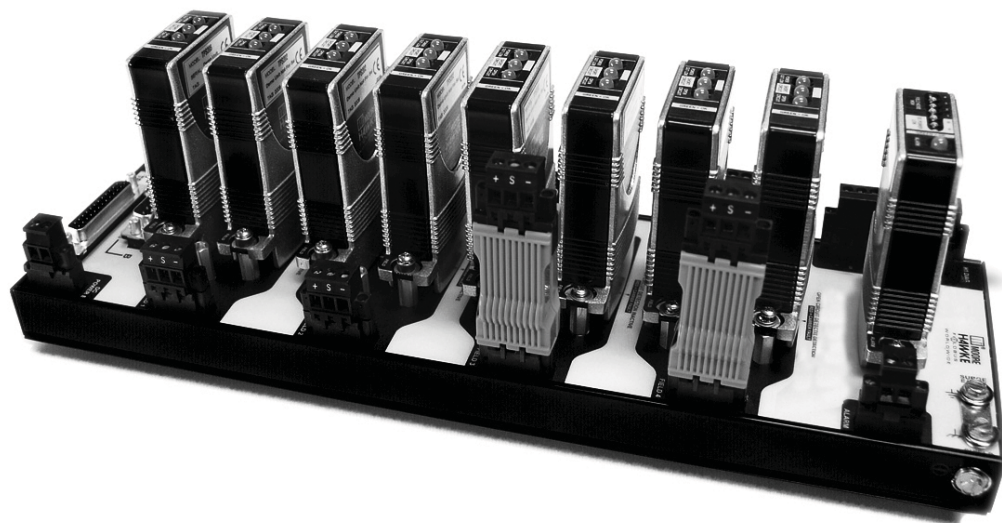


 **MOORE
HAWKE**
FIELD BUS WORLDWIDE

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TPS400

TRUNKGUARD®
Fieldbus Power Supply



TPS400
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Introduction

The TRUNKGUARD TPS400 Power Supply enables fast and easy implementation of fieldbus systems by providing properly conditioned power for simplex and duplex FOUNDATION fieldbus H1 networks. TRUNKGUARD TPS400 is FOUNDATION fieldbus registered and fully compliant with FF831-1 (the technical specification for fieldbus power supplies).

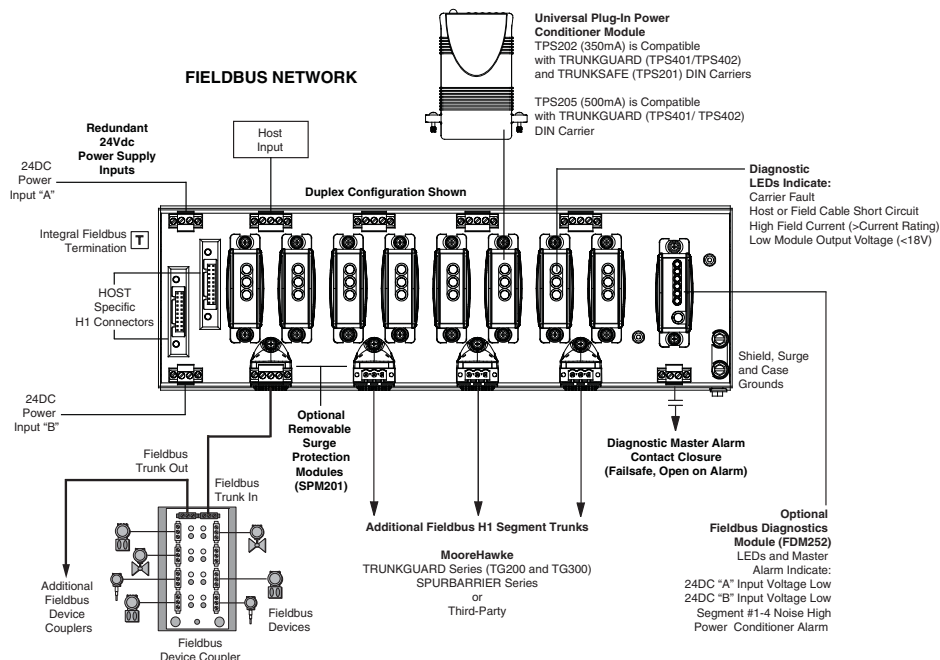
TRUNKGUARD TPS400 is composed of a DIN Carrier populated with individual Power Conditioner Modules (TPS202/TPS205). A Fieldbus Diagnostics Module (FDM252) may be fitted onto the DIN Carrier to provide alarm and diagnostics information. It provides LED indicators for DC power status, cable short-circuits and noise on each segment, and a common contact closure (opens on alarm). The TPS202 and FDM252 are also used in the Fault Tolerant TRUNKSAFE system.

Another component of the TRUNKGUARD TPS400 is the optional Surge Protection Module, SPM201, which provides a full 3-element surge suppression circuit for the selected segment. The SPM201 fits directly onto the DIN Carrier pluggable terminal socket (field-side) for the segment being protected. This eliminates the need for additional panel wiring or mounting space. A ground connection for surge protection is provided through a bus bar located within the DIN Carrier. It is made externally available as a separate grounding stud.

Features

- **Delivers up to 500mA per segment.** Available models supply 350mA (for non-incendive, energy-limited applications) or 500mA (for high current demand applications) of isolated, conditioned simplex (non-redundant) or duplex (redundant) power for up to four segments.
- **High-availability, modular design.** Provides individual power conditioner modules for each segment. Modules are hot-swappable with load-sharing in redundant pairs to maintain power to the segment in the instance that one module in a pair needs to be removed.
- **Universal Modules.** Power conditioner and other modules can be used in simplex, duplex and fault tolerant configurations.
- **Economical fieldbus physical layer diagnostics.** An optional Diagnostics Module (FDM252) provides a master alarm and LED-based alarms for segment noise, DC voltage levels and conditioner status faults.
- **Pluggable surge protection (optional).** Surge protection with a three-element surge arrester is available per segment to protect the TPS400 and the HOST from surges coming in on the trunk cables.

