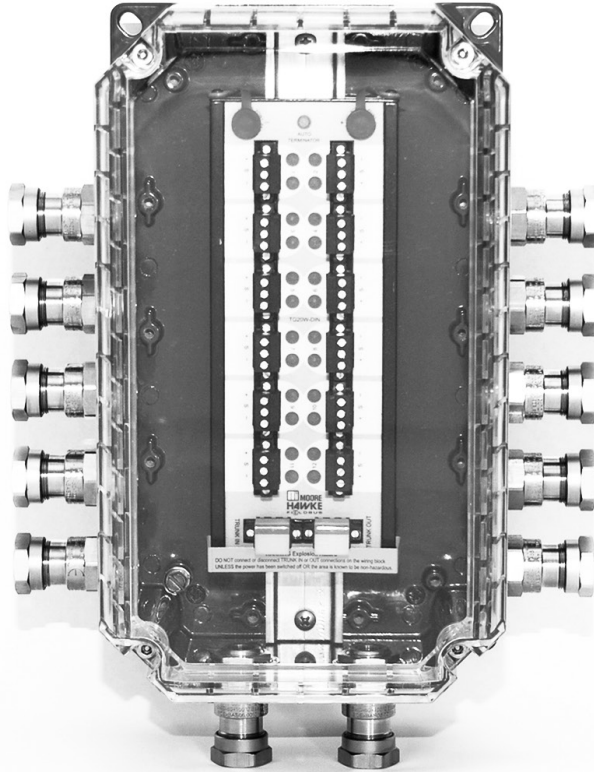


# TG200

**TRUNKGUARD™** Series Fieldbus Device Couplers  
General Purpose and Non-Incendive/Zone 2 Locations

**TRUNKGUARD™** Series Fieldbus Device Couplers  
(General Purpose and Non-Incendive Locations)

# TG200



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# TG200

*TRUNKGUARD™ Series Fieldbus Device Couplers  
(General Purpose and Non-Incendive Locations)*

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## Introduction

Device Couplers provide easy and practical mechanisms for implementing fieldbus systems. Among the capabilities provided in MooreHawke's TG200 Series are connection points and automatic resetting short-circuit protection for multiple fieldbus devices, convenient field test points for hand-held communicators and our patented Automatic Segment Termination feature.

TRUNKGUARD Device Couplers provide electronic and fully auto-resetting spur short-circuit protection that prevents segment failure caused by a short circuit to any field device. Additionally, the short circuit protection does not cause other devices to fall off the network as a result of insufficient voltage because of a spur short circuit. Utilizing a unique "Fold-Back" technique, any spur that attempts to draw more than 48mA is automatically switched off and not permitted any current flow until the fault is removed. With removal of the short, TRUNKGUARD automatically reconnects the spur to the fieldbus segment within 20 microseconds.

The Automatic Segment Termination feature eliminates segment failure from under or over termination which is generally the most common cause for delays in fieldbus startups. The auto-terminator also assures that local parts of a segment will continue to function even if there is a downstream cable break.

## About this Manual

Wherever you see a "**Note**", "**Caution**" or "**WARNING**" pay particular attention.

**WARNING** - Hazardous procedure or condition that could injure the operator.

**Caution** - Hazardous procedure or condition that could damage or destroy the unit.

**Note** - Information that is helpful for a procedure, condition, or operation of the unit.

## DIN Units

Each unit is designed to fit onto a 32mm (EN50035) G-type and 35mm (EN50022) Top Hat DIN-rail and may be mounted at any angle and 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 (a minimum of IP54 is recommended).

## Device Coupler Enclosures

Device Couplers can be ordered in ready-to-install, field-mount enclosures designed for applications in rugged and hazardous field conditions. Options include aluminum, enclosures (with clear cover or with metal cover), GRP (Glass Reinforced Polyester) and stainless steel enclosures. These offer IP66/ type 4X protection. Standard cable glands are nickel-plated brass, 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™).

