

# Description of Device Parameters

## **Prothermo NMT81**

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. The document provides a detailed explanation of each individual parameter.

Performance of tasks that require detailed knowledge of the functioning of the device:

- Commissioning measurements under difficult conditions
- Optimal adaptation of the measurement to difficult conditions
- Detailed configuration of the communication interface
- Error diagnostics in difficult cases

## 1.2 Target audience

The document is aimed at specialists who work with the device over the entire life cycle and perform specific configurations.

## 1.3 Using this document

### 1.3.1 Information on the document structure

This document lists the submenus and their parameters that are available when the **"Maintenance" option** user role is activated.



For the operating concept of the operating menus, see the Operating Instructions.


### 1.3.2 Structure of a parameter description


The individual parts of a parameter description are described in the following section:


- Navigation: Navigation path to the parameter via the local display
- Prerequisite: The parameter is only available under these specific conditions
- Description: Description of the parameter function
- Selection: List of the individual options for the parameter
- User entry: Input range for the parameter
- User interface: Display value/data of the parameter
- Factory setting: Default setting on leaving the factory
- Additional information:
  - On individual options
  - On display values/data
  - On the input range
  - On the factory setting
  - On the parameter function


## 1.4 Symbols used

### 1.4.1 Symbols for certain types of information

Additional information: 

Reference to documentation: 

Operation via local display: 


Operation via operating tool: 

Write-protected parameter: 

## 1.5 Documentation

### 1.5.1 Standard documentation

#### Operating Instructions

 The Operating Instructions are available on the Internet at: [www.endress.com](http://www.endress.com) →  
Download

### 1.5.2 Supplementary device-dependent documentation
























#### Special Documentation

























 The Special Documentation is available on the Internet at: [www.endress.com](http://www.endress.com) →  
Download

## 2 Overview of the operating menu

Navigation

 Operating tool

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## 3 Description of device parameters





*Navigation*  Operating tool

### 3.1 "Guidance" menu

*Navigation*  Guidance

#### 3.1.1 "Commissioning" wizard

*Navigation*  Guidance → Commissioning

<b>Device tag</b> 	
<b>Navigation</b>	 Guidance → Commissioning → Device tag
<b>Description</b>	Enter a unique name for the measuring point to identify the device quickly within the plant.
<b>User entry</b>	Character string comprising numbers, letters and special characters (#32)
<b>Device name</b>	
<b>Navigation</b>	 Guidance → Commissioning → Device name
<b>Description</b>	Use this function to display the device name. It can also be found on the nameplate.
<b>User interface</b>	Character string comprising numbers, letters and special characters (#16)
<b>Serial number</b>	
<b>Navigation</b>	 Guidance → Commissioning → Serial number
<b>Description</b>	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.
<b>User interface</b>	Max. 11-digit character string comprising letters and numbers.

**Additional information***Description***Uses of the serial number**

- To identify the measuring device quickly, e.g. when contacting Endress+Hauser.
- To obtain specific information on the measuring device using the Device Viewer: [www.endress.com/deviceviewer](http://www.endress.com/deviceviewer)

**Extended order code 1****Navigation**

Guidance → Commissioning → Ext. order cd. 1

**Description**

The extended order code is an alphanumeric code containing all information to identify the device and its options.

**User interface**

Character string comprising numbers, letters and special characters (#20)

**Extended order code 2****Navigation**

Guidance → Commissioning → Ext. order cd. 2

**Description**

The extended order code is an alphanumeric code containing all information to identify the device and its options.

**User interface**

Character string comprising numbers, letters and special characters (#20)

**Extended order code 3****Navigation**

Guidance → Commissioning → Ext. order cd. 3

**Description**

The extended order code is an alphanumeric code containing all information to identify the device and its options.

**User interface**

Character string comprising numbers, letters and special characters (#20)

**HART short tag****Navigation**

Guidance → Commissioning → HART short tag

**Description**

Defines the short tag for the measuring point.

Maximum length: 8 characters

Allowed characters: A-Z, 0-9, certain special characters

**User entry**

Character string comprising numbers, letters and special characters (#8)



---

**HART date code**

---



<b>Navigation</b>	Guidance → Commissioning → HART date code
<b>Description</b>	Enter date of the last configuration change. Use this format yyyy-mm-dd
<b>User entry</b>	Character string comprising numbers, letters and special characters (#10)

---

**HART descriptor**

---



<b>Navigation</b>	Guidance → Commissioning → HART descriptor
<b>Description</b>	User defined HART descriptor (16 characters).
<b>User entry</b>	Character string comprising numbers, letters and special characters (#16)
<b>Factory setting</b>	NMT8x

---

**HART message**

---



<b>Navigation</b>	Guidance → Commissioning → HART message
<b>Description</b>	User defined HART message (32 characters).
<b>User entry</b>	Character string comprising numbers, letters and special characters (#32)
<b>Factory setting</b>	NMT8x

---

**HART address**

---




<b>Navigation</b>	Guidance → Commissioning → HART address
<b>Description</b>	Define the HART address of the device.
<b>User entry</b>	0 to 63
<b>Factory setting</b>	2
<b>Additional information</b>	<ul style="list-style-type: none"> <li>■ The measured value can only be transmitted via the current value if the address is set to "0". The current is fixed at 4.0 mA for all other addresses (Multidrop mode).</li> <li>■ Only addresses in the range 0 to 15 are permitted for a system according to HART 5.0.</li> <li>■ All addresses in the range 0 to 63 are permitted for a system with HART 6.0 and higher.</li> </ul>

---


**Temperature unit**




---

<b>Navigation</b>	 Guidance → Commissioning → Temperature unit						
<b>Description</b>	Use this function to select the unit for the temperature.						
<b>Selection</b>	<table> <tr> <td><i>SI units</i></td> <td><i>US units</i></td> </tr> <tr> <td>■ °C</td> <td>°F</td> </tr> <tr> <td>■ K</td> <td></td> </tr> </table>	<i>SI units</i>	<i>US units</i>	■ °C	°F	■ K	
<i>SI units</i>	<i>US units</i>						
■ °C	°F						
■ K							
<b>Factory setting</b>	°C						


---

**Distance unit**




---

<b>Navigation</b>	 Guidance → Commissioning → Distance unit								
<b>Description</b>	Use this function to select the unit for the distance.								
<b>Selection</b>	<table> <tr> <td><i>SI units</i></td> <td><i>US units</i></td> </tr> <tr> <td>■ mm</td> <td>■ in</td> </tr> <tr> <td>■ cm</td> <td>■ ft</td> </tr> <tr> <td>■ m</td> <td></td> </tr> </table>	<i>SI units</i>	<i>US units</i>	■ mm	■ in	■ cm	■ ft	■ m	
<i>SI units</i>	<i>US units</i>								
■ mm	■ in								
■ cm	■ ft								
■ m									
<b>Factory setting</b>	mm								

---

**End of probe to zero distance**



---


<b>Navigation</b>	 Guidance → Commissioning → EOP20 distance
<b>Description</b>	<p>Defines the distance between the physical end of the probe and the zero level value in the tank. E.g. datum plate or tank bottom.</p> <p>Adjust this value so that the absolute element positions fit to the level in the tank.</p>
<b>User entry</b>	-100 to 100 m
<b>Factory setting</b>	Depending on order codes

---

**Water level offset**



---


<b>Navigation</b>	 Guidance → Commissioning → Water offset
<b>Description</b>	Enter an offset to adjust the output value of the water bottom probe.
<b>User entry</b>	-100 to 100 m

**Factory setting**                      0 m

---

### Expert settings?

---

**Navigation**                                Guidance → Commissioning → Expert settings?

**Description**                            By activating this option you will be asked to  
a) adjust the default values for covered/uncovered elements.  
b) change the element weighting depending on your tank shape.

**Selection**                                Yes

---

### Distance tank level uncovered

---

**Navigation**                                Guidance → Commissioning → Level uncovered

**Description**                            Used this function to define the distance, an element has to be uncovered, before included in vapor average temperature calculation.

