

## Features

- Suitable for 19 inch, 4U high rack mounting
- Suitable for flush panel mounting
- M4 screw terminations
- Stud termination possible
- Range of ring lugs available
- Simple screw (M4) mounting from front of panel (Supplied)
- Semi-projection mounting kits available
- 4U, 6U, 8U high 19" rack mounting frames available
- 4U, 6U, 8U high 19" flush mounting frames available
- Size 2 with 28 terminals
- Size 4 with 28 or 56 terminals
- Size 2, 4 & 8 blanking plates
- CT shorting switches available
- Sealable front cover
- IP5X category 2 dust protected and IP4X for solid ingress to IEC60529.
- Rugged metal construction with black powder coat matt finish

## Application

The M Series has been specifically designed to meet the demanding & varied requirements for protection relay applications in power utility sub-station environments. The standard 4U high 19-inch rack mounting modular configuration simplifies panel design & installation.

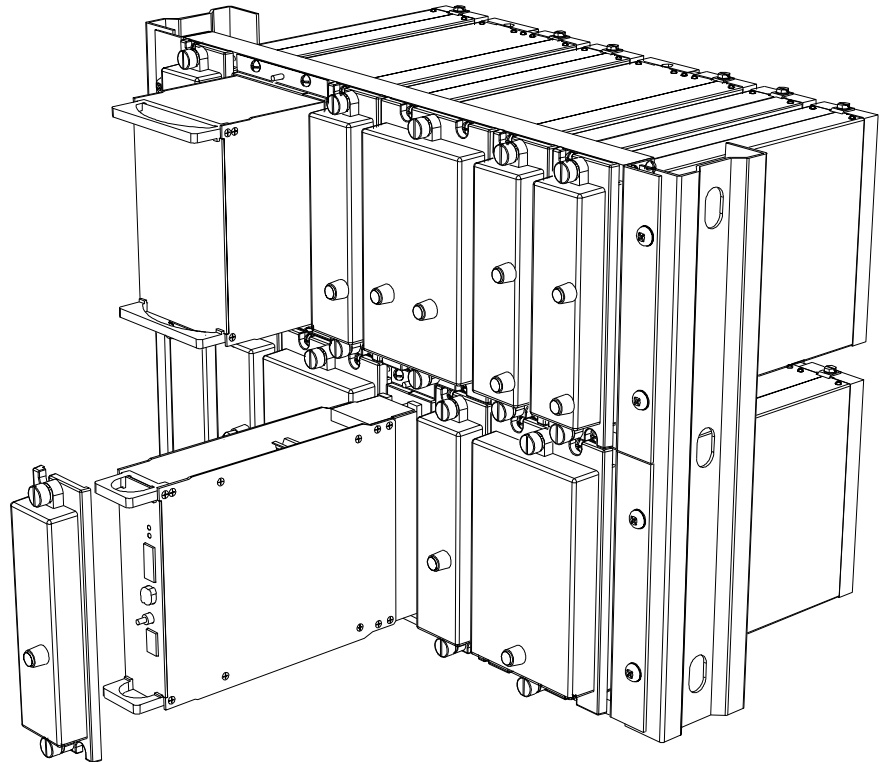
Mounting points & overall panel dimensions meet international standards such that the cases may be interchanged with other similar types available on the market.

Optional CT shorting switches, blanking plates & 19" rack mount frames are also available. Blanking plates may be specially fabricated with cut outs & labeling to suit control switches, fuses, pilot lamps etc.

The M Series case range supersedes the previous D & E Series models.

Technical Bulletin

## M Series Modular Rack Mount Protection Relay Cases



## Description

Made in Australia

The M Series range of protection relay enclosures has been designed with flexibility in mind. Only three versions are required to meet a wide range of applications. Both the size 2 & size 4 case are suitable for either flush panel mounting or 19 inch 4U high rack mounting. The design utilizes a draw out chassis for ease of installation & maintenance. M4 screw terminals are provided with optional CT shorting switches.

The M Series cases are of metal construction for durability & screening from radiated electrical noise. Select from three versions as follows:

|               |        |              |                   |
|---------------|--------|--------------|-------------------|
| <b>2M28-S</b> | Size 2 | 28 terminals | 1/8 width 4U high |
| <b>4M28-S</b> | Size 4 | 28 terminals | 1/4 width 4U high |
| <b>4M56-S</b> | Size 4 | 56 terminals | 1/4 width 4U high |

Cases of different sizes may be mixed on the same rack up to the full width (19 inch) maximum. e.g. 4 x size 2 + 2 x size 4 would fill one 4U high 19 inch rack row.

Alternatively the cases may be flush or projection mounted in either orientation (Vertical or horizontal) as necessitated by the panel design.

## Reduced Case Length Versions

From August 2005 the M Series case range was reduced in length by 18mm to 217mm. This is indicated in the product case drawings by the -S code (For example 2M28-S indicates a "short" case version). Refer to the specific product Technical Bulletins to determine the case length.

When purchasing replacement modules it is important to check the case length required. This can be done by quoting the old module serial number to the factory.

## 2M28 Series Case Details

|                    |   |          |
|--------------------|---|----------|
| <b>290-406-151</b> | Relay mounting screw kit (4 screws)                                 | Supplied |
| <b>290-407-153</b> | M4 terminal screw kit with captive lock washers (14 pieces per kit) | Supplied |
| <b>205-103-003</b> | Earth screw (1 piece)   | Supplied |

- Size 2 draw out case with 28 screw terminals
- Suitable for flush panel & rack mounting

