Super-mini Signal Conditioners *Mini-M Series*

RATIO/BIAS TRANSMITTER
(output bias)

MODEL **M2REB**

MODEL & SUFFIX CODE SELECTION

M2REB–❑–❑❑–❑❑

MODEL

OUTPUT CHARACTERISTICS
S : Proportional; ratio 0.1 – 4.00
R : Inverted; ratio -0.1 – -4.00

INPUT

Current	Voltage
A : 4 – 20mA DC	**2** : 0 – 100mV DC
A1: 4 – 20mA DC *1	**3** : 0 – 1V DC
B : 2 – 10mA DC	**4** : 0 – 10V DC
C : 1 – 5mA DC	**5** : 0 – 5V DC
D : 0 – 20mA DC	**6** : 1 – 5V DC
E : 0 – 16mA DC	**4W** : -10 – +10V DC
F : 0 – 10mA DC	**5W** : -5 – +5V DC
G : 0 – 1mA DC	**0** : Specify voltage
H : 10 – 50mA DC	
K : 0 – 100μA DC	
GW: -1 – +1mA DC	
FW : -10 – +10mA DC	
Z : Specify current	

*1 : 50Ω input resistance for Code A1

OUTPUT

Current	Voltage
A : 4 – 20mA DC	**1** : 0 – 10mV DC
B : 2 – 10mA DC	**2** : 0 – 100mV DC
C : 1 – 5mA DC	**3** : 0 – 1V DC
D : 0 – 20mA DC	**4** : 0 – 10V DC
E : 0 – 16mA DC	**5** : 0 – 5V DC
F : 0 – 10mA DC	**6** : 1 – 5V DC
G : 0 – 1mA DC	**4W** : -10 – +10V DC
Z : Specify current	**5W** : -5 – +5V DC
	0 : Specify voltage

POWER INPUT

AC Power	DC Power
M2: 100 – 240V AC	**R** : 24V DC
	R2: 11 – 27V DC *2
	P : 110V DC

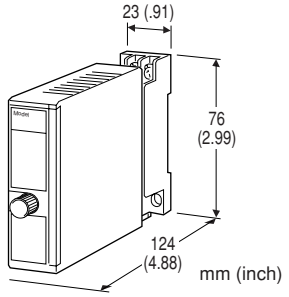
*2 : Select '/N' for 'Standards & Approvals' code.

STANDARDS & APPROVALS
/N : Without CE
/CE: CE marking

ORDERING INFORMATION

Specify code number and variables.
- **Code number** (e.g. M2REB-S-6A-M2/CE)
- **Special input and output ranges** (For codes Z & 0)

ISOLATION



Functions & Features
- Providing precise matching of DC control signals to final control elements in open- or closed-loop systems
- Easy ratio/bias setting with the front digital display
- Ratio adjustable from 0.1 to 4.00 or from -0.1 to -4.00; Bias adjustable to ±100%
- High-density mounting
- CE marking

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

GENERAL SPECIFICATIONS

Construction: Plug-in
Connection: M3 screw terminals (torque 0.8 N·m)
Housing material: Flame-resistant resin (black)
Isolation: Input to output to power
Overrange output: Approx. -10 – +120% at 1 – 5V
Front adjustments: Zero and span; ±5%
Ratio adjustment
Proportional: 0.10 – 4.00; 0.01 increments
Inverted: -0.10 – -4.00; 0.01 increments
Bias adjustment: -100 – +100%; 1% increments
Ratio/bias selector: Double-throw SW (front)
UP/DOWN control: Double-throw, momentary SW (front)

Equation: $Xo = KXi + B$ (proportional)
$Xo = KXi + B + 100\%$ (inverted)
where Xo : Output (%)
K : Ratio
[Linear characteristics
0.1 to 4.00 (proportional)
-0.1 to -4.00 (inverted)]
Xi : Input (approx. -10 to +120%)
B : Bias (-100 – +100%)

■INDICATORS

Ratio/bias digital display: Red LED; 6.4 mm (.25") 7 segment, 3 digits

Polarity indicator: Dual color (red/green) LED; Red with a positive set value; Green with a negative set value.

Power saving mode: Indicators turn off if the switches are untouched for 1 minute.

INPUT & OUTPUT

■INPUT

•DC Current: Shunt resistor attached to input terminals (0.5W)

Input resistance: For resistance values other than listed below, specify when ordering.

Input	Input Resistance
4 – 20mA	: 250 (Ω) (50Ω for Code A1)
2 – 10mA	: 500
1 – 5mA	: 1000
0 – 20mA	: 50
0 – 16mA	: 62.5
0 – 10mA	: 100
0 – 1mA	: 1000
10 – 50mA	: 100
0 – 100μA	: 1000
-1 – +1mA	: 1000
-10 – +10mA	: 100

•DC Voltage: -30 – +30V DC
Minimum span: 100mV
Zero suppression/elevation: Max. 1.5 times span
Input resistance

Input Span	Input Resistance
0.1 – 1V	: 100k (Ω minimum)
≥1V	: 1M

■OUTPUT

•DC Current: 0 – 20mA DC
Minimum span: 1mA
Zero suppression/elevation: Max. 1.5 times span
Load resistance: Output drive 15V maximum

Output	Load Resistance
4 – 20mA	: 750 (Ω maximum)
2 – 10mA	: 1500
1 – 5mA	: 3000
0 – 20mA	: 750
0 – 16mA	: 900
0 – 10mA	: 1500
0 – 1mA	: 15k

