INSTRUCTION MANUAL

SIGNAL TRANSMITTER
(field-selectable range)

MODEL **6BVS**

BEFORE USE ....

Thank you for choosing M-System. Before use, please check contents of the package you received as outlined below.
If you have any problems or questions with the product, please contact M-System's Sales Office or representatives.

■ PACKAGE INCLUDES:

Transmitter module .....(1)
Outdoor enclosure .....(1)
Mounting screws
  Bolt (M8 × 15).....(4)
  Spring washer for M8 .....(4)
Mounting bracket assembly (optional)
  Mounting bracket.....(1)
  M10 U-bolt.....(2)
  Nut for M10 .....(4)
  Spring washer for M10 .....(4)

■ MODEL NO.

Confirm Model No. marking on the product to be exactly what you ordered.

■ INSTRUCTION MANUAL

This manual describes necessary points of caution when you use this product, including installation, connection and basic maintenance procedures.

POINTS OF CAUTION

■ GENERAL PRECAUTIONS

- Before you remove the unit or mount it, turn off the power supply and input signal for safety.

■ ENVIRONMENT

- Do not install the unit where it is subjected to continuous vibration. Do not subject the unit to physical impact.
- Environmental temperature must be within -5 to +70°C (23 to 158°F) in order to ensure adequate life span and operation.

