

YASKAWA Drive

PROFINET Function Block for Use in TIA Portal

User Instructions

To properly use the product, read this manual thoroughly and retain for easy reference, inspection, and maintenance. Ensure the end user receives this manual.

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1 Document Overview

This document shows the steps to successfully integrate Yaskawa drives into TIA Portal. Additionally, it shows the steps required to quickly and easily integrate it into the PLC logic.

◆ Library Overview

The Yaskawa VFD PROFINET Library allows you to integrate Yaskawa drives controlled over PROFINET into TIA Portal projects quickly and easily.

The library has function blocks that are designed to let you easily interface with the drive to decrease development time.

The library supports S7-1200 and S7-1500 controllers. There are separate libraries for 4 different versions of TIA Portal: V15_1, V16, V17 & V18.

Note: These instructions assume that you have already created a TIA Portal project and you have already added a PLC controller to the project.

2 Library Contents

This library contains 9 different function blocks. There are blocks for the SI-EP3 PROFINET Option card and for the JOHB-SMP3 Multi-Protocol Ethernet Option card. Some function blocks are only available for use on the JOHB-SMP3.

Function Block	Function Block Name	Drive Object Module (Telegram) Configured in PLC	Availability	
			SI-EP3	JOHB-SMP3
Standard	fbVFD_Yaskawa_Standard	Std Tgm 1	Yes	Yes
Standard + 5 Configurable	fbVFD_Yaskawa_Standard + 5 PZD	Std gm 1 + 5 PZD	Yes	Yes
Standard + 10 Configurable	fbVFD_Yaskawa_Standard + 10 PZD	Std Tgm 1 + 10 PZD	–	Yes
P-Drive	fbVFD_Yaskawa_PROFIDrive	Std Tgm 1	Yes	Yes
P-Drive + 5 Configurable	fbVFD_Yaskawa_PROFIDrive + 5 PZD	Std Tgm 1 + 5	Yes	Yes
P-Drive + 10 Configurable	fbVFD_Yaskawa_PROFIDrive + 10 PZD	Std Tgm 1 + 10	–	Yes
Gateway Master </>	fbVFD_Yaskawa_Gateway_Master	Gateway + 10 PZD	–	Yes
Gateway Slave </>	fbVFD_Yaskawa_Gateway_Slave	-	–	Yes
P-Drive Gateway Master </>	fbVFD_Yaskawa_Gateway_Master_P-Drive	Gateway + 10 PZD	–	Yes

<1> These function blocks will only operate correctly when you install a JOHB-SMP3 on a GA800, GA700, GA500, FP605 or HV600 drive. If you install a JOHB-SMP3 on a 1000-series drive, these function blocks will NOT operate correctly.

◆ Yaskawa Standard Function Blocks

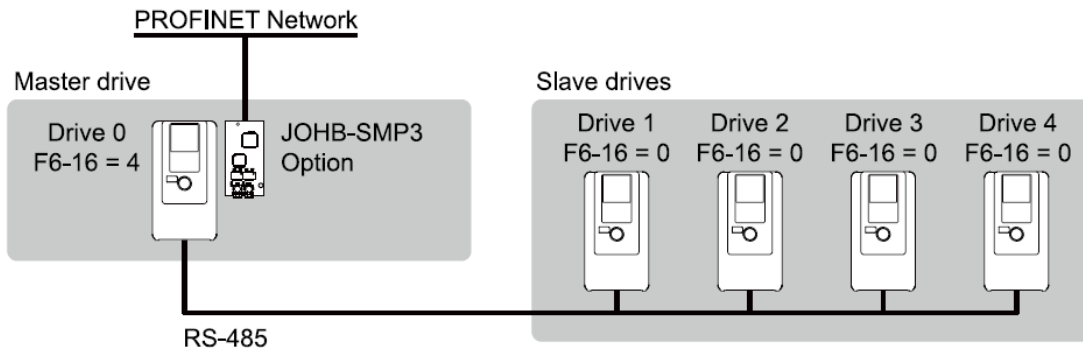
- The control word uses a simple Boolean Run Forward / Run Reverse interface. (For example: Fwd Run, Rev Run, and Fault Reset.)
- The status word uses simple Boolean status signals. (For example: Running, Ready, and Fault.)
- The frequency reference is unipolar, accepting positive values only (normally in units of 0.01 Hz).
- Can include 0, 5, or 10 configurable registers (PZDs) for additional cyclic information exchange.
- Set the Control/Status Configuration in the PLC parameters to **0: Yaskawa Specific**

◆ Yaskawa P-Drive Function Blocks

- The control word (STW) is set up for PROFIDrive operation. (For example: Ready To Operate, Emergency Off, and Inhibit Operation.)
- The status word (ZSW) is set up for PROFIDrive operation. (For example: Ready To Switch On, Ready To Operate, and Fault.)
- The frequency reference is bi-polar.
- Can include 0, 5, or 10 configurable registers (PZDs) for additional cyclic information exchange.
- Set the Control/Status Configuration in the PLC parameters to **1: Yaskawa P-Drive**

◆ Standard Gateway Function Block (Gateway Master)

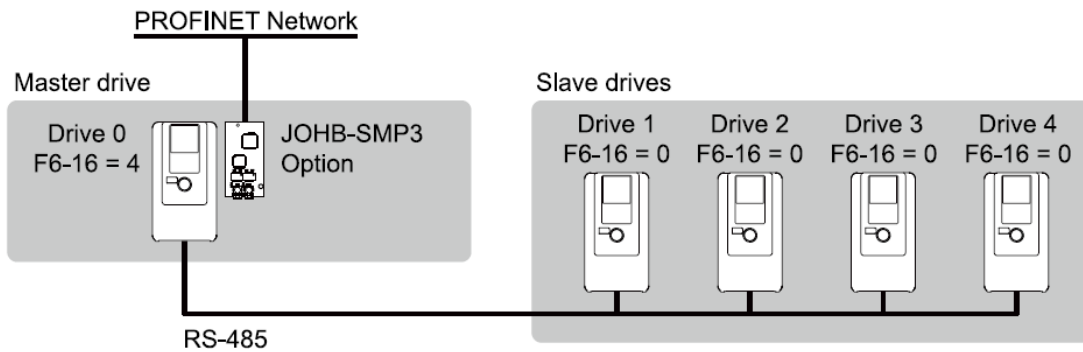
- Uses the gateway feature that lets you connect one drive (Master) to a PROFINET network and use a low-speed RS-485 connection to communicate with up to 4 additional (Slave) drives.



- The control word for the master drive uses a simple Boolean Run Forward / Run Reverse interface (For example: Fwd Run, Rev Run and Fault Reset). The status word (ZSW) is set up for PROFIDrive operation. (For example: Ready To Switch On, Ready To Operate, and Fault.)
- The status word uses simple Boolean status signals (For example: Running, Ready, and Fault.)
- All slave drives use a simple Boolean Run Forward / Run Reverse interface.
- Includes 10 configurable registers (PZDs) for additional cyclic information exchange with the Master Drive (only).
- Set the Control/Status Configuration in the PLC parameters to **0: Yaskawa Specific**

◆ P-Drive Gateway Function Block (Gateway Master)

- Uses the gateway feature that lets you connect one drive (Master) to a PROFINET network and use a low-speed RS-485 connection to communicate with up to 4 additional (Slave) drives.



- The control word (STW) is set up for PROFIDrive operation. (For example: Ready To Operate, Emergency Off, and Inhibit Operation.) The control word for the master drive uses a simple Boolean Run Forward / Run Reverse interface. (For example: Fwd Run, Rev Run, and Fault Reset.) The status word (ZSW) is set up for PROFIDrive operation (For example: Ready To Switch On, Ready To Operate, and Fault.)
- The status word (ZSW) is set up for PROFIDrive operation (For example: Ready To Switch On, Ready To Operate, and Fault.)
- The frequency reference is bi-polar.
- All slave drives use a simple Boolean Run Forward / Run Reverse interface.
- Includes 10 configurable registers (PZDs) for additional cyclic information exchange with the Master Drive (only).
- Set the Control/Status Configuration in the PLC parameters to **1: Yaskawa P-Drive**

◆ Gateway Slave Function Block

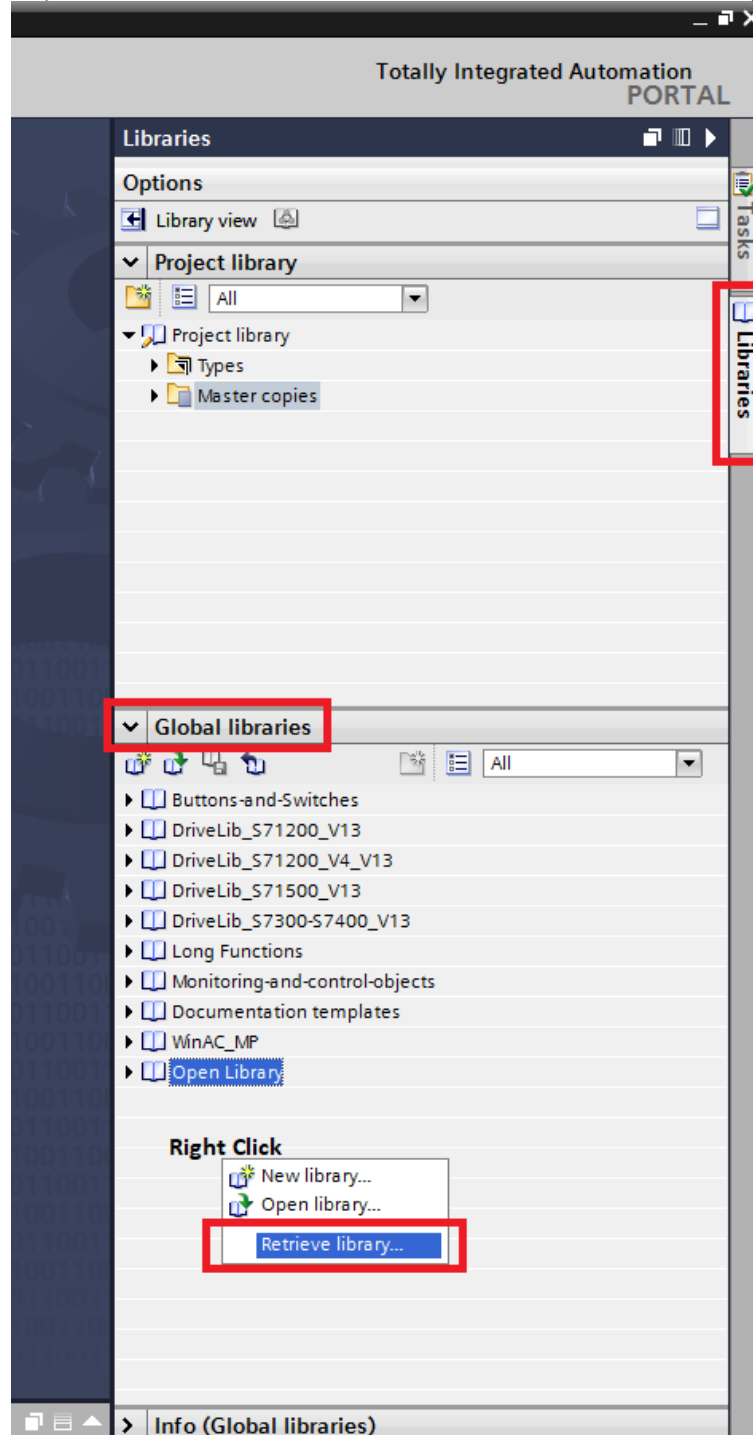
- Used with a Gateway Master Function Block (either Standard or P-Drive).
- One Gateway Slave Function block is necessary for each slave drive.
- The frequency reference is unipolar, accepting positive values only (usually in 0.01 Hz units).
- Simple Boolean Run Forward / Run Reverse interface.

3 Import the Library Into Your Project

1. Download the most recent version of the library from the Yaskawa website at <https://www.yaskawa.com/products/drives/industrial-ac-drives/industrial-network-communication-protocols/profinet>.

Note: Make sure that the library version that you download aligns with the version of Portal that you are using for development. Look under Help > Installed Software to verify your version.