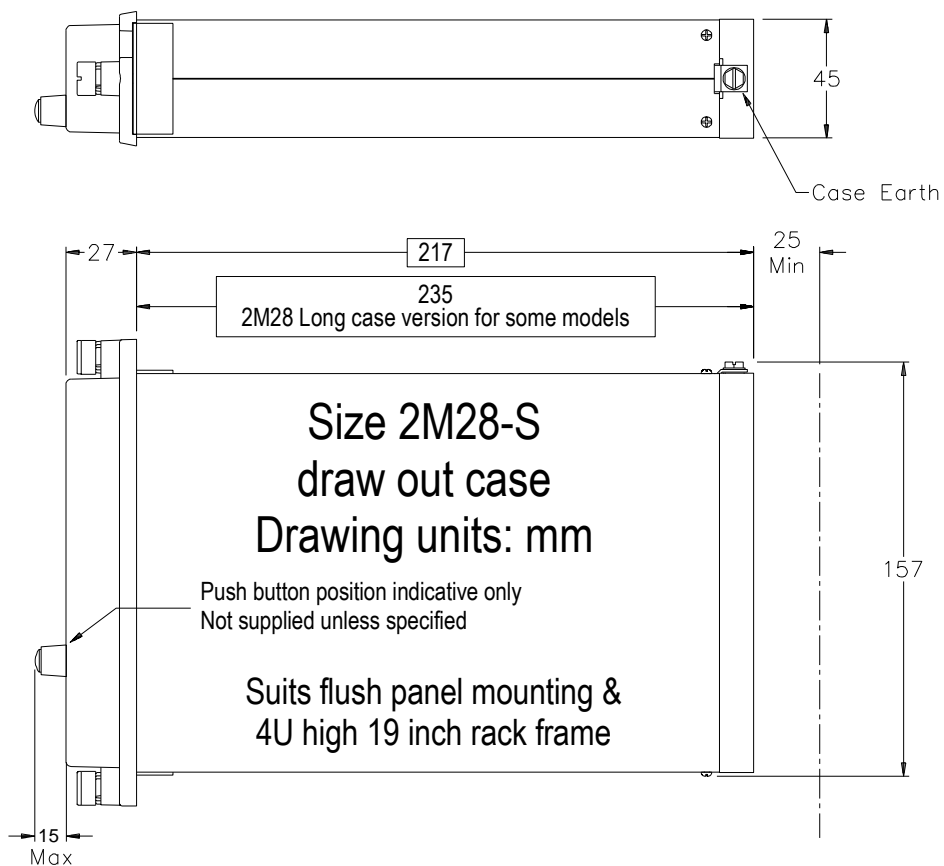
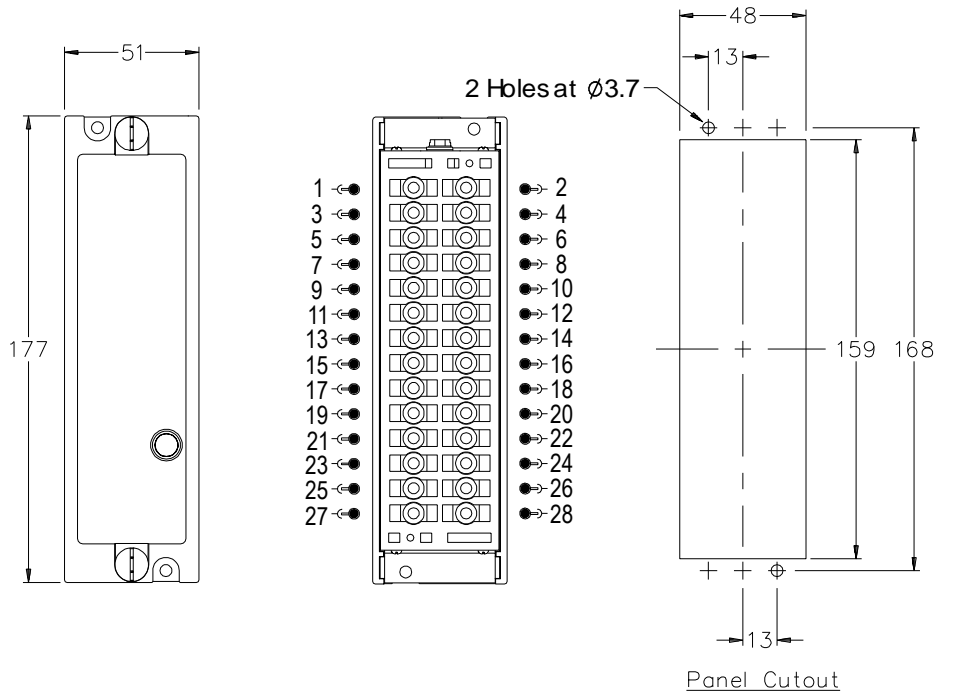


Figure 1: 2M28 Case dimensions

## 4M28 Series Case Details

|                    |   |          |
|--------------------|---|----------|
| <b>290-406-151</b> | Relay mounting screw kit (4 screws)                                 | Supplied |
| <b>290-407-154</b> | M4 terminal screw kit with captive lock washers (14 pieces per kit) | Supplied |
| <b>205-103-003</b> | Earth screw (1 piece)   | Supplied |

- Size 4 draw out case with 28 screw terminals
- Suitable for flush panel & rack mounting

