Endress+Hauser
People for Process Automation

Liquiline_Cond – Device Revision 4

FF-H1 Guideline

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1. Introduction

1.1. Scope

The Endress+Hauser analysis transmitter, model Liquiline_Cond 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
CIP	Clean in place
CFF	Common File Format
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
PCS	Process Control System
PID	Proportional/Integral/Derivative Control
PV	Process Variable
RB	Resource Block
SIP	Sterilisation in place
SM	System Management

Abbreviation	Description
SP	Set Point
TB	Transducer Block
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_Cond Part 1
BA00382C	Operating Instructions Liquiline_Cond Part 2
BA00062S	Guideline FOUNDATION Fieldbus Function Blocks
BA00013S	FOUNDATION Fieldbus Overview

2. Device identification

Manufacturer name:	Endress+Hauser
Model name:	Liquiline_Cond
Manufacturer ID code:	$452B48_h$ (4533064)
Device type code:	$10A1_h$ (4257)
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.

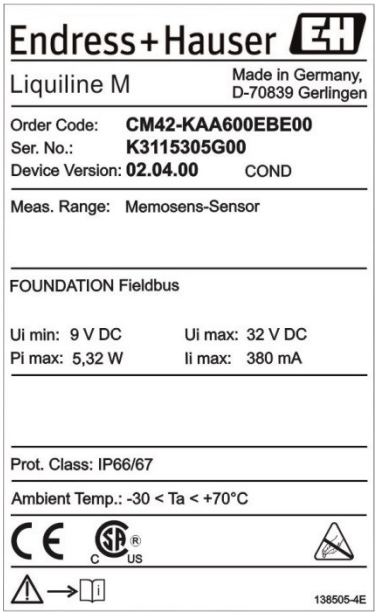


Fig. 3: A name plate example

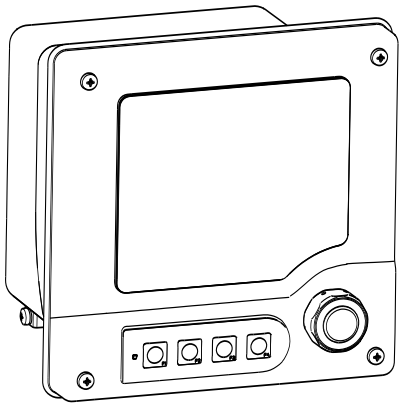


Fig. 2: Stainless steel housing

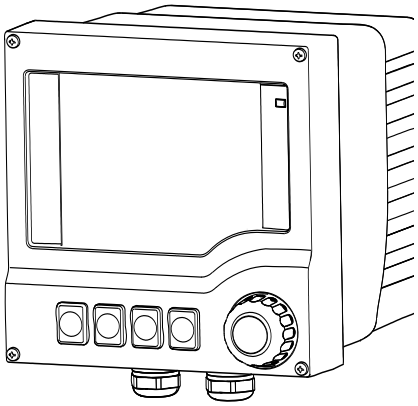


Fig. 1: Plastics (PC) housing

3. Product overview

Liquiline_Cond is a liquid analysis transmitter for conductivity, resistivity and concentration 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.

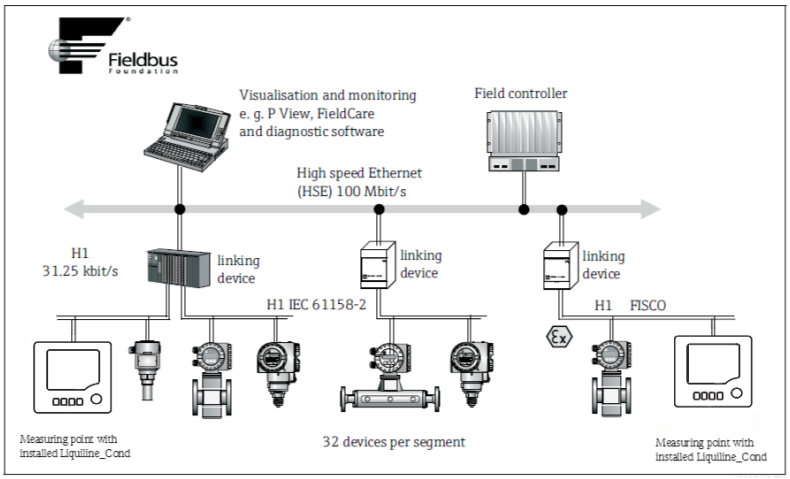


Fig. 4: System integration via FOUNDATION™ fieldbus™

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 is 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 in question 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.products.endress.com/fieldbus-dd
- Via the FieldCommGroup Organization: www.fieldcommgroup.org
- Or via 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

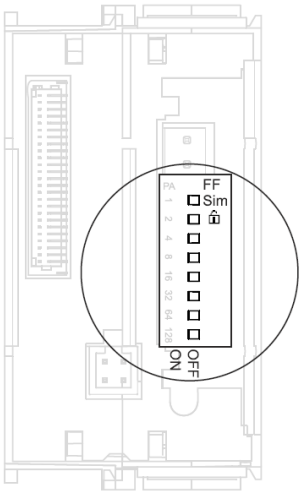
current write protection status is displayed in the WRITE_LOCK parameter (see Section Resource Block FF Parameters). The simulation mode via the hardware setting must be changed before the software setting.

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,.

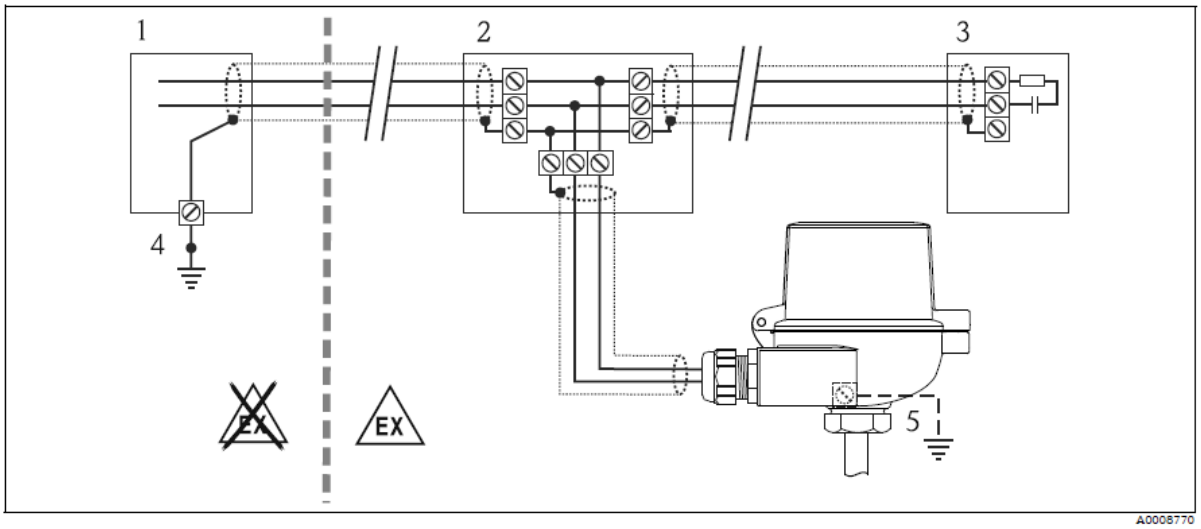


Fig. 5: Shielding and one-sided grounding of the fieldbus cab le shielding

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	$\geq 10^9$ Ω

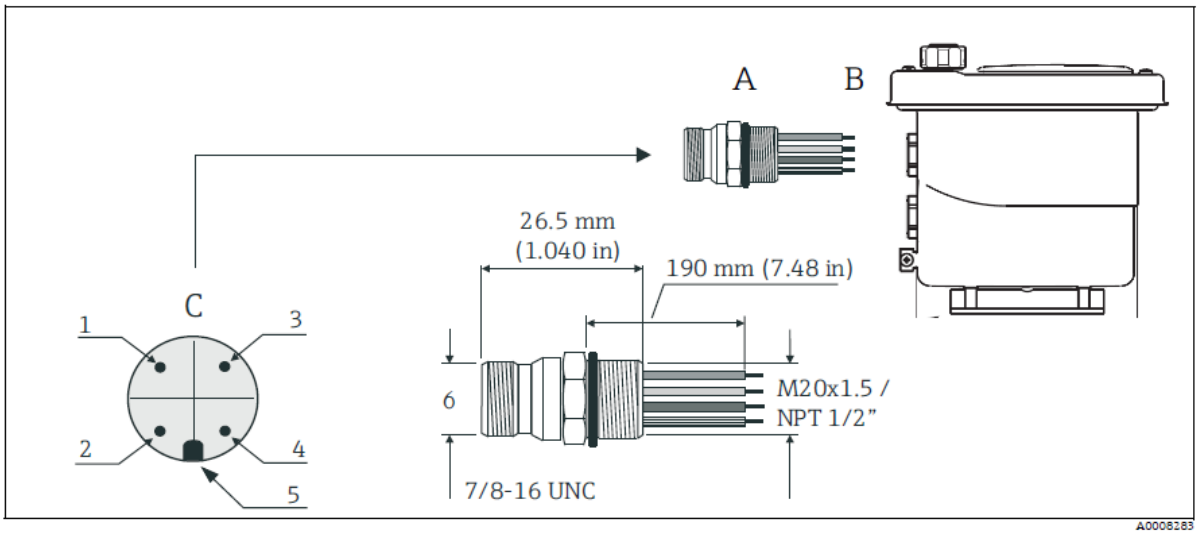


Fig. 6: Connectors for connecting to FOUNDATION™ Fieldbus

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 = 452B4810A1-XXXXXXXXXXX
  452B48 = Endress+Hauser
  10A1 = Liquiline_Cond
  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 2 Device Identification).
4. Switch the device on. The first time you establish a connection, the device reacts as follows in the configuration system:

   – EH_Liquiline_Cond_xxxxxxxxxxx (tag name PD-TAG)
   – 452B4810A1-xxxxxxxxxxx (DEVICE_ID)

– Block structure:

Display text (xxx... = serial number)	Base index (decimal)	Description
RS_xxxxxxxxxxx	0400	Resource Block
CONDCONC_xxxxxxxxxxx	0570	CONDCONC Transducer Block
DIAGDI_xxxxxxxxxxx	0740	DIAGDI Transducer Block
SERVICE_xxxxxxxxxxx	0910	Service Transducer Block
ADVDIAGCOND_xxxxxxxxxxx	1080	Advanced Diagnostics Transducer Block
DISPLAYCOND_xxxxxxxxxxx	1250	Display Transducer Block
MEMOCOND_xxxxxxxxxxx	1420	Memosens Transducer Block
DIAGCOND_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_Cond_xxxxxxxxxxx (xxx... = serial number).
6. Quick Setup in transducers
   a. Check the measured value setting (parameter **MEASURED_VALUE** in CONDCONC Transducer Block) and change the indicated value, if required, after switching the operating mode of CONDCONC Transducer to OOS.
   b. Check conductivity and temperature compensated conductivity unit setting (parameters **UNIT_CONDUCTIVITY_VALUE** and **UNIT_TEMPCOMP_CONDUCTIVITY_VALUE**), if selected measured value is set to ‘Conductivity’ and change the indicated value (writing to this parameter in OOS mode only), if required.
   c. Check resistivity unit setting (parameter **UNIT_RESISTIVITY_VALUE**), if selected measured value is set to ‘Resistivity’ and change the indicated value (writing to this parameter in OOS mode only), if required.

