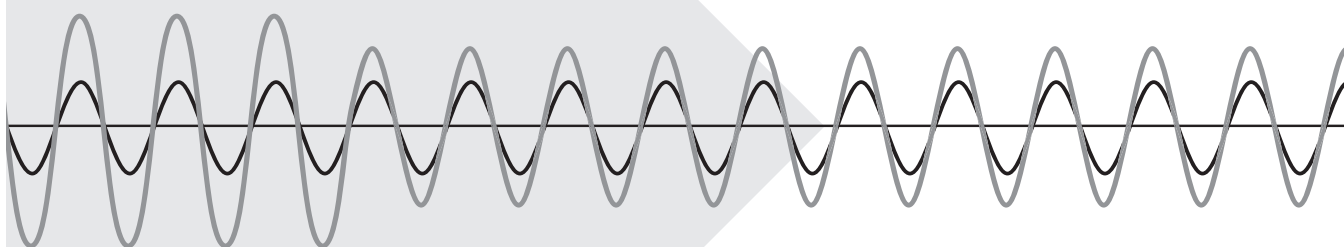


Installation, Operation and Maintenance Manual

PN 750-0072-008 C00



**Selenium Enhanced
Suppression Filter Systems**

Featuring the Failure-Free ISMTM

Select® SL3™ suppression filter systems feature selenium-enhanced surge protection along with a powerful failure-free ISM™ (Integrated Suppression Module). The ISM™ contains individual thermally fused and protected MOVs, surge-rated copper busing, robust filtering and advanced remote communications capabilities. Additionally, the ISM™ selenium-enhanced seamless technology design ensures maximum performance and a dramatically extended product life.

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Guide to Installation and Assistance

Thank you for choosing the Current Technology® SL3 Surge Suppression System. We look forward to fulfilling your facility-wide surge suppression filter system needs.

Should you have questions about installing the SL3 please call Current Technology® Technical Support at 800.238.5000 or 804.236.3300. Support is available Monday through Friday, 8:00 a.m. to 5:00 p.m. EST. You can also email us at currenttechnology@tnbpowersolutions.com

This manual provides guidelines for the proper installation of the SL3 family of devices. 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 SL3 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.



△ W A R N I N G !

HAZARDOUS VOLTAGES PRESENT: Improper installation or misapplication may result in serious personnel injury and/or damage to electrical system. 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.



△ W A R N I N G ! FOR UNITS WITH DTS-2 TESTER: When unit is equipped with an Amphenol test port. Power to the Equipment Under Test (EUT) must be OFF prior to testing. Turn EUT's disconnect switch or upstream circuit breaker to "OFF" position.

△ W A R N I N G ! THE SL3 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.

△ W A R N I N G ! Do not HIPOT the SL3 unit or the electrical system to which the SL3 unit is connected without disconnecting the SL3 conductors including phases, neutral and ground.

Pre-Installation Checklist ☒

- ☐ Confirm that the voltage(s) and service configuration shown on the SL3 product label are consistent with the voltage and service configuration of the system to which it is being attached. A model number is printed on the label affixed to the inside of the SL3 cabinet. Each model number corresponds to the voltage and service configurations as per sample model number scheme in Table 1:

E.g.: SL3-050-208-3Y-MNT-M6E-F2

SL3	—	050	—	208	—	3Y	—	MNT	—	M6E	—	F2
Model		kA Rating		Voltage		Configuration		Enclosure Cable Entry		Monitoring		Filter Option Optional Feature

kA Rating

Available SL3™ 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

Enclosure

MN	Metal Without Disconnect
MD	Metal With Disconnect
SN	Stainless Steel Without Disconnect
SD	Stainless Steel With Disconnect

Disconnect available on 125kA systems and above

Cable Entry

T	Top Feed
B	Bottom Feed

Monitoring

M0	No local monitoring (see remote MxX stand-alone option)
M1	LED/Phase + Audible Alarm, Dry Relay Contacts
M2	M1 + Surge Counter
M3	Advanced Monitoring, Character Display, Modbus RTU
M4E	M3 + Ethernet, Modbus TCP
M5	Advanced Monitoring, Graphics Display, Modbus RTU
M6E	M5 + Ethernet, Modbus TCP

Filter

F	Filter
N	No Filter

Optional Features

2	Test Port
4	Enhanced Selenium

Enhanced selenium available on 125kA systems and above

Stand-Alone Options

(Ordered As Separate Items)

DTS	DTS-2 Diagnostic Test Set
MxX	Remote Monitor Extension M1X through M6EX
HPI	HPI Cable

*Consult factory for additional Voltage/Configuration options.

