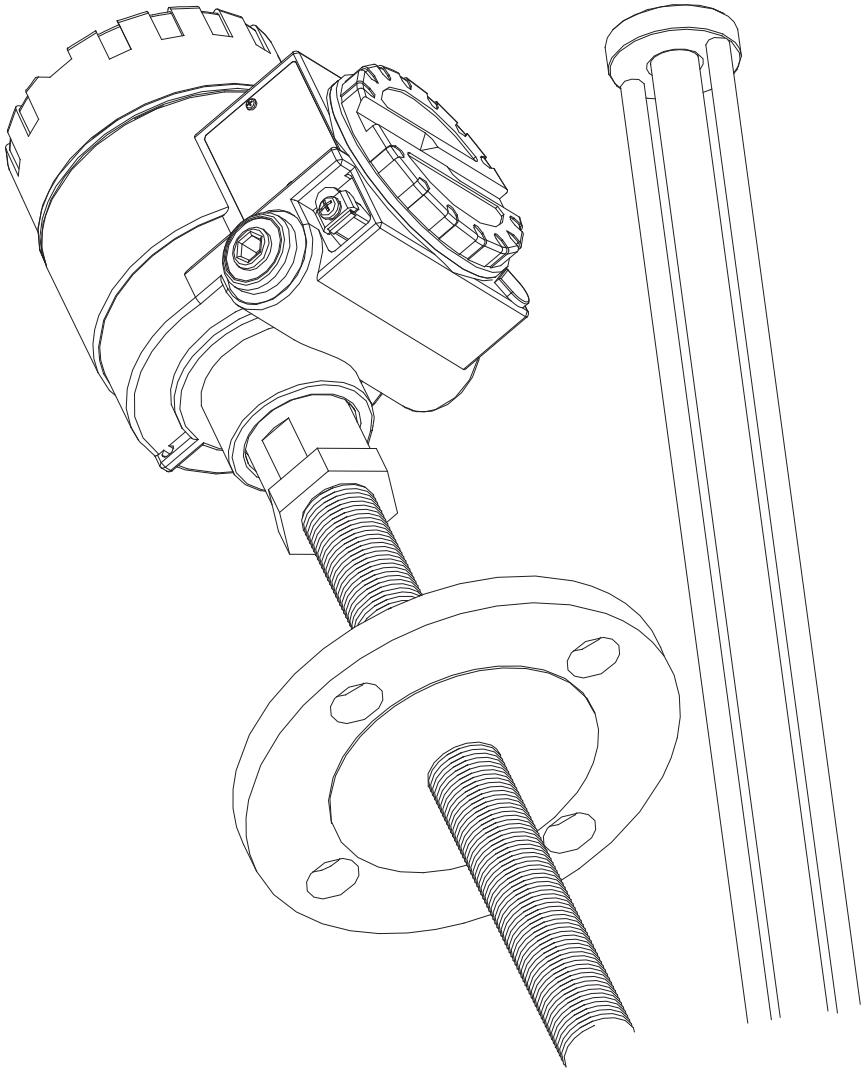
Level Pressure Flow Temperature Liquid Analysis Registration Systems Components Services Solutions

Installation Instructions

Prothermo NMT539
Temperature



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Valid as of software version:
V01.45.00

Endress+Hauser
People for Process Automation

Table of Contents

1 Safety instructions

1.1 Designated use

The Prothermo NMT539 is a multi-spot Pt100 average thermometer combined with a HART signal converter to meet the demand of temperature measurement for both
custody transfer and inventory control applications. One unique feature is the implementation of capacitance water / oil interface measurement (Water Bottom). Mounted on the tank top, the NMT539 provides both temperature and water interface information on the two wire, intrinsically safe (i.s.) powered local HART loop. The designated host controller can be either the Endress+Hauser Tank Side Monitor NRF590 or Proservo NMS5/7.

1.2 Installation, commissioning and operation

- Mounting, electrical installation, start-up and maintenance of the instrument may only be carried out by trained personnel authorized by the operator of the facility.
- Personnel must absolutely and without fail read and understand these installation instructions before carrying out 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 are to be observed without fail.
- The installer must make sure that the measuring system is correctly wired according to the wiring diagrams. The measuring system is to be grounded.
- Please observe all provisions valid for your country and pertaining to the opening and repairing of electrical devices.

1.3 Product Requirements

Hazardous areas
Measuring systems for use in hazardous environments are accompanied by separate "Ex documentation", which is an integral part of this Operating Manual. Strict compliance with the installation instructions and ratings as stated in this supplementary documentation is mandatory.
- Ensure that all personnel are suitably qualified.
- Observe the specifications in the certificate as pipe as national and local regulations.

FCC approval
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Caution!

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

1.4 Return

The following procedures must be carried out before the NMT539 is sent to Endress+Hauser for repair:
- Always enclose a duly completed "Declaration of Contamination" form. Only then can Endress +Hauser transport, examine and repair a returned device.

- Enclose special handling instructions if necessary, for example, safety data sheet as per EN 91/155/EEC.
- Remove all residue which may be present. Pay special attention to the gasket grooves and crevices where fluid may be present. This is especially important if the fluid is dangerous to health, e.g. corrosive, poisonous, carcinogenic, radioactive, etc.

Note!
A copy of the "Declaration of Contamination" is included at the end of these installation instructions.

Caution

- No instrument should be sent back for repair without all dangerous material being completely removed first, e.g. in scratches or diffused through plastic.
- Incomplete cleaning of the instrument may result in waste disposal or cause harm to personnel (burns, etc.). Any costs arising from this will be charged to the operator of the instrument.

1.5 Disposal

In case of disposal, please separate the different components according to their material consistency.

1.6 Contact addresses of Endress+Hauser

The addresses of Endress+Hauser are given on the back cover of this Installation Instructions. If you have any questions, please do not hesitate to contact your E+H representative.

1.7 Notes on safety conventions and symbols

In order to highlight safety-relevant or alternative operating procedures in the manual, the following conventions have been used, each indicated by a corresponding symbol in the margin.

Safety conventions

Symbol	Meaning
	**Warning!** A warning highlights actions or procedures which, if not performed correctly, will lead to personal injury, a safety hazard or destruction of the instrument.
	**Caution!** Caution highlights actions or procedures which, if not performed correctly, may lead to personal injury or incorrect functioning of the instruments.
	**Note!** A note highlights actions or procedures which, if not performed correctly, may indirectly affect operation or may lead to an instrument response which is not planned.

Explosion protection

	**Device certified for use in explosion hazardous area** If the device has this symbol embossed on its name plate it can be installed in an explosion hazardous area.
	**Explosion hazardous area** Symbol used in drawings to indicate explosion hazardous area. - Devices located in and wiring entering areas with the designation "explosion hazardous areas" must conform with the stated type of protection.
	**Safe area (non-explosion hazardous area)** Symbol used in drawings to indicate, if necessary, non-explosion hazardous areas. - Devices located in safe areas still require a certificate if their outputs run into explosion hazardous areas.

Electrical Symbols

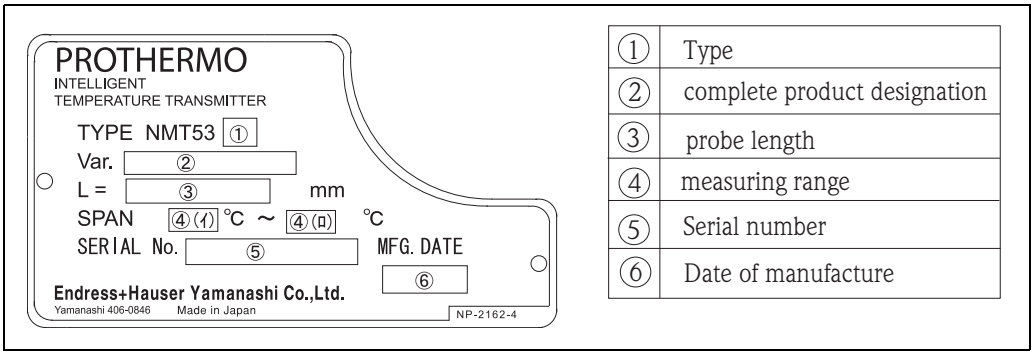
	**Direct voltage** A terminal to which or from which a direct current or voltage may be applied or supplied
	**Alternating voltage** A terminal to which or from which an alternating (sine-wave) current or voltage may be applied or supplied
	**Grounded terminal** A grounded terminal, which as far as the operator is concerned, is already grounded by means of an earth grounding system.
	**Protective grounded (earth) terminal** A terminal which must be connected to earth ground prior to making any other connection to the equipment.
	**Equipotential connection (earth bonding)** A connection made to the plant grounding system which may be of type e.g. neutral star or equipotential line according to national or company practice

2 Identification

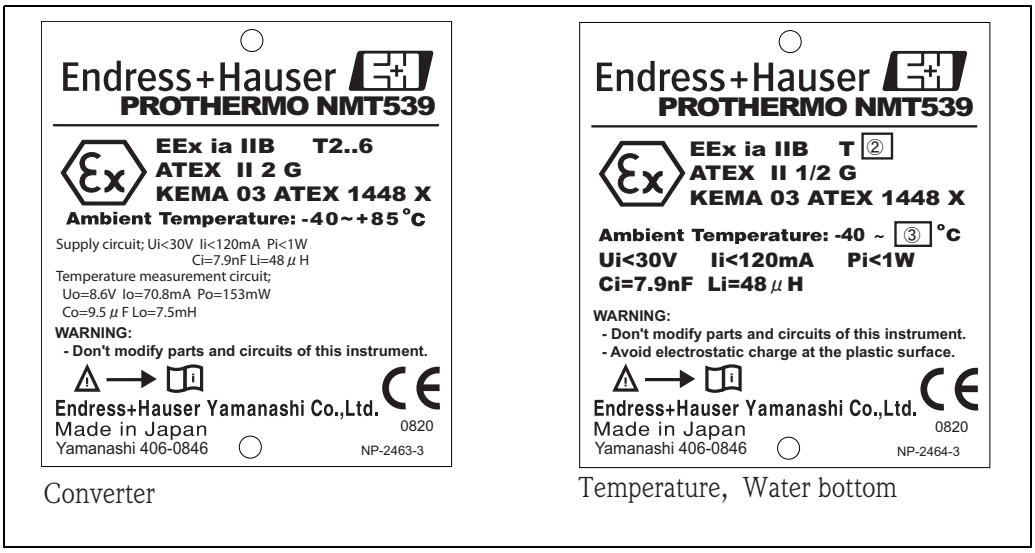
2.1 Device designation

2.1.1 Nameplate

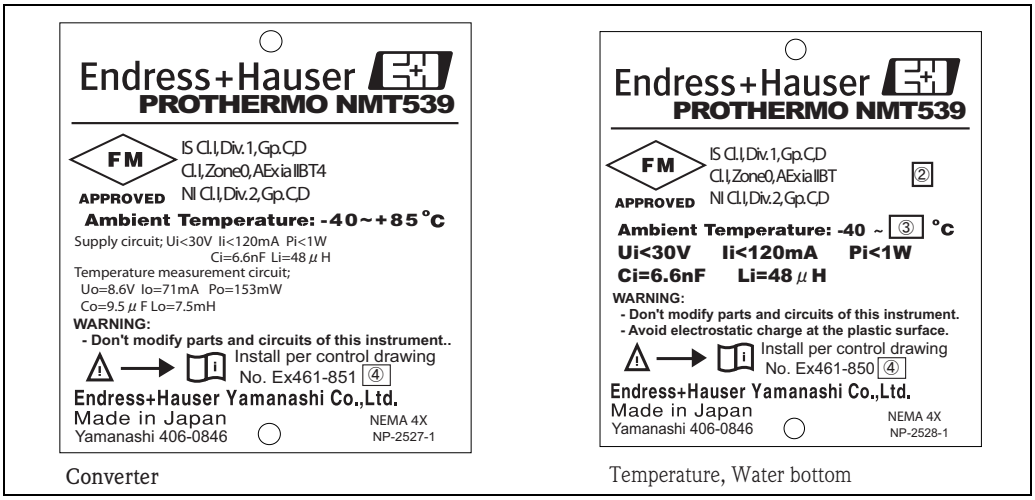
The follow technical data are given on the instrument nameplate:



