

## STRAIN GAUGE ALARM (dual or quad alarm trip; field-configurable)

MODEL **AS4LC**

### 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:

Strain gauge alarm (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.

### POINTS OF CAUTION

#### ■ CONFORMITY WITH EU DIRECTIVES

- This equipment is suitable for Pollution Degree 2, Measurement Category II (output, transient voltage 2500V) and Installation Category II (transient voltage 2500V). Basic insulation (signal input to output to power input: 300V) is maintained. Prior to installation, check that the insulation class of this unit satisfies the system requirements.
- Altitude up to 2000 meters.
- The equipment must be mounted inside a panel.
- Insert a noise filter for the power source connected to the unit. TDK-Lambda Noise Filter Model RSNA-2006 or equivalent is recommended.
- The equipment must be installed such that appropriate clearance and creepage distances are maintained to conform to CE requirements. Failure to observe these requirements may invalidate the CE conformance.
- The actual installation environments such as panel configurations, connected devices, connected wires, may affect the protection level of this unit when it is integrated in a panel system. The user may have to review the CE requirements in regard to the whole system and employ additional protective measures\* to ensure the CE conformity.
- \* For example, installation of noise filters and clamp filters for the power source, input and output connected to the unit, etc.
- Install lightning surge protectors for those wires connected to remote locations.

#### ■ POWER INPUT RATING & OPERATIONAL RANGE

- Locate the power input rating marked on the product and confirm its operational range as indicated below:  
100 – 240V AC rating: 85 – 264V, 47 – 66 Hz, approx. 11VA  
24V DC rating: 24V  $\pm$ 10%, approx. 8W  
110V DC rating: 85 – 150V, approx. 8W

#### ■ 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.

#### ■ 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.

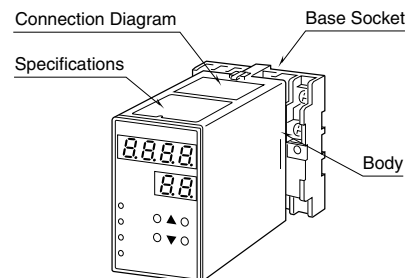
#### ■ EXCITATION

- Be sure to use the excitation of the unit.
- Adjust excitation voltage so that the current is below the maximum current of the excitation.

#### ■ 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

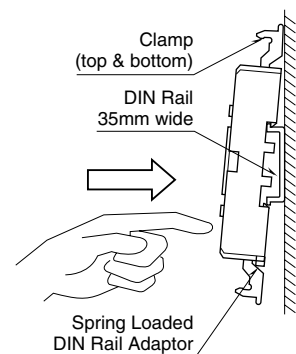


### INSTALLATION

Detach the yellow clamps located at the top and bottom of the unit for 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."

Shape and size of the base socket are slightly different with various socket types.

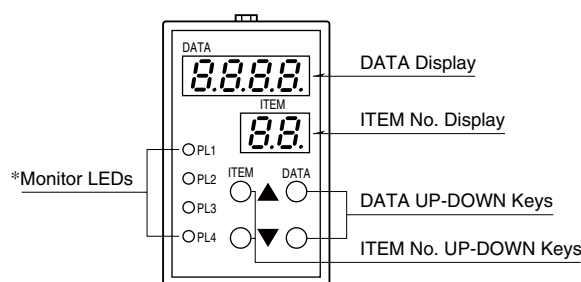
## FRONT VIEW & PROGRAMMING

### PROGRAMMING PROCEDURE

- 1) Press ITEM UP or DOWN key until ITEM display indicates "01".
- 2) Press DATA UP or DOWN key and choose "1" or "2" on DATA display.
  - 1: Only alarm setpoints are modifiable.
  - 2: All parameters are modifiable.
- 3) Press ITEM UP or DOWN key until ITEM display shows the ITEM No. you need to change.
- 4) Press DATA UP or DOWN key and choose a DATA No. or value you need on DATA display.
- 5) Repeat above 3 and 4. (Entered data is stored when you move to a new ITEM.)
- 6) Press ITEM UP or DOWN key until ITEM display indicates "01".
- 7) Press DATA UP or DOWN key and choose "0" on the display.
- 8) Press ITEM UP or DOWN key until ITEM display indicates "P".  
DATA display shows process input.

