

# Description of Device Parameters

## **Micropilot NMR81**

Tank Gauging





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# 1 About this document

## 1.1 Document function

The document is part of the Operating Instructions and serves as a reference for parameters, providing a detailed explanation of each individual parameter of the operating menu.

## 1.2 Symbols

### 1.2.1 Safety symbols

#### DANGER

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

#### WARNING

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

#### CAUTION

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

#### NOTICE

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

### 1.2.2 Electrical symbols



Alternating current



Direct current and alternating current



Direct current



Ground connection

A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system.

#### **Protective earth (PE)**

Ground terminals that must be connected to ground prior to establishing any other connections.

The ground terminals are located on the interior and exterior of the device:

- Interior ground terminal: protective earth is connected to the mains supply.
- Exterior ground terminal: device is connected to the plant grounding system.

### 1.2.3 Tool symbols



Phillips head screwdriver



Flat blade screwdriver



Torx screwdriver



Allen key



Open-ended wrench

## 1.2.4 Symbols for certain types of information and graphics

### Permitted

Procedures, processes or actions that are permitted

### Preferred

Procedures, processes or actions that are preferred

### Forbidden

Procedures, processes or actions that are forbidden

### Tip

Indicates additional information



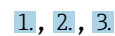
Reference to documentation



Reference to graphic



Notice or individual step to be observed



Series of steps



Result of a step



Visual inspection



Operation via operating tool



Write-protected parameter

**1, 2, 3, ...**

Item numbers

**A, B, C, ...**

Views

### → **Safety instructions**

Observe the safety instructions contained in the associated Operating Instructions




**Temperature resistance of the connection cables**

Specifies the minimum value of the temperature resistance of the connection cables

## 1.3 Documentation

The following documentation types are available in the Downloads area of the Endress+Hauser website ([www.endress.com/downloads](http://www.endress.com/downloads)):

 For an overview of the scope of the associated Technical Documentation, refer to the following:

- *Device Viewer* ([www.endress.com/deviceviewer](http://www.endress.com/deviceviewer)): Enter the serial number from the nameplate
- *Endress+Hauser Operations app*: Enter serial number from nameplate or scan matrix code on nameplate.

### 1.3.1 Technical Information (TI)

#### Planning aid

The document contains all the technical data on the device and provides an overview of the accessories and other products that can be ordered for the device.

### 1.3.2 Brief Operating Instructions (KA)

#### Guide that takes you quickly to the 1st measured value

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

### 1.3.3 Operating Instructions (BA)

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

It also contains a detailed explanation of each individual parameter in the operating menu (except the **Expert** menu). The description is aimed at those who work with the device over the entire life cycle and perform specific configurations.

### 1.3.4 Description of Device Parameters (GP)

The Description of Device Parameters provides a detailed explanation of each individual parameter in the 2nd part of the operating menu: the **Expert** menu. It contains all the device parameters and allows direct access to the parameters by entering a specific code. The description is aimed at those who work with the device over the entire life cycle and perform specific configurations.

### 1.3.5 Safety Instructions (XA)


Depending on the approval, the following Safety Instructions (XA) are supplied with the device. They are an integral part of the Operating Instructions.

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



















### 1.3.6 Installation instructions (EA)

Installation Instruction are used to replace a faulty unit with a functioning unit of the same type.

## 2 Overview of the operating menu


























- i
  - The following table lists all parameters the **Expert** menu (→  7) may contain. The page number refers to where a description of the parameter can be found.
  - Depending on the device version and parametrization some parameters will not be available in a given situation. For details on the conditions refer to the "Prerequisite" category in the description of the respective parameter.
  - The representation essentially corresponds to the menu seen when using an operating tool (e.g. FieldCare). On the local display there may be minor differences in the menu structure. Details are mentioned in the description of the respective submenu.

Navigation   Expert

<b>Expert</b>		
Locking status		→  27
Access status display		→  28
User role		→  28
Enter access code		→  28
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	▶ <b>Display</b>	→  30
	Language	→  30
	Format display	→  31
	Value 1 to 4 display	→  32
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	Header	→  34
	Header text	→  35
	Display interval	→  35
	Display damping	→  36
	Backlight	→  36
	Contrast display	→  36


























▶ System units	→ 37
Units preset	→ 37
Distance unit	→ 38
Pressure unit	→ 38
Temperature unit	→ 38
Density unit	→ 39
Decimal places length	→ 39
Decimal places pressure	→ 39
Decimal places temperature	→ 40
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Date/time	→ 45
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Year	→ 45
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Hour	→ 46
Minute	→ 47
▶ Administration	→ 50
Define access code	→ 51
Activate SW option	→ 51
Software option overview	→ 51
Device reset	→ 52
▶ Sensor	→ 54



























<b>► Information</b>	→  55
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▶ HART Device(s)	→ 85
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<b>► Communication</b>	→ 143
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
























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
















	H alarm value	→ 237
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Device name	→  268
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### 3 The "Expert" menu

Navigation  Expert

<b>Expert</b>	
Locking status	→ 27
Access status display	→ 28
User role	→ 28
Enter access code	→ 28
▶ System	→ 29
▶ Sensor	→ 54
▶ Input/output	→ 83
▶ Communication	→ 143
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#### Locking status

Navigation   Expert → Locking status

**Description**

Indicates the type of locking.

"Hardware locked" (HW)  
 The device is locked by the "WP" switch on the main electronics module. To unlock, set the switch into the OFF position.

"WHG locked" (SW)  
 Unlock the device by entering the appropriate access code in "Enter access code".

"SIL locked" (SW)  
 Unlock the device by entering the appropriate access code in "Enter access code".

"Temporarily locked" (SW)  
 The device is temporarily locked by processes in the device (e.g. data upload/download, reset). The device will automatically be unlocked after completion of these processes.

**Additional information**

Read access	Operator
Write access	-

---

**Access status display**


---



**Navigation**   Expert → Access stat.disp



**Prerequisite** The device has a local display.

**Description** Indicates access authorization to parameters via local display.

**Additional information**

Read access	Operator
Write access	-

 The access authorization can be changed via the **Enter access code** parameter (→  28).

 If an additional write protection is active, this restricts the current access authorization even further. The write protection status can be viewed via the **Locking status** parameter (→  27).

---

**User role**


---

**Navigation**  Expert → User role

**Description** Shows the access authorization to the parameters via the operating tool

**Additional information**

Read access	Operator
Write access	-

---

**Enter access code**


---

**Navigation**   Expert → Ent. access code (0003)





**Description** Enter access code to disable write protection of parameters.

**Additional information**

Read access	Operator
Write access	Operator













### 3.1 "System" submenu

Navigation  Expert → System



▶ System	
▶ Display	→  30
▶ System units	→  37
▶ Date / time	→  44
▶ Administration	→  50

### 3.1.1 "Display" submenu

Navigation   Expert → System → Display

► Display	
Language	→  30
Format display	→  31
Value 1 to 4 display	→  32
Decimal places 1 to 4	→  33
Separator	→  34
Number format	→  34
Header	→  34
Header text	→  35
Display interval	→  35
Display damping	→  36
Backlight	→  36
Contrast display	→  36

## Language

<b>Navigation</b>	  Expert → System → Display → Language
<b>Prerequisite</b>	The device has a local display.
<b>Description</b>	Set display language.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ English</li> <li>▪ Deutsch</li> <li>▪ русский язык (Russian)</li> <li>▪ 日本語 (Japanese)</li> <li>▪ Español</li> <li>▪ 中文 (Chinese)</li> </ul>
<b>Factory setting</b>	English

**Additional information**

Read access	Operator
Write access	Operator

**Format display**

**Navigation**

Expert → System → Display → Format display

**Prerequisite**

The device has a local display.

**Description**

Select how measured values are shown on the display.

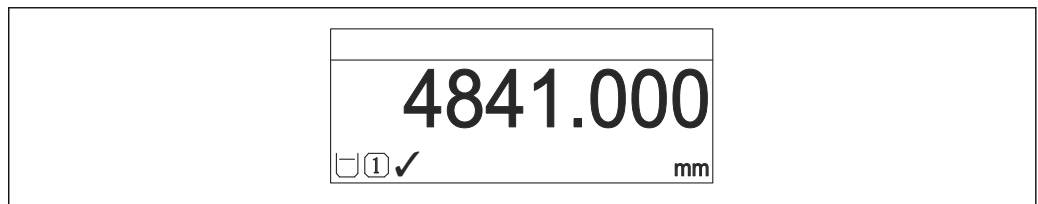
**Selection**

- 1 value, max. size
- 1 bargraph + 1 value
- 2 values
- 1 value large + 2 values
- 4 values

**Factory setting**

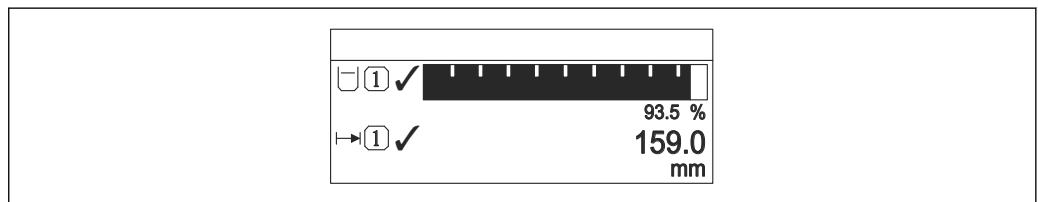
1 value, max. size

**Additional information**



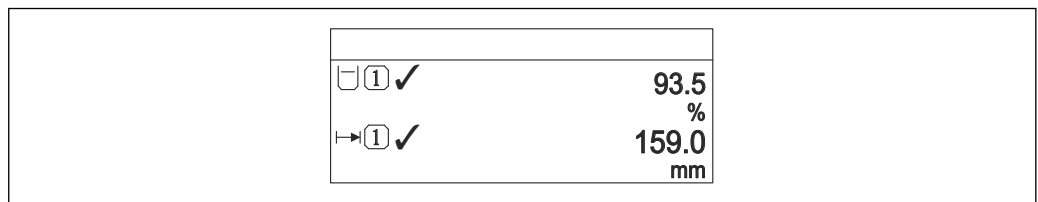
A0019963

1 "Format display" = "1 value, max. size"



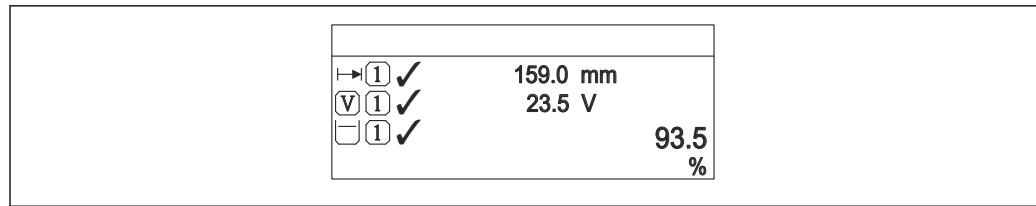
A0019964

2 "Format display" = "1 bargraph + 1 value"



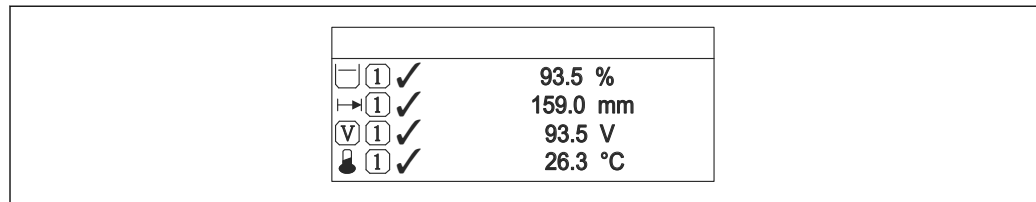
A0019965

3 "Format display" = "2 values"



A0019966



4 "Format display" = "1 value large + 2 values"



A0019966



5 "Format display" = "4 values"

Read access	Operator
Write access	Operator

- The **Value 1 to 4 display** (→  32) parameters specify which measured values are shown on the display and in which order.
- If more measured values are specified than the current display mode permits, the values alternate on the device display. The display time until the next change is configured in the **Display interval** parameter (→  35).

## Value 1 to 4 display

### Navigation

  Expert → System → Display → Value 1 display

### Prerequisite

The device has a local display.

### Description

Select the measured value that is shown on the local display.

### Selection

- None <sup>1)</sup>
- Tank level
- Measured level
- Level linearized
- Tank level %
- Water level <sup>1)</sup>
- Liquid temperature <sup>1)</sup>
- Vapor temperature <sup>1)</sup>
- Air temperature <sup>1)</sup>
- Tank ullage
- Tank ullage %
- Observed density value <sup>1)</sup>
- P1 (bottom) <sup>1)</sup>
- P2 (middle) <sup>1)</sup>
- P3 (top) <sup>1)</sup>

1) not available for the **Value 1 display** parameter



- GP 1 value <sup>1)</sup>
- GP 2 value <sup>1)</sup>
- GP 3 value <sup>1)</sup>
- GP 4 value <sup>1)</sup>
- Gauge command <sup>1)</sup>
- Gauge status <sup>1)</sup>
- AIO B1-3 value <sup>1)</sup>
- AIO B1-3 value mA <sup>1)</sup>
- AIO B1-3 value % <sup>1)</sup>
- AIO C1-3 value <sup>1)</sup>
- AIO C1-3 value mA <sup>1)</sup>
- AIO C1-3 value % <sup>1)</sup>
- AIP B4-8 value <sup>1)</sup>
- AIP B4-8 value mA <sup>1)</sup>
- AIP B4-8 value % <sup>1)</sup>
- AIP C4-8 value <sup>1)</sup>
- AIP C4-8 value mA <sup>1)</sup>
- AIP C4-8 value % <sup>1)</sup>

**Factory setting**

Depending on device version

**Additional information**

Read access	Operator
Write access	Maintenance

**Decimal places 1 to 4**



**Navigation**

Expert → System → Display → Decimal places 1

**Prerequisite**

The device has a local display.

**Description**

This selection does not affect the measurement and calculation accuracy of the device.

**Selection**

- x
- x.x
- x.xx
- x.xxx
- x.xxxx

**Factory setting**

x.x

**Additional information**

The setting does not affect the measuring or computational accuracy of the device.



Read access	Operator
Write access	Maintenance

---

**Separator**



---

<b>Navigation</b>	  Expert → System → Display → Separator
<b>Prerequisite</b>	The device has a local display.
<b>Description</b>	Select decimal separator for displaying numerical values.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ .</li> <li>▪ ,</li> </ul>
<b>Factory setting</b>	.

**Additional information**



Read access	Operator
Write access	Maintenance

---

**Number format**




---

<b>Navigation</b>	  Expert → System → Display → Number format
<b>Prerequisite</b>	The device has a local display.
<b>Description</b>	Choose number format for the display.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Decimal</li> <li>▪ ft-in-1/16"</li> </ul>
<b>Factory setting</b>	Decimal

**Additional information**

Read access	Operator
Write access	Maintenance



 The **ft-in-1/16"** option is only valid for distance values.

---

**Header**



---


<b>Navigation</b>	  Expert → System → Display → Header
<b>Prerequisite</b>	The device has a local display.
<b>Description</b>	Select header contents on local display.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Device tag</li> <li>▪ Free text</li> </ul>
<b>Factory setting</b>	Device tag

**Additional information**

Read access	Operator
Write access	Maintenance

**Meaning of the options**

▪ **Device tag**

The header contents is defined in the **Device tag** parameter (→  181).



▪ **Free text**

The header contents is defined in the **Header text** parameter (→  35).

**Header text**



**Navigation**

  Expert → System → Display → Header text

**Prerequisite**

**Header** (→  34) = **Free text**

**Description**

Enter display header text.

**User entry**

Character string comprising numbers, letters and special characters (11)

**Factory setting**



TG-Platform

**Additional information**

Read access	Operator
Write access	Maintenance

**Display interval**

**Navigation**

  Expert → System → Display → Display interval

**Description**

Set time measured values are shown on display if display alternates between values.


**User entry**

1 to 10 s

**Factory setting**

5 s

**Additional information**

 This parameter is only relevant if the number of selected measuring values exceeds the number of values the selected display format can display simultaneously.

Read access	Operator
Write access	Operator

---

**Display damping**


**Navigation** Expert → System → Display → Display damping

**Prerequisite** The device has a local display.

**Description** Set display reaction time to fluctuations in the measured value.

**User entry** 0.0 to 999.9 s

**Factory setting** 0.0 s

**Additional information**

Read access	Operator
Write access	Maintenance

---

**Backlight**

**Navigation** Expert → System → Display → Backlight

**Prerequisite** The device has a local display.

**Description** Switch the local display backlight on and off.

**Selection**

- Disable
- Enable

**Factory setting** Enable

**Additional information**

Read access	Operator
Write access	Operator

---

**Contrast display**

**Navigation** Expert → System → Display → Contrast display

**Prerequisite** The device has a local display.

**Description** Adjust local display contrast setting to ambient conditions (e.g. lighting or reading angle)



**User entry** 20 to 80 %

**Factory setting** 30 %










**Additional information**

Read access	Operator
Write access	Operator

### 3.1.2 "System units" submenu

Navigation   Expert → System → System units

▶ System units

Units preset	→  37
Distance unit	→  38
Pressure unit	→  38
Temperature unit	→  38
Density unit	→  39
Decimal places length	→  39
Decimal places pressure	→  39
Decimal places temperature	→  40
Decimal places density	→  40

#### Units preset

Navigation   Expert → System → System units → Units preset

Description Defines a set of units for length, pressure and temperature.




- Selection
- mm, bar, °C
  - m, bar, °C
  - mm, PSI, °C
  - ft, PSI, °F
  - ft-in-16, PSI, °F
  - ft-in-8, PSI, °F
  - Customer value


Factory setting mm, bar, °C

#### Additional information

Read access	Operator
Write access	Maintenance

If the **Customer value** option is selected, the units are defined in the following parameters. In any other case these are read-only parameters used to indicate the respective unit:

- Distance unit (→  38)
- Pressure unit (→  38)
- Temperature unit (→  38)

Distance unit 

**Navigation**   Expert → System → System units → Distance unit


**Description** Select distance unit.


**Selection**

<i>SI units</i>	<i>US units</i>
<ul style="list-style-type: none"> <li>■ m</li> <li>■ mm</li> <li>■ cm</li> </ul>	<ul style="list-style-type: none"> <li>■ ft</li> <li>■ in</li> <li>■ ft-in-16</li> <li>■ ft-in-8</li> </ul>

**Factory setting** mm

**Additional information**

Read access	Operator
Write access	Maintenance (if <b>Units preset</b> (→  37) = Customer value)

Pressure unit 


**Navigation**   Expert → System → System units → Pressure unit

**Selection**



<i>SI units</i>	<i>US units</i>	<i>Other units</i>
<ul style="list-style-type: none"> <li>■ bar</li> <li>■ Pa</li> <li>■ kPa</li> <li>■ MPa</li> <li>■ mbar a</li> </ul>	<ul style="list-style-type: none"> <li>psi</li> </ul>	<ul style="list-style-type: none"> <li>■ inH2O</li> <li>■ inH2O (68°F)</li> <li>■ ftH2O (68°F)</li> <li>■ mmH2O</li> <li>■ mmHg</li> </ul>

**Factory setting** bar

**Additional information**

Read access	Operator
Write access	Maintenance (if <b>Units preset</b> (→  37) = Customer value)

Temperature unit 

**Navigation**   Expert → System → System units → Temperature unit


**Description** Select temperature unit.

**Selection**

<i>SI units</i>	<i>US units</i>
<ul style="list-style-type: none"> <li>■ °C</li> <li>■ K</li> </ul>	<ul style="list-style-type: none"> <li>■ °F</li> <li>■ °R</li> </ul>

**Factory setting** °C

**Additional information**

Read access	Operator
Write access	Maintenance (if <b>Units preset</b> (→  37) = Customer value)

**Density unit**



**Navigation** Expert → System → System units → Density unit

**Description** Select density unit.

**Selection**

<p><i>SI units</i></p> <ul style="list-style-type: none"> <li>■ g/cm<sup>3</sup></li> <li>■ g/ml</li> <li>■ g/l</li> <li>■ kg/l</li> <li>■ kg/dm<sup>3</sup></li> <li>■ kg/m<sup>3</sup></li> </ul>	<p><i>US units</i></p> <ul style="list-style-type: none"> <li>■ lb/ft<sup>3</sup></li> <li>■ lb/gal (us)</li> <li>■ lb/in<sup>3</sup></li> <li>■ STon/yd<sup>3</sup></li> </ul>	<p><i>Other units</i></p> <ul style="list-style-type: none"> <li>■ °API</li> <li>■ SGU</li> </ul>
---	---	---

**Factory setting** kg/m<sup>3</sup>

**Additional information**

Read access	Operator
Write access	Maintenance (if <b>Units preset</b> (→  37) = <b>Customer value</b> )

**Decimal places length**



**Navigation** Expert → System → System units → Decimal length

**Description** Number of decimal places for length values.

**Selection**

- X
- X.X
- X.XX
- X.XXX
- X.XXXX

**Factory setting** X.X

**Additional information**

Read access	Operator
Write access	Maintenance

The setting does not affect the accuracy of the measurement or the calculations.

**Decimal places pressure**



**Navigation** Expert → System → System units → Decimal pressure

**Description** Number of decimal places for pressure values.

- Selection**
- X
  - X.X
  - X.XX
  - X.XXX
  - X.XXXX

**Factory setting** x.xxx


**Additional information**

Read access	Operator
Write access	Maintenance

 The setting does not affect the accuracy of the measurement or the calculations.

---

## Decimal places temperature

**Navigation**  Expert → System → System units → Decimal temp.

**Description** Number of decimal places for temperature values.

- Selection**
- X
  - X.X
  - X.XX
  - X.XXX
  - X.XXXX

**Factory setting** x.x


**Additional information**

Read access	Operator
Write access	Maintenance

 The setting does not affect the accuracy of the measurement or the calculations.

---

## Decimal places density

**Navigation**  Expert → System → System units → Decimal density

**Description** Number of decimal places for density values.

- Selection**
- X
  - X.X
  - X.XX
  - X.XXX
  - X.XXXX

**Factory setting** x.x



**Additional information**

Read access	Operator
Write access	Maintenance










The setting does not affect the accuracy of the measurement or the calculations.

### 3.1.3 "Date / time" submenu

The **Date / time** submenu is used to set the real-time clock of the device.

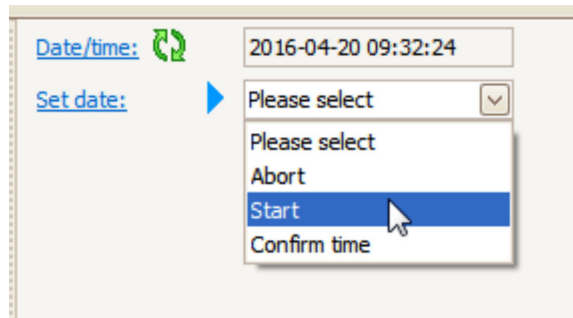
#### Setting the real-time clock via the display and operating module

1. Navigate to Expert → System → Date / time → Set date.
  - ↳ The current value of the real-time clock is displayed.
2. If the displayed value is correct: Press  to terminate the wizard.
3. If the displayed value is not correct: Press  to edit it.
  - ↳ The current value of the **Year** parameter is displayed.
4. If the displayed value is correct: Press  to go to the next value.
5. If the displayed value is incorrect: Press  and enter the correct value. Confirm the new value by pressing .
6. Repeat the last two steps for the following parameters: **Month, Day, Hour, Minute**.
  - ↳ The new value of the real-time clock is displayed.
7. Confirm the new value of the real-time clock by pressing .
8. Quit the wizard by pressing  again.

### Setting the real-time clock via an operating tool (e.g. FieldCare)

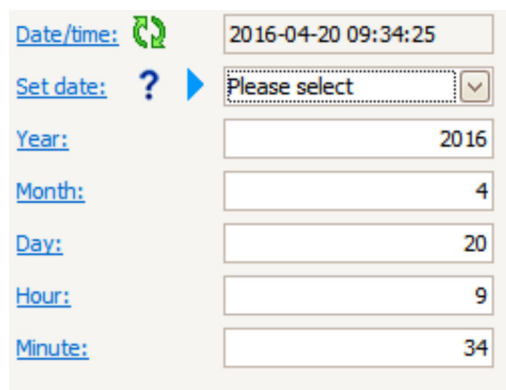
1. Navigate to: Expert → System → Date / time

2.



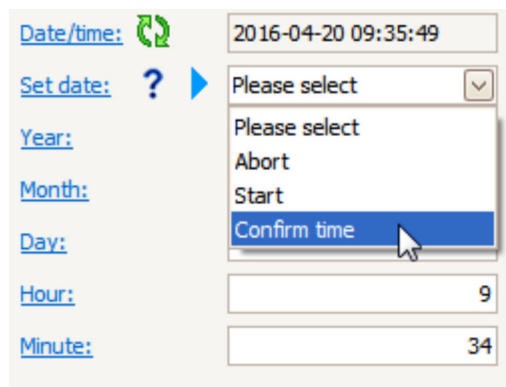
Go to the **Set date** parameter (→ 45) and select the **Start** option.

3.



Use the following parameters to set the date and time: **Year**, **Month**, **Day**, **Hour**, **Minutes**.

4.












Go to the **Set date** parameter (→ 45) and select the **Confirm time** option.

↳ The real-time clock is set to the current date and time.








### Structure of the submenu on the display and operating module

Navigation  Expert → System → Date / time

<b>► Date / time</b>		
Date/time		→  45
<b>► Set date</b>		→  48
Date/time		→  48
Year		→  48
Month		→  48
Day		→  48
Hour		→  48
Minute		→  49
Set date		→  49

### Structure of the submenu in an operating tool (e.g. FieldCare)


Navigation  Expert → System → Date / time

<b>► Date / time</b>		
Date/time		→  45
Set date		→  45
Year		→  45
Month		→  46
Day		→  46
Hour		→  46
Minute		→  47

**Description of parameters**

*Navigation*       Expert → System → Date / time


**Date/time** 

**Navigation**       Expert → System → Date / time → Date/time

**Description**      Displays the device internal real time clock.

**Additional information**

Read access	Operator
Write access	-

**Set date** 

**Navigation**       Expert → System → Date / time → Set date

**Description**      Controls the setting of the real-time clock.

- Selection**
- Please select
  - Abort
  - Start
  - Confirm time

**Factory setting**      Please select


**Additional information**

Read access	Operator
Write access	Maintenance

**Meaning of the options**

- **Please select**  
Prompts the user to select an action.
- **Abort**  
Discards the entered date and time.
- **Start**  
Starts the setting of the real time clock.
- **Confirm time**  
Sets the real-time clock to the entered date and time.

**Year** 

**Navigation**       Expert → System → Date / time → Year

**Prerequisite**      Set date (→  45) = Start

**Description** Enter the current year.

**User entry** 2 016 to 2 079

**Factory setting** 2 016

**Additional information**

Read access	Operator
Write access	Maintenance

---

## Month

---

**Navigation**  Expert → System → Date / time → Month

**Prerequisite** Set date (→  45) = Start

**Description** Enter the current month.

**User entry** 1 to 12

**Factory setting** 1


**Additional information**

Read access	Operator
Write access	Maintenance

---

## Day

---

**Navigation**  Expert → System → Date / time → Day

**Prerequisite** Set date (→  45) = Start

**Description** Enter the current day.

**User entry** 1 to 31

**Factory setting** 1

**Additional information**

Read access	Operator
Write access	Maintenance

---

## Hour

---

**Navigation**  Expert → System → Date / time → Hour

**Prerequisite** Set date (→  45) = Start

**Description** Enter the current hour.

**User entry** 0 to 23

**Factory setting** 0

**Additional information**

Read access	Operator
Write access	Maintenance

**Minute**



**Navigation** Expert → System → Date / time → Minute

**Prerequisite** Set date (→ 45) = Start

**Description** Enter the current minute.


**User entry** 0 to 59

**Factory setting** 0

**Additional information**

Read access	Operator
Write access	Maintenance


*"Set date" wizard*

Navigation  Expert → System → Date / time → Set date

---

**Date/time**

---

Navigation  Expert → System → Date / time → Set date → Date/time


Description →  45

---

**Year**

---



Navigation  Expert → System → Date / time → Set date → Year


Description →  45

---

**Month**

---



Navigation  Expert → System → Date / time → Set date → Month


Description →  46

---

**Day**

---



Navigation  Expert → System → Date / time → Set date → Day


Description →  46

---

**Hour**

---



Navigation  Expert → System → Date / time → Set date → Hour

Description →  46



**Minute****Navigation**

Expert → System → Date / time → Set date → Minute

**Description**→ 47

---

**Set date****Navigation**

Expert → System → Date / time → Set date → Set date

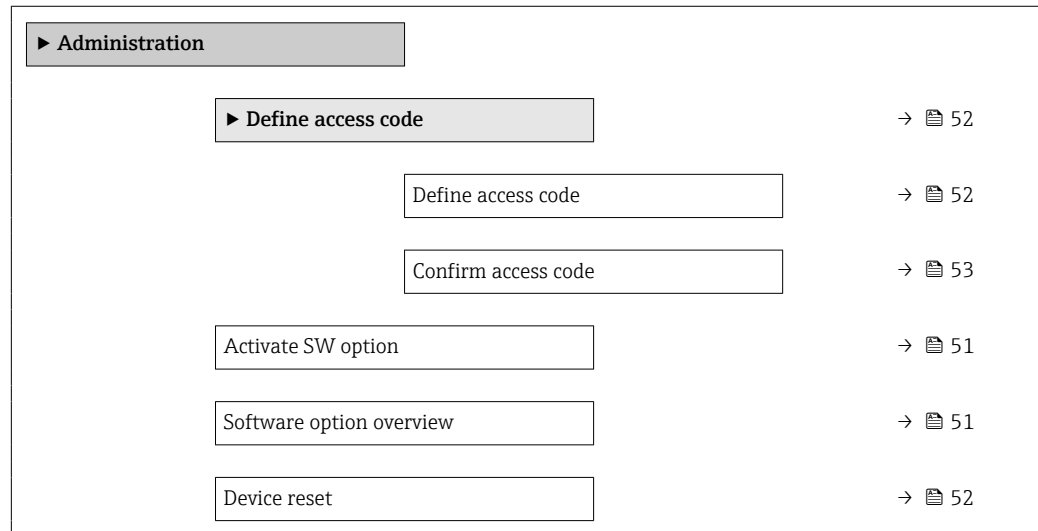
**Description**

Confirm the displayed new value of the real-time clock by pressing .

### 3.1.4 "Administration" submenu

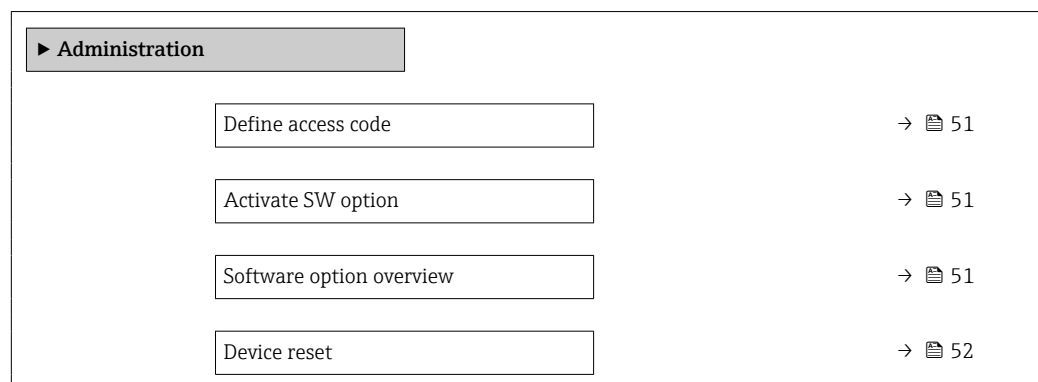
#### Structure of the submenu on the display and operating module

Navigation  Expert → System → Administration



#### Structure of the submenu in an operating tool (e.g. FieldCare)


Navigation  Expert → System → Administration




**Description of parameters**

*Navigation*  Expert → System → Administration

---

**Define access code** 

**Navigation**  Expert → System → Administration → Def. access code






**Description** Define release code for write access to parameters.

**User entry** 0 to 9999

**Factory setting** 0


**Additional information**

<b>Read access</b>	Operator
<b>Write access</b>	Maintenance

-  If the factory setting is not changed or 0 is defined as the access code, the parameters are not write-protected and the configuration data of the device can then always be modified. The user is logged on in the *Maintenance* role.
-  The write protection affects all parameters marked with the  symbol in this document.
-  Once the access code has been defined, write-protected parameters can only be modified if the access code is entered in the **Enter access code** parameter (→  28).

---

**Activate SW option** 

**Navigation**  Expert → System → Administration → Activate SW opt.

**Description** Enter the application package code or code of another re-ordered functionality to enable it

**User entry** Positive integer


**Factory setting** 0

**Additional information**

<b>Read access</b>	Operator
<b>Write access</b>	Maintenance

---

**Software option overview**

**Navigation**  Expert → System → Administration → SW option overv.

**Description** Shows all enabled software options

- User interface**
- Extended HistoROM
  - SIL
  - WHG
  - CLG

**Additional information**

Read access	Operator
Write access	-

**Device reset****Navigation**

Expert → System → Administration → Device reset

**Description**

Reset the device configuration - either entirely or in part - to a defined state

**Selection**

- Cancel
- To factory defaults
- Restart device

**Factory setting**

Cancel

**Additional information****Meaning of the options**

- **Cancel**  
No action
- **To factory defaults**  
All parameters are reset to the order-code specific factory setting.
- **Restart device**  
The restart resets every parameter which is stored in the volatile memory (RAM) to the factory setting (e.g. measured value data). The device configuration remains unchanged.

Read access	Operator
Write access	Maintenance

*"Define access code" wizard*

*Navigation* Expert → System → Administration → Def. access code

**Define access code****Navigation**

Expert → System → Administration → Def. access code → Def. access code

**Description**

→ 51

**Confirm access code**



**Navigation** Expert → System → Administration → Def. access code → Confirm code

**Description** Confirm the entered access code.

**User entry** 0 to 9999

**Factory setting** 0

**Additional information**

Read access	Operator
Write access	Maintenance

## 3.2 "Sensor" submenu

The Sensor submenu contains all parameters related to the measurement and the sensor settings.

*Navigation*  Expert → Sensor









▶ Sensor	
▶ Information	→ 55
▶ Filter options	→ 60
▶ Sensor diagnostics	→ 62
▶ Safety settings	→ 64
▶ Mapping	→ 72
▶ Echo tracking	→ 79
▶ Tank bottom evaluation	→ 82

### 3.2.1 "Information" submenu

The **Information** submenu comprises all display parameters which give information about the current state of the measurement.

#### Structure of the submenu

*Navigation*        Expert → Sensor → Information


► Information	
Distance	→  56
Sensor temperature	→  56
Signal quality	→  56
Absolute echo amplitude	→  57
Relative echo amplitude	→  57
Tank bottom echo amplitude	→  57
Found echoes	→  57
Used calculation	→  58

## Description of parameters

*Navigation*       Expert → Sensor → Information

### Distance

#### Navigation

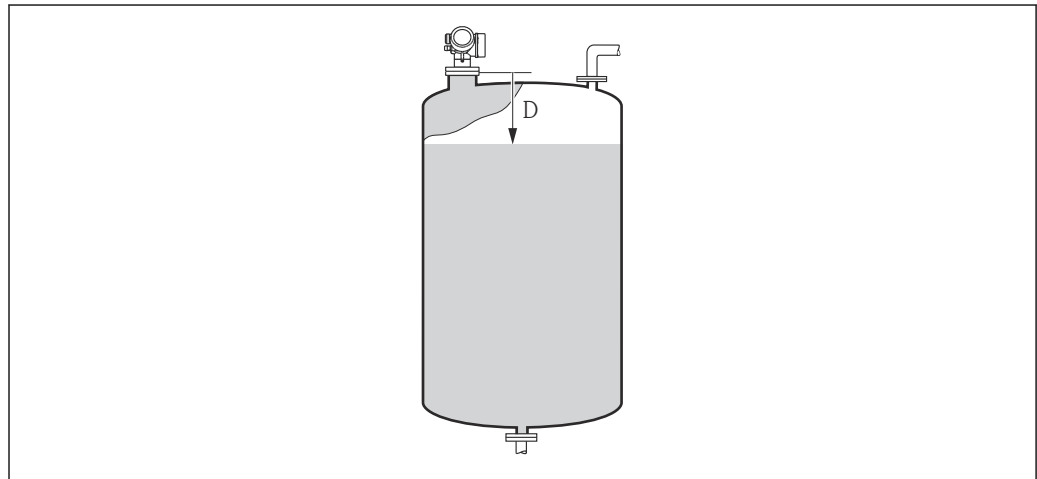
 Expert → Sensor → Information → Distance

#### Description


Distance from lower edge of device flange to product surface.