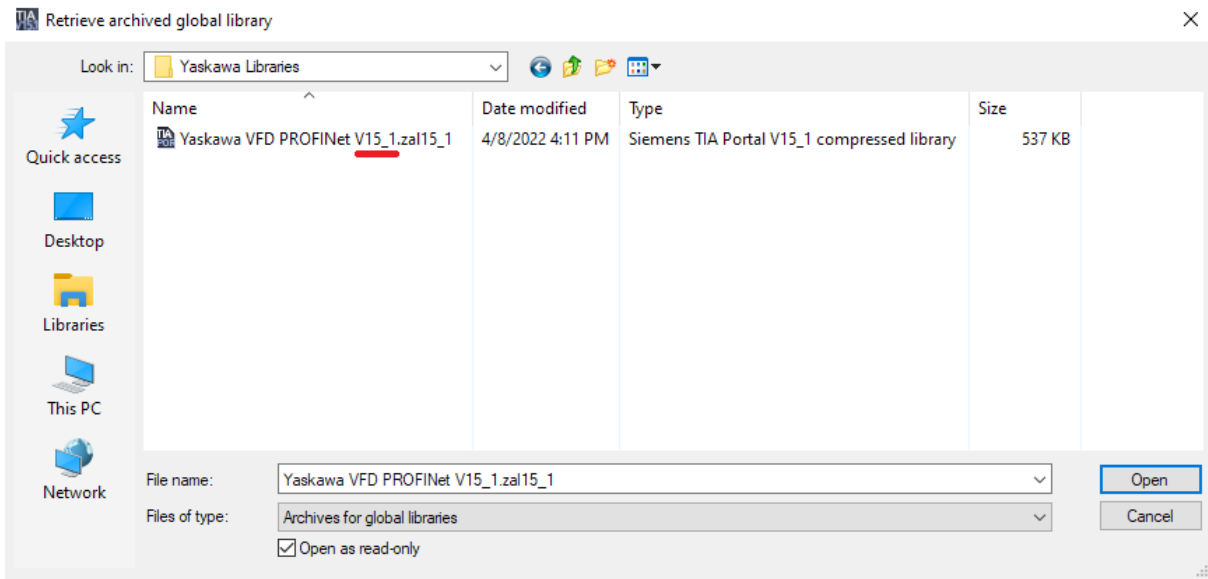
2. On the right-hand side of Portal, select the **Libraries** tab and expand **Global libraries**.
3. Right-click in the blank space in the **Global libraries** tab, then select **Retrieve library...**



3 Import the Library Into Your Project

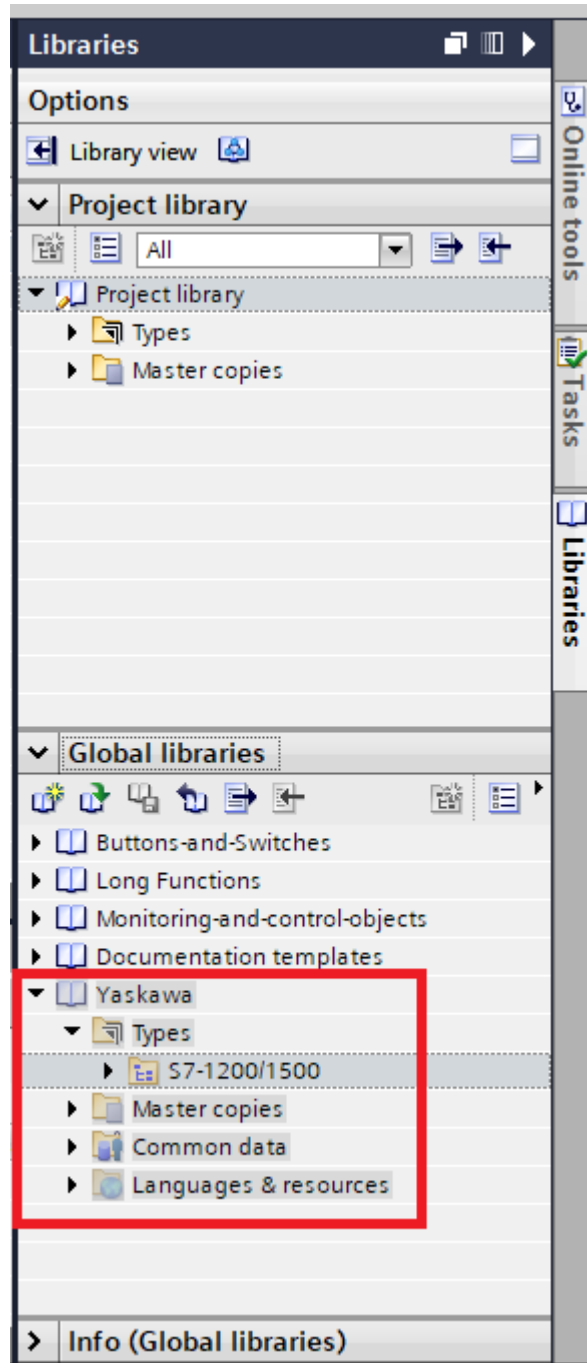
4. After the file explorer opens, navigate to the location where you saved the downloaded library in **Step 1**.

Note: If you cannot find your library in this file explorer, make sure that library version you downloaded matches the version of TIA Portal you are using.



5. After you select the archived library, the software will ask you where you want to save the uncompressed version of the library. Select a destination and click **OK**.

6. Make sure that the library is shown in the **Global libraries** tab to confirm that you have successfully added the library.



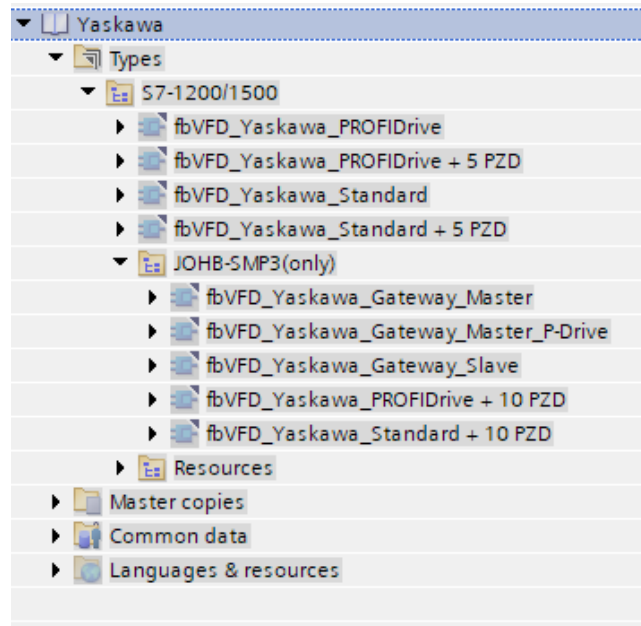
7. Expand the **Yaskawa** library folder, then expand **Types**, then **S7-1200 / 1500**.

3 Import the Library Into Your Project

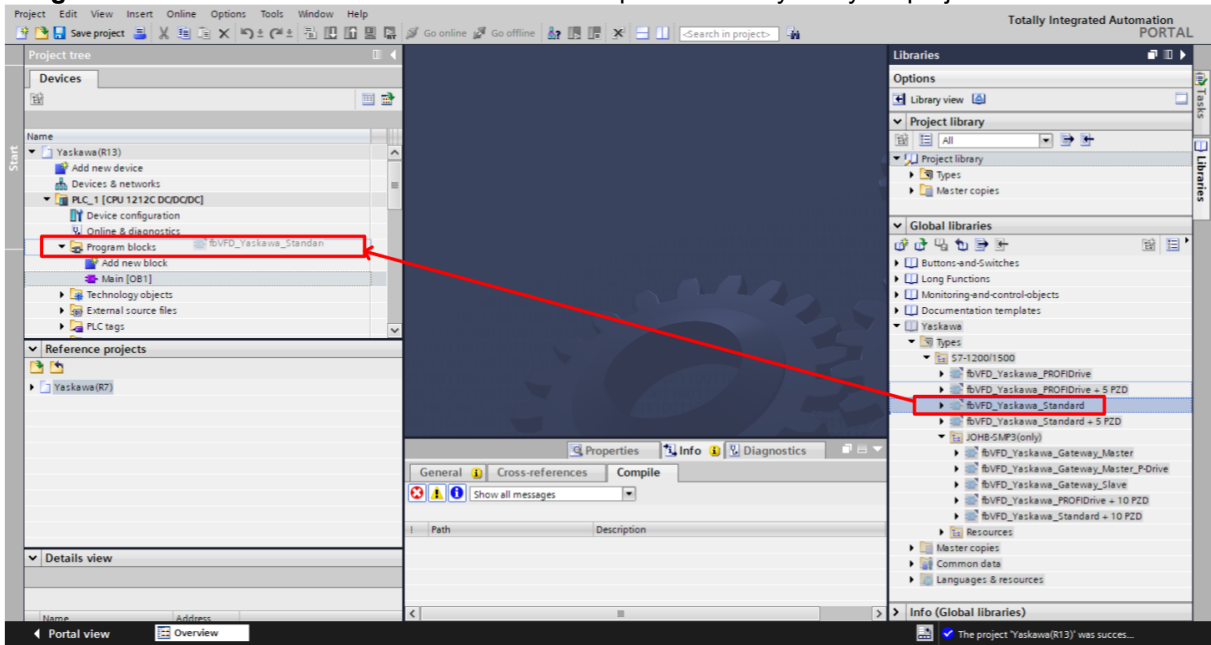
8. There are several different function blocks that can be used depending upon the telegram you want to use in your application:

Function Block	Standard	Drive Object Module (Telegram) Configured in PLC	Availability	
			SI-EP3	JOHB-SMP3
Standard Telegram 1 (Std Tgm 1)	fbVFD_Yaskawa_Standard	0: Yaskawa Standard	Yes	Yes
	fbVFD_Yaskawa_PROFIDrive	1: Yaskawa P-Drive		
Standard Telegram 1 + 5 Configurable PZDs (Std Tgm 1 + 5 PZD)	fbVFD_Yaskawa_Standard + 5 PZD	0: Yaskawa Standard	Yes	Yes
	fbVFD_Yaskawa_PROFIDrive + 5 PZD	1: Yaskawa P-Drive		
Standard Telegram 1 + 10 Configurable PZDs (Std Tgm 1 + 10)	fbVFD_Yaskawa_Standard + 10 PZD	0: Yaskawa Standard	-	Yes
	fbVFD_Yaskawa_PROFIDrive + 10 PZD	1: Yaskawa P-Drive		
Gateway Master Telegram + 10 Configurable PZDs (Gateway + 10 PZD)	fbVFD_Yaskawa_Gateway_Master	0: Yaskawa Standard	-	Yes
	fbVFD_Yaskawa_Gateway_Master_P-Drive	1: Yaskawa P-Drive		
	fbVFD_Yaskawa_Gateway_Slave	n/a		

Below shows how the function blocks are organized within TIA Portal:

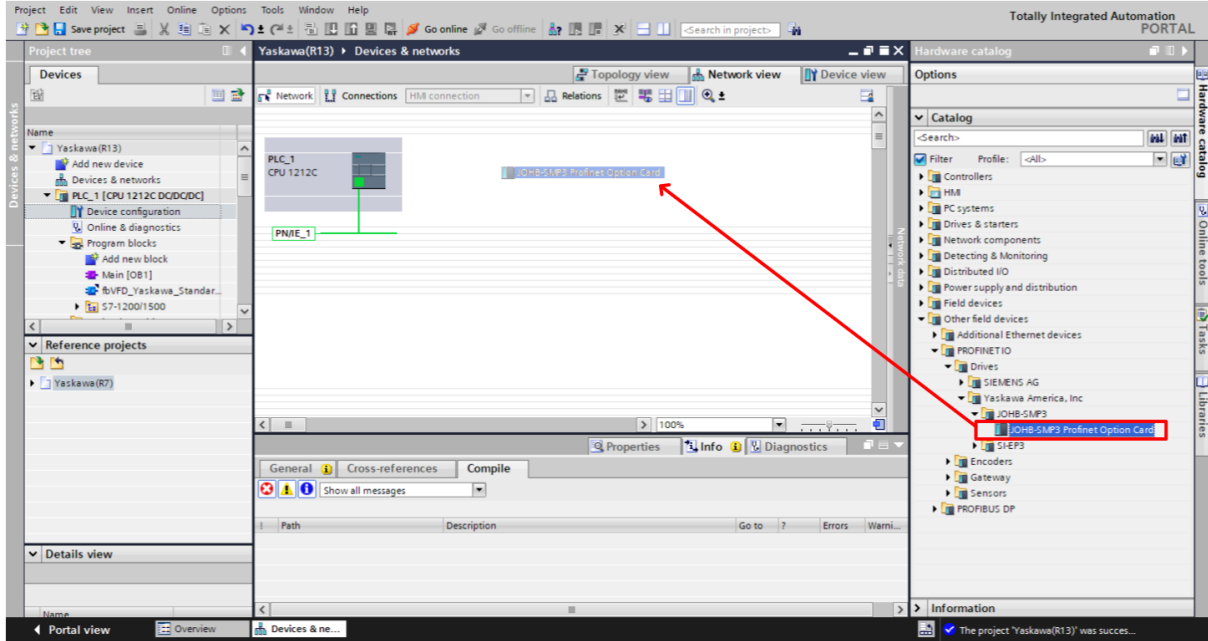


- Depending on the telegram you want to use in your application, drag the appropriate block from your global libraries to **Program blocks** in the left-hand side of Portal to import the library into your project.



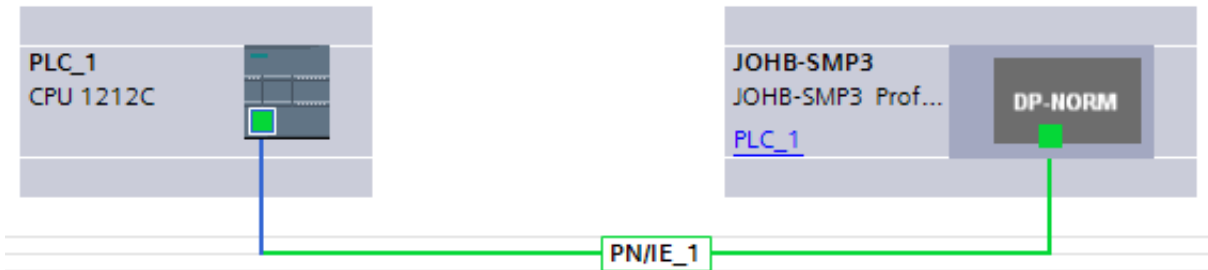
4 Add the Drive to Your Hardware Configuration

1. Download the appropriate GSD (.GSDML) file for the option card:
JOHB-SMP3: Most installations will use: GSDML-V2.4-Yaskawa-JOHB-SMP3-20220222
<https://www.yaskawa.com/MPE>
SI-EP3: Most installations will use: GSDML-V2.3-Yaskawa-SIEP3-20150604
<https://www.yaskawa.com/products/drives/industrial-ac-drives/industrial-network-communication-protocols/profinet>
2. Select **Options**, then **Manage General Station Description Files (GSD)** to add the .GSDML file.
3. Open the hardware configuration of your project in the Network View.
4. Drag the applicable option card into your hardware configuration. (Examples shown below use the JOHB-SMP3, but the procedure is the same for the SI-EP3).