      Resistivity measurement is available for inductive sensors only.

   d. If selected measured value is set to ‘Concentration’, set parameter value **CONC_MEDIUM** to the desired medium type (writing to this parameter in OOS mode only).
   e. Check temperature unit setting (parameter **UNIT _TEMPERATURE_VALUE**) and change the indicated value, if required (writing to this parameter in OOS mode only).
   f. Check the cell constant value (parameter **CELL_CONSTANT** in CONDCONC Transducer Block) and change the indicated value, if required (writing to this parameter in OOS mode only).

g. 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 local 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.

h. Check/Select language for local device display (DISPLAYCOND 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-LAA610EB**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.

i. 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 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_Cond contains the following blocks:

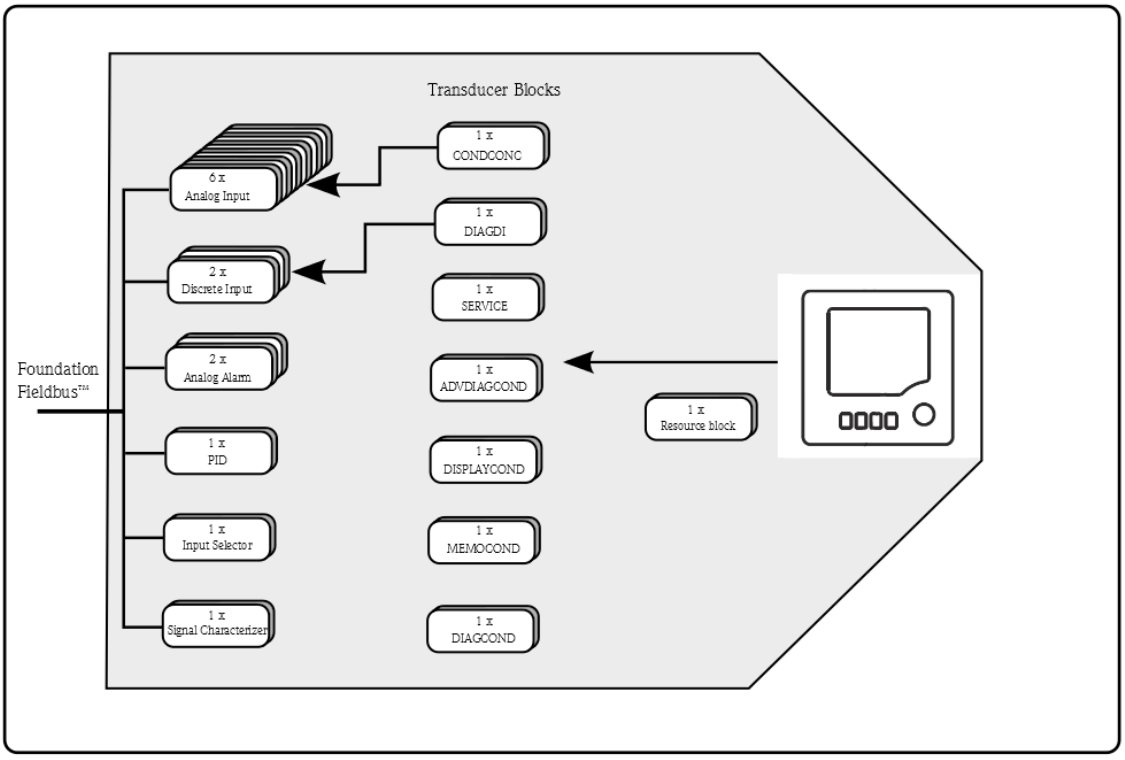


Fig. 7: Block model Liquiline_Cond

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 you to specify 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: 0x10A1 (hex) for Liquiline_Cond
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 | Fault state | 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 | Fault state | 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 0x03C1(0000 to 0961); 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**: Cond
45	SOFTWARE_FUNCTIONALITY DIAG -> Device information -> Order code	Read only	Indicates software capability as Standard or Advanced like indicated in order code (i.e. KAA600E**A**D00 means standard or KAA600E**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).
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 behavior 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 behavior 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 behavior 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 behavior 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: 0xF3F9FFFF**
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: 0x01FFFFFF**
92	Restart Enable (RESTART_ENABLE)	AUTO - OOS	This parameter indicates which factory-specific restart levels are actually available. Options: • Restart Factory (all device parameters are reset to default values as set leaving the factory)
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_Cond contain all the measuring and device-specific parameters. All the settings directly connected with the application (conductivity, resistivity, concentration 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_Cond are split into several Transducer Blocks, each covering different task areas.

Transducer Block CONDCONC / base index 570 (dec.):
This block contains all the parameters and functions that have to do with measuring and configuring the input variables (conductivity and temperature compensated conductivity, resistivity, concentration and temperature values).

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, and 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 ADVDIAGCOND/ 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 DISPLAYCOND/ base index 1250 (dec.):
The parameters of this block allow the configuration of the local display.

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

Transducer Block DIAGCOND/ 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 "CONDCONC" 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
CONDCONC	MEAS_CONDUCTIVITY_VALUE	Conductivity Value	1
CONDCONC	MEAS_TEMPCOMP_CONDUCTIVITY_VALUE	Temperature Compensated Conductivity Value	2
CONDCONC	MEAS_RESISTIVITY_VALUE	Resistivity Value	4
CONDCONC	MEAS_CONCENTRATION_VALUE	Concentration Value	5
CONDCONC	MEAS_TEMPERATURE_VALUE	Temperature Value	6
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 47). I/O Transducer Blocks CONDCONC 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 47).

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 CONDCONC Transducer Block (page 47) 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

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

6.3.5. Selecting the units

The CONDCONC Transducer provides 5 Signals with configurable units:

Process variable	unit	unit code [hex]	unit code [dec]	configurable unit parameter
MEAS_CONDUCTIVITY_VALUE	mS/cm	516	1302	UNIT_CONDUCTIVITY_VALUE
	µS/cm	632	1586	
	S/m	513	1299	
	S/cm	FFF3	65523	
	mS/m	642	1602	
	µS/m	643	1603	
MEAS_TEMPCOMP_CONDUCTIVITY_VALUE	mS/cm	516	1302	UNIT_TEMPCOMP_CONDUCTIVITY_VALUE
	µS/cm	632	1586	
	S/m	513	1299	
	S/cm	FFF3	65523	
	mS/m	642	1602	
	µS/m	643	1603	
MEAS_RESISTIVITY_VALUE	MOhm-cm	633	1587	UNIT_RESISTIVITY_VALUE
	kOhm-m	50E	1294	
	kOhm-cm	644	1604	
MEAS_CONCENTRATION_VALUE	%	53E	1342	Unchangeable unit % for pre-defined medium types selected through parameter CONC_MEDIUM. Selectable units for user-defined tables in parameters CONC_UNIT_TABLE_1, CONC_UNIT_TABLE_2, CONC_UNIT_TABLE_3, CONC_UNIT_TABLE_4
	mg/L	648	1608	
	ppm	58F	1423	
	No_units	634	1588	
MEAS_TEMPERATURE_VALUE	°C	3E9	1001	UNIT_TEMPERATURE_VALUE
	°F	3EA	1002	

The CONDCONC 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 in BA00062S (www.endress.com/cm42 under "Documents").

Indicated unit and format on the Liquiline device display may differ from the CONDCONC Transducer unit settings. The main measurement value on the device’s display is selected by CONDCONC Transducer parameter MEASURED_VALUE. The device’s firmware calculates the best format for indication then. The DISPLAY_COND 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 ADVDIAGCOND 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 ADVDIAGCOND 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:

Method/Menu name	Description
View logbook data 1-10	Indicate Logbook entries 1 to 10 in “ring memory”
View logbook data 11-20	Indicate Logbook entries 11 to 20 in “ring memory”
View logbook data 21-30	Indicate Logbook entries 21 to 30 in “ring memory”
View logbook data 31-40	Indicate Logbook entries 31 to 40 in “ring memory”
View logbook data 41-50	Indicate Logbook 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 temperature compensation tables

A description about how to edit temperature 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 CONDCONC 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 CONDCONC Transducer to edit 1 of 4 Temperature Compensation Tables:

Method name	Description
Edit TComp 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 CONDCONC Transducer to edit 1 of 4 Temperature Compensation Tables:

Method/Menu name	Description
Edit alpha tempcomp table (menu page)	Provides both following methods and a grid to edit table values for temperature and coefficient alpha
Edit tempcomp matrix table (menu page)	Provides both following methods and a grid to edit table values for temperature, conductivity and temperature compensated conductivity
Read TempComp Table (method)	Read selected table
Send TempComp Table to Device (method)	Send selected and edited table to device

"Read TempComp Table" and "Send TempComp Table to Device" methods shall only be called within EDD-menus "Edit alpha tempcomp table" or "Edit tempcomp matrix table".

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

6.3.8. Accessing user-defined concentration tables

A description about how to edit User-defined Concentration Tables via local keys of the device is to be found in (see BA00381C). Advanced software functionality allows editing of these tables via FF-H1 communication as well.

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

If no graphical enhancements are used in a host system, the following method is available in the CONDCONC Transducer to edit 1 of 4 User-defined Concentration Tables:

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

If a device description with graphical enhancements is used (*.ff5/*.sy5), the following methods and menus are available in the CONDCONC Transducer to edit 1 of 4 User-defined Concentration Tables:

Method/Menu name	Description
Edit conc. table w/o tempcomp (menu page)	Provide both following methods and a grid to edit table values for conductivity and concentration
Edit conc. table with tempcomp (menu page)	Provide both following methods and a grid to edit table values for temperature, conductivity and concentration
Read Concentration Table (method)	Read selected table
Send Concentr. Table to Device (method)	Send selected and edited table to device

"Read Concentration Table" and "Send Concentration Table to Device" methods shall only be called within EDD-menus "Edit conc. table w/o tempcomp" or "Edit conc. table with tempcomp".

Indicated table data are not updated automatically. It is required to run "Read Concentration 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	ADVDIAGCOND and DIAGDI Transducer Block
ACTUAL_DIAG_LIST_1	ADVDIAGCOND Transducer Block, highest priority
ACTUAL_DIAG_LIST_2	ADVDIAGCOND Transducer Block
ACTUAL_DIAG_LIST_3	ADVDIAGCOND Transducer Block
ACTUAL_DIAG_LIST_4	ADVDIAGCOND Transducer Block
ACTUAL_DIAG_LIST_5	ADVDIAGCOND Transducer Block
ACTUAL_DIAG_LIST_6	ADVDIAGCOND Transducer Block
ACTUAL_DIAG_LIST_7	ADVDIAGCOND Transducer Block
ACTUAL_DIAG_LIST_8	ADVDIAGCOND Transducer Block
ACTUAL_DIAG_LIST_9	ADVDIAGCOND Transducer Block
ACTUAL_DIAG_LIST_10	ADVDIAGCOND Transducer Block, lowest priority
SIMULATED_DIAGNOSTIC_EVENT	ADVDIAGCOND Transducer Block

Parameters which give instructions to find a remedy are

Parameter name	Where to find
FD_RECOMMEN_ACT	Resource Block
MAINT_INSTRUCTION_COND	ADVDIAGCOND Transducer Block

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

Diagnostic Code	Indicated Maintenance Instruction	CONDCONC Transducer Error (XD_ERROR)
0: No diagnostic message	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 defective	12 - Check meas. Chain | Check sensor settings	General Error
013 Wrong sensor type	13 - Check meas. Chain | Check sensor settings	General Error
014 Wrong sensor data	14 - Change sensor type | Change firmware	General Error
104 Sensor supply voltage bad	104 – Check connector | Replace sensor/cable	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
133 Polarization warning	133 – Use sensor with larger cell constant | Check medium	Unspecified Error
163 Oper.time >120 degC alarm	163 – Replace sensor	Unspecified Error
164 Oper.time >140 degC alarm	164 – Replace sensor	Unspecified Error
165 Oper.time >80 degC <100 nS alarm	165 – Replace sensor	Unspecified Error
169 Oper.time >120 degC warning	169 – Prepare to replace sensor	Unspecified Error
172 Alarm operating time	172 – Replace sensor	Calibration Error

Diagnostic Code	Indicated Maintenance Instruction	CONDCONC Transducer Error (XD_ERROR)
173 Oper.time >80 degC alarm	173 – Replace sensor	Calibration Error
174 Oper.time >100 degC alarm	174 – 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 Operating time warning	182 – Prepare to replace sensor	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
187 Oper.time >125 degC warning	187 – Prepare to replace sensor	Unspecified Error
188 Oper.time >150 degC warning	188 – Prepare to replace sensor	Unspecified Error
189 Oper.time <5 degC warning	189 – Prepare to replace sensor	Unspecified Error
190 Calibration expired warning	190 – Prepare to replace sensor	Calibration Error
191 Number of sterilizations warning	191 – Prepare to replace sensor	Calibration Error
194 Oper.time >140 degC warning	194 – Prepare to replace sensor	Unspecified Error
195 Oper.time >80 degC <100 nS warning	195 – Prepare to replace sensor	Unspecified Error
196 Oper.time >125 degC alarm	196 – Replace sensor	Unspecified Error
197 Oper.time >150 degC alarm	197 – Replace sensor	Unspecified Error
198 Oper.time <5 degC alarm	198 – Replace sensor	Unspecified 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
310 Temp. slope lower lmt alarm	310 – Repeat Calib | Replace sensor	Calibration Error
311 Temp. slope upper lmt alarm	311 – Repeat Calib | Replace sensor	Calibration Error
312 No conductivity detected	312 – Check installation | Replace sensor	General Error
313 Sensor coil current too high	313 – Replace sensor | Contact Service Department	General Error
314 Sensor coil current too low	314 – Replace sensor | Contact Service Department	General Error
315 Air set not calibrated	315 – Perform air set calibration	Calibration Error
316 Cell constant not calibrated	316 – Check calib | Contact Service Department	Calibration Error
317 Temperature not calibrated	317 – Check calib info | Calib temperature	Calibration Error
322 Meas. Value out of range	322 – inc. process value | Check meas. Chain | change sensor	General Error
325 Sensor value out of range	325 – Use sensor with suitable cell constant	General Error
326 Internal sensor connection broken	326 – Replace sensor	General Error
380 Communication module defect	380 – Contact the Service Team	Electronics Failure
381 Communication module incompatible	381 – Contact the Service Team	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
802 Process check system alarm	802 – Check sensor | Check conn. | Air cushion in assembly | Check appl., deactivate PCS	General Error
810 PV upper limit	810 – Sensor in air | Air cushion in assembly | Check measuring chain	No Error
811 PV lower limit	811 – Sensor in air | Air cushion in assembly | Check measuring chain	No Error
812 Temp out of range	812 – Sensor in air | Air cushion in assembly | Check measuring chain	No Error
813 Sensor temp out of range	813 – Sensor in air | Air cushion in assembly | Check measuring chain	General Error
814 USP alarm	814 – Check process conditions	Calibration 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

