the same input port is set to "Use" in the input signal setting parameter *1 as the input port selected in this parameter.
	Terminal Port Selection for Safety Data Input Signal	Select "Disabled" (default setting).	–
Safety Function Configuration III			
	Terminal Port Selection for EDM Signal	Select from the following. • Disabled • DOA to DOE (Redundant Outputs) • DOA1 to DOE2 (Single Output) • VO0 to VO15	• When you select "Disabled," select "Disabled" for EDM Signal Behavior below as well. • When you select a digital output signal (DOA to DOE or DOA1 to DOE2), confirm that the same output port is set to "Use" in the output signal setting parameter *2 as the output port selected in this parameter.
	EDM Signal Behavior	Select from the following. • Disabled • In Operation • Working Safety Function • After Limit Violation • HWBB (STO) State	–
Safety Function Configuration IV			
	Terminal Port Selection for Safe Output Signal	Select "Disabled" (default setting).	–

*1 Refer to the following section for details on the input signal setting parameters.
☞ 7.4.5 Settings for Digital Input Signals on page 144

*2 Refer to the following section for details on the output signal setting parameters.
☞ 7.5.5 Settings for Digital Output Signals on page 155

Parameter Name	Unit	Sign	Setting Range	Remarks
Monitoring Parameter				
Waiting Time (t1)	10 ms	No	0 to 10000	–
Monitoring Time (t2)	10 ms	No	0 to 10000	Not used. Set this parameter to the default setting.
Speed Limit (s1)	User speed reference unit	No	0 to 4294967295	Dual polarity
Speed Limit (s2)	User speed reference unit	No	0 to 4294967295	Not used. Set this parameter to the default setting.
Acceleration Limit (a1)	User acceleration reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p1)	User position reference unit	Yes	0 to 2147483647	–
Distance Limit (p2)	User position reference unit	Yes	-2147483648 to 2147483647	Not used. Set this parameter to the default setting.
Distance Limit (p3)	User position reference unit	No	0 to 4294967295	

(b) For the FSoE Communications References Model (SGDXS-OSAA0A)

The SDI-n function settings are configured in the following parameters.

The parameter numbers depend on the slot. Refer to the following section for details.

☞ *7.3.3 Parameters for Safety Function Slot Settings on page 140*

Parameter Name		Description	Remarks
Safety Function Configuration I			
	Safety Function Selection	Select "SDI-n."	–
Safety Function Configuration II			
	Terminal Port Selection for Safety Request Input Signal	Select from the following. • VI0 to VI15	–
	Terminal Port Selection for Safety Data Input Signal	Select "Disabled" (default setting).	–
Safety Function Configuration III			
	Terminal Port Selection for EDM Signal	Select from the following. • Disabled • VO0 to VO15	When you select "Disabled," select "Disabled" for EDM Signal Behavior below as well.
	EDM Signal Behavior	Select from the following. • Disabled • In Operation • Working Safety Function • After Limit Violation • HWBB (STO) State	–
Safety Function Configuration IV			
	Terminal Port Selection for Safe Output Signal	Select "Disabled" (default setting).	–

Parameter Name	Unit	Sign	Setting Range	Remarks
Monitoring Parameter				
Waiting Time (t1)	10 ms	No	0 to 10000	–
Monitoring Time (t2)	10 ms	No	0 to 10000	Not used. Set this parameter to the default setting.
Speed Limit (s1)	User speed reference unit	No	0 to 4294967295	Dual polarity
Speed Limit (s2)	User speed reference unit	No	0 to 4294967295	Not used. Set this parameter to the default setting.
Acceleration Limit (a1)	User acceleration reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p1)	User position reference unit	Yes	0 to 2147483647	–
Distance Limit (p2)	User position reference unit	Yes	-2147483648 to 2147483647	Not used. Set this parameter to the default setting.
Distance Limit (p3)	User position reference unit	No	0 to 4294967295	

(2) Signal Operation

Turn ON SRIS.

7.21.4 Returning to Normal Operation

(1) Signal Operation

Turn OFF SRIS.

(2) Conditions for Returning to Normal SERVOPACK Operation

After the monitoring error occurs and the SERVOPACK is set to the HWBB state, the conditions to return to normal operation are the same as those for the STO function.

Refer to the following section for details.

☞ *(2) Conditions for Returning to Normal SERVOPACK Operation on page 167*

7.22 SCA (Safe CAM)

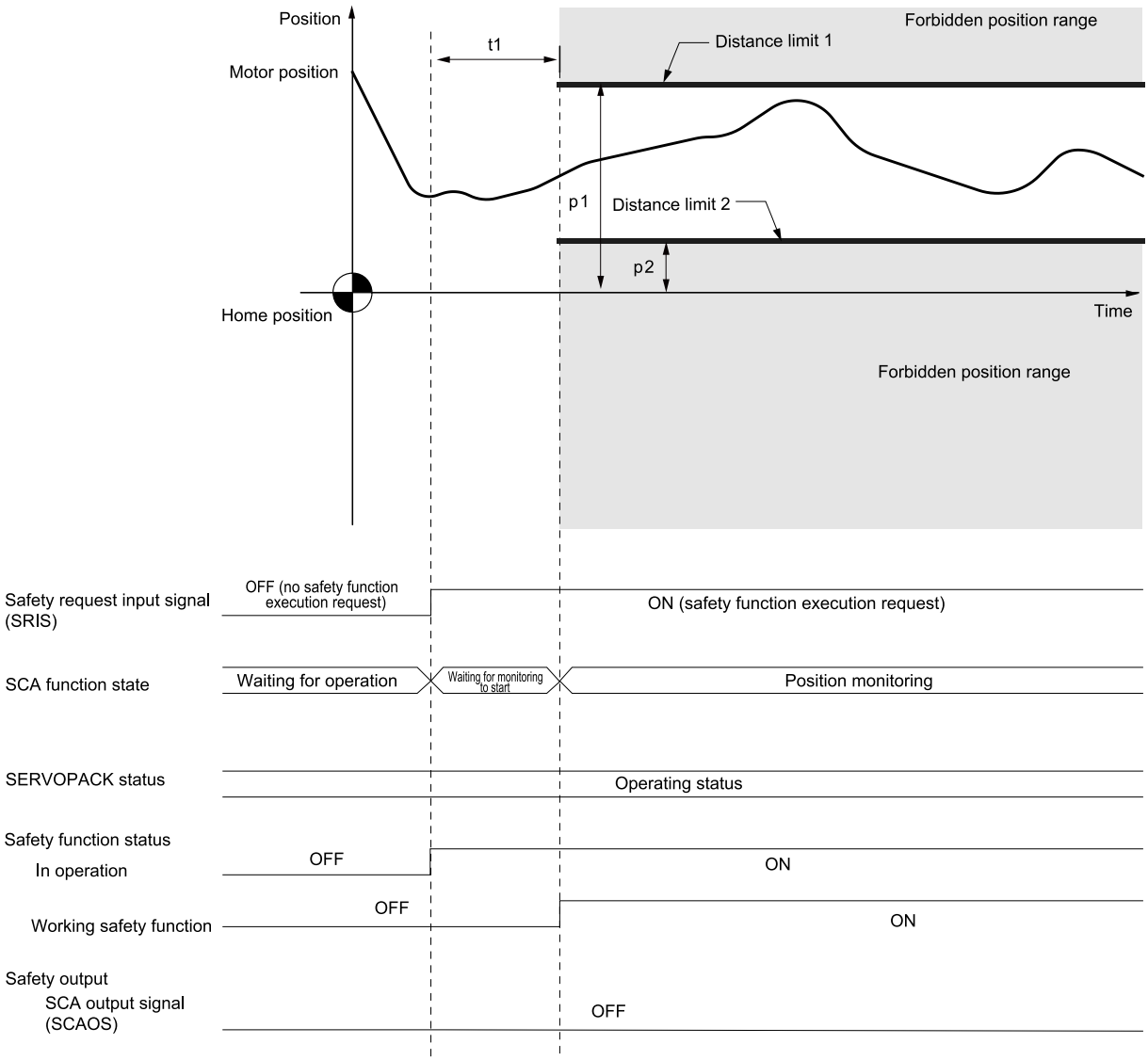
7.22.1 Function Description

When the Safety Request Input Signal (SRIS) is turned ON, the SCA function monitors the position of the servomotor after the Waiting Time (t1) has elapsed. Position monitoring is performed based on the safe home position set with the SHP function. This means that to use the SCA function, you must use the SHP function to set the safe home position. Refer to the following section for details on setting the safe home position.

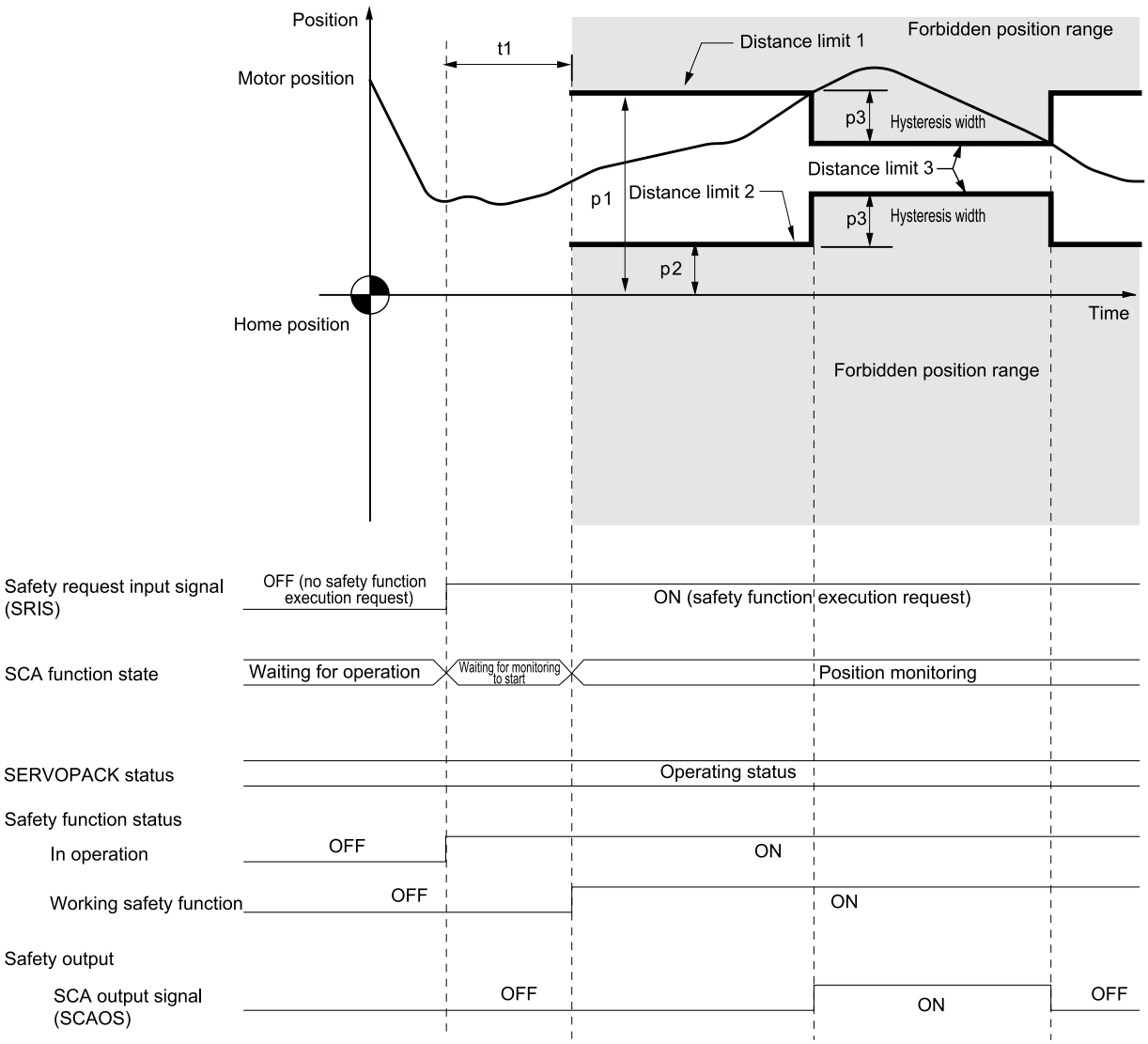
☞ *7.23 SHP (Safe Home Position) on page 256*

This function monitors whether the position of the servomotor is within the range of the distance limits (p1 and p2). The STO function is not activated even if a limit violation occurs. If a limit violation occurs, the function continues monitoring by narrowing the range to monitor to p1 – p3 and p2 + p3. When the servomotor position enters the range of p3, the function continues monitoring by restoring the distance limits to p1 and p2.

Monitoring Conditions	Monitoring Status	Limit Violation Conditions	Remarks
t < t1	–	Not monitored	–
t ≥ t1	Before limit violation	(Motor position - Safe home position) > p1 or (Motor position - Safe home position) < p2	Position monitoring **Note:** If the condition to the left is satisfied, the SCA output signal (SCAOS) is turned ON and the monitoring status changes to "After limit violation."
	After limit violation	(Motor position - Safe home position) ≤ (p1 - p3) and (Motor position - Safe home position) ≥ (p2 + p3)	Position monitoring **Note:** If the condition to the left is satisfied, the SCA output signal (SCAOS) is turned OFF and the monitoring status changes to "Before limit violation."


Position
t1
Forbidden position range
Distance limit 1
Motor position
p1
Distance limit 2
p2
Home position
Time
Forbidden position range
Safety request input signal (SRIS)
OFF (no safety function execution request)
ON (safety function execution request)
SCA function state
Waiting for operation
Waiting for monitoring to start
Position monitoring
SERVOPACK status
Operating status
Safety function status
In operation
OFF
ON
Working safety function
OFF
ON
Safety output
SCA output signal (SCAOS)
OFF

7.22.2 Operation during Limit Violation



7.22.3 Activation Method

(1) Parameter Settings

(a) For the FSoE Communications References and Digital I/O Model (SGDXS-OSAA1A)

The SCA function settings are configured in the following parameters.

The parameter numbers depend on the slot. Refer to the following section for details.

☞ *7.3.3 Parameters for Safety Function Slot Settings on page 140*

Parameter Name		Description	Remarks
Safety Function Configuration I			
	Safety Function Selection	Select "SCA."	–
Safety Function Configuration II			

Continued on next page.

Continued from previous page.

Parameter Name		Description	Remarks
	Terminal Port Selection for Safety Request Input Signal	Select from the following. • DIA to DIE • VI0 to VI15	When you select a digital input signal (DIA to DIE), confirm that the same input port is set to "Use" in the input signal setting parameter *1 as the input port selected in this parameter.
	Terminal Port Selection for Safety Data Input Signal	Select "Disabled" (default setting).	–
Safety Function Configuration III			
	Terminal Port Selection for EDM Signal	Select from the following. • Disabled • DOA to DOE (Redundant Outputs) • DOA1 to DOE2 (Single Output) • VO0 to VO15	• When you select "Disabled," select "Disabled" for EDM Signal Behavior below as well. • When you select a digital output signal (DOA to DOE or DOA1 to DOE2), confirm that the same output port is set to "Use" in the output signal setting parameter *2 as the output port selected in this parameter.
	EDM Signal Behavior	Select from the following. • Disabled • In Operation • Working Safety Function	–
Safety Function Configuration IV			
	Terminal Port Selection for Safe Output Signal	Select from the following. • DOA to DOE (Redundant Outputs) • VO0 to VO15	–

*1 Refer to the following section for details on the input signal setting parameters.
☞ 7.4.5 Settings for Digital Input Signals on page 144

*2 Refer to the following section for details on the output signal setting parameters.
☞ 7.5.5 Settings for Digital Output Signals on page 155

Parameter Name	Unit	Sign	Setting Range	Remarks
Monitoring Parameter				
Waiting Time (t1)	10 ms	No	0 to 10000	–
Monitoring Time (t2)	10 ms	No	0 to 10000	Not used. Set this parameter to the default setting.
Speed Limit (s1)	User speed reference unit	No	0 to 4294967295	
Speed Limit (s2)	User speed reference unit	No	0 to 4294967295	
Acceleration Limit (a1)	User acceleration reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p1)	User position reference unit	Yes	-2147483648 to 2147483647	Set the parameter as shown below. • p1 > p2 • p3 < ((p1-p2)/2) If a value is set other than the above, alarm A.EB2 (Parameter Setting Error) will occur.
Distance Limit (p2)	User position reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p3)	User position reference unit	No	0 to 4294967295	

(b) For the FSoE Communications References Model (SGDXS-OSAA0A)

The SCA function settings are configured in the following parameters.

The parameter numbers depend on the slot. Refer to the following section for details.

☞ 7.3.3 Parameters for Safety Function Slot Settings on page 140

Parameter Name		Description	Remarks
Safety Function Configuration I			
	Safety Function Selection	Select "SCA."	–
Safety Function Configuration II			
	Terminal Port Selection for Safety Request Input Signal	Select from the following. • VI0 to VI15	–
	Terminal Port Selection for Safety Data Input Signal	Select "Disabled" (default setting).	–
Safety Function Configuration III			
	Terminal Port Selection for EDM Signal	Select from the following. • Disabled • VO0 to VO15	When you select "Disabled," select "Disabled" for EDM Signal Behavior below as well.
	EDM Signal Behavior	Select from the following. • Disabled • In Operation • Working Safety Function	–
Safety Function Configuration IV			
	Terminal Port Selection for Safe Output Signal	Select from the following. • DOA to DOE (Redundant Outputs) • VO0 to VO15	–

Parameter Name	Unit	Sign	Setting Range	Remarks
Monitoring Parameter				
Waiting Time (t1)	10 ms	No	0 to 10000	–
Monitoring Time (t2)	10 ms	No	0 to 10000	Not used. Set this parameter to the default setting.
Speed Limit (s1)	User speed reference unit	No	0 to 4294967295	
Speed Limit (s2)	User speed reference unit	No	0 to 4294967295	
Acceleration Limit (a1)	User acceleration reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p1)	User position reference unit	Yes	-2147483648 to 2147483647	Set the parameter as shown below. • p1 > p2 • p3 < ((p1-p2)/2) If a value is set other than the above, alarm A.EB2 (Parameter Setting Error) will occur.
Distance Limit (p2)	User position reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p3)	User position reference unit	No	0 to 4294967295	

(2) Signal Operation

Turn ON SRIS.

7.22.4 Returning to Normal Operation

(1) Signal Operation

Turn OFF SRIS.

(2) Conditions for Returning to Normal SERVOPACK Operation

After the monitoring error occurs and the SERVOPACK is set to the HWBB state, the conditions to return to normal operation are the same as those for the STO function.

Refer to the following section for details.

☞ *(2) Conditions for Returning to Normal SERVOPACK Operation on page 167*

7.23 SHP (Safe Home Position)

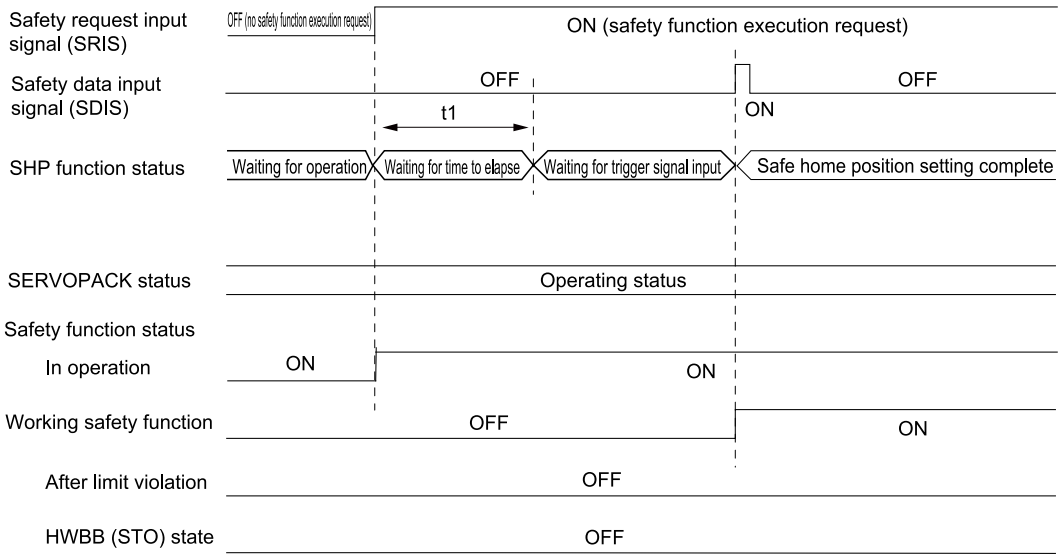
7.23.1 Function Description

The SHP function sets the safe home position for the distance limits used for executing the SLP and SCA functions. The SLP and SCA functions monitor the position of the servomotor based on the safe home position set with the SHP function.

After the Safety Request Input Signal (SRIS) is turned ON and the SHP function is set to the running state, that motor position is latched when the Safety Data Input Signal (SDIS) is turned ON, and that position is registered as the safe home position.

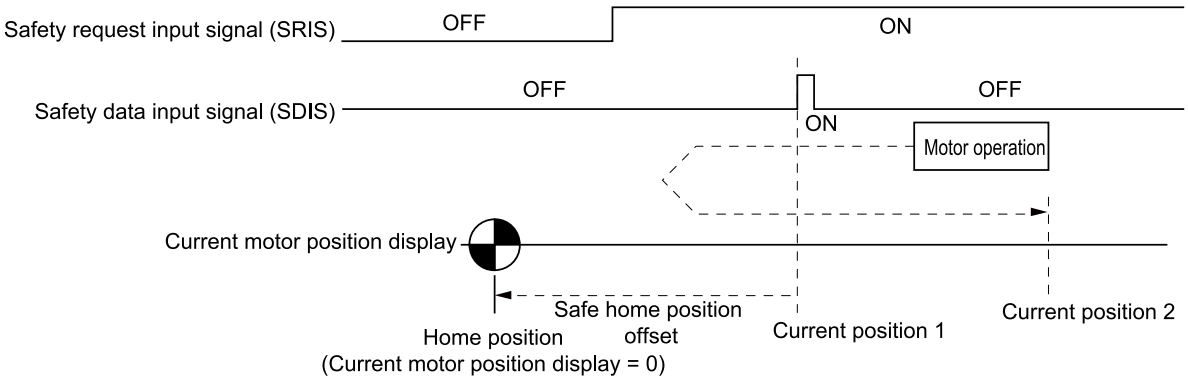
For the device to connect to SDIS (e.g., safety limit switch), select a device with a safety level suited to the system performance level.

The limit violation state and HWBB (STO) state will always be OFF because the SHP function is not a monitor function.



(1) Displaying the Current Motor Position After Executing SHP

The display of the current motor position with the SHP function varies as shown below.



Safe Home Position = Current Position 1 + Safe Home Position Offset

- Current position 1: Position when SDIS was turned ON
  Current position 1 depends on the usage of the encoder.
  - When using the encoder as an incremental encoder: A relative position from the power ON position
  - When using the encoder as an absolute encoder: A position from the encoder's origin

Current Motor Position Display = Current Position 2 - Safe Home Position

- Current motor position: The position compared to the monitoring position with the SLP and SCA functions

- Current position 2: Any motor position after SHP was executed
- Safe home position offset: Setting in Pc160

(2) Execution Conditions

(a) When Using an Absolute Encoder

When Pc068 = n.□□□1 (absolute encoder) and Pc068 = n.1□□□ (Use encoder as an absolute encoder) are set, the safe home position is saved in nonvolatile memory when it is set. Then the safe home position does not need to be set after the power is turned ON.

Diagnosing the Absolute Position

Alarm A.E2A (Safety Module - Absolute Encoder Error) will occur if the difference in the absolute encoder's home position exceeds ±1 rotation when the power is turned ON after the safe home position was set. Refer to the following section for the recovery procedure when this alarm occurs.

☞ *7.23.4 Recovering from Alarm A.E2A on page 261*

Note:

The accuracy for diagnosing the absolute position is ±1 rotation. If the error is within 1 rotation, the failure will not be detected. Make the system able to tolerate an error within 1 rotation or regularly check if the position is correct.

The motor position before power OFF is saved in the following cases:

- When the main circuit power is turned OFF
- When the servo is turned OFF


Important

If there is a possibility that the motor may move when the main circuit and servo are OFF, take measures (e.g., using a holding brake on the equipment) to prevent alarm A.E2A from being detected by mistake.

(b) When Using an Incremental Encoder

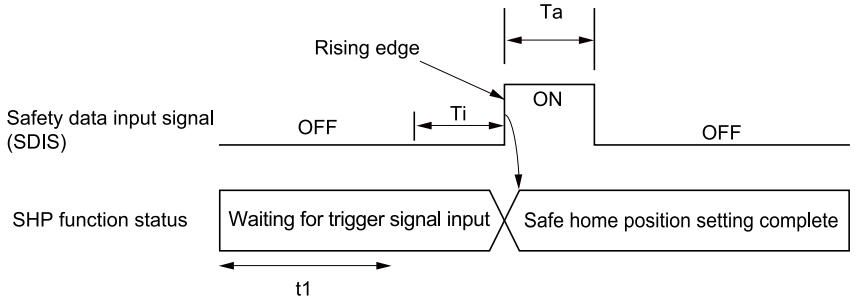
When Pc068 = n.□□□0 (incremental encoder) and Pc068 = n.□0□□ (Use encoder as an incremental encoder) are set, the safe home position is not saved in nonvolatile memory when it is set. The safe home position must be set each time the power is turned ON.

(3) Specifications of SDIS

SDIS is used as the trigger in the SHP function to set the safe home position.

Note the following two precautions when using SDIS.

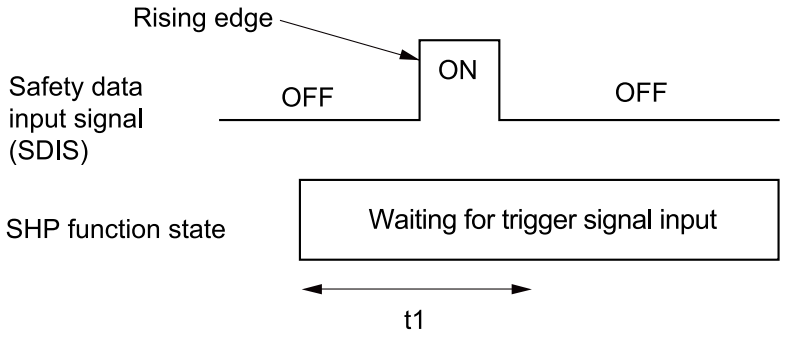
- The safe home position is set on the rising edge of SDIS.



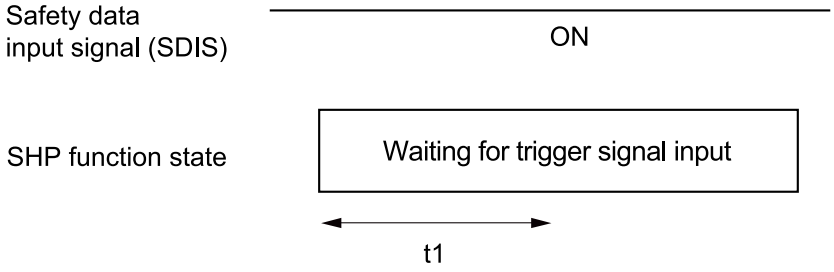
Refer to the following section for the specifications of Ti and Ta.

☞ *(3) Specifications of SDIS on page 232*

- Switch SDIS from OFF to ON after the Waiting Time (t1) has elapsed.
  In cases such as the following, SDIS will not be recognized and the safe home position will not be set.
  - When SDIS is switched from OFF to ON before the Waiting Time (t1) has elapsed



– When SDIS is always ON

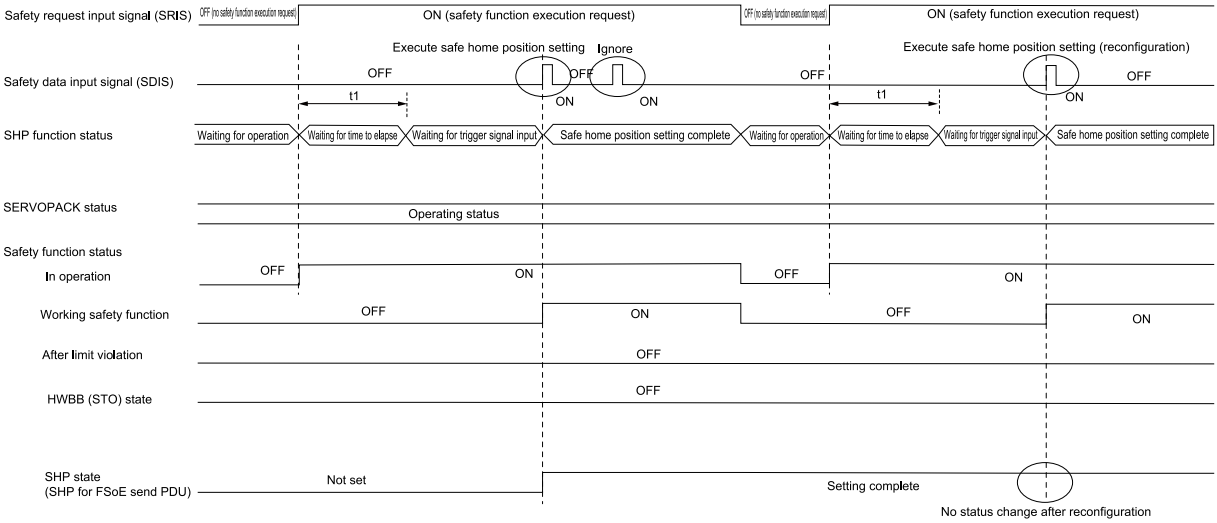


(4) Limitations in Setting the Safe Home Position

After the SHP function is activated, the safe home position can be set once only when SDIS is switched from OFF to ON.

If the safe home position is already set, the safe home position can be set again by executing the SHP function.

However, the SHP status in the FSoE send PDU will not change when the home position is set again.



(5) Related Monitoring

Monitor Item	Monitor Output Destination		
	SigmaWin+	EtherCAT	FSoE
Safe State (SHP)	Safe State (SHP) • 0: SHP not set • 1: SHP completed normally	Object 0x5A0B.10 SHP status • 0: SHP was not completed • 1: SHP was completed normally	FSoE Send PDU SHP status • 0: SHP was not completed • 1: SHP was completed normally
Safe Home Position	Displays the safe home position data	Object 0x5A0B.11 SHP Encoder Position	-

7.23.2 Activation Method

(1) Parameter Settings

(a) For the FSoE Communications References and Digital I/O Model (SGDXS-OSAA1A)

The SHP function settings are configured in the following parameters.

The parameter numbers depend on the slot. Refer to the following section for details.

☞ *7.3.3 Parameters for Safety Function Slot Settings on page 140*

Parameter Name		Description	Remarks
Safety Function Configuration I			
	Safety Function Selection	Select "SHP."	–
Safety Function Configuration II			
	Terminal Port Selection for Safety Request Input Signal	Select from the following. • DIA to DIE • VI0 to VI15	When you select a digital input signal (DIA to DIE), confirm that the same input port is set to "Use" in the input signal setting parameter *1 as the input port selected in this parameter.
	Terminal Port Selection for Safety Data Input Signal	Select from the following. • DIA to DIE • VI0 to VI15	
Safety Function Configuration III			
	Terminal Port Selection for EDM Signal	Select from the following. • Disabled • DOA to DOE (Redundant Outputs) • DOA1 to DOE2 (Single Output) • VO0 to VO15	• When you select "Disabled," select "Disabled" for EDM Signal Behavior below as well. • When you select a digital output signal (DOA to DOE or DOA1 to DOE2), confirm that the same output port is set to "Use" in the output signal setting parameter *2 as the output port selected in this parameter.
	EDM Signal Behavior	Select from the following. • Disabled • In Operation • Working Safety Function • After Limit Violation • HWBB (STO) State	–
Safety Function Configuration IV			
	Terminal Port Selection for Safe Output Signal	Select "Disabled" (default setting).	–

*1 Refer to the following section for details on the input signal setting parameters.
☞ *7.4.5 Settings for Digital Input Signals on page 144*

*2 Refer to the following section for details on the output signal setting parameters.
☞ *7.5.5 Settings for Digital Output Signals on page 155*

Parameter Name	Unit	Sign	Setting Range	Remarks
Monitoring Parameter				
Waiting Time (t1)	10 ms	No	5 to 10000	–

Continued on next page.

Continued from previous page.

Parameter Name	Unit	Sign	Setting Range	Remarks
Monitoring Time (t2)	10 ms	No	0 to 10000	Not used. Set this parameter to the default setting.
Speed Limit (s1)	User speed reference unit	No	0 to 4294967295	
Speed Limit (s2)	User speed reference unit	No	0 to 4294967295	
Acceleration Limit (a1)	User acceleration reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p1)	User position reference unit	Yes	0 to 2147483647	
Distance Limit (p2)	User position reference unit	Yes	0 to 2147483647	
Distance Limit (p3)	User position reference unit	No	0 to 4294967295	

Related Parameters

Pc No.	Name	Unit	Setting Range	Default Setting
Pc160	Safe Home Position Offset	User position reference unit	-1073741823 to 1073741823	0

(b) For the FSoE Communications References Model (SGDXS-OSAA0A)

The SHP function settings are configured in the following parameters.

The parameter numbers depend on the slot. Refer to the following section for details.

☞ *7.3.3 Parameters for Safety Function Slot Settings on page 140*

Parameter Name		Description	Remarks
Safety Function Configuration I			
	Safety Function Selection	Select "SHP."	–
Safety Function Configuration II			
	Terminal Port Selection for Safety Request Input Signal	Select from the following. • VI0 to VI15	–
	Terminal Port Selection for Safety Data Input Signal	Select from the following. • VI0 to VI15	–
Safety Function Configuration III			
	Terminal Port Selection for EDM Signal	Select from the following. • Disabled • VO0 to VO15	When you select "Disabled," select "Disabled" for EDM Signal Behavior below as well.
	EDM Signal Behavior	Select from the following. • Disabled • In Operation • Working Safety Function • After Limit Violation • HWBB (STO) State	–
Safety Function Configuration IV			
	Terminal Port Selection for Safe Output Signal	Select "Disabled" (default setting).	–

Parameter Name	Unit	Sign	Setting Range	Remarks
Monitoring Parameter				
Waiting Time (t1)	10 ms	No	5 to 10000	–

Continued on next page.

Continued from previous page.

Parameter Name	Unit	Sign	Setting Range	Remarks
Monitoring Time (t2)	10 ms	No	0 to 10000	Not used. Set this parameter to the default setting.
Speed Limit (s1)	User speed reference unit	No	0 to 4294967295	
Speed Limit (s2)	User speed reference unit	No	0 to 4294967295	
Acceleration Limit (a1)	User acceleration reference unit	Yes	-2147483648 to 2147483647	
Distance Limit (p1)	User position reference unit	Yes	0 to 2147483647	
Distance Limit (p2)	User position reference unit	Yes	0 to 2147483647	
Distance Limit (p3)	User position reference unit	No	0 to 4294967295	

Related Parameters

Pc No.	Name	Unit	Setting Range	Default Setting
Pc160	Safe Home Position Offset	User position reference unit	-1073741823 to 1073741823	0

(2) Signal Operation

Turn ON SRIS.

Refer to the following section for the SDIS input conditions.

☞ *(3) Specifications of SDIS on page 257*

7.23.3 Returning to Normal Operation

(1) Signal Operation

Turn OFF SRIS.

7.23.4 Recovering from Alarm A.E2A

If alarm A.E2A (Safety Module - Absolute Encoder Error) occurs, the following are two possible causes.

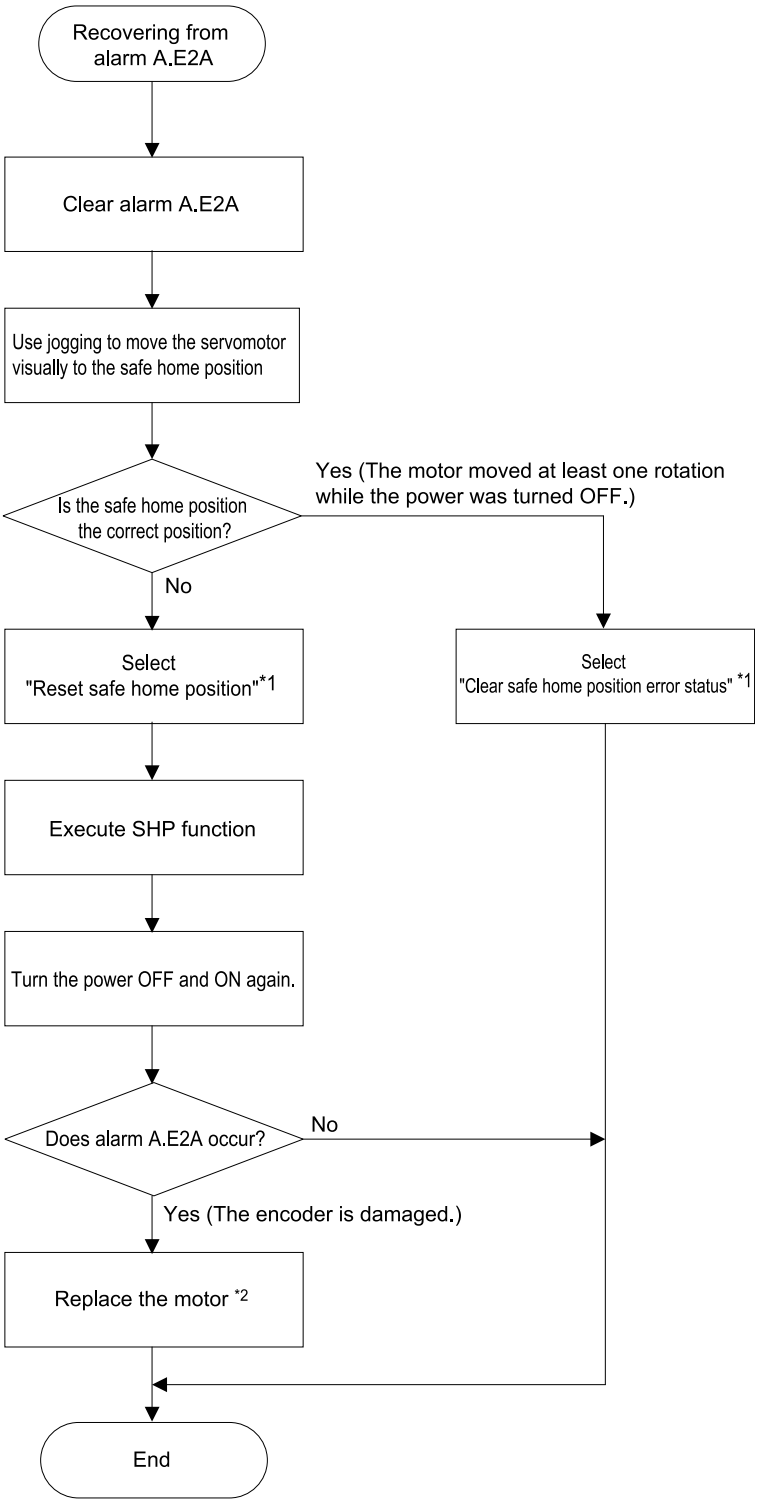
- The encoder failed.
- The motor moved more than ±1 rotation while the power was OFF.

You can clear this alarm with the reset alarm operation, but the safe home position error status is held in the ASM-X because the user must determine the cause of the alarm. To clear this information, perform the following operations in the SigmaWin+.

Note:

If alarm A.8□0 (alarms related to the encoder such as A.820) occurs at the same time, correct alarm A.8□0 before you reset alarm A.E2A. Correct alarm A.8□0 as described below.

- Turn the power OFF and ON again.
- If the alarm still occurs, refer to the manual for the SERVOPACK and perform troubleshooting for the corresponding alarm code. (When setting up (i.e., initializing) the absolute encoder, the safe home position must be set again with the SHP function.)



*1 Select this on the [Safety Functions Menu] - [Reset Safety Monitoring Home Position] window in the SigmaWin+.
*2 After a motor is replaced, set up the SERVOPACK and execute the ASM-X's SHP function again.

Note:

The SLP, SCA, and SHP functions cannot be used while the safe home position in the ASM-X has an error. If the alarm A.E2A occurs, make sure to perform the recovery operations described above.

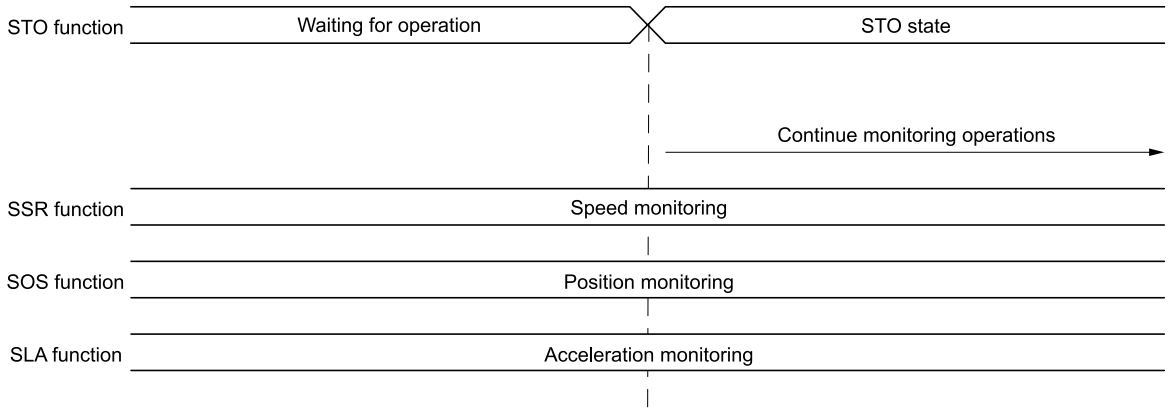
7.24 Safety Function Priority

7.24.1 Relationship between Safety Functions in the ASM-X

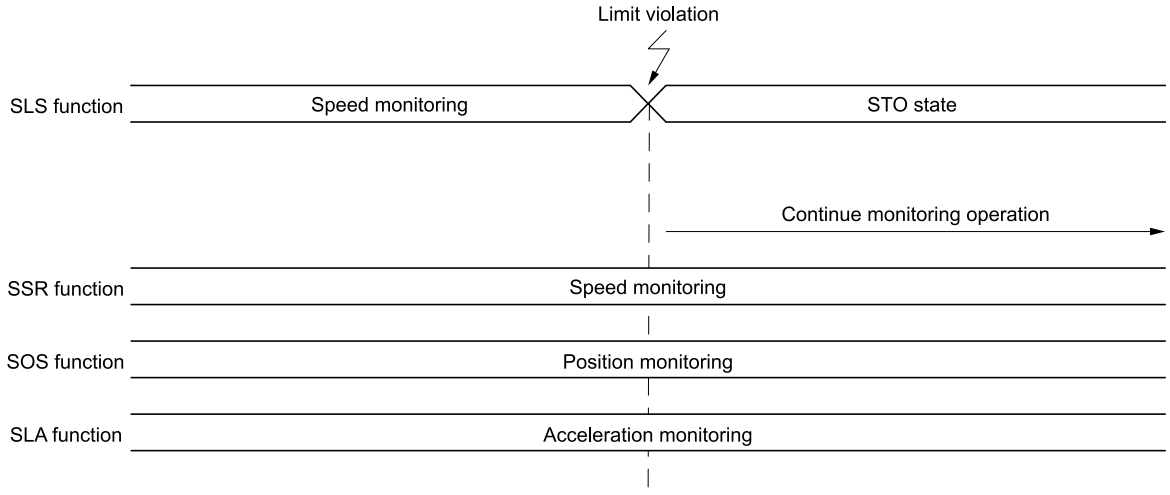
(1) Effect of the STO State on Other Safety Functions

If two or more ASM-X safety functions are being executed at the same time, and one of the safety functions sets the STO state, the other safety functions will continue operation.

- Example 1: When the STO function is activated during simultaneous execution of the SSR, SOS, and SLA functions
  The other safety functions continue monitoring operations even when the STO function is activated and the STO state has occurred.



- Example 2: When a limit violation occurs in the SLS function during simultaneous execution of the SLS, SSR, SOS, and SLA functions
  The SLS function sets the STO state due to the limit violation, but the other safety functions continue monitoring operations.



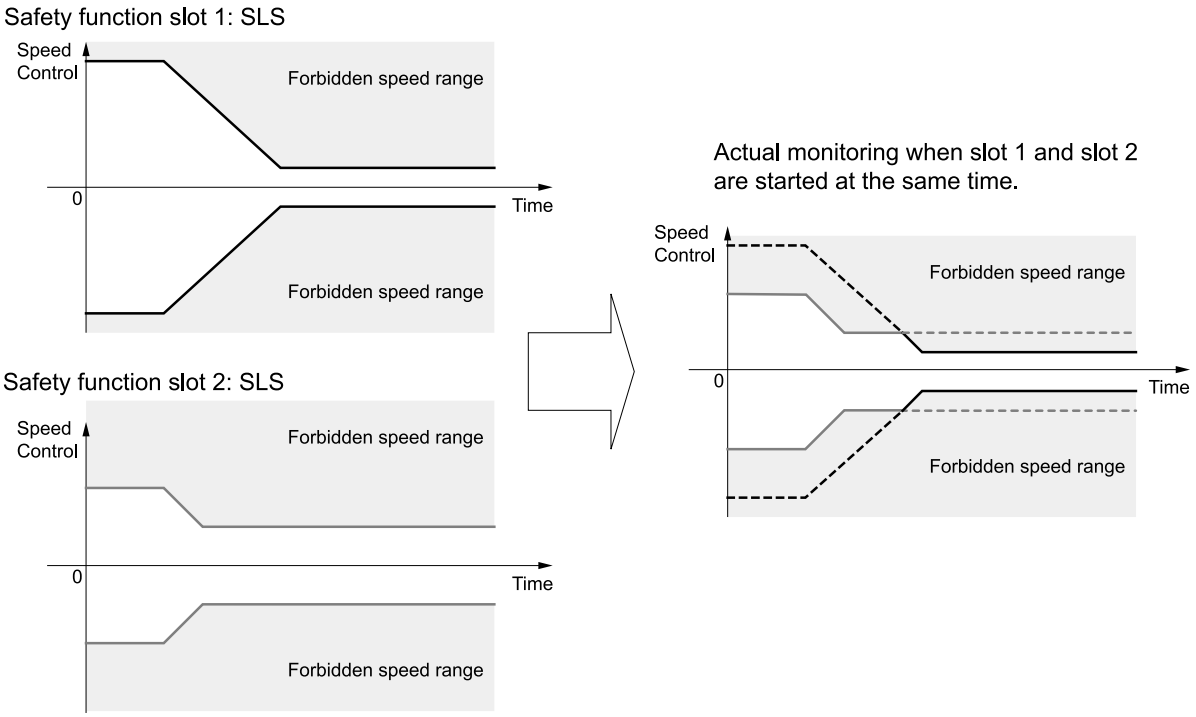
(2) Independence of Speed Monitoring

Even when multiple safety functions that monitor speed are executed at the same time, each safety function operates independently to monitor speed.

Example: When two SLS functions are activated at the same time and the SLS function with a lower speed monitoring value detected a limit violation

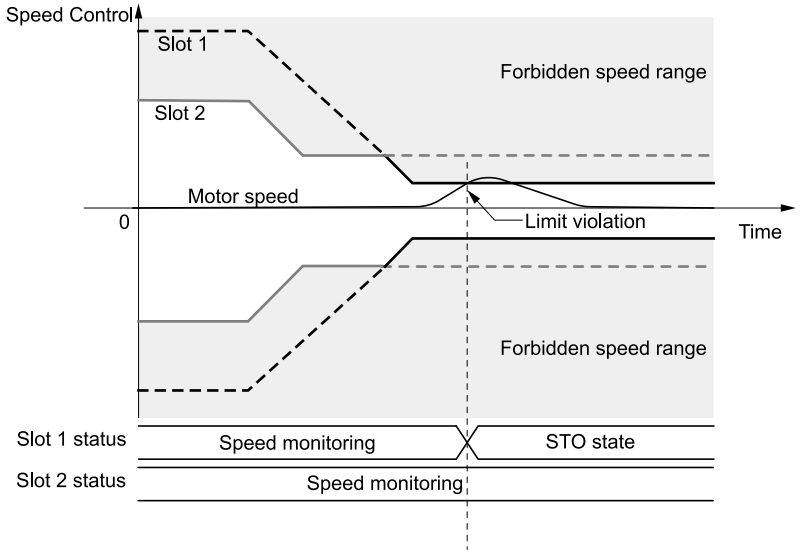
The SLS function in which the motor speed did not exceed its speed monitoring value continues to monitor speed.

- SLS Settings



- Operation

When the motor speed exceeds the speed limit value of slot 1.



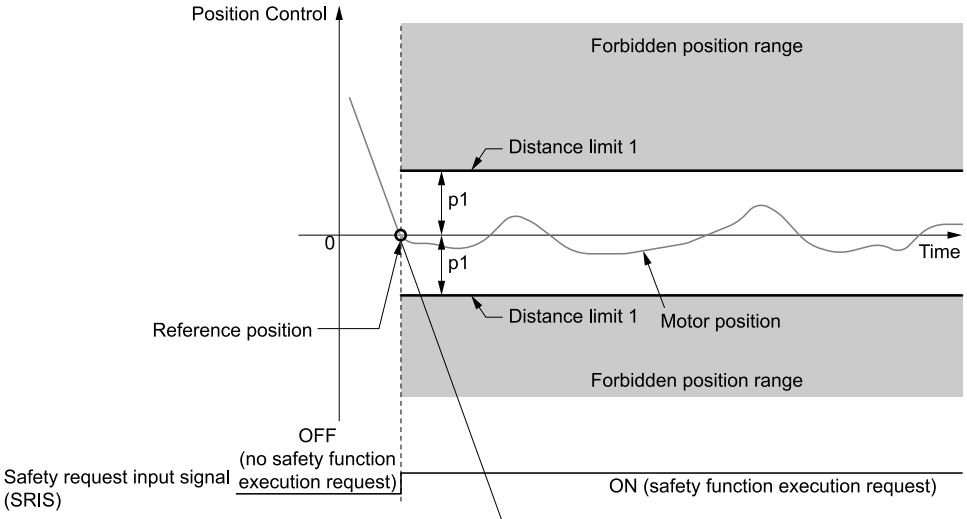
(3) Shared Operation of the Position Monitoring Reference Position in the SOS Function

When multiple SOS functions are executed at the same time, the reference position obtained in position monitoring of the first SOS function is also used by SOS functions executed afterward. The multiple SOS functions monitor the position with respect to the same reference position. When SRIS for all SOS functions is turned OFF and operation is stopped, the shared reference position is discarded.

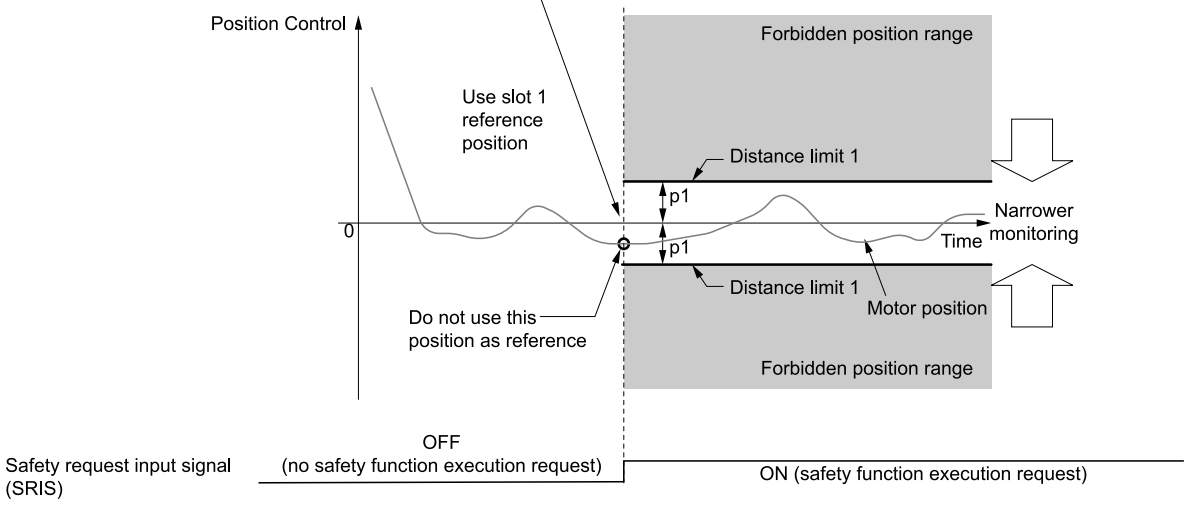
However, other safety functions that perform position monitoring (SS2-t and SS2-r) are position monitoring functions that involve motion, so they do not share a reference position.

Example: When two SOS functions are activated, slot 1 first and then slot 2, and monitoring is performed with respect to the same reference position

Safety function slot 1: SOS



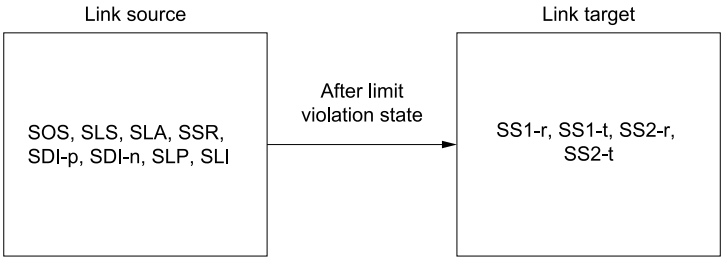
Safety function slot 2: SOS



7.24.2 Coordinated Operation of Safety Functions

Normally, when a limit violation is detected during monitoring operation of a safety function, the STO state is set immediately. However, coordinated operation of safety functions can be achieved by setting the limit violation state as an activation condition for another safety function.

In this operation, the source safety function slot will not execute the STO function when a limit violation occurs. Instead, the target safety function slot will continue execution of its safety function.

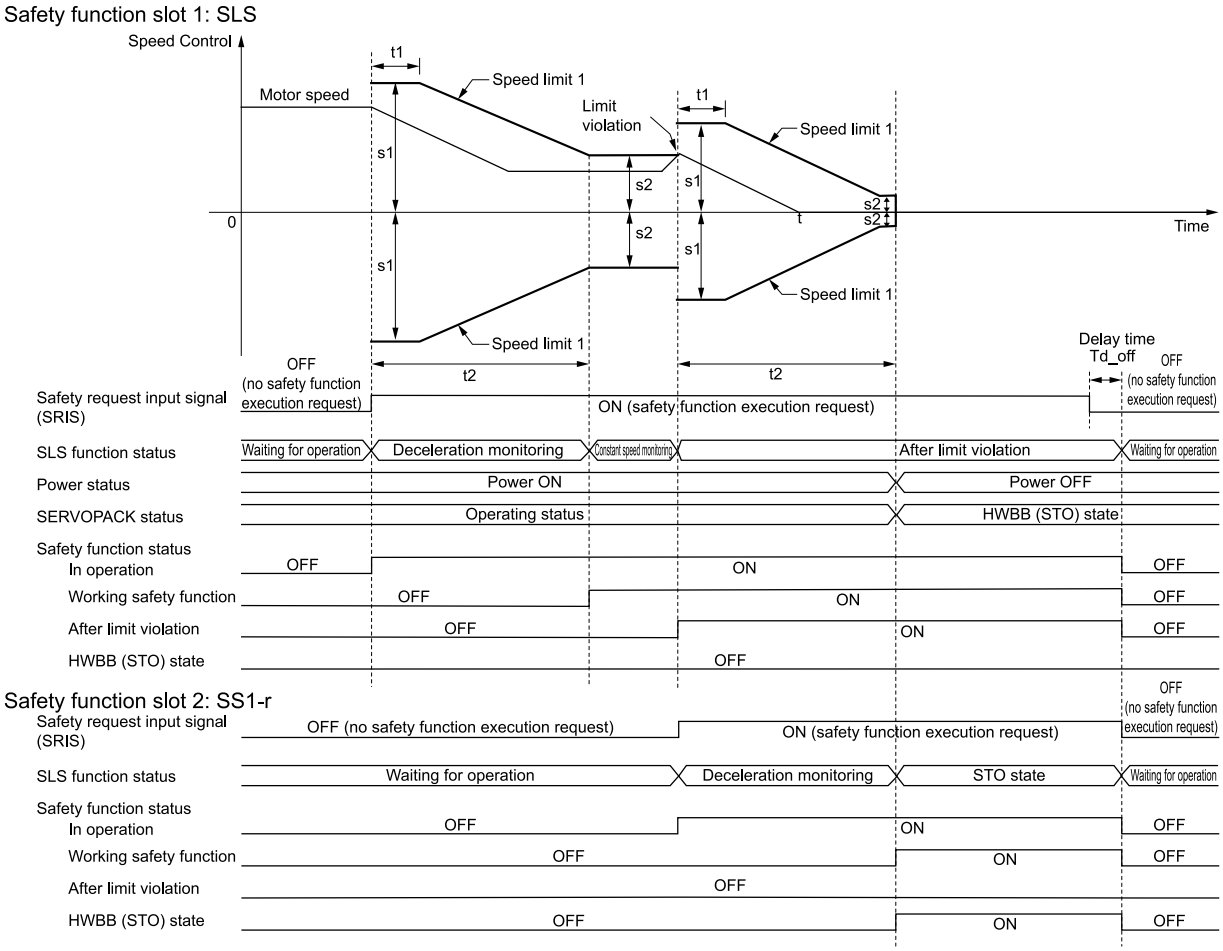


Set the parameter as shown below to enable coordinated operation.

Source Safety Function	Target Safety Function
No settings are required.	Specify the slot for coordinated operation.

The following chart shows an example of coordinated operation.

The operation is coordinated so that a limit violation state in the SLS function set in safety function slot 1 acts as a trigger for the SS1-r function in safety function slot 2. Transferring control to the SS1-r function in this manner allows controlled stopping by the SS1-r function.



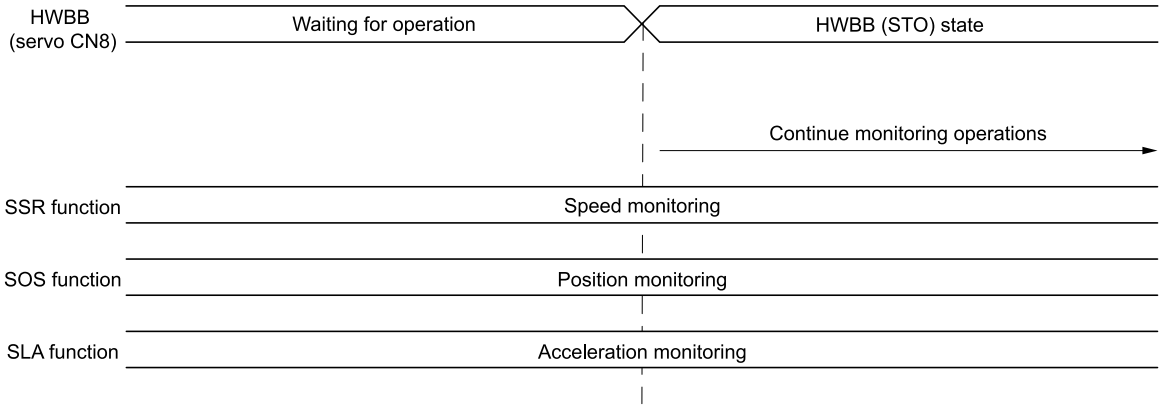
7.24.3 SERVOPACK HWBB

The HWBB in the SERVOPACK unit (CN8) can be used in the SERVOPACK to which the ASM-X is mounted.

If the HWBB in the SERVOPACK is executed during execution of an ASM-X safety function, operation of the safety function will continue.

Example: When the HWBB in the SERVOPACK is activated during execution of the SSR, SOS, and SLA functions

The safety functions continue monitoring operations even when the HWBB is activated and the HWBB state is set.



7.24.4 Restrictions on Safety Function Execution That Vary with SERVOPACK Status

The status of the SERVOPACK may affect the execution of safety functions.

If a safety function that monitors position, speed, or acceleration is executed when the SERVOPACK status is the following, the STO state will be set without performing any monitoring operations.

- When the following operations are being executed using the SigmaWin+ or the digital operator
  - Absolute Encoder Reset
  - Multiturn Limit Setting
  - Σ-LINK II Setting
- When the following operations are being executed using EtherCAT object 2710h
  - Absolute Encoder Reset
  - Multiturn Limit Setting
- When user parameter configuration is being executed using EtherCAT object 2700h

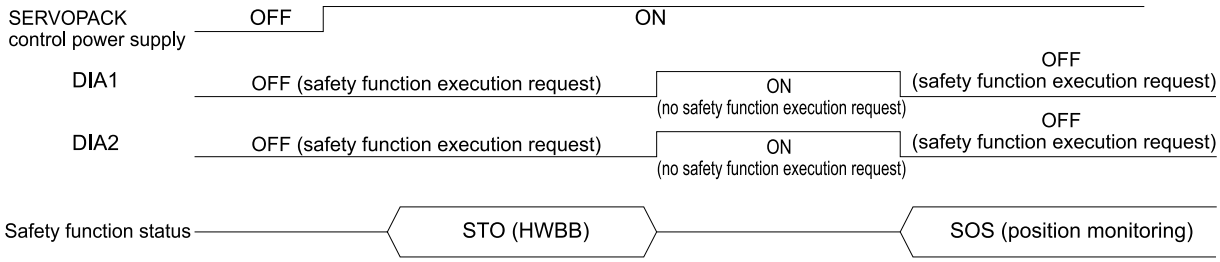
  Information This restriction is applicable for SERVOPACK software versions 0011 to 0017.
- When the EtherCAT state machine recovers to the OPERATIONAL (OP) state after going down from OPERATIONAL (OP)

7.24.5 Restrictions on Safety Function Execution That Vary with Digital Input Signal Status

If the power to the SERVOPACK is turned ON when the digital input signals on CN21 are OFF (there is a request to execute a safety function), the safety functions will enter the STO state instead of the monitoring state.

In this case, after recovering to the normal state by turning ON the digital input signals (no request to execute a safety function), once again turn OFF the digital input signals to execute the normal monitoring state.

