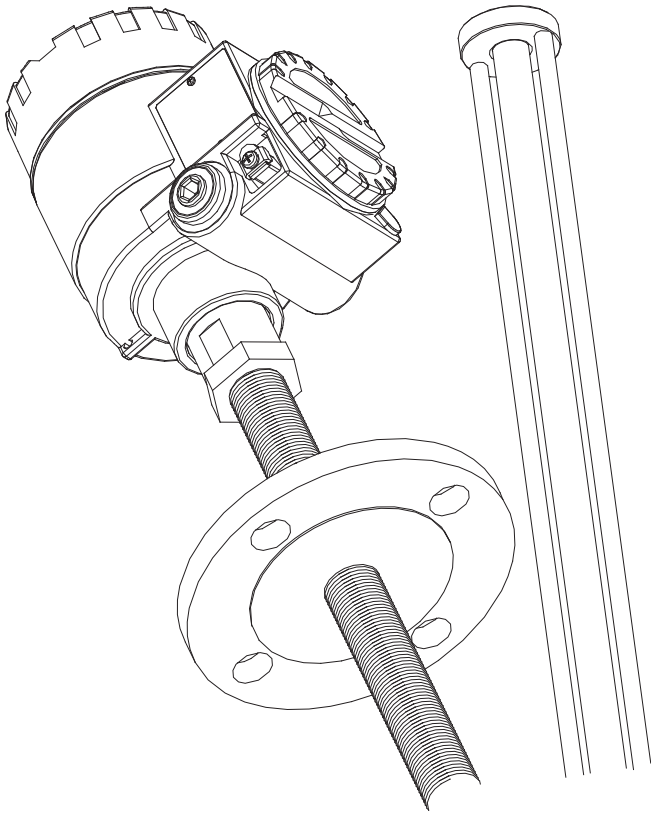
BA01025G/08/EN/20.15
71308661

Operating Instruction
Prothermo NMT539

Average Temperature



Endress+Hauser
People for Process Automation

Table of Contents

1 Safety Instructions

1.1 Designated Use

Average Temperature Prothermo NMT539 is a multi-spot Pt100 average thermometer combined with a local HART signal converter to meet the demand of temperature measurement for inventory control applications. NMT539 consists of Max. 6 temperature elements which have different length with fixed (2m or 3m) interval. It is best suited connected to Proservo NMS5, or Endress+Hauser Micropilot S-series radars and the Tank Side
Monitor NRF590. Mounted on the tank top, NMT539 provides temperature information on the two wire, intrinsically safe (i.s.) powered local HART loop.

1.2 Installation, Commissioning, and Operation

- Mounting, electrical installation, start-up, and maintenance of the instrument may only be performed by trained personnel authorized by the operator of the facility.
- Personnel must read and understand these installation instructions before performing the procedures.
- The instrument may only be operated by personnel who are authorized and trained by the operator of the facility. All instructions in this manual must be observed.
- The installer must make sure that the measuring system is correctly wired according to the wiring diagrams. The measuring system must be grounded.
- Observe all law and regulations applicable and valid for your country and pertaining to the opening and repairing of electrical devices.

1.3 Product Requirements

Power Source
Check the voltage of the power supply before connecting it to the product. It should be the exact voltage required for proper operation of the product.

Connection to Other Devices
It is possible to connect to other devices explained in this instruction. Refer to each operation instruction when connecting to devices.

Ground
Do not remove earth terminal or earth wire when the power is on.

Power Cable
Use a power cable specified by our company. The product should be protectively grounded before it is connected to a measurement object or an external control circuit.

1.4 Operational Safety

Hazardous Area

- Use the explosion proof type for measurement in areas where explosion hazards are present.
- Devices installed in areas having explosion hazards must not be opened when the power is on.
- Strict compliance with installation instructions and - ratings, as directed in this supplementary documentation, is mandatory.
- Device maintenance and repair is restricted to meet explosion proof regulations.
- Tighten the cable gland firmly.
- Devices employed in areas having explosion hazards should be installed and wired in keeping with explosion proof regulations.
- Ensure that all personnel are properly qualified.
- Observe the certification requirements as well as national and local regulations.

Changes or modifications other than those expressly approved by Endress+Hauser are strictly prohibited. Unauthorized modifications can cause malfunction or damage, resulting in serious injury or death.

1.5 Notes on Safety Conventions and Symbols

To highlight safety-relevant or alternative operating procedures in this manual, the following conventions have been used, each indicated by a corresponding symbol on the left.

Symbol	Meaning
 A0011189-EN	**DANGER!** This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.
 A0011190-EN	**WARNING!** This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.
 A0011191-EN	**CAUTION!** This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.
 A0011192-EN	**NOTICE!** This symbol contains information on procedures and other facts which do not result in personal injury.

1.6 Symbols for Certain Types of Information

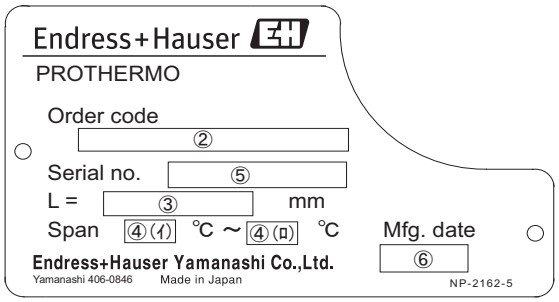
Symbol	Meaning
 A0011182	**Allowed** Indicates procedures, processes or actions that are allowed.
 A0011183	**Recommendation** Indicates procedures, processes or actions that are recommended.
 A0011184	**Forbidden** Indicates procedures, processes or actions that are forbidden.
 A0011193	**Tip** Indicates additional information.

2 Identification

2.1 Device Designation

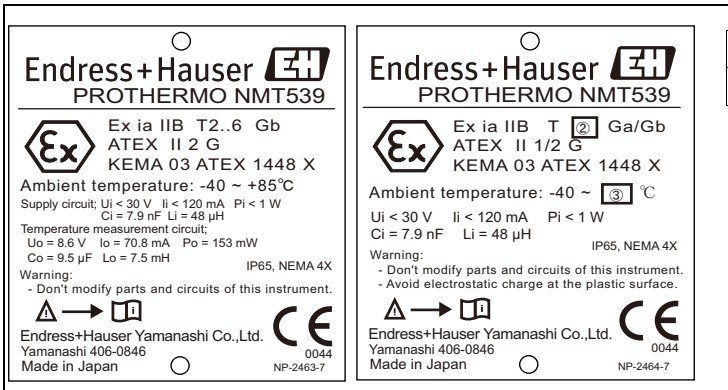
2.1.1 Nameplate

The follow technical data are given on the instrument nameplate:



1	Order Code
2	Serial Number
3	Flexible Tube Length
4	Measuring Temperature Range
5	Date of Manufacture (MM/YY)

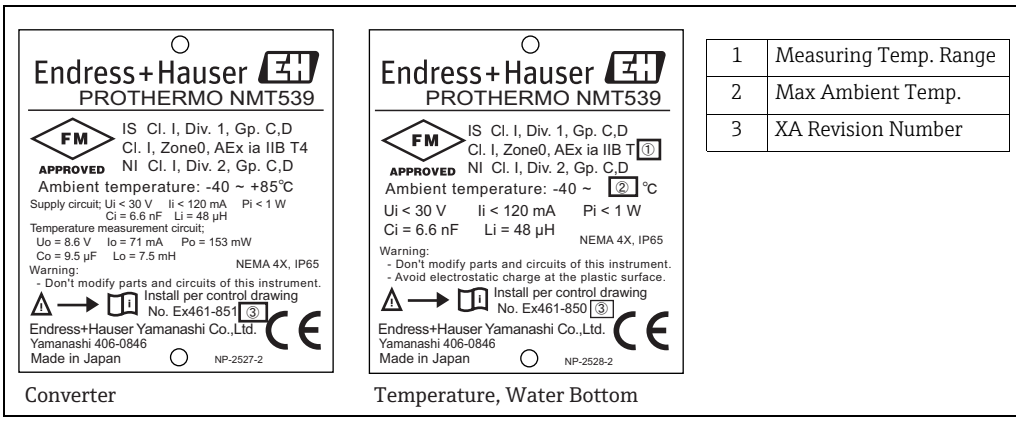
Figure 1: Prothermo Module Name Plate



1	Measuring Temp. Range
2	Max Ambient Temp.

Converter Temperature, Water Bottom

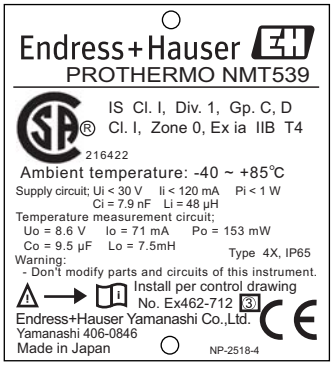
Figure 2: ATEX Approval Type

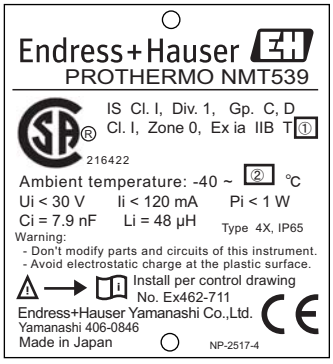


1	Measuring Temp. Range
2	Max Ambient Temp.
3	XA Revision Number

Converter Temperature, Water Bottom

Figure 3: FM Approval Type

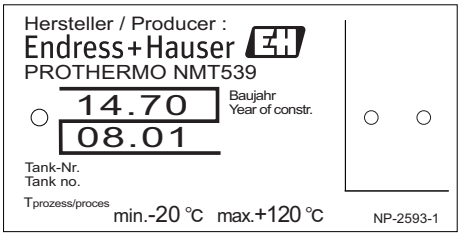




1	Measuring Temp. Range
2	Max Ambient Temp.
3	XA Revision Number

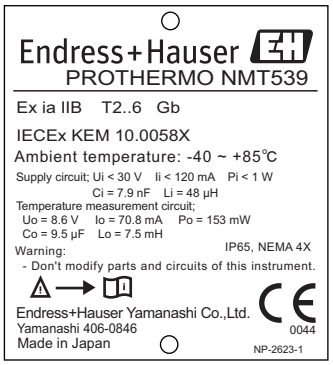
Converter Temperature, Water Bottom

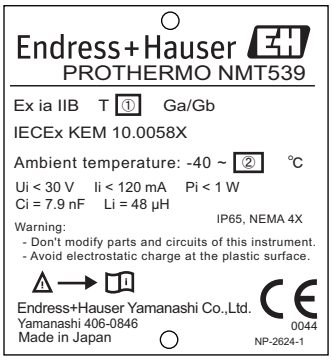
Figure 4: CSA Approval Type



PTB W&M

Figure 5: PTB W&M Approval Type

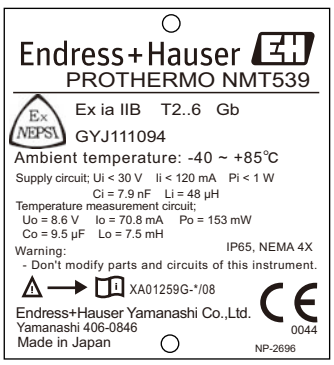


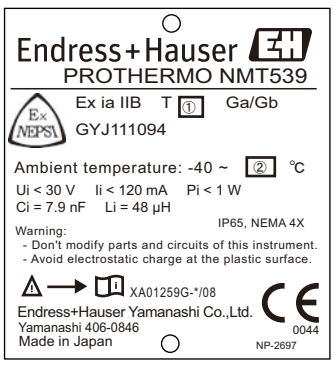


1	Temp. Class
2	Max Ambient Temp.

Converter Temperature, Water Bottom

Figure 6: IEC Approval Type



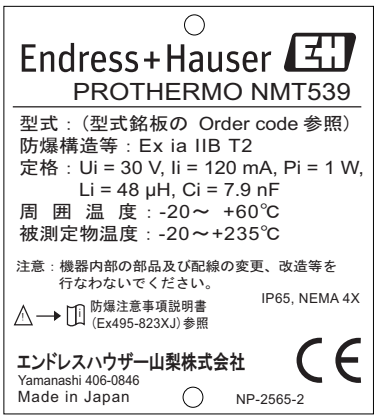


1	Temp. Class
2	Max Ambient Temp.

Converter Temperature, Water Bottom

Figure 7: NEPSI Approval Type

Temperature, Water Bottom
TIIS: TC18319

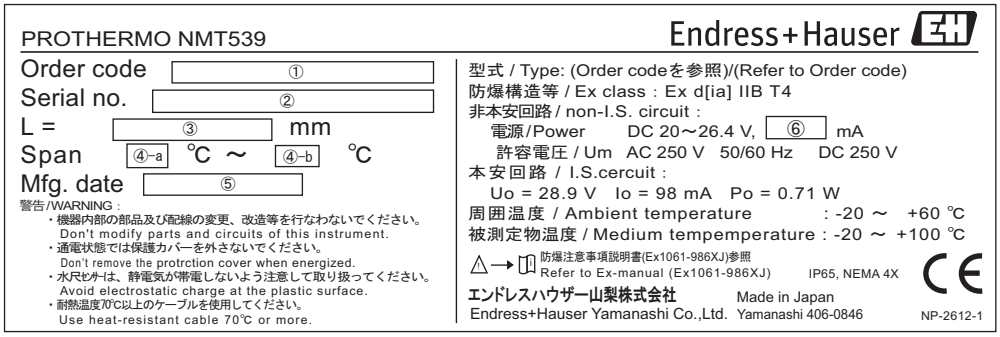


For High Temperature
TIIS: TC18320

Converter
TIIS: TC18321

For Low Temperature
TIIS: TC18604

Figure 8: TIIS Ex ia Approval Type



TIIS : TC18884

1	Order Code
2	Serial Number
3	Flexible Tube Length
4	Measuring Temperature Range
5	Date of Manufacture (MM/YY)
6	Consumed Power

Figure 9: TIIS Ex d[ia] Approval Type

2.2 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:
	A	.....mm
	C	.....Gas-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 ≤ L ≤ 30000), (ATEX & IECEx: 1000 ≤ L ≤ 99999),
(FM & CSA & NEPSI: 1000 ≤ L ≤ 40000)

B: .....Gas-tight feed through (TIIS : 1000 ≤ L ≤ 40000, flange welding type)

Y: .....mm (TIIS: 30000< L ≤ 40000)

2.3 Scope of Delivery

⚠ CAUTION

It is essential to follow the instructions concerning the unpacking, transport and storage of measuring instruments given in the chapter "Incoming acceptance, transport, storage" on.

The scope of delivery consists of:

- Assembled instrument
- Accessories (Mounting Bracket)

Accompanying documentation:

- Operating Manual (this manual)
- Operating Instructions and Description of Instrument Function
- Safety Instruction (XA)

2.4 Certificates and Approvals

CE Mark, Declaration of Conformity
The device is designed to meet state-of-the-art safety requirements, has been tested and left the factory in a condition in which it is safe to operate. The device complies with the applicable standards and regulations as listed in the EC declaration of conformity and thus complies with the statutory requirements of the EC directives. Endress+Hauser confirms the successful testing of the device by affixing to it the CE mark.

2.5 Registered Trademarks

HART®
Registered trademark of HART Communication Foundation, Austin, USA

FieldCare®
Registered trademark of the company Endress+Hauser Flowtec AG, Rheinach, CH

3 Installation

3.1 Incoming Acceptance, Transportation, and Storage

3.1.1 Incoming Acceptance

Check the packing and contents for any signs of damage.
Check the shipment, and make sure that nothing is missing and that the items match your order.

3.1.2 Transportation

⚠ WARNING

- Follow the safety instructions and conditions of transportation for instruments in excess of 18kg (40 lbs.).
- Do not lift the measuring instrument by its housing during unpacking.

3.1.3 Storage

Pack the measuring instrument so that it is protected against impacts during storage and transportation.
The original packing material provides the optimum protection for this.
The allowed storage temperature is -40 to +85°C (-40 to +185°F)

3.2 Installation Conditions

3.2.1 Dimensions

Type 1 Converter Only Version [Standard PF(NPS)3/4 Universal Coupling Connection]

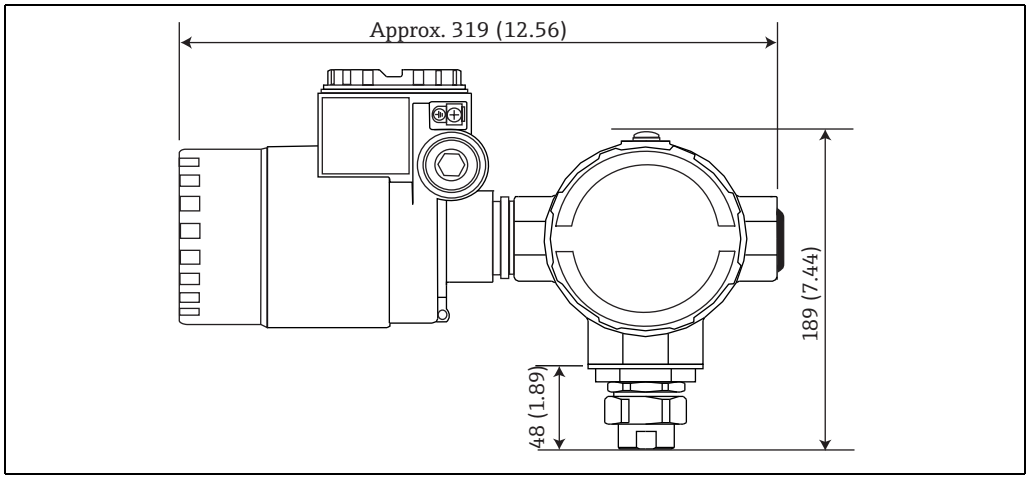


Figure 10: Type 1 Dimensions, Unit of Measurement: mm (in)

Type 2 Converter Only Version (for Varec 1700 with M20 Threaded Connection)

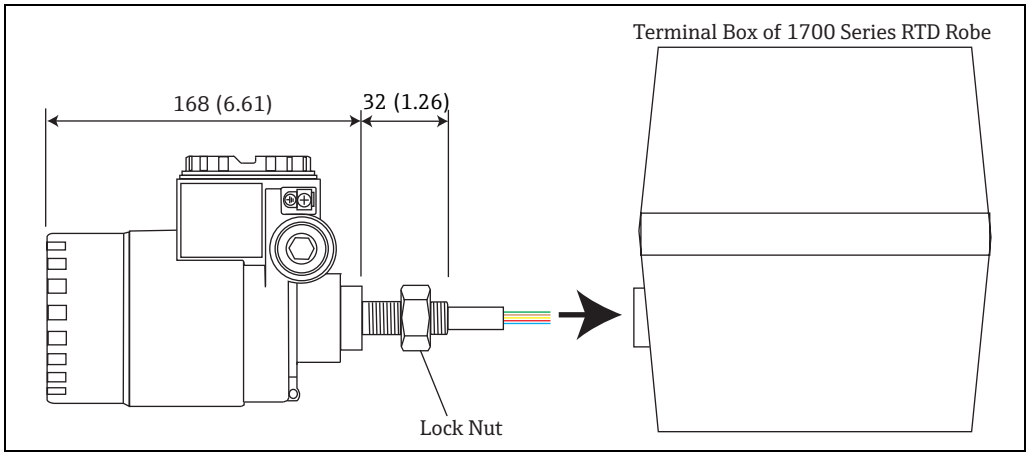


Figure 11: Type 2 Dimensions, Unit of Measurement: mm (in)

⚠ CAUTION

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.