Diagnostic Code	Indicated Maintenance Instruction	CONDCONC Transducer Error (XD_ERROR)
844 USP warning	844 – Check process conditions	Calibration Error
950 Conc temp lower limit	950 – Check process conditions | Adjust measuring range	Calibration Error
951 Conc temp upper limit	951 – Check process conditions | Adjust measuring range	Calibration Error
952 Conc kappa lower limit	952 – Check process conditions | Adjust measuring range	Calibration Error
953 Conc kappa upper limit	953 – Check process conditions | Adjust measuring range	Calibration Error
954 Conc lower limit	954 – Check process conditions | Adjust measuring range	Calibration Error
955 Conc upper limit	955 – Check process conditions | Adjust measuring range	Calibration Error
956 Cond temp lower limit	956 - Check process conditions | Adjust measuring range	Calibration Error
957 Cond temp upper limit	957 - Check process conditions | Adjust measuring range	Calibration Error
958 Cond kappa lower limit	958 - Check process conditions | Adjust measuring range	Calibration Error
959 Cond kappa upper limit	959 - Check process conditions | Adjust measuring range	Calibration Error
960 Cond kappa comp lower limit	960 - Check process conditions | Adjust measuring range	Calibration Error
961 Cond kappa comp upper limit	961 - Check process conditions | Adjust measuring range	Calibration Error

If XD_ERROR is set to a value other than“No error” the CONDCONC 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_Cond 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	133
1	4	17	163
2	10	18	164
3	11	19	165
4	12	20	169
5	13	21	172
6	14	22	173
7	104	23	174
8	119	24	180
9	120	25	181
10	127	26	182
11	128	27	183
12	129	28	184
13	130	29	187
14	131	30	188
15	132	31	189

FD_EXTENDED_MAP_2/FD_EXTENDED_ACTIVE_2:

Bit Position 0-15	Event number	Bit Position 16-31	Event number
0	190	16	315
1	191	17	316
2	194	18	317
3	195	19	322
4	196	20	325
5	197	21	326
6	198	22	380
7	203	23	381
8	215	24	404
9	218	25	405
10	219	26	406
11	310	27	407
12	311	28	408
13	312	29	409
14	313	30	501
15	314	31	513

FD_EXTENDED_MAP_3/FD_EXTENDED_ACTIVE_3:

Bit Position 0-15	Event number	Bit Position 16-31	Event number
0	514	16	953
1	530	17	954
2	531	18	955
3	532	19	956
4	802	20	957
5	810	21	958
6	811	22	959
7	812	23	960
8	813	24	961
9	814	25	
10	840	26	
11	841	27	
12	844	28	
13	950	29	
14	951	30	
15	952	31	

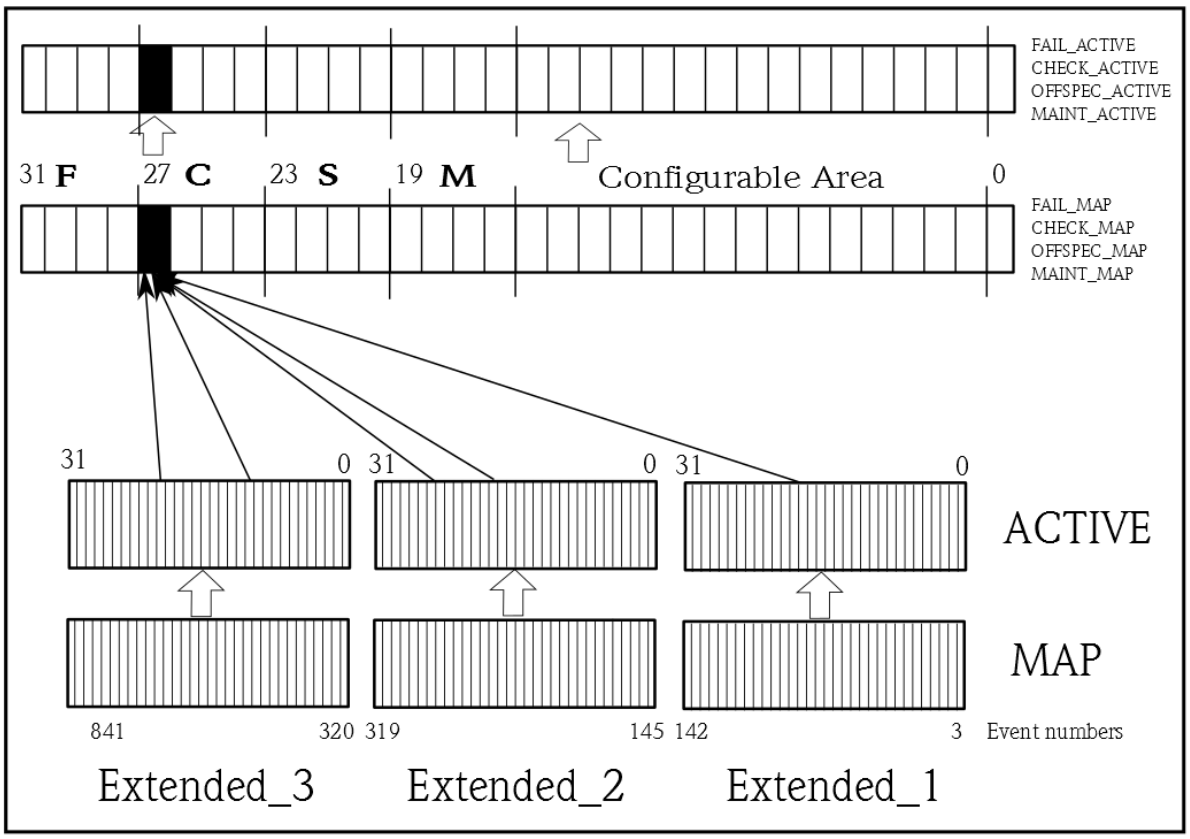
These events are mapped to the fixed area bits 16 to 31 in the Field Diagnostics parameters FD_FAIL_XXX, FD_CHECK_XXX, FD_OFFSPEC_XXX and FD_MAINT_XXX which are also pre-defined by the manufacturer. In the Liquiline_Cond device these events are grouped as follows.

Bit Position in Manufacturer Specific Conditions	NAMUR class (F, C, S, M)	ADVDIAGCOND Transducer Parameter	Event numbers
31 SensorHiHiSeverity	F	Fixed_Area_31	3, 11, 12, 13, 104, 119, 120, 127, 128, 203, 312, 313, 314, 326
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, 813, 814
27 SensorHiSeverity	C	Fixed_Area_27	4, 10, 14, 129, 130, 315
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, 325
22 ElectronicLoSeverity	S	Fixed_Area_22	None
21 ConfigLoSeverity	S	Fixed_Area_21	316, 317, 404, 405, 530,531

Bit Position in Manufacturer Specific Conditions	NAMUR class (F, C, S, M)	ADVDIAGCOND Transducer Parameter	Event numbers
20 ProcessLoSeverity	S	Fixed_Area_20	None
19 SensorLoLoSeverity	M	Fixed_Area_19	131, 132, 133, 163, 164, 165, 169, 172, 173, 174, 180, 181, 183, 184, 187, 188, 189, 190, 191, 194, 195, 196, 197, 310, 311
18 ElectronicLoLoSeverity	M	Fixed_Area_18	None
17 ConfigLoLoSeverity	M	Fixed_Area_17	501, 514, 532
16 ProcessLoLoSeverity	M	Fixed_Area_16	182, 408, 840, 841, 844, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961

The ADVDIAGCOND Transducer Block provides these 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 ADVDIAGCOND 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_Cond 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 CONDCONC. 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_COND	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_COND	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 CONDCONC 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 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 using a specific status value with a specific measurement value, all 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 depends on the order code, the selected measurand, the connected sensor type and the chosen bus unit.

Active Order code	Sensor type	Measurand	Bus unit parameter	Possible AI CHANNEL
CM42-**C**xx**6**xxxxx	analog	Conductivity	UNIT_CONDUCTIVITY_VALUE or UNIT_TEMPCOMP_CONDUCTIVITY_VALUE	1 – Conductivity or 2 – Temperature compensated conductivity
CM42-**C**xx**6**xxxxx	analog	Resistivity (if 2-pole sensor)	UNIT_RESISTIVITY_VALUE	4 - Resistivity

Active Order code	Sensor type	Measurand	Bus unit parameter	Possible AI CHANNEL
CM42- **C**xx**6**xxxxx	analog	Concentration	UNIT_CONCENTRATION_VALUE which is read only. Default unit: %, if no concentration table is activated. Otherwise depending on selected table unit in parameters CONC_UNIT_TABLE_1 to _4. Available units: None, %, ppm, mg/l, TDS	5 - Concentration
CM42- **I**xx**6**xxxxx	analog	Conductivity	UNIT_CONDUCTIVITY_VALUE or UNIT_TEMPCOMP_CONDUCTIVITY_VALUE	1 – Conductivity or 2 – Temperature compensated conductivity
CM42- **I**xx**6**xxxxx	analog	Concentration	UNIT_CONCENTRATION_VALUE which is read only. Default unit: %, if no concentration table is activated. Otherwise depending on selected table unit in parameters CONC_UNIT_TABLE_1 to _4. Available units: None, %, ppm, mg/l, TDS	5 - Concentration
CM42- **K**xx**6**xxxxx	Conductive Conductivity Memosens digital	Conductivity	UNIT_CONDUCTIVITY_VALUE or UNIT_TEMPCOMP_CONDUCTIVITY_VALUE	1 – Conductivity or 2 – Temperature compensated conductivity
CM42- **K**xx**6**xxxxx	Conductive Conductivity Memosens digital	Resistivity (if 2-pole sensor)	UNIT_RESISTIVITY_VALUE	4 - Resistivity
CM42- **K**xx**6**xxxxx	Conductive Conductivity Memosens digital	Concentration	UNIT_CONCENTRATION_VALUE which is read only. Default unit: %, if no concentration table is activated. Otherwise depending on selected table unit in parameters CONC_UNIT_TABLE_1 to _4. Available units: None, %, ppm, mg/l, TDS	5 - Concentration
CM42- **L**xx6xxxxx	Inductive Conductivity Memosens digital	Conductivity	UNIT_CONDUCTIVITY_VALUE or UNIT_TEMPCOMP_CONDUCTIVITY_VALUE	1 – Conductivity or 2 – Temperature compensated conductivity
CM42- **L**xx6xxxxx	Inductive Conductivity Memosens digital	Concentration	UNIT_CONCENTRATION_VALUE which is read only. Default unit: %, if no concentration table is activated. Otherwise depending on selected table unit in parameters CONC_UNIT_TABLE_1 to _4. Available units: None, %, ppm, mg/l, TDS	5 - Concentration

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

Order code	Sensor type	Unit	Possible AI CHANNEL
CM42- xxx**6**xxxxx	All	UNIT_TEMPERATURE_VALUE 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 CONDCONC 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 79 in chapter **Fehler! Verweisquelle konnte nicht gefunden werden.** 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 79 in 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 49 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: 0**
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:** • CONDCONC Transducer Block: Conductivity/Concentration Measurement, 0xFFF6 • DIAGDI Transducer Block: Diagnostic Discrete Input, 0xFFEF • SERVICE Transducer Block: Service, 0xFFF0 • ADVDIAGCOND Transducer Block: Advanced Diagnostics Conductivity, 0xFFED • DISPLAYCOND Transducer Block: Conductivity/Concentration Display CM42, 0xFFFE • MEMOCOND Transducer Block: Conductivity Memosens Transmitter, 0xFFFC • DIAGCOND Transducer Block: Conductivity Diagnostics, 0xFFF9
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 ADVDIAGCOND 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. CONDCONC 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.

