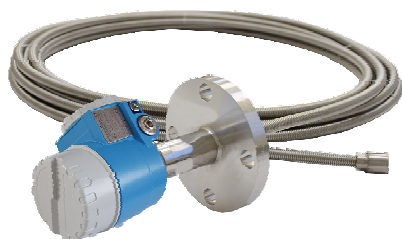


# Technical Information

## Prothermo NMT532

Intrinsically safe multi-signal converter with precision average temperature sensor for inventory control



### Application

Prothermo NMT532 consists of an intelligent local HART signal converter and average temperature sensor.

For average temperature measurement, it consists of precision multi-spot Pt100 (Max.6) elements which have fixed interval (2 m (6.57 ft) or 3 m (9.84 ft)).

NMT532 is a highly capable solution for a variety of tank gauging applications and provides constant average temperature data via local HART communication.

For customs bonding applications, it can provide accurate inventory management when used in conjunction with a tank gauge liquid surface meter such as Endress +Hauser's Proservo, Tank Side Monitor, or Micropilot radar.

### Features

- High accuracy
- Intrinsically safe device allowing for the safest electrical configuration possible
- Compatible with FieldCare
- Simple and economical
- Compact size and weight
- High-reliability and easy installation
- Maintenance free

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## About this document

### Symbol

#### Safety symbols

| Symbol                                                                            | Meaning                                                                                                                                                                            |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <b>DANGER!</b><br>This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury, as well as a risk of fire or explosion. |
|  | <b>WARNING!</b><br>This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in a risk of serious or fatal injury, fire or explosion.           |
|  | <b>Note</b><br>This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in a risk of minor or moderate injury and damages to properties.       |
|  | <b>NOTE!</b><br>This symbol contains information on procedures and other facts that do not result in personal injury.                                                              |

#### Electrical symbols

| Symbol                                                                              | Meaning                                                                                                                                                                                                     |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    | Direct current                                                                                                                                                                                              |
|   | Alternating current                                                                                                                                                                                         |
|  | Direct current and alternating current                                                                                                                                                                      |
|  | <b>Ground connection</b><br>A grounded terminal that, as far as the operator is concerned, is grounded via a grounding system.                                                                              |
|  | <b>Protective ground connection</b><br>A terminal that must be connected to the ground prior to establishing any other connections.                                                                         |
|  | <b>Equipotential connection</b><br>This connects with the grounding system at the plant. It includes equipotential line and single point ground systems, depending on the norms of each country or company. |

#### Tool symbols

| Symbol                                                                                          | Meaning                |
|-------------------------------------------------------------------------------------------------|------------------------|
| <br>A0013442 | Torx screwdriver       |
| <br>A0011220 | Flat blade screwdriver |
| <br>A0011219 | Phillips screwdriver   |
| <br>A0011221 | Allen key              |
| <br>A0011222 | Open-ended wrench      |

### Symbols for certain types of information

| Symbol                                                                              | Meaning                                                                 |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
|    | <b>Permitted</b><br>Procedures, processes or actions that are permitted |
|    | <b>Preferred</b><br>Procedures, processes or actions that are preferred |
|    | <b>Forbidden</b><br>Procedures, processes or actions that are forbidden |
|    | <b>Tip</b><br>Indicates additional information                          |
|    | Reference to documentation                                              |
|    | Reference to page                                                       |
|    | Reference to graphic                                                    |
|    | Notice or individual step to be observed                                |
|    | Series of steps                                                         |
|    | Result of an operation or commissioning                                 |
|    | Help in the event of a problem                                          |
|  | Visual inspection                                                       |
|  | Operation via the local display                                         |
|  | Operation via operating tool                                            |
|  | Write-protected parameter                                               |

### Symbols in graphics

| Symbol                                                                              | Meaning                                                                   |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| 1, 2, 3 ...                                                                         | Item numbers                                                              |
|  | Series of steps                                                           |
| A, B, C, ...                                                                        | Graphics                                                                  |
| A-A, B-B, C-C, ...                                                                  | Cross-sections                                                            |
|  | <b>Hazardous area</b><br>Indicates the hazardous area                     |
|  | <b>Safe area (non-hazardous area)</b><br>Indicates the non-hazardous area |

### Device symbol

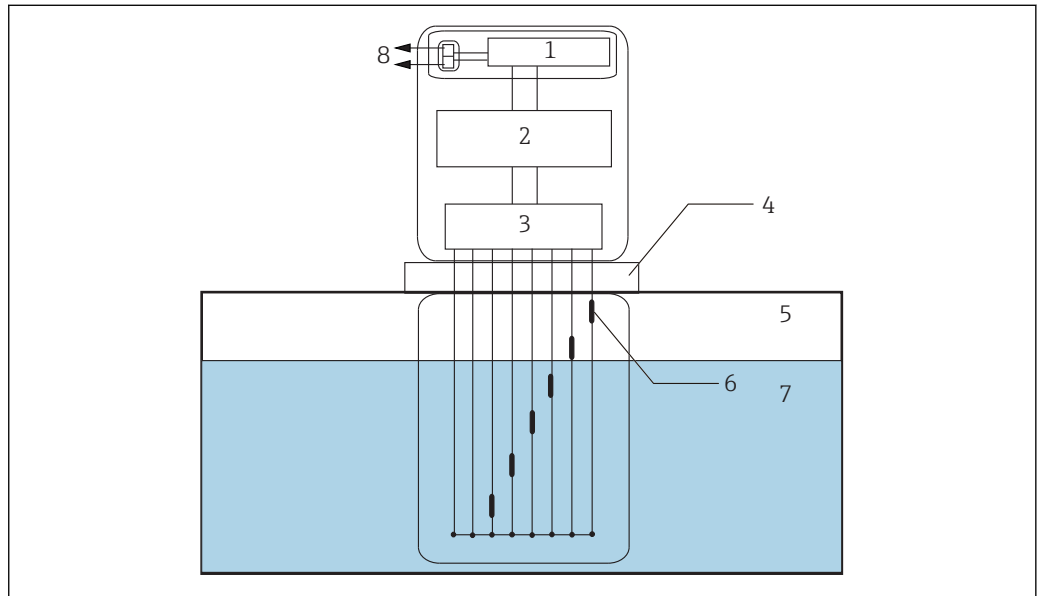
| Symbol                                                                              | Meaning                                                                                                                                       |
|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
|  | <b>Safety instructions</b><br>Observe the safety instructions contained in the associated Operating Instructions.                             |
|  | <b>Temperature resistance of the connection cables</b><br>Specifies the minimum value of the temperature resistance of the connection cables. |

## Function and system design

### Measuring system

The NMT532 is compact and economical. The average temperature sensor consists of six Pt100 elements which have fixed interval of 2 m (6.57 ft) or 3 m (9.84 ft)) from the next sensor. Temperature data is transmitted to the NRF560, NRF81, NMS5, NMS8x, or NMR81x via an intrinsically safe (i.s.) 2-wire local HART signal.

### Operation principle



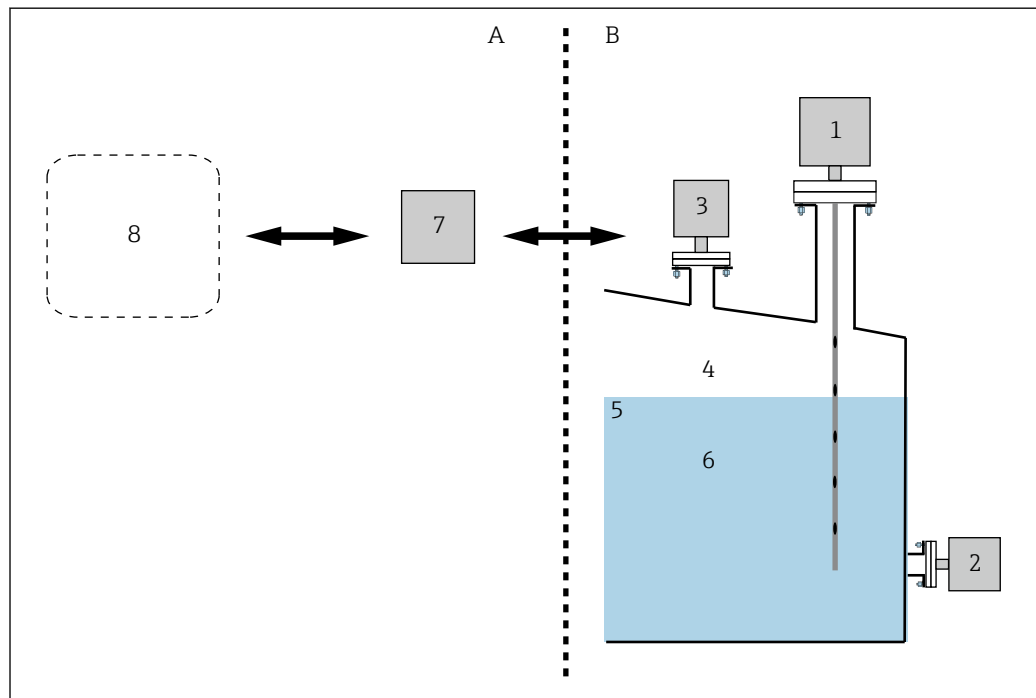
A0038611

#### 1 Operation principle

- 1 Noise filter
- 2 Power supply module
- 3 CPU module
- 4 Flange
- 5 Gas phase
- 6 Pt100 Multi-spot element (up to 6 points)
- 7 Liquid phase
- 8 Local HART communication

## System design

Endress+Hauser offers a wide range of solutions to utilize data of the sensor into the process management requirements. The diagrams above describe some individual solutions according to various example concepts. For additional application requirements, contact local Endress+Hauser representatives.



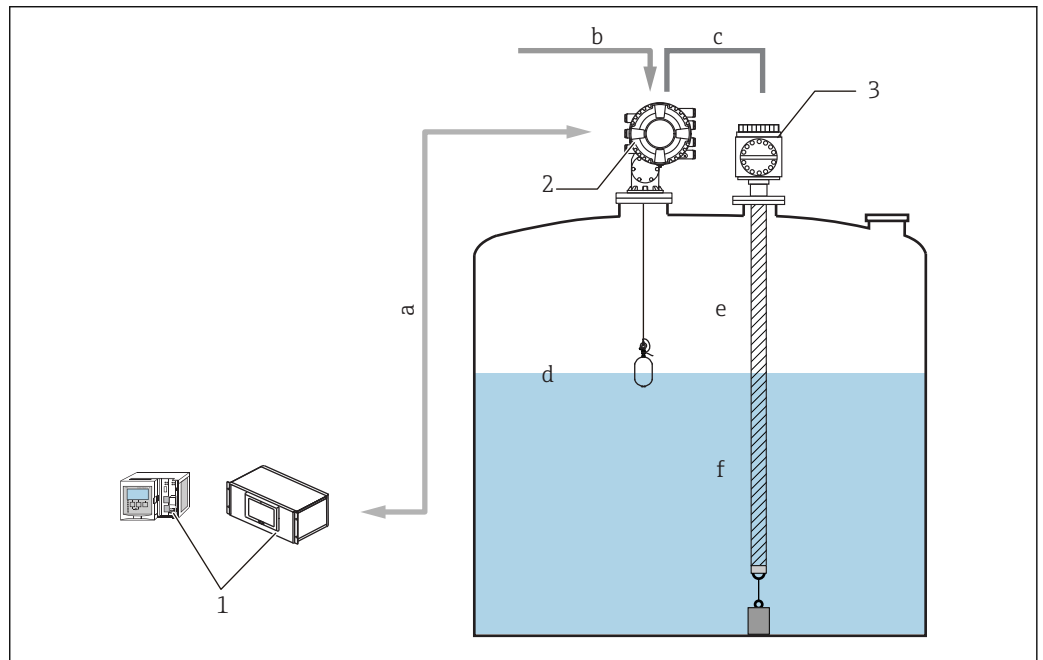
A0038563

### 2 System design

- A Data management
- B Field process
- 1 Average temperature
- 2 Pressure gauge
- 3 Level gauge
- 4 Gas temperature
- 5 Liquid level
- 6 Liquid temperature
- 7 System (system interface, Tankvision NXA82x/NXA83)
- 8 Host application (Tankvision NXA85/NXA86, DCS, PLC, others)

**NMT532 Ex ia and NMS8x  
Exd [ia] combination**

The connection of NMT532 shown below is only available for connection with NMS5 or NMS8x.



A0038539

**3 NMS8x and NMT532 system design**

- a* Fieldbus protocol
- b* Power supply
- c* Local HART (Ex i) loop (data transmission)
- d* Level
- e* Gas temperature
- f* Liquid temperature
- 1* Tankvision
- 2* NMS8x
- 3* NMT532

**Typical application of NMT532 and NMS8x**

NMT532 is used most effectively with NMS8x to provide average temperature, level, interface, and density measurement. All the necessary configuration and parameter settings for NMT532 are performed via either NMS5, NMS8x, or FieldCare. NMT532 receives liquid level data from NMS5 or NMS8x, then calculates liquid and gas phase average temperature. Calculated data and basic information including raw data for each temperature element and device status are transmitted to NMS5 or NMS8x.