**User entry**                              0 to 1 m

**Factory setting**                        50 mm

---

### Distance tank level covered

---

**Navigation**                                Guidance → Commissioning → level covered

**Description**                            Used this function to define the distance, an element has to be covered, before included in product and liquid average temperature calculation.

**User entry**                              0 to 1 m

**Factory setting**                        50 mm

---

### Distance water level uncovered

---

**Navigation**                                Guidance → Commissioning → wt lvl uncovered

**Description**                            Used this function to define the distance, an element has to be above the water level, before it is included in average product temperature.


**User entry**                              0 to 1 m

**Factory setting**                      50 mm

---

### Distance water level covered

---

**Navigation**                                    Guidance → Commissioning → wt level covered

**Description**                              Used this function to define the distance, an element has to be covered by water, before it is included in average water temperature.

**User entry**                                0 to 1 m

**Factory setting**                        50 mm

---

### Hysteresis width

---

**Navigation**                                    Guidance → Commissioning → Hysteresis width

**Description**                              Defines the hysteresis width for all switching levels, to include or exclude elements in the averaging algorithm.

**User entry**                                0 to 1 m

**Factory setting**                        10 mm

---

### Element weighting

---

**Navigation**                                    Guidance → Commissioning → Element weight

**Description**                              By enabling the element weighting, the average calculation can be adapted to different tank shapes. When disabled, elements will be weighted same.

**Selection**                                 Disable  
 Enable

**Factory setting**                        Enable


---

### Element 1 to 24 weighting

---

**Navigation**                                     Guidance → Commissioning → Elemnt 1 to 24 weight


**Description**                              Used this function to adjust the weighting of each individual element, depending on the tank shape. Elements that are located in a greater volume of liquid can be weighted with a bigger factor than elements located in a smaller amount of liquid.

<b>User entry</b>	1 to 100
<b>Factory setting</b>	1
<b>Additional information</b>	 This parameter displays up to 24 elements, regardless of the actual number of installed elements. Non-existent elements will be excluded from weighted calculation.

---

### Assign PV


---

<b>Navigation</b>	 Guidance → Commissioning → Assign PV
<b>Description</b>	Assign a measured variable to the primary dynamic variable (PV). Additional information: The assigned measured variable is also used by the current output.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Liquid temperature</li> <li>■ Product temperature</li> <li>■ Water temperature</li> </ul>
<b>Factory setting</b>	Liquid temperature

---

### Assign SV


---

<b>Navigation</b>	 Guidance → Commissioning → Assign SV
<b>Description</b>	Assign a measured variable to the second dynamic variable (SV).
<b>Selection</b>	Vapor temperature
<b>Factory setting</b>	Vapor temperature

---

### Assign TV

---

<b>Navigation</b>	 Guidance → Commissioning → Assign TV
<b>Description</b>	Assign a measured variable to the tertiary dynamic variable (TV).
<b>Selection</b>	Water level
<b>Factory setting</b>	Water level

---

**Assign QV**

---

**Navigation**

Guidance → Commissioning → Assign QV

**Description**

Assign a measured variable to the quaternary dynamic variable (QV).

**Selection**

- Liquid temperature
- Product temperature
- Vapor temperature
- Water temperature
- Water level
- Tank level
- Element temperature
- Element resistance
- Electronics temperature
- Test resistance
- Terminal voltage
- Measured current
- Percent of range
- Loop current
- Not used

**Factory setting**

Electronics temperature

### 3.1.2 "Import / Export" submenu

*Navigation* Guidance → Import / Export

Import/Export has three functions as follows:

- Save/Restore
- Create documentation
- Compare datasets

## 3.2 "Diagnostics" menu

Navigation  Diagnostics




### 3.2.1 "Active diagnostics" submenu

Navigation  Diagnostics → Active diagnos.

---

#### Active diagnostics




---

<b>Navigation</b>	 Diagnostics → Active diagnos. → Active diagnos.
<b>Prerequisite</b>	A diagnostic event has occurred.
<b>Description</b>	Displays the current diagnostic message. If two or more messages occur simultaneously, the message with the highest priority is shown on the display.
<b>User interface</b>	Symbol for diagnostic behavior, diagnostic code and short message.
<b>Additional information</b>	<p><i>User interface</i></p> <p> Additional pending diagnostic messages can be viewed in the <b>Diagnostic list</b> submenu.</p> <p><i>Example</i></p> <p>For the display format:   F271 Main electronic failure</p>

---

#### Timestamp


---

<b>Navigation</b>	 Diagnostics → Active diagnos. → Timestamp
<b>Description</b>	Displays the operating time when the current diagnostic message occurred.
<b>User interface</b>	Days (d), hours (h), minutes (m) and seconds (s)
<b>Additional information</b>	<p><i>User interface</i></p> <p> The diagnostic message can be viewed via the <b>Actual diagnostics</b> parameter (→  23).</p> <p><i>Example</i></p> <p>For the display format:  24d12h13m00s</p>

---

**Previous diagnostics**





---

<b>Navigation</b>	 Diagnostics → Active diagnos. → Prev.diagnostics
<b>Description</b>	Shows the diagnostic event that occurred prior to the current diagnostic event along with its diagnostic information.
<b>User interface</b>	Positive integer

---

**Timestamp**



---

<b>Navigation</b>	 Diagnostics → Active diagnos. → Timestamp
<b>Description</b>	Displays the operating time when the last diagnostic message before the current message occurred.
<b>User interface</b>	Days (d), hours (h), minutes (m) and seconds (s)
<b>Additional information</b>	<p><i>User interface</i></p> <p> The diagnostic message can be viewed via the <b>Previous diagnostics</b> parameter (→  24).</p> <p><i>Example</i></p> <p>For the display format: 24d12h13m00s</p>

---

**Operating time from restart**



---

<b>Navigation</b>	 Diagnostics → Active diagnos. → Time fr. restart
<b>Description</b>	Shows the time the device has been in operation since the last device restart.
<b>User interface</b>	Days (d), hours (h), minutes (m), seconds (s)

---

**Operating time**


---

<b>Navigation</b>	 Diagnostics → Active diagnos. → Operating time
<b>Description</b>	Indicates how long the device has been in operation.
<b>Additional information</b>	Maximum time: 9999 d (≈ 27 years)



### 3.2.2 "Diagnostic list" submenu

*Navigation*       Diagnostics → Diagnostic list

### 3.2.3 "Event logbook" submenu

*Navigation*       Diagnostics → Event logbook

### 3.2.4 "Minimum/maximum values" submenu

*Navigation*       Diagnostics → Min/max val.

---

#### Minimum terminal voltage

---


**Navigation**       Diagnostics → Min/max val. → Min.term.volt.

**User interface**      0.0 to 50.0 V

---

#### Minimum electronics temperature

---


**Navigation**       Diagnostics → Min/max val. → Min.electr.temp.

**User interface**      Signed floating-point number

---

#### Minimum sensor temperature

---

**Navigation**       Diagnostics → Min/max val. → Min. sensor temp

**User interface**      Signed floating-point number

---

#### Minimum waterbottom sensor temperature

---


**Navigation**       Diagnostics → Min/max val. → Min WB temp.

**User interface**      Signed floating-point number

---

**Maximum terminal voltage**

---


**Navigation**  Diagnostics → Min/max val. → Max.term.voltage

**User interface** 0.0 to 50.0 V

---

**Maximum electronics temperature**

---


**Navigation**  Diagnostics → Min/max val. → Max.electr.temp.

**User interface** Signed floating-point number

---

**Maximum sensor temperature**

---

**Navigation**  Diagnostics → Min/max val. → Max. Sensor temp

**User interface** Signed floating-point number

---

**Maximum waterbottom sensor temperature**

---


**Navigation**  Diagnostics → Min/max val. → Max WB temp.

**User interface** Signed floating-point number

---

**Minimum element 1 to 24 temperature**

---

**Navigation**  Diagnostics → Min/max val. → Min elem. 1 to 24

**User interface** 0 to 1273.15 K

---

**Maximum element 1 to 24 temperature**

---

**Navigation**  Diagnostics → Min/max val. → Max elem. 1 to 24

**User interface** 0 to 1273.15 K

**Additional information**

This parameter displays up to 24 elements, regardless of the actual number of installed elements. Non-existent elements will be shown as NaN.

