

# MCG Surge Protection

## MODELS 120LS, 200LS, 300LS, 400LS, 560LS INSTALLATION INSTRUCTIONS

**Important Warranty Information:** *MCG surge protectors are designed to work at specific voltages and configurations, for example, at 120/208VAC, Wye. Installation of the surge protector improperly on a power system will automatically void the warranty.*

### 1. Confirm Model with Power Service

Measure Phase - Neutral, Phase - Phase, and Phase - Ground with voltmeter to confirm application voltage prior to installation.

120LS-, 200LS-, 300LS-, 400LS-, 560LS-	Power Service	Description	Wiring Diagrams (pg. 2-4)
120S	120 VAC	1 ph, 2W+G Single phase	1
120T	120/240 VAC	1 ph, 3W+G Split phase	2
120Y	120/208 VAC	3 ph, 4W+G Wye	4
220Y	220/380 VAC	3 ph, 4W+G Wye	4
220S	220 VAC	1 ph, 2W+G Single phase	1
240Y	240/415 VAC	3 ph, 4W+G Wye	4
240S	240 VAC	1 ph, 2W+G Single phase	1
240DCT	240/120/120 VAC	3 ph, 4W+G High-leg Delta	3
277Y	277/480 VAC	3 ph, 4W+G Wye	4
347Y	347/600 VAC	3 ph, 4W+G Wye	4
240D	240 VAC	3 ph, 3W+G Delta	5
480D	480 VAC	3 ph, 3W+G Delta	5
600D	600 VAC	3 ph, 3W+G Delta	5

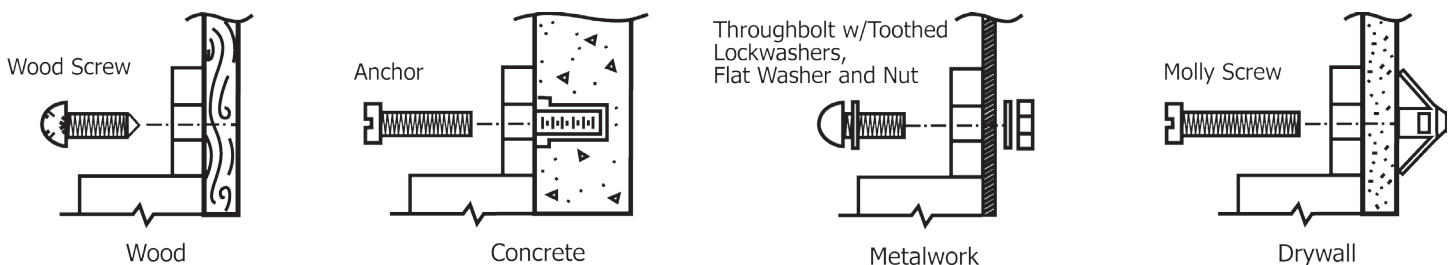
### 2. Disconnect Power Before Installation

All wiring to be done in accordance with National Electric Code and local codes by qualified electricians.

Note: This device features 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 instructions for servicing the device.

### 3. Mounting

For best performance, mount protector as close to service panel as possible. Secure unit to mounting surface. Use proper fasteners as indicated. (Fasteners not supplied.)



Note 1) Recommended screw torque for cover clamp screws: 75 in-lbs.

Note 2) For outdoor use, use a 1" watertight conduit hub.

