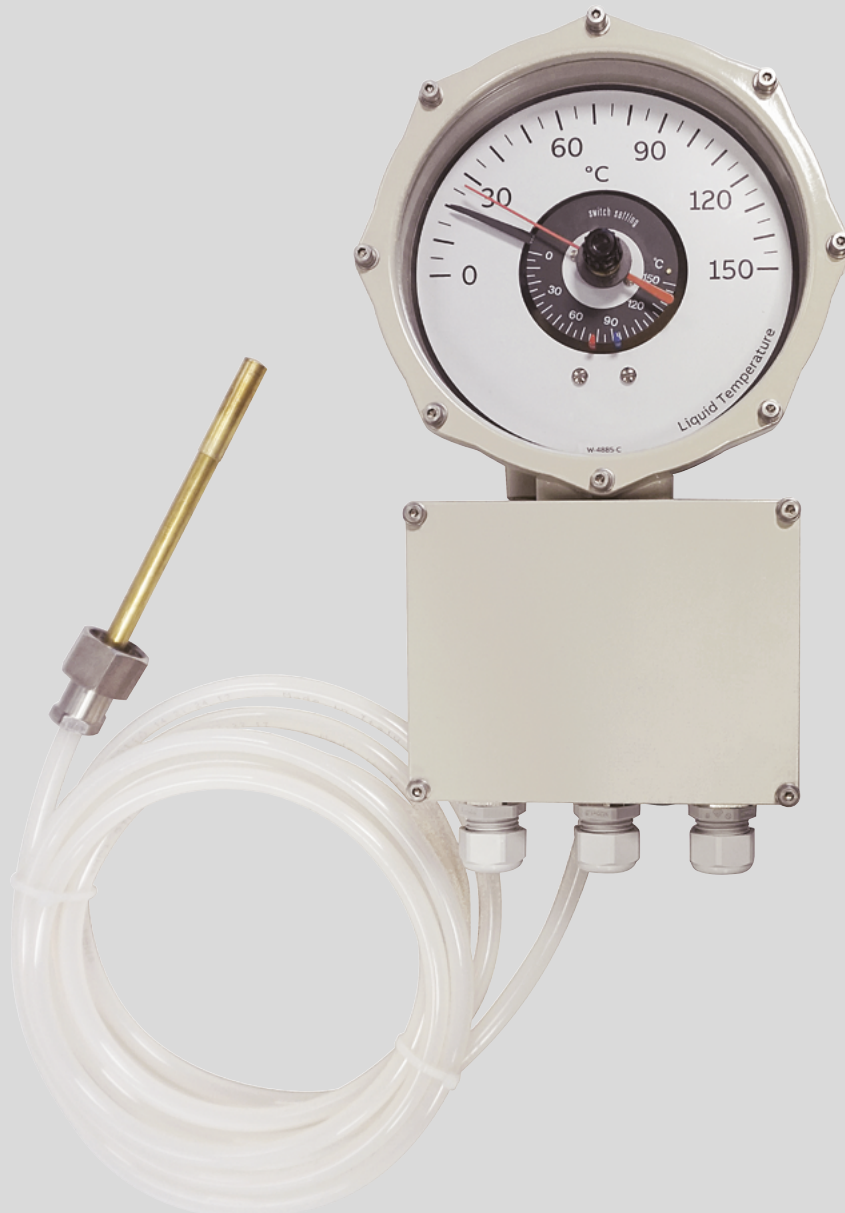


TECHNICAL GUIDE

## Temperature indicators





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# Application

## Temperature indicators in oil / IEC

	Features	Liquid temperature indicators	Winding temperature indicators
Standard configuration	Type	OTI / eOTI	WTI / eWTI
	Scale	-50 °C / +150 °C, -20 °C / +140 °C, 0 °C / +150 °C, 0 °C / +160 °C	
	Dial protection	Polycarbonate	Polycarbonate
	CT nominal current	-	1, 2, and 5A
	Ventilation System	YES	YES
	Micro switches	2 or 4	2 or 4
	Capillary length	up to 18 m	up to 18 m
	Max pointer	Yes	Yes
Options	PT100	Up to 2	Up to 2
	Vibration damping	Available	Available
	MBO contacts	Available (up to 4)	Available (up to 4)
	Analog output 4-20 mA	Embedded (eOTI) or external transducer	Embedded (eWTI) or external transducer
	Digital output Modbus RTU	Embedded (eOTI)	Embedded (eWTI)
	Dial protection	Glass	Glass
	Thermal well	Available	Available

