

Endress+Hauser IO-Link Function Block Library v1.3

For SIEMENS S7-1200/1500 - TIA Portal V17

Flow:

Picomag DMA

Level:

Liquiphant FTL31, FTL33

Liquipoint FTW23, FTW33

Nivector FTI26

Liquitrend QMW43

Pressure:

Ceraphant PTC31B, PTP31B, PTP33B

Cerabar PMP51, PMP55, PMC51

Deltapilot FMB50

LiquidAnalysis:

Smartec CLD18

Temperature:

iTHERM CompactLine TM311

With IO-Link Master from Turck, IFM, Siemens as exemplary assembly

Tested with TIA-Portal Version 17

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1 Notes on the document

1.1 Document function

This document provides information about the IO-Link Function Block Library of Endress+Hauser and helps the customer to integrate Endress+Hauser IO-Link Devices into Siemens S7-1200/1500 PLCs.

2 Purpose of the IO-Link Function Block Library

To use the full advantage of the IO-Link technology, some steps are necessary during commissioning. The Function Block Library helps the commissioning engineer to reduce tasks and provides process data and diagnostics immediately. Process values will be displayed directly at the output parameters of each function block with no further decoding necessary. The Function Blocks also provide the option to parametrize the device with the most common parameters for each product.

The function blocks are tested and created in combination with IO-Link Masters from Turck, IFM and Siemens.

The library contains the following:

- Function blocks for the following devices with the necessary user defined types (UDTS's), applicable for S7-1200 or 1500:
 - **Flow:**
Picomag DMA
 - **Level:**
Liquiphant FTL31, FTL33
Liquipoint FTW23, FTW33
Nivector FTI26
Liquitrend QMW43
 - **Pressure:**
Ceraphant PTC31B, PTP31B, PTP33B
Cerabar PMP51, PMP55, PMC51
Deltapilot FMB50
 - **LiquidAnalysis:**
Smartec CLD18
 - **Temperature:**
iTHERM CompactLine TM311
- The function blocks contain functions from the Siemens Library for IO-Link (LIOLink).
[Library for IO-Link \(LIOLink\) - ID: 82981502 - Industry Support Siemens](#)
- Faceplates (Siemens Comfort Panels)
To visualize the possibilities of the function blocks to the operator level (HMI).

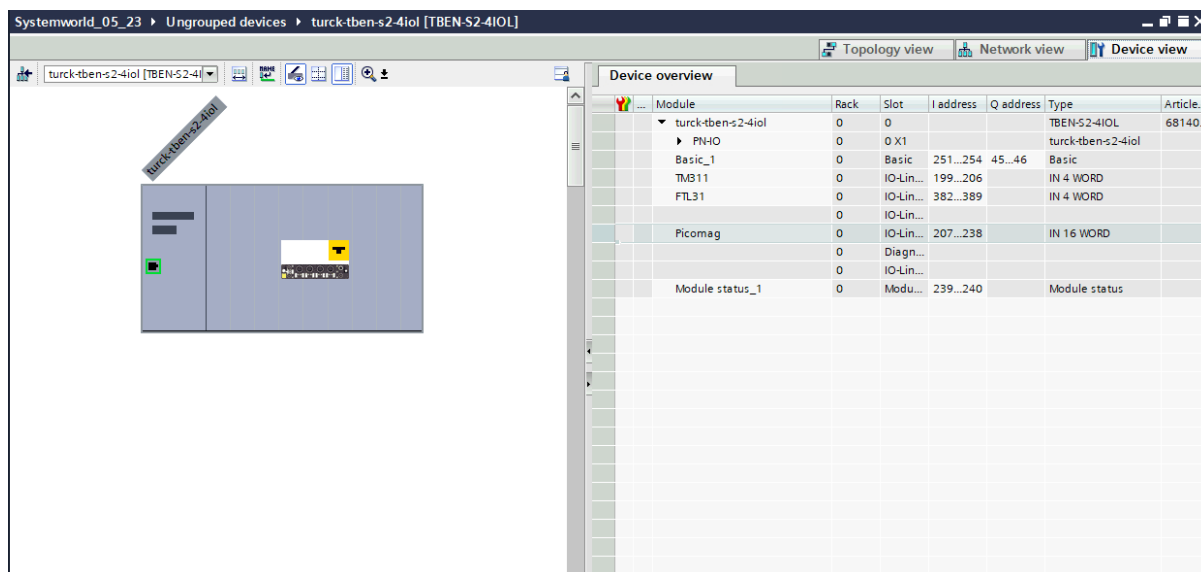
To integrate the function block library, a basic knowledge of Siemens TIA-Portal is expected.

3 Hardware configuration of the IO-Link Master

Before using the function block, the IO-Link master needs to be configured correctly. The function block communicates with the IO-Link master and not directly with the device. The blocks are designed to work with generic input modules to provide more flexibility in choosing the desired hardware.

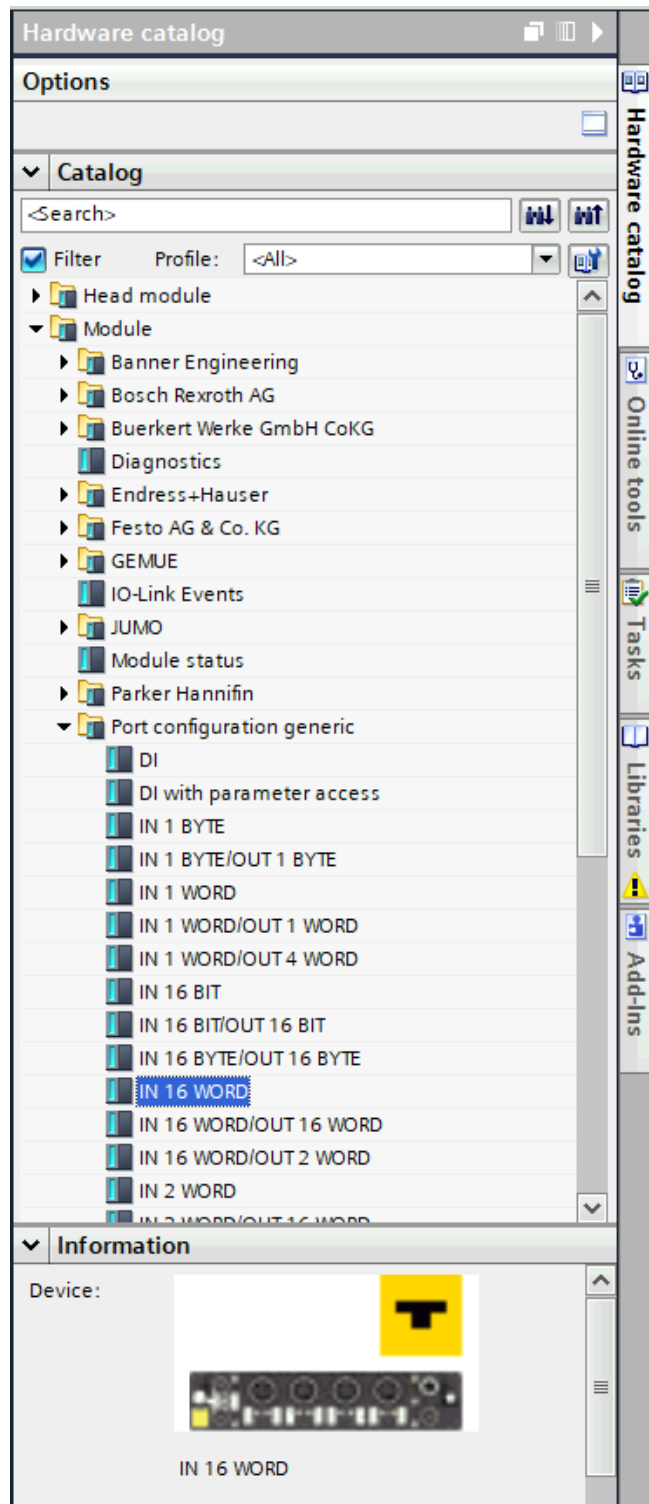
3.1 Turck TBEN-S2-4IOL

Open the device view of the Turck TBEN-S2-4IOL in the hardware configuration



1 Device view of GSDML-file of Turck TBENS2-4IOL in the Siemens TIA-Portal

Open the Hardware catalog and choose the right port configuration generic input module

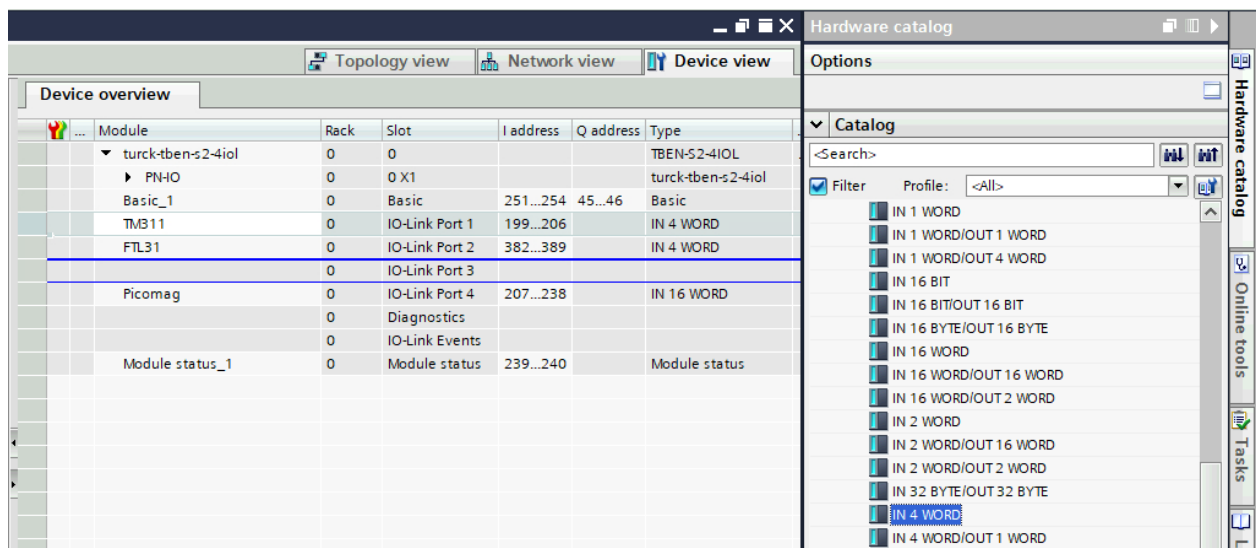


2 Hardware catalog of Siemens TIA-Portal with generic port modules

This table shows the module configuration for each device.