An area on the back cover of this manual is allocated to log your SL3 model number, purchase date, installation date, and installer

Table 1: Sample Model Number Scheme (SL3)

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 SL3 devices (see NEC article 250.) Lack of a proper bond will damage the SL3 and void the warranty.
- ☐ Confirm that the environmental conditions are consistent with the following ranges:
 - Ambient Temperatures: The SL3 must be installed in an area with a temperature between -13° and +140°F (-25° and +60°C).
 - Humidity: The SL3 must be installed in an area with relative humidity between 5% and 95% non-condensing.
 - Altitude: The SL3 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 pre-installation checklist 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 SL3 is a Type 1 SPD which is suitable for use in both Type 1 and Type 2 SPD applications. The SL3 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 SL3 be equipped with the optional integral disconnect switch.

Service Configurations

Figures 1–4 show the electrical relationship between the SL3 and these four basic service configurations: Wye, Delta, High-Leg Delta and Split-Phase.

Figure 1
3-Phase, 4-Wire Wye

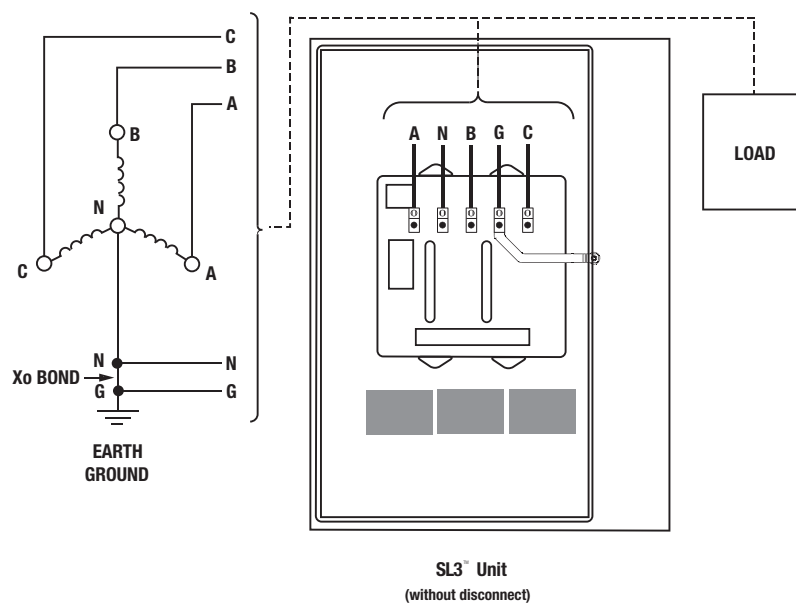


Figure 2
3-Phase, 3-Wire Delta

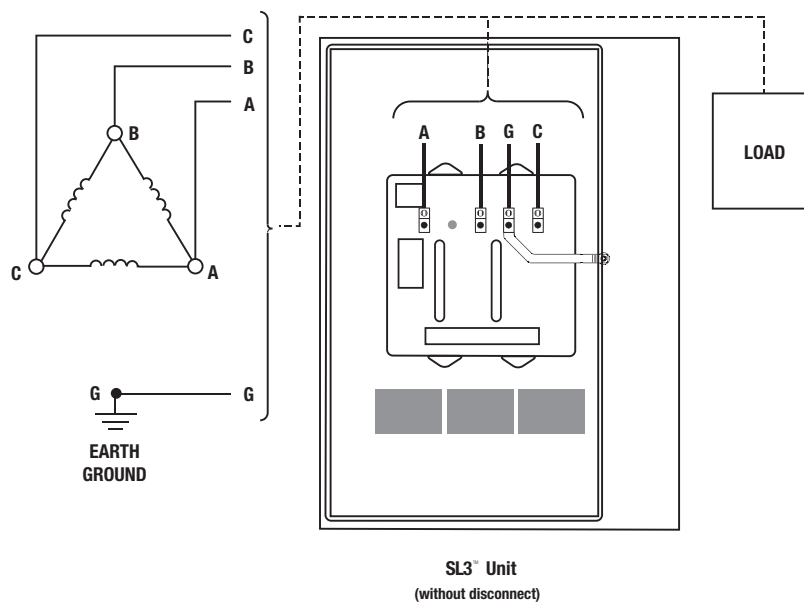


Figure 3
3-Phase, 4-Wire High-Leg Delta

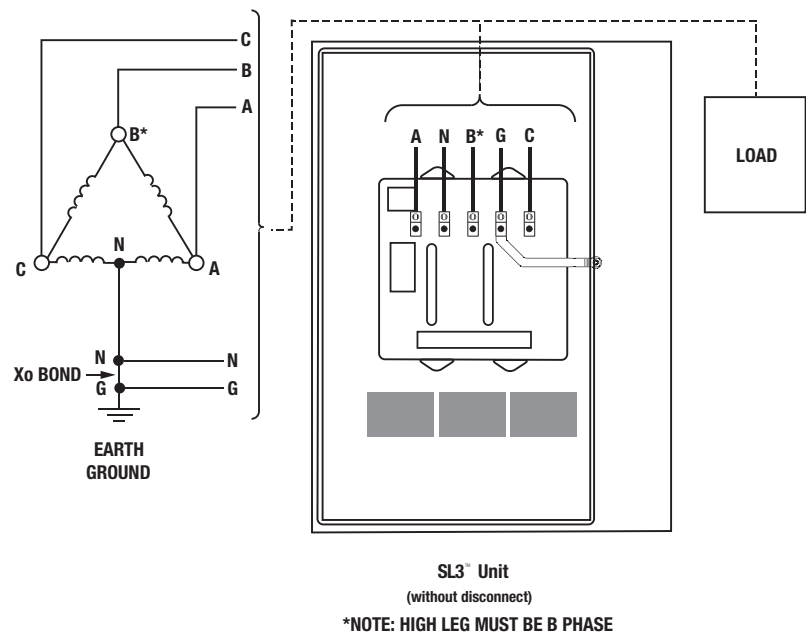
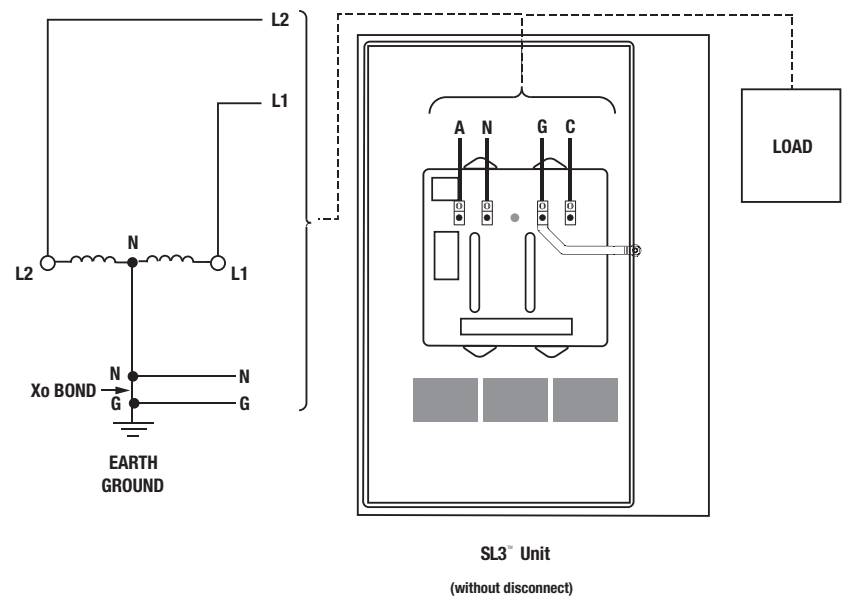


Figure 4
