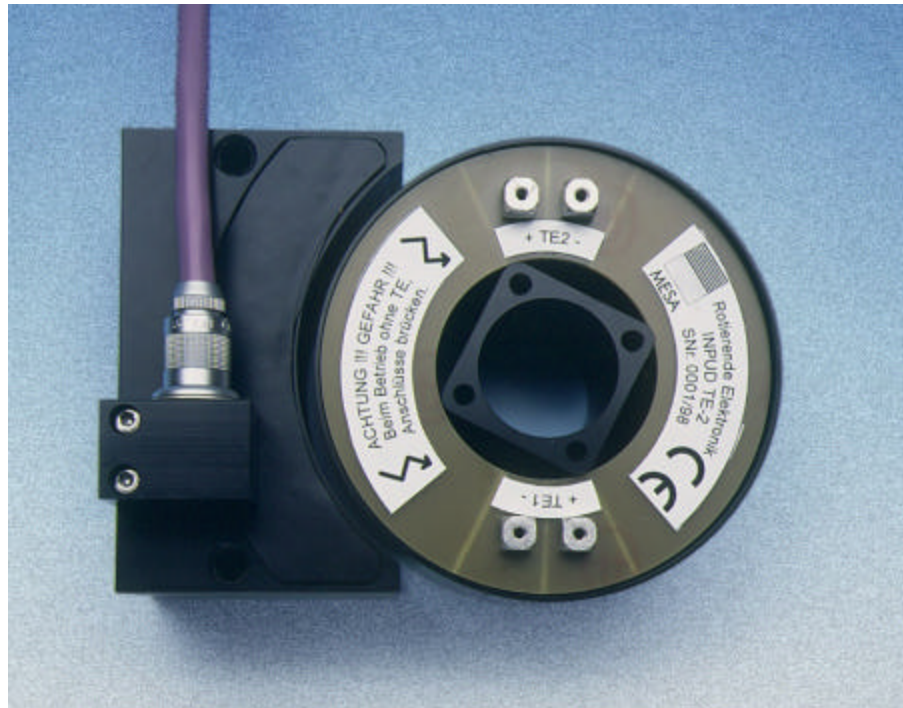


INPUD-T T/C – Radial Type R1 housing User's Guide

Edition 2003/03

APPLICATION AND PRINCIPLES OF OPERATION



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1.0 Application

Remote systems are used where fixed wiring is a problem, for example on rotary tables, rotating hafts etc., and where the use of slip rings is precluded by the presence of dust, water or oil. These systems are also used to replace slip rings due to their susceptibility to rapid mechanical wear, which leads to machine failure and downtime.

