



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



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 \pm 0.1°C or \pm 0.1% of span makes regular calibration less necessary.

Low temperature drift

C330 have a very low temperature drift of $\pm 0.01^{\circ}$ C per °C or $\pm 0.01^{\circ}$ 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.

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 $\boldsymbol{\Omega}$ 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 checkup 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

P1100 (IEC 60751, α=0.00385) -200 to +850 °C PY 10 4 X ≤ 1000 (IEC 60751, α=0.00385) Corresp. to max. 4000 D P1100 (JIS C 1644, α=0.003916) -200 to +850 °C Ni120 (Edison Curve No. 7) -60 to +250 °C Ni120 (Edison Curve No. 7) -60 to +250 °C Ni120 (Edison Corve No. 7) -60 to +250 °C Cu10 (Edison Copper Windings No. 15) -50 to +180 °C Cu10 (Edison Copper Windings No. 15) -50 to +180 °C Maximum sensor wire resistance 3- and 4-wire connection 200 µÅ Maximum sensor wire resistance -3 and 4-wire connection Compensation for 0 to 40 Ω loop resistance Input Resistance / Potentiometer Range, resistance 0 to 10000 Ω Minimum span 10 Ω Ω Quivre Customized linearization Up to 50 points Sensor current <300 µÅ Input connections Sele P130Rh-Pt4Rh IIEC 60584] 400 to +1800 °C T/C C T/C B P130Rh-Pt4Rh IIEC 60584] -200 to +1000 °C T/C C T/C C W5-Re IAST M E 988] 0 to +2315 °C <th>Input RTD</th> <th></th> <th></th>	Input RTD			
P100 [JIS C 1604, a=0.003916] -200 to +850 °C Ni100 [DIN 43760] -60 to +250 °C Ni100 [DIN 43760] -50 to +180 °C Cu10 [Edison Copper Windings No. 15] -50 to +250 °C Input connections See "Input connections" below Sensor current -300 to +250 °C Maximum sensor wire resistance 3- and 4-wire connection 20 0/wire Put Resistance / Potentiometer -wire connection Compensation for 0 to 40 0 loop resistance Input Resistance 0 to 10000 0 Range, resistance 0 to 10000 0 Range, resistance 0 to 10000 0 Compensation for 0 to 40 0 loop resistance Input connections See "input connections" below Sensor current Kaximum sensor wire resistance 20 0 / wire 20 0 / wire Input connections See "input connections" below Maximum sensor wire resistance Input Connections See "input connections" below Maximum sensor wire resistance 20 0 / wire Input Connections See "input connections" below Maximum sensor wire resistance 20 0 / wire Input Connections See "i		(IEC 60751, a=0.00385)	-200 to +850 °C	
Ni100 (DiN 4376) -60 to +250 °C Ni120 (Edison Curve No. 7) -60 to +250 °C Ni100 (DiN 4376) -50 to +180 °C Cu10 (Edison Corper Windings No. 15) -50 to +200 °C Input connection See "Input connections" below Sensor current -3 and 4-wire connection 20 0/Wire Maximum sensor wire resistance 3 - and 4-wire connection Compensation for 0 to 40 0 loop resistance Input Resistance / Potentiometer Range, resistance 0 to 10000 0 0 Range, resistance 0 to 10000 0 0 0 Gustomized linearization Up to 50 points 0 0 Sensor current -300 µA -300 µA -300 µA Input connections Up to 50 points -300 µA -300 µA Sensor current -300 µA -300 µA -300 µA Input connections See input connections" below -300 µA Maximum sensor wire resistance 20 0 / wire -200 to +1800 °C T/C B P130Rh-Pt6Rh (IEC 60584) -200 to +1800 °C -200 to +1800 °C	Pt X (10 ≤ X ≤ 1000)	(IEC 60751, a=0.00385)	Corresp. to max. 4000 Ω	
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T/C RPt13Rh-Pt [IEC 60584]-50 to +1750 °CT/C SPt10Rh-Pt [IEC 60584]-50 to +1750 °CT/C TCu-CuNi (IEC 60584)-200 to +400 °CInput impedance>10 MQInput connectionsSee "Input connections" belowMaximum wire loop resistance500 Ω [Including T/C sensor]Cold Junction Compensation (CJC)Internal, external (Pt100) or fixedInput Voltage-10 to +1000 mVRange-10 to +1000 mVMinimum span2 mVCustomized linearizationUp to 50 pointsInput impedance>10 MQInput connectionsSee "Input connections" belowMaximum wire loop resistance500 Ω	Т/СК	NiCr-Ni (IEC 60584)	-200 to +1350 °C	
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T/C SPt10Rh-Pt [[EC 60584]-50 to +1750 °CT/C TCu-CuNi [IEC 60584]-200 to +400 °CInput impedance>10 MΩInput connectionsSee "Input connections" belowMaximum wire loop resistance500 Ω [Including T/C sensor]Cold Junction Compensation (CJC)Internal, external (Pt100) or fixedInput Voltage-10 to +1000 mVRange-10 to +1000 mVMinimum span2 mVCustomized linearizationUp to 50 pointsInput impedance>10 MΩInput onnectionsSee "Input connections" belowSee mixed linearizationUp to 50 pointsInput impedance>10 MΩSee mixed linearizationSee mixed linearizationInput connectionsSee mixed linearizationInput onnectionsSee mixed linearizationInput connectionsSee mixed linearization <td></td> <td></td> <td>-50 to +1750 °C</td>			-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 -10 to +1000 mV Range -10 to +1000 mV Minimum span 2 mV Customized linearization Up to 50 points Input impedance >10 MΩ Input impedance >10 MΩ General input See "Input connections" below General input Within range				
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 -10 to +1000 mV Range -10 to +1000 mV Minimum span 2 mV Customized linearization Up to 50 points Input connections See "Input connections" below Maximum wire loop resistance 500 Ω				
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 Internal, external (Pt100) or fixed 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		00 0011 (iE0 00004)		
Maximum wire loop resistance 500 Ω (Including T/C sensor) Cold Junction Compensation (CJC) Internal, external (Pt100) or fixed Input Voltage Range 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				
Cold Junction Compensation (CJC) Internal, external (Pt100) or fixed Input Voltage Range -10 to +1000 mV Range -10 to +1000 mV 0 Minimum span 2 mV 0 Customized linearization Up to 50 points 0 Input impedance >10 MΩ 0 Input connections See "Input connections" below 0 Maximum wire loop resistance 500 Ω 0 General input Zero adjustment Within range				
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				
Range-10 to +1000 mVMinimum span2 mVCustomized linearizationUp to 50 pointsInput impedance>10 MΩInput connectionsSee "Input connections" belowMaximum wire loop resistance500 ΩGeneral inputZero adjustmentWithin range	Cold Sunction Compensation (CSC)			
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				
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			-10 to +1000 mV	
Input impedance >10 MΩ Input connections See "Input connections" below Maximum wire loop resistance 500 Ω General input Zero adjustment Within range				
Input connections See "Input connections" below Maximum wire loop resistance 500 Ω General input Zero adjustment	Customized linearization		Up to 50 points	
Input connections See "Input connections" below Maximum wire loop resistance 500 Ω General input Zero adjustment	Input impedance		>10 MΩ	
Maximum wire loop resistance 500 Ω General input Zero adjustment			See "Input connections" below	
Zero adjustment Within range	Maximum wire loop resistance			
Zero adjustment Within range				
Zero adjustment Within range Max offset adjustment 50% of selected max value			\A/'\1 '	
Max offset adjustment 50% of selected max value	Zero adjustment			
	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			
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 µÅ	
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	3	Individual upscale/downscale action for Sensor	
		break and Sensor short-circuit	
Status information via ConSoft acc.		Sensor break and Sensor short-circuit	
General data			
Isolation		1500 VAC, 1 min	
Power supply, polarity protected		8 to 36 VDC	
Line rejection		50 Hz to 60 Hz line rejection	
Ex Approvals IPAQ C330X			
ATEX		II 1 G Ex ia IIC T6T4 Ga	
IECEx		Ex ia IIC T6T4 Ga	
FM		Ex ia IIC T6T4 Ga	
CSA		Ex ia IIC T6T4 Ga	
Environment conditions			
Ambient temperature	Storage	-40 to +85 °C	
	Operating	-40 to +85 °C	
Humidity		098% 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	
	initiality performance	NE 21: <0,5% of span	
		1 1 2 1. 10,0 /0 01 Spain	
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	$\frac{1}{10000000000000000000000000000000000$	
Weight	Single/Stranueu wires		
		35g IP 65 / IP 00	
Protection, housing / terminals		IF 00 / IF UU	