IN 16 WORD	IN 4 WORD
Smartec CLD18	Cerabar PMP23, PMP55, PMC51
Picomag DMA	Nivector FTI26
Cerabar PMP51 / PMC51 / PMP55	Liquipoint FTW23, FTW33
Deltapilot FMB50	Ceraphant PTC31B, PTP31B, PTP33B
	iTHERM CompactLine TM311
	Liquitrend QMW43
	Liquiphant FTL31, FTL33

Drag and drop the module to the Slot (Port) the device is connected to and rename the module as desired.



3 Device view of the Turck TBEN-S2-4IOL

Take note of the Input address of the module or the port the device is connected to.
Also, take note of the value of the hardware identifier of the module. You can find this in the System constants menu.

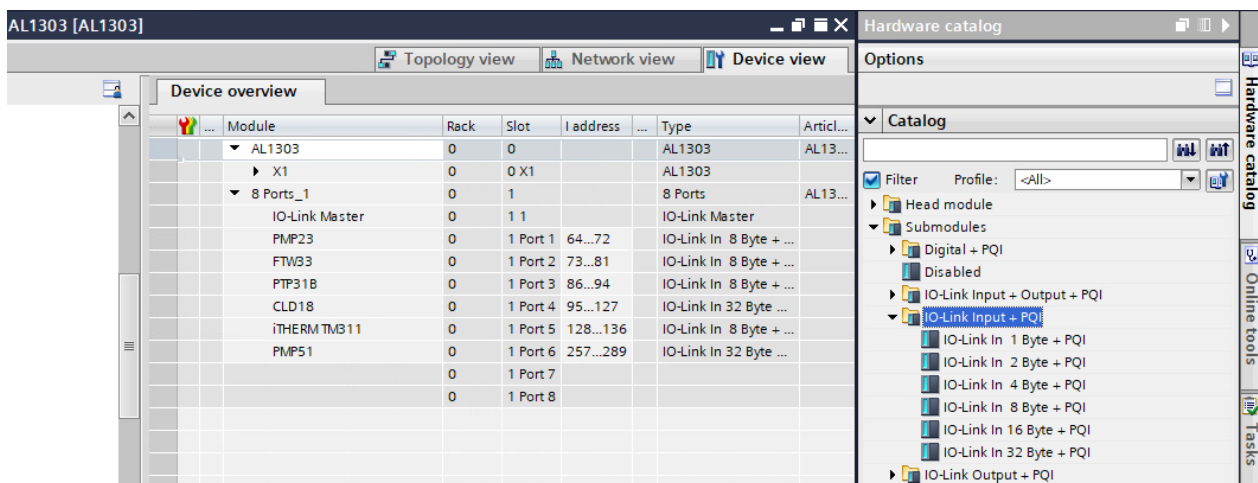
The screenshot shows the Siemens TIA Portal interface. The main window displays a rack diagram with the module 'tben-s2-4iol_lab' in slot 0. The 'Device overview' table on the right lists modules and their addresses. The 'System constants' table at the bottom shows the hardware identifier for the selected module.

Module	Rack	Slot	I address	Q address	Type
tben-s2-4iol_lab	0	0			TBEN-S2-4IOL
PN-IO	0	0 X1			turck-tben-s2-4iol
Basic_1	0	Basic	82...85	48...49	Basic
FTL31	0	IO-Link Port 1	16...23		IN 4 WORD
QMW43	0	IO-Link Port 2	24...31		IN 4 WORD
DMA	0	IO-Link Port 3	32...63		IN 16 WORD
FMB50	0	IO-Link Port 4	161...192		IN 16 WORD
	0	Diagnostics			
	0	IO-Link Events			
	0	Device status			

Name	Type	Hardware identifier	Used by	Comment
tben-s2-4iol_lab-FTL31	Hw_SubModule	297	PLC_1	

4 Device view of the Turck TBEN-S2-4IOL with assigned input addresses

3.2 IFM AL1303



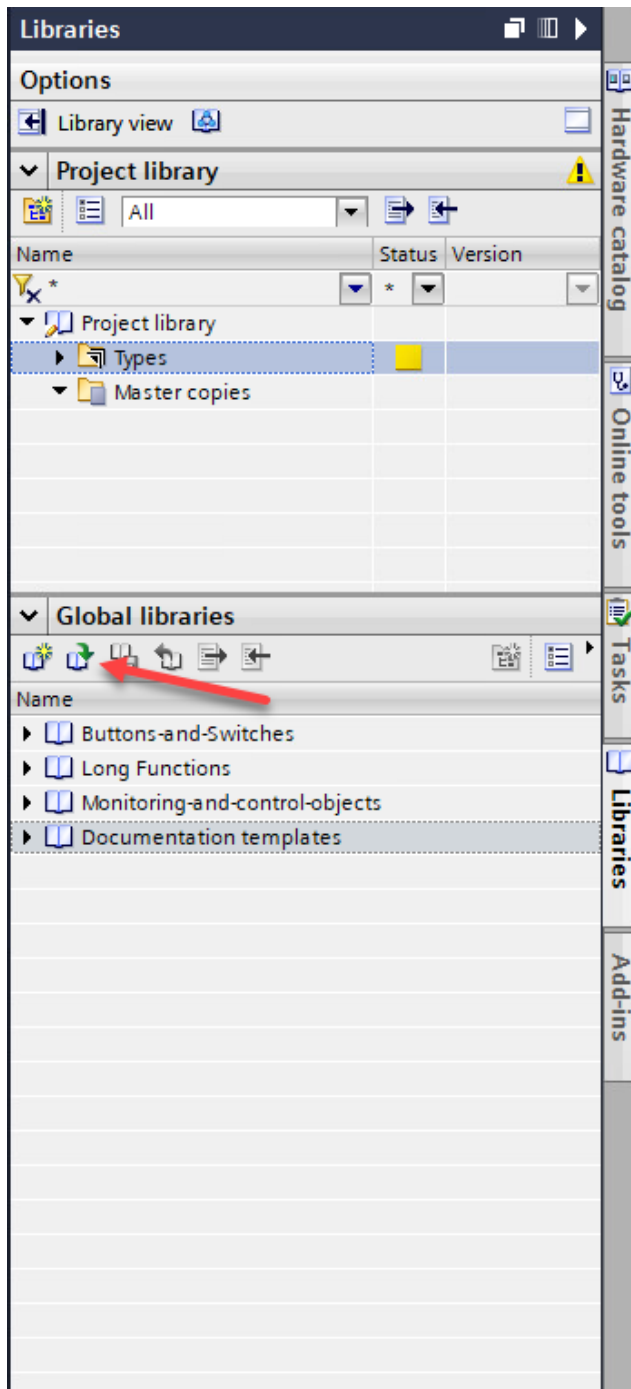
5 Device view of the IFM AL1303 with assigned input addresses

The hardware configuration is done in analogy to the Turck configuration. Please note that the modules for the IFM Master work in bytes. That means that you have to use a module twice as big as in the Turck configuration.

Also, note the input address and the hardware identifier of the module.

