

## *ctrlX - Drive*

- *Control in ProfiNet*  
- System configuration

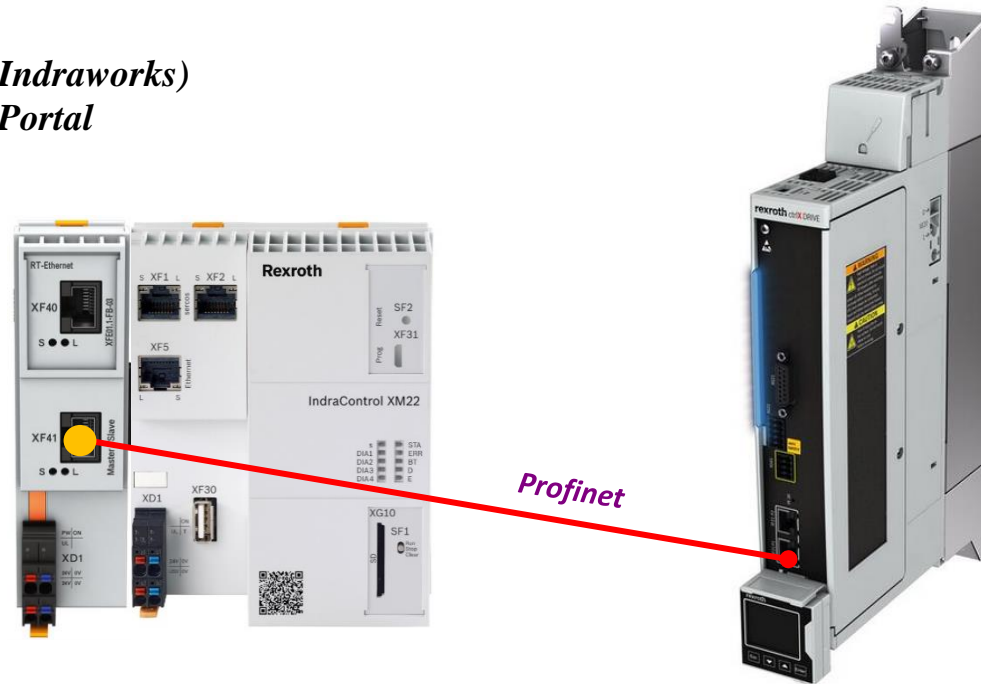
*Jordi Laboria (DCET/SLF4-ES)*

**rexroth**  
A Bosch Company



# Goals:

- ctrlX-Drive Configuration
- Description of a control FB (Indraworks)
- Control on Profinet with Tia Portal



# *Configuration in ctrlX-Drive*

Communication selection:

Select Profinet Protocol

- Deactivated
- Sercos
- Servodrive Profile over EtherCAT® (SoE)
- CAN Application Protocol over EtherCAT® (CoE)
- J1939 over CAN
- PROFINET®**

Select profile

- No profile
- Sercos profile**
- Analog



*You must choose "Sercos Profile" since the other modes do not allow the system to start*

Settings IP settings Slot 0 (Consumer) Slot 1 (Producer)

Active protocol **PROFINET®**

Selected protocol **PROFINET®**

Communication status A0007 Operational

Master communication - sub-device coupling active

Application profile **Sercos profile**

Device name **eje 1**

Vendor ID **0x011F**

Device ID **0x2602**

Target mode after run-up Automatic run-up to OM (operating mode)

Reaction to failure of cycl. communication As error (F4xxx) and config. error reaction of the application

Signal status word Signal control word

Pre-OP OP

Reboot...

*The name must match in the master to be able to establish communication correctly.*

## Configuration Slot 0 (Consumer)

For the equipment to work, in jogging and positioning mode, we must configure the ctrlXDrive with this structure for the control part, data sent from the Superior PLC



In the system, the standard fieldbus words used previously have been eliminated and work has been changed with parameter S-0-0134, which does not include some of the data previously used by P-0-4077.

Parameter S-0-0346 has been included manually for managing the positioning operation mode, since S-0-0134, among other things, only allows us to activate the axis (AH, AF) and change of operation mode if we have more than one.

Offset	IDN		
0	S-0-0134 : Master control word	+	x
2	S-0-0346 : Positioning control word	+	x
4	S-0-0282 : Positioning command value	+	x
8	S-0-0259 : Positioning velocity	+	x
12	S-0-0260 : Positioning acceleration	+	x
16	S-0-0359 : Positioning deceleration	+	x
20	S-0-0145 : Signal control word	+	x
22	S-0-0000 : < empty >	+	x



Caution with the “Current Conn.Length” since, due to system issues, it incorporates a few more bytes in the communication and can bring us some surprise, if we do not take it into account. After the incorporation of the data we have 26 Bytes that do not agree with those assigned in the offset that would be about 24

Slot 1 Configuration (Producer)

*In the "Producer" part and to leave the size of communications the same as those used in the "Consumer", the 4 "empty" at the end are added.*

Settings IP settings Slot 0 (Consumer) Slot 1 (Producer)

**Producer asynchronous**

Status: producing

Number: 0

Producer cycle time: 1000.000 us

Max. connection length: 56

Current conn. length: 26

Connection class: -1

[Process data](#)


**Data configuration**

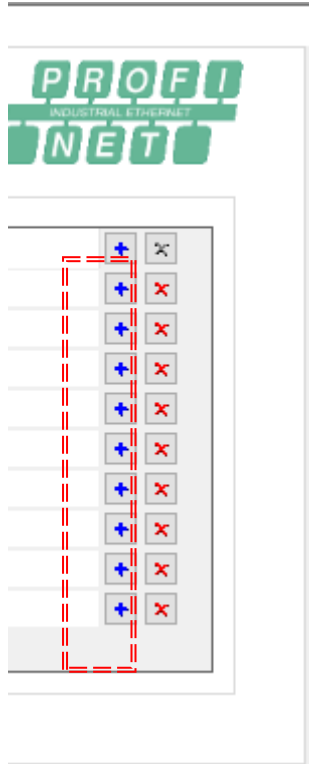
Offset	IDN	+	x
0	S-0-0135 : Drive status word	+	x
2	S-0-0051 : Position feedback value of encoder 1	+	x
6	S-0-0040 : Velocity feedback value of encoder 1	+	x
10	S-0-0390 : Diagnostic message number	+	x
14	S-0-0144 : Signal status word	+	x
16	S-0-0000 : < empty >	+	x
18	S-0-0000 : < empty >	+	x
20	S-0-0000 : < empty >	+	x
22	S-0-0000 : < empty >	+	x



*As in the "Consumer" part, the bytes used maintain a certain discrepancy between those of the "Current Conn. Lengh" and those defined in the offset*

## Communication parameter lists:

If there is any problem when adding parameters with the option  we can add them by accessing the parameter lists



### Configuration Slot 0 (Consumer)

Parameter editor	
IDN	S-0-1050.0.6
Axis / power supply [1] default	
Name	Connection: Configuration list
Status	OK
Min / Max	-- / --
Elements	Act: 8 Max: 20
0	S-0-0134
1	S-0-0346
2	S-0-0282
3	S-0-0259
4	S-0-0260
5	S-0-0359
6	S-0-0145
7	S-0-0000

### Slot 1 Configuration (Producer)

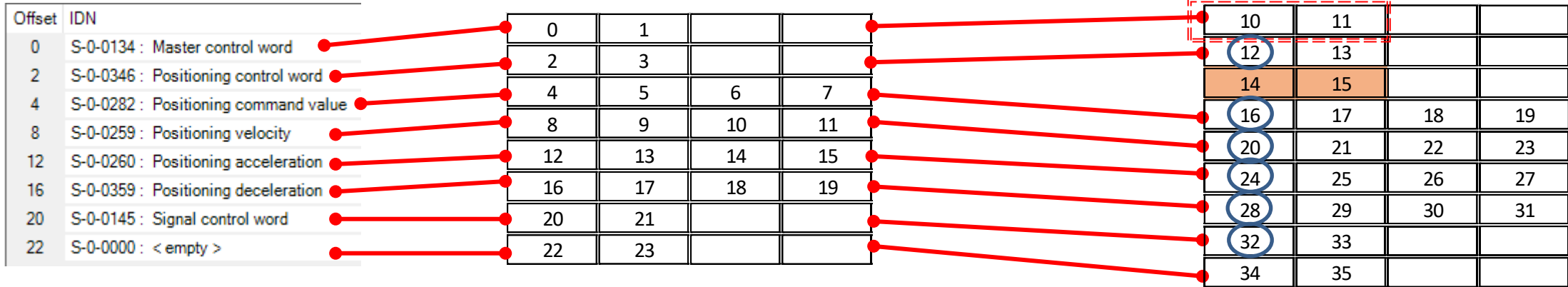
Parameter editor	
IDN	S-0-1050.1.6
Axis / power supply [1] default	
Name	Connection: Configuration list
Status	OK
Min / Max	-- / --
Elements	Act: 9 Max: 20
0	S-0-0135
1	S-0-0051
2	S-0-0040
3	S-0-0390
4	S-0-0144
5	S-0-0000
6	S-0-0000
7	S-0-0000
8	S-0-0000



**Parameters can be added in the “Configuration List” from parameter S-0-1050.0.6 and S-0-1050.1.6**

Data mappings and communication structures (Consumer)

According to the offsets, defined from the positions within the frame, this would be this way



The structures use the 4-byte system and in this way, the system itself always places the beginning of 4-byte structures (Dword) on multiples of four

0
4
8
12
16
20
24
28
32
36
40

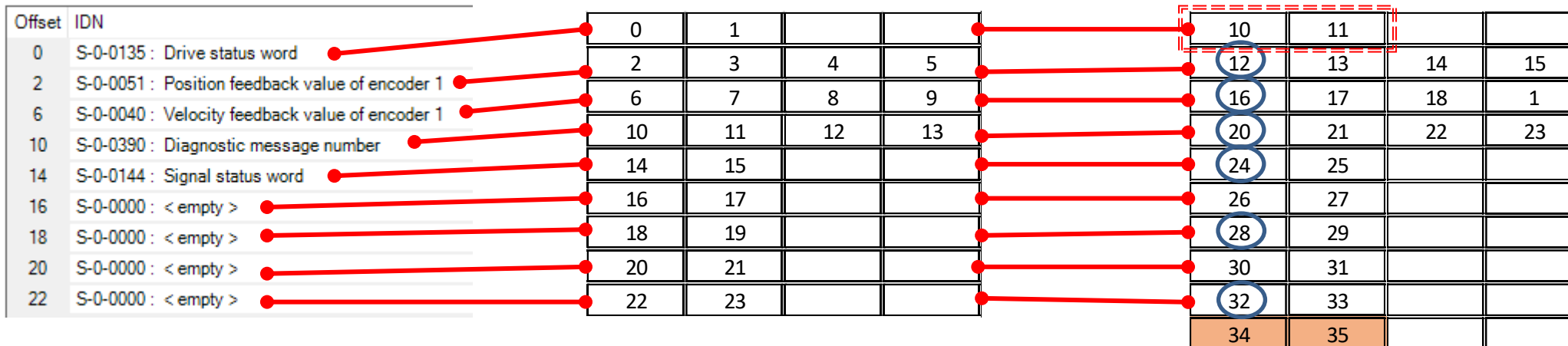


However, when in the PLC part we put that the first of the areas start with the value 10, a "shift" of the areas is produced and in this case 2 more Bytes are "added" to the frame generated by the 26 of the "Current Conn. Length"

Current conn. length



Data Mappings and Communication Structures (Producer)



Total: 26 Bytes

The structures use the 4-byte system and in this way, the system itself always places the beginning of 4-byte structures (Dword) on multiples of four

0
4
8
12
16
20
24
28
32
36
40



In this case, as in the “Consumer” section, if we start with area 10 we will see that the elements fit perfectly, although two more bytes are used that generate the 26 of the “Current Conn. Length”

Current conn. length

The modifications in the communication must be "validated" by activating "Pre-OP" and then activating "OP". This allows the frame to be updated, both for the subsequent scanning of the equipment from the Master PLC and if we have changed any data manually. .