Example of Operation When the Power Is Turned ON with Digital Input Signals Turned OFF



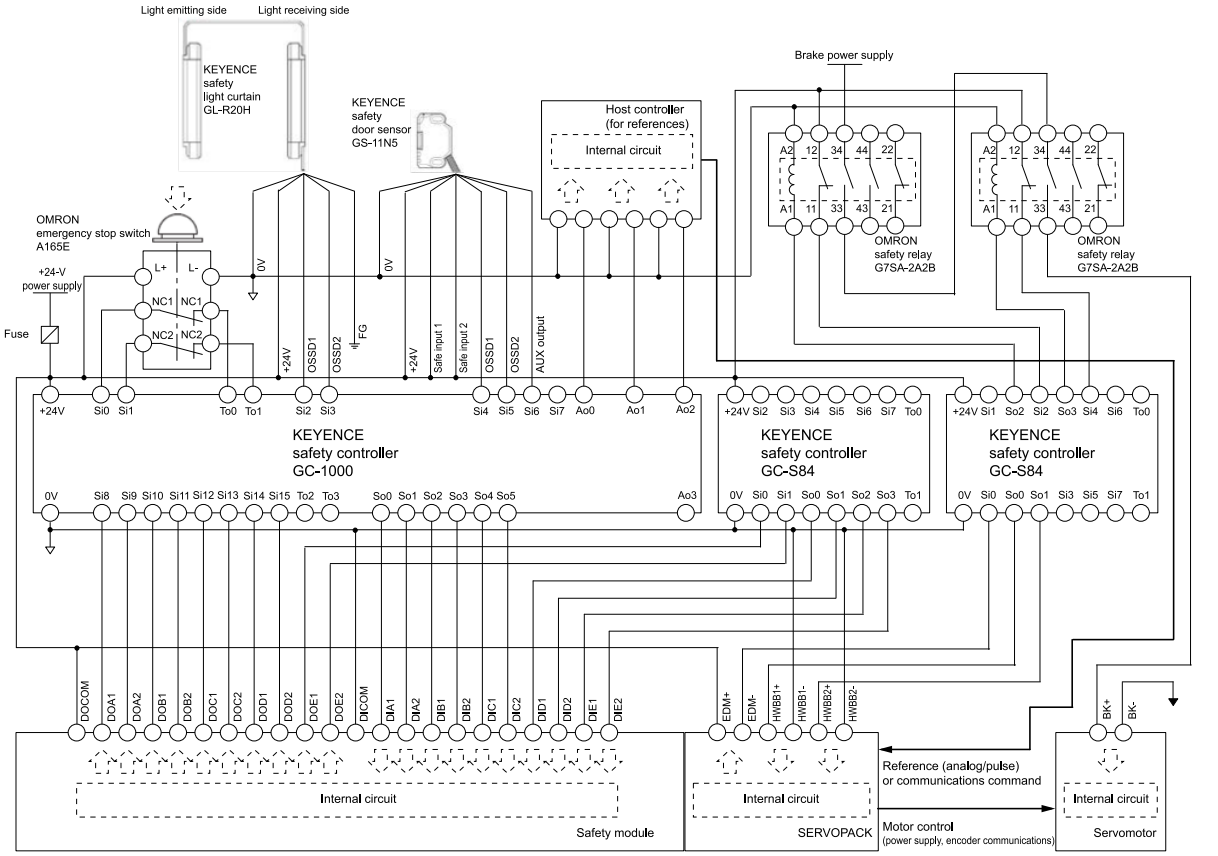
7.25 Applications Examples for Safety Functions

This section provides examples of using the Safety Functions.

7.25.1 Connection Example

The following figure shows a wiring example that operates the safety functions using the ASM-X when the following conditions occur.

Condition	Functions to Activate	Operation Example
When an object makes contact with the light curtain	SS1-r and SBC	*(1) When an Object Makes Contact with the Light Curtain on page 269*
When the door sensor is opened	SLS	*(2) When the Door Sensor Is Opened on page 269*
When the emergency stop switch is pressed	HWBB	*(3) When the Emergency Stop Switch Is Pressed on page 270*



Note:

Contact KEYENCE CORPORATION for detailed information on using KEYENCE products.

Important

The devices to be used must conform to the following standards.

- Light curtain: IEC 61496-1
- Input device for emergency stop applications: ISO 13850
- Safety PLC: IEC 61131-6
- Safety relay: EN 50205

7.25.2 Operation Examples

(1) When an Object Makes Contact with the Light Curtain

An operation example is shown below for when an object makes contact with the light curtain.

Condition	Operation
When nothing is making contact with the light curtain (Normal operation)	• The So0 and So1 output signals on the GC-1000 safety controller are ON, and Ao0 is OFF. • The DIA1 and DIA2 input signals on the ASM-X are both ON.
When an object makes contact with the light curtain	• The So0 and So1 output signals on the GC-1000 safety controller are turned OFF, and Ao0 is turned ON. The host controller switches from the normal operation command to the stop motor command from the changed status of the Ao0 signal. • The DIA1 and DIA2 input signals on the ASM-X are both turned OFF to activate the SS1-r function. The EDM as set by the parameters is output from the DOA1 and DOA2 output signals on the ASM-X. • The SBC function is activated together with the activation of the SS1-r function. When the SBC function is activated, the safety relay coils are turned OFF (de-energized state), and the servomotor's holding brake is activated.
When the object making contact with the light curtain is removed	• If the safety controller is set to auto retry, the So0 and So1 output signals on the GC-1000 safety controller are turned ON, and Ao0 is turned OFF. • The DIA1 and DIA2 input signals on the ASM-X are both turned ON to end the SSR-r function. • The SBC function also ends, the safety relay coils are turned ON (energized state), and the servomotor's holding brake is released. • The host controller switches to the normal operation command due from the changed status of the Ao0 output signal on the GC-1000 safety controller.

Refer to the following sections for details on the operations.

☞ *7.8 SS1-r (Safe Stop 1, Ramp Monitored) on page 168*

☞ *7.17 SBC (Safe Brake Control) on page 217*

(2) When the Door Sensor Is Opened

An operation example is shown below for when the door sensor is opened.

Condition	Operation
When the door sensor is closed (Normal operation)	• The So2 and So3 output signals on the GC-1000 safety controller are ON, and Ao1 is OFF. • The DIB1 and DIB2 input signals on the ASM-X are both ON.
When the door sensor is opened	• The So2 and So3 output signals on the GC-1000 safety controller are turned OFF, and Ao1 is turned ON. The host controller switches from the normal operation command to the command to decelerate to within SLS function speed limit from the changed status of the Ao1 signal. • The DIB1 and DIB2 input signals on the ASM-X are both turned OFF to activate the SLS function. The EDM as set by the parameters is output from the DOB1 and DOB2 output signals on the ASM-X.
When the door sensor is closed	• If the safety controller is set to auto retry, the So2 and So3 output signals on the GC-1000 safety controller are turned ON, and Ao1 is turned OFF. • The DIB1 and DIB2 input signals on the ASM-X are both turned ON to end the SLS function. • The host controller switches to the normal operation command due from the changed status of the Ao1 output signal on the GC-1000 safety controller.

Refer to the following section for details on the operations.

☞ *7.13 SLS (Safely-Limited Speed) on page 197*

(3) When the Emergency Stop Switch Is Pressed

An operation example is shown below for when the emergency stop switch is pressed.

Condition	Operation
When the emergency stop switch is not pressed (Normal operation)	• The So0 and So1 output signals on the GC-S84 safety controller are ON, and the Ao2 output signal on the GC-1000 safety controller is OFF. • The HWBB1 and HWBB2 input signals on the SERVOPACK are both ON.
When the emergency stop switch is pressed	• The So0 and So1 output signals on the GC-S84 safety controller are turned OFF, and the Ao2 output signal on the GC-1000 safety controller is turned ON. The host controller switches from the normal operation command to the stop motor command from the changed status of the Ao2 signal. • The HWBB1 and HWBB2 input signals on the SERVOPACK are both turned OFF to activate the HWBB. The EDM output signal on the SERVOPACK is turned ON at this time. • The SBC function is activated together with the HWBB state. When the SBC function is activated, the safety relay coils are turned OFF (de-energized state), and the servomotor's holding brake is activated.
When the emergency stop switch is reset	• If the safety controller is set to auto retry, the So0 and So1 output signals on the GC-S84 safety controller are turned ON, and the Ao2 output signal on the GC-1000 safety controller is turned OFF. • The HWBB1 and HWBB2 input signals on the SERVOPACK are both turned ON to end the HWBB. • The SBC function also ends, the safety relay coils are turned ON (energized state), and the servomotor's holding brake is released. • The host controller switches to the normal operation command due from the changed status of the Ao2 output signal on the GC-1000 safety controller.

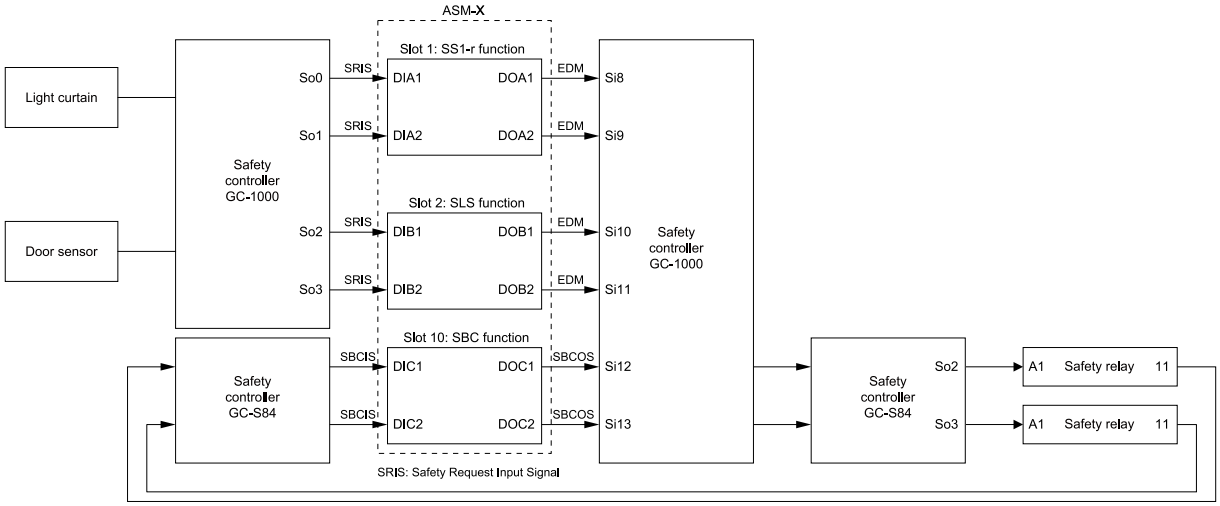
Refer to the following manual for details on the operations.

Σ-XS SERVOPACK with EtherCAT Communications References Product Manual (Manual No.: SIEP C710812 02)

7.25.3 Example Parameter Settings

Example parameter settings are listed below for when the ASM-X I/O signals are assigned as shown in the following figure.

Refer to these example parameter settings when you set the parameters for your equipment.



Parameter No.	Name	Default Setting	Setting Example	Remarks
Pc0C0 = n.□□□X	Digital Input Port A (DIA) - Input Port Selection	0	1: Use input port	–
Pc0C5 = n.□□□X	Digital Input Port B (DIB) - Input Port Selection	0	1: Use input port	–
Pc0CA = n.□□□X	Digital Input Port C (DIC) - Input Port Selection	0	1: Use input port	–

Continued on next page.

Continued from previous page.

Parameter No.	Name	Default Setting	Setting Example	Remarks
Pc0E0 = n.□□□X	Digital Output Port A (DOA) - Output Port Selection	0	1: Use output port	–
Pc0E0 = n.□□X□	Digital Output Port A (DOA) - Output Signal Usage Selection	0	0: Used for EDM signal (Redundant Outputs)	–
Pc0E0 = n.□X□□	Digital Output Port A (DOA) - Output Port Initial Stuck Diagnosis Selection	0	1: Enable diagnosis	–
Pc0E0 = n.X□□□	Digital Output Port A (DOA) - Output Port Test Pulse Diagnosis Selection	0	1: Enable diagnosis	–
Pc0E6 = n.□□□X	Digital Output Port B (DOB) - Output Port Selection	0	1: Use output port	–
Pc0E6 = n.□□X□	Digital Output Port B (DOB) - Output Signal Usage Selection	0	0: Used for EDM signal (Redundant Outputs)	–
Pc0E6 = n.□X□□	Digital Output Port B (DOB) - Output Port Initial Stuck Diagnosis Selection	0	1: Enable diagnosis	–
Pc0E6 = n.X□□□	Digital Output Port B (DOB) - Output Port Test Pulse Diagnosis Selection	0	1: Enable diagnosis	–
Pc0EC = n.□□□X	Digital Output Port C (DOC) - Output Port Selection	0	1: Use output port	–
Pc0EC = n.□□X□	Digital Output Port C (DOC) - Output Signal Usage Selection	0	4: Used for SBCOS signal	–
Pc0EC = n.□X□□	Digital Output Port C (DOC) - Output Port Initial Stuck Diagnosis Selection	0	1: Enable diagnosis	–
Pc0EC = n.X□□□	Digital Output Port C (DOC) - Output Port Test Pulse Diagnosis Selection	0	0: Disable diagnosis	–
Pc170 = n.□□□X	Safety Function Application Selection - Safety Function Monitoring Resolution Mode Selection	0	0: Normal mode	–
Pc170 = n.□□X□	Safety Function Application Selection - Safety Function Monitoring Response Mode Selection	0	0: Enable high response mode	–
Pc188	Safety Module: User Speed Reference Unit (Numerator)	1	32768	unit: min^{-1} Rotation speed of the motor shaft
Pc18A	Safety Module: User Speed Reference Unit (Denominator)	1	60	
Pc300 = n.□□XX	Slot 1 - Safety Function Selection	00	03: SS1-r Function	–
Pc301 = n.□□XX	Slot 1 - Terminal Port Selection for Safety Request Input Signal	00	02: Digital Input Port A (DIA)	–
Pc302 = n.□□XX	Slot 1 - Terminal Port Selection for EDM Signal	00	10: Digital Output Port A (DOA)	–
Pc302 = n.XX□□	Slot 1 - EDM Signal Behavior	00	04: HWBB (STO) State	–
Pc310	Slot 1 - Waiting Time (t1)	0	5	50 ms
Pc311	Slot 1 - Monitoring Time (t2)	0	20	200 ms
Pc312	Slot 1 - Speed Limit (s1)	0	3000	3000 min^{-1}
Pc314	Slot 1 - Speed Limit (s2)	0	20	20 min^{-1}
Pc340 = n.□□XX	Slot 2 - Safety Function Selection	00	08: SLS Function	–
Pc341 = n.□□XX	Slot 2 - Terminal Port Selection for Safety Request Input Signal	00	03: Digital Input Port B (DIB)	–
Pc342 = n.□□XX	Slot 2 - Terminal Port Selection for EDM Signal	00	11: Digital Output Port B (DOB)	–

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Parameter No.	Name	Defau-lt Set-ting	Setting Example	Remarks
Pc342 = n. XX□□	Slot 2 - EDM Signal Behavior	00	04: HWBB (STO) State	–
Pc350	Slot 2 - Waiting Time (t1)	0	5	50 ms
Pc351	Slot 2 - Monitoring Time (t2)	0	30	300 ms
Pc352	Slot 2 - Speed Limit (s1)	0	3000	3000 min^{-1}
Pc354	Slot 2 - Speed Limit (s2)	0	30	30 min^{-1}
Pc540 = n.□□□X	Slot 10 - SBC Function Selection	0	1: Use the SBC function.	–
Pc540 = n.□□X□	Slot 10 - SBC Function Activation Selection	0	1: Activate with STO state or with start of SS1-t / Ss1-r function.	–
Pc541 = n.□□XX	Slot 10 - Terminal Port Selection for SBC Output Signal (SBCOS)	00	12: Digital Output Port C (DOC)	–
Pc541 = n. XX□□	Slot 10 - Terminal Port Selection for SBC Input Signal (SBCIS)	00	04: Digital Input Port C (DIC)	–
Pc550	Slot 10 - Brake Hold Delay Time (Tw_bkh)	0	200	200 ms
Pc551	Slot 10 - Brake Release Delay Time (Tw_bkr)	0	10	10 ms
Pc552	Slot 10 - FB Signal Discrep. Allow. Time at Brake Hold (Td_bkh)	30	30	30 ms *1
Pc553	Slot 10 - FB Signal Discrep. Allow. Time at Brake Release (Td_bkr)	30	30	30 ms *1

*1 Set a value larger than the safety relay response time + safety controller response time.

8

Monitoring

This chapter provides information for monitoring the product information and status of the ASM-X and SERVOPACK.

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8.1 Monitoring Product Information

8.1.1 Items That You Can Monitor

The ASM-X information that you can monitor is listed below.

- Product Model
- Serial Number
- Manufacturing Date
- Software Version

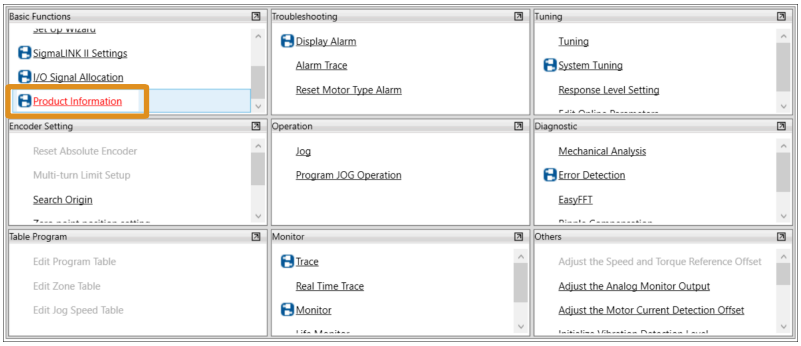
8.1.2 Operating Procedure

Use the following procedure to display the servo drive information.

1. **Click the [ ] button for the servo drive in the workspace of the Main Window of the SigmaWin+.**

   The [Menu] window will be displayed.

2. **Click [Product Information] in the [Basic Functions] area.**



The [Read Product Information] window will be displayed.

Read Product Information

Product Information	Export				
– 0001-SGDXS-1R6AA0A	QR Code				
SERVOPACK	Model/Type	Serial Number	Manufacturing Date	SW Ver.	Remarks
SERVOPACK	SGDXS-1R6AA0A (EtherCAT interface single axis)	D0251H012345678	2025.01	0012	[Specification] : Standard [I/F Ver] : 0002-0008
Motor	Model/Type	Number	Manufacturing Date	SW Ver.	Remarks
1 Motor	SGMXA-C2AUA21A3	D0251H012345678	2025.01		[Resolution] : 67108864 [Pulse/rev] [Encoder type] : absolute
1 Encoder	UTFAI-B26EX	461	2025.01	0002	
Safety Option Module	Model/Type	Serial Number	Manufacturing Date	SW Ver.	Remarks
Option Module	SGDXS-OSAA1A	D0251H012345678	2025.01	0001	[Specification] : Standard Parameters version : Ver.0100

Information With the digital operator, you can use Fn011, Fn012, and Fn01E to monitor this information. Refer to the following manual for the differences in the monitor items compared with the SigmaWin+.

Σ-7/Σ-X-Series Digital Operator Operating Manual (Manual No.: SIEP S800001 33)

8.2 Monitoring SERVOPACK Status

8.2.1 Operation Monitor, Status Monitor, and I/O Monitor

(1) Operation Monitor

Monitor Item	Description	Unit	Remarks
Monitor Target Selection Slot	Displays the setting of Pn629 = n.□□□X.	–	–
Position Limit 1 (Distance Limit 1)	Displays Distance Limit p1 set in the ASM-X.	User position reference unit *1	*2
Position Limit 2 (Distance Limit 1)	Displays Distance Limit p2 set in the ASM-X.	User position reference unit *1	*2
Speed Limit 1	Displays Speed Limit s1 set in the ASM-X.	User speed reference unit	*2
Speed Limit 2	Displays Speed Limit s2 set in the ASM-X.	User speed reference unit	*2
Acceleration Limit	Displays Acceleration Limit a1 set in the ASM-X.	User acceleration reference unit	*2
Motor Position (During Position Monitoring)	Displays the motor travel amount after t2 has elapsed for a safety function that monitors position.	User position reference unit *1	*2
Motor Position	Displays the motor position after the power is turned ON.	User position reference unit *1	–
Motor Speed	Displays the current motor speed.	User speed reference unit	–
Motor Acceleration	Displays the current motor acceleration.	User acceleration reference unit	–
secondary encoder position	Displays the current position of the secondary encoder.	User position reference unit *1	*3
SHP Encoder Position	Displays the motor position when the SHP function was set.	User position reference unit *1	–
Monitor Target Selection Slot	Displays the setting of Pn629 = n.□□XX.	–	Range: 1 to 10
SHP Status	Displays whether the safe home position was set with the SHP function. ON: Safe home position set OFF: Safe home position not set	–	–

*1 The ASM-X operates with 64-bit data, but the information displayed in the SigmaWin+ monitor shows only the lower 32 bits.
*2 The values of the safety function slot selected in SERVOPACK parameter Pn629 = n.□□XX are displayed. Refer to the following section for details.
☞ 8.2.3 Monitor Target Slot Selection on page 277
*3 Refer to the following section for details.
☞ (1) Encoder Diagnostic Function on page 108

(2) Status Monitor

Monitor Item	Description	Remarks
Slot n Status: Operating	ON: Indicates that ASM-X safety function slot n is operating and the status is "Operating."	n = 1 to 10
Slot n Status: Working SF	ON: Indicates that ASM-X safety function slot n is operating and the status is "Working Safety Function."	n = 1 to 10
Slot n Status: Limit Violation	ON: Indicates that a limit violation occurred in ASM-X safety function slot n.	n = 1 to 10

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Monitor Item	Description	Remarks
Slot n Status: Safe State	ON: Indicates that ASM-X safety function slot n is in the HWBB (STO) state.	n = 1 to 10
System Status: Operating	ON: Indicates that one of the ASM-X safety function slots (1 to 10) is operating and the status is "Operating."	–
System Status: Working SF	ON: Indicates that one of the ASM-X safety function slots (1 to 10) is operating and the status is "Working Safety Function."	–
System Status: Limit Violation	ON: Indicates that a limit violation occurred in one of the ASM-X safety function slots (1 to 10).	–
System Status: Safe State	ON: Indicates that one of the ASM-X safety function slots (1 to 10) is in the HWBB (STO) state.	–

8.2.2 I/O Signals Status Monitor

Monitor Item	Description		Remarks
	Description	Specifications	
DIA1	Current value of digital input port A, channel 1	• ON Input circuit: Closed • OFF Input circuit: Open	–
DIA2	Current value of digital input port A, channel 2		–
DIB1	Current value of digital input port B, channel 1		–
DIB2	Current value of digital input port B, channel 2		–
DIC1	Current value of digital input port C, channel 1		–
DIC2	Current value of digital input port C, channel 2		–
DID1	Current value of digital input port D, channel 1		–
DID2	Current value of digital input port D, channel 2		–
DIE1	Current value of digital input port E, channel 1		–
DIE2	Current value of digital input port E, channel 2		–
DOA1	Current value of digital output port A, channel 1	• ON Output transistor OFF • OFF Output transistor ON	*1
DOA2	Current value of digital output port A, channel 2		*1
DOB1	Current value of digital output port B, channel 1		*1
DOB2	Current value of digital output port B, channel 2		*1
DOC1	Current value of digital output port C, channel 1		*1
DOC2	Current value of digital output port C, channel 2		*1
DOD1	Current value of digital output port D, channel 1		*1
DOD2	Current value of digital output port D, channel 2		*1
DOE1	Current value of digital output port E, channel 1		*1
DOE2	Current value of digital output port E, channel 2		*1

*1 The test pulse status is not reflected in the monitor.

8.2.3 Monitor Target Slot Selection

Set the slot information to monitor in the following SERVOPACK parameter.

Pn629	n.□□XX	Monitor Target Safety Function Slot Selection (Position), (Speed), (Torque)		When Enabled
		1 (default setting)	Monitor safety function slot 1.	Immediately
		2	Monitor safety function slot 2.	
		3	Monitor safety function slot 3.	
		4	Monitor safety function slot 4.	
		5	Monitor safety function slot 5.	
		6	Monitor safety function slot 6.	
		7	Monitor safety function slot 7.	
		8	Monitor safety function slot 8.	
		9	Monitor safety function slot 9.	
		A	Monitor safety function slot 10.	

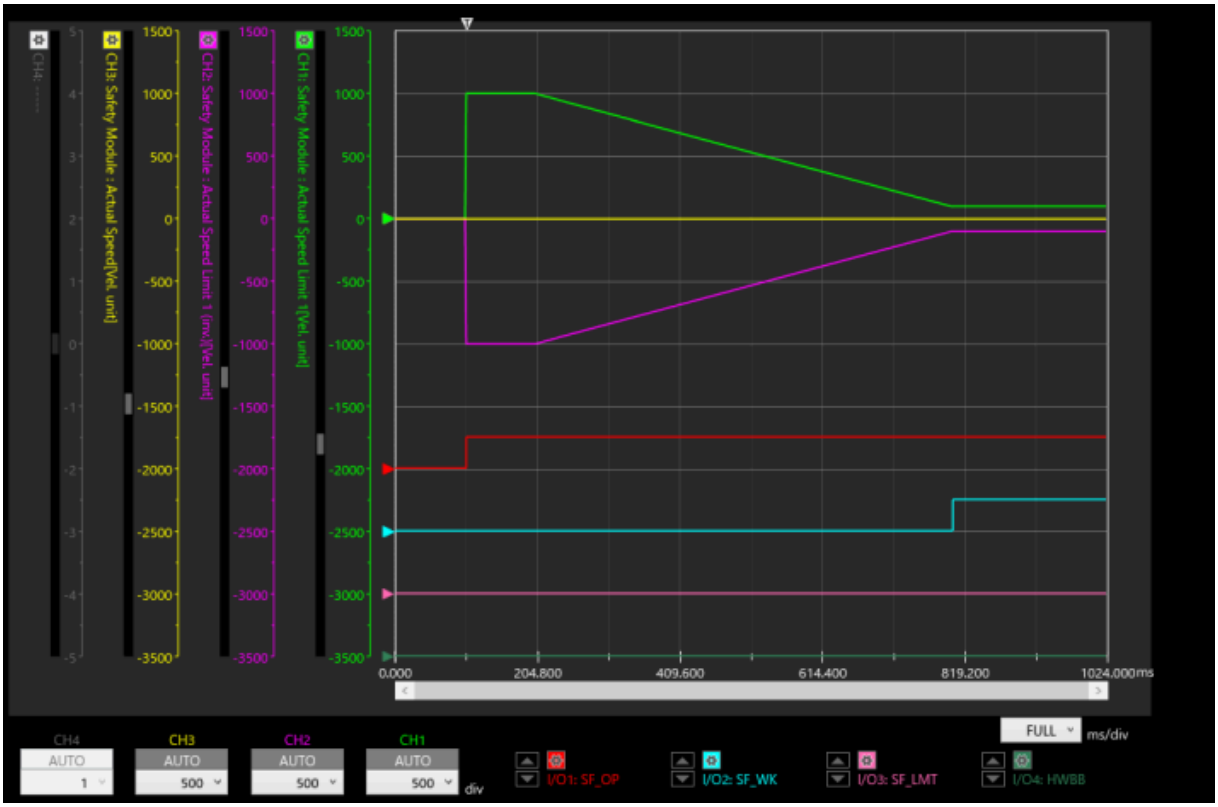
8.3 Monitoring Signal Waveforms

8.3.1 Using the SigmaWin+

You can trace the following items using the trace function in the SigmaWin+.

- Current position, speed, and acceleration in the ASM-X
- Monitoring position, speed, and acceleration of each safety function slot and the execution status of the safety functions
- Status of the SBC function safe output signal

Example of Tracing the SLS Function



(1) Analog Tracing Items

You can trace the following items.

The tracing items are described in the function descriptions for the safety functions (refer to chapter 7).

In addition, when you trace the following items, select the [High-precision trace] check box.

Name		Description	Display Unit	Remarks
Safety Module: Actual Position Limit 1	Safety Module: Actual Position Limit 1	Displays the value of the current monitoring position (monitoring parameter p1).	User position reference unit	*1
Safety Module: Actual Position Limit 1 (inv.)	Safety Module: Actual Position Limit 1 (inv)	Displays the value of Actual Position Limit 1 with the sign inverted.	User position reference unit	*1
Safety Module: Actual Position Limit 2	Safety Module: Actual Position Limit 2	Displays the value of the current monitoring position (monitoring parameter p2).	User position reference unit	*1

Continued on next page.

Continued from previous page.

Name		Description	Display Unit	Remarks
Safety Module: Actual Speed Limit 1	Safety Module: Actual Speed Limit 1	• For SS1-r, SS2-r, and SLS Displays the current speed monitoring value based on the set values of the monitoring parameters s1, s2, t1, and t2. • For SSM Displays the set value of the monitoring parameter s1 when a limit violation has not occurred. Displays the value of the monitoring parameters s1 - s2 when a limit violation has occurred. • For SSR Displays the set value of the monitoring parameter s1.	User speed reference unit	*1
Safety Module: Actual Speed Limit 1 (inv.)	Safety Module: Actual Speed Limit 1 (inv)	Displays the value of Actual Speed Limit 1 with the sign inverted.	User speed reference unit	*1
Safety Module: Actual Speed Limit 2	Safety Module: Actual Speed Limit 2	For SSR: Displays the value of the current monitoring speed (monitoring parameter s2).	User speed reference unit	*1
Safety Module: Actual Speed Limit 2 (inv.)	Safety Module: Actual Speed Limit 2 (inv)	Displays the value of Actual Speed Limit 2 with the sign inverted.	User speed reference unit	*1
Safety Module: Actual Acceleration Limit	Safety Module: Actual Acceleration Limit	Displays the value of the current monitoring acceleration (monitoring parameter a1).	User acceleration reference unit	*1
Safety Module: Actual Position (Monitoring)	Safety Module: Actual Position (Monitoring)	Displays the motor travel amount after t2 has elapsed for a safety function that monitors position.	User position reference unit	*1
Safety Module: Actual Position	Safety Module: Actual Position	Displays the current position of the servomotor.	User position reference unit	–
Safety Module: Actual Position Encoder 2	Safety Module: Actual Position Encoder 2	Displays the current position of the servomotor (position for diagnostics).	User position reference unit	–
Safety Module: Actual Speed	Safety Module: Actual Speed	Displays the current speed of the servomotor.	User speed reference unit	–
Safety Module: Actual Acceleration	Safety Module: Actual Acceleration	Displays the current acceleration of the servomotor.	User acceleration reference unit	–

*1 The values of the safety function slot selected in SERVOPACK parameter Pn629 = n.□□XX are displayed. Refer to the following section for details.

☞ *8.2.3 Monitor Target Slot Selection on page 277*

(2) I/O Tracing Items

You can trace the following items.

Name	Description	Remarks
SF_OP	Displays that one of the ASM-X safety function slots 1 to 10 is operating (In Operation).	–
SF_WK	Displays that one of the ASM-X safety function slots 1 to 10 is operating (Working Safety Function).	–
SF_LMT	Displays that one of the ASM-X safety function slots 1 to 10 has a limit violation.	–
HWBB	Displays that one of the ASM-X safety function slots 1 to 10 is in the HWBB (STO) state.	–
SF_OP Slot1-10	Displays that the safety function slot selected in Pn629 = n.□□XX is operating (In Operation).	*1

Continued on next page.

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Name	Description	Remarks
SF_WK Slot1-10	Displays that the safety function slot selected in Pn629 = n.□□XX is operating (Working Safety Function).	*1
SF_LMT Slot1-10	Displays that the safety function slot selected in Pn629 = n.□□XX has a limit violation.	*1
HWBB Slot1-10	Displays that the safety function slot selected in Pn629 = n.□□XX is in the HWBB state.	*1
DIA1	Digital input port A, channel 1	*2
DIA2	Digital input port A, channel 2	*2
DIB1	Digital input port B, channel 1	*2
DIB2	Digital input port B, channel 2	*2
DIC1	Digital input port C, channel 1	*2
DIC2	Digital input port C, channel 2	*2
DID1	Digital input port D, channel 1	*2
DID2	Digital input port D, channel 2	*2
DIE1	Digital input port E, channel 1	*2
DIE2	Digital input port E, channel 2	*2
DOA1	Digital output port A, channel 1	*3
DOA2	Digital output port A, channel 2	*3
DOB1	Digital output port B, channel 1	*3
DOB2	Digital output port B, channel 2	*3
DOC1	Digital output port C, channel 1	*3
DOC2	Digital output port C, channel 2	*3
DOD1	Digital output port D, channel 1	*3
DOD2	Digital output port D, channel 2	*3
DOE1	Digital output port E, channel 1	*3
DOE2	Digital output port E, channel 2	*3

*1 The values of the safety function slot selected in SERVOPACK parameter Pn629 = n.□□XX are displayed. Refer to the following section for details.

☞ 8.2.3 Monitor Target Slot Selection on page 277

*2 When a digital input port is used as SRIS, the signal values and meanings are as follows:

- 0: There is a request to execute a safety function.
- 1: There is no request to execute a safety function.

When a digital input port is used as SBCIS, the signal values and meanings are as follows:

- 0: The auxiliary contact of the safety relay is open.
- 1: The auxiliary contact of the safety relay is closed.

*3 The signal values and meanings of the digital output port signals are as follows:

- 0: Output transistor OFF
- 1: Output transistor ON

8.4 Monitoring over Network

This section lists the objects and parameters related to monitoring over network.

8.4.1 SERVOPACK Objects

(1) Sync Manager PDO Assignment

FSoE telegrams are transmitted by PDO during EtherCAT process data communications.

The FSoE telegrams are transmitted by setting the RxPDO and TxPDO objects for FSoE telegram transmission.

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
1C12h	0	Number of assigned PDOs	USINT	RW	No	0 to 3 (default: 1)	Yes
	1	Index of assigned RxPDO 1	UINT	RW	No	0x1600 to 0x1609 (default: 0x1601)	Yes
	2	Index of assigned RxPDO 2	UINT	RW	No	0x1600 to 0x1609 (default: 0x1600)	Yes
	3	Index of assigned RxPDO 3	UINT	RW	No	0x1600 to 0x1609 (default: 0x1602)	Yes
1C13h	0	Number of assigned PDOs	USINT	RW	No	0 to 3 (default: 1)	Yes
	1	Index of assigned TxPDO 1	UINT	RW	No	0x1A00 to 0x1A09 (default: 0x1A01)	Yes
	2	Index of assigned TxPDO 2	UINT	RW	No	0x1A00 to 0x1A09 (default: 0x1A00)	Yes
	3	Index of assigned TxPDO 3	UINT	RW	No	0x1A00 to 0x1A09 (default: 0x1A02)	Yes

When switching between the 1st FSoE telegram and the 2nd FSoE telegram, you must also change the following parameter setting.

		SPDU selection		When Enabled
Pc121	n.□□X□	0	1st SPDU (moduleident:0x02200A01)	After restart
		1	2nd SPDU (moduleident:0x02200A02)	
		2	1st SPDU (moduleident:0x02200A03)	
		3 Default	2nd SPDU (moduleident:0x02200A04)	

Setting examples are given below.

To Use the 1st SPDU

- Set Pc121 to n.□□0□ or n.□□2□ (1st SPDU).
- Set one of the subindexes 1 to 3 of object 1C12h to 0x1608. Set subindex 0 to the number of PDOs to use.
- Set one of the subindexes 1 to 3 of object 1C13h to 0x1A08. Set subindex 0 to the number of PDOs to use.
- Turn the power OFF and ON again.

To Use the 2nd SPDU

- Set Pc121 to n.□□1□ or n.□□3□ (2nd SPDU).
- Set one of the subindexes 1 to 3 of object 1C12h to 0x1609. Set subindex 0 to the number of PDOs to use.
- Set one of the subindexes 1 to 3 of object 1C13h to 0x1A09. Set subindex 0 to the number of PDOs to use.
- Turn the power OFF and ON again.

(2) Application Switch 2 for Safety Function

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
2629h	0	Application Switch 2 for Safety Function	UINT	RW	No	0000h to 110Ah (default: 0001h)	Yes

The set values are the same as the set values for SERVOPACK parameter Pn629.

(3) Safety Module Monitor

The overall status of all safety function slots being executed by the ASM-X.

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
2720h	0	Safety Module Monitor	UDINT	RO	Yes	–	No

Bit	Function	Description
0 to 11	– (Reserved)	–
12	Safety Module Status: During operation	0: – 1: During operation
13	Safety Module Status: During working safety function	0: – 1: During working safety function
14	Safety Module Status: After limit violation	0: – 1: After limit violation
15	Safety Module Status: During safe state (HWBB)	0: – 1: During safe state (HWBB (STO))
16 to 31	– (Reserved)	–

(4) Modular Device Profile

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
F000h	0	Number of entries	USINT	RO	No	2	No
	1	Module index distance	UINT	RO	No	0x0010	No
	2	Maximum number of modules	UINT	RO	No	1	No

(5) Modular List

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
F010h	0	Number of entries	USINT	RO	No	1	No
	1	Module profile list	UDINT	RO	No	790	No

(6) Detected Modules

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
F050h	0	Number of entries	USINT	RO	No	1	No
	1	Detected module ident list	UDINT	RO	No	0x00000000 to 0xFFFFFFFF (default: Differs depending on the software version of the ASM-X and the SERVOPACK.)	No

(a) Detected Module Ident List

The value of Detected Module Ident List differs depending on the software version of the ASM-X and the SERVOPACK.

Status			Value
The ASM-X is not mounted to the SERVOPACK.			0x00000000
The ASM-X is mounted to the SERVOPACK.	ASM-X software version: Version 0002 or earlier or SERVOPACK software version: Version 0017 or earlier	When the 1st SPDU (moduleident:0x02200A01) telegram is used	0x02200A01
		When the 2nd SPDU (moduleident:0x02200A02) telegram is used	0x02200A02
	ASM-X software version: Version 0003 or later and SERVOPACK software version: Version 0018 or later	When the 1st SPDU (moduleident:0x02200A01) telegram is used	0x02200A01
		When the 2nd SPDU (moduleident:0x02200A02) telegram is used	0x02200A02
		When the 1st SPDU (moduleident:0x02200A03) telegram is used	0x02200A03
		When the 2nd SPDU (moduleident:0x02200A04) telegram is used	0x02200A04

Use to following parameter to switch between the 1st SPDU and the 2nd SPDU.

Pc121 = n.□□X□

0: 1st SPDU (moduleident:0x02200A01)

1: 2nd SPDU (moduleident:0x02200A02)

2: 1st SPDU (moduleident:0x02200A03)

3: 2nd SPDU (moduleident:0x02200A04)

(7) Device Safety Address

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
F980h	0	Number of entries	USINT	RO	No	1	No
	1	FSoE Address	UINT	RO	No	0 to 65535 (default: 1)	No

(a) FSoE Address

This item contains the set value of safety module parameter Pc120.

8.4.2 Safety Module Objects

This section describes the objects related to FSoE communications that can be accessed when the safety module is mounted to the SERVOPACK.

(1) PDO Mapping Objects

FSoE telegrams are transmitted by PDO during EtherCAT process data communications.

The safety module has the following two types of FSoE telegrams. These telegrams have a predefined format and cannot be changed.

PDO Type	PDO Object Index	
	1st FSoE Telegram	2nd FSoE Telegram
RxPDO	0x1608	0x1609
TxPDO	0x1A08	0x1A09

(a) 1st RxPDO FSoE Telegram

The specifications of the 1st RxPDO FSoE telegram (i.e., the data structure of object 1608h) are shown below.

Octet	Name	Description							
0	Command	FSoE MainDevice command							
1	Safe Data [0]	VI7	VI6	VI5	VI4	VI3	VI2	VI1	VI0
2	Safe Data [1]	VI15	VI14	VI13	VI12	VI11	VI10	VI9	VI8
3	CRC_0_Lo	CRC0							
4	CRC_0_Hi								
5	Safe Data [2]	ErrAck	Padding			MPD3	MPD2	MPD1	MPD0
6	Safe Data [3]	Padding							
7	CRC_1_Lo	CRC1							
8	CRC_1_Hi								
9	Conn_id_Lo	Connection ID							
10	Conn_id_Hi								

- FSoE protocol data
  - Command: FSoE MDevice command
  - CRC_x_Lo, Hi: CRC for FSoE communications
  - Connection ID: ID for FSoE communications
- Application data (Safe Data [0] to [3])
  - VI0 to VI15: Virtual inputs
  - MPD0 to MPD3: Refer to the following table for details.
    ☞ *(5) Output Specifications of the Safety Monitor on page 133*
  - ErrAck: Error reset input (error reset request triggered by a change from 0 to 1)
    Only ASM-X internal errors can be reset by ErrAck. To clear alarms displayed on the SERVOPACK, use bit 7 (Fault reset) of Controlword (6040h) over EtherCAT or reset the alarm using the SigmaWin+.
  - Padding: For adjusting the address

(b) 1st TxPDO FSoE Telegram

The specifications of the 1st TxPDO FSoE telegram (i.e., the data structure of object 1A08h) are shown below.

Octet	Name	Description							
0	Command	FSoE SubDevice command							
1	Safe Data [0]	VO7	VO6	VO5	VO4	VO3	VO2	VO1	VO0
2	Safe Data [1]	VO15	VO14	VO13	VO12	VO11	VO10	VO9	VO8
3	CRC_0_Lo	CRC0							
4	CRC_0_Hi								
5	Safe Data [2]	SF 8	SF 7	SF 6	SF 5	SF 4	SF 3	SF 2	SF 1
6	Safe Data [3]	DIA2	DIE1	DID1	DIC1	DIB1	DIA1	SF 10	SF 9
7	CRC_1_Lo	CRC1							
8	CRC_1_Hi								
9	Safe Data [4]	MPA3	MPA2	MPA1	MPA0	DIE2	DID2	DIC2	DIB2
10	Safe Data [5]	Error	Reserved	Padding					
11	CRC_2_Lo	CRC2							
12	CRC_2_Hi								

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Octet	Name	Description
13	Safe Data [6]	Monitor val1 (1st word)
14	Safe Data [7]	
15	CRC_3_Lo	CRC3
16	CRC_3_Hi	
17	Safe Data [8]	Monitor val1 (2nd word)
18	Safe Data [9]	
19	CRC_4_Lo	CRC4
20	CRC_4_Hi	
21	Safe Data [10]	Monitor val2 (1st word)
22	Safe Data [11]	
23	CRC_5_Lo	CRC5
24	CRC_5_Hi	
25	Safe Data [12]	Monitor val2 (2nd word)
26	Safe Data [13]	
27	CRC_6_Lo	CRC6
28	CRC_6_Hi	
29	Conn_id_Lo	Connection ID
30	Conn_id_Hi	

- FSoE protocol data
  - Command: FSoE SubDevice command
  - CRC_x_Lo, Hi: CRC for FSoE communications
  - Connection ID: ID for FSoE communications
- Application data (Safe Data [0] to [5])
  - VO0 to VO15: Virtual outputs
  - SF1 to SF10: Limit violation status (slots 1 to 10)
  - DI*1, DI*2: Digital input status monitors (*: A to E)
  - MPA0 to MPA3: Safety monitor selection code outputs. Refer to the following table for details.
    ☞ *(5) Output Specifications of the Safety Monitor on page 133*
  - Error: Error status output (0: normal, 1: error occurring)
  - Padding: For adjusting the address

(c) 2nd RxPDO FSoE Telegram

The specifications of the 2nd RxPDO FSoE telegram (i.e., the data structure of object 1609h) are shown below.

Octet	Name	Description							
0	Command	FSoE MainDevice command							
1	Safe Data [0]	VI7	VI6	VI5	VI4	VI3	VI2	VI1	VI0
2	Safe Data [1]	VI15	VI14	VI13	VI12	VI11	VI10	VI9	VI8
3	CRC_0_Lo	CRC0							
4	CRC_0_Hi								
5	Safe Data [2]	ErrAck	Padding						
6	Safe Data [3]	Padding							

Continued on next page.

Continued from previous page.

Octet	Name	Description
7	CRC_1_Lo	CRC1
8	CRC_1_Hi	
9	Conn_id_Lo	Connection ID
10	Conn_id_Hi	

- FSoE protocol data
  - Command: FSoE MDevice command
  - CRC_x_Lo, Hi: CRC for FSoE communications
  - Connection ID: ID for FSoE communications
- Application data (Safe Data [0] to [3])
  - VI0 to VI15: Virtual inputs
  - ErrAck: Error reset input (error reset request triggered by a change from 0 to 1)
    Only ASM-X internal errors can be reset by ErrAck. To clear alarms displayed on the SERVOPACK, use bit 7 (Fault reset) of Controlword (6040h) over EtherCAT or reset the alarm using the SigmaWin+.
  - Padding: For adjusting the address

(d) 2nd TxPDO FSoE Telegram

The specifications of the 2nd TxPDO FSoE telegram (i.e., the data structure of object 1A09h) are shown below.

Octet	Name	Description							
0	Command	FSoE SubDevice command							
1	Safe Data [0]	VO7	VO6	VO5	VO4	VO3	VO2	VO1	VO0
2	Safe Data [1]	VO15	VO14	VO13	VO12	VO11	VO10	VO9	VO8
3	CRC_0_Lo	CRC0							
4	CRC_0_Hi								
5	Safe Data [2]	SF 8	SF 7	SF 6	SF 5	SF 4	SF 3	SF 2	SF 1
6	Safe Data [3]	Error	SHP	Padding				SF 10	SF 9
7	CRC_1_Lo	CRC1							
8	CRC_1_Hi								
9	Conn_id_Lo	Connection ID							
10	Conn_id_Hi								

- FSoE protocol data
  - Command: FSoE SubDevice command
  - CRC_x_Lo, Hi: CRC for FSoE communications
  - Connection ID: ID for FSoE communications
- Application data
  - VO0 to VO15: Virtual outputs
  - SF1 to SF10: Limit violation status (slots 1 to 10)
  - SHP: Reserved
  - Error: Error status output (0: normal, 1: error occurring)
  - Padding: For adjusting the address

(2) FSoE SubDevice Frame Elements

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
E600h	0	Number of entries	USINT	RO	No	9	No
	1	FSoE SubDevice command	USINT	RO	SI (MainDevice input)	−	No
	2	FSoE SubDevice connection ID	UINT	RO	SI	−	No
	3	FSoE SubDevice CRC_0	UINT	RO	SI	−	No
	4	FSoE SubDevice CRC_1	UINT	RO	SI	−	No
	5	FSoE SubDevice CRC_2	UINT	RO	SI	−	No
	6	FSoE SubDevice CRC_3	UINT	RO	SI	−	No
	7	FSoE SubDevice CRC_4	UINT	RO	SI	−	No
	8	FSoE SubDevice CRC_5	UINT	RO	SI	−	No
	9	FSoE SubDevice CRC_6	UINT	RO	SI	−	No

SI: MainDevice input (SubDevice to MDevice)

(a) FSoE SubDevice Command

FSoE commands sent by the safety module (FSoE SubDevice)

SubDevice Command	Value
Reset	0x2A
Session	0x4E
Connection	0x64
Parameter	0x52
ProcessData	0x36
FailSafeData	0x08

(b) FSoE SubDevice Connection ID

A unique ID on the FSoE network set by the FSoE MDevice.

(c) FSoE_SubDevice_CRC_x (x = 0 to 6)

CRCs used to check the integrity of data included in the FSoE TxPDO telegram

(3) FSoE MDevice Frame Elements

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
E700h	0	Number of entries	USINT	RO	No	4	No
	1	FSoE MainDevice command	USINT	RO	SO (MainDevice output)	−	No
	2	FSoE MainDevice connection ID	UINT	RO	SO	−	No
	3	FSoE MainDevice CRC_0	UINT	RO	SO	−	No
	4	FSoE MainDevice CRC_1	UINT	RO	SO	−	No

SO: MainDevice output (MDevice to SubDevice)

(a) FSoE MDevice Command

FSoE commands sent by the FSoE MDevice

MDevice Command	Value
Reset	0x2A
Session	0x4E
Connection	0x64
Parameter	0x52
ProcessData	0x36
FailSafeData	0x08

(b) FSoE MDevice Connection ID

A unique FSoE MDevice ID on the FSoE network.

(c) FSoE MDevice CRC_x (x = 0, 1)

CRCs used to check the integrity of data included in the FSoE RxPDO telegram.

(4) FSoE Info Data

This object contains information on the FSoE SubDevice.

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
E900h	0	Number of entries	USINT	RO	No	8	No
	1	FSoE module connection ID	UINT	RO	No	−	No
	2	FSoE module type	STRING (4)	RO	No	SGDXS-OSAA0A: 0x5AA0	No
	3	FSoE module name	STRING (24)	RO	No	SGDXS-OSAA0A or SGDXS-OSAA1A	No
	4	FSoE module device type	UDINT	RO	No	0x000A0192	No
	5	FSoE module vendor ID	UDINT	RO	No	0x00000539	No
	6	FSoE module product code	UDINT	RO	No	1st SPDU: 0x02200A01, 2nd SPDU: 0x02200A02	No
	7	FSoE module revision number	UDINT	RO	No	−	No
	8	FSoE module serial number	UDINT	RO	No	0	No

(a) FSoE Module Connection ID

A unique ID on the FSoE network set by the FSoE MDevice.

(b) FSoE Module Type, FSoE Module Name

Module Name	E900.2 FSoE Module Type	E900.3 FSoE Module Name
SGDXS-OSAA0A	0x5AA0	SGDXS-OSAA0A
SGDXS-OSAA1A	0x5AA1	SGDXS-OSAA1A

(c) FSoE Module Product Code

As shown below, the FSoE module product code depends on the selected FSoE telegram.

Status	E900.6 FSoE Module Product Code
When the 1st FSoE telegram is selected	0x02200A01
When the 2nd FSoE telegram is selected	0x02200A02

(d) FSoE Module Revision Number

This item contains the software version of the safety module.

Bit 31	Bit 16	Bit 15	Bit 0
Major version		Minor version	

(5) FSoE Communication Parameter

This object contains information on the FSoE SubDevice.

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
E901h	0	Number of entries	USINT	RO	No	8	No
	1	FSoE version	STRING (2)	RO	No	01	No
	2	Safety address	UINT	RO	No	−	No
	3	FSoE connection ID	UINT	RO	No	−	No
	4	Watchdog time	UINT	RO	No	−	No
	5	Reserved	OCTET-STRING(6)	RO	No	000000	No
	6	Connection type (SubDevice connection)	UINT	RO	No	0x0001	No
	7	Communication parameter length	UINT	RO	No	4	No
	8	Application parameter length	UINT	RO	No	0	No

(a) FSoE Version

This item contains the supported FSoE version.

(b) Safety Address

This item contains the set value of safety-related module parameter Pc120.

(c) FSoE Connection ID

A unique ID on the FSoE network set by the FSoE MDevice.

(d) Watchdog Time

This item contains the watchdog time of the FSoE SubDevice written by the FSoE MDevice. (Setting range: 30 to 65535 ms)

The FSoE SubDevice monitors if the telegram from the FSoE MDevice is updated within the watchdog time. If the telegram is not updated within this time, the FSoE SubDevice transitions to the Reset state.

(e) Connection_Type

0x0001: Indicates that the safety module is connected as an FSoE SubDevice.

(f) Communication Parameter Length

This item contains the length of the FSoE communications parameter in bytes.

(g) Application Parameter Length

This item contains the length of the FSoE application parameter in bytes. The safety module does not have an FSoE application parameter, so this value is 0.

(6) FSoE Connection Diagnosis

This object contains information on the FSoE SubDevice.

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
EA00h	0	Number of entries	USINT	RO	No	2	No
	1	Connection state	UINT	RO	No	−	No
	2	Connection diagnosis	UINT	RO	No	−	No

(a) Connection State

This item contains the FSoE communications status of the safety module.

FSoE SubDevice Status	EA00.1 Connection State
Reset	100
Session	101
Connection	102
Parameter	103
ProcessData	104
FailSafeData	105

(b) Connection Diagnosis

This item contains FSoE communication error information.

Bit	Value	Description
Bits 0 to 3	0	No error.
	1	The command is incorrect.
	2	Unknown command.
	3	The connection ID is incorrect.
	4	The CRC is incorrect.
	5	A watchdog timeout has occurred.
	6	The FSoE address is incorrect.
	7	The data is incorrect.
	8	The communications parameter length is incorrect.
	9	The communications parameter is incorrect.
	10	The application parameter length is incorrect.
	11	The application parameter is incorrect.
	12	An unexpected Session command was issued.
	13	A communications error occurred in the failsafe data.
Bit 4	0	An error occurred on the detected FSoE MDevice.
	1	An error occurred on the detected FSoE SubDevice.
Bit 5	1	The FSoE SubDevice has not sent process data. (FSoE SubDevice is in Failsafe state)
Bit 6	1	Connection is in Startup state.
Bit 7	1	The FSoE MDevice has not sent process data. (FSoE MDevice is in Failsafe state)
Bits 8 to 15	-	Reserved by system.

8.4.3 Special Safety Module Objects

This section describes the safety module objects that can be accessed when the safety module is mounted to the SERVOPACK.

(1) Safety Related Servo Parameters

This object contains the set values of safety-related servo parameters.

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5800h	0	Number of entries	USINT	RO	No	17	No
	1	Motor setting switch	UINT	RO	No	0x0000 to 0x0011 (default: 0x0000)	No
	2	Function setting switch	UINT	RO	No	0x0000 to 0x0001 (default: 0x0000)	No
	3	Reserved 1	UINT	RO	No	0x0000 to 0x0000 (default: 0x0000)	No
	4	Reserved 2	UDINT	RO	No	0 to 0 (default: 0)	No
	5	Encoder configuration setting 1	UINT	RO	No	0 to 32 (default: 26)	No
	6	Motor max. speed (motor encoder)	UINT	RO	No	0x0000 to 0xFFFF (default: 0x0107)	No
	7	Reserved 3	UDINT	RO	No	0 to 16777216 (default: 0) [fm]	No
	8	Reserved 4	UINT	RO	No	0x0000 to 0xFFFF (default: 0x0000)	No
	9	Encoder pulse number	UDINT	RO	No	0 to 1073741824 (default: 0) [pulses/rev]	No
	10	Primary encoder information	UINT	RO	No	0x0000 to 0x2111 (default: 0x0000)	No
	11	Primary encoder information 2	UINT	RO	No	0x0000 to 0xFFFF (default: 0x0000)	No
	12	Multiturn limit	UINT	RO	No	0 to 65535 (default: 65535) [1 rev]	No
	13	Reserved 8	UINT	RO	No	0x0000 to 0x1111 (default: 0x0000)	No
	14	Reserved 9	UINT	RO	No	0x0000 to 0xFFFF (default: 0x0000)	No
	15	Reserved 10	UDINT	RO	No	0 to 16777216 (default: 0)	No
	16	Reserved 11	UINT	RO	No	0 to 0xFFFF (default: 0)	No
	17	Safe encoder configuration - safe address	UINT	RO	No	0x0000 to 0x003F (default: 0x0000)	No

(a) Motor Setting Switch

This item contains the set value of safety-related servo parameter Pc050.

(b) Function Setting Switch

This item contains the set value of safety-related servo parameter Pc051.

(c) Motor Max. Speed (Motor Encoder)

This item contains the set value of safety-related servo parameter Pc062.

(d) Encoder Information (Motor Encoder)

This item contains the set value of safety-related servo parameter Pc068.

(e) Multiturn Limit

This item contains the set value of safety-related servo parameter Pc06A.

(f) Safe Encoder Configuration - Safe Address

This item contains the set value of safety-related servo parameter Pc088.

(2) Safe Safety Fieldbus - FSoE Hardware Address

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5801h	0	Safety Fieldbus - Station Address	UINT	RO	No	0x0001 to 0xFFFF (default: 0x0001)	No

This set value is the same as the set value of safety-related module parameter Pc120.

(3) Encoder Deviation Diagnosis

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5802h	0	Number of entries	USINT	RO	No	2	No
	1	Encoder deviation	UDINT	RO	No	0 to 4294967295 (default: 0) [increments]	No
	2	Encoder deviation window	UINT	RO	No	0 to 65535 (default: 0) [1 ms]	No

(a) Encoder Deviation

This item contains the set value of safety-related module parameter Pc150.

(b) Encoder Deviation Window

This item contains the set value of safety-related module parameter Pc152.

(4) Limit Violation Deactivation Delay Time (LVDDT)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5804h	0	Limit Violation Deactivation Delay Time (LVDDT)	UINT	RO	No	0 to 10000 (default: 0) [1 ms]	No

This set value is the same as the set value of safety-related module parameter Pc172.

(5) Safety Function Application Selection

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5805h	0	Safety Function Application Selection	UINT	RO	No	0x0000 to 0x0011 (default: 0x0000)	No

This set value is the same as the set value of safety-related module parameter Pc170.

(6) User Units

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5808h	0	Number of entries	USINT	RO	No	12	No
	1	Numerator position user units encoder 1	UDINT	RO	No	1 to 1073741824 (default: 1)	No
	2	Denominator Position User Units Encoder 1	UDINT	RO	No	1 to 1073741824 (default: 1)	No
	3	Reserved 1	UDINT	RO	No	1 to 1073741824 (default: 1)	No
	4	Reserved 2	UDINT	RO	No	1 to 1073741824 (default: 1)	No
	5	Numerator speed user units encoder 1	UDINT	RO	No	1 to 1073741824 (default: 1)	No
	6	Denominator speed user units encoder 1	UDINT	RO	No	1 to 1073741824 (default: 1)	No
	7	Reserved 3	UDINT	RO	No	1 to 1073741824 (default: 1)	No
	8	Reserved 4	UDINT	RO	No	1 to 1073741824 (default: 1)	No
	9	Numerator acceleration user units encoder 1	UDINT	RO	No	1 to 1073741824 (default: 1)	No
	10	Denominator acceleration user units encoder 1	UDINT	RO	No	1 to 1073741824 (default: 1)	No
	11	Reserved 5	UDINT	RO	No	1 to 1073741824 (default: 1)	No
	12	Reserved 6	UDINT	RO	No	1 to 1073741824 (default: 1)	No

(a) Numerator Position User Units Encoder 1

This item contains the set value of safety-related module parameter Pc180.

(b) Denominator Position User Units Encoder 1

This item contains the set value of safety-related module parameter Pc182.

(c) Numerator Velocity User Units Encoder 1

This item contains the set value of safety-related module parameter Pc188.

(d) Denominator Velocity User Units Encoder 1

This item contains the set value of safety-related module parameter Pc18A.

(e) Numerator Acceleration User Units Encoder 1

This item contains the set value of safety-related module parameter Pc190.

(f) Denominator Acceleration User Units Encoder 1

This item contains the set value of safety-related module parameter Pc192.

(7) Digital Input Port (A to E)

This object contains the parameter settings of the digital input signal. The contents are common to the signals. Refer to the parameter specifications for the contents of the object.

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
*1	0	Number of entries	USINT	RO	No	3	No
	1	Configuration	UINT	RO	No	*2	No
	2	Filtering time	UINT	RO	No	*2	No
	3	Discrepancy allowable time	UINT	RO	No	*2	No

*1 The index for each digital input signal is listed below.

Digital Input Signal	Index
DIA	5810h
DIB	5811h
DIC	5812h
DID	5813h
DIE	5814h

*2 The relationship between the subindexes of the safety function slots and the parameter numbers is listed below.

Subindex	Digital Input Signal				
	DIA	DIB	DIC	DID	DIE
1	Pc0C0	Pc0C5	Pc0CA	Pc0CF	Pc0D4
2	Pc0C1	Pc0C6	Pc0CB	Pc0D0	Pc0D5
3	Pc0C2	Pc0C7	Pc0CC	Pc0D1	Pc0D6

(8) Digital Output Port (A to E)

This object contains the parameter settings of the digital output signal. The contents are common to the signals. Refer to the parameter specifications for the contents of the object.

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
*1	0	Number of entries	USINT	RO	No	4	No
	1	Configuration	UINT	RO	No	*2	No
	2	Test pulse length	UINT	RO	No	*2	No
	3	Signal ON length for initial diagnosis	UINT	RO	No	*2	No
	4	Signal OFF length for initial diagnosis	UINT	RO	No	*2	No

*1 The index for each digital output signal is listed below.

Digital Output Signal	Index
DOA	5820h
DOB	5821h
DOC	5822h
DOD	5823h
DOE	5824h

*2 The relationship between the subindexes of the safety function slots and the parameter numbers is listed below.

Subindex	Digital Output Signal				
	DOA	DOB	DOC	DOD	DOE
1	Pc0E0	Pc0E6	Pc0EC	Pc0F2	Pc0F8
2	Pc0E1	Pc0E7	Pc0ED	Pc0F3	Pc0F9
3	Pc0E2	Pc0E8	Pc0EE	Pc0F4	Pc0FA
4	Pc0E3	Pc0E9	Pc0EF	Pc0F5	Pc0FB

(9) Safety Fieldbus Operation Selection

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
58F0h	0	Safety Fieldbus Operation Selection	UINT	RO	No	0x0000 to 0x0111 (default: 0x0110)	No

(a) Safety Function Operation Selection at Safety Fieldbus Initial State

This item contains the set value of safety-related module parameter Pc121 = n.□□□X.

(b) Safe Fieldbus SPDU Selection

This item contains the set value of safety-related module parameter Pc121 = n.□□X□.

(c) ON/OFF Logic Selection for Safety Fieldbus Virtual Input

This item contains the set value of safety-related module parameter Pc121 = n.□X□□.

(10) Safety Slot 1 to 9 Parameters

This object contains the parameter settings of safety slots 1 to 9. The contents are common to each slot. Refer to the parameter specifications for the contents of the object.

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
*1	0	Number of entries	USINT	RO	No	12	No
	1	Configuration I	UINT	RO	No	*2	No
	2	Configuration II	UINT	RO	No	*2	No
	3	Configuration III	UINT	RO	No	*2	No
	4	Configuration IV	UINT	RO	No	*2	No
	5	Waiting time (t1)	UINT	RO	No	*2	No
	6	Monitoring time (t2)	UINT	RO	No	*2	No
	7	Speed limit (s1)	UDINT	RO	No	*2	No
	8	Speed limit (s1)	UDINT	RO	No	*2	No
	9	Acceleration limit (a1)	DINT	RO	No	*2	No
	10	Distance limit (p1)	DINT	RO	No	*2	No
	11	Distance limit (p2)	DINT	RO	No	*2	No
	12	Distance limit (p3)	UDINT	RO	No	*2	No

*1 The index for each safety function slot is listed below.

Safety Function Slot	Index
1	5910h
2	5911h
3	5912h

Continued on next page.

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Safety Function Slot	Index
4	5913h
5	5914h
6	5915h
7	5916h
8	5917h
9	5918h

*2 The relationship between the subindexes of the safety function slots and the parameter numbers is listed below.

