

Prothermo NMT 53x Series

For average temperature measurement in a tank

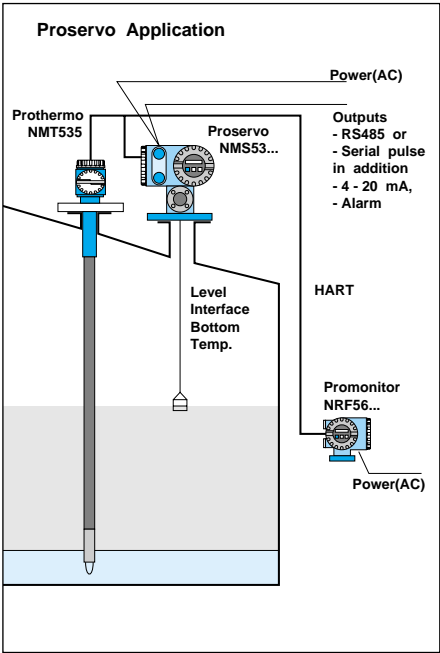


Features

- NMT 53x temperature elements are used in conjunction with the Proservo NMS 53x series of tank gauges
- Prothermo enables the gross and temperature compensated net volume of the liquid to be calculated, fulfilling the exacting demands of tank inventory management
- NMT 53x series are tank top mounted temperature elements designed to measure the average temperature from the surface of the liquid to the tank bottom
- Continuous measurement of average liquid temperature and/or average gas phase temperature
- Temperature profile throughout the tank is available by reading the position and temperature of each element
- Remote transmission via the Proservo tank gauge by 4-20mA, RS 485 or bi-directional serial pulse outputs
- Simple two wire connection between Proservo and Prothermo (HART®)
- Robust IP housing

System Configuration

Prothermo
NMT 535/6/7
System Configuration



Operating Principle

High Precision Sensor

The NMT series of average temperature probes is based on Pt 100 elements in accordance with IEC and JIS standards.

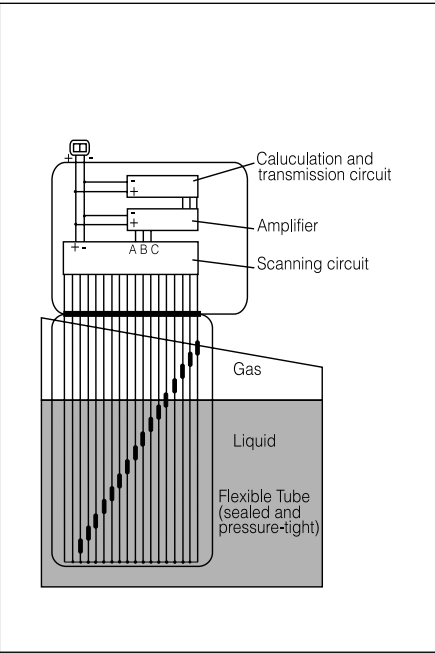
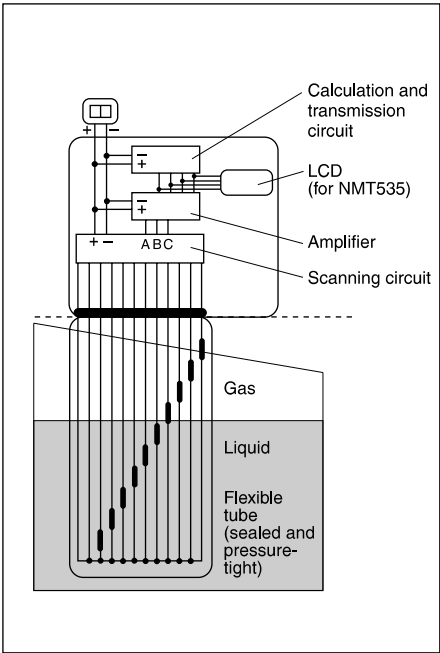
The NMT 535/6 comprises up to 16 measuring elements depending on the height of the tank and spacing of the elements. Each element consists of one Class A Pt 100.