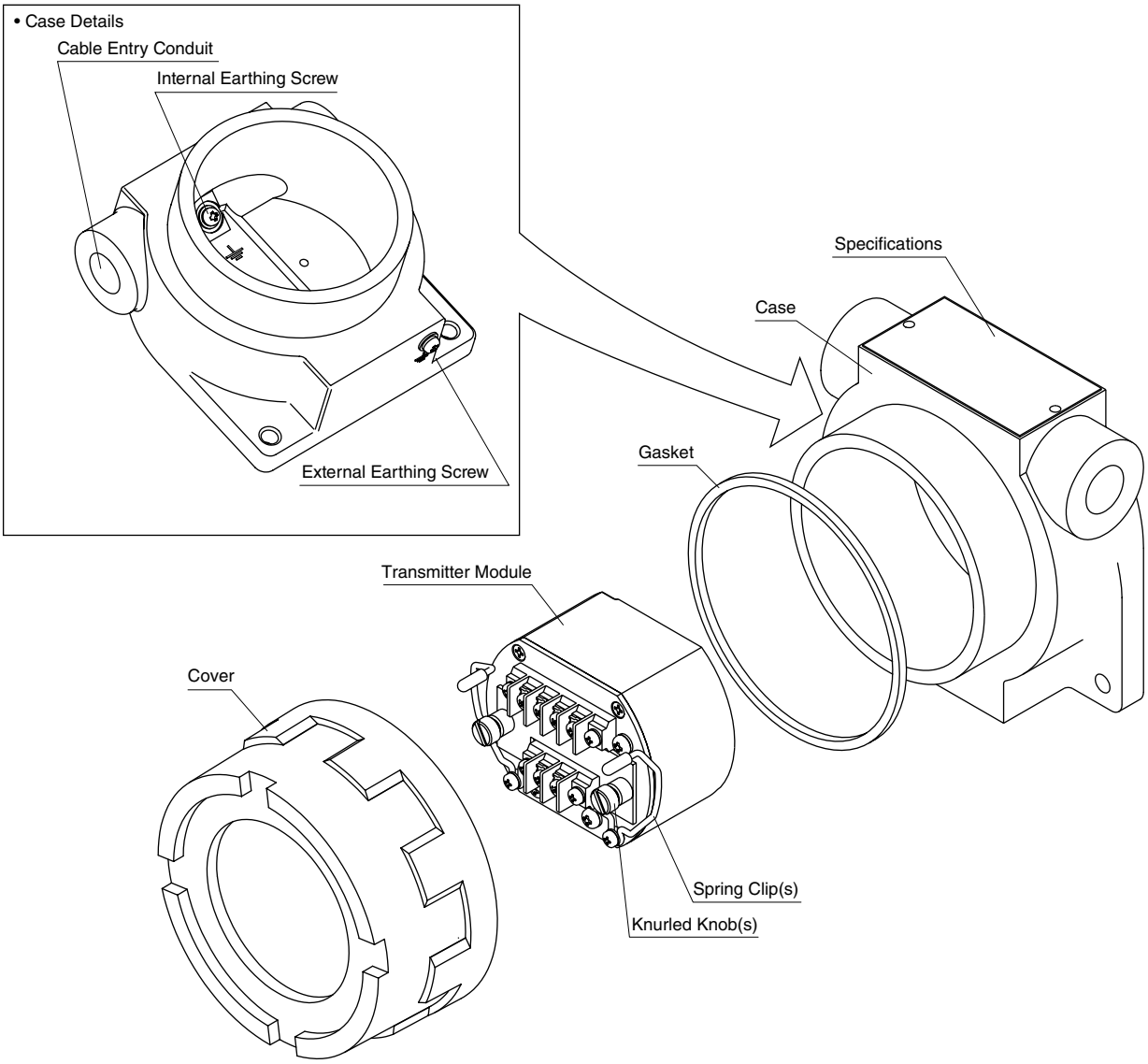
■ WIRING

- Do not install cables close to noise sources (relay drive cable, high frequency line, etc.).
- Do not bind these cables together with those in which noises are present. Do not install them in the same duct.

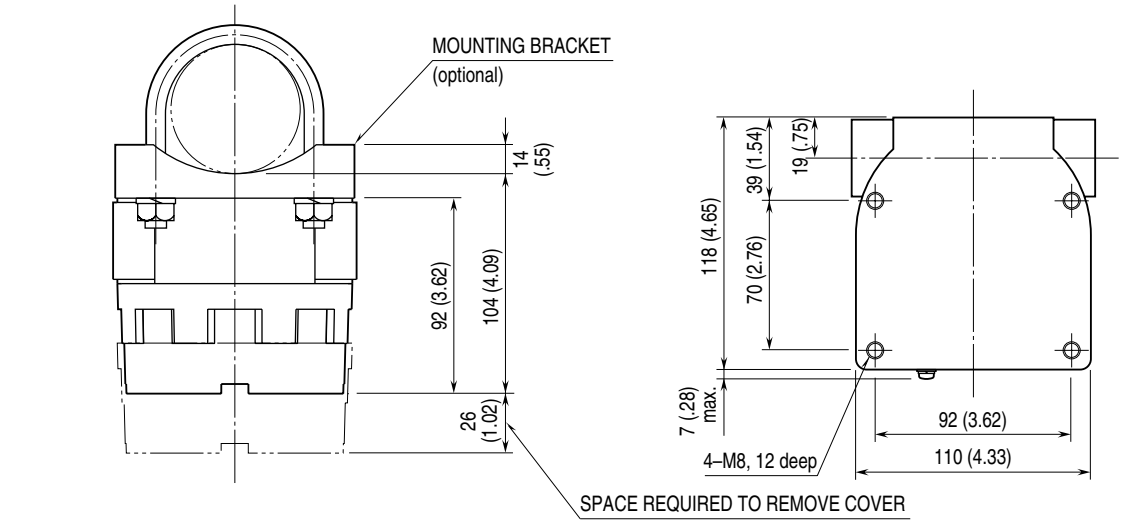
■ AND ....

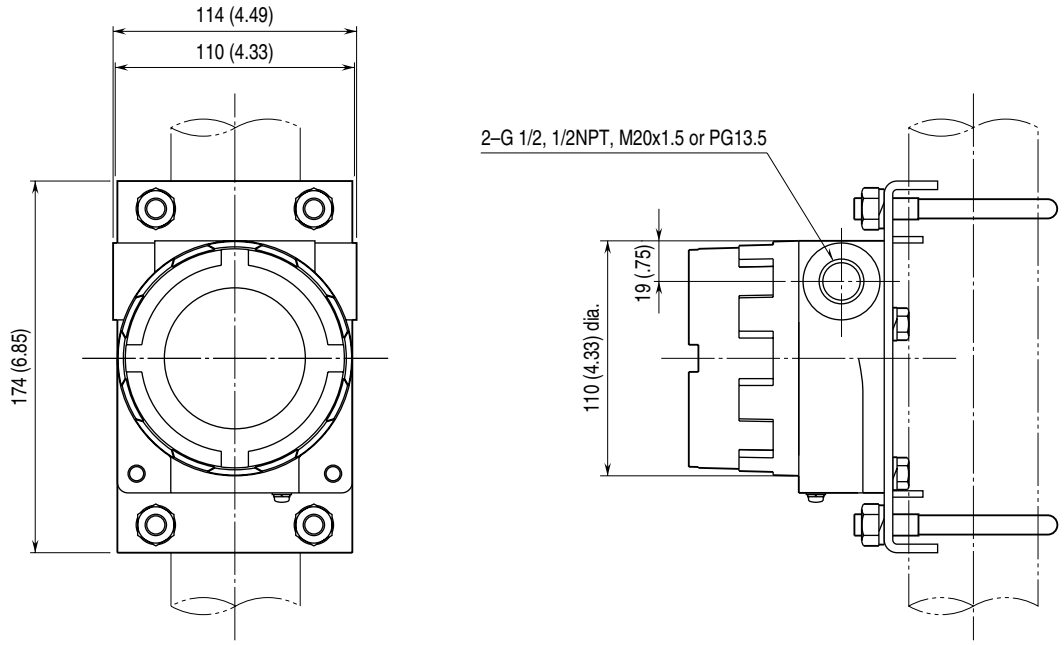
- The unit is designed to function as soon as power is supplied, however, a warm up for 10 minutes is required for satisfying complete performance described in the data sheet.