Figure 1. The TRUNKGUARD TPS400 provides duplex (redundant) or simplex power to each fieldbus segment (duplex unit shown).



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Specifications

<p>Performance TPS401/402 DIN Carrier Number of Segments: 4 Supply Voltage: 19.2 to 32Vdc, reverse polarity protected</p> <p>Terminals Type: Pluggable with screw-clamp retaining screws Wire Size: Handles 0.8-2.5mm²/12-24AWG cable sizes</p> <p>Performance TPS202 Power Conditioner Module Output Capacity: 350mA per segment; up to 25.5V (no load) Power Requirements: 22.5VA per segment for 500mA model Power Dissipation: 5.5W @350mA per segment at full load (shared in duplex mode) Terminator: 100 ohms/1microFarad per segment DC/DC Isolation: 500Vdc (segment to power supply)</p> <p>Indicators LED (Power): GREEN, normal; ORANGE, Output Voltage <18V LED (Short): GREEN, normal; RED, Cable Short LED (Open): GREEN, normal; RED, Carrier Fault</p>	<p>Performance TPS205 Power Conditioner Module Output Capacity: 500mA per segment; up to 28V (no load) DC/DC Isolation: 500Vdc (segment to power supply) Power Requirements: 22.5VA per segment for 500mA model Power Dissipation: 8W max. per segment at full load (shared in duplex mode)</p> <p>Indicators LED (Power): GREEN, normal; ORANGE, Output Voltage <18V LED (Short): GREEN, normal; RED, Cable Short LED (Open): GREEN, normal; RED, Carrier Fault</p> <p>Performance FDM252 Fieldbus Diagnostics Module Power Dissipation: 0.5W maximum</p> <p>Indicators LED Type: GREEN, Normal; RED, Fault LED A: DC "A" Input Voltage Low (<18V) LED B: DC "B" Input Voltage Low (<18V) LED 1: Segment #1 Noise High (>75mV p/p) LED 2: Segment #2 Noise High (>75mV p/p) LED 3: Segment #3 Noise High (>75mV p/p) LED 4: Segment #4 Noise High (>75mV p/p)</p>	<p>Master Alarm Output Type: Relay (failsafe, open on alarm) Contact Rating: 5A @250Vac 50/60Hz or 24Vdc, non-inductive load</p> <p>Performance SPM201 Surge Protection Module Complies with: -IEC 61158-2, for 31.25kB/s and testing according to -IEC 61643-21 Maximum Surge Current Isn: 20kA (8/20µsec) Nominal Discharge Current Isn: 3kA(8/20µsec) Nominal Rated Current In: 650mA Maximum Continuous Operating Voltage (MCOV): 35V Peak Common Mode: 230V Limiting Voltage Vlim: 50V @3kA (8/20µsec) Nominal Voltage Vn: 32V Line Attenuation: Rs: 1 ohm capacitance:1nF IP Rating: IP20</p> <p>Ambient Conditions (All TPS400 Components and Options) Operating Range: -20°C to +60°C (-4°F to +140°F) Storage Range: -40°C to +85°C (-40°F to +185°F) Relative Humidity: 0-95%, non-condensing RFI/EMI Immunity: 10V/m @80-1000MHz, 1kHz AM when tested according to IEC61326</p>
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Dimensions

Figure 2. Dimensions for The TRUNKGUARD TPS401 (Simplex)

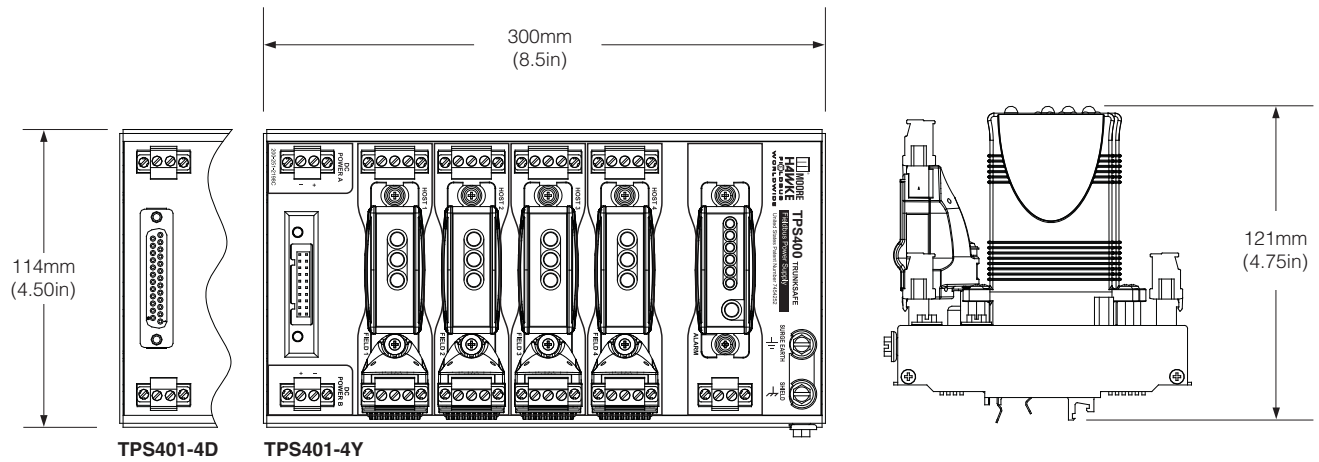
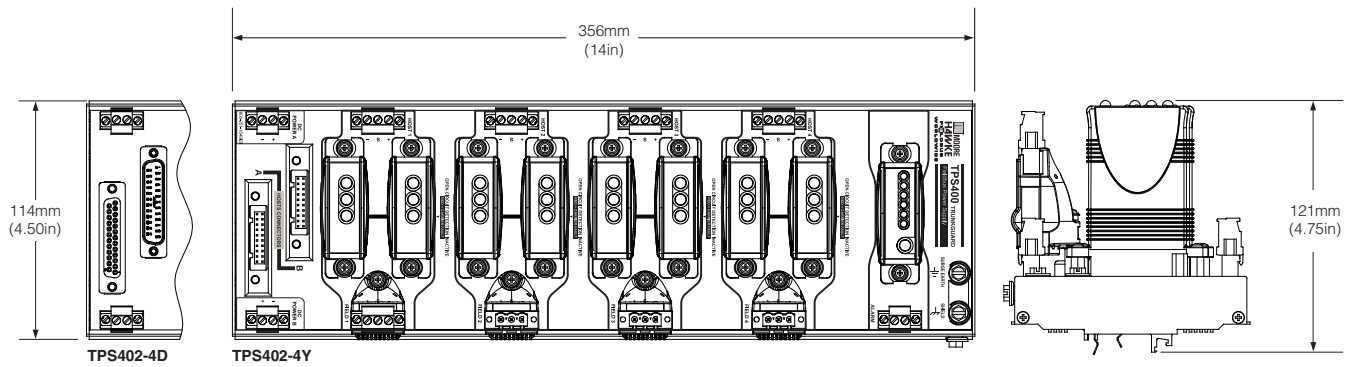


