Application Note

FESTO

Implementation manual Festo IO-Link devices into the Siemens TIA portal

The main objective of this documentation is to show the implementation of Festo IO-Link devices into the Siemens TIA portal (Totally Integrated Automation). It displays the implementation based on three examples.

CMMO-ST-C5-1-LKP; ERMO-25; VPPM; CPV-10

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1 Components/Software used

Type/Name	Description
S7-1200	Siemens PLC
ET200SP	Siemens distributed IO module
CM 4xIO-Link	Siemens IO-Link master
PM1207	Power supply unit for the PLC and IO modules
CPV-10	Festo valve manifold with 8 valves
VPPM	Festo pressure regulator
CMMO-ST-C5-1-LKP	Festo motor controller
ERMO-25	Festo rotary drive with stepper motor

Tab. 1 Components/Software used

1.1 Objective of this manual

The main objective of this documentation is to show the implementation of Festo IO-Link devices into the Siemens TIA portal (Totally Integrated Automation). It displays the implementation based on three examples.

The manual is only a reference and not a directive of how to implement IO-Link devices. It also doesn't provide a programming guide for the Siemens programming environment. It's intended exclusively for technicians trained in control and automation technology, who have experience in installing, commis- sioning, programming and diagnosing systems and the relevant fieldbuses.

1.2 List of abbreviations and terms

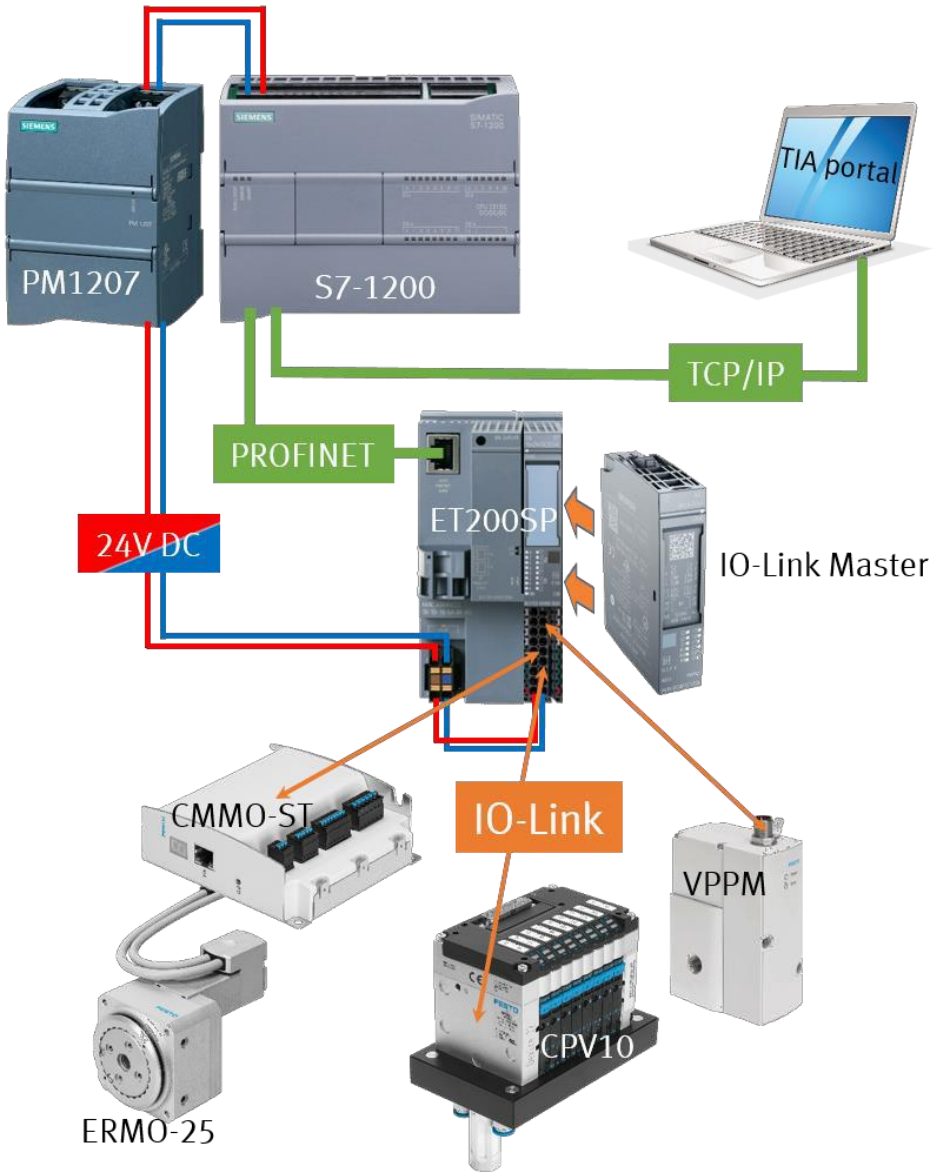
The following hardware is used

Abbr. and terms	Definition
TIA	Totally Integrated Automation, programming environment of Siemens
PLC	Programmable Logic Controller
FCT	Festo Configuration Tool
FFT	Festo Field Device Tool
Actuator	Product providing a motion or action
CPV	Product name of a Festo valve manifold
VPPM	Product name of a Festo pressure regulator
Drive	Controls an actuator
ERMO	Product name of the rotary actuator with an stepper drive
CMMO	Product name of the stepper motor drive
PC	Means a desktop PC or a laptop
Abbr. and terms	Definition
TIA	Totally Integrated Automation, programming environment of Siemens
PLC	Programmable Logic Controller
FCT	Festo Configuration Tool
FFT	Festo Field Device Tool
Actuator	Product providing a motion or action
CPV	Product name of a Festo valve manifold
VPPM	Product name of a Festo pressure regulator
Drive	Controls an actuator
ERMO	Product name of the rotary actuator with an stepper drive

Tab. 2 Used hardware

The Festo product portfolio provides a lot of IO-Link capable devices. Listed products are used to cover different difficulties of implementation.

2 Hardware Setup



2.1 Siemens components

The S7-1200 PLC is wired to the Siemens power supply unit. The ET200SP is mounted together with the power supply and PLC onto a DIN rail and connected to the power supply unit. The communication between the PLC and the ET200SP is realized with Profinet. Therefore an Ethernet cable (RJ45 connectors) is plugged into port X1P2 at the PLC and port P1R at the ET200SP. The PLC (port X1P1) is connected via Ethernet cable to the PC. At last the IO-Link master is plugged into the ET200SP at slot 1 and terminated with the server module in slot 2. All connections have to be checked before supplying power to the system.

2.2 Festo components

A Festo NEBU-M12G5-K cable is used to connect the CPV valve manifold to the IO-Link master.
The VPPM pressure regulator is connected with the same cable. Fig. 2 shows the pin assignment of the cable and the components. The CMMO can be connected via a pre-configured cable or single wires (see 5. 2. 1, only 3 wires will be used for this type of connection).

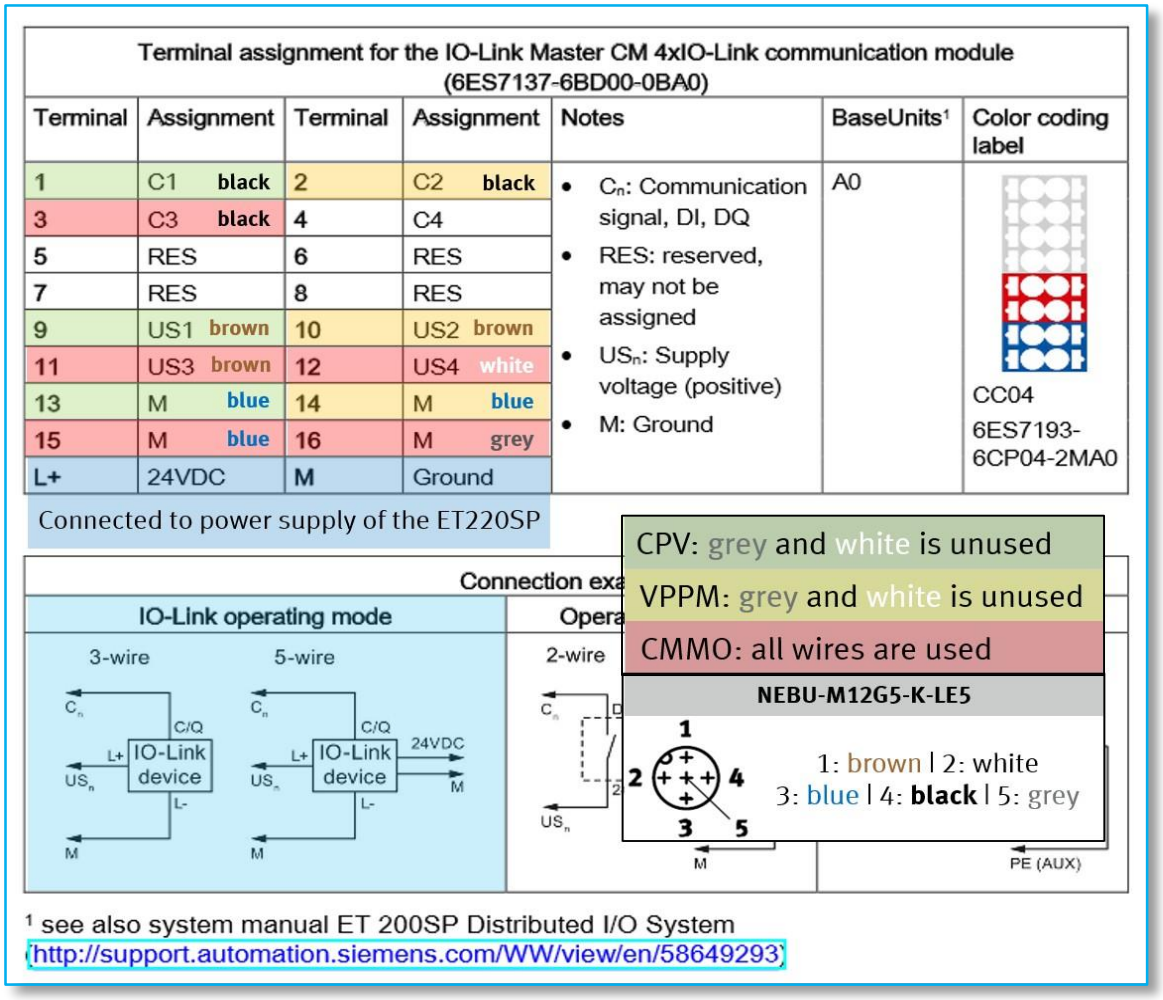


Fig.2 Pin assignment Siemens IO-Link master[1]

The clamps at the IO-Link master come with cage clamp technology so no ferrules are required

[1] Source: https://cache.industry.siemens.com/dl/files/527/67328527/att_830880/v1/et200sp_io_link_master_manual_en-US_en-US.pdf

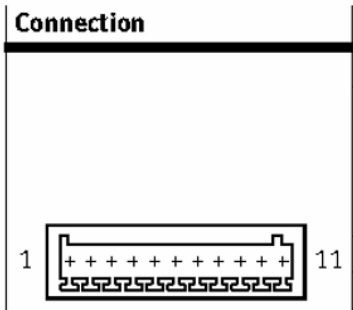
2.2.1 Connecting the CMMO

The following pictures are taken from the brief description of the CMMO-ST-C5-1-LKP.

5.2 [X1] IO-Link/I-port control interface and digital inputs/outputs

Note

The IO-Link/ I-Port interface is not electrically isolated. Under certain circumstances, the CMMO-ST can override the electrical isolation of an IO-Link master.



Connection	Pin	Function	
	Digital I/O modules (DIN/DOUT)		
	1	+24 V (OUT)	Output +24 V e.g. power supply to a potential-free relay contact for the ENABLE input. **Not overload-proof! Max. 100 mA permissible.**
	2	0 V (GND)	Reference potential for output signals
	3	DOUT2	Output 2, parameterisable
	4	DOUT1	Output 1, parameterisable
	5	Ready	Output "Ready for Operation"
	6	ENABLE	Input "controller enable"[1]
	7	–	no function, not connected internally[2]
	8	–	
	IO-Link/I-Port		
	9	L–	0 Volt (GND) → M Terminal 15
	10	C/Q	IO-Link/I-Port signal → C3 Terminal 3
	11	L+	24V on the IO-Link/I-Port ICs (not connected to the logic power supply to X9) → US3 Terminal 11

Referring to Fig. 2

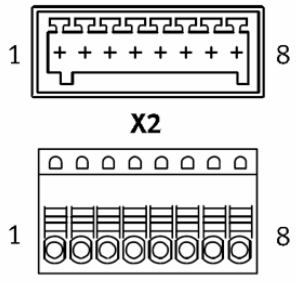
1) The required signals for controller enable are parameterisable

2) Pins 7 and 8 can be used for the 4th and 5th cores on the I-Port/IO-Link cable.

Fig. 7 Connection of [X1] control interface with plug (NEKM-C-14)

Fig. 3 Connection of X1

5.4 [X2] Encoder

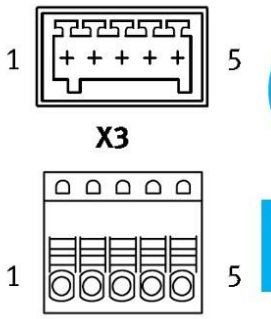


Connection	Pin		Function	
	1	A [1]	Incremental encoder signal A+	1. white
	2	A/ [1]	Incremental encoder signal A–	2. brown
	3	B [1]	Incremental encoder signal B+	3. green
	4	B/ [1]	Incremental encoder signal B–	4. yellow
	5	N [1]	Incremental encoder signal zero pulse N+	5. pink
	6	N/ [1]	Incremental encoder signal zero pulse N-	6. blue
	7	5 V (± 10 %)	Supply of the encoder. **Not overload-proof! Max. 100 mA permissible.**	7. red
	8	0 V	Reference potential	8. grey

1) At each pin: 5 V and Ri = approx. 120 Ω

Fig. 9 Connection [X2] encoder with plug (NEKM-C-14)

Fig. 4 Connection of X2

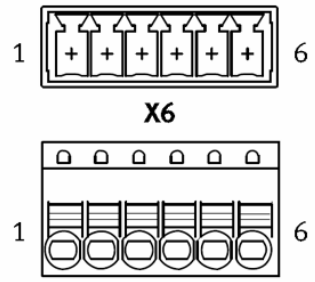
Connection	Pin	Function	
	1	+24 V LOGIC OUT	Logic voltage output [X9] **Not overload-proof! Max. 100 mA permissible.**
	2	STO1	Control port for STO function: Channel 1
	3	STO2	Control port for STO function: Channel 2
	4	DIAG1	The acknowledgment contact is closed (low …hen the STO function is

The connectors 1,2 and 3 have to be bridged

Fig. 10 Connection [X3] STO with plug (NEKM-C-14)

Fig. 5 Connection of X3

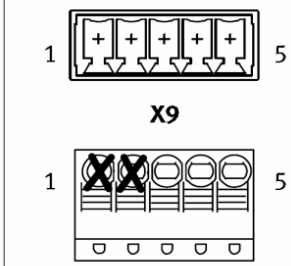
5.6 [X6] Motor

Connection	Pin	Function	
	1	String A	Connection of the two motor strings
	2	String A/	
	3	String B	
	4	String B/	
	5	BR+	Connection of the holding brake
	6	BR–	Short-circuit- and overload-proof. 24 V, max. 1.4 A ➔ 33 W. BR– = GND, BR+ is switched (24 V load)

1. white
2. brown
3. green
4. yellow
5. grey
6. pink

Fig. 11 Connection [X6] motor with plug (NEKM-C-14)

Fig. 6 Connection of X6

Connection	Pin	Function
	1	Do not connect!
	2	Do not connect!
	3	Supply of the control electronics (logic supply)
	4	Reference potential (0 V) for operating voltage, logic voltage, STO and controller interface
	5	Supply of the power output stage and the motor (load voltage)

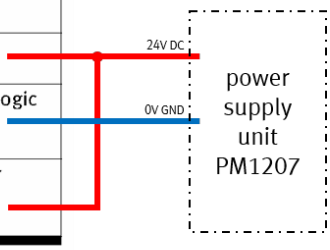


Fig. 12 Connection [X9] with plug (NEKM-C-14)

Fig. 7 Connection of X9

2.3 Software requirements

Because IO-Link is a newly technology, not every version of the TIA portal supports IO-Link. So it's necessary to carefully check the updates and versions. The described realization is implemented with:

- Totally Integrated Automation Portal Version 13 Service Pack 1 Update 5 (TIA V13 SP1 Upd5)
- STEP7 Professional Version 13 Service Pack 1 Update 5 (STEP7 Professional V13 SP1 Upd5)
- IO-Link support package: HSP0136ET200SP IO-Link V2.1.0
- SIMATIC S7-PCT Version 3.3 HF2
- IO-Link library: 20150327_IO_LINK_Library_V13_SP1
- IODD file CPV10: R01 since 2/8/2012 □Festo-CPV10-20111223-IODD1.0.1.xml
- IODD file VPPM: V1.1 since 6/1/2014 □Festo-VPPM-20140601-IODD1.1.xml
- IODD file CMMO-ST: V1.9 since 7/17/2015□Festo-CMMO-ST-C5-1-LKP_FHPP_and_FPC-20150717-IODD1.1.xml
- Festo FHPP library: V13.0.10 FestoMotionFHPP_V13_SP1.zal13
- Festo FCT V1.2.1
- FCT plugin for the ERMO: V1.4.1.0

Always make sure that the TIA portal as well as the STEP7 have the same version and update. Otherwise this can cause issues. The used components work with the listed versions. Newer or older versions may also work but were not tested for this manual.

2.4 Basic network configuration

It is recommended to work in a local network. Therefore assign a local IP address to the PC/laptop. To assign a local IP address, open the Windows control panel. Navigate to the Network and Sharing Center. If the current IP address of the used PC is assigned to a public network, an unidentified network will be shown in the Network and Sharing Center. The Local Area Connection has to be accessed and the prop- erties must be opened. Afterwards, the Internet Protocol Version 4 (TCP/IPv4) has to be selected and the properties must be opened again. A window will open where the IP-address can be changed. Now, the checkbox called 'Use the following IP address' has to be selected. This makes the fields below available. Furthermore, a local IP address (Class C address) has to be entered. Some basic information about IP addresses and TCP/IP can be found here.

A not existing IP address has to be entered into the field IP address. All clients in the network have to have the same first three blocks in the address. Only the last block needs to be unique in the network. All addresses between 192.168.0.1 and 192.168.0.254 are possible, 192.168.0.255 is exempt from use (it's called the broadcast address to reach all clients in the network). Finally, with a click into the subnet mask field, the subnet mask will be entered automatically (255.255.255.0). The correct properties can be checked by open a command prompt (□□+ R, type in 'cmd' and press enter). With the command 'ping' and the IP address of a device, a ping will be sent to the device. If the Ethernet connection was setup correctly, a response will appear in the command window. Otherwise, a timeout message will be shown. The IP address of the PLC will be assigned later, this happens with the TIA portal during the device con- figuration.

3 TIA Portal configuration

The TIA portal from Siemens provides a programming and configuring environment. PLC programs can be created, networks and devices can be configured and Human Machine Interfaces can be implemented. It is a very complex and versatile tool and it needs some time to get familiar with it. The following config- uration and program examples are realized with Organization blocks (OB), Function blocks (FB), Func- tions (FC) and Data blocks (DB). The used languages are FBD (Function block diagram) for the OB and SCL (Structured Control Language) for all FBs.,

3.1 Initializing TIA portal

The first step will be to run the Siemens Automation License Manager to organize the software licenses. The Automation License Manager will be installed during the TIA portal installation. Activate your TIA license and run the TIA portal. Please make sure the right versions and updates are installed (please refer to chapter 5. 3). After the start of the TIA portal a new project has to be created.

