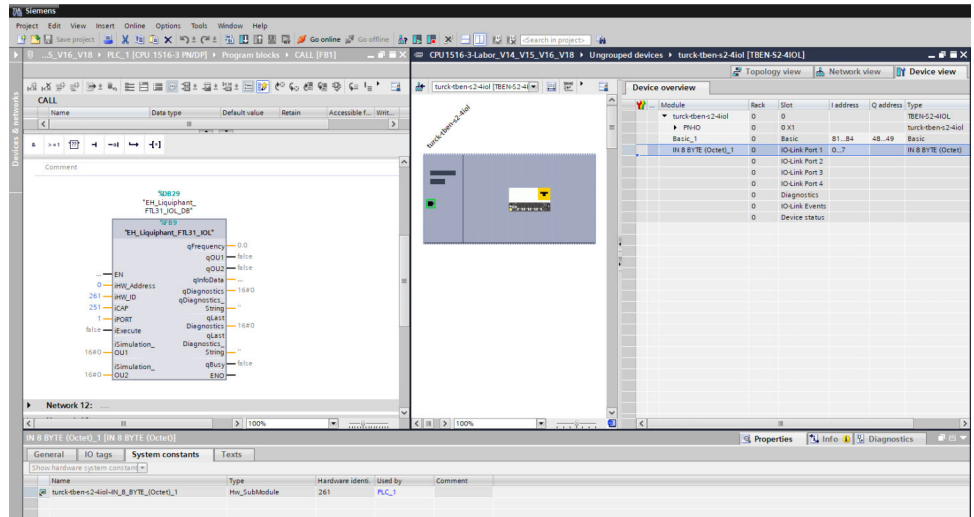


# Special Documentation

## Endress+Hauser IO-Link devices

Endress+Hauser IO-Link device function blocks  
For Siemens TIA Portal



## Change history


Version	Documentation	Changes
1.00	SD03368S/04/EN/01.24	First version
1.05	SD03368S/04/EN/02.26	New function blocks <ul style="list-style-type: none"><li>■ Picomag Insertion (DMI)</li><li>■ Cerabar PMx2x</li><li>■ Ceraphant PTx1xB</li></ul> Addition of Heartbeat Verification function for Promag 10, Promass 10, Liquiphant FTL43, Micropilot FMR43 and Cerabar PMP43

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# 1 About this document

## 1.1 Document function

This Special Documentation serves as a reference for integrating certain IO-Link field devices into certain Siemens control systems. This document is only valid for the Endress +Hauser IO-Link devices mentioned (→  9).

The described IO-Link device function blocks are designed for integration into the following PLCs via the Siemens TIA Portal automation software:

- SIMATIC S7-1200
- SIMATIC S7-1500

This document applies in addition to the accompanying product documentation for the relevant IO-Link device, such as Operating Instructions, Technical Information and ATEX Safety Instructions. The accompanying product documentation must be observed throughout the entire product life cycle.

## 1.2 Symbols

### 1.2.1 Safety symbols



This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.



This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.



This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.



This symbol contains information on procedures and other facts which do not result in personal injury.

### 1.2.2 Symbols for certain types of information and graphics



Indicates additional information



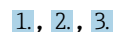
Reference to documentation



Reference to graphic



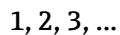
Notice or individual step to be observed



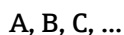
Series of steps



Result of a step



Item numbers



Views

## 1.3 Documentation

### 1.3.1 Further applicable documents

An overview of the associated documentation is provided in the following:

- *Device Viewer*: Enter serial number from nameplate  
[www.endress.com/deviceviewer](http://www.endress.com/deviceviewer)
- The download area of the Endress+Hauser website  
[www.endress.com/downloads](http://www.endress.com/downloads)

### 1.3.2 Purpose and content of the document types

#### Technical Information (TI)

##### Planning aid

This document contains all the technical data on the product and provides an overview of everything that can be ordered with the product.

#### Brief Operating Instructions (KA)

##### Quick guide to obtaining the first measured value

The Brief Operating Instructions contain all the essential information from incoming acceptance to initial commissioning.

#### Operating Instructions (BA)

##### Your reference guide

The Operating Instructions contain all the information that is required in various phases of the life cycle of the product: from product identification, incoming acceptance and storage, to mounting, electrical connection, operation and commissioning through to troubleshooting, maintenance and disposal.

#### Safety instructions (XA)

Safety Instructions (XA) are supplied with the product depending on the approval. They are an integral part of the Operating Instructions.



The nameplate indicates the Safety Instructions (XA) that are relevant to the product.

#### Special Documentation (SD)

##### Additional information

Special Documentation provides additional information on the product. Additional information can include graphical representation of commissioning, for example, or information on an app.

## 1.4 List of abbreviations

Abbreviation	Description
CAP	Client Access Point Access point
UDT	User Defined Type User-defined type

## 1.5 Registered trademarks

IO-Link® is a registered trademark of the IO-Link Community c/o PROFIBUS User Organization, (PNO) Karlsruhe/Germany - [www.io-link.com](http://www.io-link.com)

All other brand and product names are trademarks or registered trademarks of the companies and organizations in question.

## 2 Basic safety instructions

### 2.1 Requirement for personnel

This document is intended for commissioning personnel of control systems who possess the following qualifications:

- Technicians or engineers
- Knowledge of the Siemens automation software TIA Portal
- Knowledge of the components in use, such as the IO-Link masters and IO-Link devices

The personnel responsible for installation, commissioning, diagnostics, and maintenance must meet the following conditions:

- ▶ Trained, qualified specialists must have a relevant qualification for this specific function and task.
- ▶ Personnel must be authorized by the plant owner/operator.
- ▶ They must be familiar with national regulations.
- ▶ Before starting work, personnel must read and understand the instructions in the manual and supplementary documentation as well as the certificates (depending on the application).
- ▶ They must follow instructions and comply with general policies.

The operating personnel must meet the following conditions:

- ▶ Personnel must be instructed and authorized according to the requirements of the task by the facility's owner/operator.
- ▶ Personnel must follow the instructions in this manual.

### 2.2 Intended use

The Endress+Hauser IO-Link device function blocks are compiled together as a library and made available at regular intervals.


 Supported IO-Link devices: →  9



The function blocks for the Endress+Hauser IO-Link devices contain functions of the Siemens "Library for IO-Link (LIOLink)".

<https://support.industry.siemens.com/cs/ww/en/view/82981502>

The function blocks are designed for integration into the following PLCs using Siemens automation software TIA Portal:

- SIMATIC S7-1200
- SIMATIC S7-1500

The function block library has been tested with specific PLCs, IO-Link masters, and the TIA Portal. →  9

 For proper use of the IO-Link devices, refer to the accompanying operating instructions for the device →  5.

The function blocks are intended to support the commissioning personnel of control systems using Endress+Hauser IO-Link devices. The function blocks make no claim of completeness or functionality for every configuration and system. The user of the function blocks is responsible for correct and safe operation in their system and for implementing any necessary adjustments. The user is also responsible for excluding errors that could lead to material damage and/or personal injury.

#### IT security (cybersecurity)

Each IO-Link device has individually implemented security mechanisms. For details about the implemented security mechanisms, refer to the product documentation of the IO-Link device.

The operator is responsible for protecting their system, system components, and networks against attacks and, in accordance with their requirements (security level), implementing and updating a comprehensive security concept.



Endress+Hauser provides information on cybersecurity at the following website:  
<https://www.endress.com/cybersecurity>

## 3 Product description

### 3.1 Function

The function block library supports commissioning personnel with the integration into Siemens control systems SIMATIC S7-1200 and SIMATIC S7-1500.

Furthermore, the function blocks perform the following tasks:

- Writing acyclic data to an IO-Link device
- Reading acyclic data from an IO-Link device
- Parameterizing an IO-Link device
- Displaying process values directly at the output parameters of each function block without requiring further decoding

The function blocks are designed to work with generic input and output modules to provide greater flexibility in selecting the desired hardware.

### 3.2 Supported Endress+Hauser IO-Link devices

The library contains the function blocks for the following Endress+Hauser IO-Link devices.

#### Liquid analysis

Smartec CLD18

#### Flow

- Dosimag
- Dosimass
- Picomag (DMA)
- Picomag Insertion (DMI)
- Promag 10
- Promass 10

#### Level

- Liquiphant FTL31
- Liquiphant FTL33
- Liquiphant FTL43
- Liquipoint FTW23, FTW33
- Liquitrend QMW43
- Micropilot FMR43
- Nivector FTI26

#### Pressure

- Cerabar PMC21, PMP23
- Cerabar PMP43
- Cerabar M PMC51, PMP51, PMP55
- Ceraphant PTC31B, PTP31B, PTP33B
- Deltapilot M FMB50

#### Temperature

- iTHERM CompactLine TM311
- iTEMP TMT36

### 3.3 System requirements

The function block library has been tested with specific PLCs, IO-Link masters, and the TIA Portal.

### **3.3.1 PLC**

Siemens PLC:

- SIMATIC S7-1200
- SIMATIC S7-1500

### **3.3.2 IO-Link master**

IFM

- AL1102
- AL1303
- AL1402
- AL1100

Siemens  
CM 4xIO-Link

Turck  
TBEN-S2-4IOL

### **3.3.3 Software**





Siemens automation software TIA Portal version 18

## 4 System integration

### 4.1 Requirements and procedure

#### Requirements

Hardware configuration engineered.

1. Download the function block library →  11.
2. Configure the IO-Link master →  11.
3. Open the library →  14.
4. Integrate the function block →  14.

### 4.2 Downloading the function block library

1. Open the [www.endress.com](http://www.endress.com) page.
2. Select the product using the filters and search field.
3. Open the product page.
4. Select the **Downloads** page.
5. Select **Software**.

### 4.3 Configuring the IO-Link master

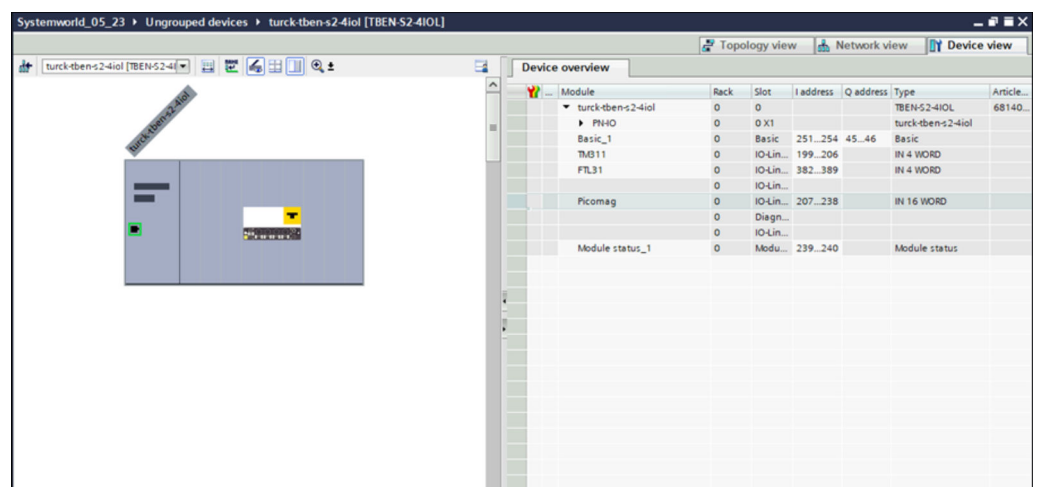
The function blocks always communicate with the IO-Link device via the IO-Link master.


The configuration of the various IO-Link masters is almost identical.

Note that some IO-Link masters use a **Port configuration generic** module in the WORD file format, while others use the Byte format.

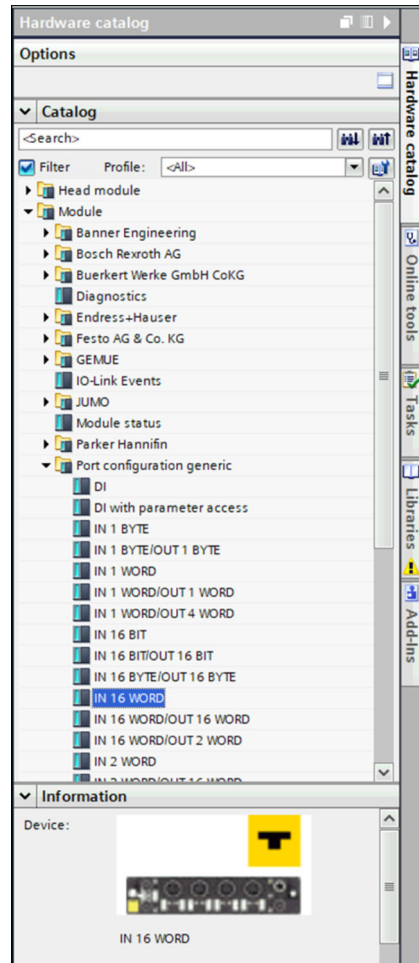
An example of the configuration for an IO-Link master "Turck TBEN-S2-4IOL" is described below.

1. In the TIA Portal, go to the **Network view** and open the **Device view** for the IO-Link master.



 1 Siemens TIA Portal: "Device view" for a IO-Link master "Turck TBENS2-4IOL"

2. In the **Hardware catalog** window in the **Port configuration generic** folder, select the module required for the IO-Link device. Table: →  13

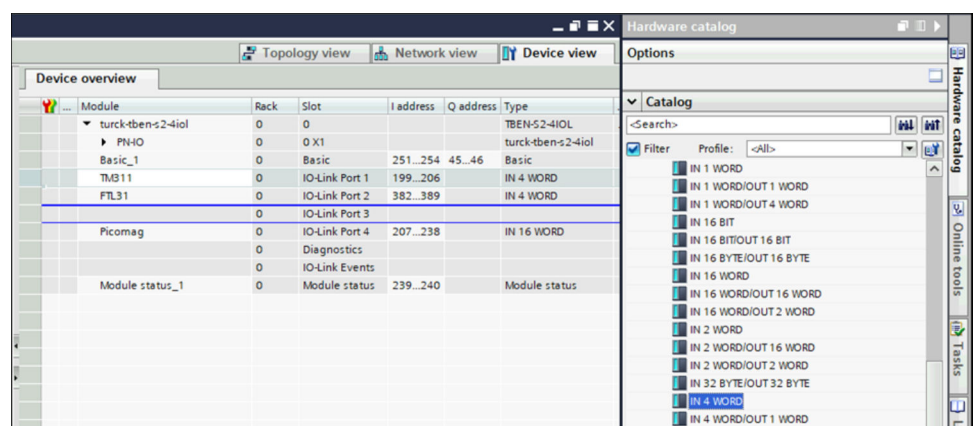


2 Siemens TIA Portal: "Port configuration generic" folder in the "Hardware catalog" window

Module to be selected depending on the IO-Link device

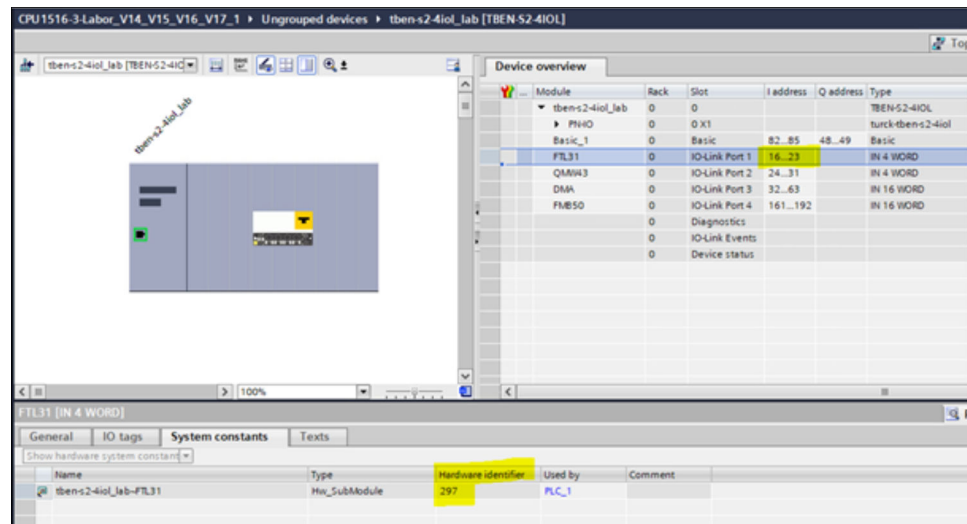
Port configuration generic	IO-Link device
IN 4 WORD IN 8 Byte (Octet)	<p><b>Level</b></p> <ul style="list-style-type: none"> <li>▪ Liquiphant FTL31</li> <li>▪ Liquiphant FTL33</li> <li>▪ Liquiphant FTL43</li> <li>▪ Liquipoint FTW23, FTW33</li> <li>▪ Liquitrend QMW43</li> <li>▪ Nivector FTI26</li> </ul> <p><b>Pressure</b></p> <ul style="list-style-type: none"> <li>▪ Ceraphant PTC31B, PTP31B, PTP33B</li> <li>▪ Cerabar PMC31, PMP23</li> <li>▪ Cerabar PMP43</li> <li>▪ Cerabar M PMC51, PMP51, PMP55</li> </ul> <p><b>Temperature</b></p> <ul style="list-style-type: none"> <li>▪ iTHERM CompactLine TM311</li> <li>▪ iTEMP TMT36</li> </ul>
IN 16 WORD IN 32 Byte (Octet)	<p><b>Liquid analysis</b></p> <p>Smartec CLD18</p> <p><b>Flow</b></p> <ul style="list-style-type: none"> <li>▪ Picomag (DMA)</li> <li>▪ Picomag Insertion (DMI)</li> </ul> <p><b>Level</b></p> <p>Micropilot FMR43</p> <p><b>Pressure</b></p> <p>Deltapilot M FMB50</p>
IN 16 WORD / OUT 16 WORD IN 32 Byte (Octet) / OUT 32 Byte (Octet)	<p><b>Flow</b></p> <ul style="list-style-type: none"> <li>▪ Promass 10</li> <li>▪ Promag 10</li> <li>▪ Dosimag</li> <li>▪ Dosimass</li> </ul>

3. Drag and drop the selected module into the **Device overview** window to the slot for the IO-Link device.
4. Rename the module.