Mounting of UK Special Version M20 Connection to Varec 1700 Terminal Box

1. Use sealing tape on the threaded gauge to terminal box connection. Connect a bunch of cable (RTD signal inlet cable) into the female thread connection of the terminal box.
2. Turn the entire NMT539 gauge head clockwise 10 times or more and secure it to the terminal box with a lock nut.
   - Make sure that terminal housing connection for NMT539 and Varec1700 is secured.

Converter + Average Temperature Probe Version

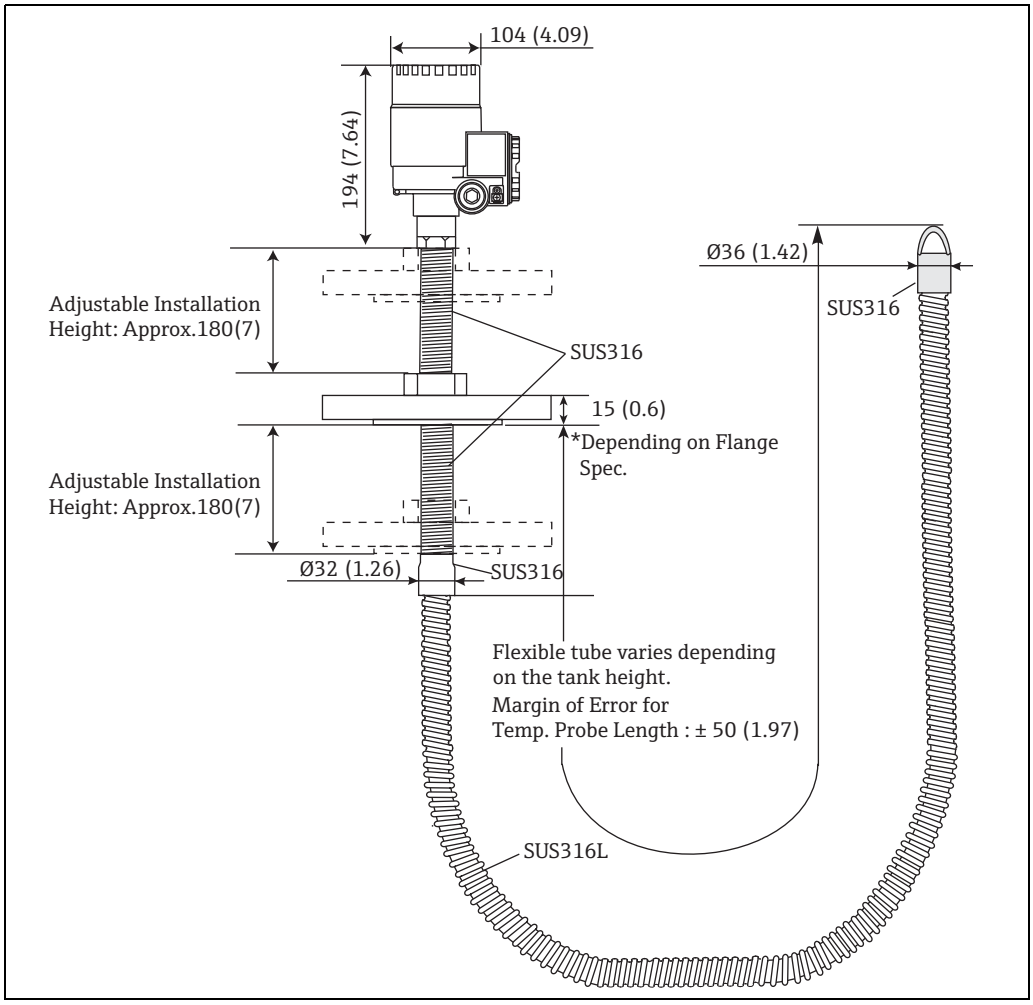


Figure 12: Dimensions for Converter + Average + Temperature Probe Version, Unit of Measurement: mm (in)

NOTICE

The position of the welded flange can not be adjusted.

Converter + Temperature + WB Probe Version

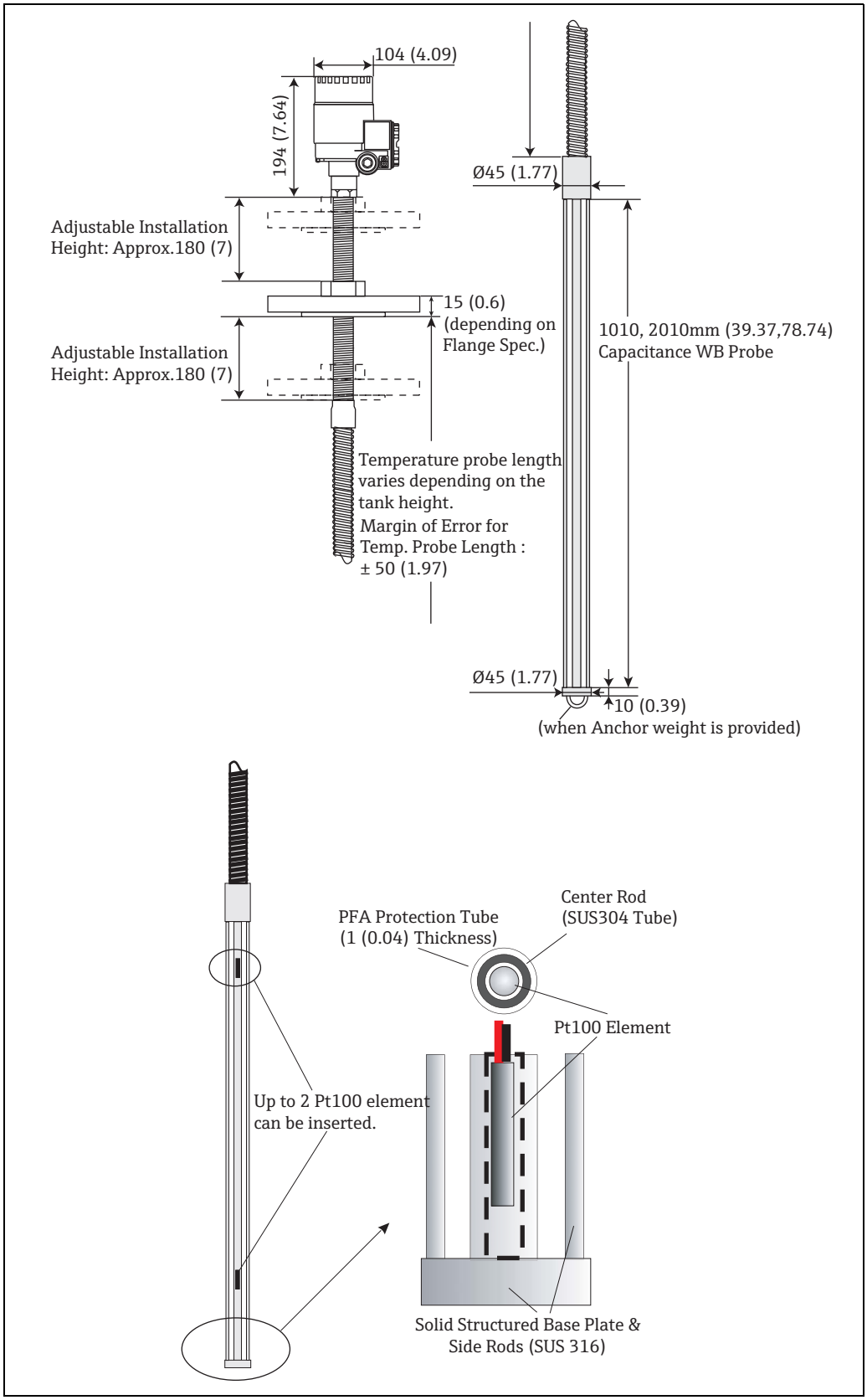


Figure 13: Dimensions for Converter + Temperature + WB Probe Version, Unit of Measurement: mm (in)

NOTICE

The position of the welded flange can not be adjusted.

NMT539 #1 Element Position

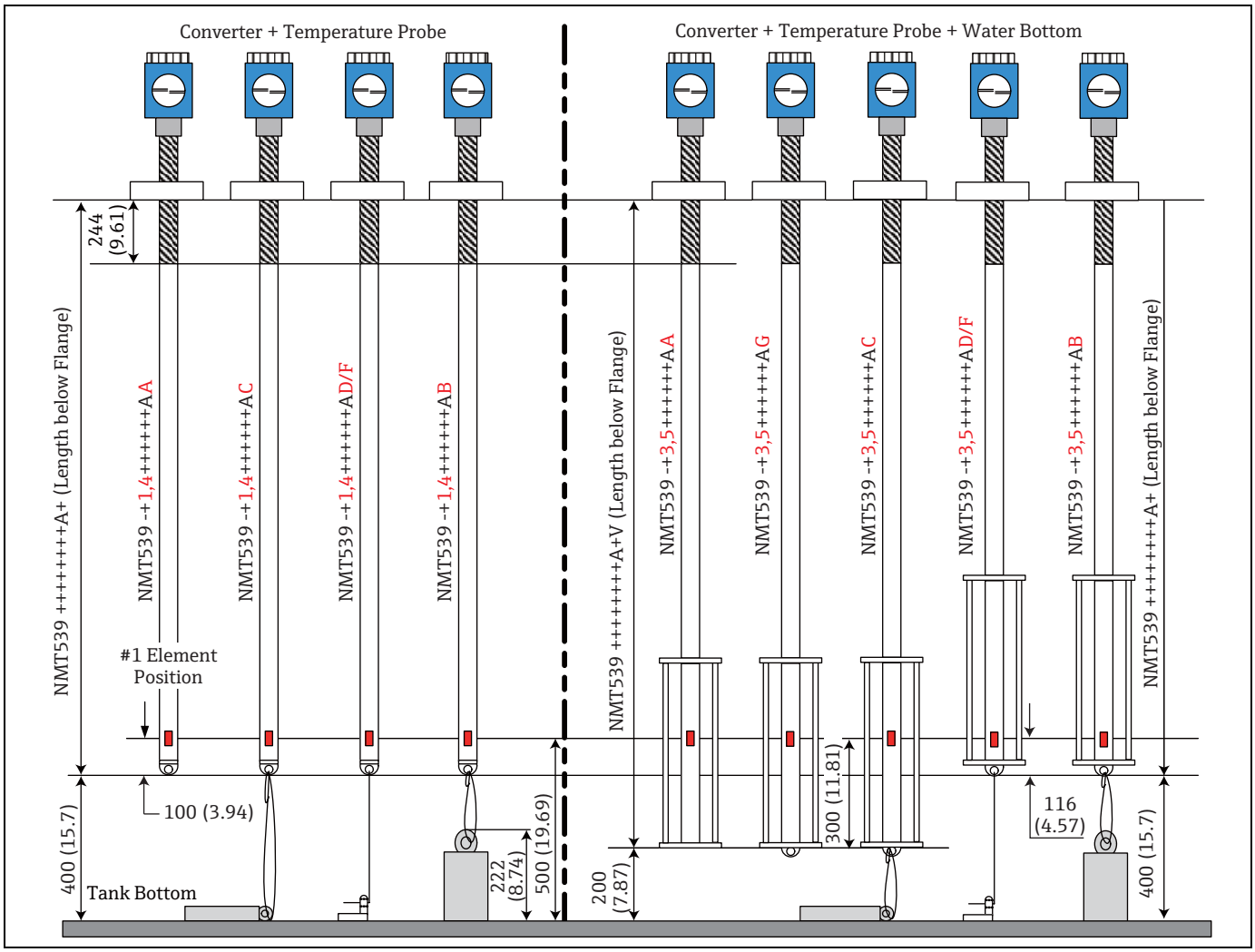


Figure 14: #1 Element Position,
Unit of Measurement: mm (in)

3.2.2 Unpacking Procedure

CAUTION

When unpacking NMT539 by only one worker, it may bend or twist the flexible tube. This work must be handled by three or more workers.

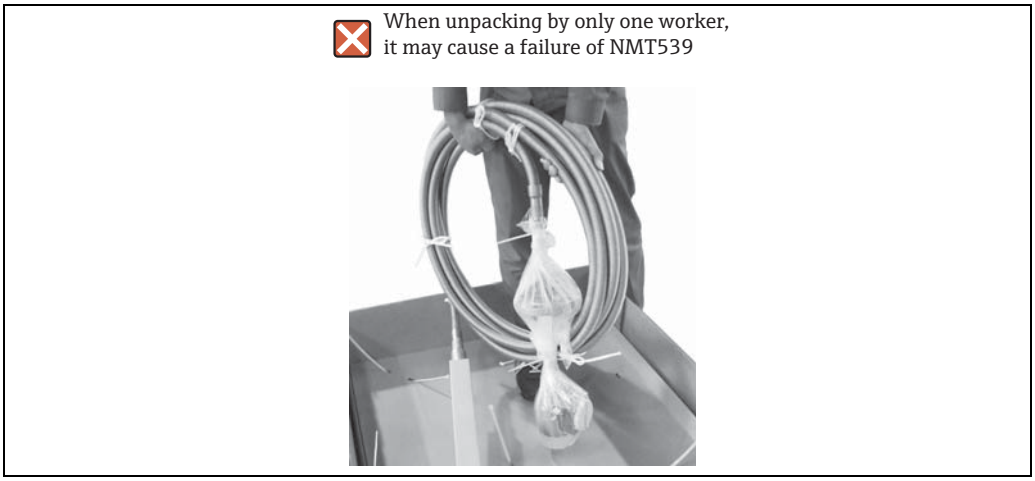


Figure 15: Unpacking Procedure for NMT539

3.2.3 Flexible Tube Procedure

CAUTION
Do not hold the flexible tube at a single point and lift the sensor. This may cause damage to the tube.

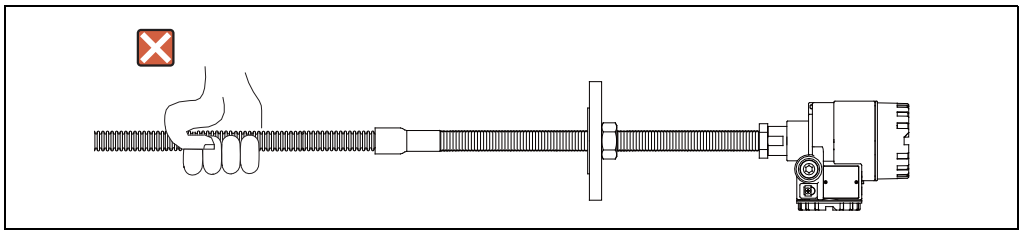


Figure 16: Flexible Tube-1

CAUTION
When winding the flexible tube, keep the diameter of the tube at a minimum of 1m (39.37") or more.
When bending the flexible tube to attach to a tank, the radius of curved area must be 500mm (19.69") or more.

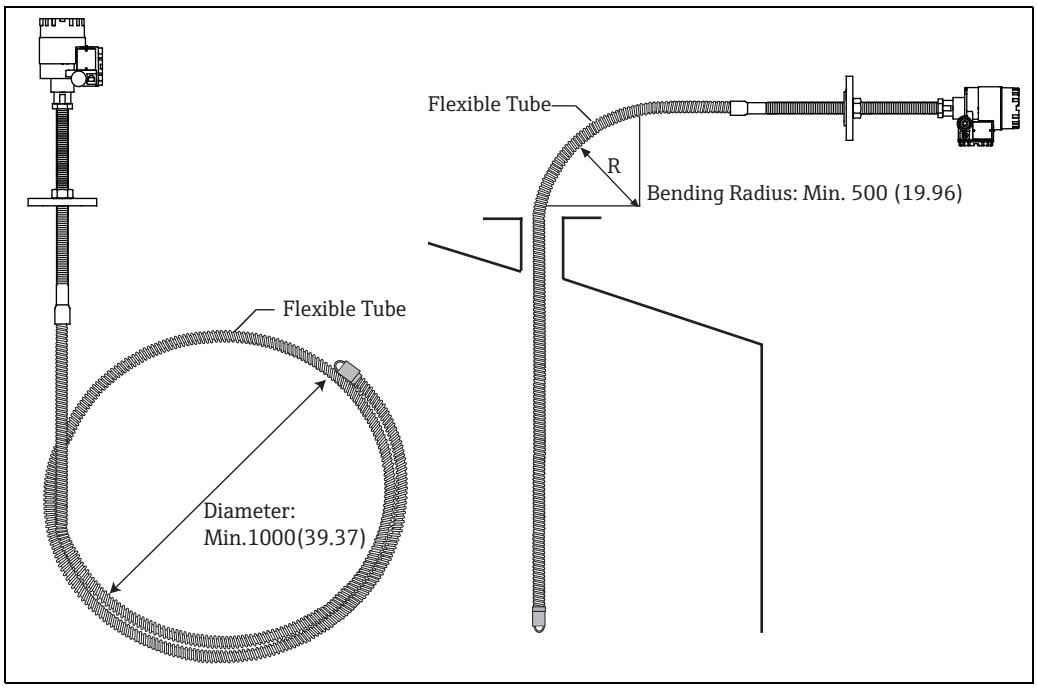


Figure 17: Flexible Tube-2, Unit of Measurement: mm (in)

CAUTION
If the radius of the curved area must be shown above becomes smaller than 500mm (19.69"), the flexible tube or the measuring element may be seriously damaged or broken.

3.2.4 Mounting of NMT539 Procedure

⚠ CAUTION

- The flexible tube length of NMT539 is defined for the customer's specifications. Before mounting, check as follows:
  1. Tag Number (if any) on the body of NMT532
  2. Length of Flexible Tube
  3. Number of Measuring Points
  4. Intervals between Measuring Points
- Mount NMT539 at a minimum of 500mm(19.67") away from the tank shell. This will ensure that the measurement is not influenced by changes in ambient temperature.
- The procedure for mounting of NMT539 on a tank varies depending on the type of tank. Procedures for a fixed roof tank and a floating roof tank are shown in this section as examples. However, procedures for mounting of the flexible tube head are the same (mounted on the top of the tank) in any types of tanks.
- The recommended standard diameter of nozzle is 50mm (2").

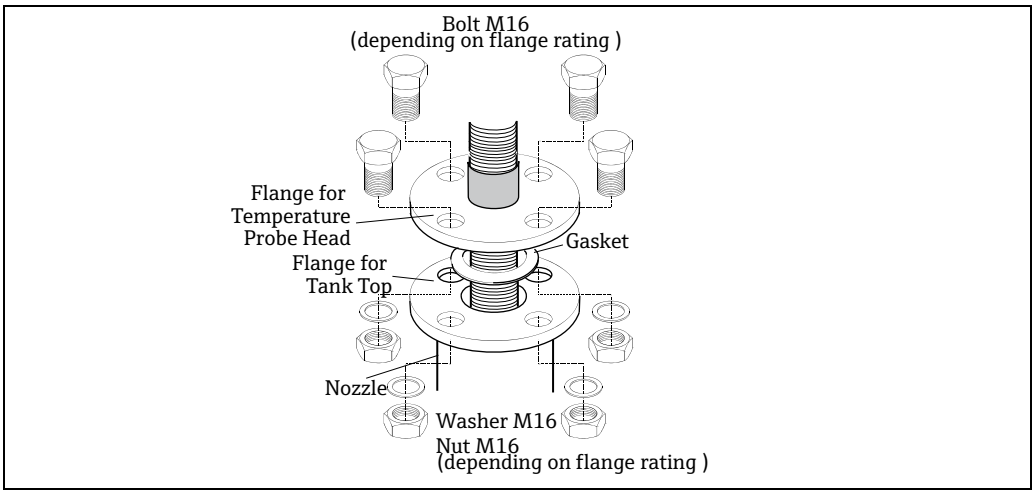


Figure 18: Mounting NMT539

Wrapping Sealing Tape Procedure

⚠ WARNING

Wrap the sealing tape around the screwed part shown below at a width of 30mm (1.18") or more to maintain high level of air sealing between flanges.

