Endress+Hauser
People for Process Automation

Liquiline_pHORP – Device Revision 4

FF-H1 Guideline

Document: SD01332C/07/EN/02.17

Initial release: 1.14
Current release: 2.17

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1. Introduction

1.1. Scope

The Endress+Hauser analysis transmitter, model Liquiline_pHORP is certified and registered by the Fieldbus FOUNDATION. The device meets all the requirements of the following specifications:

- Certified in accordance with Fieldbus FOUNDATION specification
- Fieldbus FOUNDATION H1 specification
- Interoperability Test Kit (ITK), (device certification number available on request): the device may also be operated using certified devices from other manufacturers
- Physical Layer Conformance Test of the Fieldbus FOUNDATION

This document specifies all the device specific features and documents FF-H1 protocol implementation details. The functionality of this field device is described sufficiently to allow its proper application in a process and its complete support in FF-H1 capable host applications.

1.2. Purpose

This specification is designed to complement the operating instructions (BA00381C and BA00382C) by providing a complete, unambiguous description of this field device from a FF-H1 communication perspective.

1.3. Who should use this document?

The specification is designed to be a technical reference for FF-H1 capable host application developers, system integrators and experienced end users. It also provides functional specifications (e.g., methods, enumerations and performance requirements) used during field device development, maintenance and testing. This document assumes the reader is familiar with Fieldbus FOUNDATION protocol requirements and terminology.

1.4. Notes on safety icons and symbols

The structure, signal words and safety colors of the signs comply with the specifications of ANSI Z535.6 ("Product safety information in product manuals, instructions and other collateral materials").

Safety message structure	Meaning
⚠ DANGER **Cause (/consequences)** Consequences if safety message is not heeded • Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid the situation **will** result in a fatal or serious injury.
⚠ WARNING **Cause (/consequences)** Consequences if safety message is not heeded • Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid the situation **can** result in a fatal or serious injury.
⚠ CAUTION **Cause (/consequences)** Consequences if safety message is not heeded • Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.
NOTICE **Cause/situation** Consequences if safety message is not heeded • Action/note	This symbol alerts you to situations that can result in damage to property and equipment.

1.5. Abbreviations and definitions

Abbreviation	Description
AI	Analog Input
CiF	Control in the Field
CFF	Common File Format
CIP	Clean in place
DCS	Distributed Control System/Digital Control System
DI	Discrete Input
DD	Device Description
DLL	Data Link Layer
EDDL	Electronic Device Description Language
ENP	Electronic Name Plate
FB	Function Block
FF	FOUNDATION Fieldbus
HIST	Host Interoperability Support Testing
HMI	Human Machine Interface
HSE	FOUNDATION High Speed Ethernet
IEC	International Electrotechnical Commission I/O
I/O	Input Output
IS	Intrinsic Safety
ITK	Interoperability Test Kit
LAS	Link Active Schedule
LM	Link Master
n.a.	Not applicable
NaN	Not a Number (IEEE-754, 7Fh A0h 00h 00h)
NM	Network Management
OD	Object Dictionary

Abbreviation	Description
PCS	Process Control System
PID	Proportional/Integral/Derivative Control
PV	Process Variable
RB	Resource Block
SM	System Management
SP	Set Point
SIP	Sterilisation in place
TB	Transducer Block
UDL	Up-/Download
VCR	Virtual Communication Relationship

1.6. References

Standard/Specification	Description
IEC 61158-1	Introductory Guide
IEC 61158-2	Physical Layer specification and Service Definition
IEC 61158-3	Data Link Layer (DLL) Service Definition
IEC 61158-4	Data Link Layer (DLL) Protocol Definition
IEC 61158-5	Application Layer Service Specification
IEC 61158-6	Application Layer Protocol Specification
IEC 61158-7	System Management
IEC 61158-8	Conformance Testing
CEI/IEC 61511	Functional safety – Safety Instrumented Systems for the Process Industry Sector
NAMUR NE81	Requirements for Online Plant Asset Management System
NAMUR NE107	Self-monitoring and Diagnosis of Field Devices
BA00381C	Operating Instructions Liquiline_pHORP Part 1
BA00382C	Operating Instructions Liquiline_pHORP Part 2
BA00062S	Guideline FOUNDATION Fieldbus Function Blocks
BA00013S	FOUNDATION Fieldbus Overview

2. Device identification

Manufacturer name:	Endress+Hauser
Model name:	Liquiline_pHORP
Manufacturer ID code:	$452B48_h$ (4533064)
Device type code:	$10A0_h$ (4256)
Device revision:	4
Stack Communication Profiles:	31PS, 32LT
H1 Physical Layer Profiles:	511, 113, 115
H1 ITK Profile:	6.2.0

The name plate is located on the right side of the housing and indicates the model name, order codes, serial number and software version. The device revision, device description revision, physical device tag, node address are shown in the diagnostics menu.

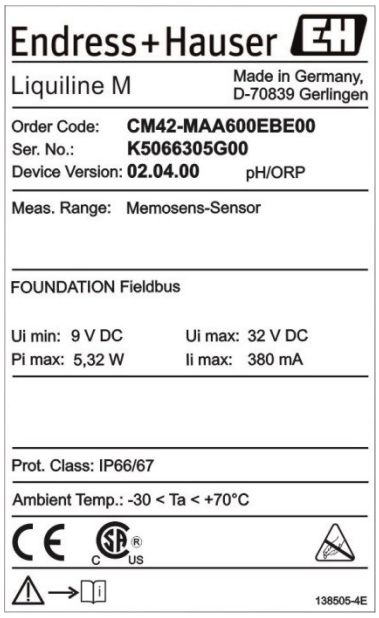


Fig. 3: A name plate example

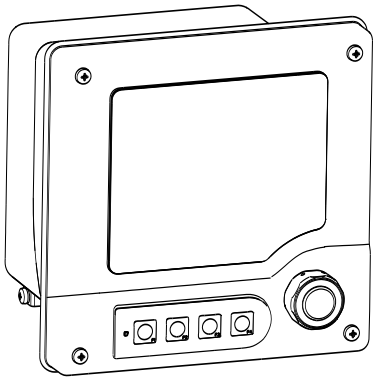


Fig. 2: Stainless steel housing

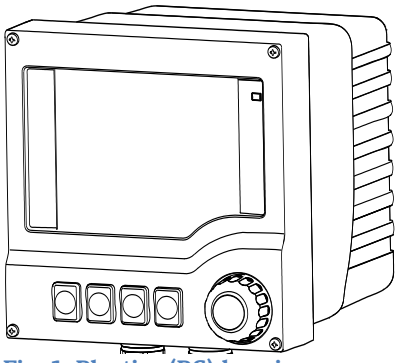


Fig. 1: Plastics (PC) housing

3. Product overview

Liquiline_pHORP is a liquid analysis transmitter for pH/ORP measurement. Different plug and play sensors (Memosens) and analog sensors can be connected for different applications.

4. Product interfaces

4.1. Process interface

Depending on the Liquiline version different sensors can be connected to different terminals. Please refer to the operating instructions shipped with your Liquiline.

4.2. FOUNDATION Fieldbus interface

4.2.1. FOUNDATION Fieldbus technology

The FOUNDATION Fieldbus (FF) is a purely digital, serial communication system that connects fieldbus devices (sensors, actuators), automation and process control systems with each other. As a local communications network (LAN) for field devices the FF was primarily designed for the requirements of process technology. The FF thus forms the basic network throughout the hierarchy of a communication system.
Please refer to Operating Instructions BA 00013S “FOUNDATION Fieldbus Overview in chapter “Installation and Commissioning Guidelines” for configuration information.

4.2.2. System architecture

The following figure shows an example of a FOUNDATION Fieldbus network with the associated components.

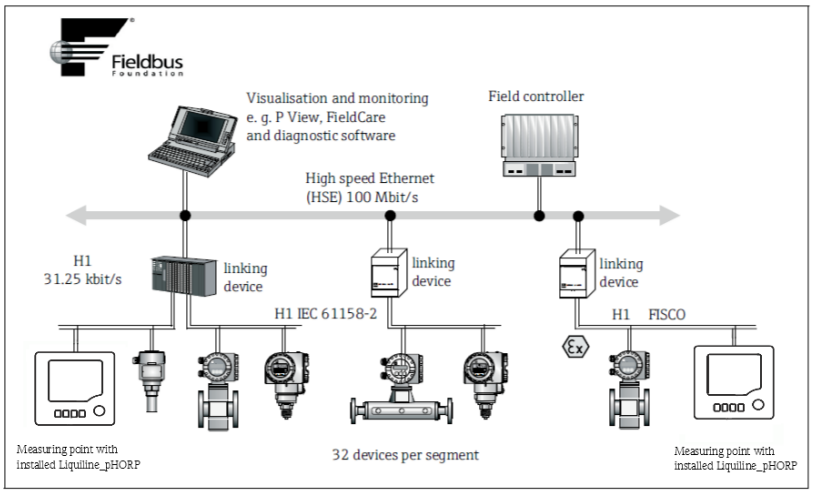


Fig. 4: System integration via FOUNDATION fieldbus

HSE = High Speed Ethernet, H1 = FOUNDATION Fieldbus-H1

The following system connection options are possible:
– A linking device can be used to connect to higher ranking fieldbus protocols (e.g. to the High Speed Ethernet - HSE) (Control Net)
– A H1 card is required for direct connection to a process control system.
– System inputs are available directly for H1 (HSE).

The system architecture of the FOUNDATION Fieldbus can be divided into two sub-networks:

H1 bus system:
In the field, fieldbus devices are connected only via the slower H1 bus system that is specified following IEC 61158-2. The H1 bus system allows simultaneous feed to the field devices and data transfer on the two-wire line.
The following points describe some important characteristics of the H1 bus system:

- All fieldbus devices are powered via the H1 bus. Like the fieldbus devices, the power supply is connected in parallel to the bus line. Devices requiring external power must use a separate power supply.
- One of the most common network structures is the line structure. Star, tree or mixed network structures are also possible using connecting components (junction boxes).
- The bus connection to the individual fieldbus devices is achieved by means of a T connector or via a spur. This has the advantage that individual fieldbus devices can be connected or disconnected without interrupting the bus or the bus communication.
- The number of connected fieldbus devices depends on various factors, such as use in hazardous areas, length of spurs, cable types, current consumption of field devices etc. (see Chapter FOUNDATION Fieldbus cable specification).
- If using fieldbus devices in a hazardous area, the H1 bus must be equipped with an intrinsically safe barrier before the transition to the hazardous area.
- A bus terminator is required at each end of the bus segment.

High Speed Ethernet (HSE):
The superior bus system is realized via the High Speed Ethernet (HSE) with a transmission rate of max. 100 MBit/s. This serves as the 'backbone' (basic network) between various local sub-networks and/or where there are a large number of network users.

4.2.3. Link Active Scheduler (LAS)

The FOUNDATION Fieldbus works according to the 'producer-consumer' relationship. This provides various advantages.
Data can be directly exchanged between field devices, e.g. a sensor and an actuating valve. Each bus user 'publishes' its data on the bus and all the bus users configured accordingly obtain this data. Publication of this data is carried out by a 'bus administrator' known as the 'Link Active Scheduler', which controls the sequence of bus communication centrally. The LAS organizes all the bus activities and sends appropriate commands to the individual field devices.

Other tasks of the LAS are:

- Recognition and reporting of newly connected devices.
- Reporting the removal of devices no longer communicating with the fieldbus.
- Keeping the 'Live List'. This list, in which all the fieldbus users are recorded, is checked by the LAS regularly. If devices are logged on or logged off, the "Live List" is updated and sent immediately to all the devices.
- Requesting process data from the field devices in accordance with a fixed schedule.
- Allocation of send rights (tokens) to devices between the untimed data transfer.

The LAS can be run redundantly, i.e. it exists both in the process control system and in the field device. If one LAS fails, the other LAS can accurately take over communication. Through precise timing of the bus communication via the LAS, the FF can run exact processes at regular intervals.

Fieldbus devices, such as this analysis transmitter, which can take over the LAS function in the event of failure of the primary master, are called 'Link Masters'. In contrast, 'Basic Devices' can only receive signals and send them to the central process control system. The LAS function is deactivated in this head transmitter when the unit is delivered.

4.2.4. Data transfer

We distinguish between two types of data transfer:
- Scheduled data transfer (cyclic): all time-critical process data (i.e. continuous measurement or actuating signals) are transferred and processed in accordance with a fixed schedule.
- Unscheduled data transfer (acyclic): device parameters that are not time-critical for the process and diagnosis information are only transferred to the fieldbus when needed. This data transfer is always carried out in the intervals between timed communications.

4.2.5. Device ID, addressing

Within the FF network, each fieldbus device is identified by a unique device ID (DEVICE_ID). The fieldbus host system (LAS) automatically gives the network address to the field device. The network address is the address that the fieldbus currently uses to address the device.

The FOUNDATION Fieldbus uses addresses between 0 and 255:
- Groups/DLL: 0 to 15
- Devices in operation: 20 to 35
- Reserve devices: 232 to 247
- Offline/substitute devices: 248 to 251

The field device tag name (PD_TAG) is given to the device during commissioning (see chapter Initial_Commissioning. It remains stored in the device even during a supply voltage failure.

4.2.6. Function Blocks

The FOUNDATION Fieldbus uses predefined function blocks to describe the functions of a device and to specify uniform data access. The function blocks implemented in each fieldbus device provide information on the tasks which a device can accept in the whole of the automation strategy.

In the case of sensors these are typically the following blocks:
- 'Analog Input' or
- 'Discrete Input' (digital input)

Actuating valves normally have the function blocks:
- 'Analog Output' or
- 'Discrete Output' (digital output)

For control tasks there are the blocks:
- PD controller or
- PID controller

More information on this can be found from Section Operation via FOUNDATION fieldbus onwards.

4.2.7. Fieldbus based process control

With the FOUNDATION Fieldbus field devices can carry out simple process control functions themselves, thereby relieving pressure on the superior process control system. Here the Link Active Scheduler (LAS) coordinates data exchange between the sensor and controller and makes sure that two field devices cannot access the bus at the same time. To do this, configuration software in host systems or workbench tools such as the NI-FBUS Configurator from National Instruments are used to connect the various function blocks to the desired control strategy (see chapter Initial Commissioning).

4.2.8. Device Description

For commissioning, diagnosis and configuration make sure that process control systems or superior configuration systems can access all device data and that the operating structure is uniform.
The device-specific information required for this is stored as so-called device description data in special files (the 'Device Description'- DD). This enables the device data to be interpreted and shown via the configuration program. The DD is thus a kind of 'device driver'.
On the other hand, a CFF file (CFF = Common File Format) is required for the network configuration in the OFF-line mode.

These files can be acquired as follows:
- Free of charge via the Internet: www.endress.com
- Via the FieldCommGroup Organization: www.fieldcommgroup.org
- Or via Fieldbus Foundation: www.fieldbus.org

Additional DCS-specific device driver packages are available as well and can be obtained from the download area on the Internet.

4.2.9. Plant asset management (PAM)

In addition to the device description a FDT/DTM device driver is available.

PAM tools (for example)	Technology	Functionality
FieldCare, FIM (Field Information Manager) PRM (Plant Resource Manager)	FDT/DTM	• Configuration of function and transducer blocks • Indication of available measuring values • Indication of diagnostics and service information • Up-/Download of parameters contained in DTM

The DTM device driver can be acquired via www.endress.com

4.2.10. Configuration of the transmitter and FF functions

The FF communication system will only function properly if correctly configured. You can obtain special configuration and operating programs from various manufacturers for the configuration. These can be used for configuring both the FF functions and all of the device-specific parameters. The predefined function blocks allow uniform access to all the network and fieldbus device data. A detailed step-by-step description of the procedure for commissioning the FF functions is given in chapter Initial Commissioning together with information on configuring device-specific parameters.

System files
You require the following files for commissioning and configuring the network:
- Commissioning →device description (DD: *.sym, *.ffo or EDD: *.sy5, *.ff5)
- Network configuration →CFF file (Common File Format)

4.2.11. Hardware settings

DIP switches on the FMPA3 module are used to enable and disable write protection and the simulation mode (for Analog Input Blocks). When write protection is active, parameters cannot be modified. The

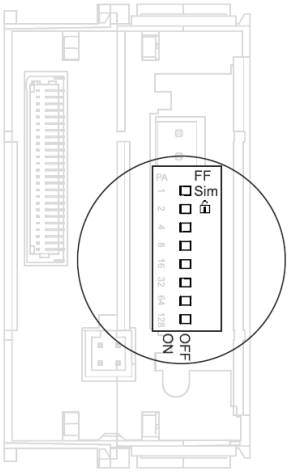
current write protection status is displayed in the WRITE_LOCK parameter (see Section Resource Block FF Parameters). The simulation mode via the hardware setting must be changed before the software setting.

NOTICE

ESD - electrostatic discharge

Failure to observe this may result in destruction or malfunction of parts of the electronics.

- ▶ **Protect the terminals from electrostatic discharge.**



To set the DIP switches, proceed as follows:

1. Open the cover of the transmitter housing.
2. Configure the DIP switch on the FMPA3 module accordingly. Switch to ON = function enabled, switch to OFF = function disabled. (first switch SIM = simulation mode, second switch 🔒 = write lock, remaining switches no function)
3. The transmitter accepts the settings within one second.
4. Close the cover and fix it to the housing with the 4 screws.

4.3. FOUNDATION Fieldbus cable specification

4.3.1. Cable type

Twin-core cables are required for connecting the device to the FOUNDATION Fieldbus H1. Following IEC 61158-2 (MBP), four different cable types (A, B, C, D) can be used with the FOUNDATION Fieldbus, only two of which (cable types A and B) are shielded.

- Cable types A or B are particularly preferable for new installations. Only these types have cable shielding that guarantees adequate protection from electromagnetic interference and thus the most reliable data transfer. In the case of cable type B, several field buses (same degree of protection) may be operated in one cable. No other circuits are permissible in the same cable.
- Practical experience has shown that cable types C and D should not be used due to the lack of shielding, since the freedom from interference generally does not meet the requirements described in the standard.

The electrical data of the fieldbus cable have not been specified but determine important characteristics of the design of the fieldbus, such as distances bridged, number of users, electromagnetic compatibility, etc.

	Type A	Type B
Cable structure	Twisted pair, shielded	One or more twisted pairs, fully shielded
Wire size	0.8 mm2 (AWG 18)	0.32 mm2 (AWG 22)
Loop-resistance (direct current)	44 Ω/km	112 Ω/km
Characteristic impedance at 31.25 kHz	100 Ω ± 20%	100 Ω ± 30%
Attenuation constant at 39 kHz	3 dB/km	5 dB/km
Capacitive asymmetry	2 nF/km	2 nF/km
Envelope delay distortion (7.9 to 39 kHz)	1.7 ms/km	*
Shield coverage	90 %	*
Max. cable length (incl. spurs >1m)	1900 m (6233 ft)	1200 m (3937 ft)
* Not specified		

Examples for suitable fieldbus cables (type A) from various manufacturers for non-hazardous areas are listed below:

- Siemens: 6XV1 830-5BH10
- Belden: 3076F
- Leoni Kerpen: FB-v2X(St*)Y-fl or FB-V2X(St*)H

4.3.2. Maximum overall cable length

The maximum network expansion depends on the type of protection and the cable specifications. The overall cable length combines the length of the main cable and the length of all spurs (>1 m/3.3 ft). Note the following points:

- The maximum permissible overall cable length depends on the cable type used.
- If repeaters are used, the maximum permissible cable length is doubled. A maximum of three repeaters are permitted between field device and master.

4.3.3. Maximum spur length

The line between the distribution box and field device is described as a spur.
In the case of non-Ex applications, the maximum length of a spur depends on the number of spurs (>1 m/3.28 ft):

Number of spurs	1 to 12	13 to 14	15 to 18	19 to 24	25 to 32
Max. length per spur	120 m (393 ft)	90 m (295 ft)	60 m (196 ft)	30 m (98 ft)	1 m (3.28 ft)

4.3.4. Number of field devices

In accordance with IEC 61158-2 (MBP), a maximum of 32 field devices can be connected per fieldbus segment. However, this number is restricted under certain conditions (explosion protection, bus power option, field device current consumption). A maximum of four field devices can be connected to a spur.

4.3.5. Shielding and grounding

Optimum electromagnetic compatibility (EMC) of the fieldbus system can only be guaranteed if the system components and, in particular, the lines are shielded and the shield forms as complete a cover as possible. Shield coverage of 90% is ideal.
- To ensure an EMC protective effect, connect the shield as often as possible to the reference ground.
- For reasons of explosion protection, you should refrain from grounding however.

To comply with both requirements, the FOUNDATION Fieldbus basically allows three different types of shielding:
- Shielding at both ends
- Shielding at one end on the feed side with capacitance connection to the field device
- Shielding at one end on the feed side

Experience shows that the best results with regard to EMC are achieved in most cases in installations with one-sided shielding. Appropriate measures with regard to input wiring must be taken to allow unrestricted operation when EMC interference is present. These measures have been taken into account for this device. Operation in the event of disturbance variables as per NAMUR NE21 is possible with one-sided shielding. Where applicable, national installation regulations and guidelines must be observed during the installation!
Where there are large differences in potential between the individual grounding points, only one point of the shielding is connected directly with the reference ground. In systems without potential equalization, therefore, cable shielding of fieldbus systems should only be grounded on one side, for example at the fieldbus supply unit or at safety barriers.

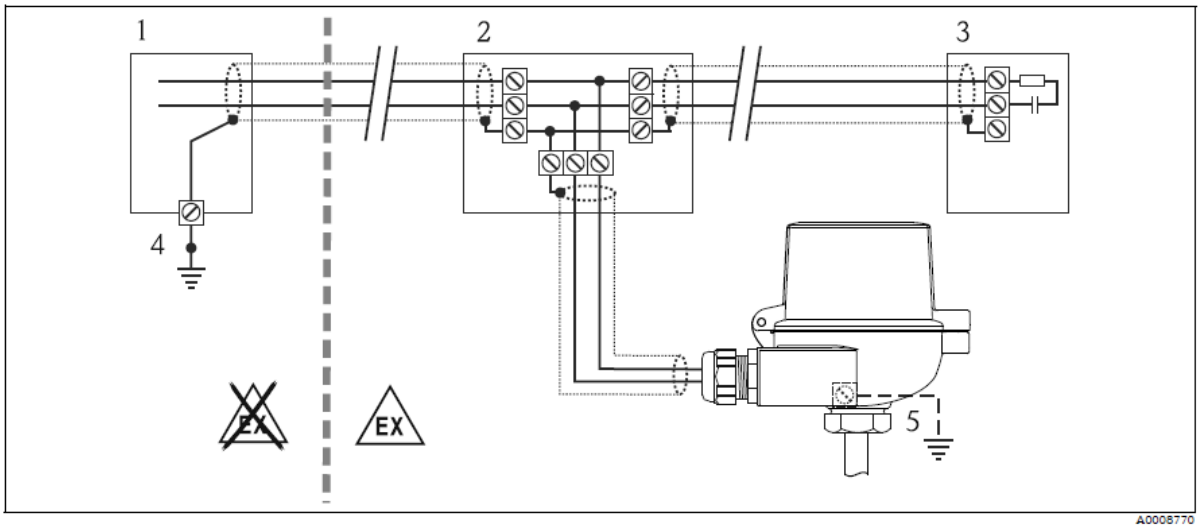


Fig. 5: Shielding and one-sided grounding of the fieldbus cab le shielding

1 Supply unit
2 Distribution box (T-box)
3 Bus terminator
4 Grounding point for fieldbus cable shielding
5 Optional grounding of the field device, isolated from cable shielding.

NOTICE

If the shielding of the cable is grounded at more than one point in systems without potential matching, power supply frequency equalizing currents can occur that damage the bus cable or shielding or have serious effect on signal transmission.

- In such cases the shielding of the fieldbus cable is to be grounded on only one side, i.e. it must not be connected to the ground terminal of the housing (terminal head, field housing).
- The shield that is not connected should be insulated!

4.3.6. Bus termination

The start and end of each fieldbus segment are always to be terminated with a bus terminator. With various junction boxes (non-Ex), the bus termination can be activated via a switch. If this is not the case, a separate bus terminator must be installed. Note the following points in addition:

- In the case of a branched bus segment, the device furthest from the segment coupler represents the end of the bus.
- If the fieldbus is extended with a repeater, then the extension must also be terminated at both ends.

4.3.7. Further information

- General information and further pointers on wiring can be found on www.fieldbus.org, the web site of the FOUNDATION Fieldbus or in the FOUNDATION Fieldbus Overview BA00013S (www.endress.com/cm42 under "Documents").

4.4. Connecting the measurement unit

Devices can be connected to the FOUNDATION Fieldbus in two ways:
- Connection via conventional cable gland → Chap. 4.4.1
- Connection via fieldbus connector (optional, can be purchased as an accessory) → Chap. 4.4.2

NOTICE

If the shielding of the fieldbus cable is grounded at more than one point in systems without additional potential matching, power supply frequency equalizing currents can occur that damage the cable or the shielding. In such cases the shielding of the fieldbus cable is to be grounded on only one side, i.e. it must not be connected to the ground terminal of the housing (terminal head, field housing). The shield that is not connected should be insulated.

▶ **Grounding via one of the grounding screws (terminal head, field housing) is recommended.**

4.4.1. Cable glands or entries

Please observe the general procedure described in BA00381C.

- The terminals for the fieldbus connection (997 and 998) are not polarity sensitive.
- A shielded cable must be used for the connection.

4.4.2. Fieldbus connector

Optionally, a fieldbus connector can be screwed into the field housing instead of a cable gland. Fieldbus connectors can be ordered from Endress+Hauser as an accessory (see BA00381C).
The connection technology of FOUNDATION Fieldbus allows measuring devices to be connected to the fieldbus via uniform mechanical connections such as T-boxes, junction boxes, etc. This connection technology using prefabricated distribution modules and plug-in connectors offers substantial advantages over conventional wiring:

- Field devices can be removed, replaced or added at any time during normal operation. Communication is not interrupted.
- Installation and maintenance are significantly easier.
- Existing cable infrastructures can be used and expanded instantly, e.g. when constructing new star distributors using 4-channel or 8-channel distribution modules.

Connector technical data:

Wire cross-section	4 x 0.8 mm^2
Connection thread	M20 x 1.5 / NPT ½"
Degree of protection	IP 67 as per DIN 40 050 IEC 529
Contact surface	CuZn, gold-plated
Housing material	1.4401 (316)
Flammability	V - 2 as per UL - 94
Ambient temperature	−40 to +105 °C (−40 to +221 °F)
Current carrying capacity	9 A
Rated voltage	Max. 600 V
Contact resistance	≤5 mΩ
Insulation resistance	≥10^9 Ω

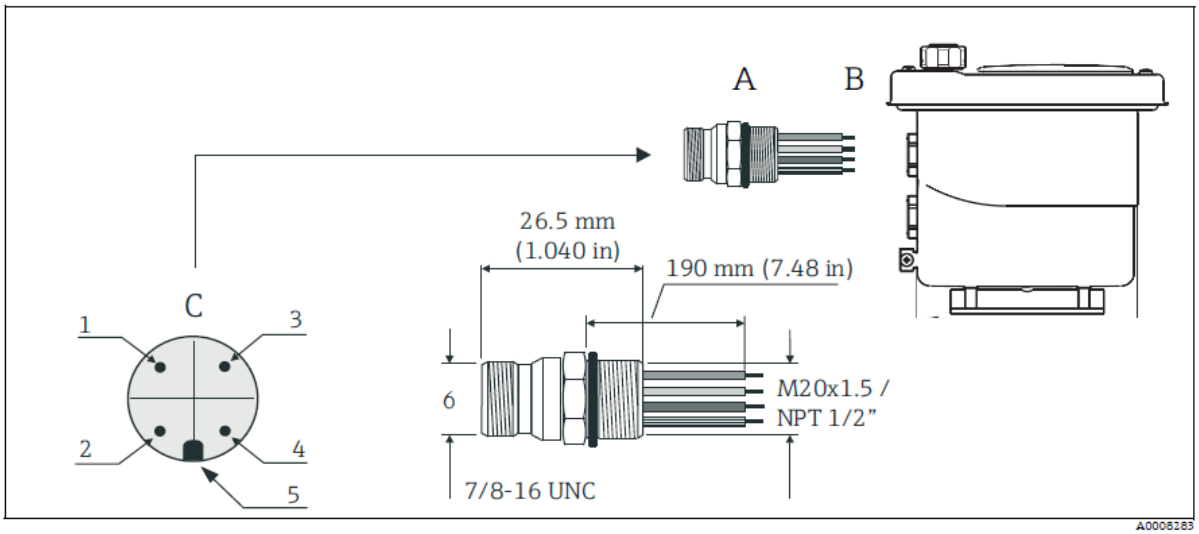


Fig. 6: Connectors for connecting to FOUNDATION Fieldbus

A *Fieldbus connector (pin assignment/color codes)*
- *1 blue wire: FF– (terminal 998)*
- *2 brown wire: FF+ (terminal 997)*
- *3 gray wire: shielding*
- *4 green/yellow wire: ground*
- *5 positioning tappet*
- *6 7/8" UNC thread*

B *Terminal Liquiline transmitter*
C *Connector at the housing (male)*

Ground and/or shield connection has to be cut by the customer, if he wants to use “single grounding” in his plant (i.e. because of Ex requirements).

4.4.3. Post-connection check

After the electrical installation of the device, always perform the following final checks:

Device condition and specifications	Notes
Are the measuring device or the cables damaged (visual check)?	-
Electrical connection	**Notes**
Does the supply voltage match the specifications on the nameplate?	9 to 32 V DC
Do the cables used comply with the specifications?	Fieldbus cable, see Cable type Sensor cable, see BA00381C
Do the cables have adequate strain relief?	-
Power supply and signal cables correctly connected?	→ see BA00381C
Have the connections of the spring terminals been checked?	-
All the cable entries installed, tightened and sealed? Cable run with "water trap"?	→ see BA00381C
Are all the housing covers installed and tightened?	→ see BA00381C
Electrical connection of FOUNDATION Fieldbus	**Notes**
Are all the connecting components (T-boxes, junction boxes, connectors, etc.) connected with each other correctly?	-
Has each fieldbus segment been terminated at both ends with a bus terminator?	-
Has the max. length of the fieldbus cable been observed in accordance with the FOUNDATION Fieldbus specifications?	→ Maximum Overall Cable Length
Has the max. length of the spurs been observed in accordance with the FOUNDATION Fieldbus specifications?	
Is the fieldbus cable fully shielded (90%) and correctly grounded?	

5. Commissioning

5.1. Function check

Before commissioning the measurement point make sure that all final checks have been carried out:

- Checklist “Post-connection check” → Post-Connection Check

The FOUNDATION Fieldbus interface's technical data must be maintained in accordance with IEC 61158-2 (MBP).
The bus voltage of 9 … 32 V (9 … 17.5 V Ex version) and the current consumption of approx. 22 mA at the measuring device can be checked using a normal multi meter.

5.2. Commissioning

Note the following points:

- The files required for commissioning and network configuration can be obtained as described in chapter Device Description.
- In the case of FOUNDATION Fieldbus, the device is identified in the host or configuration system by means of the device ID (DEVICE_ID). The DEVICE_ID is a combination of the manufacturer ID, device type and device serial number. It is unique and can never be assigned twice. The DEVICE_ID of the device is composed as follows:
  DEVICE_ID = 452B4810A0-XXXXXXXXXXX
  452B48 = Endress+Hauser
  10A0 = Liquiline_pHORP
  XXXXXXXXXXX = device serial number (11-digit)
- Please refer to the Operating Instructions of your operating and configuration software.