## Specifications

<b>Communications</b> FOUNDATION Fieldbus™ H1 and PROFIBUS PA	<b>Performance (continued)</b> <p><b>Terminator:</b> 100Ω/1μF (Internal Automatic Segment Termination is standard; For manual termination, specify the -MT option with the MooreHawke model number (e.g. TG208-DIN-MT). Also separately specify a TRK-TERM Trunk Terminator for mounting on the final device coupler in the segment.)</p>	<b>Cable Glands (Device Couplers with Enclosures)</b> <p><b>Type:</b> Armored/Unarmored <b>Material:</b> Nickel-plated brass</p>
<b>Performance</b> <p><b>Supply Voltage:</b> 10 to 32Vdc**</p> <p><b>Maximum Segment Current:</b> 1.5A</p> <p><b>Maximum Quiescent Current:</b> TG204: 10mA@32V<sub>FB</sub>**; 5mA@16V<sub>FB</sub> TG208: 18mA@32V<sub>FB</sub>**; 9mA@16V<sub>FB</sub> TG20X: 23mA@32V<sub>FB</sub>**; 11mA@16V<sub>FB</sub> TG20W: 28mA@32V<sub>FB</sub>**; 13mA@16V<sub>FB</sub> * 3mA less with -MT option</p> <p><b>Maximum Spur Output Current:</b> I<sub>Slim</sub> = 48mA</p> <p><b>Spur Short Circuit Load:</b> I<sub>Sec</sub> = 5mA (32V**), 3mA (16V)</p> <p><b>Spur Voltage Drop:</b> 0.4V@20mA</p> <p><b>Maximum Voltage Drop Trunk IN to OUT:</b> 0.7V</p>	<b>Indicators</b> <p><b>Spur:</b> GREEN (normal) RED (fault)</p> <p><b>Auto-Terminator*:</b> YELLOW LED is on when auto-termination is activated</p>	<b>Ambient Conditions</b> <p><b>Operating:</b> -40°C to +70°C (-40°F to +158°F)</p> <p><b>Storage:</b> -40°C to +85°C (-40°F to +185°F)</p> <p><b>Relative Humidity:</b> 0-95%, non-condensing</p> <p><b>Surge Protection:</b> EN61326, EN61000-4-5 1KV (1.2/50μsec)</p> <p><b>RFI/EMI Immunity:</b> 10V/m@80-1000MHz, 1kHz AM (IEC61326)</p> <p><b>Vibration (EN 60068-2-6):</b> 1g max acceleration, 10-150Hz</p> <p><b>Shock (EN 60068-2-27):</b> 15g max. acceleration, 11ms</p>
	<b>Terminals</b> <p><b>Type:</b> Removable terminals with screw-clamp retaining screws</p> <p><b>Wire Size:</b> Handles sizes between 0.8-2.5mm<sup>2</sup>/12-24AWG</p>	

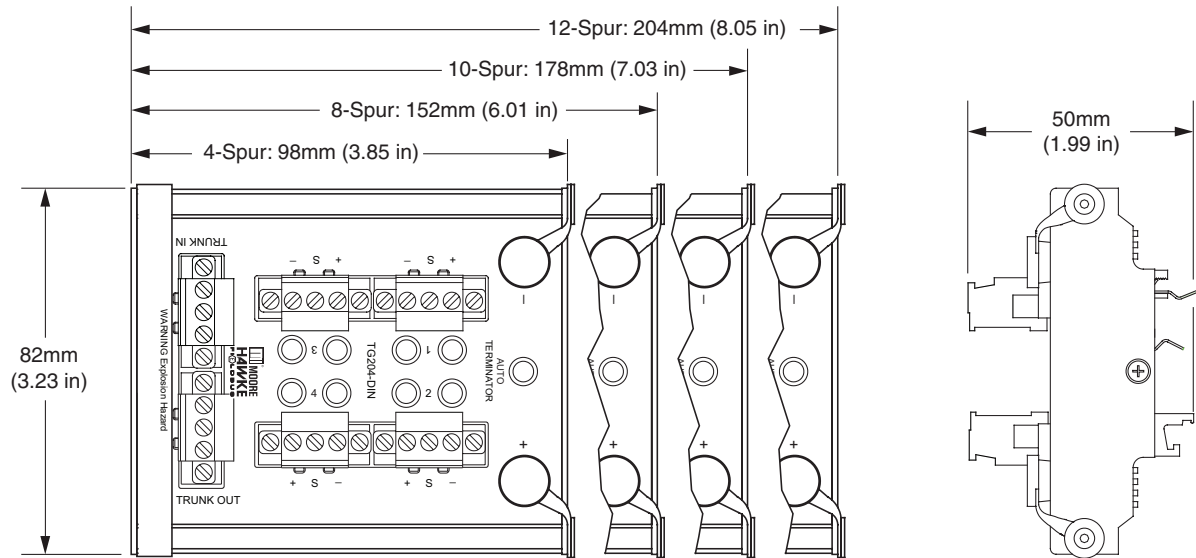
\* Auto-terminator function not applicable with -MT option.