## Temperature indicators in air / ANSI

	Features	Liquid temperature indicators	Winding temperature indicators
Standard configuration	Type	ATI/eATI/ATIw	AWTI/eAWTI
	Scale	From 0°C up to +120°C	From 0°C up to +180°C
	Dial protection	Polycarbonate	Polycarbonate
	CT nominal current	-	1, 2, and 5A
	Ventilation System	YES	YES
	Micro switches	2 or 4	2 or 4
	Capillary length	up to 394" (10 m)	up to 394" (10 m)
	Max pointer	Yes	Yes
Options	PT100	Up to 2	Up to 2
	Vibration damping	Available	Available
	Analog output 4-20 mA	Embedded or external transducer	Embedded or external transducer
	Digital output Modbus RTU	Embedded (eATI/ eATIw)	Embedded (eAWTI)
	Dial protection	Glass	Glass
	Thermal well	Available	Available

# Technical data

Temperature Indicators	Technical data
<b>Material</b>	
Housing	C4-MEDIUM: Aluminum casting, RAL 7032, powder coated (standard); C5-MEDIUM: Coastal area model, surface treatment, not painted (on request) CX: Off shore model, RAL 7035 (on request)
Dial protection	Polycarbonate (standard) / Glass (optional)
Max pointer	Standard
Temperature sensor	Brass
Temperature sensor protection	Brass
Capillary tube (in oil / IEC)	Copper capillary tube with Rilsan protection (standard) or stainless steel protection (optional)
Cable gland (in oil / IEC)	3; M25 x 1.5 made of plastic (C4) or nickel-plated brass (C5-M)
Capillary tube (in air / ANSI)	Stainless steel protection (standard) or copper capillary tube with Rilsan protection (optional)
Cable gland (in air / ANSI)	3 NPT

<b>Characteristics data</b>	
Standard	IEC 60076-22-1
Installation	Indoors and outdoors, tropical proof
Ambient temperature	-40 °C to 80 °C (-40 °F to 176 °F) (for lower temperature range please contact COMEM)
Winding temperature indicator with internal heating element	Standard for all except ATlw
Nominal current availability	1 A, 2 A and 5 A
Degree of protection	IP66 in accordance with EN60529
Measuring range in oil / IEC	-50 °C / +150 °C, -20 °C / +140 °C, 0 °C / +150 °C, 0 °C / +160 °C
Measuring range in air / ANSI	0 °C / +120 °C for ATI, eATI and 0 °C / +180 °C for ATlw, eATlw, AWTI, eAWTI,
Measuring accuracy	1.5 % of Full Scale
Ventilation	Ventilation system to prevent condensation (C4 plastic valve; C5 stainless steel valve)
Wires	Min 0.25 mm <sup>2</sup> / Max 2.5 mm <sup>2</sup> (Comem eOTI/eWTI) - Min 0.33 mm <sup>2</sup> / Max 4 mm <sup>2</sup> (OTI/WTI)
Vibration damping	Optional anti-vibration supports available
Sinusoidal (EN 60721-3-4)	cl 4M4: 2-9 Hz (6 mm peak to peak), 9-200 Hz (1g) - All axis
Shock	cl 4M4: 10g (11 ms) in all the directions (EN 60721-3-4)

<b>Standard micro switches</b>	
Number and types	2 or 4 adjustable change over switches
Contact load	ac: 250V / 5A / cosΦ=1, dc: 250V / 0.25A, 125V / 0.5A, 50V / 1A, 30V / 5A (non-inductive) (On customers request can be provide contacts with higher performances see pag. 3)
Minimum switching distance	4% Full Scale .
Rated insulation voltage	2.5 kV ac/1 min, terminals to ground
Switching accuracy	2% of Full Scale
Commutation differential	4% of Full Scale
Rated insulation voltage	2.5 kV ac 1 min between contacts and earth, 1.0 kV ac 1 min between open contacts
PT100	Max no. 2 ; 3 wires

# Technical data

## Higher performances micro switches

Number and types	2 or 4 adjustable change over switches
Contact load	ac: 250 V / 10A / $\cos\Phi=1$ dc: 250 V / 0.25A, 125 V / 0.5A, 50 V / 3A, 30 V / 10A (non-inductive)
Measuring accuracy	1.5% of Full Scale
Switching accuracy	2% of Full Scale
Commutation differential	4% of Full Scale
PT100	Max no. 2 ; 3 wires

## MBO contact (for IEC only)

Number and types	2 or 4 adjustable change over switches
Contact load	ac/dc: 250 V / 3A, 125 V / 10A (non-inductive)
Measuring accuracy	$\pm 3$ °C between 30-150 °C
Switching accuracy	$\pm 4$ °C between the range 30-150 °C
Resetting tolerance	10 $\pm 2$ °C
PT100	Max no. 2 ; 3 wires

## eDevices (eOTI / eWTI / eATI / eWTI / eATIw)

Analog output (embedded in the eDevice)	
Supply voltage	24 V $\pm 10$ % dc polarized (protected against pole reversal) Active passive loop
Output signal	4 - 20 mA
Measure Accuracy	1.5 % of Full Scale
Measuring range	In agreement with the indicator scale
Rated insulation voltage	2 kV ac, 1 min, terminals to ground
Maximum resistance	700 $\Omega$ at 24 V dc
Power consumption	0.5 W
Max distance for analogical output	Max 30 m / 98 ft (for different request contact COMEM )
Wires	Max 2.5 mm <sup>2</sup> – advised 4x1 mm <sup>2</sup> o 6x1 mm <sup>2</sup> shielded twisted pair cable for analog/digital output

