



## Transmitters



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

## RTD / Resistance Input

### Models

657T: Single RTD input channel

658T: Dual RTD input channels

### Input Ranges

RTD: 100 ohm Pt, 120 ohm Ni, 10 ohm Cu

Resistance: 0 to 500 ohms

### Output Range

4 to 20mA DC

### Power Requirement

12 to 50V DC (loop-powered)

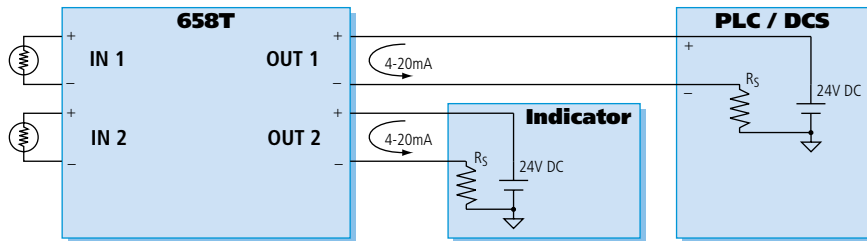
Two-wire transmitter

### Approvals

CE marked. UL, cUL listed

Class I; Division 2; Groups A, B, C, D.

## Single/Dual Channel Loop-Powered Transmitter



## Description

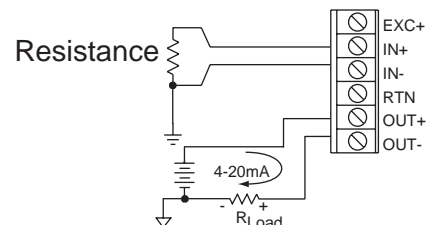
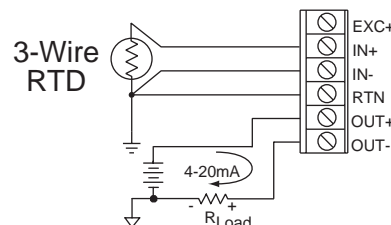
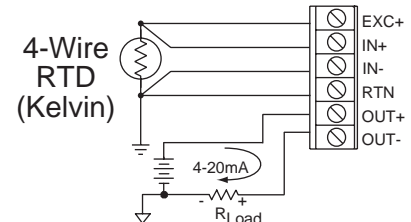
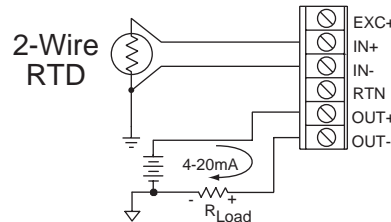
These units accept universal RTD or resistance input signals and output proportional DC current signals. The output can also be linearized to the input sensor signal. Single-channel 657T and dual-channel 658T units are ideal for panel shops and end-users who require a high-density signal conditioner that can accommodate 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 completing the calibration, just press the mode/set toggle and your configuration settings are safely saved to nonvolatile memory.

## Special Features

- Selectable RTD input types offer flexibility to fit many applications.
- DIP switch-configuration and self-ranging technologies speed installation without pots, jumpers, or software.
- 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.
- High-resolution  $\Sigma$ - $\Delta$  A/D converters deliver superior accuracy for reliable measurements.
- Lead break detection supports upscale or downscale failsafe mode.

## Input Connections





## Performance

### General Input

Analog to Digital Converter (ADC)  
16-bit  $\Sigma$ - $\Delta$  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).

### Input Impedance

400K ohm at 10mV span;  
input current,  $\pm 25$ nA, typical ( $\pm 30$ nA, max.).

### RTD Input

#### RTD Input Ranges

100 $\Omega$  Pt, 120 $\Omega$  Ni, or 10 $\Omega$  Cu; user-configured.

RTD	$^{\circ}$ C Range ( $^{\circ}$ F Range)	Accuracy
Pt <sup>1</sup>	-200 to 850 $^{\circ}$ C (-328 to 1562 $^{\circ}$ F)	$\pm 0.25^{\circ}$ C
Pt <sup>2</sup>	-200 to 850 $^{\circ}$ C (-328 to 1562 $^{\circ}$ F)	$\pm 0.25^{\circ}$ C
Ni	-80 to 320 $^{\circ}$ C (-112 to 608 $^{\circ}$ F)	$\pm 0.25^{\circ}$ C
Cu	-200 to 260 $^{\circ}$ C (-328 to 500 $^{\circ}$ F)	$\pm 1.00^{\circ}$ C

Alpha: Pt<sup>1</sup> ( $\alpha = 1.3850$ ), Pt<sup>2</sup> ( $\alpha = 1.3911$ ),  
Ni ( $\alpha = 1.6720$ ), Cu ( $\alpha = 1.4272$ ).

2, 3, or 4-wire configurations supported. Module provides sensor excitation, linearization, lead-wire compensation, and sensor break detection.

#### RTD Excitation Current

0.5mA DC typical, all types.

#### RTD Lead-Wire Compensation

25 ohms per lead.

#### RTD Break Detection

Configurable for either upscale or downscale.