\*\* For Class I, Division 2 installations, maximum allowable output voltage = 25.45Vdc.

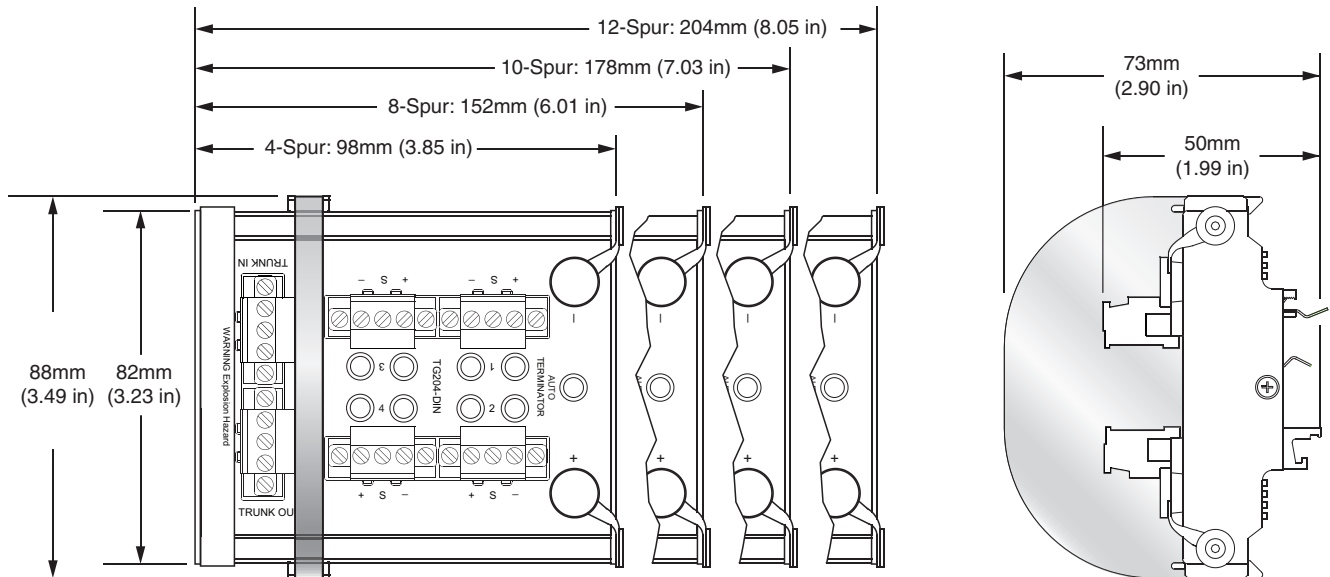
# TG200

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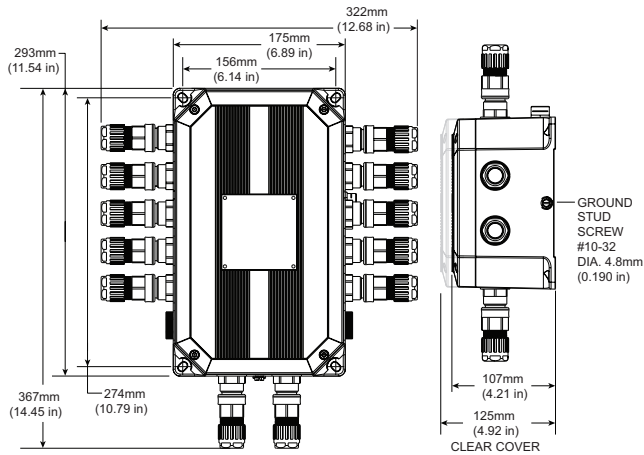
**Figure 1-A.** DIN-Rail Mounting Installation Dimensions



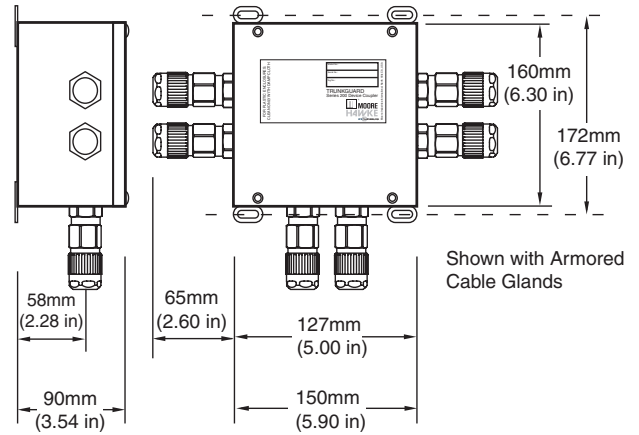
**Figure 1-B.** DIN-Rail Mounting Installation Dimensions with Optional ATEX barrier



