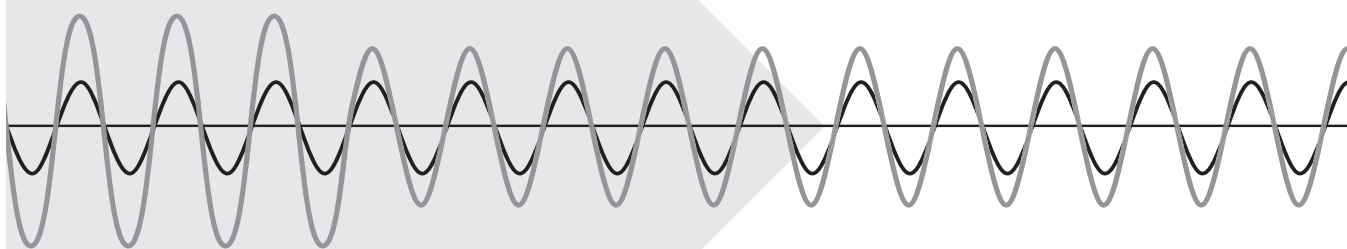




Integrated Suppression Module

Installation, Operation and Maintenance Manual

PN 750-0072-010 B00



**Electrical Transient
Suppression Filter Systems**

The ISM™ (Integrated Suppression Module) is an electrical transient suppression filter system that protects today's facilities from costly downtime and equipment damage caused by routine or catastrophic electrical disturbances. The ISM™ contains individual thermally fused and protected MOVs, surge-rated copper busing, robust filtering and advanced remote communications capabilities.

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Guide to Installation and Assistance

Thank you for choosing Current Technology's ISM Surge Suppression System. We look forward to fulfilling your facility wide surge suppression filter system needs.

Should you have questions about installing the ISM surge suppression system please call Monday through Friday 8:00 a.m. to 5:00 p.m. (EST): 800.238.5000 or 804.236.3300. Or email us at currenttechnology@tnbpowersolutions.com

This manual provides guidelines for the proper installation of the ISM surge suppression system. Proper product selection and compliance with these guidelines will help your new suppression system provide years of reliable service. If installers are unsure about the facility's electrical configuration or have other installation related questions, it is recommended they consult a master electrician or other qualified electrical professional.

When shortcuts are taken or installation procedures are not followed, the ISM system may be damaged or may not provide adequate protection. Improper installation may also void the warranty. It is extremely important to follow these installation procedures carefully.

Today's sophisticated electronic equipment requires superior suppression filter systems. By selecting Current Technology® devices, you have taken a critical step toward decreasing downtime and ensuring longer product life for your equipment.

The ISM Surge Suppression System is designed to be connected to your electrical distribution system to protect connected sensitive electrical and electronic equipment against the harmful effects of lightning strikes, internally generated transients and high frequency noise. The reliable ISM is listed as a Type 4 component assembly suitable for use in Type 1 or Type 2 applications per UL 1449 3rd Edition.

The Current Technology® ISM combines easy and flexible installation with many special features to deliver more performance than any other device in its class.

Guide to Installation & Assistance

(Continued)

The ISM offers a full range of monitoring options when connected to an optional monitoring package from the most sophisticated power quality monitoring features offered in any surge suppression product. These features include the following:

- Display of true RMS phase voltages
- Display of neutral-to-ground voltage
- Counting of swells, surges, sags and outages
- Display of percent available protection remaining

The Integrated Suppression Module incorporates individual thermally fused and protected MOVs, thus preventing individual component failure from rendering the protection mode useless. Instead, the failed component safely removes itself from the circuit and all remaining protection is allowed to continue operating as designed.



△ W A R N I N G !

HAZARDOUS VOLTAGES PRESENT: Improper installation or misapplication may result in serious personal injury and/or damage to electrical systems. Read the complete installation instructions before proceeding with installation. Remove all power to the electrical panel before installing or servicing the surge protective device (SPD).

△ W A R N I N G !

IMPORTANT SAFETY INSTRUCTIONS: All work must be performed by licensed and qualified personnel. The electrical system must be properly grounded in accordance with the U.S. National Electrical Code, state and local codes or other applicable codes for this SPD to function properly. This device is suitable for installation where the available short circuit current is 200,000 rms symmetrical amperes at 600VAC or less.



△ WARNING! THE ISM WARRANTY IS VOIDED if the unit is damaged as a result of improper installation or the installer's failure to verify the following conditions prior to installation.

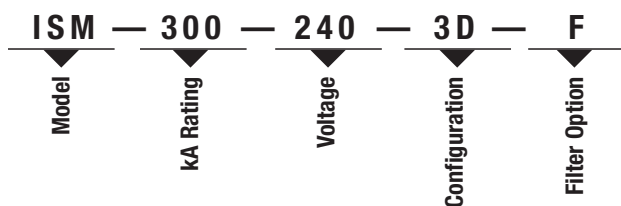
△ WARNING! Do not HIPOT the ISM unit or the electrical system to which the ISM unit is connected without disconnecting the ISM conductors including phases, neutral and ground.