4 Integrate the function blocks from the library

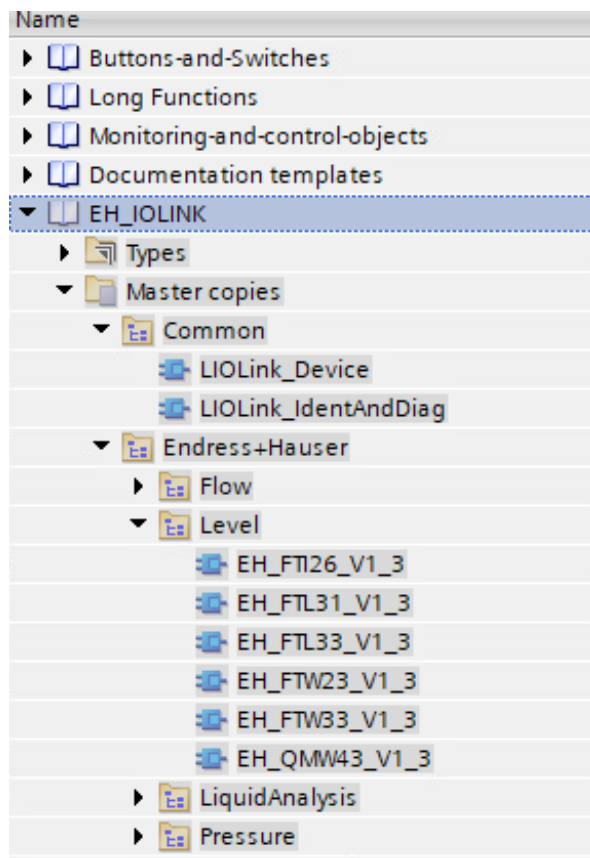
Open the library



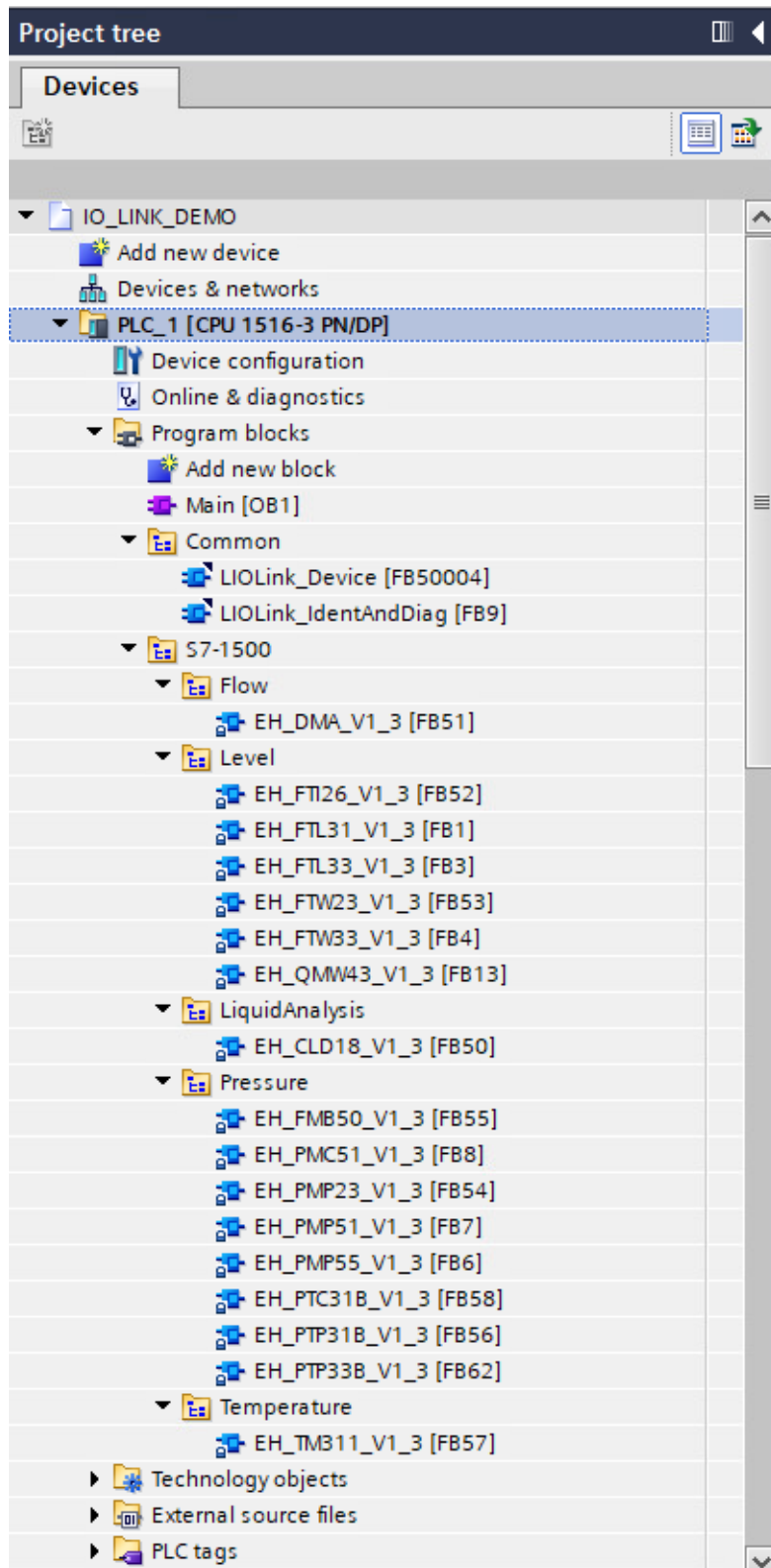
6 Library overview in Siemens TIA-Portal

Choose the function block that matches your device.

After that, you need to drag and drop the blocks *LIOLink_Device* and *LIOLinkIdentAndDiag* from the common folder too. In addition, you can also find them in the superior folder types.

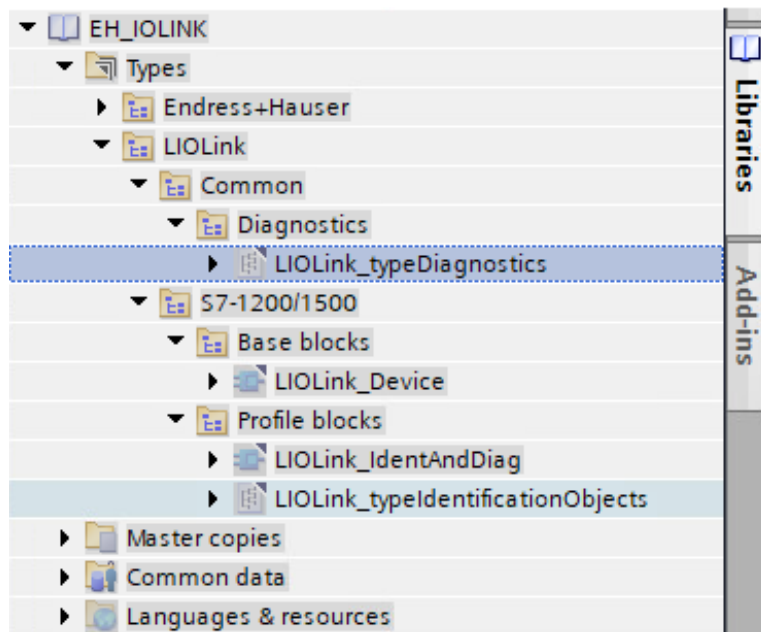


7 Opened Endress+Hauser IO-Link library

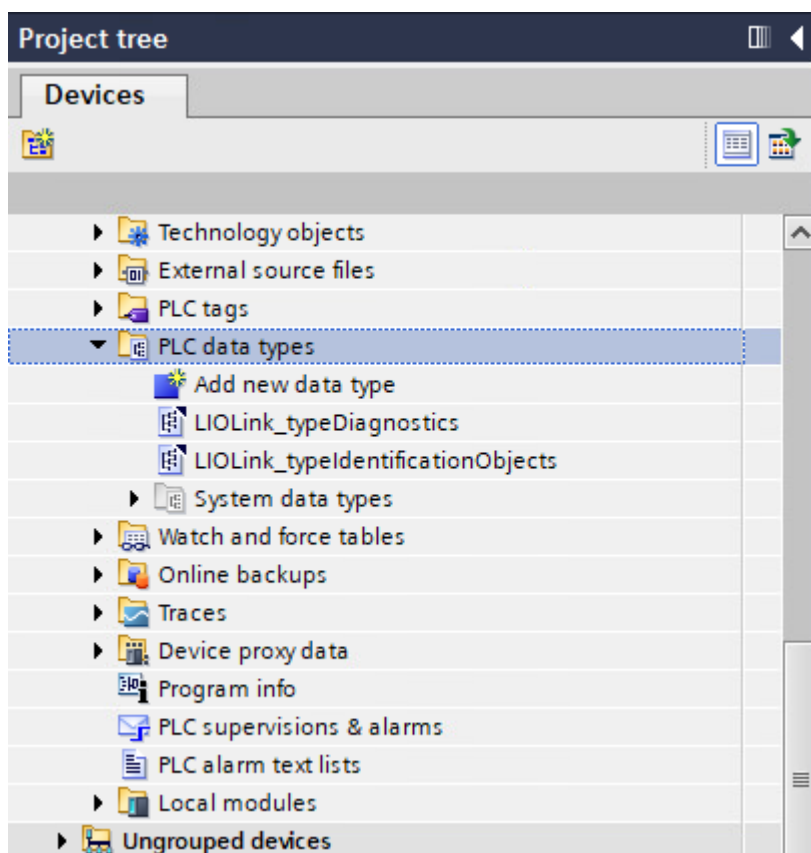


8 Project tree of the PLC program

Drag and drop the datatypes *LIOLink_typeDiagnostics* and *LIOLink_typeIdentificationObjects* to the data types in your projects.



9 Necessary UDTs of the library



10 PLC data types folder in PLC program

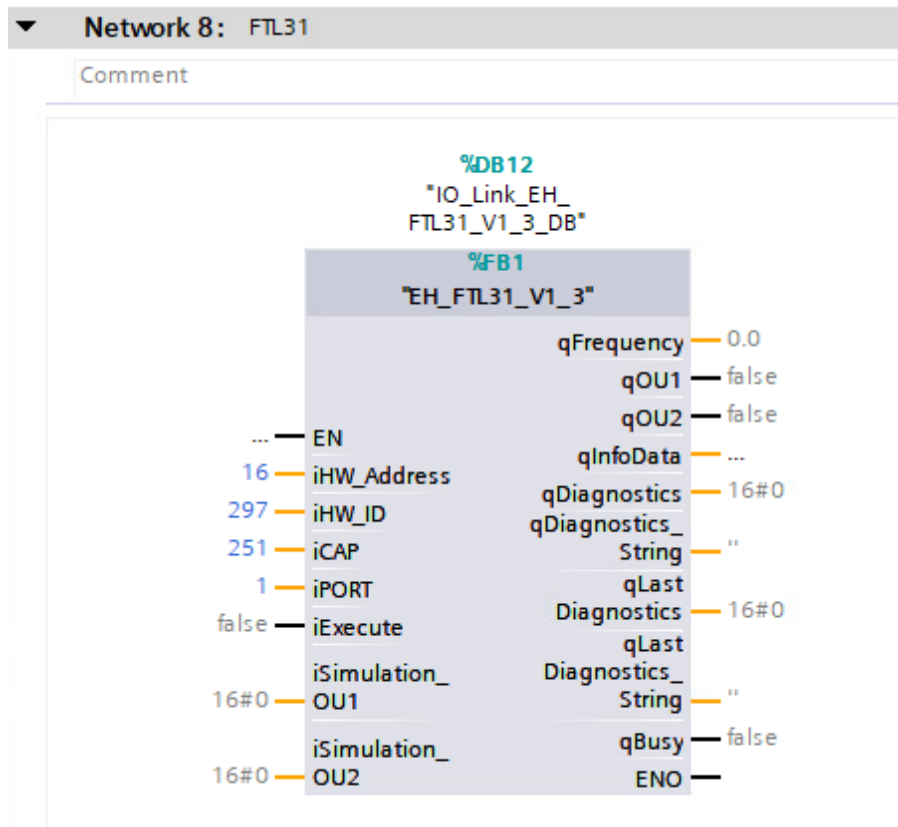
NOTE: The function blocks from the Siemens library are used for acyclic communication (*LIOLink_Device*) and reading identification data from the device (*LIOLinkIdentAndDiag*).

The Endress+Hauser function blocks provide the device identification data at the output parameter InfoData. The data type of the parameter InfoData is *LIOLink_typeIdentificationObjects*.

19		CLD18_InfoData	*LIOLink_typeId...			
20		vendorID	Word	16#0	16#0011	
21		deviceID	DWord	16#0	16#0002_0101	
22		vendorName	String[64]	""	'Endress+Hauser'	
23		vendorText	String[64]	""	'People for Process ...'	
24		productName	String[64]	""	'Smartec'	
25		productID	String[64]	""	'CLD18'	
26		productText	String[64]	""	'Conductivity'	
27		serialNumber	String[16]	""	'RA019705G18'	
28		hwRevision	String[64]	""	'00.01.01'	
29		fwRevision	String[64]	""	'03.00.01'	
30		appSpecificTag	String[32]	""	'EH_CLD18_TEST '	
31		locationTag	String[32]	""	'****'	
32		functionTag	String[32]	""	'****'	

11 Overview of UDT *LIOLink_typeIdentificationObjects* in a data block

Now call the desired function block.