Settings | IP settings | Slot 0 (Consumer) | Slot 1 (Producer)

Active protocol: PROFINET®

Selected protocol: PROFINET®

Communication status: A0007 Operational

Master communication - sub-device coupling active

Application profile: Sercos profile

Device name: eje1

Vendor ID: 0x011F

Device ID: 0x2602

Target mode after run-up: Automatic run-up to OM (operating mode)

Reaction to failure of cycl. communication: As error (F4xxx) and config. error reaction of the application

[Signal status word](#) | [Signal control word](#) | Reboot...



**Validate the configuration with  
1st Pre-OP  
2nd OP**

## Provisional definition of the “Signal Control Word” and “Signal Status Word” configurations

Status	Target parameter	Bit number
Bit 0:	S-0-0148: C0600 Drive-controlled homing procedure command	0
Bit 1:	S-0-0447: C0300 Set absolute position procedure command	0
Bit 2:	S-0-0099: C0500 Reset class 1 diagnostics	0
Bit 3:	S-0-0000: <empty>	0
Bit 4:	S-0-0000: <empty>	0
Bit 5:	S-0-0000: <empty>	0
Bit 6:	S-0-0000: <empty>	0
Bit 7:	S-0-0000: <empty>	0
Bit 8:	S-0-0000: <empty>	0
Bit 9:	S-0-0000: <empty>	0
Bit 10:	S-0-0000: <empty>	0
Bit 11:	S-0-0000: <empty>	0
Bit 12:	S-0-0000: <empty>	0
Bit 13:	S-0-0000: <empty>	0
Bit 14:	S-0-0000: <empty>	0
Bit 15:	S-0-0000: <empty>	0

Status	Source parameter	Bit number
Bit 0:	S-0-0403: Position feedback value status	0
Bit 1:	P-0-0555: Axis controller messages	2
Bit 2:	S-0-0000: <no signal>	0
Bit 3:	S-0-0000: <no signal>	0
Bit 4:	S-0-0000: <no signal>	0
Bit 5:	S-0-0000: <no signal>	0
Bit 6:	S-0-0000: <no signal>	0
Bit 7:	S-0-0000: <no signal>	0
Bit 8:	S-0-0000: <no signal>	0
Bit 9:	S-0-0000: <no signal>	0
Bit 10:	S-0-0000: <no signal>	0
Bit 11:	S-0-0000: <no signal>	0
Bit 12:	S-0-0000: <no signal>	0
Bit 13:	S-0-0000: <no signal>	0
Bit 14:	S-0-0000: <no signal>	0
Bit 15:	S-0-0000: <no signal>	0

Configuration of operating modes:



Initially we are only going to use the “Drive-Controller Positioning” mode of operation

S-0-0282

Parameter bits P-0-0346

S-0-0259

S-0-0260

S-0-0359

## Parameters

### S-0-0134 Drive Control Word

Bit	Designation/function
10-8	<b>Command operation mode</b> <b>000:</b> Primary operation mode <b>001:</b> Secondary operation mode 1, etc. <b>111:</b> Secondary operation mode 7
13	<b>Drive Halt, 1-0 change:</b> Deceleration of drive while maintaining maximum acceleration ( <a href="#">S-0-0138</a> ) (only possible if bits 14 and 15 = 1)
14	<b>Drive enable</b> <b>1-0 change:</b> Torque disable without delay (independent of bit 15 or 13)
15	<b>Drive ON</b> <b>1-0 change:</b> Best possible deceleration (only possible if bit 14 = 1)

### S-0-0135 Drive Status Word

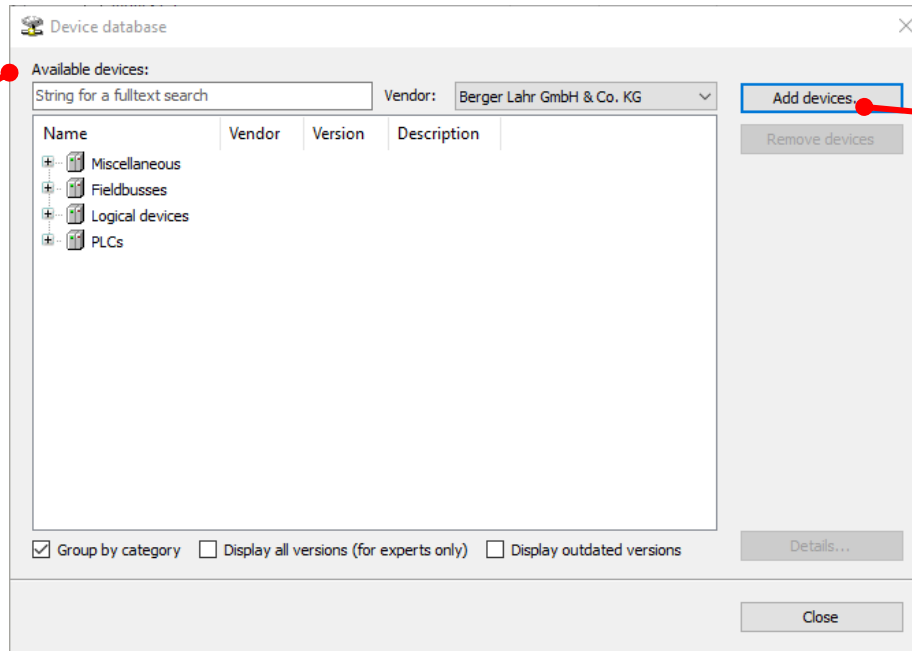
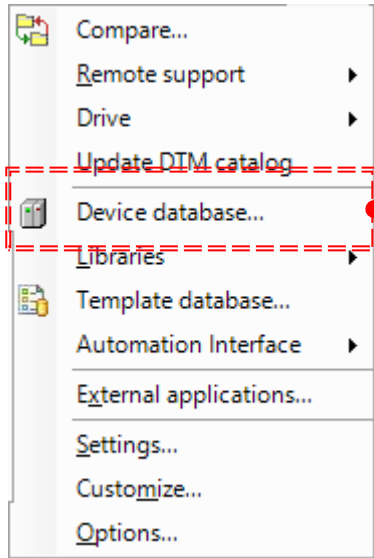
Bit	Designation/function
3	<b>Status of command value processing</b> <b>0:</b> Drive ignores command value input <b>1:</b> Drive follows command value input
4	<b>Status Drive Halt</b> <b>0:</b> Not active, bit 13 in " <a href="#">S-0-0134</a> " is 1 <b>1:</b> Active, bit 13 in " <a href="#">S-0-0134</a> " was set to 0, actual velocity within " <a href="#">S-0-0124</a> , Standstill window"
5	<b>Position feedback value status</b> ( <a href="#">S-0-0403</a> )
7	<b>Hardware enable (emergency stop)</b> <b>0:</b> Not active (bits 15 and 14 of " <a href="#">S-0-0134</a> " are ignored, emergency stop is active) <b>1:</b> Active
10-8	<b>Actual operation mode</b> <b>000:</b> Primary operation mode active <b>001:</b> Secondary operation mode 1 active <b>010:</b> Secondary operation mode 2, etc.
12	<b>Class 2 diagnostics warning (cf. S 0-0012)</b> The bit is set if a class 2 diagnostics warning is present.
13	<b>Class 1 diagnostics drive error (cf. S-0-0011)</b> The bit is set if a class 1 diagnostics error is present (drive lock-out).
15/14	<b>Ready for operation (P-0-0116, bit 15/14)</b> <b>00:</b> Not ready for power on (e.g., P2) <b>01:</b> Ready for power on (bb) <b>10:</b> Control section and power section ready for op. (Ab) <b>11:</b> In operation, with torque (e.g. AF)

### S-0-0346 Positioning control word

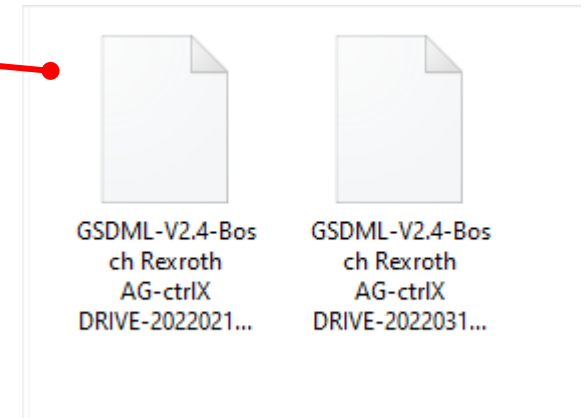
Bit	Designation/function
0	<b>Application of positioning command value</b> Applied by toggling
2/1	<b>Activation of positioning</b> <b>00:</b> Positioning active, started by toggling of bit 0 <b>Positioning aborted by:</b> <b>01:</b> Infinite travel in positive direction (jog+) <b>10:</b> Infinite travel in negative direction (jog-) <b>11:</b> Stopping the axis (positioning stop)
3	<b>Type of positioning command value</b> <b>0:</b> Absolute <b>1:</b> Relative (depending on bit 4)
4	<b>Dedicated point for positioning command values</b> <b>0:</b> Last effective target position ( <a href="#">S-0-0430</a> ) <b>1:</b> Active position feedback value ( <a href="#">S-0-0386</a> )
5	<b>Immediate block change</b> <b>0:</b> Drive moves to current target position, before positioning at new target position <b>1:</b> Immediate block change, i.e., drive immediately moves to new target position
7/6	<b>Behavior for sequential block (bit 5 = 0)</b> <b>00:</b> Halt at target position of start block <b>01:</b> Overrunning target position of start block (mode 1) <b>10:</b> Overrunning target position of start block (mode 2)