**3.2.5 "Simulation" submenu**

*Navigation* Diagnostics → Simulation

**"Simulation" submenu**

*Navigation* Diagnostics → Simulation

**Simulation**

**Navigation** Diagnostics → Simulation → Simulation

**Selection**

- Off
- Current output
- Diagnostic event simulation

**Factory setting** Off

**Value current output**

**Navigation** Diagnostics → Simulation → Val. curr.outp

**Description** Defines the value of the simulated output current.

**User entry** 3.59 to 23 mA

**Diagnostic event simulation**

**Navigation** Diagnostics → Simulation → Diag. event sim.



**Description** Use this function to select a diagnostic event for the simulation process that is activated.

**Selection**

- Off
- Diagnostic event picklist (depends on the category selected)


**Factory setting** Off

**Additional information***Description*

 For the simulation, you can choose from the diagnostic events of the category selected in the **Diagnostic event simulation** parameter (→  27).

- Off
  - 061: Sensor electronics faulty
  - 062: Sensor connection faulty
  - 101: Sensor temperature
  - 107: Temperature element open
  - 108: Temperature element short
  - 109: Test resistance out of range
  - 148: Waterbottom connection faulty
  - 149: Waterbottom electronics faulty
  - 242: Firmware incompatible
  - 252: Module incompatible
  - 270: Main electronics defective
  - 272: Main electronics faulty
  - 273: Main electronics defective
  - 281: Electronics initialization active
  - 282: Data storage inconsistent
  - 283: Memory content inconsistent
  - 287: Memory content inconsistent
  - 311: Electronic failure
  - 331: Firmware update failed
  - 410: Data transfer failed
  - 412: Processing download
  - 431: Trim required
  - 438: Dataset different
  - 441: Current output out of range
  - 484: Failure mode simulation active
  - 485: Process variable simulation active
  - 491: Current output simulation active
  - 538: Configuration Sensor Unit invalid
  - 560: Sensor calibration incomplete
  - 586: Calibration active
  - 801: Supply voltage too low
  - 802: Supply voltage too high
  - 805: Loop current faulty
  - 825: Operating temperature
  - 844: Process value out of specification
  - 969: No element in phase
  - 973: Level invalid
- Diagnostic events  
(depends on the selected simulation)

**Element temperature simulation****Navigation**

 Diagnostics → Simulation → Element temp sim

**Selection**

- No
- Yes

**Factory setting**

No

---

**Element 1 to 24 simulated temperature**

<b>Navigation</b>	Diagnostics → Simulation → Sim. temp. 1 to 24
<b>User entry</b>	0 to 1273.15 K
<b>Factory setting</b>	233.15 K

**3.2.6 "Diagnostic settings" submenu**

*Navigation* Diagnostics → Diag. settings

**"Properties" submenu**


*Navigation* Diagnostics → Diag. settings → Properties

---


**Alarm delay**

<b>Navigation</b>	Diagnostics → Diag. settings → Properties → Alarm delay
<b>User entry</b>	0 to 60 s
<b>Factory setting</b>	0 s
<b>Additional information</b>	Enter a duration for the alarm delay. When a diagnostic event of the "Alarm" category occurs, the diagnostic message is not generated until the delay has elapsed.


**"Configuration" submenu**

*Navigation*  Diagnostics → Diag. settings → Configuration


**"Sensor" submenu**

*Navigation*  Diagnostics → Diag. settings → Configuration → Sensor


**107/108 Diagnostic behavior**

<b>Navigation</b>	 Diagnostics → Diag. settings → Configuration → Sensor → 107/108 Diag. behav.
<b>Description</b>	<p>Use this value to define the effect of an open or short individual element on the average values and the diagnostic messages.</p> <p>In all cases, defective elements will be set to +inf for open elements and -inf for short elements. If all elements are open or short there will be a diagnostic message of type alarm, independent of this setting.</p> <ul style="list-style-type: none"> <li>- Logbook entry only will skip the defective element(s) and generate no diagnostic message, only an entry in the logbook.</li> <li>- Warning will skip the defective element(s) and generate a diagnostic message of type warning.</li> <li>- Alarm will skip the defective element(s) and always generate a diagnostic message of type alarm.</li> </ul>
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Alarm</li> <li>■ Warning</li> <li>■ Logbook entry only</li> </ul>
<b>Factory setting</b>	Warning


**107/108 Event category**

<b>Navigation</b>	 Diagnostics → Diag. settings → Configuration → Sensor → 107/108Event category
<b>User interface</b>	<ul style="list-style-type: none"> <li>■ Failure (F)</li> <li>■ Function check (C)</li> <li>■ Out of specification (S)</li> <li>■ Maintenance required (M)</li> <li>■ No effect (N)</li> </ul>
<b>Factory setting</b>	Maintenance required (M)


*"Process" submenu*

*Navigation*  Diagnostics → Diag. settings → Configuration → Process

**969 Diagnostic behavior**

<b>Navigation</b>	 Diagnostics → Diag. settings → Configuration → Process → 969 Diag. behav.
<b>Description</b>	<p>Use this function to define the behaviour of the average temperature for vapor, liquid, product or water in case that no element is available in the appropriate phase.</p> <ul style="list-style-type: none"> <li>- Logbook only will use the closest element available for the average temperature and only generate a logbook entry.</li> <li>- Warning will use the closest element available for average temperature and generate a diagnostic message of type warning</li> <li>- Alarm will generate a diagnostic of type alarm.</li> </ul>
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Alarm</li> <li>■ Warning</li> <li>■ Logbook entry only</li> </ul>
<b>Factory setting</b>	Logbook entry only

**969 Event category**

<b>Navigation</b>	 Diagnostics → Diag. settings → Configuration → Process → 969Event category
<b>User interface</b>	<ul style="list-style-type: none"> <li>■ Failure (F)</li> <li>■ Function check (C)</li> <li>■ Out of specification (S)</li> <li>■ Maintenance required (M)</li> <li>■ No effect (N)</li> </ul>
<b>Factory setting</b>	No effect (N)

### 3.2.7 "Sensor diagnostics" submenu

*Navigation*  Diagnostics → Sensor diag.


#### "Sensor diagnostics" submenu

*Navigation*  Diagnostics → Sensor diag. → Open elements

---

#### Open elements

---

**Navigation**  Diagnostics → Sensor diag. → Open elements

**User interface**

- Element 1
- Element 2
- Element 3
- Element 4
- Element 5
- Element 6
- Element 7
- Element 8
- Element 9
- Element 10
- Element 11
- Element 12
- Element 13
- Element 14
- Element 15
- Element 16
- Element 17
- Element 18
- Element 19
- Element 20
- Element 21
- Element 22
- Element 23
- Element 24

---

#### Short elements

---

**Navigation**  Diagnostics → Sensor diag. → Short elements



**User interface**

- Element 1
- Element 2
- Element 3
- Element 4
- Element 5
- Element 6
- Element 7
- Element 8
- Element 9



- Element 10
- Element 11
- Element 12
- Element 13
- Element 14
- Element 15
- Element 16
- Element 17
- Element 18
- Element 19
- Element 20
- Element 21
- Element 22
- Element 23
- Element 24

