

# Description of Device Parameters

## Proservo NMS81

### 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



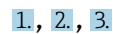
Reference to documentation



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		→  32
Access status display		→  33
User role		→  33
Enter access code		→  33
▶ System		→  34
	▶ Display	→  35
	Language	→  35
	Format display	→  36
	Value 1 to 4 display	→  37
	Decimal places 1 to 4	→  38
	Separator	→  39
	Number format	→  39
	Header	→  39
	Header text	→  40
	Display interval	→  40
	Display damping	→  41
	Backlight	→  41
	Contrast display	→  41

▶ System units	→ 42
Units preset	→ 42
Distance unit	→ 43
Pressure unit	→ 43
Temperature unit	→ 43
Density unit	→ 44
Decimal places length	→ 44
Decimal places pressure	→ 44
Decimal places temperature	→ 45
Decimal places density	→ 45
▶ Date / time	→ 49
Date/time	→ 50
Set date	→ 50
Year	→ 50
Month	→ 51
Day	→ 51
Hour	→ 51
Minute	→ 52
▶ Administration	→ 55
Define access code	→ 56
Activate SW option	→ 56
Software option overview	→ 56
Device reset	→ 57
▶ Sensor	→ 59
Gauge command (8000)	→ 59




























Gauge status (8081)	→  60
Distance (8103)	→  60
<b>► Information</b>	→  61
Gross weight (8080)	→  61
Net weight (8007)	→  61
Gauge status (8081)	→  62
Active gauge command (8073)	→  62
Balance flag (8006)	→  62
Displacer status (8160)	→  62
Motor status (8118)	→  63
One-time command status (8201)	→  63
Sensor temperature (8066)	→  63
Detector temperature (8090)	→  63
<b>► Measured values</b>	→  64
Distance (8103)	→  65
Displacer position (8130)	→  65
Liquid level (8072)	→  66
Upper interface level (8127)	→  66
Upper interface level timestamp (8055)	→  66
Lower interface level (8128)	→  66
Lower interface level timestamp (8061)	→  67
Bottom level (8129)	→  67
Bottom level timestamp (8048)	→  67
<b>► Spot density</b>	→  68
Measured upper density (8164)	→  68
























Upper density timestamp (8067)	→ 68
Measured middle density (8165)	→ 68
Middle Density Timestamp (8011)	→ 69
Measured lower density (8166)	→ 69
Lower density timestamp (8122)	→ 69
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Profile point (8170)	→ 70
Profile average density (8175)	→ 70
Profile density timestamp (8114)	→ 70
▶ Sensor diag	→ 72
▶ Start self check	→ 72
Status self check (8192)	→ 72
▶ Self check	→ 72
▶ Sensor config	→ 74
Post gauge command (8163)	→ 74
▶ Displacer	→ 75
Displacer type (8071)	→ 75
Displacer diameter (8014)	→ 75
Displacer weight (8010)	→ 76
Displacer volume (8008)	→ 76
Displacer balance volume (8009)	→ 76
Displacer height (8195)	→ 77
Immersion depth (8070)	→ 77

▶ <b>Wiredrum</b>	→ 78
Drum circumference (8082)	→ 78
Wire weight (8040)	→ 78
▶ <b>Safety settings</b>	→ 79
High stop level (8135)	→ 79
Low stop level (8069)	→ 79
Slow hoist zone (8084)	→ 80
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Undertension weight (8098)	→ 80
Output out of range (8218)	→ 81
Monitoring counter (8078)	
Last monitoring (8104)	
▶ <b>Level settings</b>	→ 82
Upper density (8113)	→ 82
Middle density (8041)	→ 82
Lower density (8042)	→ 83
Process condition (8001)	→ 83
Standby level (8194)	→ 83
Offset standby distance (8107)	→ 84
▶ <b>Balance settings</b>	→ 86
Level measurement mode (8056)	→ 86
Interface measurement mode (8064)	→ 87
Balancing waiting time (8205)	→ 87
Seek delay (8162)	→ 88
Weight tolerance (8213)	→ 88

▶ Spot density	→ 90
Upper density offset (8176)	→ 90
Middle density offset (8177)	→ 90
Lower density offset (8178)	→ 91
Submersion depth (8169)	→ 91
▶ Profile density	→ 92
Density measurement mode (8186)	→ 92
Manual profile level (8182)	→ 92
Profile density offset distance (8185)	→ 93
Profile density interval (8174)	→ 93
Profile density offset (8173)	→ 93
▶ Calibration	→ 94
▶ Move displacer	→ 95
Move distance	→ 95
Move displacer	→ 96
Motor status (8118)	→ 96
Move displacer	→ 96
Distance (8103)	→ 95
Motor status (8118)	→ 96
▶ Sensor calibration	→ 97
Sensor calibration	→ 97
Offset weight (8095)	→ 97
Span weight (8096)	→ 98
Zero calibration	→ 98
Zero calibration	→ 98


























Calibration status (8031)	→  98
Offset calibration	→  99
Offset calibration	→  99
Calibration status (8031)	→  98
Span calibration	→  99
Span calibration	→  99
Calibration status (8031)	→  98
Sensor calibration	→  97
Calibration status (8031)	→  98
<b>► Reference calibration</b>	→  100
Reference calibration	→  100
Reference position (8046)	→  100
Progress	→  100
Progress	→  100
Calibration status (8031)	→  101
Reference calibration	→  100
Calibration status (8031)	→  101
<b>► Drum calibration</b>	→  102
Make sure to have	→  102
Drum calibration	→  102
Calibration time	→  103
Set high weight (8116)	→  103
Make drum table	→  103
Calibration time	→  103
Drum table point	→  103
























Calibration status (8031)	→	📄	104
Make low table	→	📄	104
Set low weight (8115)	→	📄	104
Make drum table	→	📄	103
Calibration time	→	📄	103
Drum table point	→	📄	103
Calibration status (8031)	→	📄	104
Drum calibration	→	📄	102
Calibration status (8031)	→	📄	104
<b>► Calibration parameters</b>	→	📄	105
Set high weight (8116)	→	📄	105
Set low weight (8115)	→	📄	105
Reference position (8046)	→	📄	106
Offset weight (8095)	→	📄	106
Span weight (8096)	→	📄	106
Calibration status (8031)	→	📄	107
<b>► Input/output</b>	→	📄	108
<b>► HART devices</b>	→	📄	109
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<b>► HART Device(s)</b>	→	📄	110
Device name	→	📄	111
Polling address	→	📄	111
Device tag	→	📄	111
Operating mode	→	📄	111
Communication status	→	📄	112


























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#blank#(HART PV - description dependent on device)	→  113
#blank#(HART SV - description dependent on device)	→  113
#blank#(HART TV - description dependent on device)	→  113
#blank#(HART QV - description dependent on device)	→  113
HART device PV mA	→  114
HART device PV %	→  114
Output pressure	→  114
Output density	→  115
Output temperature	→  115
Output vapor temperature	→  115
Output level	→  116
▶ HART device information	→  117
▶ Element values	→  123
▶ Diagnostics	→  124
▶ Diagnostics	→  125
▶ NMT device config	→  127
▶ NMT device config	→  133
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0 % value	→  155
100 % value	→  155
Input value %	→  156
Output value	→  156
Readback value	→  156
Feedback threshold	→  157
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Analog input 0% value	→  157
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Error event type	→  158
Process value	→  158
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Input value percent	→  159
Damping factor	→  159
Calibration	→  160
Active calibration	→  160
Used for SIL/WHG	→  160
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Digital input source	→  163

























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Contact type	→  164
Output simulation	→  165
Output value	→  166
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Used for SIL/WHG	→  167
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Digital input source 2	→  168
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Gauge command 1	→  170
Gauge command 2	→  170
Gauge command 3	→  171
<b>► Communication</b>	→  172
<b>► "Modbus Xx-x" / "V1 Xx-x" / WM550 submenu</b>	
Communication interface protocol	→  174
Modbus value 1 to 4	→  174
Modbus discrete 1 to 4	→  174
<b>► Configuration</b>	→  175
Baudrate	→  175
Parity	→  176
Modbus address	→  176


























Float swap mode	→  176
Invalid data	→  177
Word type	→  177
CRC seed	→  178
Old TSM mode	→  178
Bus termination	→  178
Compatibility mode	→  179
<b>► Integer conversion</b>	→  180
Level 0%	→  180
Level 100%	→  181
Temperature 0%	→  181
Temperature 100%	→  181
Pressure 0%	→  182
Pressure 100%	→  182
Density 0%	→  182
Density 100%	→  183
User 0%	→  183
User 100%	→  183
Percent 0%	→  184
Percent 100%	→  184
<b>► User value source</b>	→  185
User value 1 to 8 source	→  185
<b>► GP values</b>	→  186
GP 1 value 0%	→  186
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GP 2 value 100%	→ 187
GP 3 value 0%	→ 187
GP 3 value 100%	→ 188
GP 4 value 0%	→ 188
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<b>► Discrete selector</b>	→ 189
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Communication interface protocol variant	→ 190
V1 address(V1 / MDP)	→ 190
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### 3 The "Expert" menu

Navigation  Expert

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▶ System	→  34
▶ Sensor	→  59
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▶ Communication	→  172
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#### Locking status

**Navigation**   Expert → Locking status (0004)

**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 (0091)



**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 (→  33).

 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 (→  32).

**User role**

**Navigation**  Expert → User role (0005)

**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

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### 3.1.1 "Display" submenu



Navigation   Expert → System → Display

▶ Display	
Language	→  35
Format display	→  36
Value 1 to 4 display	→  37
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Number format	→  39
Header	→  39
Header text	→  40
Display interval	→  40
Display damping	→  41
Backlight	→  41
Contrast display	→  41

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#### Language

---

<b>Navigation</b>	  Expert → System → Display → Language (0104)
<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 (0098)

**Prerequisite**

The device has a local display.

**Description**

Select how measured values are shown on the display.

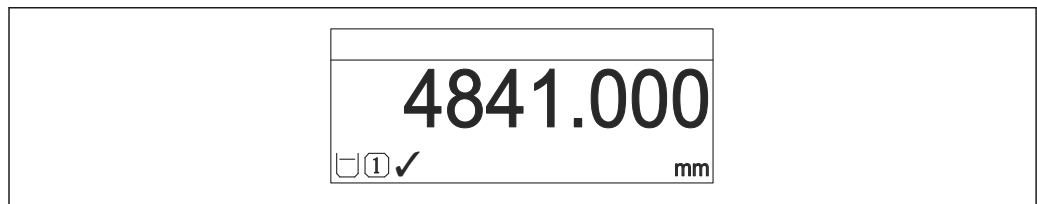
**Selection**

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

**Factory setting**

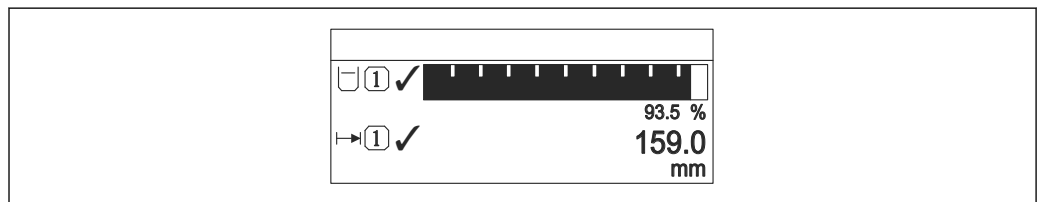
2 values

**Additional information**



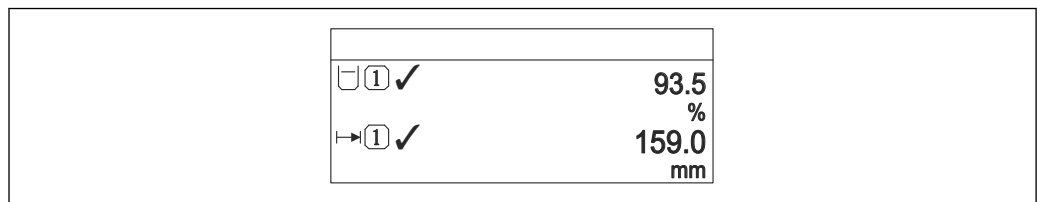
A0019963

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



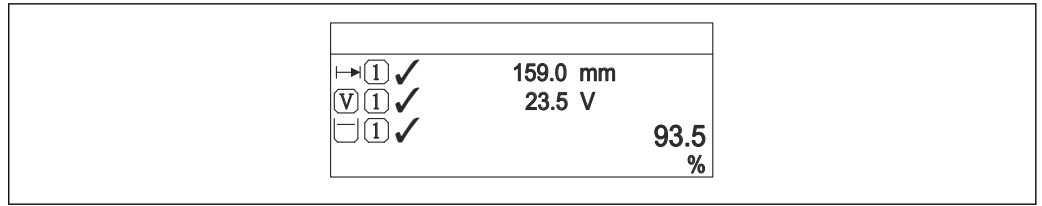
A0019964

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



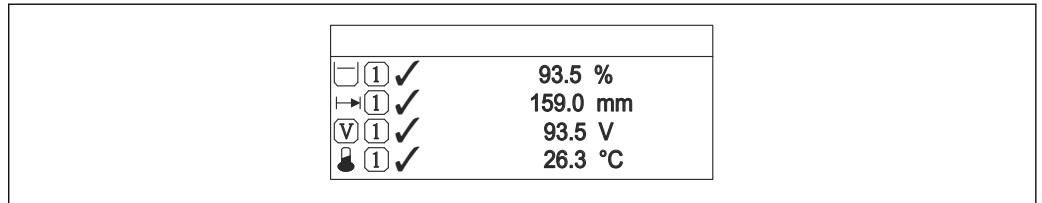
A0019965

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** (→ 37) 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 (→ 40).

## Value 1 to 4 display



**Navigation**      Expert → System → Display → Value 1 display (0107)

**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 (0095)

**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**



**Navigation** Expert → System → Display → Separator (0101)

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

**Description** Select decimal separator for displaying numerical values.

**Selection**

- .
- ,

**Factory setting** .

**Additional information**

Read access	Operator
Write access	Maintenance

**Number format**



**Navigation** Expert → System → Display → Number format (0099)

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

**Description** Choose number format for the display.

**Selection**

- Decimal
- ft-in-1/16"

**Factory setting** Decimal

**Additional information**

Read access	Operator
Write access	Maintenance

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

**Header**



**Navigation** Expert → System → Display → Header (0097)

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

**Description** Select header contents on local display.

**Selection**

- Device tag
- Free text

**Factory setting** 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 (→  211).

- **Free text**

The header contents is defined in the **Header text** parameter (→  40).

**Header text****Navigation**

  Expert → System → Display → Header text (0112)

**Prerequisite**

**Header** (→  39) = **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 (0096)

**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 (0094)
- 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**

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

**Backlight**

- Navigation** Expert → System → Display → Backlight (0111)
- Prerequisite** The device has a local display.
- Description** Switch the local display backlight on and off.
- Selection**
  - Disable
  - Enable
- Factory setting** Enable

**Additional information**

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


**Contrast display**

- Navigation** Expert → System → Display → Contrast display (0105)
- 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**

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


### 3.1.2 "System units" submenu

Navigation  Expert → System → System units

▶ System units

Units preset	→  42
Distance unit	→  43
Pressure unit	→  43
Temperature unit	→  43
Density unit	→  44
Decimal places length	→  44
Decimal places pressure	→  44
Decimal places temperature	→  45
Decimal places density	→  45

#### Units preset

**Navigation**  Expert → System → System units → Units preset (0605)

**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 (→  43)
- Pressure unit (→  43)
- Temperature unit (→  43)

**Distance unit**



**Navigation** Expert → System → System units → Distance unit (0551)

**Description** Select distance unit.

**Selection**

<p><i>SI units</i></p> <ul style="list-style-type: none"> <li>■ m</li> <li>■ mm</li> <li>■ cm</li> </ul>	<p><i>US units</i></p> <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> (→  42) = <b>Customer value</b> )

**Pressure unit**



**Navigation** Expert → System → System units → Pressure unit (0564)

**Selection**

<p><i>SI units</i></p> <ul style="list-style-type: none"> <li>■ bar</li> <li>■ Pa</li> <li>■ kPa</li> <li>■ MPa</li> <li>■ mbar a</li> </ul>	<p><i>US units</i></p> <p>psi</p>	<p><i>Other units</i></p> <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> (→  42) = <b>Customer value</b> )

**Temperature unit**



**Navigation** Expert → System → System units → Temperature unit (0557)

**Description** Select temperature unit.

**Selection**

<p><i>SI units</i></p> <ul style="list-style-type: none"> <li>■ °C</li> <li>■ K</li> </ul>	<p><i>US units</i></p> <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> (→  42) = <b>Customer value</b> )

Density unit 

## Navigation

  Expert → System → System units → Density unit (0555)

## Description

Select density unit.

## Selection

*SI units*

- g/cm<sup>3</sup>
- g/ml
- g/l
- kg/l
- kg/dm<sup>3</sup>
- kg/m<sup>3</sup>

*US units*

- lb/ft<sup>3</sup>
- lb/gal (us)
- lb/in<sup>3</sup>
- STon/yd<sup>3</sup>


*Other units*

- °API
- SGU

## Factory setting

kg/m<sup>3</sup>

## Additional information

Read access	Operator
Write access	Maintenance (if <b>Units preset</b> (→  42) = <b>Customer value</b> )

Decimal places length 

## Navigation

  Expert → System → System units → Decimal length (0573)

## 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 (0608)

## 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. (0614)

**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 (0609)

**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.

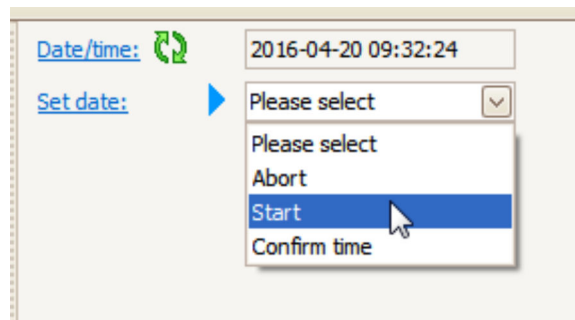
#### Setting the real-time clock via the display and operating module

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)

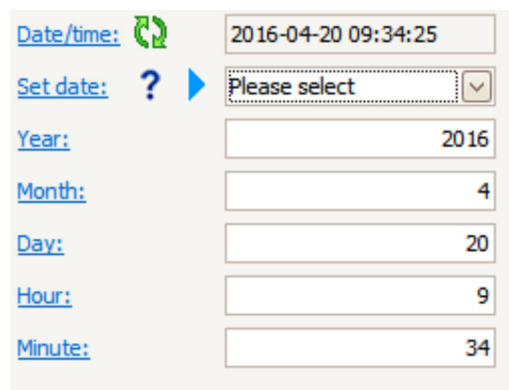
1. Navigate to: Expert → System → Date / time

2.



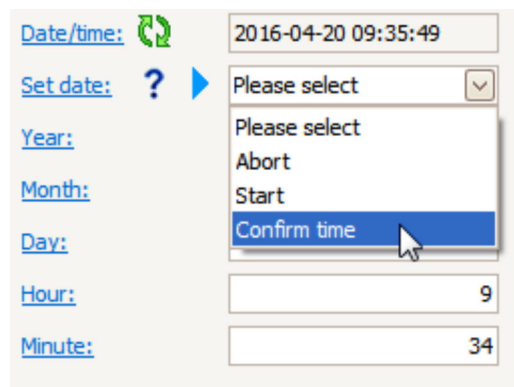
Go to the **Set date** parameter (→ ⓘ 50) and select the **Start** option.

3.



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

4.