Pre-Installation Checklist ☒

- ☐ Confirm that the voltage(s) and service configuration shown on the ISM product label are consistent with the voltage and service configuration of the system to which it is being attached. Verify that the power system operating frequency is between 47-63 Hz. A model number is printed on the label that is included with the ISM. Each model number corresponds to the voltage and service configurations per sample model number scheme in Table 1:

SAMPLE MODEL NUMBER SCHEME (ISM)

E.g.: ISM-300-240-3D-F



kA Rating

Available ISM™ kA Ratings:
050, 080, 100, 125, 150, 200,
250, 300

Voltage*

208	120/208
240	120/240
380	220/380
480	277/480
600	347/600

Configuration*

1G	1-Phase, Grounded
2G	2-Phase, Grounded, Split-Phase
3Y	3-Phase, Grounded, Wye
3R	3-Phase, Grounded, High-Resistance
3H	3-Phase, Grounded, High-Leg Delta
3D	3-Phase, Grounded, Delta

Filter

F	EMI/RFI Filter (Type 1 SPD)
F3	UL1283 Filter (Type 2 SPD)
	No Filter if Blank

Stand-Alone Options

(Ordered As Separate Items)

DTS	DTS-2 Diagnostic Test Set
HPI	HPI Cable

Stand-Alone Monitoring Options

M1X	LED/Phase + Audible Alarm, Dry Relay Contacts
M2X	M1 + Surge Counter
M3X	Advanced Monitoring, Character Display, Modbus RTU
M4EX	M3 + Ethernet, Modbus TCP
M5X	Advanced Monitoring, Graphics Display, Modbus RTU
M6EX	M5 + Ethernet, Modbus TCP

*Consult factory for additional Voltage/Configuration options.

An area on the back cover of this manual is allocated to log your ISM model number, purchase date, installation date, and installer

Table 1: Sample Model Number Scheme (ISM)

Pre-Installation Checklist ☒

continued

- ☐ Check to ensure that a proper neutral-ground bond is installed between the neutral and ground terminals at the transformer upstream from all 3-Phase WYE, 3-Phase High-Leg DELTA, or 1-Phase SPLIT-PHASE ISM devices (see NEC article 250.) Lack of a proper bond will damage the ISM and void the warranty.
- ☐ Confirm that the environmental conditions are consistent with the following ranges:
 - Ambient Temperatures: The ISM must be installed in an area with a temperature between -40° and +140°F (-40° and +60°C).
 - Humidity: The ISM must be installed in an area with relative humidity between 5% and 95% non-condensing.
 - Altitude: The ISM must be installed in a location where the altitude is below 13,000 feet.



△ WARNING !

Discontinue installation if (1) your conditions are inconsistent with the checklist above or (2) your conditions cannot be verified. Call Thomas & Betts Power Solutions' Technical Support at 800.238.5000 if you have any questions.

This device features an internal protection that will disconnect the surge protective component at the end of its useful life but will maintain power to the load now unprotected. If this situation is undesirable for the application, follow the manufacturer's instructions for replacing the device.

Installation Methods

(For the design engineer and the installer)

The ISM is a Type 4 component assembly which is suitable for use in both Type 1 and Type 2 SPD applications. It may be installed on the line or load side of the main service disconnect. The ISM is a one-port SPD and is to be connected in parallel with the electrical system. It may be connected via a circuit breaker, molded case switch, fused switch, or connected directly to the bus of the panelboard or switchboard it is protecting. If direct bus connection is used, Current Technology®, recommends that the ISM be installed with a disconnect switch.

End-use regulatory compliance is the responsibility of the end user. Consult the factory for regulatory Conditions of Acceptability.

Service Configurations

Figures 1-4 show the electrical relationship between the ISM and these four basic service configurations: WYE, DELTA, High-Leg DELTA and SPLIT-PHASE.

