

<b>LIGHTNING SURGE PROTECTOR FOR MULTI-CHANNEL USE (high discharge current capacity)</b>	MODEL	<b>MDR2</b>
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**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:**

Lightning surge protector.....(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.

**LIMITATION APPLICABLE TO M-RESTER**

The M-RESTER will protect electronics equipment from damage caused by lightning by absorbing most of the surge voltages.

However, M-RESTER may not be effective against certain extremely high voltages caused by a direct or almost direct hit by lightning.

M-RESTER must be installed according to this installation / instruction manual.

**GENERAL**

**■ FUNCTION & FEATURES**

- Protection for semiconductor switches of discrete outputs against lightning surge damage
- Applicable to both negative and positive common signals
- Applicable to multi analog signals (non-isolation between channels)
- Space saving with multi-channel protectors
- LED monitor indicating degradation of voltage limiter
- LED monitor driven by discrete I/O signal without auxiliary power supply

**■ SPECIFICATIONS**

**Max. Continuous operating voltage (Uc)**

	MDR2			
	-8NY	-8NA	-8PY	-8PA
Between each of S1 to S8 lines	±30V			
Each line to COM*	+30V	-30V		
Each line or COM to Earth	±150V			

\* MDR2 is operational as an SPD despite less than +2V (for MDR2-8PA) or more than -2V (for MDR2-8NA). However, the function of the monitor LED is not guaranteed.

**Voltage protection level (Up)**

- @1kV / 100A (1.2 / 50µs)

	MDR2			
	-8NY	-8NA	-8PY	-8PA
Between each of S1 to S8 lines	±40V	±50V	±40V	±50V
Each line to COM	+40V	+50V	-40V	-50V
Each line or COM to Earth	±500V			

- @4kV / 2kA (1.2 / 50µs)

	MDR2			
	-8NY	-8NA	-8PY	-8PA
Between each of S1 to S8 lines	±60V			
Each line to COM	+50V	+60V	-50V	-60V
Each line or COM to Earth	±600V			

**Leakage current @ max. voltage**

- Line to COM: 5µA
- Line to line: 5µA
- COM to Earth: 5µA

**Response time:** ≤ 4 ns

**Max. discharge current (Imax)**

- Line to COM: 10kA
- Line to line: 10kA
- COM to earth: 10kA

**Nominal current (In):** 150mA

**Internal series resistance:** 22Ω ±20%

## POINTS OF CAUTION

### ■ ENVIRONMENT

- Indoor use.
- When heavy dust or metal particles are present in the air, install the surge protector inside proper housing with sufficient ventilation.
- Do not install the surge protector where it is subjected to continuous vibration. Do not subject the unit to physical impact.
- Environmental temperature must be within  $-5$  to  $+55^{\circ}\text{C}$  ( $23$  to  $131^{\circ}\text{F}$ ) and relative humidity within  $30$  to  $90\%$  RH in order to ensure adequate life span and operation.

### ■ DIELECTRIC STRENGTH TEST

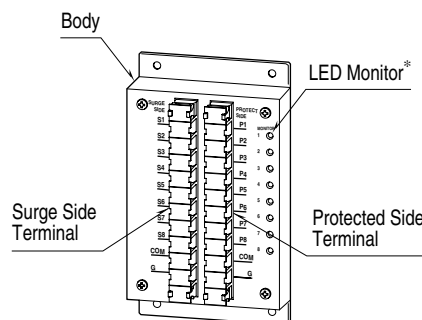
- DO NOT perform dielectric strength tests with wires connected to the surge protector. Otherwise the element will start discharging at discharge voltage, which can cause insulation failure.

Be sure to return the wires after the test.

### ■ AND ....

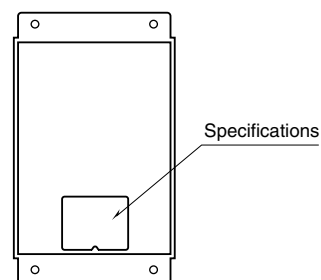
- We recommend that you keep spare surge protectors so that you can replace them when necessary.
- Lightning surge can enter not only through signal lines but also through power supply lines. We recommend that you also use the surge protectors for power line for sufficient protection.