5.2.1. Initial commissioning

The following description takes you step-by-step through commissioning the device and all the necessary configurations for the FOUNDATION Fieldbus:

1. Open the configuration program.
2. Load the device description files or the CFF file into the host system or the configuration program. Make sure you are using the right system files (see Section Device Description).
3. Note the DEVICE_ID on the device nameplate for identification in the process control system (see Section Device Identification).
4. Switch the device on. The first time you establish a connection, a device with factory default settings reacts as follows in the configuration system:

   – EH_Liquiline_pHORP_xxxxxxxxxxx (tag name PD-TAG)
   – 452B4810A0-xxxxxxxxxxx (DEVICE_ID)

– Block structure:

Display text (xxx... = serial number)	Base index (decimal)	Description
RS_xxxxxxxxxxx	0400	Resource Block
PHORP_xxxxxxxxxxx	0570	pH/ORP Transducer Block
DIAGDI_xxxxxxxxxxx	0740	DIAGDI Transducer Block
SERVICE_xxxxxxxxxxx	0910	Service Transducer Block
ADVDIAGPHORP_xxxxxxxxxxx	1080	Advanced Diagnostics Transducer Block
DISPLAYPHORP_xxxxxxxxxxx	1250	Display Transducer Block
MEMOPHORP_xxxxxxxxxxx	1420	Memosens Transducer Block
DIAGPHORP_xxxxxxxxxxx	1590	Diagnostics Transducer Block
AI_1_xxxxxxxxxxx	2100	Analog Input Function Block 1
AI_2_xxxxxxxxxxx	2270	Analog Input Function Block 2
AI_3_xxxxxxxxxxx	2440	Analog Input Function Block 3
AI_4_xxxxxxxxxxx	2610	Analog Input Function Block 4
AI_5_xxxxxxxxxxx	2780	Analog Input Function Block 5
AI_6_xxxxxxxxxxx	2950	Analog Input Function Block 6
DI_1_xxxxxxxxxxx	3120	Discrete Input Function Block 1
DI_2_xxxxxxxxxxx	3290	Discrete Input Function Block 2
PID_xxxxxxxxxxx	3460	PID Function Block
AALM_1_xxxxxxxxxxx	3630	Analog Alarm Function Block 1
AALM_2_xxxxxxxxxxx	3800	Analog Alarm Function Block 2
CHAR_xxxxxxxxxxx	3970	Signal Characterizer Function Block
ISEL_xxxxxxxxxxx	4140	Input Selector Function Block

The device is delivered ex-factory with the bus address “247” and is thus in the address range between 232 and 247 reserved for re-addressing field devices. A lower bus address should be assigned to the device for commissioning.

5. Using the DEVICE_ID noted, identify the field device and assign the desired tag name (PD_TAG) to the fieldbus device in question.
   Factory setting: EH_Liquiline_pHORP_xxxxxxxxxxx (xxx... = serial number).
6. Quick Setup in Transducers
   a. Check measured value setting (parameter **MEASURED_VALUE_PHORP** in PHORP Transduce r Block and, if required, change the indicated value after switching the operating mode of PHORP Transducer to OOS.
   b. Check temperature unit setting (parameter **UNIT_MEAS_DAMPED_TEMP_VAL**) and, if required, change the indicated value (writing to this parameter in OOS mode only).
   c. Check and change device’s date and time, if required. SERVICE Transducer Block parameters offer this functionality. **DATE_TIME** to read the current device date and time or to change (write) new date and time values to the device. **DATE_FORMAT** and **TIME_FORMAT** allow setting the format for indication on the Liquiline device display (DDMMYYYY or MMDDYYYY and HHMMSS24 or HHMMSS12).

      Please note that date and time of the device is not synchronized with FF-H1 bus time or host system time.

   d. Check/Select language for local device display (DISPLAYPHORP Transducer Block parameter **DISPLAY_LANGUAGE**). One can switch between English and a second language which is defined by the order code of the device. The antepenultimate character in the order code identifies the second language. For example CM42-MAA610EB**Z**00 means that the second language (**Z**) is set to Chinese.

The order code is indicated on the name plate. Resource Block parameter **ORDER_CODE** indicates the order code of the device as well.

e. Check that Transducer Block **MODE_BLK** is AUTO or set it back to AUTO.

7. Quick Setup in Analog Input Function Blocks
   a. Check **MODE_BLK**. If one of the following parameters has to be changed, set it to OOS.
   b. Select **CHANNEL**. Refer to chapter Block output variables for more details.
   c. Select linearization type **L_TYPE**. Choose between linear, indirect and indirect square root.
   d. Select Transducer Scaling **XD_SCALE**. Refer to chapter Selecting the units for more details.
   e. Select output scaling parameter **OUT_SCALE** and set it to desired values.
   f. Check that Analog Input Block parameter **MODE_BLK** is AUTO or set it back to AUTO.
8. If a special automatic action within the macrocycle is required in case of a specific event which the device will report, configure the DIAGDI Transducer Block and connect one output or both outputs of this Transducer to discrete inputs of function blocks (for example the Discrete Input Blocks within this device). Refer to chapter DIAGDI Transducer Block for a description of the available parameters in the DIAGDI Transducer Block.
9. Configure remaining function blocks in the device, if required. These are Input Selector, Signal Characterizer, Analog Alarm and PID function blocks. A detailed description about how to configure these blocks can be found in in the FOUNDATION Fieldbus Function Blocks manual BA00062S (www.endress.com/cm42 under "Documents").

6. Operation via FOUNDATION Fieldbus

6.1. Block model

In the FOUNDATION Fieldbus all the device parameters are categorized according to their functional properties and task and are generally assigned to three different blocks. A block may be regarded as a container in which parameters and the associated functionalities are contained. A FOUNDATION Fieldbus device has the following block types:

- A Resource Block (device block):
  The Resource Block contains all the device-specific features of the unit.
- One or more Transducer Blocks:
  The Transducer Blocks contain the measuring and device-specific parameters of the device.
- One or more function blocks: The function blocks contain the device's automation functions. We distinguish between different function blocks, e.g. Analog Input function block, Analog Output function block. Each of these function blocks is used to execute different application functions.

Depending on how the individual function blocks are arranged and connected, various automation tasks can be realized. In addition to these blocks, a field device may have other blocks, e.g. several Analog Input function blocks, if more than one process variable is available from the field device.

Liquiline_pHORP contains the following blocks:

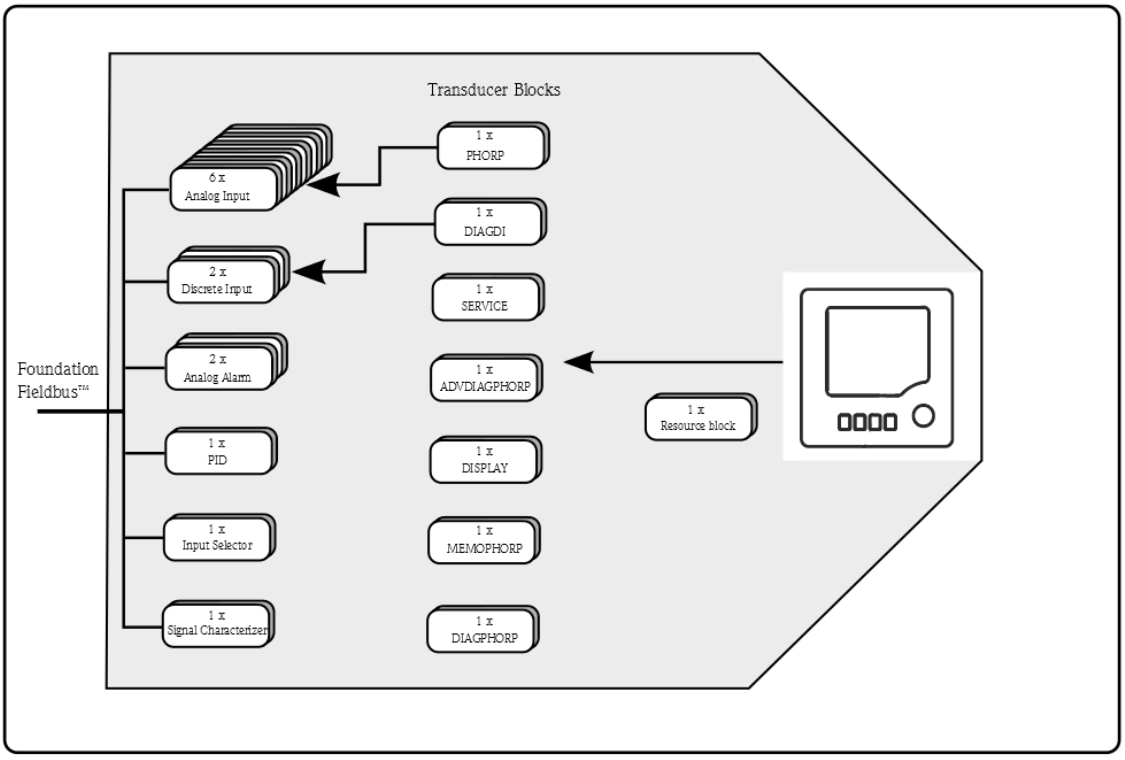


Fig. 7: Block model Liquiline_pHORP

6.2. Resource Block (Device Block)

The Resource Block contains all the data that clearly identify and characterize the field device. It is an electronic version of a nameplate on the field device. In addition to parameters that are needed to operate the device on the fieldbus, the Resource Block makes information such as the order code, device ID, hardware version, firmware version etc. available.

A further task of the Resource Block is the management of overall parameters and functions that have an influence on the execution of the remaining function blocks in the field device. The Resource Block is thus a central unit that also checks the device status and thereby influences or controls the operability of the other function blocks and thus also of the device. As the Resource Block does not have any block input and block output data, it cannot be linked to other blocks.

The most important functions and parameters of the Resource Block are listed below.

6.2.1. Selecting the operating mode

The operating mode is set by means of the MODE_BLK parameter group. The Resource Block supports the following operating modes:

- AUTO (automatic mode)
- OOS (out of service)

The 'Out of Service' (OOS) operating mode is also displayed by means of the BLOCK_ERR parameter. In the OOS operating mode, all write parameters can be accessed without restriction, if write protection has not been enabled.

6.2.2. Block status

The current operating status of the Resource Block is displayed in the RS_STATE parameter.
The Resource Block can enter the following states:

- STANDBY — The Resource Block is in the OOS operating mode. It is not possible to execute the remaining function blocks.
- ONLINE LINKING — The configured connections between the function blocks have not yet been established.
- ONLINE — Normal operating status, the Resource Block is in the AUTO operating mode. The configured connections between the function blocks have been established.

6.2.3. Alarm detection and processing

Process alarms provide information on certain block states and events. The status of the process alarms is communicated to the fieldbus host system by means of the BLOCK_ALM parameter. The current alert status is indicated in parameter ALARM_SUM. The ACK_OPTION parameter allows specifying whether an alarm has to be acknowledged by means of the fieldbus host system. The following process alarms are generated by the Resource Block:

Block process alarms

The following block process alarms of the Resource Block are displayed by means of the BLOCK_ALM parameter:

- OUT OF SERVICE
- SIMULATE_ACTIVE
- MAINTENANCE_NOW
- MAINTENANCE_SOON
- POWER_UP

Write protection process alarm
If the write protection is disabled, the alarm priority specified in the WRITE_PRI parameter is checked before the status change is relayed to the fieldbus host system. The alarm priority specifies the behavior in the event of an active write protection alarm WRITE_ALM.

If the option of a process alarm was not activated in the ACK_OPTION parameter, this process alarm must only be acknowledged in the BLOCK_ALM parameter.

Field Diagnostic Alarms
Field Diagnostic Fail, Check, Off Spec and Maintenance alarms are enabled by default.
Parameters FD_FAIL_MASK, FD_CHECK_MASK, FD_OFFSPEC_MASK and FD_MAINT_MASK allow suppressing alarms for one or more event groups.

Depending on the connected host system please check, if multi-bit alarms are supported. This option can be enabled in the device with setting “Multi-bit Alarm (Bit-Alarm) Support” in Resource Block parameter FEATURE_SEL.

Please refer to BA00381C for a detailed description of FOUNDATION Fieldbus Field diagnostics alarms.

6.2.4. Reset functions

The device supports several reset functions initiated by a write to Resource block parameter RESTART or SERVICE_RESET.

NOTICE
Resetting the device affects the running process. Before a reset function is executed please ensure yourself that the process is in a safe state.

Available selections are described in the following tables:

Function	RESTART value	Description
Run	1	Setting for normal operation (passive state of RESTART parameter).
Resource	2	Clear up problems like garbage collection and any active reported or unreported alarms.
Defaults	3	Reset all configurable function block application objects to their initial value i.e. their value before any configuration was done by the user. Transducer block parameters are not affected.
Processor	4	Reset processor and initiate execution as though power fail had occurred (provides a way to hit the reset button on the processor associated with the resource).
Factory Default	5	Restart with factory settings without changing MIB entries like PDTag, node address, device class (BFD,LM) etc.
Factory Default Blocks	11	Reset the block set to the factory default, if block instantiation is supported. Block instantiation is not supported in this device. It does nothing but accepts the write to this standard restart level.

Function	SERVICE_RESET value	Description
Factory Reset	5	Restart with initial factory settings. FBVFD and MIB will be reset to factory default values. **NOTICE** Resetting the device to factory affects the running process. MIB parameters like Physical Device Tag, Node Address, Device Class etc. might be affected. The connection to the device needs to be re-established.
ENP	7	ENP specific restart (not supported in this device). It does nothing but accepts the write.

6.2.5. Resource Block FF parameters

Resource Block			
Parameter Index	Parameter Local Display Menu Path	Write access with operating mode	Description
1	Static Revision (ST_REV)	Read only	The revision status of the static data appears on the display. The revision status is incremented on each modification of static data.
2	Tag Description (TAG_DESC)	AUTO - OOS	Entry of a user-specific text for unique identification and assignment of the block.
3	Strategy (STRATEGY)	AUTO - OOS	Parameter for grouping and thus faster evaluation of blocks. Grouping is carried out by entering the same numerical value in the STRATEGY parameter of each individual block. **Factory default:** 0 This data is neither checked nor processed by the Resource Block.
4	Alert Key (ALERT_KEY)	AUTO - OOS	Use this function to enter the identification number of the plant unit. This information can be used by the fieldbus host system for sorting alarms and events. User input: 1 to 255 **Factory default: 1**
5	Block Mode (MODE_BLK)	AUTO - OOS	Displays the current (Actual) and desired (Target) operating mode of the Resource Block, the permitted modes (Permitted) supported by the Resource Block and the normal operating mode (Normal). Display: AUTO – OOS The Resource Block supports the following operating modes: • AUTO (automatic operation) In this mode the execution of the remaining blocks (ISEL, AALM, CHAR, DI, AI and PID function blocks) is permitted. • OOS (out of service): The block is in the “Out of Service” mode. In this mode execution of the remaining blocks (ISEL, AALM, CHAR, DI, AI and PID function blocks) is blocked. These blocks cannot be set to AUTO mode. The current operating status of the Resource Block is also shown via the RS_STATE parameter.

Resource Block			
Parameter Index	Parameter Local Display Menu Path	Write access with operating mode	Description
6	Block Error (BLOCK_ERR)	Read only	The active block error is indicated. Display: SIMULATE ACTIVE Simulation is possible in an Analog Input function block via the SIMULATE parameter (refer also to Hardware Write Protection Configuration in Section Hardware Settings). OUT OF SERVICE - The block is in the "Out of Service" mode. MAINTENANCE_NOW At least one diagnostic event of NAMUR class F is active. MAINTENANCE_SOON At least one diagnostic event of NAMUR class C, S or M is active. POWER_UP The device is in start-up phase and RESTART value is set to “Run”.
7	Resource State (RS_STATE)	Read only	Displays the current operating status of the Resource Block. Display: STANDBY — The Resource Block is in the OOS operating mode. It is not possible to execute the remaining blocks. ONLINE LINKING — The configured connections between the function blocks have not yet been made. ONLINE — Normal operating status, the Resource Block is in the AUTO operating mode. The configured connections between the function blocks are established.
8	Test Read Write (TEST_RW)	AUTO - OOS	This parameter is required only for interoperability tests and has no meaning in normal operation.
9	DD Resource (DD_RESOURCE)	Read only	Displays the reference source for the device description in the device. Display: (NULL)
10	Manufacturer ID (MANUFAC_ID) DIAG→ Device information → Fieldbus module → FF settings → Device ID → Manufacturer ID	Read only	Manufacturer identification number - used by an interface device to locate the DD file for the resource.
11	Device type (DEV_TYPE) DIAG→Device information → Fieldbus module→FF settings → Device ID → Device type	Read only	Displays the device identification number in hexadecimal numerical format. Display: 0x10A0 (hex) for Liquiline_pHORP
12	Device Revision (DEV_REV) DIAG → Device information → Fieldbus module → FF settings → Device revision	Read only	Device revision number associated with the resource - used by an interface device to locate the DD file for the resource.

Resource Block			
Parameter Index	Parameter Local Display Menu Path	Write access with operating mode	Description
13	DD Revision (DD_REV) DIAG → Device information → Fieldbus module → FF settings → DD revision	Read only	For an initial release of a device revision, the DD Revision matches that value found in the Resource Block (DD_REV). The DD_REV parameter specifies the minimum DD Revision that should be used for the device. It is possible for a manufacturer to release an updated version of the DD for an existing device. DD Services provides functions for identifying the most recent version of a DD files for a given device revision.
14	Grant Deny (GRANT_DENY)	AUTO - OOS	Enables or restricts the access authorization of a fieldbus host system to the field device. **Factory default: 0, 0 (no restrictions)**
15	Hard Types (HARD_TYPES)	Read only	Displays the input signal types for the Analog and Discrete Input function blocks
16	Restart (RESTART)	AUTO - OOS	This parameter is used to reset the device in various ways. Options: • Restart UNINITIALIZED • RUN • Restart RESOURCE (restart the Resource Block) • Restart with DEFAULTS (restart with the specified default values as per FF Spec - only FF bus parameters) • Restart PROCESSOR • Restart with factory settings without changing MIB entries like PDTag, node address, device class (BFD,LM) • Reset the block set to the factory default. The device will accept the write but will not change any settings, because the device does not support block instantiation.
17	Features (FEATURES)	Read only	Displays the additional options supported by the device. Display: Reports | Faultstate | Hard W Lock | Change Bypass in Auto | MVC Report Distribution supported | Multi-bit Alarm (Bit-Alarm) Support | Defer Inter-Parameter Write Checks
18	Feature Selection (FEATURES_SEL)	AUTO - OOS	For selecting the additional functions supported by the device. **Factory default: Reports | Faultstate | Hard W Lock | Change Bypass in Auto | MVC Report Distribution supp.**
19	Cycle Type (CYCLE_TYPE)	Read only	Displays the block execution method supported by the device. Display: SCHEDULED Timed block execution method BLOCK EXECUTION Sequential block execution method MANUF SPECIFIC Manufacturer specified
20	Cycle Selection (CYCLE_SEL)	AUTO - OOS	Displays the block execution method used by the fieldbus host system. The block execution method is selected by the fieldbus host system. **Factory default: 0x0001(Scheduled)**
21	Minimum Cycle Time (MIN_CYCLE_T)	Read only	Time duration of the shortest cycle interval of which the resource is capable.

Resource Block			
Parameter Index	Parameter Local Display Menu Path	Write access with operating mode	Description
22	Memory Size (MEMORY_SIZE)	Read only	Displays the available configuration memory in kilobytes. Since the function blocks of the device are preconfigured, this parameter always displays the value 0.
23	Nonvolatile Cycle Time (NV_CYCLE_T)	Read only	Displays the time interval for which non-volatile device parameters are stored in the non-volatile memory. The time interval displayed relates to storage of the following non-volatile device parameters: • BK_CAL_IN • CAS_IN • FAULT_STATE • FF_VAL • FIELD_VAL • IN • IN_1 • IN_2 • MODE_BLK • OUT • PV • RCAS_IN • ROUT_IN • SP • OUT_D • TRK_VAL These values are stored in the non-volatile memory every 5 seconds. Display: 160000 (1/32 ms).
24	Free Space (FREE_SPACE)	Read only	Displays the free system memory (in percent) available for execution of further function blocks. Since the function blocks of the device are preconfigured, this parameter always displays the value 0.
25	Free Time (FREE_TIME)	Read only	Displays the free system time (in percent) available for execution of further function blocks. Since the function blocks of the device are preconfigured, this parameter always displays the value 0.
26	Shed Remote Cascade (SHED_RCAS)	AUTO - OOS	Specifies the monitoring time for checking the connection between the fieldbus host system and a function block in the RCAS operating mode. When the monitoring time elapses, the function block changes from the RCAS operating mode to the operating mode selected in the SHED_OPT parameter. **Factory default: 640000 1/32 ms**
27	Shed Remote Out (SHED_ROUT)	AUTO - OOS	Specifies the monitoring time for checking the connection between the fieldbus host system and the PID function block in the ROUT operating mode. When the monitoring time elapses, the PID function block changes from the ROUT operating mode to the operating mode selected in the SHED_OPT parameter. **Factory default: 640000 1/32 ms**
28	Fault State (FAULT_STATE)	Read only	Current status display of the security behavior of the Analog Output and Discrete Output function blocks.
29	Set Fault State (SET_FSTATE)	AUTO - OOS	This parameter can be used to manually enable the security behavior of the device. **Factory default: 1 (Off)**

Resource Block			
Parameter Index	Parameter Local Display Menu Path	Write access with operating mode	Description
30	Clear Fault State (CLR_FSTATE)	AUTO - OOS	This parameter can be used to manually disable the security behavior of the Analog Output and Discrete Output function blocks. **Factory default: 0x01 (Off)**
31	Max Notify (MAX_NOTIFY)	Read only	Displays the maximum number of event reports supported by the device that can exist unconfirmed at the same time. Display: 4
32	Limit Notify (LIM_NOTIFY)	AUTO - OOS	This parameter is used to specify the number of event reports that can exist unconfirmed at the same time. Options: 0 to MAX_NOTIFY (=4) **Factory default: 4**
33	Confirm Time (CONFIRM_TIME)	AUTO - OOS	Specifies the confirmation time for the event report. If the device does not receive confirmation within this time then the event report is sent to the fieldbus host system again. **Factory default: 640000 $^{1}/_{32}$ ms**
34	Write Lock (WRITE_LOCK)	Read only	Display of the current write protection (setting only possible via DIP switch, refer to chapter Hardware Settings for details). Display: LOCKED — Device data cannot be modified NOT LOCKED — Device data can be modified UNINITIALIZED
35	Update Event (UPDATE_EVT)	Read only	Indicates whether static block data have been altered, including date and time.
36	Block Alarm (BLOCK_ALM)	AUTO - OOS	The current block status is indicated with information on pending configuration, hardware or system errors, including information on the alarm period (Date, time) when the error occurred. The block alarm is triggered in the event of the following block errors: ▪ SIMULATE ACTIVE ▪ OUT OF SERVICE ▪ MAINTENANCE NOW ▪ MAINTENANCE SOON If the option of the alarm has not been enabled in the ACK_OPTION parameter, the alarm can only be acknowledged via this parameter.
37	Alarm Summary (ALARM_SUM)	AUTO - OOS	Displays the current status of the process alarms in the Resource Block. In addition the process alarms can also be disabled in this parameter group.
38	Acknowledge Option (ACK_OPTION)	AUTO - OOS	This parameter is used to specify whether a process alarm must be acknowledged at the time of alarm recognition by the fieldbus host system. If this option is enabled, the process alarm is acknowledged automatically. **Factory default: The option is not enabled for any alarm, the alarms must be acknowledged.**
39	Write Priority (WRITE_PRI)	AUTO - OOS	Specifies the behavior of a write protected alarm ("WRITE_ALM" parameter). User input: 0 = The write protection alarm is not evaluated. 1 = No report to the fieldbus host system in the event of a write protection alarm. 2 = Reserved for block alarms. 3-7 = The write protection alarm is output with the appropriate priority (3 = low priority, 7 = high priority) to the fieldbus host system as a user notice. 8-15 = The write protection alarm is output with the appropriate priority (8 = low priority, 15 = high priority) to the fieldbus host system as a critical alarm.

Resource Block			
Parameter Index	Parameter Local Display Menu Path	Write access with operating mode	Description
40	Write Alarm (WRITE_ALM)	AUTO - OOS	Displays the status of the write protected alarm. The alarm is triggered if the write protection is disabled.
41	ITK Version (ITK_VER)	Read only	Major revision number of the interoperability test kit used to register this device.
42	ACTUAL_DIAG_STATUS DIAG → Most important message	Read only	Device's FCSM information **Supported values:** 0x00 : OK, no diagnostics detected 0x01 : F, failure 0x02 : M, maintenance required 0x03 : C, function check 0x04 : S, out of specification 0x05 : NC (Not Categorized)
43	ACTUAL_DIAGNOSTICS DIAG → Most important message	Read only	Current diagnostic code with highest priority **Indicated values:** 0x0000 to 0x0349(0000 to 0841); details see below in chapter Diagnostic Codes
44	PACKAGE DIAG → Device information → Projecting	Read only	Current installed projecting package **Range**: octet string with size of 16 **Factory Setting**: PH/ORP
45	SOFTWARE_FUNCTIONALITY DIAG → Device information → Order code	Read only	Indicates software capability as Standard or Advanced like indicated in order code (i.e. MAA600E**A**D00 means standard or MAA600E**B**D00 means advanced). Advanced functionality contains functions like additional diagnostics, logbooks, table handling **Indicated values:** 0 - Standard 1 - Advanced
46	Capability Level (CAPABILITY_LEV)	Read only	Indicates the capability level that the device supports.
47	Compatibility Revision (COMPATIBILITY_REV)	Read only	This parameter is optionally used when replacing field devices. The correct usage of this parameter presumes the DEV_REV value of the replaced device is equal or greater than the COMPATIBILITY_REV value of the replacing device.
48	Electronic Name Plate Version (ENP_VERSION)	Read only	Version of the ENP (electronic name plate) specification.
49	Device Tag (DEVICE_TAG) DIAG → Device information → TAG	Read only	Tag name/device TAG.
50	Serial Number (SERIAL_NUMBER) DIAG → Device information → Serial number	Read only	Displays the device serial number.
51	Extended order code (ORDER_CODE_EXT)	Read only	Displays the extended order code of the device
52	Extended order code part2 (ORDER_CODE_EXT_PART2)	Read only	Displays the second part of the extended order code, always empty in this device (therefore sometimes not displayed in host systems)
53	Order Code / Identification (ORDER_CODE) DIAG → Device information → Order code	Read only	Displays the order code for the device.
54	Firmware Version (FIRMWARE_VERSION) DIAG → Device information → Device version	Read only	Displays the version of the device software.
55	UDL_FEATURE	Read only	Indicates availability of up-/download function. **Factory default: 0x0003** **(UL + DL support)**

Resource Block			
Parameter Index	Parameter Local Display Menu Path	Write access with operating mode	Description
56	UDL_OP_CODE	AUTO - OOS	Operational codes required to control up-/download procedures. Supported values: 0x0000: None 0x0001: DL_INITIATE 0x0002: UL_INITIATE 0x0003: UDL_ABORT 0x0004: UDL_TERMINATE **Factory default: 0x00 (None)**
57	UDL_STATUS	Read only	Indicates the current up-/download status Supported values: 0x0000: Undefined 0x0001: UDL inactive 0x0002: DL temporarily not possible 0x0003: Upload active 0x0004: Download active 0x0005: Verification of DL data is active 0x0006: Last DL successful 0x0007: Last DL with warnings 0x0008: Last DL NOT successful **Factory default: 0x01 (UDL inactive)**
58	UDL_VERI_DELAY	Read only	Verification delay: This parameter indicates the latency between termination of a download (UDL_OP_CODE has been set to "**UDL terminate"**) and the availability of parameter UDL_STATUS value. THis parameter provides a timeout information for a host system, before communicate with thew device again. **Factory default: 60 seconds**
59	UDL_REVISION	Read only	Revision of the up-/download specification **Factory default: 1**
60	UDL_HEADER	AUTO - OOS	Reserved for future use
61	UDL_CONFIG	AUTO - OOS	Reserved for future use
62	UDL_DATA	AUTO - OOS	Reserved for future use
63	Field device diagnostic version (FD_VER)	Read only	The major version of the Field Diagnostics specification used for the development of this device.
64	Fail Active (FD_FAIL_ACTIVE)	Read only	Reflects the error conditions that are being detected as active as selected for this category.
65	Offspec Active (FD_OFFSPEC_ACTIVE)	Read only	Reflects the error conditions that are being detected as active as selected for this category.
66	Maintenance Active (FD_MAINT_ACTIVE)	Read only	Reflects the error conditions that are being detected as active as selected for this category.
67	Check Active (FD_CHECK_ACTIVE)	Read only	Reflects the error conditions that are being detected as active as selected for this category.
68	Fail Map (FD_FAIL_MAP)	AUTO - OOS	Enable or disable conditions to be detected as active for this alarm category. **Factory default: 0xF0000000 (Highest Process | Highest Configuration | Highest Electronic | Highest Sensor)** Details described in BA00381C, chapter 'Configuration of event behaviour according to FOUNDATION Fieldbus Field Diagnostics'.
69	Maintenance Map (FD_MAINT_MAP)	AUTO - OOS	Enable or disable conditions to be detected as active for this alarm category. **Factory default: 0x000F0000 (Lowest Process | Lowest Configuration | Lowest Electronic | Lowest Sensor)** Details described in BA00381C, chapter 'Configuration of event behaviour according to FOUNDATION Fieldbus Field Diagnostics'.

Resource Block			
Parameter Index	Parameter Local Display Menu Path	Write access with operating mode	Description
70	Check Map (FD_CHECK_MAP)	AUTO - OOS	Enable or disable conditions to be detected as active for this alarm category. **Factory default: 0x0F000000 (High Process | High Configuration | High Electronic | High Sensor)** Details described in BA00381C, chapter 'Configuration of event behaviour according to FOUNDATION Fieldbus Field Diagnostics'.
71	Offspec Map (FD_OFFSPEC_MAP)	AUTO - OOS	Enable or disable conditions to be detected as active for this alarm category. **Factory default: 0x00F00000 (Low Process | Low Configuration | Low Electronic | Low Sensor)** Details described in BA00381C, chapter 'Configuration of event behaviour according to FOUNDATION Fieldbus Field Diagnostics'.
72	Fail Mask (FD_FAIL_MASK)	AUTO - OOS	Allow to suppress any single or multiple conditions that are active in this category from being broadcasted to the host through the alarm parameter. **Factory default: 0x00000000 (nothing suppressed)**
73	Offspec Mask (FD_OFFSPEC_MASK)	AUTO - OOS	Allow to suppress any single or multiple conditions that are active in this category from being broadcasted to the host through the alarm parameter. **Factory default: 0x00000000 (nothing suppressed)**
74	Maintenance Mask (FD_MAINT_MASK)	AUTO - OOS	Allow to suppress any single or multiple conditions that are active in this category from being broadcasted to the host through the alarm parameter. **Factory default: 0x00000000 (nothing suppressed)**
75	Check Mask (FD_CHECK_MASK)	AUTO - OOS	Allow to suppress any single or multiple conditions that are active in this category from being broadcasted to the host through the alarm parameter. **Factory default: 0x00000000 (nothing suppressed)**
76	Fail Diagnostic Alarm (FD_FAIL_ALM)	AUTO - OOS	Used primarily to broadcast a change in the associated active conditions.
77	Offspec Alarm (FD_OFFSPEC_ALM)	AUTO - OOS	Used primarily to broadcast a change in the associated active conditions.
78	Maintenance Alarm (FD_MAINT_ALM)	AUTO - OOS	Used primarily to broadcast a change in the associated active conditions.
79	Check Alarm (FD_CHECK_ALM)	AUTO - OOS	Used primarily to broadcast a change in the associated active conditions.
80	Fail Priority (FD_FAIL_PRI)	AUTO - OOS	Allow to specify the priority of this alarm category. **Factory default: 0**
81	Offspec Priority (FD_OFFSPEC_PRI)	AUTO - OOS	Allow to specify the priority of this alarm category. **Factory default: 0**
82	Maintenance Priority (FD_MAINT_PRI)	AUTO - OOS	Allow to specify the priority of this alarm category. **Factory default: 0**
83	Check Priority (FD_CHECK_PRI)	AUTO - OOS	Allow to specify the priority of this alarm category. **Factory default: 0**
84	Field Diagnostic Simulate (FD_SIMULATE)	AUTO - OOS	Used as the field diagnostic condition when the simulation is enabled. **Factory default: Disabled**
85	Recommended Action (FD_RECOMMEN_ACT)	Read only	This parameter is a device enumerated summarization of the most severe condition or conditions detected. The DD help describes by enumerated action, what should be done to alleviate the condition or conditions.

