

IPAQ®



IPAQ C310^{RTD}

Programmable 2-wire transmitter for RTD and Resistance inputs



The IPAQ C310^{RTD} transmitter is a isolated temperature transmitter for measurement with a RTD sensor. It is compatible with Pt10 ... Pt1000 sensors with additional Ni100, Ni120, Ni1000 and resistance input. Its robust design and high quality gives excellent performance and accuracy also under harsh conditions. With the runtime function you can easily supervise the elapsed operational time between calibrations.

IPAQ C310^{RTD} 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 IPAQ C310^{RTD} via a PC.

High accuracy

IPAQ C310^{RTD} offers high accuracy temperature measurements with an typical accuracy of the maximum of ± 0.1 °C or ± 0.1 % of range for RTD inputs.

Long term stability

With a drift over 5 years of maximum of ± 0.1 °C or ± 0.1 % of span makes regular calibration less necessary.

Low temperature drift

IPAQ C310^{RTD} have a low temperature drift of ± 0.01 °C per °C or ± 0.01 % of span per °C.

High safety

It offers excellent EMC performance and compliant to Namur NE21, NE43 and NE107.

Designed for harsh conditions

Rugged design tested for 10 g vibrations.

High user efficiency

The user friendly PC software ConSoft is used for transmitter configuration in seconds with window based parameters, such as measuring range, sensor failure action, error-corrections, TAG etc.

Wireless configuration with INOR Connect

The 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

Edit and read the configuration off-line, i.e. without power supply connected to the transmitter. Applies to both PC and wireless configuration.

Smart features

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

Other features of the IPAQ C310^{RTD}

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 RTD's and resistance

IPAQ C310^{RTD} accepts inputs from standardized Platinum and Nickel RTDs like Pt10...Pt1000 acc. to IEC 60751 ($\alpha=0.00385$) and Ni100/Ni1000 acc. to DIN 43760, as well as plain resistance sensors.

Additional inputs from Pt100 (JIS C1604, $\alpha = 0.003916$) and Ni120 (Edison No. 7) sensors are available.

2-, 3- or 4-wire connection can be chosen (See Input connections below).

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 XP 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. The logged data can be stored or shared by the mobile network. It makes it also very simple to read and display the actual measuring value in the transmitter.

Specifications

Input RTD

Pt100	(IEC 60751, $\alpha=0.00385$)	-200 to +850 °C / -328 to +1562 °F
Pt X ($10 \leq X \leq 1000$)	(IEC 60751, $\alpha=0.00385$)	-200 to +850 °C / -328 to +1562 °F
Pt100	(JIS C 1604, $\alpha=0.003916$)	-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 adjustment		Within range
Minimum span		10 °C
Sensor current		$\leq 300 \mu\text{A}$
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. $\pm 10\%$ of span for span $< 50 \text{ °C} / 90 \text{ °F}$, otherwise $\pm 5 \text{ °C} / \pm 9 \text{ °F}$
System error correction (Correction in two points)		When the transmitter is connected to a sensor which is exposed for a reference temperature it is possible to calculate the system error (transmitter + sensor error) by just clicking in the configuration software ConSoft. Max. $\pm 10\%$ of span for span $< 50 \text{ °C} / 90 \text{ °F}$, otherwise $\pm 5 \text{ °C} / \pm 9 \text{ °F}$

Input Resistance

Range		0 to 10 000 Ω
Zero adjustment		Within range
Max offset adjustment		50% of selected max value
Minimum span		10 Ω
Sensor current		$\leq 300 \mu\text{A}$
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

Output

Output signal		4-20 mA, 20-4 mA Temperature linear for RTD
Adjustable output filtering		0.17...90 s for 3-wire RTD
Permissible load		(Supply voltage-8,0)/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
Status information via ConSoft or via NFC when using a portable device acc. to NAMUR NE 107		Sensor break, Sensor short-circuit and Transmitter error

General data

Isolation In-Out		Galvanically isolated 1500 VAC, 1 min
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, 10 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 NAMUR NE 21 EN 61000-6-2 EN 61000-6-4 EN 61010-1
RoHS		Directive: 2011/65/EU + (EU) 2015/863 Harmonized standard: EN IEC 63000
	Immunity performance	Criteria A, Surge test influence max. $\pm 0.5\%$ of span

Housing

Mounting		DIN B head or larger, DIN-rail (with adapter)
Material, Flammability acc. to UL		PC/ABS + PA, V0, RoHS compliant
Connection	Single/stranded wires	Max. 1.5 mm ² , AWG 16
Terminal screws max. tightening torque		0.5 Nm
Weight		35 g / 0.08 lb
Protection, housing / terminals		IP 65 / IP 00

Configuration

Via PC	ConSoft	The PC configuration software, ConSoft, is a versatile and user-friendly tool for transmitter configuration. ConSoft is compatible with Windows XP 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	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 available for both Android and iOS. Communication via Bluetooth® requires the 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 $\pm 0.1 \Omega \pm 0.1\%$ of span
	Resistance 2-wire	Max. of $\pm 0.2 \Omega \pm 0.2\%$ of span
Temperature influence	RTD	See table below
	Resistance 3-wire, 4-wire	$< 4 \text{ k}\Omega$: $\pm 0.01\%$ of span per °C, $\geq 4 \text{ k}\Omega$: $\pm 0.02\%$ of span per °C
	Resistance 2-wire	$< 2 \text{ k}\Omega$: $\pm 0.01\%$ of span per °C, $\geq 2 \text{ k}\Omega$: $\pm 0.02\%$ 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		$< \pm 0.005\%$ of span per V
Long-term drift		Max of $\pm 0.02\%$ °C or $\pm 0.02\%$ of span per year