Subindex	Safety Function Slot								
	1	2	3	4	5	6	7	8	9
1	Pc300	Pc340	Pc380	Pc3C0	Pc400	Pc440	Pc480	Pc4C0	Pc500
2	Pc301	Pc341	Pc381	Pc3C1	Pc401	Pc441	Pc481	Pc4C1	Pc501
3	Pc302	Pc342	Pc382	Pc3C2	Pc402	Pc442	Pc482	Pc4C2	Pc502
4	Pc303	Pc343	Pc383	Pc3C3	Pc403	Pc443	Pc483	Pc4C3	Pc503
5	Pc310	Pc350	Pc390	Pc3D0	Pc410	Pc450	Pc490	Pc4D0	Pc510
6	Pc311	Pc351	Pc391	Pc3D1	Pc411	Pc451	Pc491	Pc4D1	Pc511
7	Pc312	Pc352	Pc392	Pc3D2	Pc412	Pc452	Pc492	Pc4D2	Pc512
8	Pc314	Pc354	Pc394	Pc3D4	Pc414	Pc454	Pc494	Pc4D4	Pc514
9	Pc316	Pc356	Pc396	Pc3D6	Pc416	Pc456	Pc496	Pc4D6	Pc516
10	Pc318	Pc358	Pc398	Pc3D8	Pc418	Pc458	Pc498	Pc4D8	Pc518
11	Pc31A	Pc35A	Pc39A	Pc3DA	Pc41A	Pc45A	Pc49A	Pc4DA	Pc51A
12	Pc31C	Pc35C	Pc39C	Pc3DC	Pc41C	Pc45C	Pc49C	Pc4DC	Pc51C

(11) Safety Slot 10 Parameter

This object contains the parameter settings of safety slot 10.

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5919h	0	Number of entries	USINT	RO	No	7	No
	1	Configuration I	UINT	RO	No	0x0000 to 0x0011 (default: 0x0000)	No
	2	Configuration II	UINT	RO	No	0x0000 to 0x0614 (default: 0x0000)	No
	3	Configuration III	UINT	RO	No	0x0000 to 0x042F (default: 0x0000)	No
	4	Brake holding delay time (Tw_bkh)	UINT	RO	No	0 to 10000 (default: 0) [1 ms]	No
	5	Brake releasing delay time (Tw_bkr)	UINT	RO	No	0 to 10000 (default: 0) [1 ms]	No
	6	Allowable time for feedback signal unmatched when brake becomes holding (Td_bkh)	UINT	RO	No	0 to 300 (default: 30) [1 ms]	No
	7	Allowable time for feedback signal unmatched when brake becomes releasing (Td_bkr)	UINT	RO	No	0 to 300 (default: 30) [1 ms]	No

(a) Configuration I

This item contains the set value of safety-related module parameter Pc540.

(b) Configuration II

This item contains the set value of safety-related module parameter Pc541.

(c) Configuration III

This item contains the set value of safety-related module parameter Pc542.

(d) Waiting Time for the Brake Holding (Tw_bkh)

This item contains the set value of safety-related module parameter Pc550.

(e) Waiting Time for the Brake Releasing (Tw_bkr)

This item contains the set value of safety-related module parameter Pc551.

(f) Diagnostic Time (Td_bkh)

This item contains the set value of safety-related module parameter Pc552.

(g) Diagnostic Time (Td_bkr)

This item contains the set value of safety-related module parameter Pc554.

(12) Virtual Input Demand Value

This object monitors the current values of the virtual input signals sent from the FSoE MDevice.

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5A00h	0	Number of entries	USINT	RO	No	16	No
	1	Virtual input 0	BOOL	RO	SO (MainDevice output)	−	No
	2	Virtual input 1	BOOL	RO	SO	−	No
	3	Virtual input 2	BOOL	RO	SO	−	No
	4	Virtual input 3	BOOL	RO	SO	−	No
	5	Virtual input 4	BOOL	RO	SO	−	No
	6	Virtual input 5	BOOL	RO	SO	−	No
	7	Virtual input 6	BOOL	RO	SO	−	No
	8	Virtual input 7	BOOL	RO	SO	−	No
	9	Virtual input 8	BOOL	RO	SO	−	No
	10	Virtual input 9	BOOL	RO	SO	−	No
	11	Virtual input 10	BOOL	RO	SO	−	No
	12	Virtual input 11	BOOL	RO	SO	−	No
	13	Virtual input 12	BOOL	RO	SO	−	No
	14	Virtual input 13	BOOL	RO	SO	−	No
	15	Virtual input 14	BOOL	RO	SO	−	No
	16	Virtual input 15	BOOL	RO	SO	−	No

SO: MainDevice output (MDevice to SubDevice)

(13) Virtual Output Actual Value

This object monitors the current values of the virtual output signals sent to the FSoE MDevice from the safety module.

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5A01h	0	Number of entries	USINT	RO	No	16	No
	1	Virtual output 0	BOOL	RO	SI (MainDevice input)	–	No
	2	Virtual output 1	BOOL	RO	SI	–	No
	3	Virtual output 2	BOOL	RO	SI	–	No
	4	Virtual output 3	BOOL	RO	SI	–	No
	5	Virtual output 4	BOOL	RO	SI	–	No
	6	Virtual output 5	BOOL	RO	SI	–	No
	7	Virtual output 6	BOOL	RO	SI	–	No
	8	Virtual output 7	BOOL	RO	SI	–	No
	9	Virtual output 8	BOOL	RO	SI	–	No
	10	Virtual output 9	BOOL	RO	SI	–	No
	11	Virtual output 10	BOOL	RO	SI	–	No
	12	Virtual output 11	BOOL	RO	SI	–	No
	13	Virtual output 12	BOOL	RO	SI	–	No
	14	Virtual output 13	BOOL	RO	SI	–	No
	15	Virtual output 14	BOOL	RO	SI	–	No
	16	Virtual output 15	BOOL	RO	SI	–	No

SI: MainDevice input (SubDevice to MDevice)

(14) Safety Slot Status Actual Value

This object monitors the safety function slots that have detected a limit violation.

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5A02h	0	Number of entries	USINT	RO	No	10	No
	1	SF_1	BOOL	RO	SI (MainDevice input)	–	No
	2	SF_2	BOOL	RO	SI	–	No
	3	SF_3	BOOL	RO	SI	–	No
	4	SF_4	BOOL	RO	SI	–	No
	5	SF_5	BOOL	RO	SI	–	No
	6	SF_6	BOOL	RO	SI	–	No
	7	SF_7	BOOL	RO	SI	–	No
	8	SF_8	BOOL	RO	SI	–	No
	9	SF_9	BOOL	RO	SI	–	No
	10	SF_10	BOOL	RO	SI	–	No

SI: MainDevice input (SubDevice to MDevice)

(15) I/O Terminal Actual Value

This object monitors the current values of the digital I/O signals in the safety module.

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5A03h	0	Number of entries	USINT	RO	No	20	No
	1	DIA1	BOOL	RO	SI (MainDevice input)	−	No
	2	DIB1	BOOL	RO	SI	−	No
	3	DIC1	BOOL	RO	SI	−	No
	4	DID1	BOOL	RO	SI	−	No
	5	DIE1	BOOL	RO	SI	−	No
	6	DIA2	BOOL	RO	SI	−	No
	7	DIB2	BOOL	RO	SI	−	No
	8	DIC2	BOOL	RO	SI	−	No
	9	DID2	BOOL	RO	SI	−	No
	10	DIE2	BOOL	RO	SI	−	No
	11	DOA1	BOOL	RO	No	−	No
	12	DOB1	BOOL	RO	No	−	No
	13	DOC1	BOOL	RO	No	−	No
	14	DOD1	BOOL	RO	No	−	No
	15	DOE1	BOOL	RO	No	−	No
	16	DOA2	BOOL	RO	No	−	No
	17	DOB2	BOOL	RO	No	−	No
	18	DOC2	BOOL	RO	No	−	No
	19	DOD2	BOOL	RO	No	−	No
	20	DOE2	BOOL	RO	No	−	No

SI: MainDevice input (SubDevice to MDevice)

(16) Multi Monitor Select Demand Value (MPD)

This object monitors the multi monitor request code for the safety module.

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5A04h	0	Number of entries	USINT	RO	No	4	No
	1	MPD 0	BOOL	RO	SO (MainDevice output)	−	No
	2	MPD 1	BOOL	RO	SO	−	No
	3	MPD 2	BOOL	RO	SO	−	No
	4	MPD 3	BOOL	RO	SO	−	No

SO: MainDevice output (MDevice to SubDevice)

(17) Multi Monitor Select Actual Value (MPA)

This object monitors the monitor code being output by the multi monitor that is output by the safety module.

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5A05h	0	Number of entries	USINT	RO	No	4	No
	1	MPA 0	BOOL	RO	SI (MainDevice input)	–	No
	2	MPA 1	BOOL	RO	SI	–	No
	3	MPA 2	BOOL	RO	SI	–	No
	4	MPA 3	BOOL	RO	SI	–	No

SI: MainDevice input (SubDevice to MDevice)

(18) Multi Monitor 1 Actual Value

This object monitors the multi monitor data that is output by the safety module.

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5A06h	0	Number of entries	USINT	RO	No	2	No
	1	Multi monitor 1 actual value (1st word)	UINT	RO	SI (MainDevice input)	–	No
	2	Multi monitor 1 actual value (2nd word)	UINT	RO	SI	–	No

SI: MainDevice input (SubDevice to MDevice)

(19) Multi Monitor 2 Actual Value

This object monitors the multi monitor data that is output by the safety module.

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5A07h	0	Number of entries	USINT	RO	No	2	No
	1	Multi monitor 2 actual value (1st word)	UINT	RO	SI (MainDevice input)	–	No
	2	Multi monitor 2 actual value (2nd word)	UINT	RO	SI	–	No

SI: MainDevice input (SubDevice to MDevice)

(20) FSoE Error

This object monitors the error bit sent to the FSoE MDevice from the safety module.

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5A08h	0	FSoE Error	BOOL	RO	SI (MainDevice input)	–	No

SI: MainDevice input (SubDevice to MDevice)

(21) FSoE Error Ack

This object monitors ErrAck bit sent to the safety module from the FSoE MDevice.

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5A09h	0	FSoE Error Ack	BOOL	RO	SO (MainDevice output)	–	No

SO: MainDevice output (MDevice to SubDevice)

(22) Safety Slot Actual Value 1

This object monitors the current monitoring threshold value of the safety function slot indicated by object 2629h.

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5A0Ah	0	Number of entries	USINT	RO	No	6	No
	1	Selected slot number	UINT	RO	No	−	No
	2	Actual position limit 1	DINT	RO	No	− [User position reference unit]	No
	3	Actual position limit 2	DINT	RO	No	− [User position reference unit]	No
	4	Actual speed limit 1	DINT	RO	No	− [User speed reference unit]	No
	5	Actual speed limit 2	DINT	RO	No	− [User speed reference unit]	No
	6	Actual acceleration limit	DINT	RO	No	− [User acceleration reference unit]	No

(23) Safety Slot Actual Value 2

This object monitors the current monitoring threshold value of the safety function slot indicated by object 2629h.

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5A0Bh	0	Number of entries	USINT	RO	No	11	No
	1	Safety function status for slot 1 to 8	UDINT	RO	No	−	No
	2	Safety function status for slot 9 to 10	UDINT	RO	No	−	No
	3	Actual position (monitoring)	DINT	RO	No	− [User position reference unit]	No
	4	Actual position	DINT	RO	No	− [User position reference unit]	No
	5	Actual speed	DINT	RO	No	− [User speed reference unit]	No
	6	Actual acceleration	DINT	RO	No	− [User speed reference unit]	No
	7	Reserved 1	INT	RO	No	−	No
	8	Reserved 2	INT	RO	No	−	No
	9	Actual position encoder 2	DINT	RO	No	− [User position reference unit]	No
	10	SHP status	BOOL	RO	SI (MainDevice input)	−	No
	11	SHP encoder position	DINT	RO	No	− [User position reference unit]	No

SI: MainDevice input (SubDevice to MDevice)

(a) Safety Function Status of Slots

Safety function status of slots

Subindex	Bit	Description	Value
1	0	Safety function status of slot 1: During operation	1 = During operation
	1	Safety function status of slot 1: During working safety function	1 = During working safety function
	2	Safety function status of slot 1: After limit violation	1 = After limit violation
	3	Safety function status of slot 1: During safe state (HWBB)	1 = During safe state (HWBB (STO))
	4 to 7	Safety function status of slot 2 (content is the same as that of slot 1)	Same as slot 1
	8 to 11	Safety function status of slot 3 (content is the same as that of slot 1)	Same as slot 1
	12 to 15	Safety function status of slot 4 (content is the same as that of slot 1)	Same as slot 1
	16 to 19	Safety function status of slot 5 (content is the same as that of slot 1)	Same as slot 1
	20 to 23	Safety function status of slot 6 (content is the same as that of slot 1)	Same as slot 1
	24 to 27	Safety function status of slot 7 (content is the same as that of slot 1)	Same as slot 1
	28 to 31	Safety function status of slot 8 (content is the same as that of slot 1)	Same as slot 1
2	0 to 3	Safety function status of slot 9 (content is the same as that of slot 1)	Same as slot 1
	4 to 7	Safety function status of slot 10 (content is the same as that of slot 1)	Same as slot 1

9

Object Dictionary

This chapter provides tables of the objects that are supported by an EtherCAT SERVOPACK.
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9.1 Object Dictionary List

The following table lists the dictionary objects.

Functional Classification	Object Name	Indexes of Related Objects
PDO Mapping Objects	Receive PDO mapping of FSoE safety module	1608h and 1609h
	Transmit PDO mapping of FSoE safety module	1A08h and 1609h
Sync Manager Communication Objects	Sync manager PDO assignment	1C12h and 1C13h
Manufacturer Specific Objects	SERVOPACK parameters	2000h to 26FFh
Manufacturer Specific Objects (Safety Module)	Safety module parameters	5800h to 5FFFh
FSoE SubDevice Connection Input	FSoE SubDevice frame elements	E600h
FSoE SubDevice Connection Output	FSoE MainDevice frame elements	E700h
FSoE SubDevice Connection Information	FSoE info data	E900h
	FSoE communication parameter	E901h
FSoE SubDevice Connection Diagnosis	FSoE connection diagnosis	EA00h
FSoE Device Information	Modular device profile	F000h
	Module list	F010h
	Detected modules	F050h
	Device Safety address	F980h

9.2 PDO Mapping Objects

The CANopen over EtherCAT protocol allows the user to map objects to process data objects (PDOs) in order to use the PDOs for realtime data transfer.

The PDO Mappings define which objects will be included in the PDOs.

A Mapping Entry (subindexes 1 to 16) is defined as shown below.

	Bit 31 to 16	Bit 15 to 8	Bit 7 to 0
Definition	Object index	Subindex	Length
Description	The index of the mapped object (0 if there is a gap in the PDOs)	The subindex of the mapped object (0 if there is a gap in the PDOs)	The length of the mapped object in bits (If there is a gap in the PDOs, the bit length of the gap is given.)

Information The objects mapped to PDOs can be changed only when the EtherCAT Network Module is in the Pre-Operational state.

Set the mapping entries (subindexes 1 to 16) only after you write 0 to subindex 0.

9.2.1 Receive PDO Mapping of FSoE Safety Module (1608h and 1609h)

(1) 1st RxPDO Mapping of FSoE SubDevice

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
1608h	0	Number of entries	USINT	RO	No	27	No
	1	Mapping entry 1 (FSoE MainDevice command)	UDINT	RO	No	0xE7000108	No
	2	Mapping entry 2 (Virtual input 0)	UDINT	RO	No	0x5A000101	No
	3	Mapping entry 3 (Virtual input 1)	UDINT	RO	No	0x5A000201	No
	4	Mapping entry 4 (Virtual input 2)	UDINT	RO	No	0x5A000301	No
	5	Mapping entry 5 (Virtual input 3)	UDINT	RO	No	0x5A000401	No
	6	Mapping entry 6 (Virtual input 4)	UDINT	RO	No	0x5A000501	No
	7	Mapping entry 7 (Virtual input 5)	UDINT	RO	No	0x5A000601	No
	8	Mapping entry 8 (Virtual input 6)	UDINT	RO	No	0x5A000701	No
	9	Mapping entry 9 (Virtual input 7)	UDINT	RO	No	0x5A000801	No
1608h	10	Mapping entry 10 (Virtual input 8)	UDINT	RO	No	0x5A000901	No
	11	Mapping entry 11 (Virtual input 9)	UDINT	RO	No	0x5A000A01	No
	12	Mapping entry 12 (Virtual input 10)	UDINT	RO	No	0x5A000B01	No
	13	Mapping entry 13 (Virtual input 11)	UDINT	RO	No	0x5A000C01	No
	14	Mapping entry 14 (Virtual input 12)	UDINT	RO	No	0x5A000D01	No
	15	Mapping entry 15 (Virtual input 13)	UDINT	RO	No	0x5A000E01	No
	16	Mapping entry 16 (Virtual input 14)	UDINT	RO	No	0x5A000F01	No
	17	Mapping entry 17 (Virtual input 15)	UDINT	RO	No	0x5A001001	No
	18	Mapping entry 18 (FSoE MainDevice CRC_0)	UDINT	RO	No	0xE7000310	No
	19	Mapping entry 19 (MPD 0)	UDINT	RO	No	0x5A040101	No

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Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
1608h	20	Mapping entry 20 (MPD 1)	UDINT	RO	No	0x5A040201	No
	21	Mapping entry 21 (MPD 2)	UDINT	RO	No	0x5A040301	No
	22	Mapping entry 22 (MPD 3)	UDINT	RO	No	0x5A040401	No
	23	Mapping entry 23 (Padding)	UDINT	RO	No	0x00000003	No
	24	Mapping entry 24 (FSoE error ack)	UDINT	RO	No	0x5A090001	No
	25	Mapping entry 25 (Padding)	UDINT	RO	No	0x00000008	No
	26	Mapping entry 26 (FSoE MainDevice CRC_1)	UDINT	RO	No	0xE7000410	No
	27	Mapping entry 27 (FSoE MainDevice connection ID)	UDINT	RO	No	0xE7000210	No

(2) 2nd RxPDO Mapping of FSoE SubDevice

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
1609h	0	Number of entries	USINT	RO	No	23	No
	1	Mapping entry 1 (FSoE MainDevice command)	UDINT	RO	No	0xE7000108	No
	2	Mapping entry 2 (Virtual input 0)	UDINT	RO	No	0x5A000101	No
	3	Mapping entry 3 (Virtual input 1)	UDINT	RO	No	0x5A000201	No
	4	Mapping entry 4 (Virtual input 2)	UDINT	RO	No	0x5A000301	No
	5	Mapping entry 5 (Virtual input 3)	UDINT	RO	No	0x5A000401	No
	6	Mapping entry 6 (Virtual input 4)	UDINT	RO	No	0x5A000501	No
	7	Mapping entry 7 (Virtual input 5)	UDINT	RO	No	0x5A000601	No
	8	Mapping entry 8 (Virtual input 6)	UDINT	RO	No	0x5A000701	No
	9	Mapping entry 9 (Virtual input 7)	UDINT	RO	No	0x5A000801	No
1609h	10	Mapping entry 10 (Virtual input 8)	UDINT	RO	No	0x5A000901	No
	11	Mapping entry 11 (Virtual input 9)	UDINT	RO	No	0x5A000A01	No
	12	Mapping entry 12 (Virtual input 10)	UDINT	RO	No	0x5A000B01	No
	13	Mapping entry 13 (Virtual input 11)	UDINT	RO	No	0x5A000C01	No
	14	Mapping entry 14 (Virtual input 12)	UDINT	RO	No	0x5A000D01	No
	15	Mapping entry 15 (Virtual input 13)	UDINT	RO	No	0x5A000E01	No
	16	Mapping entry 16 (Virtual input 14)	UDINT	RO	No	0x5A000F01	No
	17	Mapping entry 17 (Virtual input 15)	UDINT	RO	No	0x5A001001	No
	18	Mapping entry 18 (FSoE MainDevice CRC_0)	UDINT	RO	No	0xE7000310	No
	19	Mapping entry 19 (Padding)	UDINT	RO	No	0x00000007	No

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Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
1609h	20	Mapping entry 20 (FSoE error ack)	UDINT	RO	No	0x5A040201	No
	21	Mapping entry 21 (Padding)	UDINT	RO	No	0x00000008	No
	22	Mapping entry 22 (FSoE MainDevice CRC_1)	UDINT	RO	No	0xE7000410	No
	23	Mapping entry 23 (FSoE MainDevice conncetion ID)	UDINT	RO	No	0xE7000210	No

9.2.2 Transmit PDO Mapping of FSoE Safety Module (1A08h and 1A09h)

(1) 1st TxPDO Mapping of FSoE SubDevice

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
1A08h	0	Number of entries	USINT	RO	No	57	No
	1	Mapping entry 1 (FSoE SubDevice command)	UDINT	RO	No	0xE6000108	No
	2	Mapping entry 2 (Virtual output 0)	UDINT	RO	No	0x5A010101	No
	3	Mapping entry 3 (Virtual output 1)	UDINT	RO	No	0x5A010201	No
	4	Mapping entry 4 (Virtual output 2)	UDINT	RO	No	0x5A010301	No
	5	Mapping entry 5 (Virtual output 3)	UDINT	RO	No	0x5A010401	No
	6	Mapping entry 6 (Virtual output 4)	UDINT	RO	No	0x5A010501	No
	7	Mapping entry 7 (Virtual output 5)	UDINT	RO	No	0x5A010601	No
	8	Mapping entry 8 (Virtual output 6)	UDINT	RO	No	0x5A010701	No
	9	Mapping entry 9 (Virtual output 7)	UDINT	RO	No	0x5A010801	No
1A08h	10	Mapping entry 10 (Virtual output 8)	UDINT	RO	No	0x5A010901	No
	11	Mapping entry 11 (Virtual output 9)	UDINT	RO	No	0x5A010A01	No
	12	Mapping entry 12 (Virtual output 10)	UDINT	RO	No	0x5A010B01	No
	13	Mapping entry 13 (Virtual output 11)	UDINT	RO	No	0x5A01C01	No
	14	Mapping entry 14 (Virtual output 12)	UDINT	RO	No	0x5A010D01	No
	15	Mapping entry 15 (Virtual output 13)	UDINT	RO	No	0x5A010E01	No
	16	Mapping entry 16 (Virtual output 14)	UDINT	RO	No	0x5A010F01	No
	17	Mapping entry 17 (Virtual output 15)	UDINT	RO	No	0x5A011001	No
	18	Mapping entry 18 (FSoE SubDevice CRC_0)	UDINT	RO	No	0xE6000310	No
	19	Mapping entry 19 (SF_1)	UDINT	RO	No	0x5A020101	No

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Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
1A08h	20	Mapping entry 20 (SF_2)	UDINT	RO	No	0x5A020201	No
	21	Mapping entry 21 (SF_3)	UDINT	RO	No	0x5A020301	No
	22	Mapping entry 22 (SF_4)	UDINT	RO	No	0x5A020401	No
	23	Mapping entry 23 (SF_5)	UDINT	RO	No	0x5A020501	No
	24	Mapping entry 24 (SF_6)	UDINT	RO	No	0x5A020601	No
	25	Mapping entry 25 (SF_7)	UDINT	RO	No	0x5A020701	No
	26	Mapping entry 26 (SF_8)	UDINT	RO	No	0x5A020801	No
	27	Mapping entry 27 (SF_9)	UDINT	RO	No	0x5A020901	No
	28	Mapping entry 28 (SF_10)	UDINT	RO	No	0x5A020A01	No
	29	Mapping entry 29 (DIA1)	UDINT	RO	No	0x5A030101	No
1A08h	30	Mapping entry 30 (DIB1)	UDINT	RO	No	0x5A030201	No
	31	Mapping entry 31 (DIC1)	UDINT	RO	No	0x5A030301	No
	32	Mapping entry 32 (DID1)	UDINT	RO	No	0x5A030401	No
	33	Mapping entry 33 (DIE1)	UDINT	RO	No	0x5A030501	No
	34	Mapping entry 34 (DIA2)	UDINT	RO	No	0x5A030601	No
	35	Mapping entry 35 (FSoE SubDevice CRC_1)	UDINT	RO	No	0xE6000410	No
	36	Mapping entry 36 (DIB2)	UDINT	RO	No	0x5A030701	No
	37	Mapping entry 37 (DIC2)	UDINT	RO	No	0x5A030801	No
	38	Mapping entry 38 (DID2)	UDINT	RO	No	0x5A030901	No
	39	Mapping entry 39 (DIE2)	UDINT	RO	No	0x5A030A01	No

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Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
1A08h	40	Mapping entry 40 (MPA 0)	UDINT	RO	No	0x5A050101	No
	41	Mapping entry 41 (MPA 1)	UDINT	RO	No	0x5A050201	No
	42	Mapping entry 42 (MPA 2)	UDINT	RO	No	0x5A050301	No
	43	Mapping entry 43 (MPA 3)	UDINT	RO	No	0x5A050401	No
	44	Mapping entry 44 (Padding)	UDINT	RO	No	0x00000005	No
	45	Mapping entry 45 (STO status)	UDINT	RO	No	0x5A0D0001	No
	46	Mapping entry 46 (SHP status)	UDINT	RO	No	0x5A0B0A01	No
	47	Mapping entry 47 (FSoE error)	UDINT	RO	No	0x5A080001	No
	48	Mapping entry 48 (FSoE SubDevice CRC_2)	UDINT	RO	No	0xE6000510	No
	49	Mapping entry 49 (Multi monitor 1 actual value (1st word))	UDINT	RO	No	0x5A060110	No
1A08h	50	Mapping entry 50 (FSoE SubDevice CRC_3)	UDINT	RO	No	0xE6000610	No
	51	Mapping entry 51 (Multi monitor 1 actual value (2nd word))	UDINT	RO	No	0x5A060210	No
	52	Mapping entry 52 (FSoE SubDevice CRC_4)	UDINT	RO	No	0xE6000710	No
	53	Mapping entry 53 (Multi monitor 2 actual value (1st word))	UDINT	RO	No	0x5A070110	No
	54	Mapping entry 54 (FSoE SubDevice CRC_5)	UDINT	RO	No	0xE6000810	No
	55	Mapping entry 55 (Multi monitor 2 actual value (2nd word))	UDINT	RO	No	0x5A070210	No
	56	Mapping entry 56 (FSoE SubDevice CRC_6)	UDINT	RO	No	0xE6000910	No
	57	Mapping entry 57 (FSoE SubDevice connection ID)	UDINT	RO	No	0xE6000210	No

(2) 2nd TxPDO Mapping of FSoE SubDevice

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
1A09h	0	Number of entries	USINT	RO	No	34	No
	1	Mapping entry 1 (FSoE SubDevice command)	UDINT	RO	No	0xE6000108	No
	2	Mapping entry 2 (Virtual output 0)	UDINT	RO	No	0x5A010101	No
	3	Mapping entry 3 (Virtual output 1)	UDINT	RO	No	0x5A010201	No
	4	Mapping entry 4 (Virtual output 2)	UDINT	RO	No	0x5A010301	No
	5	Mapping entry 5 (Virtual output 3)	UDINT	RO	No	0x5A010401	No
	6	Mapping entry 6 (Virtual output 4)	UDINT	RO	No	0x5A010501	No
	7	Mapping entry 7 (Virtual output 5)	UDINT	RO	No	0x5A010601	No
	8	Mapping entry 8 (Virtual output 6)	UDINT	RO	No	0x5A010701	No
	9	Mapping entry 9 (Virtual output 7)	UDINT	RO	No	0x5A010801	No
1A09h	10	Mapping entry 10 (Virtual output 8)	UDINT	RO	No	0x5A010901	No
	11	Mapping entry 11 (Virtual output 9)	UDINT	RO	No	0x5A010A01	No
	12	Mapping entry 12 (Virtual output 10)	UDINT	RO	No	0x5A010B01	No
	13	Mapping entry 13 (Virtual output 11)	UDINT	RO	No	0x5A010C01	No
	14	Mapping entry 14 (Virtual output 12)	UDINT	RO	No	0x5A010D01	No
	15	Mapping entry 15 (Virtual output 13)	UDINT	RO	No	0x5A010E01	No
	16	Mapping entry 16 (Virtual output 14)	UDINT	RO	No	0x5A010F01	No
	17	Mapping entry 17 (Virtual output 15)	UDINT	RO	No	0x5A011001	No
	18	Mapping entry 18 (FSoE SubDevice CRC_0)	UDINT	RO	No	0xE6000310	No
	19	Mapping entry 19 (SF_1)	UDINT	RO	No	0x5A020101	No

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Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
1A09h	20	Mapping entry 20 (SF_2)	UDINT	RO	No	0x5A020201	No
	21	Mapping entry 21 (SF_3)	UDINT	RO	No	0x5A020301	No
	22	Mapping entry 22 (SF_4)	UDINT	RO	No	0x5A020401	No
	23	Mapping entry 23 (SF_5)	UDINT	RO	No	0x5A020501	No
	24	Mapping entry 24 (SF_6)	UDINT	RO	No	0x5A020601	No
	25	Mapping entry 25 (SF_7)	UDINT	RO	No	0x5A020701	No
	26	Mapping entry 26 (SF_8)	UDINT	RO	No	0x5A020801	No
	27	Mapping entry 27 (SF_9)	UDINT	RO	No	0x5A020901	No
	28	Mapping entry 28 (SF_10)	UDINT	RO	No	0x5A020A01	No
	29	Mapping entry 29 (Padding)	UDINT	RO	No	0x00000003	No
1A09h	30	Mapping entry 30 (STO status)	UDINT	RO	No	0x5A0D0001	No
	31	Mapping entry 31 (SHP status)	UDINT	RO	No	0x5A0B0A01	No
	32	Mapping entry 32 (FSoE error)	UDINT	RO	No	0x5A080001	No
	33	Mapping entry 33 (FSoE SubDevice CRC_1)	UDINT	RO	No	0xE6000410	No
	34	Mapping entry 34 (FSoE SubDevice connection ID)	UDINT	RO	No	0xE6000210	No

9.3 Sync Manager Communication Objects

9.3.1 Sync Manager PDO Assignment (1C12h and 1C13h)

This object defines which PDOs will be transferred in the process data communications.

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
1C12h	0	Number of assigned PDOs	USINT	RW	No	0 to 3 (default: 1)	Yes
	1	Index of assigned RxPDO 1	UINT	RW	No	0x1600 to 0x1609 (default: 0x1601)	Yes
	2	Index of assigned RxPDO 2	UINT	RW	No	0x1600 to 0x1609 (default: 0x1600)	Yes
	3	Index of assigned RxPDO 3	UINT	RW	No	0x1600 to 0x1609 (default: 0x1602)	Yes
1C13h	0	Number of assigned PDOs	USINT	RW	No	0 to 3 (default: 1)	Yes
	1	Index of assigned TxPDO 1	UINT	RW	No	0x1A00 to 0x1A09 (default: 0x1A01)	Yes
	2	Index of assigned TxPDO 2	UINT	RW	No	0x1A00 to 0x1A09 (default: 0x1A00)	Yes
	3	Index of assigned TxPDO 3	UINT	RW	No	0x1A00 to 0x1A09 (default: 0x1A02)	Yes

Objects 1C12h and 1C13h can be changed when the EtherCAT Network Module is in the Pre-Operational state. Set subindex 1 or 2 only after you write 0 to subindex 0.

9.4 Manufacturer Specific Objects

9.4.1 Safety Module Monitor (2720h)

This object gives the overall status of all safety function slots being executed by the ASM-X.

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
2720h	0	Safety Module Monitor	UDINT	RO	Yes	–	No

Bit	Function	Description
0 to 11	– (Reserved)	–
12	Safety Module Status: During operation	0: – 1: During operation
13	Safety Module Status: During working safety function	0: – 1: During working safety function
14	Safety Module Status: After limit violation	0: – 1: After limit violation
15	Safety Module Status: During safe state (HWBB)	0: – 1: During safe state (HWBB)
16 to 31	– (Reserved)	–

9.4.2 SERVOPACK Parameters (2000h to 26FFh)

Objects 2000h to 26FFh are mapped to SERVOPACK parameters (Pn□□□).

Object index 2□□□h corresponds to Pn□□□ in the SERVOPACK parameters (e.g., object 2100h is the same as Pn100).

9.5 Manufacturer Specific Objects (Safety Module)

9.5.1 Safety Related Servo Parameters (5800h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5800h	0	Number of entries	USINT	RO	No	17	No
	1	Motor setting switch	UINT	RO	No	0x0000 to 0x0011 (default: 0x0000)	No
	2	Function setting switch	UINT	RO	No	0x0000 to 0x0001 (default: 0x0000)	No
	3	Reserved 1	UINT	RO	No	0x0000 to 0x0000 (default: 0x0000)	No
	4	Reserved 2	UDINT	RO	No	0 to 0 (default: 0)	No
	5	Encoder configuration setting 1	UINT	RO	No	0 to 32 (default: 26)	No
	6	Motor max. speed (motor encoder)	UINT	RO	No	0x0000 to 0xFFFF (default: 0x0107)	No
	7	Reserved 3	UDINT	RO	No	0 to 16777216 (default: 0) [fm]	No
	8	Reserved 4	UINT	RO	No	0x0000 to 0xFFFF (default: 0x0000)	No
	9	Encoder pulse number	UDINT	RO	No	0 to 1073741824 (default: 0) [pulses/rev]	No
	10	Primary encoder information	UINT	RO	No	0x0000 to 0x2111 (default: 0x0000)	No
	11	Primary encoder information 2	UINT	RO	No	0x0000 to 0xFFFF (default: 0x0000)	No
	12	Multiturn limit	UINT	RO	No	0 to 65535 (default: 65535) [1 rev]	No
	13	Reserved 8	UINT	RO	No	0x0000 to 0x1111 (default: 0x0000)	No
	14	Reserved 9	UINT	RO	No	0x0000 to 0xFFFF (default: 0x0000)	No
	15	Reserved 10	UDINT	RO	No	0 to 16777216 (default: 0)	No
	16	Reserved 11	UINT	RO	No	0 to 0xFFFF (default: 0)	No
	17	Safe encoder configuration - safe address	UINT	RO	No	0x0000 to 0x003F (default: 0x0000)	No

9.5.2 Safety Fieldbus - Station Address FSoE Hardware Address (5801h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5801h	0	Safety Fieldbus - Station Address	UINT	RO	No	0x0001 to 0xFFFF (default: 0x0001)	No

9.5.3 Encoder Deviation Diagnosis (5802h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5802h	0	Number of entries	USINT	RO	No	2	No
	1	Encoder deviation	UDINT	RO	No	0 to 4294967295 (default: 0) [increments]	No
	2	Encoder deviation window	UINT	RO	No	0 to 65535 (default: 0) [1 ms]	No

9.5.4 Home Position Offset (5803h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5803h	0	Home Position Offset	DINT	RO	No	-1073741823 to 1073741823 (default: 0) [User position reference unit]	No

9.5.5 Limit Violation Deactivation Delay Time (LVDDT) (5804h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5804h	0	Limit Violation Deactivation Delay Time (LVDDT)	UINT	RO	No	0 to 10000 (default: 0) [1 ms]	No

9.5.6 Safety Function Application Selection (5805h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5805h	0	Safety Function Application Selection	UINT	RO	No	0x0000 to 0x0011 (default: 0x0000)	No

9.5.7 Acceleration Filter Time (5806h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5806h	0	Acceleration Filter Time	UINT	RO	No	0 to 30 (default: 0) [1 ms]	No

9.5.8 User Units (5808h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5808h	0	Number of entries	USINT	RO	No	12	No
	1	Numerator position user units encoder 1	UDINT	RO	No	1 to 1073741824 (default: 1)	No
	2	Denominator Position User Units Encoder 1	UDINT	RO	No	1 to 1073741824 (default: 1)	No
	3	Reserved 1	UDINT	RO	No	1 to 1073741824 (default: 1)	No
	4	Reserved 2	UDINT	RO	No	1 to 1073741824 (default: 1)	No
	5	Numerator speed user units encoder 1	UDINT	RO	No	1 to 1073741824 (default: 1)	No
	6	Denominator speed user units encoder 1	UDINT	RO	No	1 to 1073741824 (default: 1)	No
	7	Reserved 3	UDINT	RO	No	1 to 1073741824 (default: 1)	No
	8	Reserved 4	UDINT	RO	No	1 to 1073741824 (default: 1)	No
	9	Numerator acceleration user units encoder 1	UDINT	RO	No	1 to 1073741824 (default: 1)	No
	10	Denominator acceleration user units encoder 1	UDINT	RO	No	1 to 1073741824 (default: 1)	No
	11	Reserved 5	UDINT	RO	No	1 to 1073741824 (default: 1)	No
	12	Reserved 6	UDINT	RO	No	1 to 1073741824 (default: 1)	No

9.5.9 Digital Input Port (5810h to 5814h)

(1) Digital Input Port A (5810h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5810h	0	Number of entries	USINT	RO	No	3	No
	1	Configuration	UINT	RO	No	0x0000 to 0x0001 (default: 0x0000)	No
	2	Filtering time	UINT	RO	No	0 to 1000 (default: 0) [1 ms]	No
	3	Discrepancy allowable time	UINT	RO	No	15 to 1000 (default: 15) [1 ms]	No

(2) Digital Input Port B (5811h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5811h	0	Number of entries	USINT	RO	No	3	No
	1	Configuration	UINT	RO	No	0x0000 to 0x0001 (default: 0x0000)	No
	2	Filtering time	UINT	RO	No	0 to 1000 (default: 0) [1 ms]	No
	3	Discrepancy allowable time	UINT	RO	No	15 to 1000 (default: 15) [1 ms]	No

(3) Digital Input Port C (5812h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5812h	0	Number of entries	USINT	RO	No	3	No
	1	Configuration	UINT	RO	No	0x0000 to 0x0001 (default: 0x0000)	No
	2	Filtering time	UINT	RO	No	0 to 1000 (default: 0) [1 ms]	No
	3	Discrepancy allowable time	UINT	RO	No	15 to 1000 (default: 15) [1 ms]	No

(4) Digital Input Port D (5813h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5813h	0	Number of entries	USINT	RO	No	3	No
	1	Configuration	UINT	RO	No	0x0000 to 0x0001 (default: 0x0000)	No
	2	Filtering time	UINT	RO	No	0 to 1000 (default: 0) [1 ms]	No
	3	Discrepancy allowable time	UINT	RO	No	15 to 1000 (default: 15) [1 ms]	No

(5) Digital Input Port E (5814h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5814h	0	Number of entries	USINT	RO	No	3	No
	1	Configuration	UINT	RO	No	0x0000 to 0x0001 (default: 0x0000)	No
	2	Filtering time	UINT	RO	No	0 to 1000 (default: 0) [1 ms]	No
	3	Discrepancy allowable time	UINT	RO	No	15 to 1000 (default: 15) [1 ms]	No

9.5.10 Digital Output Port (5820h to 5824h)

(1) Digital Output Port A (5820h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5820h	0	Number of entries	USINT	RO	No	4	No
	1	Configuration	UINT	RO	No	0x0000 to 0x1141 (default: 0x1100)	No
	2	Test pulse length	UINT	RO	No	1 to 50 (default: 1) [1 ms]	No
	3	On delay time	UINT	RO	No	30 to 300 (default: 30) [1 ms]	No
	4	Off delay time	UINT	RO	No	30 to 300 (default: 30) [1 ms]	No

(2) Digital Output Port B (5821h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5821h	0	Number of entries	USINT	RO	No	4	No
	1	Configuration	UINT	RO	No	0x0000 to 0x1141 (default: 0x1100)	No
	2	Test pulse length	UINT	RO	No	1 to 50 (default: 1) [1 ms]	No
	3	On delay time	UINT	RO	No	30 to 300 (default: 30) [1 ms]	No
	4	Off delay time	UINT	RO	No	30 to 300 (default: 30) [1 ms]	No

(3) Digital Output Port C (5822h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5822h	0	Number of entries	USINT	RO	No	4	No
	1	Configuration	UINT	RO	No	0x0000 to 0x1141 (default: 0x1100)	No
	2	Test pulse length	UINT	RO	No	1 to 50 (default: 1) [1 ms]	No
	3	On delay time	UINT	RO	No	30 to 300 (default: 30) [1 ms]	No
	4	Off delay time	UINT	RO	No	30 to 300 (default: 30) [1 ms]	No

(4) Digital Output Port D (5823h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5823h	0	Number of entries	USINT	RO	No	4	No
	1	Configuration	UINT	RO	No	0x0000 to 0x1141 (default: 0x1100)	No
	2	Test pulse length	UINT	RO	No	1 to 50 (default: 1) [1 ms]	No
	3	On delay time	UINT	RO	No	30 to 300 (default: 30) [1 ms]	No
	4	Off delay time	UINT	RO	No	30 to 300 (default: 30) [1 ms]	No

(5) Digital Output Port E (5824h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5824h	0	Number of entries	USINT	RO	No	4	No
	1	Configuration	UINT	RO	No	0x0000 to 0x1141 (default: 0x1100)	No
	2	Test pulse length	UINT	RO	No	1 to 50 (default: 1) [1 ms]	No
	3	On delay time	UINT	RO	No	30 to 300 (default: 30) [1 ms]	No
	4	Off delay time	UINT	RO	No	30 to 300 (default: 30) [1 ms]	No

9.5.11 Safety Fieldbus Operation Selection (58F0h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
58F0h	0	Safety Fieldbus Operation Selection	UINT	RO	No	0x0000 to 0x0111 (default: 0x0110)	No

9.5.12 Selection for the Operations When VI Becomes Not Available (58F1h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
58F1h	0	Selection for the Operations When VI Becomes Not Available	UINT	RO	No	0x0000 to 0x0091 (default: 0x0000)	No

9.5.13 Slot Parameters (5910h-5919h)

(1) Slot 1 Parameters (5910h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5910h	0	Number of entries	USINT	RO	No	12	No
	1	Configuration I	UINT	RO	No	0x0000 to 0x0013 (default: 0x0000)	No
	2	Configuration II	UINT	RO	No	0x0000 to 0x3939 (default: 0x0000)	No
	3	Configuration III	UINT	RO	No	0x0000 to 0x042F (default: 0x0000)	No
	4	Configuration IV	UINT	RO	No	0x0000 to 0x002F (default: 0x0000)	No
	5	Waiting time (t1)	UINT	RO	No	0 to 10000 (default: 0) [10 ms]	No
	6	Monitoring time (t2)	UINT	RO	No	0 to 10000 (default: 0) [10 ms]	No
	7	Speed limit (s1)	UDINT	RO	No	0 to 4294967295 (default: 0) [User speed reference unit]	No
	8	Speed limit (s2)	UDINT	RO	No	0 to 4294967295 (default: 0) [User speed reference unit]	No
	9	Acceleration limit (a1)	DINT	RO	No	-2147483648 to 2147483647 (default: 0) [User acceleration reference unit]	No
	10	Distance limit (p1)	DINT	RO	No	-2147483648 to 2147483647 (default: 0) [User position reference unit]	No
	11	Distance limit (p2)	DINT	RO	No	-2147483648 to 2147483647 (default: 0) [User position reference unit]	No
	12	Distance limit (p3)	UDINT	RO	No	0 to 4294967295 (default: 0) [User position reference unit]	No

(2) Slot 2 Parameters (5911h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5911h	0	Number of entries	USINT	RO	No	12	No
	1	Configuration I	UINT	RO	No	0x0000 to 0x0013 (default: 0x0000)	No
	2	Configuration II	UINT	RO	No	0x0000 to 0x3939 (default: 0x0000)	No
	3	Configuration III	UINT	RO	No	0x0000 to 0x042F (default: 0x0000)	No
	4	Configuration IV	UINT	RO	No	0x0000 to 0x002F (default: 0x0000)	No
	5	Waiting time (t1)	UINT	RO	No	0 to 10000 (default: 0) [10 ms]	No
	6	Monitoring time (t2)	UINT	RO	No	0 to 10000 (default: 0) [10 ms]	No
	7	Speed limit (s1)	UDINT	RO	No	0 to 4294967295 (default: 0) [User speed reference unit]	No
	8	Speed limit (s2)	UDINT	RO	No	0 to 4294967295 (default: 0) [User speed reference unit]	No
	9	Acceleration limit (a1)	DINT	RO	No	-2147483648 to 2147483647 (default: 0) [User acceleration reference unit]	No
	10	Distance limit (p1)	DINT	RO	No	-2147483648 to 2147483647 (default: 0) [User position reference unit]	No
	11	Distance limit (p2)	DINT	RO	No	-2147483648 to 2147483647 (default: 0) [User position reference unit]	No
	12	Distance limit (p3)	UDINT	RO	No	0 to 4294967295 (default: 0) [User position reference unit]	No

(3) Slot 3 Parameters (5912h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5912h	0	Number of entries	USINT	RO	No	12	No
	1	Configuration I	UINT	RO	No	0x0000 to 0x0013 (default: 0x0000)	No
	2	Configuration II	UINT	RO	No	0x0000 to 0x3939 (default: 0x0000)	No
	3	Configuration III	UINT	RO	No	0x0000 to 0x042F (default: 0x0000)	No
	4	Configuration IV	UINT	RO	No	0x0000 to 0x002F (default: 0x0000)	No
	5	Waiting time (t1)	UINT	RO	No	0 to 10000 (default: 0) [10 ms]	No
	6	Monitoring time (t2)	UINT	RO	No	0 to 10000 (default: 0) [10 ms]	No
	7	Speed limit (s1)	UDINT	RO	No	0 to 4294967295 (default: 0) [User speed reference unit]	No
	8	Speed limit (s2)	UDINT	RO	No	0 to 4294967295 (default: 0) [User speed reference unit]	No
	9	Acceleration limit (a1)	DINT	RO	No	-2147483648 to 2147483647 (default: 0) [User acceleration reference unit]	No
	10	Distance limit (p1)	DINT	RO	No	-2147483648 to 2147483647 (default: 0) [User position reference unit]	No
	11	Distance limit (p2)	DINT	RO	No	-2147483648 to 2147483647 (default: 0) [User position reference unit]	No
	12	Distance limit (p3)	UDINT	RO	No	0 to 4294967295 (default: 0) [User position reference unit]	No

(4) Slot 4 Parameters (5913h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5913h	0	Number of entries	USINT	RO	No	12	No
	1	Configuration I	UINT	RO	No	0x0000 to 0x0013 (default: 0x0000)	No
	2	Configuration II	UINT	RO	No	0x0000 to 0x3939 (default: 0x0000)	No
	3	Configuration III	UINT	RO	No	0x0000 to 0x042F (default: 0x0000)	No
	4	Configuration IV	UINT	RO	No	0x0000 to 0x002F (default: 0x0000)	No
	5	Waiting time (t1)	UINT	RO	No	0 to 10000 (default: 0) [10 ms]	No
	6	Monitoring time (t2)	UINT	RO	No	0 to 10000 (default: 0) [10 ms]	No
	7	Speed limit (s1)	UDINT	RO	No	0 to 4294967295 (default: 0) [User speed reference unit]	No
	8	Speed limit (s2)	UDINT	RO	No	0 to 4294967295 (default: 0) [User speed reference unit]	No
	9	Acceleration limit (a1)	DINT	RO	No	-2147483648 to 2147483647 (default: 0) [User acceleration reference unit]	No
	10	Distance limit (p1)	DINT	RO	No	-2147483648 to 2147483647 (default: 0) [User position reference unit]	No
	11	Distance limit (p2)	DINT	RO	No	-2147483648 to 2147483647 (default: 0) [User position reference unit]	No
	12	Distance limit (p3)	UDINT	RO	No	0 to 4294967295 (default: 0) [User position reference unit]	No

(5) Slot 5 Parameters (5914h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5914h	0	Number of entries	USINT	RO	No	12	No
	1	Configuration I	UINT	RO	No	0x0000 to 0x0013 (default: 0x0000)	No
	2	Configuration II	UINT	RO	No	0x0000 to 0x3939 (default: 0x0000)	No
	3	Configuration III	UINT	RO	No	0x0000 to 0x042F (default: 0x0000)	No
	4	Configuration IV	UINT	RO	No	0x0000 to 0x002F (default: 0x0000)	No
	5	Waiting time (t1)	UINT	RO	No	0 to 10000 (default: 0) [10 ms]	No
	6	Monitoring time (t2)	UINT	RO	No	0 to 10000 (default: 0) [10 ms]	No
	7	Speed limit (s1)	UDINT	RO	No	0 to 4294967295 (default: 0) [User speed reference unit]	No
	8	Speed limit (s2)	UDINT	RO	No	0 to 4294967295 (default: 0) [User speed reference unit]	No
	9	Acceleration limit (a1)	DINT	RO	No	-2147483648 to 2147483647 (default: 0) [User acceleration reference unit]	No
	10	Distance limit (p1)	DINT	RO	No	-2147483648 to 2147483647 (default: 0) [User position reference unit]	No
	11	Distance limit (p2)	DINT	RO	No	-2147483648 to 2147483647 (default: 0) [User position reference unit]	No
	12	Distance limit (p3)	UDINT	RO	No	0 to 4294967295 (default: 0) [User position reference unit]	No

(6) Slot 6 Parameters (5915h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5915h	0	Number of entries	USINT	RO	No	12	No
	1	Configuration I	UINT	RO	No	0x0000 to 0x0013 (default: 0x0000)	No
	2	Configuration II	UINT	RO	No	0x0000 to 0x3939 (default: 0x0000)	No
	3	Configuration III	UINT	RO	No	0x0000 to 0x042F (default: 0x0000)	No
	4	Configuration IV	UINT	RO	No	0x0000 to 0x002F (default: 0x0000)	No
	5	Waiting time (t1)	UINT	RO	No	0 to 10000 (default: 0) [10 ms]	No
	6	Monitoring time (t2)	UINT	RO	No	0 to 10000 (default: 0) [10 ms]	No
	7	Speed limit (s1)	UDINT	RO	No	0 to 4294967295 (default: 0) [User speed reference unit]	No
	8	Speed limit (s2)	UDINT	RO	No	0 to 4294967295 (default: 0) [User speed reference unit]	No
	9	Acceleration limit (a1)	DINT	RO	No	-2147483648 to 2147483647 (default: 0) [User acceleration reference unit]	No
	10	Distance limit (p1)	DINT	RO	No	-2147483648 to 2147483647 (default: 0) [User position reference unit]	No
	11	Distance limit (p2)	DINT	RO	No	-2147483648 to 2147483647 (default: 0) [User position reference unit]	No
	12	Distance limit (p3)	UDINT	RO	No	0 to 4294967295 (default: 0) [User position reference unit]	No

(7) Slot 7 Parameters (5916h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5916h	0	Number of entries	USINT	RO	No	12	No
	1	Configuration I	UINT	RO	No	0x0000 to 0x0013 (default: 0x0000)	No
	2	Configuration II	UINT	RO	No	0x0000 to 0x3939 (default: 0x0000)	No
	3	Configuration III	UINT	RO	No	0x0000 to 0x042F (default: 0x0000)	No
	4	Configuration IV	UINT	RO	No	0x0000 to 0x002F (default: 0x0000)	No
	5	Waiting time (t1)	UINT	RO	No	0 to 10000 (default: 0) [10 ms]	No
	6	Monitoring time (t2)	UINT	RO	No	0 to 10000 (default: 0) [10 ms]	No
	7	Speed limit (s1)	UDINT	RO	No	0 to 4294967295 (default: 0) [User speed reference unit]	No
	8	Speed limit (s2)	UDINT	RO	No	0 to 4294967295 (default: 0) [User speed reference unit]	No
	9	Acceleration limit (a1)	DINT	RO	No	-2147483648 to 2147483647 (default: 0) [User acceleration reference unit]	No
	10	Distance limit (p1)	DINT	RO	No	-2147483648 to 2147483647 (default: 0) [User position reference unit]	No
	11	Distance limit (p2)	DINT	RO	No	-2147483648 to 2147483647 (default: 0) [User position reference unit]	No
	12	Distance limit (p3)	UDINT	RO	No	0 to 4294967295 (default: 0) [User position reference unit]	No

(8) Slot 8 Parameters (5917h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5917h	0	Number of entries	USINT	RO	No	12	No
	1	Configuration I	UINT	RO	No	0x0000 to 0x0013 (default: 0x0000)	No
	2	Configuration II	UINT	RO	No	0x0000 to 0x3939 (default: 0x0000)	No
	3	Configuration III	UINT	RO	No	0x0000 to 0x042F (default: 0x0000)	No
	4	Configuration V	UINT	RO	No	0x0000 to 0x002F (default: 0x0000)	No
	5	Waiting time (t1)	UINT	RO	No	0 to 10000 (default: 0) [10 ms]	No
	6	Monitoring time (t2)	UINT	RO	No	0 to 10000 (default: 0) [10 ms]	No
	7	Speed limit (s1)	UDINT	RO	No	0 to 4294967295 (default: 0) [User speed reference unit]	No
	8	Speed limit (s2)	UDINT	RO	No	0 to 4294967295 (default: 0) [User speed reference unit]	No
	9	Acceleration limit (a1)	DINT	RO	No	-2147483648 to 2147483647 (default: 0) [User acceleration reference unit]	No
	10	Distance limit (p1)	DINT	RO	No	-2147483648 to 2147483647 (default: 0) [User position reference unit]	No
	11	Distance limit (p2)	DINT	RO	No	-2147483648 to 2147483647 (default: 0) [User position reference unit]	No
	12	Distance limit (p3)	UDINT	RO	No	0 to 4294967295 (default: 0) [User position reference unit]	No

(9) Slot 9 Parameters (5918h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5918h	0	Number of entries	USINT	RO	No	12	No
	1	Configuration I	UINT	RO	No	0x0000 to 0x0013 (default: 0x0000)	No
	2	Configuration II	UINT	RO	No	0x0000 to 0x3939 (default: 0x0000)	No
	3	Configuration III	UINT	RO	No	0x0000 to 0x042F (default: 0x0000)	No
	4	Configuration IV	UINT	RO	No	0x0000 to 0x002F (default: 0x0000)	No
	5	Waiting time (t1)	UINT	RO	No	0 to 10000 (default: 0) [10 ms]	No
	6	Monitoring time (t2)	UINT	RO	No	0 to 10000 (default: 0) [10 ms]	No
	7	Speed limit (s1)	UDINT	RO	No	0 to 4294967295 (default: 0) [User speed reference unit]	No
	8	Speed limit (s2)	UDINT	RO	No	0 to 4294967295 (default: 0) [User speed reference unit]	No
	9	Acceleration limit (a1)	DINT	RO	No	-2147483648 to 2147483647 (default: 0) [User acceleration reference unit]	No
	10	Distance limit (p1)	DINT	RO	No	-2147483648 to 2147483647 (default: 0) [User position reference unit]	No
	11	Distance limit (p2)	DINT	RO	No	-2147483648 to 2147483647 (default: 0) [User position reference unit]	No
	12	Distance limit (p3)	UDINT	RO	No	0 to 4294967295 (default: 0) [User position reference unit]	No

(10) Slot 10 Parameters (5919h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5919h	0	Number of entries	USINT	RO	No	7	No
	1	Configuration I	UINT	RO	No	0x0000 to 0x0011 (default: 0x0000)	No
	2	Configuration II	UINT	RO	No	0x0000 to 0x0614 (default: 0x0000)	No
	3	Configuration III	UINT	RO	No	0x0000 to 0x042F (default: 0x0000)	No
	4	Brake holding delay time (Tw_bkh)	UINT	RO	No	0 to 10000 (default: 0) [1 ms]	No
	5	Brake releasing delay time (Tw_bkr)	UINT	RO	No	0 to 10000 (default: 0) [1 ms]	No
	6	Allowable time for feedback signal unmatched when brake becomes holding (Td_bkh)	UINT	RO	No	0 to 300 (default: 30) [1 ms]	No
	7	Allowable time for feedback signal unmatched when brake becomes releasing (Td_bkr)	UINT	RO	No	0 to 300 (default: 30) [1 ms]	No

9.5.14 Virtual Input Demand Value (5A00h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5A00h	0	Number of entries	USINT	RO	No	16	No
	1	Virtual input 0	BOOL	RO	SO (MainDevice output)	–	No
	2	Virtual input 1	BOOL	RO	SO	–	No
	3	Virtual input 2	BOOL	RO	SO	–	No
	4	Virtual input 3	BOOL	RO	SO	–	No
	5	Virtual input 4	BOOL	RO	SO	–	No
	6	Virtual input 5	BOOL	RO	SO	–	No
	7	Virtual input 6	BOOL	RO	SO	–	No
	8	Virtual input 7	BOOL	RO	SO	–	No
	9	Virtual input 8	BOOL	RO	SO	–	No
	10	Virtual input 9	BOOL	RO	SO	–	No
	11	Virtual input 10	BOOL	RO	SO	–	No
	12	Virtual input 11	BOOL	RO	SO	–	No
	13	Virtual input 12	BOOL	RO	SO	–	No
	14	Virtual input 13	BOOL	RO	SO	–	No
	15	Virtual input 14	BOOL	RO	SO	–	No
	16	Virtual input 15	BOOL	RO	SO	–	No

9.5.15 Virtual Output Actual Value (5A01h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5A01h	0	Number of entries	USINT	RO	No	16	No
	1	Virtual output 0	BOOL	RO	SI (MainDevice input)	–	No
	2	Virtual output 1	BOOL	RO	SI	–	No
	3	Virtual output 2	BOOL	RO	SI	–	No
	4	Virtual output 3	BOOL	RO	SI	–	No
	5	Virtual output 4	BOOL	RO	SI	–	No
	6	Virtual output 5	BOOL	RO	SI	–	No
	7	Virtual output 6	BOOL	RO	SI	–	No
	8	Virtual output 7	BOOL	RO	SI	–	No
	9	Virtual output 8	BOOL	RO	SI	–	No
	10	Virtual output 9	BOOL	RO	SI	–	No
	11	Virtual output 10	BOOL	RO	SI	–	No
	12	Virtual output 11	BOOL	RO	SI	–	No
	13	Virtual output 12	BOOL	RO	SI	–	No
	14	Virtual output 13	BOOL	RO	SI	–	No
	15	Virtual output 14	BOOL	RO	SI	–	No
	16	Virtual output 15	BOOL	RO	SI	–	No

9.5.16 Safety Slot Status Actual Value (5A02h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5A02h	0	Number of entries	USINT	RO	No	10	No
	1	SF_1	BOOL	RO	SI (MainDevice input)	–	No
	2	SF_2	BOOL	RO	SI	–	No
	3	SF_3	BOOL	RO	SI	–	No
	4	SF_4	BOOL	RO	SI	–	No
	5	SF_5	BOOL	RO	SI	–	No
	6	SF_6	BOOL	RO	SI	–	No
	7	SF_7	BOOL	RO	SI	–	No
	8	SF_8	BOOL	RO	SI	–	No
	9	SF_9	BOOL	RO	SI	–	No
	10	SF_10	BOOL	RO	SI	–	No

9.5.17 I/O Terminal Actual Value (5A03h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5A03h	0	Number of entries	USINT	RO	No	20	No
	1	DIA1	BOOL	RO	SI (MainDevice input)	–	No
	2	DIB1	BOOL	RO	SI	–	No
	3	DIC1	BOOL	RO	SI	–	No
	4	DID1	BOOL	RO	SI	–	No
	5	DIE1	BOOL	RO	SI	–	No
	6	DIA2	BOOL	RO	SI	–	No
	7	DIB2	BOOL	RO	SI	–	No
	8	DIC2	BOOL	RO	SI	–	No
	9	DID2	BOOL	RO	SI	–	No
	10	DIE2	BOOL	RO	SI	–	No
	11	DOA1	BOOL	RO	No	–	No
	12	DOB1	BOOL	RO	No	–	No
	13	DOC1	BOOL	RO	No	–	No
	14	DOD1	BOOL	RO	No	–	No
	15	DOE1	BOOL	RO	No	–	No
	16	DOA2	BOOL	RO	No	–	No
	17	DOB2	BOOL	RO	No	–	No
	18	DOC2	BOOL	RO	No	–	No
	19	DOD2	BOOL	RO	No	–	No
	20	DOE2	BOOL	RO	No	–	No

9.5.18 Multi Monitor Select Demand Value (MPD) (5A04h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5A04h	0	Number of entries	USINT	RO	No	4	No
	1	MPD 0	BOOL	RO	SO (MainDevice output)	–	No
	2	MPD 1	BOOL	RO	SO	–	No
	3	MPD 2	BOOL	RO	SO	–	No
	4	MPD 3	BOOL	RO	SO	–	No

9.5.19 Multi Monitor Select Actual Value (MPD) (5A05h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5A05h	0	Number of entries	USINT	RO	No	4	No
	1	MPA 0	BOOL	RO	SI (MainDevice input)	–	No
	2	MPA 1	BOOL	RO	SI	–	No
	3	MPA 2	BOOL	RO	SI	–	No
	4	MPA 3	BOOL	RO	SI	–	No

9.5.20 Multi Monitor 1 Actual Value (5A06h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5A06h	0	Number of entries	USINT	RO	No	2	No
	1	Multi monitor 1 actual value (1st word)	UINT	RO	SI (MainDevice input)	–	No
	2	Multi monitor 1 actual value (2nd word)	UINT	RO	SI	–	No

9.5.21 Multi Monitor 2 Actual Value (5A07h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5A07h	0	Number of entries	USINT	RO	No	2	No
	1	Multi monitor 2 actual value (1st word)	UINT	RO	SI (MainDevice input)	–	No
	2	Multi monitor 2 actual value (2nd word)	UINT	RO	SI	–	No

9.5.22 FSoE Error (5A08h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5A08h	0	FSoE Error	BOOL	RO	SI (MainDevice input)	–	No

9.5.23 FSoE Error Ack (5A09h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5A09h	0	FSoE Error Ack	BOOL	RO	SO (MainDevice output)	–	No

9.5.24 Safety Slot Actual Value 1 (5A0Ah)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5A0Ah	0	Number of entries	USINT	RO	No	6	No
	1	Selected slot number	UINT	RO	No	–	No
	2	Actual position limit 1	DINT	RO	No	– [User position reference unit]	No
	3	Actual position limit 2	DINT	RO	No	– [User position reference unit]	No
	4	Actual speed limit 1	DINT	RO	No	– [User speed reference unit]	No
	5	Actual speed limit 2	DINT	RO	No	– [User speed reference unit]	No
	6	Actual acceleration limit	DINT	RO	No	– [User acceleration reference unit]	No

9.5.25 Safety Slot Actual Value 2 (5A0Bh)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5A0Bh	0	Number of entries	USINT	RO	No	11	No
	1	Safety function status for slot 1 to 8	UDINT	RO	No	–	No
	2	Safety function status for slot 9 to 10	UDINT	RO	No	–	No
	3	Actual position (monitoring)	DINT	RO	No	– [User position reference unit]	No
	4	Actual position	DINT	RO	No	– [User position reference unit]	No
	5	Actual speed	DINT	RO	No	– [User speed reference unit]	No
	6	Actual acceleration	DINT	RO	No	– [User speed reference unit]	No
	7	Reserved 1	INT	RO	No	–	No
	8	Reserved 2	INT	RO	No	–	No
	9	Actual position encoder 2	DINT	RO	No	– [User position reference unit]	No
	10	SHP status	BOOL	RO	SI (MainDevice input)	–	No
	11	SHP encoder position	DINT	RO	No	– [User position reference unit]	No

9.5.26 STO Status (5A0Dh)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
5A0Dh	0	STO Status	BOOL	RO	SO (MainDevice output)	–	No

9.6 FSoE SubDevice Connection Input

9.6.1 FSoE SubDevice Frame Elements (E600h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
E600h	0	Number of entries	USINT	RO	No	9	No
	1	FSoE SubDevice command	USINT	RO	SI (MainDevice input)	−	No
	2	FSoE SubDevice connection ID	UINT	RO	SI	−	No
	3	FSoE SubDevice CRC_0	UINT	RO	SI	−	No
	4	FSoE SubDevice CRC_1	UINT	RO	SI	−	No
	5	FSoE SubDevice CRC_2	UINT	RO	SI	−	No
	6	FSoE SubDevice CRC_3	UINT	RO	SI	−	No
	7	FSoE SubDevice CRC_4	UINT	RO	SI	−	No
	8	FSoE SubDevice CRC_5	UINT	RO	SI	−	No
	9	FSoE SubDevice CRC_6	UINT	RO	SI	−	No

9.7 FSoE SubDevice Connection Output

9.7.1 FSoE MainDevice Frame Elements (E700h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
E700h	0	Number of entries	USINT	RO	No	4	No
	1	FSoE MainDevice command	USINT	RO	SO (MainDevice output)	−	No
	2	FSoE MainDevice connection ID	UINT	RO	SO	−	No
	3	FSoE MainDevice CRC_0	UINT	RO	SO	−	No
	4	FSoE MainDevice CRC_1	UINT	RO	SO	−	No

9.8 FSoE SubDevice Connection Information

9.8.1 FSoE Info Data (E900h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
E900h	0	Number of entries	USINT	RO	No	8	No
	1	FSoE module connection ID	UINT	RO	No	−	No
	2	FSoE module type	STRING (4)	RO	No	SGDXS-OSAA0A: 0x5AA0	No
	3	FSoE module name	STRING (24)	RO	No	SGDXS-OSAA0A or SGDXS-OSAA1A	No
	4	FSoE module device type	UDINT	RO	No	0x000A0192	No
	5	FSoE module vendor ID	UDINT	RO	No	0x00000539	No
	6	FSoE module product code	UDINT	RO	No	1st SPDU: 0x02200A01, 2nd SPDU: 0x02200A02	No
	7	FSoE module revision number	UDINT	RO	No	−	No
	8	FSoE module serial number	UDINT	RO	No	0	No

9.8.2 FSoE Communication Parameter (E901h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
E901h	0	Number of entries	USINT	RO	No	8	No
	1	FSoE version	STRING (2)	RO	No	01	No
	2	Safety address	UINT	RO	No	−	No
	3	FSoE connection ID	UINT	RO	No	−	No
	4	Watchdog time	UINT	RO	No	−	No
	5	Reserved	OCTET-STRING(6)	RO	No	000000	No
	6	Connection type (SubDevice connection)	UINT	RO	No	0x0001	No
	7	Communication parameter length	UINT	RO	No	4	No
	8	Application parameter length	UINT	RO	No	0	No

9.9 FSoE SubDevice Connection Diagnosis

9.9.1 FSoE Connection Diagnosis (EA00h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
EA00h	0	Number of entries	USINT	RO	No	2	No
	1	Connection state	UINT	RO	No	−	No
	2	Connection diagnosis	UINT	RO	No	−	No

9.10 FSoE Device Information

9.10.1 Modular Device Profile (F000h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
F000h	0	Number of entries	USINT	RO	No	2	No
	1	Module index distance	UINT	RO	No	0x0010	No
	2	Maximum number of modules	UINT	RO	No	1	No

9.10.2 Module List (F010h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
F010h	0	Number of entries	USINT	RO	No	1	No
	1	Module profile list	UDINT	RO	No	790	No

9.10.3 Detected Modules (F050h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
F050h	0	Number of entries	USINT	RO	No	1	No
	1	Detected module ident list	UDINT	RO	No	0x00000000 to 0xFFFFFFFF (default: Differs depending on the software version of the ASM-X and the SERVOPACK.)	No

The value of Detected Module Ident List differs depending on the software version of the ASM-X and the SERVOPACK.

