Mini-M™

INSTRUCTION MANUAL

POTENTIOMETER TRANSMITTER
(field- and PC-configurable)

MODEL **M2LPM**

BEFORE USE ....

Thank you for choosing us. 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 our sales office or representatives.

■ PACKAGE INCLUDES:

Signal conditioner (body + base socket)............................(1)

■ 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.
The M2LPM is programmable using the PC configurator software. For detailed information on the PC configuration, refer to the M2LPMCFG instruction manual. The M2LPM-CFG PC Configurator Software is downloadable at our web site.

POINTS OF CAUTION

■ POWER INPUT RATING & OPERATIONAL RANGE

• Locate the power input rating marked on the product and confirm its operational range as indicated below:
  85 – 264V AC rating: 85 – 264V, 47 – 66 Hz, approx. 4 – 6VA

■ GENERAL PRECAUTIONS

• Before you remove the unit from its base socket or mount it, turn off the power supply and input signal for safety.

■ ENVIRONMENT

• Indoor use.
• When heavy dust or metal particles are present in the air, install the unit inside proper housing with sufficient ventilation.
• 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 +55°C (23 to 131°F) with relative humidity within 30 to 90% RH in order to ensure adequate life span and operation.
• Be sure that the ventilation slits are not covered with cables, etc.

■ 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
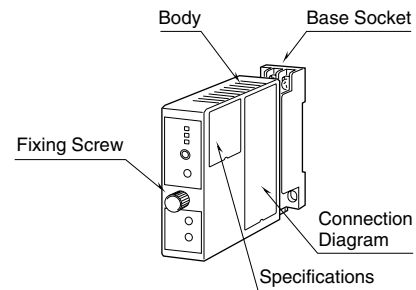
INSTALLATION

Loosen the fixing screw at the front of the unit in order to separate the body from the base socket.

■ DIN RAIL MOUNTING

Set the base socket so that its DIN rail adaptor is at the bottom. Position the upper hook at the rear side of base socket on the DIN rail and push in the lower. When removing the socket, push down the DIN rail adaptor utilizing a minus screwdriver and pull.
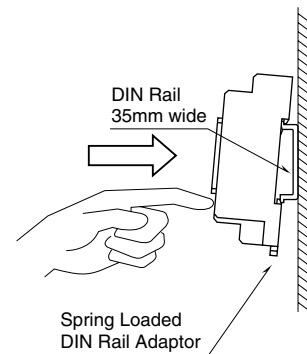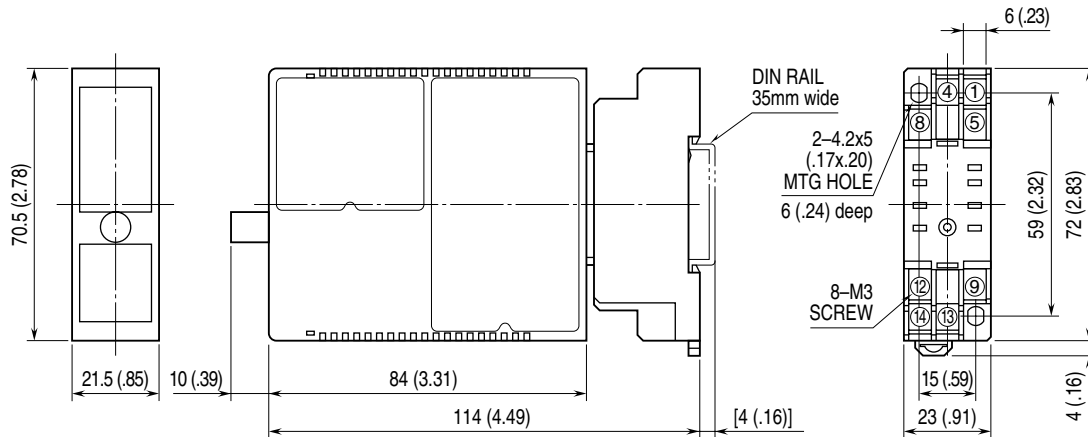

■ WALL MOUNTING

Refer to "EXTERNAL DIMENSIONS."
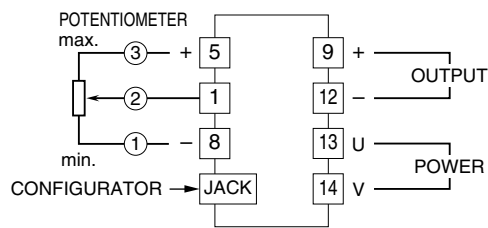
TERMINAL CONNECTIONS

Connect the unit as in the diagram below or refer to the connection diagram on the side of the unit.