## Analog and digital output (embedded in the eDevice)

Supply voltage	24 V $\pm 10$ % dc polarized (protected against pole reversal) Active current loop
Output signal	4 - 20 mA and RS485 Modbus RTU
Measure Accuracy	1.5 % of Full Scale
Measuring range	In agreement with the indicator scale (only for analog output)
Rated insulation voltage	2 kV ac, 1 min, terminals to ground
Maximum resistance	450 $\Omega$ at 24 V dc
Power consumption	0.5 W
Max distance for analogical output	Max 30 m / 98 ft (for different request contact COMEM )
Wires	Max 2.5 mm <sup>2</sup> – advised 4x1 mm <sup>2</sup> o 6x1 mm <sup>2</sup> shielded twisted pair cable for analog/digital output

**External trasducer MP88800**

Supply voltage	24 V dc $\pm$ 10 % Passive current loop
Output signal	4-20 mA
Measuring range	In agreement with the indicator scale (only for analog output)
Rated insulation voltage	2 kV ac, 1 min, terminals to ground
Maximum resistance	700 $\Omega$ at 24 V dc
Power consumption	0.5 W

**External transducer RTC685 (galvanic insulation):**

Supply voltage	24 V dc $\pm$ 15 % Active current loop
Output signal	0-20 mA, 4-20 mA, 0-5V, 0-10V
Measuring range	In agreement with the indicator scale (only for analog output)
Rated insulation voltage	1 kV ac, 1 min, terminals to ground
Maximum resistance	600 $\Omega$ at 24 V dc
Power consumption	< 1.5 W

**Temperature display for remote visualization: C40**

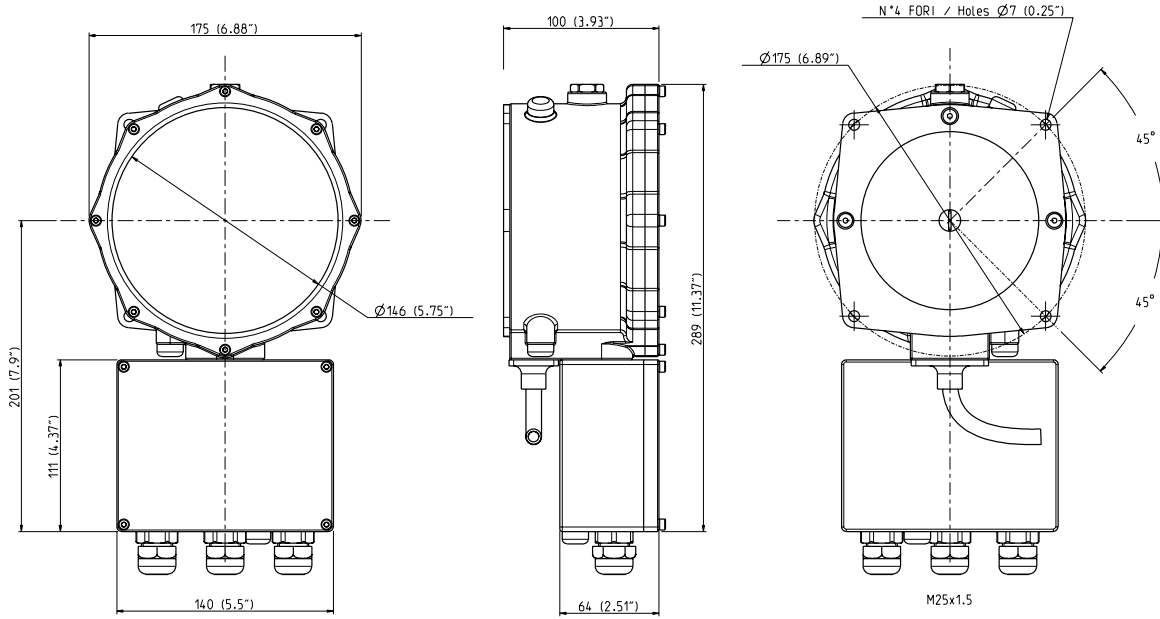
Supply voltage	18 to 265 V ac/dc
Input	4-20 mA
Power consumption	<1.5 W