(You can now check data setting by choosing ITEM No.)

Note: DO NOT press UP and DOWN keys simultaneously.



\*PL3 or PL4 does not turn on for dual output type.

ITEM	MDF. CODE	DATA	CONTENTS	DEFAULT SETTING
P	N/A	-1999 – 9999	Process input display in engineering unit (as set in ITEM 07/08)	----
L1	1, 2	-1999 – 9999* <sup>1</sup>	L1 alarm setpoint in engineering unit	Quad: 20.0    Dual: 20.0
L2	1, 2	-1999 – 9999* <sup>1</sup>	L2 alarm setpoint in engineering unit	Quad: 30.0    Dual: 80.0
L3	1, 2	-1999 – 9999* <sup>1</sup>	L3 alarm setpoint in engineering unit * <sup>2</sup>	Quad: 70.0
L4	1, 2	-1999 – 9999* <sup>1</sup>	L4 alarm setpoint in engineering unit * <sup>2</sup>	Quad: 80.0
01		0, 1, 2	Modification code 0: Data indication only. 1: Only ITEM L1 – L4 are modifiable. 2: All parameters are modifiable.	1
02	N/A	0 – 99	Status indication ("0" is normally indicated.) 0: Normal 1: Memory error 10: Out of input range -15 – +115%	
03	N/A	0, 1, 2	Input range code 0: S1 (0.0 – 3.0mV/V) 1: S2 (0.0 – 10.0mV/V) 2: S3 (0.0 – 30.0mV/V)	User specified
04	N/A	0, 1, 2	Output range code 0: 2 (Quad N.O.) 1: 3 (Quad N.C.) 2: 5 (Dual SPDT)	User specified
05	2	0.1 – 12.0	Excitation voltage (V)	1.0V
06	2	0.010 – 3.000 0.010 – 9.999 0.10 – 30.00	Sensor sensitivity S1: 0.0 – 3.0mV/V S2: 0.0 – 10.0mV/V S3: 0.0 – 30.0mV/V  Used when adjusting the sensor sensitivity by its rating value. Set ITEM 07 before 06.	3.000 9.999 30.00
07	2	-19.99 – 30.00 -19.99 – 99.99 -199.9 – 300.0	0% input voltage S1: -19.99 – 30.00mV S2: -19.99 – 99.99mV S3: -199.9 – 300.0mV  Sensor's zero adjustment. Approximate offset voltage.	
08	2	-19.99 – 30.00 -19.99 – 99.99 -199.9 – 300.0	100% input voltage S1: -19.99 – 30.00mV S2: -19.99 – 99.99mV S3: -199.9 – 300.0mV  Used when adjusting the sensor sensitivity with an actual load. Set ITEM 07 before 08.	
09	2	10.0 – 100.0	Load ratio (%) Used when adjusting the sensor sensitivity with an actual load.	100.0
10	2	-199.9 – 999.9	Tare adjustment (%)	0.0
11	N/A	-15.0 – 115.0	Input indicated in % (of the range set in ITEM 06/07/08)	----