■ EXTERNAL DIMENSIONS unit: mm (inch)

70.5 (2.78)

DIN RAIL
35mm wide

6 (.23)

2–4.2x5
(.17x.20)
MTG HOLE
6 (.24) deep

8–M3
SCREW

59 (2.32)   72 (2.83)

21.5 (.85)   10 (.39)   84 (3.31)

114 (4.49)   [4 (.16)]

15 (.59)

23 (.91)

4 (.16)

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

■ CONNECTION DIAGRAM

POTENTIOMETER
max.

③ + [5]   [9] +
②   [1]   [12] −   OUTPUT
① − [8]   [13] U
min.   POWER
CONFIGURATOR → [JACK] [14] V

WIRING INSTRUCTIONS

■ SCREW TERMINAL

Torque: 0.8 N·m

■ SOLDERLESS TERMINAL

Refer to the drawing below for recommended ring tongue terminal size. Spade tongue type is also applicable.
Applicable wire size: 0.25 to 1.65 mm^2 (AWG 22 to 16)
Recommended manufacturer: Japan Solderless Terminal MFG.Co.Ltd, Nichifu Co.,ltd
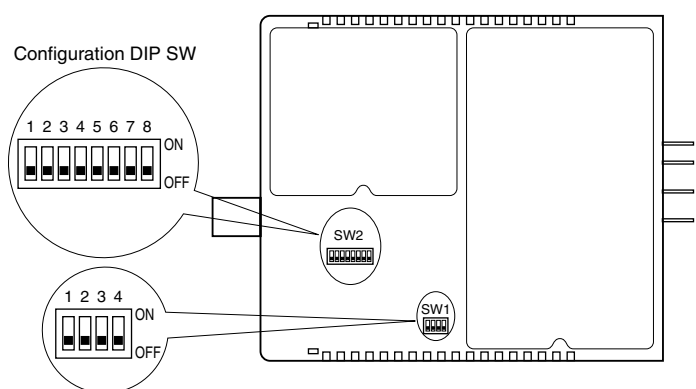
3.3 (.13) max

6 (.24) max

mm (inch)
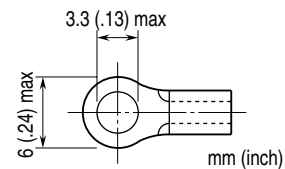
EXTERNAL VIEWS

■ FRONT VIEW

LED1 (LD1)
LED2 (LD2)
LED3 (LD3)
Configurator Jack
MODE Button
UP Button
DOWN Button
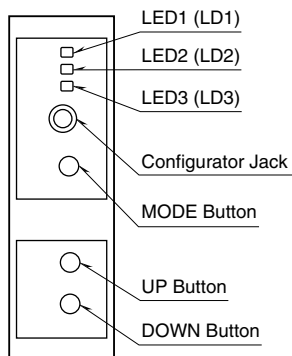
■ SIDE VIEW

Configuration DIP SW

1 2 3 4 5 6 7 8   ON
OFF

SW2

1 2 3 4   ON
OFF

SW1

CONFIGURATION MODE & DIP SW SETTINGS

When you program the transmitter module, two configuration modes are available: Field Configuration using DIP SW / control buttons, and PC Software.

The internal DIP switches are used to configure input and output type. Once the module is configured, precise ranges are set up with the front control buttons using a simulator connected to the input terminals and a multimeter connected to the output terminals as a reference.

The calibrated input and output ranges are stored in the internal memory. The module reads the DIP-switch-calibrated configuration only once after the power supply is turned on. Set the switches with the power supply removed.