1-Phase, 3-Wire Split-Phase



Plan Your Installation

△ W A R N I N G ! The performance of the SL3 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 SL3 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 Sizing and Overcurrent Protection

Conductor Length and Sizing: Conductor length must be kept as short as possible and avoid sharp bends. Conductor length must never exceed 10 feet in length from phase bus through the SL3 to the neutral bus or ground bus. If the lead length must exceed 10 feet, Current Technology recommends using our HPI low impedance cable for installing the product. 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
SL3-050	#6 AWG
SL3-080	#6 AWG
SL3-100	#6 AWG
SL3-125	#2 AWG
SL3-150	#2 AWG
SL3-200	#2 AWG
SL3-250	#2 AWG
SL3-300	#2 AWG

NOTE: Table 2 conductor sizing recommendations ensure that the effective clamping voltage of the SL3 at the point of connection is kept to a minimum in order to maximize protection.

Overcurrent Protection: As a Type 1 SPD the SL3 does not require upstream overcurrent protection for safe operation, however, the design may require or the installer may choose to connect the SL3 to a circuit breaker, molded case switch or fused disconnect.

Indoor vs Outdoor Installations

NEMA 12 enclosures are suitable for Indoor use only. 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 the monitoring components. All conduits and fittings must be rated and properly installed such that the final installation maintains the NEMA rating.

