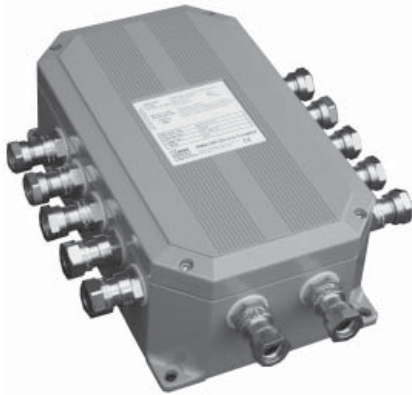
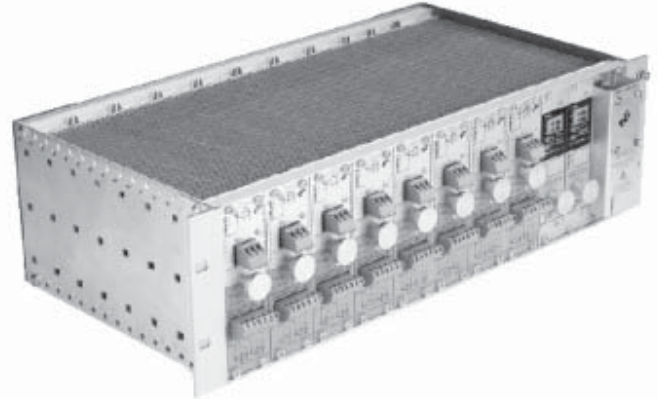


November 2008



*ROUTE-MASTER Fieldbus Device Couplers (RMA100) are available in field-mount enclosures complete with cable glands (aluminum enclosure shown), or as DIN-rail mount units.*



*ROUTE-MASTER uses a space-efficient rack-mount design to provide redundant power to up to eight intrinsically-safe segments.*

## Description

The ROUTE-MASTER Fieldbus System uses a patented split-architecture design to deliver the highest segment current to a hazardous area of ANY intrinsically-safe FOUNDATION fieldbus™ system. ROUTE-MASTER provides 350mA per segment—enough to power 16 fieldbus devices (20mA each) at 500m (1,500ft)—while remaining intrinsically-safe for hydrogen-risk areas at the individual spur connection. The system is comprised of a modular Power Supply/Conditioner Rack (RM100) combined with one, or multiple, ROUTE-MASTER Fieldbus Device Couplers (RMA100). Featuring integral surge protection, the 19-inch Power Supply/Conditioner Rack provides redundant, galvanically-isolated and conditioned DC power for up to eight fieldbus segments. RMA100 Device Couplers are available in models that handle four to 20 fieldbus devices.

### Protect Segments from Spur Faults

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 and has an impedance of less than 200 ohms is automatically switched off and not permitted any current flow until the fault is removed. This is a significant advantage over “current-limiting” designs on competing units which hold a fault permanently on the segment at a higher-than-normal current level. This often results in segment failure by overloading the segment power supply. With removal of the short, the spur is automatically reconnected to the fieldbus segment.

## Features

- **Unique split-architecture design.** Allows an industry best 350mA per segment and allows the full 1900m per segment/120m per spur (Ohm’s law permitting), plus connection to any mix of ENTITY or FISCO devices.
- **Reduce commissioning delays.** ROUTE-MASTER Device Couplers feature patented “Automatic Segment Termination” that eliminates the most common installation error: segment failure from under or over termination, and assures local parts of a segment will continue to function if remote parts are accidentally disconnected. The Manual Termination (-MT) option is also available for users who prefer manual termination.
- **Speeds diagnostics and device configuration.** Diagnostic LEDs on the Device Couplers positively indicate status of spur power, spur short circuits, and status of auto termination. The front panel features convenient connections for a fieldbus hand-held communicator.
- **High-availability power supply.** The RM100 Power Conditioner combines redundant DC power per segment with highly reliable passive conditioning to help assure an exceptionally reliable fieldbus segment.

### Certifications



FISCO



Check the listing on Page 6 for certification details.

All product names are registered trademarks of their respective companies.

# RM100

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

### Complete Intrinsically-Safe Fieldbus System

The ROUTE-MASTER Fieldbus System delivers intrinsically-safe segment power (350mA) and communications between a FOUNDATION fieldbus H1 card mounted in a safe area and fieldbus devices mounted in a hazardous area.