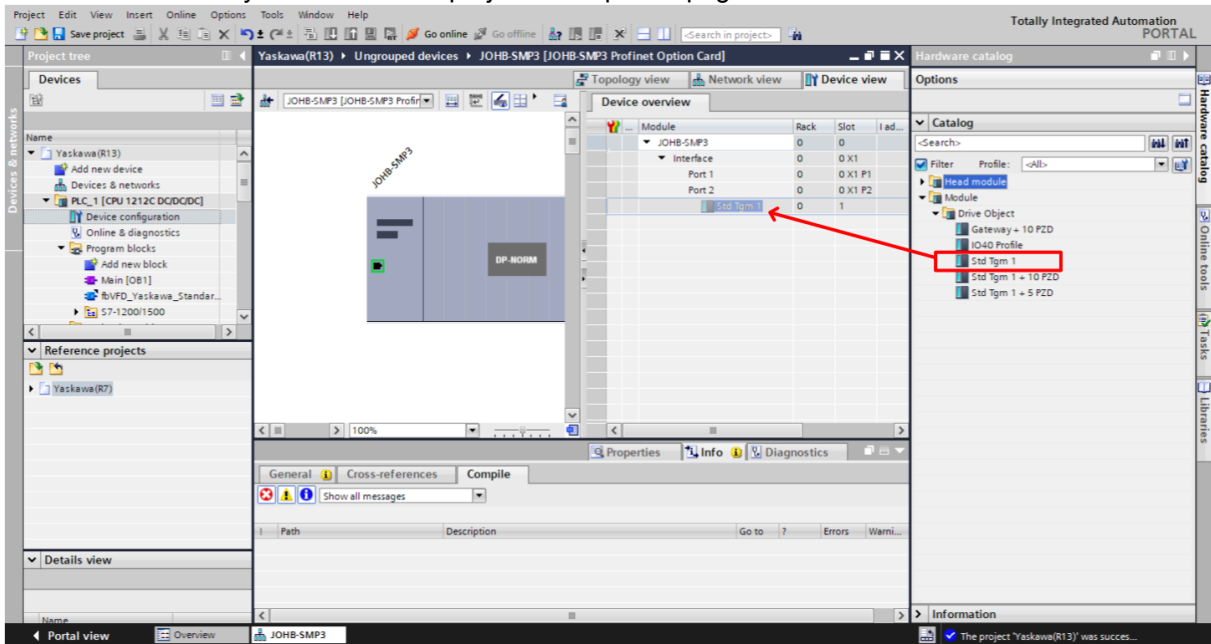
5. Drag the existing network onto the green square on the JOHB-SMP3 (DP-NORM) icon to add the drive to the appropriate PROFINET network.

Note: Make sure to assign your drive to the correct PLC as its IO controller. In the figure below, the drive is assigned to PLC_1 as indicated by the blue text.

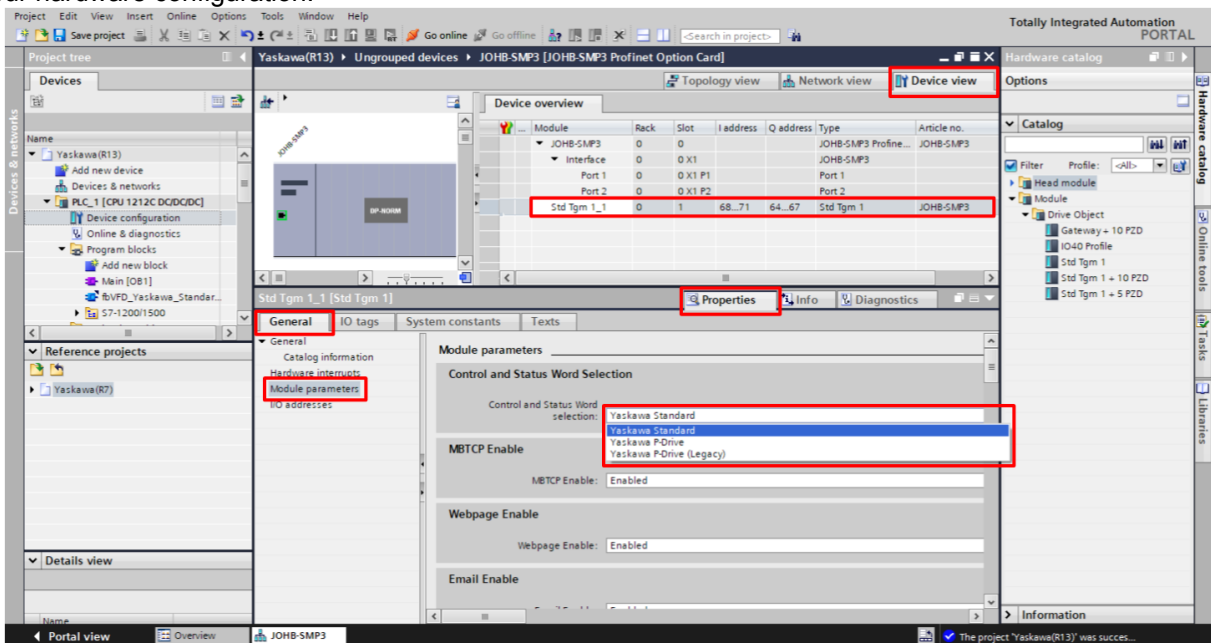


6. Double-click on the drive to enter the Device view.

7. Navigate to your hardware catalog and expand **Module > Drive Object**. Select the telegram that you want to use for your application, then drag it into the first blank row on the **Device overview** tab. In most cases, this should align with the function block that you added to the project in Step 9 on page 11.



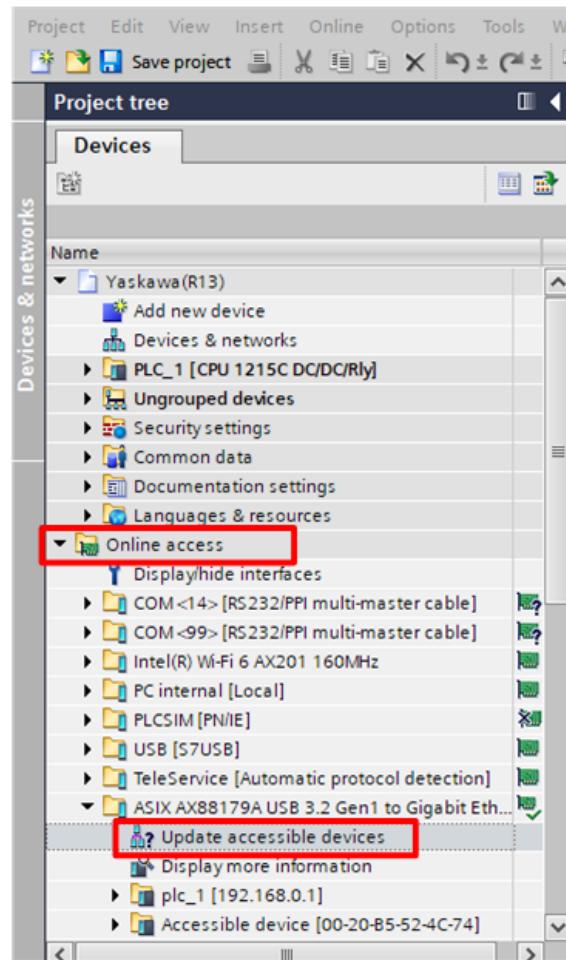
8. Specify whether you are using a Standard Yaskawa telegram or the PROFIDrive telegram. Click on the telegram that was just added in the Device overview window, then go to **Properties > General > Module Parameters** and select either “Yaskawa Standard” or “Yaskawa P-Drive” (PROFIDrive) in the drop-down list to complete adding the drive to your hardware configuration.



5 Connect the Drive to the PROFINET Network

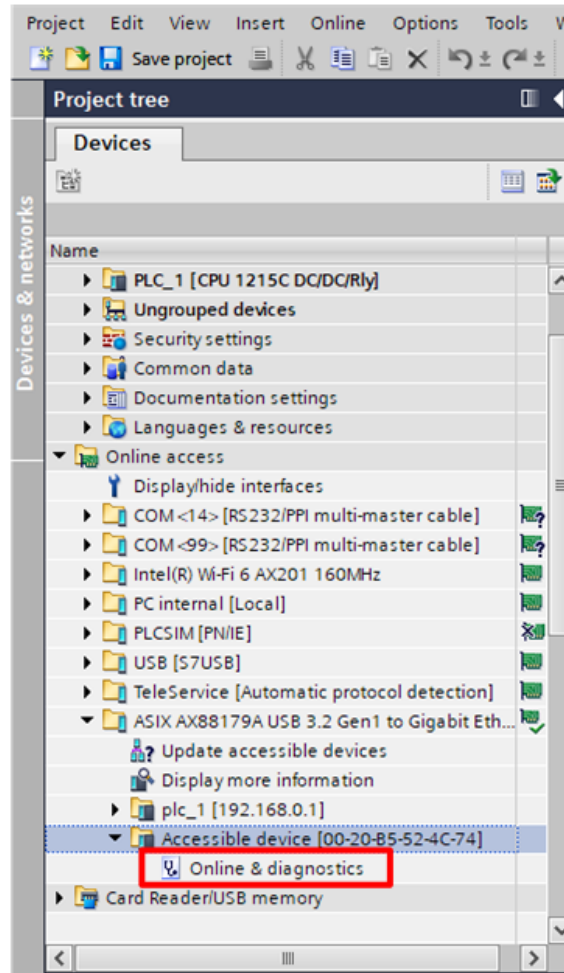
1. Connect one of the RJ-45 ports on the option card to the PROFINET network.

In the **Project Tree**, expand **Online Access**, then find the network interface that is being used to connect the PC to the PLC and click **Update accessible devices**.



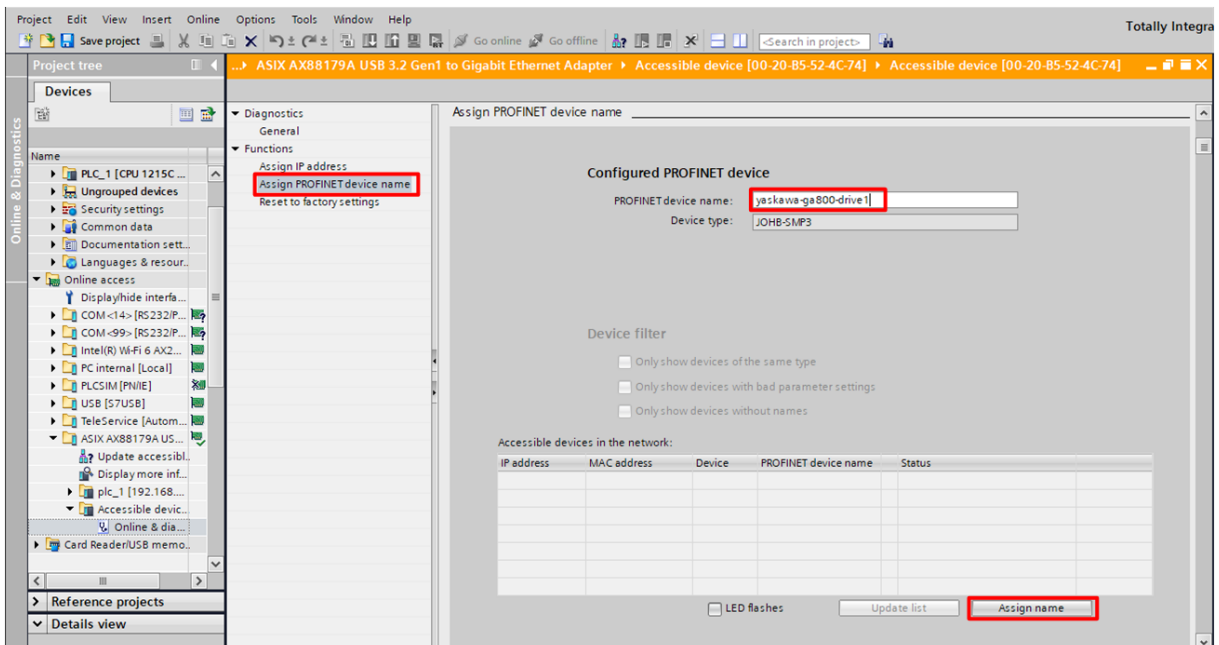
2. After the search is complete, click on the newly found drive and then select **Online & diagnostics**. If the option card does not yet have a station name assigned, it will show up as "accessible device" followed by the [MAC address].

Note: Yaskawa PROFINET option cards will start with a MAC address of "00-20-B5"



3. Assign the drive a PROFINET device name.

Expand **Functions**, then click on **Assign name**. In the box labeled **PROFINET device name**, set / change the station name for the drive. Then click **Assign name**.



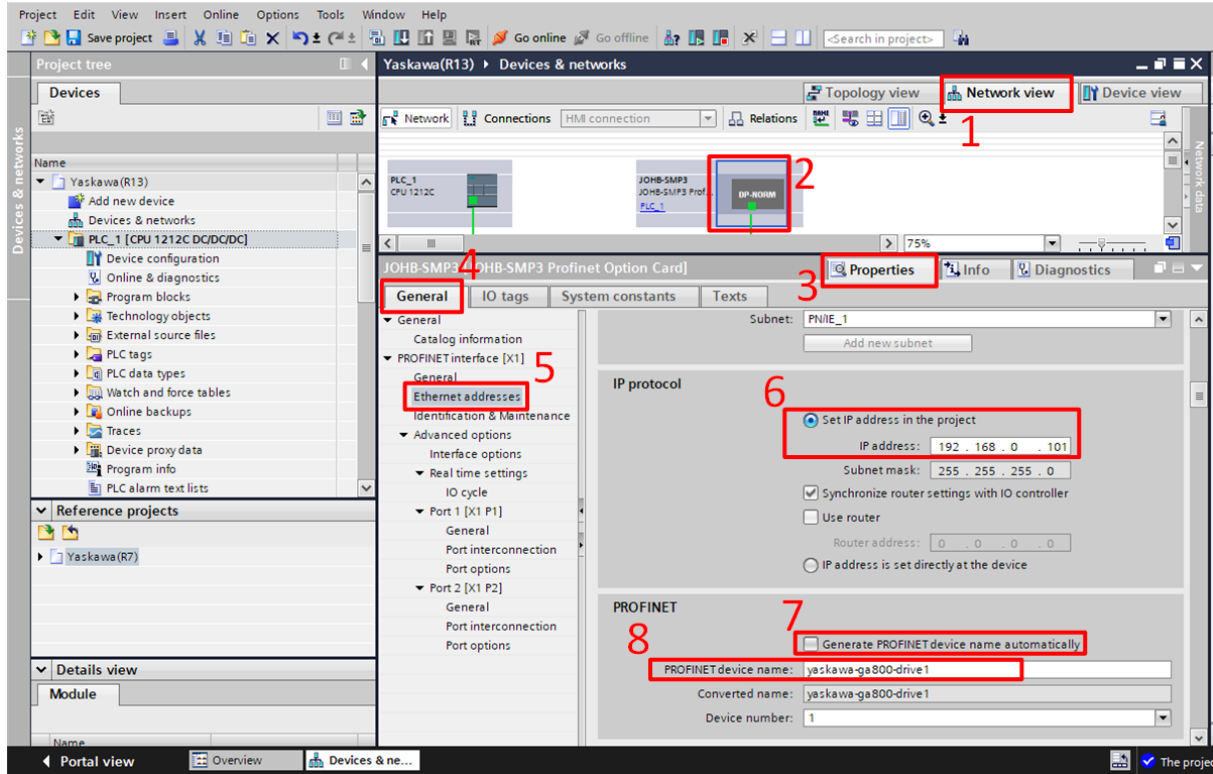
5 Connect the Drive to the PROFINET Network

4. Modify the hardware configuration to set the assigned IP address of the drive.

In the **Devices & networks** window, click on the **Network view** tab [1], then click on the drive [2].

