MinIPAQ R230
Programmable 2-wire transmitter

The MinIPAQ R230 transmitter is a non-isolated, 2-wire In-head temperature transmitter. The transmitter accepts inputs from standardized resistance thermometers (RTDs) like Pt10...Pt1000 and Ni100, Ni120, Ni1000 as well as inputs from 10 types of standardized thermocouples (TC), with additional voltage and resistance inputs. Its robust design and high quality gives excellent performance and accuracy also under harsh conditions.

MinIPAQ R230 supports communication via NFC (Near-field communication) and Bluetooth® which makes it possible to configure and monitor the transmitter remotely. It is also possible to configure MinIPAQ R230 via a PC.

High accuracy
MinIPAQ R230 offers high accuracy temperature measurements with an typical accuracy of ±0,15 K or ±0,15 % of span for RTD inputs and ±0,5 K or ±0.25 % of span for T/C Type J and K inputs (CJC error not included), in each case the greater value applies.

Long term stability
With a long-term drift of maximum ±0.05 % of span per year a re-calibration of the transmitter is normally not needed.

Low temperature drift
MinIPAQ R230 have a low temperature drift of ±0.01°C per °C or ±0.01% of span per °C.

NAMUR Compliance
Output limitations and fail currents according to NAMUR NE 43.

Designed for harsh conditions
Rugged design tested for 5 g vibrations.

Configuration with PC Software
The PC configuration software, ConSoft, is a versatile and user-friendly tool for transmitter configuration, loop check-up and sensor diagnostics. All features described in this data sheet are handled in a simple and fail-safe way.

Wireless configuration with Smartphone App
The smartphone app, INOR Connect, is used for transmitter configuration in seconds. All parameters are set in the app and then transferred to the transmitter via NFC or Bluetooth®.

Configuration without external power
Read and write configurations off-line, i.e. without any power supply connected to the transmitter, applies for both PC and wireless configuration.

Smart features
Smart features such as password protection, simulated output signal, data logging, runtime counter, min./max. power supply memory and min./max. ambient temperature memory.

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Other features of the MinIPAQ R230

Adjustable filtering
For handling of instabilities or disturbance on the input, an adjustable filtering level can be used.

Sensor and system error-correction increases the accuracy
This function compensates for deviations in connected sensors or the complete system including the transmitter error. A reduction of the total measurement error, for the sensor and transmitter combination, of more than 50 % is typical.

Measurements with RTDs and resistance
MinIPAQ R230 accepts inputs from standardized Platinum and Nickel RTDs like Pt10...Pt1000 acc. to IEC 60751 (a=0.00385), Ni100/Ni1000 acc. to DIN 43760 and Ni120 (Edison No. 7), as well as plain resistance sensors up to 4000 Ω. 2-, 3- or 4-wire connection can be chosen.

Measurements with Thermocouples and plain voltage
MinIPAQ R230 accepts inputs from 10 types of standardized thermocouples as well as plain mV input up to 1000 mV. For T/C input, the CJC (Cold Junction Compensation) is either fully automatic, by means using an internal sensor for compensation or fixed by entering a fixed external CJ temperature.

ConSoft PC configuration software
The PC configuration software, ConSoft, is a versatile and user-friendly tool for transmitter configuration, loop check-up and sensor diagnostics. It runs on Windows 10 and above. All features described in this data sheet are handled in a simple and fail-safe way.
ConSoft is a free download and the necessary USB-Interface with cables are included in configuration kit ICON-X.

Wireless configuration with the app INOR Connect

Via NFC
The app INOR Connect for portable devices (smartphones) is a versatile and user-friendly tool for wireless configuration. It is available for both Android and iOS and is a free download.The configuration procedure uses the NFC function in combination with a smartphone with built-in NFC support to perform all settings of the transmitter. The fast communication between the transmitter and the smartphone makes it possible to copy and paste a configuration to as many transmitters as you like and it only takes seconds. The transmitter does not need any power or other external connection, just to be close to the smartphone.

Via Bluetooth®
In addition to the INOR Connect app, the Bluetooth® interface ICON-BT is also needed for wireless communication and configuration via Bluetooth®. Connect the Bluetooth® interface to the transmitters communication port to perform all settings of the transmitter, no other power or connections are needed. The logging function give the possibility to log events directly in the field without any other equipment beside the smartphone and the Bluetooth® interface ICON-BT.