Go to the **Set date** parameter (→ ⓘ 50) 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	→  50
<b>► Set date</b>	
Date/time	→  53
Year	→  53
Month	→  53
Day	→  53
Hour	→  53
Minute	→  54
Set date	→  54

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


Navigation  Expert → System → Date / time

<b>► Date / time</b>	
Date/time	→  50
Set date	→  50
Year	→  50
Month	→  51
Day	→  51
Hour	→  51
Minute	→  52

**Description of parameters**

*Navigation*  Expert → System → Date / time

**Date/time**


**Navigation**  Expert → System → Date / time → Date/time (0790)

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

**Additional information**

Read access	Operator
Write access	-

**Set date**

**Navigation**  Expert → System → Date / time → Set date (0792)

**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 (0782)

**Prerequisite** Set date (→  50) = Start

**Description** Enter the current year.

**User entry** 2016 to 2079

**Factory setting** 2016

**Additional information**

Read access	Operator
Write access	Maintenance

**Month**



**Navigation** Expert → System → Date / time → Month (0787)

**Prerequisite** Set date (→ 50) = 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 (0788)

**Prerequisite** Set date (→ 50) = 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 (0789)

**Prerequisite** Set date (→ 50) = Start

**Description** Enter the current hour.

**User entry** 0 to 23

**Factory setting** 0


**Additional information**

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

---

## Minute

---

**Navigation**  Expert → System → Date / time → Minute (0791)

**Prerequisite** Set date (→  50) = Start

**Description** Enter the current minute.


**User entry** 0 to 59

**Factory setting** 0


**Additional information**

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

*"Set date" wizard*

Navigation  Expert → System → Date / time → Set date


**Date/time**

Navigation  Expert → System → Date / time → Set date → Date/time (0790)

Description →  50

**Year**




Navigation  Expert → System → Date / time → Set date → Year (0782)

Description →  50

**Month**




Navigation  Expert → System → Date / time → Set date → Month (0787)

Description →  51

**Day**




Navigation  Expert → System → Date / time → Set date → Day (0788)

Description →  51

**Hour**




Navigation  Expert → System → Date / time → Set date → Hour (0789)

Description →  51

---

**Minute**


---

**Navigation** Expert → System → Date / time → Set date → Minute (0791)**Description**→  52

---

**Set date**

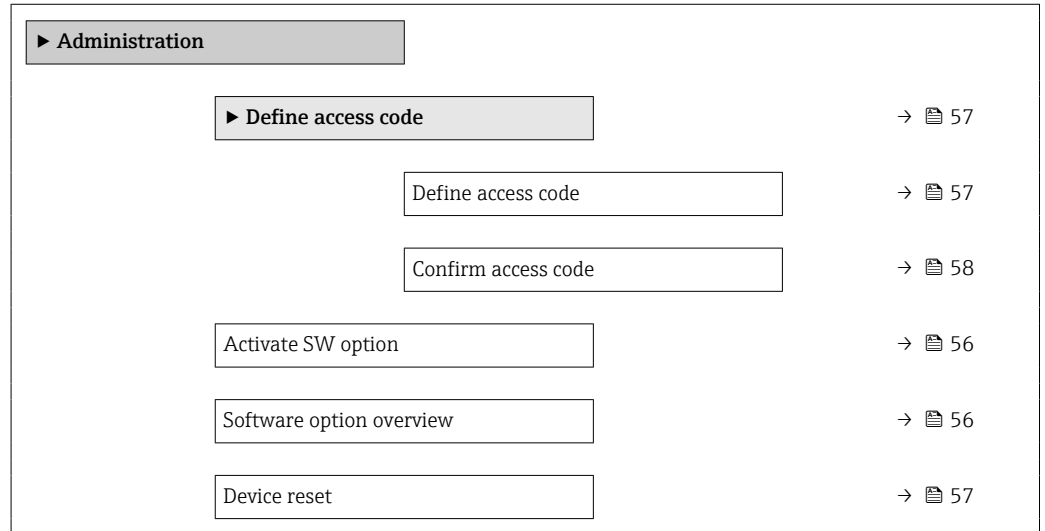
---

**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

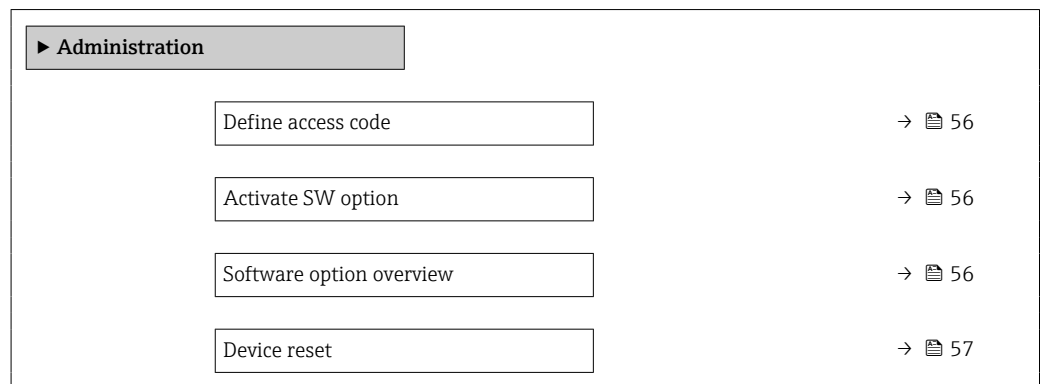
#### Structure of the submenu on the display and operating module

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 (0093)


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

**User entry** 0 to 9 999



**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 (→  33).

---

### Activate SW option

---

**Navigation**  Expert → System → Administration → Activate SW opt. (0029)

**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. (0015)

**Description** Shows all enabled software options





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

**Additional information**  The option of the CLG is not available for NMS8x.

Read access	Operator
Write access	-

---

**Device reset** 

**Navigation**  Expert → System → Administration → Device reset (0000)

**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** →  56

---

**Confirm access code**

---

**Navigation**

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

**Description**

Confirm the entered access code.

**User entry**

0 to 9 999

**Factory setting**









0

**Additional information**

Read access	Operator
Write access	Maintenance

### 3.2 "Sensor" submenu

Navigation  Expert → Sensor

▶ Sensor	
Gauge command	→  59
Gauge status	→  60
Distance	→  60
▶ Information	→  61
▶ Measured values	→  64
▶ Sensor diag	→  72
▶ Sensor config	→  74
▶ Calibration	→  94

#### Gauge command

Navigation  Expert → Sensor → Gauge command (8000)

Description Gauge operation command to choose the measurement mode of the device.

- Selection
- Stop \*
  - Level
  - Up \*
  - Bottom level \*
  - Upper I/F level \*
  - Lower I/F level \*
  - Upper density \*
  - Middle density \*
  - Lower density \*
  - Repeatability \*
  - Water dip \*
  - Release overtension \*
  - Tank profile \*
  - Interface profile \*
  - Manual profile \*
  - Level standby \*
  - Offset standby \*


Factory setting Stop

\* Visibility depends on order options or device settings

**Additional information**

Read access	Operator
Write access	Maintenance

**Gauge status****Navigation**

 Expert → Sensor → Gauge status (8081)

**Description**

Indicates the current status of the device gauge command.

**Additional information**

Read access	Operator
Write access	-

**Distance****Navigation**

  Expert → Sensor → Distance (8103)


**Description**

Shows measured distance from reference position.

**Additional information**











Read access	Operator
Write access	-

### 3.2.1 "Information" submenu

The **Information** submenu (→  61) comprises all display parameters which give information about the current state of the measurement.

#### Description of parameters



Navigation   Expert → Sensor → Information

► Information	
Gross weight	→  61
Net weight	→  61
Gauge status	→  62
Active gauge command	→  62
Balance flag	→  62
Displacer status	→  62
Motor status	→  63
One-time command status	→  63
Sensor temperature	→  63
Detector temperature	→  63

---

#### Gross weight

---

Navigation   Expert → Sensor → Information → Gross weight (8080)

Description Shows non-compensated measured weight from detector.



#### Additional information

Read access	Operator
Write access	-

---

#### Net weight

---

Navigation   Expert → Sensor → Information → Net weight (8007)

Description Shows the corrected weight data from the detector, as compensated by the drum table, This weight is used for measurement.

**Additional information**


Read access	Operator
Write access	-

**Gauge status****Navigation**
 Expert → Sensor → Information → Gauge status (8081)
**Description**

Indicates the current status of the device gauge command.

**Additional information**

Read access	Operator
Write access	-

**Active gauge command****Navigation**
 Expert → Sensor → Information → Active gauge cmd (8073)
**Description**

Indicates the currently executed Gauge Command.

**Additional information**


Read access	Operator
Write access	-

**Balance flag****Navigation**
 Expert → Sensor → Information → Balance flag (8006)
**Description**

Indicates the validity of the Measurement. If balanced, corresponding Value (Liquid Level, Upper Interface, Lower Interface, Tank Bottom ) is updated.

**Additional information**

Read access	Operator
Write access	-



**Displacer status****Navigation**
 Expert → Sensor → Information → Displacer status (8160)
**Description**

Shows the current moving and balancing status of the displacer.

**Additional information**

Read access	Operator
Write access	-

**Motor status**



**Navigation**   Expert → Sensor → Information → Motor status (8118)

**Description** Shows the current moving Direction of the Motor.

**Additional information**

Read access	Operator
Write access	-


**One-time command status**

**Navigation**   Expert → Sensor → Information → One-time Cmd (8201)



**Description** Indicates the status of the last executed one-time gauge command.

**Additional information**

Read access	Operator
Write access	-

**Additional information**  One-time command is available for all gauge commands, excepting Level, Stop, Up, and Interface.

**Sensor temperature**



**Navigation**   Expert → Sensor → Information → Sensor temp. (8066)

**Description** Shows the temperature of sensor module electronics.

**Additional information**

Read access	Operator
Write access	-

**Detector temperature**

**Navigation**   Expert → Sensor → Information → Detector temp. (8090)












**Description** Shows the temperature of the detector unit.

**Additional information**

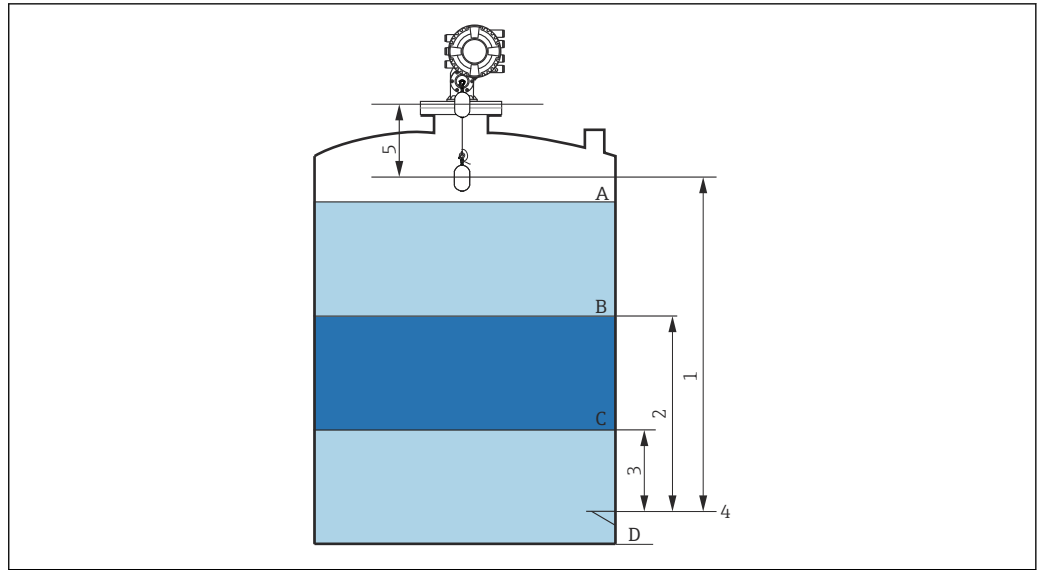
Read access	Operator
Write access	-

### 3.2.2 "Measured values" submenu

Navigation  Expert → Sensor → Measured values

<b>▶ Measured values</b>	
Distance	→  65
Displacer position	→  65
Liquid level	→  66
Upper interface level	→  66
Upper interface level timestamp	→  66
Lower interface level	→  66
Lower interface level timestamp	→  67
Bottom level	→  67
Bottom level timestamp	→  67
<b>▶ Spot density</b>	→  68
<b>▶ Profile density</b>	→  70





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6 Terms concerning NMS8x installation (e.g. NMS81)

- A Liquid level
- B Upper interface
- C Lower interface
- 1 Displacer pos
- 2 Upper I/F level
- 3 Lower I/F level
- 4 Datum plate
- 5 Distance

**Distance**

**Navigation**

Expert → Sensor → Measured values → Distance (8103)

**Description**

Shows measured distance from reference position.

**Additional information**

Read access	Operator
Write access	-

**Displacer position**

**Navigation**

Expert → Sensor → Measured values → Displacer pos (8130)

**Description**

Shows measured displacer position from zero position (tank bottom or datum plate). Value is always updated when displacer moves.


**Additional information**

Read access	Operator
Write access	-

---

**Liquid level**


---

**Navigation**
 Expert → Sensor → Measured values → Liquid level (8072)
**Description**

Shows measured level from zero position (tank bottom or datum plate). Value is updated when device generates a valid level measurement.

**Additional information**

Read access	Operator
Write access	-

---

**Upper interface level**


---

**Navigation**
 Expert → Sensor → Measured values → Upper I/F level (8127)
**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	Operator
Write access	-

---

**Upper interface level timestamp**


---

**Navigation**
 Expert → Sensor → Measured values → Up I/F timestamp (8055)
**Description**

Shows timestamp for the last measured upper interface level.

**Additional information**

Read access	Operator
Write access	-

---

**Lower interface level**


---


**Navigation**
 Expert → Sensor → Measured values → Lower I/F level (8128)
**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	Operator
Write access	-

**Lower interface level timestamp**

**Navigation**  Expert → Sensor → Measured values → LowI/F timestamp (8061)

**Description** Shows timestamp of the last measured lower interface level.

**Additional information**

Read access	Operator
Write access	-

**Bottom level**


**Navigation**  Expert → Sensor → Measured values → Bottom level (8129)

**Description** Shows measured bottom level. Value is updated after a successful tank bottom gauge command.

**Additional information**

Read access	Operator
Write access	-

**Bottom level timestamp**


**Navigation**  Expert → Sensor → Measured values → BotLev timestamp (8048)







**Description** Shows the timestamp for measured bottom level.

**Additional information**

Read access	Operator
Write access	-

**"Spot density" submenu**

Navigation  Expert → Sensor → Measured values → Spot density

▶ Spot density	
Measured upper density	→  68
Upper density timestamp	→  68
Measured middle density	→  68
Middle Density Timestamp	→  69
Measured lower density	→  69
Lower density timestamp	→  69

**Measured upper density**

Navigation  Expert → Sensor → Measured values → Spot density → Meas upper dens. (8164)

Description Shows the Measured Upper Density Value.

Additional information

Read access	Operator
Write access	-

**Upper density timestamp**

Navigation  Expert → Sensor → Measured values → Spot density → UpDens timestamp (8067)

Description Shows timestamp of the last measured upper density.

Additional information

Read access	Operator
Write access	-

**Measured middle density**

Navigation  Expert → Sensor → Measured values → Spot density → Meas middle dens (8165)



Description Shows the Measured Middle Density Value.

**Additional information**

Read access	Operator
Write access	-

**Middle Density Timestamp**

**Navigation**

  Expert → Sensor → Measured values → Spot density → MidDensTimestamp (8011)

**Description**



Shows the timestamp of the last measured middle density.

**Additional information**

Read access	Operator
Write access	-

**Measured lower density**

**Navigation**

  Expert → Sensor → Measured values → Spot density → Meas lower dens. (8166)

**Description**



Shows the Measured Lower Density Value.

**Additional information**

Read access	Operator
Write access	-

**Lower density timestamp**

**Navigation**

  Expert → Sensor → Measured values → Spot density → LowerDensTimestp (8122)


**Description**




Shows timestamp of last measured lower density.

**Additional information**

Read access	Operator
Write access	-


**"Profile density" submenu**

Navigation  Expert → Sensor → Measured values → Profile density

<b>▶ Profile density</b>	
Profile point	→  70
Profile average density	→  70
Profile density timestamp	→  70

---

**Profile point**

Navigation  Expert → Sensor → Measured values → Profile density → Profile point (8170)

Description Shows actual number of Density Points measured so far in current operation, and the total Number of Points after Density Profile Operation is complete.

Additional information

Read access	Operator
Write access	-

---

**Profile average density**

Navigation  Expert → Sensor → Measured values → Profile density → Profile avg dens (8175)

Description Shows the average density calculated after a profile density measurement is complete.

Additional information

Read access	Operator
Write access	-

---

**Profile density timestamp**


Navigation  Expert → Sensor → Measured values → Profile density → Profil dens time (8114)

Description Shows the timestamp when the last average density profile was finished.

Additional information

Read access	Operator
Write access	-


*"Density table" submenu*

*Navigation*            Expert → Sensor → Measured values → Profile density → Density table

---

**Density table**

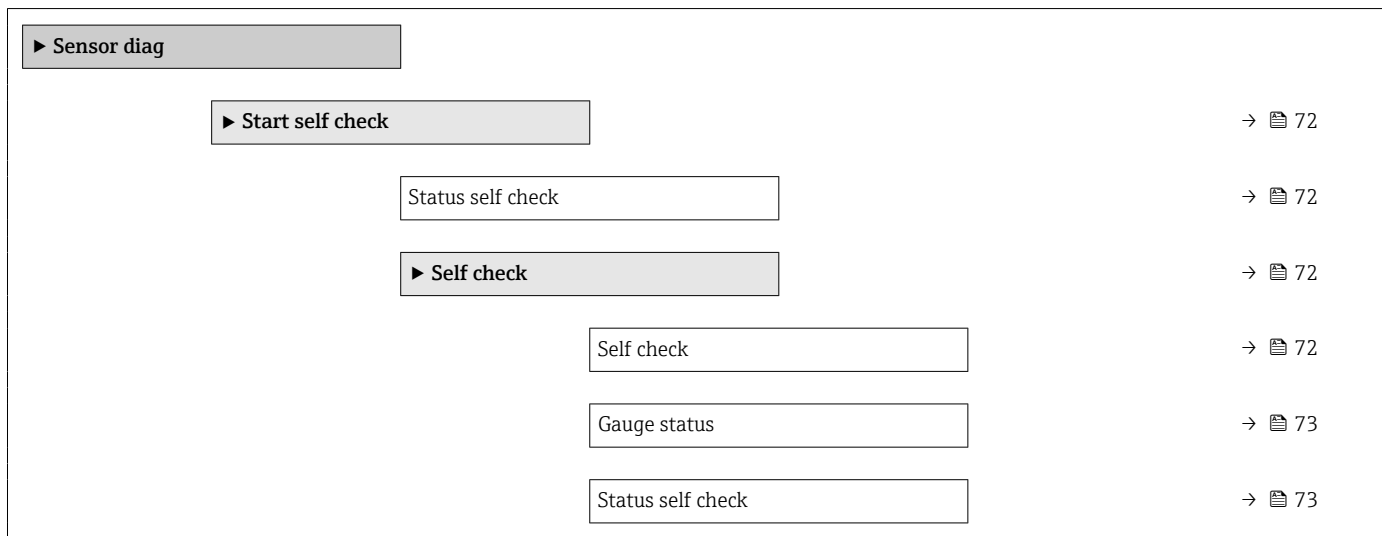
---

**Navigation**            Expert → Sensor → Measured values → Profile density → Density table

**Description**      Shows measured density table of profile density.

### 3.2.3 "Sensor diag" submenu

Navigation  Expert → Sensor → Sensor diag



#### "Start self check" submenu

Navigation  Expert → Sensor → Sensor diag → Start self check

#### Status self check


Navigation  Expert → Sensor → Sensor diag → Start self check → Status (8192)

Description Shows the status of the self check of the sensor module.


#### Additional information

Read access	Operator
Write access	-

#### "Self check" wizard

Navigation  Expert → Sensor → Sensor diag → Start self check → Self check

#### Self check

Navigation  Expert → Sensor → Sensor diag → Start self check → Self check → Self check

#### Additional information

Read access	Operator
Write access	-



**Gauge status**

**Navigation**

 Expert → Sensor → Sensor diag → Start self check → Self check → Gauge status (8081)

**Description**

Indicates the current status of the device gauge command.

**Additional information**

Read access	Operator
Write access	-

**Status self check**

**Navigation**

 Expert → Sensor → Sensor diag → Start self check → Self check → Status (8192)


**Description**









Shows the status of the self check of the sensor module.

**Additional information**

Read access	Operator
Write access	-


### 3.2.4 "Sensor config" submenu

Navigation  Expert → Sensor → Sensor config → Post gauge cmd (8163)

▶ Sensor config	
Post gauge command	→  74
▶ Displacer	→  75
▶ Wiredrum	→  78
▶ Safety settings	→  79
▶ Level settings	→  82
▶ Balance settings	→  86
▶ Spot density	→  90
▶ Profile density	→  92

#### Post gauge command

**Navigation**

 Expert → Sensor → Sensor config → Post gauge cmd (8163)

**Description**

Defines the gauge command that will be executed after a one-time gauge command has finished.

**Selection**

- Stop
- Level
- Up
- Upper I/F level
- Lower I/F level
- None



**Factory setting**

Level








**Additional information**


Read access	Operator
Write access	Maintenance



**"Displacer" submenu**

Navigation   Expert → Sensor → Sensor config → Displacer → Displacer type (8071)

▶ **Displacer**

Displacer type	→  75
Displacer diameter	→  75
Displacer weight	→  76
Displacer volume	→  76
Displacer balance volume	→  76
Displacer height	→  77
Immersion depth	→  77

**Displacer type** 

Navigation   Expert → Sensor → Sensor config → Displacer → Displacer type (8071)


Description Chooses the type of displacer used.



- Selection
- Custom diameter
  - Diameter 30 mm
  - Diameter 50 mm
  - Diameter 70 mm
  - Diameter 110 mm

Factory setting Dependent on the device version

**Additional information**

Read access	Operator
Write access	Maintenance

**Displacer diameter** 

Navigation   Expert → Sensor → Sensor config → Displacer → Displacer diamet (8014)

Prerequisite **Displacer type (→  75) = Custom diameter**

Description Sets the diameter of the cylindrical part of displacer.