## Resistance Input

### Resistance Input Range

0 to 500 ohms.

### Resistance Accuracy

$\pm 0.05$  ohms.

## 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  $\pm 0.006\%$  of input span per  $^{\circ}$ C or  $\pm 100$ ppm/ $^{\circ}$ 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 $^{\circ}$ C (-13 to 167 $^{\circ}$ F).  
Storage: -40 to 85 $^{\circ}$ C (-40 to 185 $^{\circ}$ F).

### Relative Humidity

5 to 95%, noncondensing.

### Power Requirement

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

### Isolation

Not isolated.

### Radiated Field Immunity (RFI)

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

### Electromagnetic Field Immunity (EMI)

Less than  $\pm 0.25\%$  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

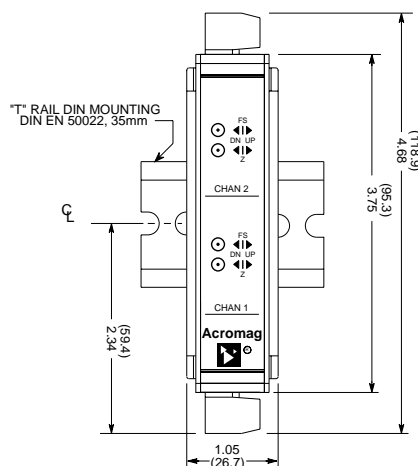
Meets or exceeds EN50081-1 for Class B equipment.

### Approvals

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



Optional terminal blocks: barrier strip (left) and spring clamp (right). Cage clamp terminal is standard.



NOTE: ALL DIMENSION ARE IN INCHES (MILLIMETERS)

## 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

657T-0600 (add "-C" for factory calibration)

Single channel RTD 2-wire transmitter

658T-0600 (add "-C" for factory calibration)

Dual channel RTD 2-wire transmitter

### Accessories (see Page 138)

#### PS5R-D24

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

#### TBK-B01

Optional terminal block kit, barrier strip style, 2 pcs.

#### TBK-S01

Optional terminal block kit, spring clamp style, 2 pcs.

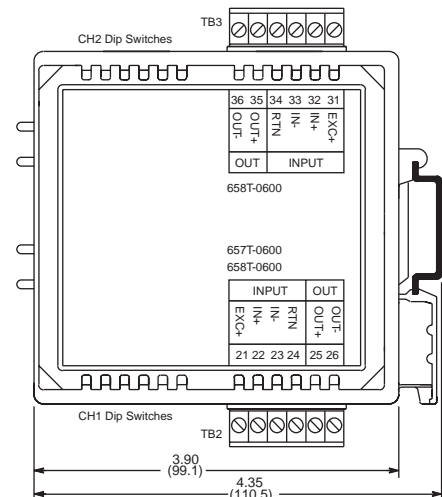
#### DIN RAIL 3.0

#### 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 transmitters.





## Accessories

### Terminal Blocks

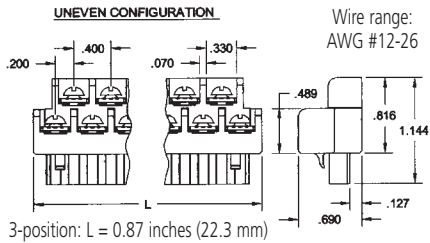
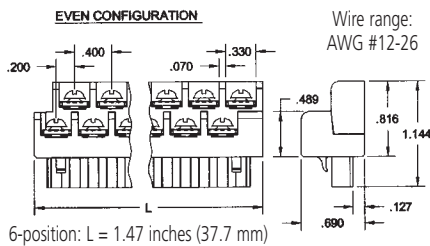


Barrier strip (left) and spring clamp (right).

#### Ordering Information

See individual I/O modules for compatibility.

#### Barrier Strip Terminal Blocks

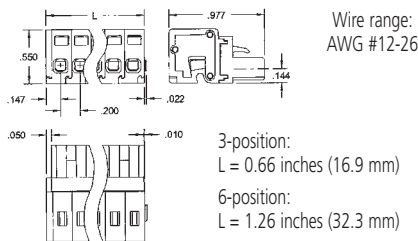


**TBK-B01**  
Terminal block kit,  
two 6-position pieces

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

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

#### Spring Clamp Terminal Blocks



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

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

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

### Mounting Hardware

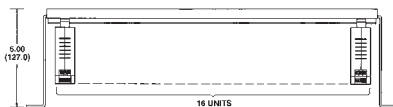
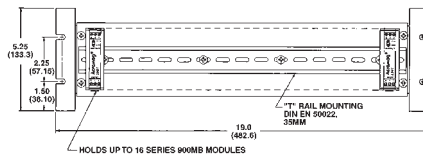


#### DIN-Rail Mounting

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

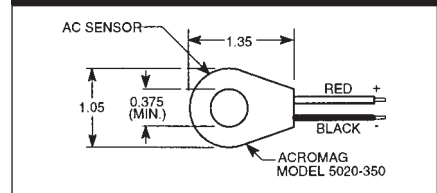
**Output**  
24V DC, 2.1A (50W)

#### 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