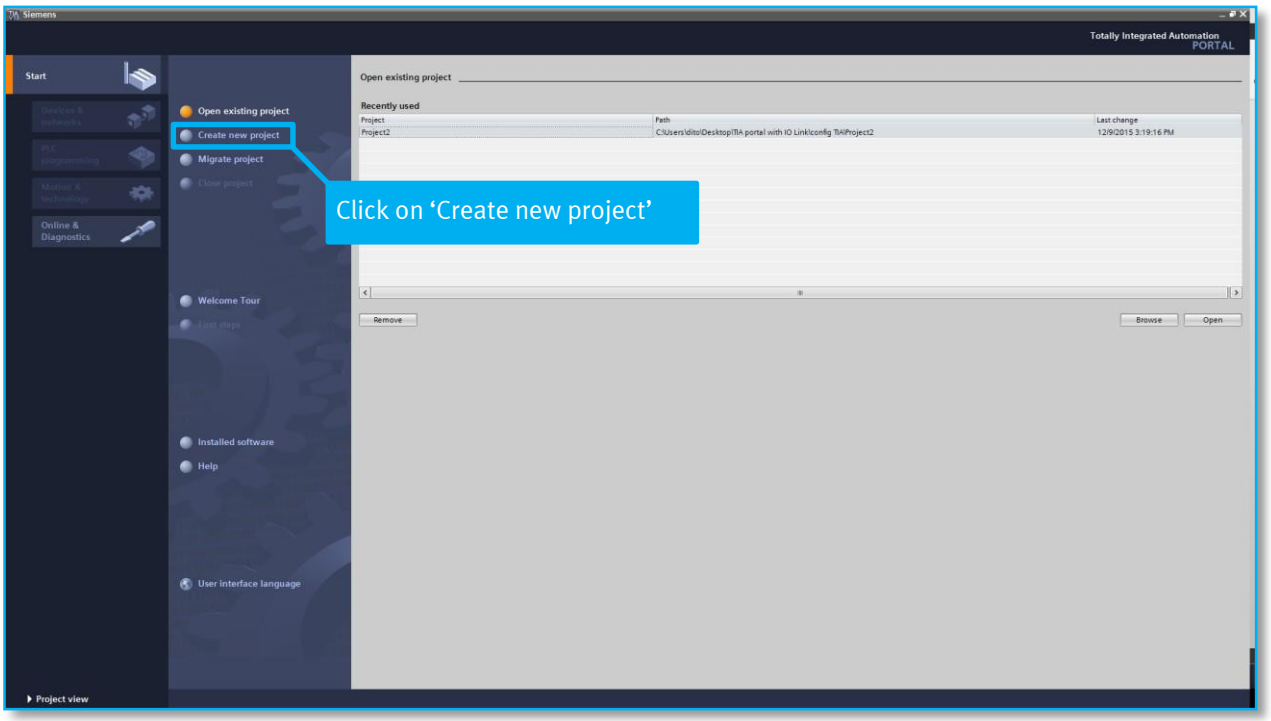


Fig. 8 TIA portal view

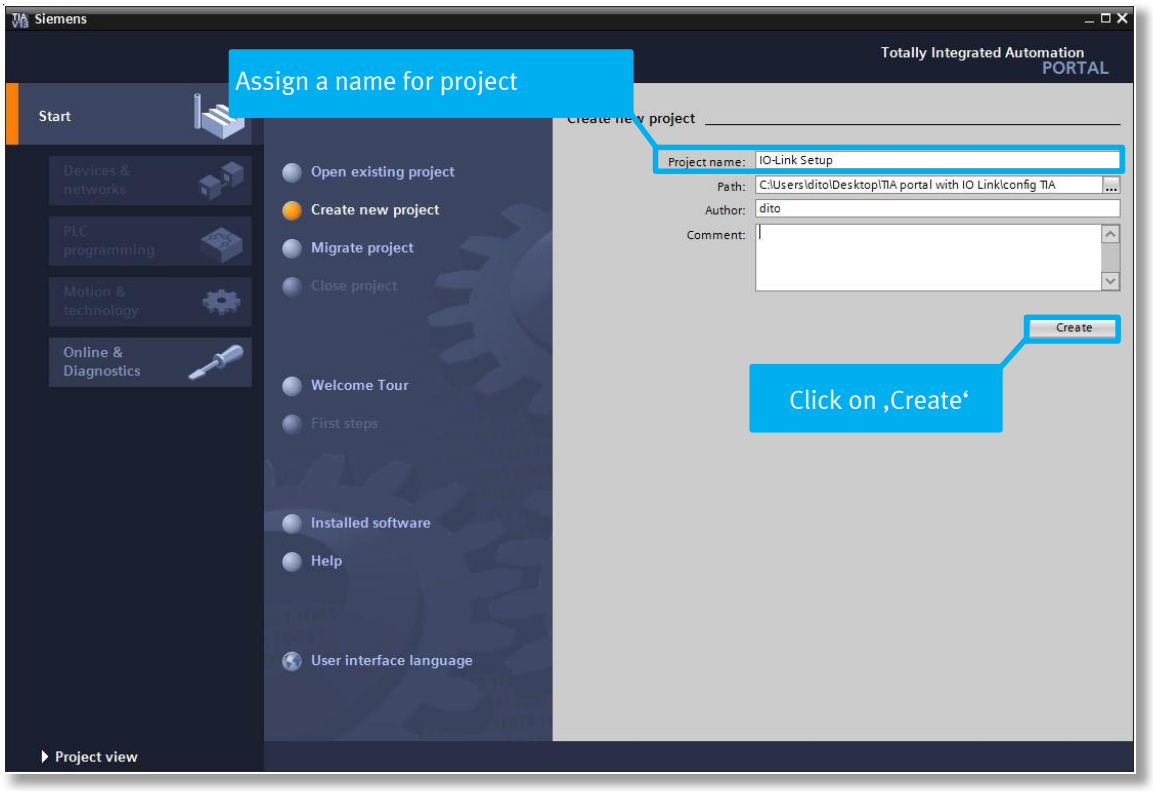


Fig. 9 Project name assignment

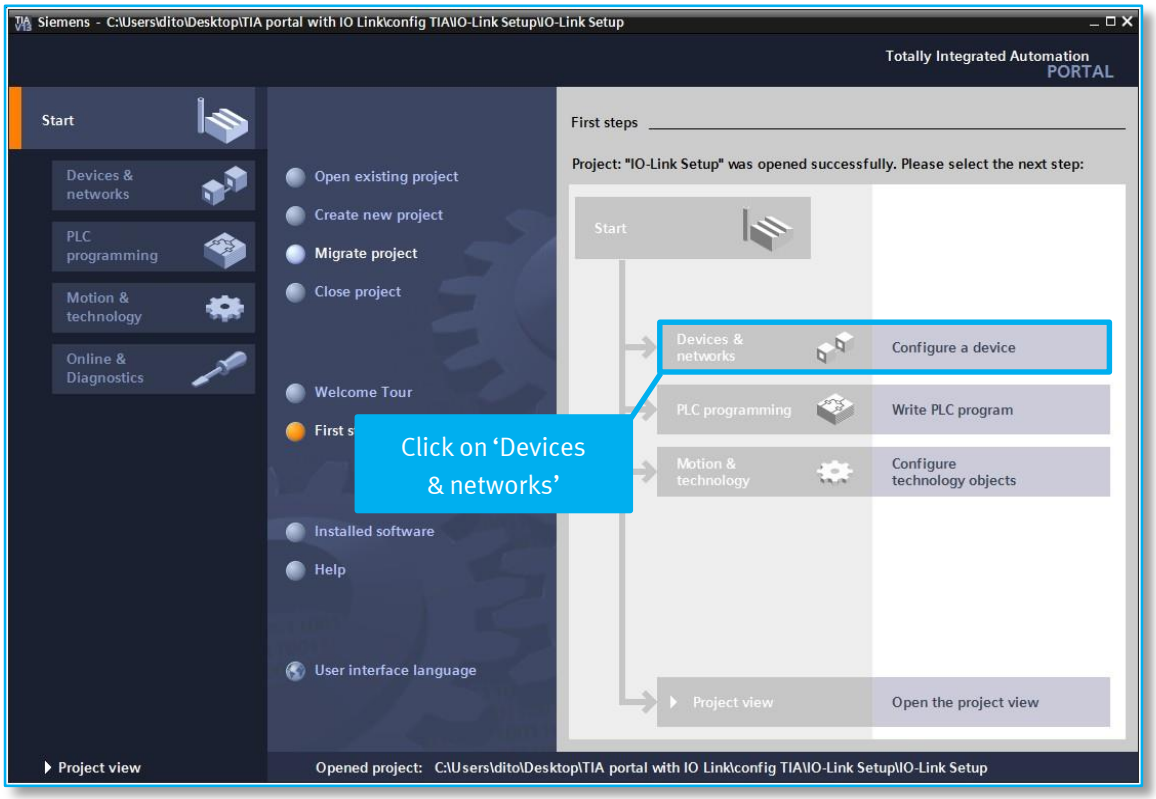


Fig. 10 First steps

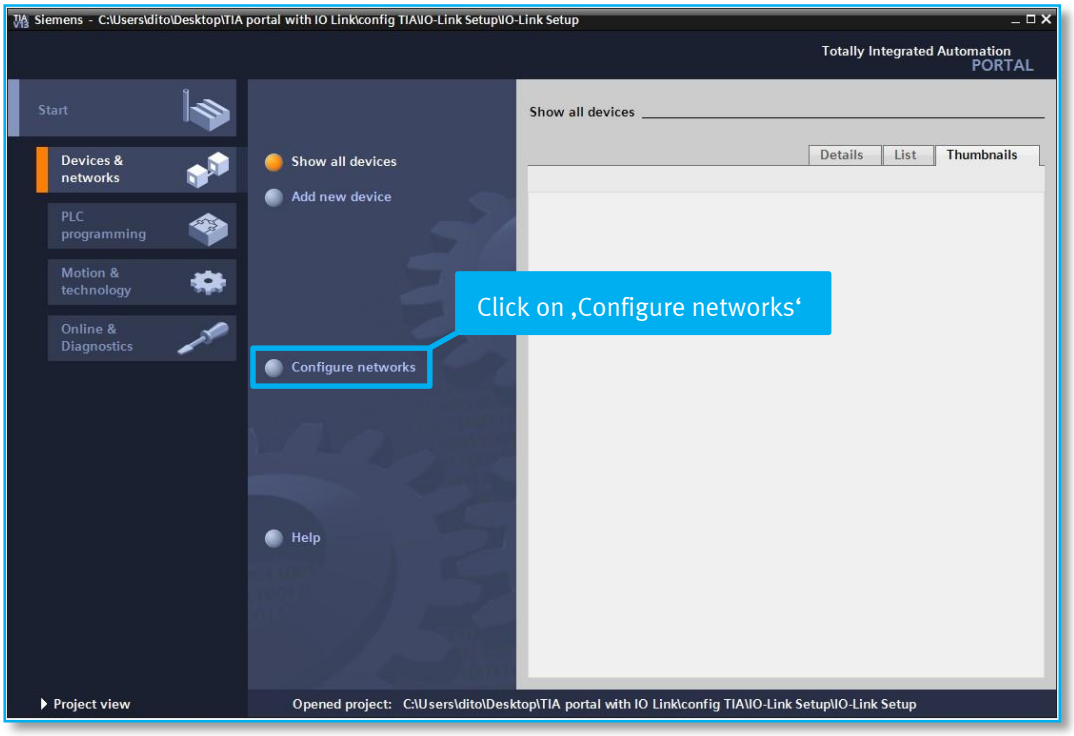


Fig. 11 Device overview

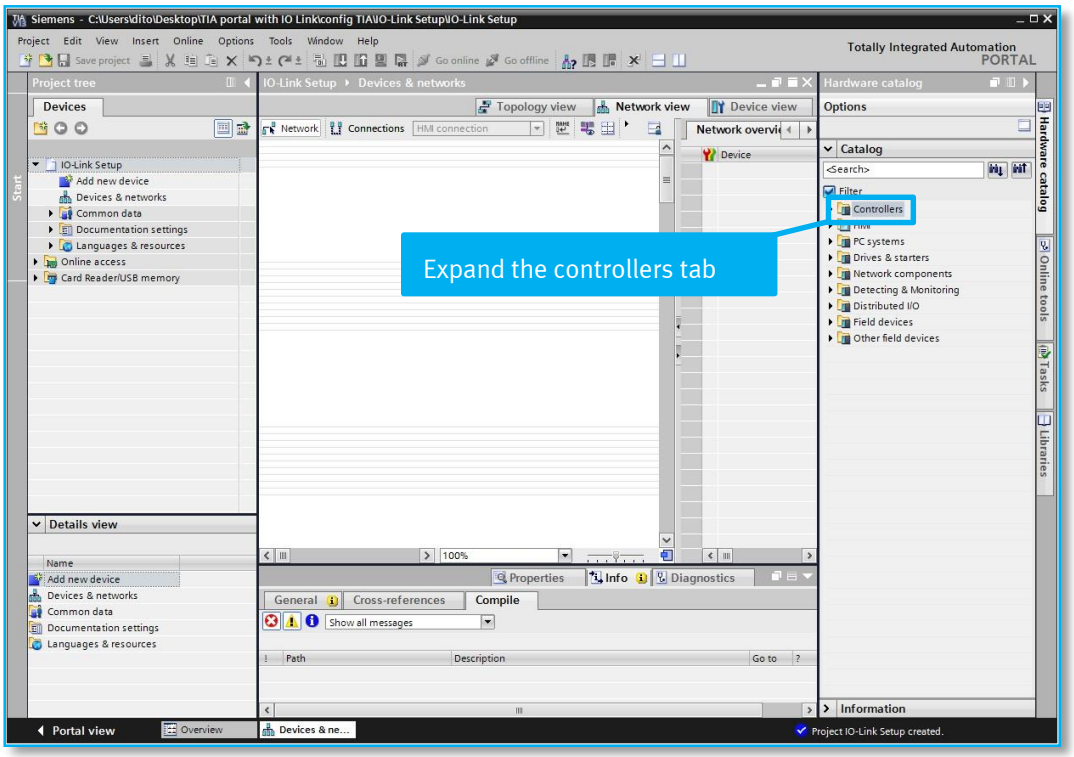


Fig. 12 Network view

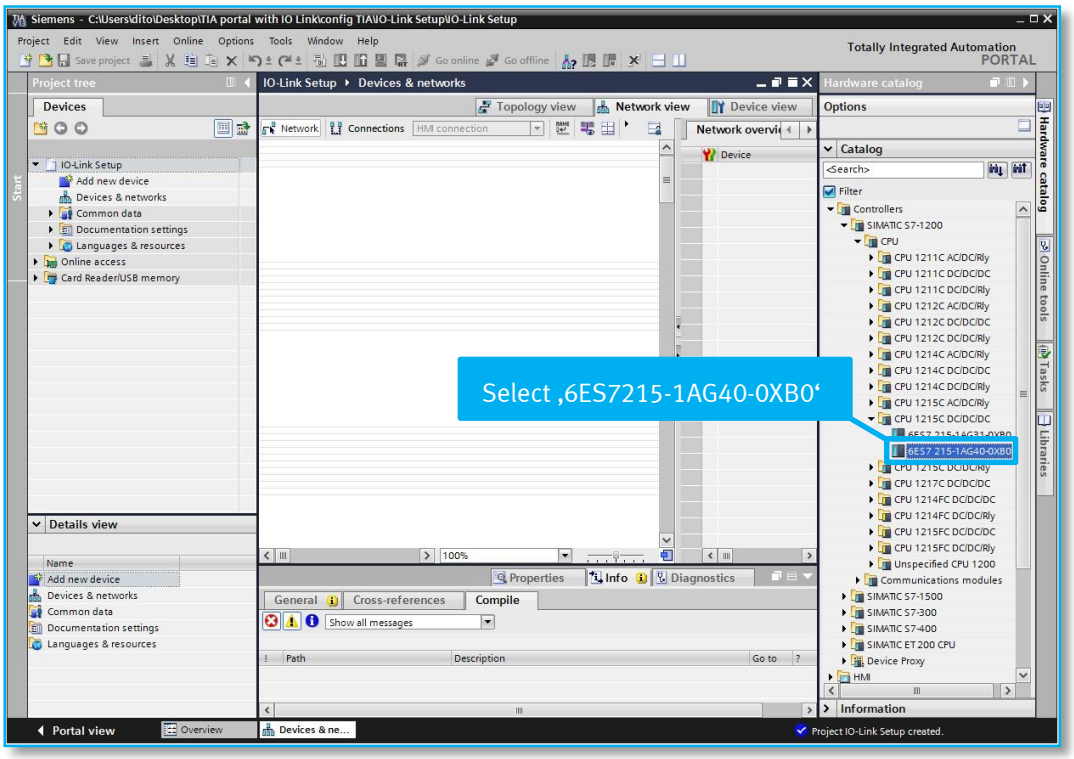


Fig. 13 Selection of the PLC

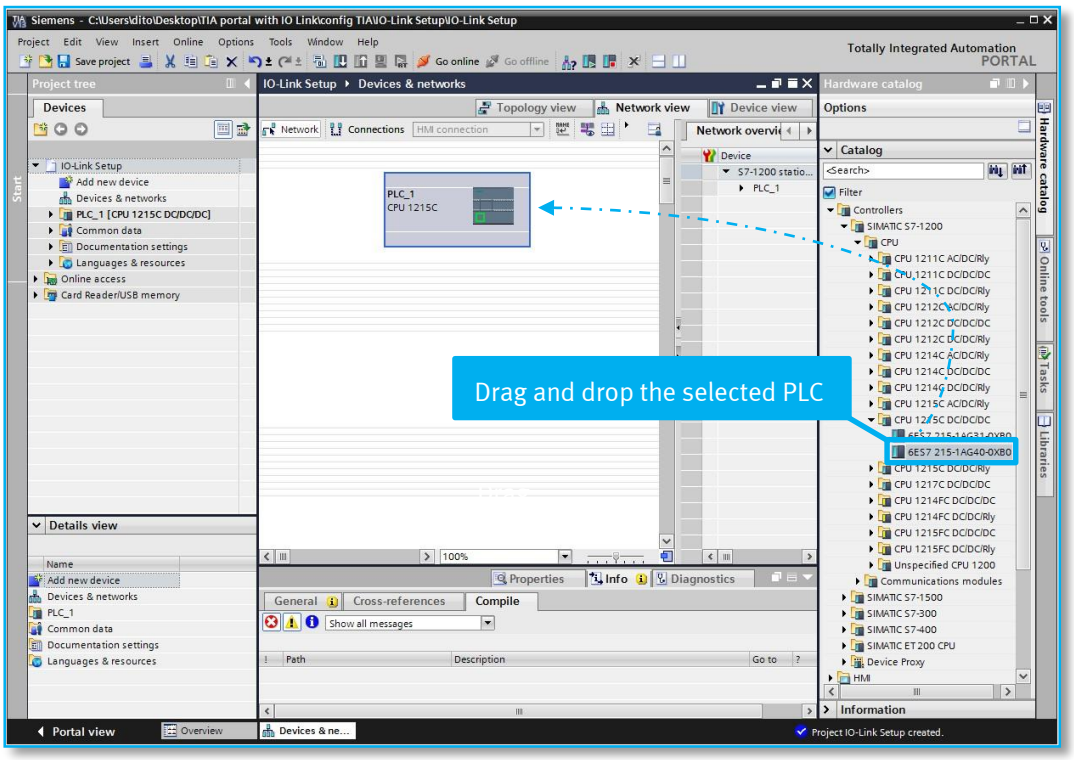


Fig. 14 Insert the PLC

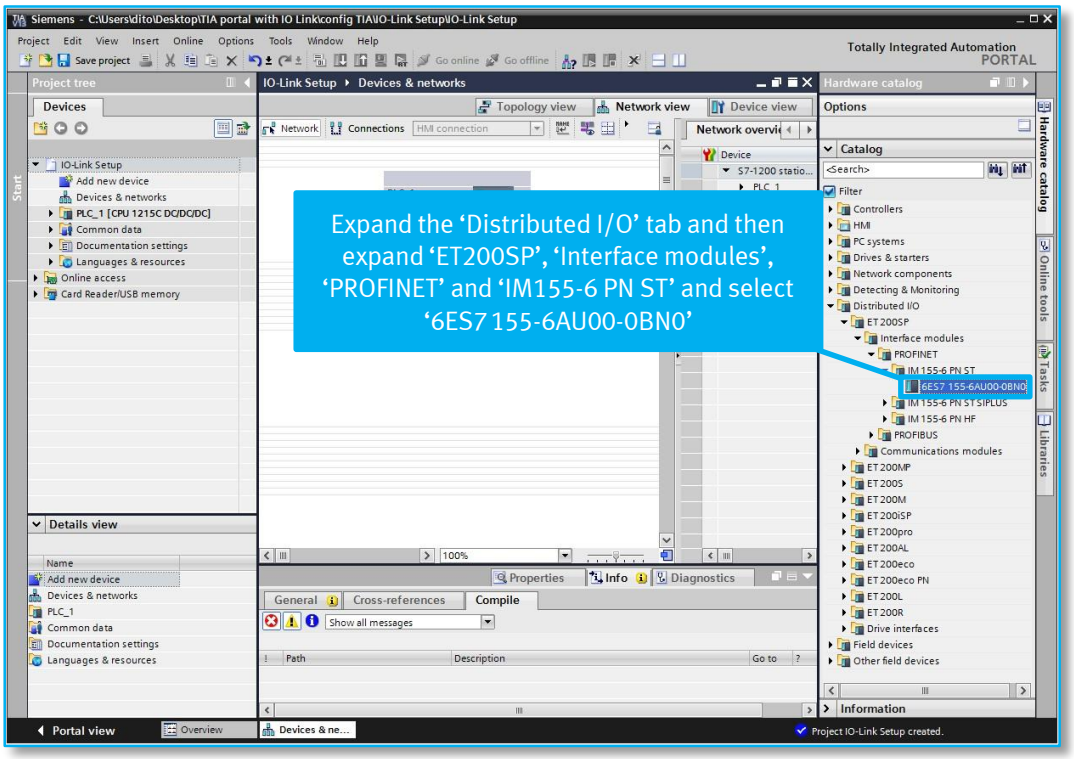


Fig. 15 Distributed I/O selection

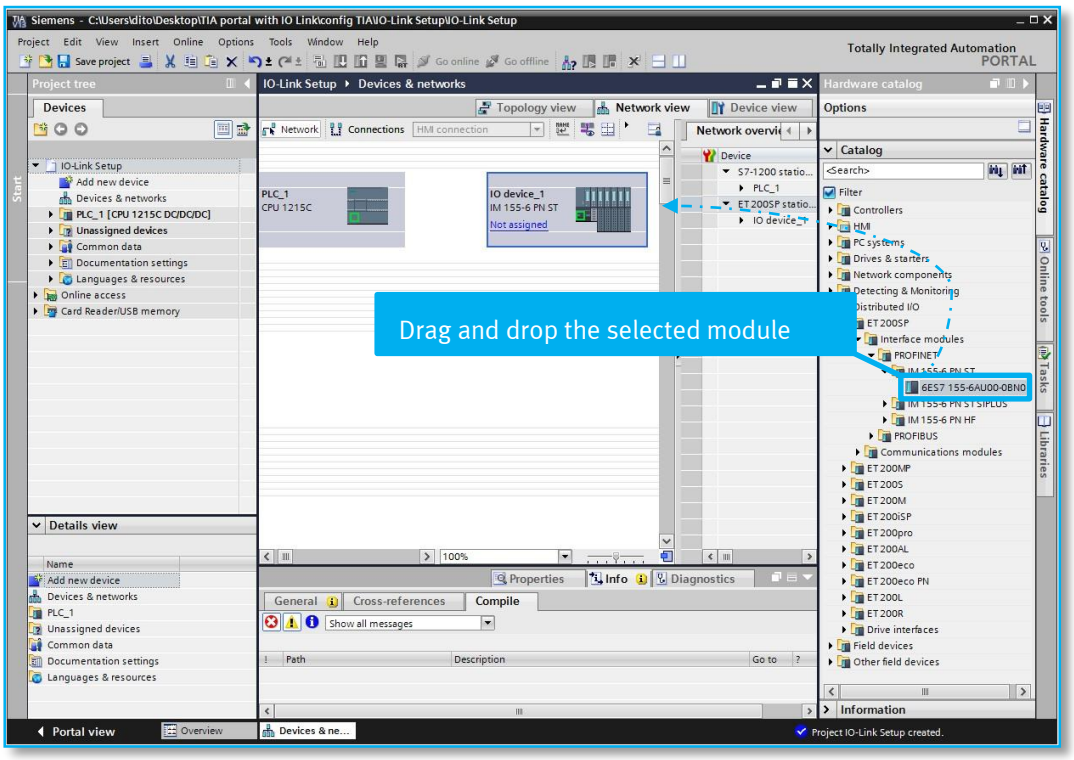


Fig. 16 Insert the distributed I/O terminal

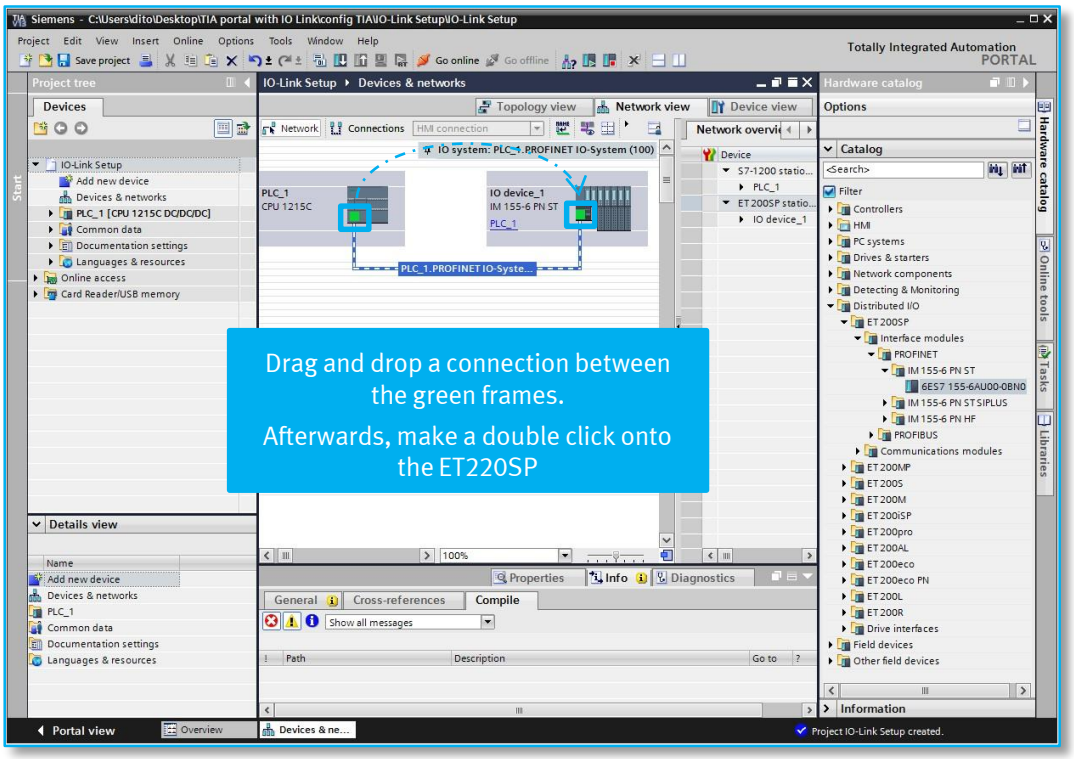


Fig. 17 PROFINET connection

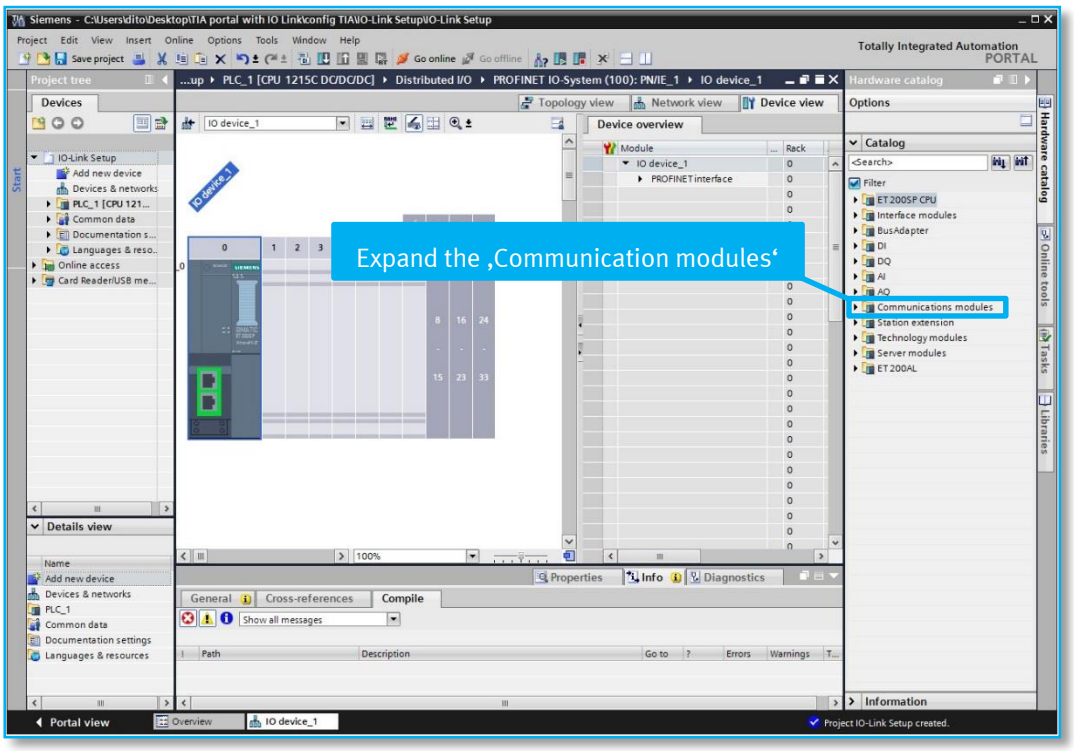


Fig. 18 Device configuration ET200SP

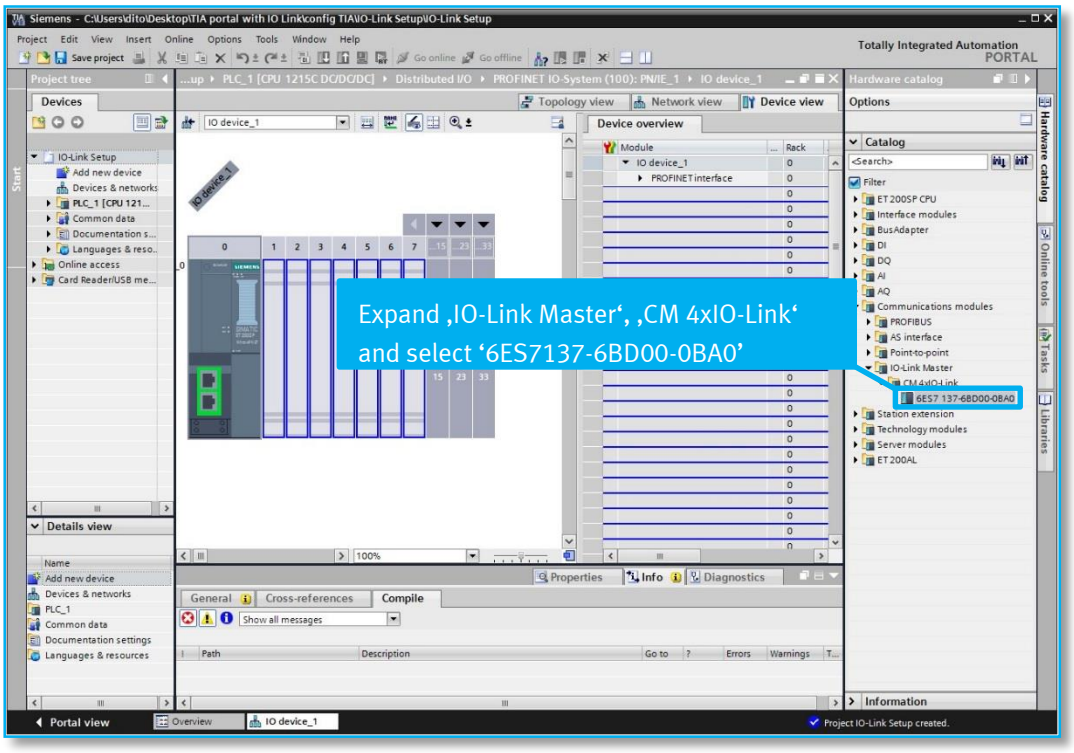


Fig. 19 IO-Link Master selection

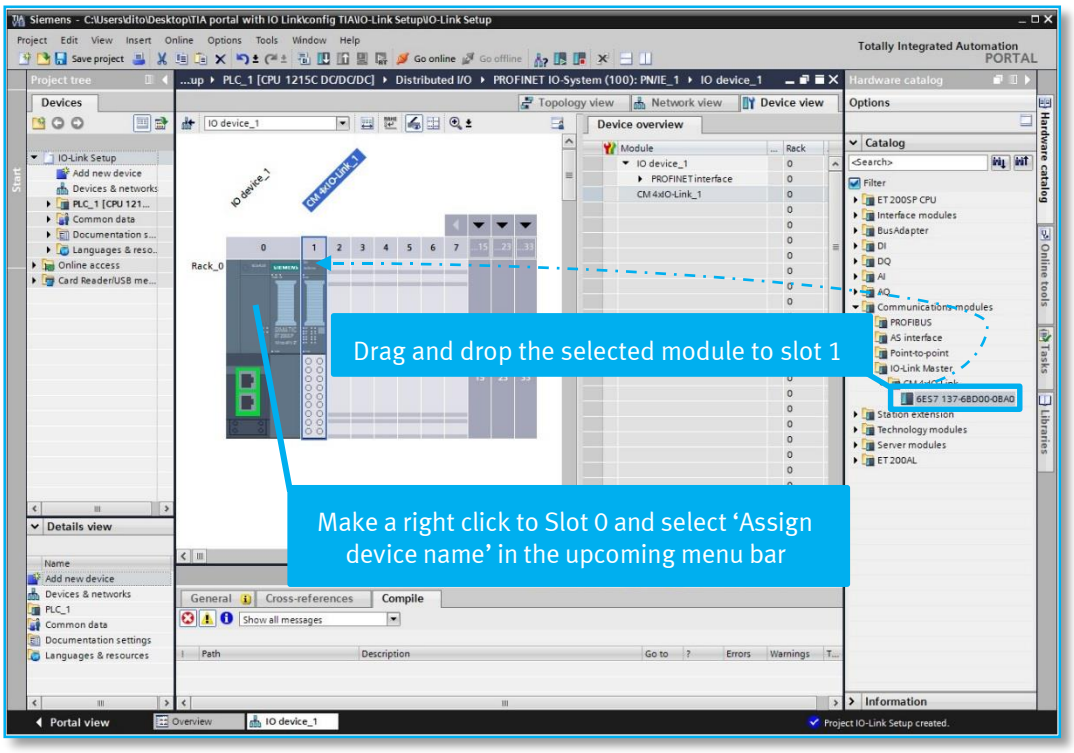


Fig. 20 Insert the IO-Link Master

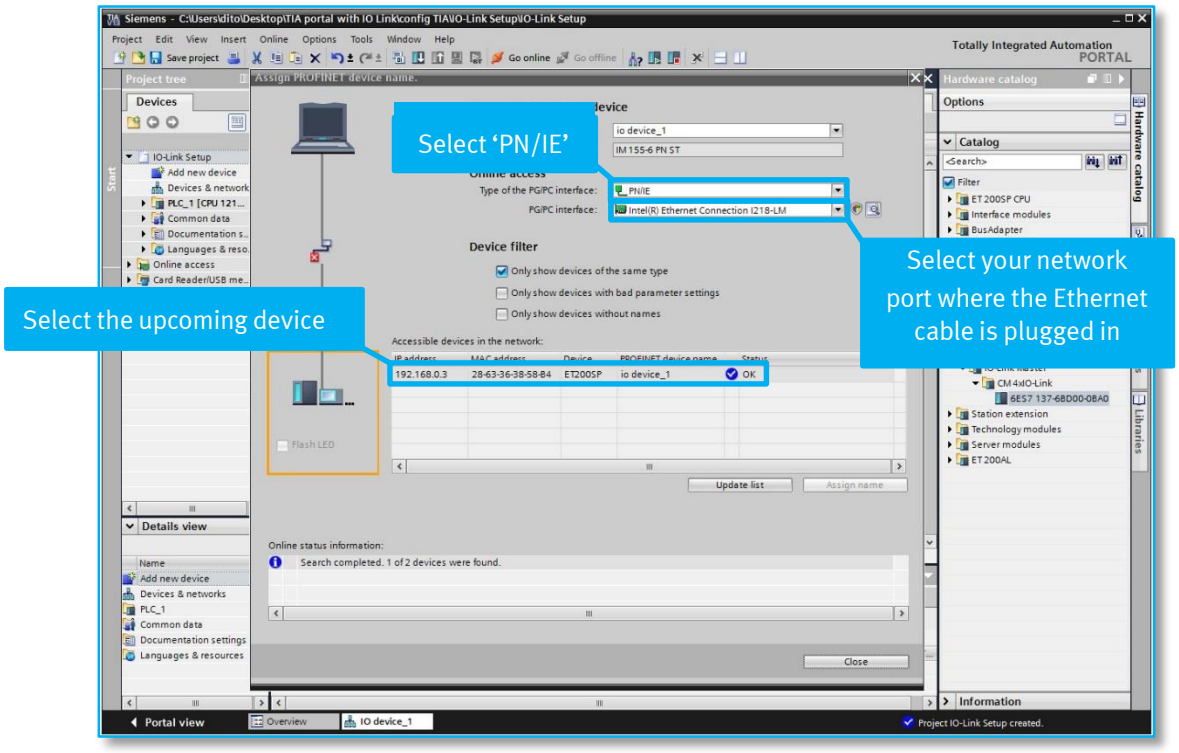


Fig. 21 Assignment of ET200SP

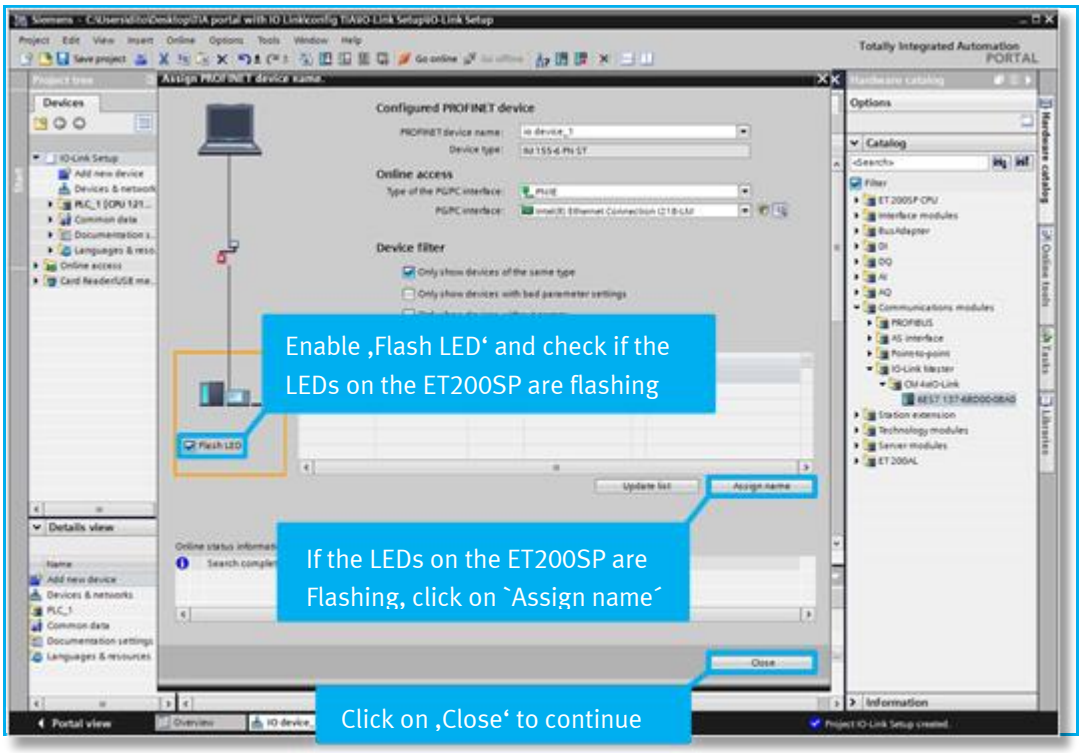


Fig. 22 Check the selected device

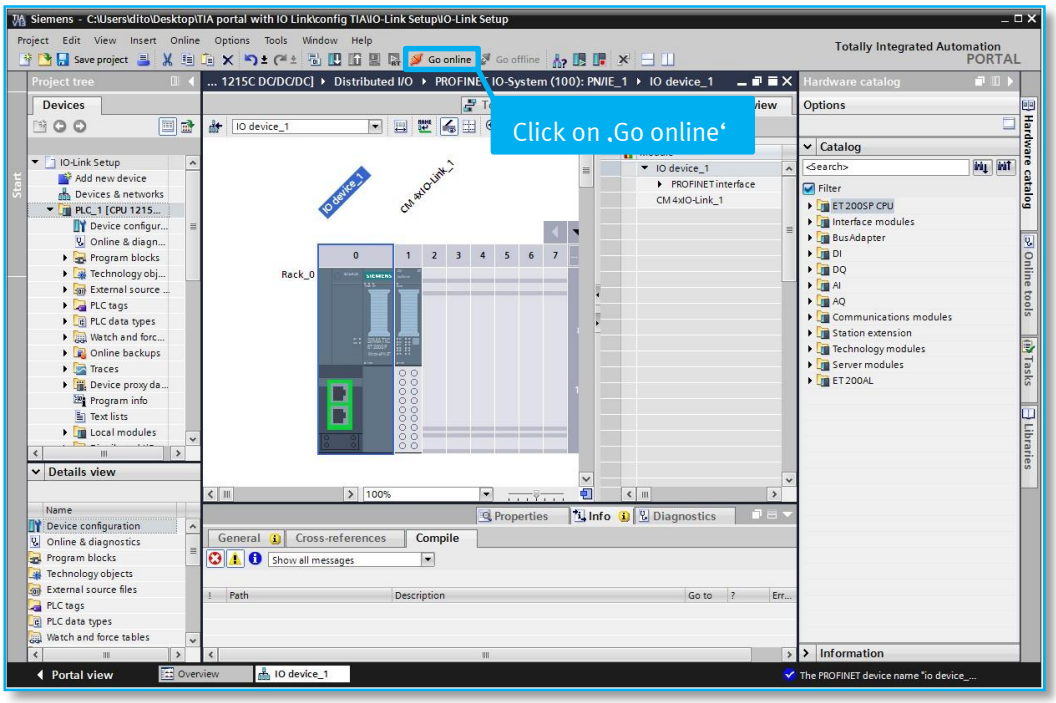


Fig. 23 Going online

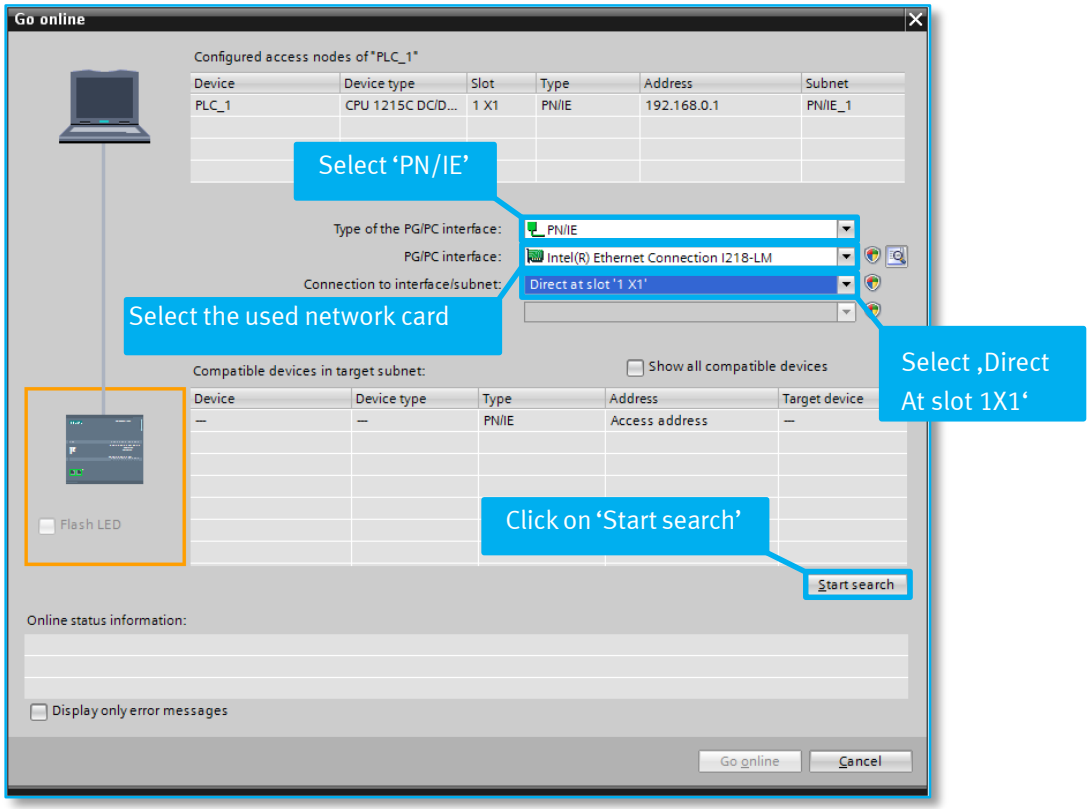
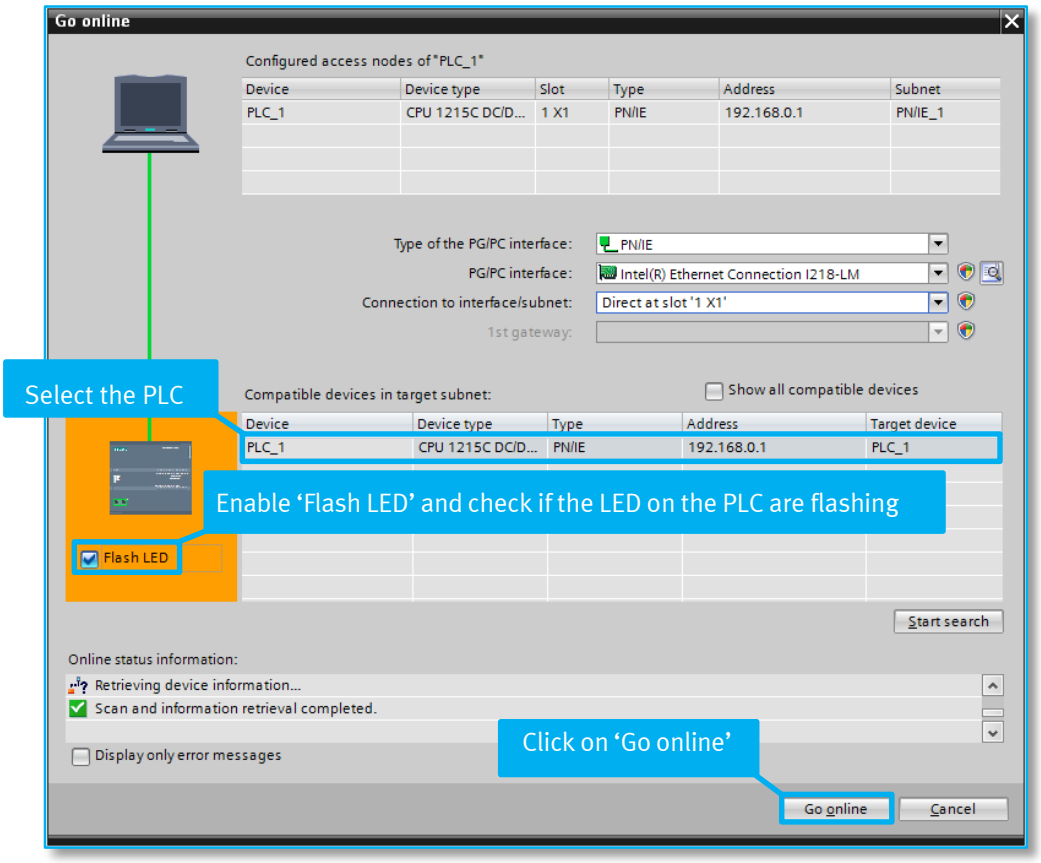