Resource Block			
Parameter Index	Parameter Local Display Menu Path	Write access with operating mode	Description
86	Extended Active 1 (FD_EXTENDED_ACTIVE_1)	Read only	More detailed conditions causing an active condition in FD_*_ACTIVE parameters (details described in chapter Field Diagnostics).
87	Extended MAP 1 (FD_EXTENDED_MAP_1)	AUTO - OOS	Allows more detailed control on enabling conditions contributing to the conditions in FD_*_ACTIVE parameters (details described in chapter Field Diagnostics). **Factory default: 0xFFFFFFFF**
88	Extended Active 2 (FD_EXTENDED_ACTIVE_2)	Read only	More detailed conditions causing an active condition in FD_*_ACTIVE parameters (details described in chapter Field Diagnostics).
89	Extended MAP 2 (FD_EXTENDED_MAP_2)	AUTO - OOS	Allows more detailed control on enabling conditions contributing to the conditions in FD_*_ACTIVE parameters (details described in chapter Field Diagnostics). **Factory default: 0xFFFFFFFF**
90	Extended Active 3 (FD_EXTENDED_ACTIVE_3)	Read only	More detailed conditions causing an active condition in FD_*_ACTIVE parameters (details described in chapter Field Diagnostics).
91	Extended MAP 3 (FD_EXTENDED_MAP_3)	AUTO - OOS	Allows more detailed control on enabling conditions contributing to the conditions in FD_*_ACTIVE parameters (details described in chapter Field Diagnostics). **Factory default: 0x00FFFE7F**
92	Restart Enable (RESTART_ENABLE)	AUTO - OOS	This parameter indicates which factory-specific restart levels are actually selectable. Options: • Restart Factory (all device parameters are reset to default values as set leaving the factory) • Electronic name plate reset
93	Block Error Description 1 (RS_BLOCK_ERR_DESC_1)	Read only	Displays further information for solving block errors: • Simulation permitted: Simulation is allowed due to activated hardware simulation switch • Failsafe active: Failsafe mechanism in an AI block is active
94	Service reset (SERVICE_RESET)	AUTO - OOS	Allows a manual manufacturer-specific device restart to be initiated. Several degrees of restarts are possible. These are 5: Restart with initial default configuration ex-factory. FBVFD and MIB will be reset to factory default values including PD Tag, node address and device class (LM, BFD); 7: Electronic name plate reset. (This procedure is not supported in this device.) **Factory default: 0x00 (Uninitialized)**

6.3. Transducer Blocks

The Transducer Blocks of the Liquiline_pHORP contain all the measuring and device-specific parameters. All the settings directly connected with the application (pH/ORP and temperature measurement) are made here. They form the interface between sensor-specific measured value processing and the Analog Input function blocks required for automation. In addition diagnostics related functions are provided in further manufacturer-specific Transducer Blocks as well.

A Transducer Block allows influencing input and output variables of a function block. The parameters of a Transducer Block include information on the sensor configuration, physical units, calibration, damping, error messages, etc. as well as the device-specific parameters.

The device-specific parameters and functions of Liquiline_pHORP are split into several Transducer Blocks, each covering different task areas.

Transducer Block PHORP / base index 570 (dec.):
This block contains all the parameters and functions that have to do with measuring and configuring the input variables (mV values, pH values, ORP values, rH values, temperature, glass impedance, pH slope and zero point).

Transducer Block DIAGDI / base index 740 (dec.):
This block contains parameters for configuration of 2 discrete signals, which reflect the status of the current diagnostics with highest priority or-ed with a configurable mask over all available event numbers.

Transducer Block SERVICE/ base index 910 (dec.):
This block contains parameters which show detailed information about installed modules (i.e. CPU, Fieldbus, Display etc.) and provides the possibility to set date and time in the device which is used for logbook and event message time stamps on the local display.

Transducer Block ADVDIAGPHORP/ base index 1080 (dec.):
This block comprises parameters for advanced automatic monitoring and field diagnostics including diagnostic list, simulation of diagnostic events, maintenance messages, indicating FF network settings, field diagnostic details, a list with configurable measurement variable status values, logbooks reading.

Transducer Block DISPLAYPHORP/ base index 1250 (dec.):
The parameters of this block allow the configuration of the device’s display.

Transducer Block MEMOPHORP/ base index 1420 (dec.):
The parameters of this block indicate all available Memosens sensor related parameter values.

Transducer Block DIAGPHORP/ base index 1590 (dec.):
The parameters of this block contain the configuration of diagnostic limits for performance data.

6.3.1. Block output variables

The following table shows which output variables (process variables) the Transducer Blocks make available. Only Transducer Blocks "PHORP" and "DIAGDI" do have output variables. The CHANNEL parameters in Analog and Discrete Input function blocks are used to assign which process variable is read and processed in the downstream blocks.

Block	Process variable	Channel parameter	Channel
PHORP	MEAS_MV_VALUE	mV Value	1
PHORP	MEAS_DAMPED_MV_VALUE	damped mV Value	2
PHORP	MEAS_PH_VALUE	pH Value	3
PHORP	MEAS_ORP_MV_VALUE	ORP mV Value	4
PHORP	MEAS_ORP_PERCENT_VALUE	ORP % Value	5
PHORP	MEAS_DAMPED_TEMP_VALUE	Damped Temperature Value	6
PHORP	MEAS_RH_VALUE	rH Value	7
PHORP	MEAS_GLASS_IMPEDANCE	Glass Impedance	8
PHORP	MEAS_SLOPE	pH Slope	9
PHORP	MEAS_ZERO_POINT	pH Zeropoint	10
DIAG_DI	CURRENT_STATE_CH1	Ch1 Codes	15
DIAG_DI	CURRENT_STATE_CH2	Ch2 Codes	16

6.3.2. Selecting the operating mode

The operating mode is set by means of the MODE_BLK parameter group (page 48). I/O Transducer Blocks PHORP and DIAGDI support the following operating modes:
- AUTO (automatic mode)
- OOS (out of service)
- MAN (manual mode)

Remaining transducer blocks are configuration transducers and provide no output signals. Nevertheless OOS, MAN and AUTO are permitted.

The OOS block status is also displayed by means of the BLOCK_ERR parameter (page 48).

6.3.3. Alarm detection and processing

The status of the process variables is evaluated in the downstream Analog Input function blocks. If the Analog Input function block receives no input value that can be evaluated from the Transducer Block then a process alarm is generated. This process alarm is displayed in the BLOCK_ERR parameter of the Analog Input function block (BLOCK_ERR = Input/Sensor Failure or Device Failure).

Parameters BLOCK_ERR and XD_ERROR of the pHORP Transducer Block (page 44) indicate the device error that produced the input value that could not be evaluated and thus triggered the process alarm in the Analog Input function block.

6.3.4. Accessing manufacturer-specific parameters

The hardware write protection must be deactivated to access the manufacturer-specific parameters (see Section Hardware Settings).

6.3.5. Selecting the units

The PHORP Transducer provides 9 signals with constant units and 1 signal with configurable units:

Process variable	unit	unit code [hex]	unit code [dec]	configurable unit parameter
MEAS_MV_VALUE	mV	4DB	1243	
MEAS_DAMPED_MV_VALUE	mV	4DB	1243	
MEAS_PH_VALUE	pH	58E	1422	
MEAS_ORP_MV_VALUE	mV	4DB	1243	
MEAS_ORP_PERCENT_VALUE	%	53E	1342	
MEAS_DAMPED_TEMP_VALUE	°C or °F	3E9 or 3EA	1001 or 1002	UNIT_MEAS_DAMPED_TEMP_VAL
MEAS_RH_VALUE	rH	691	1681	
MEAS_GLASS_IMPEDANCE	Ohm	501	1281	

MEAS_SLOPE	mV/pH	631	1585	
MEAS_ZERO_POINT	pH	58E	1422	

The PHORP Transducer delivers a process value to an AI function block. The CHANNEL parameter of an AI function block realizes the association or relationship between transducer and function block.
The unit code of the connected signal should match the unit code of the XD_SCALE parameter in the AI function block with one exception. If the unit code in XD_SCALE is "%" (1342), the Transducer value will be used without conversion. Please refer to further configuration checks in an AI function block in BA00062S (www.endress.com/cm42 under "Documents").

Indicated unit and format on the Liquiline device display may differ from the PHORP Transducer unit settings. The main measurement value on the device's display is selected by PHORP Transducer parameter MEASURED_VALUE_PHORP. The device's firmware calculates the best format for indication then. The DISPLAY_PHORP Transducer provides unit and format parameter options, if a specific indication on the device's display is desired.

Both process variable values of the DIAGDI Transducer are Boolean variables without units.

Process variable	unit	unit code [hex]	unit code [dec]	configurable unit parameter
CURRENT_STATE_CH1	n.a.	n.a.	n.a.	n.a.
CURRENT_STATE_CH2	n.a.	n.a.	n.a.	n.a.

6.3.6. Accessing logbooks

A description about how to use Logbooks via local keys of the device is to be found in BA00382C.
Logbooks are available via FF-H1 communication as well. A set of methods provides access for reading and deletion of logbook entries.

If no graphical enhancements are used in a host system and the device's software functionality is ADVANCED, the following methods are available in the ADVDIAGPHORP Transducer Block and provide reading of logbook entries:

- Read Event logbook
- Read Calib logbook
- Read Param logbook
- Read User logbook
- Read Audit logbook

The "Delete Logbook" method is available to select and delete logbook entries of Event, Calibration, Parameter, User or Audit logbook.

If a device description with graphical enhancements is used (*.ff5/*.sy5) and the device's software functionality is ADVANCED, additionally the following methods are available in the ADVDIAGPHORP Transducer Block and provide reading of logbook entries:

Method name	Description
Select logbook type	The desired logbook type will be selected
Get logbook state	Available entries and size will be evaluated
Read logbook data	Logbook Overview data will be read
Read logbook detail	Logbook Detail data will be read

These methods shall be called in the following order to get available logbook data:

“Select logbook type” → “Get logbook state” → “Read logbook data”.

These methods shall only be called within menu “Logbooks advanced access” (device level EDD) or “Logbooks adv logging" (block level EDD).

After these methods have been performed the following menus will indicate overview data of the selected logbook type:

Menu name	Description
View logbook data 1-10	Indicate Logbook overview entries 1 to 10 in “ring memory”
View logbook data 11-20	Indicate Logbook overview entries 11 to 20 in “ring memory”
View logbook data 21-30	Indicate Logbook overview entries 21 to 30 in “ring memory”
View logbook data 31-40	Indicate Logbook overview entries 31 to 40 in “ring memory”
View logbook data 41-50	Indicate Logbook overview entries 41 to 50 in “ring memory”
Read logbook detail (window menu)	Indicate Logbook detail data of a selected entry

Within menu “Read logbook detail” the method “Read logbook detail” could be called to read logbook detail data of an entry number which the user shall enter.

Indicated logbook data are not updated automatically. It is required to re-run the complete set of methods as described above to read current logbook entries.

6.3.7. Accessing buffer tables

A description about how to edit buffer tables via local keys of the device is to be found in BA00382C. Advanced software functionality allows editing of these tables via FF-H1 communication as well.

Transducer Block PHORP contains a set of parameters which provide this functionality.

If no graphical enhancements are used in a host system and the device’s software functionality is ADVANCED, the following method is available in the PHORP Transducer to edit up to 4 Temperature Compensation Tables:

Method name	Description
Edit Selected Table (single dialog)	Read selected table, edit and send table to device

If a device description with graphical enhancements is used (*.ff5/*.sy5) and the device’s software functionality is ADVANCED, the following methods and menus are available in the PHORP Transducer to edit 1 of 4 Temperature Compensation Tables:

Method/Menu name	Description
Select Special Buffer (window menu)	Provide both following methods and a grid to edit table values
Read Table (method)	Read selected table
Read Table (method)	Send selected and edited table to device

“Read Table” and “Send Table” methods shall only be called within EDD-menu “Select Special Buffer”.

Indicated table data are not updated automatically. It is required to run “Read Table Method” to get current table data which are stored in the device.

6.3.8. Accessing process medium compensation tables

A description about how to edit Process Medium Compensation Tables via local keys of the device is to be found in BA00382C. Advanced software functionality allows editing of these tables via FF-H1 communication as well.

Transducer Block PHORP contains a set of parameters which provide this functionality.

If no graphical enhancements are used in a host system and the device's software functionality is ADVANCED, the following method is available in the PHORP Transducer to edit up to 4 Process Medium Compensation Tables:

Method name	Description
Edit Medium Comp. Table (single dialog)	Read selected table, edit and send table to device

If a device description with graphical enhancements is used (*.ff5/*.sy5) and the device's software functionality is ADVANCED, the following methods and menus are available in the PHORP Transducer to edit 1 of 4 Process Medium Compensation Tables:

Method/Menu name	Description
Edit medium compensation table (window menu)	Provides both following methods and a grid to edit table values
Read Medium Comp Table (method)	Read selected table
Send Medium Comp Table (method)	Send selected and edited table to device

"Read Medium Comp Table" and "Send Medium Comp Table" methods shall only be called within EDD-menu "Edit medium compensation table".

Indicated table data are not updated automatically. It is required to run "Read Medium Comp Table" method to get current table data which are stored in the device.

6.3.9. Diagnostic codes and maintenance

A detailed description about diagnostic events and how to find a remedy is to be found in BA00382C, chapter Troubleshooting.
Several parameters within Transducer Blocks and the Resource Block reflect these Diagnostic Codes as well. These are:

Parameter name	Where to find
ACTUAL_DIAGNOSTICS	Resource Block and all Transducer Blocks
PREVIOUS_DIAGNOSTICS	ADVDIAGPHORP and DIAGDI Transducer Block
ACTUAL_DIAG_LIST_1	ADVDIAGPHORP Transducer Block, highest priority
ACTUAL_DIAG_LIST_2	ADVDIAGPHORP Transducer Block
ACTUAL_DIAG_LIST_3	ADVDIAGPHORP Transducer Block
ACTUAL_DIAG_LIST_4	ADVDIAGPHORP Transducer Block
ACTUAL_DIAG_LIST_5	ADVDIAGPHORP Transducer Block
ACTUAL_DIAG_LIST_6	ADVDIAGPHORP Transducer Block
ACTUAL_DIAG_LIST_7	ADVDIAGPHORP Transducer Block
ACTUAL_DIAG_LIST_8	ADVDIAGPHORP Transducer Block
ACTUAL_DIAG_LIST_9	ADVDIAGPHORP Transducer Block
ACTUAL_DIAG_LIST_10	ADVDIAGPHORP Transducer Block, lowest priority
SIMULATED_DIAGNOSTIC_EVENT	PHORP Transducer Block

Parameters which give instructions how to find a remedy are

Parameter name	Where to find
FD_RECOMMEN_ACT	Resource Block
MAINT_INSTRUCTION_PHORP	ADVDIAGPHORP Transducer Block

The following table describes the relationship between diagnostic codes and maintenance instructions:

Diagnostic Code	Indicated Maintenance Instruction	PHORP Transducer Error (XD_ERROR)
0 - OK	0 - Not initialized	No Error
	1 - No Action Required	No Error
003 Temperature sensor failure	3 - Check wiring | Change electrode	Electronics Failure
004 Scanning sensor	4 - Establishing a connection to the sensor	General Error
010 Sensor initialization	10 - Wait for sensor initialization to finish	General Error
011 Sensor no comm.	11 - Check meas. chain | Check sensor settings	General Error
012 Sensor failure	12 - Check meas. chain | Check sensor settings	General Error
013 Wrong sensor type	13 - Check meas. chain | Check sensor settings	General Error
014 Sensor failure	14 - Change sensor type | Change firmware	General Error
100 Glass impedance alarm	100 - Check glass electrode | Check medium temperature | Check electrode plug-in head	Mechanical Failure
101 Reference impedance alarm	101 - Check reference electrode	Mechanical Failure
102 Glass impedance too low alarm	102 - Check pH sensor, replace if necessary	Mechanical Failure
103 Reference impedance too low alarm	103 - Check reference electrode | Replace reference	Mechanical Failure
104 Sensor supply voltage bad	104 - Check connector | Replace sensor/cable	Mechanical Failure
106 Glass impedance warning	106 - Check glass electrode | Check medium temperature | Check electrode plug-in head	Mechanical Failure
107 Reference impedance too low warning	107 - Check reference electrode | Clean reference electrode	Mechanical Failure
111 Glass impedance too low warning	111 - Check glass electrode | Check medium temperature | Check electrode plug-in head	Mechanical Failure
112 Reference impedance too low warning	112 - Check reference electrode | Clean reference electrode	Mechanical Failure
119 Temperature offset upper limit	119 - Check temp. sensor | Replace sensor	Calibration Error
120 Temperature offset lower limit	120 - Check temp. sensor | Replace sensor	Calibration Error
127 Invalid TAG group	127 - Replace sensor | Deactivate tag check	General Error
128 Invalid TAG	128 - Replace sensor | Deactivate tag check	General Error
129 Sensor change aborted	129 - Restart the sensor change	No Error
130 Calibration active	130 - Wait for the calibration to finish	No Error
131 PV not stable	131 - Sensor too old | Cable or connector defective	Calibration Error
132 Temperature value unstable	132 - Sensor too old | Cable/connector defective	Calibration Error
134 Zero point too high alarm	134 - Sensor too old | Diaphragm blocked | Buffer solutions too old or contaminated	Calibration Error
135 Zero point too high warning	135 - Sensor too old | Diaphragm blocked | Buffer solutions too old or contaminated	Calibration Error
136 Zero point too low warning	136 - Sensor too old | Diaphragm blocked | Buffer solutions too old or contaminated	Calibration Error
137 Zero point too low alarm	137 - Sensor too old | Diaphragm blocked | Buffer solutions too old or contaminated	Calibration Error
138 Slope too low alarm	138 - Sensor too old | Diaphragm blocked | Buffer solutions too old or contaminated	Calibration Error
139 Slope too low warning	139 - Sensor too old | Diaphragm blocked | Buffer solutions too old or contaminated	Calibration Error
140 Leakage current alarm	140 - Replace sensor	Calibration Error
142 SCC electrode condition bad	142 - Replace sensor	General Error
145 Leakage current warning	145 - Prepare to replace sensor	Electronics Failure
148 SCC Electrode sufficient	148 - Clean sensor soon | Regenerate sensor | Replace sensor	General Error
153 Operating point too high alrm	153 - Sensor old or defective | Diaphragm blocked | Buffer solutions too old or contaminated	Calibration Error
154 Operating point too high warn	154 - Sensor old or defective | Diaphragm blocked | Buffer solutions too old or contaminated	Calibration Error
155 Operating point too low warn	155 - Sensor old or defective | Diaphragm blocked | Buffer solutions too old or contaminated	Calibration Error
156 Operating point too low warn	156 - Sensor old or defective | Diaphragm blocked | Buffer solutions too old or contaminated	Calibration Error
172 Alarm operating time	172 - Replace sensor	Calibration Error
173 Oper.time >80 degC alarm	173 - Replace sensor	Calibration Error
174 Oper.time >100 degC alarm	174 - Replace sensor	Calibration Error
175 Oper.time <300 mV alarm	175 - Replace sensor	Calibration Error
176 Oper.time >300 mV alarm	176 - Replace sensor	Calibration Error

Diagnostic Code	Indicated Maintenance Instruction	PHORP Transducer Error (XD_ERROR)
177 Delta slope alarm	177 - Replace sensor	Calibration Error
178 Delta zero point alarm	178 - Replace sensor	Calibration Error
179 Delta operating point alarm	179 - Replace sensor	Calibration Error
180 Calibration expired alarm	180 - Perform a calibration	Calibration Error
181 Number of sterilizations alarm	181 - Replace sensor	Calibration Error
182 Oper.time warning	182 - Replace sensor soon	Calibration Error
183 Oper.time >80 degC warning	183 - Prepare to replace sensor	Calibration Error
184 Oper.time >100 degC warning	184 - Prepare to replace sensor	Calibration Error
185 Oper.time <300 mV warning	185 - Prepare to replace sensor	Calibration Error
186 Oper.time >300 mV warning	186 - Prepare to replace sensor	Calibration Error
190 Calibration expired warning	190 - Prepare to replace sensor	Calibration Error
191 Number of sterilizations warning	191 - Prepare to replace sensor	Calibration Error
203 Wrong transmitter type	203 - Check sensor	General Error
215 Simulation active	215 - Active corresponding to your settings	No Error
218 Curr.out module defect	218 - Contact the Service Team!	Electronics Failure
219 Power supply bad	219 - Connect to a clean power supply | Check cable	No Error
238 Delta slope warning	238 - Replace sensor soon	No Error
239 Delta zero point warning	239 - Replace sensor soon	No Error
240 Delta operating point warning	240 - Replace sensor soon	No Error
318 Glass impedance too high alarm	318 - Check electrode | Check medium temperature | Check electrode plug-in head	Mechanical Failure
319 Reference impedance too high alarm	319 - Check reference electrode | Clean reference electrode	Mechanical Failure
320 Glass impedance too high warning	320 - Check electrode | Check medium temperature | Check electrode plug-in head	Mechanical Failure
321 Reference impedance too high warning	321 - Check reference electrode | Clean reference electrode	Mechanical Failure
322 Measuring value out of range	322 - Inc. process value | Check meas. chain | change sensor	General Error
380 Communication module defect	380 - Replace comm. module	Electronics Failure
381 Communication module incompatible	381 - Use FBPA3 comm. module	Electronics Failure
404 Lower limit current output	404 - Check plausibility	Calibration Error
405 Upper limit current output	405 - Check plausibility	Calibration Error
406 Setup active	406 - End parameter entry	No Error
407 Diag. active	407 - End query of device and sensor information	No Error
408 Calibration aborted	408 - Renew calib solution | repeat calib	Calibration Error
409 Sensor change active	409 - Sensor change in progress	No Error
501 Device open	501 - Close the housing and tighten the screws	No Error
513 Device alarm	513 - Contact the Service Team	Software Error
514 Device warning	514 - Contact the Service Team	Software Error
530 Logbook 20% remaining	530 - Logbook ring memory is almost full	No Error
531 Logbook full	531 - New events will overwrite the oldest entries	No Error
532 Calibration timer expired	532 - Perform a calibration	Calibration Error
770 Process check system alarm	770 - Sensor has been deactivated by user. Replace sensor	Calibration Error
802 Process check system alarm	802 - Check sensor and sensor connection | Air cushion in assembly | Check application	General Error
810 PV upper limit alarm	810 - Sensor in air | Air cushion in assembly | Check measuring chain	No Error
811 PV lower limit alarm	811 - Sensor in air | Air cushion in assembly | Check measuring chain	No Error
812 Temperature out of range	812 - Sensor in air | Air cushion in assembly | Check measuring chain	No Error
840 PV upper limit warning	840 - Sensor in air | Air cushion in assembly | Check measuring chain	Calibration Error
841 PV lower limit warning	841 - Sensor in air | Air cushion in assembly | Check measuring chain	Calibration Error

If XD_ERROR is set to a value other than“No error” the PHORP Transducer parameter BLOCK_ERR will indicate “OTHER”.

6.3.10. Field Diagnostics

This device supports Field Diagnostics as specified in FOUNDATION Fieldbus specification FF-891. The standard functionality is described in BA00381C.

In addition to the grouped diagnostic events for Resource Block parameters FD_FAIL_XXX, FD_CHECK_XXX, FD_OFFSPEC_XXX and FD_MAINT_XXX and the ability to move single events from a group to special bits called Configurable Area in the Manufacturer Specific Conditions there are 3 EXTENDED_MAP and 3 EXTENDED_ACTIVE parameters providing single disabling/enabling of specific events.
Each available event is mapped to one bit of the 3 Extended MAP/ACTIVE parameters. The bit position is set by the manufacturer and cannot be changed. Liquiline_pHORP default settings are as follows.

FD_EXTENDED_MAP_1/FD_EXTENDED_ACTIVE_1:

Bit Position 0-15	Event number	Bit Position 16-31	Event number
0	3	16	119
1	4	17	120
2	10	18	127
3	11	19	128
4	12	20	129
5	13	21	130
6	14	22	131
7	100	23	132
8	101	24	134
9	102	25	135
10	103	26	136
11	104	27	137
12	106	28	138
13	107	29	139
14	111	30	140
15	112	31	142

FD_EXTENDED_MAP_2/FD_EXTENDED_ACTIVE_2:

Bit Position 0-15	Event number	Bit Position 16-31	Event number
0	145	16	182
1	148	17	183
2	153	18	184
3	154	19	185
4	155	20	186
5	156	21	190
6	172	22	191
7	173	23	203
8	174	24	215
9	175	25	218
10	176	26	219
11	177	27	238
12	178	28	239
13	179	29	240
14	180	30	318
15	181	31	319

FD_EXTENDED_MAP_3/FD_EXTENDED_ACTIVE_3:

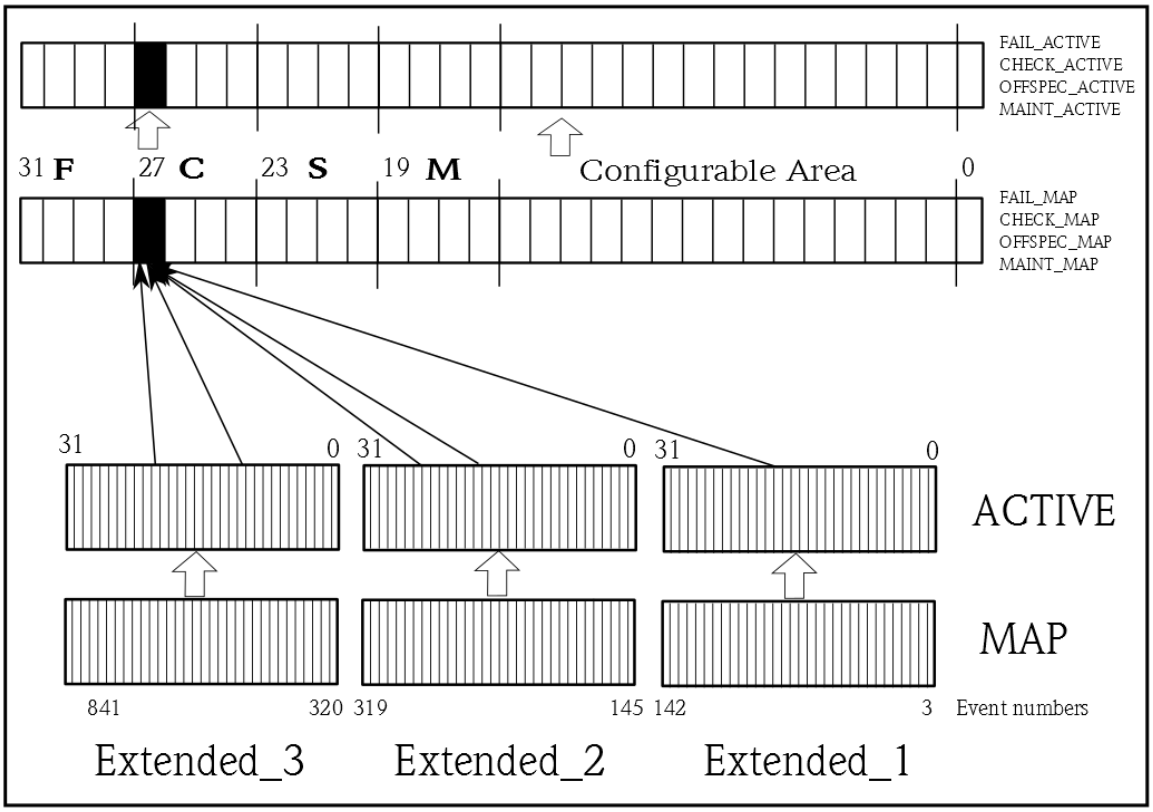
Bit Position 0-15	Event number	Bit Position 16-31	Event number
0	320	16	532
1	321	17	770
2	322	18	802
3	380	19	810
4	381	20	811
5	404	21	812
6	405	22	840
7	406	23	841
8	407	24	
9	408	25	
10	409	26	
11	501	27	
12	513	28	
13	514	29	
14	530	30	
15	531	31	

These events are mapped to the fixed area bits 16 to 31 in the Field Diagnostics parameters FD_FAIL_XXX, FD_CHECK_XXX, FD_OFFSPEC_XXX and FD_MAINT_XXX which are also pre-defined by the manufacturer. In the Liquiline_pHORP device these events are grouped as follows.

Bit Position in Manufacturer Specific Conditions	NAMUR class (F, C, S, M)	ADVDIAGPHORP Transducer Parameter	Event numbers
31 SensorHiHiSeverity	F	Fixed_Area_31	3, 11, 12, 13, 100, 101, 102, 103, 104, 119, 120, 127, 128, 140, 203, 770
30 ElectronicHiHiSeverity	F	Fixed_Area_30	218, 380, 381
29 ConfigHiHiSeverity	F	Fixed_Area_29	513
28 ProcessHiHiSeverity	F	Fixed_Area_28	802, 810, 811, 812
27 SensorHiSeverity	C	Fixed_Area_27	4, 10, 14, 129, 130
26 ElectronicHiSeverity	C	Fixed_Area_26	219
25 ConfigHiSeverity	C	Fixed_Area_25	215, 406, 407, 409
24 ProcessHiSeverity	C	Fixed_Area_24	None
23 SensorLoSeverity	S	Fixed_Area_23	322
22 ElectronicLoSeverity	S	Fixed_Area_22	None
21 ConfigLoSeverity	S	Fixed_Area_21	404, 405, 530, 531
20 ProcessLoSeverity	S	Fixed_Area_20	None
19 SensorLoLoSeverity	M	Fixed_Area_19	106, 107, 111, 112, 131, 132, 134, 135, 136, 137, 138, 139, 142, 145, 148, 153, 154, 155, 156, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 190, 191, 238, 239, 240, 318, 319, 320, 321
18 ElectronicLoLoSeverity	M	Fixed_Area_18	None
17 ConfigLoLoSeverity	M	Fixed_Area_17	501, 514, 532
16 ProcessLoLoSeverity	M	Fixed_Area_16	408, 840, 841

The ADVDIAGPHORP Transducer Block provides 16 lists to identify which events are mapped to which group.

The following diagram illustrates the principle of routing an event through the field diagnostics parameter group.



An event is enabled, if the bit representing the event number is set in the FD_EXTENDED_MAP_X parameter. It is disabled by clearing this bit. If an event is disabled, the related bit in the Extended ACTIVE parameter won't be set any more and will not lead to an active condition in the upper field diagnostics group.
The disabled event number will be replaced with the value "Not categorized" in the matching ADVDIAGPHORP Transducer Block parameter list position. This event will appear without a FCSM mark in the diagnostic list menu on the local display of the device then.

6.3.11. Discrete diagnostic indication

Liquiline_pHORP provides 1 Discrete Diagnostic Transducer Block. Two configurable lists with diagnostic event numbers of the device are maintained. The diagnostic message with the highest priority is compared against the configured diagnostic numbers in these lists. If the message number matches an input signal of one of the lists, the system activates the output signal assigned to that list. In the factory setting, the "Ch1 Codes" list is configured with the F-classified events categorized in accordance with NAMUR, the "Ch2 Codes" list is configured with the remaining CSM-classified events.

Therefore the DIAGDI Transducer provides two channels to connect discrete data with status (transducer parameters CURRENT_STATE_CH1 and CURRENT_STATE_CH2) to 2 DI Function Blocks.
CURRENT_STATE_CH1 value will be connected to a DI function block, if CHANNEL value 15 (“Ch1 Codes”) is selected.
CURRENT_STATE_CH2 value will be connected to a DI function block, if CHANNEL value 16 (“Ch2 Codes”) is selected.

The following methods can be accessed in the DIAGDI Transducer and provide options to modify the ex-factory settings, which diagnostic events will activate “Ch1 Codes or “Ch2 Codes” discrete transducer outputs or both outputs or won’t be taken into account for this action.

Method name	Description
Enable diagnostic event	Allows to put a single diagnostic event into “Ch1 Codes” or “Ch2 Codes” list
Disable diagnostic event	Allows deleting a single diagnostic event from “Ch1 Codes” or “Ch2 Codes” list.
Disable all diagnostic events	Allows deleting all diagnostic events from “Ch1 Codes” or “Ch2 Codes” list.
Get enabled diag events for Chn1	Allows indication of all diagnostic events which are belonging to“Ch1 Codes” list
Get enabled diag events for Chn2	Allows indication of all diagnostic events which are belonging to“Ch2 Codes” list

6.3.12. Simulation of measurement values and events

In addition to the standard Analog Input function block simulation feature another possibility is implemented to simulate a measurement value and/or a diagnostic event accessible in the first IO Transducer Block PHORP. This transducer block simulation has no dependencies with the Analog Input SIMULATE parameter.

As well, measurement value simulation is available by selecting the simulation menu for main or temperature measurement value on the local screen of the device. This local operation is described in operating instructions BA00381C/BA00382C.

