BA00429G/00/EN/04.24-00
71679817
2024-11-08

Operating Instructions
TMD1

HHT2 Hand Held Terminal

Endress+Hauser
HAND HELD TERMINAL
HHT-2-A
労(2023.12)検
第T64030号
SFT
MODE
OFF
ON
7
8
9
D 4
E 5
F 6
A 1
B 2
C 3
ESC BS
0
.
—
ENT

Endress+Hauser
People for Process Automation

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1 Document information

1.1 Document function

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

1.2 Symbols

1.2.1 Safety symbols

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

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

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

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

1.2.2 Electrical symbols

~

Alternating current

≂

Direct current and alternating current

⎓

Direct current

⏚

Ground connection

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

⊜ **Protective earth (PE)**

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

The ground terminals are located on the interior and exterior of the device:
- Interior ground terminal: protective earth is connected to the mains supply.
- Exterior ground terminal: device is connected to the plant grounding system.

1.2.3 Tool symbols

⊕
Phillips head screwdriver

◐ ✎
Flat blade screwdriver

✪ ✎
Torx screwdriver

⬡ ✎
Allen key

🔧
Open-ended wrench

1.2.4 Symbols for certain types of information and graphics

☑ **Permitted**
Procedures, processes or actions that are permitted

☑☑ **Preferred**
Procedures, processes or actions that are preferred

☒ **Forbidden**
Procedures, processes or actions that are forbidden

ℹ **Tip**
Indicates additional information

📖
Reference to documentation

🖼
Reference to graphic

▶
Notice or individual step to be observed

1., 2., 3.
Series of steps

↳
Result of a step

👁
Visual inspection

💻
Operation via operating tool

🔒
Write-protected parameter

1, 2, 3, ...
Item numbers

A, B, C, ...
Views

⚠ → 📖 **Safety instructions**
Observe the safety instructions contained in the associated Operating Instructions

🔌 **Temperature resistance of the connection cables**
Specifies the minimum value of the temperature resistance of the connection cables

1.3 Documentation

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

ℹ For an overview of the scope of the associated Technical Documentation, refer to the following:
- *Device Viewer* (www.endress.com/deviceviewer): Enter the serial number from the nameplate
- *Endress+Hauser Operations app*: Enter serial number from nameplate or scan matrix code on nameplate.

1.3.1 Technical Information (TI)

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

1.3.2 Brief Operating Instructions (KA)

Guide that takes you quickly to the 1st measured value
The Brief Operating Instructions contain all the essential information from incoming acceptance to initial commissioning.

1.3.3 Operating Instructions (BA)

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

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

1.3.4 Description of Device Parameters (GP)

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

1.3.5 Safety Instructions (XA)

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

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

1.3.6 Installation instructions (EA)

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

1.4 Registered trademarks

FieldCare®
Registered trademark of the Endress+Hauser Process Solutions AG, Reinach, Switzerland.

HART®
Registered trademark of the FieldComm Group, Austin, USA.

2 Basic safety instructions

2.1 Requirements for personnel

The personnel for installation, commissioning, diagnostics and maintenance must fulfill the following requirements:

- ▶ Be specialists who are trained and have a relevant qualification for this specific function and task.
- ▶ Be authorized by the plant owner-operator.
- ▶ Be familiar with local/national regulations.
- ▶ Before starting work, read and understand the instructions in the Operating Instructions and supplementary documentation as well as the certificates (depending on the application).
- ▶ Follow instructions and comply with basic conditions.

The operating personnel must fulfill the following requirements:

- ▶ Be instructed and authorized according to the requirements of the task by the facility's owner-operator.
- ▶ Follow the instructions in this manual.

2.2 Designated use

Application and measured materials

Depending on the version ordered, the device can also be used with potentially explosive, flammable, poisonous or oxidizing materials.

Devices that are used in hazardous areas have corresponding labels on their nameplates.

To ensure that the device remains in proper condition for the operation time:

- ▶ Only use the device in full compliance with the data on the nameplate and the general conditions listed in the Operating Instructions and supplementary documentation.
- ▶ Check the nameplate to verify if the device can be put to its intended use in hazardous areas.
- ▶ If the device is not operated at an atmospheric temperature, compliance with the relevant basic conditions specified in the relevant device documentation is absolutely essential.
- ▶ Protect the device permanently against corrosion from environmental influences.
- ▶ Observe the limit values in the "Technical Information".

The manufacturer is not liable for damage caused by improper or non-designated use.

2.3 Workplace safety

For work on and with the device:

- ▶ Wear the required personal protective equipment according to local/national regulations.

2.4 Operational safety

Risk of injury!

- Operate the device in proper technical conditions and fail-safe conditions only.
- The plant owner-operator is responsible for interference-free operation of the device.

Modifications to the device

Unauthorized modifications to the device are not permitted and can lead to unforeseeable dangers:

- If modifications are nevertheless required, contact your Endress+Hauser Sales Center.

Repair

To ensure continued operational safety and reliability:

- Carry out repairs on the device only if they are expressly permitted.
- Observe local/national regulations pertaining to repair of an electrical device.
- Use only original spare parts and accessories from Endress+Hauser.

Ex-area

Observe the following notes to eliminate the risk of danger to persons or the facility when the device is used in Ex-areas (e.g. explosion protection, pressure equipment safety):

- Check the model nameplate to ensure that the ordered device is explosion proof.
- Observe the specifications in the separate supplementary documentation attached to these Instructions.

2.5 Product safety

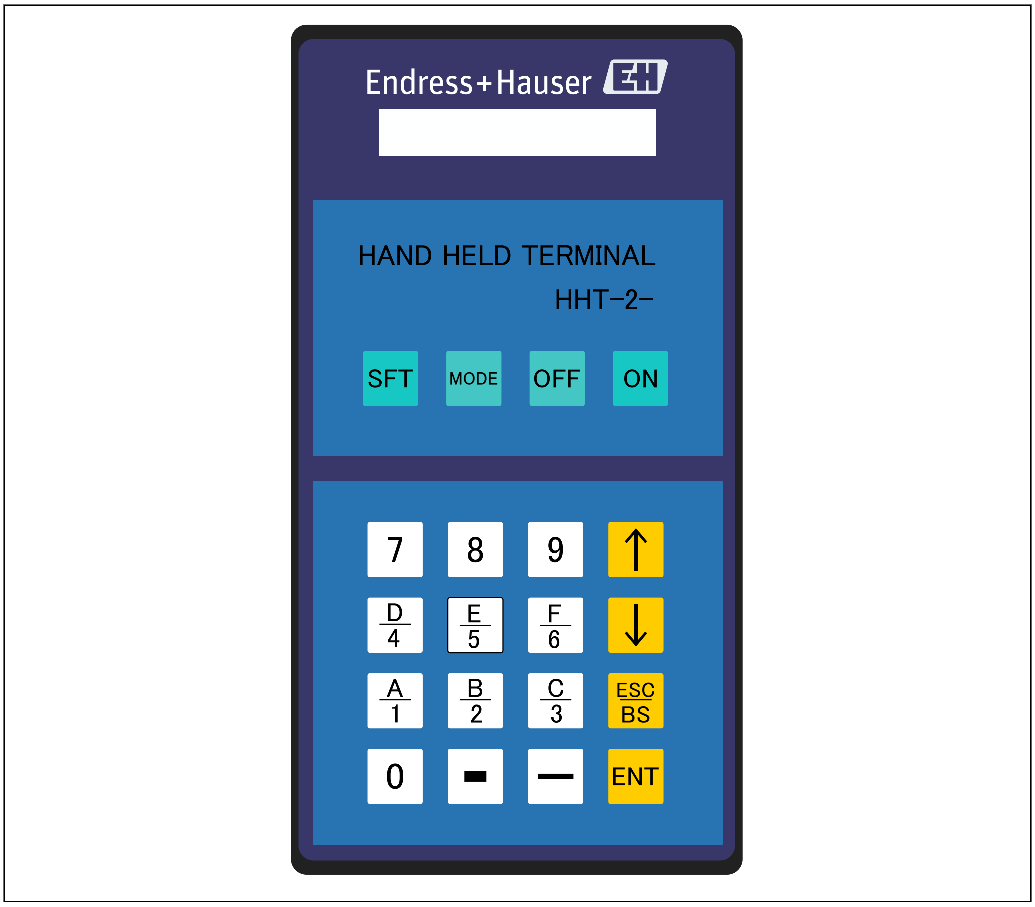
This device was designed in accordance with GEP (Good Engineering Practice) to meet state-of-the-art safety requirements, has been tested and left the factory in a condition in which it is safe to operate. It meets the general safety standards and legal requirements.

3 Product description

3.1 Product design

All operations on HHT2 are done by using twenty keys on the key pad. The upper four keys are used to turn the power on/off and select modes. The lower sixteen keys are used to select items and input values.

Refer to "Basic operations and settings" and "Option input and output settings" for details.



1 *HHT2 display*

3.2 Keypad

Name	Descriptions
ON	Power ON switch: Keep pressing until the display appears on the LCD screen.
OFF	Power OFF switch: Keep pressing until the display appears on the LCD screen. The automatic power off function will turn off the power four minutes after key operation stops.
MODE	Mode display switch: MODE No. input standby screen will appear. ↑ and ↓ keys are used to change the MODE No.
SFT	Shift key: Press an alphabet key or the ESC key while holding down the shift key when entering letters A through F and ESC.
↑	Device selection screen: The name of the previous device will appear. MODE, ITEM selection screen: The screen for the MODE or ITEM one number smaller than the MODE or ITEM being displayed will appear.