Status			Value
The ASM-X is not mounted to the SERVOPACK.			0x00000000
The ASM-X is mounted to the SERVOPACK.	ASM-X software version: Version 0002 or earlier or SERVOPACK software version: Version 0017 or earlier	When the 1st SPDU (modulei-dent:0x02200A01) telegram is used	0x02200A01
		When the 2nd SPDU (modulei-dent:0x02200A02) telegram is used	0x02200A02
		When the 1st SPDU (modulei-dent:0x02200A03) telegram is used	0x02200A03 *1
		When the 2nd SPDU (modulei-dent:0x02200A04) telegram is used	0x02200A04 *1
	ASM-X software version: Version 0003 or later and SERVOPACK software version: Version 0018 or later	When the 1st SPDU (modulei-dent:0x02200A01) telegram is used	0x02200A01
		When the 2nd SPDU (modulei-dent:0x02200A02) telegram is used	0x02200A02
		When the 1st SPDU (modulei-dent:0x02200A03) telegram is used	0x02200A03
		When the 2nd SPDU (modulei-dent:0x02200A04) telegram is used	0x02200A04

*1 Alarm A.EB2 (Safety Module - Parameter Setting Error) will occur.

9.10.4 Device Safety Address (F980h)

Index	Subindex	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
F980h	0	Number of entries	USINT	RO	No	1	No
	1	FSoE Address	UINT	RO	No	0 to 65535 (default: 1)	No

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Maintenance

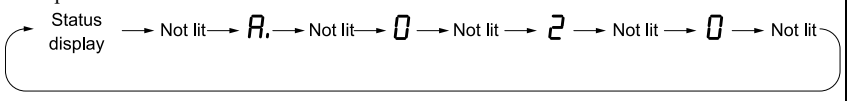
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10.1 Alarm Displays

To check an alarm that occurs in the SERVOPACK, use one of the following methods. However, if no alarm number appears on the panel display, this indicates a SERVOPACK system error. Replace the SERVOPACK.

Panel display on SERVOPACK	If there is an alarm, the code will be displayed one character at a time, as shown below. Example: Alarm A.020 
Digital operator	The alarm code will be displayed.
Statusword (6041h)	Bit 3 (fault) in the statusword will change to 1. (Bit 3 is 0 during normal operation.)
Error code (603Fh)	A current alarm code is stored in object 603Fh.
Emergency message	The controller is notified of any alarm that occurs. (Notification may not be possible if EtherCAT communications are unstable.)

This section provides a list of the alarms that may occur and the causes of and corrections for those alarms.

10.1.1 List of Alarms

The list of alarms gives the alarm name, alarm meaning, alarm stopping method, and alarm reset possibility in order of the alarm numbers.

(1) Servomotor Stopping Method for Alarms

Refer to the product manual for your SERVOPACK for information on the stopping method for alarms.

(2) Alarm Reset Possibility

Yes	You can use an alarm reset to clear the alarm. However, this assumes that the cause of the alarm has been removed. To reset an alarm that occurs on the safety module, the alarm must be reset twice. Reset the alarm using bit 7 (Fault reset) of Controlword (6040h) over EtherCAT or the [Display Alarm] window in the SigmaWin+.
No	You cannot clear the alarm.

(3) List of Alarms

The following table lists the alarms.

Alarm Number	Alarm Name	Alarm Meaning	Servomotor Stopping Method	Alarm Reset Possibility
A.047	Encoder with Functional Safety - Safety Mode Setting Error	An encoder with functional safety is connected that was set to safety mode, but the safety module is not connected. **Note:** This alarm is detected on the SERVOPACK.	Gr.1	Yes
A.048	Safety Module - Σ-LINK II Node Configuration Error	Pc068 = n.□X□□ (Encoder Data Configuration Setting 4) is set to a value other than 0, and multiple nodes are connected to the CN2 connector. **Note:** This alarm is detected on the SERVOPACK.	Gr.1	Yes
A.A47	Loading Servo Information Error	Loading SERVOPACK information failed.	Gr.1	No

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Alarm Number	Alarm Name	Alarm Meaning	Servomotor Stopping Method	Alarm Reset Possibility
A.E11	Safety Module - DIA Diagnostic Error	The statuses of DIA1 and DIA2 did not match within the specified time.	Gr.1	Yes
A.E12	Safety Module - DIB Diagnostic Error	The statuses of DIB1 and DIB2 did not match within the specified time.	Gr.1	Yes
A.E13	Safety Module - DIC Diagnostic Error	The statuses of DIC1 and DIC2 did not match within the specified time.	Gr.1	Yes
A.E14	Safety Module - DID Diagnostic Error	The statuses of DID1 and DID2 did not match within the specified time.	Gr.1	Yes
A.E15	Safety Module - DIE Diagnostic Error	The statuses of DIE1 and DIE2 did not match within the specified time.	Gr.1	Yes
A.E1F	Safety Module - Module Error	An alarm occurred for an ASM-X that was not registered in the SERVOPACK. **Note:** This alarm occurs when the SERVOPACK software version is older than the ASM-X software version.	Gr.1	No
A.E28	Safety Module - FSoE Error	• An error occurred in FSoE communications. • The FSoE communications state has become a state other than Data.	Gr.1	Yes
A.E29	Safety Module - Encoder Error	• Receiving encoder data failed. • Acquiring multi-turn data of the encoder with functional safety failed.	Gr.1	No
A.E2A	Safety Module - Absolute Encoder Error	• An error occurred with the safe home position of the absolute encoder. • The deviation between encoders exceeded the specified value when the power was turned ON.	Gr.1	Yes
A.E2B	Safety Module - Exceeded Encoder Deviation	The deviation between redundant encoders exceeded the specified value.	Gr.1	Yes
A.E2D	Safety Module - Safe Home Position Not Set	A safety function (SCA or SLP) that requires the safe home position was executed when setting the safe home position was not completed.	Gr.1	Yes
A.E2E	Safety Module - SHP Execution Conditions Error	• The SHP function was executed while the SCA or SLP function was running. • The SHP function was executed when the encoder position information was unconfirmed.	Gr.1	Yes
A.E35	Safety Module - Internal Status Mismatch	The alarm status between CPUs did not match.	Gr.1	Yes
A.E36	Safety Module - Internal Temperature Error	An anomaly occurred in the internal temperature of the safety module.	Gr.1	Yes
A.E3A	Safety Module - EEPROM Diagnostic Error	An error occurred in the safety module EEPROM.	Gr.1	No
A.E3B	Safety Module - Encoder Diagnostic Error	An error occurred in contents of the encoder communications data.	Gr.1	No
A.E3C	Safety Module - CPU Status Mismatch	The statuses between CPUs in the safety module do not match.	Gr.1	No
A.E3E	Safety Module - SBC Feedback Signal Error	The statuses of the SBC safe output and the feedback signal did not match within the specified time.	Gr.1	No
A.E71	Safety Module - Detection Failure	Detection of the safety module failed. **Note:** This alarm is detected on the SERVOPACK.	Gr.1	No

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Alarm Number	Alarm Name	Alarm Meaning	Servomotor Stopping Method	Alarm Reset Possibility
A.E74	Safety Module - Not Supported	An unsupported safety module was connected to the SERVOPACK. **Note:** This alarm is detected on the SERVOPACK.	Gr.1	No
A.E78	Safety Module - DOA Diagnostic Error	DOA is not operating correctly.	Gr.1	No
A.E79	Safety Module - DOB Diagnostic Error	DOB is not operating correctly.	Gr.1	No
A.E7A	Safety Module - DOC Diagnostic Error	DOC is not operating correctly.	Gr.1	No
A.E7B	Safety Module - DOD Diagnostic Error	DOD is not operating correctly.	Gr.1	No
A.E7C	Safety Module - DOE Diagnostic Error	DOE is not operating correctly.	Gr.1	No
A.E81	Safety Module - Detection Mismatch	A safety module of a different model than the previous safety module was connected to the SERVOPACK. **Note:** This alarm is detected on the SERVOPACK.	Gr.1	No
A.EB0	Safety Module - System Error	An error occurred in the safety module CPU or peripheral circuit. **Note:** This alarm is detected on the SERVOPACK.	Gr.1	No
A.EB2	Safety Module - Parameter Setting Error	• A safety module parameter setting is outside the setting range. • An error occurred for a combination of safety module parameters.	Gr.1	No
A.EB3	Safety Module - HWBB Circuit Monitoring Error	An error occurred in the SERVOPACK HWBB circuit.	Gr.1	No
A.EB9	Safety Module - Parameter Modification Alarm	A safety module parameter was modified.	Gr.1	No
A.EC0	Safety Module - Setup Confirmation Alarm	A different SERVOPACK than the previous SERVOPACK was connected.	Gr.1	Yes
A.EC1	Safety Module - Safety-Related Servo Parameter Mismatch	There is a mismatch between the safety-related servo parameters in the safety module and the parameters in the SERVOPACK or in the combination of the currently connected motor and encoder.	Gr.1	No
A.EC3	Safety Module - Unsupported SERVOPACK	An unsupported SERVOPACK was connected to the safety module. **Note:** This alarm is detected on the SERVOPACK.	Gr.1	No
A.EC4	Safety Module - Encoder Configuration Error	• An unsupported encoder was connected. • The encoder configuration is not appropriate.	Gr.1	No
A.EC5	Safety Module - No Password	The safety module password has not been registered.	Gr.1	No
A.EC6	Safety Module - System Error 2	An error occurred in a peripheral circuit of the safety module. **Note:** This alarm is detected on the SERVOPACK.	Gr.1	No

10.1.2 Troubleshooting Alarms

The causes of and corrections for the alarms are given in the following table. Contact your Yaskawa representative if you cannot solve a problem with the correction given in the table.

◆ A.047:Encoder with Functional Safety - Safety Mode Setting Error

Possible Cause	Confirmation	Correction	Reference
An encoder with functional safety is connected that was set to safety mode, but the safety module is not connected.	• Check the connection status of the safety module. • Use the SigmaWin+ and check the status of the safety mode setting for the encoder with functional safety.	• Connect the safety module. • Change the encoder with functional safety to a non-safe mode.	–

◆ A.048:Safety Module - Σ-LINK II Node Configuration Error

Possible Cause	Confirmation	Correction	Reference
Pc068 = n.□X□□ (Encoder Data Configuration Setting 4) is set to a value other than 0, and multiple nodes are connected to the CN2 connector.	Check the number of nodes connected to the CN2 connector.	If Pc068 = n.□X□□ (Encoder Data Configuration Setting 4) is set to a value other than 0, make the number of nodes connected to the CN2 connector 1.	–

◆ A.A47:Loading Servo Information Error

Possible Cause	Confirmation	Correction	Reference
When the SERVOPACK software version is 0017 or earlier, Pc121 was set to n.□□2□ (1st SPDU (moduleident:0x02200A03)) or n.□□3□ (2nd SPDU (moduleident:0x02200A04)).	Check the SERVOPACK software version and the setting of Pc121 = n.□□X□ (SPDU Selection).	When the SERVOPACK software version is 0017 or earlier, set Pc121 to n.□□0□ (1st SPDU (moduleident:0x02200A01)) or n.□□1□ (2nd SPDU (moduleident:0x02200A02)).	–

◆ A.E11:Safety Module - DIA Diagnostic Error

Possible Cause	Confirmation	Correction	Reference
The statuses of DIA1 and DIA2 did not match within the specified time (Discrepancy Allowable Time: Pc0C2).	• Check the statuses of DIA1 and DIA2 on the input signal monitor. • Check the statuses of DIA1 and DIA2 by tracing in the SigmaWin+.	Correct the discrepancy allowable time setting.	145
The statuses of DIA1 and DIA2 did not match within the specified time (Discrepancy Allowable Time: Pc0C2).	Check the wiring.	Correct the wiring.	–

◆ A.E12:Safety Module - DIB Diagnostic Error

Possible Cause	Confirmation	Correction	Reference
The statuses of DIB1 and DIB2 did not match within the specified time (Discrepancy Allowable Time: Pc0C7).	• Check the statuses of DIB1 and DIB2 on the input signal monitor. • Check the statuses of DIB1 and DIB2 by tracing in the SigmaWin+.	Correct the discrepancy allowable time setting.	145
The statuses of DIB1 and DIB2 did not match within the specified time (Discrepancy Allowable Time: Pc0C7).	Check the wiring.	Correct the wiring.	–

◆ A.E13:Safety Module - DIC Diagnostic Error

Possible Cause	Confirmation	Correction	Reference
The statuses of DIC1 and DIC2 did not match within the specified time (Discrepancy Allowable Time: Pc0CC).	• Check the statuses of DIC1 and DIC2 on the input signal monitor. • Check the statuses of DIC1 and DIC2 by tracing in the SigmaWin+.	Correct the discrepancy allowable time setting.	145
The statuses of DIC1 and DIC2 did not match within the specified time (Discrepancy Allowable Time: Pc0CC).	Check the wiring.	Correct the wiring.	–

◆ A.E14:Safety Module - DID Diagnostic Error

Possible Cause	Confirmation	Correction	Reference
The statuses of DID1 and DID2 did not match within the specified time (Discrepancy Allowable Time: Pc0D1).	• Check the statuses of DID1 and DID2 on the input signal monitor. • Check the statuses of DID1 and DID2 by tracing in the SigmaWin+.	Correct the discrepancy allowable time setting.	145
The statuses of DID1 and DID2 did not match within the specified time (Discrepancy Allowable Time: Pc0D1).	Check the wiring.	Correct the wiring.	–

◆ A.E15:Safety Module - DIE Diagnostic Error

Possible Cause	Confirmation	Correction	Reference
The statuses of DIE1 and DIE2 did not match within the specified time (Discrepancy Allowable Time: Pc0D6).	• Check the statuses of DIE1 and DIE2 on the input signal monitor. • Check the statuses of DIE1 and DIE2 by tracing in the SigmaWin+.	Correct the discrepancy allowable time setting.	145
The statuses of DIE1 and DIE2 did not match within the specified time (Discrepancy Allowable Time: Pc0D6).	Check the wiring.	Correct the wiring.	–

◆ A.E1F:Safety Module - Module Error

Possible Cause	Confirmation	Correction	Reference
An unsupported SERVOPACK was connected to the safety module.	Check the combination of SERVOPACK and safety module software.	Replace the SERVOPACK or the safety module.	–

◆ A.E28:Safety Module - FSoE Error

Possible Cause	Confirmation	Correction	Reference
An error occurred in EtherCAT communications.	Check status of EtherCAT communications.	After you clear the EtherCAT communications error, restore FSoE to the Data communications state.	–
FSoE has transitioned from the Data communications state to a different state.	Check if there is an error in the FSoE MDevice or another FSoE SubDevice.	After you clear error, restore FSoE to the Data communications state.	–

◆ A.E29:Safety Module - Encoder Error

Possible Cause	Confirmation	Correction	Reference
The safety module failed to receive encoder data.	Check if A.C90 (Encoder Communications Error) occurred at the same time in the SERVOPACK's alarm history.	If A.C90 occurred, implement the corrections for A.C90. For details, refer to the product manual for your SERVOPACK.	–
A malfunction was caused by noise.	Set Pc170 = n.□□X□ (Safety Function Monitoring Response Mode Selection) to 1 (Disable High Response Mode), and check the status of the alarm.	If the alarm does not occur, keep using the safety module with Pc170 = n.□□X□ (Safety Function Monitoring Response Mode Selection) set to 1 (Disable High Response Mode).	–
An encoder failure was detected.	Check if A.8□0 (alarms related to the encoder such as A.820) occurred at the same time in the SERVOPACK's alarm history.	• If A.8□0 occurred, implement the corrections for A.8□0. For details, refer to the product manual for your SERVOPACK. • Turn the power OFF and ON again, and reset the absolute encoder. If the alarm still occurs, replace the motor.	–
Acquiring multi-turn data of the encoder with functional safety failed.	Check if A.8□0 (alarms related to the encoder such as A.820) occurred at the same time in the SERVOPACK's alarm history.	• If A.8□0 occurred, implement the corrections for A.8□0. For details, refer to the product manual for your SERVOPACK. • Turn the power OFF and ON again, and reset the absolute encoder. If the alarm still occurs, replace the motor.	–
Pn62E (Reserved parameter) is set to anything other than the default setting.	–	Initialize the SERVOPACK parameter settings.	–

◆ A.E2A:Safety Module - Absolute Encoder Error

Possible Cause	Confirmation	Correction	Reference
The motor moved one or more revolutions while the power was OFF.	After you reset the alarm, confirm that the safe home position is correct by jogging the motor.	• If alarm A.820 occurs at the same time, turn the power OFF and ON again. • If the safe home position is correct, cancel the error status of the safe home position in the SigmaWin+.	261
After A.E2A occurred, a safety function (SLP, SCA, or SHP) that uses the safe home position was executed when the error status of the safe home position was not canceled.	Turn the power OFF and ON again, and check if A.E2A occurs.	If A.E2A occurs, perform the recovery operation from alarm A.E2A (clear the error status of the safe home position or set the safe home position again after resetting it).	261
The encoder failed.	After you reset the alarm, confirm that the safe home position is correct by jogging the motor.	If the safe home position is not correct, reset the safe home position in the SigmaWin+, and then execute the SHP function again.	261
The encoder failed.	After you reset the alarm, confirm that the safe home position is correct by jogging the motor.	Replace the motor.	261

◆ A.E2B:Safety Module - Exceeded Encoder Deviation

Possible Cause	Confirmation	Correction	Reference
The deviation between redundant encoder communications data exceeded the specified value.	Check the position deviation of the primary motor and the secondary motor by tracing in the SigmaWin+.	Set Pc150 (Encoder Deviation) and Pc152 (Encoder Deviation Window).	145

◆ A.E2D:Safety Module - Safe Home Position Not Set

Possible Cause	Confirmation	Correction	Reference
The SCA or SLP function was executed when setting the safe home position was not completed.	Check the completion status of the SHP function in the SigmaWin+.	Execute the SHP function.	–
The SCA or SLP function was executed when setting the safe home position was not completed.	Check if the SCA or SLP function was executed when the SHP function completion status was OFF.	Correct the operation sequence so that the SCA or SLP function is not executed when the SHP function completion status is OFF.	–

◆ A.E2E:Safety Module - SHP Execution Conditions Error

Possible Cause	Confirmation	Correction	Reference
The SHP function was executed while the SCA or SLP function was running.	Check if the SHP function was executed while the SCA or SLP function was running.	• Correct the operation sequence so that the SHP function is not executed while the SCA or SLP function is running. • Set the SHP function waiting time (t1). (This alarm is not detected during the waiting time.)	–
The SHP function was executed when position data cannot be used.	Check if the following functions were executed while the SHP function was running. • Absolute encoder reset • Change absolute encoder multiturn limit • Change Σ-LINK II settings • Execute User Parameter Configuration (2700h) over EtherCAT communications	Correct the operation sequence so that the SHP function is not executed at the same time as the functions to the left.	–

◆ A.E35:Safety Module - Internal Status Mismatch

Possible Cause	Confirmation	Correction	Reference
Different alarms occurred between CPUs in the safety module.	Check the alarm history.	Implement the corrections for the alarm that was found in the alarm history.	–

◆ A.E36:Safety Module - Internal Temperature Error

Possible Cause	Confirmation	Correction	Reference
The surrounding temperature is too high.	–	Decrease the surrounding temperature by improving the SERVOPACK installation conditions. For details, refer to the product manual for your SERVOPACK.	–
There was an excessive load or operation was performed that exceeded the regenerative processing capacity.	–	Reconsider the load and operating conditions.	–
The SERVOPACK installation orientation is not correct or there is insufficient space around the SERVOPACK.	–	Install the SERVOPACK according to specifications. For details, refer to the product manual for your SERVOPACK.	–
A failure occurred in the safety module.	–	Replace the safety module.	–

◆ A.E3A:Safety Module - EEPROM Diagnostic Error

Possible Cause	Confirmation	Correction	Reference
An error occurred in the safety module EEPROM.	Check if the power was turned OFF while parameters were being written.	After you initialize the parameters, set the parameters again. If the alarm still occurs, the safety module may be faulty. Replace the safety module.	–

◆ A.E3B:Safety Module - Encoder Diagnostic Error

Possible Cause	Confirmation	Correction	Reference
An error occurred in contents of the encoder communications data received by the safety module.	–	After you initialize the encoder with functional safety, set the parameters again. If the alarm still occurs, the encoder with functional safety may be faulty. Replace the servomotor.	–
Pn62E (Reserved parameter) is set to anything other than the default setting.	–	Initialize the SERVOPACK parameter settings.	–

◆ A.E3C:Safety Module - CPU Status Mismatch

Possible Cause	Confirmation	Correction	Reference
The statuses between CPUs in the safety module do not match.	–	After you initialize the parameters, set the parameters again. If the alarm still occurs, the safety module may be faulty. Replace the safety module.	–

◆ A.E3E:Safety Module - SBC Feedback Signal Error

Possible Cause	Confirmation	Correction	Reference
Large amount of SBCIS (SBC input signal) delay.	• Check the setting of Pc552 (Slot 10 - Feedback signal discrepancy allowable time at brake hold (Td_bkh)) or Pc553 (Slot 10 - Feedback signal discrepancy allowable time at brake release (Td_bkr)). • Check the operation delay time of the safety relays that are being used.	Set Pc552 and Pc553 according to the safety relays that are being used.	217
The input terminal for SBCIS (SBC input signal) is not correct.	Check if the input terminal for SBCIS is working on the input signal monitor.	• Correct the wiring. • Correct the setting of Pc541 = n. XX□□ (Terminal Port Selection for SBC Input Signal (SBCIS)).	87

◆ A.E71:Safety Module - Detection Failure

Possible Cause	Confirmation	Correction	Reference
The connection between the SERVOPACK and the safety module is not appropriate.	Check the connection between the SERVOPACK and the safety module.	Correctly connect the safety module.	–
The safety module was removed.	–	Execute Reset Option Module Configuration Error and turn the power OFF and ON again. Execute Reset Option Module Configuration Error with digital operator Fn014 or with the SigmaWin+.	–
A failure occurred in the safety module.	–	Replace the safety module.	–
A failure occurred in the SERVOPACK.	–	Replace the SERVOPACK.	–

◆ A.E74:Safety Module - Not Supported

Possible Cause	Confirmation	Correction	Reference
An unsupported safety module was connected to the SERVOPACK.	• Check the safety module model. • Check for models of safety modules that are supported by the SERVOPACK.	• Mount a safety module that is supported by the SERVOPACK. • Replace the safety module. • Replace the SERVOPACK.	–
An error occurred in the safety module system.	–	Replace the safety module.	–

◆ A.E78:Safety Module - DOA Diagnostic Error

Possible Cause	Confirmation	Correction	Reference
The wiring for DOA is not correct.	Check the wiring for DOA.	• Correct the wiring for DOA. • If you are not using DOA, set Pc0E0 = n.□□□X (Output Port Selection) to 0 (Do not use output port).	152
The safety module has failed.	–	Replace the safety module.	–
The delay time of the output signal is long.	Check the delay in response at the rise or fall of the output signal. (The response time depends on the configuration of the external circuit for the output signal.)	Correct the settings in Pc0E0 to Pc0E3 so they are suited to the circuit configuration of the output signal.	155 158
The delay time of the output signal is long.	Check the test pulse diagnosis settings (Pc0E1 (Digital Output Port A (DOA) - Test Pulse Length) and Pc0E0 = n.X□□□ (Digital Output Port A (DOA) - Test Pulse Diagnosis Selection)).	Correct the settings in Pc0E0 and Pc0E1 so they are suited to the circuit configuration of the output signal.	155 158
The delay time of the output signal is long.	Check the initial stuck diagnosis settings (Pc0E2 (Digital Output Port A (DOA) - ON Delay Time) and Pc0E3 (Digital Output Port A (DOA) - OFF Delay Time)).	Correct the settings in Pc0E2 and Pc0E3 so they are suited to the circuit configuration of the output signal.	155 158

◆ A.E79:Safety Module - DOB Diagnostic Error

Possible Cause	Confirmation	Correction	Reference
The wiring for DOB is not correct.	Check the wiring for DOB.	• Correct the wiring for DOB. • If you are not using DOB, set Pc0E6 = n.□□□X (Output Port Selection) to 0 (Do not use output port).	152
The safety module has failed.	–	Replace the safety module.	–
The delay time of the output signal is long.	Check the delay in response at the rise or fall of the output signal. (The response time depends on the configuration of the external circuit for the output signal.)	Correct the settings in Pc0E6 to Pc0E9 so they are suited to the circuit configuration of the output signal.	155 158
The delay time of the output signal is long.	Check the test pulse diagnosis settings (Pc0E7 (Digital Output Port B (DOB) - Test Pulse Length) and Pc0E6 = n.X□□□ (Digital Output Port B (DOB) - Test Pulse Diagnosis Selection)).	Correct the settings in Pc0E6 and Pc0E7 so they are suited to the circuit configuration of the output signal.	155 158
The delay time of the output signal is long.	Check the initial stuck diagnosis settings (Pc0E8 (Digital Output Port B (DOB) - ON Delay Time) and Pc0E9 (Digital Output Port B (DOB) - OFF Delay Time)).	Correct the settings in Pc0E8 and Pc0E9 so they are suited to the circuit configuration of the output signal.	155 158

◆ A.E7A:Safety Module - DOC Diagnostic Error

Possible Cause	Confirmation	Correction	Reference
The wiring for DOC is not correct.	Check the wiring for DOC.	• Correct the wiring for DOC. • If you are not using DOC, set Pc0EC = n.□□□X (Output Port Selection) to 0 (Do not use output port).	152
The safety module has failed.	–	Replace the safety module.	–
The delay time of the output signal is long.	Check the delay in response at the rise or fall of the output signal. (The response time depends on the configuration of the external circuit for the output signal.)	Correct the settings in Pc0EC to Pc0EF so they are suited to the circuit configuration of the output signal.	155 158
The delay time of the output signal is long.	Check the test pulse diagnosis settings (Pc0ED (Digital Output Port C (DOC) - Test Pulse Length) and Pc0EC = n.X□□□ (Digital Output Port C (DOC) - Test Pulse Diagnosis Selection)).	Correct the settings in Pc0EC and Pc0ED so they are suited to the circuit configuration of the output signal.	155 158
The delay time of the output signal is long.	Check the initial stuck diagnosis settings (Pc0EE (Digital Output Port C (DOC) - ON Delay Time) and Pc0EF (Digital Output Port C (DOC) - OFF Delay Time)).	Correct the settings in Pc0EE and Pc0EF so they are suited to the circuit configuration of the output signal.	155 158

◆ A.E7B:Safety Module - DOD Diagnostic Error

Possible Cause	Confirmation	Correction	Reference
The wiring for DOD is not correct.	Check the wiring for DOD.	• Correct the wiring for DOD. • If you are not using DOD, set Pc0F2 = n.□□□X (Output Port Selection) to 0 (Do not use output port).	152
The safety module has failed.	–	Replace the safety module.	–
The delay time of the output signal is long.	Check the delay in response at the rise or fall of the output signal. (The response time depends on the configuration of the external circuit for the output signal.)	Correct the settings in Pc0F2 to Pc0F5 so they are suited to the circuit configuration of the output signal.	155 158
The delay time of the output signal is long.	Check the test pulse diagnosis settings (Pc0F3 (Digital Output Port D (DOD) - Test Pulse Length) and Pc0F2 = n.X□□□ (Digital Output Port D (DOD) - Test Pulse Diagnosis Selection)).	Correct the settings in Pc0F2 and Pc0F3 so they are suited to the circuit configuration of the output signal.	155 158
The delay time of the output signal is long.	Check the initial stuck diagnosis settings (Pc0F4 (Digital Output Port D (DOD) - ON Delay Time) and Pc0F5 (Digital Output Port D (DOD) - OFF Delay Time)).	Correct the settings in Pc0F4 and Pc0F5 so they are suited to the circuit configuration of the output signal.	155 158

◆ A.E7C:Safety Module - DOE Diagnostic Error

Possible Cause	Confirmation	Correction	Reference
The wiring for DOE is not correct.	Check the wiring for DOE.	• Correct the wiring for DOE. • If you are not using DOE, set Pc0F8 = n.□□□X (Output Port Selection) to 0 (Do not use output port).	152
The safety module has failed.	–	Replace the safety module.	–
The delay time of the output signal is long.	Check the delay in response at the rise or fall of the output signal. (The response time depends on the configuration of the external circuit for the output signal.)	Correct the settings in Pc0F8 to Pc0FB so they are suited to the circuit configuration of the output signal.	155 158
The delay time of the output signal is long.	Check the test pulse diagnosis settings (Pc0F9 (Digital Output Port E (DOE) - Test Pulse Length) and Pc0F8 = n.X□□□ (Digital Output Port E (DOE) - Test Pulse Diagnosis Selection)).	Correct the settings in Pc0F8 and Pc0F9 so they are suited to the circuit configuration of the output signal.	155 158
The delay time of the output signal is long.	Check the initial stuck diagnosis settings (Pc0FA (Digital Output Port E (DOE) - ON Delay Time) and Pc0FB (Digital Output Port E (DOE) - OFF Delay Time)).	Correct the settings in Pc0FA and Pc0FB so they are suited to the circuit configuration of the output signal.	155 158

◆ A.E81:Safety Module - Detection Mismatch

Possible Cause	Confirmation	Correction	Reference
A safety module of a different model than the previous safety module was connected to the SERVOPACK.	Check the safety module model.	• Execute Reset Option Module Configuration Error and turn the power OFF and ON again. Execute Reset Option Module Configuration Error with digital operator Fn014 or with the SigmaWin+. • Mount the safety module that was previously connected.	–

◆ A.EB0:Safety Module - System Error

Possible Cause	Confirmation	Correction	Reference
An error occurred in the safety module system.	–	• Restart the system. • Improve the EMC installation conditions. • Replace the safety module. • Replace the SERVOPACK.	–
An error occurred in the safety module system.	A rotary servomotor older than the Σ-7 series is connected.	Turn OFF the power, disconnect the encoder cable from CN2, and then turn ON the power again and configure the following settings. • Set Pc088 (Safety Encoder - Safe Address) to 0. • Set only STO, SS1-t, and SBC as the safety functions to be used. • Turn OFF the power, reconnect the encoder cable, and then turn ON the power again.	–
An error occurred with encoder communications when the power was turned ON.	Check if A.E29 (Safety Module - Encoder Error) occurred at the same time in the SERVOPACK's alarm history.	If A.E29 occurred, implement the corrections for A.E29.	–
Pn62E (Reserved parameter) is set to anything other than the default setting.	–	Initialize the SERVOPACK parameter settings.	–

◆ A.EB2:Safety Module - Parameter Setting Error

Possible Cause	Confirmation	Correction	Reference
A parameter setting is outside of the setting range.	Check the parameter settings.	Set the parameters again.	–
The combination of user unit parameter settings is not appropriate.	Check if the parameter settings for user unit system are within 262144 to 1/262144.	Set the user unit parameters again.	–
The parameter settings for unused safety function slots are not the default settings.	Check if the parameters related to the safety function slots are set to the default settings for those safety function slots in which the safety function selection is set to "None."	Reset all parameters related to unused safety function slots to the default settings.	–
A speed limit in the safety function slot parameters is faster than the maximum motor speed.	Check the speed limits (s1 and s2) for the safety function slots and the maximum rotation speed of the motor.	Set the speed limits for the safety function slots to the maximum motor speed or less.	–
The size relationship between the speed limits in the safety function slot parameters is not appropriate.	Check the speed limits (s1 and s2) for the safety function slots.	Set the speed limits for the safety function slots so that s1 ≥ s2.	–
The size relationship between the time settings in the safety function slot parameters is not appropriate.	Check the time settings (t1 and t2) for the safety function slots.	Set the time settings for the safety function slots so that t1 ≤ t2.	–
An unused digital input port is being used by a safety function slot.	Check if the digital input port set in the terminal port selection for the safety request input signal in the safety function slots is set to "Use input port" in the input port selection settings (Pc0C0, Pc0C5, Pc0CA, Pc0CF, and Pc0D4).	• Correct the settings for the terminal port selection for safety request input signal in the safety function slots. • Correct the digital input port settings.	–
An unused digital input port is being used by a safety function slot.	Check if the digital input port set in Pc541 = n.XX□□ (Terminal Port Selection for Safe Input Signal (SBCIS)) is set to "Use input port" in the input port selection settings (Pc0C0, Pc0C5, Pc0CA, Pc0CF, and Pc0D4).	• Correct the setting of Pc541 = n.XX□□ (Terminal Port Selection for Safe Input Signal (SBCIS)). • Correct the digital input port settings.	–
An unused digital output port is being used by a safety function slot.	Check if digital output port set in EDM signal terminal port selection in safety function slots is set to "Use output port", "Used for EDM signal" (Redundant Outputs or Single Output) in output port selection settings (Pc0E0, Pc0E6, Pc0EC, Pc0F2, Pc0F8).	• Correct the settings for the terminal port selection for the EDM output signal in the safety function slots. • Correct the digital output port setting.	–
An unused digital output port is being used by a safety function slot.	Check if the digital output port set in the terminal port selection for the EDM signal in the safety function slots is set to "Use output port" or "Used for SSMOS signal" in the output port selection settings (Pc0E0, Pc0E6, Pc0EC, Pc0F2, and Pc0F8).	• Correct the settings for the terminal port selection for the EDM output signal in the safety function slots. • Correct the digital output port setting.	–
An unused digital output port is being used by a safety function slot.	Check if the digital output port set in Pc541 = n.□□XX (Terminal Port Selection for SBC Output Signal (SBCOS)) is set to "Use output port" or "Used for SBCOS signal" in the output port selection settings (Pc0E0, Pc0E6, Pc0EC, Pc0F2, and Pc0F8).	• Correct the setting of Pc541 = n.□□XX (Terminal Port Selection for SBC Output Signal (SBCOS)). • Correct the digital output port setting.	–
An error occurred in the function activation condition of a safety function.	A combination that does not allow for coordinated operation between safety function slots was set.	Correct the parameters for safety function slots. The safety functions that can set the limit violation state of another safety function slot for the activation condition of a safety function slot are as follows: SS1-r, SS1-t, SS2-r, and SS2-t	265
Pc068 is set to n.1□□□ (Use encoder as an absolute encoder) when the software version of the SERVOPACK is Ver. 0017 or earlier.	Check the SERVOPACK software version and the setting of Pc068 = n.X□□□ (Encoder Usage).	Set Pc068 to n.0□□□ (Use encoder as an incremental encoder) when the software version of the SERVOPACK is Ver. 0017 or earlier.	–

◆ A.EB3:Safety Module - HWBB Circuit Monitoring Error

Possible Cause	Confirmation	Correction	Reference
An error occurred in the SERVOPACK HWBB circuit.	–	• Restart the system. • Replace the safety module. • Replace the SERVOPACK.	–

◆ A.EB9:Safety Module - Parameter Modification Alarm

Possible Cause	Confirmation	Correction	Reference
A safety module parameter was modified.	–	Turn the power OFF and ON again.	105
The safety module was initalized.	–	Turn the power OFF and ON again.	120

◆ A.EC0:Safety Module - Setup Confirmation Alarm

Possible Cause	Confirmation	Correction	Reference
A different safety module was mounted to the SERVOPACK.	–	Initialize the safety module.	103

◆ A.EC1:Safety Module - Safety-Related Servo Parameter Mismatch

Possible Cause	Confirmation	Correction	Reference
There is a mismatch between the safety-related servo parameter settings in the safety module and the parameter settings in the SERVOPACK.	–	• Modify the safety module parameters. • Modify the SERVOPACK parameter settings.	120
There is a mismatch between the safety-related servo parameter settings in the safety module and the settings for the encoder with functional safety.	–	• Modify the safety module parameters. • Change the parameter settings for the encoder with functional safety.	120

◆ A.EC3:Safety Module - Unsupported SERVOPACK

Possible Cause	Confirmation	Correction	Reference
An unsupported SERVOPACK was connected to the safety module.	Check the safety module model and the SERVOPACK model.	• Replace the safety module. • Replace the SERVOPACK.	58

◆ A.EC4:Safety Module - Encoder Configuration Error

Possible Cause	Confirmation	Correction	Reference
An unsupported encoder was connected.	Check the encoder model.	Replace the servomotor.	58
The encoder configuration is not appropriate.	Check the Σ-LINK II system configuration.	Change to system to one that supports the safety module.	85

◆ A.EC5:Safety Module - No Password

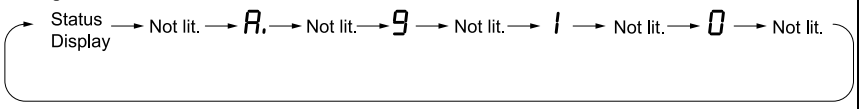
Possible Cause	Confirmation	Correction	Reference
The safety module password has not been set.	–	Use the SigmaWin+ and set the safety module password.	121
The safety module was initalized.	–	Use the SigmaWin+ and set the safety module password.	121

◆ A.EC6:Safety Module - System Error 2

Possible Cause	Confirmation	Correction	Reference
An error occurred in a peripheral circuit of the safety module.	–	• Restart the system. • Replace the safety module. • Replace the SERVOPACK.	–

10.2 Warning Displays

To check a warning that occurs in the SERVOPACK, use one of the following methods. Warnings are displayed to warn you before an alarm occurs.

Panel display on SERVOPACK	If there is a warning, the code will be displayed one character at a time, as shown below. Example: Alarm A.910 
Digital operator	The warning code will be displayed.
Statusword (6041h)	Bit 7 (Warning) in the Statusword will change to 1. (Bit 7 is 0 during normal operation.)
Error code (603Fh)	A current warning code is stored in object 603Fh.
Emergency message	The controller is notified of any warning that occurs. (Notification may not be possible if EtherCAT communications are unstable.)

If a warning occurs, eliminate the cause and then reset it with the SigmaWin+. Refer to the following manual for the reset procedure.

Σ-XS SERVOPACK with EtherCAT Communications References Product Manual (Manual No.: SIEP C710812 02)

This section provides a list of warnings, information on how to select warning detection, and the causes of and corrections for warnings.

10.2.1 List of Warnings

The list of warnings gives the warning name and warning meaning in order of the warning numbers.

Warning Number	Warning Name	Warning Meaning
A.9C0	Safety Module - Safety Slot 1 Limit Violation	A limit violation was detected in the monitoring operation of safety slot 1.
A.9C1	Safety Module - Safety Slot 2 Limit Violation	A limit violation was detected in the monitoring operation of safety slot 2.
A.9C2	Safety Module - Safety Slot 3 Limit Violation	A limit violation was detected in the monitoring operation of safety slot 3.
A.9C3	Safety Module - Safety Slot 4 Limit Violation	A limit violation was detected in the monitoring operation of safety slot 4.
A.9C4	Safety Module - Safety Slot 5 Limit Violation	A limit violation was detected in the monitoring operation of safety slot 5.
A.9C5	Safety Module - Safety Slot 6 Limit Violation	A limit violation was detected in the monitoring operation of safety slot 6.
A.9C6	Safety Module - Safety Slot 7 Limit Violation	A limit violation was detected in the monitoring operation of safety slot 7.
A.9C7	Safety Module - Safety Slot 8 Limit Violation	A limit violation was detected in the monitoring operation of safety slot 8.
A.9C8	Safety Module - Safety Slot 9 Limit Violation	A limit violation was detected in the monitoring operation of safety slot 9.
A.9CA	Safety Module - Internal Temperature Warning	An anomaly occurred in the internal temperature of the safety module.

10.2.2 Selecting Warning Detection

Use the following SERVOPACK parameters to set whether to detect warnings.

Pn008	n.□X□□	Warning Detection Selection (Position), (Speed), (Torque)		When Enabled
		0 (default setting)	Detect warnings.	After restart
		1	Do not detect warnings.	

Pn629	n.X□□□	Safety Module Warning Detection Selection (Position), (Speed), (Torque)		When Enabled
		0 (default setting)	Detect A.9C□ warnings.	After restart
		1	Do not detect A.9C□ warnings.	

10.2.3 Troubleshooting Warnings

The causes of and corrections for the warnings are given in the following table. Contact your Yaskawa representative if you cannot solve a problem with the correction given in the table.

◆ A.9C0:Safety Module - Safety Slot 1 Limit Violation

Possible Cause	Confirmation	Correction	Reference
A limit violation was detected in the monitoring operation of the safety function running in safety slot 1.	• Compare the operation reference (position ref.) and the distance limit settings. • Compare the operation reference (speed ref.) and the speed limit settings. • Compare the operation reference (acceleration ref.) and the acceleration limit setting.	• Correct the operation reference. • Correct the distance limit settings. • Correct the speed limit settings. • Correct the acceleration limit setting.	–

◆ A.9C1:Safety Module - Safety Slot 2 Limit Violation

Possible Cause	Confirmation	Correction	Reference
A limit violation was detected in the monitoring operation of the safety function running in safety slot 2.	• Compare the operation reference (position ref.) and the distance limit settings. • Compare the operation reference (speed ref.) and the speed limit settings. • Compare the operation reference (acceleration ref.) and the acceleration limit setting.	• Correct the operation reference. • Correct the distance limit settings. • Correct the speed limit settings. • Correct the acceleration limit setting.	–

◆ A.9C2:Safety Module - Safety Slot 3 Limit Violation

Possible Cause	Confirmation	Correction	Reference
A limit violation was detected in the monitoring operation of the safety function running in safety slot 3.	• Compare the operation reference (position ref.) and the distance limit settings. • Compare the operation reference (speed ref.) and the speed limit settings. • Compare the operation reference (acceleration ref.) and the acceleration limit setting.	• Correct the operation reference. • Correct the distance limit settings. • Correct the speed limit settings. • Correct the acceleration limit setting.	–

◆ A.9C3:Safety Module - Safety Slot 4 Limit Violation

Possible Cause	Confirmation	Correction	Reference
A limit violation was detected in the monitoring operation of the safety function running in safety slot 4.	• Compare the operation reference (position ref.) and the distance limit settings. • Compare the operation reference (speed ref.) and the speed limit settings. • Compare the operation reference (acceleration ref.) and the acceleration limit setting.	• Correct the operation reference. • Correct the distance limit settings. • Correct the speed limit settings. • Correct the acceleration limit setting.	–

◆ A.9C4:Safety Module - Safety Slot 5 Limit Violation

Possible Cause	Confirmation	Correction	Reference
A limit violation was detected in the monitoring operation of the safety function running in safety slot 5.	• Compare the operation reference (position ref.) and the distance limit settings. • Compare the operation reference (speed ref.) and the speed limit settings. • Compare the operation reference (acceleration ref.) and the acceleration limit setting.	• Correct the operation reference. • Correct the distance limit settings. • Correct the speed limit settings. • Correct the acceleration limit setting.	–

◆ A.9C5:Safety Module - Safety Slot 6 Limit Violation

Possible Cause	Confirmation	Correction	Reference
A limit violation was detected in the monitoring operation of the safety function running in safety slot 6.	• Compare the operation reference (position ref.) and the distance limit settings. • Compare the operation reference (speed ref.) and the speed limit settings. • Compare the operation reference (acceleration ref.) and the acceleration limit setting.	• Correct the operation reference. • Correct the distance limit settings. • Correct the speed limit settings. • Correct the acceleration limit setting.	–

◆ A.9C6:Safety Module - Safety Slot 7 Limit Violation

Possible Cause	Confirmation	Correction	Reference
A limit violation was detected in the monitoring operation of the safety function running in safety slot 7.	• Compare the operation reference (position ref.) and the distance limit settings. • Compare the operation reference (speed ref.) and the speed limit settings. • Compare the operation reference (acceleration ref.) and the acceleration limit setting.	• Correct the operation reference. • Correct the distance limit settings. • Correct the speed limit settings. • Correct the acceleration limit setting.	–

◆ A.9C7:Safety Module - Safety Slot 8 Limit Violation

Possible Cause	Confirmation	Correction	Reference
A limit violation was detected in the monitoring operation of the safety function running in safety slot 8.	• Compare the operation reference (position ref.) and the distance limit settings. • Compare the operation reference (speed ref.) and the speed limit settings. • Compare the operation reference (acceleration ref.) and the acceleration limit setting.	• Correct the operation reference. • Correct the distance limit settings. • Correct the speed limit settings. • Correct the acceleration limit setting.	–

◆ A.9C8:Safety Module - Safety Slot 9 Limit Violation

Possible Cause	Confirmation	Correction	Reference
A limit violation was detected in the monitoring operation of the safety function running in safety slot 9.	• Compare the operation reference (position ref.) and the distance limit settings. • Compare the operation reference (speed ref.) and the speed limit settings. • Compare the operation reference (acceleration ref.) and the acceleration limit setting.	• Correct the operation reference. • Correct the distance limit settings. • Correct the speed limit settings. • Correct the acceleration limit setting.	–

◆ A.9CA:Safety Module - Internal Temperature Warning

Possible Cause	Confirmation	Correction	Reference
The surrounding temperature is too high.	–	Decrease the surrounding temperature by improving the SERVOPACK installation conditions. For details, refer to the product manual for your SERVOPACK.	–
There was an excessive load or operation was performed that exceeded the regenerative processing capacity.	–	Reconsider the load and operating conditions.	–
The SERVOPACK installation orientation is not correct or there is insufficient space around the SERVOPACK.	–	Install the SERVOPACK according to specifications. For details, refer to the product manual for your SERVOPACK.	–
A failure occurred in the safety module.	–	Replace the safety module.	–

10.3 Troubleshooting Based on the Operation and Conditions of the ASM-X

This section provides troubleshooting based on the operation and conditions of the ASM-X, including causes and corrections.

10.3.1 The STO Function Starts Instead of the Safety Function Specified in the Parameter

Possible Cause	Confirmation	Correction	Reference
A CN21 digital input signal (DIA to E) was set to the request safety function execution state before the power was turned ON.	Check the status of the CN21 digital input signals. Check if User Parameter Configuration (2700h) is being executed with EtherCAT communications. If User Parameter Configuration (2700h) is executed, the safety function being executed operates as the STO function.	After the power is turned ON, switch the CN21 digital input signals from ON (input circuit closed) to OFF (input circuit open).	267
The absolute encoder was reset from the SigmaWin+ or over EtherCAT communications during safety function execution.	Check if the power was turned OFF and ON again after the absolute encoder was reset.	If the power was not turned OFF and ON again, then turn the power OFF and ON again.	267
The multiturn limit for the absolute encoder was changed from the SigmaWin+ or over EtherCAT communications during safety function execution.	Check if the power was turned OFF and ON again after the multiturn limit for the absolute encoder was changed.	If the power was not turned OFF and ON again, then turn the power OFF and ON again.	267
A Σ-LINK II setting was changed from the SigmaWin+ during safety function execution.	Check if the power was turned OFF and ON again after a Σ-LINK II setting was changed.	If the power was not turned OFF and ON again, then turn the power OFF and ON again.	267
User parameter configuration (2700h) was executed from an EtherCAT object during safety function execution.	–	Turn ON the safety fieldbus input signal set in the parameter (a bit from VI0 to VI15).	267

10.3.2 STO State Cannot Be Cleared After Power Is Turned ON

Possible Cause	Confirmation	Correction	Reference
The Safety Request Input Signal (SRIS) is OFF (clear request to execute the safety function), but the EtherCAT communications status is not OPERATIONAL.	Check the setting of Pc121 = n.□□□X.	If Pc121 = n.□□□1, place EtherCAT communications in the OPERATIONAL state. If the FSoE MDevice is not connected, set Pc121 to n.□□□0.	146
The Safety Request Input Signal (SRIS) is ON (request to execute the safety function).	–	Turn OFF the Safety Request Input Signal (SRIS).	–

10.3.3 Safety Function for FSoE MDevice Virtual Input Turns ON/OFF in an Unintended Manner

Possible Cause	Confirmation	Correction	Reference
The ON/OFF logic setting for the safety fieldbus virtual input is incorrect.	Check the setting of Pc121 = n.□X□□.	Match the setting of Pc121 = n.□X□□ to the logic of the FSoE MDevice virtual input.	142

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Parameter and Object Lists

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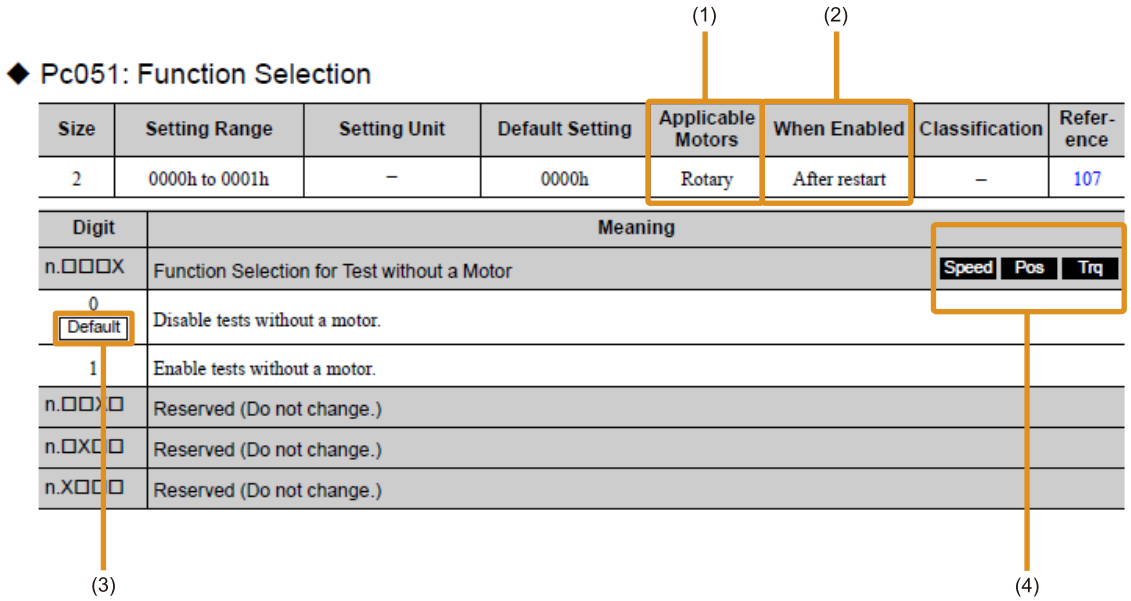
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11.1 Parameter Lists

11.1.1 Interpreting the Parameter Lists



No.	Item	Meaning
(1)	Applicable Motors	Indicates the types of servomotors to which the parameter applies. • All: The parameter is used for both rotary servomotors and linear servomotors. • Rotary: The parameter is used for only rotary servomotors. • Linear: The parameter is used for only linear servomotors. If this item differs by digit, it is added to the digit table. Rotary servomotor terms are used for parameters that are applicable to all servomotors. If you are using a linear servomotor, you need to interpret the terms accordingly. Refer to the following sections for details. Later
(2)	When Enabled	Indicates when a change to the parameter will be effective. “After restart” indicates parameters that will be effective after one of the following is executed. • The power is turned OFF and ON again. • A software reset is executed. If this item differs by digit, it is added to the digit table.
(3)	Default Setting	The default setting.
(4)	Control Mode	Speed: A parameter that can be used in speed control. Pos: A parameter that can be used in position control. Trq: A parameter that can be used in torque control. "Torque" is used even for linear servomotor parameters. Grayed-out icons (Speed, Pos, Trq) indicate parameters that cannot be used in the corresponding control method. For parameters for numeric settings, this item is added next to the parameter name. For parameters for selecting functions, this item is added to each digit in the table.

11.1.2 List of Safety-Related Servo Parameters

◆ Pc050: Motor Setting Switch

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0000h to 0011h	–	0000h	All	After restart	–	113

Digit	Meaning
n.□□□X	Motor Types Speed Pos Trq
0 Default	Rotary servomotor
1	Reserved (Do not use.)
n.□□X□	Rotation Direction Selection Speed Pos Trq
0 Default	Use CCW as the forward direction.
1	Use CW as the forward direction. (Reverse Rotation Mode)
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc051: Function Selection

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0000h to 0001h	–	0000h	All	After restart	–	113

Digit	Meaning
n.□□□X	Function Selection for Test without a Motor Speed Pos Trq
0 Default	Disable tests without a motor.
1	Enable tests without a motor.
n.□□X□	Reserved (Do not change.)
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc060: Encoder Data Configuration Setting 1 Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0 to 32	1 bit	26	All	After restart	–	–

◆ Pc062: Maximum Motor Speed

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0000h to FFFFh	–	0107h	All	After restart	–	114

Digit	Meaning
n.□□XX	Mantissa Part of Maximum Motor Rotation Speed Speed Pos Trq
–	0 to 255
n.XX□□	Exponent Part of Maximum Motor Speed Speed Pos Trq
03	10^3
02	10^2
01 Default	10^1
00	10^0
FF	10^{-1}
FE	10^{-2}
FD	10^{-3}

◆ Pc066: Number of Encoder Pulses Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
4	0 to 1073741824	1 pulse/rev	0	All	After restart	–	–

◆ Pc068: First Encoder Information

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0000h to 1411h	–	0100h	All	After restart	–	115

Digit	Meaning
n.□□□X	Encoder Data Configuration Setting 2 Speed Pos Trq
0 Default	Incremental encoder
1	Absolute encoder
n.□□X□	Encoder Data Configuration Setting 3 Speed Pos Trq
0 Default	No reverse connection
1	Reserved (Do not use.)
n.□X□□	Encoder Data Configuration Setting 4 Speed Pos Trq
0	When using an encoder with functional safety or when using STO, SS1-t, and SBC functions only
1 Default	Rotary encoder compatible with Σ-LINK II (Σ-X series)
2 to 4	Reserved (Do not use.)
n.X□□□	Encoder Usage Speed Pos Trq
0 Default	Use the encoder as an incremental encoder.
1	Use the encoder as an absolute encoder.