ITEM	MDF. CODE	DATA	CONTENTS	DEFAULT SETTING
12	2	-19.99 – 99.99	Zero adjustment (%) (fine adj. of the value set in ITEM 06/07/08)	0.00
13	2	0.000 – 9.999	Gain adjustment (fine adj. of the value set in ITEM 06/07/08)	1.000
14	2	-1999 – 9999	Display range scaling 0% *3	0.0
15	2	-1999 – 9999	Display range scaling 100% *3	100.0
16	2	0, 1, 2, 3	Decimal point position 0: ____ (Specify the number of 1: ____ . ____ digits) 2: ____ . ____ 3: ____ . ____	1
17	2	0, 1, 2, 3, 4	Moving average (sampling cycle: 100 msec.) 0: No, 1: 4 samples, 2: 8 samples, 3: 16 samples, 4: 32 samples	0
18	2	0, 1, 2, 3	Contact input function 0: Tare adjustment, 1: Peak hold, 2: Valley hold, 3: Sample hold	0
19	2	0, 1 – 60	Power-saving mode 0: Continuous display after the last access*4 1 – 60 : Time before display turned off (minutes)	10
20	2	10 – 99	Power ON-delay time (seconds)	10
21	2	0 – 99	Alarm ON-delay time (seconds)	0
22	2	0, 1	L1 trip operation (0: Lo, 1: Hi)	Quad: 0 Dual: 0
23	2	0, 1	L2 trip operation (0: Lo, 1: Hi)	Quad: 0 Dual: 1
24	2	0, 1	L3 trip operation (0: Lo, 1: Hi) *2	Quad: 1
25	2	0, 1	L4 trip operation (0: Lo, 1: Hi) *2	Quad: 1
26	2	0, 1	L1 coil at alarm (0: Energized, 1: De-energized)	0
27	2	0, 1	L2 coil at alarm (0: Energized, 1: De-energized)	0
28	2	0, 1	L3 coil at alarm (0: Energized, 1: De-energized)*2	0
29	2	0, 1	L4 coil at alarm (0: Energized, 1: De-energized)*2	0
30	2	1 – 9999	L1 hysteresis (deadband) in engineering unit	1.0
31	2	1 – 9999	L2 hysteresis (deadband) in engineering unit	1.0
32	2	1 – 9999	L3 hysteresis (deadband) in engineering unit *2	1.0
33	2	1 – 9999	L4 hysteresis (deadband) in engineering unit *2	1.0
34	N/A	----	Version No. indication	----

\*1. Selectable within the display scaling range

\*2. Quad alarm trip type only

\*3. Of the range set in ITEM 06/07/08. ITEM 14 < ITEM 15.

\*4. OFF when power is on. After power is turned on, pressing any key enables to turn on continuously.

## ■ SENSOR ADJUSTMENTS USING AN ACTUAL LOAD

### 1) Program Mode

Set ITEM 01 – DATA 2 to turn the unit into Program Mode.

### 2) Excitation Voltage

Choose ITEM 05. Press DATA UP or DOWN key until the Data display shows the desired excitation voltage. When the value calculated by [Excitation / Resistance] exceeds 30 mA, set a voltage value to fit with 30 mA limit.

[Example] Max. excitation voltage 10 V  
Strain gauge resistance 120 Ω

If you choose 10 V as the excitation:

$$10 \text{ V} / 120 \text{ } \Omega = 83.3 \text{ mA} \rightarrow \text{out of allowable range}$$

Then you will choose 3.6 V or less as calculated by the equation:  $30 \text{ mA} \times 120 \text{ } \Omega = 3.6 \text{ V}$

### 3) 0% Input Voltage

Choose ITEM 07. With no load applied to the sensor, press DATA DOWN key until the display value is stabilized (while the computation circuit of the unit conducts averaging process).

DATA display shows the approximate offset voltage.

$$\text{Display Value} = \text{Sensor Voltage} \times \text{Internal Coefficient}^*$$

### 4) 100% Input Voltage

Choose ITEM 08. With an actual known load, press DATA DOWN key until the display value is stabilized (while the computation circuit of the unit conducts averaging process).

DATA display shows the sensor's sensitivity span.

### 5) Monitor Mode

Set ITEM 01 – DATA 1 to turn the unit into Monitor Mode.

### 6) PV Indication

Press ITEM UP or DOWN key until ITEM display indicates "P".

If necessary, go to Display Range Scaling, Moving Average, and other adjustments.

Set the unit to Monitor Mode with ITEM P displayed other than for programming.

\*If 100% load is not available, use the load ratio setting.

With 10% load, set ITEM 09 – DATA 10.0 before adjustments.

## ■ SENSOR ADJUSTMENTS BY ENTERING VALUES

### 1) Turn the unit into Program Mode.

### 2) Excitation Voltage

Choose ITEM 05. Press DATA UP or DOWN key until the DATA display shows the desired excitation voltage. When the value calculated by [Excitation / Resistance] exceeds 30 mA, set a voltage value to fit with 30 mA limit.