3 Siemens TIA Portal: "Device overview" window of the IO-Link master "Turck TBENS2-4IOL" and "Hardware catalog" with modules

5. Record the input addresses and port of the module to which the IO-Link device is connected.
6. Note the "Hardware identifier" value of the module. The "Hardware identifier" is displayed in the "System constants" menu (path: Properties > System constants).

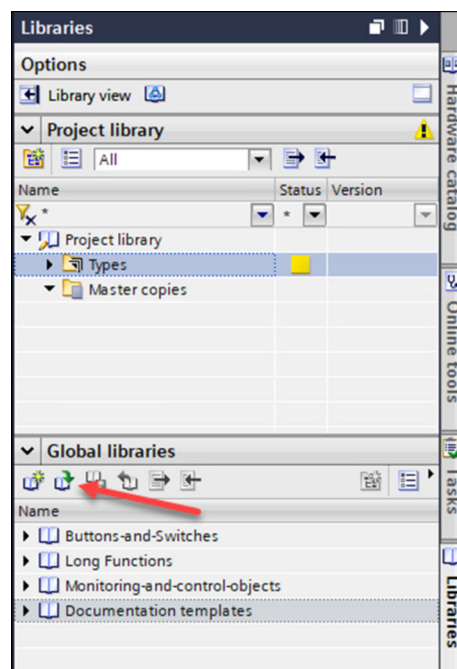


4 Siemens TIA Portal: "Device overview" window IO-Link master "Turck TBENS2-4IOL" with assigned input address and "System constants" window with "Hardware identifier"

## 4.4 Integrating a function block from the library

The Endress+Hauser function block library is available on the product pages of the IO-Link devices ([www.endress.com](http://www.endress.com) > Product page of the IO-Link device > Downloads > Device drivers and Firmware) → 11.

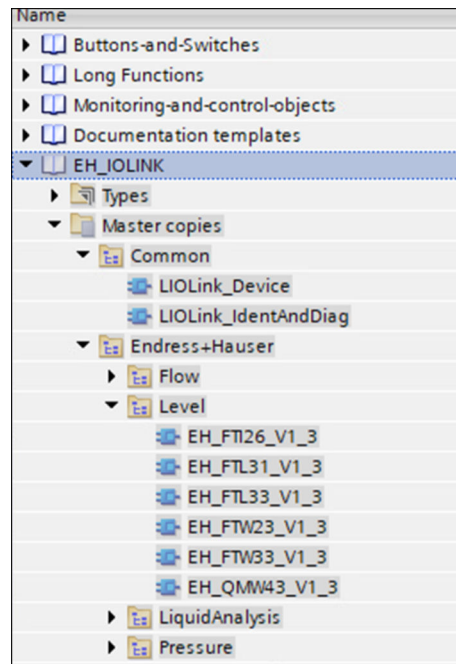
- In the **Libraries** window, under the **Global libraries** section, open the Endress+Hauser function block library "EH\_IOLINK".
  - The Endress+Hauser function block library is displayed as "EH\_IOLink".



5 Siemens TIA Portal: "Libraries" window and "Global libraries" section

- Drag and drop the function block for the IO-Link device from the library into the "Project tree" window.
- Drag and drop the function blocks OLink\_Device and LIOLinkIdentAndDiag into the "Project tree" window.

The Siemens basic block "LIOLink\_Device" is required for acyclic communication. The profile module "LIOLinkIdentAndDiag" reads and writes acyclic identification and diagnostic data and displays the status of the connected IO-Link device.

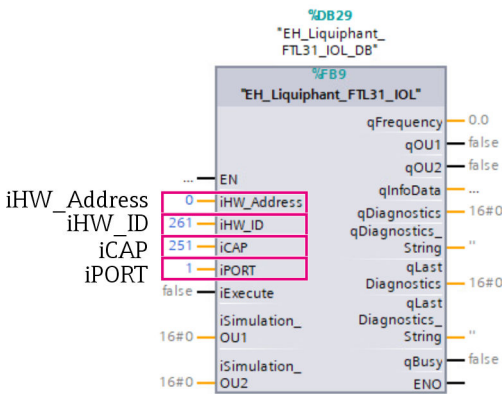
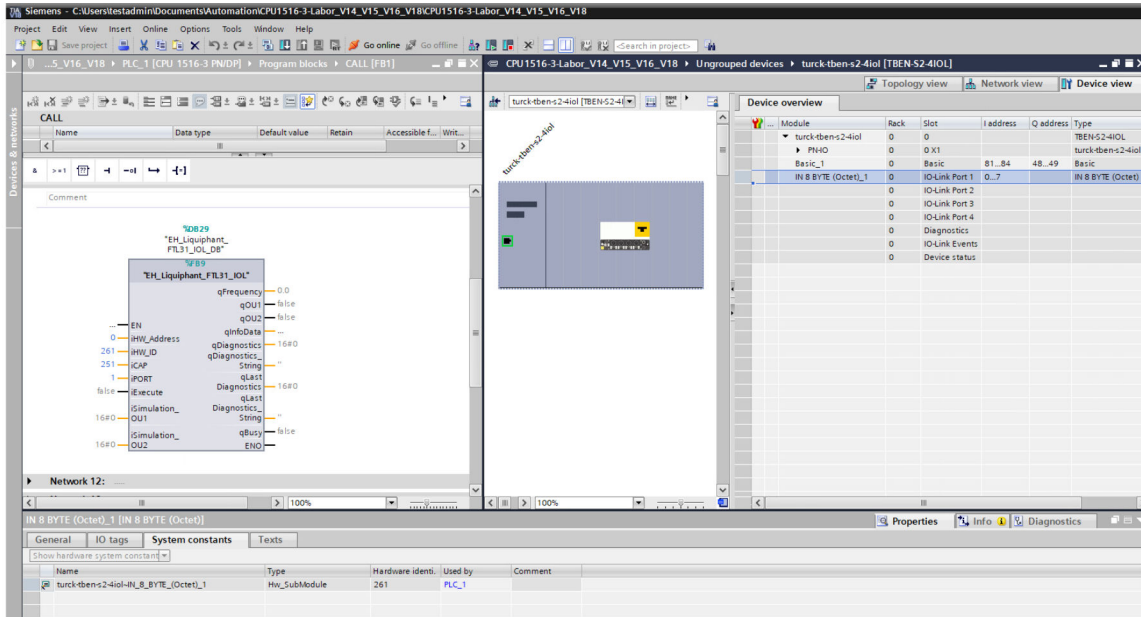


6 Siemens TIA Portal: Endress+Hauser function block library "EH\_IOLINK"

4. Drag and drop the data types LIOLink\_typeDiagnostics and LIOLink\_TypeIdentificationObjects from the library into the "Project tree" window.

The Endress+Hauser function blocks provide the data for device identification at the output parameter InfoPath. The data type of the InfoData parameter is LIOLink\_typeIdentification Objects.

5. Open the function block.



This table is a detailed view of the 'Device overview' table from the screenshot above. It highlights the 'IN 8 BYTE (Octet)\_1' module and its IO-Link Port 1 address (0...7). Annotations show that the 'iHW\_Address' parameter of the function block is linked to the rack address (0) and the 'iPORT' parameter is linked to the IO-Link Port 1 address (0...7).





The screenshot shows the 'System constants' tab for the hardware configuration. The following table shows the 'Hardware identifier' for the module:

Name	Type	Hardware identi.	Used by	Comment
turck-tben-s2-4iol-IN_8_BYTE_(Octet)_1	Hw_SubModule	261	PLC_1	

7 Required parameterization of the function block, example of Liquiphant FTL31

6. Link the input address of the module in the hardware configuration to the function block using either iHW\_Address or iInput\_Address.
7. If applicable, link the output address of the module in the hardware configuration to the function block using iOutput\_Address.
8. Link the value for the "Hardware identifier" of the module in the hardware configuration to the function block using the parameter iHW\_ID. iHW\_ID: The value for the "Hardware identifier" of the generic module (path: Properties > System constants). → 13
9. Set the iCAP parameter.


*CAP IDs for various IO-Link masters*

IO-Link master	CAP IDs for iCAP
<b>Turck</b> TBEN-S2-4IOL	251 to 254  Use a different CAP ID for each port when using parallel acyclic communication.
<b>IFM</b> <ul style="list-style-type: none"> <li>▪ AL1102</li> <li>▪ AL1303</li> <li>▪ AL1402</li> <li>▪ AL1100</li> </ul>	-19456  Since parallel acyclic communication is not possible, you must ensure that only one acyclic connection is open.
<b>Siemens</b>	227, if no other CAP ID is specified in the IO-Link Master documentation.  Since parallel acyclic communication is not possible, you must ensure that only one acyclic connection is open.
<b>Keyence</b> NQ-MP8L	247 to 255  Use a different CAP ID for each port when using parallel acyclic communication.

10. For the iPort parameter, specify the port number to which the IO-Link device is connected.

At the output of the function block, the current process values are displayed.

Parameterization is device-specific.

 Detailed information about the function blocks and parameters: As of →  18

## 5 Description of the "Liquid analysis" function blocks

### 5.1 Smartec CLD18

#### Function block designation


EH\_Smartec\_CLD18\_IOL

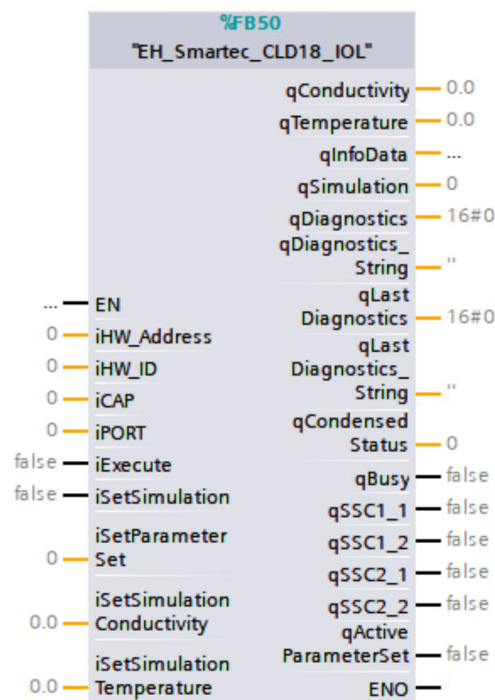
#### Device ID

131329

#### Overview of functions




- Providing the current values for the main measured variables: conductivity and temperature
- Providing the status of switching signals
- Cyclic delivery of the summarized status signal
- Reading the diagnostic data after triggering of the input iExecute
- Simulating the main measured variables
- Selection of parameter sets

 For detailed information on the device, see the product documentation →  5.



 8 EH\_Smartec\_CLD18\_IOL function block

#### Parameters of EH\_Smartec\_CLD18\_IOL

Name	P Type	Data Type	Comment
iHW_Address	IN	Int	Input address of the module →  13
iHW_ID	IN	HW_IO, HW_ANY	Hardware identifier of the module →  13
iCAP	IN	Int	Client Access Point →  17
iPORT	IN	Int	Port number where the device is connected to the IO-Link master

Name	P Type	Data Type	Comment
iExecute	IN	Bool	Trigger to execute the acyclic routine for parametrization and read out diagnostics
iSetSimulation	IN	Bool	Signal to put device into simulation <ul style="list-style-type: none"> <li>▪ TRUE: Simulation ON</li> <li>▪ FALSE: Simulation OFF</li> </ul>
iSetParameterSet	IN	Int	Signal to set parameter set <ul style="list-style-type: none"> <li>▪ 1: Parameter set 1</li> <li>▪ 2: Parameter set 2</li> </ul>
iSetSimulationConductivity	IN	Real	Conductivity value to be simulated
iSetSimulationTemperature	IN	Real	Temperature value to be simulated
qConductivity	OUT	Real	Process value conductivity
qTemperature	OUT	Real	Process value temperature
qInfoData	OUT	LI-OLink_type Identification Objects	UDT to provide device data
qSimulation	OUT	Int	<ul style="list-style-type: none"> <li>▪ 1: Device is in simulation mode</li> <li>▪ 0: Device is not in simulation mode</li> </ul>
qDiagnostics	OUT	Dword	Current diagnostic code → 19
qDiagnostics_String	OUT	String	Current diagnostic text → 19
qLastDiagnostics	OUT	Dword	Previous diagnostic code → 19
qLastDiagnostics_String	OUT	String	Previous diagnostic text → 19
qCondensedStatus	OUT	Int	<ul style="list-style-type: none"> <li>▪ 0: Not specified</li> <li>▪ 36: Failure</li> <li>▪ 60: Functional check</li> <li>▪ 120: Out of specification</li> <li>▪ 128: Good</li> <li>▪ 129: Good - simulation</li> <li>▪ 164: Maintenance required</li> </ul>
qBusy	OUT	Bool	Busy signal of the function block after triggering the iExecute input <ul style="list-style-type: none"> <li>▪ TRUE: parametrization and acyclic communication ongoing</li> <li>▪ FALSE: No action</li> </ul>
qSSC1_1	OUT	Bool	Status switching signal 1.1
qSSC1_2	OUT	Bool	Status switching signal 1.2
qSSC2_1	OUT	Bool	Status switching signal 2.1
qSSC2_2	OUT	Bool	Status switching signal 2.2
qActiveParameterSet	OUT	Bool	Selected parameter set <ul style="list-style-type: none"> <li>▪ TRUE: Parameter set 2</li> <li>▪ FALSE: Parameter set 1</li> </ul>

#### Diagnostic numbers and diagnostic texts Smartec CLD18

Diagnostic number	Diagnostic text
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_0107	Sensor calibration
16#0000_0130	No conductivity

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

## 6 Description of the "Flow" function blocks

### 6.1 Dosimag

**Function block designation**

EH\_Dosimag\_IOL

**Device ID**

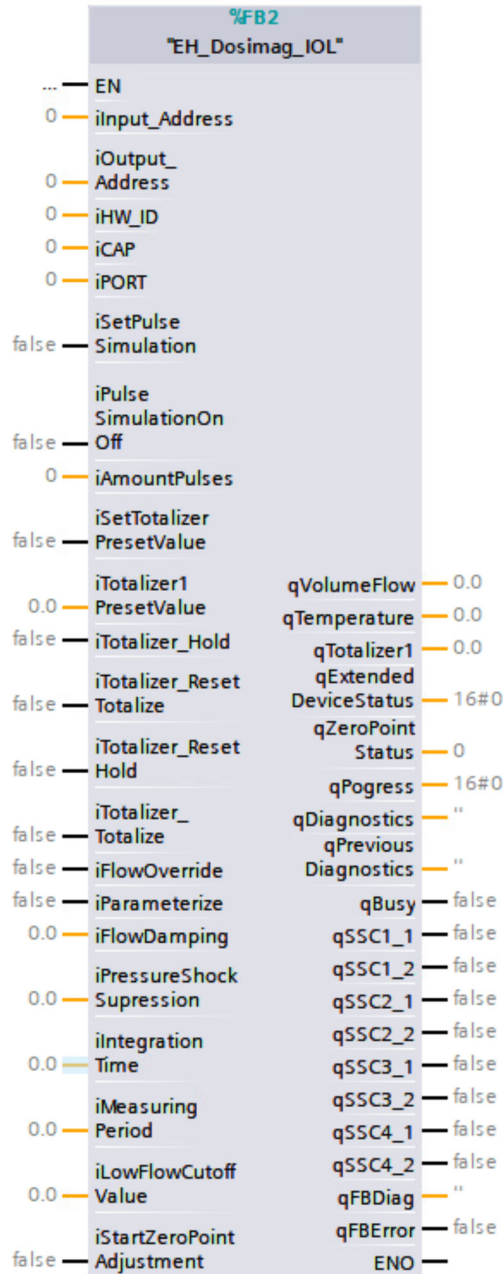
9729281

**Overview of functions**

- Providing the current values for the main measured variables: volume flow, temperature and totalizer
- Providing the status of switching signals
- Cyclic delivery of the extended status signal
- Starting the zero adjustment
- Control of pulses
- Control of the totalizer



For detailed information on the device, see the product documentation → 5.