1. When the installation height of the probe is set, lift the probe and mark the position of the bottom of the flange.
2. Turn the flange and moves it up toward the converter unit approximately 30mm (1.18").
3. Wrap sealing tape (e.g. material: PTFE or other appropriate materials) around the adjusting pipe below the bottom of the flange.
4. Turn the flange back to the marked installation (original) height.
5. Wrap sealing tape around the adjusting pipe above the flange.
6. Turn the lock nut downwards to the flange until it is properly secured.

This completes the wrapping sealing tape procedure.

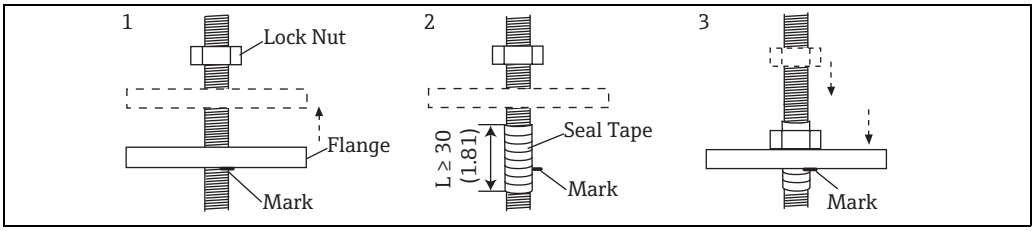


Figure 19: Wrapping Sealing Tape, Unit of Measurement: mm (in)

WARNING

Ensure to keep the tension at of 16kg or less during setting and after setting. Exceeding the limit may cause breakage in the flexible tube.

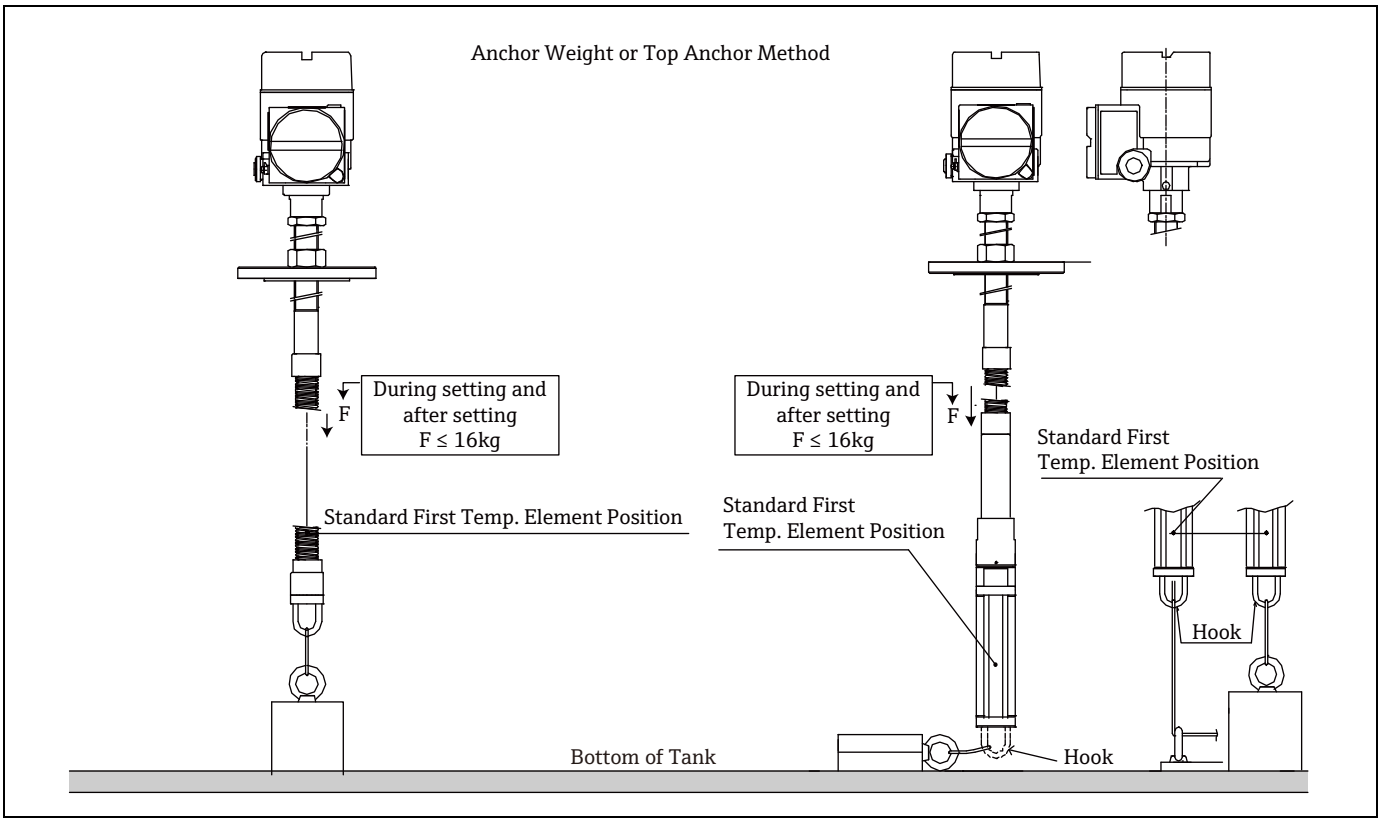


Figure 20: Mounting Accessory

Safety Precaution for Use of NMT539 at Temperature of -170°C

When NMT539 is installed in cryogenic tanks, pressure in the flexible tube and electrical housing may decrease due to the rapid cooling of the tank processes. During commissioning of the temperature probe, loosen the terminal compartment cover to stabilize the pressure.

When removing NMT539 from a cryogenic tank, the temperature and pressure in the flexible tube may rapidly increase due to an extreme temperature difference between the inside and outside of the tank. In this case, the flexible tube may move in an uncontrolled manner, and could lead to mechanical damage or personal injury.

To prevent this, turn off the power and loosen the terminal compartment cover to stabilize the pressure.

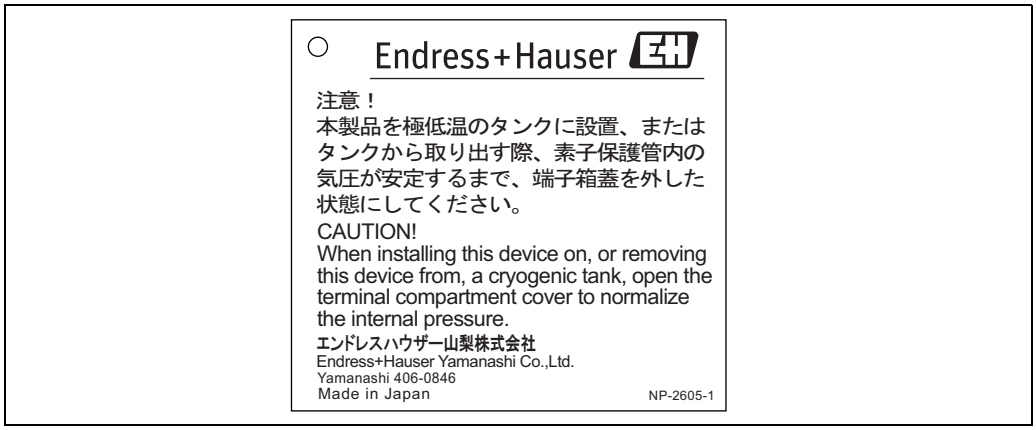


Figure 21: -170°C caution plate

3.3 Mounting NMT539 on Various Tanks

NOTICE

When installing water bottom, check "Zero" reference position of water bottom compared with manual dipping reference.

3.3.1 Mounting NMT539 on Fixed Roof Tank

There are three methods for mounting NMT539 on a fixed roof tank:

- Top Anchor Method
- Stilling Well Method
- Anchor Weight Method

⚠ CAUTION

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 and water bottom sensor are fixed with a wire hook and a top anchor.

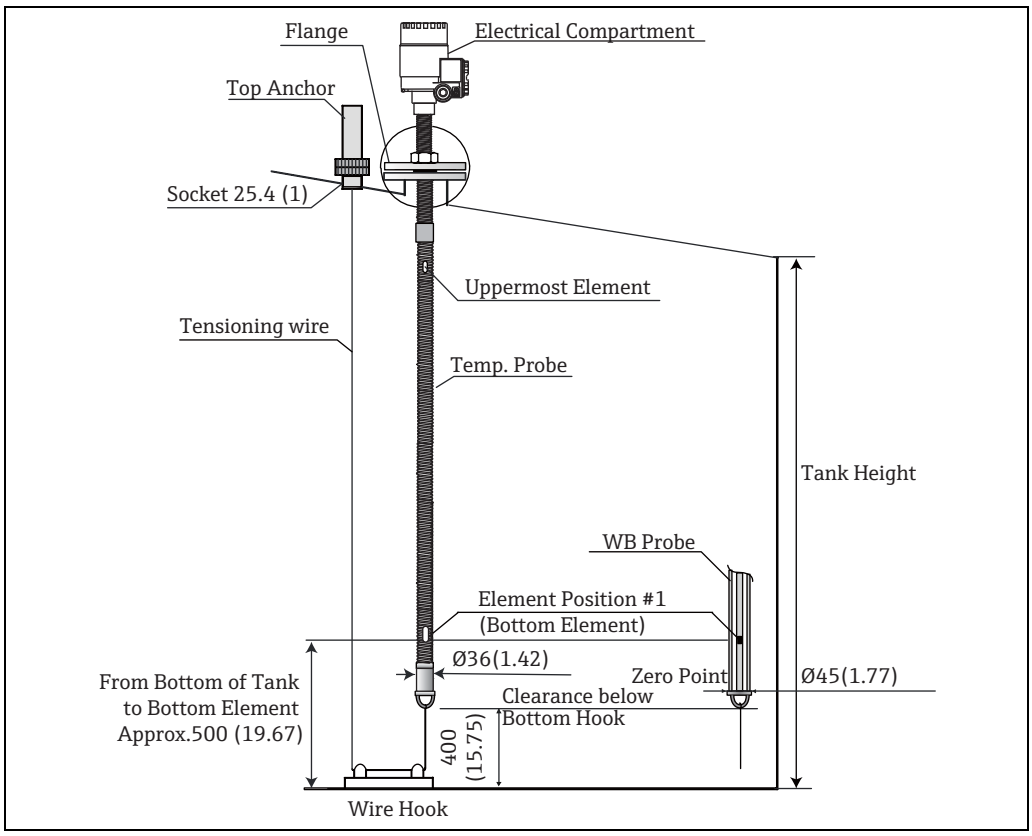


Figure 22: Top Anchor Method, Unit of Measurement: mm (in)

Top Anchor Attachment Procedure

1. Insert a flexible tube and/or WB (Water Bottom) probe into a gasket and lower the flexible tube from the nozzle at the top of the tank.

⚠ CAUTION

The flexible tube and/or WB probe must be lowered carefully without overbending and scratching the inner edge of the nozzle hole.

2. Rotate NMT539 for cabling in the most convenient way.
3. Straighten the tensioning wire, temporarily fix the end of the wire to the top anchor and lower the wire.

4. Put the tensioning wire into the wire hook at the bottom of the tank.
5. Secure the tensioning wire twice through the hole at the bottom hook
6. Wind the provided wire around the tensioning wire to secure the tensioning wire.

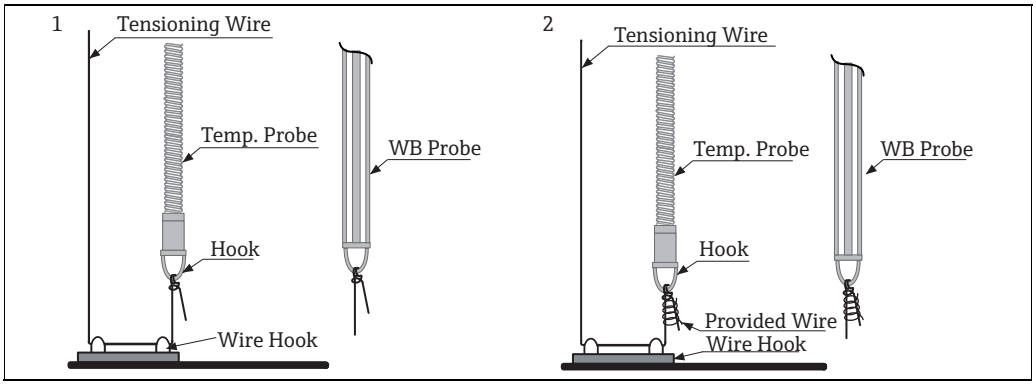


Figure 23: Top Anchor Attachment-1

7. Using bolts, fix the mounting flange of Prothermo to the nozzle at the top of the tank.

CAUTION

Keep the compression of the spring of 35 to 37mm (1.38 to 1.47 inch). Compression exceeding the spring of 35 to 37mm may damage the sensor.

8. Wind the end of the wire once around the shaft of the top anchor and tighten it with nuts (2pcs.).
9. Cut the excess wire.
10. Screw the nut to compress down the spring of the top anchor from 35 to 37mm.
11. Cover the top anchor.

This completes the mounting top anchor procedure.

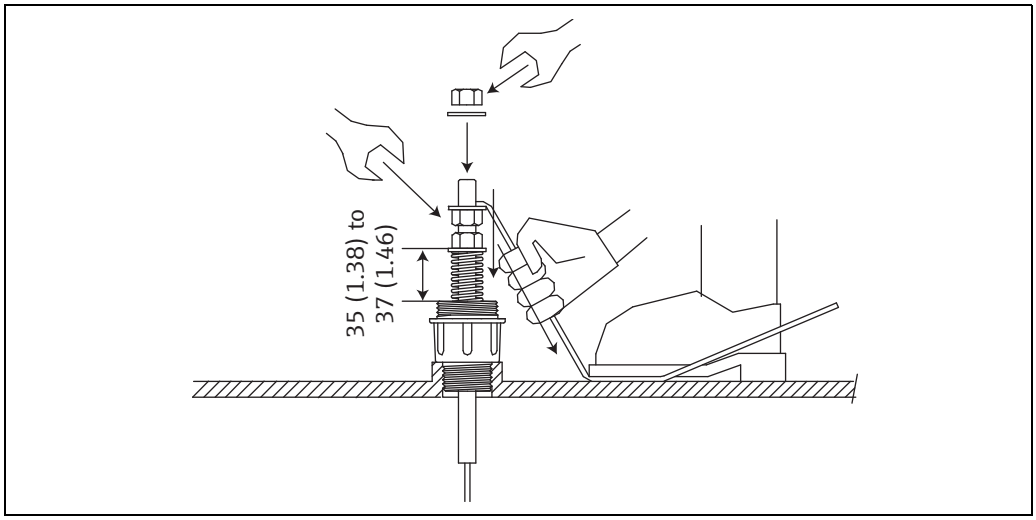


Figure 24: Top Anchor Attachment-2, Unit of Measurement: mm (in)

Stilling Well Method

The flexible tube and/or WB sensor are inserted into a stilling well with a diameter of 2 inches (50A) or more.

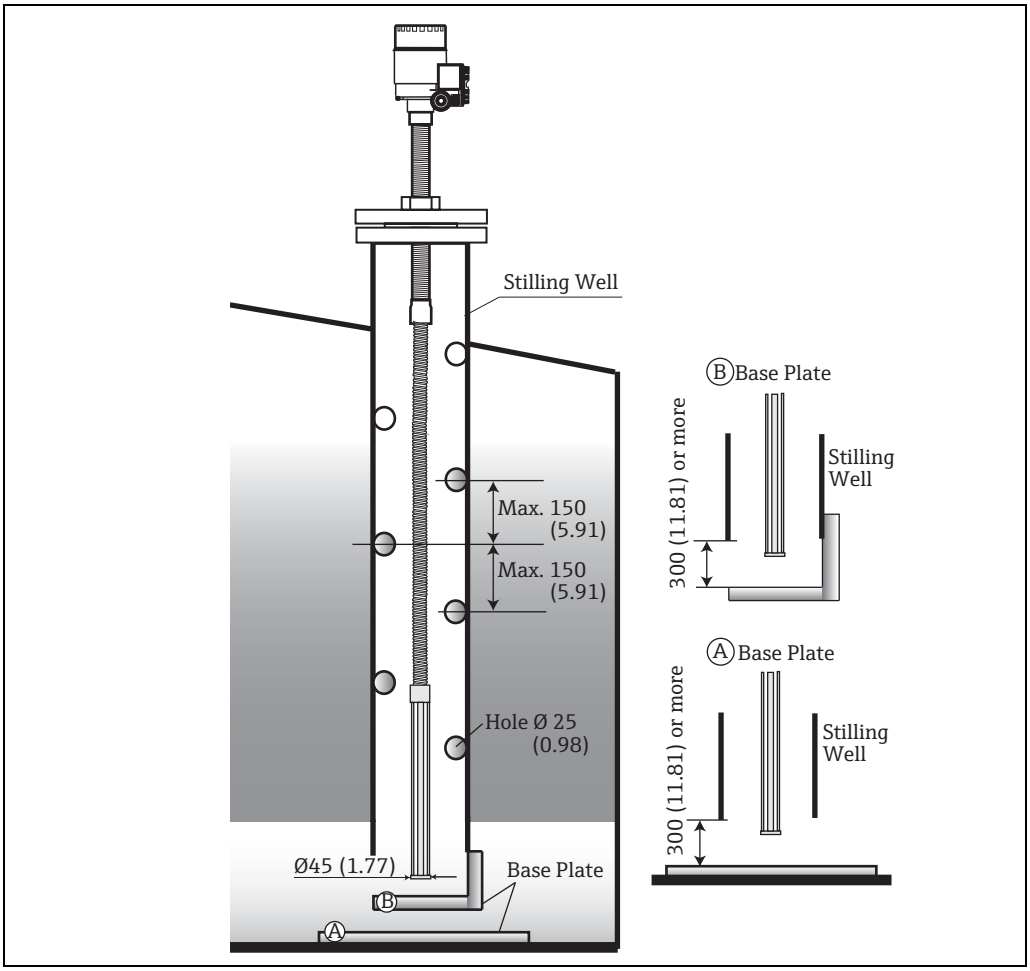


Figure 25: Stilling Well Method, Unit of Measurement: mm (in)

Stilling Well Attachment Procedure

CAUTION

- When anchor weight is not used in the stilling well method, install water probe into the place which is lower than the bottom of the stilling well to get the tip of the water probe.
- The stilling well of 2 inches (50A) (JIS, ASME) or more is available to install.
- When using anchor weight, use the pipe of 4 inches (100A) (JIS, ASME) or more.