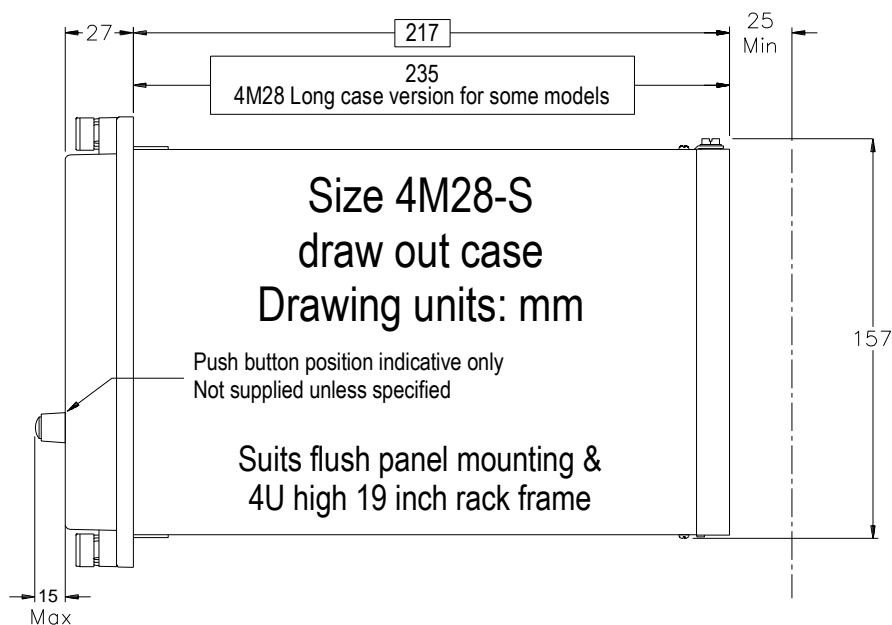
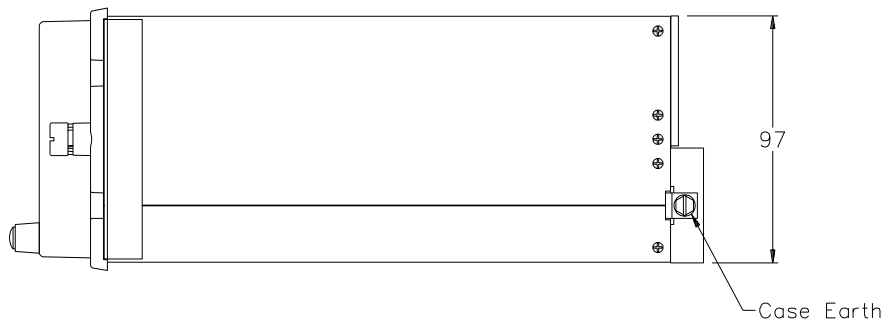
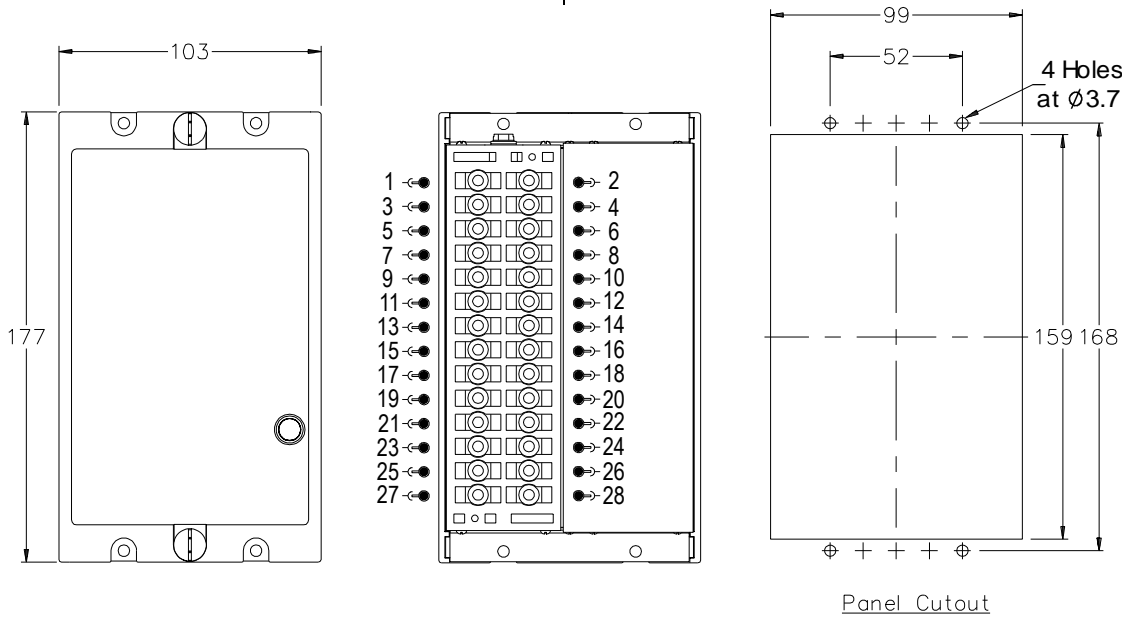
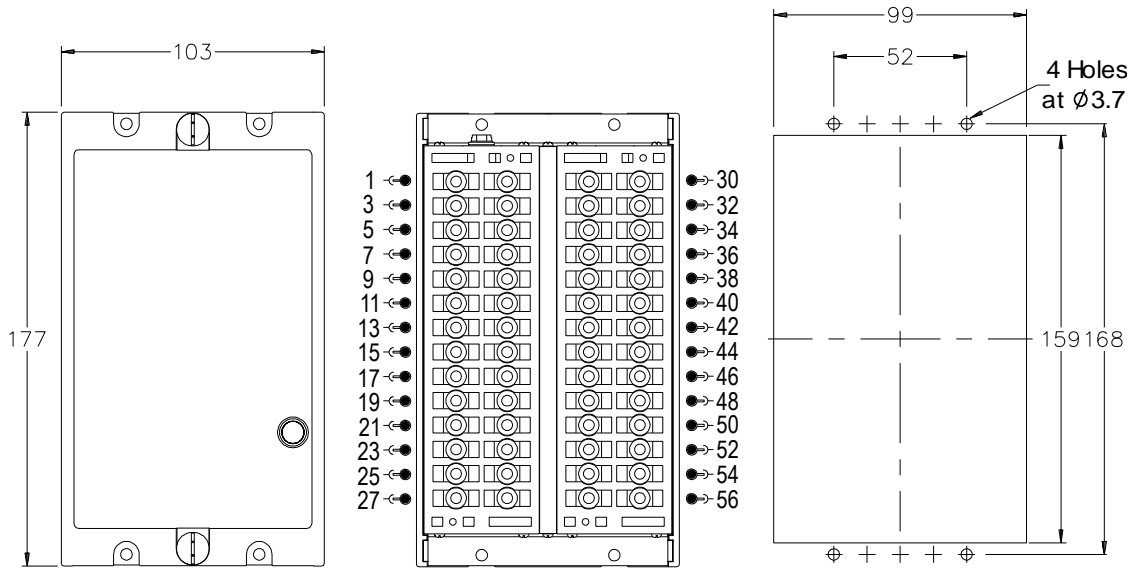