2.0 Technical Data

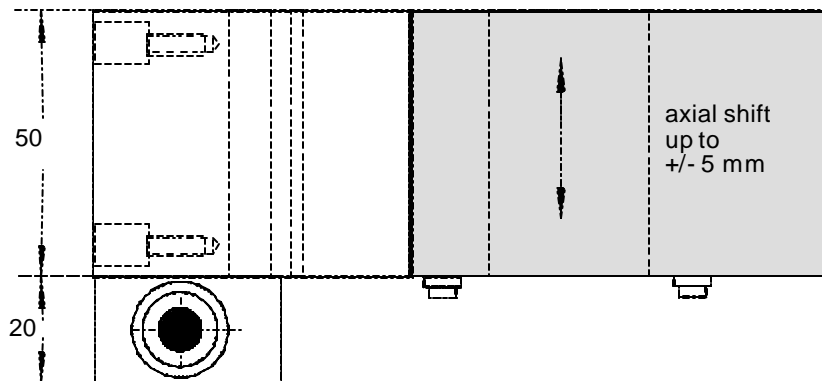
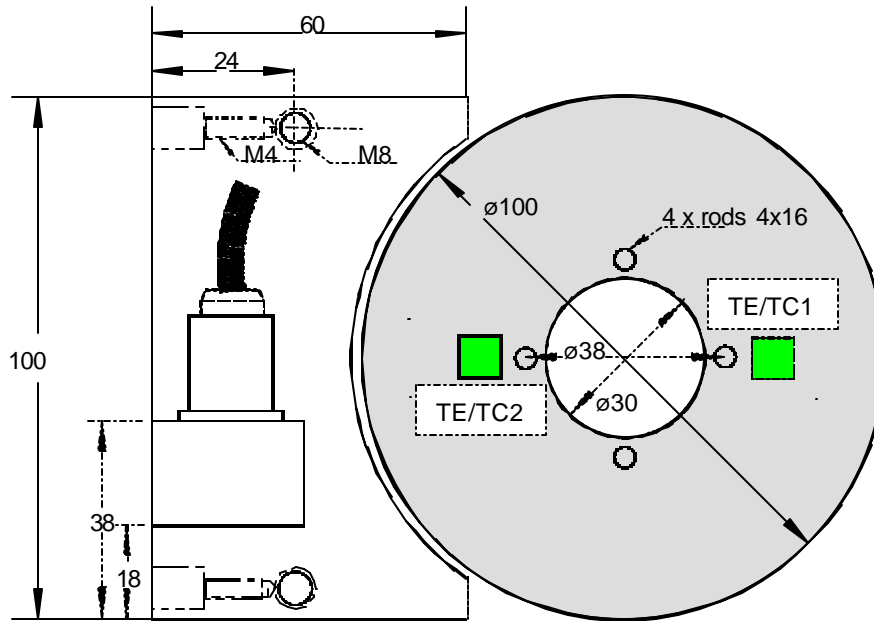
	Stationary module		Rotating module
Dimensions (see page 6)	60mm x 100mm x 50mm		d=30mm; d _o = 100mm
Installation type	fixed		rotating on a shaft d = 30 ^{-0/+0.1} mm
Fixation	4 screws M4 or 2 screws M8		4 rods 4 ^{H8} , 90 degree shift
Assured transmission distance (between rotating and stationary module)		2 mm, ± 1 mm	
Supply voltage U _b including ripple	24 V ± 5%		
Current draw	0.4...1A		
Axial offset		± 5mm	
Ambient temperature T _a		0°..70° C	
Sensors			2 ea thermal couple, type J, FE - Constantan
Measurement range			0°C..300°C
Signal output	4...20mA (s. page 5)		
Enclosure rating		IP65	
Contamination protection		water, dust, oil	
Housing material		POM	
Potting material		Wepuran	
Connection type	Lemo SA Serie 2C		Terminal Block
Recommend connection cable	PUR 3x2x0,22mm ² , 4m		
Weight	400 gr		700 gr

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3.0 Installation



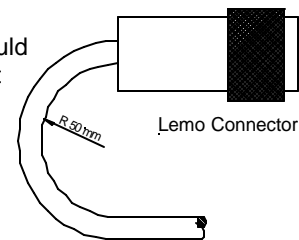
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4.0 Installation procedure

- Attach rotating module to the shaft
- Connect the thermal element couplers
- Caution: If TC is not connected to terminators, bridge the contacts!
- Install stationary module; adjust to an air gap of 2mm; the distance should be set such that imbalance or vibration on the rotating shaft will not allow the two systems to make mechanical contact
- Turn on power supply; current draw should be < 1A.



Inductive transmission

The transmission is working on an inductive way, therefore contactless. The recommended air gap between transmitter and receiver is 2 mm; operation is possible up to 3mm distance.

Cable routing

Note the following when routing cable:

- Double check the connections
- When routing cables, avoid proximity to high voltage lines in order to prevent noise coupling. Especially critical is inductive interference caused by AC harmonics, against which the cable offers no protection
- Note the least bending radius of the cable

Maintenance

Since no mechanically contacting parts are used, this technology completely eliminates all service and maintenance work. It is recommended that the mechanical fixing be checked regularly, as well as the size of the air gap.

Power supply

The current draw of the stationary part depends on the size of the air gap. Only power supplies bearing the CE Marking may be used. Excessive ripple or an unregulated output voltage may result in RF disturbances.

Caution: Depending on the operating condition, modules can get hot.