### Fieldbus Segment Power Conditioning and Isolation

The ROUTE-MASTER's 19-inch Power Supply/Conditioner Rack (RM100) converts an AC power input to up to eight fully-isolated DC channels (Figure 1). A DC Regulator Card (RM103B) controls the voltages of each of the individual channels. A second DC Regulator Card may be added to the rack to provide redundancy, load-sharing and hot-swap capabilities.

Trunk Isolator Modules (up to eight per rack) provide passive fieldbus conditioning, systems-side isolation and I.S. current-limiting for each fieldbus segment. The output from each Trunk Isolator Module (RM102B) is a galvanically-isolated, redundantly-powered, passively-conditioned and intrinsically-safe fieldbus trunk that can be connected into a hazardous area. No I.S. ground is required.

The RM102B Trunk Isolator Module provides dual outputs from the same H1 segment input, with each providing independent I.S. current-limiting. This technique minimizes irrecoverable voltage drop and maximizes the power available in the field.

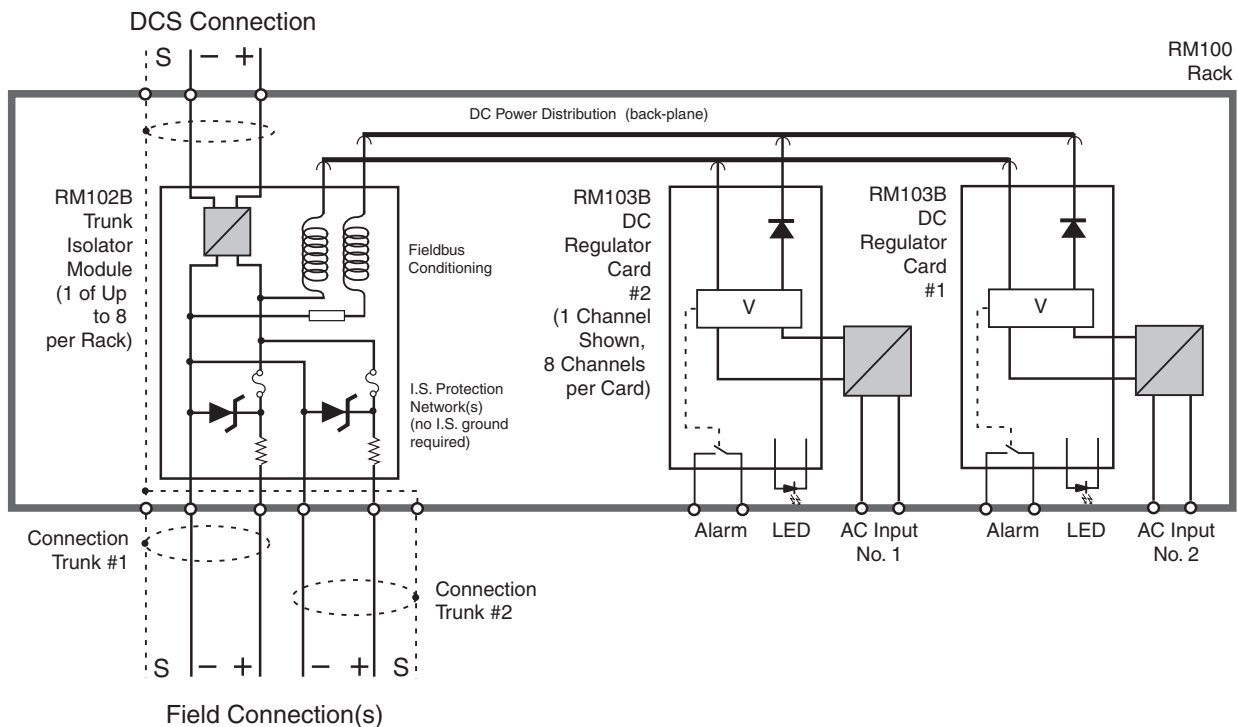
Each Trunk is available for connection to separate RMA100 Device Couplers, which remain part of the same segment. When used in this way, the individual trunk currents per leg create voltage drop only in that leg, avoiding the losses which would be imposed if all devices were powered from a single trunk.

Because the Trunk Isolator Module has independent I.S. power limitation per trunk, each trunk is considered as a separate I.S. circuit and there are no complications for use in a hazardous area.

The dual trunk configuration allows 16 devices with 500m (1640ft) cable, even in areas classified as IIC/Groups A and B. The use of both trunks in this way is optional, and single trunk connection may be preferred where total cable length is short and device numbers and/or total current draw within the segment is low. In single trunk applications, a local terminator (TRK-TERM) should be fitted to the unused channel of the Trunk Isolator Module.

