

M-THERMO3 16

16 thermocouple measuring inputs

- High-resolution 24-bit technology
- Measurement data output on CAN-FD
- Cable free system connection → connection cable not required
- Tool-free, magnetic connection technology
- Separate cold junction compensation for each channel
- Ultra compact and robust design
- IP 67 and extended temperature range
- Galvanic isolation (channel, CAN, supply, housing)
- Channel status LED at each measuring input with display of the selected thermocouple type according to IEC/ANSI
- Display of channel and device status in software interface (e.g. sensor break / undervoltage detection)
- System status information (system, devices, channel)



General channel properties	
AD converter	24 bit (Sigma-Delta)
Special functions	Selectable number of averaging values (1-100)
Channel sampling rates	1 / 2 / 5 / 10 / min - 1 / 2 / 5 / 10 / 20 / 50 / 100 / 200 Hz
Total sampling rate	3200 Hz
Hardware filter (static)	22 Hz 2nd order accuracy ±25 %
Input resistance	15 MΩ (No influence of sensor break detection)
Channel LED	Yes Displays the color of the selected thermocouple type according to IEC/ANSI Channel LED is flashing yellow during configuration Sensor break detection Channel-LED is activated for 10s after initialization in color of selected thermocouple type
Channel temperature	
Measurement range	Type K (NiCr/NiAl) -270 ... 1372 °C (-454 ... 2502 °F) Type B (Pt30Rh/Pt6Rh) 0 ... 1820 °C (32 ... 3308 °F) Type C (W5Re/W26Re) 0 ... 2320 °C (32 ... 4208 °F) Type E (NiCr/CuNi) -270 ... 1000 °C (-454 ... 1832 °F) Type J (Fe/CuNi) -210 ... 1200 °C (-346 ... 2192 °F) Type N (NiCrSi/NiSi) -270 ... 1300 °C (-454 ... 2372 °F) Type R (Pt13Rh/Pt) -50 ... 1768 °C (-58 ... 3214 °F) Type S (Pt10Rh/Pt) -50 ... 1768 °C (-58 ... 3214 °F) Type T (Cu/CuNi) -270 ... 400 °C (-454 ... 752 °F)

Measurement deviation (type K)	<p>Gain error at 23 °C: max. $\pm 0.015\%$.</p> <p>Offset and scaling error: typ. $\pm 0.11\text{ K}$: max. $\pm 0.33\text{ K}$</p> <p>Zero drift at -40 °C to 23 °C: max. $\pm 1.65\text{ mK/K}$</p> <p>Gain drift at -40 °C to 23 °C: max. $\pm 10.0\text{ ppm/K}$</p> <p>Zero drift at 23 °C to 125 °C: max. $\pm 3.35\text{ mK/K}$</p> <p>Gain drift at 23 °C to 125 °C: max. $\pm 10.0\text{ ppm/K}$</p>
Measurement deviation (type B)	<p>Gain error at 23 °C: max. $\pm 0.0001\%$</p> <p>Offset and scaling error: typ. $\pm 0.55\text{ K}$: max. $\pm 1.65\text{ K}$</p> <p>Zero drift at -40 °C to 23 °C: max. $\pm 7.0\text{ mK/K}$</p> <p>Gain drift at -40 °C to 23 °C: max. $\pm 0.5\text{ ppm/K}$</p> <p>Zero drift at 23 °C to 125 °C: max. $\pm 10.0\text{ mK/K}$</p> <p>Gain drift at 23 °C to 125 °C: max. $\pm 0.5\text{ ppm/K}$</p>
Measurement deviation (type C)	<p>Gain error at 23 °C: max. $\pm 0.0001\%$</p> <p>Offset and scaling error: typ. $\pm 0.55\text{ K}$: max. $\pm 1.65\text{ K}$</p> <p>Zero drift at -40 °C to 23 °C: max. $\pm 7.0\text{ mK/K}$</p> <p>Gain drift at -40 °C to 23 °C: max. $\pm 0.5\text{ ppm/K}$</p> <p>Zero drift at 23 °C to 125 °C: max. $\pm 10.0\text{ mK/K}$</p> <p>Gain drift at 23 °C to 125 °C: max. $\pm 0.5\text{ ppm/K}$</p>
Measurement deviation (type E)	<p>Gain error at 23 °C: max. $\pm 0.004\%$</p> <p>Offset and scaling error: typ. $\pm 0.09\text{ K}$: max. $\pm 0.26\text{ K}$</p> <p>Zero drift at -40 °C to 23 °C: max. $\pm 1.30\text{ mK/K}$</p> <p>Gain drift at -40 °C to 23 °C : max. $\pm 9.0\text{ ppm/K}$</p> <p>Zero drift at 23 °C to 125 °C: max. $\pm 2.95\text{ mK/K}$</p> <p>Gain drift at 23 °C to 125 °C: max. $\pm 9.0\text{ ppm/K}$</p>
Measurement deviation (type J)	<p>Gain error at 23 °C: max. $\pm 0.0025\%$</p> <p>Offset and scaling error: typ. $\pm 0.09\text{ K}$: max. $\pm 0.28\text{ K}$</p> <p>Zero drift at -40 °C to 23 °C: max. $\pm 1.5\text{ mK/K}$</p> <p>Gain drift at -40 °C to 23 °C: max. $\pm 8.0\text{ ppm/K}$</p> <p>Zero drift at 23 °C to 125 °C: max. $\pm 3.1\text{ mK/K}$</p> <p>Gain drift at 23 °C to 125 °C: max. $\pm 8.0\text{ ppm/K}$</p>
Measurement deviation (type N)	<p>Gain error at 23 °C: max. $\pm 0.0001\%$</p> <p>Offset and scaling error: typ. $\pm 0.15\text{ K}$: max. $\pm 0.45\text{ K}$</p> <p>Zero drift at -40 °C to 23 °C: max. $\pm 2.0\text{ mK/K}$</p> <p>Gain drift at -40 °C to 23 °C: max. $\pm 8.7\text{ ppm/K}$</p> <p>Zero drift at 23 °C to 125 °C: max. $\pm 4.0\text{ mK/K}$</p> <p>Gain drift at 23 °C to 125 °C: max. $\pm 8.7\text{ ppm/K}$</p>
Measurement deviation (type R)	<p>Gain error at Typical: $\pm 0.0001\%$ max.</p> <p>Offset and scaling error: typ. $\pm 0.59\text{ K}$: max. $\pm 1.75\text{ K}$</p> <p>Zero drift at -40 °C to 23 °C: max. $\pm 7.0\text{ mK/K}$</p> <p>Gain drift at -40 °C to 23 °C: max. $\pm 0.5\text{ ppm/K}$</p> <p>Zero drift at 23 °C to 125 °C: max. $\pm 10.25\text{ mK/K}$</p> <p>Gain drift at 23 °C to 125 °C: max. $\pm 0.5\text{ ppm/K}$</p>
Measurement deviation (type S)	<p>Gain error at Typical: $\pm 0.0001\%$ max.</p> <p>Offset and scaling error: typ. $\pm 0.57\text{ K}$: max. $\pm 1.70\text{ K}$</p> <p>Zero drift at -40 °C to 23 °C: max. $\pm 7.25\text{ mK/K}$</p> <p>Gain drift at -40 °C to 23 °C : max $\pm 0.5\text{ ppm/K}$</p> <p>Zero drift at 23 °C to 125 °C: max. $\pm 10.25\text{ mK/K}$</p> <p>Gain drift at 23 °C to 125 °C: max. $\pm 1.0\text{ ppm/K}$</p>
Measurement deviation (type T)	<p>Gain error at 23 °C: max. $\pm 0.0001\%$.</p> <p>Offset and scaling error: typ. $\pm 0.11\text{ K}$: max. $\pm 0.33\text{ K}$</p> <p>Zero drift at -40 °C to 23 °C: max. $\pm 1.75\text{ mK/K}$</p> <p>Gain drift at -40 °C to 23 °C: max. $\pm 4.5\text{ ppm/K}$</p> <p>Zero drift at 23 °C to 125 °C: max. $\pm 3.5\text{ mK/K}$</p> <p>Gain drift at 23 °C to 125 °C: max. $\pm 5.0\text{ ppm/K}$</p>

