

# RM100

**ROUTE-MASTER™** Fieldbus System  
*(Intrinsically-Safe Installations)*



**RM100** **ROUTE-MASTER™** Fieldbus System  
*(Intrinsically-Safe Installations)*

# Table of Contents

<b>Introduction</b> .....	<b>3</b>
<b>System Configuration</b> .....	<b>4</b>
ROUTE-MASTER system wiring with RMA100 Device Couplers .....	4
ROUTE-MASTER system wiring with RMA100C Device Couplers .....	5
<b>Specifications</b> .....	<b>6</b>
RM100 ROUTE-MASTER .....	6
RMA100C and RMA100C Fieldbus Device Couplers .....	6
<b>Dimensions</b> .....	<b>7</b>
<b>Installation</b> .....	<b>11</b>
RM100 Rack .....	11
Device Coupler Mounting.....	11
<b>Essential Health and Safety Requirements</b> .....	<b>12</b>
<b>Terminal Designations</b> .....	<b>13</b>
Single Trunk Hook-Up .....	14
Dual Trunk Hook-Up.....	15
<b>Commissioning</b> .....	<b>16</b>
<b>Troubleshooting</b> .....	<b>16</b>
Hand-Held Communicator.....	16
Recommended Ground Wiring Practices.....	17
CE Conformity.....	17
Operation .....	17
Maintenance .....	17
<b>Customer Support</b> .....	<b>17</b>
<b>Certification Drawings</b> .....	<b>18</b>
<b>Appendix A: RM110 PowerTray</b> .....	<b>24</b>
Installation.....	24
Commissioning .....	24
<b>Appendix B: Yokogawa Connector Panel</b> .....	<b>26</b>
<b>Appendix C: Honeywell Connector Panel</b> .....	<b>27</b>

## Introduction

The ROUTE-MASTER™ RM100 Series is an intrinsically-safe fieldbus power supply system providing galvanically-isolated and fieldbus-conditioned power for FOUNDATION Fieldbus or PROFIBUS PA segments. Fieldbus devices may be connected into these segments only through RMA100 or RMA100C Device Couplers, and any intrinsically-safe segment may only contain intrinsically-safe devices, that are approved for the appropriate Zone/Division of use and the appropriate Gas hazard.

The intrinsically-safe trunk powered by the ROUTE-MASTER's Trunk Isolator Module (RM102B) is available for connection to one (or more) ROUTE-MASTER Device Couplers. Our "Split Architecture" dual trunk outputs from the RM102B deliver 350mA per trunk for intrinsically-safe applications. RM102B Trunk Isolator Modules are modular per segment and located in the RM100 Rack, which may be front-mounted into a cabinet or surface-mounted using rear mounting brackets RMB001 (supplied).

The Rack provides AC isolation through one or two independent AC feeds and may contain one or two RM103B DC Regulator Cards to provide fully load-sharing and redundant DC power. The RM103B controls the voltages of each of the individual channels and also provides failsafe relay contacts to alarm if there is a power failure.

There are two versions of the ROUTE-MASTER Device Couplers, the RMA100 and RMA100C. Both Device Couplers offer the same functionality except for their hazardous area approvals. The RMA100 is FM and ATEX approved to mount in Class 1 Division 1 Groups C & D and Zones 0 & 1, Gas Groups IIA & IIB locations, and directly connect to devices in Class I, Division I, Groups A, B, C, D Zones 0&1, Gas Groups IIA, IIB and IIC locations. The RMA100C is FISCO compatible and ATEX approved to mount directly in IIC Zone 1, 2. For more details please see Figures 1 and 2 and also refer to installation drawings at the end of this manual.

ROUTE-MASTER Device Couplers provide electronic and fully auto-resetting spur short-circuit protection that prevent segment failure caused by single device faults. Utilizing a unique "Fold-Back" technique, any spur that attempts to draw more than approximately 48mA is automatically switched off and not permitted any current flow until the fault is removed. With removal of the short, the spur is automatically reconnected (within 30 microseconds) to the fieldbus segment.

The Automatic Segment Termination feature eliminates segment failure from under or over termination which is generally the most common installation error. This assures that the segment will continue with proper termination even if downstream couplers are disconnected.

Each Device Coupler is designed to fit onto a 32mm (EN50035) G-type and 35mm (EN50022) Top Hat DIN-rail and should be mounted in such a way as to allow easy access to terminal receptacles and to keep LEDs visible. These units are not weatherproof and outdoor placement will require an external enclosure. Any enclosure which meets the requirements of the location in relation to electrical and mechanical safety may be used.

ROUTE-MASTER Device Couplers (RMA100/RMA100C) can be ordered in ready-to-install, field-mount enclosures designed for applications in rugged and hazardous field conditions. Options include aluminum, GRP (Glass Reinforced Polyester) and stainless steel enclosures. Both offer IP66 protection. Standard cable glands are nickel-plated, and can be ordered for use with un-armored or armored cable. Compound seal glands (for cable with inter-core spaces, i.e. unfilled cable), and quick-connect plugs and sockets are also available.

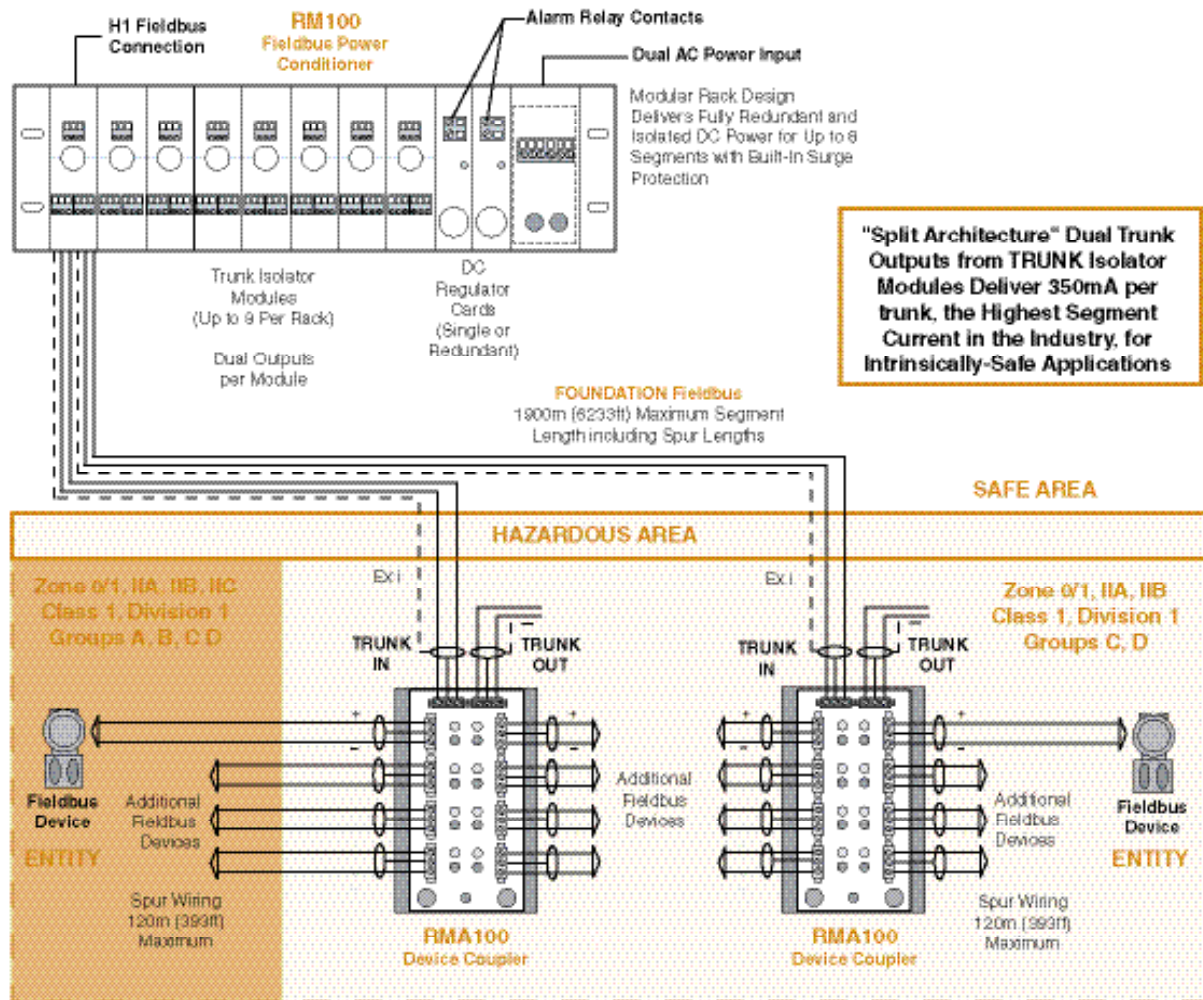
Field devices are individually connected directly to terminals via spur cables through a variety of cable gland options, or through proprietary plug and socket connectors (*Eurofast™* or *Minifast™*).

# RM100

ROUTE-MASTER™ Fieldbus System  
(Intrinsically-Safe Installations)

## System Configuration

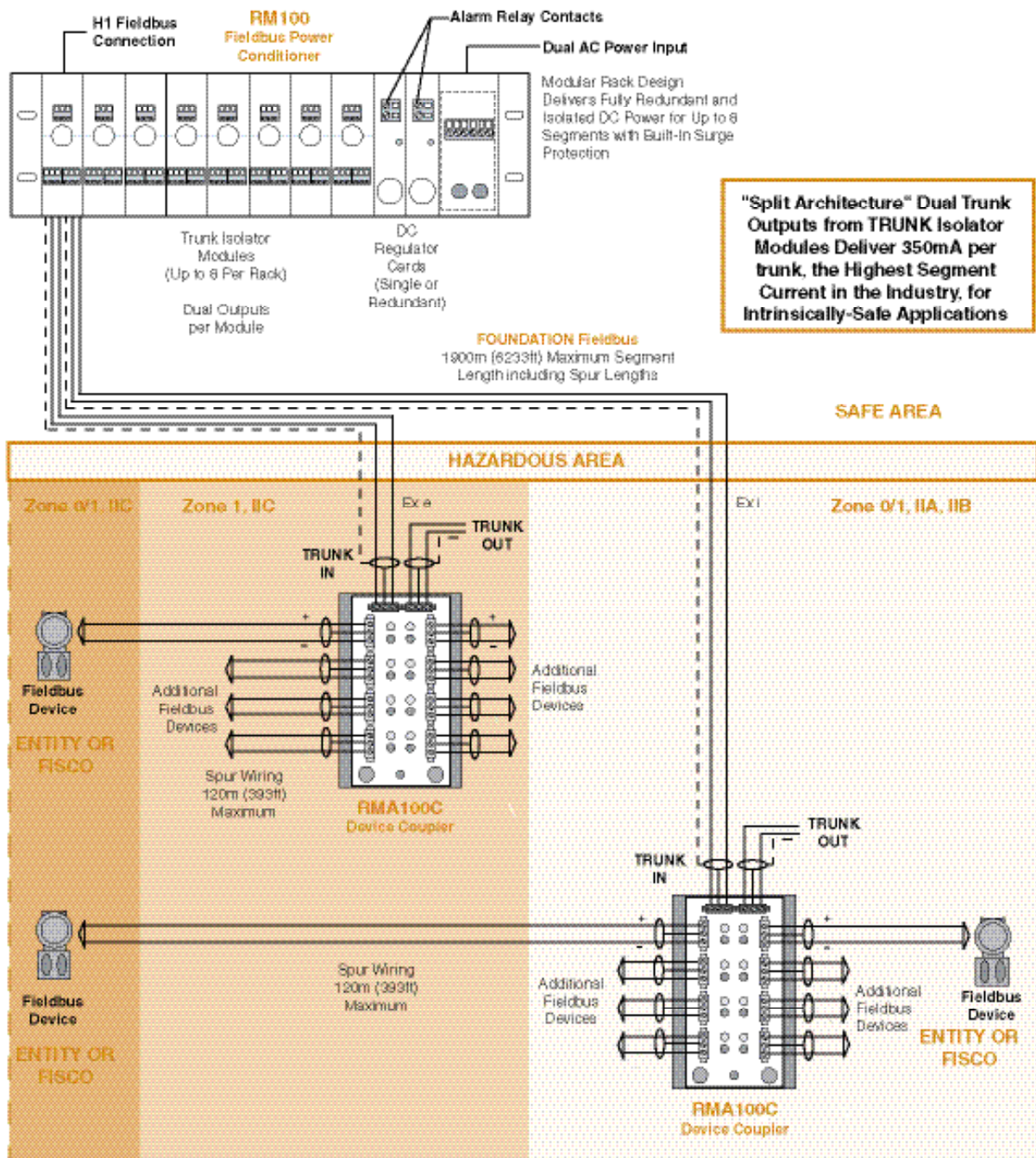
Figure 1. ROUTE-MASTER system wiring with RMA100 Device Couplers