### "Sensor diagnostics" submenu

*Navigation*        Diagnostics → Sensor diag. → Electronics temp

---

### Electronics temperature

---

**Navigation**       Diagnostics → Sensor diag. → Electronics temp

**User interface**      Signed floating-point number

---

### Sensor temperature

---

**Navigation**       Diagnostics → Sensor diag. → Sensor temp.

**User interface**      233 to 353 K

---

### Waterbottom sensor temperature

---

**Navigation**       Diagnostics → Sensor diag. → WB sensor temp.

**User interface**      233 to 353 K

### 3.3 "Application" menu

Navigation  Application


#### 3.3.1 "Measured values" submenu

Navigation  Application → Measured values

---

#### Vapor temperature


---

<b>Navigation</b>	 Application → Measured values → Vapor temp
<b>Description</b>	Shows the average temperature of all elements in vapor. If no element is available, the closest element to tank level is used.
<b>User interface</b>	0 to 1273.15 K

---

#### Liquid temperature


---

<b>Navigation</b>	 Application → Measured values → Liquid temp
<b>Description</b>	Shows the average temperature of all elements in liquid, including the elements in water. If no element is available, the closest element to tank level is used.
<b>User interface</b>	0 to 1273.15 K

---

#### Product temperature


---

<b>Navigation</b>	 Application → Measured values → Product temp
<b>Description</b>	Shows the average temperature of all elements in product, excluding elements in water. If no element is available, the closest element to tank level is used.
<b>User interface</b>	0 to 1273.15 K

---

#### Water temperature

---

<b>Navigation</b>	 Application → Measured values → Water temp
<b>Description</b>	Shows the average temperature of all elements in water. If no element is available, the closest element to the water level is used.

**User interface** 0 to 1273.15 K

---

### Tank level

---

**Navigation**  Application → Measured values → Tank level

**Description** Shows the actual tank level which is used for average calculation.

**User interface** -100 to 100 m

---

### Water level

---

**Navigation**  Application → Measured values → Water level

**Description** Shows the water level which is used for average calculation of product and water temperature. The value is output as TV via HART. The water level value can be measured by the water bottom probe if available, or can be sent from the external master. The water level is measured from the datum plate or tank bottom and includes the end of probe to zero distance.

**User interface** -100 to 100 m

---


### Terminal current

---

**Navigation**  Application → Measured values → Terminal curr.

**Description** Shows the current value of the current output which is currently measured.

**User interface** 0 to 30 mA

**Additional information**  Terminal current of the NMT81 is fixed at 4 mA. Other values may appear during firmware update. If a value other than 4 mA is shown at any other time, this may indicate a system error or other failure.

---

### Terminal voltage 1

---

**Navigation**  Application → Measured values → Terminal volt. 1

**Description** Shows the current terminal voltage that is applied at the output.

**User interface** 0.0 to 50.0 V

**Additional information**

Terminal current of the NMT81 is fixed at 4 mA. Other values may appear during firmware update. If a value other than 4 mA is shown at any other time, this may indicate a system error or other failure.

**"Measured values" submenu**

*Navigation* Application → Measured values

*"Measured values" submenu*

*Navigation* Application → Measured values

**Element 1 to 24 temperature**

<b>Navigation</b>	Application → Measured values → Element 1 to 24 temp
<b>Description</b>	Temperature unit
<b>User interface</b>	0 to 1273.15 K

**Element 1 to 24 position**

<b>Navigation</b>	Application → Measured values → Element 1 to 24 pos.
<b>Description</b>	Shows the position of each element measured from the zero level point (datum plate or tank bottom). This value includes the end of probe to zero distance. The value is used to determine, if elements are included or excluded from average calculation.
<b>User interface</b>	-1 000 to 1 000 m
<b>Additional information</b>	Depending on order codes


**"Measured values" submenu**

*Navigation*        Application → Measured values

*"Measured values" submenu*

*Navigation*        Application → Measured values

**Element 1 to 24 resistance**

**Navigation**       Application → Measured values → Element 1 to 24 res.

**User interface**      Signed floating-point number

**Element 1 to 24 position**

**Navigation**        Application → Measured values → Element 1 to 24 pos.

**Description**      Shows the position of each element measured from the zero level point (datum plate or tank bottom). This value includes the end of probe to zero distance. The value is used to determine, if elements are included or excluded from average calculation.

**User interface**      -1 000 to 1 000 m

**Additional information**      Depending on order codes

**"Measured values" submenu**

*Navigation*        Application → Measured values

*"Measured values" submenu*

*Navigation*        Application → Measured values

**Elements in vapor**

**Navigation**       Application → Measured values → Elements vapor

**Description**      Shows the elements used for average vapor temperature calculation. These elements are all elements above tank level. Defective elements will be skipped.

---

<b>User interface</b>	<ul style="list-style-type: none"><li>■ Element 1</li><li>■ Element 2</li><li>■ Element 3</li><li>■ Element 4</li><li>■ Element 5</li><li>■ Element 6</li><li>■ Element 7</li><li>■ Element 8</li><li>■ Element 9</li><li>■ Element 10</li><li>■ Element 11</li><li>■ Element 12</li><li>■ Element 13</li><li>■ Element 14</li><li>■ Element 15</li><li>■ Element 16</li><li>■ Element 17</li><li>■ Element 18</li><li>■ Element 19</li><li>■ Element 20</li><li>■ Element 21</li><li>■ Element 22</li><li>■ Element 23</li><li>■ Element 24</li></ul>
-----------------------	--

---

## Elements in product

---

**Navigation**  Application → Measured values → Elements product

**Description** Shows the elements used for average product temperature calculation. These elements are all elements between water level and tank level. Defective elements will be skipped.

<b>User interface</b>	<ul style="list-style-type: none"><li>■ Element 1</li><li>■ Element 2</li><li>■ Element 3</li><li>■ Element 4</li><li>■ Element 5</li><li>■ Element 6</li><li>■ Element 7</li><li>■ Element 8</li><li>■ Element 9</li><li>■ Element 10</li><li>■ Element 11</li><li>■ Element 12</li><li>■ Element 13</li><li>■ Element 14</li><li>■ Element 15</li><li>■ Element 16</li><li>■ Element 17</li><li>■ Element 18</li><li>■ Element 19</li><li>■ Element 20</li><li>■ Element 21</li></ul>
-----------------------	---

- Element 22
- Element 23
- Element 24

### "Measured values" submenu

*Navigation*       Application → Measured values

### "Measured values" submenu

*Navigation*       Application → Measured values

---

## Elements in liquid

---

**Navigation**       Application → Measured values → Elements liquid

**Description**      Shows the elements which are used for average liquid temperature calculation. These are all elements below tank level. Defective elements will be skipped.


**User interface**

- Element 1
- Element 2
- Element 3
- Element 4
- Element 5
- Element 6
- Element 7
- Element 8
- Element 9
- Element 10
- Element 11
- Element 12
- Element 13
- Element 14
- Element 15
- Element 16
- Element 17
- Element 18
- Element 19
- Element 20
- Element 21
- Element 22
- Element 23
- Element 24

---

**Elements in water**


---

<b>Navigation</b>	 Application → Measured values → Elements water
<b>Description</b>	Shows the elements which are used for average water temperature calculation. These are all elements below water level. Defective elements will be skipped.
<b>User interface</b>	<ul style="list-style-type: none"> <li>■ Element 1</li> <li>■ Element 2</li> <li>■ Element 3</li> <li>■ Element 4</li> <li>■ Element 5</li> <li>■ Element 6</li> <li>■ Element 7</li> <li>■ Element 8</li> <li>■ Element 9</li> <li>■ Element 10</li> <li>■ Element 11</li> <li>■ Element 12</li> <li>■ Element 13</li> <li>■ Element 14</li> <li>■ Element 15</li> <li>■ Element 16</li> <li>■ Element 17</li> <li>■ Element 18</li> <li>■ Element 19</li> <li>■ Element 20</li> <li>■ Element 21</li> <li>■ Element 22</li> <li>■ Element 23</li> <li>■ Element 24</li> </ul>