**User entry** 0 to 999.9 mm



**Factory setting** See label on the device.

**Additional information**

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

---

**Displacer weight** 

**Navigation**   Expert → Sensor → Sensor config → Displacer → Displacer weight (8010)

**Description** Set the weight of the displacer in air. Indicated on the displacer in grams.

**User entry** 10 to 999.9 g



**Factory setting** See label on the device.

**Additional information**

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

---

**Displacer volume** 

**Navigation**   Expert → Sensor → Sensor config → Displacer → Displacer volume (8008)

**Description** Displacer volume indicated on displacer in milliliter.


**User entry** 10 to 999.9 ml



**Factory setting** See label on the device.

**Additional information**

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

---

**Displacer balance volume** 

**Navigation**   Expert → Sensor → Sensor config → Displacer → Balance volume (8009)

**Description** Defines the balance volume of the displacer as the lower part of displacer immersed in liquid. Units in milliliters. Indicated on displacer.

**User entry** 10 to 999.9 ml

**Factory setting** See label on the device.

**Additional information**

Read access	Operator
Write access	Maintenance

**Displacer height**



**Navigation**

Expert → Sensor → Sensor config → Displacer → Displacer height (8195)

**Description**

Sets the displacer height in mm. Used for density measurement as minimum distance between last profile point and liquid level.

**User entry**

10 to 300 mm

**Factory setting**

Dependent on the device version

**Additional information**

Read access	Operator
Write access	Maintenance

**Immersion depth**



**Navigation**

Expert → Sensor → Sensor config → Displacer → Immersion depth (8070)

**Description**

Defines distance (mm) from displacer bottom to balancing line defined by balanced volume. Value is needed for correct bottom level measurement.

**User entry**

0 to 99.9 mm


**Factory setting**

Dependent on the device version

**Additional information**


Read access	Operator
Write access	Maintenance

**"Wiredrum" submenu**


Navigation  Expert → Sensor → Sensor config → Wiredrum

▶ **Wiredrum**


Drum circumference


→  78

Wire weight

→  78

---

**Drum circumference** 

**Navigation**  Expert → Sensor → Sensor config → Wiredrum → Drum circumfer (8082)

**Description** Sets the circumference of the wire drum. Indicated in Label.


**User entry** 100 to 999.9 mm


**Factory setting** See label on the device.

**Additional information**

Read access	Operator
Write access	Maintenance

---

**Wire weight** 

**Navigation**  Expert → Sensor → Sensor config → Wiredrum → Wire weight (8040)

**Description** Defines the weight of the measuring wire in g/10m. Indicated on Label.

**User entry** 0 to 999.9 g

**Factory setting** See label on the device.







**Additional information**

Read access	Operator
Write access	Maintenance



**"Safety settings" submenu**

Navigation   Expert → Sensor → Sensor config → Safety settings

▶ Safety settings

High stop level	→  79
Low stop level	→  79
Slow hoist zone	→  80
Overtension weight	→  80
Undertension weight	→  80
Output out of range	→  81

**High stop level** 

**Navigation**   Expert → Sensor → Sensor config → Safety settings → High stop level (8135)


**Description** Position of the displacer high stop as measured from defined zero position (tank bottom or datum plate).



**User entry** -999 999.9 to 999 999.9 mm

**Factory setting** 20 000 mm

**Additional information**

Read access	Operator
Write access	Maintenance

**Low stop level** 

**Navigation**   Expert → Sensor → Sensor config → Safety settings → Low stop level (8069)

**Description** Position of the displacer low stop as measured from defined zero position (tank bottom or datum plate).

**User entry** -999 999.9 to 999 999.9 mm

**Factory setting** 0 mm

**Additional information**

Read access	Operator
Write access	Maintenance

**Slow hoist zone**

<b>Navigation</b>	Expert → Sensor → Sensor config → Safety settings → Slow hoist zone (8084)				
<b>Description</b>	Defines the interval in millimeters, measured down from the Reference Position, in which the Displacer reduces moving speed.				
<b>User entry</b>	10 to 999 999.9 mm				
<b>Factory setting</b>	70 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				

**Overtension weight**

<b>Navigation</b>	Expert → Sensor → Sensor config → Safety settings → Overtension wgt (8097)				
<b>Description</b>	Sets the minimum Weight in grams when Overtension Alarm will be set.				
<b>User entry</b>	100 to 999.9 g				
<b>Factory setting</b>	350 g				
<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				

**Undertension weight**

<b>Navigation</b>	Expert → Sensor → Sensor config → Safety settings → Undertension wgt (8098)				
<b>Description</b>	Defines the undertension error weight. Undertension error will be issued if displacer weight is below this value longer than 7 seconds.				
<b>User entry</b>	0 to 300 g				
<b>Factory setting</b>	10 g				
<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 out of range**



**Navigation** Expert → Sensor → Sensor config → Safety settings → Output out range (8218)

**Description** Selection of behavior between Alarm or Last valid value when displacer reached HighStoplevel, LowStopLevel or ReferencePosition.


- Selection**
- Last valid value
  - Alarm
  - None

**Factory setting** Last valid value







**Additional information**


Read access	Operator
Write access	Maintenance


**"Level settings" submenu**

*Navigation*  Expert → Sensor → Sensor config → Level settings → Upper density (8113)

▶ **Level settings**

Upper density	→  82
Middle density	→  82
Lower density	→  83
Process condition	→  83
Standby level	→  83
Offset standby distance	→  84

**Upper density** 

**Navigation**  Expert → Sensor → Sensor config → Level settings → Upper density (8113)


**Description** Sets the density of the upper phase of the liquid.


**User entry** 50 to 2 000 kg/m<sup>3</sup>

**Factory setting** 800 kg/m<sup>3</sup>

**Additional information**

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

**Middle density** 

**Navigation**  Expert → Sensor → Sensor config → Level settings → Middle density (8041)

**Description** Sets Density of Middle Phase in the Tank if three Phases are available. Otherwise used for the Lower Phase in the Tank if two Phases are available.

**User entry** 50 to 2 000 kg/m<sup>3</sup>

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

**Additional information**

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

**Lower density**



**Navigation** Expert → Sensor → Sensor config → Level settings → Lower density (8042)

**Description** Sets the density of the lower Phase in the tank if three phases are available.

**User entry** 50 to 2 000 kg/m<sup>3</sup>

**Factory setting** 1 200 kg/m<sup>3</sup>

**Additional information**

Read access	Operator
Write access	Maintenance

**Process condition**



**Navigation** Expert → Sensor → Sensor config → Level settings → Process cond. (8001)

**Description** Select the liquid condition of the tank.

- Selection**
- Universal
  - Calm surface
  - Turbulent surface

**Factory setting** Universal

**Additional information** For W&M, setting to option **Calm surface** is recommended.

Read access	Operator
Write access	Maintenance

**Standby level**



**Navigation** Expert → Sensor → Sensor config → Level settings → Standby level (8194)

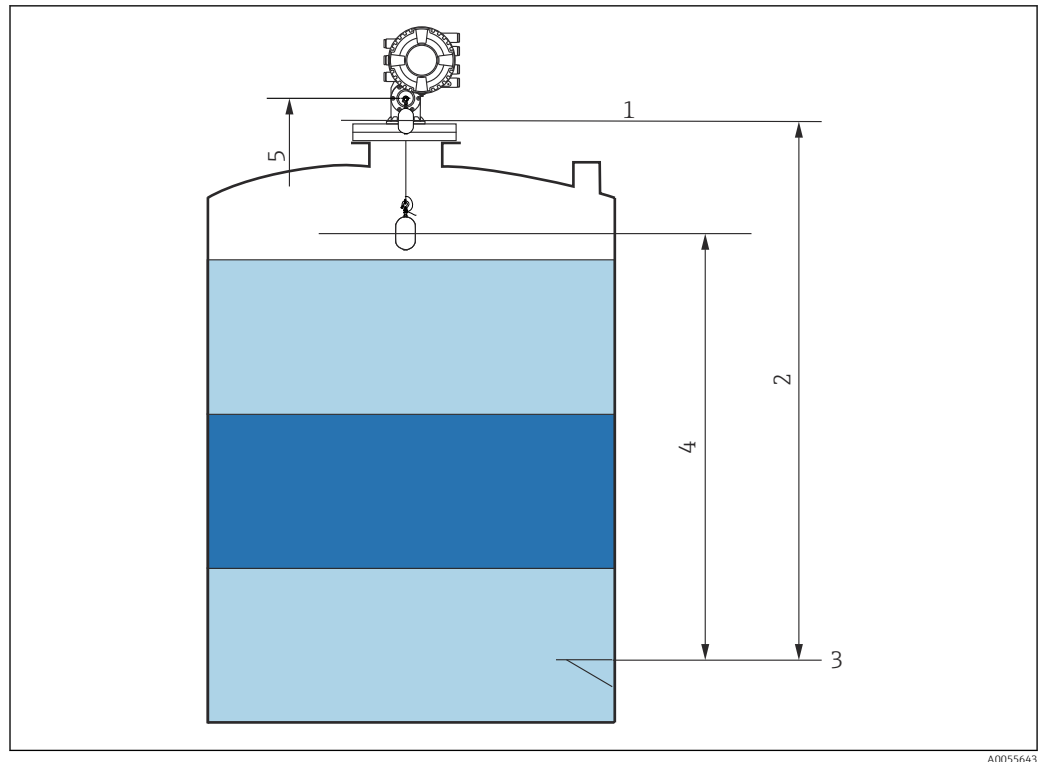
**Description** Defines the position in the tank where the displacer waits for the liquid level to rise during standby level gauge command.

**User entry** -999 999.9 to 999 999.9 mm

**Factory setting** 0 mm

**Additional information**

Read access	Operator
Write access	Maintenance



A0055643

7 Displacer waiting for the liquid level to rise during standby level gauge command

- 1 Gauge reference height
- 2 Empty
- 3 Datum plate
- 4 Standby level (→ 83)
- 5 Reference position

## Offset standby distance

### Navigation

Expert → Sensor → Sensor config → Level settings → Offset distance (8107)

### Description

Defines the distance from the current position where the displacer waits for the liquid level to rise during offset standby gauge command.

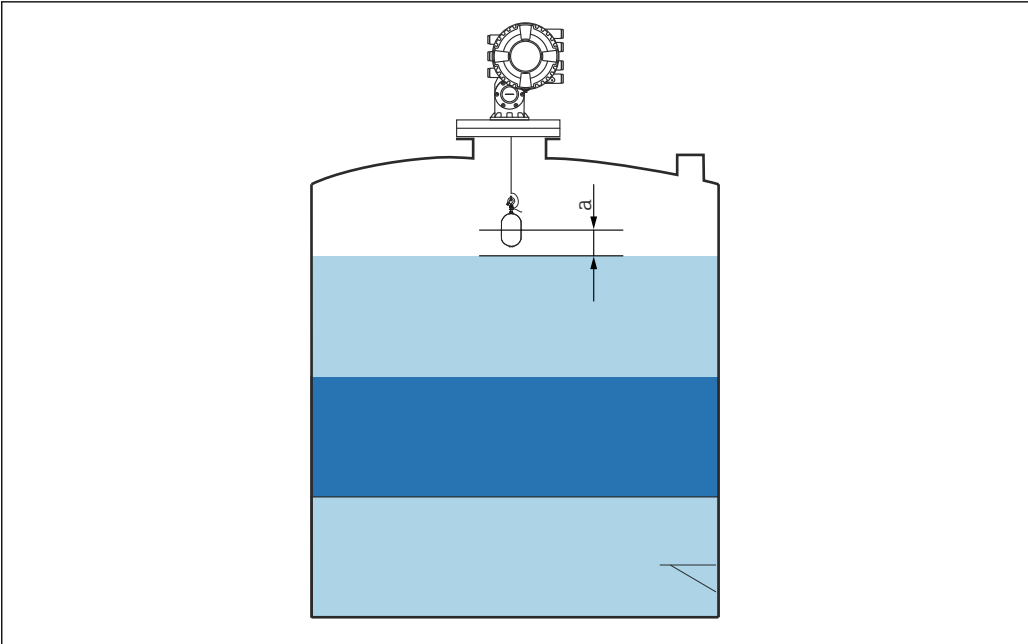
### User entry

0 to 999 999.9 mm

### Factory setting

500 mm


**Additional information**








A0051202


8 a: Offset standby distance

**"Balance settings" submenu**

Navigation  Expert → Sensor → Sensor config → Balance settings

▶ **Balance settings**

Level measurement mode	→  86
Interface measurement mode	→  87
Balancing waiting time	→  87
Seek delay	→  88
Weight tolerance	→  88

 The parameter "Process condition" does a pre-set of the major balancing parameters. For the most applications its enough to set the correct "Process condition" parameter which affects the balancing parameter settings automatically.

**Level measurement mode**



**Navigation**  Expert → Sensor → Sensor config → Balance settings → Level meas mode (8056)

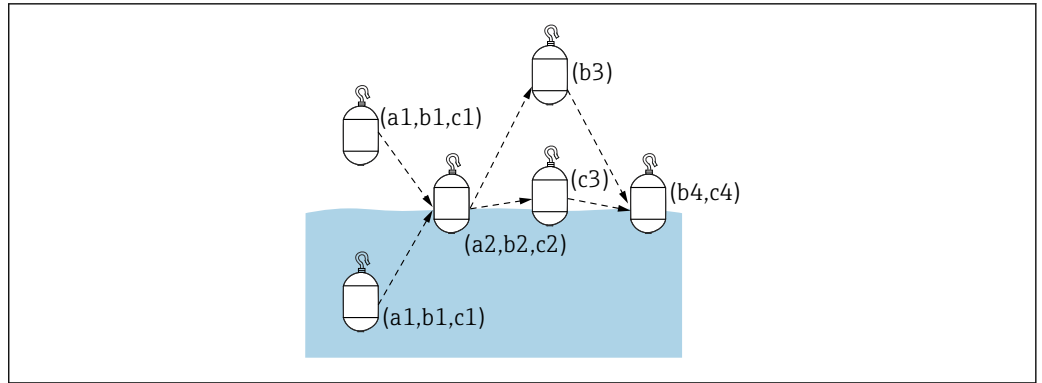
**Description** Chooses the measurement mode used for level measurement.

- Selection**
- Normal measure mode
  - Compensation mode
  - Non hysteresis mode

**Factory setting** Non hysteresis mode

**Additional information**

Read access	Operator
Write access	Maintenance



A0038582

9 NMS8x level mode

- a1 Displacer is in liquid or air unbalanced
- a2 Displacer on liquid balanced
- b1 Displacer is in liquid or air unbalanced
- b2 Displacer on liquid balanced
- b3 Displacer is moved out of the liquid, the weight in vapour is measured and used for the new weight calculation
- b4 Displacer on liquid balanced
- c1 Displacer is in liquid or air unbalanced
- c2 Displacer on liquid balanced
- c3 Displacer is lifted up
- c4 Displacer on liquid balanced

Interface measurement mode



- Navigation** Expert → Sensor → Sensor config → Balance settings → Interface mode (8064)
- Description** Chooses the measurement mode used for interface level measurements.
- Selection**
  - Non hysteresis mode
  - Normal measure mode
- Factory setting** Non hysteresis mode

Additional information

Read access	Operator
Write access	Maintenance

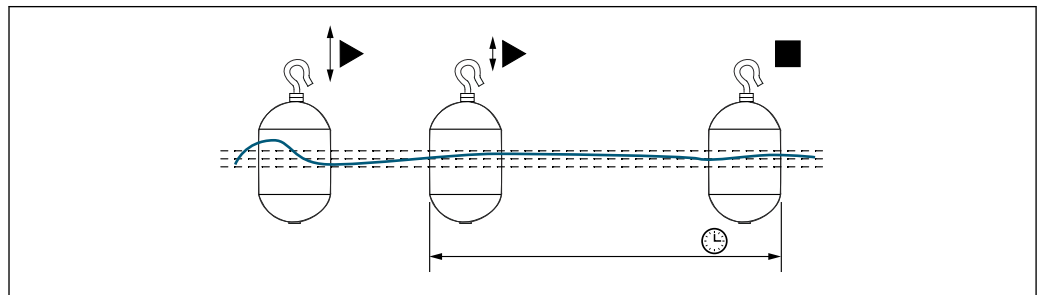
Balancing waiting time



- Navigation** Expert → Sensor → Sensor config → Balance settings → Bal waiting time (8205)
- Description** Set the waiting time in seconds, after which the balance flag is turned on if level measurement is balanced (motor has stopped).
- User entry** 0 to 255 s
- Factory setting** 4 s

**Additional information**

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



10 Balancing waiting time

A0057248

**Seek delay**



**Navigation**

Expert → Sensor → Sensor config → Balance settings → Seek delay (8162)

**Description**

When displacer is balanced, this parameter sets the Delay Time (seconds) before displacer starts to track Level again.

**User entry**

1 to 255 s

**Factory setting**

2 s

**Additional information**

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

**Weight tolerance**



**Navigation**

Expert → Sensor → Sensor config → Balance settings → Weight tolerance (8213)

**Description**

Defines balance weight tolerance in grams, in which the displacer is in balance status.

**User entry**

0.1 to 100 g

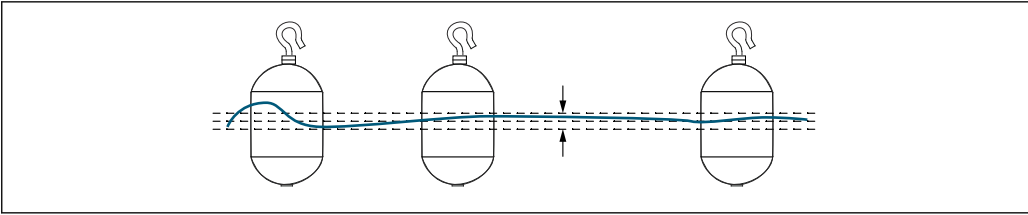
**Factory setting**

1.6 g

**Additional information**

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










A0038583


11 Weight tolerance

### "Spot density" submenu

Navigation  Expert → Sensor → Sensor config → Spot density

▶ Spot density	
Upper density offset	→  90
Middle density offset	→  90
Lower density offset	→  91
Submersion depth	→  91

#### Upper density offset

**Navigation**  Expert → Sensor → Sensor config → Spot density → Up dens. offset (8176)


**Description** Defines an offset value which is added to the measured upper density value.

**User entry** -999.99 to 999.99 kg/m<sup>3</sup>

**Factory setting** 0 kg/m<sup>3</sup>

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

#### Middle density offset

**Navigation**  Expert → Sensor → Sensor config → Spot density → Mid dens. offset (8177)

**Description** Defines an Offset Value which is added to the measured Middle Density Value.

**User entry** -999.99 to 999.99 kg/m<sup>3</sup>

**Factory setting** 0 kg/m<sup>3</sup>

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

**Lower density offset**



**Navigation** Expert → Sensor → Sensor config → Spot density → Low dens. offset (8178)

**Description** Defines an offset value which is added to the measured lower density value.

**User entry** -999.99 to 999.99 kg/m<sup>3</sup>

**Factory setting** 0 kg/m<sup>3</sup>

**Additional information**

Read access	Operator
Write access	Maintenance

**Submersion depth**



**Navigation** Expert → Sensor → Sensor config → Spot density → Submersion depth (8169)

**Description** Sets the displacer submersion depth (mm) for spot density operations.

**User entry** 50 to 99 999.9 mm






**Factory setting** 150 mm

**Additional information**

Read access	Operator
Write access	Maintenance


**"Profile density" submenu**

Navigation  Expert → Sensor → Sensor config → Profile density

<b>► Profile density</b>	
Density measurement mode	→  92
Manual profile level	→  92
Profile density offset distance	→  93
Profile density interval	→  93
Profile density offset	→  93

**Density measurement mode**



**Navigation**  Expert → Sensor → Sensor config → Profile density → Density mode (8186)

**Description** In normal measure mode, measures at specified positions. In compensation mode measures using next integer value of drum turns to improve accuracy.


**Selection**

- Normal measure mode
- Compensation mode

**Factory setting** Normal measure mode


**Additional information**

Read access	Operator
Write access	Maintenance

 In normal mode, measures spot densities at requested positions. In compensations mode the Proservo measures the spot densities at multiples of the wiredrum circumference (e.g. every ~ 150 mm (5.91 in))

**Manual profile level**



**Navigation**  Expert → Sensor → Sensor config → Profile density → Man profile lvl (8182)

**Description** Sets the level position in the tank where the manual profile density operation starts.

**User entry** -999 999.9 to 999 999.9 mm

**Factory setting** 1 000 mm

**Additional information**

Read access	Operator
Write access	Maintenance

**Profile density offset distance**



**Navigation**

Expert → Sensor → Sensor config → Profile density → Dens offset dist (8185)

**Description**

Profile density offset distance [mm] is the distance between start point and first measurement point.

**User entry**

0 to 999 999.9 mm

**Factory setting**

500 mm

**Additional information**

Read access	Operator
Write access	Maintenance

**Profile density interval**



**Navigation**

Expert → Sensor → Sensor config → Profile density → Density interval (8174)

**Description**

Sets the interval between two measurement points in profile density operation.