WARNING

- Do not move the flexible tube horizontally or swing it. This may cause turbulence of liquid, which may damage the flexible tube.
- The flexible tube and/or WB probe must be lowered carefully without overbending and scratching the inner edge of the nozzle hole.

1. Insert a gasket and lower the flexible tube and/or WB sensor probe from the inlet of the stilling well.
2. Rotate NMT539 so that you can set up the cable in the most convenient way.
3. Fix the mounting flange of NMT539 to the nozzle on the tank top using bolts.

This completes the stilling well attachment procedure.

Anchor Weight Method

The flexible tube is fixed with an anchor weight.

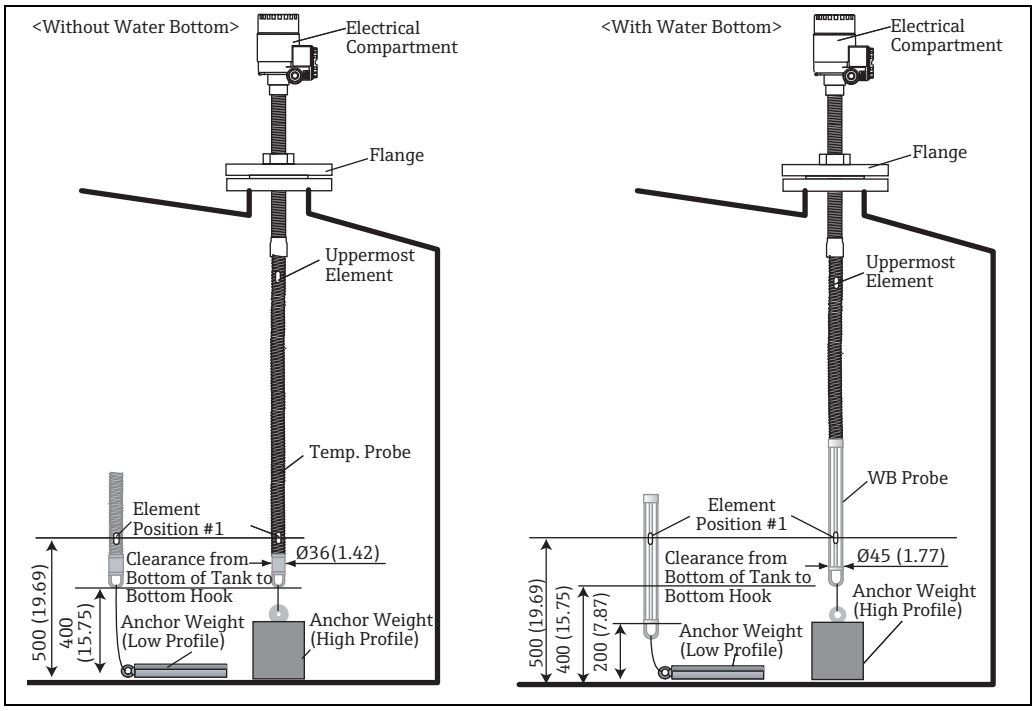


Figure 26: Anchor Weight Method, Unit of Measurement: mm (in)

Anchor Weight Attachment Procedure

CAUTION

Ensure to put the anchor weight at the bottom of the tank. When installing NMT539 with the suspended anchor weight, use the anchor weight of 16kg or less. Exceeding the limit may cause internal breakage in the flexible tube.

WARNING

The temperature probe and/or WB probe must be lowered carefully without overbending and scratching the inner edge of the nozzle hole.

1. Insert the flexible tube and/or WB probe into a gasket and lower the flexible tube from the nozzle at the top of the tank.
2. Rotate NMT539 for cabling in the most convenient way.
3. Put the tensioning wire through the anchor weight hook twice and also tie the other end to the bottom hook.
4. Wind the provided wire around both ties of the hooks to secure the tensioning wire.
5. Using the bolts, fix the mounting flange of NMT539 to the nozzle at the top of the tank.

This completes the mounting anchor weight procedure.

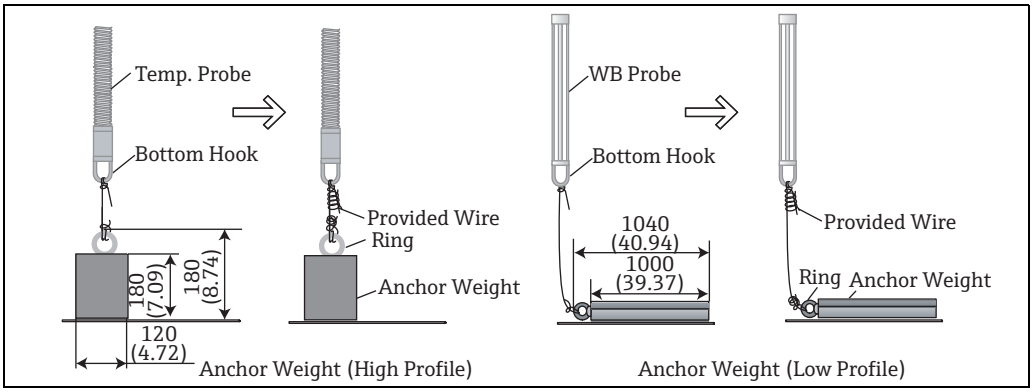


Figure 27: Anchor Weight Attachment, Unit of Measurement: mm (in)

3.3.2 Mounting NMT539 on Floating Roof Tank

There are three methods of mounting NMT539 on a floating roof tank:

- Top Anchor Method
- Stilling Well Method
- Guide Wire Ring Method

CAUTION

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 or WB sensor is installed in a fixed pipe and fixed with a top anchor. NMS5/NMS7 and NMT539 can be mounted in the same fixed pipe.

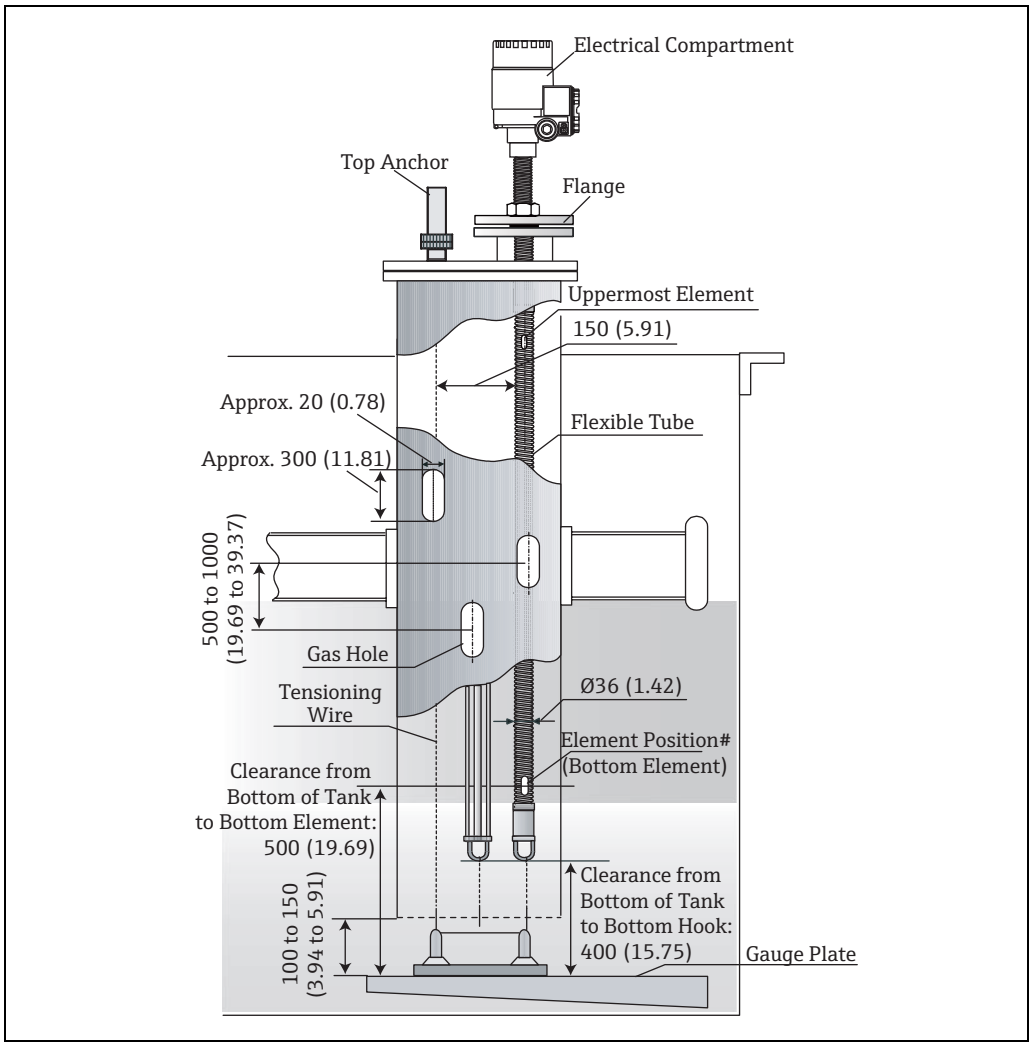


Figure 28: Top Anchor Method, Unit of Measurement: mm (in)

NOTICE

The installation procedure is the same as in the mounting on fixed roof tanks using the top anchor (refer to "3.3.1 Mounting NMT539 on Fixed Roof Tank").

Stilling Well Method

The flexible tube and/or WB sensor probe are inserted into a stilling well with a diameter of 2 inches (50A) or more in the fixed pipe.

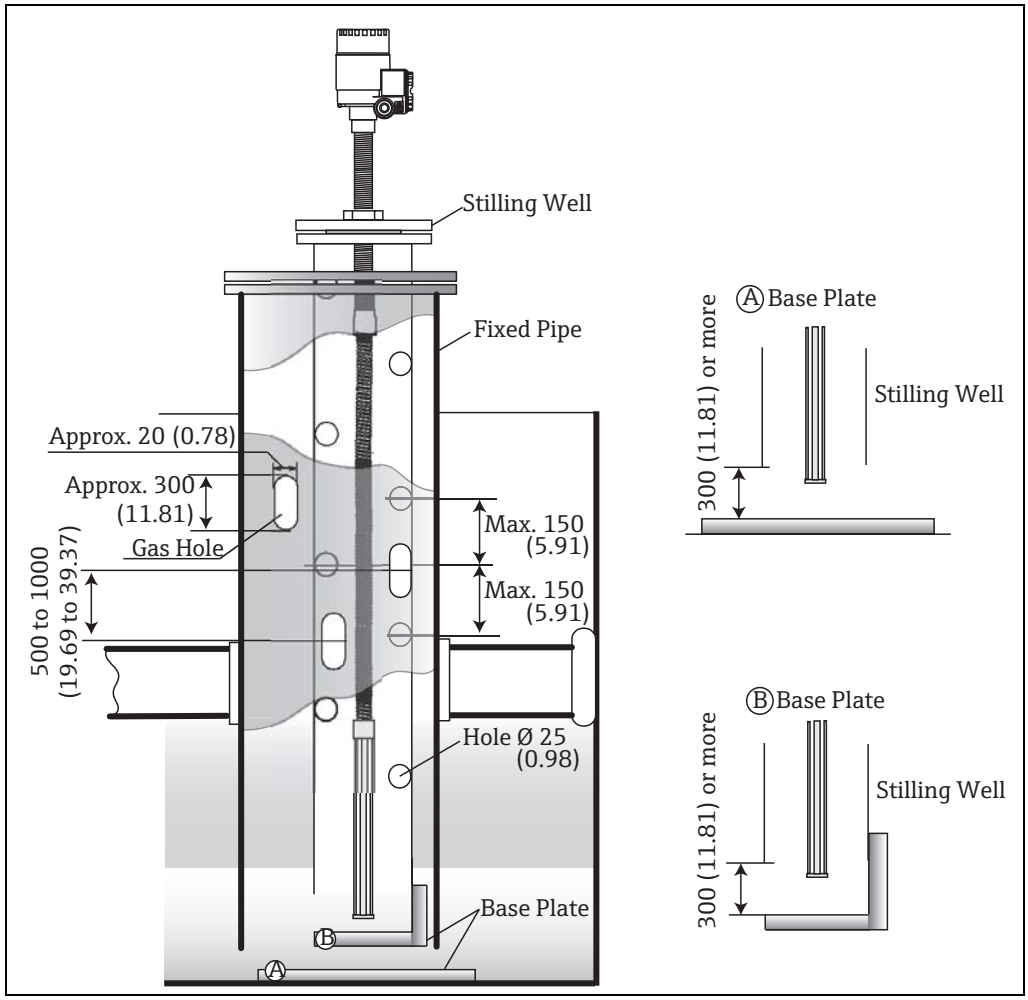


Figure 29: Stilling Well Method, Unit of Measurement: mm (in)

NOTICE

The installation procedure is the same as in the mounting on fixed roof tanks using the stilling well.

Guide Ring and Anchor Weight Method

Flexible tube and/or WB sensor are fixed with a guide ring and anchor weight.

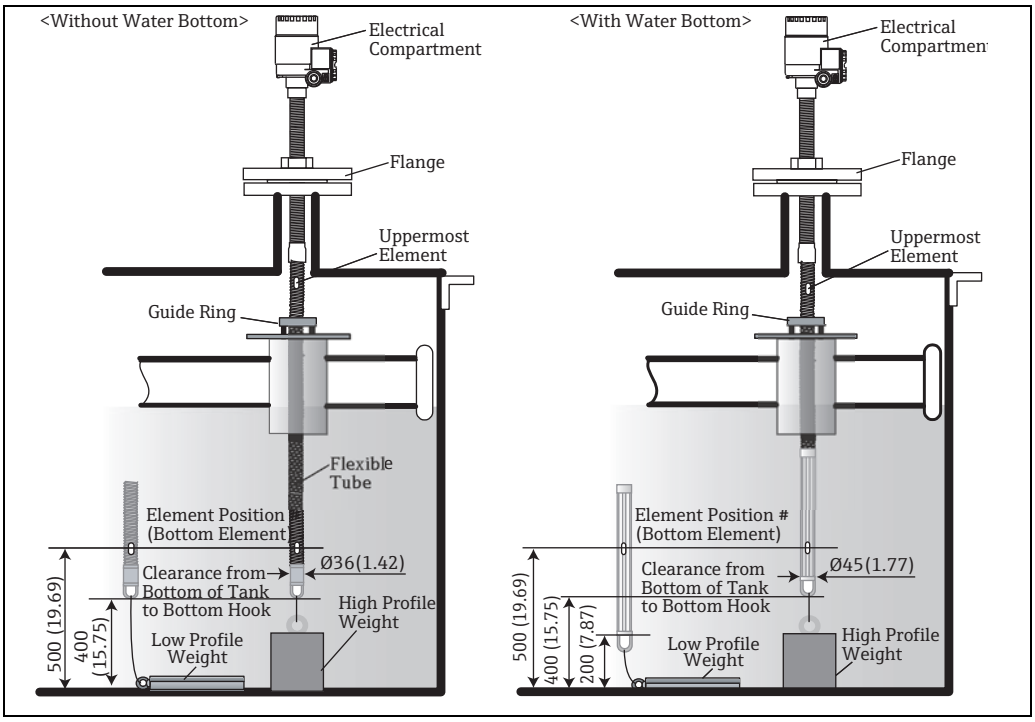


Figure 30: Guide Ring and Anchor Weight, Unit of Measurement: mm (in)

Guide Ring and Anchor Weight Attachment Procedure

⚠ CAUTION

Ensure to put the anchor weight at the bottom of the tank. When installing with the suspended anchor weight, use the anchor weight of 16kg or less. Exceeding the limit may cause internal breakage in the flexible tube.

⚠ WARNING

The flexible tube must be lowered carefully without overbending and scratching the inner edge of the nozzle hole.

1. Set the guide ring to the floating roof.
2. Insert the flexible tube and/or WB probe into a gasket and lower the flexible tube from the nozzle at the top of the tank.
3. Rotate NMT539 for cabling in the most convenient way.
4. Put the tensioning wire through the anchor weight hook twice and also tie the other end to the bottom hook.
5. Wind the provided wire around both ties of the hooks to secure the tensioning wire.
6. Using the bolts, fix the mounting flange of NMT539 to the nozzle at the top of the tank.

This completes the mounting guide ring and anchor weight procedure.

3.3.3 Mounting NMT539 on Pressurized Tank

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

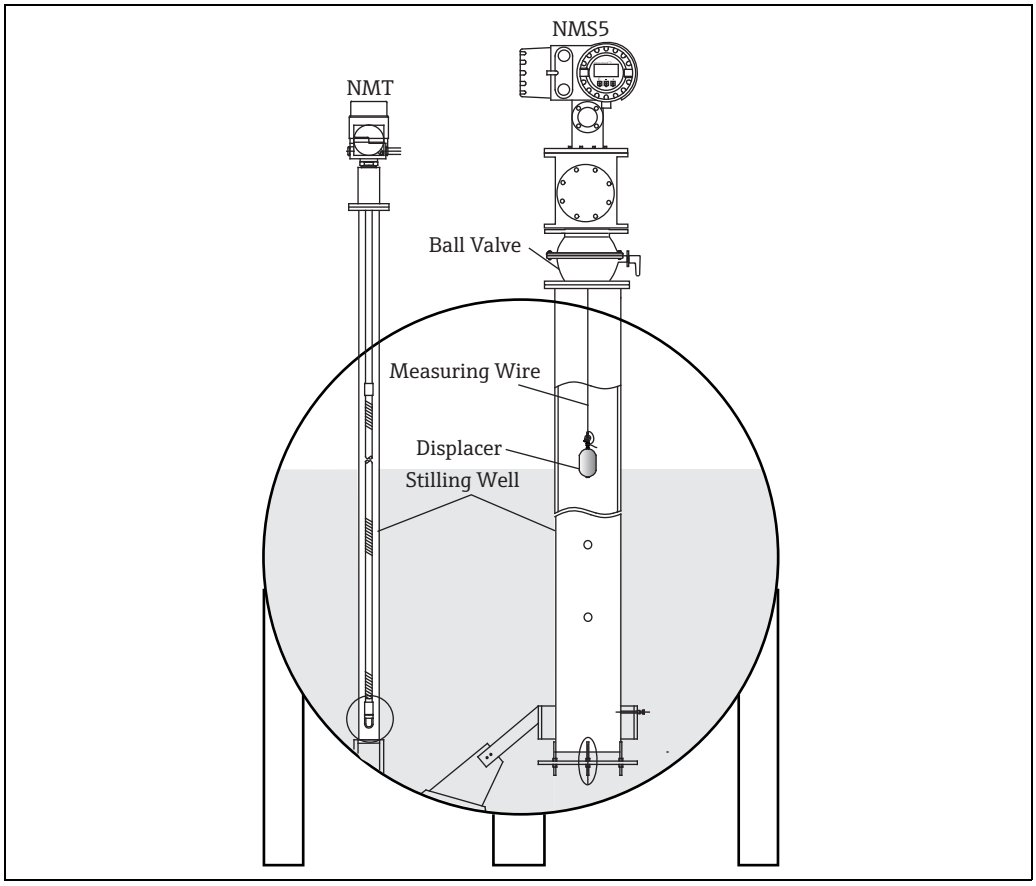


Figure 31: stilling well for Pressurized Tank

WARNING

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

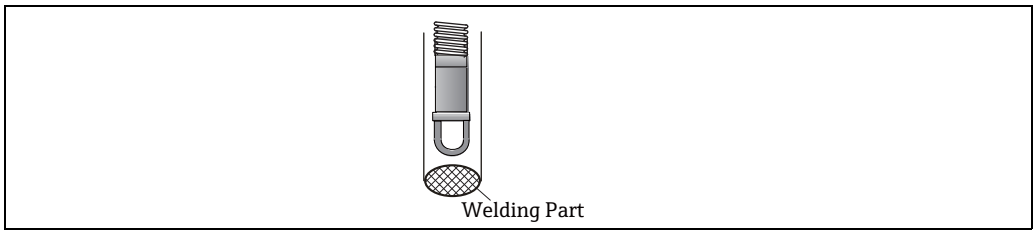


Figure 32: Welding Part of Stilling Well

3.4 Protective Cover

In case of NMT539 TIIS Ex d [ia] only available in Japan, a protective cover is required.