### 3.3.2 "Measuring Units" submenu


*Navigation*   Application → Measuring Units

---

**Temperature unit**


---



<b>Navigation</b>	 Application → Measuring Units → Temperature unit						
<b>Description</b>	Use this function to select the unit for the temperature.						
<b>Selection</b>	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"><i>SI units</i></td> <td style="width: 50%; vertical-align: top;"><i>US units</i></td> </tr> <tr> <td>■ °C</td> <td>°F</td> </tr> <tr> <td>■ K</td> <td></td> </tr> </table>	<i>SI units</i>	<i>US units</i>	■ °C	°F	■ K	
<i>SI units</i>	<i>US units</i>						
■ °C	°F						
■ K							
<b>Factory setting</b>	Country-specific: °C						



---

**Distance unit**

---



<b>Navigation</b>	Application → Measuring Units → Distance unit								
<b>Description</b>	Defines the unit for all distance and level values, e.g. element position and water level.								
<b>Selection</b>	<table> <tr> <td><i>SI units</i></td> <td><i>US units</i></td> </tr> <tr> <td>▪ mm</td> <td>▪ in</td> </tr> <tr> <td>▪ cm</td> <td>▪ ft</td> </tr> <tr> <td>▪ m</td> <td></td> </tr> </table>	<i>SI units</i>	<i>US units</i>	▪ mm	▪ in	▪ cm	▪ ft	▪ m	
<i>SI units</i>	<i>US units</i>								
▪ mm	▪ in								
▪ cm	▪ ft								
▪ m									
<b>Factory setting</b>	mm								

### 3.3.3 "Sensor" submenu

*Navigation*      Application → Sensor

#### "General settings" submenu

*Navigation*      Application → Sensor → General settings

---

**Sensor module type**

---



<b>Navigation</b>	Application → Sensor → General settings → SensorModuleType
<b>User interface</b>	<ul style="list-style-type: none"> <li>▪ Temperature only</li> <li>▪ Temperature and water level</li> </ul>
<b>Factory setting</b>	Depending on order codes

---

**Number of temperature elements**

---



<b>Navigation</b>	Application → Sensor → General settings → no of element
<b>User interface</b>	1 to 24
<b>Factory setting</b>	Depending on order codes

---

**Element to output**

---



**Navigation** Application → Sensor → General settings → Elem. to output

**Description** The element chosen here can be shown on the display and output as QV.

**User entry** 1 to 24

**Factory setting** 1

**"Average settings" submenu**

*Navigation* Application → Sensor → Average settings

---

**Tank level source**

---



**Navigation** Application → Sensor → Average settings → Tanklevel source

**Selection**

- External
- Manual

**Factory setting** External

---

**Manual tank level**

---



**Navigation** Application → Sensor → Average settings → Man. tank level

**User entry** Positive floating-point number

**Factory setting** 0 m

---

**Water level source**

---



**Navigation** Application → Sensor → Average settings → Water level src.

**Selection**

- None
- Internal \*
- External \*
- Manual

---


\* Visibility depends on order options or device settings

**Factory setting**                      Depending on order codes

---

### Manual water level

---

**Navigation**                          Application → Sensor → Average settings → Man. water level


**User entry**                        Positive floating-point number

**Factory setting**                    0 m

---

### Distance tank level uncovered

---

**Navigation**                          Application → Sensor → Average settings → Level uncovered

**Description**                      Used this function to define the distance, an element has to be uncovered, before included in vapor average temperature calculation.


**User entry**                        0 to 1 m

**Factory setting**                    50 mm

---

### Distance tank level covered

---

**Navigation**                          Application → Sensor → Average settings → level covered

**Description**                      Used this function to define the distance, an element has to be covered, before included in product and liquid average temperature calculation.


**User entry**                        0 to 1 m

**Factory setting**                    50 mm

---

### Distance water level uncovered

---

**Navigation**                          Application → Sensor → Average settings → wt lvl uncovered

**Description**                      Used this function to define the distance, an element has to be above the water level, before it is included in average product temperature.

**User entry**                        0 to 1 m

**Factory setting**                    50 mm

---

**Distance water level covered**


**Navigation** Application → Sensor → Average settings → wt level covered

**Description** Used this function to define the distance, an element has to be covered by water, before it is included in average water temperature.

**User entry** 0 to 1 m

**Factory setting** 50 mm

---

**Hysteresis width**


**Navigation** Application → Sensor → Average settings → Hysteresis width

**Description** Defines the hysteresis width for all switching levels, to include or exclude elements in the averaging algorithm.

**User entry** 0 to 1 m

**Factory setting** 10 mm

---

**Element weighting**


**Navigation** Application → Sensor → Average settings → Element weight

**Description** By enabling the element weighting, the average calculation can be adapted to different tank shapes. When disabled, elements will be weighted same.

**Selection**

- Disable
- Enable

**Factory setting** Enable

---

**Element 1 to 24 weighting**


**Navigation** Application → Sensor → Average settings → Element 1 to 24 weight

**Description** Used this function to adjust the weighting of each individual element, depending on the tank shape. Elements that are located in a greater volume of liquid can be weighted with a bigger factor than elements located in a smaller amount of liquid.

**User entry** 1 to 100

**Factory setting** 1

**Additional information**

This parameter displays up to 24 elements, regardless of the actual number of installed elements. Non-existent elements will be excluded from weighted calculation.

**"Element settings" submenu**

*Navigation* Application → Sensor → Element set.

**Element type****Navigation**

Application → Sensor → Element set. → Element type

**User interface**

- Pt100, IEC751,  $\alpha=0.00385$
- Pt100, Canadian,  $\alpha=0.00389$
- Pt100, GOST,  $\alpha=0.00391$
- Cu100, GOST,  $\alpha=0.00428$
- Ni100, GOST,  $\alpha=0.00617$
- Custom

**Factory setting**

Pt100, IEC751,  $\alpha=0.00385$

**Threshold short element****Navigation**

Application → Sensor → Element set. → Threshold short

**Description**

Defines the threshold value from which the electronic will consider the element as open or short.

**User entry**

0 to 100 Ohm

**Factory setting**

3.0 Ohm

**Threshold open element****Navigation**

Application → Sensor → Element set. → Threshold open

**Description**

Defines the threshold value from which the electronic will consider the element as open or short.

**User entry**

100 to 1 000 Ohm

**Factory setting**

600 Ohm

---

**End of probe to zero distance**

---



<b>Navigation</b>	Application → Sensor → Element set. → EOP20 distance
<b>Description</b>	Defines the distance between the physical end of the probe and the zero level value in the tank. E.g. datum plate or tank bottom. Adjust this value so that the absolute element positions fit to the level in the tank.
<b>User entry</b>	-100 to 100 m
<b>Factory setting</b>	Depending on order codes

---

**Element 1 to 24 position**

---



<b>Navigation</b>	Application → Sensor → Element set. → Element 1 to 24 pos.
<b>Description</b>	Shows the position of each element measured from the zero level point (datum plate or tank bottom). This value includes the end of probe to zero distance. The value is used to determine, if elements are included or excluded from average calculation.
<b>User interface</b>	-1 000 to 1 000 m
<b>Factory setting</b>	Depending on order codes

---

**Element temperature offset enable**

---



<b>Navigation</b>	Application → Sensor → Element set. → Temp. offset on
<b>Description</b>	Use this function to activate individual temperature offsets added to each element.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Disable</li> <li>■ Enable</li> </ul>
<b>Factory setting</b>	Enable

---

**Element 1 to 24 temperature offset**

---



<b>Navigation</b>	Application → Sensor → Element set. → Temp offset 1 to 24
<b>User entry</b>	-100 to 100 K
<b>Factory setting</b>	0 K

**"Temperature limit" submenu**

*Navigation*       Application → Sensor → Temp limit


**0% temperature value** 

**Navigation**       Application → Sensor → Temp limit → 0% temperature

**Description**      Use this value to define the lower range value which will affect the bargraph on the display and the process out of range diagnostics message (S844).