Current Technology® recommends feeding all SL3 models not equipped with an integral disconnect with 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.

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

Neutral to Ground Filter Jumper

SL3 models equipped with a 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.

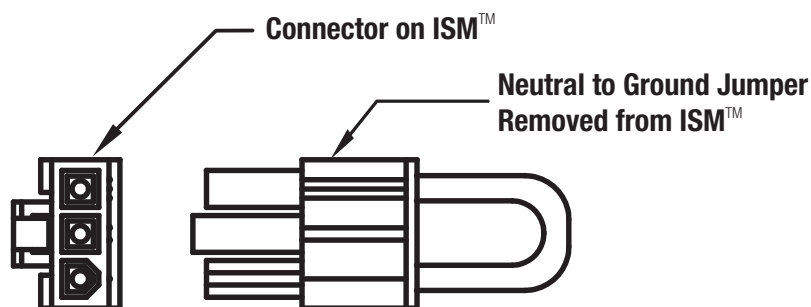


Figure 5

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).

Conduit Openings

Punch holes only in the shaded areas as shown in the following illustration.

Figure 6
Standard: Top Feed SL3™ Products
(Metallic Enclosure, NEMA 4/12)

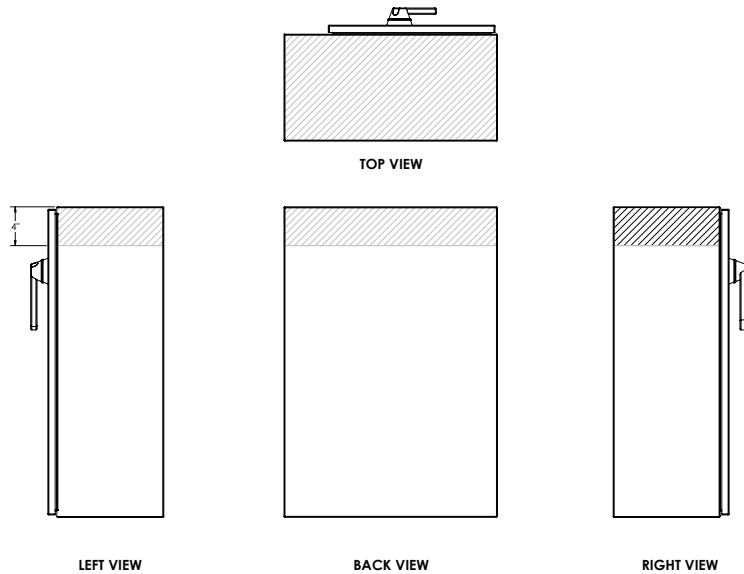
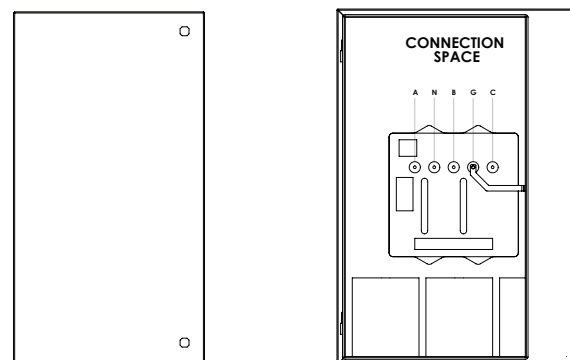
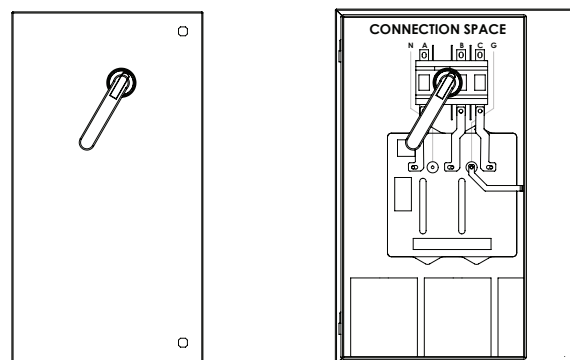


Figure 7
Typical Enclosure Configurations
for Top-Feed Products
(Metallic Enclosure, NEMA 4/12)



Top Feed SL3™ without Disconnect



Top Feed SL3™ with Disconnect

Punch holes only in the shaded areas as shown in the following illustration.