# *Configuration in Indraworks*

## Insert XML file:

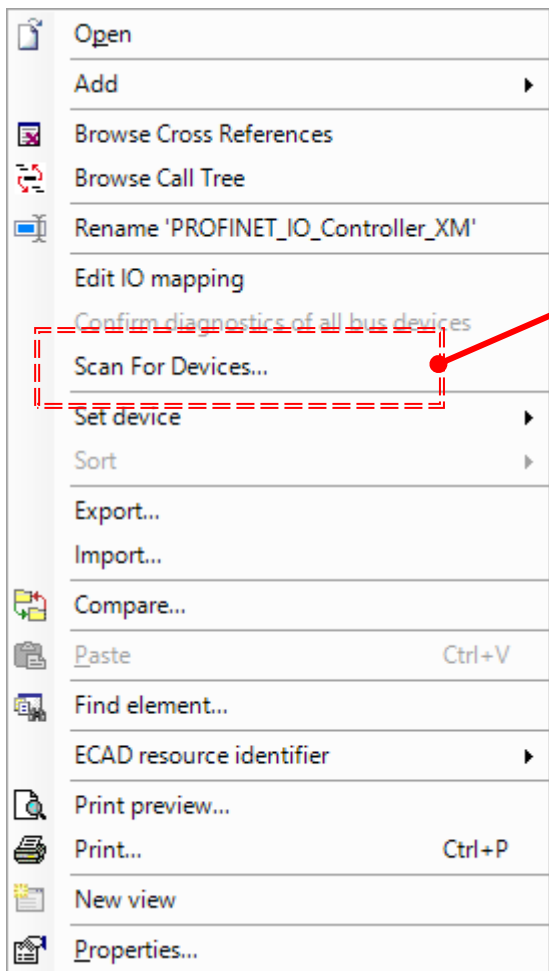


*Find files in the path where they are saved*

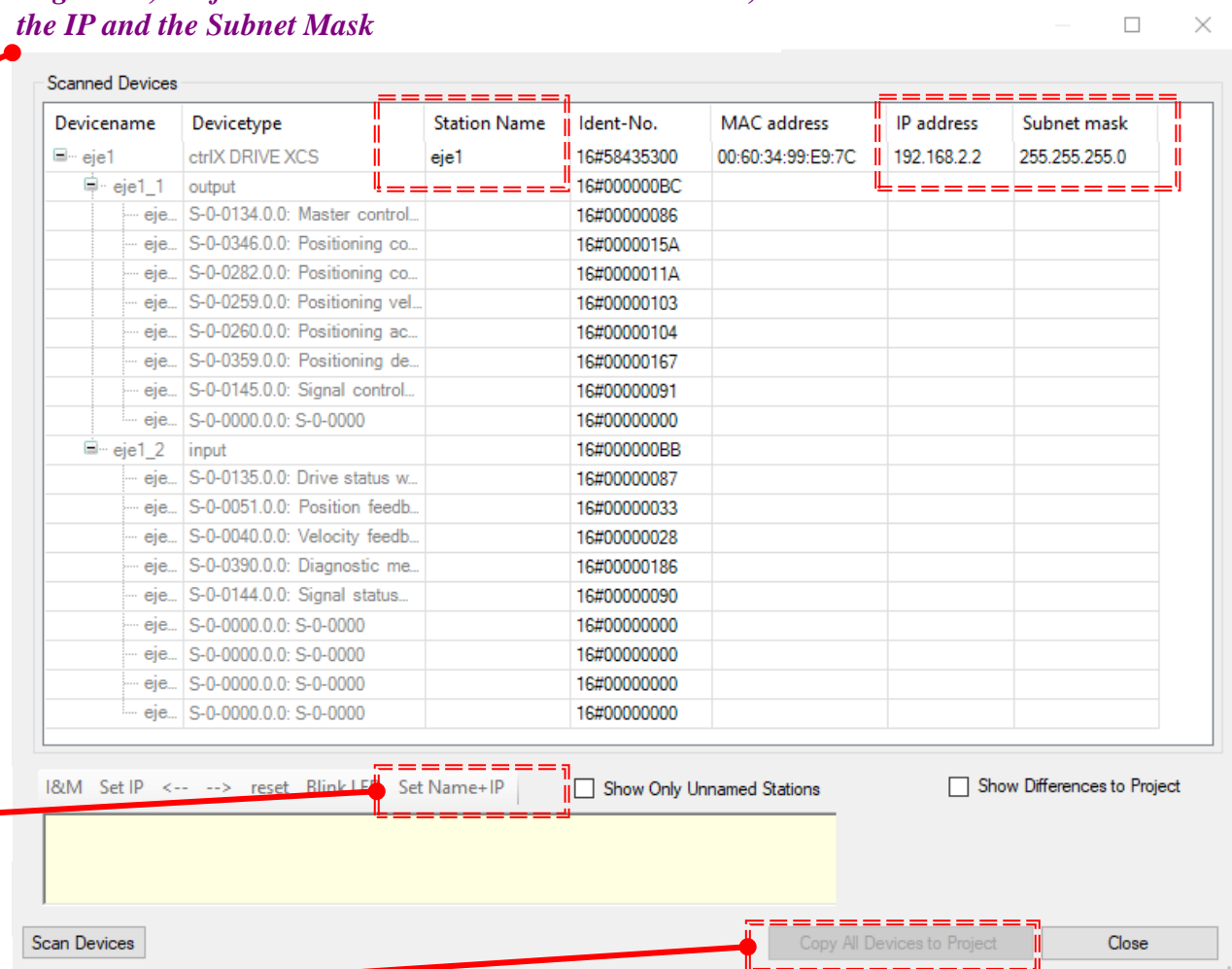


- GSDML-011F-2602-ctrlXDRIVE.bmp
- GSDML-011F-2602-ctrlXDRIVE.ico
- GSDML-V2.4-Bosch Rexroth AG-ctrlX DRIVE-20220217.xml
- GSDML-V2.4-Bosch Rexroth AG-ctrlX DRIVE-20220311.xml

Scan for Devices



*In general, the first scanner will ask us to enter the name, the IP and the Subnet Mask*

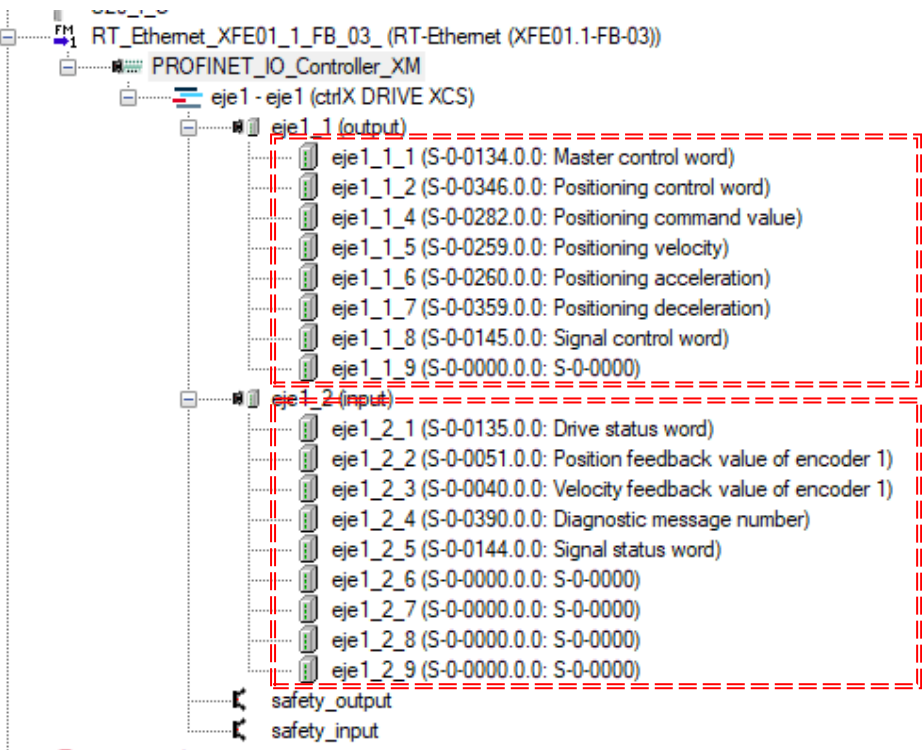


*Activate "SetName+IP" to validate the entered data*

*Activate to add the axes found in the project*



Once the device has been scanned, the read configuration should appear



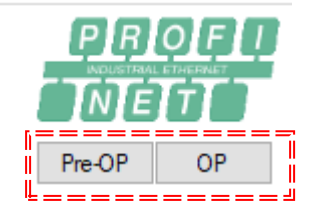
Data sent to the ctrlX-Drive

Data received from the ctrlX-Drive



Remember that if the configuration read differs from the one we have programmed, it may be because we have not validated it with:

- 1st Pre-OP
- 2nd OP



In the case of the ctrlX-Drive the I/O configuration appears separated by parameters

Data sent to the ctrlX-Drive



*I recommend activating the "Enabled 2" option in each of the I/O areas for their automatic refresh.*

Always update variables: Enabled 2 (always in bus cycle task) [dropdown arrow]

Data received from the ctrlX-Drive

Variable	Mapping	Channel	Address	Type
eje1_2_1 (S-0-0135.0.0: Drive status word)		Unsigned16	%IW10	UINT
eje1_2_2 (S-0-0051.0.0: Position feedback value of encoder 1)		Integer32	%ID12	DINT
eje1_2_3 (S-0-0040.0.0: Velocity feedback value of encoder 1)		Integer32	%ID16	DINT
eje1_2_4 (S-0-0390.0.0: Diagnostic message number)		Unsigned32	%ID20	UDINT
eje1_2_5 (S-0-0144.0.0: Signal status word)		Unsigned16	%IW24	UINT
eje1_2_6 (S-0-0000.0.0: S-0-0000)		Unsigned16	%IW26	UINT
eje1_2_7 (S-0-0000.0.0: S-0-0000)		Unsigned16	%IW28	UINT
eje1_2_8 (S-0-0000.0.0: S-0-0000)		Unsigned16	%IW30	UINT
eje1_2_9 (S-0-0000.0.0: S-0-0000)		Unsigned16	%IW32	UINT

**Warning:** I recommend activating the "Enabled 2" option in each of the I/O areas for their automatic refresh.

Always update variables: **Enabled 2 (always in bus cycle task)**

Communication settings:

Station Name: controller

**IP Parameter**

IP Address: 192 . 168 . 2 . 1

Subnet Mask: 255 . 255 . 255 . 0

Default Gateway: 0 . 0 . 0 . 0

**Default Slave IP Parameter**

First IP Address: 192 . 168 . 2 . 2

Last IP Address: 192 . 168 . 2 . 253

Subnet Mask: 255 . 255 . 255 . 0

Default Gateway: 192 . 168 . 2 . 1

**IO Provider / Consumer Status**

Application Stop --> Substitute Values

Add to I/O Mapping

**Watchdog**

Enable

1000 (ms)

Station Name: eje1

**IP Parameter**

IP Address: 192 . 168 . 2 . 2

Subnet Mask: 255 . 255 . 255 . 0

Default Gateway: 192 . 168 . 2 . 1

**Communication**

Send clock (ms): 1

Watchdog (ms): 6

Reduction ratio: 2

VLAN ID: 0

Phase: -

RT Class: RT Class 1



*The name must be the same as the one assigned in the ctrlX-Drive configuration*

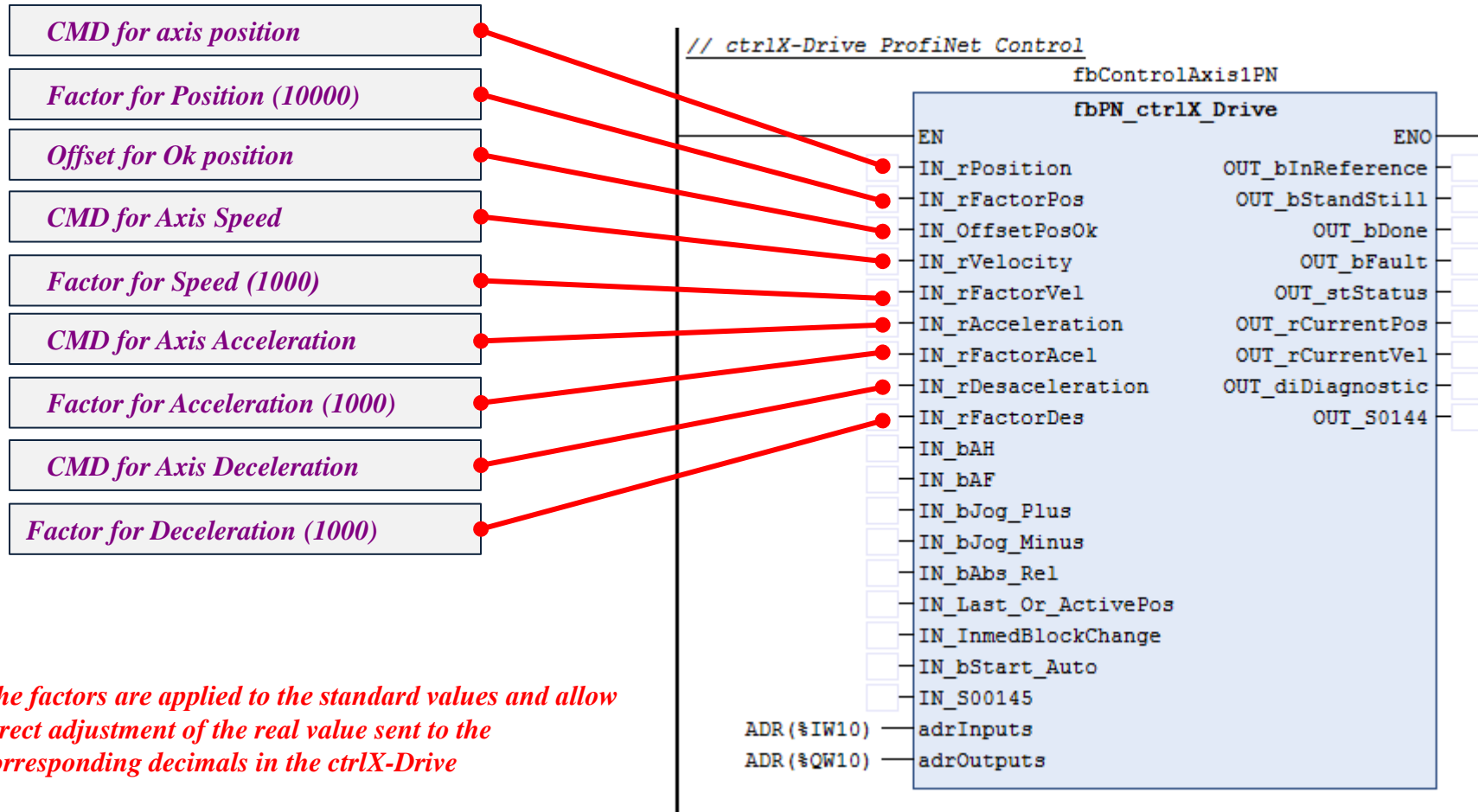


*The IP must be assigned from the area for slaves defined in the Master part*

# *Control FB Configuration*

Description of the control Fb used in the example (CMD Setpoint Values)