# RM100

ROUTE-MASTER™ Fieldbus System  
(Intrinsically-Safe Installations)

Figure 2. ROUTE-MASTER system wiring with RMA100C Device Couplers





# RM100

ROUTE-MASTER™ Fieldbus System  
(Intrinsically-Safe Installations)

## Specifications

### RM100 ROUTE-MASTER Fieldbus Power Supply/Conditioner Rack

<p><b>Communications</b> FOUNDATION Fieldbus™ (H1) or PROFIBUS PA to IEC61158-2</p> <p><b>Performance</b> <b>Rack Capacity:</b> Up to 8 Trunk Isolator Modules (RM102B); One or two DC Regulator Cards (RM103B) <b>Supply Voltage:</b> 115Vac or 230Vac, 50/60Hz (not field selectable) <b>Output:</b> 18.65V (no load), 350mA per trunk <b>Power Dissipation:</b> 35W, fully-loaded, 8 channels</p>	<p><b>Performance (continued)</b> <b>Fault Power:</b> 250W, all channels shorted <b>MTTF</b> using RELCALC software with Telcordia SR-332 Data at 25C. Segment with Single DC Regulator Card is 199 Years; Segment with Dual DC Regulator Cards is 757 Years. <b>Alarm Action:</b> Volt-free Contact Closure (rated at 250Vac, 0.5A, 100VA) <b>Terminals:</b> Screw-clamp terminals, 0.8-2.5mm<sup>2</sup>/12-24AWG</p>	<p><b>Indicators</b> One GREEN LED per DC Regulator Card indicates normal operation</p> <p><b>Ambient Conditions</b> <b>Operating:</b> -20°C to +60°C (-4°F to +140°F) <b>Storage:</b> -40°C to +85°C (-40°F to +185°F) <b>Relative Humidity:</b> 0-95%, non-condensing <b>Surge Protection:</b> 5,000W/1msec <b>RFI/EMI Immunity:</b> 10V/m@80-1000MHz, 1kHz AM (IEC61326)</p>
--	---	---

### RMA100 and RMA100C Fieldbus Device Couplers

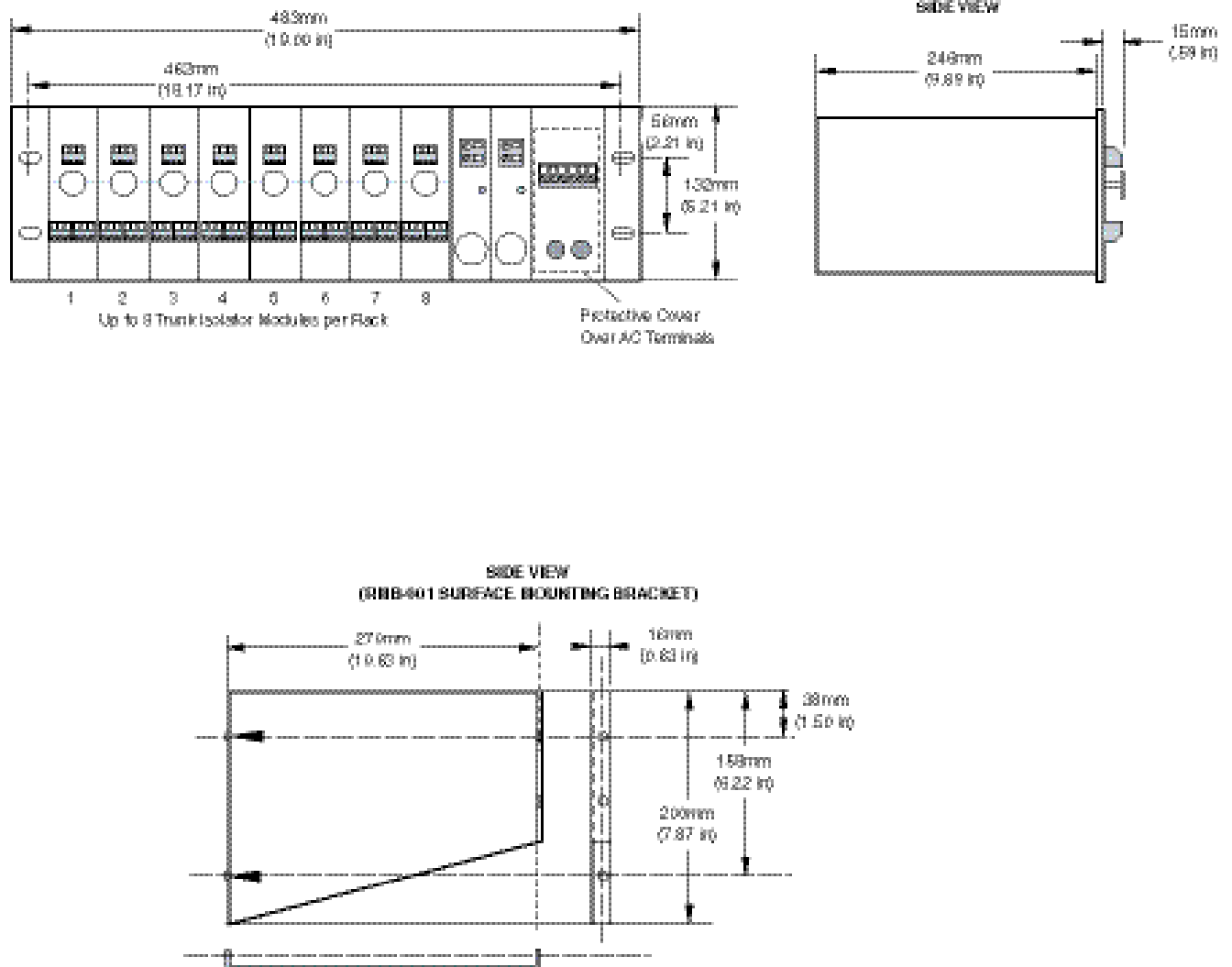
<p><b>Communications</b> FOUNDATION Fieldbus™ (H1) to IEC61158-2</p> <p><b>Performance</b> <b>Voltage Rating:</b> V<sub>max</sub>: 18.65V V<sub>min</sub>: 11V <b>Maximum Quiescent Current:</b> RMA104/RMA104C: 9mA@18.65V; 5mA@12V RMA108/RMA108C: 13mA@18.65V; 9mA@12V RMA10X: 15mA@18.65V; 11mA@12V RMA10W/RMA10WC: 17mA@18.65V; 13mA@12V (4mA lower with -MT option) <b>Spur Output Voltage (No Load):</b> RMA100/RMA100C: V&lt;V<sub>in</sub>&lt;18.65V; RMA100: 10.4V&lt;V<sub>s</sub>&lt;18.5V RMA100C: 10.5V&lt;V<sub>s</sub>&lt;16V <b>Max. Spur Output Current:</b> I<sub>s<sub>lim</sub></sub> = 48mA</p>	<p><b>Performance (continued)</b> <b>Spur Short Circuit Load:</b> I<sub>s<sub>sc</sub></sub>: 2mA typical, 5mA maximum <b>Maximum Voltage Drop Trunk IN to OUT:</b> V<sub>dt</sub>: 0.5V</p> <p><b>Indicators</b> <b>Spur:</b> GREEN (normal) RED (fault) <b>Auto-Terminator:</b> YELLOW LED is on when auto-termination is activated</p> <p><b>Terminals</b> <b>Type: Spur-</b> Removable terminals with screw-clamp retaining screws <b>Type: Trunk-</b> RMA100 Series Removable terminals with screw clamp retaining screws <b>Type: Trunk-</b> RMA100C Series: Ex e Terminal Block <b>Wire Size:</b> Handles sizes between 0.8-2.5mm<sup>2</sup>/12-24AWG</p>	<p><b>Cable Glands (Device Couplers with Enclosures)</b> <b>Type:</b> Armored/Unarmored <b>Material:</b> Nickel-plated brass</p> <p><b>Ambient Conditions</b> <b>Operating:</b> -40°C to +70°C (-40°F to +158°F) <b>Storage:</b> -40°C to +85°C (-40°F to +185°F) <b>Relative Humidity:</b> 0-95%, non-condensing <b>Surge Protection:</b> EN61326, EN6100-4-5 1KV (1.2/50 μsec impulse) differential mode protection <b>RFI/EMI Immunity:</b> 10V/m@80-1000MHz, 1kHz AM (IEC61326) <b>Vibration (EN 60068-2-6):</b> 1g max acceleration, 10-150Hz <b>Shock (EN 60068-2-27):</b> 15g max. acceleration, 11ms</p>
---	---	--

# RM100

ROUTE-MASTER™ Fieldbus System  
(Intrinsically-Safe Installations)

## Dimensions

Figure 3. RM100 Power Conditioner Rack and RMB-001 Surface Mounting Bracket Installation Dimensions.

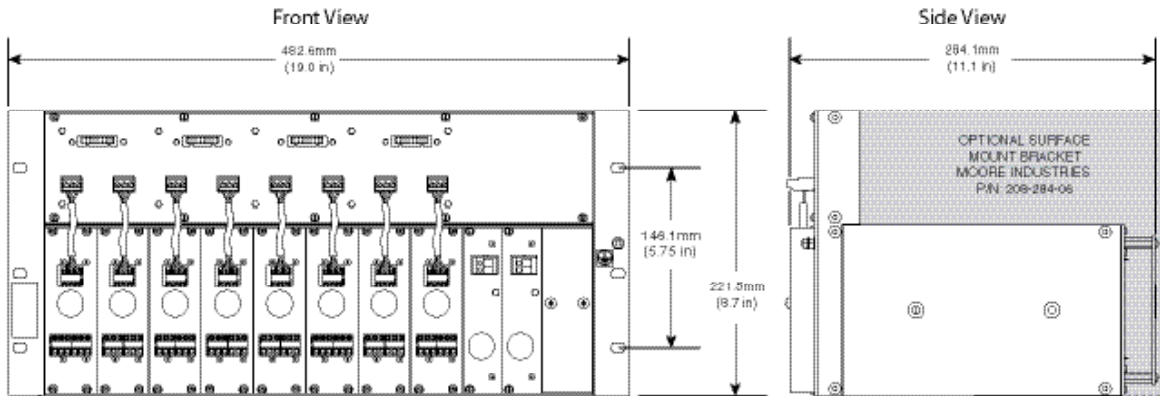


# RM100

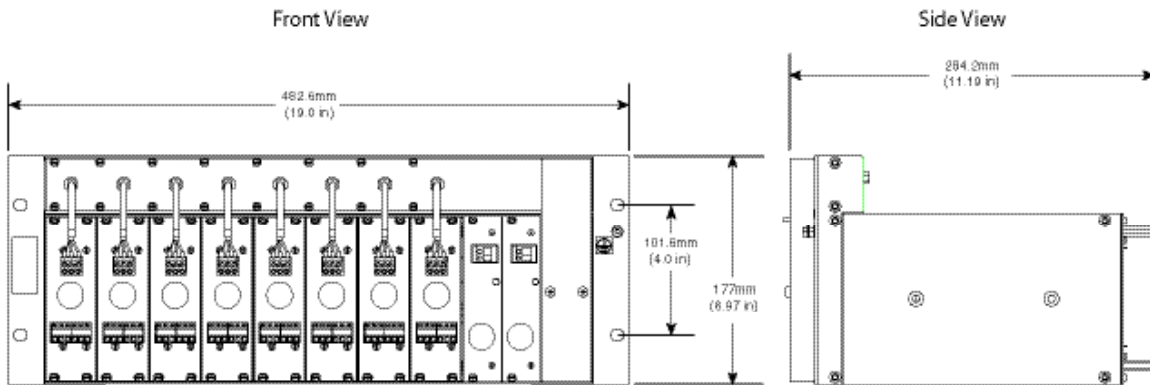
ROUTE-MASTER™ Fieldbus System  
(Intrinsically-Safe Installations)

Figure 4. ROUTE-MASTER RM100 with Connector Panel (RM100\*-Y or H) available for Yokogawa or Honeywell Host Systems. (RM110 Power Tray combined with RM100 has same dimensions as Yokogawa)