## COMPONENT IDENTIFICATION



\*Only available with MDR2-8xA

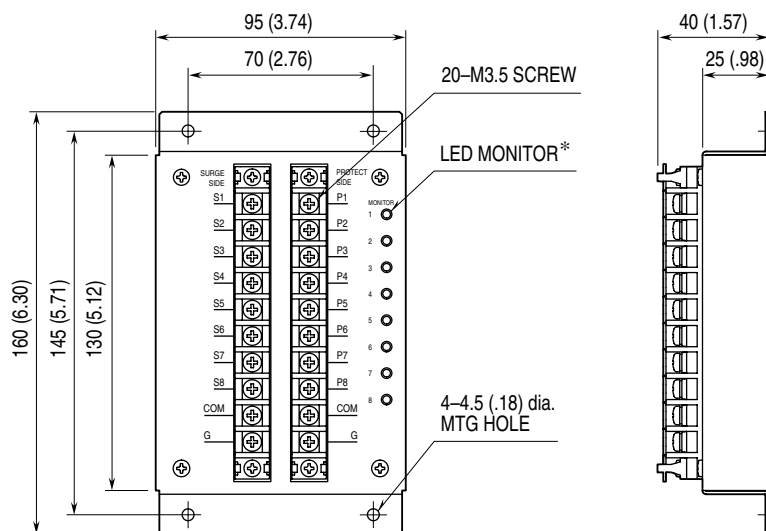
### ■ REAR VIEW



## INSTALLATION

Refer to the figure below.

### ■ EXTERNAL DIMENSIONS unit: mm (inch)

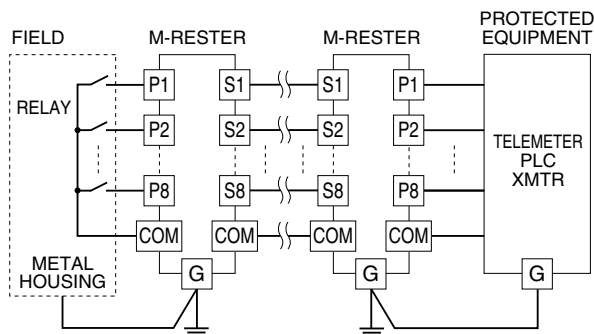


\*Only available with MDR2-8xA

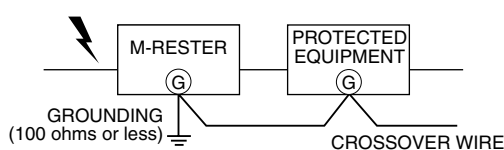
## TERMINAL CONNECTIONS

Connect the unit as in the diagram below.

Be sure to cross-wire between the ground terminal (G) and that of the protected equipment.

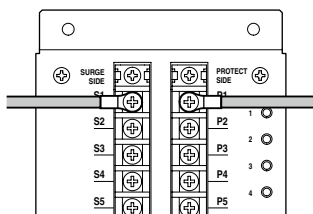


### ■ GROUNDING



A crossover wire between M-RESTER ground and the ground or metallic housing of the equipment is required for protection. If the protected equipment has no ground terminal, ground the M-RESTER only.

### ■ WIRING



When the connections of surge and protecting sides get bundled, the protection effect decreases. Be sure to wire them separately.

Wiring to the terminals, please install wires according to the above figure.

## MAINTENANCE

Check M-RESTER periodically. Many cases of lightning are ignored, and even lightning at a far distance often causes inductive surges.

We recommend that you check your M-RESTER about twice a year, before and after the rainy season. Check whenever you experience a strong lightning occurrence.

Checking procedure is explained in the following:

### ■ CHECKING WIRING

- 1) Make sure that wiring is done as instructed in the connection diagram.
- 2) Make sure that the ground terminal (G) is connected to the metallic housing of protected equipment.
- 3) Make sure that the ground terminal (G) is grounded to earth.

### DISCHARGE ELEMENTS

Approximate checking can be conducted as following.

#### • MDR2-8xA (with LED monitor)

- 1) Make sure that the front LED monitor turns OFF while the discrete signal is ON.
- 2) When leakage current exceeds the rating (5 $\mu$ A), the LED becomes brighter gradually. In this case, please replace the unit.
- 3) When the discrete signal is unable to be ON, take the same procedure as MDR2-8xN.

#### • MDR2-8xY (without LED monitor)

Remove all wiring connected to M-RESTER when you test the discharge elements.

- 1) Check resistance across the following terminals on the high resistance range of multimeter and confirm no conduction. (The meter will show 10M $\Omega$  or greater.)

Terminals (P1) or (P2) or (P3) or (P4) or (P5) or (P6) or (P7) or (P8) – (COM), (COM) – (G)

When measuring across the Px to COM, apply the positive voltage for MDR2-8N or negative voltage for MDR2-8P with multimeter.

- 1) Check that discharging occurs across the same terminals with a 500V DC/1000 M $\Omega$  insulation tester. (The tester will show 20 M $\Omega$  or less.)
- 2) If any of the above tests shows negative, replace the M-RESTER.