6.3.12.1. Simulate measurement values

Two simulation paths exist which can be used simultaneously.

There is one section for main measurement value simulation, which contains the following parameters:

Parameter name	Description
MAIN_MEASURED_VALUE_SIMULATION	Switch to enable or disable main measured value simulation.
SIMULATED_MEASURAND_PHORP	Switch to select the desired main measurement parameter which should be simulated. Usable selections depend on the current device's order code which determines the measurement principle.
SIMULATED_MAINMEASURED_VAL_PHORP	Contains the desired main measurement simulation value which is not restricted to sensor specification limits.

There is another section for temperature measurement simulation containing following parameters:

Parameter name	Description
TEMPERATURE_VALUE_SIMULATION	Switch to enable or disable temperature value simulation.
SIMULATED_TEMPERATURE_VALUE	Contains the desired temperature simulation value which is not restricted to sensor specification limits.

NOTICE

It is required to set the transducer block mode to Out-of-Service (OOS) before one of these simulation modes can be activated. Depending on the host system features and the current schedule status a PHORP transducer "OOS" block alarm and an Analog Input "Input Failure" block alarm will be sent, because the measured transducer value status is set to "BAD, Out-of-service". The position of the hardware simulation jumper is not taken into account.

As a consequence of enabling main or temperature measurement simulation the diagnostic event 215 (Simulation active) and the SIMU-Icon will be indicated on the device's local display. If no other events than 215 are active, main measurement and temperature value status will be set to a value defined by the setting of Advanced Diagnostic Transducer parameter "Status select 215". Refer to page 81 in chapter 6.3.17 for a description of available status values. If option "Unmodified" is selected, the measurement value processing will set the status value to UNCERTAIN SUBSTITUTE VALUE.
If other events are active simultaneously and a target of the simulation will be to use a specific status value with a specific measurement value, all active events besides 215 should be set to Field Diagnostics state "Not configured". This can be done by de-selecting the desired events in one of the three Resource Block FD_EXTENDED_MAP parameters. Refer to chapter 6.3.10 for a description of these parameters.

⚠ WARNING

Be careful with changing PV status and Resource extended MAP parameter values. Modifications will be persistent whether simulation is active or disabled. If a PV status value other than "Unmodified" is selected

for a specific diagnostic event, all available measurement and temperature status values are set to the configured status when this event will be active. All diagnostic events, which are de-selected in Resource extended MAP parameters are moved to state “Not configured”. There is no special notification about a status modification other than the standard static revision update event.

After enabling this simulation mode the Transducer block mode can be set to AUTO again and depending on the current setting of simulated measurand and a simulated main measured/temperature value will be transferred to a connected Analog Input block, if AI MODE_BLK is set to AUTO and CHANNEL and scaling parameters are set correctly.

The unit for main measurement value entered for simulation is fixed and depends on the order code, the selected measurand and the connected sensor type.

Active Order code	Sensor type	Measurand	Unit	Possible AI CHANNEL
CM42- **P**xx**6**xxxxx	pH (glass/ISFET) analog	pH	pH (unit code 1422)	3 – pH value
CM42- **P**xx**6**xxxxx	ORP analog	ORPmV or ORP%	mV (unit code 1243), if Measurand is set to ORPmV % (unit code 1342), if Measurand is set to ORP %	4 – ORP mV value 5 – ORP % value
CM42- **M**xx**6**xxxxx	pH glass Memosens digital	pH	pH (unit code 1422)	3 – pH value
CM42- **M**xx6xxxxx	ORP Memosens digital	ORPmV or ORP%	mV, if Measurand is set to ORPmV %, if Measurand is set to ORP %	4 – ORP mV value 5 – ORP % value
CM42- **M**xx**6**xxxxx	pH/ORP Memosens digital	pH or ORPmV or ORP% or rH	pH (unit code 1422), if Measurand is set to pH mV (unit code 1243), if Measurand is set to ORPmV % (unit code 1342), if Measurand is set to ORP % rH% (unit code 1681), if Measurand is set to rH	3 – pH value 4 – ORP mV value 5 – ORP % value 7 – rH value
CM42- **N**xx**6**xxxxx	pH (ISFET) Memosens digital	pH	pH (unit code 1422)	3 – pH value

The unit for simulated temperature value depends on the setting of UNIT_MEAS_DAMPED_TEMP_VAL.

Order code	Sensor type	Unit	Possible AI CHANNEL
CM42- xxx**6**xxxxx	All	UNIT_MEAS_DAMPED_TEMP_VAL Possible selections are °C (unit code 1001) or °F (unit code 1002)	6 - Temperature

NOTICE

It is required to set the transducer block mode to Out-of-Service (OOS) again before a simulation mode can be de-activated. As soon as simulation is de-activated the simulated measurement value will be replaced with the un-simulated value. The SIMU-Icon on the device’s local display will be switched off, if no other reason for an active simulation exists.

Restarting the device will always de-activate the measurement simulation mode. All entries made in simulation parameters are lost.

6.3.12.2. Simulate diagnostic events

Two parameters in the PHORP Transducer provide a diagnostic event simulation feature.

Parameter name	Description
DIAGNOSTIC_EVENT_SIMULATION	Switch to enable or disable diagnostic event simulation.
SIMULATED_DIAGNOSTIC_EVENT	Contains the desired diagnostic event to be simulated.

NOTICE

It is required to set the transducer block mode to Out-of-Service (OOS) before this simulation mode can be activated. Depending on the host system features and the current schedule status a PHORP transducer "OOS" block alarm and an Analog Input "Input Failure" block alarm will be sent, because the measured transducer value status is set to "BAD, Out-of-service". The position of the hardware simulation jumper is not taken into account.

As a consequence of enabling main or diagnostic event simulation the diagnostic event 215 (Simulation active) will be set. The SIMU-Icon will be indicated on the device's local display as well.

The event being entered to parameter SIMULATED_DIAGNOSTIC_EVENT will be transferred as current device status. The status value of any measurement value will be set to the value specified in Advanced Diagnostics Transducer parameter "Status select 215". Refer to page 81 in chapter 6.3.17 for a description of available status values. If option "Unmodified" is selected, the measurement value processing will set the status value to UNCERTAIN SUBSTITUTE VALUE in event simulation mode. Refer to page 81 of chapter 6.3.17 for a description of available status values.

⚠ WARNING

Be careful with changing PV status values. Modifications will be persistent whether simulation is active or not. If a value other than "Unmodified" is selected for a specific diagnostic event, all available measurement and temperature status values are set to the configured status when this event will be active. There is no special notification about a status modification other than the standard static revision update event.

After enabling this simulation mode the Transducer block mode can be set to AUTO again and any desired diagnostic event may be entered.

NOTICE

It is required to set the transducer block mode to Out-of-Service (OOS) again before the simulation mode can be de-activated. As soon as simulation is de-activated the simulated event will be replaced with the un-simulated value. The SIMU-Icon on the device's local display will be switched off, if no other reason for an active simulation exists.

Restarting the device will always de-activate the event simulation mode. All entries made in simulation parameters are lost.

6.3.13. Transducer Block FF universal parameters

The following table lists all the parameters of the Transducer Blocks specified by FOUNDATION Fieldbus. The device-specific parameters are described as of page 50 ff.

Transducer Block (Universal FF parameters)			
Parameter index	**Parameter**	**Write access with operating Mode (MODE_BLK)**	**Description**
1	**Static revision (STAT_REV)**	Read only	The revision status of the static. The revision status parameter is incremented on each modification of static data. This parameter is reset to 0 in all blocks in the event of a factory reset.
2	**Tag description (TAG_DESC)**	AUTO - OOS	Use this function to enter a user-specific text of max. 32 characters for unique identification and assignment of the block. **Factory setting: (_____) no text**
3	**Strategy (STRATEGY)**	AUTO - OOS	Parameter for grouping and thus faster evaluation of blocks. Grouping is carried out by entering the same numerical value in the STRATEGY parameter of each individual block. **Factory setting: 0** These data are neither checked nor processed by the Transducer Blocks.
4	**Alert key (ALERT_KEY)**	AUTO - OOS	Use this function to enter the identification number of the plant unit. This information can be used by the fieldbus host system for sorting alarms and events. **User input:** 1 to 255 **Factory setting: 1**
5	**Block Mode (MODE_BLK)**	AUTO - OOS	Displays the current (Actual) and desired (Target) operating mode of the corresponding Transducer Block, the permitted modes (Permitted) supported by the Resource Block and the normal operating mode (Normal). **Supported values:** AUTO OOS MAN The Transducer Block supports the following operating modes: • AUTO (automatic mode): The block is executed. • OOS (out of service): The block is in the “Out of Service” mode. The process variable is updated, but the status of the process variable changes to status is BAD. • MAN (manual mode): The block is in the "manual mode". The process variable is updated. This state will be automatically set, if the resource block is "Out of Service".
6	**Block Error (BLOCK_ERR)**	Read only	Indicates active block errors. **Supported values:** • OUT OF SERVICE The block is in the "out of service" operating mode. • OTHER Further information is available in the Transducer Error parameter and in the Advanced Diagnostic Transducer An error description as well as information on rectifying faults can be found in section Diagnostic Codes and Maintenance.

Transducer Block (Universal FF parameters)			
Parameter index	**Parameter**	**Write access with operating Mode (MODE_BLK)**	**Description**
7	**Update Event (UPDATE_EVT)**	AUTO - OOS	Indicates whether static block data have been altered, including date and time.
8	**Block Alarm (BLOCK_ALM)**	AUTO - OOS	The current block status is indicated with information on pending configuration, hardware or system errors, including information on the alarm period (date, time) when the error occurred. • In addition, the active block alarm can be acknowledged in this parameter group. • The device does not use this parameter to display a process alarm since this is generated in the BLOCK_ALM parameter of the Analog Input function block.
9	**Transducer Directory**	Read only	A directory that specifies the number and starting indicies of the transducers in the transducer block. Because no multiple transducers are defined. **Display**: This value is 0.
10	**Transducer Type (TRANSDUCER_TYPE)**	Read only	The Transducer Block type is indicated. **Supported values:** • PHORP Transducer Block: pH/ORP Measurement, 0xFFF2 • DIAGDI Transducer Block: Diagnostic Discrete Input, 0xFFEF • SERVICE Transducer Block: Service, 0xFFF0 • ADVDIAGPHORP Transducer Block: Advanced Diagnostics pH/ORP, 0xFFEE • DISPLAYPHORP Transducer Block: pH/ORP Display CM42, 0xFFEB • MEMOPHORP Transducer Block: pH/ORP Memosens Transmitter, 0xFFFB • DIAGPHORP Transducer Block: pH/ORP Diagnostics, 0xFFF8
11	**Transducer Type Version (TRANSDUCER_TYPE_VER)**	Read only	Display of the transducer block type version
12	**Transducer Error (XD_ERROR)**	Read only	Indication of the active device. **Supported values:** • 00 - No Error (normal status) • 17 - General Error • 18 - Calibration Error • 19 - Configuration Error • 20 - Electronics Failure • 21 - Mechanical Failure Summarized device status/condition, more precise information on the pending error(s) is available by means of the manufacturer-specific error display. This can be read via the ADVDIAGPHORP Transducer Block in the "ACTUAL_DIAG_STATUS" and "ACTUAL_DIAGNOSTICS" parameters and more about previous diagnostics and a list of up to 10 current diagnostic events. How to remedy the error is indicated in the parameter MAINT_INSTRUCTION and in the Resource Block parameter FD_RECOMMEN_ACT.
13	**Collection Directory (COLLECTION_DIR)**	Read only	Display of the Collection Directory; Not used **Display**: 0

6.3.14. PHORP Transducer Block

The properties column lists parameter properties:
- W: Parameter is writable
- OOS: Parameter is writable in OOS mode only

Since all parameters can be read, this is not explicitly stated.

PHORP Transducer Block (manufacturer-specific parameters)			
Parameter index	**Parameter** **Local Display Menu Path**	**Properties**	**Description**
14	IOTRD_BLOCK_ERR_DESC_1		Block Error Description which indicates problems detected within the block **Supported values:** 0x01 - Resource Block in OOS
15	ACTUAL_DIAG_STATUS DIAG → Most important message		Device's FCSM information **Supported values:** 0x00 : OK, no diagnostics detected 0x01 : F, failure 0x02 : M, maintenance required 0x03 : C, function check 0x04 : S, out of specification 0x05 : NC (Not Categorized)
16	ACTUAL_DIAGNOSTICS DIAG → Most important message		Current diagnostic code with highest priority **Indicated values:** 0x0000 to 0x0349(0000 to 0841); details see chapter Diagnostic Codes and Maintenance
17	SENSOR_INTERFACE		Connected sensor interface type **Indicated values:** 0 - Analog 1 - Digital
18	SOFTWARE_FUNCTIONALITY DIAG → Device information → Order code		Indicates software capability as Standard or Advanced like indicated in order code (i.e. MAA600E**A**D00 means standard or MAA600E**B**D00 means advanced). Advanced functionality contains functions like additional diagnostics, logbooks, table handling **Indicated values:** 0 - Standard 1 - Advanced
19	SIM_JUMPER		Physical position of the simulation jumper (on/off) **Indicated values:** 1 - Sim disabled 2 - Sim enabled **Factory setting:** Sim disabled
20	DEVICE_SIM		Icon on local display. If lit, it indicates, that simulate functionality is activated **Indicated values:** 0 - Off 1 - On
21	HOLD_ON_CALIB SETUP → General settings → Hold settings → Calibration active	OOS	The last measured value is used constantly on the output, if calibration menu is selected on the local device display **Available values:** 0 - Off 1 – On **Factory setting:** Off
22	HOLD_ON_SETUP SETUP → General settings → Hold settings → SETUP active	OOS	The last measured value is used constantly on the output, if parameterization menu is selected on the local device display **Available values:** 0 - Off 1 – On **Factory setting:** Off

PHORP Transducer Block (manufacturer-specific parameters)			
Parameter index	**Parameter** **Local Display Menu Path**	**Properties**	**Description**
23	HOLD_ON_DIAG SETUP → General settings → Hold settings → DIAG active	OOS	The last measured value is used constantly on the output, if diagnosis menu is selected on the local device display **Available values:** 0 - Off 1 – On **Factory setting:** Off
24	HOLD_DELAY SETUP → General settings → Hold settings → Hold delay	OOS	Defines the time the output will be hold in his fixed signalization status after leaving of calibration, parameterization or diagnosis menu. **Available values:** 0 to 300 seconds **Factory setting:** 15 seconds
25	TEMP_CAL_TYPE CAL → Temp. adjustment → Mode	OOS	Select temperature adjustment type **Available values:** 0: 1 point 1: 2 point 2: 2 point table **Factory setting:** 1 point
26	SENSOR_TYPE SETUP → Sensor pH/ORP → Sensor type pH (visible only if analog sensor interface)	OOS	Select/Indicate sensor type **Available values:** 0: Glass 1: IsFET 2: ORP 3: IsFET analog 4: ORP analog 5: Pfaudler abs 6: Pfaudler rel 7: Antimony 8: UNUSED 9: Glass analog 10: Pfaudler pH/ORP 11: rH 12: None 13: Glass V2 **Default value:** if sensor interface is digital: automatic, depending on connected sensor if sensor interface is analog: Glass analog
27	MEASURED_VALUE_PHORP SETUP → Sensor pH/ORP → Measured value	OOS	Select measurement mode; this setting determines the main measurement value indication on the device's display as well. **Available values:** 0 - pH 1 - ORP mV 2 - rH 3 - ORP % **Default value:** if sensor interface is digital: automatic, depends on connected sensor if sensor interface is analog: pH
28	MEASURED_VALUE_ANALOG SETUP → Sensor pH/ORP → Measured value	OOS	required for up/download only
29	MEASURED_VALUE_DIGITAL SETUP → Sensor pH/ORP → Measured value	OOS	required for up/download only
30	MEAS_MV_VALUE DIAG → Service → Raw values → pH (only visible, if rH measurement is selected)		Current measured mV value and status Unit code: 1243 (mV)
31	MEAS_DAMPED_MV_VALUE MEAS → Second and third measurement screen (only visible, if pH measurement is selected)		Current measured damped mV value and status Unit code: 1243 (mV)
32	MEAS_PH_VALUE MEAS → All measurement screens (only visible, if pH or rH measurement is selected)		Current measured pH value and status Unit code: 1422 (pH)

PHORP Transducer Block (manufacturer-specific parameters)			
Parameter index	**Parameter** **Local Display Menu Path**	**Properties**	**Description**
33	MEAS_PH_RAW_VALUE DIAG → Service → Raw values → pH (only visible for rH sensor type)		Current measured pH raw value Unit code: 1422 (pH)
34	MEAS_ORP_MV_VALUE MEAS → All measurement screens (only visible, if ORP mV measurement is selected)		Current measured ORP mV value and status Unit code: 1243 (mV)
35	MEAS_ORP_PERCENT_VALUE MEAS → All measurement screens (only visible, if ORP % measurement is selected)		Current measured ORP % value and status Unit code: 1342 (%)
36	MEAS_RH_VALUE MEAS → All measurement screens (only visible, if rH measurement is selected)		Current measured rH value and status Unit code: 1681 (rH)
37	MEAS_GLASS_IMPEDANCE MEAS → All measurement screens (only visible, if pH or rH measurement is selected)		Current measured glass impedance value and status Unit code: 11281 (Ohm)
38	MEAS_SLOPE		Current measured pH slope value and status Unit code: 11585 (mV/pH)
39	MEAS_ZERO_POINT		Current measured pH zero point value and status Unit code: 11422 (pH)
40	MEAS_DAMPED_TEMP_VALUE MEAS → All measurement screens		Current measured damped temperature value and status Unit code: depends on setting of parameter UNIT_MEAS_DAMPED_TEMP_VAL 1001 (°C) or 1002 (°F)
41	UNIT_MEAS_MV_VALUE		Indicated unit for mV value Unit code: 1243 (mV)
42	UNIT_MEAS_DAMPED_MV_VALUE		Indicated unit for damped mV value Unit code: 1243 (mV)
43	UNIT_MEAS_PH_VALUE		Indicated unit for pH value Unit code: 1422 (pH)
44	UNIT_MEAS_ORP_MV_VALUE		Indicated unit for ORP mV value Unit code: 1243 (mV)
45	UNIT_MEAS_ORP_PERCENT_VALUE		Indicated unit for ORP % value Unit code: 1342 (%)
46	UNIT_MEAS_DAMPED_TEMP_VAL	OOS	Selected unit for temperature value which is transferred over FF-H1 bus only. **Available values:** 1001 - Celsius 1002 - Fahrenheit **Factory setting:** Celsius To select temperature unit which is indicated on the local display only, use parameter DISPLAY_TEMPERATURE_UNIT_PH in DISPLAYPHORP transducer block.
47	UNIT_MEAS_RH_VALUE		Indicated unit for rH value Unit code: 1681 (rH)
48	UNIT_MEAS_GLASS_IMPEDANCE_VALUE		Indicated unit for glass impedance value Unit code: 1283 (MOhm)
49	UNIT_MEAS_SLOPE_VALUE		Indicated unit for pH slope value Unit code: 1585 (mV/pH)
50	UNIT_MEAS_ZERO_POINT_VALUE		Indicated unit for pH zero point value Unit code: 1422 (pH))
51	POTENTIAL_MATCHING SETUP → Sensor pH/ORP → Potential matching	OOS	Analog sensors only: Indicates symmetric measurement (= with PM, only with a glass electrode, ISFET sensor or Pfaudler electrode) or asymmetric measurement (= without PM) **Available values:** 0 - Without PM 1 - With PM **Factory setting:** Without PM

PHORP Transducer Block (manufacturer-specific parameters)			
Parameter index	**Parameter** **Local Display Menu Path**	**Properties**	**Description**
52	OTHER_POTENTIAL_MATCHING SETUP → Sensor pH/ORP → Potential matching	OOS	required for up/download only
53	ANTIMONY_POTENTIAL_MATCHING SETUP → Sensor pH/ORP → Potential matching	OOS	required for up/download only
54	REFERENCE_ELECTRODE SETUP → Sensor pH/ORP →Reference electrode	OOS	Refer to the manufacturer's certificate of the sensor for information on the reference electrode type (Pfaudler sensors only) **Available values:** 0 - AGAGel 1 - AgAgCl **Factory setting:** AGAGel
55	DAMPING_TIME SETUP → Sensor pH/ORP → Damping	OOS	The damping causes a floating average curve of the measured values over the time specified (for pH sensors) **Available values:** 0 to 600 seconds **Factory setting:** 0 seconds
56	DAMPING_TIME_ORP SETUP → Sensor pH/ORP → Damping	OOS	The damping causes a floating average curve of the measured values over the time specified (for ORP sensors) **Available values:** 0 to 600 seconds **Factory setting:** 0 seconds
57	TEMPERATURE_DAMPING_TIME		The damping causes a floating average curve of the measured values over the time specified (for temperature) **Available values:** 0 to 600 seconds **Factory setting:** 3 seconds
58	TEMPERATURE_SENSOR_PHORP SETUP → Sensor pH/ORP → Temperature sensor	OOS	configured temperature sensor for analog sensors **Available values:** 0 - None 1 - PT100 or PT1000 **Factory setting:** PT100 or PT1000
59	DIGITAL_TEMPERATURE_SENSOR SETUP → Sensor pH/ORP → Temperature sensor	OOS	required for up/download only
60	ANALOG_TEMPERATURE_SENSOR SETUP → Sensor pH/ORP → Temperature sensor	OOS	required for up/download only
61	ANTIMONY_TEMPERATURE_SENSOR SETUP → Sensor pH/ORP → Temperature sensor	OOS	required for up/download only
62	ENABLE_CAL_DATA_INPUT SETUP → Sensor pH/ORP → Cal. Settings → Type of calibration → Numeric input	W	Unblocking manual data entry adjustment method for pH measurement **Available values:** 0 - Off 1 – On **Factory setting:** On
63	ENABLE_CAL_2_POINT SETUP → Sensor pH/ORP → Cal. Settings → Type of calibration → 2 point cal.	W	Unblocking 2-point calibration method for pH measurement **Available values:** 0 - Off 1 – On **Factory setting:** On
64	INTERNAL_BUFFER SETUP → Sensor pH/ORP → Internal buffer	OOS	Glass electrodes generally have an internal buffer with pH 7. For this reason, a change of the factory setting is useful only, if a special glass electrode with a different internal buffer is used **Available values:** -2.0 to 16.0 pH **Factory setting:** 7.0 pH

PHORP Transducer Block (manufacturer-specific parameters)			
Parameter index	**Parameter** **Local Display Menu Path**	**Properties**	**Description**
65	ENABLE_CAL_OFFSET SETUP → Sensor pH/ORP → Cal. Settings → Type of calibration → 1 point cal.	W	Unblocking offset calibration method for pH measurement **Available values:** 0 - Off 1 – On **Factory setting:** On
66	ENABLE_CAL_PROBE SETUP → Sensor pH/ORP → Cal. Settings → Type of calibration →Grab sample cal.	W	Unblocking grab sample calibration method for pH measurement **Available values:** 0 - Off 1 – On **Factory setting:** On
67	ENABLE_CAL_DATA_INPUT_ORPMV SETUP → Sensor pH/ORP → Cal. Settings → Type of calibration →Numeric input	W	Unblocking manual data entry adjustment method for ORP mV measurement **Available values:** 0 - Off 1 – On **Factory setting:** On
68	ENABLE_CAL_1_POINT_ORPMV SETUP → Sensor pH/ORP → Cal. Settings → Type of calibration → 1 point cal.	W	Unblocking 1-point calibration method for ORP mV measurement **Available values:** 0 - Off 1 – On **Factory setting:** On
69	ENABLE_CAL_DATA_INPUT_ORPPERC SETUP → Sensor pH/ORP → Cal. Settings → Type of calibration →Numeric input	W	Unblocking manual data entry adjustment method for ORP % measurement **Available values:** 0 - Off 1 – On **Factory setting:** On
70	ENABLE_CAL_2_POINT_ORPPERC SETUP → Sensor pH/ORP → Cal. Settings → Type of calibration → 2 point cal.	W	Unblocking 2-point calibration method for ORP % measurement **Available values:** 0 - Off 1 – On **Factory setting:** On
71	TEMP_COMP_CALIBRATION SETUP → Sensor pH/ORP → Cal. Settings → Temp. compensation	OOS	Temperature Compensation method used for calibration **Available values:** 0: None 1: ATC (Automatic temperature compensation) 2: MTC (Manual temperature compensation) **Factory setting:** ATC
72	MEDIUM_TEMP_CALIBRATION SETUP → Sensor pH/ORP → Cal. Settings → Medium temp.	OOS	Medium (buffer) temperature used for calibration, if MEDIUM_TEMP_CALIBRATION is set to "MTC" **Available values:** -50 to +250 °C **Factory setting:** 25 °C

PHORP Transducer Block (manufacturer-specific parameters)			
Parameter index	**Parameter** **Local Display Menu Path**	**Properties**	**Description**
73	BUFFER_RECOGNITION SETUP → Sensor pH/ORP → Cal. Settings → Buffer recognition	W	Calibration Buffer Recognition **Available values:** 0: Automatic 1: Fixed Buffer 2: Manual **Automatic:** The device recognizes the buffer automatically. The recognition depends on the setting for BUFFER_MANUFACTURER. **Fixed:** You choose values from a list. This list depends on the setting for BUFFER_MANUFACTURER. **Manual:** You enter any two buffer values. These must differ in terms of their pH value. Details to temperature tables and calibration see chapter 3.1 Sensor pH/ORP in BA00382C **Factory setting:** Fixed Buffer
74	AUTO_BUFFER_RECOGNITION SETUP → Sensor pH/ORP → Cal. Settings → Buffer recognition	W	required for up/download only
75	MANUAL_BUFFER_RECOGNITION SETUP → Sensor pH/ORP → Cal. Settings → Buffer recognition	W	required for up/download only
76	BUFFER_MANUFACTURER SETUP → Sensor pH/ORP → Cal. Settings → Buffer manufact.	W	Calibration Buffer Manufacturer **Available values:** 0: EH_NIST 1: INGOLD METTLER 2: DIN 19266 3: DIN 19267 4: MERCK RIEDEL 5: Special Buffer 6: Hamilton Details to temperature tables and calibration see chapter 3.1 Sensor pH/ORP in BA00382C You have the possibility of defining four buffers of your own with option "Special Buffer". **Factory setting:** EH_NIST
77	SPECIAL_BUFFER SETUP → Sensor pH/ORP → Cal. Settings → Special buffer → Special buffer	W	Select one of four available special buffers **Available values:** 0: User Buffer 1 1: User Buffer 2 2: User Buffer 3 3: User Buffer 4 **Factory setting:** User Buffer 1
78	TAB1_BUFFER_NAME SETUP → Sensor pH/ORP → Cal. Settings → Special buffer → Buffername	W	user-defined name for special buffer 1 **Available values:** up to 10 Ascii characters **Factory setting:** Buffer 1
79	TAB2_BUFFER_NAME SETUP → Sensor pH/ORP → Cal. Settings → Special buffer → Buffername	W	user-defined name for special buffer 2 **Available values:** up to 10 Ascii characters **Factory setting:** Buffer 2
80	TAB3_BUFFER_NAME SETUP → Sensor pH/ORP → Cal. Settings → Special buffer → Buffername	W	user-defined name for special buffer 3 **Available values:** up to 10 Ascii characters **Factory setting:** Buffer 3

PHORP Transducer Block (manufacturer-specific parameters)			
Parameter index	**Parameter** **Local Display Menu Path**	**Properties**	**Description**
81	TAB4_BUFFER_NAME SETUP → Sensor pH/ORP → Cal. Settings → Special buffer → Buffername	W	user-defined name for special buffer 4 **Available values:** up to 10 Ascii characters **Factory setting:** Buffer 4
82	TAB_ENTRY	W	Used to read/write special buffer tables by methods
83	TAB_X_VALUE	W	Used to read/write special buffer tables by methods
84	TAB_Y_VALUE	W	Used to read/write special buffer tables by methods
85	TAB_MIN_NUMBER		Used to read/write special buffer tables by methods
86	TAB_MAX_NUMBER		Used to read/write special buffer tables by methods
87	TAB_OP_CODE	W	Used to read/write special buffer tables by methods
88	TAB_STATUS		Used to read/write special buffer tables by methods
89	TAB_ACTUAL_NUMBER	W	Used to read/write special buffer tables by methods
90	MANUAL_1_CAL_BUFFER SETUP → Sensor pH/ORP → Cal. Settings → Calib. Buffer 1	OOS	Configuration of the value of calibration buffer 1, which will be used, if BUFFER_RECOGNITION is set to "Manual" **Available values:** -2.0 to 16.0 pH **Factory setting:** 7.0 pH
91	MANUAL_2_CAL_BUFFER SETUP → Sensor pH/ORP → Cal. Settings → Calib. Buffer 1	OOS	Configuration of the value of calibration buffer 2, which will be used, if BUFFER_RECOGNITION is set to "Manual" **Available values:** -2.0 to 16.0 pH **Factory setting:** 4.0 pH
92	FIXED_1_CAL_BUFFER SETUP → Sensor pH/ORP → Cal. Settings → Calib. Buffer 1	OOS	Configuration of the value of calibration buffer 1, which will be used, if BUFFER_RECOGNITION is set to "Fixed". Indicated values depend on the setting of BUFFER_MANUFACTURER **Available values:** Details to temperature tables and calibration see chapter 3.1 Sensor pH/ORP in BA00382C **Factory setting:** E+H 7.00 pH
93	E_H_FIXED_1_CAL_BUFFER SETUP → Sensor pH/ORP → Cal. Settings → Calib. Buffer 1	OOS	required for up/download only
94	INGOLDMETTLER_FIXED_1_CAL_BUFFER SETUP → Sensor pH/ORP → Cal. Settings → Calib. Buffer 1	OOS	required for up/download only
95	DIN19266_FIXED_1_CAL_BUFFER SETUP → Sensor pH/ORP → Cal. Settings → Calib. Buffer 1	OOS	required for up/download only
96	DIN19267_FIXED_1_CAL_BUFFER SETUP → Sensor pH/ORP → Cal. Settings → Calib. Buffer 1	OOS	required for up/download only
97	MERCKRIEDEL_FIXED_1_CAL_BUFFER SETUP → Sensor pH/ORP → Cal. Settings → Calib. Buffer 1	OOS	required for up/download only
98	SPECIAL_FIXED_1_CAL_BUFFER SETUP → Sensor pH/ORP → Cal. Settings → Calib. Buffer 1	OOS	required for up/download only
99	HAMILTON_FIXED_1_CAL_BUFFER SETUP → Sensor pH/ORP → Cal. Settings → Calib. Buffer 1	OOS	required for up/download only
100	FIXED_2_CAL_BUFFER SETUP → Sensor pH/ORP → Cal. Settings → Calib. Buffer 2	OOS	Configuration of the value of calibration buffer 2, which will be used, if BUFFER_RECOGNITION is set to "Fixed". Indicated values depend on the setting of BUFFER_MANUFACTURER **Available values:** Details to temperature tables and calibration see chapter 3.1 Sensor pH/ORP in BA00382C **Factory setting:** E+H 4.00 pH