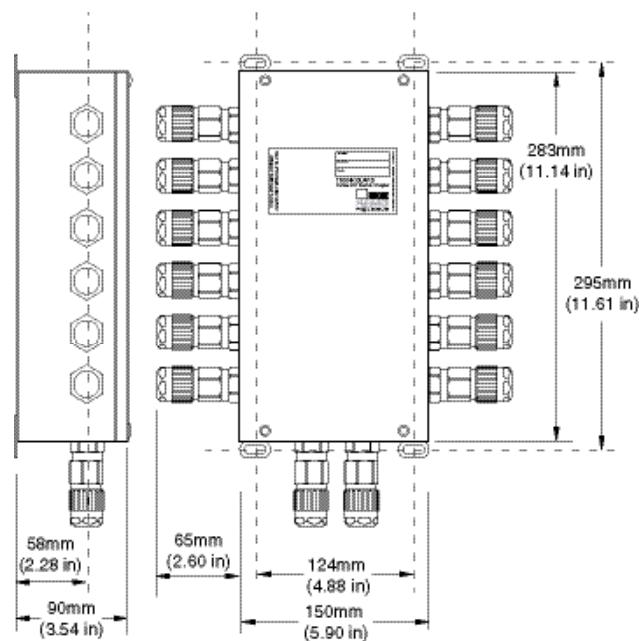
**Figure 2. Standard Aluminum Enclosure Installation Dimensions for 4-spur, 8-spur, 10-spur and 12-spur models. Model shown is 10-spur with armored cable glands.**



**Figure 3. Electro-Polished Stainless Steel 316 Enclosure Installation Dimensions for 4-Spur Device Couplers. Model shown is with armored cable glands.**



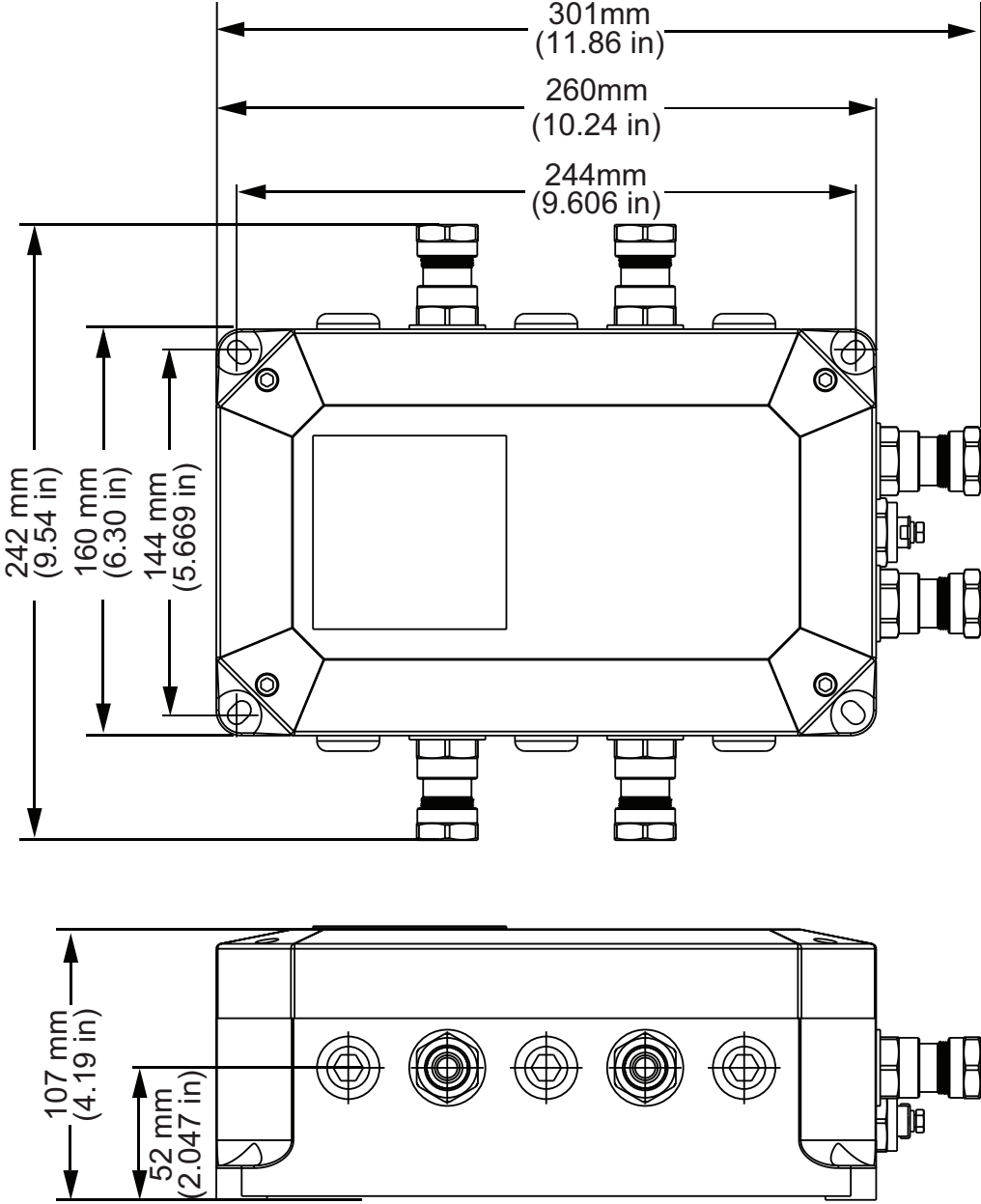
**Figure 4. Electro-Polished Stainless Steel 316 Enclosure Installation Dimensions for 8-Spur, 10-Spur, and 12-Spur Device Couplers. Model shown is 12-spur with armored cable glands.**