12 Call of function block

Now link the noted Input address of the module in the hardware configuration to the function block – as well as the hardware identifier.

iHW_Address => Input address of the generic module

iHW_ID => Value of the hardware identifier of the generic module found in the properties/system

constants – See picture in 3.1

The CAP ID's for the IO-Link Masters are:

The following table represents The CAP IDs (Client Access Point) of various IO-Link Masters

Turck TBEN-S2-4IOL	IFM AL1102, AL1303, AL1402, AL1100	Siemens (For all masters, if not explicit mentioned in the manual)
251	-19456	227

Also enter the port number where the device is connected.

After downloading, you should see process values in the output of the function block.

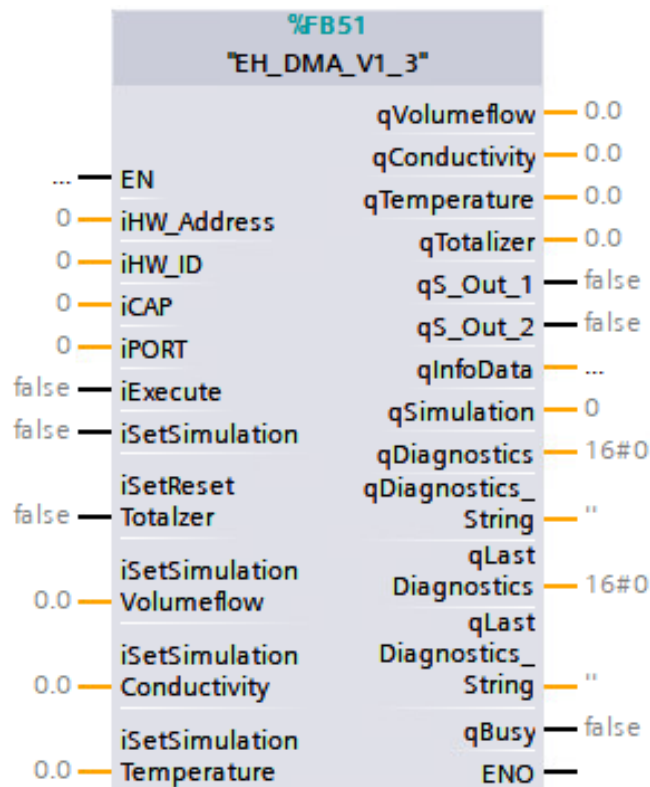
By triggering the execute input, the function block performs its routine to read out the device data as well as diagnostics and performs a parametrization of the device. The parametrization is individual to each device. You can find the information in the corresponding chapter.

5 Picomag DMA

EH_DMA_V1_3

The function block extracts cyclic process data and provides it as a floating point variable. The four main values are Volume flow, Conductivity, Temperature and Totalizer. It also provides the status of the switch outputs as a Boolean variable.

By triggering the execute input, the function block can put the device into simulation mode and send the values that the device should simulate to the device. In addition to that, it is possible to reset the totalizer.



13 Call of function block

The following table represents the input and output parameters of the function block

Name	P type	Data type	Comment
iHW_Address	Input	Int	Input address of the module - See chapter 4
iHW_ID	Input	HW_IO, HW_ANY	Hardware identifier of the module - See chapter 4
iCAP	Input	Int	See table on page 15
iPORT	Input	Int	Portnumber where the device is connected to the IO-Link master 1..x
iExecute	Input	Bool	Trigger to execute the acyclic routine for parametrization and read out diagnostics
iSetSimulation	Input	Bool	Signal to put device into simulation TRUE = Simulation ON

			FALSE = Simulation OFF
iSetResetTotalizer	Input	Bool	Signal to reset totalizer TRUE = Totalizer will be reset FALSE = No action
iSetSimulationVolumeFlow	Input	Real	Value of volume flow that should be simulated
iSetSimulationConductivity	Input	Real	Value of conductivity that should be simulated
iSetSimulationTemperature	Input	Real	Value of temperature that should be simulated
qVolumeFlow	Output	Real	Process value volume flow
qConductivity	Output	Real	Process value conductivity
qTemperature	Output	Real	Process value temperature
qTotalizer	Output	Real	Totalizer value
qS_Out_1	Output	Bool	Switch output 1
qS_Out_2	Output	Bool	Switch output 2
qInfoData	Output	LI-OLink_typeIdentificationObjects	UDT to provide device data – See chapter 4
qSimulation	Output	Int	1 = Device is in simulation mode 0 = Device is not in simulation mode
qDiagnostics	Output	Dword	Diagnostic code – See table below
qDiagnostics_String	Output	String	Text of diagnostics message – See table below
qLastDiagnostics	Output	Dword	Last diagnostic code – See table below
qLastDiagnostics_String	Output	String	Last text of diagnostics message – See table below
qBusy	Output	Bool	Busy signal of the function block after triggering the iExecute input TRUE = parametrization and acyclic communication ongoing FALSE = no action

The following table represents the diagnostic messages of the function block

Diagnostics	Text of diagnostics message
16#0000_0000	SYSTEM OK
16#0000_0001	No communication
16#4631_3831	COIL CIRC.FAIL.
16#4631_3830	EMP.CIRC.FAIL
16#4632_3031	DEVICE FAIL.
16#4632_3033	MEMORY FAIL.
16#4334_3436	I/O 1 OVERLOAD
16#4334_3437	I/O 2 OVERLOAD
16#4334_3835	SIMULATION ACT.
16#4334_3533	FLOW OVERRIDE
16#5334_3431	I-OUT 1 RANGE
16#5334_3434	U-OUT 1 RANGE
16#5334_3433	P-OUT 1 RANGE
16#5334_3432	T-OUT 2 RANGE
16#5334_3435	U-OUT 2 RANGE

16#5339_3632	EMPTY PIPE
16#5338_3334	TEMPERAT. RANGE

For further information please check the device manual or the IODD

6 Smartec CLD18

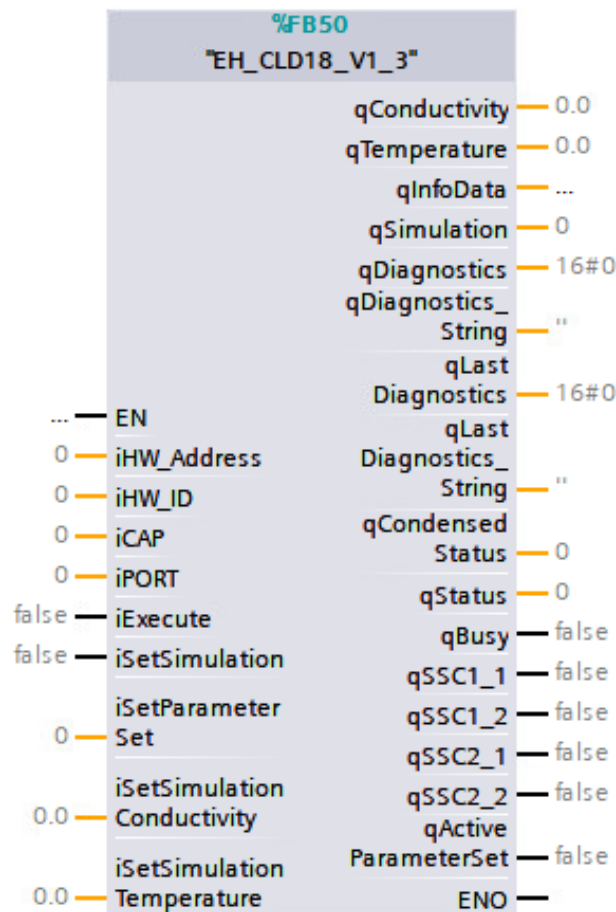
EH_CLD18_V1_3

The function block extracts the cyclic process data and provides it as a floating point variable.

The two main values are Conductivity and Temperature.

It also provides the status of the switch outputs as a Boolean variable. An additional diagnostic status as a condensed status is also provided cyclically.

By triggering the execute input, the function block can put the device into simulation mode and send the values that the device should simulate to the device. It is also possible to change the parameter set.



14 Call of function block

The following table represents the input and output parameters of the function block

Name	P type	Data type	Comment
iHW_Address	Input	Int	Input address of the module - See chapter 4
iHW_ID	Input	HW_IO, HW_ANY	Hardware identifier of the module - See chapter 4
iCAP	Input	Int	See table on page 15

iExecute	Input	Bool	Trigger to execute the acyclic routine for parametrization and read out diagnostics
iPORT	Input	Int	Portnumber where the device is connected to the IO-Link master 1..x
iSetSimulation	Input	Bool	Signal to put device into simulation TRUE = Simulation ON FALSE = Simulation OFF
iSetParameterSet	Input	Int	Signal to parameter set 1 = Parameter set 1 2 = Parameter set 2
iSetSimulationConductivity	Input	Real	Value of conductivity that should be simulated
iSetSimulationTemperature	Input	Real	Value of temperature that should be simulated
qConductivity	Output	Real	Process value conductivity
qTemperature	Output	Real	Process value temperature
qSSC1_1	Output	Bool	Switching signal 1.1
qSSC1_2	Output	Bool	Switching signal 1.2
qSSC2_1	Output	Bool	Switching signal 2.1
qSSC2_2	Output	Bool	Switching signal 2.2
qInfoData	Output	LI-OLink_typeIdentificationObjects	UDT to provide device data – See chapter 4
qSimulation	Output	INT	1 = Device is in simulation mode 0 = Device is not in simulation mode
qDiagnostics	Output	Dword	Diagnostic code – See table below
qDiagnostics_String	Output	String	Text of diagnostics message – See table below
qLastDiagnostics	Output	Dword	Last diagnostic code – See table below
qLastDiagnostics_String	Output	String	Last text of diagnostics message – See table below
qCondensedStatus	Output	Int	0 = nonspecific 128 = good 129 = simulation 164 = maintenance req. 120 = out of spec. 60 = functional check 36 = failure
qBusy	Output	Bool	Busy signaling of the function block after triggering the iExecute input TRUE = Parametrization and acyclic communication ongoing FALSE = No action

