

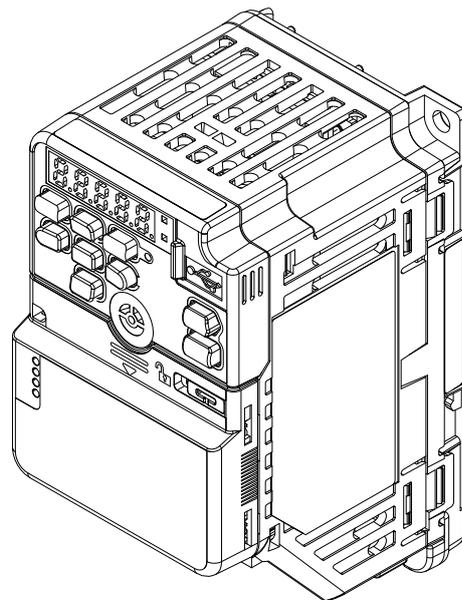
YASKAWA AC Drive GA501

# PROFINET

## Technical Manual

Model CIPR-GA51xxxxxxxxx

To correctly use the product, read this manual thoroughly and keep it for easy reference, inspection, and maintenance.  
Make sure that the end user receives this manual.



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# Table of Contents

1. Preface and Safety . . . . .	5
Applicable Documentation . . . . .	5
Glossary . . . . .	5
Registered Trademarks . . . . .	5
Supplemental Safety Information . . . . .	6
Section Safety . . . . .	6
2. Overview . . . . .	6
3. Component Names . . . . .	7
PCB . . . . .	7
Communication Connector . . . . .	7
Communication LED States . . . . .	8
Power-Up Diagnostics . . . . .	9
4. Installation . . . . .	9
Section Safety . . . . .	9
Settings for DIP Switch S1 . . . . .	10
Communication Cable Specifications . . . . .	10
Communication Topology Specifications . . . . .	10
GSDML File . . . . .	11
Device Access Point (DAP) Selection . . . . .	11
5. Related Drive Parameters . . . . .	12
6. PROFINET Messaging . . . . .	15
PROFINET Overview . . . . .	15
Yaskawa Vendor-Specific Control and Status Words . . . . .	16
The Control Word and the Status Word . . . . .	16
Frequency Reference . . . . .	16
Output Frequency . . . . .	16
PROFIdrive Communication Profile . . . . .	16
PROFIdrive Operation . . . . .	17
7. Communication . . . . .	19
Introduction to PROFINET IO . . . . .	19
PROFINET IO . . . . .	19
Hardware Catalog . . . . .	19
DAP Descriptions/Selection . . . . .	20
Module Configuration . . . . .	20
Services Provided by PROFINET in GA501 . . . . .	21
PROFINET Configuration Parameters . . . . .	21

PROFINET IO Modules .....	22
Communication Cycle .....	26
Yaskawa Acyclic Parameter Access Mechanism .....	26
PROFIdrive Acyclic Parameter Access Mechanism .....	26
PROFINET High Priority Alarm Codes .....	31
PROFINET Low Priority Alarm Codes .....	33
Identification and Maintenance Functions (I&M) .....	34
Alarm Mechanism .....	35
S2 Redundancy .....	35
Media Redundancy Protocol (MRP) .....	35
Simple Network Management Protocol (SNMP) .....	35
LLDP - MIB Details .....	36
<b>8. Web Interface .....</b>	<b>39</b>
Home Page .....	39
PROFINET Page .....	41
Network Page .....	41
Ring Page .....	43
Chart Page .....	43
Email Alerts Page .....	44
Procedure: Conditional Email Set-up .....	45
Parameter Access Page .....	45
Settings Page .....	45
Security Login .....	46
Webpage Password .....	46
Webpage Settings .....	46
Email Settings .....	46
<b>9. Troubleshooting .....</b>	<b>46</b>
Drive-Side Error Codes .....	46
Fault .....	46
bUS Fault Tolerance .....	47
bUS Fault Auto-Restart .....	47
bUS Fault Delay .....	47
PROFINET Error Codes .....	47
Fault Monitors <i>U6-98</i> and <i>U6-99</i> .....	47
Communication Error .....	48
Self RAM Check .....	48
<b>10. Specifications .....</b>	<b>49</b>
Specifications .....	49
<b>11. P-Drive Communication Profile .....</b>	<b>49</b>
P-Drive Operation .....	49
The Control Word and the Status Word .....	49
P-Drive to PROFIdrive Transition .....	50
<b>Revision History .....</b>	<b>53</b>

# 1 Preface and Safety

YASKAWA Electric supplies component parts for use in a wide variety of industrial applications. The selection and application of YASKAWA products remain the responsibility of the equipment designer or end user.

YASKAWA accepts no responsibility for the way its products are incorporated into the final system design. Under no circumstances should any YASKAWA product be incorporated into any product or design as the exclusive or sole safety control. Without exception, all controls should be designed to detect faults dynamically and fail safely under all circumstances. All products designed to incorporate a component part manufactured by YASKAWA must be supplied to the end user with appropriate warnings and instructions as to the safe use and operation of that part. Any warnings provided by YASKAWA must be promptly provided to the end user. YASKAWA offers an express warranty only as to the quality of its products in conforming to standards and specifications published in the manual. **NO OTHER WARRANTY, EXPRESS OR IMPLIED, IS OFFERED.** YASKAWA assumes no liability for any personal injury, property damage, losses, or claims arising from misapplication of its products.

## ◆ Applicable Documentation

Document	Description
YASKAWA AC Drive GA501 PROFINET Technical Manual Manual No.: SIEP C710617 4T (This book)	The Technical Manual contains detailed information about the PROFINET protocol. For questions, contact Yaskawa or a Yaskawa representative.
YASKAWA AC Drive GA501 Manuals	Drive manuals contain basic installation and wiring information in addition to detailed parameter setting, fault diagnostic, and maintenance information. The manuals also include important information about parameter settings and tuning the drive. The drive product Quick Setup Procedures/Quick Start Guides are packaged with the drive. The most recent versions of these documents are available for download on these documentation websites; U.S.: <a href="https://www.yaskawa.com/ga501manuals">https://www.yaskawa.com/ga501manuals</a> , Europe: <a href="https://www.yaskawa.eu.com/manuals/ga501">https://www.yaskawa.eu.com/manuals/ga501</a> , China: <a href="https://yaskawa.com.cn/manual/ga501g5e.aspx?from=NTdfNF80">https://yaskawa.com.cn/manual/ga501g5e.aspx?from=NTdfNF80</a> , Asia: <a href="https://dlc.e-mechatronics.com/dqr/qr/ga501en_AT.html">https://dlc.e-mechatronics.com/dqr/qr/ga501en_AT.html</a> . Refer to the back cover of these documents for other locations. For questions, contact Yaskawa or a Yaskawa representative.

## ◆ Glossary

Terms	Definition
JOHB-SMP3	YASKAWA AC Drive Option JOHB-SMP3
Keypad	<ul style="list-style-type: none"> <li>• HOA Operator</li> <li>• LCD Operator</li> <li>• LED Operator</li> <li>• HOA Keypad</li> <li>• LCD Keypad</li> <li>• LED Keypad</li> </ul>
Hex. (Example: 900 (Hex.))	Identifies a unit for hexadecimal number format.

## ◆ Registered Trademarks

- Modbus TCP/IP is a trademark of Modbus-IDA.
- EtherNet/IP is a registered trademark of Open DeviceNet Vendor Association, Inc. (ODVA).
- EtherCAT® is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.
- PROFINET is a registered trademark of PROFIBUS Nutzerorganisation e.V. (PNO).
- BACnet is a trademark of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE).
- MECHATROLINK-4 is a trademark of the MECHATROLINK Members Association (MMA).
- Ethernet is a registered trademark of FUJIFILM Business Innovation Corp.
- Trademarks are the property of their respective owners.

## ◆ Supplemental Safety Information

Read and understand this manual before installing, operating, or servicing this product. The product must be installed according to this manual and local codes.

The following conventions are used to indicate safety messages in this manual. Failure to heed these messages could result in serious or possibly even fatal injury or damage to the products or to related equipment and systems.

**⚠ 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 minor or moderate injuries if you do not prevent it.*

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

## ■ Section Safety

### General Precautions

- The diagrams in this section may include options and drives without covers or safety shields to illustrate details. Be sure to reinstall covers or shields before operating any devices. The option should be used according to the instructions described in this manual.
- The diagrams in this manual are provided as examples only and may not pertain to all products covered by this manual.
- The products and specifications described in this manual or the content and presentation of the manual may be changed without notice to improve the product and/or the manual.
- Contact Yaskawa or a Yaskawa representative and provide the manual number shown on the front cover to order new copies of the manual.

**⚠ DANGER** *Do not ignore the safety messages in this manual. If you ignore the safety messages in this manual, it will cause serious injury or death. The manufacturer is not responsible for injuries or damage to equipment.*

**⚠ WARNING** *Electrical Shock Hazard. Do not modify the drive circuitry. Failure to obey can cause serious injury or death, or cause damage to the drive and will void warranty. Yaskawa is not responsible for modifications of the product made by the user.*

**NOTICE** *Damage to Equipment. Do not use steam or other disinfectants to fumigate wood for packaging the drive. Use alternative methods, for example heat treatment, before you package the components. Gas from wood packaging fumigated with halogen disinfectants, for example fluorine, chlorine, bromine, iodine or DOP gas (phthalic acid ester), can cause damage to the drive.*

## 2 Overview

This drive provides a communications connection between the drive and a PROFINET network.

The controller can do these functions:

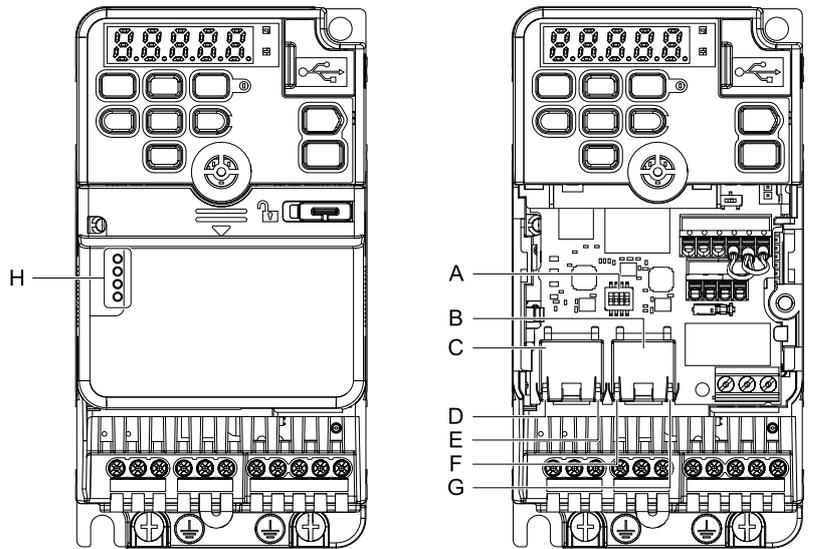
- Operate the drive
- Monitor the drive operation status
- Change drive parameter settings

PROFINET is a communications link to connect industrial devices (for example smart motor controllers, operator interfaces, and variable frequency drives) and control devices (for example, programmable controllers and computers) to a network. PROFINET is a simple networking solution. PROFINET decreases the cost and time to wire and install factory automation devices, and it gives the drive to interchange like components from other vendors. PROFINET is an open network standard.

The drive is PROFINET Conformance Class B certified.

## 3 Component Names

### ◆ PCB



- A - DIP switch S1
- B - Ethernet connector CN1B (Port 2) (RJ45)
- C - Ethernet connector CN1A (Port 1) (RJ45)
- D - Port 1 LED (LINK/ACT) \*1
- E - Port 1 LED (10/100) \*1
- F - Port 2 LED (LINK/ACT) \*1
- G - Port 2 LED (10/100) \*1
- H - Communication status LEDs \*1

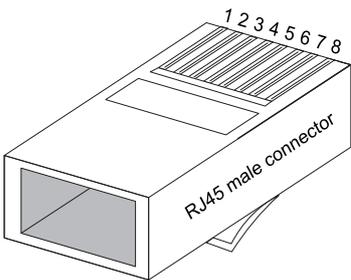
Figure 3.1 PCB Components

\*1 Refer to [Communication LED States on page 8](#) for more information about the LEDs.

### ◆ Communication Connector

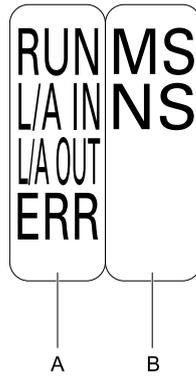
Ports CN1A (Port 1) and CN1B (Port 2) are connection points for male 8-way Ethernet modular RJ45 connectors on customer-supplied communication cables.

Table 3.1 Male 8-way Ethernet Modular Connector (Customer-Supplied)

Male 8-way Ethernet Modular Connector	Pin	Description
	1 (Pair 2)	Transmit data (TXD) +
	2 (Pair 2)	Transmit data (TXD) -
	3 (Pair 3)	Receive data (RXD) +
	4 (Pair 1)	Not used
	5 (Pair 1)	Not used
	6 (Pair 3)	Receive data (RXD) -
	7 (Pair 4)	Not used
	8 (Pair 4)	Not used

◆ **Communication LED States**

Use LED label B when you use PROFINET.



**A - For EtherCAT**

**B - For Modbus TCP/IP, EtherNet/IP, PROFINET, BACnet/IP, MECHATROLINK-4**

**Figure 3.2 Communication LED Labels**

PROFINET uses the following four LEDs:

- Bi-color Status LEDs:
  - Module status (MS) red/green
  - Network status (NS) red/green
- Ethernet Port LEDs (2 each):
  - Network speed-10/100 green
  - Link status and network activity-Link/Act green

Wait 2 seconds minimum for the power-up diagnostic process to complete before you verify the LED states. [Table 3.2](#) shows the operating status of the LEDs after the power-up diagnostic LED sequence is complete. The number in parentheses in the "Display" column is the number of pulses of 250 ms ON and 250 ms OFF. When the ON and OFF pulses complete for the number of times in parentheses, LED will be 500 ms OFF, then repeat the cycle of ON and OFF for the number of times.

Refer to [Table 3.3](#) for more information about the LEDs.

**Table 3.2 Communication LED States**

LED Name	Indication		Operating State	Description
	Color	Display		
MS	-	OFF	Power supply off	There is no power to the drive.
	Green	ON	Operating	The communication network is operating normally and initialization is complete.
	Green	Flashing (1)	Diagnostics	Diagnostic data available.
	Green	Flashing (2)	Configuration tool	Set by the hardware configuration tool for identification purposes.
	Red	ON	Default MAC or bad webpage configuration.	The default MAC address is programmed or the drive detected an issue with the webpage configuration.
	Red	Flashing (2)	No IP (non-fatal)	No IP address assigned.
	Red	Flashing (3)	No station name (non-fatal)	No station name assigned.
	Red	Flashing (5)	EF0 (Forced Fault)	Forced fault from the network.
	Red/Green	Flashing	Self-test	The drive is in self-test mode.
NS	-	OFF	Power supply OFF or Offline	-
	Green	ON	Connected	Connection established with IO-Controller and in RUN mode.
	Green	Flashing	Connected and stopped	Connection established with IO-Controller and in STOP mode.
	Red	Flashing (1)	Lost communication	Host communication is temporarily lost.
	Red	Flashing (2)	Lost link	No link detected to network.

LED Name	Indication		Operating State	Description
	Color	Display		
	Red	Flashing (3)	IP configuration error	The configured IP addresses are incompatible. The IP Address (F7-01 to F7-04) does not agree with the Subnet Mask (F7-05 to F7-08) and/or the Gateway Address (F7-09 to F7-12). This will clear the fault automatically.
	Red	Flashing (4)	S2 primary connection timeout	Timeout for no Primary PLC connection when using S2 Redundancy
10/100	Green	OFF	10 Mbps is established	
	Green	ON	100 Mbps is established	
LINK/ACT	-	OFF	Link is not established	
	Green	ON	Link is established	
	Green	Flashing	Link is established and there is network activity	

## ■ Power-Up Diagnostics

An LED test is performed each time the drive is powered up. The initial boot sequence can take several seconds. After the LEDs complete the diagnostic LED sequence, the drive is successfully initialized. The LEDs then assume operational conditions as shown in [Table 3.3](#).

**Table 3.3 Power-Up Diagnostic LED Sequence**

Sequence	Module Status (MS)	Network Status (NS)	Time (ms)
1	Green	OFF	250
2	Red	OFF	250
3	Green	OFF	-
4	Green	Green	250
5	Green	Red	250
6	Green	OFF	-

## 4 Installation

### ◆ Section Safety

**⚠ DANGER** *Electrical Shock Hazard. Do not examine, connect, or disconnect wiring on an energized drive. Before servicing, disconnect all power to the equipment and wait for the time specified on the warning label at a minimum. The internal capacitor stays charged after the drive is de-energized. The charge indicator LED extinguishes when the DC bus voltage decreases below 50 Vdc. When all indicators are OFF, measure for dangerous voltages to make sure that the drive is safe. If you do work on the drive when it is energized, it will cause serious injury or death from electrical shock.*

**⚠ WARNING** *Electrical Shock Hazard. Do not operate the drive when covers are missing. Replace covers and shields before you operate the drive. Use the drive only as specified by the instructions. Some figures in this section include drives without covers or safety shields to more clearly show the inside of the drive. If covers or safety shields are missing from the drive, it can cause serious injury or death.*

**⚠ WARNING** *Electrical Shock Hazard. Only let approved personnel install, wire, maintain, examine, replace parts, and repair the drive. If personnel are not approved, it can cause serious injury or death.*

**⚠ WARNING** *Electrical Shock Hazard. Do not remove covers or touch circuit boards while the drive is energized. If you touch the internal components of an energized drive, it can cause serious injury or death.*

**⚠ WARNING** *Electrical Shock Hazard. Do not use damaged wires, put too much force on the wiring, or cause damage to the wire insulation. Damaged wires can cause serious injury or death.*

**⚠ WARNING** *Fire Hazard. Tighten all terminal screws to the correct tightening torque. Connections that are too loose or too tight can cause incorrect operation and damage to the drive. Incorrect connections can also cause death or serious injury from fire.*

**NOTICE** *Damage to Equipment. When you touch the product, make sure that you observe correct electrostatic discharge (ESD) procedures. If you do not follow procedures, it can cause ESD damage to the drive circuitry.*

**NOTICE** *Damage to Equipment. Do not de-energize the drive while the drive is outputting voltage. Incorrect equipment sequencing can cause damage to the drive.*

**NOTICE** Do not operate a drive or connected equipment that has damaged or missing parts. You can cause damage to the drive and connected equipment.

**NOTICE** Use Yaskawa connection cables or recommended cables only. Incorrect cables can cause the drive to function incorrectly.

**NOTICE** Damage to Equipment. Correctly connect the connectors. Incorrect connections can cause malfunction or damage to the equipment.

**NOTICE** Damage to Equipment. Make sure that all connections are correct after you install the drive and connecting peripheral devices. Incorrect connections can cause damage to the product.

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### ◆ Settings for DIP Switch S1

Use DIP switch S1 on the PCB to select the communication protocol.

Use non-conductive tweezers or a tool with a tip width of approximately 0.5 mm (0.02 in) to set DIP switch S1.

Figure 4.1 shows the default settings for DIP switch S1.

**Note:**

Remove the front cover to set DIP switch S1.

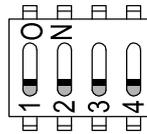


Figure 4.1 Default Settings for DIP Switch S1

When you use PROFINET, set DIP switch S1 as shown in Figure 4.2.

**Note:**

If you set the DIP switch for a different protocol, it will erase all user-entered data from the drive, including the Station Name.