# TG200

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Figure 5. .GRP (Glass Reinforced Polyester) Enclosure Installation Dimesnions for 4-Spur (TG234) Models



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## Installation

Device Couplers are typically mounted vertically onto a flat surface. However, device couplers may be mounted at any angle. A preference should be given towards ease of installation plus visibility if the device coupler LEDs. Cables should be brought to the Device Coupler in such a way as to prevent water from running into the cable entry position. For cables coming vertically down to a Device Coupler, it is good practice to continue down past the Device Coupler and return upwards to the cable entry position.

All cables should be supported within 250mm (9.84 in) of the cable entry position by a cable tray or other support. This is particularly important with armored cable.

Once the installation and wiring has been completed, the enclosure should be closed and secured.

## Wiring Connections

### **WARNING:**

*To avoid an explosion hazard do not disconnect or connect trunk cable wiring at trunk terminals when a flammable or combustible atmosphere is present.*

All wiring is via pluggable cable connectors mounted on the front of the unit. Cables should be stripped to expose no more than 8mm (0.31 in) of conductor inserted fully into the terminal opening. Bootlace ferrules are recommended for use with stranded cable. Fieldbus systems and devices may not be polarity-sensitive, however consistent polarity connections are good practice. The center terminal of the pluggable connector is always shield (screen).

Segment TRUNK input and output connections should be made at the terminals marked IN and OUT, respectively. Terminal shields/covers should be replaced after making the connections.

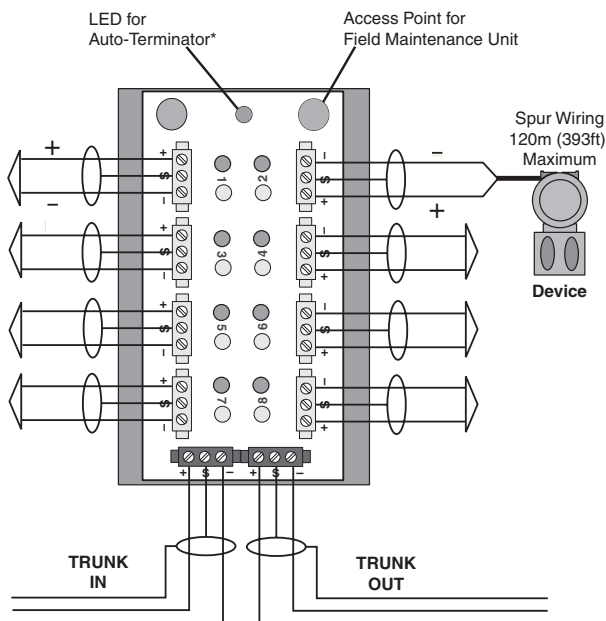
Individual SPUR connections should be made at the appropriate terminals, and where applicable, system wiring drawings should be followed and cables marked accordingly.