Figure 3. Dimensions for The TRUNKGUARD TPS402 (Duplex)



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Installation

TPS401 DIN Carrier Units

DIN Carrier Units fit onto 32mm (EN50035) G-type and 35mm (EN50022) Top Hat DIN-rails. They should be mounted in a way to allow easy access to terminal receptacles and to keep LEDs visible. Horizontal DIN-rails are preferred so that air can flow vertically between the Conditioners to assist in module cooling.

An outdoor location requires an external enclosure. Any enclosure meeting the requirements of the location in relation to electrical and mechanical safety can be used (a minimum of IP54 is recommended). Contact MooreHawke for specific advice regarding installation of TPS400 Series in any hazardous area.

TPS202/TPS205 Power Conditioner

Power Conditioners fit onto sockets on the Carrier face. They only mount in one orientation and should be secured to the Carrier using the on-board screws. A jumper is fitted to each unused socket and it must be removed prior to module installation. Should a Power Conditioner be removed, the Fieldbus Diagnostics Module will indicate an alarm unless a jumper is fitted in the empty socket.

For duplex (redundant) power for the segment configuration, two Power Conditioners are required per segment.

FDM252 Fieldbus Diagnostics Module

A Fieldbus Diagnostics Module (optional component) will fit onto a socket on the Carrier face. It only mounts in one orientation. Use the on-board screws to secure the module to the Carrier.

Fieldbus Diagnostics Modules are required for alarm indication and alarm contact output, but removal or non-installation does not affect the power supply operation for the segment.

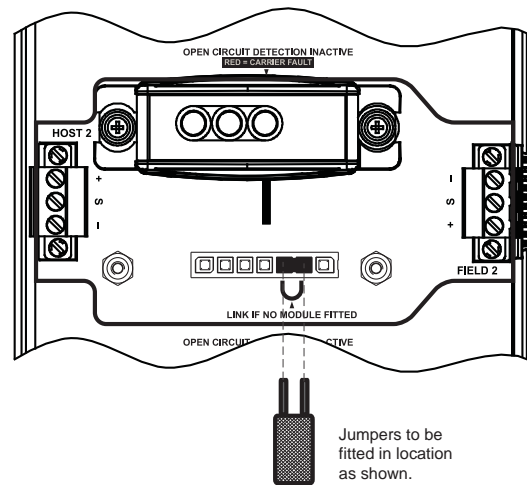
FDM252 Alarms

There are multiple reasons that a Fieldbus Diagnostics Module may alarm. See Testing and Troubleshooting sections of this manual for details. At installation, errors will be shown if there are unused power sockets. These errors can be removed by installation of jumpers (see Figure 6).

Jumpers

The TPS400 Carrier Module is shipped with jumpers fitted into the appropriate unused power sockets (as marked). These jumpers must be fitted in any unused power socket once the Carrier is used in an application, or the alarm will be set on the Fieldbus Diagnostics Module. Extra jumpers are supplied with each carrier board.

Figure 4. Example of jumper placement



Resistors

Additionally, since the TPS202 continually monitors for open or short connections, if a TPS202 module is installed on the Carrier and is not being used in the system, the resistors provided (3.3kohm, 1W) in the TRUNKSAFE Kit, P/N: 208-265-00, must be placed on the Field and Host sides (at the + and – terminals not required on the Host side if DB25 cable is used and Interface/ Redundant adapter is connected) of that segment to prevent the Fieldbus Diagnostics Module from alarming. Resistors must be removed when the Trunk cables and Host wiring is added.

Resistors must also be placed on the field and Host side terminals for bench test purposes.

SPM201 Surge Protection Module

Surge Protection Modules (optional component) fit onto the field-side pluggable socket on the DIN Carrier face and accept the field-side pluggable terminals. They only mount in one orientation. A long screw is provided to secure the unit to the Carrier. This screw must be fitted in order to complete the ground connection of the Surge Protection Module.