### Yokogawa Connection Panel or RM110 Power Tray Dimensions (Yokogawa Shows)



### Honeywell Dimensions

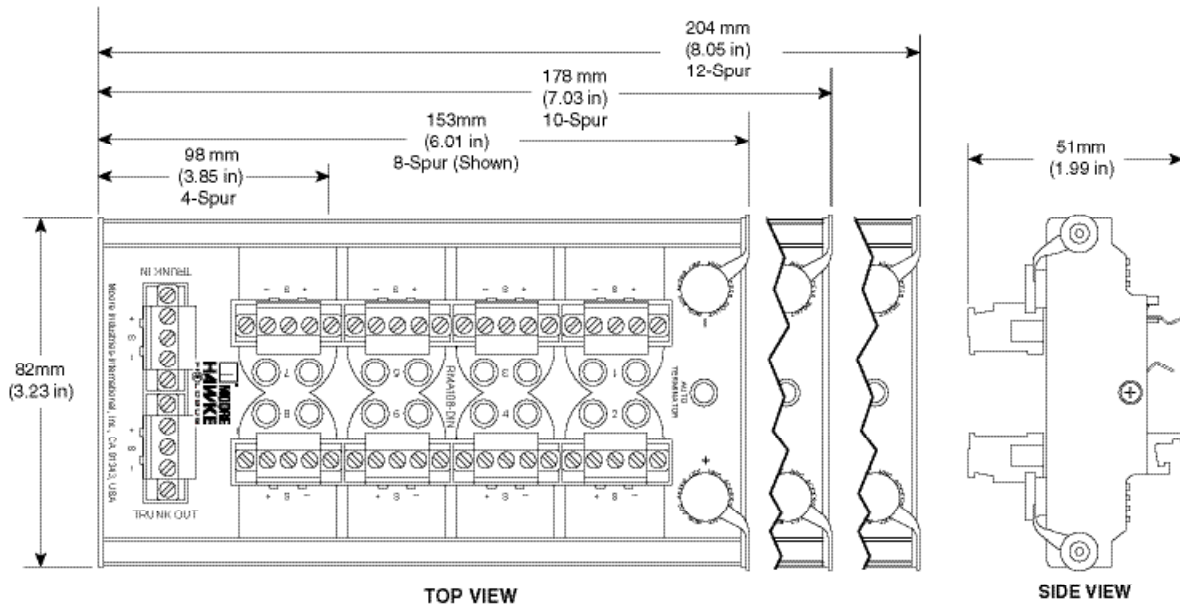




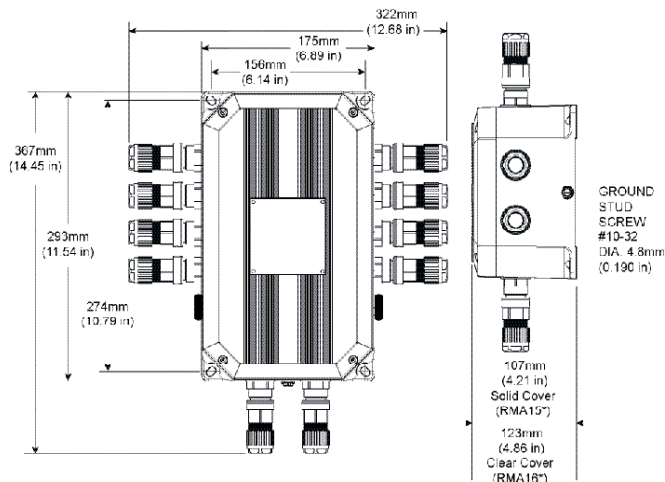
# RM100

**ROUTE-MASTER™** Fieldbus System  
(Intrinsically-Safe Installations)

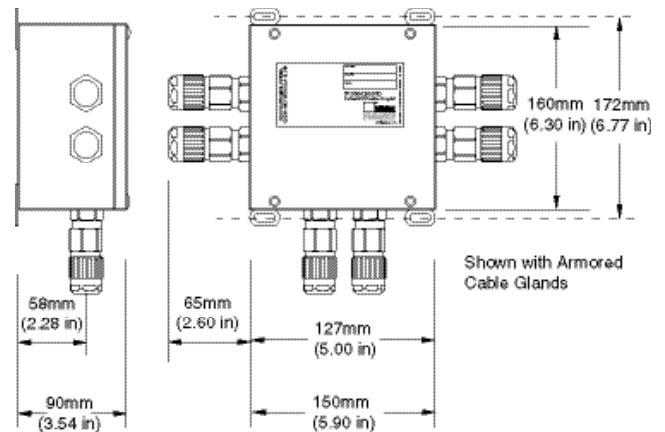
**Figure 5.** Device Coupler RMA100 or RMA100C Series DIN Rail Mounting Installation Dimensions.



**Figure 6.** Standard Aluminum Enclosure Installation Dimensions for 4-Spur (RMA154/164), 8-Spur (RMA158/168), 10-Spur (RMA15X/16X) and 12-Spur (RMA15W/16W) Models.



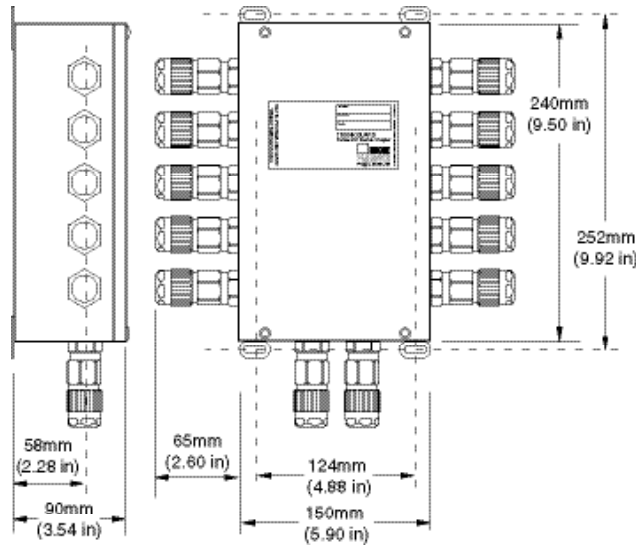
**Figure 7.** Electro-Polished Stainless Steel 316 Enclosure Installation Dimensions for 4-Spur (RMA124) Device Couplers.



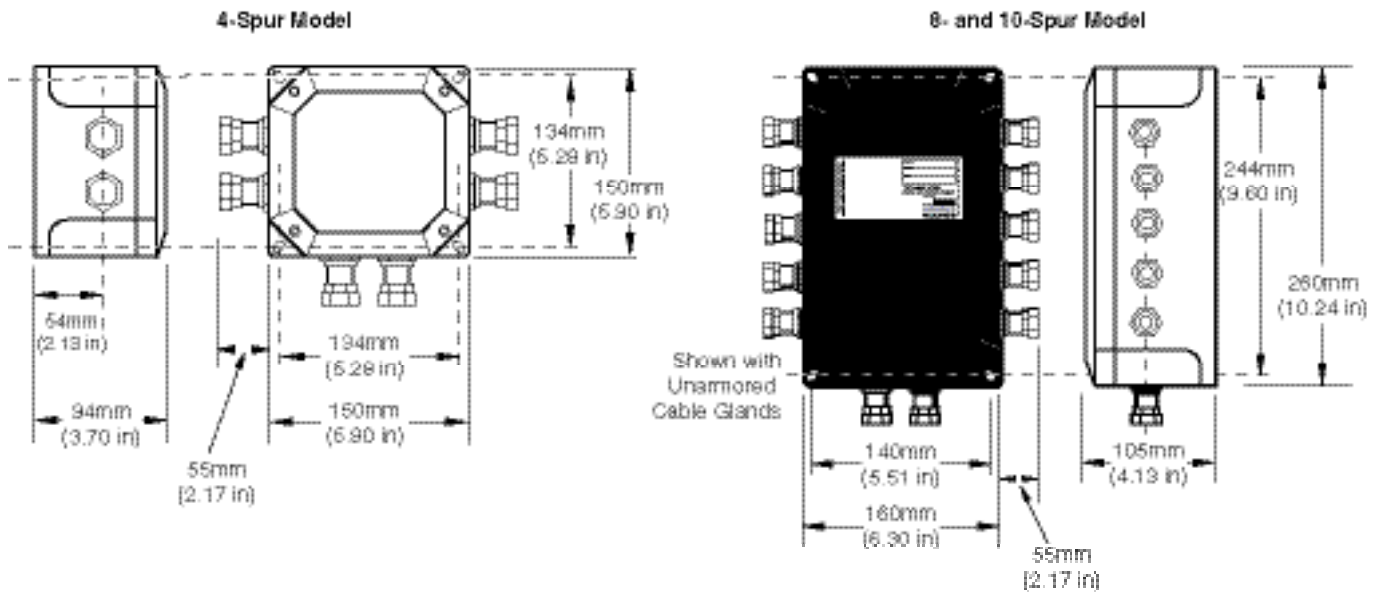
# RM100

**ROUTE-MASTER™** Fieldbus System  
(Intrinsically-Safe Installations)

**Figure 8.** Electro-Polished Stainless Steel 316 Enclosure Installation for 8-Spur, 10-Spur and 12-Spur Device Couplers. 12-Spur shown.



**Figure 9.** GRP (Glass-Reinforced Polyester) Enclosure Dimensions



## Installation

**Note:**

Hook-Up and System Wiring diagrams shown in this manual represent common wiring and installation configurations for MooreHawke's ROUTE-MASTER System.

### RM100 Rack

The RM100 Series Rack is Safe Area Associated Apparatus and is not approved to be located in a hazardous area without supplementary protection. Device Couplers are approved for location in hazardous areas and for connection to fieldbus devices.

Mounting of the RM100 Rack requires a clean and dry environment between -20 to +60°C (-4 to +140°F). The Rack should be mounted horizontally and can be fixed into conventional 19-inch cabinets from the front using the mounting slots provided or surface-mounted using the RMB001 Rear Mounting Brackets. Clearance of 20mm (0.79 in) top and bottom is required to allow satisfactory cooling air flow.

Cards within the Rack may be removed to ease mounting, but care must be taken to avoid damage to Cards and exposed motherboard connections. Cards should be re-installed into the Rack as soon as practicable.

Cables to/from the Rack need to be segregated; non-IS cables (i.e. AC power, DCS input and DC Regulator Card alarm output wiring) should be routed away from IS cables (field connections) using suitable cable trunking or other mechanical means. Segregation of 50mm (1.97 in) is adequate to prevent accidental contact between I.S and non-I.S cables.

Optional accessories allow powering of the HOST H1 card (RM110) or direct HOST plug-in connections. Please see Appendices for more details.

Accessories and connection drawings for use with Emerson DeltaV, Yokogawa and Honeywell are available in Appendices.

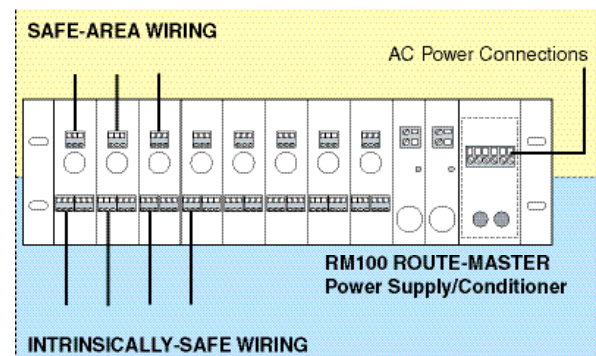
### Device Coupler Mounting

Field-mounting enclosures should be securely mounted onto a flat surface vertically or horizontally, or with a 2 inch pipe mounting bracket (optional). The mounting surface should be flat and free from sharp or raised areas which may damage the IP rating of the enclosure. The position should be selected to provide protection from falling debris, erosion from, for example, wind-blown sand and continuous high vibration levels.

Positions with cables coming from above the enclosure mounting position should have the cables brought down below the enclosure and then directed upwards to minimize the possibility of water or other fluid entry.

If cable glands are to be used, please follow instructions for cable gland installation.

Figure 10. RM100 Rack Safe-Area and Intrinsically-Safe Wiring



# RM100

**ROUTE-MASTER™** Fieldbus System  
(Intrinsically-Safe Installations)

---

## Essential Health and Safety Requirements

### Electrical Safety

1. Always ensure AC Protective Cover is in place before working on the rack.
2. Always connect power earth/ground to the appropriate terminals provided on the RM100 Rack. The RM100 System is suitable for connection to TN-systems (AC supplies with grounded neutral) only, with fuse protection on ac Live/Hot input(s).
3. **WARNING:** High voltage levels (230Vac or 115Vac depending on model) are present within the RM100 Rack. DO NOT insert metal objects between Cards or into the Rack assembly. Replace the protective cover over the AC input terminals after installation. With correct handling, there is no threat to health through direct or accidental contact.

### Fuse Replacement

FUSES: 2A HBC 20mm IEC anti-surge or slow-blow fuses (RM100 Rack AC input).

### DC Regulator Cards

1. **WARNING:** In normal operation, some components may become hot (>50°C) particularly with high segment currents (>200mA). Take care when removing any Card from a Rack.
2. DC Regulator cards may be replaced under power.

### Isolators

1. **WARNING:** In normal operation, some components may become hot (>50°C) particularly with high segment currents (>200mA). Take care when removing any Card from a Rack.
2. Isolator cards may be replaced under power. Remove TRUNK and SEGMENT connections BEFORE removing the isolator card. DO NOT reconnect TRUNK and SEGMENT wiring until AFTER the replacement isolator card is plugged into the rack.