◆ Pc069: Encoder Data Configuration Setting 5

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0000h to FFFFh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Least Significant Bit Position in Encoder Position Data Speed Pos Trq
–	0 to 255
n.XX□□	Most Significant Bit Position in Encoder Position Data Speed Pos Trq
–	0 to 255

◆ Pc06A: Multiturn Limit Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0 to 65535	1 rev	65535	All	After restart	–	116

◆ Pc088: Safety Encoder - Safe address Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0000h to 003Fh	–	0001h	All	After restart	–	116

11.1.3 List of Safety-Related Module Parameters: FSoE Communications References and Digital I/O Model

◆ Pc0C0: Digital Input Port A (DIA) - Configuration

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0000h to 0001h	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□□X	Input Port Selection Speed Pos Trq
0 Default	Do not use input port
1	Use input port
n.□□X□	Reserved (Do not change.)
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc0C1: Digital Input Port A (DIA) - Filtering Time Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0 to 1000	1 ms	0	All	After restart	–	–

◆ Pc0C2: Digital Input Port A (DIA) - Discrepancy Allowable Time Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	15 to 1000	1 ms	15	All	After restart	–	–

◆ Pc0C5: Digital Input Port B (DIB) - Configuration

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 0001h	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□□X	Input Port Selection Speed Pos Trq
0 Default	Do not use input port
1	Use input port
n.□□X□	Reserved (Do not change.)
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc0C6: Digital Input Port B (DIB) - Filtering Time Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 1000	1 ms	0	All	After restart	–	–

◆ Pc0C7: Digital Input Port B (DIB) - Discrepancy Allowable Time Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	15 to 1000	1 ms	15	All	After restart	–	–

◆ Pc0CA: Digital Input Port C (DIC) - Configuration

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 0001h	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□□X	Input Port Selection Speed Pos Trq
0 Default	Do not use input port
1	Use input port
n.□□X□	Reserved (Do not change.)
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc0CB: Digital Input Port C (DIC) - Filtering Time Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 1000	1 ms	0	All	After restart	–	–

◆ Pc0CC: Digital Input Port C (DIC) - Discrepancy Allowable Time Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	15 to 1000	1 ms	15	All	After restart	–	–

◆ Pc0CF: Digital Input Port D (DID) - Configuration

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 0001h	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□□X	Input Port Selection Speed Pos Trq
0 Default	Do not use input port
1	Use input port
n.□□X□	Reserved (Do not change.)
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc0D0: Digital Input Port D (DID) - Filtering Time Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 1000	1 ms	0	All	After restart	–	–

◆ Pc0D1: Digital Input Port D (DID) - Discrepancy Allowable Time Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	15 to 1000	1 ms	15	All	After restart	–	–

◆ Pc0D4: Digital Input Port E (DIE) - Configuration

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 0001h	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□□X	Input Port Selection Speed Pos Trq
0 Default	Do not use input port
1	Use input port
n.□□X□	Reserved (Do not change.)
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc0D5: Digital Input Port E (DIE) - Filtering Time Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 1000	1 ms	0	All	After restart	–	–

◆ Pc0D6: Digital Input Port E (DIE) - Discrepancy Allowable Time Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	15 to 1000	1 ms	15	All	After restart	–	–

◆ Pc0E0: Digital Output Port A (DOA) - Configuration

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 1141h	–	1100h	All	After restart	–	–

Digit	Meaning
n.□□□X	Output Port Selection Speed Pos Trq
0 Default	Do not use output port
1	Use output port
n.□□X□	Output Signal Usage Selection Speed Pos Trq
0 Default	Used for EDM signal (Redundant Outputs)
1	Used for EDM signal (Single Output)
2	Used for SSMOS signal
3	Used for SCAOS signal
4	Used for SBCOS signal
n.□X□□	Output Port Initial Stuck Diagnosis Selection Speed Pos Trq
0	Disable Diagnosis
1 Default	Enable Diagnosis
n.X□□□	Output Port Test Pulse Diagnosis Selection Speed Pos Trq
0	Disable Diagnosis
1 Default	Enable Diagnosis

◆ Pc0E1: Digital Output Port A (DOA) - Test Pulse Length Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	2 to 20	1 ms	2	All	After restart	–	–

◆ Pc0E2: Digital Output Port A (DOA) - ON Delay Time Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	30 to 300	1 ms	30	All	After restart	–	–

◆ Pc0E3: Digital Output Port A (DOA) - OFF Delay Time Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	30 to 300	1 ms	30	All	After restart	–	–

◆ Pc0E6: Digital Output Port B (DOB) - Configuration

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 1141h	–	1100h	All	After restart	–	–

Digit	Meaning
n.□□□X	Output Port Selection Speed Pos Trq
0 Default	Do not use output port
1	Use output port
n.□□X□	Output Signal Usage Selection Speed Pos Trq
0 Default	Used for EDM signal (Redundant Outputs)
1	Used for EDM signal (Single Output)
2	Used for SSMOS signal
3	Used for SCAOS signal
4	Used for SBCOS signal
n.□X□□	Output Port Initial Stuck Diagnosis Selection Speed Pos Trq
0	Disable Diagnosis
1 Default	Enable Diagnosis
n.X□□□	Output Port Test Pulse Diagnosis Selection Speed Pos Trq
0	Disable Diagnosis
1 Default	Enable Diagnosis

◆ Pc0E7: Digital Output Port B (DOB) - Test Pulse Length Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	2 to 20	1 ms	2	All	After restart	–	–

◆ Pc0E8: Digital Output Port B (DOB) - ON Delay Time Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	30 to 300	1 ms	30	All	After restart	–	–

◆ Pc0E9: Digital Output Port B (DOB) - OFF Delay Time Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	30 to 300	1 ms	30	All	After restart	–	–

◆ Pc0EC: Digital Output Port C (DOC) - Configuration

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 1141h	–	1100h	All	After restart	–	–

Digit	Meaning
n.□□□X	Output Port Selection Speed Pos Trq
0 Default	Do not use output port
1	Use output port
n.□□X□	Output Signal Usage Selection Speed Pos Trq
0 Default	Used for EDM signal (Redundant Outputs)
1	Used for EDM signal (Single Output)
2	Used for SSMOS signal
3	Used for SCAOS signal
4	Used for SBCOS signal
n.□X□□	Output Port Initial Stuck Diagnosis Selection Speed Pos Trq
0	Disable Diagnosis
1 Default	Enable Diagnosis
n.X□□□	Output Port Test Pulse Diagnosis Selection Speed Pos Trq
0	Disable Diagnosis
1 Default	Enable Diagnosis

◆ Pc0ED: Digital Output Port C (DOC) - Test Pulse Length Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	2 to 20	1 ms	2	All	After restart	–	–

◆ Pc0EE: Digital Output Port C (DOC) - ON Delay Time Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	30 to 300	1 ms	30	All	After restart	–	–

◆ Pc0EF: Digital Output Port C (DOC) - OFF Delay Time Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	30 to 300	1 ms	30	All	After restart	–	–

◆ Pc0F2: Digital Output Port D (DOD) - Configuration

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0000h to 1141h	–	1100h	All	After restart	–	–

Digit	Meaning
n.□□□X	Output Port Selection Speed Pos Trq
0 Default	Do not use output port
1	Use output port
n.□□X□	Output Signal Usage Selection Speed Pos Trq
0 Default	Used for EDM signal (Redundant Outputs)
1	Used for EDM signal (Single Output)
2	Used for SSMOS signal
3	Used for SCAOS signal
4	Used for SBCOS signal
n.□X□□	Output Port Initial Stuck Diagnosis Selection Speed Pos Trq
0	Disable Diagnosis
1 Default	Enable Diagnosis
n.X□□□	Output Port Test Pulse Diagnosis Selection Speed Pos Trq
0	Disable Diagnosis
1 Default	Enable Diagnosis

◆ Pc0F3: Digital Output Port D (DOD) - Test Pulse Length Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	2 to 20	1 ms	2	All	After restart	–	–

◆ Pc0F4: Digital Output Port D (DOD) - ON Delay Time Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	30 to 300	1 ms	30	All	After restart	–	–

◆ Pc0F5: Digital Output Port D (DOD) - OFF Delay Time Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	30 to 300	1 ms	30	All	After restart	–	–

◆ Pc0F8: Digital Output Port E (DOE) - Configuration

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0000h to 1141h	–	1100h	All	After restart	–	–

Digit	Meaning
n.□□□X	Output Port Selection Speed Pos Trq
0 Default	Do not use output port
1	Use output port
n.□□X□	Output Signal Usage Selection Speed Pos Trq
0 Default	Used for EDM signal (Redundant Outputs)
1	Used for EDM signal (Single Output)
2	Used for SSMOS signal
3	Used for SCAOS signal
4	Used for SBCOS signal
n.□X□□	Output Port Initial Stuck Diagnosis Selection Speed Pos Trq
0	Disable Diagnosis
1 Default	Enable Diagnosis
n.X□□□	Output Port Test Pulse Diagnosis Selection Speed Pos Trq
0	Disable Diagnosis
1 Default	Enable Diagnosis

◆ Pc0F9: Digital Output Port E (DOE) - Test Pulse Length Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	2 to 20	1 ms	2	All	After restart	–	–

◆ Pc0FA: Digital Output Port E (DOE) - ON Delay Time Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	30 to 300	1 ms	30	All	After restart	–	–

◆ Pc0FB: Digital Output Port E (DOE) - OFF Delay Time Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	30 to 300	1 ms	30	All	After restart	–	–

◆ Pc120: Safety Fieldbus - station address Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0001h to FFFFh	–	0001h	All	After restart	–	–

◆ Pc121: Safety Fieldbus - operation selection

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 0131h	–	0130h	All	After restart	–	–

Digit	Meaning
n.□□□X	Safety function operation selection at initial state Speed Pos Trq
0 Default	After power ON, the STO state is not forced until safe data communication is possible.
1	After power ON, the STO state is forced until safe data communication is possible.
n.□□X□	SPDU selection Speed Pos Trq
0	1st SPDU (moduleident:0x02200A01)
1	2nd SPDU (moduleident:0x02200A02)
2	1st SPDU (moduleident:0x02200A03)
3 Default	2nd SPDU (moduleident:0x02200A04)
n.□X□□	ON/OFF Logic Selection for Safety Fieldbus Virtual Input Speed Pos Trq
0	The SRIS is ON when the Virtual input is 1.
1 Default	The SRIS is ON when the Virtual input is 0.
n.X□□□	Reserved (Do not change.)

◆ Pc122: Operation When Safety Fieldbus Virtual Input Not Usable

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 0009h	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□□X	Selection of Operation When Safety Fieldbus Virtual Input Not Usable Speed Pos Trq
0 Default	Execute STO function.
1	Execute SS1 function or SS2 function set for safety slot 1.
2	Execute SS1 function or SS2 function set for safety slot 2.
3	Execute SS1 function or SS2 function set for safety slot 3.
4	Execute SS1 function or SS2 function set for safety slot 4.
5	Execute SS1 function or SS2 function set for safety slot 5.
6	Execute SS1 function or SS2 function set for safety slot 6.
7	Execute SS1 function or SS2 function set for safety slot 7.
8	Execute SS1 function or SS2 function set for safety slot 8.
9	Execute SS1 function or SS2 function set for safety slot 9.
n.□□X□	Reserved (Do not change.)
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc150: Encoder Deviation Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 1073741823	User position reference unit	16384	All	After restart	–	–

◆ Pc152: Encoder Deviation Window

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 65535	1 ms	0	All	After restart	–	–

◆ Pc160: Safe Home Position Offset

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-1073741823 to 1073741823	User position reference unit	0	All	After restart	–	–

◆ Pc170: Safety Function Application Selection

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 0011h	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□□X	Safety Function Monitoring Resolution Mode Selection Speed Pos Trq
0 Default	Normal Mode
1	High Resolution Mode
n.□□X□	Safety Function Monitoring Response Mode Selection Speed Pos Trq
0 Default	Enable High Response Mode
1	Disable High Response Mode
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc172: Limit Violation Deactivation Delay Time (LVDDT)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 10000	1 ms	0	All	After restart	–	–

◆ Pc173: Acceleration Filter Time

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 30	1 ms	0	All	After restart	–	107

◆ Pc180: Safety Module: User Position Reference Unit (Numerator)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	1 to 1073741824	–	1	All	After restart	–	–

◆ Pc182: Safety Module: User Position Reference Unit (Denominator)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	1 to 1073741824	–	1	All	After restart	–	–

◆ Pc188: Safety Module: User Speed Reference Unit (Numerator)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
4	1 to 1073741824	–	1	All	After restart	–	–

◆ Pc18A: Safety Module: User Speed Reference Unit (Denominator)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
4	1 to 1073741824	–	1	All	After restart	–	–

◆ Pc190: Safety Module: User Acceleration Ref. Unit (Numerator)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
4	1 to 1073741824	–	1	All	After restart	–	–

◆ Pc192: Safety Module: User Acceleration Ref. Unit (Denominator)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
4	1 to 1073741824	–	1	All	After restart	–	–

◆ Pc300: Slot 1 - Safety Function Configuration I

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 0013h	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Safety Function Selection Speed Pos Trq
00 Default	Disabled
01	Reserved Parameter (Do not change)
02	STO Function
03	SS1-r Function
04	SS1-t Function
05	SS2-r Function
06	SS2-t Function
07	SOS Function
08	SLS Function
09	SLA Function
0A	SSR Function
0B	SDI-p Function
0C	SDI-n Function
0D	SLP Function
0E	SLI Function
0F to 10	Reserved (Do not change)
11	SCA Function
12	SSM Function
13	SHP Function
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc301: Slot 1 - Safety Function Configuration II

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0000h to 1F3Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for Safety Request Input Signal Speed Pos Trq
00 Default	Disabled
01	Reserved Parameter (Do not change)
02	Digital Input Port A (DIA)
03	Digital Input Port B (DIB)
04	Digital Input Port C (DIC)
05	Digital Input Port D (DID)
06	Digital Input Port E (DIE)
07 to 0F	Reserved (Do not change)
10	Virtual Input 0
11	Virtual Input 1
12	Virtual Input 2
13	Virtual Input 3
14	Virtual Input 4
15	Virtual Input 5
16	Virtual Input 6
17	Virtual Input 7
18	Virtual Input 8
19	Virtual Input 9
1A	Virtual Input 10
1B	Virtual Input 11
1C	Virtual Input 12
1D	Virtual Input 13
1E	Virtual Input 14
1F	Virtual Input 15
20 to 2F	Reserved (Do not change)
30	Slot 1 Limit Violation
31	Slot 2 Limit Violation
32	Slot 3 Limit Violation
33	Slot 4 Limit Violation
34	Slot 5 Limit Violation
35	Slot 6 Limit Violation
36	Slot 7 Limit Violation
37	Slot 8 Limit Violation
38	Slot 9 Limit Violation
39	Slot 10 Limit Violation
3A to 3E	Reserved (Do not change)
3F	Safety fieldbus virtual input not usable state

Digit	Meaning
n.XX□□	Terminal Port Selection for Safety Data Input Signal Speed Pos Trq
00 Default	Disabled
01	Reserved Parameter (Do not change)
02	Digital Input Port A (DIA)
03	Digital Input Port B (DIB)
04	Digital Input Port C (DIC)
05	Digital Input Port D (DID)
06	Digital Input Port E (DIE)
07 to 0F	Reserved (Do not change)
10	Virtual Input 0
11	Virtual Input 1
12	Virtual Input 2
13	Virtual Input 3
14	Virtual Input 4
15	Virtual Input 5
16	Virtual Input 6
17	Virtual Input 7
18	Virtual Input 8
19	Virtual Input 9
1A	Virtual Input 10
1B	Virtual Input 11
1C	Virtual Input 12
1D	Virtual Input 13
1E	Virtual Input 14
1F	Virtual Input 15

◆ Pc302: Slot 1 - Safety Function Configuration III

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0000h to 042Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for EDM Signal Speed Pos Trq
00 Default	Disabled
01	Digital Output Port A channel 1 (DOA1)
02	Digital Output Port A channel 2 (DOA2)
03	Digital Output Port B channel 1 (DOB1)
04	Digital Output Port B channel 2 (DOB2)
05	Digital Output Port C channel 1 (DOC1)
06	Digital Output Port C channel 2 (DOC2)
07	Digital Output Port D channel 1 (DOD1)
08	Digital Output Port D channel 2 (DOD2)
09	Digital Output Port E channel 1 (DOE1)
0A	Digital Output Port E channel 2 (DOE2)
0B to 0F	Reserved (Do not change.)
10	Digital Output Port A (DOA)
11	Digital Output Port B (DOB)
12	Digital Output Port C (DOC)
13	Digital Output Port D (DOD)
14	Digital Output Port E (DOE)
15 to 1F	Reserved (Do not change)
20	Virtual Output 0
21	Virtual Output 1
22	Virtual Output 2
23	Virtual Output 3
24	Virtual Output 4
25	Virtual Output 5
26	Virtual Output 6
27	Virtual Output 7
28	Virtual Output 8
29	Virtual Output 9
2A	Virtual Output 10
2B	Virtual Output 11
2C	Virtual Output 12
2D	Virtual Output 13
2E	Virtual Output 14
2F	Virtual Output 15
n.XX□□	EDM Signal Behavior Speed Pos Trq
00 Default	Disabled

Digit	Meaning
01	In Operation
02	Working Safety Function
03	After Limit Violation
04	HWBB (STO) State

◆ Pc303: Slot 1 - Safety Function Configuration IV

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 002Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for Safe Output Signal Speed Pos Trq
00 Default	Disabled
01 to 0F	Reserved (Do not change)
10	Digital Output Port A (DOA)
11	Digital Output Port B (DOB)
12	Digital Output Port C (DOC)
13	Digital Output Port D (DOD)
14	Digital Output Port E (DOE)
15 to 1F	Reserved (Do not change)
20	Virtual Output 0
21	Virtual Output 1
22	Virtual Output 2
23	Virtual Output 3
24	Virtual Output 4
25	Virtual Output 5
26	Virtual Output 6
27	Virtual Output 7
28	Virtual Output 8
29	Virtual Output 9
2A	Virtual Output 10
2B	Virtual Output 11
2C	Virtual Output 12
2D	Virtual Output 13
2E	Virtual Output 14
2F	Virtual Output 15
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc310: Slot 1 - Waiting Time (t1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 10000	10 ms	0	All	After restart	–	–

◆ Pc311: Slot 1 - Monitoring Time (t2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 10000	10 ms	0	All	After restart	–	–

◆ Pc312: Slot 1 - Speed Limit (s1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User Speed Reference Unit	0	All	After restart	–	–

◆ Pc314: Slot 1 - Speed Limit (s2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User Speed Reference Unit	0	All	After restart	–	–

◆ Pc316: Slot 1 - Acceleration Limit (a1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User acceleration reference unit	0	All	After restart	–	–

◆ Pc318: Slot 1 - Distance Limit (p1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User position reference unit	0	All	After restart	–	–

◆ Pc31A: Slot 1 - Distance Limit (p2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User position reference unit	0	All	After restart	–	–

◆ Pc31C: Slot 1 - Distance Limit (p3)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User position reference unit	0	All	After restart	–	–

◆ Pc340: Slot 2 - Safety Function Configuration I

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 0013h	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Safety Function Selection Speed Pos Trq
00 Default	Disabled
01	Reserved Parameter (Do not change)
02	STO Function
03	SS1-r Function
04	SS1-t Function
05	SS2-r Function
06	SS2-t Function
07	SOS Function
08	SLS Function
09	SLA Function
0A	SSR Function
0B	SDI-p Function
0C	SDI-n Function
0D	SLP Function
0E	SLI Function
0F to 10	Reserved (Do not change)
11	SCA Function
12	SSM Function
13	SHP Function
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc341: Slot 2 - Safety Function Configuration II

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0000h to 1F3Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for Safety Request Input Signal Speed Pos Trq
00 Default	Disabled
01	Reserved Parameter (Do not change)
02	Digital Input Port A (DIA)
03	Digital Input Port B (DIB)
04	Digital Input Port C (DIC)
05	Digital Input Port D (DID)
06	Digital Input Port E (DIE)
07 to 0F	Reserved (Do not change)
10	Virtual Input 0
11	Virtual Input 1
12	Virtual Input 2
13	Virtual Input 3
14	Virtual Input 4
15	Virtual Input 5
16	Virtual Input 6
17	Virtual Input 7
18	Virtual Input 8
19	Virtual Input 9
1A	Virtual Input 10
1B	Virtual Input 11
1C	Virtual Input 12
1D	Virtual Input 13
1E	Virtual Input 14
1F	Virtual Input 15
20 to 2F	Reserved (Do not change)
30	Slot 1 Limit Violation
31	Slot 2 Limit Violation
32	Slot 3 Limit Violation
33	Slot 4 Limit Violation
34	Slot 5 Limit Violation
35	Slot 6 Limit Violation
36	Slot 7 Limit Violation
37	Slot 8 Limit Violation
38	Slot 9 Limit Violation
39	Slot 10 Limit Violation
3A to 3E	Reserved (Do not change)
3F	Safety fieldbus virtual input not usable state

Digit	Meaning
n.XX□□	Terminal Port Selection for Safety Data Input Signal Speed Pos Trq
00 Default	Disabled
01	Reserved Parameter (Do not change)
02	Digital Input Port A (DIA)
03	Digital Input Port B (DIB)
04	Digital Input Port C (DIC)
05	Digital Input Port D (DID)
06	Digital Input Port E (DIE)
07 to 0F	Reserved (Do not change)
10	Virtual Input 0
11	Virtual Input 1
12	Virtual Input 2
13	Virtual Input 3
14	Virtual Input 4
15	Virtual Input 5
16	Virtual Input 6
17	Virtual Input 7
18	Virtual Input 8
19	Virtual Input 9
1A	Virtual Input 10
1B	Virtual Input 11
1C	Virtual Input 12
1D	Virtual Input 13
1E	Virtual Input 14
1F	Virtual Input 15

◆ Pc342: Slot 2 - Safety Function Configuration III

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0000h to 042Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for EDM Signal Speed Pos Trq
00 Default	Disabled
01	Digital Output Port A channel 1 (DOA1)
02	Digital Output Port A channel 2 (DOA2)
03	Digital Output Port B channel 1 (DOB1)
04	Digital Output Port B channel 2 (DOB2)
05	Digital Output Port C channel 1 (DOC1)
06	Digital Output Port C channel 2 (DOC2)
07	Digital Output Port D channel 1 (DOD1)
08	Digital Output Port D channel 2 (DOD2)
09	Digital Output Port E channel 1 (DOE1)
0A	Digital Output Port E channel 2 (DOE2)
0B to 0F	Reserved (Do not change.)
10	Digital Output Port A (DOA)
11	Digital Output Port B (DOB)
12	Digital Output Port C (DOC)
13	Digital Output Port D (DOD)
14	Digital Output Port E (DOE)
15 to 1F	Reserved (Do not change)
20	Virtual Output 0
21	Virtual Output 1
22	Virtual Output 2
23	Virtual Output 3
24	Virtual Output 4
25	Virtual Output 5
26	Virtual Output 6
27	Virtual Output 7
28	Virtual Output 8
29	Virtual Output 9
2A	Virtual Output 10
2B	Virtual Output 11
2C	Virtual Output 12
2D	Virtual Output 13
2E	Virtual Output 14
2F	Virtual Output 15
n.XX□□	EDM Signal Behavior Speed Pos Trq
00 Default	Disabled

Digit	Meaning
01	In Operation
02	Working Safety Function
03	After Limit Violation
04	HWBB (STO) State

◆ Pc343: Slot 2 - Safety Function Configuration IV

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 002Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for Safe Output Signal Speed Pos Trq
00 Default	Disabled
01 to 0F	Reserved (Do not change)
10	Digital Output Port A (DOA)
11	Digital Output Port B (DOB)
12	Digital Output Port C (DOC)
13	Digital Output Port D (DOD)
14	Digital Output Port E (DOE)
15 to 1F	Reserved (Do not change)
20	Virtual Output 0
21	Virtual Output 1
22	Virtual Output 2
23	Virtual Output 3
24	Virtual Output 4
25	Virtual Output 5
26	Virtual Output 6
27	Virtual Output 7
28	Virtual Output 8
29	Virtual Output 9
2A	Virtual Output 10
2B	Virtual Output 11
2C	Virtual Output 12
2D	Virtual Output 13
2E	Virtual Output 14
2F	Virtual Output 15
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc350: Slot 2 - Waiting Time (t1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 10000	10 ms	0	All	After restart	–	–

◆ Pc351: Slot 2 - Monitoring Time (t2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 10000	10 ms	0	All	After restart	–	–

◆ Pc352: Slot 2 - Speed Limit (s1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User Speed Reference Unit	0	All	After restart	–	–

◆ Pc354: Slot 2 - Speed Limit (s2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User Speed Reference Unit	0	All	After restart	–	–

◆ Pc356: Slot 2 - Acceleration Limit (a1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User acceleration reference unit	0	All	After restart	–	–

◆ Pc358: Slot 2 - Distance Limit (p1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User position reference unit	0	All	After restart	–	–

◆ Pc35A: Slot 2 - Distance Limit (p2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User position reference unit	0	All	After restart	–	–

◆ Pc35C: Slot 2 - Distance Limit (p3)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User position reference unit	0	All	After restart	–	–

◆ Pc380: Slot 3 - Safety Function Configuration I

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 0013h	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Safety Function Selection Speed Pos Trq
00 Default	Disabled
01	Reserved Parameter (Do not change)
02	STO Function
03	SS1-r Function
04	SS1-t Function
05	SS2-r Function
06	SS2-t Function
07	SOS Function
08	SLS Function
09	SLA Function
0A	SSR Function
0B	SDI-p Function
0C	SDI-n Function
0D	SLP Function
0E	SLI Function
0F to 10	Reserved (Do not change)
11	SCA Function
12	SSM Function
13	SHP Function
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc381: Slot 3 - Safety Function Configuration II

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0000h to 1F3Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for Safety Request Input Signal Speed Pos Trq
00 Default	Disabled
01	Reserved Parameter (Do not change)
02	Digital Input Port A (DIA)
03	Digital Input Port B (DIB)
04	Digital Input Port C (DIC)
05	Digital Input Port D (DID)
06	Digital Input Port E (DIE)
07 to 0F	Reserved (Do not change)
10	Virtual Input 0
11	Virtual Input 1
12	Virtual Input 2
13	Virtual Input 3
14	Virtual Input 4
15	Virtual Input 5
16	Virtual Input 6
17	Virtual Input 7
18	Virtual Input 8
19	Virtual Input 9
1A	Virtual Input 10
1B	Virtual Input 11
1C	Virtual Input 12
1D	Virtual Input 13
1E	Virtual Input 14
1F	Virtual Input 15
20 to 2F	Reserved (Do not change)
30	Slot 1 Limit Violation
31	Slot 2 Limit Violation
32	Slot 3 Limit Violation
33	Slot 4 Limit Violation
34	Slot 5 Limit Violation
35	Slot 6 Limit Violation
36	Slot 7 Limit Violation
37	Slot 8 Limit Violation
38	Slot 9 Limit Violation
39	Slot 10 Limit Violation
3A to 3E	Reserved (Do not change)
3F	Safety fieldbus virtual input not usable state

Digit	Meaning
n.XX□□	Terminal Port Selection for Safety Data Input Signal Speed Pos Trq
00 Default	Disabled
01	Reserved Parameter (Do not change)
02	Digital Input Port A (DIA)
03	Digital Input Port B (DIB)
04	Digital Input Port C (DIC)
05	Digital Input Port D (DID)
06	Digital Input Port E (DIE)
07 to 0F	Reserved (Do not change)
10	Virtual Input 0
11	Virtual Input 1
12	Virtual Input 2
13	Virtual Input 3
14	Virtual Input 4
15	Virtual Input 5
16	Virtual Input 6
17	Virtual Input 7
18	Virtual Input 8
19	Virtual Input 9
1A	Virtual Input 10
1B	Virtual Input 11
1C	Virtual Input 12
1D	Virtual Input 13
1E	Virtual Input 14
1F	Virtual Input 15

◆ Pc382: Slot 3 - Safety Function Configuration III

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0000h to 042Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for EDM Signal Speed Pos Trq
00 Default	Disabled
01	Digital Output Port A channel 1 (DOA1)
02	Digital Output Port A channel 2 (DOA2)
03	Digital Output Port B channel 1 (DOB1)
04	Digital Output Port B channel 2 (DOB2)
05	Digital Output Port C channel 1 (DOC1)
06	Digital Output Port C channel 2 (DOC2)
07	Digital Output Port D channel 1 (DOD1)
08	Digital Output Port D channel 2 (DOD2)
09	Digital Output Port E channel 1 (DOE1)
0A	Digital Output Port E channel 2 (DOE2)
0B to 0F	Reserved (Do not change.)
10	Digital Output Port A (DOA)
11	Digital Output Port B (DOB)
12	Digital Output Port C (DOC)
13	Digital Output Port D (DOD)
14	Digital Output Port E (DOE)
15 to 1F	Reserved (Do not change)
20	Virtual Output 0
21	Virtual Output 1
22	Virtual Output 2
23	Virtual Output 3
24	Virtual Output 4
25	Virtual Output 5
26	Virtual Output 6
27	Virtual Output 7
28	Virtual Output 8
29	Virtual Output 9
2A	Virtual Output 10
2B	Virtual Output 11
2C	Virtual Output 12
2D	Virtual Output 13
2E	Virtual Output 14
2F	Virtual Output 15
n.XX□□	EDM Signal Behavior Speed Pos Trq
00 Default	Disabled

Digit	Meaning
01	In Operation
02	Working Safety Function
03	After Limit Violation
04	HWBB (STO) State

◆ Pc383: Slot 3 - Safety Function Configuration IV

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 002Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for Safe Output Signal Speed Pos Trq
00 Default	Disabled
01 to 0F	Reserved (Do not change)
10	Digital Output Port A (DOA)
11	Digital Output Port B (DOB)
12	Digital Output Port C (DOC)
13	Digital Output Port D (DOD)
14	Digital Output Port E (DOE)
15 to 1F	Reserved (Do not change)
20	Virtual Output 0
21	Virtual Output 1
22	Virtual Output 2
23	Virtual Output 3
24	Virtual Output 4
25	Virtual Output 5
26	Virtual Output 6
27	Virtual Output 7
28	Virtual Output 8
29	Virtual Output 9
2A	Virtual Output 10
2B	Virtual Output 11
2C	Virtual Output 12
2D	Virtual Output 13
2E	Virtual Output 14
2F	Virtual Output 15
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc390: Slot 3 - Waiting Time (t1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 10000	10 ms	0	All	After restart	–	–

◆ Pc391: Slot 3 - Monitoring Time (t2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 10000	10 ms	0	All	After restart	–	–

◆ Pc392: Slot 3 - Speed Limit (s1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User Speed Reference Unit	0	All	After restart	–	–

◆ Pc394: Slot 3 - Speed Limit (s2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User Speed Reference Unit	0	All	After restart	–	–

◆ Pc396: Slot 3 - Acceleration Limit (a1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User acceleration reference unit	0	All	After restart	–	–

◆ Pc398: Slot 3 - Distance Limit (p1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User position reference unit	0	All	After restart	–	–

◆ Pc39A: Slot 3 - Distance Limit (p2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User position reference unit	0	All	After restart	–	–

◆ Pc39C: Slot 3 - Distance Limit (p3)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User position reference unit	0	All	After restart	–	–

◆ Pc3C0: Slot 4 - Safety Function Configuration I

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 0013h	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Safety Function Selection Speed Pos Trq
00 Default	Disabled
01	Reserved Parameter (Do not change)
02	STO Function
03	SS1-r Function
04	SS1-t Function
05	SS2-r Function
06	SS2-t Function
07	SOS Function
08	SLS Function
09	SLA Function
0A	SSR Function
0B	SDI-p Function
0C	SDI-n Function
0D	SLP Function
0E	SLI Function
0F to 10	Reserved (Do not change)
11	SCA Function
12	SSM Function
13	SHP Function
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc3C1: Slot 4 - Safety Function Configuration II

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0000h to 1F3Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for Safety Request Input Signal Speed Pos Trq
00 Default	Disabled
01	Reserved Parameter (Do not change)
02	Digital Input Port A (DIA)
03	Digital Input Port B (DIB)
04	Digital Input Port C (DIC)
05	Digital Input Port D (DID)
06	Digital Input Port E (DIE)
07 to 0F	Reserved (Do not change)
10	Virtual Input 0
11	Virtual Input 1
12	Virtual Input 2
13	Virtual Input 3
14	Virtual Input 4
15	Virtual Input 5
16	Virtual Input 6
17	Virtual Input 7
18	Virtual Input 8
19	Virtual Input 9
1A	Virtual Input 10
1B	Virtual Input 11
1C	Virtual Input 12
1D	Virtual Input 13
1E	Virtual Input 14
1F	Virtual Input 15
20 to 2F	Reserved (Do not change)
30	Slot 1 Limit Violation
31	Slot 2 Limit Violation
32	Slot 3 Limit Violation
33	Slot 4 Limit Violation
34	Slot 5 Limit Violation
35	Slot 6 Limit Violation
36	Slot 7 Limit Violation
37	Slot 8 Limit Violation
38	Slot 9 Limit Violation
39	Slot 10 Limit Violation
3A to 3E	Reserved (Do not change)
3F	Safety fieldbus virtual input not usable state

Digit	Meaning
n.XX□□	Terminal Port Selection for Safety Data Input Signal Speed Pos Trq
00 Default	Disabled
01	Reserved Parameter (Do not change)
02	Digital Input Port A (DIA)
03	Digital Input Port B (DIB)
04	Digital Input Port C (DIC)
05	Digital Input Port D (DID)
06	Digital Input Port E (DIE)
07 to 0F	Reserved (Do not change)
10	Virtual Input 0
11	Virtual Input 1
12	Virtual Input 2
13	Virtual Input 3
14	Virtual Input 4
15	Virtual Input 5
16	Virtual Input 6
17	Virtual Input 7
18	Virtual Input 8
19	Virtual Input 9
1A	Virtual Input 10
1B	Virtual Input 11
1C	Virtual Input 12
1D	Virtual Input 13
1E	Virtual Input 14
1F	Virtual Input 15

◆ Pc3C2: Slot 4 - Safety Function Configuration III

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0000h to 042Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for EDM Signal Speed Pos Trq
00 Default	Disabled
01	Digital Output Port A channel 1 (DOA1)
02	Digital Output Port A channel 2 (DOA2)
03	Digital Output Port B channel 1 (DOB1)
04	Digital Output Port B channel 2 (DOB2)
05	Digital Output Port C channel 1 (DOC1)
06	Digital Output Port C channel 2 (DOC2)
07	Digital Output Port D channel 1 (DOD1)
08	Digital Output Port D channel 2 (DOD2)
09	Digital Output Port E channel 1 (DOE1)
0A	Digital Output Port E channel 2 (DOE2)
0B to 0F	Reserved (Do not change.)
10	Digital Output Port A (DOA)
11	Digital Output Port B (DOB)
12	Digital Output Port C (DOC)
13	Digital Output Port D (DOD)
14	Digital Output Port E (DOE)
15 to 1F	Reserved (Do not change)
20	Virtual Output 0
21	Virtual Output 1
22	Virtual Output 2
23	Virtual Output 3
24	Virtual Output 4
25	Virtual Output 5
26	Virtual Output 6
27	Virtual Output 7
28	Virtual Output 8
29	Virtual Output 9
2A	Virtual Output 10
2B	Virtual Output 11
2C	Virtual Output 12
2D	Virtual Output 13
2E	Virtual Output 14
2F	Virtual Output 15
n.XX□□	EDM Signal Behavior Speed Pos Trq
00 Default	Disabled

Digit	Meaning
01	In Operation
02	Working Safety Function
03	After Limit Violation
04	HWBB (STO) State

◆ Pc3C3: Slot 4 - Safety Function Configuration IV

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 002Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for Safe Output Signal Speed Pos Trq
00 Default	Disabled
01 to 0F	Reserved (Do not change)
10	Digital Output Port A (DOA)
11	Digital Output Port B (DOB)
12	Digital Output Port C (DOC)
13	Digital Output Port D (DOD)
14	Digital Output Port E (DOE)
15 to 1F	Reserved (Do not change)
20	Virtual Output 0
21	Virtual Output 1
22	Virtual Output 2
23	Virtual Output 3
24	Virtual Output 4
25	Virtual Output 5
26	Virtual Output 6
27	Virtual Output 7
28	Virtual Output 8
29	Virtual Output 9
2A	Virtual Output 10
2B	Virtual Output 11
2C	Virtual Output 12
2D	Virtual Output 13
2E	Virtual Output 14
2F	Virtual Output 15
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc3D0: Slot 4 - Waiting Time (t1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 10000	10 ms	0	All	After restart	–	–

◆ Pc3D1: Slot 4 - Monitoring Time (t2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 10000	10 ms	0	All	After restart	–	–

◆ Pc3D2: Slot 4 - Speed Limit (s1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User Speed Reference Unit	0	All	After restart	–	–

◆ Pc3D4: Slot 4 - Speed Limit (s2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User Speed Reference Unit	0	All	After restart	–	–

◆ Pc3D6: Slot 4 - Acceleration Limit (a1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User acceleration reference unit	0	All	After restart	–	–

◆ Pc3D8: Slot 4 - Distance Limit (p1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User position reference unit	0	All	After restart	–	–

◆ Pc3DA: Slot 4 - Distance Limit (p2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User position reference unit	0	All	After restart	–	–

◆ Pc3DC: Slot 4 - Distance Limit (p3)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User position reference unit	0	All	After restart	–	–

◆ Pc400: Slot 5 - Safety Function Configuration I

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 0013h	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Safety Function Selection Speed Pos Trq
00 Default	Disabled
01	Reserved Parameter (Do not change)
02	STO Function
03	SS1-r Function
04	SS1-t Function
05	SS2-r Function
06	SS2-t Function
07	SOS Function
08	SLS Function
09	SLA Function
0A	SSR Function
0B	SDI-p Function
0C	SDI-n Function
0D	SLP Function
0E	SLI Function
0F to 10	Reserved (Do not change)
11	SCA Function
12	SSM Function
13	SHP Function
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc401: Slot 5 - Safety Function Configuration II

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0000h to 1F3Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for Safety Request Input Signal Speed Pos Trq
00 Default	Disabled
01	Reserved Parameter (Do not change)
02	Digital Input Port A (DIA)
03	Digital Input Port B (DIB)
04	Digital Input Port C (DIC)
05	Digital Input Port D (DID)
06	Digital Input Port E (DIE)
07 to 0F	Reserved (Do not change)
10	Virtual Input 0
11	Virtual Input 1
12	Virtual Input 2
13	Virtual Input 3
14	Virtual Input 4
15	Virtual Input 5
16	Virtual Input 6
17	Virtual Input 7
18	Virtual Input 8
19	Virtual Input 9
1A	Virtual Input 10
1B	Virtual Input 11
1C	Virtual Input 12
1D	Virtual Input 13
1E	Virtual Input 14
1F	Virtual Input 15
20 to 2F	Reserved (Do not change)
30	Slot 1 Limit Violation
31	Slot 2 Limit Violation
32	Slot 3 Limit Violation
33	Slot 4 Limit Violation
34	Slot 5 Limit Violation
35	Slot 6 Limit Violation
36	Slot 7 Limit Violation
37	Slot 8 Limit Violation
38	Slot 9 Limit Violation
39	Slot 10 Limit Violation
3A to 3E	Reserved (Do not change)
3F	Safety fieldbus virtual input not usable state

Digit	Meaning
n.XX□□	Terminal Port Selection for Safety Data Input Signal Speed Pos Trq
00 Default	Disabled
01	Reserved Parameter (Do not change)
02	Digital Input Port A (DIA)
03	Digital Input Port B (DIB)
04	Digital Input Port C (DIC)
05	Digital Input Port D (DID)
06	Digital Input Port E (DIE)
07 to 0F	Reserved (Do not change)
10	Virtual Input 0
11	Virtual Input 1
12	Virtual Input 2
13	Virtual Input 3
14	Virtual Input 4
15	Virtual Input 5
16	Virtual Input 6
17	Virtual Input 7
18	Virtual Input 8
19	Virtual Input 9
1A	Virtual Input 10
1B	Virtual Input 11
1C	Virtual Input 12
1D	Virtual Input 13
1E	Virtual Input 14
1F	Virtual Input 15

◆ Pc402: Slot 5 - Safety Function Configuration III

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0000h to 042Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for EDM Signal Speed Pos Trq
00 Default	Disabled
01	Digital Output Port A channel 1 (DOA1)
02	Digital Output Port A channel 2 (DOA2)
03	Digital Output Port B channel 1 (DOB1)
04	Digital Output Port B channel 2 (DOB2)
05	Digital Output Port C channel 1 (DOC1)
06	Digital Output Port C channel 2 (DOC2)
07	Digital Output Port D channel 1 (DOD1)
08	Digital Output Port D channel 2 (DOD2)
09	Digital Output Port E channel 1 (DOE1)
0A	Digital Output Port E channel 2 (DOE2)
0B to 0F	Reserved (Do not change.)
10	Digital Output Port A (DOA)
11	Digital Output Port B (DOB)
12	Digital Output Port C (DOC)
13	Digital Output Port D (DOD)
14	Digital Output Port E (DOE)
15 to 1F	Reserved (Do not change)
20	Virtual Output 0
21	Virtual Output 1
22	Virtual Output 2
23	Virtual Output 3
24	Virtual Output 4
25	Virtual Output 5
26	Virtual Output 6
27	Virtual Output 7
28	Virtual Output 8
29	Virtual Output 9
2A	Virtual Output 10
2B	Virtual Output 11
2C	Virtual Output 12
2D	Virtual Output 13
2E	Virtual Output 14
2F	Virtual Output 15
n.XX□□	EDM Signal Behavior Speed Pos Trq
00 Default	Disabled

Digit	Meaning
01	In Operation
02	Working Safety Function
03	After Limit Violation
04	HWBB (STO) State

◆ Pc403: Slot 5 - Safety Function Configuration IV

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 002Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for Safe Output Signal Speed Pos Trq
00 Default	Disabled
01 to 0F	Reserved (Do not change)
10	Digital Output Port A (DOA)
11	Digital Output Port B (DOB)
12	Digital Output Port C (DOC)
13	Digital Output Port D (DOD)
14	Digital Output Port E (DOE)
15 to 1F	Reserved (Do not change)
20	Virtual Output 0
21	Virtual Output 1
22	Virtual Output 2
23	Virtual Output 3
24	Virtual Output 4
25	Virtual Output 5
26	Virtual Output 6
27	Virtual Output 7
28	Virtual Output 8
29	Virtual Output 9
2A	Virtual Output 10
2B	Virtual Output 11
2C	Virtual Output 12
2D	Virtual Output 13
2E	Virtual Output 14
2F	Virtual Output 15
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc410: Slot 5 - Waiting Time (t1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 10000	10 ms	0	All	After restart	–	–

◆ Pc411: Slot 5 - Monitoring Time (t2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 10000	10 ms	0	All	After restart	–	–

◆ Pc412: Slot 5 - Speed Limit (s1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User Speed Reference Unit	0	All	After restart	–	–

◆ Pc414: Slot 5 - Speed Limit (s2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User Speed Reference Unit	0	All	After restart	–	–

◆ Pc416: Slot 5 - Acceleration Limit (a1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User acceleration reference unit	0	All	After restart	–	–

◆ Pc418: Slot 5 - Distance Limit (p1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User position reference unit	0	All	After restart	–	–

◆ Pc41A: Slot 5 - Distance Limit (p2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User position reference unit	0	All	After restart	–	–

◆ Pc41C: Slot 5 - Distance Limit (p3)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User position reference unit	0	All	After restart	–	–

◆ Pc440: Slot 6 - Safety Function Configuration I

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 0013h	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Safety Function Selection Speed Pos Trq
00 Default	Disabled
01	Reserved Parameter (Do not change)
02	STO Function
03	SS1-r Function
04	SS1-t Function
05	SS2-r Function
06	SS2-t Function
07	SOS Function
08	SLS Function
09	SLA Function
0A	SSR Function
0B	SDI-p Function
0C	SDI-n Function
0D	SLP Function
0E	SLI Function
0F to 10	Reserved (Do not change)
11	SCA Function
12	SSM Function
13	SHP Function
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc441: Slot 6 - Safety Function Configuration II

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0000h to 1F3Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for Safety Request Input Signal Speed Pos Trq
00 Default	Disabled
01	Reserved Parameter (Do not change)
02	Digital Input Port A (DIA)
03	Digital Input Port B (DIB)
04	Digital Input Port C (DIC)
05	Digital Input Port D (DID)
06	Digital Input Port E (DIE)
07 to 0F	Reserved (Do not change)
10	Virtual Input 0
11	Virtual Input 1
12	Virtual Input 2
13	Virtual Input 3
14	Virtual Input 4
15	Virtual Input 5
16	Virtual Input 6
17	Virtual Input 7
18	Virtual Input 8
19	Virtual Input 9
1A	Virtual Input 10
1B	Virtual Input 11
1C	Virtual Input 12
1D	Virtual Input 13
1E	Virtual Input 14
1F	Virtual Input 15
20 to 2F	Reserved (Do not change)
30	Slot 1 Limit Violation
31	Slot 2 Limit Violation
32	Slot 3 Limit Violation
33	Slot 4 Limit Violation
34	Slot 5 Limit Violation
35	Slot 6 Limit Violation
36	Slot 7 Limit Violation
37	Slot 8 Limit Violation
38	Slot 9 Limit Violation
39	Slot 10 Limit Violation
3A to 3E	Reserved (Do not change)
3F	Safety fieldbus virtual input not usable state

Digit	Meaning
n.XX□□	Terminal Port Selection for Safety Data Input Signal Speed Pos Trq
00 Default	Disabled
01	Reserved Parameter (Do not change)
02	Digital Input Port A (DIA)
03	Digital Input Port B (DIB)
04	Digital Input Port C (DIC)
05	Digital Input Port D (DID)
06	Digital Input Port E (DIE)
07 to 0F	Reserved (Do not change)
10	Virtual Input 0
11	Virtual Input 1
12	Virtual Input 2
13	Virtual Input 3
14	Virtual Input 4
15	Virtual Input 5
16	Virtual Input 6
17	Virtual Input 7
18	Virtual Input 8
19	Virtual Input 9
1A	Virtual Input 10
1B	Virtual Input 11
1C	Virtual Input 12
1D	Virtual Input 13
1E	Virtual Input 14
1F	Virtual Input 15

◆ Pc442: Slot 6 - Safety Function Configuration III

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0000h to 042Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for EDM Signal Speed Pos Trq
00 Default	Disabled
01	Digital Output Port A channel 1 (DOA1)
02	Digital Output Port A channel 2 (DOA2)
03	Digital Output Port B channel 1 (DOB1)
04	Digital Output Port B channel 2 (DOB2)
05	Digital Output Port C channel 1 (DOC1)
06	Digital Output Port C channel 2 (DOC2)
07	Digital Output Port D channel 1 (DOD1)
08	Digital Output Port D channel 2 (DOD2)
09	Digital Output Port E channel 1 (DOE1)
0A	Digital Output Port E channel 2 (DOE2)
0B to 0F	Reserved (Do not change.)
10	Digital Output Port A (DOA)
11	Digital Output Port B (DOB)
12	Digital Output Port C (DOC)
13	Digital Output Port D (DOD)
14	Digital Output Port E (DOE)
15 to 1F	Reserved (Do not change)
20	Virtual Output 0
21	Virtual Output 1
22	Virtual Output 2
23	Virtual Output 3
24	Virtual Output 4
25	Virtual Output 5
26	Virtual Output 6
27	Virtual Output 7
28	Virtual Output 8
29	Virtual Output 9
2A	Virtual Output 10
2B	Virtual Output 11
2C	Virtual Output 12
2D	Virtual Output 13
2E	Virtual Output 14
2F	Virtual Output 15
n.XX□□	EDM Signal Behavior Speed Pos Trq
00 Default	Disabled

Digit	Meaning
01	In Operation
02	Working Safety Function
03	After Limit Violation
04	HWBB (STO) State

◆ Pc443: Slot 6 - Safety Function Configuration IV

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 002Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for Safe Output Signal Speed Pos Trq
00 Default	Disabled
01 to 0F	Reserved (Do not change)
10	Digital Output Port A (DOA)
11	Digital Output Port B (DOB)
12	Digital Output Port C (DOC)
13	Digital Output Port D (DOD)
14	Digital Output Port E (DOE)
15 to 1F	Reserved (Do not change)
20	Virtual Output 0
21	Virtual Output 1
22	Virtual Output 2
23	Virtual Output 3
24	Virtual Output 4
25	Virtual Output 5
26	Virtual Output 6
27	Virtual Output 7
28	Virtual Output 8
29	Virtual Output 9
2A	Virtual Output 10
2B	Virtual Output 11
2C	Virtual Output 12
2D	Virtual Output 13
2E	Virtual Output 14
2F	Virtual Output 15
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc450: Slot 6 - Waiting Time (t1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 10000	10 ms	0	All	After restart	–	–

◆ Pc451: Slot 6 - Monitoring Time (t2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 10000	10 ms	0	All	After restart	–	–

◆ Pc452: Slot 6 - Speed Limit (s1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User Speed Reference Unit	0	All	After restart	–	–

◆ Pc454: Slot 6 - Speed Limit (s2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User Speed Reference Unit	0	All	After restart	–	–

◆ Pc456: Slot 6 - Acceleration Limit (a1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User acceleration reference unit	0	All	After restart	–	–

◆ Pc458: Slot 6 - Distance Limit (p1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User position reference unit	0	All	After restart	–	–

◆ Pc45A: Slot 6 - Distance Limit (p2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User position reference unit	0	All	After restart	–	–

◆ Pc45C: Slot 6 - Distance Limit (p3)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User position reference unit	0	All	After restart	–	–

◆ Pc480: Slot 7 - Safety Function Configuration I

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 0013h	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Safety Function Selection Speed Pos Trq
00 Default	Disabled
01	Reserved Parameter (Do not change)
02	STO Function
03	SS1-r Function
04	SS1-t Function
05	SS2-r Function
06	SS2-t Function
07	SOS Function
08	SLS Function
09	SLA Function
0A	SSR Function
0B	SDI-p Function
0C	SDI-n Function
0D	SLP Function
0E	SLI Function
0F to 10	Reserved (Do not change)
11	SCA Function
12	SSM Function
13	SHP Function
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc481: Slot 7 - Safety Function Configuration II

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0000h to 1F3Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for Safety Request Input Signal Speed Pos Trq
00 Default	Disabled
01	Reserved Parameter (Do not change)
02	Digital Input Port A (DIA)
03	Digital Input Port B (DIB)
04	Digital Input Port C (DIC)
05	Digital Input Port D (DID)
06	Digital Input Port E (DIE)
07 to 0F	Reserved (Do not change)
10	Virtual Input 0
11	Virtual Input 1
12	Virtual Input 2
13	Virtual Input 3
14	Virtual Input 4
15	Virtual Input 5
16	Virtual Input 6
17	Virtual Input 7
18	Virtual Input 8
19	Virtual Input 9
1A	Virtual Input 10
1B	Virtual Input 11
1C	Virtual Input 12
1D	Virtual Input 13
1E	Virtual Input 14
1F	Virtual Input 15
20 to 2F	Reserved (Do not change)
30	Slot 1 Limit Violation
31	Slot 2 Limit Violation
32	Slot 3 Limit Violation
33	Slot 4 Limit Violation
34	Slot 5 Limit Violation
35	Slot 6 Limit Violation
36	Slot 7 Limit Violation
37	Slot 8 Limit Violation
38	Slot 9 Limit Violation
39	Slot 10 Limit Violation
3A to 3E	Reserved (Do not change)
3F	Safety fieldbus virtual input not usable state

Digit	Meaning
n.XX□□	Terminal Port Selection for Safety Data Input Signal Speed Pos Trq
00 Default	Disabled
01	Reserved Parameter (Do not change)
02	Digital Input Port A (DIA)
03	Digital Input Port B (DIB)
04	Digital Input Port C (DIC)
05	Digital Input Port D (DID)
06	Digital Input Port E (DIE)
07 to 0F	Reserved (Do not change)
10	Virtual Input 0
11	Virtual Input 1
12	Virtual Input 2
13	Virtual Input 3
14	Virtual Input 4
15	Virtual Input 5
16	Virtual Input 6
17	Virtual Input 7
18	Virtual Input 8
19	Virtual Input 9
1A	Virtual Input 10
1B	Virtual Input 11
1C	Virtual Input 12
1D	Virtual Input 13
1E	Virtual Input 14
1F	Virtual Input 15

◆ Pc482: Slot 7 - Safety Function Configuration III

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0000h to 042Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for EDM Signal Speed Pos Trq
00 Default	Disabled
01	Digital Output Port A channel 1 (DOA1)
02	Digital Output Port A channel 2 (DOA2)
03	Digital Output Port B channel 1 (DOB1)
04	Digital Output Port B channel 2 (DOB2)
05	Digital Output Port C channel 1 (DOC1)
06	Digital Output Port C channel 2 (DOC2)
07	Digital Output Port D channel 1 (DOD1)
08	Digital Output Port D channel 2 (DOD2)
09	Digital Output Port E channel 1 (DOE1)
0A	Digital Output Port E channel 2 (DOE2)
0B to 0F	Reserved (Do not change.)
10	Digital Output Port A (DOA)
11	Digital Output Port B (DOB)
12	Digital Output Port C (DOC)
13	Digital Output Port D (DOD)
14	Digital Output Port E (DOE)
15 to 1F	Reserved (Do not change)
20	Virtual Output 0
21	Virtual Output 1
22	Virtual Output 2
23	Virtual Output 3
24	Virtual Output 4
25	Virtual Output 5
26	Virtual Output 6
27	Virtual Output 7
28	Virtual Output 8
29	Virtual Output 9
2A	Virtual Output 10
2B	Virtual Output 11
2C	Virtual Output 12
2D	Virtual Output 13
2E	Virtual Output 14
2F	Virtual Output 15
n.XX□□	EDM Signal Behavior Speed Pos Trq
00 Default	Disabled

Digit	Meaning
01	In Operation
02	Working Safety Function
03	After Limit Violation
04	HWBB (STO) State

◆ Pc483: Slot 7 - Safety Function Configuration IV

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 002Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for Safe Output Signal Speed Pos Trq
00 Default	Disabled
01 to 0F	Reserved (Do not change)
10	Digital Output Port A (DOA)
11	Digital Output Port B (DOB)
12	Digital Output Port C (DOC)
13	Digital Output Port D (DOD)
14	Digital Output Port E (DOE)
15 to 1F	Reserved (Do not change)
20	Virtual Output 0
21	Virtual Output 1
22	Virtual Output 2
23	Virtual Output 3
24	Virtual Output 4
25	Virtual Output 5
26	Virtual Output 6
27	Virtual Output 7
28	Virtual Output 8
29	Virtual Output 9
2A	Virtual Output 10
2B	Virtual Output 11
2C	Virtual Output 12
2D	Virtual Output 13
2E	Virtual Output 14
2F	Virtual Output 15
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc490: Slot 7 - Waiting Time (t1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 10000	10 ms	0	All	After restart	–	–

◆ Pc491: Slot 7 - Monitoring Time (t2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 10000	10 ms	0	All	After restart	–	–

◆ Pc492: Slot 7 - Speed Limit (s1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User Speed Reference Unit	0	All	After restart	–	–

◆ Pc494: Slot 7 - Speed Limit (s 2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User Speed Reference Unit	0	All	After restart	–	–

◆ Pc496: Slot 7 - Acceleration Limit (a1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User acceleration reference unit	0	All	After restart	–	–

◆ Pc498: Slot 7 - Distance Limit (p1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User position reference unit	0	All	After restart	–	–

◆ Pc49A: Slot 7 - Distance Limit (p2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User position reference unit	0	All	After restart	–	–

◆ Pc49C: Slot 7 - Distance Limit (p3)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User position reference unit	0	All	After restart	–	–

◆ Pc4C0: Slot 8 - Safety Function Configuration I

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 0013h	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Safety Function Selection Speed Pos Trq
00 Default	Disabled
01	Reserved Parameter (Do not change)
02	STO Function
03	SS1-r Function
04	SS1-t Function
05	SS2-r Function
06	SS2-t Function
07	SOS Function
08	SLS Function
09	SLA Function
0A	SSR Function
0B	SDI-p Function
0C	SDI-n Function
0D	SLP Function
0E	SLI Function
0F to 10	Reserved (Do not change)
11	SCA Function
12	SSM Function
13	SHP Function
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc4C1: Slot 8 - Safety Function Configuration II

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0000h to 1F3Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for Safety Request Input Signal Speed Pos Trq
00 Default	Disabled
01	Reserved Parameter (Do not change)
02	Digital Input Port A (DIA)
03	Digital Input Port B (DIB)
04	Digital Input Port C (DIC)
05	Digital Input Port D (DID)
06	Digital Input Port E (DIE)
07 to 0F	Reserved (Do not change)
10	Virtual Input 0
11	Virtual Input 1
12	Virtual Input 2
13	Virtual Input 3
14	Virtual Input 4
15	Virtual Input 5
16	Virtual Input 6
17	Virtual Input 7
18	Virtual Input 8
19	Virtual Input 9
1A	Virtual Input 10
1B	Virtual Input 11
1C	Virtual Input 12
1D	Virtual Input 13
1E	Virtual Input 14
1F	Virtual Input 15
20 to 2F	Reserved (Do not change)
30	Slot 1 Limit Violation
31	Slot 2 Limit Violation
32	Slot 3 Limit Violation
33	Slot 4 Limit Violation
34	Slot 5 Limit Violation
35	Slot 6 Limit Violation
36	Slot 7 Limit Violation
37	Slot 8 Limit Violation
38	Slot 9 Limit Violation
39	Slot 10 Limit Violation
3A to 3E	Reserved (Do not change)
3F	Safety fieldbus virtual input not usable state

Digit	Meaning
n.XX□□	Terminal Port Selection for Safety Data Input Signal Speed Pos Trq
00 Default	Disabled
01	Reserved Parameter (Do not change)
02	Digital Input Port A (DIA)
03	Digital Input Port B (DIB)
04	Digital Input Port C (DIC)
05	Digital Input Port D (DID)
06	Digital Input Port E (DIE)
07 to 0F	Reserved (Do not change)
10	Virtual Input 0
11	Virtual Input 1
12	Virtual Input 2
13	Virtual Input 3
14	Virtual Input 4
15	Virtual Input 5
16	Virtual Input 6
17	Virtual Input 7
18	Virtual Input 8
19	Virtual Input 9
1A	Virtual Input 10
1B	Virtual Input 11
1C	Virtual Input 12
1D	Virtual Input 13
1E	Virtual Input 14
1F	Virtual Input 15

◆ Pc4C2: Slot 8 - Safety Function Configuration III

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 042Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for EDM Signal Speed Pos Trq
00 Default	Disabled
01	Digital Output Port A channel 1 (DOA1)
02	Digital Output Port A channel 2 (DOA2)
03	Digital Output Port B channel 1 (DOB1)
04	Digital Output Port B channel 2 (DOB2)
05	Digital Output Port C channel 1 (DOC1)
06	Digital Output Port C channel 2 (DOC2)
07	Digital Output Port D channel 1 (DOD1)
08	Digital Output Port D channel 2 (DOD2)
09	Digital Output Port E channel 1 (DOE1)
0A	Digital Output Port E channel 2 (DOE2)
0B to 0F	Reserved (Do not change.)
10	Digital Output Port A (DOA)
11	Digital Output Port B (DOB)
12	Digital Output Port C (DOC)
13	Digital Output Port D (DOD)
14	Digital Output Port E (DOE)
15 to 1F	Reserved (Do not change)
20	Virtual Output 0
21	Virtual Output 1
22	Virtual Output 2
23	Virtual Output 3
24	Virtual Output 4
25	Virtual Output 5
26	Virtual Output 6
27	Virtual Output 7
28	Virtual Output 8
29	Virtual Output 9
2A	Virtual Output 10
2B	Virtual Output 11
2C	Virtual Output 12
2D	Virtual Output 13
2E	Virtual Output 14
2F	Virtual Output 15
n.XX□□	EDM Signal Behavior Speed Pos Trq
00 Default	Disabled

Digit	Meaning
01	In Operation
02	Working Safety Function
03	After Limit Violation
04	HWBB (STO) State

◆ Pc4C3: Slot 8 - Safety Function Configuration IV

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 002Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for Safe Output Signal Speed Pos Trq
00 Default	Disabled
01 to 0F	Reserved (Do not change)
10	Digital Output Port A (DOA)
11	Digital Output Port B (DOB)
12	Digital Output Port C (DOC)
13	Digital Output Port D (DOD)
14	Digital Output Port E (DOE)
15 to 1F	Reserved (Do not change)
20	Virtual Output 0
21	Virtual Output 1
22	Virtual Output 2
23	Virtual Output 3
24	Virtual Output 4
25	Virtual Output 5
26	Virtual Output 6
27	Virtual Output 7
28	Virtual Output 8
29	Virtual Output 9
2A	Virtual Output 10
2B	Virtual Output 11
2C	Virtual Output 12
2D	Virtual Output 13
2E	Virtual Output 14
2F	Virtual Output 15
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc4D0: Slot 8 - Waiting Time (t1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 10000	10 ms	0	All	After restart	–	–

◆ Pc4D1: Slot 8 - Monitoring Time (t2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 10000	10 ms	0	All	After restart	–	–

◆ Pc4D2: Slot 8 - Speed Limit (s1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User Speed Reference Unit	0	All	After restart	–	–

◆ Pc4D4: Slot 8 - Speed Limit (s2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User Speed Reference Unit	0	All	After restart	–	–

◆ Pc4D6: Slot 8 - Acceleration Limit (a1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User acceleration reference unit	0	All	After restart	–	–

◆ Pc4D8: Slot 8 - Distance Limit (p1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User position reference unit	0	All	After restart	–	–

◆ Pc4DA: Slot 8 - Distance Limit (p2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User position reference unit	0	All	After restart	–	–

◆ Pc4DC: Slot 8 - Distance Limit (p3)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User position reference unit	0	All	After restart	–	–

◆ Pc500: Slot 9 - Safety Function Configuration I

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 0013h	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Safety Function Selection Speed Pos Trq
00 Default	Disabled
01	Reserved Parameter (Do not change)
02	STO Function
03	SS1-r Function
04	SS1-t Function
05	SS2-r Function
06	SS2-t Function
07	SOS Function
08	SLS Function
09	SLA Function
0A	SSR Function
0B	SDI-p Function
0C	SDI-n Function
0D	SLP Function
0E	SLI Function
0F to 10	Reserved (Do not change)
11	SCA Function
12	SSM Function
13	SHP Function
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc501: Slot 9 - Safety Function Configuration II

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0000h to 1F3Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for Safety Request Input Signal Speed Pos Trq
00 Default	Disabled
01	Reserved Parameter (Do not change)
02	Digital Input Port A (DIA)
03	Digital Input Port B (DIB)
04	Digital Input Port C (DIC)
05	Digital Input Port D (DID)
06	Digital Input Port E (DIE)
07 to 0F	Reserved (Do not change)
10	Virtual Input 0
11	Virtual Input 1
12	Virtual Input 2
13	Virtual Input 3
14	Virtual Input 4
15	Virtual Input 5
16	Virtual Input 6
17	Virtual Input 7
18	Virtual Input 8
19	Virtual Input 9
1A	Virtual Input 10
1B	Virtual Input 11
1C	Virtual Input 12
1D	Virtual Input 13
1E	Virtual Input 14
1F	Virtual Input 15
20 to 2F	Reserved (Do not change)
30	Slot 1 Limit Violation
31	Slot 2 Limit Violation
32	Slot 3 Limit Violation
33	Slot 4 Limit Violation
34	Slot 5 Limit Violation
35	Slot 6 Limit Violation
36	Slot 7 Limit Violation
37	Slot 8 Limit Violation
38	Slot 9 Limit Violation
39	Slot 10 Limit Violation
3A to 3E	Reserved (Do not change)
3F	Safety fieldbus virtual input not usable state

Digit	Meaning
n.XX□□	Terminal Port Selection for Safety Data Input Signal Speed Pos Trq
00 Default	Disabled
01	Reserved Parameter (Do not change)
02	Digital Input Port A (DIA)
03	Digital Input Port B (DIB)
04	Digital Input Port C (DIC)
05	Digital Input Port D (DID)
06	Digital Input Port E (DIE)
07 to 0F	Reserved (Do not change)
10	Virtual Input 0
11	Virtual Input 1
12	Virtual Input 2
13	Virtual Input 3
14	Virtual Input 4
15	Virtual Input 5
16	Virtual Input 6
17	Virtual Input 7
18	Virtual Input 8
19	Virtual Input 9
1A	Virtual Input 10
1B	Virtual Input 11
1C	Virtual Input 12
1D	Virtual Input 13
1E	Virtual Input 14
1F	Virtual Input 15

◆ Pc502: Slot 9 - Safety Function Configuration III

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0000h to 042Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for EDM Signal Speed Pos Trq
00 Default	Disabled
01	Digital Output Port A channel 1 (DOA1)
02	Digital Output Port A channel 2 (DOA2)
03	Digital Output Port B channel 1 (DOB1)
04	Digital Output Port B channel 2 (DOB2)
05	Digital Output Port C channel 1 (DOC1)
06	Digital Output Port C channel 2 (DOC2)
07	Digital Output Port D channel 1 (DOD1)
08	Digital Output Port D channel 2 (DOD2)
09	Digital Output Port E channel 1 (DOE1)
0A	Digital Output Port E channel 2 (DOE2)
0B to 0F	Reserved (Do not change.)
10	Digital Output Port A (DOA)
11	Digital Output Port B (DOB)
12	Digital Output Port C (DOC)
13	Digital Output Port D (DOD)
14	Digital Output Port E (DOE)
15 to 1F	Reserved (Do not change)
20	Virtual Output 0
21	Virtual Output 1
22	Virtual Output 2
23	Virtual Output 3
24	Virtual Output 4
25	Virtual Output 5
26	Virtual Output 6
27	Virtual Output 7
28	Virtual Output 8
29	Virtual Output 9
2A	Virtual Output 10
2B	Virtual Output 11
2C	Virtual Output 12
2D	Virtual Output 13
2E	Virtual Output 14
2F	Virtual Output 15
n.XX□□	EDM Signal Behavior Speed Pos Trq
00 Default	Disabled

Digit	Meaning
01	In Operation
02	Working Safety Function
03	After Limit Violation
04	HWBB (STO) State

◆ Pc503: Slot 9 - Safety Function Configuration IV

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 002Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for Safe Output Signal Speed Pos Trq
00 Default	Disabled
01 to 0F	Reserved (Do not change)
10	Digital Output Port A (DOA)
11	Digital Output Port B (DOB)
12	Digital Output Port C (DOC)
13	Digital Output Port D (DOD)
14	Digital Output Port E (DOE)
15 to 1F	Reserved (Do not change)
20	Virtual Output 0
21	Virtual Output 1
22	Virtual Output 2
23	Virtual Output 3
24	Virtual Output 4
25	Virtual Output 5
26	Virtual Output 6
27	Virtual Output 7
28	Virtual Output 8
29	Virtual Output 9
2A	Virtual Output 10
2B	Virtual Output 11
2C	Virtual Output 12
2D	Virtual Output 13
2E	Virtual Output 14
2F	Virtual Output 15
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc510: Slot 9 - Waiting Time (t1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 10000	10 ms	0	All	After restart	–	–

◆ Pc511: Slot 9 - Monitoring Time (t2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 10000	10 ms	0	All	After restart	–	–

◆ Pc512: Slot 9 - Speed Limit (s1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User Speed Reference Unit	0	All	After restart	–	–

◆ Pc514: Slot 9 - Speed Limit (s2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User Speed Reference Unit	0	All	After restart	–	–

◆ Pc516: Slot 9 - Acceleration Limit (a1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User acceleration reference unit	0	All	After restart	–	–

◆ Pc518: Slot 9 - Distance Limit (p1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User position reference unit	0	All	After restart	–	–

◆ Pc51A: Slot 9 - Distance Limit (p2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User position reference unit	0	All	After restart	–	–

◆ Pc51C: Slot 9 - Distance Limit (p3)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User position reference unit	0	All	After restart	–	–

◆ Pc540: Slot 10 - Safety Function Configuration I

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0000h to 0011h	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□□X	SBC Function Selection Speed Pos Trq
0 Default	Do not use SBC function
1	Use SBC function
n.□□X□	SBC Function Activation Selection Speed Pos Trq
0 Default	Activate with STO state
1	Activate with STO state or with start of SS1-t / Ss1-r function.
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc541: Slot 10 - Safety Function Configuration II

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0000h to 0614h	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for SBC Output Signal (SBCOS) Speed Pos Trq
00 Default	Disabled
01 to 0F	Reserved (Do not change)
10	Digital Output Port A (DOA)
11	Digital Output Port B (DOB)
12	Digital Output Port C (DOC)
13	Digital Output Port D (DOD)
14	Digital Output Port E (DOE)
n.XX□□	Terminal Port Selection for SBC Input Signal (SBCIS) Speed Pos Trq
00 Default	Disabled
01	Reserved Parameter (Do not change)
02	Digital Input Port A (DIA)
03	Digital Input Port B (DIB)
04	Digital Input Port C (DIC)
05	Digital Input Port D (DID)
06	Digital Input Port E (DIE)

◆ Pc542: Slot 10 - Safety Function Configuration III

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0000h to 042Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for EDM Signal Speed Pos Trq
00 Default	Disabled
01	Digital Output Port A channel 1 (DOA1)
02	Digital Output Port A channel 2 (DOA2)
03	Digital Output Port B channel 1 (DOB1)
04	Digital Output Port B channel 2 (DOB2)
05	Digital Output Port C channel 1 (DOC1)
06	Digital Output Port C channel 2 (DOC2)
07	Digital Output Port D channel 1 (DOD1)
08	Digital Output Port D channel 2 (DOD2)
09	Digital Output Port E channel 1 (DOE1)
0A	Digital Output Port E channel 2 (DOE2)
0B to 0F	Reserved (Do not change.)
10	Digital Output Port A (DOA)
11	Digital Output Port B (DOB)
12	Digital Output Port C (DOC)
13	Digital Output Port D (DOD)
14	Digital Output Port E (DOE)
15 to 1F	Reserved (Do not change)
20	Virtual Output 0
21	Virtual Output 1
22	Virtual Output 2
23	Virtual Output 3
24	Virtual Output 4
25	Virtual Output 5
26	Virtual Output 6
27	Virtual Output 7
28	Virtual Output 8
29	Virtual Output 9
2A	Virtual Output 10
2B	Virtual Output 11
2C	Virtual Output 12
2D	Virtual Output 13
2E	Virtual Output 14
2F	Virtual Output 15
n.XX□□	EDM Signal Behavior Speed Pos Trq
00 Default	Disabled

Digit	Meaning
01	In Operation
02	Working Safety Function
03	Reserved Parameter (Do not change)
04	Reserved Parameter (Do not change)

◆ Pc550: Slot 10 - Brake hold delay time (Tw_bkh)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 10000	1 ms	0	All	After restart	–	–

◆ Pc551: Slot 10 - Brake release delay time (Tw_bkr)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 10000	1 ms	0	All	After restart	–	–

◆ Pc552: Slot 10 - FB signal discrep. allow. time at brake hold (Td_bkh)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 300	1 ms	30	All	After restart	–	–

◆ Pc553: Slot 10 - FB signal discrep. allow. time at brake release (Td_bkr)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 300	1 ms	30	All	After restart	–	–

11.1.4 List of Safety-Related Module Parameters: FSoE Communications References Model

◆ Pc120: Safety Fieldbus - station address

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0001h to FFFFh	–	0001h	All	After restart	–	–

◆ Pc121: Safety Fieldbus - operation selection

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 0131h	–	0130h	All	After restart	–	–

Digit	Meaning
n.□□□X	Safety function operation selection at initial state Speed Pos Trq
0 Default	After power ON, the STO state is not forced until safe data communication is possible.
1	After power ON, the STO state is forced until safe data communication is possible.
n.□□X□	SPDU selection Speed Pos Trq
0	1st SPDU (moduleident:0x02200A01)
1	2nd SPDU (moduleident:0x02200A02)
2	1st SPDU (moduleident:0x02200A03)
3 Default	2nd SPDU (moduleident:0x02200A04)
n.□X□□	ON/OFF Logic Selection for Safety Fieldbus Virtual Input Speed Pos Trq
0	The SRIS is ON when the Virtual input is 1.
1 Default	The SRIS is ON when the Virtual input is 0.
n.X□□□	Reserved (Do not change.)