9 Function block EH\_Dosimag\_IOL

Parameters of EH\_Dosimag\_IOL

Name	P Type	Data Type	Comment
iInput_Address	IN	Int	Logical input address of the module → 13
iOutput_Address	IN	Int	Logical output address of the module → 13
iHW_ID	IN	HW_IO, HW_ANY	Hardware identifier of the module → 13
iCAP	IN	Int	Client Access Point → 17
iPORT	IN	Int	Port number where the device is connected to the IO-Link master
iSetPulseSimulation	IN	Bool	Trigger to start pulse simulation
iPulseSimulationOnOff	IN	Bool	<ul style="list-style-type: none"> <li>▪ TRUE: Pulse simulation ON</li> <li>▪ FALSE: Pulse simulation OFF</li> </ul>
iAmountPulses	IN	Int	Amount of pulses to be executed

Name	P Type	Data Type	Comment
iSetTotalizerPresetValue	IN	Bool	Trigger to set totalizer preset value
iTotalizer1PresetValue	IN	Real	Start value for the totalizer. The totalizer starts totalizing with this value.
iTotalizer_Hold	IN	Bool	Totalizer hold
iTotalizer_ResetTotalize	IN	Bool	Reset totalizer and totalize
iTotalizer_ResetHold	IN	Bool	Reset totalizer and hold
iTotalizer_Totalize	IN	Bool	Totalizer totalize
iFlowOverride	IN	Bool	Flow override
iParameterize	IN	Bool	Trigger to start parameterization
iFlowDamping	IN	Real	Flow damping value
iPressureShockSupression	IN	Real	Pressure shock suppression value
iIntegrationTime	IN	Real	Integration time value
iMeasuringPeriod	IN	Real	Measuring period value
iLowFlowCutoffValue	IN	Real	Low flow cut-off value
iStartZeroPointAdjustment	IN	Bool	Trigger to start zero point adjustment
qVolumeFlow	OUT	Real	Process value volume flow
qTemperature	OUT	Real	Process value temperature
qTotalizer1	OUT	Real	Process value totalizer
qExtendedDeviceStatus	OUT	Byte	<ul style="list-style-type: none"> <li>▪ 0: Not specified</li> <li>▪ 36: Failure</li> <li>▪ 37: Failure - simulation</li> <li>▪ 60: Functional check</li> <li>▪ 61: Functional check - simulation</li> <li>▪ 120: Out of specification</li> <li>▪ 121: Out of specification - simulation</li> <li>▪ 128: Good</li> <li>▪ 129: Good - simulation</li> <li>▪ 164: Maintenance required</li> <li>▪ 165: Maintenance required - simulation</li> </ul>
qZeroPointStatus	OUT	Int	Status of the zero point adjustment <ul style="list-style-type: none"> <li>▪ 2: Failed</li> <li>▪ 5: Done</li> <li>▪ 8: Busy</li> </ul>
qProgress	OUT	Byte	Progress of the zero point adjustment 0 to 100 %
qDiagnostics	OUT	String	Current diagnostic text See product documentation
qPreviousDiagnostics	OUT	String	Previous diagnostic message See product documentation
qBusy	OUT	Bool	Busy signal of the function block <ul style="list-style-type: none"> <li>▪ TRUE: parametrization and acyclic communication ongoing</li> <li>▪ FALSE: No action</li> </ul>
qSSC1_1	OUT	Bool	Status switching signal 1.1
qSSC1_2	OUT	Bool	Status switching signal 1.2
qSSC2_1	OUT	Bool	Status switching signal 2.1
qSSC2_2	OUT	Bool	Status switching signal 2.2
qSSC3_1	OUT	Bool	Status switching signal 3.1
qSSC3_2	OUT	Bool	Status switching signal 3.2
qSSC4_1	OUT	Bool	Status switching signal 4.1

Name	P Type	Data Type	Comment
qSSC4_2	OUT	Bool	Status switching signal 4.2
qFBDiag	OUT	String	<p>Diagnostic text of the function block            If a diagnostic message is displayed for the function block, ensure that no other acyclic communication is taking place. Acyclic communication should only be triggered for one function block at a time. Multiple triggers may cause errors.</p> <p> For information on diagnostic messages of the IO-Link device: See the product documentation (→  5) or IODD.</p>
qFBError	OUT	Bool	Internal error of the function block

## 6.2 Dosimass

### Function block designation



EH\_Dosimass\_IOL

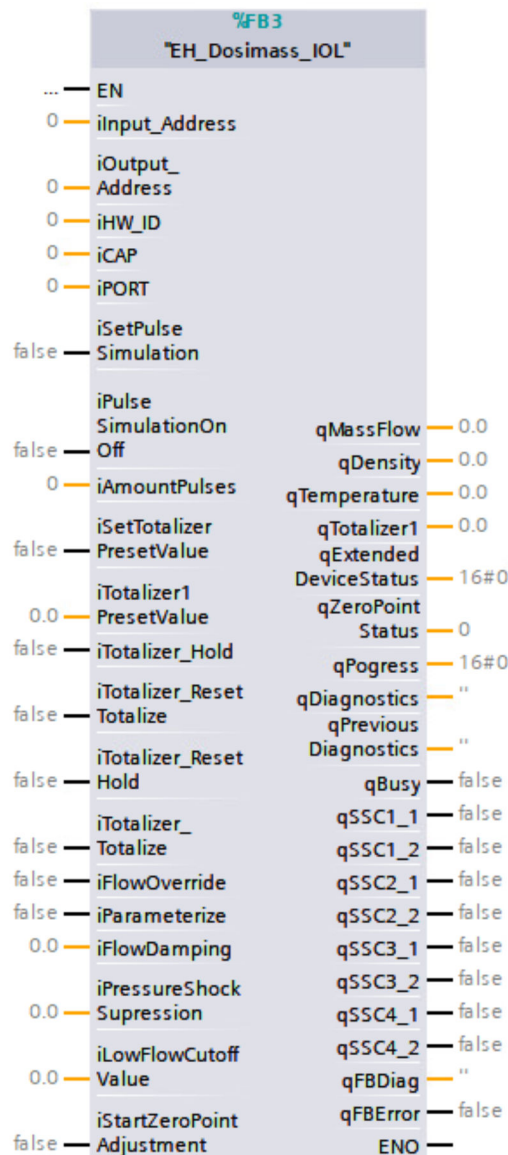
### Device ID

9729025

### Overview of functions

- Providing the current values for the main measured variables: mass flow, density, temperature and totalizer
- Providing the status of switching signals
- Cyclic delivery of the extended status signal
- Starting the zero adjustment
- Control of pulses
- Control of the totalizer


 For detailed information on the device, see the product documentation →  5.



 10 Function block EH\_Dosimass\_IOL

*Parameters of EH\_Dosimass\_IOL*

Name	P Type	Data Type	Comment
iInput_Address	IN	Int	Logical input address of the module → 13
iOutput_Address	IN	Int	Logical output address of the module → 13
iHW_ID	IN	HW_IO, HW_ANY	Hardware identifier of the module → 13
iCAP	IN	Int	Client Access Point → 17
iPORT	IN	Int	Port number where the device is connected to the IO-Link master
iSetPulseSimulation	IN	Bool	Trigger to start pulse simulation
iPulseSimulationOnOff	IN	Bool	<ul style="list-style-type: none"> <li>▪ TRUE: Pulse simulation ON</li> <li>▪ FALSE: Pulse simulation OFF</li> </ul>
iAmountPulses	IN	Int	Amount of pulses to be executed
iSetTotalizerPresetValue	IN	Bool	Trigger to set totalizer preset value
iTotalizer1PresetValue	IN	Real	Start value for the totalizer. The totalizer starts totalizing with this value
iTotalizer_Hold	IN	Bool	Totalizer hold
iTotalizer_ResetTotalize	IN	Bool	Reset totalizer and totalize
iTotalizer_ResetHold	IN	Bool	Reset totalizer and hold
iTotalizer_Totalize	IN	Bool	Totalizer totalize
iFlowOverride	IN	Bool	Flow override
iParameterize	IN	Bool	Trigger to start parameterization
iFlowDamping	IN	Real	Flow damping value
iPressureShockSuppression	IN	Real	Pressure shock suppression value
iLowFlowCutoffValue	IN	Real	Low flow cut-off value
iStartZeroPointAdjustment	IN	Bool	Trigger to start zero point adjustment
qMassFlow	OUT	Real	Process value mass flow
qDensity	OUT	Real	Process value density
qTemperature	OUT	Real	Process value temperature
qTotalizer1	OUT	Real	Process value totalizer
qExtendedDeviceStatus	OUT	Byte	<ul style="list-style-type: none"> <li>▪ 0: Not specified</li> <li>▪ 36: Failure</li> <li>▪ 37: Failure - simulation</li> <li>▪ 60: Functional check</li> <li>▪ 61: Functional check - simulation</li> <li>▪ 120: Out of specification</li> <li>▪ 121: Out of specification - simulation</li> <li>▪ 128: Good</li> <li>▪ 129: Good - simulation</li> <li>▪ 164: Maintenance required</li> <li>▪ 165: Maintenance required - simulation</li> </ul>
qZeroPointStatus	OUT	Int	Status of the zero point adjustment <ul style="list-style-type: none"> <li>▪ 2: Failed</li> <li>▪ 5: Done</li> <li>▪ 8: Busy</li> </ul>
qProgress	OUT	Byte	Progress of the zero point adjustment 0 to 100 %
qDiagnostics	OUT	String	Current diagnostic text See product documentation
qPreviousDiagnostics	OUT	String	Previous diagnostic message See product documentation

Name	P Type	Data Type	Comment
qBusy	OUT	Bool	Busy signal of the function block <ul style="list-style-type: none"> <li>▪ TRUE: parametrization and acyclic communication ongoing</li> <li>▪ FALSE: No action</li> </ul>
qSSC1_1	OUT	Bool	Status switching signal 1.1
qSSC1_2	OUT	Bool	Status switching signal 1.2
qSSC2_1	OUT	Bool	Status switching signal 2.1
qSSC2_2	OUT	Bool	Status switching signal 2.2
qSSC3_1	OUT	Bool	Status switching signal 3.1
qSSC3_2	OUT	Bool	Status switching signal 3.2
qSSC4_1	OUT	Bool	Status switching signal 4.1
qSSC4_2	OUT	Bool	Status switching signal 4.2
qFBDiag	OUT	String	Diagnostic text of the function block If a diagnostic message is displayed for the function block, ensure that no other acyclic communication is taking place. Acyclic communication should only be triggered for one function block at a time. Multiple triggers may cause errors.   For information on diagnostic messages of the IO-Link device: See the product documentation (→ 5) or IODD.
qFBError	OUT	Bool	Internal error of the function block

## 6.3 Picomag (DMA)

### Function block designation

EH\_Picomag\_DMA\_IOL

### Device ID

65793

### Overview of functions

- Providing the current values for the main measured variables: volume flow, temperature, totalizer and conductivity
- Providing the status of switching signals
- Reading the diagnostic data after triggering of the input iExecute
- Simulating the main measured variables
- Resetting the totalizer



For detailed information on the device, see the product documentation → 5.

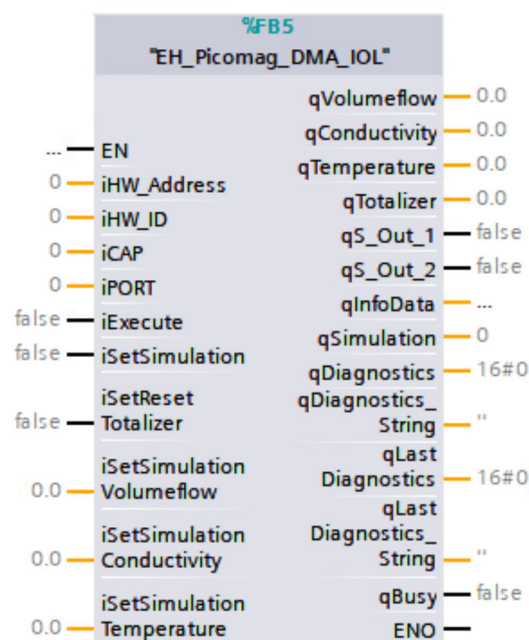


Fig. 11 Function block EH\_Picomag\_DMA\_IOL

### Parameters of EH\_DMA\_IOL

Name	P Type	Data Type	Comment
iHW_Address	IN	Int	Input address of the module → 13
iHW_ID	IN	HW_IO, HW_ANY	Hardware identifier of the module → 13
iCAP	IN	Int	Client Access Point → 17
iPORT	IN	Int	Port number where the device is connected to the IO-Link master
iExecute	IN	Bool	Trigger to execute the acyclic routine for parametrization and read out diagnostics
iSetSimulation	IN	Bool	Signal to set device into simulation mode <ul style="list-style-type: none"> <li>▪ TRUE: Simulation ON</li> <li>▪ FALSE: Simulation OFF</li> </ul>
iSetResetTotalizer	IN	Bool	Signal to reset totalizer <ul style="list-style-type: none"> <li>▪ TRUE: Reset totalizer</li> <li>▪ FALSE: No action</li> </ul>

Name	P Type	Data Type	Comment
iSetSimulationVolumeFlow	IN	Real	Volume flow value to be simulated
iSetSimulationConductivity	Input	Real	Conductivity value to be simulated
iSetSimulationTemperature	IN	Real	Temperature value to be simulated
qVolumeFlow	OUT	Real	Process value volume flow
qConductivity	OUT	Real	Process value conductivity
qTemperature	OUT	Real	Process value temperature
qTotalizer	OUT	Real	Totalizer value
qS_Out_1	OUT	Bool	Signal switching signal 1
qS_Out_2	OUT	Bool	Signal switching signal 2
qInfoData	OUT	LI-OLink_type Identification Objects	UDT to provide device data
qSimulation	OUT	Int	<ul style="list-style-type: none"> <li>▪ 1: Device is in simulation mode</li> <li>▪ 0: Device is not in simulation mode</li> </ul>
qDiagnostics	OUT	Dword	Current diagnostic code → 29
qDiagnostics_String	OUT	String	Current diagnostic text → 29
qLastDiagnostics	OUT	Dword	Previous diagnostic code → 29
qLastDiagnostics_String	OUT	String	Previous diagnostic text → 29
qBusy	OUT	Bool	Busy signal of the function block after triggering the iExecute input <ul style="list-style-type: none"> <li>▪ TRUE: parametrization and acyclic communication ongoing</li> <li>▪ FALSE: No action</li> </ul>

#### Diagnostic numbers and diagnostic texts Picomag (DMA)

Diagnostic number	Diagnostic text
16#0000_0000	SYSTEM OK
16#0000_0001	No communication
16#4631_3830	EMP.CIRC.FAIL
16#4631_3831	COIL 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_3533	FLOW OVERRIDE
16#4334_3835	SIMULATION ACT.
16#5334_3431	I-OUT 1 RANGE
16#5334_3432	I-OUT 2 RANGE
16#5334_3433	P-OUT 1 RANGE
16#5338_3334	U-OUT 1 RANGE
16#5334_3435	U-OUT 2 RANGE
16#5339_3632	EMPTY PIPE

## 6.4 Picomag Insertion (DMI)

### Function block designation

EH\_PicomagInsertion\_DMI\_IOL

### Device ID

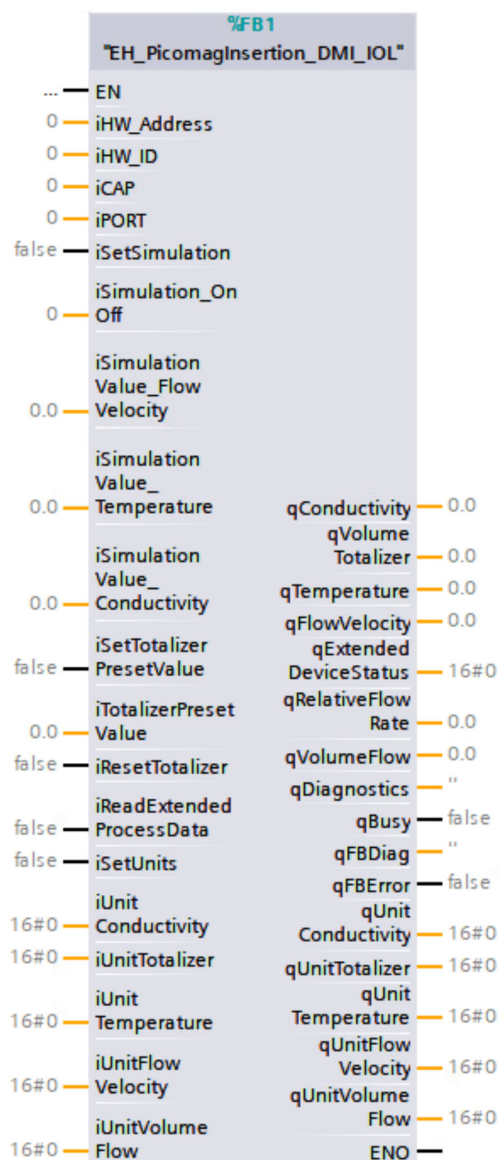
9728001

### Overview of functions

- Providing the current values for the main measured variables: conductivity, totalizer, flow velocity and temperature
- Cyclic delivery of the extended status signal
- Simulating the main measured variables
- Providing the advanced process data "Relative flow rate" and "Volume flow"
- Control of the totalizer








For detailed information on the device, see the product documentation → 5.



