Description of Device Parameters
Prothermo NMT81

Tank Gauging

Endress+Hauser

People for Process Automation

Table of contents

1   Overview of the operating menu

Navigation   ▣▢   Operating tool

Offline pre-selection	→ 🕮 14
Sensor module type	→ 🕮 14
Guidance	→ 🕮 14
▶ Commissioning	→ 🕮 14
Device tag	→ 🕮 14
Device name	→ 🕮 15
Serial number	→ 🕮 15
Extended order code 1	→ 🕮 15
Extended order code 2	→ 🕮 15
Extended order code 3	→ 🕮 16
HART short tag	→ 🕮 16
HART date code	→ 🕮 16
HART descriptor	→ 🕮 16
HART message	→ 🕮 17
HART address	→ 🕮 17
Temperature unit	→ 🕮 17
Distance unit	→ 🕮 17
End of probe to zero distance	→ 🕮 18
Water level offset	→ 🕮 18
Expert settings?	→ 🕮 18
Distance tank level uncovered	→ 🕮 19
Distance tank level covered	→ 🕮 19
Distance water level uncovered	→ 🕮 19

Minimum waterbottom sensor temperature		→ 🕮 25
Maximum terminal voltage		→ 🕮 26
Maximum electronics temperature		→ 🕮 26
Maximum sensor temperature		→ 🕮 26
Maximum waterbottom sensor temperature		→ 🕮 26
Minimum element 1 to 24 temperature		→ 🕮 26
Maximum element 1 to 24 temperature		→ 🕮 26
▶ Simulation		→ 🕮 27
Value current output		→ 🕮 27
Simulation		→ 🕮 27
Diagnostic event simulation		→ 🕮 27
Element temperature simulation		→ 🕮 28
Element 1 to 24 simulated temperature		→ 🕮 29
▶ Diagnostic settings		→ 🕮 29
▶ Properties		→ 🕮 29
Alarm delay		→ 🕮 29
▶ Sensor		→ 🕮 30
Threshold pair difference		→ 🕮 30
▶ Configuration		→ 🕮 30
▶ Sensor		→ 🕮 30
107/108 Event category		→ 🕮 31
107/108 Diagnostic behavior		→ 🕮 30
116 Diagnostic behavior		→ 🕮 31
116 Event category		→ 🕮 31

‣ Element settings		→ 🖺 47
	Element type	→ 🖺 47
	Threshold short element	→ 🖺 47
	Threshold open element	→ 🖺 47
	End of probe to zero distance	→ 🖺 48
	Element 1 to 24 position	→ 🖺 48
	Element temperature offset enable	→ 🖺 48
	Element 1 to 24 temperature offset	→ 🖺 48
‣ Temperature limit		→ 🖺 49
	0% temperature value	→ 🖺 49
	100% temperature value	→ 🖺 49
‣ Water bottom settings		→ 🖺 49
	Water bottom probe length	→ 🖺 49
	Water level offset	→ 🖺 50
	Product type	→ 🖺 50
	Three layer detection	→ 🖺 50
	Water bottom frequency ratio	→ 🖺 50
‣ Present calibration		→ 🖺 51
	Calibrated reference resistance	→ 🖺 51
	Calibrated test resistance	→ 🖺 51
	Test resistance	→ 🖺 51
‣ HART output		→ 🖺 52
	‣ Configuration	→ 🖺 52
	HART address	→ 🖺 52
	HART short tag	→ 🖺 52

	Device tag	→ 🗎 52
	No. of preambles	→ 🗎 53
‣ HART output		→ 🗎 53
	Assign PV	→ 🗎 53
	Primary variable (PV)	→ 🗎 53
	Assign SV	→ 🗎 54
	Secondary variable (SV)	→ 🗎 54
	Assign TV	→ 🗎 54
	Tertiary variable (TV)	→ 🗎 54
	Assign QV	→ 🗎 54
	Quaternary variable (QV)	→ 🗎 55
‣ Information		→ 🗎 55
	Device ID	→ 🗎 55
	Device type	→ 🗎 56
	Device revision	→ 🗎 56
	HART short tag	→ 🗎 56
	HART revision	→ 🗎 56
	HART descriptor	→ 🗎 56
	HART message	→ 🗎 57
	HART date code	→ 🗎 57
System		→ 🗎 57
‣ **Device management**		→ 🗎 57
Device tag		→ 🗎 57
Locking status		→ 🗎 58