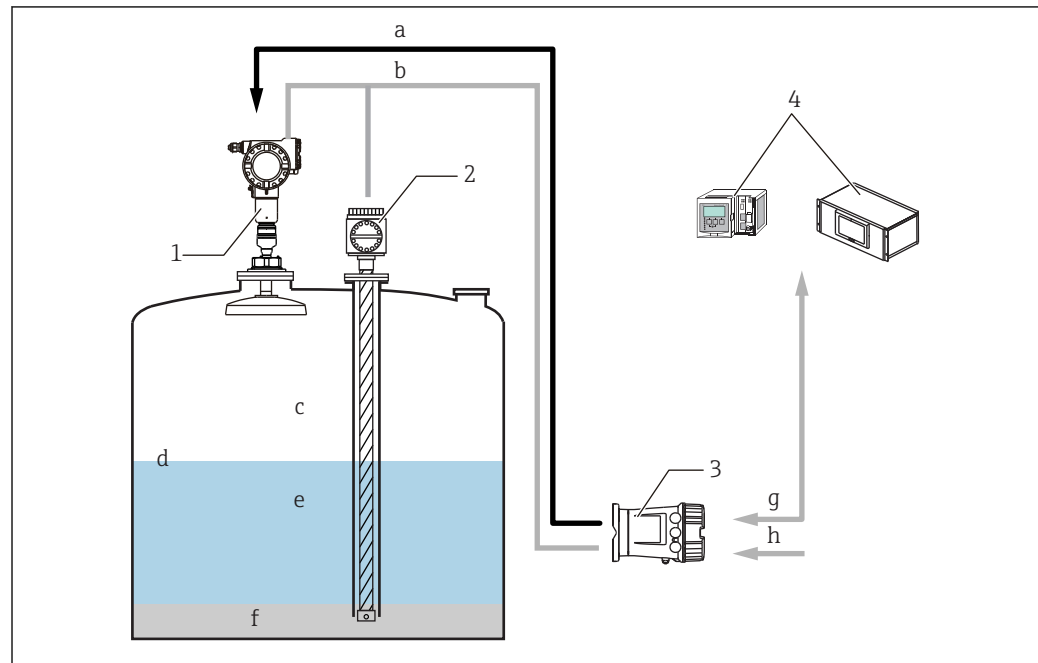
All gathered data in the field interface unit are sent to inventory management software (Tankvision) or to NMS8x, NMS5x, NMS7, NMR8x, NRF8x or NRF590.

## NMT532 Ex ia and Micropilot FMR S-series combination

### Typical application of NMT532 converter + temperature probe

Temperature and level measurement with data collection and calculations via NRF81 allows for optimal inventory control. Basic functionality of NMT532 is displayed and configured on NRF81. Detailed NMT532 functionality and data access can be performed by FieldCare. NMT532 receives radar level data from NRF81 and then calculates liquid and gas phase average temperature. Calculated and standard data including temperature element raw data and device status are transmitted to NRF81.

**i** All gathered data in the field interface unit are sent to inventory management software (Tankvision) or to NMS8x, NMS5x, NMS7, NMR8x, NRF8x or NRF590.



A0038587

#### **4** NMT532 Ex ia and NRF590 Ex d [ia] combination

- a FMR power supply (DC/Ex i)
- b Local HART (Ex i) loop (data transmission)
- c Gas temperature
- d Level
- e Liquid level temperature
- f Water
- g Fieldbus protocol
- h Power supply
- 1 FMR540
- 2 NMT532
- 3 NRF81/NRF590
- 4 Tankvision

## Input/output

|                           |                                         |                                 |
|---------------------------|-----------------------------------------|---------------------------------|
| <b>Measured variables</b> | <b>Liquid and gas temperature range</b> | -200 to 100 °C (-328 to 212 °F) |
|                           | <b>Probe length</b>                     | 18.5 m (60.6 ft) or less        |

|                           |                           |                |
|---------------------------|---------------------------|----------------|
| <b>Number of elements</b> | <b>Number of elements</b> | Maximum of six |
|---------------------------|---------------------------|----------------|



For the intervals of attaching elements, the distance of 2 m (6.57 ft) or 3 m (9.84 ft) must be required.

|                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Communication</b> | <p>Local HART protocol (exclusively for local host device)</p> <ul style="list-style-type: none"> <li>■ Proservo NMS5/NMS7/NMS8x</li> <li>■ Micropilot NMR8x</li> <li>■ Tank side monitor NRF590/NRF81</li> </ul> <p><b>Local HART</b></p> <p>Local HART is Endress+Hauser's proprietary signal format that only uses local HART protocol digital transmission without a 4 to 20 mA signal. It is used for communications in NMT532, NRF560, NMS5, NMS7, NMS8x, NMR8x, NRF590, NRF81.</p> |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                               |             |                                                           |              |                    |               |                                     |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-----------------------------------------------------------|--------------|--------------------|---------------|-------------------------------------|
| <b>Alarm signal</b> | <p>Error information can be accessed via the following interface and transmission digital protocol. Refer to operating instructions for details on each device.</p> <table> <tr> <td><b>NMS5</b></td><td>BA00401G, MS7: BA01001G, NMS8x: BA1456G, BA1459G, BA1462G</td></tr> <tr> <td><b>NMR8x</b></td><td>BA01450G, BA01453G</td></tr> <tr> <td><b>NRF590</b></td><td>BA00256F, BA00257F, NRF81: BA01465G</td></tr> </table> | <b>NMS5</b> | BA00401G, MS7: BA01001G, NMS8x: BA1456G, BA1459G, BA1462G | <b>NMR8x</b> | BA01450G, BA01453G | <b>NRF590</b> | BA00256F, BA00257F, NRF81: BA01465G |
| <b>NMS5</b>         | BA00401G, MS7: BA01001G, NMS8x: BA1456G, BA1459G, BA1462G                                                                                                                                                                                                                                                                                                                                                                     |             |                                                           |              |                    |               |                                     |
| <b>NMR8x</b>        | BA01450G, BA01453G                                                                                                                                                                                                                                                                                                                                                                                                            |             |                                                           |              |                    |               |                                     |
| <b>NRF590</b>       | BA00256F, BA00257F, NRF81: BA01465G                                                                                                                                                                                                                                                                                                                                                                                           |             |                                                           |              |                    |               |                                     |

|                      |                     |
|----------------------|---------------------|
| <b>Output signal</b> | Local HART protocol |
|----------------------|---------------------|

|                   |                                                                                                                                                    |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Connection</b> | <ul style="list-style-type: none"> <li>■ Proservo NMS5/NMS7/NMS8x</li> <li>■ Micropilot NMR8x</li> <li>■ Tank side monitor NRF590/NRF81</li> </ul> |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|

## Power supply

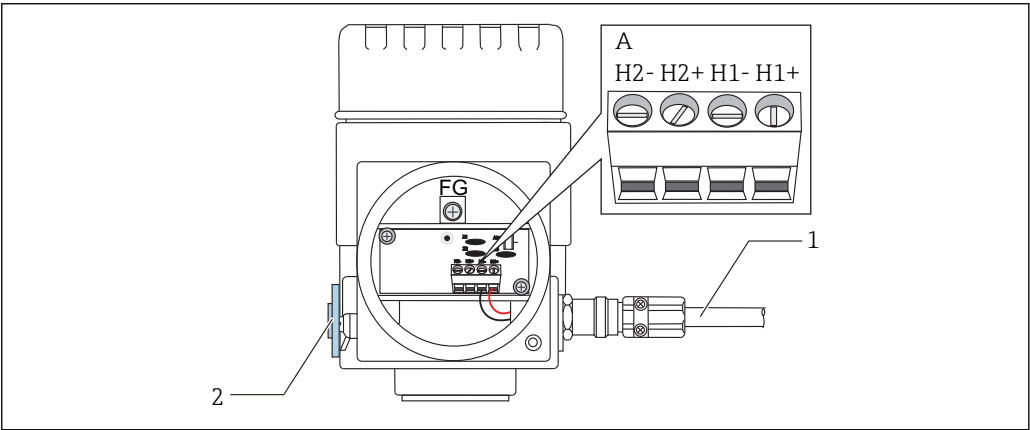
|                                      |                                                                                                                                                                                                                                                                                                                                                                    |                                      |                                                 |                                                 |                          |       |
|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|-------------------------------------------------|-------------------------------------------------|--------------------------|-------|
| Load local HART                      | Minimum loading for local HART circuit: 250 Ω                                                                                                                                                                                                                                                                                                                      |                                      |                                                 |                                                 |                          |       |
| Overvoltage protection               | The NMT532 has an internal surge arrester that complies with EN/IEC 61000-4-5 (Line to Line 1.0 kV). Connect the metallic housing of the NMT532 to the tank wall directly with an electrically conductive lead to ensure reliable potential matching.                                                                                                              |                                      |                                                 |                                                 |                          |       |
| Power consumption                    | 6 mA                                                                                                                                                                                                                                                                                                                                                               |                                      |                                                 |                                                 |                          |       |
| Cable entry                          | Wiring of NMT532 must meet the flameproof and intrinsic safety requirements. The following cable entries are available: <ul style="list-style-type: none"><li>■ Thread NPT1/2</li><li>■ Thread M20</li></ul>                                                                                                                                                       |                                      |                                                 |                                                 |                          |       |
| Supply voltage                       | DC 16 to 30 V: Ex ia<br><br>Only for connection to a certified intrinsically safe circuit with the following maximum values <table><tr><td rowspan="2">Ui = 30 V<br/>Ii = 120 mA<br/>Pi = 1 W</td><td>Internal capacitance Ci =</td><td>7.9 nF (ATEX, IECEx, NEPSI)<br/>6.6 nF (FM C/US)</td></tr><tr><td>Internal inductance Li =</td><td>48 mH</td></tr></table> | Ui = 30 V<br>Ii = 120 mA<br>Pi = 1 W | Internal capacitance Ci =                       | 7.9 nF (ATEX, IECEx, NEPSI)<br>6.6 nF (FM C/US) | Internal inductance Li = | 48 mH |
| Ui = 30 V<br>Ii = 120 mA<br>Pi = 1 W | Internal capacitance Ci =                                                                                                                                                                                                                                                                                                                                          |                                      | 7.9 nF (ATEX, IECEx, NEPSI)<br>6.6 nF (FM C/US) |                                                 |                          |       |
|                                      | Internal inductance Li =                                                                                                                                                                                                                                                                                                                                           | 48 mH                                |                                                 |                                                 |                          |       |
| Process connection                   | <b>Converter-only version</b><br><br>NMT532's local HART converter is compatible to other brands' average temperature sensors with the following mechanical connection sizes and types: <ul style="list-style-type: none"><li>■ NPS 2" Cl.150 RF, 304 flange ASME B16.5</li><li>■ DN50 PN10 B1, 304 flange EN1092-1 (DIN2527 C)</li></ul>                          |                                      |                                                 |                                                 |                          |       |
| Grounding                            | The NMT532 must be grounded to the tank potential before connection to the host gauge. All ground connections must be compliant with local and company regulations, and checked before the equipment is commissioned.                                                                                                                                              |                                      |                                                 |                                                 |                          |       |

# Electrical connection

## Terminal connection

### NMT532 (Ex ia) intrinsically safe connection

NMT532, which uses intrinsically safe local HART communication, must be connected to the device's intrinsically safe terminal to be connected. Refer to the intrinsic safety regulations for establishing wiring and field device layout.



A0038528

5 NMT532 terminal (ATEX • Ex ia)

A Temperature data / NMT532 intrinsically safe 2-wire HART communication (see Information)

1 Shielded twisted pair wire or steel-armored wire

2 Standard aluminum (die-cast plug)

**i** Only a metal cable gland may be used. The shielded wire on the HART communication line must be grounded.

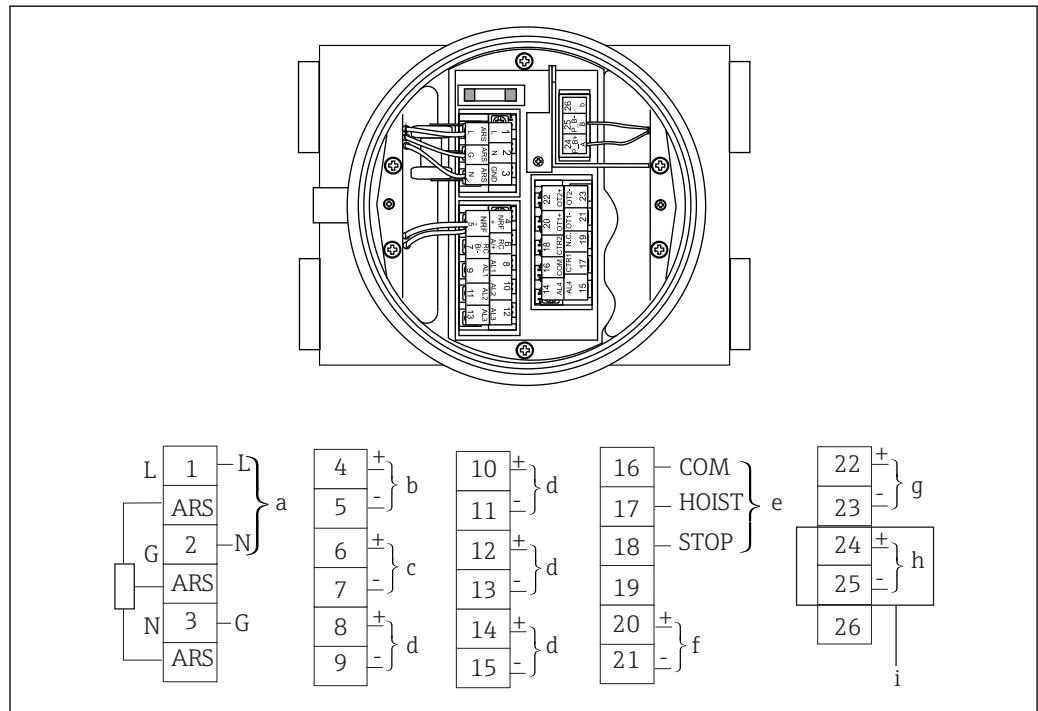
### Connection table

| Connection to NRF590 |            | Connection to NMS5 |    | Connection to NMS8x/NMR8x/NRF81 |    |
|----------------------|------------|--------------------|----|---------------------------------|----|
| + Terminal           | 24, 26, 28 | + Terminal         | 24 | + Terminal                      | E1 |
| - Terminal           | 25, 27, 29 | - Terminal         | 25 | - Terminal                      | E2 |

**i** +H1 and +H2 are + terminals, and -H1 and -H2 are - terminals.

**NMS5 (Ex d [ia]) intrinsically safe connection**

The intrinsically safe NMT532 must be connected to the intrinsically safe local HART terminal on NMS5.