### Device Couplers

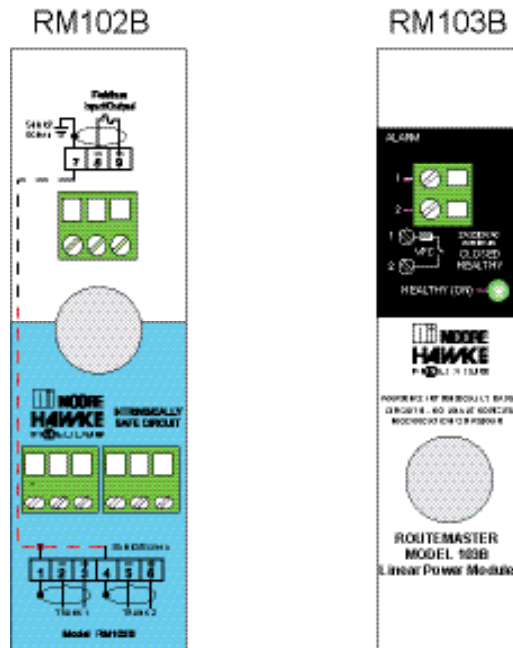
1. Device Couplers using GRP enclosures may present a static hazard. Clean only with a damp cloth.
2. DIN-rail mounting units must be installed in an external enclosure providing a minimum of IP20 protection (minimum IP54, recommended).

### Materials of Construction

1. Materials and components that form parts of the intrinsically-safe protection must not be exposed to, and must be protected from, corrosion, dilution, erosion and mechanical damage. Any damaged system components must be immediately replaced.
2. The intrinsically-safe nature of the RM100 Series system means that NO on-site repair or modification is permissible. Return all suspect, failed or damaged items to Moore Industries.
3. Device Coupler components are composed of aluminum and polyamide, with polyurethane potting compound. Exposed circuit boards are sealed with polyurethane varnish, and terminal screws are zinc plated steel. Standard cable glands/connectors fitted to all types are nickel-plated brass with neoprene seals and nylon or fiber washers. Eurofast/Minifast plugs and sockets (options) are typically ni-plated brass.

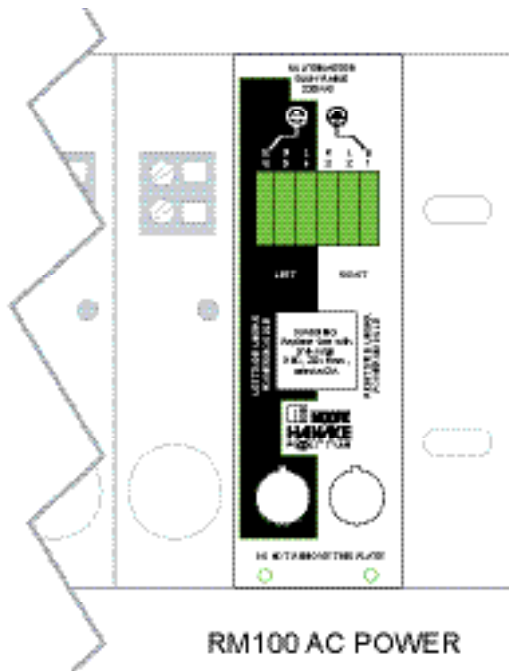
The user and installer should take the performance of materials listed above into account with regard to possible attack by aggressive substances in any specific installation.

## Terminal Designations



DC Regulator Card Alarm RM103B	
Terminal	Function
1	Volt-free Contact Closure
2	Volt-free Contact Closure

Trunk Isolator Module RM102B	
Terminal	Function
1	TRUNK 1 Screen/Shield
2	TRUNK 1 Negative -
3	TRUNK 1 Positive +
4	TRUNK 2 Screen/Shield
5	TRUNK 2 Negative -
6	TRUNK 2 Positive +
7	SEGMENT Screen/Shield
8	SEGMENT Negative -
9	SEGMENT Positive +



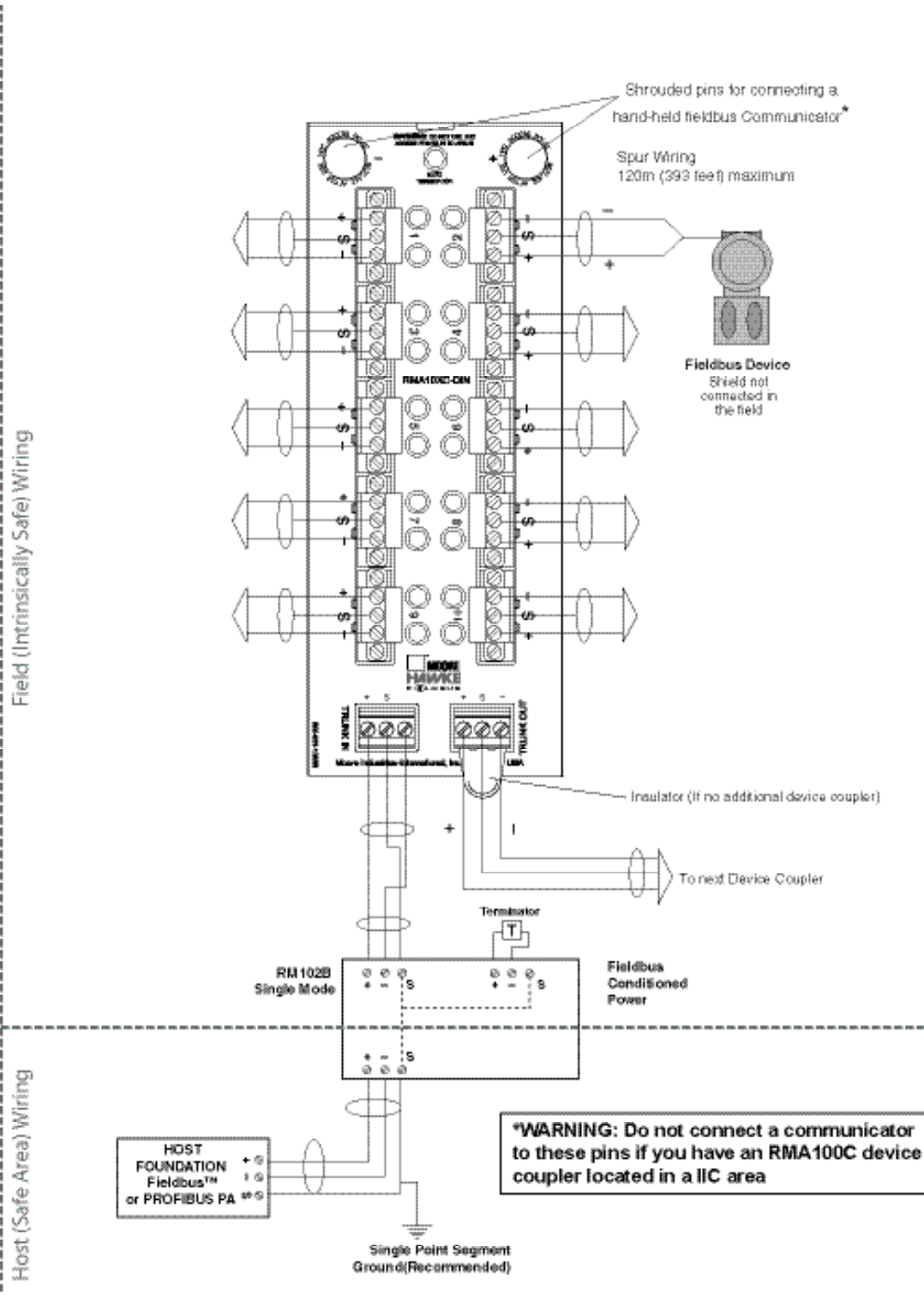
AC Power Connections	
Terminal	Function
1	Circuit 1 Earth/Ground
2	Circuit 1 Live / Hot
3	Circuit 1 Neutral / Common
4	Circuit 2 Live / Hot
5	Circuit 2 Neutral / Common
6	Circuit 2 Earth/Ground

1. Remove protective cover to access terminals.
2. Circuit 1 (Right Side) powers the DC regulator card (RM103B) in the slot next to the RM101B. Circuit 2 (Left Side) powers the RM103B in the furthest slot to left. If using only one AC feed with 2 DC regulator cards the circuits need to be linked together.
3. Warning: protective cover must be replaced after wiring and before applying power.

# RM100

ROUTE-MASTER™ Fieldbus System  
(Intrinsically-Safe Installations)

Figure 11. Single Trunk Hook-Up (RMA10XC shown as an example)

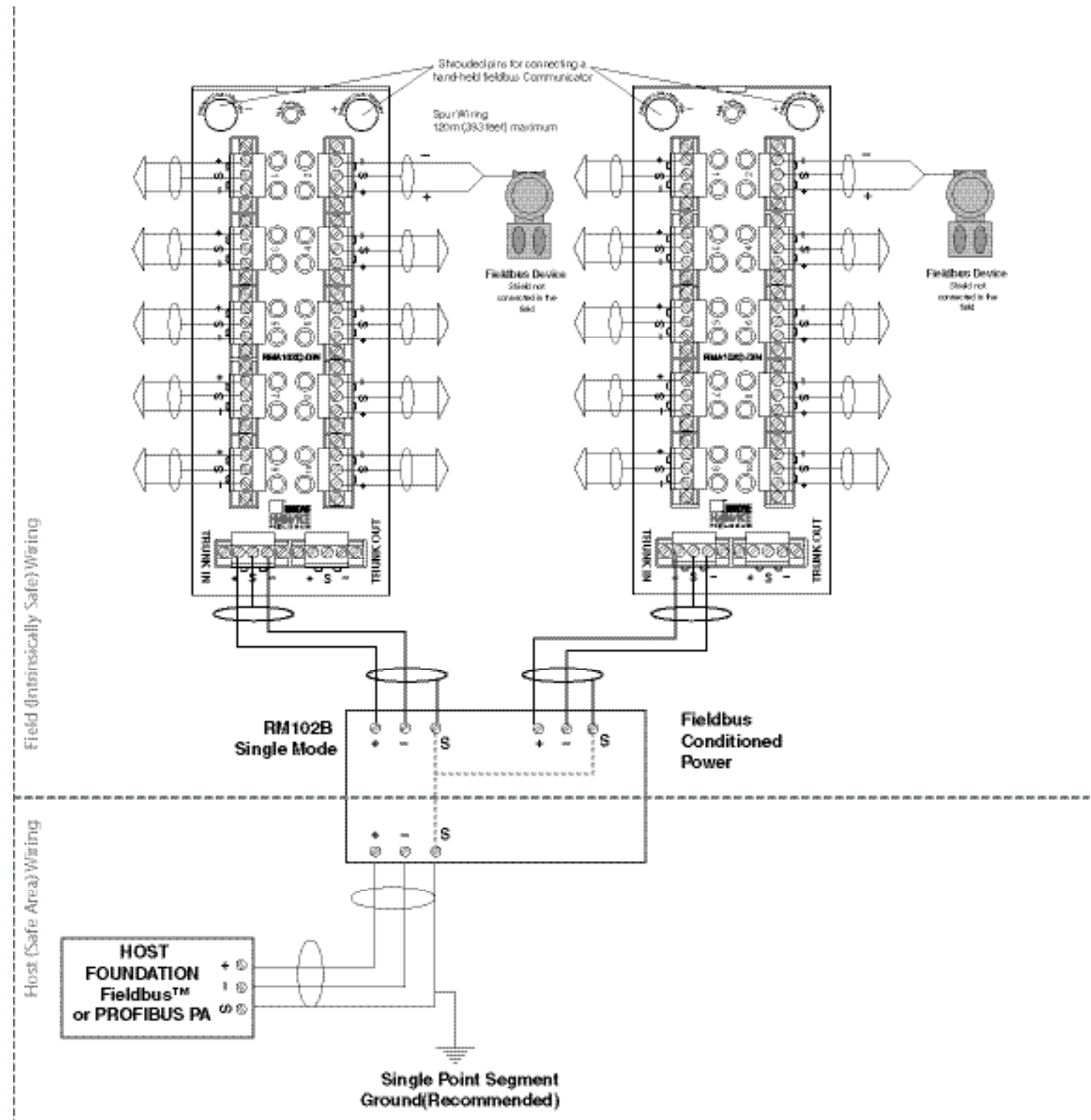




# RM100

ROUTE-MASTER™ Fieldbus System  
(Intrinsically-Safe Installations)

Figure 12. Dual Trunk Hook-Up (RMA10X shown as an example)



# RM100

**ROUTE-MASTER™** Fieldbus System  
(Intrinsically-Safe Installations)

## Commissioning

**Note:**

*Use I.S. test equipment for all testing in the hazardous area, unless the plant is known to be non-hazardous.*

1. Ensure AC power to RM100 Rack is OFF, TRUNK(s) are NOT connected to Isolators or Device Couplers.
2. Connect AC power to RM100 Rack, verify that each RM102B has 18.65V ±0.1V at the output terminals.
3. Connect TRUNK wiring to RM102B units as required. If both trunks are not being used, ensure that a terminator is applied to this Host end of the segment. This may be accomplished by wiring a TRK-Term to the unused TRUNK output. Alternately a Terminator may be enabled in Host H1 card, or if a safe side power conditioning supply is required (i.e. RM110 with DeltaV) the terminator may be switched “on” for this segment on the RM110. Ensure that only one terminator is applied at this end of the segment.
4. In the field, start with the first device coupler connected to the TRUNK IN cable and disconnect any devices and TRUNK OUT connections. Measure the voltage across TRUNK IN. Pass if voltage levels >11V.

