

Plug-in Signal Conditioners M-UNIT

3-input MATH FUNCTION MODULE

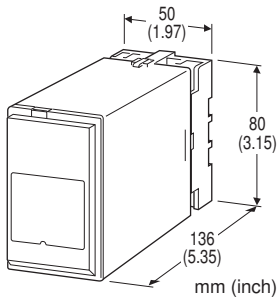
(field-programmable)

Functions & Features

- Providing temperature and 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 three flows
- Calculating average temperature



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

ORDERING INFORMATION

- Code number: JFK-[1][2]-[3][4]

Specify a code from below for each of [1] through [4].
(e.g. JFK-6A-B/2/Q)

- Special output ranges (For codes Z & 0)
- Parameters

Use Ordering Information Sheet (No. ESU-1681) to specify parameters. Default setting will be used if not otherwise specified.

($K_0 = 1, K_1 = 1, K_2 = 1, K_3 = 1, A_0 = 0\%, A_1 = 0\%, A_2 = 0\%, A_3 = 0\%$)

- 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: Temp. & pressure compensation for DP flowmeter (ideal gas)
- /2: Addition/subtraction
- /3: Multiplication
- /4: Multiplication/division
- /5: Multiplication/division
- /6: Addition/multiplication
- /7: Addition/division
- /8: Addition/division
- /9: Addition/multiplication
- /10: Addition/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

TERMINAL SCREW MATERIAL

/S01: Stainless steel

EQUATION**Equation parameters**X₀: output (%)X₁ to X₃: input (%)K₀ to K₃: gain ±29.999A₀ to A₃: bias (%) ±299.99 %**EQUATION**

/1: Temp. & pressure compensation for DP flowmeter (ideal gas)

$$X_0 = K_1 X_1 \sqrt{\frac{K_2 X_2 + A_2}{K_3 X_3 + A_3}}$$

where X₀ : compensated flow (linear characteristic)
 X₁ : uncompensated flow (sq. root extraction available)
 X₂ : pressure X₃ : temperature

/2: Addition/subtraction

$$X_0 = K_0 \{K_1 (X_1 + A_1) + K_2 (X_2 + A_2) + K_3 (X_3 + A_3)\} + A_0$$

/3: Multiplication

$$X_0 = K_0 (K_1 X_1 + A_1) (K_2 X_2 + A_2) (K_3 X_3 + A_3) + A_0$$

/4: Multiplication/division

$$X_0 = \frac{K_0 (K_1 X_1 + A_1) (K_2 X_2 + A_2)}{(K_3 X_3 + A_3)} + A_0$$

/5: Multiplication/division

$$X_0 = \frac{K_0 (K_1 X_1 + A_1)}{(K_2 X_2 + A_2) (K_3 X_3 + A_3)} + A_0$$

/6: Addition/multiplication

$$X_0 = K_0 (K_1 X_1 + K_2 X_2 + A_1) (K_3 X_3 + A_3) + A_0$$

/7: Addition/division

$$X_0 = \frac{K_0 (K_1 X_1 + K_2 X_2 + A_1)}{(K_3 X_3 + A_3)} + A_0$$

/8: Addition/division

$$X_0 = \frac{K_0 (K_1 X_1 + A_1)}{(K_2 X_2 + K_3 X_3 + A_2)} + A_0$$

/9: Addition/multiplication

$$X_0 = K_0 (K_1 X_1 + A_1) + K_0 (K_2 X_2 + A_2) (K_3 X_3 + A_3) + A_0$$

/10: Addition/division

$$X_0 = K_0 (K_1 X_1 + A_1) + \frac{K_0 (K_2 X_2 + A_2)}{(K_3 X_3 + A_3)} + A_0$$

RELATED PRODUCTS

- Programming Unit (model: PU-2x)
- PC configurator software (model: JXCON)

Downloadable at M-System's web site.

A dedicated cable is required to connect the module to the PC. Please refer to the internet software download site or the users manual for the PC configurator for applicable cable types.