Device Coupler

The TPS400 can supply conditioned power to any suitably certified fieldbus device coupler (also spur junction block, brick, etc.) including the MooreHawke TG200 and TG300 TRUNKGUARD Series, the SPURBARRIER™ Series, and third-party device couplers. Please consult the appropriate device coupler manual for installation instructions

Wiring Connections

Any cable suitable for FOUNDATION fieldbus / PROFIBUS PA applications may be used. This is typically 6-22 AWG cable with individual shields (normally called Type A cable). Components from multiple segments may be combined within a multi-core cable. It is recommended that various component shields remain independent of each other within the multi-core cable.

Wire terminations should be made from cables stripped to expose no more than 8mm (0.3 in) of conductor and inserted fully into the terminal opening. Bootlace ferrules are recommended for use with stranded cable.

Field-side segment wiring is made via screw-clamp pluggable terminals marked FIELD. HOST connections are made either through the terminals marked HOST or via multi-way cables plugged directly to the HOST connectors on the Carrier. See Appendices for HOST specific hook up information.

Nominal 24Vdc (19.2-30Vdc) power is required for terminals marked DC Power. Provisions are made for two independent DC feeds to the Carrier.

WARNING:

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

Note:

If only one DC power input is to be used, the FMD252 (if fitted) will indicate an alarm. Hence, use a pair of jumper wires between both DC inputs A and B terminals to insure it operates correctly.

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

Terminator

Each Segment must have two terminators to function properly. The terminator (100 ohm resistor in series with a 1 microfarad capacitor) provides an end load for the segment and prevents reflections. A terminator is hard wired on the TPS400 carrier board for each segment. Another terminator should be placed at the end of the segment in the field (if using a TG Series device coupler with an auto-termination feature the second terminator will automatically be applied).

Contact MooreHawke if the HOST link cable is in excess of 30m (100ft).

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Grounding

The TPS400 carrier is provided with three independent connection points relating to ground. This section provides details of each connection point and provides recommendations on connecting these grounds.

Case Ground

The CASE ground connection is for personnel protection and should be connected to the local structural ground in the panel or enclosure, typically the incoming ac power ground, if available. The case can also be grounded via the DIN rail.

Shield Ground

The SHIELD ground is the collection point for all of the shields relating to the fieldbus signals (both field and HOST-side). This may be directly connected to ground, through a capacitor or via the HOST ground.

Note:

If capacitor is not used, only one SHIELD ground is needed either at the power carrier or at the HOST top end. However, if it is at the power carrier, then connect SHIELD point to GROUND.

Surge Ground

The SURGE ground is available for those installations that use the SPM201 surge protection modules. These are designed to divert very large/short duration currents associated with surges (up to 20kA) and so these should not be connected to the normal SHIELD ground. When used for surge protection, the shorting bar between these ground points must be removed. Therefore, if no surge protection is being used, this shorting bar must be always connected to ground.

Recommended Ground Wiring Practices

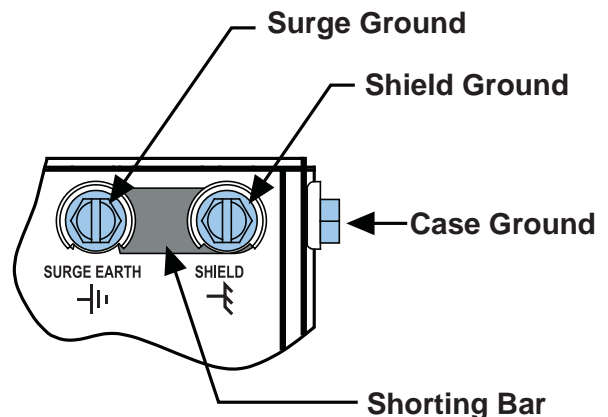
Moore Industries recommends the following ground wiring practices:

- Any Moore Hawke 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 should be wired to the connector for the specific trunk or spur and the SHIELD ground connected as described above.
- The maximum length of unshielded input and output signal wiring should be 2 inches.

Fieldbus cable shields are "carried through" the TPS400 Carrier's input/output terminals and require a suitable, noise-free ground connection point.

If SPM201 Surge Protection Units are fitted, their securing screw must be installed per unit and the TPS400 DIN Carrier must be connected to a low impedance surge protection ground with a direct cable of at least 10 AWG (10mm² cross-sectional area) from the grounding lug provided.

Figure 5. Grounding options



Testing and Troubleshooting

Refer to Table 1 for information on LED indications of fault conditions.

Note:

The DIN Carrier has a link fitted at each Power Conditioner position. The link must be removed prior to installation of a Power Conditioner and must be replaced should a Power Conditioner be removed to avoid alarm indication.

LED Operation

During normal operation, LED sequence should be as follows:

TPS202/TPS205 Power Conditioners: All LEDs should be GREEN.

FDM252 Diagnostics Modules: All LEDs should be GREEN.

If any RED LED is ON, or any GREEN LED is OFF, refer to Table 1 for troubleshooting tips.