12 Function block EH\_PicomagInsertion\_DMI\_IOL

*Parameters of EH\_PicomagInsertion\_DMI\_IOL*

Name	P Type	Data Type	Comment
iHW_Address	IN	Int	Input address of the module →  13
iHW_ID	IN	HW_IO, HW_ANY	Hardware identifier of the module →  13
iCAP	IN	Int	Client Access Point →  17
iPORT	IN	Int	Port number where the device is connected to the IO-Link master
iSetSimulation	IN	Bool	Trigger to set device into simulation
iSimulation_OnOff	IN	Int	Signal to set device into simulation mode <ul style="list-style-type: none"> <li>▪ TRUE: Simulation ON</li> <li>▪ FALSE: Simulation OFF</li> </ul>
iSimulationValue_FlowVelocity	IN	Real	Flow velocity value to be simulated (-20.0 to 20.0)
iSimulationValue_Temperature	IN	Real	Temperature value to be simulated
iSimulationValue_Conductivity	IN	Real	Conductivity value to be simulated
iSetTotalizerPresetValue	IN	Bool	Trigger to set totalizer preset value
iTotalizer1PresetValue	IN	Real	Excel: Totalizer preset value Other Start value for the totalizer. The totalizer starts totalizing with this value.
iResetTotalizer	IN	Bool	Trigger to reset totalizer
iReadExtendedProcessData	IN	Bool	Trigger to read extended process data
iSetUnits	IN	Bool	Trigger to set units
iUnitConductivity	IN	Byte	Unit for conductivity value <ul style="list-style-type: none"> <li>▪ 3: S/m</li> <li>▪ 6: mS/cm</li> <li>▪ 8 = uS/cm</li> </ul>
iUnitTotalizer	IN	Byte	Unit for the totalizer value <ul style="list-style-type: none"> <li>▪ 2: m<sup>3</sup></li> <li>▪ 4: l</li> <li>▪ 10: fl oz (us)</li> <li>▪ 11: gal (us)</li> <li>▪ 22: kgal (us)</li> <li>▪ 150: kl</li> </ul>
iUnitTemperature	IN	Byte	Unit for temperature value <ul style="list-style-type: none"> <li>▪ 32: °C</li> <li>▪ 33: °F</li> </ul>
iUnitFlowVelocity	IN	Byte	Unit for flow velocity value <ul style="list-style-type: none"> <li>▪ 21: m/s</li> <li>▪ 22: ft/s</li> <li>▪ 50: ft/h</li> <li>▪ 114: in/s</li> <li>▪ 115: in/min</li> <li>▪ 116: ft/min</li> <li>▪ 120: m/h</li> <li>▪ 240: in/h</li> </ul>
iUnitVolumeFlow	IN	Byte	Unit for volume flow value <ul style="list-style-type: none"> <li>▪ 16: gal/min (us)</li> <li>▪ 17: l/min</li> <li>▪ 18: l/h</li> <li>▪ 19: m<sup>3</sup>/h</li> <li>▪ 24: l/s</li> <li>▪ 41: fl oz/min</li> </ul>
qConductivity	OUT	Real	Process value conductivity

Name	P Type	Data Type	Comment
qVolumeTotalizer	OUT	Real	Process value volume totalizer
qTemperature	OUT	Real	Process value temperature
qFlowVelocity	OUT	Real	Process value flow velocity
qExtendedDeviceStatus	OUT	Byte	<ul style="list-style-type: none"> <li>▪ 0: Not specified</li> <li>▪ 36: Failure</li> <li>▪ 37: Failure - simulation</li> <li>▪ 60: Functional check</li> <li>▪ 61: Functional check - simulation</li> <li>▪ 120: Out of specification</li> <li>▪ 121: Out of specification - simulation</li> <li>▪ 128: Good</li> <li>▪ 129: Good - simulation</li> <li>▪ 164: Maintenance required</li> <li>▪ 165: Maintenance required - simulation</li> </ul>
qRelativeFlowRate	OUT	Real	Relative flow rate (Extended process data)
qVolumeFlow	OUT	Real	Volume flow (Extended process data)
qDiagnostics	OUT	String	Current diagnostic text See product documentation
qBusy	OUT	Bool	Busy signal of the function block <ul style="list-style-type: none"> <li>▪ TRUE: parametrization and acyclic communication ongoing</li> <li>▪ FALSE: No action</li> </ul>
qFBDiag	OUT	String	<p>Diagnostic text of the function block If a diagnostic message is displayed for the function block, ensure that no other acyclic communication is taking place. Acyclic communication should only be triggered for one function block at a time. Multiple triggers may cause errors.</p> <p> For information on diagnostic messages of the IO-Link device: See the product documentation (→  5) or IODD.</p>
qFBError	OUT	Bool	Internal error of the function block
qUnitConductivity	OUT	Byte	Unit for conductivity <ul style="list-style-type: none"> <li>▪ 3: S/m</li> <li>▪ 6: mS/cm</li> <li>▪ 8 = uS/cm</li> </ul>
qUnitTotalizer	OUT	Byte	Selected unit for the totalizer value <ul style="list-style-type: none"> <li>▪ 2: m<sup>3</sup></li> <li>▪ 4: l</li> <li>▪ 10: fl oz (us)</li> <li>▪ 11: gal (us)</li> <li>▪ 22: kgal (us)</li> <li>▪ 150: kl</li> </ul>
qUnitTemperature	OUT	Byte	Selected unit for temperature value <ul style="list-style-type: none"> <li>▪ 32: °C</li> <li>▪ 33: °F</li> </ul>

Name	P Type	Data Type	Comment
qUnitFlowVelocity	OUT	Byte	Selected unit for flow velocity value <ul style="list-style-type: none"><li>▪ 21: m/s</li><li>▪ 22: ft/s</li><li>▪ 50: ft/h</li><li>▪ 114: in/s</li><li>▪ 115: in/min</li><li>▪ 116: ft/min</li><li>▪ 120: m/h</li><li>▪ 240: in/h</li></ul>
qUnitVolumeFlow	OUT	Byte	Selected unit for volume flow value <ul style="list-style-type: none"><li>▪ 16: gal/min (us)</li><li>▪ 17: l/min</li><li>▪ 18: l/h</li><li>▪ 19: m<sup>3</sup>/h</li><li>▪ 24: l/s</li><li>▪ 41: fl oz/min</li></ul>

## 6.5 Promag 10

### Function block designation

EH\_Promag10\_IOL

### Device ID

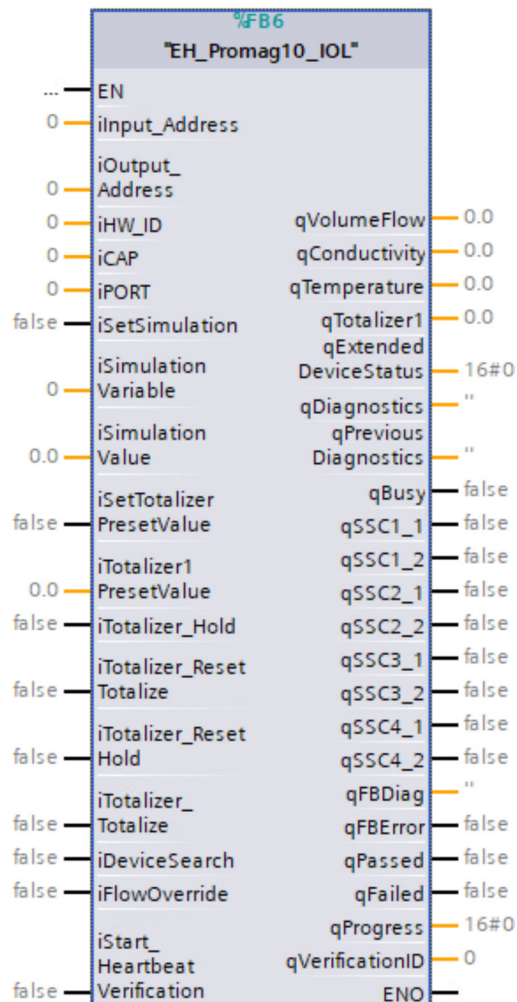
972825

### Overview of functions

- Providing the current values for the main measured variables: volume flow, conductivity, temperature and totalizer
- Providing the status of switching signals
- Cyclic delivery of the extended status signal
- Simulating the main measured variables and other measured variables
- Control of the totalizer
- Start the Heartbeat Verification and provide the results



For detailed information on the device, see the product documentation → 5.





13 Function block EH\_Promag10\_IOL

### Parameters of EH\_Promag10\_IOL

Name	P Type	Data Type	Comment
iInput_Address	IN	Int	Logical input address of the module → 13
iOutput_Address	IN	Int	Logical output address of the module → 13

Name	P Type	Data Type	Comment
iHW_ID	IN	HW_IO, HW_ANY	Hardware identifier of the module → 13
iCAP	IN	Int	Client Access Point → 17
iPORT	IN	Int	Port number where the device is connected to the IO-Link master
iSetSimulation	IN	Bool	Signal to set device into simulation mode <ul style="list-style-type: none"> <li>TRUE: Simulation ON</li> <li>FALSE: Simulation OFF</li> </ul>
iSimulationVariable	IN	Int	Variable for simulation mode <ul style="list-style-type: none"> <li>0: Off</li> <li>1: Volume flow</li> <li>4: Conductivity</li> <li>7: Temperature</li> <li>11: Mass flow</li> <li>13: Corrected conductivity</li> </ul>
iSimulationValue	IN	Real	Value to be simulated
iSetTotalizerPresetValue	IN	Bool	Trigger to set totalizer preset value
iTotalizer1PresetValue	IN	Real	Start value for the totalizer. The totalizer starts totalizing with this value.
iTotalizer_Hold	IN	Bool	Totalizer hold
iTotalizer_ResetTotalize	IN	Bool	Reset totalizer and totalize
iTotalizer_ResetHold	IN	Bool	Reset totalizer and hold
iTotalizer_Totalize	IN	Bool	Totalizer totalize
iDeviceSearch	IN	Bool	Device search. Display is flashing.
iFlowOverride	IN	Bool	Flow override
iStart_HeartbeatVerification	IN	Bool	Trigger to start Heartbeat Verification
qVolumeFlow	OUT	Real	Process value volume flow
qConductivity	OUT	Real	Process value conductivity
qTemperature	OUT	Real	Process value temperature
qTotalizer1	OUT	Real	Process value totalizer
qExtendedDeviceStatus	OUT	Byte	<ul style="list-style-type: none"> <li>0: Not specified</li> <li>36: Failure</li> <li>37: Failure - simulation</li> <li>60: Functional check</li> <li>61: Functional check - simulation</li> <li>120: Out of specification</li> <li>121: Out of specification - simulation</li> <li>128: Good</li> <li>129: Good - simulation</li> <li>164: Maintenance required</li> <li>165: Maintenance required - simulation</li> </ul>
qDiagnostics	OUT	String	Current diagnostic text See product documentation
qPreviousDiagnostics	OUT	String	Previous diagnostic message See product documentation
qBusy	OUT	Bool	Busy signal of the function block <ul style="list-style-type: none"> <li>TRUE: parametrization and acyclic communication ongoing</li> <li>FALSE: No action</li> </ul>
qSSC1_1	OUT	Bool	Status switching signal 1.1
qSSC1_2	OUT	Bool	Status switching signal 1.2
qSSC2_1	OUT	Bool	Status switching signal 2.1
qSSC2_2	OUT	Bool	Status switching signal 2.2

Name	P Type	Data Type	Comment
qSSC3_1	OUT	Bool	Status switching signal 3.1
qSSC3_2	OUT	Bool	Status switching signal 3.2
qSSC4_1	OUT	Bool	Status switching signal 4.1
qSSC4_2	OUT	Bool	Status switching signal 4.2
qFBDiag	OUT	String	<p>Diagnostic text of the funktion block            If a diagnostic message is displayed for the function block, ensure that no other acyclic communication is taking place. Acyclic communication should only be triggered for one function block at a time. Multiple triggers may cause errors.</p> <p> For information on diagnostic messages of the IO-Link device: See the product documentation (→  5) or IODD.</p>
qFBError	OUT	Bool	Internal error of the function block
qPassed	OUT	Bool	TRUE: Heartbeat Verification passed
qFailed	OUT	Bool	TRUE: Heartbeat Verification failed
qProgress	OUT	Byte	Progress of the Heartbeat Verification
qVerificationID	OUT	Int	VerificationID

## 6.6 Promass 10

### Function block designation



EH\_Promass10\_IOL

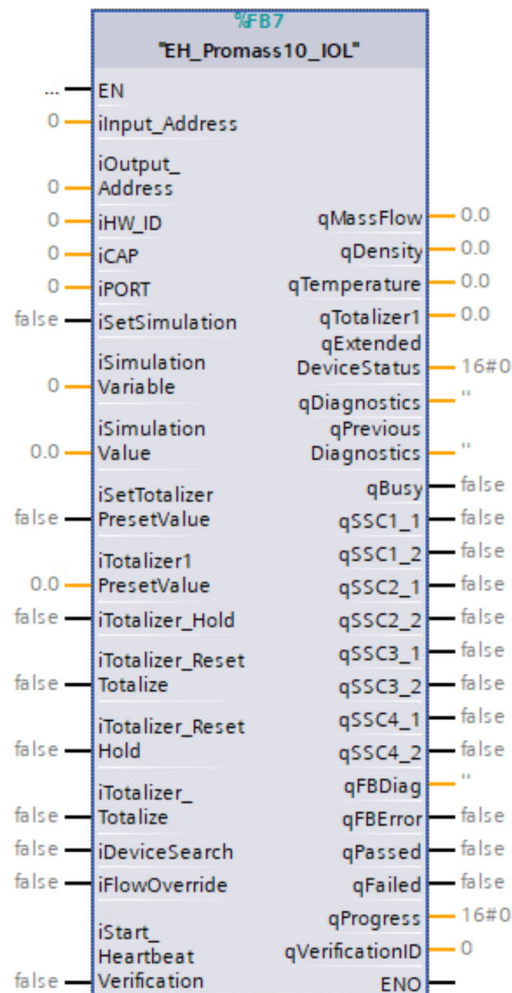
### Device ID

9728513

### Overview of functions




- Providing the current values for the main measured variables: mass flow, density, temperature and totalizer
- Providing the status of switching signals
- Cyclic delivery of the extended status signal
- Simulating the main measured variables and other measured variables
- Control of the totalizer
- Start the Heartbeat Verification and provide the results

 For detailed information on the device, see the product documentation →  5.





