

Technical Information

Prothermo NMT539

Intrinsically safe multi-signal converter with precision average temperature and water bottom sensor for inventory control and custody transfer applications



Application

Prothermo NMT539 is based on the API (American Petroleum Institute) Manual of Petroleum Measurement Standard, Chapter 7, and enables highly accurate temperature measurement. At the same time, it is an intelligent average temperature sensor for tank gauging with an optional WB capacitance sensor at the bottom of the temperature probe. For average temperature measurement, it comprises precision multi-spot Pt100 elements capable of accurately measuring temperature. NMT539 is a highly capable solution that provides both constant average temperature data and water level 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 and benefits

- 2-wire local HART communication is employed and complete digital design without data transmission error is used.
- Intrinsically safe device allowing for the safest electrical configuration possible
- Available in three different versions based on customer requirements:
 - Converter Only
 - Converter and Temperature probe
 - Converter, temperature and water bottom (WB) probe
- Converter is compatible with Pt100, Cu90, and PtCu100.
- Variety of process connections and cable entries available to meet worldwide classifications.

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Important document information

Notes on safety conventions and symbols

Symbols for safety conventions

| Symbol | Meaning |
|--|--|
|  <small>A001189-EN</small> | DANGER! This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury. |
|  <small>A001190-EN</small> | WARNING! This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury. |
|  <small>A001191-EN</small> | CAUTION! This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury. |
|  <small>A001192-EN</small> | NOTICE! This symbol contains information on procedures and other facts which do not result in personal injury. |

Symbols for certain types of information

| Symbol | Meaning |
|---|---|
|  <small>A001182</small> | Allowed Indicates procedures, processes or actions that are allowed. |
|  <small>A001183</small> | Recommendation Indicates procedures, processes or actions that are recommended. |
|  <small>A001184</small> | Forbidden Indicates procedures, processes or actions that are forbidden. |
|  <small>A001193</small> | Tip Indicates additional information. |

Function and system design

System design

NMT539 is available in three different versions:

- Converter only
- Converter + Average temperature probe
- Converter + Average temp probe + Water bottom probe

The converter-only version can be retrofitted without significant modifications onto existing third-party average temperature probes, such as the Whessoe Varec 9909 and 1700 and the Weed Beacon MW type probes. The average temperature probe + converter combines a local HART signal converter for a temperature measurement function and a probe. The average temperature + WB + converter is the ultimate multi-function sensor, transmitting temperature and water interface level data along a pair of local HART signal cables to the host NMS5, NMS8x, NMR8x, NRF81, TGM5, TMD1, or NRF590.

NMT539 principle (Converter + Temp + WB probe version)

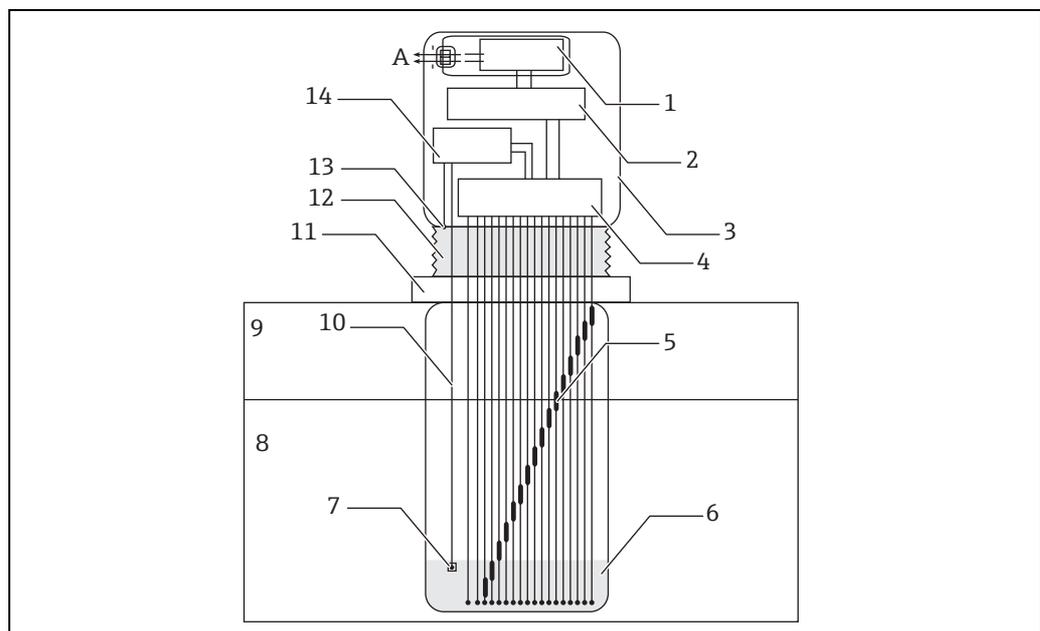


Figure 1: NRF560 System Configuration

- | | |
|----|--|
| A | Local HART communication |
| 1 | Noise filter |
| 2 | Power supply module |
| 3 | Converter housing (electrical compartment) |
| 4 | CPU module |
| 5 | Pt100 Multi-spot elements up to 16 points |
| 6 | Capacitance water bottom (WB) sensor |
| 7 | Water bottom sensor coaxial signal cable |
| 8 | Liquid |
| 9 | Gas |
| 10 | Isolated capacitance signal data to C/F Module |
| 11 | Flange |
| 12 | Height adjustable screw for flange |
| 13 | Water bottom sensor flame gland |
| 14 | C/F module |

NOTICE

- Each type of NMT539 including converter only or converter + average temperature are simplified versions for combination of converter + average temperature probe + WB (Water Bottom) Probe.
- Multi-spot elements up to 2 points can be installed in the water bottom sensor.

System design 2

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.

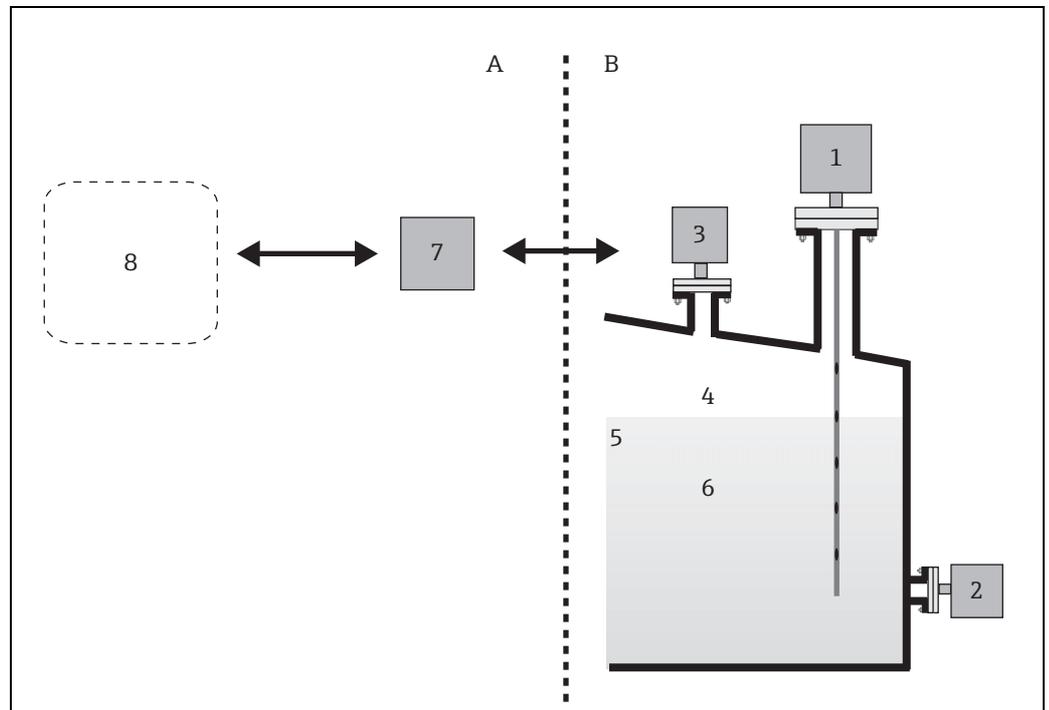


Figure 2: System diagram

- A *Field process*
- B *Data management*
- 1 *Average temperature*
- 2 *Pressure gauge*
- 3 *Level gauge*
- 4 *Gas temperature*
- 5 *Liquid level*
- 6 *Liquid temperature*
- 7 *System (Filed interface, NXA820/NXA83)*
- 8 *Host application (Tankvision, DCS, PLC, others)*

NMT539 Ex ia and NMS8x Ex d [ia] combination

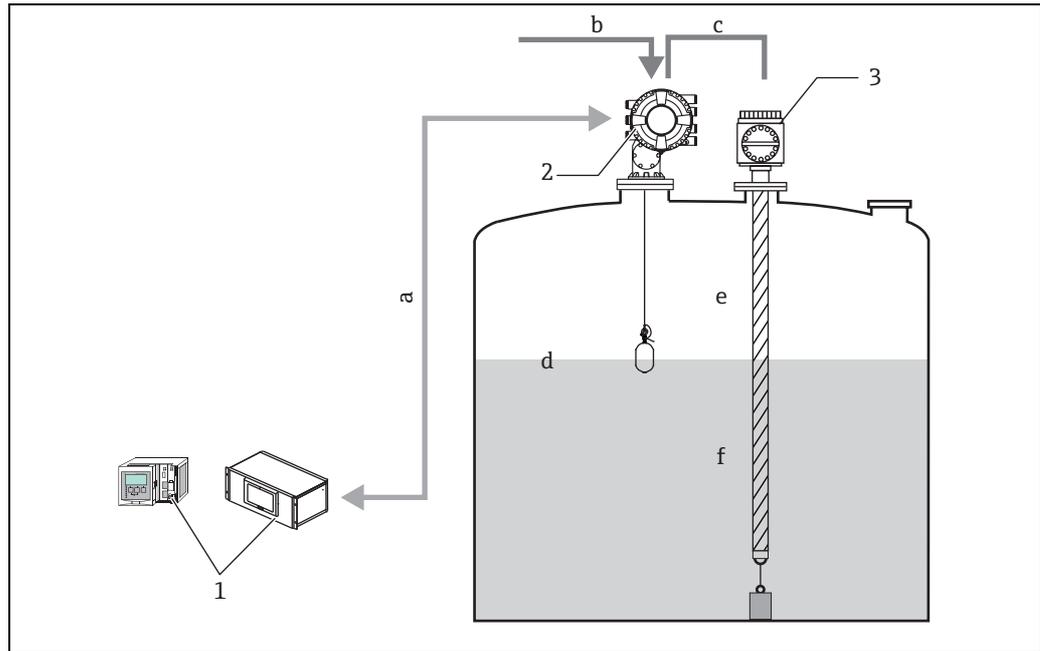


Figure 3: System Layout (ATEX, FM, CSA, Ex i) with NMS5 and NMS8x

- a Filedbus protocol
- b Power supply
- c Local HART (Ex i) communication (Data transmission)
- d Liquid level
- e Gas temperature
- f Liquid temperature
- 1 Tankvision
- 2 NMS8x/NMS5
- 3 NMT539

i The connection of NMT539 shown above is only available to connect with NMS5 or NMS8x.

NMT539 Converter + Temp. Probe

NMT539 is the successor of the former NMT535, and inherits all the functionality and specifications of NMT535 including connection flange specifications, cable entries and wiring method.

Since NMS5 or NMS8x already provides water bottom measurement, they can be used in combination with the NMT539 converter + average temperature probe. When the converter + WB + average temperature version is used in combination with NMS5 or NMS8x, the level, continuous average temperature, and water bottom measurement of the liquid in the tank can be measured at the same time.

Most configuration and parameter settings for NMT539 can be performed via NMS5 or NMS8x. NMT539 receives liquid level data from NMS5, then calculates liquid and gas phase average temperature. The average temperature data of liquid phase and gas phase will be transferred to NMS5 or NMS8x together with the measured temperature at each temperature element and the status information of NMT539.

i All of the data collected by field interface units is transmitted to the inventory management software (Tankvision) or directly to the customer's DCS or PLC..

NMT539 Ex ia and NMR8x Ex d [ia] combination

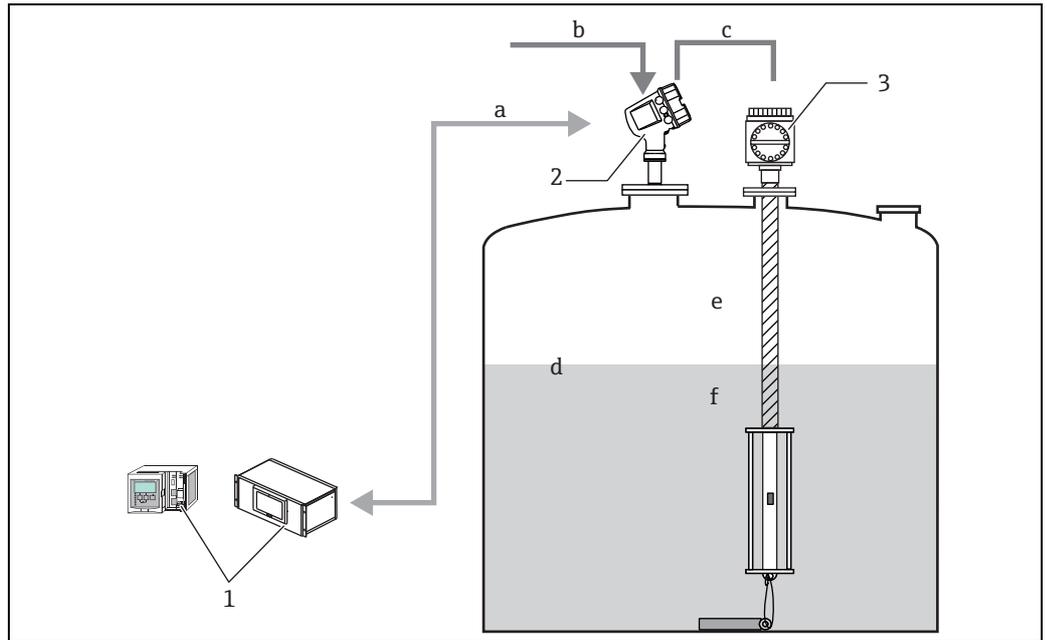


Figure 4: System layout NMT539 Ex ia + NMRx Ex d [ia]

- a Fieldbus protocol
- b Power supply
- c Local HART (Ex i) communication (Data transmission)
- d Liquid level
- e Gas temperature
- f Liquid temperature
- 1 Tankvision
- 2 NMR8x
- 3 NMT539

i The connection of NMT539 shown above is only available to connect with NMR8x Ex d [ia].

NMT539 Ex ia and NRF81 Ex d [ia] combination

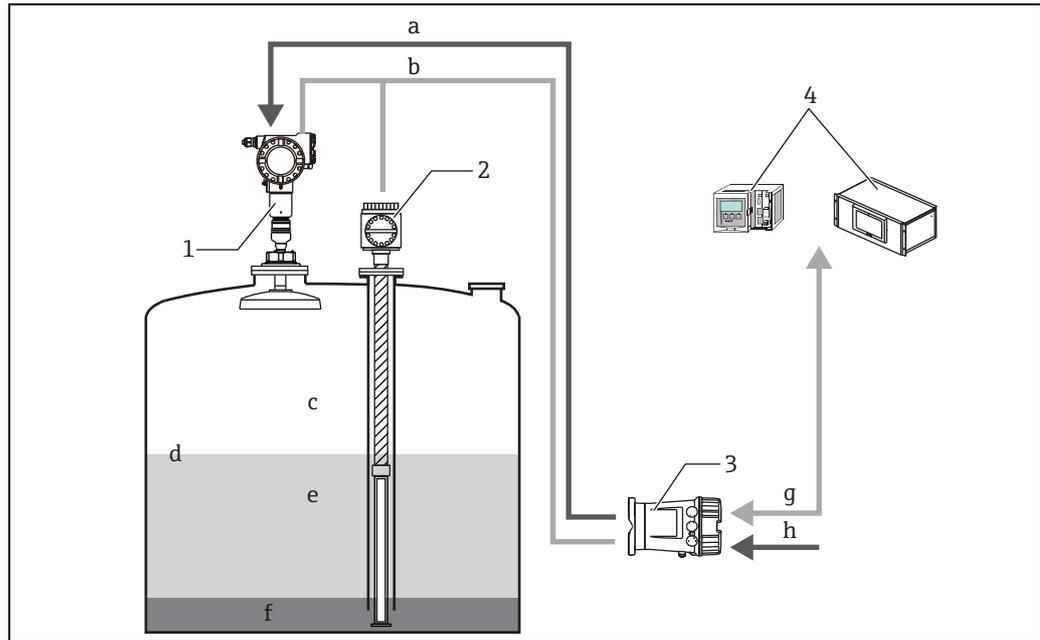


Figure 5: System layout NMT539 Ex ia + NRF81 Ex d [ia]

- a FMR power supply (DC/Exi)
- b Local HART (Ex i) communication (Data transmission)
- c Gas temperature
- d Liquid level
- e Liquid temperature
- f Water
- g Fieldbus protocol
- h Power supply
- 1 FMR540
- 2 NMT539
- 3 NRF81/NRF590
- 4 Tankvision

NMT539 Converter + Temp. + WB version

NMT539 converter + temperature + WB version is optimal for combination with radar. For optimal inventory management, NMT539 can collect data via NRF590 or NRF81 and calculate it, while performing WB measurement, temperature measurement, and liquid level measurement. NMT539's detailed functions and data can be accessed from NRF81 or NRF590. NMT539 receives radar meter level data from NRF590 or NRF81, and calculates the average temperature of the liquid and gas phases. The liquid and gas phase average temperature data is transmitted to NRF81 or NRF590 together with the measured temperature at each temperature element and the status information of NMT539.

i All of the data collected by field interface units is transmitted to the inventory management software (Tankvision) or directly to the customer's DCS or PLC.