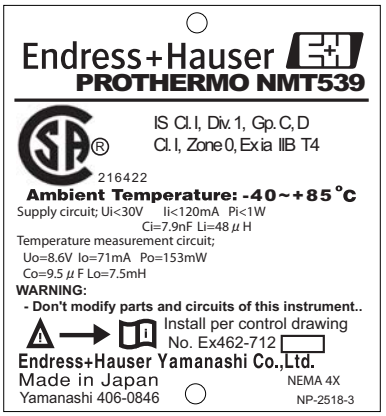
Prothermo Module name plate



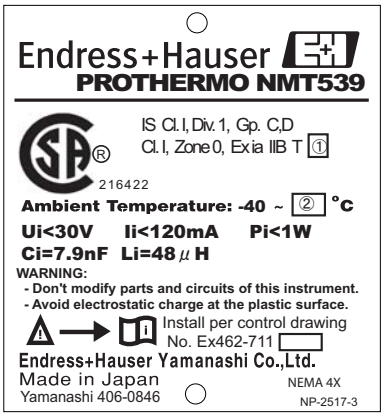
ATEX Approval type



FM Approval type

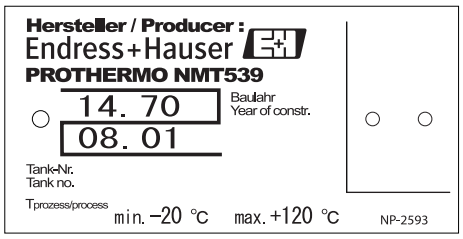


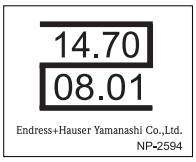
Converter



Temperature, Water bottom

CSA Approval type





PTB W&M

PTB W+M Approval type

Temperature, Water bottom
TIIS: TC18090

Temperature
TIIS: TC18091

Converter
TIIS: TC18092

TIIS Approval type

2.2 Product structure

10	Protection class
	0 IP 65
	7 IS class 1 Div 1 Gp.CD FM
	8 Ex ia Class 1, Div. 1 Gr.CD, CSA
	A Ex ia IIB T4, TIIS
	B EEx ia IIB T2 - T6, ATEX
	C Ex ia IIB, T2, TIIS
	9 Special version

20	Measuring function
	0 Converter only
	1 Temperature, Converter
	2 Water Bottom, Converter
	3 Temperature, Water Bottom, Converter
	4 Temperature, Converter (W&M)
	5 Temperature, Water Bottom, Converter (W&M)
	9 Special version

30	Temp.measuring range
	0 Temp.device not selected
	1 -40...+100 °C (-40...+212 °F)
	2 -55...+235 °C (-67...+455 °F)
	3 -170...+60 °C (-274...+140 °F)
	4 -20...+120 °C (-4...+248 °F)(W&M only)
	5 -20...+100°C (-4...212 °F)
	6 -20...+235°C (-4...+455)
	9 Special version

40	WB Measuring range
	0 WB device not selected
	1 1m(3.3 ft.)
	2 2m(6.6 ft.)
	9 Special version

50	Cable entry
	A G(PF)½ x1, thread
	B NPT ½ x1, thread
	C PG 16 x1, thread
	D M20 x1, thread
	9 Special version

60	Process connection
	0 JIS 10K 50A RF, flange
	1 ANSI 2" 150Ib RF, flange
	2 DIN DN50 PN 10RF, flange
	3 JPI 50A 150Ib RF, flange
	4 PF ¾ (NPS ¾), universal coupling...Converter Type 1
	5 M20, thread...Converter only Type 2
	9 Special version

70	Number of temp. element
	A 2...Pt100 elements
	B 3...Pt100 elements
	C 4...Pt100 elements
	D 5...Pt100 elements
	E 6...Pt100 elements
	F 7...Pt100 elements
	G 8...Pt100 elements
	H 9...Pt100 elements
	J 10...Pt100 elements
	K 11...Pt100 elements
	L 12...Pt100 elements
	M 13...Pt100 elements
	N 14...Pt100 elements
	O 15...Pt100 elements
	P 16...Pt100 elements
	Q Element not selected
	Y Special version

NMT539-	Complete product designation

80								**Element spacing**			
								1	2000mm (79")		
								2	1500mm (59")		
								3	1000mm (39")		
								4	Custom element position & spacing		
								5	3000mm (118")		
								6	Spacing not selected		
								7	UK standard (converter only)		
								9	Special version		
90								**1 to 40m probe length (below flange to edge of probe)**			
								A	...mm probe Length		
								B	probe not selected		
								Y	Special version		
100									**Mounting attachment**		
									A	No installation material	
									B	Anchor weight (Tall profile)	
									C	Anchor weight (Low profile)	
									D	Tensioning wire + wire hook + top anchor (NPT1")	
									F	Tensioning wire + wire hook + top anchor (PT1")	
									Y	Special version	
NMT539-											Complete product designation

3 Installation

3.1 Incoming acceptance, transport, storage

3.1.1 Incoming acceptance

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

3.1.2 Transport

Caution!
Follow the safety instructions and transport conditions for instruments of more than 18kg. Do not lift the measuring instrument by its housing in order to transport it.

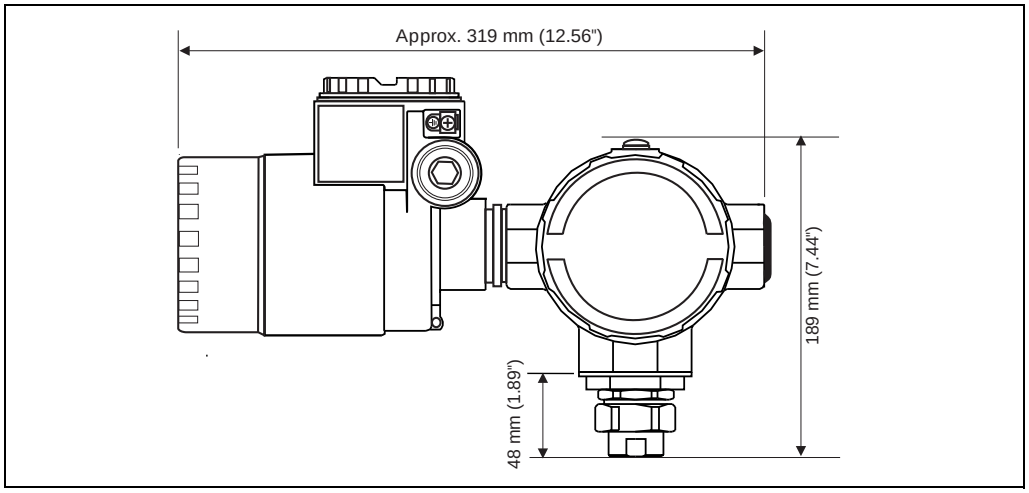
3.1.3 Storage

Pack the measuring instrument so that is protected against impacts for storage and transport. The original packing material provides the optimum protection for this. The permissible storage temperature is –40°C...+85°C (–40°F...+185°F)

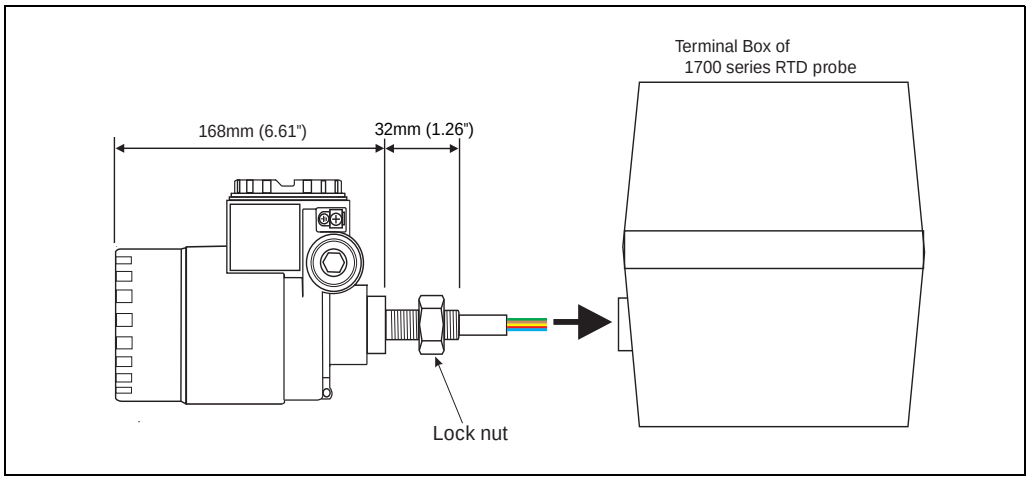
3.2 Installation conditions

3.2.1 Dimensions

Type 1 Converter only version [Standard PF(NPS)¾" universal coupling connection]



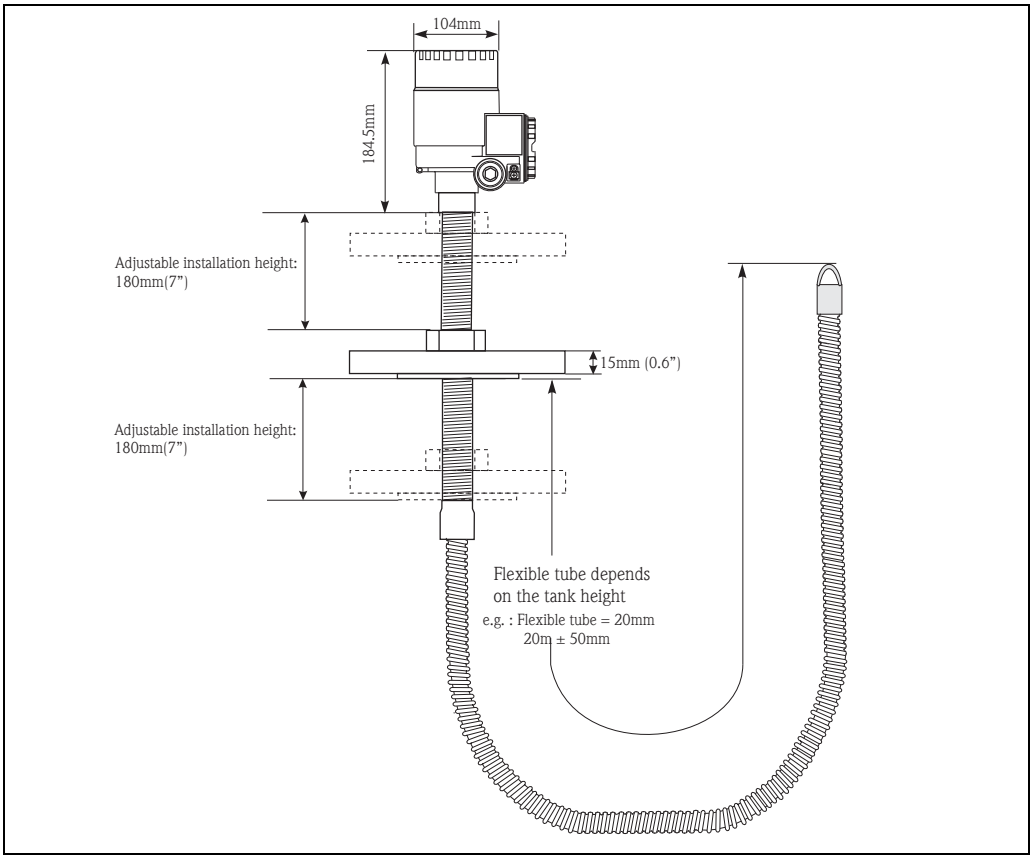
Type 2 Converter only version (for the Varec 1700 with M20 threaded connection