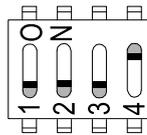


Figure 4.2 PROFINET Settings for DIP Switch S1

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### ◆ Communication Cable Specifications

Yaskawa recommends using shielded Cat5e cable. The Yaskawa warranty does not cover other cable types.

**Note:**

The maximum Ethernet cable length is 100 m (328 ft).

### ■ Communication Topology Specifications

When you use PROFINET, drives can be connected to network in a star, ring, or line topology.

- Star Topology  
Use either one of the communication connectors CN1A (Port 1) or CN1B (Port 2).
- Daisy-Chained Topology  
Use the communication connectors CN1A (Port 1) and CN1B (Port 2) at the same time. A switch is not necessary for this connection.
- Ring Topology  
Use the communication connectors CN1A (Port 1) and CN1B (Port 2) at the same time.

**Note:**

With a ring topology, MRP (Media Redundancy Protocol) must be enabled in the PLC configuration.

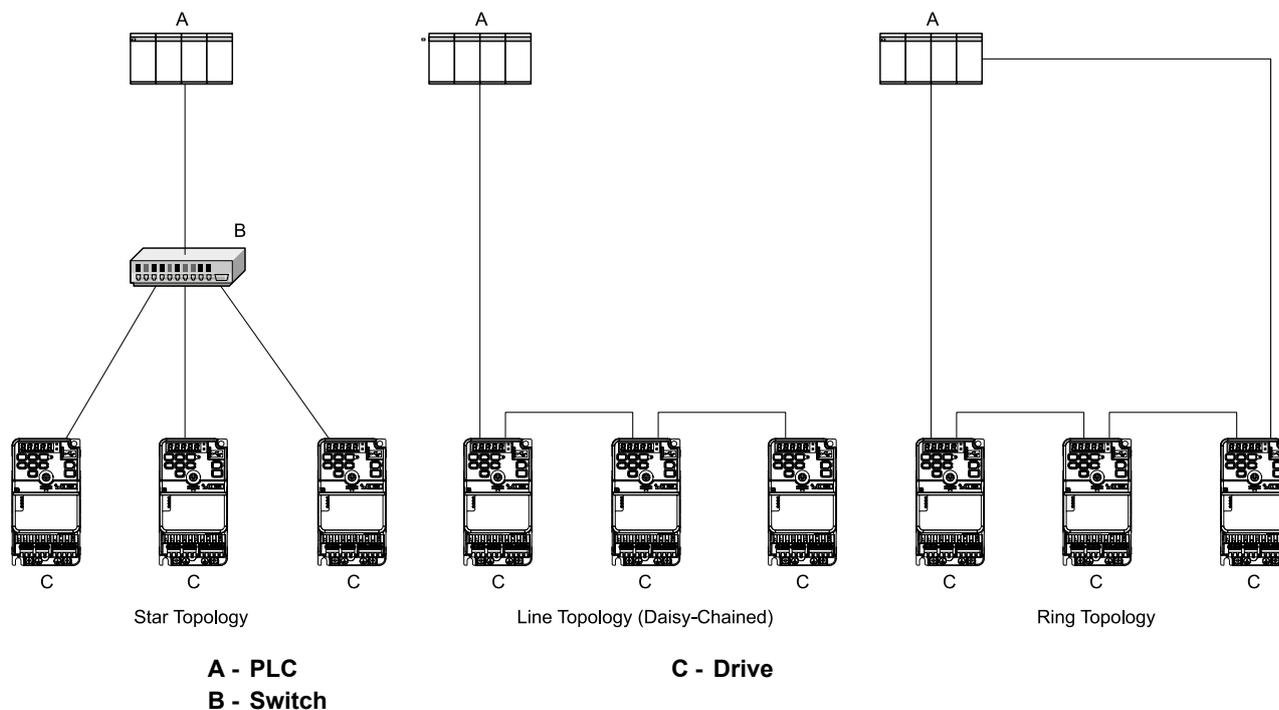


Figure 4.3 Communication Cable Wiring

## ◆ GSDML File

For easy network implementation of drives, please obtain the GSDML file from the Yaskawa website.

### Note:

Download the compatible GSDML file for this product. You can also obtain the GSDML file from the built-in web page on the drive (PROFINET Page). Refer to [PROFINET Page on page 41](#) for more information.

## ■ Device Access Point (DAP) Selection

The GSDML file contains the information needed to commission the Yaskawa PROFINET equipment within the PLC engineering tool software. Inside of the GSDML file are the definitions for the various Device Access Points (DAPs). For the selection of which DAP to use in the PLC program, refer to [Communication on page 19](#).

As [Figure 4.4](#) shows, once the GSDML is installed into the PLC engineering tool software, the various DAPs can be selected from the tool's hardware catalog. The GA501 will be found at the following path in the hardware catalog:

Other field devices → PROFINET IO → Drives → Yaskawa → Yaskawa Drives

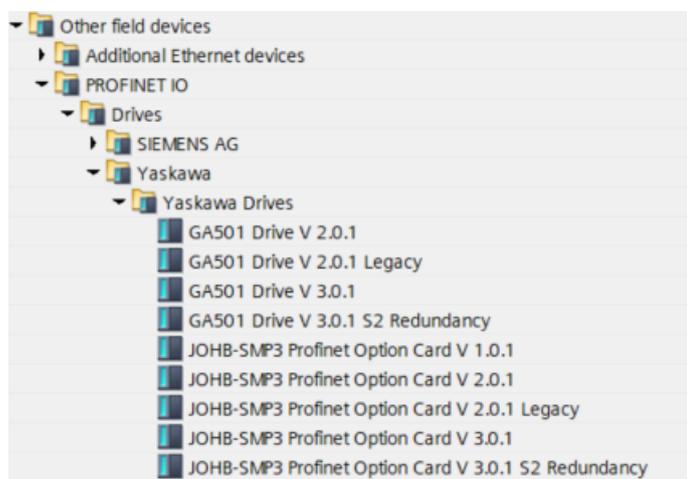


Figure 4.4 Hardware Catalog Example

## 5 Related Drive Parameters

These parameters set the drive for operation with PROFINET. Make sure that the parameter settings in this table are correct before you start network communications.

**Note:**

- Hex.: MEMOBUS addresses that you can use to change parameters over network communication are represented in hexadecimal numbers.
- Expert: Some monitors are available in Expert Mode only. When  $A1-01 = 3$  [*Access Level Selection = Expert Level*], Expert Mode monitors can be displayed on the keypad.

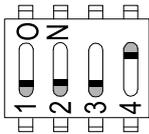
No. (Hex.)	Name	Description	Default (Range)
b1-01 (0180)	Frequency Reference Selection 1	Selects the input method for frequency reference. 0 : Keypad 1 : Analog Input 2 : USB 3 : Ethernet <b>Note:</b> Set $b1-01 = 3$ to use Ethernet to control the frequency reference of the drive.	3 (0 - 3)
b1-02 (0181)	Run Command Selection 1	Sets the input method for the Run command. 0 : Keypad 1 : Digital Input 2 : USB 3 : Ethernet <b>Note:</b> Set $b1-02 = 3$ to start and stop the drive with Ethernet.	3 (0 - 3)
F6-01 (03A2)	Communication Error Selection	Selects drive response when the drive detects a <i>bUS [Ethernet Communication Error]</i> error during communications. 0 : Ramp to Stop 1 : Coast to Stop 2 : Fast Stop (Use C1-09) 3 : Alarm Only 4 : Alarm (Run at $d1-04$ ) 5 : Alarm - Ramp Stop <b>Note:</b> • When you set this parameter to 3 or 4, the drive will continue operation after it detects a fault. Separately prepare safety protection equipment and systems, for example fast-stop switches. • Changes to this parameter take effect immediately. It is not necessary to cycle power on the drive.	1 (0 - 5)
F6-02 (03A3)	Comm External Fault (EF0) Detect	Selects the conditions at which <i>EF0 [Ethernet External Fault]</i> is detected. 0 : Always Detected 1 : Detected during RUN Only	0 (0, 1)
F6-03 (03A4)	Comm External Fault (EF0) Select	Selects the operation of the drive when <i>EF0 [Ethernet External Fault]</i> is detected. 0 : Ramp to Stop 1 : Coast to Stop 2 : Fast Stop (Use C1-09) 3 : Alarm Only <b>Note:</b> When you set this parameter to 3, the drive will continue operation after it detects a fault. Separately prepare safety protection equipment and systems, for example fast stop switches.	1 (0 - 3)
F6-06 (03A7)	Torque Limit by Comm. Ethernet	Selects whether to enable or disable the torque reference and torque limit received from Ethernet. 0 : Disabled 1 : Enabled <b>Note:</b> • Parameter is available when $A1-02 = 2, 6, 8$ [ <i>Control Method Selection = Open Loop Vector, PM Advanced Open Loop Vector, EZ Vector Control</i> ]. The drive reads this value as the Torque Limit. • If the PLC does not supply a torque reference or torque limit when $F6-06 = 1$ [ <i>Torque Limit by Comm. Ethernet = Enabled</i> ], the motor cannot rotate.	0 (0, 1)
F6-07 (03A8)	Multi-Step Ref @ NetRef/ ComRef	0 : Disable Multi-Step References 1 : Enable Multi-Step References	1 (0, 1)
F6-08 (036A)	Comm Parameter Reset @Initialize	Selects whether communication-related parameters $F6-xx$ and $F7-xx$ are set back to original default values when you use parameter $A1-03$ [ <i>Initialize Parameters</i> ] to initialize the drive. 0 : No Reset - Parameters Retained 1 : Reset - Back to Factory Default <b>Note:</b> When you set $F6-08$ to 1 and you then use $A1-03$ to initialize the drive, the drive will not change this setting value.	0 (0, 1)
F6-14 (03BB)	Bus Error Auto Reset	Enables and disables the automatic reset of a <i>bUS [Ethernet Communication Error]</i> fault. 0 : Disabled	0 (0, 1)

No. (Hex.)	Name	Description	Default (Range)
		1 : Enabled <b>Note:</b> Changes to this parameter take effect immediately. It is not necessary to cycle power on the drive.	
F6-15 (0B5B)	Ethernet Parameters Reload	Sets when the drive will activate the F6-xx/F7-xx communications-related parameters that you changed. Use this parameter as an alternative to cycling power to the drive to active parameters. 0 : Reload at Next Power Cycle 1 : Reload Now 2 : Cancel Reload Request <b>Note:</b> • F6-15 is reset to 0 after setting 1 or 2. • Changes to this parameter take effect immediately. It is not necessary to cycle power on the drive.	0 (0 - 2)
F7-01 (03E5)	IP Address 1	Sets the static/fixed IP address. Sets the most significant octet. <b>Note:</b> • This parameter is only effective when F7-13 = 0 [Address Mode at Startup = Static]. • All IP Addresses must be unique. • You must cycle power to the drive or set F6-15 = 1 [Ethernet Parameters Reload = Reload Now] for the changes to take effect.	192 (0 - 255)
F7-02 (03E6)	IP Address 2	Sets the static/fixed IP address. Sets the second most significant octet. <b>Note:</b> • This parameter is only effective when F7-13 = 0 [Address Mode at Startup = Static]. • All IP Addresses must be unique. • You must cycle power to the drive or set F6-15 = 1 [Ethernet Parameters Reload = Reload Now] for the changes to take effect.	168 (0 - 255)
F7-03 (03E7)	IP Address 3	Sets the static/fixed IP address. Sets the third most significant octet. <b>Note:</b> • This parameter is only effective when F7-13 = 0 [Address Mode at Startup = Static]. • All IP Addresses must be unique. • You must cycle power to the drive or set F6-15 = 1 [Ethernet Parameters Reload = Reload Now] for the changes to take effect.	1 (0 - 255)
F7-04 (03E8)	IP Address 4	Sets the static/fixed IP address. Sets the fourth most significant octet. <b>Note:</b> • This parameter is only effective when F7-13 = 0 [Address Mode at Startup = Static]. • All IP Addresses must be unique. • You must cycle power to the drive or set F6-15 = 1 [Ethernet Parameters Reload = Reload Now] for the changes to take effect.	20 (0 - 255)
F7-05 (03E9)	Subnet Mask 1	Sets the static/fixed Subnet Mask. Sets the most significant octet. <b>Note:</b> • This parameter is only effective when F7-13 = 0 [Address Mode at Startup = Static]. • All IP Addresses must be unique. • You must cycle power to the drive or set F6-15 = 1 [Ethernet Parameters Reload = Reload Now] for the changes to take effect.	255 (0 - 255)
F7-06 (03EA)	Subnet Mask 2	Sets the static/fixed Subnet Mask. Sets the second most significant octet. <b>Note:</b> • This parameter is only effective when F7-13 = 0 [Address Mode at Startup = Static]. • All IP Addresses must be unique. • You must cycle power to the drive or set F6-15 = 1 [Ethernet Parameters Reload = Reload Now] for the changes to take effect.	255 (0 - 255)
F7-07 (03EB)	Subnet Mask 3	Sets the static/fixed Subnet Mask. Sets the third most significant octet. <b>Note:</b> • This parameter is only effective when F7-13 = 0 [Address Mode at Startup = Static]. • All IP Addresses must be unique. • You must cycle power to the drive or set F6-15 = 1 [Ethernet Parameters Reload = Reload Now] for the changes to take effect.	255 (0 - 255)
F7-08 (03EC)	Subnet Mask 4	Sets the static/fixed Subnet Mask. Parameter F7-08 sets the fourth most significant octet. <b>Note:</b> • This parameter is only effective when F7-13 = 0 [Address Mode at Startup = Static]. • All IP Addresses must be unique. • You must cycle power to the drive or set F6-15 = 1 [Ethernet Parameters Reload = Reload Now] for the changes to take effect.	0 (0 - 255)
F7-09 (03ED)	Gateway Address 1	Sets the static/fixed Gateway address. Sets the most significant octet. <b>Note:</b> • This parameter is only effective when F7-13 = 0 [Address Mode at Startup = Static]. • All IP Addresses must be unique. • You must cycle power to the drive or set F6-15 = 1 [Ethernet Parameters Reload = Reload Now] for the changes to take effect.	192 (0 - 255)
F7-10 (03EE)	Gateway Address 2	Sets the static/fixed Gateway address. Sets the second most significant octet. <b>Note:</b> • This parameter is only effective when F7-13 = 0 [Address Mode at Startup = Static]. • All IP Addresses must be unique. • You must cycle power to the drive or set F6-15 = 1 [Ethernet Parameters Reload = Reload Now] for the changes to take effect.	168 (0 - 255)

## 5 Related Drive Parameters

No. (Hex.)	Name	Description	Default (Range)
F7-11 (03EF)	Gateway Address 3	Sets the static/fixed Gateway address. Sets the third most significant octet. <b>Note:</b> • This parameter is only effective when $F7-13 = 0$ [Address Mode at Startup = Static]. • All IP Addresses must be unique. • You must cycle power to the drive or set $F6-15 = 1$ [Ethernet Parameters Reload = Reload Now] for the changes to take effect.	1 (0 - 255)
F7-12 (03F0)	Gateway Address 4	Sets the static/fixed Gateway address. Parameter $F7-12$ sets the fourth most significant octet. <b>Note:</b> • This parameter is only effective when $F7-13 = 0$ [Address Mode at Startup = Static]. • All IP Addresses must be unique. • You must cycle power to the drive or set $F6-15 = 1$ [Ethernet Parameters Reload = Reload Now] for the changes to take effect.	1 (0 - 255)
F7-13 (03F1)	Address Startup Mode	Selects how the IP address is set. 0 : Static (Use $F7-01$ to $F7-12$ to set.) 1 : BOOTP (PLC will assign IP Address) 2 : DHCP (PLC will assign IP Address) <b>Note:</b> • You must cycle power to the drive or set $F6-15 = 1$ [Ethernet Parameters Reload = Reload Now] for the changes to take effect. • The PLC will assign the IP addresses when $F7-13 = 1$ or 2.	2 (0 - 2)
F7-14 (03F2)	Duplex Mode Selection	Sets duplex mode settings (Port 1 (CN1A)/Port 2 (CN1B)). Set this parameter to 1 or 2 for PROFINET. Set $F7-15 = 100$ [Communication Speed Selection = 100/100 Mbps (100 Mbps/100 Mbps)] if you set this parameter to 2. 0 : Half/Half (Half Duplex/Half Duplex) 1 : Auto/Auto (Auto Negotiation/Auto Negotiation) 2 : Full/Full (Full Duplex/Full Duplex) 3 : Half/Auto (Half Duplex/Auto Negotiation) 4 : Half/Full (Half Duplex/Full Duplex) 5 : Auto/Half (Auto Negotiation/Half Duplex) 6 : Auto/Full (Auto Negotiation/Full Duplex) 7 : Full/Half (Full Duplex/Half Duplex) 8 : Full/Auto (Full Duplex/Auto Negotiation) <b>Note:</b> You must cycle power to the drive or set $F6-15 = 1$ [Ethernet Parameters Reload = Reload Now] for the changes to take effect.	1 (0 - 8)
F7-15 (03F3)	Communication Speed Selection	Sets the communications speed (Port 1 (CN1A)/Port 2 (CN1B)). Set this parameter to 100 for PROFINET. 10 : 10/10 Mbps (10 Mbps/10 Mbps) 100 : 100/100 Mbps (100 Mbps/100 Mbps) 101 : 10/100 Mbps (10 Mbps/100 Mbps) 102 : 100/10 Mbps (100 Mbps/10 Mbps) <b>Note:</b> • $F7-15$ is only effective when the port is set to half or full duplex in $F7-14$ [Duplex Mode Selection]. • You must cycle power to the drive or set $F6-15 = 1$ [Ethernet Parameters Reload = Reload Now] for the changes to take effect.	10 (10 - 102)
F7-16 (03F4)	Timeout Value	Sets the <i>bUS</i> [Ethernet Communication Error] fault delay time to the drive after a <i>bUS</i> fault is detected to let the network condition self-correct. <b>Note:</b> Changes to this parameter take effect immediately. It is not necessary to cycle power on the drive.	0.0 s (0.0 s - 30.0 s)
F7-23 - F7-27 (03FB - 03FF) F7-28 - F7-32 (0370 - 0374)	Dynamic Out Param 1 to 10 for Ethernet	Sets configurable outputs 1 to 10 that are used in some of the PROFINET I/O modules. Each parameter contains a MEMOBUS/Modbus address. The values received from the PLC for the configurable outputs will be written to this corresponding MEMOBUS / Modbus addresses. A MEMOBUS/Modbus address value of 0 means that the value received from the PLC for the configurable outputs will not be written to any MEMOBUS/Modbus register.	0 (-)
F7-33 - F7-42 (0375 to 037E)	Dynamic In Param 1 to 10 for Ethernet	Sets configurable inputs 1 to 10 which are used in some of the PROFINET I/O modules. Each parameter contains a MEMOBUS/Modbus address. The values sent to the PLC via the configurable inputs will be read from the corresponding MEMOBUS/Modbus addresses. A MEMOBUS/Modbus address value of 0 means that the value sent for the configurable inputs is not defined by the user, therefore the default register value will be returned.	0 (-)
H5-11 (043C)	Communications ENTER Function Selection	Sets when an Enter command is necessary to use PROFINET communications to change parameter values. 0 : Parameter changes are activated when ENTER command is written 1 : Parameter changes are activated immediately. No ENTER command is necessary.	1 (0, 1)
o1-03 (0502)	Frequency Display Unit Selection	Sets the display units for the frequency reference and output frequency. Changes to this parameter take effect immediately. It is not necessary to cycle power on the drive. 0 : 0.01 Hz units 1 : 0.01% units 2 : $\text{min}^{-1}$ (r/min) units 3 : User Units (o1-10 & o1-11)	0 (0 - 3)