### **WARNING:**

*For -ATEX units used in Zone 2 applications: Only the pluggable connectors supplied with the unit can be used for spur connections. This ensures that spurs cannot be plugged into the trunk sockets.*

Once all wiring connections have been made, the retaining screws on each terminal should be securely fastened and the external enclosure closed (if applicable).

**Figure 6.** Typical TG200 Device Coupler Hook-Up



\*Auto-terminator function not applicable with -MT option



## 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.
- The maximum length of unshielded input and output signal wiring should be 2 inches.
- Some local electrical codes or facility practices may require the Shield to be connected to Ground at more than one location. Follow proper local guidelines.

Fieldbus segment cable Shields for spurs and trunks are gathered together in the device coupler and then wired through the trunk cable to the next device coupler and eventually to the fieldbus power conditioner. Grounding of the Shield usually occurs at the power conditioner.

## CE Conformity

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

## FM and ATEX Installation Drawings

The installation diagrams located in the back of this manual must be used to augment the installation instructions described earlier in this manual for units that are to operate per ATEX and FM requirements.

### ATEX Zone 2 only:

Legacy systems installed prior to May 1st, 2013 may install replacement TG200 units with energy limited spurs using installation diagram TG200-ATEX.

All new ATEX Zone 2 installations or system expansions after May 1st 2013 must use intrinsically safe wiring for spur circuits per installation diagram 100-100-76.

### cFMus Special Conditions of Use:

The TG200 shall be installed in compliance with the enclosure, mounting, spacing and segregation requirements of the ultimate application.

# TG200

**TRUNKGUARD™ Series Fieldbus Device Couplers**  
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## Testing and Troubleshooting

**WARNING:**

*To avoid an explosion hazard  
do not disconnect or connect trunk cable  
wiring at TRUNK IN or TRUNK OUT terminals  
when a flammable or combustible atmosphere  
is present.*

Connect segment wiring to fieldbus power supply.

Normal indications are:

All GREEN LEDs ON

All RED LEDs OFF

Refer to Table 1 regarding LED fault condition indications.

The Auto-Terminator\* LED should be ON (if the device is the last in the segment).

Check the Auto-Terminator\* by putting a load (1kohm, minimum) across the TRUNK OUT terminals. The YELLOW LED should turn OFF.

**Caution:**

*Do not short any terminals if power conditioner output can be more than 800mA.*

**Table 1.** LED Indications

<b>If</b>	<b>Then</b>
<b>All LEDs are OFF</b>	Check polarity of TRUNK IN
	Check that voltage at TRUNK IN is >10V
	Check for short circuits in the trunk cable
	Check that the segment power supply is operating correctly
<b>If</b>	<b>Then</b>
<b>Any red LED is ON</b>	Disconnect that individual spur by temporarily removing the black color spur terminal or the field device cable
	Check for a short circuit on that spur cable
	Check for a core-to-shield fault on that spur cable
	Locate and repair any spur fault before reconnecting that spur

\*Auto-terminator function not applicable with -MT option

## Hand-Held Communicators

Where fitted, test points are available under plastic caps for use with Hand-Held Communicators (HHC). 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.

## Operation

During normal operation, the GREEN LED should be ON for all spur connections.

The Auto-Terminator\* LED is ON for the last TRUNK-GUARD device in the segment; the remaining Auto-Terminator\* LEDs are OFF.

If RED LED(s) are ON, the affected spur(s) have fault(s) in external wiring or field device(s). Please refer to the *Testing and Troubleshooting* section.

If TRUNK IN voltage >10V and spur connections show neither GREEN nor RED LEDs, refer to the *Testing and Troubleshooting* section for more information.

## Maintenance

TG200-DIN series contains no user serviceable parts, non-functioning units should be returned to MooreHawke for replacement or repair.

**WARNING:**

*Substitution of components may impair the device coupler suitability for Div 2 applications.*

**Note:**

*When returning non-functioning units only the DIN-Rail mounted electronics should be returned. It is normally prudent to retain the enclosure, glands, and connectors with their terminals attached when a device coupler is changed out in the field.*

TG200 enclosures have weatherproof seals on enclosure lids and on cable glands; 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.

\*Auto-terminator function not applicable with -MT option

## Customer Support

If service assistance is ever required for an instrument in your application, refer to the back cover of this manual for the telephone numbers to MooreHawke Customer Service Department.

If possible, make a note of the model number of the unit before calling. For fastest assistance, have the following available: serial number, job number or purchase order number.