Name	Descriptions
↓	Device selection screen: The name of the next device will appear. MODE, ITEM selection screen: The screen for the MODE or ITEM one number greater than the MODE or ITEM being displayed will appear.
ESC/BS	ESC: Pressing the ESC and SFT keys simultaneously will return the screen to the Device Selection screen when the mode and item currently being displayed have been entered. BS: Backspace key, which deletes one character from the input characters
ENT	Setting mode key (input key)

3.3 Technical data

Category	Item	Description
Display	Display element	Liquid Crystal Display (LCD)
	Display characters	16 characters x 2 digits
	Dot configuration	5 x 7 dot + cursor
	Display character size	2.95 (width) x 5.55 (height)
Keyboard	Key top	Vinyl sheet splash resistant structure
	Switch	Membrane switch
Interface	Basic format	Optical data link
	Transmission form	A type: 2-way, 2-wire
	Transmission rate	1953.2BPS
Power supply	Battery used	AA alkaline battery (LR6 1.5V) x 4
	Current consumption	45 mA (typ)
	Uptime (continuous use)	Approx. 25 hours (LR6 x 4 at 25 °C (77 °F) in ambient temperature)
	Automatic power off function	Four minutes after HHT2 identifies the last input
	Low battery alarm	Alarm displayed at approx. 5 V upon communication error
Appearance	External dimensions	191 mm (7.52 in) x 102 mm (4.01 in) x 29 mm (1.14 in)
	Materials	Plastic (ABS resin)
	Weight	Approx. 430 g (0.95 lb)
Mechanical construction	Ex [ia] structure	i2G3
Temperature	Ambient environment temperature	−10 to 40 °C (14 to 104 °F) (without condensation)
Accessory	Soft case	Vinyl leather x 1
	Battery	LR6 x 4
	Communication cable	Fiber-optic with optic cable (1 m (3.28 ft)) x 1

4 Incoming acceptance and product identification

4.1 Incoming acceptance

Upon receipt of the goods, check the following:
- Are the order codes on the delivery note and the product label identical?
- Are the goods undamaged?
- Do the nameplate data match the ordering information on the delivery note?
- If required (see nameplate): Are the Safety Instructions (XA) enclosed?

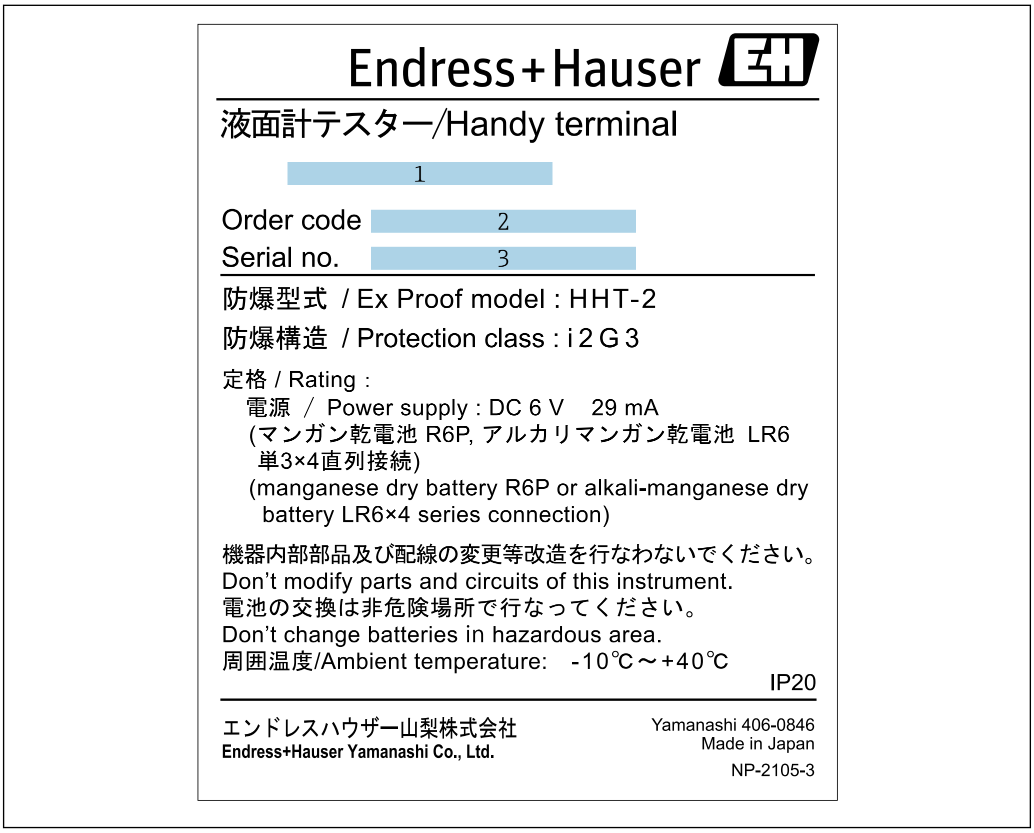
If one or more of these conditions are not satisfied, contact your Endress+Hauser Sales Center or distributor.

4.2 Product identification

The following options are available for identification of the device:
- Nameplate specifications
- Extended order code on the delivery note (including details of the device specification codes)
- Entering the serial number from the nameplate in *W@M Device Viewer* (www.endress.com/deviceviewer) will display all the information about the device.
- Scanning the serial number from the nameplate in the *Endress+Hauser Operations app* or scanning the 2-D matrix code (QR code) with the *Endress+Hauser Operations app* will display all the information about the device.

For an overview of the scope of the associated Technical Documentation, refer to the following:
- *W@M Device Viewer*: Enter the serial number from the nameplate (www.endress.com/deviceviewer).
- *Endress+Hauser Operations app*: Enter the serial number from the nameplate or scan the 2-D matrix code (QR code) on the nameplate.

4.2.1 Nameplate



Endress+Hauser

液面計テスター/Handy terminal

Order code

Serial no.

防爆型式 / Ex Proof model : HHT-2

防爆構造 / Protection class : i 2 G 3

定格 / Rating :
電源 / Power supply : DC 6 V 29 mA
(マンガン乾電池 R6P, アルカリマンガン乾電池 LR6
単3×4直列接続)
(manganese dry battery R6P or alkali-manganese dry
battery LR6×4 series connection)

機器内部部品及び配線の変更等改造を行なわないでください。
Don’t modify parts and circuits of this instrument.
電池の交換は非危険場所で行なってください。
Don’t change batteries in hazardous area.
周囲温度/Ambient temperature: -10℃～+40℃
IP20

エンドレスハウザー山梨株式会社
Endress+Hauser Yamanashi Co., Ltd.

Yamanashi 406-0846
Made in Japan
NP-2105-3

A0038094

2 HHT2 nameplate

1 *Tag number*
2 *Order code*
3 *Serial number*

4.3 Manufacturer contact address

Endress+Hauser Yamanashi Co., Ltd.
406-0846
862-1 Mitsukunugi, Sakaigawa-cho, Fuefuki-shi, Yamanashi

4.4 Storage and transport

4.4.1 Storage conditions

- Storage temperature: −20 to +60 °C (−4 to 140 °F)
- Store the device in its original packaging.

4.4.2 Transport

NOTICE

The housing may become damaged or dislodged.

Risk of injury

- When transporting the device to the measuring point, either use the device's original packaging or hold by the process connector.
- Secure a hoisting device (such as a hoisting ring or a lifting eye bolt) to the process connector, not to the housing. Pay attention to the device's center of gravity to prevent unexpected tilting.
- Comply with the safety instructions, transport conditions for devices over 18 kg (39.6 lbs) (IEC61010).

NOTICE

Risk of injury

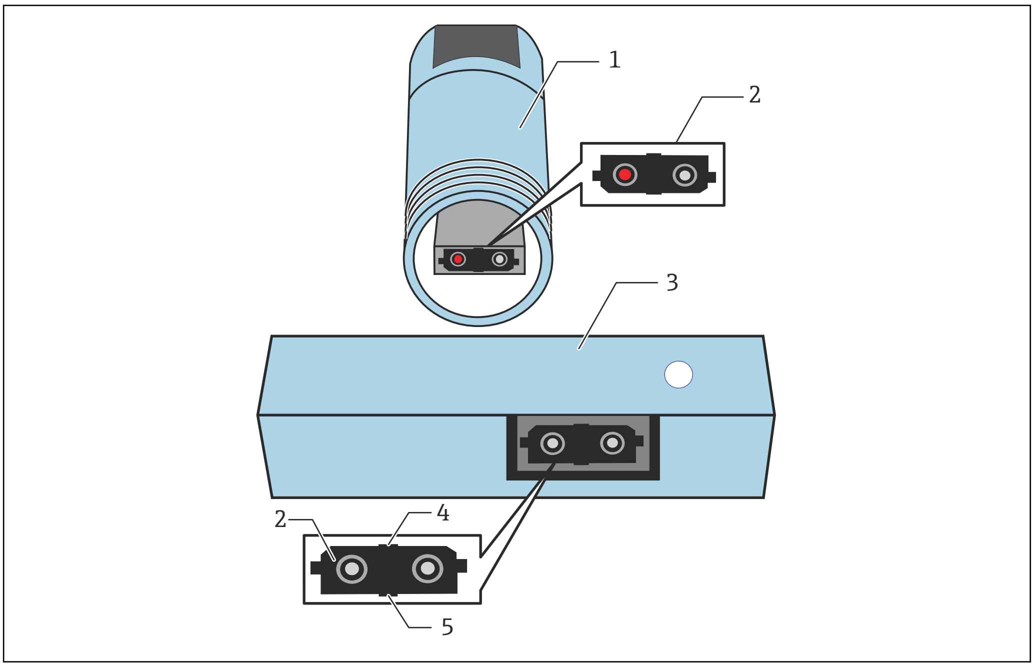
- When transporting the device to the measuring point, use the device's original packaging.
- Pay attention to the device's center of gravity to prevent unexpected tilting.
- Comply with the safety instructions, transport conditions for devices over 18 kg (39.6 lbs) (IEC61010).