Configuration counter		→ 🖹 58
Reset device		→ 🖹 59
‣ User management		→ 🖹 59
User role		→ 🖹 59
‣ Change user role		→ 🖹 60
	Enter access code	→ 🖹 60
‣ Change user role		→ 🖹 60
	Start	→ 🖹 60
	Password	→ 🖹 61
	Status password entry	→ 🖹 61
‣ Define password		→ 🖹 61
	Start	→ 🖹 61
	New password	→ 🖹 62
	Status password entry	→ 🖹 62
	Confirm new password	→ 🖹 62
	Status password entry	→ 🖹 62
‣ Change password		→ 🖹 63
	Start	→ 🖹 63
	Old password	→ 🖹 63
	Status password entry	→ 🖹 64
	New password	→ 🖹 64
	Status password entry	→ 🖹 64
	Confirm new password	→ 🖹 65
	Status password entry	→ 🖹 64
‣ Delete password		→ 🖹 66

		Start	→ 🖺 66
		Old password	→ 🖺 66
		Status password entry	→ 🖺 66
	► Reset password		→ 🖺 67
		Start	→ 🖺 67
		Reset password	→ 🖺 67
		Status password entry	→ 🖺 67
	► Logout		→ 🖺 68
		Start	→ 🖺 68
		User role	→ 🖺 68
► Display			→ 🖺 68
	Value 1 display		→ 🖺 68
	Decimal places 1		→ 🖺 69
	Value 2 display		→ 🖺 69
	Decimal places 2		→ 🖺 70
	Value 3 display		→ 🖺 70
	Decimal places 3		→ 🖺 71
	Value 4 display		→ 🖺 71
	Decimal places 4		→ 🖺 72
► Geolocation			→ 🖺 72
	Process Unit Tag		→ 🖺 72
	Location Description		→ 🖺 73
	Longitude		→ 🖺 73
	Latitude		→ 🖺 73

	Altitude	→ 🗎 73
	Location method	→ 🗎 74
▸ Information		→ 🗎 74
	Device name	→ 🗎 74
	Manufacturer	→ 🗎 74
	Serial number	→ 🗎 75
	Order code	→ 🗎 75
	Firmware version	→ 🗎 75
	Hardware version	→ 🗎 76
	Firmware CRC	→ 🗎 76
	Extended order code 1	→ 🗎 76
	Extended order code 2	→ 🗎 76
	Extended order code 3	→ 🗎 76
▸ Software configuration		→ 🗎 77
	W&M calibration checksum	→ 🗎 77

2 Description of device parameters

Navigation   ⊞⊟ Operating tool

2.1 "Offline pre-selection" menu

Navigation   ⊞⊟ Pre-selection

2.1.1 "Offline pre-selection" menu

Navigation   ⊞⊟ Pre-selection

Sensor module type	

Navigation   ⊟ Pre-selection → SensorModuleType

Selection   • Please select
• Temperature only
• Temperature and water level
• Temperature only (pairs)
• Temperature (pairs) and water level

2.2 "Guidance" menu

Navigation   ⊞⊟ Guidance

2.2.1 "Commissioning" wizard

Navigation   ⊞⊟ Guidance → Commissioning

Device tag	ⓐ

Navigation   ⊟ Guidance → Commissioning → 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)

Device name

Navigation	▣ Guidance → Commissioning → 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

Serial number

Navigation	▣ Guidance → Commissioning → Serial number
Description	The serial number is a unique alphanumerical code identifying the device. It is printed on the nameplate. In combination with the Operations app it allows to access all device related documentation.
User interface	Max. 11-digit character string comprising letters and numbers.
Additional information	*Description*

ℹ 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

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

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

---

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

---

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   🔒

Navigation	▣	Guidance → Commissioning → 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)

HART descriptor   🔒

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

HART message	🔒

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

HART address	🔒

Navigation	🖳 Guidance → Commissioning → 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.

Temperature unit	🔒

Navigation	🖳 Guidance → Commissioning → Temperature unit
Description	Use this function to select the unit for the temperature.
Selection	*SI units* *US units* • ˚C ˚F • K
Factory setting	˚C

Distance unit	🔒

Navigation	🖳 Guidance → Commissioning → Distance unit
Description	Use this function to select the unit for the distance.