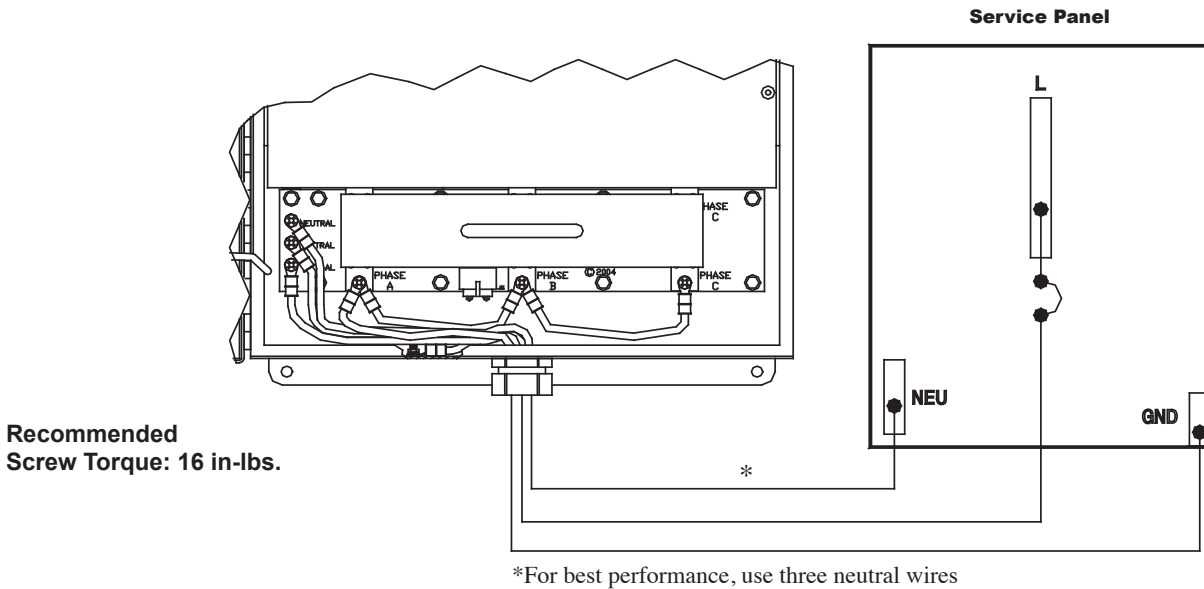
## 4. Wiring

**CAUTION:** Protector must be connected to a dedicated overcurrent device sized for the protector’s wires: For example, if 10 AWG wires are used, then a 30A UL489 Listed circuit breaker shall be used. These protectors are suitable for use on a circuit capable of delivering not more than 100,000 rms symmetrical Amperes (See also note at bottom of page). 10 AWG supply wire required.

Note: Internal views shown represent models with optional disconnect switch. For models without disconnect switch, connect phase wires to top terminals labelled Phase A, Phase B, and Phase C.

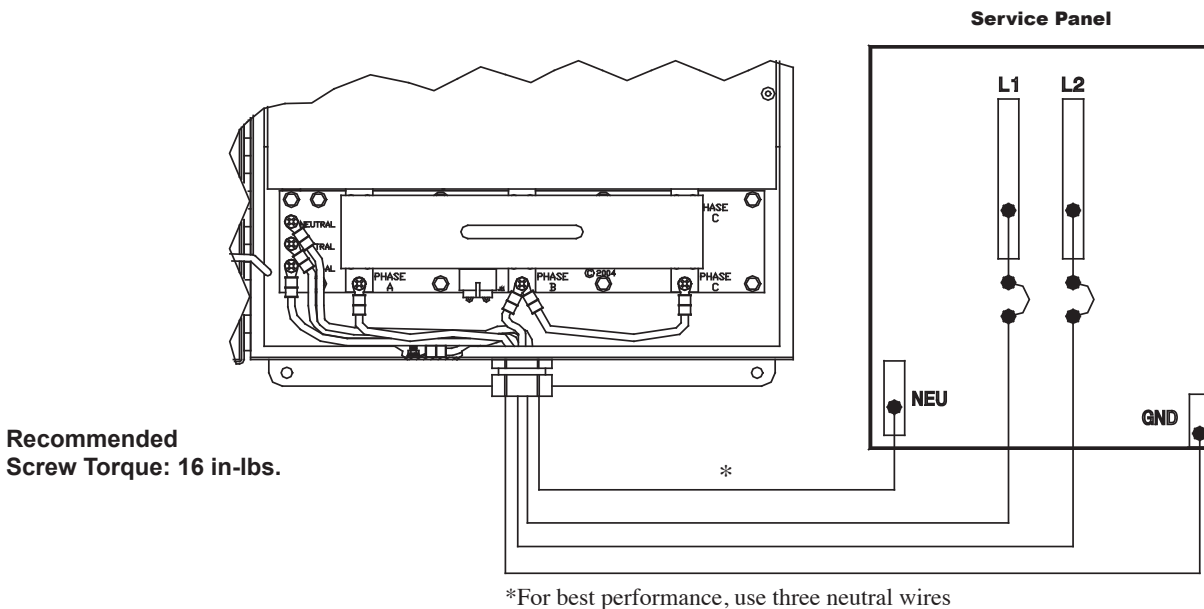
### Wiring Diagram 1: For -120S Models

Note: All three phases are jumped together (Ph. A - Ph. B jumper, Ph. B - Ph. C jumper). Connect hot lead to Phase A terminal.