All the elements are continuously scanned. The average liquid temperature and/or gas phase temperature is derived from the level data measured by the Proservo intelligent tank gauge.

Local indication can be provided on the NMT 535 (optionally displayed on the Proservo and re-transmitted for remote indication)

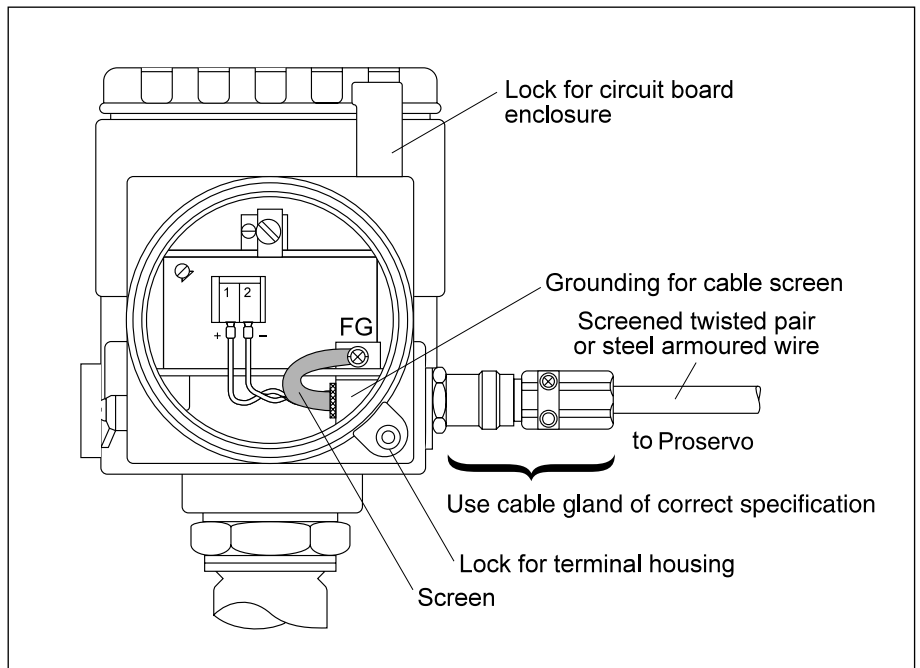
Left:
Operating Principle of
Prothermo NMT 535/7
with 10 elements (example)

Right:
Operating Principle of
Prothermo NMT 536 with 16
elements (example)



Electrical Connections

Connection diagram for the Prothermo NMT 535/6/7 temperature probe



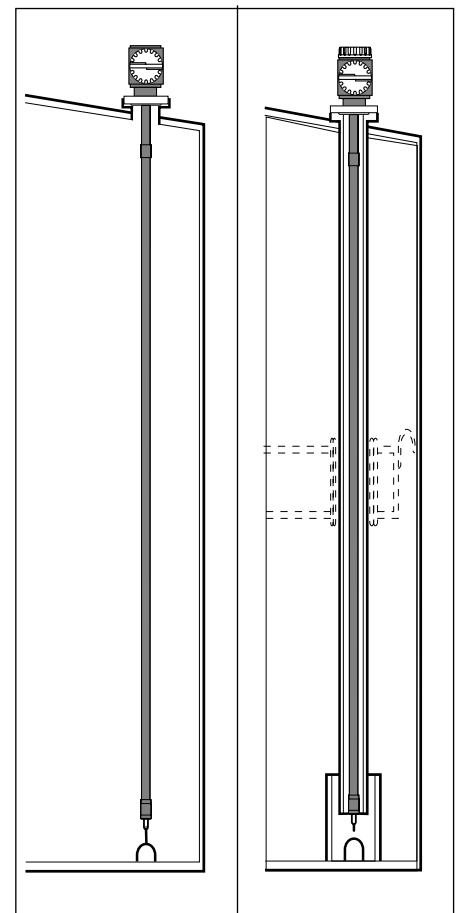
Installation

The NMT temperature bulb is primarily for use in cone, dome and floating roof tanks. Top mounted, the unit is connected via a flange to the bottom of the tank using a weight or anchor hook. Alternatively, a stilling well may be used to prevent turbulence from moving the probe.

