

- HIGH ACCURACY
- 3 1/2 DIGITS LED DISPLAY
- INPUTS: T/C, RTD, Ohm and mV
- GALVANIC ISOLATION
- DRY CONFIGURATION™
- LOW COST
- 3 YEAR WARRANTY



The USD-2 is a computerized, PC rogrammable, galvanically isolated two-wire smart transmitter.

The unit converts 13 types of thermocouple sensors, 12 types of RTD sensors, potentiometer, resistor and millivolt inputs, into process current loop.

The RTD sensors can be connected as 2, 3 or 4 wires - single or differential.

Thermocouple sensors and voltage input can be configured as single input or dual at differential mode.

Integral 3 ½ digits LED display forms a monitor - transmitter unit which is visiable in dark installations. Special red filter is provided for optimal view.

24 bit A/D converter and two microprocessors are the heart of the outstanding performance.

The output current is temperature linearized and can be set to be 4 to 20 / 20 to 4mA - or any range within these limits. The current is limited to 3.95 and 20.5mA.

The USD-2 samples and updates the output current in a rate of 2 - 3 samples per second depends on the sensor type.

The transmitter is fully configurable in Dry- Configuration™ mode by which the communication to PC is performed with no external power source. The configuration parameters are stored in a non-volatile memory.

Exceptional digital accuracy of typically  $\pm 0.1^{\circ}\text{C}$  is provided for most sensors regardless of the calibrated span.

Internal Pt-100 temperature sensor provides precise cold-junction compensation throughout the entire ambient range.

Detection of sensor breakage or disconnection of input leads, forces the output to a pre-defined up/down scale value.

The unit continuously monitors the sensor and automatically returns to normal operation mode when the sensor is recovered.

The USD-2 is housed in a plastic enclosure mounted on a standard DIN rail.

**Input**

Input Impedance	$> 10^7 \Omega$
Maximum input voltage	$< 1V$

**Thermocouple and Millivolts**

Type	Standard	Input range °C	Input range °F	Minimum Span	Digital Accuracy <sup>2</sup>	D/A Accuracy <sup>1</sup>
<b>B</b> Pt30Rh-Pt6Rh	IEC 584-1 ITS-90	400 to 1820	752 to 3308	200°C / 360°F	±0.8°C	±0.05%
<b>E</b> NiCr-Con	IEC 584-1 ITS-90	-200 to 1000	-328 to 1832	50°C / 90°F	±0.1°C	
<b>J</b> Fe-Con	IEC 584-1 ITS-90	-200 to 1200	-328 to 2192	50°C / 90°F	±0.1°C	
<b>K</b> NiCr-Ni	IEC 584-1 ITS-90	-200 to 1370	-328 to 2498	50°C / 90°F	±0.1°C	
<b>L</b> Fe-Con	IEC 584-1 ITS-90	-190 to 890	-310 to 1634	25°C / 45°F	±0.1°C	
<b>N</b> NiCrSi-NiSi	IEC 584-1 ITS-90	-200 to 1300	-328 to 2372	25°C / 45°F	±0.1°C	
<b>R</b> Pt3Rh-Pt	IEC 584-1 ITS-90	0 to 1760	32 to 3200	200°C / 360°F	±0.5°C	
<b>S</b> Pt10Rh-Pt	IEC 584-1 ITS-90	0 to 1760	32 to 3200	200°C / 360°F	±0.5°C	
<b>T</b> Cu-Con	IEC 584-1 ITS-90	-200 to 400	-328 to 752	50°C / 90°F	±0.1°C	
<b>U</b> Cu-Con	IEC 584-1 ITS-90	-190 to 590	-310 to 1094	25°C / 45°F	±0.1°C	
<b>D</b> W3Re-W25Re	ASTM E988-90	0 to 2230	32 to 4046	25°C / 45°F	±0.5°C	
<b>G</b> W-W26Re	ASTM E988-90	1000 to 2160	32 to 3920	25°C / 45°F	±0.5°C	
<b>C</b> W5Re-W26Re	ASTM E988-90 ITS-90	0 to 2320	32 to 4208	25°C / 45°F	±0.5°C	
Millivolt Input		-145 to 145		2 mV	±5µV	
Mode	T/C: single or differential sensor			Voltage: ordinary or differential		
Cold Junction	Internal Pt-100 sensor					
C.J Accuracy	±0.5°C (±0.9°F)					
Sampling Rate	T/C: single: 4 (S/sec) , Differential: 2 (S/sec)			Voltage: 4, Differential: 2 (S/sec)		

Total probable accuracy for T/C measurement equals to:  $\sqrt{C.J.E^2 + DA^2 + (\text{span} * 5 * 10^{-4})^2}$  where C.J.E is the cold-junction error and DA is the digital accuracy value for the specific T/C.