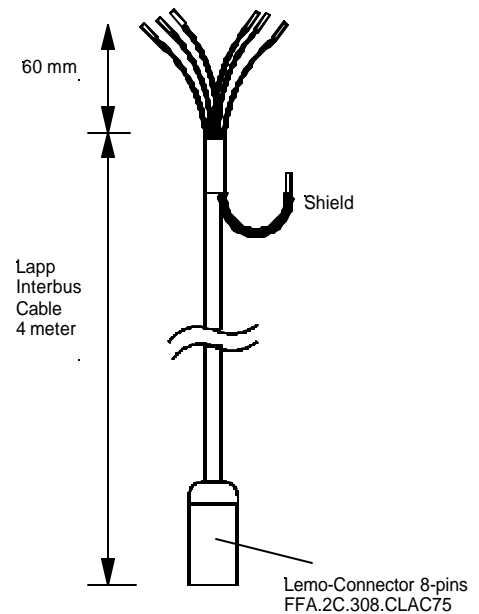
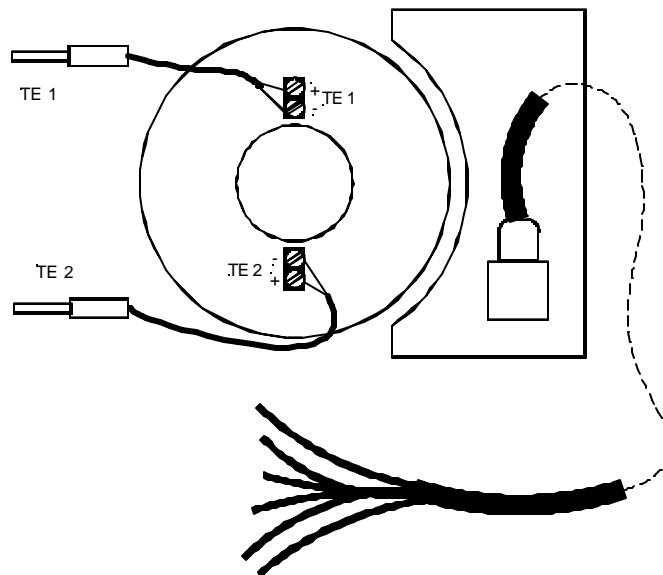
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5.0 Cable connection - wiring

Lemo Connector (Pin)	Description	Colour
1+2	+24V (<1A)	Brown
3+4	0VDC (return of 24V)	White
5	thermal element coupler 1	Pink
6	thermal element coupler 1 GND	Grey
7	thermal element coupler 2	Yellow
8	thermal element coupler 2 GND	Green



6.0 Principle function

The system offers 2 channels to transmit temperature signals. Furthermore a cold junction compensation on the ring is made by a PT-100 sensor. The integrated electronic in the rotary part compensates the T/C cold-junction temperature relative to 0° Celsius. The input voltage at the amplifier is proportional to the difference of T-measurement (hot junction) and T-compensation. The integrated electronic of the rotary part adds the T/C-value to the cold junction value. The microcontroller on the rotating part reads the T/C-values and converts it into a binary code. An integrated circuit modulates the signal for the transmission. The stationary electronic demodulates the signal and a processor calculates the corresponding current.

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7.0 Measurement range

The output signals of the T/C-channels are calibrated as follows:
 4mA corresponds to 0°C at T/C
 20mA corresponds to 300°C at T/C

Temperature [°C]	Output Current [mA]
300	20,00
275	18,66
250	17,33
225	16,00
200	14,66
175	13,33
150	12,00
125	10,66
100	9,33
75	8,00
50	6,66
25	5,33
0	4,00

$$K = \text{Temperature } (^\circ\text{C}) \quad I = \text{Current (mA)}$$

$$Y = \frac{\Delta K}{\Delta I} = \frac{300^\circ\text{C}}{16\text{mA}} = 18,75 \frac{^\circ\text{C}}{\text{mA}} \quad K = (I - 4\text{mA}) \times 18,75 \frac{^\circ\text{C}}{\text{mA}} \quad I = 4\text{mA} + \frac{K}{18,75 \frac{^\circ\text{C}}{\text{mA}}} = 4\text{mA} + K \times 0,053333 \frac{\text{mA}}{^\circ\text{C}}$$

8.0 Error Analysis

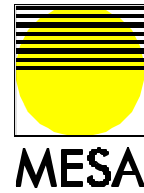
The T/C iron-cooper nickel Type J is characterized by DIN to following classes:
 Class 1: -40... + 750°C: +/-0,004 x T or +/-1,5°C
 Class 2: -40... + 750°C: +/-0,0075 x T or +/-2,5°C

In addition errors has to be added:
 cold-junction compensation error : +/-1°C
 INPUD-Transfer-System error: +/- 0,2° C

Geometrical addition results in following total error:
 with probe class 1: +/-1,8°C
 with probe class 2: +/-2,7°C

System is customized, therefore no linearisation is included.

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