



Weidmüller 

Output Loop Powered Products Section C

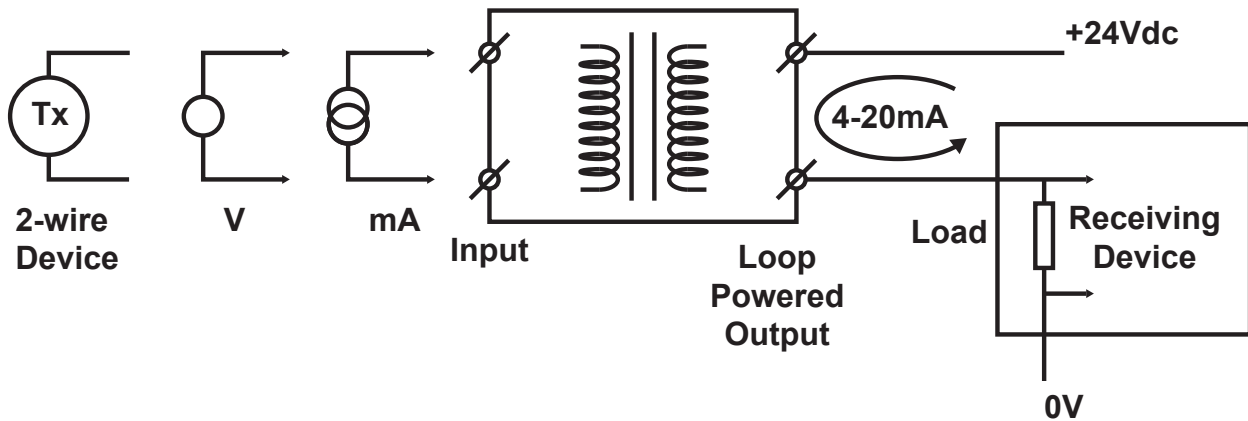
An output loop powered (or signal powered) isolator derives its power from the voltage drop across the device's 4-20mA current loop output. Because they require no separate power supply wires they have a low installed cost.

Output Loop Powered Products

Output Loop Powered Isolators

Output loop powered (or 2-Wire) isolators gained their name because the power for their operation is carried on the same pair of wires as the output signal they control. A typical loop consists of a regulated dc power supply, the two-wire transmitter and a receiving device all connected in series as shown. The 4-20mA output signal powers the electronics of the transmitter. The input is filtered and conditioned and then passed across an input to output isolation barrier. The demodulated signal varies the output in proportion to the measurement. The input side can be analogue based with fixed input, or microprocessor based such as the ITXPlus, which offers greater flexibility in handling many different input types in a standard off the shelf unit.

Typical connection for Loop Powered Transmitter



Output Loop powered isolators require from 6V minimum to operate correctly. The maximum load in the output loop can be calculated using ohm's law as follows:

$R(\max) = (V_s - V_d) / 0.02\Omega$, where V_s is the dc loop supply voltage and V_d is the voltage drop across the inputs of the isolator.

Output loop powered isolators accept passive inputs and or active inputs from two wire transmitters in the field. Output loop powered Isolators are commonly used for isolating and converting inputs from the field to the control or monitoring system. These could include Thermocouples, RTD's, Resistance, Potentiometers, mA, or Volts and now 2-wire transmitters with the ACT20M models available in single and dual channel models.

Care should also be taken to ensure that an output loop powered isolator has sufficient power to drive the required load. Failure to do so will not allow the unit to reach full output, resulting in false readings and preventing the activation of high alarms.

Universal Input



ITXPlus

Weidmüller's ITXPlus is a PC configurable 2 wire isolator. The ITXPlus is powered from the 4-20mA output loop and boasts a fully programmable input (selectable for Thermocouples, RTD's, mV, V, mA, resistance or potentiometer). The 4-20mA output can be configured for direct or reverse acting or custom curve.

Software for the ITXPlus is shipped with the CBX100USB adaptor (for programming via PC USB port) or you can order a factory customised unit using the variable number.

Although the ITXPlus is output loop powered, it can drive a 600Ω output load @ 24Vdc supply. Input/Output isolation is 2kV while housed in a 12.5mm wide case.

