

## RM10 Integration Guide

|                      |  |
|----------------------|--|
| Last updated         | 18 June 2007   |
| Applicable products  | RM10 rectifier magazine  |
| Audience             | Eaton DC Product Channel Partners and Integrators  |
| Related documents    | Drawings (attached): Subrack8, DRG3691200, DRG3691207, DRG3691226  |
| For more information | Contact the Product Manager: <a href="mailto:GrantAStalker@eaton.com">GrantAStalker@eaton.com</a> with details of the application. |

### Scope

This application note provides a basic understanding of the RM10 to enable local integration facilities to assemble, test and integrate the RM10 in to various DC power systems.

*Note: This application note does not attempt to provide step by step work instructions – these are to be developed locally by each facility in accordance with their work flow and best practice requirements.*

### Introduction

The RM10 is a 3U x 19" rectifier magazine which provides a common platform for the Eaton 3G series of rectifiers (APR-3G, NPR-3G, CR-3G).

The RM10 is suitable for either 48V or 24V operation and is configurable for different AC input options.



## Delivery

The RM10 is supplied from the factory in a kitset form and some assembly is required at the local integration facility prior to use.



*Two kitsets are packed per box.*

## Kitset

Each kitset contains the following items:

| Item   | Quantity |
|--|----------|
| Tray   | 1        |
| Side plates (19" rack mount brackets already attached)   | 2        |
| Rear chassis (connector/busbar assembly – pre-assembled) | 1        |
| Assembly kit (screws, nuts, washers)                     | 1        |
| Rack mount kit (screws, cage nuts)                       | 1        |

The following items are NOT included in the kitset. These items must be ordered as separate line items or sourced locally:

- AC input cables (refer to page 5)
- DC output cables (refer to page 5)
- RJ45 rectifier communications cable.

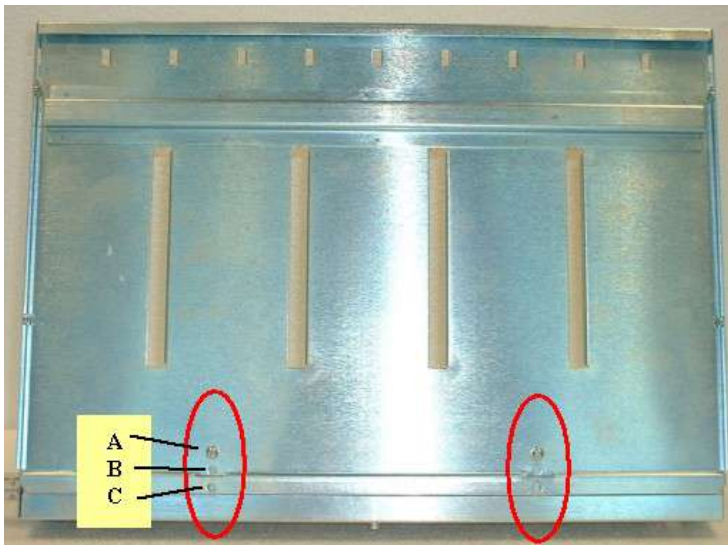
## Assembly

*Notes:*

1. The AC cable set can be attached to the rear chassis either before or after assembly of the RM10.
2. Recommended torque setting for M4 screws: 1.2Nm (1.5Nm maximum).

1. The rear chassis attaches to the tray using 2 x M4 x 8 screws, flat washers and spring washers.

*Note: There are three different mounting holes in the tray depending on rectifier type (refer to photo).*