### Wiring Diagram 2: For -120T Models

Note: Phase B and Phase C are jumped together. Connect L1 lead to Phase A terminal and L2 lead to Phase B terminal.

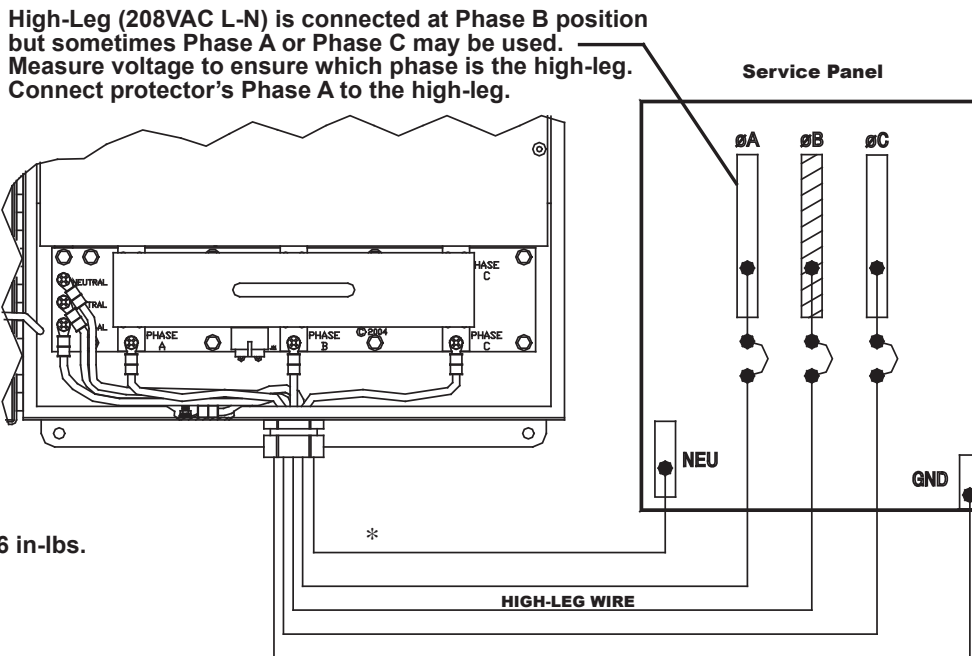


\* Models 560LS-240D, 560LS-277Y, 560LS-347Y, 560LS-480D, and 560LS-600D are suitable for use on a circuit system capable of delivering not more than 5,000 rms symmetrical Amperes.

# 4. Wiring (con't)

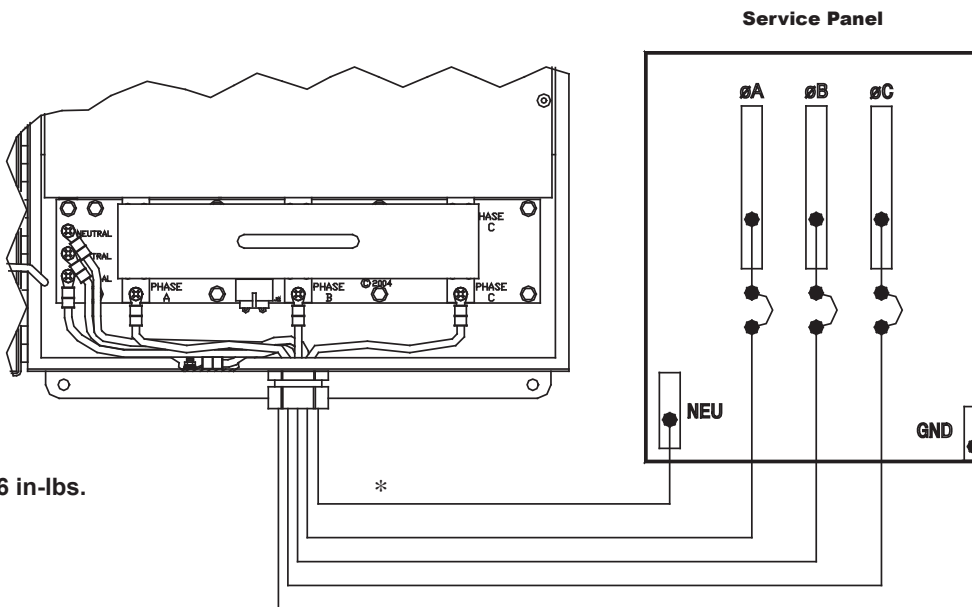
## Wiring Diagram 3: For -240DCT Models

Important: Protector Phase A MUST be connected to Service Panel's High-Leg Phase. Use voltmeter to confirm High-Leg Phase (typically 208VAC L-N)



Recommended Screw Torque: 16 in-lbs.