Fig. 24 Selection of connection



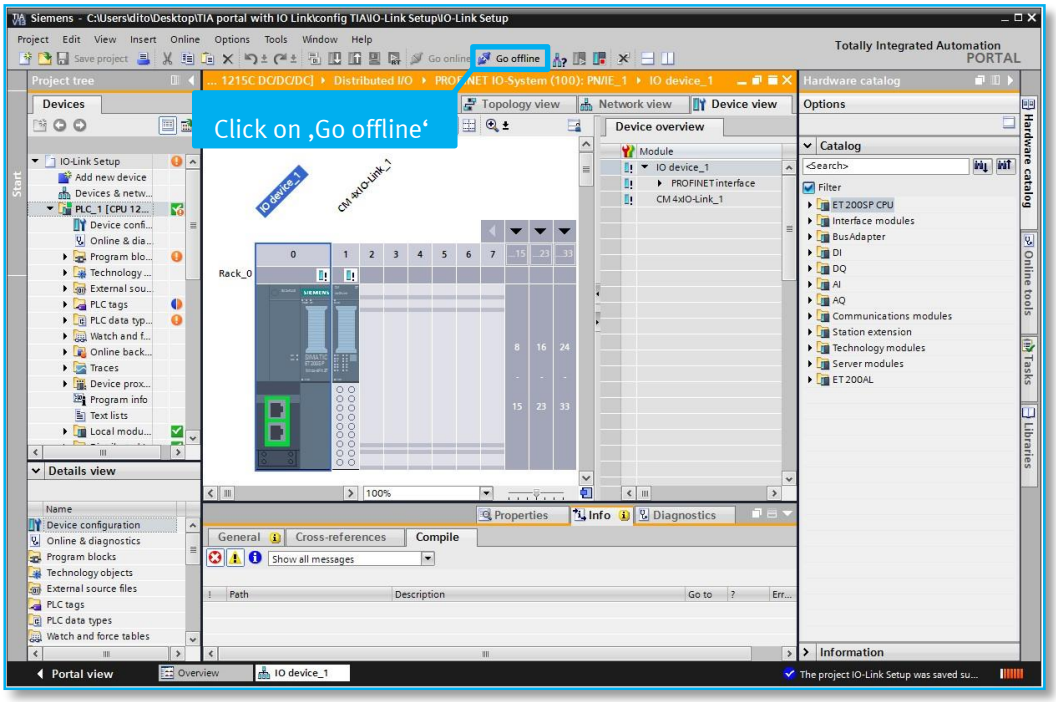


Fig. 25 Connection established

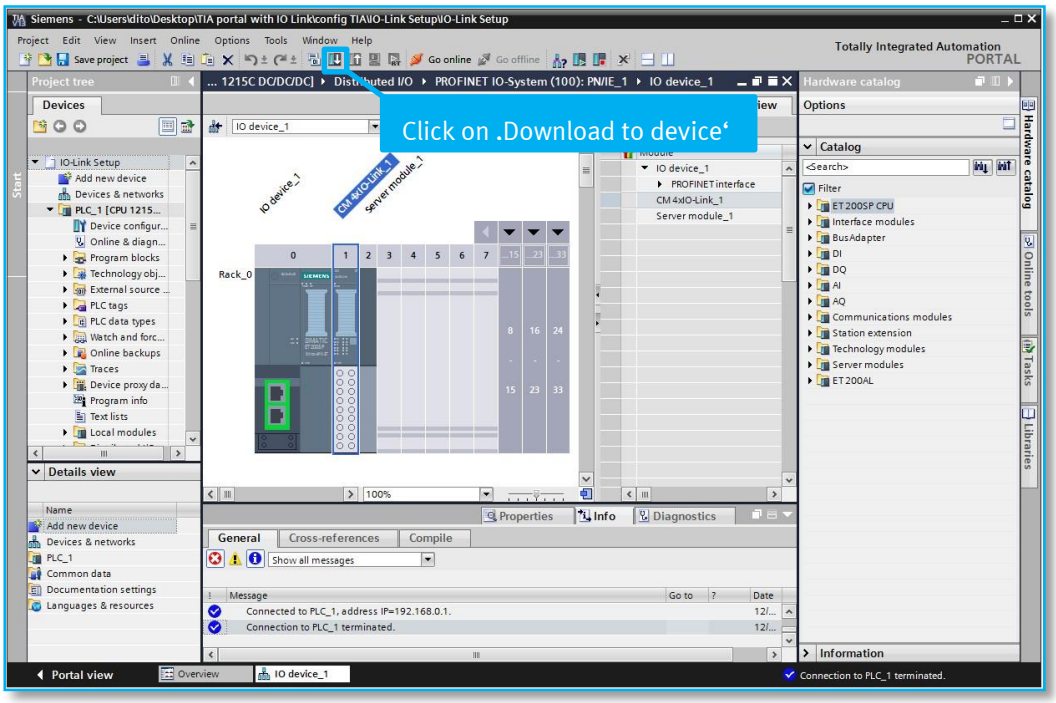


Fig. 26 Downloading the configuration

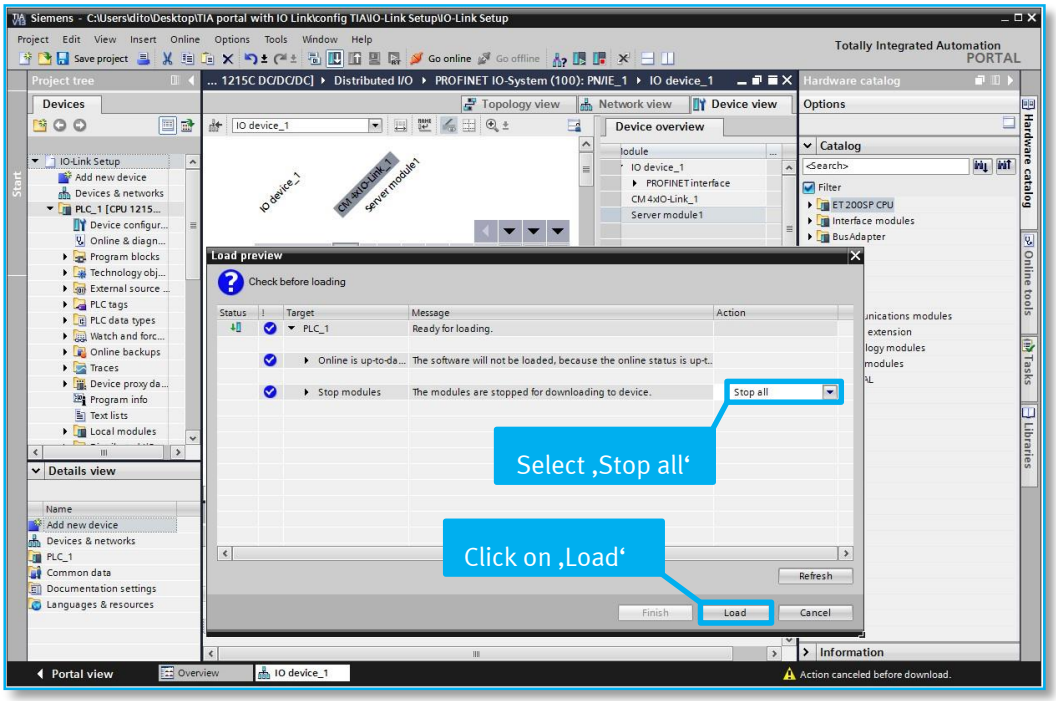


Fig. 27 Load preview

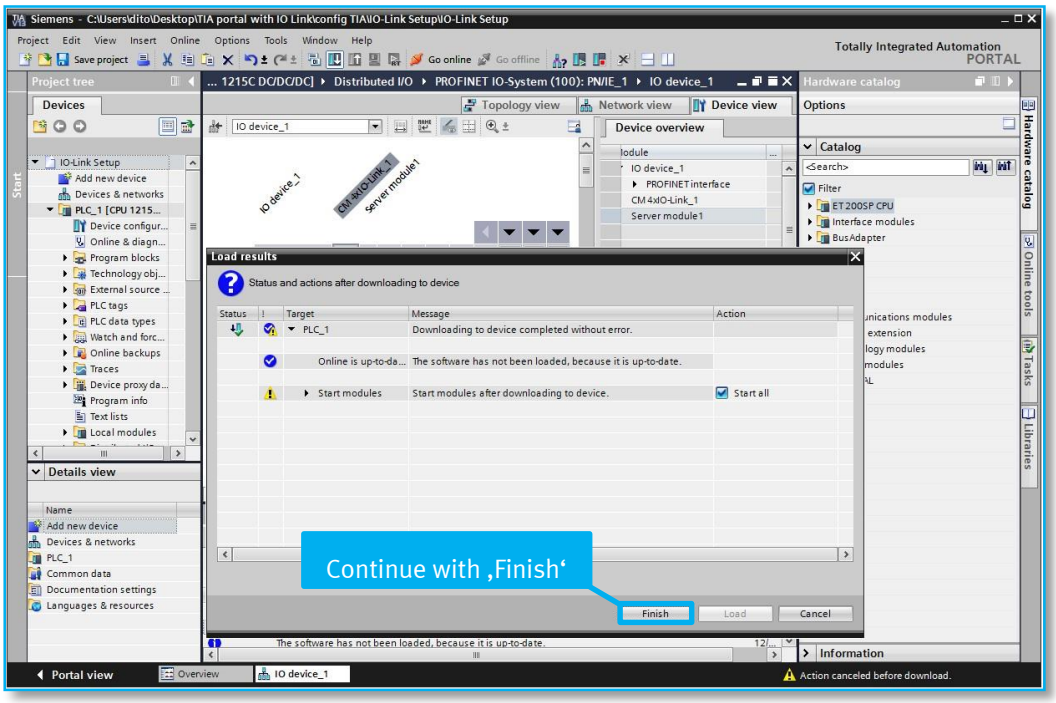


Fig. 28 Loading results

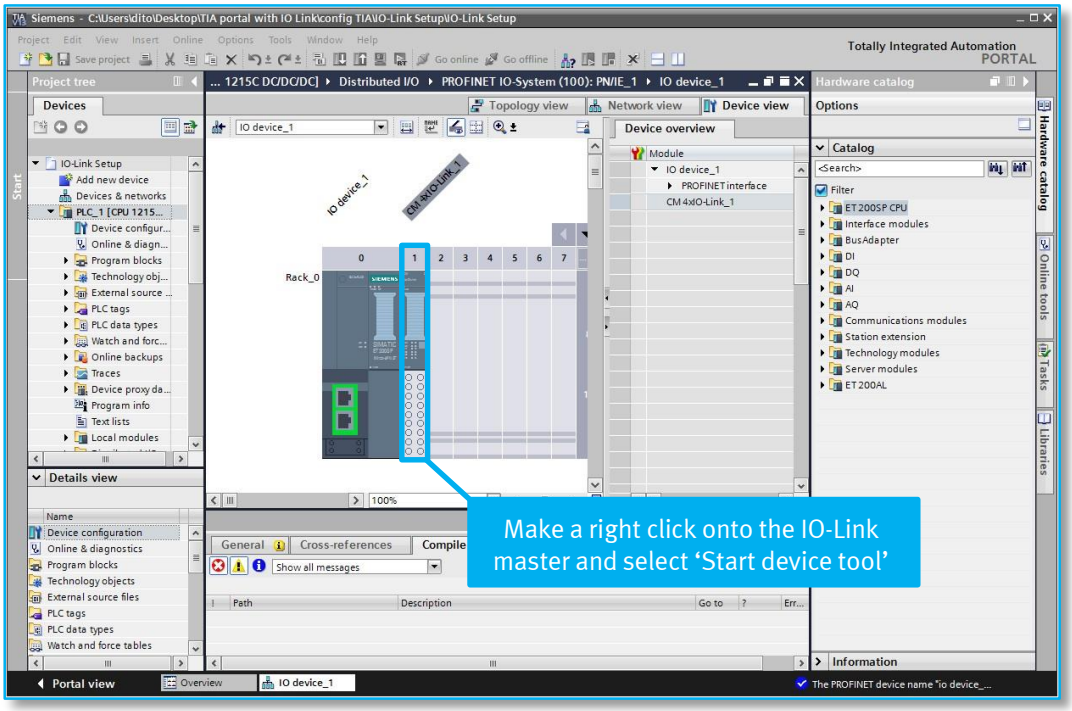


Fig. 29 Successful implementation of the IO-Link master

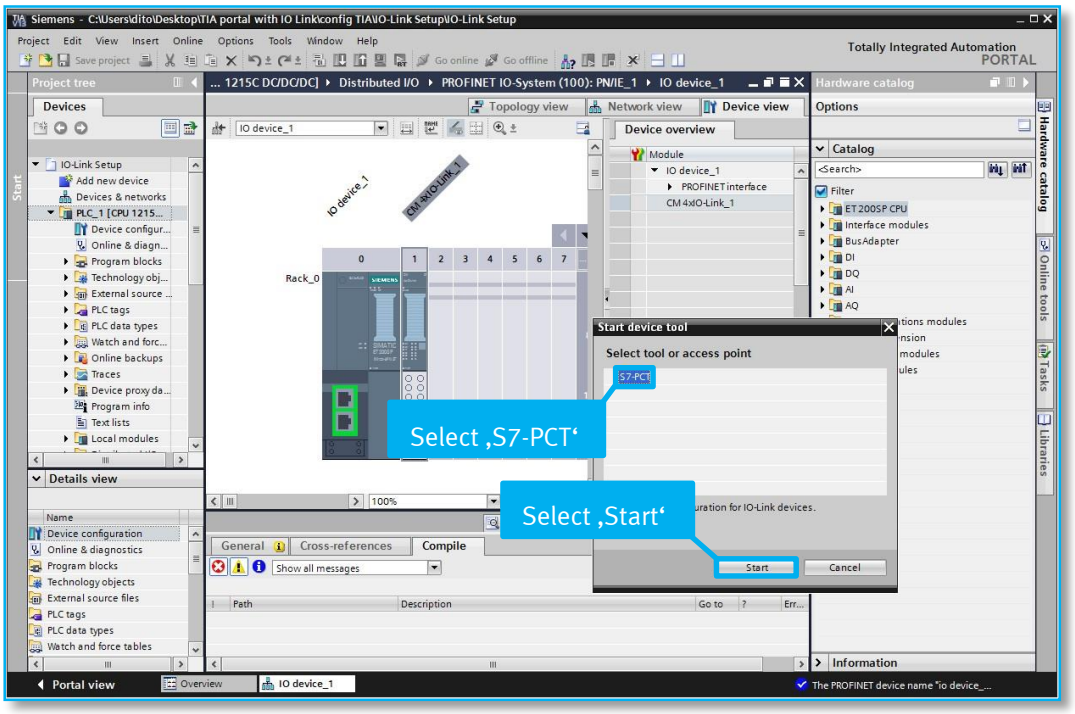


Fig. 30 Starting the device tool

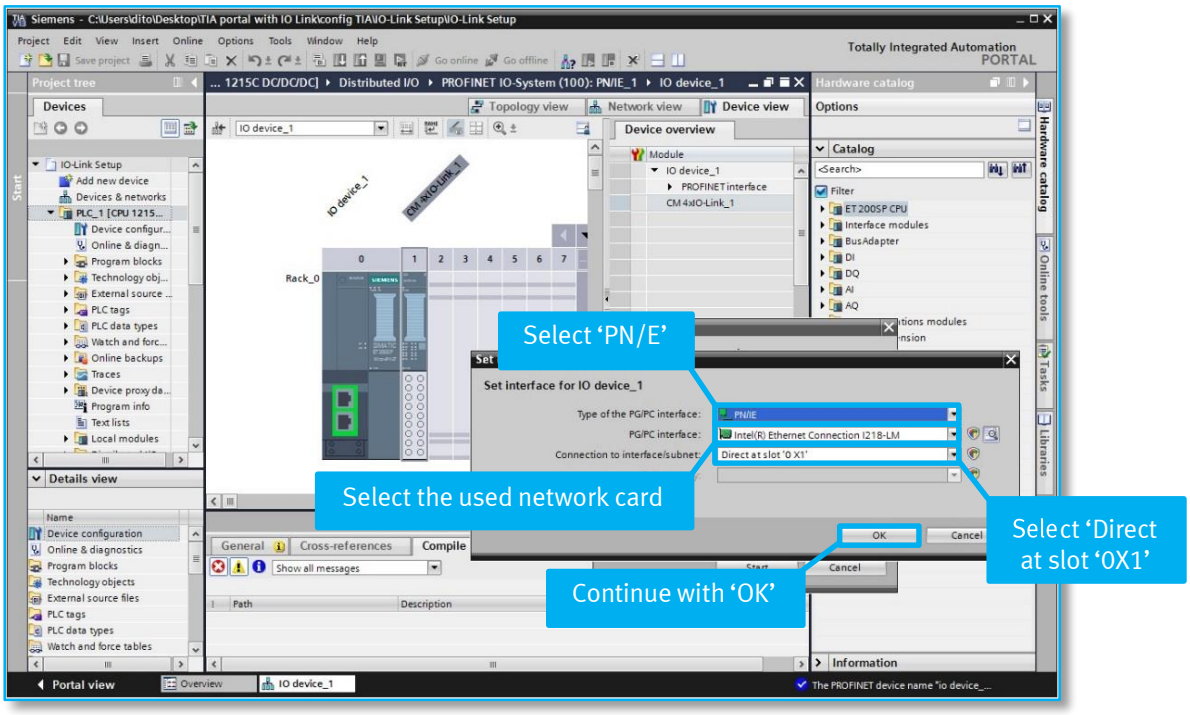


Fig. 31 Selection of the used network interface

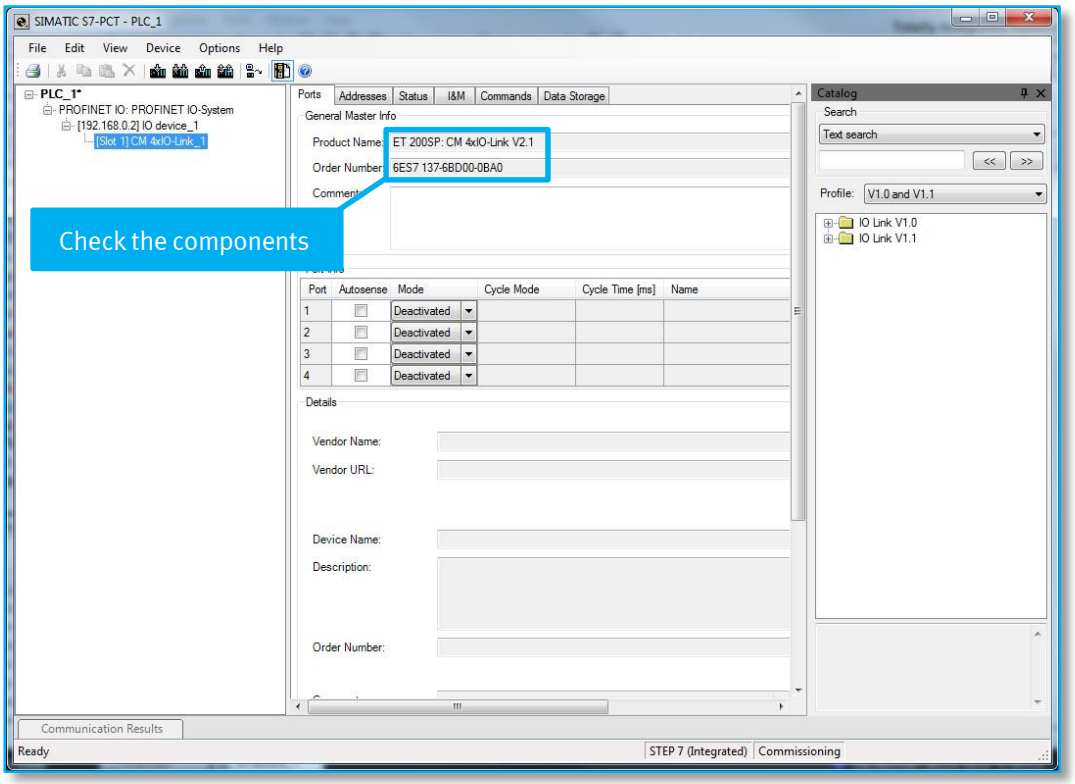


Fig. 32 SIMATIC S7-PCT

The next step will be choosing the IODD file. Therefore, download the latest IODD file for the CPV10, VPPM and CMMO-ST from the Festo support portal and save it locally on the hard drive. Then extract the .zip file into a folder and keep the location path in mind.