*Rear chassis mounting holes:*

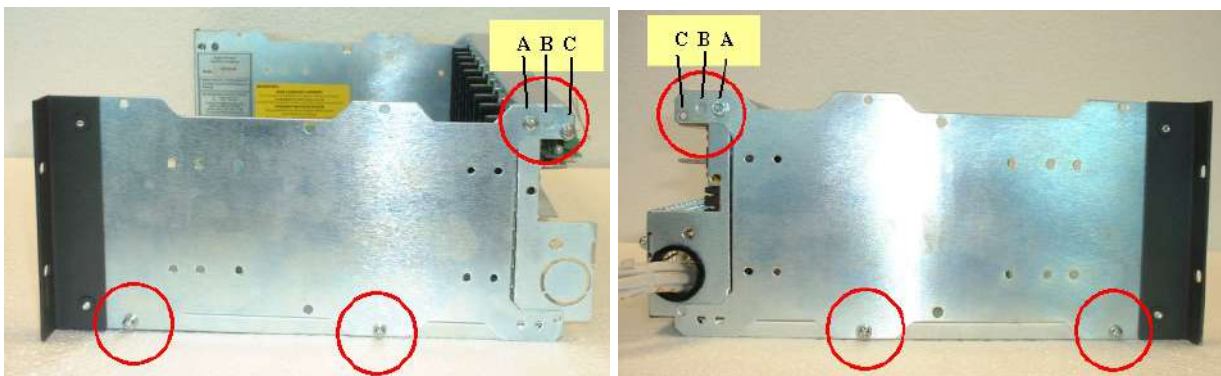
*A = APR-3G series rectifiers*

*B = NPR-3G series rectifiers*

*C = CR-3G series rectifiers*

2. The side panels attach to the tray using 4 x M4 x 8 screws, flat washers and spring washers.
3. The side panels attach to the rear chassis using an M4 stud (with nut, flat washer and spring washer) on one side and an M4 x 8 screw (with flat washer and spring washer) on the other side. For APR-3G rectifiers only an additional M4 x 8 screw (with flat washer and spring washer) can be used each side.

*Note: There are three different mounting holes on the back of the side panels depending on rectifier type (refer to photos).*



*Side panel mounting holes:*

*A = APR-3G series rectifiers*

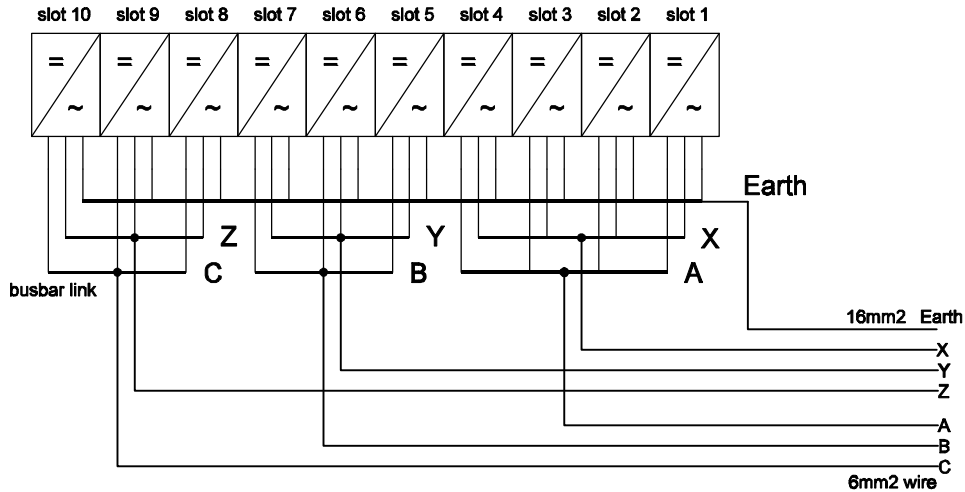
*B = NPR-3G series rectifiers*

*C = CR-3G series rectifiers*

### AC Input (APR-3G/NPR-3G Rectifiers)

Note: A different busbar assembly will be used for the 3-phase CR-3G rectifiers. Further details will be published at a later date.

The RM10 can accept a wide range of AC input configurations depending upon the required system application. The general principle used, is to supply the AC to the RM10 via a 6-wire plus Earth loom. Each wire of the loom is connected to a small busbar on the rear of the RM10 chassis, which in turn links together up to four rectifier positions.



**Notes:**

1. Remove the lower bus links (A, B, C) to allow easier access to the upper bus links (X, Y, Z).
2. Recommended bus bar link torque setting: 1.2Nm.

### AC Input Wiring

Select the wiring configuration to suit the AC supply from one of the following tables (depending on location).

1. In all countries except USA and Canada:

| Wire Tail | 1-Phase<br>120/230/240V L-N | 2-Phase<br>208/220/240V L-L | 3-Phase<br>380/400/415V L-L | 3-Phase<br>208/220V L-L |
|-----------|-----------------------------|-----------------------------|-----------------------------|-------------------------|
| A         | L1                          | L1                          | L1                          | L1                      |
| B         | L1                          | L1                          | L2                          | L3                      |
| C         | L1                          | L1                          | L3                          | L2                      |
| X         | N                           | L2                          | N                           | L2                      |
| Y         | N                           | L2                          | N                           | L1                      |
| Z         | N                           | L2                          | N                           | L3                      |

2. In USA and Canada (UL compliant):

| Wire Tail | 1-Phase<br>120V L-N | 2-Phase<br>208V L-L | 3-Phase<br>208V L-L |
|-----------|---------------------|---------------------|---------------------|
| A         | L1                  | L1                  | L1                  |
| B         | L1                  | L1                  | L3                  |
| C         | L1                  | L1                  | L2                  |
| X         | N                   | L2                  | L2                  |
| Y         | N                   | L2                  | L1                  |
| Z         | N                   | L2                  | L3                  |



## AC Cable

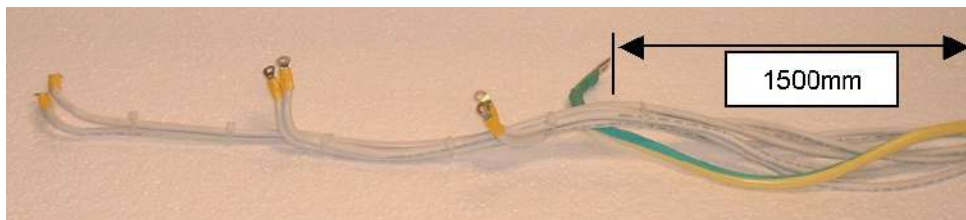
Factory pre-made AC cable assemblies (RMACxxxx-00) are available.