6 NMS5 terminal

a Power supply AC 85: 264 V50/60 Hz or DC20: 62 V AC20: 55 V

b Non-intrinsically safe HART communication: NRF, etc.

c Digital output Modbus, RS485 serial pulse or HART

d Alarm contact point

e Operation contact point input

f 4 to 20 mA channel 1

g 4 to 20 mA channel 2

h Intrinsically safe HART

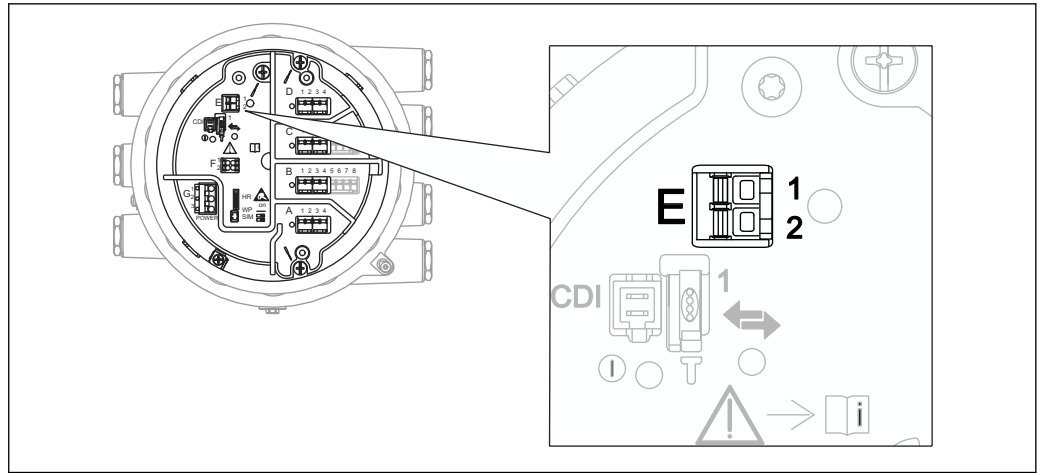
i From NMT532 Ex ia



Do not connect NMT532 local HART communication cable to terminals 4 and 5 on NMS5/ NMS7. These terminals are designed to connect to Ex d local HART communication.

**NMS8x/NMR8x/NRF81 (Ex d [ia]) intrinsically safe connection**

To connect an intrinsically safe NMT532, E1 and E2 are used to connect with NMS8x, NMR8x and NRF81.



A0038531

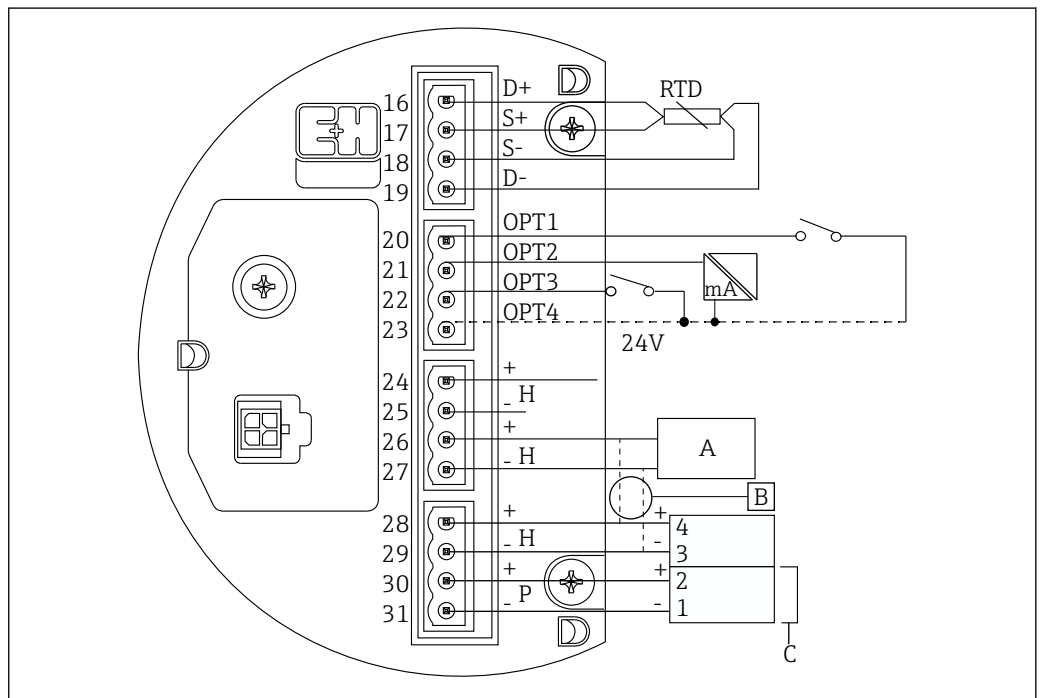
7 NMS8x terminal for NMT532

E1 H+ terminal

E2 H- terminal

## NRF590 terminals

NRF590 has three sets of intrinsically safe local HART terminals.



A0038533

8 NRF590 (intrinsically safe) terminals

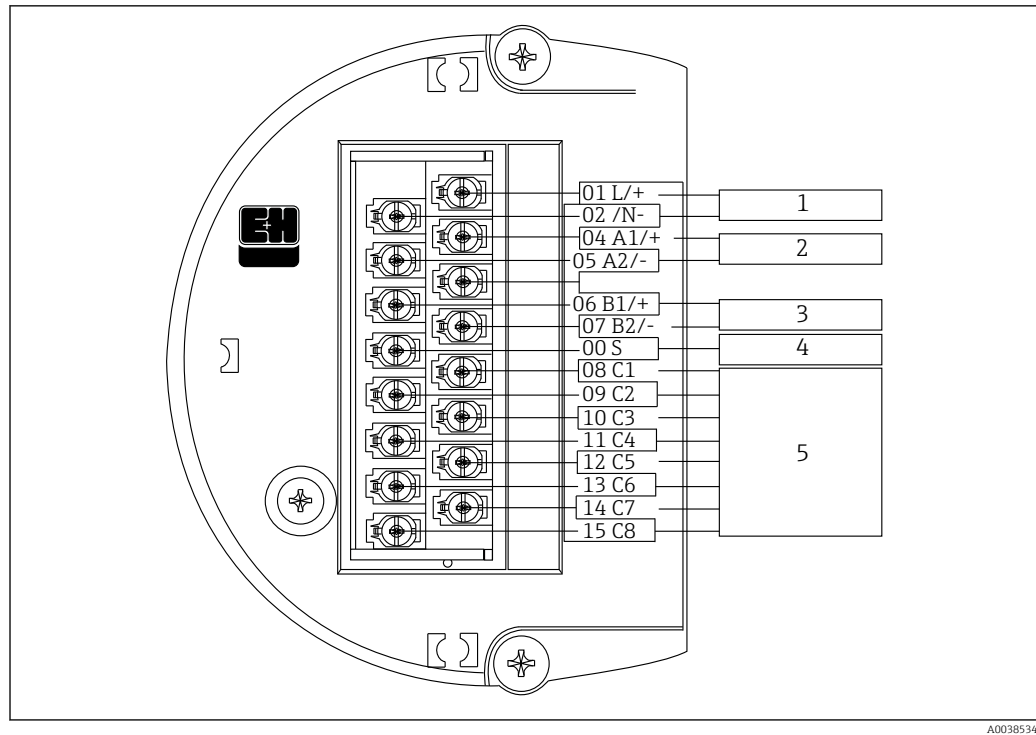
A A HART sensor (mutually connected as a single HART fieldbus loop on the inside)

B Fieldbus loop

C Only in Micropilot S series



A signal local HART line cannot be connected from NMT532 to terminals 30 and 31. These terminals are an intrinsically safe 24 V<sub>DC</sub> power supply for the Micropilot S Series (FMR53x, FMR540).



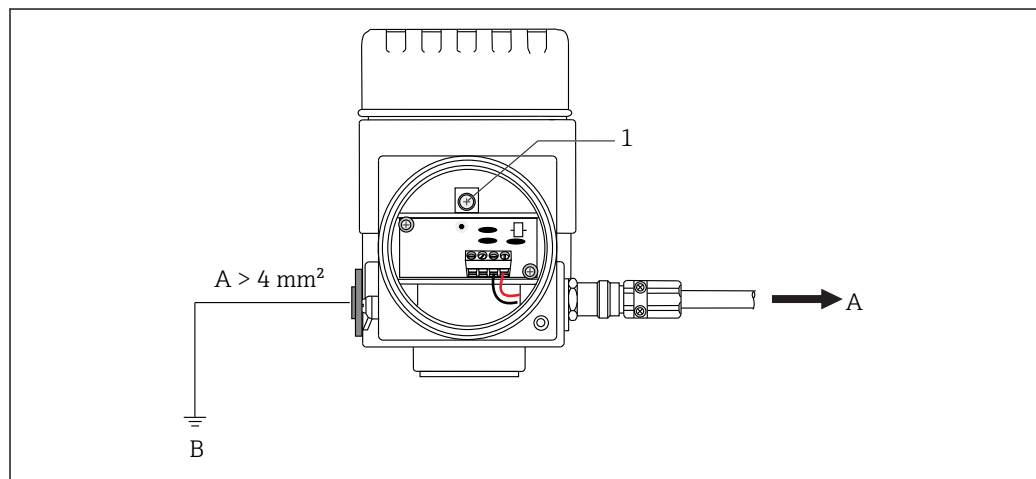
A0038534

9 NRF590 (TIIS flameproof) terminal

- 1 Power supply
- 2 Digital I/O A
- 3 Digital I/O B
- 4 Cable shield
- 5 Field protocol and analog I/O

## Grounding

NMT532 must be grounded to the tank potential before communication and power connections are made. The connections from ground terminal of NMT532 to the tank ground must be made before any other wiring connections are made. All grounding must comply with local and company regulations and must be checked before the equipment is commissioned.



A0038607

10 Grounding

- A To NRF590, NMS5, NMS8x, NMR8x, or NRF81
- B Tank ground
- 1 Ground terminal

## Performance characteristics

### Reference operating conditions

- Temperature: 25 °C (77 °F) ± 5 °C (9 °F)
- Pressure: 1 013 mbar abs. ± 20 mbar abs. (1 013 hPa abs. ± 20 hPa abs. , 14.7 psi abs. ± 0.3 psi abs.)
- Relative humidity (air): 65 % ± 20 % (linearity)
- Converter and precision resistor combination or converter and probe combination

### Measured value resolution

|             |                    |
|-------------|--------------------|
| Temperature | ≤ 0.1 °C (0.18 °F) |
|-------------|--------------------|

### Maximum measurement error

The values below represent performances under reference operating conditions (including linearity, repeatability, hysteresis).

#### Conversion accuracy

| Function | Option           | Accuracy           |
|----------|------------------|--------------------|
| Temp.    | Standard/<br>PTB | ± 0.1 °C (0.18 °F) |

#### Probe accuracy

| Function | Option   | Accuracy                                                                                                                 |
|----------|----------|--------------------------------------------------------------------------------------------------------------------------|
| Temp.    | Standard | ± 0.15 °C + 0.002 °C x  t  (0.27 °F + 0.0036 °F  t )<br>IEC 60751 / DIN EN 60751 / JIS C1604 class A temperature element |

#### Overall accuracy

| Function | Option   | Accuracy                                                                                                                                                               |
|----------|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Temp.    | Standard | Conversion accuracy ± 0.1 °C (0.18 °F) + environmental effect ± 0.05 °C (0.09 °F) + Class A temperature element ± 0.15 °C + 0.002 °C x  t  (0.27 °F + 0.0036 °F x  t ) |



- Accuracy can be improved for each application by making adjustments on-site, such as adjusting the offset.
- |t| represents the temperature of the measured item.