Figure 2: 4M28 Case dimensions

## 4M56 Series Case Details

|                    |   |          |
|--------------------|---|----------|
| <b>290-406-151</b> | Relay mounting screw kit (4 screws)                                 | Supplied |
| <b>290-407-155</b> | M4 terminal screw kit with captive lock washers (14 pieces per kit) | Supplied |
| <b>205-103-003</b> | Earth screw (1 piece)   | Supplied |

- Size 4 draw out case with 56 screw terminals
- Suitable for flush panel & rack mounting



Panel Cutout

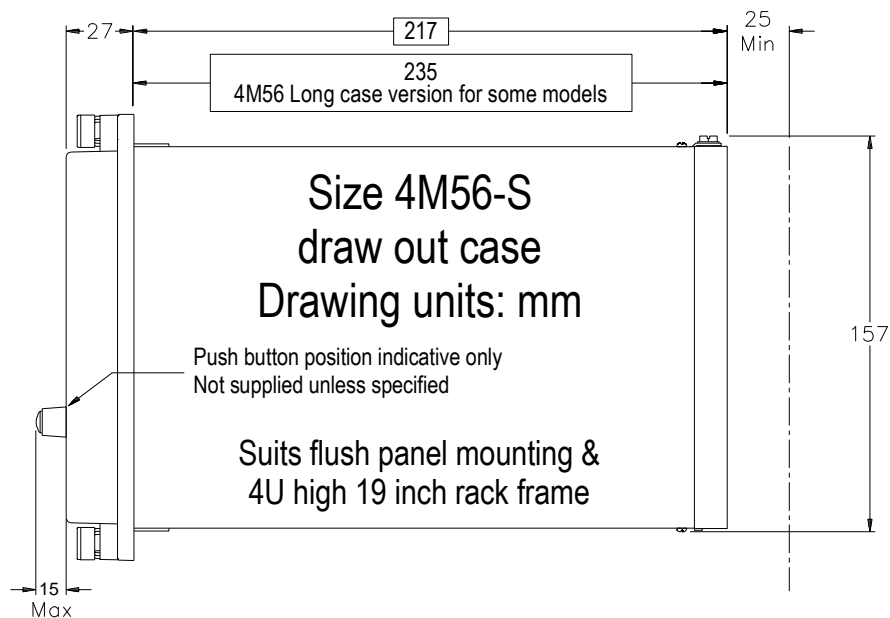
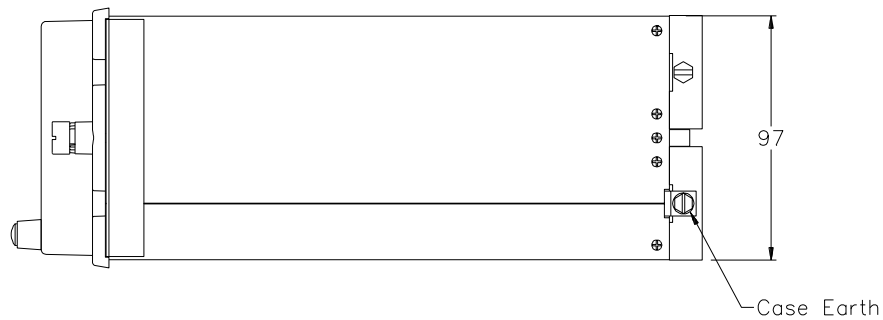


Figure 3: 4M56 Case dimensions

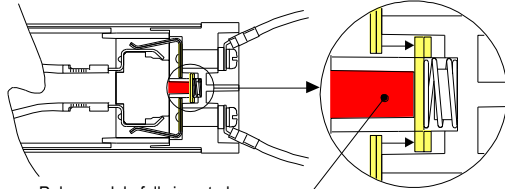
## Technical Data

### AUTOMATIC CT SHORTING

To avoid open circuiting external CT's when a relay module is draw out from the case, CT shorting switches are fitted. These have the effect of shorting the adjacent odd & even terminal pair before the connection to the relay module is broken during the draw out operation.

### NORMAL SERVICE CONDITION

CT circuits routed through relay module CT(s)



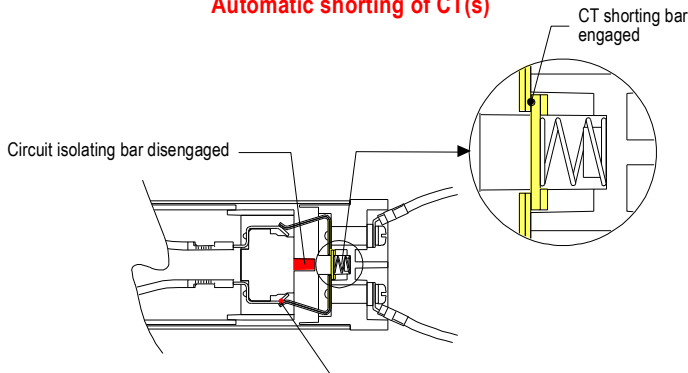
Relay module fully inserted

Circuit isolating bar engaged

Equipment side CT circuits routed through relay module CT

### REMOVAL OF RELAY MODULE

Automatic shorting of CT(s)



CT shorting bar engaged

Circuit isolating bar disengaged

Relay module CT terminals remain in touch until automatic CT shorting engaged (Make before break circuit function)

Heavy duty CT terminals & shorting switches may be specified between any adjacent odd & even terminal pair.

Figure 4: CT Shorting switch function

### CURRENT RATINGS

|                  |      |            |
|------------------|------|------------|
| CT terminals:    | 20A  | continuous |
|                  | 400A | 1s         |
| Other terminals: | 10A  | continuous |
|                  | 200A | 1s         |

### VOLTAGE RATINGS

|                           |                    |
|---------------------------|--------------------|
| All circuits & terminals: | 600V AC continuous |
|                           | 350V DC continuous |

### AUXILIARY INSULATION WITHSTAND

In accordance IEC 255-5:

2KV RMS between all terminals & all terminals & frame.

1.2/50 5KV impulse between all terminals & all terminals & frame.

### IP RATING

IP5X category 2 dust protected and IP4X for solid ingress to IEC60529.

### CASE EARTH CONNECTIONS

Case bonding to earth is critical for electrical ensure safety & EMI / EMC standards compliance.