*Note: "xxxx" indicates the free length of cable (mm) as measured from the side of the RM10 magazine. E.g RMAC1500-00 has 1500mm free length of cable.*

Due to the high temperature of the exhaust air when the rectifier is operating in adverse environmental conditions (low AC input, high ambient air), it is recommended that high temperature rated wire is used.

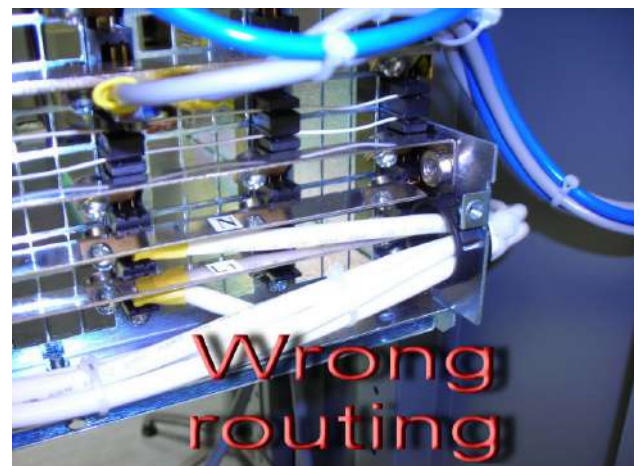
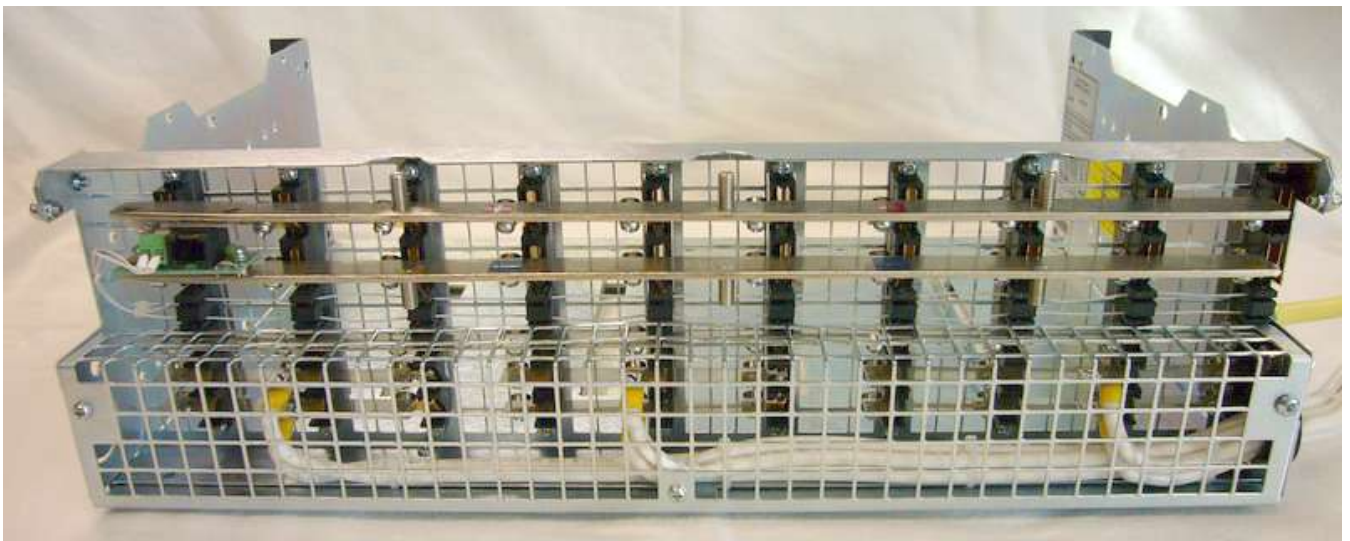
**Minimum AC cable characteristics: 6mm<sup>2</sup>, 600V/1kV, 150°C.**