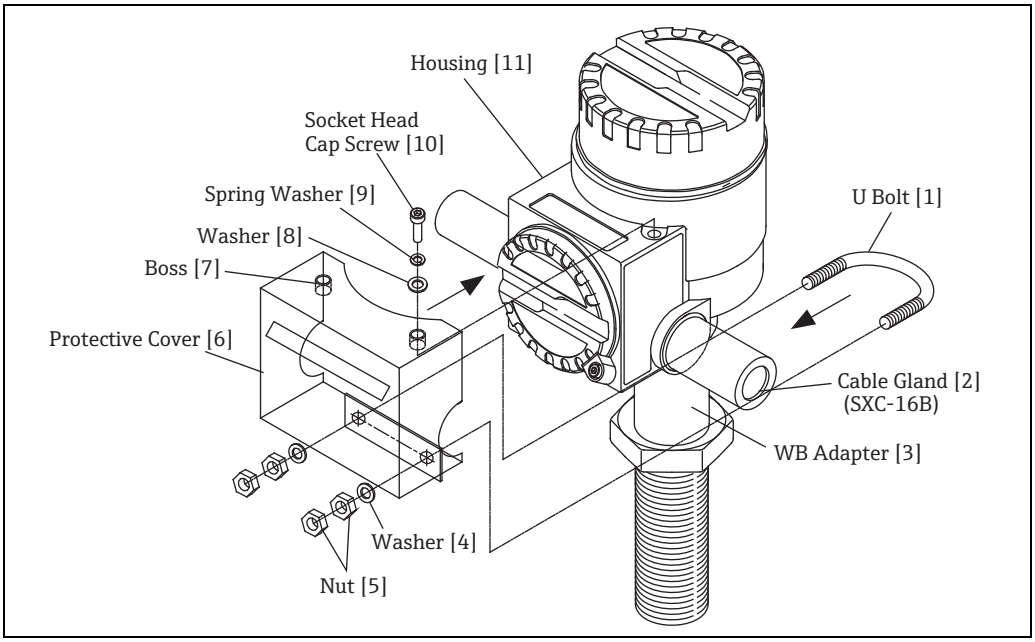


Figure 33: Protective Cover

Attachment Procedure of Protective Cover

1. Place the protective cover [6] on the housing [11].
2. Fix the protective cover with a socket head cap screw [10], a spring washer [9], and a washer [4].
3. Insert U bolt [1] into the holes of the protective cover from the side of WB adapter [3].
4. Fix the protective cover with washers [4] and double nuts [5].

This completes the protective cover attachment procedure.

⚠ CAUTION

Over tightening nuts [5] may damage the protective cover [6].

⚠ WARNING

Ensure to use the cable glands attached to NMT539.

4 Wiring

4.1 Mechanical Connection for Converter Version

Preparation of Mechanical Connection

⚠ CAUTION

Prior to the removal of the existing RTD temp. converter, check the following items. The items are also applicable for installation of converter version of NMT539.

- Element type (material and structure)
- Total element number
- Presence of bottom and vapor spot elements
- Lowest element position
- Element intervals
- Cable color for each element

Prior to installation of NMT539, tie all RTD cables (and coaxial cables if the probe is equipped with a water bottom sensor) temporarily with zip ties or short string to avoid damaging cables during mechanical connection.

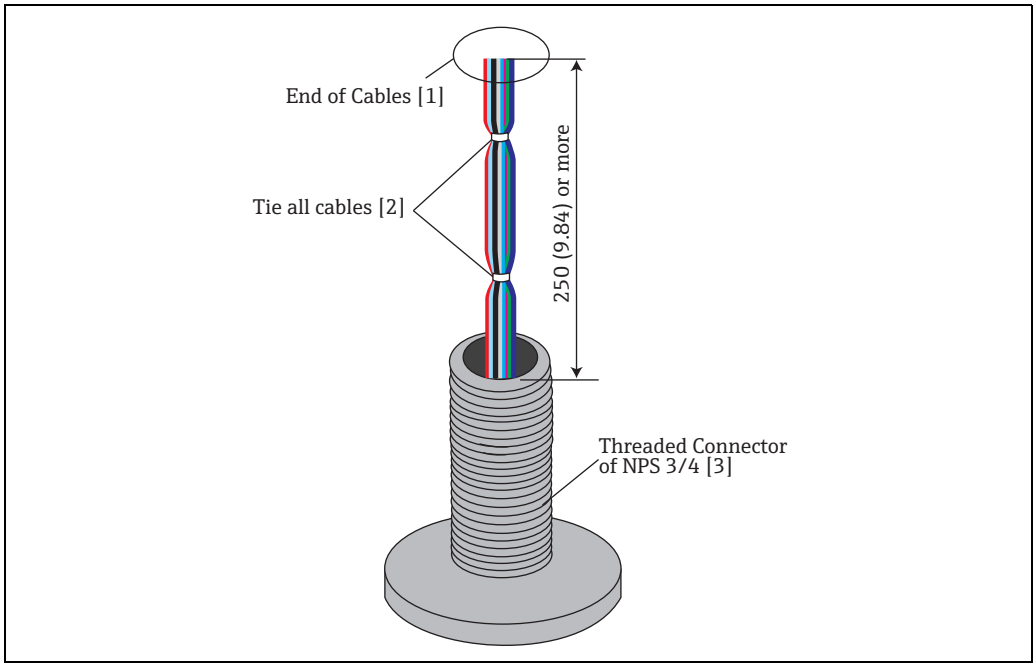


Figure 34: Tying Cable,

Procedure of Tying Cable

1. Cut the tip of cables [1] in the same length for all the cables to connect them to NMT539.
2. Tie all the cables to prevent damage due to mechanical connection.
3. Keep the distance between the end of the cables and the top of the threaded connector of NPS 3/4 [3] at 250mm or more [2].

This completes the tying cable procedure.

Procedure of Connecting Threaded Type Connector

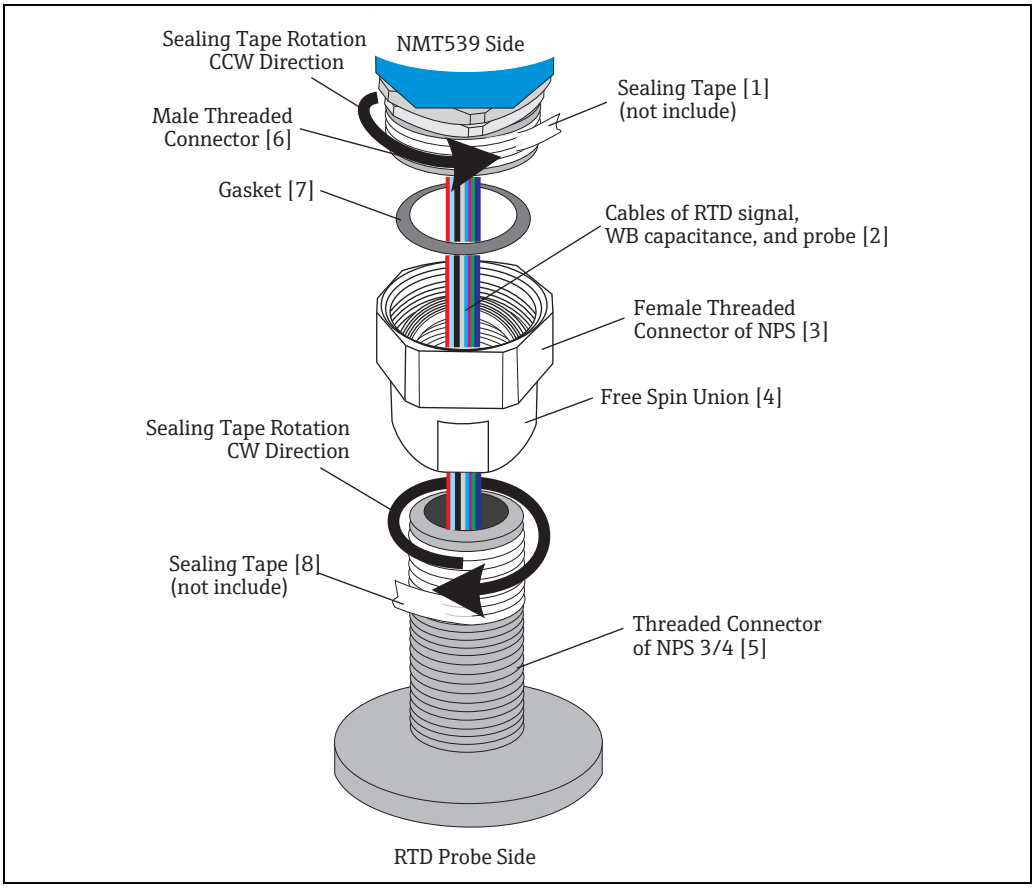


Figure 35: Connecting Threaded Type Connector

CAUTION

- Take precautions prior to installation of NMT539 into RTD probe.
- Loosen the threaded female connector of lower NPS.
- Mount the threaded female connector on RTD probe to ensure that each connection can be smoothly attached.

1. Wrap the sealing tape [8] around the threaded connector of NPS 3/4 [2].
2. Insert the free spin union [4] and the female threaded connector of NPS [3] into the threaded connector of NPS 3/4 [5] until they are completely secured.
3. Wrap the sealing tape [1] around the male threaded connector [6] of NMT539 side.
4. Insert the gasket [7] into the union [4] and mount NMT539 on RTD probe.
5. Tighten the union [4] with hand until it is secured.
6. Remove the cover and confirm that both sides of the cables [2] have enough length to be connected.
7. After completing of cable connection and position adjustment of NMT539, tighten the union [4] with hand and tighten it 1/8 rotation securely using a wrench.

This completes the threaded connection procedure

WARNING

Do not pull both sides of the cables or subject them to over-tension during this procedure. Pulling cables or subjecting them to over-tension may damage the inside the cable, which makes it impossible NMT539 to measure the temperature.

4.2 Wiring Connection for Converter Version

Temperature Signal Cable
Temperature signal cable is directly connected to NMT539 (converter only version) input cable with simple terminal connectors (included).

Connection of Signal Cable Procedure

1. Select a pair cables.
2. Strip cable ends approximately 10mm (1/2").
3. Twist both ends together and install terminal connector [1].
4. Crimp the connected terminal with plier or any connector tool.

This completes the connection of signal cable procedure.

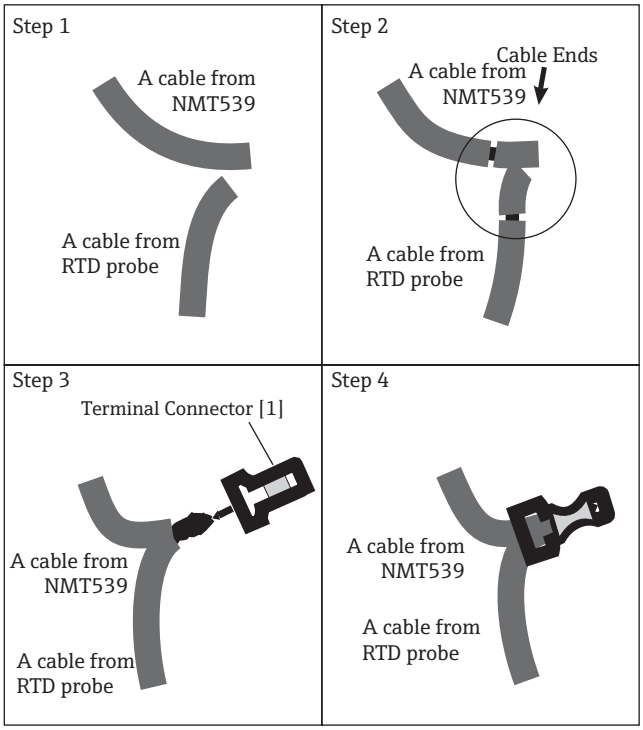


Figure 36: Connection of Signal Cable

The cabling color code is listed below.
NMT539 cable color: the principle is based on the A,B,b 3-wire cabling method.

A: Signal Wires

A: Signal Cable	
No.1: Brown No.2: Red No.3: Orange No.4: Yellow No.5: Green No.6: Blue No.7: Purple No.8 Gray	No.9: White No.10: Black No.11: Brown and Black No.12: Red and White No.13: Orange and White No.14: Yellow and White No.15: Green and White No.16: Blue and White

B: Common Wire

B: Common Signal Cable
B: Purple and White b: Black and White

4.3 Electrical Connection (TIIS, Ex d [ia])

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.

CAUTION

- Use a conductive grounding wire with cross-sectional dimensions 2~2.6mm^2.
- In an instrumentation room, a field device with Class A ground may be connected in common with the communication cable shield.

Class A Ground General Description

Ground Resistance Value	10Ωor less
Grounding Cable	Tensile strength: more 1.04kN Metallic wire Cable core cross section diameter: 2~2.6mm copper wire or more Cable finished external diameter: more than ϕ 8mm

Sample of Grounding Cable

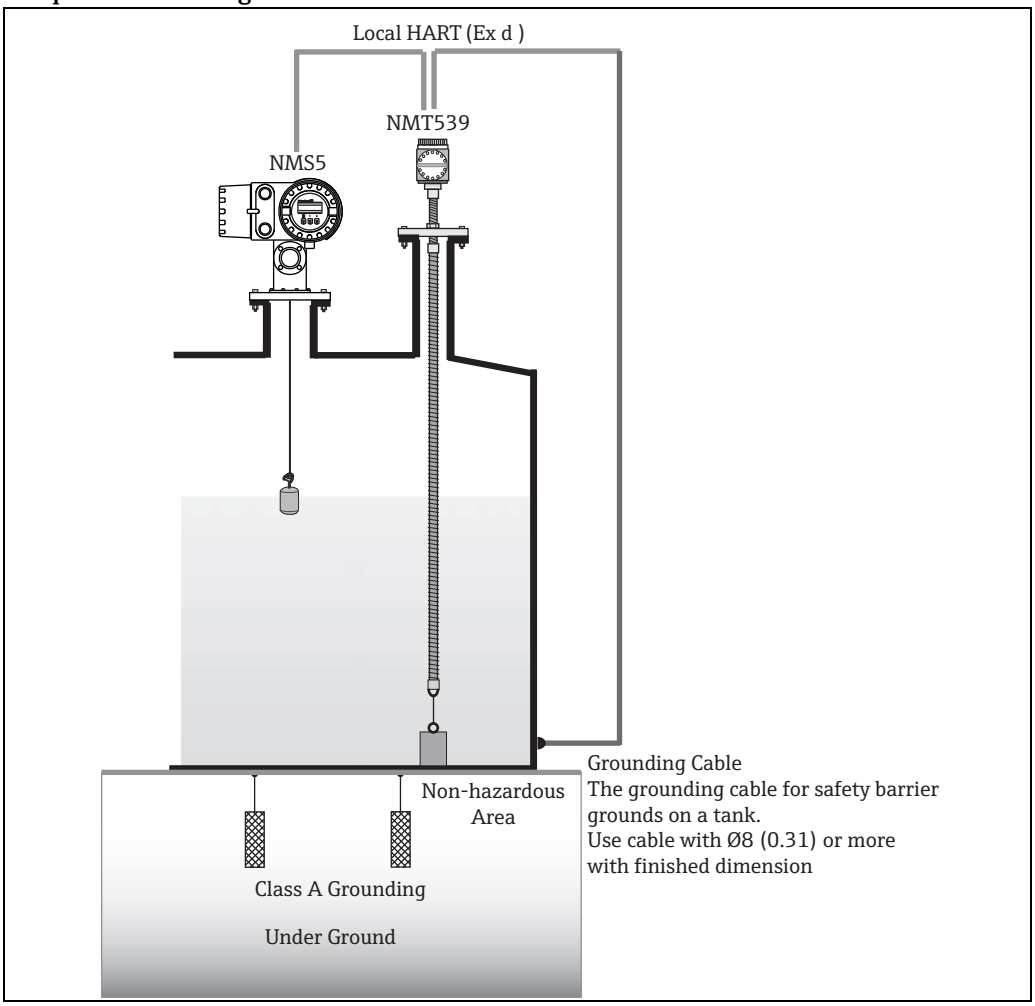
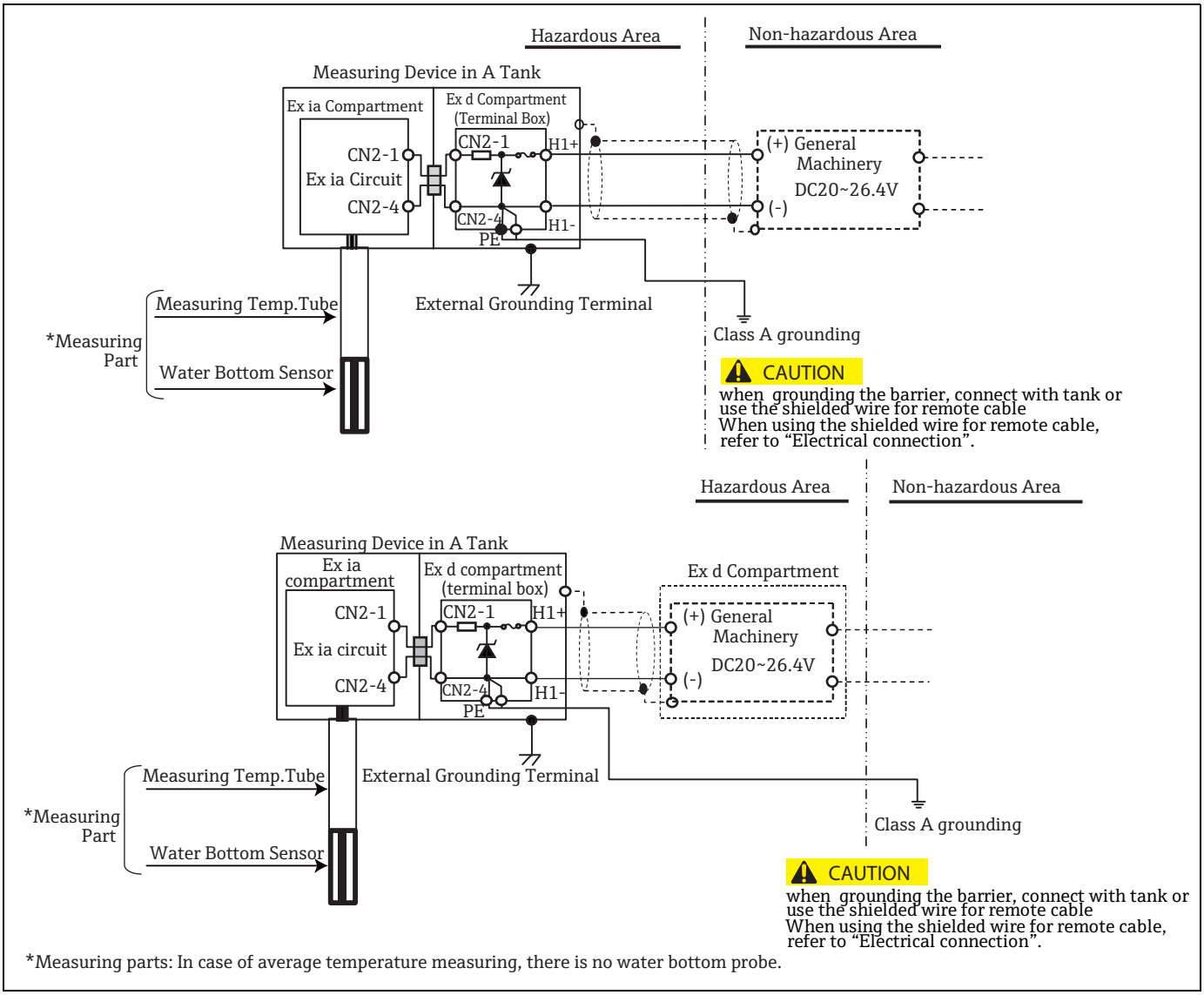


Figure 37: Grounding Cable

4.3.1 Connecting Diagram

CAUTION

Install wiring in manner to prevent current or voltage from causing electro magnetic interference on the intrinsically safe circuit.