**Note:** For maximum accuracy for T/C input, all the above error components should be accumulated.

**Resistor Temperature Detector (RTD)**

Type	Standard	Input range °C	Input range °F	Minimum Span	Digital Accuracy <sup>2</sup>	D/A Accuracy <sup>1</sup>
Pt-50	α=0.00385 Ω/Ω/°C ITS-90	-200 to 850	-328 to 1562	10°C / 18°F	±0.15°C	±0.05%
Pt-100		-200 to 850	-328 to 1562	10°C / 18°F	±0.1°C	
Pt-500		-200 to 690	-328 to 1274	10°C / 18°F	±0.1°C	
Pt-1000		-200 to 690	-328 to 1274	10°C / 18°F	±0.1°C	
Pt-50	α=0.00392 Ω/Ω/°C ITS-90	-100 to 455	-148 to 851	10°C / 18°F	±0.15°C	
Pt-100		-100 to 455	-148 to 851	10°C / 18°F	±0.1°C	
Pt-500		-100 to 455	-148 to 851	10°C / 18°F	±0.1°C	
Pt-1000		-100 to 455	-148 to 851	10°C / 18°F	±0.1°C	
Ni-Fe		-200 to 260	-328 to 500	10°C / 18°F	±0.1°C	
Ni-120		-80 to 200	-112 to 500	10°C / 18°F	±0.1°C	
Ni-1000		-50 to 160	-58 to 320	10°C / 18°F	±0.1°C	
Cu-10		-120 to 150	-184 to 500	20°C / 18°F	±0.7°C	
Resistor		0 to 2 KΩ		4 ohm	±0.1% <sup>1</sup>	
Potentiometer		0 to 30KΩ		±0.1% <sup>1</sup>	±0.1% <sup>1</sup>	
Connection Type		2, 3 or 4-wire				
Mode		Single Sensor Mode			Dual Sensor-Differential Mode	
Sensor Current		< 0.2 mA				
Sampling Rate		Single sensor: 3 S/sec, Differential: 2 S/sec			Potentiometer: 2 S/sec	

Example: Pt-100 sensor input, configured to 0-50°C: The digital accuracy would be  $\pm 0.1^\circ\text{C}$ , the D/A accuracy would be  $\pm 50 \times 0.05 / 100 = \pm 0.025^\circ\text{C}$ , Total maximum accuracy =  $\pm 0.125^\circ\text{C}$ .

### Output

Output Signal	Proportional dc current 4-20mA or 20-4mA (user configurable)
Under Range	Linear to 3.97mA
Over Range	Linear to 20.8mA
Burnout	~ 3.6mA or ~22.5mA (user configurable)
Isolation	>1500V between input and output
Output Linearity	For temperature sensors - linear with temperature
	For potentiometer - linear with potentiometer ratio
	For millivolt input - linear with the measured voltage
Long Term Stability	$\leq \pm 0.1\%$ of span for 12 months
Maximum Loop Resistance	According to: $R_{max}(\Omega) = (V_{supply}-13)/0.02$
Calibration Accuracy	At 24V supply, at room temperature : $0.05\%$ <sup>1</sup>
Damping Factor	1 - 60 seconds
Analog Step-Response	200-500mS (depends on the sensor and the mode of operation)
Set-Up Time	10 seconds after power on

### Display

Display	3 1/2 digits LED ( -1999 to 1999) + one decimal point
Display Size	0.32" digit height
Display Color	Red
Intensity	Varies as a function of the output current

### Supply

Supply Voltage	13 to 36 Vdc
Supply Variation Effect	Negligible ( $<1\mu A/V$ )
Polarity Protection	Yes
CMR	> 110 db

### Environmental Influence

Operating Temperature Range	-40 to +80°C / -40 to 185°F
Storage Temperature Range	-50 to +90°C / -45 to 185°F
Temperature Stability	$< \pm 0.004\%/^{\circ}C$ <sup>1</sup>
Humidity	10 to 90 % RH, non condensing

### Housing

Material	Plastic Polycarbonate
Screw Connection	6 terminals
Mounting	Standard DIN rail
Protection Level	IP20 UL-94-V0 flame retardant
Weight	75 gr.

### Programming

Software Package	CONCAL
Modem Cord	CON-USB - Length: 1.50m
Configured Parameters	Tag information , Sensor type, Input range, Display range, Selection of connection type, Output offset, Output curve correction, Damping factor, Burnout type, Output current mode, Sensor calibration

<sup>1</sup>. Of span

<sup>2</sup>. The digital readout can be accessed via the programming communication port.

### Transmitter Configuration

The CONCAL configuration and calibration software is a PC-based software package.

The PC is connected to the transmitter via CON-USB, communication cable for USB port. This communication cable contains the electronic interface circuitry for DRY CONFIGURATION™.

The DRY CONFIGURATION™ feature makes the configuration process very easy, as it does not require the transmitter to be wired to an external power supply.

The Windows based software conducts the user to the configuration steps in a friendly and simple interactive way.

The PC requirements are:

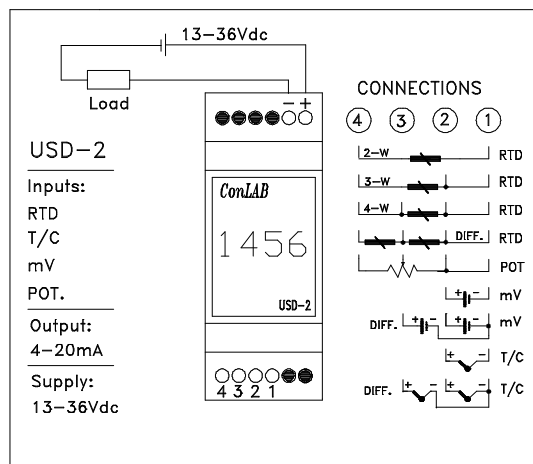
PC Operating System:

Microsoft Windows 98®, Windows XP®, Windows NT®, Vista.

Display: Color display with screen resolution of 1024x768. Lower resolution will require scrolling for accommodation of the configuration window.

Free Disk Space: 15 MB

### Connection Diagram



### Dimensions