The following table represents the diagnostic messages of the function block

Diagnostics	Text of diagnostics message
16#0000_0000	System ok
16#0000_0001	No communication
16#0000_0022	Temperature sensor broken
16#0000_0061	Sensor electronics defective
16#0000_0100	Sensor not communicating

16#0000_0130	No conductivity
16#0000_0152	No calibration data available
16#0000_0241	Unspecific software failure
16#0000_0243	Unspecific hardware failure
16#0000_0419	The Back-To-Box command is execute
16#0000_0904	Process check system
16#0000_0107	Sensor calibration
16#0000_0216	Hold function
16#0000_0848	Simulation active
16#0000_0144	Conductivity out of range
16#0000_0146	Temperature out of range
16#0000_0460	Measured value below limit
16#0000_0461	Measured value above limit
16#0000_0500	Sensor calibration aborted

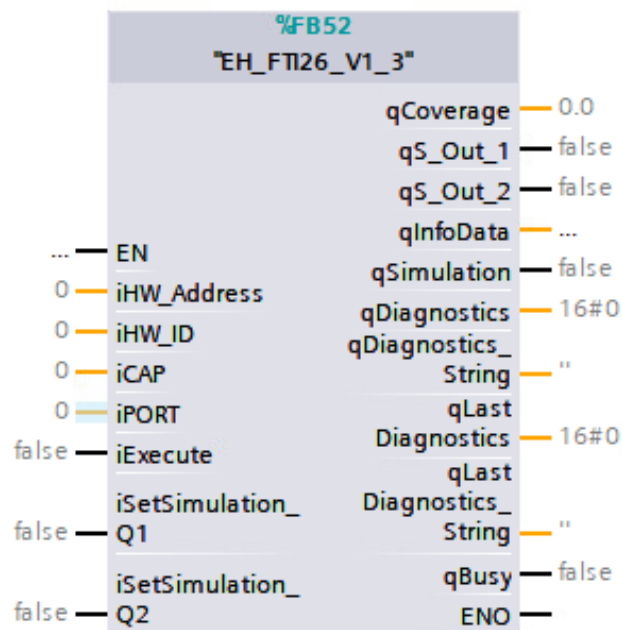
7 Nivector FTI26

EH_FT126_V1_3

The function block extracts the cyclic process data and provides it as a floating point variable. The main value is the Coverage in percent.

It also provides the status of the switch outputs as a Boolean variable.

By triggering the execute input the function block can put the device into simulation mode and read the diagnostics.



15Call of function block

The following table represents the input and output parameters of the function block

Name	P type	Data type	Comment
iHW_Address	Input	Int	Input address of the module - See chapter 4
iHW_ID	Input	HW_IO, HW_ANY	Hardware identifier of the module - See chapter 4
iCAP	Input	Int	See table on page 15
iPORT	Input	Int	Portnumber where the device is connected to the IO-Link master 1..x
iExecute	Input	Bool	Trigger to execute the acyclic routine for parametrization and read out diagnostics
iSetSimulation_Q1	Input	Bool	State of the switch output 1 that should be simulated
iSetSimulation_Q2	Input	Bool	State of the switch output 2 that should be simulated
qCoverage	Output	Real	Process value coverage
qS_Out_1	Output	Bool	Switching signal 1
qS_Out_2	Output	Bool	Switching signal 2

qInfoData	Output	LI- OLink_typeIdentifi- cationObjects	UDT to provide device data – See chapter 4
qSimulation	Output	Bool	TRUE = Device is in simulation mode FALSE = Device is not in simulation mode
qDiagnostics	Output	Dword	Diagnostic code – See table below
qDiagnostics_String	Output	String	Text of diagnostics message – See table below
qLastDiagnostics	Output	Dword	Last diagnostic code – See table below
qLastDiagnostics_String	Output	String	Last text of diagnostics message – See table below
qBusy	Output	Bool	Busy signal of the function block after triggering the iExecute input TRUE = Parametrization and acyclic communication ongoing FALSE = No action

The following table represents the diagnostic messages of the function block

Diagnostics	Text of diagnostics message
16#2D2D_2D2D	SYSTEM OK
16#0000_0001	No communication
16#4632_3730	F270 - Defect in electronic / sensor
16#5338_3034	S804 - Load current > 200mA per output
16#4D32_3930	M290 - Device wiring fault
16#4334_3835	C485 - Simulation active
16#4331_3832	C182 - Invalid calibration
16#4331_3033	C103 - Sensor check failed
16#5338_3235	S825 - Ambient temperature out of specification

For further information please check the device manual or the IODD

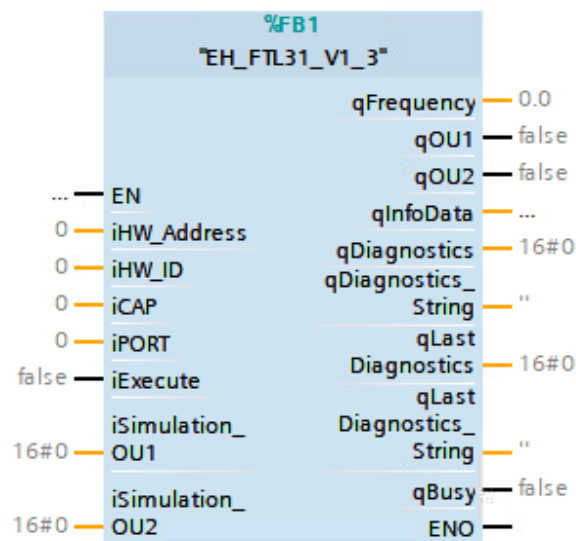
8 Liquiphant FTL31 / FTL33

EH_FTL31_V1_3

EH_FTL33_V1_3

The function block extracts the cyclic process data and provides it as a floating point variable. The main value is the Frequency in percent. It also provides the status of the switch outputs as a Boolean variable.

By triggering the execute input the function block can put the device into simulation mode and read the diagnostics.



16Call of function block

The following table represents the input and output parameters of the function block

Name	P type	Data type	Comment
iHW_Address	Input	Int	Input address of the module - See chapter 4
iHW_ID	Input	HW_IO, HW_ANY	Hardware identifier of the module - See chapter 4
iCAP	Input	Int	See table on page 15
iPORT	Input	Int	Portnumber where the device is connected to the IO-Link master 1..x
iExecute	Input	Bool	Trigger to execute the acyclic routine for parametrization and read out diagnostics
iSetSimulation_OU1	Input	Byte	1 = Simulated ON 0 = Simulated OFF
iSetSimulation_OU2	Input	Byte	1 = Simulated ON 0 = Simulated OFF
qCoverage	Output	Real	Process value coverage
qOU1	Output	Bool	Switching signal 1

qOU2	Output	Bool	Switching signal 2
qInfoData	Output	LI- OLink_typeIdentifi- cationObjects	UDT to provide device data – See chapter 4
qSimulation	Output	Bool	TRUE = Device is in simulation mode FALSE = Device is not in simulation mode
qDiagnostics	Output	Dword	Diagnostic code – See table below
qDiagnostics_String	Output	String	Text of diagnostics message – See table below
qLastDiagnostics	Output	Dword	Last diagnostic code – See table below
qLastDiagnostics_String	Output	String	Last text of diagnostics message – See table below
qBusy	Output	Bool	Busy signal of the function block after triggering the iExecute input TRUE = Parametrization and acyclic communication ongoing FALSE = No action

The following table represents the diagnostic messages of the function block

Diagnostics	Text of diagnostics message
16#2d20_2d20	No Error
16#5338_3235	S825
16#4331_3033	C103
16#4331_3832	C182
16#4331_3835	C485
16#5338_3034	S804
16#4630_3432	F042
16#4632_3730	F270

For further information please check the device manual or the IODD

9 Liquipoint FTW23 / FTW33

EH_FT23_V1_3

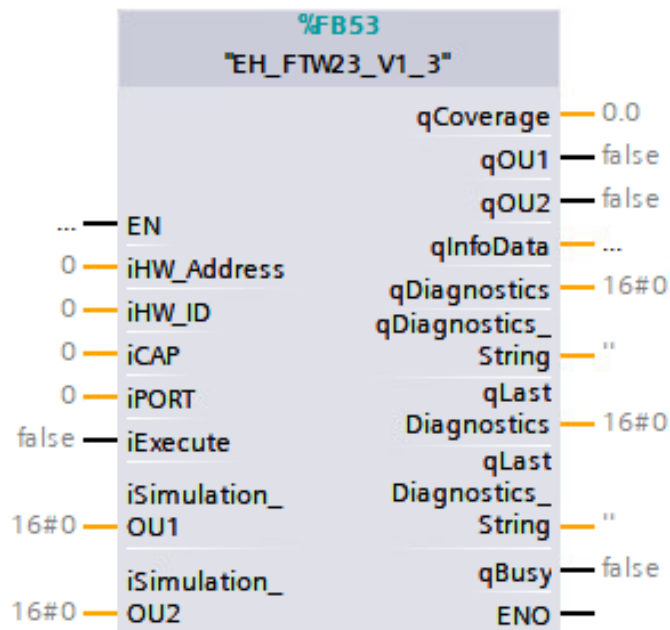
EH_FT33_V1_3

The function block extracts the cyclic process data and provides it as a floating point variable.

The main value is the Coverage in percent.

It also provides the status of the switch outputs as a Boolean variable.

By triggering the execute input, the function block can put the device into simulation mode and read the diagnostics.