*Measuring parts: In case of average temperature measuring, there is no water bottom probe.

Figure 38: Connecting Diagram

4.4 Terminal Connection

4.4.1 NMT539 Terminal (ATEX, Ex ia)

CAUTION

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

NMT539 Terminal Board

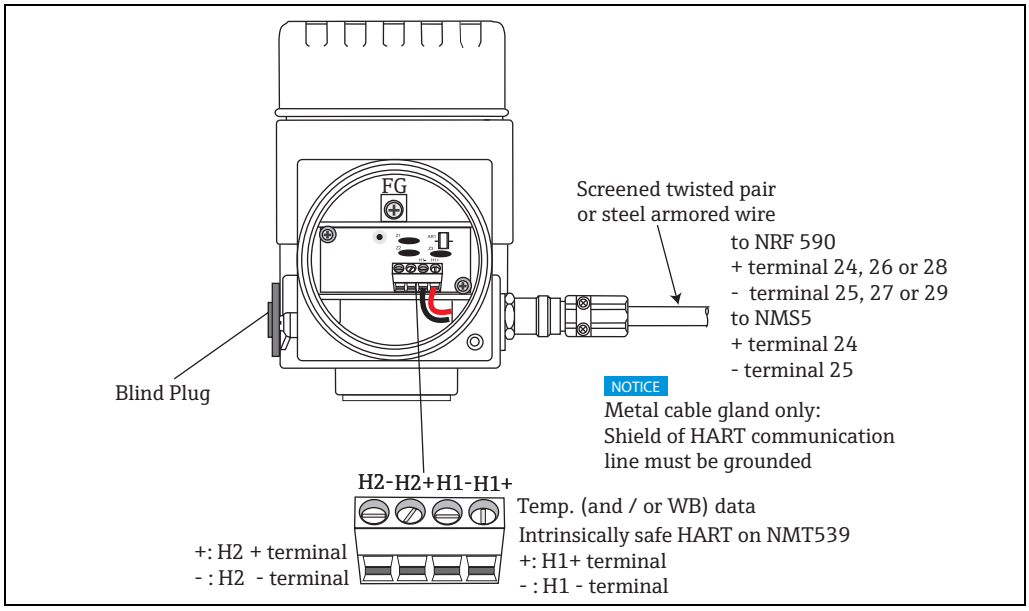


Figure 39: NMT539 Terminals (ATEX, Ex ia)

4.4.2 NMS5/NMS7 Terminal (ATEX, Ex d [ia])

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.

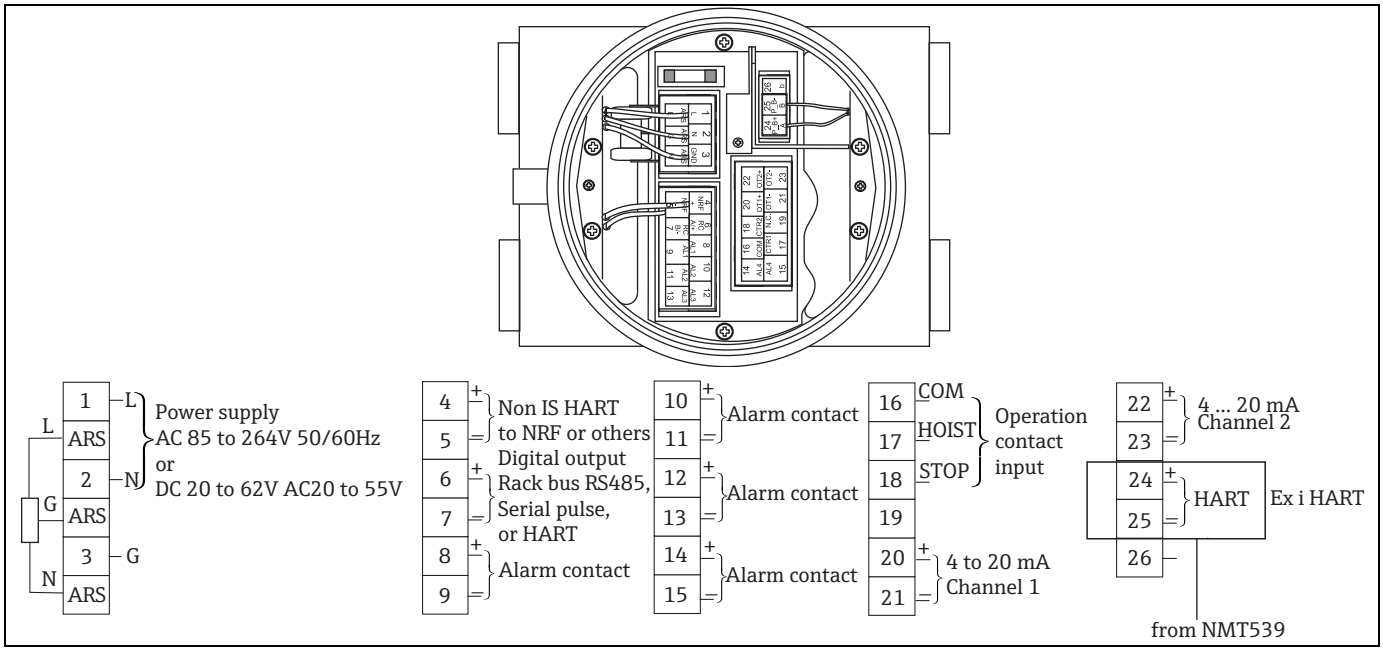


Figure 40: NMS5/NMS7 Terminal

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.

4.4.3 NMT539 (TIIS, Ex d [ia]) Terminal

NOTICE

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

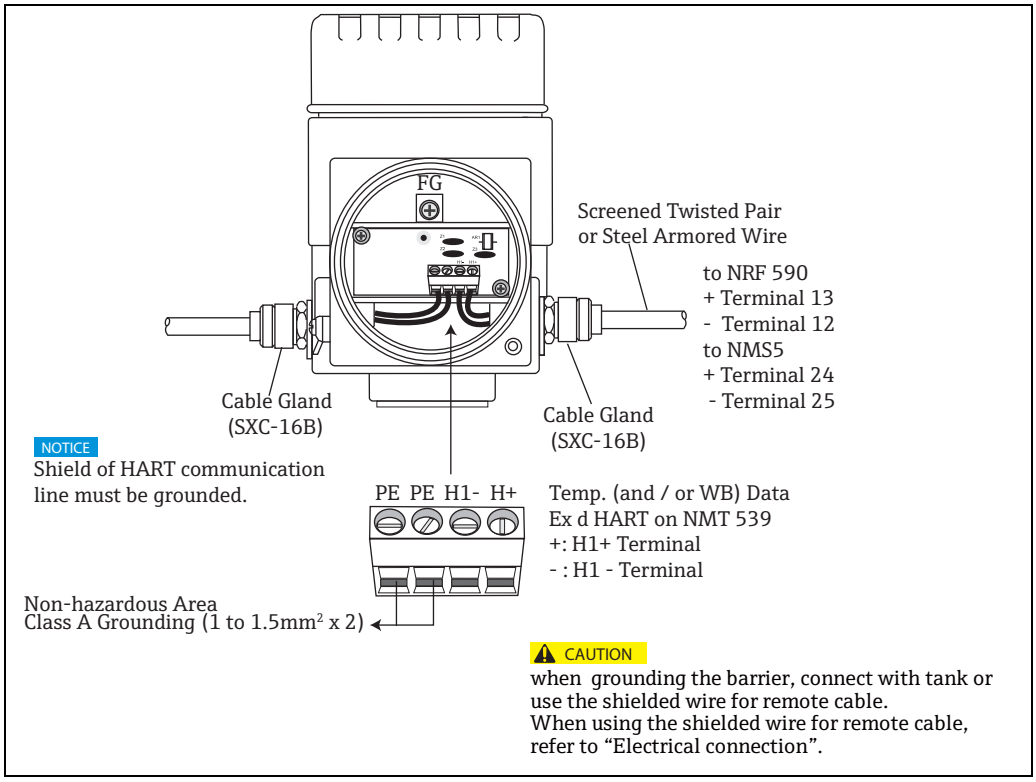


Figure 41: NMT539 Terminals (TIIS, Ex d [ia])

4.4.4 NMS Ex d Connection

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

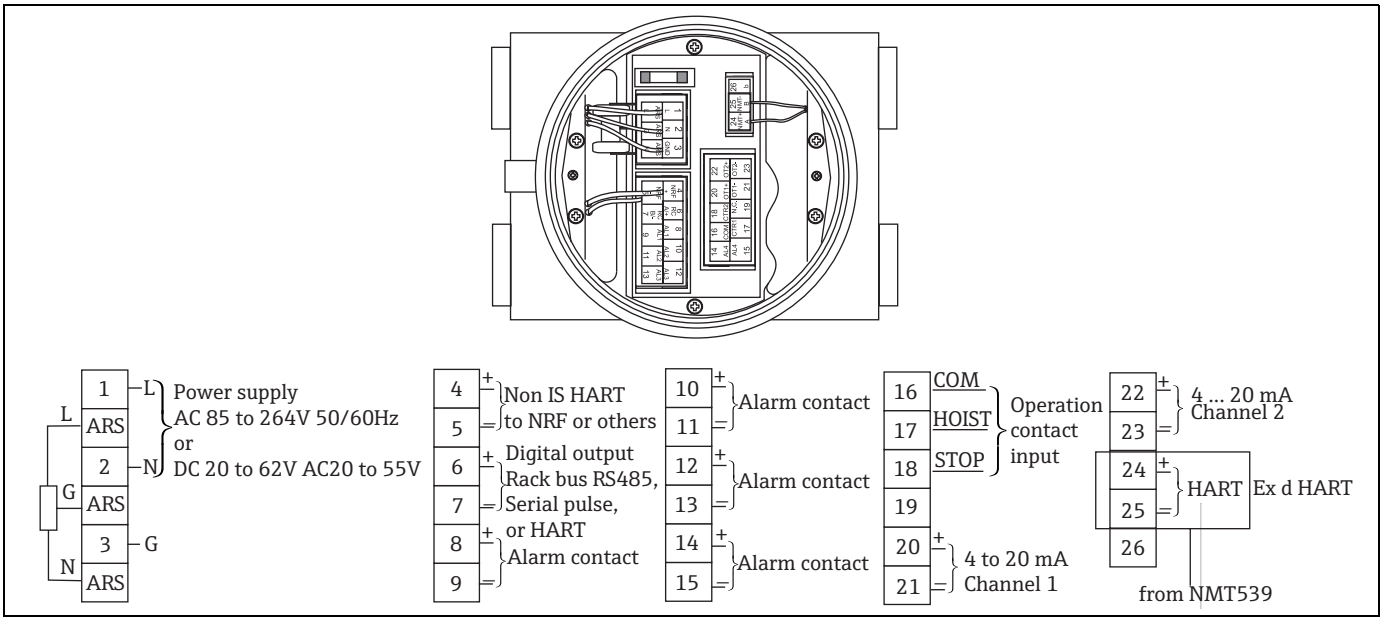


Figure 42: NMS Ex d Connection

4.4.5 TGM5 and TMD1 Terminal

When TGM5 (except Sakura code (collector common), BCD (emitter common), BCD (collector common) is equipped with local HART communication, it is possible to connect Ex d [ia] equipment, however terminal number depends on the specification. See terminal figure for TGM5.
In case of TMD1-xBxxxxxxxxx (with local HART input), it is possible to connect Ex d [ia] equipment, however terminal number depends on the specification. See terminal figure for TMD1.

4.4.6 NRF590 Terminal

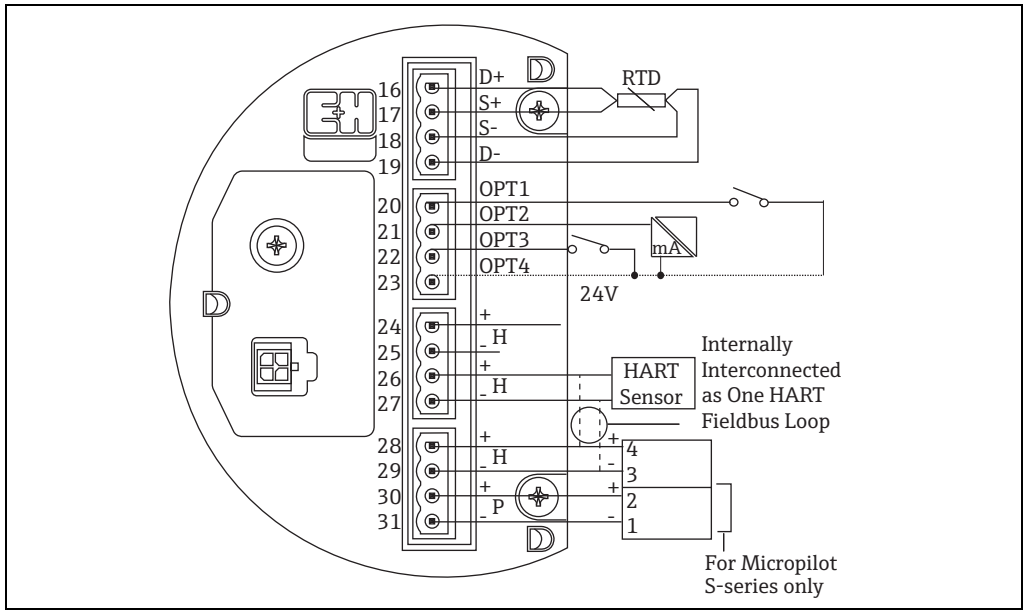


Figure 43: NRF590 Terminals (Ex ia)

NRF590 has three sets of intrinsically safe local HART terminals.

CAUTION

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

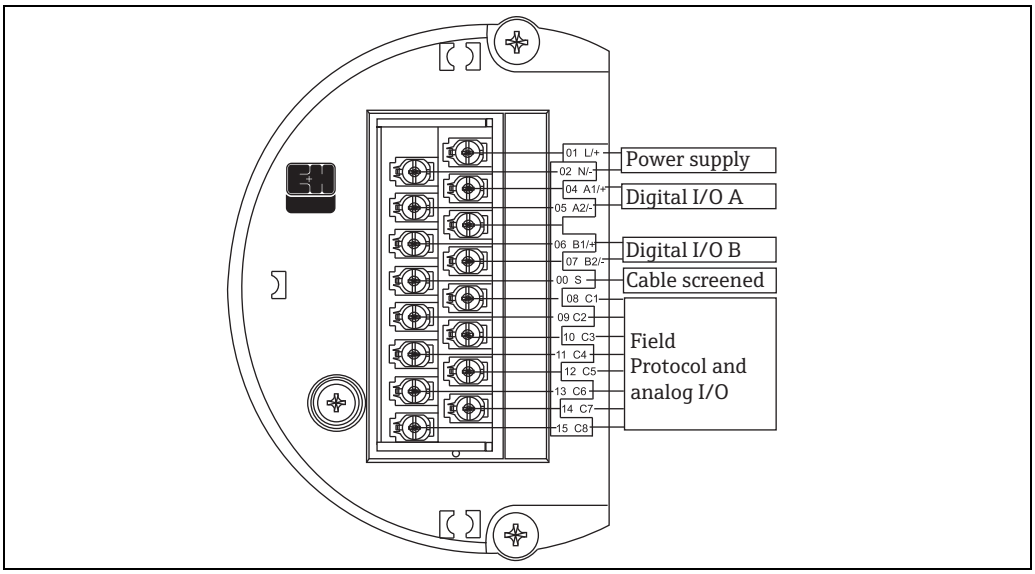


Figure 44: NRF590 Terminals (TIIS Ex d)

5 Maintenance

5.1 Periodic Inspection

NMT539 requires no special maintenance.
Conduct all-round periodic inspection of equipment wiring etc. once a year as much as possible.

Periodic Inspection Item

- Check terminal parts and body cover loose
- Check damage or deterioration of cable and O-rings
- Check screw of adjustment parts

5.2 Repairs

The Endress+Hauser repair policy is based on the fact that the measuring devices have a modular design and that customers are able to undertake repairs themselves. Spare parts are contained in corresponding kits along with their related replacement instructions. Contact Endress+Hauser service representatives for further assistance regarding service and spare parts.

5.3 Repairs to Ex-approved Devices

When performing repairs on Ex-approved devices, note the following:

- Repairs of Ex-approved devices may only be performed by trained personnel or by Endress+Hauser Service.
- Comply with the prevailing standards, national Ex-area regulations, safety instructions (XA) and other relevant rules.
- Only use original spare parts provided by Endress+Hauser.
- When ordering spare parts, note the device information on the nameplate. Replace parts only with parts that have the same device information.
- Perform repairs according to the instructions. When completing repairs, perform the specified routine test on the device.
- Only Endress+Hauser service representatives may convert a certified device into a different certified variant.
- Document all repair work and conversions.

5.4 Replacement

Refer to the separate instruction manual "Operating Instructions and Description of Instrument Function 3 Replacement" for NMT539 replacement.

6 Accessories

Anchor Weight (High Profile) Mounting Attachment Option: B
This is the anchor weight designed for Converter + Temperature probe versions

⚠ CAUTION
Installation of the anchor weight will cause the lowest temperature measurement position to be raised approximately 400mm (16") from the bottom of the tank.
For installing the high profile anchor from a tank top nozzles, the nozzle opening has to be 6 inches (150A) or more.