CONDCONC 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 0x03C1(0000 to 0961); 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. KAA600E**A**D00 means standard or KAA600E**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

CONDCONC Transducer Block (manufacturer-specific parameters)			
Parameter index	**Parameter** **Local Display Menu Path**	**Properties**	**Description**
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
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_COND CAL → Temperature → Mode	OOS	Select temperature adjustment type **Available values:** 0: 1 point 1: 2 point 2: 2 point table **Factory setting**: 1 point
26	MEAS_CONDUCTIVITY_VALUE MEAS → third measurement screen, if "Conductivity" is selected in MEASURED_VALUE		Current measured conductivity value and status Unit code depend on UNIT_CONDUCTIVITY_VALUE
27	MEAS_TEMPCOMP_CONDUCTIVITY_VALUE MEAS → All measurement screens, if "Conductivity" is selected in MEASURED_VALUE		Current measured temperature compensated conductivity value and status Unit code depends on UNIT_TEMPCOMP_CONDUCTIVITY_VALUE
28	MEAS_RESISTIVITY_VALUE MEAS → All measurement screens, if "Resistivity" is selected in MEASURED_VALUE		Current measured resistivity value and status Unit code depends on UNIT_RESISTIVITY_VALUE
29	MEAS_CONCENTRATION_VALUE MEAS → All measurement screens, if "Concentration" is selected in MEASURED_VALUE		Current measured concentration value and status Unit code: % or, if a concentration table is selected in parameter CONC_MEDIUM: UNIT_CONC_TABLE_1 or UNIT_CONC_TABLE_2 or UNIT_CONC_TABLE_3 or UNIT_CONC_TABLE_4
30	UNIT_CONDUCTIVITY_VALUE	OOS	Selected unit for conductivity value, which is transferred via FF-H1 bus. **Available values**: 0x516 (1302): mS/cm 0x632 (1586): µS/cm 0x513 (1299): S/m 0xFFF3 (65523): S/cm 0x642 (1602): mS/m 0x643 (1603): µS/m **Factory setting:** S/m To select the conductivity unit which is indicated on the local display only, use parameter DISPLAY_CONDUCTIVITY_UNIT in DISPLAYCOND Transducer Block.

CONDCONC Transducer Block (manufacturer-specific parameters)			
Parameter index	**Parameter** **Local Display Menu Path**	**Properties**	**Description**
31	UNIT_TEMPCOMP_CONDUCTIVITY_VALUE	OOS	Selected unit temperature compensated conductivity value **Available values:** 0x516 (1302): mS/cm 0x632 (1586): µS/cm 0x513 (1299): S/m 0xFFF3 (65523): S/cm 0x642 (1602): mS/m 0x643 (1603): µS/m **Factory setting:** S/m To select conductivity unit which is indicated on the local display only, use parameter DISPLAY_CONDUCTIVITY_UNIT in DISPLAYCOND Transducer Block.
32	UNIT_RESISTIVITY_VALUE	OOS	Selected unit resistivity value **Available values:** 0x633 (1587): MOhm-cm 0x50E (1294): kOhm-m 0x644 (1604): kOhm-cm **Factory setting**: MOhm-cm To select resistivity unit which is indicated on the local display only, use parameter DISPLAY_RESISTIVITY_UNIT in DISPLAYCOND Transducer Block.
33	UNIT_CONCENTRATION_VALUE		Selected unit for concentration value. Unchangeable unit % for pre-defined medium types. Selectable units for user-defined tables in CONC_UNIT_TABLE_1, CONC_UNIT_TABLE_2, CONC_UNIT_TABLE_3, CONC_UNIT_TABLE_4 **Available values**: 0x53E (1342): % 0x648 (1608): mg/L 0x58F (1423): ppm 0x634 (1588): no_units **Factory setting**: %
34	MEASURED_VALUE SETUP → Sensor conductivity → Operating mode → Measured value	OOS	Select measurement mode **Available values**: 0 - Conductivity 1 - Resistivity 2 – Concentration **Default value**: Conductivity
35	COND_MEASURED_VALUE SETUP → Sensor conductivity → Operating mode → Measured value	OOS	required for up/download only
36	IND_MEASURED_VALUE SETUP → Sensor conductivity → Operating mode → Measured value	OOS	required for up/download only
37	SENSOR SETUP → Sensor conductivity → Sensor	OOS	Enter sensor type **Available values**: 0: 2 electrodes Sensor 1: 4 electrodes Sensor 2: 4 electrodes Memosens **Default value**: 2 electrodes sensor
38	SENSOR_MODULE	OOS	if SENSOR_INTERFACE analog: measurement principle is selected depending on inserted sensor adapter module FSLI1 (inductive) or FSLC1 (conductive); if SENSOR_ INTERFACE digital: indicates measurement principle **Available values**: 0: Conductive 1: Inductive **Default value**: Conductive

CONDCONC Transducer Block (manufacturer-specific parameters)			
Parameter index	**Parameter** **Local Display Menu Path**	**Properties**	**Description**
39	CELL_CONSTANT SETUP → Sensor conductivity → Cell constant	OOS	Current cell constant **Available values** 0.0025 to 99.99 1/cm **Default value**: Conductive: 0.1 Inductive: 2.0
40	COND_CELL_CONSTANT SETUP → Sensor conductivity → Cell constant	OOS	required for up/download only
41	IND_CELL_CONSTANT SETUP → Sensor conductivity → Cell constant	OOS	required for up/download only
42	MEAS_TEMPERATURE_VALUE MEAS → second and third measurement screen		Current measured damped temperature value and status **Unit code**: depends on setting of parameter UNIT_MEAS_ TEMPERATURE_VALUE
43	UNIT_TEMPERATURE_VALUE	OOS	Selected unit for temperature value which is transferred via FF-H1 bus. **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 in DISPLAYCOND Transducer Block.
44	OFFSET_TEMPERATURE CAL → Current values → Offset		Temperature offset **unit**: °C **Default value**::0
45	OFFSET_1PNT_TEMPERATURE CAL → Current values → Offset		required for up/download only
46	OFFSET_2PNT_TEMPERATURE CAL → Current values → Offset		required for up/download only
47	OFFSET_TABLE_TEMPERATURE CAL → Current values → Offset		required for up/download only
48	SLOPE_TEMPERATURE CAL → Current values → Slope		Temperature slope **unit:** none **Default value**:: 1.0
49	SLOPE_1PNT_TEMPERATURE CAL → Current values → Slope		required for up/download only
50	SLOPE_2PNT_TEMPERATURE CAL → Current values → Slope		required for up/download only
51	SLOPE_TABLE_TEMPERATURE CAL → Current values → Slope		required for up/download only
52	TEMPERATURE_SENSOR SETUP → Sensor conductivity → Temperature sensor	OOS	Temperature sensor selection (writable for analog inductive sensor types only) **Available values**: 0: None 1: PT100 or PT1000 **Factory setting: 1**
53	CABLE_RESISTANCE SETUP → Sensor conductivity → Cable resistance	OOS	Cable resistance (analog sensors only) **Available values**: 0 to 99.99 Ohm **Factory setting**:0.0
54	CABLE_LENGTH	OOS	Cable length (analog sensors only) [not used] **unit**: m **Factory setting**: 0.0
55	CURRENT_AIRSET CAL → Current values → Airset		Current airset **Available values**: -100.0 to 250.0 µS **Factory setting**: 0.0 µS

CONDCONC Transducer Block (manufacturer-specific parameters)			
Parameter index	Parameter Local Display Menu Path	Properties	Description
56	CAL_TEMP_COMPENSATION CAL → Cell constant → Temp. compensation		Temperature compensation value during calibration **Available values**: 0 - TC Cal Off 1 - TC Cal On **Factory setting**: TC Cal On
57	CAL_COEFF_ALPHA CAL → Cell constant → Factor alpha		Coefficient Alpha during calibration **Available values:** 0.0 to 20 %/K **Factory setting**: 2.1%/K
58	CAL_ALPHA_REF_TEMPERATURE CAL → Cell constant → Alpha ref. temp.		Reference temperature for coefficient alpha during calibration **Available values**: -5 to +100 °C **Factory setting:** 25.0 °C
59	CAL_TEMP_SOURCE CAL → Cell constant → Temp. source		Temperature source during calibration **Available values**: 0: Sensor Temperature 1: Manual Input **Factory setting**: Sensor Temperature
60	NONE_CAL_TEMP_SOURCE CAL → Cell constant → Temp. source		required for up/download only
61	AUTO_CAL_TEMP_SOURCE CAL → Cell constant → Temp. source		required for up/download only
62	CAL_MANUAL_TEMPERATURE CAL → Cell constant → Manual temperature		Manually entered temperature during calibration, if CAL_TEMP_SOURCE is "Manual Input" **Available values**: -50.0 to 250.0 °C **Default value**: 25.0 °C
63	CONDUCTIVITY_REF_VALUE CAL → Cell constant → Conductivity ref. val.	OOS	Conductivity reference value during calibration **unit:** S/m **Default value**: 0.1 S/m
64	INSTALLATION_FACTOR CAL → Current values → Inst. factor	OOS	Inductive Installation factor **Available values**: 0.1 to 5.0 **Factory setting:** 1.0
65	TEMPERATURE_COMPENSATION SETUP → Sensor conductivity → Operating mode → Temp. compensation	OOS	Switch to select temperature compensation **Available values:** 0: None 1: Linear 2: NaCl (IEC 746-3) 3: Natural Water (ISO 7888) 4: Ultra-Pure Water NaCl 5: Ultra-Pure Water HCl 6: User Tab 1 7: User Tab 2 8: User Tab 3 9: User Tab 4 10: Natural Water 20 °C **Factory setting**: Linear
66	TEMPERATURE_SOURCE SETUP → Sensor conductivity → Operating mode → Temp. source	OOS	Switch to select temperature source **Available values**: 0: Sensor Temperature 1: Manual Input **Factory setting**: Sensor Temperature
67	NONE_TEMPERATURE_SOURCE SETUP → Sensor conductivity → Operating mode → Temp. source	OOS	required for up/download only
68	AUTO_TEMPERATURE_SOURCE SETUP → Sensor conductivity → Operating mode → Temp. source	OOS	required for up/download only
69	MEDIUM_TEMPERATURE_COND SETUP → Sensor conductivity → Operating mode → Medium temp.	OOS	Manually entered medium temperature, if TEMPERATURE_SOURCE is "Manual Input" **Available values**: -50.0 to 250.0 °C **Factory setting:** 25.0 °C

CONDCONC Transducer Block (manufacturer-specific parameters)			
Parameter index	**Parameter** **Local Display Menu Path**	**Properties**	**Description**
70	MEAS_REF_TEMPERATURE	OOS	Reference value for temperature compensation **unit**: °C **Factory setting:** 25.0 °C
71	COEFF_ALPHA_TEMP_COMP SETUP → Sensor conductivity → Operating mode → Factor alpha	OOS	Temperature coefficient alpha **Available values**: 0.0 to 20 %/K **Factory setting**: 2.1 %/K
72	ALPHA_REF_TEMPERATURE SETUP → Sensor conductivity → Operating mode → Alpha ref. temp.	OOS	Reference temperature, to which alpha refers **Available values**: -5 to +100 °C **Factory setting**: 25.0 °C
73	DAMPING_TIME_COND SETUP → Sensor conductivity → Damping	OOS	Damping time for conductivity measurement **Available values**: 0 to 600 s **Factory setting**: 0 s
74	TC_TABLE_SELECTION SETUP → Sensor conductivity → Temp. comp. tab. → Table selection	OOS	Select temperature compensation table **Available values**: 0: User Tab 1 1: User Tab 2 2: User Tab 3 3: User Tab 4 **Factory setting**: User Tab 1
75	TC_TABLE_NAME_1 SETUP → Sensor conductivity → Temp. comp. tab. → Table name	W	User-defined name for temperature compensation table 1 **Factory setting**: UserTabT1
76	TC_TABLE_NAME_2 SETUP → Sensor conductivity → Temp. comp. tab. → Table name	W	User-defined name for temperature compensation table 2 **Factory setting**: UserTabT2
77	TC_TABLE_NAME_3 SETUP → Sensor conductivity → Temp. comp. tab. → Table name	W	User-defined name for temperature compensation table 3 **Factory setting**: UserTabT3
78	TC_TABLE_NAME_4 SETUP → Sensor conductivity → Temp. comp. tab. → Table name	W	User-defined name for temperature compensation table 4 **Factory setting**: UserTabT4
79	TEMP_COMP_MODE_1 SETUP → Sensor conductivity → Temp. comp. tab. → Temp. comp. mode	OOS	Switch to select temperature compensation for table 1 **Available values**: 0: Alpha Value 1: Conductivity **Factory setting**: Alpha Value
80	TEMP_COMP_MODE_2 SETUP → Sensor conductivity → Temp. comp. tab. → Temp. comp. mode	OOS	Switch to select temperature compensation for table 2 **Available values**: 0: Alpha Value 1: Conductivity **Factory setting**: Alpha Value:
81	TEMP_COMP_MODE_3 SETUP → Sensor conductivity → Temp. comp. tab. → Temp. comp. mode	OOS	Switch to select temperature compensation for table 3 **Available values**: 0: Alpha Value 1: Conductivity **Factory setting**: Alpha Value
82	TEMP_COMP_MODE_4 SETUP → Sensor conductivity → Temp. comp. tab. → Temp. comp. mode	OOS	Switch to select temperature compensation for table 4 **Available values** 0: Alpha Value 1: Conductivity **Factory setting**: Alpha Value
83	ALPHA_REF_TEMP_1 SETUP → Sensor conductivity → Temp. comp. tab. → Alpha ref. temp.	OOS	Reference temperature for table 1, to which alpha refers **Available values**: -5 to +100 °C **Factory setting**: 25.0 °C
84	ALPHA_REF_TEMP_2 SETUP → Sensor conductivity → Temp. comp. tab. → Alpha ref. temp.	OOS	Reference temperature for table 2, to which alpha refers **Available values**: -5 to +100 °C