Setpoint values sent to the drive



The factors are applied to the standard values and allow direct adjustment of the real value sent to the corresponding decimals in the ctrlX-Drive

Description of the control Fb used in the example (Activation Bits)

Activation values and option control

Activate Axis in AH Mode

Activate Axis in AF Mode

Movement in Jogging Plus

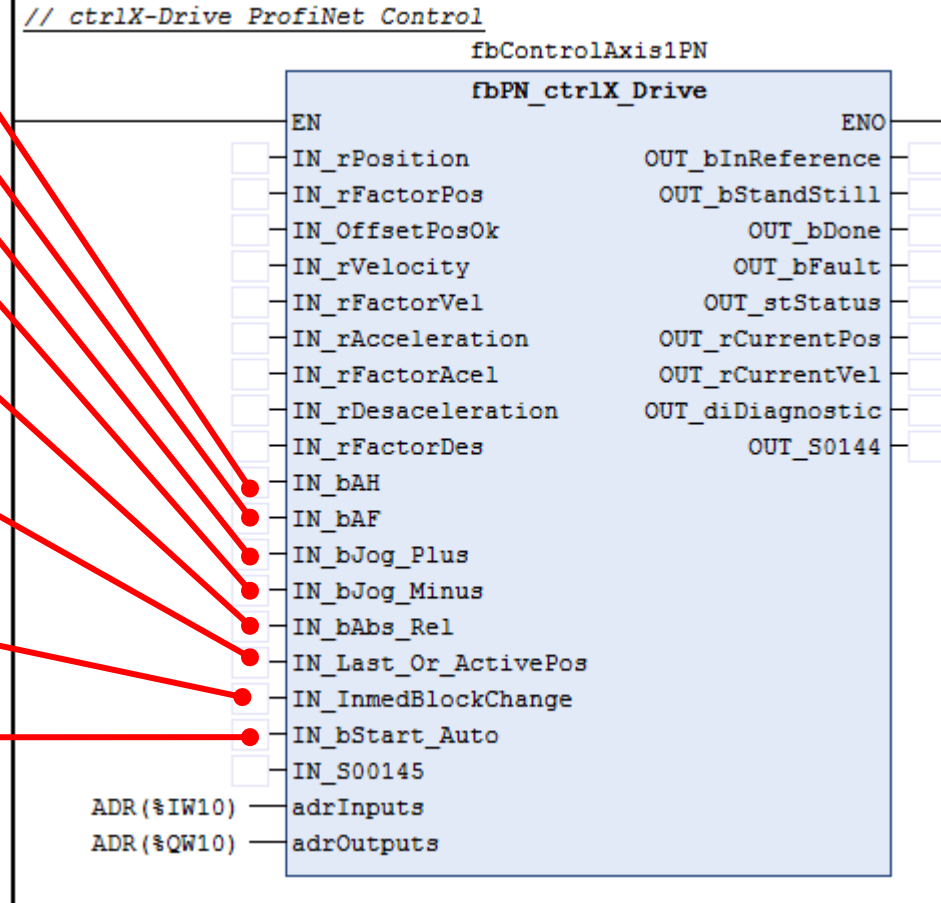
Movement in Jogging Minus

Selection of the type of movement  
 Absolute Motion = False  
 Relative Motion = True

Starting point selection  
 Last position = False  
 Current Position = True

Selection to update values  
 Move to new Pos. After reaching position = False  
 Move to new Pos. Directly = True

Toggle Bit, activation to the new position

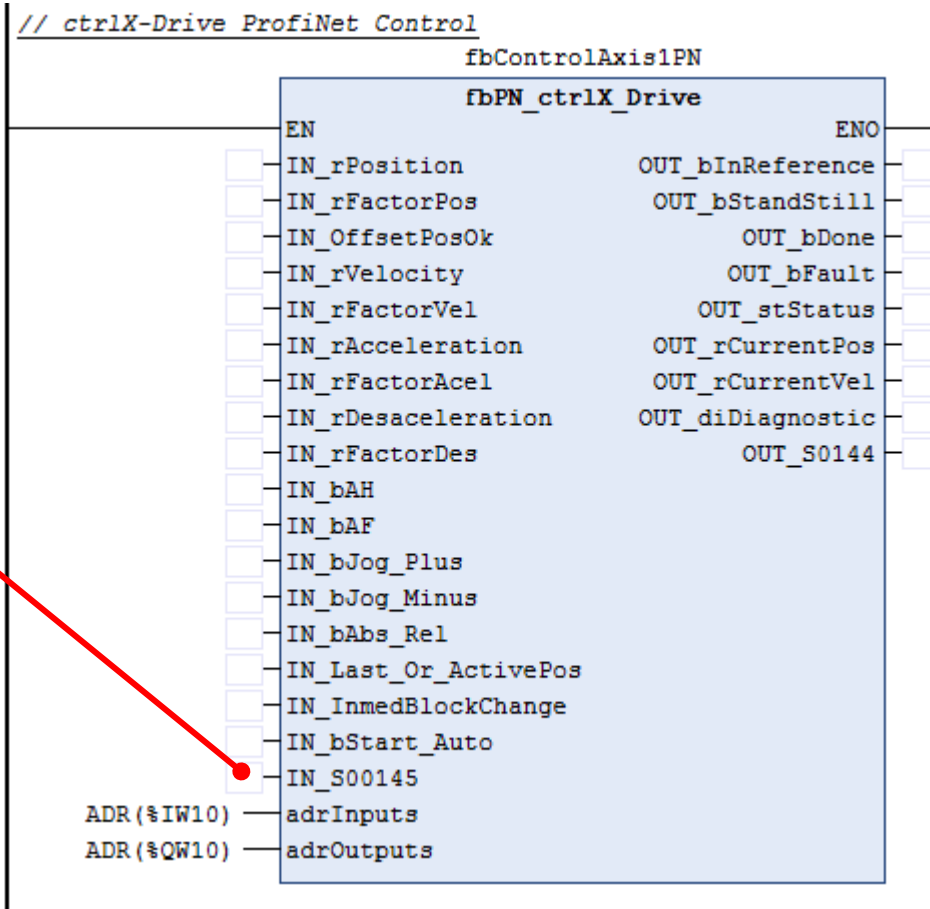


## Description of the control Fb used in the example (Signal Control Word)

We will use the “Signal Control Word” for the time being to activate the referencing, incremental or absolute modes and the error reset

### Signal Control Word

Status	Target parameter	Bit number
Bit 0: <input type="radio"/>	S-0-0148: C0600 Drive-controlled homing procedure command	0
Bit 1: <input type="radio"/>	S-0-0447: C0300 Set absolute position procedure command	0
Bit 2: <input type="radio"/>	S-0-0099: C0500 Reset class 1 diagnostics	0
Bit 3: <input type="radio"/>	S-0-0000: <empty>	0
Bit 4: <input type="radio"/>	S-0-0000: <empty>	0
Bit 5: <input type="radio"/>	S-0-0000: <empty>	0
Bit 6: <input type="radio"/>	S-0-0000: <empty>	0
Bit 7: <input type="radio"/>	S-0-0000: <empty>	0
Bit 8: <input type="radio"/>	S-0-0000: <empty>	0
Bit 9: <input type="radio"/>	S-0-0000: <empty>	0
Bit 10: <input type="radio"/>	S-0-0000: <empty>	0
Bit 11: <input type="radio"/>	S-0-0000: <empty>	0
Bit 12: <input type="radio"/>	S-0-0000: <empty>	0
Bit 13: <input type="radio"/>	S-0-0000: <empty>	0
Bit 14: <input type="radio"/>	S-0-0000: <empty>	0
Bit 15: <input type="radio"/>	S-0-0000: <empty>	0





Description of the control Fb used in the example (Assignment Inputs / Outputs Areas)

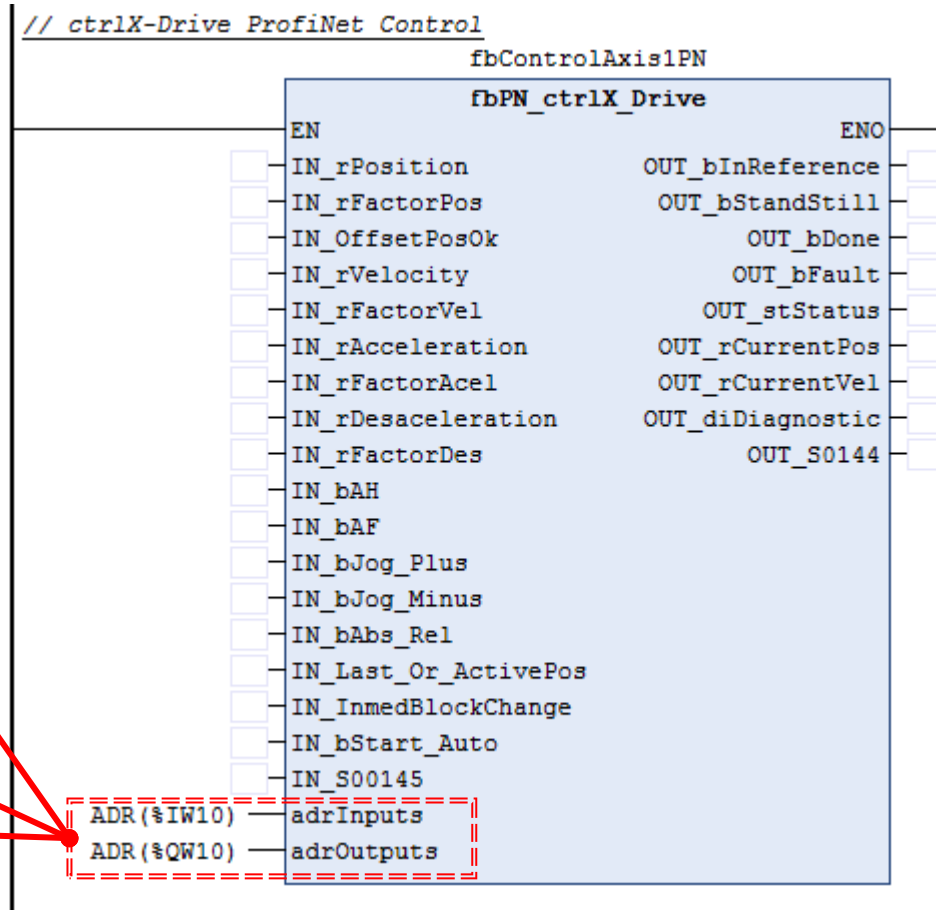
I/O definition

We will use ADR() to define the I/O bytes assigned to the axis. In this way and automatically the internal structures of the FB collect the information of the areas and assign them to the different internal parameters of the FB