An electrical connection from earth to the case is achieved using a dedicated earth terminal located at the rear top of the case. A hex screw suitable for ring lugs & a star washer is provided as depicted in figure 5.

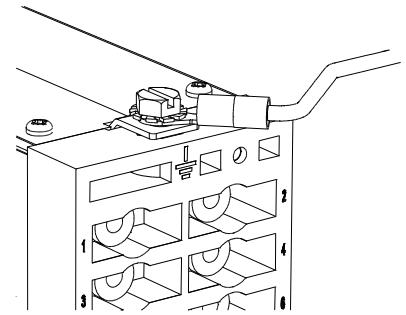


Figure 5: Case earth terminal detail

Some electronic relays are also fitted with an additional earth stud which is mounted on an earth bracket that is fitted between the case earth & terminal 2. This is useful for marshalling multiple earth connections such as arc fault sensor screen cable earths & is depicted in figure 6.

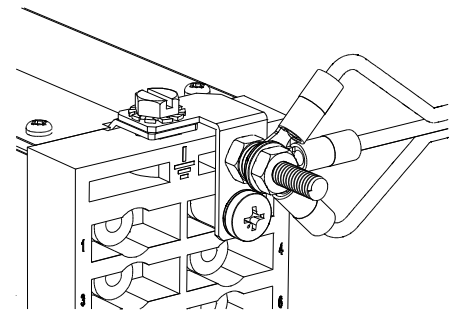


Figure 6: Earth stud detail

## Termination Ring Lugs

### TERMINATION RING LUGS

Reliable electrical connection to M Series cases is achieved using M4 screws & ring lug terminals as depicted in figure 7.



Figure 7: Typical 'flat' ring terminal lugs

### RING LUG DIMENSIONAL GUIDELINES

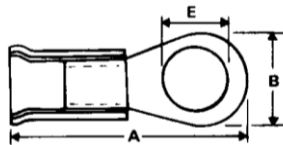


Figure 8: Ring terminal lug dimensions

Referring to dimensions "E" and "B" in Figure 8, the M Series terminal block can accommodate the following lug dimensions:

- "E" greater than 4mm
- "B" less than 8mm

### STUD TERMINALS

The stud terminal mounting kit is suitable for the following situations:

- Where more than two wire terminations per point are required
- Where large profile lugs are to be used

Refer to the M Series Case Accessories section describing M4 studs & figure 13 for details.

### RING LUGS - 90 DEGREE PRE-FORMING

Lugs must be pre-formed to ~90 degrees before insertion into the M Series terminal block.

Ring lugs are available from various suppliers in a wide range of sizes & configurations.

To fit flat lugs into the M Series terminal block, an angle must be pre-formed as depicted in figure 10.

Multi strand wire

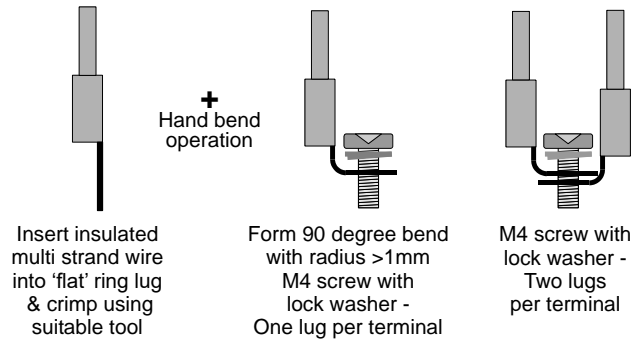


Figure 9: 'Flat' lug 90 degree pre-form & screw fitting detail

Note: Pre-formed ring lugs are not suitable with stud terminals.

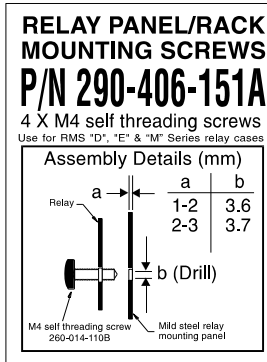
## ACCESSORIES

The following accessories are available separately:

|                    |  |           |    |
|--------------------|--|-----------|----|
| <b>4M801-A-</b>    | Size 1 4U Blanking Plate   | 177 x 25  | mm |
| <b>4M802-A-</b>    | Size 2 4U Blanking Plate   | 177 x 51  | mm |
| <b>4M803-A-</b>    | Size 3 4U Blanking Plate   | 177 x 77  | mm |
| <b>4M804-A-</b>    | Size 4 4U Blanking Plate   | 177 x 103 | mm |
| <b>4M806-A-</b>    | Size 6 4U Blanking Plate   | 177 x 155 | mm |
| <b>4M808-A-</b>    | Size 8 4U Blanking Plate   | 177 x 206 | mm |
| <b>290-406-151</b> | Relay mounting screw kit (4 screws)  |           |    |
| <b>290-407-153</b> | M4 terminal screw kit with captive lock washers (14 pieces per kit)              |           |    |
| <b>290-407-154</b> | Stud terminal kit (28 terminals per kit)   |           |    |
| <b>290-407-158</b> | Earth bar to suit M Series Cases mounted in a 19 inch rack mount frame (4M800K1) |           |    |
| <b>205-103-003</b> | Earth screw (1 piece)  |           |    |

## CASE MOUNTING SCREWS

An M4 self threading screw kit is supplied as standard with each M Series case.



M Series cases may be flush mounted to mild steel panels up to 3mm thick using the M4 self threading screws provided with the case. Panel mounting is simplified due to the location of the fixing screws at the front face of the relay. Alternatively the cases may be 19 inch rack mounted using a 4U high sub rack. The M4 self threading screws are suitable for application with the RMS type 4M800K1 sub

Figure 10: Case mounting screws

## TERMINATION SCREWS

### M4 Screws

An M4 screw kit is supplied as standard with each M Series case. Additional M4 screw kits may be purchased separately. M4 screws are suitable for use with the recommended ring lugs as per tables 1 & 2.