**User entry**

1 to 100 000 mm

**Factory setting**

1 000 mm

**Additional information**

Read access	Operator
Write access	Maintenance

**Profile density offset**



**Navigation**

Expert → Sensor → Sensor config → Profile density → Prof dens offset (8173)

**Description**

Defines an offset value which is added to the measured profile density value.

**User entry**

-999.99 to 999.99 kg/m<sup>3</sup>

**Factory setting**






0 kg/m<sup>3</sup>

**Additional information**

Read access	Operator
Write access	Maintenance

### 3.2.5 "Calibration" submenu






Navigation  Expert → Sensor → Calibration

▶ Calibration	
▶ Move displacer	→  95
▶ Sensor calibration	→  97
▶ Reference calibration	→  100
▶ Drum calibration	→  102
▶ Calibration parameters	→  105

### "Move displacer" wizard

Navigation  Expert → Sensor → Calibration → Move displacer

▶ Move displacer

Move distance	→  95
Net Distance	→  95
Move displacer	→  96
Motor status	→  96
Move displacer	→  96

---

#### Move distance

**Navigation**  Expert → Sensor → Calibration → Move displacer → Move distance

**Description** Up or down movement of displacer in mm.

**User entry** 0 to 999 999.9 mm

**Factory setting** 0 mm

**Additional information**

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

---

#### Distance

**Navigation**  Expert → Sensor → Calibration → Move displacer → Distance (8103)

**Description** Shows measured distance from reference position.

**Additional information**

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

**Move displacer**



**Navigation**

Expert → Sensor → Calibration → Move displacer → Move displacer

**Selection**

- Stop
- Move down
- Move up

**Factory setting**

Stop

**Additional information**

Read access	Operator
Write access	Maintenance

**Motor status**

**Navigation**

Expert → Sensor → Calibration → Move displacer → Motor status (8118)

**Description**

Shows the current moving Direction of the Motor.

**Additional information**

Read access	Operator
Write access	-

**Move displacer**



**Navigation**

Expert → Sensor → Calibration → Move displacer → Move displacer

**Selection**

- No
- Yes

**Factory setting**



No

**Additional information**








Read access	Operator
Write access	Maintenance



**"Sensor calibration" wizard**

Navigation   Expert → Sensor → Calibration → Sensor cal.

▶ **Sensor calibration**

Sensor calibration	→  97
Offset weight	→  97
Span weight	→  98
Zero calibration	→  98
Calibration status	→  98
Offset calibration	→  99
Span calibration	→  99

**Sensor calibration**



Navigation   Expert → Sensor → Calibration → Sensor cal. → Sensor cal.


Description This sequence calibrates the sensor of the servo.

**Additional information**

Read access	Operator
Write access	Maintenance

**Offset weight**



Navigation   Expert → Sensor → Calibration → Sensor cal. → Offset wgt. (8095)


Description Sets the weight that is used for the lower point sensor calibration. Changing the value will delete the calibration data.

User entry 0 to 150 g

Factory setting Dependent on the device version

**Additional information**

Read access	Operator
Write access	Maintenance

 The recommended offset weight value to improve measurement accuracy varies depending on the liquid density of applications. Use the weight close to the value determined by the following formula.

$$(\text{Recommended offset weight [g]}) = (\text{Displacer weight [g]}) - ((\text{Application density [g/cm}^3\text{]}) \times (\text{Displacer Volume [ml]}))$$

**Span weight****Navigation**

 Expert → Sensor → Calibration → Sensor cal. → Span wgt. (8096)

**Description**

Sets the weight that is used for the middle point sensor calibration. Changing the value will delete the calibration data.

**User entry**

10 to 999.9 g

**Factory setting**

Dependent on the device version

**Additional information**

Read access	Operator
Write access	Maintenance

**Zero calibration****Navigation**

 Expert → Sensor → Calibration → Sensor cal. → Zero calibration

**Description**

In this step the sensor calibration zero weight will be done.

**Additional information**

Read access	Operator
Write access	Maintenance

**Calibration status****Navigation**

 Expert → Sensor → Calibration → Sensor cal. → Status (8031)

**Description**

Gives feedback on the latest status of the calibration process.

**Additional information**

Read access	Operator
Write access	-

**Offset calibration**



**Navigation**

Expert → Sensor → Calibration → Sensor cal. → Offset cal.

**Description**

In this step the sensor calibration with offset weight will be done.

**Additional information**

Read access	Operator
Write access	Maintenance

**Span calibration**



**Navigation**

Expert → Sensor → Calibration → Sensor cal. → Span calibration


**Description**





In this step the sensor calibration with span weight will be done.

**Additional information**

Read access	Operator
Write access	Maintenance


### "Reference calibration" wizard

Navigation  Expert → Sensor → Calibration → Reference cal.

<b>▶ Reference calibration</b>	
Reference calibration	→  100
Reference position	→  100
Progress	→  100
Calibration status	→  101

---

#### Reference calibration

**Navigation**  Expert → Sensor → Calibration → Reference cal. → Reference cal.


**Description** This sequence will move the displacer to the mechanical stop and set the reference position.

**Additional information**

Read access	Operator
Write access	Maintenance

---

#### Reference position

**Navigation**  Expert → Sensor → Calibration → Reference cal. → Ref. position (8046)

**Description** Defines in mm, during reference calibration, the distance between mechanical stop inside the drum housing and the middle of the wire ring.

**User entry** 0 to 9999.9 mm

**Factory setting** Dependent on the device version

**Additional information**

Read access	Operator
Write access	Maintenance

---

#### Progress

**Navigation**  Expert → Sensor → Calibration → Reference cal. → Progress


**Description** Gives feedback on the latest status of the reference calibration process.

**Additional information**

Read access	Operator
Write access	Maintenance

**Calibration status**

**Navigation**

 Expert → Sensor → Calibration → Reference cal. → Status (8031)


**Description**

Gives feedback on the latest status of the calibration process.










**Additional information**

Read access	Operator
Write access	-

**"Drum calibration" wizard**

Navigation  Expert → Sensor → Calibration → Drum cal.

**▶ Drum calibration**

Make sure to have	→  102
Drum calibration	→  102
Calibration time	→  103
Set high weight	→  103
Make drum table	→  103
Drum table point	→  103
Calibration status	→  104
Make low table	→  104
Set low weight	→  104

**Make sure to have**

**Navigation**

 Expert → Sensor → Calibration → Drum cal. → Make sure

**Additional information**

Read access	Operator
Write access	-

**Drum calibration**



**Navigation**

 Expert → Sensor → Calibration → Drum cal. → Drum cal.



**Description**

This sequence will perform a drum calibration.

**Additional information**

Read access	Operator
Write access	Maintenance


**Calibration time**



**Navigation**   Expert → Sensor → Calibration → Drum cal. → Time

**Description** Time until drum calibration is finished.

**Additional information**

Read access	Operator
Write access	-

**Set high weight** 

**Navigation**   Expert → Sensor → Calibration → Drum cal. → Set high weight (8116)


**Description** High weight that is used for a drum calibration (normally it is the displacer weight).



**User entry** 10 to 999.9 g

**Factory setting** Dependent on the device version

**Additional information**

Read access	Operator
Write access	Maintenance

**Make drum table** 


**Navigation**   Expert → Sensor → Calibration → Drum cal. → Make drum table

**Description** This will perform a drum calibration.

**Additional information**

Read access	Operator
Write access	Maintenance

**Drum table point**

**Navigation**   Expert → Sensor → Calibration → Drum cal. → Drum table point

**Description** Shows the currently measured point of the drum calibration. Maximum number of measured points is 50.

**Additional information**

Read access	Operator
Write access	-

---

**Calibration status**


---

**Navigation**  Expert → Sensor → Calibration → Drum cal. → Status (8031)

**Description** Gives feedback on the latest status of the calibration process.


**Additional information**

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

---

**Make low table**


---



**Navigation**  Expert → Sensor → Calibration → Drum cal. → Make low table

**Description** For additional accuracy it is possible to perform a second drum calibration with low weight. Choose "Yes" or "No" to start/stop calibration.

**Selection**

- No
- Yes

**Factory setting** No


**Additional information**

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

---

**Set low weight**


---



**Navigation**  Expert → Sensor → Calibration → Drum cal. → Set low weight (8115)

**Description** Set weight for additional drum calibration sequence.

**User entry** 10 to 999.9 g

**Factory setting** Dependent on the device version

**Additional information**







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





**"Calibration parameters" submenu**

Navigation  Expert → Sensor → Calibration → Calib parameters

▶ Calibration parameters

Set high weight	→  105
Set low weight	→  105
Reference position	→  106
Offset weight	→  106
Span weight	→  106
Calibration status	→  107

**Set high weight** 

**Navigation**  Expert → Sensor → Calibration → Calib parameters → Set high weight (8116)

**Description** High weight that is used for a drum calibration (normally it is the displacer weight).


**User entry** 10 to 999.9 g

**Factory setting** Dependent on the device version

**Additional information**

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

**Set low weight** 

**Navigation**  Expert → Sensor → Calibration → Calib parameters → Set low weight (8115)

**Description** Set weight for additional drum calibration sequence.



**User entry** 10 to 999.9 g


**Factory setting** Dependent on the device version



**Additional information**


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

Reference position 


<b>Navigation</b>	  Expert → Sensor → Calibration → Calib parameters → Ref. position (8046)				
<b>Description</b>	Defines in mm, during reference calibration, the distance between mechanical stop inside the drum housing and the middle of the wire ring.				
<b>User entry</b>	0 to 9 999.9 mm				
<b>Factory setting</b>	Dependent on the device version				
<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				



Offset weight 

<b>Navigation</b>	  Expert → Sensor → Calibration → Calib parameters → Offset wgt. (8095)				
<b>Description</b>	Sets the weight that is used for the lower point sensor calibration. Changing the value will delete the calibration data.				
<b>User entry</b>	0 to 150 g				
<b>Factory setting</b>	Dependent on the device version				
<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 recommended offset weight value to improve measurement accuracy varies depending on the liquid density of applications. Use the weight close to the value determined by the following formula.

$$(\text{Recommended offset weight [g]}) = (\text{Displacer weight [g]}) - ((\text{Application density [g/cm}^3\text{]}) \times (\text{Displacer Volume [ml]}))$$

Span weight 


<b>Navigation</b>	  Expert → Sensor → Calibration → Calib parameters → Span wgt. (8096)
<b>Description</b>	Sets the weight that is used for the middle point sensor calibration. Changing the value will delete the calibration data.
<b>User entry</b>	10 to 999.9 g
<b>Factory setting</b>	Dependent on the device version

**Additional information**

Read access	Operator
Write access	Maintenance

**Calibration status**

**Navigation**

 Expert → Sensor → Calibration → Calib parameters → Status (8031)

**Description**






Gives feedback on the latest status of the calibration process.

**Additional information**



Read access	Operator
Write access	-





### 3.3 "Input/output" submenu

Navigation  Expert → Input/output

▶ Input/output	
▶ HART devices	→  109
▶ Analog IP	→  140
▶ Analog I/O	→  149
▶ Digital Xx-x	→  162
▶ Digital input mapping	→  168

### 3.3.1 "HART devices" submenu



Navigation   Expert → Input/output → HART devices

▶ HART devices		
Number of devices		→  109
▶ HART Device(s)		→  110
▶ Forget device		→  138
▶ #blank#		→  138

---

#### Number of devices

---


Navigation   Expert → Input/output → HART devices → Number devices (13051)

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)

▶ HART Device(s)	
Device name	→  111
Polling address	→  111
Device tag	→  111
Operating mode	→  111
Communication status	→  112
Status signal	→  112
#blank# (PV - designation dependent on device)	→  113
#blank# (SV - designation dependent on device)	→  113
#blank# (TV - designation dependent on device)	→  113
#blank# (QV - designation dependent on device)	→  113
HART device PV mA	→  114
HART device PV %	→  114
Output pressure	→  114
Output density	→  115
Output temperature	→  115
Output vapor temperature	→  115
Output level	→  116
▶ HART device information	→  117
▶ Element values	→  123

▶ Diagnostics	→ 📄 124
▶ Diagnostics	→ 📄 125
▶ NMT device config	→ 📄 127

**Device name**


**Navigation**  Expert → Input/output → HART devices → HART Device(s) → Device name (14722)

**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 (14712)

**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 (14713)


**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 (14745)

**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>2)</sup>
  - Measured level <sup>2)</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 (14710)

**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 (14760)

**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** ---

---

2) 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** (→  111) = 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** (→  111) = 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** (→  111) = 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 (14708)

**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 % (14709)

**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 (14719)

**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**



**Navigation** Expert → Input/output → HART devices → HART Device(s) → Output density (14720)

**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 density.

- 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 temperature**



**Navigation** Expert → Input/output → HART devices → HART Device(s) → Output temp. (14721)

**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 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 vapor temperature**



**Navigation** Expert → Input/output → HART devices → HART Device(s) → Output vapor tmp (14726)

**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 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 (14718)

**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	→  117
Density	→  118
Temperature	→  118
Vapor temperature	→  118
Water level	→  119
Level source	→  119
Tank level to NMT	→  119
Manual value	→  120
HART bus	→  120
Device type	→  120
Device ID	→  120
Device date	→  121
Device description	→  121
Device message	→  121
Software version	→  121
Firmware CRC	→  122
Custody transfer	→  122

**Pressure**

**Navigation**

  Expert → Input/output → HART devices → HART Device(s) → HART device info → Pressure (14723)

**Prerequisite**

**Output pressure (→  114) ≠ 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 (14724)

**Prerequisite**

**Output density (→  115) ≠ 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 (14725)

**Prerequisite**

**Output temperature (→  115) ≠ 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. (14727)

**Prerequisite**

**Output vapor temperature (→  115) ≠ No value**



**Description**

Shows the temperature value 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 (14717)

**Prerequisite** **Output level (→  116) ≠ 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 (14749)

**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 (14750)

**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 (14746)

**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 (14711)

**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 (14701)

**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 (14702)

**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 (14707)

**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. (14704)

**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 (14703)

**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 (14747)

**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 (14758)

**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 (14748)

**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**

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


*"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**





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

"Diagnostics" submenu

 This submenu is only available for Prothermo NMT53x.

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


▶ Diagnostics

Diagnostic code	→  124
Last diagnostic	→  124
Reference 0	→  124
Reference 17	→  125

---

**Diagnostic code**

---

**Navigation**  Expert → Input/output → HART devices → HART Device(s) → Diagnostics → Diag. code (14739)

**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 (14742)

**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 (14740)



**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 (14741)


**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 →  125
- Previous diagnostics →  126
- Test resistance →  126
- WB frequency ratio →  126

**Active diagnostics**

**Navigation**   Expert → Input/output → HART devices → HART Device(s) → Diagnostics → Active diagnos. (14754)


**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 (14755)


**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 (14752)

**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 (14753)

**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?	→  127
Access code	→  128
Total no. element	→  128
Bottom point	→  129
Temperature element short	→  129
Temperature element open	→  129
Output at error	→  130
Gain adjust	→  130
Kind of interval	→  130
Element interval	→  131
Update water level	→  131
<b>► Element setup</b>	→  132
Select element	→  132
Zero adjust	→  132
Element temperature	→  133
Element position	→  133

**Configure device?**



**Navigation**

  Expert → Input/output → HART devices → HART Device(s) → NMT dev. config → Config. device? (14728)

**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

---

**Access code** 

**Navigation**   Expert → Input/output → HART devices → HART Device(s) → NMT dev. config → Access code (14714)

**Prerequisite** **Configure device? (→  127) = Yes**

**Description** Shows the access code to configure the NMT device. Code is read from NMT device at start up.


**User entry** 0 to 65 535



**Factory setting** 0

**Additional information**

Read access	Operator
Write access	Maintenance

---

**Total no. element** 

**Navigation**   Expert → Input/output → HART devices → HART Device(s) → NMT dev. config → Total elements (14730)

**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 (14729)

**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

**Temperature element short**



**Navigation** Expert → Input/output → HART devices → HART Device(s) → NMT dev. config → Temp elem. short (14731)

**Description** Sets the displayed temperature if element is broken (shorten).

**User entry** Signed floating-point number

**Factory setting** 0 °C

**Additional information**

Read access	Operator
Write access	Maintenance

**Temperature element open**



**Navigation** Expert → Input/output → HART devices → HART Device(s) → NMT dev. config → Temp. elem. open (14732)

**Description** Sets the displayed temperature if element is not connected (open).

**User entry** Signed floating-point number

**Factory setting** 0 °C

**Additional information**

Read access	Operator
Write access	Maintenance

**Output at error****Navigation**

Expert → Input/output → HART devices → HART Device(s) → NMT dev. config  
→ Output at error (14733)

**Description**

Off -> Defective element will not be used in average calculation. On -> Defective element generate error at output value.

**Selection**

- Off
- On

**Factory setting**

Off

**Additional information**

Read access	Operator
Write access	Maintenance

**Gain adjust****Navigation**

Expert → Input/output → HART devices → HART Device(s) → NMT dev. config  
→ Gain adjust (14736)

**Description**

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%.

**User entry**

Signed floating-point number

**Factory setting**

0

**Additional information**

Read access	Operator
Write access	Maintenance

**Kind of interval****Navigation**

Expert → Input/output → HART devices → HART Device(s) → NMT dev. config  
→ Kind of interval (14744)

**Description**

Determines how the element positions are defined.

**Selection**

- Even
- Not even

**Factory setting**

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 (14743)

**Prerequisite**

**Kind of interval** (→ 130) = **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. (14751)

**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 (14734)


**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 (14735)

**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. (14737)



**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 (14738)

**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

▶ **NMT device config**

Configure device?	→  134
Total no. element	→  134
Bottom point	→  135
No element in phase	→  135
Water bottom level offset	→  135

Update water level	→  136
▶ Element setup	→  136
Select element	→  136
Zero adjust	→  137
Element temperature	→  137
Element position	→  137

**Configure device?**



**Navigation**

Expert → Input/output → HART devices → HART Device(s) → NMT dev. config → Config. device? (14728)

**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 (14730)

**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 (14729)

**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 (14756)

**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 (14757)

**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. (14751)

**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

▶ **Element setup**

Select element	→  136
Zero adjust	→  137
Element temperature	→  137
Element position	→  137

**Select element**



**Navigation** Expert → Input/output → HART devices → HART Device(s) → NMT dev. config → Element setup → Select element (14734)

**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 (14759)

**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. (14737)

**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 (14738)

**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

→  139

Current

→  139

\* Visibility depends on order options or device settings

**Operating mode**

**Navigation**  Expert → Input/output → HART devices → #blank# → Operating mode (14453)

**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 (14457)

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

**User interface** 0 to 100 000 mA

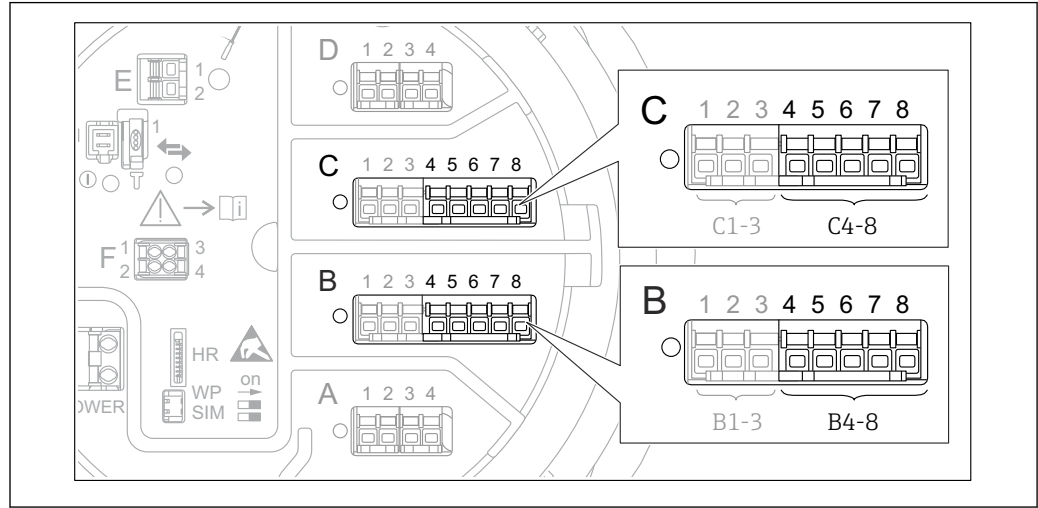
**Factory setting** 0 mA

**Additional information**

Read access	Operator
Write access	-

### 3.3.2 "Analog IP" submenu

**i** There is an **Analog IP** submenu (→ 140) 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 → 149.



12 Terminals for the "Analog IP" submenu (→ 140) ("B4-8" or "C4-8", respectively)

Navigation Expert → Input/output → Analog IP

**▶ Analog IP**

Operating mode	→ 141
RTD type	→ 141
Ohms offset	→ 142
Thermocouple type	→ 142
RTD connection type	→ 143
Process value	→ 143
Process variable	→ 143
0 % value	→ 144
100 % value	→ 144
Input value percent	→ 144
Input value	→ 145
Temperature offset after conversion	→ 145