**Power supply: DRA 18**

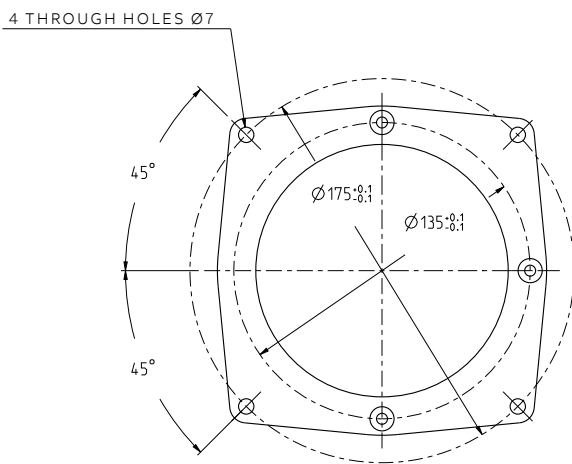
Input supply voltage	90 to 260 V ac/dc
Output voltage	24 V dc
Power consumption	18W
Assembly	DIN RAIL

# Dimensions

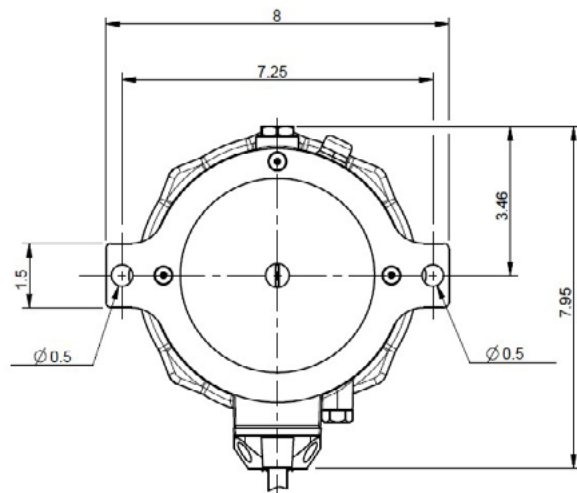
## Liquid and winding temperature indicators



## Flange connection (Type F)



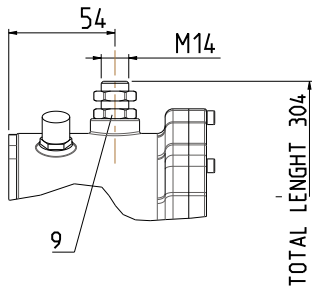
## Flange connection (Type Q)



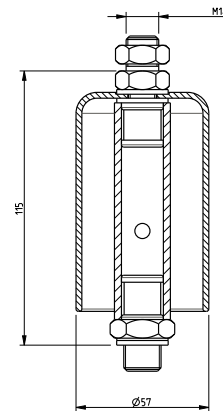
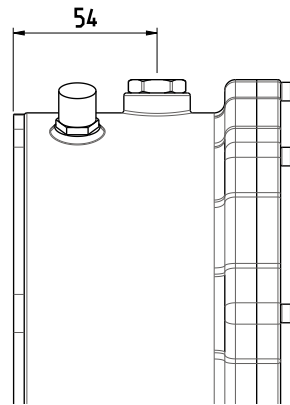


# Mounting type

## Rigid screw (Type R)



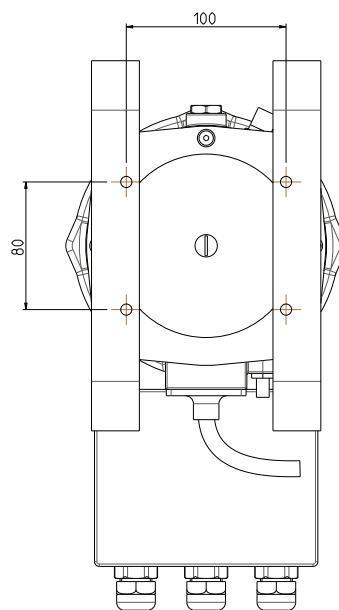
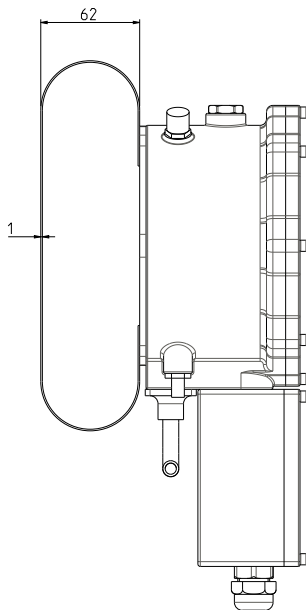
## Elastic suspension (Type ES)



Unscrew the upper rigid locking M14 screw located on the top of the thermometer

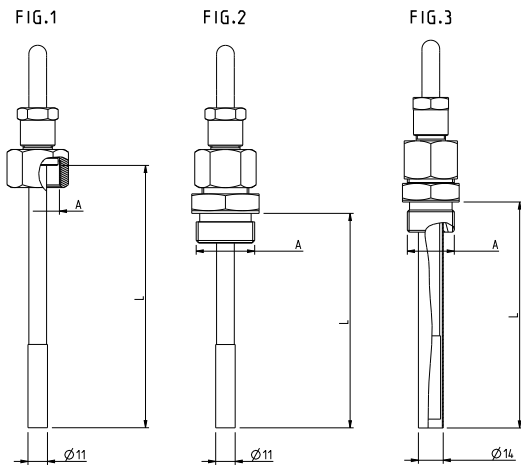
Assembly the elastic suspension on the top of the thermometer with a M14 screw that let install the instrument in the plant