			Factory setting: 25.0 °C

CONDCONC Transducer Block (manufacturer-specific parameters)			
Parameter index	**Parameter** **Local Display Menu Path**	**Properties**	**Description**
85	ALPHA_REF_TEMP_3 SETUP → Sensor conductivity → Temp. comp. tab. → Alpha ref. temp.	OOS	Reference temperature for table 3, to which alpha refers **Available values**: -5 to +100 °C **Factory setting**: 25.0 °C
86	ALPHA_REF_TEMP_4 SETUP → Sensor conductivity → Temp. comp. tab. → Alpha ref. temp.	OOS	Reference temperature for table 4, to which alpha refers **Available values:** -5 to +100 °C **Factory setting**: 25.0 °C
87	TC_TAB_ENTRY	W	Used to read/write temperature compensation tables by methods
88	TC_TAB_X_VALUE	W	Used to read/write temperature compensation tables by methods
89	TC_TAB_Y_VALUE	W	Used to read/write temperature compensation tables by methods
90	TC_TAB_Z_VALUE	W	Used to read/write temperature compensation tables by methods
91	TC_TAB_MAX_NUMBER		Used to read/write temperature compensation tables by methods
92	TC_TAB_MIN_NUMBER		Used to read/write temperature compensation tables by methods
93	TC_TAB_OP_CODE	W	Used to read/write temperature compensation tables by methods
94	TC_TAB_STATUS		Used to read/write temperature compensation tables by methods
95	TC_TAB_ACTUAL_NUMBER		Used to read/write temperature compensation tables by methods
96	CONC_MEDIUM SETUP → Sensor conductivity → Operating mode → Medium	OOS	Select pre-defined or user concentration table **Available values:** 0: NaOH 0..15% 1: NaOH 18..50% 2: HCl 0..20% 3: HNO3_0_25% 4: H2SO4 0..28% 5: H2SO4 40..80% 6: H3PO4 0..40% 7: UserTabC1 8: UserTabC2 9: UserTabC3 10: UserTabC4 11: H2SO4 93..100% 12: HNO3 24..30% 13: NaCl 0..26% **Factory setting**: NaOH 0..15%
97	CONC_TABLE_SELECTION SETUP → Sensor conductivity → Conc. table → Table selection	OOS	Select user concentration table **Available values:** 0: Conc Table C1 1: Conc Table C2 2: Conc Table C3 3: Conc Table C4 **Factory setting**: Conc Table C1
98	CONC_TABLE_NAME_1 SETUP → Sensor conductivity → Conc. table → Table name	W	User-defined name for concentration table 1 **Factory setting**: UserTabC1
99	CONC_TABLE_NAME_2 SETUP → Sensor conductivity → Conc. table → Table name	W	User-defined name for concentration table 2 **Factory setting**: UserTabC1
100	CONC_TABLE_NAME_3 SETUP → Sensor conductivity → Conc. table → Table name	W	User-defined name for concentration table 3 **Factory setting**: UserTabC1
101	CONC_TABLE_NAME_4	W	User-defined name for concentration table 4

	SETUP → Sensor conductivity → Conc. table → Table name		**Factory setting**: UserTabC1
CONDCONC Transducer Block (manufacturer-specific parameters)			
Parameter index	**Parameter** **Local Display Menu Path**	**Properties**	**Description**
102	CONC_TEMP_COMP_MODE_1 SETUP → Sensor conductivity → Conc. table → Temp. comp. mode	OOS	Switch to select temperature compensation for table 1 **Available values:** 0: With TempComp 1: Without TempComp **Factory setting**: With TempComp
103	CONC_TEMP_COMP_MODE_2 SETUP → Sensor conductivity → Conc. table → Temp. comp. mode	OOS	Switch to select temperature compensation for table 2 **Available values:** 0: With TempComp 1: Without TempComp **Factory setting**: With TempComp
104	CONC_TEMP_COMP_MODE_3 SETUP → Sensor conductivity → Conc. table → Temp. comp. mode	OOS	Switch to select temperature compensation for table 3 **Available values:** 0: With TempComp 1: Without TempComp **Factory setting**: With TempComp
105	CONC_TEMP_COMP_MODE_4 SETUP → Sensor conductivity → Conc. table → Temp. comp. mode	OOS	Switch to select temperature compensation for table 4 **Available values:** 0: With TempComp 1: Without TempComp **Factory setting**: With TempComp
106	CONC_UNIT_TABLE_1 SETUP → Sensor conductivity → Conc. table → Conc. unit	OOS	Select unit for concentration table 1 **Available values:** 0: None 1: % 2: ppm 3: mg/L 4: tds **Factory setting**: % Unit will be mapped to parameter UNIT_CONCENTRATION_VALUE depending on selected entry of parameter CONC_TABLE_SELECTION. Unit "tds" will be mapped to FF unit code "no unit" (0x634).
107	CONC_UNIT_TABLE_2 SETUP → Sensor conductivity → Conc. table → Conc. unit	OOS	Select unit for concentration table 2 **Available values:** 0: None 1: % 2: ppm 3: mg/L 4: tds **Factory setting**: % Unit will be mapped to parameter UNIT_CONCENTRATION_VALUE depending on selected entry of parameter CONC_TABLE_SELECTION. Unit "tds" will be mapped to FF unit code "no unit" (0x634).
109	CONC_UNIT_TABLE_4 SETUP → Sensor conductivity → Conc. table → Conc. unit	OOS	Select unit for concentration table 4 **Available values:** 0: None 1: % 2: ppm 3: mg/L 4: tds **Factory setting**: % Unit will be mapped to parameter UNIT_CONCENTRATION_VALUE depending on selected entry of parameter CONC_TABLE_SELECTION. Unit "tds" will be mapped to FF unit code "no unit" (0x634).

CONDCONC Transducer Block (manufacturer-specific parameters)			
Parameter index	Parameter Local Display Menu Path	Properties	Description
108	CONC_UNIT_TABLE_3 SETUP → Sensor conductivity → Conc. table → Conc. unit	OOS	Select unit for concentration table 3 **Available values:** 0: None 1: % 2: ppm 3: mg/L 4: tds **Factory setting**: % Unit will be mapped to parameter UNIT_CONCENTRATION_VALUE depending on selected entry of parameter CONC_TABLE_SELECTION. Unit "tds" will be mapped to FF unit code "no unit" (0x634).
110	CONC_TAB_ENTRY	W	Used to read/write concentration tables by methods
111	CONC_TAB_X_VALUE	W	Used to read/write concentration tables by methods
112	CONC_TAB_Y_VALUE	W	Used to read/write concentration tables by methods
113	CONC_TAB_Z_VALUE	W	Used to read/write concentration tables by methods
114	CONC_TAB_MAX_NUMBER		Used to read/write concentration tables by methods
115	CONC_TAB_MIN_NUMBER		Used to read/write concentration tables by methods
116	CONC_TAB_OP_CODE	W	Used to read/write concentration tables by methods
117	CONC_TAB_STATUS		Used to read/write concentration tables by methods
118	CONC_TAB_ACTUAL_NUMBER		Used to read/write concentration tables by methods
119	TYPE_PHARMA_WATER SETUP → Sensor conductivity → Limits → Pharmacy water → Type	W	Select pharma water type **Available values:** 0: OFF 1: EP (European Pharmacopeia) 3: PW (Purified Water) 4: USP (United States Pharmacopeia) **Factory setting**: OFF
120	THRESHOLD_PREALARM SETUP → Sensor conductivity → Limits → Pharmacy water → Prealarm → Threshold	W	Threshold pre-alarm limit **Available values:** 10 to 99.9 % **Factory setting**: 80 %
121	THRESHOLD_ALARM	W	Threshold alarm limit **Factory setting**: 100 %
122	HYSTERESIS SETUP → Sensor conductivity → Limits → Pharmacy water → Prealarm → Hysteresis	W	Hysteresis for pre-alarm limit **Available values:** 2 to 9.9 % **Factory setting**: 2%
123	RESPONSE_DELAY_TIME SETUP → Sensor conductivity → Limits → Pharmacy water → Response delay	W	Response delay time **Available values:** 0 to 3600.0 s **Factory setting**: 0.0 s
124	FALL_DELAY_TIME SETUP → Sensor conductivity → Limits → Pharmacy water → Fall-delay time	W	Fall delay time **Available values:** 0 to 3600.0 s **Factory setting**: 0.0 s
125	ENABLE_CAL_AIRSET SETUP → Sensor conductivity → Cal. Settings → Type of Calibration → Airset calib.	W	Switch to enable/disable airset calibration **Available values:** 0 - Off 1 - On **Factory setting**: On
126	ENABLE_CAL_CELL_CONSTANT SETUP → Sensor conductivity → Cal. Settings → Type of Calibration → Cell constant calib.	W	Switch to enable/disable cell constant calibration **Available values:** 0 - Off 1 - On **Factory setting**: On
127	ENABLE_CAL_INSTALLATION_FACTOR SETUP → Sensor conductivity → Cal. Settings → Type of Calibration → Installation factor	W	Switch to enable/disable installation factor calibration **Available values:** 0 - Off 1 - On **Factory setting**: On

CONDCONC Transducer Block (manufacturer-specific parameters)			
Parameter index	**Parameter** **Local Display Menu Path**	**Properties**	**Description**
128	SENSOR_CAL_VALID		Validity of the displayed calibration parameter for main measurement **Available values:** 0: FALSE 1: TRUE **Factory setting**: FALSE
129	SENSOR_CAL_TEMP_VALID		Validity of the displayed calibration parameter for temperature measurement **Available values:** 0: FALSE 1: TRUE **Factory setting**: FALSE
130	SENSOR_CONNECTED		Indicates current sensor connection state **Available values:** 0 to 29: not connected 30 - connected **Default value:** 0
131	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
132	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
133	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
134	SIMULATED_MEASURAND_COND DIAG → Service →Simulation → Measured value → Measured value	W	Select the desired main measurement parameter which should be simulated. **Available values**: 0 - Conductivity 1 - Resistivity 2 - Concentration **Factory setting**: 0 – Conductivity
135	SIMULATED_MAINMEASURED_VAL_COND DIAG → Service →Simulation → Measured value → Simulation value	W	Enter desired value to be simulated. The selected measurand unit depends on the measurand setting: Conductivity: UNIT_TEMPCOMP_CONDUCTIVITY_VALUE Resistivity: UNIT_RESISTIVITY_VALUE Concentration: UNIT_CONCENTRATION_VALUE

CONDCONC Transducer Block (manufacturer-specific parameters)			
Parameter index	**Parameter** **Local Display Menu Path**	**Properties**	**Description**
136	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
137	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_TEMPERATURE_VALUE **Possible values**: -50.0 to 250 °C
138	TYPE_PHARMA_WATER_COND	W	Select pharma water type for conductive sensor types (required for up/download only) **Available values:** 0: OFF 1: EP (European Pharmacopeia) 3: PW (Purified Water) 4: USP (United States Pharmacopeia) **Factory setting**: OFF
139	TYPE_PHARMA_WATER_IND	W	Select pharma water type for inductive sensor types (required for up/download only) **Available values:** 0: OFF 1: EP (European Pharmacopeia) 3: PW (Purified Water) 4: USP (United States Pharmacopeia) **Factory setting**: OFF
140	DIGITAL_TEMP_SENSOR_COND	W	Select temperature sensor for digital sensor types (required for up/download only) **Available values**: 0: None 1: PT100 or PT1000 **Factory setting: 1**
141	ANALOG_TEMP_SENSOR_COND	W	Select temperature sensor for analog sensor types (required for up/download only) **Available values**: 0: None 1: PT100 or PT1000 **Factory setting: 1**

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)
16	ACTUAL_DIAGNOSTICS DIAG → Most important message		Current diagnostic code with highest priority **Indicated values:** 0x0000 to 0x03C1(0000 to 0961); details see chapter Diagnostic Codes and Maintenance
17	PREVIOUS_DIAGNOSTICS_DIAGDI DIAG → Past message		Previous diagnostic code **Indicated values:** 0x0000 to 0x03C1(0000 to 0961); 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

	DIAGDI Transducer Block (manufacturer-specific parameters)		
Parameter index	Parameter	Properties	Description
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**: 0xC0C00080 Activated event numbers: 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**: 0x00000000
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**: 0x03800000 Activated event numbers:: 312, 313, 314