Select the **Properties** tab [3], then select the **General** tab [4], then expand **PROFINET interface [X1]**, and select **Ethernet addresses** [5]. Make sure that the **Set IP address in the project** radio button [6] is selected, and enter the IP address you assigned to the drive in Step 3.

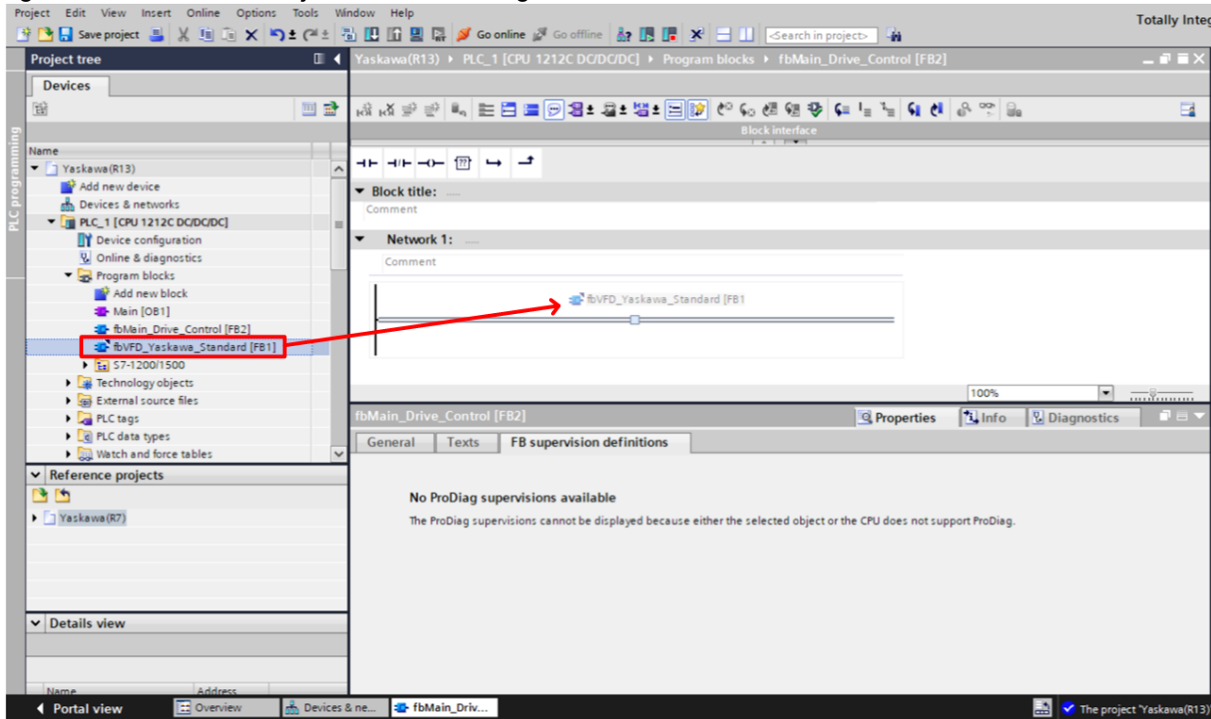
In the PROFINET area underneath the IP address, uncheck **Generate PROFINET device name automatically** [7] and enter the PROFINET device name [8] you set in Step 3.



5. Recompile and download the updated hardware configuration to verify a successful connection. If successful, both “NS” and “MS” LEDs on the drive will be lit.

6 Add the Yaskawa Function Block to the Program

1. Drag the block from the Project tree into a rung of ladder to add an instance of the function block into the program.

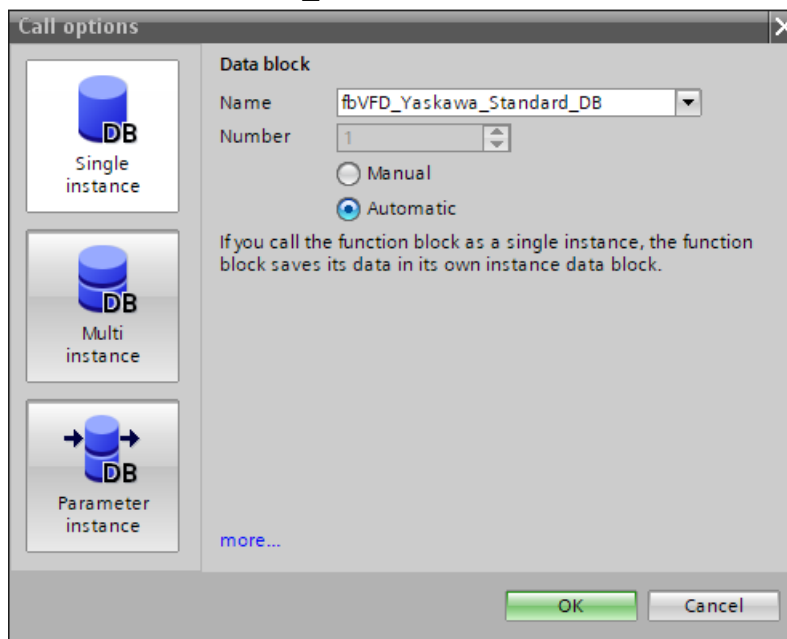


2. After you drag the block into a rung, you will be prompted to declare the block as either single or multi-instance. Consider the existing architecture of your code before you make your selection.

When you declare the function block as single instance, it will create a global data block that will allow you to access the inputs and outputs of the function block anywhere in the program.

When you declare the function block as multi-instance, it can improve the organization of your code when you use many drives throughout the project.

3. Choose a name for the instance memory, considering existing naming conventions. If no naming conventions already exist, consider the following:
 - Example Single Instance Name: dbIns_Drive1
 - Example Multi-Instance Name: #VFD_Drive1



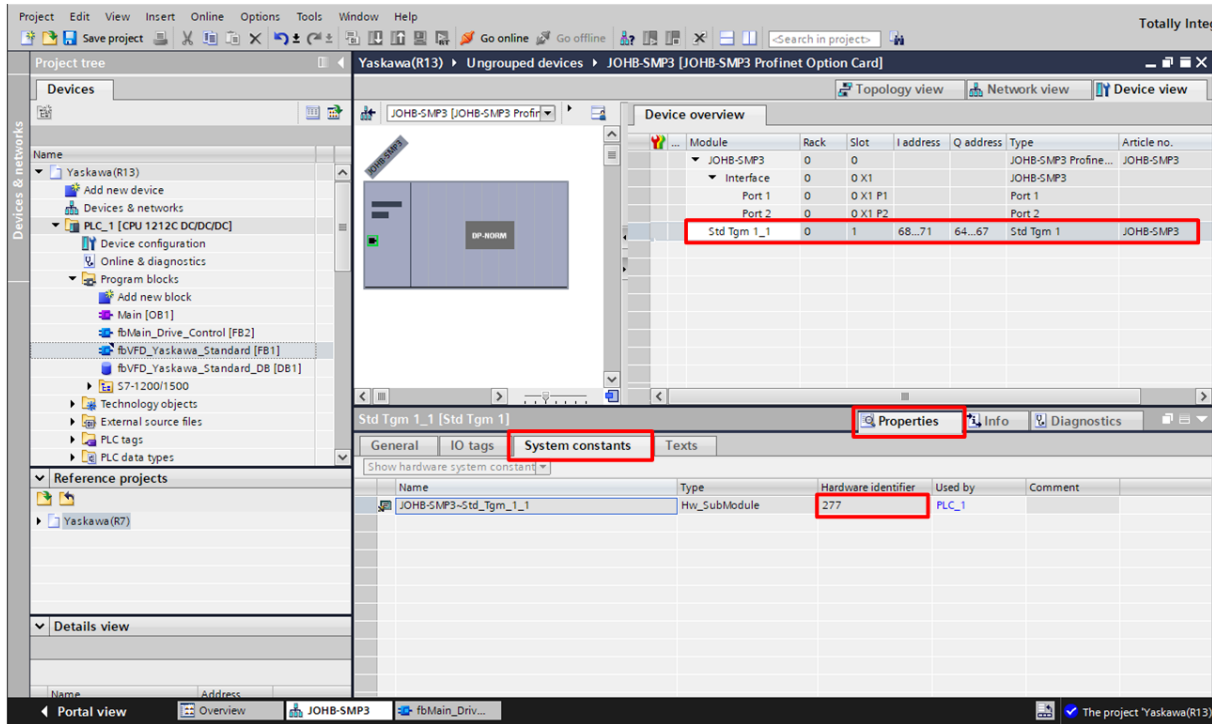
7 Link the Yaskawa Function Block to the Applicable Drive

◆ Using S7-1200/1500 PLCs

The 1200/1500 version of the block interfaces with the drive using the hardware identifier number of the telegram.

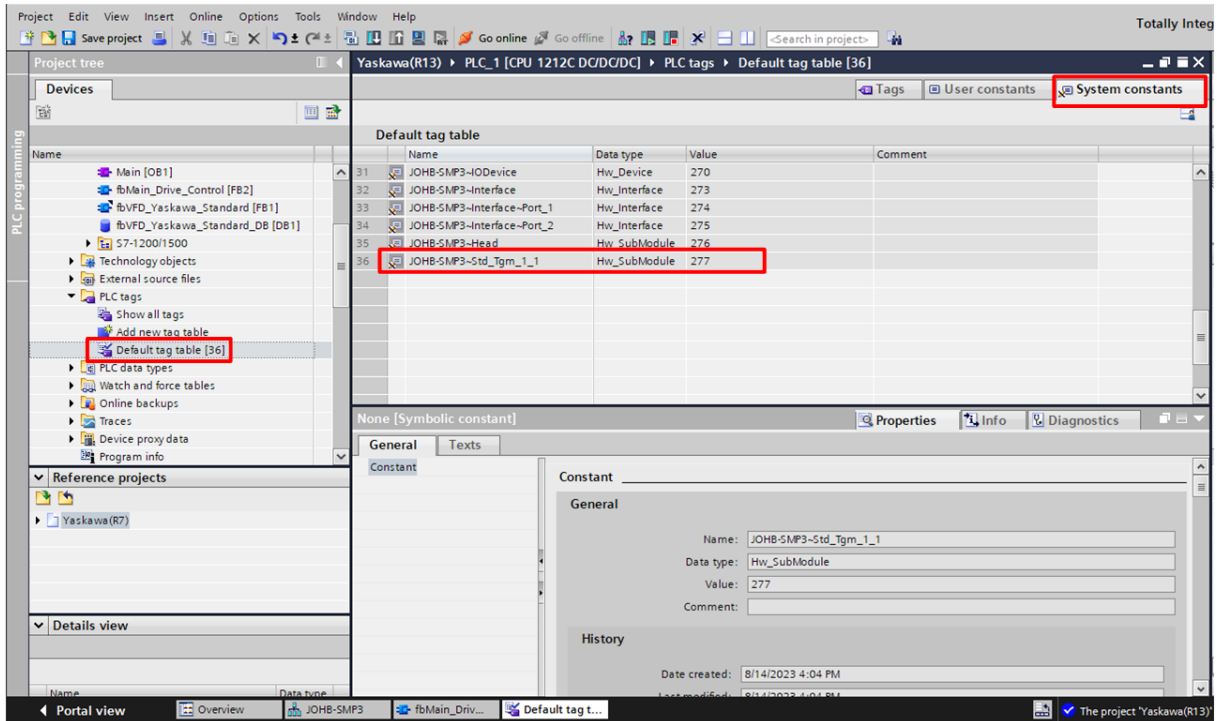
1. To find the hardware identifier number for the telegram, navigate back to the Device view for the drive by double clicking on it from the Network view.

Click on the telegram in the **Device overview** tab and then click on **Properties > General > System Constants** to find the hardware identifier number.



2. The TIA Portal automatically creates tags for all hardware identifier numbers. To locate the hardware identifier number for a drive, navigate to **Default Tag Table > System Constants**. Here, there will be a tag of datatype Hw_SubModule that will have the “Drive name” + “~” + “Telegram name”.