17 Call of function block

The following table represents the input and output parameters of the function block

Name	P type	Data type	Comment
iHW_Address	Input	Int	Input address of the module - See chapter 4
iHW_ID	Input	HW_IO, HW_ANY	Hardware identifier of the module - See chapter 4
iCAP	Input	Int	See table on page 15
iPORT	Input	Int	Portnumber where the device is connected to the IO-Link master 1..x
iExecute	Input	Bool	Trigger to execute the acyclic routine for paramtetrization and read out diagnostics
iSetSimulation_OU1	Input	Byte	1 = Simulated ON 0 = Simulated OFF
iSetSimulation_OU2	Input	Byte	1 = Simulated ON 0 = Simulated OFF
qCoverage	Output	Real	Process value coverage

qOU1	Output	Bool	Switching signal 1
qOU2	Output	Bool	Switching signal 2
qInfoData	Output	LI- OLink_typeIdenti- ficationObjects	UDT to provide device data – See chapter 4
qSimulation	Output	Bool	TRUE = Device is in simulation mode FALSE = Device is not in simulation mode
qDiagnostics	Output	Dword	Diagnostic code – See table below
qDiagnostics_String	Output	String	Text of diagnostics message – See table below
qLastDiagnostics	Output	Dword	Last diagnostic code – See table below
qLastDiagnostics_String	Output	String	Last text of diagnostics message – See table below
qBusy	Output	Bool	Busy signal of the function block after triggering the iExecute input TRUE = Parametrization and acyclic communication ongoing FALSE = No action

The following table represents the diagnostic messages of the function block

Diagnostics	Text of diagnostics message
16#2d2d_2d2d	System ok
16#0000_0001	No communication
16#4632_3730	Defect in electronics / sensor
16#5338_3034	Load current > 200mA per output
16#4334_3835	Simulation active
16#4331_3832	Invalid calibration
16#4331_3033	Sensor checked failed
16#5338_3235	Sensor connection

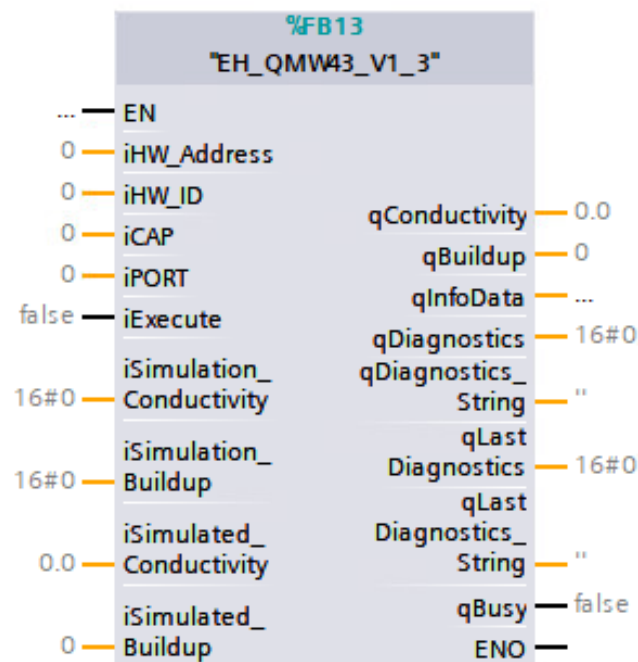
For further information please check the device manual or the IODD

10 Liquitrend QMW43

EH_QMW43_V1_3

The function block extracts the cyclic process data and provides it as a floating point variable. The main values are Conductivity and Buildup in percent.

By triggering the execute input, the function block can put the device into simulation mode and read the diagnostics.



18 Call of function block

The following table represents the input and output parameters of the function block

Name	P type	Data type	Comment
iHW_Address	Input	Int	Input address of the module - See chapter 4
iHW_ID	Input	HW_IO, HW_ANY	Hardware identifier of the module - See chapter 4
iCAP	Input	Int	See table on page 15
iPORT	Input	Int	Portnumber where the device is connected to the IO-Link master 1..x
iExecute	Input	Bool	Trigger to execute the acyclic routine for parametrization and read out diagnostics
iSimulation_Conductivity	Input	Byte	1 = Simulation ON 0 = Simulation OFF
iSimulation_Buildup	Input	Byte	1 = Simulation ON 0 = Simulation OFF
iSimulated_Conductivity	Input	Real	Simulated value conductivity
iSimulated_Buildup	Input	Int	Simulated value buildup

qConductivity	Output	Real	Process value conductivity
qBuildup	Output	Int	Process value buildup
qInfoData	Output	LI- OLink_typeIdentifi- cationObjects	UDT to provide device data – See chapter 4
qDiagnostics	Output	Dword	Diagnostic code – See table below
qDiagnostics_String	Output	String	Text of diagnostics message – See table below
qLastDiagnostics	Output	Dword	Last diagnostic code – See table below
qLastDiagnostics_String	Output	String	Last text of diagnostics message – See table below
qBusy	Output	Bool	Busy signal of the function block after triggering the iExecute input TRUE = Parametrization and acyclic communication ongoing FALSE = No action

The following table represents the diagnostic messages of the function block

Diagnostics	Text of diagnostics message
16#2d20_2d20	No Error
16#5338_3235	S825
16#4331_3033	C103
16#5339_3731	S971
16#4331_3832	C182
16#4334_3835	C485
16#5338_3033	S803
16#5338_3034	S804
16#4632_3730	F270

For further information please check the device manual or the IODD

11 Deltapilot FMB50 / Cerabar M PMP51, PMC51, PMP55

EH_FMB50_V1_3

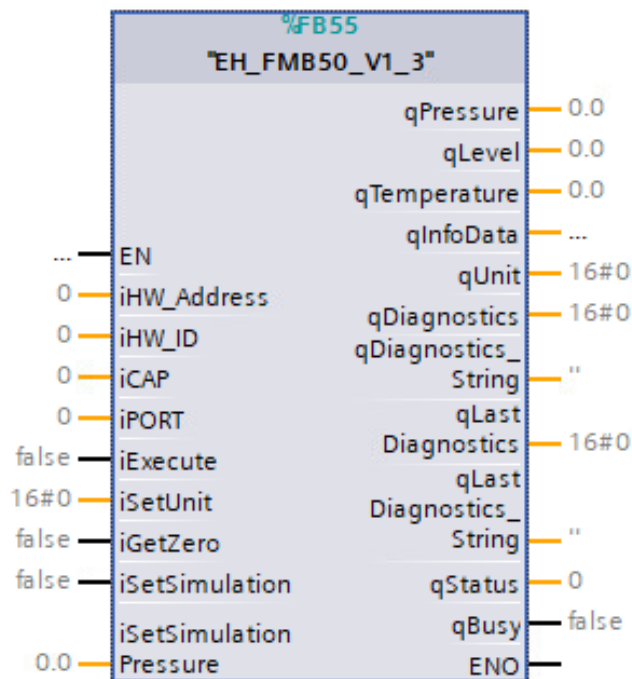
EH_PMP51_V1_3

EH_PMC51_V1_3

EH_PMP55_V1_3

The function block extracts the cyclic process data and provides it as a floating point variable. The main values are Pressure, Level and Temperature.

By triggering the execute input, the function block can put the device into simulation mode, set the zero point and read the diagnostics. In addition, it is also possible to change the unit of the process value. In this case the block will convert the value into the desired unit.



19 Call of function block

The following table represents the input and output parameters of the function block

Name	P type	Data type	Comment
iHW_Address	Input	Int	Input address of the module - See chapter 4
iHW_ID	Input	HW_IO, HW_ANY	Hardware identifier of the module - See chapter 4
iCAP	Input	Int	See table on page 15
iPORT	Input	Int	Portnumber where the device is connected to the IO-Link master 1..x
iExecute	Input	Bool	Trigger to execute the acyclic routine for parametrization and read out diagnostics

iSetUnit	Input	Byte	0 = mbar 1 = bar 2 = mmH2O 3 = mH2O 4 = ftH2O 5 = inH2O 6 = Pa 7 = kPa 8 = Mpa 9 = psi 10 = mmHg 11 = inHg 12 = kgf/cm
iGetZero	Input	Bool	TRUE = Set zero point FALSE = No action
iSetSimulation	Input	Bool	TRUE = Set device to simulation mode FALSE = No action
iSetSimulation_Pressure	Input	Real	Simulated value pressure
qPressure	Output	Real	Process value pressure
qLevel	Output	Real	Process value level
qInfoData	Output	LI-OLink_typeIdentificationObjects	UDT to provide device data – See chapter 4
qDiagnostics	Output	Dword	Diagnostic code – See table below
qDiagnostics_String	Output	String	Text of diagnostics message – See table below
qLastDiagnostics	Output	Dword	Last diagnostic code – See table below
qLastDiagnostics_String	Output	String	Last text of diagnostics message – See table below
qCondensedStatus	Output	Int	0 = Nonspecific 36 = Failure 60 = Functional check 120 = Out of spec. 128 = Good 129 = Simulation 165 = Maintenance req.
qBusy	Output	Bool	Busy signal of the function block after triggering the iExecute input TRUE = Parametrization and acyclic communication ongoing FALSE = No action

The following table represents the diagnostic messages of the function block

Diagnostics	Text of diagnostics message
000	System ok
001	No communication
482	C482 - Simulation output
484	C484 - Error simulation
485	C485 - Measure simulation
824	C824 - Process pressure
002	F002 - Sensor unknown

062	F062 - Sensor connection
081	F081 - Initialization
083	F083 - Memory content
140	F140 - Working range P
261	F261 - Electronics module
282	F282 - Memory
283	F283 - Memory content
419	F419 - Current cycle
841	F841 - Sensor range
431	M431 - Calibration
434	M434 - Scaling
438	M438 - Data record
803	M803 - Current loop
110	S110 - Working range T
822	S822 - Process temperature

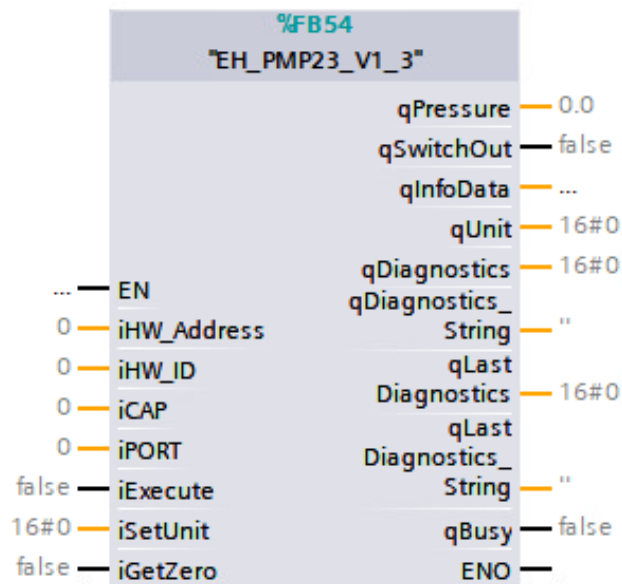
For further information please check the device manual or the IODD

12 Cerabar PMP23

EH_PMP23_V1_3

The function block extracts the cyclic process data and provides it as a floating point variable. The main process value is Pressure. In addition, it provides the status of the switch output.

By triggering the execute input, the function block can set the zero point and read the diagnostics. It is also possible to change the unit of the process value.