Figure 8
Option: Bottom-Feed SL3™ Products
(Metallic Enclosure, NEMA 4/12)

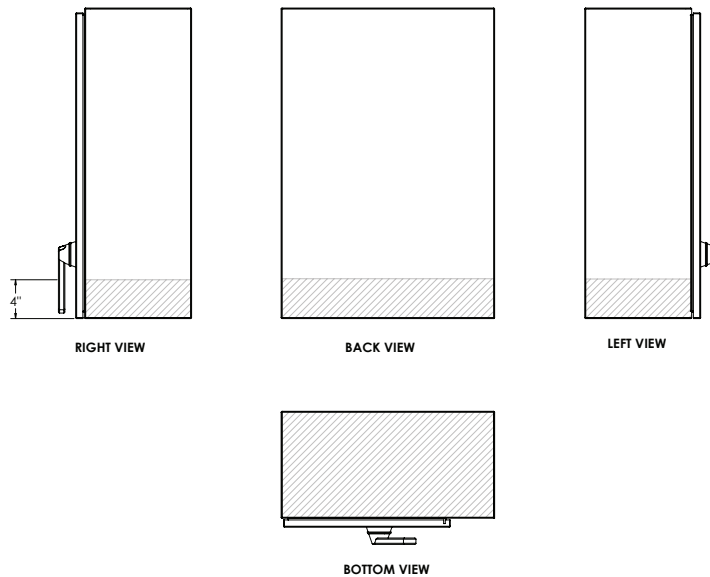
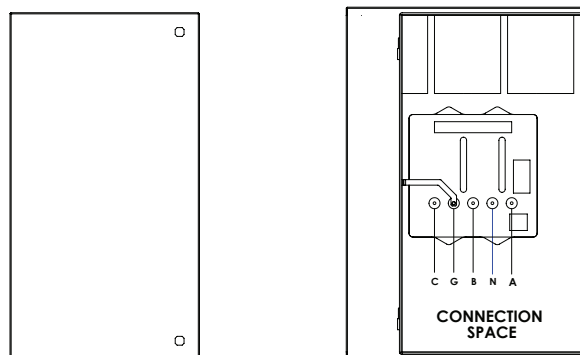
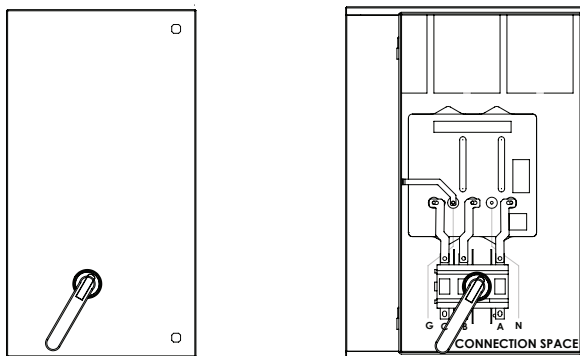


Figure 9
Typical Enclosure Configurations
for Bottom-Feed Products
(Metallic Enclosure, NEMA 4/12)



Bottom Feed SL3™ without Disconnect



Bottom Feed SL3™ with Disconnect

Mounting

Mount the SL3 to the building structure using construction methods and hardware appropriate for your site. Install the conduit and pull the conductors as specified in Figures 6–9 or according to the engineer's design.

Electrical Connections

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

For SL3 models equipped with an integral disconnect switch, remove the disconnect barrier, connect the phase conductors to the line-side lugs on the disconnect and the ground and neutral* conductors to the lugs labeled “G” and “N” on the blue device (ISM). Reinstall the disconnect barrier once all terminations have been made.

For SL3 models without an integral disconnect switch, connect the phase conductors to the lugs labeled “A”, “B”, and “C” on the ISM and the ground and neutral* conductors to the lugs labeled “G” and “N”.

** Delta-configured SL3 models do not have a Neutral Lug.*

Before Applying Power Checklist

- ☐ **Field Testing:** Your SL3 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 SL3 or *Field Startup Testing Service* may have been specified during the purchase of the SL3. 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 SL3. Use the following table to determine the range of acceptable voltages for each model of the SL3. The power system operating frequency is between 47–63 Hz.

Table 3: Acceptable Voltage Ranges for All SL3 Models

SL3 MODEL NO.	NOMINAL L-L VOLTAGE	-10% TO +10% L-L VOLTAGE
SL3-xxx-240-2G-xxx-xx-xx	240	216 to 264
SL3-xxx-208-3Y-xxx-xx-xx	208	188 to 228
SL3-xxx-380-3Y-xxx-xx-xx	380	342 to 419
SL3-xxx-480-3Y-xxx-xx-xx	480	432 to 528
SL3-xxx-600-3Y-xxx-xx-xx	600	540 to 660
SL3-xxx-240-3H-xxx-xx-xx	240	216 to 264
SL3-xxx-240-3D-xxx-xx-xx	240	216 to 264
SL3-xxx-480-3D-xxx-xx-xx	480	432 to 528
SL3-xxx-600-3D-xxx-xx-xx	600	540 to 660

Note: First "xxx" specifies rating of 050, 080, 100, 125, 150, 200, 250, 300kA

WARNING!