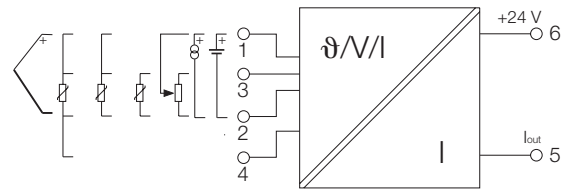
Features

- Configurable input to most process signals
- 10-40Vdc loop powered supply
- Simple free PC software
- Slim 12.5mm housing

Applications

Use the ITXPlus to:

- Isolate instrument runs between the field and the control system
- Convert most process signals to 4-20mA 2-wire output
- Linearise non linear signals from tanks or flow sensors
- Convert current source signals to Loop Powered



Universal Loop Powered Signal Isolator/Converter



CBX100USB Interface kit

A CBX100USB provides an isolated USB connection from a PC to provide data transfer to the ITXPlus and Wave TTA models. T-Set programming software allows parameter upload or download, live viewing of process value, and data logging.

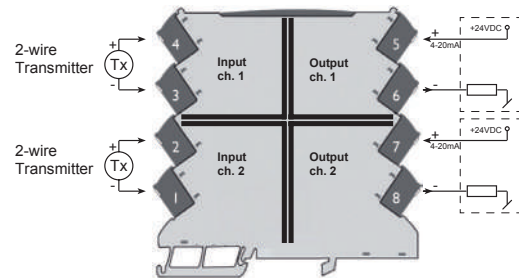
Technical Data

Inputs	
Input Type	Universal
Thermocouple	B, C, E, J, K, L, N, R, S, T, W3, W5 or User Defined
RTD	Pt100, Pt200, Ni120, Cu100 (2, 3 or 4-wire mode)
Milliamp	-10mA to +20mA into 40Ω (min. span 1mA)
Voltage	-5V to +10V into 2MΩ (min. span 0.5V)
Milivolt	-100mV to +200mV into 2MΩ (min. span 4mV)
Resistance	0 to 10kΩ (min. span 10Ω)
Potentiometer	1.2kΩ to 500kΩ (end-to-end resistance)
Outputs	
Output Type	4-20mA (Output Loop Powered)
Power Supply	
Power Supply Type	Output Loop Powered
Voltage Drop Across Unit	10V
Performance	
Linearity	Typically ±0.1%
CJC	Better than ±1.0°C
Lead Length Compensation	< 0.002Ω per Ω of cable resistance
Step Response (10%-90%)	Typically 400ms
Operating Temperature	-10 to +70°C
Housing	
Dimensions (mm)	75.5 x 12.5 x 119
Terminals	Screw Type
Conductor Type	12-28AWG wire

Ordering Data

Type	Order No.
ITXPlus 4-20mA 4-20mA	7940016563
ITXPlus Variable (Specify input type and range)	8944980000
CBX100USB and Software	7940025031

ACT20M Isolators for Output Loop Powered Devices



Single and Dual Channel, Output loop Powered, Isolator

Isolators for Output Loop Powered Devices

The ACT20M OLP provides an isolated field supply for an Active input from a 2 wire transmitter, and repeats this value on the output. This model will insert directly into an existing 2 wire loop and provide isolation with no wiring changes.

Features

- Extremely compact design (6.1mm wide)
- Isolate 2 wire Transmitters
- Output Loop Powered
- Available in single and dual channel versions
- Complete Isolation (Input to Output)
- -25°C to 70°C operating temperature
- DIN Rail mounting

Technical Data

Accuracy	< 0.1% of end value
Galvanic Isolation	Passive Isolator
Input/Output	0(4)...20 mA/0(4)...20 mA
V Drop	Typically 2.5V
Output Load	≤ 600Ω
Channels	Single/Dual
Mounting rail	TS 35
Temperature coefficient	50 ppm/K of final value
Type of Connection	Screw Connection
IECEx ratings	Ex nA IIC T4 Gc
Length x Width x Height	114.3 x 6.1 x 112.5 mm