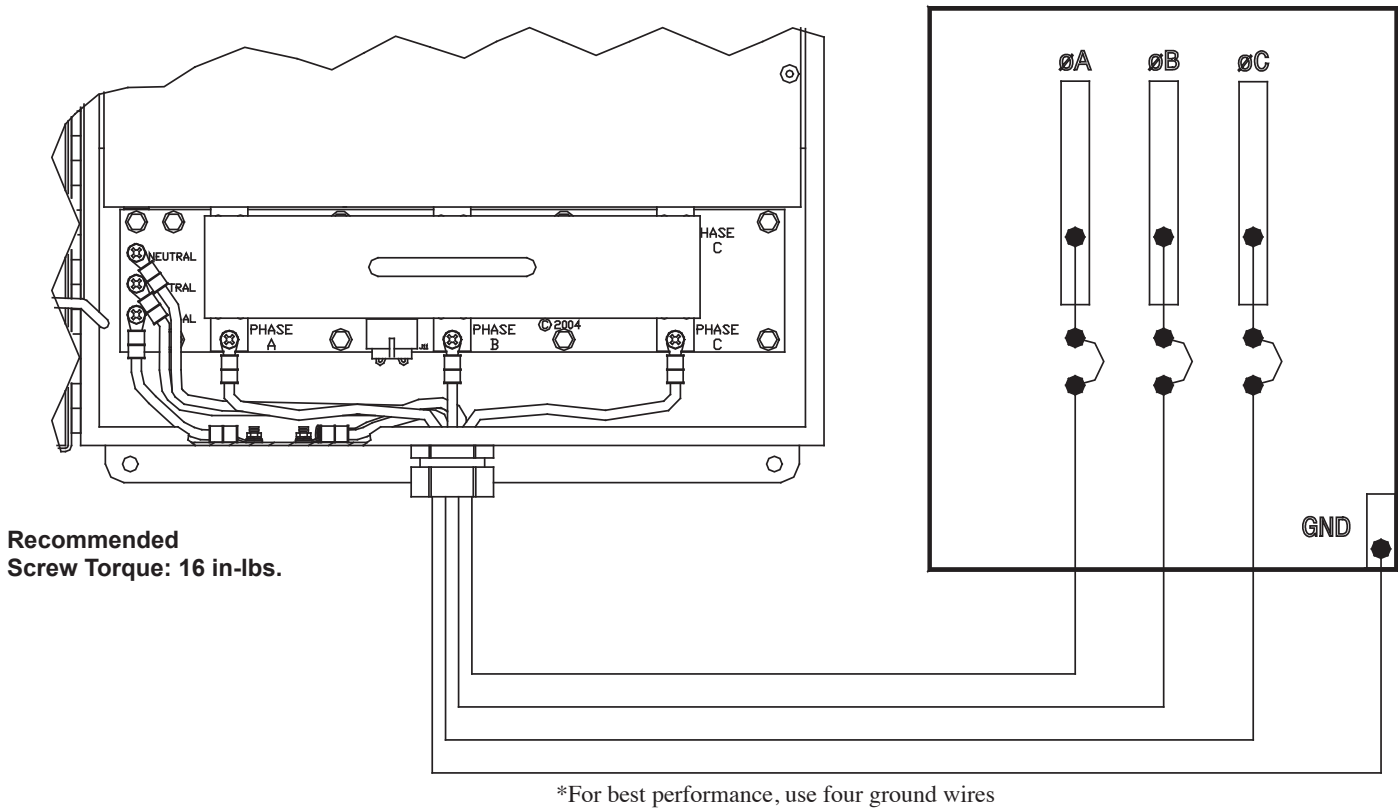
## Wiring Diagram 4: For Models -120Y, -220Y, -240Y, 277Y, -347Y



Recommended Screw Torque: 16 in-lbs.

## 4: Wiring (Con't)

**Wiring Diagram 5:** For Models -240D, -480D, -600D



## 5. Powering Up the Protector

To prevent possible electrical hazard, door on protector **MUST** be closed before applying power. Upon power up, the front panel will show the following:

**For models without Upgraded Front Panel option (which includes a counter, beeper, relay)**

- a. Green LED illuminated, Red LED extinguished.