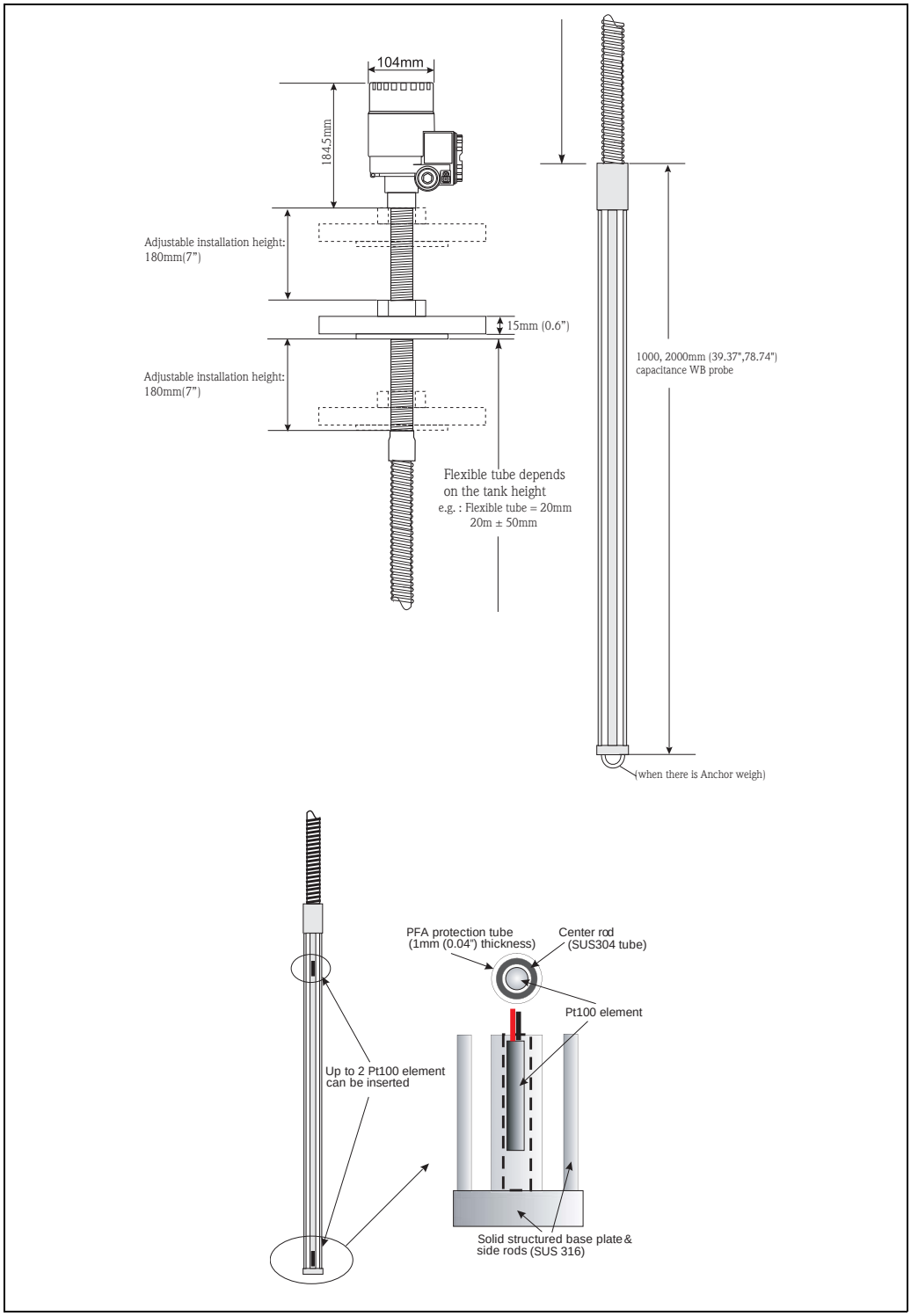
Note!
UK Special is only designed to connect with the Whessoe Varec 1700 series average temperature probe. Water bottom data accessibility is no longer available at the Prothermo NMT539.

Mounting of UK Special version M20 connection to Varec 1700 terminal box
Use seal tape on the threaded gauge to terminal box connection. Slip in a bunch of cable (RTD signal inlet cable) into the terminal box female thread connection. Turn the entire NMT539 gauge head clockwise and screw in the connection at least 10 complete turns, then secure with lock nut against terminal box.

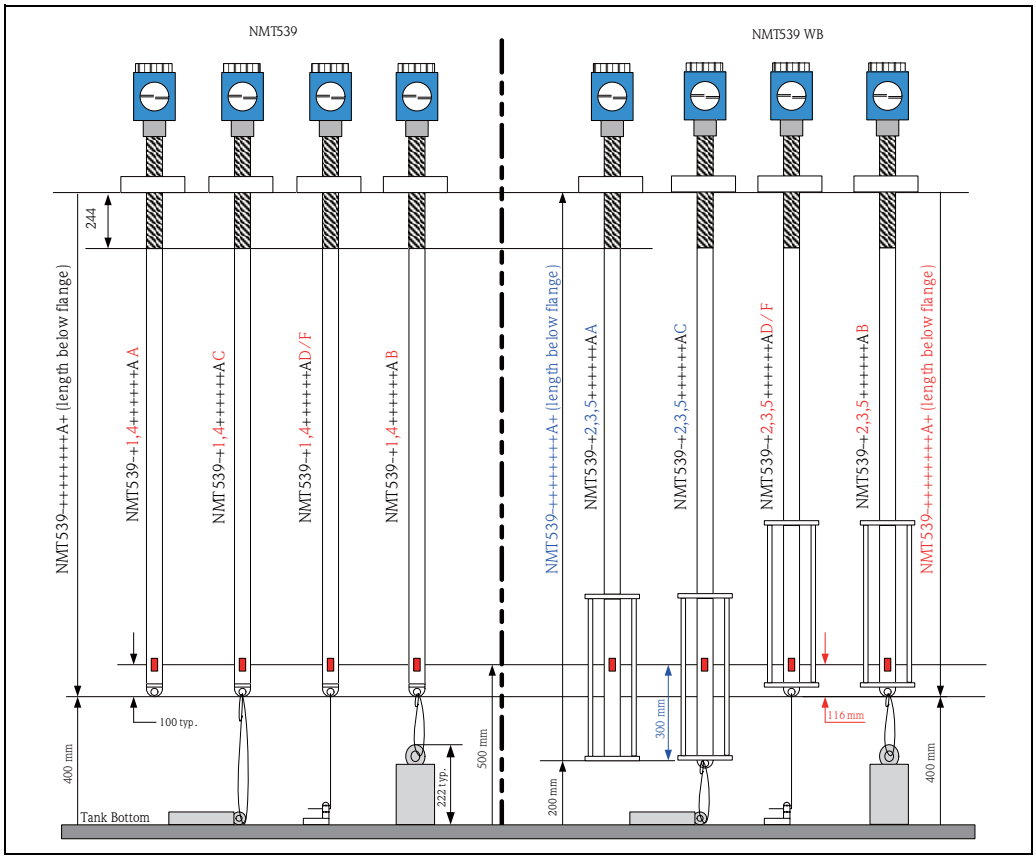
Converter + average temperature probe version



Converter + WB probe version and Converter + Temp. + WB probe version



Prothermo NMT539 #1 Element position



3.3 Procedure

3.3.1 Unpacking procedure

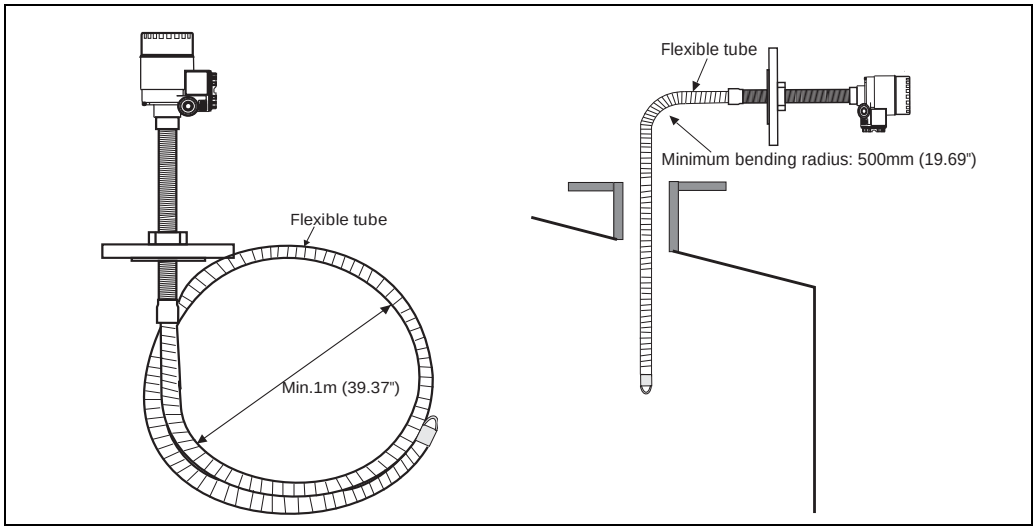
Note!
When unpacking, be careful not to allow the flexible tube to bend and twist. Please refer to the recommended procedure below.

Incorrect procedure **Recommended procedure**

3.3.2 Flexible tube procedure

Note!
When taking out and winding the flexible tube, please keep the length a minimum of 1 meter in diameter.

When attaching and bending the flexible tube, the radius of curvature must be at least 500mm (19.69") at any bend portion.



Note!
If a flexible tube is bent with a radius of curvature of 500mm (19.69") or less, the flexible tube or the measuring element may be seriously damaged or broken.

3.3.3 Mounting procedure

Note!
1. The flexible tube length of the Prothermo NMT539 is defined for the customer's specifications. Before mounting, please check as follows:

- The tag number (if available) on the body of the Prothermo NMT539
- The length of the flexible tube
- The number of measuring points
- The intervals between measuring points

2. Mount the Prothermo 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.

3. The procedure for mounting the Prothermo NMT539 on a tank depends on the type of tank. Here we shall explain the procedures for a fixed roof tank and for a floating roof tank. In any case, the flexible tube head is mounted on the tank top as show in figure 1. The mounting nozzle should have a diameter of 50mm (2") on standard.

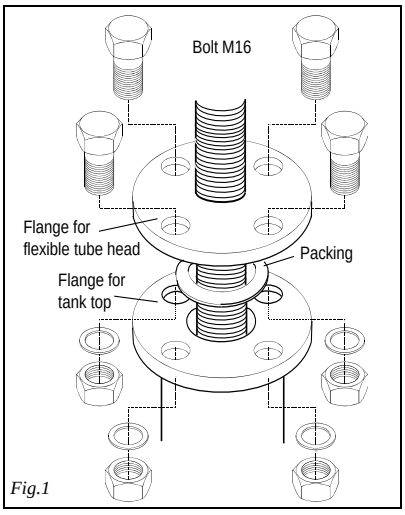
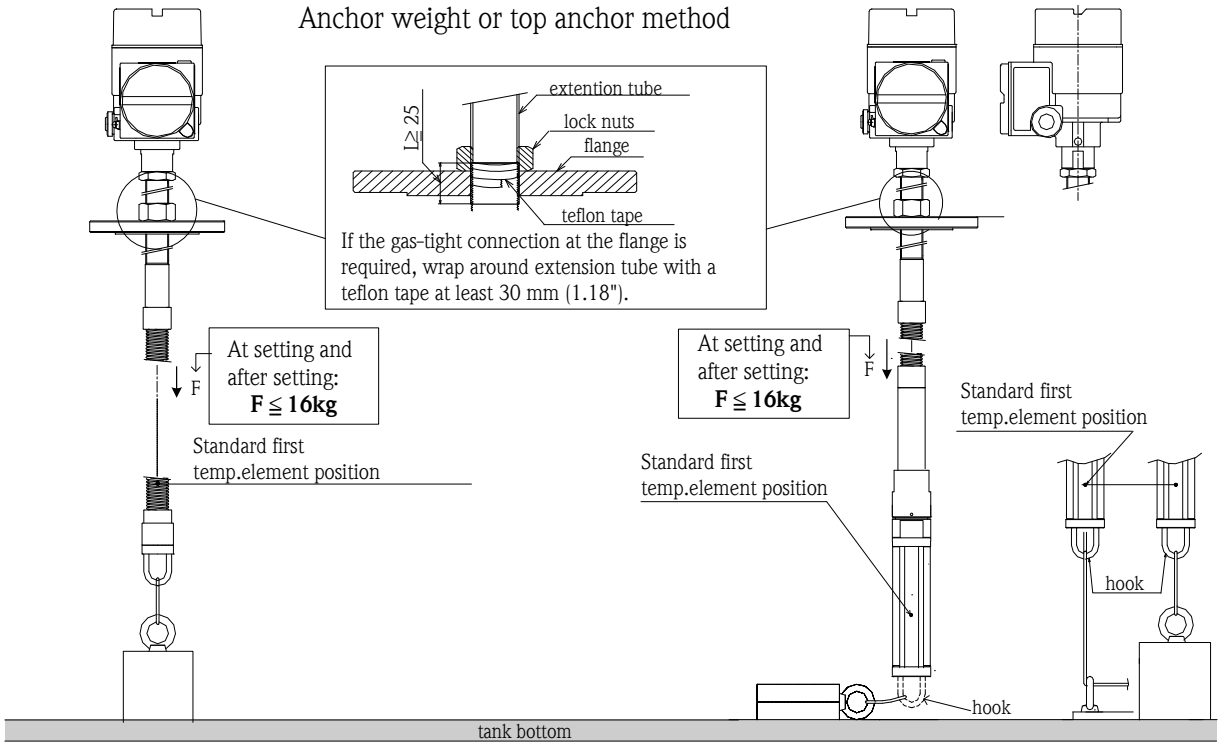


Fig.1

Caution!
If a gas-tight connection at the flange is required, wrap some Teflon tape around the threaded side for at least 30mm (1.18"). Make sure to keep the tension at a maximum of 16kg both when setting and after setting, because it may cause internal breaking in the flexible tube caused by too much tension.