Applications

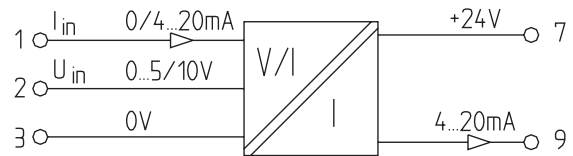
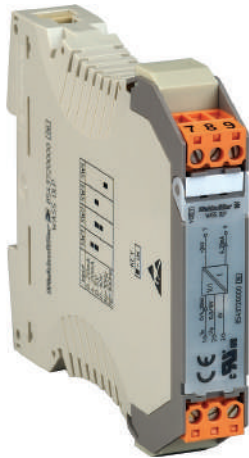
Use ACT20M CI-CO-OLP Isolators for:

- Isolating 2-wire (Output Loop Powered) devices
- Prevention of ground loops and reduction of common mode noise

Ordering Data

Type	Description	Order No.
ACT20M CI-CO-OLP-S	Single Channel, Screw Connection	1176040000
ACT20M 2CI-2CO-OLP-S	Dual Channel, Screw Connection	1176050000

Current/Voltage Isolator



Single Channel, Output Loop Powered, Isolator

Output Loop Powered Isolators

The Wave Series output powered (2-wire) isolator draws its power from the output signal current loop (4-20mA). It has switch selectable input range and can be configured with two response times to suit your application.

Features

- Output Loop Powered
- Switch Selectable Input Current /Voltage Ranges
- Switch Selectable response time
- Complete Isolation (Input to Output)
- 0°C to 55°C operating temperature
- DIN Rail mounting

Technical Data

Inputs	
Input Type	DIP Switch Selectable Current/Voltage Range
Input Ranges	0-20mA into 51Ω 4-20mA into 51Ω 0-5V into 210kΩ 0-10V into 430kΩ
Max. Voltage / Current	30Vdc / 40mA
Analogue Output	
Output Type	Output Loop Powered (12Vdc to 30Vdc)
Output Range	4-20mA
Output Drive	600Ω @ 24Vdc
Performance	
Accuracy	Better than 0.2% of Span
Step Response	Switch Selectable (80ms or 50ms)
Operating Temperature	0 to 55°C
Housing	
Dimensions (mm)	92.4 x 17.5.0 x 112.4
Terminals	Screw Type
Conductor Clamping Range	0.5mm ² to 2.5mm ²

Applications

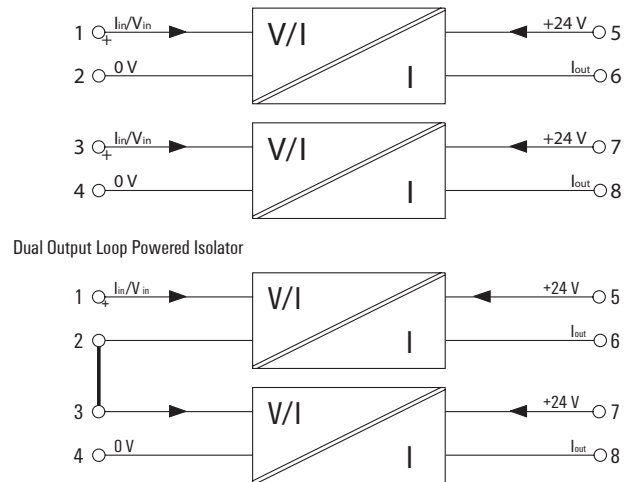
Use output loop powered isolators for:

- Isolation of mA or Volt signals into 4-20mA
- Conversion and isolation of sourced 4-20mA loops to control systems configured for loop powered inputs
- Reduction of power supply wiring

Ordering Data

Type	Description	Order No.
WAS5 OLP	Single Channel, Screw Connection	8543720000

Dual Channel Signal Splitter/Isolator



Using the TWI-2 as a signal splitter

TWI-2

The TWI-2 has two, independent, output loop powered isolators for 4-20mA loops in one box. Typically TWI-2 isolators are used as:

- Isolators - to eliminate faulty readings caused by ground loops, electrical interference and motor noise.
- Signal Splitters - to produce two independent isolated 4-20mA outputs from one input. Use the TWI-2 for this application by connecting the two 4-20mA inputs in series. The outputs can go to completely separate devices such as control systems, PLCs, indicators, controllers and data loggers.
- Signal Repeaters - to boost signals for increased transmission distance or allow additional devices to be connected to the loop.