#### Additional information

Read access	Operator
Write access	-




A0019483

*D*    *Distance* (→  56)

### Sensor temperature

#### Navigation

 Expert → Sensor → Information → Sensor temp.

#### Description


Shows the temperature of the sensor electronics.

#### Additional information

Read access	Operator
Write access	-

### Signal quality

#### Navigation

 Expert → Sensor → Information → Signal quality

#### Description



Shows the quality of the evaluated level signal.



**Additional information**

Read access	Operator
Write access	-

**Absolute echo amplitude****Navigation**

  Expert → Sensor → Information → Abs. echo ampl.

**Description**

Shows the absolute amplitude of the evaluated level signal.

**Additional information**

Read access	Operator
Write access	-

**Relative echo amplitude****Navigation**

  Expert → Sensor → Information → Relat.echo ampl.

**Description**

Shows the relative amplitude (i.e. the distance to the evaluation curve) of the evaluated level signal.

**Additional information**

Read access	Operator
Write access	-

**Tank bottom echo amplitude****Navigation**

  Expert → Sensor → Information → Tank bottom ampl



**Description**

Shows the absolute amplitude of the tank bottom echo.

**Additional information**

Read access	Operator
Write access	-

**Found echoes****Navigation**

  Expert → Sensor → Information → Found echoes

**Description**

Shows the found echo type.


**Additional information**

Read access	Operator
Write access	-

---

**Used calculation**

---

**Navigation** Expert → Sensor → Information → Used calculation**Description**

Target used for distance calculation.

**User interface**

- None
- Level
- EOP
- EOP (TT)
- Multiple echo (TT)
- Level and EOP


**Additional information**

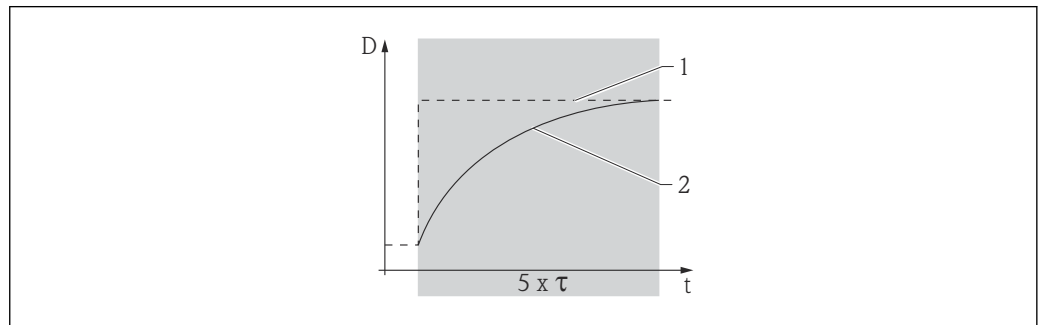
Read access	Operator
Write access	-

### 3.2.2 "Filter options" submenu


The **Filter options** submenu contains the parameters controlling the filtering of the distance signal. It consists of a low pass filter and a dead time.


#### Low pass filter

The low pass filter dampens the distance signal with a user defined integration time  $\tau$  (Integration time ( $\rightarrow$   61)). After a sudden change of the level, it takes about  $5 \times \tau$ , until the new measured value is obtained.



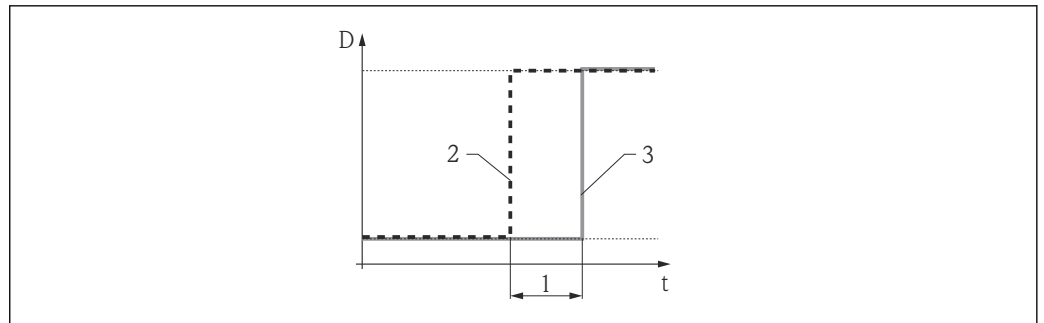
A0016169

 6 Low pass filter



- 1 Signal before the low pass filter
- 2 Signal after the low pass filter
- $\tau$  Integration time ( $\rightarrow$   61)

#### Dead time

Sudden changes of the measured distance are ignored during the **Dead time** ( $\rightarrow$   61).



A0016164

 7 Effect of the "Dead time" parameter ( $\rightarrow$   61)

- 1 Dead time
- 2 Signal before the Dead time filter
- 3 Signal after the Dead time filter


#### Advantages



The **Dead time** filter prevents short-term interferences from disturbing the output signal.

#### Disadvantages



- The device slows down.
- Fast level changes are registered with a delay.


**Structure of the submenu**



*Navigation*       Expert → Sensor → Filter options

<b>▶ Filter options</b>	
Integration time	→  61
Dead time	→  61

**Description of parameters**

*Navigation*        Expert → Sensor → Filter options

**Integration time** 

**Navigation**        Expert → Sensor → Filter options → Integration time


**Description**      Sets the integration time of the distance filter.

**User entry**      0.0 to 200 000.0 s

**Factory setting**      20.0 s

**Additional information**

<b>Read access</b>	Operator
<b>Write access</b>	Maintenance

**Dead time** 

**Navigation**        Expert → Sensor → Filter options → Dead time

**Description**      Dead time (delay time) of the shown distance.



**User entry**      0 to 60 s

**Factory setting**      5 s

**Additional information**

<b>Read access</b>	Operator
<b>Write access</b>	Maintenance

### 3.2.3 "Sensor diagnostics" submenu



The **Sensor diagnostics** submenu is used to check the analog signal path. The test is started by the **Start self check** parameter (→  62). A test signal is generated in the sensor module and fed onto the analog path. It is checked whether the signal arrives in the expected time window and whether it has a sufficient amplitude. The test result is indicated in the **Result self check** parameter (→  62).

*Navigation*   Expert → Sensor → Sensor diag.

---

#### Start self check

---

**Navigation**   Expert → Sensor → Sensor diag. → Start self check

**Description** Starts the self check of the sensor module.

**Selection**

- No
- Yes

**Factory setting** No



**Additional information**

Read access	Operator
Write access	Maintenance

---

#### Result self check

---

**Navigation**   Expert → Sensor → Sensor diag. → Result selfcheck

**Description** Shows the result of the self check.


**Additional information**


Read access	Operator
Write access	-

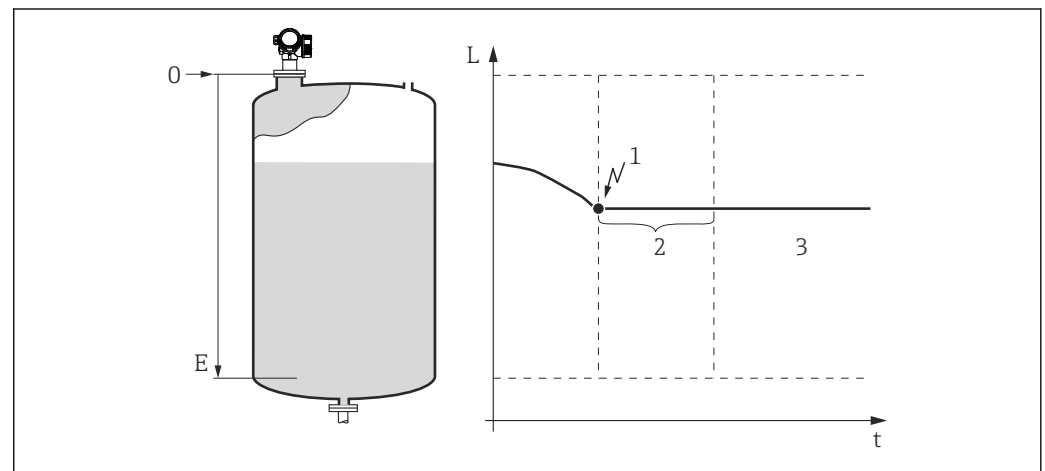
### 3.2.4 "Safety settings" submenu

The **Safety settings** submenu contains all parameters which determine the behavior in case of an echo loss.

#### Behavior in the case of an echo loss

The behavior in case of an echo loss is defined in the **Output echo lost** parameter (→  65):

"Output echo lost (→  65)"	Remarks
<b>Last valid value</b>	The last value before the echo loss is held.
<b>Alarm</b>	The device generates an alarm.





A0016206

- 1 Echo loss
- 2 Delay echo lost
- 3 The last valid measured value is held.

**Structure of the submenu**


*Navigation*       Expert → Sensor → Safety sett.


<b>▶ Safety settings</b>	
Output echo lost	→  65
Delay time echo lost	→  65



**Description of parameters**

*Navigation*       Expert → Sensor → Safety sett.

**Output echo lost** 

**Navigation**       Expert → Sensor → Safety sett. → Output echo lost


**Description**      Defines the output behavior in case of a lost echo.


**Additional information**

Read access	Operator
Write access	Service

**Meaning of the options**

- **Last valid value**  
The last value before the occurrence of the echo is kept.
- **Alarm**  
The device generates an alarm.

**Delay time echo lost** 

**Navigation**       Expert → Sensor → Safety sett. → Delay echo lost

**Description**      Time between the echo loss and the reaction defined for the output.

**User entry**      0 to 99 999.9 s

**Factory setting**      60.0 s

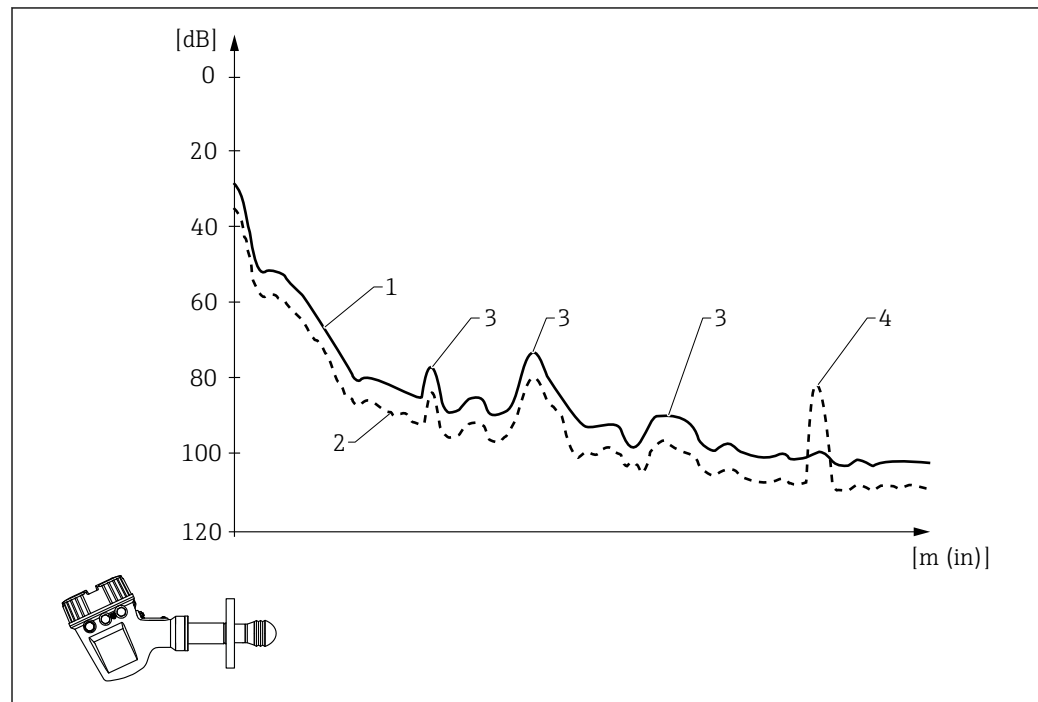
**Additional information**

Read access	Operator
Write access	Maintenance

### 3.2.5 "Mapping" submenu

The mapping is used to suppress static interference signals which may be generated by internal tank or silo fittings. A **mapping curve**, representing the **envelope curve** of an empty tank or silo as precisely as possible, is used for the mapping.

In the case of a **static envelope curve evaluation**<sup>2)</sup> all echos below the mapping curve are ignored in the signal evaluation.



A0033962

- 1 Mapping curve
- 2 Envelope curve
- 3 Interference echos; covered by the mapping curve
- 4 Level echo; exceeds the envelope curve

In the case of a **dynamic envelope curve evaluation**<sup>2)</sup> echoes from below the map can also be taken into account. In this case the static envelope curve evaluation serves as a starting point as long as enough history information is not yet available.

2) For the difference between static and dynamic envelope curve evaluation refer to the Expert (→ 7) → Sensor (→ 54) → Echo tracking (→ 79) submenu.

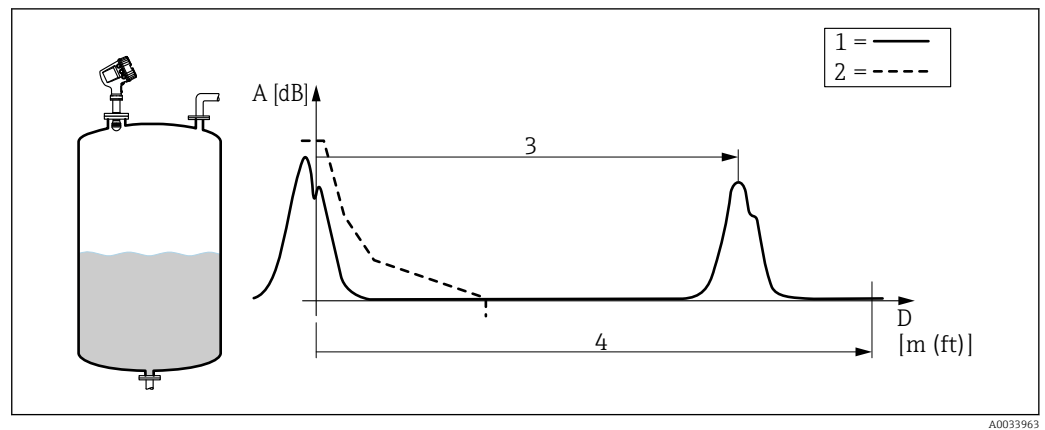
### Types of mapping

Depending on the **Confirm distance** parameter (→ 74) there are different types of mapping:

Confirm distance (→ 74)	Type of mapping	Description
Factory map	Factory map	→ 67
<ul style="list-style-type: none"> <li>▪ Distance ok</li> <li>▪ Tank empty</li> </ul>	Overlay map	→ 67
Manual map	New map	→ 67

#### Factory map

The factory map is optimized for the individual antenna and is therefore permanently stored in the device. It covers the near field of the antenna (ringing area).



- 1 Envelope curve
- 2 Factory map
- 3 Level distance
- 4 Empty distance

If a new mapping is recorded, the factory map nevertheless remains in the device and can be reactivated when required by selecting the **Factory map** option in the **Confirm distance** parameter (→ 74).

#### Overlay map

In this case the existing mapping curve (i.e. the factory map or a previously recorded map) initially remains valid.

The envelope curve is observed during a specific overlay time. At each distance the highest value reached during this time is used for the new mapping curve. Depending on the circumstances this may be the amplitude of the old mapping curve or an amplitude obtained during the overlay time.

With the help of the overlay mapping it is possible to map not only static but also dynamic signals (e.g. from an agitator).

To record an overlay map, proceed as follows:




1. Go to the **Confirm distance** parameter (→ 74) and select the **Distance ok** or **Tank empty** option.
2. Go to the **Record map** parameter (→ 76) and select the **Record map** option.

#### New map


In this case the existing map is deleted and a new map is recorded.



In contrast to the overlay map, only the current envelope curve is used and there is no mapping overlay time. Therefore the new recording is faster than with the overlay map. However, dynamic interference echoes can not be suppressed in this way.

A new recording of the map is started in the following way:

1. Go to the **Confirm distance** parameter (→  74) and select the **Manual map** option.
2. Go to the **Mapping end point** parameter (→  76) and specify up to which distance the mapping is to be recorded.
3. Go to the **Record map** parameter (→  76) and select the **Record map** option.

### Mapping range

Depending on the **Confirm distance** parameter (→  74), the mapping range is defined as follows:

Confirm distance (→  74)	Starting point of mapping	End point of mapping
<ul style="list-style-type: none"><li>▪ Distance ok</li><li>▪ Tank empty</li></ul>	-250 mm (-9.8 in)	automatically assigned according to the current level
Manual map	-250 mm (-9.8 in)	<b>Mapping end point (→  76)</b>

After these settings, the recording of the mapping curve is started as described above.

### Mapping in the tank bottom area

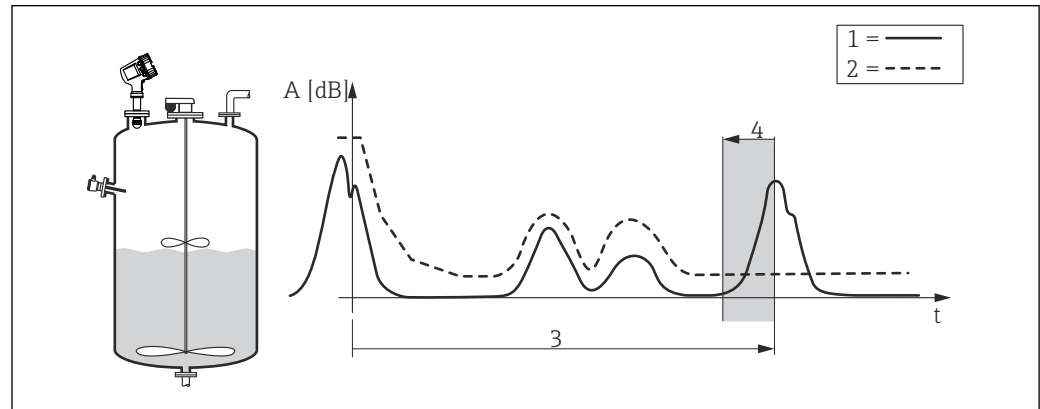
Irrespective of the defined mapping range, no mapping is recorded in a gap near the end of the measuring range.

The value of the map in this gap is defined by the following parameters:

- End of mapping (→ ☰ 77)
- End map. ampl. (→ ☰ 77)

"End of mapping" = "Last map value"

With this setting, the last value of the map remains valid within the tank bottom area.

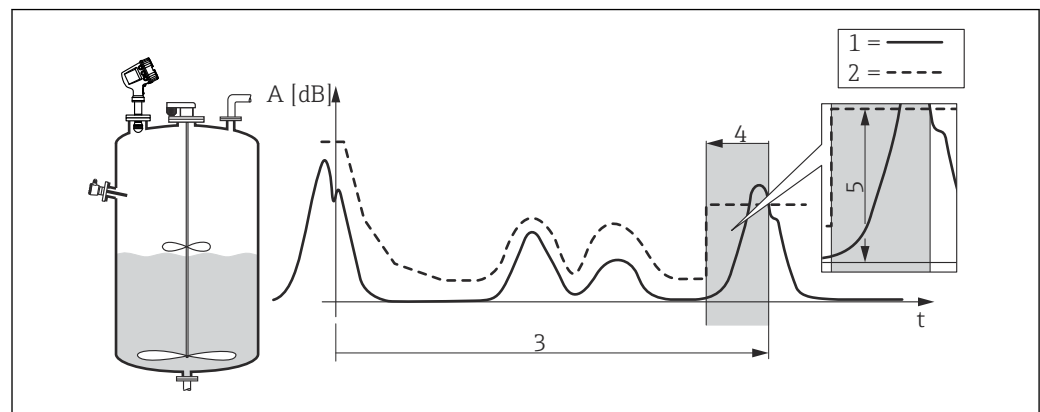


A0033966

- 1 Envelope curve
- 2 Map
- 3 Empty (→ ☰ 186)
- 4 Mapping gap

"End of mapping" = "Adjustable"

With this setting, the value of the mapping curve within the tank bottom area is defined in the **End map. ampl.** parameter (→ ☰ 77)





A0033967


- 1 Envelope curve
- 2 Map
- 3 Empty (→ ☰ 186)
- 4 Mapping gap
- 5 End map. ampl. (→ ☰ 77)



**Deleting a map**

To delete a part of the map, proceed as follows:


1. Enter the end point of the area to be deleted into the **Mapping end point** parameter (→  76).
2. Go to the **Record map** parameter (→  76) and select the **Delete partial map** option.






**Structure of the submenu on the local display**

Navigation  Expert → Sensor → Mapping

<b>► Mapping</b>		
End of mapping	→	 77
End map. ampl.	→	 77



**Structure of the mapping wizard on the local display**








Navigation  Expert → Sensor → Mapping

<b>► Mapping</b>		
Confirm distance	→	 74
Mapping end point	→	 76
Present mapping	→	 75
Record map	→	 76
Distance	→	 74




**Structure of the submenu in an operating tool**

*Navigation*        Expert → Sensor → Mapping

<b>► Mapping</b>	
Distance	→  74
Confirm distance	→  74
Present mapping	→  75
Mapping end point	→  76
Record map	→  76
End of mapping	→  77
End map. ampl.	→  77

## Description of parameters

Navigation  Expert → Sensor → Mapping

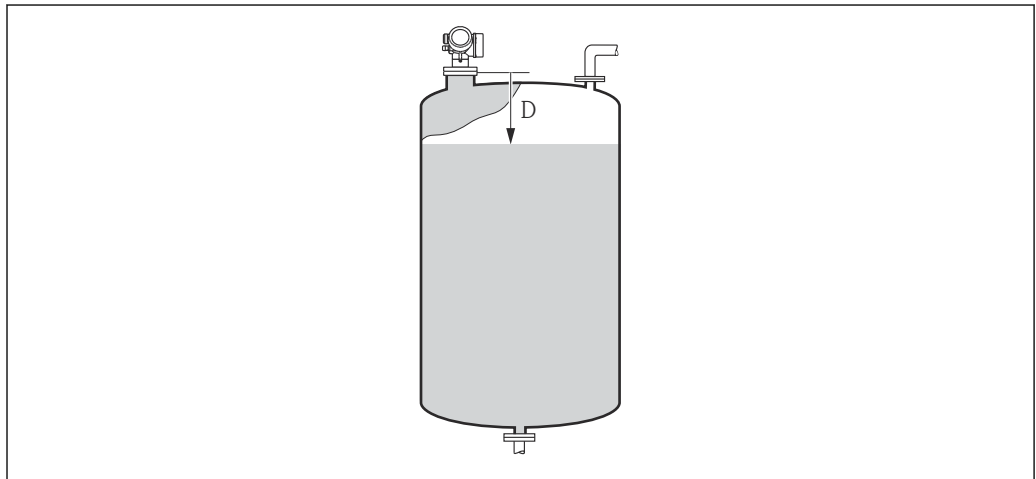
### Distance

Navigation  Expert → Sensor → Mapping → Distance


Description Distance from lower edge of device flange to product surface.

### Additional information

Read access	Operator
Write access	-



A0019483

D Distance (→  56)

### Confirm distance



Navigation  Expert → Sensor → Mapping → Confirm distance

Description Specify, whether the measured distance matches the real distance. Depending on the selection the device automatically sets the range of mapping.

Selection

- Distance ok
- Distance unknown
- Distance too small\*
- Distance too big\*
- Tank empty
- Manual map
- Factory map

Factory setting Distance unknown

\* Visibility depends on order options or device settings

**Additional information**

Read access	Operator
Write access	Maintenance

**Meaning of the options**


▪ **Distance ok**

To be selected if the measured distance matches the actual distance. The device performs a mapping.


▪ **Distance unknown**

To be selected if the actual distance is unknown. No mapping will be recorded in this case.


▪ **Distance too small**<sup>3)</sup>

To be selected if the measured distance is smaller than the actual distance. The device searches for the next echo and returns to the **Confirm distance** parameter (→  74). The distance is recalculated and displayed. The comparison must be repeated until the displayed distance matches the actual distance. After this, the recording of the map can be started by selecting "**Distance ok**" option.


▪ **Distance too big**<sup>3)</sup>

To be selected if the measured distance exceeds the actual distance. The device adjusts the signal evaluation and returns to the **Confirm distance** parameter (→  74). The distance is recalculated and displayed. The comparison must be repeated until the displayed distance matches the actual distance. After this, the recording of the map can be started by selecting "**Distance ok**" option.

▪ **Tank empty**

To be selected if the tank is completely empty. The device records a mapping covering the complete measuring range as defined by the **Empty** parameter (→  186).

▪ **Manual map**

To be selected if the range of mapping is to be defined manually in the **Mapping end point** parameter (→  76). In this case it is not necessary to confirm the distance.

▪ **Factory map**

To be selected if the present mapping curve (if one exists) is to be deleted. The factory map is used, instead.



When operating via the display module, the measured distance is displayed together with this parameter for reference purposes.





If the teaching procedure with the **Distance too small** or **Distance too big** option is quit before the distance has been confirmed, a map is **not** recorded and the teaching procedure is reset after 60 s.

---

**Present mapping**

---

**Navigation**

  Expert → Sensor → Mapping → Present mapping (12487)


**Description**

Present end of mapping.

**Additional information**

Read access	Operator
Write access	-

---

3) Only available for "Evaluation mode (→  80)" = "Short time history"

---

**Mapping end point**


**Navigation** Expert → Sensor → Mapping → Map. end point

**Prerequisite** **Confirm distance (→ 74) = Manual map**

**Description** Defines up to which distance the new mapping has to be recorded.  
Remark: Make sure the level signal is not covered by the mapping.

**User entry** 100 to 999 999.9 mm

**Factory setting** 100 mm

**Additional information**

Read access	Operator
Write access	Maintenance

---

**Record map**


**Navigation** Expert → Sensor → Mapping → Record map (12448)

**Prerequisite** **Confirm distance (→ 74) = Manual map**

**Description** Controls the recording of the map.

**Selection**

- No
- Record map
- Overlay map
- Factory map
- Delete partial map


**Factory setting** No

**Additional information**


Read access	Operator
Write access	Maintenance

**Meaning of the options**



- **No**  
The map is not recorded.
- **Record map**  
The map is recorded. After the recording is completed, the new measured distance and the new mapping range appear on the display. When operating via the local display, these values must be confirmed by pressing .
- **Recalculate map**  
Used internally by the software. Initiates a new calculation of the map from the new data points.
- **Overlay map**  
The new mapping curve is generated by overlaying the old and the current envelope curves.

- **Factory map**  
The factory map stored in the ROM of the device is used.
- **Delete partial map**  
The mapping curve is deleted up to **Mapping end point** (→  76).
- **Stop overlay**  
Stops the overlaying of the map.

---

**End of mapping** 

---

**Navigation**   Expert → Sensor → Mapping → End of mapping

**Description** Defines the behavior of the mapping curve in the tank bottom area.

**Selection**


- Adjustable
- Last map value

**Factory setting** Adjustable



**Additional information**

Read access	Operator
Write access	Maintenance

---

**End map. ampl.** 

---

**Navigation**   Expert → Sensor → Mapping → End map. ampl.

**Description** Specify the amplitude of the mapping curve in the tank bottom area.


**User entry** -99 999.0 to 99 999.0 dB

**Factory setting** -90 dB

**Additional information**

Read access	Operator
Write access	Maintenance

### 3.2.6 "Echo tracking" submenu

The echo tracking algorithm takes into account the short-time history of individual echoes when evaluating the envelope curve. This improves the identification of the level signal. The echo tracking can be activated in the **Evaluation mode** parameter ( $\rightarrow$   80). A number of further parameters is used to configure the echo tracking more precisely.

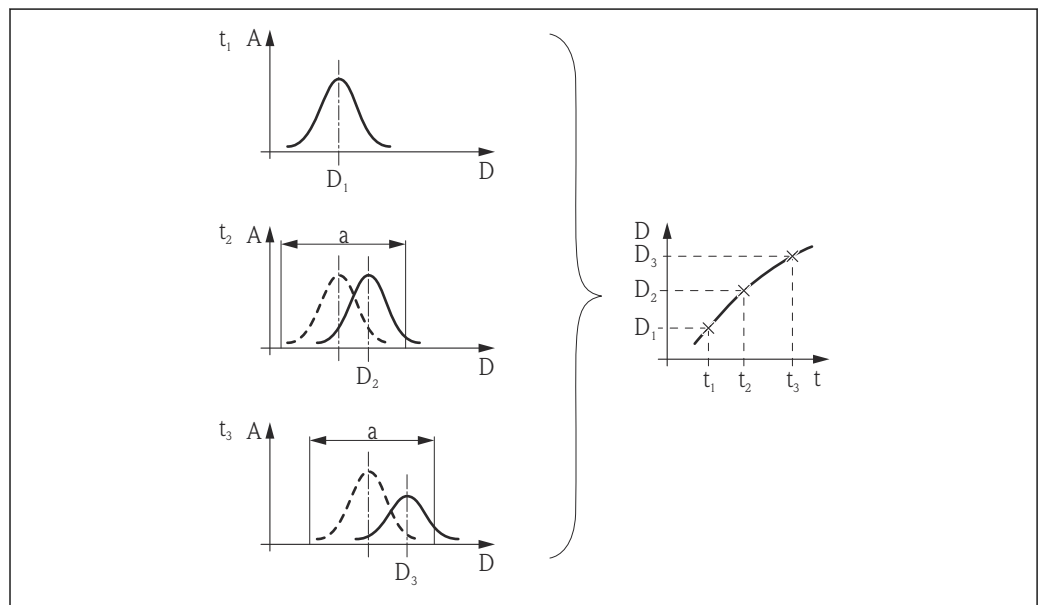
#### "Evaluation mode" = "History off"


The envelope curve is evaluated statically, taking the mapping into account.

#### "Evaluation mode" = "Short time history"

The echo is tracked without consideration of the mapping.



The position of the individual echoes is tracked. The track contains the position, the velocity, the relative and the absolute echo amplitude. Normally the strongest echo within a search window is selected and allocated to the track.




 8 Definition of a track: In a new envelope curve, the echo is searched for in a window of width "a" centered around the echo position in the previous envelope curve. The change of the echo position in the course of time defines the track.

**Structure of the submenu**


*Navigation*        Expert → Sensor → Echo tracking

<b>▶ Echo tracking</b>	
Evaluation mode	→  80
History reset	→  80

**Description of parameters**

*Navigation*  Expert → Sensor → Echo tracking

**Evaluation mode**

**Navigation**  Expert → Sensor → Echo tracking → Evaluation mode

**Description** Defines the evaluation mode for the echo tracking.

**Selection**

- Short time history
- History off

**Factory setting** Short time history

**Additional information**

Read access	Operator
Write access	Maintenance

**Meaning of the options**

- **Short time history**

In addition to the static algorithms a dynamic echo trace is continuously generated and evaluated.

- **History off**

The envelope curve is evaluated only statically.

**History reset**

**Navigation**  Expert → Sensor → Echo tracking → History reset

**Description** Resets the history of the echo tracking.

**Selection**

- Reset done
- Restart echo tracking
- Delete history

**Factory setting** Reset done

**Additional information**

Read access	Operator
Write access	Maintenance

Meaning of options:

- **Reset done**

Does not initiate an action but is only a display option. It is displayed as soon as the reset operation has been accomplished.



- **Delete history**

The echo tracking and tank trace are reset.




### 3.2.7 "Tank bottom evaluation" submenu

The tank bottom evaluation is used to prevent an echo loss if the tank is empty.

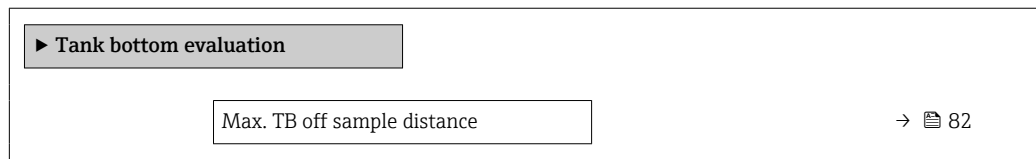
The level echo is searched for in the measuring range defined by the **Empty** parameter (→  186). If no level echo is found, a tank bottom echo is searched for. The tank bottom echo is assumed to be within the area defined by the **Max. TB off sample distance** parameter (→  82).

If a tank bottom echo has been found, a level of 0% is assumed. If neither a direct level echo nor a tank bottom echo has been found, an echo loss is reported (error message S941).

-  ■ Level echoes from within the measuring range always have a higher priority than the tank bottom echo.
- The first echo factor is not applied to the tank bottom echo.


**Structure of the "Tank bottom evaluation" submenu**

*Navigation*  Expert → Sensor → Tank bottom eval

**Description of parameters**

*Navigation*  Expert → Sensor → Tank bottom eval

**Max. TB off sample distance****Navigation**

 Expert → Sensor → Tank bottom eval → Max.TB off dist.

**Description**

Defines the range in which the tank bottom echo is searched for.

**User entry**

Positive floating-point number

**Factory setting**





15 000 mm

**Additional information**


<b>Read access</b>	Operator
<b>Write access</b>	Maintenance





### 3.3 "Input/output" submenu

Navigation  Expert → Input/output

▶ Input/output	
▶ HART devices	→  84
▶ Analog IP	→  115
▶ Analog I/O	→  124
▶ Digital Xx-x	→  137

### 3.3.1 "HART devices" submenu


*Navigation*  Expert → Input/output → HART devices

▶ HART devices	
Number of devices	→  84
▶ HART Device(s)	→  85
▶ Forget device	→  113
▶ #blank#	→  113

---

#### Number of devices

---


**Navigation**  Expert → Input/output → HART devices → Number devices



**Description** Shows the number of devices on the HART bus.




















**Additional information**




Read access	Operator
Write access	-

**"HART Device(s)" submenu**

 There is a **HART Device(s)** submenu for each HART slave device found on the HART loop.

*Navigation*        Expert → Input/output → HART devices → HART Device(s)


<b>▶ HART Device(s)</b>	
Device name	→  86
Polling address	→  86
Device tag	→  86
Operating mode	→  86
Communication status	→  87
Status signal	→  87
#blank# (PV - designation dependent on device)	→  88
#blank# (SV - designation dependent on device)	→  88
#blank# (TV - designation dependent on device)	→  88
#blank# (QV - designation dependent on device)	→  88
HART device PV mA	→  89
HART device PV %	→  89
Output pressure	→  89
Output density	→  90
Output temperature	→  90
Output vapor temperature	→  90
Output level	→  91
<b>▶ HART device information</b>	→  92
<b>▶ Element values</b>	→  98

▶ Diagnostics	→  99
▶ Diagnostics	→  100
▶ NMT device config	→  102

---

**Device name**


---

**Navigation**   Expert → Input/output → HART devices → HART Device(s) → Device name

**Description** Shows the name of the transmitter.

**Additional information**

Read access	Operator
Write access	-

---

**Polling address**


---

**Navigation**   Expert → Input/output → HART devices → HART Device(s) → Polling address

**Description** Shows the polling address of the transmitter.



**Additional information**

Read access	Operator
Write access	-

---

**Device tag**


---

**Navigation**   Expert → Input/output → HART devices → HART Device(s) → Device tag

**Description** Shows the device tag of the transmitter.


**Additional information**

Read access	Operator
Write access	-

---

**Operating mode**


---



**Navigation**   Expert → Input/output → HART devices → HART Device(s) → Operating mode

**Prerequisite** Not available if the HART device is a Prothermo NMT.

**Description** Selection of the operation mode PV only or PV,SV,TV,QV. Devines which values are polled from the connected HART Device.