**DO NOT SCALE DRAWING**

DESIGNER	C. Whelan	1/08
CHECKED	CAM	1/08
DRAWN	O. Denton	1/08
SCALE	NONE	

**CONTROL DRAWING**

TITLE  
**TG200 SERIES  
INSTALLATION DIAGRAM  
cFMbus**

REVISION NUMBER  
**TG200-FM**

REVISION  
**C**

REVIEWED BY  
**ECO 17314**

DATE  
**1-23 2014**

BY  
**CW CB**

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**Non-Classified Area**

**Hazardous Area / Explosive Atmosphere**  
Class I, Division 2, Groups A, B, C, D  
-40°C < Ta < +70°C

**Fieldbus Device**  
Any FM (Ex) Approved Apparatus for Class I, Division 2, Non-incendive or Class I, Division 1, Intrinsically-Safe.

Only 1 device may be connected per spot, using shielded single twisted pair only, either as single shielded cables or within a multi-core where each pair is shielded.

**Non-incendive field wiring configuration**  
Spurs are permissible if cable parameters are not exceeded. Non-incendive spurs may be assembled and disconnected under power.

**Spur Connection (+/- 8') Entry Parameters**  
U<sub>0</sub> = 25.0kVAC, max.    C<sub>0</sub> = 10nF  
I<sub>0</sub> = 0.02A                    L<sub>0</sub> = 3.4mH  
Must use -40°C outside wiring

**WIRING NOTES:** Examine Hazmat. Do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous. Installation of components may impact suitability for Class I, Division 2.

**WARNING:** Single wire spurs. Avoid on 100mm cable. Equipment, except as noted on drawings, can be hazardous and should not be connected. Use substitution as acceptable and handle as detailed throughout your installation in Class I, Division 2.

**WIRING NOTES:** This is a language of the clarity in which the equipment is being used, please apply to Moore Industries International, Inc. (MII) for a suitable translation.

**CAUTION:** This is a language of the clarity in which the equipment is being used, please apply to Moore Industries International, Inc. (MII) for a suitable translation.

**WIRING NOTES:** This is a language of the clarity in which the equipment is being used, please apply to Moore Industries International, Inc. (MII) for a suitable translation.

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<b>DO NOT SCALE DRAWING</b>	CATEGORY: CONTROL DRAWING	DRAWING NUMBER: 100-100-75	REVISION: A
TOLERANCES (UNLESS NOTED) DECIMALS = 0.01mm X .XX = 0.1 / 0.25 .XXX = 0.063 / 0.125 HOLEES = 0.03 / 0.080 ANGLES = ±1/2°	DRAWN: C. Whan CHECKED: V. Garcia ENGINEER: W. Tchan SCALE: NONE	REVISED BY: ECO 16972 DATE: 10/13 BY: CW	APPROVAL: CB
<b>Installation Diagram: TG200-DIN-A-TEX SERIES [ic] Zone 2</b>			
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**Non-Hazardous Area**

Installation may only be carried out by suitably trained personnel and in accordance with national wiring regulations or codes of practice.

Where English is not a language of the Country in which the equipment is being used, please apply to Moore Industries International, Inc. (MI) for a suitable translation.

**Hazardous Area / Explosive Atmosphere**

Ex II 3 G Ex nA [ic] IIC T5 (Zone 2)

**-- WARNING --**  
Substitution of components may impair Intrinsic Safety. To prevent ignition of flammable or combustible atmospheres, disconnect power before servicing.

**Fieldbus Power Conditioner (FPC)**

Normal operating conditions: 30V max., 1.5A max.

Fusing of FPC is recommended

Power input must be Class 2 or SELV rated supply

**Entity Parameters**

Lo = 30Vdc	Groups IIC/II/IIA
Io = 50mA	Group IIC
Co = 220nF	Group IIB
Lo = 30mH	Group IIA
Co = 1.41µF	
Lo = 120mH	
Co = 5.50µF	
Lo = 240mH	
Op. Temp. Range: -40°C ≤ Tamb. ≤ +70°C	
Must use +75°C suitable wiring	