 14 Function block EH\_Promass10\_IOL

### Parameters of EH\_Promass10\_IOL

Name	P Type	Data Type	Comment
iInput_Address	IN	Int	Logical input address of the module →  13
iOutput_Address	IN	Int	Logical output address of the module →  13
iHW_ID	IN	HW_IO, HW_ANY	Hardware identifier of the module →  13

Name	P Type	Data Type	Comment
iCAP	IN	Int	Client Access Point → 17
iPORT	IN	Int	Port number where the device is connected to the IO-Link master
iSetSimulation	IN	Bool	Signal to set device into simulation mode <ul style="list-style-type: none"> <li>▪ TRUE: Simulation ON</li> <li>▪ FALSE: Simulation OFF</li> </ul>
iSimulationVariable	IN	Int	Variable for simulation mode <ul style="list-style-type: none"> <li>▪ 0: Off</li> <li>▪ 1: Mass flow</li> <li>▪ 2: Volume flow</li> <li>▪ 3: Corrected volume flow</li> <li>▪ 4: Density</li> <li>▪ 7: Temperature</li> </ul>
iSimulationValue	IN	Real	Value to be simulated
iSetTotalizerPresetValue	IN	Bool	Trigger to set totalizer preset value
iTotalizer1PresetValue	IN	Real	Start value for the totalizer. The totalizer starts totalizing with this value.
iTotalizer_Hold	IN	Bool	Totalizer hold
iTotalizer_ResetTotalize	IN	Bool	Reset totalizer and totalize
iTotalizer_ResetHold	IN	Bool	Reset totalizer and hold
iTotalizer_Totalize	IN	Bool	Totalizer totalize
iDeviceSearch	IN	Bool	Device search. Display is flashing.
iFlowOverride	IN	Bool	Flow override
iStart_HeartbeatVerification	IN	Bool	Trigger to start Heartbeat Verification
qMassFlow	OUT	Real	Process value mass flow
qDensity	OUT	Real	Process value density
qTemperature	OUT	Real	Process value temperature
qTotalizer1	OUT	Real	Process value totalizer
qExtendedDeviceStatus	OUT	Byte	<ul style="list-style-type: none"> <li>▪ 0: Not specified</li> <li>▪ 36: Failure</li> <li>▪ 37: Failure - simulation</li> <li>▪ 60: Functional check</li> <li>▪ 61: Functional check - simulation</li> <li>▪ 120: Out of specification</li> <li>▪ 121: Out of specification - simulation</li> <li>▪ 128: Good</li> <li>▪ 129: Good - simulation</li> <li>▪ 164: Maintenance required</li> <li>▪ 165: Maintenance required - simulation</li> </ul>
qDiagnostics	OUT	String	Current diagnostic text See product documentation
qPreviousDiagnostics	OUT	String	Previous diagnostic message See product documentation
qBusy	OUT	Bool	Busy signal of the function block <ul style="list-style-type: none"> <li>▪ TRUE: parametrization and acyclic communication ongoing</li> <li>▪ FALSE: No action</li> </ul>
qSSC1_1	OUT	Bool	Status switching signal 1.1
qSSC1_2	OUT	Bool	Status switching signal 1.2
qSSC2_1	OUT	Bool	Status switching signal 2.1
qSSC2_2	OUT	Bool	Status switching signal 2.2
qSSC3_1	OUT	Bool	Status switching signal 3.1

Name	P Type	Data Type	Comment
qSSC3_2	OUT	Bool	Status switching signal 3.2
qSSC4_1	OUT	Bool	Status switching signal 4.1
qSSC4_2	OUT	Bool	Status switching signal 4.2
qFBDiag	OUT	String	<p>Diagnostic text of the function block            If a diagnostic message is displayed for the function block, ensure that no other acyclic communication is taking place. Acyclic communication should only be triggered for one function block at a time. Multiple triggers may cause errors.</p> <p> For information on diagnostic messages of the IO-Link device: See the product documentation (→  5) or IODD.</p>
qFBError	OUT	Bool	Internal error of the function block
qPassed	OUT	Bool	TRUE: Heartbeat Verification passed
qFailed	OUT	Bool	TRUE: Heartbeat Verification failed
qProgress	OUT	Byte	Progress of the Heartbeat Verification
qVerificationID	OUT	Int	VerificationID

## 7 Description of the "Level" function blocks

### 7.1 Liquiphant FTL31, FTL33

#### Function block designation


- EH\_Liquiphant\_FTL31\_IOL
- EH\_Liquiphant\_FTL33\_IOL


#### Device ID

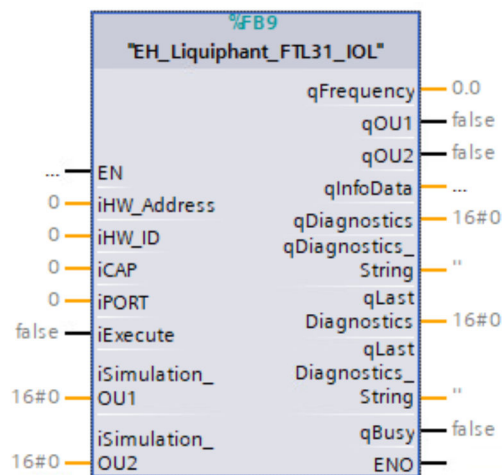
1024

#### Overview of functions

- Providing the current value for the main measured variable: frequency in percentage
- Providing the status of switching signals
- Reading the diagnostic data after triggering of the input iExecute
- Simulating switching signals




 For detailed information on the device, see the product documentation →  5.

 The function blocks for FTL31 and FTL33 are functionally identical and differ solely in their function block designation.



 15 Function block EH\_Liquiphant\_FTL31\_IOL

#### Parameters of EH\_Liquiphant\_FTL31\_IOL and EH\_Liquiphant\_FTL33\_IOL

Name	P Type	Data Type	Comment
iHW_Address	IN	Int	Input address of the module →  13
iHW_ID	IN	HW_IO, HW_ANY	Hardware identifier of the module →  13
iCAP	IN	Int	Client Access Point →  17
iPORT	IN	Int	Port number where the device is connected to the IO-Link master
iExecute	IN	Bool	Trigger to execute the acyclic routine for parametrization and read out diagnostics
iSetSimulation_OU1	IN	Byte	<ul style="list-style-type: none"> <li>▪ 1: Simulate switching signal 1</li> <li>▪ 0: No simulation of switching signal 1</li> </ul>
iSetSimulation_OU2	IN	Byte	<ul style="list-style-type: none"> <li>▪ 1: Simulate switching signal 2</li> <li>▪ 0: No simulation of switching signal 2</li> </ul>
qFrequency	OUT	Real	Process value frequency
qOU1	OUT	Bool	Status switching signal 1

Name	P Type	Data Type	Comment
qOU2	OUT	Real	Status switching signal 2
qInfoData	OUT	LI-OLink_type Identification Objects	UDT to provide device data
qDiagnostics	OUT	Dword	Current diagnostic code → 41
qDiagnostics_String	OUT	String	Current diagnostic text → 41
qLastDiagnostics	OUT	Dword	Previous diagnostic code → 41
qLastDiagnostics_String	OUT	String	Previous diagnostic text → 41
qBusy	OUT	Bool	Busy signal of the function block after triggering the iExecute input <ul style="list-style-type: none"> <li>▪ TRUE: parametrization and acyclic communication ongoing</li> <li>▪ FALSE: No action</li> </ul>

*Diagnostic numbers and diagnostic texts Liquiphant FTL31 and Liquiphant FTL33*

Diagnostic number	Diagnostic text
16#2d20_2d20	No Error
16#4331_3033	C103
16#4331_3832	C182
16#4331_3835	C485
16#4630_3432	F042
16#4632_3730	F270
16#5338_3034	S804
16#5338_3235	S825

## 7.2 Liquiphant FTL43

### Function block designation

EH\_Liquiphant\_FTL43\_IOL

### Device ID

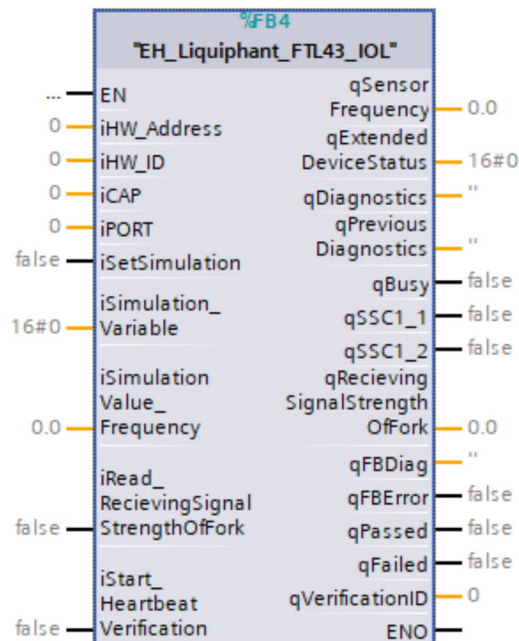
9559809

### Overview of functions

- Providing the current value for the main measured variable: frequency of the vibrating fork
- Providing the status of switching signals
- Cyclic delivery of the extended status signal
- Providing the strength of the received signal from the vibrating fork
- Simulating the main measured variable
- Start the Heartbeat Verification and provide the results





For detailed information on the device, see the product documentation → 5.



16 Function block EH\_Liquiphant\_FTL43\_IOL

### Parameters of EH\_Liquiphant\_FTL43\_IOL

Name	P Type	Data Type	Comment
iHW_Address	IN	Int	Input address of the module → 13
iHW_ID	IN	HW_IO, HW_ANY	Hardware identifier of the module → 13
iCAP	IN	Int	Client Access Point → 17
iPORT	IN	Int	Port number where the device is connected to the IO-Link master
iSetSimulation	IN	Bool	Signal to set device into simulation mode <ul style="list-style-type: none"> <li>■ TRUE: Simulation ON</li> <li>■ FALSE: Simulation OFF</li> </ul>
iSimulation_Variable	IN	Byte	Variable for simulation mode <ul style="list-style-type: none"> <li>■ 0: Off</li> <li>■ 1: Sensor frequency</li> </ul>
iSimulationValue_Frequency	IN	Real	Frequency value to be simulated

Name	P Type	Data Type	Comment
iRead_ReceivingSignalStrengthOfFork	IN	Bool	Trigger to read the receiving signal strength of the fork
iStart_HeartbeatVerification	IN	Bool	Trigger to start Heartbeat Verification
qSensorFrequency	OUT	Real	Process value sensor frequency
qExtendedDeviceStatus	OUT	Byte	<ul style="list-style-type: none"> <li>▪ 0: Not specified</li> <li>▪ 36: Failure</li> <li>▪ 37: Failure - simulation</li> <li>▪ 60: Functional check</li> <li>▪ 61: Functional check - simulation</li> <li>▪ 120: Out of specification</li> <li>▪ 121: Out of specification - simulation</li> <li>▪ 128: Good</li> <li>▪ 129: Good - simulation</li> <li>▪ 164: Maintenance required</li> <li>▪ 165: Maintenance required - simulation</li> </ul>
qDiagnostics	OUT	String	Current diagnostic text See product documentation
qPreviousDiagnostics	OUT	String	Previous diagnostic message See product documentation
qBusy	OUT	Bool	Busy signal of the function block <ul style="list-style-type: none"> <li>▪ TRUE: parametrization and acyclic communication ongoing</li> <li>▪ FALSE: No action</li> </ul>
qSSC1_1	OUT	Bool	Status switching signal 1.1
qSSC1_2	OUT	Bool	Status switching signal 1.2
qReceivingSignalStrengthOfFork	OUT	Real	Receiving signal strength of fork
qFBDiag	OUT	String	
qFBOut	OUT	String	<p>Diagnostic text of the function block If a diagnostic message is displayed for the function block, ensure that no other acyclic communication is taking place. Acyclic communication should only be triggered for one function block at a time. Multiple triggers may cause errors.</p> <p> For information on diagnostic messages of the IO-Link device: See the product documentation (→  5) or IODD.</p>
qFBError	OUT	Bool	Internal error of the function block
qPassed	OUT	Bool	TRUE: Heartbeat Verification passed
qFailed	OUT	Bool	TRUE: Heartbeat Verification failed
qProgress	OUT	Byte	Progress of the Heartbeat Verification
qVerificationID	OUT	Int	VerificationID

## 7.3 Liquipoint FTW23, FTW33

### Function block designation

- EH\_Liquipoint\_FTW23\_IOL
- EH\_Liquipoint\_FTW33\_IOL

### Device ID

512

### Overview of functions

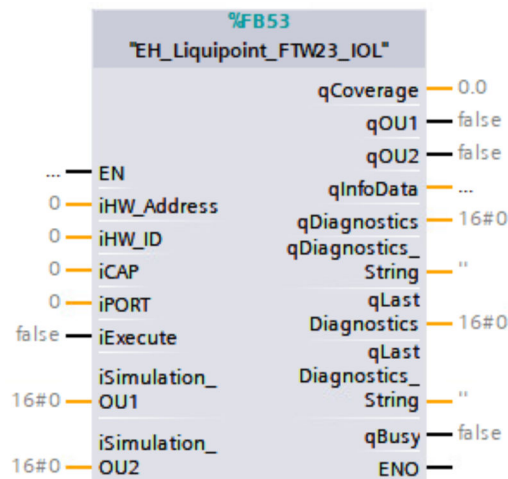
- Providing the current value for the main measured variable: coverage in percent
- Providing the status of switching signals
- Reading the diagnostic data after triggering of the input iExecute
- Simulating switching signals



For detailed information on the device, see the product documentation → 5.



The function blocks for FTW23 and FTW33 are functionally identical and differ solely in their function block designation.



17 Function block EH\_Liquipoint\_FTW23\_IOL

### Parameters of EH\_Liquipoint\_FTW23\_IOL and Liquipoint\_FTW33\_IOL

Name	P Type	Data Type	Comment
iHW_Address	IN	Int	Input address of the module → 13
iHW_ID	IN	HW_IO, HW_ANY	Hardware identifier of the module → 13
iCAP	IN	Int	Client Access Point → 17
iPORT	IN	Int	Port number where the device is connected to the IO-Link master
iExecute	IN	Bool	Trigger to execute the acyclic routine for parametrization and read out diagnostics
iSetSimulation_OU1	IN	Byte	<ul style="list-style-type: none"> <li>▪ 1: Simulate switching signal 1</li> <li>▪ 0: No simulation of switching signal 1</li> </ul>
iSetSimulation_OU2	IN	Byte	<ul style="list-style-type: none"> <li>▪ 1: Simulate switching signal 2</li> <li>▪ 0: No simulation of switching signal 2</li> </ul>
qCoverage	OUT	Real	Process value coverage
qOU1	OUT	Bool	Switching signal 1
qOU2	OUT	Real	Switching signal 2

Name	P Type	Data Type	Comment
qInfoData	OUT	LI-OLink_type Identification Objects	UDT to provide device data
qDiagnostics	OUT	Dword	Current diagnostic code → 41
qDiagnostics_String	OUT	String	Current diagnostic text → 41
qLastDiagnostics	OUT	Dword	Previous diagnostic code → 41
qLastDiagnostics_String	OUT	String	Previous diagnostic text → 41
qBusy	OUT	Bool	Busy signal of the function block after triggering the iExecute input <ul style="list-style-type: none"> <li>▪ TRUE: parametrization and acyclic communication ongoing</li> <li>▪ FALSE: No action</li> </ul>

*Diagnostic numbers and diagnostic texts Liquipoint FTW23 and Liquipoint FTW33*

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

## 7.4 Liquitrend QMW43

### Function block designation

EH\_Liquitrend\_QMW43\_IOL

### Device ID

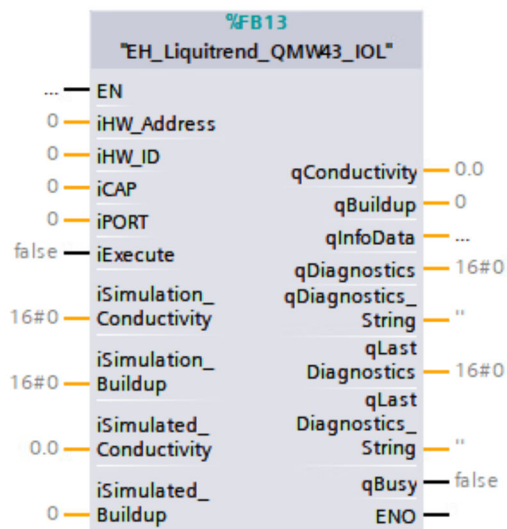
1536

### Overview of functions

- Providing the current values for the main measured variables: conductivity and coverage
- Reading the diagnostic data after triggering of the input iExecute
- Simulating the main measured variables



For detailed information on the device, see the product documentation → 5.