Minimum probe temperature	→ 145
Maximum probe temperature	→ 146
Probe position	→ 146
Calibration type AIP	→ 147
Active calibration	→ 147
Damping factor	→ 147
Gauge current	→ 148

**Operating mode**



**Navigation** Expert → Input/output → Analog IP → Operating mode (14014)

**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 (14021)

**Prerequisite** **Operating mode (→ 141) = 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 (14026)

**Prerequisite****Operating mode (→ 141) = 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 (14008)


**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 (14022)

**Prerequisite** **Operating mode (→  141) = 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 (14003)



**Prerequisite** **Operating mode (→  141) ≠ 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 (14016)

**Prerequisite** **Operating mode (→  141) ≠ 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 (14001)

**Prerequisite**

**Operating mode (→ 141) = 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 (14013)

**Prerequisite**

**Operating mode (→ 141) = 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 [%] (14002)

**Prerequisite**

**Operating mode (→ 141) = 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 (14015)

**Prerequisite** **Operating mode (→  141) ≠ 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 (14025)

**Prerequisite** **Operating mode (→  141) = 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 (14010)

**Prerequisite** **Operating mode (→  141) = 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 (14011)

**Prerequisite**

**Operating mode (→ 141) = 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 (14009)

**Prerequisite**

**Operating mode (→ 141) = 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 (14018)

**Prerequisite** **Operating mode (→ 141) ≠ 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.

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

**Active calibration**

**Navigation** Expert → Input/output → Analog IP → Act. calibration (14012)

**Prerequisite** **Operating mode (→ 141) ≠ Disabled**

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

**Additional information**

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

**Damping factor**



**Navigation** Expert → Input/output → Analog IP → Damping factor (14004)

**Prerequisite** **Operating mode (→ 141) ≠ 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 (14027)

**Prerequisite**

**Operating mode (→  141) = Gauge power supply**

**Description**

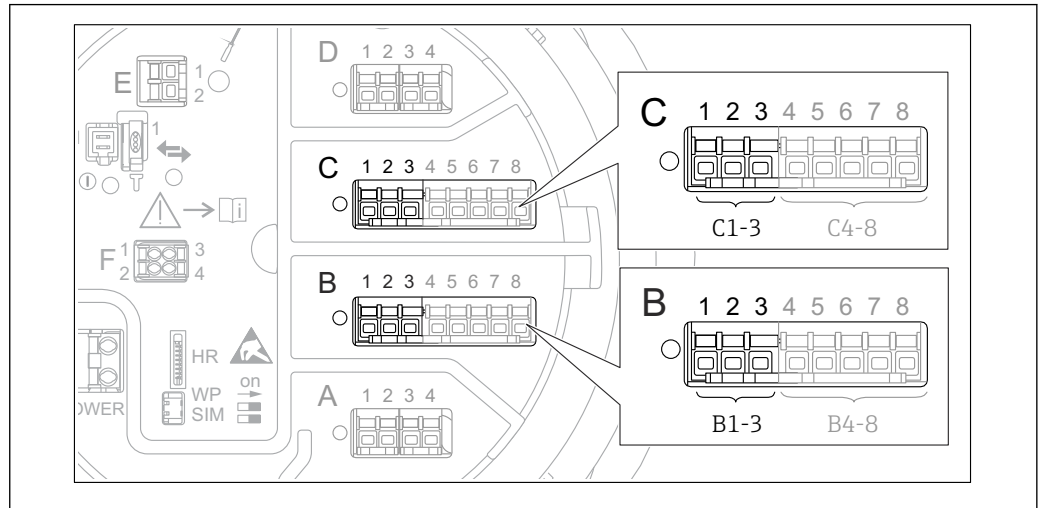
Shows the current on the power supply line for the connected device.

**Additional information**

Read access	Operator
Write access	-

### 3.3.3 "Analog I/O" submenu

**i** There is a **Analog I/O** submenu (→ 149) 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 → 140.

















13 Terminals for the "Analog I/O" submenu (→ 149) ("B1-3" or "C1-3", respectively)

Navigation Expert → Input/output → Analog I/O

**▶ Analog I/O**



Operating mode	→ 150
Current span	→ 151
Fixed current	→ 152
Analog input source	→ 152
Failure mode	→ 153
Error value	→ 154
Output out of range	→ 154
Error on event	→ 154
Input value	→ 155
0 % value	→ 155
100 % value	→ 155
Input value %	→ 156

Output value	→  156
Readback value	→  156
Feedback threshold	→  157
Process variable	→  157
Analog input 0% value	→  157
Analog input 100% value	→  158
Error event type	→  158
Process value	→  158
Input value in mA	→  159
Input value percent	→  159
Damping factor	→  159
Calibration	→  160
Active calibration	→  160
Used for SIL/WHG	→  160

**Operating mode**



**Navigation**

  Expert → Input/output → Analog I/O → Operating mode (13958)

**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 (→  150)	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** 


<b>Navigation</b>	  Expert → Input/output → Analog I/O → Current span (13987)				
<b>Prerequisite</b>	<b>Operating mode</b> parameter (→  150) ≠ <b>Disabled</b> option or <b>HART master</b> option				
<b>Description</b>	Defines the current range for the measured value transmission.				
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ 4...20 mA NE (3.8...20.5 mA)</li> <li>■ 4...20 mA US (3.9...20.8 mA)</li> <li>■ 4...20 mA (4...20.5 mA)</li> <li>■ Fixed value *</li> </ul>				
<b>Factory setting</b>	4...20 mA NE (3.8...20.5 mA)				
<b>Additional information</b>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">Read access</td> <td style="padding: 2px;">Operator</td> </tr> <tr> <td style="padding: 2px;">Write access</td> <td style="padding: 2px;">Maintenance</td> </tr> </table>	Read access	Operator	Write access	Maintenance
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 (→  152).				

 In the case of an error, the output current assumes the value defined in the **Failure mode** parameter (→  153).

**Fixed current** **Navigation**

  Expert → Input/output → Analog I/O → Fixed current (13989)

**Prerequisite**

**Current span** (→  151) = **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 (13974)

**Prerequisite**

- **Operating mode** (→  150) = **4..20mA output** or **HART slave +4..20mA output**
- **Current span** (→  151) ≠ **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>3)</sup>
- Upper density
- Middle density
- Lower density
- P1 (bottom)
- P2 (middle)
- P3 (top)
- GP 1 ... 4 value
- AIO B1-3 value <sup>3)</sup>
- AIO B1-3 value mA <sup>3)</sup>
- AIO C1-3 value <sup>3)</sup>
- AIO C1-3 value mA <sup>3)</sup>
- AIP B4-8 value <sup>3)</sup>
- AIP C4-8 value <sup>3)</sup>
- Element temperature 1 ... 24 <sup>3)</sup>
- HART device 1...15 PV <sup>3)</sup>
- HART device 1 ... 15 PV mA <sup>3)</sup>
- HART device 1 ... 15 PV % <sup>3)</sup>
- HART device 1 ... 15 SV <sup>3)</sup>
- HART device 1 ... 15 TV <sup>3)</sup>
- HART device 1 ... 15 QV <sup>3)</sup>

**Factory setting**

Tank level

**Additional information**

Read access	Operator
Write access	Maintenance

---


**Failure mode** 

---

**Navigation**

  Expert → Input/output → Analog I/O → Failure mode (13988)

**Prerequisite**

**Operating mode (→  150) = 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>3)</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 (13972)

**Prerequisite**

**Failure mode (→ 153) = 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 (13971)

**Prerequisite**

**Operating mode (→ 150) = 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 (13967)

**Prerequisite**

**Operating mode (→ 150) = 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 (13979)

**Prerequisite** ■ Operating mode (→  150) = 4..20mA output or HART slave +4..20mA output  
■ Current span (→  151) ≠ 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 (13954)

**Prerequisite** ■ Operating mode (→  150) = 4..20mA output or HART slave +4..20mA output  
■ Current span (→  151) ≠ 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 (13968)

**Prerequisite** ■ Operating mode (→  150) = 4..20mA output or HART slave +4..20mA output  
■ Current span (→  151) ≠ 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 % (13955)

**Prerequisite**

- **Operating mode** (→  150) = **4..20mA output** or **HART slave +4..20mA output**
- **Current span** (→  151) ≠ **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 (13969)

**Prerequisite** **Operating mode** (→  150) = **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 (13957)

**Prerequisite** **Operating mode** (→  150) = **4..20mA output** or **HART slave +4..20mA output**

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

**User interface** 0 to 65 535  $\mu$ A

**Factory setting** 0  $\mu$ A

**Additional information**

Read access	Operator
Write access	-

**Feedback threshold**

**Navigation**

Expert → Input/output → Analog I/O → Feedback thresh. (13956)

**Prerequisite**

**Operating mode** (→ 150) = **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 (13964)

**Prerequisite**

**Operating mode** (→ 150) = **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 (13977)

**Prerequisite**

**Operating mode** (→ 150) = **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 (13965)

**Prerequisite**

**Operating mode (→ 150) = 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 (13953)

**Prerequisite**

**Operating mode (→ 150) ≠ 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 (13963)

**Prerequisite**

**Operating mode (→ 150) = 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 (13970)

**Prerequisite**

**Operating mode** (→  150) = **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 [%] (13978)

**Prerequisite**

**Operating mode** (→  150) = **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 (13951)

**Prerequisite**

**Operating mode** (→  150) ≠ **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 (13966)

**Prerequisite** **Operating mode (→ 150) ≠ 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 (13981)

**Prerequisite** **Operating mode (→ 150) ≠ 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 (13980)

- Prerequisite**
- **Operating mode (→ 150) = 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 (13952)

**Prerequisite**

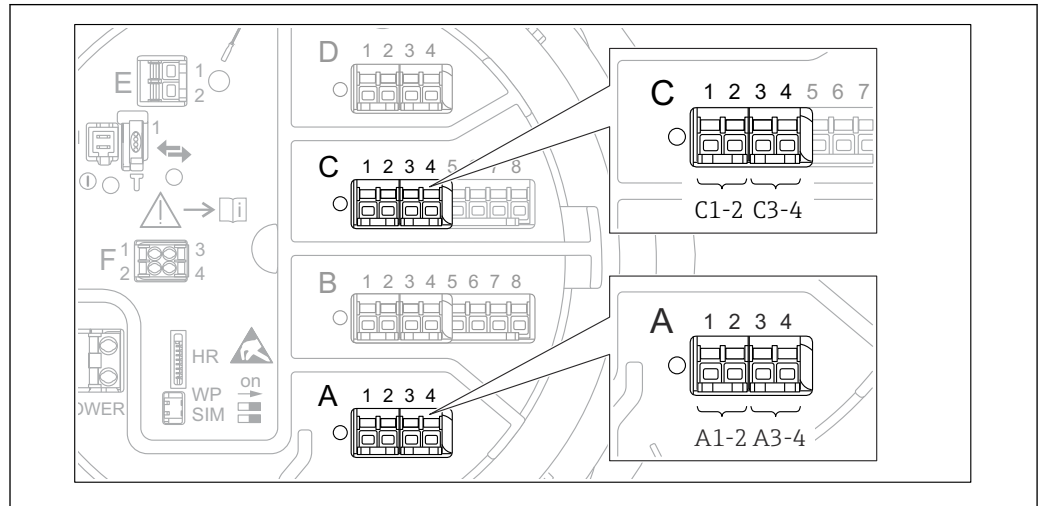
- **Operating mode (→  150) = 4..20mA output or HART slave +4..20mA output**
- The device has a SIL approval.

**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.



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14 Designation of the digital inputs or outputs (examples)

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

▶ Digital Xx-x	
Operating mode	→  163
Digital input source	→  163
Input value	→  164
Contact type	→  164
Output simulation	→  165
Output value	→  166
Readback value	→  166
Error on event	→  166
Damping factor	→  167
Used for SIL/WHG	→  167

**Operating mode**



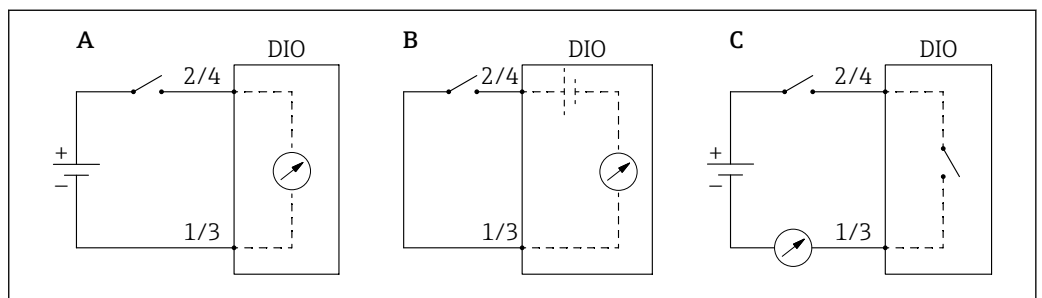
**Navigation**      Expert → Input/output → Digital Xx-x → Operating mode (13911)

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

- Selection**
- Disabled
  - Output passive
  - Input passive
  - Input active

**Factory setting**      Disabled

**Additional information**



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15 Operating modes of the Digital I/O module

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

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

**Digital input source**



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

**Prerequisite**      **Operating mode (→ 163) = Output passive**

**Description**      Defines which device state is indicated by the digital output.

- Selection**
- None
  - Balance flag
  - 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>4)</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>5)</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 (→  163) = "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 (→  163) ≠ Disabled**

**Description** Determines the switching behavior of the input or output.

**Selection**

- Normally open
- Normally closed

**Factory setting** Normally open

4) Only present if "Operating mode (→  163)" = "Input passive" or "Input active" for the respective Digital I/O module.

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

**Additional information**

Read access	Operator
Write access	Maintenance

**Output simulation**



**Navigation**

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

**Prerequisite**

**Operating mode (→ 163) = Output passive**

**Description**

Sets the output to a specific simulated value.

**Selection**

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

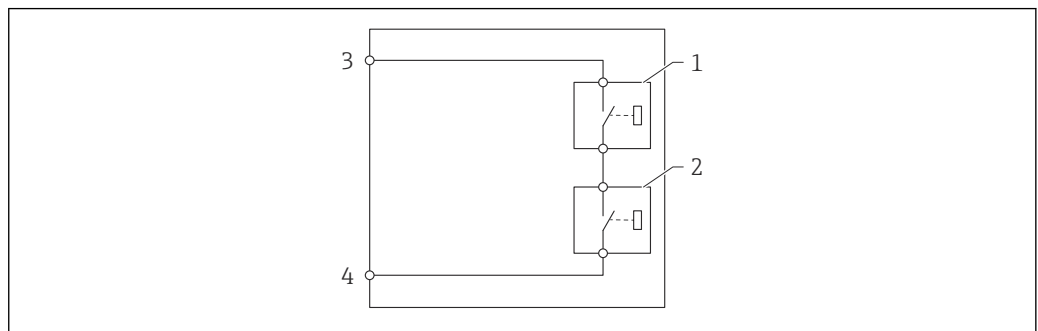
**Factory setting**

Disable

**Additional information**

Read access	Operator
Write access	Maintenance

The digital output consists of two relays connected in series:



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16 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


Output simulation	State of relay 1	State of relay 2	Expected result on the terminals of the I/O module
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 (→  163) = 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 (→  163) = 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 (→  163) = 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 (→ 163) ≠ 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 (→ 163) = 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


### 3.3.5 "Digital input mapping" submenu

Navigation  Expert → Input/output → DI mapping

▶ Digital input mapping

Digital input source 1	→  168
Digital input source 2	→  168
Gauge command 0	→  169
Gauge command 1	→  170
Gauge command 2	→  170
Gauge command 3	→  171

#### Digital input source 1

**Navigation**  Expert → Input/output → DI mapping → Digital source 1 (8147)

**Description** Selects the source of digital input #1 (for gauge command).

- 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

#### Digital input source 2

**Navigation**  Expert → Input/output → DI mapping → Digital source 2 (8148)

**Description** Selects the source of digital input #2 (for gauge command).

\* Visibility depends on order options or device settings



- 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

---

**Gauge command 0**



**Navigation** Expert → Input/output → DI mapping → Gauge command 0 (8149)

**Prerequisite** **Digital input source 1 (→ 168) ≠ None**

**Description** Gauge command assigned to digital input combination 0 (DI2=0, DI1=0).

- Selection**
- Stop \*
  - Level
  - Up \*
  - Bottom level \*
  - Upper I/F level \*
  - Lower I/F level \*
  - Upper density \*
  - Middle density \*
  - Lower density \*
  - Repeatability \*
  - Water dip \*
  - Release overtension \*
  - Tank profile \*
  - Interface profile \*
  - Manual profile \*
  - Level standby \*
  - Offset standby \*

**Factory setting** Level

**Additional information**

Read access	Operator
Write access	Maintenance

---

\* Visibility depends on order options or device settings

## Gauge command 1



**Navigation** Expert → Input/output → DI mapping → Gauge command 1 (8150)

**Prerequisite** **Digital input source 1 (→ 168) ≠ None**

**Description** Gauge command assigned to digital input combination 1 (DI2=0, DI1=1).

**Selection**

- Stop \*
- Level
- Up \*
- Bottom level \*
- Upper I/F level \*
- Lower I/F level \*
- Upper density \*
- Middle density \*
- Lower density \*
- Repeatability \*
- Water dip \*
- Release overtension \*
- Tank profile \*
- Interface profile \*
- Manual profile \*
- Level standby \*
- Offset standby \*

**Factory setting** Up

**Additional information**

Read access	Operator
Write access	Maintenance

## Gauge command 2



**Navigation** Expert → Input/output → DI mapping → Gauge command 2 (8151)

**Prerequisite**

- **Digital input source 1 (→ 168) ≠ None**
- **Digital input source 2 (→ 168) ≠ None**

**Description** Gauge command assigned to digital Input combination 2 (DI2=1, DI1=0).

**Selection**

- Stop \*
- Level
- Up \*
- Bottom level \*
- Upper I/F level \*
- Lower I/F level \*
- Upper density \*
- Middle density \*
- Lower density \*
- Repeatability \*

\* Visibility depends on order options or device settings

- Water dip \*
- Release overtension \*
- Tank profile \*
- Interface profile \*
- Manual profile \*
- Level standby \*
- Offset standby \*

**Factory setting**

Stop

**Additional information**

Read access	Operator
Write access	Maintenance

**Gauge command 3**



**Navigation**

Expert → Input/output → DI mapping → Gauge command 3 (8152)

**Prerequisite**

- Digital input source 1 (→ 168) ≠ None
- Digital input source 2 (→ 168) ≠ None

**Description**

Gauge command assigned to digital input combination 3 (DI2=1, DI1=1).