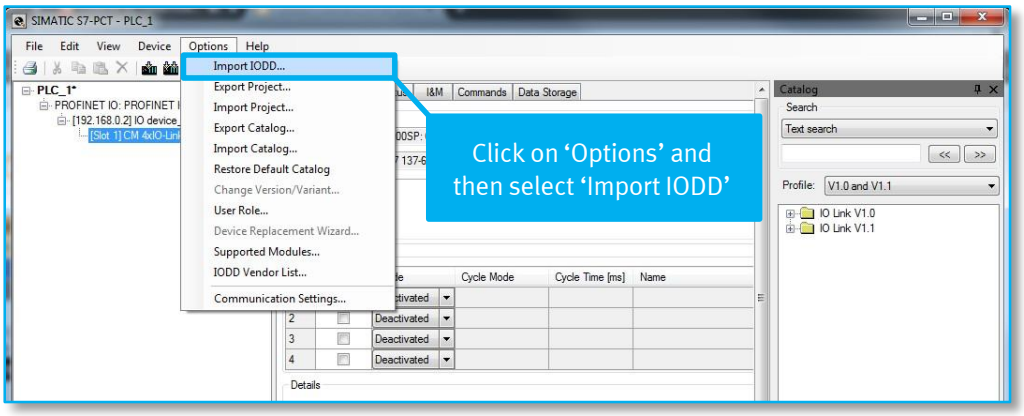


Fig. 33 Open the options

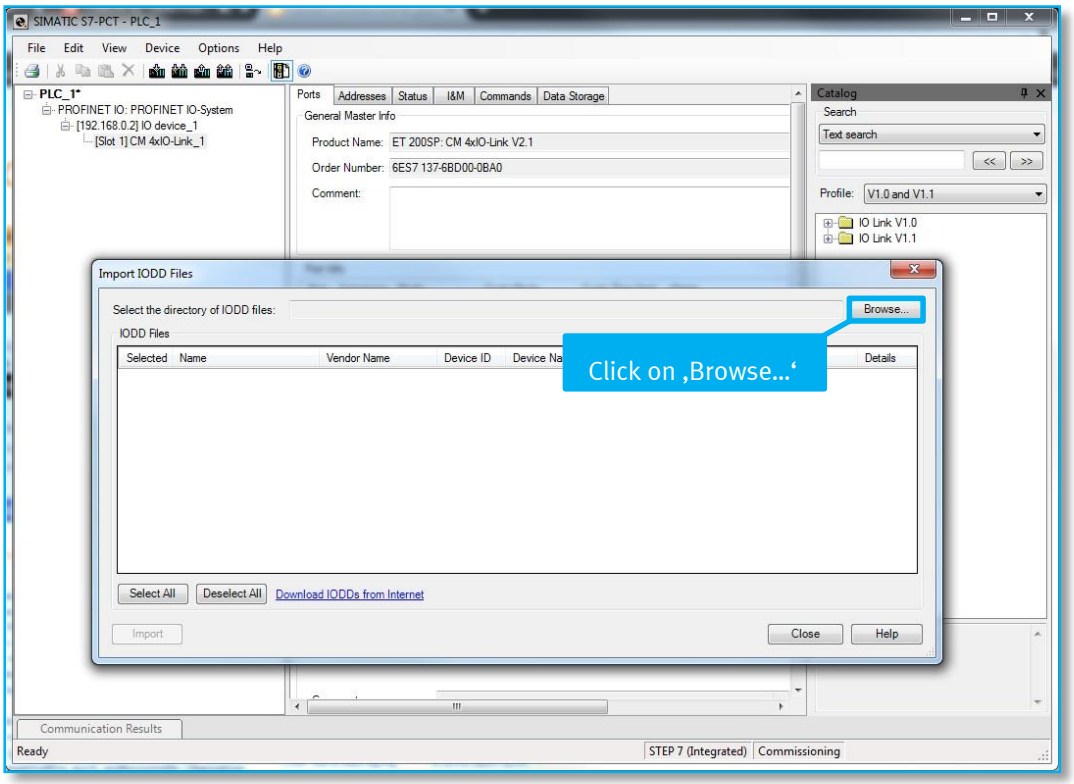


Fig. 34 Import IODD files

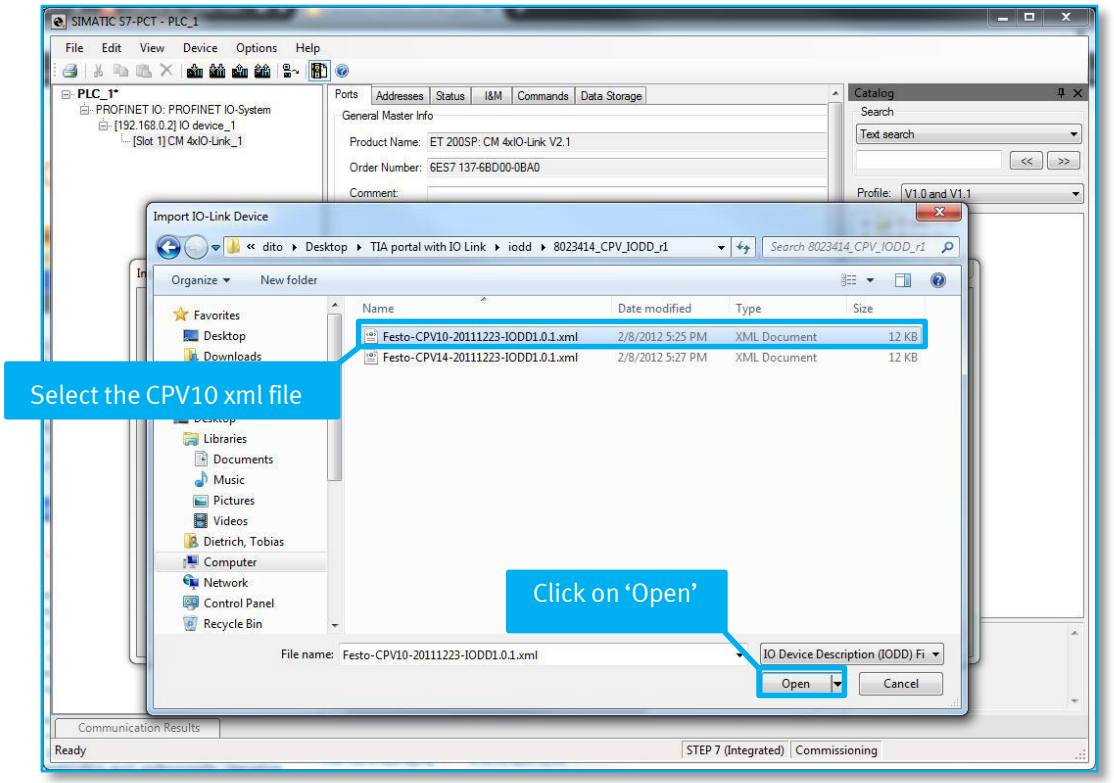


Fig. 35 Select the CPV IODD file

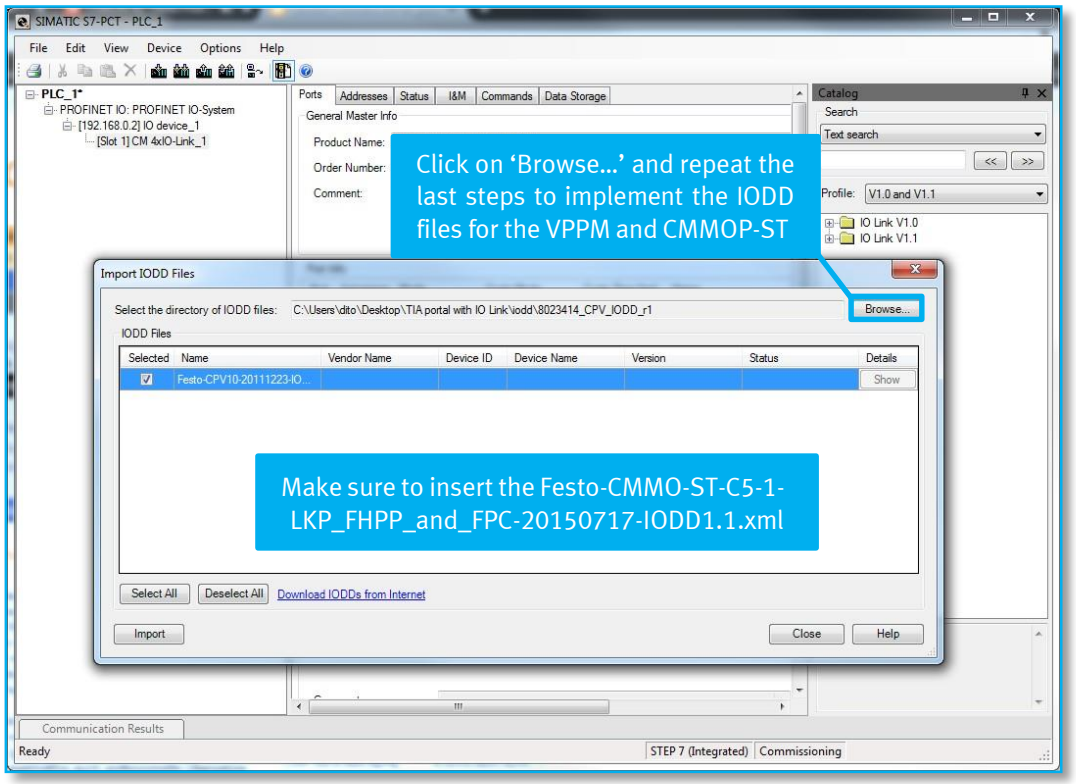


Fig. 36 Browse for the other IODD files

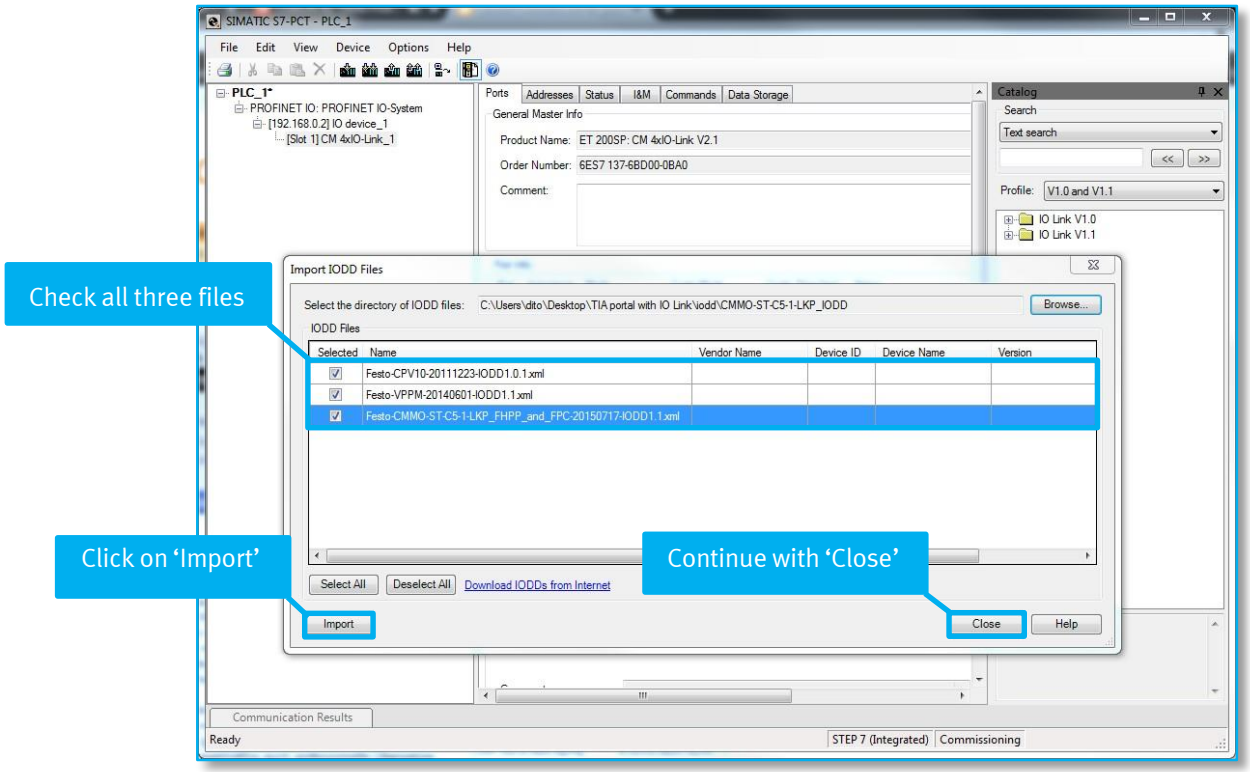


Fig. 37 Import all IODD files

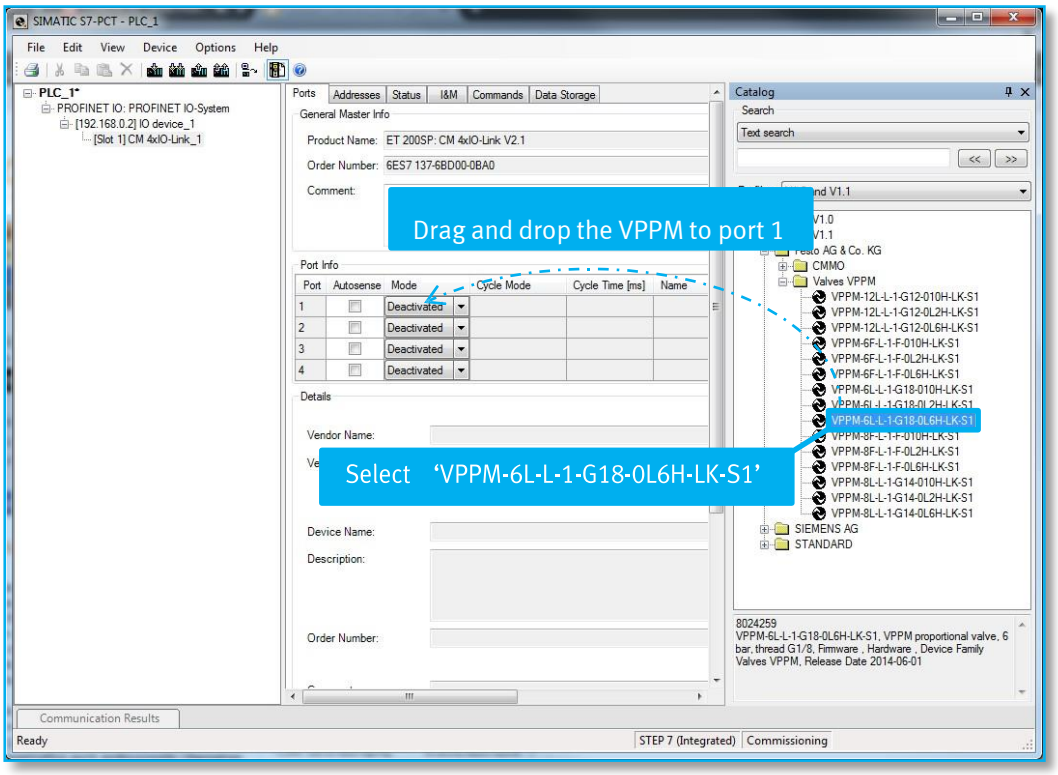


Fig. 38 Configuring IO-Link master slots

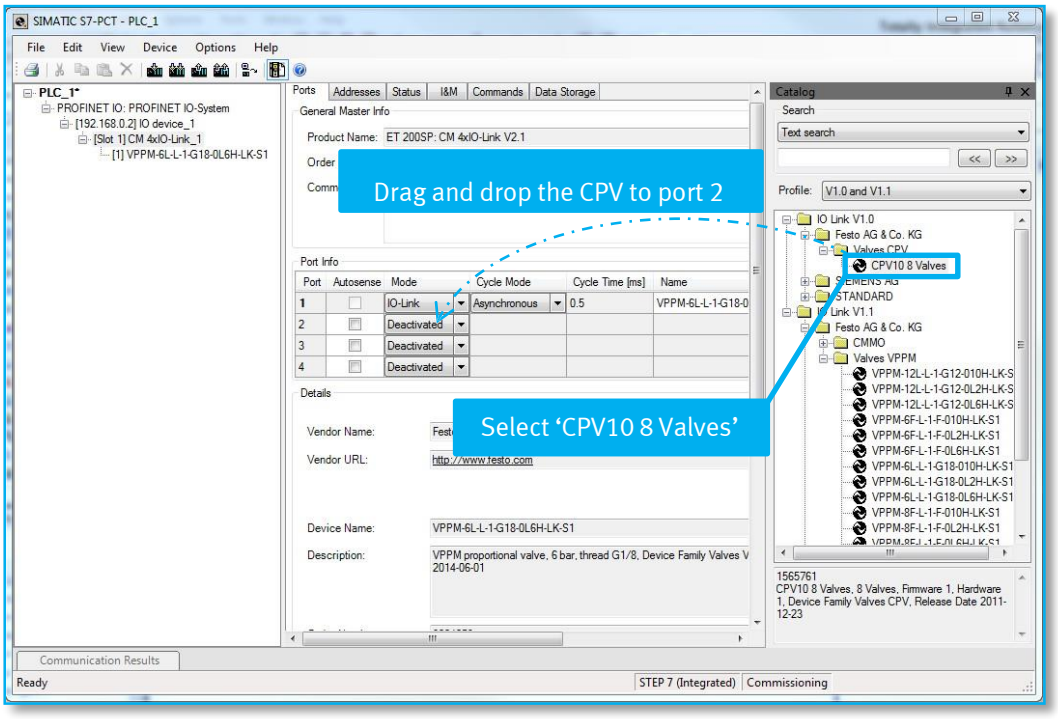


Fig. 39 Insert the CPV10

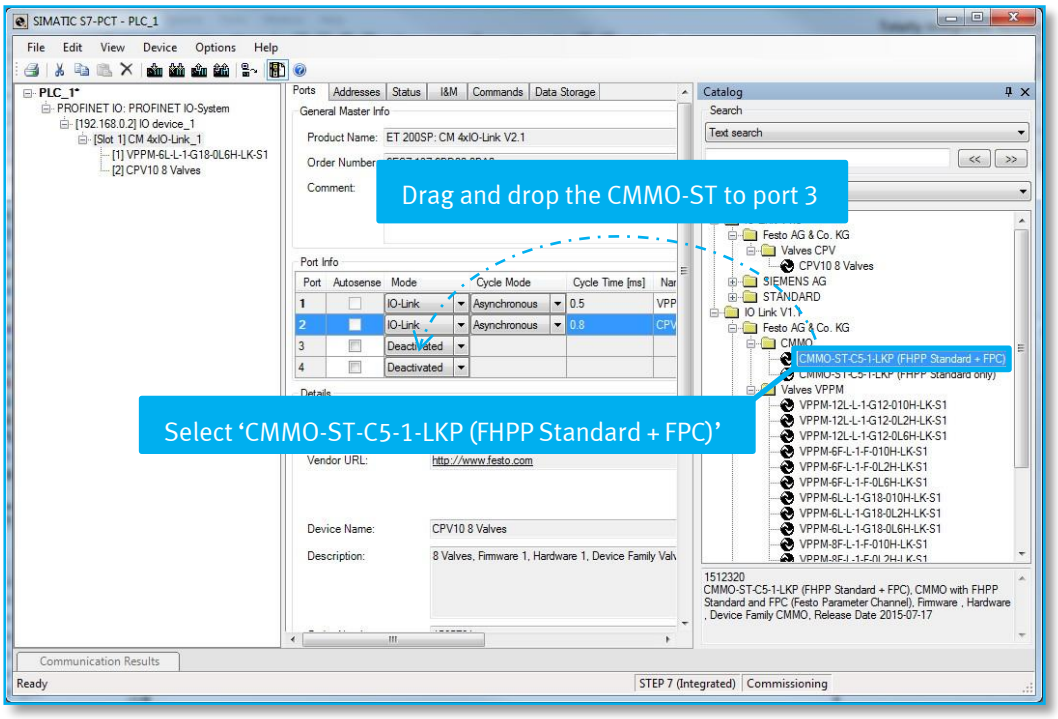


Fig. 40 Insert the CMMO-ST

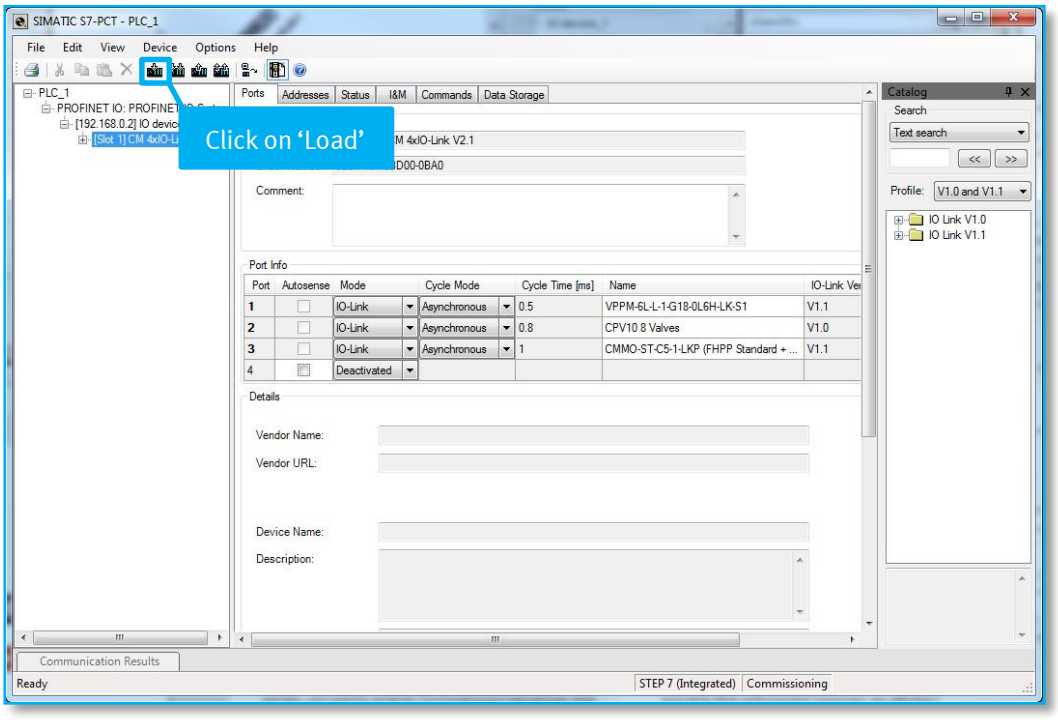


Fig. 41 Loading the configuration to the device

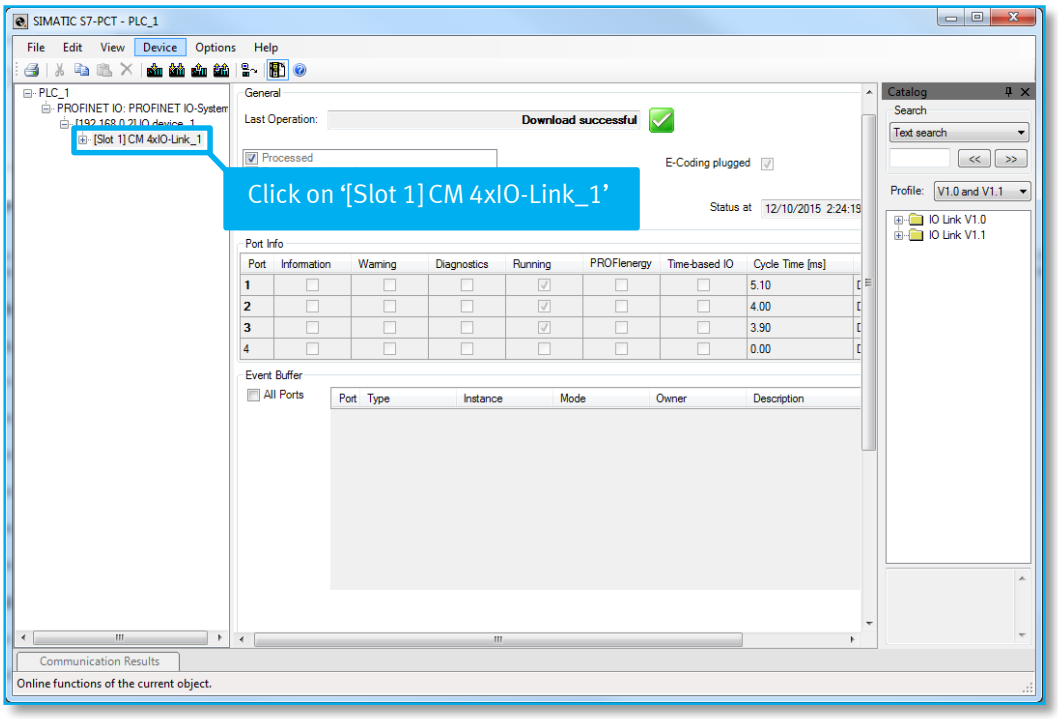


Fig. 42 Successful download

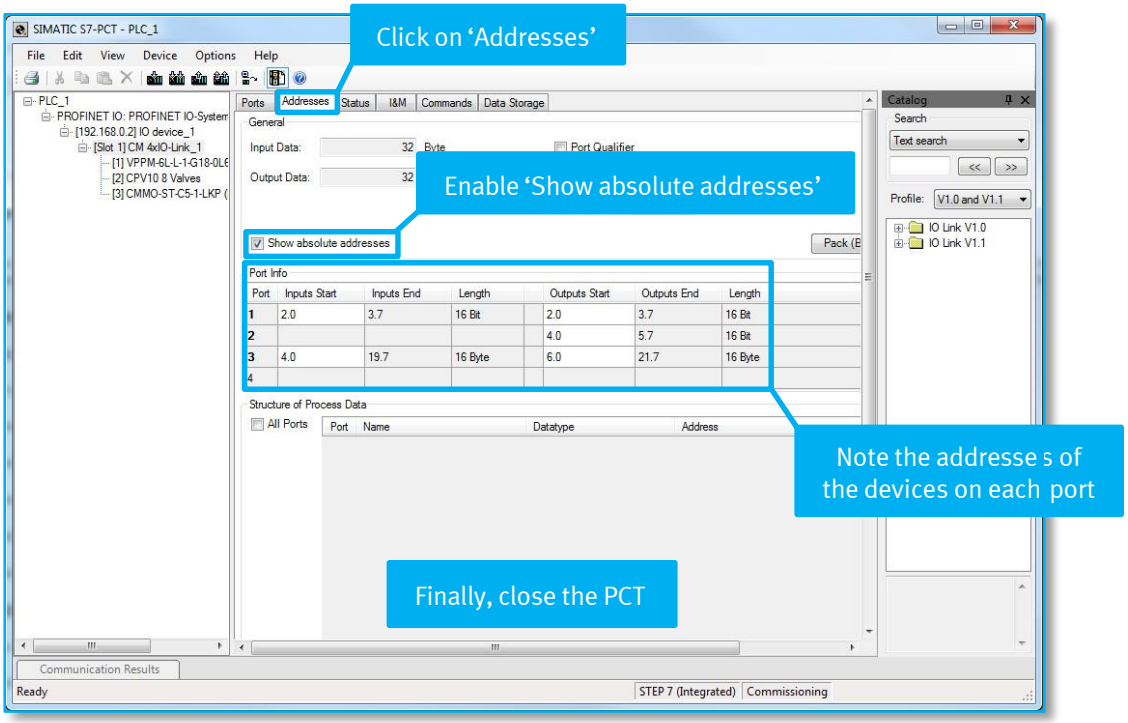


Fig. 43 Address assignment

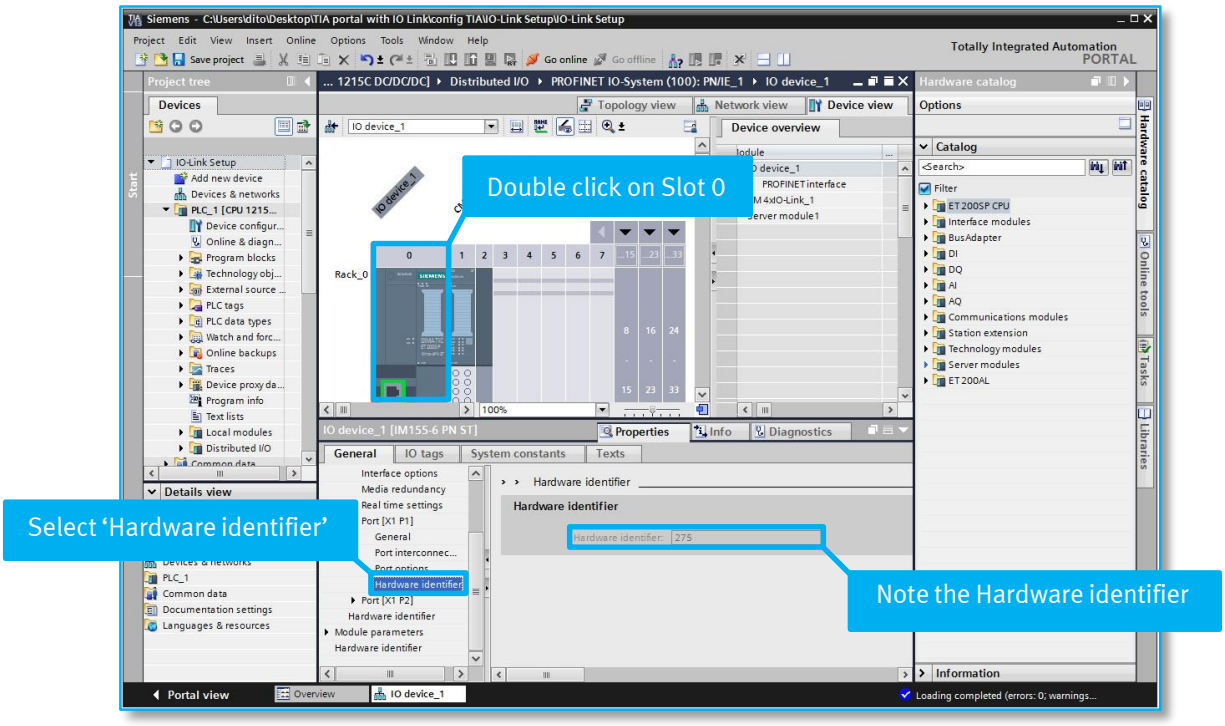


Fig. 44 Hardware identifier

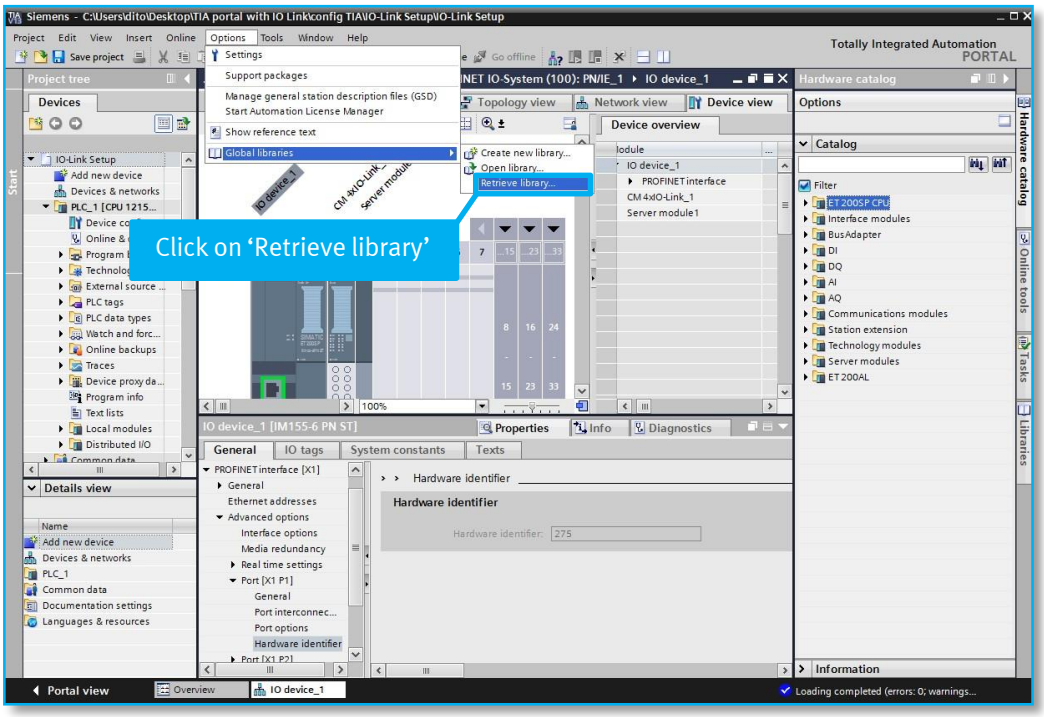


Fig. 45 Retrieve library

Now, select the library file: FestoMotionFHPP_V13_SP1.zal13 and open the library. It's very important that the library is Version V13.0.10 or newer!!!, otherwise a problem will occur during compiling. Then include the library in the same way: 20150327_IO_LINK_Library_V13_SP1.