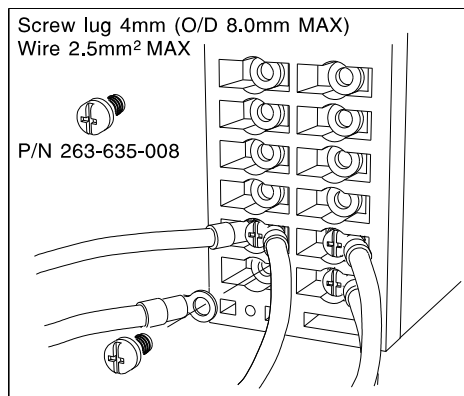


Figure 11: M4 terminal screws with captive lock washers

## M Series Case Accessories

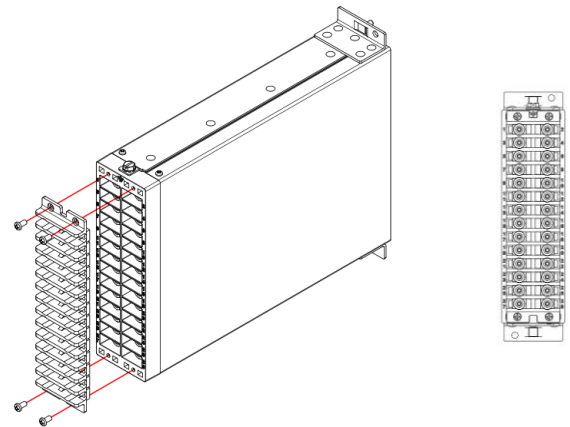
### TERMINATION IP2X COVER KITS

IP2X terminal cover kits are available to provide IP2X protection of the case terminals.

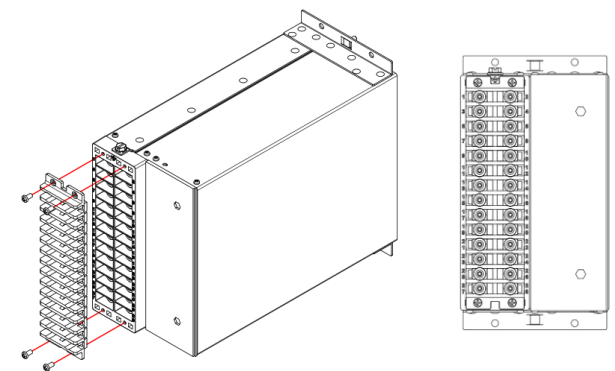
The covers are fitted to the terminal block prior to cable termination.

Kits are available for either 28 terminal or 56 terminal relays:

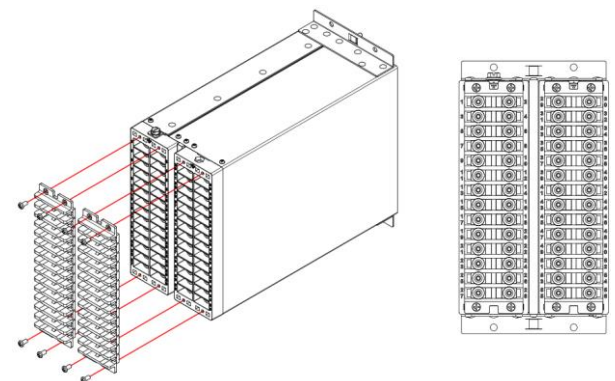
| IP2X Cover Kit | Enclosure Suitability |
|----------------|-----------------------|
| IP2XMATRIX-28- | 2M28-S or 4M28-S      |
| IP2XMATRIX-56- | 4M56-S                |



2M28-S Case with IP2X cover



4M28-S Case with IP2X cover



4M56-S Case with IP2X covers

Figure 12: IP2X Cover kits

## M Series Case Accessories

### M4 Studs

An M4 stud kit is available as an option. This kit consists of 28 studs complete with insulating sleeves to allow

M4 studs are suitable for use with the recommended ring lugs as per table 1 & larger profile lugs that will not fit directly into the M Series terminal block.

### M28 STUD TERMINAL KIT

**P/N 290-407-154A**

28 X M4 stud terminals

Use for RMS "M" Series relay cases

Start with a long stud and spacer on terminal 1,  
then a short stud on terminal 2.  
Alternate stud lengths to maintain isolation.

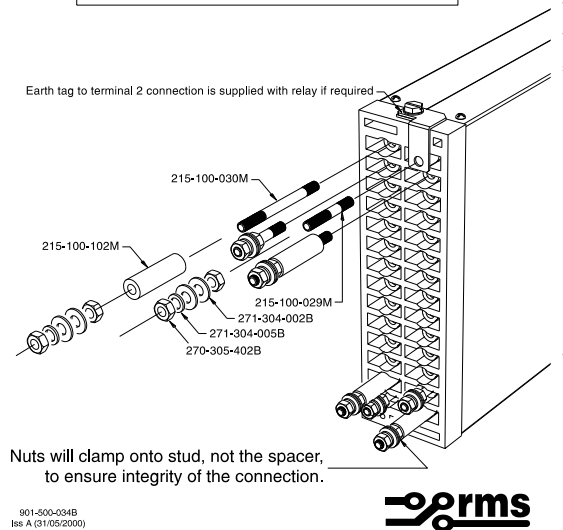


Figure 13: Stud terminal

### Maximum Torque Setting

The maximum torque setting that should be applied to either M4 screws or M4 studs is 2.0 Nm. 1.8 Nm is recommended.



## Sub Rack Frames

### STANDARD VERSIONS AVAILABLE

|             |                                     |
|-------------|-------------------------------------|
| 4M800-4U--  | 4U High rack mount frame            |
| 4M800-4U-P- | 4U High flush panel mount frame     |
| 4M800-6U--  | 6U High rack mount frame            |
| 4M800-6U-P- | 6U High flush panel mount frame     |
| 4M800-8U--  | 2 x 4U High rack mount frame        |
| 4M800-8U-P- | 2 x 4U High flush panel mount frame |

### 19 INCH SUB RACK MOUNTING FRAMES

Sub rack frames are constructed from powder coated mild steel & aluminium bar. The result is a very sturdy yet cost effective solution for mounting 4U & 6U modular cases in 19 inch cabinets or for flush mounting on panels or doors.

Pre-drilled holes in the aluminium cross bars are designed for use with M4 self threading screws supplied with mSeries relays or available separately.

