

## Space-saving Plug-in Signal Conditioners F-UNIT

### RATIO TRANSMITTER

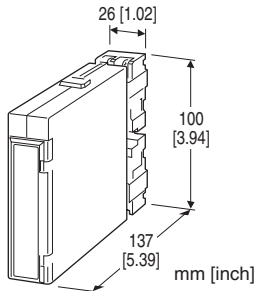
(output bias; non-isolated)

#### Functions & Features

- Providing precise matching of DC control signals to final control elements in open- or closed-loop systems
- Monitor jacks provided for ratio & bias adjustments
- Ratio adjustable from 0.5 to 3.0
- Bias adjustable within  $\pm 100\%$
- Isolation up to 2000 V AC
- High-density mounting

#### Typical Applications

- Ratio control for air/fuel flows or for two flows
- Gain calculation for manipulated variable from a controller
- Large scale signal span adjustment



## MODEL: FRT-[1][2]-[3][4]

### ORDERING INFORMATION

- Code number: FRT-[1][2]-[3][4]
- Specify a code from below for each of [1] through [4]. (e.g. FRT-6A-K/Q)
- Special input and output ranges (For codes Z & Q)
- Specify the specification for option code /Q (e.g. /C01/S01)

#### [1] INPUT

Current

- A: 4 - 20 mA DC (Input resistance 250  $\Omega$ )
- B: 2 - 10 mA DC (Input resistance 500  $\Omega$ )
- C: 1 - 5 mA DC (Input resistance 1000  $\Omega$ )
- D: 0 - 20 mA DC (Input resistance 50  $\Omega$ )
- E: 0 - 16 mA DC (Input resistance 62.5  $\Omega$ )
- F: 0 - 10 mA DC (Input resistance 100  $\Omega$ )
- G: 0 - 1 mA DC (Input resistance 1000  $\Omega$ )
- H: 10 - 50 mA DC (Input resistance 100  $\Omega$ )
- Z: Specify current (See INPUT SPECIFICATIONS)

Voltage

- 3: 0 - 1 V DC (Input resistance 1 M $\Omega$  min.)
- 4: 0 - 10 V DC (Input resistance 1 M $\Omega$  min.)
- 5: 0 - 5 V DC (Input resistance 1 M $\Omega$  min.)
- 6: 1 - 5 V DC (Input resistance 1 M $\Omega$  min.)
- 0: Specify voltage (See INPUT SPECIFICATIONS)

#### [2] OUTPUT

Current

- A: 4 - 20 mA DC (Load resistance 750  $\Omega$  max.)
- B: 2 - 10 mA DC (Load resistance 1500  $\Omega$  max.)
- C: 1 - 5 mA DC (Load resistance 3000  $\Omega$  max.)
- D: 0 - 20 mA DC (Load resistance 750  $\Omega$  max.)
- E: 0 - 16 mA DC (Load resistance 900  $\Omega$  max.)
- F: 0 - 10 mA DC (Load resistance 1500  $\Omega$  max.)
- G: 0 - 1 mA DC (Load resistance 15 k $\Omega$  max.)
- Z: Specify current (See OUTPUT SPECIFICATIONS)

Voltage

- 1: 0 - 10 mV DC (Load resistance 10 k $\Omega$  min.)
- 2: 0 - 100 mV DC (Load resistance 100 k $\Omega$  min.)
- 3: 0 - 1 V DC (Load resistance 1000  $\Omega$  min.)
- 4: 0 - 10 V DC (Load resistance 10 k $\Omega$  min.)
- 5: 0 - 5 V DC (Load resistance 5000  $\Omega$  min.)
- 6: 1 - 5 V DC (Load resistance 5000  $\Omega$  min.)
- 0: Specify voltage (See OUTPUT SPECIFICATIONS)

#### [3] POWER INPUT

AC Power

- K: 85 - 132 V AC (Operational voltage range 85 - 132 V, 47 - 66 Hz)
- L: 170 - 264 V AC (Operational voltage range 170 - 264 V, 47 - 66 Hz)

DC Power

- R: 24 V DC (Operational voltage range 24 V  $\pm 10\%$ , ripple 10 %p-p max.)
- P: 110 V DC (Operational voltage range 85 - 150 V, ripple 10 %p-p max.)