PHORP Transducer Block (manufacturer-specific parameters)			
Parameter index	**Parameter** **Local Display Menu Path**	**Properties**	**Description**
101	E_H_FIXED_2_CAL_BUFFER SETUP → Sensor pH/ORP → Cal. Settings → Calib. Buffer 2	OOS	required for up/download only
102	INGOLDMETTLER_FIXED_2_CAL_BUFFER SETUP → Sensor pH/ORP → Cal. Settings → Calib. Buffer 2	OOS	required for up/download only
103	DIN19266_FIXED_2_CAL_BUFFER SETUP → Sensor pH/ORP → Cal. Settings → Calib. Buffer 2	OOS	required for up/download only
104	DIN19267_FIXED_2_CAL_BUFFER SETUP → Sensor pH/ORP → Cal. Settings → Calib. Buffer 2	OOS	required for up/download only
105	MERCKRIEDEL_FIXED_2_CAL_BUFFER SETUP → Sensor pH/ORP → Cal. Settings → Calib. Buffer 2	OOS	required for up/download only
106	SPECIAL_FIXED_2_CAL_BUFFER SETUP → Sensor pH/ORP → Cal. Settings → Calib. Buffer 2	OOS	required for up/download only
107	HAMILTON_FIXED_2_CAL_BUFFER SETUP → Sensor pH/ORP → Cal. Settings → Calib. Buffer 2	OOS	required for up/download only
108	ISOTHERM_PH SETUP → Sensor pH/ORP → Cal. Settings → Isotherm pnt.	OOS	Isotherm intersection The value is identical to that of the internal buffer. Do not change the value. **Available values:** -2.0 to 16.0 pH **Factory setting:** 7.0 pH
109	PH_GLASS_ISOTHERM_PH SETUP → Sensor pH/ORP → Cal. Settings → Isotherm pnt.	OOS	required for up/download only
110	PFAUDLER03_ISOTHERM_PH SETUP → Sensor pH/ORP → Cal. Settings → Isotherm pnt.	OOS	required for up/download only
111	PFAUDLER18_ISOTHERM_PH SETUP → Sensor pH/ORP → Cal. Settings → Isotherm pnt.	OOS	required for up/download only
112	REFERENCE_BUFFER_ORP_MV SETUP → Sensor pH/ORP → Cal. Settings ORP → Reference buffer	OOS	Reference buffer for ORP mV: Enter the buffer value indicated on the manufacturer's certificate. **Available values:** -1500 to +1500 mV **Factory setting:** 0 mV
113	SENSOR_OFFSET_ORP_MV DIAG → Sensor status → Offset		Calibrated sensor offset **Possible values:** -100 to +100 mV **Default value**: 0 mV
114	SENSOR_OFFSET_ORP_PERCENT DIAG → Sensor status → Offset		Calibrated sensor offset **Possible values:** -100 to +100 mV **Default value**: 0 mV
115	BUFFER_1_PERCENT_ORP SETUP → Sensor pH/ORP → Cal. Settings ORP → Buffer 1	OOS	For ORP % only: First value for two point calibration **Available values:** 0 to 30 % **Factory setting:** 20 %
116	BUFFER_2_PERCENT_ORP SETUP → Sensor pH/ORP → Cal. Settings ORP → Buffer 1	OOS	For ORP % only: Second value for two point calibration **Available values:** 70 to 100 % **Factory setting:** 80 %
117	TEMP_COMPENSATION SETUP → Sensor pH/ORP → Temp. compensation	OOS	Current temperature compensation setting **Available values:** 0: None 1: ATC (Automatic temperature compensation) 2: MTC (Manual temperature compensation) **Factory setting:** ATC

PHORP Transducer Block (manufacturer-specific parameters)			
Parameter index	**Parameter** **Local Display Menu Path**	**Properties**	**Description**
118	MEDIUM_TEMPERATURE SETUP → Sensor pH/ORP → Medium temp.	OOS	Medium (buffer) temperatur, if TEMP_COMPENSATION is set to "MTC" **Available values:** -50 to +250 °C **Factory setting:** 25.0 °C
119	COMP_TYPE_PH_MEDIUM SETUP → Sensor pH/ORP → Medium compensation → Type of compensation	OOS	Select medium compensation type (pH only) **Available values:** 0:Comp Off 1: 2 point 2: Table **Factory setting:** Comp off
120	REFERENCE_TEMPERATURE SETUP → Sensor pH/ORP → Medium compensation → Reference temp.	OOS	Temperature to which the compensated pH value refers (pH only) **Available values:** 50 to +250 °C **Factory setting:** 25.0 °C
121	TEMPERATURE_1 SETUP → Sensor pH/ORP → Medium compensation → Temperature 1	OOS	Medium compensation temperature value 1 for 2-point compensation **Available values:** 50 to +250 °C **Factory setting:** 25.0 °C
122	PH_1 SETUP → Sensor pH/ORP → Medium compensation → pH 1	OOS	Medium compensation pH value 1 for 2-point compensation **Available values:** -2.0 to 16.0 pH **Factory setting:** 7.0 pH
123	TEMPERATURE_2 SETUP → Sensor pH/ORP → Medium compensation → Temperature 2	OOS	Medium compensation temperature value 2 for 2-point compensation **Available values:** 50 to +250 °C **Factory setting:** 40.0 °C
124	PH_2 SETUP → Sensor pH/ORP → Medium compensation → pH 2	OOS	Medium compensation pH value 2 for 2-point compensation **Available values:** -2.0 to 16.0 pH **Factory setting:** 7.5 pH
125	MEDIUMS_COMP_TAB_ENTRY	W	Used to read/write medium compensation table by methods
126	MEDIUMS_COMP_TAB_X_VALUE	W	Used to read/write medium compensation table by methods
127	MEDIUMS_COMP_TAB_Y_VALUE	W	Used to read/write medium compensation table by methods
128	MEDIUMS_COMP_TAB_MIN_NUMBER		Used to read/write medium compensation table by methods
129	MEDIUMS_COMP_TAB_MAX_NUMBER		Used to read/write medium compensation table by methods
130	MEDIUMS_COMP_TAB_OP_CODE	W	Used to read/write medium compensation table by methods
131	MEDIUMS_COMP_TAB_STATUS		Used to read/write medium compensation table by methods
132	MEDIUMS_COMP_TAB_ACTUAL_NUMBER	W	Used to read/write medium compensation table by methods
133	PH_OFFSET DIAG → Sensor status → Offset	OOS	pH offset **Available values:** -2.0 to 16.0 pH **Factory setting:** 0.0 pH
134	REFERENCE_IMPEDANCE_SENSOR DIAG → Service → Raw values → Impedance reference		Current reference impedance (anlog pH or pHORP sensor) unit: Ohm
135	ISFET_OPERATING_POINT DIAG → Sensor status → Operating point		IsFET sensor only: operating point unit: mV **Default value**: 0 mV
136	ISFET_LEAKAGE_CURRENT		IsFET sensor only: leakage current unit: nA

PHORP Transducer Block (manufacturer-specific parameters)			
Parameter index	**Parameter** **Local Display Menu Path**	**Properties**	**Description**
137	SLOPE_ORPPERCENT DIAG → Sensor status → Slope		Slope of mV/percent mapping (ORP% only) Unit: none **Default value**: 0.03
138	ZERO_POINT_ORPPERCENT DIAG → Sensor status → Offset		Offset of mV/percent mapping (ORP% only) Unit: mV **Default value**: 0.0 mV
139	SENSOR_CAL_VALID		Validity of the displayed calibration parameter for main measurement **Available values:** FALSE - Invalid TRUE - Valid **Factory setting:** FALSE
140	SENSOR_CAL_TEMP_VALID		Validity of the displayed calibration parameter for temperature measurement **Available values:** FALSE - Invalid TRUE - Valid **Factory setting:** FALSE
141	PH_ADJUSTMENT_STORAGE SETUP → Sensor pH/ORP →Cal. Settings → 1 point adjustment		Storage selection for 1-point adjustment data **Available values:** 0 – Sensor 1 - Transmitter **Factory setting:** FALSE
142	SENSOR_CONNECTED		Indicates current sensor connection state **Available values:** 0 to 29: not connected 30 - connected **Default value:** 0
143	OFFSET_TEMPERATURE CAL → Temperature → Offset		Indicates current temperature offset Unit: Kelvin **Factory setting:** 0.0
144	DIAGNOSTIC_EVENT_SIMULATION	W	Switch to enable/disable the simulation of diagnostic events. Pre-condition before diagnostic simulation can be set to enabled state: The actual block mode must be OOS. After enabling simulation the SIMU icon on the local display will be lit. The diagnostic event 'Simulation active' will be set as well. **Available values**: 0 - Off 1 – On **Factory setting**: Off
145	SIMULATED_DIAGNOSTIC_EVENT	W	Select one of the available enumerations which will be transferred as an active diagnostic event. **Possible values**: 0x0000 to 0x0349 (0000 to 0841); details see chapter Diagnostic Codes and Maintenance
146	MAIN_MEASURED_VALUE_SIMULATION DIAG → Service →Simulation → Measured value → Simulation	W	Switch to enable/disable main measured value simulation. Pre-condition before this simulation type can be set to enabled state: The actual block mode must be OOS. After enabling simulation the SIMU icon on the local display will be lit. The diagnostic event 'Simulation active' will be set as well. **Available values**: 0 - Off 1 – On **Factory setting**: Off

PHORP Transducer Block (manufacturer-specific parameters)			
Parameter index	**Parameter** **Local Display Menu Path**	**Properties**	**Description**
147	SIMULATED_MEASURAND_PHORP DIAG → Service →Simulation → Measured value → Measured value	W	Select the desired main measurement parameter which should be simulated. **Available values**: 0 - pH 1 - ORP mV 2 - rH 3 - ORP % **Factory setting**: 0 – pH, 1 – ORP for ORP sensor types
148	SIMULATED_MAINMEASURED_VAL_PHORP DIAG → Service →Simulation → Measured value → Simulation value	W	Select the desired main measurement parameter which should be simulated. The selected measurand unit is set automatically and cannot be changed. **Possible values**: Depending on the selected measurand:
149	TEMPERATURE_VALUE_SIMULATION DIAG → Service →Simulation → Temperature→ Simulation	W	Switch to enable/disable temperature value simulation. Pre-condition before this simulation type can be set to enabled state: The actual block mode must be OOS. After enabling simulation the SIMU icon on the local display will be lit. The diagnostic event 'Simulation active' will be set as well. **Available values**: 0 - Off 1 – On **Factory setting**: Off
150	SIMULATED_TEMPERATURE_VALUE DIAG → Service →Simulation → Temperature→ Simulation value	W	Enter the desired value to be simulated in the unit which is set in parameter UNIT_MEAS_DAMPED_TEMP_VAL.. **Possible values**: -50.0 to 250 °C
151	ANALOG_SENSOR_TYPE	W	required for up/download only
152	DIGITAL_SENSOR_TYPE	W	required for up/download only
153	OFFSET_1PNT_TEMPERATURE	W	required for up/download only
154	OFFSET_2PNT_TEMPERATURE	W	required for up/download only
155	OFFSET_TABLE_TEMPERATURE	W	required for up/download only
156	CIP_SETTINGS SETUP → Sensor pH/ORP → CIP settings → Function	W	Switch to enable or disable CIP counter function **Available values**: 0 - Off 1 – On **Factory setting**: Off
157	CIP_DURATION SETUP → Sensor pH/ORP → CIP settings →Duration	W	The duration in min, which have to be reached to count a CIP cycle. The duration starts after falling below the lower temperature threshold value. **Available values**: 1.0 to 250.0 minutes **Factory setting**: 30 minutes
158	CIP_LOWER_TEMP_THRESHOLD SETUP → Sensor pH/ORP → CIP settings → Lower temp. threshold	W	The lower temperature threshold of CIP criteria. The temperature, measured within the temperature thresholds, is considered as a CIP cycle. **Available values**: 5.0 to (CIP_UPPER_TEMP_THRESHOLD – 1.0) °C **Factory setting**: 75 °C

PHORP Transducer Block (manufacturer-specific parameters)			
Parameter index	Parameter Local Display Menu Path	Properties	Description
159	CIP_UPPER_TEMP_THRESHOLD SETUP → Sensor pH/ORP → CIP settings → Upper temp. threshold	W	The upper temperature threshold of CIP criteria. If the temperature measurement value exceeds this limit, the CIP conditions will be violated and no CIP cycle is counted. A CIP cycle is counted when the lower temperature threshold is exceeded and followed by falling below the lower temperature threshold value again. **Available values**: (CIP_UPPER_TEMP_THRESHOLD + 1.0) to 90.0 °C **Factory setting**: 85 °C
160	CIP_PH_RANGE SETUP → Sensor pH/ORP → CIP settings → Type	W	Switch to select type of CIP. **Available values**: 0: Acidic 1: Alkaline **Factory setting**: 0 (Acidic)
161	CIP_PH_THRESHOLD SETUP → Sensor pH/ORP → CIP settings → pH threshold	W	A limit switch which should be set to a pH value where acidic or alkaline CIP level will be reached depending on the selected value in parameter CIP_PH_RANGE. **Available values**: 2.0 to 11.0 pH **Factory setting**: 11.0 pH
162	CUSTOMER_ID SETUP → Sensor pH/ORP → Identification → Customer ID	R	Customer ID, customer-specific identification **Available values**: max. 16 visible string characters **Factory setting**: 16 blank characters
163	SCS_REFERENCE SETUP → Sensor pH/ORP → Sensor diagnostics → SCS reference	R	Switch to enable or disable Sensor Check System for analog sensors with potential matching enabled and Memosens ORP sensors. Writable in DIAGPHORP transducer only. **Available values**: 0 - Off 1 – On **Factory setting**: Off

6.3.15. DIAGDI Transducer Block

The properties column lists parameter properties:
- W: Parameter is writable
- OOS: Parameter is writable in OOS mode only

Since all parameters can be read, this is not explicitly stated.

	DIAGDI Transducer Block (manufacturer-specific parameters)		
Parameter index	Parameter Local Display Menu Path	Properties	Description
14	IOTRD_BLOCK_ERR_DESC_1		Block Error Description which indicates problems detected within the block **Supported values:** 0x01 - Resource Block in OOS
15	ACTUAL_DIAG_STATUS DIAG → Most important message		Device's FCSM information **Supported values:** 0x00 : OK, no diagnostics detected 0x01 : F, failure 0x02 : M, maintenance required 0x03 : C, function check 0x04 : S, out of specification 0x05 : NC (Not Categorized)

	DIAGDI Transducer Block (manufacturer-specific parameters)		
Parameter index	Parameter Local Display Menu Path	Properties	Description
16	ACTUAL_DIAGNOSTICS DIAG → Most important message		Current diagnostic code with highest priority **Indicated values:** 0x0000 to 0x0349(0000 to 0841); details see chapter Diagnostic Codes and Maintenance
17	PREVIOUS_DIAGNOSTICS_DIAGDI DIAG → Past message		Previous diagnostic code **Indicated values:** 0x0000 to 0x0349(0000 to 0841); details see chapter Diagnostic Codes and Maintenance
18	CURRENT_STATE_CH1		Current state (value and status) for channel 1 after evaluating parameters ACTUAL_DIAGNOSTICS and CH1_ENB_xxx_yyy_ERR **Available values:** FALSE - Invalid TRUE - Valid **Factory setting:** value - FALSE, status – GOOD_NC (0x80)
19	CURRENT_STATE_CH2		Current state (value and status) for channel 2 after evaluating parameters ACTUAL_DIAGNOSTICS and CH2_ENB_xxx_yyy_ERR **Available values:** FALSE - Invalid TRUE - Valid **Factory setting:** value - FALSE, status – GOOD_NC (0x80)
20	CH1_ENB_001_032_ERR	W	A list of event numbers from 001 to 032. Each set bit will lead to an activated output for channel 1, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00001C04 Activated event numbers: 3, 11, 12, 13
21	CH1_ENB_033_064_ERR	W	A list of event numbers from 033 to 064. Each set bit will lead to an activated output for channel 1, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000000
22	CH1_ENB_065_096_ERR	W	A list of event numbers from 065 to 096. Each set bit will lead to an activated output for channel 1, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000000
23	CH1_ENB_097_128_ERR	W	A list of event numbers from 097 to 128. Each set bit will lead to an activated output for channel 1, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0xC0C000F8 Activated event numbers: 100, 101, 102, 103, 104, 119, 120, 127, 128
24	CH1_ENB_129_160_ERR	W	A list of event numbers from 129 to 160. Each set bit will lead to an activated output for channel 1, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000800 Activated event number: 140

	DIAGDI Transducer Block (manufacturer-specific parameters)		
Parameter index	**Parameter**	**Properties**	**Description**
25	CH1_ENB_161_192_ERR	W	A list of event numbers from 161 to 192. Each set bit will lead to an activated output for channel 1, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000000
26	CH1_ENB_193_224_ERR	W	A list of event numbers from 193 to 224. Each set bit will lead to an activated output for channel 1, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x02000400 Activated event numbers: 203, 218
27	CH1_ENB_225_256_ERR	W	A list of event numbers from 225 to 256. Each set bit will lead to an activated output for channel 1, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000000
28	CH1_ENB_257_288_ERR	W	A list of event numbers from 257 to 288. Each set bit will lead to an activated output for channel 1, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000000
29	CH1_ENB_289_320_ERR	W	A list of event numbers from 289 to 320. Each set bit will lead to an activated output for channel 1, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000000
30	CH1_ENB_321_352_ERR	W	A list of event numbers from 321 to 352. Each set bit will lead to an activated output for channel 1, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000000
31	CH1_ENB_353_384_ERR	W	A list of event numbers from 353 to 384. Each set bit will lead to an activated output for channel 1, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x18000000 Activated event numbers: 380, 381
32	CH1_ENB_385_416_ERR	W	A list of event numbers from 385 to 416. Each set bit will lead to an activated output for channel 1, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000000
33	CH1_ENB_417_448_ERR	W	A list of event numbers from 417 to 448. Each set bit will lead to an activated output for channel 1, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000000

	DIAGDI Transducer Block (manufacturer-specific parameters)		
Parameter index	Parameter	Properties	Description
34	CH1_ENB_449_480_ERR	W	A list of event numbers from 449 to 480. Each set bit will lead to an activated output for channel 1, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000000
35	CH1_ENB_481_512_ERR	W	A list of event numbers from 481 to 512. Each set bit will lead to an activated output for channel 1, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000000
36	CH1_ENB_513_544_ERR	W	A list of event numbers from 513 to 544. Each set bit will lead to an activated output for channel 1, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000001 Activated event number: 513
37	CH1_ENB_545_576_ERR	W	A list of event numbers from 545 to 576. Each set bit will lead to an activated output for channel 1, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000000
38	CH1_ENB_577_608_ERR	W	A list of event numbers from 577 to 608. Each set bit will lead to an activated output for channel 1, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000000
39	CH1_ENB_609_640_ERR	W	A list of event numbers from 609 to 640. Each set bit will lead to an activated output for channel 1, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000000
40	CH1_ENB_641_672_ERR	W	A list of event numbers from 641 to 672. Each set bit will lead to an activated output for channel 1, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000000
41	CH1_ENB_673_704_ERR	W	A list of event numbers from 673 to 704. Each set bit will lead to an activated output for channel 1, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000000

	DIAGDI Transducer Block (manufacturer-specific parameters)		
Parameter index	**Parameter**	**Properties**	**Description**
42	CH1_ENB_705_736_ERR	W	A list of event numbers from 705 to 736. Each set bit will lead to an activated output for channel 1, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000000
43	CH1_ENB_737_768_ERR	W	A list of event numbers from 737 to 768. Each set bit will lead to an activated output for channel 1, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000000
44	CH1_ENB_769_800_ERR	W	A list of event numbers from 769 to 800. Each set bit will lead to an activated output for channel 1, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000002
45	CH1_ENB_801_832_ERR	W	A list of event numbers from 801 to 832. Each set bit will lead to an activated output for channel 1, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000E02 Activated event numbers: 802, 810, 811, 812
46	CH1_ENB_833_864_ERR	W	A list of event numbers from 833 to 864. Each set bit will lead to an activated output for channel 1, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000000
47	CH1_ENB_865_896_ERR	W	A list of event numbers from 865 to 896. Each set bit will lead to an activated output for channel 1, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000000
48	CH1_ENB_897_928_ERR	W	A list of event numbers from 897 to 928. Each set bit will lead to an activated output for channel 1, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000000
49	CH1_ENB_929_960_ERR	W	A list of event numbers from 929 to 960. Each set bit will lead to an activated output for channel 1, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000000
50	CH1_ENB_961_992_ERR	W	A list of event numbers from 961 to 992. Each set bit will lead to an activated output for channel 1, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000000

	DIAGDI Transducer Block (manufacturer-specific parameters)		
Parameter index	Parameter	Properties	Description
51	CH1_ENB_993_999_ERR	W	A list of event numbers from 993 to 999. Each set bit will lead to an activated output for channel 1, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000000
52	CH2_ENB_001_032_ERR	W	A list of event numbers from 001 to 032. Each set bit will lead to an activated output for channel 2, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00002208 Activated event numbers: 4, 10, 14
53	CH2_ENB_033_064_ERR	W	A list of event numbers from 033 to 064. Each set bit will lead to an activated output for channel 2, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000000
54	CH2_ENB_065_096_ERR	W	A list of event numbers from 065 to 096. Each set bit will lead to an activated output for channel 2, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000000
55	CH2_ENB_097_128_ERR	W	A list of event numbers from 097 to 128. Each set bit will lead to an activated output for channel 2, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x0000C600 Activated event numbers: 106, 107, 111, 112
56	CH2_ENB_129_160_ERR	W	A list of event numbers from 129 to 160. Each set bit will lead to an activated output for channel 2, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x0F0927EF Activated event numbers: 129, 130, 131, 132, 134, 135, 136, 137, 138, 139, 142, 145, 148, 153, 154, 155, 156
57	CH2_ENB_161_192_ERR	W	A list of event numbers from 161 to 192. Each set bit will lead to an activated output for channel 2, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x63FFF800 Activated event numbers: 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 190, 191
58	CH2_ENB_193_224_ERR	W	A list of event numbers from 193 to 224. Each set bit will lead to an activated output for channel 2, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x04400000 Activated event numbers:215, 219

	DIAGDI Transducer Block (manufacturer-specific parameters)		
Parameter index	**Parameter**	**Properties**	**Description**
59	CH2_ENB_225_256_ERR	W	A list of event numbers from 225 to 256. Each set bit will lead to an activated output for channel 2, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x0000E000 Activated event numbers:238, 239, 240
60	CH2_ENB_257_288_ERR	W	A list of event numbers from 257 to 288. Each set bit will lead to an activated output for channel 2, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000000
61	CH2_ENB_289_320_ERR	W	A list of event numbers from 289 to 320. Each set bit will lead to an activated output for channel 2, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0xE0000000 Activated event numbers:318, 319, 320
62	CH2_ENB_321_352_ERR	W	A list of event numbers from 321 to 352. Each set bit will lead to an activated output for channel 2, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000003 Activated event numbers: 321, 322
63	CH2_ENB_353_384_ERR	w	A list of event numbers from 353 to 384. Each set bit will lead to an activated output for channel 2, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000000
64	CH2_ENB_385_416_ERR	W	A list of event numbers from 385 to 416. Each set bit will lead to an activated output for channel 2, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x01980000 Activated event numbers: 404, 405, 408, 409
65	CH2_ENB_417_448_ERR	W	A list of event numbers from 417 to 448. Each set bit will lead to an activated output for channel 2, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000000
66	CH2_ENB_449_480_ERR	W	A list of event numbers from 449 to 480. Each set bit will lead to an activated output for channel 2, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000000

	DIAGDI Transducer Block (manufacturer-specific parameters)		
Parameter index	Parameter	Properties	Description
67	CH2_ENB_481_512_ERR	W	A list of event numbers from 481 to 512. Each set bit will lead to an activated output for channel 2, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00100000 Activated event number: 501
68	CH2_ENB_513_544_ERR	W	A list of event numbers from 513 to 544. Each set bit will lead to an activated output for channel 2, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x000E0002 Activated event numbers: 514, 530, 531, 532
69	CH2_ENB_545_576_ERR	W	A list of event numbers from 545 to 576. Each set bit will lead to an activated output for channel 2, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000000
70	CH2_ENB_577_608_ERR	W	A list of event numbers from 577 to 608. Each set bit will lead to an activated output for channel 2, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000000
71	CH2_ENB_609_640_ERR	W	A list of event numbers from 609 to 640. Each set bit will lead to an activated output for channel 2, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000000
72	CH2_ENB_641_672_ERR	W	A list of event numbers from 641 to 672. Each set bit will lead to an activated output for channel 2, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000000
73	CH2_ENB_673_704_ERR	W	A list of event numbers from 673 to 704. Each set bit will lead to an activated output for channel 2, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000000
74	CH2_ENB_705_736_ERR	W	A list of event numbers from 705 to 736. Each set bit will lead to an activated output for channel 2, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000000
75	CH2_ENB_737_768_ERR	W	A list of event numbers from 737 to 768. Each set bit will lead to an activated output for channel 2, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000000

	DIAGDI Transducer Block (manufacturer-specific parameters)		
Parameter index	**Parameter**	**Properties**	**Description**
76	CH2_ENB_769_800_ERR	W	A list of event numbers from 769 to 800. Each set bit will lead to an activated output for channel 2, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000000
77	CH2_ENB_801_832_ERR	W	A list of event numbers from 801 to 832. Each set bit will lead to an activated output for channel 2, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000000
78	CH2_ENB_833_864_ERR	W	A list of event numbers from 833 to 864. Each set bit will lead to an activated output for channel 2, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000180 Activated event numbers: 840, 841
79	CH2_ENB_865_896_ERR	W	A list of event numbers from 865 to 896. Each set bit will lead to an activated output for channel 2, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000000
80	CH2_ENB_897_928_ERR	W	A list of event numbers from 897 to 928. Each set bit will lead to an activated output for channel 2, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000000
81	CH2_ENB_929_960_ERR	W	A list of event numbers from 929 to 960. Each set bit will lead to an activated output for channel 2, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000000
82	CH2_ENB_961_992_ERR	W	A list of event numbers from 961 to 992. Each set bit will lead to an activated output for channel 2, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000000
83	CH2_ENB_993_999_ERR	W	A list of event numbers from 993 to 999. Each set bit will lead to an activated output for channel 2, if parameter value ACTUAL_DIAGNOSTICS matches. **Available values**: 0x00000000 to 0xFFFFFFFF **Factory setting**: 0x00000000

6.3.16. SERVICE Transducer Block

The properties column lists parameter properties:
- W: Parameter is writable
- OOS: Parameter is writable in OOS mode only

Since all parameters can be read, this is not explicitly stated.

SERVICE Transducer Block (manufacturer-specific parameters)			
Parameter index	**Parameter** **Local Display Menu Path**	**Properties**	**Description**
14	TRD_BLOCK_ERR_DESC_1		Block Error Description which indicates problems detected within the block **Supported values:** 0x01 - Resource Block in OOS
15	ACTUAL_DIAG_STATUS DIAG → Most important message		Device's FCSM information **Supported values:** 0x00 : OK, no diagnostics detected 0x01 : F, failure 0x02 : M, maintenance required 0x03 : C, function check 0x04 : S, out of specification 0x05 : NC (Not Categorized)
16	ACTUAL_DIAGNOSTICS DIAG → Most important message		Current diagnostic code with highest priority **Indicated values:** 0x0000 to 0x0349(0000 to 0841); details see chapter Diagnostic Codes and Maintenance
17	SENSOR_INTERFACE		Connected sensor interface type **Indicated values:** 0 - Analog 1 - Digital
18	SOFTWARE_FUNCTIONALITY DIAG → Device information → Order code		Indicates software capability as Standard or Advanced like indicated in order code (i.e. MAA600E**A**D00 means standard or MAA600E**B**D00 means advanced). Advanced functionality contains functions like additional diagnostics, logbooks, table handling **Indicated values:** 0 - Standard 1 - Advanced
19	SIM_JUMPER		Physical position of the simulation jumper (on/off) **Indicated values:** 1 - Sim disabled 2 - Sim enabled **Factory setting:** Sim disabled
20	DEVICE_SIM		Icon on local display. If lit, it indicates, that simulate functionality is activated **Indicated values:** 0 - Off 1 - On
21	PACKAGE DIAG → Device information → Projecting		Current installed projecting package **Range**: octet string with size of 16 **Factory Setting**: PH/ORP
22	DATE_FORMAT SETUP → General settings → Date/Time → Date format	W	Select date format for local device display **Available values**: 2 - DDMMYYYY 4 – MMDDYYYY **Factory setting**: DDMMYYYY

SERVICE Transducer Block (manufacturer-specific parameters)			
Parameter index	**Parameter** **Local Display Menu Path**	**Properties**	**Description**
23	DATE_TIME SETUP → General settings → Date/Time → Set date	W	Date and time which is indicated on the local device display and used for time stamps in ACTUAL_TIME_STAMP_1..._10, ACTUAL_DIAG_TIMESTAMP and PREVIOUS_DIAG_TIMESTAMP **Range**: DATE format (size 7) according to FF specification 870
24	TIME_FORMAT SETUP → General settings → Date/Time → Time format	W	Select time format for local device display **Available values:** 0 - HHMMSS24 2 - HHMMSS12 **Factory setting**: HHMMSS24
25	HW_ID_INFO_MODUL DIAG → Device information → Hardware identifier		Hardware identification number of the device **Range**: Octet string of size 20
26	SERIAL_NUMBER_INFO_MODUL DIAG → Device information → Serial number		Serial number of the device **Range**: Octet string of size 20
27	PROJ_VER_INFO_MODUL DIAG → Device information → Device version		Projecting version of the device **Range**: Octet string of size 20
28	SW_VERSION_INFO_MODUL		Software version of the device **Range**: Octet string of size 20
29	ORDER_CODE_INFO_MODUL DIAG → Device information → Order code		Order code of the device **Range**: Octet string of size 20
30	HW_ID_INFO_CPU DIAG → Device information → CPU → Hardware identifier		Hardware identification number of the CPU module **Range**: Octet string of size 20
31	SERIAL_NUMBER_INFO_CPU DIAG → Device information → CPU → Serial number		Serial number of the CPU module **Range**: Octet string of size 20
32	ORDER_CODE_INFO_CPU DIAG → Device information → CPU → Order code		Order Code for the CPU module **Range**: Octet string of size 20
33	HW_VERSION_INFO_CPU DIAG → Device information → CPU → Hardware version		Hardware version of the CPU **Range**: Octet string of size 20module
34	SW_VERSION_INFO_CPU DIAG → Device information → CPU → Software version		Software version of the CPU module **Range**: Octet string of size 20
35	HW_ID_INFO_BUS DIAG → Device information → Fieldbus module → Hardware identifier		Hardware identification number of the Fieldbus module **Range**: Octet string of size 20
36	SERIAL_NUMBER_INFO_BUS DIAG → Device information → Fieldbus module → Serial number		Serial number of the Fieldbus module **Range**: Octet string of size 20
37	ORDER_CODE_INFO_BUS DIAG → Device information → Fieldbus module → Order code		Order Code for the Fieldbus module **Range**: Octet string of size 20
38	HW_VERSION_INFO_BUS DIAG → Device information → Fieldbus module → Hardware version		Hardware version of the Fieldbus module **Range**: Octet string of size 20
39	SW_VERSION_INFO_BUS DIAG → Device information → Fieldbus module → Software version		Software version of the Fieldbus module **Range**: Octet string of size 20
40	HW_ID_INFO_SAMODUL DIAG → Device information → Sensor module → Hardware identifier		Hardware identification number of the Sensor module **Range**: Octet string of size 20
41	SERIAL_NUMBER_INFO_SAMODUL DIAG → Device information → Sensor module → Serial number		Serial number of the Sensor module **Range**: Octet string of size 20

SERVICE Transducer Block (manufacturer-specific parameters)			
Parameter index	**Parameter** **Local Display Menu Path**	**Properties**	**Description**
42	ORDER_CODE_INFO_SAMODUL DIAG → Device information → Sensor module → Order code		Order Code for the Sensor module **Range**: Octet string of size 20
43	HW_VERSION_INFO_SAMODUL DIAG → Device information → Sensor module → Hardware version		Hardware version of the Sensor module **Range**: Octet string of size 20
44	SW_VERSION_INFO_SAMODUL DIAG → Device information → Sensor module → Software version		Software version of the Sensor module **Range**: Octet string of size 20
45	HW_ID_INFO_DISPLAY DIAG → Device information → Display → Hardware identifier		Hardware identification number of the Display module **Range**: Octet string of size 20
46	SERIAL_NUMBER_INFO_DISPLAY DIAG → Device information → Display → Serial number		Serial number of the Display module **Range**: Octet string of size 20
47	ORDER_CODE_INFO_DISPLAY DIAG → Device information → Display → Order code		Order Code for the Display module **Range**: Octet string of size 20
48	HW_VERSION_INFO_DISPLAY DIAG → Device information → Display → Hardware version		Hardware version of the Display module **Range**: Octet string of size 20
49	SW_VERSION_INFO_DISPLAY DIAG → Device information → Display → Software version		Software version of the Display module **Range**: Octet string of size 20

6.3.17. ADVDIAGPHORP Transducer Block

The properties column lists parameter properties:
- W: Parameter is writable
- OOS: Parameter is writable in OOS mode only

Since all parameters can be read, this is not explicitly stated.