5 Electrical connection

5.1 Wiring

Wiring HHT2 with TMD1:Because HHT2 operation and signals for setting are communicated by a dedicated fiber-optic, a dedicated connecting coupler are mounted on the sending and receiving entry of HHT2 and TMD1.

- HHT2 communication has two types of optical communication modules and connection couplers as follows: 1) 2-way, 2-wire, 2) 2-way, single wire.
- There is a specific direction for the coupler insertion port. Connect according to the TMD1's insertion port.
- When removing fiber-optic cable, hold the connector tip while removing the fiber-optic cable.
- Always cover the TMD1 HHT2 port to prevent light, except when communicating with HHT2.



3 *TMD1, HHT2 main unit, HHT2 optic communication coupler*

1	*TMD1 HHT2 port*
2	*Coupler insertion port*
3	*HTT2 main unit keypad side*
4	*Top*
5	*Bottom*

6 Operation

6.1 Introduction

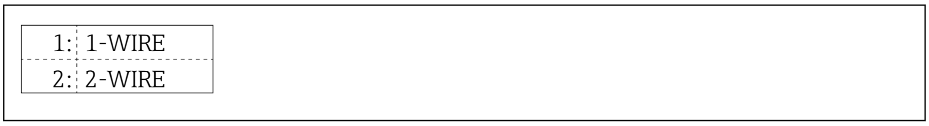
Check the connection environment between HHT2 and TMD1 before starting TMD1 operation and settings. Because the HHT2 is used for operation and settings of both the TMD1 and the servo level gauge TGM5, follow the instructions in this chapter and set the TMD1 appropriately.

6.2 Power ON

Connect TMD1 and HHT2 with a fiber-optic cable, then turn on HHT2. Confirm that TMD1 is operating. Once HHT2 is turned on, it immediately starts to access the CPU on the connected device. If TMD1 is not turned on, the subsequent message may not be displayed properly.

HHT2 setting procedure for type B (single/2-wire fiber-optic module compatible model)

1. Turn on the power.
2. Set the desired fiber cable from the following table.
   ↳ Select [2] for the 2-way 2-wire fiber-optic module used for TMD1.



1: 1-WIRE
2: 2-WIRE

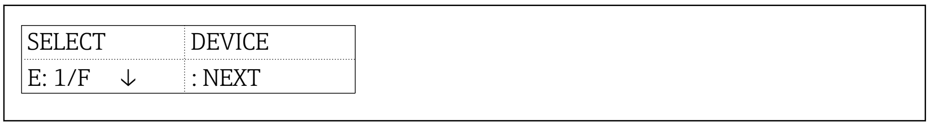
A0038096

This completes the setting procedure.

6.3 Device selection

Selecting procedure

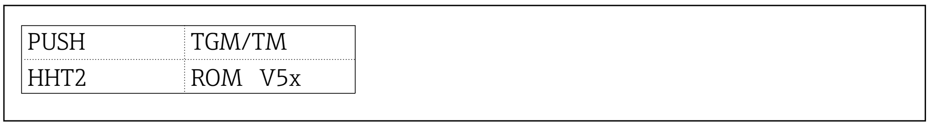
1. Turn on the power (after selecting [2] for type B).
   ↳ The first screen will display the following.



```
SELECT      DEVICE
E: 1/F  ↓   : NEXT
```

A0038097

2. Using the [↑] and [↓] keys, display the TGM/TM screen and press the [ENT] key.
   ↳ The lower display shows the ROM version installed in the HHT2.



```
PUSH        TGM/TM
HHT2        ROM   V5x
```

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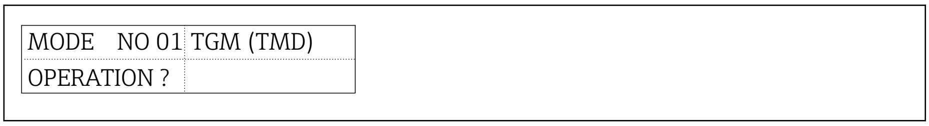
3. Press the MODE key and check that the following display is shown.
   ↳



```
MODE   NO 01 TGM (TMD)
OPERATION ?
```

A0038099

4. Using the [↑] and [↓] keys, select the desired MODE and press the [ENT] key.
   ↳ The initial ITEM in the MODE will be displayed.

This completes the selection procedure.

6.4 MODE00 Function display and setting change

In MODE00, the module type installed in TMD1 is displayed and function and setting changes can be performed. After selecting MODE00, select the following ITEM using the [↑] or [↓] keys and press ENT to confirm.

No.	Function	Description
01	Wiring type display/change	TMD1 wiring type data (maximum number of characters: 3)
02	Display of the board installed in slot 1	Name of the board installed in the main unit of TMD1
03	Display of the board installed in slot 2	Name of the board installed in the main unit of TMD1
04	Display of the board installed in slot 3	Name of the board installed in the main unit of TMD1
05	Display of the board installed in slot 4	Name of the board installed in the main unit of TMD1
06	Display of the board installed in slot 5	Name of the board installed in the main unit of TMD1
07	Display of the board installed in slot 6	Name of the board installed in the main unit of TMD1
08	TAG NAME display/change	Enter the tank number (maximum number of characters: 6).
12	Memo No.1	See Notes
13	Memo No.2	See Notes
14	Memo No.3	See Notes

No.	Function	Description
18	Measuring function display/ setting	20: NONE 2A: Level gauge operation 2 points 2B: Level gauge operation 2 points + external device operation 6 points 2C: External device operation 8 points
19	Temperature device measurement function selection	0: Single element average temperature 1: Multi-element average temperature 2: Spot temperature 4 points 3: Spot temperature 1 point
20	Temperature conversion method selection	Conversion method by Thermo-A 0: Pt100 1: JPt100 2: Cu ADC-1 conversion table method 3: Cu 4: Pt100 (70 to 350℃) 5: Pt100 (-50 to 200℃)
21	Display unit selection	0: mm & °C 1: Ft1/8 & °F 2: Ft1/16 & °F
22	NRF560 connection/selection	0: Disconnected 1: Connected In TMD1, it is HART output when both NRF560 connection and NMT53x connection are set to 0, and it is HART input if either one of them is set to 1.
23	NMT53x connection/selection	0: Disconnected 1: Connected In TMD1, it is HART output when both NRF560 connection and NMT53x connection are set to 0, and it is HART input if either one of them is set to 1.
24	Memory initialization	0: NONE 1: MAIN-CPU 2: MOTOR (not used) Contents to be initialized will vary depending on the access code. ▪ 74: Initialize only the error history ▪ 530: Use when an access code is required (initialization of error history, cumulative operation hours) ▪ 987: Full initialization (cumulative operation hours is also initialized)
25	Access code	Change the access authority to change the operation and function settings
27	Level selection	0: Innage 1: Ullage Upper limit stop and lower limit stop is reversed.
28	Selection of processing with a level of at least 90 mm	0: Change to 0 mm 1: Unchanged
29	Error history	DDD: Date (since TMD's power was turned on) MMMMM: Minutes and time are shown as date and minutes. EEEEE: Error code PP: History number from 0 to 99 Error is saved from 0 to 99, then overwriting starts from 0.

TMD1's program control flag

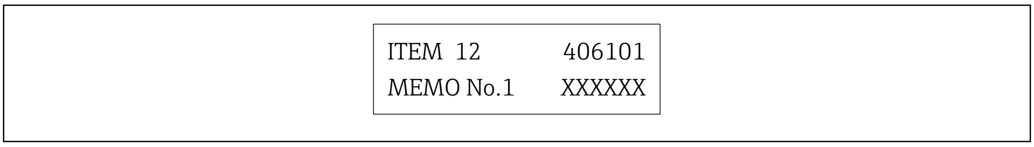
TMD1 writes predetermined data into the MEMO area of MODE00, ITEM:12, ITEM:13, ITEM:14 to control each program (this MEMO function is not used for memos). Example: If "123456" is displayed, "1" is the first digit and "6" is the sixth digit.

