

**Plug-in Signal Conditioners M-UNIT**

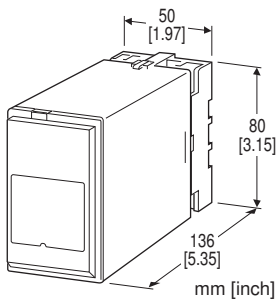
**SPLIT-RANGE TRANSMITTER**

**Functions & Features**

- Generating two signals which control two final control elements
- High-density mounting

**Typical Applications**

- Balancing two final control elements in opposite actions used in heating-cooling or humidifying-dehumidifying processes



**MODEL: MFS-[1]-[2][3][4]-[5][6]**

**ORDERING INFORMATION**

- Code number: MFS-[1]-[2][3][4]-[5][6]
- Specify a code from below for each of [1] through [6]. (e.g. MFS-V-AAA-B/Q)
- Specify the specification for option code /Q (e.g. /C01/S01)

**[1] OUTPUT CHARACTERISTICS**

V: V-shape  
 P: Parallel  
 Output 2 is assigned to the reversed output in V-shape characteristics.

**[2] INPUT**

Current  
**A:** 4 - 20 mA DC (Input resistance 250 Ω)  
 Voltage  
**4:** 0 - 10 V DC (Input resistance 200 kΩ min.)  
 I/O code combination available AAA or 444 suffix codes only.

**[3] OUTPUT 1**

Current  
**A:** 4 - 20 mA DC (Load resistance 600 Ω max.)

Voltage  
**4:** 0 - 10 V DC (Load resistance 10 kΩ min.)

**[4] OUTPUT 2**

Current  
**A:** 4 - 20 mA DC (Load resistance 600 Ω max.)  
 Voltage  
**4:** 0 - 10 V DC (Load resistance 10 kΩ min.)

**[5] POWER INPUT**

AC Power  
**B:** 100 V AC  
**C:** 110 V AC  
**D:** 115 V AC  
**F:** 120 V AC  
**G:** 200 V AC  
**H:** 220 V AC  
**J:** 240 V AC  
 DC Power  
**R:** 24 V DC

**[6] 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  
**Screw terminal:** Chromated steel (standard) or stainless steel  
**Housing material:** Flame-resistant resin (black)  
**Isolation:** Input or output 1 or output 2 to power  
**Input range:** 0 - 23.2 mA DC or -1 - +12 V DC  
**Output range:** 0 - 23.2 mA DC or -1 - +12 V DC  
**Output characteristics**  
 • **V-shape:** two signals vary in opposite directions; used when both final control devices have the same action (direct-direct or reverse-reverse).  
 • **Parallel:** two signals vary in the same direction; used when one final control device is direct and another is reverse.  
**Monitor jacks:** Direct monitoring of output signal; accessible at front

- **Ammeter requirement:** Input resistance 10 Ω max. (for current output)

**Monitor jack diameter:** 2 mm (.08")

## INPUT SPECIFICATIONS

- **DC Current:** Input resistor incorporated

## INSTALLATION

### Power input

• **AC:** Operational voltage range: rating  $\pm 10\%$ , 50/60  $\pm 2$  Hz, approx. 3 VA

• **DC:** Operational range: 24 V  $\pm 10\%$ , approx. 80 mA (ripple 10 %p-p max.)

**Operating temperature:** -5 to +60°C (23 to 140°F)

**Operating humidity:** 30 to 90 %RH (non-condensing)

**Mounting:** Surface or DIN rail

**Weight:** 400 g (0.88 lb)

## PERFORMANCE in percentage of span

**Accuracy:**  $\pm 0.3\%$  (gain = 1 or -1)

**Temp. coefficient:**  $\pm 0.02\%$ /°C ( $\pm 0.01\%$ /°F)

**Response time:**  $\leq 0.5$  sec. (0 - 90 %)

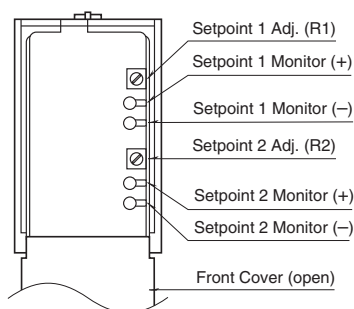
**Line voltage effect:**  $\pm 0.1\%$  over voltage range