**NMT539 Ex d [ia] and TMD1
Ex d combination**

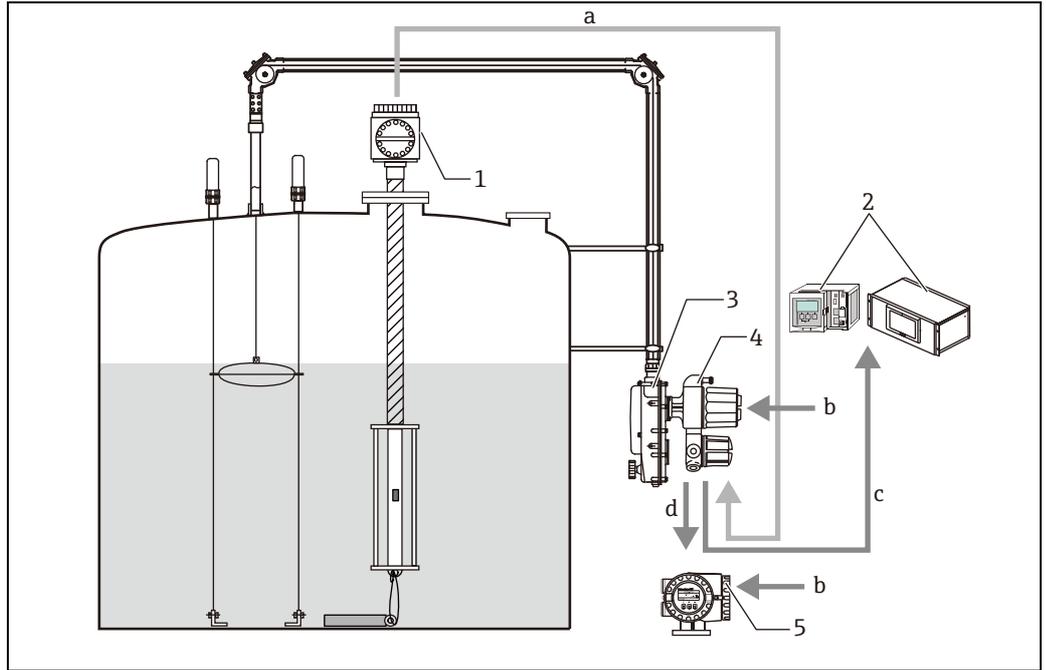


Figure 6: System layout NMT539 Ex d [ia] + TMD1 Ex d

- a Local HART (Ex i) communication (Data transmission)
- b Power supply
- c Digital output
- d HART (Ex d) communication
- 1 NMT539
- 2 Tankvision
- 3 LT5
- 4 TMD1
- 5 NRF560

Prothermo NMT539 and transmitter TMD1 can be connected via local HART communication.

NOTICE

If NMT539 with WB probe and NRF560 are used together, confirm that the supply voltage to TMD1 is stable at 100 VAC or more.

**NMT539 Ex d [ia] and TGM5
or NMS5 combination**

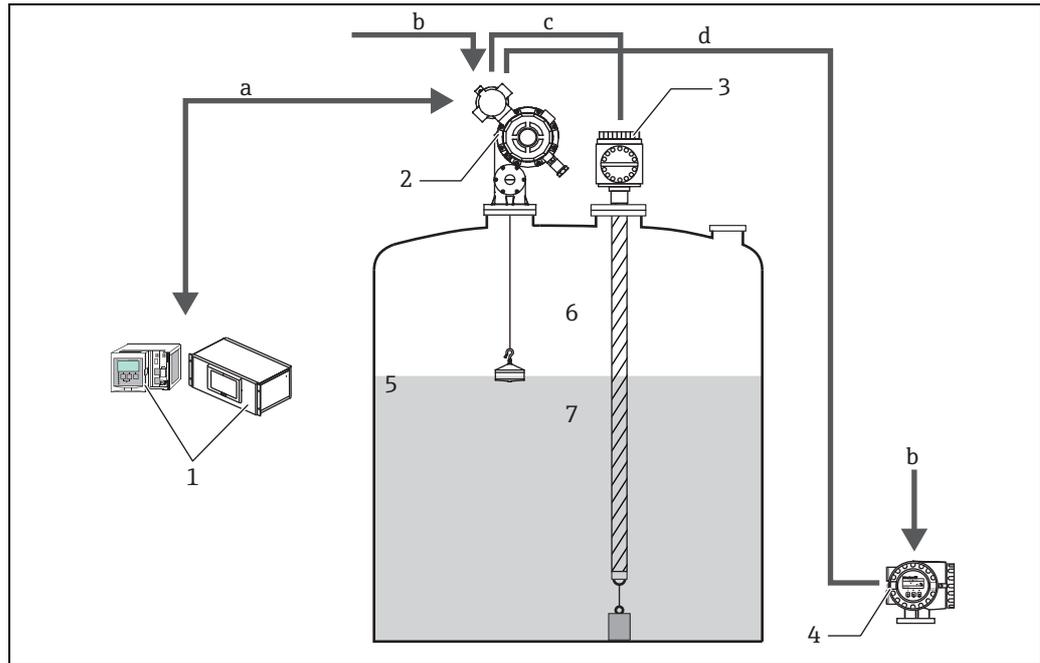


Figure 7: System layout NMT539 Ex d [ia] + TGM5 Ex d

- a Filedbus protocol
- b Power supply
- c Local HART (Ex d) communication (NMT539 and TGM5)
- d Local HART (Ex d) communication (TGM5 and NRF560)
- 1 Tankvision
- 2 TGM5
- 3 NMT539
- 4 NRF560
- 5 Liquid
- 6 Gas temperature
- 7 Liquid temperature

NOTICE If NMT539 with WB probe and NRF560 are used together, confirm that the supply voltage to TMD1 is stable at 100 VAC or more.

Installation to fixed roof tank

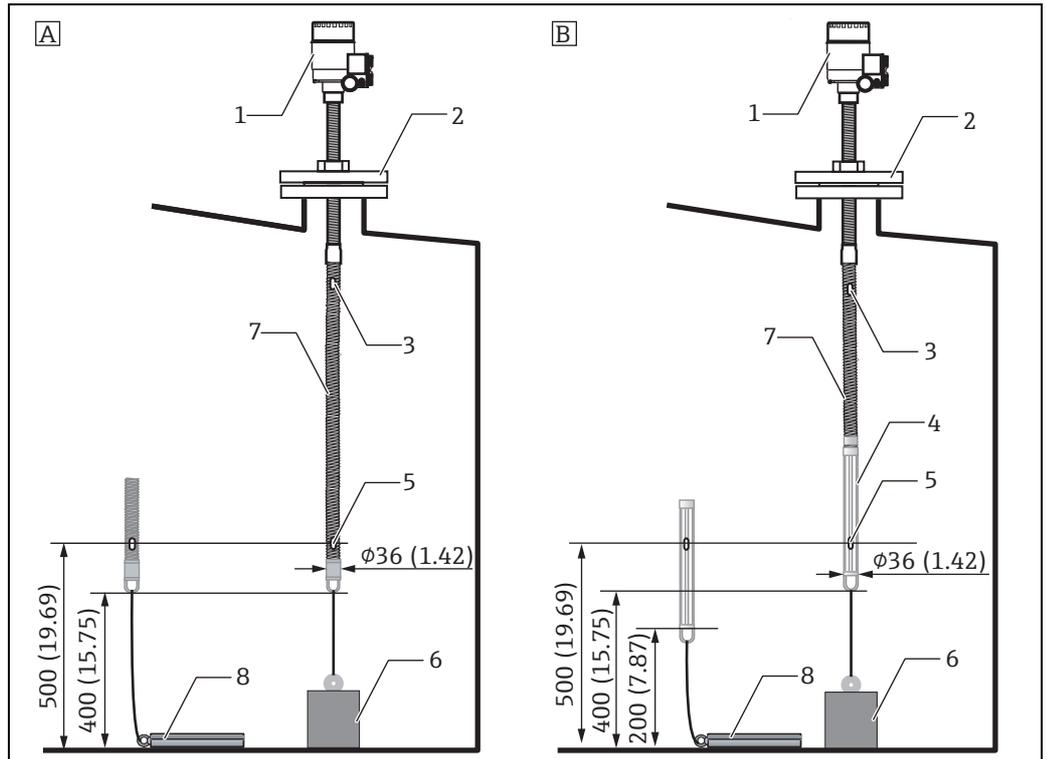


Figure 8: Fixed roof tank, Unit of measurement: mm (in)

- A Without water bottom sensor
- B With water bottom sensor
- 1 Transmitter (electrical compartment)
- 2 Flange
- 3 Uppermost element
- 4 Water probe sensor
- 5 Lowermost element
- 6 Anchor weight for high profile
- 7 Temperature probe
- 8 Anchor weight for low profile

Installation to floating roof tank 1

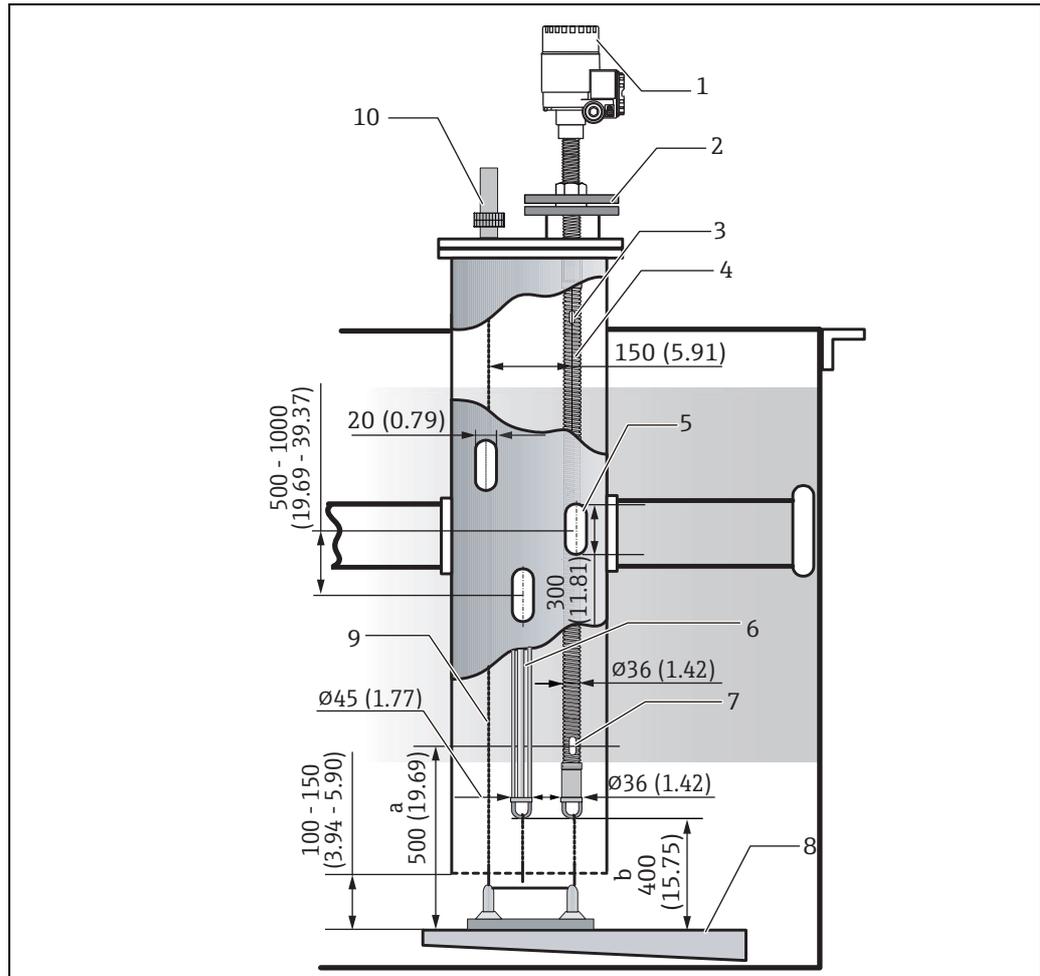


Figure 9: Floating roof tank 1, Unit of measurement: mm (in)

- a* Distance from the bottom of the tank to the lowermost element
- b* Distance from the bottom of the tank to the bottom hook
- 1 Transmitter (electrical compartment)
- 2 Flange
- 3 Uppermost element
- 4 Temperature probe without WB sensor
- 5 Gas hole
- 6 Temperature probe with WB sensor
- 7 Element position #1 (Lowermost element)
- 8 Base plate
- 9 Tensioning wire
- 10 Top anchor

Installation to floating roof tank 2

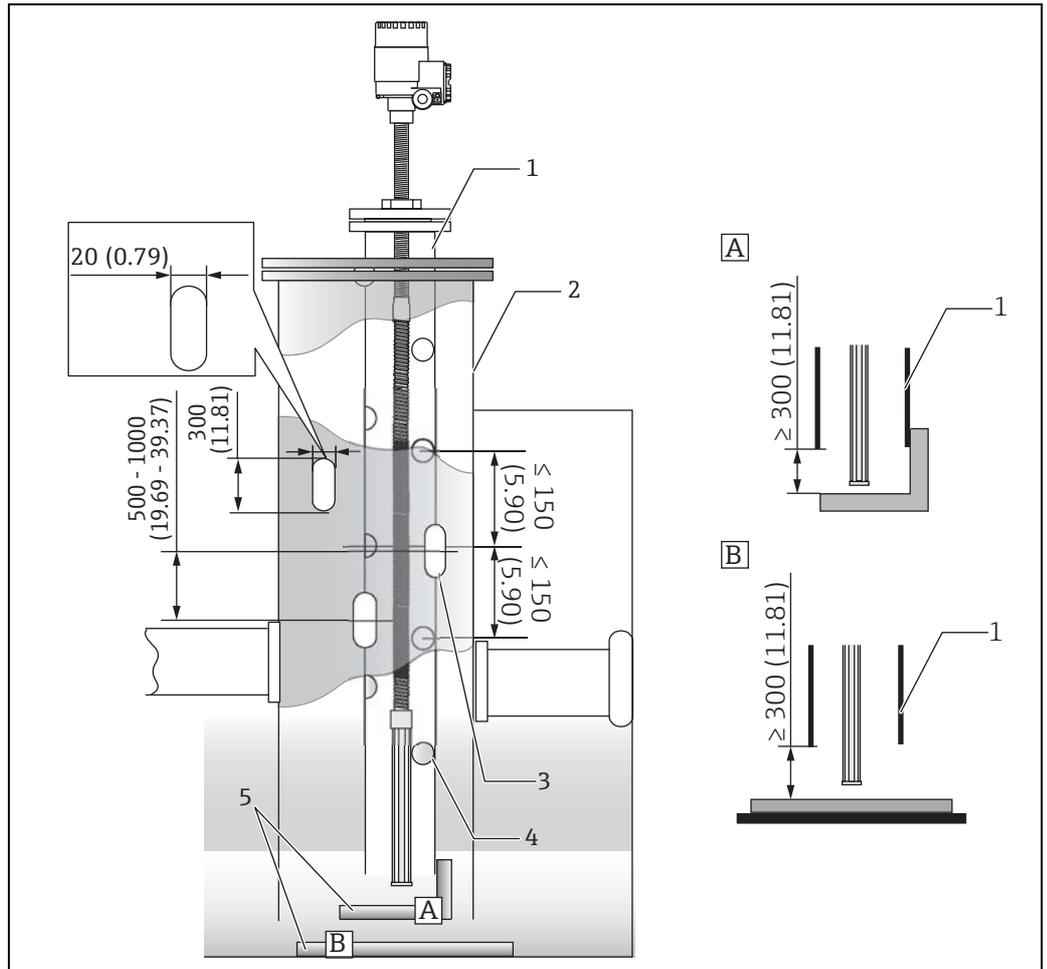


Figure 10: Floating roof tank 2, Unit of measurement: mm (in)

- A Base plate 1
- B Base plate 2
- 1 Stilling well
- 2 Fixed pipe
- 3 Gas hole
- 4 Hole
- 5 Base plate

