

- HIGH ACCURACY
- INPUTS: T/C, RTD, Ohm AND mV
- GALVANIC ISOLATION
- PC CONFIGURABLE
- 3½ DIGIT LED DISPLAY
- CHOICE OF ALUMINUM OR SS316 ENCLOSURE
- EXPLOSION PROOF, INTRINSICALLY SAFE CERTIFIED
- 3 YEAR WARRANTY

## INTRODUCTION

IME Model 8088TR is a Digital, PC programmable, galvanically isolated two-wire smart transmitter. The unit converts 13 types of thermocouple sensors; 12 types of RTD sensors, configured as 2, 3 and 4 wires; potentiometer, resistor and millivolt inputs into process current loop. A 24 bit A/D converter is the heart of this outstanding performance.

## DESCRIPTION

IME Model 8080TR Universal Input Smart transmitters are designed for use in process industries where vibration, inclement weather and corrosive atmospheres prevail. The electronics are enclosed in a low copper epoxy coated Aluminum housing and for more aggressive environments, a SS316 housing is optionally available. The housings meet the requirements of NEMA4X and IP67, and are also certified Explosion Proof by FM/CSA and ATEX(CENELEC).

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 3.6 and 22mA. The unit updates are 3 times per second for the display and 4 times per second(max.) for the current output.

Exceptional digital accuracy of typical  $\pm 0.1^{\circ}\text{C}$  is provided for all the sensors regardless of the calibrated span. Extremely accurate cold-junction temperature measurement provides precise compensation throughout the entire ambient range. The unit also accurately measures and compensates the RTD



sensor leads in the 3-wire connection.

The transmitter can be set and wired to perform differential measurement conversions of temperature sensors as well as mV sources.

The transmitter is fully configurable by connecting to a PC with no external power supply required. The configuration parameters are stored in a non volatile memory.

Digital output data can be obtained via a communication port located on the front panel. Continuous, average and max/min readings can be monitored.

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.

In applications where no local indication is required, the tempered glass cover is replaced by a solid cover and no LED indicator is provided.

**Input**

Input Impedance	>10 <sup>7</sup> Ω
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 Pt16Rh	IECS84-1 ITS-90	100 to 1820	212 to 3308	200°C / 360°F	±0.5°C	±0.02%
<b>E</b> NiCr-Con	IECS84-1 ITS-90	-200 to 1000	-328 to 1832	50°C / 90°F	±0.1°C	
<b>J</b> Fe-Con	IECS84-1 ITS-90	-200 to 1200	-328 to 2192	50°C / 90°F	±0.1°C	
<b>K</b> NiCr-Ni	IECS84-1 ITS-90	-200 to 1370	-328 to 2498	50°C / 90°F	±0.1°C	
<b>L</b> Fe-Con	IECS84-1 ITS-90	-190 to 890	-310 to 1634	25°C / 45°F	±0.1°C	
<b>N</b> NiCrSi-NiSi	IECS84-1 ITS-90	-200 to 1300	-328 to 2372	25°C / 45°F	±0.1°C	
<b>R</b> Pt13Rh-Pt	IECS84-1 ITS-90	0 to 1760	32 to 3200	200°C / 360°F	±0.5°C	
<b>S</b> Pt10Rh-Pt	IECS84-1 ITS-90	0 to 1760	32 to 3200	200°C / 360°F	±0.5°C	
<b>T</b> Cu-Con	IECS84-1 ITS-90	-200 to 400	-328 to 752	50°C / 90°F	±0.1°C	
<b>U</b> Cu-Con	IECS84-1 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	0 to 2160	32 to 3920	25°C / 45°F	±0.5°C	
<b>C</b> W5Re-W26Re	ASTM E988-90 ITS-90	-15 to 2320	5 to 4208	25°C / 45°F	±0.5°C	
Millivolt Input		-145 to 145		2mV	±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: 10, differential: 3 (S/sec)			Voltage: 42, differential: 4 (S/sec)		

Total probable accuracy for T/C measurement equals to:  $\sqrt{C.J.E^2 + DA^2 + (\text{span} \times 2 \times 10^{-4})^2}$   
 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>	
<b>Pt-50</b>	$\alpha=0.00385$ Ω/Ω/°C ITS-90	-200 to 850	-328 to 1562	10°C / 18°F	±0.15°C	±0.02%	
<b>Pt-100</b>		-200 to 850	-328 to 1562	10°C / 18°F	±0.1°C		
<b>Pt-500</b>		-200 to 690	-328 to 1274	10°C / 18°F	±0.1°C		
<b>Pt-1000</b>		-200 to 690	-328 to 1274	10°C / 18°F	±0.1°C		
<b>Pt-50</b>	$\alpha=0.00392$ Ω/Ω/°C	-100 to 455	-148 to 851	10°C / 18°F	±0.15°C		
<b>Pt-100</b>		-100 to 455	-148 to 851	10°C / 18°F	±0.1°C		
<b>Pt-500</b>		-100 to 455	-148 to 851	10°C / 18°F	±0.1°C		
<b>Pt-1000</b>		-100 to 455	-148 to 851	10°C / 18°F	±0.1°C		
<b>Ni-Fe</b>		-200 to 260	-328 to 500	10°C / 18°F	±0.1°C		
<b>Ni-120</b>		-80 to 260	-112 to 500	10°C / 18°F	±0.1°C		
<b>Ni-1000</b>		-50 to 160	-58 to 320	10°C / 18°F	±0.1°C		
<b>Cu-10</b>		-120 to 260	-184 to 500	10°C / 18°F	±0.1°C		
<b>Resistor</b>	Potentiometer	0 to 2 KΩ		4 ohm	±0.1% <sup>1</sup>		
Connection Type	2, 3 or 4-wire						
Mode	Single sensor			Dual-differential			
Sensor Current	<0.3mA						
Sampling Rate	Single sensor; 4, Differential; 2 S/sec			Potentiometer; 3 S/sec			

Example: Pt-100 sensor input, with a 0-50°C span: The digital accuracy would be ±0.1°C, the D/A accuracy would be  $\pm 50 \times 0.02/100 = \pm 0.01^\circ\text{C}$ . Total maximum accuracy = ±0.11°C.