**Minimum Earth wire characteristics: 16mm<sup>2</sup>, 600V, green/yellow insulation.**



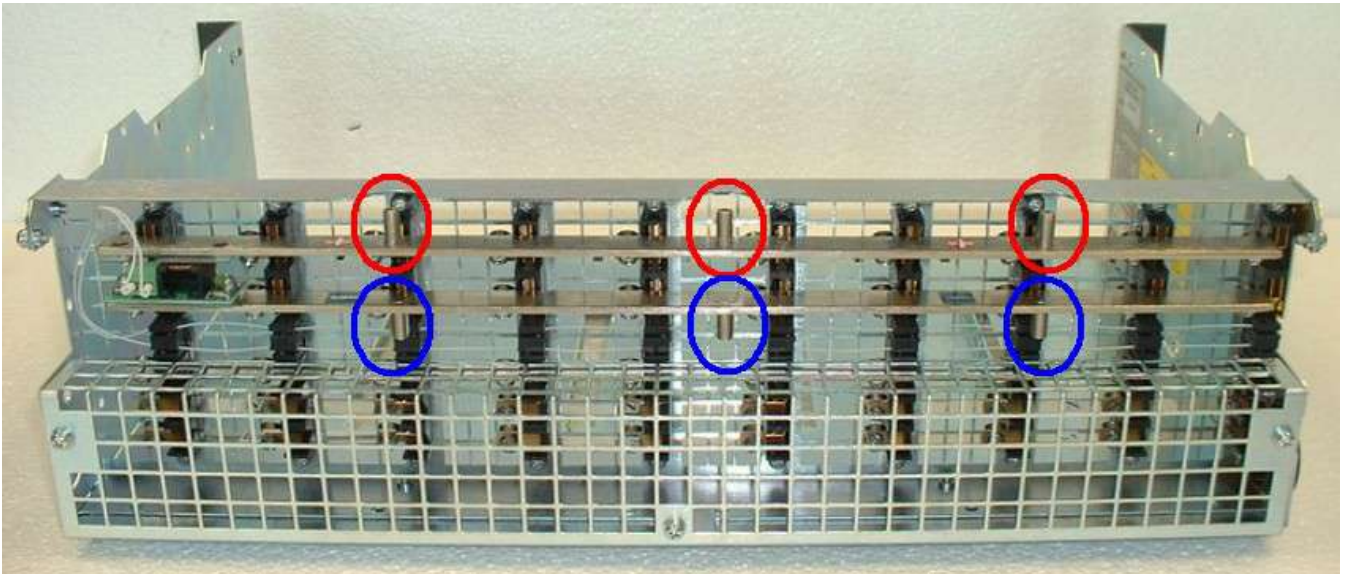
## AC Cable Routing

It is important to route the AC cables within the RM10 magazine so they do not restrict the rectifier exhaust airflow and do not rub on the AC busbars.



## DC Output

The RM10 is fitted with two DC output busbars (+ve/-ve), which link the outputs of all the rectifiers together. Each busbar is fitted with 3 x M6 studs (see photo) for connection of the DC output cables.

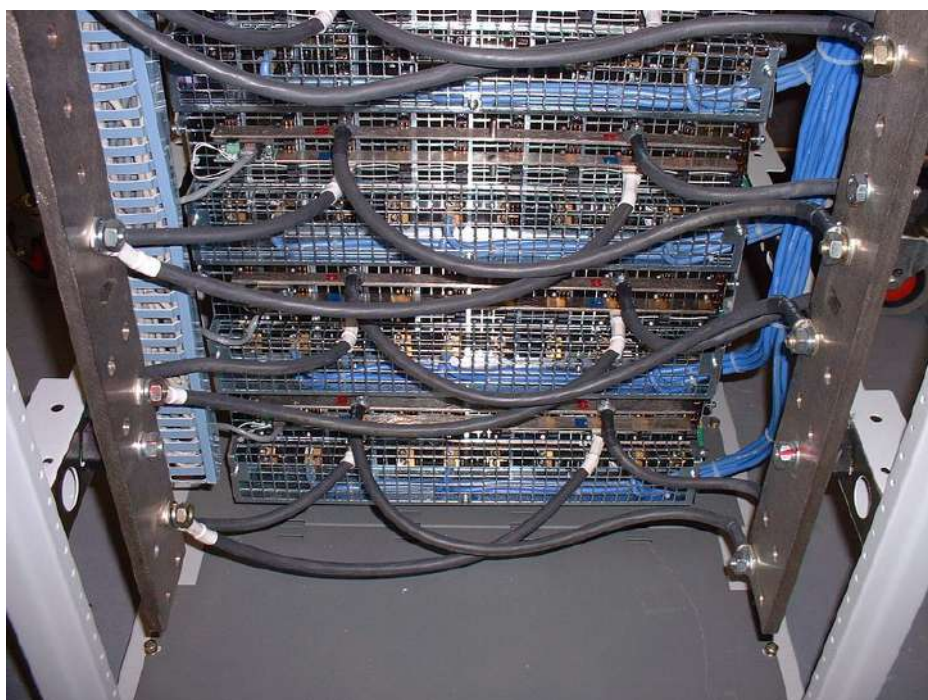


Use of the busbar studs and the presently available cable sets are shown in the following table.

| Rectifiers                     | Studs per busbar to be used | DC cable set presently available |
|--------------------------------|-----------------------------|----------------------------------|
| APR48-3G/NPR48-3G (375A)       | 2                           | RMDCS-00                         |
| APR24-3G/NPR24-3G/CPR48 (500A) | 3                           | RMDCS-01                         |

### Notes:

1. These cable sets have been designed to run from the RM10 busbars to vertical mounted system busbars located along the sides at the rear of a standard 600 x 600 cabinet. Other cable sets can be made upon request by the factory.
2. Recommended torque setting: 4Nm.





