

Plug-in Signal Conditioners M-UNIT

2-input MATH FUNCTION MODULE

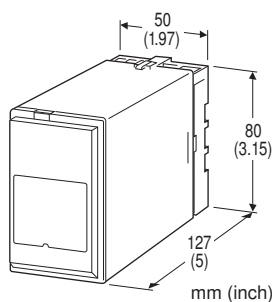
(field-programmable)

Functions & Features

- Providing temperature or pressure compensation for a gas flow, and other arithmetic operations
- Microprocessor based
- Equation and parameters selectable on site via hand-held programmer PU-2x
- Loop testing
- Isolation up to 2000 V AC
- High-density mounting

Typical Applications

- Various flowmeters
- Adding two flows
- Ratio calculation
- Calculating average temperature



MODEL: JF-[1][2]-[3][4]

ORDERING INFORMATION

- Code number: JF-[1][2]-[3][4]
- Specify a code from below for each [1] through [4].
(e.g. JF-6A-B/3/Q)
- Parameters
 - Special output range (For codes Z & 0)
 - Use Ordering Information Sheet (No. ESU-1980). Default setting will be used if not otherwise specified.
($K_0 = 1$, $K_1 = 1$, $K_2 = 1$, $A_0 = 0\%$, $A_1 = 0\%$, $A_2 = 0\%$)
 - Specify the specification for option code /Q
(e.g. /C01/S01)

[1] INPUT

Current

A: 4 - 20 mA DC (Input resistance 100 Ω)

Voltage

6: 1 - 5 V DC (Input resistance 1 M Ω min.)

[2] OUTPUT

Current

A: 4 - 20 mA DC (Load resistance 750 Ω max.)

B: 2 - 10 mA DC (Load resistance 1500 Ω max.)

C: 1 - 5 mA DC (Load resistance 3000 Ω max.)

D: 0 - 20 mA DC (Load resistance 750 Ω max.)

E: 0 - 16 mA DC (Load resistance 900 Ω max.)

F: 0 - 10 mA DC (Load resistance 1500 Ω max.)

G: 0 - 1 mA DC (Load resistance 15 k Ω max.)

Z: Specify current (See OUTPUT SPECIFICATIONS)

Voltage

1: 0 - 10 mV DC (Load resistance 10 k Ω min.)

2: 0 - 100 mV DC (Load resistance 100 k Ω min.)

3: 0 - 1 V DC (Load resistance 1000 Ω min.)

4: 0 - 10 V DC (Load resistance 10 k Ω min.)

5: 0 - 5 V DC (Load resistance 5000 Ω min.)

6: 1 - 5 V DC (Load resistance 5000 Ω min.)

4W: -10 - +10 V DC (Load resistance 10 k Ω min.)

5W: -5 - +5 V DC (Load resistance 5000 Ω min.)

0: Specify voltage (See OUTPUT SPECIFICATIONS)

[3] 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

S: 12 V DC

R: 24 V DC

V: 48 V DC

[4] OPTIONS (multiple selections)

Equation (Refer to the EQUATION table)

/1: Temperature compensation for DP flowmeter (ideal gas)

/2: Pressure compensation for DP flowmeter (ideal gas)

/3: Addition/subtraction

/4: Multiplication

/5: Division

Other Options

blank: none

/Q: Option other than the above (specify the specification)

SPECIFICATIONS OF OPTION: Q (multiple selections)

COATING (For the detail, refer to M-System's web site.)

/C01: Silicone coating

/C02: Polyurethane coating

/C03: Rubber coating



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TERMINAL SCREW MATERIAL

/S01: Stainless steel

EQUATION**Equation parameters**X₀: output (%)X₁ to X₂: input (%)K₀ to K₂: gain ±29.999A₀ to A₂: bias (%) ±299.99 %**EQUATION**

/1: Temperature compensation for DP flowmeter (ideal gas)

$$X_0 = \frac{K_1 X_1}{\sqrt{K_2 X_2 + A_2}}$$

where X₀ : compensated flow (linear characteristic)X₁ : uncompensated flow (square root extraction available)X₂ : temperature

/2: Pressure compensation for DP flowmeter (ideal gas)

$$X_0 = K_1 X_1 \sqrt{K_2 X_2 + A_2}$$

where X₀ : compensated flow (linear characteristic)X₁ : uncompensated flow (square root extraction available)X₂ : pressure

/3: Addition/subtraction

$$X_0 = K_0 \{K_1 (X_1 + A_1) + K_2 (X_2 + A_2)\} + A_0$$

/4: Multiplication

$$X_0 = K_0 (K_1 X_1 + A_1) (K_2 X_2 + A_2) + A_0$$

/5: Division

$$X_0 = \frac{K_0 (K_1 X_1 + A_1)}{(K_2 X_2 + A_2)} + A_0$$

RELATED PRODUCTS

- JX configurator connection kit (model: JXCON)
- Programming Unit (model: PU-2x)

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 to output to power (non-isolated between inputs)**Overrange input:** Approx. -25 to +125 %**Overrange output:** Approx. -10 to +120 % at 1 - 5 V**Zero adjustment:** -5 to +5 % (front)**Span adjustment:** 95 to 105 % (front)

Adjustments: Programming Unit (model: PU-2x); equation and parameters, square root extraction, zero and span, etc. (Refer to the users manual of JXCON for the adjustments configurable with JXCON.)