Features

- Output Loop Powered
- Single and Dual Channel versions
- Current or Voltage inputs
- Independent Zero and Span controls for each channel
- 600Ω output drive capability at 24Vdc
- No internal adjustments needed
- Dual DIN rail mount housing
- Plug-in, screw type, terminal blocks

Technical data

Housing	Dual DIN Rail mount
Input Type	4-20mA/0-10V (as ordered)
Channels	Single/Dual (as ordered)
Analogue Output	4-20mA (Fixed)
Output load	600Ω Load @ 24Vdc
Power supply	Output Loop Powered
Adjustments	20-turn potentiometers
Linearity	Typically ±0.1% of span
Isolation	1.5kVrms for 60s (AC & DC)

Applications

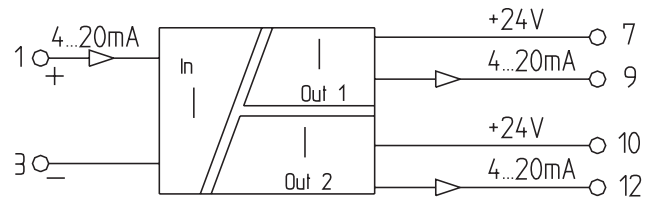
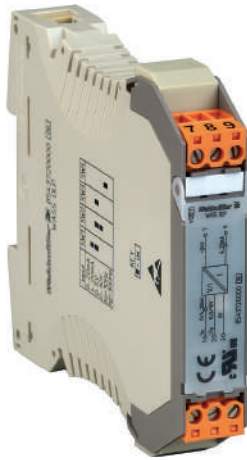
Use the TWI-2 for:

- Reduction of rail space for 2 loops
- Link inputs for 1in/2out option for adding second output
- Add 250Ω to second output for 1-5V monitoring point

Ordering Data

Type	Description	Order No.
TWI-2 0-10V	TWI-2 with 0-10V Inputs	7940012011
TWI-2 4-20mA	TWI-2 with 4-20mA Inputs	7940010171

Splitter/Isolator



Output Loop Powered, Splitter and Isolator

Output Loop Powered Splitter

The Wave Series Output Loop Powered Signal Splitter produces two independent isolated 4-20mA outputs from one 4-20mA input. The outputs can go to completely separate devices such as control systems, PLCs, indicators, controllers and data loggers. Both outputs are loop powered.

Features

- Very low power consumption
- Output Loop Powered
- Input range selected by DIP switch
- Complete Isolation
- 0°C to 55°C operating temperature
- DIN Rail mounting

Technical Data

Inputs	
Input Type	4-20mA
Maximum Current	40mA
Voltage drop	3.8V
Analogue Output	
Output Type	Dual Output Loop Powered (12Vdc to 30Vdc)
Output Range	4-20mA
Output Load	600Ω @ 24Vdc
Output Voltage Drop	12V
Performance	
Accuracy	Better than 0.2% of Span
Step Response	20ms
Isolation	4kV
Operating Temperature	0°C to 55°C
Housing	
Dimensions (mm)	92.4 x 17.5 x 112.4
Terminals	Screw Type
Conductor Clamping Range	0.5mm ² to 2.5mm ²

Applications

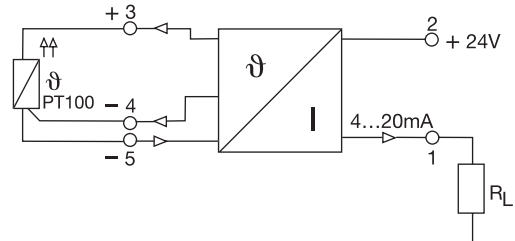
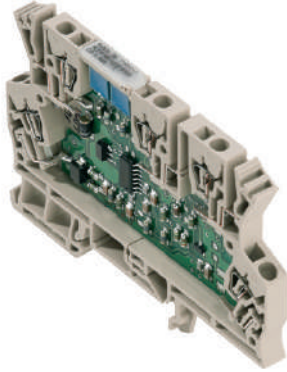
Use Output Loop powered splitters for:

- Applications that require a second signal from a 4-20mA loop
- Feeding a duplicate signal to monitoring system, e.g. DCS/PLC
- Providing a 0-5V test point on a 4-20mA loop across a 250Ω resistor

Ordering Data

Type	Description	Order No.
WAS5 CCC 20LP	Output Loop Powered Signal Splitter / Isolator	8581160000

MCZ Pt100 Signal Converters



MCZ Pt100/3 CLP

Pt100 Signal Converters

The MCZ Pt100/3 CLP is an Output Loop Powered Signal Converter for two and three wire Pt100 Temperature Sensors. Pt100 sensor construction provides natural isolation from the process.

A version is also available with a built-in sensor for enclosure temperature monitoring applications with an overall accuracy of $\pm 0.5^\circ\text{C}$.

Features

- Accuracy Typically 0.2%
- Linearised to Temperature
- Automatic Lead Length Compensation
- Operating Temperature 0-50°C
- Fast response 10ms

Technical Data

Input Type	Pt100 Temperature Sensor with automatic lead length compensation
Output Type	4-20mA current loop
Output Drive	$\leq 600\Omega$
Step response time	10ms
Supply voltage max.	30 V/min. 9 V + (20 mA x RL)
Temperature coefficient max.	± 250 ppm/K
Linearised	To measure temperature
Accuracy	Typical 0.2%, max. 0.5% of span
Isolation	None
Operating Temperature	0°C to 50°C
Mounting rail	TS 35
Dimensions (mm)	91 x 6 x 63.2
Terminals	Tension Clamp style connectors
Conductor Clamping Range	0.5mm ² to 1.5mm ²

Applications

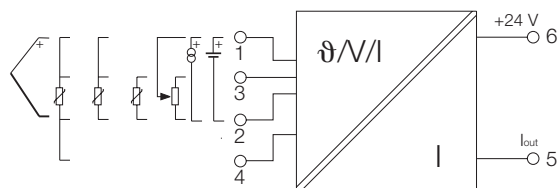
Use the MCZ Pt100/3 CLP for:

- Conversion of temperature sensor to 4-20mA for noise immunity
- 4-20mA cable cost reduction over sensor cable
- Also available with built-in Pt100 sensor for enclosure temperature monitoring (0-50°C)

Ordering Data

Type	Description	Order No.
MCZ Pt100/3 CLP 0-100°C	Output Loop Powered Pt100 Converter 0-100°C	8425720000
MCZ Pt100/3 CLP 0-120°C	Output Loop Powered Pt100 Converter 0-120°C	8483680000
MCZ Pt100/3 CLP 0-150°C	Output Loop Powered Pt100 Converter 0-150°C	8604420000
MCZ Pt100/3 CLP 0-200°C	Output Loop Powered Pt100 Converter 0-200°C	8473010000
MCZ Pt100/3 CLP 0-300°C	Output Loop Powered Pt100 Converter 0-300°C	8473020000
MCZ Pt100/3 CLP -50°C to 150°C	Output Loop Powered Pt100 Converter -50°C to 150°C	8473000000
MCZ Pt100/3 CLP -40°C to 100°C	Output Loop Powered Pt100 Converter -40°C to 100°C	8604430000
MCZ Pt100 / 0-100°C / Built-in Pt100 New!	Temperature Sensing Terminal Block 0-100°C	7940047724
APMCZ 1.5	End Plate for MCZ housing	8389030000

ITXPlusH Head Mount, Universal Input Converter/Isolator



Universal Loop Powered Signal Isolator/Converter



CBX100USB Interface kit

A CBX100USB provides an isolated USB connection from a PC to provide data transfer to the ITXPlusH, ITXPlus and Wave TTA models. T-Set programming software allows parameter upload or download, live viewing of process value, and data logging.

