IPAQ®

C330 / C330X
PC-Programmable Universal, 2-wire Transmitter

5 YEAR WARRANTY

The IPAQ C330 transmitter is a universal, isolated, temperature transmitter with additional voltage and resistance input. Its robust design and high quality gives excellent performance and accuracy also under harsh conditions. The C330 is available with Ex certificates making it suitable for a wide range of applications.

With the new runtime function you can easily supervise the elapsed operational time between calibrations.

High accuracy
With an accuracy of ±0.08 °C or ±0.08 % of span C330 offers a high performance in its class.

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
C330 have a very 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, NE53 and NE107 together with different Ex approvals.

Designed for harsh conditions
Rugged design tested for 10 g vibrations.

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

Configuration without external power
Edit or read the configuration off-line, i.e. without power supply, by just connecting the USB-interface to a PC.

Security
Configuration is password protected and date of changes logged.

Runtime counter
With the runtime counter function you can for example easily supervise the elapsed operational time.

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Other features of the 330 transmitters

Basic accuracy and long-term stability
The combination of a high-efficient 50-point linearization or Callendar-Van Dusen equation and an electronic design based on the most precise and "zero-drift" technology results in a high basic accuracy and excellent long-term stability. The drift over 5 years is guaranteed to maximum of ±0.1°C or ±0.1 % of the measuring span.

Ambient temperature stability
Features like background calibration of the input converter in every measurement cycle have strongly reduced the ambient temperature influence to a minimum.

Customized linearization
For resistance and mV inputs, either a 50-point Customized Linearization table or via Callendar-Van Dusen constants can provide a correct process value, in a choice of engineering units, for a sensor with non-linear input/output relation.

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 potentiometers
The 330 transmitters accept inputs from standardized Platinum RTDs acc. to IEC 60751 and JIS C 1604, Nickel RTD's acc. to DIN 43760 and Cu10 acc. to Edison Cu Windings No. 15.
Input for plain resistance and potentiometers, up to 10000 Ω is available.
2-, 3- or 4-wire connection can be chosen (See Input connections below).

Measurements with Thermocouples and voltage
The 330 transmitters accept 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 of an internal accurate sensor, external with Pt100 sensor or fixed by entering an external CJ temperature.

ConSoft configuration 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.
ConSoft is part of the complete ICON Configuration Kit, which also contains a USB Interface and necessary cables.

Specifications

Input RTD

Pt100	(IEC 60751, α=0.00385)	-200 to +850 °C
Pt X (10 ⩽ X ⩽ 1000)	(IEC 60751, α=0.00385)	Corresp. to max. 4000 Ω
Pt100	(JIS C 1604, α=0.003916)	-200 to +850 °C
Ni100	(DIN 43760)	-60 to +250 °C
Ni120	(Edison Curve No. 7)	-60 to +250 °C
Ni1000	(DIN 43760)	-50 to +180 °C
Cu10	(Edison Copper Windings No. 15)	-50 to +200 °C
Input connection		See "Input connections" below
Sensor current		⩽300 µA
Maximum sensor wire resistance	3- and 4-wire connection	20 Ω/wire
	2-wire connection	Compensation for 0 to 40 Ω loop resistance

Input Resistance / Potentiometer

Range, resistance		0 to 10000 Ω
Range, potentiometer		100 to 10000 Ω
Minimum span		10 Ω
Customized linearization		Up to 50 points
Sensor current		⩽300 µA
Input connections		See "input connections" below
Maximum sensor wire resistance		20 Ω / wire

Input Thermocouple

T/C B	Pt30Rh-Pt6Rh (IEC 60584)	400 to +1800 °C
T/C C	W5-Re (ASTM E 988)	0 to +2315 °C
T/C D	W3-Re (ASTM E 988)	0 to +2315 °C
T/C E	NiCr-CuNi (IEC 60584)	-200 to +1000 °C
T/C J	Fe-CuNi (IEC 60584)	-200 to +1000 °C
T/C K	NiCr-Ni (IEC 60584)	-200 to +1350 °C
T/C N	NiCrSi-NiSi (IEC 60584)	-250 to +1300 °C
T/C R	Pt13Rh-Pt (IEC 60584)	-50 to +1750 °C
T/C S	Pt10Rh-Pt (IEC 60584)	-50 to +1750 °C
T/C T	Cu-CuNi (IEC 60584)	-200 to +400 °C
Input impedance		>10 MΩ
Input connections		See "Input connections" below
Maximum wire loop resistance		500 Ω (Including T/C sensor)
Cold Junction Compensation (CJC)		Internal, external (Pt100) or fixed

Input Voltage

Range	-10 to +1000 mV
Minimum span	2 mV
Customized linearization	Up to 50 points
Input impedance	>10 MΩ
Input connections	See "Input connections" below
Maximum wire loop resistance	500 Ω