Table 1. Troubleshooting

TPS202/TPS205 Power Conditioner

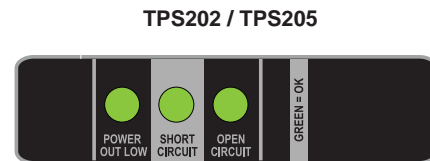
LED	LED Indication		
POWER OUT LOW	GREEN	Orange	OFF
	Normal Operation	Output Voltage < 18V	Module failure
SHORT CIRCUIT	GREEN	RED	OFF
	Normal Operation	Cable short-circuit	Module failure
OPEN CIRCUIT	GREEN	RED	OFF
	Normal Operation	Carrier Fault*	Module failure

*Open Circuit detection is inactive. Red LED indicates a Carrier Fault

FDM252 Fieldbus Diagnostic Module

LED	LED Indication		
DC power_A	GREEN	RED	OFF
	Normal Operation	Input Voltage A < 18V	Module failure
DC power_B	GREEN	RED	OFF
	Normal Operation	Input Voltage B < 18V	Module failure
NOISE 1	GREEN	RED	OFF
	Normal Operation	Noise > 75mVp/p	Module failure
NOISE 2	GREEN	RED	OFF
	Normal Operation	Noise > 75mVp/p	Module failure
NOISE 3	GREEN	RED	OFF
	Normal Operation	Noise > 75mVp/p	Module failure
NOISE 4	GREEN	RED	OFF
	Normal Operation	Noise > 75mVp/p	Module failure

Figure 6. Module LED Indicators



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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 2004/108/EC, EN 61326. Consult the factory for the most current information on products that have been CE certified.

Operation

Once configured, installed and supplied with the correct power, TRUNKGUARD begins to operate immediately.

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.

TPS400 Series modules contain no user-serviceable parts. Non-functioning units under warranty should be returned to Moore Industries for replacement or repair.

Moore Industries uses a combination of protection finishes on our aluminum parts to eliminate the risk of corrosion and to maintain the original appearance of our units. The user/installer should exercise caution with regard to possible attack by aggressive substances in a specific installation.

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's customer service department.

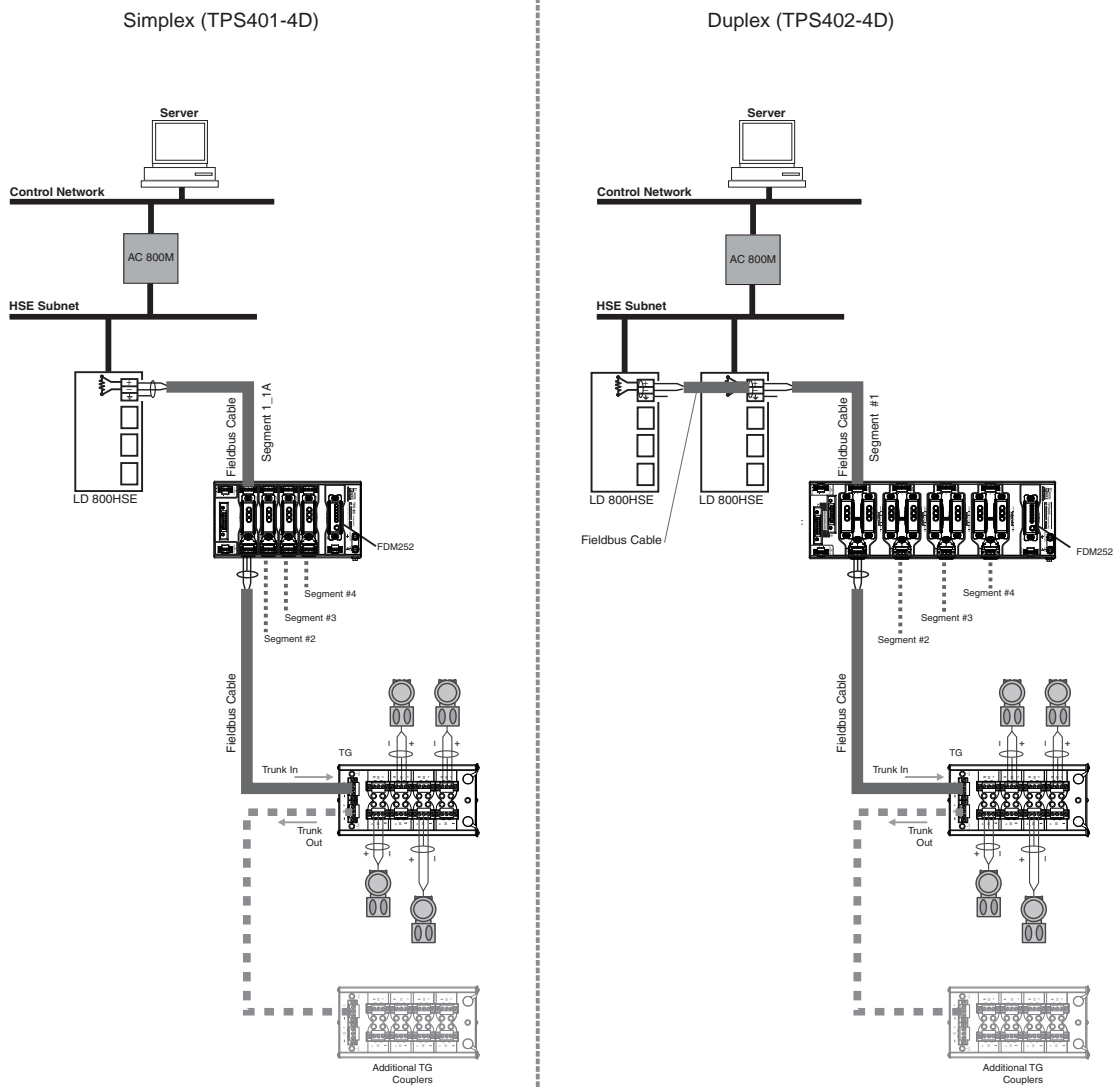
If possible, make a note of the model number of the offending unit before calling. For fastest assistance, have the following available: serial number and the job and purchase order number under which it was shipped

Appendix A: TRUNKGUARD / ABB System 800 Configuration

TRUNKGUARD can be wired directly to each channel at the LD 800HSE linking device.

Refer to Figure A-1 for installation examples.

