

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

**3-input MATH FUNCTION MODULE**

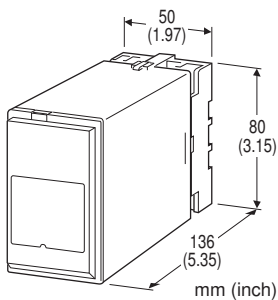
(field-programmable)

**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 [1] through [4].

(e.g. JFK-6A-B/2/Q)

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

Use Ordering Information Sheet (No. ESU-1681). 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  $\Omega$ )

**Voltage**

6: 1 - 5 V DC (Input resistance 1 M $\Omega$  min.)

**[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.)

4W: -10 - +10 V DC (Load resistance 10 k $\Omega$  min.)

5W: -5 - +5 V DC (Load resistance 5000  $\Omega$  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

X<sub>0</sub>: output (%)

X<sub>1</sub> to X<sub>3</sub>: input (%)

K<sub>0</sub> to K<sub>3</sub>: gain ±29.999

A<sub>0</sub> to A<sub>3</sub>: 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 X<sub>0</sub> : compensated flow (linear characteristic)  
 X<sub>1</sub> : uncompensated flow (sq. root extraction available)  
 X<sub>2</sub> : pressure X<sub>3</sub> : 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

- 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: ≤ 1.2 sec. (0 - 90 %)

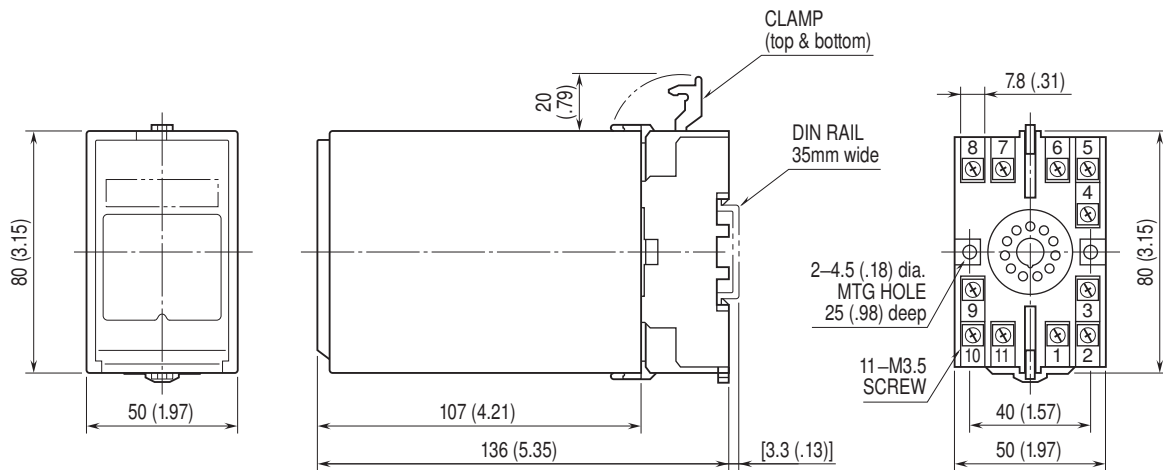
Line voltage effect: ±0.1 % over voltage range

Insulation resistance: ≥ 100 MΩ with 500 V DC

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

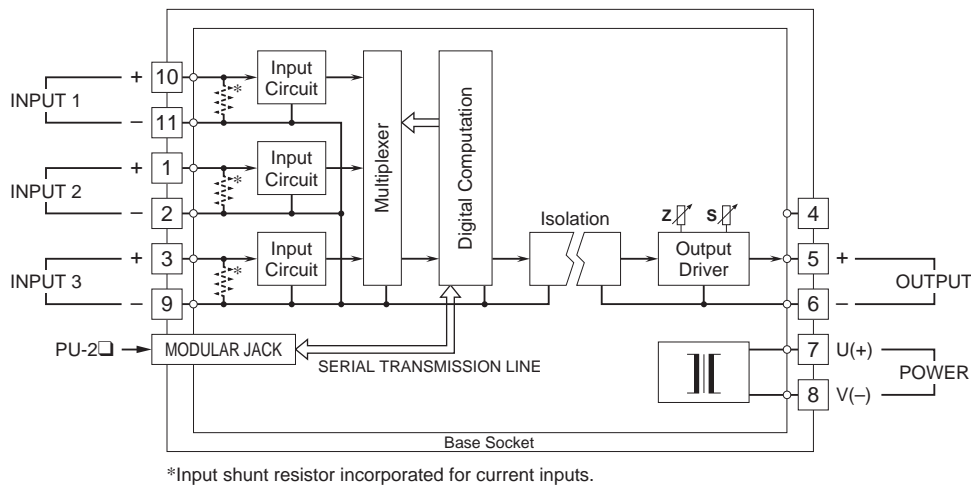


## EXTERNAL DIMENSIONS & TERMINAL ASSIGNMENTS unit: mm (inch)



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

## SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM



Specifications are subject to change without notice.