NMT539 -170°C application consideration

Coution!
When installing this device on, or removing thisdevice from, a cryogenic tank, open the terminalcompartment cover to normalize the internalpressure.

-170°**C** caution plate

4 Mounting

4.1 Mounting on a fixed roof tank

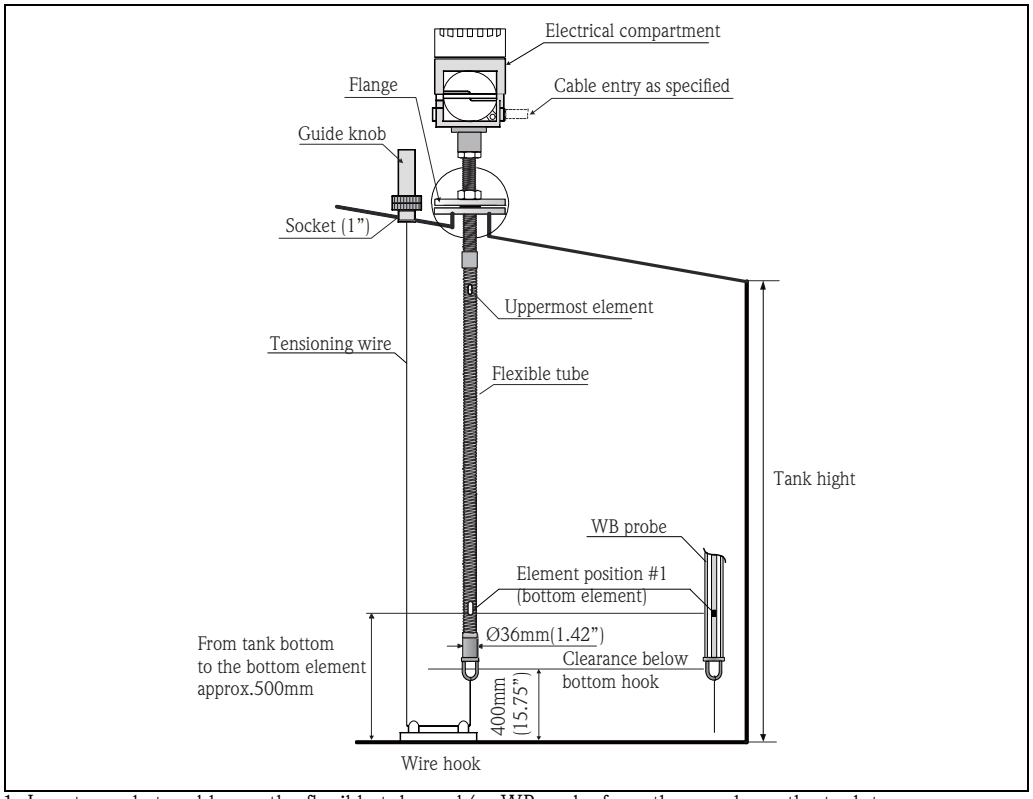
There are three methods for mounting the Prothermo NMT539 on a fixed roof tank:

1) Top anchor method
2) Stilling pipe method
3) Anchor weight method

Note!
If the tank bottom has a heating coil, the clearance from the flexible tube or probe bottom hook to the tank bottom must increase according to the heating coil type.

4.1.1 Top anchor method

The flexible tube and water bottom sensor are stabilized by a wire hook and a top anchor.



1. Insert a gasket and lower the flexible tube and/or WB probe from the nozzle on the tank top.

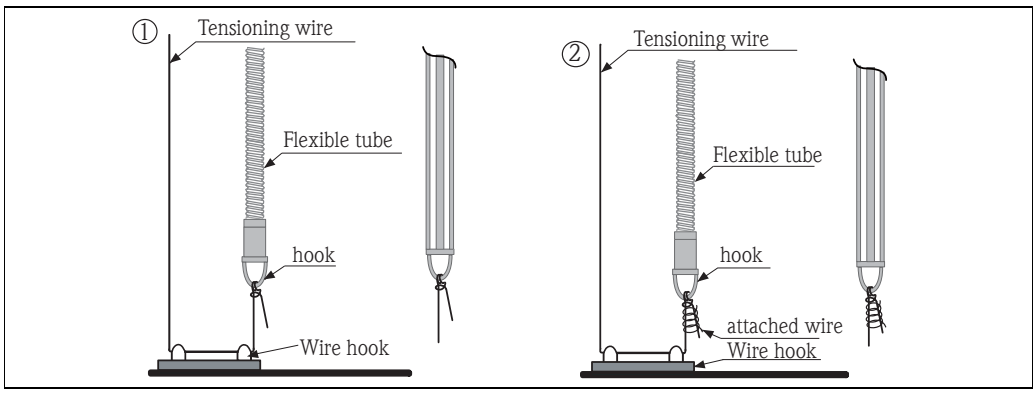
Caution!
The flexible tube and/or WB probe must be lowered carefully without bending too much and scratching at the inner edge of the nozzle hole.

2. Rotate the Prothermo NMT539 so that you can set up the cabling in the most convenient way.

3. Straighten the tensioning wire, fix the wire end to the top anchor temporarily and lower the wire.

4. Draw the tensioning wire through the wire hook on the tank bottom.

5. Wind the tensioning wire twice around the hitch, tighten it and wrap a commercial wire around it .



6. Fix the mounting flange of the Prothermo to the nozzle on the tank top using bolts.

Note!
Please keep the compression of the spring at 35 to 37mm (1.38" to 1.47").
If you compress the spring over 35 to 37mm, it may cause an internal breaking in the flexible tube.

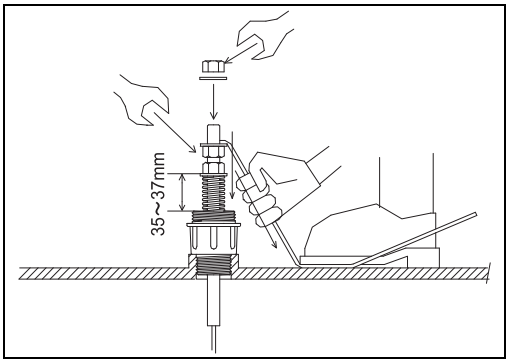
7.Draw the end of the tensioning wire as much as possible by hand and foot.

8.Bend the wire and fix it using the nut.

9.Cut the excess wire.

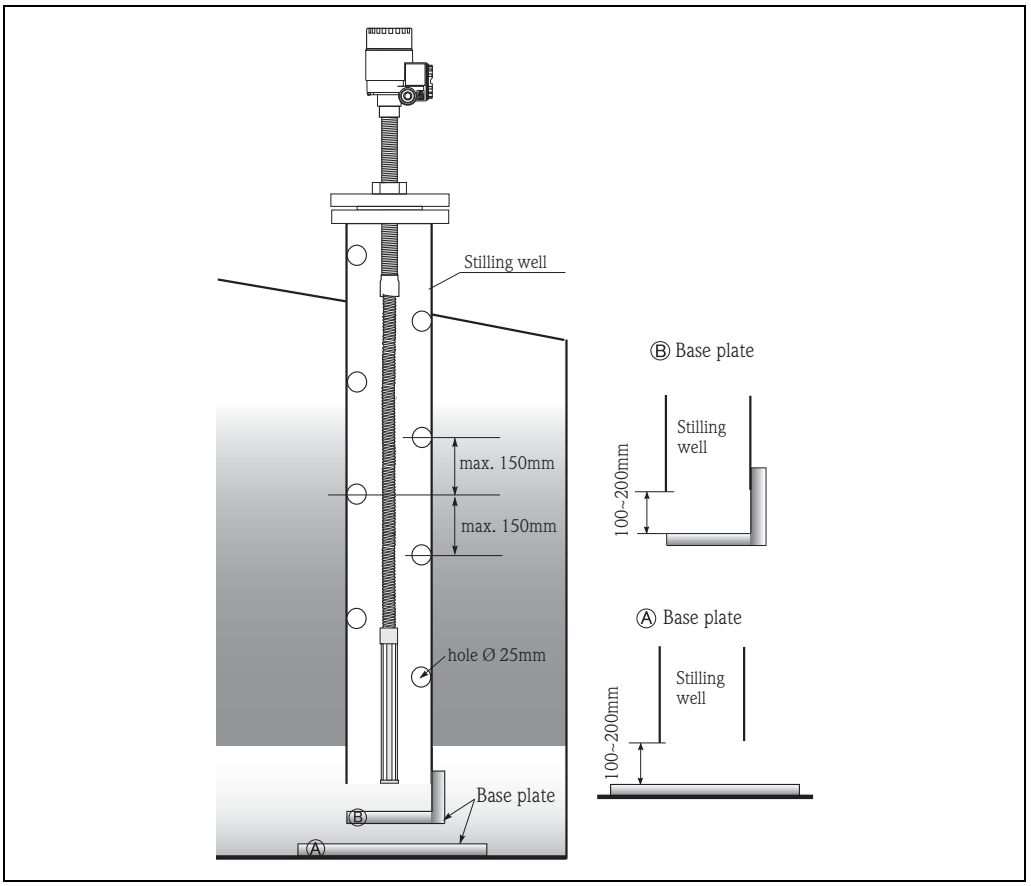
10.Screw the bolt and press down the spring of the top anchor 35 to 37mm.

11.Cover the top anchor.



4.1.2 Stilling pipe method

The flexible tube and/or WB sensor are inserted into a stilling pipe with a diameter of 2" or more.

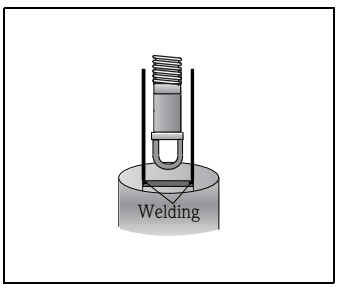


The installation procedure requires the following steps:

Caution!
The flexible tube and/or WB probe must be lowered carefully without bending too much and scratching at the inner edge of the nozzle hole. Please refer to the recommended mounting.

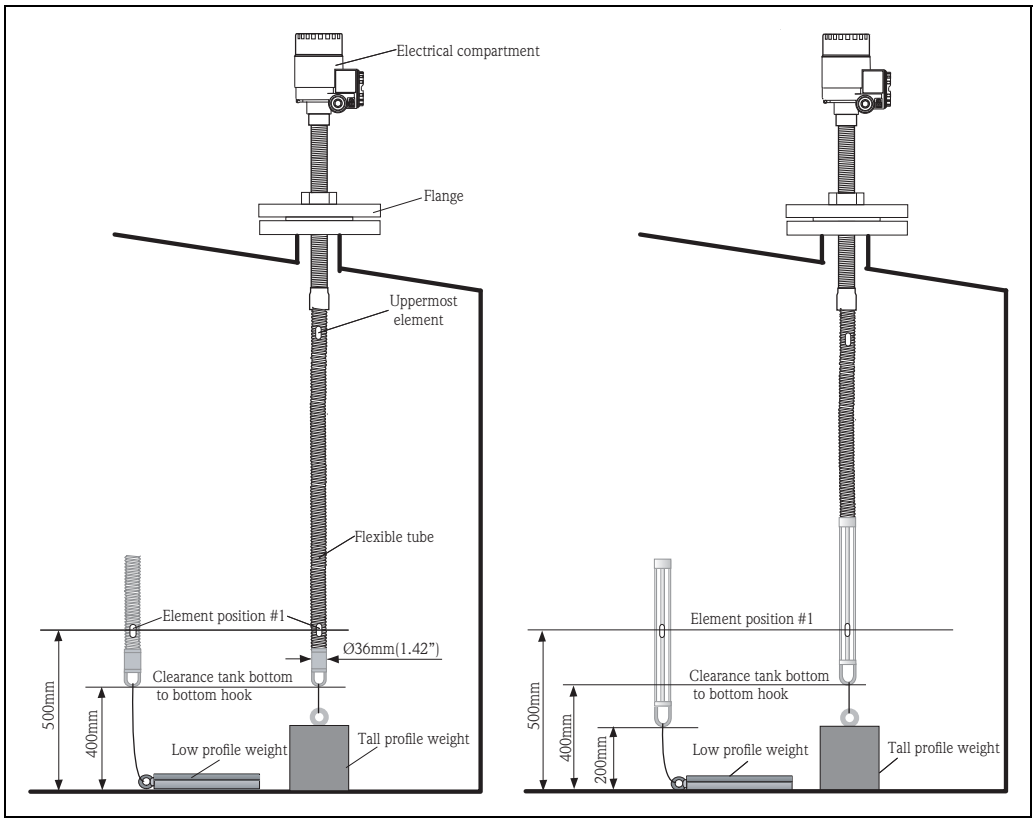
1. Insert a gasket and lower the flexible tube and/or WB sensor probe from the inlet of the Stilling pipe.
2. Rotate the Prothermo NMT539 so that you can set up the cable in the most convenient way.
3. Fix the mounting flange of the Prothermo NMT539 to the nozzle on the tank top using bolts.