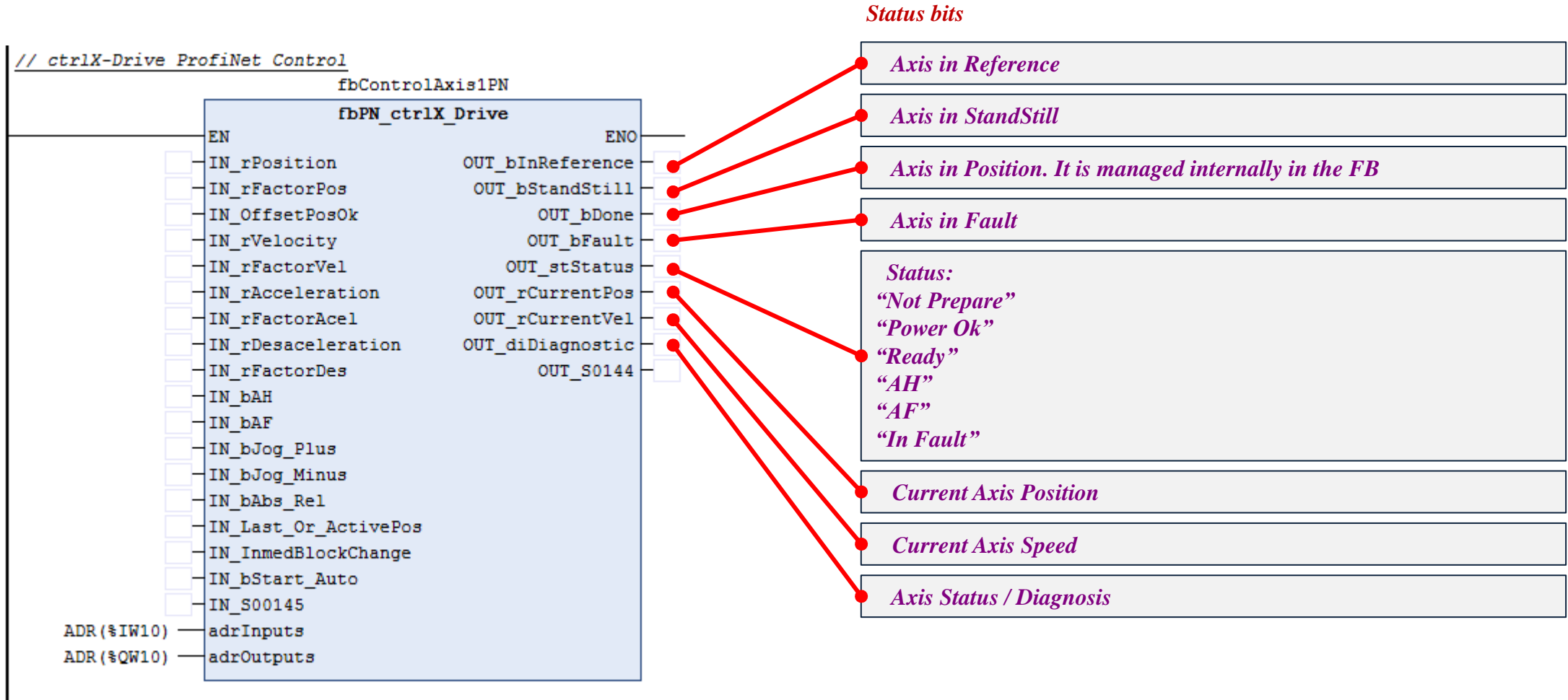


The starting address is determined by the first communications word used in the I/Os.

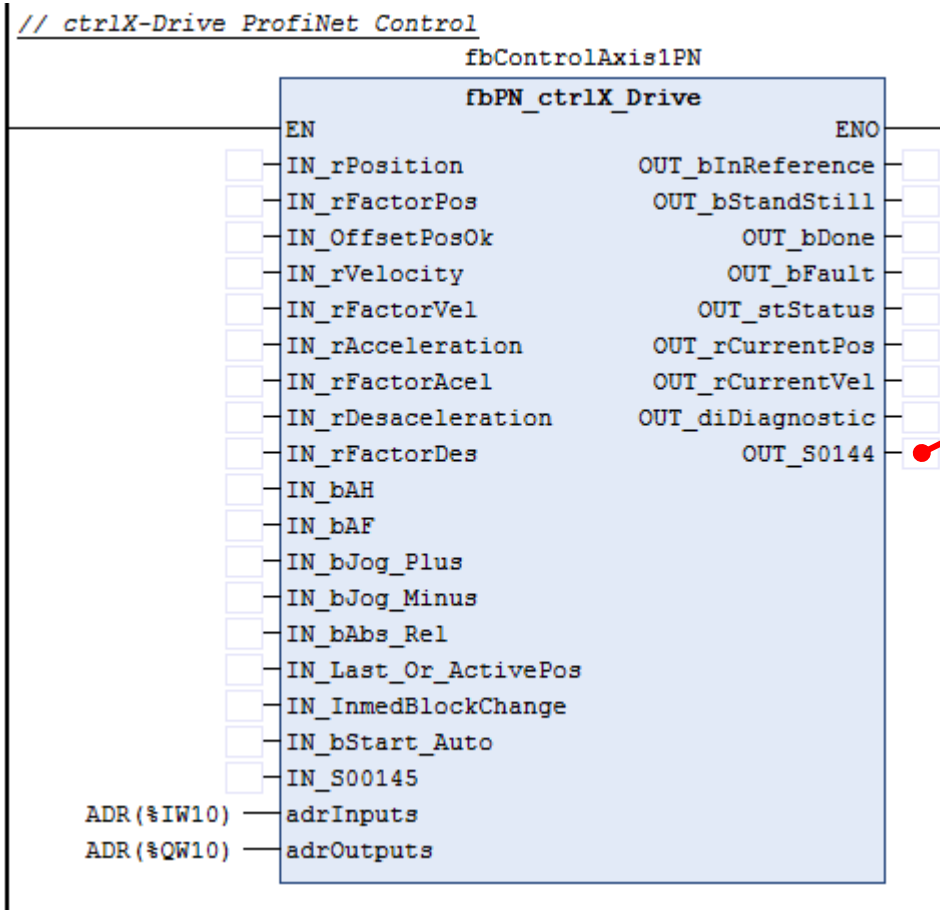
Variable	Mapping	Channel	Address	Type
eje1_2_1 (S-0-0135.0.0: Drive status word)		Unsigned16	%IW10	UINT
eje1_1_1 (S-0-0134.0.0: Master control word)		Unsigned16	%QW10	UINT



Description of the control Fb used in the example (Assignment Inputs / Outputs Areas)



Description of the control Fb used in the example (Assignment Inputs / Outputs Areas)



The "Signal Status Word" will be used for the time being to control the referenced axis and the standstill

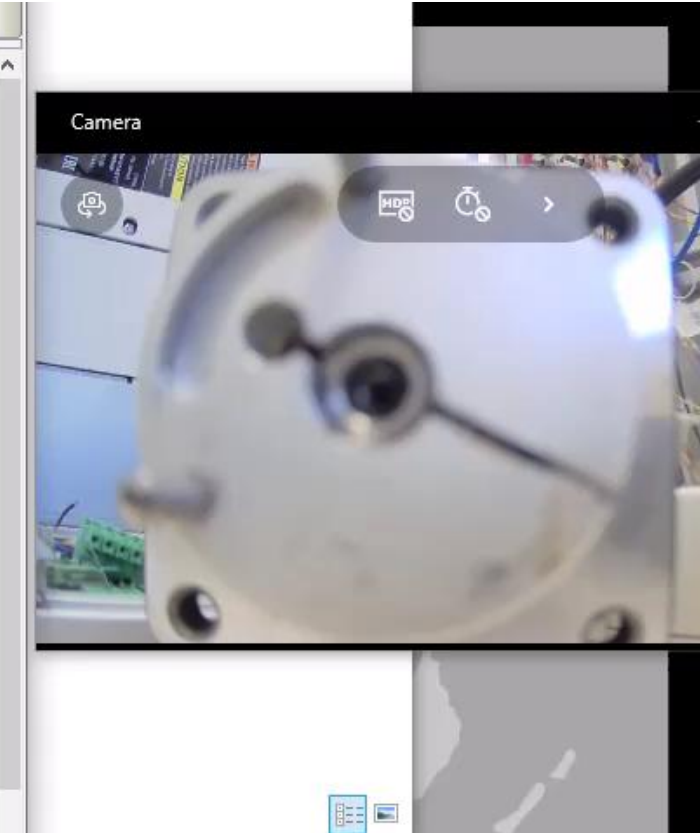
**Signal Status Word**

Bit	Status	Source parameter	Bit number
Bit 0:	<input checked="" type="radio"/>	S-0-0403: Position feedback value status	0
Bit 1:	<input checked="" type="radio"/>	P-0-0555: Axis controller messages	2
Bit 2:	<input type="radio"/>	S-0-0000: <no signal>	0
Bit 3:	<input type="radio"/>	S-0-0000: <no signal>	0
Bit 4:	<input type="radio"/>	S-0-0000: <no signal>	0
Bit 5:	<input type="radio"/>	S-0-0000: <no signal>	0
Bit 6:	<input type="radio"/>	S-0-0000: <no signal>	0
Bit 7:	<input type="radio"/>	S-0-0000: <no signal>	0
Bit 8:	<input type="radio"/>	S-0-0000: <no signal>	0
Bit 9:	<input type="radio"/>	S-0-0000: <no signal>	0
Bit 10:	<input type="radio"/>	S-0-0000: <no signal>	0
Bit 11:	<input type="radio"/>	S-0-0000: <no signal>	0
Bit 12:	<input type="radio"/>	S-0-0000: <no signal>	0
Bit 13:	<input type="radio"/>	S-0-0000: <no signal>	0
Bit 14:	<input type="radio"/>	S-0-0000: <no signal>	0
Bit 15:	<input type="radio"/>	S-0-0000: <no signal>	0

rlX-Drive ProfiNet Control

```

fbControlAxis1PN
fbPN_ctrlX_Drive
EN
arEjeControl[2].rPos_CMD 0
1E+04
0.5
arEjeControl[2].rVel_CMD 500
1E+03
arEjeControl[2].rAce_CMD 0
1E+03
arEjeControl[2].rDec_CMD 0
1E+03
arEjeControl[2].bAH FALSE
arEjeControl[2].bAF FALSE
arEjeControl[2].bJogPlus FALSE
arEjeControl[2].bJogMinus FALSE
arEjeControl[2].bModo FALSE
FALSE
FALSE
arEjeControl[2].bStartPos FALSE
arEjeControl[2].ws0145 16#0000
ADR(%IW10)
ADR(%QW10)
IN_rPosition
IN_rFactorPos
IN_OffsetPosOk
IN_rVelocity
IN_rFactorVel
IN_rAcceleration
IN_rFactorAcel
IN_rDesacceleration
IN_rFactorDes
IN_bAH
IN_bAF
IN_bJog_Plus
IN_bJog_Minus
IN_bAbs_Rel
IN_Last_Or_ActivePos
IN_InmedBlockChange
IN_bStart_Auto
IN_S00145
adrInputs
adrOutputs
OUT_bInReference
OUT_bStandStill
OUT_bDone
OUT_bFault
OUT_stStatus
OUT_rCurrentPos
OUT_rCurrentVel
OUT_diDiagnostic
OUT_S0144
ENO
arEjeStatus[2].bRefOk TRUE
arEjeStatus[2].bStandStill TRUE
arEjeStatus[2].bDone FALSE
arEjeStatus[2].bFault FALSE
arEjeStatus[2].stStatus 'Power Ok'
arEjeStatus[2].rPos_ACT 44.7
arEjeStatus[2].rVel_ACT 0
arEjeStatus[2].diDiagnostic 16#C00A0012
arEjeStatus[2].ws0144 16#0003
    
```



# *Control on Profinet with TIA Portal*

For the control of the axis through Tia Portal, we will use the same configuration in ctrlXdrive used previously for use with the XM