Figure A-1. TRUNKGUARD / ABB System 800 Configuration



TPS400

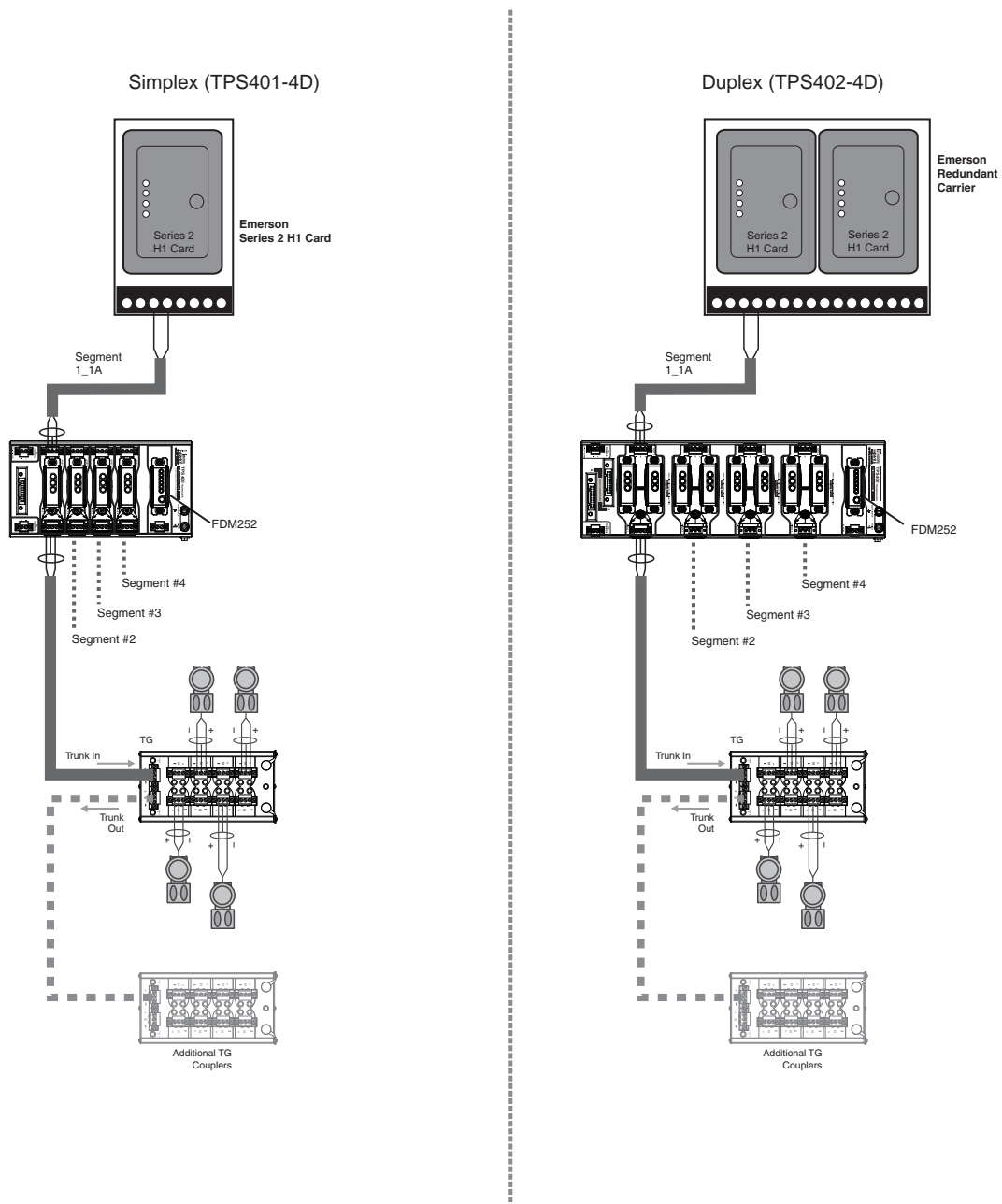
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Appendix B: TRUNKGUARD/ Emerson DeltaV System Configuration

DeltaV is a digital automation system from Emerson Process Management. DeltaV incorporates FOUNDATION Fieldbus I/O capability via H1 cards. Redundant H1 cards are supported if using a DeltaV Series 6.0 or later which utilizes Series 2 H1 cards.

To install TRUNKGUARD with an Emerson DeltaV system, refer to Figure A-2.