## Back metallic sheets (Type V)



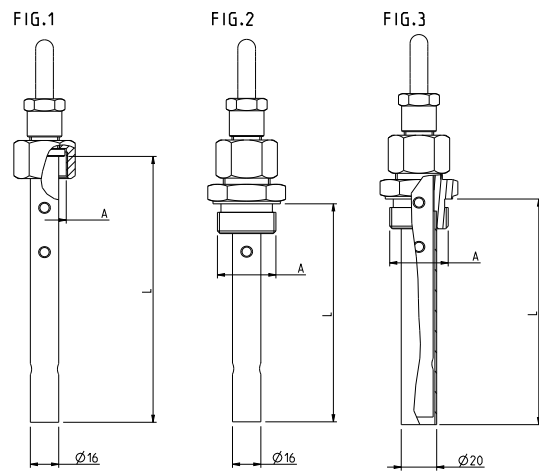
# Bulbs for types in oil / IEC

## Liquid temperature indicator Comem OTI



### OTI

Fig. 1				
A	3/4" BSP	1/2" BSP		
L	Min 80 mm / Std. 150 mm			
A Fig. 2/3				
	3/4" BSP	1/2" BSP	1" BSP	M27x2 M22x1.5
L	Min 80 mm / Std. 150 mm			



### OTI equipped with PT100 sensor

Fig. 1				
A	3/4" BSP			
L	Min 150 mm / Std. 150 mm			
A Fig. 2/3				
	3/4" BSP	1" BSP	M27x2	M22x1.5
L	Min 120 mm / Std. 150 mm			

## Winding temperature indicator Comem WT1

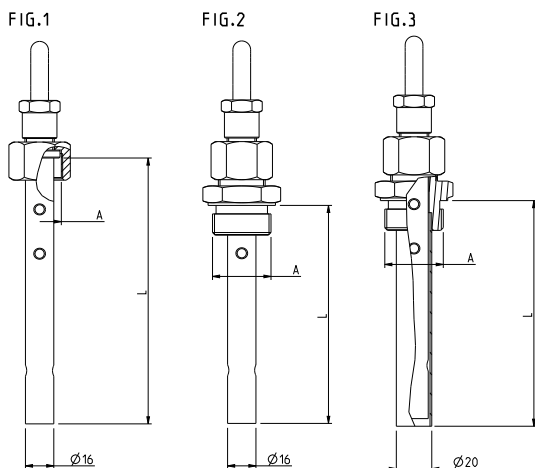


Fig. 1				
A	3/4" BSP			
L	Std. 150 mm			
A Fig. 2/3				
	3/4" BSP	1" BSP	M27x2	M22x1.5
L	Min 120 mm / Std. 150 mm			

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# Bulbs for types in air / ANSI

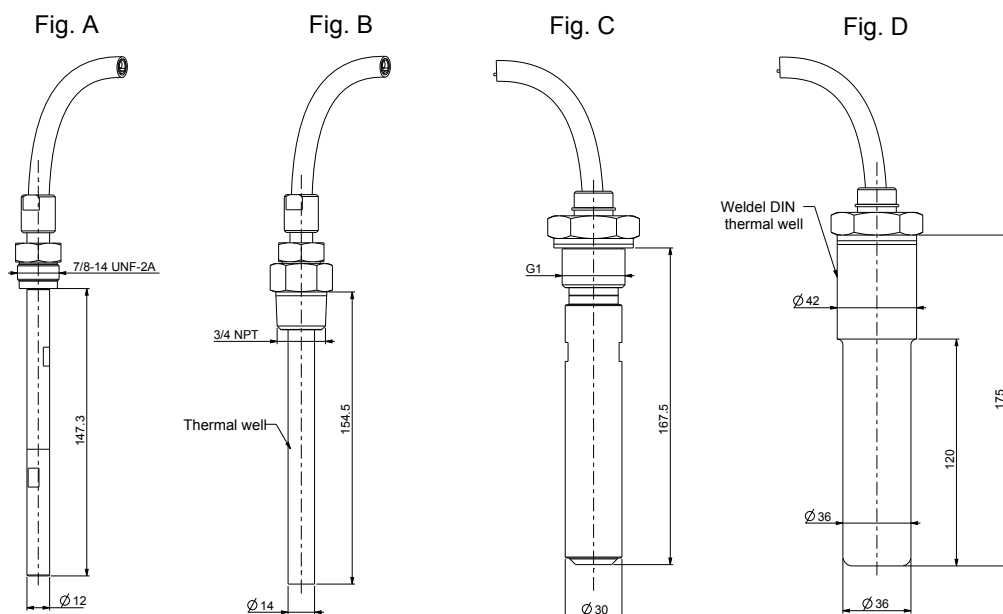
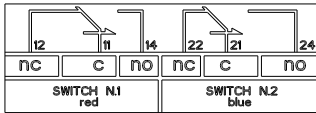