Selectable I/O type and ranges are listed in Table 6 and 7.

■ DIP SW CONFIGURATION MODE

Turn the SW2-8 OFF to enable the DIP SW (Field Configuration) mode as shown in Table 1.

See Table 2 to configure the input and Table 4 for the output.

■ PC CONFIGURATION MODE

Turn the SW2-8 ON to enable the PC Configuration mode as shown in Table 1. All programmable features can be set up on a PC regardless of other DIP SW setting except that the output type must be selected with the DIP SW1-1 through SW1-4 (See Table 5).

For detailed information on the PC configuration, refer to the M2LPMCFG instruction manual.

■ CONFIGURATION MODE (SW2)　　　Table 1

MODE	SW2-8	
DIP SW	OFF	Configuration mode can be confirmed with the front LED.
PC (*)	ON	

(*) Factory setting

■ INPUT TYPE (SW2)　　　Table 2

INPUT	SW2-7	SW2-6	SW2-5
$0 - 50\Omega$	OFF	OFF	OFF
$0 - 150\Omega$	ON	OFF	OFF
$0 - 300\Omega$	OFF	ON	OFF
$0 - 500\Omega$	ON	ON	OFF
$0 - 1500\Omega$	OFF	OFF	ON
$0 - 10k\Omega$	ON	OFF	ON

■ BURNOUT (SW2)　　　Table 3

BURNOUT	SW2-1	SW2-2
No burnout	OFF	OFF
Upscale (*)	OFF	ON
Downscale	ON	ON

(*) Factory setting

■ OUTPUT TYPE (SW2 & 1)　　　Table 4

OUTPUT	SW2-4	SW2-3	SW1-4	SW1-3	SW1-2	SW1-1
$0 - 20mA$	OFF	OFF	OFF	ON	OFF	OFF
$-2.5 - +2.5V$	OFF	ON	ON	OFF	OFF	ON
$-10 - +10V$	ON	OFF	ON	OFF	ON	OFF

■ OUTPUT TYPE / PC CONFIG (SW1)　　　Table 5

OUTPUT	SW1-4	SW1-3	SW1-2	SW1-1
$0 - 20mA$	OFF	ON	OFF	OFF
$-2.5 - +2.5V$	ON	OFF	OFF	ON
$-10 - +10V$	ON	OFF	ON	OFF

■ INPUT TYPE & RANGE　　　Table 6

INPUT RANGE	MINIMUM SPAN
$0 - 50\Omega$	2.5Ω
$0 - 150\Omega, 0 - 300\Omega, 0 - 500\Omega$	5Ω
$0 - 1500\Omega$	150Ω
$0 - 10k\Omega$	1000Ω

■ OUTPUT TYPE & RANGE　　　Table 7

OUTPUT TYPE	MINIMUM SPAN	MAXIMUM RANGE	CONFORMANCE RANGE
DC Current	1mA	0 to 20mA	0 to 24mA
DC Voltage, Narrow Spans	0.25V	-2.5 to +2.5V	-3 to +3V
DC Voltage, Wide Spans	1V	-10 to +10V	-11.5 to +11.5V

CHECKING

1) Terminal wiring: Check that all cables are correctly connected according to the connection diagram.

2) DIP SW setting: Check that the switches are set to appropriate positions.

3) Power input voltage: Check voltage across the terminal 13 – 14 with a multimeter.

4) Input: Check that the input signal is within 0 – 100% of full-scale.

   If the potentiometer wires are broken, the output goes over 100% (below 0% with downscale burnout) due to burnout function. Confirm the status indicator LED pattern and check leadwires in such a case.

5) Output: Check that the load resistance meets the described specifications.

I/O RANGING & FINE ADJUSTMENTS

After the DIP SW setting is complete, set up the precise input and output range using the front control buttons.

The front LEDs' colors and blinking patterns help you to easily identify the transmitter's status and confirm the set-up actions in each step of Calibration Modes. Please read the following explanations referring to "Calibration Flow Chart".