General input

Zero adjustment	Within range
Max offset adjustment	50% of selected max value

Note: All sensor types measure maximum another 10°C of specified min/max sensor values

Output

Output signal		4-20 mA, 20-4 mA Temperature linear for RTD & T/C
Update time		~150 - 300 ms
Resolution		0,4 µA
Uncertainty		1 µA
Adjustable output filtering		0,15 to 75 sec (3-wire RTD)
Permissible load		750Ω @ 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 acc. to NAMUR NE 107		Sensor break and Sensor short-circuit

General data

Isolation		1500 VAC, 1 min
Power supply, polarity protected		8 to 36 VDC for C330 / 8 to 30 VDC for C330X
Line rejection		50 Hz to 60 Hz line rejection

Ex Approvals IPAQ C330X

ATEX		II 1 G Ex ia IIC T6...T4 Ga
IECEx		Ex ia IIC T6...T4 Ga
FM		Ex ia IIC T6...T4 Ga
CSA		Ex ia IIC T6...T4 Ga

Environment conditions

Ambient temperature	Storage	-40 to +85 °C
	Operating	-40 to +85 °C
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
EMC	Standards	Directive: 2014/30/EU Harmonized standards: EN 61326-1, EN 61326-2-3 NAMUR NE 21
	Immunity performance	EN61326-1 and -2-3: Criteria A NE 21: <0,5% of span

Housing

Mounting		DIN B head or larger, DIN-rail (with adapter)
Material, Flammability acc. to UL		PC/ABS + PA, V0/HB, RoHS compliant
Connection	Single/stranded wires	Max. 1.5 mm², AWG 16
Weight		35g
Protection, housing / terminals		IP 65 / IP 00

Accuracy and stability

Basic accuracy	RTD and Thermocouple	See table below
	Resistance Digital accuracy [1]	0-1000 Ω: Max of ±40 mΩ or ±0.040 % of span
		1000-10000 Ω: ±0.05 % or max 1 Ω of span
	Resistance Analog accuracy [1]	±0.06 % of span
	Voltage Digital accuracy [1]	±5 µV or ±0.02 % of span
	Voltage Analog accuracy [1]	±0.06 % of span
Temperature influence	RTD and Thermocouple	See table below
	Resistance	±0.01 % < 4000 Ω [2] < ±0.02 % of span per °C
	Voltage	±0.01 % of span per °C
Cold Junction Compensation (CJC)		±0.5 °C within ambient temperature -40 to +85 °C
Temperature influence CJC		±0.01 °C 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
	Thermocouple and Voltage	Negligible
Supply voltage influence	Within specified limits	<±0.005 % of span per V
Long-term drift		Max of ±0.02 °C or ±0.02 % of span per year

[1] Total accuracy = Sum of digital and analog accuracy, calculated as an RMS (Root Mean Square) value

[2] 2000 Ω at 2-wire

Accuracy specifications and minimum spans for RTD and Thermocouples

Conformance level 95 % (2σ)