	DIAGDI Transducer Block (manufacturer-specific parameters)		
Parameter index	**Parameter**	**Properties**	**Description**
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**: 0x00000020 Activated event numbers:: 326
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
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

	DIAGDI Transducer Block (manufacturer-specific parameters)		
Parameter index	Parameter	Properties	Description
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
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**: 0x00000000
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**: 0x00003E00 Activated event numbers: 802, 810, 811, 812, 813, 814
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

	DIAGDI Transducer Block (manufacturer-specific parameters)			
Parameter index	Parameter		Properties	Description
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
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**: 0x00000000
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**: 0x0000001F Activated event numbers: 129, 130, 131, 132, 133

	DIAGDI Transducer Block (manufacturer-specific parameters)		
Parameter index	Parameter	Properties	Description
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**: 0x7CF8391C Activated event numbers: 163, 164, 165, 169, 172, 173, 174, 180, 181, 182, 183, 184, 187, 188, 189, 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**: 0x0440003E Activated event numbers: 194, 195, 196, 197, 198, 215, 219
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**: 0x00000000
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**: 0x04600000 Activated event numbers: 310, 311, 315
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**: 0x00000012 Activated event numbers: 322, 325
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

	DIAGDI Transducer Block (manufacturer-specific parameters)		
Parameter index	Parameter	Properties	Description
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
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

	DIAGDI Transducer Block (manufacturer-specific parameters)		
Parameter index	Parameter	Properties	Description
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
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**: 0x00000980 Activated event numbers: 840, 841, 844
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**: 0xFFE00000 Activated event numbers: 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960

	DIAGDI Transducer Block (manufacturer-specific parameters)		
Parameter index	**Parameter**	**Properties**	**Description**
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**: 0x00000001 Activated event numbers: 961
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 0x03C1(0000 to 0961); 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. KAA600E**A**D00 means standard or KAA600E**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

SERVICE Transducer Block (manufacturer-specific parameters)			
Parameter index	**Parameter** **Local Display Menu Path**	**Properties**	**Description**
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**: Cond
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
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

SERVICE Transducer Block (manufacturer-specific parameters)			
Parameter index	**Parameter** **Local Display Menu Path**	**Properties**	**Description**
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
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. ADVDIAGCOND 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.

ADVDIAGCOND 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 0x03C1(0000 to 0961); 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. KAA600E**A**D00 means standard or KAA600E**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_COND		maintenance instruction **Possible values:** 0x0000 to 0x03C1(0000 to 0961); details see chapter Diagnostic Codes and Maintenance

ADVDIAGCOND 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 0x03C1 (0000 to 0961); 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 0x03C1(0000 to 0961); 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 0x03C1(0000 to 0961); 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 0x03C1(0000 to 0961); details see below in chapter Diagnostic Codes
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 0x03C1(0000 to 0961); 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

ADVDIAGCOND Transducer Block (manufacturer-specific parameters)			
Parameter index	**Parameter** **Local Display Menu Path**	**Properties**	**Description**
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 0x03C1(0000 to 0961); 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 0x03C1(0000 to 0961); details see chapter Diagnostic Codes and Maintenance
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 0x03C1(0000 to 0961); 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 0x03C1(0000 to 0961); 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 0x03C1(0000 to 0961); 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 0x03C1(0000 to 0961); 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
50	LOGBOOKS_RECORDING SETUP → General settings → Logbooks → Recording	W	Switch to enable/disable logbook recording **Available values**: 0 - Off 1 – On **Factory setting**: On
51	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
52	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

ADVDIAGCOND Transducer Block (manufacturer-specific parameters)			
Parameter index	**Parameter** **Local Display Menu Path**	**Properties**	**Description**
53	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
54	LOGBOOK_CMD	W	manufacturer-specific structure used for logbook read methods
55	LOGBOOK_RSP		manufacturer-specific structure used for logbook read methods
56	ENP_VERSION		Electronic name plate version number **Range**: Octet string(32) **Factory setting**: 02.02.00
57	DEVICE_TAG DIAG→Device information→TAG		Device TAG **Range**: Octet string(32) **Factory setting**: EH_Liquiline_Cond-<serial number>
58	SERIAL_NUMBER DIAG→Device information→ Serial number		serial number of the device **Range**: Octet string(16) **Example**: J3047B05G00
59	ORDER_CODE_EXT		extended order code, part 1; not used **Range**: Octet string(32) **Factory setting**: 32 blanks
60	ORDER_CODE_EXT_P2		extended order code, part 2; not used **Range**: Octet string(32) **Factory setting**: 32 blanks
61	ORDER_CODE DIAG→Device information→ Order code		order code **Range**: Octet string(32) **Example**: KAA610EBD00
62	FIRMWARE_VERSION DIAG → Device information → Device version		firmware version of the device **Range**: Octet string(32) **Example**: 02.01.00-0042
63	DEVICE_ID DIAG → Device information → Fieldbusmodule → FF settings→ Device ID		Device ID **Range**: Octet string(32) **Factory setting**: 452B4810A1-<serial number>
64	DEVICE_REV DIAG → Device information → Fieldbusmodule → FF settings→ Device revision		Device Revision **Range**: 00 to FFh
65	DEV_DESCR_REV DIAG → Device information → Fieldbusmodule → FF settings→ DD revision		initial Device Description Revision **Range**: 00 to FFh
66	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
67	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
68	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)
69	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)

ADVDIAGCOND Transducer Block (manufacturer-specific parameters)			
Parameter index	**Parameter** **Local Display Menu Path**	**Properties**	**Description**
70	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)
71	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)
72	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)
73	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)
74	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)
75	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 104 104 Sensor supply voltage bad 180 180 Calibration expired alarm 181 181 Number of sterilizations alarm 215 215 Simulation active 312 312 No conductivity detected 322 322 Meas. value out of range 325 325 Sensor value out of range 532 532 Calibration timer expired 802 802 Process check system alarm 810 810 PV upper limit 811 811 PV lower limit 812 812 Temperature out of range 813 812 Sensor temperature out of range 814 812 USP alarm **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
76	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 0x03C1(0000 to 0961); details see chapter Diagnostic Codes and Maintenance 7FFCh – Not categorized 7FFDh – Moved to Configurable Area 7FFEh - Empty **Factory setting**: 3, 11, 12, 13, 104, 119, 120, 127, 128, 140, 203, 313, 314, 326

ADVDIAGCOND Transducer Block (manufacturer-specific parameters)			
Parameter index	Parameter Local Display Menu Path	Properties	Description
77	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 0x03C1(0000 to 0961); details see chapter Diagnostic Codes and Maintenance 7FFCh – Not categorized 7FFDh – Moved to Configurable Area 7FFEh - Empty **Factory setting**: 218, 380, 381
78	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 0x03C1(0000 to 0961); details see chapter Diagnostic Codes and Maintenance 7FFCh – Not categorized 7FFDh – Moved to Configurable Area 7FFEh - Empty **Factory setting**: 513
79	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 0x03C1(0000 to 0961); details see chapter Diagnostic Codes and Maintenance 7FFCh – Not categorized 7FFDh – Moved to Configurable Area 7FFEh - Empty **Factory setting**: 802, 810, 811, 812, 813, 814
80	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 0x03C1(0000 to 0961); details see chapter Diagnostic Codes and Maintenance 7FFCh – Not categorized 7FFDh – Moved to Configurable Area 7FFEh - Empty **Factory setting**: 4, 10, 14, 129, 130, 315
81	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 0x03C1(0000 to 0961); details see chapter Diagnostic Codes and Maintenance 7FFCh – Not categorized 7FFDh – Moved to Configurable Area 7FFEh - Empty **Factory setting**: 219

ADVDIAGCOND Transducer Block (manufacturer-specific parameters)			
Parameter index	Parameter Local Display Menu Path	Properties	Description
82	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 0x03C1(0000 to 0961); details see chapter Diagnostic Codes and Maintenance 7FFCh – Not categorized 7FFDh – Moved to Configurable Area 7FFEh - Empty **Factory setting**: 215, 406,407,409
83	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 0x03C1(0000 to 0961); details see chapter Diagnostic Codes and Maintenance 7FFCh – Not categorized 7FFDh – Moved to Configurable Area 7FFEh - Empty **Factory setting**: Empty
84	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 0x03C1(0000 to 0961); details see chapter Diagnostic Codes and Maintenance 7FFCh – Not categorized 7FFDh – Moved to Configurable Area 7FFEh - Empty **Factory setting**: 312, 322, 325
85	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 0x03C1(0000 to 0961); details see chapter Diagnostic Codes and Maintenance 7FFCh – Not categorized 7FFDh – Moved to Configurable Area 7FFEh - Empty **Factory setting**: Empty
86	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 0x03C1(0000 to 0961); details see chapter Diagnostic Codes and Maintenance 7FFCh – Not categorized 7FFDh – Moved to Configurable Area 7FFEh - Empty **Factory setting**: 316, 317, 404, 405, 530, 531

ADVDIAGCOND Transducer Block (manufacturer-specific parameters)			
Parameter index	Parameter Local Display Menu Path	Properties	Description
87	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 0x03C1(0000 to 0961); details see chapter Diagnostic Codes and Maintenance 7FFCh – Not categorized 7FFDh – Moved to Configurable Area 7FFEh - Empty **Factory setting**: Empty
88	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 0x03C1(0000 to 0961); details see chapter Diagnostic Codes and Maintenance 7FFCh – Not categorized 7FFDh – Moved to Configurable Area 7FFEh - Empty **Factory setting**: 131, 132, 133, 163, 164, 165, 169, 172, 173, 174, 180, 181, 183, 184, 187, 188, 189, 190, 191, 194, 195, 196, 197, 198, 310, 311
89	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 0x03C1(0000 to 0961); details see chapter Diagnostic Codes and Maintenance 7FFCh – Not categorized 7FFDh – Moved to Configurable Area 7FFEh - Empty **Factory setting**: Empty
90	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 0x03C1(0000 to 0961); details see chapter Diagnostic Codes and Maintenance 7FFCh – Not categorized 7FFDh – Moved to Configurable Area 7FFEh - Empty **Factory setting**: 501, 514, 532
91	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 0x03C1(0000 to 0961); details see chapter Diagnostic Codes and Maintenance 7FFCh – Not categorized 7FFDh – Moved to Configurable Area 7FFEh - Empty **Factory setting**: 182, 408, 840, 841, 844, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961

ADVDIAGCOND Transducer Block (manufacturer-specific parameters)			
Parameter index	Parameter Local Display Menu Path	Properties	Description
92	ADVDIAG_DIAG_EXE_BLOCK		For development only
93	ADVDIAG_DIAG_EXE_MAX		For development only
94	ADVDIAG_DIAG_EXE_MIN		For development only
95	ADVDIAG_DIAG_EXE_CUR		For development only
96	ADVDIAG_DIAG_EXE_RESET		For development only
97	ADVDIAG_DIAG_EXE_CAT		For development only
98	ADVDIAG_DIAG_EXE_COUNT		For development only
99	STATUS_SELECT_003_COND	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
100	STATUS_SELECT_104_COND	W	optional status setting for diagnostic code 104 (Sensor supply voltage bad) **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
101	STATUS_SELECT_180_COND	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

ADVDIAGCOND Transducer Block (manufacturer-specific parameters)			
Parameter index	Parameter Local Display Menu Path	Properties	Description
102	STATUS_SELECT_181_COND	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
102	STATUS_SELECT_215_COND	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
103	STATUS_SELECT_312_COND	W	optional status setting for diagnostic code 312 (No conductivity detected) **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

ADVDIAGCOND Transducer Block (manufacturer-specific parameters)			
Parameter index	Parameter Local Display Menu Path	Properties	Description
104	STATUS_SELECT_322_COND	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
105	STATUS_SELECT_325_COND	W	optional status setting for diagnostic code 325 (Sensor 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
106	STATUS_SELECT_532_COND	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

ADVDIAGCOND Transducer Block (manufacturer-specific parameters)			
Parameter index	Parameter Local Display Menu Path	Properties	Description
107	STATUS_SELECT_802_COND	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:** UNMODIFIED
108	STATUS_SELECT_810_COND	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:** UNMODIFIED
109	STATUS_SELECT_811_COND	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:** UNMODIFIED
110	STATUS_SELECT_812_COND	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:** UNMODIFIED