■ PREPARATION (e.g. Input 0 – 500Ω, Output 1 – 5V)

1) Mount the DIP-SW-configured M2LPM on to a DIN rail.

2) Connect the M2LPM to a simulator and a multimeter and to a AC power source as shown below.

3) Turn the power supply on and wait for 10 minutes.
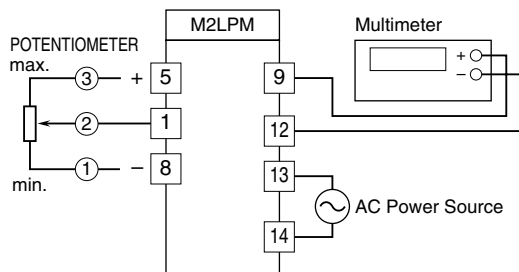
■ INPUT & OUTPUT RANGING

[Example]

1) Run Mode: Confirm that: the LD1 green LED is blinking in PC configuration mode; and the LD1 green LED is ON in DIP switch configuration mode.

2) Input Ranging Mode: Hold down MODE button for longer than 5 seconds until the LD1 red LED is ON and the LD2 red LED is blinking.

3) 0% Input Ranging: Apply the desired minimum input level (e.g. 0Ω) from the potentiometer and hold down DOWN button until the LD1 blinks for approx. 2 sec. and then turns OFF. When you release the button, the LD1 is returned to ON.

   The blinking LD1 means that the value is stored in the memory. If the LED does not change, the entered level may be inappropriate: too small a span, or out of usable range (same for all steps).

4) 100% Input Ranging: Apply the desired maximum input level (e.g. 500Ω) from the potentiometer and hold down UP button until the LD1 blinks for approx. 2 sec. and then turns OFF. When you release the button, the LD1 is returned to ON.

5) Output Ranging Mode: Press MODE button and confirm that the LD3 red LED instead of LD2 is blinking.

6) 0% Output Ranging: Increase or decrease the simulated input until the meter shows the desired minimum output level (e.g. 1V). Hold down DOWN button until the LD1 blinks for approx. 2 sec. and then turns OFF. When you release the button, the LD1 is returned to ON.

7) 100% Output Ranging: Increase or decrease the simulated input until the meter shows the desired maximum output level (e.g. 5V). Hold down UP button until the LD1 blinks for approx. 2 sec. and then turns OFF. When you release the button, the LD1 is returned to ON.