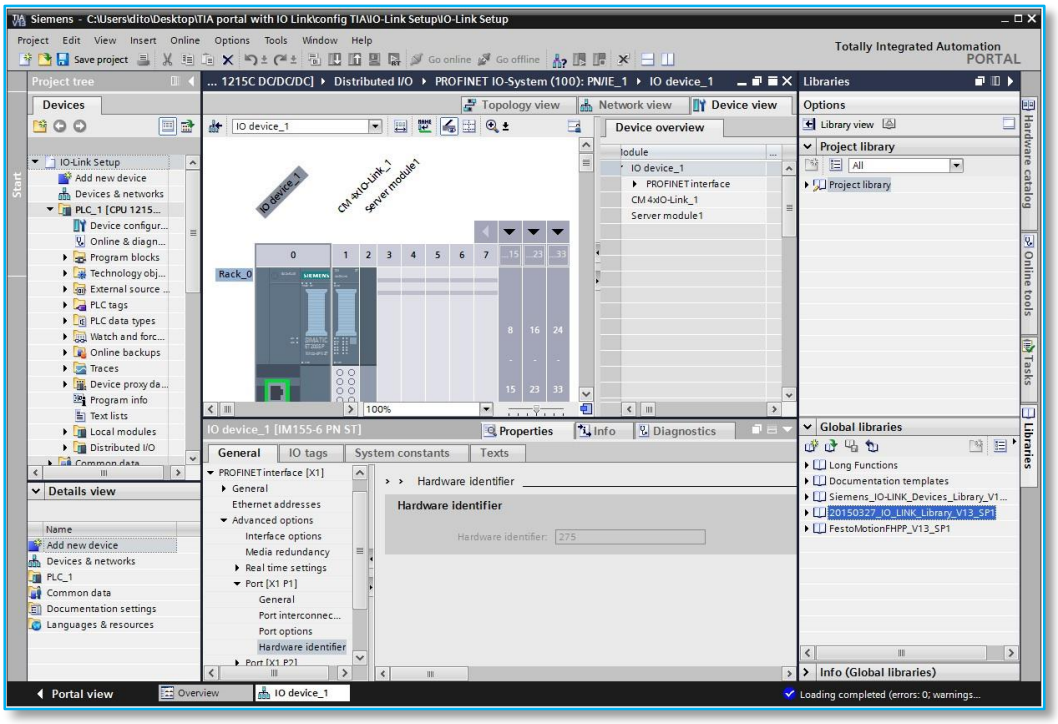


Fig. 46 Organizing the project library

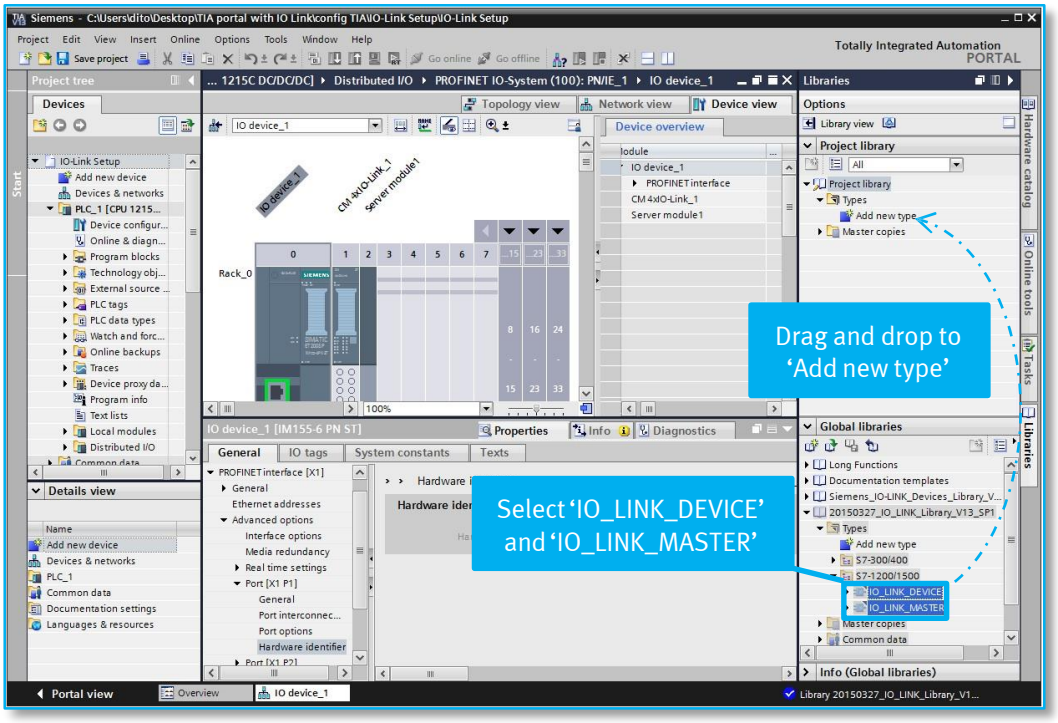


Fig. 47 Copying the IO-Link types

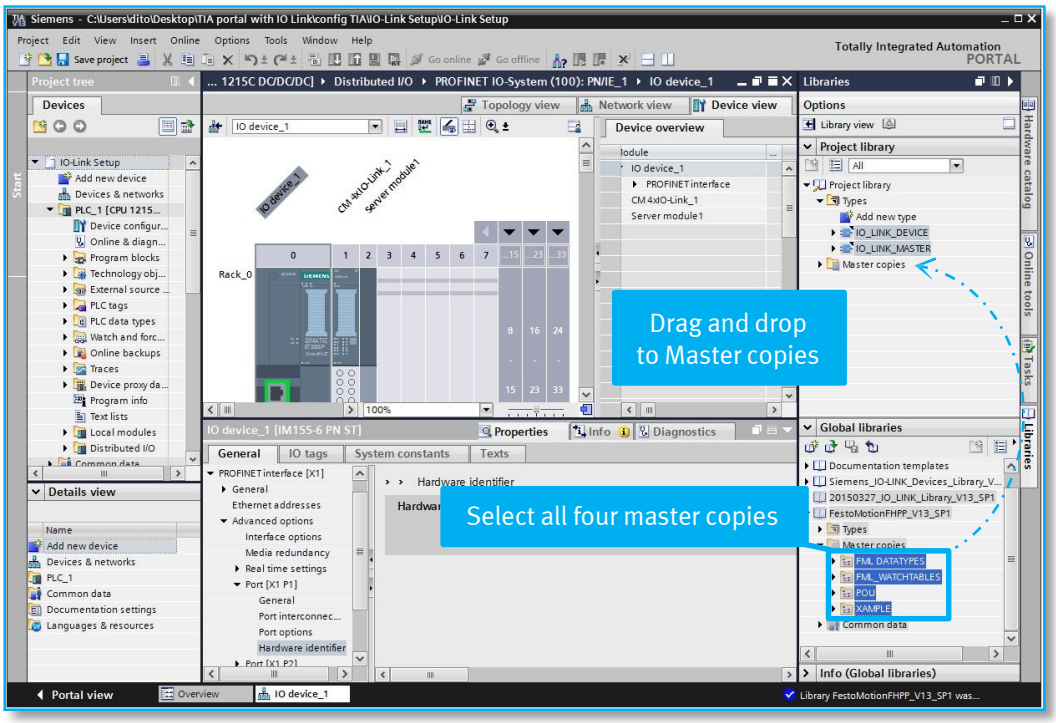


Fig. 48 Adding FHPP functions to the project library

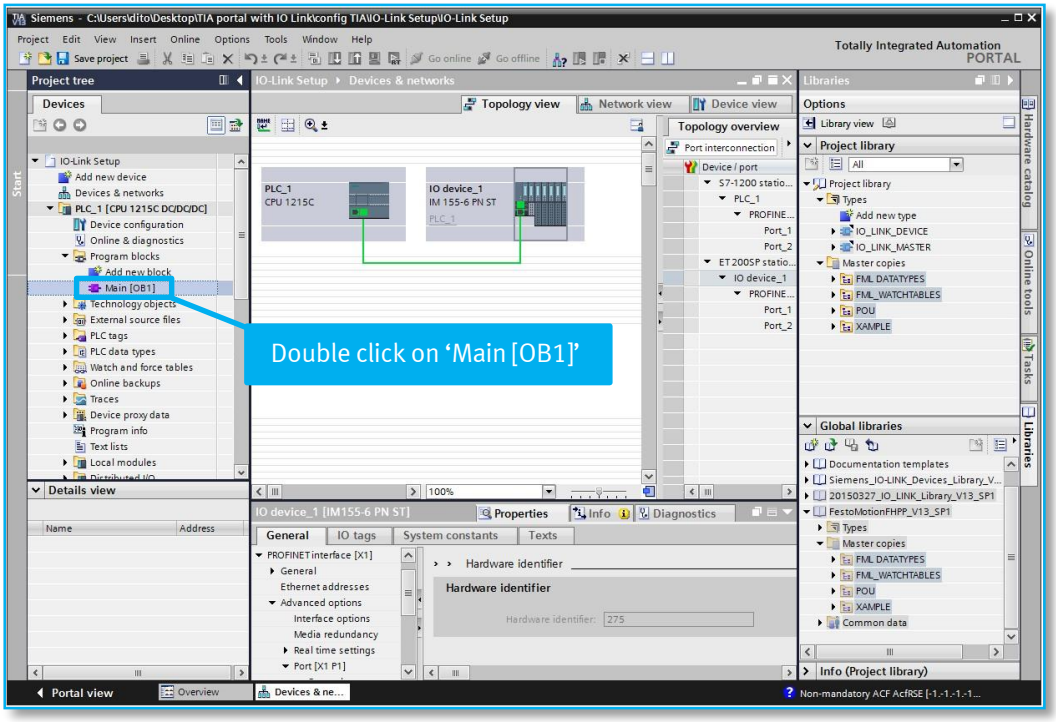


Fig. 49 Finished library configuration

3.2 Configuration CPV10

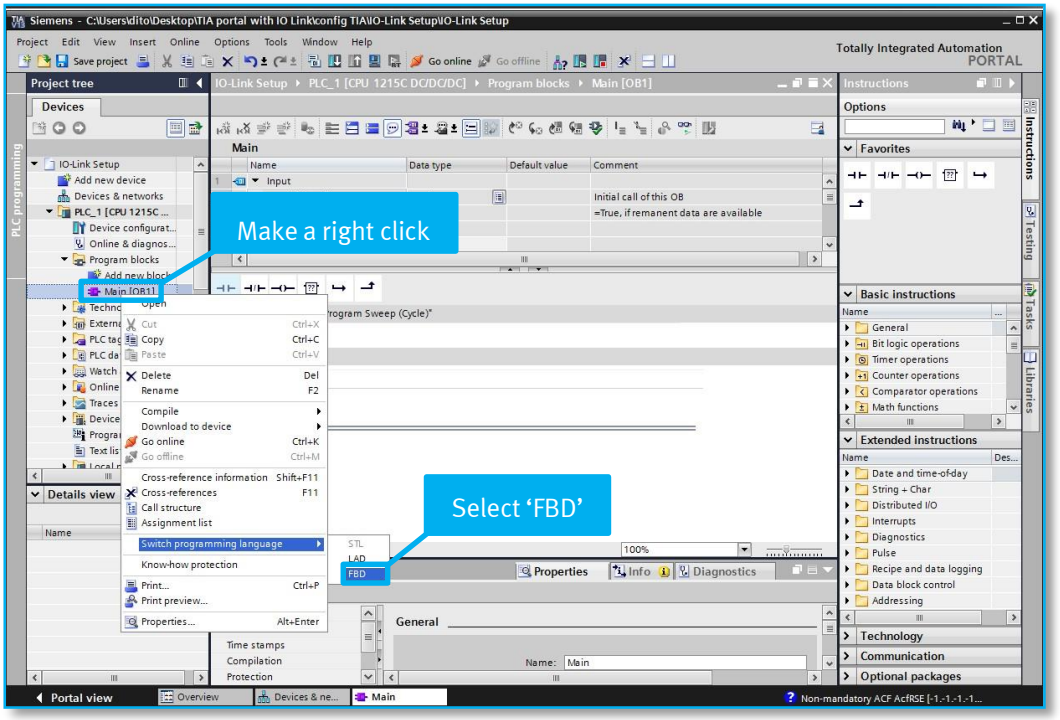


Fig. 50 Switching programming language of the OB1

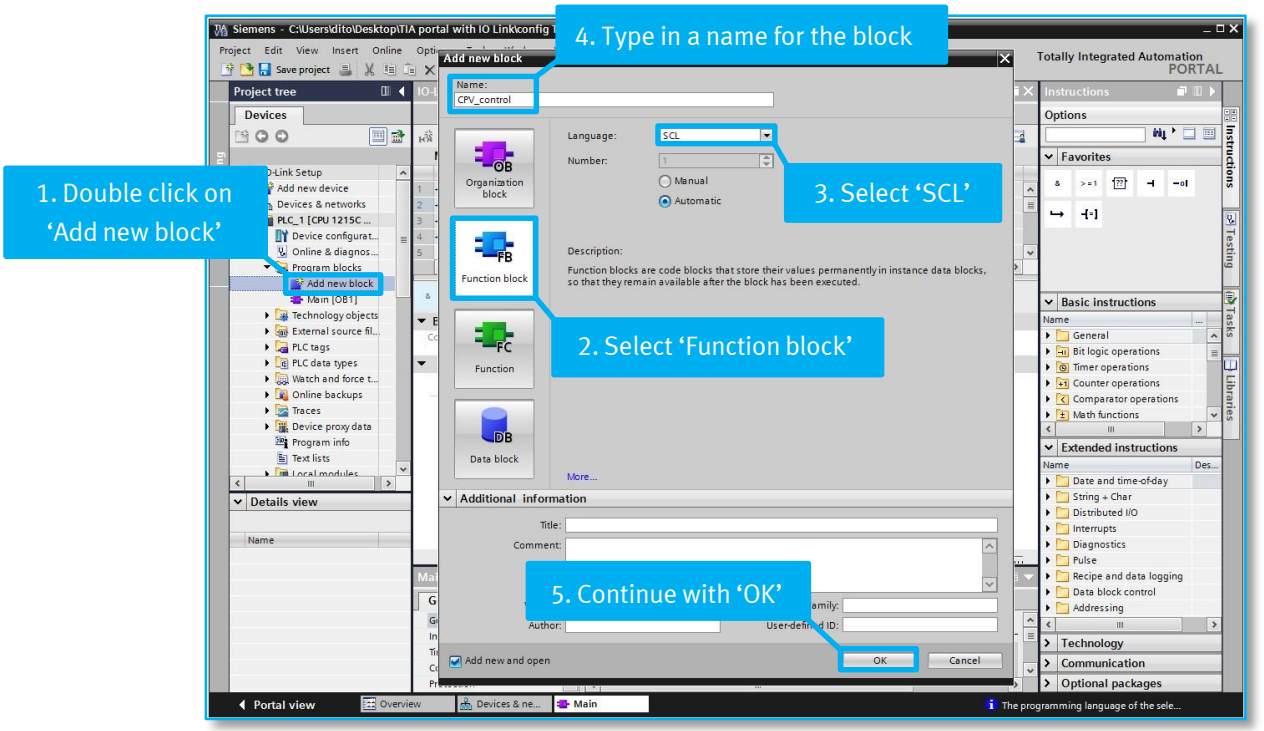


Fig. 51 Creating a function block

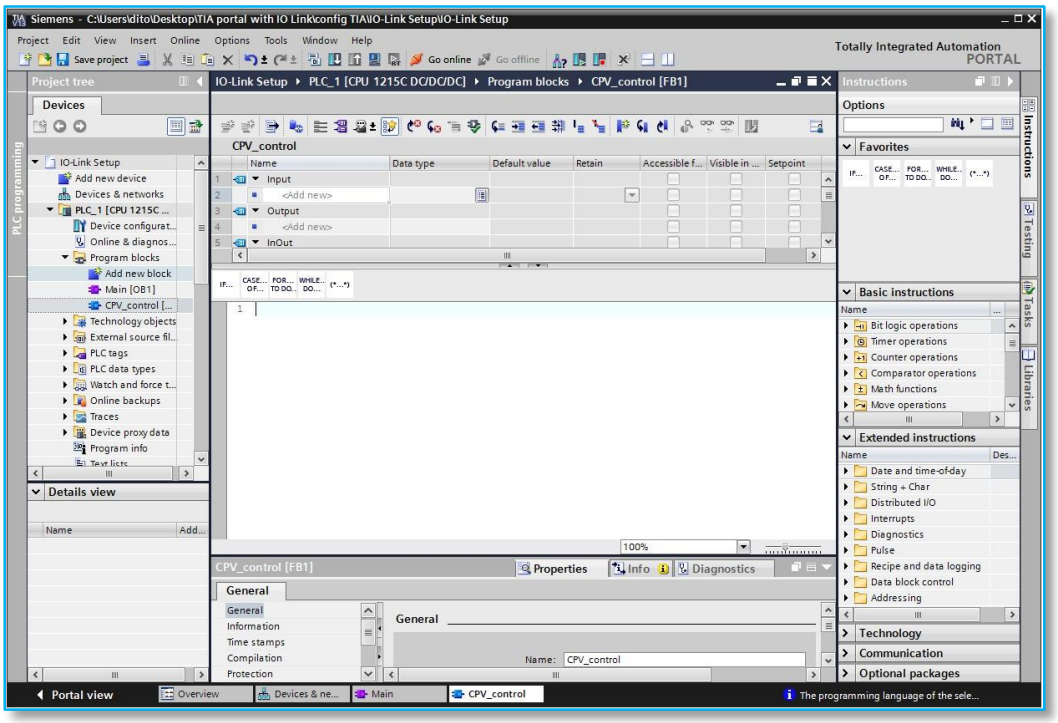


Fig. 52 Created function block

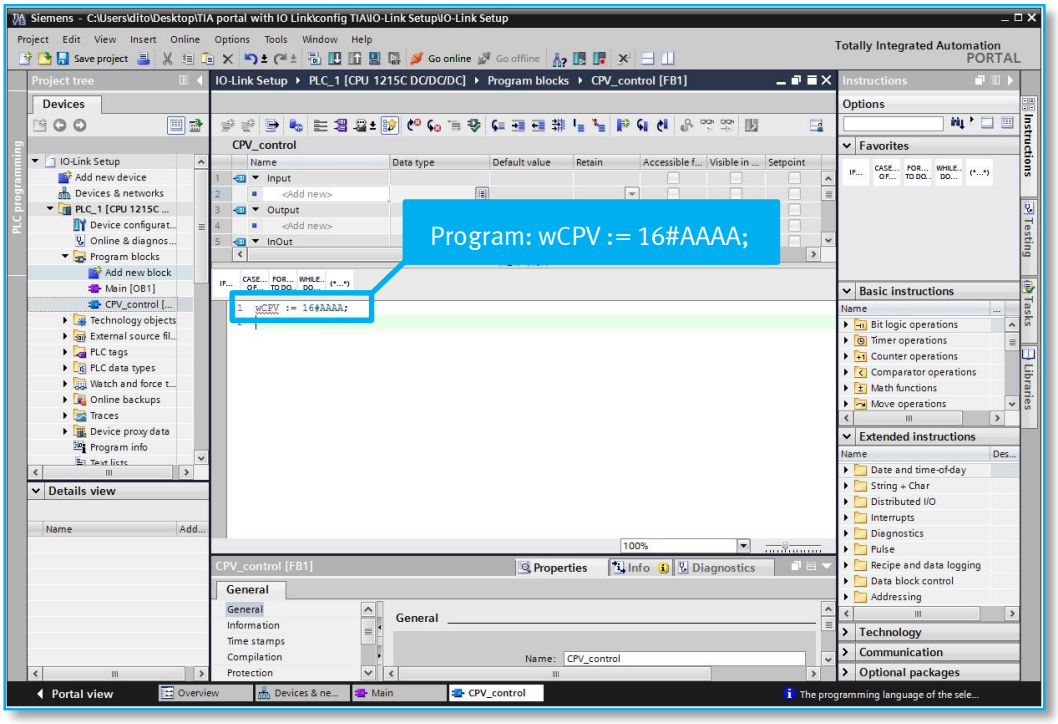


Fig. 53 Programming the CPV control function block

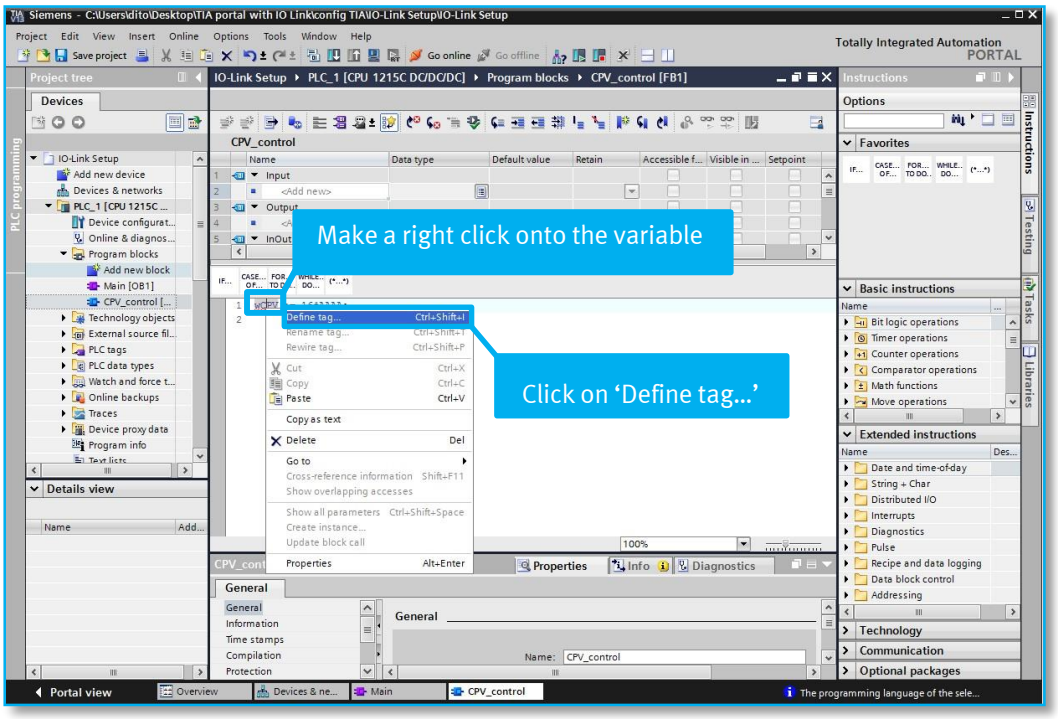


Fig. 54 Define a tag

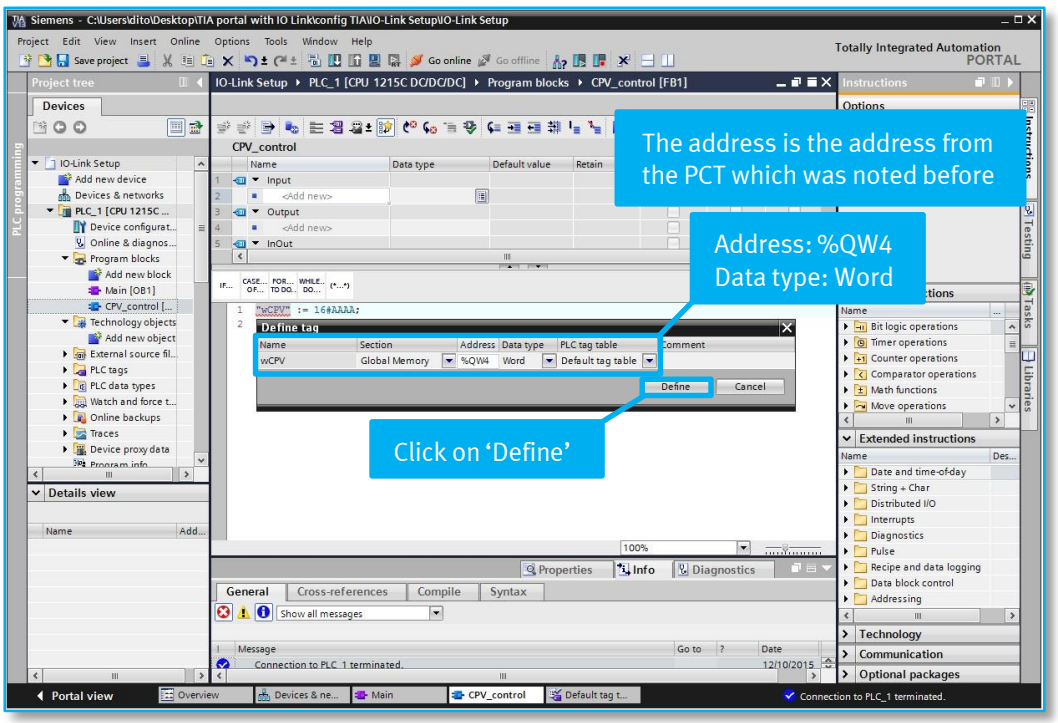


Fig. 55 Addressing the output word of the CPV

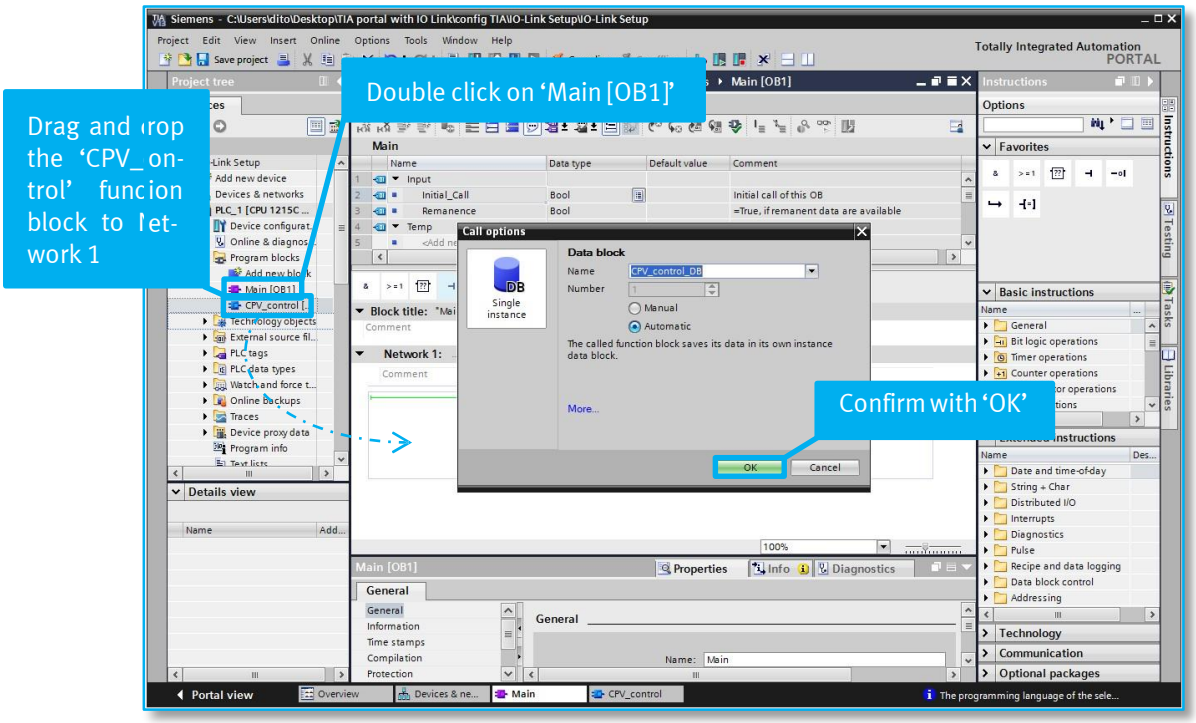


Fig. 56 Creating the related data block

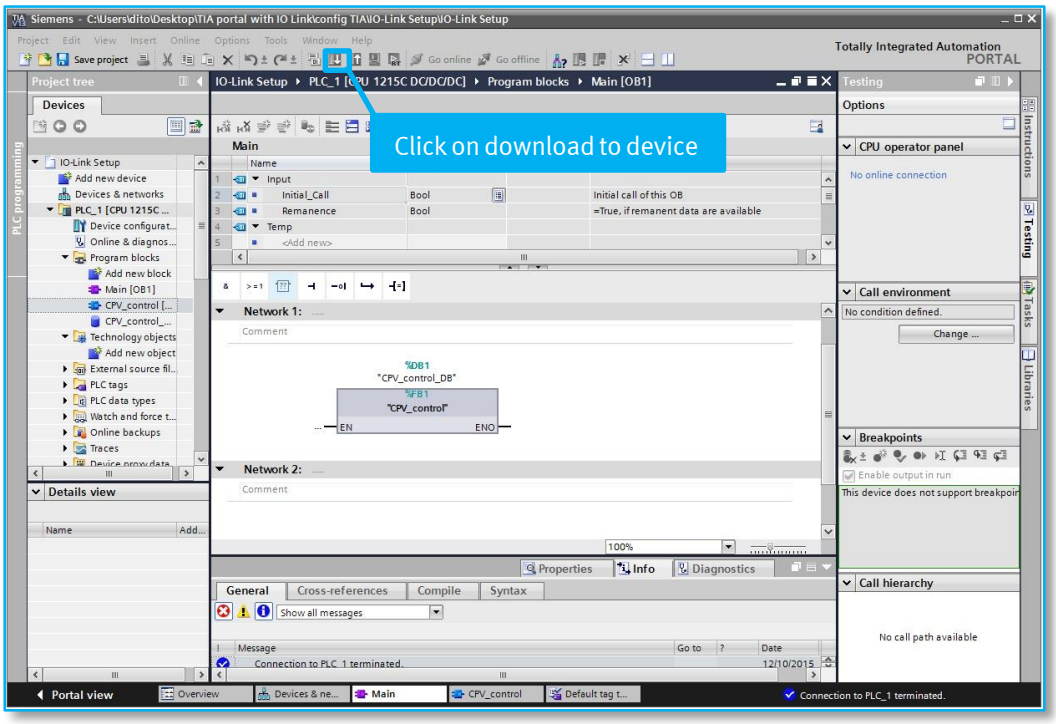


Fig. 57 Downloading the PLC program

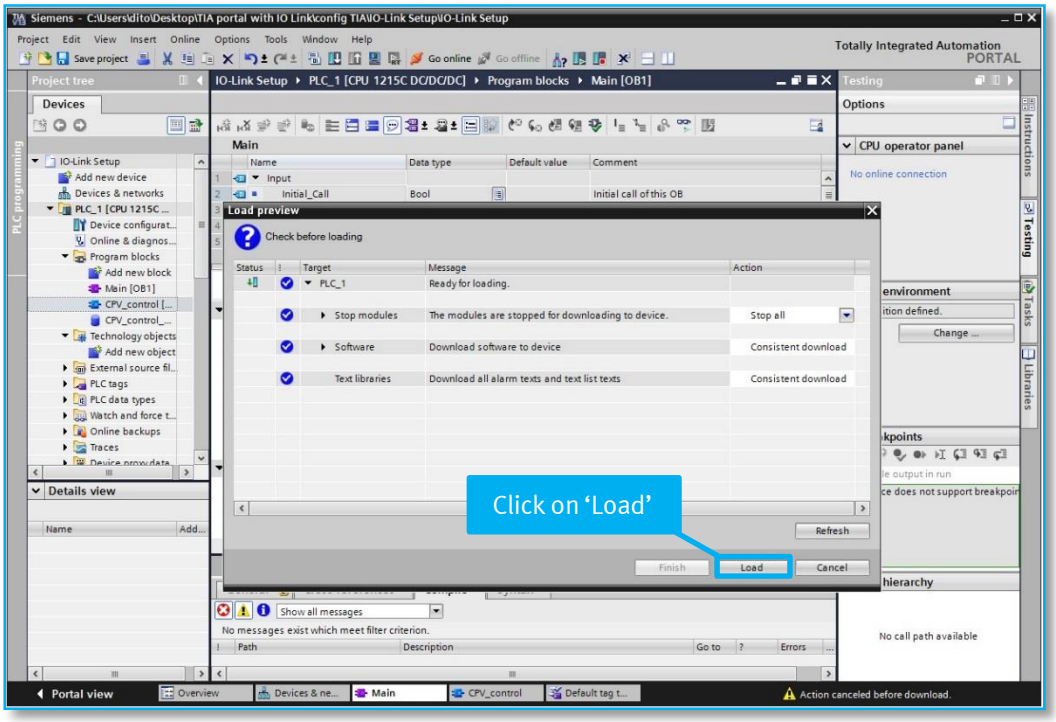


Fig. 58 Load preview

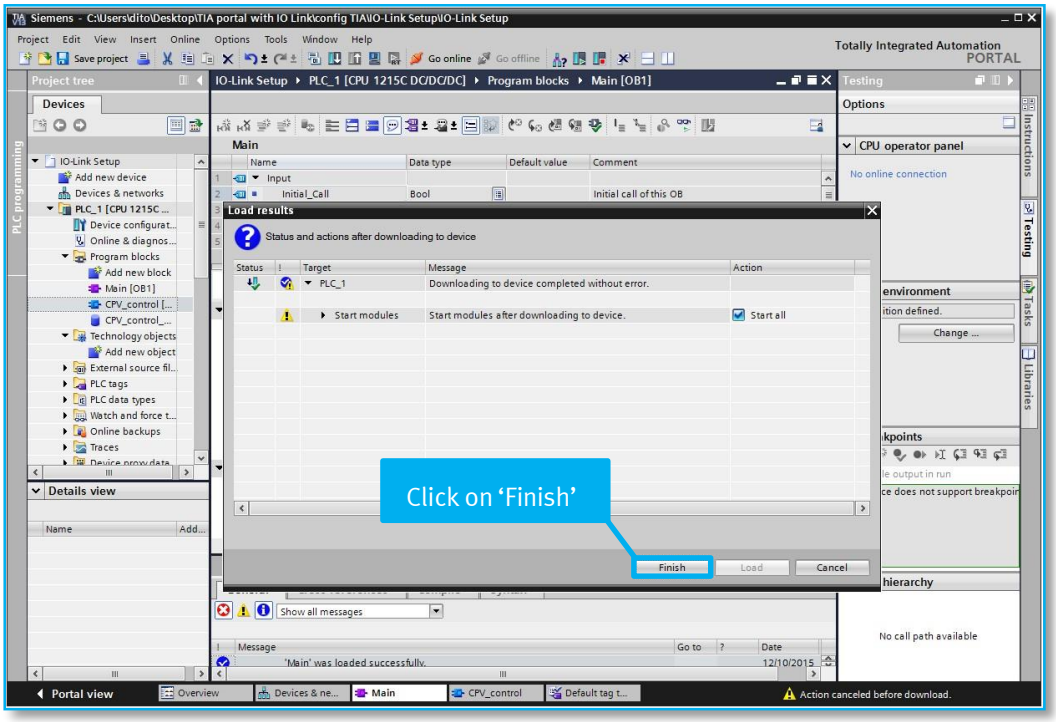


Fig. 59 Load results

Now the LEDs on the CPV10 should be The next step will be the implementation of the VPPM on..

3.3 Configuration VPPM

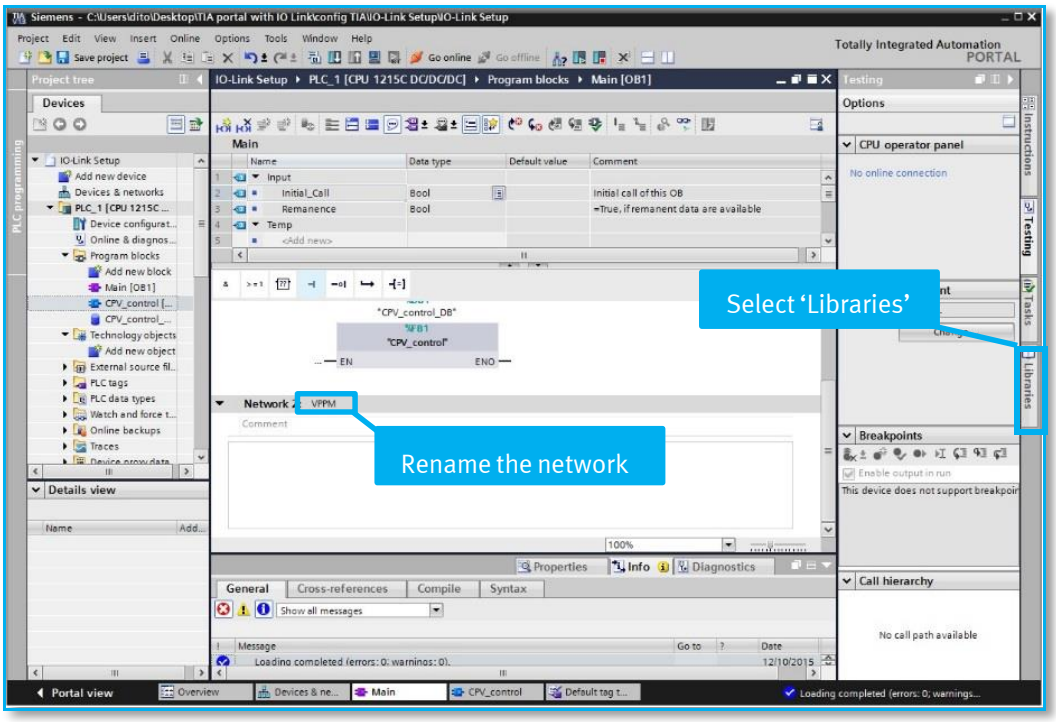


Fig. 60 Starting the implementation of the VPPM

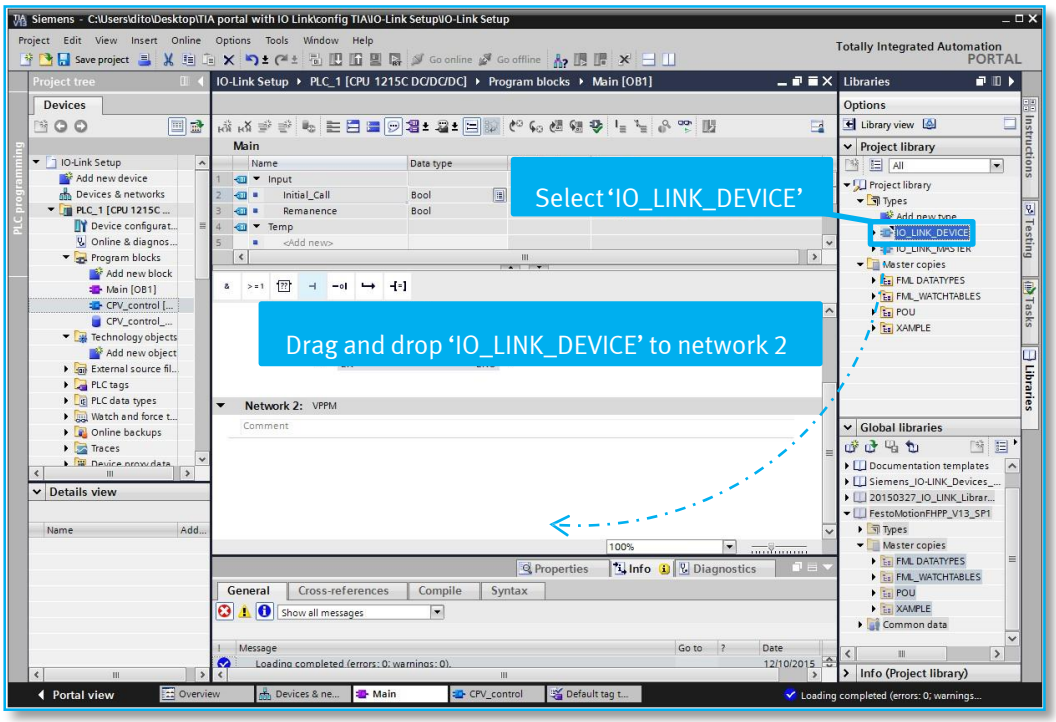


Fig. 61 Implementation of an IO-Link function block

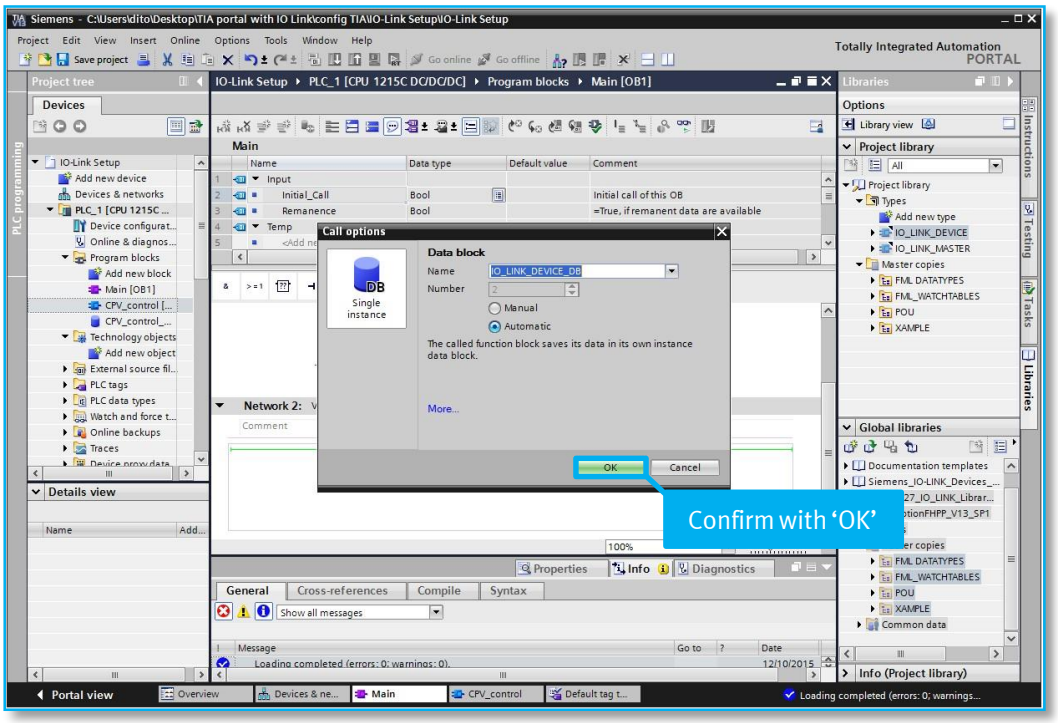


Fig. 62 Data block VPPM

An additional global data block will be created to organize all variable in one data block.

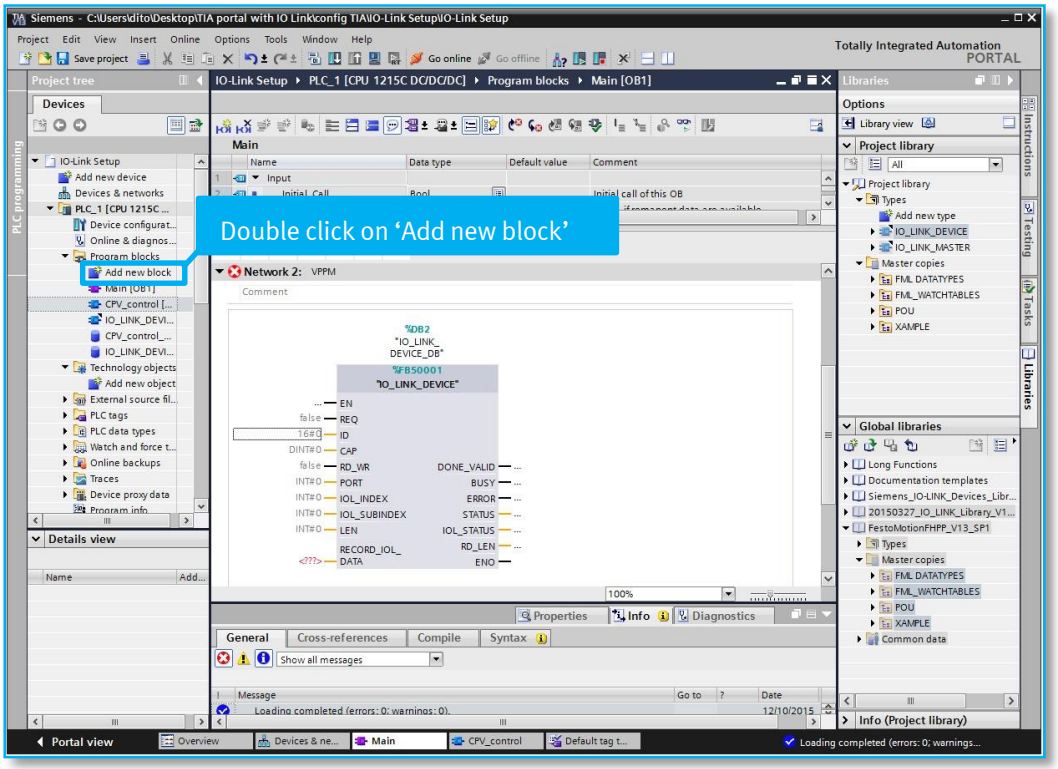


Fig. 63 Creating a global data block

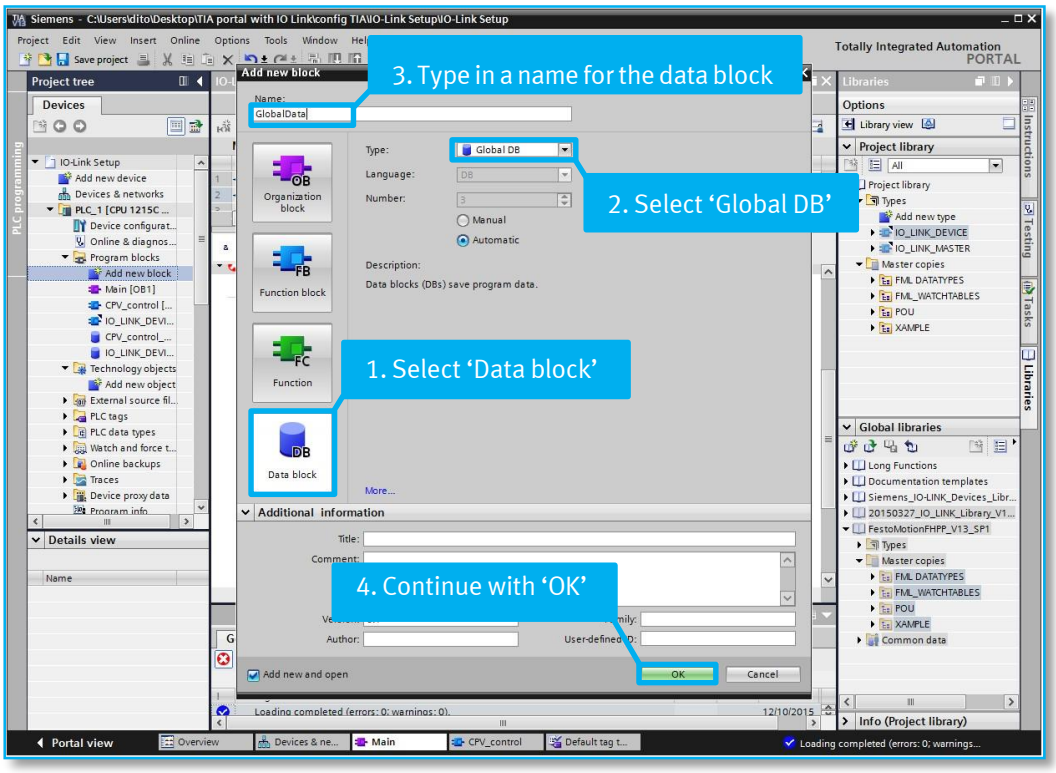


Fig. 64 Configuration global data block

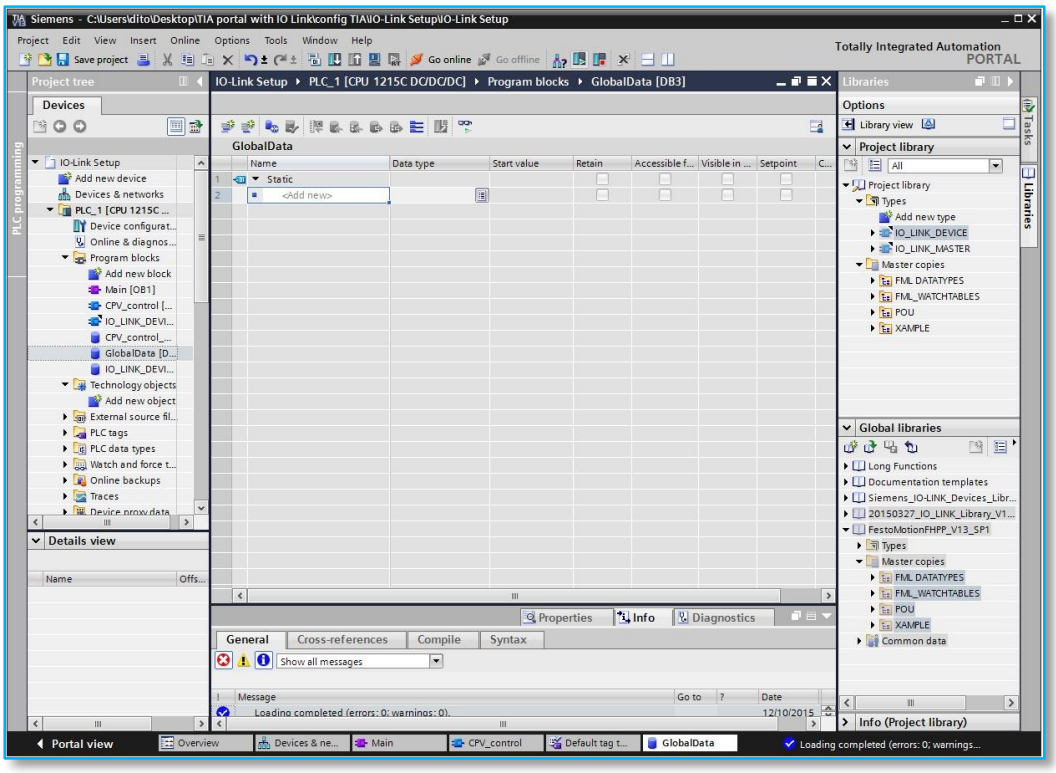


Fig. 65 Global data block

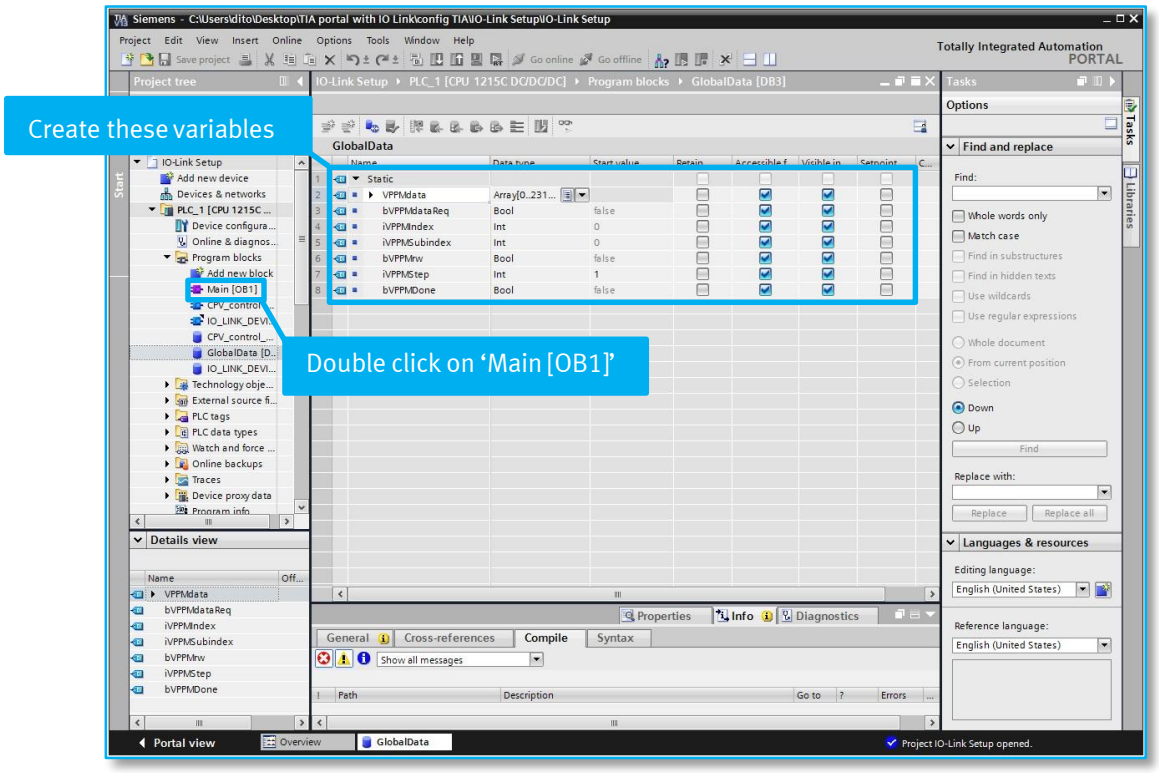


Fig. 66 Creation of the variables for the VPPM

Name	Data type	Default value
VPPMdata	Array[0..231] of Byte	
bVPPMdataReq	Bool	False
iVPPMIndex	Int	0
iVPPMSubindex	Int	0
bVPPMrw	Bool	false
iVPPMStep	Int	1
bVPPMDone	Bool	false

Table 3.1: Global data block variable declaration VPPM

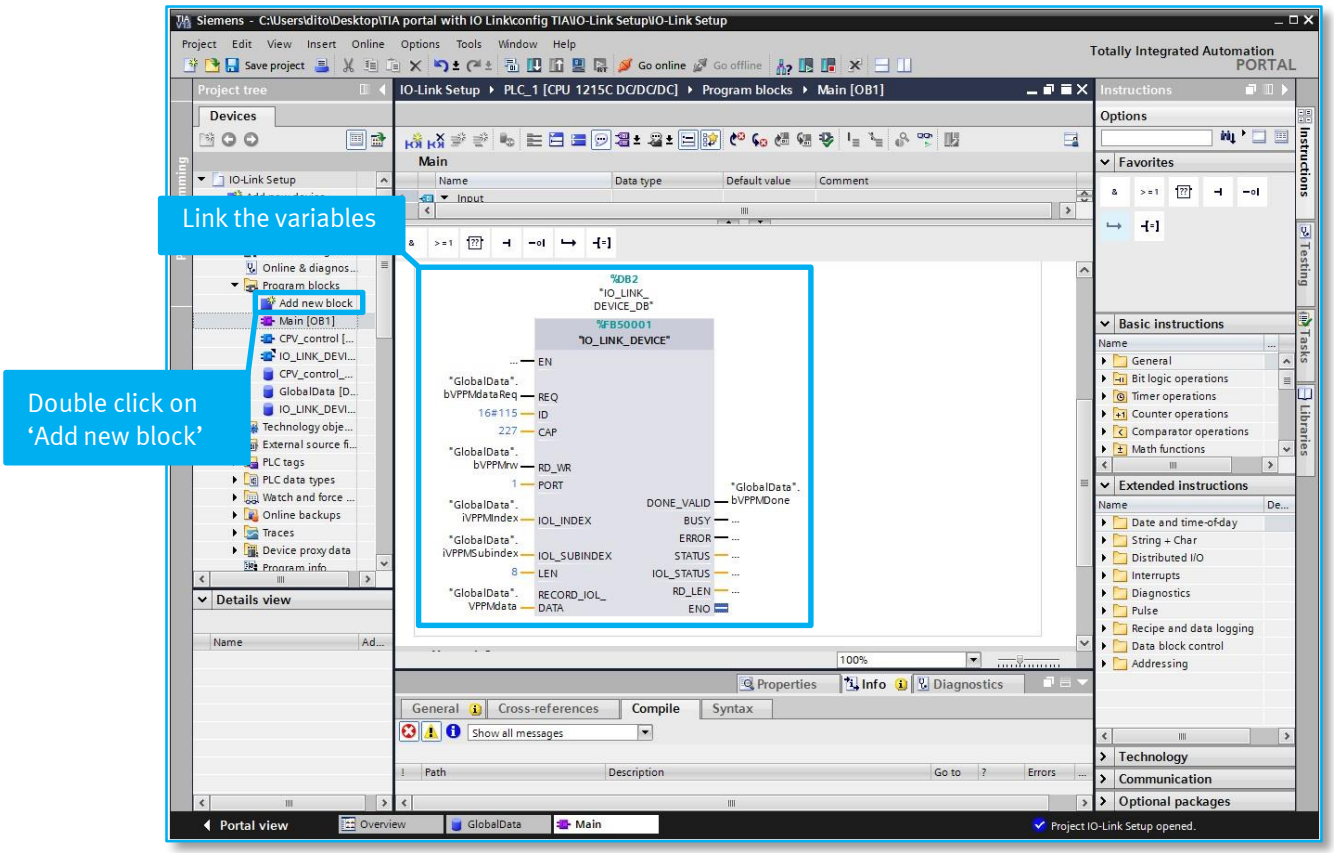


Fig. 67 Link the global variables to the function block

Variable name	Function block assignment
GlobalData.bVPPMdataReq	REQ
16#115	ID
227	CAP
GlobalData.bVPPMrw	RD_WR
1	PORT
GlobalData.iVPPMIndex	IOL_INDEX
GlobalData.iVPPMSubindex	IOL_SUBINDEX
8	LEN
GlobalData.VPPMdata	RECORD_IOL_DATA
GlobalData.bVPPMDone	DONE_VALID