◆ Pc122: Operation When Safety Fieldbus Virtual Input Not Usable

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 0009h	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□□X	Selection of Operation When Safety Fieldbus Virtual Input Not Usable Speed Pos Trq
0 Default	Execute STO function.
1	Execute SS1 function or SS2 function set for safety slot 1.
2	Execute SS1 function or SS2 function set for safety slot 2.
3	Execute SS1 function or SS2 function set for safety slot 3.
4	Execute SS1 function or SS2 function set for safety slot 4.
5	Execute SS1 function or SS2 function set for safety slot 5.
6	Execute SS1 function or SS2 function set for safety slot 6.
7	Execute SS1 function or SS2 function set for safety slot 7.
8	Execute SS1 function or SS2 function set for safety slot 8.
9	Execute SS1 function or SS2 function set for safety slot 9.
n.□□X□	Reserved (Do not change.)
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc150: Encoder Deviation Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 1073741823	–	16384	All	After restart	–	–

◆ Pc152: Encoder Deviation Window

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 65535	1 ms	0	All	After restart	–	–

◆ Pc160: Safe Home Position Offset

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-1073741823 to 1073741823	User position reference unit	0	All	After restart	–	–

◆ Pc170: Safety Function Application Selection

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 0011h	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□□X	Safety Function Monitoring Resolution Mode Selection Speed Pos Trq
0 Default	Normal Mode
1	High Resolution Mode
n.□□X□	Safety Function Monitoring Response Mode Selection Speed Pos Trq
0 Default	Enable High Response Mode
1	Disable High Response Mode
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc172: Limit Violation Deactivation Delay Time (LVDDT)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 10000	1 ms	0	All	After restart	–	–

◆ Pc173: Acceleration Filter Time

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 30	1 ms	0	All	After restart	–	107

◆ Pc180: Safety Module: User Position Reference Unit (Numerator)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	1 to 1073741824	–	1	All	After restart	–	–

◆ Pc182: Safety Module: User Position Reference Unit (Denominator)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	1 to 1073741824	–	1	All	After restart	–	–

◆ Pc188: Safety Module: User Speed Reference Unit (Numerator)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
4	1 to 1073741824	–	1	All	After restart	–	–

◆ Pc18A: Safety Module: User Speed Reference Unit (Denominator)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
4	1 to 1073741824	–	1	All	After restart	–	–

◆ Pc190: Safety Module: User Acceleration Ref. Unit (Numerator)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
4	1 to 1073741824	–	1	All	After restart	–	–

◆ Pc192: Safety Module: User Acceleration Ref. Unit (Denominator)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
4	1 to 1073741824	–	1	All	After restart	–	–

◆ Pc300: Slot 1 - Safety Function Configuration I

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 0013h	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Safety Function Selection Speed Pos Trq
00 Default	Disabled
01	Reserved Parameter (Do not change)
02	STO Function
03	SS1-r Function
04	SS1-t Function
05	SS2-r Function
06	SS2-t Function
07	SOS Function
08	SLS Function
09	SLA Function
0A	SSR Function
0B	SDI-p Function
0C	SDI-n Function
0D	SLP Function
0E	SLI Function
0F to 10	Reserved (Do not change)
11	SCA Function
12	SSM Function
13	SHP Function
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc301: Slot 1 - Safety Function Configuration II

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0000h to 1F3Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for Safety Request Input Signal Speed Pos Trq
00 Default	Disabled
01	Reserved Parameter (Do not change)
02	Digital Input Port A (DIA)
03	Digital Input Port B (DIB)
04	Digital Input Port C (DIC)
05	Digital Input Port D (DID)
06	Digital Input Port E (DIE)
07 to 0F	Reserved (Do not change)
10	Virtual Input 0
11	Virtual Input 1
12	Virtual Input 2
13	Virtual Input 3
14	Virtual Input 4
15	Virtual Input 5
16	Virtual Input 6
17	Virtual Input 7
18	Virtual Input 8
19	Virtual Input 9
1A	Virtual Input 10
1B	Virtual Input 11
1C	Virtual Input 12
1D	Virtual Input 13
1E	Virtual Input 14
1F	Virtual Input 15
20 to 2F	Reserved (Do not change)
30	Slot 1 Limit Violation
31	Slot 2 Limit Violation
32	Slot 3 Limit Violation
33	Slot 4 Limit Violation
34	Slot 5 Limit Violation
35	Slot 6 Limit Violation
36	Slot 7 Limit Violation
37	Slot 8 Limit Violation
38	Slot 9 Limit Violation
39	Slot 10 Limit Violation
3A to 3E	Reserved (Do not change)
3F	Safety fieldbus virtual input not usable state

Digit	Meaning
n.XX□□	Terminal Port Selection for Safety Data Input Signal Speed Pos Trq
00 Default	Disabled
01 to 0F	Reserved (Do not change)
10	Virtual Input 0
11	Virtual Input 1
12	Virtual Input 2
13	Virtual Input 3
14	Virtual Input 4
15	Virtual Input 5
16	Virtual Input 6
17	Virtual Input 7
18	Virtual Input 8
19	Virtual Input 9
1A	Virtual Input 10
1B	Virtual Input 11
1C	Virtual Input 12
1D	Virtual Input 13
1E	Virtual Input 14
1F	Virtual Input 15

◆ Pc302: Slot 1 - Safety Function Configuration III

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0000h to 042Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for EDM Signal Speed Pos Trq
00 Default	Disabled
01 to 1F	Reserved (Do not change)
20	Virtual Output 0
21	Virtual Output 1
22	Virtual Output 2
23	Virtual Output 3
24	Virtual Output 4
25	Virtual Output 5
26	Virtual Output 6
27	Virtual Output 7
28	Virtual Output 8
29	Virtual Output 9
2A	Virtual Output 10
2B	Virtual Output 11
2C	Virtual Output 12
2D	Virtual Output 13
2E	Virtual Output 14
2F	Virtual Output 15
n.XX□□	EDM Signal Behavior Speed Pos Trq
00 Default	Disabled
01	In Operation
02	Working Safety Function
03	After Limit Violation
04	HWBB (STO) State

◆ Pc303: Slot 1 - Safety Function Configuration IV

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 002Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for Safe Output Signal Speed Pos Trq
00 Default	Disabled
01 to 1F	Reserved (Do not change)
20	Virtual Output 0
21	Virtual Output 1
22	Virtual Output 2
23	Virtual Output 3
24	Virtual Output 4
25	Virtual Output 5
26	Virtual Output 6
27	Virtual Output 7
28	Virtual Output 8
29	Virtual Output 9
2A	Virtual Output 10
2B	Virtual Output 11
2C	Virtual Output 12
2D	Virtual Output 13
2E	Virtual Output 14
2F	Virtual Output 15
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc310: Slot 1 - Waiting Time (t1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 10000	10 ms	0	All	After restart	–	–

◆ Pc311: Slot 1 - Monitoring Time (t2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 10000	10 ms	0	All	After restart	–	–

◆ Pc312: Slot 1 - Speed Limit (s1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User Speed Reference Unit	0	All	After restart	–	–

◆ Pc314: Slot 1 - Speed Limit (s2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User Speed Reference Unit	0	All	After restart	–	–

◆ Pc316: Slot 1 - Acceleration Limit (a1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User acceleration reference unit	0	All	After restart	–	–

◆ Pc318: Slot 1 - Distance Limit (p1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User position reference unit	0	All	After restart	–	–

◆ Pc31A: Slot 1 - Distance Limit (p2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User position reference unit	0	All	After restart	–	–

◆ Pc31C: Slot 1 - Distance Limit (p3)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User position reference unit	0	All	After restart	–	–

◆ Pc340: Slot 2 - Safety Function Configuration I

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 0013h	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Safety Function Selection Speed Pos Trq
00 Default	Disabled
01	Reserved Parameter (Do not change)
02	STO Function
03	SS1-r Function
04	SS1-t Function
05	SS2-r Function
06	SS2-t Function
07	SOS Function
08	SLS Function
09	SLA Function
0A	SSR Function
0B	SDI-p Function
0C	SDI-n Function
0D	SLP Function
0E	SLI Function
0F to 10	Reserved (Do not change)
11	SCA Function
12	SSM Function
13	SHP Function
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc341: Slot 2 - Safety Function Configuration II

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0000h to 1F3Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for Safety Request Input Signal Speed Pos Trq
00 Default	Disabled
01	Reserved Parameter (Do not change)
02	Digital Input Port A (DIA)
03	Digital Input Port B (DIB)
04	Digital Input Port C (DIC)
05	Digital Input Port D (DID)
06	Digital Input Port E (DIE)
07 to 0F	Reserved (Do not change)
10	Virtual Input 0
11	Virtual Input 1
12	Virtual Input 2
13	Virtual Input 3
14	Virtual Input 4
15	Virtual Input 5
16	Virtual Input 6
17	Virtual Input 7
18	Virtual Input 8
19	Virtual Input 9
1A	Virtual Input 10
1B	Virtual Input 11
1C	Virtual Input 12
1D	Virtual Input 13
1E	Virtual Input 14
1F	Virtual Input 15
20 to 2F	Reserved (Do not change)
30	Slot 1 Limit Violation
31	Slot 2 Limit Violation
32	Slot 3 Limit Violation
33	Slot 4 Limit Violation
34	Slot 5 Limit Violation
35	Slot 6 Limit Violation
36	Slot 7 Limit Violation
37	Slot 8 Limit Violation
38	Slot 9 Limit Violation
39	Slot 10 Limit Violation
3A to 3E	Reserved (Do not change)
3F	Safety fieldbus virtual input not usable state

Digit	Meaning
n.XX□□	Terminal Port Selection for Safety Data Input Signal Speed Pos Trq
00 Default	Disabled
01 to 0F	Reserved (Do not change)
10	Virtual Input 0
11	Virtual Input 1
12	Virtual Input 2
13	Virtual Input 3
14	Virtual Input 4
15	Virtual Input 5
16	Virtual Input 6
17	Virtual Input 7
18	Virtual Input 8
19	Virtual Input 9
1A	Virtual Input 10
1B	Virtual Input 11
1C	Virtual Input 12
1D	Virtual Input 13
1E	Virtual Input 14
1F	Virtual Input 15

◆ Pc342: Slot 2 - Safety Function Configuration III

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0000h to 042Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for EDM Signal Speed Pos Trq
00 Default	Disabled
01 to 1F	Reserved (Do not change)
20	Virtual Output 0
21	Virtual Output 1
22	Virtual Output 2
23	Virtual Output 3
24	Virtual Output 4
25	Virtual Output 5
26	Virtual Output 6
27	Virtual Output 7
28	Virtual Output 8
29	Virtual Output 9
2A	Virtual Output 10
2B	Virtual Output 11
2C	Virtual Output 12
2D	Virtual Output 13
2E	Virtual Output 14
2F	Virtual Output 15
n.XX□□	EDM Signal Behavior Speed Pos Trq
00 Default	Disabled
01	In Operation
02	Working Safety Function
03	After Limit Violation
04	HWBB (STO) State

◆ Pc343: Slot 2 - Safety Function Configuration IV

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 002Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for Safe Output Signal Speed Pos Trq
00 Default	Disabled
01 to 1F	Reserved (Do not change)
20	Virtual Output 0
21	Virtual Output 1
22	Virtual Output 2
23	Virtual Output 3
24	Virtual Output 4
25	Virtual Output 5
26	Virtual Output 6
27	Virtual Output 7
28	Virtual Output 8
29	Virtual Output 9
2A	Virtual Output 10
2B	Virtual Output 11
2C	Virtual Output 12
2D	Virtual Output 13
2E	Virtual Output 14
2F	Virtual Output 15
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc350: Slot 2 - Waiting Time (t1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 10000	10 ms	0	All	After restart	–	–

◆ Pc351: Slot 2 - Monitoring Time (t2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 10000	10 ms	0	All	After restart	–	–

◆ Pc352: Slot 2 - Speed Limit (s1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User Speed Reference Unit	0	All	After restart	–	–

◆ Pc354: Slot 2 - Speed Limit (s2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User Speed Reference Unit	0	All	After restart	–	–

◆ Pc356: Slot 2 - Acceleration Limit (a1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User acceleration reference unit	0	All	After restart	–	–

◆ Pc358: Slot 2 - Distance Limit (p1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User position reference unit	0	All	After restart	–	–

◆ Pc35A: Slot 2 - Distance Limit (p2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User position reference unit	0	All	After restart	–	–

◆ Pc35C: Slot 2 - Distance Limit (p3)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User position reference unit	0	All	After restart	–	–

◆ Pc380: Slot 3 - Safety Function Configuration I

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 0013h	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Safety Function Selection Speed Pos Trq
00 Default	Disabled
01	Reserved Parameter (Do not change)
02	STO Function
03	SS1-r Function
04	SS1-t Function
05	SS2-r Function
06	SS2-t Function
07	SOS Function
08	SLS Function
09	SLA Function
0A	SSR Function
0B	SDI-p Function
0C	SDI-n Function
0D	SLP Function
0E	SLI Function
0F to 10	Reserved (Do not change)
11	SCA Function
12	SSM Function
13	SHP Function
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc381: Slot 3 - Safety Function Configuration II

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0000h to 1F3Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for Safety Request Input Signal Speed Pos Trq
00 Default	Disabled
01	Reserved Parameter (Do not change)
02	Digital Input Port A (DIA)
03	Digital Input Port B (DIB)
04	Digital Input Port C (DIC)
05	Digital Input Port D (DID)
06	Digital Input Port E (DIE)
07 to 0F	Reserved (Do not change)
10	Virtual Input 0
11	Virtual Input 1
12	Virtual Input 2
13	Virtual Input 3
14	Virtual Input 4
15	Virtual Input 5
16	Virtual Input 6
17	Virtual Input 7
18	Virtual Input 8
19	Virtual Input 9
1A	Virtual Input 10
1B	Virtual Input 11
1C	Virtual Input 12
1D	Virtual Input 13
1E	Virtual Input 14
1F	Virtual Input 15
20 to 2F	Reserved (Do not change)
30	Slot 1 Limit Violation
31	Slot 2 Limit Violation
32	Slot 3 Limit Violation
33	Slot 4 Limit Violation
34	Slot 5 Limit Violation
35	Slot 6 Limit Violation
36	Slot 7 Limit Violation
37	Slot 8 Limit Violation
38	Slot 9 Limit Violation
39	Slot 10 Limit Violation
3A to 3E	Reserved (Do not change)
3F	Safety fieldbus virtual input not usable state

Digit	Meaning
n.XX□□	Terminal Port Selection for Safety Data Input Signal Speed Pos Trq
00 Default	Disabled
01 to 0F	Reserved (Do not change)
10	Virtual Input 0
11	Virtual Input 1
12	Virtual Input 2
13	Virtual Input 3
14	Virtual Input 4
15	Virtual Input 5
16	Virtual Input 6
17	Virtual Input 7
18	Virtual Input 8
19	Virtual Input 9
1A	Virtual Input 10
1B	Virtual Input 11
1C	Virtual Input 12
1D	Virtual Input 13
1E	Virtual Input 14
1F	Virtual Input 15

◆ Pc382: Slot 3 - Safety Function Configuration III

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0000h to 042Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for EDM Signal Speed Pos Trq
00 Default	Disabled
01 to 1F	Reserved (Do not change)
20	Virtual Output 0
21	Virtual Output 1
22	Virtual Output 2
23	Virtual Output 3
24	Virtual Output 4
25	Virtual Output 5
26	Virtual Output 6
27	Virtual Output 7
28	Virtual Output 8
29	Virtual Output 9
2A	Virtual Output 10
2B	Virtual Output 11
2C	Virtual Output 12
2D	Virtual Output 13
2E	Virtual Output 14
2F	Virtual Output 15
n.XX□□	EDM Signal Behavior Speed Pos Trq
00 Default	Disabled
01	In Operation
02	Working Safety Function
03	After Limit Violation
04	HWBB (STO) State

◆ Pc383: Slot 3 - Safety Function Configuration IV

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 002Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for Safe Output Signal Speed Pos Trq
00 Default	Disabled
01 to 1F	Reserved (Do not change)
20	Virtual Output 0
21	Virtual Output 1
22	Virtual Output 2
23	Virtual Output 3
24	Virtual Output 4
25	Virtual Output 5
26	Virtual Output 6
27	Virtual Output 7
28	Virtual Output 8
29	Virtual Output 9
2A	Virtual Output 10
2B	Virtual Output 11
2C	Virtual Output 12
2D	Virtual Output 13
2E	Virtual Output 14
2F	Virtual Output 15
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc390: Slot 3 - Waiting Time (t1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 10000	10 ms	0	All	After restart	–	–

◆ Pc391: Slot 3 - Monitoring Time (t2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 10000	10 ms	0	All	After restart	–	–

◆ Pc392: Slot 3 - Speed Limit (s1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User Speed Reference Unit	0	All	After restart	–	–

◆ Pc394: Slot 3 - Speed Limit (s2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User Speed Reference Unit	0	All	After restart	–	–

◆ Pc396: Slot 3 - Acceleration Limit (a1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User acceleration reference unit	0	All	After restart	–	–

◆ Pc398: Slot 3 - Distance Limit (p1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User position reference unit	0	All	After restart	–	–

◆ Pc39A: Slot 3 - Distance Limit (p2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User position reference unit	0	All	After restart	–	–

◆ Pc39C: Slot 3 - Distance Limit (p3)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User position reference unit	0	All	After restart	–	–

◆ Pc3C0: Slot 4 - Safety Function Configuration I

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 0013h	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Safety Function Selection Speed Pos Trq
00 Default	Disabled
01	Reserved Parameter (Do not change)
02	STO Function
03	SS1-r Function
04	SS1-t Function
05	SS2-r Function
06	SS2-t Function
07	SOS Function
08	SLS Function
09	SLA Function
0A	SSR Function
0B	SDI-p Function
0C	SDI-n Function
0D	SLP Function
0E	SLI Function
0F to 10	Reserved (Do not change)
11	SCA Function
12	SSM Function
13	SHP Function
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc3C1: Slot 4 - Safety Function Configuration II

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0000h to 1F3Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for Safety Request Input Signal Speed Pos Trq
00 Default	Disabled
01	Reserved Parameter (Do not change)
02	Digital Input Port A (DIA)
03	Digital Input Port B (DIB)
04	Digital Input Port C (DIC)
05	Digital Input Port D (DID)
06	Digital Input Port E (DIE)
07 to 0F	Reserved (Do not change)
10	Virtual Input 0
11	Virtual Input 1
12	Virtual Input 2
13	Virtual Input 3
14	Virtual Input 4
15	Virtual Input 5
16	Virtual Input 6
17	Virtual Input 7
18	Virtual Input 8
19	Virtual Input 9
1A	Virtual Input 10
1B	Virtual Input 11
1C	Virtual Input 12
1D	Virtual Input 13
1E	Virtual Input 14
1F	Virtual Input 15
20 to 2F	Reserved (Do not change)
30	Slot 1 Limit Violation
31	Slot 2 Limit Violation
32	Slot 3 Limit Violation
33	Slot 4 Limit Violation
34	Slot 5 Limit Violation
35	Slot 6 Limit Violation
36	Slot 7 Limit Violation
37	Slot 8 Limit Violation
38	Slot 9 Limit Violation
39	Slot 10 Limit Violation
3A to 3E	Reserved (Do not change)
3F	Safety fieldbus virtual input not usable state

Digit	Meaning
n.XX□□	Terminal Port Selection for Safety Data Input Signal Speed Pos Trq
00 Default	Disabled
01 to 0F	Reserved (Do not change)
10	Virtual Input 0
11	Virtual Input 1
12	Virtual Input 2
13	Virtual Input 3
14	Virtual Input 4
15	Virtual Input 5
16	Virtual Input 6
17	Virtual Input 7
18	Virtual Input 8
19	Virtual Input 9
1A	Virtual Input 10
1B	Virtual Input 11
1C	Virtual Input 12
1D	Virtual Input 13
1E	Virtual Input 14
1F	Virtual Input 15

◆ Pc3C2: Slot 4 - Safety Function Configuration III

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0000h to 042Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for EDM Signal Speed Pos Trq
00 Default	Disabled
01 to 1F	Reserved (Do not change)
20	Virtual Output 0
21	Virtual Output 1
22	Virtual Output 2
23	Virtual Output 3
24	Virtual Output 4
25	Virtual Output 5
26	Virtual Output 6
27	Virtual Output 7
28	Virtual Output 8
29	Virtual Output 9
2A	Virtual Output 10
2B	Virtual Output 11
2C	Virtual Output 12
2D	Virtual Output 13
2E	Virtual Output 14
2F	Virtual Output 15
n.XX□□	EDM Signal Behavior Speed Pos Trq
00 Default	Disabled
01	In Operation
02	Working Safety Function
03	After Limit Violation
04	HWBB (STO) State

◆ Pc3C3: Slot 4 - Safety Function Configuration IV

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 002Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for Safe Output Signal Speed Pos Trq
00 Default	Disabled
01 to 1F	Reserved (Do not change)
20	Virtual Output 0
21	Virtual Output 1
22	Virtual Output 2
23	Virtual Output 3
24	Virtual Output 4
25	Virtual Output 5
26	Virtual Output 6
27	Virtual Output 7
28	Virtual Output 8
29	Virtual Output 9
2A	Virtual Output 10
2B	Virtual Output 11
2C	Virtual Output 12
2D	Virtual Output 13
2E	Virtual Output 14
2F	Virtual Output 15
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc3D0: Slot 4 - Waiting Time (t1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 10000	10 ms	0	All	After restart	–	–

◆ Pc3D1: Slot 4 - Monitoring Time (t2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 10000	10 ms	0	All	After restart	–	–

◆ Pc3D2: Slot 4 - Speed Limit (s1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User Speed Reference Unit	0	All	After restart	–	–

◆ Pc3D4: Slot 4 - Speed Limit (s2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User Speed Reference Unit	0	All	After restart	–	–

◆ Pc3D6: Slot 4 - Acceleration Limit (a1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User acceleration reference unit	0	All	After restart	–	–

◆ Pc3D8: Slot 4 - Distance Limit (p1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User position reference unit	0	All	After restart	–	–

◆ Pc3DA: Slot 4 - Distance Limit (p2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User position reference unit	0	All	After restart	–	–

◆ Pc3DC: Slot 4 - Distance Limit (p3)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User position reference unit	0	All	After restart	–	–

◆ Pc400: Slot 5 - Safety Function Configuration I

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 0013h	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Safety Function Selection Speed Pos Trq
00 Default	Disabled
01	Reserved Parameter (Do not change)
02	STO Function
03	SS1-r Function
04	SS1-t Function
05	SS2-r Function
06	SS2-t Function
07	SOS Function
08	SLS Function
09	SLA Function
0A	SSR Function
0B	SDI-p Function
0C	SDI-n Function
0D	SLP Function
0E	SLI Function
0F to 10	Reserved (Do not change)
11	SCA Function
12	SSM Function
13	SHP Function
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc401: Slot 5 - Safety Function Configuration II

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0000h to 1F3Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for Safety Request Input Signal Speed Pos Trq
00 Default	Disabled
01	Reserved Parameter (Do not change)
02	Digital Input Port A (DIA)
03	Digital Input Port B (DIB)
04	Digital Input Port C (DIC)
05	Digital Input Port D (DID)
06	Digital Input Port E (DIE)
07 to 0F	Reserved (Do not change)
10	Virtual Input 0
11	Virtual Input 1
12	Virtual Input 2
13	Virtual Input 3
14	Virtual Input 4
15	Virtual Input 5
16	Virtual Input 6
17	Virtual Input 7
18	Virtual Input 8
19	Virtual Input 9
1A	Virtual Input 10
1B	Virtual Input 11
1C	Virtual Input 12
1D	Virtual Input 13
1E	Virtual Input 14
1F	Virtual Input 15
20 to 2F	Reserved (Do not change)
30	Slot 1 Limit Violation
31	Slot 2 Limit Violation
32	Slot 3 Limit Violation
33	Slot 4 Limit Violation
34	Slot 5 Limit Violation
35	Slot 6 Limit Violation
36	Slot 7 Limit Violation
37	Slot 8 Limit Violation
38	Slot 9 Limit Violation
39	Slot 10 Limit Violation
3A to 3E	Reserved (Do not change)
3F	Safety fieldbus virtual input not usable state

Digit	Meaning
n.XX□□	Terminal Port Selection for Safety Data Input Signal Speed Pos Trq
00 Default	Disabled
01 to 0F	Reserved (Do not change)
10	Virtual Input 0
11	Virtual Input 1
12	Virtual Input 2
13	Virtual Input 3
14	Virtual Input 4
15	Virtual Input 5
16	Virtual Input 6
17	Virtual Input 7
18	Virtual Input 8
19	Virtual Input 9
1A	Virtual Input 10
1B	Virtual Input 11
1C	Virtual Input 12
1D	Virtual Input 13
1E	Virtual Input 14
1F	Virtual Input 15

◆ Pc402: Slot 5 - Safety Function Configuration III

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0000h to 042Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for EDM Signal Speed Pos Trq
00 Default	Disabled
01 to 1F	Reserved (Do not change)
20	Virtual Output 0
21	Virtual Output 1
22	Virtual Output 2
23	Virtual Output 3
24	Virtual Output 4
25	Virtual Output 5
26	Virtual Output 6
27	Virtual Output 7
28	Virtual Output 8
29	Virtual Output 9
2A	Virtual Output 10
2B	Virtual Output 11
2C	Virtual Output 12
2D	Virtual Output 13
2E	Virtual Output 14
2F	Virtual Output 15
n.XX□□	EDM Signal Behavior Speed Pos Trq
00 Default	Disabled
01	In Operation
02	Working Safety Function
03	After Limit Violation
04	HWBB (STO) State

◆ Pc403: Slot 5 - Safety Function Configuration IV

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 002Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for Safe Output Signal Speed Pos Trq
00 Default	Disabled
01 to 1F	Reserved (Do not change)
20	Virtual Output 0
21	Virtual Output 1
22	Virtual Output 2
23	Virtual Output 3
24	Virtual Output 4
25	Virtual Output 5
26	Virtual Output 6
27	Virtual Output 7
28	Virtual Output 8
29	Virtual Output 9
2A	Virtual Output 10
2B	Virtual Output 11
2C	Virtual Output 12
2D	Virtual Output 13
2E	Virtual Output 14
2F	Virtual Output 15
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc410: Slot 5 - Waiting Time (t1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 10000	10 ms	0	All	After restart	–	–

◆ Pc411: Slot 5 - Monitoring Time (t2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 10000	10 ms	0	All	After restart	–	–

◆ Pc412: Slot 5 - Speed Limit (s1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User Speed Reference Unit	0	All	After restart	–	–

◆ Pc414: Slot 5 - Speed Limit (s2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User Speed Reference Unit	0	All	After restart	–	–

◆ Pc416: Slot 5 - Acceleration Limit (a1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User acceleration reference unit	0	All	After restart	–	–

◆ Pc418: Slot 5 - Distance Limit (p1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User position reference unit	0	All	After restart	–	–

◆ Pc41A: Slot 5 - Distance Limit (p2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User position reference unit	0	All	After restart	–	–

◆ Pc41C: Slot 5 - Distance Limit (p3)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User position reference unit	0	All	After restart	–	–

◆ Pc440: Slot 6 - Safety Function Configuration I

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 0013h	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Safety Function Selection Speed Pos Trq
00 Default	Disabled
01	Reserved Parameter (Do not change)
02	STO Function
03	SS1-r Function
04	SS1-t Function
05	SS2-r Function
06	SS2-t Function
07	SOS Function
08	SLS Function
09	SLA Function
0A	SSR Function
0B	SDI-p Function
0C	SDI-n Function
0D	SLP Function
0E	SLI Function
0F to 10	Reserved (Do not change)
11	SCA Function
12	SSM Function
13	SHP Function
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc441: Slot 6 - Safety Function Configuration II

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 1F3Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for Safety Request Input Signal Speed Pos Trq
00 Default	Disabled
01 to 0F	Reserved (Do not change)
10	Virtual Input 0
11	Virtual Input 1
12	Virtual Input 2
13	Virtual Input 3
14	Virtual Input 4
15	Virtual Input 5
16	Virtual Input 6
17	Virtual Input 7
18	Virtual Input 8
19	Virtual Input 9
1A	Virtual Input 10
1B	Virtual Input 11
1C	Virtual Input 12
1D	Virtual Input 13
1E	Virtual Input 14
1F	Virtual Input 15
20 to 2F	Reserved (Do not change)
30	Slot 1 Limit Violation
31	Slot 2 Limit Violation
32	Slot 3 Limit Violation
33	Slot 4 Limit Violation
34	Slot 5 Limit Violation
35	Slot 6 Limit Violation
36	Slot 7 Limit Violation
37	Slot 8 Limit Violation
38	Slot 9 Limit Violation
39	Slot 10 Limit Violation
3A to 3E	Reserved (Do not change)
3F	Safety fieldbus virtual input not usable state
n.XX□□	Terminal Port Selection for Safety Data Input Signal Speed Pos Trq
00 Default	Disabled
01 to 0F	Reserved (Do not change)
10	Virtual Input 0
11	Virtual Input 1

Digit	Meaning
12	Virtual Input 2
13	Virtual Input 3
14	Virtual Input 4
15	Virtual Input 5
16	Virtual Input 6
17	Virtual Input 7
18	Virtual Input 8
19	Virtual Input 9
1A	Virtual Input 10
1B	Virtual Input 11
1C	Virtual Input 12
1D	Virtual Input 13
1E	Virtual Input 14
1F	Virtual Input 15

◆ Pc442: Slot 6 - Safety Function Configuration III

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 042Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for EDM Signal Speed Pos Trq
00 Default	Disabled
01 to 1F	Reserved (Do not change)
20	Virtual Output 0
21	Virtual Output 1
22	Virtual Output 2
23	Virtual Output 3
24	Virtual Output 4
25	Virtual Output 5
26	Virtual Output 6
27	Virtual Output 7
28	Virtual Output 8
29	Virtual Output 9
2A	Virtual Output 10
2B	Virtual Output 11
2C	Virtual Output 12
2D	Virtual Output 13
2E	Virtual Output 14
2F	Virtual Output 15
n.XX□□	EDM Signal Behavior Speed Pos Trq
00 Default	Disabled
01	In Operation
02	Working Safety Function
03	After Limit Violation
04	HWBB (STO) State

◆ Pc443: Slot 6 - Safety Function Configuration IV

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 002Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for Safe Output Signal Speed Pos Trq
00 Default	Disabled
01 to 1F	Reserved (Do not change)
20	Virtual Output 0
21	Virtual Output 1
22	Virtual Output 2
23	Virtual Output 3
24	Virtual Output 4
25	Virtual Output 5
26	Virtual Output 6
27	Virtual Output 7
28	Virtual Output 8
29	Virtual Output 9
2A	Virtual Output 10
2B	Virtual Output 11
2C	Virtual Output 12
2D	Virtual Output 13
2E	Virtual Output 14
2F	Virtual Output 15
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc450: Slot 6 - Waiting Time (t1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 10000	10 ms	0	All	After restart	–	–

◆ Pc451: Slot 6 - Monitoring Time (t2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 10000	10 ms	0	All	After restart	–	–

◆ Pc452: Slot 6 - Speed Limit (s1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User Speed Reference Unit	0	All	After restart	–	–

◆ Pc454: Slot 6 - Speed Limit (s2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User Speed Reference Unit	0	All	After restart	–	–

◆ Pc456: Slot 6 - Acceleration Limit (a1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User acceleration reference unit	0	All	After restart	–	–

◆ Pc458: Slot 6 - Distance Limit (p1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User position reference unit	0	All	After restart	–	–

◆ Pc45A: Slot 6 - Distance Limit (p2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User position reference unit	0	All	After restart	–	–

◆ Pc45C: Slot 6 - Distance Limit (p3)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User position reference unit	0	All	After restart	–	–

◆ Pc480: Slot 7 - Safety Function Configuration I

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 0013h	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Safety Function Selection Speed Pos Trq
00 Default	Disabled
01	Reserved Parameter (Do not change)
02	STO Function
03	SS1-r Function
04	SS1-t Function
05	SS2-r Function
06	SS2-t Function
07	SOS Function
08	SLS Function
09	SLA Function
0A	SSR Function
0B	SDI-p Function
0C	SDI-n Function
0D	SLP Function
0E	SLI Function
0F to 10	Reserved (Do not change)
11	SCA Function
12	SSM Function
13	SHP Function
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc481: Slot 7 - Safety Function Configuration II

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0000h to 1F3Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for Safety Request Input Signal Speed Pos Trq
00 Default	Disabled
01	Reserved Parameter (Do not change)
02	Digital Input Port A (DIA)
03	Digital Input Port B (DIB)
04	Digital Input Port C (DIC)
05	Digital Input Port D (DID)
06	Digital Input Port E (DIE)
07 to 0F	Reserved (Do not change)
10	Virtual Input 0
11	Virtual Input 1
12	Virtual Input 2
13	Virtual Input 3
14	Virtual Input 4
15	Virtual Input 5
16	Virtual Input 6
17	Virtual Input 7
18	Virtual Input 8
19	Virtual Input 9
1A	Virtual Input 10
1B	Virtual Input 11
1C	Virtual Input 12
1D	Virtual Input 13
1E	Virtual Input 14
1F	Virtual Input 15
20 to 2F	Reserved (Do not change)
30	Slot 1 Limit Violation
31	Slot 2 Limit Violation
32	Slot 3 Limit Violation
33	Slot 4 Limit Violation
34	Slot 5 Limit Violation
35	Slot 6 Limit Violation
36	Slot 7 Limit Violation
37	Slot 8 Limit Violation
38	Slot 9 Limit Violation
39	Slot 10 Limit Violation
3A to 3E	Reserved (Do not change)
3F	Safety fieldbus virtual input not usable state

Digit	Meaning
n.XX□□	Terminal Port Selection for Safety Data Input Signal Speed Pos Trq
00 Default	Disabled
01 to 0F	Reserved (Do not change)
10	Virtual Input 0
11	Virtual Input 1
12	Virtual Input 2
13	Virtual Input 3
14	Virtual Input 4
15	Virtual Input 5
16	Virtual Input 6
17	Virtual Input 7
18	Virtual Input 8
19	Virtual Input 9
1A	Virtual Input 10
1B	Virtual Input 11
1C	Virtual Input 12
1D	Virtual Input 13
1E	Virtual Input 14
1F	Virtual Input 15

◆ Pc482: Slot 7 - Safety Function Configuration III

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0000h to 042Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for EDM Signal Speed Pos Trq
00 Default	Disabled
01 to 1F	Reserved (Do not change)
20	Virtual Output 0
21	Virtual Output 1
22	Virtual Output 2
23	Virtual Output 3
24	Virtual Output 4
25	Virtual Output 5
26	Virtual Output 6
27	Virtual Output 7
28	Virtual Output 8
29	Virtual Output 9
2A	Virtual Output 10
2B	Virtual Output 11
2C	Virtual Output 12
2D	Virtual Output 13
2E	Virtual Output 14
2F	Virtual Output 15
n.XX□□	EDM Signal Behavior Speed Pos Trq
00 Default	Disabled
01	In Operation
02	Working Safety Function
03	After Limit Violation
04	HWBB (STO) State

◆ Pc483: Slot 7 - Safety Function Configuration IV

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 002Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for Safe Output Signal Speed Pos Trq
00 Default	Disabled
01 to 1F	Reserved (Do not change)
20	Virtual Output 0
21	Virtual Output 1
22	Virtual Output 2
23	Virtual Output 3
24	Virtual Output 4
25	Virtual Output 5
26	Virtual Output 6
27	Virtual Output 7
28	Virtual Output 8
29	Virtual Output 9
2A	Virtual Output 10
2B	Virtual Output 11
2C	Virtual Output 12
2D	Virtual Output 13
2E	Virtual Output 14
2F	Virtual Output 15
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc490: Slot 7 - Waiting Time (t1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 10000	10 ms	0	All	After restart	–	–

◆ Pc491: Slot 7 - Monitoring Time (t2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 10000	10 ms	0	All	After restart	–	–

◆ Pc492: Slot 7 - Speed Limit (s1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User Speed Reference Unit	0	All	After restart	–	–

◆ Pc494: Slot 7 - Speed Limit (s 2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User Speed Reference Unit	0	All	After restart	–	–

◆ Pc496: Slot 7 - Acceleration Limit (a1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User acceleration reference unit	0	All	After restart	–	–

◆ Pc498: Slot 7 - Distance Limit (p1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User position reference unit	0	All	After restart	–	–

◆ Pc49A: Slot 7 - Distance Limit (p2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User position reference unit	0	All	After restart	–	–

◆ Pc49C: Slot 7 - Distance Limit (p3)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User position reference unit	0	All	After restart	–	–

◆ Pc4C0: Slot 8 - Safety Function Configuration I

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 0013h	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Safety Function Selection Speed Pos Trq
00 Default	Disabled
01	Reserved Parameter (Do not change)
02	STO Function
03	SS1-r Function
04	SS1-t Function
05	SS2-r Function
06	SS2-t Function
07	SOS Function
08	SLS Function
09	SLA Function
0A	SSR Function
0B	SDI-p Function
0C	SDI-n Function
0D	SLP Function
0E	SLI Function
0F to 10	Reserved (Do not change)
11	SCA Function
12	SSM Function
13	SHP Function
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc4C1: Slot 8 - Safety Function Configuration II

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Refer-ence
2	0000h to 1F3Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for Safety Request Input Signal Speed Pos Trq
00 Default	Disabled
01	Reserved Parameter (Do not change)
02	Digital Input Port A (DIA)
03	Digital Input Port B (DIB)
04	Digital Input Port C (DIC)
05	Digital Input Port D (DID)
06	Digital Input Port E (DIE)
07 to 0F	Reserved (Do not change)
10	Virtual Input 0
11	Virtual Input 1
12	Virtual Input 2
13	Virtual Input 3
14	Virtual Input 4
15	Virtual Input 5
16	Virtual Input 6
17	Virtual Input 7
18	Virtual Input 8
19	Virtual Input 9
1A	Virtual Input 10
1B	Virtual Input 11
1C	Virtual Input 12
1D	Virtual Input 13
1E	Virtual Input 14
1F	Virtual Input 15
20 to 2F	Reserved (Do not change)
30	Slot 1 Limit Violation
31	Slot 2 Limit Violation
32	Slot 3 Limit Violation
33	Slot 4 Limit Violation
34	Slot 5 Limit Violation
35	Slot 6 Limit Violation
36	Slot 7 Limit Violation
37	Slot 8 Limit Violation
38	Slot 9 Limit Violation
39	Slot 10 Limit Violation
3A to 3E	Reserved (Do not change)
3F	Safety fieldbus virtual input not usable state

Digit	Meaning
n.XX□□	Terminal Port Selection for Safety Data Input Signal Speed Pos Trq
00 Default	Disabled
01 to 0F	Reserved (Do not change)
10	Virtual Input 0
11	Virtual Input 1
12	Virtual Input 2
13	Virtual Input 3
14	Virtual Input 4
15	Virtual Input 5
16	Virtual Input 6
17	Virtual Input 7
18	Virtual Input 8
19	Virtual Input 9
1A	Virtual Input 10
1B	Virtual Input 11
1C	Virtual Input 12
1D	Virtual Input 13
1E	Virtual Input 14
1F	Virtual Input 15

◆ Pc4C2: Slot 8 - Safety Function Configuration III

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 042Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for EDM Signal Speed Pos Trq
00 Default	Disabled
01 to 1F	Reserved (Do not change)
20	Virtual Output 0
21	Virtual Output 1
22	Virtual Output 2
23	Virtual Output 3
24	Virtual Output 4
25	Virtual Output 5
26	Virtual Output 6
27	Virtual Output 7
28	Virtual Output 8
29	Virtual Output 9
2A	Virtual Output 10
2B	Virtual Output 11
2C	Virtual Output 12
2D	Virtual Output 13
2E	Virtual Output 14
2F	Virtual Output 15
n.XX□□	EDM Signal Behavior Speed Pos Trq
00 Default	Disabled
01	In Operation
02	Working Safety Function
03	After Limit Violation
04	HWBB (STO) State

◆ Pc4C3: Slot 8 - Safety Function Configuration IV

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 002Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for Safe Output Signal Speed Pos Trq
00 Default	Disabled
01 to 1F	Reserved (Do not change)
20	Virtual Output 0
21	Virtual Output 1
22	Virtual Output 2
23	Virtual Output 3
24	Virtual Output 4
25	Virtual Output 5
26	Virtual Output 6
27	Virtual Output 7
28	Virtual Output 8
29	Virtual Output 9
2A	Virtual Output 10
2B	Virtual Output 11
2C	Virtual Output 12
2D	Virtual Output 13
2E	Virtual Output 14
2F	Virtual Output 15
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc4D0: Slot 8 - Waiting Time (t1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 10000	10 ms	0	All	After restart	–	–

◆ Pc4D1: Slot 8 - Monitoring Time (t2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 10000	10 ms	0	All	After restart	–	–

◆ Pc4D2: Slot 8 - Speed Limit (s1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User Speed Reference Unit	0	All	After restart	–	–

◆ Pc4D4: Slot 8 - Speed Limit (s2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User Speed Reference Unit	0	All	After restart	–	–

◆ Pc4D6: Slot 8 - Acceleration Limit (a1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User acceleration reference unit	0	All	After restart	–	–

◆ Pc4D8: Slot 8 - Distance Limit (p1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User position reference unit	0	All	After restart	–	–

◆ Pc4DA: Slot 8 - Distance Limit (p2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User position reference unit	0	All	After restart	–	–

◆ Pc4DC: Slot 8 - Distance Limit (p3)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User position reference unit	0	All	After restart	–	–

◆ Pc500: Slot 9 - Safety Function Configuration I

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 0013h	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Safety Function Selection Speed Pos Trq
00 Default	Disabled
01	Reserved Parameter (Do not change)
02	STO Function
03	SS1-r Function
04	SS1-t Function
05	SS2-r Function
06	SS2-t Function
07	SOS Function
08	SLS Function
09	SLA Function
0A	SSR Function
0B	SDI-p Function
0C	SDI-n Function
0D	SLP Function
0E	SLI Function
0F to 10	Reserved (Do not change)
11	SCA Function
12	SSM Function
13	SHP Function
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc501: Slot 9 - Safety Function Configuration II

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 1F3Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for Safety Request Input Signal Speed Pos Trq
00 Default	Disabled
01 to 0F	Reserved (Do not change)
10	Virtual Input 0
11	Virtual Input 1
12	Virtual Input 2
13	Virtual Input 3
14	Virtual Input 4
15	Virtual Input 5
16	Virtual Input 6
17	Virtual Input 7
18	Virtual Input 8
19	Virtual Input 9
1A	Virtual Input 10
1B	Virtual Input 11
1C	Virtual Input 12
1D	Virtual Input 13
1E	Virtual Input 14
1F	Virtual Input 15
20 to 2F	Reserved (Do not change)
30	Slot 1 Limit Violation
31	Slot 2 Limit Violation
32	Slot 3 Limit Violation
33	Slot 4 Limit Violation
34	Slot 5 Limit Violation
35	Slot 6 Limit Violation
36	Slot 7 Limit Violation
37	Slot 8 Limit Violation
38	Slot 9 Limit Violation
39	Slot 10 Limit Violation
3A to 3E	Reserved (Do not change)
3F	Safety fieldbus virtual input not usable state
n.XX□□	Terminal Port Selection for Safety Data Input Signal Speed Pos Trq
00 Default	Disabled
01 to 0F	Reserved (Do not change)
10	Virtual Input 0
11	Virtual Input 1

Digit	Meaning
12	Virtual Input 2
13	Virtual Input 3
14	Virtual Input 4
15	Virtual Input 5
16	Virtual Input 6
17	Virtual Input 7
18	Virtual Input 8
19	Virtual Input 9
1A	Virtual Input 10
1B	Virtual Input 11
1C	Virtual Input 12
1D	Virtual Input 13
1E	Virtual Input 14
1F	Virtual Input 15

◆ Pc502: Slot 9 - Safety Function Configuration III

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 042Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for EDM Signal Speed Pos Trq
00 Default	Disabled
01 to 1F	Reserved (Do not change)
20	Virtual Output 0
21	Virtual Output 1
22	Virtual Output 2
23	Virtual Output 3
24	Virtual Output 4
25	Virtual Output 5
26	Virtual Output 6
27	Virtual Output 7
28	Virtual Output 8
29	Virtual Output 9
2A	Virtual Output 10
2B	Virtual Output 11
2C	Virtual Output 12
2D	Virtual Output 13
2E	Virtual Output 14
2F	Virtual Output 15
n.XX□□	EDM Signal Behavior Speed Pos Trq
00 Default	Disabled
01	In Operation
02	Working Safety Function
03	After Limit Violation
04	HWBB (STO) State

◆ Pc503: Slot 9 - Safety Function Configuration IV

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0000h to 002Fh	–	0000h	All	After restart	–	–

Digit	Meaning
n.□□XX	Terminal Port Selection for Safe Output Signal Speed Pos Trq
00 Default	Disabled
01 to 1F	Reserved (Do not change)
20	Virtual Output 0
21	Virtual Output 1
22	Virtual Output 2
23	Virtual Output 3
24	Virtual Output 4
25	Virtual Output 5
26	Virtual Output 6
27	Virtual Output 7
28	Virtual Output 8
29	Virtual Output 9
2A	Virtual Output 10
2B	Virtual Output 11
2C	Virtual Output 12
2D	Virtual Output 13
2E	Virtual Output 14
2F	Virtual Output 15
n.□X□□	Reserved (Do not change.)
n.X□□□	Reserved (Do not change.)

◆ Pc510: Slot 9 - Waiting Time (t1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 10000	10 ms	0	All	After restart	–	–

◆ Pc511: Slot 9 - Monitoring Time (t2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
2	0 to 10000	10 ms	0	All	After restart	–	–

◆ Pc512: Slot 9 - Speed Limit (s1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User Speed Reference Unit	0	All	After restart	–	–

◆ Pc514: Slot 9 - Speed Limit (s2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User Speed Reference Unit	0	All	After restart	–	–

◆ Pc516: Slot 9 - Acceleration Limit (a1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User acceleration reference unit	0	All	After restart	–	–

◆ Pc518: Slot 9 - Distance Limit (p1)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User position reference unit	0	All	After restart	–	–

◆ Pc51A: Slot 9 - Distance Limit (p2)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	-2147483648 to 2147483647	User position reference unit	0	All	After restart	–	–

◆ Pc51C: Slot 9 - Distance Limit (p3)

Speed Pos Trq

Size	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
4	0 to 4294967295	User position reference unit	0	All	After restart	–	–

11.2 Object List

The following table lists the objects.

11.2.1 List of SERVOPACK Objects

Index	Subin-dex	Name	Data Type	Acc-ess	PDO Map-ping	Saving to EEPRO-M	Default Value	Lower Limit	Upper Limit	Unit	Parame-ter No.
1C12h	Sync Manager PDO Assignment 2										
	0	Number of assigned PDOs	USINT	RW	No	Yes	1	0	3	–	PnCB5
	1	Index of assigned RxPDO 1	UINT	RW	No	Yes	0x1601	0x1600	0x1609	–	PnCB6
	2	Index of assigned RxPDO 2	UINT	RW	No	Yes	0x1600	0x1600	0x1609	–	PnCB7
	3	Index of assigned RxPDO 3	UINT	RW	No	Yes	0x1602	0x1600	0x1609	–	PnCB8
1C13h	Sync Manager PDO Assignment 3										
	0	Number of assigned PDOs	USINT	RW	No	Yes	1	0	3	–	PnCBB
	1	Index of assigned TxPDO 1	UINT	RW	No	Yes	0x1A01	0x1A00	0x1A09	–	PnCBC
	2	Index of assigned TxPDO 2	UINT	RW	No	Yes	0x1A00	0x1A00	0x1A09	–	PnCBD
	3	Index of assigned TxPDO 3	UINT	RW	No	Yes	0x1A02	0x1A00	0x1A09	–	PnCBE
2629h	0	Application Switch 2 for Safety Function	UINT	RW	No	Yes	0001h	0000h	110Ah	–	Pn629
2720h	0	Safety Module Monitor	UDINT	RO	Yes	No	–	–	–	–	–
F000h	Modular Device Profile										
	0	Number of entries	USINT	RO	No	No	2	–	–	–	–
	1	Module index distance	UINT	RO	No	No	0x0010	–	–	–	–
	2	Maximum number of modules	UINT	RO	No	No	1	–	–	–	–
F010h	Module List										
	0	Number of entries	USINT	RO	No	No	1	–	–	–	–
	1	Module profile list	UDINT	RO	No	No	790	–	–	–	–
F050h	Detected Modules										
	0	Number of entries	USINT	RO	No	No	1	–	–	–	–
	1	Detected module ident list	UDINT	RO	No	No	Differs depending on the software version of the ASM-X and the SERVO-PACK.	0x00000000	0xFFFFFFFF	–	–
F980h	Device Safety Address										
	0	Number of entries	USINT	RO	No	No	1	–	–	–	–
	1	FSoE Address	UINT	RO	No	No	1	0	65535	–	Pc120

11.2.2 List of ASM-X Objects

Index	Subin-dex	Name	Data Type	Acc-ess	PDO Map-ping	Saving to EEPRO-M	Default Value	Lower Limit	Upper Limit	Unit	Pc No.
1608h	1st RxPDO Mapping of FSoE SubDevice										
	0	Number of entries	USINT	RO	No	No	27	–	–	–	–
	1	Mapping entry 1 (FSoE MainDevice command)	UDINT	RO	No	No	0xE7000108	–	–	–	–
	2	Mapping entry 2 (Virtual input 0)	UDINT	RO	No	No	0x5A000101	–	–	–	–
	3	Mapping entry 3 (Virtual input 1)	UDINT	RO	No	No	0x5A000201	–	–	–	–
	4	Mapping entry 4 (Virtual input 2)	UDINT	RO	No	No	0x5A000301	–	–	–	–
	5	Mapping entry 5 (Virtual input 3)	UDINT	RO	No	No	0x5A000401	–	–	–	–
	6	Mapping entry 6 (Virtual input 4)	UDINT	RO	No	No	0x5A000501	–	–	–	–
	7	Mapping entry 7 (Virtual input 5)	UDINT	RO	No	No	0x5A000601	–	–	–	–
	8	Mapping entry 8 (Virtual input 6)	UDINT	RO	No	No	0x5A000701	–	–	–	–
	9	Mapping entry 9 (Virtual input 7)	UDINT	RO	No	No	0x5A000801	–	–	–	–
1608h	1st RxPDO Mapping of FSoE SubDevice										
	10	Mapping entry 10 (Virtual input 8)	UDINT	RO	No	No	0x5A000901	–	–	–	–
	11	Mapping entry 11 (Virtual input 9)	UDINT	RO	No	No	0x5A000A01	–	–	–	–
	12	Mapping entry 12 (Virtual input 10)	UDINT	RO	No	No	0x5A000B01	–	–	–	–
	13	Mapping entry 13 (Virtual input 11)	UDINT	RO	No	No	0x5A000C01	–	–	–	–
	14	Mapping entry 14 (Virtual input 12)	UDINT	RO	No	No	0x5A000D01	–	–	–	–
	15	Mapping entry 15 (Virtual input 13)	UDINT	RO	No	No	0x5A000E01	–	–	–	–
	16	Mapping entry 16 (Virtual input 14)	UDINT	RO	No	No	0x5A000F01	–	–	–	–
	17	Mapping entry 17 (Virtual input 15)	UDINT	RO	No	No	0x5A001001	–	–	–	–
	18	Mapping entry 18 (FSoE MainDevice CRC_0)	UDINT	RO	No	No	0xE7000310	–	–	–	–
	19	Mapping entry 19 (MPD 0)	UDINT	RO	No	No	0x5A040101	–	–	–	–

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Index	Subindex	Name	Data Type	Access	PDO Mapping	Saving to EEPROM	Default Value	Lower Limit	Upper Limit	Unit	Pc No.
1608h	1st RxPDO Mapping of FSoE SubDevice										
	20	Mapping entry 20 (MPD 1)	UDINT	RO	No	No	0x5A040201	–	–	–	–
	21	Mapping entry 21 (MPD 2)	UDINT	RO	No	No	0x5A040301	–	–	–	–
	22	Mapping entry 22 (MPD 3)	UDINT	RO	No	No	0x5A040401	–	–	–	–
	23	Mapping entry 23 (Padding)	UDINT	RO	No	No	0x00000003	–	–	–	–
	24	Mapping entry 24 (FSoE error ack)	UDINT	RO	No	No	0x5A090001	–	–	–	–
	25	Mapping entry 25 (Padding)	UDINT	RO	No	No	0x00000008	–	–	–	–
	26	Mapping entry 26 (FSoE MainDevice CRC_1)	UDINT	RO	No	No	0xE7000410	–	–	–	–
	27	Mapping entry 27 (FSoE MainDevice connection ID)	UDINT	RO	No	No	0xE7000210	–	–	–	–
1609h	2nd RxPDO Mapping of FSoE SubDevice										
	0	Number of entries	USINT	RO	No	No	23	–	–	–	–
	1	Mapping entry 1 (FSoE MainDevice command)	UDINT	RO	No	No	0xE7000108	–	–	–	–
	2	Mapping entry 2 (Virtual input 0)	UDINT	RO	No	No	0x5A000101	–	–	–	–
	3	Mapping entry 3 (Virtual input 1)	UDINT	RO	No	No	0x5A000201	–	–	–	–
	4	Mapping entry 4 (Virtual input 2)	UDINT	RO	No	No	0x5A000301	–	–	–	–
	5	Mapping entry 5 (Virtual input 3)	UDINT	RO	No	No	0x5A000401	–	–	–	–
	6	Mapping entry 6 (Virtual input 4)	UDINT	RO	No	No	0x5A000501	–	–	–	–
	7	Mapping entry 7 (Virtual input 5)	UDINT	RO	No	No	0x5A000601	–	–	–	–
	8	Mapping entry 8 (Virtual input 6)	UDINT	RO	No	No	0x5A000701	–	–	–	–
	9	Mapping entry 9 (Virtual input 7)	UDINT	RO	No	No	0x5A000801	–	–	–	–

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Index	Subin-dex	Name	Data Type	Acc-ess	PDO Map-ping	Saving to EEPRO-M	Default Value	Lower Limit	Upper Limit	Unit	Pc No.
1609h	2nd RxPDO Mapping of FSoE SubDevice										
	10	Mapping entry 10 (Virtual input 8)	UDINT	RO	No	No	0x5A000901	–	–	–	–
	11	Mapping entry 11 (Virtual input 9)	UDINT	RO	No	No	0x5A000A01	–	–	–	–
	12	Mapping entry 12 (Virtual input 10)	UDINT	RO	No	No	0x5A000B01	–	–	–	–
	13	Mapping entry 13 (Virtual input 11)	UDINT	RO	No	No	0x5A000C01	–	–	–	–
	14	Mapping entry 14 (Virtual input 12)	UDINT	RO	No	No	0x5A000D01	–	–	–	–
	15	Mapping entry 15 (Virtual input 13)	UDINT	RO	No	No	0x5A000E01	–	–	–	–
	16	Mapping entry 16 (Virtual input 14)	UDINT	RO	No	No	0x5A000F01	–	–	–	–
	17	Mapping entry 17 (Virtual input 15)	UDINT	RO	No	No	0x5A001001	–	–	–	–
	18	Mapping entry 18 (FSoE MainDevice CRC_0)	UDINT	RO	No	No	0xE7000310	–	–	–	–
	19	Mapping entry 19 (Padding)	UDINT	RO	No	No	0x00000007	–	–	–	–
1609h	2nd RxPDO Mapping of FSoE SubDevice										
	20	Mapping entry 20 (FSoE error ack)	UDINT	RO	No	No	0x5A040201	–	–	–	–
	21	Mapping entry 21 (Padding)	UDINT	RO	No	No	0x00000008	–	–	–	–
	22	Mapping entry 22 (FSoE MainDevice CRC_1)	UDINT	RO	No	No	0xE7000410	–	–	–	–
	23	Mapping entry 23 (FSoE MainDevice con-ncetion ID)	UDINT	RO	No	No	0xE7000210	–	–	–	–