Due to the high temperature of the exhaust air when the rectifier is operating in adverse environmental conditions (low AC, high ambient air), it is recommended that high temperature rated wire is used.

**Minimum DC cable characteristics: Single 35mm<sup>2</sup> or dual 16mm<sup>2</sup>, 600V/1kV, 125°C.**

## Electrical Safety Testing

The RM10 kitset is visually inspected prior to leaving the factory to ensure all the components are correctly supplied. No electrical test is undertaken.

An electrical safety test must be undertaken by the local integration facility after the RM10 is fully assembled. The actual test requirements may vary depending upon local regulations. The following figures are given as a guide only.

| Test                  | Details         | Limit                         |
|-----------------------|-----------------|-------------------------------|
| Earth continuity      | 7.5V / 30A (AC) | < 0.1Ω                        |
| Di-electric strength  | 1.9kVrms / 2sec | No arc-over / under set point |
| Insulation resistance | 500V DC         | > 5MΩ                         |

## Rectifier Communications Cabling

The rectifier communications cable (RJ45 patch cable) is plugged into the PCB assembly mounted on the Negative DC busbar. This PCB converts the RJ45 style cabling to discrete wires (data "A" and data "B") for connection to the rectifier connectors. The PCB also provides additional protection and a "0" volt reference for the communications when used with an SM60 or SM65 supervisory module.



When the RM10 is shipped in the kitset form, the two discrete wires (data "A" and data "B") are fitted to all the rectifier connectors but they are not connected to the PCB assembly. These must be fitted into the green terminal block during the assembly of the RM10.

Care must be taken to ensure the correct wire is inserted in to the correct terminal block position (i.e. do not swap data "A" with data "B", otherwise the rectifiers communications will not work).

### Notes:

1. *The discrete wires are fitted to the rectifier connectors via an insulation displacement method (IDC). The correct tool to use for terminating the communications wires in the rectifier connector is a Krone LSA-PLUS insertion tool. There are several suitable part numbers. One is 6417/1/810/02 (available from Farnell, part number 147894).*
2. **IMPORTANT:** *You MUST remove the cutter from the tool before using it on the rectifier connector, this is easily done using a screwdriver. Some Krone tools have a switch to disable the cutter, however this is not sufficient. You must physically remove the cutter.*

## Rectifier Addressing

The 3G series of rectifiers incorporate an automatic addressing feature as part of the new RCP/RXP communications protocol. Consequently, the RM10 does not have any addressing switches or address boards.

However, there is no longer any association between a rectifier's number and its physical rack position.

### SM60/SM65 operation

The 3G rectifiers automatically select an unused RCP address (typically in the range of 65 - 127). In the rectifier section of main menu, the SM60/SM65 will display each RCP address and the output current of the associated rectifier.