Table 5.1 PROFINET Monitor

No.	Name	Description	Range
U4-75	Ethernet Protocol	Shows the setting of DIP switch S1. <ul style="list-style-type: none"> <li>78 (Setting to use PROFINET (1: OFF, 2: OFF, 3: OFF, 4: ON))</li> </ul>  <ul style="list-style-type: none"> <li>00 to 77, 79 to FF (Setting to use other than PROFINET)</li> </ul> <b>Note:</b> PROFINET will not operate with these setting values.	00 - FF (Hex.)
U4-76 - U4-78	MAC Address 1	Shows the Main MAC Address. <ul style="list-style-type: none"> <li>U4-76: First octet, Second octet</li> <li>U4-77: Third octet, Fourth octet</li> <li>U4-78: Fifth octet, Sixth octet</li> </ul>	0000 - FFFF (Hex.)
U4-79 - U4-81 Expert	MAC Address 2	Shows the second MAC Address. <ul style="list-style-type: none"> <li>U4-79: First octet, Second octet</li> <li>U4-80: Third octet, Fourth octet</li> <li>U4-81: Fifth octet, Sixth octet</li> </ul>	0000 - FFFF (Hex.)
U4-82 - U4-84 Expert	MAC Address 3	Shows the third MAC Address. <ul style="list-style-type: none"> <li>U4-82: First octet, Second octet</li> <li>U4-83: Third octet, Fourth octet</li> <li>U4-84: Fifth octet, Sixth octet</li> </ul>	0000 - FFFF (Hex.)
U6-80 - U6-83	Ethernet IP Address 1 - 4	Shows the currently available local IP Address. <ul style="list-style-type: none"> <li>U6-80: First octet</li> <li>U6-81: Second octet</li> <li>U6-82: Third octet</li> <li>U6-83: Fourth octet</li> </ul>	0 - 255
U6-84 - U6-87	Ethernet Subnet 1 - 4	Shows the currently available subnet mask. <ul style="list-style-type: none"> <li>U6-84: First octet</li> <li>U6-85: Second octet</li> <li>U6-86: Third octet</li> <li>U6-87: Fourth octet</li> </ul>	0 - 255
U6-88 - U6-91	Ethernet Gateway 1 - 4	Shows the currently available gateway address. <ul style="list-style-type: none"> <li>U6-88: First octet</li> <li>U6-89: Second octet</li> <li>U6-90: Third octet</li> <li>U6-91: Fourth octet</li> </ul>	0 - 255
U6-92	Ethernet Speed	Shows CN1A Port 1 link speed currently available.	10: 10 Mbps 100: 100 Mbps
U6-93	Online Duplex	Shows CN1A Port 1 duplex setting currently available.	0: Half/Half 1: Full/Full
U6-94	Ethernet SPARE 1	Shows CN1B Port 2 link speed currently available.	10: 10 Mbps 100: 100 Mbps
U6-95	Ethernet SPARE 2	Shows CN1B Port 2 duplex setting currently available.	0: Half/Half 1: Full/Full
U6-97	Ethernet SPARE 4	Shows the PROFINET-specific software version. (when DIP switches are set for PROFINET) Shows overall communication software version (when DIP switches are all OFF)	-
U6-98	Ethernet First Fault	Shows first PROFINET fault.	-
U6-99	Ethernet Current Fault	Shows current PROFINET fault.	-

## 6 PROFINET Messaging

### ◆ PROFINET Overview

This section describes the communication profile used between the PROFINET I/O network and the drive.

The drive can be configured by the hardware configuration tool (customer supplied) to use either the Yaskawa-specific set of control and status words or the PROFIdrive profile.

By default, the drive uses the Yaskawa-specific profile. The Yaskawa-specific control word allows for simple run/stop/reverse control. The Yaskawa-specific status word contains simple bit-mapped status information.

Optionally, the PROFIdrive profile can be selected. Selecting the PROFIdrive profile forces the PROFIdrive run/stop sequence and re-maps the control and status word definitions to be compatible with PROFIdrive.

**Note:**

If you need a previous P-Drive behavior, select the GA501 Drive V 2.0.1 Legacy DAP. Refer to *P-Drive Operation on page 49* for details on P-Drive Legacy operation.

## ◆ Yaskawa Vendor-Specific Control and Status Words

### ■ The Control Word and the Status Word

The contents of the Control Word and the Status Word are detailed in [Table 6.1](#).

The Control and Status Words are always the first words (Word 0) regardless of the selected telegram.

### ■ Frequency Reference

Frequency Reference is a 16-bit word containing the desired output frequency.

The default units for this word are 0.01 Hz (example: 1234 → 12.34 Hz reference).

You can use *o1-03 [Frequency Display Unit Selection]* and *o1-10 [User Units Maximum Value]* to change the units of the frequency reference.

### ■ Output Frequency

Output Frequency is a 16-bit word containing the current output frequency of the drive.

The default units for this word are 0.01 Hz (example: 1234 → 12.34 Hz reference).

You can use *o1-03 [Frequency Display Unit Selection]* and *o1-10 [User Units Maximum Value]* to change the units of the output frequency.

The Output Frequency is always the second word (Word 1) of the "produce" telegram, regardless of the selected telegram.

**Table 6.1 Yaskawa-Specific Control Word and Status Word**

Yaskawa-Specific Control Word		Yaskawa-Specific Status Word	
Bit	Description	Bit	Description
0	Forward Run	0	Running
1	Reverse Run	1	Zero Speed
2	Ethernet External Fault (EFO)	2	Reverse Operation
3	Fault Reset	3	Reset Signal Input Active
4	Multi-Function Input 1	4	Speed Agree
5	Multi-Function Input 2	5	Ready
6	Multi-Function Input 3	6	Alarm
7	Multi-Function Input 4	7	Fault
8	Multi-Function Input 5	8	<i>oPE</i> Fault
9	Multi-Function Input 6	9	During Undervoltage
10	Multi-Function Input 7	10	Motor 2 Selected
11	Not Used	11	Zero Servo Complete
12	Not Used	12	Not Used
13	Not Used	13	Not Used
14	Not Used	14	Net Reference
15	Not Used	15	Net Control

## ◆ PROFIdrive Communication Profile

This drive has a PROFIdrive communication profile in compliance with PROFIdrive. This behavior is different than P-Drive in JOHB-SMP3 option software versions 5002 and earlier. If you need a previous P-Drive behavior

for backwards compatibility, select the GA501 Drive V2.0.1 Legacy DAP. Refer to *P-Drive Operation on page 49* for details on P-Drive and the differences between P-Drive and PROFIdrive.

## ■ PROFIdrive Operation

### Drive Parameter Settings

For conformant PROFIdrive operation, the following drive parameters must be set:

- Set *b1-01* = 3 [*Frequency Reference Selection 1* = Ethernet]
- Set *b1-02* = 3 [*Run Command Selection 1* = Ethernet]
- Set *b1-03* = 0 [*Stopping Method Selection* = Ramp to Stop]
- *L4-01* [*Speed Agree Detection Level*] - Determines the Frequency Output level that Setpoint Reached bit of STW (Bit 10) will be set (true).
- *L4-02* [*Speed Agree Detection Width*] - Determines tolerance of actual speed as compared to commanded speed. Actual speed is based on *U1-05* [*Motor Speed*], and commanded speed is based on *U1-16* [*SFS Output Frequency*]. Speed Deviation bit of STW (bit 8) will be set (true) when within tolerance and will be reset (false) when not within tolerance.

#### Note:

Alternate sequence and reference *b1-15* [*Frequency Reference Selection 2*] & *b1-16* [*Run Command Selection 2*] if used, can affect PROFIdrive operation.

### The Control Word and the Status Word

For a more detailed description of PROFIdrive Control Bits, Status Bits and behavior see the PROFIdrive specification. This can be obtained from the regional PI associations.

The drive supports PROFIdrive Application Class 1. This is the standard drive application with setpoint control.

**Table 6.2 Control Word (STW)**

Bit	Name	Value	State Change/Description
0	ON	1	Proceed to Switched On unless other interlocks (OFF2, OFF3) are active.
	OFF	0	Proceed to Ready For Switching On unless other interlocks (OFF2, OFF3) are active.
1	OFF2	1	Continue operation (OFF2 inactive)
		0	Coast to Stop Proceed to Switch On Inhibit.
2	OFF3	1	Continue operation (OFF3 inactive)
		0	Quick stop Proceed to Quick Stop. Proceed to Switch On Inhibit once drive stopped.
3	Enable Operation	1	Proceed to Operation.
		0	Inhibit operation. Proceed to Switched On.
4	Enable Ramp Generator	1	Normal operation
		0	When in a running state, it will ramp to zero speed using <i>C1-09</i> [ <i>Fast Stop Time</i> ].
5	Unfreeze Ramp Generator	1	Normal operation
		0	Drive will retain its current frequency reference even if ramping up or ramping down.
6	Enable Setpoint	1	Normal operation Proceed to Operating. <b>Note:</b> This bit is effective only if the fieldbus interface is set as the source for this signal by drive parameters.
		0	Will force the input of the ramp generator (frequency reference) to zero.
7	Fault Acknowledge	0 -> 1	Fault reset if an active fault exists. Proceed to Switch On Inhibit.
		0	(Continue normal operation)
8	Jog 1	-	(Not supported)
9	Jog 2	-	(Not supported)
10	Control by PLC	1	Network control enabled.
		0	Cannot proceed to Operating.
11 - 15	(Device Specific)	-	(Device Specific)

Table 6.3 Status Word (ZSW)

Bit	Name	Value	State Change/Description
0	Ready to Switch on	1	Ready to Switch on
		0	Not Ready to Switch on
1	Ready to Operate	1	Ready to Operate
		0	Not Ready to Operate
2	Operation Enabled	1	Enable Operation
		0	Disable Operation
3	Fault Present	1	Faulted
		0	Not Faulted
4	OFF2 Status	1	OFF2 Inactive. (Coast to Stop)
		0	OFF2 Active. (Coast to Stop)
5	OFF3 Status	1	OFF3 Inactive. (Quick Stop)
		0	OFF3 Active. (Quick Stop)
6	Switch on Inhibited	1	Switch on Inhibit Active
		0	Switch on Inhibit Not Active
7	Warning	1	Warning/Alarm.
		0	No Warning/Alarm.
8	Speed Error	1	Actual value equals reference value (i.e. is within tolerance limits).
		0	Actual value differs from reference value (= is outside tolerance limits). This will occur DEV alarm or DEV fault from drive.
9	Control Requested	1	Drive can accept commands from PLC.
		0	Drive is not ready to accept commands from the PLC.
10	Setpoint Reached		Set if frequency output level is more than the value of L4-01.
11 to 13	(Reserved)	-	(Reserved)
14	Safe Torque Off (STo or SToF)	1	Safe Torque Off circuit open, Coast To Stop
		0	Safe Torque Off circuit closed.
15	(Reserved)	-	(Reserved)

#### • State Machine

PROFIdrive is based upon a state machine for PLC control. For a more detailed description of the PROFIdrive state machine, see the PROFIdrive specification. This can be obtained from the regional PI associations.

#### Note:

When you operate the drive in LOCAL Mode, the drive operation status will be reflected to Status Word (ZSW) as follows:

- Operation Stopped: S2 (Ready For Switching On)
- Drive Running: S4 (Operation)

#### Frequency Reference

The Frequency reference is a 16-bit word containing a sign bit and a 15-bit integer. A negative reference (indicating reverse direction of rotation) is formed by calculating the two's complement from the corresponding positive reference. The reference value is the desired output frequency.

The default units for this word are 0.01 Hz (example: 1234 → 12.34 Hz reference).

You can use *o1-03 [Frequency Display Unit Selection]* and *o1-10 [User Units Maximum Value]* to change the units of the frequency reference.

The Frequency Reference is always the second word (Word 1) of the “consume” telegram, regardless of the selected telegram.

**⚠ WARNING** *Sudden Movement Hazard. Do not set o1-03 = 3 [Frequency Display Unit Selection = User Units (o1-10 & o1-11)] and o1-10 [User Units Maximum Value] > 32,767 at the same time. When o1-03 = 0 [0.01 Hz units], do not set a value greater than 32768 for the frequency reference. This word is a 15-bit signed integer, and incorrect parameter settings can cause serious injury or death from reverse rotation at incorrect speeds.*

#### Output Frequency

Output Frequency is a 16-bit word containing the current output frequency (*U1-02*) of the drive.

The default units for this word are 0.01 Hz (example: 1234 → 12.34 Hz reference).

You can use *o1-03 [Frequency Display Unit Selection]* and *o1-10 [User Units Maximum Value]* to change the units of the output frequency.

The Output Frequency is always the second word (Word 1) of the “produce” telegram, regardless of the selected telegram.

## 7 Communication

This section describes the PROFINET IO messaging used in communication with the drive.

For detailed information on PROFINET IO communication, refer to PROFINET specification Application Layer protocol for decentralized periphery and distributed automation v2.0 available at [www.profibus.com](http://www.profibus.com).

### ◆ Introduction to PROFINET IO

PROFINET IO is a fieldbus protocol that enables communication between programmable controllers and distributed field devices on an Ethernet network. The protocol classifies devices into IO-Controllers, IOSupervisors, and IO-Devices, which have a specific collection of services.

PROFINET IO uses three different communication channels to exchange data. The standard UDP/IP and TCP/IP channel is used for parameterization and configuration of devices and for acyclic operations. The Real Time (RT) channel is used for cyclic data transfer and alarms. The third channel, Isochronous Real Time (IRT) channel, is used e.g. in motion control applications (not implemented in the GA501).

PROFINET IO devices are structured in slots and sub-slots, which can contain modules and sub-modules correspondingly. Device specific data is represented in slot 0, module and sub-module specific data is in subsequent slots and sub-slots.

One of the benefits of PROFINET IO is the diagnostics and alarm mechanism. Every module and sub-module provide alarm data to the IO-Controller using the cyclic channel. Diagnostic data can be read non-cyclically from the device by using record data.

Properties and services of a PROFINET IO device are described in a GSD file that is written in General Station Description Markup Language (GSDML). GSD file describes the device specific modules and the method of assigning modules and sub-modules to predefined slots and sub-slots.

Information about how to obtain the GSDML file is contained in [GSDML File on page 11](#).

### ◆ PROFINET IO

The decision to use the PROFIdrive, P-Drive (Legacy) or the Yaskawa-specific control and status words is done in the hardware configuration tool (customer supplied). The default value is the Yaskawa-specific format.

The drive uses slots 0 and 1. Slot 0 is the DAP and represents the device itself.

IO modules and sub-modules described in the GSD file can be assigned to slot 1 and its sub-slots. The way in which the Slot 1 and its sub-slots are defined differs depending upon which software version of PROFINET that is in use and which DAP is selected.

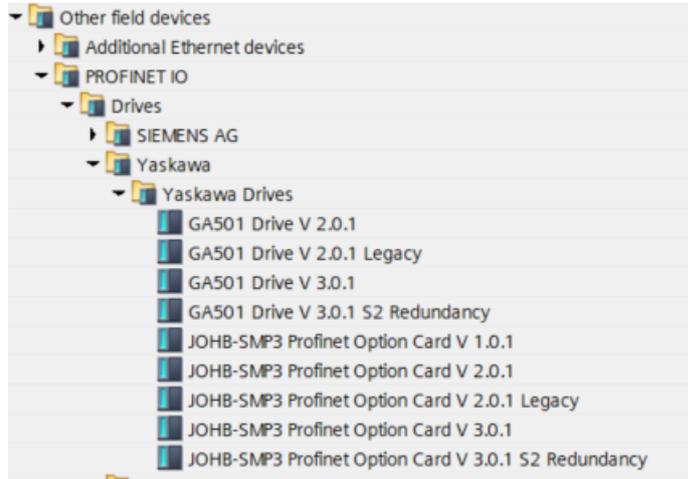
### ■ Hardware Catalog

There are nine types of DAPs that can be selected:

- GA501 Drive V 2.0.1
- GA501 Drive V 2.0.1 Legacy
- GA501 Drive V 3.0.1
- GA501 Drive V 3.0.1 S2 Redundancy
- JOHB-SMP3 Profinet Option Card V 1.0.1 <sup>\*1</sup>
- JOHB-SMP3 Profinet Option Card V 2.0.1 <sup>\*1</sup>
- JOHB-SMP3 Profinet Option Card V 2.0.1 Legacy <sup>\*1</sup>
- JOHB-SMP3 Profinet Option Card V 3.0.1 <sup>\*1</sup>
- JOHB-SMP3 Profinet Option Card V 3.0.1 S2 Redundancy <sup>\*1</sup>

<sup>\*1</sup> Not available when using the GA501.

The hardware catalog in TIA portal should show like below:



### ■ DAP Descriptions/Selection

For PROFINET version V 2.0.1 and later, the PROFIdrive implementation is not fully backward compatible with P-Drive. If you have an existing PLC program that is using P-Drive, you should select GA501 Drive V 2.0.1 Legacy so as not to have to change your PLC program. If you use the redundancy feature of PROFINET S2, select GA501 Drive V 3.0.1 S2 Redundancy.

More detailed descriptions of each DAP is below.

DAP	Content
GA501 Drive V 3.0.1 S2 Redundancy	Best to use for all new installations when software is Ver5004 or later Available functions: <ul style="list-style-type: none"> <li>• S2 Redundancy</li> <li>• MRP (Media Redundancy Protocol - Ring)</li> <li>• PROFIdrive</li> <li>• SNMP (Simple Network Management Protocol)</li> <li>• I/O communication cycle times of 4 ms to 512 ms</li> </ul>
GA501 Drive V 3.0.1	Best to use when I/O communication cycle time of 2 ms is required Available functions: <ul style="list-style-type: none"> <li>• MRP (Media Redundancy Protocol - Ring)</li> <li>• PROFIdrive</li> <li>• SNMP (Simple Network Management Protocol)</li> <li>• I/O communication cycle times of 2 ms to 512 ms</li> </ul>
GA501 Drive V 2.0.1	Available functions: <ul style="list-style-type: none"> <li>• MRP (Media Redundancy Protocol - Ring)</li> <li>• PROFIdrive</li> <li>• SNMP (Simple Network Management Protocol)</li> <li>• I/O communication cycle times of 2 ms to 512 ms</li> </ul>
GA501 Drive V 2.0.1 Legacy	Available functions: <ul style="list-style-type: none"> <li>• MRP (Media Redundancy Protocol - Ring)</li> <li>• P-Drive</li> <li>• SNMP (Simple Network Management Protocol)</li> <li>• I/O communication cycle times of 2 ms to 512 ms</li> </ul>

### ■ Module Configuration

The parameters to configure the PROFINET features within the engineering tool (like TIA Portal) are contained in the “Module” definitions. [Table 7.1](#) lists the parameters and the modules where they are located.

**Table 7.1 Module Parameter Locations**

Parameter	V3.0.1/V2.0.1	V2.0.1 (Legacy)
SNMP Enable	Module Access Point (Slot 1.1)	N/A
MBTCP Enable		Various Modules (Slot 1)
Webpage Enable		
Email Enable		
Network Configurator Enable		

Parameter	V3.0.1/V2.0.1	V2.0.1 (Legacy)
Control and Status Word Selection	Standard Telegram 1 (Slot 1.2) • Yaskawa Standard • PROFIDrive	Various Modules (Slot 1) • Yaskawa Standard • P-Drive • P-Drive (no STO)
PZD Selections	Various Modules (Slot 1.3) Output Parameters Input Parameters	Various Modules (Slot 1) Output Parameters Input Parameters

Figure 7.1 shows the engineering tool examples of the module configurations.

Module	Rack	Slot	I address	Q address	Type	Firmware
GA501	0	0			GA501 Drive V 3.0....	V3.0.1
Interface	0	0 X1			GA501	
Port 1	0	0 X1 P1			Port 1	
Port 2	0	0 X1 P2			Port 2	
Std Tgm 1 V2.0.1_1	0	1			Std Tgm 1 V2.0.1	V2.0.1
Module Access Point	0	1 1			Module Access Point	
Standard telegram 1 V2....	0	1 2	194...197	72...75	Standard telegram ...	

