



# Multiple Thermosensor Thermometer & Multiple element Interface Thermosensor converter

## The ultimate average temperature measurement

Enraf's Multiple Thermosensor Thermometer (MTT) is the ultimate answer for liquid temperature measurement.

The MTT is a robust and reliable device representing the leading edge in sensor technology. Its accuracy exceeds the requirements for W & M accepted temperature information.

The MTT also provides temperature profiles of your stored products. In addition the temperature above the liquid (gas phase) in for instance spheres can be measured. This parameter can be used for mass calculations of the product in the gas phase.

The MTT contains sixteen sensors. One of them is bound to a reference RTD. The others are equally spaced over a specified measuring height, measuring the differential temperature between the reference RTD and each sensor. Each sensor measures the spot temperature at its physical height. Those sensors which are fully immersed in the liquid are used for the average product temperature calculations. From the sensors above the liquid level the average gas (vapor) temperature is calculated.

The sensor assembly is contained in either a hermetical sealed polyamide (Nylon) tube or a corrugated stainless steel tube.

With the MTT, a Multi-element Interface Thermosensor converter (MIT) is needed. This MIT is a solid state electronic unit which derives the measured data from the MTT. This information is transmitted via only two cores to Enraf field instruments including Servo tank gauges, SmartRadar level gauges.

These instruments, in turn, transmit the complete information via Communication Interface Units (CIUs) to remote systems.

The MTT can be used for temperature measurement in Enraf's Hydrostatic Tank Gauging system (HTG) or Hybrid Inventory Measurement Systems (HIMS).

For power supply and transmission between the MIT and any Enraf field instrument a two core (twisted pair) cable is all that is needed .

The MIT is usually mounted on the extension pipe on top of the MTT. Only a small flange is required for mounting the instrument on the tank.

MTTs are available with extended length for special applications such as caverns.



The system uses intrinsically safe signals and complies with safety requirements for use in hazardous areas.

Together with the outstanding Enraf tank gauges, the MTT is the superior tool for liquid storage tank inventory management.



## Benefits

- Provides accurate liquid temperature measurement
- Provides temperature stratification profiles
- Records gas phase temperature
- Requires no maintenance
- Ideal for legal measurement



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# Technical specifications *Multiple Thermosensor Thermometer (MTT)*

## Measuring specifications

Accuracy	: <math>\pm 0.1\text{ }^{\circ}\text{C}</math> (0.18 °F) <sup>1)</sup>
Measuring resolution	: 0.01 °C (0.01 °F)

## Principle

Measuring principle	: 16 Temperature sensor divided over the sensitive length
Reference RTD	: Pt100, accuracy $\pm 0.06\text{ }^{\circ}\text{C}$ at 0°C (0.11 °F at 32 °F)
Sensor	: Type T (Copper/Constantan), Class 2 according to IEC 584-2

## Mechanical

Dimensions	: Maximum outer diameter 32 mm (1 <sup>1/4</sup> " )
Weight <sup>2)</sup>	: Nylon version (0.5 + 0.18 x L1) kg, (1.1 + 0.12 x L2) lb Stainless steel version (0.5 + 0.35 x L1) kg, (1.1 + 0.24 x L2) lb
Extension pipe	: Length 300 mm (12"), 1/2" BSP threaded

## Environmental

Operating temperature	: See identification note MTT Pos. 2
Operating pressure	: 5 bar / 500 kPa (72 psi) hydrostatic pressure
Safety	: The MTT is a passive device and is intrinsically safe for connection with MIT - EEx ia IIB T4 according to CENELEC - Class I, Division 1, Groups B <sup>3)</sup> , C and D, in acc. to NFPA 70 (FM, USA)

## Materials

Sheathing	: Nylon or Stainless Steel AISI 316L (Werkstoff 1.4404) corrugated tube
Fittings and extension pipe	: AISI 316L (Werkstoff 1.4404) Stainless Steel

## Electrical

Connection leads	: PTFE isolated, standard length 0.5 m ( 20" ) for other length see MTT identification code
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## Options