If the Prothermo is installed in a tank with a pressure of greater than 10 bar gauge, a closed pipe (thermowell) must be used to isolate the pressure. The recommended mounting position is ideally 20" (500 mm) (minimum) from the tank wall to prevent ambient temperature changes from influencing the measurement.

Left:
Prothermo NMT 535 installed on a fixed roof tank by an anchor weight

Right:
Prothermo NMT 535 installed on a covered floating roof tank by a stilling well

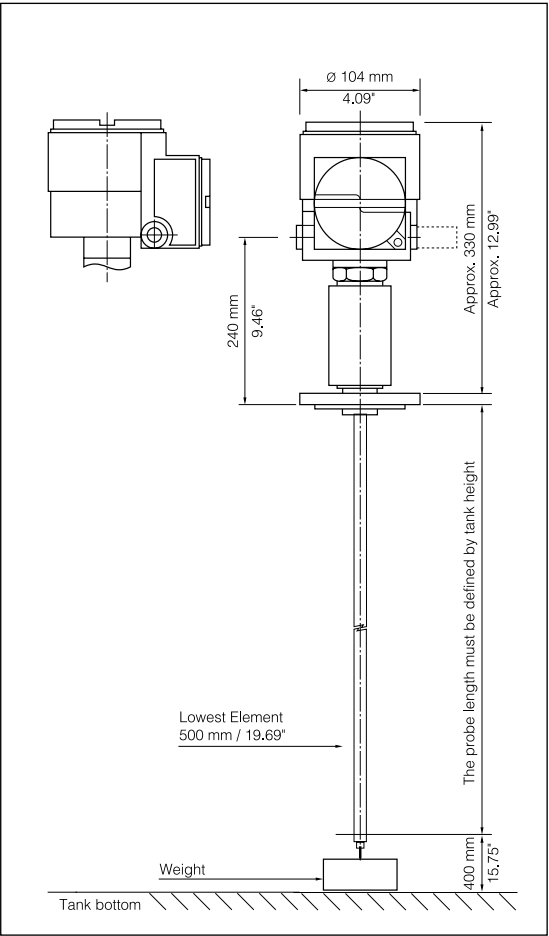
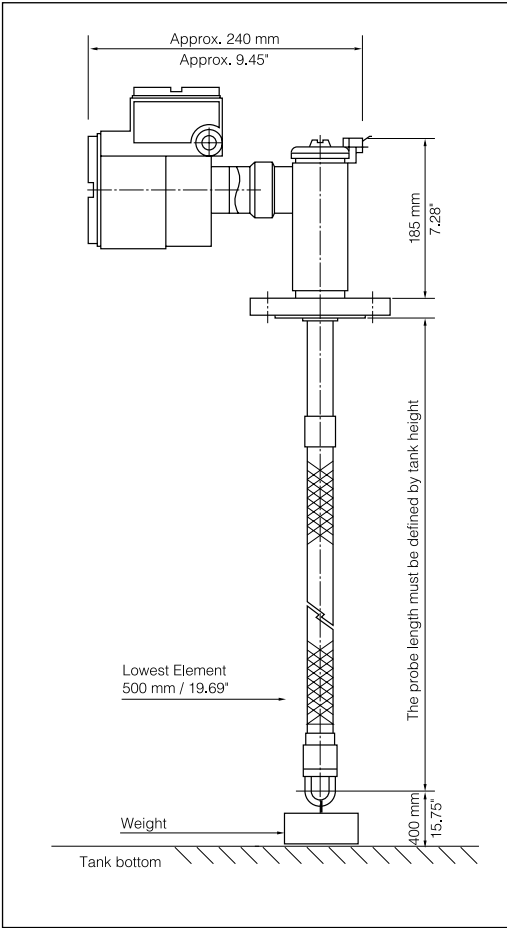
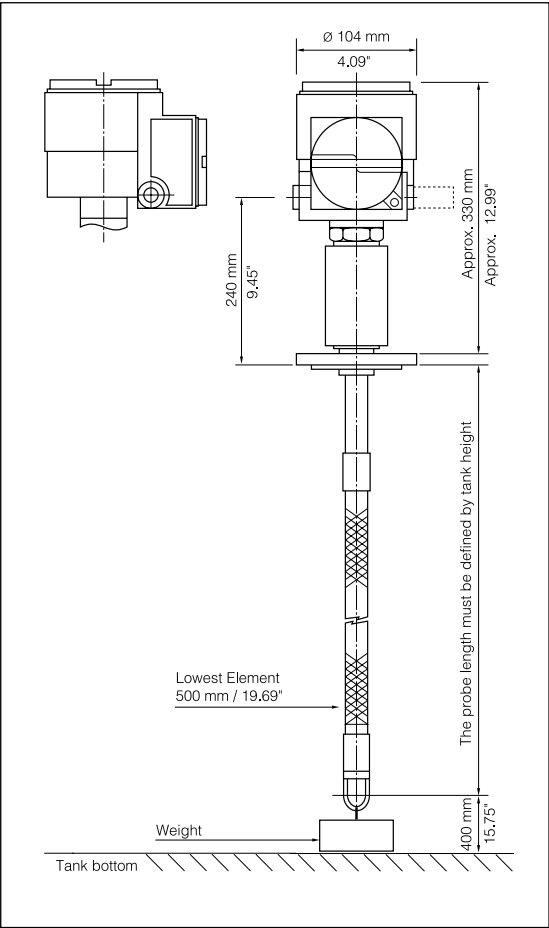