18 Function block EH\_Liquitrend\_QMW43\_IOL

### Parameters of EH\_Liquitrend\_QMW43\_IOL

Name	P Type	Data Type	Comment
iHW_Address	IN	Int	Input address of the module → 13
iHW_ID	IN	HW_IO, HW_ANY	Hardware identifier of the module → 13
iCAP	IN	Int	Client Access Point → 17
iPORT	IN	Int	Port number where the device is connected to the IO-Link master
iExecute	IN	Bool	Trigger to execute the acyclic routine for parametrization and read out diagnostics
iSimulation_Conductivity	IN	Byte	Signal to simulate the entered conductivity value <ul style="list-style-type: none"> <li>▪ 1: Simulation ON</li> <li>▪ 0: Simulation OFF</li> </ul>
iSimulation_Buildup	IN	Byte	Signal to simulate the entered buildup value <ul style="list-style-type: none"> <li>▪ 1: Simulation ON</li> <li>▪ 0: Simulation OFF</li> </ul>
iSimulated_Conductivity	IN	Real	Conductivity value to be simulated
iSimulated_Buildup	IN	Int	Buildup value to be simulated
qConductivity	OUT	Real	Process value conductivity
qBuildup	OUT	Int	Process value buildup

Name	P Type	Data Type	Comment
qInfoData	OUT	LI-OLink_type Identification Objects	UDT to provide device data
qDiagnostics	OUT	Dword	Current diagnostic code → 47
qDiagnostics_String	OUT	String	Current diagnostic text → 47
qLastDiagnostics	OUT	Dword	Previous diagnostic code → 47
qLastDiagnostics_String	OUT	String	Previous diagnostic text → 47
qBusy	OUT	Bool	Busy signal of the function block after triggering the iExecute input <ul style="list-style-type: none"> <li>▪ TRUE: parametrization and acyclic communication ongoing</li> <li>▪ FALSE: No action</li> </ul>

*Diagnostic numbers and diagnostic texts Liquitrend QMW43*

Diagnostic number	Diagnostic text
16#2d20_2d20	No Error
16#4331_3033	C103
16#4331_3832	C182
16#4334_3835	C485
16#5338_3033	S803
16#5338_3034	S804
16#5338_3235	S825
16#5339_3731	S971

## 7.5 Micropilot FMR43

### Function block designation

EH\_Micropilot\_FMR43\_IOL

### Device ID

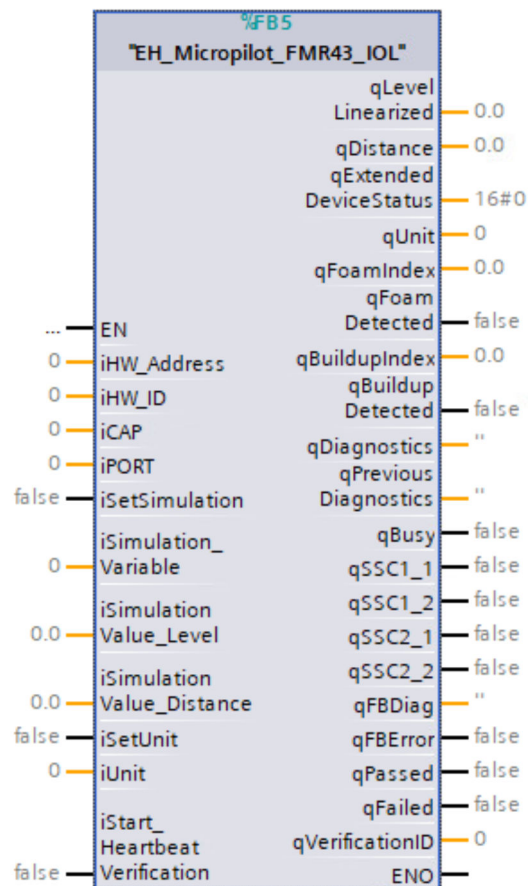
9553409

### Overview of functions

- Providing the current values for the main measured variables: linearized level and distance
- Providing the status of switching signals
- Cyclic delivery of the extended status signal
- Selection of the unit for the distance value
- Simulating the main measured variables
- Providing Heartbeat Diagnostics
- Start the Heartbeat Verification and provide the results



For detailed information on the device, see the product documentation → 5.





19 Function block EH\_Micropilot\_FMR43\_IOL

### Parameters of EH\_Micropilot\_FMR43\_IOL

Name	P Type	Data Type	Comment
iHW_Address	IN	Int	Input address of the module → 13
iHW_ID	IN	HW_IO, HW_ANY	Hardware identifier of the module → 13
iCAP	IN	Int	Client Access Point → 17
iPORT	IN	Int	Port number where the device is connected to the IO-Link master

Name	P Type	Data Type	Comment
iSetSimulation	IN	Bool	Trigger to start simulation of the device
iSetSimulation_Variable	IN	Int	Variable for simulation mode <ul style="list-style-type: none"> <li>▪ 1: Level</li> <li>▪ 3: Distance</li> </ul>
iSimulationValue_Level	IN	Real	Level value to be simulated
iSimulationValue_Distance	IN	Real	Distance value to be simulated
iSetUnit	IN	Bool	Trigger to set the unit for the distance value
iUnit	IN	Int	Unit for distance value <ul style="list-style-type: none"> <li>▪ 45: m</li> <li>▪ 47: inch</li> <li>▪ 49: mm</li> </ul>
iStart_HeartbeatVerification	IN	Bool	Trigger to start Heartbeat Verification
qLevelLinearized	OUT	Real	Process value level linearized
qDistance	OUT	Real	Process value distance
qExtendedDeviceStatus	OUT	Byte	<ul style="list-style-type: none"> <li>▪ 0: Not specified</li> <li>▪ 36: Failure</li> <li>▪ 37: Failure - simulation</li> <li>▪ 60: Functional check</li> <li>▪ 61: Functional check - simulation</li> <li>▪ 120: Out of specification</li> <li>▪ 121: Out of specification - simulation</li> <li>▪ 128: Good</li> <li>▪ 129: Good - simulation</li> <li>▪ 164: Maintenance required</li> <li>▪ 165: Maintenance required - simulation</li> </ul>
qUnit	OUT	Int	Selected unit for distance <ul style="list-style-type: none"> <li>▪ 45: m</li> <li>▪ 47: inch</li> <li>▪ 49: mm</li> </ul>
qFoamIndex	OUT	Real	Foam index
qFoamDetected	OUT	Bool	Foam detection <ul style="list-style-type: none"> <li>▪ TRUE: Foam detected</li> <li>▪ FALSE: No foam detected</li> </ul>
qBuildupIndex	OUT	Real	Buildup index
qBuildupDetected	OUT	Bool	Buildup detection <ul style="list-style-type: none"> <li>▪ TRUE: Buildup detected</li> <li>▪ FALSE: No buildup detected</li> </ul>
qDiagnostics	OUT	String	Current diagnostic text See product documentation
qPreviousDiagnostics	OUT	String	Previous diagnostic message See product documentation
qBusy	OUT	Bool	Busy signal of the function block <ul style="list-style-type: none"> <li>▪ TRUE: parametrization and acyclic communication ongoing</li> <li>▪ FALSE: No action</li> </ul>
qSSC1_1	OUT	Bool	Status switching signal 1.1
qSSC1_2	OUT	Bool	Status switching signal 1.2
qSSC2_1	OUT	Bool	Status switching signal 2.1
qSSC2_2	OUT	Bool	Status switching signal 2.2

Name	P Type	Data Type	Comment
qFBDiag	OUT	String	<p>Diagnostic text of the function block If a diagnostic message is displayed for the function block, ensure that no other acyclic communication is taking place. Acyclic communication should only be triggered for one function block at a time. Multiple triggers may cause errors.</p> <p> For information on diagnostic messages of the IO-Link device: See the product documentation (→  5) or IODD.</p>
qFBError	OUT	Bool	Internal error of the function block
qPassed	OUT	Bool	TRUE: Heartbeat Verification passed
qFailed	OUT	Bool	TRUE: Heartbeat Verification failed
qProgress	OUT	Byte	Progress of the Heartbeat Verification
qVerificationID	OUT	Int	VerificationID

## 7.6 Nivector FTI26

### Function block designation



EH\_Nivector\_FT126\_IOL

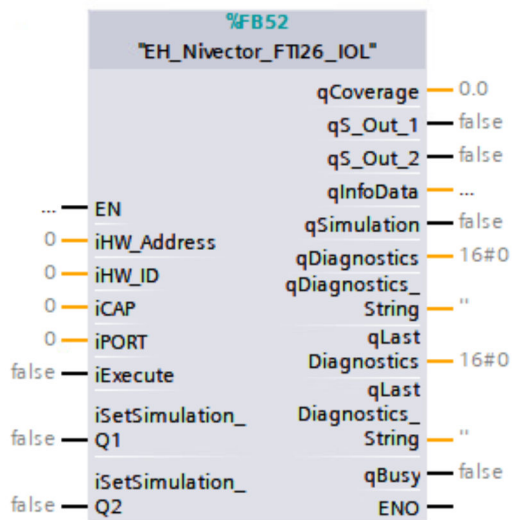
### Device ID

769

### Overview of functions




- Providing the current value for the main measured variable: coverage in percent
- Providing the status of switching signals
- Reading the diagnostic data after triggering of the input iExecute
- Simulating switching signals

 For detailed information on the product, see the product documentation →  5.



 20 Function block EH\_Nivector\_FT126\_IOL

### Parameters of EH\_Nivector\_FT126\_IOL

Name	P Type	Data Type	Comment
iHW_Address	IN	Int	Input address of the module →  13
iHW_ID	IN	HW_IO, HW_ANY	Hardware identifier of the module →  13
iCAP	IN	Int	Client Access Point →  17
iPORT	IN	Int	Port number where the device is connected to the IO-Link master
iExecute	IN	Bool	Trigger to execute the acyclic routine for parametrization and read out diagnostics
iSetSimulation_Q1	IN	Bool	State of switch output 1 to be simulated
iSetSimulation_Q2	IN	Bool	State of switch output 2 to be simulated
qCoverage	OUT	Real	Process value coverage
qS_Out_1	OUT	Bool	Switching signal 1
qS_Out_2	OUT	Bool	Switching signal 2
qInfoData	OUT	LI-OLink_type Identification Objects	UDT to provide device data
qSimulation	OUT	Bool	<ul style="list-style-type: none"> <li>▪ TRUE: Device is in simulation mode</li> <li>▪ FALSE: Device is not in simulation mode</li> </ul>

Name	P Type	Data Type	Comment
qDiagnostics	OUT	Dword	Current diagnostic code → 52
qDiagnostics_String	OUT	String	Current diagnostic text → 52
qLastDiagnostics	OUT	Dword	Previous diagnostic code → 52
qLastDiagnostics_String	OUT	String	Previous diagnostic text → 52
qBusy	OUT	Bool	Busy signal of the function block after triggering the iExecute input <ul style="list-style-type: none"> <li>▪ TRUE: parametrization and acyclic communication ongoing</li> <li>▪ FALSE: No action</li> </ul>

*Diagnostic numbers and diagnostic texts Nivector FTI26*

Diagnostic number	Diagnostic text
16#0000_0001	No communication
16#2D2D_2D2D	SYSTEM OK
16#4331_3033	C103: Sensor check failed
16#4331_3832	C182: Invalid calibration
16#4334_3835	C485: Simulation active
16#4632_3730	F270: Defect in electronic / sensor
16#4D32_3930	M290: Device wiring fault
16#5338_3034	S804: Load current > 200 mA per output

## 8 Description of the "Pressure" function blocks

### 8.1 Cerabar PMx21, PMP23

#### 8.1.1 Cerabar PMx21, PMP23

**Function block designation**



EH\_Cerabar\_PMx2x\_IOL

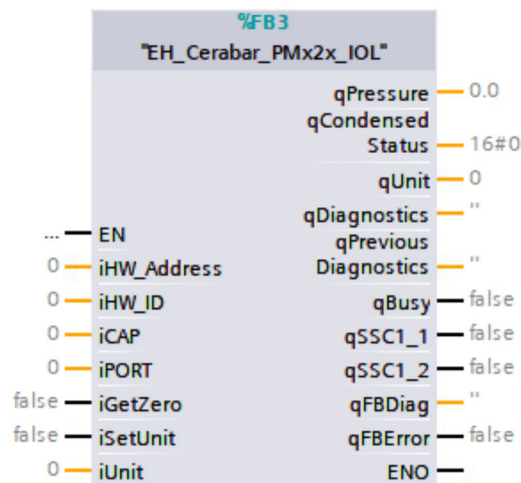
**Device ID**

- PMx21: 3841
- PMP23: 258

**Overview of functions**




- Providing the current value for the main measured variable: pressure
- Providing the status of the switching signal
- Cyclic delivery of the extended status signal
- Selection of the unit for the pressure value
- Adopting the applied pressure as the zero point


 For detailed information on the product, see the product documentation →  5.



 21 Function block EH\_Cerabar\_PMx2x\_IOL

*Parameters of EH\_Cerabar\_PMx2x\_IOL*

Name	P Type	Data Type	Comment
iHW_Address	IN	Int	Input address of the module →  13
iHW_ID	IN	HW_IO, HW_ANY	Hardware identifier of the module →  13
iCAP	IN	Int	Client Access Point →  17
iPORT	IN	Int	Port number where the device is connected to the IO-Link master
iGetZero	IN	Bool	<ul style="list-style-type: none"> <li>■ TRUE: Adopt the applied pressure as zero</li> <li>■ FALSE: No action</li> </ul>
iSetUnit	IN	Bool	Trigger to set unit the pressure unit
iUnit	IN	Int	Unit for pressure value <ul style="list-style-type: none"> <li>■ 0: bar</li> <li>■ 1: kPa</li> <li>■ 2: psi</li> <li>■ 3: MPa</li> </ul>

Name	P Type	Data Type	Comment
qPressure	OUT	Real	Process value pressure
qCondensedStatus	OUT	Byte	<ul style="list-style-type: none"> <li>▪ 0: Not specified</li> <li>▪ 36: Failure</li> <li>▪ 37: Failure - simulation</li> <li>▪ 60: Functional check</li> <li>▪ 61: Functional check - simulation</li> <li>▪ 120: Out of specification</li> <li>▪ 121: Out of specification - simulation</li> <li>▪ 128: Good</li> <li>▪ 129: Good - simulation</li> <li>▪ 164: Maintenance required</li> <li>▪ 165: Maintenance required - simulation</li> </ul>
qUnit	OUT	Int	Selected unit for pressure value <ul style="list-style-type: none"> <li>▪ 0: bar</li> <li>▪ 1: kPa</li> <li>▪ 2: psi</li> <li>▪ 3: MPa</li> </ul>
qDiagnostics	OUT	String	Current diagnostic text See product documentation
qPreviousDiagnostics	OUT	String	Previous diagnostic message See product documentation
qBusy	OUT	Bool	Busy signal of the function block <ul style="list-style-type: none"> <li>▪ TRUE: parametrization and acyclic communication ongoing</li> <li>▪ FALSE: No action</li> </ul>
qSSC1_1	OUT	Bool	Status switching signal 1.1
qSSC1_2	OUT	Bool	Status switching signal 1.2
qFBOut	OUT	String	Diagnostic text of the function block If a diagnostic message is displayed for the function block, ensure that no other acyclic communication is taking place. Acyclic communication should only be triggered for one function block at a time. Multiple triggers may cause errors.   For information on diagnostic messages of the IO-Link device: See the product documentation (→ 5) or IODD.
qFBError	OUT	Bool	Internal error of the function block

### 8.1.2 Cerabar PMP23

#### Function block designation



EH\_Cerabar\_PMP23\_IOL

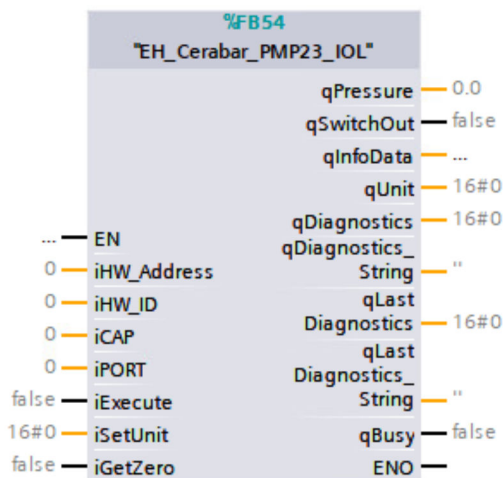
#### Device ID

256, 257

#### Overview of functions




- Providing the current value for the main measured variable: pressure
- Providing the status of the switching signal
- Reading the diagnostic data after triggering of the input iExecute
- Selection of the unit for the pressure value
- Adopting the applied pressure as the zero point

 For detailed information on the product, see the product documentation →  5.