ITXPlusH

The ITXPlusH is a truly universal, compact, loop powered, isolated, signal conditioner in head mount housing. You can program it to suit most input signals. It will measure, convert, linearise, filter, and isolate the signal and provide you with an industry standard 4-20mA output.

Features

- Universal Input
- Converts, filters and and isolates most common signals and sensor types
- Loop powered
- PC Programmable
- Automatic CJC for thermocouple inputs
- Automatic lead length compensation for RTD inputs
- Sensor burnout detection
- Preset and user-defined linearisation
- Fully isolated
- Head mount

Applications

Use the ITXPlusH for:

- Improved signal over long runs
- Low cost temperature conversion
- Valve position monitoring - Potentiometer conversion
- RTD Conversion in large sensor head
- DIN Rail RTD converter

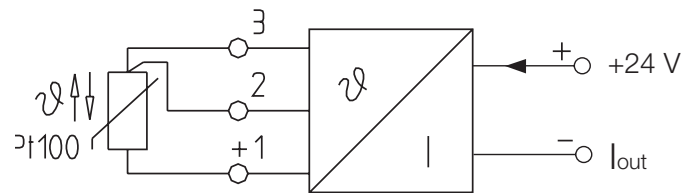
Technical Data

Inputs	
Input Type	Universal
Thermocouple	B, C, E, J, K, L, N, R, S, T, W3, W5 or user Defined
RTD	Pt100, Pt200, Ni120, Cu100 (2,3 or 4-wire mode)
Milliamp	-10mA to +20mA into 40Ω (min.span 1mA)
Voltage	-5V to +10V into 2MΩ (min.span 0.5V)
Millivolt	-100mV to + 200mV 2MΩ (min.span 4mV)
Resistance	0 to 10kΩ (min.span 10Ω)
Potentiometer	1.2kΩ to 500kΩ (end-to-end resistance)
Outputs	
Output type	4-20mA (Output Loop Powered)
Power Supply	
Power Supply Type	Output Loop Powered
Voltage Drop Across Unit	10V
Performance	
Linearity Typically	±0.1%
CJC Better than	±1.0°C
Lead Length Compensation	< 0.002Ω per Ω of cable resistance
Step Response	400ms Typically
Operating Temperature	-10 to +70°C
Housing	
Type	Head mount hockey puck type
Dimensions	(mm) 44.0 x 25mm
Terminals	Screw Type
Conductor Type	12-28AWG Wire

Ordering Data

Type	Description	Order No.
ITXPlusH/4-20mA/4-20mA	ITXPlusH 4-20mA / 4-20mA	7940010160
ITXPlusH	ITXPlusH Variable (Specify input type and range)	7940083981
CBX100USB and Software	Communications and Isolation for PC USB Port	7940025031
Adaptor to suit CBX100UBB	CBX100 USB head mount adaptor	7940029545

Head Mount Temperature Sensor Converters



NTX/H/RTD

Technical data

Housing	Fully encapsulated, Hockey puck style design
Input Type	Pt100
Input Range	Fixed (as Ordered)
Channels	Single
Analogue Output	4-20mA
Power supply	Output Loop Powered
Adjustments	Front panel, multi-turn potentiometers
Linearity	Typically $\pm 0.1\%$ of span

NTX/H Series

The Mann Series NTX/H/RTD are head mount, loop powered, transmitter suitable for measuring temperatures. Inputs are fixed range (with wide adjustment) from Pt 100 resistive temperature detectors (in 2-wire or 3-wire mode). The transmitters are non-isolated since RTD construction normally provides isolation from the process.

The fully encapsulated, hockey puck style design mounts directly into a standard temperature probe head. This reduces cabling costs as long runs of expensive RTD (3-wire) and thermocouple extension cables are not required. In addition the low level measurement signals are converted to a high level 4-20mA signal more suitable for long distance transmission.