Memo No.1 (M00, I12)

Digit	Description	Default	Memo
1	4: Gauge status = LEVEL balance flag = Fixed to ON	4	Everything other than 4 is status = LEVEL, balance flag = OFF.
2	1: Written data from HART CMD#31 64,387 is output to DO port Other: No output to DO port	0	Written data from HART master is output to DO (port 1 to 4) (0x01 to 0x0f). If 1, it is prioritized over alarm output [Mode 6]. [1]
3	HART slave address setting (restart required)	6	Restart the device after setting the HART address. [2]
4	1: Temperature element exposure error is not processed (LCD error display prohibition processing) Other than 1: Temperature element exposure error is processed	1	
5	2: No V1 dummy pulse (new V1 only)	0	Default is 0 except for specific users. There is a dummy pulse if the default is other than 2.
6	0: External status input is the same NC contact point processing as that of TGM4000 1: External status input is NO contact point processing (the logic is the opposite of TGM4000) Other than above: There is no external status input	1	

[1] This function is only enabled in HART slave mode.

[2] This function is only enabled in HART slave mode.



ITEM 12 406101
MEMO No.1 XXXXXX

A0038470

4 *Memo No.1 screen display example*

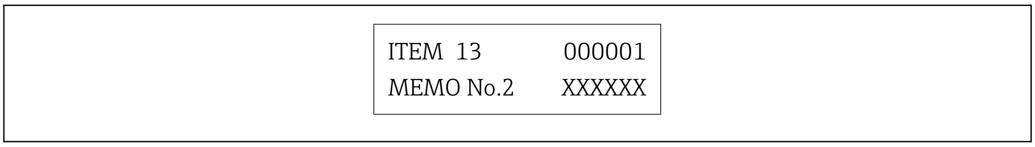
Memo No.2 (M00, I13)

Digit	Description	Default	Memo
1	"HART HART CMD#1, #3, #14, #15 transmission level unit selection 1: Ft 2: Inch Other: mm	0	If 1: Ft or 2: Inch is selected, the temperature unit will be converted to Deg_F. This only applies to HART CMD#1, #3, #14, #15. (This is not linked to the ([Mode0:Item21: Ft, Inch] setting) [1]
2	N/A	0	
3	N/A	0	
4	N/A	0	

Digit	Description	Default	Memo
5	N/A	0	
6	1: There is an NMT matrix scan	1	Enabled only in HART input. Setting other than 1: Does not scan other than the average liquid temperature and average gas temperature.

1) This function is only enabled in HART slave mode.

HART slave: Digital input is Port1 = TV, Port2 = QV fixed (compatible with CMD#3 only).



```
ITEM  13        000001
MEMO No.2       XXXXXX
```

A0038471

5 *Memo No.2 screen display example*

Memo No.3 (M00, I14)

Digit	Description	Applicable version no.
1	Reserved	
2	Reserved	
3	Reserved	
4	Reserved	
5	Reserved	
6	Reserved	

For details on the latest flag for program control, contact your nearest Endress+Hauser Japan office.

6.5 MODE01 Operation and display setting

In MODE01, the external device operation can be changed.

No.	Function	Description
06	External device ON/OFF operation External device operation output 1	External device operation output: 8 points (The number of points for operation output varies depending on TMD1 specifications.) CSR specification (C: Cancel, S: Set, R: Reset) ▪ If Cancel is selected, operation output will become invalid (there is no change in operation output status). ▪ If Set is selected, operation output will be ON (if N/O is used, contact will be ON). ▪ If Reset is selected, operation output will be OFF (if N/O is used, contact will be OFF).
07	External device ON/OFF operation External device operation output 2	Same as above
08	External device ON/OFF operation External device operation output 3	Same as above
09	External device ON/OFF operation External device operation output 4	Same as above
10	External device ON/OFF operation External device operation output 5	Same as above
11	External device ON/OFF operation External device operation output 6	Same as above
12	External device ON/OFF operation External device operation output 7	Same as above
13	External device ON/OFF operation External device operation output 8	Same as above
14	Switching the operation command source	If setting 0, perform external device operation output according to operation command from 2-way 2-wire. If setting 1, perform external device operation output using HHT connected to TMD.
15	Gauge operation	0: Liquid surface 1: Hoisting 2: Stop 3: Bottom 4: Operation cancellation 5: Density 6: Interface B: Table C: 10 mm down D: 10 mm up
16	LCD screen selection	0: Home screen 1: Address 2: V1 (2-wire transmission output details) 3: Displacer detection weight 4: Lifespan (calculation data based on the cumulative operation time) 5: Date 6: NMT communication status 7: NRF communication status 8: Inter-CPU communication status 9: Error history 10: ROM version 11: Temperature system

6.6 MODE02 Level and status

This mode is for displaying the before/after calibrated data in MODE03 and MODE04.

No.	Function	Description
11	Level data display	GLEVEL: Before correction NLEVEL: After correction
13	Error code display	Display TMD error code (refer to "7.23 List of error messages").
14	HART communication error rate display	NMT: 000.000 % NRF: 999.999 %

6.7 MODE03 Data setting operation for level

This mode is for setting the data setting operation for level.

No.	Function	Description
04	Level calibration	Set the level value when the current level has been determined based on measurements.

6.8 MODE05 Parallel output

When installing parallel output board OUT-3 or OUT-4, the following operations and settings are available.

No.	Function	Description
01	Output data and code display	LEVEL BCD: Level BCD code output LEVEL-SIC: Level SIC code output TEM-BCD: For temperature BCD code output terminal table, see electrical compartment internal wiring diagram.
04	Error code of level encoder read error	Set the code output when a level encoder error occurs while outputting level (BCD, SIC code). Example: Set level XXXX.X mm.
10	Select output code	0: SAKURA code 1: BCD code level 2: BIN code level 3: BCD code temperature

6.9 MODE06 Contact output (alarm)

This mode is only available when an Exp-A board is installed. Up to 4 alarm points are available to be output for standard specification.

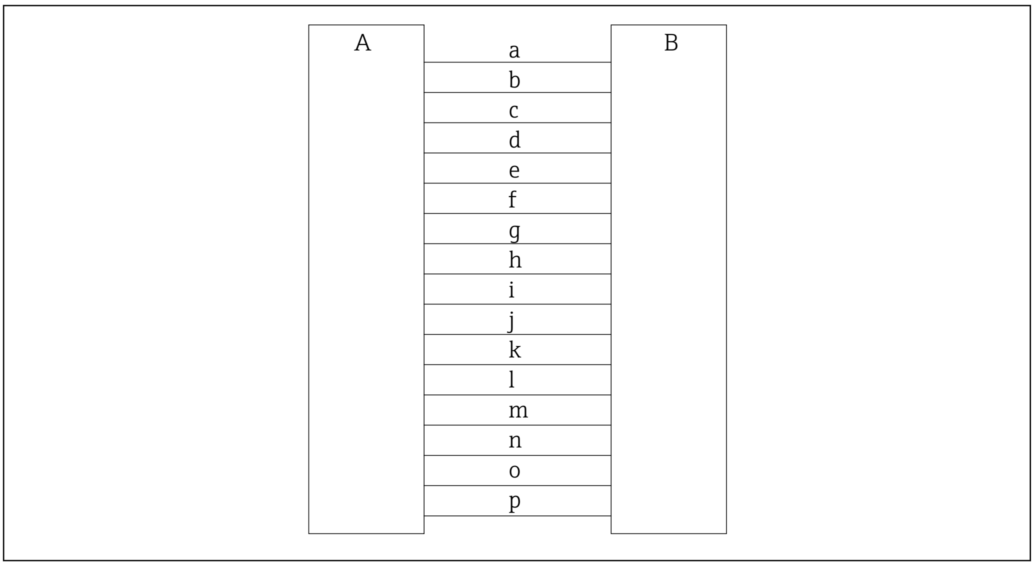
However, alarms can be set for up to 8 points depending on the application.

No.	Function	Description
01	Alarm 1	Specify LEVEL H, L, NON H: High alarm L: Low alarm NON: No output
02	Alarm 1	LEVEL setting value
03	Alarm 1	LEVEL hysteresis value
04	Alarm 1	Specify NO/NC contact

The pattern shown above is repeated up to Alarm 8.

No.	Function	Description
33	Alarm 1	Specify LEVEL H, L, NON H: High alarm L: Low alarm NON: No output
34	Alarm 1	TEMP setting value
35	Alarm 1	TEMP hysteresis value
36	Alarm 1	Specify NO/NC contact

The pattern shown above is repeated up to Alarm 8.



6 Alarm 1 to 8 output

A	*Alarm output board OUT-2*
B	*Terminal*
a	*Alarm 1*
b	*Alarm 1 Common*
c	*Alarm 2*
d	*Alarm 2 Common*
e	*Alarm 3*
f	*Alarm 3 Common*
g	*Alarm 4*
h	*Alarm 4 Common*
i	*Alarm 5*
j	*Alarm 5 Common*
k	*Alarm 6*
l	*Alarm 6 Common*
m	*Alarm 7*
n	*Alarm 7 Common*
o	*Alarm 8*
p	*Alarm 8 Common*

- Numbers of terminals and wires from the alarm output board to terminals vary depending on specifications. Refer to delivery specifications or wiring diagram for details.
- If level or temperature is specified in the same alarm (Alarm 1), the level shall be given priority.

6.10 MODE07 Spot temperature device 1 point input

Operation and setting of spot temperature device are only available when Thermo-A board is installed.