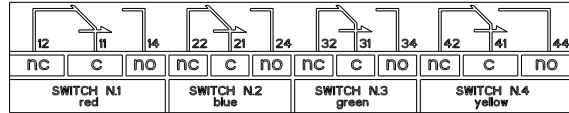
Fig.	Temperature indicator type	PT100 sensors
A	ATI / eATI / ATlw / eATlw (bulb)	max n. 1
B	ATI / eATI / ATlw / eATlw (bulb + thermal well)	max n. 1
C	ATI / eATI with PT100 sensors / AWTI / eAWTI (bulb)	max n. 2
D	ATI / eATI with PT100 sensors / AWTI / eAWTI (bulb + thermal well)	max n. 2

# Electrical scheme

## Liquid temperature indicator with cable box

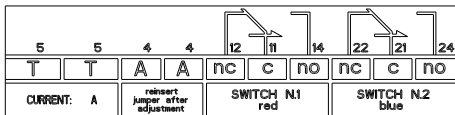


2 contacts

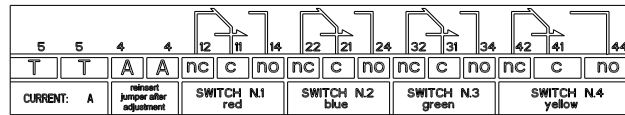


4 contacts

## Winding temperature indicator with cable box

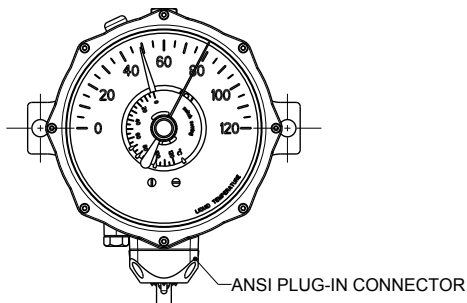


2 contacts



4 contacts

## Plug-in connection



## Liquid temperature indicator with plug-in connection (type ANSI)

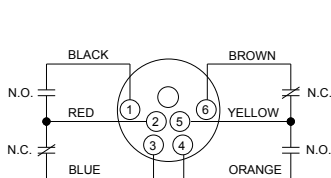


Fig.1

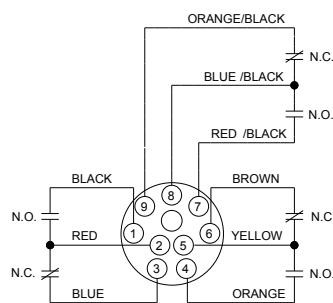


Fig.2

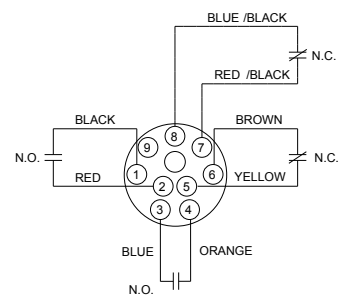
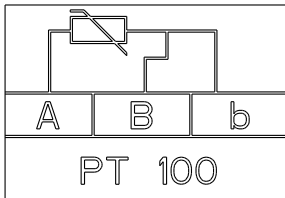
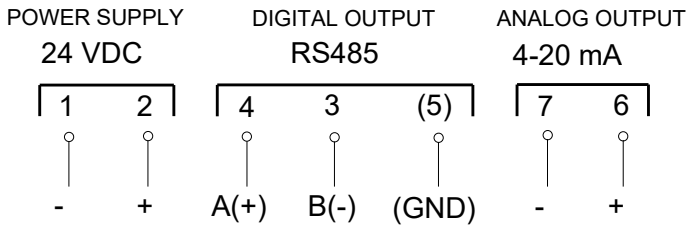


Fig.3

**PT100**



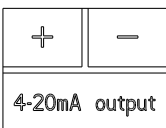
**Liquid and winding temperture indicator with cable box with embedded analog and digital output**



**Terminals number**

Supply Voltage 24 V dc	1(-) / 2(+)
Analog output 4-20 mA	6(+ ) / 7(-)
Modbus RTU (RS485 gate)	4 (A+) / 3 (B-)
Optional PT100	A, B, b

**eOTI / eATI / eAWTI with embedded analog output with passive current loop**



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# Order sheet

## Temperature indicators in oil / IEC

Type	
<input type="checkbox"/>	<b>OTI</b> (Liquid temperature indicator)
<input type="checkbox"/>	<b>WTI</b> (Winding temperature indicator)
<input type="checkbox"/>	<b>eOTI</b> (Liquid temperature indicator - eDevice)
<input type="checkbox"/>	<b>eWTI</b> (Winding temperature indicator - eDevice)

Output : relevant only for eDevice (eOTI and eWTI)	
<input type="checkbox"/>	Analog output (4 - 20mA)
<input type="checkbox"/>	Analog and digital output (4 - 20mA and Modbus RTU)