Then measure the voltage across TRUNK OUT. Pass if voltage levels >10.5V.

5. Connect devices to device coupler spurs and ensure that all spur LEDs are green.

6. If there is more than one device coupler per trunk, connect the next device coupler in series, (TRUNK OUT to TRUNK IN) and repeat steps 4&5.

## Troubleshooting

For Troubleshooting tips, refer to Table 1, below.

### Hand-Held Communicator

Where fitted, test points are available under plastic caps for use with Hand-Held Communicators (HHCs). To use a fieldbus-compatible HHC, unclip the plastic caps (automatically retained) and connect the HHC probes to the exposed test points. Operate the HHC as normal. The plastic caps must be replaced after use.

**WARNING:**

*Do not connect a communicator to these pins if you have an RMA100C device coupler located in a IIC area.*

**Table 1.** Troubleshooting Guide

If	Then
No communications with any devices on any segment	Check AC input fuses - replace if required. Verify AC supply within limits (115Vac, ±10%, 230Vac ±10%).
No communications with any devices on one segment While other segments functional	Check HOST cable connection to RM102B. Check Connections with H1 Host Check Voltage is > 10 volts on H1 input terminals on isolator cards if RM110 is connected Verify RM102B open-circuit voltage >18.5V (field side) Check RM102B internal fuse (scrape varnish to make contact). Check TRUNK cable and connections. Verify open-circuit voltage available at field SPUR connection >8.5V Verify segment loading is within limits.
RM109B DC Regulator Card LED OFF	Check AC input fuses - replace if required. (NOTE that for 2x DC Regulator Cards with 1x AC power feed, AC power needs to be linked between AC input terminals for both DC Cards to operate).
Red LED ON RMA100/RMA100C	Check SPUR wiring for short-circuit Verify that DEVICE is operational (by moving to another spur).
Intermittent communication within a single segment	Verify that the correct number of terminators are activated, with one at each end of the segment. Verify segment loading is within limits. Verify open-circuit voltage available at field SPUR connection >8.5V. Check all TRUNK cable and SPUR connections for damage or water entry at equipment.

## Recommended Ground Wiring Practices

Moore Industries recommends the following ground wiring practices:

- Any MooreHawke product in a metal case or housing should be grounded.
- The protective earth conductor must be connected to a system safety earth ground before making any other connections.
- All input signals to, and output signals from, MooreHawke's products should be wired using a shielded, twisted pair technique. Shields are to be connected to the S terminal associated with each spur and Trunk. Class A single point grounding is recommended and the ground should be at the Fieldbus Power Conditioner. The shield at the device should not be grounded.
- The maximum length of unshielded input and output signal wiring should be 2 inches.

Fieldbus cable shields for spurs and trunks are gathered together in the device coupler and then carrier through to the next coupler.

## CE Conformity

Installation of any Moore Industries' products that carry CE certification (Commission Electrotechnique) **must** adhere to the guidelines in *Recommended Ground Wiring Practices* in order to meet the requirements set forth in applicable EMC (Electromagnetic Compatibility) directives.

## ATEX and FM Installation Drawings

This following pages contain installation diagrams for the RM100 and RMA100/RMA100C series. These diagrams must be used to augment the installation instructions earlier in this manual for units that are to operate per ATEX and FM requirements.

## Operation

Once configured, installed and supplied with the correct power, ROUTE-MASTER Device Couplers begin to operate immediately. Depending upon environmental conditions, they can be expected to operate unattended for extended periods of time.

## Maintenance

Moore Industries suggests a quick check for terminal tightness and general unit condition every 6-8 months. Always adhere to any site requirements for programmed maintenance.

ROUTE-MASTER Device Couplers contains no user serviceable parts. Non-functioning units should be returned to Moore Industries for replacement or repair.

### **Note:**

*When returning non-functioning units only the DIN-Rail mounted electronics should be returned when being repaired or replaced.*

Device Coupler enclosures have weatherproof seals; these should be periodically inspected to verify correct operation. Any significant water entry should be investigated and corrected in order to prevent malfunction.

In high humidity environments, it may be appropriate to have enclosure breathers fitted so that internal condensation does not lead to equipment malfunction. These are available from MooreHawke distributors worldwide.

## Customer Support

If service assistance is ever required for an device in your application, refer to the back cover of this manual for the telephone numbers to Moore Industries' customer service department.

If possible, make a note of the model number of the unit before calling. For fastest assistance, have the following information available: serial number, the job number and purchase order number under which it was shipped.

# RM100

ROUTE-MASTER™ Fieldbus System  
(Intrinsically-Safe Installations)

<b>DO NOT SCALE DRAWING</b> <small>TOLERANCES (UNLESS NOTED)</small> <small>DECIMALS - inches/mm</small> <small>.X - .1 / .254</small> <small>.XX - .01 / .025</small> <small>.XXX - .005 / .125</small> <small>ANGLES - ±1/2°</small>		<small>DRAWN</small> C. Whan	<small>DATE</small> 1/06	<b>CONTROL DRAWING</b> RMA100/RMA100C I.S. INSTALLATION DIAGRAM, ATEX	<small>REVISION</small> B
		<small>CHECKED</small> CAM	<small>DATE</small> 10/09		<small>BY</small> CW
<b>MOORE INDUSTRIES</b>		DRAWING NUMBER <b>RMA100-001 SHEET 1 OF 3</b>		REVISION <b>B</b>	
NON-HAZARDOUS AREA ZONES 0, 1 and 2 GAS GROUP IIA/IB		HAZARDOUS AREA ZONES 0, 1 and 2 GAS GROUP IIA/IB		REVISOR ECO 15591	
SCALE NONE		CATEGORY CONTROL DRAWING		DATE 10/09	
WHERE ENGLISH IS NOT A LANGUAGE OF THE COUNTRY IN WHICH THE EQUIPMENT IS BEING USED, PLEASE APPLY TO MooreHawke FOR A SUITABLE TRANSLATION.		TITLE RMA100/RMA100C I.S. INSTALLATION DIAGRAM, ATEX		BY CW	
NOT REPRODUCED OR DISCLOSED TO ANY THIRD PARTY WITHOUT THE WRITTEN CONSENT OF AN AUTHORIZED OFFICER OF MIL.		NOTICE RE PROPRIETARY INFORMATION: This drawing and the information contained herein are the proprietary property of Moore Industries International, Inc. (MII) and should not be reproduced or disclosed to any third party without the written consent of an authorized officer of MII.		APPROVAL 	

**II (1)G [EEx Ib] IIB**  
(T<sub>a</sub> - 20°C to 60°C)  
SIRA 00ATEX2090X  
0518

**RM102B**  
TRUNK ISOLATOR  
MODULE

HOST CONNECTION (TYPICAL)

PARALLEL TRUNK OUTPUT (OPTIONAL)

RM100 SERIES  
FIELDBUS POWER SUPPLY

**II 1G**  
**EEx ia IIB T4**  
**EEx [ia] IIC**  
(T<sub>a</sub> - 40°C to 70°C)  
SIRA 00ATEX2090X

**RMA100-DIN**

TRUNK IN CONNECTION

TRUNK OUT CONNECTION

SPURS

CABLE A Ex i

CABLE B

**EEx i**

**FIELDBUS DEVICE**

ENCLOSURE  
IP54 MINIMUM FOR GAS HAZARDS

**HAZARDOUS AREA**  
ZONES 0, 1 and 2  
GAS GROUP IIA/IB

**EEx ia IIB TRUNK CONNECTIONS**  
 U<sub>o</sub> = 18.9V  
 I<sub>o</sub> = 830.04mA  
 P<sub>o</sub> = 3.93W  
 C<sub>o</sub> = 1.6uF (IIB) 6.39uF (IIA)  
 L<sub>o</sub> = 0.206mH (IIB) 0.412mH (IIA)

**NON-HAZARDOUS AREA**  
ZONES 0, 1 and 2  
GAS GROUP IIA/IB

**EEx ia IIC SPUR CONNECTIONS (ENTITY)**  
 U<sub>o</sub> = 18.9V  
 I<sub>o</sub> = 249.9mA  
 P<sub>o</sub> = 1.181W  
 C<sub>o</sub> = 262nF (IIC) 1.6uF (IIB) 6.39uF (IIA)  
 L<sub>o</sub> = 0.150mH (IIC) 0.206mH (IIB) 0.412mH (IIA)  
 LoRo = 30uH/ohm (IIC) 36uH/ohm (IIB)  
 72uH/ohm (IIA)

Capacitance limit is per spur cable and per trunk cable (independently assessed).  
 Inductance limit is for total cable (spurs plus trunk).  
 Lo/Ro is the total maximum allowable inductance to maximum resistance (per trunk plus spur).  
 The Lo/Ro values are appropriate for Hazardous Location Apparatus with the following permitted values of Li and Ci.  
 The values vary depending upon the group of the hazardous location:  
 Group IIC Li = 0, Ci = 2.62 nF  
 Group IIB Li = 0, Ci = 16 nF  
 Group IIA Li = 0, Ci = 63.9 nF

ZONES 0, 1 and 2  
GAS GROUP IIA/IB/IIC

DEVICE ENTITY PARAMETERS MUST NOT BE EXCEEDED.  
 DEVICE MAY BE LOCATED IN GAS GROUP IIC IF SUITABLY APPROVED.

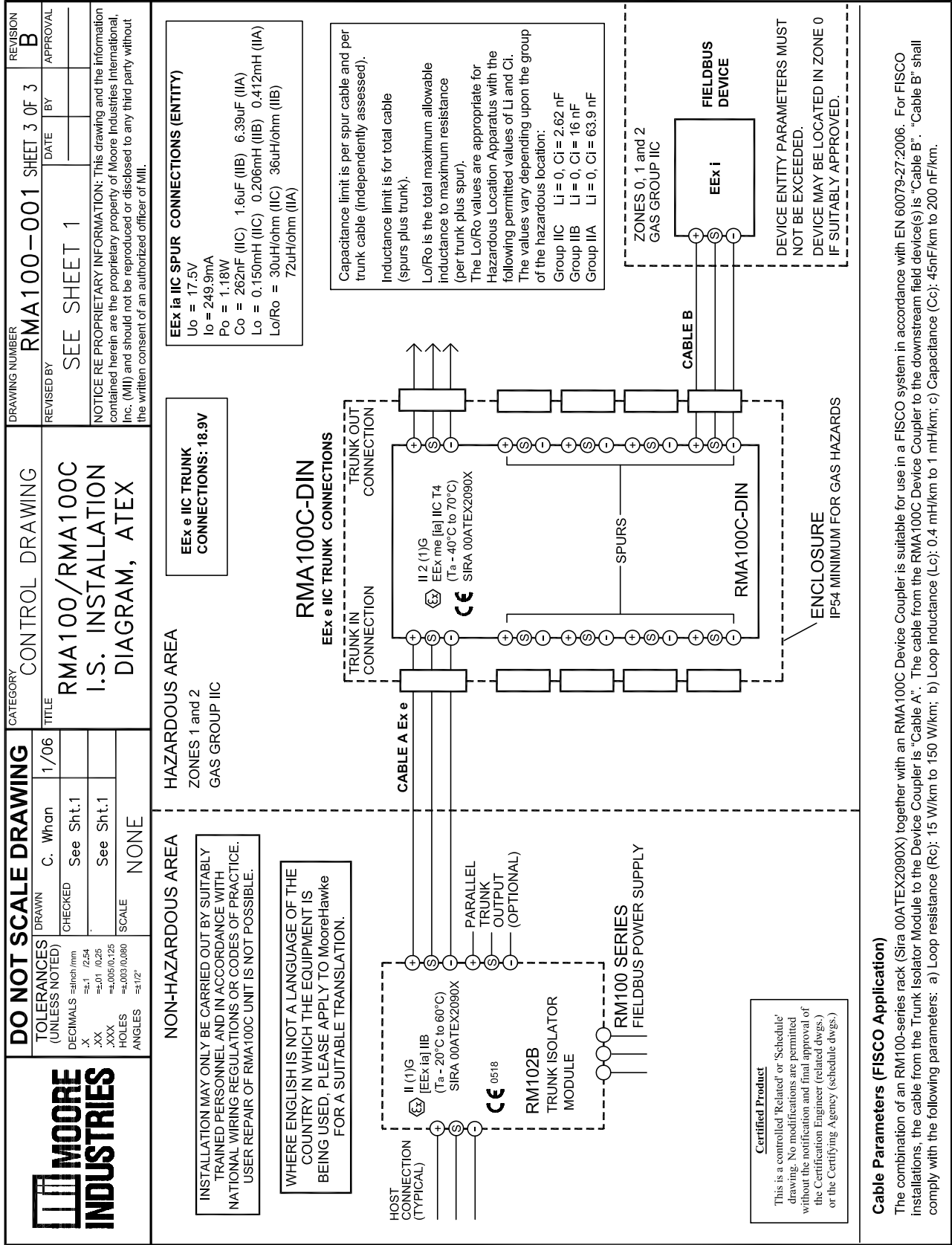
**Certified Product**  
 This is a controlled 'Related' or 'Schedule' drawing. No modifications are permitted without the notification and final approval of the Certification Engineer (related dwgs.) or the Certifying Agency (schedule dwgs.)