Features

- Output Loop Powered
- Linearised to temperature
- Accurate, stable and repeatable
- True lead length compensation
- Mounts directly in a standard temperature probe head
- 'Loop operating' LED indication
- Fully encapsulated, hockey puck style design

Applications

Use the NTX/H Series for:

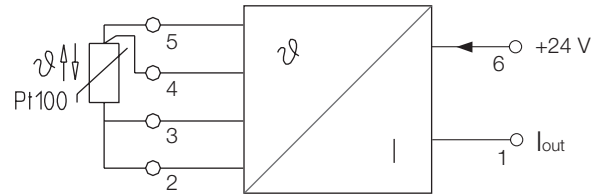
- Conversion of temperature sensor at sensor head to 4-20mA for noise immunity
- 4-20mA cable cost reduction over sensor cable

Ordering Information

Type	Type	Order No.
NTX/H/RTD 100	NTX/H/RTD/0-100°C	7940010161
NTX/H/RTD 150	NTX/H/RTD/0-150°C	7940011771
NTX/H/RTD 200	NTX/H/RTD/0-200°C	7940011383

Other ranges available on request.

Head Mount RTD Sensor Converters



Head mount RTD Transmitter

Head Mount RTD Transmitter

The head mount RTD transmitter fits in a standard probe head and converts the measurement from an RTD to a standard 4-20mA analogue signal suitable for sending long distances. It is output loop powered so it only requires two wires for both the power and signal connection.

Features

- Suits most RTD Sensor Types
- Output Loop Powered
- Mounts in large temperature probe head
- Accuracy 0.05% from reading +0.1°C
- Connects to sensor using three or four wire connection
- Wide operating temperature range (-40°C to 85°C)
- PC Programmable via USB port and HTB-Prog interface box



HTB-PROG USB Programmer

Applications

Use the HTB230 for:

- Improved signal over long runs
- Low cost temperature conversion
- Valve position monitoring - Potentiometer conversion
- RTD Conversion in large sensor head
- DIN Rail RTD converter

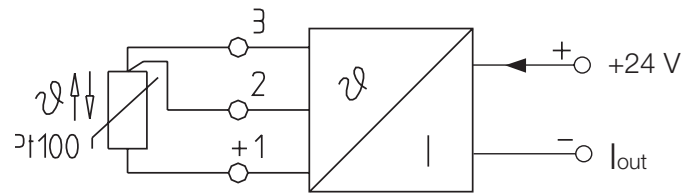
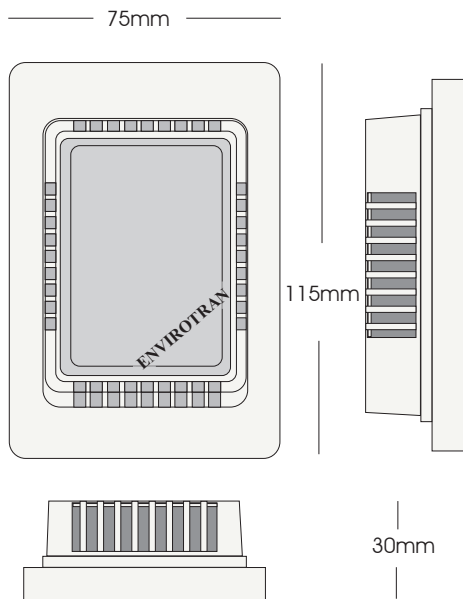
Technical Data

Inputs	
Type	2, 3 or 4-wire RTD or resistance
RTD Sensors	Pt100, Ni100, Cu10
Resistance range	0 to 2kΩ
Output	
Type	Output Loop Powered, 4-20mA
Supply Voltage	6.5 to 30Vdc
Drop across outputs	6.5V
Sensor fault	23mA (upscale selected) or 3.5mA (downscale selected)
Performance	
Accuracy	±0.05% of span ±0.1°C
Thermal Drift	±1µA per °C
Operating Temperature	-40°C to +85°C
Housing	
Type	Head mount, hockey puck type
Dimensions	24 high x 60 mm diameter
Fixing	Two captive M4 screws (44mm apart)