Table 3.2: Assignment list IO_LINK_DEVICE_FB

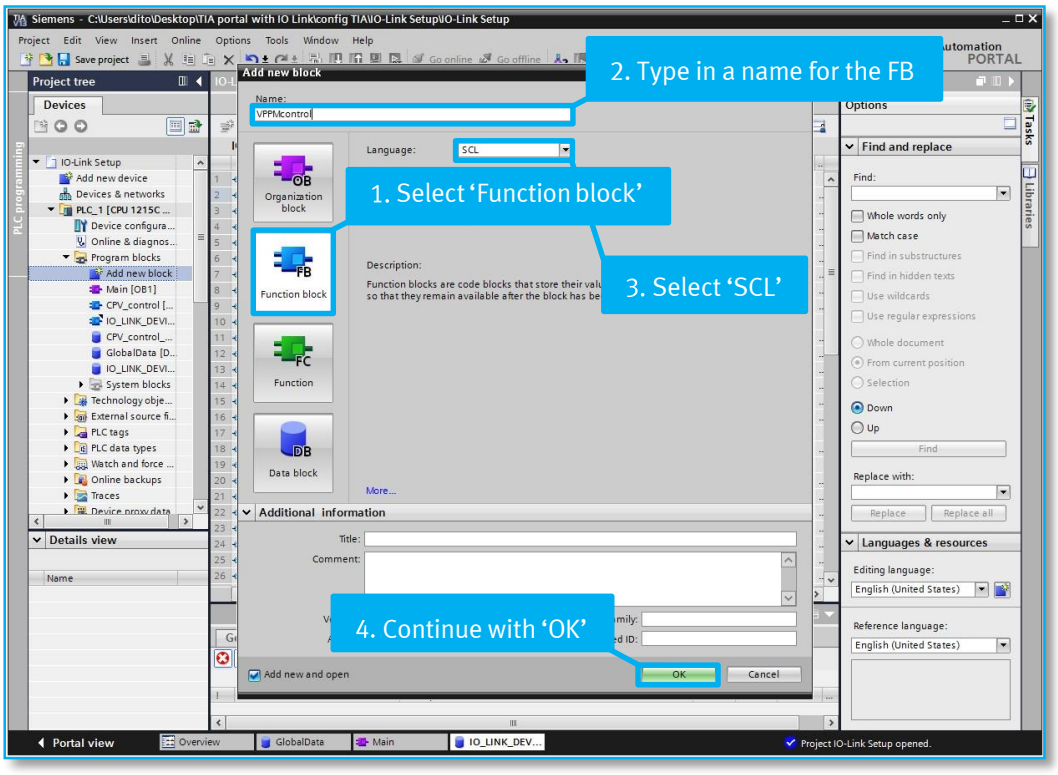


Fig. 68 Creation of a new function block to control the VPPM

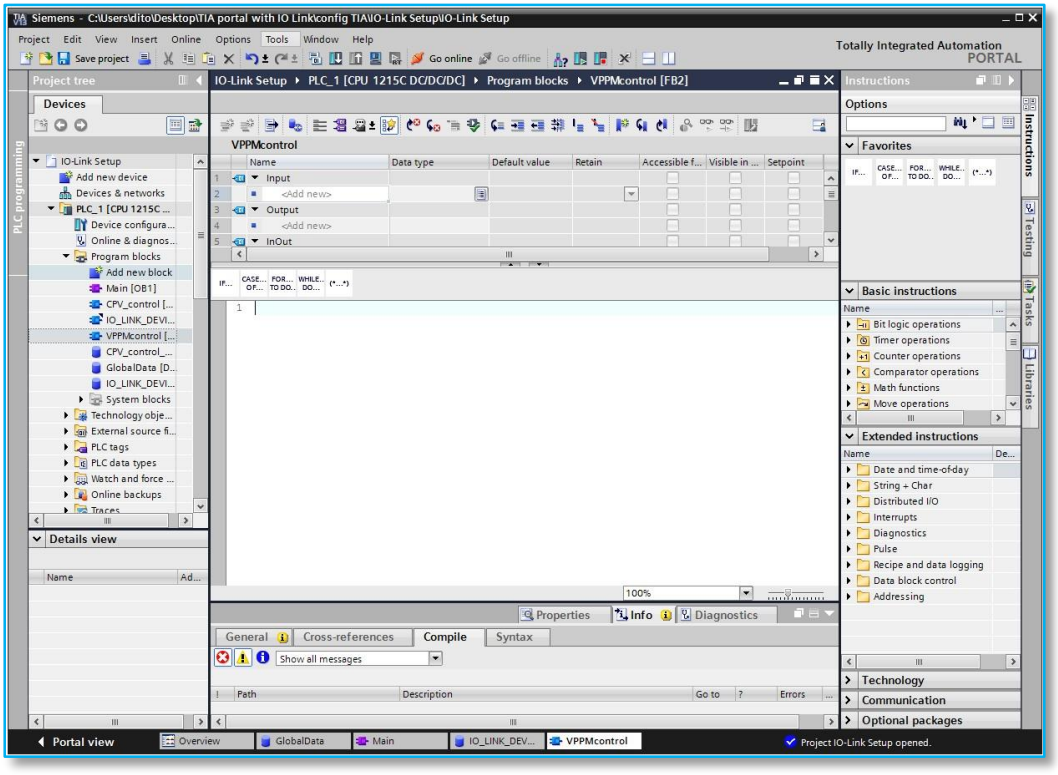


Fig. 69 VPPM control function block

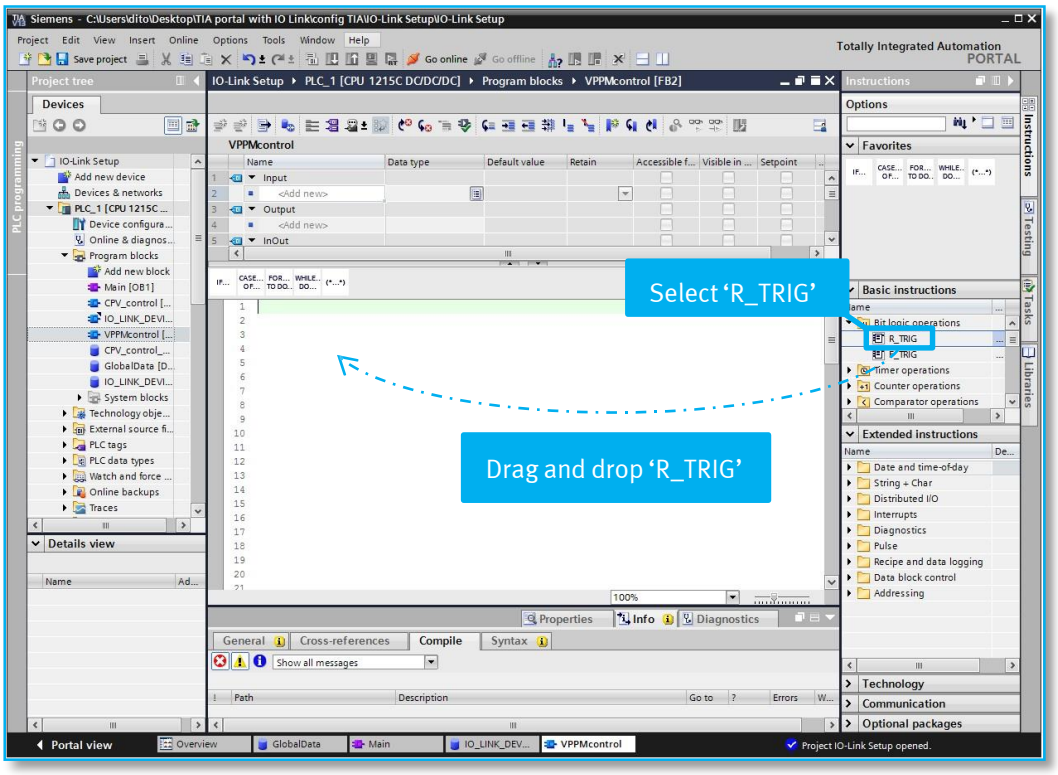


Fig. 70 Implementation of an edge detection

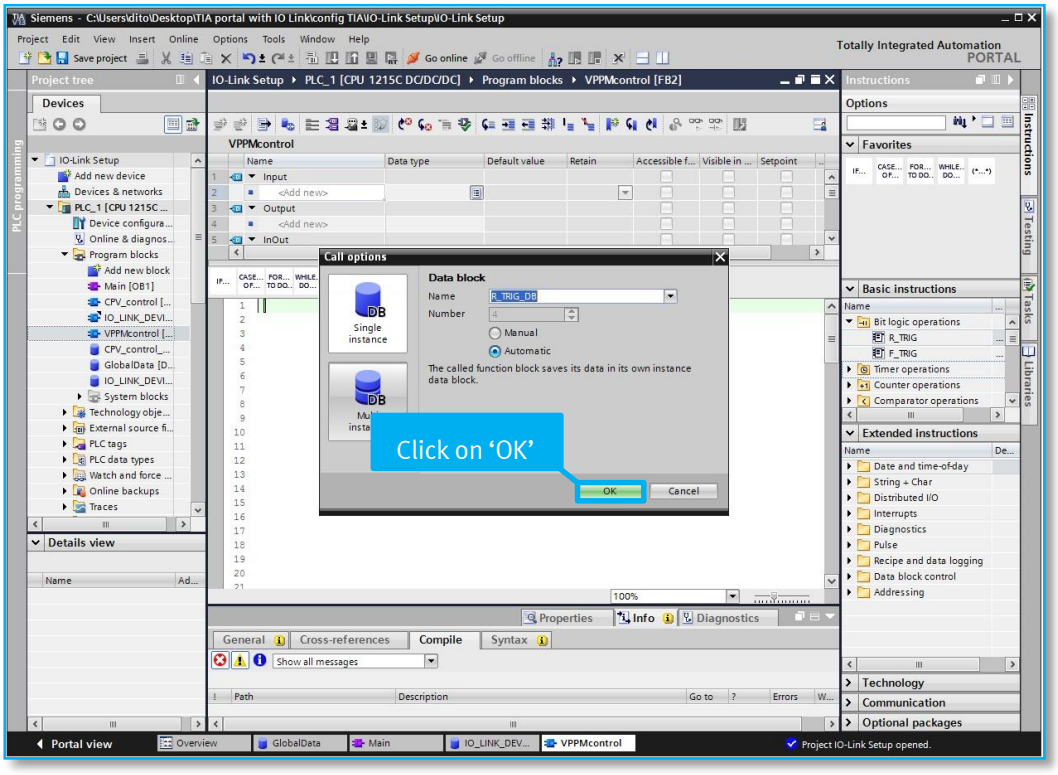


Fig. 71 Data block R_TRIG

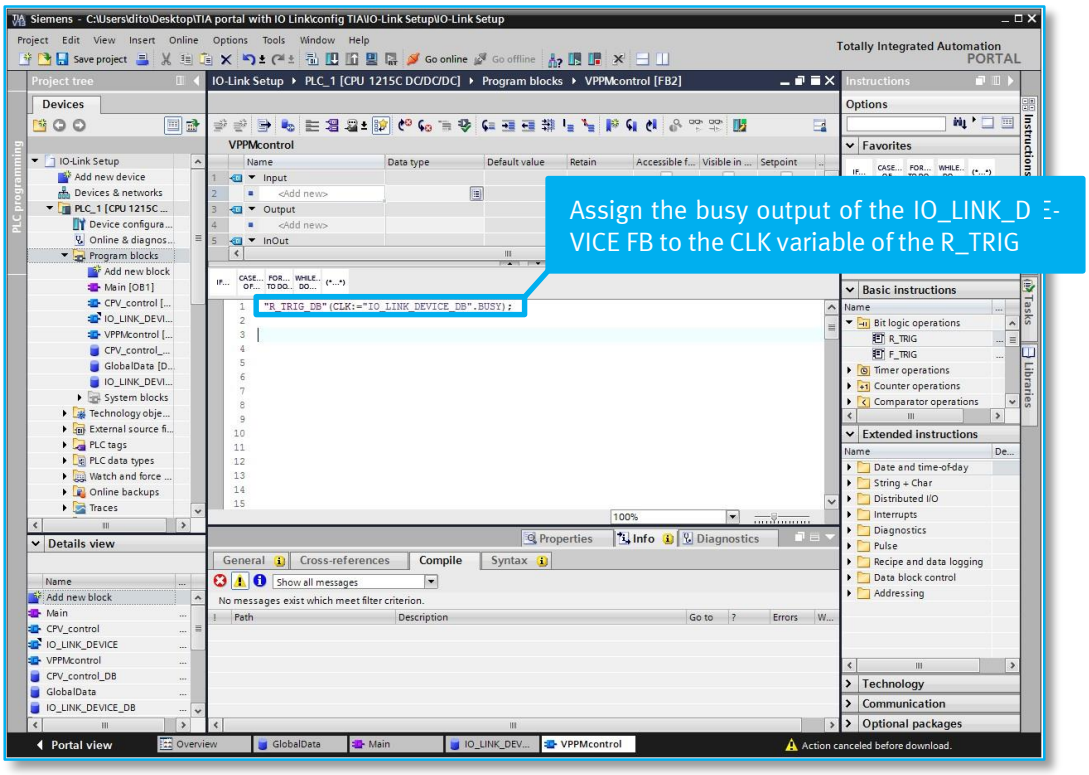


Fig. 72 Variable assignment for the edge detection

Program:

```
"R_TRIG_DB"(CLK:="IO_LINK_DEVICE_DB".BUSY);

CASE "Global-
  Data".iVPP-
  MStep OF 1:
    "GlobalData".iVPPMIndex := 67;
    "GlobalData".iVPPMSubindex := 1;
    "GlobalData".bVPPMrw := true;
    "GlobalData".VPPMdata[0] := 64;      //motoring limits active
    "GlobalData".bVPPMdataReq := true;
    IF "R_TRIG_DB".Q THEN            //positive edge detection
      "GlobalData".iVPPMStep := 10;
    END_IF;

  10:
    IF "R_TRIG_DB".Q THEN
      "GlobalData".bVPPMdataReq := false;
      "GlobalData".iVPPMStep := 20;
    END_IF;

  20:
    "GlobalData".iVPPMIndex := 67;
    "GlobalData".iVPPMSubindex := 3; "GlobalData".bVPPMrw
    := true; "GlobalData".VPPMdata[0]
    := 0;                                  // pressure unit: mbar
    "GlobalData".bVPPMdataReq := true;       // start the transfer

    IF "R_TRIG_DB".Q THEN
    "GlobalData".iVPPMStep := 30;
    END_IF;
```

```
30:
  IF "GlobalData".bVPPMDone THEN "Global-
    Data".bVPPMdataReq := false; "Global-
    Data".iVPPMStep := 40;
  END_IF;

  //low
er up-
per
limit
40:
  "GlobalData".iVPPMIndex := 105;
  "GlobalData".iVPPMSubindex := 0;
  "GlobalData".bVPPMrw := true;
  "GlobalData".VPPMdata[0] := 16#0A;      //write the lower limit: dec->2600
  "GlobalData".VPPMdata[1] := 16#28;      // value has to be split in two bytes

  "GlobalData".bVPPMdataReq := true;

  IF "R_TRIG_DB".Q THEN
    "GlobalData".iVPP-
  MStep := 50; END_IF;

50:
  IF "GlobalData".bVPPMDone THEN "Global-
    Data".bVPPMdataReq := false; "Global-
    Data".iVPPMStep := 60;
  END_IF;

60:
  "GlobalData".iVPPMIndex := 106;
  "GlobalData".iVPPMSubindex := 0;
  "GlobalData".bVPPMrw := true;
  "GlobalData".VPPMdata[0] := 16#0C;      //write the upper limit: dec->3300
  "GlobalData".VPPMdata[1] := 16#E4;      // value has to be split in two bytes
  "GlobalData".bVPPMdataReq := true;

  IF "R_TRIG_DB".Q THEN
    "GlobalData".iVPP-
  MStep := 70; END_IF;

70:
  IF "GlobalData".bVPPMDone THEN "Global-
    Data".bVPPMdataReq := false; "Global-
    Data".iVPPMStep := 80;
  END_IF;

80:
  "wVPPMOut" := 16#BB8;  // setpoint for the pressure value

END_CASE;
```

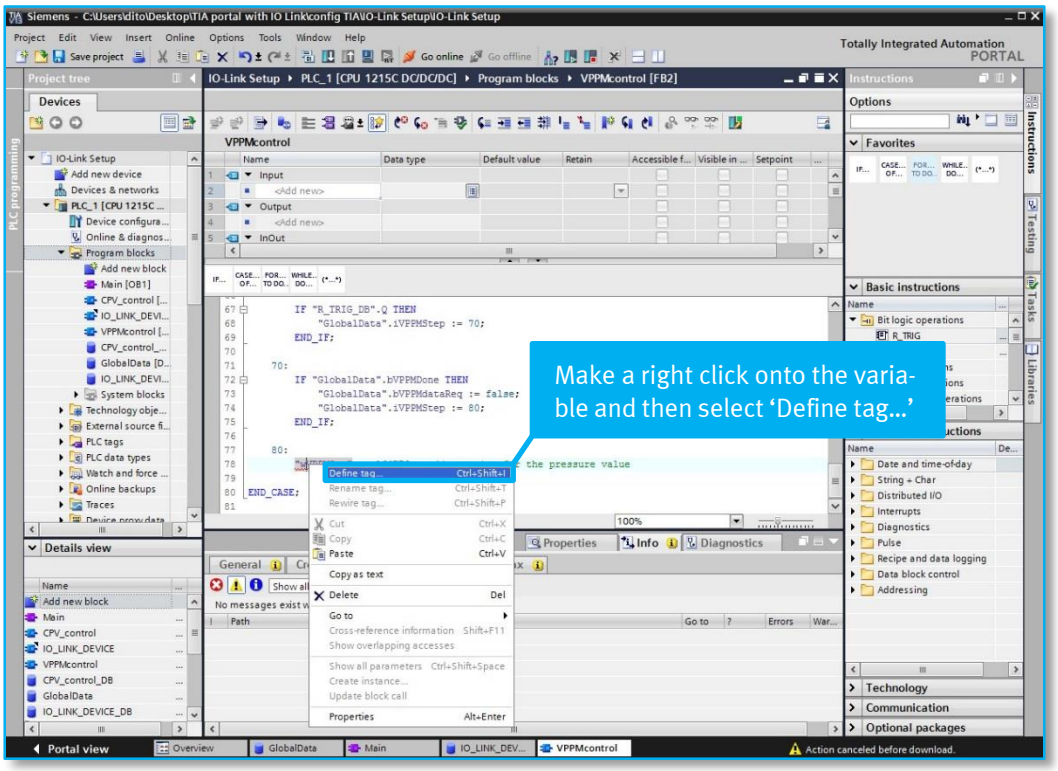


Fig. 73 Definition of the output word for the VPPM

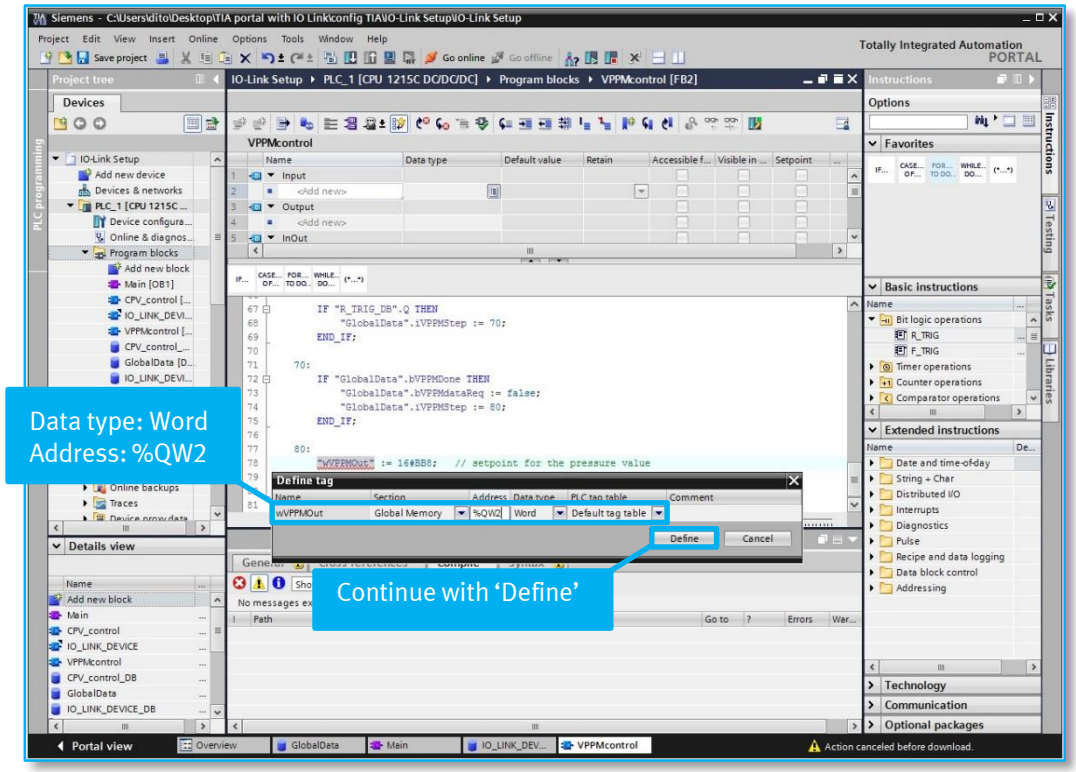


Fig. 74 Assignment of the VPPM output address

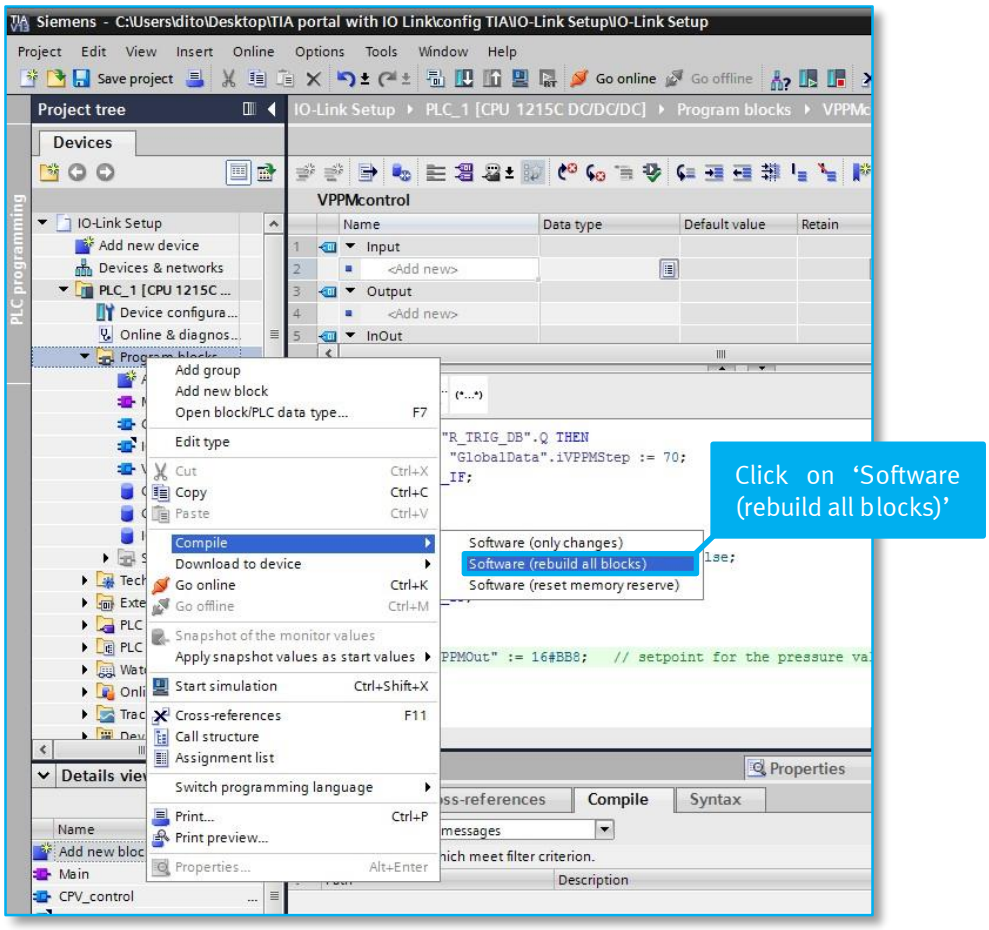


Fig. 75 Compile all blocks

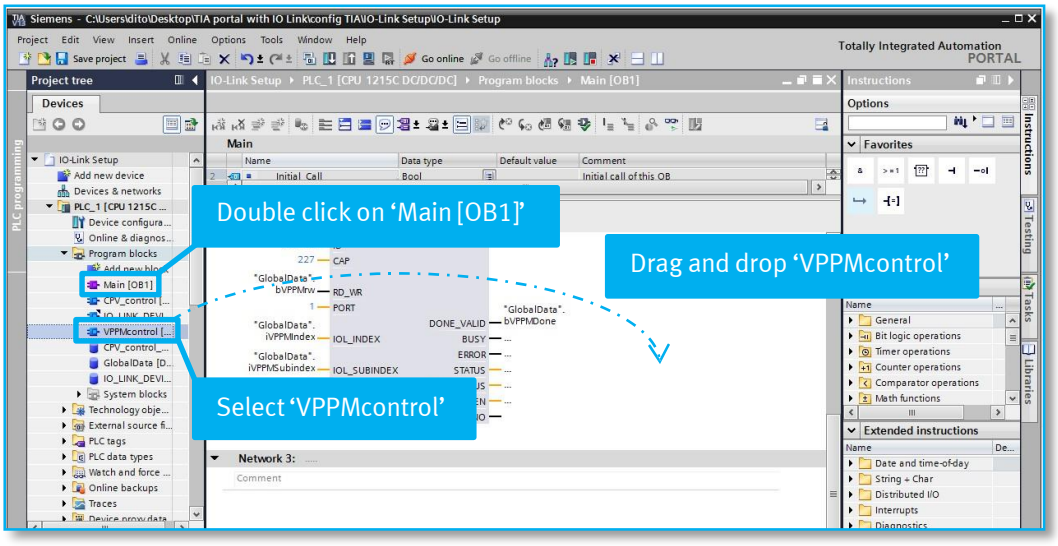


Fig. 76 Calling of the VPPM FB

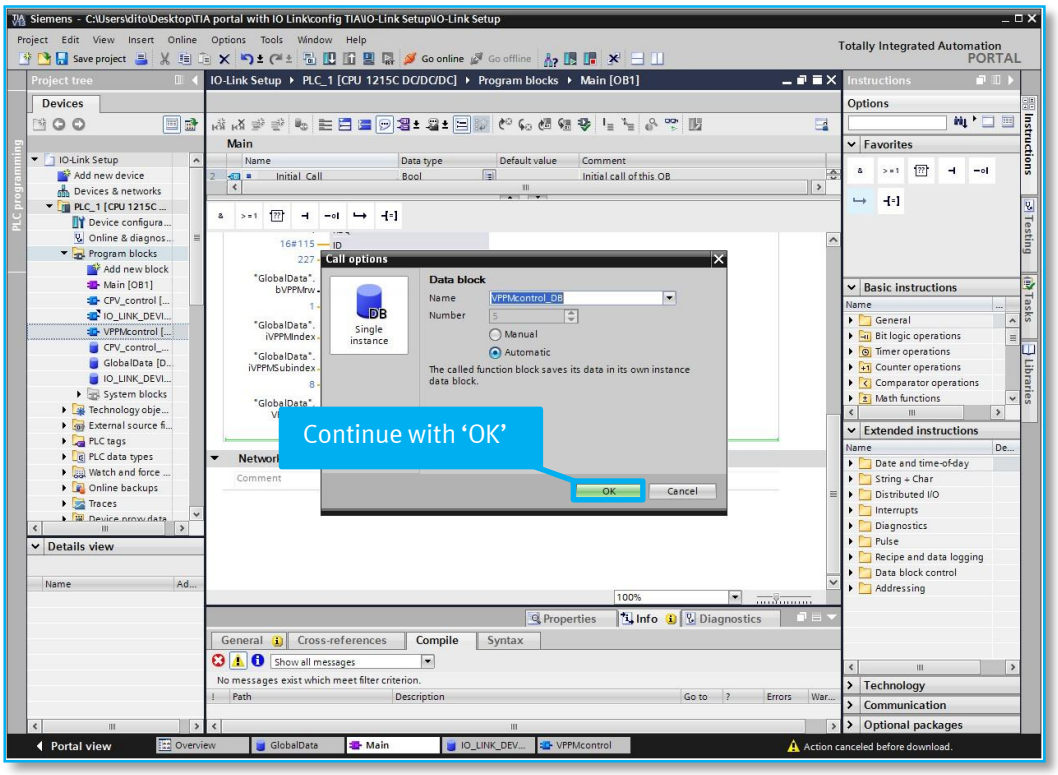


Fig. 77 Creation of a new data block

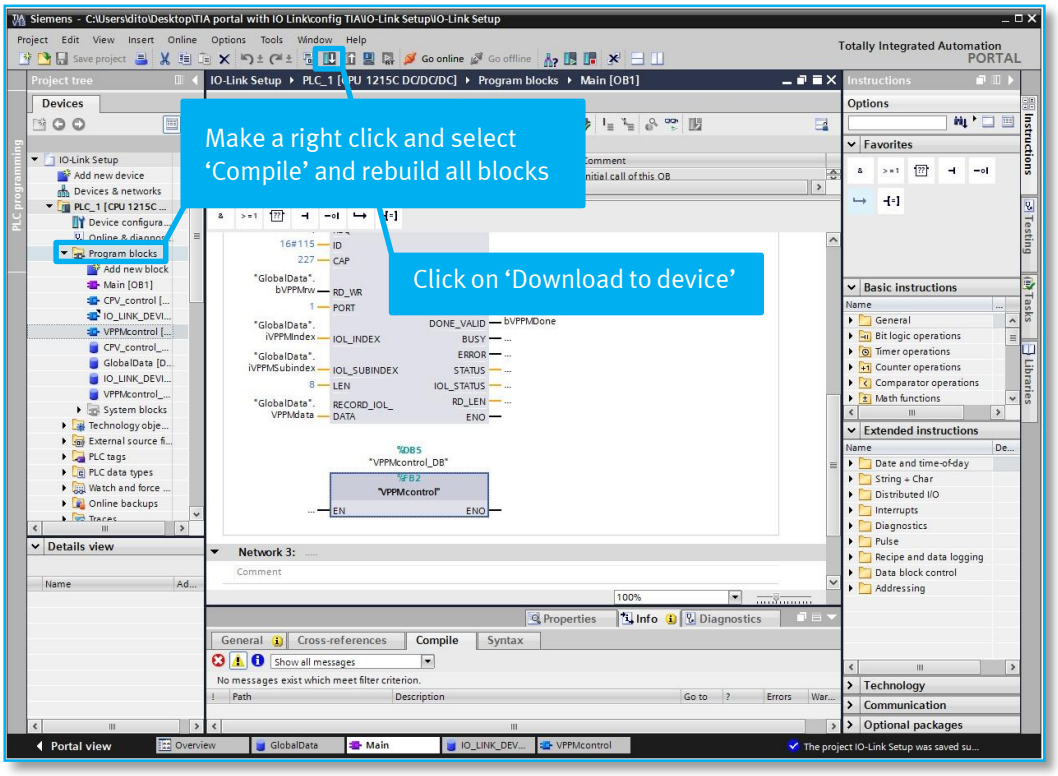


Fig. 78 Compile and going online

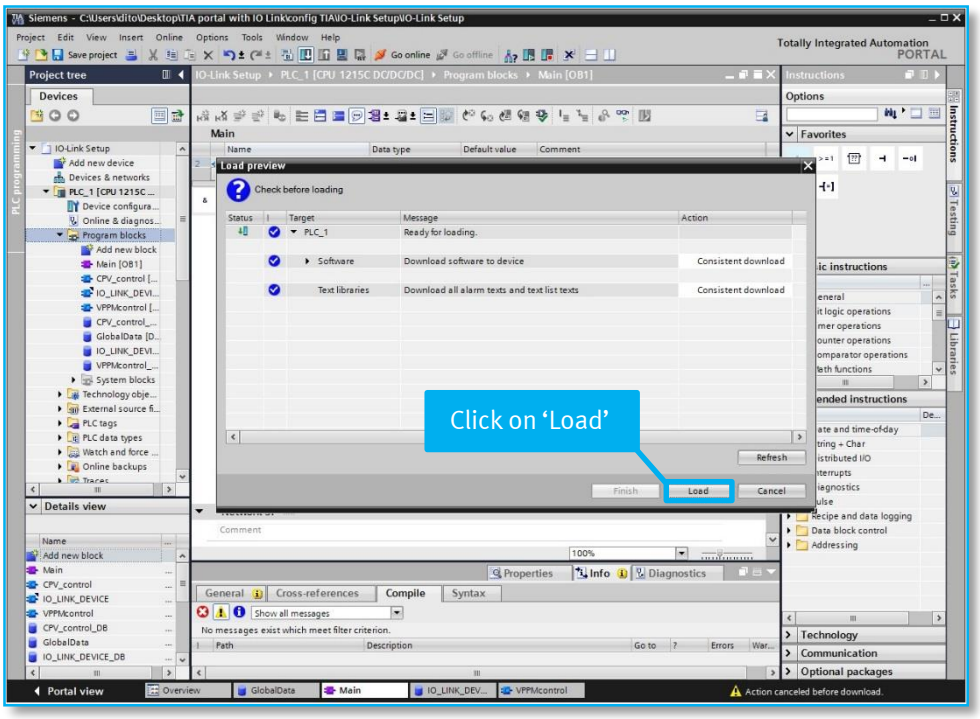


Fig. 79 Load preview

The setpoint of the VPPM can be changed by changing the output word wVPPMout. To watch the cur- rent pressure value, read the input word at the address %IW2. Create a tag in the same way as the out- put tag. Many other parameters can be read or written. Therefore, the index and subindex at the IO- Link device function block have to be changed. Referring to the operating instructions of the VPPM, the parameters 0-7 can be read/written with the index **0x43**. The parameters 8-11 with index **0x68**, param- eters 12-13 with index **0x69** and parameters 14-15 with index **0x6A**. Use the subindex 0 to write param- eters and also use subindex 0 to read all parameters of an index.

3.4 Configuration CMMO_ST

The last device is the CMMO-ST. The CMMO uses the Festo Handling and Positioning Protocol (FHPP). Some basics about the FHPP and documentations can be found in the support portal. The CMMO is connected to the ERMO (connected with a motor and an encoder cable) which has to be parameterized first. Therefore open the Festo Configuration Tool. Create a new project and configure the project as follows. Only the necessary parameters are shown. The other parameters can be left with the default value.

Configuration→	Controller:	Controller type: **CMMO_ST-C5-1-LKP**
Configuration→	Axis Motor Unit:	Type: **ERMO-25-ST-E (unlimited)** Brake: **No** Encoder: **Yes**
Application Data→	Operation Modes:	Control Interface: **IO-Link** Used functions: **Record Sequence** Comparators: **Position**
Application Data→	Environment:	Base load: **0.0 kgcm²** (if nothing is mounted on the ERMO)
Axis→	Axis Options:	Homing Switch Type: **None**
Axis→ Homing→	Method:	Homing Method: Target: **Current Position**
Fieldbus→	Operation Parameters:	Interface Parameters: Device Profile: **FHPP Standard +FPC**
Record table→	Basic Data:	No.:**1** Type: **PRN** Target: **2.000r** Start Condition: **Ignore** Velocity: **60.000rpm** Accl./Decel.: **1300rpm/s**

Establish the connection, download the parameterization and store it in the CMMO.