 22 Function block EH\_Cerabar\_PMP23\_IOL

#### Parameters of EH\_Cerabar\_PMP23\_IOL

Name	P Type	Data Type	Comment
iHW_Address	IN	Int	Input address of the module →  13
iHW_ID	IN	HW_IO, HW_ANY	Hardware identifier of the module →  13
iCAP	IN	Int	Client Access Point →  17
iPORT	IN	Int	Port number where the device is connected to the IO-Link master
iExecute	IN	Bool	Trigger to execute the acyclic routine for parametrization and read out diagnostics
iSetUnit	IN	Byte	Unit for pressure value <ul style="list-style-type: none"> <li>■ 0: bar</li> <li>■ 1: kPa</li> <li>■ 2: psi</li> <li>■ 3: MPa</li> </ul>
iGetZero	IN	Bool	<ul style="list-style-type: none"> <li>■ TRUE: Adopt the applied pressure as zero</li> <li>■ FALSE: No action</li> </ul>
qPressure	OUT	Real	Process value pressure
qSwitchOut	OUT	Bool	Status switching signal

Name	P Type	Data Type	Comment
qUnit	OUT	Byte	Selected unit for pressure value <ul style="list-style-type: none"> <li>▪ 0: bar</li> <li>▪ 1: kPa</li> <li>▪ 2: psi</li> <li>▪ 3: MPa</li> </ul>
qInfoData	OUT	LI-OLink_type Identification Objects	UDT to provide device data
qDiagnostics	OUT	Dword	Current diagnostic code → 56
qDiagnostics_String	OUT	String	Current diagnostic text → 56
qLastDiagnostics	OUT	Dword	Previous diagnostic code → 56
qLastDiagnostics_String	OUT	String	Previous diagnostic text → 56
qBusy	OUT	Bool	Busy signal of the function block after triggering the iExecute input <ul style="list-style-type: none"> <li>▪ TRUE: parametrization and acyclic communication ongoing</li> <li>▪ FALSE: No action</li> </ul>

#### *Diagnostic numbers and diagnostic texts Cerabar PMP23*

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

## 8.2 Cerabar PMP43

### Function block designation



EH\_Cerabar\_PMP43\_IOL

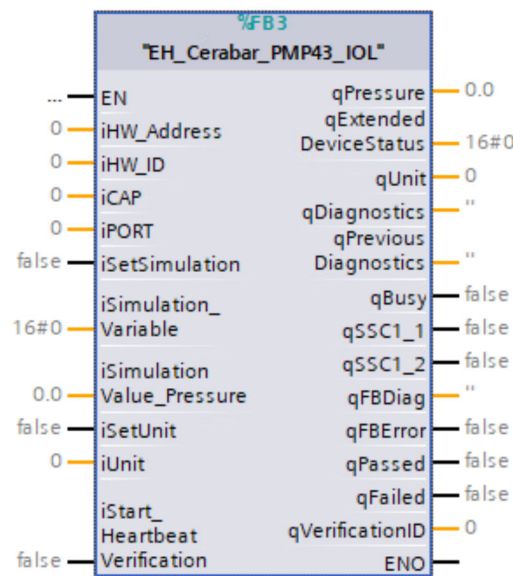
### Device ID

9618689

### Overview of functions




- Providing the current value for the main measured variable: pressure
- Providing the status of switching signals
- Cyclic delivery of the extended status signal
- Selection of the unit for the pressure value
- Simulating the main measured variable
- Start the Heartbeat Verification and provide the results



 For detailed information on the product, see the product documentation →  5.



 23 Function block EH\_Cerabar\_PMP43\_IOL

### Parameters of EH\_EH\_Cerabar\_PMP43\_IOL

Name	P Type	Data Type	Comment
iHW_Address	IN	Int	Input address of the module →  13
iHW_ID	IN	HW_IO, HW_ANY	Hardware identifier of the module →  13
iCAP	IN	Int	Client Access Point →  17
iPORT	IN	Int	Port number where the device is connected to the IO-Link master
iSetSimulation	IN	Bool	Signal to set device into simulation mode <ul style="list-style-type: none"> <li>■ TRUE: Simulation ON</li> <li>■ FALSE: Simulation OFF</li> </ul>
iSimulation_Variable	IN	Byte	Variable for simulation mode <ul style="list-style-type: none"> <li>■ 0: Off</li> <li>■ 1: Pressure</li> </ul>
iSetSimulationPressure	IN	Real	Pressure value to be simulated
iSetUnit	IN	Bool	Trigger to set the unit for the pressure value

Name	P Type	Data Type	Comment
iUnit	IN	Byte	Unit for pressure value <ul style="list-style-type: none"> <li>▪ 0: bar</li> <li>▪ 6: psi</li> <li>▪ 8: mbar</li> <li>▪ 11: Pa</li> <li>▪ 12: kPa</li> <li>▪ 237: MPa</li> </ul>
iStart_HeartbeatVerification	IN	Bool	Trigger to start Heartbeat Verification
qPressure	OUT	Real	Process value pressure
qExtendedDeviceStatus	OUT	Byte	<ul style="list-style-type: none"> <li>▪ 0: Not specified</li> <li>▪ 36: Failure</li> <li>▪ 37: Failure - simulation</li> <li>▪ 60: Functional check</li> <li>▪ 61: Functional check - simulation</li> <li>▪ 120: Out of specification</li> <li>▪ 121: Out of specification - simulation</li> <li>▪ 128: Good</li> <li>▪ 129: Good - simulation</li> <li>▪ 164: Maintenance required</li> <li>▪ 165: Maintenance required - simulation</li> </ul>
qUnit	OUT	Int	Selected unit for pressure value <ul style="list-style-type: none"> <li>▪ 0: bar</li> <li>▪ 6: psi</li> <li>▪ 8: mbar</li> <li>▪ 11: Pa</li> <li>▪ 12: kPa</li> <li>▪ 237: MPa</li> </ul>
qDiagnostics	OUT	String	Current diagnostic text See product documentation
qPreviousDiagnostics	OUT	String	Previous diagnostic message See product documentation
qBusy	OUT	Bool	Busy signal of the function block <ul style="list-style-type: none"> <li>▪ TRUE: parametrization and acyclic communication ongoing</li> <li>▪ FALSE: No action</li> </ul>
qSSC1_1	OUT	Bool	Status switching signal 1.1
qSSC1_2	OUT	Bool	Status switching signal 1.2
qFBDiag	OUT	String	<p>Diagnostic text of the function block If a diagnostic message is displayed for the function block, ensure that no other acyclic communication is taking place. Acyclic communication should only be triggered for one function block at a time. Multiple triggers may cause errors.</p> <p> For information on diagnostic messages of the IO-Link device: See the product documentation (→  5) or IODD.</p>
qFBError	OUT	Bool	Internal error of the function block
qPassed	OUT	Bool	TRUE: Heartbeat Verification passed
qFailed	OUT	Bool	TRUE: Heartbeat Verification failed
qProgress	OUT	Byte	Progress of the Heartbeat Verification
qVerificationID	OUT	Int	VerificationID

### 8.3 Cerabar M PMC51, PMP51, PMP55

**Function block designation**



- PMC51: EH\_Cerabar\_PMC51\_IOL
- PMP51: EH\_Cerabar\_PMP51\_IOL
- PMP55: EH\_Cerabar\_PMP55\_IOL


**Device ID**

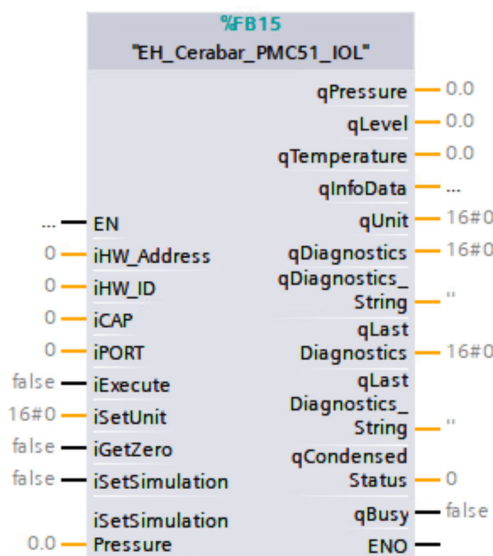
2048


**Overview of functions**

- Providing the current values for the main measured variables: pressure, level, and temperature
- Cyclic delivery of the summarized status signal
- Reading the diagnostic data after triggering of the input iExecute
- Selection of the unit for the pressure value or for the converted level value
- Adopting the applied pressure as the zero point
- Simulating the main measured variable: pressure




 For detailed information on the product, see the product documentation →  5.

 The function blocks for PMC51, PMP51, and PMP55 are functionally identical and differ solely in their function block designation.



 24 Function block EH\_Cerabar\_PMC51\_IOL

Parameters of EH\_Cerabar\_PMC51\_IOL, EH\_Cerabar\_PMP51\_IOL and EH\_Cerabar\_PMP55\_IOL

Name	P Type	Data Type	Comment
iHW_Address	IN	Int	Input address of the module →  13
iHW_ID	IN	HW_IO, HW_ANY	Hardware identifier of the module →  13
iCAP	IN	Int	Client Access Point →  17
iPORT	IN	Int	Port number where the device is connected to the IO-Link master
iExecute	IN	Bool	Trigger to execute the acyclic routine for parametrization and read out diagnostics

Name	P Type	Data Type	Comment
iSetUnit	IN	Byte	Unit for pressure value <ul style="list-style-type: none"> <li>▪ 0: mbar</li> <li>▪ 1: bar</li> <li>▪ 2: mmH2O</li> <li>▪ 3: mH2O</li> <li>▪ 4: ftH2O</li> <li>▪ 5: inH2O</li> <li>▪ 6: Pa</li> <li>▪ 7: kPa</li> <li>▪ 8: MPa</li> <li>▪ 9: psi</li> <li>▪ 10: mmHg</li> <li>▪ 11: inHg</li> <li>▪ 12: kgf/cm</li> </ul>
iGetZero	IN	Bool	<ul style="list-style-type: none"> <li>▪ TRUE: Adopt the applied pressure as zero</li> <li>▪ FALSE: No action</li> </ul>
iSetSimulation	IN	Bool	Signal to set device into simulation mode <ul style="list-style-type: none"> <li>▪ TRUE: Simulation ON</li> <li>▪ FALSE: Simulation OFF</li> </ul>
iSetSimulation_Pressure	IN	Real	Pressure value to be simulated
qPressure	OUT	Real	Process value pressure
qLevel	OUT	Real	Process value level
qInfoData	OUT	LI-OLink_type Identification Objects	UDT to provide device data
qDiagnostics	OUT	Dword	Current diagnostic code → ⓘ 60
qDiagnostics_String	OUT	String	Current diagnostic text → ⓘ 60
qLastDiagnostics	OUT	Dword	Previous diagnostic code → ⓘ 60
qLastDiagnostics_String	OUT	String	Previous diagnostic text → ⓘ 60
qCondensedStatus	OUT	Int	<ul style="list-style-type: none"> <li>▪ 0: Not specified</li> <li>▪ 36: Failure</li> <li>▪ 60: Functional check</li> <li>▪ 120: Out of specification</li> <li>▪ 128: Good</li> <li>▪ 129: Good - Simulation</li> <li>▪ 164: Maintenance required</li> </ul>
qBusy	OUT	Bool	Busy signal of the function block after triggering the iExecute input <ul style="list-style-type: none"> <li>▪ TRUE: parametrization and acyclic communication ongoing</li> <li>▪ FALSE: No action</li> </ul>

*Diagnostic numbers and diagnostic texts Cerabar M PMC51, Cerabar M PMP51 and Cerabar M PMP55*

Diagnostic number	Diagnostic text
0	System ok
1	No communication
2	F002: Sensor unknown
62	F062: Sensor connection
81	F081: Initialization
83	F083: Memory content
110	S110: Working range T
140	F140: Working range P

Diagnostic number	Diagnostic text
261	F261: Electronics module
282	F282: Memory
283	F283: Memory content
419	F419: Current cycle
431	M431: Calibration
434	M434: Scaling
438	M438: Data record
482	C482: Simulation output
484	C484: Error simulation
485	C485: Measure simulation
803	M803: Current loop
822	S822: Process temperature
824	C824: Process pressure
841	F841: Sensor range

## 8.4 Ceraphant PTC31B, PTP31B, PTP33B

### 8.4.1 Ceraphant PTC31B, PTP31B, PTP33B

#### Function block designation



EH\_Ceraphant\_PT $\times$ 3xB\_IOL

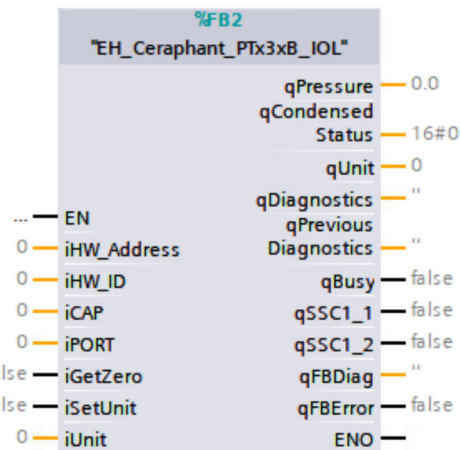
#### Device ID

1793

#### Overview of functions



- Providing the current value for the main measured variable: pressure
- Providing the status of switching signals
- Cyclic delivery of the extended status signal
- Selection of the unit for the pressure value
- Adopting the applied pressure as the zero point


 For detailed information on the product, see the product documentation →  5.



 25 Function block EH\_Ceraphant\_PT $\times$ 3xB\_IOL

#### Parameters of EH\_Ceraphant\_PT $\times$ 3xB\_IOL

Name	P Type	Data Type	Comment
iHW_Address	IN	Int	Input address of the module →  13
iHW_ID	IN	HW_IO, HW_ANY	Hardware identifier of the module →  13
iCAP	IN	Int	Client Access Point →  17
iPORT	IN	Int	Port number where the device is connected to the IO-Link master
iGetZero	IN	Bool	<ul style="list-style-type: none"> <li>▪ TRUE: Adopt the applied pressure as zero</li> <li>▪ FALSE: No action</li> </ul>
iSetUnit	IN	Bool	Trigger to set unit the pressure unit
iUnit	IN	Int	Unit for pressure value <ul style="list-style-type: none"> <li>▪ 0: bar</li> <li>▪ 1: kPa</li> <li>▪ 2: psi</li> <li>▪ 3: MPa</li> </ul>
qPressure	OUT	Real	Process value pressure

Name	P Type	Data Type	Comment
qCondensedStatus	OUT	Byte	<ul style="list-style-type: none"> <li>▪ 0: Not specified</li> <li>▪ 36: Failure</li> <li>▪ 37: Failure - simulation</li> <li>▪ 60: Functional check</li> <li>▪ 61: Functional check - simulation</li> <li>▪ 120: Out of specification</li> <li>▪ 121: Out of specification - simulation</li> <li>▪ 128: Good</li> <li>▪ 129: Good - simulation</li> <li>▪ 164: Maintenance required</li> <li>▪ 165: Maintenance required - simulation</li> </ul>
qUnit	OUT	Int	Selected unit for pressure value <ul style="list-style-type: none"> <li>▪ 0: bar</li> <li>▪ 1: kPa</li> <li>▪ 2: psi</li> <li>▪ 3: MPa</li> </ul>
qDiagnostics	OUT	String	Current diagnostic text See product documentation
qPreviousDiagnostics	OUT	String	Previous diagnostic message See product documentation
qBusy	OUT	Bool	Busy signal of the function block <ul style="list-style-type: none"> <li>▪ TRUE: parametrization and acyclic communication ongoing</li> <li>▪ FALSE: No action</li> </ul>
qSSC1_1	OUT	Bool	Status switching signal 1.1
qSSC1_2	OUT	Bool	Status switching signal 1.2
qFBDiag	OUT	String	Diagnostic text of the function block If a diagnostic message is displayed for the function block, ensure that no other acyclic communication is taking place. Acyclic communication should only be triggered for one function block at a time. Multiple triggers may cause errors.   For information on diagnostic messages of the IO-Link device: See the product documentation (→ 5) or IODD.
qFBError	OUT	Bool	Internal error of the function block

## 8.4.2 Ceraphant PTC31B, PTP31B, PTP33B

### Function block designation

EH\_Ceraphant\_PTx3xB\_prev\_IOL

### Device ID

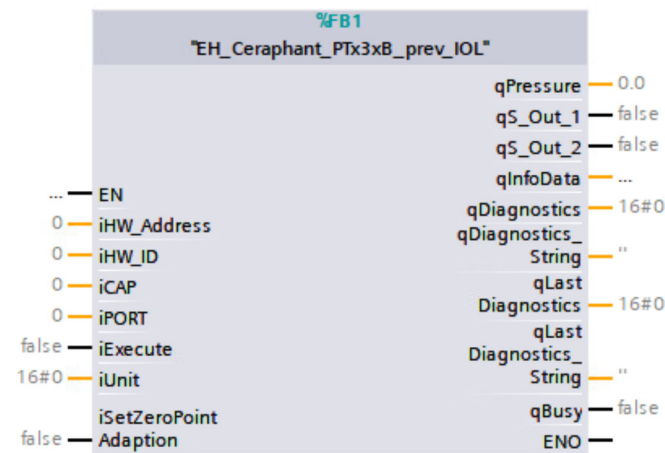
1792

### Overview of functions

- Providing the current value for the main measured variable: pressure
- Providing the status of switching signals
- Reading the diagnostic data after triggering of the input iExecute
- Selection of the unit for the pressure value
- Adopting the applied pressure as the zero point



For detailed information on the product, see the product documentation → 5.