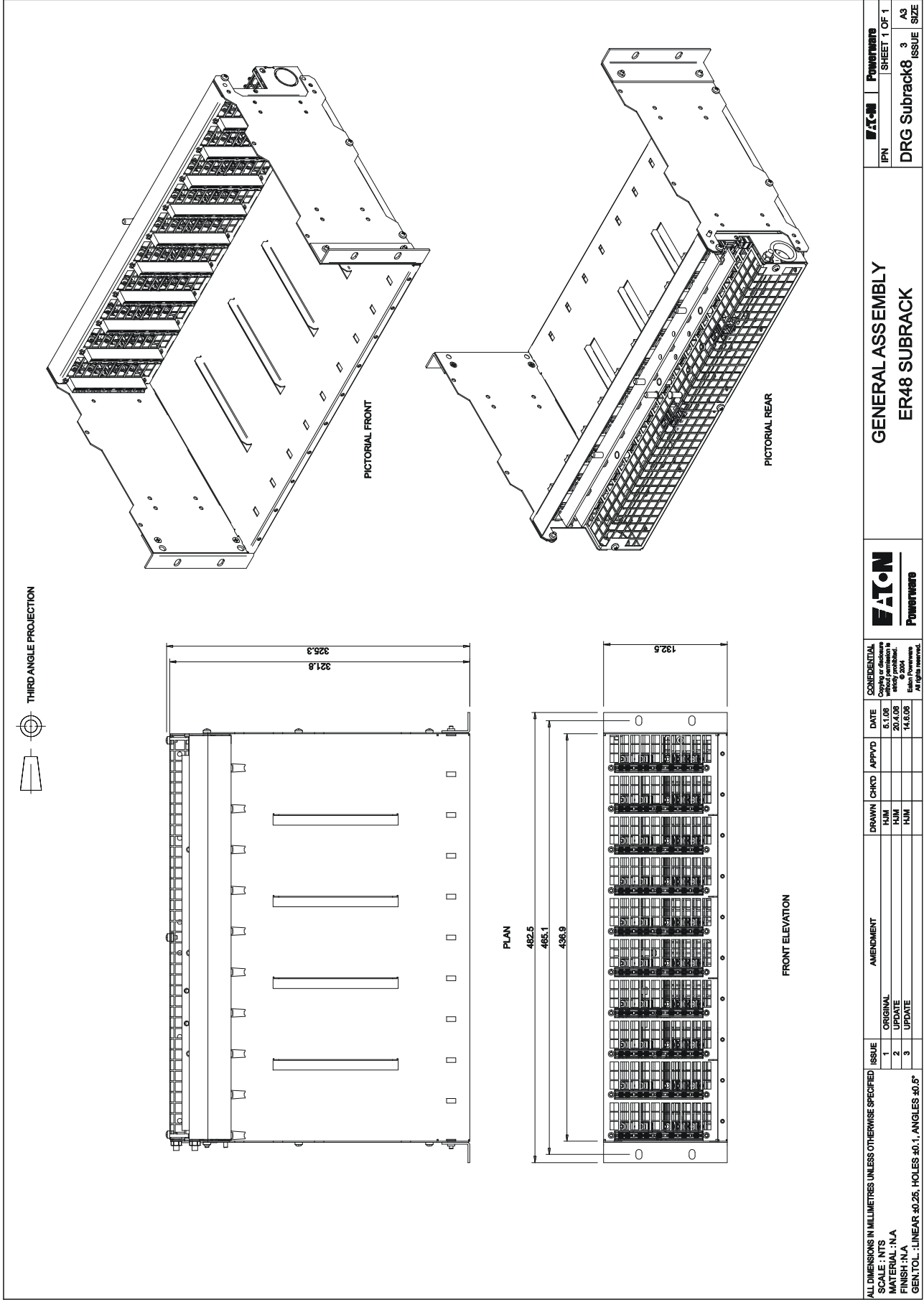
### SC100/SC200 operation

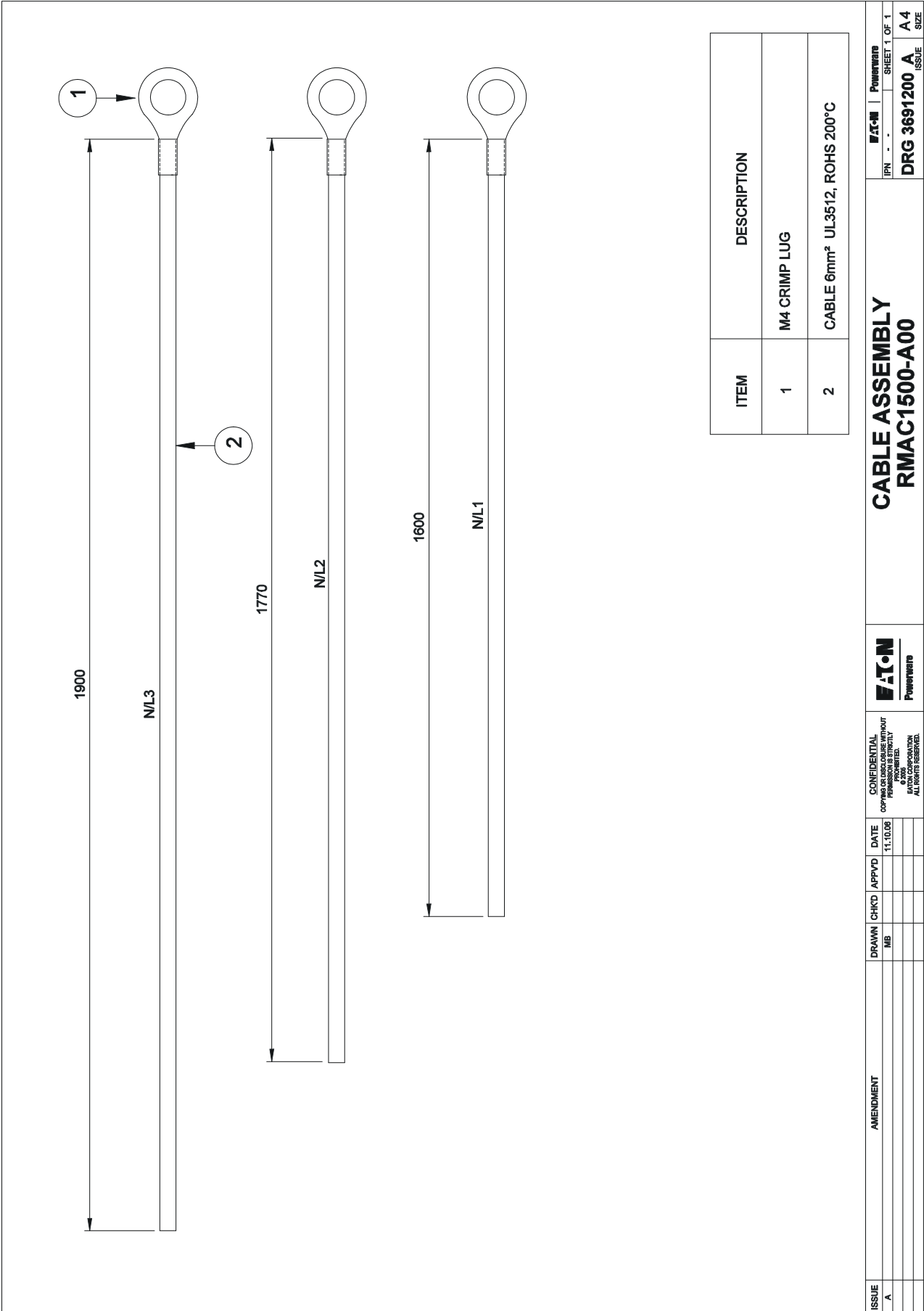
The RXP rectifier address is based on the rectifier serial number. This number is visible on the front of each rectifier and is displayed by the SC100/SC200 controllers. To physically identify a particular rectifier within the system, the SC200 has an "identify me" command. This causes the required rectifier's LEDs to flash.