ADVDIAGCOND Transducer Block (manufacturer-specific parameters)			
Parameter index	Parameter Local Display Menu Path	Properties	Description
111	STATUS_SELECT_813_COND	W	optional status setting for diagnostic code 813 (Sensor 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:** UNMODIFIED
112	STATUS_SELECT_814_COND	W	optional status setting for diagnostic code 814 (USP 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
113	STATUS_SELECT_844_COND	W	optional status setting for diagnostic code 844 (USP 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
114	TOTAL_OPERATING_TIME_COND		Total operating time of the device; will be reset by factory default command
115	AVAILABILITY_COND		Availability of the device since last counter reset: (Operating time - Time in failure) / Operating time * 100 since last counter reset
116	OPERATING_TIME_COND		Operating time of the device since last counter reset
117	TIME_IN_FAILURE_COND		Operating time of the device with NAMUR F status signal since last counter reset
118	NUMBER_OF_FAILURES_COND		Number of failures since last counter reset
119	MTBF_COND		Mean time between failures: (Operating time - Time in failure) / Number of failures
120	MTTR_COND		Mean time to repair: Time in failure / Number of failures
121	TIME_IN_CALIBRATION_COND		Operating time of the device with calibration status since last counter reset.
122	NO_OF_CALIBRATIONS_COND		Number of calibrations since last counter reset

ADVDIAGCOND Transducer Block (manufacturer-specific parameters)			
Parameter index	Parameter Local Display Menu Path	Properties	Description
123	MTBC_COND		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_COND	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
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

ADVDIAGCOND Transducer Block (manufacturer-specific parameters)			
Parameter index	Parameter Local Display Menu Path	Properties	Description
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_COND		Date of last calibration
138	DAYS_SINCE_LAST_CALIB_COND		Days since last calibration
139	CAL_DATE_CURRENT_1_COND		Current calibration date 1
140	CAL_DATE_CURRENT_2_COND		Current calibration date 2
141	HEARTBEAT_COND		Heartbeat diagnostic option Depends on order code. Examples: CM42-KAA600**EH**E00 --> with Heartbeat option CM42-KAA600**EA**E00 or CM42-KAA600**EB**E00 --> without Heartbeat option **Available values**: 0: No 1: Yes

6.3.18. DISPLAYCOND 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.

DISPLAYCOND 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 0x03C1(0000 to 0961); 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. KAA600E**A**D00 means standard or KAA600E**B**D00 means advanced). Advanced functionality contains functions like additional diagnostics, logbooks, table handling **Indicated values:** 0 - Standard 1 - Advanced

DISPLAYCOND Transducer Block (manufacturer-specific parameters)			
Parameter index	Parameter Local Display Menu Path	Properties	Description
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
24	DISPLAY_TEMPERATURE_UNIT SETUP → Display → Temperature unit	W	Select temperature unit used for the local device display **Available values**: 1001 - Celsius 1002 – Fahrenheit **Factory setting:** Celsius
25	DISPLAY_TEMPERATURE_VALUE_FORMAT 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
26	MEASURED_VALUE SETUP → Sensor conductivity → Operating mode → Measured value		Selected measurement mode as set in CONDCONC Transducer **Available values:** 0 - Conductivity 1 - Resistivity 2 - Concentration
27	DISPLAY_MAIN_VALUE_FORMAT SETUP → Display → Main meas. format	W	Select format of the main value used for the local device display **Available values:** 80 - XXXX 81 - XXX.X 95 - Auto 370 - XX.XX 371 - X.XXX **Factory setting:** Auto
28	DISPLAY_CONDUCTIVITY_UNIT SETUP → Display → Main meas. unit	W	Select conductivity unit used for the local device display **Available values::** 28 - µS/m 29 - µS/cm 30 - mS/m 31 - mS/cm 33 - S/m 75 - S/cm 114 – Auto **Factory setting:** Auto

DISPLAYCOND Transducer Block (manufacturer-specific parameters)			
Parameter index	**Parameter** **Local Display Menu Path**	**Properties**	**Description**
29	DISPLAY_RESISTIVITY_UNIT SETUP → Display → Main meas. unit	W	Select resistivity unit used for the local device display 63 - kOhm*m 66 - kOhm*cm 67 - Mohm*cm 114 – Auto **Factory setting:** Auto
30	DISPLAY_MAIN_VALUE_2POL_FORMAT		Select format of the 2-pol. sensor main value used for the local display of the device (required for up/download only) **Available values:** 80 - XXXX 81 - XXX.X 370 - XX.XX 371 - X.XXX 95 AUTO_2P_IND **Factory setting:** AUTO_2P_IND
31	DISPLAY_MAIN_VALUE_4POL_FORMAT		Select format of the 4-pol. sensor main value used for the local display of the device (required for up/download only) **Available values:** 80 - XXXX 81 - XXX.X 370 - XX.XX 79 - AUTO_4P_IND **Factory setting:** AUTO_4P_IND
32	SENSOR SETUP → Sensor conductivity → Sensor		Indicates current connected sensor type **Available values**: 0: 2 electrodes Sensor 1: 4 electrodes Sensor 2: 4 electrodes Memosens **Default value**: depends on connected sensor
33	SENSOR_MODULE		Indicates current measurement principle **Available values**: 0: Conductive 1: Inductive **Default value**: depends on connected sensor

6.3.19. MEMOCOND 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.

MEMOCOND 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 0x03C1(0000 to 0961); 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. KAA600E**A**D00 means standard or KAA600E**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

MEMOCOND Transducer Block (manufacturer-specific parameters)			
Parameter index	**Parameter** **Local Display Menu Path**	**Properties**	**Description**
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
27	ORDER_CODE_INFO_SENSOR DIAG → Sensor information → Identification → Order code		Order code for the sensor **Example**: CLS50D-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		Calibration type **Available values**: 0 None 1 Numeric Input 2 1 point 3 2 point 4 n 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. **Default value**: None
31	CAL_MANUFACT_ID_TRANSMITTER DIAG → Sensor information → Calibration → Main value → Manufacturer ID		Manufacturer-ID of the transmitter used for main value calibration **Example**: 1
32	CAL_S_N_TRANSMITTER DIAG → Sensor information → Calibration → Main value → Serial number		Serial number of the transmitter used for main value calibration **Example**: 91094905G00
33	CAL_OPERATING_HOURS DIAG → Sensor information → Calibration → Main value →Operating hours		Operating time used for main value calibration **unit:** hours
34	TEMP_CAL_MANUFACT_ID_TRANSMITTER DIAG → Sensor information → Calibration → Temperature → Manufacturer ID		Manufacturer-ID of the transmitter used for temperature calibration **Example**: 1
35	TEMP_CAL_S_N_TRANSMITTER DIAG → Sensor information → Calibration → Temperature → Serial number		Serial number of the transmitter used for temperature calibration **Example**: 91094905G00

MEMOCOND Transducer Block (manufacturer-specific parameters)			
Para-meter index	Parameter Local Display Menu Path	Proper ties	Description
36	TEMP_CAL_OPERATING_HOURS DIAG → Sensor information → Calibration → Temperature →Operating hours		Operating time used for temperature calibration **unit:** hours
37	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
38	SPEC_MAX_TEMPERATURE_SENSOR DIAG → Sensor information → Specification → Max. temperature		Maximum temperature the sensor can be exposed to **unit**: °C; value depends on sensor type
39	SPEC_MIN_TEMPERATURE_SENSOR DIAG → Sensor information → Specification → Min. temperature		Minimum temperature the sensor can be exposed to **unit**: °C; value depends on sensor type
40	TEMP_OFFSET_SENSOR DIAG → Sensor information → Calibration → Temperature → Temp. offset		Temperature Offset **unit**: K
41	MAX_TEMPERATURE_SENSOR DIAG → Sensor information → Max. operating values → Max temperature		Maximum temperature the sensor has been exposed to **unit**: °C
42	MIN_TEMPERATURE_SENSOR DIAG → Sensor information → Max. operating values → Min temperature		Minimum temperature the sensor has been exposed to **unit**: °C
43	COMMISSIONING_DATE_SENSOR DIAG → Sensor information → Identification → Commissioning date		Sensor commissioning date **Range**: DATE format (size 7) according to FF specification 870
44	OPERATING_TIME_SENSOR DIAG → Sensor information → Operating time → Operating time		Total sensor operating time **unit** hours
45	TIME_OVER_80C_SENSOR DIAG → Sensor information → Operating time → Usage >80°C		Total sensor operating time over 80 °C **unit**: hours
46	NO_OF_STERILIZATIONS_SENSOR DIAG → Sensor information → Operating time → No. steril. sensor		Total sterilization counts of the sensor
47	CAL_NUMBER_SENSOR DIAG → Sensor information → Calibration → Main value → No. cal. sensor		Number of calibrations performed with current sensor
48	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
49	MANUFACTURING_DATE_SENSOR DIAG → Sensor information → Identification → Manufacturing date		Sensor manufacturing date and time **Range**: DATE format (size 7) according to FF specification 870
50	SPEC_CELL_CONST_SENSOR DIAG → Sensor information → Specification → Cell constant		Specified cell constant **unit**: 1/cm
51	CAL_COND_REF_SENSOR DIAG → Sensor information → Calibration →Main value → Conductivity ref		Conductivity reference for calibration **unit**: µs/cm
52	TIME_OVER_120C_SENSOR DIAG → Sensor information → Operating time → Usage >120°C		Total sensor operating time over 120 °C **unit**: hours
53	TIME_OVER_100C_SENSOR DIAG → Sensor information → Operating time → Usage >100°C		Total sensor operating time over 100 °C **unit**: hours
54	TIME_OVER_140C_SENSOR DIAG → Sensor information → Operating time → Usage >140°C		Total sensor operating time over 140 °C **unit**: hours
55	TIME_OVER_80C_LWR_100NS_SENSOR DIAG → Sensor information → Operating time → Usage >80°C <100nS		Total sensor operating time below 5 °C **unit**: hours
56	TIME_UNDER_5C_SENSOR DIAG → Sensor information → Operating time → Usage <5°C		Total sensor operating time under -300 mV **unit**: hours

MEMOCOND Transducer Block (manufacturer-specific parameters)			
Para-meter index	**Parameter** **Local Display Menu Path**	**Proper ties**	**Description**
57	TIME_OVER_125C_SENSOR DIAG → Sensor information → Operating time → Usage >125°C		Total sensor operating time over 125 °C **unit**: hours
58	TIME_OVER_150C_SENSOR DIAG → Sensor information → Operating time → Usage >150°C		Total sensor operating time over 150 °C **unit**: hours
59	SPEC_MIN_CONDUCTIVITY_SENSOR DIAG → Sensor information → Specification → Min. conductivity		Specified minimum conductivity measurement value **unit** µS/cm
60	SPEC_MAX_ CONDUCTIVITY _SENSOR DIAG → Sensor information → Specification → Max. conductivity		Specified maximum conductivity measurement value **unit**: µS/cm
61	CURRENT_CELL_CONST_SENSOR CAL → Current values → Cell constant		Current cell constant **unit:** 1/cm
62	DELTA_CELL_CONST_SENSOR DIAG → Sensor information → Calibration → Main value → Delta cell const		Cell Constant difference between the last two calibrations **unit**: 1/cm
63	MIN_CONDUCTIVITY_SENSOR DIAG → Sensor information → Max. operating values -→ Min. conductivity		Minimum conductivity the sensor has been exposed to **unit**: S/m
64	MAX_CONDUCTIVITY_SENSOR DIAG → Sensor information → Max. operating values -→ Max. conductivity		Maximum conductivity the sensor has been exposed to **unit**: S/m
65	TEMP_CAL_SLOPE_SENSOR DIAG → Sensor information → Calibration → Temperature →Slope		Adjusted temperature slope
66	TEMP_T1_REF_SENSOR DIAG → Sensor information → Calibration → Temperature →Temperature ref 1		Reference value 1 of last temperature calibration **unit** °C
67	TEMP_T2_REF_SENSOR DIAG → Sensor information → Calibration → Temperature →Temperature ref 2		Reference value 2 of last temperature calibration **unit**: °C
68	CAL_TEMP_REF_COND_SENSOR DIAG → Sensor information → Calibration → Main value →		Temperature value during last cell constant calibration **unit**: °C
69	TEMP_CAL_TYPE_SENSOR DIAG → Sensor information → Calibration → Temperature → Mode		Calibration type used for temperature calibration **Available values:** 1: 1-point 2: 2-point
70	TEMP_CAL_COUNT_SENSOR DIAG → Sensor information → Calibration → Temperature → No. cal. sensor		Calibration counter for temperature calibration
71	CIP_CYCLES_SENSOR DIAG → Sensor information → Operating time →CIP cycle		Clean-in-place cycles
72	MAX_PRESSURE_SENSOR DIAG → Sensor information → Specification → max. Pressure (20°C)		Maximum process pressure **unit**: bar
73	SPEC_MIN_RESISTIVITY_SENSOR DIAG → Sensor information → Specification → Min. resistivity		Specified minimum measurement value for resistivity **unit**: Ohm-m
74	SPEC_MAX_RESISTIVITY_SENSOR DIAG → Sensor information → Specification → Max. resistivity		Specified maximum measurement value for resistivity **unit** Ohm-m
75	SPEC_MIN_CONCENTRATION_SENSOR DIAG → Sensor information → Specification → Min. concentration		Specified minimum measurement value for concentration **unit** %
76	SPEC_MAX_CONCENTRATION_SENSOR DIAG → Sensor information → Specification → Max. concentration		Specified maximum measurement value for concentration **unit** %