Mounting type	Reference page 8-9
<input type="checkbox"/> Flange	Type F
<input type="checkbox"/> Rigid screw	Type R
<input type="checkbox"/> Elastic suspension	Type ES
<input type="checkbox"/> Back metallic sheets	Type V
<input type="checkbox"/> Flange	Type Q

Scale	
<input type="checkbox"/> -50 °C/+150 °C	<input type="checkbox"/> 0 °C/+150 °C
<input type="checkbox"/> -20 °C/+140 °C	<input type="checkbox"/> 0 °C/+160 °C

Dial minimum division	
<input type="checkbox"/>	5° (standard)
<input type="checkbox"/>	2° (special)

Terminal board type	
<input type="checkbox"/>	Cable box
<input type="checkbox"/>	Plug-in

Number of micro switches (cable box; see page 12)	
<input type="checkbox"/>	2
<input type="checkbox"/>	4
<input type="checkbox"/>	4 with overlapping switches (only standard switches) (see page 18)

Number of micro switches (plug-in; see page 12)	
<input type="checkbox"/>	2
<input type="checkbox"/>	3
<input type="checkbox"/>	4

Type of micro switches	Contact load
<input type="checkbox"/> Standard	AC: 250 V/5A / $\cos\Phi=1$ , DC: 250 V/0.25A, 125 V/0.5A, 50 V/1A, 30 V/5A
<input type="checkbox"/> High performances	AC: 250 V/10A / $\cos\Phi=1$ , DC: 250 V/0.25A, 125 V/0.5A, 50 V/3A, 30 V/10A
<input type="checkbox"/> MBO	AC/DC: 250 V/3A, 125 V/10A

Date	
Rev.	
Customer reference	

PT100	
<input type="checkbox"/>	N. 1 (3 wires) <sup>(1)</sup>
<input type="checkbox"/>	N. 2 (3 wires) <sup>(1)</sup>

(1) For eOTI/eWTI possible to choose max. 1 additional PT100 sensor

Capillary tube protection	
<input type="checkbox"/>	RILSAN (standard)
<input type="checkbox"/>	Stainless steel AISI 304 (optional)

Capillary length	
<input type="checkbox"/>	2 m
<input type="checkbox"/>	6 m
<input type="checkbox"/>	8 m
<input type="checkbox"/>	10 m
<input type="checkbox"/>	12 m
<input type="checkbox"/>	16 m

Bulb type (page 10)	Note
<input type="checkbox"/> Fig.1	Female
<input type="checkbox"/> Fig.2	Male
<input type="checkbox"/> Fig.3	Male with well

Bulb thread (page 10)	Note
<input type="checkbox"/> ½" BSP	Not for WTI, PT100, eOTI and eWTI
<input type="checkbox"/> ¾" BSP	
<input type="checkbox"/> M22x1.5	Male only; without PT100
<input type="checkbox"/> M27x2	Male only
<input type="checkbox"/> 1" BSP	Male only

Special Bulb length (thread included)	
<input type="checkbox"/>	.....mm Without PT100 (min 80 mm)
<input type="checkbox"/>	.....mm With PT100 (min 150 mm)

Corrosion protection	
<input type="checkbox"/>	C4 acc. to ISO 12944 (standard)
<input type="checkbox"/>	C5-M acc. to ISO 12944 (not paintable)
<input type="checkbox"/>	CX offshore acc. to ISO 12944

**Dial protection**

<input type="checkbox"/>	Polycarbonate (standard - not available for CX offshore corrosion protection class)
<input type="checkbox"/>	Glass (optional)

Date	
Rev.	
Customer reference	

**Accessories**

<input type="checkbox"/>	Temperature display for remote visualization C40
<input type="checkbox"/>	External transducer MP88800 (only for OTI/WTI)
<input type="checkbox"/>	External transducer RTC685 (only for OTI/WTI)
<input type="checkbox"/>	Power supply: DRA 18 IN 110/230 V ac/dc, OUT 24 V dc (only for external transducer RTC685), eOTI and eWTI; no External trasducer MP88800)

**WTI/ eWTI – CT nominal current**

<input type="checkbox"/>	1A
<input type="checkbox"/>	2A
<input type="checkbox"/>	5A

**WTI /eWTI– optional values**

<input type="checkbox"/>	..... °C Specify set thermal gradient (with thermowell thickness between 2,5 and 4 mm)
<input type="checkbox"/>	.....A Specify set nominal current for WTI & eWTI

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# Order sheet

## Temperature indicators in air / ANSI

Date	
Rev.	
Customer reference	

Type	
<input type="checkbox"/>	<b>ATI</b> (Liquid temperature indicator)
<input type="checkbox"/>	<b>ATIw</b> (Liquid temperature indicator for winding)
<input type="checkbox"/>	<b>AWTI</b> (Winding temperature indicator)
<input type="checkbox"/>	<b>eATI</b> (Liquid temperature indicator - eDevice)
<input type="checkbox"/>	<b>eATIw</b> (liquid temperature indicator for winding - eDevice)
<input type="checkbox"/>	<b>eAWTI</b> (Winding temperature indicator - eDevice)