## Attachments

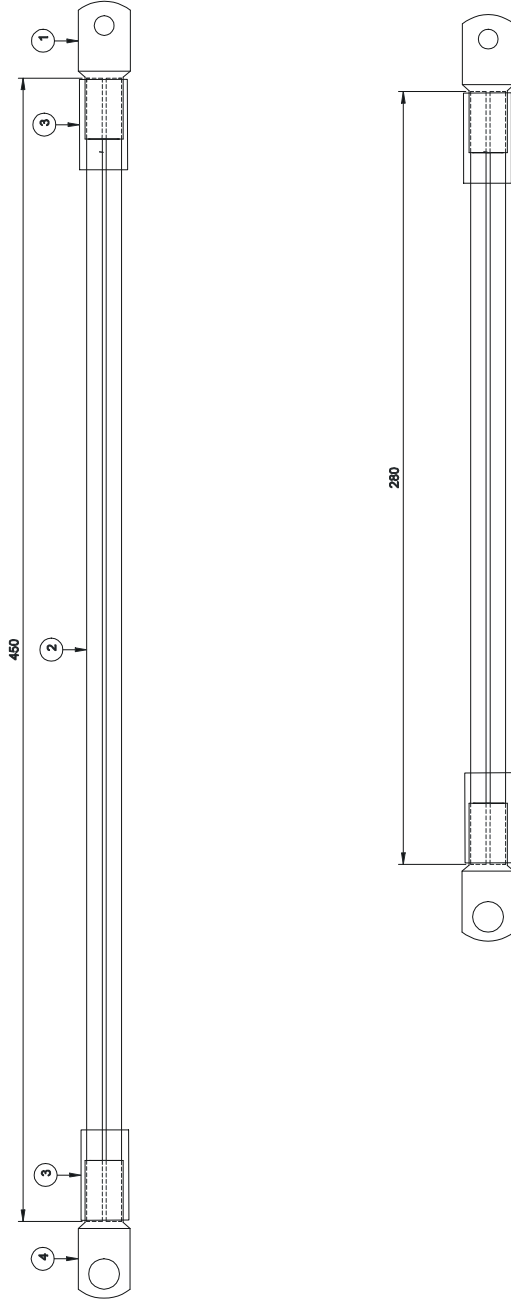
| Drawing Number | Issue | Title                         |
|----------------|-------|-------------------------------|
| Subrack8       | 3     | General Assembly ER48 Subrack |
| DRG3691200     | A     | Cable Assembly RMAC1500-A00   |
| DRG3691207     | A     | Cable Assembly RMDCS-00       |
| DRG3691226     | A     | Cable Assembly RMDCS-01       |