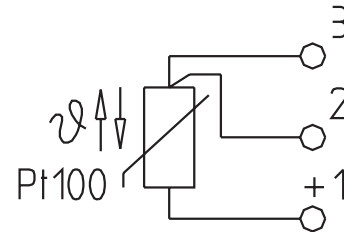
Ordering Data

Type	Description	Order No.
HTB230	Head mount RTD transmitter	7940084187
HTB-PROG	Configuring Hardware	7940084188
HTB300 DIN Bracket	DIN Rail mounting bracket	7940084991
MekuWin	Configuring Software (Free)	7940084992

Wall/Ceiling Mount, RTD Temperature Sensor Converters



ENXHRTD



ENXRTD

ENXHRTD

The ENXHRTD is a cost effective, wall mounted temperature transmitter designed to blend into any environment from factory warehouses to hotel rooms. It mounts on a standard electrical wall plate. Its output is either a proportional 4-20mA signal or direct 3-wire Pt100 RTD connection.

As a loop powered device, the ENXHRTD uses only two wires and the 4-20mA signal eliminates errors caused by resistance at connections and over the length of the wiring run. The internal electronics of the Envirotran are fully encapsulated and safe to install in any environment.

Features

- Mounts directly on any flat wall or ceiling
- Highly reliable, fully encapsulated design
- Low temperature drift
- Cost effective
- Loop Powered with "Loop operating" LED indication
- Fully factory calibrated
- Output linearised to temperature

Technical data

Housing	Wall mount
Input Type	Pt100 or 4-20mA
Input Range	Fixed (as Ordered)
Channels	Single
Power supply	Output Loop Powered
Adjustments	Multi-turn potentiometers
Linearity	Typically $\pm 0.1\%$ of span

Applications

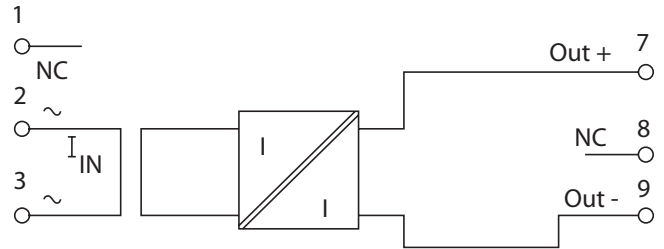
Use the ENXHRTD for:

- Air-conditioning temperature sensor
- Environmental temperature monitoring
- Cabinet temperature monitoring

Ordering Data

Type	Description	Order No.
ENXRTD	Pt100	7940011512
ENXHRTD 60	4-20mA Output for 0-60°C	7940015211
ENXHRTD 75	4-20mA Output for 0-75°C	7940012035
ENXHRTD 100	4-20mA Output for 0-100°C	7940011673

AC Current Monitoring



WAS1 CMA LP 1/5/10A ac

Wave Series current monitoring

The WAS1 CMA LP is an output loop powered AC current transmitter with switch selectable input range of 1A, 5A and 10A.

Units provide 4kV isolation with 6kV impulse protection and can handle temporary overcurrents up to 100A.

Features

- Switch selectable input ranges
- 4-20mA output
- Slim 22.5mm housing



For Current Transformers see page K.1

Technical Data

Inputs	
Input Type	Sinusoidal AC Current (50-60Hz)
Measurement Method	Via direct connection to Internal CT
Current Range	Switch selectable 1A, 5A or 10A
Max. Current	100A for 1s
Outputs	
Output Type	Output Loop Powered
Output Range	4-20mA
Power Supply	
Power Supply Type	Output Loop Powered
Voltage	13-30Vdc
Performance	
Accuracy	0.5% Full Scale
Step Response	700msTypically
Operating Temperature	0-50°C
Isolation	
Input/output isolation	4kV
Impulse withstand	6kV
Housing	
Dimensions	72.0mm x 22.5mm x 92.4mm
Terminals	Screw Type rated 2.5A
Conductor Diameter	0.5mm ² to 2.5mm ²

Applications

Use Input Loop Powered Isolators for:

- Monitoring of mains current
- Measuring motor current consumption

Ordering Data

Type	Input Sensor	Input Range	AC/DC	Output Type	Description	Order No.
WAS1 CMA LP 1/5/10A	Inbuilt CT	0-1A / 0-5A / 0-10A	50-60Hz AC	4-20mA	Output Loop Powered	8528650000