Figure 7.1 For DAP 3.0.1

## ◆ Services Provided by PROFINET in GA501

The following services are provided by PROFINET in GA501:

- Cyclic messaging in PROFIDrive or Yaskawa-specific mode
- Acyclic parameter access mechanism
- Identification & Maintenance functions (I&M0)
- PROFIDrive parameters
- Diagnostic and alarm mechanism
- Fault buffer mechanism

## ■ PROFINET Configuration Parameters

PROFINET Configuration Parameters are set through the hardware (PLC) configuration tool. They define the behaviors, features, and some of the data exchanged on the PROFINET network.

### Note:

MEMOBUS/Modbus addresses in the drive manuals are shown in hexadecimal. Often, the hardware configuration tool needs this data in decimal format, so conversion will be necessary.

Table 7.2 PROFINET Configuration Parameters

PROFINET Configuration Parameter	Drive Parameter	Description
General Configuration and Feature Parameters		
Control/Status Configuration	-	<p>Selects between the Yaskawa Specific profile (control and status words), and the PROFIDrive profile (control and status words):</p> <p>Yaskawa Specific</p> <ul style="list-style-type: none"> <li>• The control and status words are mapped as shown in <a href="#">Table 6.1</a>.</li> <li>• Simple run/stop control sequence.</li> </ul> <p>PROFIDrive</p> <ul style="list-style-type: none"> <li>• The control and status words are mapped as shown in <a href="#">Table 6.2</a> and <a href="#">Table 6.3</a>.</li> <li>• The PROFIDrive state machine is active.</li> <li>• The "Safe Torque Off" digital inputs are monitored by the PROFIDrive state machine.</li> </ul> <p>Default Value: Yaskawa Specific</p>
MBTCP Enable (Modbus/TCP) <i>*I</i>	-	<p>Selects if the Modbus/TCP protocol and port are active. Modbus/TCP is used by the Yaskawa DriveWizard software.</p> <p>0: Enabled</p> <ul style="list-style-type: none"> <li>• The Modbus/TCP protocol is enabled and active.</li> <li>• Communications with Yaskawa DriveWizard software over the Ethernet network is functional.</li> <li>• The Modbus/TCP port (Port 502) is enabled.</li> <li>• PROFINET protocol remains enabled.</li> </ul> <p>1: Disabled</p> <ul style="list-style-type: none"> <li>• The Modbus/TCP protocol is disabled.</li> <li>• Communications with Yaskawa DriveWizard software over the Ethernet network is not possible.</li> <li>• The Modbus/TCP port (Port 502) is disabled.</li> <li>• PROFINET protocol remains enabled.</li> </ul>

PROFINET Configuration Parameter	Drive Parameter	Description
		Default Value: Modbus/TCP is Active
Webpage Enable <sup>*1</sup>	-	<p>Selects if the built-in web-pages and port (HTTP) are available.</p> <p>0: Enabled</p> <ul style="list-style-type: none"> <li>The built-in web pages are available.</li> <li>The HTTP port (Port 80) is enabled.</li> </ul> <p>1: Disabled</p> <ul style="list-style-type: none"> <li>The built-in web pages cannot be accessed.</li> <li>The HTTP port (Port 80) is disabled.</li> </ul> <p>Default Value: Web-pages are available</p>
Email Enable <sup>*1</sup>	-	<p>Selects if the built-in email notification mechanism and port is enabled.</p> <p>0: Enabled</p> <ul style="list-style-type: none"> <li>The built-in email notification mechanism is enabled.</li> <li>The SMTP port (configurable port number) is enabled.</li> </ul> <p>1: Disabled</p> <ul style="list-style-type: none"> <li>The built-in email notification mechanism is disabled.</li> <li>The SMTP port (configurable port number) is disabled.</li> </ul> <p>Default Value: Email is enabled.</p>
DriveWizard Network Configurator Enable <sup>*1</sup>	-	<p>Selects if the built-in DriveWizard network configurator is enabled.</p> <p>0: Enabled</p> <ul style="list-style-type: none"> <li>The built-in DriveWizard network configurator is enabled.</li> </ul> <p>1: Disabled</p> <ul style="list-style-type: none"> <li>The built-in DriveWizard network configurator is disabled.</li> </ul> <p>Default Value: DriveWizard network configurator is enabled.</p>
SNMP Enable <sup>*1</sup>	-	<p>Selects if the SNMP is enabled in the drive.</p> <p>0: Enabled</p> <p>1: Disabled</p> <p>Default Value: SNMP is enabled.</p>
<b>Configurable Outputs (PLC Controller to Drive)</b>		
Configurable Output 1	F7-23	<p>The settings in these 10 parameters configure commands originating from the controller (PLC) and going to the drive. Each of these 10 parameters will be populated with a MEMOBUS/Modbus address. Details on command register addresses are in the drive manuals.</p> <p>Example: If the PLC wants to control Torque Limit in the drive, the associated Configurable Output should be set to 0004H.</p> <p>Default Value (all Configurable Outputs): 0</p> <p><b>Note:</b></p> <p>The values configured in the module parameters of the PLC will be used for the Configurable Outputs and the drive parameters (F7-xx) will be ignored. Only when the module parameters in the PLC are set to 0 will the drive parameters (F7-xx) be used.</p>
Configurable Output 2	F7-24	
Configurable Output 3	F7-25	
Configurable Output 4	F7-26	
Configurable Output 5	F7-27	
Configurable Output 6	F7-28	
Configurable Output 7	F7-29	
Configurable Output 8	F7-30	
Configurable Output 9	F7-31	
Configurable Output 10	F7-32	
<b>Configurable Inputs (Drive to PLC Controller)</b>		
Configurable Input 1	F7-33	<p>The settings in these 10 parameters configure status and feedback originating the drive and going to the controller (PLC).</p> <p>Each of these 10 parameters will be populated with a MEMOBUS/Modbus address. Details on addresses are in the drive manuals. Any valid MEMOBUS/Modbus address can be used: Monitors, Monitor Registers, Parameters, and Command Data.</p> <p>Example: If the PLC wants to monitor the digital inputs on the drive, the associated Configurable Input should be set to 002BH.</p> <p>Default Value (all Configurable Inputs): 0</p> <p><b>Note:</b></p> <p>The values configured in the module parameters of the PLC will be used for the Configurable Inputs and the drive parameters (F7-xx) will be ignored. Only when the module parameters in the PLC are set to 0 will the drive parameters (F7-xx) be used.</p>
Configurable Input 2	F7-34	
Configurable Input 3	F7-35	
Configurable Input 4	F7-36	
Configurable Input 5	F7-37	
Configurable Input 6	F7-38	
Configurable Input 7	F7-39	
Configurable Input 8	F7-40	
Configurable Input 9	F7-41	
Configurable Input 10	F7-42	

\*1 The values for these PROFINET Configuration Parameters will be maintained through a power loss.

## ■ PROFINET IO Modules

You can select 4 different I/O modules.

## Std Tgm 1 (Standard Telegram 1)

Table 7.3 Std Tgm 1 Consume

Word (16 bits)	Description	Notes
0	Control Word	Yaskawa-Specific or PROFIdrive, selectable through the hardware configuration tool.
1	Frequency Reference	The default units are 0.01Hz. (ex: 1234 → 12.34 Hz) <ul style="list-style-type: none"> <li>For PROFIdrive only this is a bi-polar value: A negative reference commands reverse operation.</li> <li>Units can be changed using drive parameters <i>o1-03</i> and <i>o1-10</i>.</li> </ul>

Table 7.4 Std Tgm 1 Produce

Word (16 bits)	Description	Notes
0	Status Word	Yaskawa-Specific or PROFIdrive, selectable through the hardware configuration tool.
1	Output Frequency	The default units are 0.01Hz. (ex: 1234 → 12.34 Hz) <ul style="list-style-type: none"> <li>For PROFIdrive only this is a bi-polar value: A negative reference commands reverse operation.</li> <li>Units can be changed using drive parameters <i>o1-03</i> and <i>o1-10</i>.</li> </ul>

## Std Tgm 1 + 5 PZD (Standard Telegram 1 + 5 Configurable Inputs &amp; Outputs)

Table 7.5 Std Tgm 1 + 5 Consume

Word (16 bits)	Description	Notes
0	Control Word	Yaskawa-Specific or PROFIdrive, selectable through the hardware configuration tool.
1	Frequency Reference	The default units are 0.01Hz. (ex: 1234 → 12.34 Hz) <ul style="list-style-type: none"> <li>For PROFIdrive only this is a bi-polar value: A negative reference commands reverse operation.</li> <li>Units can be changed using drive parameters <i>o1-03</i> and <i>o1-10</i>.</li> </ul>
2	Configurable Output 1	Configured by hardware configuration tool or by drive parameter <i>F7-23</i> [Dynamic Out Param 1 for Ethernet].
3	Configurable Output 2	Configured by hardware configuration tool or by drive parameter <i>F7-24</i> [Dynamic Out Param 2 for Ethernet].
4	Configurable Output 3	Configured by hardware configuration tool or by drive parameter <i>F7-25</i> [Dynamic Out Param 3 for Ethernet].
5	Configurable Output 4	Configured by hardware configuration tool or by drive parameter <i>F7-26</i> [Dynamic Out Param 4 for Ethernet].
6	Configurable Output 5	Configured by hardware configuration tool or by drive parameter <i>F7-27</i> [Dynamic Out Param 5 for Ethernet].

Table 7.6 Std Tgm 1 + 5 Produce

Word (16 bits)	Description	Notes
0	Status Word	Yaskawa-Specific or PROFIdrive, selectable through the hardware configuration tool.
1	Output Frequency	The default units are 0.01Hz. (ex: 1234 → 12.34 Hz) <ul style="list-style-type: none"> <li>For PROFIdrive only this is a bi-polar value: A negative reference commands reverse operation.</li> <li>Units can be changed using drive parameters <i>o1-03</i> and <i>o1-10</i>.</li> </ul>
2	Configurable Input 1	Configured by hardware configuration tool or by drive parameter <i>F7-33</i> [Dynamic In Param 1 for Ethernet].
3	Configurable Input 2	Configured by hardware configuration tool or by drive parameter <i>F7-34</i> [Dynamic In Param 2 for Ethernet].
4	Configurable Input 3	Configured by hardware configuration tool or by drive parameter <i>F7-35</i> [Dynamic In Param 3 for Ethernet].
5	Configurable Input 4	Configured by hardware configuration tool or by drive parameter <i>F7-36</i> [Dynamic In Param 4 for Ethernet].
6	Configurable Input 5	Configured by hardware configuration tool or by drive parameter <i>F7-37</i> [Dynamic In Param 5 for Ethernet].

## Forty Byte IO

Table 7.7 Forty Byte IO Consume

Word (16 bits)	Description	Notes
0	Control Word	Yaskawa-Specific or PROFIdrive, selectable through the hardware configuration tool.
1	Frequency Reference	The default units are 0.01Hz. (ex: 1234 → 12.34 Hz)

Word (16 bits)	Description	Notes
		<ul style="list-style-type: none"> <li>For PROFIdrive only this is a bi-polar value: A negative reference commands reverse operation.</li> <li>Units can be changed using drive parameters <i>o1-03</i> and <i>o1-10</i>.</li> </ul>
2	Torque Limit	Units are 0.1% (ex: 1000 → 100.0%) You must set drive parameter <i>F6-06</i> = 1 [ <i>Torque Limit by Comm. Ethernet = Enabled</i> ].
3	Torque Compensation	Units are 0.1% (ex: 1000 → 100.0%)
4	Reserved	-
5	Reserved	-
6	Reserved	-
7	Reserved	-
8	Digital Outputs	Refer to the drive manuals for details on MEMOBUS/Modbus register 0009H. You must set <i>H2-0x</i> = F [ <i>Not Used</i> ] for each output used.
9	Reserved	-
10	Reserved	-
11	Reserved	-
12	Reserved	-
13	Reserved	-
14	Reserved	-
15	Configurable Output 1	Configured by hardware configuration tool or by drive parameter <i>F7-23</i> [ <i>Dynamic Out Param 1 for Ethernet</i> ].
16	Configurable Output 2	Configured by hardware configuration tool or by drive parameter <i>F7-24</i> [ <i>Dynamic Out Param 2 for Ethernet</i> ].
17	Configurable Output 3	Configured by hardware configuration tool or by drive parameter <i>F7-25</i> [ <i>Dynamic Out Param 3 for Ethernet</i> ].
18	Configurable Output 4	Configured by hardware configuration tool or by drive parameter <i>F7-26</i> [ <i>Dynamic Out Param 4 for Ethernet</i> ].
19	Configurable Output 5	Configured by hardware configuration tool or by drive parameter <i>F7-27</i> [ <i>Dynamic Out Param 5 for Ethernet</i> ].

Table 7.8 Forty Byte IO Produce

Word (16 bits)	Description	Notes
0	Status Word	Yaskawa-Specific or PROFIdrive, selectable through the hardware configuration tool.
1	Output Frequency	The default units are 0.01Hz. (ex: 1234 → 12.34 Hz) <ul style="list-style-type: none"> <li>For PROFIdrive only this is a bi-polar value: A negative reference commands reverse operation.</li> <li>Units can be changed using drive parameters <i>o1-03</i> and <i>o1-10</i>.</li> </ul>
2	Torque Reference	Units are 0.1% (ex: 1000 → 100.0%) Drive monitor <i>U1-09</i> .
3	Reserved	-
4	Motor Speed	The default units are 0.01Hz. (ex: 1234 → 12.34 Hz) Units can be changed using drive parameters <i>o1-03</i> and <i>o1-10</i> . Drive monitor <i>U1-05</i> .
5	Frequency Reference Monitor	The default units are 0.01Hz. (ex: 1234 → 12.34 Hz) Units can be changed using drive parameters <i>o1-03</i> and <i>o1-10</i> . Drive monitor <i>U1-01</i> .
6	Output Current	Units are 0.1Amps (ex: 432 → 43.2 Amps) Drive MEMOBUS/Modbus Address: 0026H
7	Analog Input 1	Units are 0.1% (ex: 500 → 50.0%) Drive monitor <i>U1-13</i> .
8	DC Bus Voltage	Units are 1V (ex: 625 → 625 VDC)
9	Fault Code	For information on fault code numbers, refer to the drive manuals - MEMOBUS/Modbus: Fault Trace / Fault History Contents. Drive monitor <i>U2-01</i> .
10	Alarm Code	For information on alarm code numbers, refer to the drive manuals - MEMOBUS/Modbus: Minor Fault/Alarm Contents. Drive MEMOBUS/Modbus Address: 007FH
11	Output Power	Units are 0.01 kW (ex: 345 → 3.45 kW) or 0.1 kW (ex: 345 → 34.5 kW)

Word (16 bits)	Description	Notes
		See U1-08 in the drive manuals for details about units and scaling. Drive monitor <i>U1-08</i> .
12	Reserved	-
13	Digital Inputs	For information on digital input status bit-mapping, see U1-10 in the drive manuals. Drive monitor <i>U1-10</i> .
14	Reserved	-
15	Configurable Input 1	Configured by hardware configuration tool or by drive parameter <i>F7-33</i> [ <i>Dynamic In Param 1 for Ethernet</i> ].
16	Configurable Input 2	Configured by hardware configuration tool or by drive parameter <i>F7-34</i> [ <i>Dynamic In Param 2 for Ethernet</i> ].
17	Configurable Input 3	Configured by hardware configuration tool or by drive parameter <i>F7-35</i> [ <i>Dynamic In Param 3 for Ethernet</i> ].
18	Configurable Input 4	Configured by hardware configuration tool or by drive parameter <i>F7-36</i> [ <i>Dynamic In Param 4 for Ethernet</i> ].
19	Configurable Input 5	Configured by hardware configuration tool or by drive parameter <i>F7-37</i> [ <i>Dynamic In Param 5 for Ethernet</i> ].

### Std Tgm 1 + 10 PZD (Standard Telegram 1 + 10 Configurable Inputs & Outputs)

Table 7.9 Std Tgm 1 + 10 Consume

Word (16 bits)	Description	Notes
0	Control Word	Yaskawa-Specific or PROFIdrive, selectable through the hardware configuration tool.
1	Frequency Reference	The default units are 0.01Hz. (ex: 1234 → 12.34 Hz) <ul style="list-style-type: none"> <li>For PROFIdrive only this is a bi-polar value: A negative reference commands reverse operation.</li> <li>Units can be changed using drive parameters <i>o1-03</i> and <i>o1-10</i>.</li> </ul>
2	Configurable Output 1	Configured by hardware configuration tool or by drive parameter <i>F7-23</i> [ <i>Dynamic Out Param 1 for Ethernet</i> ].
3	Configurable Output 2	Configured by hardware configuration tool or by drive parameter <i>F7-24</i> [ <i>Dynamic Out Param 2 for Ethernet</i> ].
4	Configurable Output 3	Configured by hardware configuration tool or by drive parameter <i>F7-25</i> [ <i>Dynamic Out Param 3 for Ethernet</i> ].
5	Configurable Output 4	Configured by hardware configuration tool or by drive parameter <i>F7-26</i> [ <i>Dynamic Out Param 4 for Ethernet</i> ].
6	Configurable Output 5	Configured by hardware configuration tool or by drive parameter <i>F7-27</i> [ <i>Dynamic Out Param 5 for Ethernet</i> ].
7	Configurable Output 6	Configured by hardware configuration tool or by drive parameter <i>F7-28</i> [ <i>Dynamic Out Param 6 for Ethernet</i> ].
8	Configurable Output 7	Configured by hardware configuration tool or by drive parameter <i>F7-29</i> [ <i>Dynamic Out Param 7 for Ethernet</i> ].
9	Configurable Output 8	Configured by hardware configuration tool or by drive parameter <i>F7-30</i> [ <i>Dynamic Out Param 8 for Ethernet</i> ].
10	Configurable Output 9	Configured by hardware configuration tool or by drive parameter <i>F7-31</i> [ <i>Dynamic Out Param 9 for Ethernet</i> ].
11	Configurable Output 10	Configured by hardware configuration tool or by drive parameter <i>F7-32</i> [ <i>Dynamic Out Param 10 for Ethernet</i> ].

Table 7.10 Std Tgm 1 + 10 Produce

Word (16 bits)	Description	Notes
0	Status Word	Yaskawa-Specific or PROFIdrive, selectable through the hardware configuration tool.
1	Output Frequency	The default units are 0.01Hz. (ex: 1234 → 12.34 Hz) <ul style="list-style-type: none"> <li>For PROFIdrive only this is a bi-polar value: A negative reference commands reverse operation.</li> <li>Units can be changed using drive parameters <i>o1-03</i> and <i>o1-10</i>.</li> </ul>
2	Configurable Input 1	Configured by hardware configuration tool or by drive parameter <i>F7-33</i> [ <i>Dynamic In Param 1 for Ethernet</i> ].
3	Configurable Input 2	Configured by hardware configuration tool or by drive parameter <i>F7-34</i> [ <i>Dynamic In Param 2 for Ethernet</i> ].
4	Configurable Input 3	Configured by hardware configuration tool or by drive parameter <i>F7-35</i> [ <i>Dynamic In Param 3 for Ethernet</i> ].
5	Configurable Input 4	Configured by hardware configuration tool or by drive parameter <i>F7-36</i> [ <i>Dynamic In Param 4 for Ethernet</i> ].

Word (16 bits)	Description	Notes
6	Configurable Input 5	Configured by hardware configuration tool or by drive parameter F7-37 [Dynamic In Param 5 for Ethernet].
7	Configurable Input 6	Configured by hardware configuration tool or by drive parameter F7-38 [Dynamic In Param 6 for Ethernet].
8	Configurable Input 7	Configured by hardware configuration tool or by drive parameter F7-39 [Dynamic In Param 7 for Ethernet].
9	Configurable Input 8	Configured by hardware configuration tool or by drive parameter F7-40 [Dynamic In Param 8 for Ethernet].
10	Configurable Input 9	Configured by hardware configuration tool or by drive parameter F7-41 [Dynamic In Param 9 for Ethernet].
11	Configurable Input 10	Configured by hardware configuration tool or by drive parameter F7-42 [Dynamic In Param 10 for Ethernet].