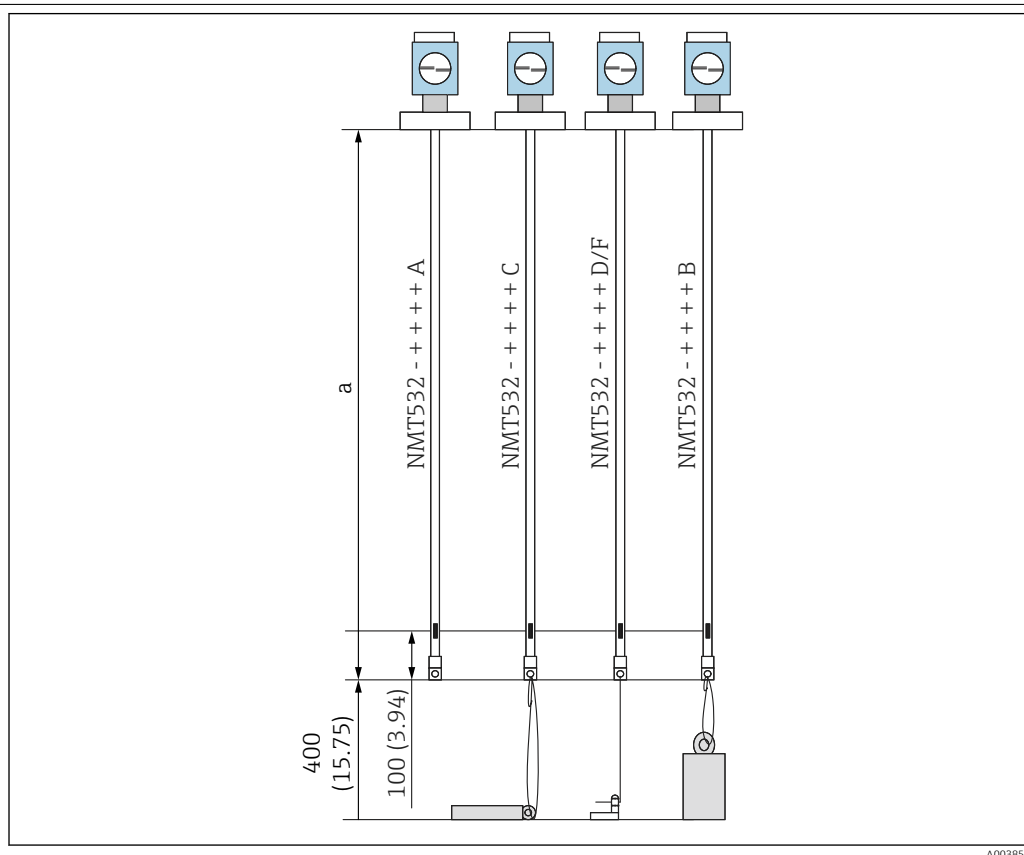
### New module

NMT532 employs a completely new electronic module compared to the previous NMT535.

| Items                                             | NMT532                          | NMT535                    |
|---------------------------------------------------|---------------------------------|---------------------------|
| CPU performance                                   | 16 bit                          | 8 bit                     |
| Clock speed                                       | 2.7648 MHz                      | 0.9216 MHz                |
| Memory capacity (RAM)                             | 20 KB                           | 176 B                     |
| EEPROM                                            | 2 KB                            | 256 B                     |
| Flash memory                                      | 256 KB                          | 16 KB                     |
| Total # of print boards                           | 4 (5: with capacitance board)   | 5                         |
| Power consumption (converter + temperature probe) | 6 mA: 16 V <sub>DC</sub> Ex  ia | 10 mA: 16 V <sub>DC</sub> |

## Installation

Position of NMT532 element  
No. 1 based on the  
installation method



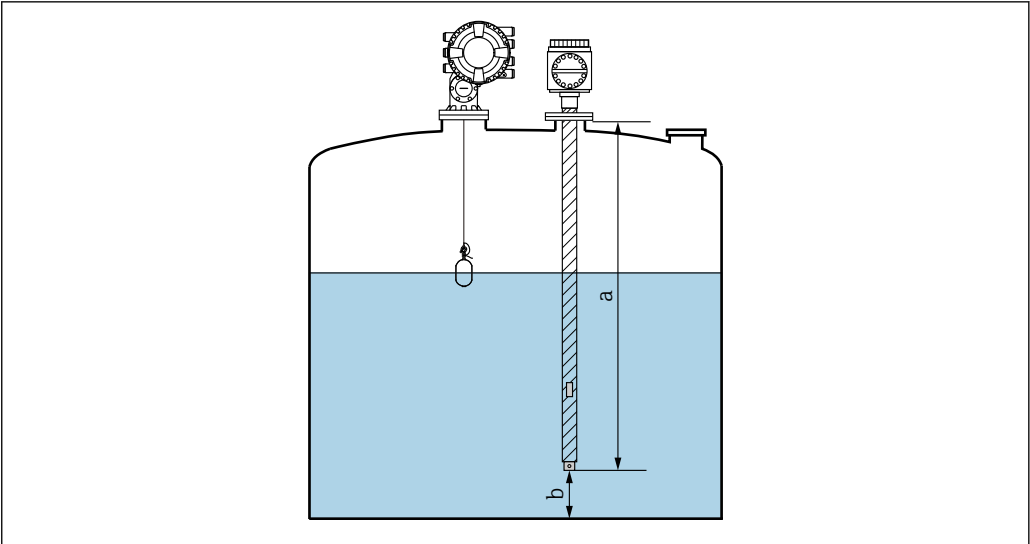
A0038597

11 Element No. 1 position

*a* Height below the flange to the end of the temperature probe for all types of NMT532

### Recommended installation height

The required bottom clearance of both the temperature probe varies depending on the anchoring method. Consider the required bottom clearance when ordering NMT532. See the recommended bottom clearance in the above illustration and/or consult Endress+Hauser representatives for further information. The standard location of the lowest temperature element should be set at 500 mm (19.7 in) from the bottom of the tank regardless of probe type.



A0038612

12 Recommended installation

a a Installation height  
b b Bottom clearance

- Installation height shows height below the flange to the end of the temperature probe.
- Recommended bottom clearance with mounting attachment A, B, C, or D (refer to the next table) is 400 mm (15.57 in).

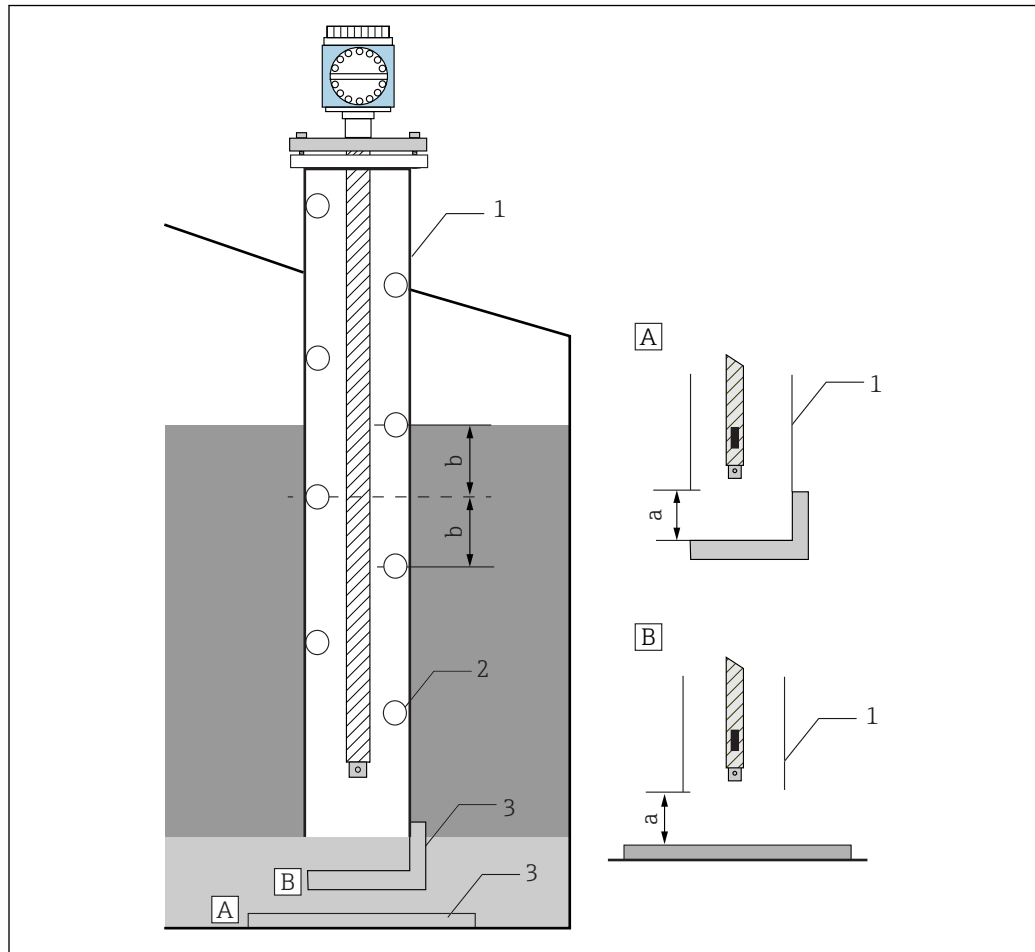
**Installation attachments** Contents of anchoring hardware: based on the selection of 100: mounting attachment.

| 020 |                         | A: installation attachments not selected | B: anchor weight (high profile, D120)      | C: anchor weight (low profile, hexagon H41) | D: tension wire + wire hook + NPT1 top anchor                             | F: tension wire + wire hook + R1 top anchor                             |
|-----|-------------------------|------------------------------------------|--------------------------------------------|---------------------------------------------|---------------------------------------------------------------------------|-------------------------------------------------------------------------|
| 100 | Converter + Temp. probe | Bottom hook                              | Bottom hook<br>Anchor weight<br>Sling wire | Bottom hook<br>Anchor weight<br>Sling wire  | Bottom hook<br>Base plate<br>Wire hook NPT1<br>Top anchor<br>Tension wire | Bottom hook<br>Base plate<br>Wire hook<br>R1 top anchor<br>Tension wire |

**Recommended thermo well installation**

When installing a base plate at the bottom of a tank, A requires at least 300 mm (11.81 in) clearance from the bottom of a thermo well (perforated protective pipe).

If the anchor weight is not used when installing thermo well, the water should fill the tank up to the bottom from the end of the thermo well, enough to allow liquid to enter/exit the pipe.



A0038613

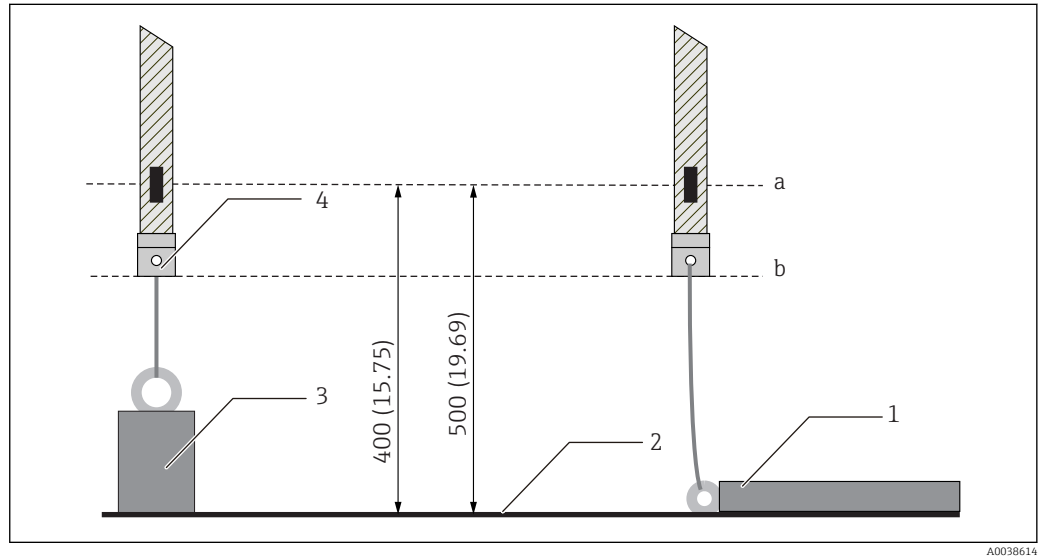
13 Recommended thermo well

- A Base plate case 1
- B Base plate case 2
- a 300 mm (11.8 in) or more
- b 150 mm (5.91 in)
- 1 Thermo well
- 2 Hole (Ø 25 mm (0.98 in))
- 3 Base plate

**Installation attachment 1:  
Anchor weight**

The high-profile anchor weight is an anchoring method designed for the converter + temperature probe versions. The low-anchor weight is the an anchoring method designed for the small tank nozzle (max. 2 in (50A)).