- Selection**
- PV only
  - PV,SV,TV & QV
  - Level <sup>4)</sup>
  - Measured level <sup>4)</sup>

**Factory setting** PV,SV,TV & QV

**Additional information**

Read access	Operator
Write access	Maintenance

**Communication status**

**Navigation**  Expert → Input/output → HART devices → HART Device(s) → Comm. status

**Description** Shows the operating status of the transmitter.

- User interface**
- Operating normally
  - Device offline

**Additional information**

Read access	Operator
Write access	-

**Status signal**

**Navigation**  Expert → Input/output → HART devices → HART Device(s) → Status signal

**Description** Indicates the current device status in accordance with VDI/VDE 2650 and NAMUR Recommendation NE 107.

- User interface**
- OK
  - Failure (F)
  - Function check (C)
  - Out of specification (S)
  - Maintenance required (M)
  - ---
  - No effect (N)
  - ---

**Factory setting** ---

4) only visible if the connected device is a Micropilot

---

**#blank# ( HART PV - designation dependent on device)**

---

**Navigation**  Expert → Input/output → HART devices → HART Device(s) → #blank# (14716)

**Description** Shows the first HART variable (PV).


**Additional information**


Read access	Operator
Write access	-

---

**#blank# (HART SV - designation dependent on device)**

---

**Navigation**  Expert → Input/output → HART devices → HART Device(s) → #blank# (14705)

**Prerequisite** For HART devices other than NMT: **Operating mode** (→  86) = PV,SV,TV & QV

**Description** Shows the second HART variable (SV).

**Additional information**


Read access	Operator
Write access	-

---

**#blank# (HART TV - designation dependent on device)**

---

**Navigation**  Expert → Input/output → HART devices → HART Device(s) → #blank# (14706)

**Prerequisite** For HART devices other than NMT: **Operating mode** (→  86) = PV,SV,TV & QV

**Description** Shows the third HART variable (TV).

**Additional information**


Read access	Operator
Write access	-

---

**#blank# (HART QV - designation dependent on device)**

---

**Navigation**  Expert → Input/output → HART devices → HART Device(s) → #blank# (14716)

**Prerequisite** For HART devices other than NMT: **Operating mode** (→  86) = PV,SV,TV & QV

**Description** Shows the fourth HART variable (QV).

**Additional information**

Read access	Operator
Write access	-



**HART device PV mA**

**Navigation**  Expert → Input/output → HART devices → HART Device(s) → HARTDEV PV mA


**Prerequisite** Not available for Micropilot S FMR5xx and Prothermo 53x.

**Description** Shows the first HART variable (PV) in mA.

**Additional information**

Read access	Operator
Write access	-

**HART device PV %**

**Navigation**  Expert → Input/output → HART devices → HART Device(s) → HARTDEV PV %

**Prerequisite** Not available for Micropilot S FMR5xx and Prothermo 53x.


**Description** Shows the first HART variable (PV) in percentage.

**Additional information**

Read access	Operator
Write access	-

**Output pressure**



**Navigation**  Expert → Input/output → HART devices → HART Device(s) → Output pressure

**Prerequisite** Not available for Micropilot S FMR5xx, Prothermo NMT53x and Prothermo NMT8x. In these cases the measured variables are allocated automatically.

**Description** Defines which HART variable is the pressure.

- Selection**
- No value
  - Primary variable (PV)
  - Secondary variable (SV)
  - Tertiary variable (TV)
  - Quaternary variable (QV)

**Factory setting** No value

**Additional information**

Read access	Operator
Write access	Maintenance

---

**Output density**


<b>Navigation</b>	Expert → Input/output → HART devices → HART Device(s) → Output density				
<b>Prerequisite</b>	Not available for Micropilot S FMR5xx, Prothermo NMT53x and Prothermo NMT8x. In these cases the measured variables are allocated automatically.				
<b>Description</b>	Defines which HART variable is the density.				
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ No value</li> <li>▪ Primary variable (PV)</li> <li>▪ Secondary variable (SV)</li> <li>▪ Tertiary variable (TV)</li> <li>▪ Quaternary variable (QV)</li> </ul>				
<b>Factory setting</b>	No value				
<b>Additional information</b>	<table border="1"> <tr> <td>Read access</td> <td>Operator</td> </tr> <tr> <td>Write access</td> <td>Maintenance</td> </tr> </table>	Read access	Operator	Write access	Maintenance
Read access	Operator				
Write access	Maintenance				

---

**Output temperature**


<b>Navigation</b>	Expert → Input/output → HART devices → HART Device(s) → Output temp.				
<b>Prerequisite</b>	Not available for Micropilot S FMR5xx, Prothermo NMT53x and Prothermo NMT8x. In these cases the measured variables are allocated automatically.				
<b>Description</b>	Defines which HART variable is the temperature.				
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ No value</li> <li>▪ Primary variable (PV)</li> <li>▪ Secondary variable (SV)</li> <li>▪ Tertiary variable (TV)</li> <li>▪ Quaternary variable (QV)</li> </ul>				
<b>Factory setting</b>	No value				
<b>Additional information</b>	<table border="1"> <tr> <td>Read access</td> <td>Operator</td> </tr> <tr> <td>Write access</td> <td>Maintenance</td> </tr> </table>	Read access	Operator	Write access	Maintenance
Read access	Operator				
Write access	Maintenance				

---

**Output vapor temperature**


<b>Navigation</b>	Expert → Input/output → HART devices → HART Device(s) → Output vapor tmp
<b>Prerequisite</b>	Not available for Micropilot S FMR5xx, Prothermo NMT53x and Prothermo NMT8x. In these cases the measured variables are allocated automatically.

**Description** Defines which HART variable is the vapor temperature.

- Selection**
- No value
  - Primary variable (PV)
  - Secondary variable (SV)
  - Tertiary variable (TV)
  - Quaternary variable (QV)

**Factory setting** No value

**Additional information**

Read access	Operator
Write access	Maintenance

**Output level**



**Navigation** Expert → Input/output → HART devices → HART Device(s) → Output level

**Prerequisite** Not available for Micropilot S FMR5xx, Prothermo NMT53x and Prothermo NMT8x. In these cases the measured variables are allocated automatically.

**Description** Defines which HART variable is the level.


- Selection**
- No value
  - Primary variable (PV)
  - Secondary variable (SV)
  - Tertiary variable (TV)
  - Quaternary variable (QV)


















**Factory setting** No value

**Additional information**

Read access	Operator
Write access	Maintenance

*"HART device information" submenu*


Navigation  Expert → Input/output → HART devices → HART Device(s)  
→ HART device info

▶ HART device information	
Pressure	→  92
Density	→  93
Temperature	→  93
Vapor temperature	→  93
Water level	→  94
Level source	→  94
Tank level to NMT	→  94
Manual value	→  95
HART bus	→  95
Device type	→  95
Device ID	→  95
Device date	→  96
Device description	→  96
Device message	→  96
Software version	→  96
Firmware CRC	→  97
Custody transfer	→  97

**Pressure****Navigation**

 Expert → Input/output → HART devices → HART Device(s) → HART device info  
→ Pressure

**Prerequisite**


**Output pressure (→  89) ≠ No value**


**Description** Shows the pressure value measured by the connected HART device.

**Additional information**

Read access	Operator
Write access	-

**Density**

**Navigation**   Expert → Input/output → HART devices → HART Device(s) → HART device info → Density



**Prerequisite** **Output density (→  90) ≠ No value**


**Description** Shows the density value measured by the connected HART device.

**Additional information**

Read access	Operator
Write access	-

**Temperature**

**Navigation**   Expert → Input/output → HART devices → HART Device(s) → HART device info → Temperature



**Prerequisite** **Output temperature (→  90) ≠ No value**

**Description** Shows the temperature measured by the connected HART device.

**Additional information**

Read access	Operator
Write access	-

**Vapor temperature**

**Navigation**   Expert → Input/output → HART devices → HART Device(s) → HART device info → Vapor temp.

**Prerequisite** **Output vapor temperature (→  90) ≠ No value**

**Description** Shows the temperature vaule of the vapor phase measured by the connected HART device.


**Additional information**


Read access	Operator
Write access	-

---

**Water level**


---

**Navigation**  Expert → Input/output → HART devices → HART Device(s) → HART device info → Water level

**Prerequisite** **Output level (→  91) ≠ No value**

**Description** Shows the water level value measured by the connected HART device.

**Additional information**


Read access	Operator
Write access	-

---

**Level source**


---



**Navigation**  Expert → Input/output → HART devices → HART Device(s) → HART device info → Level source

**Prerequisite** Prothermo NMT53x

**Description** Shows which source should be used for level reference sent to NMT to determine liquid/vapour temperature. Tank level or manual level.

**Selection**

- Manual value
- Tank level

**Factory setting** Tank level


**Additional information**

Read access	Maintenance
Write access	Maintenance

---

**Tank level to NMT**


---

**Navigation**  Expert → Input/output → HART devices → HART Device(s) → HART device info → Tank lvl to NMT

**Prerequisite** Prothermo NMT53x with level measurement

**Description** Shows the level transferred to NMT.

**Additional information**

Read access	Maintenance
Write access	-

**Manual value**



**Navigation** Expert → Input/output → HART devices → HART Device(s) → HART device info → Manual value

**Prerequisite** Prothermo NMT53x with level measurement

**Description** Shows the manual set level.

**User entry** Signed floating-point number

**Factory setting** 0 mm

**Additional information**

Read access	Maintenance
Write access	Maintenance

**HART bus**

**Navigation** Expert → Input/output → HART devices → HART Device(s) → HART device info → HART bus

**Description** Information about the used IO-Slot.

**Additional information**

Read access	Operator
Write access	-

**Device type**

**Navigation** Expert → Input/output → HART devices → HART Device(s) → HART device info → Device type

**Description** Shows the device type with which the measuring device is registered with the HART Communication Foundation.

**Additional information**

Read access	Operator
Write access	-

**Device ID**

**Navigation** Expert → Input/output → HART devices → HART Device(s) → HART device info → Device ID

**Description** Shows the device ID of the connected HART device.

**Additional information**

Read access	Operator
Write access	-

**Device date****Navigation**

 Expert → Input/output → HART devices → HART Device(s) → HART device info → Device date

**Description**

Shows the date of the connected HART device. (e.g.: the last configuration change).

**Additional information**

Read access	Operator
Write access	-

**Device description****Navigation**

 Expert → Input/output → HART devices → HART Device(s) → HART device info → Device descrip.

**Description**

Shows a user defined HART descriptor of the connected device.

**Additional information**

Read access	Operator
Write access	-

**Device message****Navigation**

 Expert → Input/output → HART devices → HART Device(s) → HART device info → Device message

**Description**

Shows a user defined HART message of the connected device.

**Additional information**

Read access	Operator
Write access	-

**Software version****Navigation**

 Expert → Input/output → HART devices → HART Device(s) → HART device info → Software version

**Prerequisite**

Prothermo NMT53x

**Description**

Shows the software version of the NMT device.



**Additional information**

Read access	Maintenance
Write access	-

**Firmware CRC**

**Navigation**

 Expert → Input/output → HART devices → HART Device(s) → HART device info → Firmware CRC

**User interface**

Positive integer

**Factory setting**


0

**Additional information**

Read access	Maintenance
Write access	-

**Custody transfer**

**Navigation**

 Expert → Input/output → HART devices → HART Device(s) → HART device info → Custody transfer

**Prerequisite**

Prothermo NMT53x with temperature measurement

**Description**


Shows information about hardware lock of NMT device. Off -> NMT parameter can be changed. On -> NMT parameter can not be changed.

**Additional information**


Read access	Maintenance
Write access	-

*"Element values" submenu*


 This submenu is only available for Prothermo NMT53x.

*Navigation*  Expert → Input/output → HART devices → HART Device(s)  
→ Element values

*"Element temperature" submenu*

*Navigation*  Expert → Input/output → HART devices → HART Device(s)  
→ Element values → Element temp.

**Element temperature 1 to 24**


**Navigation**  Expert → Input/output → HART devices → HART Device(s) → Element values  
→ Element temp. → Element temp 1 to 24 (14984-1 to 24)

**Description** Shows the temperature of an element in the NMT.


**Additional information**

Read access	Operator
Write access	-

*"Element position" submenu*

*Navigation*  Expert → Input/output → HART devices → HART Device(s)  
→ Element values → Element position

**Element position 1 to 24**

**Navigation**  Expert → Input/output → HART devices → HART Device(s) → Element values  
→ Element position → Element pos. 1 to 24 (15014-1 to 24)


**Description** Shows the position of the selected element in the NMT.

**Additional information**





Read access	Operator
Write access	-

*"Diagnostics" submenu*

 This submenu is only available for Prothermo NMT53x.



*Navigation*   Expert → Input/output → HART devices → HART Device(s) → Diagnostics

▶ **Diagnostics**

Diagnostic code	→  99
Last diagnostic	→  99
Reference 0	→  99
Reference 17	→  100

---

**Diagnostic code**

**Navigation**   Expert → Input/output → HART devices → HART Device(s) → Diagnostics → Diag. code



**Description** Shows the current diagnostic code of NMT. Check NMT manual for details.

**Additional information**

Read access	Operator
Write access	-

---

**Last diagnostic**

**Navigation**   Expert → Input/output → HART devices → HART Device(s) → Diagnostics → Last Diagnostic



**Description** Shows the previous diagnostic code of NMT. Check NMT manual for details.

**Additional information**

Read access	Operator
Write access	-

---

**Reference 0**

**Navigation**   Expert → Input/output → HART devices → HART Device(s) → Diagnostics → Reference 0

**Prerequisite** Prothermo NMT53x with temperature measurement.

**Description** Shows the temperature of internal reference element 0.

**Additional information**

Read access	Operator
Write access	-

---

**Reference 17**

---

**Navigation**

 Expert → Input/output → HART devices → HART Device(s) → Diagnostics  
→ Reference 17

**Prerequisite**

Prothermo NMT53x with temperature measurement.

**Description**

Shows the temperature of internal reference element 17.


**Additional information**





Read access	Operator
Write access	-

*"Diagnostics" submenu*

 This submenu is only available for Prothermo NMT8x.

*Navigation*

 Expert → Input/output → HART devices → HART Device(s)  
→ Diagnostics


▶ Diagnostics	
Active diagnostics	→  100
Previous diagnostics	→  101
Test resistance	→  101
WB frequency ratio	→  101

---

**Active diagnostics**

---

**Navigation**

 Expert → Input/output → HART devices → HART Device(s) → Diagnostics → Active diagnos.

**User interface**

Character string comprising numbers, letters and special characters

**Factory setting**

**Additional information**

Read access	Operator
Write access	-

**Previous diagnostics**

**Navigation**

 Expert → Input/output → HART devices → HART Device(s) → Diagnostics → Prev.diagnostics

**User interface**

Character string comprising numbers, letters and special characters


**Factory setting**

**Additional information**

Read access	Operator
Write access	-

**Test resistance**

**Navigation**

 Expert → Input/output → HART devices → HART Device(s) → Diagnostics → Test resistance

**User interface**

Signed floating-point number

**Factory setting**


0 Ohm

**Additional information**

Read access	Operator
Write access	-

**WB frequency ratio**

**Navigation**

 Expert → Input/output → HART devices → HART Device(s) → Diagnostics → WB freq. ratio

**User interface**

Signed floating-point number


**Factory setting**


0
















**Additional information**

Read access	Operator
Write access	-

"NMT device config" submenu

 This submenu is only present if the connected HART device is a Prothermo NMT5xx.

*Navigation*  Expert → Input/output → HART devices → HART Device(s) → NMT dev. config

<b>► NMT device config</b>	
Configure device?	→  102
Access code	→  103
Total no. element	→  103
Bottom point	→  104
Temperature element short	→  104
Temperature element open	→  104
Output at error	→  105
Gain adjust	→  105
Kind of interval	→  105
Element interval	→  106
Update water level	→  106
<b>► Element setup</b>	
Select element	→  107
Zero adjust	→  107
Element temperature	→  108
Element position	→  108

**Configure device?**



**Navigation**

 Expert → Input/output → HART devices → HART Device(s) → NMT dev. config → Config. device?

**Description**

Enable NMT device configuration.



**Bottom point**

<b>Navigation</b>	Expert → Input/output → HART devices → HART Device(s) → NMT dev. config → Bottom point
<b>Description</b>	Shows the bottom clearance from the end of temperature probe or WB probe.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	0 mm

**Additional information**

<b>Read access</b>	Operator
<b>Write access</b>	Maintenance

**Temperature element short**

<b>Navigation</b>	Expert → Input/output → HART devices → HART Device(s) → NMT dev. config → Temp elem. short
<b>Description</b>	Sets the displayed temperature if element is broken (shorten).
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	0 °C

**Additional information**

<b>Read access</b>	Operator
<b>Write access</b>	Maintenance

**Temperature element open**

<b>Navigation</b>	Expert → Input/output → HART devices → HART Device(s) → NMT dev. config → Temp. elem. open
<b>Description</b>	Sets the displayed temperature if element is not connected (open).
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	0 °C

**Additional information**

<b>Read access</b>	Operator
<b>Write access</b>	Maintenance



**Output at error**



<b>Navigation</b>	Expert → Input/output → HART devices → HART Device(s) → NMT dev. config → Output at error				
<b>Description</b>	Off -> Defective element will not be used in average calculation. On -> Defective element generate error at output value.				
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Off</li> <li>■ On</li> </ul>				
<b>Factory setting</b>	Off				
<b>Additional information</b>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Read access</td> <td>Operator</td> </tr> <tr> <td>Write access</td> <td>Maintenance</td> </tr> </table>	Read access	Operator	Write access	Maintenance
Read access	Operator				
Write access	Maintenance				

**Gain adjust**



<b>Navigation</b>	Expert → Input/output → HART devices → HART Device(s) → NMT dev. config → Gain adjust				
<b>Description</b>	Adjustment of all shown temperature elements. Also reference elements 0 and 17. e.g. 0.8 -> 80% 1.0 -> 100% of factory calibration 1.2 -> 120%.				
<b>User entry</b>	Signed floating-point number				
<b>Factory setting</b>	0				
<b>Additional information</b>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Read access</td> <td>Operator</td> </tr> <tr> <td>Write access</td> <td>Maintenance</td> </tr> </table>	Read access	Operator	Write access	Maintenance
Read access	Operator				
Write access	Maintenance				

**Kind of interval**



<b>Navigation</b>	Expert → Input/output → HART devices → HART Device(s) → NMT dev. config → Kind of interval
<b>Description</b>	Determines how the element positions are defined.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Even</li> <li>■ Not even</li> </ul>
<b>Factory setting</b>	Even

**Additional information****Meaning of the options**■ **Even**

First position bottom point + element interval for every next element.

■ **Not even**

Position of elements can be set manually.

Read access	Operator
Write access	Maintenance

**Element interval****Navigation**

Expert → Input/output → HART devices → HART Device(s) → NMT dev. config  
→ Element interval

**Prerequisite**

**Kind of interval** (→ 105) = **Even**

**Description**

Shows the distance between the temperature elements used if kind of interval parameter is set to even.

**User entry**

Signed floating-point number

**Factory setting**

0 mm

**Additional information**

Read access	Operator
Write access	Maintenance

**Update water level****Navigation**

Expert → Input/output → HART devices → HART Device(s) → NMT dev. config  
→ Water level upd.

**Description**

Select if water level value is transferred to NMT or not.

**Selection**

- Enabled
- Disabled

**Factory setting**

Disabled


**Additional information**

- Enabled: Water level value is transferred
- Disabled: Water level value is **not** transferred


The NMT delivers the average liquid temperature value in a tank by picking up the value of all temperature elements which are covered by liquid and calculating the average value. To select the submerged temperature elements, the NMT receives level information from a tank gauging device. If the water bottom temperature shall be excluded from the measurement, the water level value is used to exclude the temperature elements which are submerged in water.


<b>Read access</b>	Operator
<b>Write access</b>	Maintenance

*"Element setup" submenu*

Navigation  Expert → Input/output → HART devices → HART Device(s) → NMT dev. config → Element setup

---

**Select element** 

**Navigation**  Expert → Input/output → HART devices → HART Device(s) → NMT dev. config → Element setup → Select element

**Description** Chooses the temperature element to be configured manually.


**User entry** 1 to 24


**Factory setting** 1

**Additional information**

<b>Read access</b>	Operator
<b>Write access</b>	Maintenance

---

**Zero adjust** 

**Navigation**  Expert → Input/output → HART devices → HART Device(s) → NMT dev. config → Element setup → Zero adjust

**Description** Adjusts the offset of the selected temperature element.

**User interface** Signed floating-point number

**Factory setting** 0 None


**Additional information**

<b>Read access</b>	Operator
<b>Write access</b>	Service

---

**Element temperature**


---

**Navigation**  Expert → Input/output → HART devices → HART Device(s) → NMT dev. config → Element setup → Element temp.

**Description** Shows the temperature of the element.

**Additional information**


Read access	Operator
Write access	-

---

**Element position**


---



**Navigation**  Expert → Input/output → HART devices → HART Device(s) → NMT dev. config → Element setup → Element position

**Description** Shows the position of the temperature element.

**User interface** Signed floating-point number


**Factory setting** 0 mm






**Additional information**

Read access	Operator
Write access	Service

*"NMT device config" submenu*

 This submenu is only present if the connected HART device is a Prothermo NMT8x.

*Navigation*  Expert → Input/output → HART devices → HART Device(s) → NMT dev. config

<b>► NMT device config</b>	
Configure device?	→  109
Total no. element	→  109
Bottom point	→  110
No element in phase	→  110
Water bottom level offset	→  110

Update water level	→  111
▶ Element setup	→  111
Select element	→  111
Zero adjust	→  112
Element temperature	→  112
Element position	→  112

**Configure device?**



**Navigation** Expert → Input/output → HART devices → HART Device(s) → NMT dev. config → Config. device?

**Description** Enable NMT device configuration.

**Selection**

- No
- Yes

**Factory setting** No

**Additional information** **Meaning of the options**

- **No**  
Not configurable
- **Yes**  
Configurable

Read access	Operator
Write access	Maintenance

**Total no. element**



**Navigation** Expert → Input/output → HART devices → HART Device(s) → NMT dev. config → Total elements

**Description** Shows the total amount of configurable temperature elements.

**Additional information**

Read access	Operator
Write access	-

**Bottom point**

**Navigation** Expert → Input/output → HART devices → HART Device(s) → NMT dev. config → Bottom point

**Description** Shows the bottom clearance from the end of temperature probe or WB probe.

**User entry** Signed floating-point number

**Factory setting** 0 mm

**Additional information**

Read access	Operator
Write access	Maintenance

**No element in phase**

**Navigation** Expert → Input/output → HART devices → HART Device(s) → NMT dev. config → No elm. in phase

**Selection**

- Alarm
- Warning
- Logbook entry only

**Factory setting** Alarm

**Additional information**

Read access	Operator
Write access	Operator

**Water bottom level offset**

**Navigation** Expert → Input/output → HART devices → HART Device(s) → NMT dev. config → WB level offset

**User entry** Signed floating-point number

**Factory setting** 0 mm

**Additional information**

Read access	Operator
Write access	Operator

**Update water level**



**Navigation** Expert → Input/output → HART devices → HART Device(s) → NMT dev. config → Water level upd.

**Description** Select if water level value is transferred to NMT or not.

**Selection**

- Enabled
- Disabled

**Factory setting** Disabled

**Additional information**

- Enabled: Water level value is transferred
- Disabled: Water level value is **not** transferred

The NMT delivers the average liquid temperature value in a tank by picking up the value of all temperature elements which are covered by liquid and calculating the average value. To select the submerged temperature elements, the NMT receives level information from a tank gauging device. If the water bottom temperature shall be excluded from the measurement, the water level value is used to exclude the temperature elements which are submerged in water.

Read access	Operator
Write access	Maintenance

*"Element setup" submenu*

**Navigation** Expert → Input/output → HART devices → HART Device(s) → NMT dev. config → Element setup

▶ **Element setup**

Select element	→  111
Zero adjust	→  112
Element temperature	→  112
Element position	→  112

**Select element**



**Navigation** Expert → Input/output → HART devices → HART Device(s) → NMT dev. config → Element setup → Select element

**Description** Chooses the temperature element to be configured manually.

**User entry** 1 to 24

**Factory setting** 1

**Additional information**

Read access	Operator
Write access	Maintenance

---

**Zero adjust**



**Navigation**

Expert → Input/output → HART devices → HART Device(s) → NMT dev. config  
→ Element setup → Zero adjust

**User interface** Signed floating-point number

**Factory setting** 0 °C

**Additional information**

Read access	Operator
Write access	Maintenance

---

**Element temperature**

**Navigation**

Expert → Input/output → HART devices → HART Device(s) → NMT dev. config  
→ Element setup → Element temp.

**Description** Shows the temperature of the element.

**Additional information**

Read access	Operator
Write access	-

---

**Element position**



**Navigation**

Expert → Input/output → HART devices → HART Device(s) → NMT dev. config  
→ Element setup → Element position

**Description** Shows the position of the temperature element.

**User interface** Signed floating-point number


**Factory setting** 0 mm



**Additional information**

Read access	Operator
Write access	Service



**"Forget device" wizard**

 This submenu is only available if there is at least one unlocked device at the bus.

*Navigation*   Expert → Input/output → HART devices → Forget device

---

**Forget device** 

---

**Navigation**   Expert → Input/output → HART devices → Forget device → Forget device

**Description** With this function an offline device can be deleted from the device list.



- Selection**
- HART Device 1 \*
  - HART Device 2 \*
  - HART Device 3 \*
  - HART Device 4 \*
  - HART Device 5 \*
  - HART Device 6 \*
  - HART Device 7 \*
  - HART Device 8 \*
  - HART Device 9 \*
  - HART Device 10 \*
  - HART Device 11 \*
  - HART Device 12 \*
  - HART Device 13 \*
  - HART Device 14 \*
  - HART Device 15 \*
  - None

**Factory setting** None

**Additional information**


Read access	Operator
Write access	Maintenance

**HART Bus interface**


*Navigation*   Expert → Input/output → HART devices → #blank#

▶ #blank#

Operating mode

→  114

Current

→  114


---

\* Visibility depends on order options or device settings

---

**Operating mode**


---

**Navigation**  Expert → Input/output → HART devices → #blank# → Operating mode

**Description** Shows the operation mode of this HART bus.

**User interface**

- None
- Disable
- HART master
- HART slave +4...20mA output
- HART tunnel

**Factory setting** None


**Additional information**

Read access	Operator
Write access	-

---

**Current**


---

**Navigation**  Expert → Input/output → HART devices → #blank# → Current

**Description** Shows the actual current on this HART bus.

**User interface** 0 to 100 000 mA

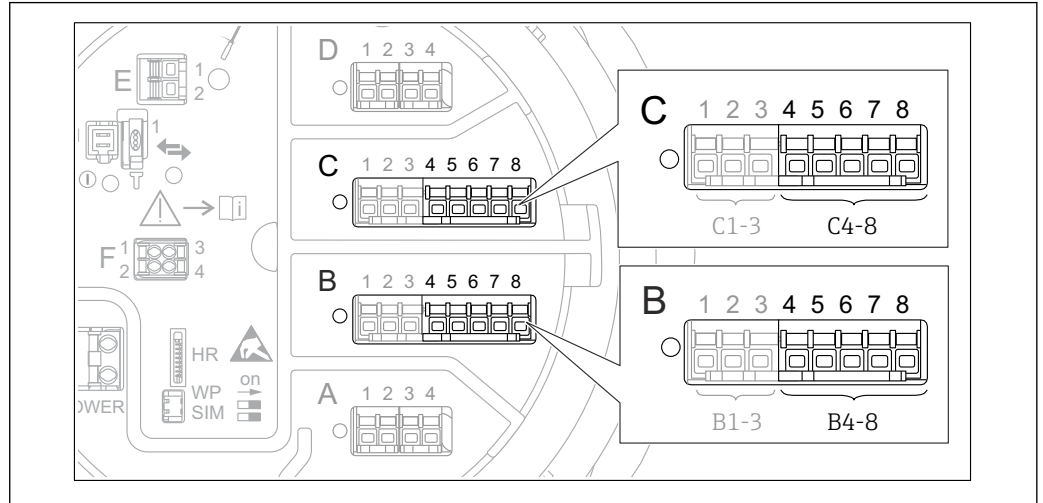
**Factory setting** 0 mA

**Additional information**

Read access	Operator
Write access	-

### 3.3.2 "Analog IP" submenu

**i** There is an **Analog IP** submenu (→ 115) for each Analog I/O module of the device. This submenu refers to terminals 4 to 8 of this module (the analog input). They are primarily used to connect an RTD. For terminals 1 to 3 (analog input or output) refer to → 124.










9 Terminals for the "Analog IP" submenu (→ 115) ("B4-8" or "C4-8", respectively)

Navigation Expert → Input/output → Analog IP



**▶ Analog IP**

Operating mode	→ 116
RTD type	→ 116
Ohms offset	→ 117
Thermocouple type	→ 117
RTD connection type	→ 118
Process value	→ 118
Process variable	→ 118
0 % value	→ 119
100 % value	→ 119
Input value percent	→ 119
Input value	→ 120
Temperature offset after conversion	→ 120

Minimum probe temperature	→  120
Maximum probe temperature	→  121
Probe position	→  121
Calibration type AIP	→  122
Active calibration	→  122
Damping factor	→  122
Gauge current	→  123

## Operating mode

### Navigation

  Expert → Input/output → Analog IP → Operating mode

### Description

Defines the operating mode of the analog input.

### Selection

- Disabled
- RTD temperature input
- Gauge power supply

### Factory setting

Disabled

### Additional information


Read access	Operator
Write access	Maintenance

## RTD type

### Navigation

  Expert → Input/output → Analog IP → RTD type

### Prerequisite

**Operating mode (→  116) = RTD temperature input**

### Description

Defines the type of the connected RTD.

### Selection

- Cu50 (w=1.428, GOST)
- Cu53 (w=1.426, GOST)
- Cu90; 0°C (w=1.4274, GOST)
- Cu100; 25°C (w=1.4274, GOST)
- Cu100; 0°C (w=1.4274, GOST)
- Pt46 (w=1.391, GOST)
- Pt50 (w=1.391, GOST)
- Pt100(385) (a=0.00385, IEC751)
- Pt100(389) (a=0.00389, Canadian)
- Pt100(391) (a=0.003916, JIS1604)

- Pt100 (w=1.391, GOST)
- Pt500(385) (a=0.00385, IEC751)
- Pt1000(385) (a=0.00385, IEC751)
- Ni100(617) (a=0.00617, DIN43760)
- Ni120(672) (a=0.00672, DIN43760)
- Ni1000(617) (a=0.00617, DIN43760)

**Factory setting** Pt100(385) (a=0.00385, IEC751)

**Additional information**

Read access	Operator
Write access	Maintenance

**Ohms offset**



**Navigation** Expert → Input/output → Analog IP → Ohms offset

**Prerequisite** **Operating mode (→ 116) = RTD temperature input**

**Description** Defines a offset for the resistance.  
This value is added to the measured resistance before the calculation of the temperature.

**User entry** -10.0 to 10.0 Ohm

**Factory setting** 0 Ohm

**Additional information** The value entered in this parameter is added to the measured resistance before the calculation of the temperature.

Read access	Operator
Write access	Maintenance

**Thermocouple type**



**Navigation** Expert → Input/output → Analog IP → Thermocouple typ

**Description** Defines the type of the connected thermocouple.



- Selection**
- N type
  - B type
  - C type
  - D type
  - J type
  - K type
  - L type
  - L GOST type
  - R type
  - S type
  - T type
  - U type


**Factory setting** N type

---

### RTD connection type

---

**Navigation**   Expert → Input/output → Analog IP → RTD connect type

**Prerequisite** **Operating mode (→  116) = RTD temperature input**

**Description** Defines the connection type of the RTD.

**Selection**

- 4 wire RTD connection
- 2 wire RTD connection
- 3 wire RTD connection

**Factory setting** 4 wire RTD connection



**Additional information**

Read access	Operator
Write access	Maintenance

---

### Process value

---

**Navigation**   Expert → Input/output → Analog IP → Process value

**Prerequisite** **Operating mode (→  116) ≠ Disabled**

**Description** Shows the measured value received via the analog input.



**Additional information**


Read access	Operator
Write access	-

---

### Process variable

---

**Navigation**   Expert → Input/output → Analog IP → Process variable

**Prerequisite** **Operating mode (→  116) ≠ RTD temperature input**

**Description** Determines type of measured value.

**Selection**

- Level linearized
- Temperature
- Pressure
- Density

**Factory setting** Level linearized

**Additional information**

Read access	Operator
Write access	Maintenance

**0 % value**



**Navigation**

Expert → Input/output → Analog IP → 0 % value

**Prerequisite**

**Operating mode (→ 116) = 4..20mA input**

**Description**

Defines the value represented by a current of 4mA.

**User entry**

Signed floating-point number

**Factory setting**

0 mm

**Additional information**

Read access	Operator
Write access	Maintenance

**100 % value**



**Navigation**

Expert → Input/output → Analog IP → 100 % value

**Prerequisite**

**Operating mode (→ 116) = 4..20mA input**

**Description**

Defines the value represented by a current of 20mA.

**User entry**

Signed floating-point number

**Factory setting**

0 mm

**Additional information**

Read access	Operator
Write access	Maintenance

**Input value percent**

**Navigation**

Expert → Input/output → Analog IP → Input value [%]

**Prerequisite**

**Operating mode (→ 116) = 4..20mA input**

**Description**

Shows the input value in percent.  
 0% corresponds to 4 mA.  
 100% corresponds to 20 mA.


- Additional information**
- 0% corresponds to 4 mA
  - 100% corresponds to 20 mA

Read access	Operator
Write access	-

---

### Input value

---

**Navigation**  Expert → Input/output → Analog IP → Input value

**Prerequisite** **Operating mode (→  116) ≠ Disabled**

**Description** Shows the value received via the analog input.


**Additional information**


Read access	Operator
Write access	-

---

### Temperature offset after conversion

---

**Navigation**  Expert → Input/output → Analog IP → Temp. offset

**Prerequisite** **Operating mode (→  116) = RTD temperature input**

**Description** Defines an offset for the measured temperature.  
The offset is applied after the resistance of the RTD has been converted to a temperature.

**User entry** -20 to 20 °C

**Factory setting** 0 °C


**Additional information** The offset defined in this parameter is applied after the resistance of the RTD has been converted to a temperature.


Read access	Operator
Write access	Maintenance

---

### Minimum probe temperature

---

**Navigation**  Expert → Input/output → Analog IP → Min. probe temp

**Prerequisite** **Operating mode (→  116) = RTD temperature input**

**Description** Minimum approved temperature of the connected probe.  
If the temperature falls below this value, the W&M status will be "invalid".



**User entry** -213 to 927 °C

**Factory setting** -100 °C

**Additional information**

Read access	Operator
Write access	Maintenance

**Maximum probe temperature**



**Navigation** Expert → Input/output → Analog IP → Max. probe temp

**Prerequisite** **Operating mode (→ 116) = RTD temperature input**

**Description** Maximum approved temperature of the connected probe.  
If the temperature rises above this value, the W&M status will be "invalid".

**User entry** -213 to 927 °C

**Factory setting** 250 °C

**Additional information**

Read access	Operator
Write access	Maintenance

**Probe position**



**Navigation** Expert → Input/output → Analog IP → Probe position

**Prerequisite** **Operating mode (→ 116) = RTD temperature input**

**Description** Position of the temperature probe, measured from zero position (tank bottom or datum plate). This parameter, in conjunction with the measured level, determines whether the temperature probe is still covered by the product. If this is no longer the case, the status of the temperature value will be "invalid".

**User entry** -5 000 to 30 000 mm

**Factory setting** 5 000 mm

**Additional information**

Read access	Operator
Write access	Maintenance

---

**Calibration type AIP**


**Navigation** Expert → Input/output → Analog IP → Cal type AIP

**Prerequisite** **Operating mode (→ 116) ≠ Disabled**

**Description** Select calibration state of the analog input or output.

**Selection**

- User calibration
- Factory calibration

**Factory setting** Factory calibration

**Additional information** **Meaning of the options**

- Not calibrated  
This is a display option only. It can not be selected. It is shown if the analog input is not in a calibrated state.
- User calibration  
Activates a user calibration. The user calibration itself is defined in the **User calibration** wizard.
- Factory calibration  
Activates the factory calibration which is permanently stored in the device.

Read access	Operator
Write access	Maintenance

---

**Active calibration**

**Navigation** Expert → Input/output → Analog IP → Act. calibration

**Prerequisite** **Operating mode (→ 116) ≠ Disabled**

**Description** Shows calibration state of the analog input.

**Additional information**

Read access	Operator
Write access	-

---

**Damping factor**


**Navigation** Expert → Input/output → Analog IP → Damping factor

**Prerequisite** **Operating mode (→ 116) ≠ Disabled**

**Description** Defines the damping constant (in seconds).

**User entry** 0 to 999.9 s


**Factory setting**                      0 s

**Additional information**


Read access	Operator
Write access	Maintenance

**Gauge current**

**Navigation**

 Expert → Input/output → Analog IP → Gauge current

**Prerequisite**

**Operating mode (→  116) = Gauge power supply**



**Description**

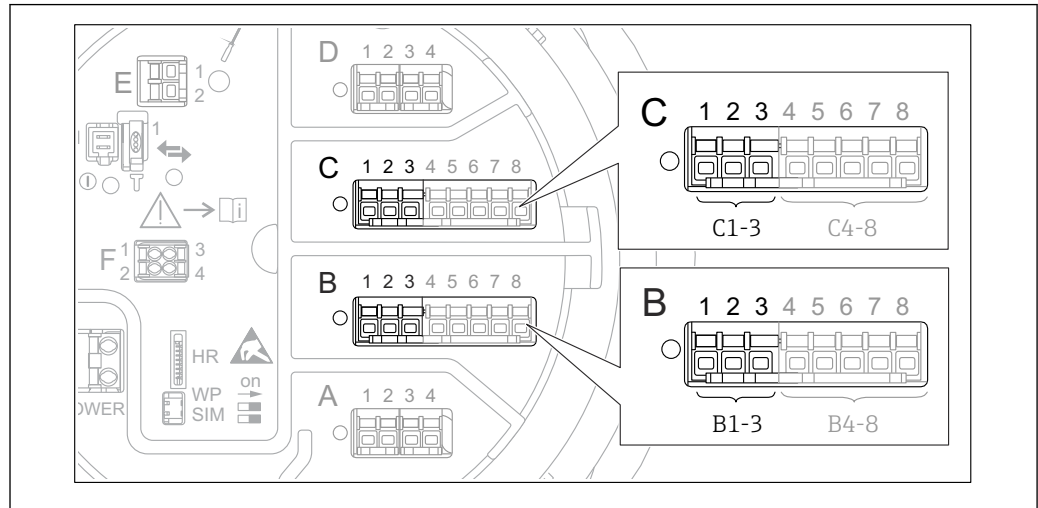
Shows the current on the power supply line for the connected device.