Specifications

Input RTD

Pt100	(IEC 60751, α=0.00385)	-200 to +850 °C / -328 to +1562 °F
Pt X (10 ⩽ X ⩽ 1000)	(IEC 60751, α=0.00385)	-200 to +850 °C / -328 to +1562 °F
Ni100	(DIN 43760)	-60 to +250 °C / -76 to +482 °F
Ni120	(Edison Curve No. 7)	-60 to +250 °C / -76 to +482 °F
Ni1000	(DIN 43760)	-50 to +180 °C / -58 to +356 °F
Input connection		2-, 3-, 4-wire connection
Zero adjustmen		Within range
Minimum span		10 °C
Sensor current		⩽300 µA
Maximum sensor wire resistance	3- and 4-wire connection	50 Ω/wire
	2-wire connection	Compensation for 0 to 100 Ω loop resistance
Sensor error correction (Correction in two points)		Known sensor errors are entered and the transmitter compensates for them. Max. ±10 % of span for span <50 °C / 90 °F, otherwise ±5 °C / ±9 °F
System error correction (Correction in two points)		When the transmitter is connected to a sensor which is exposed for a reference temperature it is possibe to calculate the system error (transmitter + sensor error) by just cklicking in the configuration software ConSoft. Max. ±10 % of span for span <50 °C / 90 °F, otherwise ±5 °C / ±9 °F

Input Resistance

Range	3- and 4-wire connection	0 to 4 000 Ω
	2-wire connection	0 to 2 000 Ω
Zero adjustment		Within range
Max offset adjustment		50% of selected max value
Minimum span		10 Ω
Sensor current		⩽300 µA
Input connections		2-, 3-, 4-wire connection
Maximum sensor wire resistance	3- and 4-wire connection	50 Ω/wire
	2-wire connection	Compensation for 0 to 100 Ω loop resistance

Input Thermocouple

T/C B	Pt30Rh-Pt6Rh (IEC 60584)	400 to +1800 °C
T/C C	W5Re-W26Re (ASTM E 988)	0 to +2315 °C
T/C D	W3Re-W25Re (ASTM E 988)	0 to +2315 °C
T/C E	NiCr-CuNi (IEC 60584)	-270 to +1000 °C
T/C J	Fe-CuNi (IEC 60584)	-210 to +1200 °C
T/C K	NiCr-Ni (NiCr-NiAl) (IEC 60584)	-270 to +1300 °C
T/C N	NiCrSi-NiSi (IEC 60584)	-270 to +1300 °C
T/C R	Pt13Rh-Pt (IEC 60584)	-50 to +1750 °C
T/C S	Pt10Rh-Pt (IEC 60584)	-270 to +400 °C
T/C T	Cu-CuNi (IEC 60584)	-50 to +1750 °C
Input impedance		>10 MΩ
Input connections		See “Input connections” below
Maximum wire loop resistance		5000 Ω (Including T/C sensor)
Cold Junction Compensation (CJC)		Internal or fixed

Input Voltage

Range	-10 to +1000 mV
Zero adjustment	Within range
Minimum span	2 mV
Input impedance	>10 MΩ
Input connections	See “Input connections” below
Maximum wire loop resistance	5000 Ω

Output

Output signal	4-20 mA, temperature linear for RTD and T/C
Adjustable output filtering	0.17...90 s for 3-wire RTD
Permissible load	(Supply voltage-8)/0.022, 725 Ω @ 24 VDC
NAMUR Compliance	Current limitations and failure currents acc. to NAMUR, NE 43

Sensor Failure Effects

Output control acc. to NAMUR NE 43		Individual upscale/downscale action for Sensor break and Sensor short-circuit

General data

Isolation In-Out		None
Power supply, polarity protected		8 to 36 VDC

Environment conditions

Ambient temperature	Storage	-40 to +85 °C / -40 to +185 °F
	Operating	-40 to +85 °C / -40 to +185 °F
Humidity		0...98% RH (non-condensing)
Vibration		Acc. to IEC 60068-2-6, test Fc, 10 to 2000 Hz, 5 g
Shock		Acc. to IEC-60068-2-27, test Ea
Rough Handling		Acc. to IEC-60068-2-31:2008, test Ec

Approvals and certifications

CE		The device fulfils the statutory requirements of the EU directives. The manufacturer certifies that these requirements have been met by applying the CE-Marking.
Radio Equipment Directive 2014/53/EU		EN 300 330 EN 61326-1 EN 61326-2-3 EN 61010-1
RoHS		Directive: 2011/65/EU + (EU) 2015/863 Harmonized standard: EN IEC 63000

Housing

Mounting		DIN-Rail 35 mm according to EN IEC 60715
Material, Flammability acc. to UL		PC/ABS + PA, V0/HB, RoHS compliant
Connection	Single/stranded wires	Max. 1.5 mm², AWG 16
Tightening torque		0.22 Nm ... 0.25 Nm
Weight		70 g / 0.15 lb
Protection, housing / terminals		IP 20 / IP 20

Configuration

Via PC	ConSoft	The PC configuration software ConSoft is a versatile and user-friendly tool for transmitter configuration. ConSoft is compatible with Windows 10 and above and is free to download from www.inor.com. Required communication USB-Interface and cables are included in the configuration kit ICON-X.
Wirelessly	Smartphone App INOR Connect	The app INOR Connect for portable devices (smartphones) is a versatile and user-friendly tool for wireless configuration through NFC and Bluetooth® technology. The app is a free download and is avaliable for both Android and iOS. Communication via Bluetooth® requires a Bluetooth® interface which is included in the configuration kit ICON-BT.