Characteristic linearization	Numerically interpolated
Cold junction compensation	One cold junction per channel
Excitation	
Measurement input ↔ Module supply	±100 V (indefinitely), ±500 V (pulse voltage)
Galvanic isolation	
Measurement input ↔ CAN	±100 V (indefinitely), ±500 V (pulse voltage)
Measurement input ↔ Housing	±100 V (indefinitely), ±500 V (pulse voltage)
Measurement input ↔ Measurement input	±100 V (indefinitely), ±500 V (pulse voltage)
Measurement input ↔ Sensor supply	±100 V (indefinitely), ±500 V (pulse voltage)
Device	
Inputs	16
Maximum input voltage (channel)	Operating safety ±60 V (permanent) Device safety ±60 V (permanent), additional ESD protection
Power supply	6 ... 59 VDC For On-board power supply of 12 24 48 V
Switching thresholds of the operating voltage	On 9 ±0.3 VDC / Off 6 ±0.3 VDC
Power consumption, typical	1.2 W
Operating temperature range	-40 ... 125 °C (-40 ... 257 °F)
Storage temperature range	-55 ... 150 °C (-67 ... 302 °F)
IP protection class	IP 67 (ISO 20653 - 2013)
Relative humidity	5 ... 95 %
Operating altitude (above sea level)	max. 5000m
Dimensions	L165 mm x W33 mm x D58 mm (L6.50 in x W1.30 in x D2.28 in)
Weight	415 g (0.91 lb)
Configuration interface	CAN FD (ISO 11898-2-2016)) 125kBit/s to 5MBit/s 64 data bytes Via CAN-FD or X-Link (tunneling) with IPEmotion PC, RT
Data rate	Software adjustable up to 5Mbit/s (ISO11898-2-2016)
Input sockets	Miniature TC connector (DIN IEC 584, ANSI MC 96.1)
Output sockets	Spring contact connector 9-pin
Status-LED	Yes Display of the operating status as well as warnings in case of undervoltage or expired calibration
Accessories	
Module	IPE-COV-M3-001 cover cap IPE-HWI-M3-001 mounting plate IPE-HWI-M3-002 mounting plate

System cable	623-500 M3-CAN/PWR cable, SubD9/S term, banana 623-502 M3-CAN/PWR cable, LOG term 623-503 M3-CAN/PWR cable 623-504 M3-CAN/PWR cable, M-CAN/PWR 623-506 M3-CAN cable, SUB-D/9S term 623-507 M3-CAN/PWR cable, banana 623-508 M3-CAN/PWR cable, CAN/PWR 0B-5p. 623-509 M3-CAN/PWR cable, X-LINK/PWR 623-510 M3-CAN/ cable, ETAS-CAN 1B-8p 623-511 M3-CAN cable, M-CAN/noPWR M-feed
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