ADVDIAGPHORP Transducer Block (manufacturer-specific parameters)			
Parameter index	**Parameter** **Local Display Menu Path**	**Properties**	**Description**
14	TRD_BLOCK_ERR_DESC_1		Block Error Description which indicates problems detected within the block **Supported values**: 0x01 - Resource Block in OOS
15	ACTUAL_DIAG_STATUS DIAG → Most important message		Device's FCSM information **Supported values:** 0x00 : OK, no diagnostics detected 0x01 : F, failure 0x02 : M, maintenance required 0x03 : C, function check 0x04 : S, out of specification 0x05 : NC (Not Categorized)
16	ACTUAL_DIAGNOSTICS DIAG → Most important message		Current diagnostic code with highest priority **Indicated values:** 0x0000 to 0x0349(0000 to 0841); details see chapter Diagnostic Codes and Maintenance
17	SENSOR_INTERFACE		Connected sensor interface type **Indicated values:** 0 - Analog 1 - Digital
18	SOFTWARE_FUNCTIONALITY DIAG → Device information → Order code		Indicates software capability as Standard or Advanced like indicated in order code (i.e. MAA600E**A**D00 means standard or MAA600E**B**D00 means advanced). Advanced functionality contains functions like additional diagnostics, logbooks, table handling **Indicated values:** 0 - Standard 1 - Advanced
19	SIM_JUMPER		Physical position of the simulation jumper (on/off) **Indicated values**: 1 - Sim disabled 2 - Sim enabled **Factory setting**: Sim disabled
20	DEVICE_SIM		Icon on local display. If lit, it indicates, that simulate functionality is activated **Indicated values**: 0 - Off 1 - On
21	DEVICE_HOLD		Icon on local display. If lit, it indicates, that HOLD functionality is activated **Indicated values**: 0 - Off 1 - On
22	ACTUAL_DIAG_TIMESTAMP		time stamp of current diagnostics **Range**: DATE format (size 7) according to FF specification 870
23	MAINT_INSTRUCTION_PHORP		maintenance instruction **Possible values:** 0x0000 to 0x0349 (0000 to 0841); details see chapter Diagnostic Codes and Maintenance

ADVDIAGPHORP Transducer Block (manufacturer-specific parameters)			
Parameter index	**Parameter** **Local Display Menu Path**	**Properties**	**Description**
24	PREVIOUS_DIAG_STATUS DIAG → Past message		Previous device's FCSM information **Supported values**: 0x00 : OK 0x01 : F 0x02 : M 0x03 : C 0x04 : S 0x05 : NC (Not Categorized)
25	PREVIOUS_DIAGNOSTICS DIAG → Past message		Previous diagnostic code **Possible values**: 0x0000 to 0x0349 (0000 to 0841); details see chapter Diagnostic Codes and Maintenance
26	PREVIOUS_DIAG_TIMESTAMP		time stamp of previous diagnostics **Range**: DATE format (size 7) according to FF specification 870
27	OPERATING_TIME_FROM_RESTART		Indicates how long the device has been in operation since last restart **Range**: Octet string of size 14 Format: 0000d00h00m00s
28	ACTUAL_DIAG_LIST_1		First entry in current diagnostics list; matches with first entry of errors/messages view on device's local display **Possible values**: 0x0000 to 0x0349 (0000 to 0841); details see chapter Diagnostic Codes and Maintenance
29	ACTUAL_TIMESTAMP_1		time stamp of first diagnostic list entry **Range**: DATE format (size 7) according to FF specification 870
30	ACTUAL_DIAG_LIST_2		Second entry in current diagnostics list; matches with second entry of errors/messages view on device's local display **Possible values**: 0x0000 to 0x0349 (0000 to 0841 details see chapter Diagnostic Codes and Maintenance
31	ACTUAL_TIMESTAMP_2		time stamp of second diagnostic list entry **Range**: DATE format (size 7) according to FF specification 870
32	ACTUAL_DIAG_LIST_3		Third entry in current diagnostics list; matches with third entry of errors/messages view on device's local display **Possible values**: 0x0000 to 0x0349 (0000 to 0841); details see chapter Diagnostic Codes and Maintenance
33	ACTUAL_TIMESTAMP_3		time stamp of third diagnostic list entry **Range**: DATE format (size 7) according to FF specification 870
34	ACTUAL_DIAG_LIST_4		Fourth entry in current diagnostics list; matches with fourth entry of errors/messages view on device's local display **Possible values** 0x0000 to 0x0349 (0000 to 0841); details see chapter Diagnostic Codes and Maintenance
35	ACTUAL_TIMESTAMP_4		time stamp of fourth diagnostic list entry **Range**: DATE format (size 7) according to FF specification 870
36	ACTUAL_DIAG_LIST_5		Fifth entry in current diagnostics list; matches with fifth entry of errors/messages view on device's local display **Possible values**: 0x0000 to 0x0349 (0000 to 0841); details see chapter Diagnostic Codes and Maintenance
37	ACTUAL_TIMESTAMP_5		time stamp of fifth diagnostic list entry **Range**: DATE format (size 7) according to FF specification 870
38	ACTUAL_DIAG_LIST_6		Sixth entry in current diagnostics list; matches with sixth entry of errors/messages view on device's local display **Possible values**: 0x0000 to 0x0349 (0000 to 0841); details see chapter Diagnostic Codes and Maintenance

ADVDIAGPHORP Transducer Block (manufacturer-specific parameters)			
Parameter index	Parameter Local Display Menu Path	Properties	Description
39	ACTUAL_TIMESTAMP_6		time stamp of sixth diagnostic list entry **Range**: DATE format (size 7) according to FF specification 870
40	ACTUAL_DIAG_LIST_7		Seventh entry in current diagnostics list; matches with seventh entry of errors/messages view on device's local display **Possible values**: 0x0000 to 0x0349 (0000 to 0841); details see chapter Diagnostic Codes and Maintenance
41	ACTUAL_TIMESTAMP_7		time stamp of Seventh diagnostic list entry **Range**: DATE format (size 7) according to FF specification 870
42	ACTUAL_DIAG_LIST_8		Eighth entry in current diagnostics list; matches with eighth entry of errors/messages view on device's local display **Possible values**: 0x0000 to 0x0349 (0000 to 0841); details see chapter Diagnostic Codes and Maintenance
43	ACTUAL_TIMESTAMP_8		time stamp of eighth diagnostic list entry **Range**: DATE format (size 7) according to FF specification 870
44	ACTUAL_DIAG_LIST_9		Ninth entry in current diagnostics list; matches with ninth entry of errors/messages view on device's local display **Possible values**: 0x0000 to 0x0349 (0000 to 0841); details see chapter Diagnostic Codes and Maintenance
45	ACTUAL_TIMESTAMP_9		time stamp of ninth diagnostic list entry **Range**: DATE format (size 7) according to FF specification 870
46	ACTUAL_DIAG_LIST_10		Tenth entry in current diagnostics list; matches with tenth entry of errors/messages view on device's local display **Possible values** 0x0000 to 0x0349 (0000 to 0841); details see chapter Diagnostic Codes and Maintenance
47	ACTUAL_TIMESTAMP_10		time stamp of tenth diagnostic list entry **Range**: DATE format (size 7) according to FF specification 870
48	LOGBOOKS_RECORDING SETUP → General settings → Logbooks → Recording	W	Switch to enable/disable logbook recording **Available values**: 0 - Off 1 – On **Factory setting**: On
49	DATA_LOGBOOK_RECORDING SETUP → General settings → Logbooks → Data logbook → Recording	W	Switch to enable/disable data logbook recording **Available values**: 0 - Off 1 – On **Factory setting**: Off
50	SEC_SAMPLE_TIME SETUP → General settings → Logbooks → Data logbook → Sample time	W	sample interval for data logbook reading in seconds **Range**: 0 to 356400 seconds **Factory setting**: 60 seconds

ADVDIAGPHORP Transducer Block (manufacturer-specific parameters)			
Para-meter index	**Parameter** **Local Display Menu Path**	**Properties**	**Description**
51	MEAS_VALUE_TO_LOG SETUP → General settings → Logbooks → data logbook → Meas. value	W	Selection of measurement value which will be logged for data logbook **Avaliable values**: 0 - raw value 1 - Temperature 2 - Main Value **Factory setting**: Main Value
52	LOGBOOK_CMD	W	manufacturer-specific structure used for logbook read methods
53	LOGBOOK_RSP		manufacturer-specific structure used for logbook read methods
54	ENP_VERSION		Electronic name plate version number **Range**: Octet string(32) **Factory setting**: 02.02.00
55	DEVICE_TAG DIAG→Device information→TAG		Device TAG **Range**: Octet string(32) **Factory setting**: EH_Liquiline_pHORP-<serial number>
56	SERIAL_NUMBER DIAG→Device information→ Serial number		serial number of the device **Range**: Octet string(16) **Example**: J3047B05G00
57	ORDER_CODE_EXT		extended order code, part 1; not used **Range**: Octet string(32) **Factory setting**: 32 blanks
58	ORDER_CODE_EXT_P2		extended order code, part 2; not used **Range**: Octet string(32) **Factory setting**: 32 blanks
59	ORDER_CODE DIAG→Device information→ Order code		order code **Range**: Octet string(32) **Example**: MAA610EBD00
60	FIRMWARE_VERSION DIAG → Device information → Device version		firmware version of the device **Range**: Octet string(32) **Example**: 02.04.00-0042
61	DEVICE_ID DIAG → Device information → Fieldbusmodule → FF settings→ Device ID		Device ID **Range**: Octet string(32) **Factory setting**: 452B4810A0-<serial number>
62	DEVICE_REV DIAG → Device information → Fieldbusmodule → FF settings→ Device revision		Device Revision **Range**: 00 to FFh
63	DEV_DESCR_REV DIAG → Device information → Fieldbusmodule → FF settings→ DD revision		initial Device Description Revision **Range**: 00 to FFh
64	DL_DEVICE_CLASS DIAG → Device information → Fieldbusmodule → FF settings→ DL device class		defines the current operating class of the device **Available values**: 1 - Basic Field Device 2 - Link Master **Factory setting**: Basic Field Device
65	BOOT_DEVICE_CLASS DIAG → Device information → Fieldbusmodule → FF settings→ Boot device class SETUP → General settings → Boot device class	W	specifies how the device should function in the network the next time it boots up **Available values**: 1 - Basic Field Device 2 - Link Master **Factory setting**: Basic Field Device
66	NODE_ADDRESS DIAG → Device information → Fieldbusmodule → FF settings→ Node address		node address assigned to the device **Range**: 10h to FFh, unit in octet time (8 * 1/32 ms = 256 µs) **Factory setting**: 247 (F7h)
67	CURRENT_SLOT_TIME DIAG → Device information → Fieldbusmodule → FF settings→ Current slot time		Slot time written by LAS **Range**: 00h to FFFFh, unit in octet time (8 * 1/32 ms = 256 µs) **Factory setting**: 4 (1.024 ms)

ADVDIAGPHORP Transducer Block (manufacturer-specific parameters)			
Parameter index	**Parameter** **Local Display Menu Path**	**Properties**	**Description**
68	CURRENT_MIN_INTER_PDU_DELAY DIAG → Device information → Fieldbusmodule → FF settings→ Current MID		minimum inter PDU (protocol data unit) delay written by LAS **Range**: 00h to FFh, unit in octet time (8 * 1/32 ms = 256 µs) **Factory setting**: 10 (2.56 ms)
69	CURRENT_MAX_RESPONSE_DELAY DIAG → Device information → Fieldbusmodule → FF settings→ Current MRD		maximum response delay written by LAS **Range**: 00h to FFh, unit in octet time (8 * 1/32 ms = 256 µs) **Factory setting**:8 (2.048 ms)
70	FEASIBLE_SLOT_TIME DIAG → Device information → Fieldbusmodule → FF settings→ Feasible slot time		slot time provided by device **Range**: 0000h to FFFFh, unit in octet time (8 * 1/32 ms = 256 µs) **Factory setting**: 4 (1.024 ms)
71	FEASIBLE_MIN_INTER_PDU_DELAY DIAG → Device information → Fieldbusmodule → FF settings→ Feasible MID		minimum inter PDU (protocol data unit) delay provided by device **Range**: 00h to FFh, unit in octet time (8 * 1/32 ms = 256 **Factory setting**: 10 (2.56 ms)
72	FEASIBLE_MAX_RESPONSE_DELAY DIAG → Device information → Fieldbusmodule → FF settings→ Feasible MRD		maximum response delay provided by device **Range**: 00h to FFh, unit in octet time (8 * 1/32 ms = 256 µs) **Factory setting**: 8 (1.024 ms)
73	CONFIGURABLE_AREA	W	Configurable area mapped from bit 1 to bit 15 of FF-912 manufacturer specific conditions **Available values (for each entry of this array):** 0 Not used 3 003 Temperature sensor failure 100 100 Glass impedance alarm 101 101 Ref- impedance alarm 102 102 Glass impedance too low 103 103 Ref. impedance too low 104 104 Oper. voltage uncertain 140 140 Leak current alarm 145 140 Leak current warning 180 180 Cal. expired alarm 181 181 No. steril. alarm 215 215 Simulation active 322 322 Meas. Value out of range 532 532 Cal. timer expired 802 802 Process check system alarm 810 810 PV upper limit 811 811 PV lower limit 812 812 Temp out of range **Factory setting**: all entries: 0 Not used For further description of the advanced field diagnostics functionality please see chapter 'Configuration of event behaviour according to FOUNDATION Fieldbus Field Diagnostics' of BA000381C
74	FIXED_AREA_31		Current list of diagnostic events in Sensor Highest Severity group (bit 31 of manufacturer specific conditions) **Range**: Array of Unsigned16 values **Available values**: 0x0000 to 0x0349 (0000 to 0841) details see chapter Diagnostic Codes and Maintenance 7FFCh – Not categorized 7FFDh – Moved to Configurable Area 7FFEh - Empty **Factory setting**: 3, 11, 12, 13, 100, 101, 102, 103, 104, 119, 120, 127, 128, 140, 203, 770

ADVDIAGPHORP Transducer Block (manufacturer-specific parameters)			
Parameter index	Parameter Local Display Menu Path	Properties	Description
75	FIXED_AREA_30		Current list of diagnostic events in Electronic Highest Severity group (bit 30 of manufacturer specific conditions) **Range**: Array of Unsigned16 values **Available values**: 0x0000 to 0x0349 (0000 to 0841) details see chapter Diagnostic Codes and Maintenance 7FFCh – Not categorized 7FFDh – Moved to Configurable Area 7FFEh - Empty **Factory setting**: 218, 380, 381
76	FIXED_AREA_29		Current list of diagnostic events in Config Highest Severity group (bit 29 of manufacturer specific conditions) **Range**: Array of Unsigned16 values **Available values**: 0x0000 to 0x0349 (0000 to 0841) details see chapter Diagnostic Codes and Maintenance 7FFCh – Not categorized 7FFDh – Moved to Configurable Area 7FFEh - Empty **Factory setting**: 513
77	FIXED_AREA_28		Current list of diagnostic events in Process Highest Severity group (bit 28 of manufacturer specific conditions) **Range**: Array of Unsigned16 values **Available values**: 0x0000 to 0x0349 (0000 to 0841) details see chapter Diagnostic Codes and Maintenance 7FFCh – Not categorized 7FFDh – Moved to Configurable Area 7FFEh - Empty **Factory setting**: 802, 810, 811, 812
78	FIXED_AREA_27		Current list of diagnostic events in Sensor High Severity group (bit 27 of manufacturer specific conditions) **Range**: Array of Unsigned16 values **Available values**: 0x0000 to 0x0349 (0000 to 0841) details see chapter Diagnostic Codes and Maintenance 7FFCh – Not categorized 7FFDh – Moved to Configurable Area 7FFEh - Empty **Factory setting**: 4, 10, 14, 129, 130
79	FIXED_AREA_26		Current list of diagnostic events in Electronic High Severity group (bit 26 of manufacturer specific conditions) **Range**: Array of Unsigned16 values **Available values**: 0x0000 to 0x0349 (0000 to 0841) details see chapter Diagnostic Codes and Maintenance 7FFCh – Not categorized 7FFDh – Moved to Configurable Area 7FFEh - Empty **Factory setting**: 219
80	FIXED_AREA_25		Current list of diagnostic events in Config High Severity group (bit 25 of manufacturer specific conditions) **Range**: Array of Unsigned16 values **Available values**: 0x0000 to 0x0349 (0000 to 0841) details see chapter Diagnostic Codes and Maintenance 7FFCh – Not categorized 7FFDh – Moved to Configurable Area 7FFEh - Empty **Factory setting**: 215,406,407,409

ADVDIAGPHORP Transducer Block (manufacturer-specific parameters)			
Parameter index	Parameter Local Display Menu Path	Properties	Description
81	FIXED_AREA_24		Current list of diagnostic events in Process High Severity group (bit 24 of manufacturer specific conditions) **Range**: Array of Unsigned16 values **Available values**: 0x0000 to 0x0349 (0000 to 0841) details see chapter Diagnostic Codes and Maintenance 7FFCh – Not categorized 7FFDh – Moved to Configurable Area 7FFEh - Empty **Factory setting**: Empty
82	FIXED_AREA_23		Current list of diagnostic events in Sensor Low Severity group (bit 23 of manufacturer specific conditions) **Range**: Array of Unsigned16 values **Available values**: 0x0000 to 0x0349 (0000 to 0841) details see chapter Diagnostic Codes and Maintenance 7FFCh – Not categorized 7FFDh – Moved to Configurable Area 7FFEh - Empty **Factory setting**: 322
83	FIXED_AREA_22		Current list of diagnostic events in Electronic Low Severity group (bit 22 of manufacturer specific conditions) **Range**: Array of Unsigned16 values **Available values**: 0x0000 to 0x0349 (0000 to 0841) details see chapter Diagnostic Codes and Maintenance 7FFCh – Not categorized 7FFDh – Moved to Configurable Area 7FFEh - Empty **Factory setting**: Empty
84	FIXED_AREA_21		Current list of diagnostic events in Config Low Severity group (bit 21 of manufacturer specific conditions) **Range**: Array of Unsigned16 values **Available values**: 0x0000 to 0x0349 (0000 to 0841) details see chapter Diagnostic Codes and Maintenance 7FFCh – Not categorized 7FFDh – Moved to Configurable Area 7FFEh - Empty **Factory setting**: 404, 405, 530, 531
85	FIXED_AREA_20		Current list of diagnostic events in Process Low Severity group (bit 20 of manufacturer specific conditions) **Range**: Array of Unsigned16 values **Available values**: 0x0000 to 0x0349 (0000 to 0841) details see chapter Diagnostic Codes and Maintenance 7FFCh – Not categorized 7FFDh – Moved to Configurable Area 7FFEh - Empty **Factory setting**: Empty

ADVDIAGPHORP Transducer Block (manufacturer-specific parameters)			
Parameter index	Parameter Local Display Menu Path	Properties	Description
86	FIXED_AREA_19		Current list of diagnostic events in Sensor Lowest Severity group (bit 19 of manufacturer specific conditions) **Range**: Array of Unsigned16 values **Available values**: 0x0000 to 0x0349 (0000 to 0841) details see chapter Diagnostic Codes and Maintenance 7FFCh – Not categorized 7FFDh – Moved to Configurable Area 7FFEh - Empty **Factory setting**: 106, 107, 111, 112, 131, 132, 134, 135, 136, 137, 138, 139, 142, 145, 148, 153, 154, 155, 156, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 190, 191, 238, 239, 240, 318, 319, 320, 321
87	FIXED_AREA_18		Current list of diagnostic events in Electronic Lowest Severity group (bit 18 of manufacturer specific conditions) **Range**: Array of Unsigned16 values **Available values**: 0x0000 to 0x0349 (0000 to 0841) details see chapter Diagnostic Codes and Maintenance 7FFCh – Not categorized 7FFDh – Moved to Configurable Area 7FFEh - Empty **Factory setting**: Empty
88	FIXED_AREA_17		Current list of diagnostic events in Config Lowest Severity group (bit 17 of manufacturer specific conditions) **Range**: Array of Unsigned16 values **Available values**: 0x0000 to 0x0349 (0000 to 0841) details see chapter Diagnostic Codes and Maintenance 7FFCh – Not categorized 7FFDh – Moved to Configurable Area 7FFEh - Empty **Factory setting**: 501, 514, 532
89	FIXED_AREA_16		Current list of diagnostic events in Process Lowest Severity group (bit 16 of manufacturer specific conditions) **Range**: Array of Unsigned16 values **Available values**: 0x0000 to 0x0349 (0000 to 0841) details see chapter Diagnostic Codes and Maintenance 7FFCh – Not categorized 7FFDh – Moved to Configurable Area 7FFEh - Empty **Factory setting**: 182, 408, 840, 841
90	ADVDIAG_DIAG_EXE_BLOCK		For development only
91	ADVDIAG_DIAG_EXE_MAX		For development only
92	ADVDIAG_DIAG_EXE_MIN		For development only
93	ADVDIAG_DIAG_EXE_CUR		For development only
94	ADVDIAG_DIAG_EXE_RESET		For development only
95	ADVDIAG_DIAG_EXE_CAT		For development only
96	ADVDIAG_DIAG_EXE_COUNT		For development only

ADVDIAGPHORP Transducer Block (manufacturer-specific parameters)			
Parameter index	Parameter Local Display Menu Path	Properties	Description
97	STATUS_SELECT_003_PHORP	W	optional status setting for diagnostic code 003 (Temperature sensor failure) **Available values**: 0x00 - BAD 0x01 - UNCERTAIN 0x03 - GOOD 0x10 - BAD_SENSOR_FAILURE 0x40 - UNC_NON_SPECIFIC 0x44 - UNC_LAST_USABLE_VALUE 0x50 - UNC_SENSOR_CONV_NOT_ACCURATE 0x80 - GOOD_NC_NON_SPECIFIC 0xFF – UNMODIFIED Value UNMODIFIED means that the measurement status will NOT be changed and transferred as received from the measurement unit. **Factory setting:** UNMODIFIED
98	STATUS_SELECT_100_PHORP	W	optional status setting for diagnostic code 100 (Glass impedance alarm) **Available values**: 0x00 - BAD 0x01 - UNCERTAIN 0x03 - GOOD 0x10 - BAD_SENSOR_FAILURE 0x40 - UNC_NON_SPECIFIC 0x44 - UNC_LAST_USABLE_VALUE 0x50 - UNC_SENSOR_CONV_NOT_ACCURATE 0x80 - GOOD_NC_NON_SPECIFIC 0xFF – UNMODIFIED Value UNMODIFIED means that the measurement status will NOT be changed and transferred as received from the measurement unit. **Factory setting:** UNMODIFIED
99	STATUS_SELECT_101_PHORP	W	optional status setting for diagnostic code 101 (Reference impedance alarm) **Available values**: 0x00 - BAD 0x01 - UNCERTAIN 0x03 - GOOD 0x10 - BAD_SENSOR_FAILURE 0x40 - UNC_NON_SPECIFIC 0x44 - UNC_LAST_USABLE_VALUE 0x50 - UNC_SENSOR_CONV_NOT_ACCURATE 0x80 - GOOD_NC_NON_SPECIFIC 0xFF – UNMODIFIED Value UNMODIFIED means that the measurement status will NOT be changed and transferred as received from the measurement unit. **Factory setting:** UNMODIFIED
100	STATUS_SELECT_102_PHORP	W	optional status setting for diagnostic code 102 (Glass impedance too low) **Available values**: 0x00 - BAD 0x01 - UNCERTAIN 0x03 - GOOD 0x10 - BAD_SENSOR_FAILURE 0x40 - UNC_NON_SPECIFIC 0x44 - UNC_LAST_USABLE_VALUE 0x50 - UNC_SENSOR_CONV_NOT_ACCURATE 0x80 - GOOD_NC_NON_SPECIFIC 0xFF – UNMODIFIED Value UNMODIFIED means that the measurement status will NOT be changed and transferred as received from the measurement unit. **Factory setting:** UNMODIFIED

ADVDIAGPHORP Transducer Block (manufacturer-specific parameters)			
Parameter index	Parameter Local Display Menu Path	Properties	Description
101	STATUS_SELECT_103_PHORP	W	optional status setting for diagnostic code 103 (Reference impedance too low) **Available values**: 0x00 - BAD 0x01 - UNCERTAIN 0x03 - GOOD 0x10 - BAD_SENSOR_FAILURE 0x40 - UNC_NON_SPECIFIC 0x44 - UNC_LAST_USABLE_VALUE 0x50 - UNC_SENSOR_CONV_NOT_ACCURATE 0x80 - GOOD_NC_NON_SPECIFIC 0xFF – UNMODIFIED Value UNMODIFIED means that the measurement status will NOT be changed and transferred as received from the measurement unit. **Factory setting:** UNMODIFIED
102	STATUS_SELECT_104_PHORP	W	optional status setting for diagnostic code 104 (Operating voltage uncertain) **Available values**: 0x00 - BAD 0x01 - UNCERTAIN 0x03 - GOOD 0x10 - BAD_SENSOR_FAILURE 0x40 - UNC_NON_SPECIFIC 0x44 - UNC_LAST_USABLE_VALUE 0x50 - UNC_SENSOR_CONV_NOT_ACCURATE 0x80 - GOOD_NC_NON_SPECIFIC 0xFF – UNMODIFIED Value UNMODIFIED means that the measurement status will NOT be changed and transferred as received from the measurement unit. **Factory setting:** UNMODIFIED
103	STATUS_SELECT_140_PHORP	W	optional status setting for diagnostic code 140 (Leakage current alarm) **Available values**: 0x00 - BAD 0x01 - UNCERTAIN 0x03 - GOOD 0x10 - BAD_SENSOR_FAILURE 0x40 - UNC_NON_SPECIFIC 0x44 - UNC_LAST_USABLE_VALUE 0x50 - UNC_SENSOR_CONV_NOT_ACCURATE 0x80 - GOOD_NC_NON_SPECIFIC 0xFF – UNMODIFIED Value UNMODIFIED means that the measurement status will NOT be changed and transferred as received from the measurement unit. **Factory setting:** UNMODIFIED
104	STATUS_SELECT_145_PHORP	W	optional status setting for diagnostic code 145 (Leakage current warning) **Available values**: 0x00 - BAD 0x01 - UNCERTAIN 0x03 - GOOD 0x10 - BAD_SENSOR_FAILURE 0x40 - UNC_NON_SPECIFIC 0x44 - UNC_LAST_USABLE_VALUE 0x50 - UNC_SENSOR_CONV_NOT_ACCURATE 0x80 - GOOD_NC_NON_SPECIFIC 0xFF – UNMODIFIED Value UNMODIFIED means that the measurement status will NOT be changed and transferred as received from the measurement unit. **Factory setting:** UNMODIFIED

ADVDIAGPHORP Transducer Block (manufacturer-specific parameters)			
Parameter index	Parameter Local Display Menu Path	Properties	Description
105	STATUS_SELECT_180_PHORP	W	optional status setting for diagnostic code 180 (Calibration expired alarm) **Available values**: 0x00 - BAD 0x01 - UNCERTAIN 0x03 - GOOD 0x10 - BAD_SENSOR_FAILURE 0x40 - UNC_NON_SPECIFIC 0x44 - UNC_LAST_USABLE_VALUE 0x50 - UNC_SENSOR_CONV_NOT_ACCURATE 0x80 - GOOD_NC_NON_SPECIFIC 0xFF – UNMODIFIED Value UNMODIFIED means that the measurement status will NOT be changed and transferred as received from the measurement unit. **Factory setting:** UNMODIFIED
106	STATUS_SELECT_181_PHORP	W	optional status setting for diagnostic code 181 (Number of sterilizations alarm) **Available values**: 0x00 - BAD 0x01 - UNCERTAIN 0x03 - GOOD 0x10 - BAD_SENSOR_FAILURE 0x40 - UNC_NON_SPECIFIC 0x44 - UNC_LAST_USABLE_VALUE 0x50 - UNC_SENSOR_CONV_NOT_ACCURATE 0x80 - GOOD_NC_NON_SPECIFIC 0xFF – UNMODIFIED Value UNMODIFIED means that the measurement status will NOT be changed and transferred as received from the measurement unit. **Factory setting:** UNMODIFIED
107	STATUS_SELECT_215_PHORP	W	optional status setting for diagnostic code 215 (Simulation active) **Available values**: 0x00 - BAD 0x01 - UNCERTAIN 0x03 - GOOD 0x10 - BAD_SENSOR_FAILURE 0x40 - UNC_NON_SPECIFIC 0x44 - UNC_LAST_USABLE_VALUE 0x50 - UNC_SENSOR_CONV_NOT_ACCURATE 0x80 - GOOD_NC_NON_SPECIFIC 0xFF – UNMODIFIED Value UNMODIFIED means that the measurement status will NOT be changed and transferred as received from the measurement unit. **Factory setting:** UNMODIFIED
108	STATUS_SELECT_322_PHORP	W	optional status setting for diagnostic code 322 (Meas. Value out of range) **Available values**: 0x00 - BAD 0x01 - UNCERTAIN 0x03 - GOOD 0x10 - BAD_SENSOR_FAILURE 0x40 - UNC_NON_SPECIFIC 0x44 - UNC_LAST_USABLE_VALUE 0x50 - UNC_SENSOR_CONV_NOT_ACCURATE 0x80 - GOOD_NC_NON_SPECIFIC 0xFF – UNMODIFIED Value UNMODIFIED means that the measurement status will NOT be changed and transferred as received from the measurement unit. **Factory setting:** UNMODIFIED

ADVDIAGPHORP Transducer Block (manufacturer-specific parameters)			
Parameter index	Parameter Local Display Menu Path	Properties	Description
109	STATUS_SELECT_532_PHORP	W	optional status setting for diagnostic code 532 (Calibration timer expired) **Available values**: 0x00 - BAD 0x01 - UNCERTAIN 0x03 - GOOD 0x10 - BAD_SENSOR_FAILURE 0x40 - UNC_NON_SPECIFIC 0x44 - UNC_LAST_USABLE_VALUE 0x50 - UNC_SENSOR_CONV_NOT_ACCURATE 0x80 - GOOD_NC_NON_SPECIFIC 0xFF – UNMODIFIED Value UNMODIFIED means that the measurement status will NOT be changed and transferred as received from the measurement unit. **Factory setting:** UNMODIFIED
110	STATUS_SELECT_802_PHORP	W	optional status setting for diagnostic code 802 (Process check system alarm) **Available values**: 0x00 - BAD 0x01 - UNCERTAIN 0x03 - GOOD 0x10 - BAD_SENSOR_FAILURE 0x40 - UNC_NON_SPECIFIC 0x44 - UNC_LAST_USABLE_VALUE 0x50 - UNC_SENSOR_CONV_NOT_ACCURATE 0x80 - GOOD_NC_NON_SPECIFIC 0xFF – UNMODIFIED Value UNMODIFIED means that the measurement status will NOT be changed and transferred as received from the measurement unit. **Factory setting:** GOOD
111	STATUS_SELECT_810_PHORP	W	optional status setting for diagnostic code 810 (PV upper limit) **Available values**: 0x00 - BAD 0x01 - UNCERTAIN 0x03 - GOOD 0x10 - BAD_SENSOR_FAILURE 0x40 - UNC_NON_SPECIFIC 0x44 - UNC_LAST_USABLE_VALUE 0x50 - UNC_SENSOR_CONV_NOT_ACCURATE 0x80 - GOOD_NC_NON_SPECIFIC 0xFF – UNMODIFIED Value UNMODIFIED means that the measurement status will NOT be changed and transferred as received from the measurement unit. **Factory setting:** GOOD
112	STATUS_SELECT_811_PHORP	W	optional status setting for diagnostic code 811 (PV lower limit) **Available values**: 0x00 - BAD 0x01 - UNCERTAIN 0x03 - GOOD 0x10 - BAD_SENSOR_FAILURE 0x40 - UNC_NON_SPECIFIC 0x44 - UNC_LAST_USABLE_VALUE 0x50 - UNC_SENSOR_CONV_NOT_ACCURATE 0x80 - GOOD_NC_NON_SPECIFIC 0xFF – UNMODIFIED Value UNMODIFIED means that the measurement status will NOT be changed and transferred as received from the measurement unit. **Factory setting:** GOOD

ADVDIAGPHORP Transducer Block (manufacturer-specific parameters)			
Parameter index	Parameter Local Display Menu Path	Properties	Description
113	STATUS_SELECT_812_PHORP	W	optional status setting for diagnostic code 812 (Temperature out of range) **Available values**: 0x00 - BAD 0x01 - UNCERTAIN 0x03 - GOOD 0x10 - BAD_SENSOR_FAILURE 0x40 - UNC_NON_SPECIFIC 0x44 - UNC_LAST_USABLE_VALUE 0x50 - UNC_SENSOR_CONV_NOT_ACCURATE 0x80 - GOOD_NC_NON_SPECIFIC 0xFF – UNMODIFIED Value UNMODIFIED means that the measurement status will NOT be changed and transferred as received from the measurement unit. **Factory setting:** GOOD
114	TOTAL_OPERATING_TIME_PHORP		Total operating time of the device; will be reset by factory default command
115	AVAILABILITY_PHORP		Availability of the device since last counter reset: (Operating time - Time in failure) / Operating time * 100 since last counter reset
116	OPERATING_TIME_PHORP		Operating time of the device since last counter reset
117	TIME_IN_FAILURE_PHORP		Operating time of the device with NAMUR F status signal since last counter reset
118	NUMBER_OF_FAILURES_PHORP		Number of failures since last counter reset
119	MTBF_PHORP		Mean time between failures: (Operating time - Time in failure) / Number of failures
120	MTTR_PHORP		Mean time to repair: Time in failure / Number of failures
121	TIME_IN_CALIBRATION_PHORP		Operating time of the device with calibration status since last counter reset.
122	NO_OF_CALIBRATIONS_PHORP		Number of calibrations since last counter reset
123	MTBC_PHORP		Mean time between calibrations: (Operating time - Time in calibration / No. of calibrations Calibration = one point validation against known standard solution Adjustment = change slope and offset of the sensor
124	RESET_COUNTERS_PHORP	W	This method resets current number of failures and calibrations, time in failure, time in calibration and the operating time value since last reset.
125	ACTUAL_NAMUR_CLASS_1		NAMUR class of first entry in diagnostics list **Available values**: 0x01 : F 0x02 : M 0x03 : C 0x04 : S
126	ACTUAL_NAMUR_CLASS_2		NAMUR class of second entry in diagnostics list **Available values**: 0x01 : F 0x02 : M 0x03 : C 0x04 : S
127	ACTUAL_NAMUR_CLASS_3		NAMUR class of third entry in diagnostics list **Available values**: 0x01 : F 0x02 : M 0x03 : C 0x04 : S
128	ACTUAL_NAMUR_CLASS_4		NAMUR class of fourth entry in diagnostics list **Available values**: 0x01 : F 0x02 : M 0x03 : C 0x04 : S

ADVDIAGPHORP Transducer Block (manufacturer-specific parameters)			
Parameter index	Parameter Local Display Menu Path	Properties	Description
129	ACTUAL_NAMUR_CLASS_5		NAMUR class of fifth entry in diagnostics list **Available values**: 0x01 : F 0x02 : M 0x03 : C 0x04 : S
130	ACTUAL_NAMUR_CLASS_6		NAMUR class of sixth entry in diagnostics list **Available values**: 0x01 : F 0x02 : M 0x03 : C 0x04 : S
131	ACTUAL_NAMUR_CLASS_7		NAMUR class of seventh entry in diagnostics list **Available values**: 0x01 : F 0x02 : M 0x03 : C 0x04 : S
132	ACTUAL_NAMUR_CLASS_8		NAMUR class of eighth entry in diagnostics list **Available values**: 0x01 : F 0x02 : M 0x03 : C 0x04 : S
133	ACTUAL_NAMUR_CLASS_9		NAMUR class of ninth entry in diagnostics list **Available values**: 0x01 : F 0x02 : M 0x03 : C 0x04 : S
134	ACTUAL_NAMUR_CLASS_10		NAMUR class of tenth entry in diagnostics list **Available values**: 0x01 : F 0x02 : M 0x03 : C 0x04 : S
135	ADVDIAG_EXE_TWOTIMEMAX		For development only
136	ADVDIAG_EXE_THREETIMEMAX		For development only
137	DATE_OF_LAST_CALIB_PHORP		Date of last calibration
138	DAYS_SINCE_LAST_CALIB_PHORP		Days since last calibration
139	CAL_DATE_CURRENT_1_PHORP		Current calibration date 1 pH
140	CAL_DATE_CURRENT_2_PHORP		Current calibration date 2 ORP
141	HEARTBEAT_PHORP		Heartbeat diagnostic option Depends on order code. Examples: CM42-MAA600**EH**E00 --> with Heartbeat option CM42-MAA600**EA**E00 or CM42-MAA600**EB**E00 --> without Heartbeat option **Available values**: 0: No 1: Yes

6.3.18. DISPLAYPHORP Transducer Block

The properties column lists parameter properties:
- W: Parameter is writable
- OOS: Parameter is writable in OOS mode only

Since all parameters can be read, this is not explicitly stated.