Accuracy and stability

Typical accuracy	RTD	See table below
	Resistance 3-wire, 4-wire	Max. of ±0.1 Ω or ±0.1 % of span
	Resistance 2-wire	Max. of ±0.2 Ω or ±0.2 % of span
Temperature influence	RTD	See table below
	Resistance 3-wire, 4-wire	±0.01% of span per °C
	Resistance 2-wire	±0.01% of span per °C

Sensor wire influence	RTD and Resistance, 2-wire	Adjustable wire resistance compensation
	RTD and Resistance, 3-wire	Negligible, with equal wire resistance
	RTD and Resistance, 4-wire	Negligible
Supply voltage influence		<±0.005 % of span per V
Long-term drift		Maximum ±0,05% of span per year

Accuracy specifications and minimum spans

Conformance level 95 % (2σ)

Accuracy (°C)

Input type	Temperature range	Minimum span	Accuracy	Temperature Influence
			Maximum of:	*(Deviation from ref. temp. 20 °C)*
RTD Pt100	-200 to +850 °C	10 °C	±0.15 K or ±0.15 % of span [3]	±0.01 % of span per °C
RTD PtX [1]	-200 to +850 °C	10 °C	±0.15 K or ±0.15 % of span [3]	±0.01 % of span per °C [2]
RTD Ni100	-60 to +250 °C	10 °C	±0.15 K or ±0.15 % of span [3]	±0.01 % of span per °C
RTD Ni120	-60 to +250 °C	10 °C	±0.15 K or ±0.15 % of span [3]	±0.01 % of span per °C
RTD Ni1000	-50 to + 180 °C	10 °C	±0.15 K or ±0.15 % of span [3]	±0.01 % of span per °C [2]
T/C type B	+400 to +1800 °C	700 °C	±1.0 K or ±0.25 % of span [4]	±0.01 % of span per °C
T/C type C	0 to +2315 °C	200 °C	±1.0 K or ±0.25 % of span [4]	±0.01 % of span per °C
T/C type D	0 to +2315 °C	200 °C	±1.0 K or ±0.25 % of span [4]	±0.01 % of span per °C
T/C type E	-270 to +1000 °C	50 °C	±0.5 K or ±0.25 % of span [4]	±0.01 % of span per °C
T/C type J	-210 to +1200 °C	50 °C	±0.5 K or ±0.25 % of span [4]	±0.01 % of span per °C
T/C type K	-270 to +1300 °C	50 °C	±0.5 K or ±0.25 % of span [4]	±0.01 % of span per °C
T/C type N	-100 to +1300 °C	100 °C	±0.5 K or ±0.25 % of span [4]	±0.01 % of span per °C
T/C type N	-270 to -100 °C	100 °C	±1.0 C [4]	±0.1 % of span per °C
T/C type R	-50 to +1750 °C	300 °C	±1.0 K or ±0.25 % of span [4]	±0.01 % of span per °C
T/C type S	-50 to +1750 °C	300 °C	±1.0 K or ±0.25 % of span [4]	±0.01 % of span per °C
T/C type T	-270 to +400 °C	50 °C	±0.25 K or ±0.25 % of span [4]	±0.01 % of span per °C

[1] (10 ≤ X ≤ 1000)

[2] For 2-wire connection and span >2000 Ω applies ±0.02 % of span per °C

[3] Valid for 3- and 4-wire connections

[4] CJC error not included. ≤ ±1.0 °C within ambient temperature range

Accuracy (°F)