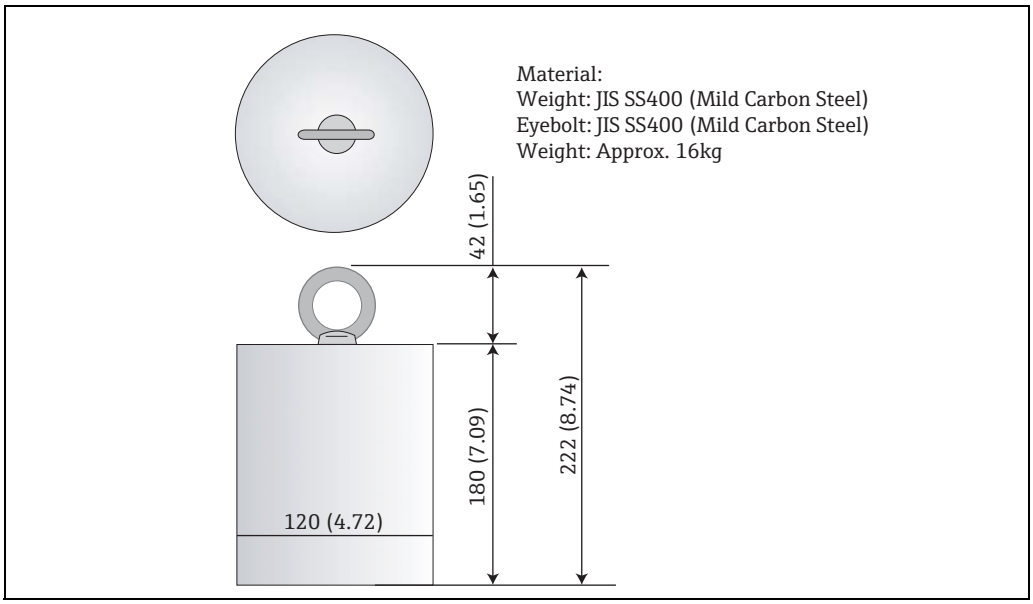


Figure 45: Anchor Weight for High Profile, Unit of Measurement: mm (in)

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

Anchor Weight (Low Profile) Mounting Attachment Option: C and G
The low profile anchor weight is mainly designed to fix WB (Water Bottom) sensor, securing it straight up without shortening WB measuring range. It is also suitable for an existing tank installation with a small nozzle opening for converter and temperature version.

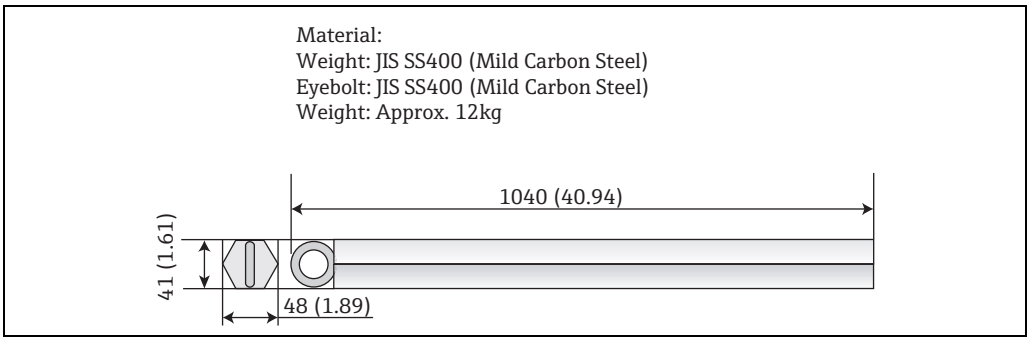


Figure 46: Anchor Weight for Low Profile, Unit of Measurement: mm (in)

Wire hook, Top Anchor Mounting Attachment Option: D and F

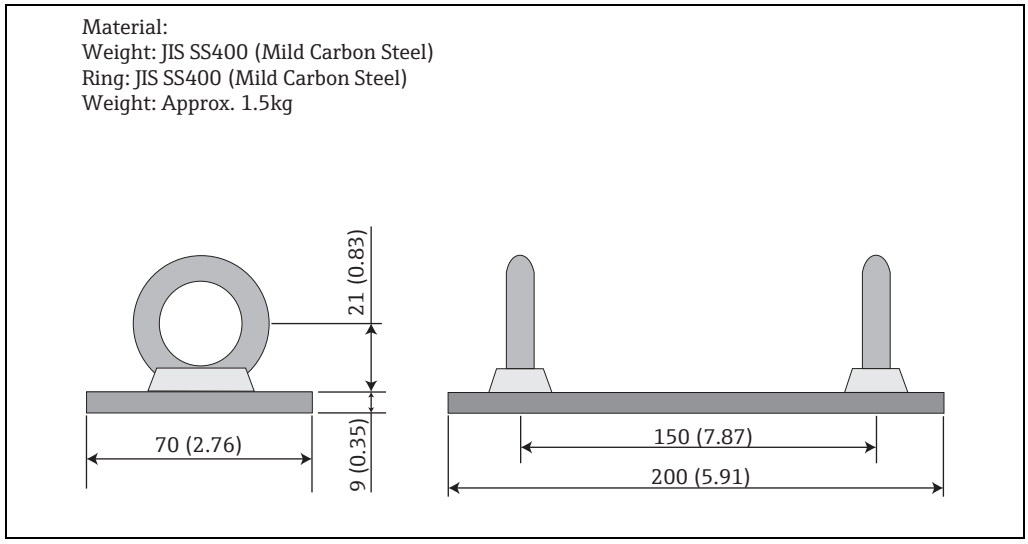


Figure 47: Wire Hook, Unit of Measurement: mm (in)

Actual tensioning can be completed with SUS316 stranded 3mm diameter tension wire between the wire hook and the top anchor.

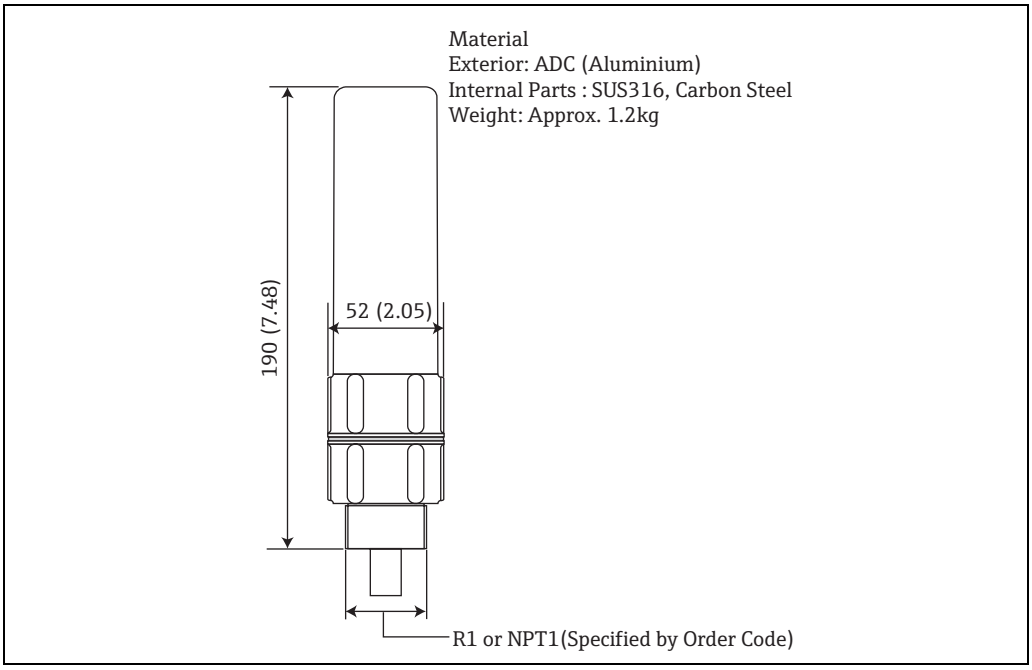


Figure 48: Top Anchor Dimensions, Unit of Measurement: mm (in)

NOTICE

The standard process connection of the top anchor is NPT1 or R1 threaded connection. For top anchor and flange, different screw size, material, and special specification can be ordered.

7 Troubleshooting

7.1 System Error Messages

Code	Text	Description	Action
0	No Error presence	No error	Not necessary.
1	Common line open	Common line is open.	Check the module connector attachment, and check resistance on common (white/black spiral or white/violet spiral) cable to #1 temperature element cable (brown).
3	#1 element open	Temperature element cable (#1) is an open circuit.	Check the module connector attachment, and check resistance on common (white/black spiral or white/violet spiral) cable to #1 temperature element cable (brown).
4	#1 element short	Temperature element cable (#1) is short circuited.	Check the module connector attachment, and check resistance on common (white/black spiral or white/violet spiral) cable to #1 temperature element cable (brown).
5	#2 element open	Temperature element signal cable (#2) is an open circuit.	Check connector attachment, and check resistance on common (white/black spiral or white/violet spiral) line to #2 temperature element cable (red).
6	#2 element short	Temperature element signal cable (#2) is short circuited.	Check connector attachment, and check resistance on common (white/black spiral or white/violet spiral) line to #2 temperature element cable (red).
7	#3 element open	Temperature element signal cable (#3) is an open circuit.	Check connector attachment, and check resistance on common (white/black spiral or white/violet spiral) line to #3 temperature element cable (orange).
8	#3 element short	Temperature element signal cable (#3) is short circuited.	Check connector attachment, and check resistance on common (white/black spiral or white/violet spiral) line to #3 temperature element cable (orange).
9	#4 element open	Temperature element signal cable (#4) is an open circuit.	Check connector attachment, and check resistance on common (white/black spiral or white/violet spiral) line to #4 temperature element cable (yellow).
10	#4 element short	Temperature element signal cable (#4) is short circuited.	Check connector attachment, and check resistance on common (white/black spiral or white/violet spiral) line to #4 temperature element cable (yellow).
11	#5 element open	Temperature element signal cable (#5) is an open circuit.	Check connector attachment, and check resistance on common (white/black spiral or white/violet spiral) line to #5 temperature element cable (green).
12	#5 element short	Temperature element signal cable (#5) is short circuited.	Check connector attachment, and check resistance on common (white/black spiral or white/violet spiral) line to #5 temperature element cable (green).
13	#6 element open	Temperature element signal cable (#6) is an open circuit.	Check connector attachment, and check resistance on common (white/black spiral or white/violet spiral) line to #6 temperature element cable (blue).
14	#6 element short	Temperature element signal cable (#6) is short circuited.	Check connector attachment, and check resistance on common (white/black spiral or white/violet spiral) line to #6 temperature element cable (blue).
15	#7 element open	Temperature element signal cable (#7) is an open circuit.	Check connector attachment, and check resistance on common (white/black spiral or white/violet spiral) line to #7 temperature element cable (violet).
16	#7 element short	Temperature element signal cable (#7) is short circuited.	Check connector attachment, and check resistance on common (white/black spiral or white/violet spiral) line to #7 temperature element cable (violet).
17	#8 element open	Temperature element signal cable (#8) is an open circuit.	Check connector attachment, and check resistance on common (white/black spiral or white/violet spiral) line to #8 temperature element cable (gray).

Code	Text	Description	Action
18	#8 element short	Temperature element signal cable (#8) is short circuited.	Check connector attachment, and check resistance on common (white/black spiral or white/violet spiral) line to #8 temperature element cable (gray).
19	#9 element open	Temperature element signal cable (#9) is an open circuit.	Check connector attachment, and check resistance on common (white/black spiral or white/violet spiral) line to #9 temperature element cable (white).
20	#9 element short	Temperature element signal cable (#9) is short circuited.	Check connector attachment, and check resistance on common (white/black spiral or white/violet spiral) line to #9 temperature element cable (white).
21	#10 element open	Temperature element signal cable (#10) is an open circuit.	Check connector attachment, and check resistance on common (white/black spiral or white/violet spiral) line to #10 temperature element cable (black).
22	#10 element short	Temperature element signal cable (#10) is short circuited.	Check connector attachment, and check resistance on common (white/black spiral or white/violet spiral) line to #10 temperature element cable (black).
23	#0 element over range	The reference temperature element #0 on the module is broken.	Replace the electronic module.
24	Memory defect (ROM)	Program memory malfunction.	Replace the electronic module.
25	#11 element open	Temperature element signal cable (#11) is an open circuit.	Check connector attachment, and check resistance on common (white/black spiral or white/violet spiral) line to #11 temperature element cable (white/brown spiral).
26	#11 element short	Temperature element signal cable (#11) is short circuited.	Check connector attachment, and check resistance on common (white/black spiral or white/violet spiral) line to #11 temperature element cable (white/brown spiral).
27	#12 element open	Temperature element signal cable (#12) is an open circuit.	Check connector attachment, and check resistance on common (white/black spiral or white/violet spiral) line to #12 temperature element cable (white/red spiral).
28	#12 element short	Temperature element signal cable (#12) is short circuited.	Check connector attachment, and check resistance on common (white/black spiral or white/violet spiral) line to #12 temperature element cable (white/red spiral).
29	Element exposed	Liquid level is below #1 element position.	No liquid temperature measurement is available. When liquid level goes over #1 element position, the error disappears.
32	Low power supply	The supply voltage from the host device via the multi drop HART loop is below the specification for Prothermo.	Check the power supply on the host instrument and the consumption of connected HART devices.
33	#13 element open	Temperature element signal cable (#13) is an open circuit.	Check connector attachment on the electronic module, and check resistance on common (white/black spiral or white/violet spiral) line to #13 element line (white/orange spiral).
34	#13 element short	Temperature element signal cable (#13) is short circuited.	Check connector attachment on the electronic module, and check resistance on common (white/black spiral or white/violet spiral) line to #13 element line (white/orange spiral).
35	#14 element open	Temperature element signal cable (#14) is an open circuit.	Check connector attachment on the electronic module, and check resistance on common (white/black spiral or white/violet spiral) line to #14 element line (white/yellow spiral).
36	#14 element short	Temperature element signal cable (#14) is short circuited.	Check connector attachment on the electronic module, and check resistance on common (white/black spiral or white/violet spiral) line to #14 element line (white/yellow spiral).
37	#15 element open	Temperature element signal cable (#15) is an open circuit.	Check connector attachment on the electronic module, and check resistance on common (white/black spiral or white/violet spiral) line to #15 element line (white/green spiral).
38	#15 element short	Temperature element signal cable (#15) is short circuited.	Check connector attachment on the electronic module, and check resistance on common (white/black spiral or white/violet spiral) line to #15 element line (white/green spiral).
39	#16 element open	Temperature element signal cable (#16) is an open circuit.	Check connector attachment on the electronic module, and check resistance on common (white/black spiral or white/violet spiral) line to #16 element line (white/blue spiral).

Code	Text	Description	Action
40	#16 element short	Temperature element signal cable (#16) is an short circuit.	Check connector attachment on the electronic module, and check resistance on common (white/black spiral or white/violet spiral) line to #16 element line (white/blue spiral).
41	Memory defect (RAM)	Data memory malfunction.	Replace the electronic module with new one.
42	Memory defect (EEROM)	Non-volatile data memory malfunction.	Replace the electronic module with new one.
43	WB line open	WB line is an open circuit in the probe.	Replace the module. If the problem is not solved by replacing the module, replace the entire unit.
44	WB line short	WB line is short circuited in the probe.	Replace the electronic module. If the problem is not solved, it is necessary to replace entire unit.

NOTICE

These error code will be mainly displayed on FieldCare displays when the tool is properly connected. Method and description of error display on host instrument, refer to documentation of NRF590 or NMS5/NMS7.

7.2 Return

The measuring device must be returned if repairs or a factory calibration are required, or if the wrong measuring device has been ordered or delivered. According to legal regulations, Endress+Hauser, as an ISO-certified company, is required to follow certain procedures when handling returned products that are in contact with medium.
To ensure swift, safe and professional device returns, please read the return procedures and conditions on the Endress+Hauser website at www.services.endress.com/return-material

7.3 Disposal

Observe the following notes during disposal:

- Observe valid federal/national regulations.
- Ensure proper separation and reuse of the device components.

7.4 Software History

Software Version/Date	Software Changes	Documentation Changes
V01.41.00 / 2003.10	Original software	BA1025N(Installation Instructions) BA1026N(Operation, function Instructions)
V01.45.00 / 2006.3	Set default to UK element interval, Cu90, multi elements with access code 164	BA1025N (Installation Instructions) BA1026N(Operation, function Instructions)
V01.50.00 / 2008.7	W&M, PTB, Lock function with hardware	BA1026N(Operation, function Instructions)
V01.51.00 / 2011.1	HART ID configuration, FieldCare support updated	BA01026G(Operation, function Instructions)
V01.52.00 / 2014.8	Software update	BA01025G (Installation Instructions) BA01026G(Operation, function Instructions)

8 Technical Data

Application	
Application	NMT539 performs precise liquid and gas phase average temperature measurement in custody transfer bulk storage tank applications. Along with capacitance water to oil interface measurement probe, complete temperature and WB (BSW) level measurement in crude oil and other bi-layer liquid tank application are accomplished. ▪ Flange: standard 2" flange installation ▪ Measurement range: Max. 99.999m (333.33ft) (ATEX, IECEx), Max. 40.000m (133.33ft) (TIIS, FM, CSA, NEPSI) ▪ Up to 1m or 2m of BSW measurement range
Function and System Design	
Measuring Principle	▪ Temperature Measurement: NMT539 consists of platinum characterized temperature element "Pt100" up to 16 elements in SUS316 protection tube. Pt100 has an unique characteristic of linear resistance change across surrounding ambient temperature change. Module in NMT539 converter head receives this resistance signal change as input variable and converts to temperature data. Then, converted and calculated data are transmitted on loop powered local HART signal to designated host instrument ▪ WB (water interface) measurement: An attached capacitance level measurement probe detects presence of water. The level of water is converted into given frequency variable (default setting) and its data is transmitted via local HART converter to connected host instrument.
Equipment Architecture	RTD average temperature signal to local HART conversion RTD average temperature measurement + local HART converter Average temperature & Water interface measurement + local HART converter
Input	
Measured Variable	▪ Temperature Measuring Range: – Temperature conversion : -200 to +235 °C (-328 to +455 °F), (-170 to +235°C TIIS) RTD signal – Standard: -40 to +100°C (-20 to +100°C TIIS) – Wide range: -55 to +235°C (-20 to +235°C TIIS) – Cryogenic: -170 to +60°C – Probe length: 99.999m (333.33ft) or less ▪ Water Interface Level (Water Bottom) Range – Standard: 1m or 2m (3.3 or 6.6 ft)
Output	
Output Signal	▪ local HART protocol
Signal on Alarm	Error information can be accessed via the following interfaces and transmitted digital protocol (refer to "Prothermo NMT539 Operating Instructions and Description of Instrument Function" for the following instruments) ▪ NRF590 ▪ NMS5/NMS7
Auxiliary Energy	
Load HART	Minimum load for local HART communication: 250 Ω
Cable Entry	Thread G1/2 Thread NPT1/2 Thread M20
Supply Voltage	16 to 30VDC: Ex ia DC20 to 24V: TIIS Ex d [ia]
Current Consumption	Ex ia: 6mA (temperature measurement) 12mA (WB measurement) Ex d [ia] 8mA (temperature measurement) 14mA (WB measurement)

Performance Characteristics	
Reference Operating Conditions	▪ Temperature = +25 °C (77 °F) ±5 °C (9 °F) ▪ Pressure = 1013mbar abs. ±20mbar abs. (1013hPa abs. ±20hPa abs., 14.7psi abs. ±0.3psi abs.) ▪ Relative humidity (air) = 65% ± 20% (Linearity)
Maximum Measured Error	Typical statements for reference conditions, include linearity, repeatability, and hysteresis: ▪ Linearity: – Temperature: ±0.15°C (0.27°F) + value of element deviation (based on IEC 60751/ DIN EN 60751) Standard version class A: ± (0.15 + 0.002 x ltl) PTB version class 1/10 B: ± (0.3 + 0.005 x ltl)/10 – WB: ±2mm
Operating Conditions	
Environment Condition	
Ambient Temperature	-40 °C to +85°C (-40°F to +185°F) -20°C to +60 °C (-4°F to +140°F) TIIS
Storage Temperature	-40°C to +85°C (-40°F to +185°F)
Climate Class	DIN EN 60068-2-38 (test Z/AD)
Degree of Protection	▪ Housing: IP 65, (Converter only, open housing: IP20) ▪ Probe: IP 68
Electromagnetic Compatibility	When installing the probes in metal and concrete tanks and when using a coax probe: ▪ Interference Emission to EN 61326, Electrical Equipment Class B ▪ Interference Immunity to EN 61326, Annex A (Industrial)
Process Condition	
Temperature Range	Temperature probe: -170 to +235 °C (-274 to +455°F) WB sensor: -0 to +100 °C (+32 to +212°F)
Pressure Limit	1 bar (100kPa, 14.5psi) ⚠ WARNING If the pressure inside the tank exceeds the limit shown above, stilling well which does not have any holes or slits must be installed to protect the probe from the pressure.
Data Transmission	2.5mm coaxial cable & common ground
Mechanical construction	
Weight	Approx. 13kg Condition: 16 elements temp. probe: 10m WB sensor: 1m Flange: 2" 150lbs RF, SUS316
Material	Elements: Class A Pt100, IEC 60751/DIN EN 60751/ JIS C1604 Housing: Aluminum diecast Temp probe: SUS316 flexible tube WB sensor: SUS316 (center rod SUS 304 & PFA protected)
Process Connection	10K 50A RF, 316, flange JIS B2220 NPS 2" Cl.150 RF, 316 flange ASME B16.5 DN50 PN10 B1, 316, flange EN1092-1 (DIN2527 B) 50A 150lbs RF, 316, flange JPI 7S-15 Universal coupling, G3/4, (Converter only) Thread M20 (converter only) Special version, TSP-no. to be spec.