Installation to floating roof tank 3

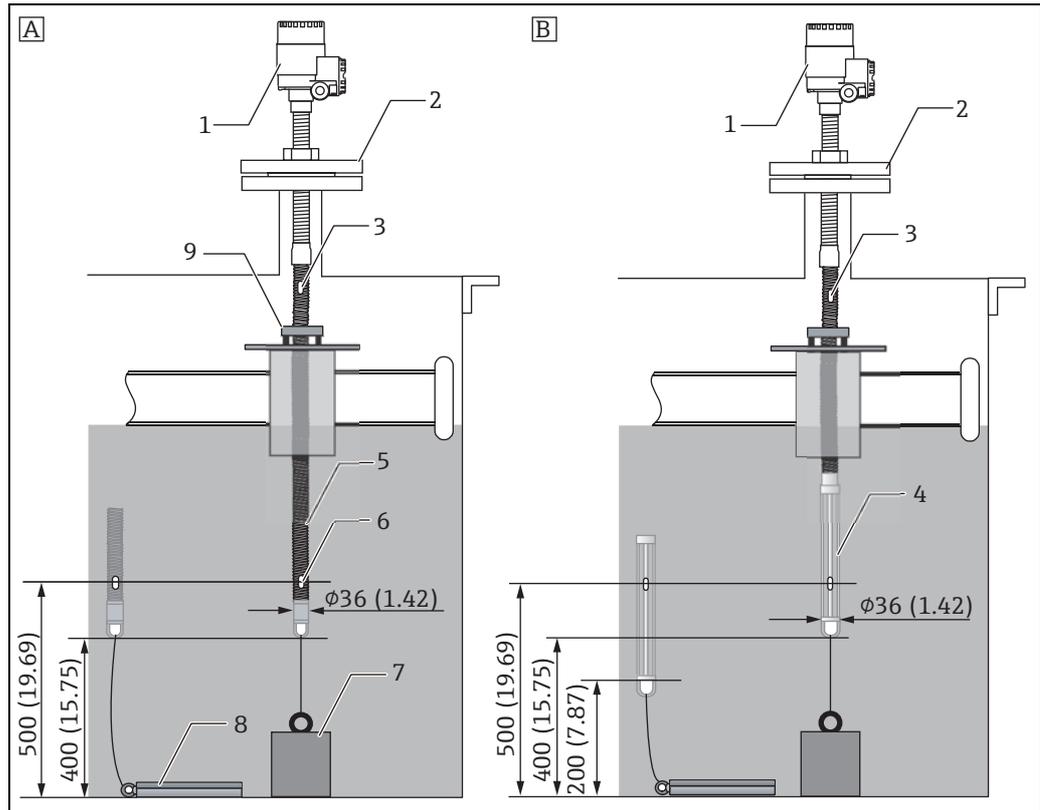


Figure 11: Floating roof tank 3, Unit of measurement: mm (in)

- A Temperature probe without WB sensor
- B Temperature probe with WB sensor
- 1 Transmitter (electrical compartment)
- 2 Flange
- 3 Uppermost element
- 4 Water probe
- 5 Temperature probe
- 6 Lowermost element
- 7 Anchor weight for high profile
- 8 Anchor weight for low profile
- 9 Guide ring

Application for pressurized tank

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

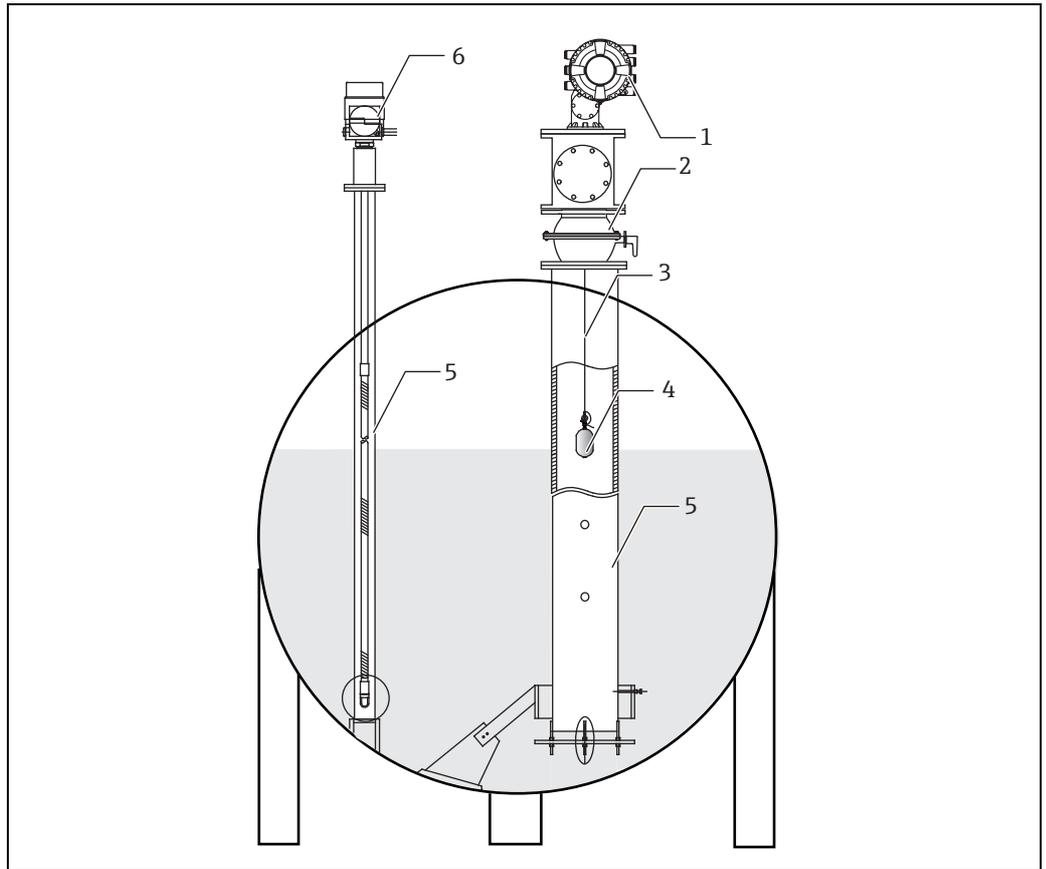


Figure 12: Stilling well for pressurized tank

- 1 NMS8x/NM5
- 2 Ball valve
- 3 Measuring wire
- 4 Displacer
- 5 Stilling well
- 6 NMT539

CAUTION

- When the pressure inside the tank exceeds 1 bar (100KPa, 14.5psi), a stilling well that does not have any holes or slits must be installed for the NMT539. However the NMS8x and NMT5 require a stilling well with holes or slits.
- The NMT539 is installed in the stilling well from the top of the tank nozzle.
- Cover the bottom of the stilling well of the NMT539 and weld it to protect the probe from the pressure.

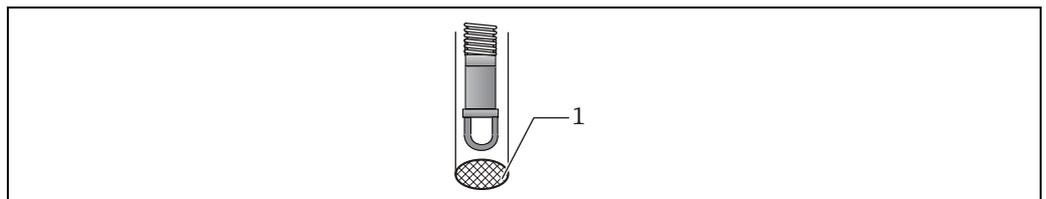


Figure 13: Welding part of stilling well

- 1 Welding part

Input and output

| | |
|--|--|
| Measured variables | <p>Temperature measuring range</p> <p>Temperature conversion: -200 to +235 °C (-170 to +235 °C TIIS)</p> <p>Standard: -40 to +100° C (-20 to +100 °C TIIS)</p> <p>Wide range: -55 to +235 °C (-20 to +235°C TIIS)</p> <p>Cryogenic: -170 to +60 °C</p> <p>Probe length: Max. 99.9999 m (333.33 ft) (ATEX, IECEx, NEPCI), Max. 40.000 m (131.2 ft) (TIIS, FM, CSA)</p> <p>Water interface level (Water bottom) range</p> <p>Standard: 1 m or 2 m (3.3 to 6.6 ft)</p> <p> If the range exceeds the standard, contact local Endress+Hauser representatives</p> |
| Compatible element (Converter only version) | <ul style="list-style-type: none"> ▪ Pt100 ▪ Cu90 ▪ Cu100 ▪ PtCu100 ▪ JPt100 <p>TIIS is only available for Pt100 and JPt100.</p> <p> NMT539 Converter + Temp. version has only Pt100 elements installed. The element types above can be utilized in third party temperature probes, such as the Endress+Hauser 9909, 1700 or Weed Beacon MWR. Other manufacturer multi-resistant and multi-spot average temperature probes may be compatible.</p> |
| Number of elements | 2 to 16 points |
| Communication | <p>Local HART (only for local host)</p> <ul style="list-style-type: none"> ▪ Proservo NMS5/NMS7/NMT8x ▪ Micropilot NMR8x ▪ Tank side monitor NRF560/NRF81 ▪ Digital transmitter TMD1 ▪ Servo gauge TGM5 <p>Local HART</p> <p>Local HART is Endress+Hauser's original signal system that uses only local HART protocol for digital transmission without a 4 to 20 mA current signal. Local HART is used for communication between NMT539, NRF560, NMS5, NMS7, NMS8x, NMR8x, NRF590, NRF81, TMD1, and TGM5.</p> |
| Alarm signal | <p>Error information via the following interface and transmission digital protocol. Refer to Operating Instructions for details of each device.</p> <ul style="list-style-type: none"> ▪ NMS5: BA00401G, NMS7, BA01001G, NMS8x, BA1456G, BA1459G, BA1462G ▪ NMR8x: BA01450G, BA01453G ▪ NRF590: BA00256F, BA00257F, NRF81, BA01465G ▪ TMD1: BA00427G ▪ TGM5: BA00415G |
| Output signal | <ul style="list-style-type: none"> ▪ Local HART protocol |
| Connection | <ul style="list-style-type: none"> ▪ Proservo NMS5/NMS7/NMT8x ▪ Micropilot NMR8x ▪ Tank side monitor NRF560/NRF81 ▪ Digital transmitter TMD1 ▪ Servo gauge TGM5 |

Auxiliary energy

| | |
|-------------------------------|---|
| Load HART | Minimum loading for local HART circuit: 250 Ω |
| Overvoltage protection | NMT539 has internal surge arrester which complies with EN / IEC 61000-4-5 (Line to Line 1.0kV). Connect the metallic housing of the NMT539 to the tank wall directly with an electrically conductive lead to ensure reliable potential matching. |
| Supply voltage | DC16 to 30V: Ex ia DC20 to 24V: TIS Ex d [ia] connectable only TGM5, TMD, NMS: Ex d |
| Power consumption | Ex ia 6 mA (Temperature measurement) 12 mA (WB measurement) TIS Ex d [ia] 8 mA (Temperature measurement) 14 mA (WB measurement) |

Performance characteristics

| | |
|---------------------------------------|---|
| Temperature accuracy | <p>$\pm 0.1^{\circ}\text{C}$ or better (under the reference condition)*1</p> <p>Reference condition*1:</p> <p>Accuracy of RTD - temperature conversion. Accuracy measurement shall be conditioned with precisely calibrated dial resistor or IEC60751/DIN EN 60751 class A Pt100 temperature element.</p> |
| WB sensor accuracy | <p>± 2 mm or less (under the reference condition)*2</p> <p>Reference condition*2:</p> <p>Measurement condition is based on 80% span of 1m probe in water / air interface at a temperature of 25°C.</p> <p>The factory default is adjusted based on DC (ϵ_r) = 2.1</p> |
| Reference operating conditions | <ul style="list-style-type: none"> ■ Temperature = $+25^{\circ}\text{C}$ (77°F) ± 5 (9°F) ■ Pressure = 1013 mbar abs. ± 20 mbar abs. (1013hPa abs. ± 20hPa abs., 14.7 psi abs ± 0.3 psi abs.) ■ Relative humidity (air) = $65\% \pm 20\%$ (linearity) |
| Maximum measured error | <p>Typical statements for reference conditions, include linearity, repeatability, and hysteresis:</p> <p>Linearity:</p> <p>Temperature: $\pm 0.15^{\circ}\text{C}$ (0.27°F) + value of element deviation (based on IEC 60751/ DIN EN 60751)</p> <p>Standard version class A: $\pm (0.15 + 0.002 \times \text{t})$</p> <p>PTB version class 1/10 B: $\pm (0.3 + 0.005 \times \text{t})/10$</p> <p>WB: ± 2 mm *2</p> |
| New module | NMT539 employs a completely new electronic module compared to the previous NMT535. |

| | NMT539 | NMT535 |
|---|--|---------------|
| CPU Performance | 16 bit | 8 bit |
| Clock Speed | 2.7648 MHz | 0.9216 MHz |
| Memory Capacity (RAM) | 20 K bytes | 176 bytes |
| EEPROM | 2 K bytes | 256 bytes |
| Flash Memory | 256 K bytes | 16 K bytes |
| Total # of Print Boards | 4 (5 with Capacitance board) | 5 |
| Current Consumption (Converter + Temp. Probe) | 6 mA: 16VDCEx ia 8 mA: 16VDCEx d [ia] | 10 mA: 16 VDC |
| Current Consumption (Converter + Temp. Probe + W.B. Probe) | 12 mA: Ex ia 14 mA: Ex d [ia] | |

All-in-one program The powerful processor enables multi-function calculations under a single program. This means that there is no need for a variety of spare parts.

RTD Temperature calculation

The main CPU board now has all the required data processing functionality, including RTD - local HART conversion. With the NMT 538, various programs were required depending on temperature element characteristics, such as Pt100, Cu90, Cu100 and PtCu100. The new NMT539 has all the programs in one powerful processor.

Capacitance - Local HART signal conversion

A separate C/F (Capacitance - Frequency) module can be connected directly to the CPU board when NMT539 is equipped with WB sensor.

Operating condition: Environment and process

| | |
|--------------------------------------|---|
| Ambient temperature range | -40 to +85 °C (-40 to +185°F) -20 to +60 °C (-4 to +140°F) for TIS |
| Storage temperature | -40 to +85 °C (-40 to +185°F) |
| Climate class | DIN EN 60068-2-38 (test Z/AD) |
| Degree of protection | <ul style="list-style-type: none">▪ Housing: IP65 (Converter only, open housing: IP20)▪ Probe: IP68 |
| Electromagnetic compatibility | When installing the probes in metal and concrete tanks and when using a coax probe: <ul style="list-style-type: none">▪ Interference Emission to EN 61326, Electrical Equipment Class B▪ Interference Immunity to EN 61326, Annex A (Industrial) |
| Process temperature range | Temperature probe: -170 to +235 °C (-274 to +455 °F) WB probe: 0 to +100 °C (+32 to +212 °F) |
| Process pressure limits | 1 bar (100 kPa, 14.5 psi)  CAUTION If the tank inside is over this process pressure, it is required to install stilling well to protect the probe from the pressure. |
| Data transmission | Minimum cable dimension: #24 AWG Cable type: Twisted pair with sealed |

Operating condition: Installation

Cable glands

Wiring of the NMT539 must meet explosion proof or intrinsically safe requirements.

The following cable entries are available:

- Thread G 1/2"
- Thread NPT 1/2"
- Thread M20

Only G1/2 is selectable for TIIS Ex d [ia] and for TIIS Ex d [ia], 2 cable glands SXC-16B are attached.

CAUTION Ensure to use the cable glands attached to NMT539. Cable gland is not provided for other NMT539 specifications excluding TIIS Ex d [ia]. Size and condition of the communication cable must meet the requirements of intrinsically safe local HART communication.

Process connection

Converter only version

NMT539's local HART converter can fit onto third party average temperature probes with the following mechanical connection size and type:

- G 3/4" (equivalent to NPS 3/4") universal coupling: Housing type 1
- M20 threaded: housing type 2, specific design to fit to Varec 1700 terminal housing



- Use sealing tape to secure the connection between converter and temperature probe.
- Refer to the NMT539 instruction manual for the detailed installation procedure.

Converter + Temp. Converter + Temp. + WB Version

All versions have the same installation method to fit with the tank nozzle.

The following flange sizes are available:

- 10K 50A RF, SUS316, flange JIS B2220
- NPS 2" Cl.150 RF, SUS316 flange ASME B16.5
- DN50 PN10 B1, SUS316, flange EN1092-1 (DIN2527 B)
- 50A 150lbs RF, SUS316, flange JPI 7S-15

Height adjustment for NMT539

When installing NMT539, height adjustment can be performed within approximately ± 180 mm (7") from the original height.



The height adjuster is not included in "Converter Only" version.

CAUTION Tighten the lock nut with sealing tape to secure NMT539 flange at the end of installation. A loose lock nut may lead to improper tank sealing or unexpected leakage into the tank.

WB blocking distance

The water bottom (WB) probe has an installation height adjustment function that allows installation at any desired height. This can be used to finely adjust the bottom clearance to the tank floor. The capacitance-type WB meter mounted on NMT539 has a unique construction that enables it to establish a ground reference with the unit alone, so there is almost no influence from the tank side or bottom. This makes it possible to measure from a height as close to the tank bottom as desired. Due to the mechanical design of WB sensor, bottom plate has approximately 10 mm (0.39 in) thickness. This will become a blocking distance (ineffective measuring range).

CAUTION Consider the vertical movement of NMT539 installation height prior to setting the WB probe tank bottom clearance. Typical tank shell deformation causes vertical movement at a minimum 20 to 30 mm (1 in). If the WB probe contacts the tank floor, it may experience an excessive weight load of the entire NMT539, it may become unable to perform accurate and stable WB measurement.