No.	Function	Description
01	Input temperature data	GTEMP: Measurement value display NTEMP: Measurement value ± Temperature correction value (This value will be reflected on the LCD display and external output data.)
02	Temperature correction value data setting	Display value added/subtracted to measurement value as "±"

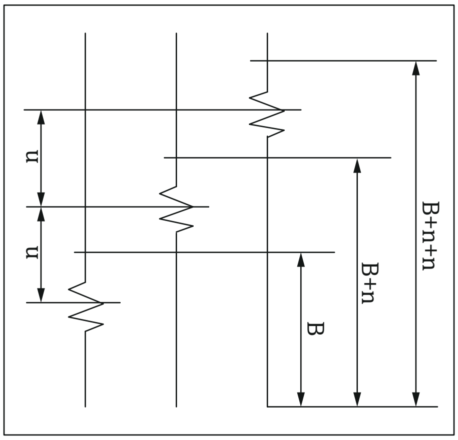
6.11 MODE08 Spot temperature device 3 points input

TMD1 can connect a spot temperature device to up to 3 points. As with a spot temperature device, the following operations and settings are only available when a Thermo-A board is installed.

No.	Function	Description
01	No.1 spot	GTP: Spot temperature device 1 measurement value NTP: Measurement value ± Temperature correction value
02	No.2 spot	GTP: Spot temperature device 2 measurement value NTP: Measurement value ± Temperature correction value
03	No.3 spot	GTP: Spot temperature device 3 measurement value NTP: Measurement value ± Temperature correction value
05	Number of connections	Number of connected spot temperature devices
06	Correction value setting for No.1 spot temperature device	Display value added/subtracted to measurement value as "±"
07	Correction value setting for No. 2 spot temperature device	
08	Correction value setting for No. 3 spot temperature device	
09	Correction value setting for No. 4 spot temperature device	
10	Direct selection	Select No.1 to No.4 spot temperature devices by direct mode. In direct mode, only the specified spot temperature device data will be updated. This function is useful for temperature line adjustment and calibration because the data update is fast. In free mode (specified 0), No.1 to No.4 will be updated in this order.

6.12 MODE09 Multi-element average temperature device input

TMD1 can connect an MRT (Multi Resistance Thermo) type average temperature device, configured by RCV series platinum resistor. Operation and setting are available only when temperature input board ADC-1 and average temperature switching board TSL-1A are installed. NMT53x is configured in FieldCare. This mode can be set by HHT2 with software ver. 5.8 or later.

No.	Function	Description
01	Display average temperature data	GTEMP: Temperature input board's direct reading value NTEMP: GTEMP ± ITEM: 05 Correction value
02	Set number of connected elements	The number of average temperature device elements in a switching interval is input (maximum 12 points).
03	Set bottom level value	For an average temperature device shown below
04	Switch interval	 A0038101 7 *Bottom level value* n: Element interval B: Bottom level value (The level at which the first point element is in liquid.) When "B" is set in ITEM03 and "n" is set in ITEM04 = level value, then Up to n + B < select point 1 Up to n + B ≤ level < n + n + B select point 2 If the level value exceeds the number of connected elements, select the setting connection element (number of elements set in ITEM02). Example: When setting three elements in ITEM02 Up to n + n + B ≤ select point 3 This setting is ignored for specifications with unequal switching intervals.
05	Set temperature correction	Set ± XXX.X °C temperature correction value in GTEMP value of ITEM01 (default: ±0.0).

6.13 MODE10 Single-element average temperature

Operation and setting are available only when temperature input board ADC-1 and average temperature switching board TSL-1B are installed.

- NMT53x is configured in FieldCare. This mode can be set by HHT2 with software ver. 5.8 or later.
- Both multi- and single-elements have several temperature resistors installed inside an average temperature device, but the average temperature calculation logic is different. If the elements are connected to an average temperature device with incorrect settings, they will fail to read the temperature correctly.

No.	Function	Description
01	Display average temperature data in liquid	GAVE: Measurement and calculation data NAVE: Measurement and calculation data ± Temperature correction value
02	No.1 element data	GTP: No. 1 element measurement value NTP: No. 1 element calculation value ± Temperature correction value
03	No.2 element data	GTP: No. 2 element measurement value NTP: No. 2 element calculation value ± Temperature correction value
04	No.3 element data	GTP: No. 3 element measurement value NTP: No. 3 element calculation value ± Temperature correction value
05	No.4 element data	GTP: No. 4 element measurement value NTP: No. 4 element calculation value ± Temperature correction value
06	No.5 element data	GTP: No. 5 element measurement value NTP: No. 5 element calculation value ± Temperature correction value
07	No.6 element data	GTP: No. 6 element measurement value NTP: No. 6 element calculation value ± Temperature correction value
08	No.7 element data	GTP: No. 7 element measurement value NTP:No. 7 element calculation value ± Temperature correction value
09	No.8 element data	GTP: No. 8 element measurement value NTP: No. 8 element calculation value ± Temperature correction value
10	No.9 element data	GTP: No. 9 element measurement value NTP: No. 9 element calculation value ± Temperature correction value
11	No.10 element data	GTP: No. 10 element measurement value NTP: No. 10 element calculation value ± Temperature correction value
12	No.11 element data	GTP: No. 11 element measurement value NTP: No. 11 element calculation value ± Temperature correction value
13	No.12 element data	GTP: No. 12 element measurement value NTP: No. 12 element calculation value ± Temperature correction value
14	Temperature correction value	Set value added/subtracted to each element as "±"
15	Number of elements	Inputs the maximum points of temperature resistors for temperature input (maximum 12 points).
16	Set bottom level	Same as MODE09, ITEM03 and 04.
17	Set switching interval level value	

No.	Function	Description
18	Direct selection	Select No.1 to No.12 elements by direct mode. ▪ In direct mode, only the specified spot temperature data will be updated. ▪ This function is useful for temperature line adjustment and calibration because the data update is fast. ▪ In free mode (specified 0), No.1 to No.12 will be updated in this order.
19	Display average temperature data in gas	GTP-A: Measurement and calculation data NTP-A: Measurement and calculation data ± Temperature correction value

6.14 MODE11 Analog 4 to 20 mA output (No.1)

TMD1 can output a maximum of two analog 4 to 20 mA data. Set and operate the first board in MODE11.

No.	Function	Description
01	Display output current	Display current, which is output as 0 to 100 % at this time.
02	Set level output	0: NON 1: Set as YES (set with "1" and "ENT")
03	Set level FULL data	Set level value at 100 % output
04	Set level ZERO	Set level value at 0 % output
05	Set temperature output	0: NON 1: Set as YES (set with "1" and "ENT") ℹ When selecting level output in ITEM02, the temperature output will be automatically canceled.
06	Set temperature FULL data	Set temperature value at 100 % output
07	Set temperature ZERO	Set temperature value at 0 % output
08	Specify temperature type	0: AVE (Average temperature device) 1: S1 (First spot point) 2: S2 (Second spot point) 3: S3 (Third spot point) 4: S4 (Fourth spot point) ℹ Specify 0: AVE for spot 1 point element specification.
09	Configure and adjust current output	0: INS (outputs the measurement value) 1: AJ-4 (4 mA output) 2: AJ-20 (20 mA output) Output 4 mA and 20 mA fixed values from 1 and 2.
10	Set output value in case of failure	▪ Over-tension ▪ Under-tension ▪ Level A/D ▪ Level flow Set current that is output whenever above errors occur (allowable setting value: 0.00 to 20.00 mA) Default: 20.00 mA

6.15 Analog 4 to 20 mA output (No.2)

It is possible to set analog 4 to 20 mA output and the second output operation. As with No. 1 output, this requires a board to be installed.

No.	Function	Description
01	Display output current	Display current, which is output as 0 to 100 % at this time.
02	Set level output	0: NON 1: Set as YES (set with "1" and "ENT")
03	Set level FULL data	Set level value at 100 % output
04	Set level ZERO	Set level value at 0 % output
05	Set temperature output	0: NON 1: Set as YES (set with "1" and "ENT") ℹ When selecting level output in ITEM02, the temperature output will be automatically canceled.
06	Set temperature FULL data	Set temperature value at 100 % output
07	Set temperature ZERO	Set temperature value at 0 % output
08	Specify temperature type	0: AVE (Average temperature device) 1: S1 (First spot point) 2: S2 (Second spot point) 3: S3 (Third spot point) 4: S4 (Fourth spot point) ℹ Specify 0: AVE for spot 1 point element specification.
09	Configure and adjust current output	0: INS (outputs the measurement value) 1: AJ-4 (4 mA output) 2: AJ-20 (20 mA output) Output 4 mA and 20 mA fixed values from 1 and 2.
10	Set output value in case of failure	▪ Over-tension ▪ Under-tension ▪ Level A/D ▪ Level flow Set current that is output whenever above errors occur (allowable setting value: 0.00 to 20.00 mA) Default: 20.00 mA

6.16 MODE13 2-wire transmission output

No.	Function	Description
01	Set select code	Set the read address for reading out from a receiver. The setting value must be matched to the receiver's setting value. In DX type communication mode (1-way 2-wire), there is no need to set the read address.
04	Select data line resistance	Set 16 types of line resistance from 0 to F. At 0 to 300 Ω, 20 Ω steps between 0 to F
06	Maximum alarm value data setting for 2-wire transmission	Set upper limit alarm value corresponding to upper limit alarm bit in 2-way transmission data.
07	Minimum alarm value data setting for 2-wire transmission	Set lower limit alarm value corresponding to lower limit alarm bit in 2-way transmission data.
18	Select output code	Select 2-way transmission output (level in case of error) 0: Outputs code for each error (Item 21, 22) 1: Conventional level-only output
21	Output level value setting for level encoder (counter) error	Set level value output when a level encoder (counter) error occurs. Set level XXXXX.X mm.