**Factory setting**      Depending on order codes

**100% temperature value** 

**Navigation**       Application → Sensor → Temp limit → 100% temperature

**Description**      Use this value to define the upper range value which will affect the bargraph on the display and the process out of range diagnostics message (S844).

**Factory setting**      Depending on order codes

**"Water bottom settings" submenu**

*Navigation*       Application → Sensor → WB settings

**Water bottom probe length**

**Navigation**       Application → Sensor → WB settings → WB probe length

**Description**      Displays the active length of the water bottom probe.

**User interface**      0.0 to 5.03 m

**Factory setting**      Depending on order codes

---

**Water level offset**

---



<b>Navigation</b>	Application → Sensor → WB settings → Water offset
<b>Description</b>	Enter an offset to adjust the output value of the water bottom probe.
<b>User entry</b>	-100 to 100 m
<b>Factory setting</b>	0 m

---

**Product type**

---



<b>Navigation</b>	Application → Sensor → WB settings → Product type
<b>Description</b>	Use this function to set the correct product beside water, in which the probe will be used.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ No product</li> <li>■ Fuel oil</li> <li>■ Crude oil</li> <li>■ Gasoline</li> <li>■ Diesel oil / Kerosene</li> </ul>
<b>Factory setting</b>	Depending on order codes

---

**Three layer detection**

---



<b>Navigation</b>	Application → Sensor → WB settings → Layer detection
<b>Description</b>	Activate this function if the product level can move below the top of the water bottom probe, so that air as a third layer is present at the probe.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Disable</li> <li>■ Enable</li> </ul>
<b>Factory setting</b>	Enable

---

**Water bottom frequency ratio**

---


<b>Navigation</b>	Application → Sensor → WB settings → WB freq. ratio
<b>Description</b>	Shows the raw value of the water bottom sensor which is used to determine the water level.
<b>User interface</b>	0 to 2



**"Present calibration" submenu**

*Navigation*       Application → Sensor → Present values


**Calibrated reference resistance**

**Navigation**       Application → Sensor → Present values → Calib.ref resist

**Description**      Value of the resistor which was used for the actual calibration.

**User interface**      Signed floating-point number

**Calibrated test resistance**

**Navigation**       Application → Sensor → Present values → Calib. test res.

**Description**      The calibrated test resistance shows the value of the test resistor which was measured during calibration. This is the reference value used to compare the actual value of the test resistance. If deviation is too big, a diagnostic message is generated.

**User interface**      Signed floating-point number

**Test resistance**

**Navigation**       Application → Sensor → Present values → Test resistance

**Description**      The test resistance is an internal high accuracy resistor which is used to verify if the sensor is still measuring correctly within its limits. The value shows the actual measured value of this resistor.

**User interface**      Signed floating-point number

### 3.3.4 "HART output" submenu

*Navigation*  Application → HART output


#### "Configuration" submenu

*Navigation*  Application → HART output → Configuration

---

#### HART address

---

**Navigation**  Application → HART output → Configuration → HART address

**Description** Define the HART address of the device.

**User entry** 0 to 63

**Factory setting** 2


**Additional information**

- The measured value can only be transmitted via the current value if the address is set to "0". The current is fixed at 4.0 mA for all other addresses (Multidrop mode).
- Only addresses in the range 0 to 15 are permitted for a system according to HART 5.0.
- All addresses in the range 0 to 63 are permitted for a system with HART 6.0 and higher.

---

#### HART short tag

---

**Navigation**  Application → HART output → Configuration → HART short tag

**Description** Short description of the measuring point

**User entry** Max. 8 characters: A ... Z, 0 ... 9 and some special characters (for example, punctuation marks, @,%)

**Factory setting** Depending on order codes

---

#### Device tag

---

**Navigation**  Application → HART output → Configuration → Device tag

**Description** Enter a unique name for the measuring point to identify the device quickly within the plant.

**User entry** Character string comprising numbers, letters and special characters (#32)

**Factory setting** Depending on order codes

---

**No. of preambles**

---



<b>Navigation</b>	Application → HART output → Configuration → No. of preambles
<b>Description</b>	Defines the number of preambles in the HART telegram.
<b>User entry</b>	5 to 20
<b>Factory setting</b>	5

**"HART output" submenu**

*Navigation*      Application → HART output

*"HART output" submenu*

*Navigation*      Application → HART output → HART output

---

**Assign PV**

---



<b>Navigation</b>	Application → HART output → HART output → Assign PV
<b>Description</b>	Assign a measured variable to the primary dynamic variable (PV). Additional information: The assigned measured variable is also used by the current output.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Liquid temperature</li> <li>■ Product temperature</li> <li>■ Water temperature</li> </ul>
<b>Factory setting</b>	Liquid temperature

---

**Primary variable (PV)**

---


<b>Navigation</b>	Application → HART output → HART output → Primary var (PV)
<b>Description</b>	Shows the current measured value of the primary dynamic variable (PV).
<b>User interface</b>	0 to 1273.15 K

---

**Assign SV**

---



**Navigation**  Application → HART output → HART output → Assign SV

**Description** Assign a measured variable to the second dynamic variable (SV).


**Selection** Vapor temperature

**Factory setting** Vapor temperature

---

**Secondary variable (SV)**

---

**Navigation**  Application → HART output → HART output → Second.var(SV)

**Description** Shows the current measured value of the secondary dynamic variable (SV).

**User interface** 0 to 1 273.15 K

---

**Assign TV**

---



**Navigation**  Application → HART output → HART output → Assign TV

**Description** Assign a measured variable to the tertiary dynamic variable (TV).


**Selection** Water level

**Factory setting** Water level

---

**Tertiary variable (TV)**

---

**Navigation**  Application → HART output → HART output → Tertiary var(TV)

**Description** Shows the current measured value of the tertiary (third) dynamic variable (TV).


**User interface** -100 to 100 m

---

**Assign QV**

---



**Navigation**  Application → HART output → HART output → Assign QV

**Description** Assign a measured variable to the quaternary dynamic variable (QV).


<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Liquid temperature</li> <li>■ Product temperature</li> <li>■ Vapor temperature</li> <li>■ Water temperature</li> <li>■ Water level</li> <li>■ Tank level</li> <li>■ Element temperature</li> <li>■ Element resistance</li> <li>■ Electronics temperature</li> <li>■ Test resistance</li> <li>■ Terminal voltage</li> <li>■ Measured current</li> <li>■ Percent of range</li> <li>■ Loop current</li> <li>■ Not used</li> </ul>
------------------	---

<b>Factory setting</b>	Electronics temperature
------------------------	-------------------------

---

### Quaternary variable (QV)

---

<b>Navigation</b>	 Application → HART output → HART output → Quaterna.var(QV)
<b>Description</b>	Shows the current measured value of the quaternary (fourth) dynamic variable (QV).
<b>User interface</b>	0 to 99 999.9999 K


### "Information" submenu

*Navigation*        Application → HART output → Information

---

### Device ID


---

<b>Navigation</b>	 Application → HART output → Information → Device ID
<b>Description</b>	Shows the device ID for identifying the device in a HART network.
<b>User interface</b>	Positive integer

---

**Device type**



---

<b>Navigation</b>	 Application → HART output → Information → Device type
<b>Description</b>	Shows the device type with which the measuring device is registered with the HART Communication Foundation.
<b>User interface</b>	0 to 65 535

---

**Device revision**



---


<b>Navigation</b>	 Application → HART output → Information → Device revision
<b>Description</b>	Shows the device revision with which the device is registered with the HART Communication Foundation.
<b>User interface</b>	0 to 255

---

**HART short tag**


---




<b>Navigation</b>	 Application → HART output → Information → HART short tag
<b>Description</b>	Short description of the measuring point
<b>User entry</b>	Max. 8 characters: A ... Z, 0 ... 9 and some special characters (for example, punctuation marks, @,%)
<b>Factory setting</b>	Depending on order codes

---

**HART revision**



---


<b>Navigation</b>	 Application → HART output → Information → HART revision
<b>User interface</b>	5 to 7

---

**HART descriptor**


---




<b>Navigation</b>	 Application → HART output → Information → HART descriptor
<b>Description</b>	User defined HART descriptor (16 characters).
<b>User entry</b>	Character string comprising numbers, letters and special characters (#16)

**Factory setting** NMT8x

---

### HART message

---

**Navigation**  Application → HART output → Information → HART message

**Description** User defined HART message (32 characters).


**User entry** Character string comprising numbers, letters and special characters (#32)

**Factory setting** NMT8x

---

### HART date code

---

**Navigation**  Application → HART output → Information → HART date code

**Description** Enter date of the last configuration change. Use this format yyyy-mm-dd


**User entry** Character string comprising numbers, letters and special characters (#10)

**Factory setting** 2009-07-20

## 3.4 "System" menu

*Navigation*  System

### 3.4.1 "Device management" submenu

*Navigation*  System → Device manag.