Output : relevant only for eDevice (eATI , eATIw, eAWTI)	
<input type="checkbox"/>	Analog output (4 - 20mA)
<input type="checkbox"/>	Analog and digital output (4 - 20mA and Modbus RTU)

Mounting type	Reference page 8-9
<input type="checkbox"/>	Flange Type F
<input type="checkbox"/>	Rigid screw Type R
<input type="checkbox"/>	Elastic suspension Type ES
<input type="checkbox"/>	Back metallic sheets Type V
<input type="checkbox"/>	Flange Type Q

Terminal board type	
<input type="checkbox"/>	Cable box
<input type="checkbox"/>	Plug-in

Number of micro switches (cable box; see page 12)	
<input type="checkbox"/>	2
<input type="checkbox"/>	4
<input type="checkbox"/>	4 with overlapping switches (only standard switches)(see page 18)

Number of micro switches (plug-in; see page 12)	
<input type="checkbox"/>	2
<input type="checkbox"/>	3
<input type="checkbox"/>	4

Type of micro switches	Contact load
<input type="checkbox"/>	Standard AC: 250V / 5A / $\cos\Phi=1$ , DC: 250V / 0.25A, 125V / 0.5A, 50V / 1A, 30V / 5A
<input type="checkbox"/>	High performances AC: 250V / 10A / $\cos\Phi=1$ , DC: 250V / 0.25A, 125V / 0.5A, 50V / 3A, 30V / 10A

Dial minimum scale division	
<input type="checkbox"/>	5° (standard)
<input type="checkbox"/>	2° (special)

PT100	
<input type="checkbox"/>	No. 1 (3 wires) <sup>(1)</sup>
<input type="checkbox"/>	No. 2 (3 wires) <sup>(2)</sup>

(1) For eATI / eAWTI / eATIw possible to choose max. 1 additional PT100 sensor

Capillary tube protection	
<input type="checkbox"/>	Stainless steel AISI 304 (standard)
<input type="checkbox"/>	RILSAN (optional)

Capillary length	
<input type="checkbox"/>	157" (4 m)
<input type="checkbox"/>	236" (6 m)
<input type="checkbox"/>	394" (10 m)

Bulb thread (page 11)		
<input type="checkbox"/>	Fig.A 7/8"-14 UNF-2A	only for type ATI / ATIw
<input type="checkbox"/>	Fig.C G1"	not applicable for type ATIw

Thermal well - optional (Page 11)		
<input type="checkbox"/>	Fig.B 3/4" NPT	only for type ATI / ATIw
<input type="checkbox"/>	Fig.D Welded DIN well	not applicable for type ATIw

Corrosion protection	
<input type="checkbox"/>	C4 acc. to ISO 12944 (standard)
<input type="checkbox"/>	C5-M coastal area acc. to ISO 12944 (not paintable)
<input type="checkbox"/>	CX offshore acc. to ISO 12944

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Date	
Rev.	
Customer reference	

**Dial protection**

<input type="checkbox"/>	Polycarbonate (standard - not available for CX offshore corrosion protection class)
<input type="checkbox"/>	Glass (optional)

**Accessories**

<input type="checkbox"/>	Temperature display for remote visualization C40
<input type="checkbox"/>	External transducer MP88800 (only for ATI/ATIW)
<input type="checkbox"/>	External transducer RTC685 (only for ATI/ATIW)
<input type="checkbox"/>	Power supply: DRA 18 IN 110/230 V ac/dc, OUT 24 V dc (only for external transducer RTC685 eATI and eAWTI; and eATIW no External trasducer MP88800)

**AWTI/ eAWTI – CT nominal current**

<input type="checkbox"/>	1A
<input type="checkbox"/>	2A
<input type="checkbox"/>	5A

**AWTI /eAWTI– optional values**

<input type="checkbox"/>	Specify set thermal gradient ..... °C (with thermowell thickness between 2,5 and 4 mm)
<input type="checkbox"/>	.....A Specify set nominal current

For further information or clarification, please contact our support team. E-mail address: [customerservice@it.comem.com](mailto:customerservice@it.comem.com)

COMEM is an ISO 9001 system certified. Information subject to change without notice

# Overlapping switches



Date	
Rev.	
Customer reference	

Pointer 1	Pointer 2	Pointer 3	Pointer 4	Description (n° micro switches connected to the terminal board (pointers indication))	Select below
■	■	■	■	2 <sup>A</sup> + 1 + 1	
■	■	■	■	1 + 1 + 2 <sup>A</sup>	
■	■	■	■	2 <sup>A</sup> + 2 <sup>A</sup>	

A: Two contacts connected to the same pointer in order to have two relay outputs that switch at the same temperature



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