20 Call of function block

The following table represents the input and output parameters of the function block

Name	P type	Data type	Comment
iHW_Address	Input	Int	Input address of the module - See chapter 4
iHW_ID	Input	HW_IO, HW_ANY	Hardware identifier of the module - See chapter 4
iCAP	Input	Int	See table on page 15
iPORT	Input	Int	Portnumber where the device is connected to the IO-Link master 1..x
iExecute	Input	Bool	Trigger to execute the acyclic routine for parametrization and read out diagnostics
iSetUnit	Input	Byte	0 = bar 1 = kPa 2 = MPa 3 = psi
iGetZero	Input	Bool	TRUE = Set zero point FALSE = No action
qPressure	Output	Real	Process value pressure
qSwitchOut	Output	Bool	Switch Output

qInfoData	Output	LI- OLink_typeIdentifi- cationObjects	UDT to provide device data – See chapter 4
qDiagnostics	Output	Dword	Diagnostic code – See table below
qDiagnostics_String	Output	String	Text of diagnostics message – See table below
qLastDiagnostics	Output	Dword	Last diagnostic code – See table below
qLastDiagnostics_String	Output	String	Last text of diagnostics message – See table below
qBusy	Output	Bool	Busy signal of the function block after triggering the iExecute input TRUE = Parametrization and acyclic communication ongoing FALSE = No action

The following table represents the diagnostic messages of the function block

Diagnostics	Text of diagnostics message
16#3030_3030	System ok
16#0000_0001	No communication
16#5331_3430	Sensor signal outside of permitted ranges
16#4632_3730	Overpressure/low pressure, Defect in electronics
16#4334_3331	Invalid position adjustment (current output)
16#4334_3332	Invalid position adjustment (switching output)
16#4634_3337	Incompatible configuration
16#4334_3639	Switch points output violated
16#4334_3835	Simulation active
16#5335_3130	Turn down violated
16#5338_3033	Current output not connected
16#4638_3034	Overload at switch output
16#5339_3731	Measured value is outside sensor range

For further information please check the device manual or the IODD

13 Ceraphant PTC31B / PTP31B / PTP33B

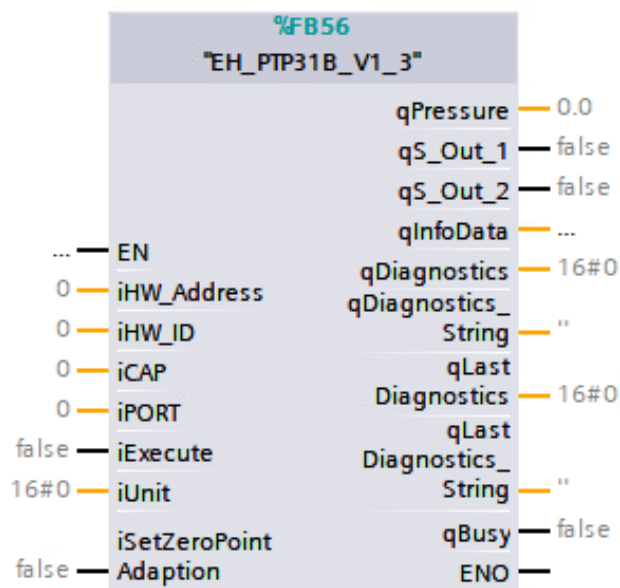
EH_PTC31B_V1_3

EH_PTP31B_V1_3

EH_PTP33B_V1_3

The function block extracts the cyclic process data and provides it as a floating point variable. The main process value is Pressure. In addition, it provides the status of the switch output.

By triggering the execute input, the function block can set the zero point and read the diagnostics. It is also possible to change the unit of the process value.



2.1 Call of function block

The following table represents the input and output parameters of the function block

Name	P type	Data type	Comment
iHW_Address	Input	Int	Input address of the module – See chapter 4
iHW_ID	Input	HW_IO, HW_ANY	Hardware identifier of the module – See chapter 4
iCAP	Input	Int	See table on page 15
iPORT	Input	Int	Portnumber where the device is connected to the IO-Link master 1..x
iExecute	Input	Bool	Trigger to execute the acyclic routine for parametrization and read out diagnostics
iUnit	Input	Byte	0 = bar 1 = kPa 2 = Mpa 3 = psi
iSetZeroPointAdaption	Input	Bool	TRUE = Set zero point FALSE = No action
qPressure	Output	Real	Process value pressure

qS_Out_1	Output	Bool	Switch Output 1
qS_Out_2	Output	Bool	Switch Output 2
qInfoData	Output	LI- OLink_typeIdentifi- cationObjects	UDT to provide device data – See chapter 4
qDiagnostics	Output	Dword	Diagnostic code – See table below
qDiagnostics_String	Output	String	Text of diagnostics message – See table below
qLastDiagnostics	Output	Dword	Last diagnostic code – See table below
qLastDiagnostics_String	Output	String	Last text of diagnostics message – See table below
qBusy	Output	Bool	Busy signal of the function block after triggering the iExecute input TRUE = Parametrization and acyclic communication ongoing FALSE = No action

The following table represents the diagnostic messages of the function block

Diagnostics	Text of diagnostics message
16#3030_3030	System ok
16#0000_0001	No communication
16#5331_3430	S140 – Sensor signal outside of permitted ranges
16#4632_3730	F270 – Overpressure/low pressure
16#4334_3331	C431 – Invalid position adjustment (Current Output)
16#4334_3332	C432 – Invalid position adjustment (Switching Output)
16#4634_3337	F437 – Incompatible configuration
16#4334_3639	C469 – Switch points for output violated
16#4334_3835	C485 – Simulation active
16#5335_3130	S510 – Turn down violated
16#5338_3033	S803 – Current loop
16#5338_3034	F804 – Overload at switch
16#5339_3731	S971 – Measured value is outside sensor range

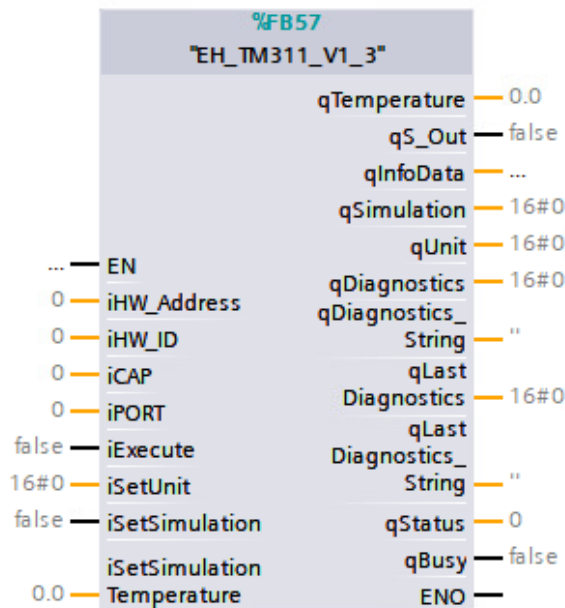
For further information please check the device manual or the IODD

14 iTHERM CompactLine TM311

EH_TM311_V1_3

The function block extracts the cyclic process data and provides it as a floating point variable. The main process value is Temperature. In addition, it provides the status of the switch output.

By triggering the execute input, the function block can set the zero device to simulation and read the diagnostics. It is also possible to change the unit of the process value.



2.2 Call of function block

The following table represents the input and output parameters of the function block

Name	P type	Data type	Comment
iHW_Address	Input	Int	Input address of the module - See chapter 4
iHW_ID	Input	HW_IO, HW_ANY	Hardware identifier of the module - See chapter 4
iCAP	Input	Int	See table on page 15
iPORT	Input	Int	Portnumber where the device is connected to the IO-Link master 1..x
iExecute	Input	Bool	Trigger to execute the acyclic routine for parametrization and read out diagnostics
iSetUnit	Input	Byte	32 = Celsius 33 = Fahrenheit 35 = °Kelvin
iSetSimulation	Input	Bool	TRUE = Set device to simulation FALSE = No action
iSetSimulationTemperature	Input	Real	Simulated process value temperature
qTemperature	Output	Real	Process value temperature

qS_Out	Output	Bool	Switch Output
qInfoData	Output	LI- OLink_typeIdentifi- cationObjects	UDT to provide device data – See chapter 4
qDiagnostics	Output	Dword	Diagnostic code – See table below
qDiagnostics_String	Output	String	Text of diagnostics message – See table below
qLastDiagnostics	Output	Dword	Last diagnostic code – See table below
qLastDiagnostics_String	Output	String	Last text of diagnostics message – See table below
qCondensedStatus	Output	Int	0 = Bad: Not limited 1 = Bad: Low limited 2 = Bad: High limited 3 = Bad: Constant 4 = Uncertain: Not limited 5 = Uncertain: Low limited 6 = Uncertain: High limited 7 = Uncertain: Constant 8 = Manual: Fixed: Not limited 9 = Manual: Fixed: Low limited 10 = Manual: Fixed: High limited 11 = Manual: Fixed: Constant 12 = Good: Not limited 13 = Good: Low limited 14 = Good: High limited 15 = Good: Constant
qBusy	Output	Bool	Busy signal of the function block after triggering the iExecute input TRUE = Parametrization and acyclic communication ongoing FALSE = No action

The following table represents the diagnostic messages of the function block

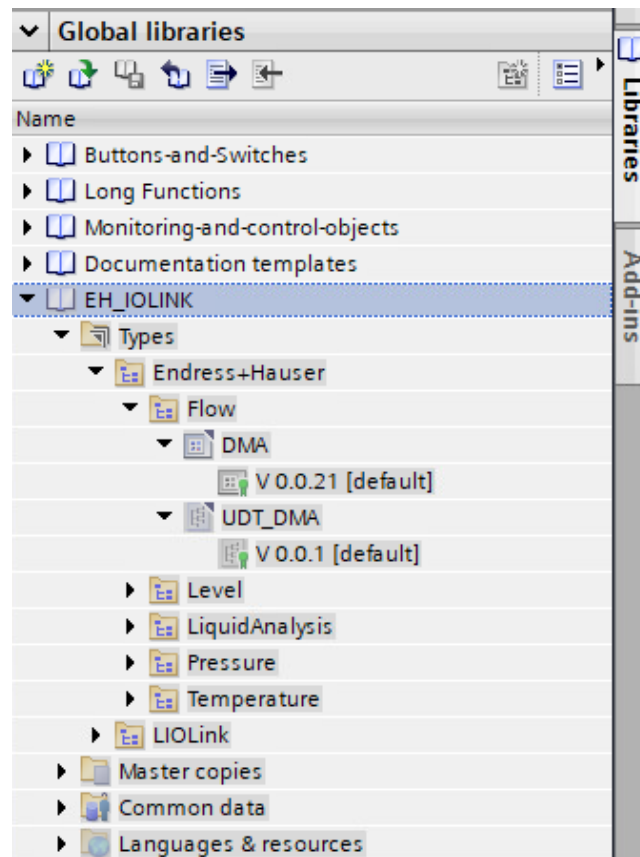
Diagnostics	Text of diagnostics message
16#0	System ok
16#1	No communication
16#4001	F001 - Device failure
16#4004	F004 - Sensor defective
16#102F	S047 - Sensor limit reached
16#2191	C401 - Factory Reset active
16#2192	C402 + Initialization active
16#21E5	C485 - Process variable sim. active
16#21E8	C491 + Current output sim. active
16#21EE	C494 - Switch output sim. active
16#4219	F537 - Configuration invalid
16#1321	S801 - Supply voltage too low
16#1324	S804 - Overload at switch output
16#1339	S825 - Operating temperature
16#134C	S844 - Process value out of spec.