**Configuration Slot 0 (Consumer)**

Settings IP settings Slot 0 (Consumer) Slot 1 (Producer)

**Consumer asynch. (no watchdog)**

Status: consuming

Number: 0

Producer cycle time: 1000.000 us

Allowed data losses: 2

Error counter: 0

Max. connection length: 56

**Current conn. length: 26**

Connection class: -1

[Process data](#)

**Data configuration**

Offset	IDN		
0	S-0-0134 : Master control word	+	x
2	S-0-0346 : Positioning control word	+	x
4	S-0-0282 : Positioning command value	+	x
8	S-0-0259 : Positioning velocity	+	x
12	S-0-0260 : Positioning acceleration	+	x
16	S-0-0359 : Positioning deceleration	+	x
20	S-0-0145 : Signal control word	+	x
22	S-0-0000 : < empty >	+	x

**Slot 1 Configuration (Producer)**

Settings IP settings Slot 0 (Consumer) Slot 1 (Producer)

**Producer asynchronous**

Status: producing

Number: 0

Producer cycle time: 1000.000 us

Max. connection length: 56

**Current conn. length: 26**

Connection class: -1

[Process data](#)

**Data configuration**

Offset	IDN		
0	S-0-0135 : Drive status word	+	x
2	S-0-0051 : Position feedback value of encoder 1	+	x
6	S-0-0040 : Velocity feedback value of encoder 1	+	x
10	S-0-0084 : Torque/force feedback value	+	x
12	S-0-0390 : Diagnostic message number	+	x
16	S-0-0144 : Signal status word	+	x
18	S-0-0000 : < empty >	+	x
20	S-0-0000 : < empty >	+	x
22	S-0-0000 : < empty >	+	x

*In the example communication used in Tia Portal, the value of "Torque Feedback value" has been added*

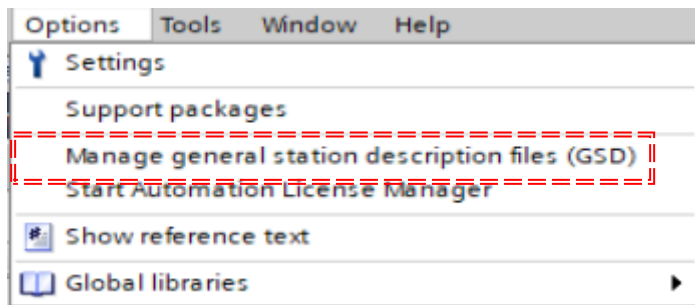


*The size of the "Current Connection Length" is still maintained at 26 Bytes as can be seen in the image*

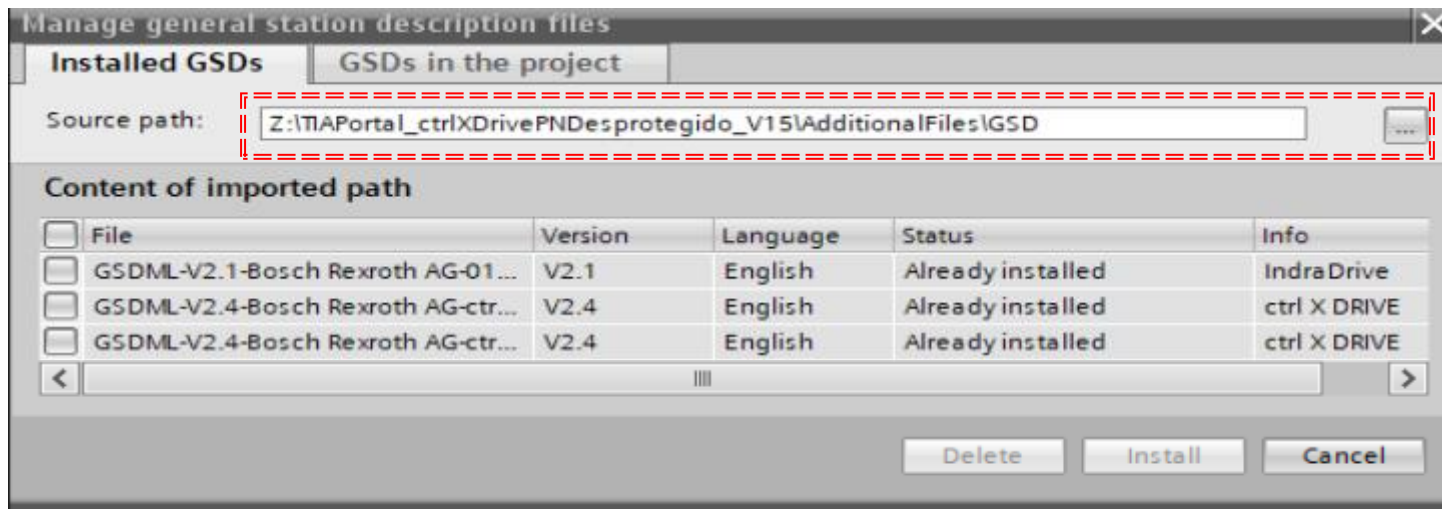


Logically, the first thing we must do is add the XML files to the system.

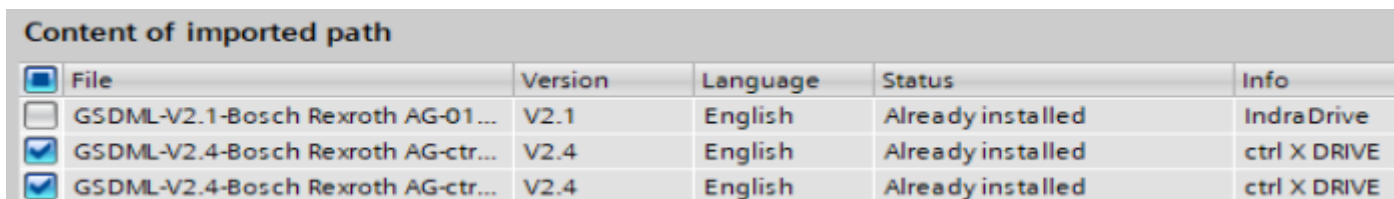
In the “Options” section select “Manage General Station Description Files”



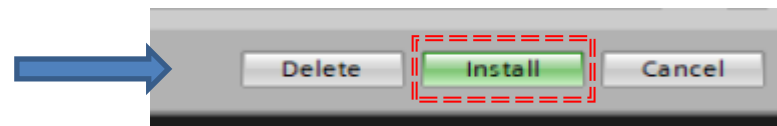
Then choose the path where we have saved the XML files



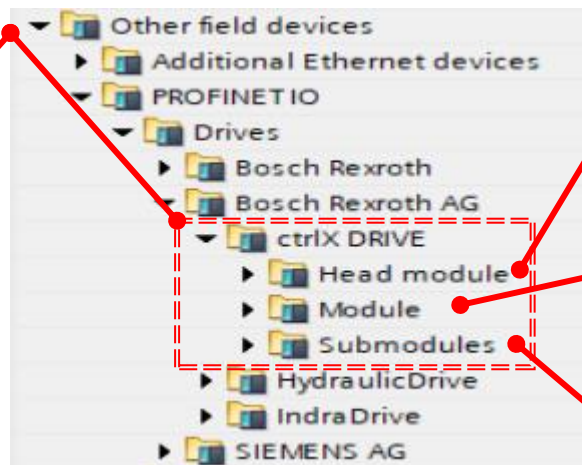
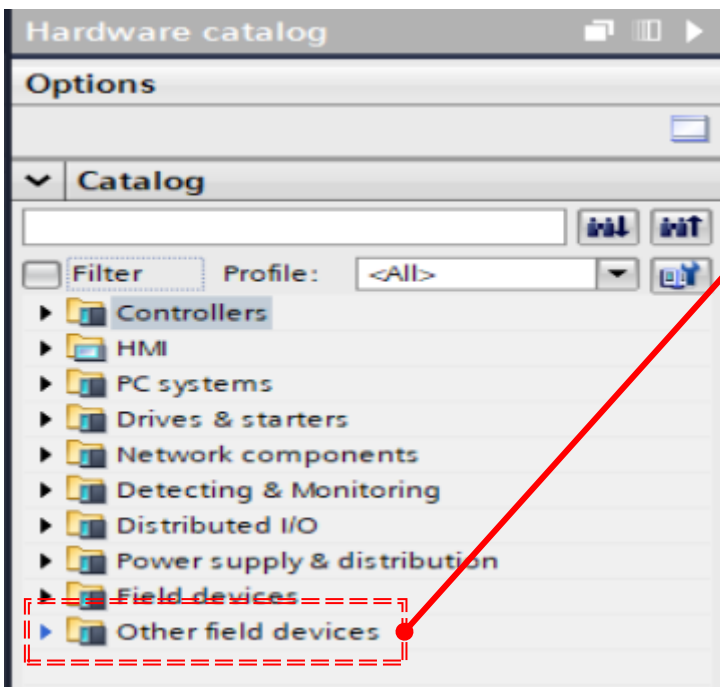
Select the files that we want to install, (in the example the two ctrlXDrive files were already installed)



Press “Install”



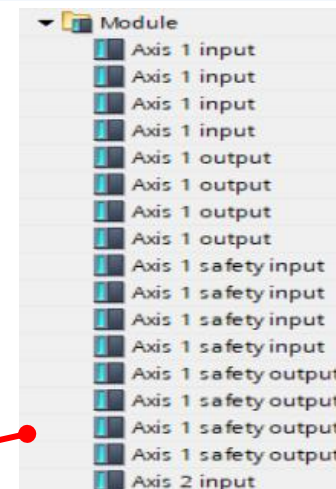
The inserted XML files should appear in the Hardware catalog



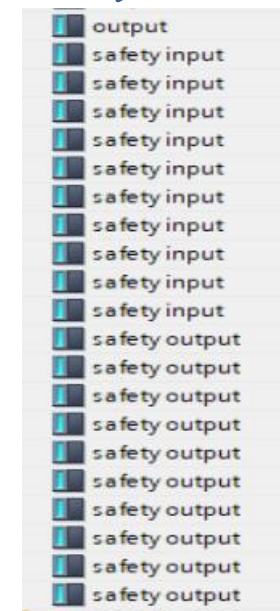
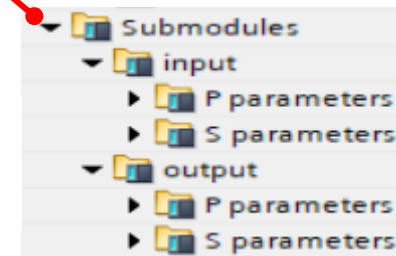
Available equipment



General modules



Submódulos para parametrización usuario



The submodules at the IO level allow the selection of the different parameters that we must use for communication



Once the ctrlXDrive of the desired type has been inserted, the module allows us to configure it according to what we want. In any case, there should always be an Outputs area and an Inputs area.

Module	Rack	Slot	I address	Q addr...
ctrlx-drive-xms	0	0		
XMS interface PF30	0	0 X1		
output_1	0	output		
S-0-0134.0.0: Master control word	0	output...		
S-0-0145.0.0: Signal control word	0	output...		
S-0-0282.0.0: Positioning command ...	0	output...		
S-0-0259.0.0: Positioning velocity	0	output...		
S-0-0260.0.0: Positioning acceleration	0	output...		
S-0-0359.0.0: Positioning deceleration	0	output...		
input_1	0	input		
S-0-0135.0.0: Drive status word	0	input 1		
S-0-0144.0.0: Signal status word	0	input 2		
S-0-0386.0.0: Active position feedba...	0	input 3		
S-0-0535.0.0: Active velocity feedba...	0	input 4		
S-0-0390.0.0: Diagnostic message n...	0	input 5		

**Minimum structure generated from the Input and Output modules**

*Drag and drop*

The addition of parameters by the user must be done from the “Submodule” option

The screenshot displays the TIA Portal parameter configuration interface. On the left, a tree view shows 'Submodules' expanded to 'input' and 'output', each containing 'P parameters' and 'S parameters'. Red arrows point from these folders to detailed views of the parameter lists. A dashed red box encloses these detailed views. A warning icon and text are positioned to the left of the detailed views.