**Additional information**

Read access	Operator
Write access	-

### 3.3.3 "Analog I/O" submenu













**i** There is a **Analog I/O** submenu (→  124) for each Analog I/O module of the device. This submenu refers to terminals 1 to 3 of this module (an analog input or output). For terminals 4 to 8 (always an analog input) refer to →  115.

















 10 Terminals for the "Analog I/O" submenu (→  124) ("B1-3" or "C1-3", respectively)

Navigation   Expert → Input/output → Analog I/O

**▶ Analog I/O**



Operating mode	→  125
Current span	→  126
Fixed current	→  127
Analog input source	→  127
Failure mode	→  128
Error value	→  129
Output out of range	→  129
Error on event	→  129
Input value	→  130
0 % value	→  130
100 % value	→  130
Input value %	→  131

Output value	→  131
Readback value	→  131
Feedback threshold	→  132
Process variable	→  132
Analog input 0% value	→  132
Analog input 100% value	→  133
Error event type	→  133
Process value	→  133
Input value in mA	→  134
Input value percent	→  134
Damping factor	→  134
Calibration	→  135
Active calibration	→  135
Used for SIL/WHG	→  135

**Operating mode**



**Navigation**

  Expert → Input/output → Analog I/O → Operating mode

**Description**

Defines the operating mode of the analog I/O module.

**Selection**

- Disabled
- 4..20mA input
- HART master+4..20mA input
- HART master
- 4..20mA output
- HART slave +4..20mA output


**Factory setting**

Disabled

**Additional information**

Read access	Operator
Write access	Maintenance

*Meaning of the options*

Operating mode (→  125)	Direction of signal	Type of signal
Disabled	-	-
4..20mA input	Input from 1 external device	Analog (4...20mA)
HART master+4..20mA input	Input from 1 external device	<ul style="list-style-type: none"> <li>■ Analog (4...20mA)</li> <li>■ HART</li> </ul>
HART master	Input from up to 6 external devices	HART
4..20mA output	Output to higher-level unit	Analog (4...20mA)
HART slave +4..20mA output	Output to higher-level unit	<ul style="list-style-type: none"> <li>■ Analog (4...20mA)</li> <li>■ HART</li> </ul>

Depending on the terminals used, the Analog I/O module is used in the passive or active mode.

Mode	Terminals of the I/O module		
	1	2	3
Passive (power supply from external source)	-	+	not used
Active (power supplied by the device itself)	not used	-	+





In the active mode the following conditions must be met:


- Maximum current consumption of the connected HART devices: 24 mA (i.e. 4 mA per device if 6 devices are connected).
- Output voltage of the Ex-d module: 17.0 V@4 mA to 10.5 V@22 mA
- Output voltage of the Ex-ia module: 18.5 V@4 mA to 12.5 V@22 mA

---

**Current span**
**Navigation**

  Expert → Input/output → Analog I/O → Current span

**Prerequisite**

**Operating mode** parameter (→  125) ≠ **Disabled** option or **HART master** option

**Description**

Defines the current range for the measured value transmission.

**Selection**

- 4...20 mA NE (3.8...20.5 mA)
- 4...20 mA US (3.9...20.8 mA)
- 4...20 mA (4...20.5 mA)
- Fixed value \*

**Factory setting**

4...20 mA NE (3.8...20.5 mA)


**Additional information**

Read access	Operator
Write access	Maintenance


---



\* Visibility depends on order options or device settings

Meaning of the options

Option	Current range for process variable	Minimum value	Lower alarm signal level	Upper alarm signal level	Maximum value
4...20 mA (4...20.5 mA)	4 to 20.5 mA	3.5 mA	< 3.6 mA	> 21.95 mA	22.6 mA
4...20 mA NE (3.8...20.5 mA)	3.8 to 20.5 mA	3.5 mA	< 3.6 mA	> 21.95 mA	22.6 mA
4...20 mA US (3.9...20.8 mA)	3.9 to 20.8 mA	3.5 mA	< 3.6 mA	> 21.95 mA	22.0 mA
Fixed current	Constant current, defined in the <b>Fixed current</b> parameter (→  127).				

 In the case of an error, the output current assumes the value defined in the **Failure mode** parameter (→  128).

**Fixed current** 

**Navigation**   Expert → Input/output → Analog I/O → Fixed current

**Prerequisite** **Current span (→  126) = Fixed current**


**Description** Defines the fixed output current.



**User entry** 4 to 22.5 mA

**Factory setting** 4 mA



**Additional information**

Read access	Operator
Write access	Maintenance

**Analog input source** 

**Navigation**   Expert → Input/output → Analog I/O → Analog source

**Prerequisite**

- **Operating mode (→  125) = 4..20mA output or HART slave +4..20mA output**
- **Current span (→  126) ≠ Fixed current**

**Description** Defines the process variable transmitted via the AIO.

**Selection**

- None
- Tank level
- Tank level %
- Tank ullage
- Tank ullage %
- Measured level
- Distance
- Displacer position
- Water level

- Upper interface level
- Lower interface level
- Bottom level
- Tank reference height
- Liquid temperature
- Vapor temperature
- Air temperature
- Observed density value
- Average profile density <sup>5)</sup>
- Upper density
- Middle density
- Lower density
- P1 (bottom)
- P2 (middle)
- P3 (top)
- GP 1 ... 4 value
- AIO B1-3 value <sup>5)</sup>
- AIO B1-3 value mA <sup>5)</sup>
- AIO C1-3 value <sup>5)</sup>
- AIO C1-3 value mA <sup>5)</sup>
- AIP B4-8 value <sup>5)</sup>
- AIP C4-8 value <sup>5)</sup>
- Element temperature 1 ... 24 <sup>5)</sup>
- HART device 1...15 PV <sup>5)</sup>
- HART device 1 ... 15 PV mA <sup>5)</sup>
- HART device 1 ... 15 PV % <sup>5)</sup>
- HART device 1 ... 15 SV <sup>5)</sup>
- HART device 1 ... 15 TV <sup>5)</sup>
- HART device 1 ... 15 QV <sup>5)</sup>

**Factory setting**

Tank level

**Additional information**

Read access	Operator
Write access	Maintenance

**Failure mode****Navigation**

Expert → Input/output → Analog I/O → Failure mode

**Prerequisite****Operating mode (→ 125) = 4..20mA output or HART slave +4..20mA output****Description**

Defines the output behavior in case of an error.

**Selection**

- Min.
- Max.
- Last valid value
- Actual value
- Defined value

**Factory setting**

Max.

---

<sup>5)</sup> Visibility depends on order options or device settings



**Additional information**

Read access	Operator
Write access	Maintenance

**Error value**



**Navigation**

Expert → Input/output → Analog I/O → Error value

**Prerequisite**

**Failure mode (→ 128) = Defined value**

**Description**

Defines the output value in case of an error.

**User entry**

3.4 to 22.6 mA

**Factory setting**

22 mA

**Additional information**

Read access	Operator
Write access	Maintenance

**Output out of range**



**Navigation**

Expert → Input/output → Analog I/O → Output out range

**Prerequisite**

**Operating mode (→ 125) = 4..20mA output or HART slave +4..20mA output**

**Description**

Behavior of current output if the value is out of allowed range.

**Selection**

- Last valid value
- Alarm
- None

**Factory setting**

Alarm

**Additional information**

Read access	Operator
Write access	Maintenance

**Error on event**



**Navigation**

Expert → Input/output → Analog I/O → Error on event

**Prerequisite**

**Operating mode (→ 125) = 4..20mA output or HART slave +4..20mA output**

**Description**

Defines to which type of event (alarm or warning) the output responds.

- Selection**
- Output related error
  - Any error
  - Any error or warning

**Factory setting** Output related error


**Additional information**



Read access	Operator
Write access	Maintenance

---

**Input value**

---

**Navigation**  Expert → Input/output → Analog I/O → Input value

- Prerequisite**
- Operating mode (→  125) = 4..20mA output or HART slave +4..20mA output
  - Current span (→  126) ≠ Fixed current

**Description** Shows the input value of the analog I/O module.

**Additional information**


Read access	Operator
Write access	-



---

**0 % value**

---



**Navigation**  Expert → Input/output → Analog I/O → 0 % value

- Prerequisite**
- Operating mode (→  125) = 4..20mA output or HART slave +4..20mA output
  - Current span (→  126) ≠ Fixed current

**Description** Value corresponding to an output current of 0% (4mA).

**User entry** Signed floating-point number

**Factory setting** 0 Unitless

**Additional information**


Read access	Operator
Write access	Maintenance



---

**100 % value**

---



**Navigation**  Expert → Input/output → Analog I/O → 100 % value

- Prerequisite**
- Operating mode (→  125) = 4..20mA output or HART slave +4..20mA output
  - Current span (→  126) ≠ Fixed current

**Description** Value corresponding to an output current of 100% (20mA).



**User entry** Signed floating-point number

**Factory setting** 0 Unitless



**Additional information**

Read access	Operator
Write access	Maintenance

**Input value %**

**Navigation**   Expert → Input/output → Analog I/O → Input value %

**Prerequisite**



- **Operating mode** (→  125) = **4..20mA output** or **HART slave +4..20mA output**
- **Current span** (→  126) ≠ **Fixed current**


**Description** Shows the output value as a percentage of the complete 4...20mA range.

**Additional information**

Read access	Operator
Write access	-

**Output value**

**Navigation**   Expert → Input/output → Analog I/O → Output value



**Prerequisite** **Operating mode** (→  125) = **4..20mA output** or **HART slave +4..20mA output**


**Description** Shows the output value in mA.

**Additional information**

Read access	Operator
Write access	-

**Readback value**

**Navigation**   Expert → Input/output → Analog I/O → Readback value

**Prerequisite** **Operating mode** (→  125) = **4..20mA output** or **HART slave +4..20mA output**

**Description** Shows the measured (feedback) current at the output.



**User interface** 0 to 65 535 µA

**Factory setting** 0 µA


**Additional information**

Read access	Operator
Write access	-

**Feedback threshold****Navigation**

  Expert → Input/output → Analog I/O → Feedback thresh.

**Prerequisite**

**Operating mode (→  125) = 4..20mA output or HART slave +4..20mA output**



**Description**

Shows the feedback threshold.

**Additional information**

Read access	Operator
Write access	-

**Process variable****Navigation**

  Expert → Input/output → Analog I/O → Process variable

**Prerequisite**

**Operating mode (→  125) = 4..20mA input or HART master+4..20mA input**

**Description**

Defines the type of measuring variable.

**Selection**

- Level linearized
- Temperature
- Pressure
- Density



**Factory setting**

Level linearized


**Additional information**

Read access	Operator
Write access	Maintenance

**Analog input 0% value****Navigation**

  Expert → Input/output → Analog I/O → AI 0% value

**Prerequisite**

**Operating mode (→  125) = 4..20mA input or HART master+4..20mA input**

**Description**

Value corresponding to an input current of 0% (4mA).

**User entry**

Signed floating-point number

**Factory setting**

0 mm

**Additional information**

Read access	Operator
Write access	Maintenance

**Analog input 100% value**



**Navigation**

Expert → Input/output → Analog I/O → AI 100% value

**Prerequisite**

**Operating mode (→ 125) = 4..20mA input or HART master+4..20mA input**

**Description**

Value corresponding to an input current of 100% (20mA).

**User entry**

Signed floating-point number

**Factory setting**

0 mm

**Additional information**

Read access	Operator
Write access	Maintenance

**Error event type**



**Navigation**

Expert → Input/output → Analog I/O → Error event type

**Prerequisite**

**Operating mode (→ 125) ≠ Disabled or HART master**

**Description**

Defines the type of event message (alarm/warning) in case of an error or output out of range in the analog I/O module.

**Selection**

- None
- Warning
- Alarm

**Factory setting**

Warning

**Additional information**

Read access	Operator
Write access	Maintenance

**Process value**

**Navigation**

Expert → Input/output → Analog I/O → Process value

**Prerequisite**

**Operating mode (→ 125) = 4..20mA input or HART master+4..20mA input**


**Description**

Shows the input value scaled to customer units.

**Additional information**

Read access	Operator
Write access	-

**Input value in mA****Navigation**

 Expert → Input/output → Analog I/O → Input val. in mA

**Prerequisite**

**Operating mode (→  125) = 4..20mA input or HART master+4..20mA input**


**Description**

Shows the input value in mA.

**Additional information**

Read access	Operator
Write access	-

**Input value percent****Navigation**

 Expert → Input/output → Analog I/O → Input value [%]

**Prerequisite**

**Operating mode (→  125) = 4..20mA input or HART master+4..20mA input**


**Description**

Shows the input value as a percentage of the complete 4...20mA current range.


**Additional information**

Read access	Operator
Write access	-

**Damping factor****Navigation**

 Expert → Input/output → Analog I/O → Damping factor

**Prerequisite**

**Operating mode (→  125) ≠ Disabled or HART master**

**Description**

Defines the damping constant (in seconds).

**User entry**

0 to 999.9 s

**Factory setting**

0 s

**Additional information**

Read access	Operator
Write access	Maintenance

**Calibration**



**Navigation** Expert → Input/output → Analog I/O → Calibration

**Prerequisite** **Operating mode** (→ 125) ≠ **Disabled** or **HART master**

**Description** Select calibration state of the analog input or output.

- Selection**
- User calibration
  - Factory calibration

**Factory setting** Factory calibration

**Additional information**

Read access	Operator
Write access	Maintenance

**Active calibration**

**Navigation** Expert → Input/output → Analog I/O → Act. calibration

**Prerequisite** **Operating mode** (→ 125) ≠ **Disabled** or **HART master**

**Description** Indicates the calibration status of the Analog I/O module.

**Additional information**

**Meaning of the options**

- **User calibration**  
The calibration entered by the user is active.
- **Factory calibration**  
The calibration stored permanently in the device is active.

Read access	Operator
Write access	-

**Used for SIL/WHG**



**Navigation** Expert → Input/output → Analog I/O → Used for SIL/WHG

- Prerequisite**
- **Operating mode** (→ 125) = **4..20mA output** or **HART slave +4..20mA output**
  - The device has a SIL approval.

**Description** Determines whether the discrete I/O module is in SIL/WHG mode.


- Selection**
- Enabled
  - Disabled

**Factory setting** Disabled


**Additional information**

Read access	Operator
Write access	Maintenance

**Expected SIL/WHG chain****Navigation**

 Expert → Input/output → Analog I/O → SIL/WHG chain

**Prerequisite**

- **Operating mode** (→  125) = **4..20mA output** or **HART slave +4..20mA output**
- The device has a SIL approval.

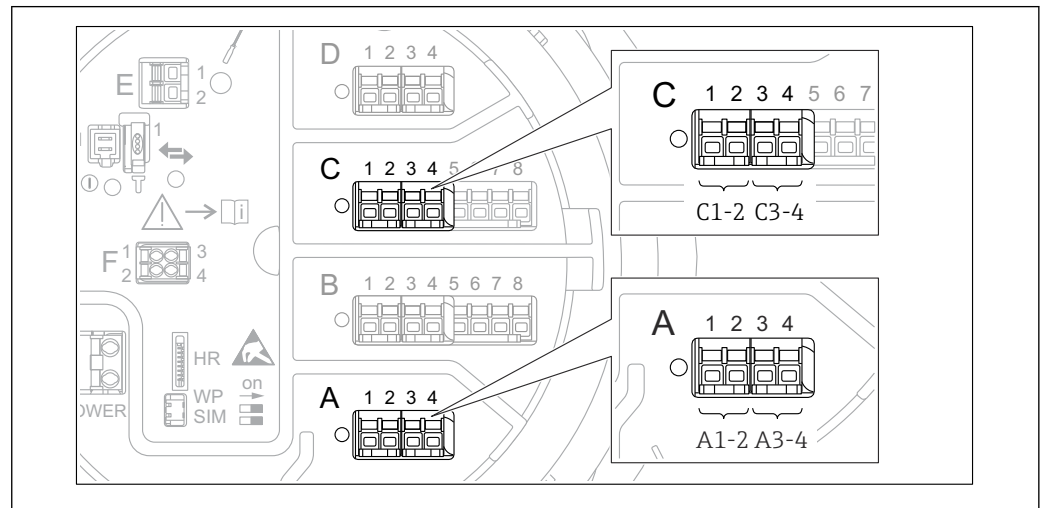
**Additional information**

Read access	Operator
Write access	-



### 3.3.4 "Digital Xx-x" submenu

- i In the operating menu, each digital input or output is designated by the respective slot of the terminal compartment and two terminals within this slot. **A1-2**, for example, denotes terminals 1 and 2 of slot **A**. The same is valid for slots **B**, **C** and **D** if they contain a Digital IO module.
- In this document, **Xx-x** designates any of these submenus. The structure of all these submenus is the same.



11 Designation of the digital inputs or outputs (examples)

Navigation Expert → Input/output → Digital Xx-x → Operating mode (13911)

▶ Digital Xx-x	
Operating mode	→ 138
Digital input source	→ 138
Input value	→ 139
Contact type	→ 139
Output simulation	→ 140
Output value	→ 141
Readback value	→ 141
Error on event	→ 141
Damping factor	→ 142
Used for SIL/WHG	→ 142

**Operating mode**



**Navigation**

Expert → Input/output → Digital Xx-x → Operating mode (13911)

**Description**

Defines the operating mode of the discrete I/O module.

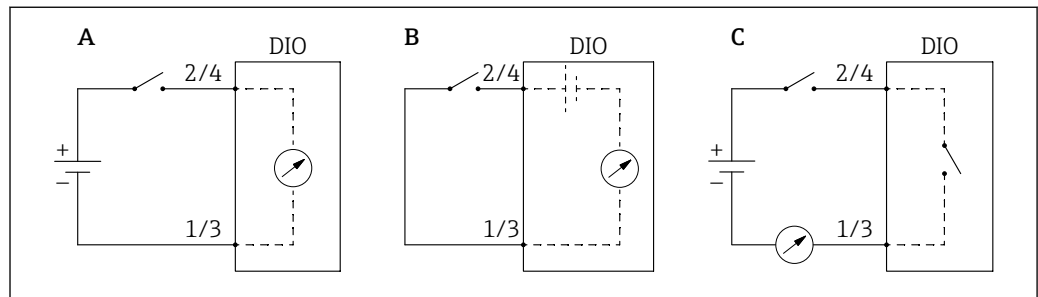
**Selection**

- Disabled
- Output passive
- Input passive
- Input active

**Factory setting**

Disabled

**Additional information**



A0033028

12 Operating modes of the Digital I/O module

- A Input passive
- B Input active
- C Output passive

Read access	Operator
Write access	Maintenance

**Digital input source**



**Navigation**

Expert → Input/output → Digital Xx-x → Digital source (13907)

**Prerequisite**

Operating mode (→ 138) = Output passive

**Description**

Defines which device state is indicated by the digital output.

**Selection**

- None
- Alarm x any
- Alarm x High
- Alarm x HighHigh
- Alarm x High or HighHigh
- Alarm x Low
- Alarm x LowLow
- Alarm x Low or LowLow
- Digital Xx-x
- Primary Modbus x
- Secondary Modbus x

**Factory setting**

None

**Additional information**

**Meaning of the options**

- **Alarm x any, Alarm x High, Alarm x HighHigh, Alarm x High or HighHigh, Alarm x Low, Alarm x LowLow, Alarm x Low or LowLow**

The digital output indicates if the selected alarm is currently active. The alarms themselves are defined in the **Alarm 1 to 4** submenus.

- **Digital Xx-x**<sup>6)</sup>

The digital signal present at the digital input **Xx-x** is passed through to the digital output.

- **Modbus A1-4 Discrete x**  
**Modbus B1-4 Discrete x**  
**Modbus C1-4 Discrete x**  
**Modbus D1-4 Discrete x**

The digital value written by the Modbus Master device to the **Modbus discrete x** parameter<sup>7)</sup> is passed to the digital output. For details refer to Special Documentation SD02066G.

Read access	Operator
Write access	Maintenance

**Input value**

**Navigation**

Expert → Input/output → Digital Xx-x → Input value (13901)

**Prerequisite**

**Operating mode** (→ 138) = "Input passive" option or "Input active" option

**Description**

Shows the digital input value.

**Additional information**

Read access	Operator
Write access	-

**Contact type**

**Navigation**

Expert → Input/output → Digital Xx-x → Contact type (13912)

**Prerequisite**

**Operating mode** (→ 138) ≠ Disabled

**Description**

Determines the switching behavior of the input or output.

**Selection**

- Normally open
- Normally closed

**Factory setting**

Normally open

**Additional information**

Read access	Operator
Write access	Maintenance

6) Only present if "Operating mode (→ 138)" = "Input passive" or "Input active" for the respective Digital I/O module.

7) Expert → Communication → Modbus Xx-x → Modbus discrete x

## Output simulation



## Navigation

Expert → Input/output → Digital Xx-x → Output sim (13909)

## Prerequisite

**Operating mode** (→ 138) = **Output passive**

## Description

Sets the output to a specific simulated value.

## Selection

- Disable
- Simulating active
- Simulating inactive
- Fault 1
- Fault 2

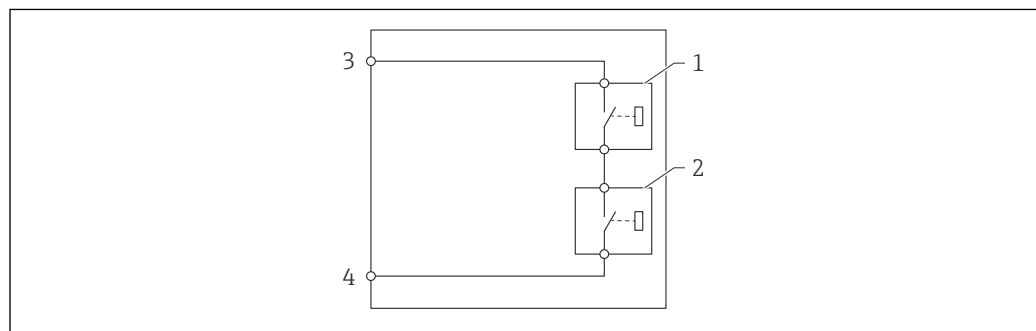
## Factory setting

Disable

## Additional information

Read access	Operator
Write access	Maintenance

The digital output consists of two relays connected in series:



A0028602

13 The two relays of a digital output

1/2 The relays

3/4 The terminals of the digital output

The switching state of these relays is defined by the **Output simulation** parameter as follows:


Output simulation	State of relay 1	State of relay 2	Expected result on the terminals of the I/O module
Simulating active	Closed	Closed	Closed
Simulating inactive	Open	Open	Open
Fault 1	Closed	Open	Open
Fault 2	Open	Closed	Open


The **Fault 1** and **Fault 2** options can be used to check the correct switching behavior of the two relays.

---

**Output value**

---

**Navigation**  Expert → Input/output → Digital Xx-x → Output value (13902)

**Prerequisite** **Operating mode (→  138) = Output passive**

**Description** Shows the digital output value.


**Additional information**


Read access	Operator
Write access	-

---

**Readback value**

---

**Navigation**  Expert → Input/output → Digital Xx-x → Readback value (13903)

**Prerequisite** **Operating mode (→  138) = Output passive**

**Description** Shows the value read back from the output.

**Additional information**

Read access	Operator
Write access	-


---

**Error on event**

---



**Navigation**  Expert → Input/output → Digital Xx-x → Error on event (13916)

**Prerequisite** **Operating mode (→  138) = Output passive**

**Description** Defines to which type of events (error or warning) the output responds. Choice: only output related or all.

**Selection**

- Output related error
- Any error
- Any error or warning

**Factory setting** Output related error

**Additional information**

Read access	Operator
Write access	Maintenance

---

**Damping factor**

---



**Navigation** Expert → Input/output → Digital Xx-x → Damping factor (13904)

**Prerequisite** **Operating mode (→ 138) ≠ Disabled**

**Description** Defines the damping constant.

**User entry** 1 to 10 s

**Factory setting** 5 s

**Additional information**

Read access	Operator
Write access	Maintenance

---

**Used for SIL/WHG**

---



**Navigation** Expert → Input/output → Digital Xx-x → Used for SIL/WHG (13910)

**Prerequisite**

- **Operating mode (→ 138) = Output passive**
- The device has a SIL certificate.

**Description** Determines whether the discrete I/O module is in SIL/WHG mode.

**Selection**

- Enabled
- Disabled

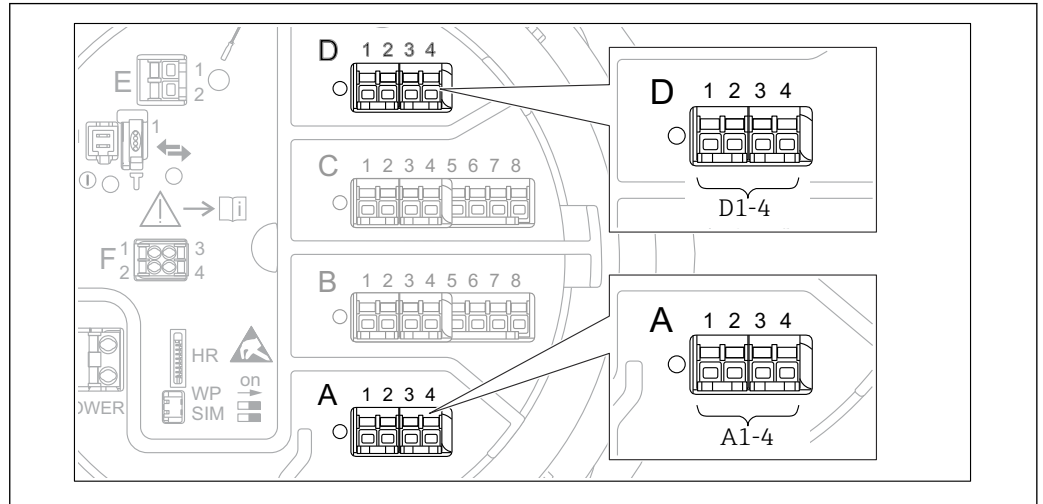
**Factory setting** Disabled

**Additional information**

Read access	Operator
Write access	Maintenance

### 3.4 "Communication" submenu

This menu contains a submenu for each digital communication interface of the device. The communication interfaces are designated by "X1-4" where "X" specifies the slot in the terminal compartment and "1-4" the terminals within this slot.











14 Designation of the "Modbus" or "V1" modules (examples); depending on the device version these modules may also be in slot B or C.




Navigation  Expert → Communication



### 3.4.1 "Modbus Xx-x", "V1 Xx-x" or "WM550 Xx-x" submenu

This submenu is only present for devices with MODBUS, V1 and/or WM550 communication interface. There is one submenu of this type for each communication interface.

*Navigation*  Expert → Communication → Modbus Xx-x / V1 Xx-x / WM550 Xx-x


► Modbus Xx-x	
Communication interface protocol	→  145
Modbus value 1 to 4	→  145
Modbus discrete 1 to 4	→  145
► Configuration	→  146
► Integer conversion	→  150
► User value source	→  155
► GP values	→  156
► Discrete selector	→  159

► V1 Xx-x	
Communication interface protocol	→  145
► Configuration	→  160
► V1 input selector	→  163

► WM550 Xx-x	
► Configuration	→  168
► WM550 input selector	→  170



**Communication interface protocol**


**Navigation**  Expert → Communication → Modbus X1-4 / V1 X1-4 / WM550 X1-4 → Commu I/F protoc (13201)


**Description** Shows the type of communication protocol.

**Additional information**

Read access	Operator
Write access	-

**Modbus value 1 to 4**


**Navigation**  Expert → Communication → Modbus Xx-x → Modbus value 1 to 4 (13206-1 to 4)

**Prerequisite** **Communication interface protocol (→  145) = MODBUS**

**Description** Shows the respective floating point value written by the host system.


**Additional information**

Read access	Operator
Write access	-

 The Modbus interface provides four floating point values which can be written to by the Host system. These values can be linked to specific functions (e.g. providing the air temperature value).

**Modbus discrete 1 to 4**


**Navigation**  Expert → Communication → Modbus Xx-x → Modbus discr. 1 to 4 (13240-1 to 4)

**Prerequisite** **Communication interface protocol (→  145) = MODBUS**

**Description** Shows the integer value written by the host-system.

**Additional information**


Read access	Operator
Write access	-


 The Modbus interface provides four discrete (integer) registers which can be written to by the Host system. These values can be linked to specific functions (e.g. controlling a discrete output).










In the device these values are converted into the following discrete state values:

- Unknown (integer value 0)
- Inactive (integer value 1)
- Active (integer value 2)
- Invalid (integer value >= 3)

**"Configuration" submenu (Modbus)**

 Only visible for devices with a Modbus I/O module.


Navigation  Expert → Communication → Modbus Xx-x → Configuration

<b>► Configuration</b>	
Baudrate	→  146
Parity	→  147
Modbus address	→  147
Float swap mode	→  147
Invalid data	→  148
Word type	→  148
CRC seed	→  148
Old TSM mode	→  149
Bus termination	→  149

**Baudrate**



Navigation  Expert → Communication → Modbus X1-4 → Configuration → Baudrate (13203)

Prerequisite **Communication interface protocol (→  145) = MODBUS**

Description Defines the baud rate of the communication.

- Selection
- 600 BAUD
  - 1200 BAUD
  - 2400 BAUD
  - 4800 BAUD
  - 9600 BAUD \*
  - 19200 BAUD \*

Factory setting 9600 BAUD

**Additional information**

Read access	Operator
Write access	Maintenance

\* Visibility depends on order options or device settings

**Parity**



- Navigation** Expert → Communication → Modbus X1-4 → Configuration → Parity (13204)
- Prerequisite** **Communication interface protocol (→ 145) = MODBUS**
- Description** Defines the parity of the Modbus communication.
- Selection**
- Odd
  - Even
  - None / 1 stop bit
  - None / 2 stop bits
- Factory setting** None / 1 stop bit

**Additional information**

Read access	Operator
Write access	Maintenance

**Modbus address**



- Navigation** Expert → Communication → Modbus X1-4 → Configuration → Modbus address (13205)
- Prerequisite** **Communication interface protocol (→ 145) = MODBUS**
- Description** Defines the Modbus address of the device.
- User entry** 1 to 247
- Factory setting** 1

**Additional information**

Read access	Operator
Write access	Maintenance

**Float swap mode**



- Navigation** Expert → Communication → Modbus X1-4 → Configuration → Float swap mode (13232)
- Prerequisite** **Communication interface protocol (→ 145) = MODBUS**
- Description** Sets the format of how the floating point value is transferred on Modbus.
- Selection**
- Normal 3-2-1-0
  - Swap 0-1-2-3
  - WW Swap 1-0-3-2
  - WW Swap 2-3-0-1

**Factory setting** Swap 0-1-2-3

**Additional information**

<b>Read access</b>	Operator
<b>Write access</b>	Maintenance

---

**Invalid data**



**Navigation**

Expert → Communication → Modbus Xx-x → Configuration → Invalid data (13243)

**Prerequisite**

**Communication interface protocol (→ 145) = MODBUS**

**Description**

Sets what byte is sent in a message that contains invalid data.

**Selection**

- 0x00
- 0xFF

**Factory setting**

0x00

**Additional information**

<b>Read access</b>	Operator
<b>Write access</b>	Maintenance

---

**Word type**



**Navigation**

Expert → Communication → Modbus Xx-x → Configuration → Word type (13208)

**Prerequisite**

**Communication interface protocol (→ 145) = MODBUS**

**Description**

Selects if the integer value has the range 0 to +65535 or -32768 to +32767.

**Selection**

- Unsigned
- Signed

**Factory setting**

Unsigned

**Additional information**

<b>Read access</b>	Operator
<b>Write access</b>	Maintenance

---

**CRC seed**



**Navigation**

Expert → Communication → Modbus Xx-x → Configuration → CRC seed (13248)

**Prerequisite**

**Communication interface protocol (→ 145) = MODBUS**

**Description**

CRC seed value selection used for all communication CRC calculations.

**Selection**                    ■ 0x0000  
                                      ■ 0xFFFF


**Factory setting**            0xFFFF

**Additional information**

Read access	Operator
Write access	Maintenance

**Old TSM mode** 

**Navigation**                      Expert → Communication → Modbus Xx-x → Configuration → Old TSM mode (13213)

**Prerequisite**                    **Communication interface protocol (→  145) = MODBUS**

**Description**                    Selects the type of value available at the NRF590 SW vers.1 compatible modbus map (Address 3000-3195) addresses.

**Selection**                        ■ Float values  
                                      ■ Integer values


**Factory setting**                Float values

**Additional information**

Read access	Operator
Write access	Maintenance

**Bus termination** 

**Navigation**                      Expert → Communication → Modbus X1-4 → Configuration → Bus termination (13249)

**Prerequisite**                    **Communication interface protocol (→  145) = MODBUS**

**Description**                    Activates or deactivates the bus termination at the device. Should only be activated on the last device in a loop.


**Selection**                        ■ Off  
                                      ■ On


**Factory setting**                Off

**Additional information**













Read access	Operator
Write access	Maintenance

**"Integer conversion" submenu**

 Only visible for devices with a Modbus I/O module.

*Navigation*  Expert → Communication → Modbus Xx-x → Integer convers

**▶ Integer conversion**

Level 0%	→  150
Level 100%	→  151
Temperature 0%	→  151
Temperature 100%	→  151
Pressure 0%	→  152
Pressure 100%	→  152
Density 0%	→  152
Density 100%	→  153
User 0%	→  153
User 100%	→  153
Percent 0%	→  154
Percent 100%	→  154

**Level 0%**



**Navigation**  Expert → Communication → Modbus Xx-x → Integer convers → Level 0% (13214)

**Description** Defines the level that represents 0% on the integer value scale.

**User entry** Signed floating-point number

**Factory setting** 0.00 mm

**Additional information**

<b>Read access</b>	Operator
<b>Write access</b>	Maintenance

**Level 100%**



<b>Navigation</b>	Expert → Communication → Modbus Xx-x → Integer convers → Level 100% (13250)				
<b>Description</b>	Defines the level that represents 100% on the integer value scale.				
<b>User entry</b>	Signed floating-point number				
<b>Factory setting</b>	30.0 mm				
<b>Additional information</b>	<table border="1"> <tr> <td>Read access</td> <td>Operator</td> </tr> <tr> <td>Write access</td> <td>Maintenance</td> </tr> </table>	Read access	Operator	Write access	Maintenance
Read access	Operator				
Write access	Maintenance				

**Temperature 0%**






<b>Navigation</b>	Expert → Communication → Modbus Xx-x → Integer convers → Temperature 0% (13215)				
<b>Description</b>	Defines the temperature that represents 0% on the integer value scale.				
<b>User entry</b>	Signed floating-point number				
<b>Factory setting</b>	233.15 °C				
<b>Additional information</b>	<table border="1"> <tr> <td>Read access</td> <td>Operator</td> </tr> <tr> <td>Write access</td> <td>Maintenance</td> </tr> </table>	Read access	Operator	Write access	Maintenance
Read access	Operator				
Write access	Maintenance				

**Temperature 100%**






<b>Navigation</b>	Expert → Communication → Modbus Xx-x → Integer convers → Temperature 100% (13216)				
<b>Description</b>	Defines the temperature that represents 100% on the integer value scale.				
<b>User entry</b>	Signed floating-point number				
<b>Factory setting</b>	373.15 °C				
<b>Additional information</b>	<table border="1"> <tr> <td>Read access</td> <td>Operator</td> </tr> <tr> <td>Write access</td> <td>Maintenance</td> </tr> </table>	Read access	Operator	Write access	Maintenance
Read access	Operator				
Write access	Maintenance				




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<b>Pressure 0%</b>					
<b>Navigation</b>	  Expert → Communication → Modbus Xx-x → Integer convers → Pressure 0% (13217)				
<b>Description</b>	Defines the pressure that represents 0% on the integer value scale.				
<b>User entry</b>	Signed floating-point number				
<b>Factory setting</b>	0 bar				
<b>Additional information</b>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Read access</td> <td>Operator</td> </tr> <tr> <td>Write access</td> <td>Maintenance</td> </tr> </table>	Read access	Operator	Write access	Maintenance
Read access	Operator				
Write access	Maintenance				

---

<b>Pressure 100%</b>					
<b>Navigation</b>	  Expert → Communication → Modbus Xx-x → Integer convers → Pressure 100% (13251)				
<b>Description</b>	Defines the pressure that represents 100% on the integer value scale.				
<b>User entry</b>	Signed floating-point number				
<b>Factory setting</b>	25 000 bar				
<b>Additional information</b>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Read access</td> <td>Operator</td> </tr> <tr> <td>Write access</td> <td>Maintenance</td> </tr> </table>	Read access	Operator	Write access	Maintenance
Read access	Operator				
Write access	Maintenance				

---

<b>Density 0%</b>					
<b>Navigation</b>	  Expert → Communication → Modbus Xx-x → Integer convers → Density 0% (13252)				
<b>Description</b>	Defines the density that represents 0% on the integer value scale.				
<b>User entry</b>	Signed floating-point number				
<b>Factory setting</b>	0 kg/m <sup>3</sup>				
<b>Additional information</b>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Read access</td> <td>Operator</td> </tr> <tr> <td>Write access</td> <td>Maintenance</td> </tr> </table>	Read access	Operator	Write access	Maintenance
Read access	Operator				
Write access	Maintenance				

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**Density 100%**



**Navigation** Expert → Communication → Modbus Xx-x → Integer convers → Density 100% (13218)

**Description** Defines the density that represents 100% on the integer value scale.

**User entry** Signed floating-point number

**Factory setting** 1 000 kg/m<sup>3</sup>

**Additional information**

Read access	Operator
Write access	Maintenance

**User 0%**



**Navigation** Expert → Communication → Modbus Xx-x → Integer convers → User 0% (13221)

**Description** Defines the value of the user selected variable that represents 0% on the integer value scale.

**User entry** Signed floating-point number

**Factory setting** 0

**Additional information**

Read access	Operator
Write access	Maintenance

**User 100%**



**Navigation** Expert → Communication → Modbus Xx-x → Integer convers → User 100% (13222)

**Description** Defines the value of the user selected variable that represents 100% on the integer value scale.

**User entry** Signed floating-point number

**Factory setting** 0

**Additional information**

Read access	Operator
Write access	Maintenance

---

**Percent 0%**


**Navigation** Expert → Communication → Modbus Xx-x → Integer convers → Percent 0% (13202)

**Description** Defines the percentage of the measured value that represents 0% on the integer value scale.

**User entry** -200 to +400 %

**Factory setting** 0.00 %

**Additional information**

Read access	Operator
Write access	Maintenance

---

**Percent 100%**


**Navigation** Expert → Communication → Modbus Xx-x → Integer convers → Percent 100% (13234)

**Description** Defines the percentage of the measured value that represents 100% on the integer value scale.


**User entry** -200 to +400 %

**Factory setting** 100 %

**Additional information**

Read access	Operator
Write access	Maintenance

**"User value source" submenu**


 Only visible for devices with a Modbus I/O module.