**Note:** Trunk Isolator Modules do not power the systems side of a H1 card. Specify the RM110 PowerTray if this function is required.

Figure 1. RM100 Power Conditioner Rack Connections.



### Fieldbus Device Couplers

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. Device Couplers can be mounted in the field or back-of-panel.

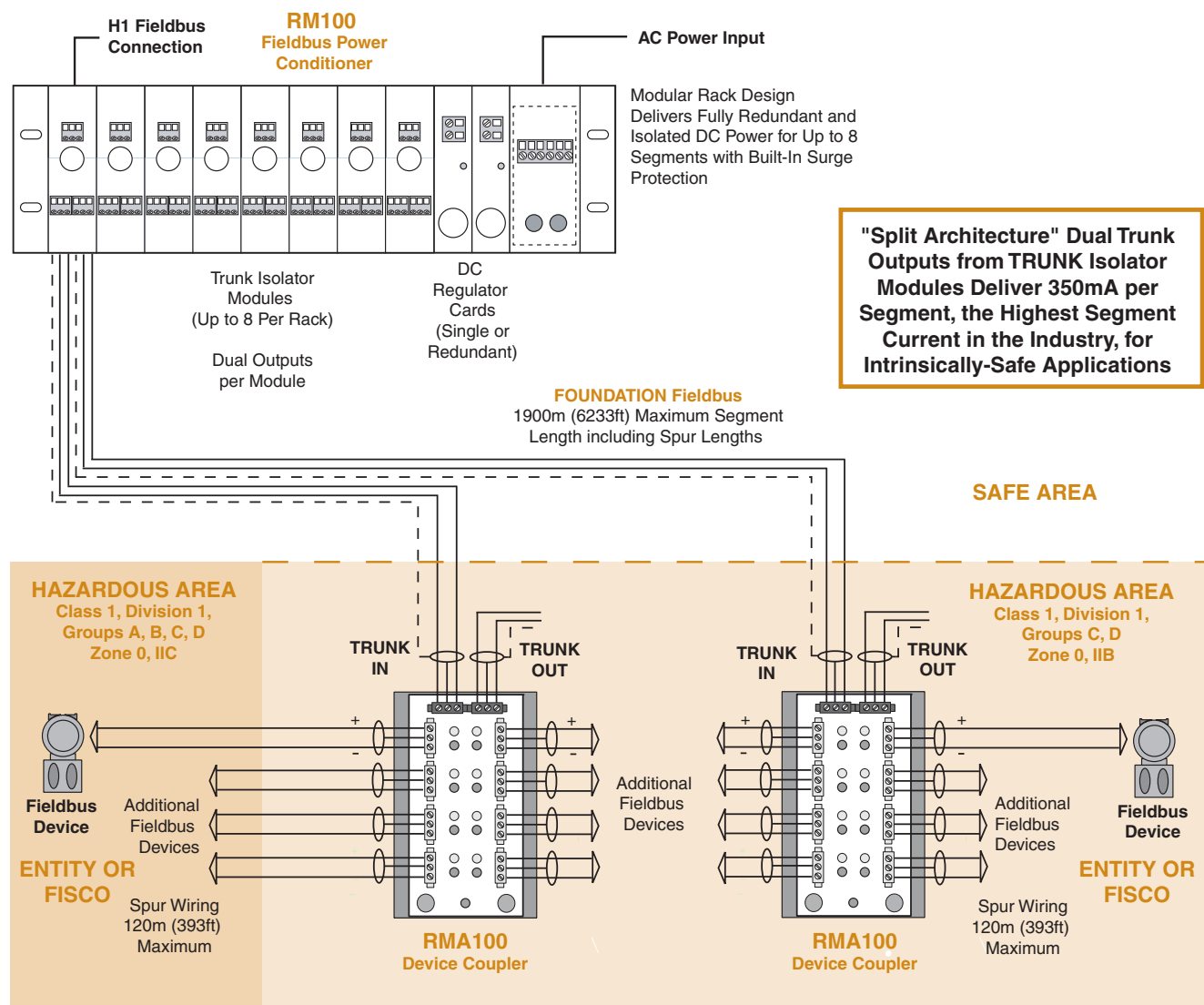
ROUTE-MASTER Device Couplers offer environmental and functional advantages that simplify fieldbus segment design.

**Environmental Advantages**—ROUTE-MASTER Device Couplers (RMA100) can be ordered in ready-to-install, field-mount enclosures designed for applications in rugged and hazardous field conditions. Options include aluminum (painted blue) 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.