Figure 1
3-Phase, 4-Wire WYE

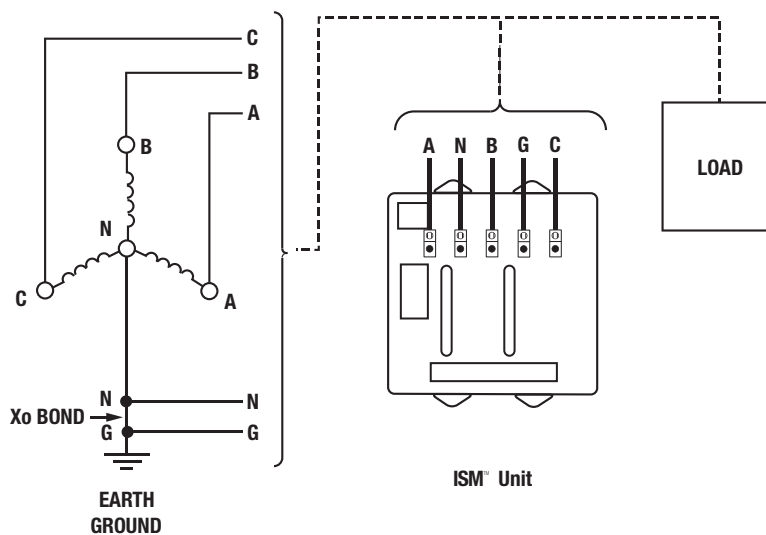


Figure 2
3-Phase, 3-Wire DELTA

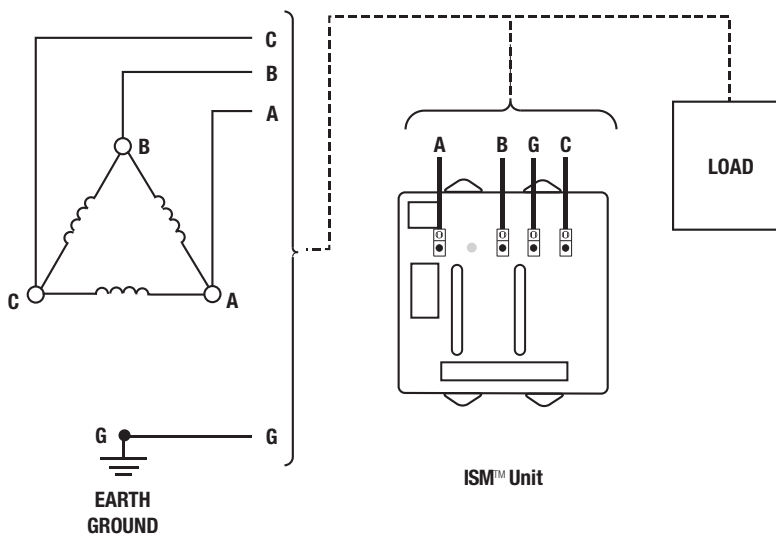


Figure 3
3-Phase, 4-Wire High-Leg DELTA

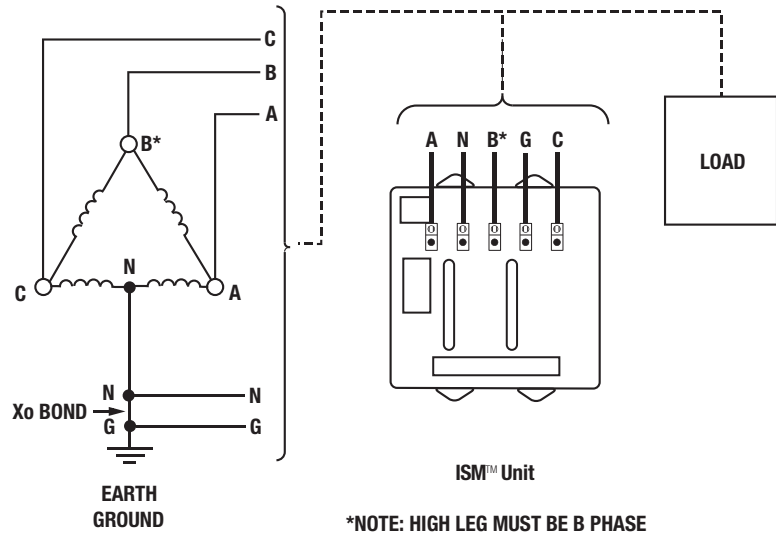
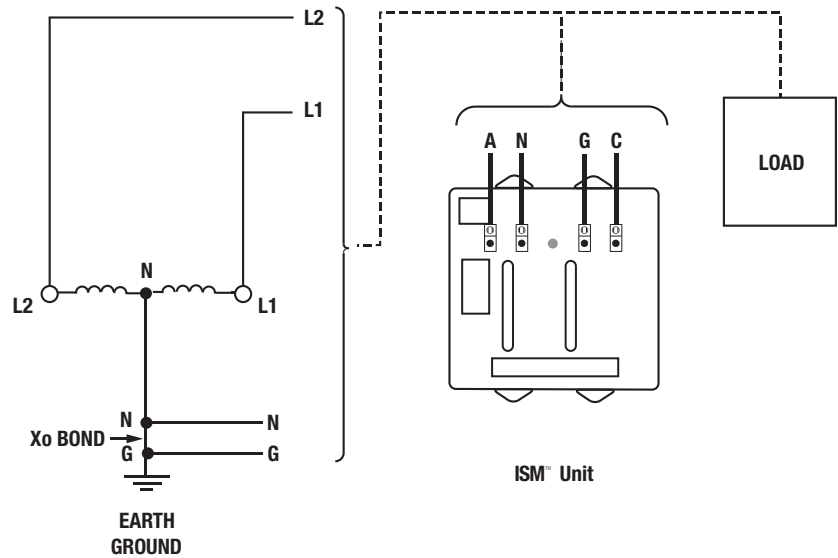


Figure 4
1-Phase, 3-Wire SPLIT-PHASE



Plan Your Installation

△ W A R N I N G ! The performance of the ISM will be severely limited if the conductors are too long, are of too small a wire gauge, have too many bends, or have sharp bends.