## ■ Communication Cycle

The drive supports cycle times of 2 ms to 512 ms.

### Note:

The communication cycle will be limited depending upon the DAP you are using. Refer to [DAP Descriptions/Selection on page 20](#) for details. If a network failure occurs when communicating in a ring topology, it may take a long time to restore communication using the MRP (Media Redundancy Protocol) and the connection with the PLC will be disconnected. This may cause a *bUS [Ethernet Communication Error]*. If a *bUS* error occurs, slow down the IO cycle rate in the PLC.

## ■ Yaskawa Acyclic Parameter Access Mechanism

All drive parameters can be read and written under address 0x8000 by performing a read or write with the index value of the corresponding parameter address in the drive. Refer to the drive manuals for a list of these parameter addresses.

Example: Read drive parameter *C1-01 [Acceleration Time 1]*.

The MEMOBUS/Modbus address for *C1-01* (from the drive manuals) is 200 (Hex).

Using the "Read Record" function block in the PLC, enter the value 200 (Hex) (or 512 decimal) into the index field. The function block will then return (via the record field) an integer value like 1000, which represents 10.00 seconds.

Example: Write drive parameter *C1-01 [Acceleration Time 1]*.

The MEMOBUS/Modbus address for *C1-01* (from the drive manuals) is 200 (Hex).

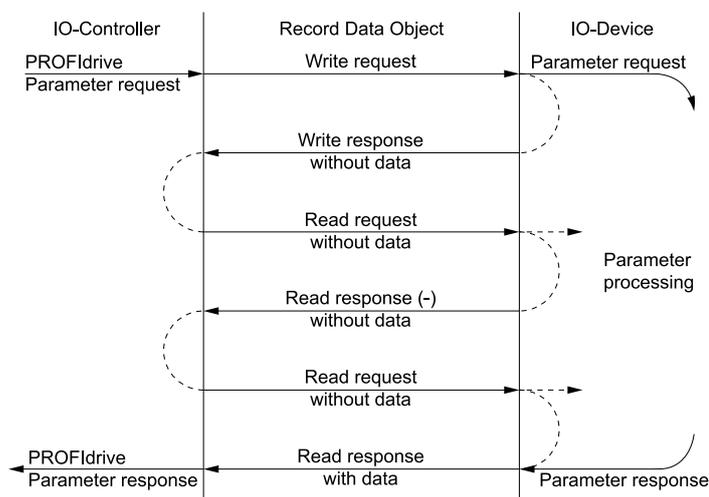
Using the "Write Record" function block in the PLC, enter the value 200 (Hex) (or 512 decimal) into the index field. Enter the desired new value, as a 16-bit integer into the record field. If 5.00 seconds is desired, enter a value of 500.

The parameter change will take effect immediately, but will NOT be saved if power is lost.

## ■ PROFIdrive Acyclic Parameter Access Mechanism

A PROFIdrive acyclic parameter access mechanism can be used to access PROFIdrive parameters and drive parameters using an index of 0xB02E and the structure in [Figure 7.2](#) for write and read requests.

Requests and responses between the IO-Device and the IO-Controller or the IO-Supervisor are transferred with the Record Data Objects.



**Figure 7.2 PROFIdrive Acyclic Parameter Access Mechanism Structure**

A write request is first sent containing the parameter request.

If the write request is valid, the request is accepted and acknowledged. The IO-Controller then sends a read request. If the drive is still busy performing the internal parameter request, it will return a negative response with the error code “0x11” (State conflict). In this case, the IO-Controller repeats the read request until the drive has the PROFIdrive response data ready.

If the write request is invalid, a negative response is returned with an error code.

#### Base Mode Parameter Access - Local

The DO-ID field in the Record Data Object request header is not evaluated by the parameter manager. Parameters can be read through any slot in the configuration.

**Table 7.11 Response Error Codes**

Byte	Value and Meaning
ErrorCode	0xDF (Error Write)
	0xDE (Error Read)
ErrorDecode	0x80 (PNIORW) ErrorCode1 decoded according to Table 7.12. ErrorCode2 is 0.
	0x81 (PNIO) ErrorCode1 and ErrorCode2 decoded according to Table 7.12.
ErrorCode1	Error class and error code (Refer to Table 7.12).
ErrorCode2	-

**Table 7.12 ErrorCode1 with PNIORW Decoding**

Error Class	Meaning	Error Code
0 - 9	Reserved	-
10 (0x0A)	Application	0 = Read error
		1 = Write error
		2 = Module failure
		3 - 7 = Reserved
		8 = Version conflict
		9 = Feature not supported
		10 - 15 = User-specific
11 (0x0B)	Access	0 = Invalid index
		1 = Write length error
		2 = Invalid slot
		3 = Type conflict
		4 = Invalid area
		5 = State conflict
		6 = Access denied

Error Class	Meaning	Error Code
		7 = Invalid range
		8 = Invalid parameter
		9 = Invalid type
		10 - 15 = User-specific
12 (0x0C)	Resource	0 = Read constraint conflict
		1 = Write constraint conflict
		2 = Resource busy
		3 = Resource unavailable
		4 - 7 = Reserved
		8 - 15 = User-specific
13 - 15	User-specific	-

Read block is used in read requests and responses. Write block is used in write requests and responses. The request consists of unique identifiers for the connection, addressing information and length of the record data. The response also contains two additional fields for transferring information.

**Table 7.13 Structure of the Read and Write Blocks**

Field(s)	Description	Range	Type
Request Reference	Unique identification set by the IO-Controller. Changed for each new request.	1 - 255	Byte
Service	Request or Response service.	Request (0x00) Response (0x80)	UI8
Operation	Read or Write operation.	Write (0x08) Read (0x09)	UI8
Block length	Length of the block.	0 - 0xFFFF	UI16
ARUID	Identifier <ul style="list-style-type: none"> <li>• time low</li> <li>• time mid</li> <li>• time high and version - clock - node</li> </ul>	-	UI32 UI16 UI16 Octet [2] Octet [6]
API	Application Process Identifier	Device Access Point (0x0000)	UI32
Slot	Slot of the Module Access Point (MAP/PAP)	0x01	UI16
Sub-slot	Sub-slot of the Module Access Point (MAP/PAP)	0x01	UI16
Padding	2 bytes		
Index	Index of the Record Data Object	0x0001 to 0x7FFF 0xB02E	UI16
Data length	Length of the data block	0 to 0xFFFFFFFF	UI32
Additional value 1 (response only)	Field for transferring additional data	-	UI16
Additional value 2 (response only)	Field for transferring additional data	-	UI16
Padding	24 bytes for request, 20 bytes for response.		
Data block	Used only with write request and read response.		

Data block contains PROFIdrive specific request or response header.

**Table 7.14 PROFIdrive Request Header**

Field(s)	Description	Range	Byte/Word
Request Reference	Unique identification set by the IO-Controller. Changed for each new request.	1 - 255	Byte
Request ID	Request type for the issued block.	Request Parameter (0x01) Change Parameter (0x02)	Byte
DO-ID	To be set to 0x01.	0 - 255	Byte
No. of Parameters	Number of parameters that are present in the request.	1	Byte
Attribute	Type of object being accessed.	Value (0x10)	Byte
No. of Elements	Number of array elements accessed or length of string accessed. Set to 0 if non-array parameters are used.	1	Byte

Field(s)	Description	Range	Byte/Word
Parameter Index (group)	Address of the PROFIdrive parameter that is being accessed. Also "1" is allowed to access drive parameters. Drive parameter group when accessing drive parameters.	1 - 65535	Word
Subindex (parameter)	Addresses the first array element of the parameter. Drive parameter number when accessing drive parameters.	0 - 65535	Word
Format */	Refer to Table 7.16 for more information.	-	Byte
Number of Values */	Number of values following.	1	Byte
Values */	The values of the request. In case of odd number of bytes, a zero byte is appended to ensure the word structure of the telegram.	Varies based on value	Refer to Table 7.16 for more information.

\*1 Only when Request ID is 0x02 (Change Parameter). The Format, Number of Values, and Value Fields are repeated for other parameters.

**Table 7.15 PROFIdrive Response Header**

Field (s)	Description	Range
Response Reference	Mirrored from the request.	1 - 255
Response ID	Response from the IO-Device. In the event that requested services fail, a "not acknowledged" (NAK) response will be indicated.	Request Param OK (0x01), Request Param NAK (0x81), Change Param OK (0x02), Change Param NAK (0x82)
DO-ID	To be set to 1.	0 - 255
No. of Parameters	Number of parameters that are present in the response.	1
Format */	Refer to Table 7.16 for more information.	-
Number of Values */	Number of values following.	1
Values */	The values of the request. When there is an odd number of bytes, a zero byte is appended to ensure the word structure of the telegram.	Varies based on value

\*1 Only when Request ID is 0x01 (Request Parameter OK). The Format, Number of Values, and Value Fields are repeated for other parameters.

**Table 7.16 Data Types for Format Field**

Code	Type
0x00	Reserved
0x01 - 0x36	Standard data types
0x37 - 0x3F	Reserved
0x40	0
0x41	Byte
0x42	Word
0x43	Double word
0x44	Error
0x45 - 0xFF	Reserved

**Table 7.17 PROFIdrive Parameter Request Error Codes**

Error #	Meaning	Used at
0x00	Impermissible parameter number	Access to unavailable parameter.
0x01	Parameter value cannot be changed	Change access to a parameter value that cannot be changed.
0x02	Low or high limit exceeded	Change access with value outside the limits.
0x03	Invalid subindex	Access to unavailable subindex.
0x04	No array	Access with subindex to non-indexed parameter.
0x05	Incorrect data type	Change access with value that does not match the data type of the parameter.
0x06	Setting not permitted (can only be reset)	Change access with value unequal to 0 when this is not permitted.
0x07	Description element cannot be changed	Change access to a description element that cannot be changed.
0x09	No description data available	Access to unavailable description (parameter value is available).
0x0B	No operation priority	Change access rights without rights to change parameters.
0x0F	No text array available	Access to text array that is not available (parameter value is available).

Error #	Meaning	Used at
0x11	Request cannot be executed because of operating mode	Access is temporarily not possible for reasons outside scope of these instructions.
0x14	Value impermissible	Change access with a value that is within limits but is not permissible for other long-term reasons (parameter with defined single values).
0x15	Response too long	The length of the current response exceeds the maximum transmittable length.
0x16	Parameter address impermissible	Illegal value or value that is not supported for the attribute, number of elements, parameter number or sub-index, or a combination.
0x17	Illegal format	Write request: Illegal format or format of parameter data that is not supported.
0x18	Number of values inconsistent	Write request: Number of values of parameter data does not match number of elements at the parameter address.
0x19	DO nonexistent	Request to DO, which does not exist.
0x65 - 0xFF	Manufacturer-specific	-
0x65	Vendor-specific error	Vendor-specific error.
0x66	Request not supported	Request not supported.
0x67	Communication error	Request cannot be completed because of communication error.
0x6F	Time-out error	Request aborted due to time-out.
0x78	PZD map failure	Parameter cannot be mapped to PZD (size mismatch or non-existent).
0x79	PZD memory failure	Parameter cannot be mapped to PZD (out of memory).
0x7A	Multiple PZD map	Parameter cannot be mapped to PZD (multiple PZD write).
0x8C	Set torque mode error	Cannot change mode to TORQUE (frequency is used).
0x90	Illegal Request ID	The request ID of the response is illegal.

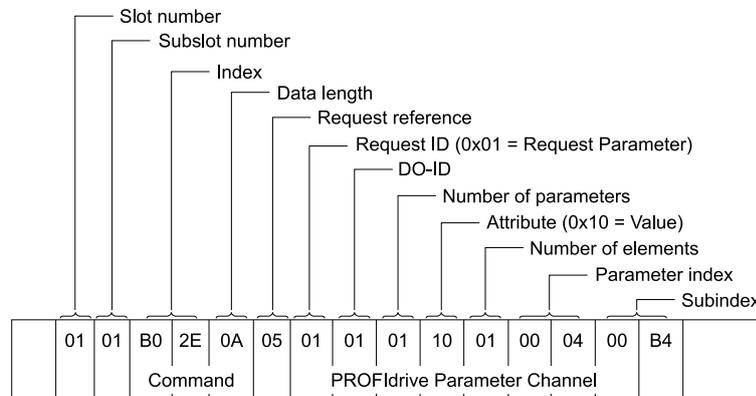
**Parameter Data Transfer Examples**

The following example shows how parameter data is transferred using the acyclic parameter access mechanism's READ and WRITE.

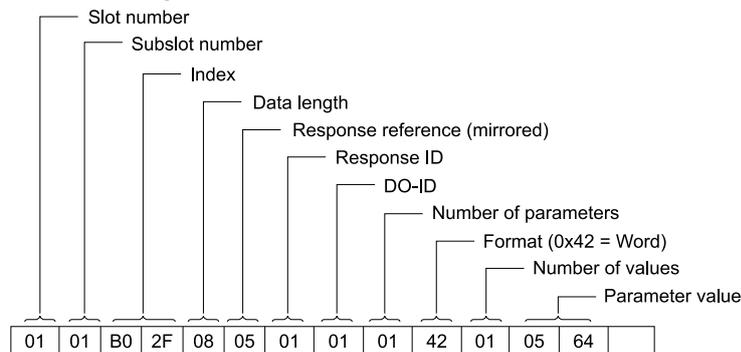
Example: Reading a drive parameter

To read a Yaskawa Drive parameter, use the PNU of 1 and the actual address of the parameter in the SubIndex.

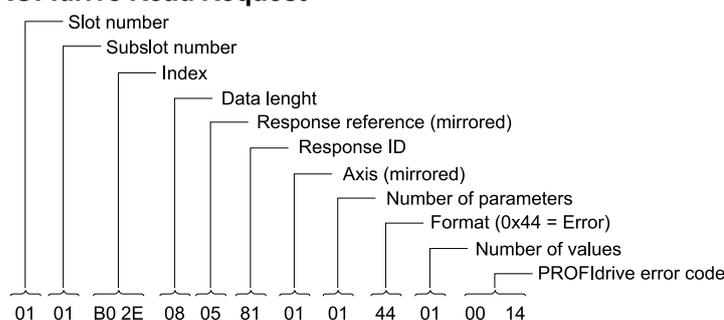
**Write Request (Read Parameter Value)**



**Positive Read Response to Read Request**



## Negative Response to PROFIdrive Read Request



## PROFIdrive Profile-Specific Parameters

PROFIdrive parameters contain data of the drive in standard form. The table below describes the supported PROFIdrive parameters.

Parameter	Read/Write	Data type	Description
922	Read	Unsigned16	Telegram selection
944	Read	Unsigned16	Fault message counter
945	Read	Array [5] Unsigned16	Fault Code
947	Read	Array [5] Unsigned16	Fault number. (coded according to DRIVECOM profile) Refer to parameter 945 for information about Subindex Contents.
950	Read	Array [2] Unsigned16	Scaling of the fault buffer
964	Read	Array [6] Unsigned16	Device identification Subindex Contents 0: Manufacturer 1: Device type 2: Version 3: Firmware date (year) 4: Firmware date (day/month) 5: Number of Drive Objects (DO)
965	Read	Octet String2	Profile number of this device. 0328h = Profile 3, Version 40
967	Read	Unsigned16	Control word (CW)
968	Read	Unsigned16	Status word (SW)
974	Read	Array [3] Unsigned16	Base Mode Parameter Access service Identification.
975	Read	Array [8] Unsigned16	DO Identification
980 - 989	Read	Array [20] Unsigned16	Numbered list of supported parameters
60000	Read	Float	Velocity reference value. This returns max freq value in <i>o1-10 [User Units Maximum Value]</i> .
61000	Read	VisibleString24	Name of station
61001	Read	Unsigned32	IP of station
61002	Read	Array [6] Unsigned8	MAC of station
61003	Read	Unsigned32	Default gateway of station
61004	Read	Unsigned32	Subnet mask of station

## Fault Buffer Mechanism

PROFIdrive profile has a mechanism that can store five fault situations to PROFIdrive parameters. Fault and diagnostic data, like fault number and fault code can be accessed simultaneously with only one subindex. The mechanism consists of two PROFIdrive parameters:

- PNU944: Fault message counter
- PNU947: Fault numbers. Cycle power to clear the fault buffer.

## ◆ PROFINET High Priority Alarm Codes

Refer to the drive manuals for details about each of the PROFINET High Priority Alarm Codes (faults) listed in [Table 7.18](#).

These codes are transmitted as Manufacturer Specific Diagnostic high priority alarms that can be seen in the PLC configuration software. These high priority codes are the same codes that appear in the drive manual, except with an offset of 1000 (Hex).

**Table 7.18 PROFINET High Priority Alarm Codes**

Drive Alarm Code (Hex.)	Description	Drive Alarm Code (Hex.)	Description
1002	DC Bus Undervoltage (Uv1)	1035	Inversion Prevention Detection (dv4)
1003	Control Power Undervoltage (Uv2)	1036	Output Current Imbalance (LF2)
1004	Soft Charge Answerback Fault (Uv3)	1037	Motor Step-Out Detected (STPo)
1005	Short Circuit/IGBT Failure (SC)	1038	Encoder (PG) Hardware Fault (PGoH)
1006	Ground Fault (GF)	103B	Speed Search Retries Exceeded (SEr)
1007	Overcurrent (oC)	1041	Excessive PID Feedback (FbH)
1008	Overvoltage (ov)	1042	External Fault (Terminal S1) (EF1)
1009	Heatsink Overheat (oH)	1043	External Fault (Terminal S2) (EF2)
100A	Heatsink Overheat (oH1)	1044	Mechanical Weakening Detection 1 (oL5)
100B	Motor Overload (oL1)	1045	Mechanical Weakening Detection 2 (UL5)
100C	Drive Overload (oL2)	1046	Current Offset Fault (CoF)
100D	Overtorque Detection 1 (oL3)	1047	PLC Fault 1 (PE1)
100E	Overtorque Detection 2 (oL4)	1048	PLC Fault 2 (PE2)
100F	Dynamic Braking Transistor Fault (rr)	1049	DriveWorksEZ Fault (dWFL)
1010	Braking Resistor Overheat (rH)	104A	EEPROM Memory DWEZ Data Error (dWF1)
1011	External Fault (Ethernet DI3) (EF3)	104B	DriveWorksEZ Fault 2 (dWF2)
1012	External Fault (Ethernet DI4) (EF4)	104C	DriveWorksEZ Fault 3 (dWF3)
1013	External Fault (Ethernet DI5) (EF5)	104D	Output Voltage Detection Fault (voF)
1014	External Fault (Ethernet DI6) (EF6)	104E	Braking Resistor Fault (rF)
1015	External Fault (Ethernet DI7) (EF7)	104F	Braking Transistor Overload Fault (boL)
1017	Internal Fan Fault (FAn)	1050	Motor Overheat (NTC Input) (oH5)
1018	Overspeed (oS)	1051	Low Speed Motor Step-Out (LSo)
1019	Speed Deviation (dEv)	1052	Node Setup Error (nSE)
101A	Encoder (PG) Feedback Loss (PGo)	1053	Thermistor Disconnect (THo)
101B	Input Phase Loss (PF)	105B	Polarity Judge Timeout (dv7)
101C	Output Phase Loss (LF)	1081	Control Circuit Error (CPF00)
101D	Motor Overheat (PTC Input) (oH3)	1082	Control Circuit Error (CPF01)
101E	Keypad Connection Fault (oPr)	1083	A/D Conversion Error (CPF02)
101F	EEPROM Write Error (Err)	1084	Control Board Connection Error (CPF03)
1020	Motor Overheat Fault (PTC Input) (oH4)	1086	CPU Adjust Error (CPF05)
1021	Serial Communications Error (CE)	1087	EEPROM Memory Data Error (CPF06)
1022	Ethernet Communication Error (bUS)	1088	Terminal Board Connection Error (CPF07)
1025	Control Fault (CF)	1089	Terminal Board Connection Error (CPF08)
1026	Zero Servo Fault (SvE)	108A	EEPROM Error (CPF09)
1027	Ethernet External Fault (EF0)	108C	RAM Fault (CPF11)
1028	PID Feedback Loss (FbL)	108D	FLASH Memory Fault (CPF12)
1029	Undertorque Detection 1 (UL3)	108E	Watchdog Circuit Exception (CPF13)
102A	Undertorque Detection 2 (UL4)	108F	Control Circuit Fault (CPF14)
102B	High Slip Braking Overload (oL7)	1091	Clock Fault (CPF16)
1032	Z Pulse Fault (dv1)	1092	Timing Fault (CPF17)
1033	Z Pulse Noise Fault Detection (dv2)	1093	Control Circuit Fault (CPF18)
1034	Inversion Detection (dv3)		

Drive Alarm Code (Hex.)	Description	Drive Alarm Code (Hex.)	Description
1094	Control Circuit Fault (CPF19)	10A3	Power/Clock Error (CPF34)
1095	Control Circuit Error (CPF20)	10A4	Ext A/D Conv Error (CPF35)
1096	Control Circuit Error (CPF21)	10A5	ASIC COM Error (CPF36)
1097	Hybrid IC Error (CPF22)	10A6	ASIC COM Error (CPF37)
1098	Control Board Connection Error (CPF23)	10A7	EEPROM Data Error (CPF38)
1099	Drive Unit Signal Fault (CPF24)	10A8	CPU-ASIC Communication Error (CPF39)
109A	Terminal Board not Connected (CPF25)	1401	Keypad Time Not Set (TiM)
109B	BB Circuit Error (CPF26)	1402	Keypad Battery Low Voltage (bAT)
109C	PWM Set Reg Error (CPF27)	140F	Safety Circuit Fault (SCF)
109D	PWM Pattern Error (CPF28)	1411	High Level Communications Error (HLCE)
109E	On-Delay Error (CPF29)	1413	Drive Cooling Fan Fault (FAn1)
109F	BB On Error (CPF30)	1414	Comparator 1 Limit Fault (CP1)
10A0	ASIC Code Error (CPF31)	1415	Comparator 2 Limit Fault (CP2)
10A1	ASIC Startup Error (CPF32)	1416	Bluetooth Communication Fault (bCE)
10A2	Watch-dog Error (CPF33)		

### ◆ PROFINET Low Priority Alarm Codes

These codes are transmitted as Manufacturer Specific Diagnostic low priority alarms that can be seen in the PLC configuration software. These low priority codes are the same codes that appear in the drive manual, except with an offset of 400 (Hex).