COMPONENT IDENTIFICATION



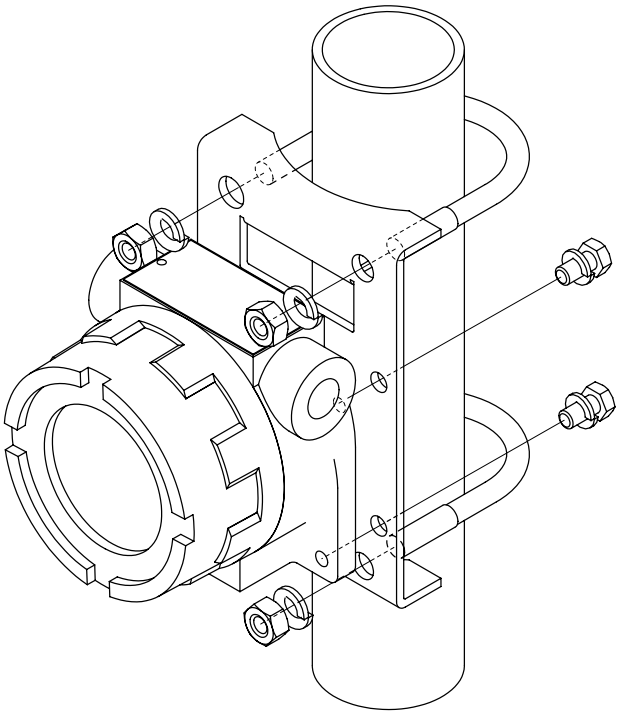
EXTERNAL DIMENSIONS unit: mm (inch)



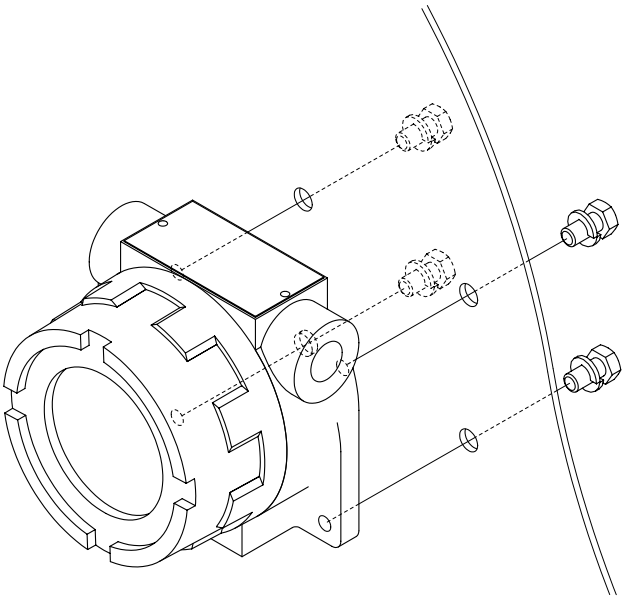


INSTALLATION

■ **MOUNTING THE ENCLOSURE ON A PIPE**

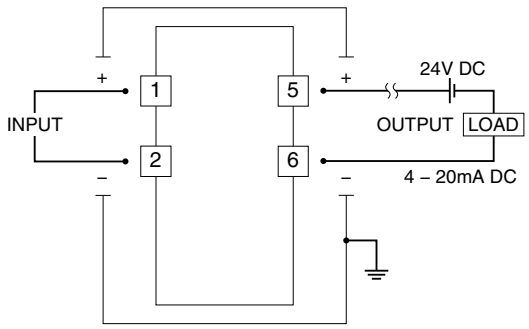


■ **MOUNTING THE ENCLOSURE ON A WALL**



TERMINAL CONNECTIONS

Connect the unit as in the diagram below.