Certificates and Approvals		
CE Approval	The measuring system meets the legal requirements of the EC-guidelines. Endress+Hauser confirms the instrument passing the required tests by attaching the CE-mark.	
External Standards and Guidelines	EN 60529 Protection class of housing (IP-code) EN 61326 Emissions (equipment class B), compatibility (appendix A – industrial area)	
Ex Approval	ATEX	II 1/2 G Ex ia IIB T2 - T6 Ga/Gb (converter with temperature and/or WB) II 2G Ex ia IIB T2 - T6 Gb (converter only)
	IEC	Ex ia IIB T2 - T6 Ga/Gb (converter with temperature and /or WB) Ex ia IIB T2 - T6 Ga/Gb (converter only)
	NEPSI	Ex ia IIB T2 - T6 (converter with temperature and /or WB) Ex ia IIB T2- T6 Ga (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 - T2 Ex ia IIB T6 - T2
	TIIS	Ex ia IIB T4
		Ex ia IIB T2
		Ex d[ia] IIB T4

9 Appendix

9.1 Description of Functions

⚠ CAUTION

A detailed description of the function groups, functions and parameter is given in the documentation "Operating Instructions and Description of Instrument Functions" for NMT539.

When NMT539 with WB probe and NRF590 are used together, confirm that the supply voltage to TMD1/NMS/TGM/NRF590 is stable at a voltage of 100VAC or more.

9.2 Function and System Design

NMT539 Ex ia and NMS5 Exd [ia] Combination

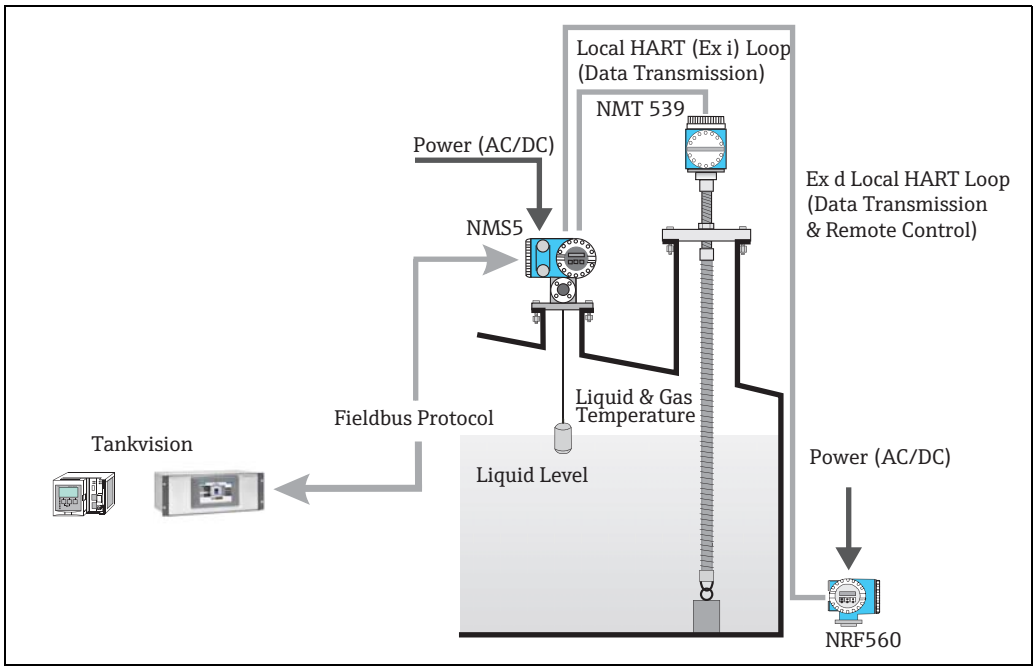


Figure 49: System Layout with ATEX, FM, CSA, TIIS NMS5

NMT539 Converter + Temp. Version Typical Installation Diagram
NMT539 is the successor of the former NMT 535 Ex i version. For proper migration, NMT539 has inherited all the functionality and specifications of the NMT535, including process connections, cable entries and wiring method.

Since NMS5 already provides water interface measurement, NMT539 Converter + average temperature may be the best version when used in combination with the Proservo. However if the converter + WB + average temperature version is used in combination with the Proservo, the product in the tank will be thoroughly managed with level, continuous average temperature and water interface measurement.
Most configuration and parameter settings for NMT539 can be performed via NMS5 or FieldCare. NMT539 receives liquid level data from the Proservo, 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 the Proservo.

⚠ CAUTION

Since the Proservo is a multi-functional device (measurement and data transmission), the Promonitor NRF 560 acts as a tank side remote data indicator and controller for NMS.

NMT539 Ex ia and NRF590 Ex d [ia] Combination

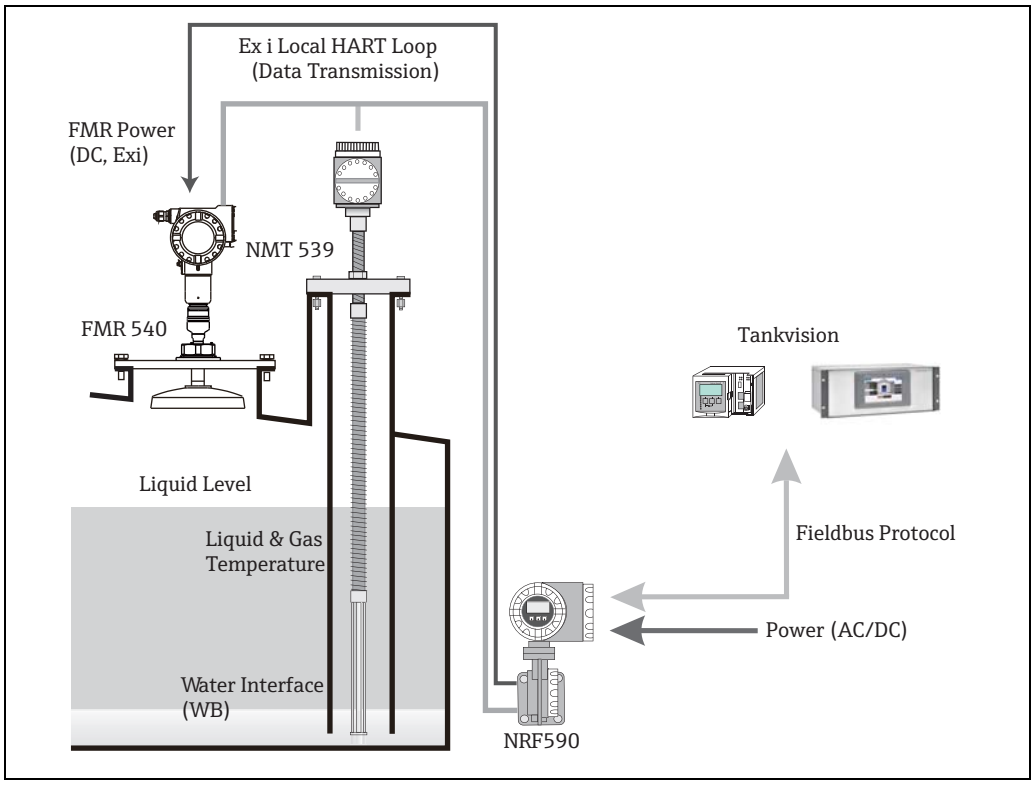


Figure 50: System Layout with NRF590

NMT539 Converter + Temp. + WB Version Typical Installation Diagram
NMT539 converter + temp. + WB is utilized most effectively in combination with radar level gauging. Water interface, temperature and level measurement, with data collection and calculations via the NRF590, allows for optimal inventory control. Basic functionality and data access can be performed by FieldCare.

NMT539 receives radar level data from NRF590 and then calculates liquid and gas phase average temperature. Calculated and standard data, included temperature element raw data and device status, are transmitted to the NRF590.

Depending on the size of the tank farm and data processing functionality, measurement data can be transmitted to various interface units via V1 protocol or other industry standard communication protocols (see NRF590 technical information).

All gathered data in the interface unit is sent to inventory management software, such as Endress + Hauser's Inventory Management software or Tankvision), or directly sent to the customer's specific DCS or PLC.

NMT539 Ex d [ia] and TMD1 Combination

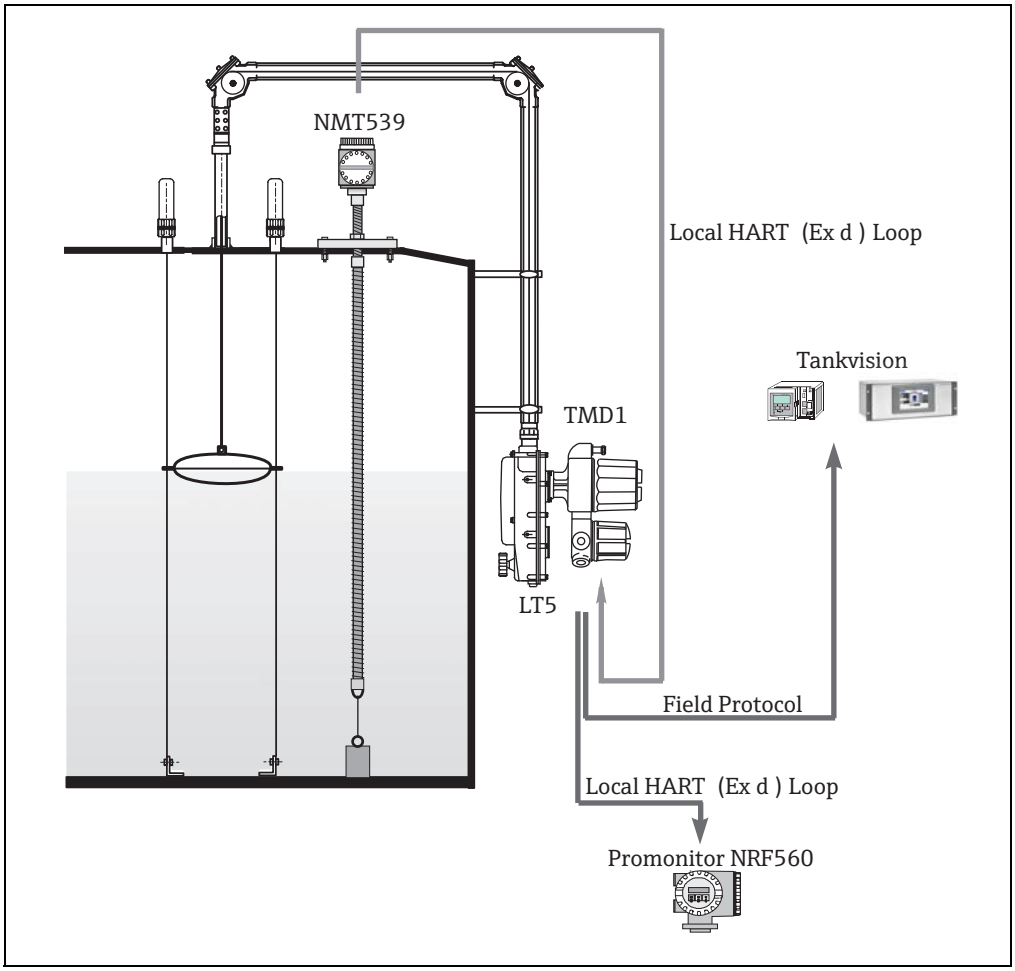


Figure 51: System Layout with TMD1

NMT539 can be connected with transmitter TMD1 or Servo gauge TGM5 via local HART communication.
Local HART communication, a digital communication method, which enables larger volume of information transfer compared to the traditional simple RTD method, allows NMT539 to work with NRF560 for DRM9700.

⚠ CAUTION
When NMT539 with WB probe and NRF590 are used together, confirm that the supply voltage to TMD1 is stable at a voltage of 100VAC or more.

NMT539 Ex d [ia] and TGM5 or NMS5 Combination

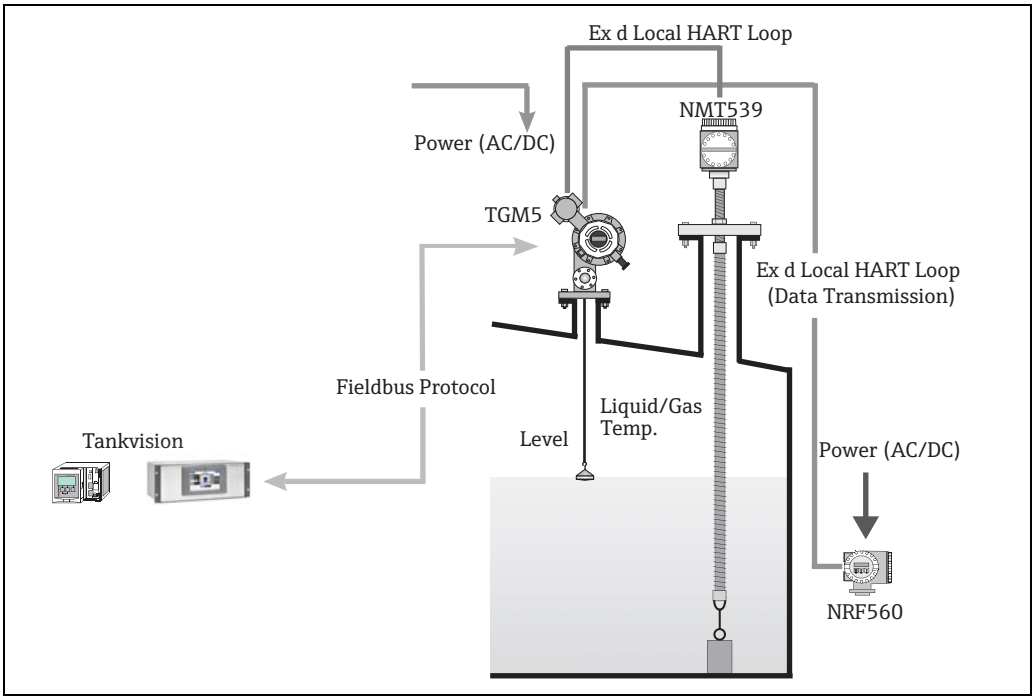


Figure 52: System Layout with TGM5

CAUTION

When NMT539 with WB probe and NRF590 are used together, confirm that the supply voltage to TGM5 is stable at a voltage of 100VAC or more.

NMT539 TIIS Ex ia (High Temp. Spec.) and NMS5 Ex d Combination

The high temperature specification (application more than 100℃) of NMT539 is EX d (TIIS) output system. When this NMT specification and NMS5 are used together, NAB560 of EX i /Ex d intrinsically safety and explosion proof barrier is required.

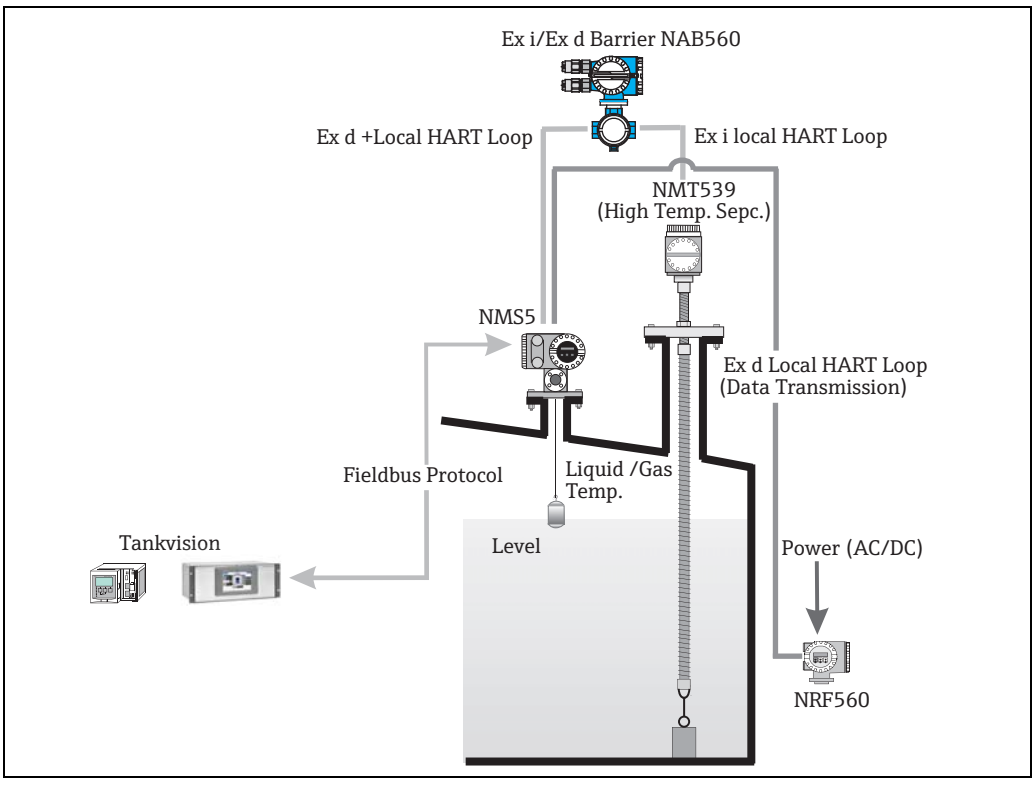


Figure 53: System Layout with TIIS Ex i for High Temperature

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