Mounting flange	: 2" 150 lb r.f. with 1/2" BSP threaded mounting hole. For other flanges please contact an Enraf office
Anchor weight	: For nylon version MTT max. 13 kg (30 lb), for Stainless Steel version max. 23 kg (50 lb)
Adapter	: Zone 0 adapter between MTT and MIT for Germany
Shielded flexible conduit	: - MTT to MIT (when remote mounted), standard length 2 m with couplings PG16 and 1/2" BSP part number 0815.080 - MIT to field instrument <sup>4)</sup> , standard length 2 m with two couplings PG16 part number 0815.081 <sup>5)</sup>

# *Multiple element Interface Thermosensor converter (MIT)*

## Principle

Function	: Measuring, digitizing and transmitting the measured values from the temperature sensor MTT
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## Mechanical

Dimensions (w x h x d)	: 160 mm x 160 mm x 90 mm (6 <sup>5/16</sup> " x 6 <sup>5/16</sup> " x 3 <sup>9/16</sup> " )
Weight	: 2.2 kg (4.9 lb)
Entries	: Standard two threaded holes PG16

## Environmental

Ambient temperature	: -40 °C to +85 °C (-40 °F to +180 °F)
Protection class	: IP 65, according to IEC 529
Safety	: Intrinsically safe for connection to field instruments <sup>4)</sup> - EEx ib IIB T4 according to CENELEC - Class I, Division 1, Groups B <sup>3)</sup> , C and D, in acc. to NFPA 70 (FM, USA)

## Materials

Housing	: Epoxy coated aluminum
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## Electrical

Power supply	: Intrinsically safe from field instrument via the two communication lines
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## Transmission

Type	: Modulated current loop Ex-ib
Cabling	: Two conductors, twisted pair shielded, $R_{\max} = 25\ \Omega/\text{line}$ , $C_{\max} = 670\ \text{nF}$ , $L_{\max} = 0.65\ \text{mH}$

## Options

Mounting brackets	: For railing 1 1/2", 2" and 3"
Cable glands	: See identification codes

- 1) Under reference conditions
- 2) L1 = Overall length of MTT in m  
L2 = Overall length of MTT in ft
- 3) Pending on temperature option board
- 4) Field instruments include: Servo Tank Gauges, SmartRadar and Field Display & Interface
- 5) For mounting into field instrument use reducer Enraf part number 2049.711

# Identification code

# Multiple Thermosensor Thermometer (MTT)

<b>Pos 1 Application</b>															
U	General purpose														
X	With sealing facilities														
<b>Pos 2 Temperature range</b>															
C	Very low temperature : -200 °C to +70 °C (-328 °F to +158 °F), Pos. 8 = S														
H	High temperature : -55 °C to +200 °C (-67 °F to +392 °F), Pos. 8 = S														
L	Low temperature : -20 °C to +90 °C (-4 °F to +194 °F), Pos. 8 = N -55 °C to +135 °C (-67 °F to +275 °F), Pos. 8 = S														
<b>Pos 3 Safety approvals <sup>6)</sup></b>															
D	KDB Poland				N	None									
F	FM USA				Y	CENELEC Europe									
<b>Pos 4 Length of flying leads</b>															
A	0.5 m (20"), standard					C	5.0 m (16 ft)								
B	2.5 m (8 ft)														
<b>Pos 5, 6, 7 Instrument designation</b>															
8	6	4													
<b>Pos 8 Outer sheathing material</b>															
N	Polyamide (Nylon) <sup>7)</sup>														
S	AISI 316 Stainless Steel														
<b>Pos 9, 10, 11, 12 Overall length</b>															
2	2	0	0					to	3	3	9	0			
in steps of 10 cm (4")															
<b>Pos 13, 14, 15, 16 Sensitive length <sup>8)</sup></b>															
2	1	3	0					to	3	3	2	0			
in steps of 10 cm (4"), min. 70 cm (2.3 ft) shorter than Pos. 9 to 12															
U	C	D	A	8	6	4	N	2	2	0	0	2	1	3	0
Typical identification code for the MTT															
				8	6	4									
Your identification code for the MTT															