## Output

Output Signal	Proportional dc current 4 - 20 mA or 20 - 4 mA (user configurable)
Under Range	Linear to 3.97 mA
Over Range	Linear to 20.8 mA
Burnout	<3.6 mA or >22.1 mA (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
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	1-100 seconds
Analog Step-Response	200-500mS (depends on the sensor and the mode of operation)
Set-Up Time	5 seconds after power on

## Supply

Supply Voltage	13 to 36 VDC
Supply Variation Effect	Negligible (1 $\mu$ AV)
Polarity Protection	Yes
CMR	>110 db

## Environmental Influence

Operating Temperature Range	-50 to +80°C / -45 to 185°F
Storage temperature Range	-50 to +90°C / -45 to 185°F
Temperature Stability	< $\pm$ 0.004% / 1°C <sup>1</sup>
Humidity	10 to 90% RH, non-condensing
EMC	<0.5% of span at 27 to 1000 Mhz at field strength of 20V/m

## Programming

Software Package	UstCal
Modem Cord	MC-232-length: 1.5m with 9-pin D-Type Connector
Configured Parameters	Tag information, Sensor type, Input range, Selection of connection type, Output offset, Output curve correction, Damping factor, Burnout type, Output current mode, 50/60 Hz, Sensor calibration.

<sup>1</sup> Of span.

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

## Transmitter Configuration

The USTCAL configuration and calibration Software is PC-based software package.

The PC is connected to the transmitter via MC232-communicaton cable, which contains the electronic interface circuitry. This features 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 Window® 95, or Window® 98, or Window® 2000, or Window® NT, or Window® XP.

Display: Color display with screen resolution of 1024 x 768.

Lower resolution will require scrolling for accommodation of the configuration widow.

Free Disk Space: 15MB

## CERTIFICATIONS\* FOR MODEL 8088TR AND 8088ND

Both the Aluminum and the SS316 housing are certified NEMA4X and IP67. As indicated below IME Model 8088TR and ND can be optionally provided with certification and a SS Nameplate for use in Hazardous Area applications.

### FM/CSA EX PROOF CERTIFICATIONS

Class I Div I Groups B, C and D

Class II Div I Groups E, F and G

Eexd IIC ATEX 2G T 6

### CENELEC (ATEX) EX PROOF CERTIFICATIONS

Class I Div 1 & 2 Group A - D

### FM IS CERTIFICATIONS

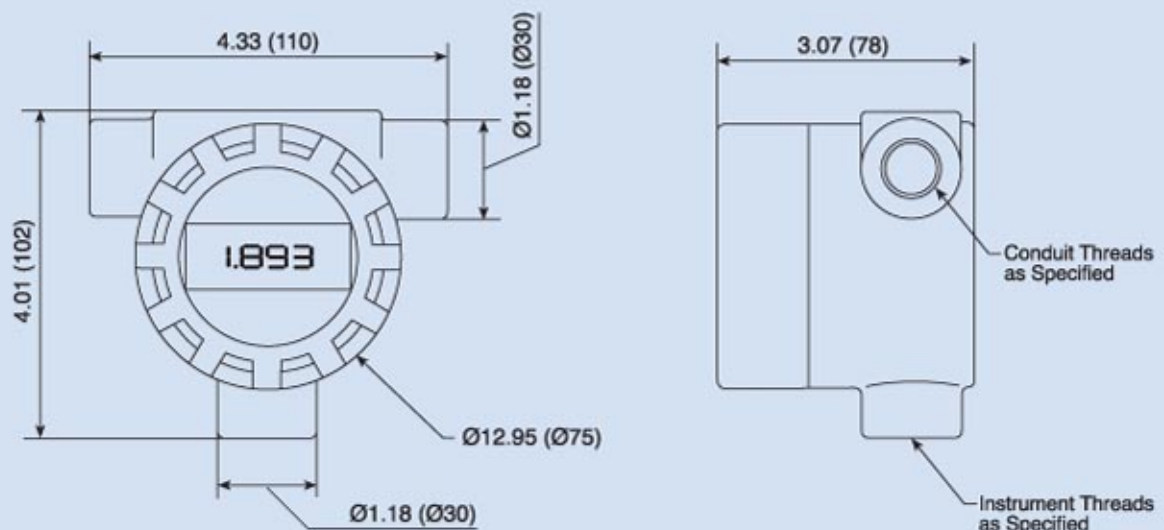
Class I Zone 0/1 Gr II C

### CSA IS CERTIFICATIONS

## ORDERING INFORMATION

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8088ND	Non Indicating Field Mounted 2 Wire Smart Transmitter								
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8088TR	A 03 E 07 ← Typical Model Number								

\* = Some Certifications pending at time of publication



Note: Dimensions are in inches (millimetres)