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

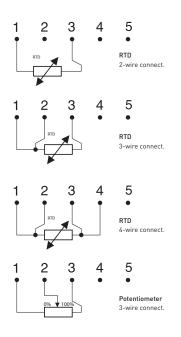
Accuracy specifications and minimum spans for RTD and Thermocouples

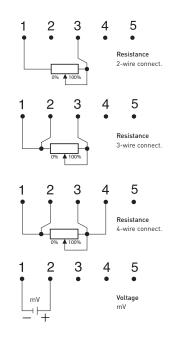
Conformance level 95 % (2o)

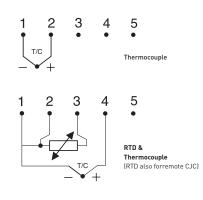
Input type	Temperature range	Minimum span	Accuracy	Temperature Influence
			Maximum of:	(Deviation from ref. temp. 20 °C)
RTD Pt100	-200 to +850 °C	10 °C	±0.08 °C or ±0.08 % of span	±0.01 % of span per °C
RTD PtX 1)	Corresp. to max. 4 kΩ	10 °C	±0.1 °C or ±0.1 % of span	±0.01 % of span per °C ^{3]}
RTD 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
			· · · · · · · · · · · · · · · · · · ·	

(10 ≤ X ≤ 1000)
CJC error is not included
±0.02 % at 2-wire > 2000 Ω of span per °C

Input connections



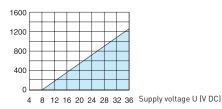




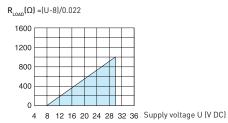
Output load diagram

Standard version

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



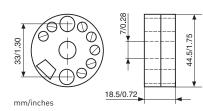




Output connections



Dimensions





10/0.39

Ordering information

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