Caution!
If the tank inside is over 100kPa, fix the stilling pipe as below drawing.



4.1.3 Anchor weight method

The flexible tube is stabilized by an anchor weight.

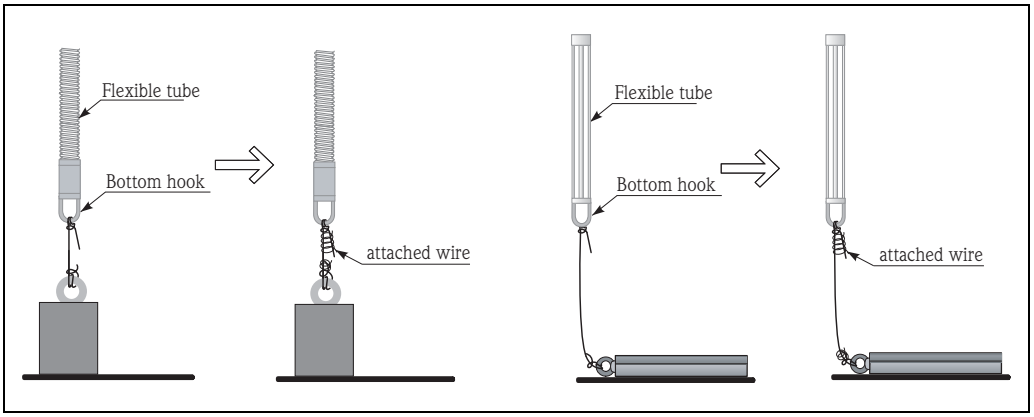


The installation procedure requires the following steps:

Note!
Make sure to put the anchor weight on the tank bottom. When installing with the suspended anchor weight, please use the anchor weight at a maximum of 16kg. More wieght may cause internal breaking in the flexible tube.

Caution!
The flexible tube and/or WB probe must be lowered carefully without bending too much and scratching at the inner edge of the nozzle hole.

1. Insert a gasket and lower the flexible tube and/or WB sensor from the nozzle on the tank top.
2. Rotate the Prothermo NMT539 so that you can set up the cabling in the most convenient way.
3. Tighten the tensioning wire between the lower end of the flexible tube and the anchor weight.
4. Wind the tensioning wire twice around the hitches and wrap a wire around it.
5. Fix the mounting flange of the Prothermo NMT539 to the nozzle on the tank top using bolts.



4.2 Mounting on a floating roof tank

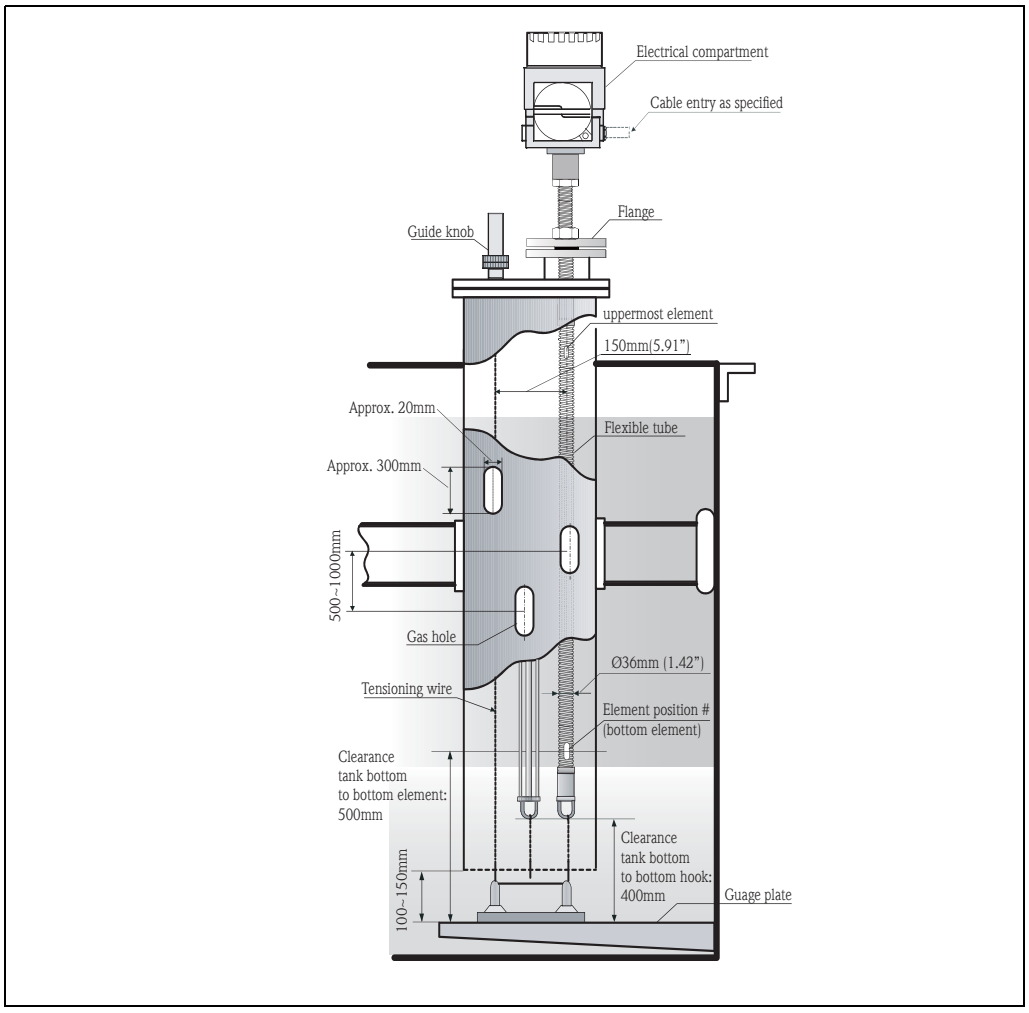
There are three methods of mounting the Prothermo NMT539 on a floating roof tank:

1) Top anchor method
2) Stilling pipe method
3) Guide wire ring method

Note!
If the tank bottom has a heating coil, the clearance from the flexible tube or probe bottom hook to the tank bottom must increase according to the heating coil type.

4.2.1 Top anchor method

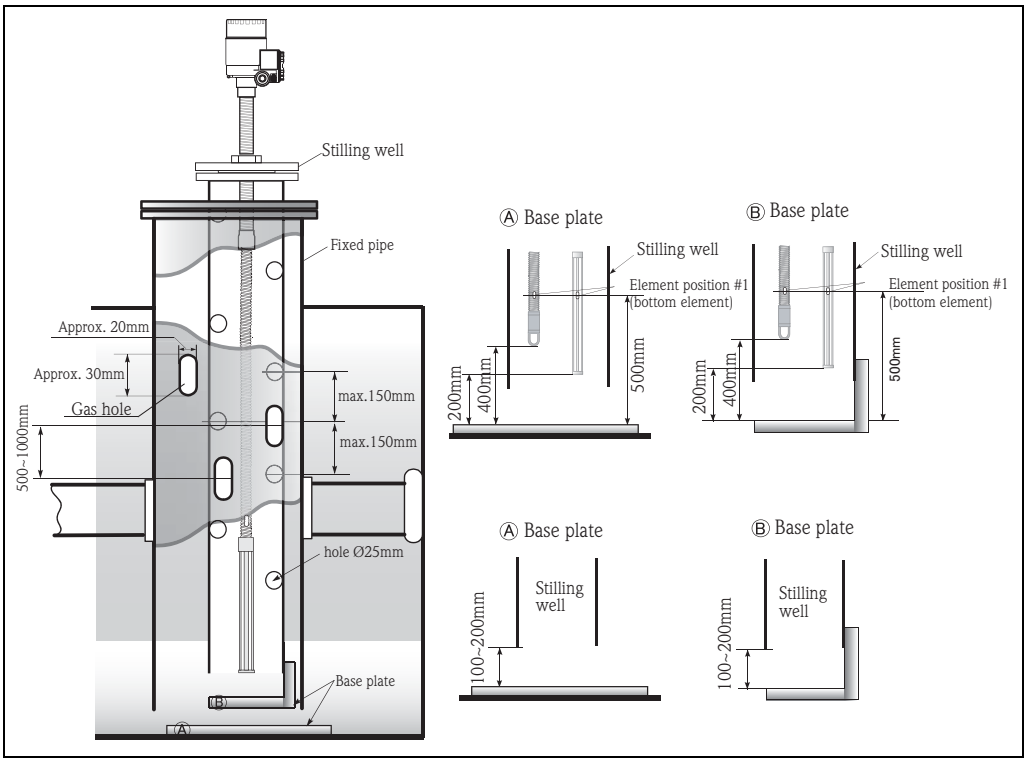
The flexible tube or WB sensor is installed in a fixed pipe and stabilized by a tip anchor. The Proservo NMS5/ 7 and Prothermo NMT539 can be mounted in the same fixed pipe.



The installation procedure is the same as for mounting on a fixed roof tank using the top anchor method.

4.2.2 Stilling pipe method

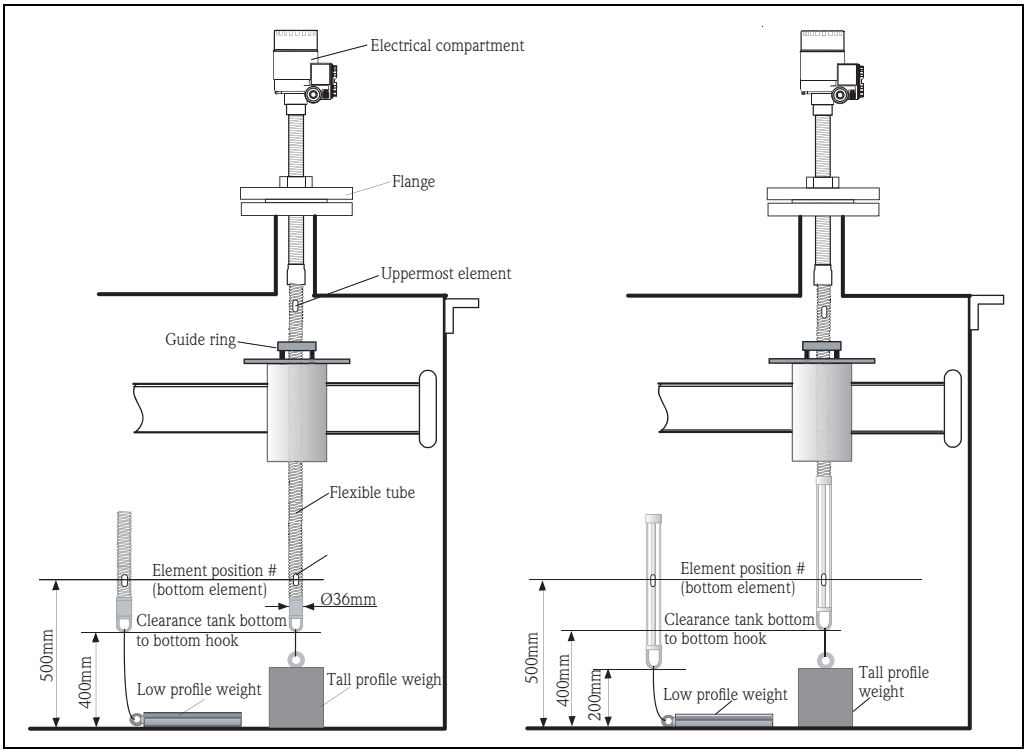
The flexible tube and/or WB sensor probe are inserted into a stilling pipe in the fixed pipe.



The installation procedure is the same as for mounting on a fixed roof tank using the thermo pipe method.

4.2.3 Guide ring and anchor weight method

The flexible tube and/or WB sensor are stabilized by a guide ring and anchor weight.



Note!
Make sure to put the anchor weight on the tank bottom. When installing with the suspended anchor weight, please use the anchor weight at a maximum of 16kg. More weight may cause internal breaking in the flexible tube.

Caution!
The flexible tube and/or WB probe must be lowered carefully without bending too much and scratching at the inner edge of the nozzle hole.