For a temperature probe with anchor weight method, a clearance of 400 mm (15.57 in) is recommended.



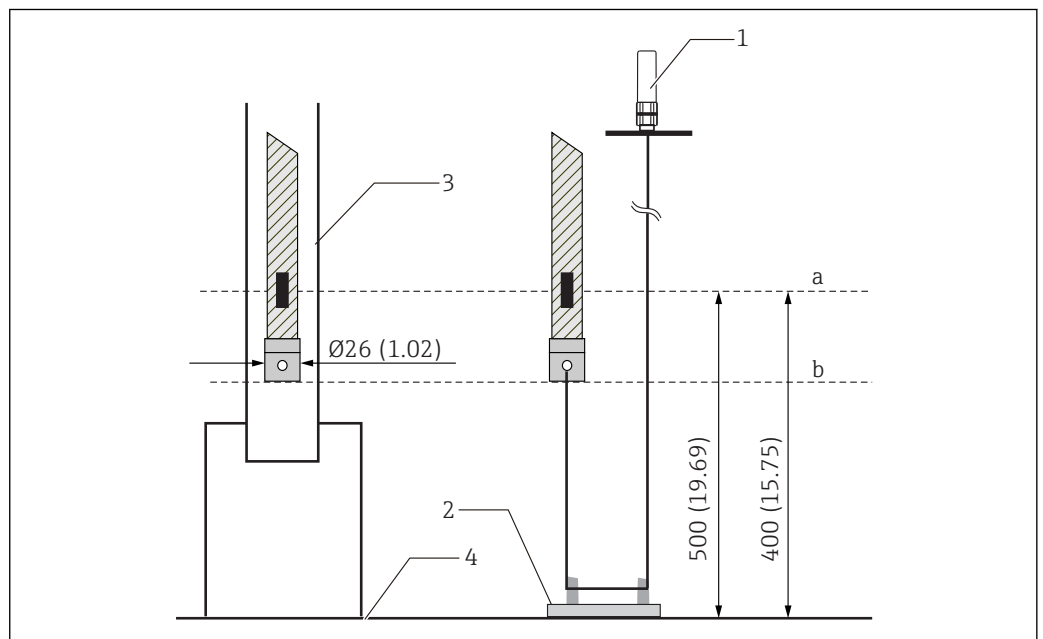
A0038614

14 Installation attachment 1: anchor weight

- a Element position #1 (bottom element)
- b Clearance from the tank floor
- 1 Weight for low profile
- 2 Tank floor
- 3 Weight for high profile
- 4 Bottom hook

**Installation attachment 2:  
Wire hook + top anchor with  
thermo well**

For a temperature probe with wire hook and top anchor, and thermo well method, a clearance of 400 mm (15.57 in) is recommended.



A0038615

### Mounting NMT532 on fixed roof tank

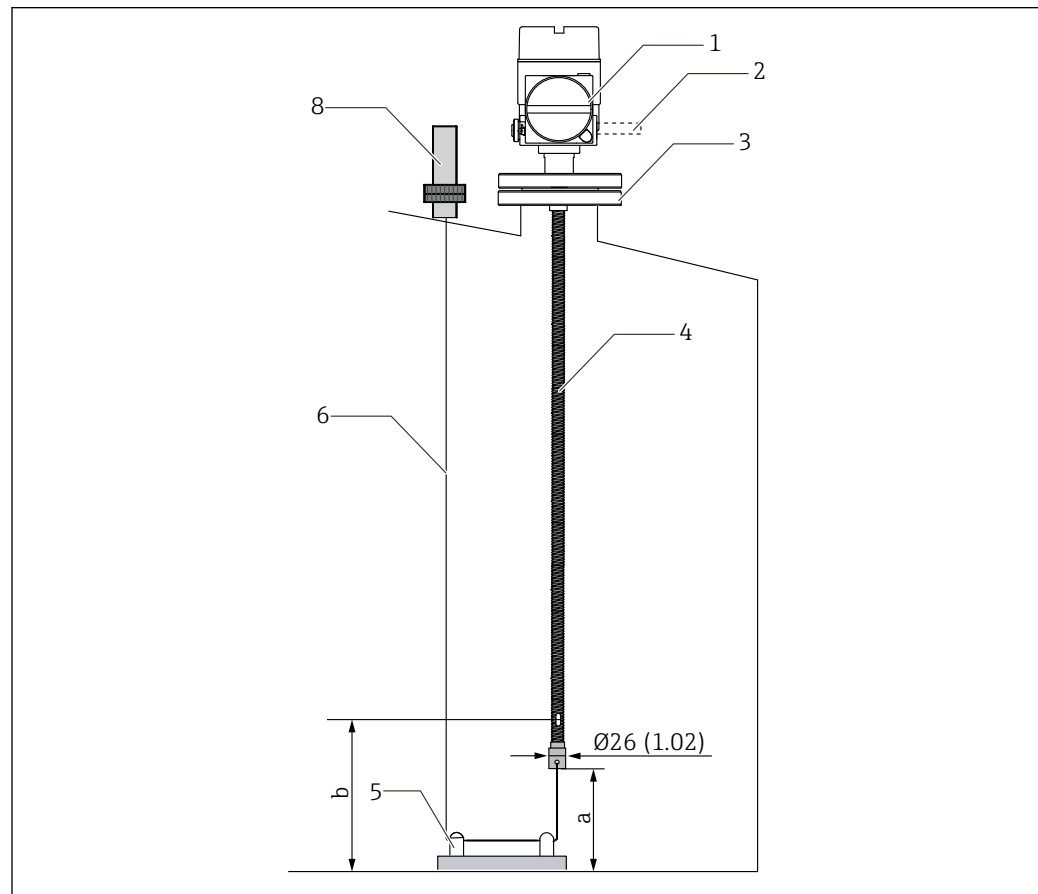
There are three ways to install NMT532 onto a fixed roof tank:

- Top anchor method
- Thermo well method
- Anchor weight method

**i** If a heating coil is attached to the bottom of the tank, the clearance between the bottom hook of the flexible tube and the bottom of the tank may vary depending on the type of heating coil.

#### Top anchor method

The flexible tube is fixed with a wire hook and a top anchor.



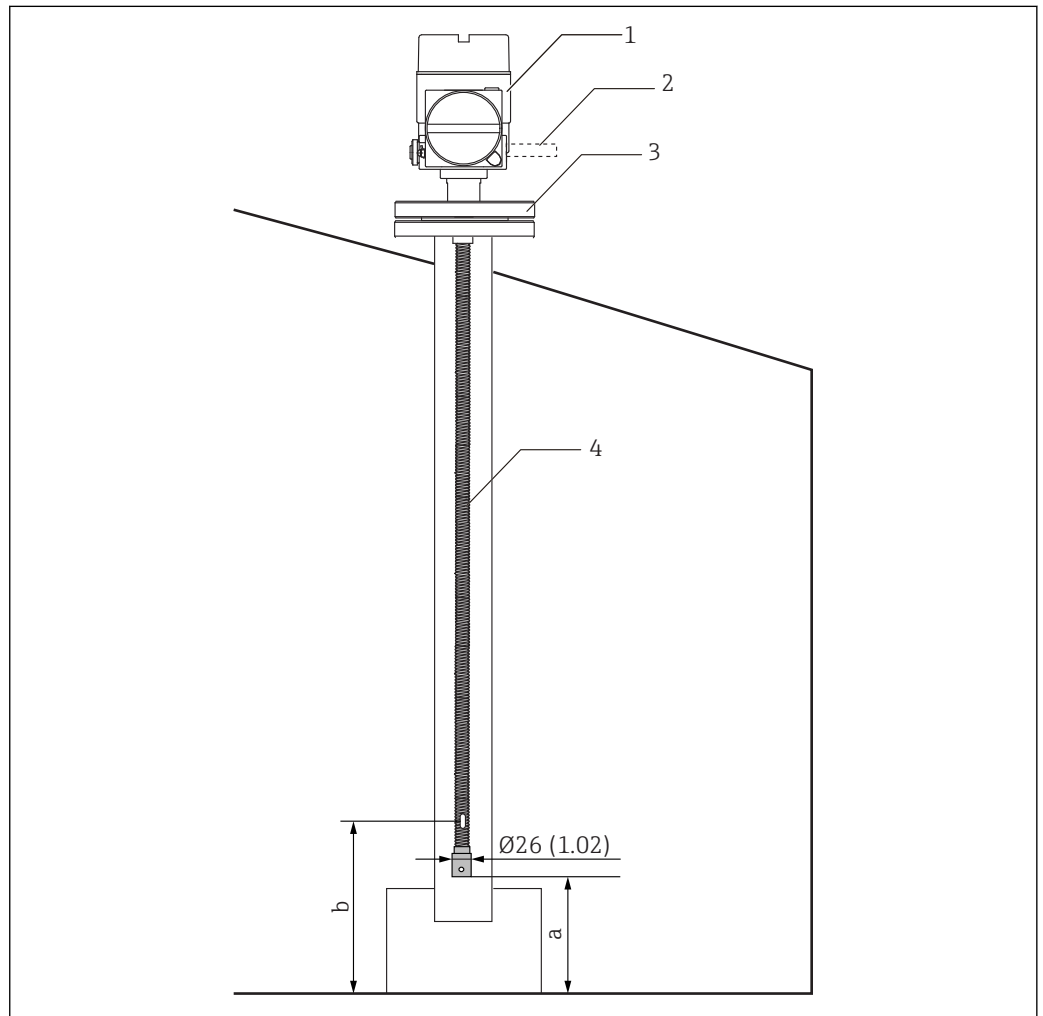
A0038596

**15** Fixed roof tank. Unit of measurement mm (in)

- a* 400 mm (15.57 in) (Clearance below bottom hook)
- b* Approx. 500 mm (20 in) (From the bottom of the tank to the temperature element position #1)
- 1* Electrical compartment
- 2* Cable entry as specified
- 3* Flange
- 4* Temperature probe
- 5* Wire hook
- 6* Tensioning wire
- 7* Top anchor

**Thermo well method**

The flexible tube is inserted into a thermo well with a diameter of 80.8 mm (2 in) or more.



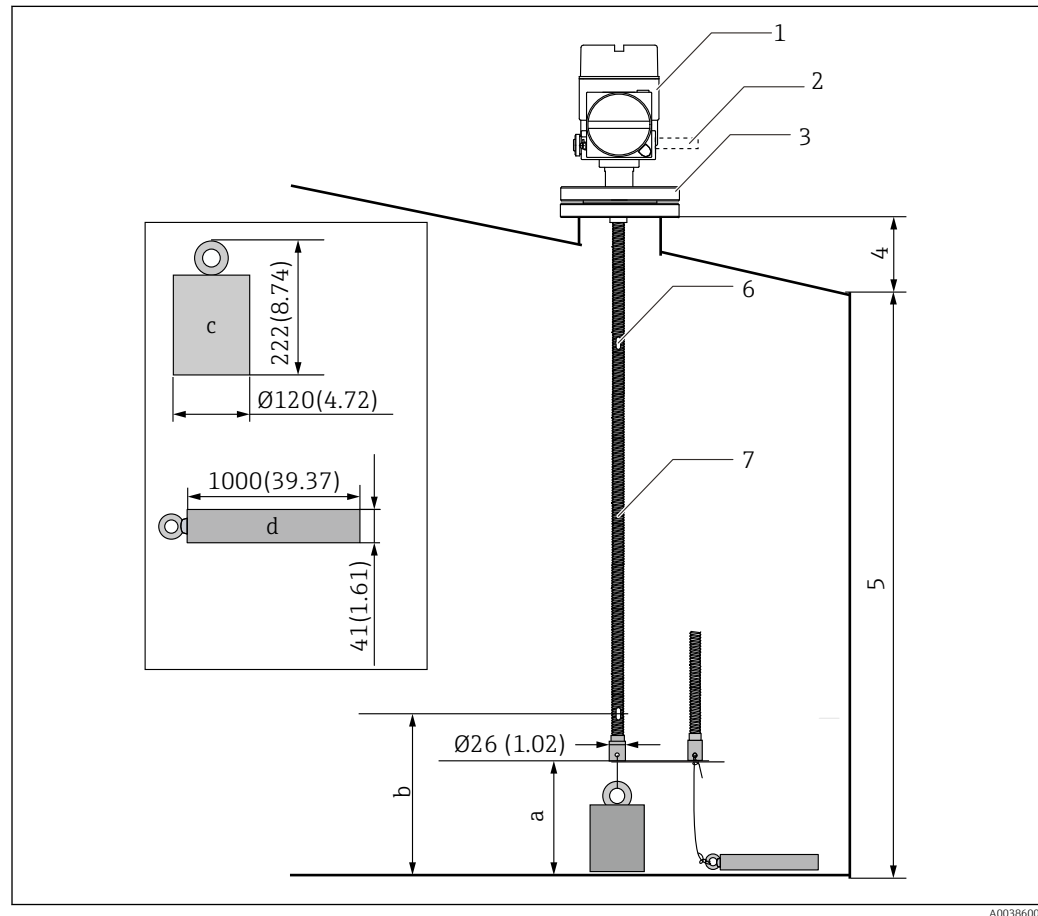
A0038599

16 Thermo well. Unit of measurement mm (in)

- 1 Electrical compartment
- 2 Cable entry as specified
- 3 Flange
- 4 Temperature probe
- 5 400 mm (15.57 in) (Clearance below bottom hook)
- 6 Approx. 500 mm (20 in) (From the bottom of the tank to the temperature element position #1)

### Anchor weight method

The flexible tube is fixed with an anchor weight.