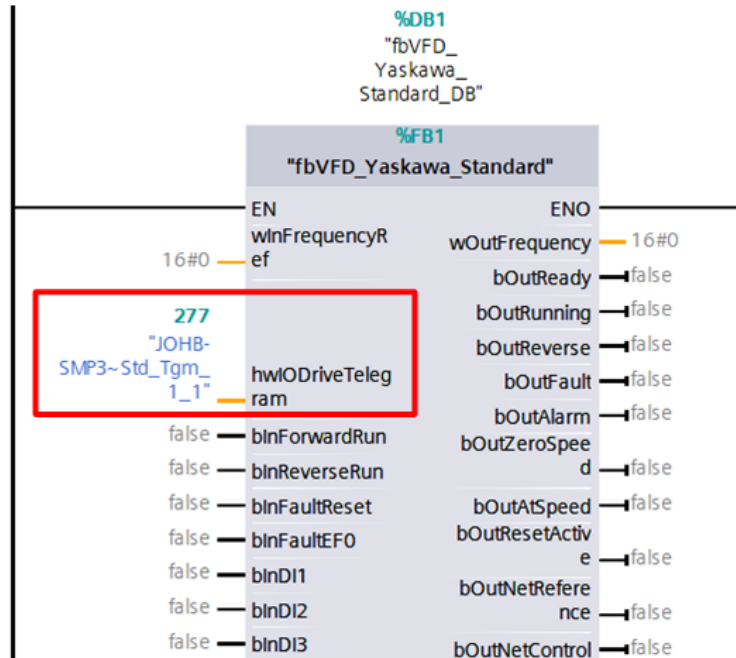
In our example it has the name is *JOHB-SMP3~Std_Tgm_1_1*. Use CTRL + C to copy this entire tag name onto the clipboard for use later. Make sure that this number matches the number in Step 1.



- After you add the Yaskawa function block into your project, you must link the input `hwIODriveTelegram` to the tag located in the previous step.

Use CTRL + V to paste the tag name from the clipboard and press ENTER. To confirm the tag is correct, ensure that the green number above the tag matches the value in Step 1.

Note: The tag name needs to be in quotations to register as a tag and show the green number.



8 Example Block Usage

This section shows an example use case for the Yaskawa Standard telegram block.

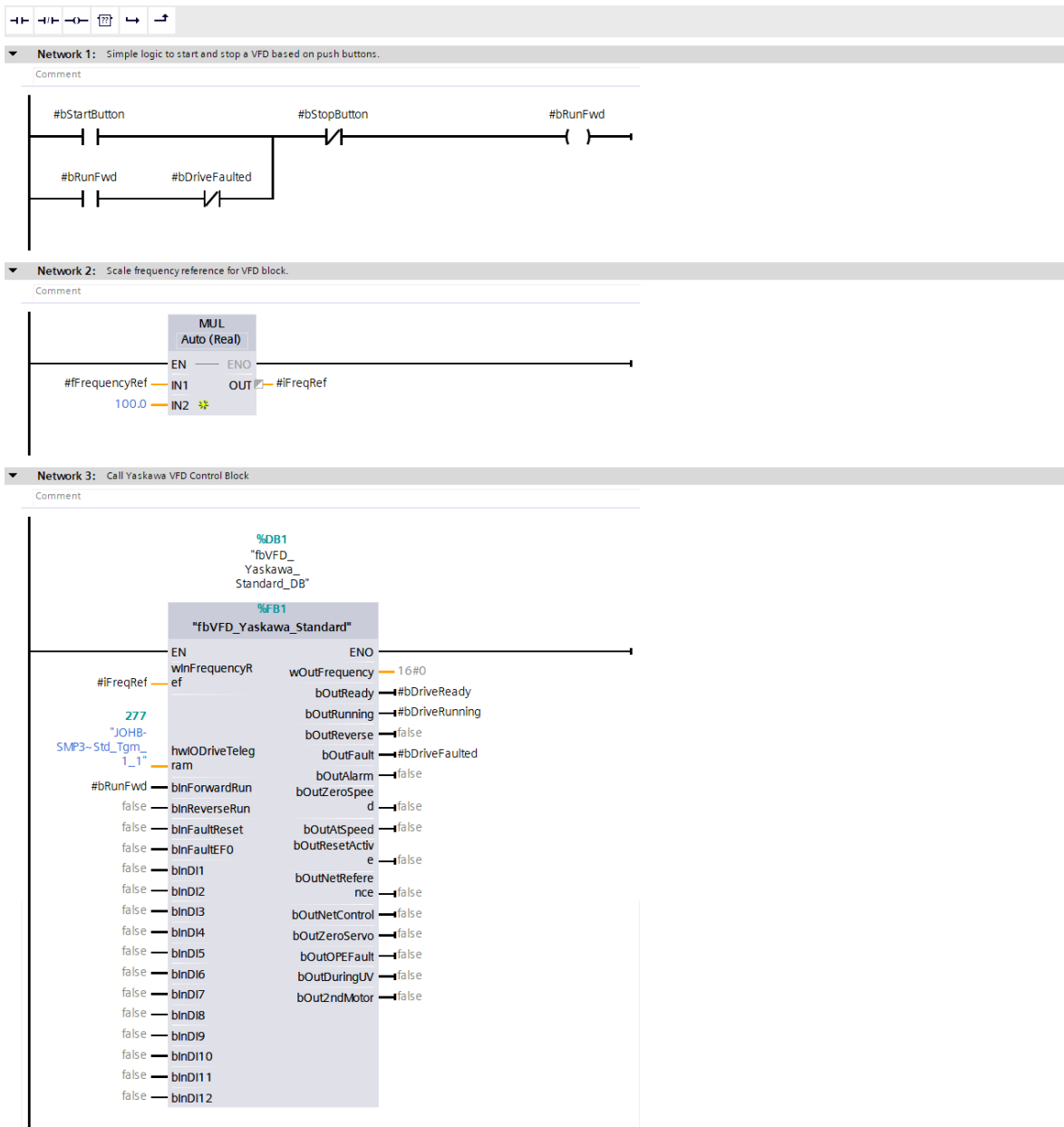
In the example system, the drive takes start, stop, reset and speed setpoint commands from an HMI. The start and stop buttons originate from outside of the calling function block and are written to the local static variable #bRunForward, which is then an input to the Yaskawa function block.

This particular drive is only being commanded to run forward, so the bInReverseRun input is given a permanent “false”.

The frequency reference fFrequencyRef (controlled from the HMI), is converted from a 0.00 - 60.00 real value to a 0 - 6000 integer value, which the function block sends to the drive. The outputs of the function block write drive status variables to a few local variables: #bDriveReady, #bDriveRunning and #bDriveFaulted

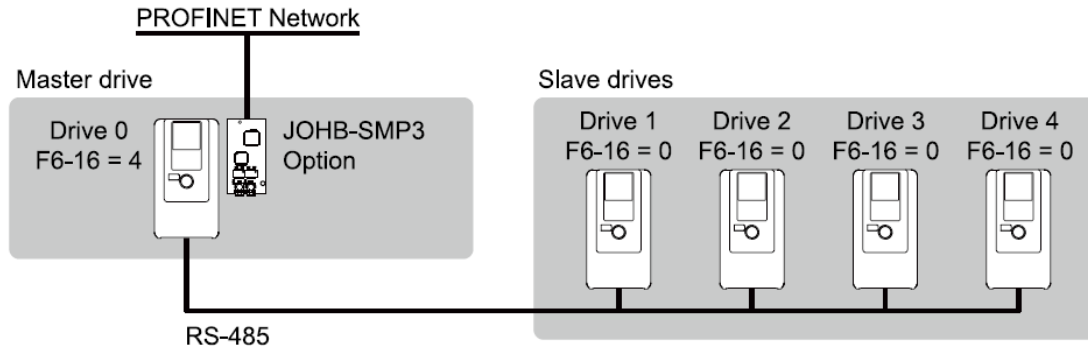
You can use these variables to monitor or control related logic elsewhere in the program. For example, in Network 1, the variable #bDriveFaulted is used to unlatch the forward Run command when the drive encounters a fault.

Additionally, since this block is declared as single instance, you can globally access its inputs and outputs. For example: "fbVFD_Yaskawa_Standard_DB".bOutFault, "fbVFD_Yaskawa_Standard_DB".bOutRunning, and "fbVFD_Yaskawa_Standard_DB".bOutReady.”



9 Gateway Program Example

The gateway function lets you connect one PROFINET option to a Master Drive and use the built-in RS-485 connection to connect that Master drive to a maximum of four Slave drives. The gateway function is available when you use a JOHB-SMP3 on a GA800, GA700, GA500, or FP605 drive. Refer to the drive Technical Manual for more information about how to set this up.

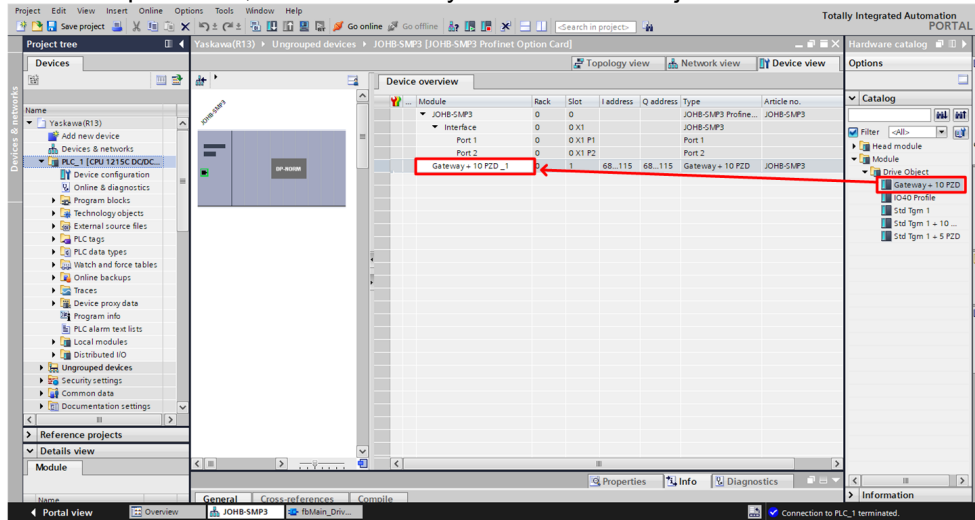


Some of the following steps are abbreviated; see the previous example in this document for details about where to find the various menus and other information.

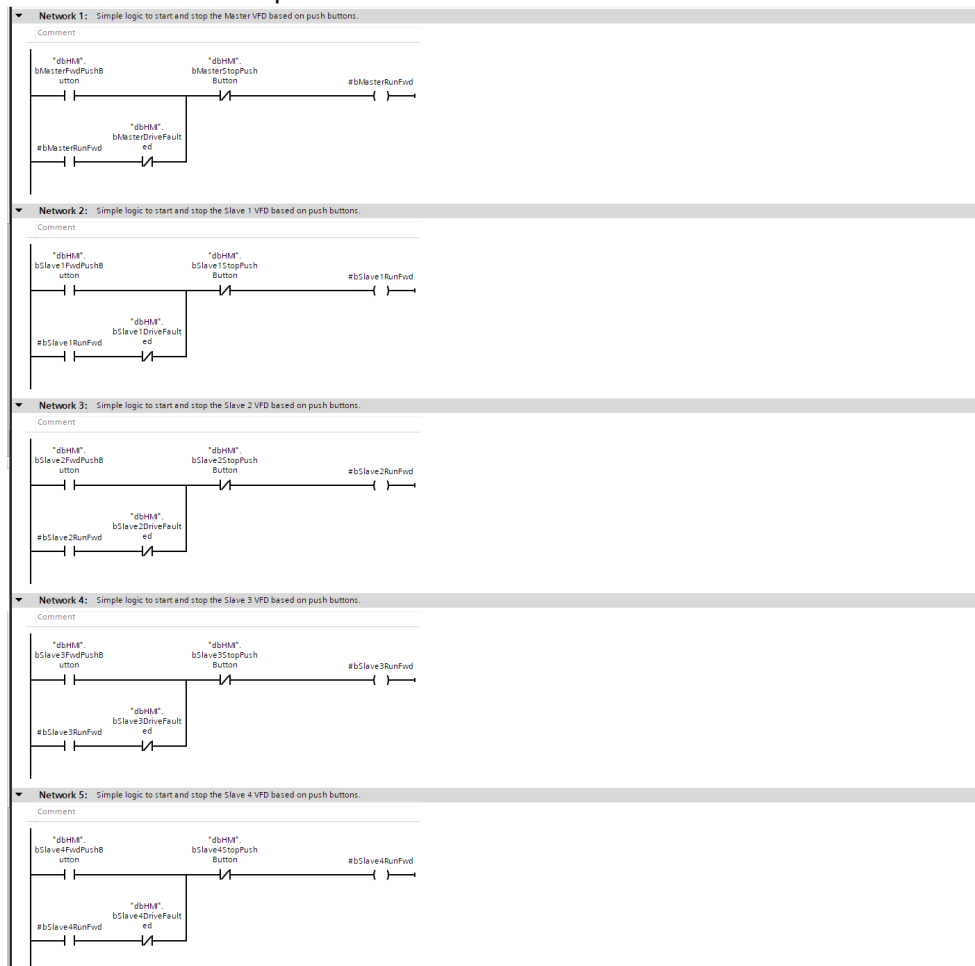
9 Gateway Program Example

PLC programming example for a Master and 4 Slave drives:

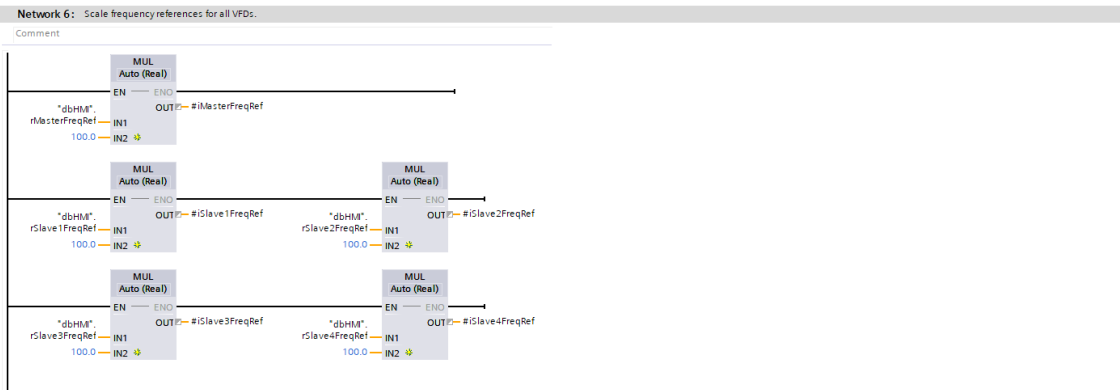
1. On the JOHB-SMP3 option card, use the Gateway + 10PZD drive object module from the hardware catalog.