The installation procedure required the following steps:
1. Set the guide ring to the floating roof.
2. Insert a gasket and lower the flexible tube and/or WB sensor probe from the nozzle on the tank top.
3. Rotate the Prothermo NMT539 so that you can set up the cabling in the most convenient way.
4. Tighten the tensioning wire between the lower end of the flexible tube or WB sensor and the anchor weight.
5. Wind the tensioning wire twice around each of the hitches and wrap a wire around it.
6. Fix the mounting flange of the Prothermo NMT539 to the nozzle on the tank top using bolts.

5 Wiring

5.1 Mechanical connection for converter only version

Note!

Prior to the removal of the existing RTD temp. converter, note the following information. This information is also applicable for new installations.

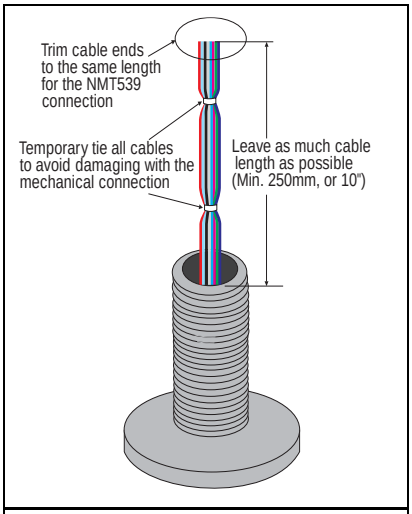
1. Element type (material and structure)
2. Total element number
3. Presence of bottom and vapour spot elements
4. Lowest element position
5. Element intervals
6. Cable colour for each element

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

Preparation of the mechanical connection

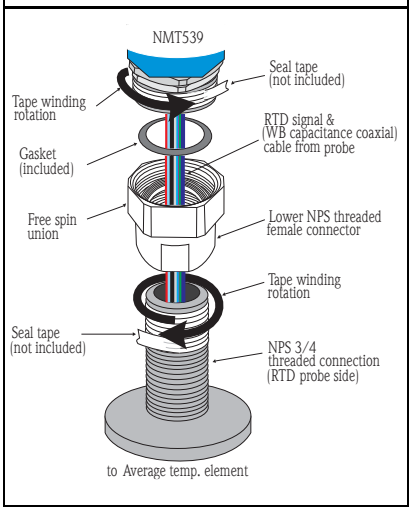
Caution!

Take precaution before performing the NMT mechanical installation to the existing RTD probe. Unscrew the lower NPS threaded female connector once and try to fit it on the temperature RTD probe to ensure that each threaded connection can be smoothly attached.



Threaded type connection

1. Install lower NPS threaded female connector and along with free spinning union onto the RTD probe threaded connection until it is completely seated. Use seal tape and rap it around the RTD probe's threaded connection.



2. Install NMT539 housing along with the included gasket in-between. Use seal tape and wrap it around the male threaded connector on the NMT539 housing side, then hand tighten the free spinning coupling until it stops.
3. Remove the cap cover and make sure that both sides of the cable have enough length to be connected freely.

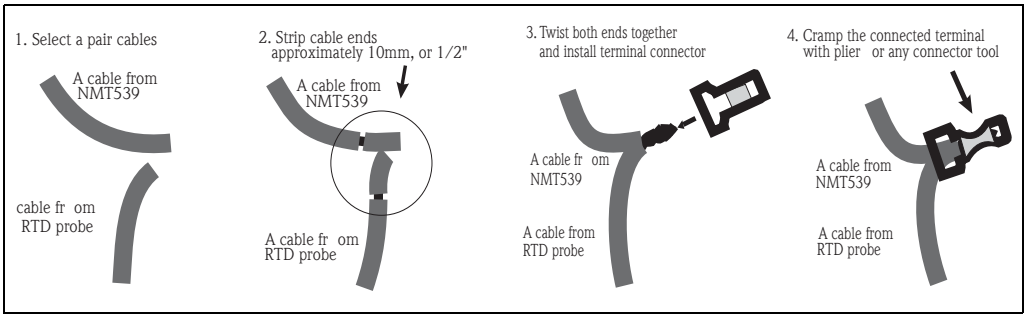
Warning!

Do not pull either side of the cables or apply over-tension during this procedure. Internally torn cables or loose connections can cause invalid temperature measurement.

4. After performing the cable connection and positioning the face angle of the NMT539, tighten the free spinning union approx.1/8th turn with a wrench from where it was hand tightened

5.2 NMT539 to RTD probe

Temperature signal cable
The RTD cable is directly connected to the NMT539 (converter only version) input cable with simple cramp connectors (included). Strip each end of the cable approximately 10mm(3/8") and slip it into the connector, then pinch with pliers to secure the connection.



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

A: Signal wires

No. 1 : brown	No. 9 : white
No. 2 : red	No. 10 : black
No. 3 : orange	No. 11 : brown & white
No. 4 : yellow	No. 12 : red & white
No. 5 : green	No. 13 : orange & white
No. 6 : blue	No. 14 : yellow & white
No. 7 : violet	No. 15 : green & white
No. 8 : gray	No. 16 : blue & white

B: Common wire

B0 : violet & white
B : black & white

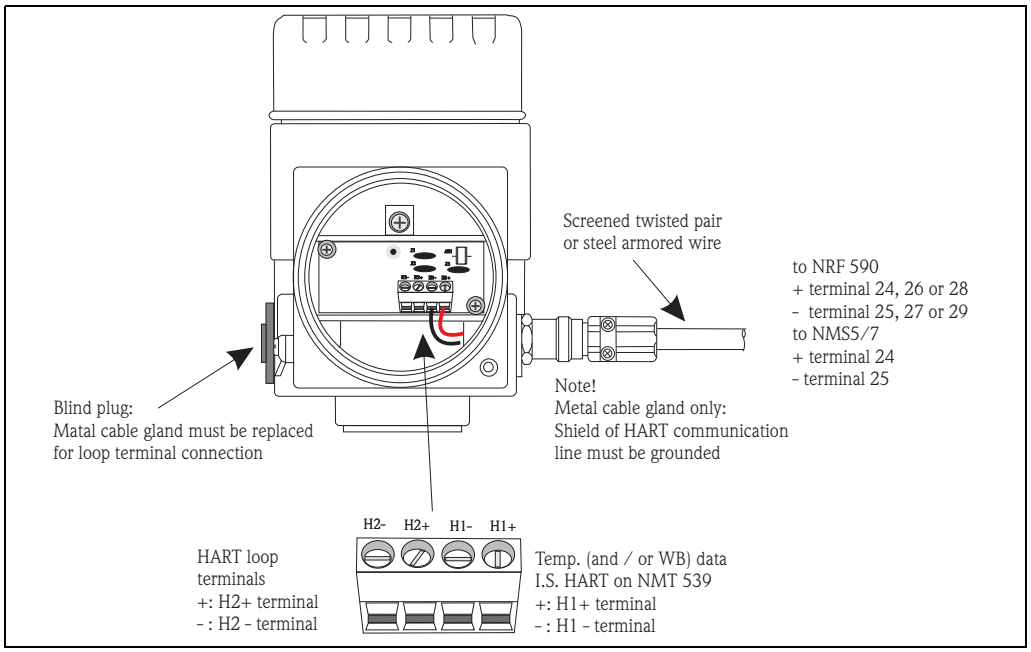
Coaxial cable for capacitance signal to auxiliary converter
The NMT539 temperature and water bottom version allows accessibility to the coaxial cable (water bottom capacitance signal) from the auxiliary capacitance to HART converter (Drexelbrook and others). The sensor cable from the WB probe and converter cable through the cable outlet can meet within the NMT539 terminal housing or the sensor cable can directly exit from the cable outlet. Some WB capacitance sensors might have additional ground wire. Please route this wire to the existing CV converter without causing interruption inside the NMT539 housing.

5.3 Terminal Connection

5.3.1 NMT539 terminal

Note!
The NMT539 allows an intrinsically safe HART connection only. Please refer to the i.s. regulation for establishing wiring and field device layout.

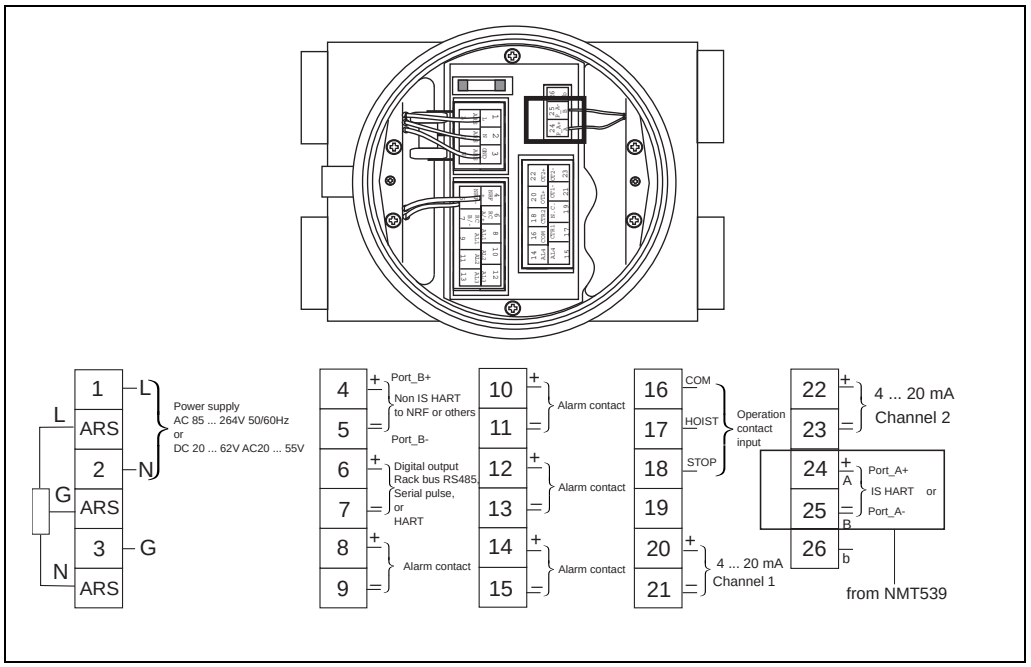
NMT539 terminal board



The NMT539 has convenient HART loop terminals that enable the NMT539 to be a terminal junction for HART multi-drop instruments.

5.3.2 Proservo NMS5/7 terminal

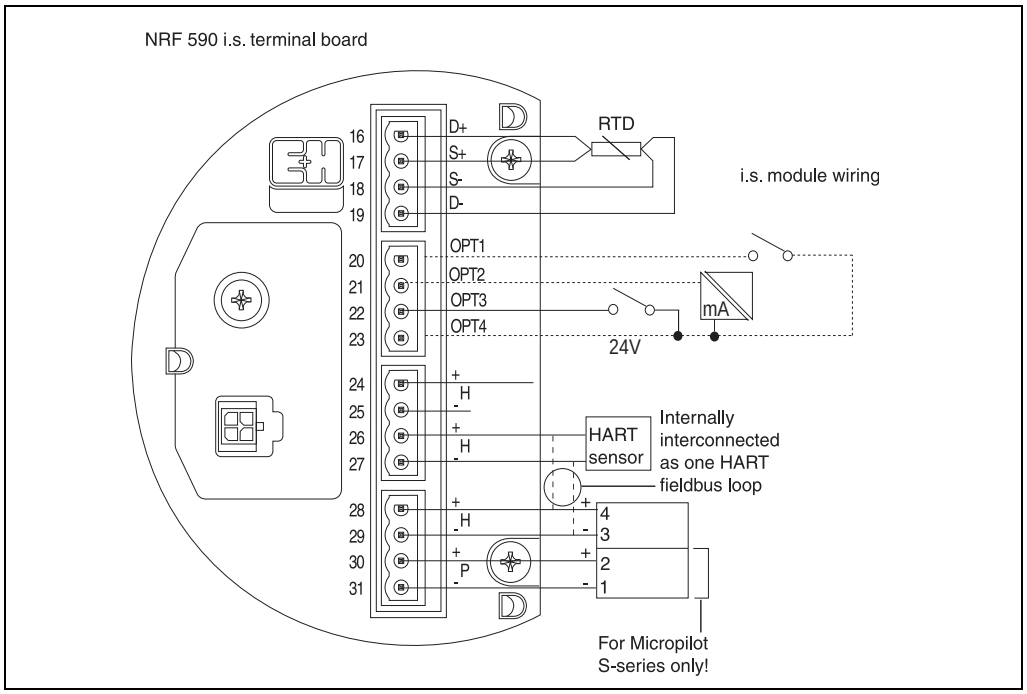
Since the Prothermo NMT539 is an intrinsically safe instrument, the terminal connection to the Ex i side on HART connection is allowed on the NMS5/7 terminal housing.



Note!
Do not connect the NMT539 HART communication on terminals 4 and 5 on the Proservo NMS5/7. These terminals are designed to connect Ex d HART communication.