Dimensions

Left:
Prothermo NMT 535
temperature probe

Right:
Prothermo NMT 536
temperature probe

Down:
Prothermo NMT 537
temperature probe



Manufacturer	Endress+Hauser Systems & Gauging, Inc.
Designation	Prothermo NMT 535/536/537
Function	Average temp. (Liquid gas) profile

Measuring element	Platinum (Pt100), Class A according to IEC PUB 751 1983 and/or JIS 1604 1989
Accuracy of element	$\pm (0.15 + 0.002) \text{ t } ^\circ\text{C}$
Measuring range	For NMT 535/536 -50 to +80 °C (-58 to +176°F) (standard) +70 to +200 °C (+158 to +392°F) (high temp) Minimum -200 °C (-328 °F) (optional) For optional measuring range, the measuring span is 150 °C (302 °F) For NMT 537 -18 to +80 °C (-40 to +176 °F)
Tolerance of reading	$\pm 0.25 \text{ } ^\circ\text{F}$ (0.25 °C) (for standard measuring range)
Number of elements	2-16

Flexible tube	For NMT 535/536 Inner tube - SS316 Outer mesh - SS304 For NMT 537 None
Housing	Aluminum diecast
Flange	Mild steel (standard), SS304/316 (optional)

Flange rating	JIS 10K 50A RF ANSI 150 lb 2" RF JPI 150 lb 2" RF DIN DN50 PN 10 RF Others optional
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Output	HART® multi drop
Power supply	DC14 - 36V (NMS53....supplies DC24V)

Cable entry	1 x M20, 1 x G(PF)1/2, 1 x NPT1/2 1 x PG16 (only with protection class 0)
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Ambient temperature	-20 to +60 °C (-4 to +140 °F) (housing)
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Explosion proof	Exd IIB T4 (TIIS) for NMT 535 Eexd IIB T6 (CENELEC) for NMT 536 Eex IIB T4 (PTB) Zone 0 for NMT537
Element position (standard)	Lowest 100 mm (4") above bottom of flexible tube Highest 1000 mm (39") below flange surface
Flexible tube of cable bottom	400 mm (16") from tank bottom