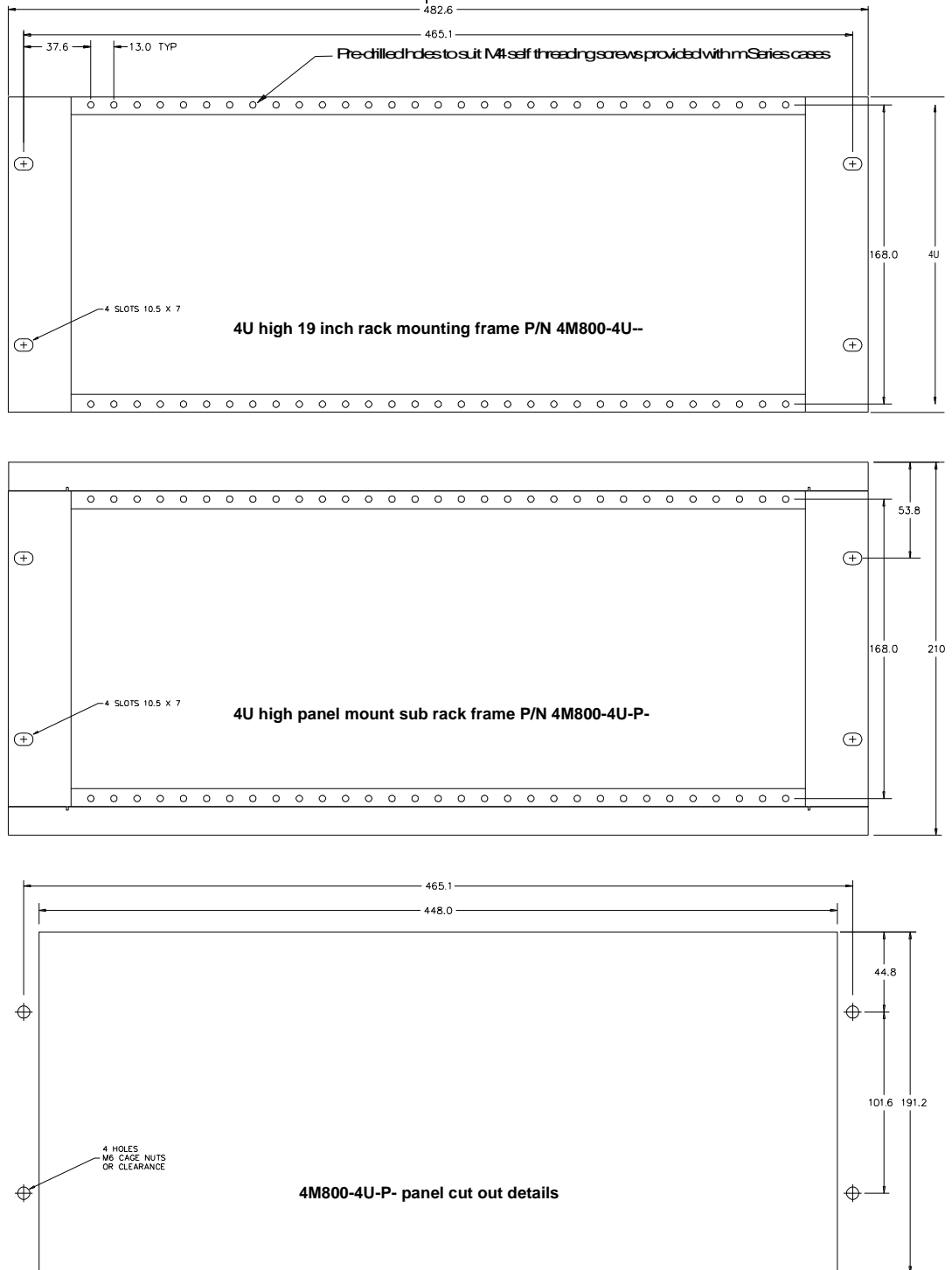


Figure 14: Rack mount frames

## Semi Projection Mounting

### SEMI PROJECTION MOUNT KITS

Semi projection mount kits are available for the size 2M & 4M case. + Each kit consists of:

- 1 x semi projection mount top spacer (Acetal)
- 1 x semi projection mount bottom spacer (Acetal)
- 2 x black powder coated aluminium side panels
- Mounting screws

Semi projection mount kits are available in six (6) standard sizes for the size 2M and size 4M cases as follows:

#### Size 2 Case

**4M820-050-** 50mm projection  
**4M820-075-** 75mm projection  
**4M820-100-** 100mm projection  
**4M820-125-** 125mm projection  
**4M820-150-** 150mm projection  
**4M820-200-** 200mm projection

#### Size 4 Case

**4M821-050-** 50mm projection  
**4M821-075-** 75mm projection  
**4M821-100-** 100mm projection  
**4M821-125-** 125mm projection  
**4M821-150-** 150mm projection  
**4M821-200-** 200mm projection

#### Size 6 Case

**4M822-050-** 50mm projection  
**4M822-075-** 75mm projection  
**4M822-100-** 100mm projection  
**4M822-125-** 125mm projection  
**4M822-150-** 150mm projection  
**4M822-200-** 200mm projection

#### Size 8 Case

**4M823-050-** 50mm projection  
**4M823-075-** 75mm projection  
**4M823-100-** 100mm projection  
**4M823-125-** 125mm projection  
**4M823-150-** 150mm projection  
**4M823-200-** 200mm projection

