



## Isolated Transmitters



## 650T Units Multi-Channel, Two-Wire Transmitters

## Thermocouple and Millivolt Input

### Models

655T: Single TC/mV input channel  
656T: Dual TC/mV input channels

### Input Ranges

TC types: J, K, T, R, S, E, B, N (DIP switch selection)  
DC voltage:  $\pm 15.6\text{mV}$  to  $\pm 62.5\text{mV}$ , 0 to 1V DC

### Output Range

4 to 20mA DC

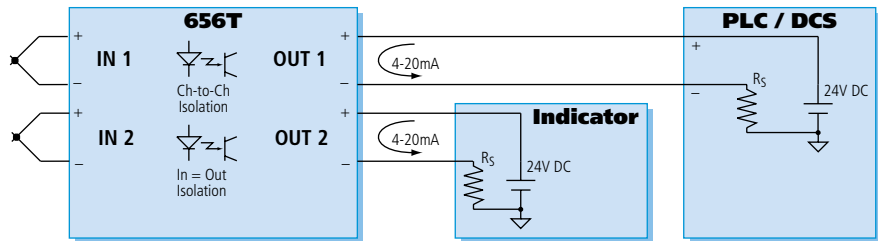
### Power Requirement

12 to 50V DC (loop-powered)  
Two-wire transmitter

### Approvals

CE marked. UL, cUL listed  
Class I; Division 2; Groups A, B, C, D.

## Single/Dual Channel Loop-Powered Transmitter



### Description

These units accept universal thermocouple and millivolt input signals, provide isolation, and output proportional DC current signals. The output can also be linearized to the input sensor signal. Single-channel 655T and dual-channel 656T units are ideal for panel shops and end-users who require a high-density signal conditioner that can cover a broad range of temperature measurement applications.

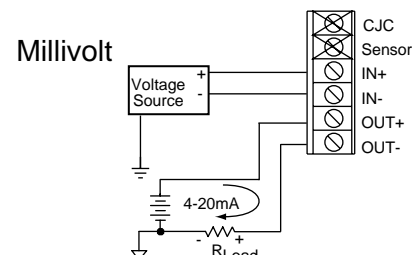
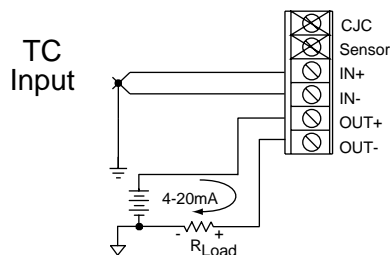
Configuration is fast and easy. First, you select the input type with a simple DIP switch. Then, you set your zero/full-scale output values using a toggle switch on the front panel to increase or decrease the signal until you read the desired output value on your voltmeter. The toggles make it easy to calibrate a normal (proportional) or reverse-acting (inverse) response in seconds. After setting the desired calibration, just press the mode/set toggle and your configuration settings are safely saved to nonvolatile memory.

Both models provide high-voltage input isolation (output and power circuits share a common). On dual channel units, each channel operates independently, with inputs isolated from each other, to prevent interaction between channels.

### Special Features

- Selectable thermocouple input types offer flexibility to fit many applications.
- DIP switch-configuration and self-ranging technologies speed installation without pots, jumpers, or software.
- Linearizer function provides an output that is linear to the temperature or millivolt signal.
- Isolation eliminates ground loops, reduces noise, and blocks transient signals.
- Toggle-switch calibration simplifies field adjustments for faster and easier maintenance.
- Configuration lockout safety feature prevents tampering and accidental changes.
- Reverse-acting output capability enables inverse proportional control signals.
- Dual channel model saves space and reduces equipment costs.
- CJC control only requires a millivolt source to calibrate modules
- High-resolution  $\Sigma\text{-}\Delta$  A/D converters deliver superior accuracy for reliable measurements.

### Input Connections





## Performance

### General Input

Analog to Digital Converter (ADC)  
16-bit  $\Sigma\text{-}\Delta$  A/D converter.

### Noise Rejection

Normal Mode: Better than 40dB @ 60Hz.  
Common Mode: Better than 100dB @ 60Hz.

### Input Overvoltage Protection

Bipolar Transient Voltage Suppressors (TVS).

