

M-THERMO 96

96-channel universal thermocouple inputs type E, J, K, N, R, S, T

- Cold junction compensation per channel
- Status LED at each measurement channel
- Measurement data output to Ethernet
- Galvanic isolation (inputs, CAN, supply, enclosure)
- Compliant to requirements of the aerospace industry
- Ruggedized modules for harsh environments
- Cable relief



General channel properties	
A/D converter	24 bit (Sigma/Delta)
Spezialfunktionen	Sensor breakage detection (activation via software setting)
Channel sampling rates	1/ 2/ 5/ 10/ min -- 1/ 2/ 5/ 10/ 20/ 50/ 100 Hz
Aggregate sample rate	9600 Hz
Hardware filter (fixed)	11 Hz, filter type RC low pass
Channel impedance	15.0 MΩ
Channel LED	During configuration - blinking Sensor break detection
Channel temperature	
Measurement range temperature	Typ R (Pt13Rh/Pt) -50 ... 1700 °C (-58 ... 3092 °F) Typ J (Fe/CuNi) -180 ... 750 °C (-292 ... 1352 °F) Typ S (Pt10Rh/Pt) -50 ... 1750 °C (-58 ... 3182 °F) Typ N (NiCrSi/NiSi) -270 ... 1300 °C (-454 ... 2372 °F) Typ E (NiCr-CuNi) -200 ... 900 °C (-328 ... 1652 °F) Typ K (NiCr/NiAl) -200 ... 1300 °C (-328 ... 2372 °F) Typ T (Cu/CuNi) -250 ... 400 °C (-418 ... 752 °F)
Linearization of sensor characteristic line	Numerical interpolated
Cold junction compensation (CJC)	PT100 for each channel
Measurement range thermo voltage	±78125μV
Cold junction measurement range	0 ... 167.8 Ω
Total error thermocouple type E	
Ambient temperature -40 °C	@Tinput= 0 °C / 700 °C (±0.183 K / ±0.214 K)
Ambient temperature 5 °C	@Tinput= 0 °C / 700 °C (±0.145 K / ±0.225 K)
Ambient temperature 25 °C	@Tinput= 0 °C / 700 °C (±0.129 K / ±0.161 K)
Ambient temperature 45 °C	@Tinput= 0 °C / 700 °C (±0.170 K / ±0.251 K)
Ambient temperature 85 °C	@Tinput= 0 °C / 700 °C (±0.204 K / ±0.235 K)
Total error thermocouple type J	
Ambient temperature -40 °C	@Tinput= 0 °C / 600 °C (±0.191 K / ±0.220 K)

Ambient temperature 5 °C	@TInput= 0 °C / 600 °C (±0.154 K / ±0.226 K)
Ambient temperature 25 °C	@TInput= 0 °C / 600 °C (±0.137 K / ±0.167 K)
Ambient temperature 45 °C	@TInput= 0 °C / 600 °C (±0.180 K / ±0.252 K)
Ambient temperature 85 °C	@TInput= 0 °C / 600 °C (±0.212 K / ±0.241 K)
Total error thermocouple type K	
Ambient temperature -40 °C	@TInput= 0 °C / 800 °C (±0.206 K / ±0.257 K)
Ambient temperature 5 °C	@TInput= 0 °C / 800 °C (±0.173 K / ±0.287 K)
Ambient temperature 25 °C	@TInput= 0 °C / 800 °C (±0.153 K / ±0.203 K)
Ambient temperature 45 °C	@TInput= 0 °C / 800 °C (±0.199 K / ±0.313 K)
Ambient temperature 85 °C	@TInput= 0 °C / 800 °C (±0.227 K / ±0.278 K)
Total error thermocouple type N	
Ambient temperature -40 °C	@TInput= 0 °C / 800 °C (±0.243 K / ±0.254 K)
Ambient temperature 5 °C	@TInput= 0 °C / 800 °C (±0.219 K / ±0.278 K)
Ambient temperature 25 °C	@TInput= 0 °C / 800 °C (±0.190 K / ±0.201 K)
Ambient temperature 45 °C	@TInput= 0 °C / 800 °C (±0.245 K / ±0.304 K)
Ambient temperature 85 °C	@TInput= 0 °C / 800 °C (±0.264 K / ±0.275 K)
Total error thermocouple type R	
Ambient temperature -40 °C	@TInput= 0 °C / 1300 °C (±0.664 K / ±0.403 K)
Ambient temperature 5 °C	@TInput= 0 °C / 1300 °C (±0.738 K / ±0.481 K)
Ambient temperature 25 °C	@TInput= 0 °C / 1300 °C (±0.611 K / ±0.349 K)
Ambient temperature 45 °C	@TInput= 0 °C / 1300 °C (±0.763 K / ±0.507 K)
Ambient temperature 85 °C	@TInput= 0 °C / 1300 °C (±0.685 K / ±0.424 K)
Total error thermocouple type S	
Ambient temperature -40 °C	@TInput= 0 °C / 1300 °C (±0.653 K / ±0.438 K)
Ambient temperature 5 °C	@TInput= 0 °C / 1300 °C (±0.724 K / ±0.527 K)
Ambient temperature 25 °C	@TInput= 0 °C / 1300 °C (±0.600 K / ±0.384 K)
Ambient temperature 45 °C	@TInput= 0 °C / 1300 °C (±0.750 K / ±0.553 K)
Ambient temperature 85 °C	@TInput= 0 °C / 1300 °C (±0.674 K / ±0.459 K)
Total error thermocouple type T	
Ambient temperature -40 °C	@TInput= 0 °C / 300 °C (±0.200 K / ±0.200 K)
Ambient temperature 5 °C	@TInput= 0 °C / 300 °C (±0.175 K / ±0.182 K)
Ambient temperature 25 °C	@TInput= 0 °C / 300 °C (±0.154 K / ±0.147 K)
Ambient temperature 45 °C	@TInput= 0 °C / 300 °C (±0.201 K / ±0.208 K)