**Functional Advantages**—MooreHawke Device Couplers offer functional advantages over the competition. This includes our unique short circuit protection (see Page 1) and patented "Automatic Segment Termination", which also enables easy extension of the segment through additional device couplers without re-termination issues. The Manual Termination (-MT) Option is available for users who prefer manual termination. Other advantages include convenient field test points for hand-held communicators.

Figure 2. ROUTE-MASTER Delivers 350mA per Segment into Hazardous Areas/Locations.



# RM100

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

### Specifications

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

<b>Communications</b>	FOUNDATION Fieldbus™ (H1) to IEC61158-2	<b>Performance (continued)</b>	<b>Fault Power:</b> 250W, all channels shorted <b>MTTF (MIL HDBK-217):</b> Segment with Single DC Regulator Card, 66 years; Segment with Dual DC Regulator Cards, 468 years Trunk Isolator Module, 510 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	<b>Indicators</b>	One GREEN LED per DC Regulator Card indicates normal operation
<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 segment <b>Power Dissipation:</b> 35W, fully-loaded, 8 channels			<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)

#### RMA100 Fieldbus Device Coupler

<b>Communications</b>	FOUNDATION Fieldbus™ (H1) to IEC61158-2	<b>Indicators</b>	<b>Fault Indicators:</b> GREEN (normal) RED (fault) Auto-Terminator Indicator: AMBER LED is on when auto-termination is activated	<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>Performance</b>	<b>Voltage Rating:</b> Vmax: 18.65V Vmin: 11V <b>Maximum Quiescent Current:</b> RMA10X: 15mA RMA108: 13mA RMA104: 9mA (4mA lower with -MT option) <b>Spur Output Voltage (No Load):</b> 14.7V<Vin<18.65V; 12.25V<Vs<16V Vin<14.2V; Vs<13.6V <b>Hysteresis:</b> ±0.45V <b>Rate of Change:</b> 0.5µA/ms <b>Spur Output Current:</b> Is <sub>lim</sub> : 48mA <b>Spur Short Circuit:</b> Is <sub>sc</sub> : 3.5mA <b>Trunk In to Trunk Out Voltage Drop:</b> Vdt: 0.5V	<b>Terminals</b>	<b>Type:</b> Removable terminals with screw-clamp retaining screws <b>Wire Size:</b> Handles sizes between 0.8-2.5mm <sup>2</sup> /12-24AWG		
		<b>Cable Glands (Device Couplers with Enclosures)</b>	<b>Type:</b> Armored/Unarmored <b>Material:</b> Nickel-plated brass		

### Ordering Information

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

Rack	No. of Trunk Isolator Modules	No. of DC Regulator Cards	Power
<b>RM100</b> ROUTE-MASTER 19-Inch Power Conditioner Rack with Trunk Isolator Module(s) and DC Regulator Card(s) for Intrinsically-Safe Applications	-1 Trunk Isolator Module -2 Trunk Isolator Modules -3 Trunk Isolator Modules -4 Trunk Isolator Modules -5 Trunk Isolator Modules -6 Trunk Isolator Modules -7 Trunk Isolator Modules -8 Trunk Isolator Modules	-1 DC Regulator Card -2 DC Regulator Cards (Redundant)	-A 115Vac -B 230Vac

**When ordering, specify:** Rack -No. of Trunk Isolator Modules -No. of DC Regulator Cards - Power  
**Model number example:** RM100-8-2-A  
 (Rack with 8 Trunk Isolator Modules, 2 DC Regulator Cards and 115Vac Power)