INSTALLATION MAY ONLY BE CARRIED OUT BY SUITABLY TRAINED PERSONNEL AND IN ACCORDANCE WITH NATIONAL WIRING REGULATIONS OR CODES OF PRACTICE. USER REPAIR OF RMA100 UNIT IS NOT POSSIBLE.

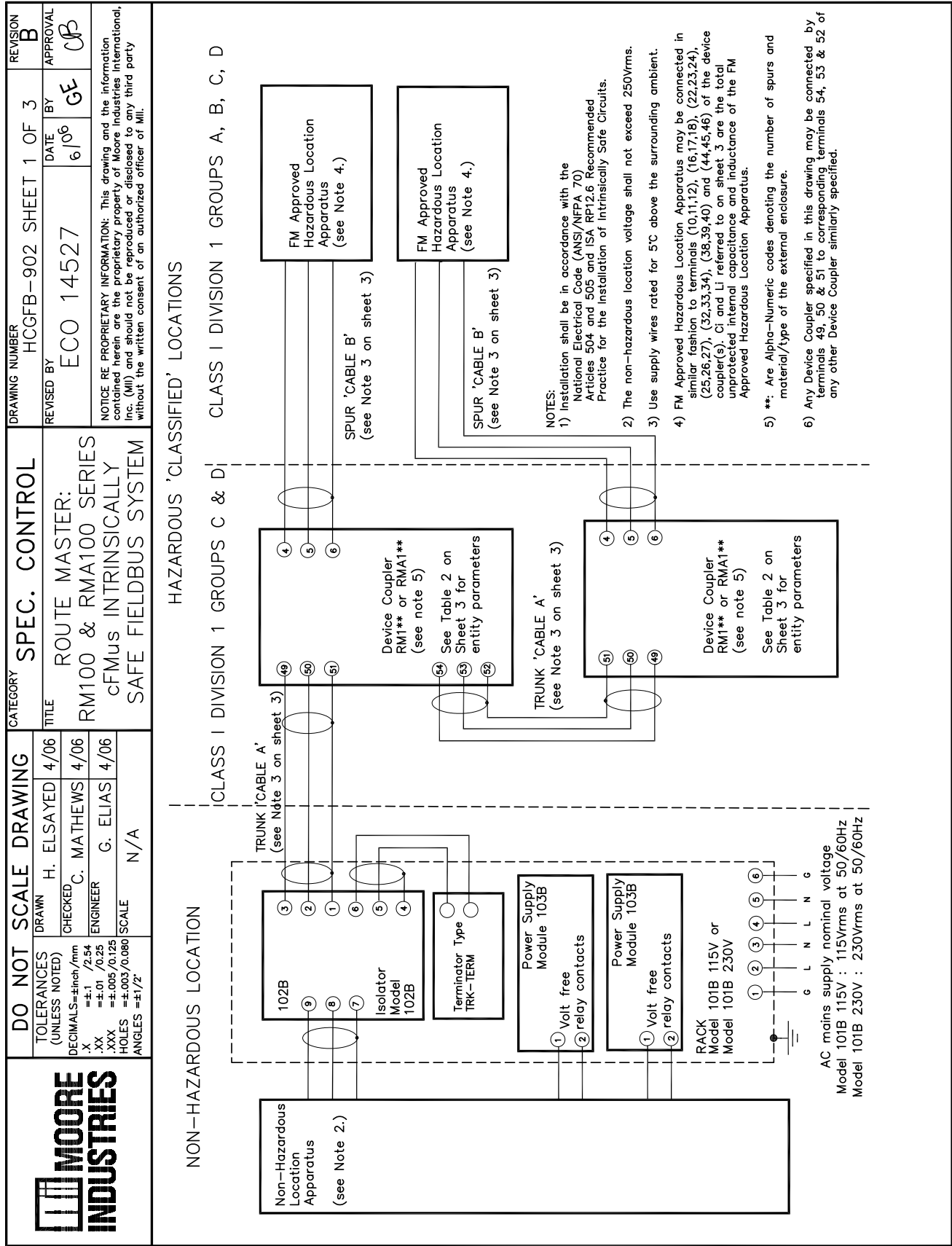


# RM100

ROUTE-MASTER™ Fieldbus System  
(Intrinsically-Safe Installations)

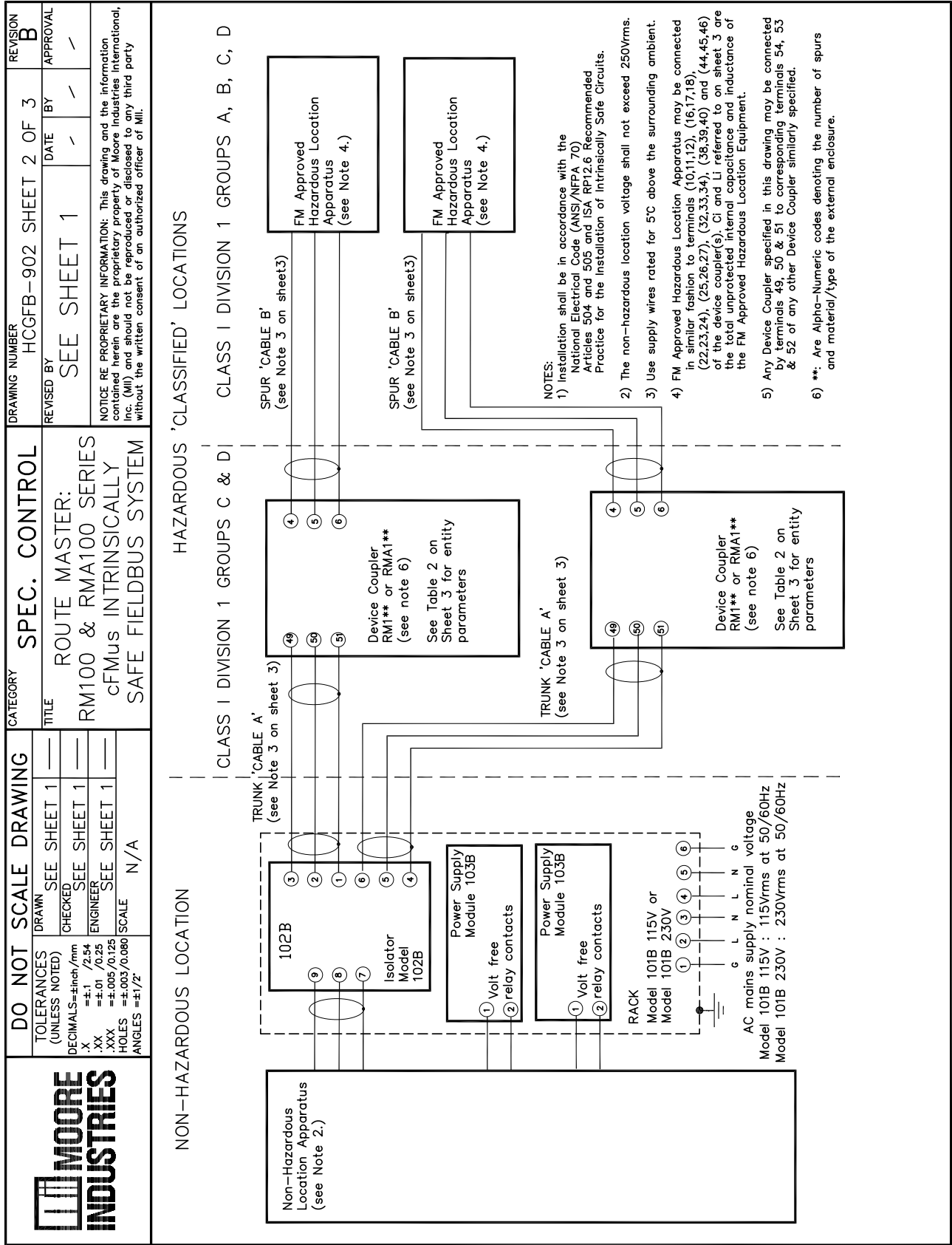







# RM100

ROUTE-MASTER™ Fieldbus System  
(Intrinsically-Safe Installations)



	DO NOT SCALE DRAWING		CATEGORY		DRAWING NUMBER		REVISION	
	TOLERANCES (UNLESS NOTED)	DRAWN	SEE SHEET 1	SPEC. CONTROL		HCGFB-902 SHEET 3 OF 3		B
DECIMALS= $\frac{\text{inch}}{\text{mm}}$	CHECKED	SEE SHEET 1	TITLE		REVISED BY		DATE	
X $\pm 1 / 254$	ENGINEER	SEE SHEET 1	ROUTE MASTER:		SEE SHEET 1		BY	
XX $\pm 0.01 / 0.25$			RM100 & RMA100 SERIES				APPROVAL	
XXX $\pm 0.005 / 0.125$			cFMus INTRINSICALLY				-	
Holes $\pm 0.003 / 0.080$			SAFE FIELDBUS SYSTEM				-	
ANGLES $\pm 1/2^\circ$	SCALE							

NOTICE: RE PROPRIETARY INFORMATION: This drawing and the information contained herein are the proprietary property of Moore Industries International, Inc. (MII) and should not be reproduced or disclosed to any third party without the written consent of an authorized official of MII.

## Entity Parameters

Table 1

LINEAR POWER SUPPLY MODULE	
103B CN3 CONNECTIONS 1 AND 2	
PARAMETER	RATING
Um	250 V rms

Table 2

DEVICE COUPLER RM114, RM118, RM118DIN, RM124 AND RM128 OUTPUT PARAMETERS: TERMINALS 4, 5 AND 6 AND ALL OTHERS MARKED 'DEVICE'	
PARAMETER	VALUE
Voc	18.9 V
Isc	249.3 mA
Pmax	1.15 W
Ca	See Table 5
La	See Table 3 or 4
DEVICE COUPLER RMA100 OUTPUT PARAMETERS	
PARAMETER	VALUE
Voc	18.9 V
Isc	249.81 mA
Pmax	1.18 W
Ca	See Table 5
La	See Table 3 or 4

Table 3

Total maximum allowable Inductance 'La'	
Cable A Group	Cable B Group
CL I DIV 1 GROUP C, D	CL I DIV 1 GROUP A, B, C, D
CL I DIV 1 GROUP C, D	CL I DIV 1 GROUP C, D
CL I DIV 1 GROUP C, D	CL I DIV 1 GROUP D
CL I DIV 1 GROUP D	CL I DIV 1 GROUP A, B, C, D
CL I DIV 1 GROUP D	CL I DIV 1 GROUP C, D
CL I DIV 1 GROUP D	CL I DIV 1 GROUP D
	La (mH)
	0.15
	0.206
	0.206
	0.15
	0.412
	0.412

Table 4

Maximum Inductance to Resistance Ratio 'Lo/Ro'	
Cable A Group	Cable B Group
CL I DIV 1 GROUP C, D	CL I DIV 1 GROUP A, B, C, D
CL I DIV 1 GROUP C, D	CL I DIV 1 GROUP C, D
CL I DIV 1 GROUP C, D	CL I DIV 1 GROUP D
CL I DIV 1 GROUP D	CL I DIV 1 GROUP A, B, C, D
CL I DIV 1 GROUP D	CL I DIV 1 GROUP C, D
CL I DIV 1 GROUP D	CL I DIV 1 GROUP D
	Lo/Ro ( $\mu\text{H}/\text{ohms}$ )
	30
	36
	36
	30
	72
	72

Table 5

Maximum Allowable Capacitance	
Group	Capacitance of Cable A
CL I DIV 1 GROUP A, B, C, D	Ca (see sheets 1 & 2 note 4)
CL I DIV 1 GROUP C, D	262 nF
CL I DIV 1 GROUP D	1.6 $\mu\text{F}$
CL I DIV 1 GROUP D	6.39 $\mu\text{F}$

### NOTES:

- For interconnection of apparatus using the Entity Concept, use the appropriate parameters to ensure the following:  
 $V_{oc} \leq V_{max}$   
 $I_{sc} \leq I_{max}$   
 $C_1 + C_{\text{CableB}} \leq C_0$  & either  $[L_1 + L_{\text{Cable(A+B)}} \leq L_d]$  or  $[L/R_{\text{Cable}} \leq L_0/R_{\text{Cable}}]$
- Note 1 applies to each connected device via terminals 4, 5 & 6, 10, 11 & 12, 16, 17 & 18, 22, 23 & 24, 25, 26 & 27, 32, 33 & 34, 38, 39 & 40, 44, 45 & 46.
- The cable from Isolator to Device Coupler is "Cable A". The Cable from Device Coupler to Device is "Cable B". See Sheets 1 and 2 for cables A and B.
- The maximum capacitance of cable A shall not exceed the value in Table 5. The maximum capacitance of Cable B plus the  $C_i$  of the FM Approved Apparatus shall not exceed the value  $C_a$  in Table 5. The sum of the inductances of cable A and cable B plus the  $L_i$  of FM Approved apparatus shall not exceed the  $L_a$  value in Table 3. The maximum inductance to resistance ratio  $L_0/R_0$  in Table 4 applies to each cable.