•DC Voltage: -10 – +12V DC
Minimum span: 5mV
Zero suppression/elevation: Max. 1.5 times span
Load resistance: Output drive 1mA maximum; at ≥0.5V

Output	Load Resistance
0 – 10mV	: 10k (Ω minimum)
0 – 100mV	: 100k
0 – 1V	: 1000
0 – 10V	: 10k
0 – 5V	: 5000
1 – 5V	: 5000
-10 – +10V	: 10k
-5 – +5V	: 5000

INSTALLATION

Power input

AC: Operational voltage range 85 – 264V; 47 – 66 Hz; approx. 3VA at 100V
approx. 4VA at 200V
approx. 5VA at 264V

DC: Operational voltage range for R: 24V ±10%, R2: 11 – 27V, or P: 85 – 150V; ripple 10% p-p max.; approx. 3W

Operating temperature: -5 to +55°C (23 to 131°F)
Operating humidity: 30 to 90% RH (non-condensing)
Mounting: Surface or DIN rail
Dimensions: W23×H76×D124 mm (0.91"×2.99"×4.88")
See General Spec. Sheet Figure A-2.
Weight: 150 g (0.33 lbs)
Terminal assignment: See General Spec. Sheet Figure B-2.

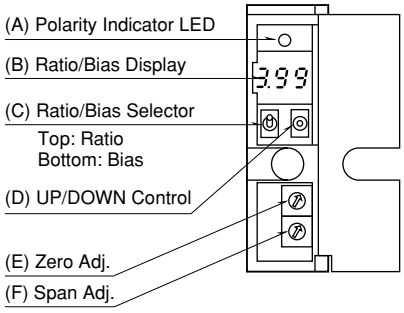
PERFORMANCE in percentage of span

Accuracy: ±0.2%
Ratio = 1, Bias = 0% (proportional)
Ratio = -1, Bias = 0% (inverted)
Temp. coefficient: ±0.015%/°C (±0.008%/°F)
Response time: ≤0.5 seconds (0 – 90%)
Line voltage effect: ±0.1% over voltage range
Insulation resistance: ≥100MΩ with 500V DC
Dielectric strength: 2000V AC @1 minute
(input to output to power to ground)

STANDARDS & APPROVALS

CE conformity: EMC Directive (89/336/EEC)
EMI EN61000-6-4
EMS EN61000-6-2
Low Voltage Directive (73/23/EEC)
EN61010-1
Installation category II
Pollution degree 2
Max. operating voltage 300V
Input or output to power – Reinforced insulation
Input to output – Basic insulation

FRONT PANEL CONFIGURATION



The front cover cannot be turned open by 180 deg. when there is no extra space between units.

•How to Set the Ratio

Turn the Ratio/Bias Selector (C) to the top.
The Ratio/Bias Display (B) shows the current ratio (0.10 – 4.00). Press UP/DOWN Control (D) until the display shows a desired set value.
The Polarity Indicator LED (A) is red when the set value is in positive range, green when in negative range.

•How to Set the Bias

Turn the Ratio/Bias Selector (C) to the bottom.
The Ratio/Bias Display (B) shows the current bias (0 – 100%). Press UP/DOWN Control (D) until the display shows a desired set value.
The Polarity Indicator LED (A) is red when the set value is in positive range, green when in negative range.

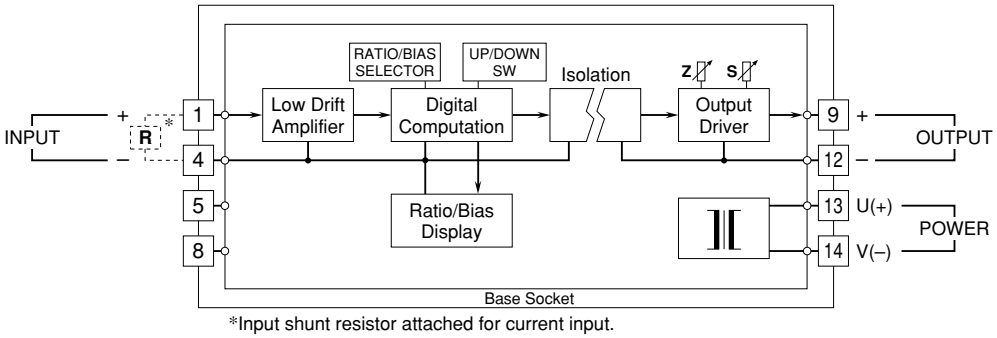
•Fine Calibration

Equation: $Xo = KXi + B$ (proportional)
$Xo = KXi + B + 100\%$ (inverted)

1) Calculate the input signal Xi which results in 0% output. Apply the calculated input and adjust with Zero Adj. (E) the output Xo to 0%.
2) Calculate the input signal Xi which results in 100% output. Apply the calculated input and adjust with Span Adj. (E) the output Xo to 100%.
3) Apply the calculated zero point input again and check the output Xo.
4) If the output has been shifted, go through (1) through (3) again.

The unit is factory set and calibrated to the following ratio and bias values.
Proportional characteristics: ratio (K) = 1, Bias (B) = 0%
Inverted characteristics: ratio (K) = -1, Bias (B) = 0%

SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM



*Input shunt resistor attached for current input.