8) Run Mode: When calibration is completed, press MODE button once and confirm that: the LD1 green LED is blinking in PC configuration mode; and the LD1 green LED is ON in DIP switch configuration mode.
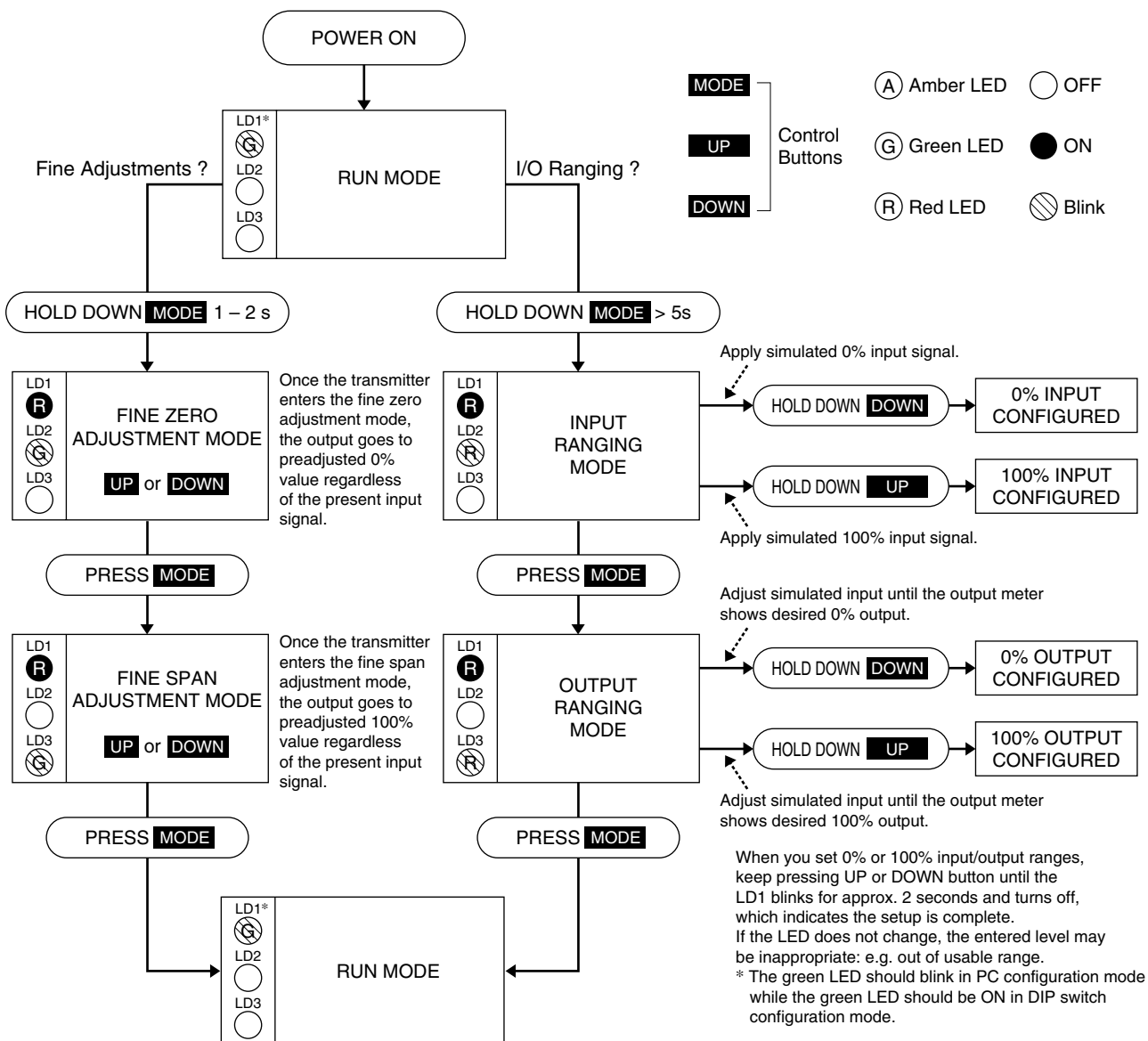
■ ZERO & SPAN ADJUSTMENTS

After the transmitter is installed and operational, fine zero and span tuning can be performed as explained below. Both zero and span are adjustable within ±15%.

1) Run Mode: Confirm that: the LD1 green LED is blinking in PC configuration mode; and the LD1 green LED is ON in DIP switch configuration mode.

2) Fine Zero Adjustment Mode: Hold down MODE button for 1 or 2 seconds until the LD1 red LED is ON and the LD2 green LED is blinking.

   Use UP (increase) and DOWN (decrease) buttons to adjust the output to 0%.

3) Fine Span Adjustment Mode: Press MODE button and confirm that the LD3 green LED instead of LD2 is blinking.

   Use UP (increase) and DOWN (decrease) buttons to adjust the output to 100%.

4) Run Mode: When fine adjustment is completed, press MODE button once and confirm that: the LD1 green LED is blinking in PC configuration mode; and the LD1 green LED is ON in DIP switch configuration mode.

Note 1: Calibration steps can be skipped when not needed by repeating pushing MODE buttons.

Note 2: There is no stated order of setting 0% and 100% levels or no limitation of entering values for multiple times within one step of Calibration Mode. Signal level is stored each time the respective UP or DOWN button is pressed.

■ **CALIBRATION FLOW CHART**

POWER ON

RUN MODE

LD1*
LD2
LD3

Fine Adjustments ?

I/O Ranging ?