*Navigation*   Expert → Communication → Modbus Xx-x → UserVal source → UserVal 1 source (13209)

---

**User value 1 to 8 source** 

---

**Navigation**   Expert → Communication → Modbus Xx-x → UserVal source → UserVal 1 to 8 source (13209-1 to 8)

**Description** Selects which parameter shall be transmitted as User value x.

- Selection**
- None
  - Tank ullage
  - Distance
  - Upper interface level
  - Lower interface level
  - Bottom level
  - Average profile density<sup>8)</sup>
  - Vapor density
  - Manual density
  - P1 position
  - P3 position
  - GP 1...4 value
  - AIO B1-3 value
  - AIO C1-3 value
  - AIP B4-8 value
  - AIP C4-8 value
  - HART device 1...15 PV
  - HART device 1...15 PV mA
  - HART device 1...15 PV %
  - HART device 1...15 SV
  - HART device 1...15 TV
  - HART device 1...15 QV

**Factory setting** None


**Additional information**

Read access	Operator
Write access	Maintenance









---

8) Visibility depends on order options or device settings

**"GP values" submenu**

*Navigation*  Expert → Communication → Modbus Xx-x → GP values → GP 1 value 0% (13223)

**▶ GP values**

GP 1 value 0%	→  156
GP 1 value 100%	→  156
GP 2 value 0%	→  157
GP 2 value 100%	→  157
GP 3 value 0%	→  157
GP 3 value 100%	→  158
GP 4 value 0%	→  158
GP 4 value 100%	→  158

**GP 1 value 0%** 

**Navigation**  Expert → Communication → Modbus Xx-x → GP values → GP 1 value 0% (13223)


**Description** Defines the GP1 value that represents 0% on the integer value scale.

**User entry** Signed floating-point number

**Factory setting** 0 Unitless

**Additional information**

<b>Read access</b>	Operator
<b>Write access</b>	Maintenance

**GP 1 value 100%** 

**Navigation**  Expert → Communication → Modbus Xx-x → GP values → GP 1 value 100% (13224)

**Description** Defines the GP1 value that represents 100% on the integer value scale.

**User entry** Signed floating-point number

**Factory setting** 0 Unitless

**Additional information**

Read access	Operator
Write access	Maintenance

**GP 2 value 0%**



**Navigation**

Expert → Communication → Modbus Xx-x → GP values → GP 2 value 0% (13257)

**Description**

Defines the GP2 value that represents 0% on the integer value scale.

**User entry**

Signed floating-point number

**Factory setting**

0 None

**Additional information**

Read access	Operator
Write access	Maintenance

**GP 2 value 100%**



**Navigation**

Expert → Communication → Modbus Xx-x → GP values → GP 2 value 100% (13258)

**Description**

Defines the GP2 value that represents 100% on the integer value scale.

**User entry**

Signed floating-point number

**Factory setting**

0 None

**Additional information**

Read access	Operator
Write access	Maintenance

**GP 3 value 0%**



**Navigation**

Expert → Communication → Modbus Xx-x → GP values → GP 3 value 0% (13259)

**Description**

Defines the GP3 value that represents 0% on the integer value scale.

**User entry**

Signed floating-point number

**Factory setting**

0 Unitless

**Additional information**

Read access	Operator
Write access	Maintenance

## GP 3 value 100%



<b>Navigation</b>	Expert → Communication → Modbus Xx-x → GP values → GP 3 value 100% (13226)				
<b>Description</b>	Defines the GP3 value that represents 100% on the integer value scale.				
<b>User entry</b>	Signed floating-point number				
<b>Factory setting</b>	0 Unitless				
<b>Additional information</b>	<table border="1"> <tr> <td>Read access</td> <td>Operator</td> </tr> <tr> <td>Write access</td> <td>Maintenance</td> </tr> </table>	Read access	Operator	Write access	Maintenance
Read access	Operator				
Write access	Maintenance				

## GP 4 value 0%




<b>Navigation</b>	Expert → Communication → Modbus Xx-x → GP values → GP 4 value 0% (13225)				
<b>Description</b>	Defines the GP4 value that represents 0% on the integer value scale.				
<b>User entry</b>	Signed floating-point number				
<b>Factory setting</b>	0 Unitless				
<b>Additional information</b>	<table border="1"> <tr> <td>Read access</td> <td>Operator</td> </tr> <tr> <td>Write access</td> <td>Maintenance</td> </tr> </table>	Read access	Operator	Write access	Maintenance
Read access	Operator				
Write access	Maintenance				

## GP 4 value 100%



<b>Navigation</b>	Expert → Communication → Modbus Xx-x → GP values → GP 4 value 100% (13227)				
<b>Description</b>	Defines the GP4 value that represents 100% on the integer value scale.				
<b>User entry</b>	Signed floating-point number				
<b>Factory setting</b>	0 Unitless				
<b>Additional information</b>	<table border="1"> <tr> <td>Read access</td> <td>Operator</td> </tr> <tr> <td>Write access</td> <td>Maintenance</td> </tr> </table>	Read access	Operator	Write access	Maintenance
Read access	Operator				
Write access	Maintenance				

**"Discrete selector" submenu**

*Navigation*       Expert → Communication → Modbus Xx-x → Discreteselect

**Discrete 1 to 4 selector**



**Navigation**       Expert → Communication → WM550 X1-4 → Discreteselect → Discrete 1 to 4select (13260-1 to 4)

**Description**      Determines the input source which is transferred as Alarm bit [n] value in the corresponding WM550 tasks.

- Selection**
- None
  - **Balance flag** option Visibility depends on order options or device settings
  - Alarm 1...4 any
  - Alarm 1...4 HighHigh
  - Alarm 1...4 High or HighHigh
  - Alarm 1...4 High
  - Alarm 1...4 Low
  - Alarm 1...4 Low or LowLow
  - Alarm 1...4 LowLow
  - Digital Xx-x


**Factory setting**      None

**Additional information**







Read access	Operator
Write access	Maintenance

**"Configuration" submenu (V1)**

 Only visible for devices with a V1 I/O module.


*Navigation*  Expert → Communication → V1 Xx-x → Configuration

▶ **Configuration**

Communication interface protocol variant	→  160
V1 addressV1/MDP	→  160
V1 addressBBB/MIC+232	→  161
Level mapping	→  161
Line impedance	→  162
Compatibility mode	→  162

**Communication interface protocol variant**



**Navigation**  Expert → Communication → V1 Xx-x → Configuration → Protocol variant (13269)

**Description** Determines which variant of the V1 protocol is used.

**User interface**

- None
- V1 \*

**Factory setting** None


**Additional information**

Read access	Operator
Write access	Maintenance

**V1 address**



**Navigation**  Expert → Communication → V1 Xx-x → Configuration → V1 address (13235)

**Prerequisite** **Communication interface protocol variant** (→  160) = V1

**Description** Identifier of the device for the V1 communication.

**User entry** 0 to 99

\* Visibility depends on order options or device settings



**Factory setting** 1

**Additional information**

Read access	Operator
Write access	Maintenance

**V1 address**



**Navigation**

Expert → Communication → V1 Xx-x → Configuration → V1 address (13236)

**Prerequisite**

**Communication interface protocol variant (→ 160)**

**Description**

Identifier of the previous device for V1 communication.

**User entry**

0 to 255

**Factory setting**

1

**Additional information**

Read access	Operator
Write access	Maintenance

**Level mapping**



**Navigation**

Expert → Communication → V1 Xx-x → Configuration → Level mapping (13268)

**Prerequisite**

**Communication interface protocol (→ 145) = V1**

**Description**

Determines the transmittable range of levels.

**Selection**

- +ve
- +ve & -ve

**Factory setting**

+ve

**Additional information**

Read access	Operator
Write access	Maintenance

In V1, the level is always represented by a number in the range from 0 to 999 999. This number corresponds to a level as follows:




*"Level mapping" = "+ve"*


Number	Corresponding level
0	0.0 mm
999 999	99 999.9 mm

"Level mapping" = "+ve & -ve"



Number	Corresponding level
0	0.0 mm
500 000	50 000.0 mm
500 001	-0.1 mm
999 999	-49 999.9 mm

## Line impedance

<b>Navigation</b>	  Expert → Communication → V1 Xx-x → Configuration → Line impedance (13266)				
<b>Prerequisite</b>	<b>Communication interface protocol (→  145) = V1</b>				
<b>Description</b>	Adjusts the impedance of the communication line.				
<b>User entry</b>	0 to 15				
<b>Factory setting</b>	15				
<b>Additional information</b>	<table border="1"> <tr> <td>Read access</td> <td>Operator</td> </tr> <tr> <td>Write access</td> <td>Maintenance</td> </tr> </table>	Read access	Operator	Write access	Maintenance
Read access	Operator				
Write access	Maintenance				



 The line impedance affects the voltage difference between a logical 0 and a logical 1 on the message of the device to the bus. The default setting is suitable for most applications.

## Compatibility mode











<b>Navigation</b>	  Expert → Communication → V1 Xx-x → Configuration → Comp. mode (13281)				
<b>Description</b>	Defines the compatibility mode.				
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Nxx5xx</li> <li>▪ Nxx8x</li> </ul>				
<b>Factory setting</b>	Nxx8x				
<b>Additional information</b>	<p>In <b>NMS5x</b> mode: Only values which have also existed on NMS5x Gauge status are output on the bus.</p> <p>In <b>NMS8x</b> mode: All Gauge status are available at this parameter.</p> <table border="1"> <tr> <td>Read access</td> <td>Operator</td> </tr> <tr> <td>Write access</td> <td>Maintenance</td> </tr> </table>	Read access	Operator	Write access	Maintenance
Read access	Operator				
Write access	Maintenance				

**"V1 input selector" submenu (V1)**

 Only visible for devices with a V1 I/O module.

*Navigation*   Expert → Communication → V1 Xx-x → V1 input select.



▶ **V1 input selector**

User value 1 to 8 source	→  163
Alarm 1 input source	→  164
Alarm 2 input source	→  164
Alarm 3 input source	→  165
Alarm 4 input source	→  165
SP 1 value selector	→  166
SP 2 value selector	→  166
SP 3 value selector	→  167
SP 4 value selector	→  167
Value percent selector	→  168

**User value 1 to 8 source**



**Navigation**

  Expert → Communication → V1 Xx-x → V1 input select. → UserVal 1 to 8 source (13209-1 to 8)

**Description**

Selects which parameter shall be transmitted as User value x.

**Selection**

- None
- Tank ullage
- Distance
- Upper interface level
- Lower interface level
- Bottom level
- Average profile density<sup>9)</sup>
- Vapor density
- Manual density
- P1 position
- P3 position
- GP 1...4 value

9) Visibility depends on order options or device settings

- AIO B1-3 value
- AIO C1-3 value
- AIP B4-8 value
- AIP C4-8 value
- HART device 1...15 PV
- HART device 1...15 PV mA
- HART device 1...15 PV %
- HART device 1...15 SV
- HART device 1...15 TV
- HART device 1...15 QV

**Factory setting**

None

**Additional information**

Read access	Operator
Write access	Maintenance

**Alarm 1 input source****Navigation**

Expert → Communication → V1 Xx-x → V1 input select. → Alarm1 input src (13270)

**Description**

Determines which discrete value will be transmitted as V1 alarm 1 status.

**Selection**

- None
- Alarm 1-4 any
- Alarm 1-4 HighHigh
- Alarm 1-4 High or HighHigh
- Alarm 1-4 High
- Alarm 1-4 Low
- Alarm 1-4 Low or LowLow
- Alarm 1-4 LowLow

**Factory setting**

None

**Additional information**

Read access	Operator
Write access	Maintenance

**Alarm 2 input source****Navigation**

Expert → Communication → V1 Xx-x → V1 input select. → Alarm2 input src (13271)

**Description**

Determines which discrete value will be transmitted as V1 alarm 2 status.

**Selection**

- None
- Alarm 1-4 any
- Alarm 1-4 HighHigh
- Alarm 1-4 High or HighHigh
- Alarm 1-4 High

- Alarm 1-4 Low
- Alarm 1-4 Low or LowLow
- Alarm 1-4 LowLow

**Factory setting** None

**Additional information**

Read access	Operator
Write access	Maintenance

**Alarm 3 input source**



**Navigation**

Expert → Communication → V1 Xx-x → V1 input select. → Alarm3 in-source (13283)

**Description**

Determines which discrete value will be transmitted as V1 alarm 3 status in Z0 and Z1 message.

**Selection**

- None
- Alarm 1-4 any
- Alarm 1-4 HighHigh
- Alarm 1-4 High or HighHigh
- Alarm 1-4 High
- Alarm 1-4 Low
- Alarm 1-4 Low or LowLow
- Alarm 1-4 LowLow

**Factory setting** None

**Additional information**

Read access	Operator
Write access	Maintenance

**Alarm 4 input source**



**Navigation**

Expert → Communication → V1 Xx-x → V1 input select. → Alarm4 in-source (13284)

**Description**

Determines which discrete value will be transmitted as V1 alarm 4 status in Z0 and Z1 message.

**Selection**

- None
- Alarm 1-4 any
- Alarm 1-4 HighHigh
- Alarm 1-4 High or HighHigh
- Alarm 1-4 High
- Alarm 1-4 Low
- Alarm 1-4 Low or LowLow
- Alarm 1-4 LowLow

**Factory setting** None

**Additional information**

Read access	Operator
Write access	Maintenance

**SP 1 value selector****Navigation**

Expert → Communication → V1 → V1 input select. → SP1 value select (13274)

**Description**

Selects which discrete value will be transmitted as V1 External Status bit 1 in Z0/Z1 message.

**Selection**

- None
- Digital A1-2 \*
- Digital A3-4 \*
- Digital B1-2 \*
- Digital B3-4 \*
- Digital C1-2 \*
- Digital C3-4 \*
- Digital D1-2 \*
- Digital D3-4 \*

**Factory setting**

None

**Additional information**

Read access	Operator
Write access	Maintenance

**SP 2 value selector****Navigation**

Expert → Communication → V1 → V1 input select. → SP2 value select (13275)

**Description**

Selects which discrete value will be transmitted as V1 external status bit 2 in Z0/Z1 message.

**Selection**

- None
- Digital A1-2 \*
- Digital A3-4 \*
- Digital B1-2 \*
- Digital B3-4 \*
- Digital C1-2 \*
- Digital C3-4 \*
- Digital D1-2 \*
- Digital D3-4 \*

**Factory setting**

None

**Additional information**

Read access	Operator
Write access	Maintenance

\* Visibility depends on order options or device settings

**SP 3 value selector**



**Navigation** Expert → Communication → V1 → V1 input select. → SP3 value select (13276)

**Description** Selects which discrete value will be transmitted as V1 external status bit 3 in Z0/Z1 message.

- Selection**
- None
  - Digital A1-2 \*
  - Digital A3-4 \*
  - Digital B1-2 \*
  - Digital B3-4 \*
  - Digital C1-2 \*
  - Digital C3-4 \*
  - Digital D1-2 \*
  - Digital D3-4 \*

**Factory setting** None

**Additional information**

Read access	Operator
Write access	Maintenance

**SP 4 value selector**



**Navigation** Expert → Communication → V1 → V1 input select. → SP4 value select (13277)

**Description** Selects which discrete value will be transmitted as V1 external status bit 4 in Z0/Z1 message.

- Selection**
- None
  - Digital A1-2 \*
  - Digital A3-4 \*
  - Digital B1-2 \*
  - Digital B3-4 \*
  - Digital C1-2 \*
  - Digital C3-4 \*
  - Digital D1-2 \*
  - Digital D3-4 \*


**Factory setting** None

**Additional information**


Read access	Operator
Write access	Maintenance

\* Visibility depends on order options or device settings





Value percent selector 

<b>Navigation</b>	 Expert → Communication → V1 → V1 input select. → Value % select (13282)				
<b>Description</b>	Selects which value shall be transmitted as a 0..100% value in the V1 Z0/Z1 message.				
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ None</li> <li>■ Tank level %</li> <li>■ Tank ullage %</li> <li>■ AIO B1-3 value % *</li> <li>■ AIO C1-3 value % *</li> </ul>				
<b>Factory setting</b>	None				
<b>Additional information</b>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Read access</td> <td>Operator</td> </tr> <tr> <td>Write access</td> <td>Maintenance</td> </tr> </table>	Read access	Operator	Write access	Maintenance
Read access	Operator				
Write access	Maintenance				



**"Configuration" submenu (WM550)**

 This submenu is only present for devices with a **WM550** option communication interface.

*Navigation*  Expert → Communication → WM550 Xx-x → Configuration

<b>► Configuration</b>	
Baudrate	→  168
WM550 address	→  169
Software ID	→  169
Compatibility mode	→  169

Baudrate 

<b>Navigation</b>	 Expert → Communication → WM550 Xx-x → Configuration → Baudrate (13203)
<b>Prerequisite</b>	<b>Communication interface protocol (→  145) = "WM550" option</b>
<b>Description</b>	Defines the baud rate of the WM550 communication.

\* Visibility depends on order options or device settings



**Selection**

- 600 BAUD
- 1200 BAUD
- 2400 BAUD
- 4800 BAUD

**Factory setting** 2400 BAUD

**Additional information**

Read access	Operator
Write access	Maintenance

**WM550 address**



**Navigation** Expert → Communication → WM550 Xx-x → Configuration → WM550 address (13286)

**Description** Describes the WM550 address of the device.

**User entry** 0 to 63

**Factory setting** 1

**Software ID**



**Navigation** Expert → Communication → WM550 Xx-x → Configuration → Software ID (13287)

**Prerequisite** **Communication interface protocol (→ 145) = "WM550" option**

**Description** Defines content for WM550 Task 32.  
Detailed information on content for WM550 Task 32, Special Documentation SD02567G.

**User entry** 0 to 9999

**Factory setting** 2000

**Compatibility mode**



**Navigation** Expert → Communication → WM550 Xx-x → Configuration → Comp. mode

**Description** Defines the compatibility mode.

**Selection**

- Nxx5xx
- Nxx8x

**Factory setting** Nxx8x

**Additional information**


In **NMS5x** mode: Only values which have also existed on NMS5x Gauge status are output on the bus.

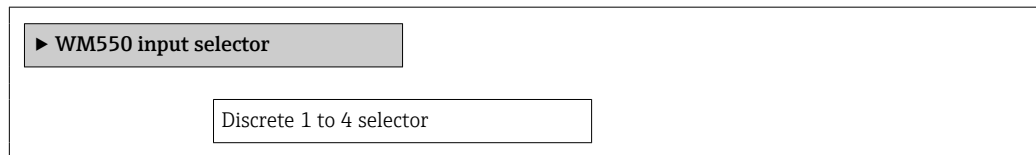
In **NMS8x** mode: All Gauge status are available at this parameter.

Read access	Operator
Write access	Maintenance

**"WM550 input selector" submenu (WM550)**

 This submenu is only present for devices with a **WM550** option communication interface.


*Navigation*  Expert → Communication → WM550 Xx-x → WM550 inp select



**Discrete 1 to 4 selector**



**Navigation**

 Expert → Communication → WM550 Xx-x → WM550 inp select → Discrete 1 to 4select (13260-1 to 4)

**Description**

Determines the input source which is transferred as Alarm bit [n] value in the corresponding WM550 tasks.

**Selection**

- None
- **Balance flag** option Visibility depends on order options or device settings
- Alarm 1...4 any
- Alarm 1...4 HighHigh
- Alarm 1...4 High or HighHigh
- Alarm 1...4 High
- Alarm 1...4 Low
- Alarm 1...4 Low or LowLow
- Alarm 1...4 LowLow
- Digital Xx-x


**Factory setting**

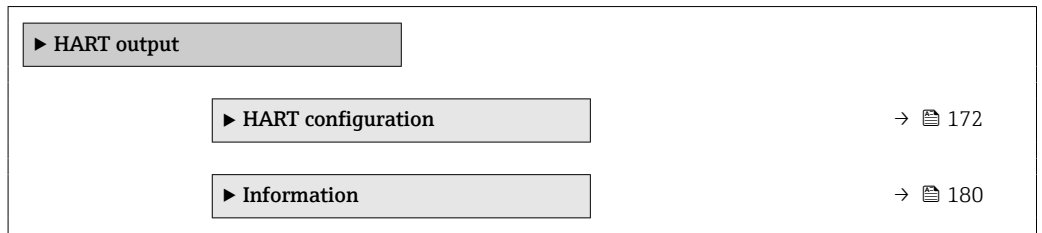
None

**Additional information**


Read access	Operator
Write access	Maintenance
















### 3.4.2 "HART output" submenu

Navigation  Expert → Communication → HART output




**"HART configuration" submenu**

Navigation  Expert → Communication → HART output → HART config.

▶ HART configuration	
System polling address	→  172
No. of preambles	→  173
PV source	→  173
Assign PV	→  173
0 % value	→  174
100 % value	→  175
PV mA selector	→  175
Primary variable (PV)	→  175
Percent of range	→  176
Assign SV	→  176
Secondary variable (SV)	→  177
Assign TV	→  177
Tertiary variable (TV)	→  178
Assign QV	→  178
Quaternary variable (QV)	→  179

**System polling address**

<b>Navigation</b>	 Expert → Communication → HART output → HART config. → Polling address
<b>Description</b>	Device address for HART communication.
<b>User entry</b>	0 to 63
<b>Factory setting</b>	15

**Additional information**

Read access	Operator
Write access	Maintenance

**No. of preambles**



**Navigation**

Expert → Communication → HART output → HART config. → No. of preambles

**Description**

Defines the number of preambles in the HART telegram.

**User entry**

5 to 20

**Factory setting**

5

**Additional information**

Read access	Operator
Write access	Maintenance

**PV source**



**Navigation**

Expert → Communication → HART output → HART config. → PV source

**Description**

Decides, if the PV configuration is according to an analog output (HART slave) or customized (in case of HART tunneling only).

**Selection**

- AIO B1-3 \*
- AIO C1-3 \*
- Custom

**Factory setting**

Custom

**Additional information**

Read access	Maintenance
Write access	Maintenance

**Assign PV**



**Navigation**

Expert → Communication → HART output → HART config. → Assign PV

**Prerequisite**

**PV source (→ 173) = Custom**

**Description**

Assign a measured variable to the primary dynamic variable (PV).

Additional information:

The assigned measured variable is also used by the current output.

\* Visibility depends on order options or device settings

**Selection**


- None
- Tank level
- Tank ullage
- Measured level
- Distance
- Displacer position
- Water level
- Upper interface level
- Lower interface level
- Bottom level
- Tank reference height
- Liquid temperature
- Vapor temperature
- Air temperature
- Observed density value
- Average profile density
- Upper density
- Middle density
- Lower density
- P1 (bottom)
- P2 (middle)
- P3 (top)
- GP 1 value
- GP 2 value
- GP 3 value
- GP 4 value

**Factory setting**

Tank level

**Additional information**

Read access	Operator
Write access	Maintenance

 The **Measured level** option doesn't contain a unit. If a unit is needed, select the **Tank level** option.

**0 % value****Navigation**

 Expert → Communication → HART output → HART config. → 0 % value

**Prerequisite**

PV source = Custom

**Description**

0% value of the primary variable (PV).

**User entry**

Signed floating-point number

**Factory setting**

0 mm

**Additional information**

Read access	Operator
Write access	Maintenance

**100 % value**



**Navigation** Expert → Communication → HART output → HART config. → 100 % value

**Prerequisite** **PV source = Custom**

**Description** 100% value of the primary variable (PV).

**User entry** Signed floating-point number

**Factory setting** 0 mm

**Additional information**

Read access	Operator
Write access	Maintenance

**PV mA selector**



**Navigation** Expert → Communication → HART output → HART config. → PV mA selector

**Prerequisite** **PV source = Custom**

**Description** Assigns a current to the primary HART variable (PV).

- Selection**
- None
  - AIO B1-3 value mA \*
  - AIO C1-3 value mA \*

**Factory setting** None

**Additional information**

Read access	Operator
Write access	Maintenance

**Primary variable (PV)**

**Navigation** Expert → Communication → HART output → HART config. → Primary var (PV)

**Description** Shows the current measured value of the primary dynamic variable (PV)

**Additional information**


Read access	Operator
Write access	-

\* Visibility depends on order options or device settings

---

**Percent of range**


---

**Navigation**  Expert → Communication → HART output → HART config. → Percent of range

**Description** Shows the value of the primary variable (PV) as a percentage of the defined 0% to 100% range.

**Additional information**


Read access	Operator
Write access	-

---

**Assign SV**


---



**Navigation**  Expert → Communication → HART output → HART config. → Assign SV

**Description** Assign a measured variable to the second dynamic variable (SV).

**Selection**

- None
- Tank level
- Tank ullage
- Measured level
- Distance
- Displacer position
- Water level
- Upper interface level
- Lower interface level
- Bottom level
- Tank reference height
- Liquid temperature
- Vapor temperature
- Air temperature
- Observed density value
- Average profile density
- Upper density
- Middle density
- Lower density
- P1 (bottom)
- P2 (middle)
- P3 (top)
- GP 1 value
- GP 2 value
- GP 3 value
- GP 4 value

**Factory setting** Liquid temperature

**Additional information**

Read access	Operator
Write access	Maintenance




The **Measured level** option doesn't contain a unit. If a unit is needed, select the **Tank level** option.



**Secondary variable (SV)**

**Navigation**  Expert → Communication → HART output → HART config. → Second.var(SV)

**Prerequisite** **Assign SV (→  176) ≠ None**


**Description** Shows the current measured value of the secondary dynamic variable (SV)

**Additional information**

Read access	Operator
Write access	-

**Assign TV**



**Navigation**  Expert → Communication → HART output → HART config. → Assign TV

**Description** Assign a measured variable to the tertiary dynamic variable (TV).


**Selection**

- None
- Tank level
- Tank ullage
- Measured level
- Distance
- Displacer position
- Water level
- Upper interface level
- Lower interface level
- Bottom level
- Tank reference height
- Liquid temperature
- Vapor temperature
- Air temperature
- Observed density value
- Average profile density
- Upper density
- Middle density
- Lower density
- P1 (bottom)
- P2 (middle)
- P3 (top)
- GP 1 value
- GP 2 value
- GP 3 value
- GP 4 value

**Factory setting** Water level

**Additional information**


Read access	Operator
Write access	Maintenance


 The **Measured level** option doesn't contain a unit. If a unit is needed, select the **Tank level** option.

---

**Tertiary variable (TV)**


---

**Navigation**  Expert → Communication → HART output → HART config. → Tertiary var(TV)

**Prerequisite** **Assign TV (→  177) ≠ None**

**Description** Shows the current measured value of the tertiary (third) dynamic variable (TV)

**Additional information**

Read access	Operator
Write access	-

---

**Assign QV**


---



**Navigation**  Expert → Communication → HART output → HART config. → Assign QV

**Description** Assign a measured variable to the quaternary dynamic variable (QV).


**Selection**

- None
- Tank level
- Tank ullage
- Measured level
- Distance
- Displacer position
- Water level
- Upper interface level
- Lower interface level
- Bottom level
- Tank reference height
- Liquid temperature
- Vapor temperature
- Air temperature
- Observed density value
- Average profile density
- Upper density
- Middle density
- Lower density
- P1 (bottom)
- P2 (middle)
- P3 (top)
- GP 1 value
- GP 2 value
- GP 3 value
- GP 4 value

**Factory setting** Observed density value

**Additional information**


Read access	Operator
Write access	Maintenance

 The **Measured level** option doesn't contain a unit. If a unit is needed, select the **Tank level** option.

---

**Quaternary variable (QV)**

---


**Navigation** Expert → Communication → HART output → HART config. → Quaterna.var(QV)**Prerequisite**Assign QV (→  178) ≠ None**Description**













Shows the current measured value of the quaternary (fourth) dynamic variable (QV)

**Additional information**

Read access	Operator
Write access	-

**"Information" submenu**

Navigation  Expert → Communication → HART output → Information

▶ Information	
HART short tag	→  180
Device tag	→  181
Device revision	→  181
Device ID	→  181
Device type	→  182
Manufacturer ID	→  182
HART revision	→  182
HART descriptor	→  183
HART message	→  183
Hardware revision	→  183
Software revision	→  184
HART date code	→  184

**HART short tag**



**Navigation**

 Expert → Communication → HART output → Information → HART short tag

**Description**

Defines the short tag for the measuring point.

Maximum length: 8 characters

Allowed characters: A-Z, 0-9, certain special characters

**User entry**

Character string comprising numbers, letters and special characters (8)

**Factory setting**

NMR8x

**Additional information**

Read access	Operator
Write access	Maintenance

**Device tag**



**Navigation** Expert → Communication → HART output → Information → Device tag

**Description** Enter a unique name for the measuring point to identify the device quickly within the plant.

**User entry** Character string comprising numbers, letters and special characters (32)

**Factory setting** NMR8x

**Additional information**

Read access	Operator
Write access	Maintenance

**Device revision**

**Navigation** Expert → Communication → HART output → Information → Device revision

**Description** Shows the device revision with which the device is registered with the HART Communication Foundation

**User interface** 0 to 255

**Factory setting** 7

**Additional information**

Read access	Operator
Write access	-

**Device ID**

**Navigation** Expert → Communication → HART output → Information → Device ID

**Description** Shows the device ID for identifying the device in a HART network

**User interface** Positive integer

**Factory setting** 123456


**Additional information**

Read access	Operator
Write access	-

---

**Device type**



---

<b>Navigation</b>	 Expert → Communication → HART output → Information → Device type				
<b>Description</b>	Shows the device type with which the measuring device is registered with the HART Communication Foundation				
<b>User interface</b>	0 to 65 535				
<b>Factory setting</b>	4 398				
<b>Additional information</b>	<table border="1"> <tr> <td>Read access</td> <td>Operator</td> </tr> <tr> <td>Write access</td> <td>-</td> </tr> </table>	Read access	Operator	Write access	-
Read access	Operator				
Write access	-				

---

**Manufacturer ID**



---

<b>Navigation</b>	 Expert → Communication → HART output → Information → Manufacturer ID				
<b>Description</b>	Shows the device's manufacturer ID registered with the HART Communication Foundation.				
<b>User interface</b>	0 to 65 535				
<b>Factory setting</b>	17				
<b>Additional information</b>	<table border="1"> <tr> <td>Read access</td> <td>Operator</td> </tr> <tr> <td>Write access</td> <td>-</td> </tr> </table>	Read access	Operator	Write access	-
Read access	Operator				
Write access	-				

---

**HART revision**


---

<b>Navigation</b>	 Expert → Communication → HART output → Information → HART revision				
<b>Description</b>	HART revision used by the device.				
<b>User interface</b>	5 to 7				
<b>Factory setting</b>	7				
<b>Additional information</b>	<table border="1"> <tr> <td>Read access</td> <td>Operator</td> </tr> <tr> <td>Write access</td> <td>-</td> </tr> </table>	Read access	Operator	Write access	-
Read access	Operator				
Write access	-				

**HART descriptor**



- Navigation** Expert → Communication → HART output → Information → HART descriptor
- Description** Enter description for the measuring point
- User entry** Character string comprising numbers, letters and special characters (16)
- Factory setting** NMR8x

**Additional information**

Read access	Operator
Write access	Maintenance

**HART message**



- Navigation** Expert → Communication → HART output → Information → HART message
- Description** Use this function to define a HART message which is sent via the HART protocol when requested by the master.  
Maximum length: 32 characters  
Allowed characters: A-Z, 0-9, certain special characters
- User entry** Character string comprising numbers, letters and special characters (32)
- Factory setting** NMR8x

**Additional information**

Read access	Operator
Write access	Maintenance

**Hardware revision**

- Navigation** Expert → Communication → HART output → Information → Hardware rev.
- Description** Hardware revision of the device.
- User interface** 0 to 30
- Factory setting** 1


**Additional information**

Read access	Operator
Write access	-

---

**Software revision**


---

**Navigation**  Expert → Communication → HART output → Information → Software rev.

**Description** Software revision of the device.

**User interface** 0 to 255

**Factory setting** 7

**Additional information**


Read access	Operator
Write access	-

---

**HART date code**


---



**Navigation**  Expert → Communication → HART output → Information → HART date code

**Description** Enter date of the last configuration change. Use this format yyyy-mm-dd

**User entry** Character string comprising numbers, letters and special characters (10)

**Factory setting** 2009-07-20




**Additional information**

Read access	Operator
Write access	Maintenance








### 3.5 "Application" submenu

Navigation  Expert → Application


▶ Application		
▶ Tank configuration		→  185
▶ Tank calculation		→  208
▶ Alarm		→  233











#### 3.5.1 "Tank configuration" submenu

Navigation  Expert → Application → Tank config


Tank configuration		
▶ Level		→  186
▶ Temperature		→  190
▶ Density		→  194
▶ Pressure		→  198
▶ GP values		→  206

**"Level" submenu**

Navigation  Expert → Application → Tank config → Level

▶ Level	
Empty	→  186
Tank reference height	→  187
Tank level	→  187
Set level	→  187
Upper interface level	→  188
Lower interface level	→  188
Water level source	→  188
Water level	→  188
Manual water level	→  189
Blocking distance	→  189

**Empty** 

**Navigation**  Expert → Application → Tank config → Level → Empty

**Description** Distance from reference point to zero position (tank bottom or datum plate).






**User entry** 0 to 10 000 000 mm

**Factory setting** Dependent on the device version



**Additional information**

Read access	Operator
Write access	Maintenance


 The reference point is the lower edge of the device flange.

-  After changing the **Empty** parameter (→  186), the **Table mode** parameter (→  232) is automatically set to **Disable**.
- If **Empty** (→  186) has been changed by more than 20 mm (0.8 in), it is recommended to delete the dip table.
- The dip table values are not affected by a change of the **Empty** parameter (→  186).