Recommended installation height

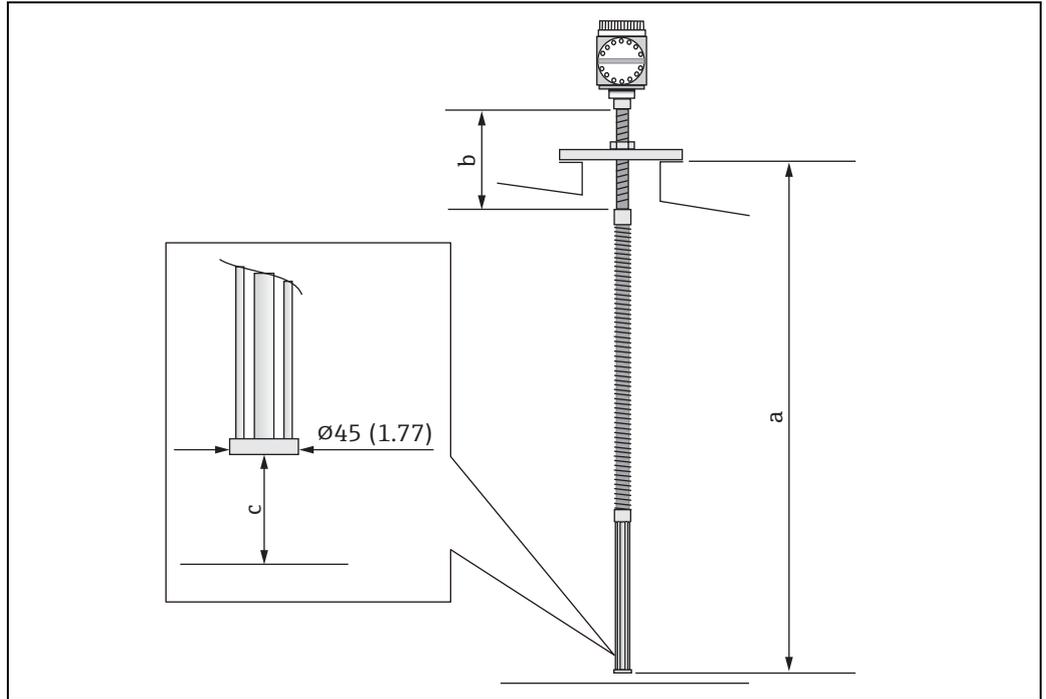


Figure 14: Recommended installation, Unit of measurement: mm (in)

- a* Ordered installation height (distance from the lower part of the flange to the top of the temperature probe or water bottom probe)
- b* Approximately ± 180 mm, total: 360 mm (Adjustable range)
- c* Distance varies depending on the specifications.

NOTICE

- The required bottom clearances of both the temperature probe and WB sensor vary depending on the anchoring method. Consider the required bottom clearance when ordering NMT539. See the recommended bottom clearance shown above and/or consult local Endress+Hauser representatives for further information.
- When ordering NMT539 with special element position and bottom clearance, refer to "Ordering Information," section 80, Element Spacing. Select 4, Equally spaced, defined by length.
- The standard location of the lowest temperature element should be set at 500 mm (20") from the bottom of the tank regardless of probe type.

Recommended stilling well installation

Base plate should be mounted on the bottom of the tank below the slotted stilling well (see **(B)**) or located 300 mm (12 inches) or more below the slotted stilling well (see **(A)**).

When anchor weight is not used in the stilling well method, the water should fill the tank up to the bottom from the end of the stilling well, enough to allow liquid to enter/exit the pipe and water probe is installed into the place which is lower than the bottom of the stilling well to get the tip of the water probe. When using stilling well, it is available from 2 inches (50A) (JIS, ANSI) pipe

CAUTION When using anchor weight, use 4 inches (100A) (JIS, ANSI) pipe or more. Avoid turbulence in the water so that WB (Water Bottom) sensor will not be damaged.

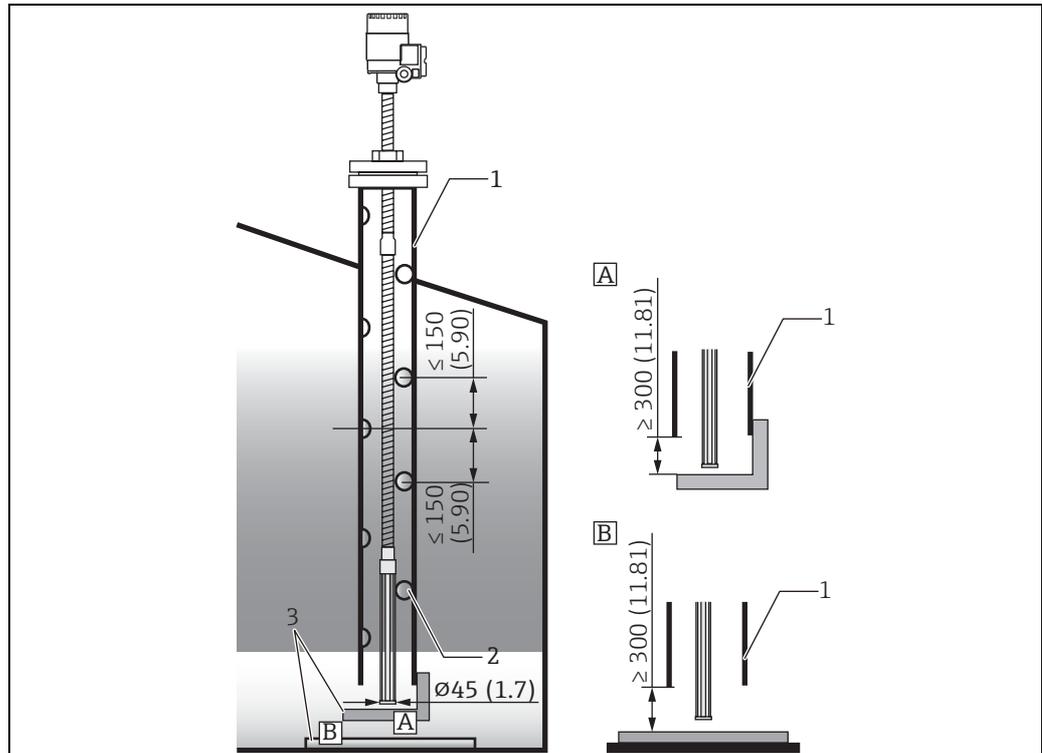


Figure 15: Recommended stilling well installation, Unit of measurement: mm (in)

- A Base plate 1
- B Base plate 2
- 1 Stilling well
- 2 Hole (Ø25)
- 3 Base plate

Installation equipment

The bottom anchor hook on WB sensor is not available when "A: no installation material" is selected. The Converter + Temp. probe version includes the bottom anchor hook as standard, although, "A: no installation material" is selected.

Contents of anchoring hardware based on choice of 100: Mounting Attachment

| 020 | | A: | B: | C: | D: | F: | G: |
|---------------------------------------|--|--------------|---|---|---|---|--------------------------|
| 100 | | Not selected | Anchor weight (High profile, D120) | Anchor weight (Low profile, hexagon H41) | Tension wire + wire hook + NPT1 top anchor | Tension wire + wire hook + R1 top anchor | Bottom hook, Low profile |
| 0 Converter only | | none | none | none | none | none | none |
| 1 and 4 Temp. + Converter | | bottom hook | bottom hook anchor weight slings wire | bottom hook anchor weight slings wire | bottom hook base plate wire hook NPT1 top anchor tension wire | bottom hook base plate wire hook R1 top anchor tension wire | ----- |
| 3 and 5 Temp. + WB + Converter | | none | same as above | same as above | same as above | same as above | bottom hook |

Mounting attachment 1 (Converter + Temperature Probe)

A: bottom hook, B: anchor weight: high profile, D120, D: tension wire + wire hook + NPT1 top anchor or F: tension wire + wire hook + R1 top anchor

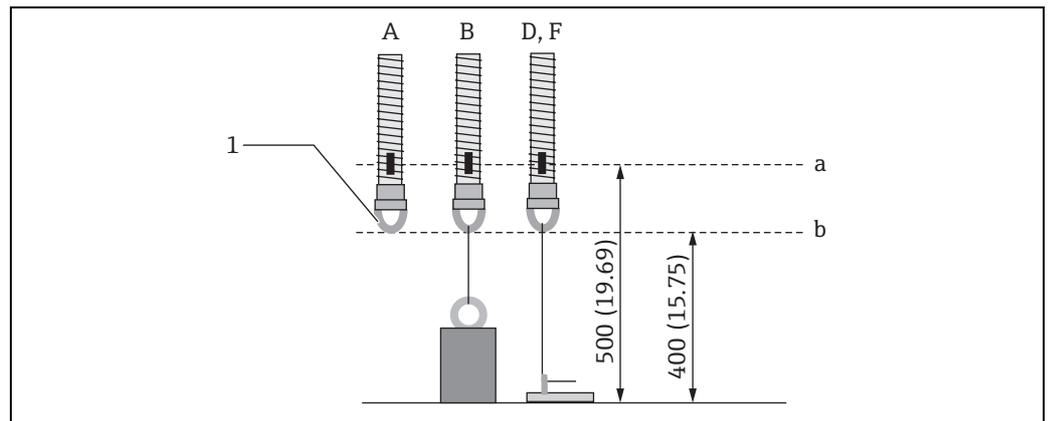


Figure 16: Attachment 1, Unit of measurement: mm (in)

- a* Lowermost element position
- b* Distance from the bottom of the tank to the bottom hook
- 1* Bottom hook

High profile anchor weight is the anchor method designed for converter + temperature probe. Both temperature probe and WB sensor with high profile anchor weight and tension wire anchor methods have a recommended clearance below the bottom of the anchor hook of approximately 400 mm (16"). This clearance can be easily changed by turning the height adjuster at the top of the tank.

i When ordering NMT539, refer to "Ordering information," section 80 (Temperature element spacing).

**Mounting attachment 2
(Converter + Temperature
Probe + Water Bottom
Probe)**

A: bottom hook, B: anchor weight: high profile, D120, C: anchor weight: low profile (hexagon H41), D: tension wire + wire hook + NPT1 top anchor or F: tension wire + wire hook + R1 top anchor, G: bottom hook, low profile

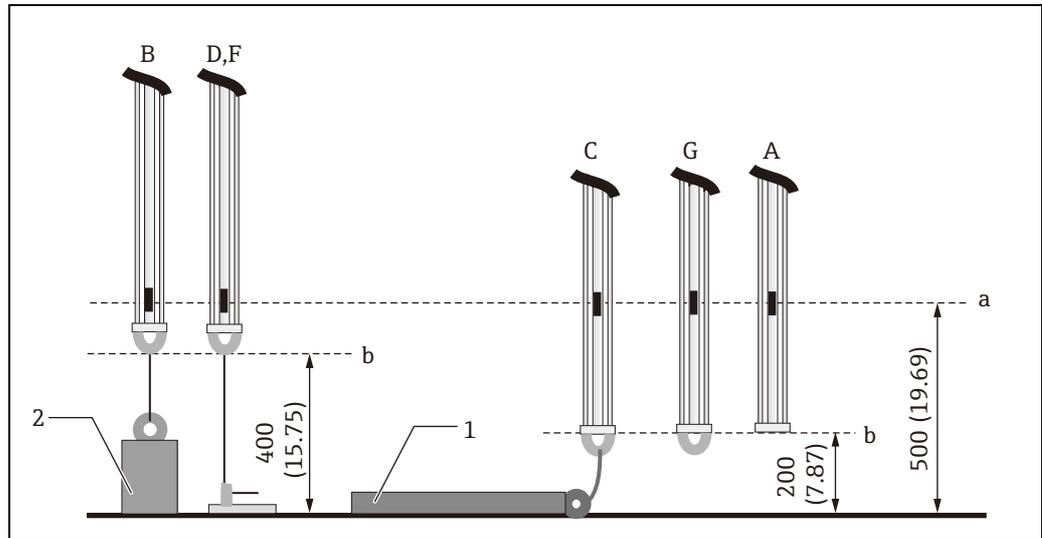


Figure 17: Attachment 2, Unit of measurement: mm (in)

- a* Lowermost element position
- b* Distance from the bottom of the tank to the bottom hook
- 1* Anchor weight for low profile
- 2* Anchor weight for high profile

Low profile anchor weight is provided to anchor WB probe and to measure accurately water bottom range. When installing NMT539 into the small tank nozzle (max. 2 inches (50A)) of operating tank, it is available as mounting attachment for converter + temperature probe version. Both the temperature probe and WB sensor with Low profile anchor weigh at 100: Mounting attachment option (refer to Ordering information) should have 200 mm (8") of bottom clearance from the edge of probes.

- i** The lowest possible WB measuring point can be approximately 10 mm from the tank floor with No installation material selected (refer to Ordering Information). If necessary, use the height adjuster to set at the desired installation height. No bottom anchor hook is available with the WB sensor and 100: Mounting attachment, A: No installation material. A bottom hook is attached on WB sensor but a low profile anchor is not included to the option, G: Bottom hook, low profile.

No. 1 element position of NMT539

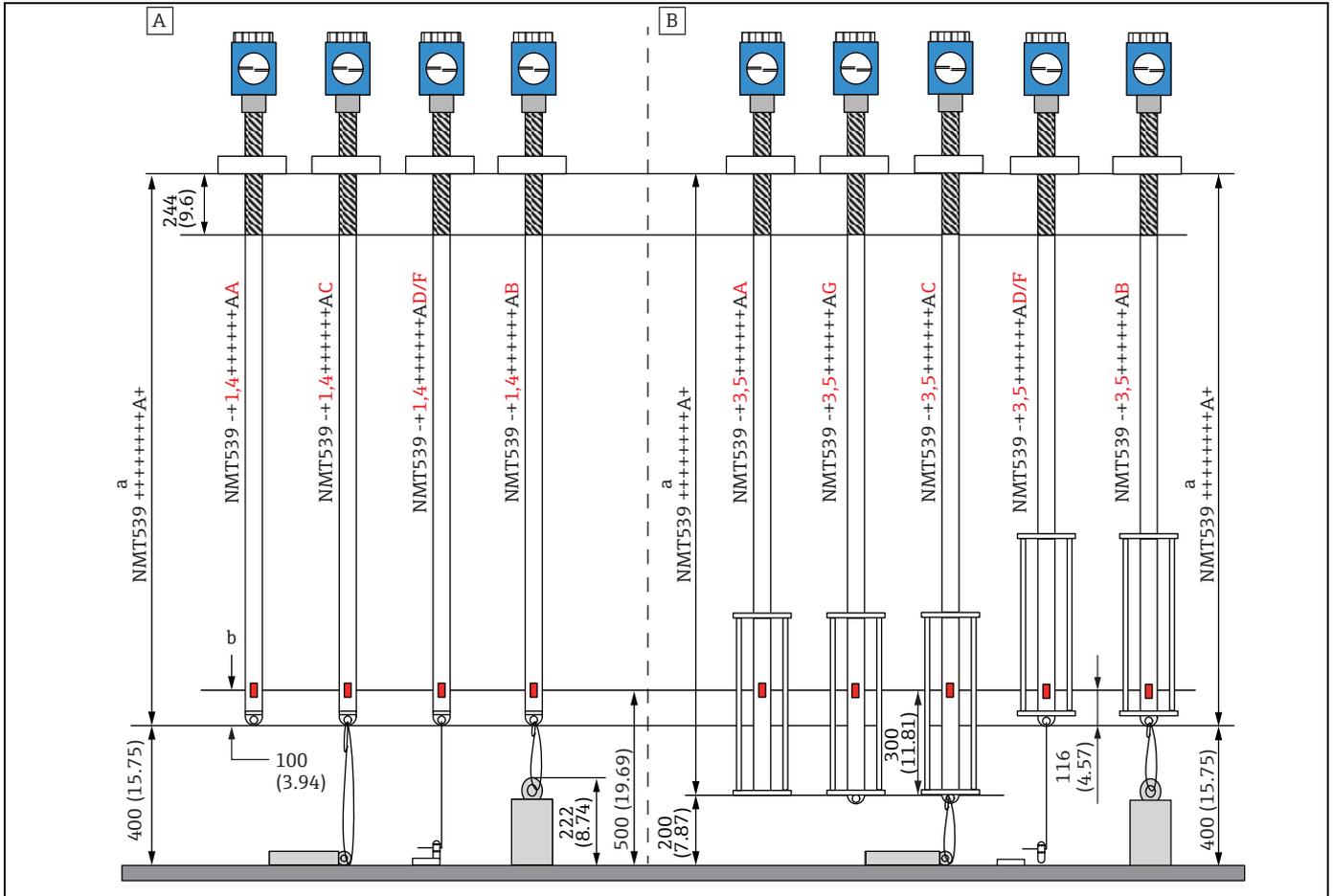


Figure 18: No.1 Element Position, Unit of measurement: mm (in)

| | |
|---|---|
| A | Transmitter + Temperature probe |
| B | Transmitter + Temperature probe + Water probe |
| a | Distance from the bottom of the flange |
| b | Position of No.1 element |

Anchor weight method

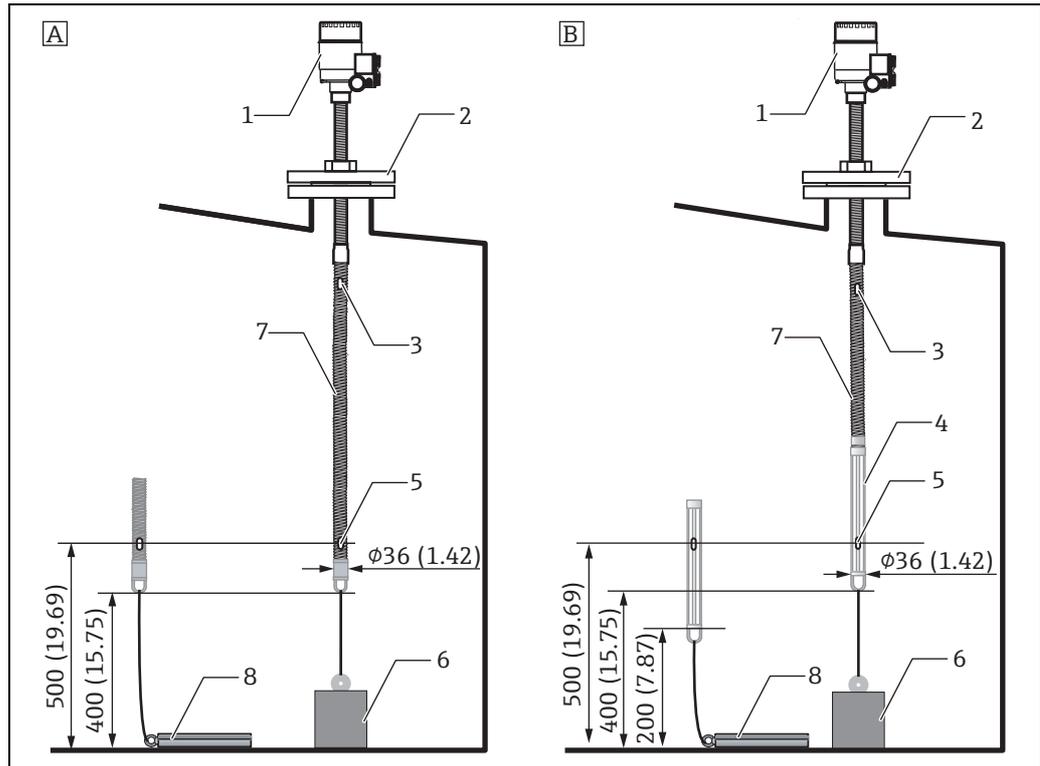


Figure 19: Anchor weight method, Unit of measurement: mm (in)

- A NMT539 without water probe
- B NMT539 with water probe
- 1 Transmitter (electrical compartment)
- 2 Flange
- 3 Uppermost element
- 4 Water probe
- 5 Lowermost element
- 6 Anchor weight for high profile
- 7 Temperature probe
- 8 Anchor weight for low profile

Operating condition: Wiring

TIIS Ex d [ia] wiring

When NMT539 TIIS, Ex d [ia] is available only in Japan, Class A grounding directly from NMT539 is required.