 17 Anchor weight

- a* 400 mm (15.57 in) (Clearance below bottom of the hook to the bottom of the tank)
- b* 500 mm (20 in) (From the bottom of the tank to the temperature element position #1)
- c* Anchor weight for high profile
- d* Anchor weight for low profile
- 1 Electrical compartment
- 2 Cable entry as specified
- 3 Flange
- 4 Nozzle height
- 5 Tank height
- 6 Upper temperature element
- 7 Flexible tube

### CAUTION

#### Installation of an anchor weight

Using an anchor weight that is heavier than 16 kg may cause internal damages to the flexible tube.

- Ensure that the anchor weight is stable at the bottom of the tank. When installing NMT532 with a suspended anchor weight, use an anchor weight that weighs 16 kg or less.
- The flexible tube must be lowered carefully without overbending and scratching the inner edge of the nozzle hole.

#### Mounting on floating roof tank

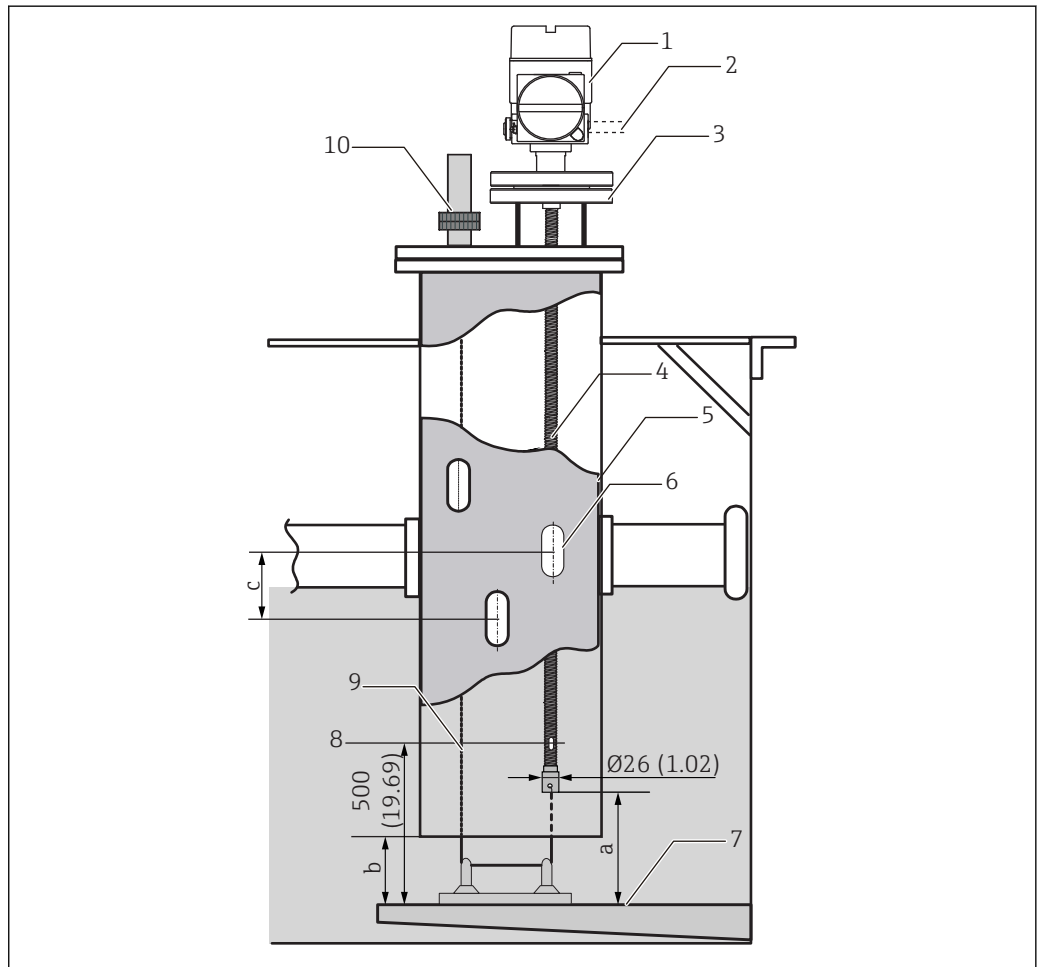
There are three methods of mounting NMT532 on a floating roof tank as follows.

- Top anchor method
- Thermo well method
- Guide wire ring method

 If a heating coil is attached to the bottom of the tank, the clearance between the bottom hook of the flexible tube and the bottom of the tank may vary depending on the type of heating coil.

**Top anchor method**

The flexible tube is installed in a fixed pipe and fixed with the top anchor. NMS5 or NMS8x and NMT532 can be mounted in the same fixed pipe.



A0038602

18 Floating roof tank. Unit of measurement mm (in)

a 400 mm (15.57 in), Clearance of the bottom hook

b 100 to 150 mm (3.94 to 5.91 in)

c 500 to 1000 mm (19.69 to 39.37 in)

Electrical compartment

Cable entry as specified

Flange

Temperature probe

Fixed pipe

Gas hole

Gauge plate

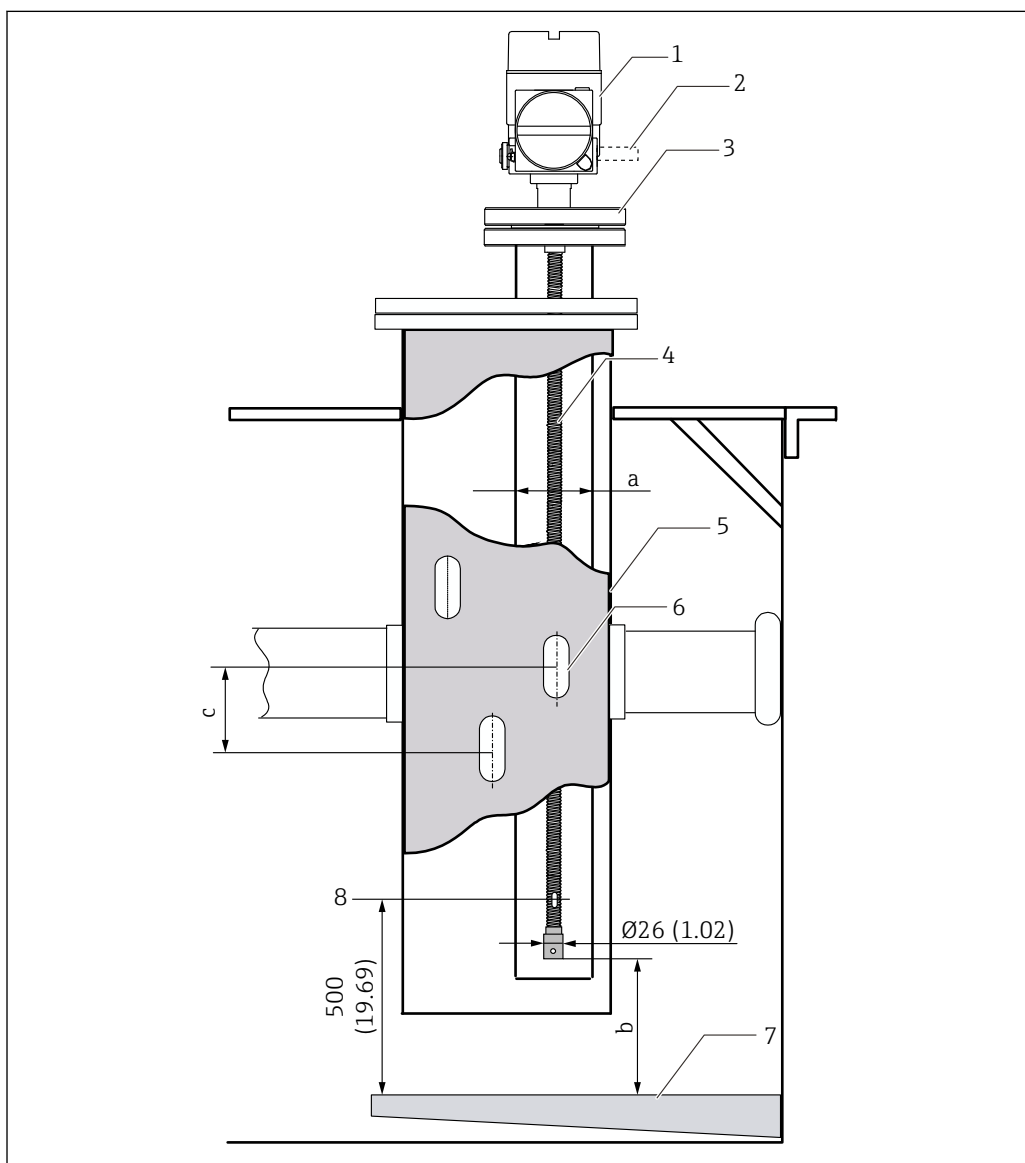
Temperature element position #1 (bottom temperature element)

Tensioning wire

Top anchor

### Thermo well method

The flexible tube is inserted into a thermo well in the fixed pipe.



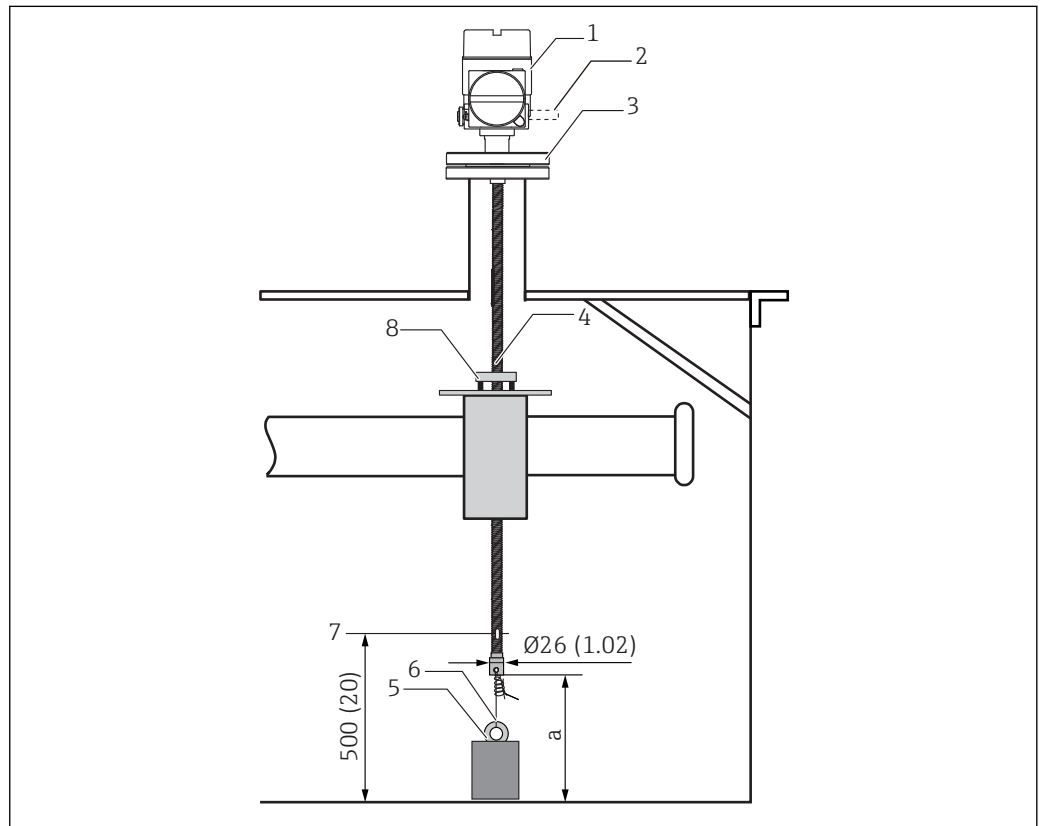
A0038603

19 Thermo well method. Unit of measurement mm (in)

- a Stilling pipe,  $\varnothing$  50.8 mm (2 in) or more, depending on specifications
- b 400 mm (15.57 in), Clearance of bottom hook
- c 500 to 1000 mm (19.69 to 39.37 in)
- 1 Electrical compartment
- 2 Cable entry as specified
- 3 Flange
- 4 Temperature probe
- 5 Fixed pipe
- 6 Gas hole
- 7 Gauge plate
- 8 Temperature element position #1 (bottom temperature element)

### Guide ring and anchor weight method

The flexible tube is fixed with a guide ring and an anchor weight.