**Selection**

- Stop \*
- Level
- Up \*
- Bottom level \*
- Upper I/F level \*
- Lower I/F level \*
- Upper density \*
- Middle density \*
- Lower density \*
- Repeatability \*
- Water dip \*
- Release overtension \*
- Tank profile \*
- Interface profile \*
- Manual profile \*
- Level standby \*
- Offset standby \*

**Factory setting**

Upper I/F level

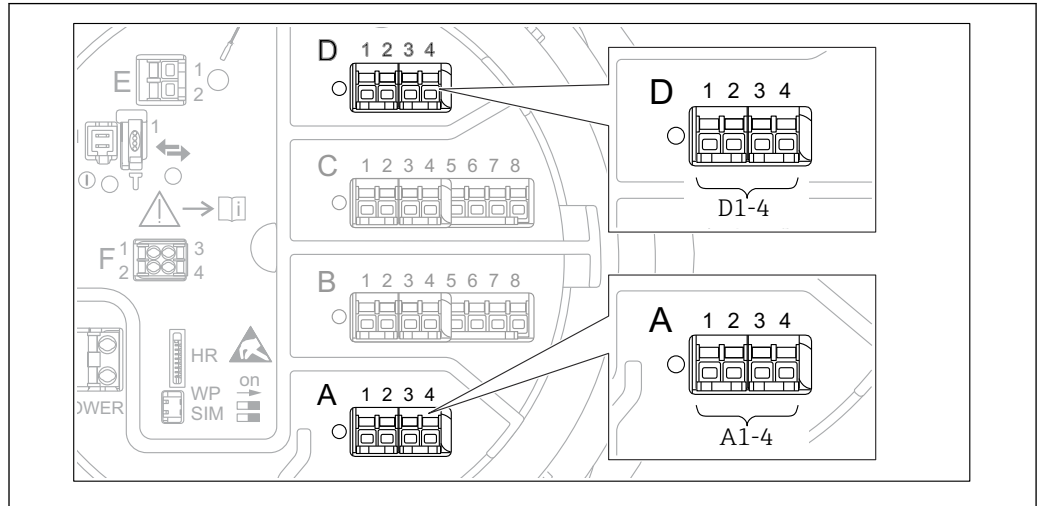
**Additional information**

Read access	Operator
Write access	Maintenance

\* Visibility depends on order options or device settings

### 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.



A0031200

17 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

<b>► Modbus Xx-x</b>	
Communication interface protocol	→  174
Modbus value 1 to 4	→  174
Modbus discrete 1 to 4	→  174
<b>► Configuration</b>	→  175
<b>► Integer conversion</b>	→  180
<b>► User value source</b>	→  185
<b>► GP values</b>	→  186
<b>► Discrete selector</b>	→  189



<b>► V1 Xx-x</b>	
Communication interface protocol	→  174
<b>► Configuration</b>	→  190
<b>► V1 input selector</b>	→  193

<b>► WM550 Xx-x</b>	
<b>► Configuration</b>	→  198
<b>► WM550 input selector</b>	→  200

---

**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** (→  174) = **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** (→  174) = **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	→  175
Parity	→  176
Modbus address	→  176
Float swap mode	→  176
Invalid data	→  177
Word type	→  177
CRC seed	→  178
Old TSM mode	→  178
Bus termination	→  178
Compatibility mode	→  179

**Baudrate**



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

**Prerequisite** **Communication interface protocol (→  174) = 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

\* Visibility depends on order options or device settings

**Additional information**

Read access	Operator
Write access	Maintenance

**Parity****Navigation**

Expert → Communication → Modbus X1-4 → Configuration → Parity (13204)

**Prerequisite**

**Communication interface protocol (→ 174) = 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 (→ 174) = 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 (→ 174) = 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**

Read access	Operator
Write access	Maintenance

**Invalid data** 

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

**Prerequisite** **Communication interface protocol (→  174) = MODBUS**

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


- Selection**
- 0x00
  - 0xFF


**Factory setting** 0x00

**Additional information**

Read access	Operator
Write access	Maintenance

**Word type** 

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

**Prerequisite** **Communication interface protocol (→  174) = 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**

Read access	Operator
Write access	Maintenance


---

**CRC seed**



---

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

**Prerequisite** **Communication interface protocol (→  174) = 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 (→  174) = 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 (→  174) = 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

**Compatibility mode**



**Navigation** Expert → Communication → Modbus Xx-x → Configuration → Comp. mode (13281)

**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

**"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%	→  180
Level 100%	→  181
Temperature 0%	→  181
Temperature 100%	→  181
Pressure 0%	→  182
Pressure 100%	→  182
Density 0%	→  182
Density 100%	→  183
User 0%	→  183
User 100%	→  183
Percent 0%	→  184
Percent 100%	→  184

**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" 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				

**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" 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				

**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" 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				

**Pressure 0%****Navigation**

Expert → Communication → Modbus Xx-x → Integer convers → Pressure 0% (13217)

**Description**

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

**User entry**

Signed floating-point number

**Factory setting**

0 bar

**Additional information**

Read access	Operator
Write access	Maintenance

**Pressure 100%****Navigation**

Expert → Communication → Modbus Xx-x → Integer convers → Pressure 100% (13251)

**Description**

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

**User entry**

Signed floating-point number

**Factory setting**

25 000 bar

**Additional information**

Read access	Operator
Write access	Maintenance

**Density 0%****Navigation**

Expert → Communication → Modbus Xx-x → Integer convers → Density 0% (13252)

**Description**

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

**User entry**

Signed floating-point number

**Factory setting**

0 kg/m<sup>3</sup>

**Additional information**

Read access	Operator
Write access	Maintenance

**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>6)</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**

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









---


6) 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%	→  186
GP 1 value 100%	→  186
GP 2 value 0%	→  187
GP 2 value 100%	→  187
GP 3 value 0%	→  187
GP 3 value 100%	→  188
GP 4 value 0%	→  188
GP 4 value 100%	→  188

**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%

**Navigation**

Expert → Communication → Modbus Xx-x → GP values → GP 3 value 100% (13226)

**Description**

Defines the GP3 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 4 value 0%

**Navigation**

Expert → Communication → Modbus Xx-x → GP values → GP 4 value 0% (13225)

**Description**

Defines the GP4 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 4 value 100%

**Navigation**

Expert → Communication → Modbus Xx-x → GP values → GP 4 value 100% (13227)

**Description**

Defines the GP4 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

**"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 →  190
- V1 addressV1/MDP →  190
- V1 addressBBB/MIC+232 →  191
- Level mapping →  191
- Line impedance →  192
- Compatibility mode →  192

**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** (→  190) = 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 (→ 190)**

**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 (→ 174) = 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

**Navigation**   Expert → Communication → V1 Xx-x → Configuration → Line impedance (13266)

**Prerequisite** **Communication interface protocol (→  174) = V1**


**Description** Adjusts the impedance of the communication line.

**User entry** 0 to 15


**Factory setting** 15

**Additional information**

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

**Navigation**   Expert → Communication → V1 Xx-x → Configuration → Comp. mode (13281)

**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













**"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	→  193
Alarm 1 input source	→  194
Alarm 2 input source	→  194
Alarm 3 input source	→  195
Alarm 4 input source	→  195
SP 1 value selector	→  196
SP 2 value selector	→  196
SP 3 value selector	→  197
SP 4 value selector	→  197
Value percent selector	→  198

**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>7)</sup>
- Vapor density
- Manual density
- P1 position
- P3 position
- GP 1...4 value

7) 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	→  198
WM550 address	→  199
Software ID	→  199
Compatibility mode	→  199

Baudrate 

<b>Navigation</b>	 Expert → Communication → WM550 Xx-x → Configuration → Baudrate (13203)
<b>Prerequisite</b>	<b>Communication interface protocol (→  174) = "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 (→ 174) = "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 (13281)

**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.

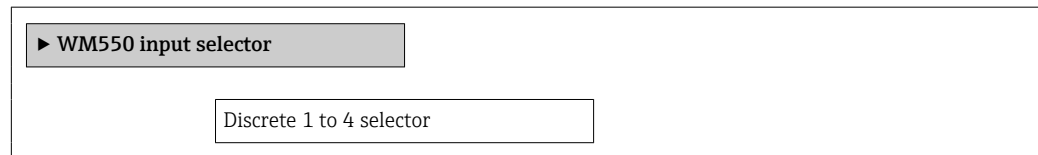
In **NMS8x** mode: All Gauge status are available at this parameter.

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 output	
▶ HART configuration	→  202
▶ Information	→  210

**"HART configuration" submenu**

Navigation  Expert → Communication → HART output → HART config.

▶ HART configuration	
System polling address	→  202
No. of preambles	→  203
PV source	→  203
Assign PV	→  203
0 % value	→  204
100 % value	→  205
PV mA selector	→  205
Primary variable (PV)	→  205
Percent of range	→  206
Assign SV	→  206
Secondary variable (SV)	→  207
Assign TV	→  207
Tertiary variable (TV)	→  208
Assign QV	→  208
Quaternary variable (QV)	→  209

**System polling address**

<b>Navigation</b>	 Expert → Communication → HART output → HART config. → Polling address (0219)
<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 (0217)

**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 (11634)

**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 (0234)

**Prerequisite**

**PV source (→ 203) = 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 (11632)
**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 (11633)

**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 (11631)

**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) (0201)

**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 (0274)

**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 (0235)

**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) (0226)

**Prerequisite** **Assign SV (→  206) ≠ 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 (0236)

**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) (0228)

**Prerequisite** **Assign TV (→  207) ≠ 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 (0237)

**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) (0203)

**Prerequisite**

**Assign QV (→  208) ≠ 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	→  210
Device tag	→  211
Device revision	→  211
Device ID	→  211
Device type	→  212
Manufacturer ID	→  212
HART revision	→  212
HART descriptor	→  213
HART message	→  213
Hardware revision	→  213
Software revision	→  214
HART date code	→  214

**HART short tag**



**Navigation**

 Expert → Communication → HART output → Information → HART short tag (0220)

**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**

NMS8x

**Additional information**

Read access	Operator
Write access	Maintenance

**Device tag**



**Navigation** Expert → Communication → HART output → Information → Device tag (0215)

**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** NMS8x

**Additional information**

Read access	Operator
Write access	Maintenance

**Device revision**

**Navigation** Expert → Communication → HART output → Information → Device revision (0204)

**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 (0221)

**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**


---

**Navigation**  Expert → Communication → HART output → Information → Device type (0209)

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

**User interface** 0 to 65 535

**Factory setting** 4 397

**Additional information**

Read access	Operator
Write access	-

---

**Manufacturer ID**


---

**Navigation**  Expert → Communication → HART output → Information → Manufacturer ID (0259)

**Description** Shows the device's manufacturer ID registered with the HART Communication Foundation.

**User interface** 0 to 65 535

**Factory setting** 17

**Additional information**

Read access	Operator
Write access	-

---

**HART revision**


---

**Navigation**  Expert → Communication → HART output → Information → HART revision (0205)

**Description** HART revision used by the device.

**User interface** 5 to 7

**Factory setting** 7

**Additional information**

Read access	Operator
Write access	-

**HART descriptor**



<b>Navigation</b>	Expert → Communication → HART output → Information → HART descriptor (0212)				
<b>Description</b>	Enter description for the measuring point				
<b>User entry</b>	Character string comprising numbers, letters and special characters (16)				
<b>Factory setting</b>	NMS8x				
<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				

**HART message**



<b>Navigation</b>	Expert → Communication → HART output → Information → HART message (0216)				
<b>Description</b>	<p>Use this function to define a HART message which is sent via the HART protocol when requested by the master.</p> <p>Maximum length: 32 characters                  Allowed characters: A-Z, 0-9, certain special characters</p>				
<b>User entry</b>	Character string comprising numbers, letters and special characters (32)				
<b>Factory setting</b>	NMS8x				
<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				


**Hardware revision**

<b>Navigation</b>	Expert → Communication → HART output → Information → Hardware rev. (0206)				
<b>Description</b>	Hardware revision of the device.				
<b>User interface</b>	0 to 30				
<b>Factory setting</b>	1				
<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	-				

---

**Software revision**


---

**Navigation**  Expert → Communication → HART output → Information → Software rev. (0224)

**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 (0202)

**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		→  215
▶ Tank calculation		→  239
▶ Alarm		→  256

#### 3.5.1 "Tank configuration" submenu

Navigation   Expert → Application → Tank config

Tank configuration		
Process condition		→  215
▶ Level		→  217
▶ Temperature		→  221
▶ Density		→  225
▶ Pressure		→  229
▶ GP values		→  237

#### Process condition


**Navigation**   Expert → Application → Tank config → Process cond. (8001)

**Description** Select the liquid condition of the tank.

**Selection**

- Universal
- Calm surface
- Turbulent surface


**Factory setting** Universal

**Additional information**  For W&M, setting to option **Calm surface** is recommended.











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



**"Level" submenu**

Navigation  Expert → Application → Tank config → Level

▶ Level

Level source	→  217
Empty	→  218
Tank reference height	→  218
Tank level	→  218
Set level	→  219
Upper interface level	→  219
Lower interface level	→  219
Water level source	→  219
Water level	→  220
Manual water level	→  220

**Level source**



**Navigation**

 Expert → Application → Tank config → Level → Level source (14601)

**Description**

Defines the source of the level value.

**Selection**

- No input value
- HART device 1 ... 15 level
- Level SR \*
- Level \*
- Displacer position \*
- AIO B1-3 value \*
- AIO C1-3 value \*
- AIP B4-8 value \*
- AIP C4-8 value \*

**Factory setting**

Dependent on the device version

**Additional information**

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

\* Visibility depends on order options or device settings

**Empty****Navigation** Expert → Application → Tank config → Level → Empty (14602)**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 reference line of the calibration window.

**Tank reference height****Navigation** Expert → Application → Tank config → Level → Tank ref height (14603)**Description** Defines the distance from the dipping reference point to the 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

**Tank level****Navigation** Expert → Application → Tank config → Level → Tank level (14655)**Description** Shows the distance from the zero position (tank bottom or datum plate) to the product surface.**Additional information**

Read access	Operator
Write access	-

**Set level**



**Navigation** Expert → Application → Tank config → Level → Set level (14604)

**Description** 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.

**User entry** 0 to 10 000 000 mm

**Factory setting** 0 mm

**Additional information**

Read access	Operator
Write access	Maintenance

The device adjusts the **Empty** parameter (→ 218) according to the entered value, such that the measured level will match the actual level.

**Upper interface level**

**Navigation** Expert → Application → Tank config → Level → Upper I/F level (15003)

**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 (15004)

**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 (14971)

**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 (14970)

**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 (14959)

**Prerequisite** **Water level source (→  219) = 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

**"Temperature" submenu**

Navigation   Expert → Application → Tank config → Temperature



▶ Temperature

Liquid temp source	→  221
Manual liquid temperature	→  222
Liquid temperature	→  222
Air temperature source	→  222
Manual air temperature	→  223
Air temperature	→  223
Vapor temp source	→  223
Manual vapor temperature	→  224
Vapor temperature	→  224

**Liquid temp source**



**Navigation**

  Expert → Application → Tank config → Temperature → Liq temp source (14972)

**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 (15015)

**Prerequisite** **Liquid temp source (→ 221) = Manual value**

**Description** Defines the manual value of the liquid temperature.

**User entry** -50 to 300 °C

**Factory setting** 25 °C

**Additional information**

Read access	Operator
Write access	Maintenance

---

**Liquid temperature**

---

**Navigation** Expert → Application → Tank config → Temperature → Liquid temp. (14978)

**Description** Shows the average or spot temperature of the measured liquid.

**Additional information**

Read access	Operator
Write access	-

---

**Air temperature source**

---



**Navigation** Expert → Application → Tank config → Temperature → Air temp. source (14993)

**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

**Additional information**

Read access	Operator
Write access	Maintenance

**Manual air temperature**



**Navigation** Expert → Application → Tank config → Temperature → Manual air temp. (14961)

**Prerequisite** **Air temperature source (→ 222) = 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. (14986)

**Description** Shows the air temperature.

**Additional information**

Read access	Operator
Write access	-

**Vapor temp source**



**Navigation** Expert → Application → Tank config → Temperature → Vapor temp src (14973)

**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. (14960)

**Prerequisite** **Vapor temp source (→ 223) = 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. (14985)



**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	→  225
Observed density	→  226
Air density	→  226
Vapor density	→  226
Measured upper density	→  226
Measured middle density	→  227
Measured lower density	→  227
Water density	→  227
Profile point	→  227
Profile average density	→  228
Profile density timestamp	→  228

**Observed density source**



Navigation   Expert → Application → Tank config → Density → Density source (13454)

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 (13452)**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 (14980)**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 (14981)**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

---

**Measured upper density**

---


**Navigation**  Expert → Application → Tank config → Density → Meas upper dens. (15001)**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 (14997)

**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. (15002)

**Description**

Density of the lower phase.

**Additional information**

Read access	Maintenance
Write access	-

**Water density**



**Navigation**

 Expert → Application → Tank config → Density → Water density (13757)

**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

**Profile point**

**Navigation**

 Expert → Application → Tank config → Density → Profile point (8170)

**Description**

Shows actual number of Density Points measured so far in current operation, and the total Number of Points after Density Profile Operation is complete.

**Additional information**

Read access	Operator
Write access	-

**Profile average density****Navigation**

 Expert → Application → Tank config → Density → Profile avg dens (8175)


**Description**

Shows the average density calculated after a profile density measurement is complete.

**Additional information**

Read access	Operator
Write access	-

**Profile density timestamp****Navigation**

 Expert → Application → Tank config → Density → Profil dens time (8114)

**Description**




















Shows the timestamp when the last average density profile was finished.


**Additional information**

Read access	Operator
Write access	-

**"Pressure" submenu**

Navigation   Expert → Application → Tank config → Pressure

► Pressure	
P1 (bottom) source	→  230
P1 (bottom)	→  230
P1 (bottom) manual pressure	→  230
P1 position	→  231
P1 offset	→  231
P1 absolute / gauge	→  231
P2 (middle) source	→  232
P2 (middle)	→  232
P2 (middle) manual pressure	→  232
P2 offset	→  233
P1-2 distance	→  233
P2 absolute / gauge	→  233
P3 (top) source	→  234
P3 (top)	→  234
P3 (top) manual pressure	→  234
P3 position	→  235
P3 offset	→  235
P3 absolute / gauge	→  235
Ambient pressure	→  236

**P1 (bottom) source** **Navigation**   Expert → Application → Tank config → Pressure → P1 (bot) source (14994)**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) (14983)**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 (14951)**Prerequisite** **P1 (bottom) source** (→  230) = **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 (14952)

**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 (14953)

**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 (14954)

**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 (14995)

**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) (14987)

**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 (14955)

**Prerequisite** **P2 (middle) source** (→ 232) = **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 (14975)

**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 (14974)

**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 (14976)

**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 (14996)

**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) (14988)

**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 (14977)

**Prerequisite** **P3 (top) source** (→ 234) = **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 (14956)

**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 (14957)

**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 (14958)

**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 (14962)

**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	→  237
GP 1 to 4 name	→  238
GP Value 1	→  238
GP Value 2	→  238
GP Value 3	→  238
GP Value 4	→  239

**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 S 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 (14963)

**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 (14966)

**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 (14967)

**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 (14968)

**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 (14969)

**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 →  239
- ▶ HyTD →  242
- ▶ CTSh →  247
- ▶ HTMS →  252

## Local gravity

**Navigation**   Expert → Application → Tank calculation → Local gravity (14979)

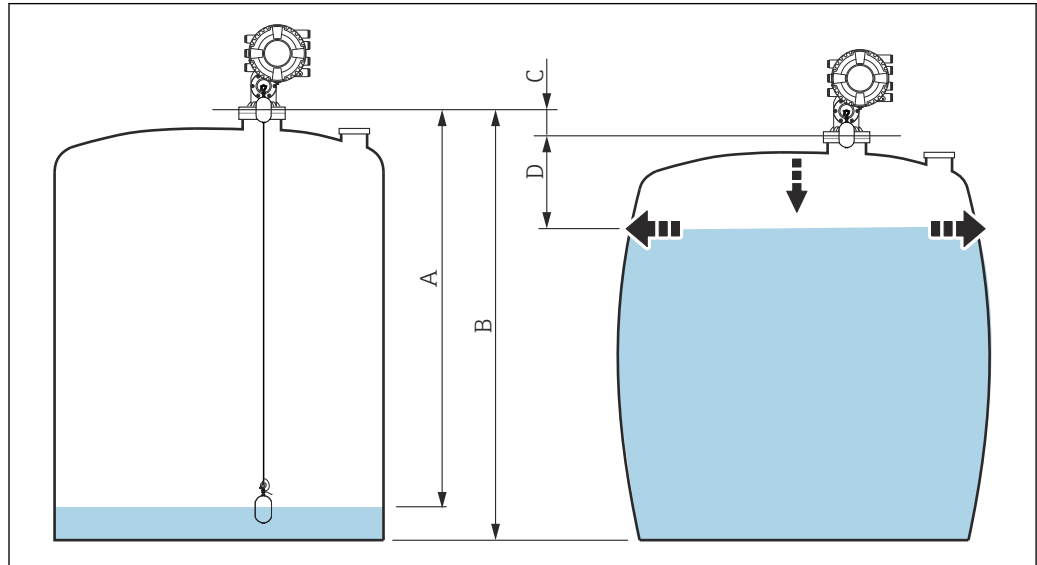
**Description** Shows the manually entered local gravity value.