- The grounding cable for safety barrier should be connected independent of any other devices or purpose, according to Class A grounding standards.
- Use a conductive grounding wire with cross-sectional dimensions 2 to 2.6 mm². In an instrumentation room, a field device with Class A ground may be connected in common with the communication cable shield.

Class A grounding general description

| Ground resistance value | 10 Ω or less |
|-------------------------|---|
| Grounding cable | Tensile strength: 1.0 4 kN metallic wire or more Cable core cross section diameter: 2 to 2.6 mm copper wire or more Cable finished external diameter: more than Ø8 mm |

Grounding cable construction (TIIS Ex d [ia])

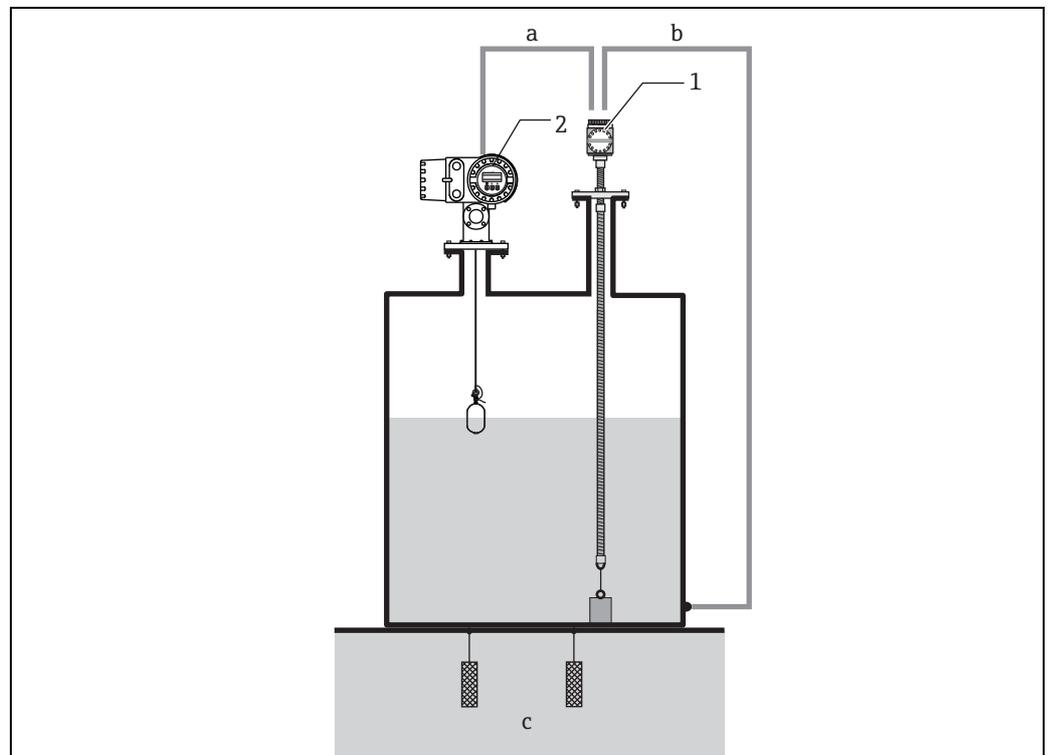


Figure 20: Grounding cable

- a Local HART (Ex d) communication
- b Grounding cable (see Tip.)
- c Non-hazardous area, Class A grounding, Under ground
- 1 NMT539
- 2 NMS5

i When installing safety barrier, use a cable with Ø8 mm (0.31 in) or more on connecting to the tank.

Connecting diagram (TIS Ex d [ia])

Install wiring in a manner to prevent current or voltage from causing electro magnetic interference on the i.s. circuit.

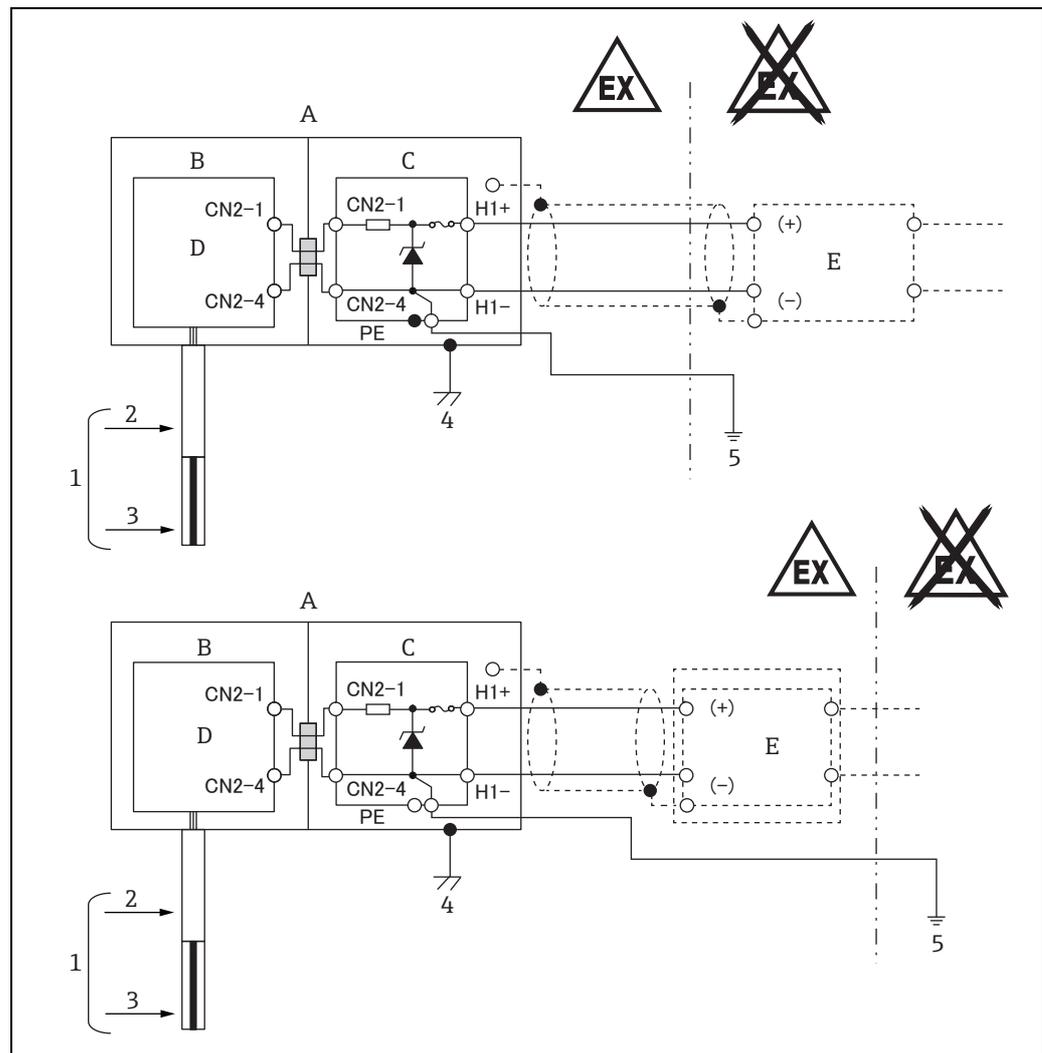


Figure 21: Connecting Diagram

- A Measuring device in a tank
- B Ex ia compartment
- C Ex d compartment (Terminal box)
- D Ex ia circuit
- E General machinery (20 to 26.4 VDC)
- 1 Measuring part
- 2 Measuring temperature tube
- 3 Water bottom sensor
- 4 External grounding terminal
- 5 Class A grounding

NOTICE

- For average temperature measuring only, there is no water bottom probe.
- The grounding wire can be shared with that of other safety barriers; however do not share the grounding wire with that of the arrester.

Operating condition: Terminal connection

Ex ia NMT539 terminal

NMT539 (Ex ia) allows an intrinsically safe local HART connection. Refer to the i.s. regulation for establishing wiring and field device layout.

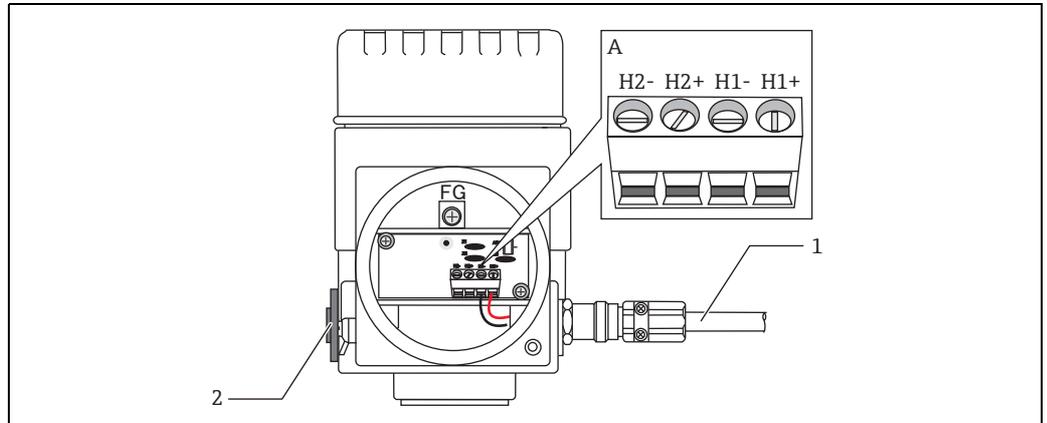


Figure 22: NMT539 terminal (Ex ia)

- A Temperature (water bottom sensor) data/Intrinsically safe HART on NMT539 (See Tips).
- 1 Screened twisted pair or steel armored wire
- 2 Blind plug (standard aluminum)



Use only metal cable glands HART communication line shielded cables must be grounded.

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



+H1 and +H2 show + terminal and -H1 and -H2 show - terminal.

**ATEX, IECEX FM, CSA, NEPSI
Ex d [ia] NMS5 terminal**

Since NMT539 is an intrinsically safe instrument, the terminal connection to the Ex i side on local HART connection is allowed on NMS5 terminal housing.

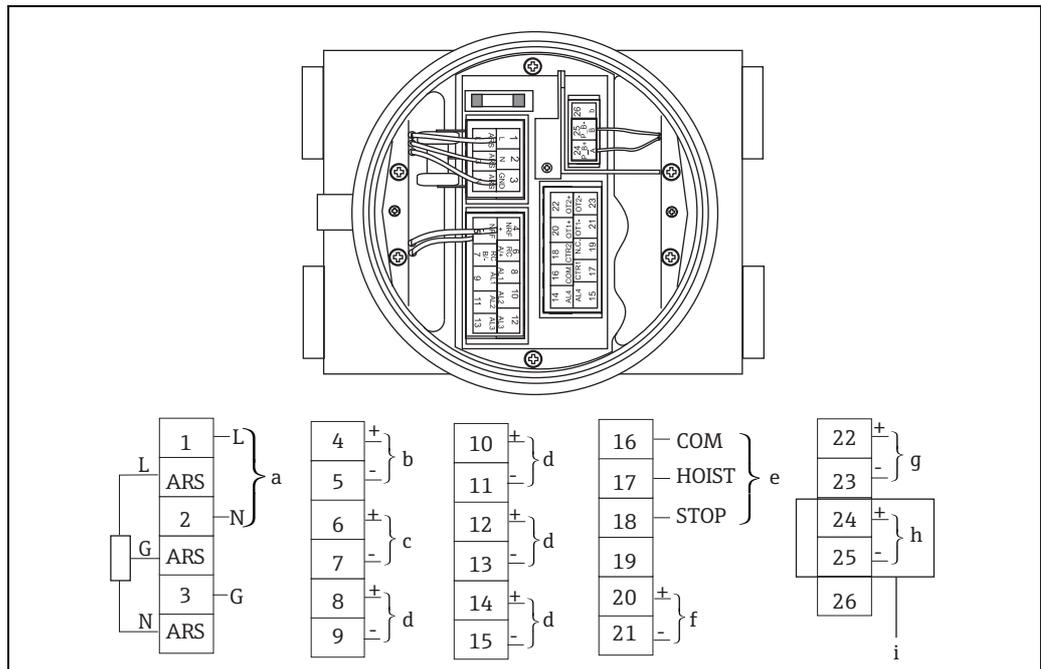


Figure 23: NMT5 Terminal (ATEX, FM, CSA, Ex d [ia])

- a Power supply: 85 to 264VAC, 50/60 Hz or 20 to 62 VDC, 20 to 55 VAC
- b Non IS HART to NRF or others
- c Digital output Modbus, RS485 Serial pulse or HART
- d Alarm contact
- e Operation contact input
- f 4 to 20 mA channel 1
- g 4 to 20 mA channel 2
- h Ex i HART
- i from NMT539 Ex ia

CAUTION Do not connect NMT539 local HART communication on terminals 4 and 5 on NMS5. These terminals are designed to connect Ex d local HART communication.

**NMS8x, NMR8x, NRF81 (Ex d
[ia]) Ex i communication**

Since NMT539 is an intrinsically safe instrument, the terminal connection to the Ex i side on local HART connection is allowed on NMS8x, NMR8x or NRF81 terminal housing.

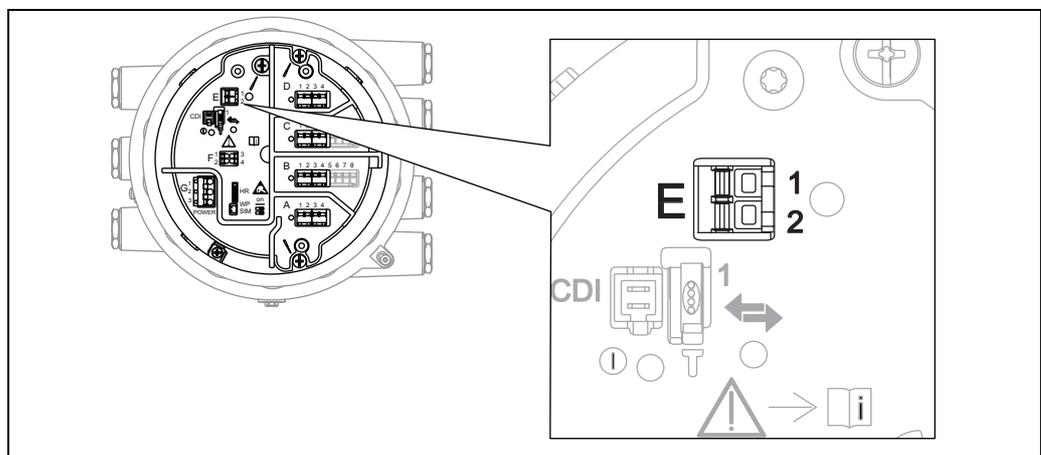


Figure 24: NMS8x terminal for NMT539

- E1 H+ terminal
- E2 H- terminal

TIIS Ex d [ia] terminal

NMT539 Ex d [ia] allows a local HART connection available in Japan. Refer to the i.s. regulation for establishing wiring and field device layout. Local HART multi drop connection varies depending on the approval type.

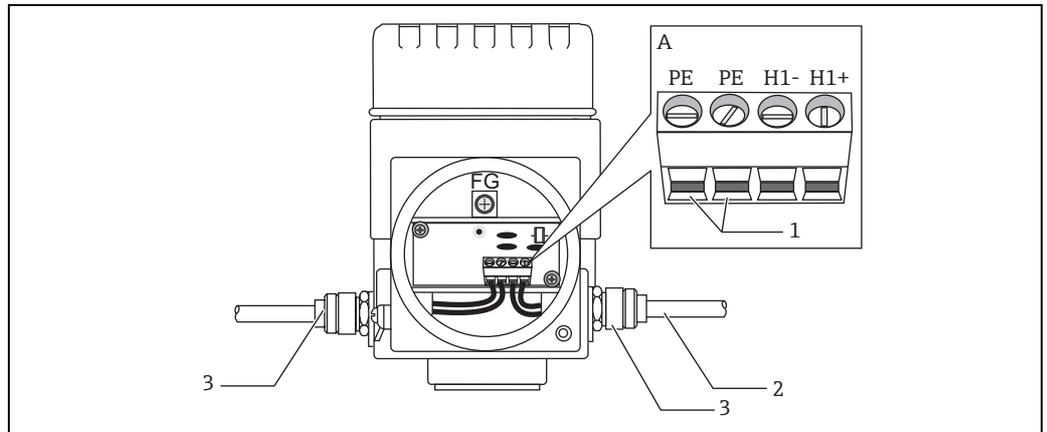


Figure 25: NMT539 terminal (TIIS Ex d [ia])

- A Temperature (water bottom sensor) data/Intrinsically safe HART on NMT539 (See Tips).
- 1 Non-hazardous area, Class A grounding (1 to 1.5 mm², 2pcs.)
- 2 Screened twisted pair or steel armored wire
- 3 Cable gland (SXC-16B)

CAUTION

- Shield cable of HART communication line must be grounded.
- The grounding wire can be shared with safety barrier for use, however do not share the grounding wire with the arrester's.