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Index	Subin-dex	Name	Data Type	Acc-ess	PDO Map-ping	Saving to EEPRO-M	Default Value	Lower Limit	Upper Limit	Unit	Pc No.
1A08h	1st TxPDO Mapping of FSoE SubDevice										
	0	Number of entries	USINT	RO	No	No	57	–	–	–	–
	1	Mapping entry 1 (FSoE SubDevice command)	UDINT	RO	No	No	0xE6000108	–	–	–	–
	2	Mapping entry 2 (Virtual output 0)	UDINT	RO	No	No	0x5A010101	–	–	–	–
	3	Mapping entry 3 (Virtual output 1)	UDINT	RO	No	No	0x5A010201	–	–	–	–
	4	Mapping entry 4 (Virtual output 2)	UDINT	RO	No	No	0x5A010301	–	–	–	–
	5	Mapping entry 5 (Virtual output 3)	UDINT	RO	No	No	0x5A010401	–	–	–	–
	6	Mapping entry 6 (Virtual output 4)	UDINT	RO	No	No	0x5A010501	–	–	–	–
	7	Mapping entry 7 (Virtual output 5)	UDINT	RO	No	No	0x5A010601	–	–	–	–
	8	Mapping entry 8 (Virtual output 6)	UDINT	RO	No	No	0x5A010701	–	–	–	–
	9	Mapping entry 9 (Virtual output 7)	UDINT	RO	No	No	0x5A010801	–	–	–	–
1A08h	1st TxPDO Mapping of FSoE SubDevice										
	10	Mapping entry 10 (Virtual output 8)	UDINT	RO	No	No	0x5A010901	–	–	–	–
	11	Mapping entry 11 (Virtual output 9)	UDINT	RO	No	No	0x5A010A01	–	–	–	–
	12	Mapping entry 12 (Virtual output 10)	UDINT	RO	No	No	0x5A010B01	–	–	–	–
	13	Mapping entry 13 (Virtual output 11)	UDINT	RO	No	No	0x5A01C01	–	–	–	–
	14	Mapping entry 14 (Virtual output 12)	UDINT	RO	No	No	0x5A010D01	–	–	–	–
	15	Mapping entry 15 (Virtual output 13)	UDINT	RO	No	No	0x5A010E01	–	–	–	–
	16	Mapping entry 16 (Virtual output 14)	UDINT	RO	No	No	0x5A010F01	–	–	–	–
	17	Mapping entry 17 (Virtual output 15)	UDINT	RO	No	No	0x5A011001	–	–	–	–
	18	Mapping entry 18 (FSoE SubDevice CRC_0)	UDINT	RO	No	No	0xE6000310	–	–	–	–
	19	Mapping entry 19 (SF_1)	UDINT	RO	No	No	0x5A020101	–	–	–	–

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Index	Subin-dex	Name	Data Type	Acc-ess	PDO Map-ping	Saving to EEPRO-M	Default Value	Lower Limit	Upper Limit	Unit	Pc No.
1A08h	1st TxPDO Mapping of FSoE SubDevice										
	20	Mapping entry 20 (SF_2)	UDINT	RO	No	No	0x5A020201	–	–	–	–
	21	Mapping entry 21 (SF_3)	UDINT	RO	No	No	0x5A020301	–	–	–	–
	22	Mapping entry 22 (SF_4)	UDINT	RO	No	No	0x5A020401	–	–	–	–
	23	Mapping entry 23 (SF_5)	UDINT	RO	No	No	0x5A020501	–	–	–	–
	24	Mapping entry 24 (SF_6)	UDINT	RO	No	No	0x5A020601	–	–	–	–
	25	Mapping entry 25 (SF_7)	UDINT	RO	No	No	0x5A020701	–	–	–	–
	26	Mapping entry 26 (SF_8)	UDINT	RO	No	No	0x5A020801	–	–	–	–
	27	Mapping entry 27 (SF_9)	UDINT	RO	No	No	0x5A020901	–	–	–	–
	28	Mapping entry 28 (SF_10)	UDINT	RO	No	No	0x5A020A01	–	–	–	–
	29	Mapping entry 29 (DIA1)	UDINT	RO	No	No	0x5A030101	–	–	–	–
1A08h	1st TxPDO Mapping of FSoE SubDevice										
	30	Mapping entry 30 (DIB1)	UDINT	RO	No	No	0x5A030201	–	–	–	–
	31	Mapping entry 31 (DIC1)	UDINT	RO	No	No	0x5A030301	–	–	–	–
	32	Mapping entry 32 (DID1)	UDINT	RO	No	No	0x5A030401	–	–	–	–
	33	Mapping entry 33 (DIE1)	UDINT	RO	No	No	0x5A030501	–	–	–	–
	34	Mapping entry 34 (DIA2)	UDINT	RO	No	No	0x5A030601	–	–	–	–
	35	Mapping entry 35 (FSoE SubDevice CRC_1)	UDINT	RO	No	No	0xE6000410	–	–	–	–
	36	Mapping entry 36 (DIB2)	UDINT	RO	No	No	0x5A030701	–	–	–	–
	37	Mapping entry 37 (DIC2)	UDINT	RO	No	No	0x5A030801	–	–	–	–
	38	Mapping entry 38 (DID2)	UDINT	RO	No	No	0x5A030901	–	–	–	–
	39	Mapping entry 39 (DIE2)	UDINT	RO	No	No	0x5A030A01	–	–	–	–

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Index	Subindex	Name	Data Type	Access	PDO Mapping	Saving to EEPROM	Default Value	Lower Limit	Upper Limit	Unit	Pc No.
1A08h	1st TxPDO Mapping of FSoE SubDevice										
	40	Mapping entry 40 (MPA 0)	UDINT	RO	No	No	0x5A050101	–	–	–	–
	41	Mapping entry 41 (MPA 1)	UDINT	RO	No	No	0x5A050201	–	–	–	–
	42	Mapping entry 42 (MPA 2)	UDINT	RO	No	No	0x5A050301	–	–	–	–
	43	Mapping entry 43 (MPA 3)	UDINT	RO	No	No	0x5A050401	–	–	–	–
	44	Mapping entry 44 (Padding)	UDINT	RO	No	No	0x00000005	–	–	–	–
	45	Mapping entry 45 (STO status)	UDINT	RO	No	No	0x5A0D0001	–	–	–	–
	46	Mapping entry 46 (SHP status)	UDINT	RO	No	No	0x5A0B0A01	–	–	–	–
	47	Mapping entry 47 (FSoE error)	UDINT	RO	No	No	0x5A080001	–	–	–	–
	48	Mapping entry 48 (FSoE SubDevice CRC_2)	UDINT	RO	No	No	0xE6000510	–	–	–	–
	49	Mapping entry 49 (Multi monitor 1 actual value (1st word))	UDINT	RO	No	No	0x5A060110	–	–	–	–
1A08h	1st TxPDO Mapping of FSoE SubDevice										
	50	Mapping entry 50 (FSoE SubDevice CRC_3)	UDINT	RO	No	No	0xE6000610	–	–	–	–
	51	Mapping entry 51 (Multi monitor 1 actual value (2nd word))	UDINT	RO	No	No	0x5A060210	–	–	–	–
	52	Mapping entry 52 (FSoE SubDevice CRC_4)	UDINT	RO	No	No	0xE6000710	–	–	–	–
	53	Mapping entry 53 (Multi monitor 2 actual value (1st word))	UDINT	RO	No	No	0x5A070110	–	–	–	–
	54	Mapping entry 54 (FSoE SubDevice CRC_5)	UDINT	RO	No	No	0xE6000810	–	–	–	–
	55	Mapping entry 55 (Multi monitor 2 actual value (2nd word))	UDINT	RO	No	No	0x5A070210	–	–	–	–
	56	Mapping entry 56 (FSoE SubDevice CRC_6)	UDINT	RO	No	No	0xE6000910	–	–	–	–
	57	Mapping entry 57 (FSoE SubDevice connection ID)	UDINT	RO	No	No	0xE6000210	–	–	–	–

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Index	Subin-dex	Name	Data Type	Acc-ess	PDO Map-ping	Saving to EEPRO-M	Default Value	Lower Limit	Upper Limit	Unit	Pc No.
1A09h	2nd TxPDO Mapping of FSoE SubDevice										
	0	Number of entries	USINT	RO	No	No	34	–	–	–	–
	1	Mapping entry 1 (FSoE SubDevice command)	UDINT	RO	No	No	0xE6000108	–	–	–	–
	2	Mapping entry 2 (Virtual output 0)	UDINT	RO	No	No	0x5A010101	–	–	–	–
	3	Mapping entry 3 (Virtual output 1)	UDINT	RO	No	No	0x5A010201	–	–	–	–
	4	Mapping entry 4 (Virtual output 2)	UDINT	RO	No	No	0x5A010301	–	–	–	–
	5	Mapping entry 5 (Virtual output 3)	UDINT	RO	No	No	0x5A010401	–	–	–	–
	6	Mapping entry 6 (Virtual output 4)	UDINT	RO	No	No	0x5A010501	–	–	–	–
	7	Mapping entry 7 (Virtual output 5)	UDINT	RO	No	No	0x5A010601	–	–	–	–
	8	Mapping entry 8 (Virtual output 6)	UDINT	RO	No	No	0x5A010701	–	–	–	–
	9	Mapping entry 9 (Virtual output 7)	UDINT	RO	No	No	0x5A010801	–	–	–	–
1A09h	2nd TxPDO Mapping of FSoE SubDevice										
	10	Mapping entry 10 (Virtual output 8)	UDINT	RO	No	No	0x5A010901	–	–	–	–
	11	Mapping entry 11 (Virtual output 9)	UDINT	RO	No	No	0x5A010A01	–	–	–	–
	12	Mapping entry 12 (Virtual output 10)	UDINT	RO	No	No	0x5A010B01	–	–	–	–
	13	Mapping entry 13 (Virtual output 11)	UDINT	RO	No	No	0x5A010C01	–	–	–	–
	14	Mapping entry 14 (Virtual output 12)	UDINT	RO	No	No	0x5A010D01	–	–	–	–
	15	Mapping entry 15 (Virtual output 13)	UDINT	RO	No	No	0x5A010E01	–	–	–	–
	16	Mapping entry 16 (Virtual output 14)	UDINT	RO	No	No	0x5A010F01	–	–	–	–
	17	Mapping entry 17 (Virtual output 15)	UDINT	RO	No	No	0x5A011001	–	–	–	–
	18	Mapping entry 18 (FSoE SubDevice CRC_0)	UDINT	RO	No	No	0xE6000310	–	–	–	–
	19	Mapping entry 19 (SF_1)	UDINT	RO	No	No	0x5A020101	–	–	–	–

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Index	Subindex	Name	Data Type	Access	PDO Mapping	Saving to EEPROM	Default Value	Lower Limit	Upper Limit	Unit	Pc No.
1A09h	2nd TxPDO Mapping of FSoE SubDevice										
	20	Mapping entry 20 (SF_2)	UDINT	RO	No	No	0x5A020201	–	–	–	–
	21	Mapping entry 21 (SF_3)	UDINT	RO	No	No	0x5A020301	–	–	–	–
	22	Mapping entry 22 (SF_4)	UDINT	RO	No	No	0x5A020401	–	–	–	–
	23	Mapping entry 23 (SF_5)	UDINT	RO	No	No	0x5A020501	–	–	–	–
	24	Mapping entry 24 (SF_6)	UDINT	RO	No	No	0x5A020601	–	–	–	–
	25	Mapping entry 25 (SF_7)	UDINT	RO	No	No	0x5A020701	–	–	–	–
	26	Mapping entry 26 (SF_8)	UDINT	RO	No	No	0x5A020801	–	–	–	–
	27	Mapping entry 27 (SF_9)	UDINT	RO	No	No	0x5A020901	–	–	–	–
	28	Mapping entry 28 (SF_10)	UDINT	RO	No	No	0x5A020A01	–	–	–	–
	29	Mapping entry 29 (Padding)	UDINT	RO	No	No	0x00000003	–	–	–	–
1A09h	2nd TxPDO Mapping of FSoE SubDevice										
	30	Mapping entry 30 (STO status)	UDINT	RO	No	No	0x5A0D0001	–	–	–	–
	31	Mapping entry 31 (SHP status)	UDINT	RO	No	No	0x5A0B0A01	–	–	–	–
	32	Mapping entry 32 (FSoE error)	UDINT	RO	No	No	0x5A080001	–	–	–	–
	33	Mapping entry 33 (FSoE SubDevice CRC_1)	UDINT	RO	No	No	0xE6000410	–	–	–	–
	34	Mapping entry 34 (FSoE SubDevice connection ID)	UDINT	RO	No	No	0xE6000210	–	–	–	–

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Index	Subindex	Name	Data Type	Access	PDO Mapping	Saving to EEPROM	Default Value	Lower Limit	Upper Limit	Unit	Pc No.
E600h	FSoE SubDevice Frame Elements										
	0	Number of entries	USINT	RO	No	No	9	–	–	–	–
	1	FSoE SubDevice command	USINT	RO	SI (MainDevice input)	No	–	–	–	–	–
	2	FSoE SubDevice connection ID	UINT	RO	SI	No	–	–	–	–	–
	3	FSoE SubDevice CRC_0	UINT	RO	SI	No	–	–	–	–	–
	4	FSoE SubDevice CRC_1	UINT	RO	SI	No	–	–	–	–	–
	5	FSoE SubDevice CRC_2	UINT	RO	SI	No	–	–	–	–	–
	6	FSoE SubDevice CRC_3	UINT	RO	SI	No	–	–	–	–	–
	7	FSoE SubDevice CRC_4	UINT	RO	SI	No	–	–	–	–	–
	8	FSoE SubDevice CRC_5	UINT	RO	SI	No	–	–	–	–	–
	9	FSoE SubDevice CRC_6	UINT	RO	SI	No	–	–	–	–	–
E700h	FSoE MainDevice Frame Elements										
	0	Number of entries	USINT	RO	No	No	4	–	–	–	–
	1	FSoE MainDevice command	USINT	RO	SO (MainDevice output)	No	–	–	–	–	–
	2	FSoE MainDevice connection ID	UINT	RO	SO	No	–	–	–	–	–
	3	FSoE MainDevice CRC_0	UINT	RO	SO	No	–	–	–	–	–
	4	FSoE MainDevice CRC_1	UINT	RO	SO	No	–	–	–	–	–

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Index	Subindex	Name	Data Type	Access	PDO Mapping	Saving to EEPROM	Default Value	Lower Limit	Upper Limit	Unit	Pc No.
E900h	FSoE Info Data										
	0	Number of entries	USINT	RO	No	No	8	–	–	–	–
	1	FSoE module connection ID	UINT	RO	No	No	–	–	–	–	–
	2	FSoE module type	STRING (4)	RO	No	No	SGDXS-OSAA0A: 0x5AA0 SGDXS-OSAA1A: 0x5AA1	–	–	–	–
	3	FSoE module name	STRING (24)	RO	No	No	SGDXS-OSAA0A or SGDXS-OSAA1A	–	–	–	–
	4	FSoE module device type	UDINT	RO	No	No	0x000A0192	–	–	–	–
	5	FSoE module vendor ID	UDINT	RO	No	No	0x00000539	–	–	–	–
	6	FSoE module product code	UDINT	RO	No	No	1st SPDU: 0x02200A01, 2nd SPDU: 0x02200A02	–	–	–	–
	7	FSoE module revision number	UDINT	RO	No	No	–	–	–	–	–
	8	FSoE module serial number	UDINT	RO	No	No	0	–	–	–	–
E901h	FSoE Communication Parameter										
	0	Number of entries	USINT	RO	No	No	8	–	–	–	–
	1	FSoE version	STRING (2)	RO	No	No	01	–	–	–	–
	2	Safety address	UINT	RO	No	No	–	–	–	–	Pc120
	3	FSoE connection ID	UINT	RO	No	No	–	–	–	–	–
	4	Watchdog time	UINT	RO	No	No	–	–	–	–	–
	5	Reserved	OCTET-STRING(6)	RO	No	No	000000	–	–	–	–
	6	Connection type (SubDevice connection)	UINT	RO	No	No	0x0001	–	–	–	–
	7	Communication parameter length	UINT	RO	No	No	4	–	–	–	–
	8	Application parameter length	UINT	RO	No	No	0	–	–	–	–
EA00h	FSoE Connection Diagnosis										
	0	Number of entries	USINT	RO	No	No	2	–	–	–	–
	1	Connection state	UINT	RO	No	No	–	–	–	–	–
	2	Connection diagnosis	UINT	RO	No	No	–	–	–	–	–

11.2.3 List of Special ASM-X Objects

Index	Subindex	Name	Data Type	Access	PDO Mapping	Saving to EEPROM	Default Value	Lower Limit	Upper Limit	Unit	Pc No.
5800h	Safety Related Servo Parameters										
	0	Number of entries	USINT	RO	No	No	17	–	–	–	–
	1	Motor setting switch	UINT	RO	No	No	0x0000	0x0000	0x0011	–	Pc050
	2	Function setting switch	UINT	RO	No	No	0x0000	0x0000	0x0001	–	Pc051
	3	Reserved 1	UINT	RO	No	No	0x0000	0x0000	0x0000	–	Pc05A
	4	Reserved 2	UDINT	RO	No	No	0	0	0	–	Pc05C
	5	Encoder configuration setting 1	UINT	RO	No	No	26	0	32	–	Pc060
	6	Motor max. speed (motor encoder)	UINT	RO	No	No	0x0107	0x0000	0xFFFF	–	Pc062
	7	Reserved 3	UDINT	RO	No	No	0	0	16777216	fm	Pc063
	8	Reserved 4	UINT	RO	No	No	0x0000	0x0000	0xFFFF	–	Pc065
	9	Encoder pulse number	UDINT	RO	No	No	0	0	1073741824	pulses/rev	Pc066
	10	Primary encoder information	UINT	RO	No	No	0x0000	0x0000	0x2111	–	Pc068
	11	Primary encoder information 2	UINT	RO	No	No	0x0000	0x0000	0xFFFF	–	Pc069
	12	Multiturn limit	UINT	RO	No	No	65535	0	65535	1 rev	Pc06A
	13	Reserved 8	UINT	RO	No	No	0x0000	0x0000	0x1111	–	Pc06B
	14	Reserved 9	UINT	RO	No	No	0x0000	0x0000	0xFFFF	–	Pc06C
	15	Reserved 10	UDINT	RO	No	No	0	0	16777216	–	Pc06D
	16	Reserved 11	UINT	RO	No	No	0	0	0xFFFF	–	Pc06F
	17	Safe encoder configuration - safe address	UINT	RO	No	No	0x0000	0x0000	0x003F	–	Pc088
5801h	0	Safety Fieldbus - Station Address	UINT	RO	No	No	0x0001	0x0001	0xFFFF	–	Pc120
5802h	Encoder Deviation Diagnosis										
	0	Number of entries	USINT	RO	No	No	2	–	–	–	–
	1	Encoder deviation	UDINT	RO	No	No	0	0	4294967295	increments	Pc150
	2	Encoder deviation window	UINT	RO	No	No	0	0	65535	1 ms	Pc152
5803h	0	Home Position Offset	DINT	RO	No	No	0	-1073741823	1073741823	User position reference unit	Pc160
5804h	0	Limit Violation Deactivation Delay Time (LVDDT)	UINT	RO	No	No	0	0	10000	1 ms	Pc172
5805h	0	Safety Function Application Selection	UINT	RO	No	No	0x0000	0x0000	0x0011	–	Pc170

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Index	Subin-dex	Name	Data Type	Acc-ess	PDO Map-ping	Saving to EEPRO-M	Default Value	Lower Limit	Upper Limit	Unit	Pc No.
5806h	0	Acceleration Filter Time	UINT	RO	No	No	0	0	30	1 ms	Pc173
5808h	User Units										
	0	Number of entries	USINT	RO	No	No	12	–	–	–	–
	1	Numerator position user units encoder 1	UDINT	RO	No	No	1	1	1073741824	–	Pc180
	2	Denominator Position User Units Encoder 1	UDINT	RO	No	No	1	1	1073741824	–	Pc182
	3	Reserved 1	UDINT	RO	No	No	1	1	1073741824	–	Pc184
	4	Reserved 2	UDINT	RO	No	No	1	1	1073741824	–	Pc186
	5	Numerator speed user units encoder 1	UDINT	RO	No	No	1	1	1073741824	–	Pc188
	6	Denominator speed user units encoder 1	UDINT	RO	No	No	1	1	1073741824	–	Pc18A
	7	Reserved 3	UDINT	RO	No	No	1	1	1073741824	–	Pc18C
	8	Reserved 4	UDINT	RO	No	No	1	1	1073741824	–	Pc18E
	9	Numerator acceleration user units encoder 1	UDINT	RO	No	No	1	1	1073741824	–	Pc190
	10	Denominator accelera-tion user units encoder 1	UDINT	RO	No	No	1	1	1073741824	–	Pc192
	11	Reserved 5	UDINT	RO	No	No	1	1	1073741824	–	Pc194
	12	Reserved 6	UDINT	RO	No	No	1	1	1073741824	–	Pc196
5810h	Digital Input Port A										
	0	Number of entries	USINT	RO	No	No	3	–	–	–	–
	1	Configuration	UINT	RO	No	No	0x0000	0x0000	0x0001	–	Pc0C0
	2	Filtering time	UINT	RO	No	No	0	0	1000	1 ms	Pc0C1
	3	Discrepancy allowable time	UINT	RO	No	No	15	15	1000	1 ms	Pc0C2
5811h	Digital Input Port B										
	0	Number of entries	USINT	RO	No	No	3	–	–	–	–
	1	Configuration	UINT	RO	No	No	0x0000	0x0000	0x0001	–	Pc0C5
	2	Filtering time	UINT	RO	No	No	0	0	1000	1 ms	Pc0C6
	3	Discrepancy allowable time	UINT	RO	No	No	15	15	1000	1 ms	Pc0C7
5812h	Digital Input Port C										
	0	Number of entries	USINT	RO	No	No	3	–	–	–	–
	1	Configuration	UINT	RO	No	No	0x0000	0x0000	0x0001	–	Pc0CA
	2	Filtering time	UINT	RO	No	No	0	0	1000	1 ms	Pc0CB
	3	Discrepancy allowable time	UINT	RO	No	No	15	15	1000	1 ms	Pc0CC

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Index	Subin-dex	Name	Data Type	Acc-ess	PDO Map-ping	Saving to EEPRO-M	Default Value	Lower Limit	Upper Limit	Unit	Pc No.
5813h	Digital Input Port D										
	0	Number of entries	USINT	RO	No	No	3	–	–	–	–
	1	Configuration	UINT	RO	No	No	0x0000	0x0000	0x0001	–	Pc0CF
	2	Filtering time	UINT	RO	No	No	0	0	1000	1 ms	Pc0D0
	3	Discrepancy allowable time	UINT	RO	No	No	15	15	1000	1 ms	Pc0D1
5814h	Digital Input Port E										
	0	Number of entries	USINT	RO	No	No	3	–	–	–	–
	1	Configuration	UINT	RO	No	No	0x0000	0x0000	0x0001	–	Pc0D4
	2	Filtering time	UINT	RO	No	No	0	0	1000	1 ms	Pc0D5
	3	Discrepancy allowable time	UINT	RO	No	No	15	15	1000	1 ms	Pc0D6
5820h	Digital Output Port A										
	0	Number of entries	USINT	RO	No	No	4	–	–	–	–
	1	Configuration	UINT	RO	No	No	0x1100	0x0000	0x1141	–	Pc0E0
	2	Test pulse length	UINT	RO	No	No	1	1	50	1 ms	Pc0E1
	3	On delay time	UINT	RO	No	No	30	30	300	1 ms	Pc0E2
	4	Off delay time	UINT	RO	No	No	30	30	300	1 ms	Pc0E3
5821h	Digital Output Port B										
	0	Number of entries	USINT	RO	No	No	4	–	–	–	–
	1	Configuration	UINT	RO	No	No	0x1100	0x0000	0x1141	–	Pc0E6
	2	Test pulse length	UINT	RO	No	No	1	1	50	1 ms	Pc0E7
	3	On delay time	UINT	RO	No	No	30	30	300	1 ms	Pc0E8
	4	Off delay time	UINT	RO	No	No	30	30	300	1 ms	Pc0E9
5822h	Digital Output Port C										
	0	Number of entries	USINT	RO	No	No	4	–	–	–	–
	1	Configuration	UINT	RO	No	No	0x1100	0x0000	0x1141	–	Pc0EC
	2	Test pulse length	UINT	RO	No	No	1	1	50	1 ms	Pc0ED
	3	On delay time	UINT	RO	No	No	30	30	300	1 ms	Pc0EE
	4	Off delay time	UINT	RO	No	No	30	30	300	1 ms	Pc0EF
5823h	Digital Output Port D										
	0	Number of entries	USINT	RO	No	No	4	–	–	–	–
	1	Configuration	UINT	RO	No	No	0x1100	0x0000	0x1141	–	Pc0F2
	2	Test pulse length	UINT	RO	No	No	1	1	50	1 ms	Pc0F3
	3	On delay time	UINT	RO	No	No	30	30	300	1 ms	Pc0F4
	4	Off delay time	UINT	RO	No	No	30	30	300	1 ms	Pc0F5

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Index	Subindex	Name	Data Type	Access	PDO Mapping	Saving to EEPROM	Default Value	Lower Limit	Upper Limit	Unit	Pc No.
5824h	Digital Output Port E										
	0	Number of entries	USINT	RO	No	No	4	–	–	–	–
	1	Configuration	UINT	RO	No	No	0x1100	0x0000	0x1141	–	Pc0F8
	2	Test pulse length	UINT	RO	No	No	1	1	50	1 ms	Pc0F9
	3	On delay time	UINT	RO	No	No	30	30	300	1 ms	Pc0FA
	4	Off delay time	UINT	RO	No	No	30	30	300	1 ms	Pc0FB
58F0h	0	Safety Fieldbus Operation Selection	UINT	RO	No	No	0x0110	0x0000	0x0111	–	Pc121
58F1h	0	Selection for the Operations When VI Becomes Not Available	UINT	RO	No	No	0x0000	0x0000	0x0091	–	Pc122

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Index	Subin-dex	Name	Data Type	Acc-ess	PDO Map-ping	Saving to EEPRO-M	Default Value	Lower Limit	Upper Limit	Unit	Pc No.
5910h	Slot 1 Parameters										
	0	Number of entries	USINT	RO	No	No	12	–	–	–	–
	1	Configuration I	UINT	RO	No	No	0x0000	0x0000	0x0013	–	Pc300
	2	Configuration II	UINT	RO	No	No	0x0000	0x0000	0x3939	–	Pc301
	3	Configuration III	UINT	RO	No	No	0x0000	0x0000	0x042F	–	Pc302
	4	Configuration IV	UINT	RO	No	No	0x0000	0x0000	0x002F	–	Pc303
	5	Waiting time (t1)	UINT	RO	No	No	0	0	10000	10 ms	Pc310
	6	Monitoring time (t2)	UINT	RO	No	No	0	0	10000	10 ms	Pc311
	7	Speed limit (s1)	UDINT	RO	No	No	0	0	4294967295	User speed refer-ence unit	Pc312
	8	Speed limit (s2)	UDINT	RO	No	No	0	0	4294967295	User speed refer-ence unit	Pc314
	9	Acceleration limit (a1)	DINT	RO	No	No	0	-2147483648	2147483647	User acce-lera-tion refer-ence unit	Pc316
	10	Distance limit (p1)	DINT	RO	No	No	0	-2147483648	2147483647	User posi-tion refer-ence unit	Pc318
	11	Distance limit (p2)	DINT	RO	No	No	0	-2147483648	2147483647	User posi-tion refer-ence unit	Pc31A
	12	Distance limit (p3)	UDINT	RO	No	No	0	0	4294967295	User posi-tion refer-ence unit	Pc31C

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Index	Subin-dex	Name	Data Type	Acc-ess	PDO Map-ping	Saving to EEPRO-M	Default Value	Lower Limit	Upper Limit	Unit	Pc No.
5911h	Slot 2 Parameters										
	0	Number of entries	USINT	RO	No	No	12	–	–	–	–
	1	Configuration I	UINT	RO	No	No	0x0000	0x0000	0x0013	–	Pc340
	2	Configuration II	UINT	RO	No	No	0x0000	0x0000	0x3939	–	Pc341
	3	Configuration III	UINT	RO	No	No	0x0000	0x0000	0x042F	–	Pc342
	4	Configuration IV	UINT	RO	No	No	0x0000	0x0000	0x002F	–	Pc343
	5	Waiting time (t1)	UINT	RO	No	No	0	0	10000	10 ms	Pc350
	6	Monitoring time (t2)	UINT	RO	No	No	0	0	10000	10 ms	Pc351
	7	Speed limit (s1)	UDINT	RO	No	No	0	0	4294967295	User speed refer-ence unit	Pc352
	8	Speed limit (s2)	UDINT	RO	No	No	0	0	4294967295	User speed refer-ence unit	Pc354
	9	Acceleration limit (a1)	DINT	RO	No	No	0	-2147483648	2147483647	User acce-lera-tion refer-ence unit	Pc356
	10	Distance limit (p1)	DINT	RO	No	No	0	-2147483648	2147483647	User posi-tion refer-ence unit	Pc358
	11	Distance limit (p2)	DINT	RO	No	No	0	-2147483648	2147483647	User posi-tion refer-ence unit	Pc35A
	12	Distance limit (p3)	UDINT	RO	No	No	0	0	4294967295	User posi-tion refer-ence unit	Pc35C

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Index	Subin-dex	Name	Data Type	Acc-ess	PDO Map-ping	Saving to EEPRO-M	Default Value	Lower Limit	Upper Limit	Unit	Pc No.
5912h	Slot 3 Parameters										
	0	Number of entries	USINT	RO	No	No	12	–	–	–	–
	1	Configuration I	UINT	RO	No	No	0x0000	0x0000	0x0013	–	Pc380
	2	Configuration II	UINT	RO	No	No	0x0000	0x0000	0x3939	–	Pc381
	3	Configuration III	UINT	RO	No	No	0x0000	0x0000	0x042F	–	Pc382
	4	Configuration IV	UINT	RO	No	No	0x0000	0x0000	0x002F	–	Pc383
	5	Waiting time (t1)	UINT	RO	No	No	0	0	10000	10 ms	Pc390
	6	Monitoring time (t2)	UINT	RO	No	No	0	0	10000	10 ms	Pc391
	7	Speed limit (s1)	UDINT	RO	No	No	0	0	4294967295	User speed refer-ence unit	Pc392
	8	Speed limit (s2)	UDINT	RO	No	No	0	0	4294967295	User speed refer-ence unit	Pc394
	9	Acceleration limit (a1)	DINT	RO	No	No	0	-2147483648	2147483647	User acce-lera-tion refer-ence unit	Pc396
	10	Distance limit (p1)	DINT	RO	No	No	0	-2147483648	2147483647	User posi-tion refer-ence unit	Pc398
	11	Distance limit (p2)	DINT	RO	No	No	0	-2147483648	2147483647	User posi-tion refer-ence unit	Pc39A
	12	Distance limit (p3)	UDINT	RO	No	No	0	0	4294967295	User posi-tion refer-ence unit	Pc39C

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Index	Subin-dex	Name	Data Type	Acc-ess	PDO Map-ping	Saving to EEPRO-M	Default Value	Lower Limit	Upper Limit	Unit	Pc No.
5913h	Slot 4 Parameters										
	0	Number of entries	USINT	RO	No	No	12	–	–	–	–
	1	Configuration I	UINT	RO	No	No	0x0000	0x0000	0x0013	–	Pc3C0
	2	Configuration II	UINT	RO	No	No	0x0000	0x0000	0x3939	–	Pc3C1
	3	Configuration III	UINT	RO	No	No	0x0000	0x0000	0x042F	–	Pc3C2
	4	Configuration IV	UINT	RO	No	No	0x0000	0x0000	0x002F	–	Pc3C3
	5	Waiting time (t1)	UINT	RO	No	No	0	0	10000	10 ms	Pc3D0
	6	Monitoring time (t2)	UINT	RO	No	No	0	0	10000	10 ms	Pc3D1
	7	Speed limit (s1)	UDINT	RO	No	No	0	0	4294967295	User speed refer-ence unit	Pc3D2
	8	Speed limit (s2)	UDINT	RO	No	No	0	0	4294967295	User speed refer-ence unit	Pc3D4
	9	Acceleration limit (a1)	DINT	RO	No	No	0	-2147483648	2147483647	User acce-lera-tion refer-ence unit	Pc3D6
	10	Distance limit (p1)	DINT	RO	No	No	0	-2147483648	2147483647	User posi-tion refer-ence unit	Pc3D8
	11	Distance limit (p2)	DINT	RO	No	No	0	-2147483648	2147483647	User posi-tion refer-ence unit	Pc3DA
	12	Distance limit (p3)	UDINT	RO	No	No	0	0	4294967295	User posi-tion refer-ence unit	Pc3DC

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Index	Subin-dex	Name	Data Type	Acc-ess	PDO Map-ping	Saving to EEPRO-M	Default Value	Lower Limit	Upper Limit	Unit	Pc No.
5914h	Slot 5 Parameters										
	0	Number of entries	USINT	RO	No	No	12	–	–	–	–
	1	Configuration I	UINT	RO	No	No	0x0000	0x0000	0x0013	–	Pc400
	2	Configuration II	UINT	RO	No	No	0x0000	0x0000	0x3939	–	Pc401
	3	Configuration III	UINT	RO	No	No	0x0000	0x0000	0x042F	–	Pc402
	4	Configuration IV	UINT	RO	No	No	0x0000	0x0000	0x002F	–	Pc403
	5	Waiting time (t1)	UINT	RO	No	No	0	0	10000	10 ms	Pc410
	6	Monitoring time (t2)	UINT	RO	No	No	0	0	10000	10 ms	Pc411
	7	Speed limit (s1)	UDINT	RO	No	No	0	0	4294967295	User speed refer-ence unit	Pc412
	8	Speed limit (s2)	UDINT	RO	No	No	0	0	4294967295	User speed refer-ence unit	Pc414
	9	Acceleration limit (a1)	DINT	RO	No	No	0	-2147483648	2147483647	User acce-lera-tion refer-ence unit	Pc416
	10	Distance limit (p1)	DINT	RO	No	No	0	-2147483648	2147483647	User posi-tion refer-ence unit	Pc418
	11	Distance limit (p2)	DINT	RO	No	No	0	-2147483648	2147483647	User posi-tion refer-ence unit	Pc41A
	12	Distance limit (p3)	UDINT	RO	No	No	0	0	4294967295	User posi-tion refer-ence unit	Pc41C

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Index	Subin-dex	Name	Data Type	Acc-ess	PDO Map-ping	Saving to EEPRO-M	Default Value	Lower Limit	Upper Limit	Unit	Pc No.
5915h	Slot 6 Parameters										
	0	Number of entries	USINT	RO	No	No	12	–	–	–	–
	1	Configuration I	UINT	RO	No	No	0x0000	0x0000	0x0013	–	Pc440
	2	Configuration II	UINT	RO	No	No	0x0000	0x0000	0x3939	–	Pc441
	3	Configuration III	UINT	RO	No	No	0x0000	0x0000	0x042F	–	Pc442
	4	Configuration IV	UINT	RO	No	No	0x0000	0x0000	0x002F	–	Pc443
	5	Waiting time (t1)	UINT	RO	No	No	0	0	10000	10 ms	Pc450
	6	Monitoring time (t2)	UINT	RO	No	No	0	0	10000	10 ms	Pc451
	7	Speed limit (s1)	UDINT	RO	No	No	0	0	4294967295	User speed refer-ence unit	Pc452
	8	Speed limit (s2)	UDINT	RO	No	No	0	0	4294967295	User speed refer-ence unit	Pc454
	9	Acceleration limit (a1)	DINT	RO	No	No	0	-2147483648	2147483647	User acce-lera-tion refer-ence unit	Pc456
	10	Distance limit (p1)	DINT	RO	No	No	0	-2147483648	2147483647	User posi-tion refer-ence unit	Pc458
	11	Distance limit (p2)	DINT	RO	No	No	0	-2147483648	2147483647	User posi-tion refer-ence unit	Pc45A
	12	Distance limit (p3)	UDINT	RO	No	No	0	0	4294967295	User posi-tion refer-ence unit	Pc45C

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Index	Subin-dex	Name	Data Type	Acc-ess	PDO Map-ping	Saving to EEPRO-M	Default Value	Lower Limit	Upper Limit	Unit	Pc No.
5916h	Slot 7 Parameters										
	0	Number of entries	USINT	RO	No	No	12	–	–	–	–
	1	Configuration I	UINT	RO	No	No	0x0000	0x0000	0x0013	–	Pc480
	2	Configuration II	UINT	RO	No	No	0x0000	0x0000	0x3939	–	Pc481
	3	Configuration III	UINT	RO	No	No	0x0000	0x0000	0x042F	–	Pc482
	4	Configuration IV	UINT	RO	No	No	0x0000	0x0000	0x002F	–	Pc483
	5	Waiting time (t1)	UINT	RO	No	No	0	0	10000	10 ms	Pc490
	6	Monitoring time (t2)	UINT	RO	No	No	0	0	10000	10 ms	Pc491
	7	Speed limit (s1)	UDINT	RO	No	No	0	0	4294967295	User speed refer-ence unit	Pc492
	8	Speed limit (s2)	UDINT	RO	No	No	0	0	4294967295	User speed refer-ence unit	Pc494
	9	Acceleration limit (a1)	DINT	RO	No	No	0	-2147483648	2147483647	User acce-lera-tion refer-ence unit	Pc496
	10	Distance limit (p1)	DINT	RO	No	No	0	-2147483648	2147483647	User posi-tion refer-ence unit	Pc498
	11	Distance limit (p2)	DINT	RO	No	No	0	-2147483648	2147483647	User posi-tion refer-ence unit	Pc49A
	12	Distance limit (p3)	UDINT	RO	No	No	0	0	4294967295	User posi-tion refer-ence unit	Pc49C

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Index	Subin-dex	Name	Data Type	Acc-ess	PDO Map-ping	Saving to EEPRO-M	Default Value	Lower Limit	Upper Limit	Unit	Pc No.
5917h	Slot 8 Parameters										
	0	Number of entries	USINT	RO	No	No	12	–	–	–	–
	1	Configuration I	UINT	RO	No	No	0x0000	0x0000	0x0013	–	Pc4C0
	2	Configuration II	UINT	RO	No	No	0x0000	0x0000	0x3939	–	Pc4C1
	3	Configuration III	UINT	RO	No	No	0x0000	0x0000	0x042F	–	Pc4C2
	4	Configuration V	UINT	RO	No	No	0x0000	0x0000	0x002F	–	Pc4C3
	5	Waiting time (t1)	UINT	RO	No	No	0	0	10000	10 ms	Pc4D0
	6	Monitoring time (t2)	UINT	RO	No	No	0	0	10000	10 ms	Pc4D1
	7	Speed limit (s1)	UDINT	RO	No	No	0	0	4294967295	User speed refer-ence unit	Pc4D2
	8	Speed limit (s2)	UDINT	RO	No	No	0	0	4294967295	User speed refer-ence unit	Pc4D4
	9	Acceleration limit (a1)	DINT	RO	No	No	0	-2147483648	2147483647	User acce-lera-tion refer-ence unit	Pc4D6
	10	Distance limit (p1)	DINT	RO	No	No	0	-2147483648	2147483647	User posi-tion refer-ence unit	Pc4D8
	11	Distance limit (p2)	DINT	RO	No	No	0	-2147483648	2147483647	User posi-tion refer-ence unit	Pc4DA
	12	Distance limit (p3)	UDINT	RO	No	No	0	0	4294967295	User posi-tion refer-ence unit	Pc4DC

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Index	Subin-dex	Name	Data Type	Acc-ess	PDO Map-ping	Saving to EEPRO-M	Default Value	Lower Limit	Upper Limit	Unit	Pc No.
5918h	Slot 9 Parameters										
	0	Number of entries	USINT	RO	No	No	12	–	–	–	–
	1	Configuration I	UINT	RO	No	No	0x0000	0x0000	0x0013	–	Pc500
	2	Configuration II	UINT	RO	No	No	0x0000	0x0000	0x3939	–	Pc501
	3	Configuration III	UINT	RO	No	No	0x0000	0x0000	0x042F	–	Pc502
	4	Configuration IV	UINT	RO	No	No	0x0000	0x0000	0x002F	–	Pc503
	5	Waiting time (t1)	UINT	RO	No	No	0	0	10000	10 ms	Pc510
	6	Monitoring time (t2)	UINT	RO	No	No	0	0	10000	10 ms	Pc511
	7	Speed limit (s1)	UDINT	RO	No	No	0	0	4294967295	User speed refer-ence unit	Pc512
	8	Speed limit (s2)	UDINT	RO	No	No	0	0	4294967295	User speed refer-ence unit	Pc514
	9	Acceleration limit (a1)	DINT	RO	No	No	0	-2147483648	2147483647	User acce-lera-tion refer-ence unit	Pc516
	10	Distance limit (p1)	DINT	RO	No	No	0	-2147483648	2147483647	User posi-tion refer-ence unit	Pc518
	11	Distance limit (p2)	DINT	RO	No	No	0	-2147483648	2147483647	User posi-tion refer-ence unit	Pc51A
	12	Distance limit (p3)	UDINT	RO	No	No	0	0	4294967295	User posi-tion refer-ence unit	Pc51C

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Index	Subin-dex	Name	Data Type	Acc-ess	PDO Map-ping	Saving to EEPRO-M	Default Value	Lower Limit	Upper Limit	Unit	Pc No.
5919h	Slot 10 Parameters										
	0	Number of entries	USINT	RO	No	No	7	–	–	–	–
	1	Configuration I	UINT	RO	No	No	0x0000	0x0000	0x0011	–	Pc540
	2	Configuration II	UINT	RO	No	No	0x0000	0x0000	0x0614	–	Pc541
	3	Configuration III	UINT	RO	No	No	0x0000	0x0000	0x042F	–	Pc542
	4	Brake holding delay time (Tw_bkh)	UINT	RO	No	No	0	0	10000	1 ms	Pc550
	5	Brake releasing delay time (Tw_bkr)	UINT	RO	No	No	0	0	10000	1 ms	Pc551
	6	Allowable time for feed-back signal unmatched when brake becomes holding (Td_bkh)	UINT	RO	No	No	30	0	300	1 ms	Pc552
	7	Allowable time for feed-back signal unmatched when brake becomes releasing (Td_bkr)	UINT	RO	No	No	30	0	300	1 ms	Pc553
5A00h	Virtual Input Demand Value										
	0	Number of entries	USINT	RO	No	No	16	–	–	–	–
	1	Virtual input 0	BOOL	RO	SO (Main-Device output)	No	–	–	–	–	–
	2	Virtual input 1	BOOL	RO	SO	No	–	–	–	–	–
	3	Virtual input 2	BOOL	RO	SO	No	–	–	–	–	–
	4	Virtual input 3	BOOL	RO	SO	No	–	–	–	–	–
	5	Virtual input 4	BOOL	RO	SO	No	–	–	–	–	–
	6	Virtual input 5	BOOL	RO	SO	No	–	–	–	–	–
	7	Virtual input 6	BOOL	RO	SO	No	–	–	–	–	–
	8	Virtual input 7	BOOL	RO	SO	No	–	–	–	–	–
	9	Virtual input 8	BOOL	RO	SO	No	–	–	–	–	–
	10	Virtual input 9	BOOL	RO	SO	No	–	–	–	–	–
	11	Virtual input 10	BOOL	RO	SO	No	–	–	–	–	–
	12	Virtual input 11	BOOL	RO	SO	No	–	–	–	–	–
	13	Virtual input 12	BOOL	RO	SO	No	–	–	–	–	–
	14	Virtual input 13	BOOL	RO	SO	No	–	–	–	–	–
	15	Virtual input 14	BOOL	RO	SO	No	–	–	–	–	–
	16	Virtual input 15	BOOL	RO	SO	No	–	–	–	–	–

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Index	Subin-dex	Name	Data Type	Acc-ess	PDO Map-ping	Saving to EEPRO-M	Default Value	Lower Limit	Upper Limit	Unit	Pc No.
5A01h	Virtual Output Actual Value										
	0	Number of entries	USINT	RO	No	No	16	–	–	–	–
	1	Virtual output 0	BOOL	RO	SI (Main-Device input)	No	–	–	–	–	–
	2	Virtual output 1	BOOL	RO	SI	No	–	–	–	–	–
	3	Virtual output 2	BOOL	RO	SI	No	–	–	–	–	–
	4	Virtual output 3	BOOL	RO	SI	No	–	–	–	–	–
	5	Virtual output 4	BOOL	RO	SI	No	–	–	–	–	–
	6	Virtual output 5	BOOL	RO	SI	No	–	–	–	–	–
	7	Virtual output 6	BOOL	RO	SI	No	–	–	–	–	–
	8	Virtual output 7	BOOL	RO	SI	No	–	–	–	–	–
	9	Virtual output 8	BOOL	RO	SI	No	–	–	–	–	–
	10	Virtual output 9	BOOL	RO	SI	No	–	–	–	–	–
	11	Virtual output 10	BOOL	RO	SI	No	–	–	–	–	–
	12	Virtual output 11	BOOL	RO	SI	No	–	–	–	–	–
	13	Virtual output 12	BOOL	RO	SI	No	–	–	–	–	–
	14	Virtual output 13	BOOL	RO	SI	No	–	–	–	–	–
	15	Virtual output 14	BOOL	RO	SI	No	–	–	–	–	–
	16	Virtual output 15	BOOL	RO	SI	No	–	–	–	–	–
5A02h	Safety Slot Status Actual Value										
	0	Number of entries	USINT	RO	No	No	10	–	–	–	–
	1	SF_1	BOOL	RO	SI (Main-Device input)	No	–	–	–	–	–
	2	SF_2	BOOL	RO	SI	No	–	–	–	–	–
	3	SF_3	BOOL	RO	SI	No	–	–	–	–	–
	4	SF_4	BOOL	RO	SI	No	–	–	–	–	–
	5	SF_5	BOOL	RO	SI	No	–	–	–	–	–
	6	SF_6	BOOL	RO	SI	No	–	–	–	–	–
	7	SF_7	BOOL	RO	SI	No	–	–	–	–	–
	8	SF_8	BOOL	RO	SI	No	–	–	–	–	–
	9	SF_9	BOOL	RO	SI	No	–	–	–	–	–
	10	SF_10	BOOL	RO	SI	No	–	–	–	–	–

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Index	Subin-dex	Name	Data Type	Acc-ess	PDO Map-ping	Saving to EEPRO-M	Default Value	Lower Limit	Upper Limit	Unit	Pc No.
5A03h	I/O Terminal Actual Value										
	0	Number of entries	USINT	RO	No	No	20	–	–	–	–
	1	DIA1	BOOL	RO	SI (Main-Device input)	No	–	–	–	–	–
	2	DIB1	BOOL	RO	SI	No	–	–	–	–	–
	3	DIC1	BOOL	RO	SI	No	–	–	–	–	–
	4	DID1	BOOL	RO	SI	No	–	–	–	–	–
	5	DIE1	BOOL	RO	SI	No	–	–	–	–	–
	6	DIA2	BOOL	RO	SI	No	–	–	–	–	–
	7	DIB2	BOOL	RO	SI	No	–	–	–	–	–
	8	DIC2	BOOL	RO	SI	No	–	–	–	–	–
	9	DID2	BOOL	RO	SI	No	–	–	–	–	–
	10	DIE2	BOOL	RO	SI	No	–	–	–	–	–
	11	DOA1	BOOL	RO	No	No	–	–	–	–	–
	12	DOB1	BOOL	RO	No	No	–	–	–	–	–
	13	DOC1	BOOL	RO	No	No	–	–	–	–	–
	14	DOD1	BOOL	RO	No	No	–	–	–	–	–
	15	DOE1	BOOL	RO	No	No	–	–	–	–	–
	16	DOA2	BOOL	RO	No	No	–	–	–	–	–
	17	DOB2	BOOL	RO	No	No	–	–	–	–	–
	18	DOC2	BOOL	RO	No	No	–	–	–	–	–
	19	DOD2	BOOL	RO	No	No	–	–	–	–	–
	20	DOE2	BOOL	RO	No	No	–	–	–	–	–
5A04h	Multi Monitor Select Demand Value (MPD)										
	0	Number of entries	USINT	RO	No	No	4	–	–	–	–
	1	MPD 0	BOOL	RO	SO (Main-Device output)	No	–	–	–	–	–
	2	MPD 1	BOOL	RO	SO	No	–	–	–	–	–
	3	MPD 2	BOOL	RO	SO	No	–	–	–	–	–
	4	MPD 3	BOOL	RO	SO	No	–	–	–	–	–
5A05h	Multi Monitor Select Actual Value (MPD)										
	0	Number of entries	USINT	RO	No	No	4	–	–	–	–
	1	MPA 0	BOOL	RO	SI (Main-Device input)	No	–	–	–	–	–
	2	MPA 1	BOOL	RO	SI	No	–	–	–	–	–
	3	MPA 2	BOOL	RO	SI	No	–	–	–	–	–
	4	MPA 3	BOOL	RO	SI	No	–	–	–	–	–

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Index	Subin-dex	Name	Data Type	Acc-ess	PDO Map-ping	Saving to EEPRO-M	Default Value	Lower Limit	Upper Limit	Unit	Pc No.
5A06h	Multi Monitor 1 Actual Value										
	0	Number of entries	USINT	RO	No	No	2	–	–	–	–
	1	Multi monitor 1 actual value (1st word)	UINT	RO	SI (Main-Device input)	No	–	–	–	–	–
	2	Multi monitor 1 actual value (2nd word)	UINT	RO	SI	No	–	–	–	–	–
5A07h	Multi Monitor 2 Actual Value										
	0	Number of entries	USINT	RO	No	No	2	–	–	–	–
	1	Multi monitor 2 actual value (1st word)	UINT	RO	SI (Main-Device input)	No	–	–	–	–	–
	2	Multi monitor 2 actual value (2nd word)	UINT	RO	SI	No	–	–	–	–	–
5A08h	0	FSoE Error	BOOL	RO	SI (Main-Device input)	No	–	–	–	–	–
5A09h	0	FSoE Error Ack	BOOL	RO	SO (Main-Device output)	No	–	–	–	–	–
5A0Ah	Safety Slot Actual Value 1										
	0	Number of entries	USINT	RO	No	No	6	–	–	–	–
	1	Selected slot number	UINT	RO	No	No	–	–	–	–	–
	2	Actual position limit 1	DINT	RO	No	No	–	–	–	User posi-tion refer-ence unit	–
	3	Actual position limit 2	DINT	RO	No	No	–	–	–	User posi-tion refer-ence unit	–
	4	Actual speed limit 1	DINT	RO	No	No	–	–	–	User speed refer-ence unit	–
	5	Actual speed limit 2	DINT	RO	No	No	–	–	–	User speed refer-ence unit	–
	6	Actual acceleration limit	DINT	RO	No	No	–	–	–	User accele-ration refer-ence unit	–

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Index	Subindex	Name	Data Type	Access	PDO Mapping	Saving to EEPROM	Default Value	Lower Limit	Upper Limit	Unit	Pc No.
5A0Bh	Safety Slot Actual Value 2										
	0	Number of entries	USINT	RO	No	No	11	–	–	–	–
	1	Safety function status for slot 1 to 8	UDINT	RO	No	No	–	–	–	–	–
	2	Safety function status for slot 9 to 10	UDINT	RO	No	No	–	–	–	–	–
	3	Actual position (monitoring)	DINT	RO	No	No	–	–	–	User position reference unit	–
	4	Actual position	DINT	RO	No	No	–	–	–	User position reference unit	–
	5	Actual speed	DINT	RO	No	No	–	–	–	User speed reference unit	–
	6	Actual acceleration	DINT	RO	No	No	–	–	–	User speed reference unit	–
	7	Reserved 1	INT	RO	No	No	–	–	–	–	–
	8	Reserved 2	INT	RO	No	No	–	–	–	–	–
	9	Actual position encoder 2	DINT	RO	No	No	–	–	–	User position reference unit	–
	10	SHP status	BOOL	RO	SI (Main-Device input)	No	–	–	–	–	–
	11	SHP encoder position	DINT	RO	No	No	–	–	–	User position reference unit	–
5A0Dh	0	STO Status	BOOL	RO	SO (Main-Device output)	No	–	–	–	–	–

11.3 Parameters Version

11.3.1 Viewing the Parameters Version

The parameters version is displayed on the [Read Product Information] window.

Refer to the following manual for the operating procedures for the SigmaWin+.

☞ *8.1.2 Operating Procedure on page 274*

11.3.2 Relationship between Parameters Version and Software Version

Parameters Version	Software Version
0100	0001
0200	0002
0300	0003

11.3.3 Parameters Revision History

Parameters Version	Revised Contents	Reference
0100	–	–
0200	• Addition: Pc121 = n.□X□□ • Revision: Default setting of Pc121 Before revision: 0010h After revision: 0110h	☞ *7.4.2 Safety Request Input Signal (SRIS) on page 142*
0300	• Revision: Settings of parameters related to the normal encoder • Addition: Setting of Pc121 = n.□□X□ • Revision: Default setting of Pc121 Before revision: 0110h After revision: 0130h • Addition: Pc122 and Pc173 • Revision: Settings of parameters related to the SLP, SLI, SDI-p, SDI-n, SCA, and SHP functions	–

11.4 Parameter Recording Table

Use the following table to record the settings of the parameters.

11.4.1 Safety-Related Servo Parameters

Pc No.	Default Setting						Name	When Enabled
Pc050	0000h						Motor Setting Switch	After restart
Pc051	0000h						Function Selection	After restart
Pc060	26						Encoder Data Configuration Setting 1	After restart
Pc062	0107h						Maximum Motor Speed	After restart
Pc066	0						Number of Encoder Pulses	After restart
Pc068	0100h						First Encoder Information	After restart
Pc069	0000h						Encoder Data Configuration Setting 5	After restart
Pc06A	65535						Multiturn Limit	After restart
Pc088	0001h						Safety Encoder - Safe address	After restart

11.4.2 Safety-Related Module Parameters: FSoE Communications References Model

Pc No.	Default Setting						Name	When Enabled
Pc120	0001h						Safety Fieldbus - station address	After restart
Pc121	0130h						Safety Fieldbus - operation selection	After restart
Pc122	0000h						Operation When Safety Fieldbus Virtual Input Not Usable	After restart
Pc150	16384						Encoder Deviation	After restart
Pc152	0						Encoder Deviation Window	After restart
Pc160	0						Safe Home Position Offset	After restart
Pc170	0000h						Safety Function Application Selection	After restart
Pc172	0						Limit Violation Deactivation Delay Time (LVDDT)	After restart
Pc173	0						Acceleration Filter Time	After restart
Pc180	1						Safety Module: User Position Reference Unit (Numerator)	After restart
Pc182	1						Safety Module: User Position Reference Unit (Denominator)	After restart
Pc188	1						Safety Module: User Speed Reference Unit (Numerator)	After restart
Pc18A	1						Safety Module: User Speed Reference Unit (Denominator)	After restart
Pc190	1						Safety Module: User Acceleration Ref. Unit (Numerator)	After restart
Pc192	1						Safety Module: User Acceleration Ref. Unit (Denominator)	After restart

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Pc No.	Default Setting						Name	When Enabled
Pc300	0000h						Slot 1 - Safety Function Configuration I	After restart
Pc301	0000h						Slot 1 - Safety Function Configuration II	After restart
Pc302	0000h						Slot 1 - Safety Function Configuration III	After restart
Pc303	0000h						Slot 1 - Safety Function Configuration IV	After restart
Pc310	0						Slot 1 - Waiting Time (t1)	After restart
Pc311	0						Slot 1 - Monitoring Time (t2)	After restart
Pc312	0						Slot 1 - Speed Limit (s1)	After restart
Pc314	0						Slot 1 - Speed Limit (s2)	After restart
Pc316	0						Slot 1 - Acceleration Limit (a1)	After restart
Pc318	0						Slot 1 - Distance Limit (p1)	After restart
Pc31A	0						Slot 1 - Distance Limit (p2)	After restart
Pc31C	0						Slot 1 - Distance Limit (p3)	After restart
Pc340	0000h						Slot 2 - Safety Function Configuration I	After restart
Pc341	0000h						Slot 2 - Safety Function Configuration II	After restart
Pc342	0000h						Slot 2 - Safety Function Configuration III	After restart
Pc343	0000h						Slot 2 - Safety Function Configuration IV	After restart
Pc350	0						Slot 2 - Waiting Time (t1)	After restart
Pc351	0						Slot 2 - Monitoring Time (t2)	After restart
Pc352	0						Slot 2 - Speed Limit (s1)	After restart
Pc354	0						Slot 2 - Speed Limit (s2)	After restart
Pc356	0						Slot 2 - Acceleration Limit (a1)	After restart
Pc358	0						Slot 2 - Distance Limit (p1)	After restart
Pc35A	0						Slot 2 - Distance Limit (p2)	After restart
Pc35C	0						Slot 2 - Distance Limit (p3)	After restart
Pc380	0000h						Slot 3 - Safety Function Configuration I	After restart
Pc381	0000h						Slot 3 - Safety Function Configuration II	After restart
Pc382	0000h						Slot 3 - Safety Function Configuration III	After restart
Pc383	0000h						Slot 3 - Safety Function Configuration IV	After restart
Pc390	0						Slot 3 - Waiting Time (t1)	After restart
Pc391	0						Slot 3 - Monitoring Time (t2)	After restart
Pc392	0						Slot 3 - Speed Limit (s1)	After restart
Pc394	0						Slot 3 - Speed Limit (s2)	After restart
Pc396	0						Slot 3 - Acceleration Limit (a1)	After restart

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Pc No.	Default Setting						Name	When Enabled
Pc398	0						Slot 3 - Distance Limit (p1)	After restart
Pc39A	0						Slot 3 - Distance Limit (p2)	After restart
Pc39C	0						Slot 3 - Distance Limit (p3)	After restart
Pc3C0	0000h						Slot 4 - Safety Function Configuration I	After restart
Pc3C1	0000h						Slot 4 - Safety Function Configuration II	After restart
Pc3C2	0000h						Slot 4 - Safety Function Configuration III	After restart
Pc3C3	0000h						Slot 4 - Safety Function Configuration IV	After restart
Pc3D0	0						Slot 4 - Waiting Time (t1)	After restart
Pc3D1	0						Slot 4 - Monitoring Time (t2)	After restart
Pc3D2	0						Slot 4 - Speed Limit (s1)	After restart
Pc3D4	0						Slot 4 - Speed Limit (s2)	After restart
Pc3D6	0						Slot 4 - Acceleration Limit (a1)	After restart
Pc3D8	0						Slot 4 - Distance Limit (p1)	After restart
Pc3DA	0						Slot 4 - Distance Limit (p2)	After restart
Pc3DC	0						Slot 4 - Distance Limit (p3)	After restart
Pc400	0000h						Slot 5 - Safety Function Configuration I	After restart
Pc401	0000h						Slot 5 - Safety Function Configuration II	After restart
Pc402	0000h						Slot 5 - Safety Function Configuration III	After restart
Pc403	0000h						Slot 5 - Safety Function Configuration IV	After restart
Pc410	0						Slot 5 - Waiting Time (t1)	After restart
Pc411	0						Slot 5 - Monitoring Time (t2)	After restart
Pc412	0						Slot 5 - Speed Limit (s1)	After restart
Pc414	0						Slot 5 - Speed Limit (s2)	After restart
Pc416	0						Slot 5 - Acceleration Limit (a1)	After restart
Pc418	0						Slot 5 - Distance Limit (p1)	After restart
Pc41A	0						Slot 5 - Distance Limit (p2)	After restart
Pc41C	0						Slot 5 - Distance Limit (p3)	After restart
Pc440	0000h						Slot 6 - Safety Function Configuration I	After restart
Pc441	0000h						Slot 6 - Safety Function Configuration II	After restart
Pc442	0000h						Slot 6 - Safety Function Configuration III	After restart
Pc443	0000h						Slot 6 - Safety Function Configuration IV	After restart
Pc450	0						Slot 6 - Waiting Time (t1)	After restart
Pc451	0						Slot 6 - Monitoring Time (t2)	After restart

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Pc No.	Default Setting						Name	When Enabled
Pc452	0						Slot 6 - Speed Limit (s1)	After restart
Pc454	0						Slot 6 - Speed Limit (s2)	After restart
Pc456	0						Slot 6 - Acceleration Limit (a1)	After restart
Pc458	0						Slot 6 - Distance Limit (p1)	After restart
Pc45A	0						Slot 6 - Distance Limit (p2)	After restart
Pc45C	0						Slot 6 - Distance Limit (p3)	After restart
Pc480	0000h						Slot 7 - Safety Function Configuration I	After restart
Pc481	0000h						Slot 7 - Safety Function Configuration II	After restart
Pc482	0000h						Slot 7 - Safety Function Configuration III	After restart
Pc483	0000h						Slot 7 - Safety Function Configuration IV	After restart
Pc490	0						Slot 7 - Waiting Time (t1)	After restart
Pc491	0						Slot 7 - Monitoring Time (t2)	After restart
Pc492	0						Slot 7 - Speed Limit (s1)	After restart
Pc494	0						Slot 7 - Speed Limit (s 2)	After restart
Pc496	0						Slot 7 - Acceleration Limit (a1)	After restart
Pc498	0						Slot 7 - Distance Limit (p1)	After restart
Pc49A	0						Slot 7 - Distance Limit (p2)	After restart
Pc49C	0						Slot 7 - Distance Limit (p3)	After restart
Pc4C0	0000h						Slot 8 - Safety Function Configuration I	After restart
Pc4C1	0000h						Slot 8 - Safety Function Configuration II	After restart
Pc4C2	0000h						Slot 8 - Safety Function Configuration III	After restart
Pc4C3	0000h						Slot 8 - Safety Function Configuration IV	After restart
Pc4D0	0						Slot 8 - Waiting Time (t1)	After restart
Pc4D1	0						Slot 8 - Monitoring Time (t2)	After restart
Pc4D2	0						Slot 8 - Speed Limit (s1)	After restart
Pc4D4	0						Slot 8 - Speed Limit (s2)	After restart
Pc4D6	0						Slot 8 - Acceleration Limit (a1)	After restart
Pc4D8	0						Slot 8 - Distance Limit (p1)	After restart
Pc4DA	0						Slot 8 - Distance Limit (p2)	After restart
Pc4DC	0						Slot 8 - Distance Limit (p3)	After restart
Pc500	0000h						Slot 9 - Safety Function Configuration I	After restart
Pc501	0000h						Slot 9 - Safety Function Configuration II	After restart
Pc502	0000h						Slot 9 - Safety Function Configuration III	After restart

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Pc No.	Default Setting						Name	When Enabled
Pc503	0000h						Slot 9 - Safety Function Configuration IV	After restart
Pc510	0						Slot 9 - Waiting Time (t1)	After restart
Pc511	0						Slot 9 - Monitoring Time (t2)	After restart
Pc512	0						Slot 9 - Speed Limit (s1)	After restart
Pc514	0						Slot 9 - Speed Limit (s2)	After restart
Pc516	0						Slot 9 - Acceleration Limit (a1)	After restart
Pc518	0						Slot 9 - Distance Limit (p1)	After restart
Pc51A	0						Slot 9 - Distance Limit (p2)	After restart
Pc51C	0						Slot 9 - Distance Limit (p3)	After restart