### Thermocouple Input

#### Input Ranges (switch-selectable)

TC Type	Temperature Range	Accuracy
J	-210 to 760°C (-346 to 1400°F)	±0.5°C
K	-200 to 1372°C (-328 to 2502°F)	±0.5°C
T	-260 to 400°C (-436 to 752°F)	±0.5°C
R	-50 to 1768°C (-58 to 3214°F)	±1.0°C
S	-50 to 1768°C (-58 to 3214°F)	±1.0°C
E	-200 to 1000°C (-328 to 1832°F)	±0.5°C
B	260 to 1820°C (500 to 3308°F)	±1.0°C
N	-230 to 1300°C (-382 to 2372°F)	±0.5°C

Span adjust: Full range. 100°C or 3mV minimum span recommended.

Zero adjust: 0 to 90 % of full range.

### Thermocouple Linearization

On/off selectable.

### Thermocouple Break Detection

TC sensor failure can be configured for either upscale or downscale.

### Cold Junction Compensation (CJC) Control

On/off selectable.

### Millivolt Input

#### Input Range

Ranges: ±15.6, ±31.3, ±62.5mV  
0 to 0.125, 0.25, 0.5, 1.0V DC  
Span adjust: 10 to 100% of range.  
Zero adjust: 0 to 90% of range.

### Output

#### Output Range

Range: 4 to 20mA DC, 3.8 to 22mA range typical.

#### Output Compliance

$$R_{LOAD} = (V_{SUPPLY} - 12V) / 0.02A$$

#### Output Response Control

Proportional/inverse selectable.

#### Ambient Temperature Effect

Better than ±0.006% of input span per °C or ±100ppm/°C, whichever is greater.

#### Output Response Time (for input step change)

700mS typical to 98% of final output value.

## Environmental

### Ambient Temperature

Operating: -25 to 75°C (-13 to 167°F).  
Storage: -40 to 85°C (-40 to 185°F).

### Relative Humidity

5 to 95%, noncondensing.

### Power Requirement

12 to 50V DC @ 25mA for each output channel.

### Isolation

Inputs, outputs, and individual channels are isolated from each other for common-mode voltages up to 250V AC, or 354V DC off ground, on a continuous basis (will withstand 1500V AC dielectric strength test for one minute without breakdown).

### Radiated Field Immunity (RFI)

Complies with EN61000-4-3 Level 3 and EN50082-1.

### Electromagnetic Field Immunity (EMI)

Less than ±0.25% of output span effect.

### Electrical Fast Transient (EFT)

Complies with EN61000-4-4 Level 3 and EN50082-1.

### Electrostatic Discharge (ESD)

Complies with EN61000-4-2 Level 3 and EN50082-1.

### Radiated Emissions

Meets or exceeds EN50081-1 for Class B equipment.

### Approvals

CE marked.  
UL listed (UL508 and UL1604).  
cUL listed (C22.2, 142-M-1987 and 213-M1987).  
Hazardous Loc.: Class I; Division 2; Groups A, B, C, D.

## Physical

### Enclosure

Case: Self-extinguishing NYLON type 6.6 polyamide thermoplastic UL94 V-2 NEMA Type 1 enclosure.

### Connectors (Removable Terminal Blocks)

Wire Range: AWG #12-24.

### Printed Circuit Boards

Military grade FR-4 epoxy glass circuit board.

### Dimensions

1.05W x 4.68H x 4.35D inches.  
26.7W x 118.9H x 110.5D millimeters.

### Shipping Weight

1 pound (0.45 Kg) packed.

## Ordering Information

### Models

655T-0600 (add "-C" for factory calibration)  
Single channel TC 2-wire transmitter. Full feature set.

656T-0600 (add "-C" for factory calibration)  
Dual channel TC 2-wire transmitter. Full feature set.

### 656T-E600

Dual channel TC 2-wire transmitter. Economy version.  
TC Type J, K and 0-125mV input ranges only.  
No linearization. No inverse output (proportional only).

## Accessories (see Page 138)

### P55R-D24

Power supply (24V DC, 2.1A).  
See Power Supplies on page 213.