Connection list of cable

| Connection to NRF590 | | Connection to NMS5 | |
|----------------------|----|--------------------|----|
| + terminal | 13 | + terminal | 24 |
| - terminal | 12 | - terminal | 25 |

i

- +H1 shows + terminal and -H1 shows - terminal.
- According to the NMT539 specification that shows Ex d [ia], NMS5 specification must be Ex d HART.
- Since the NMT539 specification is Ex d [ia], pressure-resistant explosion-protected HART modules must be selected for slot B or C of NMS8, NMR8, and NRF81. NMT539's + and - terminals must also be connected to the same module. H1+ and H- of NMT539 cannot be connected to B3 and C2.

Ex d NMS5 connection

Connect NMT539 Ex d [ia] to NMS5 Ex d local HART terminals.

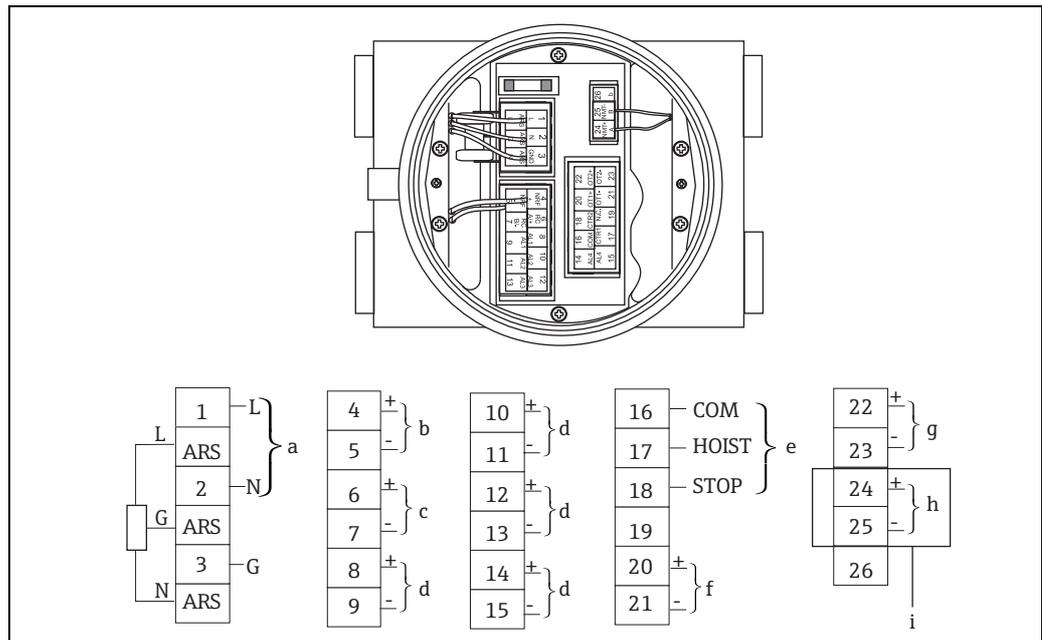


Figure 26: Ex d connection

- a Power supply: 85 to 264VAC, 50/60 Hz or 20 to 62 VDC, 20 to 55 VAC
- b Non IS HART to NRF or others
- c Digital output Modbus, RS485 Serial pulse or HART
- d Alarm contact
- e Operation contact input
- f 4 to 20 mA channel 1
- g 4 to 20 mA channel 2
- h Ex d HART
- i from NMT539 Ex d

TGM5/TMD1 terminal

When TGM5 other than Sakura code (collector common), BCD (emitter common), BCD (collector common) is selected, it is fully equipped for local HART communication functions. It is possible to connect Ex d [ia] equipment, but the terminal number depends on the specification. Refer to the terminal figure for TGM5.

In case of TMD1-xBxxxxxxxx (with local HART input), it is possible to connect Ex d [ia] equipment, but the terminal number depends on the specification. Refer to the terminal figure for TMD1.

Terminal connection of NRF590

NRF590 has three sets of i.s. local HART terminals.

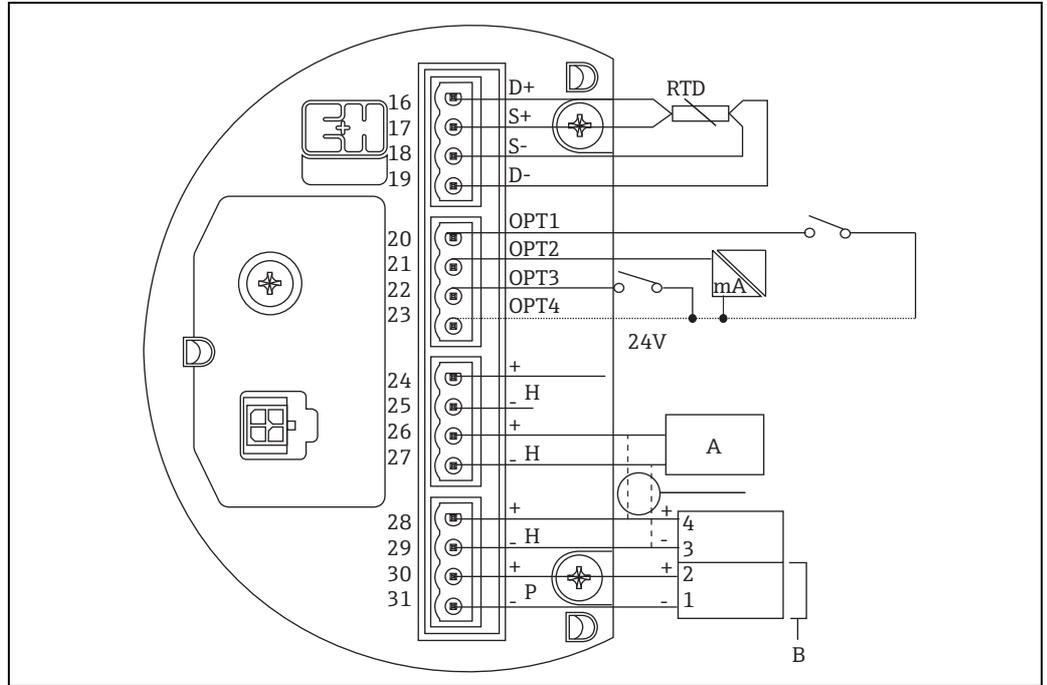


Figure 27: NRF590 Terminal (Ex ia)

A HART sensor (internally interconnected as one HART Fieldbus loop)

B For Micropilot S-series only

i Do not connect signal local HART lines from NMT539 to terminals 30 and 31. These terminals are designed to supply drive power for Micropilot S (FMR53x and FMR540).

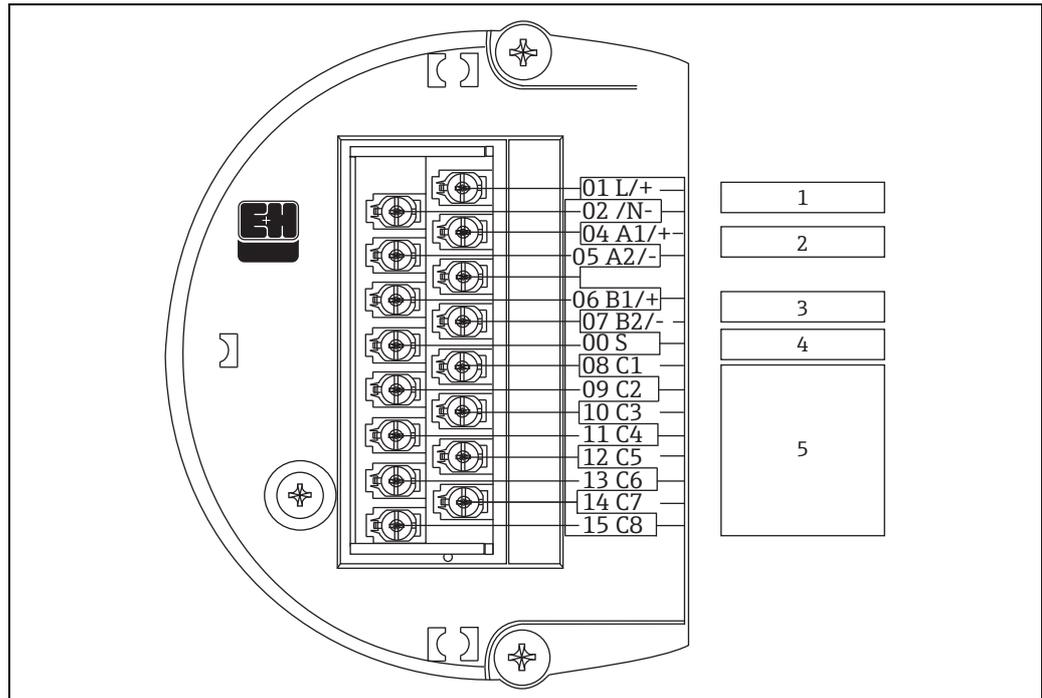


Figure 28: NRF590 terminal 2 (TIIS Ex d)

- 1 Power supply
- 2 Digital input/output A
- 3 Digital input/output B
- 4 Cable sealed
- 5 Fieldbus protocol and analog input/output

Mechanical construction

Type 1: Converter only

Standard G (NPS) 3/4 inch, Universal coupling connection

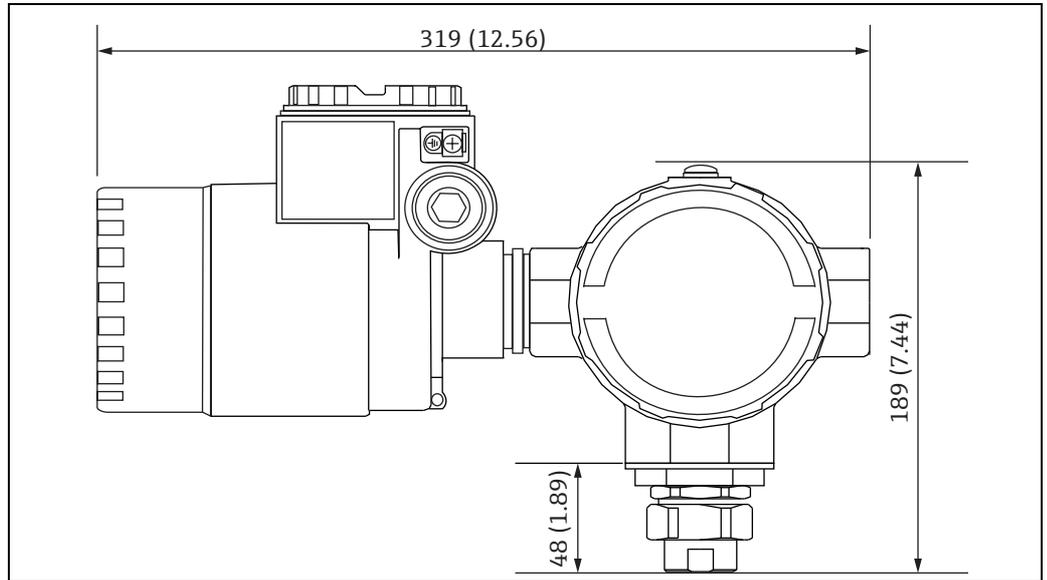


Figure 29: Type 1 Dimensions, Unit of measurement: mm (in)

Type 1: Measuring function

The converter only version is the direct replacement of the previous NMT538. Connection and compatibility are provided to third party temperature probes with various element types. Unlike the NMT538, the powerful processor of the NMT539 calculates and converts the following element types without altering the program (EPROM installed software):

- Pt100
- Cu100
- Cu90
- PtCu100

The type 1 converter also enables connection to a dual function average temperature and capacitance WB probe, such as Weed Beacon MWR. Wiring, however, requires the isolation of the RTD temperature signal from the capacitance WB signal on coaxial cable. The wiring of the temperature signal is exactly the same as Endress+Hauser's 1700, 9909 and other RTD probes. The coaxial (WB) cable must be routed from the existing auxiliary capacitance to local HART (or 4 to 20 mA) converter via NMT539's terminal compartment.

NOTICE

- NMT539 is only compatible with MRTs (Multi-Resistance Thermometers) and/or MSTs (Multi-Spot Thermometers). It is not designed to work with Thermocouple type thermometers.
- The physical connection between probe to NMT539 is completed by Zinc plated carbon steel G 3/4" (NPS 3/4") universal threaded coupling. In case a different thread size is required, Endress+Hauser can provide the simplest and most efficient solution by adapting a variety of coupling sizes and materials based on existing temperature probe specifications.
- The power supply and data transmission lines are both fed to the host gauge, NMS5 or NRF560, by one pair of local HART loop connections. In addition to the user-friendly display, NMT539 can also be configured and operated via FieldCare. Type 2: Converter only for Varec 1700, M20 threaded connection

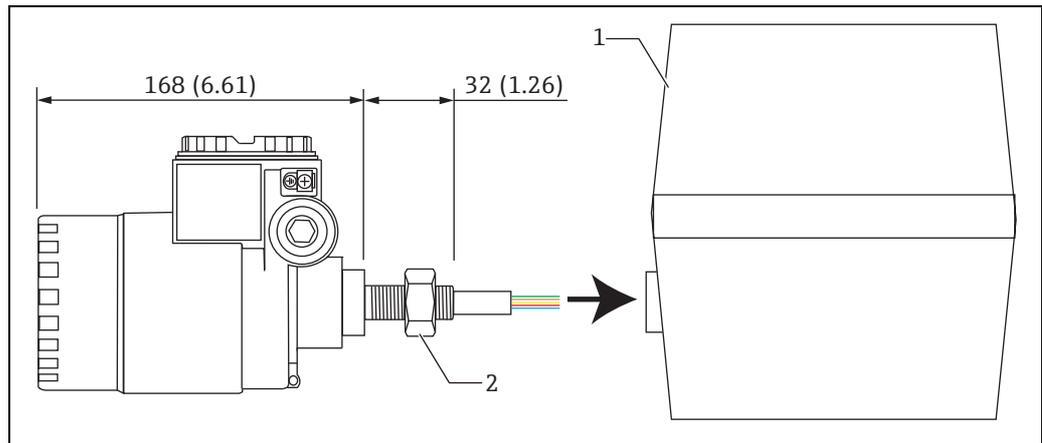
Type 2: Converter only**For Varec 1700, M20 threaded connection**

Figure 30: Type 2 Converter Only Version, Unit of measurement: mm (in)

- 1 Terminal box of 1700 series RTD probe
2 Lock nut

i UK Special is designed specifically to connect with the average temperature probe of Whessoe Varec 1700 series. UK Special is not equipped with the water bottom data accessibility function.

Type 2: Measuring function

Type 2 has the same function as Type 1, however type 2 is designed in a way so that special M20 threaded connection allows NMT539 converter to fit directly onto the current terminal housing of 1700.

The wiring of RTD signals from the probe to NMT539 must be done in the terminal box of 1700. Type 2 converter has a primary housing which contains NMT539 electronics. Therefore no secondary housing is needed.

⚠ CAUTION Secure the threaded connection with sealing tape and tighten the lock nut at the time of actual installation. A loose connection of NMT539 & Varec 1700 terminal housing may cause serious electrical damage depending on environmental conditions.