5.3.3 Tank Side Monitor NRF590 i.s. terminal

Terminal connection on the Tank Side Monitor NRF590



Note!
The Tank Side Monitor NRF590 has three sets of i.s. HART terminals. These three pairs are looped internally.

Caution!
Do not connect signal HART lines from the NMT539 to terminals 30 and 31. They are designed to supply drive power for the FMR 53x series only.

6 Certificates and approvals

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

Ex approvals
See order information

W & M approval
To be announced

External standards and guidelines
Based on IEC 61326, Immunity according to table A-1
Immunity to surge on data lines

EN 61000-4-4
Immunity to burst on data lines

EN 61000-4-2
Immunity to electrostatic discharge

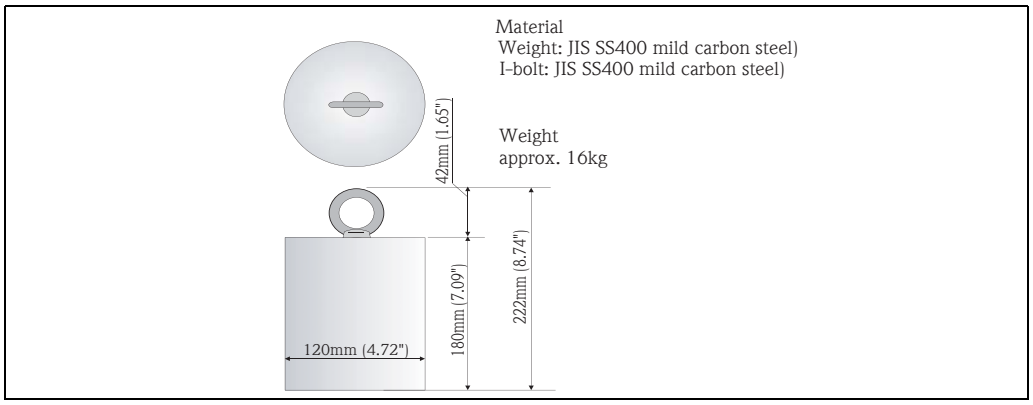
EN 61000-4-6
Immunity to electromagnetic field disturbance

CISPR 16
Electromagnetic emission

7 Accessories

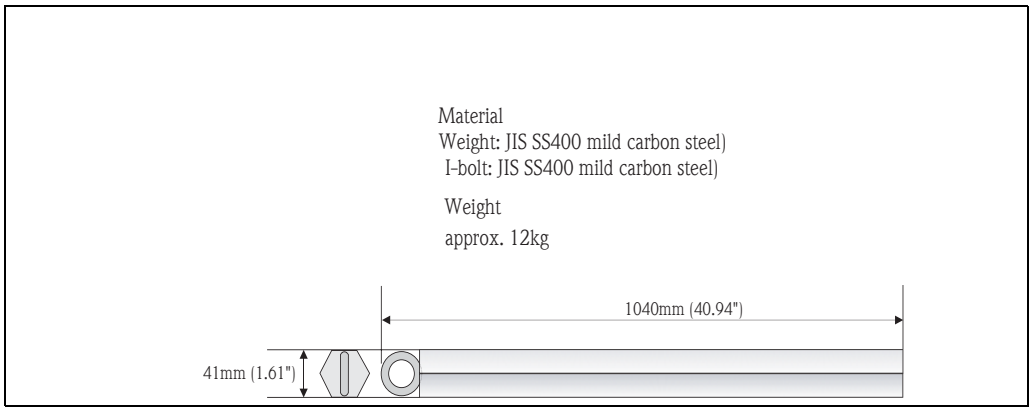
Anchor weight (tall profile) mounting attachment option: B

Caution!
Installation of the anchor weight will cause the lowest temperature measurement position to be raised approximately 400mm (16") from the tank floor.

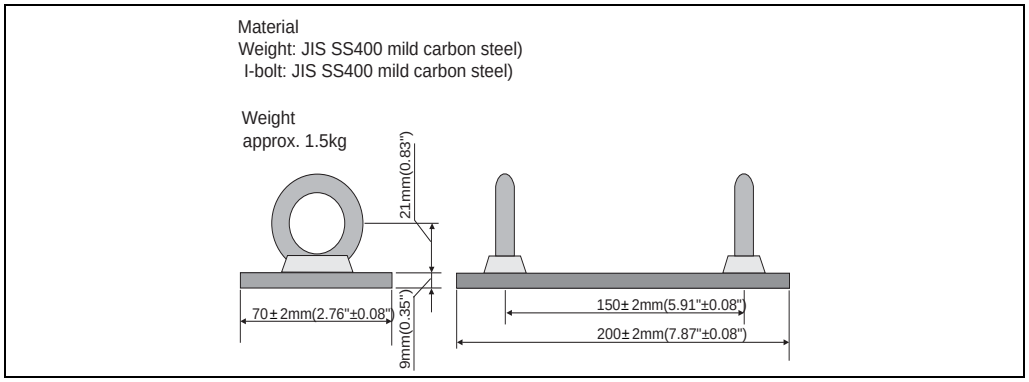


Different dimensions, weight and material for the anchor weight are also available. Consult with your Endress+Hauser representative for further details.

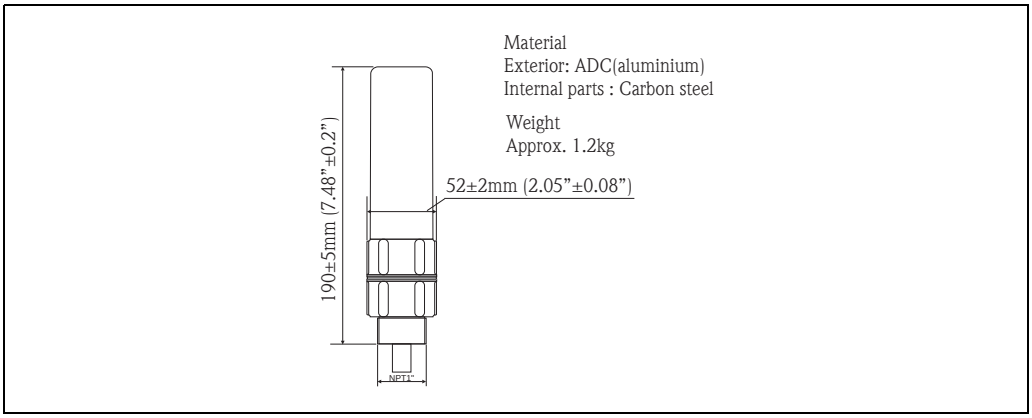
Anchor weight (low profile) mounting attachment option: C
The low profile anchor weight is mainly designed to stabilize the WB sensor, securing it straight up without shortening the WB measuring range. There is also a version for an existing tank installation with a small nozzle opening for converter and temperature version as pipe.



Wire hook, Top anchor mounting attachment option: D



Actual tensioning can be completed with SUS316 stranded 3mm diameter tension wire between wire hook to top anchor. Based on the application and installation variables, type of wire and size, material and special coatings are available. Please consult with your Endress + Hauser representative for further details.



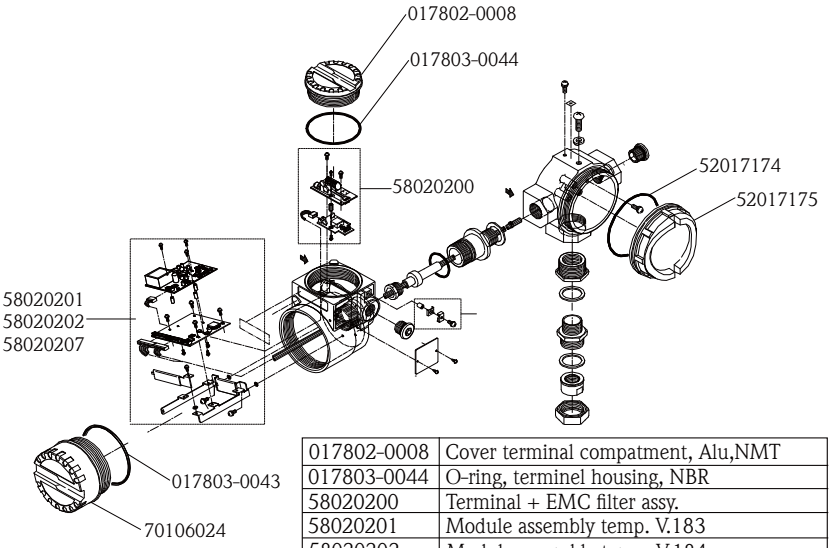
Note!
The standard process connection of the top anchor is PT1" threaded connection. Different thread size, material and specification are available. The flange type connection is also available.

8 Troubleshooting

8.1 Spare parts

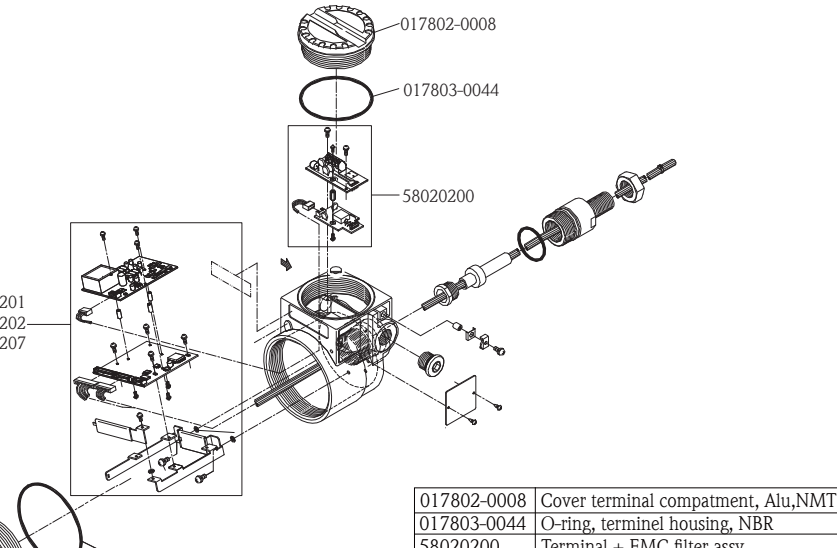
Spare parts are contained in kits. Spare parts which you can order from Endress+Hauser for the Prothermo are shown with their order numbers in the diagram below. For more information on service and spare parts, contact Endress+Hauser.

Type1:Converter only version [Standard PF(NPS3/4") universal coupling connection]



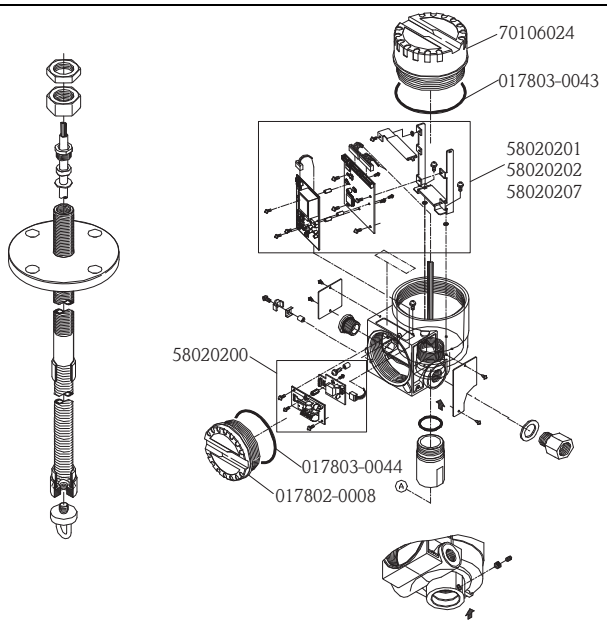
017802-0008	Cover terminal compatment, Alu,NMT
017803-0044	O-ring, terminel housing, NBR
58020200	Terminal + EMC filter assy.
58020201	Module assembly temp. V.183
58020202	Module assembly temp. V.184
58020207	Module assembly W+M temp. V.184
017803-0043	O-ring, electric cover, NBR
70106024	Cover, E-housing NMT532, M88 long type
52017174	WB ver cover O-ring
52017175	Cover connection housing

ype2:Converter only version (for the Varec 1700 win M20 threaded connection)