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

Accuracy: Input accuracy + output accuracy

Input accuracy: $\pm 0.2\%$ (gain ≤ 1)

$[\pm 0.2\% \times \text{gain}]$ with gain > 1

Output accuracy: $\pm 0.2\%$

Temp. coefficient: $\pm 0.015\%/^{\circ}\text{C}$ ($\pm 0.008\%/^{\circ}\text{F}$)

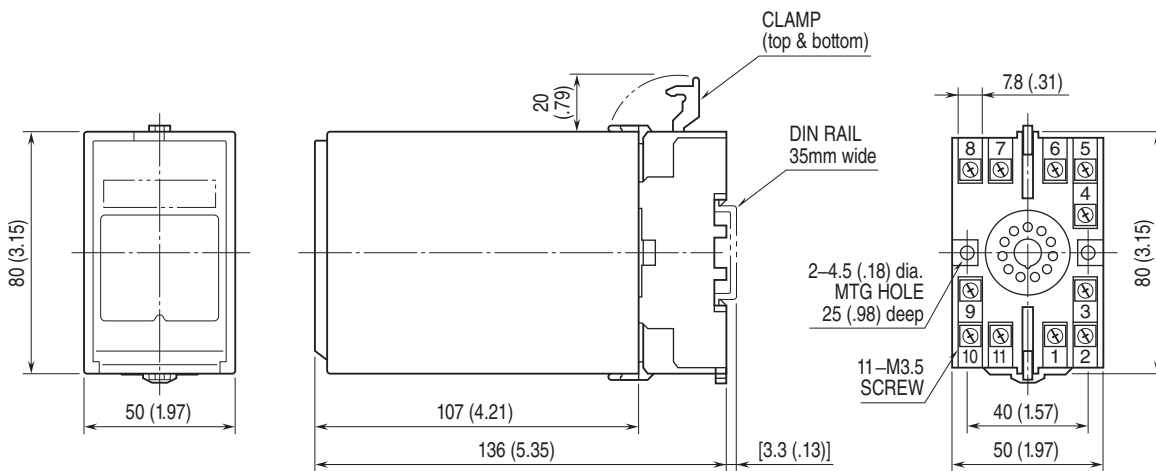
Response time: ≤ 1.2 sec. (0 - 90 %)

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

Insulation resistance: $\geq 100\text{ M}\Omega$ with 500 V DC

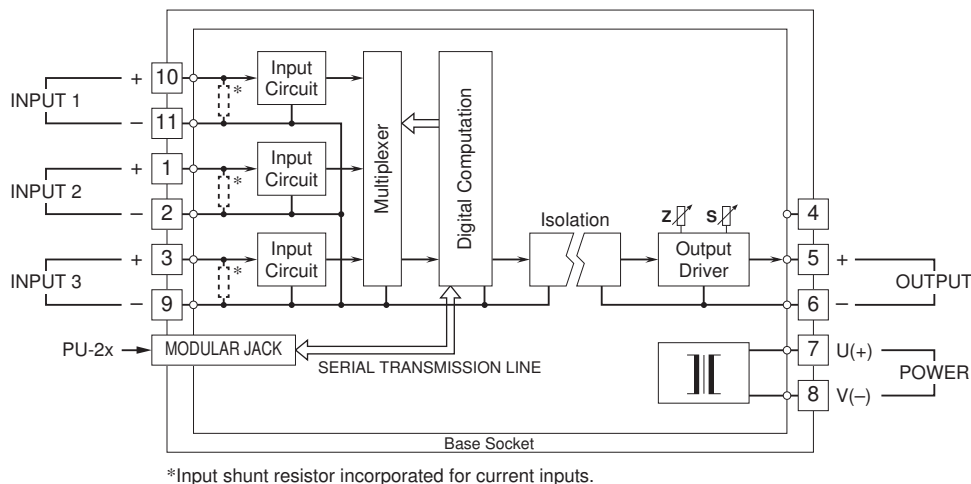
Dielectric strength: 2000 V AC @1 minute (input to output to power to ground)

EXTERNAL DIMENSIONS & TERMINAL ASSIGNMENTS unit: mm (inch)



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

SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM



Specifications are subject to change without notice.