MEMOCOND Transducer Block (manufacturer-specific parameters)			
Para-meter index	Parameter Local Display Menu Path	Proper ties	Description
77	SENSOR SETUP → Sensor conductivity → Sensor		Indicates current connected sensor type **Available values**: 0: 2 electrodes Sensor 1: 4 electrodes Sensor 2: 4 electrodes Memosens **Default value**: depends on connected sensor
78	SENSOR_MODULE		Indicates current measurement principle **Available values**: 0: Conductive 1: Inductive **Default value**: depends on connected sensor
79	SENSOR_CAL_VALID		Validity of the displayed calibration parameter for main measurement **Available values:** 0 – FALSE 1 - TRUE **Default value:** 0
80	SENSOR_TEMP_CAL_VALID		Validity of the displayed calibration parameter for temperature measurement **Available values:** 0 – FALSE 1 - TRUE **Default value:** 0
81	SENSOR_CONNECTED		Indicates current Memosens connection state **Available values:** 0 to 29: not connected 30 - connected **Default value:** 0
82	SELECT_CALIB_HISTORY_TYPE_COND	W	Select a calibration type of history data sets (function currently not available, reserved for future use)
83	AVAILABLE_CALIB_HISTORY_COND		Available number of calibration data sets **Available values:** 0 **Default value:** 0
84	SELECTED_SENSOR_CALDATA_COND	W	Choose between available calibration data sets (function currently not available, reserved for future use)
85	REFERENCE_CAL_VALID		Status of reference calibration **Available values:** 0 – FALSE 1 - TRUE **Default value:** depends on connected sensor
86	CURRENT_CAL_VALID		Status of current calibration **Available values:** 0 – FALSE 1 - TRUE **Default value:** depends on connected sensor
87	UNIT_TEMPERATURE_VALUE		Unit of temperature measurement value as set in CONDCONC transducer **Available values:** 1001 – Celsius 1002 – Fahrenheit **Default value:** 1001 – Celsius

6.3.20. DIAGCOND 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.

DIAGCOND 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 0x03C1(0000 to 0961); 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. KAA600E**A**D00 means standard or KAA600E**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 conductivity → 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 conductivity → 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 conductivity → Sensor diagnostics → Diagnostic limits → Operating hours → Function	W	Switch to enable or disable operating time diagnostic limits **Available values**: 0 - Off 1 – On **Factory setting**: Off

DIAGCOND Transducer Block (manufacturer-specific parameters)			
Para-meter index	Parameter Local Display Menu Path	Proper ties	Description
24	WARNING_OP_TIME_LIMIT SETUP → Sensor conductivity → Sensor diagnostics → Diagnostic limits → Operating hours →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 conductivity → Sensor diagnostics → Diagnostic limits → Operating hours →Alarm level	W	Alarm limit for operating time **Range:** WARNING_OP_TIME_LIMIT+1 to 50000 hours **Factory setting**: 15000 hours (625 days)
26	WARNING_OP_TIME_OVER_80C_LIMIT SETUP → Sensor conductivity → Sensor diagnostics → Diagnostic limits → Operating hours →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 conductivity → Sensor diagnostics → Diagnostic limits → Operating hours →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 conductivity → 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 conductivity → Sensor diagnostics → Diagnostic limits → Sterilization 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 conductivity → Sensor diagnostics → Diagnostic limits → Sterilization 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	TYPE_PHARMA_WATER SETUP → Sensor conductivity → Limits → Pharmacy water → Type	W	Select pharma water type **Available values:** 0: OFF 1: EP (European Pharmacopeia) 3: PW (Purified Water) 4: USP (United States Pharmacopeia) **Factory setting**: OFF
35	THRESHOLD_PREALARM SETUP → Sensor conductivity → Limits → Pharmacy water → Prealarm → Threshold	W	Threshold pre-alarm limit **Available values:** 10 to 99.9 % **Factory setting**: 80 %
36	THRESHOLD_ALARM HYSTERESIS	W	Threshold alarm limit **Factory setting**: 100 %

DIAGCOND Transducer Block (manufacturer-specific parameters)			
Para-meter index	**Parameter** **Local Display Menu Path**	**Proper ties**	**Description**
37	SETUP → Sensor conductivity → Limits → Pharmacy water → Prealarm → Hysteresis RESPONSE_DELAY_TIME	W	Hysteresis for pre-alarm limit **Available values:** 2 to 9.9 % **Factory setting**: 2%
38	SETUP → Sensor conductivity → Limits → Pharmacy water → Response delay FALL_DELAY_TIME	W	Response delay time **Available values:** 0 to 3600.0 s **Factory setting**: 0.0 s
39	SETUP → Sensor conductivity → Limits → Pharmacy water → Fall-delay time TYPE_PHARMA_WATER	W	Fall delay time **Available values:** 0 to 3600.0 s **Factory setting**: 0.0 s
40	WARNING_OP_TIME_OVER_120C_LIMIT SETUP → Sensor conductivity → Sensor diagnostics → Diagnostic limits → Operating hours →Usage >120°C → Warning level	W	Warning limit for operating time over 120 °C **Range**: 1 to ALARM_OP_TIME_OVER_120C_LIMIT-1 hours **Factory setting**: 10000 hours (416 days)
41	ALARM_OP_TIME_OVER_120C_LIMIT SETUP → Sensor conductivity → Sensor diagnostics → Diagnostic limits → Operating hours →Usage >120°C → Alarm level	W	Alarm limit for operating time over 120 °C **Range**: WARNING_OP_TIME_OVER_120C_LIMIT+1 to 50000 hours **Factory setting**: 15000 hours (625 days)
42	WARNING_OP_TIME_OVER_140C_LIMIT SETUP → Sensor conductivity → Sensor diagnostics → Diagnostic limits → Operating hours →Usage >140°C → Warning level	W	Warning limit for operating time over 140 °C **Range**: 1 to ALARM_OP_TIME_OVER_140C_LIMIT-1 hours **Factory setting**: 10000 hours (416 days)
43	ALARM_OP_TIME_OVER_140C_LIMIT SETUP → Sensor conductivity → Sensor diagnostics → Diagnostic limits → Operating hours →Usage >140°C → Alarm level	W	Alarm limit for operating time over 140 °C **Range**: WARNING_OP_TIME_OVER_140C_LIMIT+1 to 50000 hours **Factory setting**: 15000 hours (625 days)
44	WARN_OP_TIME_OVER_80C_100NS_LIM SETUP → Sensor conductivity → Sensor diagnostics → Diagnostic limits → Operating hours →Usage >80°C <100nS → Warning level	W	Warning limit for operating time over 140 °C **Range**: 1 to ALARM_OP_TIME_OVER_ OVER_80C_100NS _LIMIT-1 hours **Factory setting**: 10000 hours (416 days)
45	ALM_OP_TIME_OVER_80C_100NS_LIMIT SETUP → Sensor conductivity → Sensor diagnostics → Diagnostic limits → Operating hours →Usage >80°C <100nS → Alarm level	W	Alarm limit for operating time over 140 °C **Range**: WARNING_OP_TIME_OVER_ OVER_80C_100NS _LIM+1 to 50000 hours **Factory setting**: 15000 hours (625 days)
46	WARNING_OP_TIME_UNDER_5C_LIMIT SETUP → Sensor conductivity → Sensor diagnostics → Diagnostic limits → Operating hours →Usage < 5°C → Warning level	W	Warning limit for operating time under 5 °C **Range**: 1 to ALARM_OP_TIME_UNDER_5C_LIMIT-1 hours **Factory setting**: 10000 hours (416 days)
47	ALARM_OP_TIME_UNDER_5C_LIMIT SETUP → Sensor conductivity → Sensor diagnostics → Diagnostic limits → Operating hours →Usage < 5°C → Alarm level	W	Alarm limit for operating time under 5 °C **Range**: WARNING_OP_TIME_UNDER_5C_LIMIT+1 to 50000 hours **Factory setting**: 15000 hours (625 days)
48	WARNING_OP_TIME_OVER_125C_LIMIT SETUP → Sensor conductivity → Sensor diagnostics → Diagnostic limits → Operating hours →Usage >125°C → Warning level	W	Warning limit for operating time over 125 °C **Range**: 1 to ALARM_OP_TIME_OVER_125C_LIMIT-1 hours **Factory setting**: 10000 hours (416 days)
49	ALARM_OP_TIME_OVER_125C_LIMIT SETUP → Sensor conductivity → Sensor diagnostics → Diagnostic limits → Operating hours →Usage >125°C → Alarm level	W	Alarm limit for operating time over 125 °C **Range**: WARNING_OP_TIME_OVER_125C_LIMIT+1 to 50000 hours **Factory setting**: 15000 hours (625 days)
50	WARNING_OP_TIME_OVER_150C_LIMIT SETUP → Sensor conductivity → Sensor diagnostics → Diagnostic limits → Operating hours →Usage >150°C → Warning level	W	Warning limit for operating time over 150 °C **Range**: 1 to ALARM_OP_TIME_OVER_150C_LIMIT-1 hours **Factory setting**: 10000 hours (416 days)

DIAGCOND Transducer Block (manufacturer-specific parameters)			
Para-meter index	Parameter Local Display Menu Path	Proper ties	Description
51	ALARM_OP_TIME_OVER_150C_LIMIT SETUP → Sensor conductivity → Sensor diagnostics → Diagnostic limits → Operating hours →Usage >150°C → Alarm level	W	Alarm limit for operating time over 150 °C **Range**: WARNING_OP_TIME_OVER_150C_LIMIT+1 to 50000 hours **Factory setting**: 15000 hours (625 days)
52	WARNING_OP_TIME_OVER_100C_LIMIT SETUP → Sensor conductivity → Sensor diagnostics → Diagnostic limits → Operating hours →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)
53	ALARM_OP_TIME_OVER_100C_LIMIT SETUP → Sensor conductivity → Sensor diagnostics → Diagnostic limits → Operating hours →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)
54	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
55	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
56	PCS_BANDWIDTH SETUP → Sensor pH/ORP → Sensor diagnostics → Diagnostic limits → PCS → Tolerance width	W	Interval around the measuring signal (raw value) for detecting stagnation. Measured values within the set interval are regarded as stagnating. **Range**: 0.01 to 2.00 % **Factory setting**: 0.10 %
57	OUT_PHARMA_WATER_LIMIT		Current result of pharma water limit check **Possible values**: 0x00000000: Within Range 0x00000001: Warning
58	OUT_OP_TIME_OVER_120C_LIMIT		Current result of operating time over 120 °C check **Possible values**: 0x00000000: Within Range 0x00000001: Warning
59	OUT_OP_TIME_OVER_140C_LIMIT		Current result of operating time over 140 °C check **Possible values**: 0x00000000: Within Range 0x00000001: Warning
60	OUT_OP_TIME_OVER_80C_100NS_LIMIT		Current result of operating time over 80 °C below 100 nS check **Possible values**: 0x00000000: Within Range 0x00000001: Warning
61	OUT_OP_TIME_UNDER_5C_LIMIT		Current result of operating time under 5 °C check **Possible values**: 0x00000000: Within Range 0x00000001: Warning
62	OUT_OP_TIME_OVER_125C_LIMIT		Current result of operating time over 125 °C check **Possible values**: 0x00000000: Within Range 0x00000001: Warning
63	OUT_OP_TIME_OVER_150C_LIMIT		Current result of operating time over 150 °C check **Possible values**: 0x00000000: Within Range 0x00000001: Warning
64	OUT_OP_TIME_OVER_100C_LIMIT		Current result of operating time over 100 °C check **Possible values**: 0x00000000: Within Range 0x00000001: Warning

DIAGCOND Transducer Block (manufacturer-specific parameters)			
Parameter index	**Parameter** **Local Display Menu Path**	**Properties**	**Description**
65	SENSOR_MODULE		if SENSOR_INTERFACE analog: select measurement principle; if SENSOR_ INTERFACE digital: indicate measurement principle **Available values**: 0: Conductive 1: Inductive **Default value**: Conductive
66	CELL_CONSTANT SETUP → Sensor conductivity → Cell constant		Current cell constant **Available values** 0.0025 to 99.99 1/cm **Default value**: Conductive: 0.1 Inductive: 2.0
67	SENSOR SETUP → Sensor conductivity → Sensor		Indicates current connected sensor type **Available values**: 0: 2 electrodes Sensor 1: 4 electrodes Sensor 2: 4 electrodes Memosens **Default value**: depends on connected sensor

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_Cond provides 6 Analog Input Function Blocks. Each block can select a measurement value which is provided by the CONDCONC 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_Cond 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) coming 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_Cond provides 2 Analog alarm Function Blocks, so that two different measurement values could be evaluated. A possible application could be the conductivity 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 errors.

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