Figure A-2. TRUNKGUARD / Emerson DeltaV System Configuration

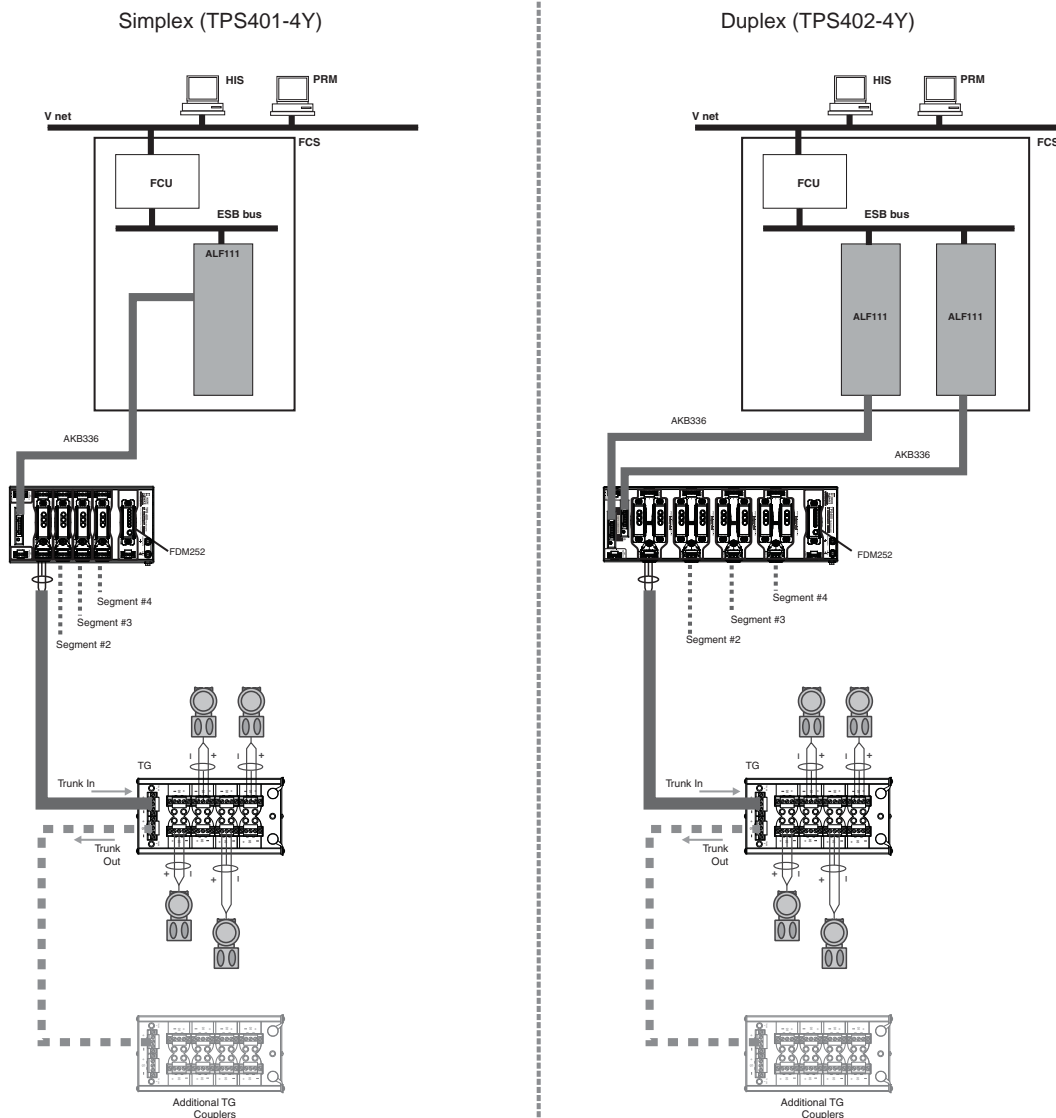


Appendix C: TRUNKGUARD / Yokogawa CENTUM System Configuration

This Configuration requires the use of a Moore Industries Yokogawa Redundant Adaptor when the TPS401-4Y TRUNKGUARD unit is used. When using the TPS402-4Y unit an AKB336 cable is required for this configuration.

To utilize TRUNKGUARD with a Yokogawa CENTUM system, refer to Figure A-3 below.

Figure A-3. TRUNKGUARD / Yokogawa CENTUM System Configuration



TPS400

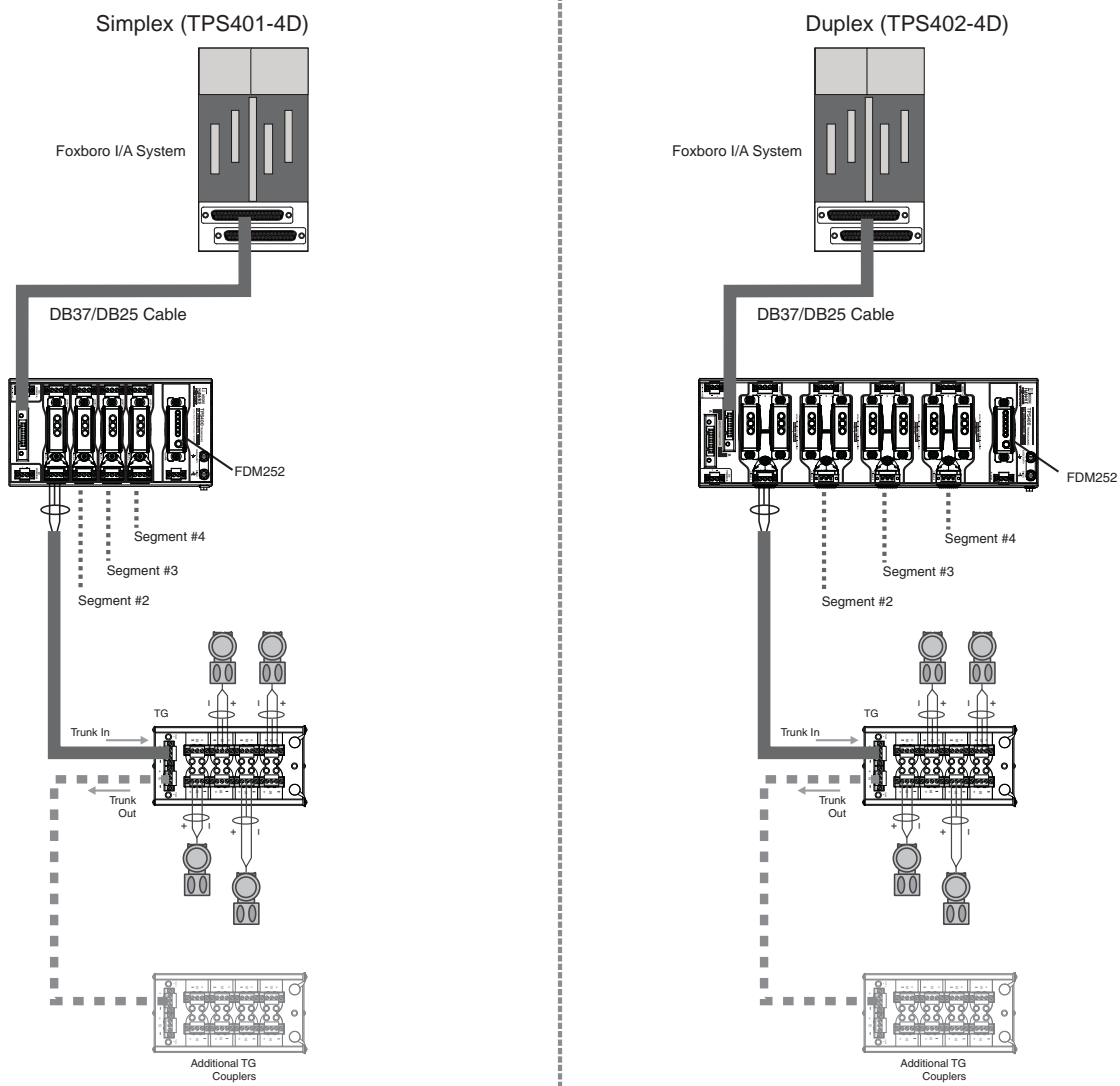
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Appendix D: TRUNKGUARD / Invensys System Configuration