**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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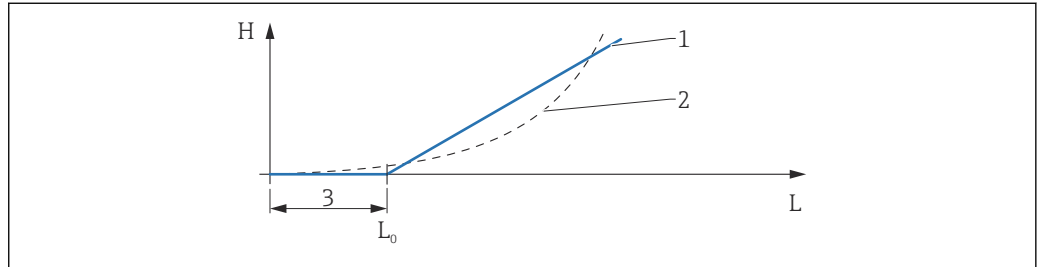
18 Correction of the hydrostatic tank deformation (HyTD)

- 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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19 Calculation of the HyTD correction

- 1 Linear correction according to "Deformation factor (→ 243)"
- 2 Real correction
- 3 Starting level (→ 242)
- L Measured level
- H HyTD correction value (→ 242)

*Calculation of the HyTD correction*

$$L \leq L_0 \Rightarrow C_{HyTD} = 0$$

$$L > L_0 \Rightarrow C_{HyTD} = - (L - L_0) \times D$$





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<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	→  242
HyTD mode	→  242
Starting level	→  242
Deformation factor	→  243

---

**HyTD correction value**

---

**Navigation**  Expert → Application → Tank calculation → HyTD → HyTD corr. value (13603)

**Description** Shows the correction value from the Hydrostatic Tank Deformation.

**Additional information**

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

---

**HyTD mode**

---



**Navigation**  Expert → Application → Tank calculation → HyTD → HyTD mode (14652)

**Description** Activates or deactivates the calculation of the Hydrostatic Tank Deformation.

**Selection**

- No
- Yes

**Factory setting** No

**Additional information**

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

---

**Starting level**

---



**Navigation**  Expert → Application → Tank calculation → HyTD → Starting level (13601)

**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 (13602)

**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

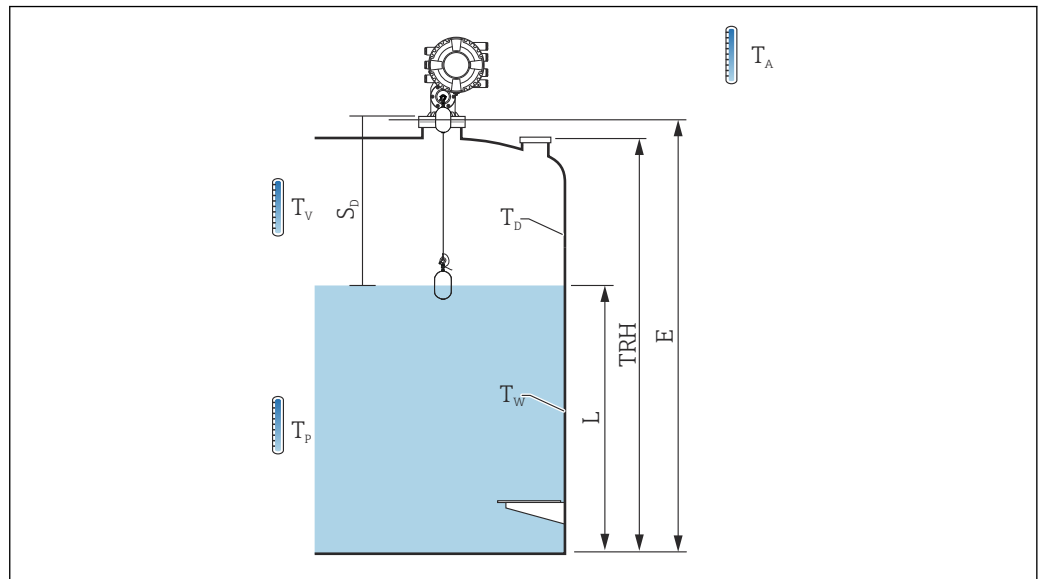
## "CTSh" submenu

### 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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20 Parameters for the CTSh calculation

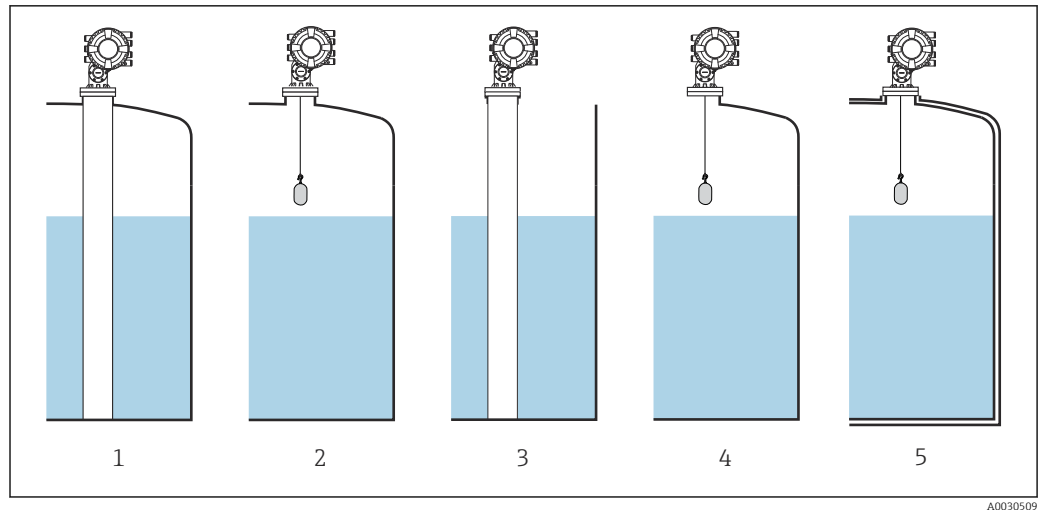
$T_W$	Temperature of the wetted part of the tank shell
$T_D$	Temperature of the dry part of the tank shell
$T_P$	Product temperature
$T_V$	Vapor temperature (in the tank)
$T_A$	Ambient temperature (atmosphere surrounding the tank)
$S_d$	Measured distance (Empty to Level)
<b>TRH</b>	Tank reference height
<b>E</b>	Empty
<b>L</b>	Level











*CTSh: Calculation of the wall temperature*

Depending on the parameters **Covered tank** (→ 248) and **Stilling well** (→ 248), the temperatures  $T_W$  of the wetted and  $T_D$  of the dry part of the tank wall are calculated as follows:

Covered tank (→ 248)	Stilling well (→ 248)	$T_W$	$T_D$
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.



- 1 Covered tank (→  248) = Covered; Stilling well (→  248) = Yes
- 2 Covered tank (→  248) = Covered; Stilling well (→  248) = No
- 3 Covered tank (→  248) = Open top; Stilling well (→  248) = Yes
- 4 Covered tank (→  248) = Open top; Stilling well (→  248) = No
- 5 Insulated tank: Covered tank (→  248) = Open top; Stilling well (→  248) = Yes

*CTSh: Calculation of the correction*

$$C_{CTSh} = \alpha_{tank} (TRH - L)(T_D - T_{cal}) + \alpha_{tank} L (T_W - T_{cal}) - \alpha_{wire} S_D (T_v - T_{cal})$$








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<b>TRH</b>	Tank reference height
<b>L</b>	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<sub>tank</sub></b>	Linear expansion coefficient of tank
<b>α<sub>wire</sub></b>	Linear expansion coefficient of wire
<b>C<sub>CTSh</sub></b>	CTSh correction value

*Description of parameters*



*Navigation*        Expert → Application → Tank calculation → CTSh

▶ CTSh

- CTSh correction value →  247
- CTSh mode →  248
- Covered tank →  248
- Stilling well →  248
- Calibration temperature →  249
- Linear expansion coefficient →  249
- Wire expansion coefficient →  249

**CTSh correction value**

**Navigation**


  Expert → Application → Tank calculation → CTSh → CTSh corr value (13651)

**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 (14651)

**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 (13654)

**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 (13653)

**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 (13652)

**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 (13655)

**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 (13656)

**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**

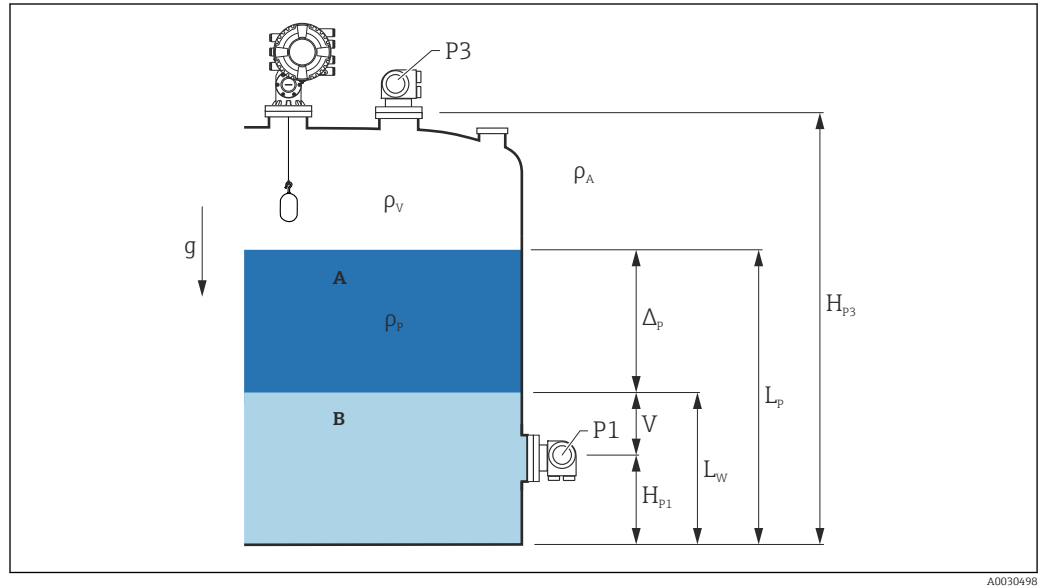
15 ppm

**"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*



21 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)
$V = L_w - H_{p1}$	
$\Delta_p = L_p - L_w = L_p - V - H_{p1}$	

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 (→ 252). 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.

**i** The **HTMS P1+P3** option must be used in pressurized tanks in order to compensate for the pressure of the vapor phase.

HTMS mode (→ 252)	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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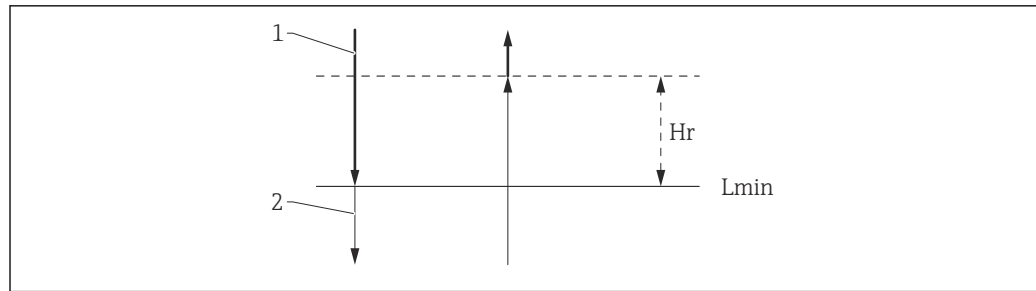
L<sub>min</sub> is defined in the **Minimum level** parameter (→ 253). As can be seen from the formula it always must be bigger than H<sub>p1</sub>.

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) 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** (→ 253)), 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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### 22 HTMS hysteresis

- 1 Value calculated
- 2 Value held/manual
- $L_{min}$  Minimum level (→ 253)
- $H_r$  Hysteresis (→ 254)

### Description of parameters

Navigation Expert → Application → Tank calculation → HTMS

▶ HTMS

HTMS mode	→ 252
Manual density	→ 253
Density value	→ 253
Minimum level	→ 253
Minimum pressure	→ 254
Safety distance	→ 254
Hysteresis	→ 254
Water density	→ 255

## HTMS mode

### Navigation

Expert → Application → Tank calculation → HTMS → HTMS mode (13751)

### 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 (15009)

**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 (13753)

**Description**

Shows the calculated product density.

**Additional information**

Read access	Operator
Write access	-

**Minimum level**



**Navigation**

Expert → Application → Tank calculation → HTMS → Min. level (13752)

**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 (13754)

**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 (13756)

**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 (13755)

**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 (13757)

**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

### 3.5.3 "Alarm" submenu

Navigation  Expert → Application → Alarm

#### "Alarm" submenu

Navigation  Expert → Application → Alarm → Alarm

▶ Alarm	
Alarm mode	→  257
Error value	→  258
Alarm value source	→  259
Alarm value	→  260
HH alarm value	→  260
H alarm value	→  260
L alarm value	→  261
LL alarm value	→  261
HH alarm	→  261
H alarm	→  262
HH+H alarm	→  262
L alarm	→  262
LL alarm	→  262
LL+L alarm	→  263
Any error	→  263
Clear alarm	→  263
Alarm hysteresis	→  264
Damping factor	→  264



**Alarm mode**



**Navigation** Expert → Application → Alarm → Alarm → Alarm mode (13864)

**Description** Defines the alarm mode of the selected alarm.

- Selection**
- Off
  - On
  - Latching

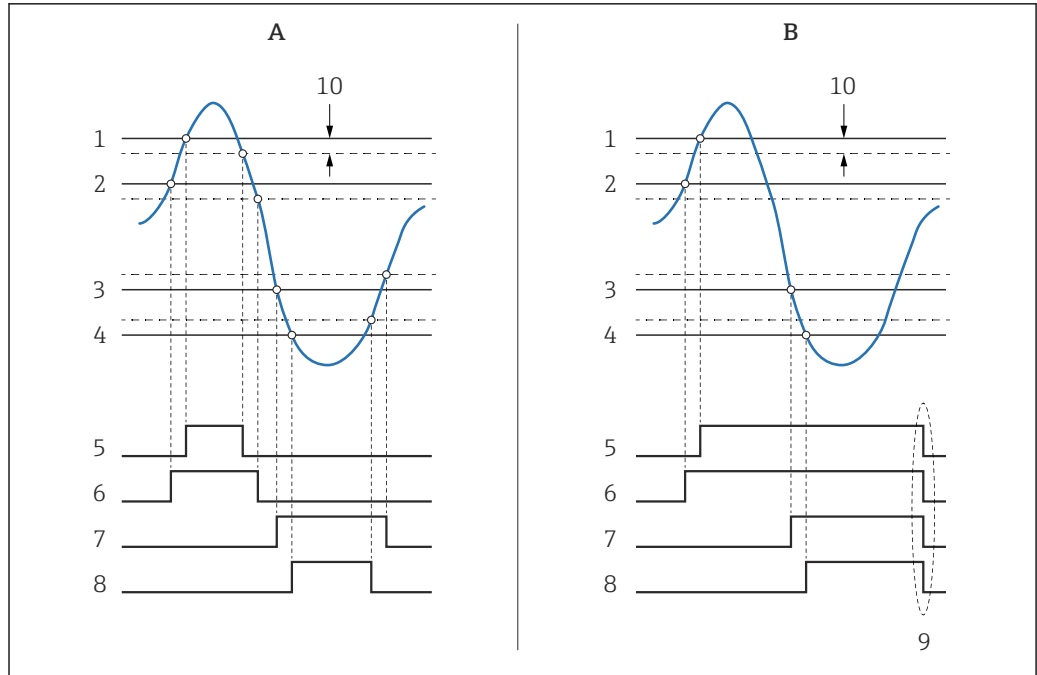
**Factory setting** Off

**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** (→ 263) = **Yes** or the power is switched off and on.



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23 Principle of the limit evaluation

- A Alarm mode (→ 257) = On
- B Alarm mode (→ 257) = Latching
- 1 HH alarm value (→ 260)
- 2 H alarm value (→ 260)
- 3 L alarm value (→ 261)
- 4 LL alarm value (→ 261)
- 5 HH alarm (→ 261)
- 6 H alarm (→ 262)
- 7 L alarm (→ 262)
- 8 LL alarm (→ 262)
- 9 "Clear alarm (→ 263)" = "Yes" or power off-on
- 10 Hysteresis (→ 264)

Error value



Navigation

Expert → Application → Alarm → Alarm → Error value (13851)

Prerequisite

Alarm mode (→ 257) ≠ 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 (13866)

**Prerequisite** **Alarm mode (→ 257) ≠ 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 (13863)**Prerequisite** **Alarm mode (→  257) ≠ 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 (13855)**Prerequisite** **Alarm mode (→  257) ≠ 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 (13854)**Prerequisite** **Alarm mode (→  257) ≠ 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 (13853)

**Prerequisite** **Alarm mode (→ 257) ≠ 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 (13852)

**Prerequisite** **Alarm mode (→ 257) ≠ 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 (13857)

**Prerequisite** **Alarm mode (→ 257) ≠ 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 (13856)

**Prerequisite** **Alarm mode (→  257) ≠ 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 (13858)

**Prerequisite** **Alarm mode (→  257) ≠ 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 (13859)

**Prerequisite** **Alarm mode (→  257) ≠ 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 (13868)

**Prerequisite** **Alarm mode (→  257) ≠ 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 (13869)

**Prerequisite**

**Alarm mode (→  257) ≠ 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 (13867)

**Prerequisite**

**Alarm mode (→  257) ≠ 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 (13861)

**Prerequisite**

**Alarm mode (→  257) = 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 (13862)

**Prerequisite**

**Alarm mode** (→ 257) ≠ 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 (13860)

**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

<b>▶ Tank values</b>		
Net weight		→  265
Gauge status		→  265
Balance flag		→  266
Standby level		→  266
Offset standby distance		→  267
One-time command status		→  268
<b>▶ Level</b>		→  268
<b>▶ Temperature</b>		→  273
<b>▶ Density</b>		→  276
<b>▶ Pressure</b>		→  280
<b>▶ GP values</b>		→  281

#### Net weight

Navigation   Expert → Tank values → Net weight (8007)

Description Shows the corrected weight data from the detector, as compensated by the drum table, This weight is used for measurement.

Additional information	Read access	Operator
	Write access	-

#### Gauge status


Navigation   Expert → Tank values → Gauge status (8081)

Description Indicates the current status of the device gauge command.

**Additional information**

Read access	Operator
Write access	-

**Balance flag****Navigation**

 Expert → Tank values → Balance flag (8006)

**Description**

Indicates the validity of the Measurement. If balanced, corresponding Value (Liquid Level, Upper Interface, Lower Interface, Tank Bottom ) is updated.

**Additional information**

Read access	Operator
Write access	-

**Standby level****Navigation**

 Expert → Tank values → Standby level (8194)

**Description**

Defines the position in the tank where the displacer waits for the liquid level to rise during standby level gauge command.

**User entry**

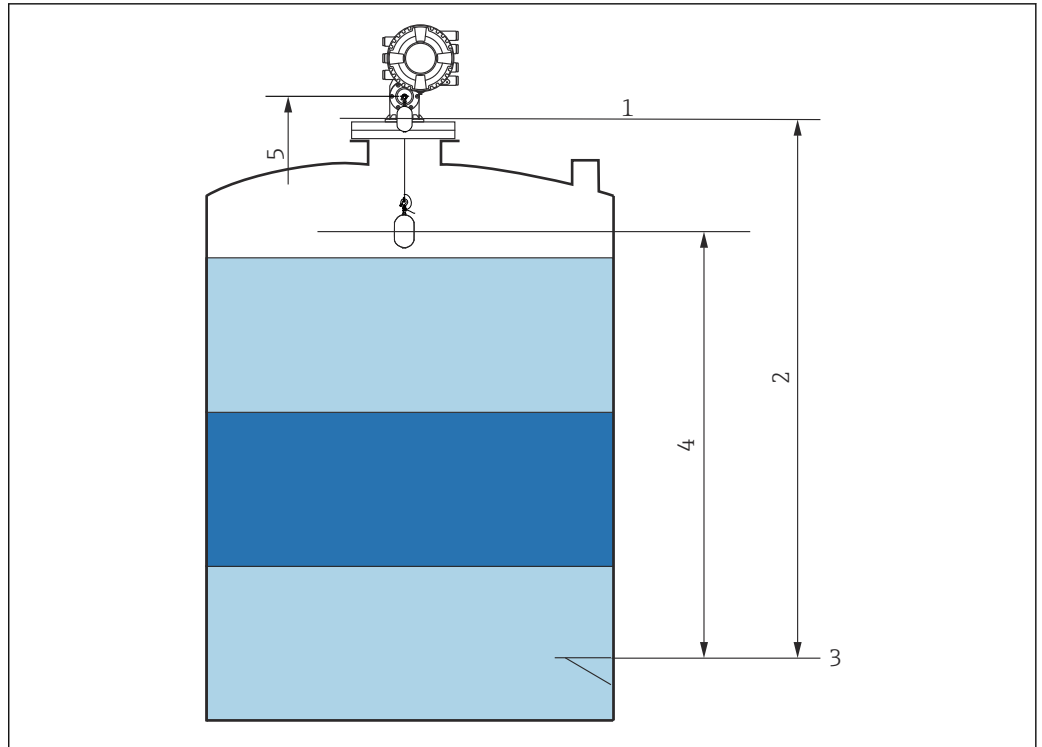
-999 999.9 to 999 999.9 mm

**Factory setting**

0 mm

**Additional information**

Read access	Operator
Write access	Maintenance



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24 Displacer waiting for the liquid level to rise during standby level gauge command

- 1 Gauge reference height
- 2 Empty
- 3 Datum plate
- 4 Standby level
- 5 Reference position

---

### Offset standby distance

---

**Navigation**

Expert → Tank values → Offset distance (8107)

**Description**

Defines the distance from the current position where the displacer waits for the liquid level to rise during offset standby gauge command.