### WARNING:

Substitution of components is not allowed as it may impair the system's Intrinsically Safe and/or Non-Incendive circuit. To prevent ignition of flammable or combustible atmospheres, disconnect power before servicing. Also, read, understand and adhere to the manufacturer's live maintenance procedures.

### Certified Product

This is a controlled 'Related' or 'Schedule' drawing. No modifications are permitted without the notification and final approval of the Certification Engineer (related dwgs.) or the Certifying Agency (schedule dwgs.)

# RM100

**ROUTE-MASTER™** Fieldbus System  
(Intrinsically-Safe Installations)

---

## Appendix A: Interfacing with Emerson Series 2 DeltaV

### Introduction

The Series 2 H1 Card for DeltaV requires conditioned power to operate, and while the RM100 Isolators provide power for the Hazardous side of the segment, no power is supplied to the safe side of the segment. Accordingly, an external fieldbus power supply is required on the safe-area side of each of the fieldbus segments.

Powering the safe side of each segment can be accomplished in several ways:

1. Addition of RM110 PowerTray (Recommended) as shown in Figure A-1.
2. Addition of single segment isolated fieldbus power conditioners as shown in Figure A-2.

### Series-2 with RM110 Power Tray

The RM110 can drive up to eight H1 safe-area segments with up to 30mA (each) of isolated, redundant fieldbus-conditioned power. The RM110 requires connection to a standard back-of-panel 24Vdc supply.

### Installation

The RM110 PowerTray is typically installed above the 19-inch ROUTE-MASTER Power Conditioner Rack (RM100) in a field cabinet. Brackets are supplied with the RM110 to mount the PowerTray to the top of the RM100 rack. In circumstances where no space is available immediately above the RM100 Rack, the RM110 can be installed up to 30m (98ft) from the RM100 rack, and an additional 120m (394ft) from the fieldbus H1 interface card. The RM110 provides a switchable terminator at each segment connection.

When the RM100 Fieldbus System is used in dual trunk mode, the section between the HOST and the RM110 PowerTray should not exceed 30m (98ft), and the local terminator should be turned OFF.

It is recommended that suitable trunking be used to maintain segregation of all wiring from I.S. isolator

output wiring. Typically, safe-area wiring and rack power supplies should occupy opposite trunking channels from intrinsically-safe wiring as shown in Figure 1A.

### Wiring Connections

All wiring is via screw-clamp terminals mounted on the front of the RM110 PowerTray. Cables should be stripped to expose no more than 8mm (0.38 in) of conductor and inserted fully into the terminal opening. Bootlace ferrules are recommended for use with stranded cable.

**Note:**

*Fieldbus systems and devices may not be polarity-sensitive, but consistent polarity connections are good practice.*

DO NOT connect any shield terminal (trunk or spur wiring) to the external ground connection.

### Commissioning with RM110

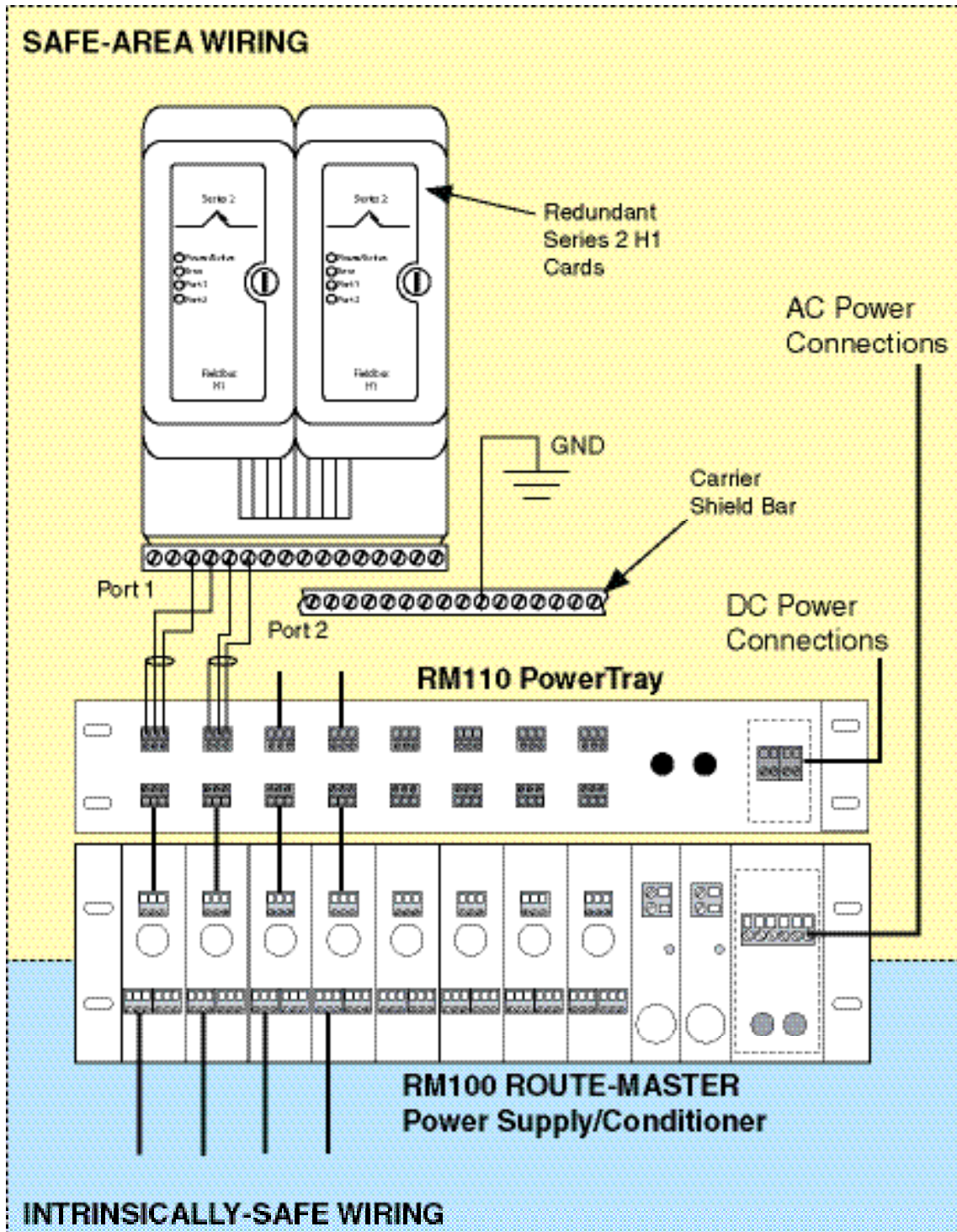
A Green LED should be ON for each 24Vdc power input connected to the RM110 PowerTray.

Measure individual segment output terminals (either top or bottom). Voltage between (+) and (-) should be at least 20Vdc.

Fieldbus segments require terminators for correct operation. Generally, a terminator is connected at the local segment termination point (back-of-panel) and another at the extreme (field) end of the segment. Typically, the field terminator is provided by a MooreHawke device coupler. Local termination for the segment may be provided via a switch on the RM110, accessible through a slot on the front panel, if required.

If the trunk is used in single trunk mode then the terminator at the RM110 should be ON. If the trunk is used in dual trunk mode then the terminator at the RM110 should be OFF. Dual trunk operation requires two MooreHawke device couplers in the field, both with active terminators, and will result in segment over-termination if combined with local termination at the RM110.

Figure A-1. RM110 Power Tray Combined with the ROUTE-MASTER RM100 Feildbus Power Supply/Conditioner.





# RM100

**ROUTE-MASTER™** Fieldbus System  
(Intrinsically-Safe Installations)

---

Table A-1. Troubleshooting Guide

If	Then
<b>GREEN LED is OFF for either 24Vdc power input</b>	Check polarity of DC power cable (unit is reverse polarity protected)
	Check that fuse is intact
	Check that DC power supply is operational
If	Then
<b>Supply FUSE is blown</b>	Disconnect that individual 24Vdc power supply cable Replace the fuse (500mA, 5x20mm, glass or ceramic).
	If fuse blows immediatly, return entire PowerTray to MooreHawke.

## RM110 PowerTray Grounding Procedure

The RM110 has an external ground stud (as marked) and should be connected to a local power ground rail immediatly upon installation.

Fieldbus segment wiring should be completed using shielded, twisted pair cable. Shields associated with segment cables should be connected to the RM110 terminals. The RM110 maintains shield continuity between input and output, but does not provide a shield ground connection. The installer should choose a suitable single-point ground for the segment shield. For best noise rejection, there should be no other direct ground connection to that shield.

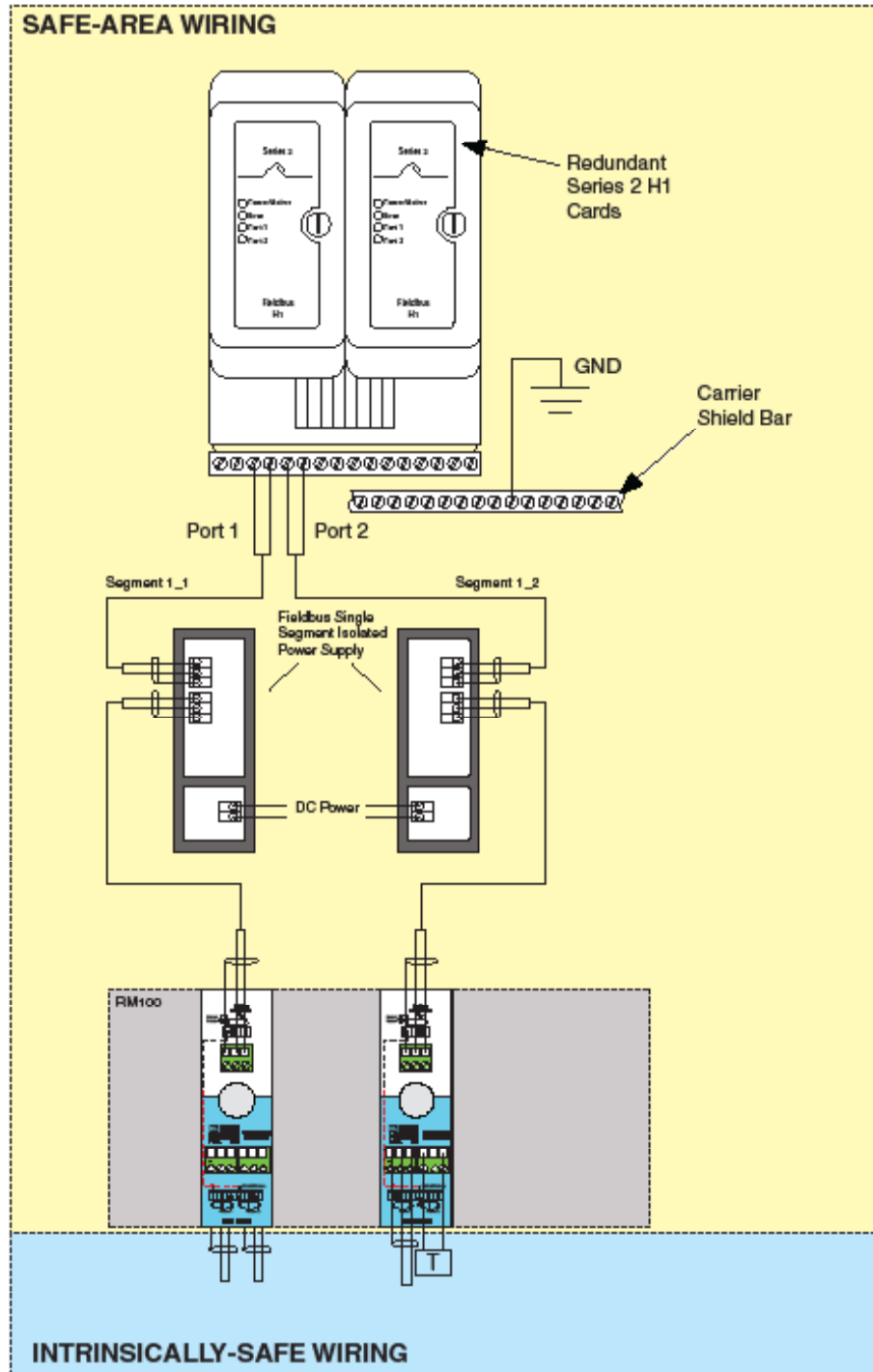


## Series-2 with Single Segment Isolated Power conditioners

As shown in Figure A-2, DC power must be brought to each FPS (Fieldbus Power Conditioner). There will be separate terminals for conditioned outputs for

DeltaV and the RM102B. Ensure that correct polarity is maintained.