**Insulation resistance:**  $\geq 100$  MΩ with 500 V DC

**Dielectric strength:** 2000 V AC @ 1 minute (input or output 1 or output 2 to power to ground)

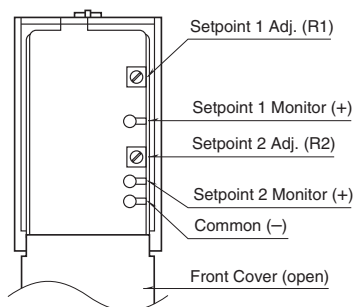
## EXTERNAL VIEW

### ■ FRONT VIEW (current output; with cover open)

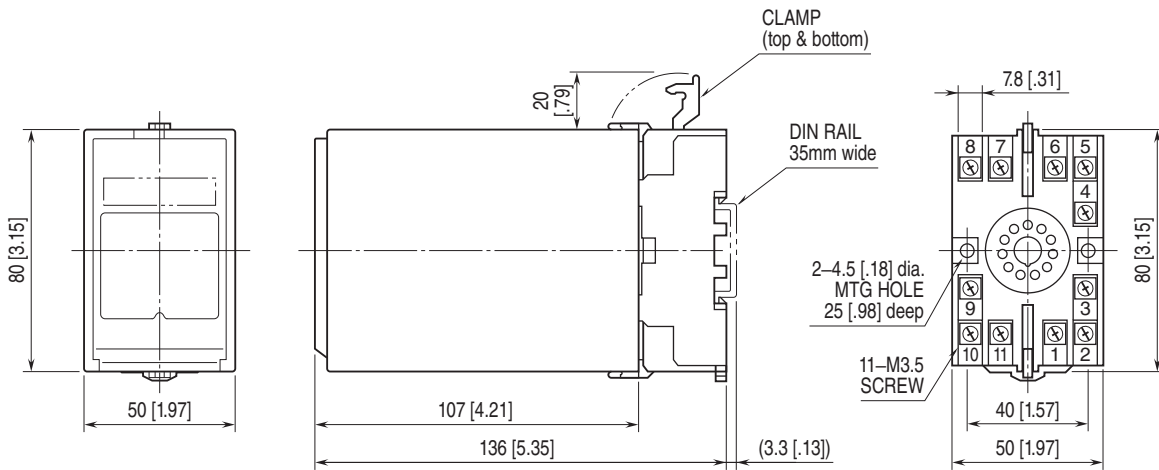


\* When monitor terminal is in use, connect a load to the output terminal or short across the output terminal.

### ■ FRONT VIEW (voltage output; with cover open)



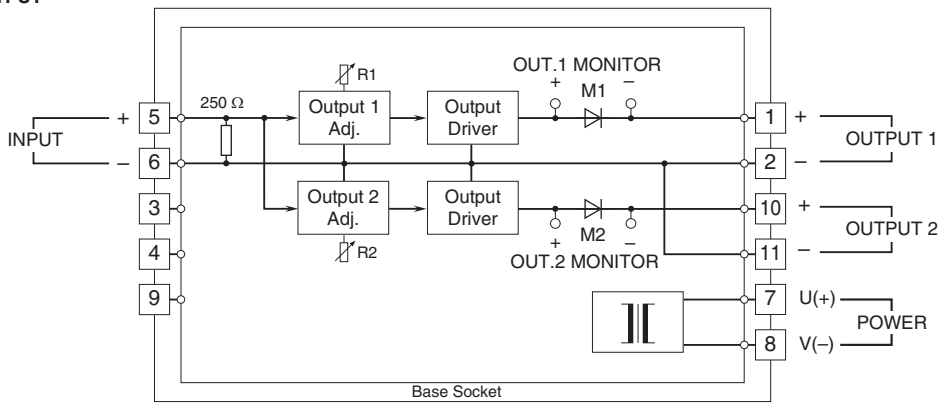
## EXTERNAL DIMENSIONS & TERMINAL ASSIGNMENTS unit: mm [inch]



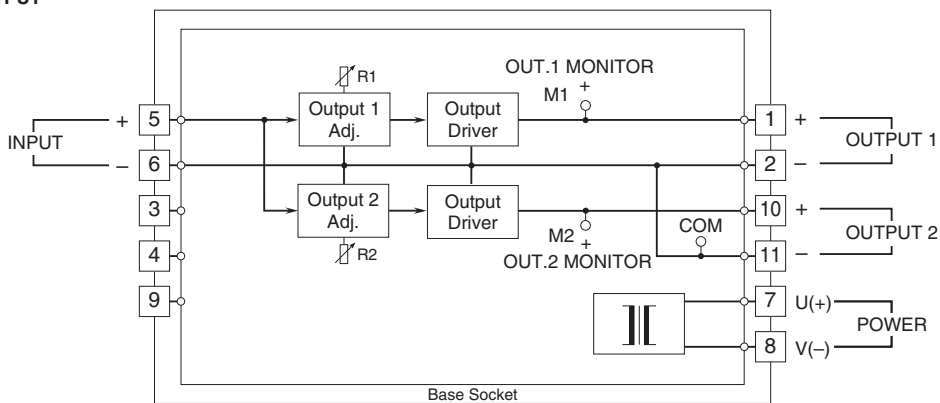
• When mounting, no extra space is needed between units.

## SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM

### ■ CURRENT OUTPUT

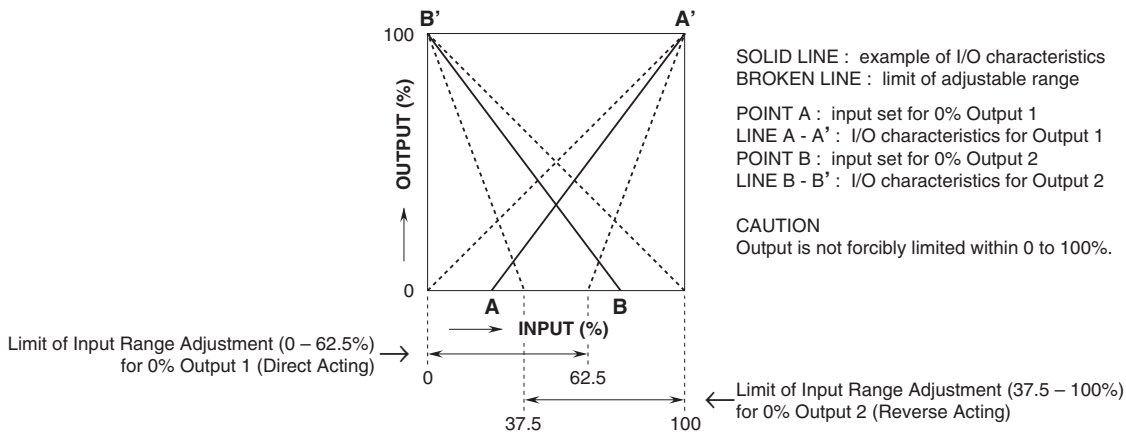


### ■ VOLTAGE OUTPUT



**OPERATION DIAGRAM**

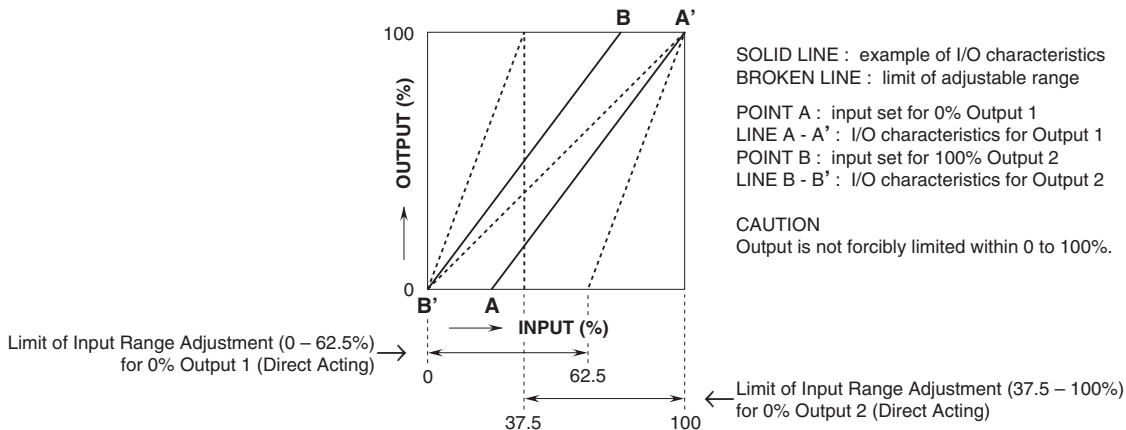
■ V-SHAPE CHARACTERISTICS (model: MFS-V)



•Input Range Adjustment

1. For current output, connect an ammeter to output 1 monitor terminals.  
 Current signal is measured at both ends of a diode inserted in series to the output 1 driver.  
 Input resistance of the ammeter must be 10Ω at the maximum to ensure accurate measurement.  
 For voltage output, connect a voltmeter across the common and output 1 monitor (+) terminals.
2. Apply an input signal desired for 0% output. (within 0 – 62.5%)
3. Turn output 1 adjustment until 0% output is monitored.
4. Adjust output 2 the same way as output 1. Allowable input range for 0% output is 37.5 – 100%.  
 Input signals for 100% output are fixed to 100% for output 1, 0% for output 2.