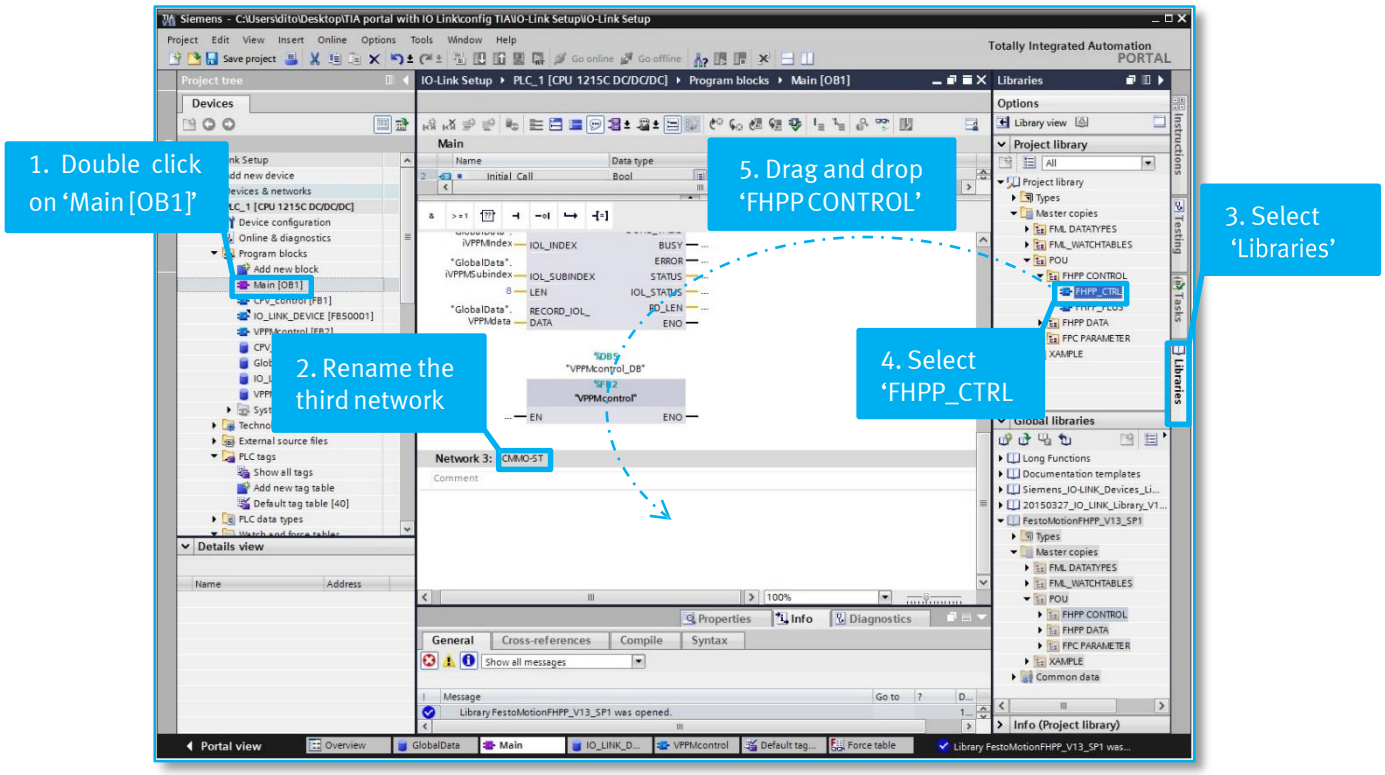


Fig. 80 Rename the third network

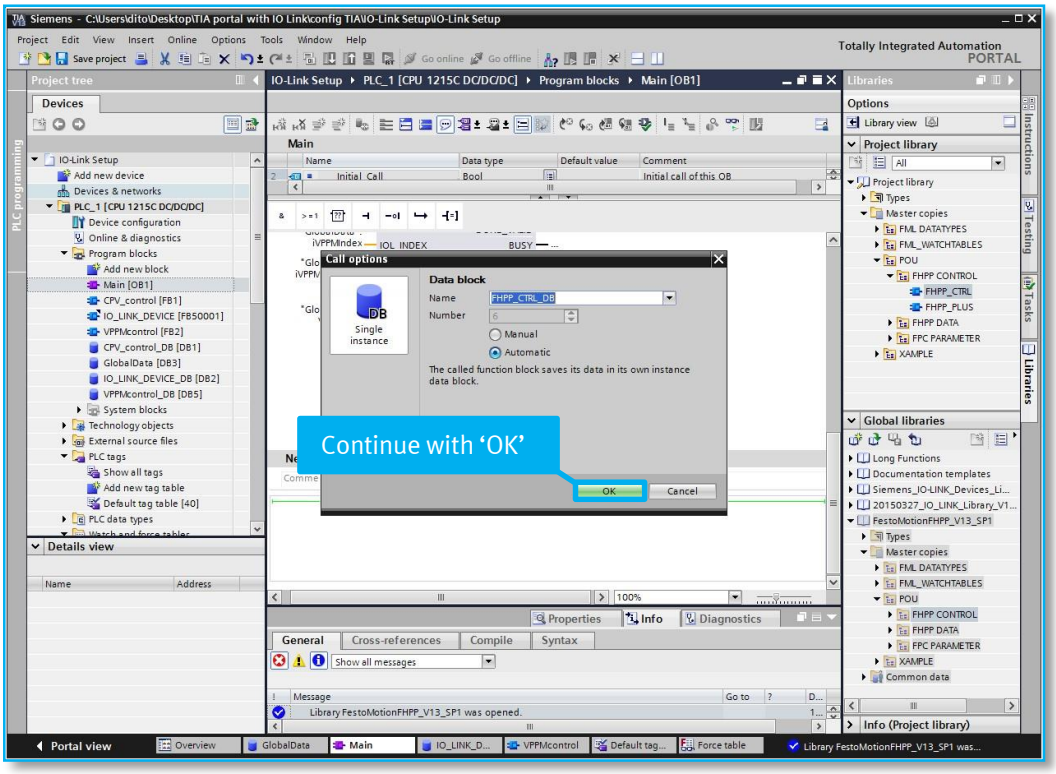


Fig. 81 Data block for the FHPP_CTRL

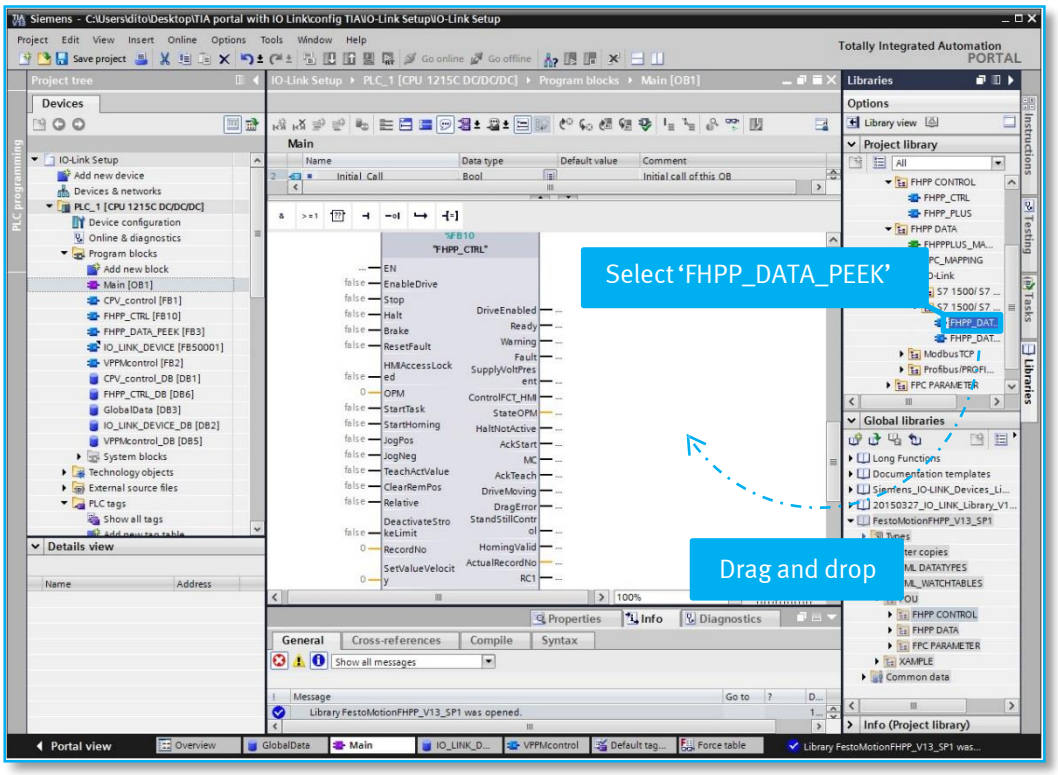


Fig. 82 FHPP_DATA_PEEK block

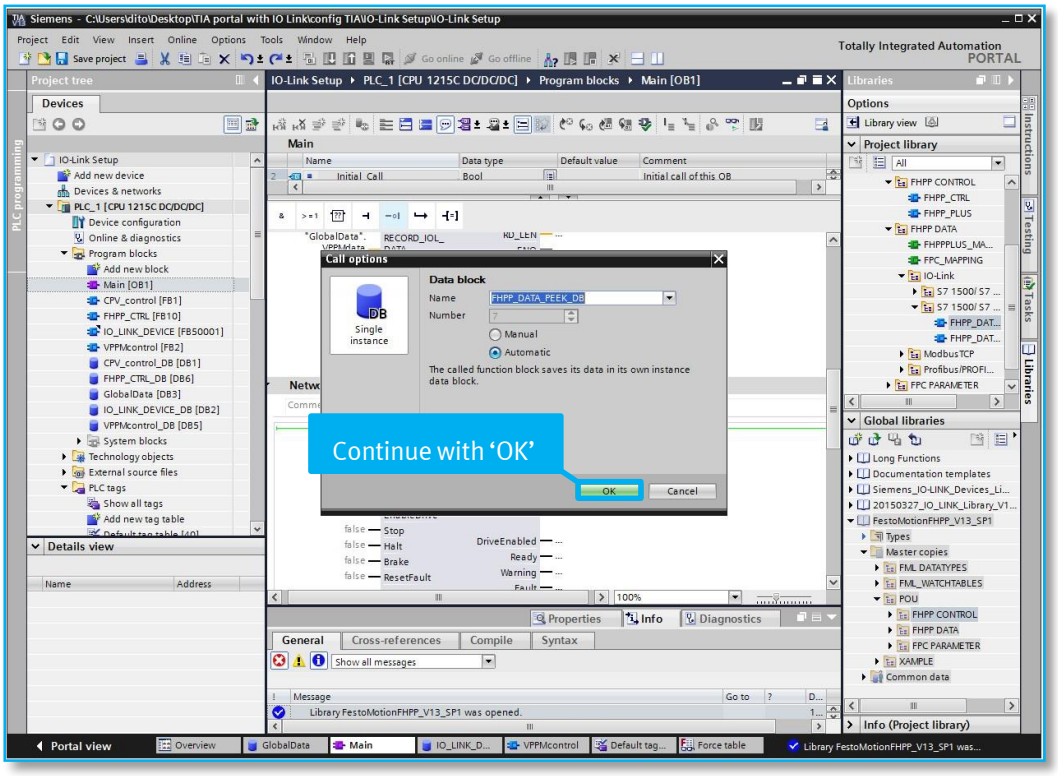


Fig. 83 Creation of FHPP_DATA_PEEK DB

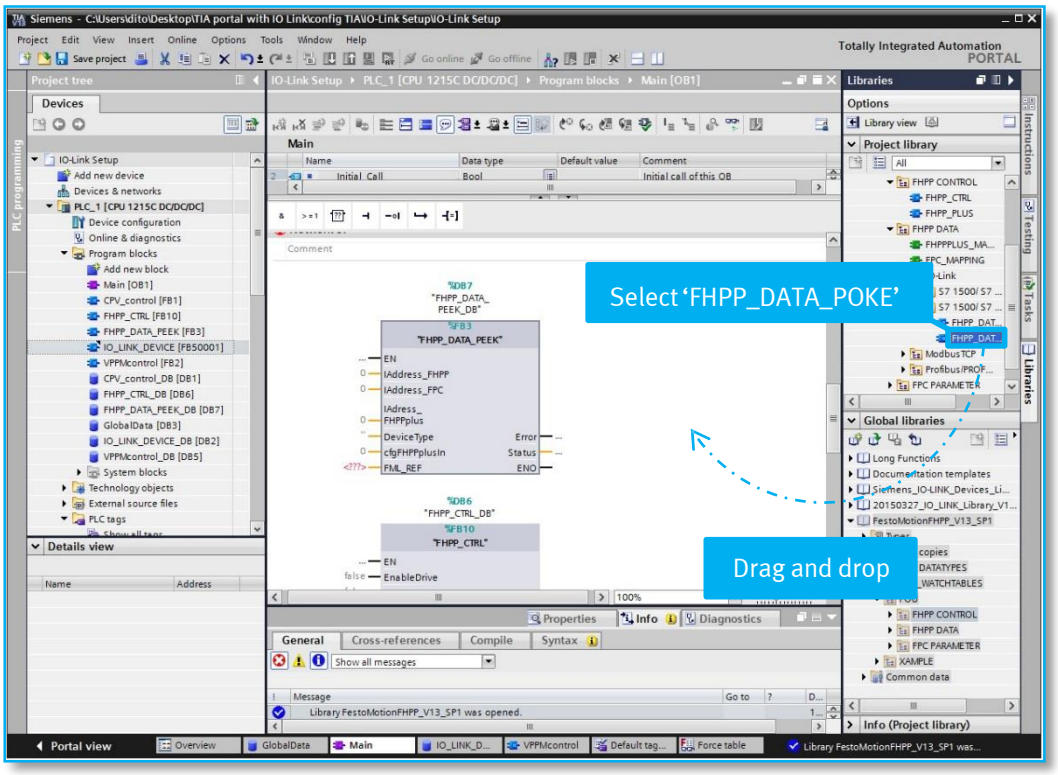


Fig. 84 FHPP_DATA_POKE

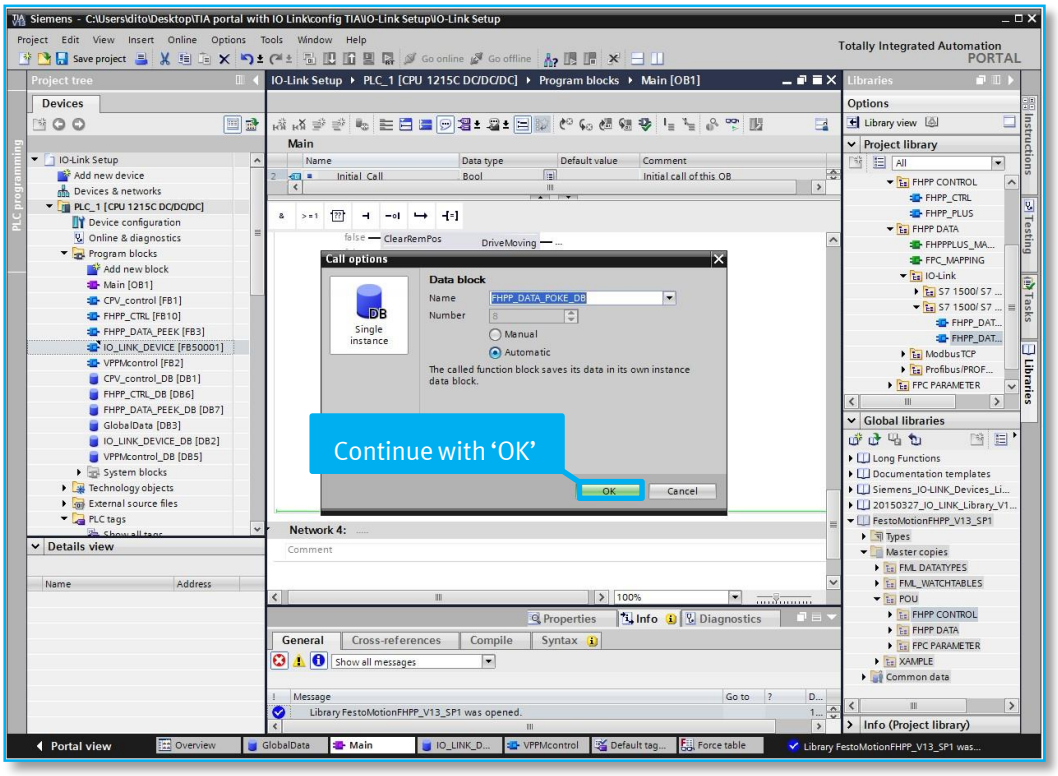


Fig. 85 Creation of the FHPP_DATA_POKE DB

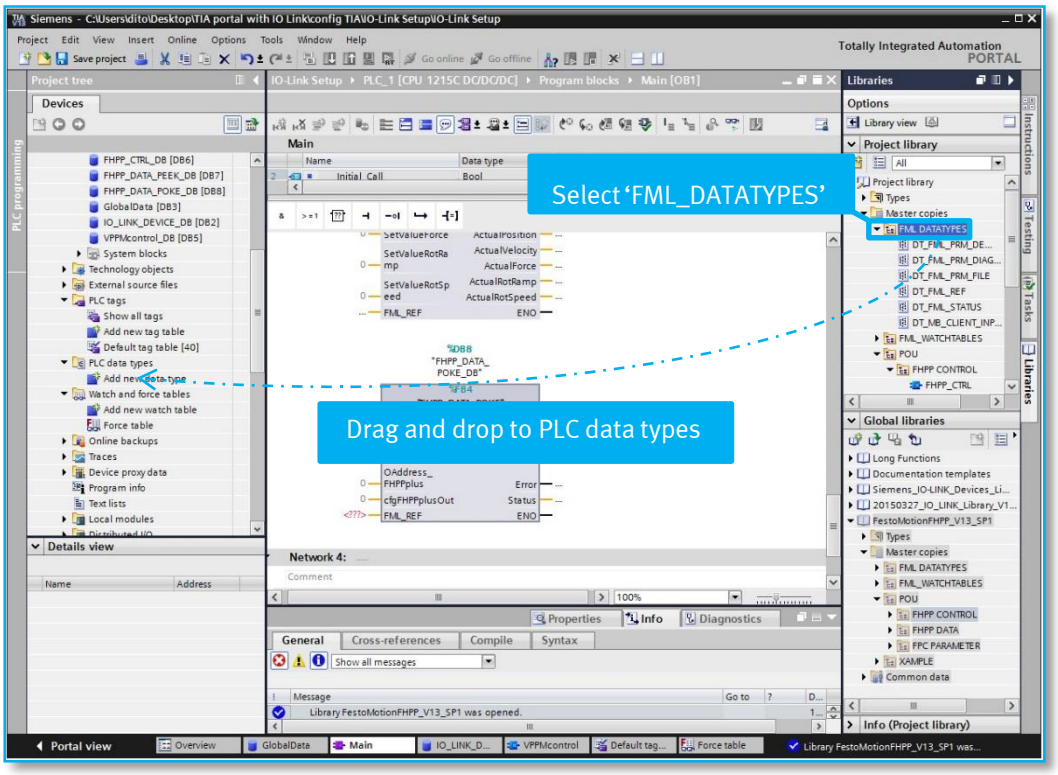


Fig. 86 Implementation of several FHPP data types

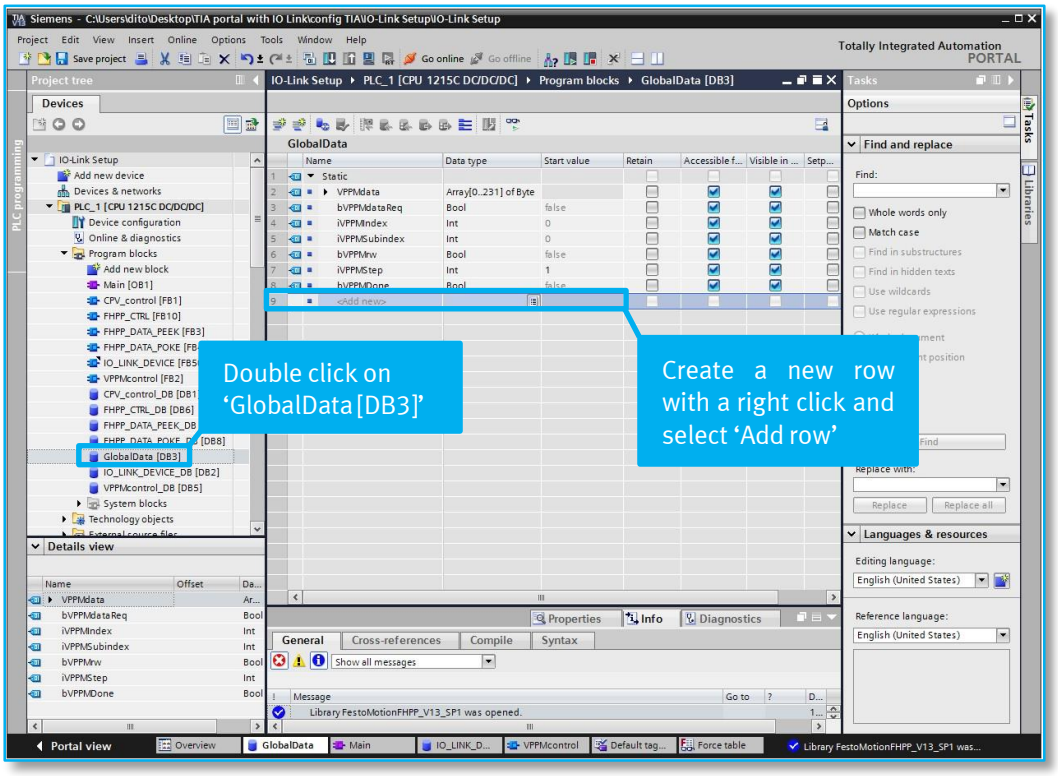


Fig. 87 Adding a new variable

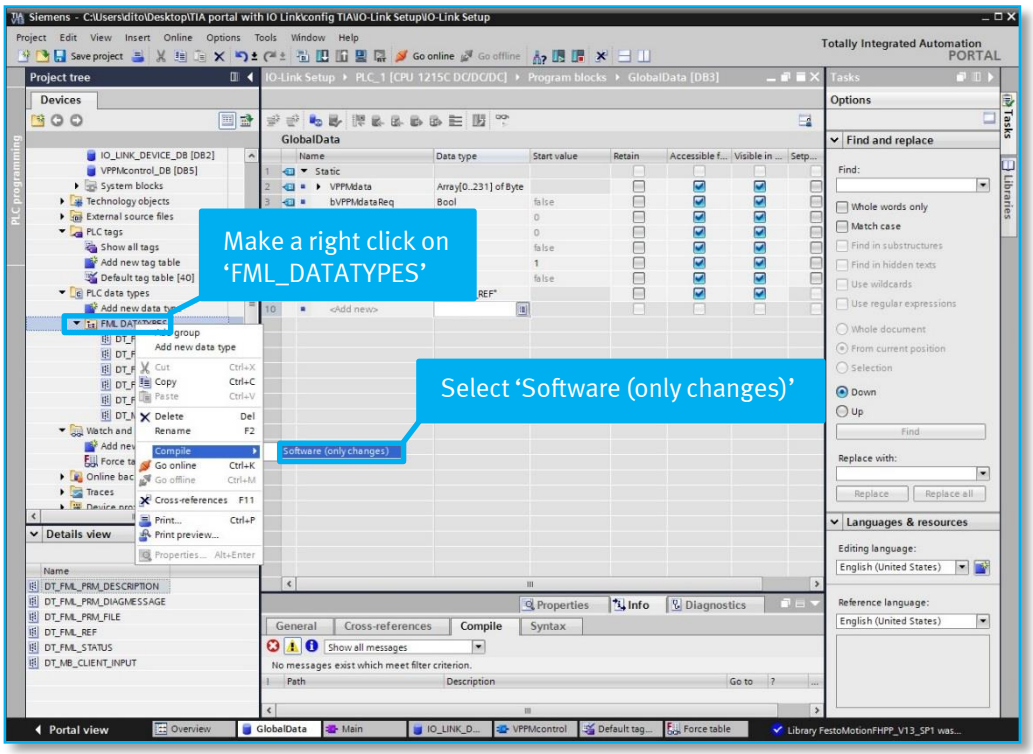


Fig. 88 Adding a DT_FML_REF data element

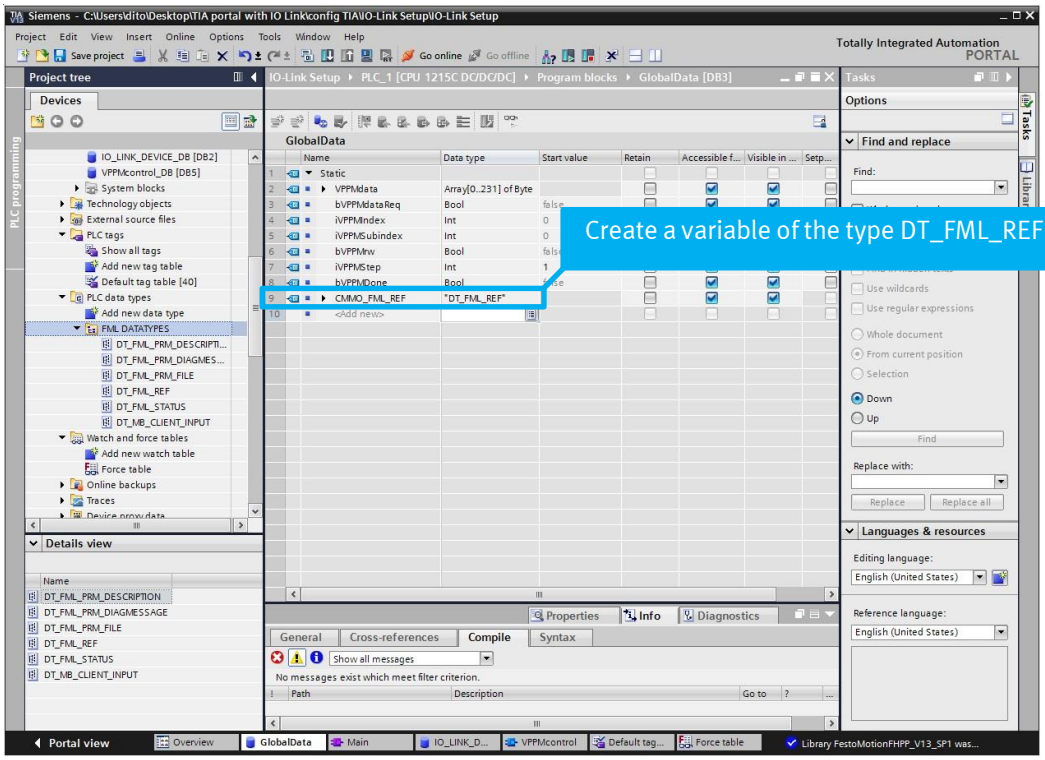


Fig. 89 Adding a DT_FML_REF data element

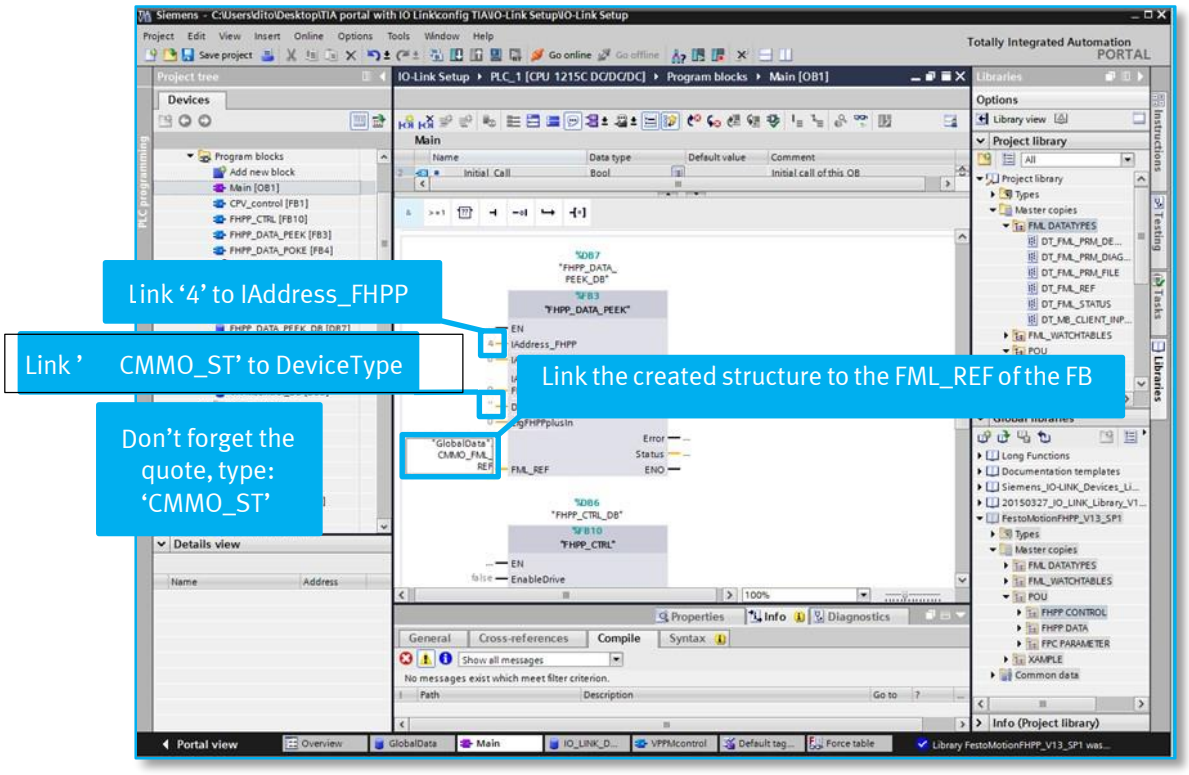


Fig. 90 Linkage of the FML_REF structure to the FB

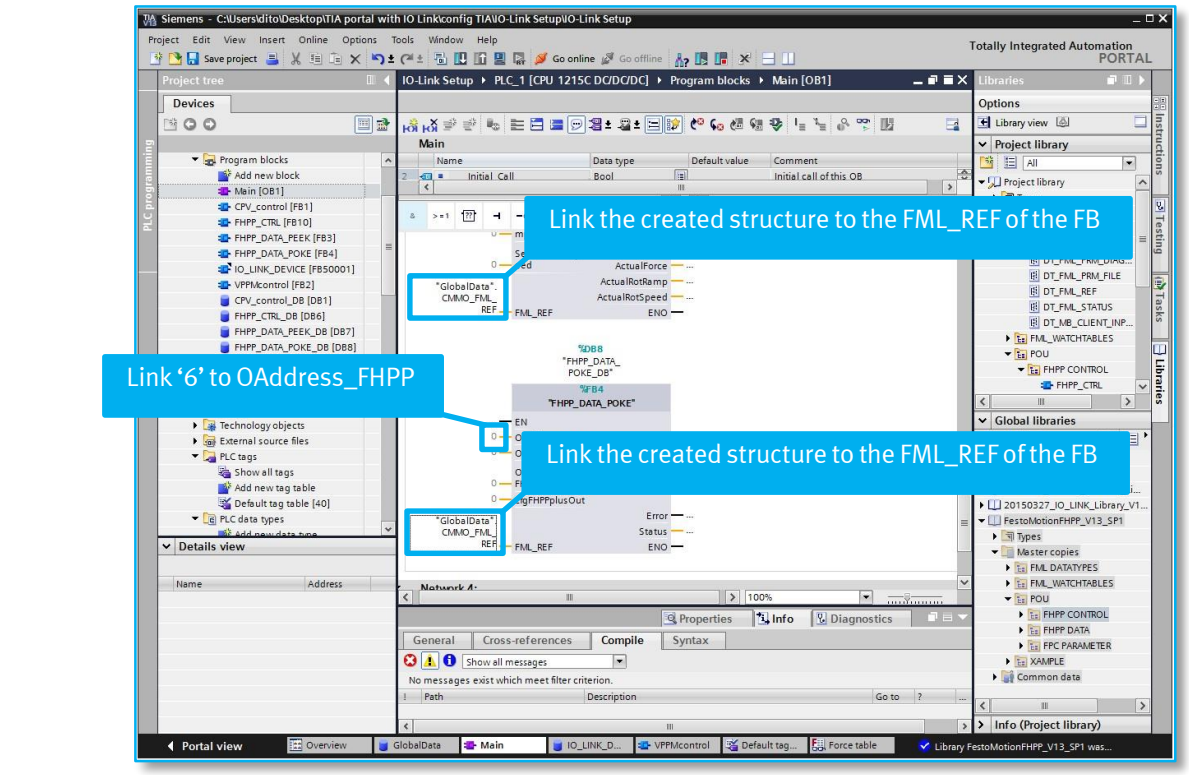


Fig. 91 Linkage of the other structures to the FBs

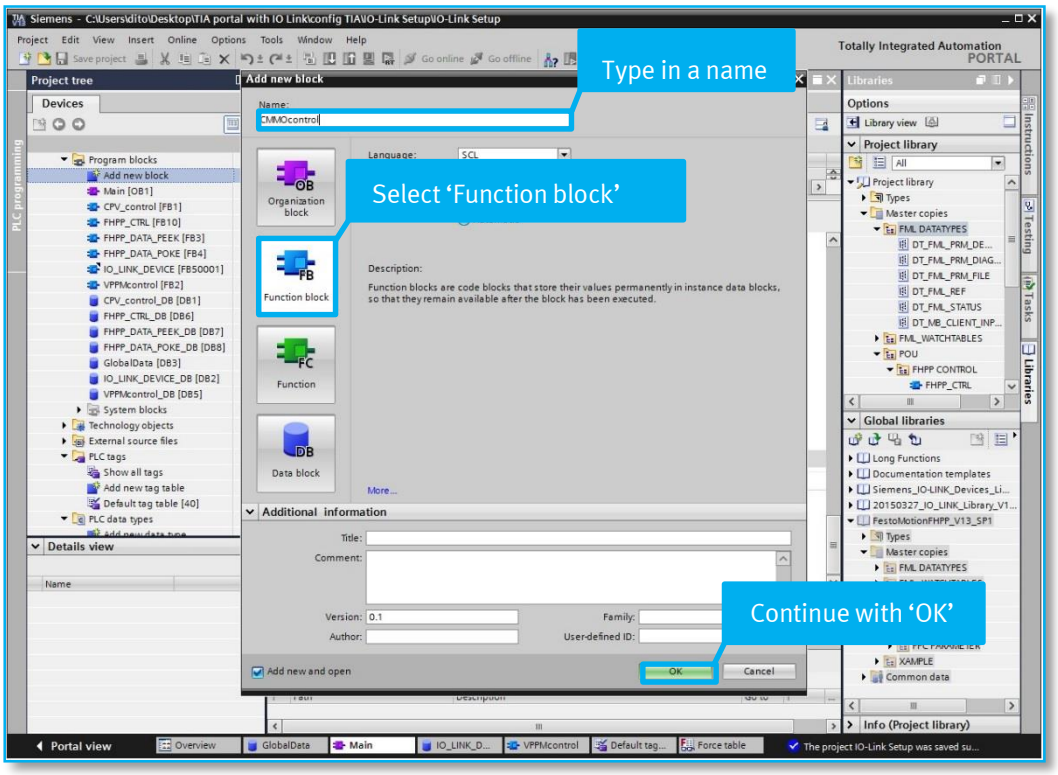


Fig. 92 Creation of the CMMO control FB

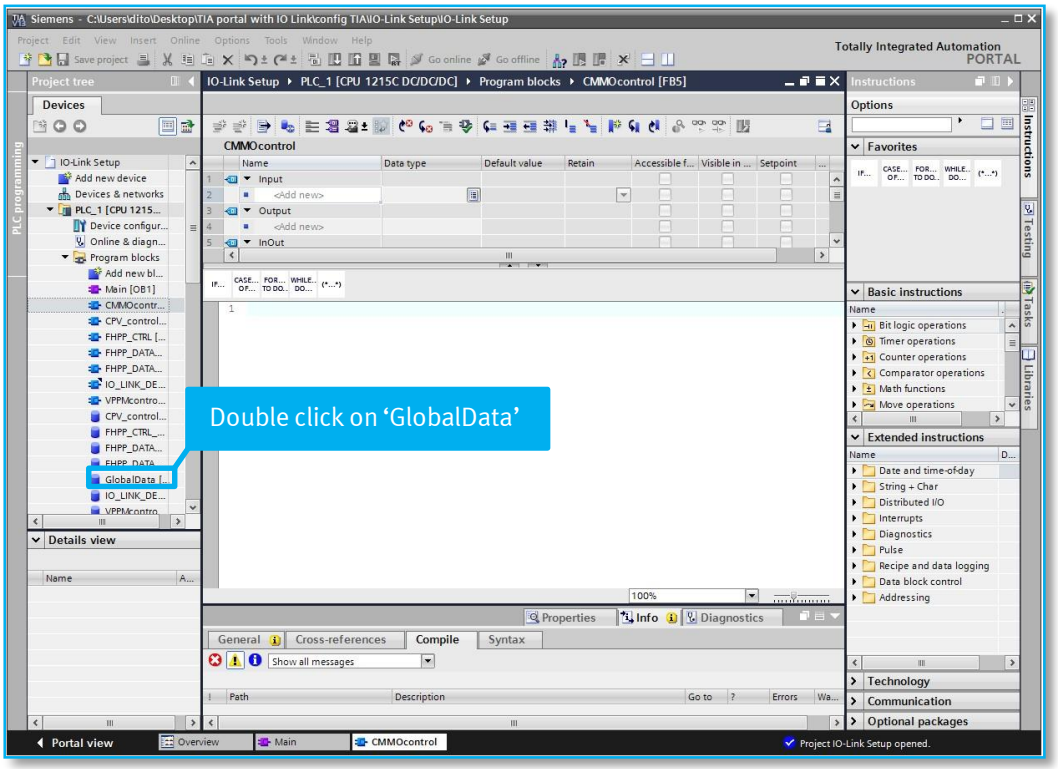


Fig. 93 Created CMMO control FB

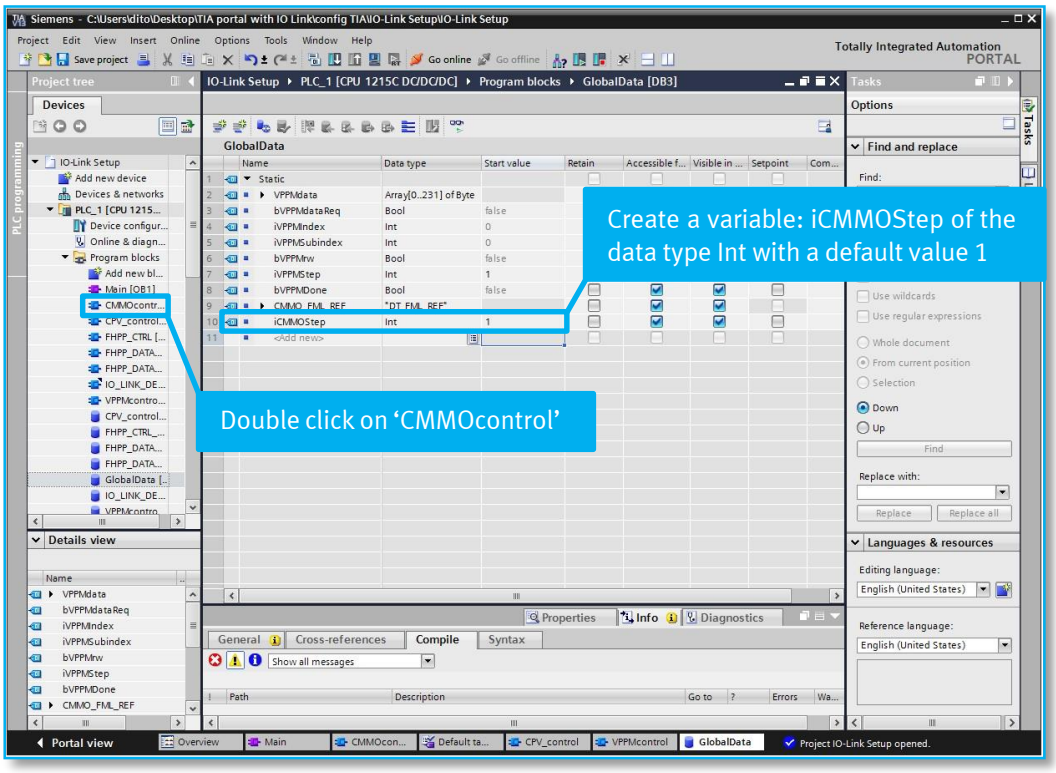


Fig. 94 Adding a step variable for the CMMO FB

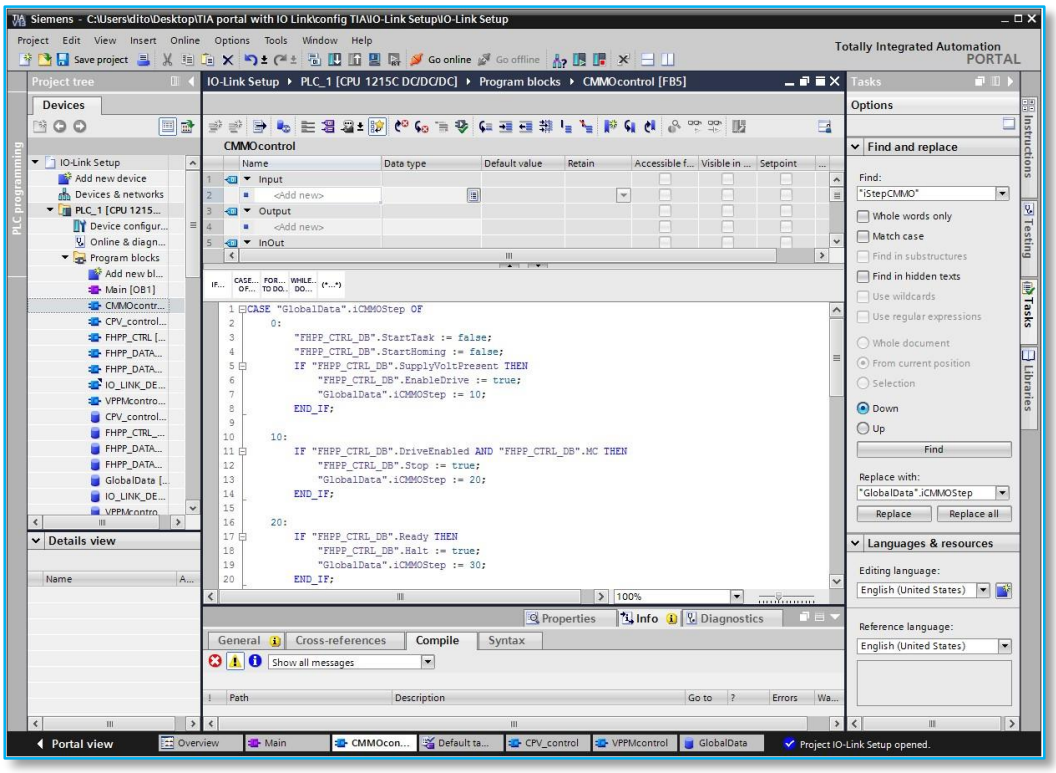


Fig. 95 Program to run the ERMO

The following code can be used to run the ERMO:

```
CASE "GlobalData".iCMMOStep OF                  // creating a sequence
  1:


    "FHPP_CTRL_DB".StartHoming := false;
    IF "FHPP_CTRL_DB".SupplyVoltPresent THEN
      "FHPP_CTRL_DB".EnableDrive := true;     //enable the drive
      "GlobalData".iCMMOStep := 10;          // go to the step 10
    END_IF;


  10:
    IF "FHPP_CTRL_DB".DriveEnabled AND "FHPP_CTRL_DB".MC THEN
      "FHPP_CTRL_DB".Stop := true;
      "GlobalData".iCMMOStep := 20;
    END_IF;


  20:
    IF "FHPP_CTRL_DB".Ready THEN
      "FHPP_CTRL_DB".Halt := true;
      "FHPP_CTRL_DB".StartHoming := true;
      "GlobalData".iCMMOStep := 30;
    END_IF;


  30:
    IF "FHPP_CTRL_DB".HomingValid THEN      //check if the homing is already done
      "FHPP_CTRL_DB".StartHoming := false;
      "GlobalData".iCMMOStep := 40;
    ELSE
      "FHPP_CTRL_DB".StartHoming := false;
      "GlobalData".iCMMOStep := 20;
    END_IF;
  40:
    FHPP_CTRL_DB".OPM := 0;           // operation mode set selection =0
    "FHPP_CTRL_DB".RecordNo := 1;   //select record number 1 from the record table in FCT
    "GlobalData".iCMMOStep := 50;


  50:
    IF ("FHPP_CTRL_DB".StateOPM = 0) THEN
      "FHPP_CTRL_DB".StartTask := true;
      "GlobalData".iCMMOStep := 60;
    END_IF;


  60:
    IF "FHPP_CTRL_DB".AckStart THEN
      "FHPP_CTRL_DB".StartTask := false;
      "GlobalData".iCMMOStep := 70;
    END_IF;


  70:
    IF NOT "FHPP_CTRL_DB".AckStart AND "FHPP_CTRL_DB".MC THEN
      "GlobalData".iC-
    MMOStep := 80;
    END_IF;


  80:
     IF "trig" THEN              // if trig is changed to 1, the same sequence starts again from step 30
    "trig" := false;
      "GlobalData".iCMMOStep := 30;
    END_IF;
END_CASE;
```

The tag 'trig' has to be defined. Therefore make a right click on the variable and select 'Define tag ...'. Select 'Bool' as the data type and confirm with 'Define'.