These factors should be addressed during the design of an installation to ensure that there is a suitable place reserved for the stand-alone ISM next to its point of connection to the panelboard it is protecting. The selected mounting location should ensure short conductor runs and a minimum of bends. If bends are required they should be sweeping bends. Do not make sharp 90° bends for aesthetic purposes.

Conductor Length and Sizing: Conductor length must be kept as short as possible and avoid sharp bends. The following conductor sizes for phase, ground and neutral connections are recommended.

Table 2: Maximum Recommended Conductor Size

Model	Use conductor lengths less than 10 feet	Max Torque (in-lb)
ISM-050	#6 AWG	45
ISM-080	#6 AWG	45
ISM-100	#6 AWG	45
ISM-125	#2 AWG	50
ISM-150	#2 AWG	50
ISM-200	#2 AWG	50
ISM-250	#2 AWG	50
ISM-300	#2 AWG	50

NOTE: Table 2 conductor sizing recommendations ensure that the effective clamping voltage of the ISM at the point of connection is kept to a minimum in order to maximize protection. Use solid or stranded copper or aluminum conductor with strip length of 0.5".

Overcurrent Protection: When used as a Type 1 SPD, the ISM does not require upstream over current protection for safe operation, however, the design may require or the installer may choose to connect the ISM to a circuit breaker, molded case switch or fused disconnect.

If a breaker or molded case switch is used for connecting the phase conductors, Current Technology® recommends a 100 amp rating.

Conductor Sizing and Overcurrent Protection



Neutral to Ground Filter Jumper

△ W A R N I N G ! Prior to proceeding, ensure the SPD unit does not have voltage applied to its input terminals.

ISM models equipped with an EMI filter system (“-F” suffix), and have a neutral connection, come with a green jumper wire that loops out of the 3-pin connector on the ISM and connects a filter neutral to ground. In certain medical applications, or circuits which employ GFCI protection, this Neutral to Ground filter connection should be removed.

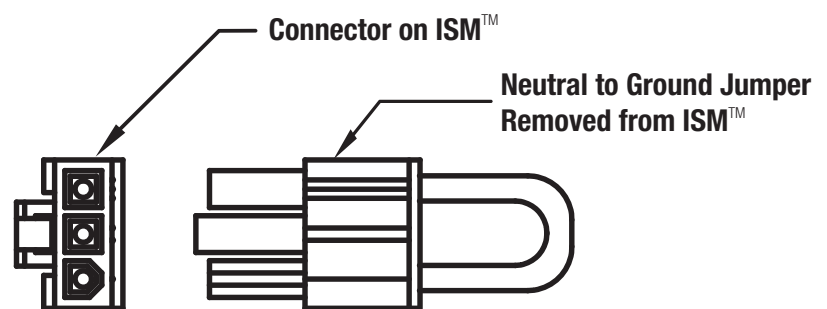


Figure 5

Removal is accomplished by pulling the green jumper from the connector on the ISM. Once removed, the jumper should be placed in the clear vinyl pocket containing the unit test data for future use if desired (Figure 5).

Mounting

For ISM mounting, refer to the appendix for detailed dimensional data. This data is provided to aid in the design and fabrication of custom mounting arrangements unique to each type of open frame installation.

The ISM is in a NEMA 1 enclosure which is suitable for indoor use only. The ISM may be placed inside another enclosure to increase its protection from environmental exposure. NEMA 4 enclosures are suitable for indoor or outdoor use. NEMA 4X (plastic and stainless steel) enclosures are suitable for corrosive environments as well. For direct sunlight applications, Current Technology® suggests shading any optional monitoring components. All conduits and fittings must be rated and properly installed such that the final installation maintains the NEMA rating.

For systems requiring end-use regulatory compliance, Current Technology recommends mounting the ISM inside a sturdy polymeric enclosure (0.125" minimum thickness) or metal enclosure (min 15 gauge) with a minimum clearance of 1/2" from any live electrical connection. End-use regulatory compliance is the responsibility of the end-user.

Electrical Connections

Phases, Neutral* and Ground: Connect the phase, neutral and ground conductors.

** DELTA-configured ISM models do not have a Neutral Lug.*

Before Applying Power Checklist

- ☐ **Field Testing:** Your ISM has been carefully tested before leaving the factory. However, the performance of this unit as a surge suppression device can be confirmed in the field prior to startup using a portable DTS-2 Tester.

The optional DTS-2 Tester may have been purchased along with your ISM or *Field Startup Testing Service* may have been specified during the purchase of the ISM. Check with the owner or owner's representative to see if this test is required at your site.

If you have questions about Field Startup Testing or would like to arrange for this service, call Current Technology® Technical Support at 800.238.5000.