#### RMA100 Fieldbus Device Coupler

Unit	Mounting/Enclosure Type	No. of Spurs	Gland/Connector Type	Gland Entry Size
<b>RMA1</b> ROUTE-MASTER Device Coupler for Intrinsically-Safe Applications	0 DIN-Rail Mount (No enclosure)	4 Fieldbus Spurs 8 Fieldbus Spurs X 10 Fieldbus Spurs	Not Applicable	-DIN (No cable glands) Universal DIN-style enclosure mounts on 32mm (EN50035) G-type and 35mm (EN50022) Top Hat DIN-rails
	5 Aluminum Enclosure with Solid Cover (Standard) 6 Aluminum Enclosure with Clear Perspex Cover 2 Stainless Steel 316, IP66 Enclosure 3 Glass Reinforced Polyester (GRP), IP66 Enclosure	4 Fieldbus Spurs 8 Fieldbus Spurs X 10 Fieldbus Spurs	-A Unarmored Cable Glands (standard) -B Armored Cable Glands -C Compound Seal Cable Glands -D No Cable Glands -E M12 Turck Euro-fast™ Sockets -F 7/8-in Turck Mini-fast™ Sockets	GLAND ENTRY SIZE FOR: -O (standard) Unarmored Cable (7.5-11.9mm O.D.); Armored Cable (9.5-16.0mm O.D.)  -S Unarmored Cable (3.0-8.0mm O.D.); Armored cable (5.5-12.0mm O.D.)
	4 Stainless Steel 316, IP66 Enclosure with E-Z vertically removable lid and bottom entry cable gland plate	4 Fieldbus Spurs 8 Fieldbus Spurs X 10 Fieldbus Spurs Y 20 Fieldbus Spurs	NOTES: 1. Gland/connector selection is for all entry ports. 2. Choices "-E" and "-F" have male sockets for "Trunk In" and female sockets for "Trunk Out" and "Spurs". 3. Weatherproof seals are provided for all glands, but not sockets.	-MT Option: Specify for RMA100 without auto-termination. NOTE: Auto-termination cannot be restored or reactivated on site. (e.g., RMA158-A-O-MT)

NOTE: Device coupler with stainless steel 316 enclosure (4) and 20 fieldbus channels (Y) is composed of two 10-channel couplers (X) mounted in the enclosure.

**When ordering, specify:** Unit • Mounting or Enclosure Type • Number of Spurs -Gland/Connector Type -Gland Entry Size  
**Model number example:** RMA158-A-O  
 (8-Spur Device Coupler in Aluminum Enclosure with Cable Glands for Unarmored Cable)

#### Accessories:

Description	Model Number
Trunk Terminator	TRK-TERM***
Surface Mounting Bracket for RM100 Rack*	RMB-001
Spare DC Regulator Card	RM103B
Spare Trunk Isolator Module	RM102B
Power Tray (see Data Sheet for details)**	RM110-8-S

\* One pair provided with each RM100 Rack. This option is for retrofit or replacement.  
 \*\* Required for use with Emerson, ABB, Honeywell systems. Consult the factory for other manufacturer's systems that may require this accessory.  
 \*\*\* Required per RM102B Trunk Isolator Module when used in single-trunk mode.

# RM100

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

### Entity Systems and Cable Parameters

As an Entity System, it is necessary to demonstrate that the design does not exceed the specified (Entity) parameters for the location.

The unique split-architecture design of RM100 means that this calculation need only be completed once and will cover the entire plant installation.

First, calculate the capacitance of a worst case spur; 120m of the chosen cable plus an FF816 device. This will certainly be less than the 262nF allowable in IIC.

Second, calculate the L/R ratio for the chosen cable (most manufacturers only quote inductance and resistance values on their datasheets). This should calculate out to around 25 L/R or so.

Third, document these calculations with an annotation that no spur can be longer than 120m and that no other cable is being used in these I.S. FOUNDATION fieldbus segments.

Note that each spur cable (and also trunk cable in dual-trunk configuration) is a separate I.S. network. Parameters for these cables are not added together.

### Certifications



Sira to Cenelec, EN50 014/020  
Certificate Number: 00ATEX2090X

#### RM100 Rack:

II (1) GD [EEx ia] IIB  
ATEX  $T_a = -20$  to  $+60^\circ\text{C}$

#### RMA100 Device Coupler:

II 1 GD EEx ia IIB T4  
ATEX EEx [ia] IIC T4

$T_a = -45$  to  $+70^\circ\text{C}$   
( $U_o = 17.5\text{V}$ ;  $I_o = 249.9\text{mA}$ ;  $P_o = 1.18\text{W}$ )

Variation 15: The combination of a RM100 Series Rack together with an RMA100 Device Coupler is suitable for use in a FISCO system in accordance with EN60079-27:2006.

For FISCO devices, spur cables should meet FISCO parameters:  $R_s = 15$  to  $150$  Ohms/km/loop,  $L_s = 0.4$  to  $1.0$  mH/km,  $C_s = 45$  to  $200$ nF/km. No further analysis is required.

RMA100 Device Coupler spur connections are compatible with both ENTITY and FISCO devices; maximum spur length is 120m.