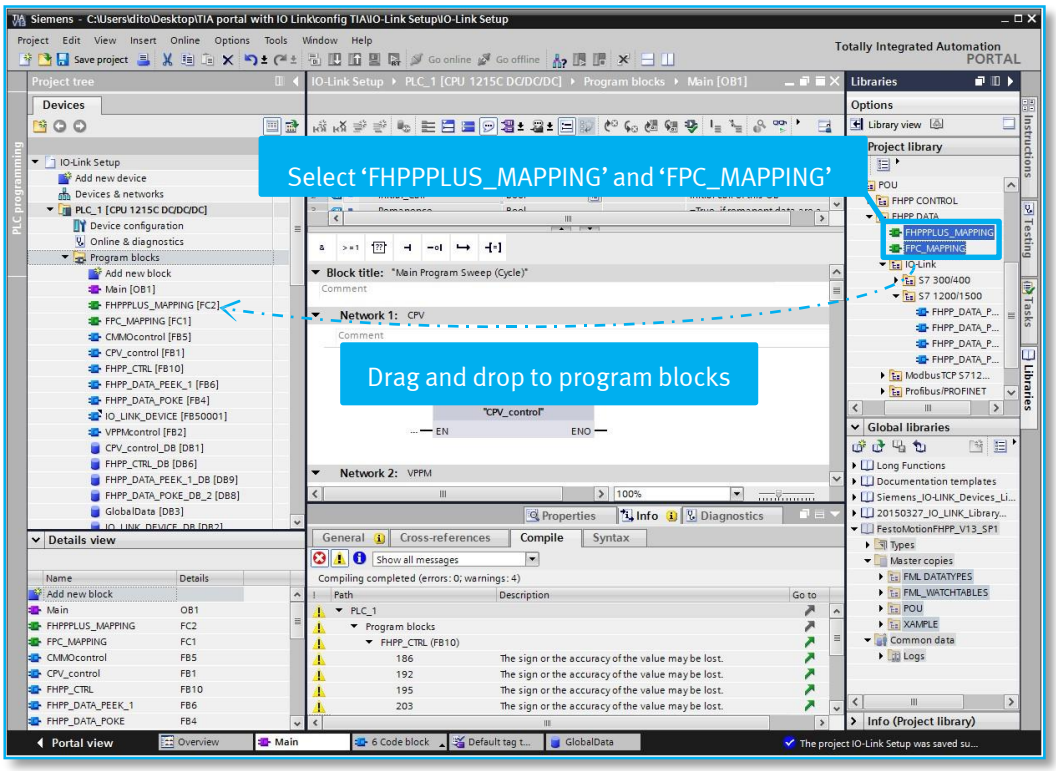


Fig. 96 Adding two reference functions

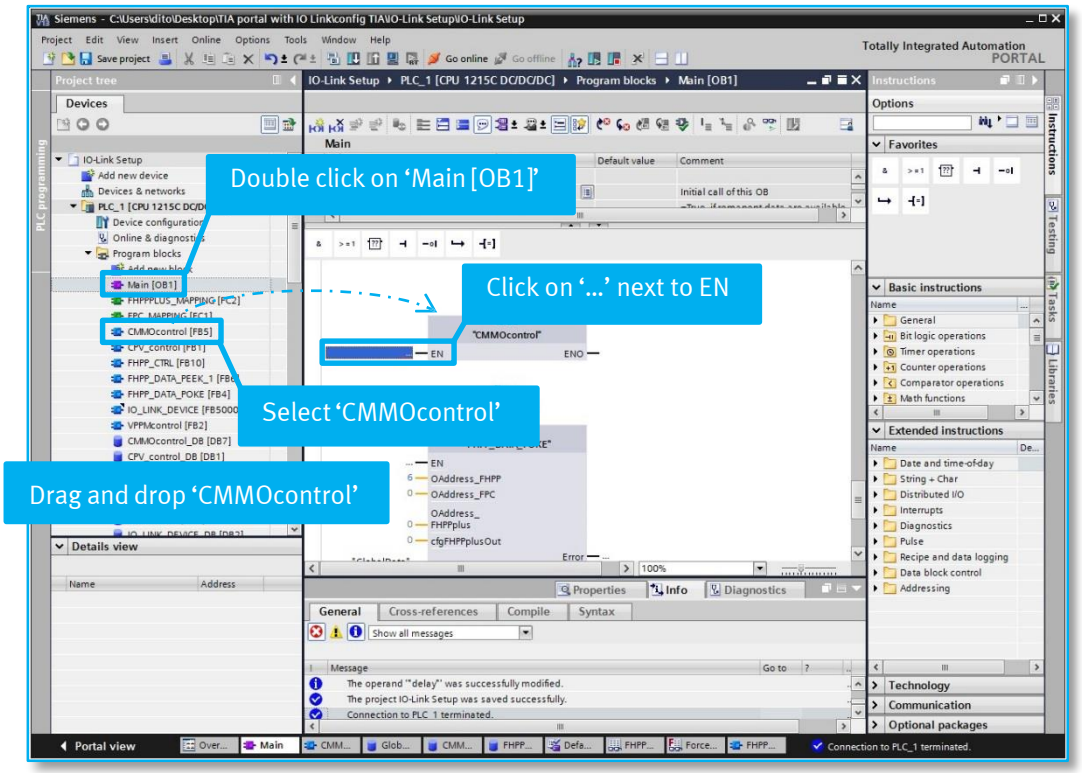


Fig. 97 Open the Main [OB1]

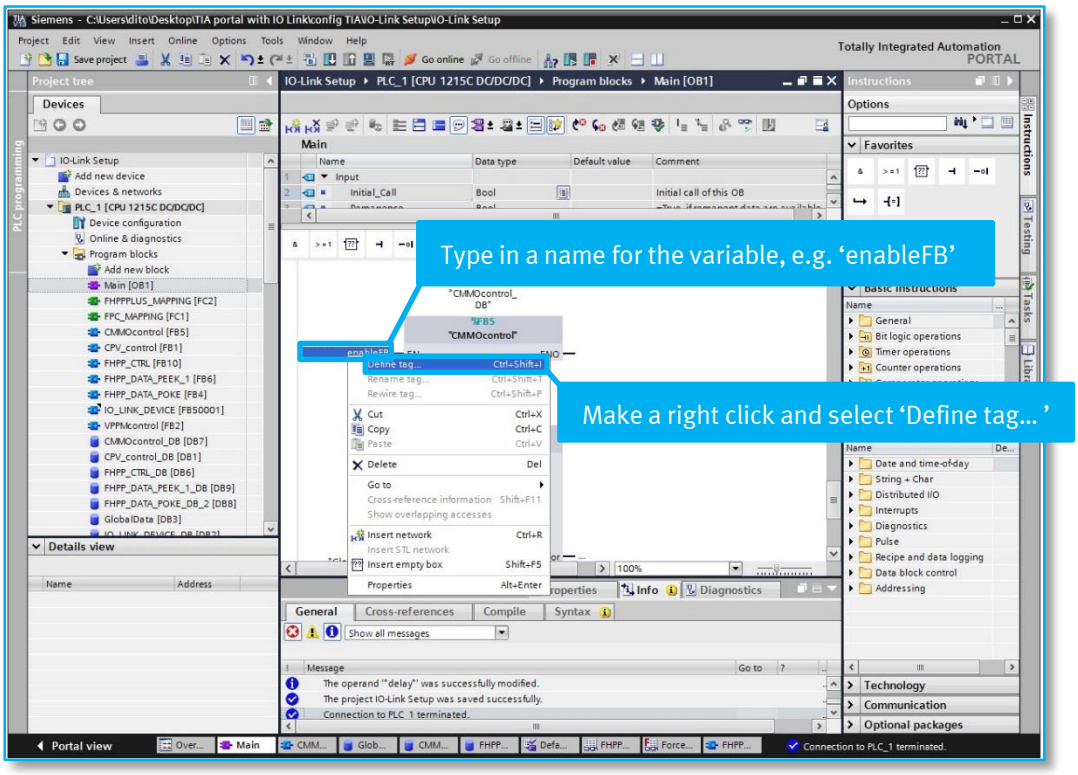


Fig. 98 Assign a name to the enabling variable

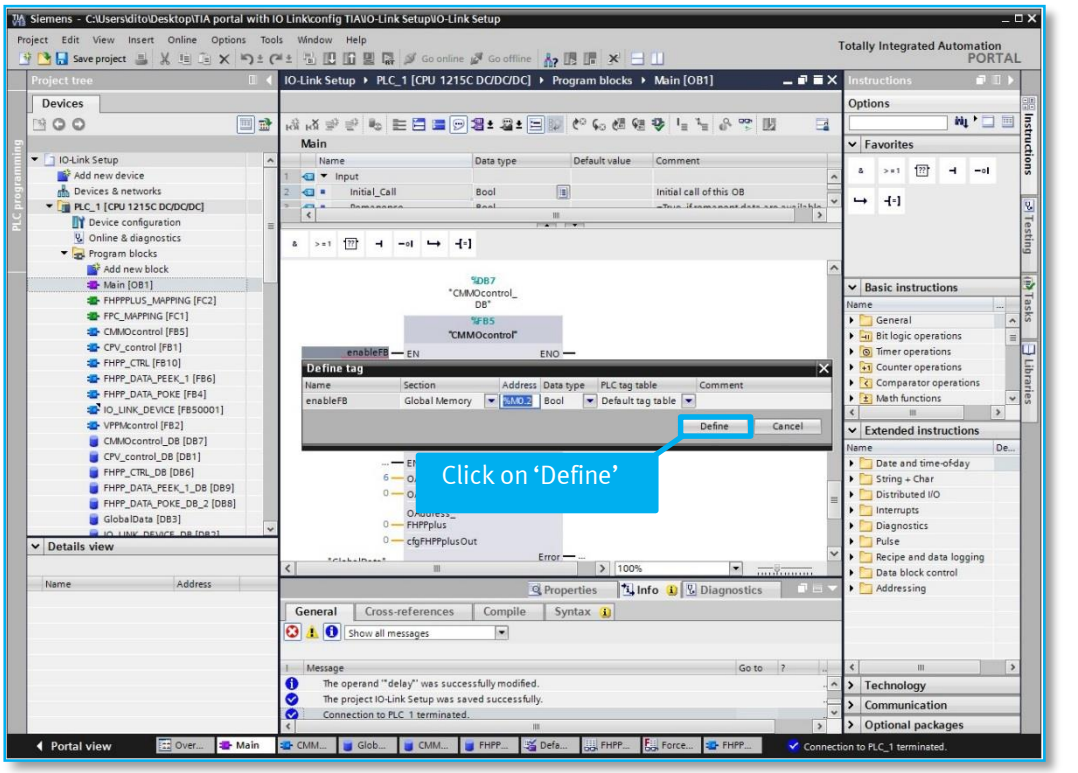


Fig. 99 Define the tag

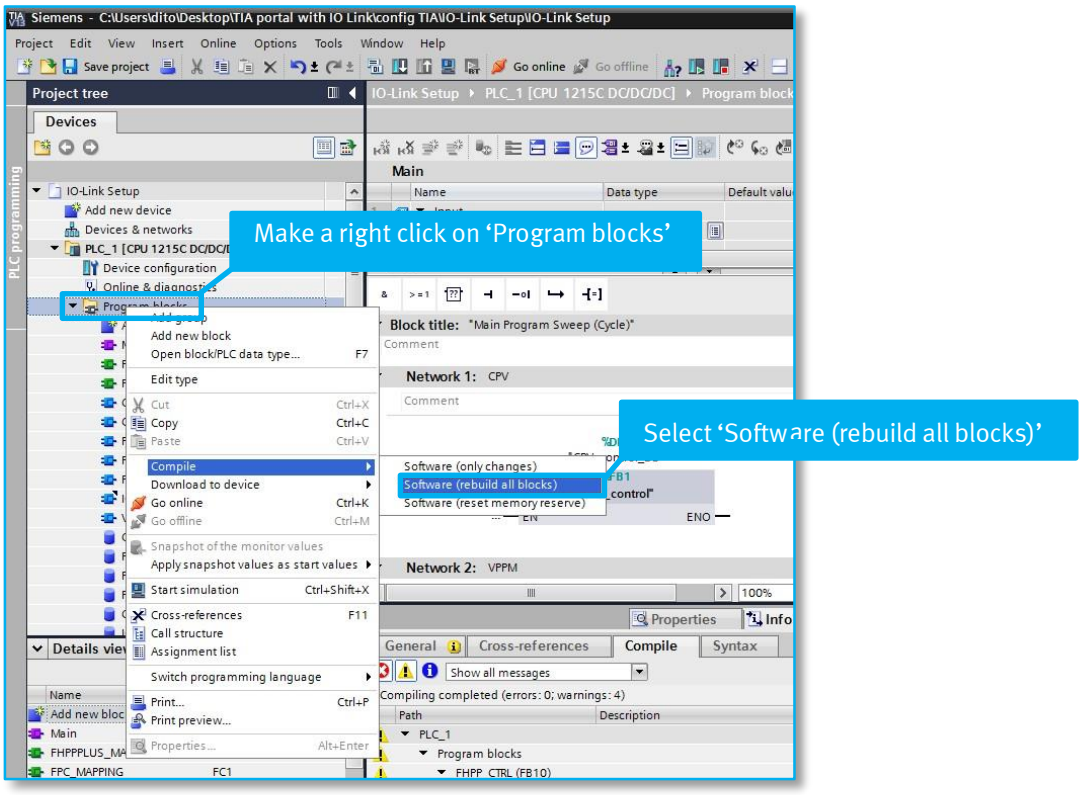


Fig. 100 Compile all program blocks

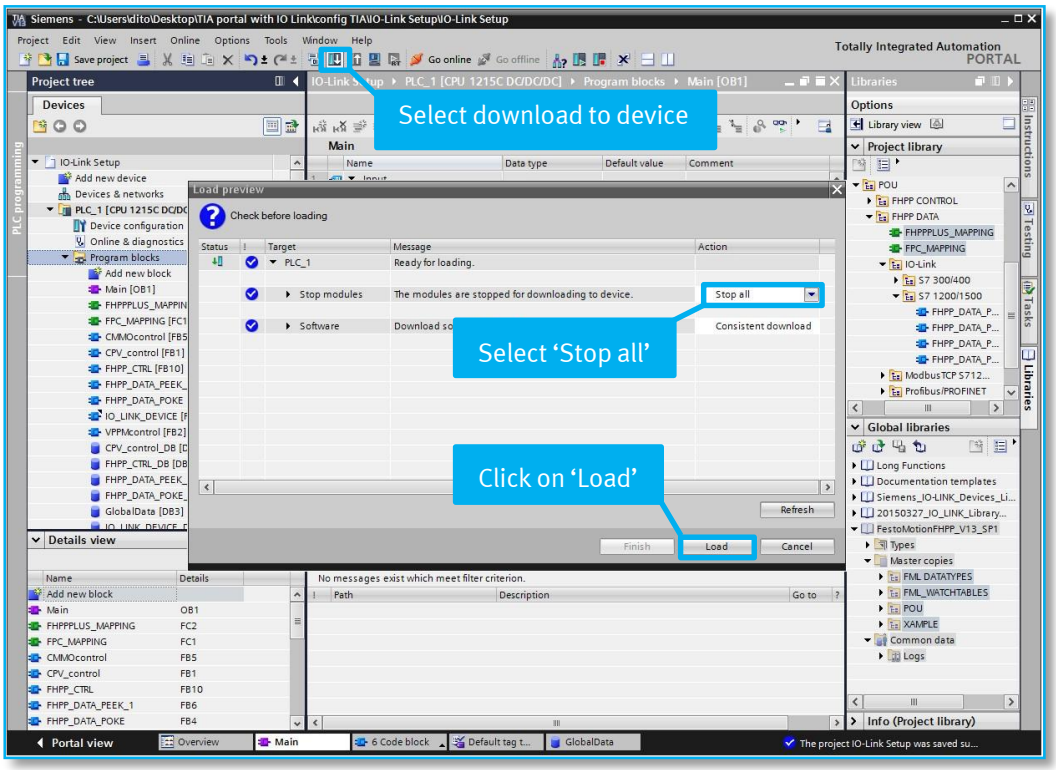


Fig. 101 Downloading the PLC program

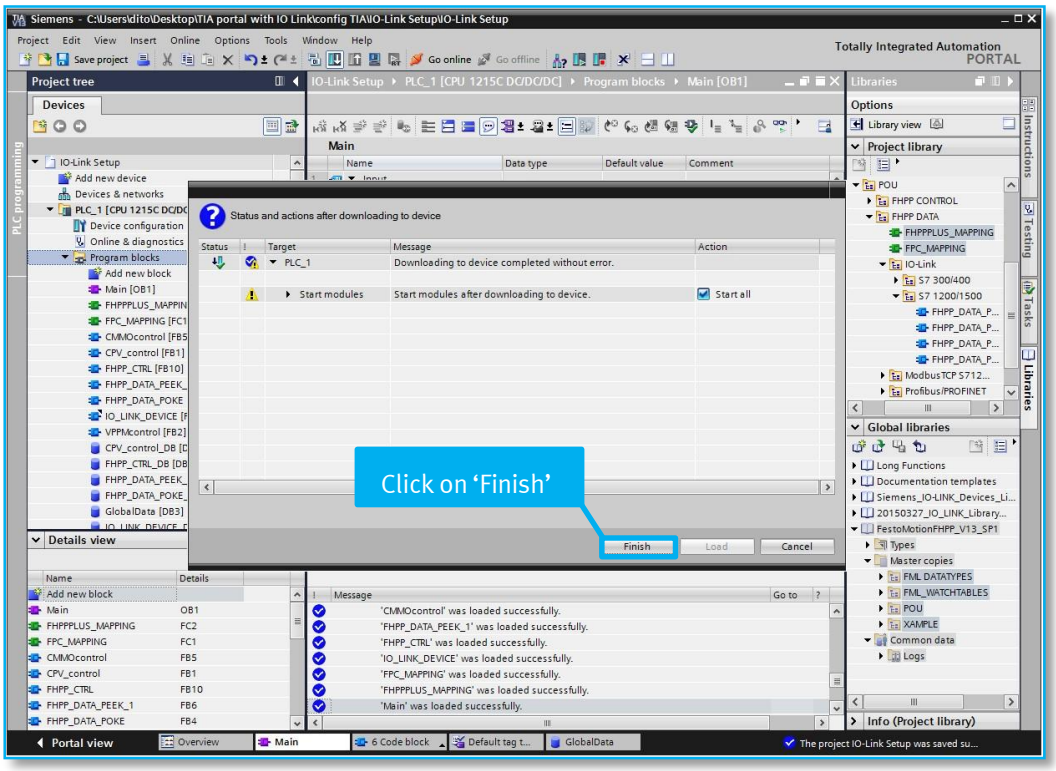


Fig. 102 Starting the modules

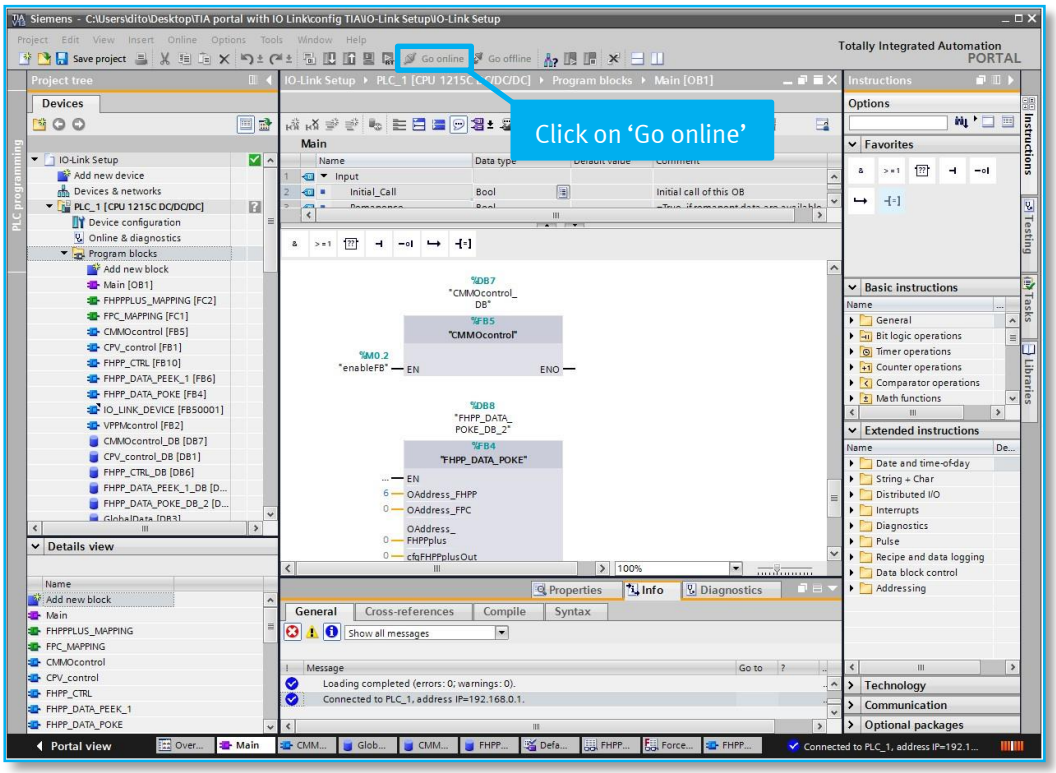


Fig. 103 Going online

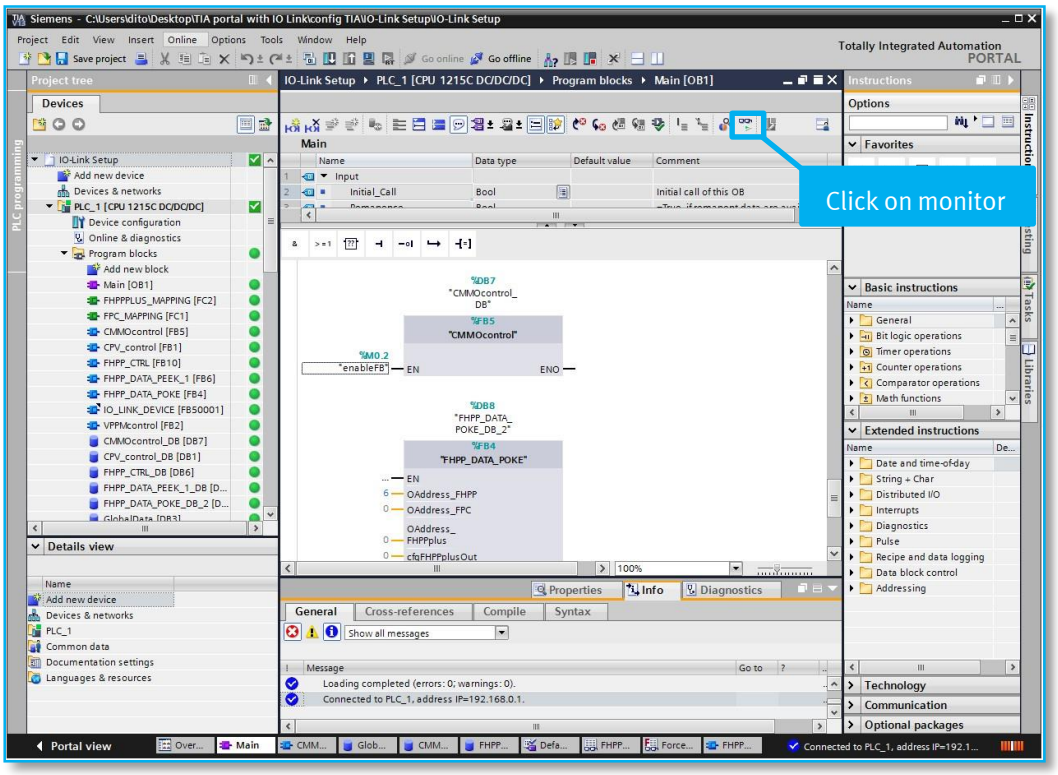


Fig. 104 Switch to monitoring mode

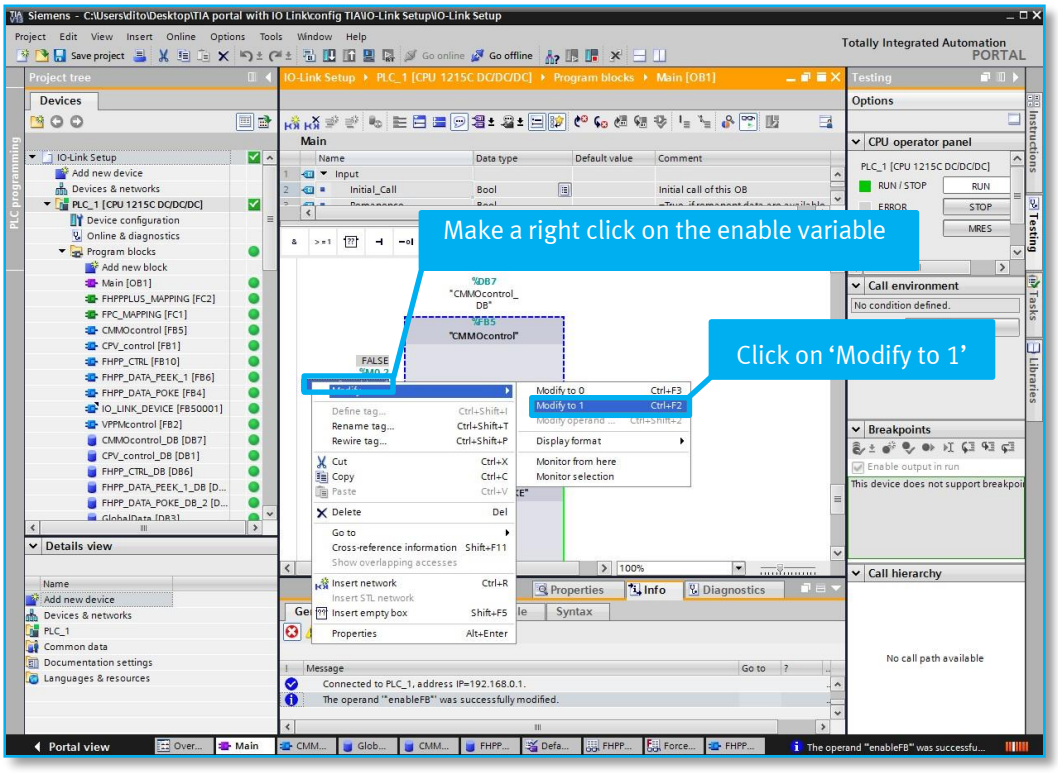


Fig. 105 Enable the CMMOcontrol FB

The ERMO is now performing the configured and selected set from the record table in FCT.

To run the sequence again, a trigger was programmed in step 80. This trigger has to be set to 1. Therefore open the CMMOcontrol function block.

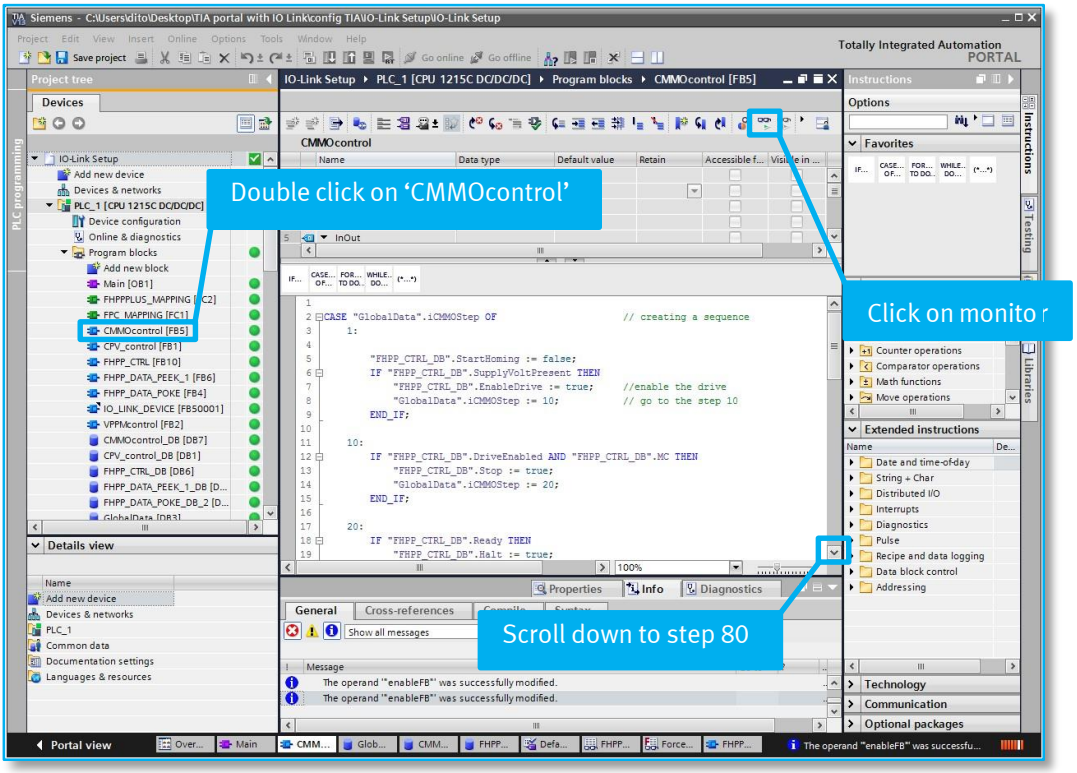


Fig. 106 Opened CMMOcontrol FB

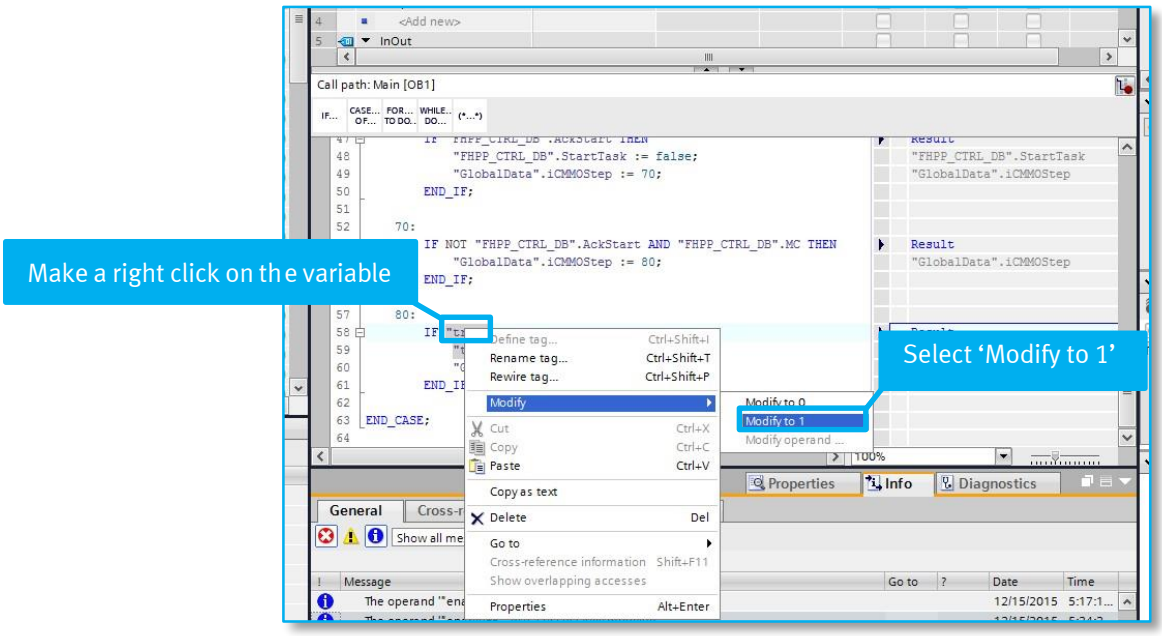


Fig. 107 Modify the trigger variable

4 Troubleshooting

Generally, check if all connectors and cables are plugged in correctly. Also ensure that the power supply is switched on. Working with electricity can be dangerous. Before making changes on the kit, switch off the power supply and wait some time (power supplies can be energized after switching them off for several minutes).

4.1 No device can be found during ‘Assign device name’

First check the physical Ethernet connection. Check if all cables are plugged in correctly?

Open a prompt window (⊞+R) type in ‘cmd’ and press enter. Then send a ping to the IP address relating to the PLC, by typing ‘ping ‹ IP address of the PLC › (e.g. ping 192.168.0.22).

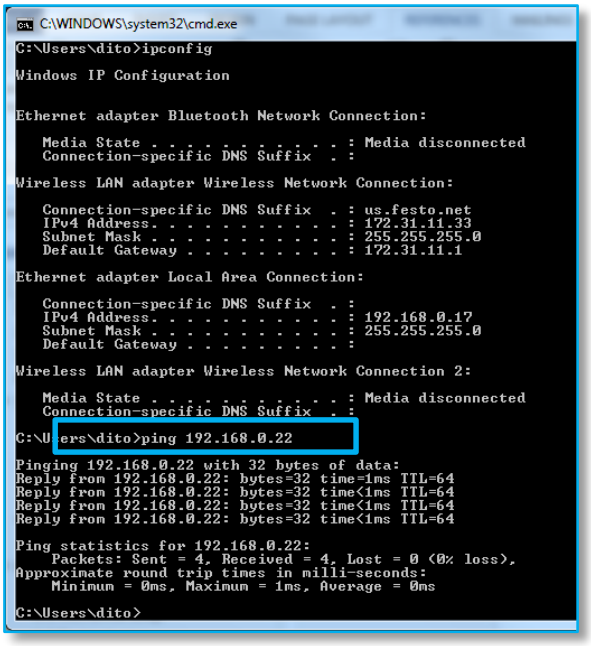


Fig. 108 Successful ping reply

In some rare cases, the PC firewall is blocking the connection. Disable the firewall for the local connection and restart the PLC.

4.2 Problems to run the ERMO

Use the FCT to monitor the FHPP status and see which bits are set and which not. Make sure the FCT and enable button for the Device control are **disabled**. If the START bit is already set, restart the PLC and run the program again. Also to switch the power supply off and on again helps sometimes

4.3 Compiling errors

If errors occur during the compiling saying that the wrong parameters were transmitted to the FHPP_PEEK or the FHPP_POKE block, the wrong library version is used. Also make sure the right library under the PLC was chosen. There are two folders for different types of Siemens PLCs (Fig. 109).

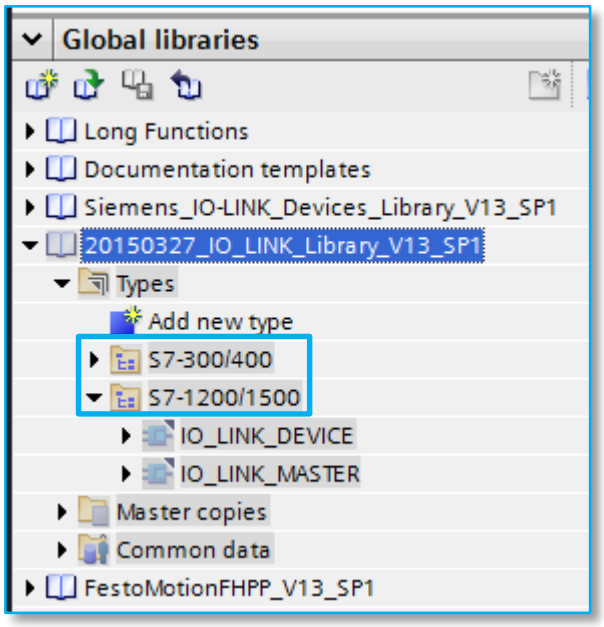


Fig. 109 Different library folders

4.4 Table of figures

4.5 List of tables

4.6 Links to the support portal

The catalogue pages of the ERMO-25 can be found here:
https://www.festo.com/cat/en-gb_gb/data/doc_ENUS/PDF/US/ERMO_ENUS.PDF

The documentation of the CMMO can be found here:
https://www.festo.com/net/en-us_us/SupportPortal/Downloads/379873/379602/8043621g1.pdf

The manual for the CMMO-ST and the device profile FHPP can be found here:
https://www.festo.com/net/en-us_us/SupportPortal/Downloads/379874/379616/8043629g1.pdf

The Siemens support portal can be accessed via this link:
https://support.industry.siemens.com/cs/?lc=en-US