**Tank reference height** 


<b>Navigation</b>	  Expert → Application → Tank config → Level → Tank ref height				
<b>Description</b>	Defines the distance from the dipping reference point to the zero position (tank bottom or datum plate).				
<b>User entry</b>	0 to 10 000 000 mm				
<b>Factory setting</b>	Dependent on the device version				
<b>Additional information</b>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Read access</td> <td>Operator</td> </tr> <tr> <td>Write access</td> <td>Maintenance</td> </tr> </table>	Read access	Operator	Write access	Maintenance
Read access	Operator				
Write access	Maintenance				




**Tank level**

<b>Navigation</b>	 Expert → Application → Tank config → Level → Tank level				
<b>Description</b>	Shows the distance from the zero position (tank bottom or datum plate) to the product surface.				
<b>Additional information</b>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Read access</td> <td>Operator</td> </tr> <tr> <td>Write access</td> <td>-</td> </tr> </table>	Read access	Operator	Write access	-
Read access	Operator				
Write access	-				

**Set level** 

<b>Navigation</b>	 Expert → Application → Tank config → Level → Set level				
<b>Description</b>	If the level measured by the device does not match the actual level obtained by a manual dip, enter the correct level into this parameter.				
<b>User entry</b>	0 to 10 000 000 mm				
<b>Factory setting</b>	0 mm				
<b>Additional information</b>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Read access</td> <td>Operator</td> </tr> <tr> <td>Write access</td> <td>Maintenance</td> </tr> </table>	Read access	Operator	Write access	Maintenance
Read access	Operator				
Write access	Maintenance				

The device adjusts the **Empty** parameter (→  186) according to the entered value, such that the measured level will match the actual level.

-  After the change of the **Empty** parameter (→  186), the **Table mode** parameter (→  232) is automatically set to **Disable**.
- If **Empty** has been changed by more than 20 mm (0.8 in), it is recommended to delete the dip table.
- The dip table values are not affected by a change of the **Empty** parameter.

**Upper interface level**

**Navigation**  Expert → Application → Tank config → Level → Upper I/F level

**Description** Shows measured interface level from zero position (tank bottom or datum plate). Value is updated when device generates a valid Interface measurement.

**Additional information**

Read access	Maintenance
Write access	-

**Lower interface level**

**Navigation**  Expert → Application → Tank config → Level → Lower I/F level

**Description** Shows measured interface level from zero position (tank bottom or datum plate). Value is updated when device generates a valid interface measurement.

**Additional information**

Read access	Maintenance
Write access	-

**Water level source**



**Navigation**  Expert → Application → Tank config → Level → Water level src

**Description** Defines the source of the bottom water level.

- Selection**
- Manual value
  - Bottom level
  - HART device 1 ... 15 level
  - AIO B1-3 value
  - AIO C1-3 value
  - AIP B4-8 value
  - AIP C4-8 value

**Factory setting** Manual value

**Additional information**

Read access	Operator
Write access	Maintenance

**Water level**

**Navigation**  Expert → Application → Tank config → Level → Water level

**Description** Shows the bottom water level.

**Additional information**

Read access	Operator
Write access	-

**Manual water level**



**Navigation**

Expert → Application → Tank config → Level → Man. water level

**Prerequisite**

**Water level source** (→ 188) = **Manual value**

**Description**

Defines the manual value of the bottom water level.

**User entry**

-2 000 to 5 000 mm

**Factory setting**

0 mm

**Additional information**

Read access	Operator
Write access	Maintenance

**Blocking distance**



**Navigation**

Expert → Application → Tank config → Level → Blocking dist.

**Description**

No echos are evaluated within the blocking distance BD. Therefore, BD can be used to suppress interference echos in the vicinity of the antenna.

**User entry**

Positive floating-point number

**Factory setting**










800 mm

**Additional information**

Read access	Operator
Write access	Maintenance

**"Temperature" submenu**

Navigation  Expert → Application → Tank config → Temperature

► Temperature	
Liquid temp source	→  190
Manual liquid temperature	→  191
Liquid temperature	→  191
Air temperature source	→  191
Manual air temperature	→  192
Air temperature	→  192
Vapor temp source	→  192
Manual vapor temperature	→  193
Vapor temperature	→  193

**Liquid temp source****Navigation**

 Expert → Application → Tank config → Temperature → Liq temp source

**Description**

Defines source from which the liquid temperature is obtained.

**Selection**

- Manual value
- HART device 1 ... 15 temperature
- AIO B1-3 value
- AIO C1-3 value
- AIP B4-8 value
- AIP C4-8 value

**Factory setting**

Manual value

**Additional information**

Read access	Operator
Write access	Maintenance

**Manual liquid temperature**



**Navigation** Expert → Application → Tank config → Temperature → Man. liquid temp

**Prerequisite** **Liquid temp source (→ 190) = Manual value**

**Description** Defines the manual value of the liquid temperature.

**User entry** -50 to 300 °C

**Factory setting** 25 °C

<b>Additional information</b>	Read access	Operator
	Write access	Maintenance

**Liquid temperature**

**Navigation** Expert → Application → Tank config → Temperature → Liquid temp.

**Description** Shows the average or spot temperature of the measured liquid.

<b>Additional information</b>	Read access	Operator
	Write access	-

**Air temperature source**



**Navigation** Expert → Application → Tank config → Temperature → Air temp. source

**Description** Defines source from which the air temperature is obtained.

- Selection**
- Manual value
  - HART device 1 ... 15 temperature
  - AIO B1-3 value
  - AIO C1-3 value
  - AIP B4-8 value
  - AIP C4-8 value

**Factory setting** Manual value

<b>Additional information</b>	Read access	Operator
	Write access	Maintenance

**Manual air temperature**

**Navigation** Expert → Application → Tank config → Temperature → Manual air temp.

**Prerequisite** **Air temperature source (→ 191) = Manual value**

**Description** Defines the manual value of the air temperature.

**User entry** -50 to 300 °C

**Factory setting** 25 °C

**Additional information**

Read access	Operator
Write access	Maintenance

**Air temperature**

**Navigation** Expert → Application → Tank config → Temperature → Air temp.

**Description** Shows the air temperature.

**Additional information**

Read access	Operator
Write access	-

**Vapor temp source**

**Navigation** Expert → Application → Tank config → Temperature → Vapor temp src

**Description** Defines the source from which the vapor temperature is obtained.

**Selection**

- Manual value
- HART device 1 ... 15 vapor temp
- AIO B1-3 value
- AIO C1-3 value
- AIP B4-8 value
- AIP C4-8 value

**Factory setting** Manual value

**Additional information**

Read access	Operator
Write access	Maintenance



**Manual vapor temperature**



**Navigation** Expert → Application → Tank config → Temperature → Man. vapor temp.

**Prerequisite** Vapor temp source (→ 192) = **Manual value**

**Description** Defines the manual value of the vapor temperature.

**User entry** -50 to 300 °C

**Factory setting** 25 °C

**Additional information**

Read access	Operator
Write access	Maintenance

**Vapor temperature**


**Navigation** Expert → Application → Tank config → Temperature → Vapor temp.











**Description** Shows the measured vapor temperature.

**Additional information**

Read access	Operator
Write access	-

**"Density" submenu**

Navigation  Expert → Application → Tank config → Density

<b>► Density</b>	
Observed density source	→  194
Observed density	→  195
Air density	→  195
Vapor density	→  195
Upper density input source	→  195
Manual upper density	→  196
Measured upper density	→  197
Measured middle density	→  197
Measured lower density	→  197
Water density	→  197

**Observed density source**



Navigation  Expert → Application → Tank config → Density → Density source

Description Determines how the density is obtained.

- Selection
- HTG \*
  - HTMS \*
  - Average profile density \*
  - Upper density
  - Middle density
  - Lower density

Factory setting Dependent on the device version

**Additional information**

Read access	Operator
Write access	Maintenance

\* Visibility depends on order options or device settings

---

**Observed density**

---

**Navigation**   Expert → Application → Tank config → Density → Observed density

**Description** Shows the measured or calculated density.

**Additional information**

<b>Read access</b>	Operator
<b>Write access</b>	-

---

**Air density**

---



**Navigation**   Expert → Application → Tank config → Density → Air density

**Description** Defines the density of the air surrounding the tank.

**User entry** 0.0 to 500.0 kg/m<sup>3</sup>

**Factory setting** 1.2 kg/m<sup>3</sup>


**Additional information**

<b>Read access</b>	Operator
<b>Write access</b>	Maintenance

---

**Vapor density**

---



**Navigation**   Expert → Application → Tank config → Density → Vapor density

**Description** Defines the density of the gas phase in the tank.

**User entry** 0.0 to 500.0 kg/m<sup>3</sup>

**Factory setting** 1.2 kg/m<sup>3</sup>


**Additional information**

<b>Read access</b>	Operator
<b>Write access</b>	Maintenance

---

**Upper density input source**

---



**Navigation**   Expert → Application → Tank config → Density → UpDensity source

**Description** Defines the input source for the upper density value.

- Selection**
- Manual value
  - HART device 1 density \*
  - HART device 2 density \*
  - HART device 3 density \*
  - HART device 4 density \*
  - HART device 5 density \*
  - HART device 6 density \*
  - HART device 7 density \*
  - HART device 8 density \*
  - HART device 9 density \*
  - HART device 10 density \*
  - HART device 11 density \*
  - HART device 12 density \*
  - HART device 13 density \*
  - HART device 14 density \*
  - HART device 15 density \*
  - Upper density \*
  - Middle density \*
  - Lower density \*
  - Average profile density \*
  - AIO B1-3 value \*
  - AIO C1-3 value \*
  - AIP B4-8 value \*
  - AIP C4-8 value \*

**Factory setting** Manual value

**Additional information**

Read access	Operator
Write access	Maintenance

**Manual upper density**



**Navigation** Expert → Application → Tank config → Density → Manual density

**Prerequisite** **Upper density input source (→ 195) = Manual value**

**Description** Defines the manual upper density of the medium.

**User entry** 0 to 3 000 kg/m<sup>3</sup>

**Factory setting** 800 kg/m<sup>3</sup>

**Additional information**

Read access	Operator
Write access	Maintenance

\* Visibility depends on order options or device settings

**Measured upper density**

**Navigation**  Expert → Application → Tank config → Density → Meas upper dens.

**Description** Shows the density of the upper phase.

**Additional information**

Read access	Operator
Write access	-

**Measured middle density**


**Navigation**  Expert → Application → Tank config → Density → Meas middle dens

**Description** Density of the middle phase.

**Additional information**

Read access	Operator
Write access	-

**Measured lower density**

**Navigation**  Expert → Application → Tank config → Density → Meas lower dens.

**Description** Density of the lower phase.

**Additional information**

Read access	Maintenance
Write access	-

**Water density**



**Navigation**  Expert → Application → Tank config → Density → Water density

**Description** Density of the water in the tank.

**User entry** Signed floating-point number


**Factory setting** 1 000 kg/m<sup>3</sup>




















**Additional information**


Read access	Operator
Write access	Maintenance

**"Pressure" submenu**

Navigation

 Expert → Application → Tank config → Pressure

► Pressure	
P1 (bottom) source	→  199
P1 (bottom)	→  199
P1 (bottom) manual pressure	→  199
P1 position	→  200
P1 offset	→  200
P1 absolute / gauge	→  200
P2 (middle) source	→  201
P2 (middle)	→  201
P2 (middle) manual pressure	→  201
P2 offset	→  202
P1-2 distance	→  202
P2 absolute / gauge	→  202
P3 (top) source	→  203
P3 (top)	→  203
P3 (top) manual pressure	→  203
P3 position	→  204
P3 offset	→  204
P3 absolute / gauge	→  204
Ambient pressure	→  205

**P1 (bottom) source** 

**Navigation**   Expert → Application → Tank config → Pressure → P1 (bot) source

**Description** Defines the source of the bottom pressure (P1).

- Selection**
- Manual value
  - HART device 1 ... 15 pressure
  - AIO B1-3 value
  - AIO C1-3 value
  - AIP B4-8 value
  - AIP C4-8 value

**Factory setting** Manual value

**Additional information**

Read access	Operator
Write access	Maintenance


**P1 (bottom)**

**Navigation**   Expert → Application → Tank config → Pressure → P1 (bottom)

**Description** Shows the pressure at the tank bottom.

**Additional information**

Read access	Operator
Write access	-

**P1 (bottom) manual pressure** 

**Navigation**   Expert → Application → Tank config → Pressure → P1 (bot) manual

**Prerequisite** **P1 (bottom) source** (→  199) = **Manual value**

**Description** Defines the manual value of the bottom pressure (P1).

**User entry** -1.01325 to 25 bar

**Factory setting** 0 bar

**Additional information**

Read access	Operator
Write access	Maintenance

**P1 position****Navigation**

Expert → Application → Tank config → Pressure → P1 position

**Description**

Defines the position of the bottom pressure transmitter (P1), measured from zero position (tank bottom or datum plate).

**User entry**

-10 000 to 100 000 mm

**Factory setting**

5 000 mm

**Additional information**

Read access	Operator
Write access	Maintenance

**P1 offset****Navigation**

Expert → Application → Tank config → Pressure → P1 offset

**Description**Offset for the bottom pressure (P1).  
The offset is added to the measured pressure prior to any tank calculation.**User entry**

-25 to 25 bar

**Factory setting**

0 bar

**Additional information**

Read access	Operator
Write access	Maintenance

**P1 absolute / gauge****Navigation**

Expert → Application → Tank config → Pressure → P1 absolut/gauge

**Description**

Defines whether the connected pressure transmitter measures an absolute or a gauge pressure.

**Selection**

- Absolute
- Gauge

**Factory setting**

Gauge

**Additional information**

Read access	Operator
Write access	Maintenance



**P2 (middle) source** 

**Navigation**   Expert → Application → Tank config → Pressure → P2 (mid) source

**Description** Defines the source of the middle pressure (P2).

- Selection**
- Manual value
  - HART device 1 ... 15 pressure
  - AIO B1-3 value
  - AIO C1-3 value
  - AIP B4-8 value
  - AIP C4-8 value

**Factory setting** Manual value

**Additional information**

Read access	Operator
Write access	Maintenance


**P2 (middle)**

**Navigation**   Expert → Application → Tank config → Pressure → P2 (middle)


**Description** Shows the pressure (P2) at the middle transmitter.

**Additional information**

Read access	Operator
Write access	-

**P2 (middle) manual pressure** 

**Navigation**   Expert → Application → Tank config → Pressure → P2 (mid) manual

**Prerequisite** **P2 (middle) source** (→  201) = **Manual value**

**Description** Defines the manual value of the middle pressure (P2).

**User entry** -1.01325 to 25 bar

**Factory setting** 0 bar

**Additional information**

Read access	Operator
Write access	Maintenance

**P2 offset****Navigation**

Expert → Application → Tank config → Pressure → P2 offset

**Description**

Defines the offset for the middle pressure (P2).  
The offset is added to the measured pressure prior to any tank calculation.

**User entry**

-25 to 25 bar

**Factory setting**

0 bar

**Additional information**

Read access	Operator
Write access	Maintenance

**P1-2 distance****Navigation**

Expert → Application → Tank config → Pressure → P1-2 distance

**Description**

Defines the distance between the bottom and the middle pressure transmitter.

**User entry**

0 to 100 000 mm

**Factory setting**

2 000 mm

**Additional information**

Read access	Operator
Write access	Maintenance

**P2 absolute / gauge****Navigation**

Expert → Application → Tank config → Pressure → P2 absolut/gauge

**Description**

Defines whether the connected pressure transmitter measures an absolute or a gauge pressure.

**Selection**


- Absolute
- Gauge

**Factory setting**

Gauge

**Additional information**

Read access	Operator
Write access	Maintenance

**P3 (top) source** 

**Navigation**   Expert → Application → Tank config → Pressure → P3 (top) source

**Description** Defines the source of the top pressure (P3).

- Selection**
- Manual value
  - HART device 1 ... 15 pressure
  - AIO B1-3 value
  - AIO C1-3 value
  - AIP B4-8 value
  - AIP C4-8 value

**Factory setting** Manual value

**Additional information**

Read access	Operator
Write access	Maintenance


**P3 (top)**

**Navigation**   Expert → Application → Tank config → Pressure → P3 (top)


**Description** Shows the pressure (P3) at the top transmitter.

**Additional information**

Read access	Operator
Write access	-

**P3 (top) manual pressure** 

**Navigation**   Expert → Application → Tank config → Pressure → P3 (top) manual

**Prerequisite** **P3 (top) source (→  203) = Manual value**

**Description** Defines the manual value of the top pressure (P3).

**User entry** -1.01325 to 25 bar

**Factory setting** 0 bar

**Additional information**

Read access	Operator
Write access	Maintenance

**P3 position****Navigation**

Expert → Application → Tank config → Pressure → P3 position

**Description**

Defines the position of the top pressure transmitter (P3), measured from zero position (tank bottom or datum plate).

**User entry**

0 to 100 000 mm

**Factory setting**

20 000 mm

**Additional information**

Read access	Operator
Write access	Maintenance

**P3 offset****Navigation**

Expert → Application → Tank config → Pressure → P3 offset

**Description**Offset for the top pressure (P3).  
The offset is added to the measured pressure prior to any tank calculation.**User entry**

-25 to 25 bar

**Factory setting**

0 bar

**Additional information**

Read access	Operator
Write access	Maintenance

**P3 absolute / gauge****Navigation**

Expert → Application → Tank config → Pressure → P3 absolut/gauge

**Description**

Defines whether the connected pressure transmitter measures an absolute or a gauge pressure.

**Selection**

- Absolute
- Gauge

**Factory setting**

Gauge

**Additional information**

Read access	Operator
Write access	Maintenance

**Ambient pressure**



**Navigation** Expert → Application → Tank config → Pressure → Ambient pressure

**Description** Defines the manual value of the ambient pressure.

**User entry** 0 to 2.5 bar

**Factory setting** 1 bar







**Additional information**

Read access	Operator
Write access	Maintenance

**"GP values" submenu**

Navigation  Expert → Application → Tank config → GP values


▶ GP values

GP 1 to 4 source	→  206
GP 1 to 4 name	→  207
GP Value 1	→  207
GP Value 2	→  207
GP Value 3	→  207
GP Value 4	→  208

**GP 1 to 4 source**



**Navigation**

 Expert → Application → Tank config → GP values → GP 1 to 4 source (14989-1 to 4)

**Description**

Source of the general purpose value 1 GP1.

**Selection**

- No input value
- SM R distance
- Average profile density
- Net weight
- AIO B1-3 value
- AIO C1-3 value
- AIP B4-8 value
- AIP C4-8 value
- HART device 1...15 PV
- HART device 1...15 SV
- HART device 1...15 TV
- HART device 1...15 QV
- Modbus A1-4 Value 1...4
- Modbus B1-4 Value 1...4
- Modbus C1-4 Value 1...4
- Modbus D1-4 Value 1...4

**Factory setting**

No input value

**Additional information**

Read access	Operator
Write access	Maintenance

**GP 1 to 4 name**



**Navigation** Expert → Application → Tank config → GP values → GP 1 name

**Description** Defines the label associated with the respective GP value.

**User entry** Character string comprising numbers, letters and special characters (15)

**Factory setting** GP Value 1

**Additional information**

Read access	Operator
Write access	Maintenance

**GP Value 1**

**Navigation** Expert → Application → Tank config → GP values → GP Value 1

**Description** Displays the value that will be used as general purpose value.

**Additional information**

Read access	Operator
Write access	-

**GP Value 2**

**Navigation** Expert → Application → Tank config → GP values → GP Value 2

**Description** Displays the value that will be used as general purpose value.

**Additional information**

Read access	Operator
Write access	-

**GP Value 3**

**Navigation** Expert → Application → Tank config → GP values → GP Value 3

**Description** Displays the value that will be used as general purpose value.


**Additional information**

Read access	Operator
Write access	-

---

**GP Value 4**


---

**Navigation**
 Expert → Application → Tank config → GP values → GP Value 4
**Description**







Displays the value that will be used as general purpose value.

**Additional information**


Read access	Operator
Write access	-

### 3.5.2 "Tank calculation" submenu

*Navigation*
 Expert → Application → Tank calculation

▶ Tank calculation	
Local gravity	→  208
▶ HyTD	→  211
▶ CTSh	→  216
▶ CLG	→  219
▶ HTMS	→  225
▶ Dip-table	→  231

---

**Local gravity**
**Navigation**
 Expert → Application → Tank calculation → Local gravity
**Description**

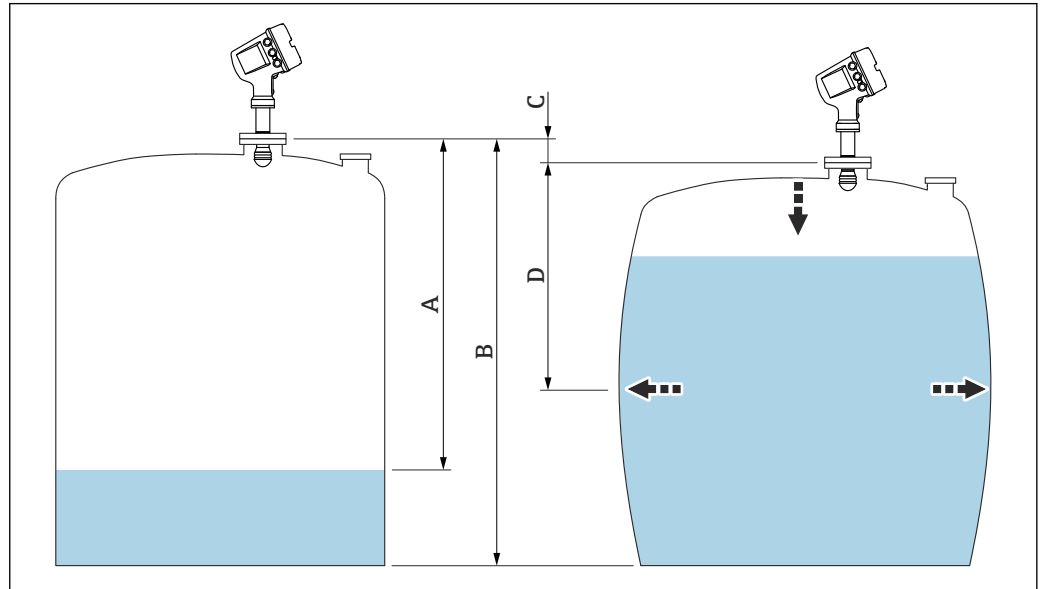
Shows the manually entered local gravity value.

**User entry**9.0 to 10.0 m/s<sup>2</sup>**Factory setting**9.807 m/s<sup>2</sup>



**"HyTD" submenu***Overview*

Hydrostatic Tank Deformation can be used to compensate the vertical movement of the Gauge Reference Height (GRH) due to bulging of the tank shell caused by the hydrostatic pressure exerted by the liquid stored in the tank. The compensation is based on a linear approximation obtained from manual hand dips at several levels distributed over the full range of the tank.



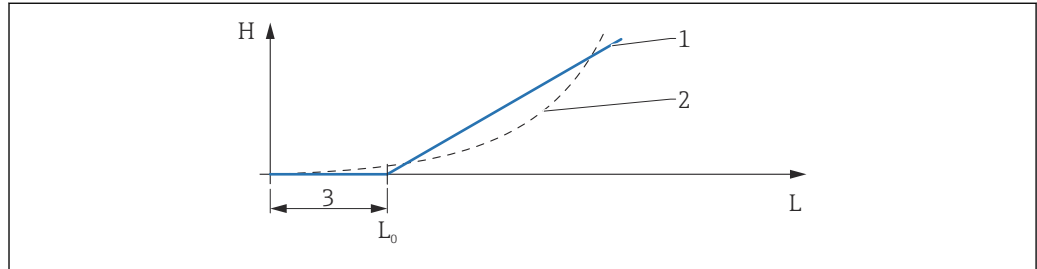
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15 Correction of the hydrostatic tank deformation (HyTD)

- A "Distance" (level below  $L_0 \rightarrow$  "HyTD correction value" = 0)
- B Gauge Reference Height (GRH)
- C HyTD correction value
- D "Distance" (level above  $L_0 \rightarrow$  "HyTD correction value" > 0)

*Linear approximation of the HyTD correction*

The real amount of deformation varies non-linearly with the level due to the construction of the tank. However, as the correction values are typically small compared to the measured level, a simple straight line method can be used with good results.



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16 Calculation of the HyTD correction

- 1 Linear correction according to "Deformation factor ( $\rightarrow$  212)"
- 2 Real correction
- 3 Starting level ( $\rightarrow$  211)
- L Measured level
- H HyTD correction value ( $\rightarrow$  211)

*Calculation of the HyTD correction*

$$L \leq L_0 \Rightarrow C_{HyTD} = 0$$

$$L > L_0 \Rightarrow C_{HyTD} = - (L - L_0) \times D$$





A0028715

<b>L</b>	Measured level
<b>L<sub>0</sub></b>	Starting level
<b>C<sub>HyTD</sub></b>	HyTD correction value
<b>D</b>	Deformation factor

*Description of parameters*

Navigation  Expert → Application → Tank calculation → HyTD

▶ HyTD

HyTD correction value	→  211
HyTD mode	→  211
Starting level	→  211
Deformation factor	→  212

---

**HyTD correction value**

---

Navigation  Expert → Application → Tank calculation → HyTD → HyTD corr. value

Description Shows the correction value from the Hydrostatic Tank Deformation.

**Additional information**

Read access	Operator
Write access	-

---

**HyTD mode**

---



Navigation  Expert → Application → Tank calculation → HyTD → HyTD mode

Description Activates or deactivates the calculation of the Hydrostatic Tank Deformation.

**Selection**

- No
- Yes

**Factory setting**

No

**Additional information**

Read access	Operator
Write access	Maintenance

---

**Starting level**

---



Navigation  Expert → Application → Tank calculation → HyTD → Starting level

Description Defines the starting level for the Hydrostatic Tank Deformation. Levels below this value are not corrected.

**User entry** 0 to 5 000 mm

**Factory setting** 500 mm

**Additional information**

<b>Read access</b>	Operator
<b>Write access</b>	Maintenance

---

**Deformation factor**



**Navigation**

Expert → Application → Tank calculation → HyTD → Deform factor

**Description**

Defines the deformation factor for the HyTD (change of device position per change of level).

**User entry**

-1.0 to 1.0 %

**Factory setting**

0.2 %




**Additional information**

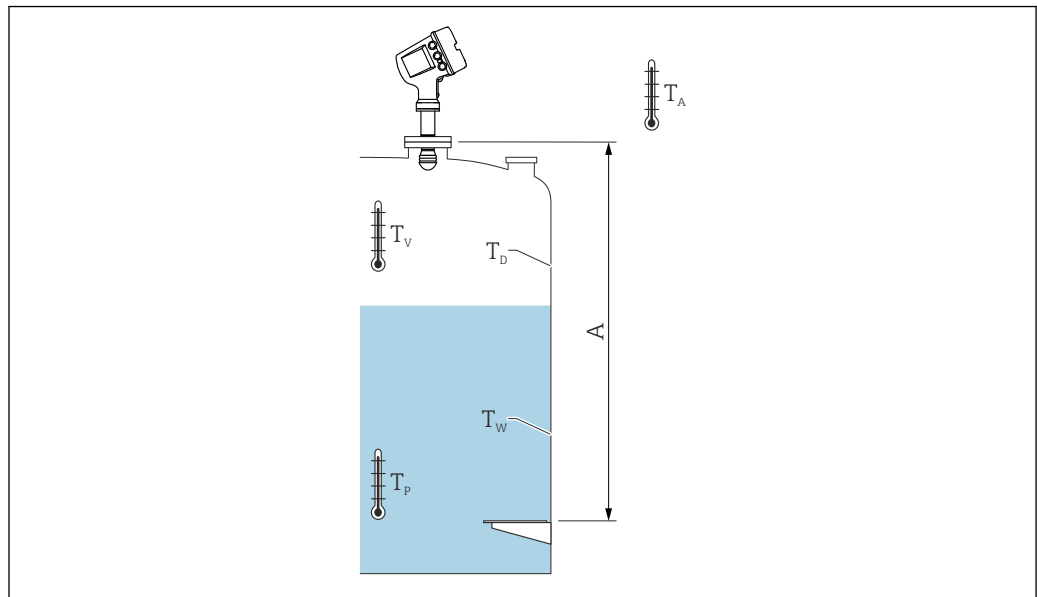
<b>Read access</b>	Operator
<b>Write access</b>	Maintenance

## "CTSh" submenu

### Overview

CTSh (correction for the thermal expansion of the tank shell) compensates for effects on the Gauge Reference Height (GRH) and on the expansion or contraction of the measuring wire due to temperature effects on the tank shell or stilling well. The temperature effects are separated into two parts, respectively affecting the 'dry' and 'wetted' part of the tank shell or stilling well. The correction function is based on thermal expansion coefficients of steel and insulation factors for both the 'dry' and 'wet' parts of the wire and the tank shell. The temperatures used for the correction can be selected from on manual or measured values.

-  This correction is recommended for the following situations:
  - if the operating temperature deviates considerably from the temperature during calibration ( $\Delta T > 10\text{ °C}$  (18 °F))
  - for extremely high tanks
  - for refrigerated, cryogenic or heated applications
-  As the use of this correction will influence the innage level reading, it is recommended to ensure the manual hand dip and level verification procedures are being conducted correctly before enabling this correction method.
-  This mode cannot be used in conjunction with HTG because the level is not measured relative to the gauge reference height with HTG.

*CTSh: Calculation of the wall temperature*

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17 Parameters for the CTSh calculation

A Gauge Reference Height (GRH)

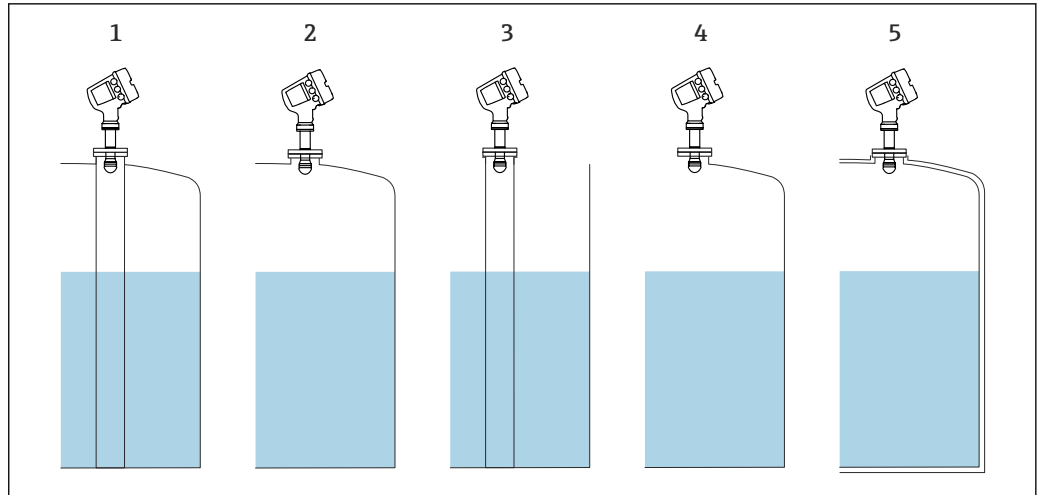
$T_W$	Temperature of the wetted part of the tank shell
$T_D$	Temperature of the dry part of the tank shell
$T_P$	Product temperature
$T_V$	Vapor temperature (in the tank)
$T_A$	Ambient temperature (atmosphere surrounding the tank)

*CTSh: Calculation of the wall temperature*

Depending on the parameters **Covered tank** ( $\rightarrow$  217) and **Stilling well** ( $\rightarrow$  217), the temperatures  $T_W$  of the wetted and  $T_D$  of the dry part of the tank wall are calculated as follows:

Covered tank ( $\rightarrow$ 217)	Stilling well ( $\rightarrow$ 217)	$T_W$	$T_D$
Covered	Yes <sup>1)</sup>	$T_P$	$T_V$
	No	$(7/8) T_P + (1/8) T_A$	$(1/2) T_V + (1/2) T_A$
Open top	Yes	$T_P$	$T_A$
	No	$(7/8) T_P + (1/8) T_A$	$T_A$

- 1) This option is also valid for insulated tanks without a stilling well. This is due to the temperature inside and outside of the tank shell being the same due to the insulation of the tank.



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- 1 Covered tank (→ 217) = Covered; Stilling well (→ 217) = Yes
- 2 Covered tank (→ 217) = Covered; Stilling well (→ 217) = No
- 3 Covered tank (→ 217) = Open top; Stilling well (→ 217) = Yes
- 4 Covered tank (→ 217) = Open top; Stilling well (→ 217) = No
- 5 Insulated tank: Covered tank (→ 217) = Open top; Stilling well (→ 217) = Yes

*CTSh: Calculation of the correction*








$$C_{CTSh} = \alpha (H - L)(T_D - T_{cal}) + \alpha L (T_W - T_{cal})$$

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<b>H</b>	Gauge Reference Height
<b>L</b>	Measured level
<b>T<sub>D</sub></b>	Temperature of the dry part of the tank shell (calculated from T <sub>P</sub> , T <sub>V</sub> and T <sub>A</sub> )
<b>T<sub>W</sub></b>	Temperature of the wetted part of the tank shell (calculated from T <sub>P</sub> , T <sub>V</sub> and T <sub>A</sub> )
<b>T<sub>cal</sub></b>	Temperature at which the measurement has been calibrated
<b>α</b>	Linear expansion coefficient
<b>C<sub>CTSh</sub></b>	CTSh correction value



*Description of parameters*

*Navigation*        Expert → Application → Tank calculation → CTSh

▶ CTSh	
CTSh correction value	→  216
CTSh mode	→  217
Covered tank	→  217
Stilling well	→  217
Calibration temperature	→  218
Linear expansion coefficient	→  218
Wire expansion coefficient	→  218

**CTSh correction value**

**Navigation**

  Expert → Application → Tank calculation → CTSh → CTSh corr value

**Description**

Shows the CTSh correction value.

**Additional information**

<b>Read access</b>	Operator
<b>Write access</b>	-



**CTSh mode**



**Navigation** Expert → Application → Tank calculation → CTSh → CTSh mode

**Description** Activates or deactivates the CTSh.

- Selection**
- No
  - Yes
  - With wire \*
  - Only wire \*

**Factory setting** No

**Additional information**

Read access	Operator
Write access	Maintenance

**Covered tank**



**Navigation** Expert → Application → Tank calculation → CTSh → Covered tank

**Description** Determines whether the tank is covered.

- Selection**
- Open top
  - Covered

**Factory setting** Open top

**Additional information**

Read access	Operator
Write access	Maintenance

The **Covered** option is only valid for fixed tank roofs. For a floating roof select **Open top**.

**Stilling well**



**Navigation** Expert → Application → Tank calculation → CTSh → Stilling well

**Description** Determines whether the device is mounted on a stilling well.

- Selection**
- No
  - Yes

**Factory setting** No

\* Visibility depends on order options or device settings

**Additional information**

Read access	Operator
Write access	Maintenance

**Calibration temperature****Navigation**

Expert → Application → Tank calculation → CTSh → Calibration temp

**Description**

Specify temperature at which the measurement has been calibrated.

**User entry**

-50 to 250 °C

**Factory setting**

25 °C

**Additional information**

Read access	Operator
Write access	Maintenance

**Linear expansion coefficient****Navigation**

Expert → Application → Tank calculation → CTSh → Linear exp coeff

**Description**

Defines the linear expansion coefficient of the tank shell material.

**User entry**

0 to 100 ppm

**Factory setting**

15 ppm

**Additional information**

Read access	Operator
Write access	Maintenance

**Wire expansion coefficient****Navigation**

Expert → Application → Tank calculation → CTSh → Wire exp coeff

**Description**

Defines the expansion coefficient of the wire material of the drum. Value is programmed in factory.

**User entry**

0 to 100 ppm

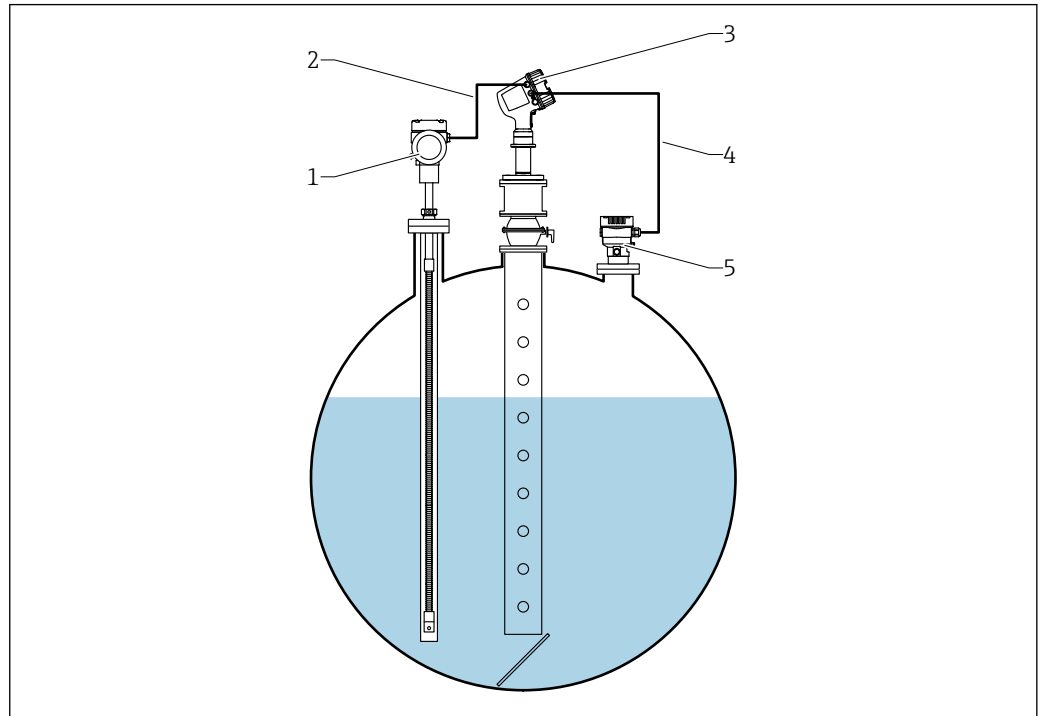
**Factory setting**

15 ppm

**"CLG" submenu**

*Overview*


The gas phase in pressurized tanks has a direct impact on the distance determination for time-of-flight sensors. This feature corrects the influences of the vapor phase based on its pressure, temperature and composition.