No.	Function	Description
26	Select communication mode	02: BBB 04: MDP 08: V1
27	Hysteresis setting for level alarm	0 to 99 999 mm
28	Level alarm output method selection	0: HL 1: LH 2: HH 3: LL Select from above. Match with a receiver display.

6.17 MODE14 Analog 4 to 20 mA input

No.	Function	Description
01	% display of the input value	GINPUT: Displays the % of the input value NINPUT: (input value x SPAN correction value) ± zero correction value
02	Zero correction value	Sets value as ± %
03	SPAN correction value	Sets value as ± %

6.18 MODE15 FFi transmission output

No.	Function	Description
01	Set FFi communication address	Set FFi communication address 00 to 07.
04	Set FFi level transmission range	0: FFi level transmission method (± 32 767 mm) 1: SAKURA level transmission method (0 to 65 535 mm)

6.19 MODE21 MIF-4 data setting

No.	Function	Description
01	Display MIF-4 error	0: Code error
02	Set absolute counter	In the case of 12345 890 1: 4-digit delay 2: 4-digit advance 3: 3-digit delay 4: 3-digit advance 5: Second digit Translation example In the case of "12345", adopt the delay for each digit "135" In the case of "12344", adopt the advance for each digit "244" (The sample shown above will be different from actual data.) 890 is the lower-level encoder value.
03	Set current black-and-white pattern threshold	Sets the threshold to sort the current white pattern and black pattern (0 - 255). When changing threshold, error history is cleared. However the same value is ignored. The threshold is automatically changed.
04	Set current white pattern measurement	The measurement is shown in the range of 0 to 255.
05	Set current black pattern measurement	The measurement is shown in the range of 0 to 255.

No.	Function	Description
06	Set black-and-white pattern threshold of initial value	This data compares initial threshold against current threshold.
07	Set white pattern of initial value	This data compares initial value to current value.
08	Set black pattern of initial value	This data compares initial value to current value.
09	Threshold buffer address	This is a storage address for thresholds starting from 0xF800. The address advances by +4 each time the threshold is updated.
10	Software version MIF-4	It signifies X X X X → X X. X X.
11	Software version Main - CPU	It signifies X X X X → X X. X X.
12	Set history number	Number for selecting the history data of ITEM: 13 (0 - 1 0 2 3)
13	History data	History data for the number that was set in ITEM: 12

6.20 MODE30 NMT: V0 (temperature value) setting

No.	Function	Description
01	Average liquid temperature	Average value of element temperature in liquid Calculation is not possible: All elements are open in liquid; however, if all elements are exposed, the gas temperature will be displayed. Applicable devices: 183, 184, 186
02	Average gas temperature	When it is not possible to calculate the average airborne element temperature: All elements in the air are open, etc.
03	Liquid level	Liquid level in tank (no water gauge)
08	Element zero temperature	Precision resistance temperature conversion value of 100 Ω
09		
10	Element 17 temperature	Precision resistance temperature conversion value of 100 Ω

Device types

183: NMT535, 536, 538

184: NMT539 temperature device

185: NMT539 water gauge device

186: NMT539 temperature device + water gauge device

6.21 MODE31 NMT: V1 (element temperature) setting

No.	Function	Description
01	Element No.1 temperature	Temperature conversion value of element No.1 to No.10 connected to NMT When an element opens or shorts, it becomes 358 °C. Applicable devices: 183, 184, 186 (see MODE30 device types)
02	Element No.2 temperature	Same as above
03	Element No.3 temperature	Same as above
04	Element No.4 temperature	Same as above
05	Element No.5 temperature	Same as above
06	Element No.6 temperature	Same as above
07	Element No.7 temperature	Same as above

No.	Function	Description
08	Element No.8 temperature	Same as above
09	Element No.9 temperature	Same as above
10	Element No.10 temperature	Same as above

6.22 MODE32 NMT: V2 (element temperature) setting

No.	Function	Description
01	Element No.11 temperature	Temperature conversion value of element No.11 to No.16 connected to NMT When an element opens or shorts, it becomes 358 ℃. Applicable devices: 183, 184, 186 (see MODE30 device types)
02	Element No.12 temperature	Same as above
03	Element No.13 temperature	Same as above
04	Element No.14 temperature	Same as above
05	Element No.15 temperature	Same as above
06	Element No.16 temperature	Same as above
07	Select averaging method	0: Standard - Divides the total value of each element temperature by the number of elements. (T1 + T2 + T3) / 3 1: Advanced - Divides the total value, which was derived by multiplying each element temperature with their corresponding volume factors, by only the volume factor. (T1 x V1 + T2 x V2 + T3 x V3) / (V1 + V2 + V3) Applicable devices: 184, 186 (see MODE30 device types)
08	Select element configuration	0: Spot (single element configuration) 1: Multi (multiple element configuration) Applicable devices: 184, 186 (see MODE30 device types)
09	Element temperature lower limit	This is used for reference value of element temperature lower limit. Applicable devices: 184, 186 (see MODE30 device types)
10	Element temperature upper limit	This is used for reference value of element temperature upper limit. Applicable devices: 184, 186 (see MODE30 device types)

6.23 MODE33 NMT: V3 (element position) setting

No.	Function	Description
01	Element No.1 temperature	Each element distance from tank bottom Automatically calculated value for equal spacing and manually entered value for irregular spacing Applicable devices: 183, 184, 186 (see MODE30 device types)
02	Element No.2 temperature	Same as above
03	Element No.3 temperature	Same as above
04	Element No.4 temperature	Same as above
05	Element No.5 temperature	Same as above
06	Element No.6 temperature	Same as above
07	Element No.7 temperature	Same as above
08	Element No.8 temperature	Same as above
09	Element No.9 temperature	Same as above
10	Element No.10 temperature	Same as above

6.24 MODE34 NMT: V4 (element position) setting

No.	Function	Description
01	Element No.11 temperature	Each element distance from tank bottom Automatically calculated value for equal spacing and manually entered value for irregular spacing Applicable devices: 184, 186 (see MODE30 device types)
02	Element No.12 temperature	Same as above
03	Element No.13 temperature	Same as above
04	Element No.14 temperature	Same as above
05	Element No.15 temperature	Same as above
06	Element No.16 temperature	Same as above
07	Element switching point hysteresis	When liquid level rises, add the element switching point only to this value and subtract the element switching point when the liquid level decreases in order to limit the element switches caused by waves, etc. Applicable devices: 184, 186 (see MODE30 device types)
08	Memory initialization	1: Memory initialization start Applicable devices: 184, 185, 186 (see MODE30 device types)
09	Gas offset	When the element in the air is above the gas offset from liquid level, this gas offset is used for average calculation of gas temperature. Applicable devices: 184, 186 (see MODE30 device types)
10	Liquid offset	When the element in the liquid is below the liquid offset from liquid level, this liquid offset is used for average calculation of liquid temperature. Applicable devices: 183, 184, 186 (see MODE30 device types)

6.25 MODE35 NMT: V5 (water scale temperature) setting

No.	Function	Description
01	Water gauge	Liquid level calculated based on frequency value Water gauge = (Measurement frequency - Frequency of an oil-filled tank) / Probe coefficient Span + Water gauge offset Applicable devices: 185, 186 (see MODE30 device types)
02	Capacitance	Capacitance calculated based on frequency Applicable devices: 185, 186 (see MODE30 device types)
03	Measurement frequency	Output frequency of capacitance meter 1 000 mm: 10 to 1 000 pF: 1 200 to 4 500 Hz 2 000 mm: 10 to 2 200 pF: 1 200 to 4 500 Hz 3 000 mm: 10 to 3 000 pF: 1 200 to 4 500 Hz are set. Applicable devices: 185, 186 (see MODE30 device types)
04	Element number (for volume factor average temperature calculation)	Select element number for creating calculation table of volume factor average temperature Set the value of element number - 1. Applicable devices: 184, 186 (see MODE30 device types)
05	Element position (for volume factor average temperature calculation)	Element position for creating calculation table of volume factor average temperature This is the element position that was specified in Item 4. Applicable devices: 185, 186 (see MODE30 device types)
06	Element volume (for volume factor average temperature calculation)	Element volume for creating calculation table of volume factor average temperature This is the element volume that was specified in Item 4. Applicable devices: 185, 186 (see MODE30 device types)

No.	Function	Description
08	Water gauge probe selection	Select the length of capacitance probe 0: 1 000 mm 1: 2 000 mm 2: 3 000 mm Applicable devices: 185, 186 (see MODE30 device types)
09	Water gauge offset value (correction value)	This value is used for the following formula to determine the water gauge. Water gauge = (Measurement frequency - Frequency of an oil-filled tank) / Probe coefficient Span + Water gauge offset Applicable devices: 186 (see MODE30 device types)
10	Water scale span value (correction value)	This value is used for the following formula to determine the water gauge. Water gauge = (Measurement frequency - Frequency of an oil-filled tank) / Probe coefficient Span + Water gauge offset Default: 1.0 Applicable devices: 185, 186 (see MODE30 device types)