When using a TPS400 with a Foxboro I/A System, a special cable is provided to plug into the I/A Carrier board and then into the TPS 400 Carrier board

Refer to Figure A-4 below..

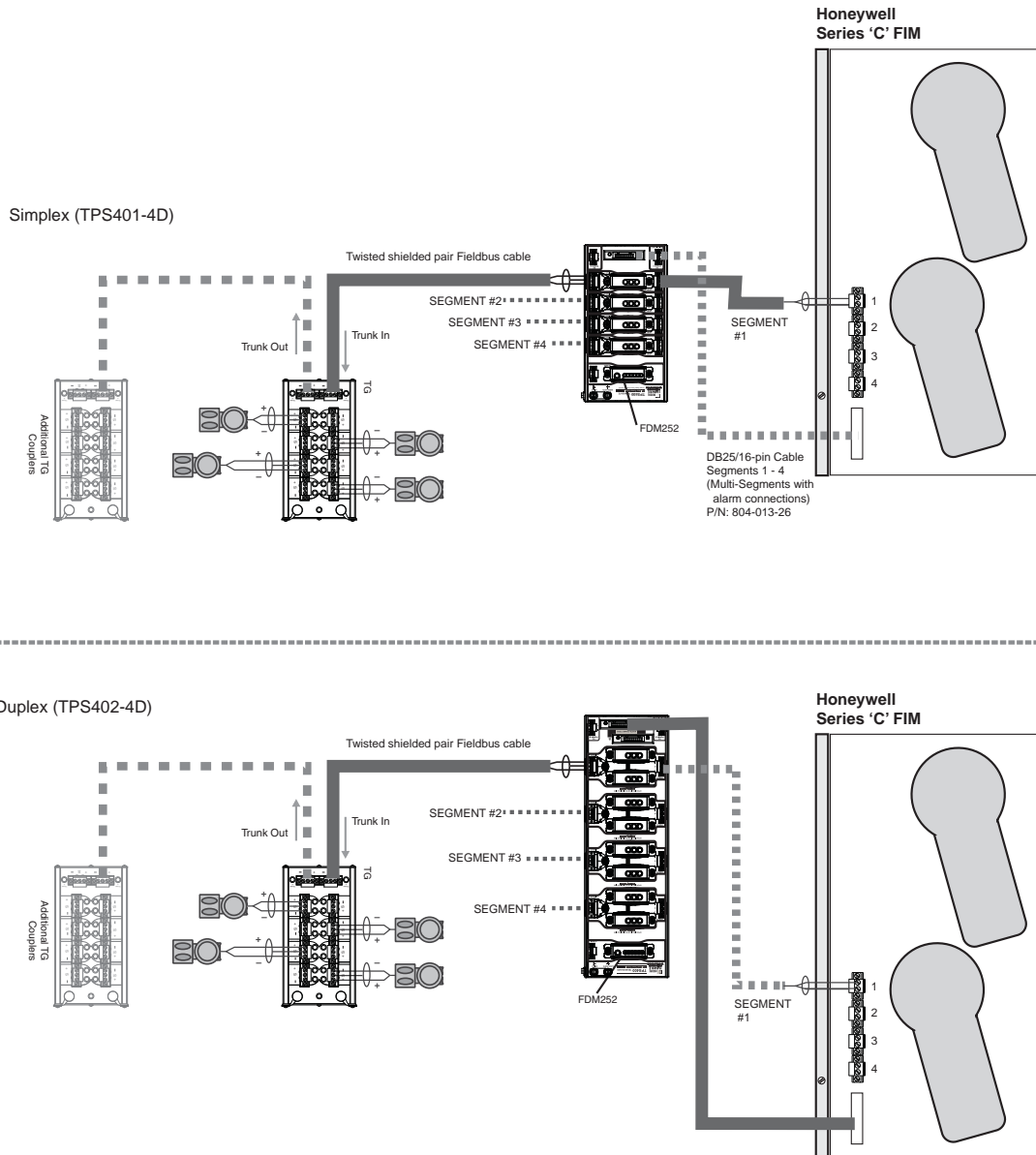
Figure A-4. TRUNKGUARD / Invensys System Configuration



Appendix E: TRUNKGUARD/ Honeywell System Configuration

To utilize TRUNKGUARD with a Honeywell system, refer to Figure A-5 below.

Figure A-5. TRUNKGUARD / Honeywell System Configuration



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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