Product Structure

NMT 535

Protection Class									
0	IP 67								
1	Ex d IIB T4 T1IS								
9	Special Version								
Cable Entry									
A	One G(PF) ½" thread								
B	One NPT ½" thread								
C	One PG 16 (only Protection class 0)								
D	One M 20 thread								
Y	Special version								
Process Connection									
0	JIS 10 50A RF flange								
1	ANSI 2" 150 lb RF flange								
2	DIN DN50 PN 10 RF flange								
3	JPI 2" 150 lb RF flange								
9	Special version								
Measuring Range									
0	-50 to +80 °C (-58 to +176 °F) liquid/gas temp.								
1	+70 to +200 °C (+158 to +392 °F) liquid/gas temp.								
9	Special Temp								
Numbers of Elements									
A	Two Pt 100								
B	Three Pt 100								
C	Four Pt 100								
D	Five Pt 100								
E	Six Pt 100								
F	Seven Pt 100								
G	Eight Pt 100								
H	Nine Pt 100								
J	Ten Pt 100								
K	Eleven Pt 100								
L	Twelve Pt 100								
M	Thirteen Pt 100								
N	Fourteen Pt 100								
P	Fifteen Pt 100								
Q	Sixteen Pt 100								
Y	Special version								
Element Spacing									
1	2000 mm (79")								
2	1500 mm (59")								
3	1000 mm (39")								
4	Elements equally spaced defined by length and element number								
9	Special version								
4 to 25m (13 to 82 ft) Probe Length (below flange)									
A	...mm probe length								
Y	Special version								
Display									
A	No display								
Mounting Attachment									
A	Without installation material for guide pipe installation								
B	With anchor weight for CRT								
C	With anchor weight and sliding sleeve for FRT without guide pipe								
D	With tensioning wire, anchor weight, top anchor (threaded NPT 1")								
Y	Special version								

NMT 536

Protection Class									
1	Eex IIB T6 CENELEC								
9	Special version								
Cable Entry									
A	One G(PF) ½" thread								
B	One NPT ½" thread								
C	One PG 16								
D	One M 20 thread								
Y	Special version								
Process Connection									
0	JIS 10 K 50A RF flange								
1	ANSI 2" 150 lb RF flange								
2	DIN DN50 PN 10 RF flange								
3	JPI 2" 150 lb RF flange								
9	Special version								
Measuring Range									
0	-50 to +80 °C (-58 to +176 °F) liquid/gas temp								
2	+70 to +200 °C (+158 to +392 °F) liquid/gas temp								
9	Special version								
Numbers of Elements									
A	Two PT 100								
B	Three PT 100								
C	Four PT 100								
D	Five PT 100								
E	Six PT 100								
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N	Fourteen PT 100								
P	Fifteen PT 100								
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Y	Special version								
Element Spacing									
1	2000 mm (79")								
2	1500 mm (59")								
3	1000 mm (39")								
4	Elements equally spaced defined by length and element number								
9	Special version								
4 to 25m (13 to 82 ft) Probe Length (below flange)									
A	...mm probe length								
Y	Special version								
Mounting Attachment									
A	Without installation material for guide pipe installation								
B	With anchor weight for CRT								
C	With anchor weight and sliding sleeve for FRT without guide pipe								
D	With tensioning wire, anchor weight, top anchor (threaded NPT 1")								
Y	Special version								

Please specify height of tank, i.e. dimensions taken from tank bottom to process connection

NMT 537

Sensor Type and Protection Class/Approval

- | | |
|---|--------------------------------------|
| 0 | Eex ia T6 PTB Zone 0 |
| 1 | Ex ia IIB T4 TIS (Under development) |
| 9 | Special version |

Cable Entry

- | | |
|---|---------------------|
| A | One G(PF) ½" thread |
| B | One NPT ½" thread |
| C | One PG 16 |
| D | One M 20 thread |
| Y | Special version |

Process Connection

- | | |
|---|--------------------------|
| 4 | JIS 10 K 50A RF flange |
| 5 | ANSI 2" 150 I RF flange |
| 6 | DIN DN50 PN 10 RF flange |
| 7 | JPI 2" 150 lb RF flange |
| 9 | Special version |