- ☐ **Confirm Pre-Installation Checklist:** Confirm that the "Pre-Installation Checklist" found in the beginning of this manual was completed correctly before proceeding.
- ☐ **Confirm Line Voltage:** Measure the line to line voltages feeding the panelboard or disconnect and be sure they are within $\pm 10\%$ of the rated line voltage of the ISM. Use the following table to determine the range of acceptable voltages for each model of the ISM.

Table 3: Acceptable Voltage Ranges for All ISM Models

ISM MODEL NO.	NOMINAL L-L VOLTAGE	-10% TO +10% L-L VOLTAGE
ISM-xxx-240-2G-x	240	216 to 264
ISM-xxx-208-3Y-x	208	188 to 228
ISM-xxx-380-3Y-x	380	342 to 419
ISM-xxx-480-3Y-x	480	432 to 528
ISM-xxx-600-3Y-x	600	540 to 660
ISM-xxx-240-3H-x	240	216 to 264
ISM-xxx-240-3D-x	240	216 to 264
ISM-xxx-480-3D-x	480	432 to 528
ISM-xxx-600-3D-x	600	540 to 660

Note: "X" specifies filtering option. None if blank.



△ WARNING !

Do not apply power if the measured voltage is not within the range specified for the ISM model being installed.

Verify Proper Operation

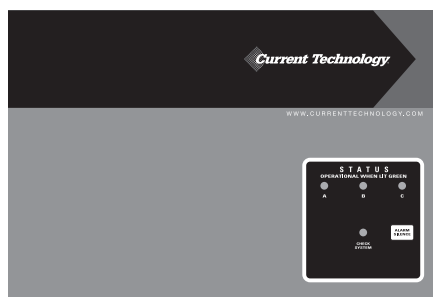


Figure 6
M1X Standard Monitoring

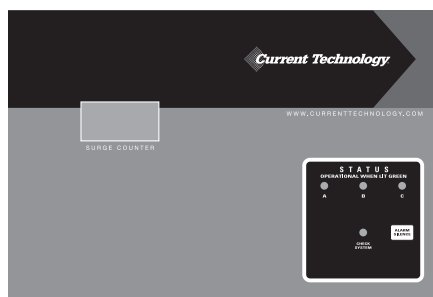


Figure 7
*M2X Standard Monitoring
with Surge Counter*

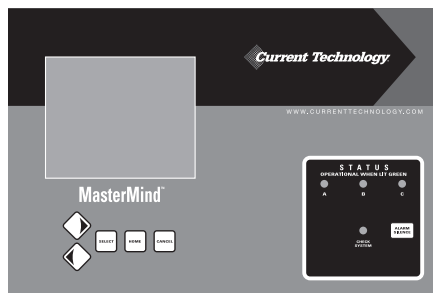


Figure 8
M3X Advanced Monitoring

► If your ISM has M1X Standard Monitoring (See Figure 6):

Verify that only the green indicating lights are illuminated and that there are no red lights illuminated. Green lights indicate a normal condition for each phase. Orange lights indicate protection of 40–75% and Red lights indicate protection of <40%. Three-phase units have three (3) green indicating lights labeled “A,” “B,” and “C.” Split-phase units should only have lights “A” and “C” illuminated. See table below for LED status indication.

The M1X Standard Monitoring is equipped with a dual set of Form “C” dry contacts (Figure 6). The relay containing the contacts is in the “alarm condition” or normally closed when the power is off to the unit, when the unit is encountering loss of power to one or more phases, or the ISM is encountering more than 40% loss of capacity due to internal fuse operation. Test the operation of the Form “C” contacts by de-energizing the ISM and checking the state of the contacts with a continuity tester or observing the effect of the contacts on the user provided remote alarm circuits.

► If your ISM has the M2X Option (See Figure 7):

The M2X option is equipped with a surge counter. The number of surges detected by the ISM is displayed on a 6-digit LCD display on the front of the counter. The surge counter will also increment each time power is applied to the unit after being in the “off” state. The counter can be reset by pressing the button on the front of the counter.

The M1X and M2X Standard Monitoring also contain an audible alarm that should not operate under normal conditions. To silence audible alarm, press ALARM SILENCE button on display.

If your ISM has the M3X option (See Figure 8), please refer to the MasterMind Manual for specifications and operations.

Table 4: LED and Display Alarm Status Conditions

Condition	Corresponding Phase LED	Alarm Cond	M3 Status Message	Priority *
Phase Loss (<80%)	LED Off	Y	“Alarm: Phase x Loss”	1A
Phase Low (80 to <90%)	LED Short Blink Green (≈25% duty)	Y	“Alarm: Phase x Low”	1B
Phase High (>110%)	LED Long Blink Green (≈75% duty)	Y	“Alarm: Phase x High”	1C
N-G OverVoltage	N/A	Y	“Alarm: N-G Voltage High”	2
Frequency Out of Range	N/A	Y	“Alarm: Frequency Out of Range”	3
% Protection < XX%	LED On Red	Y	“Alarm: Protection x Low”	4
Filter/Cap Loss	LED Blink Red once every 2 seconds	Y	“Alarm: Protection Filter x Loss”	5
% Protection XX to YY%	LED On Orange	N	“Alarm: Protection x Reduced”	6