A0053921






- 1 Prothermo temperature measurement device, equipped with thermowell or protective pipe
- 2 HART connection
- 3 Radar level gauge Micropilot NMR84
- 4 HART connection
- 5 Digital pressure transmitter



*Description of parameters*

 Configuration of the gas phase correction for liquefied gases (CLG)

*Navigation*       Expert → Application → Tank calculation → CLG

**▶ CLG**

CLG mode	→  220
CLG to tank level	→  220
Gas 1 to 4	→  221
Gas 1 to 4 refractive index	→  221
Gas 1 to 4 ratio	→  221

CLG correction value	→  222
CLG corrected level	→  222

---

**CLG mode**
**Navigation**
  Expert → Application → Tank calculation → CLG → CLG mode
**Description**

Activates or deactivates CLG for a mixture of up to four gases.

**Selection**

- Off
- Pure gas \*
- Mix of two gases \*
- Mix of three gases \*
- Mix of four gases \*



**Factory setting**

Off

**Additional information**

Read access	Operator
Write access	Maintenance

---

**CLG to tank level**
**Navigation**
  Expert → Application → Tank calculation → CLG → CLG to level
**Description**

Activates or deactivates the tank level correction by CLG. Additional information: SIL- or WHG-Mode sets this parameter to "No".

**Selection**

- No
- Yes

**Factory setting**

No

**Additional information**

Read access	Operator
Write access	Maintenance

---

\* Visibility depends on order options or device settings

**Gas 1 to 4**



**Navigation**

Expert → Application → Tank calculation → CLG → Gas 1 to 4

**Selection**

- Chloroethylene C2H3Cl
- Ethylene C2H4
- Ethane C2H6
- Propadiene C3H4
- Propylene C3H6
- Propane C3H8
- Isobutane C4H10
- Butane C4H10
- Butylene C4H8
- Isobutylene C4H8
- Pentane C5H12
- Methane CH4
- Hydrogen H2
- Nitrogen N2
- Ammonia NH3
- Air
- Custom

**Factory setting**

Air

**Additional information**

Read access	Operator
Write access	Maintenance

**Gas 1 to 4 refractive index**



**Navigation**

Expert → Application → Tank calculation → CLG → Gas 1 to 4 RI

**Description**

Gas refractive index at 0°C and 1bar with up to 6 decimal places.

**User interface**

1.0 to 2.0

**Factory setting**

1.000288

**Additional information**

Read access	Operator
Write access	Service

**Gas 1 to 4 ratio**



**Navigation**

Expert → Application → Tank calculation → CLG → Gas 1 to 4 ratio

**Description**

Defines the ratio of this gas in the mixture. Given as unitless integer value.

**User entry**

1 to 100

**Factory setting** 1

**Additional information**

Read access	Operator
Write access	Maintenance

---

**CLG correction value**

---

**Navigation**  Expert → Application → Tank calculation → CLG → CLG correction

**Description** Shows the CLG correction value.

**User interface** Signed floating-point number

**Factory setting** 0 mm

**Additional information**

Read access	Operator
Write access	-

---

**CLG corrected level**

---

**Navigation**  Expert → Application → Tank calculation → CLG → CLG corr. level

**Description** Shows the level with CLG correction only.

**User interface** Signed floating-point number

**Factory setting** 0 mm

**Additional information**

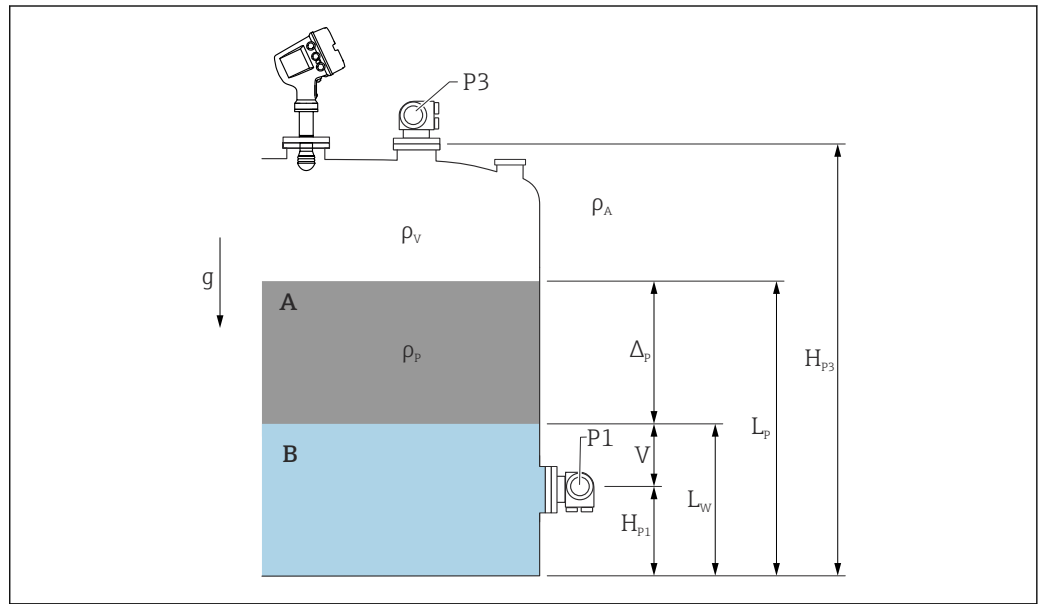
Read access	Operator
Write access	-

**"HTMS" submenu**

*Overview*

The Hybrid Tank Measurement System (HTMS) is a method to calculate the density of a product in a tank based on both a (top mounted) level and at least one (bottom mounted) pressure measurement. An additional pressure sensor can be installed at the top of the tank to provide information about the vapor pressure and to make the density calculation more accurate. The calculation method also takes into account a possible level of water at the bottom of the tank to make density calculations as accurate as possible.

*HTMS parameters*




18 HTMS parameters

- A Product
- B Water


Parameter	Navigation path
P1 (Bottom pressure)	Setup → Advanced setup → Tank configuration → Pressure → P1 (bottom)
H <sub>P1</sub> (Position of P1 transmitter)	Setup → Advanced setup → Tank configuration → Pressure → P1 position
P3 (Top pressure)	Setup → Advanced setup → Tank configuration → Pressure → P3 (top)
H <sub>P3</sub> (Position of P3 transmitter)	Setup → Advanced setup → Tank configuration → Pressure → P3 position
ρ <sub>p</sub> (Density of the product <sup>1)</sup> )	<ul style="list-style-type: none"> <li>■ Measured value: Setup → Advanced setup → Calculation → HTMS → Density value (13753)</li> <li>■ User-defined value: Setup → Advanced setup → Calculation → HTMS → Manual upper density (14998)</li> </ul>
ρ <sub>v</sub> (Vapor density)	Expert → Application → Tank configuration → Density → Vapor density
ρ <sub>A</sub> (Ambient air temperature)	Setup → Advanced setup → Tank configuration → Density → Air density
g (Local gravity)	Expert → Application → Tank Calculation → Local gravity
L <sub>p</sub> (Level of the product)	Operation → Tank level (14655)
L <sub>w</sub> (Bottom water level)	Operation → Water level (14970)
V = L <sub>w</sub> - H <sub>P1</sub>	
Δ <sub>p</sub> = L <sub>p</sub> - L <sub>w</sub> = L <sub>p</sub> - V - H <sub>P1</sub>	

1) Depending on the situation this parameter is measured or a user-defined value is used.

*HTMS modes*

Two HTMS modes can be selected in the **HTMS mode** parameter (→  225). The mode determines whether one or two pressure values are used. Depending on the selected mode a number of additional parameters are required for the calculation of the product density.

 The **HTMS P1+P3** option must be used in pressurized tanks in order to compensate for the pressure of the vapor phase.

HTMS mode (→  225)	Measured variables	Required additional parameters	Calculated variables
HTMS P1	<ul style="list-style-type: none"> <li>▪ P<sub>1</sub></li> <li>▪ L<sub>p</sub></li> </ul>	<ul style="list-style-type: none"> <li>▪ g</li> <li>▪ H<sub>p1</sub></li> <li>▪ L<sub>w</sub> (optional)</li> </ul>	ρ <sub>p</sub>
HTMS P1+P3	<ul style="list-style-type: none"> <li>▪ P<sub>1</sub></li> <li>▪ P<sub>3</sub></li> <li>▪ L<sub>p</sub></li> </ul>	<ul style="list-style-type: none"> <li>▪ ρ<sub>v</sub></li> <li>▪ ρ<sub>a</sub></li> <li>▪ g</li> <li>▪ H<sub>p1</sub></li> <li>▪ H<sub>p3</sub></li> <li>▪ L<sub>w</sub> (optional)</li> </ul>	ρ <sub>p</sub> (more precise calculation for pressurized tanks)

*Minimum level*

The density of the product can only be calculated if the product has a minimum thickness :


$$\Delta_p \geq \Delta_{p, \min}$$

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This is equivalent to the following condition for the product level:

$$L_p - V \geq \Delta_{p, \min} + H_{p1} = L_{\min}$$


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L<sub>min</sub> is defined in the **Minimum level** parameter (→  226). As can be seen from the formula it always must be bigger than H<sub>p1</sub>.

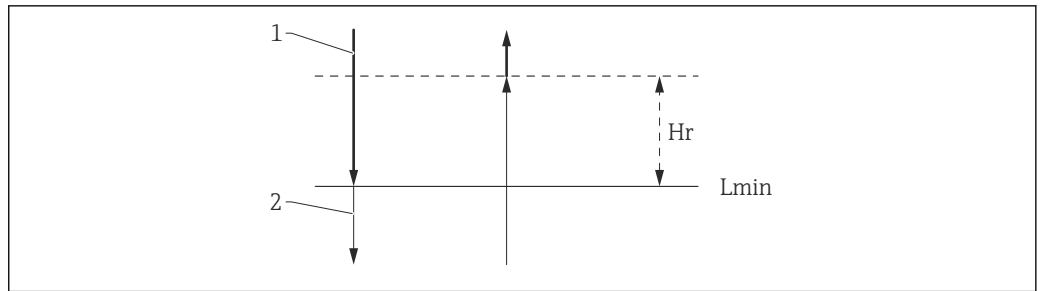
If L<sub>p</sub> - V falls below this limit, the density is calculated as follows:

- If a previous calculated value is available, this value will be kept as long as no new calculation is possible.
- If no value was previously calculated, the manual value (defined in the **Manual upper density** parameter (→  196)) will be used.

*Hysteresis*

The level of the product in a tank is not constant but slightly varies, due for example to filling disturbances. If the level oscillates around the changeover level (**Minimum level** (→  226)), the algorithm will constantly switch between calculating the value and holding the previous result. To avoid this effect a positional hysteresis is defined around the changeover point.





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19 HTMS hysteresis

- 1 Value calculated
- 2 Value held/manual
- $L_{min}$  Minimum level (→ 226)
- $H_r$  Hysteresis (→ 227)

Description of parameters

Navigation Expert → Application → Tank calculation → HTMS

▶ HTMS

HTMS mode	→  225
Manual density	→  226
Density value	→  226
Minimum level	→  226
Minimum pressure	→  227
Safety distance	→  227
Hysteresis	→  227
Water density	→  228

HTMS mode

Navigation

Expert → Application → Tank calculation → HTMS → HTMS mode

Description

Defines the HTMS mode. Depending on the mode one or two pressure transmitters are used.

Selection

- HTMS P1
- HTMS P1+P3

Factory setting

HTMS P1

**Additional information**

Read access	Operator
Write access	Maintenance

Meaning of the options

- HTMS P1  
Only a bottom pressure transmitter (P1) is used.
- HTMS P1+P3  
A bottom (P1) and top (P3) pressure transmitter are used. This option should be selected for pressurized tanks.

**Manual density****Navigation**

Expert → Application → Tank calculation → HTMS → Manual density

**Description**

Defines the manual density.

**User entry**

0 to 3 000 kg/m<sup>3</sup>

**Factory setting**

800 kg/m<sup>3</sup>

**Additional information**

Read access	Maintenance
Write access	Maintenance

**Density value****Navigation**

Expert → Application → Tank calculation → HTMS → Density value

**Description**

Shows the calculated product density.

**Additional information**

Read access	Operator
Write access	-

**Minimum level****Navigation**

Expert → Application → Tank calculation → HTMS → Min. level

**Description**

Defines the minimum product level for a HTMS calculation.

If Lp - V falls below the limit defined in this parameter, the density retains its last value or the manual value is used instead.

**User entry**

0 to 20 000 mm

**Factory setting**

7 000 mm

**Additional information**

Read access	Operator
Write access	Maintenance

**Minimum pressure**



**Navigation**

Expert → Application → Tank calculation → HTMS → Minimum pressure

**Description**

Defines the minimum pressure for a HTMS calculation.

If the pressure P1 (or the difference P1 - P3) falls below the limit defined in this parameter, the density retains its last value or the manual value is used instead.

**User entry**

0 to 100 bar

**Factory setting**

0.1 bar

**Additional information**

Read access	Operator
Write access	Maintenance

**Safety distance**



**Navigation**

Expert → Application → Tank calculation → HTMS → Safety distance

**Description**

Defines the minimum level which must be present above the bottom pressure sensor before its signal is used for the calculation.

**User entry**

0 to 10 000 mm

**Factory setting**

2 000 mm

**Additional information**

Read access	Operator
Write access	Maintenance

**Hysteresis**



**Navigation**

Expert → Application → Tank calculation → HTMS → Hysteresis

**Description**

Defines the hysteresis for the HTMS calculation. Prevents constant switching if the level is near the switch-over point.

**User entry**

0 to 2 000 mm


**Factory setting**

50 mm

**Additional information**

Read access	Operator
Write access	Maintenance

**Water density****Navigation**

 Expert → Application → Tank calculation → HTMS → Water density

**Description**

Density of the water in the tank.

**User entry**

Signed floating-point number

**Factory setting**

1 000 kg/m<sup>3</sup>

**Additional information**

Read access	Operator
Write access	Maintenance



## "Dip-table" submenu

### *Dip table*

The dip table is used to correct the level readings using independently taken hand dips. The dip table is used in particular to adapt the level gauge to the specific application conditions such as a mechanical offset and the tank or stilling well design. Depending on national regulations, national inspectors will dip the tank at one to three levels during a calibration run and check the level readings.

Only one value pair must be entered into the dip table to correct the measurement offset. If a second value pair is entered into the dip table, the device accepts the corrected measured values identically for both value pairs. All other measured values are determined by linear extrapolation.

If more than two value pairs are entered, the system carries out a linear interpolation between adjacent value pairs. Outside these value pairs, extrapolation is also linear.

-  ■ The offset should **not** be determined and entered within the close range of the antenna or immediately in the range of the tank bottom, because within these ranges interferences of the radar signal may occur.
- The entries of the dip table must be arranged in an ascending order of levels. If table values have not been entered in the correct order, they can automatically be rearranged by selecting **Table settings** (→  232) = **Sort table**

### *Semiautomatic creation of a dip table*


In order not to mix up measurement values corrected by the dip table with uncorrected measurement values, it is recommended to enter new data pairs semiautomatically into the table. This means: the uncorrected level is measured by the device and the user only enters the corresponding dip value.

The first dip value should be entered immediately after the basic calibration. Further dip points should be entered only after a level change of at least 2 m (6.6 ft) and a deviation between the uncorrected measurement value and the hand dip value of at least 4 mm (0.16 in).

If this procedure can not be followed, then **no** value pair should be entered into the dip table after basic calibration. Measurement data and hand dip values should be collected over the full measurement range and be evaluated with regard to a good linear fit. Only then characteristic value pairs should be entered into the dip table using the "manual mode" (see below).

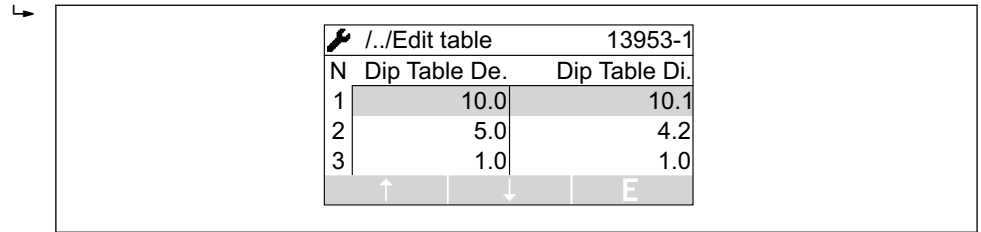
### *Manual creation of a dip table*

Before creating a dip table manually, measured levels and dip values should be collected over the full measurement range and be evaluated with regard to a linear fit. Only then characteristic value pairs from this fit should be entered into the dip table using the manual mode. In the manual mode both, the measured level (without correction) and the corresponding dip value are entered by the user.

-  If further linearisation is needed, further hand dip values should be entered using only the "semi-automatic" mode (see above).

*The table editor on the local display*

1. Navigate to Setup → Advanced setup → Application → Tank calculation → Dip-table → Table mode (12516) and select the **Disable** option.
2. Navigate to Setup → Advanced setup → Application → Calculation → Dip-table → Edit table

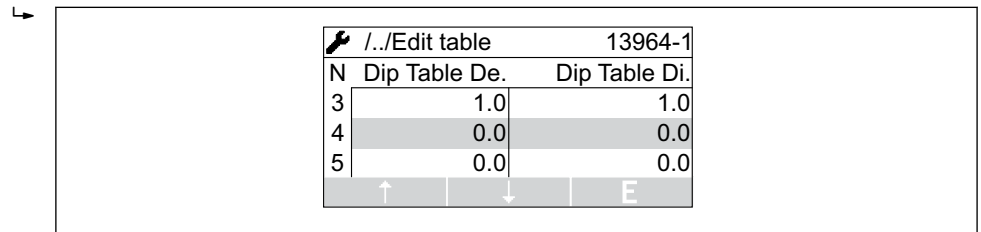


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20 The dip table editor on the local display

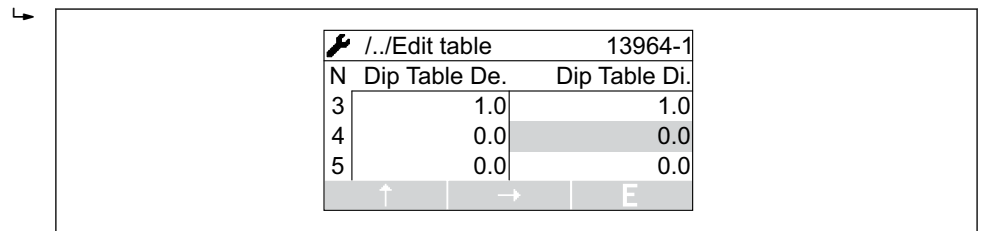
N Number of the line  
 De. Device level  
 Di. Dip level

3. Use the "↑" and "↓" keys to move to the line you want to edit.



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4. Press "E" to open the line.
5. Use "→" to select the cell you want to edit.



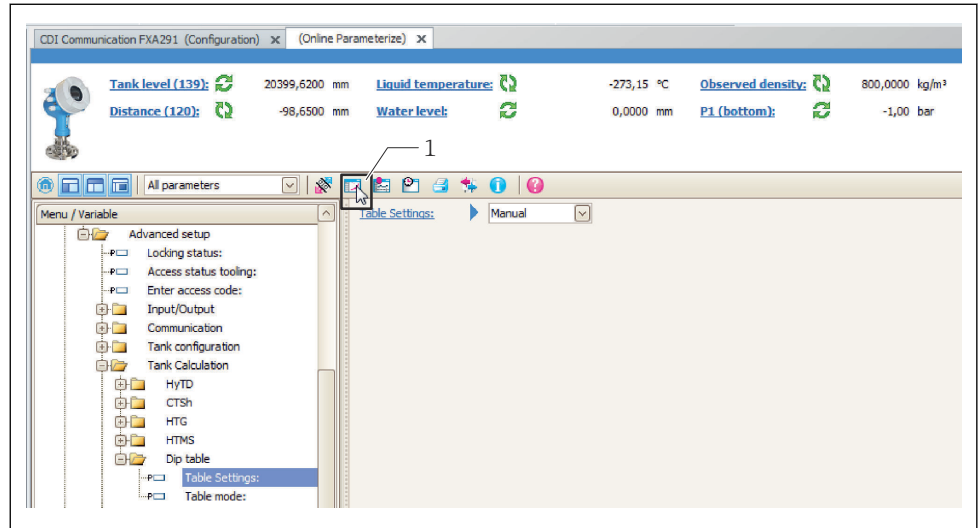
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6. Press "E" to open the cell.
7. Enter the required number.
8. Continue until all required table points have been entered.
9. Press "-" and "+" simultaneously to quit the table editor.
10. Navigate to Setup → Advanced setup → Application → Tank calculation → Dip-table → Table settings (12515) and select the **Sort table** option.
  - ↳ The table points are arranged in an ascending order.
11. Navigate to Setup → Advanced setup → Application → Tank calculation → Dip-table → Table mode (12516) and select the **Enable** option.
  - ↳ The new dip table is active.

The table editor in FieldCare

**i** In the FieldCare table editor the dip table can only be entered manually. Even if the semiautomatic method has been selected in the **Table settings** parameter (→ 232), the complete table will be written from the editor to the device in the manual mode.

1.

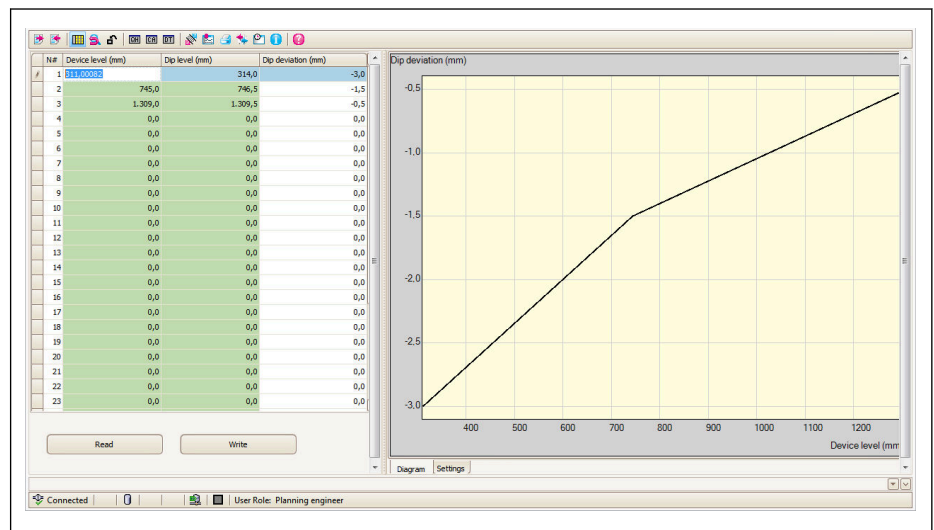


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1 Table icon; calls up the table editor.

Open the table editor by clicking on the table icon.

↳ The graphical table editor appears:





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2. If the device already contains a dip table: Click "Read" to load it into the editor.
3. Enter or change table values in the table on the right. A graphical representation of the table is shown in the diagram on the right.
4. Click "Write" to write the table back to the device.

Description of parameters



Navigation Expert → Application → Tank calculation → Dip-table



Table settings	→  232
Table mode	→  232

## Table settings

### Navigation

  Expert → Application → Tank calculation → Dip-table → Table settings

### Description

Defines the dip-table operation to be performed.

### Selection

- Manual
- Semiautomatic
- Clear table
- Sort table

### Factory setting

Manual

### Additional information



Read access	Operator
Write access	Maintenance

#### Meaning of the options

- Manual  
Both, the device level and the dip level for each table point have to be entered manually.
- Semiautomatic  
The device level of each table point is measured by the device itself, the corresponding dip level must be entered manually.
- Clear table  
Deletes the complete dip table.
- Sort table  
Sorts the table points into an ascending order. This must be performed if table values have not been entered in the correct order.

## Table mode

### Navigation

  Expert → Application → Tank calculation → Dip-table → Table mode

### Description

Enables or disables the dip-table.

### Selection

- Disable
- Enable

### Factory setting

Disable

### Additional information


Read access	Operator
Write access	Maintenance





















### 3.5.3 "Alarm" submenu

Navigation  Expert → Application → Alarm

#### "Alarm" submenu

Navigation  Expert → Application → Alarm → Alarm

▶ Alarm	
Alarm mode	→  234
Error value	→  235
Alarm value source	→  236
Alarm value	→  237
HH alarm value	→  237
H alarm value	→  237
L alarm value	→  238
LL alarm value	→  238
HH alarm	→  238
H alarm	→  239
HH+H alarm	→  239
L alarm	→  239
LL alarm	→  239
LL+L alarm	→  240
Any error	→  240
Clear alarm	→  240
Alarm hysteresis	→  241
Damping factor	→  241

**Alarm mode****Navigation**

Expert → Application → Alarm → Alarm → Alarm mode

**Description**

Defines the alarm mode of the selected alarm.

**Selection**

- Off
- On
- Latching

**Factory setting**

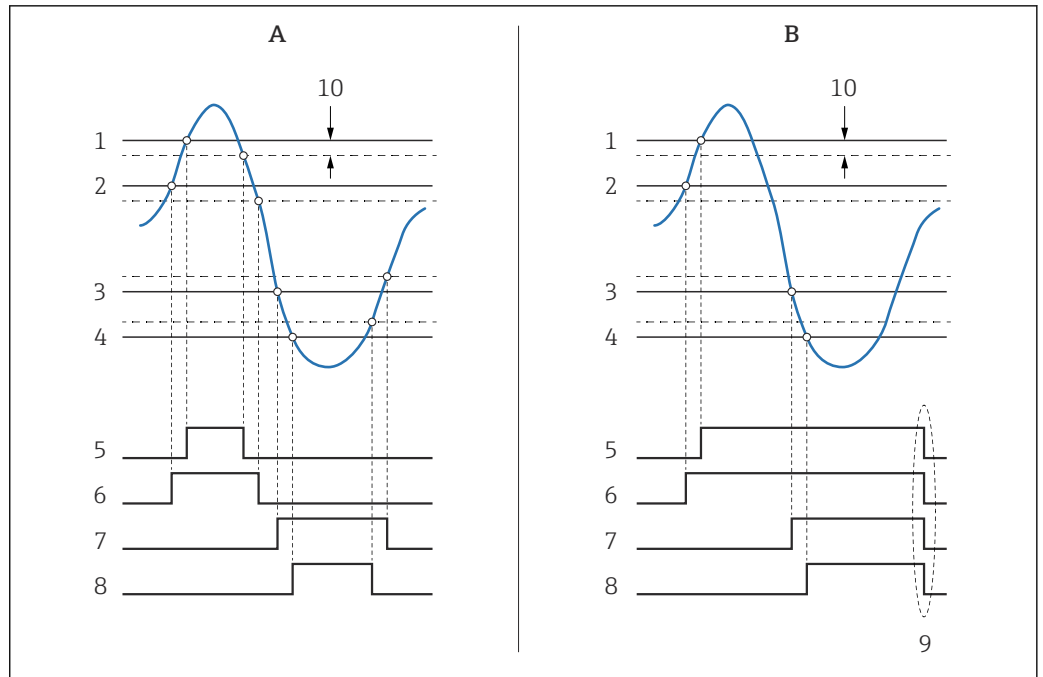
Off

**Additional information**

Read access	Operator
Write access	Maintenance

*Meaning of the options*

- **Off**  
No alarms are generated.
- **On**  
An alarm disappears if the alarm condition is no longer present (taking into consideration the hysteresis).
- **Latching**  
All alarms remain active until the user selects **Clear alarm** (→ 240) = **Yes** or the power is switched off and on.



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21 Principle of the limit evaluation

- A Alarm mode (→ 234) = On
- B Alarm mode (→ 234) = Latching
- 1 HH alarm value (→ 237)
- 2 H alarm value (→ 237)
- 3 L alarm value (→ 238)
- 4 LL alarm value (→ 238)
- 5 HH alarm (→ 238)
- 6 H alarm (→ 239)
- 7 L alarm (→ 239)
- 8 LL alarm (→ 239)
- 9 "Clear alarm (→ 240)" = "Yes" or power off-on
- 10 Hysteresis (→ 241)

Error value



Navigation

Expert → Application → Alarm → Alarm → Error value

Prerequisite

Alarm mode (→ 234) ≠ Off

Description

Defines the alarm to be issued if the input value is invalid.

Selection

- No alarm
- HH+H alarm
- H alarm
- L alarm
- LL+L alarm
- All alarms

Factory setting

All alarms

Additional information

Read access	Operator
Write access	Maintenance

**Alarm value source**



**Navigation** Expert → Application → Alarm → Alarm → Alarm source

**Prerequisite** **Alarm mode (→ 234) ≠ Off**

**Description** Determines the process variable to be monitored.


- Selection**
- Tank level
  - Liquid temperature
  - Vapor temperature
  - Water level
  - P1 (bottom)
  - P2 (middle)
  - P3 (top)
  - Observed density value
  - Volume
  - Flow velocity
  - Volume flow
  - Vapor density
  - Middle density
  - Upper density
  - Correction
  - Tank level %
  - GP 1...4 value
  - Measured level
  - P3 position
  - Tank reference height
  - Local gravity
  - P1 position
  - Manual density
  - Tank ullage
  - Average profile density
  - Lower density
  - Upper interface level
  - Lower interface level
  - Bottom level
  - Displacer position
  - HART device 1...15 PV
  - HART device 1...15 SV
  - HART device 1...15 TV
  - HART device 1...15 QV
  - HART device 1...15 PV mA
  - HART device 1...15 PV %
  - Element temperature 1...24
  - AIO B1-3 value
  - AIO C1-3 value
  - AIP B4-8 value
  - AIP C4-8 value
  - None

**Factory setting** None

**Additional information**

Read access	Operator
Write access	Maintenance

**Alarm value**

**Navigation**  Expert → Application → Alarm → Alarm → Alarm value

**Prerequisite** **Alarm mode (→  234) ≠ Off**

**Description** Shows the current value of the process variable being monitored.

**User interface** Signed floating-point number

**Factory setting** 0 None

**Additional information**

Read access	Operator
Write access	-

**HH alarm value**



**Navigation**  Expert → Application → Alarm → Alarm → HH alarm value

**Prerequisite** **Alarm mode (→  234) ≠ Off**

**Description** Defines the high-high(HH) limit value.

**User entry** Signed floating-point number


**Factory setting** 0 None

**Additional information**

Read access	Operator
Write access	Maintenance

**H alarm value**



**Navigation**  Expert → Application → Alarm → Alarm → H alarm value

**Prerequisite** **Alarm mode (→  234) ≠ Off**

**Description** Defines the high(H) limit value.

**User entry** Signed floating-point number

**Factory setting** 0 None

**Additional information**

Read access	Operator
Write access	Maintenance

---

**L alarm value**

---

**Navigation**

Expert → Application → Alarm → Alarm → L alarm value

**Prerequisite****Alarm mode** (→ 234) ≠ Off**Description**

Defines the low limit value.

**User entry**

Signed floating-point number

**Factory setting**

0 None

**Additional information**

Read access	Operator
Write access	Maintenance

---

**LL alarm value**

---

**Navigation**

Expert → Application → Alarm → Alarm → LL alarm value

**Prerequisite****Alarm mode** (→ 234) ≠ Off**Description**

Defines the low-low(LL) limit value.

**User entry**

Signed floating-point number

**Factory setting**

0 None

**Additional information**

Read access	Operator
Write access	Maintenance

---

**HH alarm**

---

**Navigation**

Expert → Application → Alarm → Alarm → HH alarm

**Prerequisite****Alarm mode** (→ 234) ≠ Off**Description**

Shows whether an HH alarm is currently active.



**Additional information**

Read access	Operator
Write access	-

---

**H alarm**

---

**Navigation**   Expert → Application → Alarm → Alarm → H alarm

**Prerequisite** **Alarm mode (→  234) ≠ Off**

**Description** Shows whether an H alarm is currently active.



**Additional information**

Read access	Operator
Write access	-

---

**HH+H alarm**

---

**Navigation**   Expert → Application → Alarm → Alarm → HH+H alarm

**Prerequisite** **Alarm mode (→  234) ≠ Off**

**Description** Shows whether an HH or H alarm is currently active.



**Additional information**

Read access	Operator
Write access	-

---

**L alarm**

---

**Navigation**   Expert → Application → Alarm → Alarm → L alarm

**Prerequisite** **Alarm mode (→  234) ≠ Off**

**Description** Shows whether an L alarm is currently active.



**Additional information**

Read access	Operator
Write access	-

---

**LL alarm**

---

**Navigation**   Expert → Application → Alarm → Alarm → LL alarm


**Prerequisite** **Alarm mode (→  234) ≠ Off**

**Description** Shows whether an LL alarm is currently active.


**Additional information**

Read access	Operator
Write access	-

**LL+L alarm****Navigation**

 Expert → Application → Alarm → Alarm → LL+L alarm

**Prerequisite**

**Alarm mode (→  234) ≠ Off**


**Description**

Shows whether an LL or L alarm is currently active.


**Additional information**

Read access	Operator
Write access	-

**Any error****Navigation**

 Expert → Application → Alarm → Alarm → Any error

**Prerequisite**

**Alarm mode (→  234) ≠ Off**

**Description**

Show whether any alarm is currently active.

**User interface**

- Unknown
- Inactive
- Active
- Error


**Factory setting**

Unknown

**Additional information**

Read access	Operator
Write access	-

**Clear alarm****Navigation**

 Expert → Application → Alarm → Alarm → Clear alarm

**Prerequisite**

**Alarm mode (→  234) = Latching**

**Description**

Deletes an alarm which is still active although the alarm condition is no longer present.

**Selection**

- No
- Yes

**Factory setting**

No



**Additional information**

Read access	Operator
Write access	Maintenance

**Alarm hysteresis**



**Navigation**

Expert → Application → Alarm → Alarm → Alarm hysteresis

**Prerequisite**

**Alarm mode** (→ 234) ≠ Off

**Description**

Defines the hysteresis for the limit values. The hysteresis prevents constant changes of the alarm state if the level is near one of the limit values.

**User entry**

Signed floating-point number

**Factory setting**

0.001

**Additional information**

Read access	Maintenance
Write access	Maintenance

**Damping factor**



**Navigation**

Expert → Application → Alarm → Alarm → Damping factor

**Description**

Defines the damping constant (in seconds).

**User entry**

0 to 999.9 s

**Factory setting**






0 s

**Additional information**

Read access	Operator
Write access	Maintenance











## 3.6 "Tank values" submenu

Navigation  Expert → Tank values

▶ Tank values		
▶ Level		→  242
▶ Temperature		→  246
▶ Density		→  249
▶ Pressure		→  252
▶ GP values		→  253

### 3.6.1 "Level" submenu


Navigation  Expert → Tank values → Level

▶ Level		
Tank level		→  243
Tank Level %		→  243
Tank ullage		→  243
Tank ullage %		→  243
Upper interface level		→  244
Lower interface level		→  244
Bottom level		→  244
Water level		→  244
Measured level		→  245
Distance		→  245

---

**Tank level**


---

**Navigation**
 Expert → Tank values → Level → Tank level
**Description**

Shows the distance from the zero position (tank bottom or datum plate) to the product surface.

**Additional information**

Read access	Operator
Write access	-

---

**Tank Level %**


---

**Navigation**
 Expert → Tank values → Level → Tank Level %
**Description**

Shows the level as a percentage of the full measuring range.


**Additional information**

Read access	Operator
Write access	-

---

**Tank ullage**


---

**Navigation**
 Expert → Tank values → Level → Tank ullage
**Description**

Shows the remaining empty space in the tank.

**Additional information**

Read access	Operator
Write access	-

---

**Tank ullage %**


---

**Navigation**
 Expert → Tank values → Level → Tank ullage %
**Description**

Shows the remaining empty space in percentage related to parameter tank reference height.