11.4.3 Safety-Related Module Parameters: FSoE Communications References and Digital I/O Model

Pc No.	Default Setting						Name	When Enabled
Pc0C0	0000h						Digital Input Port A (DIA) - Configuration	After restart
Pc0C1	0						Digital Input Port A (DIA) - Filtering Time	After restart
Pc0C2	15						Digital Input Port A (DIA) - Discrepancy Allowable Time	After restart
Pc0C5	0000h						Digital Input Port B (DIB) - Configuration	After restart
Pc0C6	0						Digital Input Port B (DIB) - Filtering Time	After restart
Pc0C7	15						Digital Input Port B (DIB) - Discrepancy Allowable Time	After restart
Pc0CA	0000h						Digital Input Port C (DIC) - Configuration	After restart
Pc0CB	0						Digital Input Port C (DIC) - Filtering Time	After restart
Pc0CC	15						Digital Input Port C (DIC) - Discrepancy Allowable Time	After restart
Pc0CF	0000h						Digital Input Port D (DID) - Configuration	After restart
Pc0D0	0						Digital Input Port D (DID) - Filtering Time	After restart
Pc0D1	15						Digital Input Port D (DID) - Discrepancy Allowable Time	After restart
Pc0D4	0000h						Digital Input Port E (DIE) - Configuration	After restart
Pc0D5	0						Digital Input Port E (DIE) - Filtering Time	After restart
Pc0D6	15						Digital Input Port E (DIE) - Discrepancy Allowable Time	After restart
Pc0E0	1100h						Digital Output Port A (DOA) - Configuration	After restart

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Pc No.	Default Setting						Name	When Enabled
Pc0E1	2						Digital Output Port A (DOA) - Test Pulse Length	After restart
Pc0E2	30						Digital Output Port A (DOA) - ON Delay Time	After restart
Pc0E3	30						Digital Output Port A (DOA) - OFF Delay Time	After restart
Pc0E6	1100h						Digital Output Port B (DOB) - Configuration	After restart
Pc0E7	2						Digital Output Port B (DOB) - Test Pulse Length	After restart
Pc0E8	30						Digital Output Port B (DOB) - ON Delay Time	After restart
Pc0E9	30						Digital Output Port B (DOB) - OFF Delay Time	After restart
Pc0EC	1100h						Digital Output Port C (DOC) - Configuration	After restart
Pc0ED	2						Digital Output Port C (DOC) - Test Pulse Length	After restart
Pc0EE	30						Digital Output Port C (DOC) - ON Delay Time	After restart
Pc0EF	30						Digital Output Port C (DOC) - OFF Delay Time	After restart
Pc0F2	1100h						Digital Output Port D (DOD) - Configuration	After restart
Pc0F3	2						Digital Output Port D (DOD) - Test Pulse Length	After restart
Pc0F4	30						Digital Output Port D (DOD) - ON Delay Time	After restart
Pc0F5	30						Digital Output Port D (DOD) - OFF Delay Time	After restart
Pc0F8	1100h						Digital Output Port E (DOE) - Configuration	After restart
Pc0F9	2						Digital Output Port E (DOE) - Test Pulse Length	After restart
Pc0FA	30						Digital Output Port E (DOE) - ON Delay Time	After restart
Pc0FB	30						Digital Output Port E (DOE) - OFF Delay Time	After restart
Pc120	0001h						Safety Fieldbus - station address	After restart
Pc121	0130h						Safety Fieldbus - operation selection	After restart
Pc122	0000h						Operation When Safety Fieldbus Virtual Input Not Usable	After restart
Pc150	16384						Encoder Deviation	After restart
Pc152	0						Encoder Deviation Window	After restart
Pc160	0						Safe Home Position Offset	After restart
Pc170	0000h						Safety Function Application Selection	After restart
Pc172	0						Limit Violation Deactivation Delay Time (LVDDT)	After restart
Pc173	0						Acceleration Filter Time	After restart

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Pc No.	Default Setting						Name	When Enabled
Pc180	1						Safety Module: User Position Reference Unit (Numerator)	After restart
Pc182	1						Safety Module: User Position Reference Unit (Denominator)	After restart
Pc188	1						Safety Module: User Speed Reference Unit (Numerator)	After restart
Pc18A	1						Safety Module: User Speed Reference Unit (Denominator)	After restart
Pc190	1						Safety Module: User Acceleration Ref. Unit (Numerator)	After restart
Pc192	1						Safety Module: User Acceleration Ref. Unit (Denominator)	After restart
Pc300	0000h						Slot 1 - Safety Function Configuration I	After restart
Pc301	0000h						Slot 1 - Safety Function Configuration II	After restart
Pc302	0000h						Slot 1 - Safety Function Configuration III	After restart
Pc303	0000h						Slot 1 - Safety Function Configuration IV	After restart
Pc310	0						Slot 1 - Waiting Time (t1)	After restart
Pc311	0						Slot 1 - Monitoring Time (t2)	After restart
Pc312	0						Slot 1 - Speed Limit (s1)	After restart
Pc314	0						Slot 1 - Speed Limit (s2)	After restart
Pc316	0						Slot 1 - Acceleration Limit (a1)	After restart
Pc318	0						Slot 1 - Distance Limit (p1)	After restart
Pc31A	0						Slot 1 - Distance Limit (p2)	After restart
Pc31C	0						Slot 1 - Distance Limit (p3)	After restart
Pc340	0000h						Slot 2 - Safety Function Configuration I	After restart
Pc341	0000h						Slot 2 - Safety Function Configuration II	After restart
Pc342	0000h						Slot 2 - Safety Function Configuration III	After restart
Pc343	0000h						Slot 2 - Safety Function Configuration IV	After restart
Pc350	0						Slot 2 - Waiting Time (t1)	After restart
Pc351	0						Slot 2 - Monitoring Time (t2)	After restart
Pc352	0						Slot 2 - Speed Limit (s1)	After restart
Pc354	0						Slot 2 - Speed Limit (s2)	After restart
Pc356	0						Slot 2 - Acceleration Limit (a1)	After restart
Pc358	0						Slot 2 - Distance Limit (p1)	After restart
Pc35A	0						Slot 2 - Distance Limit (p2)	After restart
Pc35C	0						Slot 2 - Distance Limit (p3)	After restart
Pc380	0000h						Slot 3 - Safety Function Configuration I	After restart

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Pc No.	Default Setting						Name	When Enabled
Pc381	0000h						Slot 3 - Safety Function Configuration II	After restart
Pc382	0000h						Slot 3 - Safety Function Configuration III	After restart
Pc383	0000h						Slot 3 - Safety Function Configuration IV	After restart
Pc390	0						Slot 3 - Waiting Time (t1)	After restart
Pc391	0						Slot 3 - Monitoring Time (t2)	After restart
Pc392	0						Slot 3 - Speed Limit (s1)	After restart
Pc394	0						Slot 3 - Speed Limit (s2)	After restart
Pc396	0						Slot 3 - Acceleration Limit (a1)	After restart
Pc398	0						Slot 3 - Distance Limit (p1)	After restart
Pc39A	0						Slot 3 - Distance Limit (p2)	After restart
Pc39C	0						Slot 3 - Distance Limit (p3)	After restart
Pc3C0	0000h						Slot 4 - Safety Function Configuration I	After restart
Pc3C1	0000h						Slot 4 - Safety Function Configuration II	After restart
Pc3C2	0000h						Slot 4 - Safety Function Configuration III	After restart
Pc3C3	0000h						Slot 4 - Safety Function Configuration IV	After restart
Pc3D0	0						Slot 4 - Waiting Time (t1)	After restart
Pc3D1	0						Slot 4 - Monitoring Time (t2)	After restart
Pc3D2	0						Slot 4 - Speed Limit (s1)	After restart
Pc3D4	0						Slot 4 - Speed Limit (s2)	After restart
Pc3D6	0						Slot 4 - Acceleration Limit (a1)	After restart
Pc3D8	0						Slot 4 - Distance Limit (p1)	After restart
Pc3DA	0						Slot 4 - Distance Limit (p2)	After restart
Pc3DC	0						Slot 4 - Distance Limit (p3)	After restart
Pc400	0000h						Slot 5 - Safety Function Configuration I	After restart
Pc401	0000h						Slot 5 - Safety Function Configuration II	After restart
Pc402	0000h						Slot 5 - Safety Function Configuration III	After restart
Pc403	0000h						Slot 5 - Safety Function Configuration IV	After restart
Pc410	0						Slot 5 - Waiting Time (t1)	After restart
Pc411	0						Slot 5 - Monitoring Time (t2)	After restart
Pc412	0						Slot 5 - Speed Limit (s1)	After restart
Pc414	0						Slot 5 - Speed Limit (s2)	After restart
Pc416	0						Slot 5 - Acceleration Limit (a1)	After restart
Pc418	0						Slot 5 - Distance Limit (p1)	After restart
Pc41A	0						Slot 5 - Distance Limit (p2)	After restart

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Pc No.	Default Setting						Name	When Enabled
Pc41C	0						Slot 5 - Distance Limit (p3)	After restart
Pc440	0000h						Slot 6 - Safety Function Configuration I	After restart
Pc441	0000h						Slot 6 - Safety Function Configuration II	After restart
Pc442	0000h						Slot 6 - Safety Function Configuration III	After restart
Pc443	0000h						Slot 6 - Safety Function Configuration IV	After restart
Pc450	0						Slot 6 - Waiting Time (t1)	After restart
Pc451	0						Slot 6 - Monitoring Time (t2)	After restart
Pc452	0						Slot 6 - Speed Limit (s1)	After restart
Pc454	0						Slot 6 - Speed Limit (s2)	After restart
Pc456	0						Slot 6 - Acceleration Limit (a1)	After restart
Pc458	0						Slot 6 - Distance Limit (p1)	After restart
Pc45A	0						Slot 6 - Distance Limit (p2)	After restart
Pc45C	0						Slot 6 - Distance Limit (p3)	After restart
Pc480	0000h						Slot 7 - Safety Function Configuration I	After restart
Pc481	0000h						Slot 7 - Safety Function Configuration II	After restart
Pc482	0000h						Slot 7 - Safety Function Configuration III	After restart
Pc483	0000h						Slot 7 - Safety Function Configuration IV	After restart
Pc490	0						Slot 7 - Waiting Time (t1)	After restart
Pc491	0						Slot 7 - Monitoring Time (t2)	After restart
Pc492	0						Slot 7 - Speed Limit (s1)	After restart
Pc494	0						Slot 7 - Speed Limit (s 2)	After restart
Pc496	0						Slot 7 - Acceleration Limit (a1)	After restart
Pc498	0						Slot 7 - Distance Limit (p1)	After restart
Pc49A	0						Slot 7 - Distance Limit (p2)	After restart
Pc49C	0						Slot 7 - Distance Limit (p3)	After restart
Pc4C0	0000h						Slot 8 - Safety Function Configuration I	After restart
Pc4C1	0000h						Slot 8 - Safety Function Configuration II	After restart
Pc4C2	0000h						Slot 8 - Safety Function Configuration III	After restart
Pc4C3	0000h						Slot 8 - Safety Function Configuration IV	After restart
Pc4D0	0						Slot 8 - Waiting Time (t1)	After restart
Pc4D1	0						Slot 8 - Monitoring Time (t2)	After restart
Pc4D2	0						Slot 8 - Speed Limit (s1)	After restart
Pc4D4	0						Slot 8 - Speed Limit (s2)	After restart

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Pc No.	Default Setting						Name	When Enabled
Pc4D6	0						Slot 8 - Acceleration Limit (a1)	After restart
Pc4D8	0						Slot 8 - Distance Limit (p1)	After restart
Pc4DA	0						Slot 8 - Distance Limit (p2)	After restart
Pc4DC	0						Slot 8 - Distance Limit (p3)	After restart
Pc500	0000h						Slot 9 - Safety Function Configuration I	After restart
Pc501	0000h						Slot 9 - Safety Function Configuration II	After restart
Pc502	0000h						Slot 9 - Safety Function Configuration III	After restart
Pc503	0000h						Slot 9 - Safety Function Configuration IV	After restart
Pc510	0						Slot 9 - Waiting Time (t1)	After restart
Pc511	0						Slot 9 - Monitoring Time (t2)	After restart
Pc512	0						Slot 9 - Speed Limit (s1)	After restart
Pc514	0						Slot 9 - Speed Limit (s2)	After restart
Pc516	0						Slot 9 - Acceleration Limit (a1)	After restart
Pc518	0						Slot 9 - Distance Limit (p1)	After restart
Pc51A	0						Slot 9 - Distance Limit (p2)	After restart
Pc51C	0						Slot 9 - Distance Limit (p3)	After restart
Pc540	0000h						Slot 10 - Safety Function Configuration I	After restart
Pc541	0000h						Slot 10 - Safety Function Configuration II	After restart
Pc542	0000h						Slot 10 - Safety Function Configuration III	After restart
Pc550	0						Slot 10 - Brake hold delay time (Tw_bkh)	After restart
Pc551	0						Slot 10 - Brake release delay time (Tw_bkr)	After restart
Pc552	30						Slot 10 - FB signal discrep. allow. time at brake hold (Td_bkh)	After restart
Pc553	30						Slot 10 - FB signal discrep. allow. time at brake release (Td_bkr)	After restart

12

Appendices

12.1 Calculation Results: Differences in Encoder Positions 538

12.2 SGMXJ Models 539

12.3 SGMXA Models 541

12.4 SGMXP Models 544

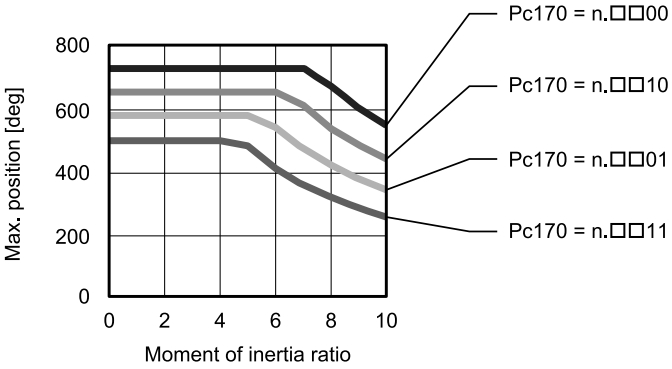
12.5 SGMXG Models 545

12.1 Calculation Results: Differences in Encoder Positions

If interference temporarily occurs in encoder communications when the servomotor is operating, due to noise or other causes, a difference will occur between the encoder position calculated by the ASM-X and the actual encoder position.

This section shows the results for the maximum value of the difference in positions (i.e., the maximum position) that were calculated under typical conditions.

Interpreting the Graphs

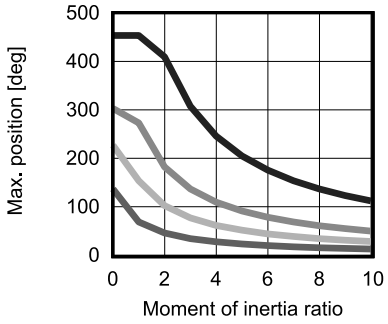


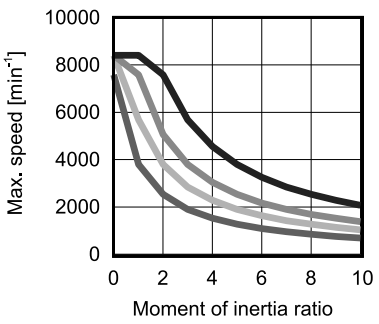
Maximum position [deg]:	The reached position after the data update time for when the servomotor accelerates from zero speed at the maximum torque (travel amount).
Maximum speed [min^{-1}]:	The reached speed after the data update time for when the servomotor accelerates from zero speed at the maximum torque.
Maximum acceleration [$\times 10^3$ rad/s^2]:	The relationship between motor acceleration when the motor has accelerated at the maximum torque and the moment of inertia ratio. **Note:** The characteristics of maximum acceleration do not change with the setting of Pc170.

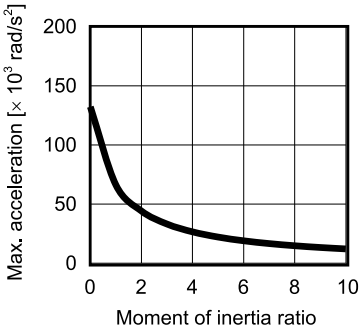
The graphs of the maximum position for each used motor are shown next.

12.2 SGMXJ Models

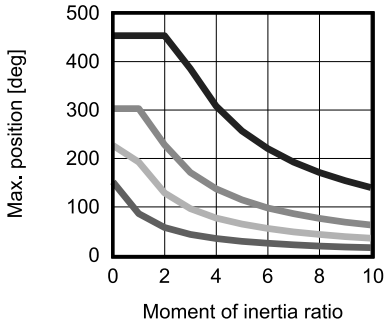
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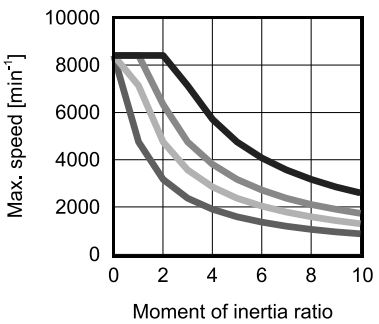


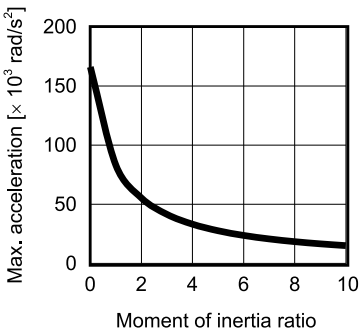




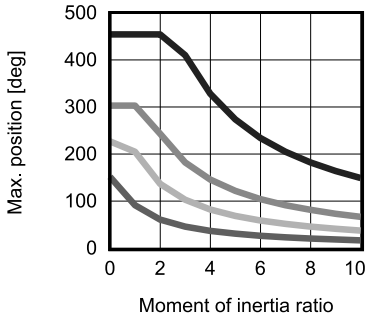
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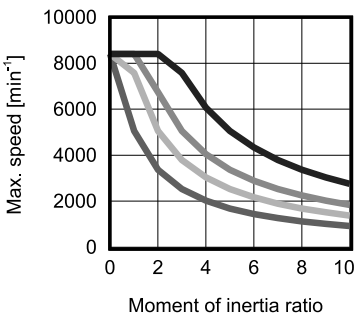


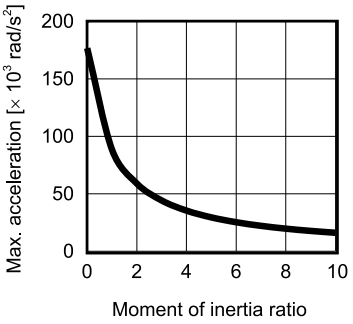




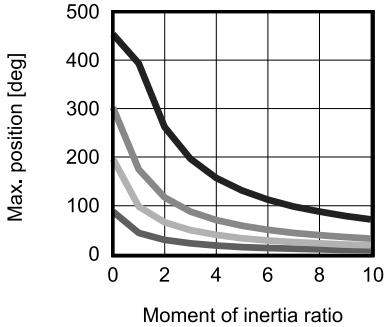
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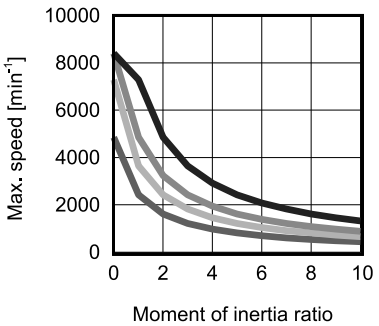


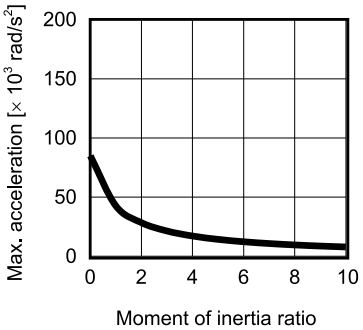




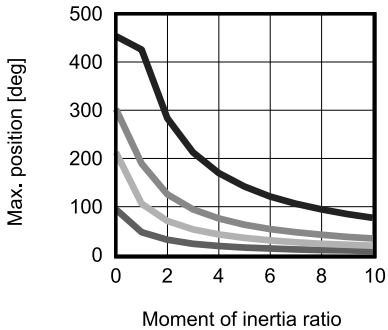
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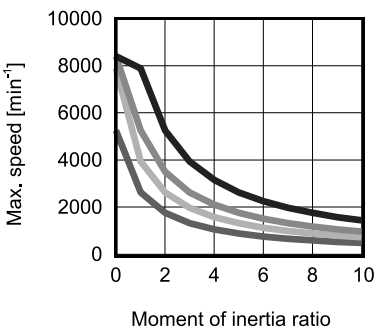


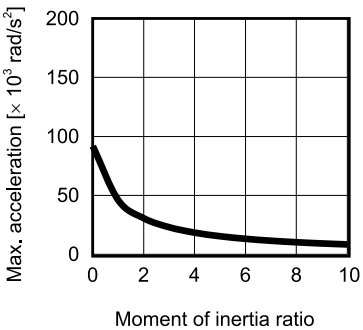




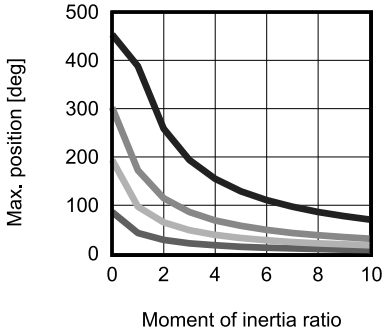
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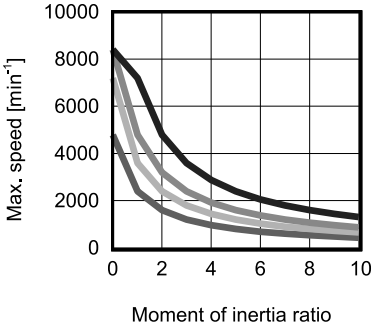


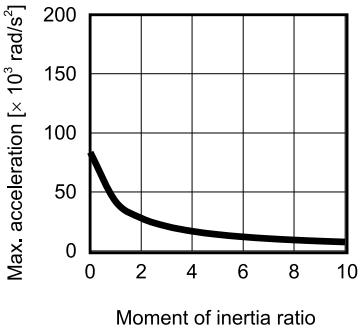




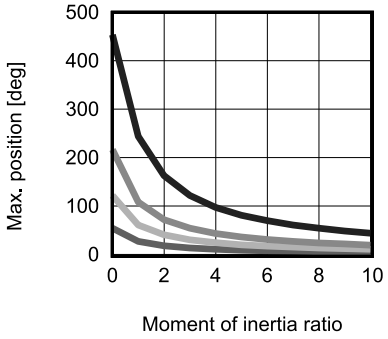
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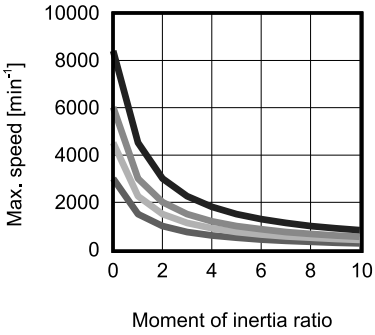


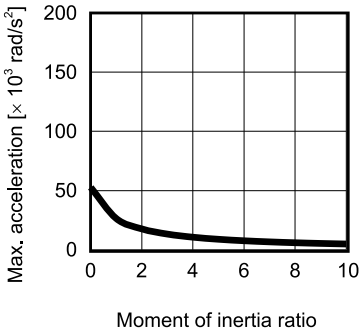




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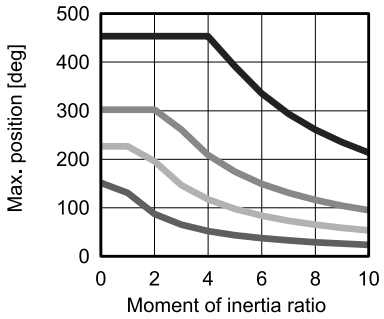


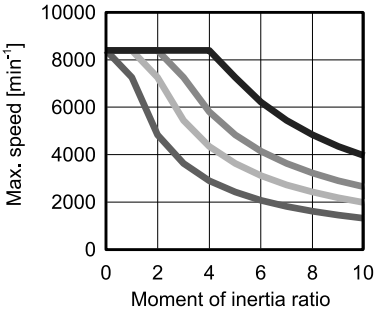


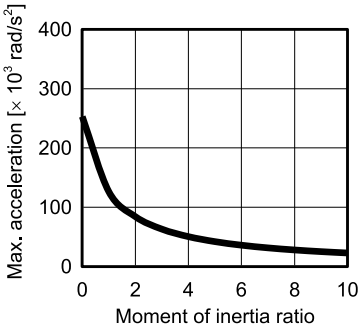


12.3 SGMXA Models

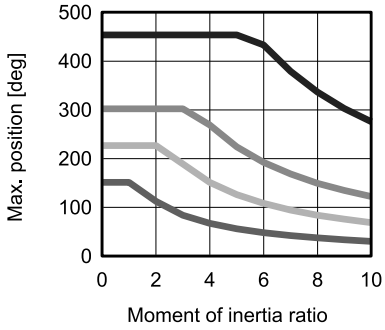
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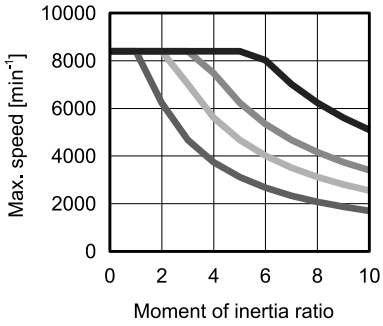


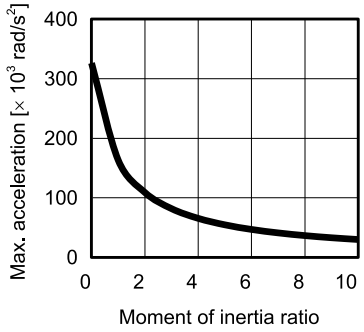




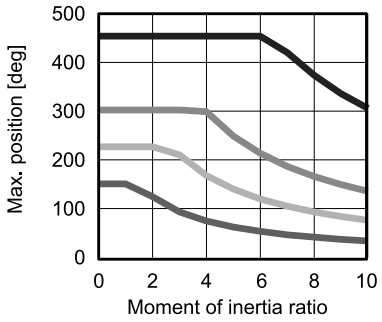
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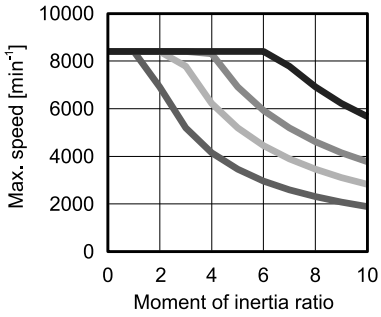


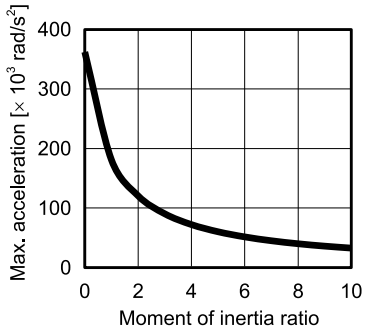




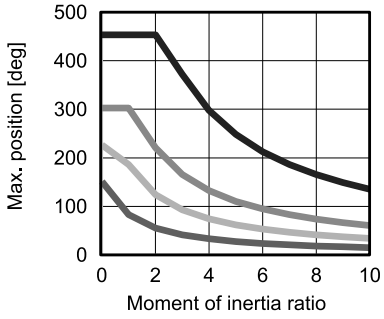
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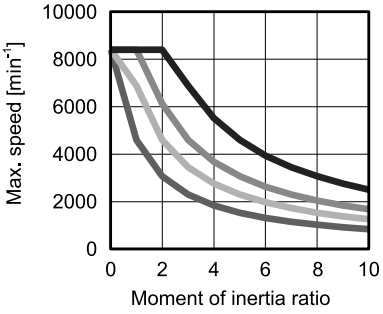


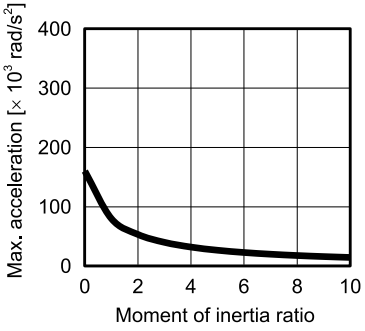




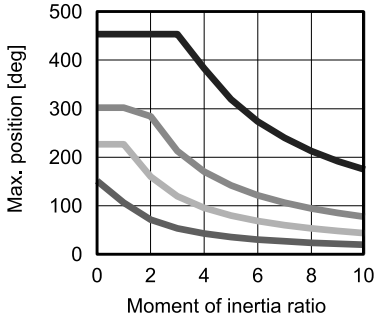
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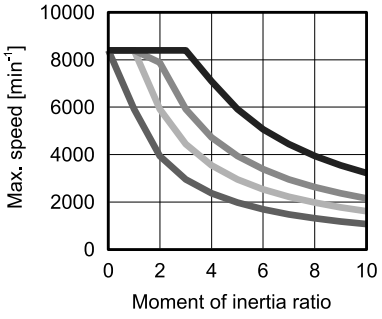


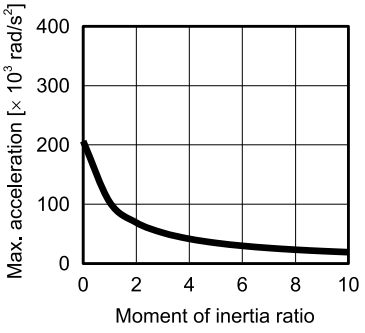




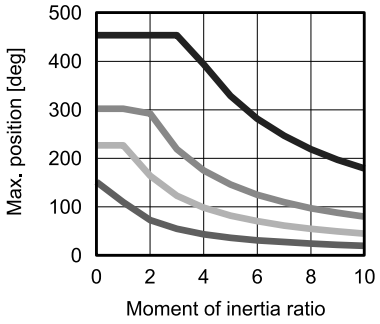
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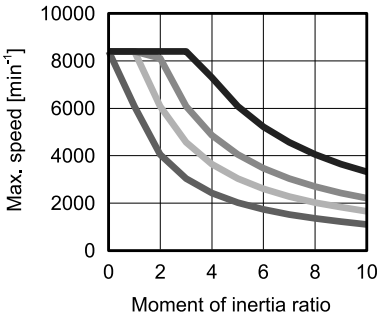


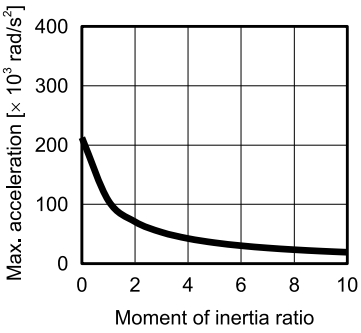




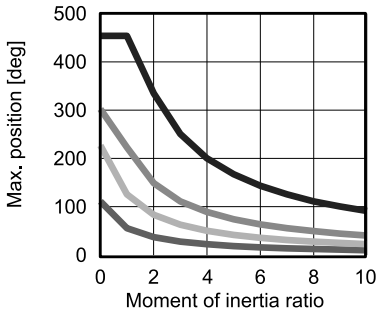
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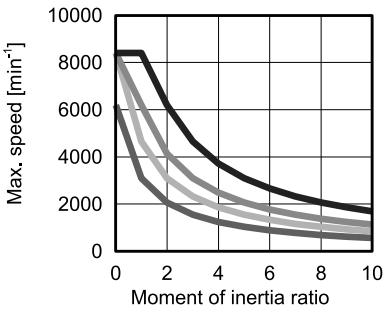


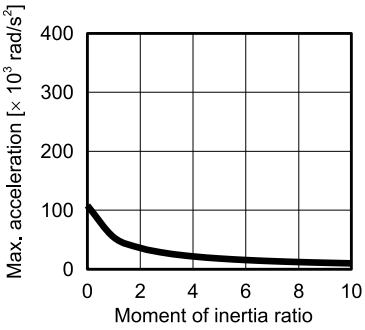




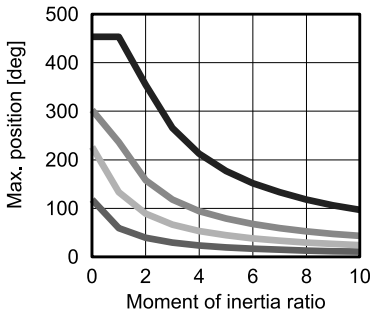
- **SGMXA-08AUA21**

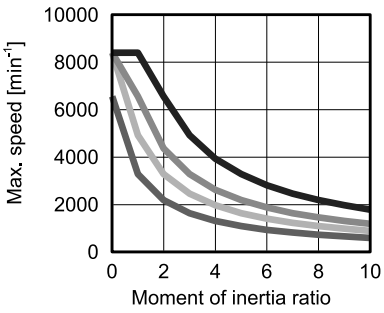


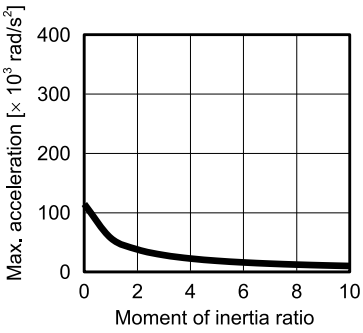




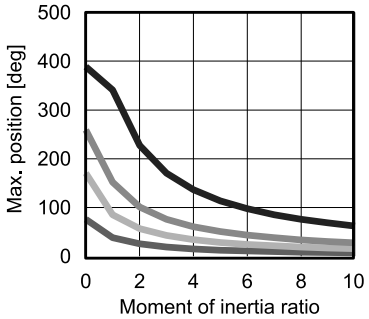
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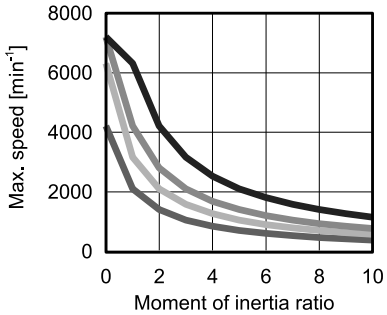


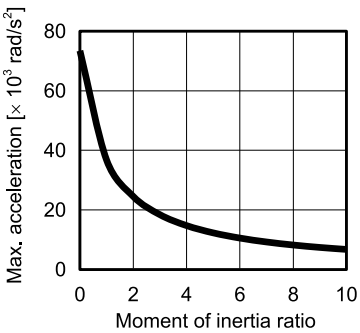




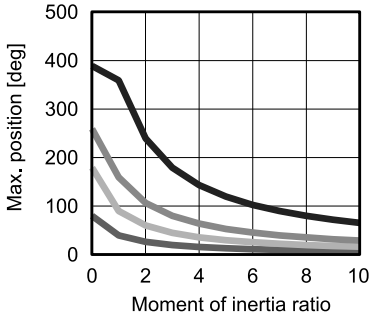
- **SGMXA-15AUA21**

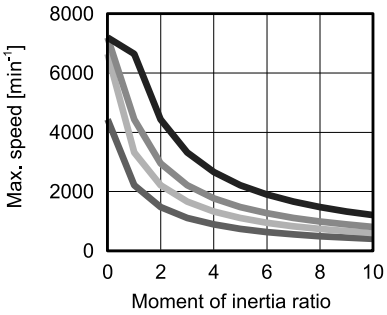


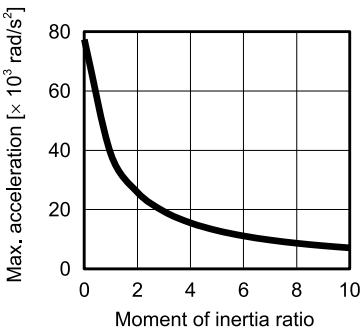




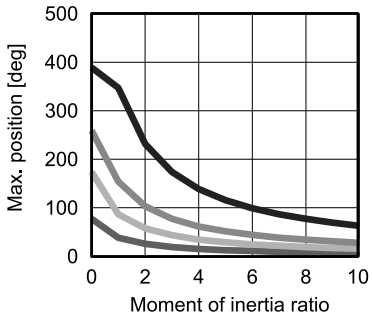
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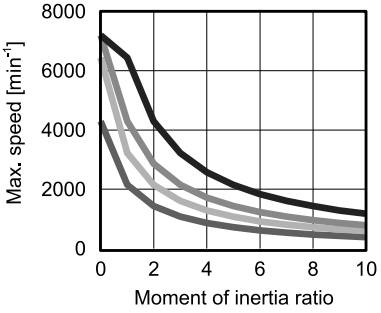


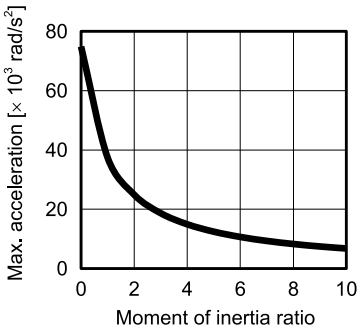




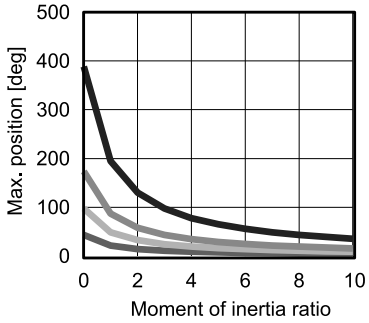
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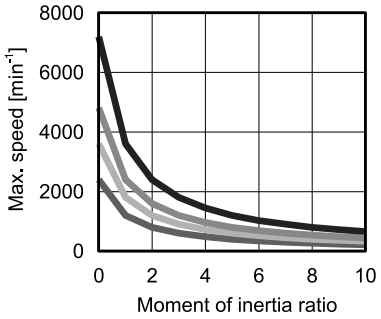


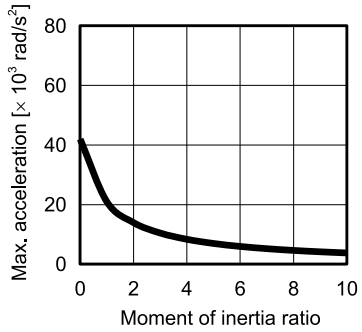




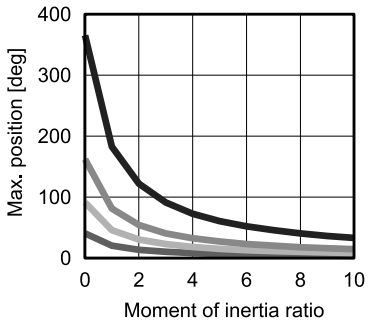
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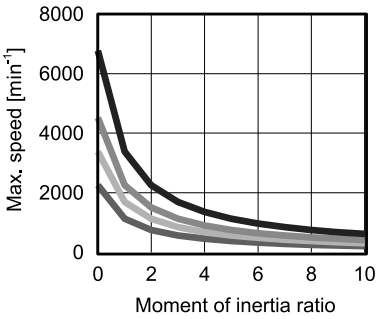


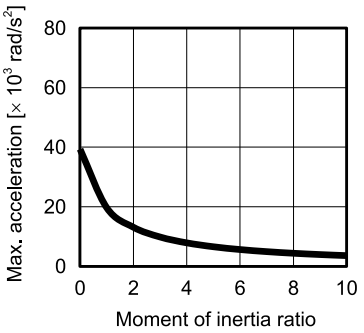




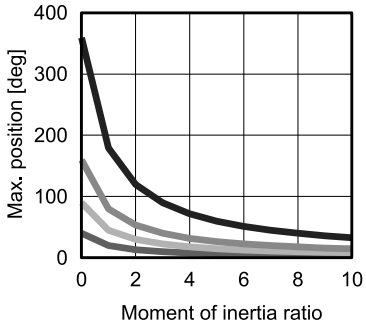
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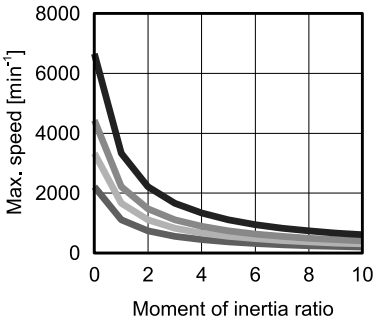


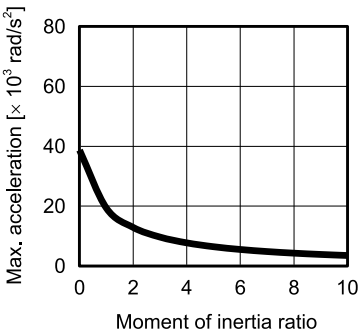




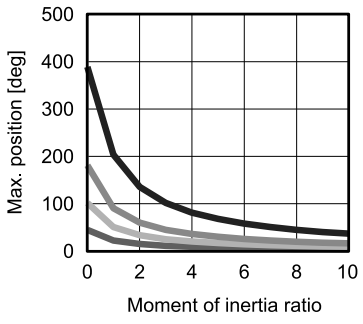
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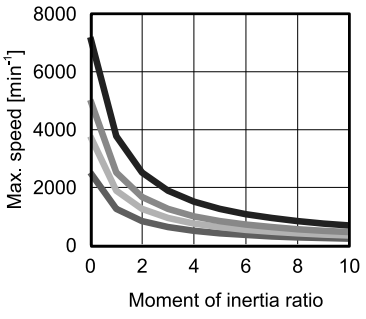


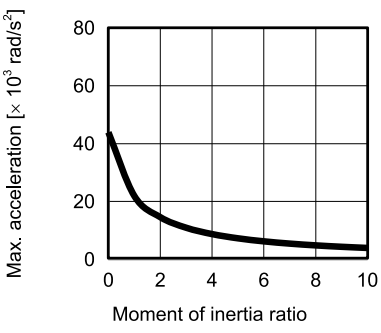




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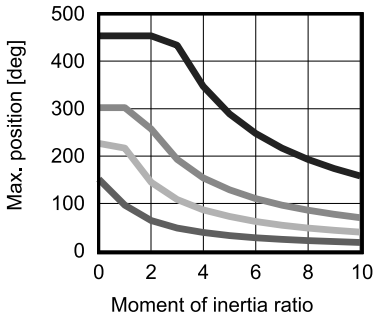


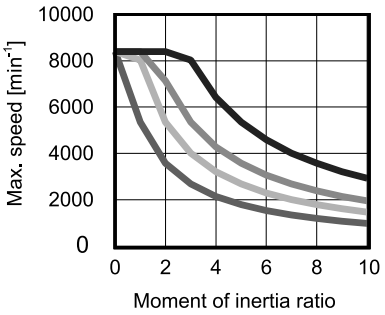


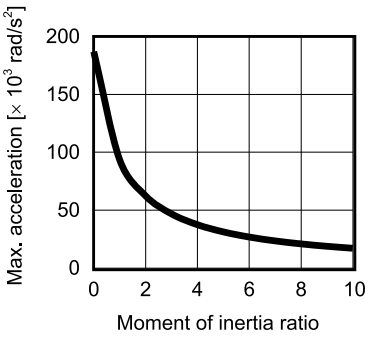


12.4 SGMXP Models

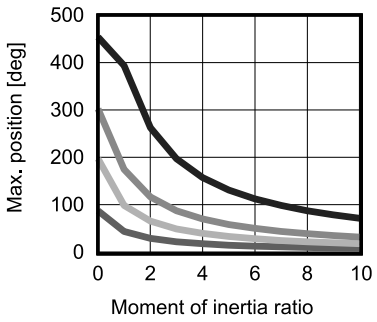
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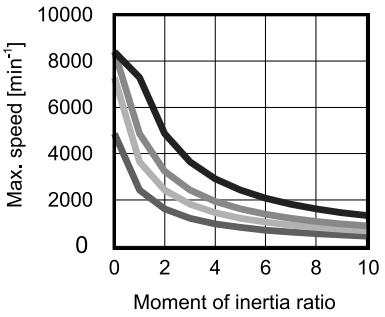


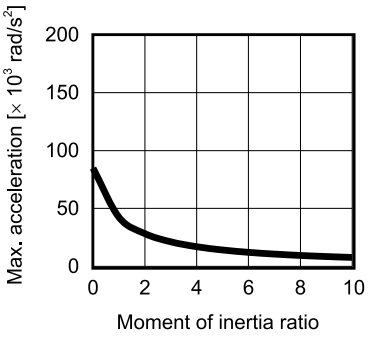




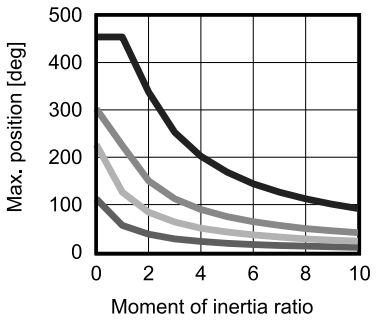
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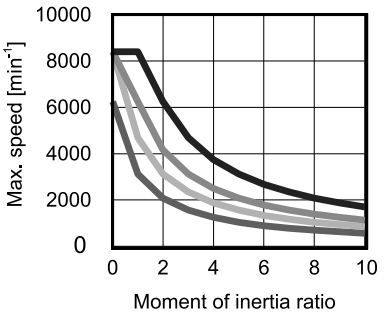


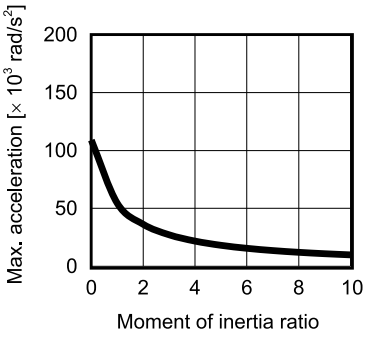




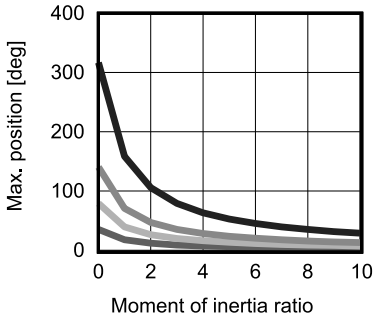
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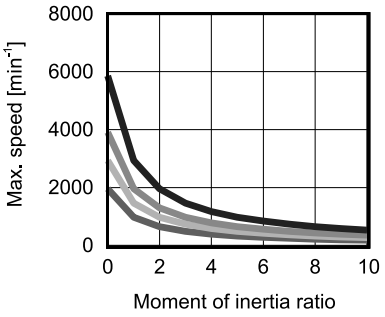


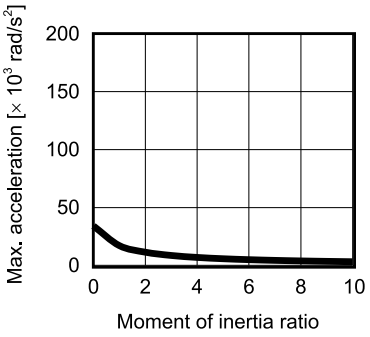




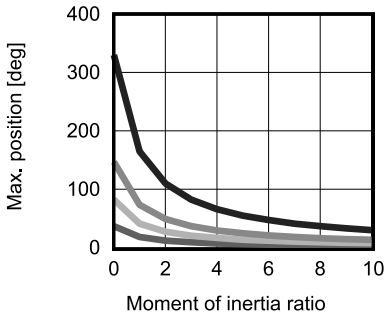
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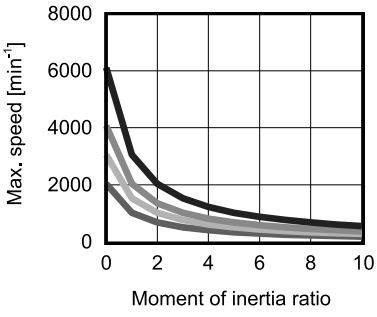


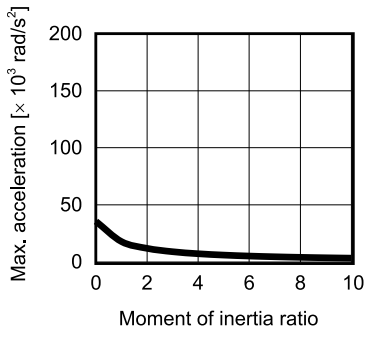




- **SGMXP-15AUA21**

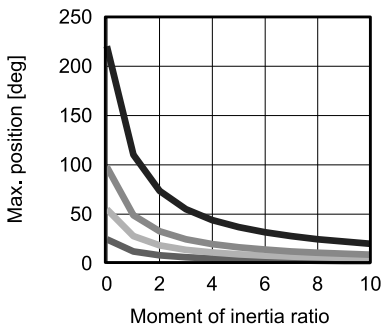


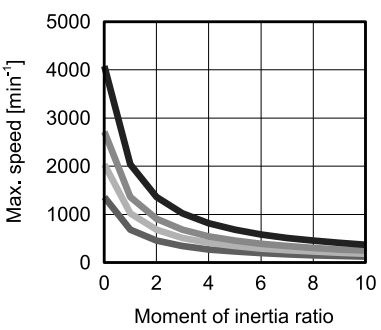


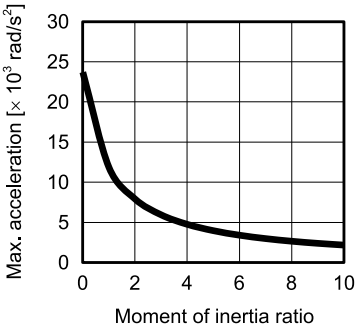


12.5 SGMXG Models

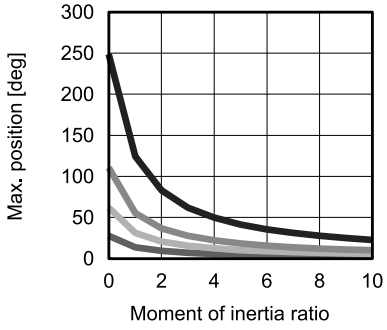
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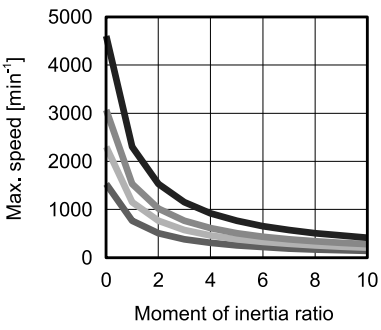


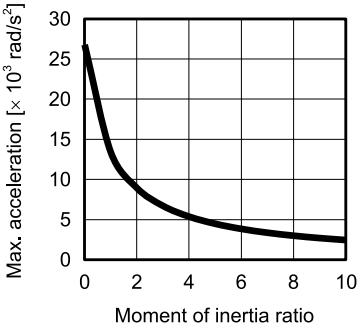




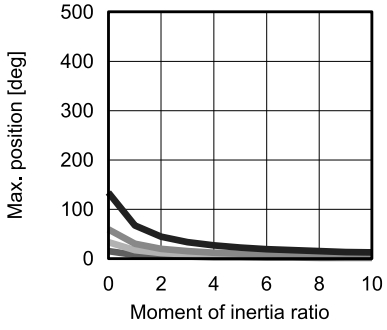
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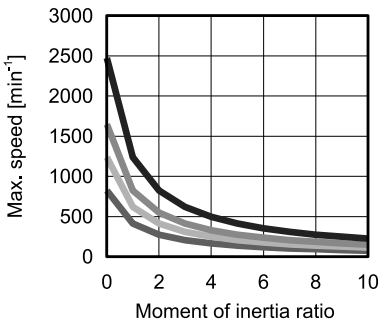


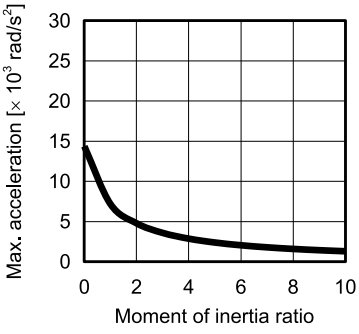




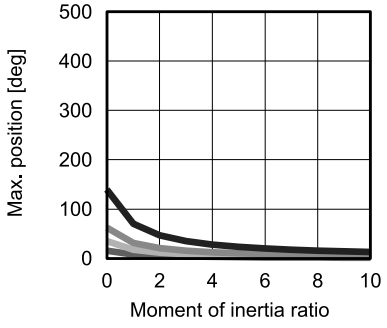
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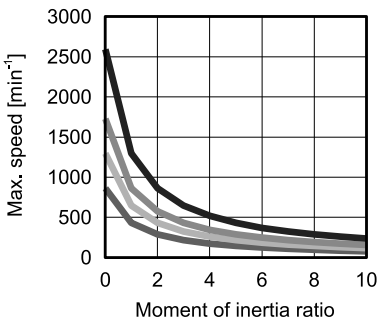


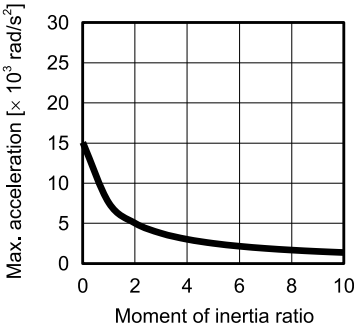




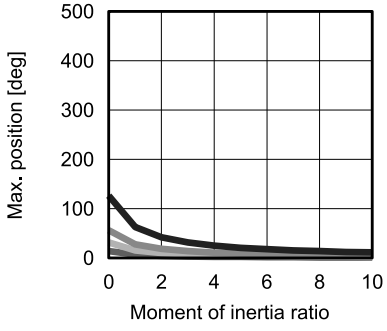
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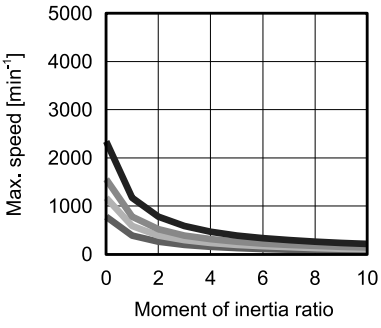


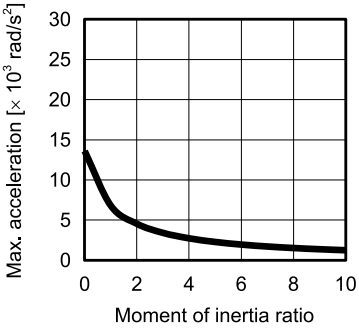




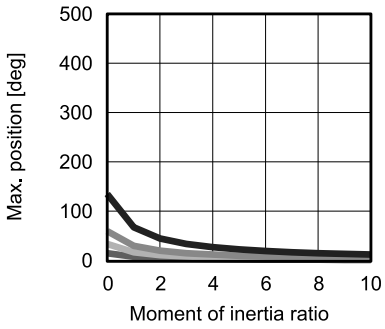
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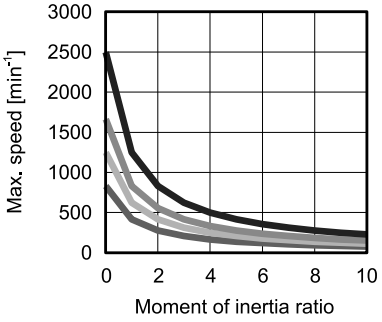


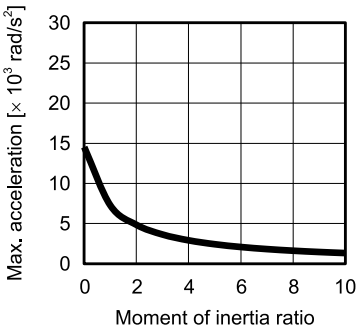




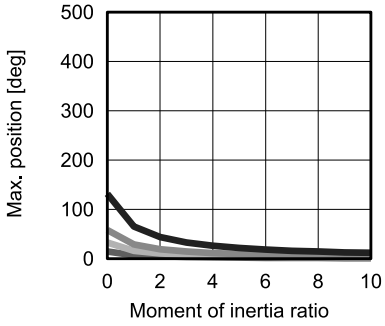
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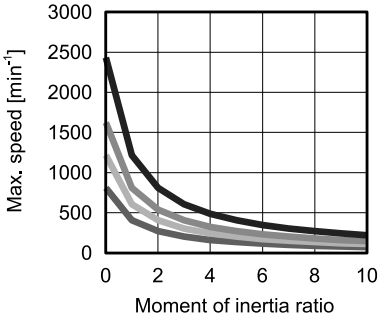


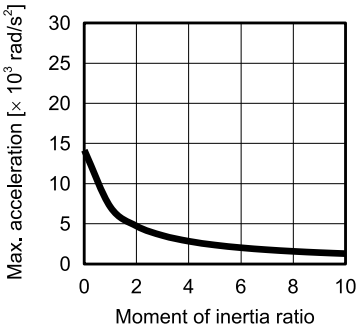




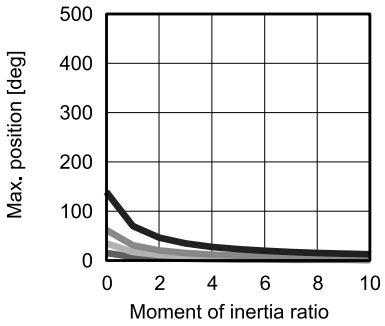
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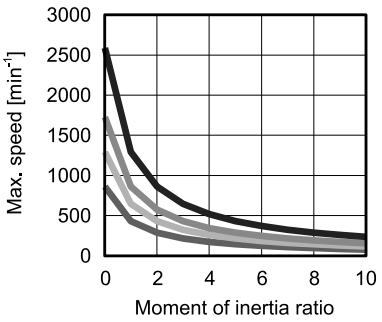


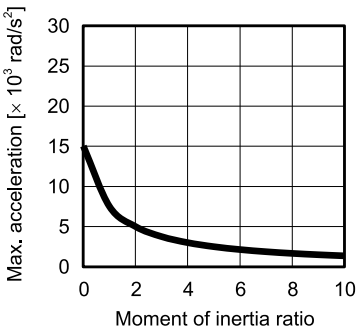




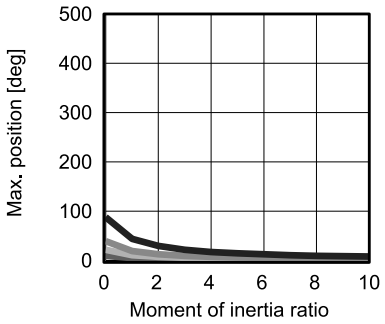
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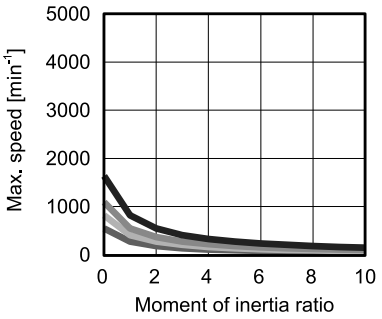


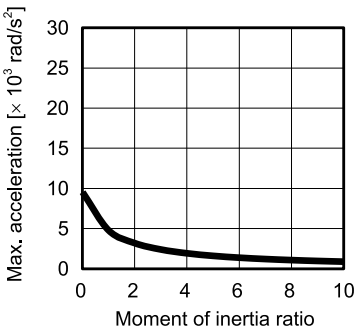




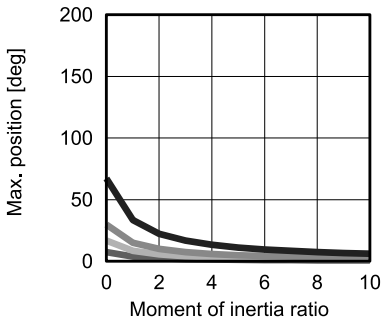
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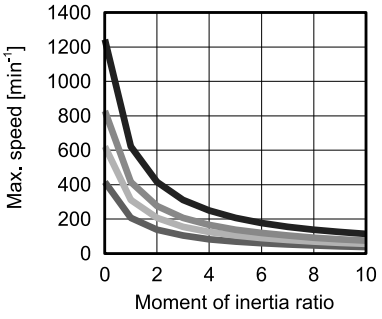


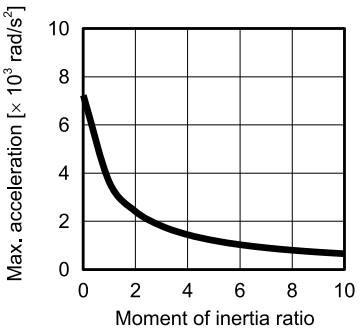




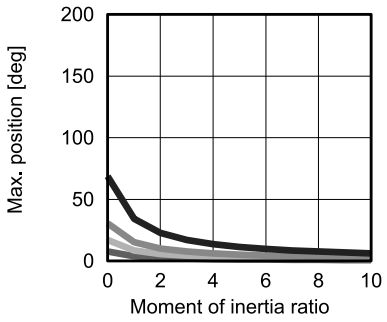
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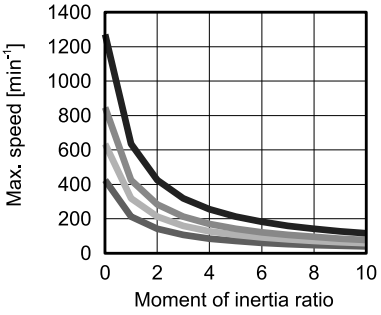


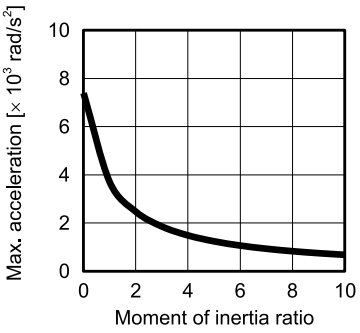




- **SGMXG-1EAUA21**







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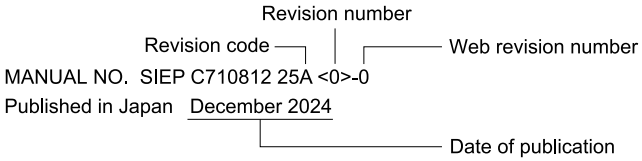
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Revision History

The date of publication, revision code, revision number, and web revision number are given at the bottom right of the back cover. Refer to the following example.



Date of Publication	Rev. Code	Rev. No.	Web Rev. No.	Section	Revised Contents
August 2026	C	<2>	0	All chapters	Addition: Information on normal encoders.
					Partly revised.
				5.2.3, 6.3.1	Addition: Acceleration filter
				7.2	Revision: Safety fieldbus specifications
				7.4.7	Addition: Operation when FailSafeData is received
				7.18 to 7.23	Addition: SLP, SLI, SDI-p, SDI-n, SCA, and SHP functions.
				Back cover	Revision: Address
March 2025	B	<1>	0	i.4.1	Addition: failure detection time
				2.1.3	Addition: Failure detection time for digital input signal, failure detection time for digital output signal diagnostic, failure detection time for SBC, and failure detection time for encoder diagnostic
				7.4.2, 8.4.3(9), 9.5.9, 11.1.2, 11.1.3, 11.2.3	Revision: Information on Pc121 = n.□X□□
				6.2.3	Addition: Correction for When the Parameters Version Is Mismatched
				11.3	Addition: Parameters Version
December 2024	A	<0>	0	–	First edition

Σ-X-Series AC Servo Drive

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