Input type	Temperature range	Minimum span	Accuracy	Temperature Influence
			Maximum of:	*(Deviation from ref. temp. 68 °F)*
RTD Pt100	-328 to +1562 °F	18 °F	±0.27 °F or ±0.15 % of span	±0.006 % of span per °F
RTD PtX [1]	-328 to +1562 °F	18 °F	±0.27 °F or ±0.15 % of span	±0.006 % of span per °F [2]
RTD Ni100	-76 to +482 °F	18 °F	±0.27 °F or ±0.15 % of span	±0.006 % of span per °F
RTD Ni120	-76 to +482 °F	18 °F	±0.27 °F or ±0.15 % of span	±0.006 % of span per °F
RTD Ni1000	-58 to + 356 °F	18 °F	±0.27 °F or ±0.15 % of span	±0.006 % of span per °F [2]
T/C type B	+752 to +3272 °F	1260 °F	±1.8 °F or ±0.25 % of span [4]	±0.006 % of span per °F
T/C type C	+32 to +4199 °F	360 °F	±1.8 °F or ±0.25 % of span [4]	±0.006 % of span per °F
T/C type D	+32 to +4199 °F	360 °F	±1.8 °F or ±0.25 % of span [4]	±0.006 % of span per °F
T/C type E	-454 to +1832 °F	90 °F	±0.9 °F or ±0.25 % of span [4]	±0.006 % of span per °F
T/C type J	-346 to +2192 °F	90 °F	±0.9 °F or ±0.25 % of span [4]	±0.006 % of span per °F
T/C type K	-454 to +2372 °F	90 °F	±0.9 °F or ±0.25 % of span [4]	±0.006 % of span per °F
T/C type N	-148 to +2372 °F	180 °F	±0.9 °F or ±0.25 % of span [4]	±0.006 % of span per °F
T/C type N	-454 to -148 °F	180 °F	±1.8 °F [4]	±0.18 % of span per °F
T/C type R	-58 to +3182 °F	540 °F	±1.8 °F or ±0.25 % of span [4]	±0.006 % of span per °F
T/C type S	-58 to +3182 °F	540 °F	±1.8 °F or ±0.25 % of span [4]	±0.006 % of span per °F
T/C type T	-454 to +752 °F	90 °F	±0.45 °F or ±0.25 % of span [4]	±0.006 % of span per °F

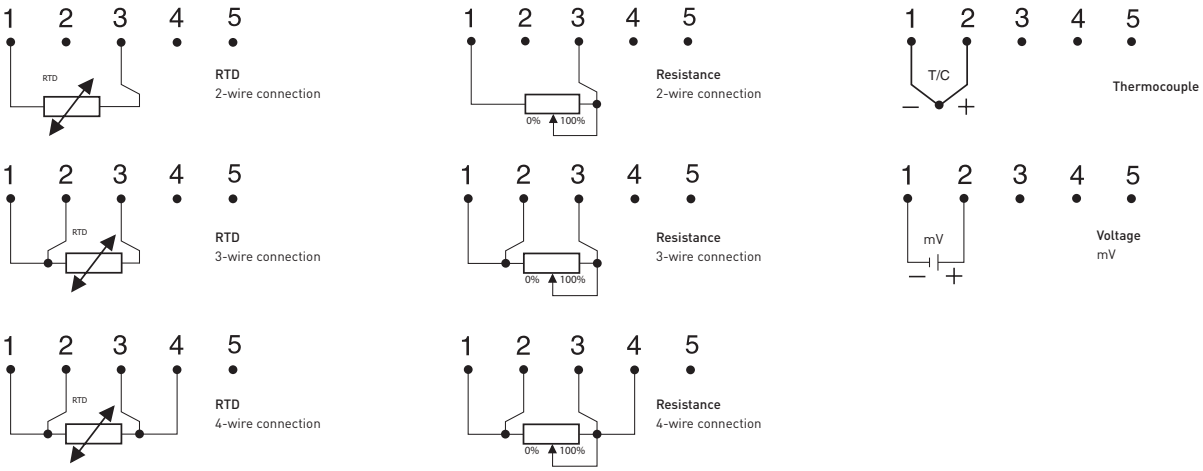
[1] (10 ≤ X ≤ 1000)

[2] For 2-wire connection and span >2000 Ω applies ±0.02 % of span per 1.8 °F

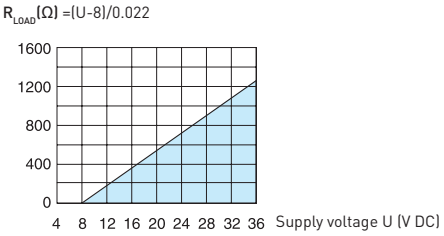
[3] Valid for 3- and 4-wire connections.

[4] CJC error not included. ≤ ±1.8 °F within ambient temperature range

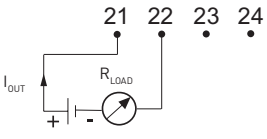
Input connections



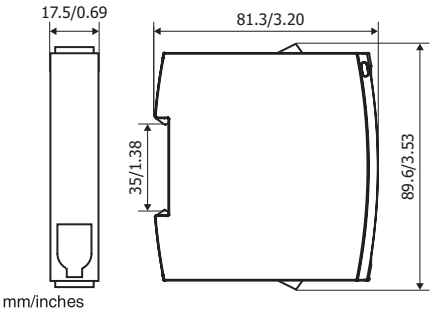
Output load diagram



Output connections



Dimensions



Ordering information

MiniPAQ R230	70R2300011
ICON-X, PC Configuration kit	70CFGUSX01
ICON-BT, Bluetooth® configuration kit	70CFGBT001