Selection	*SI units*	*US units*
	• mm	• in
	• cm	• ft
	• m	

Factory setting   mm

End of probe to zero distance

Navigation	Guidance → Commissioning → EOP20 distance

Description   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.

User entry   −100 to 100 m

Factory setting   Depending on order codes

Water level offset

Navigation	Guidance → Commissioning → Water offset

Description   Enter an offset to adjust the output value of the water bottom probe.

User entry   −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 calulation.
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.

User entry	1 to 100

Factory setting	1

Additional information	ℹ 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	🔒

Navigation		▢	Guidance → Commissioning → Assign PV

Description	Assign a measured variable to the primary dynamic variable (PV). Additional information: The assigned measured variable is also used by the current output.

Selection	• Liquid temperature
	• Product temperature
	• Water temperature

Factory setting	Liquid temperature

Assign SV   🔒

Navigation	🖳 Guidance → Commissioning → Assign SV

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

Selection	Vapor temperature

Factory setting	Vapor temperature

Assign TV   🔒

Navigation	🖳 Guidance → Commissioning → Assign TV

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

Selection	Water level

Factory setting	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

2.2.2   "Import / Export" submenu

Navigation   ▣   Guidance → Import / Export

Import/Export has two functions as follows:
• Save/Restore
• Create documentation

2.2.3   "Compare" submenu

Navigation   ▣   Guidance → Compare

Compare datasets can simply compare the following items.
• Compare offline with online.
• Compare offline with save/restore file.
• Compare online with save/restore file.
• Compare two save/restore files.

2.3   "Diagnostics" menu

Navigation   ▣▣   Diagnostics

2.3.1   "Active diagnostics" submenu

Navigation   ▣▣   Diagnostics → Active diagnos.

Active diagnostics

Navigation   ▣   Diagnostics → Active diagnos. → Active diagnos.

Prerequisite   A diagnostic event has occurred.

Description   Displays the current diagnostic message. If two or more messages occur simultaneously, the message with the highest priority is shown on the display.

User interface   Symbol for diagnostic behavior, diagnostic code and short message.

Additional information   *User interface*

ℹ️ Additional pending diagnostic messages can be viewed in the **Diagnostic list** submenu.

Example

For the display format:
⊗F271 Main electronic failure

Timestamp

Navigation   ▣   Diagnostics → Active diagnos. → Timestamp

Description   Displays the operating time when the current diagnostic message occurred.

User interface   Days (d), hours (h), minutes (m) and seconds (s)

Additional information   *User interface*

ℹ️ The diagnostic message can be viewed via the **Actual diagnostics** parameter (→ 🕮 22).

Example

For the display format:
24d12h13m00s

Previous diagnostics

Navigation   ▣   Diagnostics → Active diagnos. → Prev.diagnostics

Description   Displays the diagnostic message for the last diagnostic event that has ended.

User interface   Positive integer

Timestamp

Navigation   ▣   Diagnostics → Active diagnos. → Timestamp

Description   Displays the operating time when the last diagnostic message before the current message occurred.

User interface   Days (d), hours (h), minutes (m) and seconds (s)

Additional information   *User interface*

The diagnostic message can be viewed via the **Previous diagnostics** parameter (→ 🖺 23).

Example

For the display format:
24d12h13m00s

Operating time from restart

Navigation   🖳   Diagnostics → Active diagnos. → Time fr. restart

Description   Indicates how long the device has been in operation since the last time the device was restarted.

User interface   Days (d), hours (h), minutes (m), seconds (s)

Operating time

Navigation   🖳   Diagnostics → Active diagnos. → Operating time

Description   Indicates how long the device has been in operation.

Additional information   Maximum time: 9 999 d (≈ 27 years)

2.3.2   "Diagnostic list" submenu

Navigation   🖳🔲   Diagnostics → Diagnostic list

2.3.3   "Event logbook" submenu

Navigation   🖳🔲   Diagnostics → Event logbook

2.3.4   "Minimum/maximum values" submenu

Navigation   🖳🔲   Diagnostics → Min/max val.