26 Function block EH\_Ceraphant\_PTx3xB\_prev\_IOL

### Parameters of EH\_Ceraphant\_PTx3xB\_prev\_IOL

Name	P Type	Data Type	Comment
iHW_Address	IN	Int	Input address of the module → 13
iHW_ID	IN	HW_IO, HW_ANY	Hardware identifier of the module → 13
iCAP	IN	Int	Client Access Point → 17
iPORT	IN	Int	Port number where the device is connected to the IO-Link master
iExecute	IN	Bool	Trigger to execute the acyclic routine for parametrization and read out diagnostics
iUnit	IN	Byte	Unit for pressure value <ul style="list-style-type: none"> <li>■ 0: bar</li> <li>■ 1: kPa</li> <li>■ 2: MPa</li> <li>■ 3: psi</li> </ul>
iSetZeroPointAdaption	IN	Bool	<ul style="list-style-type: none"> <li>■ TRUE: Adopt the applied pressure as zero</li> <li>■ FALSE: No action</li> </ul>
qPressure	OUT	Real	Process value pressure
qS_Out_1	OUT	Bool	Switch output 1
qS_Out_2	OUT	Bool	Switch output 2
qInfoData	OUT	LI-OLink_type Identification Objects	UDT to provide device data

Name	P Type	Data Type	Comment
qDiagnostics	OUT	Dword	Current diagnostic code → 65
qDiagnostics_String	OUT	String	Current diagnostic text → 65
qLastDiagnostics	OUT	Dword	Previous diagnostic code → 65
qLastDiagnostics_String	OUT	String	Previous diagnostic text → 65
qBusy	OUT	Bool	Busy signal of the function block after triggering the iExecute input <ul style="list-style-type: none"> <li>▪ TRUE: parametrization and acyclic communication ongoing</li> <li>▪ FALSE: No action</li> </ul>

*Diagnostic numbers and diagnostic texts Ceraphant PTC31B, Ceraphant PTP31B and Ceraphant PTP33B*

Diagnostic number	Diagnostic text
16#0000_0001	No communication
16#3030_3030	System ok
16#4334_3331	C431: Invalid position adjustment (Current Output)
16#4334_3332	C432: Invalid position adjustment (Switching Output)
16#4334_3639	C469: Switch points for output violated
16#4334_3835	C485: Simulation active
16#4632_3730	F270: Overpressure/low pressure
16#4634_3337	F437: Incompatible configuration
16#5331_3430	S140: Sensor signal outside of permitted ranges
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

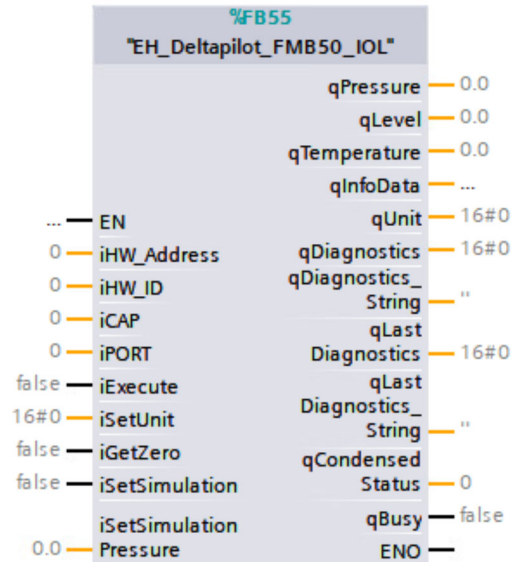
## 8.5 Deltapilot M FMB50

### Function block designation

EH\_Deltapilot\_FMB50\_IOL

### Device ID

2304



27 Function block EH\_Deltapilot\_FMB50\_IOL

**i** The function block for the Deltapilot M FMB50 is identically structured to the function blocks for the Cerabar PMC51, PMP51, and PMP55. For a description of the parameters and for the diagnostic numbers and diagnostic texts, see: → 59

## 9 Description of the "Temperature" function blocks

### 9.1 iTHERM CompactLine TM311

**Function block designation**



EH\_iTERM\_TM311\_IOL

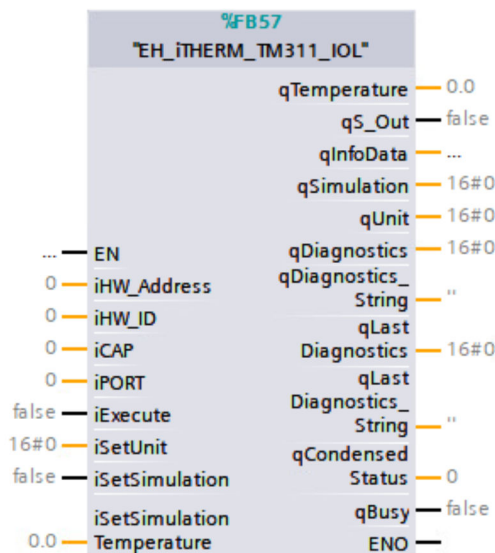
**Device ID**

196864

**Overview of functions**




- Providing the current value for the main measured variable: temperature
- Providing the status of the switching signal
- Cyclic delivery of the summarized status signal
- Reading the diagnostic data after triggering of the input iExecute
- Selection of the unit for the temperature value
- Simulating the main measured variable

 For detailed information on the product, see the product documentation →  5.



 28 Function block EH\_iTERM\_TM311\_IOL

*Parameters of EH\_iTERM\_TM311\_IOL*

Name	P Type	Data Type	Comment
iHW_Address	IN	Int	Input address of the module →  13
iHW_ID	IN	HW_IO, HW_ANY	Hardware identifier of the module →  13
iCAP	IN	Int	Client Access Point →  17
iPORT	IN	Int	Port number where the device is connected to the IO-Link master
iExecute	IN	Bool	Trigger to execute the acyclic routine for parametrization and read out diagnostics
iSetUnit	IN	Byte	Unit for temperature value <ul style="list-style-type: none"> <li>■ 32: °Celsius</li> <li>■ 33: °Fahrenheit</li> <li>■ 35: Kelvin</li> </ul>

Name	P Type	Data Type	Comment
iSetSimulation	IN	Bool	Signal to set device into simulation mode <ul style="list-style-type: none"> <li>TRUE: Simulation ON</li> <li>FALSE: Simulation OFF</li> </ul>
iSetSimulationTemperature	IN	Real	Temperature value to be simulated
qTemperature	OUT	Real	Process value temperature
qS_Out	OUT	Bool	Status switching signal
qInfoData	OUT	LI-OLink_type Identification Objects	UDT to provide device data
qSimulation	OUT	Byte	Simulated value
qUnit	OUT	Byte	Selected unit for temperature value
qDiagnostics	OUT	Dword	Current diagnostic code → 68
qDiagnostics_String	OUT	String	Current diagnostic text → 68
qLastDiagnostics	OUT	Dword	Previous diagnostic code → 68
qLastDiagnostics_String	OUT	String	Previous diagnostic text → 68
qCondensedStatus	Out	Int	<ul style="list-style-type: none"> <li>0: Bad: Not limited</li> <li>1: Bad: Low limited</li> <li>2: Bad: High limited</li> <li>3: Bad: Constant</li> <li>4: Uncertain: Not limited</li> <li>5: Uncertain: Low limited</li> <li>6: Uncertain: High limited</li> <li>7: Uncertain: Constant</li> <li>8: Manual: Fixed: Not limited</li> <li>9: Manual: Fixed: Low limited</li> <li>10: Manual: Fixed: High limited</li> <li>11: Manual: Fixed: Constant</li> <li>12: Good: Not limited</li> <li>13: Good: Low limited</li> <li>14: Good: High limited</li> <li>15: Good: Constant</li> </ul>
qBusy	OUT	Bool	Busy signal of the function block after triggering the iExecute input <ul style="list-style-type: none"> <li>TRUE: parametrization and acyclic communication ongoing</li> <li>FALSE: No action</li> </ul>

*Diagnostic numbers and diagnostic texts iTHERM CompactLine TM311*

Diagnostic number	Diagnostic text
16#0	System ok
16#1	No communication
16#102F	S047: Sensor limit reached
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.
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

Diagnostic number	Diagnostic text
16#4001	F001: Device failure
16#4004	F004: Sensor defective
16#4219	F537: Configuration invalid

## 9.2 iTEMP TMT36

### Function block designation



EH\_iTEMP\_TMT36\_IOL

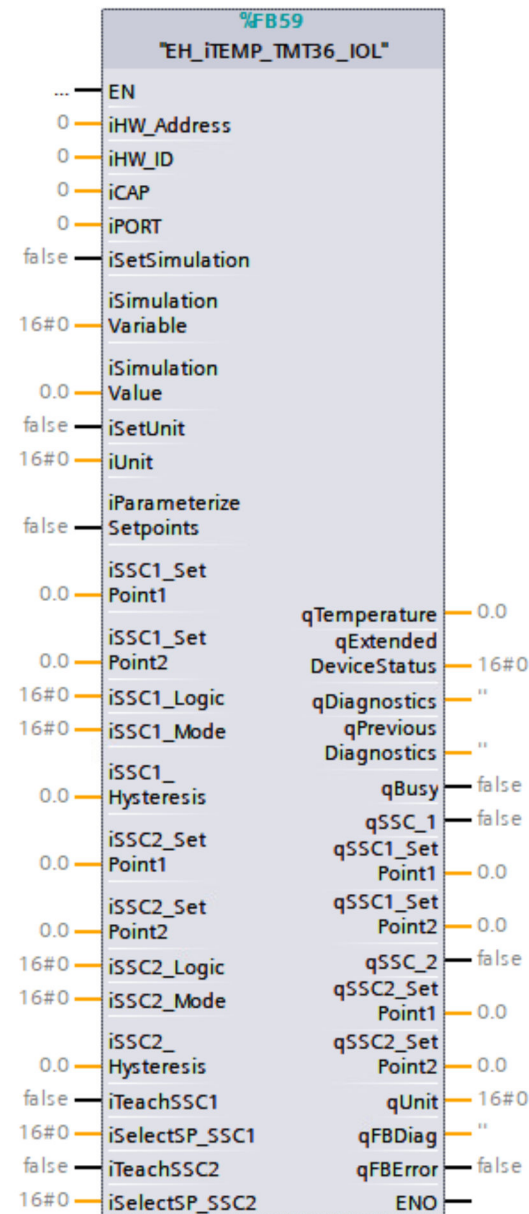
### Device ID

9698817

### Overview of functions

- Providing the current value for the main measured variable: temperature
- Providing the status of switching signals
- Cyclic delivery of the extended status signal
- Selection of the unit for the temperature value
- Simulating the main measured variable
- Programming the switch points via the inputs iTeachSSC1 and iTeachSSC2
- Starting the configuration of the switch points via the input iParameterizeSetpoints



 For detailed information on the product, see the product documentation →  5.



 29 Function block EH\_iTEMP\_TMT36\_IOL

*Parameters of EH\_iTEMP\_TMT36\_IOL*

Name	P Type	Data Type	Comment
iHW_Address	IN	Int	Input address of the module → 13
iHW_ID	IN	HW_IO, HW_ANY	Hardware identifier of the module → 13
iCAP	IN	Int	Client Access Point → 17
iPORT	IN	Int	Port number where the device is connected to the IO-Link master
iSetSimulation	IN	Bool	Signal to set device into simulation mode <ul style="list-style-type: none"> <li>▪ TRUE: Simulation ON</li> <li>▪ FALSE: Simulation OFF</li> </ul>
iSimulationVariable	IN	Int	Variable for simulation mode <ul style="list-style-type: none"> <li>▪ 0: Off</li> <li>▪ 1: Temperature</li> </ul>
iSimulationValue	IN	Real	Value to be simulated
iSetUnit	IN	Bool	Trigger to set the unit for the temperature value
iUnit	IN	Int	Unit for temperature value <ul style="list-style-type: none"> <li>▪ 32: °Celsius</li> <li>▪ 33: °Fahrenheit</li> <li>▪ 35: Kelvin</li> </ul>
iParameterizeSetpoints	IN	Bool	Trigger to start switch point configuration
iSSC1_SetPoint1	IN	Real	Set point 1 of SSC1
iSSC1_SetPoint2	IN	Real	Set point 2 of SSC1
iSSC1_Logic	IN	Byte	Logic of the switching signal 1 <ul style="list-style-type: none"> <li>▪ 0: High active</li> <li>▪ 1: Low active</li> </ul>
iSSC1_Mode	IN	Byte	Mode of the switching signal 1 <ul style="list-style-type: none"> <li>▪ 0: Deactivated</li> <li>▪ 1: Single point</li> <li>▪ 2: Window</li> <li>▪ 3: Two point</li> </ul>
iSSC1_Hysteresis	IN	Real	Hysteresis of the switching signal 1
iSSC2_SetPoint1	IN	Real	Set point 1 of SSC2
iSSC2_SetPoint2	IN	Real	Set point 2 of SSC2
iSSC2_Logic	IN	Byte	Logic of the switching signal 2 <ul style="list-style-type: none"> <li>▪ 0: High active</li> <li>▪ 1: Low active</li> </ul>
iSSC2_Mode	IN	Byte	Mode of the switching signal 2 <ul style="list-style-type: none"> <li>▪ 0: Deactivated</li> <li>▪ 1: Single point</li> <li>▪ 2: Window</li> <li>▪ 3: Two point</li> </ul>
iSSC2_Hysteresis	IN	Real	Hysteresis of the switching signal 2
iTeachSSC1	IN	Bool	Trigger to teach SSC1
iSelectSP_SSC1	IN	Byte	Selection of the set point of SSC1 <ul style="list-style-type: none"> <li>▪ 1: Set point 1</li> <li>▪ 2: Set point 2</li> </ul>
iTeachSSC2	IN	Bool	Trigger to teach SSC2
iSelectSP_SSC2	IN	Byte	Selection of the set point of SSC2 <ul style="list-style-type: none"> <li>▪ 1: Set point 1</li> <li>▪ 2: Set point 2</li> </ul>
qTemperature	OUT	Real	Process value temperature

Name	P Type	Data Type	Comment
qExtendedDeviceStatus	OUT	Byte	<ul style="list-style-type: none"> <li>▪ 0: Not specified</li> <li>▪ 36: Failure</li> <li>▪ 37: Failure - simulation</li> <li>▪ 60: Functional check</li> <li>▪ 61: Functional check - simulation</li> <li>▪ 120: Out of specification</li> <li>▪ 121: Out of specification - simulation</li> <li>▪ 128: Good</li> <li>▪ 129: Good - simulation</li> <li>▪ 164: Maintenance required</li> <li>▪ 165: Maintenance required - simulation</li> </ul>
qDiagnostics	OUT	String	Current diagnostic text See product documentation
qPreviousDiagnostics	OUT	String	Previous diagnostic message See product documentation
qBusy	OUT	Bool	Busy signal of the function block <ul style="list-style-type: none"> <li>▪ TRUE: parametrization and acyclic communication ongoing</li> <li>▪ FALSE: No action</li> </ul>
qSSC1	OUT	Bool	Status switching signal 1
qSSC1_SetPoint1	OUT	Real	Set point 1 of SSC1
qSSC1_SetPoint2	OUT	Real	Set point 2 of SSC1
qSSC2	OUT	Bool	Status switching signal 2
qSSC2_SetPoint1	OUT	Real	Set point 1 of SSC2
qSSC2_SetPoint2	OUT	Real	Set point 2 of SSC2
qUnit	OUT	Byte	Unit of the temperature value <ul style="list-style-type: none"> <li>▪ 32: °C</li> <li>▪ 33: °F</li> </ul>
qFBDiag	OUT	String	<p>Diagnostic text of the function block If a diagnostic message is displayed for the function block, ensure that no other acyclic communication is taking place. Acyclic communication should only be triggered for one function block at a time. Multiple triggers may cause errors.</p> <p> For information on diagnostic messages of the IO-Link device: See the product documentation (→  5) or IODD.</p>
qFBError	OUT	Bool	Internal error of the function block









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