A0038604

20 Guide ring and anchor weight. Unit of measurement mm (in)

- a 400 mm (15.57 in), Clearance of bottom hook
- b 500 to 1 000 mm (19.69 to 39.37 in)
- 1 Electrical compartment
- 2 Cable entry as specified
- 3 Flange
- 4 Temperature probe
- 5 Anchor weight hook
- 6 Tensioning wire
- 7 Temperature element position #1 (bottom temperature element)
- 8 Guide ring

### ⚠ CAUTION

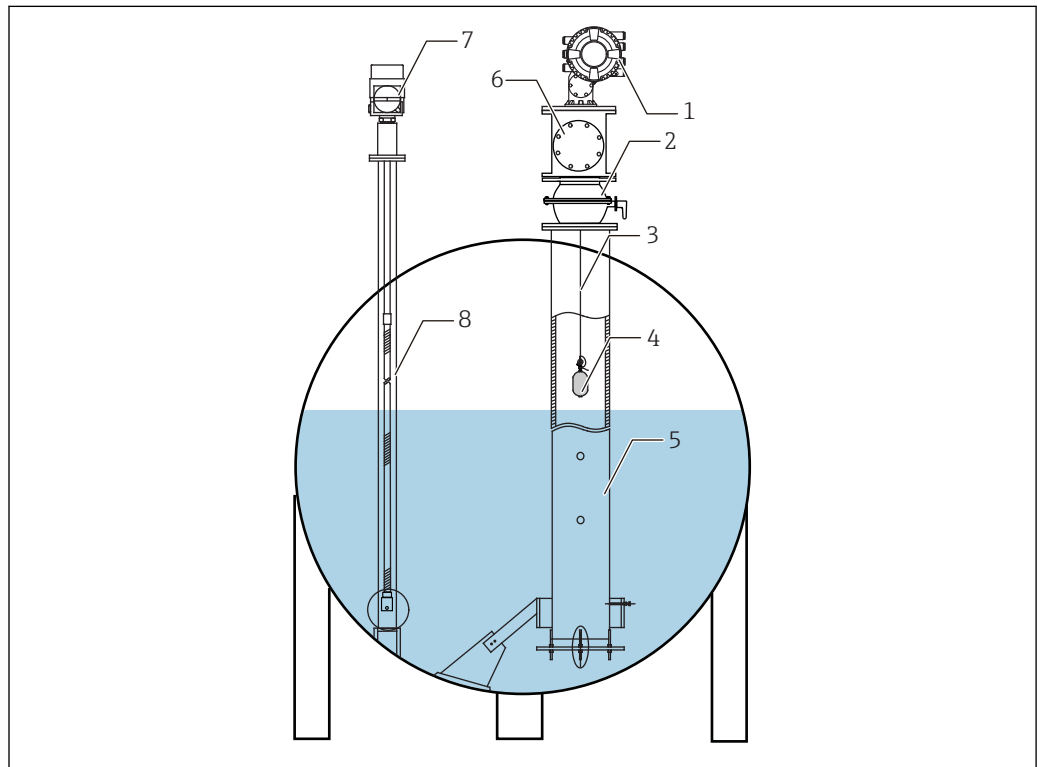
#### Installation of an anchor weight

Using an anchor weight that is heavier than 16 kg may cause internal damages to the flexible tube.

- Ensure that the anchor weight is stable at the bottom of the tank. When installing NMT532 with a suspended anchor weight, use an anchor weight that weighs 16 kg or less.
- The flexible tube must be lowered carefully without overbending and scratching the inner edge of the nozzle hole.

### Mounting on pressurized tank

Pressurized tank is required to install a thermo well to protect the probe from the pressure.

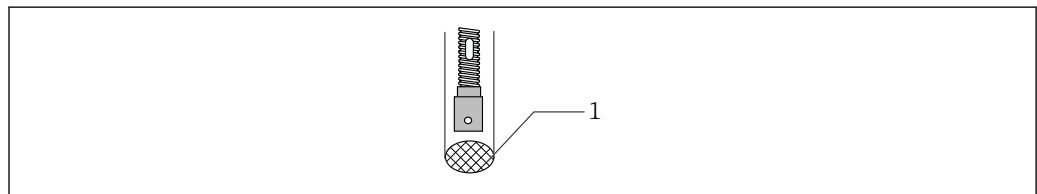


A0038605

21 Thermo well for a pressurized tank

- 1 NMS8x / NMS5
- 2 Ball valve
- 3 Measuring wire
- 4 Displacer
- 5 Stilling well
- 6 Calibration / maintenance chamber
- 7 NMT532
- 8 Thermo well

- i** If the pressure inside a tank exceeds the atmospheric pressure (absolute pressure 1 bar, 100 kPa, 14.5 psi), install a thermo well (protective pipe) with no holes or slits onto NMT532. However, NMS8x requires a stilling well with holes and slits.
- NMT532 is installed in the thermo well (protective pipe) from the top of the tank nozzle.
- Cover the bottom of the thermo well for NMT532 and weld it to protect the probe from the pressure.

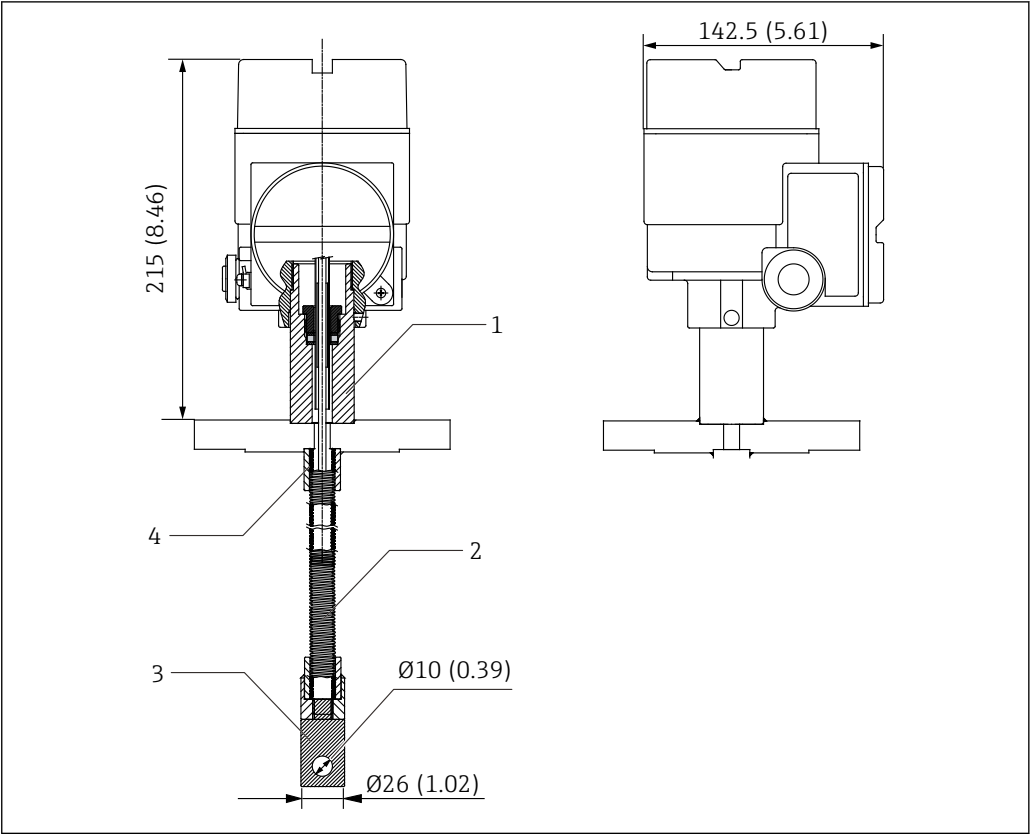


A0038606

22 Thermo well welding

- 1 Welding point

Dimensions of NMT532



A0038592

23 Dimensions of NMT532. Unit of measurement mm (in)

- 1 SUS304
- 2 Temperature probe (SUS316L) (see tips below.)
- 3 Bottom hook (SUS316)
- 4 SUS316

 The specifications of temperature probe vary depending on the tank height.

|                    |                                                                                                                                                                                                                                                         |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Weight             | Approx. 8 kg                                                                                                                                                                                                                                            |
| Number of elements | 6 points                                                                                                                                                                                                                                                |
| Temperature probe  | 11.5 m (37.72 ft)                                                                                                                                                                                                                                       |
| Flange             | NPS 2" Cl.150 RF, 304 flange ASME B16.5                                                                                                                                                                                                                 |
| Material           | <ul style="list-style-type: none"><li>■ Temperature measurement elements: Class A Pt100, IEC60751/DIN EN60751/JISC1604</li><li>■ Housing: Aluminum die cast</li><li>■ Temperature probe: SUS316, SUS316L flexible tube (refer to "Dimension")</li></ul> |

## Environment

|                            |                               |                                |
|----------------------------|-------------------------------|--------------------------------|
| <b>Ambient temperature</b> | -40 to 85 °C (-40 to 185 °F)  |                                |
| <b>Storage temperature</b> | -40 to 85 °C (-40 to 185 °F)  |                                |
| <b>Climate class</b>       | DIN EN 60068-2-38 (test Z/AD) |                                |
| <b>Protection class</b>    | <b>IP65/68 NEMA4X/6P</b>      | Housing with temperature probe |

### Electromagnetic compatibility (EMC)

When installing the probes to metal or concrete tanks and when using a coax probe:

|                 |                                                 |
|-----------------|-------------------------------------------------|
| <b>Emission</b> | Conforms to EN 61326, electrical device class B |
| <b>Immunity</b> | Conforms to EN 61326, Annex A (Industrial)      |

Interference emission and immunity apply to each standard shown above when installing probes in metal and concrete tanks and when using coax probes.

|                                  |                          |                              |
|----------------------------------|--------------------------|------------------------------|
| <b>Process temperature range</b> | <b>Temperature probe</b> | -20 to 100 °C (-4 to 212 °F) |
|----------------------------------|--------------------------|------------------------------|

**Process pressure limits** Atmospheric pressure (absolute pressure 1 bar, 100 kPa, 14.5 psi)



- Pressurized tank: When using a tank that exceeds this process pressure, install a thermo well (protective pipe) with no holes or slits onto NMT532 to protect the probes from the pressure inside the tank.
- Static pressure: Because NMT532 has undergone an airtightness test at absolute pressure of 7 bar, it can withstand static pressure in the 50 ml range in petroleum/chemical product applications.

|                          |                               |                          |
|--------------------------|-------------------------------|--------------------------|
| <b>Data transmission</b> | <b>Minimum cable diameter</b> | #24 AWG                  |
|                          | <b>Cable types</b>            | Twist pair with a shield |

### Stainless steel conversion table

The stainless steel material used in Endress + Hauser Yamanashi products uses expressions that conform to Japanese industrial standards such as JIS (Japanese Industrial Standard). Each country or region may have different expressions. The following conversion table shows the expression of equivalent stainless steel material based on chemical composition and mechanical properties.

| Country | Standard   | Expressions                    |               |                             |                    |
|---------|------------|--------------------------------|---------------|-----------------------------|--------------------|
| Japan   | JIS/TIIS   | SUS304                         | SUS304L       | SUS316                      | SUS316L            |
| Germany | DIN 17006  | X5 CrNi 18 10<br>X5 CrNi 18 12 | X2 CrNi 18 11 | X5 CrNiMo 17 12 2 / 1713 3  | X2 CrNiMo 17 13 2  |
|         | W.N. 17007 | 1.4301 1.4303                  | 1.4306        | 1.4401 / 1.4436             | 1.4404             |
| France  | AFNOR      | Z 6 CN 18-09                   | Z 2CN 18-10   | Z 6 CND 17-11 / 17 12       | Z2 CND 17-12       |
| Italy   | UNI        | X5 CrNi 1810                   | X2 CrNi 1911  | X5 CrNiMo 1712 / 1713       | X2 CrNiMo 1712     |
| U.K.    | BSI        | 304S15 / 304S16                | 304S11        | 316S31 / 316S33             | 316S11             |
| U.S.A.  | AISI       | 304                            | 304L          | 316                         | 316L               |
| E.U.    | EURONORM   | X6 CrNi 1810                   | X3 CrNi 1810  | X6 CrNiMo 17 12 2 / 17 13 3 | X3 CrNiMo 17 12 2  |
| Spain   | UNE        | X6 CrNi 19-10                  | X2 CrNi 19-10 | X6 CrNiMo 17-12-03          | X2 CrNiMo 17-12-03 |
| Russia  | GOST       | 08KH18N10<br>06KH18N11         | 03KH18N11     | -                           | 03KH17N14M2        |

| Country | Standard | Expressions |        |        |        |
|---------|----------|-------------|--------|--------|--------|
| -       | ISO      | 11          | 10     | 20     | 19     |
| -       | ASME     | S30400      | S30403 | S31600 | S31603 |



The standards may not necessarily correspond exactly to JIS because they are defined by their respective mechanical and chemical criteria.

## Operability

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### Operation using FieldCare

NMT532 can be operated with FieldCare. This program supports commissioning, securing of data, signal analysis and documentation of the instruments.