Do not apply power if the measured voltage is not within the range specified for the SL3 model being installed.

- Apply power to the SL3 by closing the circuit breaker or switch (if any) feeding the SL3 or closing the SL3 integral disconnect.



Verify Proper Operation

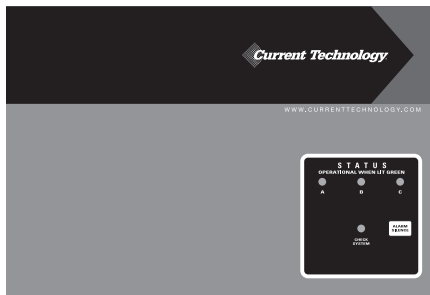


Figure 10

SL3 with M1 Standard Monitoring.

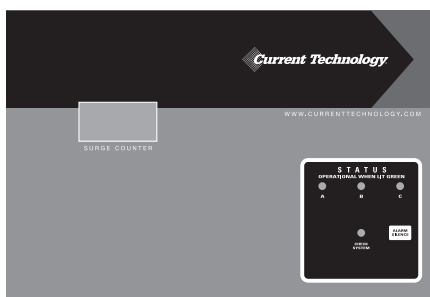


Figure 11

*SL3 with M2 Standard Monitoring
with Surge Counter.*

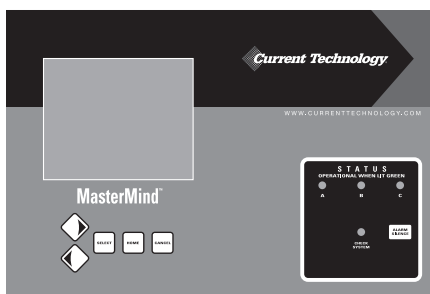


Figure 12

*SL3 with Mastermind® Advanced
Monitoring*

► If your SL3 has M1 Standard Monitoring (see Figure 10):

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 4 for LED status indication.

The M1 Standard Monitoring is equipped with a dual set of Form “C” contacts (see Figure 10). 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 SL3 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 SL3 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 SL3 has the M2 Option (see Figure 11):

The M2 option is equipped with a surge counter. The number of surges detected by the counter is displayed on a 6-digit LCD display on the front of the SL3 door. 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 M1 and M2 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 SL3 is equipped with the Mastermind® Advanced Monitoring Option (see Figure 12) Please refer to the Mastermind manual for Specifications and Operation.

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
Selenium Loss	LED Blink Red twice every 2 seconds	Y	"Alarm: Protection Selenium x Loss"	6
% Protection XX to YY%	LED On Orange	N	"Alarm: Protection x Reduced"	6

Notes:

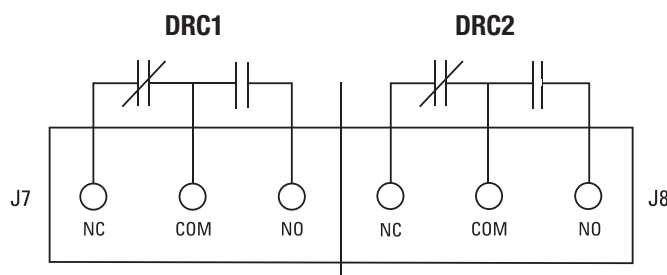
- * 1 Highest priority takes precedence: I.e. if phase is lost, LED is Off, no blinking even if filter loss. Alarm Condition means the Audible Alarm is ON, Dry Relay Contacts is OFF (de-energized), and System Alarm LED is ON.
- 2 % Protection levels of 40% and 75% are default settings which can be changed 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 SL3 models 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 observing the restrictions on conduit openings illustrated in an earlier section of this manual. The installer must route the monitoring conductors to the blue terminal blocks on the door-mounted circuit board. Choose the appropriate materials and routing to allow the door to open and close without pinching or stressing wires.

Figure 13 shows the Form "C" contact configuration. The annotations on the diagram match the markings on the blue terminal block.