**Table 7.19 PROFINET Low Priority Alarm Codes**

Drive Alarm Code (Hex.)	Description	Drive Alarm Code (Hex.)	Description
0401	Undervoltage (Uv)	0419	Ethernet External Error (E-15)
0402	DC Bus Overvoltage (ov)	041A	Ethernet External Fault (EF0)
0403	Heatsink Overheat (oH)	041B	Motor Switch during Run (rUn)
0404	External Overheat (H1-XX=B) (oH2)	041C	Ethernet Communication Error (bUS)
0405	Overtorque 1 (oL3)	041D	Serial Comm Transmission Error (CALL)
0406	Overtorque 2 (oL4)	041E	Undertorque Detection 1 (UL3)
0407	FWD/REV Run Command Input Error (EF)	041F	Undertorque Detection 2 (UL4)
0408	Baseblock (bb)	0420	Modbus Test Mode Error (SE)
0409	External Fault (Ethernet DI3) (EF3)	0421	Loss of External Power 24 Supply (L24v)
040A	External Fault (Ethernet DI4) (EF4)	0422	Motor Overheat (PTC Input) (oH3)
040B	External Fault (Ethernet DI5) (EF5)	0427	PID Feedback Loss (FbL)
040C	External Fault (Ethernet DI6) (EF6)	0428	Excessive PID Feedback (FbH)
040D	External Fault (Ethernet DI7) (EF7)	0429	Cycle Power to Accept Changes (CyPo)
040F	Internal Fan Fault (Fan)	042A	Drive Disabled (dnE)
0410	Overspeed (oS)	042B	Encoder (PG) Hardware Fault (PGoH)
0411	Speed Deviation (dEv)	0434	High Current Alarm (HCA)
0412	Encoder (PG) Feedback Loss (PGo)	0435	Cooling Fan Maintenance Time (LT-1)
0413	Keypad Disconnect (oPr)	0436	Capacitor Maintenance Time (LT-2)
0414	Modbus Communication Error (CE)	0437	Ctrl Failure/STOP (CF)
0415	Ethernet Communication Error (bUS)	0439	External Fault (Terminal S1) (EF1)
0416	Serial Comm Transmission Error (CALL)	043A	External Fault (Terminal S2) (EF2)
0417	Motor Overloaded (oL1)	043B	Safe Torque OFF Hardware (SToF)
0418	Drive Overloaded (oL2)	043C	Safe Torque OFF (STo)

Drive Alarm Code (Hex.)	Description
043D	Mechanical Weakening Detection 1 (oL5)
043E	Mechanical Weakening Detection 2 (UL5)
043F	PLC Error 1 (PA1)
0440	PLC Error 2 (PA2)
0441	Output Voltage Detection Alarm (voF)
0442	IGBT Maintenance Time (90%) (TrPC)
0443	SoftChargeBypassRelay MainteTime (LT-3)
0444	IGBT Maintenance Time (50%) (LT-4)
0445	Braking Transistor Overload (boL)
0447	Input Phase Loss (PF)
0448	Motor Overheat (NTC Input) (oH5)
0449	DriveWorksEZ Alarm (dWAL)

Drive Alarm Code (Hex.)	Description
044A	DriveWorksEZ Alarm 2 (dWA2)
044B	DriveWorksEZ Alarm 3 (dWA3)
044D	Thermistor Disconnect (THo)
0455	GF1 Error (GF1)
0481	External Power 24V Supply (EP24v)
0484	Shipping Adjustment Required (SUA)
0485	Keypad Battery Low Voltage (bAT)
0487	Comparator 1 Limit Error (CP1)
0488	Comparator 2 Limit Error (CP2)
0489	Keypad Time Not Set (TiM)
048A	Bluetooth Communication Error (bCE)

### ◆ Identification and Maintenance Functions (I&M)

The purpose of the I&M functions is to provide support for the customer during commissioning, parametrization and repair of the module. The drive supports I&M functions 0 to 3, which can be accessed using the Record data object's read request.

Function	Record Data Index
I&M0	0xAFF0
I&M1	0xAFF1
I&M2	0xAFF2
I&M3	0xAFF3

The structure of the I&M functions is described in [Table 7.20](#) to [Table 7.23](#).

**Table 7.20 I&M0 Device Identification (Read-Only)**

Content	Description
Header	-
Vendor ID	PROFINET Vendor ID of Yaskawa, which is 0x019F
Order ID	Order number of the drive adapter kit (GA501)
Serial number	Serial number of the adapter
Hardware revision	Hardware revision of the drive adapter
Software revision	Revision of the software
Revision counter	Revision number
Profile ID	No Profile ID (0x0000)
Profile specific type	No profile specific type (0x0000)
I&M version	Version is 1.1 (0x0101)
Supported I&M functions	I&M0 is supported (0x0001)

**Table 7.21 I&M1 Device Identification (Read-Write)**

Content	Description
Plant Designation	Installation area
Location Designation	Specific installation place

**Table 7.22 I&M2 Device Identification (Read-Write)**

Content	Description
Installation Date	Date of installation

Table 7.23 I&amp;M3 Device Identification (Read-Write)

Content	Description
Additional Information	Customer comments

## ◆ Alarm Mechanism

When a fault or alarm situation occurs in the drive, the drive will send an alarm notification, which the IO-Controller station must acknowledge. Refer to [Table 7.24](#) for more information.

Table 7.24 Alarm Notification

Attribute	Description
BlockHeader	-
AlarmType	PROFINET specific alarm type
API	0x3A00 (PROFIdrive profile)
SlotNumber	Slot number of the Drive Object (DO)
SubslotNumber	Sub-slot number of the sub-slot to which the diagnosis object is related
ModuleIdentNumber	Module Ident number of the DO
SubmoduleIdentNumber	0xFFFF
AlarmSpecifier	Diagnosis type
UserStructureIdentifier	0x8000 (Channel Diagnosis Data)
ChannelNumber	0
ChannelProperties	0x0800 Diagnosis Appears 0x1000 Diagnosis Disappears
ChannelErrorType	Error code of drive fault or drive alarm Refer to <a href="#">PROFINET High Priority Alarm Codes on page 31</a> and <a href="#">PROFINET Low Priority Alarm Codes on page 33</a> for more information.

## ◆ S2 Redundancy

With S2 redundancy, the GA501 can establish an IO connection to two redundant PLCs. This allows a primary and a backup connection so that if the primary connection is lost, the backup PLC can take over and become the primary PLC.

### Note:

- Select the GA501 Drive V3.0.1 S2 Redundancy DAP to enable the S2 feature. Refer to [DAP Descriptions/Selection on page 20](#) for details.
- The combination of IO cycle update time and cycles without IO data determines the overall watchdog time. This watchdog time must be set longer than the time required for the PLCs to switch control from primary to backup. The minimum total watchdog time depends on the PLC. Refer to the PLC manufacturer's instructions.
- The minimum IO cycle update time when S2 is enabled is 4 ms. Both the IO cycle time and accepted update cycles without IO data are configured in the PLC's engineering tool. If the GA501 is declaring a *bUS* fault when switching between redundant PLCs, adjust the IO cycle update time and/or the accepted update cycles without IO data to give a longer watchdog time. You can also use *F7-16* to delay declaring *bUS* fault for a length of time when a connection is lost.

## ◆ Media Redundancy Protocol (MRP)

Media Redundancy Protocol (MRP) is supported in the GA501. Use the PLC configuration software to enable this feature and configure the GA501 as an MRP client. The GA501 does not support manager functionality.

MRP fault detection works best at slower IO rates. An IO rate of 64 ms or greater works reliably to not drop IO connections when the ring is broken.

## ◆ Simple Network Management Protocol (SNMP)

Simple Network Management Protocol (SNMP) is supported in the GA501. SNMP allows a method to discover the device identification, topology, and get network diagnostics via several different Management Information Base (MIB) objects.

The module parameters enable and disable this functionality. The setting is non-volatile and will be retained between power cycles. The following MIBs are supported. Refer to [LLDP - MIB Details on page 36](#) for more information.

- MIB-II
- LLDP
- LLDP-EXT-PNO
- LLDP-EXT-DOT3

## ■ LLDP - MIB Details

**Table 7.25 MIB2 Data**

ID	Field (s)	Description	Data type	Access
System Table				
1.3.6.1.2.1.1.1.0	SysDescr	Text description of the device.	OctetString	Read Only
1.3.6.1.2.1.1.2.0	sysObjectID	The standard identification of the managed system this agent represents.	OID	Read Only
1.3.6.1.2.1.1.3.0	sysUpTime	The time (in hundredths of a second) since the network management portion of the system was last reinitialized.	TimeTicks	Read Only
1.3.6.1.2.1.1.4.0	sysContact	The textual identification of the contact person for this managed node, together with information on how to contact this person.	OctetString	Read/Write
1.3.6.1.2.1.1.5.0	sysName	An administratively-assigned name for this managed node.	OctetString	Read/Write
1.3.6.1.2.1.1.6.0	sysLocation	The text description of the physical location of this node.	OctetString	Read/Write
1.3.6.1.2.1.1.7.0	sysServices	A value which indicates the set of services that this entity primarily offers.	Integer	Read Only
Interfaces Table				
1.3.6.1.2.1.2.1.0	ifPorts	Number of network interfaces (regardless of their current state) present on this system.	Integer	Read Only
1.3.6.1.2.1.2.2.1.(ifEntry)	ifIndex	An entry containing management information applicable to a particular interface.	Integer	Read Only
1.3.6.1.2.1.2.2.1.2.(ifEntry)	ifDescr	A textual string containing information about the interface.	OctetString	Read Only
1.3.6.1.2.1.2.2.1.3.(ifEntry)	ifType	The type of interface in the physical layer.	Integer	Read Only
1.3.6.1.2.1.2.2.1.4.(ifEntry)	ifMtu	The size of the largest datagram which can be sent/received on the interface, specified in octets.	Integer	Read Only
1.3.6.1.2.1.2.2.1.5.(ifEntry)	ifSpeed	Current Bandwidth - in bits/sec Set based on current speed of port in bits/sec	Gauge	Read Only
1.3.6.1.2.1.2.2.1.6.(ifEntry)	ifPhysAddress	MAC address of interface/port	OctetString	Read Only
1.3.6.1.2.1.2.2.1.7.(ifEntry)	ifAdminStatus	The desired state of the interface. 1: Up 2: Down	Integer	Read Only
1.3.6.1.2.1.2.2.1.8.(ifEntry)	ifOperStatus	The current operational state of the interface. 1: Up 2: Down	Integer	Read Only
1.3.6.1.2.1.2.2.1.10.(ifEntry)	ifInOctets	The total number of octets received on the interface, including framing characters.	Integer	Read Only
1.3.6.1.2.1.2.2.1.13.(ifEntry)	ifInDiscards	The number of inbound packets that were discarded.	Integer	Read Only
1.3.6.1.2.1.2.2.1.14.(ifEntry)	ifInErrors	The number of inbound packets that contained errors preventing them from being deliverable to a higher layer protocol.	Integer	Read Only
1.3.6.1.2.1.2.2.1.16.(ifEntry)	ifOutOctets	The total number of octets transmitted out of the interface, including framing characters.	Integer	Read Only
1.3.6.1.2.1.2.2.1.19.(ifEntry)	ifOutDiscards	The number of outbound packets that were chosen to be free up buffer space.	Integer	Read Only
1.3.6.1.2.1.2.2.1.20.(ifEntry)	ifOutErrors	The number of outbound packets that could not be transmitted because of errors.	Integer	Read Only
1.3.6.1.2.1.3.1.1.3.(ifEntry)	atNetworkAddress	IP address of device	IpAddress	Read Only
1.3.6.1.2.1.4.1.(ifEntry)	ipForwarding	Indication of whether this device is acting as a gateway.	Integer	Read Only
1.3.6.1.2.1.4.2.(ifEntry)	ipDefaultTTL	Value placed into the Time-To-Live field of the IP header.	Integer	Read Only

Table 7.26 LLDP-MIB

ID	Field (s)	Description	Data type	Access
LLDP Configuration				
1.0.8802.1.1.2.1.1.1	lldpMessageTxInterval	LLDP Transmit interval in seconds	Integer	Read Only
1.0.8802.1.1.2.1.1.2	lldpMessageTxHoldMultiplier	Time to live multiplier on lldpMessageTxInterval.	Integer	Read Only
1.0.8802.1.1.2.1.1.3	lldpReInitDelay	Minimum number of seconds after LLDP is disabled before it can be re-enabled.	Integer	Read Only
1.0.8802.1.1.2.1.1.4	lldpTxDelay	Delay in seconds of transmission after LLDP has been changed	Integer	Read Only
1.0.8802.1.1.2.1.1.5	lldpNotificationInterval	Time in seconds between LLDP notifications.	Integer	Read Only
LLDP Port Config Table				
1.0.8802.1.1.2.1.1.6.1.1. (LocalPort)	lldpPortConfigPortNum	Port index into Port Config table Hardcoded to 1, 2	Integer	Read Only
1.0.8802.1.1.2.1.1.6.1.2. (LocalPort)	lldpPortConfigAdminStatus	Status of the LLDP port. 1: TX Only 2: RX Only 3: TX/RX 4: LLDP Disabled	Integer	Read Only
1.0.8802.1.1.2.1.1.6.1.3. (LocalPort)	lldpPortConfigNotificationEnable	Notifications enabled on a per port basis Value of 1 is enabled, 2 is disabled.	Integer	Read Only
1.0.8802.1.1.2.1.1.6.1.4. (LocalPort)	lldpPortConfigTLVsTxEnable	Bitmap of enabled TLV in LLDP	Integer	Read Only
Configuration Address Table				
1.0.8802.1.1.2.1.1.7.1.1.1.4. (Device IP Address)	lldpConfigManAddrPortsTxEnable	Bitmap of ports	Integer	Read Only
Local System Data				
1.0.8802.1.1.2.1.3.1.0	lldpLocChassisIdSubType	The type of encoding used to identify the chassis associated with the local system.	Integer	Read Only
1.0.8802.1.1.2.1.3.2.0	lldpLocChassisId	The string value used to identify the chassis component associated with the local system.	OctetString	Read Only
1.0.8802.1.1.2.1.3.3.0	lldpLocSysName	Station name or MAC address if no station name	OctetString	Read Only
Local Port Table				
1.0.8802.1.1.2.1.3.7.1.1. (LocalPort)	lldpLocPortNum	The index value used to identify the port component	Integer	Read Only
1.0.8802.1.1.2.1.3.7.1.2. (LocalPort)	lldpLocPortIdSubtype	Type of port identifier	Integer	Read Only
1.0.8802.1.1.2.1.3.7.1.3. (LocalPort)	lldpLocPortId	String of port identifier	OctetString	Read Only
1.0.8802.1.1.2.1.3.7.1.4. (LocalPort)	lldpLocPortDesc	String of Port Description	OctetString	Read Only
Local Man Addr Table				
1.0.8802.1.1.2.1.3.8.1.1. (IpAddress)	lldpLocManAddrSubType	Type of management identifier.	Integer	Read Only
1.0.8802.1.1.2.1.3.8.1.2.1.4. (IpAddress)	lldpLocaManAddr	IP Address of device.	Integer	Read Only
1.0.8802.1.1.2.1.3.8.1.3. (IpAddress)	lldpLocaManAddrLen	Length of management address subtype and address fields	Integer	Read Only
1.0.8802.1.1.2.1.3.8.1.4. (IpAddress)	lldpLocaManAddrIfSubType	Identifies interface	Integer	Read Only
1.0.8802.1.1.2.1.3.8.1.5. (IpAddress)	lldpLocaManAddrIfID	Identifies interface number	Integer	Read Only
1.0.8802.1.1.2.1.3.8.1.6. (IpAddress)	lldpLocaManAddrOID	OID of type of hardware or protocol entity. (1.3.6.1.4.1.14733)	OID	Read Only
Remote System Data - All values retrieved from neighbor device LLDP data				
1.0.8802.1.1.2.1.4.1.1.1. (Timemark).(LocalPort). (EntryIndex)	lldpRemTimeMark	TimeFilter for this entry.	Integer	Read Only
1.0.8802.1.1.2.1.4.1.1.2.	lldpRemLocalPortNum	Port on which information received	Integer	Read Only