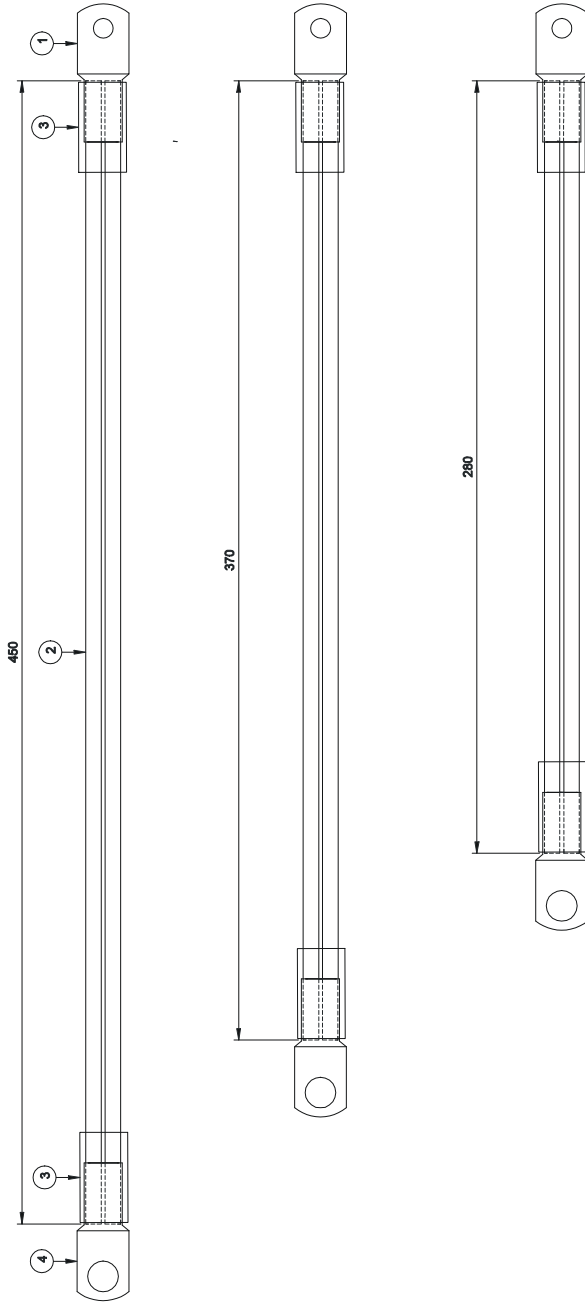


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|-------|-----------|-------|------|--------|----------|--|---|--|--|--|-------------|------------|--------------|
| ISSUE | AMENDMENT | DRAWN | CHKD | APPROV | DATE     | CONFIDENTIAL   |  |  | <b>CABLE ASSEMBLY</b><br><b>RMAC1500-A00</b> |  | IPN         | Powermetro | SHEET 1 OF 1 |
| A     |           | MB    |      |        | 11.10.08 | CONFIDENTIAL<br>INFORMATION<br>PERMISSION IS STRICTLY<br>FORBIDDEN.<br>© 2008<br>FTORX CORPORATION<br>ALL RIGHTS RESERVED. |   |  |  |  | DRG 3691200 | A          | A4           |
|       |           |       |      |        |          |  |   |  |  |  |             |            | ISSUE        |
|       |           |       |      |        |          |  |   |  |  |  |             |            | SIZE         |



| ITEM | DESCRIPTION   |
|------|---|
| 1    | M6 CRIMP LUG  |
| 2    | 10mm <sup>2</sup> RADOX CABLE 160°C (±2 PER ASSEMBLY) |
| 3    | HEATSHRINK  |
| 4    | M10 CRIMP LUG   |

|       |           |       |      |       |          |  |  |  |  |  |     |             |              |       |      |
|-------|-----------|-------|------|-------|----------|--|--|--|--|--|-----|-------------|--------------|-------|------|
| ISSUE | AMENDMENT | DRAWN | CHKD | APPVD | DATE     | CONFIDENTIAL   |  |  | <b>CABLE ASSEMBLY</b><br><b>RMDCS-00</b> |  | IPN | DRG 3691207 | SHEET 1 OF 1 | A4    |      |
| A     |           | MB    |      |       | 12.10.08 | CONFIDENTIAL<br>FOR INTERNAL USE ONLY<br>PERMISSION IS STRICTLY<br>PROHIBITED<br>© POWERWARE<br>A WORLDWIDE COMPANY<br>ALL RIGHTS RESERVED |  |  |  |  |     |             |              | ISSUE | SIZE |



| ITEM | DESCRIPTION   |
|------|---|
| 1    | M6 CRIMP LUG  |
| 2    | 10mm <sup>2</sup> RADOX CABLE 160°C (x2 PER ASSEMBLY) |
| 3    | HEATSHRINK  |
| 4    | M10 CRIMP LUG   |

**CABLE ASSEMBLY  
 RMDCS-01**



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|           | 12.10.08 |          |      | MB    |

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| A     |      |          |      |       |

| IPN           | ISSUE | SIZE         |
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| DRG 3691226 A | A4    | SHEET 1 OF 1 |