**Figure 13**

FCC TERMINAL BLOCK

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

Troubleshooting

Your Current Technology® SL3 surge suppression system does not require periodic maintenance. The unit contains no serviceable parts. 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 Checklist

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 SL3 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 door-mounted devices to the suppression module. <i>Exercise caution as High Voltage is present on door mounted 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**

Operation/Maintenance

When properly installed the SL3 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 SL3 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 SL3 Surge Suppression System is available with the following options:

M1	LED/Phase + Audible Alarm, Dry Relay Contacts
M2	M1 + Surge Counter
M3	Advanced Monitoring, Character Display, Modbus RTU
M4E	M3 + Ethernet, Modbus TCP
M5	Advanced Monitoring, Graphics Display, Modbus RTU
M6E	M5 + Ethernet, Modbus TCP

Stand-Alone Options

DTS	DTS-2 Diagnostic Test Set
MxX	Remote Monitor Extension M1X through M6EX
HPI	HPI Cable

Standards and Listings

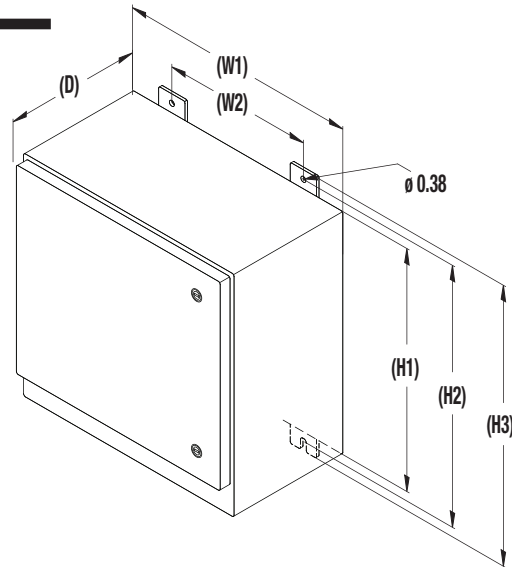
The following standards and listings apply to the SL3 product line:

- UL Listed 1449 4th Edition 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

Appendix

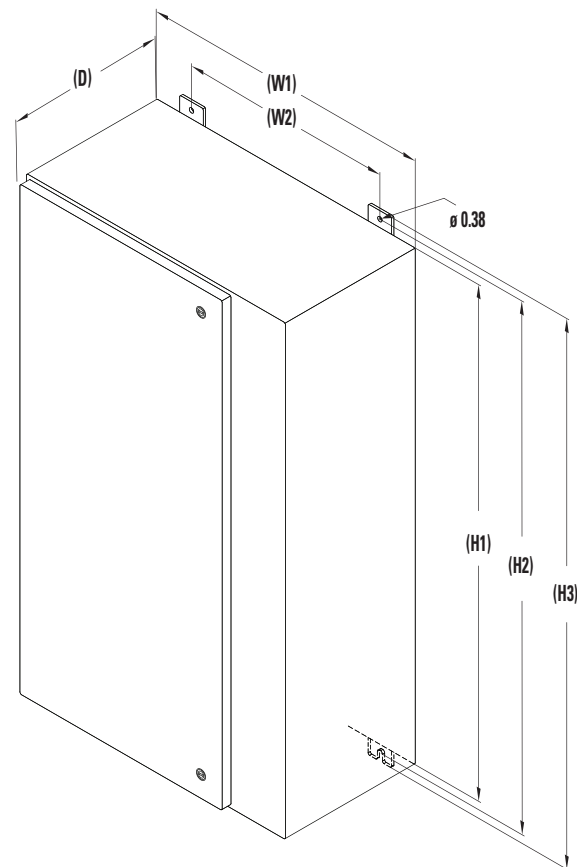
Dimensional Specifications

Figure 14
SL3™ 050 – 100



SL3™	Inches	(mm)
H1	16.00	(406.4)
H2	17.25	(438.2)
H3	18.50	(469.9)
W1	16.00	(406.4)
W2	10.00	(254.0)
D	9.20	(233.7)