**Submodules**

- input
  - P parameters
    - P-0-0010.0.0: Excessive position command value
    - P-0-0011.0.0: Last valid position command value
    - P-0-0028.0.0: Oscilloscope: Control word
    - P-0-0029.0.0: Oscilloscope: Status word
  - S parameters
    - S-0-0000.0.0: S-0-0000
    - S-0-0011.0.0: Class 1 diagnostics
    - S-0-0012.0.0: Class 2 diagnostics
    - S-0-0013.0.0: Class 3 diagnostics
    - S-0-0037.0.0: Additive velocity command value
    - S-0-0040.0.0: Velocity feedback value of encoder 1
    - S-0-0041.0.0: Homing velocity
- output
  - P parameters
    - P-0-0028.0.0: Oscilloscope: Control word
    - P-0-0036.0.0: Oscilloscope: External trigger signal
    - P-0-0055.0.0: Return distance
    - P-0-0056.0.0: Return velocity
    - P-0-0057.0.0: Return acceleration
    - P-0-0059.0.0: Additive position command value, controller
    - P-0-0100.0.0: Position command value extension
    - P-0-0120.0.0: Control word easy startup
    - P-0-0142.0.0: Synchronization acceleration
  - S parameters
    - S-0-0000.0.0: S-0-0000
    - S-0-0036.0.0: Velocity command value
    - S-0-0037.0.0: Additive velocity command value
    - S-0-0038.0.0: Positive velocity limit value
    - S-0-0039.0.0: Negative velocity limit value
    - S-0-0041.0.0: Homing velocity
    - S-0-0047.0.0: Position command value
    - S-0-0052.0.0: Reference distance of encoder 1
    - S-0-0057.0.0: Position window

**Warning:** Keep in mind that there is the group of Inputs and the group of Outputs

In Device Overview we assign the communication structures.

Module	Rack	Slot	I address	Q address
axis1	0	0		
XMS interface PF30	0	0 X1		
output_1	0	output		
S-0-0134.0.0: Master control word	0	output 1		50...51
S-0-0346.0.0: Positioning control word	0	output 2		52...53
S-0-0282.0.0: Positioning command value	0	output 3		54...57
S-0-0259.0.0: Positioning velocity	0	output 4		58...61
S-0-0260.0.0: Positioning acceleration	0	output 5		62...65
S-0-0359.0.0: Positioning deceleration	0	output 6		66...69
S-0-0145.0.0: Signal control word	0	output 7		70...71
S-0-0000.0.0: S-0-0000	0	output 8		72...73
	0	1 10		
	0	1 11		
	0	1 12		
	0	1 13		
	0	1 14		
	0	1 15		
input_1	0	input		
S-0-0135.0.0: Drive status word	0	input 1	50...51	
S-0-0051.0.0: Position feedback value of encoder 1	0	input 2	52...55	
S-0-0040.0.0: Velocity feedback value of encoder 1	0	input 3	56...59	
S-0-0084.0.0: Torque/force feedback value	0	input 4	60...61	
S-0-0390.0.0: Diagnostic message number	0	input 5	62...65	
S-0-0144.0.0: Signal status word	0	input 6	66...67	
S-0-0000.0.0: S-0-0000	0	input 7	68...69	
S-0-0000.0.0: S-0-0000_1	0	input 8	70...71	
S-0-0000.0.0: S-0-0000_2	0	input 9	72...73	
	0	2 10		
	0	2 11		
	0	2 12		
	0	2 13		
	0	2 14		
	0	2 15		
	0	safety output		
	0	safety input		

These structures must correspond to those assigned in the ctrlXDrive configuration

Offset	IDN	+	x
0	S-0-0134 : Master control word	+	x
2	S-0-0346 : Positioning control word	+	x
4	S-0-0282 : Positioning command value	+	x
8	S-0-0259 : Positioning velocity	+	x
12	S-0-0260 : Positioning acceleration	+	x
16	S-0-0359 : Positioning deceleration	+	x
20	S-0-0145 : Signal control word	+	x
22	S-0-0000 : < empty >	+	x

Offset	IDN	+	x
0	S-0-0135 : Drive status word	+	x
2	S-0-0051 : Position feedback value of encoder 1	+	x
6	S-0-0040 : Velocity feedback value of encoder 1	+	x
10	S-0-0084 : Torque/force feedback value	+	x
12	S-0-0390 : Diagnostic message number	+	x
16	S-0-0144 : Signal status word	+	x
18	S-0-0000 : < empty >	+	x
20	S-0-0000 : < empty >	+	x
22	S-0-0000 : < empty >	+	x

Unlike in the case of XM, shown above, the I/O structures do not generate any type of offset, as can be seen in the I and Q assignments of the communication

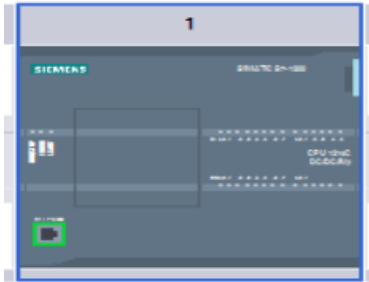


## IP assignment of the Siemens CPU (in the example)

Device view

The screenshot shows the project tree in TIA Portal. The 'General' tab is selected. Under 'PROFINET interface', the 'General' sub-tab is active, and 'Ethernet addresses' is highlighted with a red dashed box. Other visible options include 'Advanced options', 'Interface options', 'Real time settings', 'Port [X1 P1]', 'Time synchronization', 'DI 14/DQ 10', 'AI 2', 'High speed counters (HSC)', 'Pulse generators (PTO/PWM)', 'Startup', 'Cycle', 'Communication load', 'System and clock memory', 'Web server', 'Time of day', 'Protection', 'Connection resources', and 'Overview of addresses'.

PLC\_1

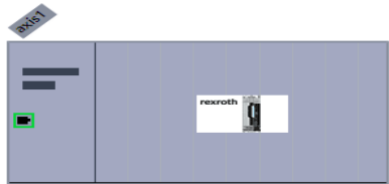


The 'Ethernet addresses' configuration dialog is shown. The 'Interface networked with' dropdown is set to 'PN/IE\_1'. Under 'IP protocol', the radio button 'Set IP address in the project' is selected and highlighted with a red dashed box. The 'IP address' field contains '192.168.0.1' and the 'Subnet mask' field contains '255.255.255.0', both also highlighted with a red dashed box. The 'PROFINET' section has 'Generate PROFINET device name automatically' checked. The 'PROFINET device name' is 'plc\_1', the 'Converted name' is 'plcxb1d0ed', and the 'Device number' is '0'.



IP assignment for the axis of type ctrlDrive XMS

Device view



axis1 [ctrlX DRIVE XMS]

- General
- IO tags
- Sys
- General
  - Catalog information
  - PROFINET interface [X1]
    - General
    - Ethernet addresses**
    - Advanced options
  - Identification & Maintenance
  - Shared Device

Ethernet addresses

Interface networked with

Subnet: PN/IE\_1

Add new subnet

IP protocol

Set IP address in the project

IP address: 192 . 168 . 0 . 2

Subnet mask: 255 . 255 . 255 . 0

Synchronize router settings with IO controller

Use router

Router address: 0 . 0 . 0 . 0

IP address is set directly at the device

PROFINET

Generate PROFINET device name automatically

PROFINET device name: axis1

Converted name: axis1

Device number: 1



*The assignment of the IP number in the ctrlXDrive is done automatically from the Tia Portal itself*

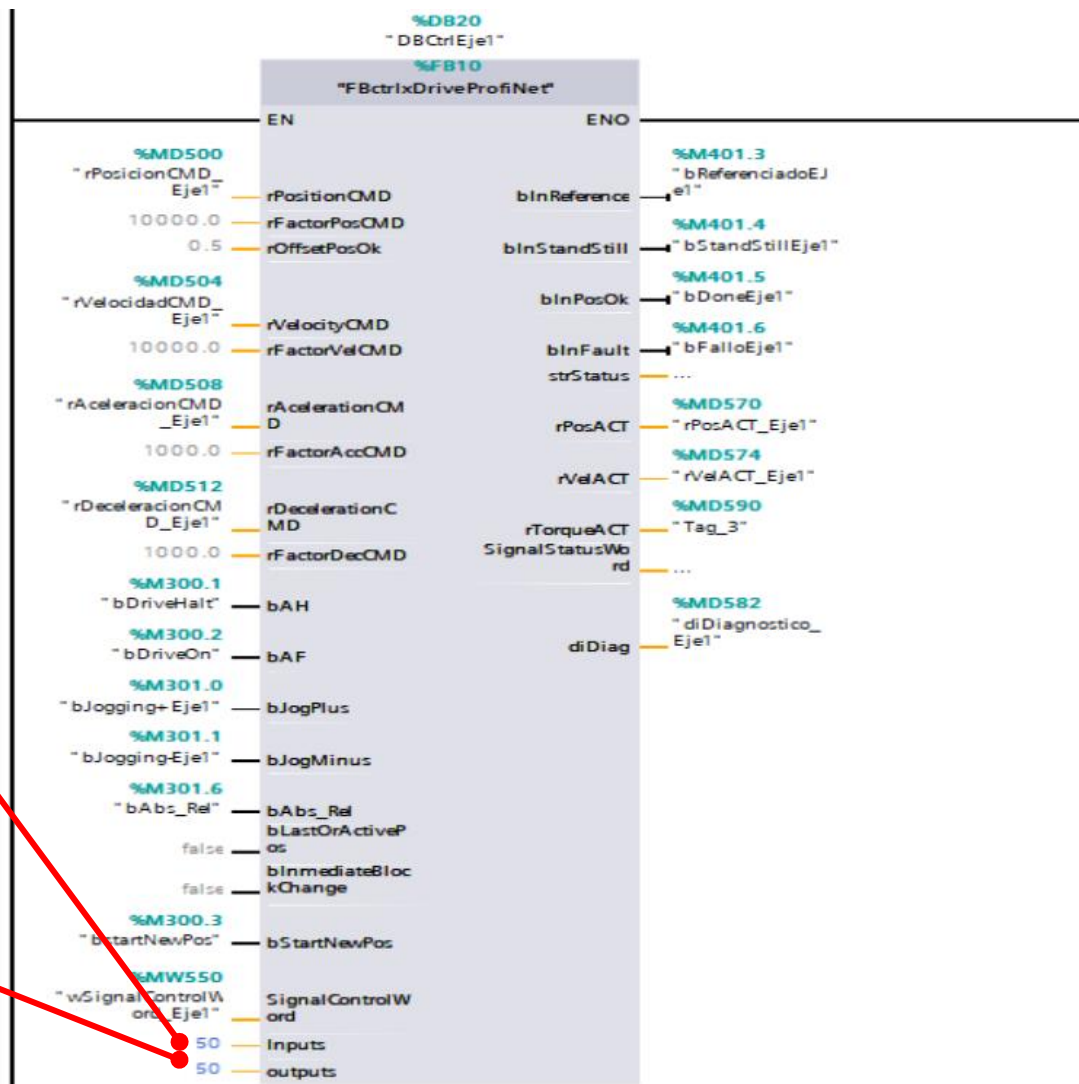
FB module for the control and status of ctrlXDrive in "Drive-Controller Positioning" mode



Similarly to what happened in the control module used with Indracontrol XM, in this part we also use the initial area of the IO structures to extract the various parameters that are part of the communication. This simplifies the programming of the module.