ID	Field (s)	Description	Data type	Access
(Timemark).(LocalPort). (EntryIndex)				
1.0.8802.1.1.2.1.4.1.1.3. (Timemark).(LocalPort). (EntryIndex)	lldpRemIndex	Arbitrary local identifier of connection	Integer	Read Only
1.0.8802.1.1.2.1.4.1.1.4. (Timemark).(LocalPort). (EntryIndex)	lldpRemChassisIsSubtype	Type of encoding for chassis identifier	Integer	Read Only
1.0.8802.1.1.2.1.4.1.1.5. (Timemark).(LocalPort). (EntryIndex)	lldpRemChassisId	The string value used to identify the chassis component associated with the remote system.	OctetString	Read Only
1.0.8802.1.1.2.1.4.1.1.6. (Timemark).(LocalPort). (EntryIndex)	lldpRemPortIdSubType	The type of port identifier encoding used in the associated 'lldpRemPortId' object	Integer	Read Only
1.0.8802.1.1.2.1.4.1.1.7. (Timemark).(LocalPort). (EntryIndex)	lldpRemPortId	The string value used to identify the port component associated with the remote system.	OctetString	Read Only
1.0.8802.1.1.2.1.4.1.1.8. (Timemark).(LocalPort). (EntryIndex)	lldpRemPortDesc	The string value used to identify the description of the given port associated with the remote system.	OctetString	Read Only
1.0.8802.1.1.2.1.4.1.1.9. (Timemark).(LocalPort). (EntryIndex)	lldpRemSysName	The string value used to identify the system name of the remote system.	OctetString	Read Only
1.0.8802.1.1.2.1.4.1.1.10. (Timemark).(LocalPort). (EntryIndex)	lldpRemSysDesc	The string value used to identify the system description of the remote system.	OctetString	Read Only
1.0.8802.1.1.2.1.4.1.1.11. (Timemark).(LocalPort). (EntryIndex)	lldpRemSysCapSupported	The bitmap value used to identify which system capabilities are supported on the remote system.	Integer	Read Only
1.0.8802.1.1.2.1.4.1.1.12. (Timemark).(LocalPort). (EntryIndex)	lldpRemSysCapEnabled	The bitmap value used to identify which system capabilities are enabled on the remote system.	Integer	Read Only
Remote Man Addr Table - All values retrieved from neighbor device LLDP data				
1.0.8802.1.1.2.1.4.2.1.1. (Timemark).(LocalPort). (EntryIndex)	lldpRemManAddrSubType	The type of management address identifier encoding used in the associated 'lldpRemManagmentAddr' object.	Integer	Read Only
1.0.8802.1.1.2.1.4.2.1.2. (Timemark).(LocalPort). (EntryIndex)	lldpRemManAddr	The string value used to identify the management address component associated with the remote system.	Integer	Read Only
1.0.8802.1.1.2.1.4.2.1.3. (Timemark).(LocalPort). (EntryIndex)	lldpRemManAddrIfSubtype	The enumeration value that identifies the interface numbering method used for defining the interface number	Integer	Read Only
1.0.8802.1.1.2.1.4.2.1.4. (Timemark).(LocalPort). (EntryIndex)	lldpRemManAddrIfId	The integer value used to identify the interface number regarding the management address component associated with the remote system	Integer	Read Only

**Table 7.27 LLDP-EXT-DOT3-MIB**

ID	Field (s)	Description	Data type
Xdot3LocPort Table			
1.0.8802.1.1.2.1.5.4623.1.2.1.1.2. (LocalPort)	lldpXdot3LocPortAutoNegEnabled	Value of 0 or 1 for whether auto-neg is enabled	Boolean
1.0.8802.1.1.2.1.5.4623.1.2.1.1.4. (LocalPort)	lldpXdot3LocPortOperMauType	MAU type, value showing speed and duplex	Integer
Xdot3RemPort Table			
1.0.8802.1.1.2.1.5.4623.1.3.1.1.2. (Timemark).(LocalPort).(EntryIndex)	lldpXdot3RemPortAutoNegEnabled	Value of 0 or 1 for whether auto-neg is enabled	Boolean
1.0.8802.1.1.2.1.5.4623.1.3.1.1.4. (Timemark).(LocalPort).(EntryIndex)	lldpXdot3RemPortOperMauType	MAU type, value showing speed and duplex	Integer

Table 7.28 LLDP-EXT-PNO-MIB

ID	Field (s)	Description	Data type
XPnoLocal Data			
1.0.8802.1.1.2.1.5.3791.1.2.1.1.1. (LocalPort)	lldpXPnoLocLPDValue	Line Propagation delay in nanoseconds	Integer
1.0.8802.1.1.2.1.5.3791.1.2.1.1.2. (LocalPort)	lldpXPnoLocPortTxDValue	Transmit delay in nanoseconds	Integer
1.0.8802.1.1.2.1.5.3791.1.2.1.1.3. (LocalPort)	lldpXPnoLocPortRxDValue	Receive delay in nanoseconds	Integer
1.0.8802.1.1.2.1.5.3791.1.2.1.1.6. (LocalPort)	lldpXPnoLocPortNoS	Name of local station Station name or MAC address if no station name	OctetString
XPnoRemote Data			
1.0.8802.1.1.2.1.5.3791.1.3.1.1.1. (Timemark).(LocalPort).(EntryIndex)	lldpXPnoRemLPDValue	Line Propagation delay in nanoseconds	Integer
1.0.8802.1.1.2.1.5.3791.1.3.1.1.2. (Timemark).(LocalPort).(EntryIndex)	lldpXPnoRemPortTxDValue	Transmit delay in nanoseconds	Integer
1.0.8802.1.1.2.1.5.3791.1.3.1.1.3. (Timemark).(LocalPort).(EntryIndex)	lldpXPnoRemPortRxDValue	Receive delay in nanoseconds	Integer
1.0.8802.1.1.2.1.5.3791.1.3.1.1.6. (Timemark).(LocalPort).(EntryIndex)	lldpXPnoRemPortNoS	Name of remote station Station Name or MAC address if no station name	OctetString

## 8 Web Interface

The drive contains a series of web pages that let you use a standard web browser to view status and diagnostic information.

You can access the web page through a self-contained web server at port 80. Type the IP address of the drive into a web browser to access the Home page.

Example: <http://192.168.1.20>

If you do not know the IP address, use monitors *U6-80 to U6-83 [Ethernet IP Address 1 to Ethernet IP Address 4]* on the keypad to read the IP address of the drive. Refer to [Table 5.1](#) for more information.

### ◆ Home Page

The Home page shows the status of the drive and the I/O. It also shows identifying information about the drive.



Figure 8.1 Home Page View

When a fault or minor fault occurs in the drive, the details of the fault or minor fault are displayed on the Home page.



If a fault or minor fault occurs in the drive and only the fault or minor fault code is displayed on the Home page, refer to the drive manuals for details on the fault or minor fault.

**YASKAWA** CIPR-GA51U2006  
PROFINET / GA501

Home PROFINET Network Ring Chart Login

Status Extended Status

**Drive Status**  
**FAULT - Code 71H**

RUN ZERO SPD REV RESET AT SPD READY ALARM **FAULT**

**Drive Monitors**

Frequency Reference	0.00 Hz
Output Frequency	0.00 Hz
Output Current	0.0 A
DC Bus Voltage	291 VDC
Torque Reference	0.0 %

**Digital Inputs**

- S1
- S2
- S3 (virtual)
- S4 (virtual)
- S5 (virtual)
- S6 (virtual)
- S7 (virtual)

**Digital Outputs**

- MA-MB-MC

**Analog Inputs**

A1  %

**Drive**

Model	GA501
Full Model	CIPR-GA51U2006
Version	2010
Serial Number	0123456789ABCDE

**Ethernet**

Version	VST908211
Protocol	PROFINET-Ver5005

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### ◆ PROFINET Page

The PROFINET page shows basic information about the protocol. You can change the station name from this page if the drive is not actively connected to a PLC. This requires a security login. Refer to [Security Login on page 46](#) for more information.

You can download the GSDML file from this page.

**YASKAWA** CIPR-GA51U2006  
PROFINET / GA501

Home PROFINET Network Ring Chart Login

**PROFINET**

PLC Status **Connected**

Station Name **drive1**

Base MAC Address **00:20:B5:52:01:1C**

Port 1 MAC Address **00:20:B5:52:01:1D**

Port 2 MAC Address **00:20:B5:52:01:1E**

**Edit Station Name**

Edit Station Name Cancel Station Name Edit

New Station Name

Save Station Name

**Downloads**

GSDML

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Figure 8.2 PROFINET Page View

### ◆ Network Page

The Network page shows the status of the drive network traffic and the status of open I/O connections.

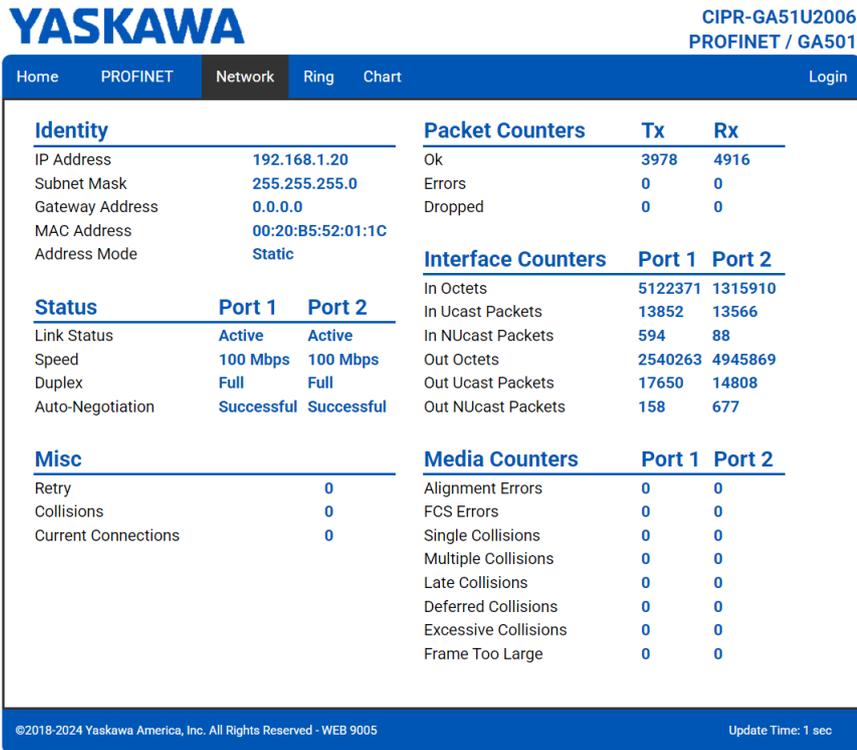


Figure 8.3 Network Page View

Table 8.1 Network Monitor Descriptions

Name	Description
Address Mode	Either static IP address or DHCP.
Alignment Errors	Cumulative number of errors for uneven packets lengths.
Auto-Negotiation	If auto-negotiation is enabled, this will show the status of the negotiation.
Collisions	Cumulative number of collisions (half duplex only) reported by the MAC/PHY (Media Access Control/Physical Layer).
Current Connections	Current number of open connections.
Deferred Collisions	Cumulative number of deferred collisions.
Duplex	Display either Full or Half.
Excessive Collisions	Cumulative number of excessive collisions.
FCS Errors	Cumulative number of frame check sequence errors.
Frame Too Large	Cumulative number of frames that exceed the maximum frame size.
Gateway Address	The Gateway IP Address.
In NUcast Packets	Cumulative number of non-unicast packets received.
In Octets	Cumulative number of incoming octets.
In Ucast Packets	Cumulative number of unicast packets received.
IP Address	IP Address.
Late Collisions	Cumulative number of late collisions.
Link Status	Active if the cable is plugged in, or inactive if no cable.
MAC Address	MAC Address.
Msg Rx Dropped	Cumulative number of messages dropped due to input network buffer being full and unable to hold the new message.
Msg Rx Errors	Cumulative number of receive errors reported by the MAC/PHY (Media Access Control/Physical Layer).
Msg Rx OK	Cumulative number of messages received successfully.
Msg Tx Dropped	Cumulative number of messages dropped due to output network buffer being full and unable to hold the new message.
Msg Tx Errors	Cumulative number of transmit errors reported by the MAC/PHY (Media Access Control/Physical Layer).
Msg Tx OK	Cumulative number of messages transmit successfully.
Multiple Collisions	Cumulative number of multiple collisions.

Name	Description
Out NUCast Packets	Cumulative number of non-unicast packets sent.
Out Octets	Cumulative number of outgoing octets.
Out Ucast Packets	Cumulative number of unicast packets sent.
Single Collisions	Cumulative number of single collisions.
Speed	Connection speed, either 10 Mbps or 100 Mbps.
Subnet Mask	Subnet Mask.
Tx Retry	Cumulative number of retransmits due to busy medium reported by the MAC/PHY (Media Access Control/Physical Layer).

**Note:**

Cumulative counters are reset when the power supply is cycled.

## ◆ Ring Page

This page shows the status of Media Redundancy Protocol (MRP) on the drive.

The screenshot shows the YASKAWA web interface for the Ring page. The page title is "YASKAWA" and the model is "CIPR-GA51U2006 PROFINET / GA501". The navigation menu includes Home, PROFINET, Network, Ring (selected), and Chart. The MRP status is displayed as follows:

MRP	Port Information	Port 1	Port 2
Enabled	Packet Rate (ms)	18	20
Source MAC Address	Last Test Packet Time (ms)	9	9
Ring State			
Manager Priority			
Num. of Topology Changes			
Num. of Transitions			

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Figure 8.4 Ring Page View

## ◆ Chart Page

The Chart page can be used to monitor one signal from a predefined list.

- Frequency Reference
- Output Frequency
- Output Current
- Motor Speed
- Torque Reference
- DC Bus Voltage
- Terminal Analog Input 1

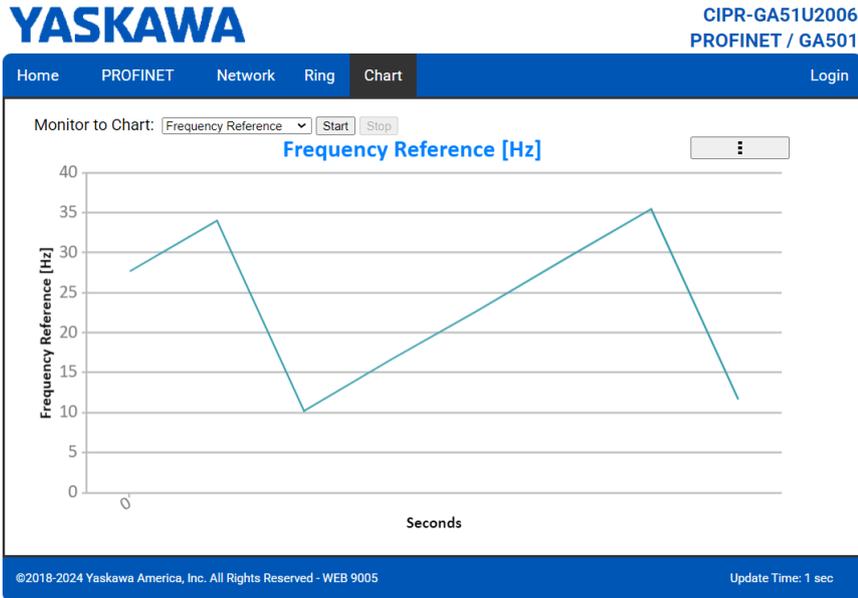


Figure 8.5 Chart Page View

### ◆ Email Alerts Page

The Email Alerts page allows the user to configure four Email Fault/Alarm conditions. When the condition is true, one email will be sent to the provided email address. Another email will not be sent until the condition becomes false and then true again. A 30-second timer prevents emails from being sent when conditions reoccur immediately after being removed. The timer helps limit the amount of emails sent regarding the same intermittent condition and helps to reduce network traffic by reducing emails about reoccurring errors.

Click [Save Email Settings] when you save the entered information.

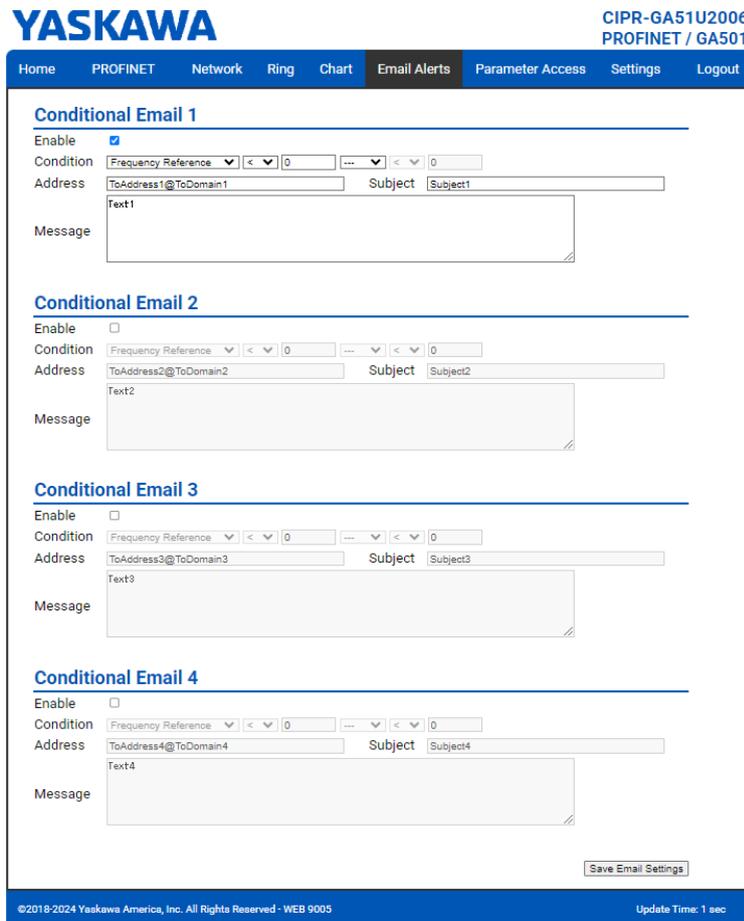


Figure 8.6 Email Alerts Page View

## ■ Procedure: Conditional Email Set-up

1. Click the “Enable” check box to enable the alert.
2. Define the condition that will trigger the email by selecting a monitor parameter, a comparator, and a value.  
Set the conditions to send alerts from the “Condition” drop-down selection. If choosing only one condition and no OR or AND are needed, set the “OR/AND” drop-down selection to “—”.
3. Enter the email address where the alert will be sent.
4. Enter the message that will appear in the email contents.
5. Enter the email subject.

## ◆ Parameter Access Page

The Parameter Access page lets you read and write parameters, monitors and other MEMOBUS/Modbus registers from the drive.

Figure 8.7 Parameter Access Page View

The MEMOBUS/Modbus address for the drive parameter being accessed must be entered in hexadecimal. Clicking [Read] will load and display the current value of the given MEMOBUS/Modbus Address.

Clicking [Set] will save the given value to the given MEMOBUS/Modbus address.

After a [Read] or [Set] command is given, Status will display [Waiting] while the action is being carried out, then [Read Successful] or [Write Successful] is displayed when finished.

## ◆ Settings Page

The Settings page sets web page behavior parameters. Access is restricted unless a valid password is entered. The default password is yaskawa.

Figure 8.8 Settings Page View

### ■ Security Login

Click “Login” and enter a valid password. The button text will change to “Log out” and the status will change to “Logged in”.

**Note:**

The default security password is “yaskawa”.

This password can be changed in the “Change Password” section of the Settings page.

Entering a valid password allows access to the settings in the Settings page, Email Alerts page, and the Parameter Access page.

### ■ Webpage Password

To change the password, enter the new password in the “New Password:” and “Confirm Password:” text boxes. Click “Save password”.

### ■ Webpage Settings

The values displayed in the various tabs are refreshed at the rate defined in the “Data Update Time” select box. The Data Update Time can be set to 250 ms, 500 ms, 1 second, 2 seconds, or 5 seconds.

### ■ Email Settings

The “Email Server IP Address” text box must contain the IP address of the email server. The subnet address is configured in drive parameters *F7-05* through *F7-08*. The configured email alerts will use the server at this address when sending emails.

Enter the email server port in the “Email Server Port” text box.

The value in the “From Email Address” text box identifies the origin of the email alerts to the recipient.

To save the entered information, click “Save Email Settings”.

## 9 Troubleshooting

### ◆ Drive-Side Error Codes

Drive-side error codes appear on the drive keypad. [Fault on page 46](#) lists causes of the errors and possible corrective actions. Refer to the drive manuals for additional error codes that may appear on the drive keypad.

#### ■ Fault

A *bUS* [Ethernet Communication Error] and *EF0* [Ethernet External Fault] can appear as a fault. When a fault occurs, the keypad ALM LED stays lit. When an alarm occurs, the ALM LED flashes.