**Converter + average
temperature probe version**

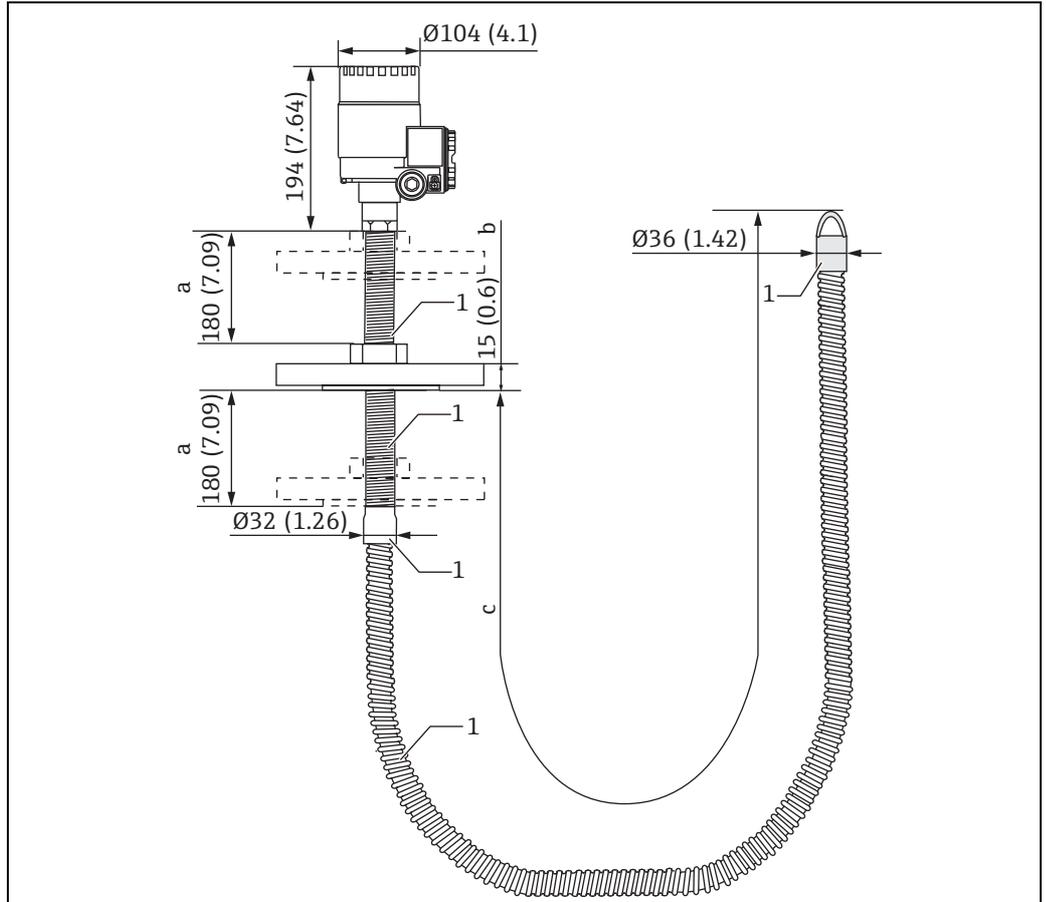


Figure 31: Converter + average temperature probe version, Unit of measurement: mm (in)

- a Adjustable installation height
- b Height of the flange (depending on spec.)
- c Length of the flexible tube (depending on tank height) (Margin of error for temp. probe length: ±50 mm)
- 1 SUS316L

 The position of the welded flange can not be adjusted.

Converter + average
temperature probe + water
bottom probe

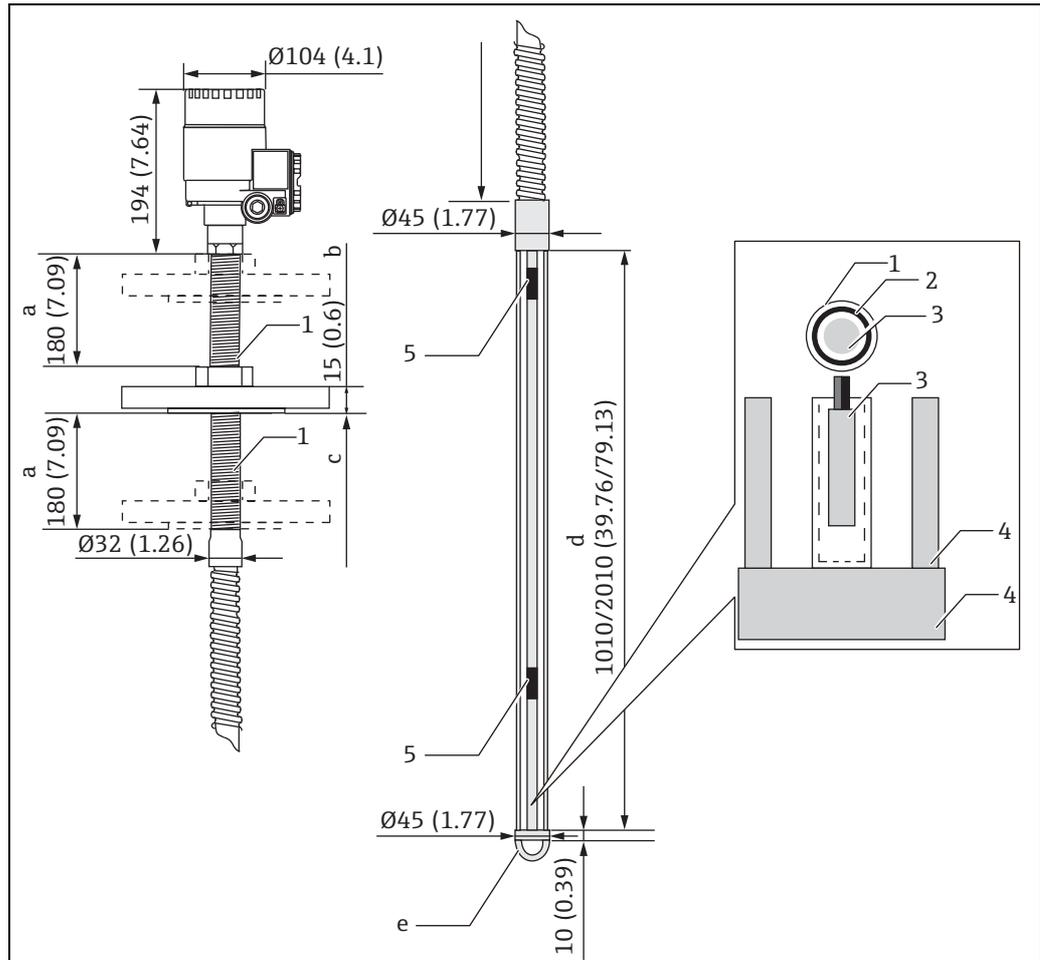


Figure 32: Dimension of Converter + average temperature probe + WB probe, Unit of measurement: mm (in)

- a Adjustable installation height
- b Height of the flange (depending on spec.)
- c Length of the flexible tube (depending on tank height) (Margin of error for temp. probe length: ± 50 mm)
- d Capacitance water bottom probe
- e NMT539 with anchor weight
- 1 PFA protection tube (thickness: 1 mm)
- 2 Center rod (SUS304)
- 3 Pt100 element
- 4 Base plate, Side rod
- 5 Element (Pt100 element can be installed up to 2 points.)



The position of the welded flange can not be adjusted.

Temperature setting and approval

W&M approved high accuracy temperature device is well suited for both custody transfer and inventory control applications. Based on the product temperature range and specific application, NMT539 has several different temperature ranges to meet application requirements: temperature and approvals

| 030: Temperature Measuring Range | | Application | 010: Approval | | | | | | | | |
|----------------------------------|------------------------------------|---|------------------|----------------------|------------------|----------------------|---------------------|-------------------------|----------------------------|-------------------------|--------------------------|
| | | | A | B | C | E | F | G | 0 | 7 | 8 |
| | | | TIS Ex ia IIB T4 | ATEX Ex ia IIB T2-T6 | TIS Ex ia IIB T2 | TIS Ex d (ia) IIB T4 | IEC Ex ia IIB T2-T6 | NEPSI Ex ia IIB T2 - T6 | Weather proof, IP65 NEMA4X | FM IS Cl.I Div.1 Gr.C-D | CSA IS Cl.I Div.1 Gr.C-D |
| 1 | -40 to +100 °C (-40 to +212 °F) | Most standard temperature range for inventory control applications. | - | ✓ | - | - | ✓ | ✓ | ✓ | ✓ | ✓ |
| 2 | -55 to +235 °C (-67 to +455 °F) | Capability of high and, or low temperature product applications like sulfur & asphalt and moderate liquid / gas application. | - | ✓ | - | - | ✓ | ✓ | ✓ | ✓ | ✓ |
| 3 | -170 to +60 °C (-274 to 140 °F) | Cryogenic, e.g. LNG, ethylene. | ✓ | ✓ | - | - | ✓ | ✓ | ✓ | ✓ | ✓ |
| 4 | -20 to +120 °C (-4 to 248 °F) | PTB (Germany): W&M certified applications. | - | ✓ | - | - | ✓ | ✓ | ✓ | ✓ | ✓ |
| 5 | -20 to +100 °C (-4 to +212 °F) | Most standard temperature range for inventory control applications. | ✓ | - | - | ✓ | - | - | ✓ | - | - |
| 6 | -20 to +235 °C (-4 to +455 °F) | Capability of high and / or low temperature product applications like sulfur & asphalt and moderate liquid / gas application. | - | - | ✓ | - | - | - | ✓ | - | - |

NMT539 converter and average temperature probe consists of up to 16 IEC60751/DIN EN 60751 class A or 1/10B Pt100 elements in the protection tube. The very sensitive sensor elements change resistance values depending on the surrounding temperature. Therefore, applied voltage through this sensor deviates based on resistance change at the element.

As a specific design to meet intrinsically safe standards, NMT539 converter and temperature version is built with a very efficient power management concept.

In order to achieve the highest degree of measurement accuracy and mechanical & electrical durability, NMT539 employs a powerful processor, large storage capacity, and simple module structure.

To achieve the user-friendly concept, the newly adopted height adjuster allows the adjustment of the installation height up to approximately ± 180 mm (7.09 in) at the process connection (flange) depending on the tank shape and condition.

W&M function

NMT539 converter and temperature probe is custody transfer approved. Once NMT539 is configured to W&M mode, all the changeable parameters are frozen by software and mechanical protect switch.

Converter + Average Temperature Probe + WB Probe Version

An integrated water bottom probe (capacitance water bottom meter) is installed under the average temperature probe. The standard water bottom probes come in two measurement ranges; 1 m (3.3 ft) and 2 m (6.6 ft). The pipe-type water probe is constructed with stainless steel pipe (SUS304) and of the electrode around the exterior of the pipe is protected by a PFA tube of thickness 1 mm. Since up to two Pt100 elements can be installed into the electrode, NMT539 always can measure the temperature accurately with or without water.

Due to the nature of capacitance measurement, a precise initial calibration must be performed in order to achieve the maximum measurement accuracy. The calibration should be performed onsite in actual conditions. The condition of the tank contents (both oil and water), liquid temperature, and individual probe characteristics can greatly affect the measurement performance.

NMT539 measurement cannot be used if the water in the tank is frozen. Ensure that the water in the tank does not freeze.

⚠ CAUTION

- According to the characteristic of capacitance measurement, precise initial calibration must be performed in order to achieve the maximum measurement accuracy. The condition of tank contents (both oil and water), liquid temperature and individual probe characteristic can greatly effect the measurement performance. Specific accuracy and repeatability measurement must be taken within the same environment in order to perform data comparison.
- NMT539 measurement can not be used in the frozen water in the tank. Prevent to freeze water.

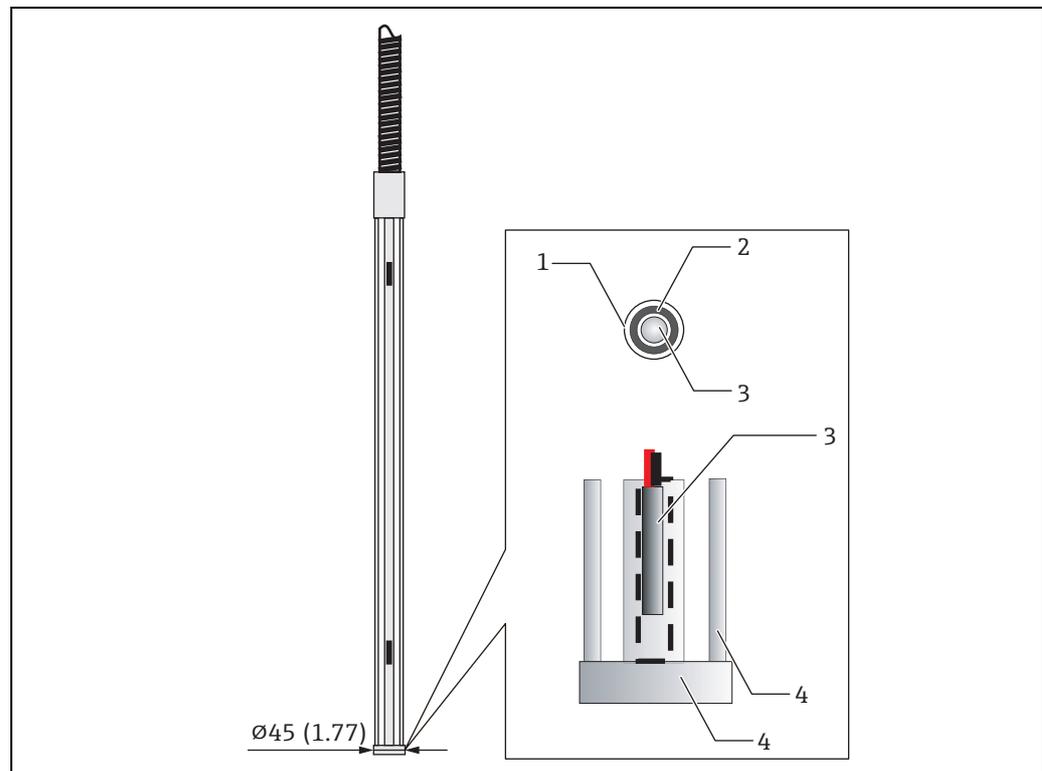


Figure 33: Converter + Probe + WB probe, Unit of measurement: mm (in)

- | | |
|---|--|
| 1 | <i>PFA protection tube (thickness: 1 mm)</i> |
| 2 | <i>Center rod (SUS304)</i> |
| 3 | <i>Pt100 element</i> |
| 4 | <i>Base plate, Side rod</i> |

i Up to 2 point Pt100 elements can be installed.

Welding flange

Because flange is completely welded, the waterproof is improved. However the position of the flange can not be adjusted after welding. The waterproof is only for TIIS.

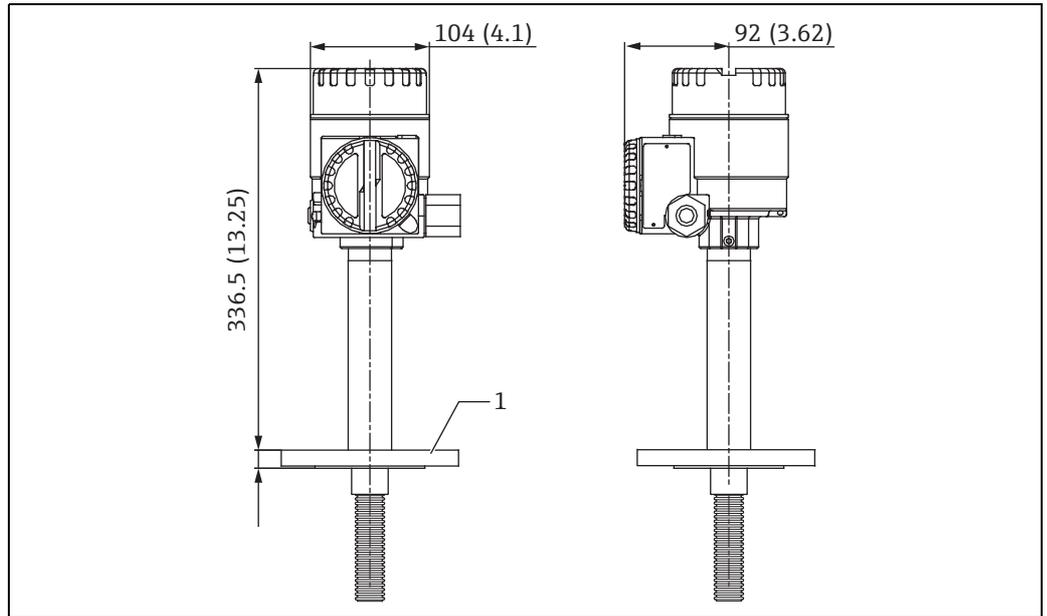


Figure 34: Welding flange, Unit of measurement: mm (in)

1 Flange (JIS, ASME, JPI, DIN)

Protect cover for TIIS Exd [ia]

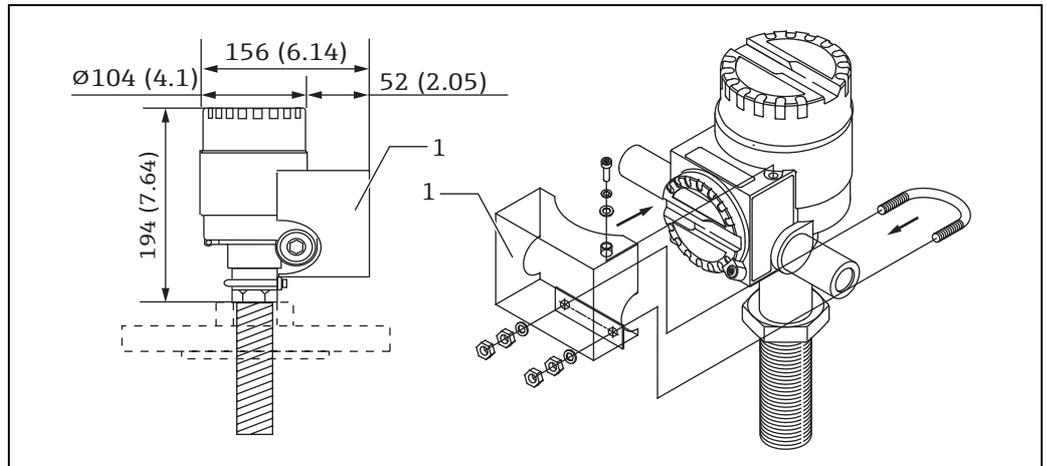


Figure 35: Protect cover, Unit of measurement: mm (in)

1 Protect cover (SUS304)

The cover is only for TIIS Ex d [ia] specification.