Ambient temperature 85 °C	@T _{Input} = 0 °C / 300 °C (±0.228 K / ±0.221 K)
Total error PT100 input	
Ambient temperature -40 °C	± 30.79 mΩ
Ambient temperature 5 °C	± 18.53 mΩ
Ambient temperature 25 °C	± 13.10 mΩ
Ambient temperature 45 °C	± 20.74 mΩ
Ambient temperature 85 °C	± 30.20 mΩ
Total error thermovoltage	
Ambient temperature -40 °C	@0 mV / 30mV (± 2.8 μV / 4.8 μV)
Ambient temperature 5 °C	@0 mV / 30mV (± 3.5 μV / 7.8 μV)
Ambient temperature 25 °C	@0 mV / 30mV (± 2.8 μV / 4.8 μV)
Ambient temperature 45 °C	@0 mV / 30mV (± 3.5 μV / 7.8 μV)
Ambient temperature 85 °C	@0 mV / 30mV (± 2.8 μV / 4.8 μV)
Galvanic isolation	
Input ↔ module power supply	±100 V (indefinitely), ±500 V (pulse voltage)
Input ↔ CAN	±100 V (indefinitely), ±500 V (pulse voltage)
Input ↔ enclosure	±100 V (indefinitely), ±500 V (pulse voltage)
Input ↔ input	±100 V (indefinitely), ±500 V (pulse voltage)
Device	
Eingänge	96
Maximum input protection voltage (channel)	±25 V (continuous), ±50 V (1 min), ±200 V (short-time, t < 2 ms)
Voltage supply	9 ... 36 VDC
Supply voltage thresholds	On 9 ±0.3 VDC / Off 9 ±0.3 VDC
Power consumption, typical	<29 W; <25 W (without IPEhub2)
Working temperature range	-50 ... 85 °C (-58 ... 185 °F)*
IP-Code	IP6K6 according to DIN EN 60529: 2014-09-01 ISO 20653
Relative humidity	5 ... 95 %
Betriebshöhe (über NN)	55.000 Fuß / 16.764 m
Dimensions	W 500 mm x H130 mm x D 476 mm (19.69 in x 5.12 in x 18.74 in)
Weight	19.6 kg (43.21 lb)
Configuration interface	Ethernet
Data transfer rate	100 Mbit Ethernet (IEEE 802.3)
Test standards	DIN EN 61326-1:2013 (EMV) RTCA DO-160G 2010-12-08 (Pulse & Vibration) IEC 61010-2-201 (safety requirements)

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	MIL-STD-810G w/Change 1 (Sound pressure) IEC-EN 60584-2 (PD accuracy - based on voltage / PT100 accuracy) ISO 9001:2015
Pressure compensation	Available
Desiccant	Available
Calibration intervall	12 months
Housing material	Aluminum, gold anodized
Input sockets	Screw terminal
Status LED	Yes
Schutz gegen aggressive Flüssigkeiten	Hyjet IV Hydraulik-Flüssigkeit
Accessories	
System cable	620-233