WIRING INSTRUCTIONS

■ SCREW TERMINAL

Torque: 0.6 N·m

CHECKING

Open the unit's outdoor enclosure cover when you conduct checking of the transmitter. Be sure to close the cover after the checking is complete.

1) Terminal wiring: Check that all cables are correctly connected according to the connection diagram.
2) Input: Check that the input signal is within 0 – 100% of the full-scale.
3) Output: Check that the load is within the permissible limit including wiring resistance.

$$\text{Load Resistance } (\Omega) = \frac{\text{Supply Voltage (V)} - 13\text{ (V)}}{0.02\text{ (A)}}$$

(including leadwire resistance)

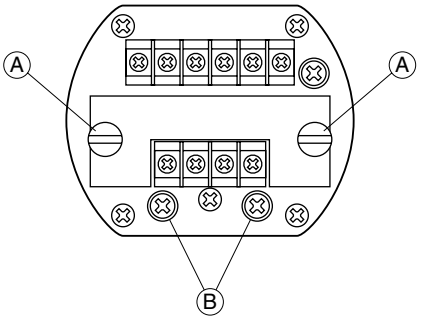
ADJUSTMENT PROCEDURE

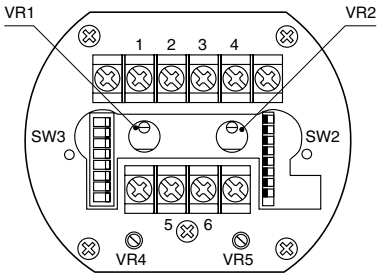
This unit is calibrated at the factory to meet the ordered specifications, therefore you usually do not need any calibration.

For matching the signal to a receiving instrument or in case of regular calibration, adjust the output as explained below.

■ PREPARATION

1) Open the outdoor enclosure cover.
2) Release knurled knobs (A) at the front of the transmitter and open the top cover.
3) Remove two screws (B).
4) After the calibration is complete, refit the screws and close the covers by performing the above procedure in the reverse order.





SW2 : Zero Bias Selector
SW3 : Span Gain Selector
VR1 : 0% Adjustment (fine)
VR2 : 100% Adjustment (fine)
VR5 : 0% Adjustment (coarse)
VR4 : 100% Adjustment (coarse)

■ INPUT BIAS ADJUSTMENT (0% input or lower range value)

1) Connect a voltmeter across the terminal 3 (+) and 2 (–).
2) With minimum (0%) input, adjust SW2 to appropriate positions – nearest to desired value – according to Table 1 to Table 3 [INPUT BIAS SELECTION TABLE], and adjust output reading to 0 ±0.002V with VR5 (zero-coarse adjustment).
3) With minimum (0%) input, adjust output to 0 ±0.05% with VR1 (zero-fine adjustment).

■ INPUT RANGE ADJUSTMENT (100% input or upper range value)

4) With maximum (100%) input, adjust SW3 to appropriate positions according to Table 4 to Table 6 [INPUT RANGE SELECTION TABLE], and adjust output to 100 ±0.05% with VR4 (span-coarse adjustment) and VR2 (span-fine adjustment).
5) With minimum (0%) input, check that input is 0 ±0.05%. When the ZERO point is changed, repeat the procedure 1) to 4).

■ OUTPUT ZERO & SPAN ADJUSTMENT

1) ZERO: Apply 0% input and adjust output to 0% with the VR1.
2) SPAN: Apply 100% input and adjust output to 100% with the VR2.
3) Check ZERO adjustment again with 0% input.
4) When ZERO value is changed, repeat the above procedure 1) – 3).