Minimum terminal voltage

Navigation	🔲 Diagnostics → Min/max val. → Min.term.volt.
Description	Minimum or maximum measured terminal (supply) voltage.
User interface	0.0 to 50.0 V

Minimum electronics temperature

Navigation	🔲 Diagnostics → Min/max val. → Min.electr.temp.
Description	Minimum or maximum measured main electronics temperature.
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
Description		Minimum or maximum measured terminal (supply) voltage.
User interface		0.0 to 50.0 V

Maximum electronics temperature

Navigation	▦	Diagnostics → Min/max val. → Max.electr.temp.
Description		Minimum or maximum measured main electronics temperature.
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 1 273.15 K

Maximum element 1 to 24 temperature

Navigation	▦	Diagnostics → Min/max val. → Max elem. 1 to 24
User interface		0 to 1 273.15 K

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

2.3.5   "Simulation" submenu

Navigation   🔲🔲   Diagnostics → Simulation

"Simulation" submenu

Navigation   🔲🔲   Diagnostics → Simulation

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

Simulation   🔒

Navigation   🔲   Diagnostics → Simulation → Simulation

Selection   • Off
                     • Current output
                     • Diagnostic event simulation

Factory setting   Off

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*

ℹ️ 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
- 116: Temperature pair open short
- 117: Temperature pair difference
- 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
- 331: Firmware update failed
- 388: Electronics and HistoROM defective
- 410: Data transfer failed
- 412: Processing download
- 431: Trim required
- 437: Configuration incompatible
- 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   🔏

Navigation   🖳   Diagnostics → Simulation → Sim. temp. 1 to 24

User entry   0 to 1 273.15 K

Factory setting   233.15 K

2.3.6   "Diagnostic settings" submenu

Navigation   🖲🖳   Diagnostics → Diag. settings

"Properties" submenu

Navigation   🖳   Diagnostics → Diag. settings → Properties

Alarm delay   🔏

Navigation   🖳   Diagnostics → Diag. settings → Properties → Alarm delay

User entry   0 to 60 s

Factory setting   0 s

Additional information   ℹ️ 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.

"Sensor" submenu

Navigation   ⌷   Diagnostics → Diag. settings → Sensor

Threshold pair difference   ⌂

Navigation   ⌷   Diagnostics → Diag. settings → Sensor → Thresh.Pair diff

Description   Threshold pair difference

User interface   0.01 to 100 K

"Configuration" submenu

Navigation   ⌷⊟   Diagnostics → Diag. settings → Configuration

"Sensor" submenu

Navigation   ⌷   Diagnostics → Diag. settings → Configuration → Sensor

---

107/108 Diagnostic behavior   ⌂

Navigation   ⌷   Diagnostics → Diag. settings → Configuration → Sensor → 107/108 Diag. behav.

Description   Use this value to define the effect of an open or short individual element on the average values and the diagnostic messages.
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.
- Logbook entry only will skip the defective element(s) and generate no diagnostic message, only an entry in the logbook.
- Warning will skip the defective element(s) and generate a diagnostic message of type warning.
-Alarm will skip the defective element(s) and always generate a diagnostic message of type alarm.

Selection   • Alarm
          • Warning
          • Logbook entry only

Factory setting   Warning

107/108 Event category

Navigation	⌨	Diagnostics → Diag. settings → Configuration → Sensor → 107/108Event category

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

Factory setting	Maintenance required (M)

116 Diagnostic behavior

Navigation	⌨	Diagnostics → Diag. settings → Configuration → Sensor → 116 Diag. behav.

Description	Use this value to define the effect of an open/short element pair on the diagnostic messages. If all element pairs are open/short there will be a diagnostic message of type alarm, independent of this setting. - Logbook entry only will generate no diagnostic message, only an entry in the logbook. - Warning will generate a diagnostic message of type warning. - Alarm will generate a diagnostic message of type alarm.