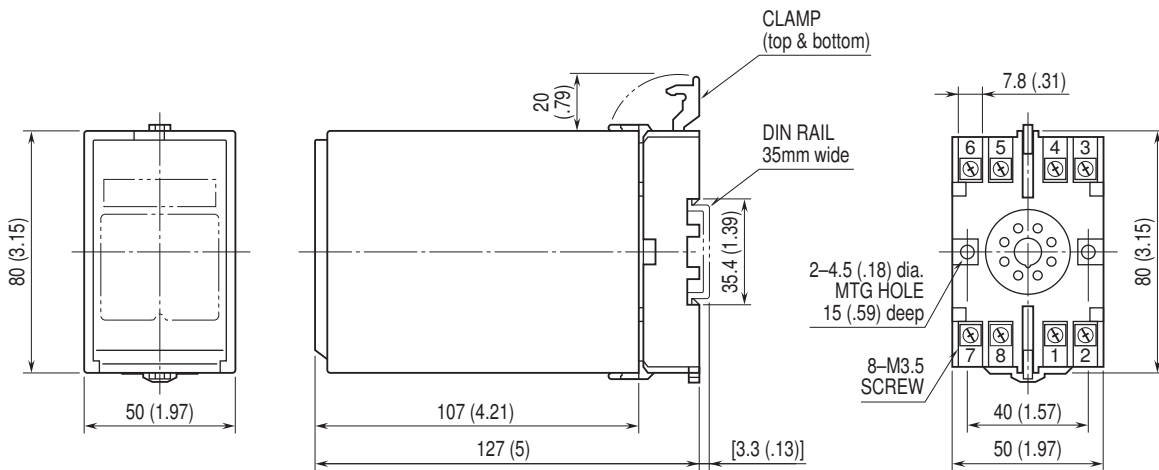
INPUT SPECIFICATIONS■ **DC Current:** Input resistor incorporated**OUTPUT SPECIFICATIONS**■ **DC Current:** 0 - 20 mA DC**Minimum span:** 1 mA**Offset:** Max. 1.5 times span**Load resistance:** Output drive 15 V max.■ **DC Voltage:** -10 - +20 V DC**Span:** Min. 5 mV, max. 20 V**Offset:** Max. 1.5 times span**Load resistance:** Output drive 1 mA max.; at ≥ 0.5 V**INSTALLATION****Power input**

- **AC:** Operational voltage range: rating ±10 %, 50/60 ±2 Hz, approx. 3 VA

- **DC:** Operational voltage range: rating ±10 %, ripple 10 %p-p max., approx. 2 W (90 mA at 24 V)

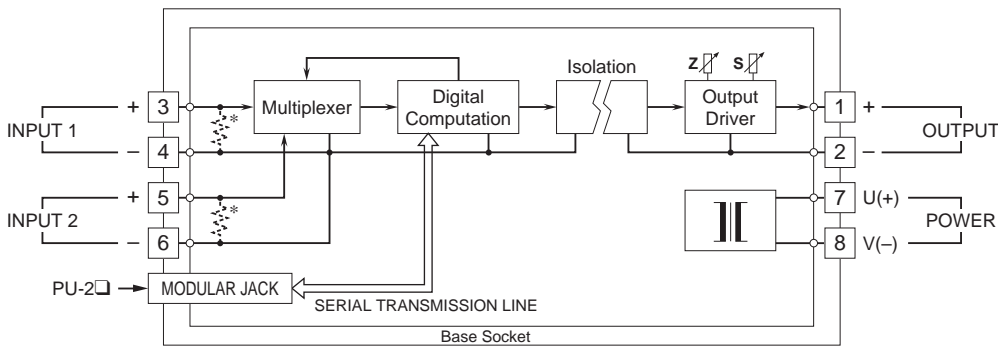
Operating temperature: -5 to +55°C (23 to 131°F)**Operating humidity:** 30 to 90 %RH (non-condensing)**Mounting:** Surface or DIN rail**Weight:** 350 g (0.77 lb)**PERFORMANCE in percentage of span****Input accuracy:** ±0.2 %**Output accuracy:** ±0.2 %**Temp. coefficient:** ±0.015 %/°C (±0.008 %/°F)**Response time:** ≤ 0.8 sec. (0 - 90 %)**Line voltage effect:** ±0.1 % over voltage range**Insulation resistance:** ≥ 100 MΩ with 500 V DC**Dielectric strength:** 2000 V AC @1 minute (input to output to power to ground)

EXTERNAL DIMENSIONS & TERMINAL ASSIGNMENTS unit: mm (inch)



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

SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM



*Input shunt resistor incorporated for current inputs.



Specifications are subject to change without notice.