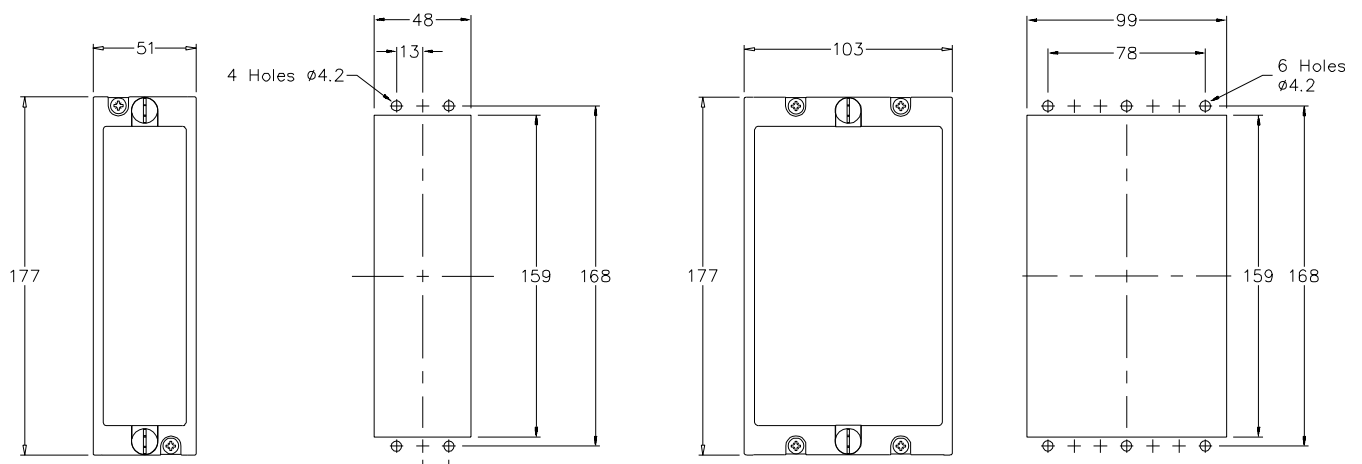
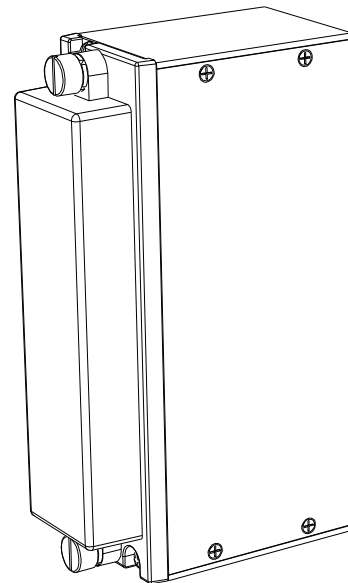
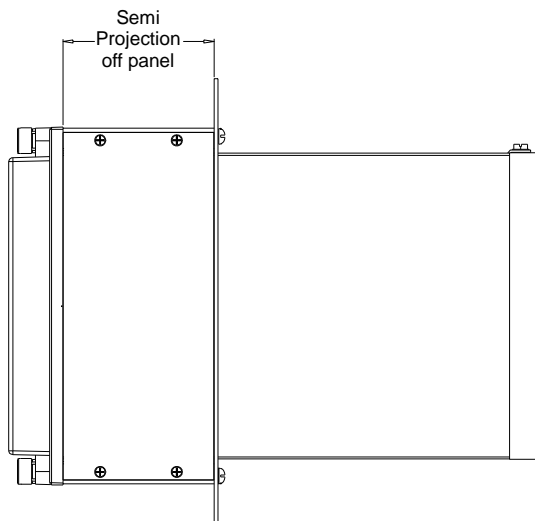


Figure 15: Semi projection mount kit details & panel cut outs



## Order Codes

Generate the required order code as follows: e.g. 2M28-S-2

| Order Code |   |   |     |   |
|------------|---|---|-----|---|
| 1          |   | 2 |     | 3 |
|            | M |   | - S |   |

### 1 CASE SIZE

- 2 Size 2
- 4 Size 4

### M M SERIES CASE

### 2 NUMBER OF TERMINALS

- 28 28 Terminals
- 56 56 Terminals

### S SHORT CASE VERSION

### 3 CASE CONFIGURATION \*

- Element only
- 1 One element per case
- 2 Two elements per case
- 3 Three elements per case
- 4 Four elements per case

Note: \* Auxiliary & tripping relays only

### M SERIES CASE PACKING DETAILS

Relays built in the M Series case system are shipped in custom packaging suitable for air, sea or land freight.

Each relay is individually packaged complete with Product/Test Manual, Terminal Screw Kit, Mounting Screw Kit & CD if applicable. The package consists of two recyclable foam moldings to secure & protect the relay from shock during transit.

A two ply custom cardboard box is used to house the relay / order module. A thermal label is attached to this box detailing the product type, customer, order & serial number information.

Depending on the number of relays in a consignment these box's may be shipped individually or packed into a larger carton. For bulk shipments these cartons are palletized.

### SIZE 2 CASE PACKAGING DIMENSIONS

#### Individual shipping box

FC0100 1 x size 2 shipping box: 240 x 230 x 85mm

#### Multiple shipping cartons

FC0113 6 x size 2 shipping boxes: 480 x 370 x 310mm

FC0114 14 x size 2 shipping boxes: 480 x 370 x 620mm

### SIZE 4 CASE PACKAGING DIMENSIONS

#### Individual shipping box

FC0101 1 x size 4 shipping box: 340 x 230 x 150mm

#### Multiple shipping cartons

FC0113 4 x size 4 shipping boxes: 480 x 370 x 310mm

FC0114 8 x size 4 shipping boxes: 480 x 370 x 620mm

### TYPICAL PALLET SIZES (Add 15Kg for pallet)

#### FC0113 shipping cartons

2L x 3W x 2H 960 x 1,110 x 610 mm

12 x relay cartons per pallet

#### FC0114 shipping cartons

2L x 3W x 2H 960 x 1,110 x 1,240 mm

12 x relay cartons per pallet

### WEIGHTS OF INDIVIDUAL SHIPPING BOXES

| Case Size | No. of elements per case * | Nominal weight Kg |
|-----------|----------------------------|-------------------|
| 2         | 1                          | 2.5               |
|           | 2                          | 3.0               |
| 4         | 1                          | 3.5               |
|           | 2                          | 3.7               |
|           | 3                          | 4.0               |
|           | 4                          | 4.5               |
| 6         | 1                          | 3.5               |
|           |                            |                   |
| 8         | 1                          | 4.0               |
|           |                            |                   |

Note: \* This relates to auxiliary & tripping relays where multiple relay elements may be specified per relay case which affects the final weight.



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