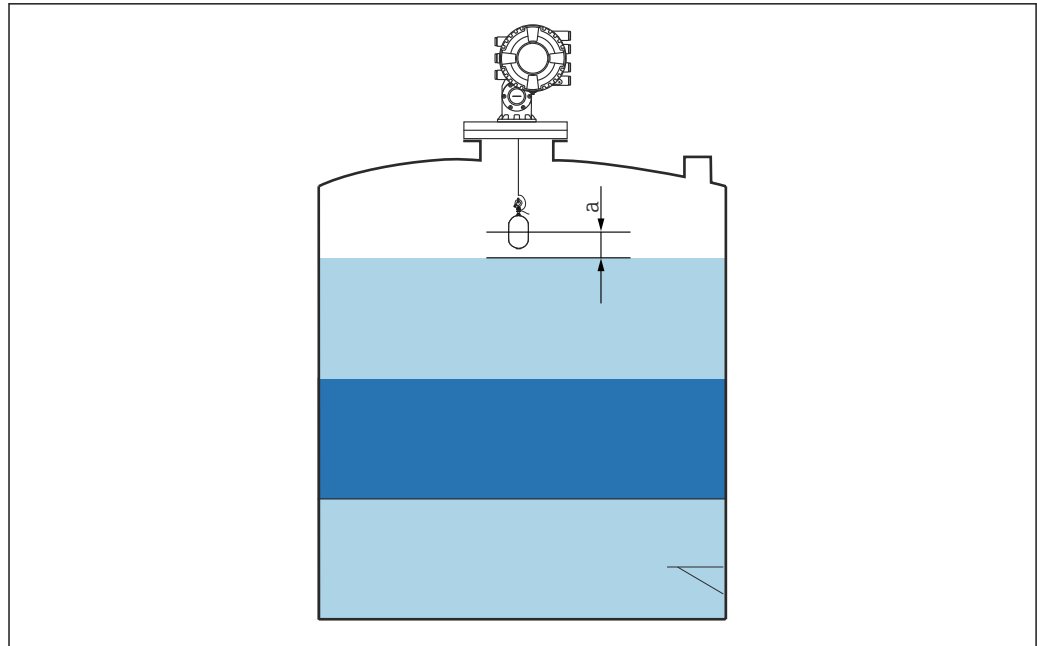
**User entry**

0 to 999 999.9 mm

**Factory setting**

500 mm

**Additional information**



A0051202

25 a: Offset standby distance

**One-time command status**

**Navigation**

Expert → Tank values → One-time Cmd (8201)

**Description**

Indicates the status of the last executed one-time gauge command.

**Additional information**

Read access	Operator
Write access	-

**Additional information**











**i** One-time command is available for all gauge commands, excepting Level, Stop, Up, and Interface.

**3.6.1 "Level" submenu**

Navigation Expert → Tank values → Level

▶ Level

- Tank level → 269
- Tank Level % → 269
- Tank ullage → 270
- Tank ullage % → 270



Upper interface level	→  270
Upper interface level timestamp	→  270
Lower interface level	→  271
Lower interface level timestamp	→  271
Bottom level	→  271
Bottom level timestamp	→  271
Water level	→  272
Measured level	→  272
Distance	→  272
Displacer position	→  272

---

### Tank level

---

**Navigation**

  Expert → Tank values → Level → Tank level (14655)

**Description**

Shows the distance from the zero position (tank bottom or datum plate) to the product surface.

**Additional information**



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

---

### Tank Level %

---

**Navigation**

  Expert → Tank values → Level → Tank Level % (14654)

**Description**

Shows the level as a percentage of the full measuring range.


**Additional information**

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

---

**Tank ullage**


---

**Navigation**  Expert → Tank values → Level → Tank ullage (14657)

**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 % (14658)

**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 (15003)

**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	-

---

**Upper interface level timestamp**


---


**Navigation**  Expert → Tank values → Level → Up I/F timestamp (8055)

**Description** Shows timestamp for the last measured upper interface level.

**Additional information**

Read access	Operator
Write access	-

**Lower interface level**


**Navigation**  Expert → Tank values → Level → Lower I/F level (15004)

**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 timestamp**


**Navigation**  Expert → Tank values → Level → LowI/F timestamp (8061)

**Description** Shows timestamp of the last measured lower interface level.

**Additional information**

Read access	Operator
Write access	-

**Bottom level**


**Navigation**  Expert → Tank values → Level → Bottom level (15018)

**Description** Shows the bottom level.

**Additional information**

Read access	Operator
Write access	-

**Bottom level timestamp**

**Navigation**  Expert → Tank values → Level → BotLev timestamp (8048)

**Description** Shows the timestamp for measured bottom level.


**Additional information**

Read access	Operator
Write access	-

---

**Water level**


---

**Navigation**  Expert → Tank values → Level → Water level (14970)

**Description** Shows the bottom water level.


**Additional information**

Read access	Operator
Write access	-

---

**Measured level**


---

**Navigation**  Expert → Tank values → Level → Measured level (14653)

**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 (8103)

**Description** Shows measured distance from reference position.


**Additional information**

Read access	Operator
Write access	-

---

**Displacer position**


---

**Navigation**  Expert → Tank values → Level → Displacer pos (15019)

**Description** Shows the displacer position.









**Additional information**

Read access	Operator
Write access	-



### 3.6.2 "Temperature" submenu

Navigation  Expert → Tank values → Temperature

▶ Temperature	
Liquid temperature	→  273
Vapor temperature	→  273
Air temperature	→  274
▶ NMT element values	→  274
▶ Element temperature	→  274
Element temperature 0 to 23	→  274
▶ Element position	→  274
Element position 0 to 23	→  274

#### Liquid temperature

Navigation  Expert → Tank values → Temperature → Liquid temp. (14978)

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. (14985)

Description Shows the measured vapor temperature.

Additional information	Read access	Operator
	Write access	-

---

**Air temperature**


---

**Navigation**   Expert → Tank values → Temperature → Air temp. (14986)

**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

<b>► Density</b>		
Observed density		→  276
Observed density temperature		→  277
Vapor density		→  277
Air density		→  277
Measured upper density		→  277
Upper density timestamp		→  278
Measured middle density		→  278
Middle Density Timestamp		→  278
Measured lower density		→  278
Lower density timestamp		→  279
<b>► Profile density</b>		→  279
Profile density 0 to 49		→  279
Profile density position 0 to 49		→  279

#### Observed density

**Navigation**


 Expert → Tank values → Density → Observed density (13451)

**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**

<b>Navigation</b>	  Expert → Tank values → Density → Obs. dens. temp. (13453)
<b>Description</b>	Corresponding temperature of measured density. Can be used for reference density calculation.
<b>User interface</b>	Signed floating-point number
<b>Factory setting</b>	0 °C



**Vapor density**





<b>Navigation</b>	  Expert → Tank values → Density → Vapor density (14981)				
<b>Description</b>	Defines the density of the gas phase in the tank.				
<b>User entry</b>	0.0 to 500.0 kg/m <sup>3</sup>				
<b>Factory setting</b>	1.2 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				

**Air density**



<b>Navigation</b>	  Expert → Tank values → Density → Air density (14980)				
<b>Description</b>	Defines the density of the air surrounding the tank.				
<b>User entry</b>	0.0 to 500.0 kg/m <sup>3</sup>				
<b>Factory setting</b>	1.2 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				

**Measured upper density**

<b>Navigation</b>	  Expert → Tank values → Density → Meas upper dens. (15001)
<b>Description</b>	Shows the density of the upper phase.

**Additional information**


Read access	Operator
Write access	-

**Upper density timestamp****Navigation**
 Expert → Tank values → Density → UpDens timestamp (8067)
**Description**

Shows timestamp of the last measured upper density.

**Additional information**

Read access	Operator
Write access	-

**Measured middle density****Navigation**
 Expert → Tank values → Density → Meas middle dens (14997)
**Description**

Density of the middle phase.

**Additional information**

Read access	Operator
Write access	-

**Middle Density Timestamp****Navigation**
 Expert → Tank values → Density → MidDensTimestamp (8011)
**Description**

Shows the timestamp of the last measured middle density.

**Additional information**

Read access	Operator
Write access	-

**Measured lower density****Navigation**
 Expert → Tank values → Density → Meas lower dens. (15002)
**Description**

Density of the lower phase.

**Additional information**

Read access	Maintenance
Write access	-

**Lower density timestamp**

**Navigation**   Expert → Tank values → Density → LowerDensTimestp (8122)

**Description** Shows timestamp of last measured lower density.


**Additional information**

Read access	Operator
Write access	-

**"Profile density" submenu**

*Navigation*  Expert → Tank values → Density → Profile density

**Profile density 0 to 49**

**Navigation**  Expert → Tank values → Density → Profile density → Profile dens 0 to 49 (8068)

**Description** Shows the density measurement at the corresponding profile density position.

**Additional information**

Read access	Operator
Write access	-

**Profile density position 0 to 49**


**Navigation**  Expert → Tank values → Density → Profile density → Profile pos 0 to 49 (8077)



**Description** Shows the position where the corresponding density was measured.

**Additional information**


Read access	Operator
Write access	-

### 3.6.4 "Pressure" submenu

Navigation  Expert → Tank values → Pressure

▶ Pressure	
P1 (bottom)	→  280
P3 (top)	→  280

#### P1 (bottom)


Navigation  Expert → Tank values → Pressure → P1 (bottom) (14983)

Description Shows the pressure at the tank bottom.

Additional information

Read access	Operator
Write access	-

#### P3 (top)

Navigation  Expert → Tank values → Pressure → P3 (top) (14988)


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	→  281
GP Value 1	→  281
GP Value 2	→  281
GP Value 3	→  282
GP Value 4	→  282

---

#### GP 1 to 4 name

**Navigation**  Expert → Tank values → GP values → GP 1 name (14963)

**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 (14966)


**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 (14967)

**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 (14968)

**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 (14969)

**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		→  285
Timestamp		→  286
Previous diagnostics		→  286
Timestamp		→  287
Operating time from restart		→  287
Operating time		→  287
Date/time		→  287
<b>► Diagnostic list</b>		→  288
Diagnostics 1 to 5		→  288
Timestamp 1 to 5		→  288
<b>► Event logbook</b>		→  289
<b>► Simulation</b>		→  290
Device alarm simulation		→  290
Diagnostic event simulation		→  290
Simulation distance on		→  291
Simulation distance		→  291
Current output 1 to 2 simulation		→  291
Simulation value		→  292
<b>► Device information</b>		→  293
Device tag		→  293
Serial number		→  294
Firmware version		→  294

Firmware CRC	→  294
Weight and measures configuration CRC	→  294
Device name	→  295
Order code	→  295
Extended order code 1 to 3	→  295
ENP version	→  295
Device type	→  296
Module type	→  296
Communication Slot	→  296
<b>▶ Board info</b>	→  298
Date/time	→  287
System temperature	→  298
W&M lock switch	→  298
<b>▶ Data logging</b>	→  300
Assign channel 1 to 4	→  301
Logging interval	→  302
Clear logging data	→  303
<b>▶ Device check</b>	→  305
<b>▶ Commissioning check</b>	→  306
Commissioning check	→  306
Result drum check	→  306
Step X / 11	→  306
<b>▶ Commissioning parameter</b>	→  307
Step X / 11	→  307

Result drum check	→  307
Displacer weight tolerance	→  307
Reference calibration incomplete	→  308

▶ LRC	
▶ LRC 1 to 2	→  309
LRC Mode	→  309
Allowed difference	→  309
Check fail threshold	→  310
Reference level source	→  310
Reference switch source	→  311
Reference switch mode	→  311
Reference level	→  311
Reference switch level	→  312
Reference point level	
Reference switch state	→  312
Start reference measurement	
Check level	→  312
Check status	→  313
Check timestamp	→  313

---

### Actual diagnostics

---

#### Navigation

Expert → Diagnostics → Actual diagnos. (0691)

#### 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 (0667)



**Description**

Displays the timestamp for the currently active diagnostic message.

**Additional information**

Read access	Operator
Write access	-

**Previous diagnostics****Navigation**

  Expert → Diagnostics → Prev.diagnostics (0690)

**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 (0672)

**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 (0653)

**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 (0652)

**Description**


Indicates how long the device has been in operation.

**Additional information**

Read access	Operator
Write access	-

**Date/time**

**Navigation**

  Expert → Diagnostics → Date/time (0790)


**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	→  288
Timestamp 1 to 5	→  288

#### 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

### 3.7.3 "Simulation" submenu

Navigation   Expert → Diagnostics → Simulation

<b>▶ Simulation</b>	
Device alarm simulation	→  290
Diagnostic event simulation	→  290
Simulation distance on	→  291
Simulation distance	→  291
Current output 1 to 2 simulation	→  291
Simulation value	→  292

#### Device alarm simulation

**Navigation**   Expert → Diagnostics → Simulation → Dev. alarm sim. (0654)

**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 (0737)


**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 (8002)

**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 (8003)

**Prerequisite**

**Simulation distance on (→  291) = 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 Anlog I/O module.
- **Operating mode (→  150) = 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 (→ 291) = 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	→  293
Serial number	→  294
Firmware version	→  294
Firmware CRC	→  294
Weight and measures configuration CRC	→  294
Device name	→  295
Order code	→  295
Extended order code 1 to 3	→  295
ENP version	→  295
Device type	→  296
Build version	→  296
Module type	→  296
Communication Slot	→  296
Recovery state	→  297
<b>► Board info</b>	→  298

#### Device tag

**Navigation**

  Expert → Diagnostics → Device info → Device tag (0011)

**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 (0009)

**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 (0010)

**Description**

Displays the device firmware version installed.

**Additional information**

Read access	Operator
Write access	-

**Firmware CRC****Navigation**

  Expert → Diagnostics → Device info → Firmware CRC (8563)

**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 (8564)

**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 (0013)

**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 (0008)

**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 (0023)

**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 (0012)

**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 (8561)

**Description**

Displays the device type.

**Additional information**

Read access	Operator
Write access	-

**Build version****Navigation**

  Expert → Diagnostics → Device info → Build version (0007)

**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 (8565)
<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	→  298
System temperature	→  298
W&M lock switch	→  298

**Date/time****Navigation**

 Expert → Diagnostics → Device info → Board info → Date/time (0790)


**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. (8553)

**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 (8558)

**Description**

Shows the position of the weights and measure (WP) switch.

**User interface**

- Enabled
- Disabled

**Factory setting**

Enabled

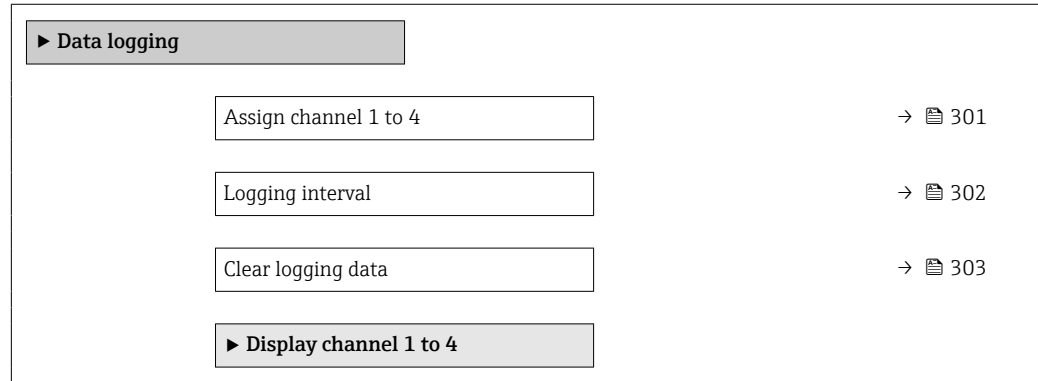
**Additional information**

Read access	Operator
Write access	-

### 3.7.5 "Data logging" submenu

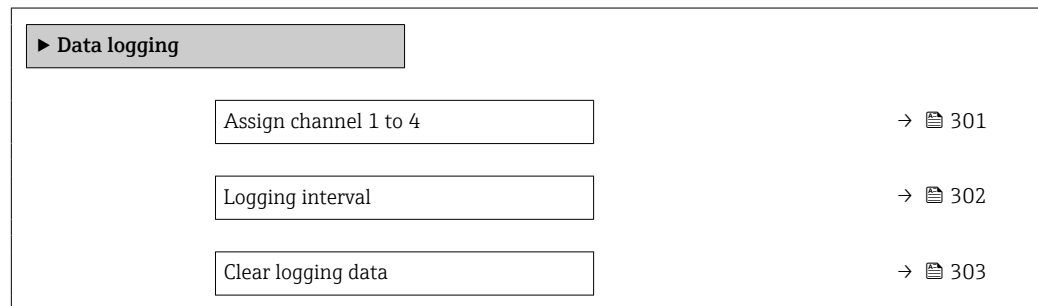
#### Structure of the submenu on the local display

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 (0856)
-  Expert → Diagnostics → Data logging → Logging interval (0856)

**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**

- $T_{log} = 1000 \cdot 1 \text{ s} = 1000 \text{ s} \approx 16.5 \text{ min}$
- $T_{log} = 1000 \cdot 10 \text{ s} = 1000 \text{ s} \approx 2.75 \text{ h}$
- $T_{log} = 1000 \cdot 80 \text{ s} = 80\,000 \text{ s} \approx 22 \text{ h}$
- $T_{log} = 1000 \cdot 3\,600 \text{ s} = 3\,600\,000 \text{ s} \approx 41 \text{ d}$

Read access	Operator
Write access	Maintenance

**Clear logging data**



**Navigation**

- Expert → Diagnostics → Data logging → Clear logging (0855)
- Expert → Diagnostics → Data logging → Clear logging (0855)

**Description**

Clear the entire logging data.

**Selection**

- Cancel
- Clear data

**Factory setting**

Cancel

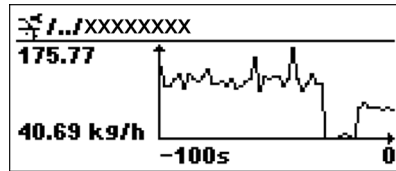
**Additional information**

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*       $\oplus$       Expert → Diagnostics → Data logging → Displ.channel 1 to 4




### 3.7.6 "Device check" submenu




*Navigation*        Expert → Diagnostics → Device check



### "Commissioning check" wizard


Navigation  Expert → Diagnostics → Device check → Commission check

▶ Commissioning check

Commissioning check	→  306
Result drum check	→  306
Step X / 11	→  306

---

#### Commissioning check

**Navigation**  Expert → Diagnostics → Device check → Commission check → Commission check


**Description** This sequence supports checking of the hardware on sensor side and correct installation of the sensor.

**Additional information**

Read access	Operator
Write access	Maintenance

---

#### Result drum check

**Navigation**  Expert → Diagnostics → Device check → Commission check → Result drum chk (8155)


**Description** Gives feedback on the latest status of the commissioning check.

**Additional information**

Read access	Operator
Write access	-

---

#### Step X / 11



**Navigation**  Expert → Diagnostics → Device check → Commission check → Step X / 11 (8143)

**Description** Indicates which step of the commissioning check is currently running.





**Additional information**

Read access	Operator
Write access	-

**"Commissioning parameter" submenu**



Navigation   Expert → Diagnostics → Device check → Commission para.

▶ Commissioning parameter

Step X / 11	→  307
Result drum check	→  307
Displacer weight tolerance	→  307
Reference calibration incomplete	→  308

---

**Step X / 11**

Navigation   Expert → Diagnostics → Device check → Commission para. → Step X / 11 (8143)



Description Indicates which step of the commissioning check is currently running.

Additional information

Read access	Operator
Write access	-

---

**Result drum check**

Navigation   Expert → Diagnostics → Device check → Commission para. → Result drum chk (8155)

Description Gives feedback on the latest status of the commissioning check.



Additional information

Read access	Operator
Write access	-

---

**Displacer weight tolerance**



Navigation   Expert → Diagnostics → Device check → Commission para. → DispWeightToler (8161)

Description Sets the tolerance of the displacer weight verification during commissioning check.


User interface 0 to 99.9 g

Factory setting 5 g

**Additional information**

Read access	Operator
Write access	Service

**Reference calibration incomplete****Navigation**

 Expert → Diagnostics → Device check → Commission para. → Ref cal. incomp (8157)

**User interface**

0 to 1


**Factory setting**

0

**Additional information**


Read access	Operator
Write access	-

### 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


---

<b>LRC Mode</b>	
-----------------	---



---

<b>Navigation</b>	  Diagnostics → LRC → LRC 1 to 2 → LRC Mode (17901-1 to 2)				
<b>Description</b>	Activates or deactivates one of the level reference check (LRC) modes.				
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Off</li> <li>■ Compare with level device</li> <li>■ Compare with level switch</li> <li>■ Measure reference point<sup>*</sup></li> </ul>				
<b>Factory setting</b>	Off				
<b>Additional information</b>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 40%;">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>Additional information</b>	The option of the Measure reference point is not available for NMS8x.				

---

<b>Allowed difference</b>	
---------------------------	---

---

<b>Navigation</b>	  Diagnostics → LRC → LRC 1 to 2 → Allowed diff. (17902-1 to 2)				
<b>Description</b>	Defines the allowed difference between the tank level and the reference.				
<b>User entry</b>	1 to 1 000 mm				
<b>Factory setting</b>	10 mm				
<b>Additional information</b>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 40%;">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				

<sup>\*</sup> Visibility depends on order options or device settings

---

**Check fail threshold**
**Navigation**

Diagnostics → LRC → LRC 1 to 2 → Fail threshold (17913-1 to 2)

**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 (17903-1 to 2)

**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 (17904-1 to 2)				
<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 (17914-1 to 2)				
<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 (17909-1 to 2)
<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 (17905-1 to 2)

**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 switch state****Navigation**

Diagnostics → LRC → LRC 1 to 2 → Ref.switch state (17908-1 to 2)

**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	-

**Check level****Navigation**

Diagnostics → LRC → LRC 1 to 2 → Check level (17910-1 to 2)

**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 (17911-1 to 2)

**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 (17912-1 to 2)

**Description**

Shows the timestamp at which the reference check has been executed.

**User interface**

Character string comprising numbers, letters and special characters

**Factory setting**

not executed

**Additional information**

Read access	Operator
Write access	-

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