**Additional information**

Read access	Operator
Write access	-

---

**Upper interface level**


---

**Navigation**
 Expert → Tank values → Level → Upper I/F level
**Description**

Shows measured interface level from zero position (tank bottom or datum plate). Value is updated when device generates a valid Interface measurement.

**Additional information**

Read access	Maintenance
Write access	-

---

**Lower interface level**


---

**Navigation**
 Expert → Tank values → Level → Lower I/F level
**Description**

Shows measured interface level from zero position (tank bottom or datum plate). Value is updated when device generates a valid interface measurement.

**Additional information**

Read access	Maintenance
Write access	-

---

**Bottom level**


---

**Navigation**
 Expert → Tank values → Level → Bottom level
**Description**

Shows the bottom level.


**Additional information**

Read access	Operator
Write access	-

---

**Water level**


---

**Navigation**
 Expert → Tank values → Level → Water level
**Description**

Shows the bottom water level.

**Additional information**

Read access	Operator
Write access	-

**Measured level**

**Navigation**

🏠📄 Expert → Tank values → Level → Measured level

**Description**

Shows the measured level without any correction from the tank calculations.

**Additional information**

Read access	Operator
Write access	-

**Distance**

**Navigation**

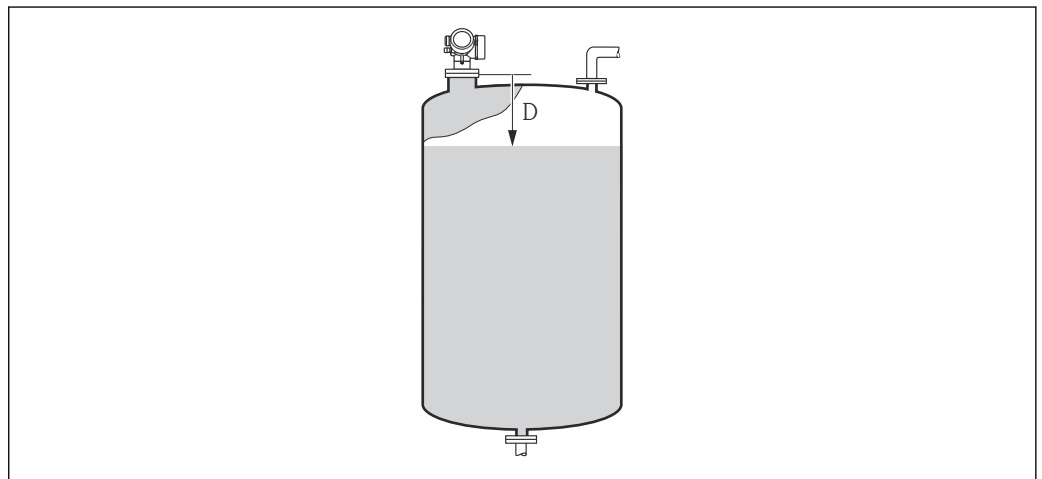
🏠📄 Expert → Tank values → Level → Distance

**Description**

Distance from lower edge of device flange to product surface.

**Additional information**

Read access	Operator
Write access	-











A0019483



*D* Distance (→ 📄 56)

### 3.6.2 "Temperature" submenu

Navigation   Expert → Tank values → Temperature

▶ Temperature	
Liquid temperature	→  246
Vapor temperature	→  246
Air temperature	→  247
▶ NMT element values	→  247
▶ Element temperature	→  247
Element temperature 0 to 23	→  247
▶ Element position	→  247
Element position 0 to 23	→  247

#### Liquid temperature



Navigation   Expert → Tank values → Temperature → Liquid temp.

Description Shows the average or spot temperature of the measured liquid.

#### Additional information

Read access	Operator
Write access	-

#### Vapor temperature



Navigation   Expert → Tank values → Temperature → Vapor temp.

Description Shows the measured vapor temperature.

#### Additional information

Read access	Operator
Write access	-

**Air temperature**

**Navigation**   Expert → Tank values → Temperature → Air temp.

**Description** Shows the air temperature.


**Additional information**

Read access	Operator
Write access	-


**"NMT element values" submenu**

*Navigation*  Expert → Tank values → Temperature → NMT elem. values

*"Element temperature" submenu*

*Navigation*  Expert → Tank values → Temperature → NMT elem. values → Element temp. → Element temp 0 to 23 (14984)

**Element temperature 1 to 24**


**Navigation**  Expert → Tank values → Temperature → NMT elem. values → Element temp. → Element temp 1 to 24 (14984-1 to 24)

**Description** Shows the temperature of an element in the NMT.


**Additional information**

Read access	Operator
Write access	-

*"Element position" submenu*

*Navigation*  Expert → Tank values → Temperature → NMT elem. values → Element position

**Element position 1 to 24**

**Navigation**  Expert → Tank values → Temperature → NMT elem. values → Element position → Element pos. 1 to 24 (15014-1 to 24)



**Description** Shows the position of the selected element in the NMT.

**Additional information**








Read access	Operator
Write access	-



### 3.6.3 "Density" submenu

Navigation   Expert → Tank values → Density



► Density

Observed density	→  249
Observed density temperature	→  249
Vapor density	→  250
Air density	→  250
Measured upper density	→  250
Measured middle density	→  250
Measured lower density	→  251

---

#### Observed density


---

Navigation   Expert → Tank values → Density → Observed density

Description Calculated density of the product.

Additional information



Read access	Operator
Write access	-

 This value is calculated from different measured variables depending on the selected calculation method.

---

#### Observed density temperature

---

Navigation   Expert → Tank values → Density → Obs. dens. temp.

Description Corresponding temperature of measured density. Can be used for reference density calculation.

User interface Signed floating-point number

Factory setting 0 °C

**Vapor density****Navigation** Expert → Tank values → Density → Vapor density**Description** Defines the density of the gas phase in the tank.**User entry** 0.0 to 500.0 kg/m<sup>3</sup>**Factory setting** 1.2 kg/m<sup>3</sup>**Additional information**

<b>Read access</b>	Operator
<b>Write access</b>	Maintenance

**Air density****Navigation** Expert → Tank values → Density → Air density**Description** Defines the density of the air surrounding the tank.**User entry** 0.0 to 500.0 kg/m<sup>3</sup>**Factory setting** 1.2 kg/m<sup>3</sup>**Additional information**

<b>Read access</b>	Operator
<b>Write access</b>	Maintenance

**Measured upper density****Navigation** Expert → Tank values → Density → Meas upper dens.**Description** Shows the density of the upper phase.**Additional information**

<b>Read access</b>	Operator
<b>Write access</b>	-


**Measured middle density****Navigation** Expert → Tank values → Density → Meas middle dens**Description** Density of the middle phase.

**Additional information**

Read access	Operator
Write access	-

**Measured lower density**

**Navigation**

 Expert → Tank values → Density → Meas lower dens.


**Description**



Density of the lower phase.

**Additional information**

Read access	Maintenance
Write access	-

### 3.6.4 "Pressure" submenu

*Navigation*  Expert → Tank values → Pressure

▶ Pressure	
P1 (bottom)	→  252
P3 (top)	→  252

---

#### P1 (bottom)

---

**Navigation**  Expert → Tank values → Pressure → P1 (bottom)

**Description** Shows the pressure at the tank bottom.


**Additional information**

Read access	Operator
Write access	-

---

#### P3 (top)

---


**Navigation**  Expert → Tank values → Pressure → P3 (top)

**Description** Shows the pressure (P3) at the top transmitter.






**Additional information**

Read access	Operator
Write access	-

### 3.6.5 "GP values" submenu


Navigation  Expert → Tank values → GP values

▶ GP values

GP 1 to 4 name	→  253
GP Value 1	→  253
GP Value 2	→  253
GP Value 3	→  254
GP Value 4	→  254

---

#### GP 1 to 4 name

**Navigation**  Expert → Tank values → GP values → GP 1 name

**Description** Defines the label associated with the respective GP value.

**User entry** Character string comprising numbers, letters and special characters (15)


**Factory setting** GP Value 1

**Additional information**

<b>Read access</b>	Operator
<b>Write access</b>	Maintenance

---

#### GP Value 1

**Navigation**  Expert → Tank values → GP values → GP Value 1


**Description** Displays the value that will be used as general purpose value.

**Additional information**

<b>Read access</b>	Operator
<b>Write access</b>	-

---

#### GP Value 2



**Navigation**  Expert → Tank values → GP values → GP Value 2

**Description** Displays the value that will be used as general purpose value.

**Additional information**

Read access	Operator
Write access	-

**GP Value 3****Navigation**

  Expert → Tank values → GP values → GP Value 3



**Description**

Displays the value that will be used as general purpose value.

**Additional information**

Read access	Operator
Write access	-

**GP Value 4****Navigation**

  Expert → Tank values → GP values → GP Value 4

**Description**























Displays the value that will be used as general purpose value.

























**Additional information**

Read access	Operator
Write access	-

### 3.7 "Diagnostics" submenu

Navigation  Expert → Diagnostics

<b>► Diagnostics</b>		
Actual diagnostics		→  257
Timestamp		→  258
Previous diagnostics		→  258
Timestamp		→  258
Operating time from restart		→  259
Operating time		→  259
Date/time		→  259
<b>► Diagnostic list</b>		→  260
Diagnostics 1 to 5		→  260
Timestamp 1 to 5		→  260
<b>► Event logbook</b>		→  261
Filter options		→  261
<b>► Simulation</b>		→  263
Device alarm simulation		→  263
Diagnostic event simulation		→  263
Simulation distance on		→  264
Simulation distance		→  264
Current output 1 to 2 simulation		→  264
Simulation value		→  265
<b>► Device information</b>		→  266
Device tag		→  266
Serial number		→  267



Firmware version	→  267
Firmware CRC	→  267
Weight and measures configuration CRC	→  267
Device name	→  268
Order code	→  268
Extended order code 1 to 3	→  268
ENP version	→  268
Device type	→  269
Module type	→  269
Communication Slot	→  269
<b>► Board info</b>	→  271
Date/time	→  259
System temperature	→  271
W&M lock switch	→  271
<b>► Data logging</b>	→  273
Assign channel 1 to 4	→  274
Logging interval	→  275
Clear logging data	→  276
<b>► Device check</b>	→  278
Start device check	→  278
Result device check	→  278
Level signal	→  279
Near distance	→  279
Area of incoupling	→  279



▶ LRC	
▶ LRC 1 to 2	→ 280
LRC Mode	→ 280
Allowed difference	→ 280
Check fail threshold	→ 281
Reference level source	→ 281
Reference switch source	→ 282
Reference switch mode	→ 282
Reference level	→ 282
Reference switch level	→ 283
Reference point level	→ 283
Reference switch state	→ 283
Start reference measurement	→ 284
Check level	→ 284
Check status	→ 284
Check timestamp	→ 285

**Actual diagnostics**

**Navigation**

  Expert → Diagnostics → Actual diagnos.

**Description**

Displays the currently active diagnostic message.


If there is more than one pending diagnostic event, the message for the diagnostic event with the highest priority is displayed.



**Additional information**

Read access	Operator
Write access	-

The display consists of:

- Symbol for event behavior
- Code for diagnostic behavior
- Operating time of occurrence
- Event text


 If several messages are active at the same time, the messages with the highest priority is displayed.

 Information on what is causing the message, and remedy measures, can be viewed via the  symbol on the display.

---

## Timestamp

---

**Navigation**  Expert → Diagnostics → Timestamp

**Description** Displays the timestamp for the currently active diagnostic message.

**Additional information**

Read access	Operator
Write access	-

---

## Previous diagnostics

---

**Navigation**  Expert → Diagnostics → Prev.diagnostics


**Description** Displays the diagnostic message for the last diagnostic event that has ended.



**Additional information**

Read access	Operator
Write access	-

The display consists of:

- Symbol for event behavior
- Code for diagnostic behavior
- Operating time of occurrence
- Event text

 If several messages are active at the same time, the messages with the highest priority is displayed.

 Information on what is causing the message, and remedy measures, can be viewed via the  symbol on the display.

---

## Timestamp


---

**Navigation**  Expert → Diagnostics → Timestamp

**Description** Displays the timestamp of the diagnostic message generated for the last diagnostic event that has ended.

**Additional information**


Read access	Operator
Write access	-

**Operating time from restart****Navigation**
 Expert → Diagnostics → Time fr. restart
**Description**

Indicates how long the device has been in operation since the last time the device was restarted.

**Additional information**

Read access	Operator
Write access	-

**Operating time****Navigation**
 Expert → Diagnostics → Operating time
**Description**

Indicates how long the device has been in operation.

**Additional information**

Read access	Operator
Write access	-

**Date/time****Navigation**
 Expert → Diagnostics → Date/time
**Description**



Displays the device internal real time clock.

**Additional information**

Read access	Operator
Write access	-

### 3.7.1 "Diagnostic list" submenu


Navigation  Expert → Diagnostics → Diagnostic list

▶ Diagnostic list	
Diagnostics 1 to 5	→  260
Timestamp 1 to 5	→  260

---

#### Diagnostics 1 to 5

---

**Navigation**  Expert → Diagnostics → Diagnostic list → Diagnostics 1 to 5 (0692-1 to 5)

**Description** Displays the currently active diagnostic message with the highest priority.

**Additional information** The display consists of:

- Symbol for event behavior
- Code for diagnostic behavior
- Operating time of occurrence
- Event text

---

#### Timestamp 1 to 5

---

**Navigation**  Expert → Diagnostics → Diagnostic list → Timestamp 1 to 5 (0683-1 to 5)

**Description** Timestamp of the diagnostic message.

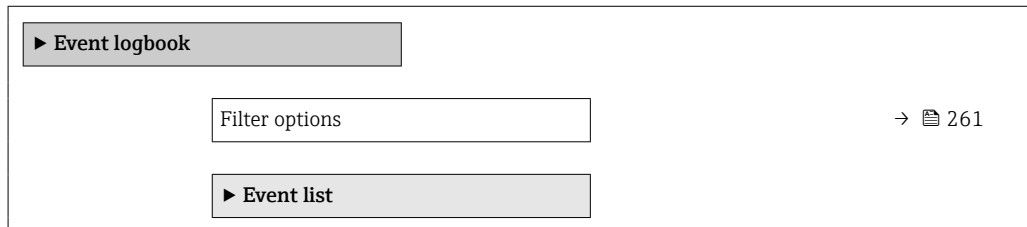
**Additional information**

Read access	Operator
Write access	-



### 3.7.2 "Event logbook" submenu

#### Structure of the submenu on the local display


Navigation  Expert → Diagnostics → Event logbook



#### Description of parameters

Navigation   Expert → Diagnostics → Event logbook


#### Filter options

**Navigation**  Expert → Diagnostics → Event logbook → Filter options

**Description** Define which category of event messages is shown in the Events list submenu.

- Selection**
- All
  - Failure (F)
  - Function check (C)
  - Out of specification (S)
  - Maintenance required (M)
  - Information (I)
  - Not categorized



**Factory setting** All

**Additional information** 

- This parameter is only used for operation via the local display.
- The status signals are categorized according to NAMUR NE 107.



Read access	Operator
Write access	Maintenance



#### "Event list" submenu

 The **Event list** submenu (→  261) is only available when operating via the local display.

The **Event list** submenu doesn't contain any parameters but only the list of events of the category selected in the **Filter options** parameter. A maximum of 100 event messages is displayed in chronological order.


The following status symbols indicate, whether an event has appeared or disappeared at the time stated:

- : Event appeared
- : Event disappeared







 Remedy measures concerning the cause of the message can be called up via the  symbol on the display.

*Navigation*            Expert → Diagnostics → Event logbook → Event list

### 3.7.3 "Simulation" submenu


Navigation  Expert → Diagnostics → Simulation

▶ Simulation

- Device alarm simulation →  263
- Diagnostic event simulation →  263
- Simulation distance on →  264
- Simulation distance →  264
- Current output 1 to 2 simulation →  264
- Simulation value →  265

---

#### Device alarm simulation

**Navigation**  Expert → Diagnostics → Simulation → Dev. alarm sim.

**Description** Switch the device alarm on and off.

**Selection**

- Off
- On


**Factory setting** Off

**Additional information**

Read access	Operator
Write access	Maintenance

---

#### Diagnostic event simulation

**Navigation**  Expert → Diagnostics → Simulation → Diagnostic event

**Description** Select a diagnostic event to simulate this event.

**Selection** The diagnostic events of the device



**Factory setting** Off

**Additional information**

Read access	Operator
Write access	Maintenance

 To terminate the simulation, select **Off**.

**Simulation distance on****Navigation**

  Expert → Diagnostics → Simulation → Sim distance on

**Description**

Switches the distance simulation on or off.

**Selection**

- Off
- On



**Factory setting**

Off


**Additional information**

Read access	Operator
Write access	Maintenance

**Simulation distance****Navigation**

  Expert → Diagnostics → Simulation → Sim distance

**Prerequisite**

**Simulation distance on (→  264) = On**

**Description**

Defines the distance value to be simulated.

**User entry**

Signed floating-point number



**Factory setting**

0 mm


**Additional information**

Read access	Operator
Write access	Maintenance

**Current output N simulation****Navigation**

  Expert → Diagnostics → Simulation → Curr.outp N sim. (13985)

**Prerequisite**

- The device has an Analog I/O module.
- **Operating mode (→  125) = 4..20mA output or HART slave +4..20mA output**

**Description**

Switches the simulation of the current on or off.






**Selection**                    ■ Off  
                                       ■ On


**Factory setting**            Off

**Additional information**

Read access	Operator
Write access	Maintenance

**Simulation value** 

**Navigation**                      Expert → Diagnostics → Simulation → Simulation value (13976)

**Prerequisite**                    **Current output simulation (→  264) = On**

**Description**                    Defines the current to be simulated.

**User entry**                      3.4 to 23 mA
















**Factory setting**                The current at the time the simulation was started.

**Additional information**

Read access	Operator
Write access	Maintenance


### 3.7.4 "Device information" submenu

Navigation  Expert → Diagnostics → Device info

<b>► Device information</b>	
Device tag	→  266
Serial number	→  267
Firmware version	→  267
Firmware CRC	→  267
Weight and measures configuration CRC	→  267
Device name	→  268
Order code	→  268
Extended order code 1 to 3	→  268
ENP version	→  268
Device type	→  269
Build version	→  269
Module type	→  269
Communication Slot	→  269
Recovery state	→  270
<b>► Board info</b>	→  271

#### Device tag

#### Navigation

 Expert → Diagnostics → Device info → Device tag

#### Description

Shows the device tag.

#### User interface

Character string comprising numbers, letters and special characters



#### Factory setting

- none -

**Additional information**

Read access	Operator
Write access	-

**Serial number****Navigation**

  Expert → Diagnostics → Device info → Serial number



**Description**

The serial number is a unique alphanumeric code identifying the device. It is printed on the nameplate. In combination with the Operations app it allows to access all device related documentation.

**Additional information**

Read access	Operator
Write access	-

**Firmware version****Navigation**

  Expert → Diagnostics → Device info → Firmware version



**Description**

Displays the device firmware version installed.

**Additional information**

Read access	Operator
Write access	-

**Firmware CRC****Navigation**

  Expert → Diagnostics → Device info → Firmware CRC



**Description**

Result of the cyclic redundancy check of the firmware.

**Additional information**

Read access	Operator
Write access	-

**Weight and measures configuration CRC****Navigation**


  Expert → Diagnostics → Device info → W&M config CRC

**Description**

Result of the cyclic redundancy check of the weights and measure relevant parameters.

**Additional information**


Read access	Operator
Write access	-

**Device name****Navigation**
 Expert → Diagnostics → Device info → Device name
**Description**

Use this function to display the device name. It can also be found on the nameplate.

**Additional information**


Read access	Operator
Write access	-

**Order code****Navigation**
 Expert → Diagnostics → Device info → Order code
**Description**

Shows the device order code.

**Additional information**

Read access	Operator
Write access	Service

**Extended order code 1 to 3****Navigation**
 Expert → Diagnostics → Device info → Ext. order cd. 1
**Description**

Display the three parts of the extended order code.


**User interface**

Character string comprising numbers, letters and special characters

**Additional information**

Read access	Operator
Write access	Service

The extended order code indicates the selected option of all ordering features and thus uniquely identifies the device.

**ENP version****Navigation**
 Expert → Diagnostics → Device info → ENP version
**Description**



Shows the version of the electronic nameplate (ENP).

**Additional information**

Read access	Operator
Write access	-

**Device type**

**Navigation**

  Expert → Diagnostics → Device info → Device type

**Description**



Displays the device type.

**Additional information**

Read access	Operator
Write access	-

**Build version**

**Navigation**

  Expert → Diagnostics → Device info → Build version

**Description**

Shows the device firmware build version installed.

**Additional information**

Read access	Operator
Write access	-

**Module type**

**Navigation**

  Expert → Diagnostics → Device info → Module type (8526)

**Description**

Shows the type of installed IO module.

**Additional information**

Read access	Operator
Write access	-

**Communication Slot**

**Navigation**

  Expert → Diagnostics → Device info → Comm. Slot (13285)

**Description**

Indicates which IOM slot contains the communication protocol interface board.


**Additional information**

Read access	Operator
Write access	-

---

**Recovery state**




---

<b>Navigation</b>	 Expert → Diagnostics → Device info → Recovery state
<b>Description</b>	Indicate the state of the backup data process.
<b>User interface</b>	<ul style="list-style-type: none"><li>■ Inactive</li><li>■ distributing</li><li>■ restoring</li><li>■ Distribution done</li><li>■ Distribution failed</li><li>■ Operating normally</li><li>■ Restore done</li><li>■ Restore failed</li></ul>
<b>Factory setting</b>	Inactive

**"Board info" submenu**

Navigation   Expert → Diagnostics → Device info → Board info

▶ Board info

Date/time	→  271
System temperature	→  271
W&M lock switch	→  271

**Date/time**

Navigation   Expert → Diagnostics → Device info → Board info → Date/time

Description Displays the device internal real time clock.

**Additional information**

Read access	Operator
Write access	-

**System temperature**

Navigation   Expert → Diagnostics → Device info → Board info → System temp.

Description Shows the electronic temperature of the main board.



User interface Signed floating-point number

Factory setting 0 °C

**Additional information**

Read access	Operator
Write access	-

**W&M lock switch**

Navigation   Expert → Diagnostics → Device info → Board info → W&M lock switch

Description Shows the position of the weights and measure (WP) switch.

User interface

- Enabled
- Disabled

**Factory setting**

Enabled

**Additional information**

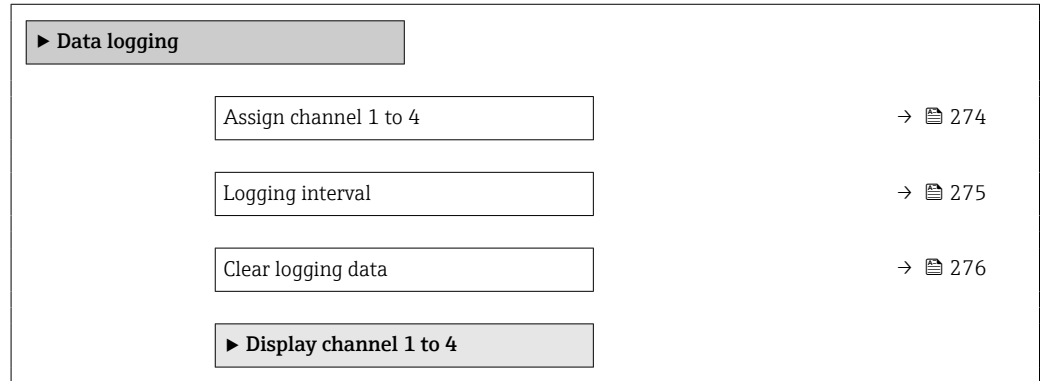
<b>Read access</b>	Operator
<b>Write access</b>	-



### 3.7.5 "Data logging" submenu

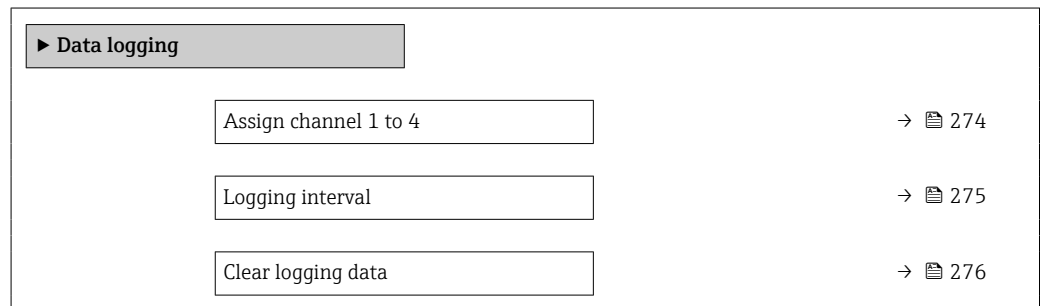
#### Structure of the submenu on the local display

Navigation  Expert → Diagnostics → Data logging



#### Structure of the submenu in an operating tool

Navigation  Expert → Diagnostics → Data logging



**Description of parameters**

*Navigation*  Expert → Diagnostics → Data logging

**Assign channel 1 to 4****Navigation**

 Expert → Diagnostics → Data logging → Assign chan. 1 (0851)

**Description**

Assign a process variable to logging channel.

**Selection**

- Off
- Tank level
- Measured level
- Tank level %
- Distance
- Water level
- Upper interface level
- Lower interface level
- Displacer position \*
- Upper density
- Middle density
- Lower density
- Bottom level
- Average profile density \*
- Liquid temperature
- Vapor temperature
- Air temperature
- Tank ullage
- Tank ullage %
- Observed density value
- P1 (bottom)
- P2 (middle)
- P3 (top)
- GP 1 value
- GP 2 value
- GP 3 value
- GP 4 value
- AIO B1-3 value \*
- AIO B1-3 value mA \*
- AIO B1-3 value % \*
- AIO C1-3 value \*
- AIO C1-3 value mA \*
- AIO C1-3 value % \*
- AIP B4-8 value \*
- AIP C4-8 value \*
- Absolute echo amplitude \*
- Amplitude eval distance \*
- DiffPhase \*

**Factory setting**

Off

\* Visibility depends on order options or device settings

**Additional information**

A total of 1000 measured values can be logged. This means:

- 1000 data points if 1 logging channel is used
- 500 data points if 2 logging channels are used
- 333 data points if 3 logging channels are used
- 250 data points if 4 logging channels are used

If the maximum number of data points is reached, the oldest data points in the data log are cyclically overwritten in such a way that the last 1000, 500, 333 or 250 measured values are always in the log (ring memory principle).



 The logged data are deleted if a new option is selected in this parameter.

Read access	Operator
Write access	Maintenance

**Logging interval**



**Navigation**

-  Expert → Diagnostics → Data logging → Logging interval
-  Expert → Diagnostics → Data logging → Logging interval

**Description**

Define the logging interval  $t_{log}$  for data logging. This value defines the time interval between the individual data points in the memory.

**User entry**

1.0 to 3 600.0 s

**Factory setting**

10.0 s

**Additional information**

This parameter defines the interval between the individual data points in the data log, and thus the maximum loggable process time  $T_{log}$ :

- If 1 logging channel is used:  $T_{log} = 1000 \cdot t_{log}$
- If 2 logging channels are used:  $T_{log} = 500 \cdot t_{log}$
- If 3 logging channels are used:  $T_{log} = 333 \cdot t_{log}$
- If 4 logging channels are used:  $T_{log} = 250 \cdot t_{log}$

Once this time elapses, the oldest data points in the data log are cyclically overwritten such that a time of  $T_{log}$  always remains in the memory (ring memory principle).

 The logged data are deleted if this parameter is changed.

*Example*

**When using 1 logging channel**



- $T_{log} = 1000 \cdot 1 \text{ s} = 1000 \text{ s} \approx 16.5 \text{ min}$
- $T_{log} = 1000 \cdot 10 \text{ s} = 1000 \text{ s} \approx 2.75 \text{ h}$
- $T_{log} = 1000 \cdot 80 \text{ s} = 80000 \text{ s} \approx 22 \text{ h}$
- $T_{log} = 1000 \cdot 3600 \text{ s} = 3600000 \text{ s} \approx 41 \text{ d}$

Read access	Operator
Write access	Maintenance

---

**Clear logging data**

---

**Navigation** Expert → Diagnostics → Data logging → Clear logging Expert → Diagnostics → Data logging → Clear logging**Description**

Clear the entire logging data.

**Selection**

- Cancel
- Clear data

**Factory setting**

Cancel

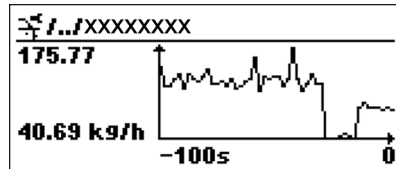
**Additional information**

Read access	Operator
Write access	Maintenance

### "Display channel 1 to 4" submenu

**i** The **Display channel 1 to 4** submenu is only available when operating via the local display. When operating via FieldCare, the diagram can be displayed in the "Event List / HistoROM" function.

The **Display channel 1 to 4** submenu displays the measured value trend of the respective logging channel.








- x-axis: displays 125 to 500 measured values of a process variable (the number of values depending on the number of selected channels).
- y-axis: displays the approximate measured value span and constantly adapts this to the ongoing measurement.

**i** To quit the diagram and to return to the operating menu, press  $\oplus$  and  $\ominus$  simultaneously.


*Navigation*            Expert → Diagnostics → Data logging → Displ.channel 1 to 4

### 3.7.6 "Device check" submenu

Navigation  Expert → Diagnostics → Device check

▶ Device check	
Start device check	→  278
Result device check	→  278
Level signal	→  279
Near distance	→  279
Area of incoupling	→  279

#### Start device check

Navigation  Expert → Diagnostics → Device check → Start dev. check

Description Starts the device check.

Selection


- No
- Yes

Factory setting No

Additional information

Read access	Operator
Write access	Maintenance

#### Result device check

Navigation  Expert → Diagnostics → Device check → Result dev.check

Description Shows the overall result of the device check.

Additional information



Read access	Operator
Write access	-

The device has a function that detects and reports any interference by unfavorable installation situation. Here, the amplitudes of measured signals are monitored, which refer to interference in the near range.

---

**Level signal**


---

**Navigation**   Expert → Diagnostics → Device check → Level signal

**Prerequisite** Only visible after a device check.

**Description** Shows the result of the device check for the level signal.

**Additional information**



<b>Read access</b>	Operator
<b>Write access</b>	-

---

**Near distance**


---



**Navigation**   Expert → Diagnostics → Device check → Near distance

**Prerequisite** Only visible after a device check

**Description** Shows the result of the device check for the near distance area.



**Additional information**

<b>Read access</b>	Operator
<b>Write access</b>	-

---

**Area of incoupling**


---

**Navigation**   Expert → Diagnostics → Device check → Area incoupling

**Description** Shows the ringing area for build up detection.

**Additional information**

<b>Read access</b>	Operator
<b>Write access</b>	-

### 3.7.7 "LRC 1 to 2" submenu



Additional information about the configuration of the level reference check (LRC) function: Operating instructions


*Navigation*  Diagnostics → LRC → LRC 1 to 2

---

#### LRC Mode

---

##### Navigation

 Diagnostics → LRC → LRC 1 to 2 → LRC Mode

##### Description

Activates or deactivates one of the level reference check (LRC) modes.

##### Selection

- Off
- Compare with level device
- Compare with level switch
- Measure reference point \*

##### Factory setting

Off

##### Additional information

Read access	Operator
Write access	Maintenance

##### Additional information


The option of the Measure reference point is not available for NMS8x.

---

#### Allowed difference

---

##### Navigation

 Diagnostics → LRC → LRC 1 to 2 → Allowed diff.

##### Description

Defines the allowed difference between the tank level and the reference.

##### User entry

1 to 1 000 mm

##### Factory setting

10 mm

##### Additional information

Read access	Operator
Write access	Maintenance

---

\* Visibility depends on order options or device settings



**Check fail threshold**



**Navigation**

Diagnostics → LRC → LRC 1 to 2 → Fail threshold

**Description**

Defines how many minutes the comparison has to fail before the check is failed. Note: Only for mode "Compare with level device".

**User entry**

1 to 60

**Factory setting**

3

**Additional information**

Read access	Operator
Write access	Maintenance

**Reference level source**



**Navigation**

Diagnostics → LRC → LRC 1 to 2 → Reference source

**Description**

Defines the source for the reference level. Note: Only for mode "Compare with level device".

**Selection**

- No input value
- HART device 1 level \*
- HART device 2 level \*
- HART device 3 level \*
- HART device 4 level \*
- HART device 5 level \*
- HART device 6 level \*
- HART device 7 level \*
- HART device 8 level \*
- HART device 9 level \*
- HART device 10 level \*
- HART device 11 level \*
- HART device 12 level \*
- HART device 13 level \*
- HART device 14 level \*
- HART device 15 level \*

**Factory setting**


No input value


**Additional information**


Read access	Operator
Write access	Maintenance

\* Visibility depends on order options or device settings


Reference switch source 

<b>Navigation</b>	 Diagnostics → LRC → LRC 1 to 2 → Reference source				
<b>Description</b>	Defines the source for the reference switch. Note: Only for mode "Compare with level switch".				
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ None</li> <li>■ Digital A1-2</li> <li>■ Digital A3-4</li> <li>■ Digital B1-2</li> <li>■ Digital B3-4</li> <li>■ Digital C1-2</li> <li>■ Digital C3-4</li> <li>■ Digital D1-2</li> <li>■ Digital D3-4</li> </ul>				
<b>Factory setting</b>	None				
<b>Additional information</b>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Read access</td> <td>Operator</td> </tr> <tr> <td>Write access</td> <td>Maintenance</td> </tr> </table>	Read access	Operator	Write access	Maintenance
Read access	Operator				
Write access	Maintenance				

Reference switch mode 

<b>Navigation</b>	 Diagnostics → LRC → LRC 1 to 2 → Ref. switch mode				
<b>Description</b>	Defines the switch direction for which the reference check is executed. Note: Only for mode "Compare with level switch".				
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Active -&gt; Inactive</li> <li>■ Inactive -&gt; Active</li> </ul>				
<b>Factory setting</b>	Active -> Inactive				
<b>Additional information</b>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Read access</td> <td>Operator</td> </tr> <tr> <td>Write access</td> <td>Maintenance</td> </tr> </table>	Read access	Operator	Write access	Maintenance
Read access	Operator				
Write access	Maintenance				

## Reference level

<b>Navigation</b>	 Diagnostics → LRC → LRC 1 to 2 → Reference level
<b>Description</b>	Shows the current reference level. Note: Only for mode "Compare with level device".
<b>User interface</b>	Signed floating-point number
<b>Factory setting</b>	0 mm

**Additional information**

Read access	Operator
Write access	-

**Reference switch level**



**Navigation**

Diagnostics → LRC → LRC 1 to 2 → Reference level

**Description**

Defines the position of the reference switch as level. Note: Only for mode "Compare with level switch".

**User entry**

0 to 10 000.00 mm

**Factory setting**

0 mm

**Additional information**

Read access	Operator
Write access	Maintenance

**Reference point level**



**Navigation**

Diagnostics → LRC → LRC 1 to 2 → Ref. point level

**Description**

Defines the position of the reference point as level. Note: Only for mode "Measure reference point".

**User entry**

0 to 10 000.00 mm

**Factory setting**

0 mm

**Additional information**

Read access	Operator
Write access	Maintenance

**Reference switch state**

**Navigation**

Diagnostics → LRC → LRC 1 to 2 → Ref.switch state

**Description**

Shows the current state of the reference switch (e.g. "active"). Note: Only for mode "Compare with level switch".

**User interface**

- Unknown
- Inactive
- Active
- Error

**Factory setting**

Unknown

**Additional information**

Read access	Operator
Write access	-

**Start reference measurement****Navigation**

Diagnostics → LRC → LRC 1 to 2 → Start ref. meas.

**Description**

Starts the measurement of the reference point and executes the check. Note: Only for mode "Measure reference point".

**Selection**

- No
- Yes

**Factory setting**

No

**Additional information**

Read access	Operator
Write access	Maintenance

**Check level****Navigation**

Diagnostics → LRC → LRC 1 to 2 → Check level

**Description**

Shows the tank level at which the reference check has been executed.

**User interface**

Signed floating-point number

**Factory setting**

0 mm

**Additional information**

Read access	Operator
Write access	Development

**Check status****Navigation**

Diagnostics → LRC → LRC 1 to 2 → Check status

**Description**

Shows the status of the reference check execution (e.g. "passed").

**User interface**

- not executed
- Passed
- Failed
- Not possible

**Factory setting**

not executed

**Additional information**

Read access	Operator
Write access	Development

**Check timestamp****Navigation**

 Diagnostics → LRC → LRC 1 to 2 → Check timestamp

**Description**

Shows the timestamp at which the reference check has been executed.

**User interface**

Character string comprising numbers, letters and special characters

**Factory setting****Additional information**

Read access	Operator
Write access	-

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