Selection	• Alarm • Warning • Logbook entry only

116 Event category

Navigation	⌨	Diagnostics → Diag. settings → Configuration → Sensor → 116Event category

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

---

117 Diagnostic behavior   🔒

Navigation	Diagnostics → Diag. settings → Configuration → Sensor → 117 Diag. behav.
Description	Use this value to define the effect of an pair temperature difference out of range on the diagnostic messages. If all pair temperature difference out of range there will be a diagnostic message of type alarm, independent of this setting. - Logbook entry only will generate no diagnostic message, only an entry in the logbook. - Warning will generate a diagnostic message of type warning. - Alarm will generate a diagnostic message of type alarm.
Selection	• Alarm • Warning • Logbook entry only

---

117 Event category

Navigation	Diagnostics → Diag. settings → Configuration → Sensor → 117Event category
User interface	• Failure (F) • Function check (C) • Out of specification (S) • Maintenance required (M) • No effect (N)

"Process" submenu

Navigation   Diagnostics → Diag. settings → Configuration → Process

---

969 Diagnostic behavior   🔒

Navigation	Diagnostics → Diag. settings → Configuration → Process → 969 Diag. behav.
Description	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. - Logbook only will use the closest element available for the average temperature and only generate a logbook entry. - Warning will use the closest element available for average temperature and generate a diagnostic message of type warning - Alarm will generate a diagnostic of type alarm.
Selection	• Alarm • Warning • Logbook entry only

Factory setting   Logbook entry only

---

969 Event category

Navigation   ⊟   Diagnostics → Diag. settings → Configuration → Process → 969Event category

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

Factory setting   No effect (N)

2.3.7   "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

2.4   "Application" menu

Navigation   ⊞⌨   Application

2.4.1   "Measured values" submenu

Navigation   ⊞⌨   Application → Measured values

Vapor temperature

Navigation   ⌨   Application → Measured values → Vapor temp

Description   Shows the average temperature of all elements in vapor. If no element is available, the
                          closest element to tank level is used.

User interface   0 to 1 273.15 K

Liquid temperature

Navigation   ⌨   Application → Measured values → Liquid temp

Description   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.

User interface   0 to 1 273.15 K

Product temperature

Navigation	▤	Application → Measured values → Product temp
Description		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.
User interface		0 to 1 273.15 K

Water temperature

Navigation	▤	Application → Measured values → Water temp
Description		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 1 273.15 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 calulation 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

Test resistance

Navigation	▣	Application → Measured 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

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   ℹ️ 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   ℹ️ 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

Navigation	□ Application → Measured values → Element 1 to 24 temp
Description	Temperature unit
User interface	0 to 1 273.15 K

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

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   –1000 to 1000 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.

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 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.

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

"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

Navigation   ⊟   Application → Measured values → Elements water

Description   Shows the elements which are used for average water temperature calculation. These are all elements below water 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

2.4.2   "Measuring Units" submenu

Navigation   ⊞⊟   Application → Measuring Units

Temperature unit   🔒

Navigation   ⊟   Application → Measuring Units → Temperature unit

Description   Use this function to select the unit for the temperature.

Selection   *SI units*   *US units*
                         • ℃   ℉
                         • K

Factory setting   Country-specific:
                         ℃

Distance unit	⌂

Navigation	⌨⊞ Application → Measuring Units → Distance unit

Description	Defines the unit for all distance and level values, e.g. element position and water level.

Selection	*SI units* *US units*
	• mm • in
	• cm • ft
	• m

Factory setting	mm

2.4.3 "Sensor" submenu

Navigation	⊞⊟ Application → Sensor

"General settings" submenu

Navigation	⊞⊟ Application → Sensor → General settings

Sensor module type	⌂

Navigation	⌨⊞ Application → Sensor → General settings → SensorModuleType

User interface	• Temperature only
	• Temperature and water level
	• Temperature only (pairs)
	• Temperature (pairs) and water level

Factory setting	Depending on order codes

Number of temperature elements	⌂

Navigation	⌨⊞ Application → Sensor → General settings → no of element

User interface	1 to 24

Factory setting	Depending on order codes

Element to output	

Navigation	Application → Sensor → General settings → Elem. to output
Description	The element choosen 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 calulation.

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 → 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.
User entry	1 to 100
Factory setting	1

Additional information   ℹ️   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, α=0.00385
- Pt100, Canadian, α=0.00389
- Pt100, GOST, α=0.00391
- Cu100, GOST, α=0.00428
- Ni100, GOST, α=0.00617
- Custom

Factory setting   Pt100, IEC751, α=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 1000 Ohm

Factory setting   600 Ohm

End of probe to zero distance	🔒

Navigation	🔲	Application → Sensor → Element set. → EOP20 distance

Description	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.