---

### Device tag

---

**Navigation**  System → Device manag. → Device tag

**Description** Enter a unique name for the measuring point to identify the device quickly within the plant.

**User entry** Character string comprising numbers, letters and special characters (#32)

**Factory setting** Depending on order codes

---

**Locking status**


---

**Navigation**  System → Device manag. → Locking status


**Description** Displays the active write protection.

**User interface**

- Hardware locked
- Temporarily locked

**Additional information** *User interface*

If two or more types of write protection are active, the write protection with the highest priority is shown on the local display. In the operating tool all active types of write protection are displayed.

 Detailed information on access authorization is provided in the "User roles and associated access authorization" and "Operating concept" sections of the Operations Instructions for the device.

*Selection*

*Function scope of the "Locking status" parameter*

Options	Description
None	The access status displayed in the <b>Access status display</b> parameter applies. Only appears on local display.
Hardware locked	The DIP switch for hardware locking is activated on the main electronics module. This prevents write access to the parameters (e.g. via the local display or operating tool).
Temporarily locked	Write access to the parameters is temporarily locked due to device-internal processing (e.g. data upload/download, reset). Once the internal processing has been completed, the parameters can be changed once again.

---

**Configuration counter**


---

**Navigation**  System → Device manag. → Config. counter

**Description** Displays the counter for changes to the device parameters.

Additional information:

- If the value for a static parameter is changed when optimizing or configuring the parameter, the counter is incremented by 1. This is to enable tracking different parameter versions.
- When multiple parameters are changed simultaneously, e.g. when loading parameters into the device from an external source such as FieldCare, the counter may display a higher value. The counter cannot be reset, nor is it reset to a default value on performing a device reset.
- Once the counter has reached the value 65535, it restarts at 0.

**User interface** 0 to 65 535



**Reset device****Navigation**

System → Device manag. → Reset device

**Description**

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

**Selection**

- Cancel
- To fieldbus defaults \*\*
- To factory defaults \*
- To delivery settings \*
- Restart device

**Additional information**

*Selection*

Options	Description
Cancel	No action is executed and the user exits the parameter.
To factory defaults	Every parameter is reset to its factory setting.
To delivery settings	Every parameter for which a customer-specific default setting was ordered is reset to this customer-specific value. All other parameters are reset to the factory setting. This option is not visible if no customer-specific settings have been ordered.
Restart device	The restart resets every parameter whose data are in the volatile memory (RAM) to the factory setting (e.g. measured value data). The device configuration remains unchanged.

**3.4.2 "User management" submenu**

*Navigation* System → User manag.

**User role****Navigation**

System → User manag. → User role

**Description**

Displays the access authorization to the parameters via the operating tool.

**User interface**

- Operator
- Maintenance
- Expert

\*\* Visibility depends on communication

\* Visibility depends on order options or device settings

**Additional information***Description*

Access authorization can be modified via the **Enter access code** parameter.



If additional write protection is active, this restricts the current access authorization even further.

*User interface*

Detailed information on access authorization is provided in the "User roles and associated access authorization" and "Operating concept" sections of the Operations Instructions for the device.

**Password****Navigation**

System → User manag. → Password

**Description**

Enter the password for the 'Maintenance' user role to get access to the functionality of this role.

**User entry**

Character string comprising numbers, letters and special characters (#16)

**Enter access code****Navigation**

System → User manag. → Ent. access code

**Description**

Enter access code to disable write protection of parameters.

**User entry**

0 to 9 999

**Status password entry****Navigation**

System → User manag. → Status pw entry





**Description**

Use this function to display the status of the password verification.

**User interface**

■ -----

- Wrong password
- Password rule violated
- Password accepted
- Permission denied
- Confirm PW mismatch
- Reset password accepted
- Invalid user role
- Wrong sequence of entry

<b>New password</b>	
<b>Navigation</b>	 System → User manag. → New password
<b>Description</b>	<p>If the factory setting is not changed, the device works without write-protection, using userrole 'Maintenance'. The configuration data of the device can always be modified. Once the password has been defined, write-protected devices can only be set to maintenance mode if a correct password is entered in the parameter 'Password'. A new password is valid, after it has been confirmed within the parameter 'Confirm new password'.</p> <p>Any new password must consist of at least 4 and a maximum of 16 characters and can contain letters and numbers.</p>
<b>User entry</b>	Character string comprising numbers, letters and special characters (#16)
<b>Confirm new password</b>	
<b>Navigation</b>	 System → User manag. → Conf. new passw.
<b>Description</b>	Enter the new password again to confirm.
<b>User entry</b>	Character string comprising numbers, letters and special characters (#16)
<b>Old password</b>	
<b>Navigation</b>	 System → User manag. → Old password
<b>Description</b>	Enter the current password, to subsequently change the existing password.
<b>User entry</b>	Character string comprising numbers, letters and special characters (#16)
<b>Reset password</b>	
<b>Navigation</b>	 System → User manag. → Reset password
<b>Description</b>	<p>Enter a code to reset the current password.</p> <p>CAUTION: Use this function only if the current password is lost. Contact your Endress +Hauser Sales Center.</p>
<b>User entry</b>	Character string comprising numbers, letters and special characters (#16)


### 3.4.3 "Display" submenu

*Navigation*  System → Display

---

#### Value 1 display

---

**Navigation**  System → Display → Value 1 display

**Prerequisite** A local display is provided.

**Description** Use this function to select one of the measured values shown on the local display.


**Selection**

- Liquid temperature
- Product temperature
- Vapor temperature
- Water temperature
- Water level
- Tank level
- Element temperature
- Element resistance
- Test resistance
- Current output

**Factory setting** Liquid temperature

**Additional information** *Description*  
If several measured values are displayed at once, the measured value selected here will be the first value to be displayed. The value is only displayed during normal operation.

*Dependency*


 The unit of the displayed measured value is taken from the **System units** submenu.