Notes:

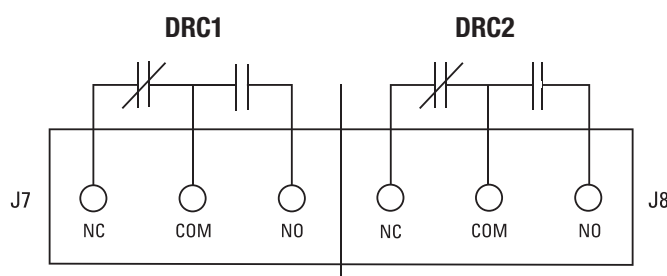
- * 1 Highest priority takes precedence: I.e. if phase is lost, LED is Off, no blinking even if filter loss. Alarm Condition means the Audible Alarm is ON, Dry Relay Contacts is OFF (de-energized), and System Alarm LED is ON.
- 2 % Protection levels of 40% and 75% are default settings which can be changed by the user (M3 System only). If the Surge Module or Current Rating settings are changed, the Protection levels will change automatically.
- ** 3 Subsequent Status message will be displayed on M3 Character and Graphics Displays, where “x” is corresponding Phase (A, B, C or L1, L2). The Highest Priority condition will over-write earlier conditions. Messages may be truncated to fit screen area (with T&B acceptance).
- 4 Red System Status LED will remain on after Status has returned to normal. User must clear the status by pressing the M3 Cancel button.
- 5 Alarm Conditions will also be logged in the Events Log.

Connecting Form “C” Dry Contacts

Dry Contacts: All monitoring assemblies have a dual set of Form “C” dry contacts available for connection to user-provided remote alarm and monitoring circuits.

The installer must provide the appropriate raceway and wiring for this circuit.

Figure 9 shows the Form “C” contact configuration. The annotations on the diagram match the markings on the blue terminal block.

**Figure 9**

FCC TERMINAL BLOCK

• Rated 250V 2A DC, 250V 5A AC, 14-22 AWG

Troubleshooting

Your Current Technology® ISM surge suppression system does not require periodic maintenance. The unit contains no serviceable parts. (Avertissement: Aucune pièce remplaçable ou réparable.) The unit's heavy-duty design should preclude the need for any repairs; however, the following indications and procedures can be checked (see Table 5):

Table 5: Troubleshooting Guide

INDICATION	PROCEDURE
One or more phase indicator lights are off	<ul style="list-style-type: none"> • Check that the external power source supplying power to unit is energized • Check that the circuit breaker or switch (if appropriate) feeding the ISM is turned "on"
Phase status lights are orange, indicating 40–75% protection Phase status lights are red, indicating <40% protection	<ul style="list-style-type: none"> • Check the cables connecting the monitoring devices to the suppression module. <i>Exercise caution as High Voltage is present on monitoring PCBs</i>
	<ul style="list-style-type: none"> • If all of above are O.K., contact factory • If breaker is tripped, use a portable Diagnostic Test Set (DTS-2) to verify unit integrity before resetting the breaker
Portable Diagnostic Test Set (Current Technology® Model DTS-2) indications are not in range* for the product	Contact factory

*Ranges are located on the underside of DTS-2 lid.

Installation Assistance

Our staff is available to support you.

Monday through Friday, 8:00 a.m. to 5:00 p.m. (EST):

800.238.5000 or 804.236.3300 Or, email us at

currenttechnology@tnbpowersolutions.com.

Operation/Maintenance

When properly installed the ISM Surge Suppression System will provide years of uninterrupted service.

With several levels of monitoring available, the user should be able to verify the normal operation of the ISM and confirm that it is connected correctly to the power system.

Current Technology® does recommend testing in order to verify that the unit is able to clamp surges to an acceptable level.

This test should be coordinated with scheduled maintenance events in your facility. It can be performed in-house with the aid of the DTS-2 Portable Test Set or requested as a service from a Current Technology® authorized service representative.

Options

The ISM Surge Suppression System is available with the following options:

MxX	Remote Monitor Extension M1X through M6EX
M0	No Stand Alone Monitoring
M1X	LED/Phase + Audible Alarm, Dry Relay Contacts
M2X	M1 + Surge Counter
M3X	Advanced Monitoring, Character Display, Modbus RTU
M4EX	M3 + Ethernet, Modbus TCP
M5X	Advanced Monitoring, Graphics Display, Modbus RTU
M6EX	M5 + Ethernet, Modbus TCP