Flange Material

- | | |
|---|---------------------------------|
| 0 | Mild steel (JIS SS 400) |
| 1 | Stainless steel (SS 304) flange |
| 9 | Special version |

Measuring Range

- | | |
|---|---|
| 0 | -18 to +80°C (-40 to +176°F) liquid/gas temp. (for PTB T&W) |
| 9 | Special version |

Numbers of Elements

- | | |
|---|-----------------|
| A | Two PT 100 |
| B | Three PT 100 |
| C | Four PT 100 |
| D | Five PT 100 |
| E | Six PT 100 |
| F | Seven PT 100 |
| G | Eight PT 100 |
| H | Nine PT 100 |
| J | Ten PT 100 |
| K | Eleven PT 100 |
| L | Twelve PT 100 |
| M | Thirteen PT 100 |
| N | Fourteen PT 100 |
| P | Fifteen PT 100 |
| Q | Sixteen PT 100 |
| Y | Special version |

Element Spacing

- | | |
|----|---|
| 5 | 2000 mm (79") |
| 6 | 1500 mm (59") |
| 7 | 1000 mm (39") |
| 8 | Elements equally spaced defined
by length and element number |
| 10 | Special version |

4 to 25m (13 to 82 ft) Probe Length (below flange)

- | | |
|---|--|
| A | ...mm probe length (Silicon cable + Brass Sleeve for standard application) |
| B | ...mm probe length (PTFE cable + Stainless Steel Sleeve for gasoline application) |
| C | ...mm probe length (PTFE cable + Stainless Steel Sleeve for heavy oil application) |
| Y | Special version |

Mounting Attachment

- | | |
|---|--|
| A | Without installation material
for guide pipe installation |
| B | With anchor weight for CRT |
| C | With anchor weight and sliding sleeve
for FRT without guide pipe |
| D | With tensioning wire, anchor
weight, top anchor [threaded NPT 1" (25 mm)] |
| Y | Special version |

Please specify height
of tank, i.e.
dimensions taken
from tank bottom to
process connection

NMT537-									
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Supplementary Documentation

❏ Proservo NMS53x
Technical information Ti013G/03/ae

❏ Promonitor NRF560
Technical information Ti015G/03/ae

❏ Proservo
System information Si013G/03/ae

❏ Tank Computer NRS 57x
Technical information Ti015N/08/e

❏ Tank Computer NRM 571
Technical information Ti014N/08/e

❏ FuelsManager
Technical information Ti007G/03/ae

Locations

Endress+Hauser
Systems & Gauging Ltd.
Heighington Lane
Newton Aycliffe
Co Durham DL5 6XZ
United Kingdom
Tel: +44 (0)1325 321111
Fax: +44 (0)1325 300840

Endress+Hauser
Systems & Gauging S.A.
Rue de Bitche
62100 Calais
France
Tel: +33 - (0)321-96-49-93
Fax: +33 - (0)321-34-36-12

Sakura Endress Co., Ltd.
862-1 Mitsukunugi
Sakaigawa-mura
Higashi-Yatsushiro-Gun
Yamanashi Prefecture
406-0846 Japan
Tel: +81 (0)552-66-4964
Fax: +81 (0)552-66-4969

Endress+Hauser
Systems & Gauging, Inc.
2901 W. Sam Houston
Parkway North
Houston, TX 77043
USA
Tel: +1 (832) 590-6200
Fax: +1 (832) 590-6201

Endress+Hauser
Systems & Gauging, Inc.
1800 Diagonal Road
Suite 300
Alexandria, VA 22314
USA
Tel: +1 (703) 837-9202
Fax: +1 (703) 837-9209

Systems & Gauging Headquarters

Endress+Hauser
Systems & Gauging, Inc.
5834 Peachtree Corners East
Norcross (Atlanta), GA 30092
USA
Tel: +1 (770) 447-9202
Fax: +1 (770) 662-8939
<http://www.systems.endress.com>

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