6.26 MODE36 NMT: V6 (water scale and power supply) adjustment

No.	Function	Description
01	Frequency of an oil-filled tank	Measure the lower frequency and input the value to find the probe coefficient when the probe is submerged in oil only. Applicable devices: 185, 186 (see MODE30 device types)
02	Frequency of a water-filled tank	Measure the higher frequency and input the value to find the probe coefficient when water has accumulated at some level. Applicable devices: 185, 186 (see MODE30 device types)
03	Probe length	Measure and input water level from the bottom of the probe in Item 2 to determine the probe coefficient. Applicable devices: 185, 186 (see MODE30 device types)
04	Probe coefficient	Probe coefficient expressed as the frequency volume per 1 mm can be determined by calculating (Frequency of a water-filled tank - Frequency of an oil-filled tank) / (Probe length). This can be determined through Hz/mm calculation. Applicable devices: 185, 186 (see MODE30 device types)
08	Temperature common line voltage	0 to 3 V: Displayed as a count value between 0 to 255. It becomes approx. 0 V whenever each element line shorts. When a common line shorts, approx. 0 V will be displayed continuously. Applicable devices: 184, 186 (see MODE30 device types)
09	Output current adjustment	Current has been adjusted to 5 mA: approx. 16000 or 12 mA: approx. 45000 prior to shipping.Change this value if adjustment is required. Applicable devices: 184, 185, 186 (see MODE30 device types)
10	Reference voltage of power supply voltage reduction	At initial value 94, an alarm for power supply voltage reduction will be activated if the power supply voltage drops to 16 V or less. Change this value if adjustment is required. Applicable devices: 184, 185, 186 (see MODE30 device types)

6.27 MODE37 NMT: V7 (temperature adjustment) setting

No.	Function	Description
01	Specify element number (for temperature adjustment)	Specify the element number for temperature adjustment. 0 to 15: Elements 1 to 16 Applicable devices: 183, 184, 186 (see MODE30 device types)
02	Zero-adjustment for element temperature	Perform zero-adjustment for the specified element. Wait for the adjustment value for each element. Applicable devices: 183, 184, 186 (see MODE30 device types)
03	Element temperature span adjustment	Multiply all elements by this setting value. Element temperature = Measurement element temperature *Span + Zero adjustment of each element Applicable devices: 183, 184, 186 (see MODE30 device types)
04	Element temperature	Temperature for specified element This is used as element temperature for liquid average temperature or gas average temperature calculations. Applicable devices: 183, 184, 186 (see MODE30 device types)
05	Element position	Element position for specified element Element position for unequal interval can be adjusted using this function. Applicable devices: 183, 184, 186 (see MODE30 device types)
06	Element resistance value	Element resistance value for specified element Resistance zero correction is added to each measurement resistance. Applicable devices: 184, 186 (see MODE30 device types)
07	Element resistance zero offset	Element resistance zero correction for specified element Applicable devices: 184, 186 (see MODE30 device types)
08	Select element resistance type	0: Pt100 0 °C or higher R= -0.580195e-04 * T * T + 0.390802 * T + 100 0 °C or lower R = -4.2735e-10 * T4 + 4.2735e-8* T3 -0.58019e-4*T2 + 3.90802e-1*Tn_1 + 100 1: Cu90 R=0.3809*T + 90.4778 2: Cu100 R = 0.38826*T + 90.2935 3: PtCu100 R = 3.3367e-7*T3 - 2.25225e-5*T2 + 0.38416*T+100.17 Select one from the number above. Applicable devices: 184, 186 (see MODE30 device types)
09	Average number of resistance sampling value	Average number of sampling resistance value Sampling conditions: Element selection cycle - approx. 2 seconds/ element 21 sampling maximum element number Number of elements: 16, internal reference resistance: 5 Applicable devices: 184, 186 (see MODE30 device types)
10	Access code	530: Writable Applicable devices: 184, 185, 186 (see MODE30 device types)

6.28 MODE38 NMT: V8 (device) setting

No.	Function	Description
01	Error information	0: No error 1: Common line open 2: 3: No. 1 element open 4: No. 1 element short 5: No. 2 element open 6: No. 2 element short 7: No. 3 element open 8: No. 3 element short 9: No. 4 element open 10: No. 4 element short 11: No. 5 element open 12: No. 5 element short 13: No. 6 element open 14: No. 6 element short 15: No. 7 element open 16: No. 7 element short 17: No. 8 element open 18: No. 8 element short 19: No. 9 element open 20: No. 9 element short 21: No. 10 element open 22: No. 10 element short 23: No. 0 element over range 24: Memory failure: ROM 25: No. 11 element open 26: No. 11 element short 27: No. 12 element open 28: No. 12 element short 29: Element exposure 30: 31: 32: Reduced power supply 33: No. 13 element open 34: No. 13 element short 35: No. 14 element open 36: No. 14 element short 37: No. 15 element open 38: No. 15 element short 39: No. 16 element open 40: No. 16 element short 41: Memory failure: ROM 42: Memory failure: EEROM 43: W.B: Disconnected 44: W.B: Short circuit Applicable devices: 183, 184, 185, 186 (see MODE30 device types)
02	Temperature unit	Select from 32: C, 33: F, 35: K
03	Number of elements	Set number of measurement lines (in case of multi-element) or number of elements (in case of single element). Applicable devices: 183, 184, 186 (see MODE30 device types)
04	Number of preambles (for HART communication)	Set number of preambles to be used in HART communication. Applicable devices: 183, 184, 185, 186 (see MODE30 device types)
05	Level unit	Select from 44: Ft, 45: m, 47: inch, 48: cm, 49: mm Applicable devices: 183, 184, 185, 186 (see MODE30 device types)
06	Select element interval	0: Equal interval 1: Unequal interval Select from above Applicable devices: 184, 186 (see MODE30 device types)
07	Set bottom level	The position from the bottom of the tank to the lowest position element Applicable devices: 183, 184, 186 (see MODE30 device types)

No.	Function	Description
08	Element interval	Element interval in equal element intervals Applicable devices: 183, 184, 186 (see MODE30 device types)
09	Output data in element shorts	For multi-element, when the selected element shorts, this data is output. For single element, the data is calculated with the remaining elements because the shorted element is not included in the average calculation. Example: Element temperature: average calculation of T1, T2, T3 = T1, T2, T3 / 3 Element temperature: average calculation of T1, T2 (short), T3 = T1, T3 / 2 (T2 is not included in this calculation.) Applicable devices: 184, 186 (see MODE30 device types)
10	Output data in element opens	For multi-element, when the selected element opens, this data is output. For single element, the data is calculated with the remaining elements because the opened element is not included in the average calculation. Example: Element temperature: average calculation of T1, T2, T3 = T1, T2, T3 / 3 Element temperature: average calculation of T1, T2 (open), T3 = T1, T3 / 2 (T2 is not included in this calculation.) Applicable devices: 184, 186 (see MODE30 device types)

6.29 MODE39 NMT: V9 (device) setting

No.	Function	Description
01	Device ID (for HART communication)	When connecting to multi drop, this function is used to distinguish the same device type. When changing the data, a communication error may occur due to an address mismatch. Restart is required. Applicable devices: 183, 184, 185, 186 (see No. 10 below)
02	Error history	Refer to MODE: 38, ITEM: 01 for error descriptions Applicable devices: 183, 184, 185, 186 (see No. 10 below)
03	Select error display when element shorts and opens	0: OFF, 1: ON 1: When ON is selected, data from Mode 38, Item 9, 10 are output 358 ℃ when 0: OFF Applicable devices: 183, 184, 186 (see No. 10 below)
04	Write-protect (bonded)	0: OFF, 1: ON 1: All data is protected from writing when ON is selected Applicable devices: 183, 184, 186 (see No. 10 below)
05	Polling address (for HART communication)	Short address for HART communication Applicable devices: 183, 184, 185, 186 (see No. 10 below)
06	Manufacture ID (for HART communication)	17: Code for Endress+Hauser Applicable devices: 184, 186 (see No. 10 below)
07	Software version	Display software version Applicable devices: 183, 184, 185, 186 (see No. 10 below)
08	Hardware version	Display hardware version 10: Ver.1.0 Applicable devices: 183, 184, 185, 186 (see No. 10 below)
09	Hardware version	0: OFF 1: ON 1: Element exposure error code is output when it is ON
10	Device types	183: NMT535, 536, 538 184: NMT539 temperature device 185: NMT539 water gauge device 186: NMT539 temperature device + water gauge device Applicable devices: 183, 184, 185, 186

7 Diagnostics and troubleshooting

7.1 General troubleshooting

7.1.1 List of error messages

Error code	Display	Item	Error descriptions	Cause
1	0000 0000 0000 0001	HART communication	NMT communication	No response
2	0000 0000 0000 0010		NMT device	Error code
4	0000 0000 0000 0100		NRF COMM	
8	0000 0000 0000 1000		NRF DEVICE	
256	0000 0001 0000 0000	EEROM	EEROM	Inaccessible
8192	0010 0000 0000 0000		SRAM	
512	0000 0010 0000 0000	System	External 12V	Disconnection
1024	0000 0100 0000 0000		Internal 12V	Disconnection
2048	0000 1000 0000 0000		MIF-4	No response, etc.
4096	0001 0000 0000 0000	Temperature system	Element abnormality	Open, short

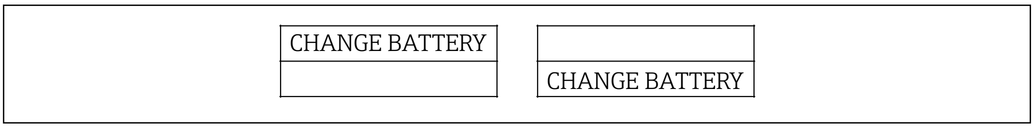
7.2 Repair and update

If HHT2 stops working for reasons other than low battery or faulty wiring (coupler) of the connection cable with TMD1, contact your nearest Endress+ Hauser Service Department immediately for repair service.