DISPLAYPHORP Transducer Block (manufacturer-specific parameters)			
Parameter index	**Parameter** **Local Display Menu Path**	**Properties**	**Description**
14	TRD_BLOCK_ERR_DESC_1		Block Error Description which indicates problems detected within the block **Supported values**: 0x01 - Resource Block in OOS
15	ACTUAL_DIAG_STATUS DIAG → Most important message		Device's FCSM information **Supported values:** 0x00 : OK, no diagnostics detected 0x01 : F, failure 0x02 : M, maintenance required 0x03 : C, function check 0x04 : S, out of specification 0x05 : NC (Not Categorized)
16	ACTUAL_DIAGNOSTICS DIAG → Most important message		Current diagnostic code with highest priority **Indicated values:** 0x0000 to 0x0349(0000 to 0841); details see chapter Diagnostic Codes and Maintenance
17	SENSOR_INTERFACE		Connected sensor interface type **Indicated values:** 0 - Analog 1 - Digital
18	SOFTWARE_FUNCTIONALITY DIAG → Device information → Order code		Indicates software capability as Standard or Advanced like indicated in order code (i.e. MAA600E**A**D00 means standard or MAA600E**B**D00 means advanced). Advanced functionality contains functions like additional diagnostics, logbooks, table handling **Indicated values:** 0 - Standard 1 - Advanced
19	SIM_JUMPER		Physical position of the simulation jumper (on/off) **Indicated values**: 1 - Sim disabled 2 - Sim enabled **Factory setting**: Sim disabled
20	DEVICE_SIM		Icon on local display. If lit, it indicates, that simulate functionality is activated **Indicated values**: 0 - Off 1 - On
21	DEVICE_HOLD		Icon on local display. If lit, it indicates, that HOLD functionality is activated **Indicated values**: 0 - Off 1 - On
22	DISPLAY_LANGUAGE SETUP → Display → Language	W	Select language used for local device display **Available values**: 0 - English 1 - Second Language (Second language is defined by the order code of the device) **Factory setting**: depends on the order code
23	LOCAL_OP_ENA	W	Enable/Disable local operations via soft-keys and navigator of the device **Available values**: 0 - Off 1 – On **Factory setting:** On

DISPLAYPHORP Transducer Block (manufacturer-specific parameters)			
Parameter index	**Parameter** **Local Display Menu Path**	**Properties**	**Description**
24	DISPLAY_TEMPERATURE_UNIT_PH SETUP → Display → Temperature unit	W	Select temperature unit used for the local device display only. **Available values**: 1001 - Celsius 1002 – Fahrenheit **Factory setting:** Celsius
25	MEASURED_VALUE_PHORP SETUP→Sensor pH/ORP→Measured value		Selected measurement mode, as set in PHORP Transducer **Available values:** 0 - pH 1 - ORP mV 2 - rH 3 - ORP %
26	DISPLAY_MAIN_VALUE_FORMAT_PH SETUP→Display→Main value format	W	Select format of the main value used for the local device display **Available values:** 273 - X.X 274 - X.XX **Factory setting:**X.XX
27	DISPLAY_TEMP_VALUE_FORMAT_PH SETUP→Display→Temperature format	W	Select format of the temperature value used for the local device display **Available values:** 272 - XXX 273 - XXX.X **Factory setting:**XXX.X
28	DISPLAY_RH_VALUE_FORMAT SETUP→Display→Main value format	W	Select format of the rH value used for the local device display **Available values:** 272 - XX 273 - XX.X **Factory setting:**XX.X
29	DISPLAY_TEMPERATURE_SENSOR SETUP→Sensor pH/ORP→Temperature sensor	W	Select temperature sensor, if sensor type is analog **Available values:** 0 - None 1 - PT100 or PT1000 **Factory setting:** PT100 or PT1000
30	SENSOR_TYPE SETUP → Sensor pH/ORP → Sensor type pH (visible only if analog sensor interface)		Indicated sensor type, as selected in PHORP transducer **Available values:** 0: Glass 1: IsFET 2: ORP 3: IsFET analog 4: ORP analog 5: Pfaudler abs 6: Pfaudler rel 7: Antimony 8: UNUSED 9: Glass analog 10: Pfaudler pH/ORP 11: rH 12: None 13: Glass V2

6.3.19. MEMOPHORP Transducer Block

The properties column lists parameter properties:
- W: Parameter is writable
- OOS: Parameter is writable in OOS mode only

Since all parameters can be read, this is not explicitly stated.

MEMOPHORP Transducer Block (manufacturer-specific parameters)			
Parameter index	**Parameter** **Local Display Menu Path**	**Properties**	**Description**
14	TRD_BLOCK_ERR_DESC_1		Block Error Description which indicates problems detected within the block **Supported values**: 0x01 - Resource Block in OOS
15	ACTUAL_DIAG_STATUS DIAG → Most important message		Device's FCSM information **Supported values:** 0x00 : OK, no diagnostics detected 0x01 : F, failure 0x02 : M, maintenance required 0x03 : C, function check 0x04 : S, out of specification 0x05 : NC (Not Categorized)
16	ACTUAL_DIAGNOSTICS DIAG → Most important message		Current diagnostic code with highest priority **Indicated values:** 0x0000 to 0x0349(0000 to 0841); details see chapter Diagnostic Codes and Maintenance
17	SENSOR_INTERFACE		Connected sensor interface type **Indicated values:** 0 - Analog 1 - Digital
18	SOFTWARE_FUNCTIONALITY DIAG → Device information → Order code		Indicates software capability as Standard or Advanced like indicated in order code (i.e. MAA600E**A**D00 means standard or MAA600E**B**D00 means advanced). Advanced functionality contains functions like additional diagnostics, logbooks, table handling **Indicated values:** 0 - Standard 1 - Advanced
19	SIM_JUMPER		Physical position of the simulation jumper (on/off) **Indicated values**: 1 - Sim disabled 2 - Sim enabled **Factory setting**: Sim disabled
20	DEVICE_SIM		Icon on local display. If lit, it indicates, that simulate functionality is activated **Indicated values**: 0 - Off 1 - On
21	CHECK_SENSOR SETUP→General settings→Sensor check	W	Switch to enable or disable checking which sensors are accepted at the field device. If enabled, only those sensors are accepted where TAG Number or Group in sensor and transmitter match **Available values:** 0 - None 1 - Group 2 - Sensor TAG **Factory setting**: None
22	CONFIGURED_TAG_NUMBER SETUP → General settings → TAG		Configured TAG number for the device
23	TAG_NUMBER_SENSOR DIAG → Sensor information → Identification → TAG number		TAG number of the sensor
24	CONFIGURED_TAG_GROUP SETUP → General settings → TAG group	W	Configured TAG group for the device **Available values**: 0 to FFFFh **Factory setting**: 0
25	TAG_GROUP_SENSOR DIAG → Sensor information → Identification → TAG group		TAG Group of the sensor **Possible values**: 0 to FFFFh
26	SERIAL_NUMBER_INFO_SENSOR DIAG→Sensor information→Identification→Serial number		Serial number of the sensor **Example**: E6052605PIO

MEMOPHORP Transducer Block (manufacturer-specific parameters)			
Parameter index	**Parameter** **Local Display Menu Path**	**Properties**	**Description**
27	ORDER_CODE_INFO_SENSOR DIAG → Sensor information → Identification → Order code		Order code for the sensor **Example**: CPS11D-AA1B21
28	HW_VERSION_INFO_SENSOR DIAG → Sensor information → Identification → Hardware version		Sensor hardware version **Example**: 2
29	SW_VERSION_INFO_SENSOR DIAG → Sensor information → Identification → Software version		Sensor software version **Example**: 10002 (i.e. 01.00.02)
30	TYPE_OF_CALIBRATION DIAG → Sensor information → Calibration → Main value → Mode or DIAG → Sensor information → Calibration →Calibration data pH → Mode or DIAG → Sensor information → Calibration →Calibration data ORP → Mode		Calibration type **Available values**: 0: None 1: Numeric Input 2: 1 point 3: 2 point 4: Multi point 5: Table 6: Grab sample 7: Zero point 8: Slope air (DOxygen only) 9: Slope water (DOxygen only) 10: Slope variable (DOxygen only) 11: Zero point reference (DOxygen only) 12: Slope Reference (DOxygen only) 13: Offset 14: Slope 15: With temp. comp. 16: Without temp. comp. 17: Standard 18: Numeric Input 19: Numeric Input 20: Numeric Input 21: Factory cal. 22: Test gas 23 .Value acquisition 24. 3-point **Default value**: None
31	CAL_S_N_TRANSMITTER DIAG → Sensor information → Calibration → Main value → Serial number or DIAG → Sensor information → Calibration →Calibration data pH → Serial number or DIAG → Sensor information → Calibration →Calibration data ORP → Serial number		Serial number of the transmitter used for calibration **Example**: 91094905G00
32	TEMP_CAL_S_N_TRANSMITTER DIAG → Sensor information → Calibration → Temperature → Serial number		Serial number of the transmitter used for temperature calibration **Example**: 91094905G00
33	TEMP_CAL_DATE_SENSOR DIAG → Sensor information → Calibration → Temperature → Date		Temperature calibration date and time **Range**: DATE format (size 7) according to FF specification 870
34	SPEC_MAX_TEMPERATURE_SENSOR DIAG → Sensor information → Max. operating values → Max. temperature		Maximum temperature the sensor can be exposed to unit: °C; value depends on sensor type

MEMOPHORP Transducer Block (manufacturer-specific parameters)			
Parameter index	**Parameter** **Local Display Menu Path**	**Properties**	**Description**
35	SPEC_MIN_TEMPERATURE_SENSOR DIAG → Sensor information → Max. operating values → Min. temperature		Minimum temperature the sensor can be exposed to unit: °C; value depends on sensor type
36	TEMP_OFFSET_SENSOR DIAG → Sensor information → Calibration → Temperature → Temp. offset		Temperature Offset unit: K
37	MAX_TEMPERATURE_SENSOR DIAG → Sensor information → Max. operating values → Max. temperature		Maximum temperature the sensor has been exposed to unit: °C
38	MIN_TEMPERATURE_SENSOR DIAG → Sensor information → Max. operating values → Min. temperature		Minimum temperature the sensor has been exposed to unit: °C
39	COMMISSIONING_DATE_SENSOR DIAG → Sensor information → Identification → Commissioning date		Sensor commissioning date **Range**: DATE format (size 7) according to FF specification 870
40	OPERATING_TIME_SENSOR DIAG → Sensor information → Operating hours → Operating time		Total sensor operating time unit: hours
41	TIME_OVER_80C_SENSOR_PHORP DIAG → Sensor information → Operating hours → Usage >80°C		Total sensor operating time over 80 °C unit: hours
42	NO_OF_STERILIZATIONS_SENSOR DIAG → Sensor information → Operating hours → No. steril. sensor		Total sterilization counts of the sensor
43	CAL_NUMBER_SENSOR DIAG → Sensor information → Calibration → Main value → No. cal. sensor		Number of calibrations performed with current sensor
44	CAL_DATE_SENSOR DIAG → Sensor information → Calibration → Main value → Date		Sensor calibration date and time **Range**: DATE format (size 7) according to FF specification 870
45	TIME_OVER_100C_SENSOR DIAG → Sensor information → Operating hours → Usage >100°C		Total sensor operating time over 100 °C unit: hours
46	TIME_OVER_300MV_SENSOR DIAG → Sensor information → Operating hours → Usage >-300mV		Total sensor operating time over 300 mV unit: hours
47	TIME_LOWER_300MV_SENSOR DIAG → Sensor information → Operating hours → Usage >300mV		Total sensor operating time under -300 mV unit: hours
48	SENSOR_TYPE SETUP → Sensor pH/ORP → Sensor type pH		Sensor type **Available values**: 0: Glass 1: IsFET 2: ORP 11: rH
49	ZERO_POINT_SENSOR DIAG → Sensor information → Calibration → Main value → Zero point		Calibrated zero point unit: pH
50	OFFSET_SENSOR_ORPMV DIAG → Sensor information → Calibration → Main value → Offset		Calibrated offset unit: mV
51	SLOPE DIAG → Sensor information → Calibration → Main value → Slope		Calibrated slope for pH unit: mV/pH
52	ISFET_OPERATING_POINT_SENSOR DIAG → Sensor information → Calibration → Main value → Operating point		Calibrated IsFET operating point unit: mV
53	ISOTHERM_POINT_PH DIAG → Sensor information → Calibration → Main value → Isotherm intersection		pH isotherm point during last calibration unit: pH
54	CAL_BUF_1_PH DIAG → Sensor information → Calibration → Main value → Calib. Buffer 1		pH calibration point 1 unit: pH

MEMOPHORP Transducer Block (manufacturer-specific parameters)			
Parameter index	Parameter Local Display Menu Path	Properties	Description
55	CAL_BUF_1_ORPMV DIAG → Sensor information → Calibration → Main value → Calib. Buffer 1		pH calibration point 1 unit: pH
56	CAL_BUF_1_ORPPERCENT DIAG → Sensor information → Calibration → Main value → Calib. Buffer 1		pH calibration point 1 unit: pH
57	CAL_BUF_2_PH_ORPMV DIAG → Sensor information → Calibration → Main value → Calib. Buffer 2		pH calibration point 2 unit: pH
58	CAL_BUF_2_ORPPERCENT DIAG → Sensor information → Calibration → Main value → Calib. Buffer 2		pH calibration point 2 unit: pH
59	DELTA_ZERO_POINT DIAG → Sensor information → Calibration → Main value → Delta zeropnt.		Zero point difference between the last two calibrations unit: pH
60	DELTA_OFFSET_SENSOR DIAG → Sensor information → Calibration → Main value → Delta offset		Offset difference between the last two calibrations unit: mV
61	DELTA_SLOPE DIAG → Sensor information → Calibration → Main value → Delta slope		pH slope difference between the last two calibrations unit: mV/pH
62	DELTA_OPERATING_POINT_SENSOR DIAG → Sensor information → Calibration → Main value → Delta operating pnt.		IsFET operating point difference between the last two calibrations unit: mV
63	SPEC_MIN_PH_SENSOR DIAG → Sensor information → Specification → Min. main meas. value		Specified minimum pH measurement value unit: pH
64	SPEC_MAX_PH_SENSOR DIAG → Sensor information → Specification → Max. main meas. value		Specified maximum pH measurement value unit: pH
65	SPEC_MIN_MV_SENSOR DIAG → Sensor information → Specification → Min. main meas. value		Specified minimum mV measurement value unit: mV
66	SPEC_MAX_MV_SENSOR DIAG → Sensor information → Specification → Max. main meas. value		Specified maximum mV measurement value unit: mV
67	DELTA_MEAS_VAL_1_SENSOR_ORP DIAG → Sensor information → Calibration → Main value → Measure value 1		ORP % calibration reference point 1 unit: mV
68	DELTA_MEAS_VAL_2_SENSOR_ORP DIAG → Sensor information → Calibration → Main value → Measure value 2		ORP % calibration reference point 2 unit: mV
69	MEASURED_VALUE_PHORP SETUP → Sensor pH/ORP → Measured value		Select measurement mode **Available values**: 0 - pH 1 - ORP mV 2 - rH 3 - ORP %
70	SELECT_CALIBRATION_HISTORY_TYPE_PHORP DIAG → Sensor information → Calibration → Calibration history → Calibration type	W	Select sensor calibration data (pH or ORP). Valid only for pH/ORP combi sensor **Available values:** 0 – pH 1 – ORP **Default value:** pH
71	AVAILABLE_CALIBRATION_HISTORY_PHORP		Available number of historian calibration data sets **Available values:** 0 to 11

MEMOPHORP Transducer Block (manufacturer-specific parameters)			
Parameter index	**Parameter** **Local Display Menu Path**	**Properties**	**Description**
72	SELECTED_SENSOR_CALDATA_PHORP DIAG → Sensor information → Calibration → Calibration history → Calibration	W	Choose between available calibration data sets **Available values:** 0 - current data set 1 - recent data set 1 2 - recent data set 2 3 - recent data set 3 4 - recent data set 4 5 - recent data set 5 6 - recent data set 6 7 - recent data set 7 8 - recent data set 7 9 - factory calibration data 10 – reference 11 – Current cal **Default value:** 0
73	SENSOR_CAL_VALID		Validity of the displayed calibration parameter for main measurement **Available values:** 0 – FALSE 1 - TRUE **Default value:** 0
74	SENSOR_TEMP_CAL_VALID		Validity of the displayed calibration parameter for temperature measurement **Available values:** 0 – FALSE 1 - TRUE **Default value:** 0
75	SENSOR_CONNECTED		Indicates current Memosens connection state **Available values:** 0 to 29: not connected 30 - connected **Default value:** 0
76	MANUFACTURER_NAME DIAG → Sensor information →Identification → Manufacturer		Sensor manufacturer name
77	ACTIVATION_STATE DIAG → Sensor information →Sensor operation → Activation state		Sensor activation state **Available values:** 0 – Deactivated 1 - Active
78	AUTOCLAVINGS_PHORP DIAG → Sensor information →Sensor operation →No. autoclavings		Current number of autoclavings
79	CIP_CYCLES_PHORP DIAG → Sensor information →Sensor operation → CIP cycles		Current number of CIP cycles

MEMOPHORP Transducer Block (manufacturer-specific parameters)			
Parameter index	**Parameter** **Local Display Menu Path**	**Properties**	**Description**
80	CAL_BUF_3 DIAG → Sensor information → Calibration → Main value → Calib. buffer 3 or DIAG → Sensor information → Calibration → Calibration data pH → Calib. buffer 3 or DIAG → Sensor information → Calibration → Calibration data ORP → Calib. buffer 3		Calibration buffer value, if calibration method is 3-point or Multipoint (unit: pH)
81	TEMP_CAL_TYPE_PHORP DIAG → Sensor information →Calibration → Temperature → Mode		Calibration type of the temperature sensor
82	TEMP_CAL_COUNT_PHORP DIAG → Sensor information →Calibration → Temperature → No. cal. sensor		Current number of temperature sensor calibrations
83	TEMP_CAL_SLOPE_PHORP DIAG → Sensor information →Calibration → Temperature →Temp. slope		Slope value result of the latest temperature calibration
84	TEMP_T1_REF_PHORP DIAG → Sensor information →Calibration → Temperature → Temp. ref. 1		Reference value 1 of last temperature calibration. Unit depends on bus unit setting (parameter UNIT_MEAS_DAMPED_TEMP_VALUE)
85	TEMP_T2_REF_PHORP DIAG → Sensor information →Calibration → Temperature → Temp. ref. 2		Reference value 2 of last temperature calibration Unit depends on bus unit setting (parameter UNIT_MEAS_DAMPED_TEMP_VALUE)
86	OP_HOURS_AT_TEMP_CAL_PHORP DIAG → Sensor information →Calibration → Temperature → Op. time at cal.		Operating hours at temperature calibration unit: hrs
87	REFERENCE_CAL_VALID		Current sensor reference calibration state **Available values:** 0 – FALSE 1 - TRUE
88	CAL_DATE_ORP DIAG → Sensor information → Calibration → Calibration data ORP → Date/Time		ORP calibration date and time
89	CAL_S_N_TRANSMITTER_ORP DIAG → Sensor information → Calibration → Calibration data ORP → Serial number		Serial number of the transmitter used for ORP calibration

MEMOPHORP Transducer Block (manufacturer-specific parameters)			
Parameter index	**Parameter** **Local Display Menu Path**	**Properties**	**Description**
90	CAL_TYPE_SENSOR DIAG → Sensor information → Calibration → Main value → Calibration or DIAG → Sensor information → Calibration → Calibration data pH → Calibration or DIAG → Sensor information → Calibration → Calibration data ORP → Calibration		Sensor calibration type **Available values:** 0 – Adjustment 1 - Calibration
91	OP_HOURS_AT_CAL_PHORP DIAG → Sensor information → Calibration → Main value → Op. time at cal.		Operating hours at pH/ORP calibration unit: hrs
92	CUSTOMER_ID_INFO DIAG → Sensor information → Identification → Customer ID		Customer ID of connected sensor
93	CURRENT_CAL_VALID		Current sensor calibration state **Available values:** 0 – FALSE 1 - TRUE
94	UNIT_MEAS_DAMPED_TEMP_VALUE		Selected temperature unit code 1001 - °C 1002 - °F Writable in TRDPHORP transducer
95	PH_ADJUSTMENT_STORAGE SETUP → Sensor pH/ORP → Cal. Settings → 1 point adjustment		Storage selection for 1-point adjustment data **Available values:** 0 – Sensor 1 –transmitter Writable in TRDPHORP transducer

6.3.20. DIAGPHORP Transducer Block

The properties column lists parameter properties:
- W: Parameter is writable
- OOS: Parameter is writable in OOS mode only

Since all parameters can be read, this is not explicitly stated.

DIAGPHORP Transducer Block (manufacturer-specific parameters)			
Parameter index	**Parameter** **Local Display Menu Path**	**Properties**	**Description**
14	TRD_BLOCK_ERR_DESC_1		Block Error Description which indicates problems detected within the block **Supported values**: 0x01 - Resource Block in OOS
15	ACTUAL_DIAG_STATUS DIAG → Most important message		Device's FCSM information **Supported values:** 0x00 : OK, no diagnostics detected 0x01 : F, failure 0x02 : M, maintenance required 0x03 : C, function check 0x04 : S, out of specification 0x05 : NC (Not Categorized)
16	ACTUAL_DIAGNOSTICS DIAG → Most important message		Current diagnostic code with highest priority **Indicated values:** 0x0000 to 0x0349(0000 to 0841); details see chapter Diagnostic Codes and Maintenance
17	SENSOR_INTERFACE		Connected sensor interface type **Indicated values:** 0 - Analog 1 - Digital
18	SOFTWARE_FUNCTIONALITY DIAG → Device information → Order code		Indicates software capability as Standard or Advanced like indicated in order code (i.e. MAA600E**A**D00 means standard or MAA600E**B**D00 means advanced). Advanced functionality contains functions like additional diagnostics, logbooks, table handling **Indicated values:** 0 - Standard 1 - Advanced
19	SIM_JUMPER		Physical position of the simulation jumper (on/off) **Indicated values**: 1 - Sim disabled 2 - Sim enabled **Factory setting**: Sim disabled
20	DEVICE_SIM		Icon on local display. If lit, it indicates, that simulate functionality is activated **Indicated values**: 0 - Off 1 - On
21	DIAGNOSTICS_FUNCTION SETUP → Sensor pH/ORP → Sensor diagnostics → Diag. function	W	Switch to enable or disable diagnostics functions **Available values**: 0 - Off 1 – On **Factory setting**: On
22	HOUSING_MONITORING SETUP → Sensor pH/ORP → Sensor diagnostics → Housing monitoring	W	Switch to enable or disable monitoring, if the housing is open **Available values**: 0 - Off 1 – On **Factory setting**: Off
23	FUNCTION_OPERATING_TIME SETUP → Sensor pH/ORP → Sensor diagnostics →Operating hours → Function	W	Switch to enable or disable operating time diagnostic limits **Available values**: 0 - Off 1 – On **Factory setting**: Off
24	WARNING_OP_TIME_LIMIT SETUP → Sensor pH/ORP → Sensor diagnostics →Operating hours → Operating time → Warning level	W	Warning limit for operating time **Range**: 1 to ALARM_OP_TIME_LIMIT-1 hours **Factory setting**: 10000 hours (416 days)
25	ALARM_OP_TIME_LIMIT SETUP → Sensor pH/ORP → Sensor diagnostics →Operating hours → Operating time → Alarm level	W	Alarm limit for operating time **Range:** WARNING_OP_TIME_LIMIT+1 to 50000 hours **Factory setting**: 15000 hours (625 days)

DIAGPHORP Transducer Block (manufacturer-specific parameters)			
Parameter index	**Parameter** **Local Display Menu Path**	**Properties**	**Description**
26	WARNING_OP_TIME_OVER_80C_LIMIT SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → Usage >80°C → Warning level	W	Warning limit for operating time over 80 °C **Range:** 1 to ALARM_OP_TIME_OVER_80C_LIMIT-1 hours **Factory setting**: 15000 hours (625 days)
27	ALARM_OP_TIME_OVER_80C_LIMIT SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → Usage >80°C → Alarm level	W	Alarm limit for operating time over 80 °C **Range:** WARNING_OP_TIME_OVER_80C_LIMIT +1 to 50000 hours **Factory setting**: 15000 hours (625 days)
28	FUNCTION_STERILIZATION_COUNTER SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → Sterilization cnt. → Function	W	Switch to enable or disable sterilization counter diagnostic limits. This is a customer specific setting how often a sensor can be sterilized **Available values**: 0 - Off 1 – On **Factory setting**: Off
29	WARNING_STERILIZATION_CNT_LIMIT SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → Sterilzation cnt. →Warning level	W	Warning limit for sterilization counter **Range:** 1 to ALARM_STERILIZATION_CNT_LIMIT-1 **Factory setting**:) 30
30	ALARM_STERILIZATION_CNT_LIMIT SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → Sterilzation cnt. → Alarm level	W	Alarm limit for sterilization counter **Range:** WARNING_STERILIZATION_CNT_LIMIT+1 to 50000 **Factory setting**: 50
31	OUT_OP_TIME_LIMIT		Current result of operating time check **Possible values**: 0x00000000: Within Range 0x00000001: Warning 0x00000002: Alarm
32	OUT_OP_TIME_OVER_80C_LIMIT		Current result of operating time over 80 °C check **Possible values**: 0x00000000: Within Range 0x00000001: Warning 0x00000002: Alarm
33	OUT_STERILIZATION_CNT_LIMIT		Current result of sterilization counter check **Possible values**: 0x00000000: Within Range 0x00000001: Warning 0x00000002: Alarm
34	CAL_SLOPE		Slope value for last calibration **Range**: 5 to 100 mV/pH
35	CAL_ZEROPOINT		Zero point value for last calibration **Range**: -2 to 16 pH
36	UPPER_ALARM_REF_IMPEDANCE SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → Ref. impedance → Upper alarm value	W	Upper alarm value for reference impedance **Range:** UPPER_WARNING_REF_IMPEDANCE + 0.1 to 1000 kOhm **Factory setting**: 100 kOhm
37	UPPER_WARNING_REF_IMPEDANCE SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → Ref. impedance → Upper warning value	W	Upper warning value for reference impedance **Range:** LOWER_WARNING_REF_IMPEDANCE + 0.1 to UPPER_ALARM_REF_IMPEDANCE - 0.1 kOhm **Factory setting**: 50 kOhm
38	LOWER_WARNING_REF_IMPEDANCE SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → Ref. impedance → Lower warning value	W	Lower warning value for reference impedance **Range:** LOWER_ALARM_REF_IMPEDANCE + 0.1 to UPPER_WARNING_REF_IMPEDANCE - 0.1 kOhm **Factory setting**: 1 kOhm
39	LOWER_ALARM_REF_IMPEDANCE SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → Ref. impedance → Lower alarm value	W	Lower alarm value for reference impedance **Range:** 0 to LOWER_WARNING_REF_IMPEDANCE - 0.1 kOhm **Factory setting**: 0 kOhm