User entry	–100 to 100 m

Factory setting	Depending on order codes

Element 1 to 24 position	🔒

Navigation	🔲	Application → Sensor → Element set. → 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	–1000 to 1000 m

Factory setting	Depending on order codes

Element temperature offset enable	🔒

Navigation	🔲	Application → Sensor → Element set. → Temp. offset on

Description	Use this function to activate individual temperature offsets added to each element.

Selection	▪ Disable ▪ Enable

Factory setting	Enable

Element 1 to 24 temperature offset	🔒

Navigation	🔲	Application → Sensor → Element set. → Temp offset 1 to 24

User entry	–100 to 100 K

Factory setting	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 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

Navigation		Application → Sensor → WB settings → Water offset

Description   Enter an offset to adjust the output value of the water bottom probe.

User entry   –100 to 100 m

Factory setting   0 m

Product type

Navigation		Application → Sensor → WB settings → Product type

Description   Use this function to set the correct product beside water, in which the probe will be used.

Selection   • No product
                     • Fuel oil
                     • Crude oil
                     • Gasoline
                     • Diesel oil / Kerosene

Factory setting   Depending on order codes

Three layer detection

Navigation		Application → Sensor → WB settings → Layer detection

Description   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.

Selection   • Disable
                     • Enable

Factory setting   Enable

Water bottom frequency ratio

Navigation		Application → Sensor → WB settings → WB freq. ratio

Description   Shows the raw value of the water bottom sensor which is used to determine the water
                     level.

User interface   0 to 2

"Present calibration" submenu

Navigation   🔘🖳   Application → Sensor → Present calib.

Calibrated reference resistance

Navigation	🖳 Application → Sensor → Present calib. → 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 calib. → 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 calib. → 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

2.4.4 "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	🔒

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

"HART output" submenu

Navigation　　🖥🖥　Application → HART output

"HART output" submenu

Navigation　　🖥🖥　Application → HART output → HART output

Assign PV	🔒

Navigation	🖥 Application → HART output → HART output → Assign PV
Description	Assign a measured variable to the primary dynamic variable (PV).
	Additional information:
	The assigned measured variable is also used by the current output.
Selection	• Liquid temperature
	• Product temperature
	• Water temperature
Factory setting	Liquid temperature

Primary variable (PV)	

Navigation	🖥 Application → HART output → HART output → Primary var (PV)
Description	Shows the current measured value of the primary dynamic variable (PV)
User interface	0 to 1 273.15 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).

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

Quaternary variable (QV)

Navigation   🖵   Application → HART output → HART output → Quaterna.var(QV)

Description   Shows the current measured value of the quaternary (fourth) dynamic variable (QV)

User interface   0 to 99 999.9999 K

"Information" submenu

Navigation   🖳🖵   Application → HART output → Information

Device ID

Navigation   🖵   Application → HART output → Information → Device ID

Description   Shows the device ID for identifying the device in a HART network

User interface   Positive integer

Device type

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

Device revision

Navigation	🔲	Application → HART output → Information → Device revision
Description		Shows the device revision with which the device is registered with the HART Communication Foundation
User interface		0 to 255

HART short tag   🔒

Navigation	🔲	Application → HART output → Information → 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

HART revision

Navigation	🔲	Application → HART output → Information → HART revision
User interface		5 to 7

HART descriptor   🔒

Navigation	🔲	Application → HART output → Information → HART descriptor
Description		User defined HART descriptor (16 characters).
User entry		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

2.5   "System" menu

Navigation   🖳   System

2.5.1   "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 **Access status display** 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. ℹ 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.

2.5.2 "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*

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

ℹ   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.

"Change user role" wizard

Navigation   System → User manag. → Change user role

Enter access code   🔒

Navigation   System → User manag. → Change user role → Ent. access code (0003)

Description   Enter access code to disable write protection of parameters.