■ PARALLEL CHARACTERISTICS (model: MFS-P)

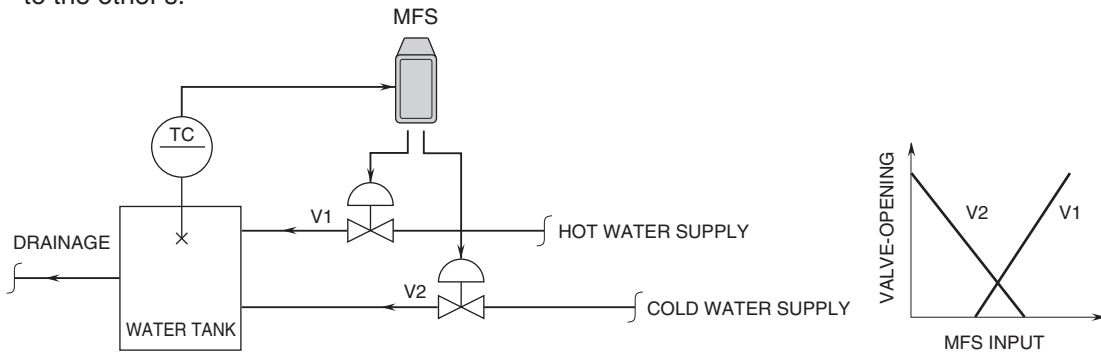


•Input Range Adjustment

1. For current output, connect an ammeter to output 1 monitor terminals.  
 Current signal is measured at both ends of a diode inserted in series to output 1 driver.  
 Input resistance of the ammeter must be 10Ω at the maximum to ensure accurate measurement.  
 For voltage output, connect a voltmeter across the common and output 1 monitor (+) terminals.
  2. Apply an input signal desired for 0% output. (within 0 – 62.5%)
  3. Turn output 1 adjustment until 0% output is monitored.
- Proceed to output 2 adjustment.
4. Connect an ammeter or voltmeter to output 2 monitor terminal.
  5. Apply input signal required for 100% output. (within 37.5 – 100%)
  6. Turn output 2 adjustment until 100% output is monitored.
- For output 1, input signal for 100% output is fixed to 100%, while for output 2, input signal for 0% output is fixed to 0%.

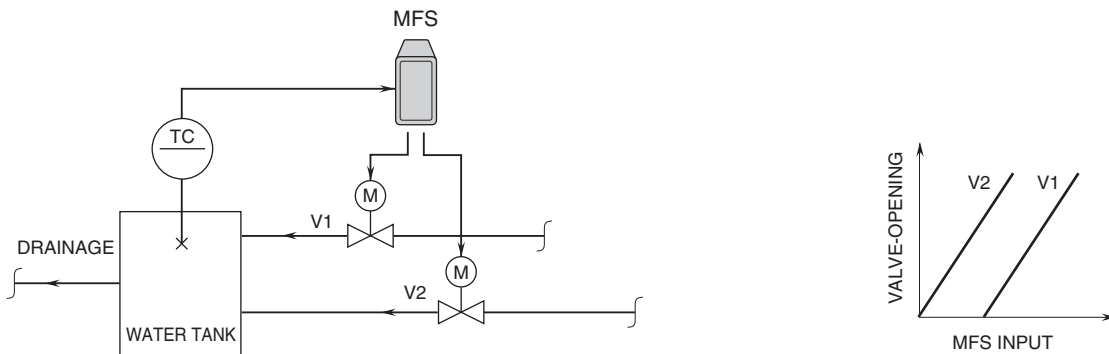
## ■ V-SHAPE CHARACTERISTICS (model: MFS-V)

- When the relation between control signal and valve-opening for one valve has the opposite characteristic to the other's:

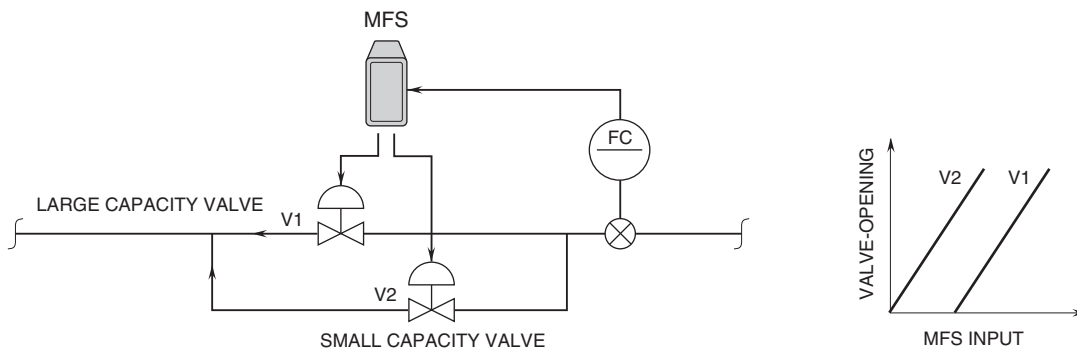


## ■ PARALLEL CHARACTERISTICS (model: MFS-P)

- When the relation between control signal and valve-opening for both valves has the same characteristic:



- To control wide flow range with two valves of different capacities:



Specifications are subject to change without notice.