Figure 15
SL3™ 125 – 300



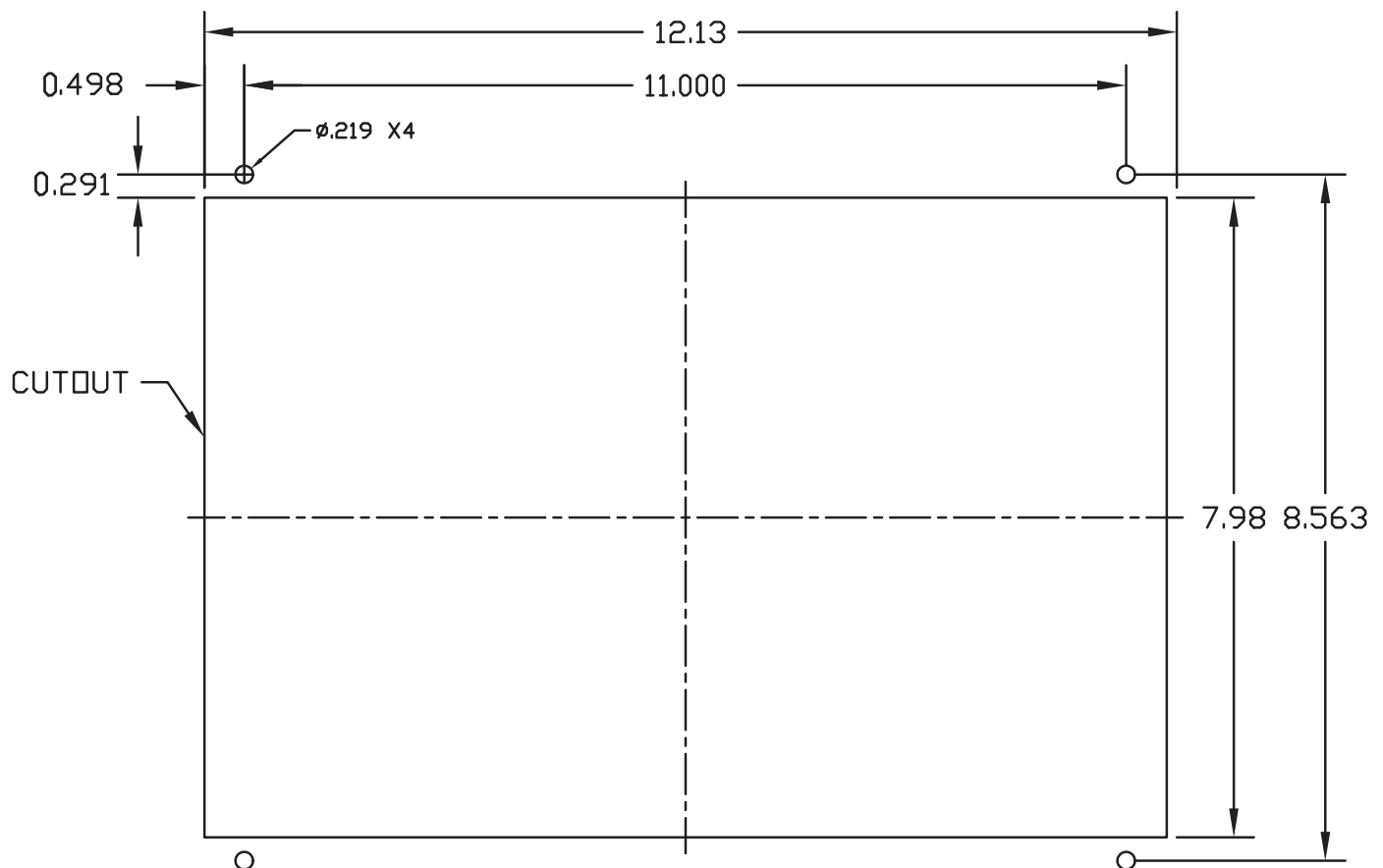
SL3™	Inches	(mm)
H1	32.00	(812.8)
H2	33.25	(844.6)
H3	34.50	(876.3)
W1	22.00	(558.8)
W2	16.00	(406.4)
D	11.95	(303.5)

Dimensional Specifications

continued

MODEL	ENCLOSURE SIZE/WEIGHT
SL3™ 50–100	16"H x 16"W x 9.2"D 42 lbs.
SL3™ 125–300	32"H x 22"W x 11.95"D 85 lbs.

M1/M2 Mounting Cutout Template



Note: All dimensions are in inches

20 Year Limited Warranty

Thomas & Betts Power Solutions, LLC, A Member of the ABB Group ("Seller") warrants that your Current Technology® Surge Protective Device (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 the standard warranty period, Seller shall either repair or replace the defective Product, or part thereof, upon return to Seller's manufacturing facility in Richmond, Virginia with transportation charges prepaid.

Seller 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. SELLER 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 Seller under this warranty is expressly limited to the replacement or repair of the defective Product or the defective part thereof, at Seller's sole option.

IN NO EVENT SHALL SELLER BE LIABLE FOR SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES OF ANY KIND OR CHARACTER. IN NO EVENT WILL SELLER 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 Seller within thirty (30) days of discovery of any Product defect.

Model #

Date of Purchase

Date Installed

Installer

Warranty Period

SL3™ 20 Years from original date of purchase



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