FM to NEC (ANSI/NFPA 70), Art. 504 & 505

Certificate No. 3009466

**RM100 Rack:** Associated apparatus located in non-hazardous location with intrinsically-safe connections for Class I, Division 1, Groups C and D hazardous locations when installed in accordance with Control Drawing HCGFB-902

**RMA100 Device Coupler:** Intrinsically-safe apparatus for installation in Class I, Division 1, Groups C and D with intrinsically-safe connections for Class I, Division 1, Groups A, B, C and D hazardous locations when installed in accordance with Entity Requirements and Control Drawing HCGFB-902

CE Conformant – EMC Directive 89/336/EEC EN61326



MooreHawke Device Couplers are fully compatible with FF-816 Device Entity Parameters ( $V_{max. in} = 24\text{V}$ ,  $I_{max. in} = 250\text{mA}$ ,  $P_{max. in} = 1.2\text{W}$ )

### Permissible ENTITY Cable Parameters for RM100 Fieldbus System:

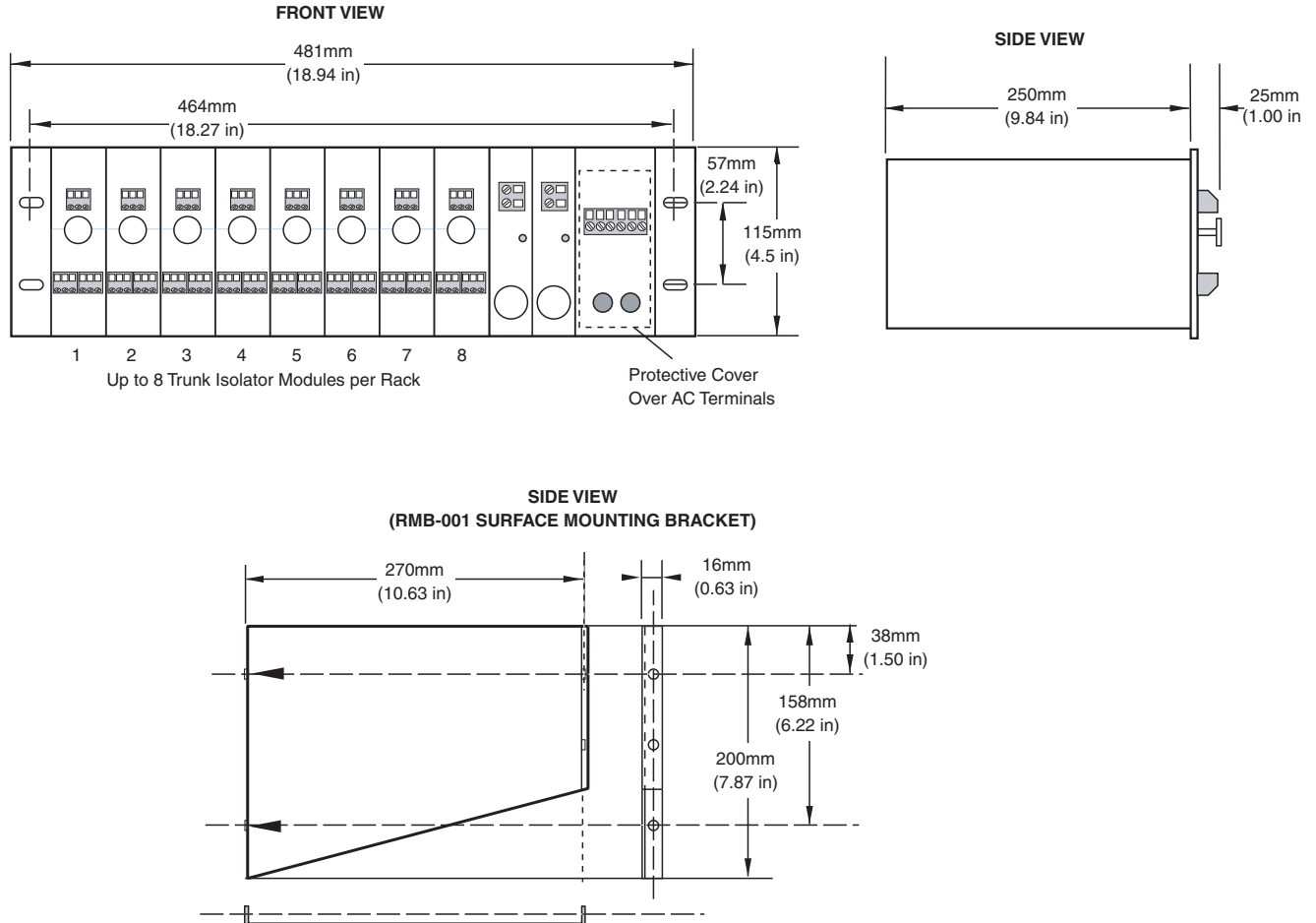
Gas Group	Capacitance (nF)	AND	Inductance (mH)	OR	L/R ratio ( $\mu\text{H}/\text{Ohms}$ )
IIA/Group D	6390 (Trunk or Spur)		0.412 (Trunk plus Spurs)		72
IIB/Group C	1600 (Trunk or Spur)		0.206 (Trunk plus Spurs)		36
IIC/Groups A B	262 (Spur only)		0.150 (Trunk plus Spurs)		30