7.3 Battery replacement

Replace the batteries with new ones in a non-hazardous area and confirm that the LCD is flashing on power ON/OFF.

Battery: AA alkaline battery (RL6), 4 batteries

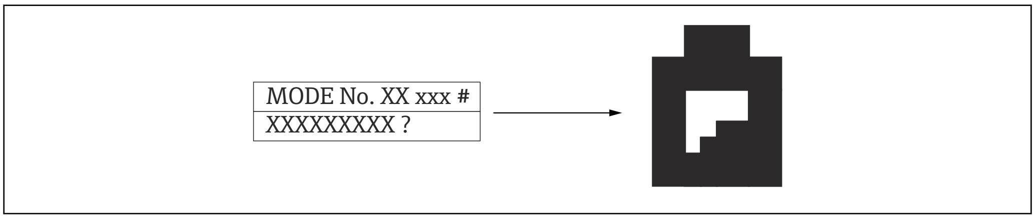


A0038465

Replacement timing

It is time to replace the batteries if it flashes 5 times when HHT2 is turned on or MODE key.is pressed.

If the display above appears, replace the batteries as soon as possible. Until the batteries are replaced after the display above has appeared, a low battery mark will be displayed in the 16th digit of the first line on the MODE screen.

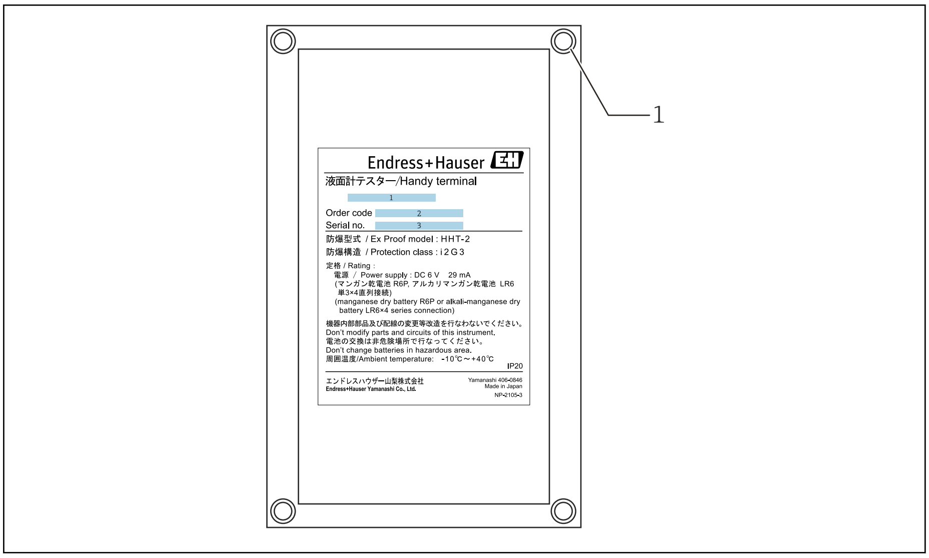

MODE No. XX xxx #
XXXXXXXXX ?

A0038466

8 *Battery mark*

Replacement procedure

1. Remove the screws (4 pcs.) and HHT2 rear cover.
   ↳

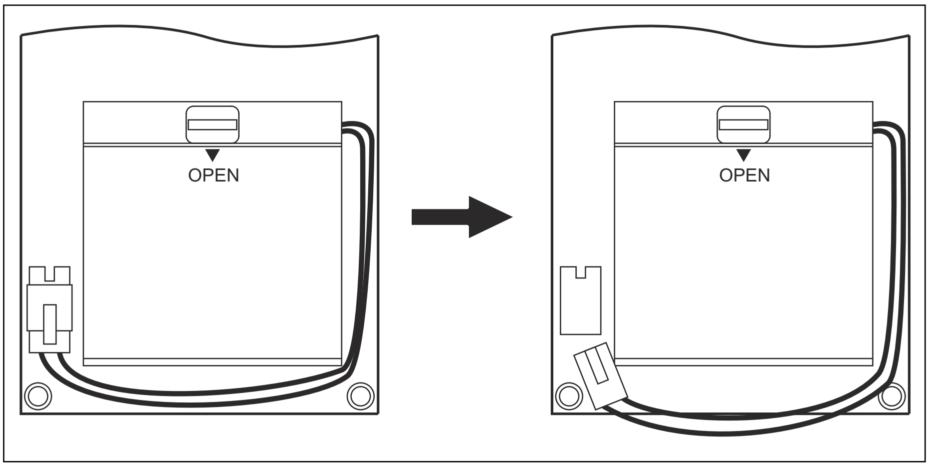

1
Endress+Hauser
液面計テスター/Handy terminal
1
Order code
2
Serial no.
3
防爆型式 / Ex Proof model : HHT-2
防爆構造 / Protection class : i 2 G 3
定格 / Rating :
電源 / Power supply : DC 6 V 29 mA
(マンガン乾電池 R6P, アルカリマンガン乾電池 LR6 単3×4直列接続)
(manganese dry battery R6P or alkali-manganese dry battery LR6×4 series connection)
機器内部部品及び配線の変更等改造を行なわないでください。
Don't modify parts and circuits of this instrument.
電池の交換は非危険場所で行なってください。
Don't change batteries in hazardous area.
周囲温度/Ambient temperature: -10℃～+40℃
IP20
エンドレスハウザー山梨株式会社
Endress+Hauser Yamanashi Co., Ltd.
Yamanashi 406-0846
Made in Japan
NP-2105-3

A0056923

9 *HHT2 rear cover*

1 *Screws (4 pcs)*

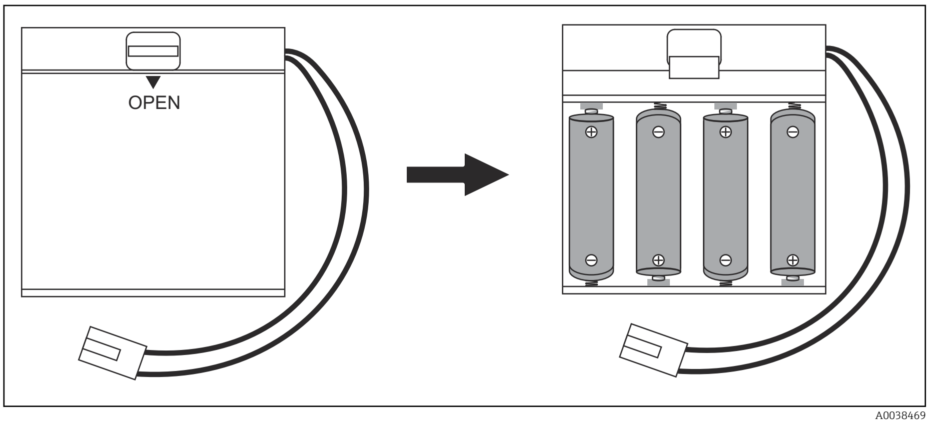
2. Pull the connector on the printed circuit from the battery case.
   ↳ Slide the upper tab upwards, then pull the tab.



A0038468

10 *Battery replacement 1*

3. Remove the battery case, then push "OPEN" on the battery cover and slide the cover in the direction of the arrow to open it.
   ↳



11 *Battery replacement 2*

4. Replace the batteries with new ones. Be sure to set the batteries in the correct + and - directions.
5. Replace the battery cover, then insert the connector in the printed circuit J4, and install the batteries in HHT2 with the battery case sponge side facing down.
6. Protect the conductor from being pinched and replace the rear cover with four screws.

This completes the replacement procedure.

7.4 Firmware history

Date	Software version	Changes	Documentation (TMD1)	
			Operating Instructions	Technical Information
11.2008	V5.5	Original software	BA1047N	TI024N
01.2010	V5.8	Corresponding to NMT	BA00429G	TI024N

8 Repair

8.1 General information on repairs

HHT2 (hand held terminal) cannot be repaired because it does not contain any replaceable parts. Replace the entire set if the device breaks.

8.2 Endress+Hauser services

Endress+Hauser offers a wide range of services.

ℹ Your Endress+Hauser Sales Center can provide detailed information on the services.

8.3 Return

The requirements for safe device return can vary depending on the device type and national legislation.

1. Refer to the web page for information:
   http://www.endress.com/support/return-material
   ↳ Select the region.
2. Return the device if repairs or a factory calibration are required, or if the wrong device was ordered or delivered.

8.4 Disposal

Observe the following notes during disposal:
- Observe valid federal/national regulations.
- Ensure proper separation and reuse of the device components.

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