If communication stops while the drive is running, use these questions as a guide to help remove the fault:

- Is the communication line connected correctly to the drive?
- Is the PLC program working? Is the controller/PLC CPU stopped?
- Did a momentary power loss interrupt communications?

Code	Name	Causes	Possible Solutions
bUS	Ethernet Communication Error	The drive did not receive a signal from the controller.	<ul style="list-style-type: none"> <li>• Check for wiring errors.</li> <li>• Correct the wiring.</li> </ul>
		The communications cable wiring is incorrect.	
		An existing short circuit or communications disconnection	Check disconnected cables and short circuits and repair as needed
		A data error occurred due to electric interference	<ul style="list-style-type: none"> <li>• Prevent noise in the control circuit, main circuit, and ground wiring.</li> <li>• If you identify a magnetic contactor as a source of noise, install a surge absorber to the contactor coil.</li> <li>• Use only recommended cables or other shielded line. Ground the shield on the controller side or the drive input power side.</li> <li>• Separate all communication wiring from drive power lines. Install an EMC noise filter to the drive power supply input.</li> <li>• Decrease the effects of electrical interference from the controller.</li> </ul>
		Connection Time-out	Check if the CPU of the controller stopped.

Code	Name	Causes	Possible Solutions
		Duplicate IP Address found on network	Change to a different IP address. If $F7-13 = 0$ [Address Mode at Startup = Static], change parameters $F7-01$ to $F7-04$ [IP Address 1 to 4].
		IP Configuration Error	IP Address Setting/Gateway Setting If $F7-13 = 0$ [Address Mode at Startup = Static], change the settings of $F7-01$ to $F7-12$ [IP Address 1 to 4, Subnet Mask 1 to 4, Gateway Address 1 to 4] to align with the network part of IP address and the gateway address, then cycle power. If $F7-13 = 1$ or $2$ [Address Startup Mode = BOOTP (Use network address.) or DHCP (Use network address.)], check the configuration of your BOOTP or DHCP server.
		The connection to the primary PLC timed out while the S2 redundancy function is used.	<ul style="list-style-type: none"> <li>Check the primary PLC state to make sure it functions correctly.</li> <li>Check cable connection on the communication path with the primary PLC.</li> </ul>
EF0	Ethernet External Fault	The drive received an external fault from the controller.	<ol style="list-style-type: none"> <li>Find the device that caused the external fault and remove the cause.</li> <li>Clear the external fault input from the controller.</li> </ol>
		A programming error occurred on the controller side.	Examine the operation of the controller program.
oFA00	Ethernet HW Error	Invalid DIP switch S1 setting	Check if the DIP switch S1 setting is correct for the communication protocol you are using.
PSE	Protocol Set Error	Invalid DIP switch S1 setting	Check if the DIP switch S1 setting is correct for the communication protocol you are using.

## ◆ bUS Fault Tolerance

### ■ bUS Fault Auto-Restart

Setting  $F6-14 = 0$  [Disabled] or  $F6-01 = 3$  or greater (Alarm only) will not affect standard default drive behavior. Setting  $F6-14 = 1$  [Enabled] AND  $F6-01 \neq 3$  [Fault] will cause the following operation:

- The *bUS* fault occurs after the  $F7-16$  [Timeout Value] delay and the Run command is removed from the drive.
- The drive detects that the *bUS* fault occurred in the PROFINET network.
- When the condition is removed, a fault reset is commanded and the control of the drive is returned to the PROFINET network.

### ■ bUS Fault Delay

The setting value of  $F7-16$  is the length of time from when the network detects a fault until the *bUS* fault is detected on the drive. The status LEDs on the drive are not affected by the delay time set in  $F7-16$ ; the LEDs will indicate the *bUS* condition immediately.

## ◆ PROFINET Error Codes

### ■ Fault Monitors U6-98 and U6-99

If any faults occur with PROFINET, you can check error/warning conditions via drive monitor parameters on the drive keypad as shown in [Table 9.1](#).

**Table 9.1 Fault Monitor Descriptions**

Status	Fault Declared	Status Value (U6-98/U6-99)	Description	MS LED	NS LED
Forced Fault	EF0	3	The network sent a message to force this node into a fault state.	RED flash 5 times	-
No Link	bUS	1300	No physical link to another device. This happens after a link is established and removed.	-	RED flash 2 times
Temporary Network Error	bUS	1301	PLC connection timeout. This indicates a network problem, for example PLC offline or switch disconnected.	-	RED flash 1 time
Default MAC Address	-	1303	Programmed MAC Address is not at factory default setting. <b>Note:</b> Return the drive to Yaskawa or your nearest sales representative and request the setting change.	Solid RED	-
No IP address	-	1304	Card does not have an IP address. This happens when the drive is set to have the PLC configure the IP address but it has not been received yet ( $F7-13 = 1$ or $2$ [Address Mode at Startup = Set by PLC]).	RED flash 2 times	-
No station name	-	1305	No station name programmed. Program a name through web page or PLC configuration program.	RED flash 3 times	-

Status	Fault Declared	Status Value (U6-98/U6-99)	Description	MS LED	NS LED
			<b>Note:</b> If DIP switches are changed, the station name will automatically be erased.		
IP Configuration Error	-	1309	The configured IP addresses are incompatible. The IP Address (F7-01 to F7-04) does not agree with the Subnet Mask (F7-05 to F7-08) and/or the Gateway Address (F7-09 to F7-12). Adjusting the above parameters or setting the PLC to assign the IP address should clear this fault.	-	RED flash 3 times
Web Interface Setting Error	-	1310	Failure to read the web interface setting.	Solid RED	
S2 Primary Connection timeout	bUS	1311	Timeout for no Primary PLC connection when using S2 Redundancy	-	RED flash 4 times

Two drive monitor parameters, U6-98 [Ethernet First Fault] and U6-99 [Ethernet Current Fault] assist the user in network troubleshooting.

- U6-98 displays the first declared fault since the last power cycle. U6-98 is only cleared upon drive power-up.
- U6-99 displays the present network status. U6-99 is cleared upon a network-issued fault reset and upon power-up.

If another fault occurs while the original fault is still active, parameter U6-98 retains the original fault value and U6-99 stores the new fault status value.

### ◆ Communication Error

If there are no problems with the drive, but you cannot communicate with other devices, try the possible solution below.

Status	Possible Solutions
The LINK/ACT LED will not illuminate.	Set F7-14 = 1 [Duplex Mode Selection = Auto/Auto (Auto Negotiation/Auto Negotiation)].

### ◆ Self RAM Check

Use these procedures to do a self RAM check for all areas including unused areas.

**Note:**

- The self RAM check completes in approximately 1.5 minutes.
- When you start the self RAM check, the drive will detect oFA00 [Ethernet HW Error].

1. Set DIP switch S1 as shown in Figure 9.1.

**Note:**

Use non-conductive tweezers or a tool with a tip width of approximately 0.5 mm (0.02 in) to set DIP switch S1.

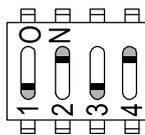


Figure 9.1 DIP Switch S1 Settings for the Self RAM Check

2. Apply power to the drive.  
This will start the self RAM check.
3. Look at the LEDs to see the status of the self RAM check.  
Refer to Table 9.2 for more information.

Table 9.2 LED States during Self RAM Check

Self RAM Check Status	LED States	
	MS	NS
Checking	Lit in green	OFF
Successful termination	Lit in green	Lit in green
Abnormal termination	Lit in red	Lit in red

## 10 Specifications

### ◆ Specifications

Table 10.1 PROFINET Specifications

Items	Specifications
PROFINET Conformance	Passed PROFINET Conformance Class B Passed PROFIdrive Conformance Passed S2 Redundancy Conformance
Minimum IO Cycle Times	2 ms - without S2 Redundancy 4 ms - with S2 Redundancy
IP Address Setting	Programmable from drive keypad or network
Communication Speed	Programmable from drive keypad or network: 10/100 Mbps, auto-negotiate.
Duplex Mode	Half-forced, Auto-negotiate, Full-forced
Address Startup Mode	Static or PLC Assigned
PROFINET Functions	PROFINET IO with PROFIdrive profile Configurable I/O in cyclic messages Drive diagnostic alarms I&M0, I&M1, I&M2, I&M3

## 11 P-Drive Communication Profile

### ◆ P-Drive Operation

This section describes the operation of P-Drive. P-Drive is a profile that was present in JOHB-SMP3 option software versions 5002 and earlier. In order to use P-Drive, the GA501 Drive V 2.0.1 Legacy DAP must be selected.

### ■ The Control Word and the Status Word

Table 11.1 Control Word (STW)

Bit	Name	Value	State Change/Description
0	ON	1	Proceed to Switched On unless other interlocks (OFF2, OFF3) are active.
	OFF	0	Proceed to Ready For Switching On unless other interlocks (OFF2, OFF3) are active.
1	OFF2	1	Continue operation (OFF2 inactive)
		0	Coast to Stop Proceed to Switch On Inhibit.
2	OFF3	1	Continue operation (OFF3 inactive)
		0	Quick stop Proceed to Quick Stop. Proceed to Switch On Inhibit once drive stopped.
3	Enable Operation	1	Proceed to Operation.
		0	Inhibit operation. Proceed to Switched On.
4	Enable Ramp Generator	1	Normal operation
		0	Reset Ramp Generator.
5	Unfreeze Ramp Generator	1	Normal operation
		0	Freeze Ramp Generator.
6	Enable Setpoint	1	Normal operation Proceed to Operating. <b>Note:</b> This bit is effective only if the fieldbus interface is set as the source for this signal by drive parameters.
		0	Force Ramp Function Generator input to zero.
7	Fault Acknowledge	0 -> 1	Fault reset if an active fault exists. Proceed to Switch On Inhibit.

Bit	Name	Value	State Change/Description
		0	(Continue normal operation)
8	Jog 1	-	(Not supported)
9	Jog 2	-	(Not supported)
10	Control by PLC	1	Controlled from the Profinet network, disregarding the settings of <i>b1-01</i> [Frequency Reference Selection 1] and <i>b1-02</i> [Run Command Selection 1].
		0	Controlled by the settings of <i>b1-01</i> and <i>b1-02</i> .
11 - 15	(Reserved)	-	(Reserved)

**Table 11.2 Status Word (ZSW)**

Bit	Name	Value	State Change/Description
0	Ready to Switch on	1	Ready to Switch on
		0	Not Ready to Switch on
1	Ready to Operate	1	Ready to Operate
		0	Not Ready to Operate
2	Operation Enabled	1	Enable Operation
		0	Disable Operation
3	Fault Present	1	Faulted
		0	Not Faulted
4	OFF2 Status	1	OFF2 Inactive. (Coast to Stop)
		0	OFF2 Active. (Coast to Stop)
5	OFF3 Status	1	OFF3 Inactive. (Quick Stop)
		0	OFF3 Active. (Quick Stop)
6	Switch on Inhibited	1	Switch on Inhibit Active
		0	Switch on Inhibit Not Active
7	Warning	1	Warning/Alarm.
		0	No Warning/Alarm.
8	Speed Error	1	Actual value equals reference value (i.e. is within tolerance limits).
		0	Actual value differs from reference value (= is outside tolerance limits). This will occur DEV alarm or DEV fault from drive.
9	Control Requested	1	Drive control location: Remote
		0	Drive control location: Local
10	Setpoint Reached		Speed Agree bit
11 - 13	(Reserved)	-	(Reserved)
14 *1	Safe Torque Off (STo or SToF)	1	Either or both of the Safe Disable input terminals H1 and H2 are OFF. Coast To Stop.
		0	Both of the Safe Disable input terminals H1 and H2 are ON.
14 *2	(Reserved)	-	(Reserved)
15	(Reserved)	-	(Reserved)

\*1 Active when the "P-Drive" Control/Status word is selected.

\*2 Bit 14 is not used when "P-Drive (NO STO)" Control/Status word is selected.

### P-Drive and STO Status

There is a selection in the Control/Status Word Selection for "P-Drive" or "P-Drive (NO STO)".

When "P-Drive" is selected, the Safe Torque Off digital inputs (STO) of the drive will be monitored. If the STO is active in the drive, the P-Drive state machine will Coast to Stop and will assert status bit 14 to 1. It will transition into the Switch On Inhibited State.

In "P-Drive (NO STO)", the STO status of the drive will not be monitored by P-Drive, and it will not affect the state machine operation.

### ■ P-Drive to PROFIdrive Transition

P-Drive is an earlier version of PROFIdrive. The differences between P-Drive operation and PROFIdrive operation are noted below.

## Drive Parameter Settings

Table 11.3 shows the differences in the drive parameter settings.

**Table 11.3 Differences in the Drive Parameter Settings**

Parameters	Function	P-Drive	PROFIdrive
<i>b1-01 [Frequency Reference Selection 1], b1-02 [Run Command Selection 1]</i>	Control from network	Bit 10 of the control word would force control to originate from the PROFINET network, if control wasn't already set by the <i>b1-01</i> and <i>b1-02</i> parameters.	Bit 10 of the control word will no longer force control to originate from the PROFINET network. Parameters <i>b1-01</i> and <i>b1-02</i> must be set to get control from the network. <ul style="list-style-type: none"> <li><i>b1-01</i> = 3 [Ethernet]</li> <li><i>b1-02</i> = 3 [Ethernet]</li> </ul>
<i>b1-03 [Stopping Method Selection]</i>	Stopping Method	The stopping method was based on the Control Word Bit 0 (OFF 1), Bit 1 (OFF2), and Bit 2 (OFF3). Parameter <i>b1-03</i> was not required to be set to any particular value.	Stopping method now must be set to [Ramp to Stop]. By this setting, PROFIdrive inherently allows for selection of Ramp, Coast, or Quick stop via the Control Word Bit 0 (OFF 1), Bit 1 (OFF2), and Bit 2 (OFF3). <i>b1-03</i> = 0 [Ramp to Stop]
<i>L4-01 [Speed Agree Detection Level]</i>	At speed bit	Bit 10 of status word would be set to 1 if the speed agree bit in the drive was 1.	Bit 10 of status word will now only be 1 if the output frequency is above the value of <i>L4-01</i> . <i>L4-01</i> must be set to the desired level to trigger this Bit 10 of status word.

## Difference in the Control and Status Words

Some functions of the Control and Status Words differ between P-Drive and PROFIdrive. Table 11.4 and Table 11.5 show these differences.

**Table 11.4 Control Word (STW)**

Name	Bit	P-Drive	PROFIdrive
Enable Ramp Generator	Bit 4		<ul style="list-style-type: none"> <li>0: When in a running state, it will ramp to zero speed using <i>CI-09 [Fast Stop Time]</i>.</li> <li>1: Normal operation</li> </ul>
Unfreeze Ramp Generator	Bit 5	<ul style="list-style-type: none"> <li>0: When in a running state, it will stop via stopping method set in <i>b1-03 [Stopping Method Selection]</i>.</li> <li>1: Required to enter running state</li> </ul>	<ul style="list-style-type: none"> <li>0: Drive will retain its current frequency reference even if ramping up or ramping down.</li> <li>1: Normal operation</li> </ul>
Enable Setpoint	Bit 6		<ul style="list-style-type: none"> <li>0: Will force the input of the ramp generator (frequency reference) to zero.</li> <li>1: Normal operation</li> </ul>
Control by PLC	Bit 10	<ul style="list-style-type: none"> <li>0: <i>b1-01 [Frequency Reference Selection 1]</i> and <i>b1-02 [Run Command Selection 1]</i> are not overridden.</li> <li>1: Overrides values of <i>b1-01</i> and <i>b1-02</i> to get Ethernet control of Freq Ref and Run Command Source.</li> </ul>	<ul style="list-style-type: none"> <li>Keeps drive from entering the running state. Run command outside the network is still available.</li> <li>1: Normal operation</li> </ul>

**Table 11.5 Status Word (ZSW)**

Name	Bit	P-Drive	PROFIdrive
OFF2 Status	Bit 4	This was not updated under all conditions. <ul style="list-style-type: none"> <li>0: OFF2 Active</li> <li>1: OFF2 Not Active</li> </ul>	This will now always show the status of OFF2 even in non-running states. <ul style="list-style-type: none"> <li>0: OFF2 Active</li> <li>1: OFF2 Not Active</li> </ul>
OFF3 Status	Bit 5	This was not updated under all conditions. <ul style="list-style-type: none"> <li>0: OFF3 Active</li> <li>1: OFF3 Not Active</li> </ul>	This will now always show the status of OFF3 even in non-running states. <ul style="list-style-type: none"> <li>0: OFF3 Active</li> <li>1: OFF3 Not Active</li> </ul>
Speed Error	Bit 8	Set based on speed deviation status sent from drive. This is limited to control methods that use an encoder. <ul style="list-style-type: none"> <li>0: Speed Deviation detected</li> <li>1: Speed within tolerance levels</li> </ul>	Set when actual speed differs from commanded speed. Actual speed is based on <i>U1-05 [Motor Speed]</i> , and commanded speed is based on <i>U1-16 [SFS Output Frequency]</i> . Parameter <i>L4-02 [Speed Agree Detection Width]</i> determines the tolerance for Speed Error. If in a control method that does not support <i>U1-05</i> , this bit is always set. <ul style="list-style-type: none"> <li>0: Speed Deviation detected</li> <li>1: Speed within tolerance levels</li> </ul>
Control Requested	Bit 9	This is set if the drive freq ref source and run command source are set to Ethernet.	This is a handshaking bit to the PLC. It will be set once the connection to the PLC has been completely established via the Application Relationship PROFINET handshake.
Setpoint Reached	Bit 10	This is set if the speed agree status bit in the drive was set.	This is set if the output frequency is above the value set in parameter <i>L4-01 [Speed Agree Detection Level]</i> .

## Behavior Changes

In PROFIdrive, the drive can now be restarted before it has finished ramping down. This was not possible in P-Drive and it required the drive to be stopped before re-asserting the run.

**PROFIdrive Parameters**

In PROFIdrive, fault history parameters are no longer linked to the values of *U2-01*, *U3-01* to *U3-04* in the drive. The fault history buffer will be generated in the communication software itself and will clear on a power cycle. This is expected behavior per the PROFIdrive specification.

Some parameters have been added to PROFIdrive that were not in P-Drive. Refer to [Table 11.6](#).

**Table 11.6 PROFIdrive Parameters**

Parameter Number	Description	P-Drive	PROFIdrive
922	Telegram selection 16 bit value	YES	YES
944	Fault message counter 16 bit value	YES	YES
945	Fault code Array of size 5	YES	YES
947	Fault number Array of size 5	YES	YES
950	Scaling of the fault buffer Array of size 2	NO	YES
964	Drive unit identification Array of size 5	YES	YES
965	Profile identification number Array of size 2	YES	YES
967	Control word 1 16 bit value	YES	YES
968	Status word 1 16 bit value	YES	YES
974	Base mode parameter access service identification Array of size 3	NO	YES
975	DO identification Array of size 8	YES	YES
977	Write trigger to non-volatile memory 16 bit value	YES	NO
980 - 989	Number list of defined parameter Each Parameter number is an array of size 20.	NO	YES
60000	Velocity reference value 32bit float value	NO	YES
61000	NameOfStation Array of size 240	YES	YES
61001	IpOfStation Array of size 4	YES	YES
61002	MacOfStation Array of size 6	YES	YES
61003	DefaultGatewayOfStation Array of size 4	YES	YES
61004	Subnet mask of station Array of size 4	YES	YES

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# YASKAWA AC Drive GA501

# PROFINET

## Technical Manual

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In the event that the end user of this product is to be the military and said product is to be employed in any weapons systems or the manufacture thereof, the export will fall under the relevant regulations as stipulated in the Foreign Exchange and Foreign Trade Act. Therefore, be sure to follow all procedures and submit all relevant documentation according to any and all rules, regulations and laws that may apply.

Specifications are subject to change without notice for ongoing product modifications and improvements.

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