#### [4] OPTIONS

blank: none

/Q: With options (specify the specification)

#### SPECIFICATIONS OF OPTION: Q (multiple selections)

COATING (For the detail, refer to our web site.)

/C01: Silicone coating

/C02: Polyurethane coating

/C03: Rubber coating

TERMINAL SCREW MATERIAL

/S01: Stainless steel

**GENERAL SPECIFICATIONS**

**Construction:** Plug-in  
**Connection:** M3.5 screw terminals (torque 0.8 N·m)  
**Screw terminal:** Nickel-plated steel (standard) or stainless steel  
**Housing material:** Flame-resistant resin (black)  
**Isolation:** Input or output to power  
**Overrange output:** Approx. -10 to +120 % at 1 - 5 V  
**Ratio adjustment:** 0.5 - 3.0 (front)  
**Bias adjustment:** -100 - +100 % (front)  
**Monitor jack diameter:** 2 mm (.08")  
**Equation:**  $X_o = KX_i + B$   
 where  $X_o$  : output (%)  
 $X_i$  : input (%)  
 $K$  : ratio  
 (linear characteristic; 0.5 - 3.0)  
 $B$  : bias (-100 - +100 %)  
 (factory setting:  $K = 1$ ,  $B = 0$  %)

**PERFORMANCE in percentage of span**

**Setpoint accuracy:**  $\pm 1.0$  % (for monitor output voltage)  
**Computing accuracy:**  $\pm 0.5$  % (with ratio=1, bias=0 %)  
**Temp. coefficient:**  $\pm 0.025$  %/°C ( $\pm 0.014$  %/°F)  
**Response time:**  $\leq 0.5$  sec. (0 - 90 %)  
**Line voltage effect:**  $\pm 0.1$  % over voltage range  
**Insulation resistance:**  $\geq 100$  M $\Omega$  with 500 V DC  
**Dielectric strength**  
**Power input code R:**  
 2000 V AC @ 1 minute (input or output or power to ground)  
 500 V AC @ 1 minute (I/O to power)  
**Power input code K, L, P:**  
 2000 V AC @ 1 minute (input or output or power to ground)  
 1500 V AC @ 1 minute (I/O to power)

**INPUT SPECIFICATIONS**

■ **DC Current:**  
 Shunt resistor attached to the input terminals (0.5 W)  
 Specify input resistance value for code Z.  
 ■ **DC Voltage:** 0 - 300 V DC  
**Minimum span:** 1 V  
**Offset:** Max. 1.5 times span  
**Input resistance:**  $\geq 1$  M $\Omega$

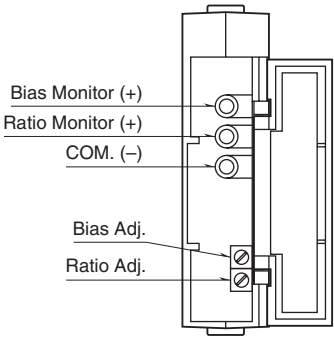
**OUTPUT SPECIFICATIONS**

■ **DC Current:** 0 - 20 mA DC  
**Minimum span:** 1 mA  
**Offset:** Max. 1.5 times span  
**Load resistance:** Output drive 15 V max.  
 ■ **DC Voltage:** 0 - 12 V DC  
**Minimum span:** 5 mV  
**Offset:** Max. 1.5 times span  
**Load resistance:** Output drive 1 mA max.; at  $\geq 0.5$  V