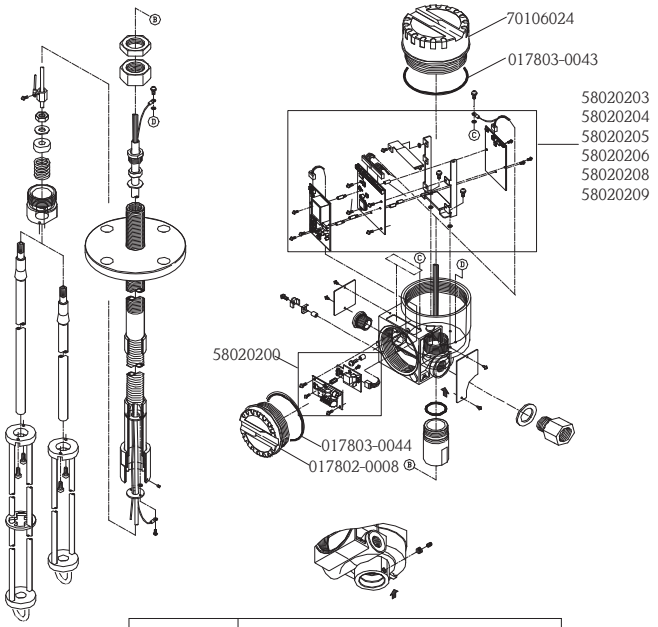
017802-0008	Cover terminal compatment, Alu,NMT
017803-0044	O-ring, terminel housing, NBR
58020200	Terminal + EMC filter assy.
58020201	Module assembly temp. V.183
58020202	Module assembly temp. V.184
58020207	Module assembly W+M temp. V.184
017803-0043	O-ring, electric cover, NBR
70106024	Cover, E-housing NMT532, M88 long type

Converter + average temperature probe version



70106024	Cover, E-housing NMT532,M88 long type
017803-0043	O-ring, electric cover, NBR
58020201	Module assembly temp. V.183
58020202	Module assembly temp. V.184
58020207	Module assembly W+M temp. V.184
58020200	Terminal+EMC filter assy.
017803-0044	O-ring, terminal housing, NBR
017802-0008	Cover terminal compartment, Alu, NMT

Converter + WB probeprobe and Converter and Temp. + WB probe version



70106024	Cover, E-housing NMT532,M88 long type
017803-0043	O-ring, electric cover, NBR
58020203	Module assembly temp. 1m V.185
58020204	Module assembly temp. 2m V.185
58020205	Module assembly 1m WB V.186
58020206	Module assembly 2m WB V.186
58020208	Module assembly W+M 1m WB V.186
58020209	Module assembly W+M 2m WB V.186
58020200	Terminal+EMC filter assy.
017803-0044	O-ring, terminal housing, NBR
017802-0008	Cover terminal compartment, Alu, NMT

9 Technical data

9.1 Technical data at a galance

Application	
Application	The Prothermo NMT539 performs precise liquid and gas phase average temperature measurement of custody transfer bulk storage tank application. 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. ■ Standard 2" flange installation ■ Overall 40m temperature measurement range ■ Up to 1m or 2m of BSW measurement range (3m optional)
Function and system design	
Measuring principle	Temperature measurement NMT539 consists of platinum charactorized 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, all of converted and calculated data are transmitted on loop powered 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 HART converter to connected host instrument.
Equipment architecture	see Installation Manual BA1025N/08/en
Input	
Measured variable	Temperature measurement Temperature conversion range: -200 ~ +240°C Standard temp probe: -40 ~ +100°C (-20~ +100°C...TIIS) Wide range temp probe: -55 ~ +235°C (-20~ +235°C...TIIS) Cryogenic range temp probe: -170 ~ +71°C WB measurement Standard probe range: 1m or 2m Optional range: 3m
Measuring range	see Technical Information TI042N/08/en
Output	
Output signal	■ HART protocol (multi drop HART loop connection)
Signal on alarm	Error information can be accessed via the following interfaces and transmitted digital protocol (refer to the operation manuals on following instruments) ■ Tank Side monitor NRF590 ■ Proservo NMS5/7
Auxiliary energy	
Load HART	Minimum load for HART communication: 250 W
Cable entry	see Technical Information TI042N/08/en
Supply voltage	16 ~ 30VDC (on multi drop HART loop)
Current consumption	Less than 6mA with temperature maesurement Less than 12mA with WB (and temperature) measurement
Performance characteristics	

Reference operating conditions	■ temperature = +25 °C (77 °F) ±5 °C (9 °F) ■ pressure = 1013 mbar abs. (14.7 psia) ±20 mbar (0.3 psi) ■ relative humidity (air) = 65 % ± 20%
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 class A standard) – WB: 4mm (±2mm) for 1m probe installed
Operating conditions	
Operating conditions	
Installation instructions	see Installation Manual BA1025N/08/en
Environment	
Storage temperature	-40 °C ... +85 °C
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 conditions	
Process temperature range	see Technical Information TI042N/08/en
Process temperature limits	see Technical Information TI 042N/08/en
Process pressure limits	see Technical Information TI042N/08/en
Mechanical construction	
Design, dimensions	see Technical Infromation TI042N/08/en
Weight	see Technical Information TI042N/08/en
Material	see Technical Information TI042N/08/en
Process connection	see Technical Information TI042N/08/en
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 61010** Safety regulations for electrical devices for measurement, control, regulation and laboratory use. **EN 61326** Emissions (equipment class B), compatibility (appendix A – industrial area)
Ex approval	see Ordering structure NMT539
Ordering Information	

	The E+H service organisation can provide detailed ordering information an information on the order codes on request.
Accessories	
	see Technical Information TI042N/08/en
Supplementary Documentation	
Supplementary Documentation	■ Technical Information (TI 042N/08/en) ■ Installation Manual (BA 1025N08/en)

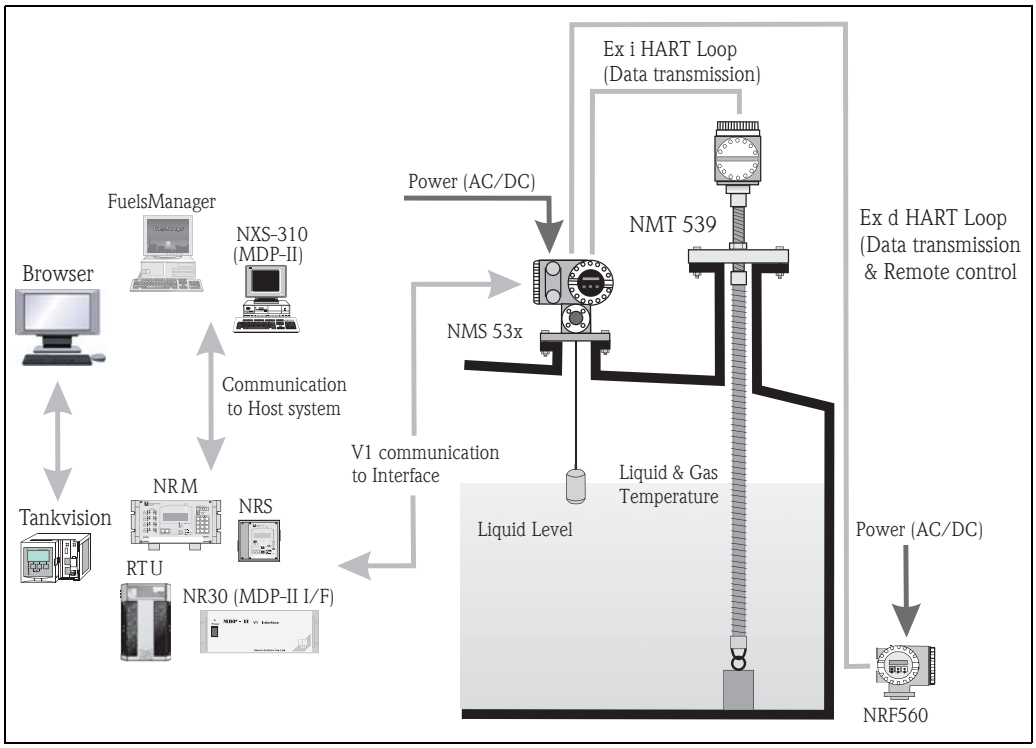
10 Appendix

10.1 Description of functions

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

10.2 Function and system design

Connection with Proservo NMS5/7



NMT539 converter + temp. version typical installation diagram
The Prothermo NMT539 is the successor of the former NMT 535 Ex i version. For proper migration, the NMT539 has inherited all the functionality and specifications of the NMT535, including process connections, cable entries and wiring method.

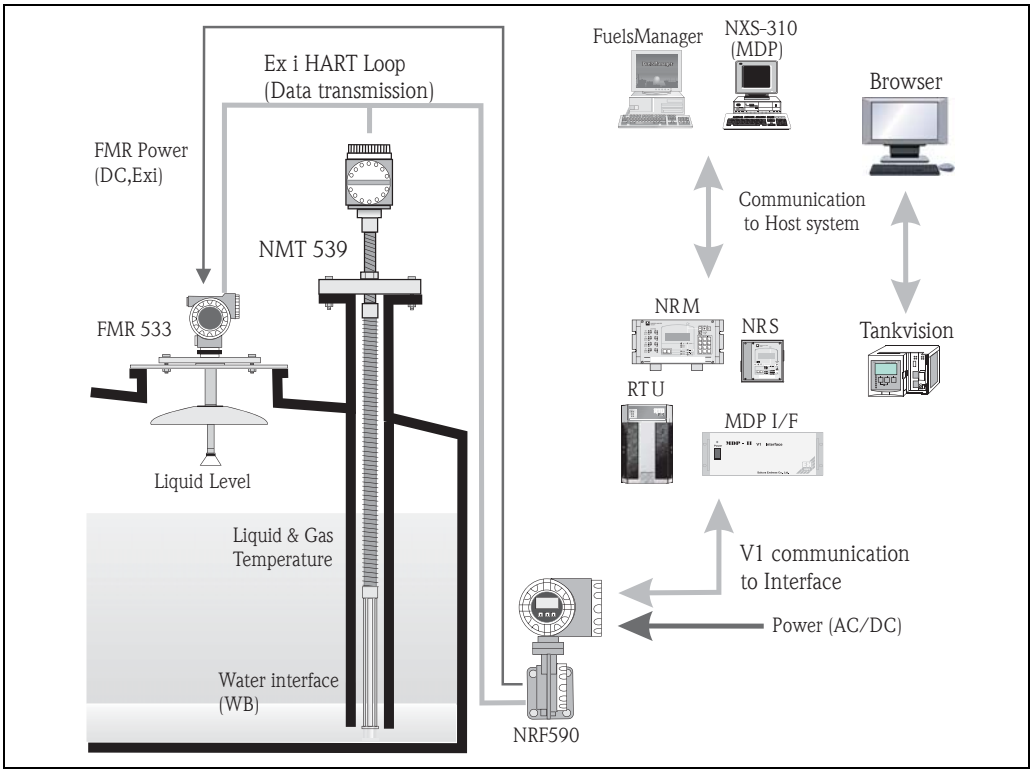
Since the Proservo NMS5/7 already provides water interface measurement, the NMT539 Converter + average temperature may be the best version when used in combination with the Proservo. However if the converter + WB + average temperature version is used in combination with the Proservo, the product in the tank will be thoroughly managed with level, continuous average temperature and water interface measurement.

All the necessary configuration and parameter settings for the NMT539 are performed on both the Proservo NMS5/7 and ToF Tool.

The 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.

From the Proservo NMS5/7 or Tank Side Monitor NRF590, all sensor data are sent to the interface unit via V1 communication protocol.

onnection with the Tank Side Monitor NRF590



NMT539 converter + temp. + WB version typical installation diagram
The NMT539 converter + temp. + WB is utilised 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 the ToF Tool.

The NMT539 receives radar level data from the 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 (please see the 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, NXS-310(MDP-II program), or directly sent to the customer's specific DCS or PLC.

Declaration of contamination

Dear customer,
Because of legal determinations and for the safety of our employees and operating equipment, we need this "Declaration of contamination" with your signature before your order can be handled. Please, include the completely filled in declaration with the device and the shipping documents in any case. Add also safety sheets and / or specific handling instructions if necessary.

Type of device / sensor:		Serial no.:			
Medium / concentration:		Temperature:		Pressure:	
Cleaned with:		Conductivity:		Viscosity:	

Warning hints for medium used (mark the appropriate hints)

☐	☐	☐	☐	☐	☐	☐	☐
radioactive	explosive	caustic	poisonous	harmful to health	biologically hazardous	inflammable	safe

Reason for return

Company data

Company:		Contact person:	
		Department:	
Address:		Phone:	
		Fax / e-mail:	
		Your order no.:	

I hereby certify that the returned equipment has been cleaned and decontaminated acc. to good industrial practices and is in compliance with all regulations. This equipment poses no health or safety risks due to contamination.

(Place, date)

(Company stamp and legally binding signature)

More information about services and repairs:
www.services.endress.com

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