### Typical Type A (Screened Twisted Pair) Cable Data\*:

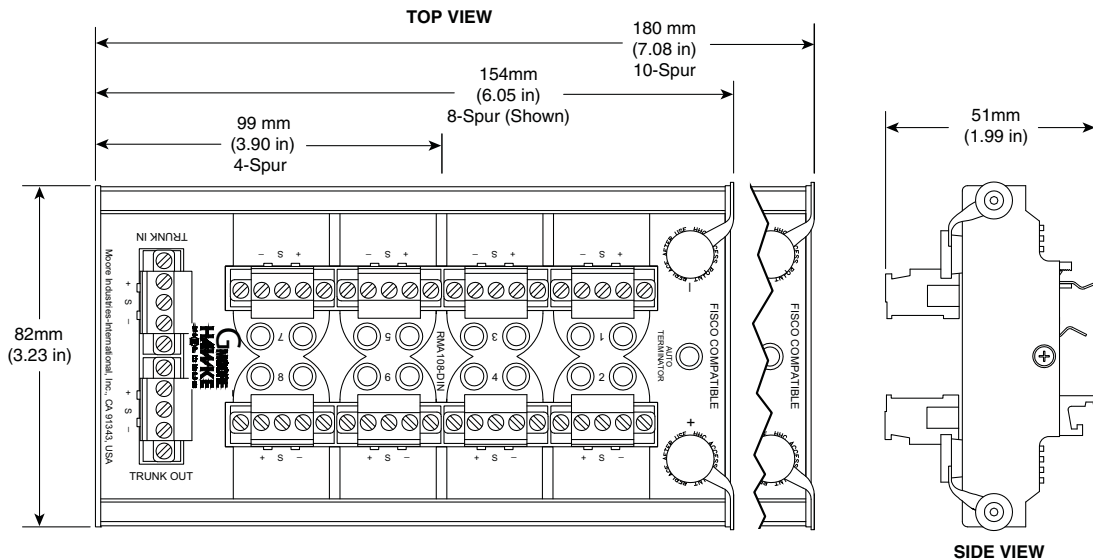
Type	Capacitance (nF/km)	Inductance (mH/km)	Resistance (Ohm/km/Core)	L/R Ratio ( $\mu\text{H}/\text{ohm}$ )	Notes
Turck 490/493	100	0.48	21.4	22.4	18AWG, Non-Armored
Turck 492	100	0.62	24.1	25.7	18AWG, Armored
Belden 3076F	78	0.617	23.7	26	18AWG, Non-Armored
Belden 3077F	143	0.65	55.6	12	22AWG, Non-Armored
Kerpen 727900019	115	0.66	26.5	25	0.75mm <sup>2</sup> , Non-Armored
Kerpen 7279B0015	115	0.46	18.4	25	1.0mm <sup>2</sup> , Non-Armored

\* Moore Industries is not responsible for specification changes made to third-party products. Please review the latest cable data from each manufacturer.

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



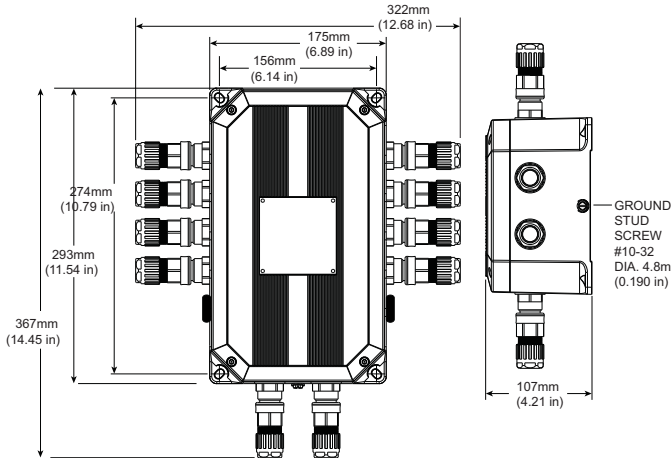
**Figure 4. Device Coupler DIN-Rail Mounting Installation Dimensions (Base Units).**