Figure A-2. RM110 Power Tray Combined with the ROUTE-MASTER RM100 Fieldbus Power Supply/Conditioner.



# RM100

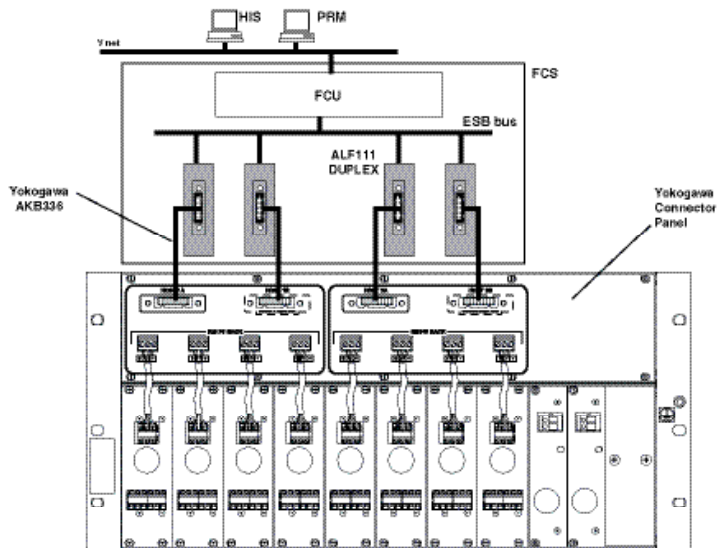
ROUTE-MASTER™ Fieldbus System  
(Intrinsically-Safe Installations)

## Appendix B: Yokogawa Connector Panel

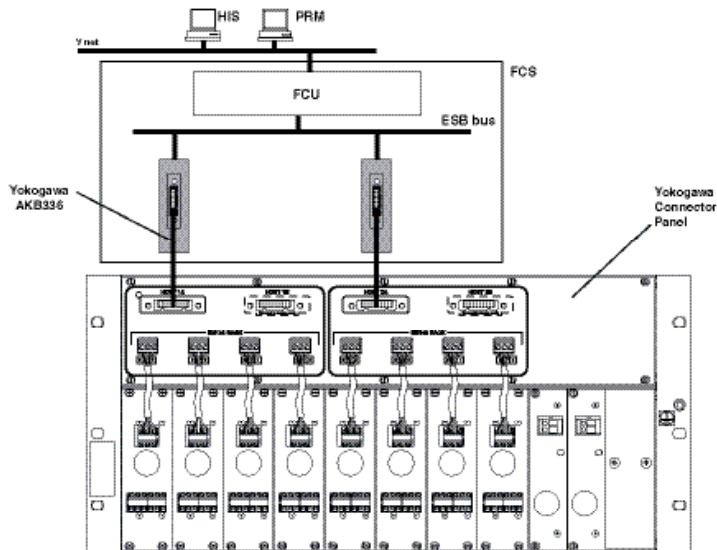
The Yokogawa connector panel can be ordered with the RM100 as an option. It allows plug-in connection from H1 cards directly to the RM100 using ALF111 cables.

Figure A-3. Yokogawa Connector Panel with RM100

### DUPLEX CONFIGURATION



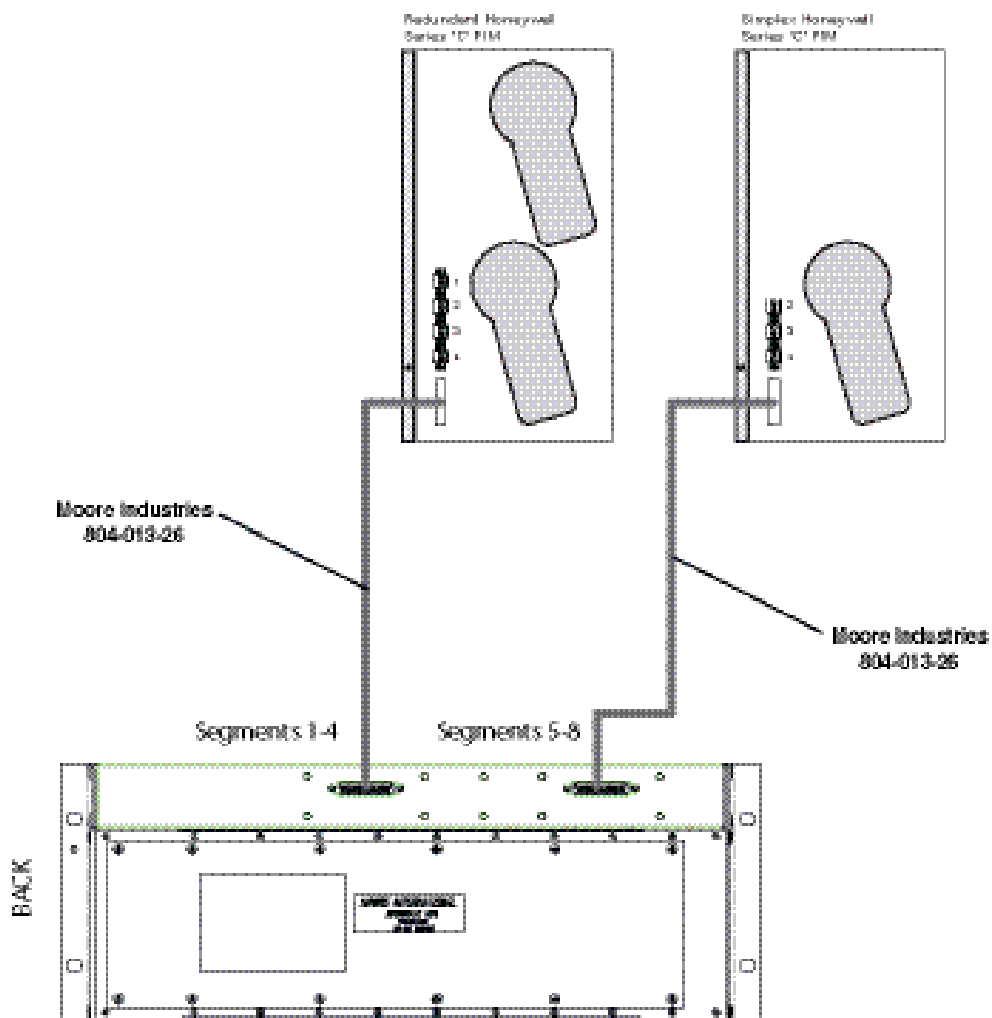
### SIMPLEX CONFIGURATION



## Appendix C: Honeywell Connector Panel

The Honeywell connector panel can be ordered with the RM100 as an option. It allows plug-in connection from Honeywell Series “C” FIM directly to the RM100 using Moore Industries 804-013-26 cable(s).

Figure A-4. Honeywell Connector Panel with RM100



# RETURN PROCEDURES

To return equipment to Moore Industries for repair, follow these four steps:

1. Call Moore Industries and request a Returned Material Authorization (RMA) number.

## Warranty Repair –

If you are unsure if your unit is still under warranty, we can use the unit's serial number to verify the warranty status for you over the phone. Be sure to include the RMA number on all documentation.

## Non-Warranty Repair –

If your unit is out of warranty, be prepared to give us a Purchase Order number when you call. In most cases, we will be able to quote you the repair costs at that time. The repair price you are quoted will be a "Not To Exceed" price, which means that the actual repair costs may be less than the quote. Be sure to include the RMA number on all documentation.

2. Provide us with the following documentation:
  - a) A note listing the symptoms that indicate the unit needs repair
  - b) Complete shipping information for return of the equipment after repair
  - c) The name and phone number of the person to contact if questions arise at the factory
3. Use sufficient packing material and carefully pack the equipment in a sturdy shipping container.
4. Ship the equipment to the Moore Industries location nearest you.

The returned equipment will be inspected and tested at the factory. A Moore Industries representative will contact the person designated on your documentation if more informal is needed. The repaired equipment, or its replacement, will be returned to you in accordance with the shipping instructions furnished in your documentation.

### WARRANTY DISCLAIMER

THE COMPANY MAKES NO EXPRESS, IMPLIED OR STATUTORY WARRANTIES (INCLUDING ANY WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE) WITH RESPECT TO ANY GOODS OR SERVICES SOLD BY THE COMPANY. THE COMPANY DISCLAIMS ALL WARRANTIES ARISING FROM ANY COURSE OF DEALING OR TRADE USAGE, AND ANY BUYER OF GOODS OR SERVICES FROM THE COMPANY ACKNOWLEDGES THAT THERE ARE NO WARRANTIES IMPLIED BY CUSTOM OR USAGE IN THE TRADE OF THE BUYER AND OF THE COMPANY, AND THAT ANY PRIOR DEALINGS OF THE BUYER WITH THE COMPANY DO NOT IMPLY THAT THE COMPANY WARRANTS THE GOODS OR SERVICES IN ANY WAY.

ANY BUYER OF GOODS OR SERVICES FROM THE COMPANY AGREES WITH THE COMPANY THAT THE SOLE AND EXCLUSIVE REMEDIES FOR BREACH OF ANY WARRANTY CONCERNING THE GOODS OR SERVICES SHALL BE FOR THE COMPANY, AT ITS OPTION, TO REPAIR OR REPLACE THE GOODS OR SERVICES OR REFUND THE PURCHASE PRICE. THE COMPANY SHALL IN NO EVENT BE LIABLE FOR ANY CONSEQUENTIAL OR INCIDENTAL DAMAGES EVEN IF THE COMPANY FAILS IN ANY ATTEMPT TO REMEDY DEFECTS IN THE GOODS OR SERVICES, BUT IN SUCH CASE THE BUYER SHALL BE ENTITLED TO NO MORE THAN A REFUND OF ALL MONIES PAID TO THE COMPANY BY THE BUYER FOR PURCHASE OF THE GOODS OR SERVICES.

ANY CAUSE OF ACTION FOR BREACH OF ANY WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE SHALL BE BARRED UNLESS THE COMPANY RECEIVES FROM THE BUYER A WRITTEN NOTICE OF THE ALL DEFECT OR BREACH WITHIN TEN DAYS FROM THE EARLIEST DATE ON WHICH THE BUYER COULD REASONABLY HAVE DISCOVERED THE ALLEGED DEFECT OR BREACH, AND NO ACTION FOR THE BREACH OF ANY WARRANTY SHALL BE COMMENCED BY THE BUYER ANY LATER THAN TWELVE MONTHS FROM THE EARLIEST DATE ON WHICH THE BUYER COULD REASONABLY HAVE DISCOVERED THE ALLEGED DEFECT OR BREACH.

### RETURN POLICY

For a period of thirty-six (36) months from the date of shipment, and under normal conditions of use and service, Moore Industries ("The Company") will at its option replace, repair or refund the purchase price for any of its manufactured products found, upon return to the Company (transportation charges prepaid and otherwise in accordance with the return procedures established by The Company), to be defective in material or workmanship. This policy extends to the original Buyer only and not to Buyer's customers or the users of Buyer's products, unless Buyer is an engineering contractor in which case the policy shall extend to Buyer's immediate customer only. This policy shall not apply if the product has been subject to alteration, misuse, accident, neglect or improper application, installation, or operation. THE COMPANY SHALL IN NO EVENT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES.



United States • info@miinet.com  
Tel: (818) 894-7111 • FAX: (818) 891-2816  
Australia • sales@mooreind.com.au  
Tel: (02) 8536-7200 • FAX: (02) 9525-7296

*Demand Moore Reliability*

[www.miinet.com](http://www.miinet.com)

BeNeLux • info@mooreind.eu  
Tel: 03/448.10.18 • FAX: 03/440.17.97

China • sales@mooreind.sh.cn  
Tel: 86-21-62491499 • FAX: 86-21-62490635  
United Kingdom • sales@mooreind.com  
Tel: 01293 514488 • FAX: 01293 536852