For further information please check the device manual or the IODD

15 Faceplates

To use the functionality of the function blocks Endress+Hauser provides a sample library of faceplates. These faceplates constitute the possibilities of the function blocks to the operator level (HMI). The faceplates can be used as templates and can be adjusted as desired.

Drag and drop the desired faceplate and UDTs to your project folder.

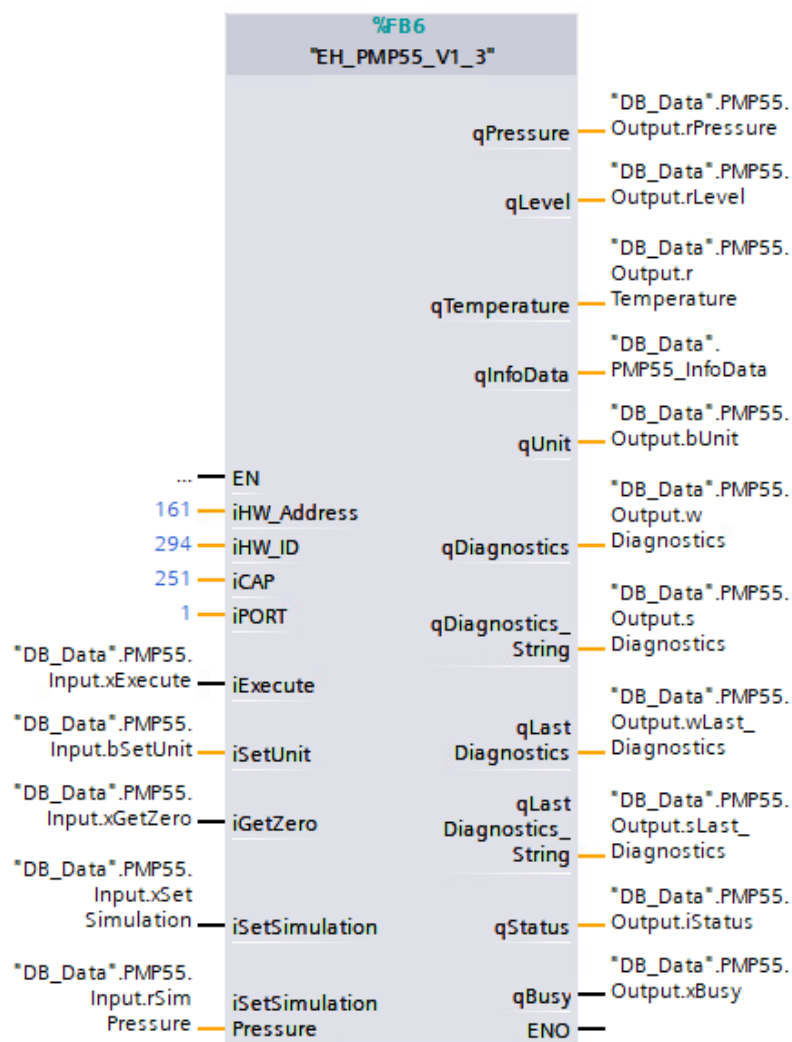


23 Opened IO-Link library of Endress+Hauser

Declare the UDTs in a datablock and link them to the inputs and outputs of the function block.

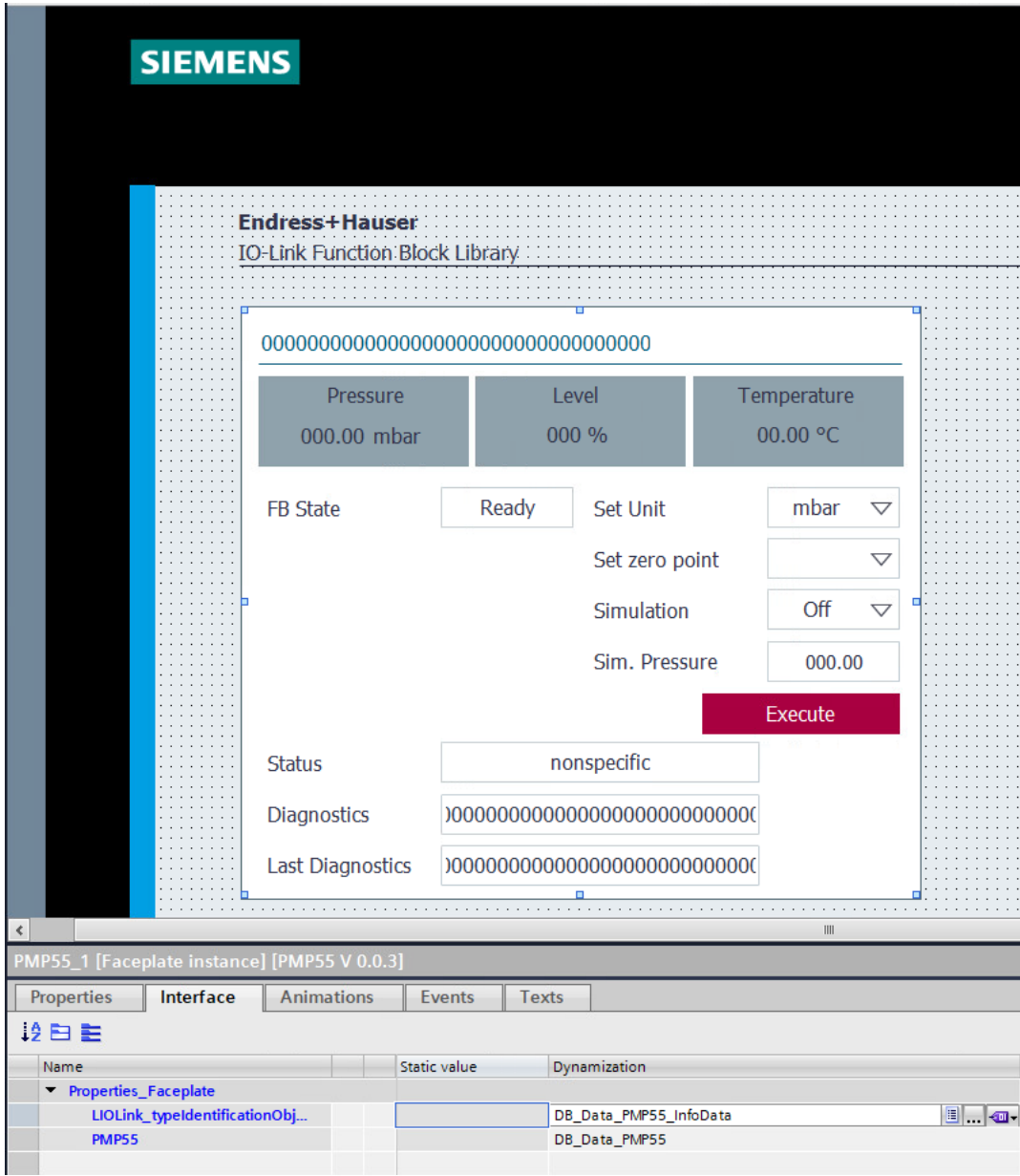
DB_Data		
	Name	Data type
1	Static	
2	DMA	"UDT_DMA"
3	CLD18	"UDT_CLD18"
4	TM311	"UDT_TM311"
5	PMP51	"UDT_PMP51"
6	PTP31B	"UDT_PTP31B"
7	PTC31B	"UDT_PTC31B"
8	PTB33B	"UDT_PTP33B"
9	PMP23	"UDT_PMP23"
10	FTI26	"UDT_FTI26"
11	FTW23	"UDT_FTW23"
12	FTW33	"UDT_FTW33"
13	FTL31	"UDT_FTL31"
14	FTL33	"UDT_FTL33"
15	FMB50	"UDT_FMB50"
16	PMC51	"UDT_PMC51"
17	PMP55	"UDT_PMP55"
18	QMW43	"UDT_QMW43"
19	CLD18_InfoData	"LIOLink_typeIdentificationObjects"
20	DMA_InfoData	"LIOLink_typeIdentificationObjects"
21	TM311_InfoData	"LIOLink_typeIdentificationObjects"
22	PMP51_InfoData	"LIOLink_typeIdentificationObjects"
23	PTP31B_InfoData	"LIOLink_typeIdentificationObjects"
24	PMP23_Infodata	"LIOLink_typeIdentificationObjects"
25	FTI26_InfoData	"LIOLink_typeIdentificationObjects"
26	FTW23_InfoData	"LIOLink_typeIdentificationObjects"
27	FMB50_InfoData	"LIOLink_typeIdentificationObjects"
28	PMC51_InfoData	"LIOLink_typeIdentificationObjects"
29	PMP55_InfoData	"LIOLink_typeIdentificationObjects"
30	PTC31B_InfoData	"LIOLink_typeIdentificationObjects"
31	PTP33B_InfoData	"LIOLink_typeIdentificationObjects"

24 Declaration of data types in a data block



25 Call of function block

Drag and drop the faceplate from the library to your screen. Link the UDTs from the DB to the interface of the faceplate.



26 Editor view of HMI

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