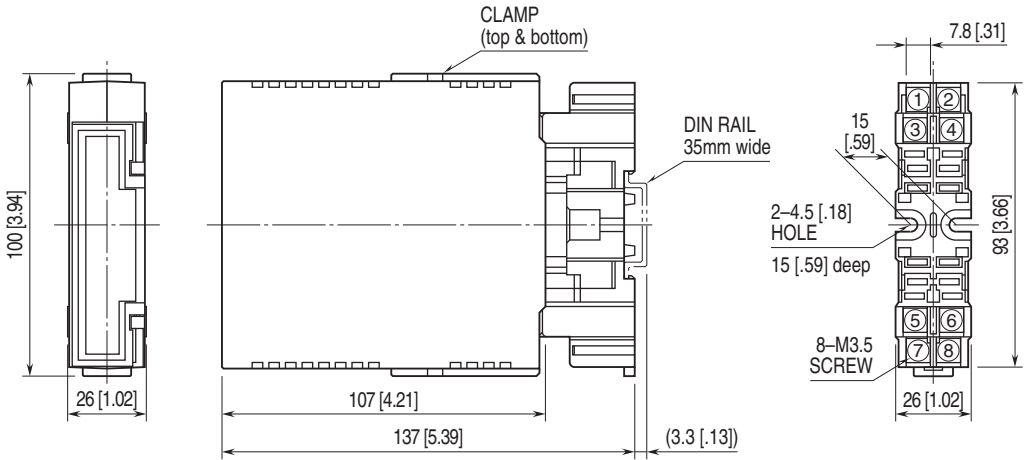
**INSTALLATION**

**Power input**  
 •AC: Approx. 4.5 VA  
 •DC: 24 V approx. 80 mA; 110 V approx. 20 mA  
**Operating temperature:** -5 to +55°C (23 to 131°F)  
**Operating humidity:** 30 to 90 %RH (non-condensing)  
**Mounting:** Surface or DIN rail; Standard Rack Mounting  
 Frame BX-16H available  
**Weight:** 200 g (0.44 lb)

**EXTERNAL VIEW**

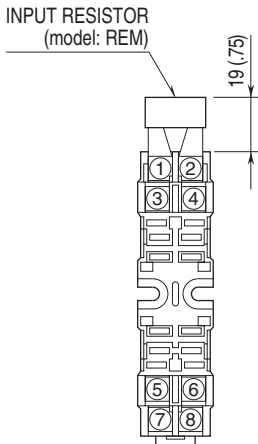


**EXTERNAL DIMENSIONS unit: mm [inch]**



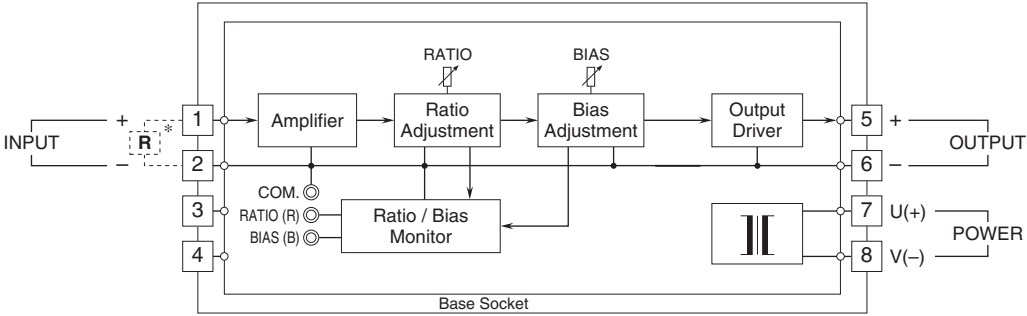
•When mounting, no extra space is needed between units.

**TERMINAL ASSIGNMENTS unit: mm [inch]**



Input shunt resistor attached for current input.

**SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM**



\*Input shunt resistor attached for current input.



Specifications are subject to change without notice.