MODE		
UP	Control Buttons
DOWN	

Ⓐ Amber LED ○ OFF
Ⓖ Green LED ● ON
Ⓡ Red LED ⊘ Blink

HOLD DOWN MODE 1 – 2 s

HOLD DOWN MODE > 5s

FINE ZERO ADJUSTMENT MODE
LD1 Ⓡ
LD2 ⊘
LD3 ○
UP or DOWN

Once the transmitter enters the fine zero adjustment mode, the output goes to preadjusted 0% value regardless of the present input signal.

INPUT RANGING MODE
LD1 Ⓡ
LD2 ⊘
LD3 ○

Apply simulated 0% input signal.

HOLD DOWN DOWN → 0% INPUT CONFIGURED

HOLD DOWN UP → 100% INPUT CONFIGURED

Apply simulated 100% input signal.

PRESS MODE

PRESS MODE

FINE SPAN ADJUSTMENT MODE
LD1 Ⓡ
LD2 ○
LD3 ⊘
UP or DOWN

Once the transmitter enters the fine span adjustment mode, the output goes to preadjusted 100% value regardless of the present input signal.

OUTPUT RANGING MODE
LD1 Ⓡ
LD2 ○
LD3 ⊘

Adjust simulated input until the output meter shows desired 0% output.

HOLD DOWN DOWN → 0% OUTPUT CONFIGURED

HOLD DOWN UP → 100% OUTPUT CONFIGURED

Adjust simulated input until the output meter shows desired 100% output.

PRESS MODE

PRESS MODE

RUN MODE
LD1* ⊘
LD2 ○
LD3 ○

When you set 0% or 100% input/output ranges, keep pressing UP or DOWN button until the LD1 blinks for approx. 2 seconds and turns off, which indicates the setup is complete.
If the LED does not change, the entered level may be inappropriate: e.g. out of usable range.
* The green LED should blink in PC configuration mode while the green LED should be ON in DIP switch configuration mode.

STATUS INDICATOR LED

Combinations of the three front LEDs (LD1, LD2, LD3) indicate the transmitter's operating status by different blinking patterns.
Examples are shown below.

(A) Amber LED	◯ OFF		
(G) Green LED	● ON		
(R) Red LED	◩ Blink		

NORMAL OPERATION (RUN) MODE			
LD1 (G) LD2 ◯ LD3 ◯	**PC Configuration RUN Mode** The transmitter is configured via PC and is in normal operating conditions.	LD1 (G) LD2 ◯ LD3 ◯	**DIP SW Configuration RUN Mode** The transmitter is configured via DIP SW and is in normal operating conditions.

ERROR MODE			
LD1 (A) LD2 ◯ LD3 ◯	**Parameter Error** Error occurred when reading parameters from the internal memory. Turn the power suppy off and on. If the error still exists, reset the parameters to default and program the unit again.	LD1 (G) LD2 ◯ LD3 (A)	**Output Saturated in PC Configuration Mode** The output is below -15% or above 115%.
LD1 *1 LD2 (A) LD3 ◯	**Communication Error** Internal CPU's communication error. *1. LD1 may be one of the ● ◩ (A).	LD1 (G) LD2 ◯ LD3 (A)	**Output Saturated in DIP SW Configuration Mode** The output is below -15% or above 115%.
LD1 *1 LD2 ◯ LD3 (R)	**AD Conversion Error** Internal AD conversion error. *1. LD1 may be one of the ● ◩ (A).	LD1 (G) LD2 (R) LD3 ◯	**Burnout in PC Configuration Mode**
LD1 (R) LD2 (R) LD3 (R)	**DIP SW Error** DIP SW configuration is inappropriate. Check the DIP SW setting referring to Tables 2 – 5.	LD1 (G) LD2 (R) LD3 ◯	**Burnout in DIP SW Configuration Mode**

HOW TO RESET TO DEFAULT STATUS

1) Set SW2-1 to ON position, SW2-2 to OFF position.
2) Turn on the power supply to the transmitter while pressing MODE button.
3) Wait until green LED turns on at the LD1, LD2 and LD3.
4) Reset SW2-1 to OFF position. Turn off and on the power supply.

LIGHTNING SURGE PROTECTION

We offer a series of lightning surge protector for protection against induced lightning surges. Please contact us to choose appropriate models.