2. Create logic to handle the Run commands for the master and 4 slave drives. In this example, the master and each of the slave drives have their own Run and Stop push buttons on an HMI. There is also an interlock for each drive that will remove the Run command if a particular drive has a fault.



3. Create logic to scale the frequency references for the master and all four slave drives. In this example, the frequency references come across from the HMI as a “real” values and are converted to the properly scaled “int” values used by the Yaskawa function blocks.

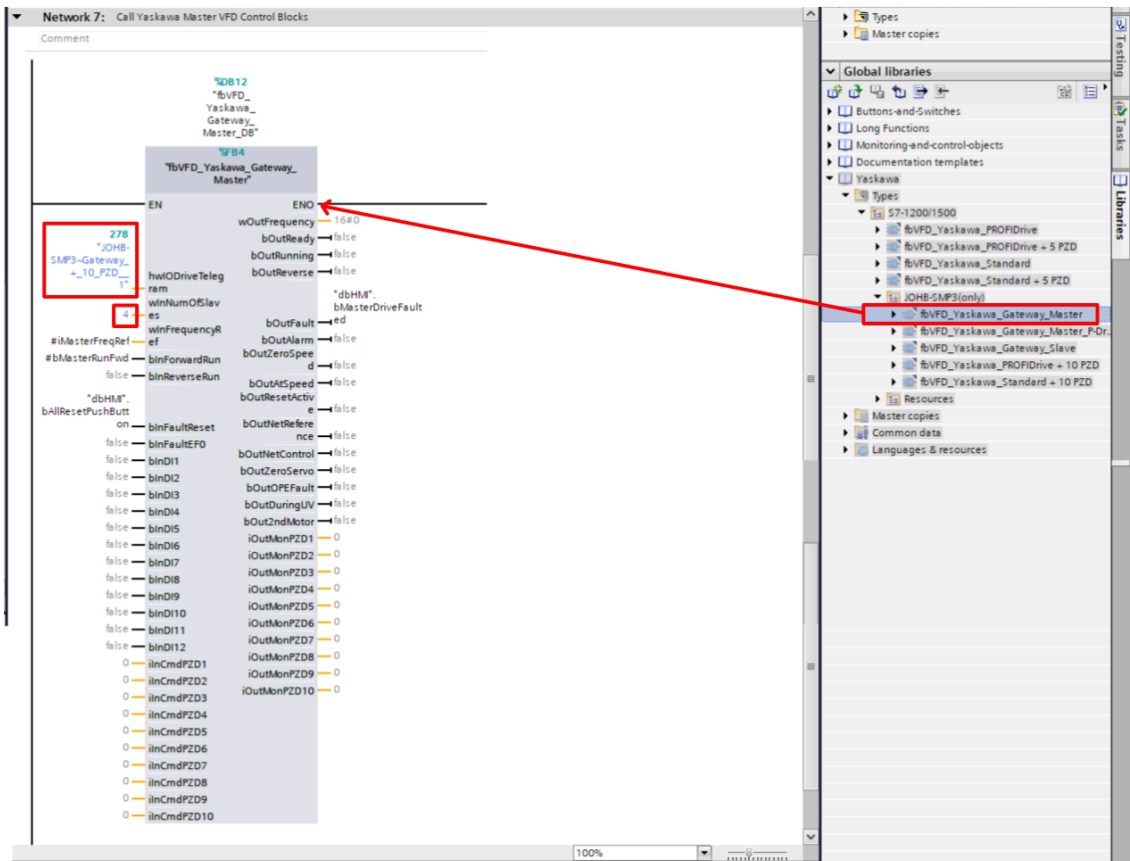


4. From the Yaskawa Function Block Library, drag the Yaskawa > Types > S7-1200/1500 > JOHB-SMP3(only) > fbVFD_Yaskawa_Gateway_Master function block into the project. This function block will control only the master drive.

Set the hwIODriveTelegram to the value copied from the JOHB-SMP3 configuration (Device View > Gateway + 10 PZD_1 > System Constants).

Set the value of wlnNumOfSlaves to the number of slave drives in the project. For this example, this is set to the maximum value of 4.

Connect other signals as needed to the function block.



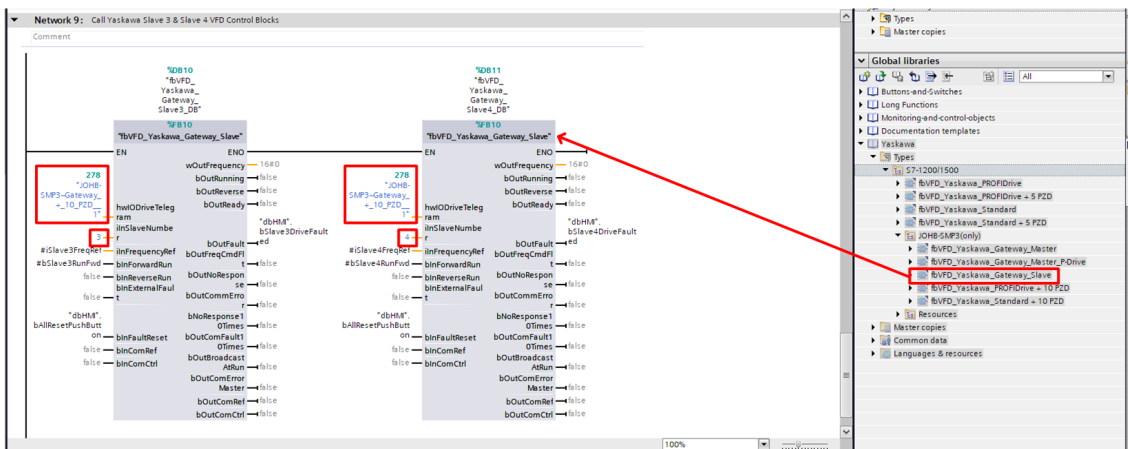
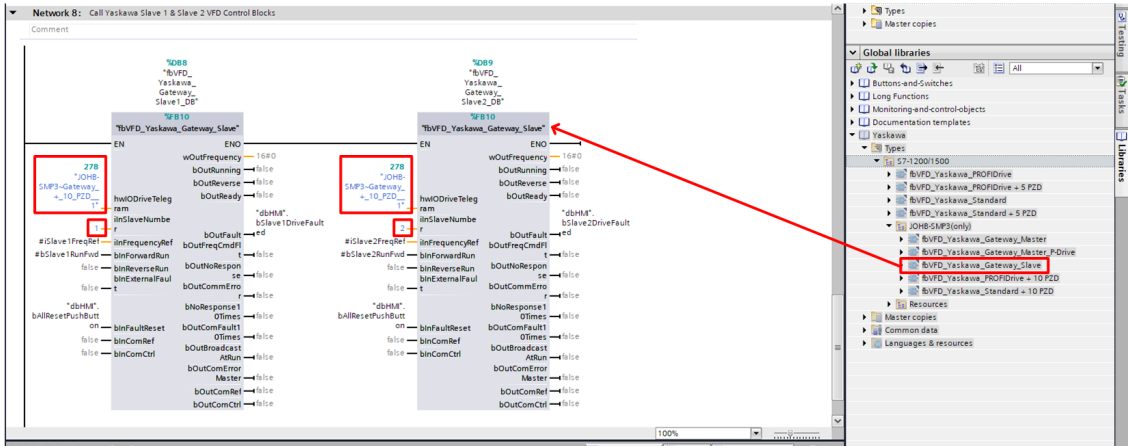
9 Gateway Program Example

- From the Yaskawa library, drag 4 of the Yaskawa > Types > S7-1200/1500 > JOHB-SMP3(only) > **fbVFD_Yaskawa_Gateway_Slave** function blocks into the project. These function blocks will control each of the slave drives.

Set the **hwIODriveTelegram** to the SAME value as copied from the JOHB-SMP3 configuration (Device View > Gateway + 10 PZD_1 > System Constants).

Set the value of **wInSlaveNumber** for each of the 4 slave drives.

Connect other signals as necessary.



10 Monitor Drive Information

Often it will be useful to monitor the data the drive is exchanging with the PLC for troubleshooting and commissioning. There are two primary ways of accomplishing this:

1. Monitoring the instance data of the block
2. Monitoring and changing variables from a watch table

To monitor the instance data of the block:

1. Locate and open the instance data block for the function block controller the drive.
2. Click **Monitor all** to view the online information.
3. View the live information in the **Monitor value** column.
4. To modify the values (for example, `wInFrequencyRef` or `blnForwardRun`), double-click on the value in the **Monitor value** column.

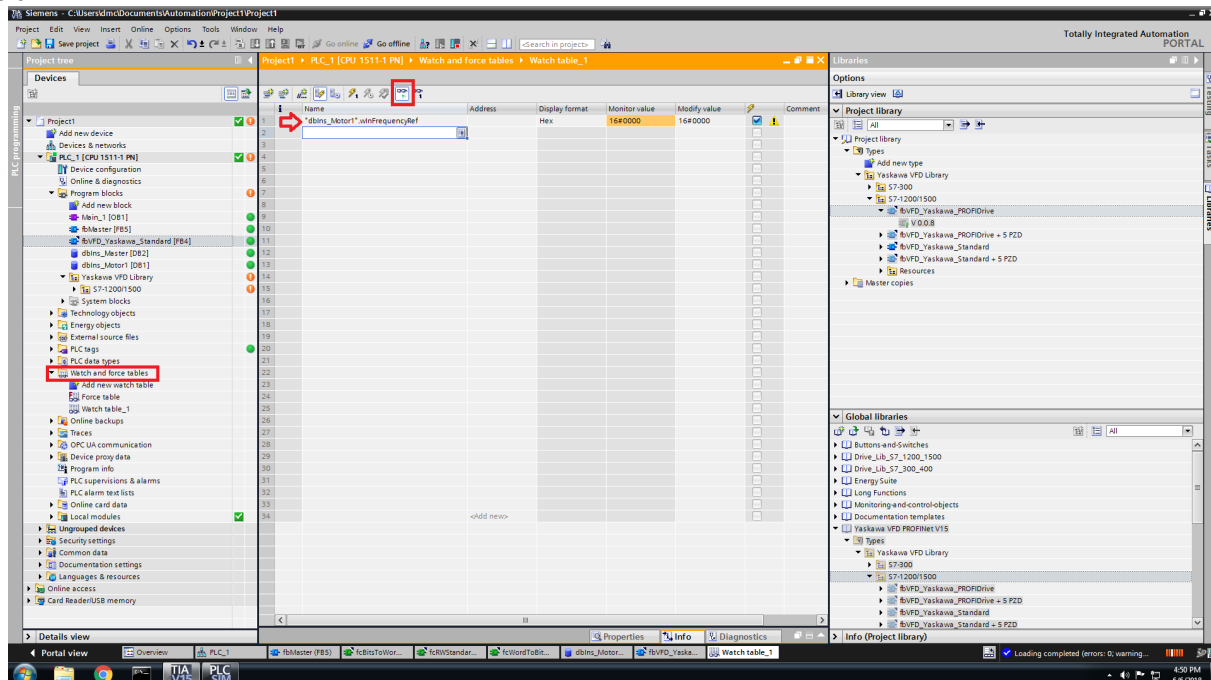
Name	Data type	Start value	Monitor value	Retain	Accessible f...	Write...	Visible in ...	Setpoint	Supervis...	Comment
Input										
wInFrequencyRef	Word	1640	1640000							Set point frequency (0-6000)
blnODriveTelegram	HW/O	0	0							Name of telegram begin used with Yaskawa d...
blnForwardRun	Bool	false	FALSE							Command forward run
blnReverseRun	Bool	false	FALSE							Command reverse run
blnFaultReset	Bool	false	FALSE							Command fault reset
blnFaultFO	Bool	false	FALSE							Command D11
blnD1	Bool	false	FALSE							Command D12
blnD2	Bool	false	FALSE							Command D14
blnD3	Bool	false	FALSE							Command D15
blnD4	Bool	false	FALSE							Command D16
blnD5	Bool	false	FALSE							Command D17
blnD6	Bool	false	FALSE							Command D18
blnD7	Bool	false	FALSE							Command D19
blnD8	Bool	false	FALSE							Command D110
blnD9	Bool	false	FALSE							Command D111
blnD10	Bool	false	FALSE							Command D112
blnD11	Bool	false	FALSE							
blnD12	Bool	false	FALSE							
Output										
wOutFrequency	Word	1640	1640000							Current output frequency
bOutReady	Bool	false	FALSE							VFD is in ready state
bOutRunning	Bool	false	FALSE							Running in forward direction
bOutReverse	Bool	false	FALSE							Running in reverse direction
bOutFault	Bool	false	FALSE							Fault signal is active
bOutAlarm	Bool	false	FALSE							Alarm signal is active
bOutZeroSpeed	Bool	false	FALSE							At zero speed
bOutM5Speed	Bool	false	FALSE							At setpoint speed
bOutReverseActive	Bool	false	FALSE							Reverse signal is active
bOutReference	Bool	false	FALSE							Frequency setpoint from PROFIBet
bOutLetControl	Bool	false	FALSE							VFD is being controlled from PROFIBet commar
bOutZeroServo	Bool	false	FALSE							
bOutOverTemp	Bool	false	FALSE							
bOutDwngUV	Bool	false	FALSE							
bOut2ndMotor	Bool	false	FALSE							
InOut										
Static										

To monitor and change variables from a watch table:

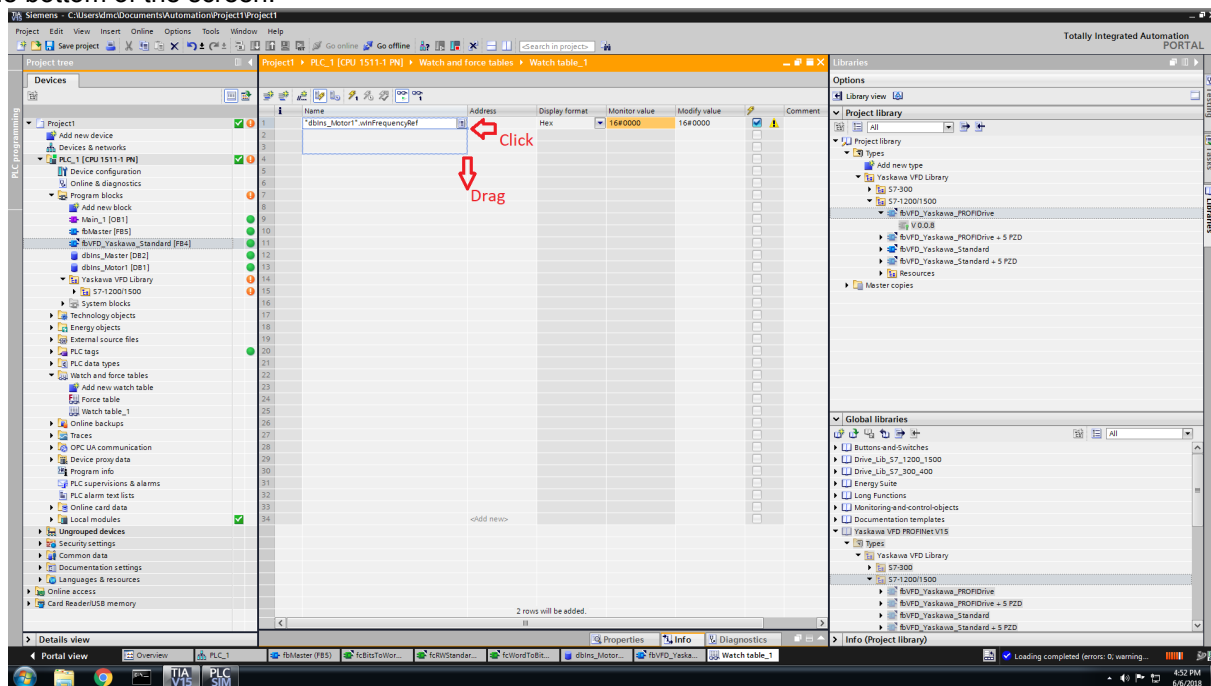
1. In the project tree, navigate to **Watch and force tables**.
2. Add a new watch table.
3. Add the instance data variables that you want to monitor to the watch table.

10 Monitor Drive Information

- Click the monitor all icon (shown in the figure below with the glasses) to view the live values in the “Monitor value” column.



- To easily add all the instance data to the watch table, click the bottom-right corner of a single item and drag it toward the bottom of the screen.



- To modify the values (for example, wInFrequencyRef or bInForwardRun), enter the desired value in the **Modify value** column. Click the **Modify all selected values once and now** button (the button with a lightning bolt with an “!” next to it).

11 Detailed Block Tables

◆ S7-1200/1500 Blocks

■ fbVFD_Yaskawa_Standard

Input Variables	Type	Description
wInFrequencyRef	Word	Setpoint frequency (0-6000)
hwIODriveTelegram	HW_IO	Name of telegram begin used with Yaskawa drive
bInForwardRun	Bool	Command forward run
bInReverseRun	Bool	Command reverse run
bInFaultReset	Bool	Command fault reset
bInFaultEF0	Bool	Command EF0 Drive Fault
bInDI1	Bool	Command DI1
bInDI2	Bool	Command DI2
bInDI3	Bool	Command DI3
bInDI4	Bool	Command DI4
bInDI5	Bool	Command DI5
bInDI6	Bool	Command DI6
bInDI7	Bool	Command DI7
bInDI8	Bool	Command DI8
bInDI9	Bool	Command DI9
bInDI10	Bool	Command DI10
bInDI11	Bool	Command DI11
bInDI12	Bool	Command DI12

Output Variables	Type	Description
wOutFrequency	Word	Current output frequency
bOutReady	Bool	Drive is in ready state
bOutRunning	Bool	Running in forward direction
bOutReverse	Bool	Running in reverse direction
bOutFault	Bool	Fault signal is active
bOutAlarm	Bool	Alarm signal is active
bOutZeroSpeed	Bool	At zero speed
bOutAtSpeed	Bool	At setpoint speed
bOutResetActive	Bool	Reset signal is active
bOutNetReference	Bool	Frequency setpoint from PROFINET
bOutNetControl	Bool	Drive is being controlled from PROFINET commands.
bOutZeroServo	Bool	Zero Servo completed
bOutOPEFault	Bool	oPE (Parameter Setting) Fault
bOutDuringUV	Bool	Drive in Undervoltage Condition
bOut2ndMotor	Bool	2nd Motor Selected

■ fbVFD_Yaskawa_Standard + 5 PZD

Input Variables	Type	Description
wInFrequencyRef	Word	Setpoint frequency (0-6000)
hwIODriveTelegram	HW_IO	Name of telegram begin used with Yaskawa drive
bInForwardRun	Bool	Command forward run
bInReverseRun	Bool	Command reverse run
bInFaultReset	Bool	Command fault reset
bInFaultEF0	Bool	Command EF0 Drive Fault
bInDI1	Bool	Command DI1

11 Detailed Block Tables

Input Variables	Type	Description
bInDI2	Bool	Command DI2
bInDI3	Bool	Command DI3
bInDI4	Bool	Command DI4
bInDI5	Bool	Command DI5
bInDI6	Bool	Command DI6
bInDI7	Bool	Command DI7
bInDI8	Bool	Command DI8
bInDI9	Bool	Command DI9
bInDI10	Bool	Command DI10
bInDI11	Bool	Command DI11
bInDI12	Bool	Command DI12
iInCmdPZD1	Int	PLC to Drive Parameter 1 Command Value
InCmdPZD2	Int	PLC to Drive Parameter 2 Command Value
iInCmdPZD3	Int	PLC to Drive Parameter 3 Command Value
iInCmdPZD4	Int	PLC to Drive Parameter 4 Command Value
iInCmdPZD5	Int	PLC to Drive Parameter 5 Command Value

Output Variables	Type	Description
wOutFrequency	Word	Current output frequency
bOutReady	Bool	Drive is in ready state
bOutRunning	Bool	Running in forward direction
bOutReverse	Bool	Running in reverse direction
bOutFault	Bool	Fault signal is active
bOutAlarm	Bool	Alarm signal is active
bOutZeroSpeed	Bool	At zero speed
bOutAtSpeed	Bool	At setpoint speed
bOutResetActive	Bool	Reset signal is active
bOutNetReference	Bool	Frequency setpoint from PROFINET
bOutNetControl	Bool	Drive is being controlled from PROFINET commands.
bOutZeroServo	Bool	Zero Servo Completed
bOutOPEFault	Bool	oPE (Parameter Setting) Fault
bOutDuringUV	Bool	Drive in Undervoltage Condition
bOut2ndMotor	Bool	2nd Motor Selected
iOutMonPZD1	Int	Drive to PLC Parameter 1 Received Value
iOutMonPZD2	Int	Drive to PLC Parameter 2 Received Value
iOutMonPZD3	Int	Drive to PLC Parameter 3 Received Value
iOutMonPZD4	Int	Drive to PLC Parameter 4 Received Value
iOutMonPZD5	Int	Drive to PLC Parameter 5 Received Value

■ fbVFD_Yaskawa_Standard + 10PZD

Input Variables	Type	Description
wInFrequencyRef	Word	Setpoint frequency (0-6000)
hwIODriveTelegram	HW_IO	Name of telegram begin used with Yaskawa drive
bInForwardRun	Bool	Command forward run
bInReverseRun	Bool	Command reverse run
bInFaultReset	Bool	Command fault reset
bInFaultEF0	Bool	Command EF0 Drive Fault
bInDI1	Bool	Command DI1
bInDI2	Bool	Command DI2
bInDI3	Bool	Command DI3
bInDI4	Bool	Command DI4

Input Variables	Type	Description
bInDI5	Bool	Command DI5
bInDI6	Bool	Command DI6
bInDI7	Bool	Command DI7
bInDI8	Bool	Command DI8
bInDI9	Bool	Command DI9
bInDI10	Bool	Command DI10
bInDI11	Bool	Command DI11
bInDI12	Bool	Command DI12
iInCmdPZD1	Int	PLC to Drive Parameter 1 Command Value
InCmdPZD2	Int	PLC to Drive Parameter 2 Command Value
iInCmdPZD3	Int	PLC to Drive Parameter 3 Command Value
iInCmdPZD4	Int	PLC to Drive Parameter 4 Command Value
iInCmdPZD5	Int	PLC to Drive Parameter 5 Command Value
iInCmdPZD6	Int	PLC to Drive Parameter 6 Command Value
InCmdPZD7	Int	PLC to Drive Parameter 7 Command Value
iInCmdPZD8	Int	PLC to Drive Parameter 8 Command Value
iInCmdPZD9	Int	PLC to Drive Parameter 9 Command Value
iInCmdPZD10	Int	PLC to Drive Parameter 10 Command Value

Output Variables	Type	Description
wOutFrequency	Word	Current output frequency
bOutReady	Bool	Drive is in ready state
bOutRunning	Bool	Running in forward direction
bOutReverse	Bool	Running in reverse direction
bOutFault	Bool	Fault signal is active
bOutAlarm	Bool	Alarm signal is active
bOutZeroSpeed	Bool	At zero speed
bOutAtSpeed	Bool	At setpoint speed
bOutResetActive	Bool	Reset signal is active
bOutNetReference	Bool	Frequency setpoint from PROFINET
bOutNetControl	Bool	Drive is being controlled from PROFINET commands.
bOutZeroServo	Bool	Zero Servo Completed
bOutOPEFault	Bool	oPE (Parameter Setting) Fault
bOutDuringUV	Bool	Drive in Undervoltage Condition
bOut2ndMotor	Bool	2nd Motor Selected
iOutMonPZD1	Int	Drive to PLC Parameter 1 Received Value
iOutMonPZD2	Int	Drive to PLC Parameter 2 Received Value
iOutMonPZD3	Int	Drive to PLC Parameter 3 Received Value
iOutMonPZD4	Int	Drive to PLC Parameter 4 Received Value
iOutMonPZD5	Int	Drive to PLC Parameter 5 Received Value
iOutMonPZD6	Int	Drive to PLC Parameter 6 Received Value
iOutMonPZD7	Int	Drive to PLC Parameter 7 Received Value
iOutMonPZD8	Int	Drive to PLC Parameter 8 Received Value
iOutMonPZD9	Int	Drive to PLC Parameter 9 Received Value
iOutMonPZD10	Int	Drive to PLC Parameter 10 Received Value

■ fbVFD_Yaskawa_PROFIDrive

Input Variables	Type	Description
iInFrequencySetPoint	Int	Setpoint frequency (-6000-6000)
hwIODriveTelegram	HW_IO	Name of telegram begin used with Yaskawa drive
bInOnOff1	Bool	Proceed to ready operate

11 Detailed Block Tables

Input Variables	Type	Description
bInOff2	Bool	Continue operation (OFF2 inactive)
bInOff3	Bool	Continue operation (OFF3 inactive)
bInOperationEnable	Bool	Proceed to ENABLE OPERATION
bInRampOutZero	Bool	Normal operation (Stop inactive)
bInRampHold	Bool	Normal operation (Force ramp function generator inactive)
bInRampInZero	Bool	Normal operation (Force ramp function generator inactive)
bInReset	Bool	Reset signal enable
bInRemoteCMD	Bool	Network control enabled

Output Variables	Type	Description
iOutFrequency	Int	Drive current output frequency
bOutRdyOn	Bool	ZSW, Bit 0: Ready to switch on
bOutRdyRun	Bool	ZSW, Bit 1: Ready to operate
bOutRdyRef	Bool	ZSW, Bit 2: Enable operation
bOutFault	Bool	ZSW, Bit 3: Fault present
bOutOff2STA	Bool	ZSW, Bit 4: OFF2 inactive
bOutOff3STA	Bool	ZSW, Bit 5: OFF3 inactive
bOutSwcOnInhib	Bool	ZSW, Bit 6: SWITCH-ON INHIBIT active
bOutAlarm	Bool	ZSW, Bit 7: Warning/alarm
bOutSpeedError	Bool	ZSW, Bit 8: Not at setpoint speed
bOutRemote	Bool	ZSW, Bit 9: Drive control location: REMOTE
bOutAtSetpoint	Bool	ZSW, Bit 10: Measured drive frequency is equal to setpoint with tolerances
bOutSafeTorqOff	Bool	ZSW, Bit 14: Safe Torque Off Alarm (JOHB-SMP3 Only)

■ fbVFD_Yaskawa_PROFIDrive + 5 PZD

Input Variables	Type	Description
iInFrequencySetPoint	Int	Setpoint frequency (-6000-6000)
hwIODriveTelegram	HW_IO	Name of telegram begin used with Yaskawa drive
bInOnOff1	Bool	STW, Bit 0: Proceed to ready operate
bInOff2	Bool	STW, Bit 1: Continue operation (OFF2 inactive)
bInOff3	Bool	STW, Bit 2: Continue operation (OFF3 inactive)
bInOperationEnable	Bool	STW, Bit 3: Proceed to ENABLE OPERATION
bInRampOutZero	Bool	STW, Bit 4: Normal operation (Stop inactive)
bInRampHold	Bool	STW, Bit 5: Normal operation (Force ramp function generator inactive)
bInRampInZero	Bool	STW, Bit 6: Normal operation (Force ramp function generator inactive)
bInReset	Bool	STW, Bit 7: Reset signal enable
bInRemoteCMD	Bool	STW, Bit 10: Network control enabled
iInCmdPZD1	Int	PLC to Drive Parameter 1 Command Value
iInCmdPZD2	Int	PLC to Drive Parameter 2 Command Value
iInCmdPZD3	Int	PLC to Drive Parameter 3 Command Value
iInCmdPZD4	Int	PLC to Drive Parameter 4 Command Value
iInCmdPZD5	Int	PLC to Drive Parameter 5 Command Value