[Example] Max. excitation voltage 10 V  
Strain gauge resistance 120 Ω

If you choose 10 V as the excitation:

$$10 \text{ V} / 120 \text{ } \Omega = 83.3 \text{ mA} \rightarrow \text{out of allowable range}$$

Then you will choose 3.6 V or less as calculated by the equation below:

$$30 \text{ mA} \times 120 \text{ } \Omega = 3.6 \text{ V}$$

### 3) 0% Input Voltage

Choose ITEM 07. With no load applied to the sensor, press DATA DOWN key until the display value is stabilized (while the computation circuit of the unit conducts averaging process).

DATA display shows the approximate offset voltage.

$$\text{Display Value} = \text{Sensor Voltage} \approx \text{Internal Coefficient}$$

### 4) Sensor's Sensitivity

Choose ITEM 06. Press DATA UP or DOWN key until the display shows desired value as specified in the sensor's specification sheet.

### 5) Turn the unit into Monitor Mode.

### 6) Set to ITEM P.

If necessary, go to Display Range Scaling, Moving Average, and other adjustments.

Set the unit to Monitor Mode with ITEM P displayed other than for programming.

## ■ DISPLAY RANGE SCALING

[Example]

PV display range 0.0 to 100.0 modified to show -100 to 100

### 1) Turn the unit into Program Mode.

### 2) Decimal Point Position

Choose ITEM 16 – DATA 0.

### 3) 0% Scaling Value

Choose ITEM 14 – DATA -100.

(Negative [-] range is identified with the PL1 turned on.)

### 4) 100% Scaling Value

Choose ITEM 15 – DATA 100.

### 5) Turn the unit into Monitor Mode.

### 6) Set to ITEM P.

## ■ TARE ADJUSTMENT

### 1) Turn the unit into Program Mode.

### 2) Contact Input Function

Choose ITEM 18 – DATA 0.

### 3) Turn the unit into Monitor Mode.

(ITEM 18 is set to DATA 0 as default. No need of conducting 1 through 3.)

### 4) Set to ITEM P.

### 5) Close across the contact input terminals (Di).

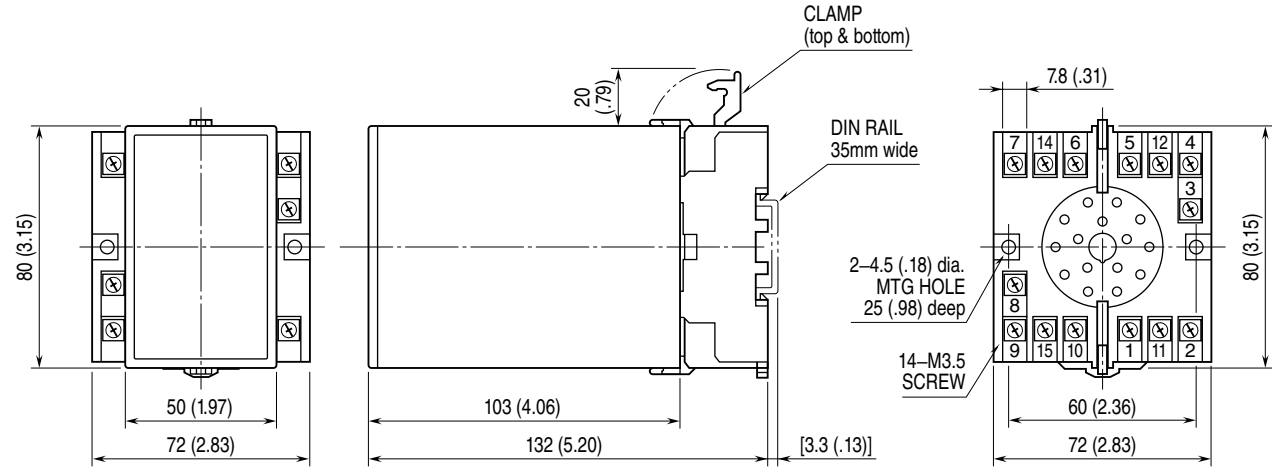
By the above mentioned procedure, the tare value is stored in ITEM 10, the PV display shows the value set by 0% Scaling Value, and the transmitter outputs the value set by 0% Output.