FieldCare supports the following functions:

- Online configuration of transmitters
- Loading and saving of instrument data (upload/download)
- Measurement position confirmation

## Certificates and approvals

**CE mark** By attaching the CE mark, Endress+Hauser confirms that the instruments have passed the required tests.

**RoHS** In compliance with RoHS directive 2011/65/EU (RoHS 2).

| Approval | Approval | Class                                                                                                            |
|----------|----------|------------------------------------------------------------------------------------------------------------------|
|          | ATEX     | II 1/2 G Ex ia IIB T4-T6 Ga/Gb                                                                                   |
|          | IECEX    | Ex ia IIB T4-T6 Ga/Gb                                                                                            |
|          | FM C/US  | IS Cl. I, Div. 1, Gr. C, D, T6, T4<br>IS Cl. I, Zone 0, AEx ia IIB, T6, T4<br>NI Cl. I, Div. 2, Gr. C, D, T6, T4 |
|          | NEPSI    | Ex ia IIB T4-T6                                                                                                  |

**External standards and guidelines** IEC 61326 Appendix: A, immunity according to table A-1

|                 |                                                                                                                              |
|-----------------|------------------------------------------------------------------------------------------------------------------------------|
| <b>EN 60529</b> | Protection class of housing (IP-code)                                                                                        |
| <b>EN 61326</b> | Emissions (equipment class B), compatibility (appendix A – industrial area) EN 61000-4-2 Immunity to electrostatic discharge |

## Order information

Detailed ordering information is available from the following sources:

- In the Product Configurator on the Endress+Hauser website: [www.endress.com](http://www.endress.com) -> Click "Corporate" -> Select your country -> Click "Products" -> Select the product using the filters and search field -> Open product page -> The "Configure" button to the right of the product image opens the Product Configurator.
- From your nearest Endress+Hauser sales organization: [www.addresses.endress.com](http://www.addresses.endress.com)



### **Product Configurator - the tool for individual product configuration**

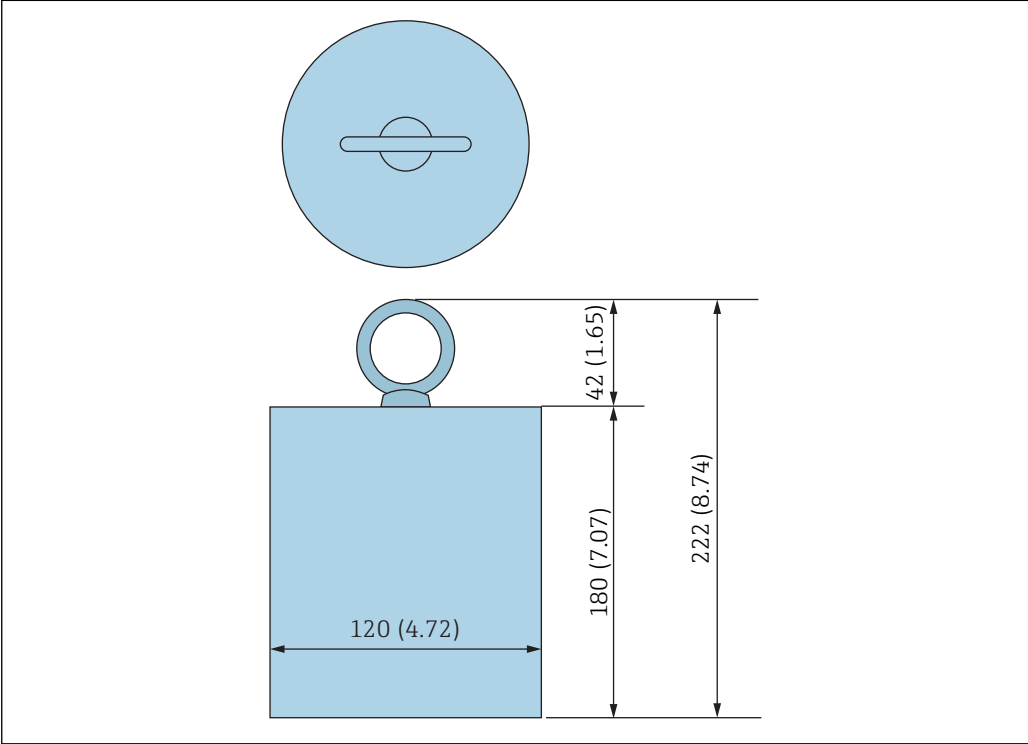
- Up-to-the-minute configuration data
- Depending on the device: Direct input of measuring point-specific information such as measuring range or operating language
- Automatic verification of exclusion criteria
- Automatic creation of the order code and its breakdown in PDF or Excel output format
- Ability to order directly in the Endress+Hauser Online Shop

## Accessories

Device-specific accessories

Anchor weight (high profile)

This anchor weight was designed for the converter + temperature probe version. Even when an anchor weight is used for the installation, the bottom element (bottom point temperature measurement position) will be set at approx. 500 mm above the tank bottom. When installing a high-profile anchor weight from a nozzle at the top of the tank, ensure that the nozzle opening is at least 150A (6").



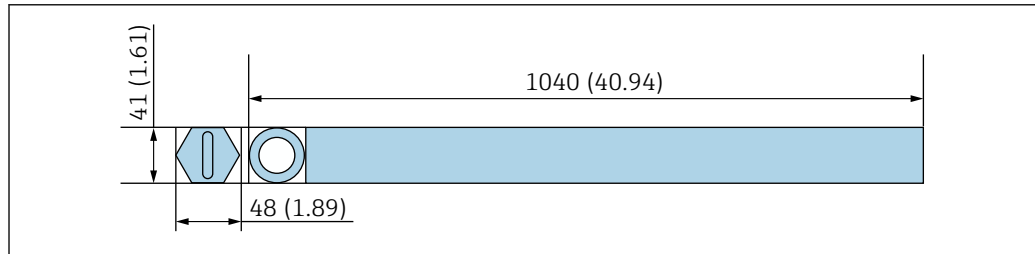
24 Installation attachment / Option B . Unit of measurement mm (in)

The anchor weight comes in different dimensions, weight and materials.

| Description | Details                     |
|-------------|-----------------------------|
| Weight      | JIS SS400 mild carbon steel |
| Eye-bolt    | JIS SS400 mild carbon steel |
| Mass        | 16 kg (35.3 lb)             |

### Anchor weight (low profile)

The low-profile anchor weight is mainly designed to secure a WB probe for measuring the WB measurement range accurately. It can also be used as an installation attachment for the converter + temperature probe version when trying to install a small tank nozzle (50A (2") or smaller) that is in use.



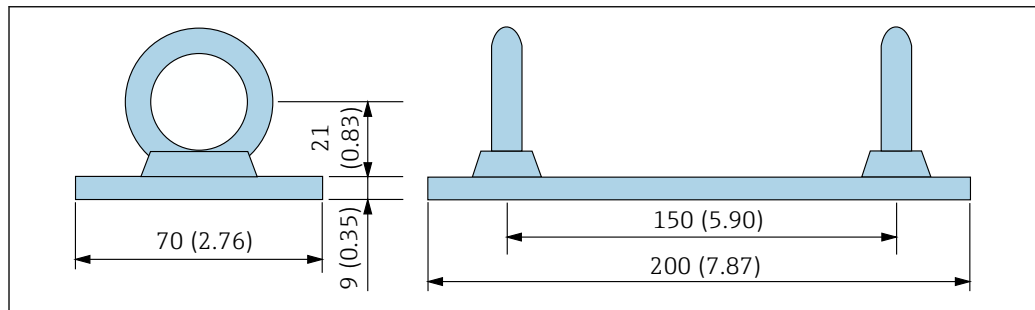
A0038536

25 Installation attachment / option C/G. Unit of measurement mm (in)

| Description | Details                     |
|-------------|-----------------------------|
| Weight      | JIS SS400 mild carbon steel |
| Eye-bolt    | JIS SS400 mild carbon steel |
| Mass        | 12 kg (26.46 lb)            |

### Wire hook

Wire hooks come in a variety of wire types, sizes, materials, and special coatings to suit installations for a wide range of applications. The actual tension is created by the securing wire between the wire hook and the top anchor (SUS316, stranded wire with a diameter of 3 mm (0.12 in)).



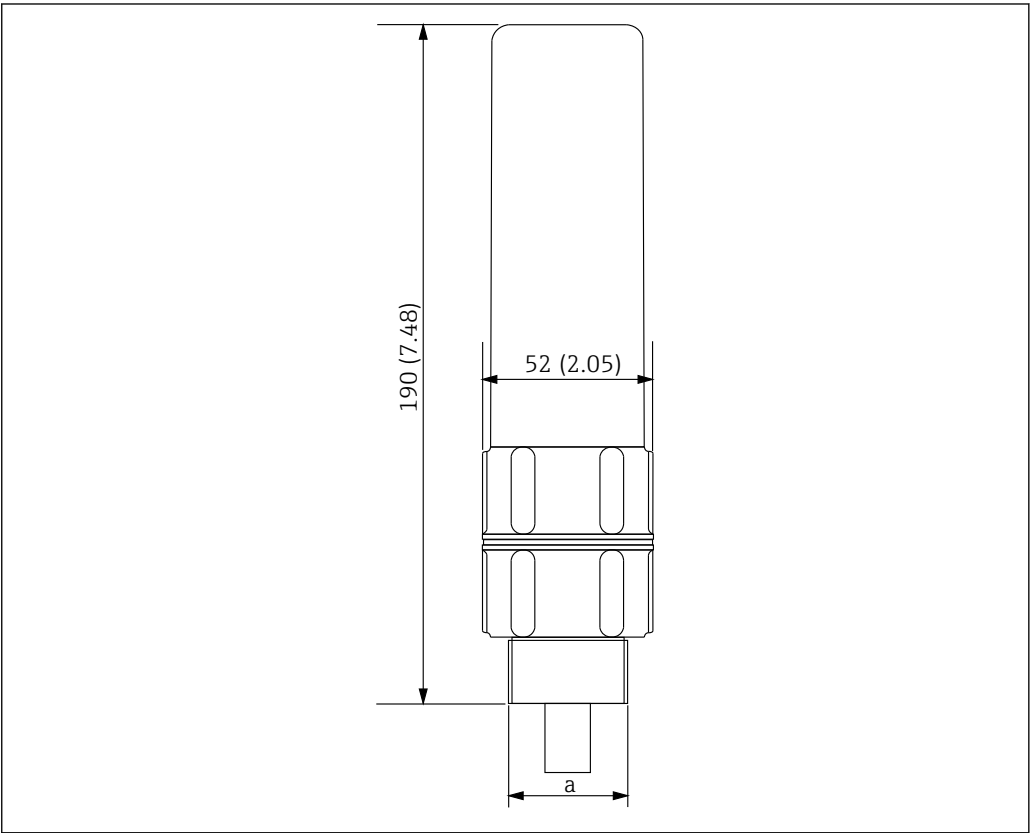
A0038537

26 Wire hook / option D/F. Unit of measurement mm (in)

| Description | Details                     |
|-------------|-----------------------------|
| Weight      | JIS SS400 mild carbon steel |
| Eye-bolt    | JIS SS400 mild carbon steel |
| Mass        | 1.5 kg (3.31 lb)            |

Top anchor

The standard threaded connection for a top anchor is an NPT1 or R1 threaded connection. It can accommodate different thread sizes, materials and special specifications. A joint flange is also possible.



A0038538

27 Top anchor dimensions. Unit of measurement mm (in)

a R1 or NPT1 (specified by the order code)

| Description | Details          |
|-------------|------------------|
| Exterior    | ADC (aluminum)   |
| Interior    | SUS316           |
| Mass        | 1.2 kg (2.65 lb) |

## Documentation



For an overview of the scope of the enclosed associated technical documentation, refer to the following:

- The *W@M device viewer*: Enter the serial number from the nameplate ([www.endress.com/deviceviewer](http://www.endress.com/deviceviewer)).
- The *Endress+Hauser operations app*: Enter the serial number from the nameplate or scan the 2-D matrix code (QR code) on the nameplate.

### Technical information

The technical information 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.

| Instrument        | Technical information          |
|-------------------|--------------------------------|
| Prothermo NMT532  | TI000049G                      |
| Proservo NMS5     | TI00452G                       |
| Proservo NMS8x    | TI01248G / TI01249G / TI01250G |
| Micropilot NMR8x  | TI01252G / TI01253G            |
| Promonitor NRF560 | TI00462G                       |
| Promonitor NRF81  | TI01251G                       |

### Operating instructions (BA)

The operating instructions contain all the information that is required during 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.

They also contain detailed information on the parameters in the operation menu. The description is aimed at those who work with the device over its entire life cycle and perform specific configurations.

| Instrument       | Operating instructions |
|------------------|------------------------|
| Prothermo NMT532 | BA01032G               |

### Safety instructions (XA)

| Feature 010 ("Approval") | Meaning                        | Ex / XA     |
|--------------------------|--------------------------------|-------------|
| B                        | ATEX Ex ia IIB T4-T6           | XA00584G    |
| F                        | IEC Ex ia IIB T4-T6            | XA00581G    |
| G                        | NEPSI Ex ia IIB T4-T6          | XA01260G    |
| M                        | INMETRO Ex ia IIB T4-T6        | XA00581G    |
| 7                        | FM C/US IS Ci. I Div.1 Gr. C-D | Ex461-852-1 |

## Registered trademarks

### **FieldCare®**

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

### **HART®**

Registered trademark of the FieldComm Group, Austin, USA.

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[www.addresses.endress.com](http://www.addresses.endress.com)

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