Weight

Approx. 13 kg
 Condition: 16 elements
 Temp. probe: 10 m (32.9 ft)
 WB probe: 1 m (3.29 ft)
 Flange: NPS 2" Cl.150 RF, 316 flange ASME B16.5

Material

Elements: Class A or 1/10B Pt100, IEC60751/DIN EN 60751/JIS C1604
 Housing: Aluminum die cast
 Temp. probe: SUS316, SUS316L (refer to the dimension of the drawing)
 Water bottom sensor: SUS316 (center rod SUS 304 and PFA protected)

Human interface

Operation using FieldCare

NMT539 can also be operated via FieldCare Package. These programs support commissioning, securing of data, signal analysis and documentation of the instruments.

FieldCare Packages support the following functions:

- Online configuration of transmitters
- Loading and saving of instrument data (Upload/Download)
- Confirmation of measuring points

Certificates and approvals

CE mark By attaching the CE mark, Endress+Hauser confirms that the instruments pass the required tests.

RoHS NMT539 meets RoHS directive 2011/65/EU (RoHS 2).

Ex approvals

| Ex Approval | Class |
|-------------|--|
| ATEX | II 1/2 G Ex ia IIB T2 to T6 Ga/Gb (converter with temperature and/or WB) II 2G Ex ia IIB T2 to T6 Gb (converter only) |
| IECEX | Ex ia IIB T2 to T6 Ga/Gb (converter with temperature and /or WB) Ex ia IIB T2 to T6 Ga/Gb (converter only) |
| FM | IS Class I, Div. 1, Gp. C, D, T6, T4, T3, T2 Class I, Zone 0, AEx ia IIB, T6, T4, T3, T2 |
| CSA | Ex ia Class I, Div.1, Gp. C, D, T6 to T2 Ex ia IIB T6 to T2 |
| TIIS | Ex ia IIB T4 |
| | Ex ia IIB T2 |
| | Ex d [ia] IIB T4 |
| NEPSI | Ex ia IIB T2 to T6 (converter with temperature and /or WB) Ex ia IIB T2 to T6 (converter only) |

PTB W&M approval PTB 14.70 08.01 (Germany)

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

EN 60529

Protection class of housing (IP-code)

EN 61326

Emissions (equipment class B), compatibility (appendix A - industrial area) EN61000-4-2 Immunity to electrostatic discharge

Order information

| | | | | |
|----------------|--------------------------------------|--|--|---|
| 010 | Approval: | | | |
| | 0 | Weather proof, IP65 NEMA4X | | |
| | 7 | FM IS Cl.I Div.1 Gr.C-D | | |
| | 8 | CSA IS Cl.I Div.1 Gr.C-D | | |
| | B | ATEX Ex (ia) IIB T2-T6 | | |
| | C | TIIS Ex ia IIB T2 | | |
| | A | TIIS Ex ia IIB T4 | | |
| | E | TIIS Ex d (ia) IIB T4 | | |
| | F | IEC Ex ia IIB T2-T6 Ga | | |
| | G | NEPSI Ex ia IIB T2-T6 | | |
| | 9 | Special version, TSP-no. to be spec. | | |
| 020 | Application: | | | |
| | 0 | Converter | | |
| | 1 | Temperature, Converter | | |
| | 3 | Temperature, Water Bottom, Converter | | |
| | 4 | Temperature, Converter (PTB type approval) | | |
| | 5 | Temperature, Converter, Water Bottom (PTB type approval) | | |
| | 9 | Special version, TSP-no. to be spec. | | |
| 030 | Temperature Measuring Range: | | | |
| | 0 | Not selected | | |
| | 5 | -20 ...+100 °C | | |
| | 1 | -40 ...+100 °C | | |
| | 6 | -20 ...+235 °C | | |
| | 2 | -55 ...+235 °C | | |
| | 3 | -170 ...+60 °C | | |
| | 4 | -20 ...+120 °C (PTB type approval only) | | |
| | 9 | Special version, TSP-no. to be spec. | | |
| 040 | Water Bottom Measuring Range: | | | |
| | 0 | Not selected | | |
| | 1 | 1m/3.3 ft. | | |
| | 2 | 2m/6.6 ft. | | |
| | 9 | Special version, TSP-no. to be spec. | | |
| 050 | Cable Entry: | | | |
| | A | Thread G1/2 | | |
| | B | Thread NPT1/2 | | |
| | D | Thread M20 | | |
| | Y | Special version, TSP-no. to be spec. | | |
| 060 | Process Connection: | | | |
| | 0 | 10K 50A RF, 316, flange JIS B2220 | | |
| | 1 | NPS 2" Cl.150 RF, 316 flange ASME B16.5 | | |
| | 2 | DN50 PN10 B1, 316, flange EN1092-1 (DIN2527 B) | | |
| | 3 | 50A 150lbs RF, 316, flange JPI 7S-15 | | |
| | 4 | Universal coupling, G3/4, (Converter only) | | |
| | 5 | Thread M20 (converter only) | | |
| | 9 | Special version, TSP-no. to be spec. | | |
| NMT539- | | | | Product designation (Continued on next page) |

| | |
|----------------|--|
| 070 | Temperature Element: |
| | A 2 x Pt100 B 3 x Pt100 C 4 x Pt100 D 5 x Pt100 E 6 x Pt100 F 7 x Pt100 G 8 x Pt100 H 9 x Pt100 J 10 x Pt100 K 11 x Pt100 L 12 x Pt100 M 13 x Pt100 N 14 x Pt100 O 15 x Pt100 P 16 x Pt100 Q Not selected Y Special version, TSP-no. to be spec. |
| 080 | Temperature Element Spacing: |
| | 7 UK standard (converter only) 3 1m / 39" 2 1.5m / 59" 1 2m / 79" 5 3m / 118" 4 Requested spacing, defined by length 6 Not selected 9 Special version, TSP-no. to be spec. |
| 090 | Probe Length: |
| | Amm CGas-tight feed through B Not selected Y Special version, TSP-no. to be spec. |
| 100 | Mounting Attachment: |
| | A 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 G Bottom hook, low profile Y Special version, TSP-no. to be spec. |
| NMT539- | Complete product designation |

NOTICE

090 Probe Length:

A:mm (TIIS: $1000 \leq L \leq 30000$), (ATEX & IECEX: $1000 \leq L \leq 99999$),

(FM & CSA & NEPSI: $1000 \leq L \leq 40000$)

B:Gas-tight feed through (TIIS : $1000 \leq L \leq 40000$, flange welding type)

Y:mm (TIIS: $30000 < L \leq 40000$)

Accessories

Anchor weight (High profile, D120)

Mounting attachment option: B

This high profile anchor type is designed for converter + temperature probe versions.

- i** Installation of the anchor weight will cause the lowest element (lowest temperature measurement position) to be raised approximately 500 mm (16 in) from the tank floor. When installing the anchor (vertical type) from a tank top nozzle, confirm that the nozzle opening is 6 in. (150A) or more.

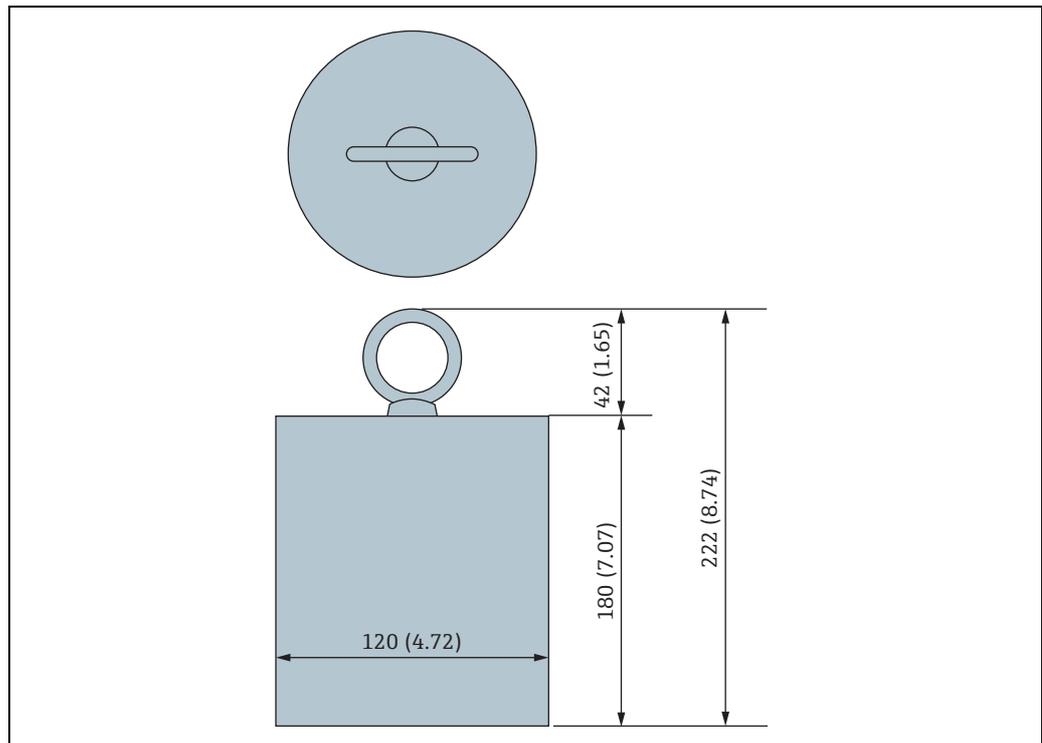


Figure 36: Anchor weight for high profile, Unit of measurement: mm (in)

Different dimensions, weight and material for the anchor weight are also available. Consult with Endress+Hauser representatives for further assistance.

| Item | Description |
|----------|-------------------------------|
| Weight | JIS SS400 (Mild Carbon Steel) |
| Eye bolt | JIS SS400 (Mild Carbon Steel) |
| Weight | 16 kg |

Anchor weight (Low profile, hexagon H41)

Mounting attachment option: C

The low profile anchor weight is mainly designed to fix water bottom sensor, securing it straight up without shortening water bottom measuring range. It is also suitable for an existing tank installation with a small nozzle opening for converter and temperature version.

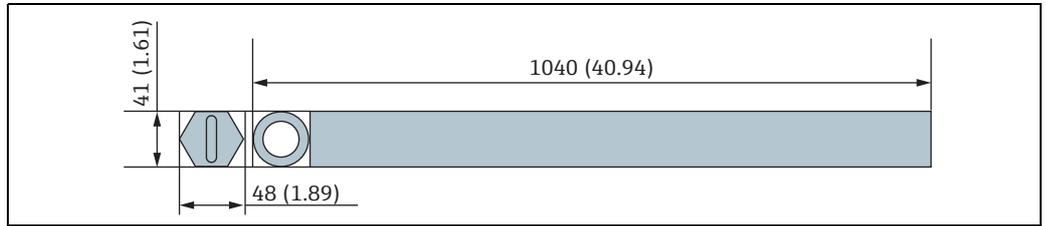


Figure 37: Anchor weight for low profile, Unit of measurement: mm (in)

| Item | Description |
|----------|-------------------------------|
| Weight | JIS SS400 (Mild Carbon Steel) |
| Eye bolt | JIS SS400 (Mild Carbon Steel) |
| Weight | 12 kg |

Wire hook

Mounting attachment option: D, F

Actual tension can be performed between wire hook and top anchor with using a tension wire (SUS316, stranded, 3mm diameter).

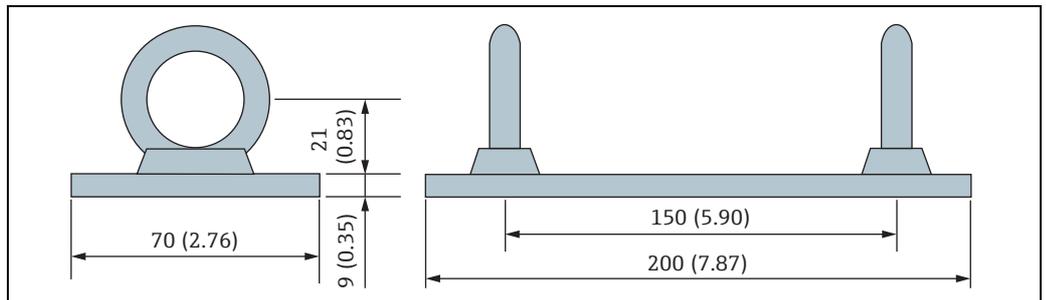


Figure 38: Wier hook, Unit of measurement: mm (in)

| Item | Description |
|----------|-------------------------------|
| Weight | JIS SS400 (Mild Carbon Steel) |
| Eye bolt | JIS SS400 (Mild Carbon Steel) |
| Weight | 1.5 kg |

Top anchor

The standard process connection of the top anchor is R1 or NPT1 threaded connection. However other sizes and materials can be used for the process connection and the flange.

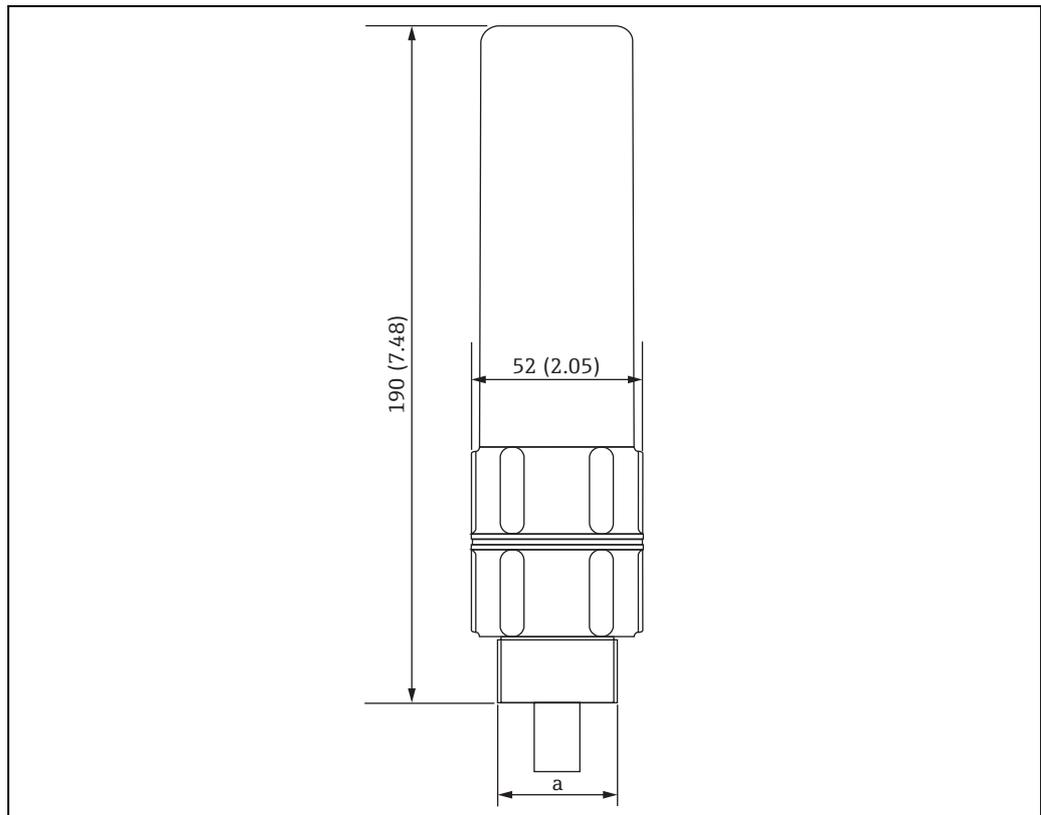


Figure 39: Top anchor dimension, Unit of measurement: mm (in)

a R1 or NPT1 (specified by order code)

| Item | Description |
|----------------|----------------------|
| Exterior | ADC (Aluminum) |
| Internal parts | SUS316, Carbon steel |
| Weight | 1.2 kg |

Documentation

Technical information

TI00452G

Proservo NMS5

TI01248G/TI01249G/TI01250G

Proservo NMS8x

TI01252G/TI01253G

Micropilot NMR8x

TI00462G

Promonitor NRF560

TI01251G

Promonitor NRF81

TI00461G

Servo Gauge TGM5

TI00463G

Digital Transmitter TMD1

Operating instructions

BA01025G

Prothermo NMT539 (Installation Instructions)

BA01026G

Prothermo NMT539 (Operating Instructions and Description of Instrument Function)

Certificates

| NMT539 | TIIS | ATEX | IEC | NEPSI | FM | CSA |
|--|--------------|------------|------------|----------|-------------|-------------|
| Temp. Converter | Ex496-826XJ | XA00585G-A | XA00583G-A | XA01259G | Ex461-851-1 | Ex462-712-2 |
| Average Temp. and/or WB Sensor (Exi) | Ex463-820XJ | | | | Ex461-850-1 | Ex462-711-2 |
| Average Temp. (High Temp.) | Ex495-823XJ | | | | | |
| Average Temp. (Low Temp.) | Ex1060-953XJ | | | | | |
| Average Temp. and/or WB Sensor (Ex d [ia]) | Ex1061-986XJ | | | | | |

Appendix

Stainless steel conversion table

The stainless steel material used in products of Endress + Hauser Yamanashi normally have expressions according to Japanese industrial standards, such as JIS (Japanese Industrial Standard). Each country or region may have different expressions.

The following conversion table contains the expression of equivalent stainless steel material based on chemical composition and mechanical properties.

| Country | Standard | Description | | | |
|---------|------------|--------------------------------|---------------|-----------------------------|--------------------|
| Japan | JIS | SUS304 | SUS304L | SUS316 | SUS316L |
| Germany | DIN 17006 | X5 CrNi 18 10 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 | 304 L | 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 06KH18N11 | 03KH18N11 | - | 03KH17N14M2 |
| - | ISO | 11 | 10 | 20 | 19 |
| - | ASME | S30400 | S30403 | S31600 | S31603 |



Standards may be not necessarily correspond exactly to JIS, because they are defined by mechanical and chemical criteria.

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