input_1	
S-0-0135.0.0: Drive status word	50...51
S-0-0051.0.0: Position feedback value of encoder 1	52...55
S-0-0040.0.0: Velocity feedback value of encoder 1	56...59
S-0-0084.0.0: Torque/force feedback value	60...61
S-0-0390.0.0: Diagnostic message number	62...65
S-0-0144.0.0: Signal status word	66...67
S-0-0000.0.0: S-0-0000	68...69
S-0-0000.0.0: S-0-0000_1	70...71
S-0-0000.0.0: S-0-0000_2	72...73

output_1	
S-0-0134.0.0: Master control word	50...51
S-0-0346.0.0: Positioning control word	52...53
S-0-0282.0.0: Positioning command value	54...57
S-0-0259.0.0: Positioning velocity	58...61
S-0-0260.0.0: Positioning acceleration	62...65
S-0-0359.0.0: Positioning deceleration	66...69
S-0-0145.0.0: Signal control word	70...71
S-0-0000.0.0: S-0-0000	72...73

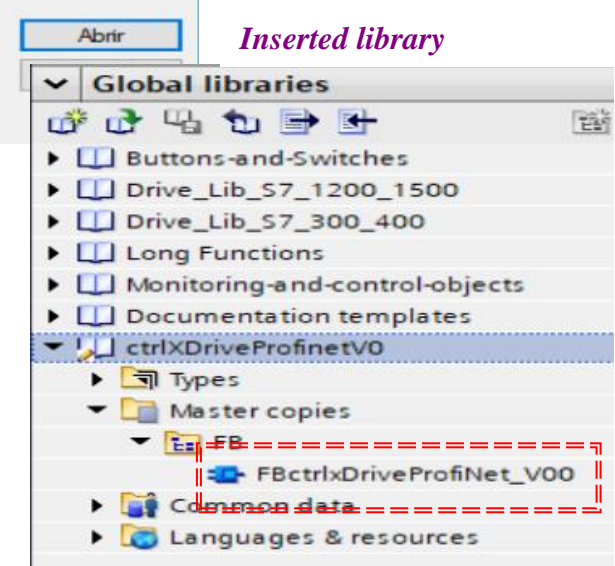
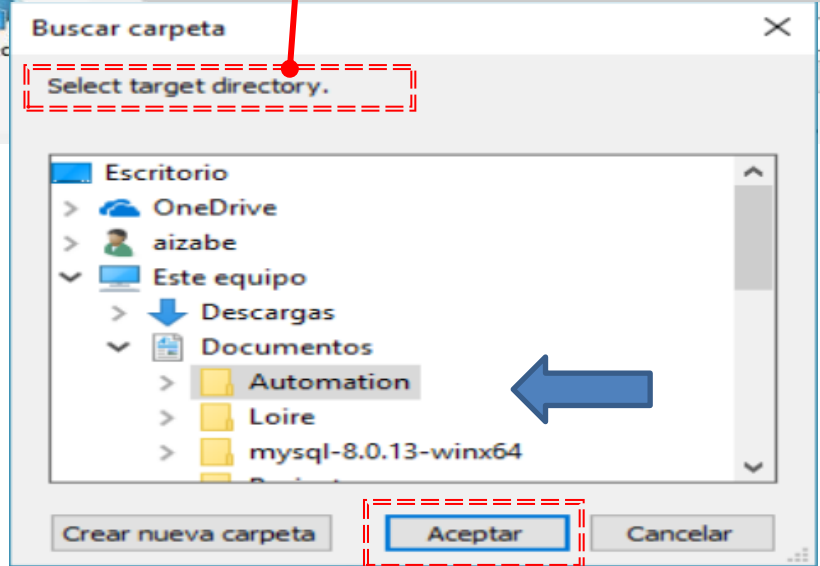
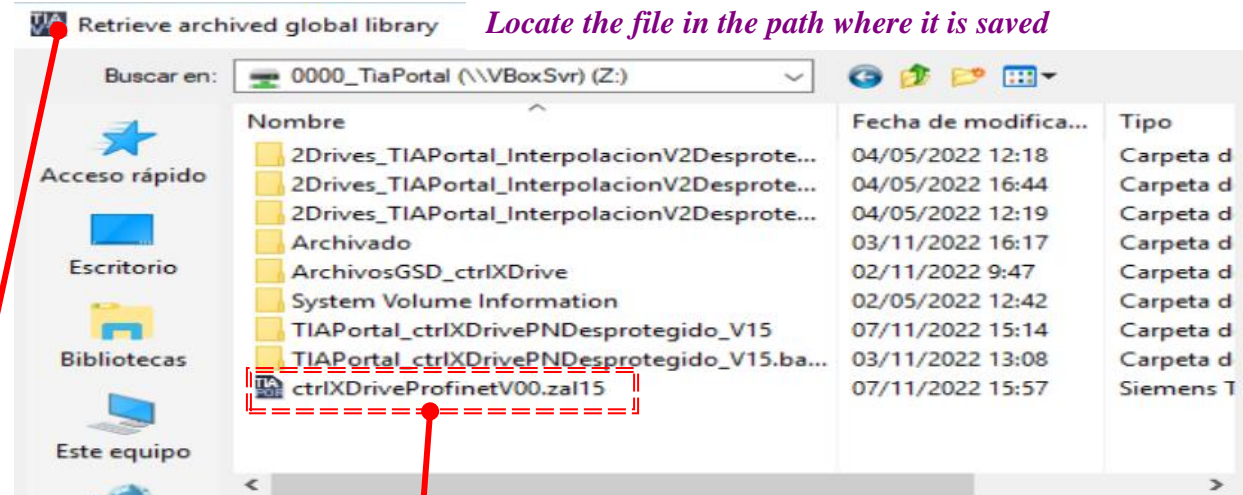
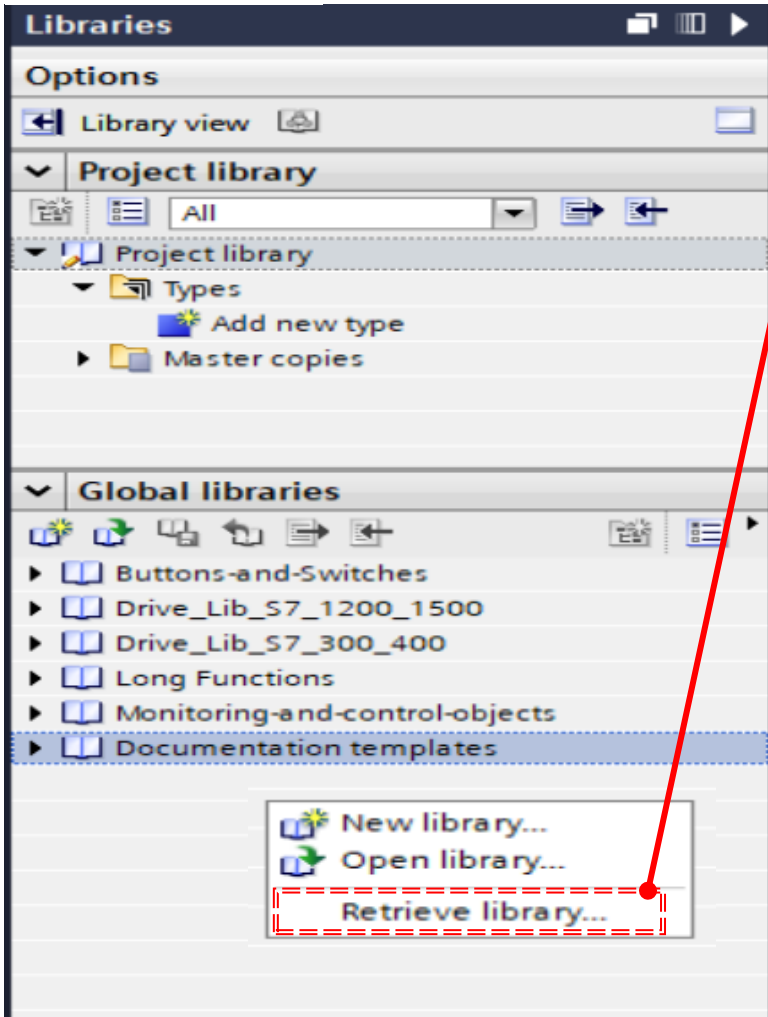


The first version of the control FB is in the generated library

ctrlXDriveProfinetV00.zal15

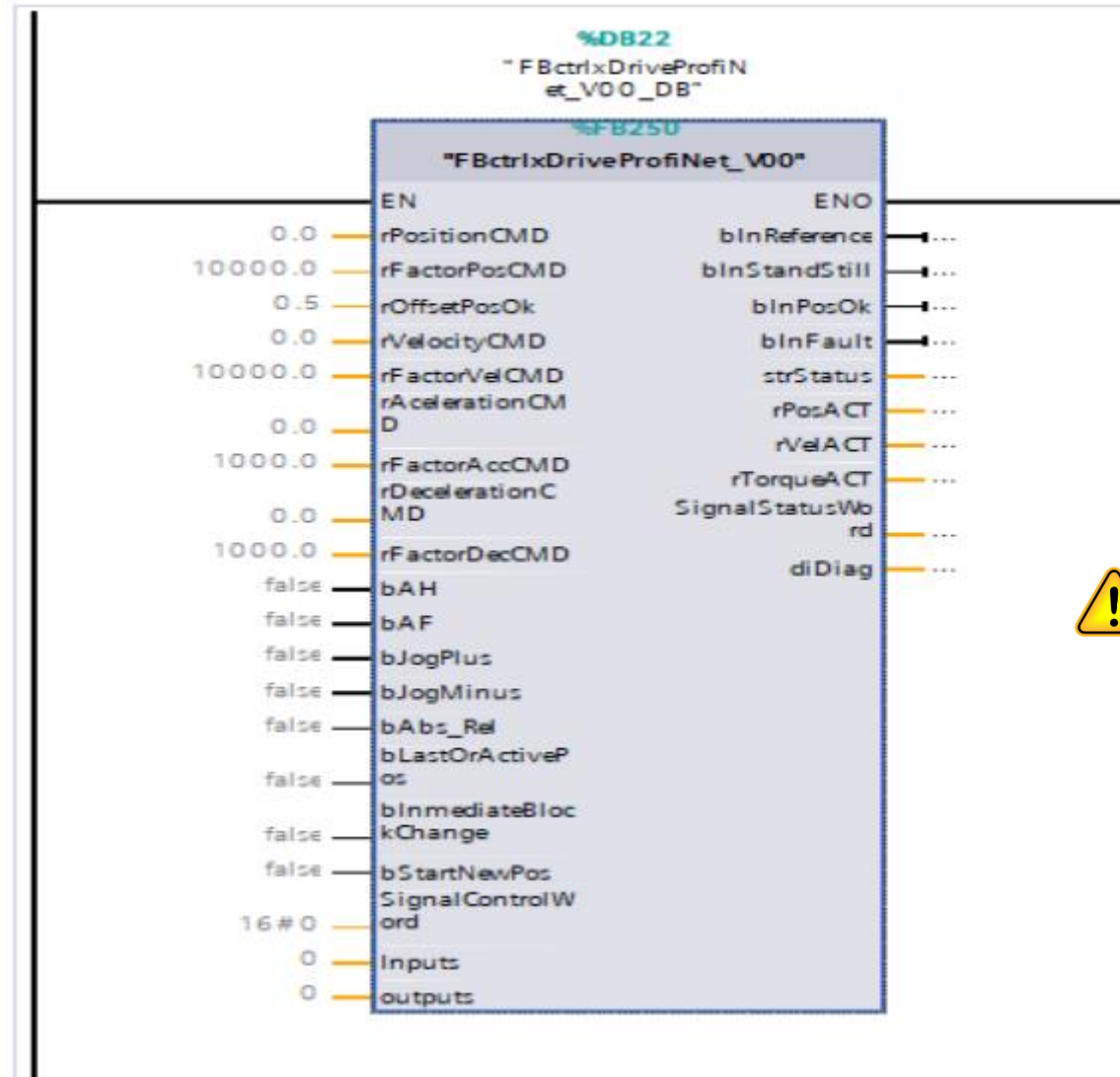
## Install Library

Locate the file in the path where it is saved



Inserted library

Library inserted in the project



*The library containing this fb is generated with version 15 of TIA Portal*



# Thanks for your attention