User entry   0 to 9 999

Factory setting   0

"Change user role" wizard

Navigation   System → User manag. → Change user role

Start

Navigation   System → User manag. → Change user role → Start

User interface   Character string comprising numbers, letters and special characters

Password	
Navigation	🖩🖵 System → User manag. → Change user role → Password
Description	Enter password to gain access to the functions of the user role. 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)
Factory setting	

Status password entry	
Navigation	🖩🖵 System → User manag. → Change user role → 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
Factory setting	--------

"Define password" wizard

Navigation   🖵   System → User manag. → Define password

Start	
Navigation	🖩 System → User manag. → Define password → Start
User interface	Character string comprising numbers, letters and special characters

New password	🔒

Navigation	🖥🖵 System → User manag. → Define password → New password
Description	Enter a new password.
	If the factory setting is not changed, the device works without write-protection, using user role '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'. Any new password must consist of at least 4 and a maximum of 16 characters and can contain letters and numbers.
User entry	Character string comprising numbers, letters and special characters (16)
Factory setting	

Status password entry	

Navigation	🖥🖵 System → User manag. → Define password → 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
Factory setting	--------

Confirm new password	🔒

Navigation	🖥🖵 System → User manag. → Define password → Conf. new passw.
Description	Confirmation new password.
	Enter the new password again to confirm.
User entry	Character string comprising numbers, letters and special characters (16)
Factory setting	

Status password entry

Navigation	⌨⊟ System → User manag. → Define password → 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

Factory setting	--------

"Change password" wizard

Navigation   ⊟   System → User manag. → Change password

Start

Navigation	⊟ System → User manag. → Change password → Start

User interface	Character string comprising numbers, letters and special characters

Old password	🔒

Navigation	⌨⊟ System → User manag. → Change password → Old password

Prerequisite	IsPasswordDefined

Description	Enter the current password to start a password change.
	Enter the current password, to subsequently change the existing password.

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

Factory setting	

Status password entry

Navigation	System → User manag. → Change password → 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
Factory setting	--------

New password   🔒

Navigation	System → User manag. → Change password → New password
Description	Enter a new password.
	If the factory setting is not changed, the device works without write-protection, using user role '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'. Any new password must consist of at least 4 and a maximum of 16 characters and can contain letters and numbers.
User entry	Character string comprising numbers, letters and special characters (16)
Factory setting	

Status password entry

Navigation	System → User manag. → Change password → 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

Factory setting   --------

Confirm new password   🔒

Navigation   🎛🖥 System → User manag. → Change password → Conf. new passw.

Description   Confirmation new password.

                          Enter the new password again to confirm.

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

Factory setting

Status password entry

Navigation   🎛🖥 System → User manag. → Change password → 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

Factory setting   --------

"Delete password" wizard

Navigation   System → User manag. → Delete password

Start

Navigation		System → User manag. → Delete password → Start
User interface		Character string comprising numbers, letters and special characters

Old password

Navigation		System → User manag. → Delete password → Old password
Prerequisite		IsPasswordDefined
Description		Enter the current password to start a password change.
		Enter the current password, to subsequently change the existing password.
User entry		Character string comprising numbers, letters and special characters (16)
Factory setting		

Status password entry

Navigation		System → User manag. → Delete password → 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

Factory setting   --------

"Reset password" wizard

Navigation   ⌨   System → User manag. → Reset password

Start

Navigation   ⌨   System → User manag. → Reset password → Start

User interface   Character string comprising numbers, letters and special characters

Reset password

Navigation   ⌨⌨   System → User manag. → Reset password → Reset password

Description   Enter a code to reset the current password.

Enter a code to reset the current password.

CAUTION: Use this function only if the current password is lost. Contact your Endress
+Hauser Sales Center.

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

Factory setting

Status password entry

Navigation   ⌨⌨   System → User manag. → Reset password → 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

Factory setting   --------

"Logout" wizard

Navigation　　　⊟　System → User manag. → Logout

Start

Navigation　　　⊠　System → User manag. → Logout → Start

User interface　　　Character string comprising numbers, letters and special characters

Access status tooling

Navigation　　　⊟　System → User manag. → Logout → Access stat.tool

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

User interface　　　• Operator
　　　• Maintenance
　　　• Expert

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.

2.5.3   "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

ℹ 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 (→ 🖹 68). |

| 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   🔒

| Navigation | ⊟   System → Display → Value 2 display |

| Prerequisite | A local display is provided. |

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

| Selection | • None
• Liquid temperature
• Product temperature
• Vapor temperature
• Water temperature |

- Water level
- Tank level
- Element temperature
- Element resistance
- Test resistance
- Current output

Factory setting   None

Additional information   *Description*

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.

Dependency

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

Decimal places 2

Navigation   System → Display → Decimal places 2

Prerequisite   A measured value is defined in the **Value 2 display** parameter (→ 🖺 69).

Description   Use this function to select the number of decimal places for measured value 2.