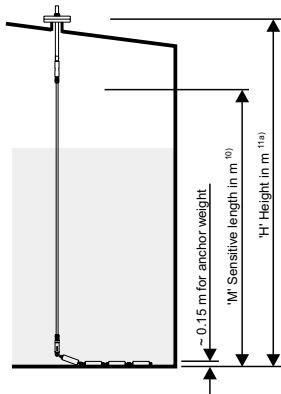
- 6) For other approvals please contact your nearest Enraf office or your local representative
- 7) Recommended for use in thermowell only
- 8) For other length please contact your nearest Enraf office or your local representative

# Multiple element Interface Thermosensor converter (MIT)

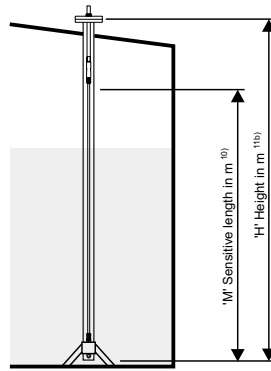
<b>Pos 1 Application</b>												
U	General purpose											
X	With sealing facilities											
<b>Pos 2 Version</b>												
T	For MTT temperature measuring element (R in case of MRT temperature measuring element)											
<b>Pos 3, 4</b>												
*	*	Options not used										
<b>Pos 5, 6, 7 Instrument designation</b>												
8	6	2										
<b>Pos 8 Mounting arrangement</b>												
A	On railing with 1 ½" bracket					C	On railing with 3" bracket					
B	On railing with 2" bracket					S	On top of sensor / wall mounting					
<b>Pos 9 Connection to temperature sensor</b>												
B	½" BSP via standard reducer					S	PG 16					
N	¾" NPT via reducer											
<b>Pos 10 Connection to field instrument (Servo gauge/SmartRadar/FDI)</b>												
G	M20 x 1.5 via reducer					PG 16 <sup>9)</sup>						
N	¾" NPT via reducer											
<b>Pos 11 Safety approvals (For other approvals contact our factory)</b>												
D	KDB Poland				None							
F	FM USA				CENELEC Europe							
<b>Pos 12</b>												
/	Separator											
<b>Pos 13 Options</b>												
Z	None											
U	T	*	*	8	6	2	A	B	G	D	/	Z
Typical identification code for the MIT												
		*	*	8	6	2					/	Z
Your identification code for the MIT												

- 9) For Germany (Zone 0) use Enraf part number 1864.801

**Free hanging with anchor weights  
(ss type MTT)**



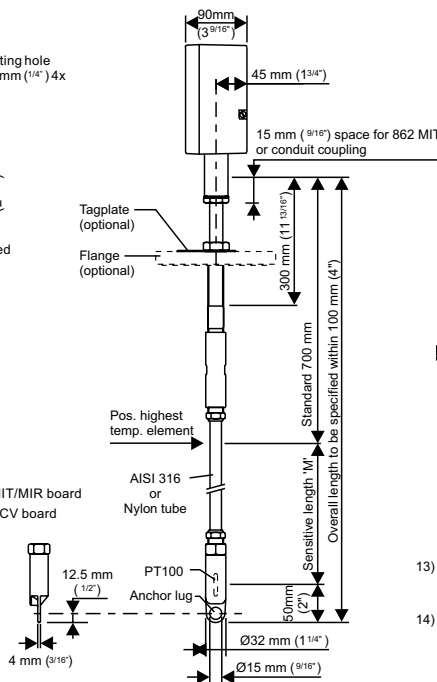
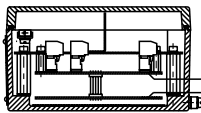
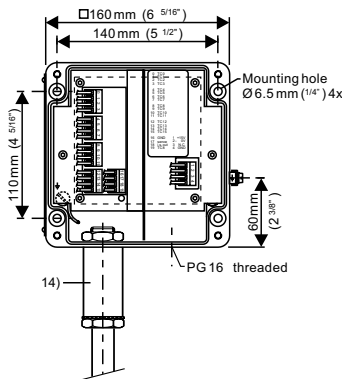
**In thermowell**