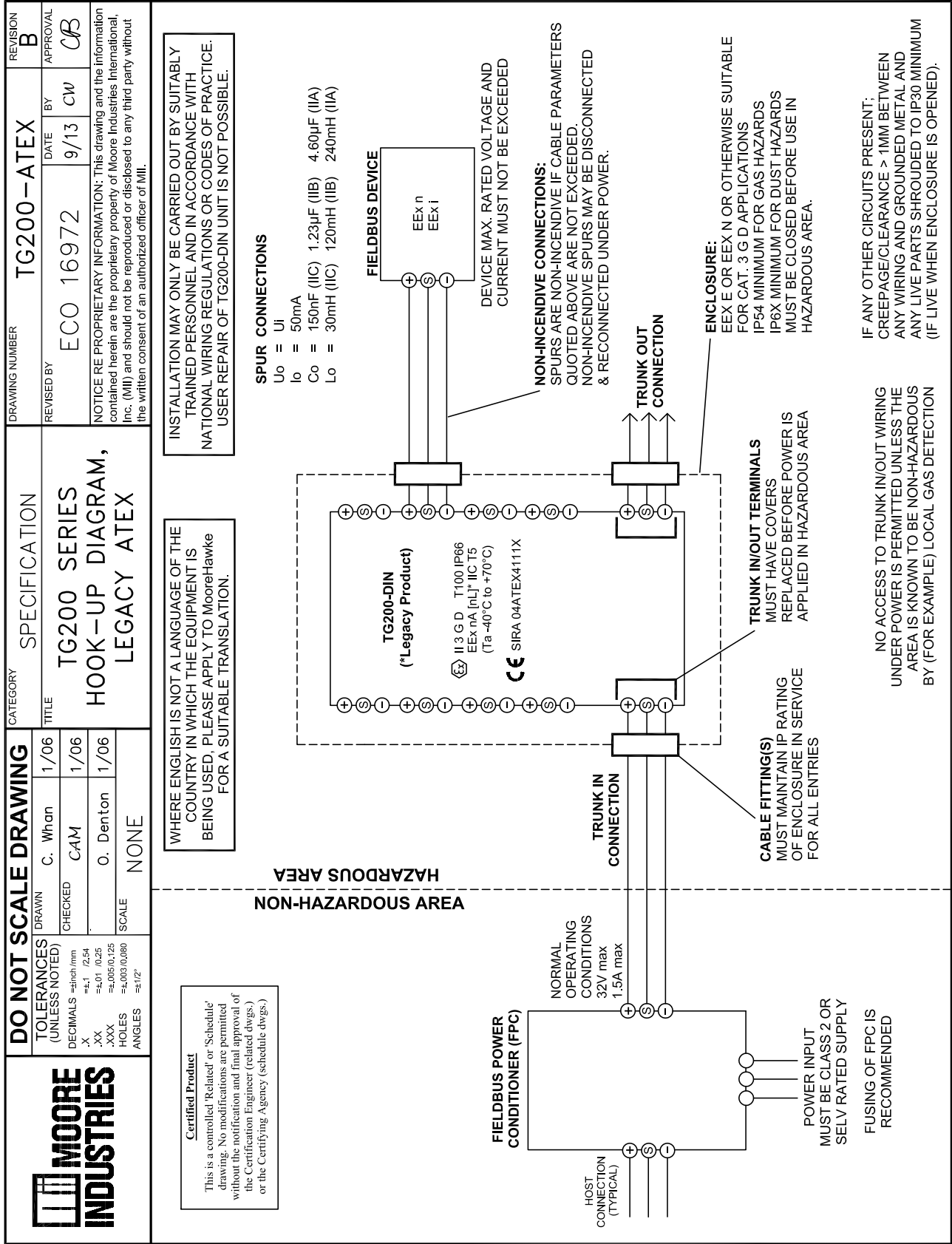
**Installation Notes:**

- If other electrical circuits are fitted into the enclosure, then they shall be suitably approved for the hazardous area of installation and live parts shall be protected to a minimum of IP40 when the enclosure is opened.
- If other electrical circuits are fitted into the enclosure, then they shall be suitably approved for the hazardous area of installation and live parts shall be protected to a minimum of IP20 when the enclosure is opened.
- A minimum clearance of 1 mm between live parts and earthed metal shall be maintained.
- Access to Trunk In/Out wiring under power is NOT permitted unless the area is known to be Non-Hazardous.
- Trunk In/Out terminals must have covers replaced before power is applied in Hazardous Area.
- External enclosure required. Must be suitable for Category 3 G applications, rated IP64 minimum and must be closed before use in Hazardous Area.
- The device must be certified Ex n or Ex i and it's maximum rated voltage and current must NOT be exceeded.
- Cable fittings must maintain IP rating of enclosure in service for all entries.
- Installation shall be in accordance with the latest editions of the wiring practices for the country of origin and EN 60079-14.

**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.)

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## 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 information 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 BY THE COMPANY SHALL BE BARRED UNLESS THE COMPANY RECEIVES FROM THE BUYER A WRITTEN NOTICE OF THE ALLEGED 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.



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