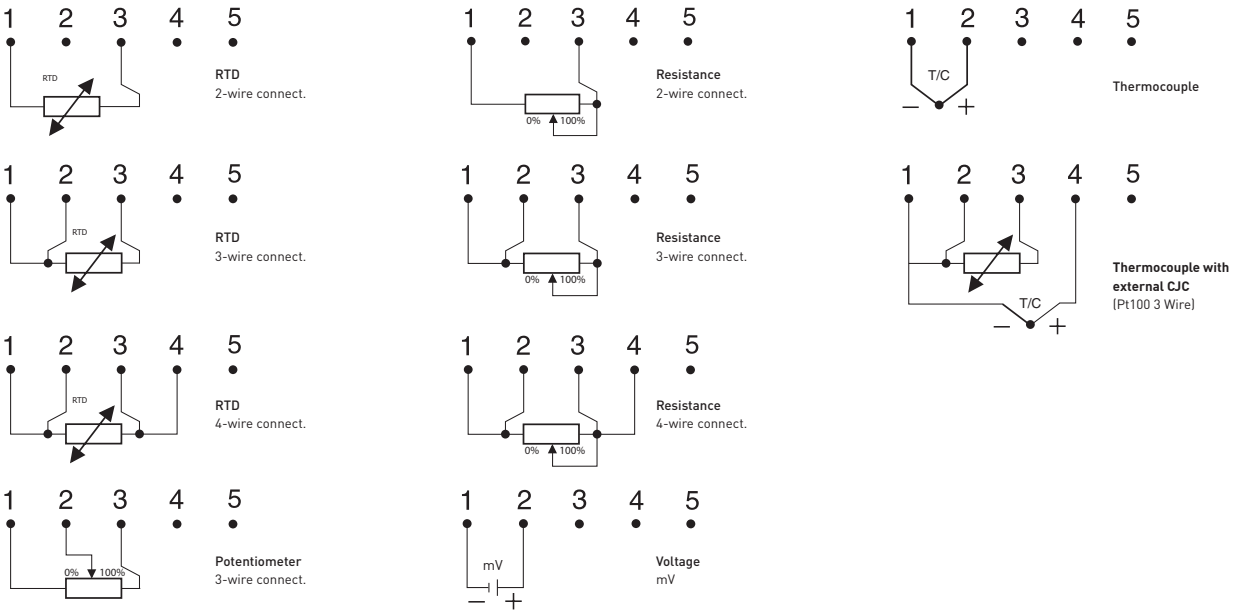
Input type	Temperature range	Minimum span	Accuracy	Temperature Influence
			Maximum of:	*(Deviation from ref. temp. 20 °C)*
RTD Pt100	-200 to +850 °C	10 °C	±0.08 °C or ±0.08 % of span	±0.01 % of span per °C
RTD PtX [1]	Corresp. to max. 4 kΩ	10 °C	±0.1 °C or ±0.1 % of span	±0.01 % of span per °C [3]
RTD Ni 100	-60 to +250 °C	10 °C	±0.1 °C or ±0.1 % of span	±0.01 % of span per °C
RTD Ni 120	-60 to +250 °C	10 °C	±0.1 °C or ±0.1 % of span	±0.01 % of span per °C
RTD Ni 1000	-50 to + 180 °C	10 °C	±0.1 °C or ±0.1 % of span	±0.01 % of span per °C [3]
RTD Cu10	-50 to +200 °C	83 °C	±1.5 °C or ±0.2 % of span	±0.01 % of span per °C
T/C type B	+400 to +1800 °C	700 °C	±1 °C or ±0.1 % of span [2]	±0.01 % of span per °C
T/C type C	0 to +2315 °C	200 °C	±1 °C or ±0.1 % of span [2]	±0.01 % of span per °C
T/C type D	0 to +2315 °C	200 °C	±1 °C or ±0.1 % of span [2]	±0.01 % of span per °C
T/C type E	-200 to +1000 °C	50 °C	±0.5 °C or ±0.1 % of span [2]	±0.01 % of span per °C
T/C type J	-200 to +1000 °C	50 °C	±0.5 °C or ±0.1 % of span [2]	±0.01 % of span per °C
T/C type K	-200 to +1350 °C	50 °C	±0.5 °C or ±0.1 % of span [2]	±0.01 % of span per °C
T/C type N	-100 to +1300 °C	100 °C	±0.5 °C or ±0.1 % of span [2]	±0.01 % of span per °C
T/C type N	-250 to -100 °C	100 °C	±1 °C [2]	±0.1 % of span per °C
T/C type R	-50 to +1750 °C	300 °C	±1 °C or ±0.1 % of span [2]	±0.01 % of span per °C
T/C type S	-50 to +1750 °C	300 °C	±1 °C or ±0.1 % of span [2]	±0.01 % of span per °C
T/C type T	-200 to +400 °C	50 °C	±0.5 °C or ±0.1 % of span [2]	±0.01 % of span per °C

[1] (10 ≤ X ≤ 1000)

[2] CJC error is not included

[3] ±0.02 % at 2-wire > 2000 Ω of span per °C

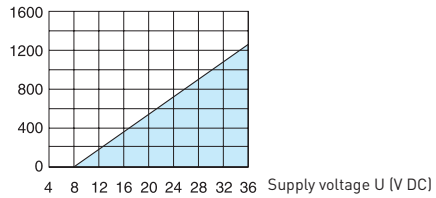
Input connections



Output load diagram

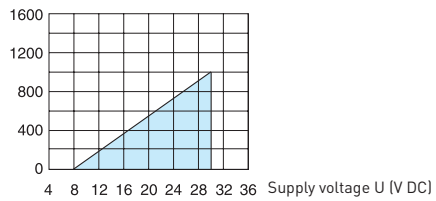
Standard version

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

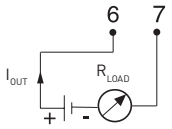


Ex version

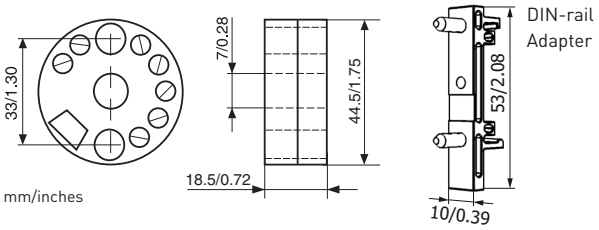
$R_{LOAD}(\Omega) = (U-8)/0.022$



Output connections



Dimensions



Ordering information

C330	70C3300010
C330X	70C330X010
PC configuration kit (USB-conn.)	70CFGUSX01
Configuration	70CAL00001
Head mounting kit	70ADA00017
Rail mounting kit	70ADA00015