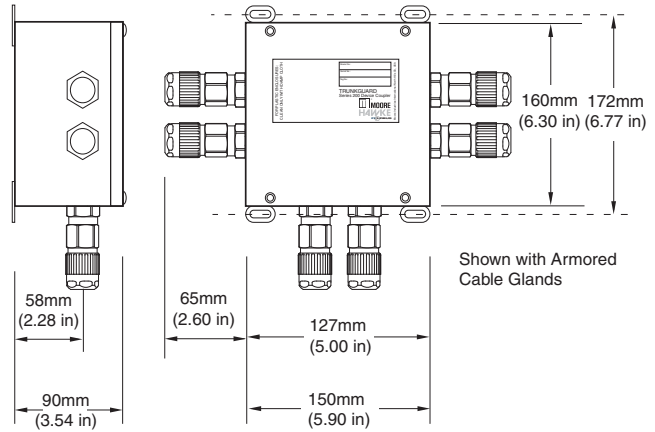
# RM100

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

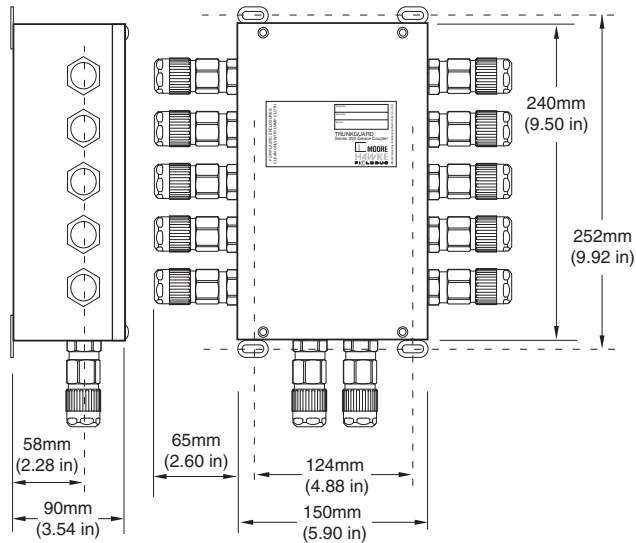
**Figure 5.** Standard Aluminum Enclosure Installation Dimensions for 4-Spur (RMA154/164), 8-Spur (RMA158/168) and 10-Spur (RMA15X/16X) Models.



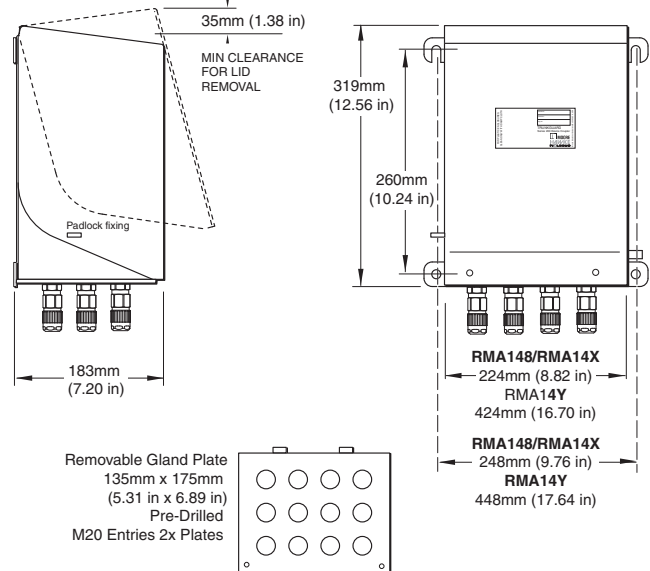
**Figure 6.** Electro-Polished Stainless Steel 316 Enclosure Installation Dimensions for 4-Spur (RMA124) Device Couplers.



**Figure 7.** Electro-Polished Stainless Steel 316 Enclosure Installation Dimensions for 8- (RMA128) and 10-Spur (RMA12X) Device Couplers.



**Figure 8.** Stainless Steel 316 with E-Z Vertically Removable Lid and Bottom Entry Cable Gland Plate Installation Dimensions for 8-Spur (RMA148), 10-Spur (RMA14X) and 20-Spur (RMA14Y) Device Couplers.



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