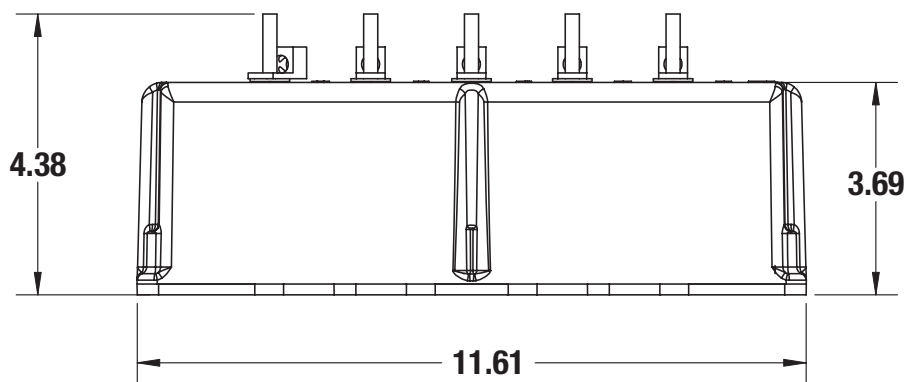
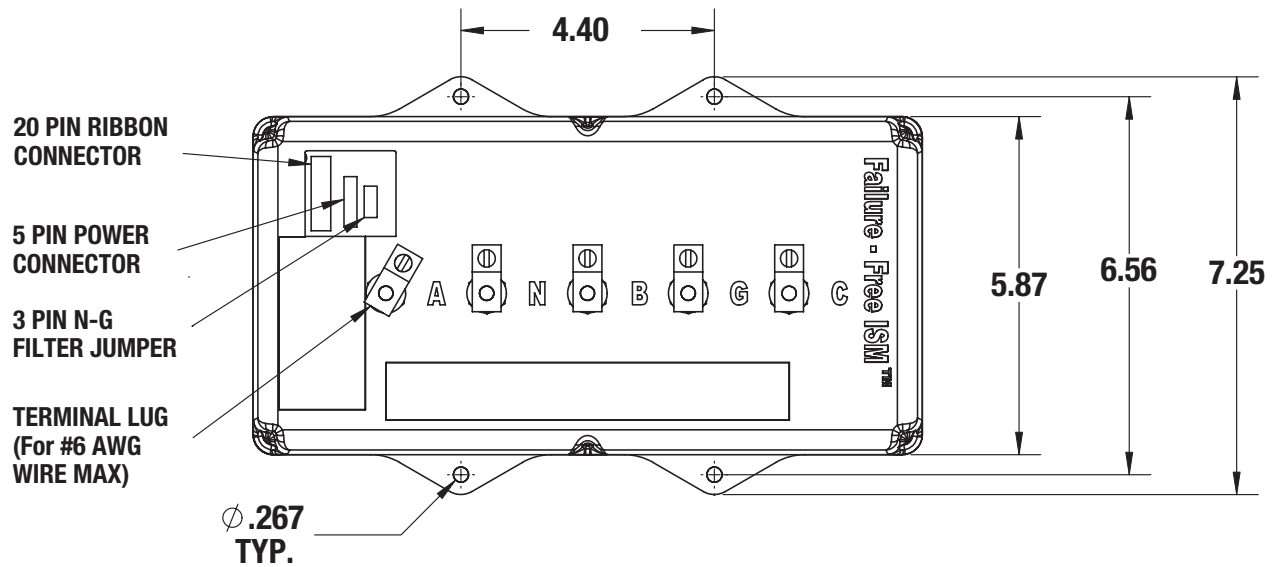
Standards and Listings

The following standards and listings apply to the ISM product line:

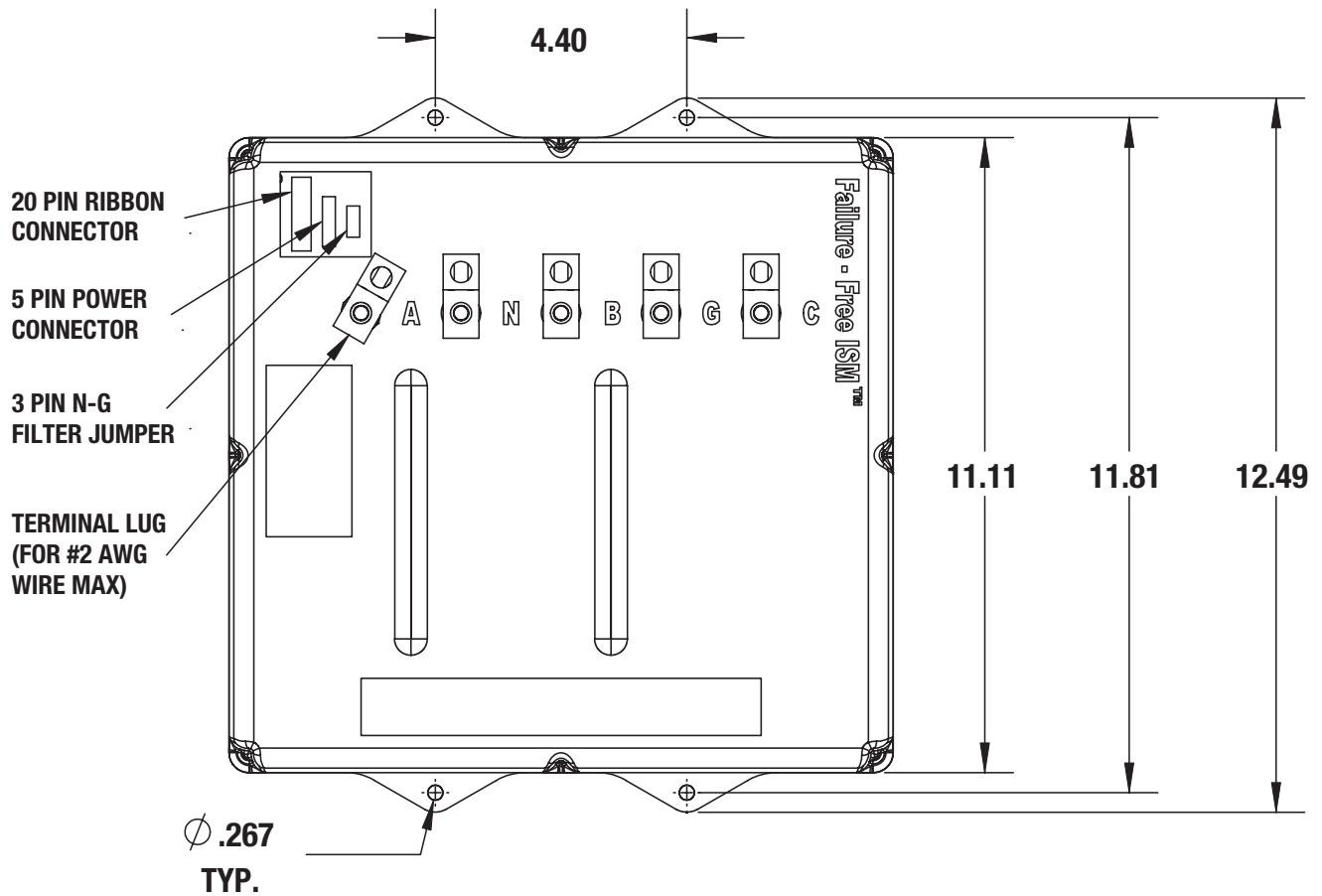
- UL Listed 1449 4th Edition Type 4 component Assembly for Type 1 and Type 2 SPD applications, cUL, and UL 1283
- Meets Requirements for UL 96A
- Compliant to IEEE C62.41.1-2002, C62.41.2-2002 and C62.45-2002
- NFPA 70 [NEC], Article 285
- RoHS Compliant

Appendix

Dimensional Specifications



50kA-100kA



125kA-300kA

15 Year Limited Warranty

Thomas & Betts Power Solutions warrants that ISM suppression filter systems (the "Product"), shall meet applicable industry standards and specifications and be free from defects in materials and/or workmanship. Should any failure of the Product to conform to this warranty appear within fifteen (15) years from the date of the purchase of the Product, Thomas & Betts Power Solutions shall either repair or replace the defective Product, or part thereof, upon return to Thomas & Betts Power Solutions' manufacturing facility in Richmond, Virginia with transportation charges prepaid.

Thomas & Betts Power Solutions shall have no liability under this warranty for any problems or defects directly or indirectly caused by misuse of the Product, alteration of the Product (including removal of any warning labels), accident, neglect or improper installation, application, operation, or repair of the Product.

THE WARRANTY STATED HEREIN IS THE SOLE AND EXCLUSIVE WARRANTY FOR CURRENT TECHNOLOGY® PRODUCTS, AND IS IN LIEU OF ALL OTHER EXPRESS AND IMPLIED WARRANTIES. THOMAS & BETTS POWER SOLUTIONS SPECIFICALLY DISCLAIMS ALL OTHER EXPRESS AND IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Installation, operation, or use of the Product for which this warranty is issued shall constitute acceptance of the terms hereof.

The liability of Thomas & Betts Power Solutions under this warranty is expressly limited to the replacement or repair of the defective Product or the defective part thereof, at Thomas & Betts Power Solutions' sole option.

IN NO EVENT SHALL THOMAS & BETTS POWER SOLUTIONS BE LIABLE FOR SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES OF ANY KIND OR CHARACTER. IN NO EVENT WILL THOMAS & BETTS POWER SOLUTIONS' LIABILITY EVER EXCEED THE PURCHASE PRICE PAID FOR SUCH DEFECTIVE PRODUCT.

This warranty is not transferable and may only be enforced by the purchaser. Claims under this warranty must be submitted to Current Technology® within thirty (30) days of discovery of any ISM product defect.

Warranty Period

ISM 15 Years from original date of purchase

Model #

Date of Purchase

Date Installed

Installer**Thomas & Betts Power Solutions**

5900 Eastport Blvd. • Richmond, VA 23231-4453 USA

Tel: (804) 236-3300 • Toll free: (800) 238-5000 • Fax: (804) 236-4841

tnbpowersolutions.com/current_technology

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