Accuracy specifications and minimum spans

Conformance level 95 % (2 σ)

Accuracy (°C)

Input type	Temperature range	Minimum span	Accuracy	Temperature Influence
			<i>Maximum of:</i>	<i>(Deviation from ref. temp. 20 °C)</i>
RTD Pt100	-200 to +850 °C	10 °C	± 0.1 °C or ± 0.1 % of span ³⁾	± 0.01 % of span per °C
RTD PtX ¹⁾	-200 to +850 °C	10 °C	± 0.1 °C or ± 0.1 % of span ³⁾	± 0.01 % of span per °C ²⁾
RTD Ni 100	-60 to +250 °C	10 °C	± 0.1 °C or ± 0.1 % of span ³⁾	± 0.01 % of span per °C
RTD Ni 120	-60 to +250 °C	10 °C	± 0.1 °C or ± 0.1 % of span ³⁾	± 0.01 % of span per °C
RTD Ni 1000	-50 to + 180 °C	10 °C	± 0.1 °C or ± 0.1 % of span ³⁾	± 0.01 % of span per °C ²⁾

¹⁾ (10 \leq X \leq 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

Accuracy (°F)

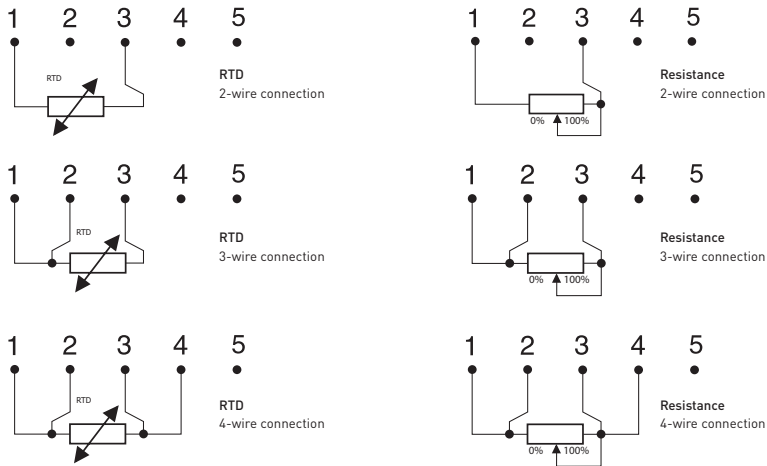
Input type	Temperature range	Minimum span	Accuracy	Temperature Influence
			<i>Maximum of:</i>	<i>(Deviation from ref. temp. 68 °F)</i>
RTD Pt100	-328 to +1562 °F	18 °F	± 0.18 °F or ± 0.1 % of span ³⁾	± 0.006 % of span per °F
RTD PtX ¹⁾	-328 to +1562 °F	18 °F	± 0.18 °F or ± 0.1 % of span ³⁾	± 0.006 % of span per °F ²⁾
RTD Ni 100	-76 to +482 °F	18 °F	± 0.18 °F or ± 0.1 % of span ³⁾	± 0.006 % of span per °F
RTD Ni 120	-76 to +482 °F	18 °F	± 0.18 °F or ± 0.1 % of span ³⁾	± 0.006 % of span per °F
RTD Ni 1000	-58 to + 356 °F	18 °F	± 0.18 °F or ± 0.1 % of span ³⁾	± 0.006 % of span per °F ²⁾

¹⁾ (10 \leq X \leq 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.

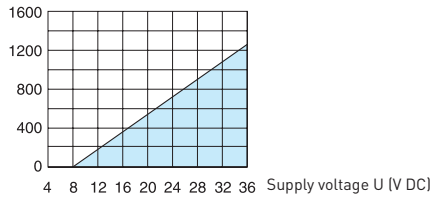
Input connections



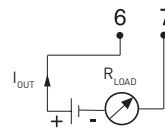
Output load diagram

Standard version

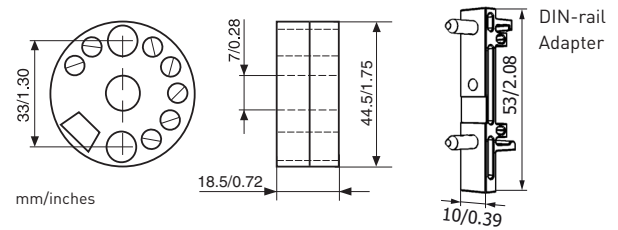
$$R_{LOAD} [\Omega] = (U - 8) / 0.022$$



Output connections



Dimensions



Ordering information

IPAQ C310 ^{RTD}	70C3100011
ICON-X, PC Configuration kit	70CFGUSX01
ICON-BT, Bluetooth [®] configuration kit	70CFGBT001
Head mounting kit	70ADA00017
Rail mounting kit	70ADA00015