DIAGPHORP Transducer Block (manufacturer-specific parameters)			
Parameter index	Parameter Local Display Menu Path	Properties	Description
40	UPPER_ALARM_GLASS_IMPEDANCE SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits →Glass impedance → Upper alarm value	W	Upper alarm value for glass impedance **Range:** UPPER_WARNING_GLASS_IMPEDANCE + 0.1 to 1000 MOhm **Factory setting**: 0 kOhm
41	UPPER_WARNING_GLASS_IMPEDANCE SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → Glass impedance → Upper warning value	W	Upper warning value for glass impedance **Range:** LOWER_WARNING_GLASS_IMPEDANCE + 0.1 to UPPER_ALARM_GLASS_IMPEDANCE - 0.1 MOhm **Factory setting**: 1600 MOhm
42	LOWER_WARNING_GLASS_IMPEDANCE SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → Glass impedance → Lower warning value	W	Lower warning value for glass impedance **Range:** LOWER_ALARM_GLASS_IMPEDANCE + 0.1 to UPPER_WARNING_GLASS_IMPEDANCE - 0.1 MOhm **Factory setting**: 0.1 MOhm
43	LOWER_ALARM_GLASS_IMPEDANCE SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → Glass impedance → Lower alarm value	W	Lower alarm value for glass impedance **Range:** 0 to LOWER_WARNING_GLASS_IMPEDANCE - 0.1 MOhm **Factory setting**: 0 MOhm
44	ALARM_PH_SLOPE SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → Slope → Alarm value	W	Alarm limit for pH slope **Range:** 0.0001 to 55.01 mV/pH **Factory setting**: 53 mV/pH
45	WARNING_PH_SLOPE SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → Slope → Maintenance value	W	Warning limit for pH slope **Range:** 52.99 to 65 mV/pH **Factory setting**: 55 mV/pH
46	UPPER_ALARM_PH_ZEROPOINT SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → Zero point → Upper alarm value	W	Upper alarm value for pH zero point **Range:** UPPER_WARNING_PH_ZEROPOINT + 0.01 to 16 pH **Factory setting**9 pH
47	UPPER_WARNING_PH_ZEROPOINT SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → Zero point → Upper warning value	W	Upper warning value for pH zero point **Range:** LOWER_WARNING_PH_ZERO_POINT + 0.01 to UPPER_ALARM_PH_ZERO_POINT - 0.1 pH **Factory setting**: 8 pH
48	LOWER_WARNING_PH_ZEROPOINT SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → Zero point → Lower warning value	W	Lower warning value for pH zero point **Range:** LOWER_ALARM_PH_ZEROPOINT + 0.01 to UPPER_WARNING_PH_ZEROPOINT - 0.01 pH **Factory setting**: 6 pH
49	LOWER_ALARM_PH_ZEROPOINT SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → Zero point → Lower alarm value	W	Lower alarm value for pH zero point **Range:** 0 to LOWER_WARNING_PH_ZEROPOINT - 0.01 pH **Factory setting**: 5 pH
50	UPPER_ALARM_OPERATE_POINT SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → Operating point → Upper alarm value	W	Upper alarm value for IsFET operate point **Range:** UPPER_WARNING_OPERATE_POINT + 1 to 2000 mV **Factory setting**: 300 mV
51	UPPER_WARNING_OPERATE_POINT SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → Operating point → Upper warning value	W	Upper warning value for IsFET operate point **Range:** LOWER_WARNING_OPERATE_POINT + 1 to UPPER_ALARM_OPERATE_POINT - 1 mV **Factory setting**: 250 mV
52	LOWER_WARNING_OPERATE_POINT SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → Operating point → Lower warning value	W	Lower warning value for IsFET operate point **Range:** LOWER_ALARM_OPERATE_POINT+ 1 to UPPER_WARNING_OPERATE_POINT - 1 mV **Factory setting**: - 250 mV
53	LOWER_ALARM_OPERATE_POINT SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → Operating point → Lower alarm value	W	Lower alarm value for IsFET operate point **Range:** -2000 to LOWER_WARNING_OPERATE_POINT - 1 mV **Factory setting**: -300 mV

DIAGPHORP Transducer Block (manufacturer-specific parameters)			
Para-meter index	**Parameter** **Local Display Menu Path**	**Proper ties**	**Description**
54	UPPER_ALARM_ORPMV_OFFSET SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → ORP mV → Upper alarm value	W	Upper alarm value for ORPmV offset **Range:** UPPER_WARNING_ORPMV_OFFSET + 1 to 2000 mV **Factory setting**: 900 mV
55	UPPER_WARNING_ORPMV_OFFSET SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → ORP mV → Upper warning value	W	Upper warning value for ORPmV offset **Range:** LOWER_WARNING_ORPMV_OFFSET + 1 to UPPER_ALARM_OPERATE_POINT - 1 mV **Factory setting**: 700 mV
56	LOWER_WARNING_ORPMV_OFFSET SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → ORP mV → lower warning value	W	Lower warning value for ORPmV offset **Range:** LOWER_ALARM_ORPMV_OFFSET+ 1 to UPPER_WARNING_OPERATE_POINT - 1 mV **Factory setting**: -700 mV
57	LOWER_ALARM_ORPMV_OFFSET SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → ORP mV → Lower alarm value	W	Lower alarm value for ORPmV offset **Range:** -2000 to LOWER_WARNING_ORPMV_OFFSET - 1 mV **Factory setting**: -900 mV
58	BANDWIDTH_PH_STABLE_CRITERIA SETUP → Sensor pH/ORP → Cal. Settings → Stable criteria → Bandwidth	W	Permitted fluctuation in the measuring signal during calibration. With the bandwidth, you define the permitted measured value fluctuation which must not be exceeded in a certain timeframe during calibration **Range**: 1 to 10 mV **Factory setting**: 1 mV
59	TIMEFRAME_PH_STABLE_CRITERIA SETUP → Sensor pH/ORP → Cal. Settings → Stable criteria →Timeframe	W	The permitted measured value fluctuation cannot be exceeded in this timeframe. With the bandwidth, you define the permitted measured value fluctuation which must not be exceeded in a certain timeframe during calibration **Range**: 5 to 60 seconds **Factory setting**: 20 seconds
60	FUNCTION_PH_CAL_TIMER SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → Calibration timer → Function	W	Decide whether you want to use the function which checks the calibration interval **Available values**: 0 - Off 1 – On **Factory setting**: Off
61	HOURS_PH_CAL_TIMER SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → Calibration timer → Time	W	Specification for the time after which the timer should have timed out **Range**: 1 to 9999 hours **Factory setting**: 1000 hours
62	REMAINING_CAL_TIME_PH DIAG → Sensor status → Calibration timer		Remaining calibration time will be initialized with the value of parameter HOURS_CAL_TIMER after a calibration has been done. REMAINING_CAL_TIME indicates the remaining time until calibration data will be indicated as invalid. If remaining calibration timer value is ZERO, a CAL_TIMER alarm will be set. The sensor should be re-calibrated then. unit: hours
63	SCC_FUNCTION SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → SCC	W	Sensor Condition Check (SCC) Decide whether you want to use the function **Available values**: 0 - Off 1 – On **Factory setting**: Off
64	PCS_FUNCTION SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → PCS → Function	W	Process Check System (PCS) Decide whether you want to use the function **Available values**: 0 - Off 1 – On **Factory setting**: Off

DIAGPHORP Transducer Block (manufacturer-specific parameters)			
Para-meter index	**Parameter** **Local Display Menu Path**	**Proper ties**	**Description**
65	PCS_OBSERVATION_MINUTES SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → PCS → Time	W	Timeframe in which the measuring signal must have a certain minimum fluctuation so that it is not considered to be stagnant. **Range**: 1 to 240 minutes **Factory setting**: 60 minutes
66	WARNING_OP_TIME_OVER_100C_LIMIT SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → Usage 100°C → Warning level	W	Warning limit for operating time over 100 °C **Range**: 1 to ALARM_OP_TIME_OVER_100C_LIMIT-1 hours **Factory setting**: 10000 hours (416 days)
67	ALARM_OP_TIME_OVER_100C_LIMIT SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → Usage 100°C → Alarm level	W	Alarm limit for operating time over 100 °C **Range**: WARNING_OP_TIME_OVER_100C_LIMIT+1 to 50000 hours **Factory setting**: 15000 hours (625 days)
68	WARN_OP_TIME_BELOW_M300MV_LIMIT SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → Usage < -300mV → Warning level	W	Warning limit for operating time below -300 mV (= pH 12) **Range**: 1 to ALARM_OP_TIME_BELOW_M300MV_LIMIT-1 hours **Factory setting**: 10000 hours (416 days)
69	ALARM_OP_TIME_BELOW_M300MV_LIMIT SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → Usage < -300mV → Alarm level	W	Alarm limit for operating time below -300 mV **Range**: WARN_OP_TIME_BELOW_M300MV_LIMIT+1 to 50000 hours **Factory setting**: 15000 hours (625 days)
70	WARNING_OP_TIME_OVER_300MV_LIMIT SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → Usage < 300mV → Warning level	W	Warning limit for operating time over 300 mV (= pH2) **Range**: 1 to ALARM_OP_TIME_OVER_300MV_LIMIT-1 hours **Factory setting**: 10000 hours (416 days)
71	ALARM_OP_TIME_OVER_300MV_LIMIT SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → Usage < 300mV → Alarm level	W	Alarm limit for operating time over 300 mV **Range**: WARN_OP_TIME_OVER_300MV_LIMIT+1 to 50000 hours **Factory setting**: 15000 hours (625 days)
72	FUNCTION_DELTA_SLOPE_LIMIT SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → Delta slope → Function	W	The device determines the difference in slope between the last calibration and the penultimate calibration, and issues a warning or an alarm depending on the setting configured. The difference is an indicator for the condition of the sensor. **Available values**: 0 - Off 1 – On **Factory setting**: Off
73	WARNING_DELTA_SLOPE_LIMIT SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → Delta slope → Warning level	W	Warning limit for delta slope **Range**: 0.1 to ALARM_DELTA_SLOPE_LIMIT-0.1 mV/pH **Factory setting**: 5 mV/pH
74	ALARM_DELTA_SLOPE_LIMIT SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → Delta slope → Alarm level	W	Alarm limit for delta slope **Range**: WARNING_DELTA_SLOPE_LIMIT+0.1 to 10 mV/pH **Factory setting**: 6 mV/pH
75	FUNCTION_DELTA_OPERATING_PNT_LIMIT SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → Delta operating pnt. → Function	W	Switch to enable or disable Delta Operating Point diagnostic limits **Available values**: 0 - Off 1 – On **Factory setting**: Off
76	WARNING_DELTA_OPERATING_PNT_LIMIT SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → Delta operating pnt. → Warning level	W	Warning limit for delta operating point **Range**: 1.0 to ALARM_DELTA_OPERATING_PNT_LIMIT-0.1 mV **Factory setting**: 10 mV
77	ALARM_DELTA_OPERATING_PNT_LIMIT SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → Delta operating pnt. → Alarm level	W	Alarm limit for delta operating point **Range**: WARNING_DELTA_OPERATING_PNT_LIMIT+0.1 to 200 mV **Factory setting**15 mV

DIAGPHORP Transducer Block (manufacturer-specific parameters)			
Para-meter index	Parameter Local Display Menu Path	Proper ties	Description
78	FUNCTION_DELTA_ZERO_PNT_LIMIT SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → Delta zeropnt. → Function	W	The device determines the difference between the last calibration and the penultimate calibration, and issues a warning or an alarm depending on the setting configured. The difference is an indicator for the condition of the sensor. **Available values**: 0 - Off 1 – On **Factory setting**: Off
79	WARNING_DELTA_ZERO_PNT_LIMIT SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → Delta zeropnt. → Warning level	W	Warning limit for delta zero point **Range**: 0 to ALARM_DELTA_ZERO_PNT_LIMIT-0.01 pH **Factory setting**: 0.5 pH
80	ALARM_DELTA_ZERO_PNT_LIMIT SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → Delta zeropnt. → Alarm level	W	Alarm limit for delta zero point **Range**: WARNING_DELTA_ZERO_PNT_LIMIT+0.01 to 2 pH **Factory setting**: 1 pH
81	FUNCTION_CAL_EXPIRED SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → Calibration expired → Function	W	Decide whether you want to use the function which checks whether the calibration of a sensor is still valid **Available values**: 0 - Off 1 – On **Factory setting**: Off
82	WARNING_CAL_EXPIRED_LIMIT SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → Calibration expired → Warning level	W	Warning limit for expired calibration **Range**: 1 to ALARM_CAL_EXPIRED_LIMIT-1 hours **Factory setting**: 16560 hours (23 months)
83	ALARM_CAL_EXPIRED_LIMIT SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → Calibration expired → Alarm level	W	Alarm limit for expired calibration **Range**: WARNING_CAL_EXPIRED_LIMIT+1 to 17280 hours **Factory setting**: 17280 hours (24 months)
84	SCS_GLASS_LOWER_CHECK SETUP → Sensor pH/ORP → Sensor diagnostics → SCS glass low	w	The sensor check system (SCS) monitors the low impedance of the pH glass and Redox sensors. An alarm is issued if a minimum impedance value is undershot. Related limits defined in GLASS_IMPEDANCE alarm and warning parameters noted above **Available values**: 0 - Off 1 – On **Factory setting**: On
85	SCS_GLASS_UPPER_CHECK SETUP → Sensor pH/ORP → Sensor diagnostics → SCS glass high	W	The sensor check system (SCS) monitors the high impedance of the pH glass and Redox sensors. An alarm is issued, if a maximum impedance value is overshot. Related limits defined in GLASS_IMPEDANCE alarm and warning parameters noted above **Available values**: 0 - Off 1 – On **Factory setting**: On
86	SCS_REFERENCE SETUP → Sensor pH/ORP → Sensor diagnostics → SCS reference	W	Switch to enable or disable Sensor Check System for analog sensors with potential matching enabled and Memosens ORP sensors **Available values**: 0 - Off 1 – On **Factory setting**: Off
87	OUT_PH_ZEROPOINT_LIMIT		Current result of pH zero point check **Possible values**: 0x00000000: Within Range 0x00000001: Check Config 0x00000002: HiHi Alarm 0x00000003: High Alarm 0x00000004: Low Alarm 0x00000005: LoLo Alarm

DIAGPHORP Transducer Block (manufacturer-specific parameters)			
Para-meter index	Parameter Local Display Menu Path	Proper ties	Description
88	OUT_PH_SLOPE_LIMIT		Current result of pH slope check **Possible values**: 0x00000000: Within Range 0x00000001: Check Config 0x00000002: HiHi Alarm 0x00000003: High Alarm 0x00000004: Low Alarm 0x00000005: LoLo Alarm
89	OUT_OPERATE_POINT_ISFET_LIMIT		Current result of ISFET operate point check **Possible values**: 0x00000000: Within Range 0x00000001: Check Config 0x00000002: HiHi Alarm 0x00000003: High Alarm 0x00000004: Low Alarm 0x00000005: LoLo Alarm
90	OUT_ORPMV_LIMIT		Current result of ORPmV limit check **Possible values**: 0x00000000: Within Range 0x00000001: Check Config 0x00000002: HiHi Alarm 0x00000003: High Alarm 0x00000004: Low Alarm 0x00000005: LoLo Alarm
91	OUT_GLASS_IMPEDANCE_LIMIT		Current result of glass impedance check **Possible values**: 0x00000000: Within Range 0x00000001: Check Config 0x00000002: HiHi Alarm 0x00000003: High Alarm 0x00000004: Low Alarm 0x00000005: LoLo Alarm
92	OUT_REF_IMPEDANCE_LIMIT		Current result of reference impedance check **Possible values**: 0x00000000: Within Range 0x00000001: Check Config 0x00000002: HiHi Alarm 0x00000003: High Alarm 0x00000004: Low Alarm 0x00000005: LoLo Alarm
93	OUT_OP_TIME_OVER_100C_LIMIT		Current result of operating time over 100 °C check **Possible values**: 0x00000000: Within Range 0x00000001: Warning 0x00000002: Alarm
94	OUT_OP_TIME_BELOW_M300MV_LIMIT		Current result of operating time below - 300 mV check **Possible values**: 0x00000000: Within Range 0x00000001: Warning 0x00000002: Alarm
95	OUT_OP_TIME_OVER_300MV_LIMIT		Current result of operating time over 300 mV check **Possible values**: 0x00000000: Within Range 0x00000001: Warning 0x00000002: Alarm
96	OUT_CAL_EXPIRED_LIMIT_PHORP		Current result of pH zero point check **Possible values**: 0x00000000: Within Range 0x00000001: Warning 0x00000002: Alarm
97	OUT_DELTA_SLOPE_LIMIT		Current result of pH delta slope check **Possible values**: 0x00000000: Within Range 0x00000001: Warning 0x00000002: Alarm

DIAGPHORP Transducer Block (manufacturer-specific parameters)			
Para-meter index	**Parameter** **Local Display Menu Path**	**Proper ties**	**Description**
98	OUT_DELTA_ZEROPNT_LIMIT		Current result of pH delta zero point check **Possible values**: 0x00000000: Within Range 0x00000001: Warning 0x00000002: Alarm
99	OUT_CAL_TIMER_LIMIT		Current result of calibration timer check **Possible values**: 0x00000000: Within Range 0x00000001: Warning 0x00000002: Alarm
100	MEASURED_VALUE_PHORP SETUP → Sensor pH/ORP → Measured value		Select measurement mode **Available values**: 0 - pH 1 - ORP mV 2 - rH 3 - ORP %
101	POTENTIAL_MATCHING SETUP → Sensor pH/ORP → Potential matching		Analog sensors only: Indicates symmetric measurement (= with PM, only with a glass electrode, ISFET sensor or Pfaudler electrode) or asymmetric measurement (= without PM) **Available values**: 0: Without PM 1: With PM **Factory Setting**: without PM
102	SENSOR_TYPE SETUP → Sensor pH/ORP → Sensor type pH (visible only if analog sensor interface)		Indicate sensor type **Available values:** 0: Glass 1: IsFET 2: ORP 3: IsFET analog 4: ORP analog 5: Pfaudler abs 6: Pfaudler rel 7: Antimony 8: UNUSED 9: Glass analog 10: Pfaudler pH/ORP 11: rH **Note:** Writable in Transducer Block PHORP **Default value:** if sensor interface is digital: automatic, depends on connected sensor if sensor interface is analog: Glass analog
103	PH_OFFSET DIAG → Sensor status → Offset		pH offset **Available values:** -2 to 16 pH **Note:** Writable in Transducer Block PHORP **Factory setting**: 0 pH
104	SENSOR_OFFSET_ORP_MV DIAG → Sensor status → Offset		ORP mV offset **Available values:** -100 to +100 mV **Note:** Writable in Transducer Block PHORP **Factory setting**: 0 mV
105	SLOPE_ORPPERCENT DIAG → Sensor status → Slope		Slope of mV/percent mapping (ORP% only) unit: % **Factory setting**: 0.03 %

DIAGPHORP Transducer Block (manufacturer-specific parameters)			
Para-meter index	Parameter Local Display Menu Path	Proper ties	Description
106	SENSOR_OFFSET_ORP_PERCENT DIAG → Sensor status → Offset		Calibrated sensor offset **Available values:** -100 to +100 mV **Factory setting**: 0 mV
107	ISFET_OPERATING_POINT DIAG → Sensor status → Operating point		IsFET sensor only: operating point **Available values:** -2000 to +2000 mV **Factory setting**: 0 mV
108	MEAS_SLOPE 		Current measured pH slope value and status Unit code: 11585 (mV/pH)
109	MEAS_ZERO_POINT 		Current measured pH zero point value and status Unit code: 11422 (pH)
110	ELECTRODE_TYPE SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → PCS → Function		Indicates electrode type (Glass or Pfaudler) **Available values:** 0 - Glass 1 - Pfaudler
111	UPPER_ALM_PFAUDLER_PH_ZERO_PNT SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → PCS → Function	W	Upper alarm value for pH zero point of a Pfaudler sensor **Range:** UPPER_WARN_PFAUDLER_PH_ZERO_PNT + 0.01 to 16 pH **Factory setting**: 10.5 pH
112	UPPER_WARN_PFAUDLER_PH_ZERO_PNT SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → PCS → Function	W	Upper warning value for pH zero point of a Pfaudler sensor **Range:** LOWER_WARN_PFAUDLER_PH_ZERO_PNT + 0.01 to UPPER_ALM_PFAUDLER_PH_ZERO_PNT - 0.1 pH **Factory setting**: 9.5 pH
113	LOWER_WARN_PFAUDLER_PH_ZERO_PNT SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → PCS → Function	W	Lower warning value for pH zero point of a Pfaudler sensor **Range:** LOWER_ALM_PFAUDLER_PH_ZERO_PNT + 0.01 to UPPER_WARNPFAUDLER__PH_ZERO_PNT - 0.01 pH **Factory setting**: 6.5 pH
114	LOWER_ALM_PFAUDLER_PH_ZERO_PNT SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → PCS → Function	W	Lower alarm value for pH zero point of a Pfaudler sensor **Range:** 0 to LOWER_WARN_PFAUDLER_PH_ZERO_PNT - 0.01 pH **Factory setting**: 5.5 pH
115	SCS_REFERENCE_NO_PAL	W	required for up/download only **Available values**: 0 - Off 1 – On **Default value:** 0 - Off
116	SCS_REFERENCE_PAL	W	required for up/download only **Available values**: 0 - Off 1 – On **Default value:** 1 - On
117	ALARM_PH_SLOPE_NO_PFAUDLER	W	required for up/download only **Range:** 0.0001 to (WARNING_PH_SLOPE_NO_PFAUDLER + 0.01) mV **Factory setting:** 53.0 mV
118	ALARM_PH_SLOPE_PFAUDLER3	W	required for up/download only **Range:** 0.0001 to (WARNING_PH_SLOPE_PFAUDLER3 + 0.01) mV **Factory setting:** 50.0 mV
119	ALARM_PH_SLOPE_PFAUDLER18	W	required for up/download only **Range:** 0.0001 to (WARNING_PH_SLOPE_PFAUDLER18 + 0.01) mV **Factory setting:** 45.0 mV

DIAGPHORP Transducer Block (manufacturer-specific parameters)			
Para-meter index	Parameter Local Display Menu Path	Proper ties	Description
120	WARNING_PH_SLOPE_NO_PFAUDLER	W	required for up/download only **Range:** (ALARM_PH_SLOPE_NO_PFAUDLER - 0.01) to 65.0 mV **Factory setting:** 55.0 mV
121	WARNING_PH_SLOPE_PFAUDLER3	W	required for up/download only **Range:** (ALARM_PH_SLOPE_PFAUDLER 3- 0.01) to 65.0 mV **Factory setting:** 52.0 mV
122	WARNING_PH_SLOPE_PFAUDLER18	W	required for up/download only **Range:** (ALARM_PH_SLOPE_PFAUDLER 18- 0.01) to 65.0 mV **Factory setting:** 48.0 mV
123	UPPER_ALM_PH_ZPNT_GLASS	W	required for up/download only **Range:** (UPPER_WARN_PH_ZPNT_GLASS + 0.01) to 16.0 pH **Factory setting:** 9.0 pH
124	UPPER_ALM_PH_ZPNT_PFDLR3_AGAGEL	W	required for up/download only **Range:** (UPPER_WARN_PH_ZPNT_PFDLR3_AGAGEL + 0.01) to 16.0 pH **Factory setting:** 3.35 pH
125	UPPER_ALM_PH_ZPNT_PFDLR3_AGAGCL	W	required for up/download only **Range:** (UPPER_WARN_PH_ZPNT_PFDLR3_AGAGCL + 0.01) to 16.0 pH **Factory setting:** 10.65 pH
126	UPPER_ALM_PH_ZPNT_PFDLR18	W	required for up/download only **Range:** (UPPER_WARN_PH_ZPNT_PFDLR18 + 0.01) to 16.0 pH**Factory setting:** 12.0 pH
127	UPPER_ALM_PH_ZPNT_ANTIMONY	W	required for up/download only **Range:** (UPPER_WARN_PH_ZPNT_ANTIMONY + 0.01) to 16.0 pH**Factory setting:** 3.0 pH
128	UPPER_WARN_PH_ZPNT_GLASS	W	required for up/download only **Range:** (LOWER_WARN_PH_ZPNT_GLASS + 0.01) to (UPPER_ALM_PH_ZPNT_GLASS - 0.01) pH **Factory setting:** 8.0 pH
129	UPPER_WARN_PH_ZPNT_PFDLR3_AGAGEL	W	required for up/download only **Range:** (LOWER_WARN_PH_ZPNT_PFDLR3_AGAGEL+ 0.01) to (UPPER_ALM_PH_ZPNT_PFDLR3_AGAGEL- 0.01) pH **Factory setting:** 2.25 pH
130	UPPER_WARN_PH_ZPNT_PFDLR3_AGAGCL	W	required for up/download only **Range:** (LOWER_WARN_PH_ZPNT_PFDLR3_AGAGCL+ 0.01) to (UPPER_ALM_PH_ZPNT_PFDLR3_AGAGCL - 0.01) pH **Factory setting:** 9.65 pH
131	UPPER_WARN_PH_ZPNT_PFDLR18	W	required for up/download only **Range:** (LOWER_WARN_PH_ZPNT_PFDLR18 + 0.01) to (UPPER_ALM_PH_ZPNT_PFDLR18 - 0.01) pH **Factory setting:** 11.0 pH
132	UPPER_WARN_PH_ZPNT_ANTIMONY	W	required for up/download only **Range:** (LOWER_WARN_PH_ZPNT_ANTIMONY + 0.01) to (UPPER_ALM_PH_ZPNT_ANTIMONY- 0.01) pH **Factory setting:** 2.0 pH

DIAGPHORP Transducer Block (manufacturer-specific parameters)			
Parameter index	Parameter Local Display Menu Path	Properties	Description
133	LOWER_WARN_PH_ZPNT_GLASS	W	required for up/download only **Range:** (LOWER_ALM_PH_ZPNT_GLASS + 0.01) to (UPPER_WARN_PH_ZPNT_GLASS - 0.01) pH **Factory setting:** 6.0 pH
134	LOWER_WARN_PH_ZPNT_PFDLR3_AGAGEL	W	required for up/download only **Range:** (LOWER_ALM_PH_ZPNT_PFDLR3_AGAGEL + 0.01) to (UPPER_WARN_PH_ZPNT_PFDLR3_AGAGEL - 0.01) pH **Factory setting:** 0.35 pH
135	LOWER_WARN_PH_ZPNT_PFDLR3_AGAGCL	W	required for up/download only **Range:** (LOWER_ALM_PH_ZPNT_PFDLR3_AGAGCL + 0.01) to (UPPER_WARN_PH_ZPNT_PFDLR3_AGAGCL- 0.01) pH **Factory setting:** 7.65 pH
136	LOWER_WARN_PH_ZPNT_PFDLR18	W	required for up/download only **Range:** (LOWER_ALM_PH_ZPNT_PFDLR18 + 0.01) to (UPPER_WARN_PH_ZPNT_PFDLR18 - 0.01) pH **Factory setting:** 9.0 pH
137	LOWER_WARN_PH_ZPNT_ANTIMONY	W	required for up/download only **Range:** (LOWER_ALM_PH_ZPNT_ANTIMONY + 0.01) to (UPPER_WARN_PH_ZPNT_ANTIMONY - 0.01) pH **Factory setting:** 0.0 pH
138	LOWER_ALM_PH_ZPNT_GLASS	W	required for up/download only **Range:** -2.0 to (LOWER_WARN_PH_ZPNT_GLASS - 0.01) pH **Factory setting:** 5.0 pH
139	LOWER_ALM_PH_ZPNT_PFDLR3_AGAGEL	W	required for up/download only **Range:** -2.0 to (LOWER_WARN_PH_ZPNT_PFDLR3_AGAGEL - 0.01) pH **Factory setting:** - 0,65 pH
140	LOWER_ALM_PH_ZPNT_PFDLR3_AGAGCL	W	required for up/download only **Range:** -2.0 to (LOWER_WARN_PH_ZPNT_PFDLR3_AGAGCL - 0.01) pH **Factory setting:** 6.65 pH
141	LOWER_ALM_PH_ZPNT_PFDLR18	W	required for up/download only **Range:** -2.0 to (LOWER_WARN_PH_ZPNT_PFDLR18 - 0.01) pH **Factory setting: 8.0 pH**
142	LOWER_ALM_PH_ZPNT_ANTIMONY	W	required for up/download only **Range:** -2.0 to (LOWER_WARN_PH_ZPNT_ANTIMONY - 0.01) pH **Factory setting:** - 1.0 pH
143	REFERENCE_ELECTRODE	W	Kind of Pfaudler sensor reference electrode: 0 - AGAGel: Silver / Silver acetate reference system or 1 - AgAgCl: Silver / Silver chloride reference system
144	NUMBER_CIP_FUNCTION_PHORP	W	Switch to enable or disable CIP diagnostic limits **Available values**: 0 - Off 1 – On **Factory setting**: 0 - Off
145	WARNING_CIP_LIMIT_PHORP	W	Warning limit for CIP **Available values**: 1.0 to (ALARM_CIP_LIMIT_PHORP - 1.0) h **Factory setting:** 80.0 h

DIAGPHORP Transducer Block (manufacturer-specific parameters)			
Para-meter index	Parameter Local Display Menu Path	Proper ties	Description
146	ALARM_CIP_LIMIT_PHORP	W	Alarm limit for CIP **Available values**: (WARNING_CIP_LIMIT_PHORP + 1.0) to 200.0 h **Factory setting:** 100.0 h
147	NUMBER_AUTO_CLAV_FUNCTION_PHORP	W	Switch to enable or disable autoclavings diagnostic limits **Available values**: 0 - Off 1 – On **Factory setting**: 0 - Off
148	WARNING_AUTO_CLAV_LIMIT_PHORP	W	Warning limit for autoclavings **Available values**: 1.0 to (ALARM_AUTO_CLAV_LIMIT_PHORP - 1.0) **Factory setting**: 30
149	ALARM_AUTO_CLAV_LIMIT_PHORP	W	Alarm limit for autoclavings **Available values**: (WARNING_AUTO_CLAV_LIMIT_PHORP + 1.0) to 99.0 **Factory setting**: 50
150	FUNCTION_ORPMV_OFFSET	W	Switch to enable or disable ORPmV offset diagnostic limits **Available values**: 0 - Off 1 – On **Factory setting**: 0 - Off
151	PH_ADJUSTMENT_STORAGE		Storage selection for 1-point adjustment data **Available values**: 0 – Sensor 1 – Transmitter Writable in PHORP transducer

6.4. Function Blocks

Several function blocks are available to provide input and output parameters to be linked over the fieldbus. Each device contains the following function blocks:

- Analog Input
- Discrete Input
- PID
- Analog Alarm
- Signal Characterizer
- Input Selector

A short overview is summarized in the following chapters.
A detailed description of the function blocks described below can be found in the FOUNDATION Fieldbus Function Blocks manual BA00062S (www.endress.com/cm42 under "Documents").

6.4.1. Analog Input

In the Analog Input (AI) function block, the process variables of the Transducer Blocks are prepared for subsequent automation functions (e.g. linearization, scaling and limit value processing). The automation function is defined by connecting up the outputs. The AI block in this device is an enhanced version with manufacturer-specific extensions. They contain configuration parameters for 5 additional discrete output alarm signals and a block error description parameter which indicates problems detected within the block like configuration errors.

Liquiline_pHORP provides 6 Analog Input Function Blocks. Each block can select a measurement value which is provided by the PHORP Transducer Block. Multiple selection of the same CHANNEL value in several AI blocks is available to support different scaling for one measurement value for example.

6.4.2. Discrete Input

The DI block takes the discrete input data, selected by channel number, and makes it available to other function blocks at its output. A block error description parameter is available which indicates problems detected within the block like configuration errors.

Liquiline_pHORP provides 2 Discrete Input Function Blocks. Each block can select one of two channels to connect the discrete data (CURRENT_STATE_CH1 or CURRENT_STATE_CH2) transfer from the DIAGDI Transducer Block.

6.4.3. PID

A PID function block contains the input channel processing, the proportional integral differential control (PID) and the analog output channel processing. The configuration of the PID function block depends on the automation task. The following can be realized: Basic controls, feedforward control, cascade control, cascade control with limiting. A block error description parameter is available which indicates problems detected within the block like configuration errors.

6.4.4. Analog Alarm

The Analog Alarm Block provides alarm condition reporting on an analog output of any block. Alarm conditions include high, high-high, low, and low-low alarms. A block error description parameter is available which indicates problems detected within the block like configuration errors.

Liquiline_pHORP provides 2 Analog alarm Function Blocks, so that two different measurement values could be evaluated. A possible application could be the pH and temperature values from the OUT signal of an Analog Input Block for example.

6.4.5. Signal Characterizer

The signal characterizer block has two sections, each with an output that is a non-linear function of the respective input. The non-linear function is determined by a single look-up table with 21 arbitrary x-y pairs.
The status of an input is copied to the corresponding output, so the block may be used in the control or process signal path. An option can swap the axes of the function for section 2, so that it can be used in the backward control path. A block error description parameter is available which indicates problems detected within the block like configuration errors.

6.4.6. Input Selector

The signal selector block (Input Selector block = ISEL) provides selection of up to four inputs and generates an output based on the configured action. A block error description parameter is available which indicates problems detected within the block like configuration error

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