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

Factory setting   x.xx

Value 3 display

Navigation   System → Display → Value 3 display

Prerequisite   A local display is provided.

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

Selection
- None
- Liquid temperature
- Product temperature
- Vapor temperature
- Water temperature
- Water level
- Tank level
- Element temperature

- Element resistance
- Test resistance
- Current output

| Factory setting | None |

Additional information   *Description*

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.

Selection

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

Decimal places 3

Navigation   System → Display → Decimal places 3

Prerequisite   A measured value is defined in the **Value 3 display** parameter (→ 🖺 70).

Description   Use this function to select the number of decimal places for measured value 3.

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

Factory setting   x.xx

Value 4 display

Navigation   System → Display → Value 4 display

Prerequisite   A local display is provided.

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

Selection
- None
- Liquid temperature
- Product temperature
- Vapor temperature
- Water temperature
- Water level
- Tank level
- Element temperature
- Element resistance
- Test resistance
- Current output

Factory setting   None

Additional information   *Description*

                           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.

                           Selection

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

Decimal places 4   🔒

Navigation   ▣   System → Display → Decimal places 4

Prerequisite   A measured value is defined in the **Value 4 display** parameter (→ 🔲 71).

Description   Use this function to select the number of decimal places for measured value 4.

Selection   ▪ x
                          ▪ x.x
                          ▪ x.xx
                          ▪ x.xxx
                          ▪ x.xxxx

Factory setting   x.xx

2.5.4   "Geolocation" submenu

Navigation   ▣   System → Geolocation

Process Unit Tag   🔒

Navigation   ▣   System → Geolocation → Process Unit Tag

Description   Enter the process unit in which the device is installed.

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

Factory setting   Process Unit Tag

Location Description	🔒

Navigation	🖳 System → Geolocation → Location Descr.
Description	Use this function to enter a description of the location so that the device can be located in the plant.
User entry	Character string comprising numbers, letters and special characters (32)
Factory setting	somewhere

Longitude	🔒

Navigation	🖳 System → Geolocation → Longitude
Description	Use this function to enter the longitude coordinates that describe the device location.
User entry	−180 to 180 ˚
Factory setting	0 ˚

Latitude	🔒

Navigation	🖳 System → Geolocation → Latitude
Description	Use this function to enter the latitude coordinates that describe the device location.
User entry	−90 to 90 ˚
Factory setting	0 ˚

Altitude	🔒

Navigation	🖳 System → Geolocation → Altitude
Description	Use this function to enter the altitude data that describe the device location.
User entry	Signed floating-point number
Factory setting	0 m

Location method	⌂

Navigation	▤	System → Geolocation → Location method

Description	Use this function to select the data format for specifying the geographic location. The codes for specifying the location are based on the US National Marine Electronics Association (NMEA) Standard NMEA 0183.

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

2.5.5 "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

Manufacturer	

Navigation	▤	System → Information → Manufacturer

User interface	Character string comprising numbers, letters and special characters

Serial number

| Navigation | ▣ | System → Information → Serial number |

Description   Displays the serial number of the measuring device.

ℹ️ The number can be found on the nameplate of the sensor and transmitter.

User interface   Max. 11-digit character string comprising letters and numbers.

Additional information   *Description*

ℹ️ 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

Order code   🔒

| Navigation | ▣ | System → Information → Order code |

Description   Shows the device order code.

User interface   Character string composed of letters, numbers and certain punctuation marks (e.g. /).

Factory setting   –

Additional information   *Description*

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.

ℹ️ Uses of the order code
- To order an identical spare device.
- To identify the device quickly and easily, e.g. when contacting Endress+Hauser.

Firmware version

| Navigation | ▣ | System → Information → Firmware version |

Description   Displays the device firmware version installed.

User interface   Character string comprising numbers, letters and special characters

Hardware version

Navigation	⊟	System → Information → Hardware version
User interface		Character string comprising numbers, letters and special characters

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

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

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

2.5.6   "Software configuration" submenu

Navigation   ▣   System → Softw. config.

W&M calibration checksum

Navigation   ▣   System → Softw. config. → W&M cal. CRC

Description   Shows the calculated checksum over all temperature calibration relevant parameter.

User interface   0 to 65 535

Index

71597241

www.addresses.endress.com

Endress+Hauser

People for Process Automation