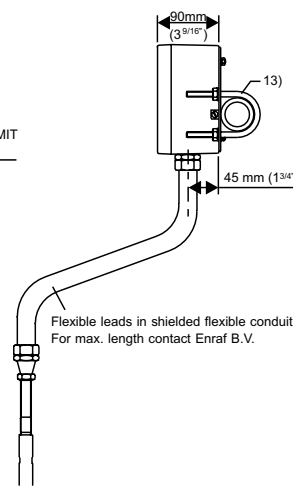
Length specifications Multiple Sensor Thermometer type 864 MTT				
Item	Tag No.	'H' height in m <sup>11a or b</sup>	'M' Sensitive length in m <sup>10</sup>	'L' Overall length in m <sup>12</sup>
To be completed by Enraf				

- 10) The standard Sensitive length 'M' = overall length L - 0.7 m (identification code pos. 9, 10, 11, 12)  
 For other length refer to identification code pos. 13, 14, 15, 16
- 11a) 'H' = Height from tank bottom to top nozzle  
 11b) 'H' = Height from bottom thermowell to top nozzle
- 12) Just complete 'H' and (eventually 'M' if not standard) and Enraf will calculate 'L' overall length

**Preferred mounting of  
MIT on extension pipe**



**MIT remote mounted  
with flexible conduit**



- 13) Bracket 1 1/2" (part no. 2136.926)  
 2" (part no. 2136.927)  
 3" (part no. 2136.928)
- 14) See identification code MIT Pos. 9



**Enraf**

**Enraf B.V.**  
 Röntgenweg 1, 2624 BD Delft  
 P.O. Box 812, 2600 AV Delft  
 The Netherlands  
 Tel.: +31 (0)15 269 86 00  
 Fax: +31 (0)15 261 95 74  
 Email: info@enraf.nl  
 http://www.enraf.com

We at Enraf are committed to excellence.

**China: Enraf B.V. (Shanghai Rep. Office)**  
 18-01 Suncome Liauw's Plaza  
 738 Shangcheng Road, Pudong, Shanghai 200120  
 Tel.: +86 21 58311611, Fax: +86 21 58313011

**France: ENRAF S.a.r.l.**  
 ZAC les Beaudottes, 15 rue Paul Langevin  
 93270 SEVRAN  
 Tel.: +33 (0)1 49 36 20 80, Fax: +33 (0)1 43 85 26 48

**Germany: Enraf GmbH**  
 Obere Dammstrasse 10, 42653 Solingen  
 Postfach 101023, 42648 Solingen  
 Tel.: +49 (0)212 58 750, Fax: +49 (0)212 58 7549

**Russia: Enraf B.V. (Moscow Rep. Office)**  
 c/o Nucletron - Oldelft  
 21, Dostoevskogo street  
 103030 Moscow  
 Tel. / Fax: +7 (0)95 788 0713, Tel. / Fax: +7 (0)95 788 0691

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**Singapore: Enraf Pte Ltd (Singapore Rep. Office)**  
 Lam Soon Industrial Building  
 63 Hillview Avenue, # 07- 04, Singapore 669569  
 Tel.: +65 76 94 348, Fax: +65 83 67 496

**United Kingdom: Enraf Ltd.**  
 Unit D2, Melville Court, Spilsby Road  
 Harold Hill, Romford, Essex Rm3 8SB  
 Tel.: +44 (0)1708 346 333, Fax: +44 (0)1708 370 670

**USA: ENRAF Inc.**  
 500 Century Plaza Drive, Suite 120  
 Houston, Texas 77073  
 Tel.: +1 281 443 4291, Fax: +1 281 443 6776