The above mentioned procedure is applicable to modifications from default setting.

# TERMINAL CONNECTIONS

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

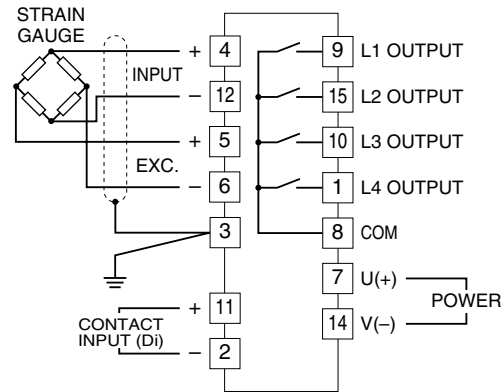
■ EXTERNAL DIMENSIONS unit: mm (inch)



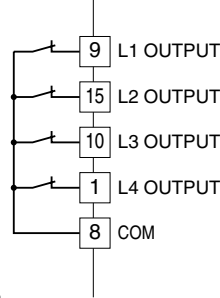
• When mounting, no extra space is needed between units.

■ CONNECTION DIAGRAM

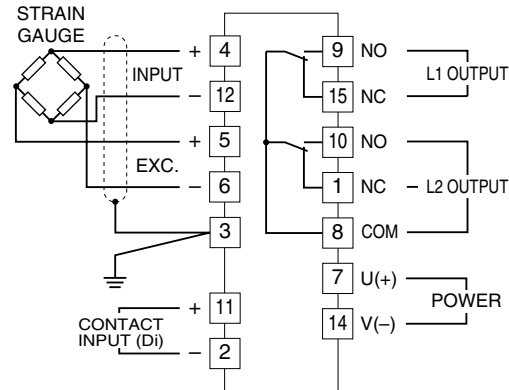
■ N.O. RELAY



■ N.C. RELAY



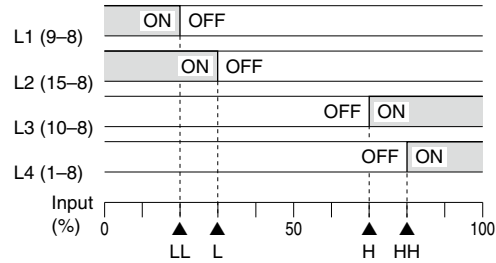
■ SPDT RELAY



CHECKING

- 1) Terminal wiring: Check that all cables are correctly connected according to the connection diagram.
- 2) Power input voltage: Check voltage across the terminal 7 – 14 with a multimeter.
- 3) Strain gauge: Maximum allowable current supplied to the strain gauge is 30 mA. Check the resistance of the sensor.
- 4) Input: Check voltage across the terminal 4 (+) – 12 (–) with a multimeter. The voltage value at the maximum load must equal [Excitation × Strain Gauge Sensitivity].
- 5) Alarm operations: Check the alarm operations referring to the figure below.
- 6) Output load: Check that the output load is 380 V AC / 120 VA or 125 V DC / 30 W (≤ 0.5 A for CE) at the maximum. For maximum relay life with inductive load, external protection is recommended.

Alarm Trip Operation Terminal No. in parentheses  
Example with quad N.O. contacts (LL, L, H, HH)



- Trip Operation in Power Failure**
- Output code 2: All relays turn off.
  - Output code 3: All relays turn on.
  - Output code 5: Terminals 15 – 8, 1 – 8 turn on.

MAINTENANCE

Regular calibration procedure is explained below:

■ CALIBRATION

Warm up the unit for at least 10 minutes.

• H (HH) Setpoint

Increase the input signal from a value lower than the setpoint and check that the relay trips at the H (or HH) setpoint within the setpoint accuracy described in the data sheet.

• L (LL) Setpoint

Decrease the input signal from a value higher than the setpoint and check that the relay trips at the L (or LL) setpoint within the setpoint accuracy described in the data sheet.

When the setpoints are shifted, please contact M-System's Sales Office or representatives.

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.