TABLES

■ INPUT BIAS SELECTION TABLE

[TABLE 1] Input Span 3 to 100mV

SW2								WEIGHT OF BIT
1	2	3	4	5	6	7	8	
1	1	0	0	0	0	0	0	+129mV
1	0	1	0	0	0	0	0	+ 64mV
1	0	0	1	0	0	0	0	+ 32mV
1	0	0	0	1	0	0	0	+ 16mV
1	0	0	0	0	1	0	0	+ 8mV
1	0	0	0	0	0	1	0	+ 4mV
1	0	0	0	0	0	0	1	+ 2mV
1	0	0	0	0	0	0	0	+ 0mV
0	1	1	1	1	1	1	1	– 2mV
0	1	1	1	1	1	1	0	– 4mV
0	1	1	1	1	1	0	1	– 6mV
0	1	1	1	1	0	1	1	– 10mV
0	1	1	1	0	1	1	1	– 18mV
0	1	1	0	1	1	1	1	– 34mV
0	1	0	1	1	1	1	1	– 66mV
0	0	1	1	1	1	1	1	–131mV

[TABLE 2] Input Span 100 to 1000mV

SW2								WEIGHT OF BIT
1	2	3	4	5	6	7	8	
1	1	0	0	0	0	0	0	+650mV
1	0	1	0	0	0	0	0	+325mV
1	0	0	1	0	0	0	0	+163mV
1	0	0	0	1	0	0	0	+ 82mV
1	0	0	0	0	1	0	0	+ 41mV
1	0	0	0	0	0	1	0	+ 21mV
1	0	0	0	0	0	0	1	+ 11mV
1	0	0	0	0	0	0	0	+ 0mV
0	1	1	1	1	1	1	1	– 10mV
0	1	1	1	1	1	1	0	– 21mV
0	1	1	1	1	1	0	1	– 31mV
0	1	1	1	1	0	1	1	– 51mV
0	1	1	1	0	1	1	1	– 91mV
0	1	1	0	1	1	1	1	–172mV
0	1	0	1	1	1	1	1	–330mV
0	0	1	1	1	1	1	1	–650mV

[TABLE 3] Input Span 1 to 10V

SW2								WEIGHT OF BIT
1	2	3	4	5	6	7	8	
1	1	0	0	0	0	0	0	+7080mV
1	0	1	0	0	0	0	0	+3540mV
1	0	0	1	0	0	0	0	+1770mV
1	0	0	0	1	0	0	0	+ 890mV
1	0	0	0	0	1	0	0	+ 440mV
1	0	0	0	0	0	1	0	+ 210mV
1	0	0	0	0	0	0	1	+ 100mV
1	0	0	0	0	0	0	0	+ 0mV
0	1	1	1	1	1	1	1	– 120mV
0	1	1	1	1	1	1	0	– 240mV
0	1	1	1	1	1	0	1	– 350mV
0	1	1	1	1	0	1	1	– 560mV
0	1	1	1	0	1	1	1	– 1000mV
0	1	1	0	1	1	1	1	–1900mV
0	1	0	1	1	1	1	1	–3660mV
0	0	1	1	1	1	1	1	–7220mV

Note 1: The SW2-1 is turned ON (1) with suppressed zero range, while it is turned OFF (0) with elevated zero range.

Note 2: With suppressed zero range, weight of bit (mV) is added by turning ON (1) each one of the SW2-8 to SW2-2, while with elevated zero range, it is added by turning OFF (0) the same.
For example, in [1 – 10V] span (TABLE 3), 1V bias (zero suppression) is nearly obtained by turning on SW2-1 (positive), SW2-5 and SW2-8 (890mV + 100mV = 990mV).