---

#### Decimal places 1

---

**Navigation**  System → Display → Decimal places 1

**Prerequisite** A measured value is defined in the **Value 1 display** parameter (→  60).

**Description** Use this function to select the number of decimal places for measured value 1.

**Selection**

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

**Factory setting** x.XX

---

**Value 2 display**





<b>Navigation</b>	System → Display → Value 2 display
<b>Prerequisite</b>	A local display is provided.
<b>Description</b>	Use this function to select one of the measured values shown on the local display.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ None</li> <li>■ Liquid temperature</li> <li>■ Product temperature</li> <li>■ Vapor temperature</li> <li>■ Water temperature</li> <li>■ Water level</li> <li>■ Tank level</li> <li>■ Element temperature</li> <li>■ Element resistance</li> <li>■ Test resistance</li> <li>■ Current output</li> </ul>
<b>Factory setting</b>	None
<b>Additional information</b>	<p><i>Description</i></p> <p>If several measured values are displayed at once, the measured value selected here will be the second value to be displayed. The value is only displayed during normal operation.</p> <p><i>Dependency</i></p> <p> The unit of the displayed measured value is taken from the <b>System units</b> submenu.</p>

---




**Decimal places 2**


<b>Navigation</b>	System → Display → Decimal places 2
<b>Prerequisite</b>	A measured value is defined in the <b>Value 2 display</b> parameter (→  61).
<b>Description</b>	Use this function to select the number of decimal places for measured value 2.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ x</li> <li>■ x.X</li> <li>■ x.XX</li> <li>■ x.XXX</li> <li>■ x.XXXX</li> </ul>
<b>Factory setting</b>	x.XX

---

<b>Value 3 display</b>	
<b>Navigation</b>	 System → Display → Value 3 display
<b>Prerequisite</b>	A local display is provided.
<b>Description</b>	Use this function to select one of the measured values shown on the local display.
<b>Selection</b>	<ul style="list-style-type: none"><li>■ None</li><li>■ Liquid temperature</li><li>■ Product temperature</li><li>■ Vapor temperature</li><li>■ Water temperature</li><li>■ Water level</li><li>■ Tank level</li><li>■ Element temperature</li><li>■ Element resistance</li><li>■ Test resistance</li><li>■ Current output</li></ul>
<b>Factory setting</b>	None
<b>Additional information</b>	<p><i>Description</i></p> <p>If several measured values are displayed at once, the measured value selected here will be the third value to be displayed. The value is only displayed during normal operation.</p> <p><i>Selection</i></p> <p> The unit of the displayed measured value is taken from the <b>System units</b> submenu.</p>

---

<b>Decimal places 3</b>	
<b>Navigation</b>	 System → Display → Decimal places 3
<b>Prerequisite</b>	A measured value is defined in the <b>Value 3 display</b> parameter (→  62).
<b>Description</b>	Use this function to select the number of decimal places for measured value 3.
<b>Selection</b>	<ul style="list-style-type: none"><li>■ x</li><li>■ x.x</li><li>■ x.xx</li><li>■ x.xxx</li><li>■ x.xxxx</li></ul>
<b>Factory setting</b>	x.xx

---

**Value 4 display**


<b>Navigation</b>	System → Display → Value 4 display
<b>Prerequisite</b>	A local display is provided.
<b>Description</b>	Use this function to select one of the measured values shown on the local display.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ None</li> <li>■ Liquid temperature</li> <li>■ Product temperature</li> <li>■ Vapor temperature</li> <li>■ Water temperature</li> <li>■ Water level</li> <li>■ Tank level</li> <li>■ Element temperature</li> <li>■ Element resistance</li> <li>■ Test resistance</li> <li>■ Current output</li> </ul>
<b>Factory setting</b>	None
<b>Additional information</b>	<p><i>Description</i></p> <p>If several measured values are displayed at once, the measured value selected here will be the fourth value to be displayed. The value is only displayed during normal operation.</p> <p><i>Selection</i></p> <p> The unit of the displayed measured value is taken from the <b>System units</b> submenu.</p>

---

**Decimal places 4**



<b>Navigation</b>	System → Display → Decimal places 4
<b>Prerequisite</b>	A measured value is defined in the <b>Value 4 display</b> parameter (→  63).
<b>Description</b>	Use this function to select the number of decimal places for measured value 4.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ x</li> <li>■ x.X</li> <li>■ x.XX</li> <li>■ x.XXX</li> <li>■ x.XXXX</li> </ul>
<b>Factory setting</b>	x.XX

### 3.4.4 "Geolocation" submenu

*Navigation*  System → Geolocation


---

#### Process Unit Tag

<b>Navigation</b>	 System → Geolocation → Process Unit Tag
<b>User entry</b>	Character string comprising numbers, letters and special characters (#32)
<b>Factory setting</b>	Process Unit Tag


---

#### Location Description

<b>Navigation</b>	 System → Geolocation → Location Descr.
<b>User entry</b>	Character string comprising numbers, letters and special characters (#32)
<b>Factory setting</b>	somewhere


---

#### Longitude

<b>Navigation</b>	 System → Geolocation → Longitude
<b>User entry</b>	-180 to 180 °
<b>Factory setting</b>	0 °

---

#### Latitude

<b>Navigation</b>	 System → Geolocation → Latitude
<b>User entry</b>	-90 to 90 °
<b>Factory setting</b>	0 °



---

**Altitude**

---



**Navigation**  System → Geolocation → Altitude

**User entry** Signed floating-point number

**Factory setting** 0 m

---

**Location method**

---



**Navigation**  System → Geolocation → Location method

**Selection**

- No fix
- GPS or Standard Positioning Service fix
- Differential GPS fix
- Precise positioning service (PPS) fix
- Real Time Kinetic (RTK) fixed solution
- Real Time Kinetic (RTK) float solution
- Estimated dead reckoning
- Manual input mode
- Simulation Mode

**Factory setting** No fix

### 3.4.5 "Information" submenu

*Navigation*  System → Information

---

**Device name**

---

**Navigation**  System → Information → Device name

**Description** Use this function to display the device name. It can also be found on the nameplate.

**User interface** Character string comprising numbers, letters and special characters (#16)

---

**Manufacturer**

---




**Navigation**  System → Information → Manufacturer

**User interface** Character string comprising numbers, letters and special characters (#32)

---

**Serial number**


---



<b>Navigation</b>	 System → Information → Serial number
<b>Description</b>	Displays the serial number of the measuring device.  The number can be found on the nameplate of the sensor and transmitter.
<b>User interface</b>	Max. 11-digit character string comprising letters and numbers.
<b>Additional information</b>	<i>Description</i>  <b>Uses of the serial number</b> <ul style="list-style-type: none"> <li>▪ To identify the measuring device quickly, e.g. when contacting Endress+Hauser.</li> <li>▪ To obtain specific information on the measuring device using the Device Viewer: <a href="http://www.endress.com/deviceviewer">www.endress.com/deviceviewer</a></li> </ul>

---

**Order code**


---




<b>Navigation</b>	 System → Information → Order code
<b>Description</b>	Shows the device order code.
<b>User interface</b>	Character string composed of letters, numbers and certain punctuation marks (e.g. /).
<b>Factory setting</b>	-
<b>Additional information</b>	<i>Description</i> The order code is generated from the extended order code through a process of reversible transformation. The extended order code indicates the attributes for all the device features in the product structure. The device features are not directly readable from the order code.  <b>Uses of the order code</b> <ul style="list-style-type: none"> <li>▪ To order an identical spare device.</li> <li>▪ To identify the device quickly and easily, e.g. when contacting Endress+Hauser.</li> </ul>

---

**Firmware version**


---

<b>Navigation</b>	 System → Information → Firmware version
<b>Description</b>	Displays the device firmware version installed.
<b>User interface</b>	Character string comprising numbers, letters and special characters (#8)

---

**Firmware CRC**


---


**Navigation**  System → Information → Firmware CRC


**User interface** Positive integer

---

**Extended order code 1**


---



**Navigation**  System → Information → Ext. order cd. 1


**Description** The extended order code is an alphanumeric code containing all information to identify the device and its options.

**User interface** Character string comprising numbers, letters and special characters (#20)

---

**Extended order code 2**


---



**Navigation**  System → Information → Ext. order cd. 2


**Description** The extended order code is an alphanumeric code containing all information to identify the device and its options.


**User interface** Character string comprising numbers, letters and special characters (#20)

---

**Extended order code 3**


---



**Navigation**  System → Information → Ext. order cd. 3

**Description** The extended order code is an alphanumeric code containing all information to identify the device and its options.

**User interface** Character string comprising numbers, letters and special characters (#20)


### 3.4.6 "Software configuration" submenu

*Navigation*            System → Softw. config.

---

#### W&M calibration checksum

---

<b>Navigation</b>	 System → Softw. config. → W&M cal. CRC
<b>Description</b>	Shows the calculated checksum over all temperature calibration relevant parameter.
<b>User interface</b>	0 to 65 535

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