Output Variables	Type	Description
iOutFrequency	Int	Drive current output frequency
bOutRdyOn	Bool	Ready to switch on
bOutRdyRun	Bool	Ready to operate
bOutRdyRef	Bool	Enable operation
bOutFault	Bool	Fault present
bOutOff2STA	Bool	OFF2 inactive
bOutOff3STA	Bool	OFF3 inactive

Output Variables	Type	Description
bOutSwcOnInhib	Bool	SWITCH-ON INHIBIT active
bOutAlarm	Bool	Warning/alarm
bOutSpeedError	Bool	Not at setpoint speed
bOutRemote	Bool	Drive control location: REMOTE
bOutAtSetpoint	Bool	Measured drive frequency is equal to setpoint with tolerances
bOutSafeTorqOff	Bool	Safe Torque Off Alarm (JOHB-SMP3 Only)
iOutMonPZD1	Int	Drive to PLC Parameter 1 Received Value
iOutMonPZD2	Int	Drive to PLC Parameter 2 Received Value
iOutMonPZD3	Int	Drive to PLC Parameter 3 Received Value
iOutMonPZD4	Int	Drive to PLC Parameter 4 Received Value
iOutMonPZD5	Int	Drive to PLC Parameter 5 Received Value

■ fbVFD_Yaskawa_PROFIDrive + 10 PZD

Input Variables	Type	Description
iInFrequencySetPoint	Int	Setpoint frequency (-6000-6000)
hwIODriveTelegram	HW_IO	Name of telegram begin used with Yaskawa drive
bInOnOff1	Bool	STW, Bit 0: Proceed to ready operate
bInOff2	Bool	STW, Bit 1: Continue operation (OFF2 inactive)
bInOff3	Bool	STW, Bit 2: Continue operation (OFF3 inactive)
bInOperationEnable	Bool	STW, Bit 3: Proceed to ENABLE OPERATION
bInRampOutZero	Bool	STW, Bit 4: Normal operation (Stop inactive)
bInRampHold	Bool	STW, Bit 5: Normal operation (Force ramp function generator inactive)
bInRampInZero	Bool	STW, Bit 6: Normal operation (Force ramp function generator inactive)
bInReset	Bool	STW, Bit 7: Reset signal enable
bInRemoteCMD	Bool	STW, Bit 10: Network control enabled
iInCmdPZD1	Int	PLC to Drive Parameter 1 Command Value
iInCmdPZD2	Int	PLC to Drive Parameter 2 Command Value
iInCmdPZD3	Int	PLC to Drive Parameter 3 Command Value
iInCmdPZD4	Int	PLC to Drive Parameter 4 Command Value
iInCmdPZD5	Int	PLC to Drive Parameter 5 Command Value
iInCmdPZD6	Int	PLC to Drive Parameter 6 Command Value
iInCmdPZD7	Int	PLC to Drive Parameter 7 Command Value
iInCmdPZD8	Int	PLC to Drive Parameter 8 Command Value
iInCmdPZD9	Int	PLC to Drive Parameter 9 Command Value
iInCmdPZD10	Int	PLC to Drive Parameter 10 Command Value

Output Variables	Type	Description
iOutFrequency	Int	Drive current output frequency
bOutRdyOn	Bool	Ready to switch on
bOutRdyRun	Bool	Ready to operate
bOutRdyRef	Bool	Enable operation
bOutFault	Bool	Fault present
bOutOff2STA	Bool	OFF2 inactive
bOutOff3STA	Bool	OFF3 inactive
bOutSwcOnInhib	Bool	SWITCH-ON INHIBIT active
bOutAlarm	Bool	Warning/alarm
bOutSpeedError	Bool	Not at setpoint speed
bOutRemote	Bool	Drive control location: REMOTE
bOutAtSetpoint	Bool	Measured drive frequency is equal to setpoint with tolerances
bOutSafeTorqOff	Bool	Safe Torque Off Alarm (JOHB-SMP3 Only)
iOutMonPZD1	Int	Drive to PLC Parameter 1 Received Value

11 Detailed Block Tables

Output Variables	Type	Description
iOutMonPZD2	Int	Drive to PLC Parameter 2 Received Value
iOutMonPZD3	Int	Drive to PLC Parameter 3 Received Value
iOutMonPZD4	Int	Drive to PLC Parameter 4 Received Value
iOutMonPZD5	Int	Drive to PLC Parameter 5 Received Value
iOutMonPZD6	Int	Drive to PLC Parameter 6 Received Value
iOutMonPZD7	Int	Drive to PLC Parameter 7 Received Value
iOutMonPZD8	Int	Drive to PLC Parameter 8 Received Value
iOutMonPZD9	Int	Drive to PLC Parameter 9 Received Value
iOutMonPZD10	Int	Drive to PLC Parameter 10 Received Value

■ fbVFD_Yaskawa_Gateway_Master

Input Variables	Type	Description
hwIODriveTelegram	HW_IO	Name of telegram begin used with Yaskawa drive
wInNumOfSlaves	Int	Number of slave drives connected to the master
wInFrequencyRef	Word	Setpoint frequency (0-6000)
bInForwardRun	Bool	Command forward run
bInReverseRun	Bool	Command reverse run
bInFaultReset	Bool	Command fault reset
bInFaultEF0	Bool	Command EF0 Drive Fault
bInDI1	Bool	Command DI1
bInDI2	Bool	Command DI2
bInDI3	Bool	Command DI3
bInDI4	Bool	Command DI4
bInDI5	Bool	Command DI5
bInDI6	Bool	Command DI6
bInDI7	Bool	Command DI7
bInDI8	Bool	Command DI8
bInDI9	Bool	Command DI9
bInDI10	Bool	Command DI10
bInDI11	Bool	Command DI11
bInDI12	Bool	Command DI12
iInCmdPZD1	Int	PLC to Drive Parameter 1 Command Value
InCmdPZD2	Int	PLC to Drive Parameter 2 Command Value
iInCmdPZD3	Int	PLC to Drive Parameter 3 Command Value
iInCmdPZD4	Int	PLC to Drive Parameter 4 Command Value
iInCmdPZD5	Int	PLC to Drive Parameter 5 Command Value
iInCmdPZD6	Int	PLC to Drive Parameter 6 Command Value
InCmdPZD7	Int	PLC to Drive Parameter 7 Command Value
iInCmdPZD8	Int	PLC to Drive Parameter 8 Command Value
iInCmdPZD9	Int	PLC to Drive Parameter 9 Command Value
iInCmdPZD10	Int	PLC to Drive Parameter 10 Command Value

Output Variables	Type	Description
wOutFrequency	Word	Current output frequency
bOutReady	Bool	Drive is in ready state
bOutRunning	Bool	Running in forward direction
bOutReverse	Bool	Running in reverse direction
bOutFault	Bool	Fault signal is active
bOutAlarm	Bool	Alarm signal is active
bOutZeroSpeed	Bool	At zero speed

Output Variables	Type	Description
bOutAtSpeed	Bool	At setpoint speed
bOutResetActive	Bool	Reset signal is active
bOutNetReference	Bool	Frequency setpoint from PROFINET
bOutNetControl	Bool	Drive is being controlled from PROFINET commands.
bOutZeroServo	Bool	Zero Servo Completed
bOutOPEFault	Bool	oPE (Parameter Setting) Fault
bOutDuringUV	Bool	Drive in Undervoltage Condition
bOut2ndMotor	Bool	2nd Motor Selected
iOutMonPZD1	Int	Drive to PLC Parameter 1 Received Value
iOutMonPZD2	Int	Drive to PLC Parameter 2 Received Value
iOutMonPZD3	Int	Drive to PLC Parameter 3 Received Value
iOutMonPZD4	Int	Drive to PLC Parameter 4 Received Value
iOutMonPZD5	Int	Drive to PLC Parameter 5 Received Value
iOutMonPZD6	Int	Drive to PLC Parameter 6 Received Value
iOutMonPZD7	Int	Drive to PLC Parameter 7 Received Value
iOutMonPZD8	Int	Drive to PLC Parameter 8 Received Value
iOutMonPZD9	Int	Drive to PLC Parameter 9 Received Value
iOutMonPZD10	Int	Drive to PLC Parameter 10 Received Value

■ fbVFD_Yaskawa_Gateway_Slave

Input Variables	Type	Description
hwIODriveTelegram	HW_IO	Name of telegram begin used with Gateway Master drive
iInSlaveNumber	Int	Slave number (1 ~ 4)
wInFrequencyRef	Int	Setpoint frequency (0-6000)
bInForwardRun	Bool	Slave drive command forward run
bInReverseRun	Bool	Slave drive command reverse run
bInExternalFault	Bool	Slave drive command EF0 Drive Fault
bInFaultReset	Bool	Slave drive command fault reset
bInComRef	Bool	Force slave drive to use PROFINET frequency reference
bInComCtrl	Bool	Force slave drive to use PROFINET run/stop commands

Output Variables	Type	Description
wOutFrequency	Word	Slave drive output frequency
bOutRunning	Bool	Slave drive is running
bOutReverse	Bool	Slave drive is running in reverse
bOutReady	Bool	Slave drive is ready
bOutFault	Bool	Slave drive fault signal is active
bOutFreqCmdFlt	Bool	Slave Drive Upper/Lower Limit Fault
bOutNoResponse	Bool	Slave Drive Response has timed out
bOutCommError	Bool	Slave Drive detected a fault
bNoResponse10Times	Bool	Slave Drive fault has occurred from a slave 10 consecutive times
bOutBroadcastAtRun	Bool	Slave Drive operates as specified by the broadcast message command
bOutComErrorMaster	Bool	Slave Drive cannot communicate with the master because of a communications error
bOutComRef	Bool	Slave Drive uses PROFINET frequency reference
bOutComCtrl	Bool	Slave Drive uses PROFINET run/stop commands

11 Detailed Block Tables

■ fbVFD_Yaskawa_Gateway_Master_P-Drive

Input Variables	Type	Description
iInFrequencySetPoint	Int	Setpoint frequency (-6000 - 6000)
hwIODriveTelegramHW_IO	HW_IO	Name of telegram being used with Yaskawa drive
bInOff1Bool	Bool	Proceed to ready operate
bInOff2	Bool	Continue operation (OFF2 inactive)
bInOff3	Bool	Continue operation (OFF3 inactive)
bInOperationEnable	Bool	Proceed to ENABLE OPERATION
bInRampOutZero	Bool	Normal operation (Stop inactive)
bInRampHold	Bool	Normal operation (Force ramp function generator inactive)
bInRampInZero	Bool	Normal operation (Force ramp function generator inactive)
bInReset	Bool	Reset signal enable
bInRemoteCMD	Bool	Network control enabled
iInCmdPZD1	Int	PLC to Drive Parameter 1 Command Value
InCmdPZD2	Int	PLC to Drive Parameter 2 Command Value
iInCmdPZD3	Int	PLC to Drive Parameter 3 Command Value
iInCmdPZD4	Int	PLC to Drive Parameter 4 Command Value
iInCmdPZD5	Int	PLC to Drive Parameter 5 Command Value
iInCmdPZD6	Int	PLC to Drive Parameter 6 Command Value
InCmdPZD7	Int	PLC to Drive Parameter 7 Command Value
iInCmdPZD8	Int	PLC to Drive Parameter 8 Command Value
iInCmdPZD9	Int	PLC to Drive Parameter 9 Command Value
iInCmdPZD10	Int	PLC to Drive Parameter 10 Command Value

Output Variables	Type	Description
iOutFrequency	Int	Drive current output frequency
bOutRdyOn	Bool	ZSW, Bit 0: Ready to switch on
bOutRdyRun	Bool	ZSW, Bit 1: Ready to operate
bOutRdyRef	Bool	ZSW, Bit 2: Enable operation
bOutFault	Bool	ZSW, Bit 3: Fault present
bOutOff2STA	Bool	ZSW, Bit 4: OFF2 inactive
bOutOff3STA	Bool	ZSW, Bit 5: OFF3 inactive
bOutSwcOnInhib	Bool	ZSW, Bit 6: SWITCH-ON INHIBIT active
bOutAlarm	Bool	ZSW, Bit 7: Warning/alarm
bOutSpeedError	Bool	ZSW, Bit 8: Not at setpoint speed
bOutRemote	Bool	ZSW, Bit 9: Drive control location: REMOTE
bOutAtSetpoint	Bool	ZSW, Bit 10: Measured drive frequency is equal to setpoint with tolerances
bOutSafeTorqOff	Bool	Safe Torque Off Alarm
iOutMonPZD1	Int	Drive to PLC Parameter 1 Received Value
iOutMonPZD2	Int	Drive to PLC Parameter 2 Received Value
iOutMonPZD3	Int	Drive to PLC Parameter 3 Received Value
iOutMonPZD4	Int	Drive to PLC Parameter 4 Received Value
iOutMonPZD5	Int	Drive to PLC Parameter 5 Received Value
iOutMonPZD6	Int	Drive to PLC Parameter 6 Received Value
iOutMonPZD7	Int	Drive to PLC Parameter 7 Received Value
iOutMonPZD8	Int	Drive to PLC Parameter 8 Received Value
iOutMonPZD9	Int	Drive to PLC Parameter 9 Received Value
iOutMonPZD10	Int	Drive to PLC Parameter 10 Received Value

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Revision History

The revision dates and the numbers of the revised manuals appear on the bottom of the back cover.

Date of Publication	Revision Number	Section	Revised Content
February 2023	<2>	2, 4, and 9	Updated to include the Multi-Protocol Ethernet Card (JOHB-SMP3).
September 2018	<1>	–	Typographical error corrections.
July 2018	–	–	First Release.

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YASKAWA Drive

PROFINET Function Block for Use in TIA Portal

User Instructions

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YASKAWA**YASKAWA AMERICA, INC.**

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 Regulations. 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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