■ INPUT RANGE SELECTION TABLE

[TABLE 4] Input Span 3 to 100mV

SW3								GAIN	SPAN [mV]
1	2	3	4	5	6	7	8		100%IN – 0%IN
1	1	1	1	1	1	1	1	1 – 2	50 – 100
1	1	1	1	1	1	1	0	2 – 3	33 – 50
1	1	1	1	1	1	0	1	3 – 4	25 – 33
1	1	1	1	1	1	0	0	4 – 5	20 – 25
1	1	1	1	1	0	1	1	5 – 6	16.7 – 20.0
1	1	1	1	1	0	1	0	6 – 7	14.3 – 16.7
1	1	1	1	1	0	0	1	7 – 8	12.5 – 14.3
1	1	1	1	1	0	0	0	8 – 9	11.1 – 12.5
1	1	1	1	0	1	1	1	9 – 10	10.0 – 11.1
1	1	1	1	0	1	1	0	10 – 11	9.0 – 10.0
1	1	1	0	1	1	1	1	11 – 12	8.3 – 9.0
1	1	1	0	1	1	1	0	12 – 13	7.7 – 8.3
1	1	1	0	1	1	0	1	13 – 14	7.3 – 7.7
1	1	1	0	1	1	0	0	14 – 15	6.7 – 7.3
1	1	1	0	1	0	1	1	15 – 16	6.3 – 6.7
1	1	1	0	1	0	1	0	16 – 17	5.9 – 6.3
1	1	1	0	1	0	0	1	17 – 18	5.6 – 5.9
1	1	1	0	1	0	0	0	18 – 19	5.3 – 5.6
1	1	1	0	0	1	1	1	19 – 20	5.0 – 5.3
1	1	1	0	0	1	1	0	20 – 21	4.8 – 5.0
1	1	0	1	1	1	1	1	21 – 22	4.5 – 4.8
1	1	0	1	1	1	1	0	22 – 23	4.3 – 4.5
1	1	0	1	1	1	0	1	23 – 24	4.2 – 4.3
1	1	0	1	1	1	0	0	24 – 25	4.0 – 4.2
1	1	0	1	1	0	1	1	25 – 26	3.8 – 4.0
1	1	0	1	1	0	1	0	26 – 27	3.7 – 3.8
1	1	0	1	1	0	0	1	27 – 28	3.5 – 3.7
1	1	0	1	1	0	0	0	28 – 29	3.4 – 3.5
1	1	0	1	0	1	1	1	29 – 30	3.3 – 3.4
1	1	0	1	0	1	1	0	30 – 31	3.2 – 3.3
1	1	0	0	1	1	1	1	31 – 32	3.1 – 3.2
1	1	0	0	1	1	1	0	32 – 33	3.0 – 3.1

Note 1: Turning SW3 OFF (0) in negative logic adds an weight of bits.
Note 2: Gain indicates the multiplying factor adjustable with SW3.

[TABLE 5] Input Span 100 to 1000mV

SW3								GAIN	SPAN [V]
1	2	3	4	5	6	7	8		100%IN – 0%IN
1	1	1	1	1	1	1	1	1 – 2	0.05 – 1.00
1	1	1	1	1	1	1	0	2 – 3	0.35 – 0.50
1	1	1	1	1	1	0	1	3 – 4	0.27 – 0.35
1	1	1	1	1	1	0	0	4 – 5	0.21 – 0.27
1	1	1	1	1	0	1	1	5 – 6	0.18 – 0.21
1	1	1	1	1	0	1	0	6 – 7	0.15 – 0.18
1	1	1	1	1	0	0	1	7 – 8	0.13 – 0.15
1	1	1	1	1	0	0	0	8 – 9	0.12 – 0.13
1	1	1	1	0	1	1	1	9 – 10	0.11 – 0.12
1	1	1	1	0	1	1	0	10 – 11	0.10 – 0.11

Note 1: Turning SW3 OFF (0) in negative logic adds an weight of bits.
Note 2: Gain indicates the multiplying factor adjustable with SW3.

[TABLE 6] Input Span 1 to 10V

SW3								GAIN	SPAN [V]
1	2	3	4	5	6	7	8		100%IN – 0%IN
1	1	1	1	1	1	1	1	1 – 2	5.0 – 10.0
1	1	1	1	1	1	1	0	2 – 3	3.5 – 5.0
1	1	1	1	1	1	0	1	3 – 4	2.7 – 3.5
1	1	1	1	1	1	0	0	4 – 5	2.1 – 2.7
1	1	1	1	1	0	1	1	5 – 6	1.8 – 2.1
1	1	1	1	1	0	1	0	6 – 7	1.5 – 1.8
1	1	1	1	1	0	0	1	7 – 8	1.3 – 1.5
1	1	1	1	1	0	0	0	8 – 9	1.2 – 1.3
1	1	1	1	0	1	1	1	9 – 10	1.1 – 1.2
1	1	1	1	0	1	1	0	10 – 11	1.0 – 1.1

Note 1: Turning SW3 OFF (0) in negative logic adds an weight of bits.
Note 2: Gain indicates the multiplying factor adjustable with SW3.

MAINTENANCE

Regular calibration procedure is explained below:

■ CALIBRATION

Warm up the unit for at least 10 minutes. Apply 0%, 25%, 50%, 75% and 100% input signal. Check that the output signal for the respective input signal remains within accuracy described in the data sheet. When the output is out of tolerance, recalibrate the unit according to the "ADJUSTMENT PROCEDURE" explained earlier.

LIGHTNING SURGE PROTECTION

M-System offers a series of lightning surge protector for protection against induced lightning surges. Please contact M-System to choose appropriate models.