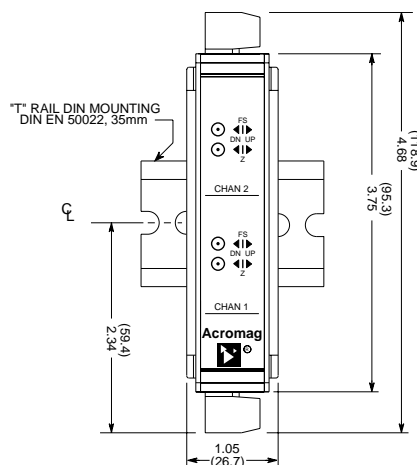
### DIN RAIL 3.0

### DIN RAIL 16.7

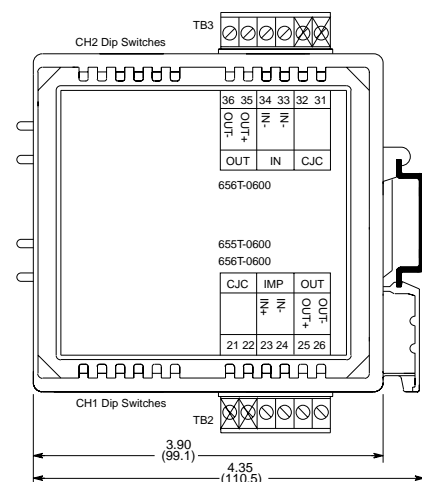
DIN rail strip, Type T,  
3 inches (75mm) or 16.7 inches (425mm)

### 20RM-16-DIN

19" rack-mount kit with DIN rail.  
Holds sixteen 650T series transmitters.



NOTE: ALL DIMENSION ARE IN INCHES (MILLIMETERS)





## Accessories

### Terminal Blocks

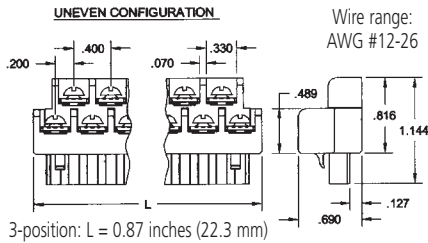
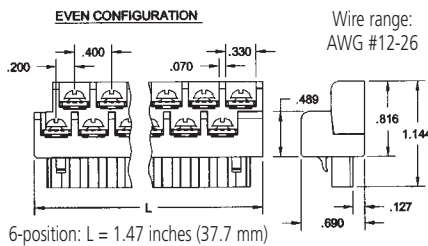


Barrier strip (left) and spring clamp (right).

#### Ordering Information

See individual I/O modules for compatibility.

#### Barrier Strip Terminal Blocks

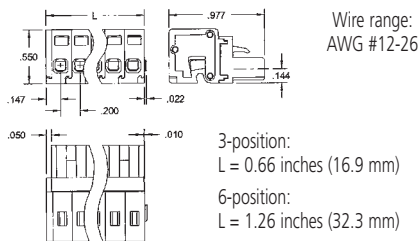


**TBK-B01**  
Terminal block kit,  
two 6-position pieces

**TBK-B02**  
Terminal block kit,  
four 6-position pieces

**TBK-B03**  
Terminal block kit,  
one 3-position and  
three 6-position pieces

#### Spring Clamp Terminal Blocks



**TBK-S01**  
Terminal block kit,  
two 6-position pieces

**TBK-S02**  
Terminal block kit,  
four 6-position pieces

**TBK-S03**  
Terminal block kit,  
one 3-position and  
three 6-position pieces

### Mounting Hardware



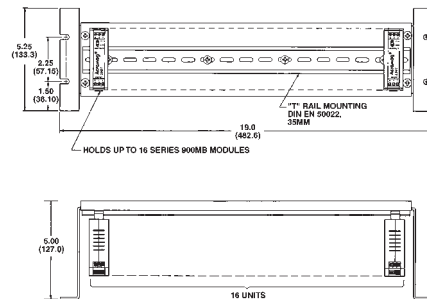
#### DIN-Rail Mounting

For your convenience, Acromag offers several mounting accessories to simplify your system installation. Our 19" rack-mount kit provides a clean solution for mounting your I/O modules and a power supply. Or you can buy precut DIN rail strips for mounting on any flat surface.

#### Ordering Information

20RM-16-DIN  
19" rack-mount kit with DIN rail.

DIN RAIL 3.0  
DIN RAIL 16.7  
DIN rail strip, Type T, 3 inches (75mm) or  
16.7 inches (425mm)



### Power Supplies



#### 50W Supply

**Input Power Requirement**  
85 to 264V AC or 105 to 370V DC

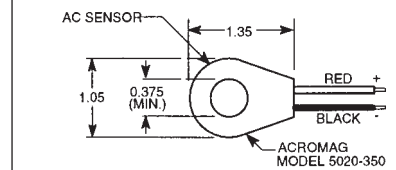
**Output**  
24V DC, 2.1A (50W)

#### Ordering Information

PSSR-D24  
Universal 50W power supply

See Power Supplies on page 213 for other models and more information.

### AC Current Sensor



#### Ordering Information

5020-350  
AC current sensor