If any other condition is observed, remove power and contact MCG at 1-800-851-1508 for assistance.

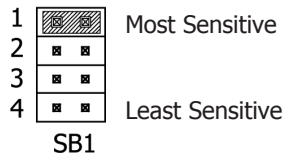
**For models with Upgraded Front Panel option**

- a. Blue LED illuminated, Red LED extinguished.
- b. Counter will read "0" or a nonzero value.

If any other condition is observed, remove power and contact MCG at 1-800-851-1508 for assistance.

## 6. Counter Trigger Sensitivity (Models with Upgraded Front Panel option)

The event counter sensitivity is preset at the factory to its most sensitive position. If you observe too many counts on the front panel, you can decrease the sensitivity of the counter. Protection is not affected. See *Appendix 2: Inside View (Page 10)*



To access the counter’s sensitivity adjustment:

- Remove power. Loosen clamps and open door – DO NOT TOUCH ANYTHING - HIGH VOLTAGE PRESENT.
- Observe circuit board mounted on back of door.
- Locate shorting block labeled SB1. Note: The shorting block is a small, black plastic jumper that connects two points together electrically. To remove it, simply pull it straight out.
- For the highest sensitivity, move the shorting block to the top-most position-Position 1.
- For the lowest sensitivity, move the shorting block to the bottom-most position-Position 4.
- Close door and secure clamps. Restore power.

## 7. Counter Reset Feature (Models with Upgraded Front Panel option)

This feature resets the surge counter back to zero. The counter reset feature is generally only exercised at time of installation, where power up may have caused an event. A monthly log is recommended to keep track of transient occurrences. See *Appendix 2: Inside View (Page 10)*

To reset event counter:

- Loosen clamps and open door – DO NOT TOUCH ANYTHING – HIGH VOLTAGE PRESENT.
- Observe circuit board mounted on back of door.
- Locate switch on board marked “SW2”.
- Press SW2 to reset counter back to zero.
- Close door and secure clamps.
- Observe that counter reads zero.



## 8. Remote Relay Feature (Models with Upgraded Front Panel option)

This feature enables you to operate a remote beeper/indicator light for monitoring the surge protector status from a remote location. It can also be connected to a building monitoring system as the relay provides a Normally Closed or a Normally Open contact. See *Appendix 2: Inside View (Page 10)*

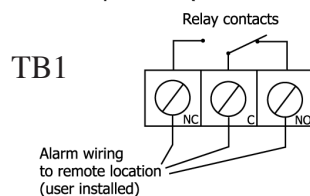
Note 1) Class 2 Wiring Only. 14-22 AWG.

Note 2) TB1 recommended screw torque: 7 in-lbs.

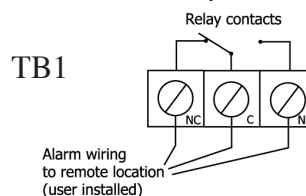
To access remote relay terminal block:

- Loosen clamps and open door – DO NOT TOUCH ANYTHING – HIGH VOLTAGE PRESENT.
- Observe circuit board mounted on back of door
- Locate TB1 on front panel
- There are three terminals, each labeled NC (Normally Closed), C (Common), and NO (Normally Open). These are 1 Form C contacts rated at 1A, 30VDC. Maximum switched power: 30W.
- Connect remote monitoring circuit (user supplied) to the appropriate terminals.
- Close door and secure clamps.

Normal Operation (100% Protection)



Reduced Protection (or Power Off)



## 9. Disconnect Switch (Models with Disconnect Switch option)

This feature allows the user to locally remove power. Once this is done, the unit can be serviced and the protection module(s) requiring replacement can now be removed without shutting off the upstream overcurrent disconnect. This feature does not take the place of the upstream overcurrent device (i.e. circuit breaker). See *Appendix 2: Inside View (Page 10)*

To remove power to protection modules via the internal disconnect switch:

- Loosen clamps and open door – DO NOT TOUCH ANYTHING – HIGH VOLTAGE PRESENT.
- Observe disconnect switch ( white plastic enclosure with black handle ) at bottom of unit located directly above power terminals
- Grasp handle and firmly pull on handle straight towards you. Observe all lights out on front panel as well as all internal lights. CAUTION: LINE SIDE OF SWITCH TERMINALS REMAIN ENERGIZED EVEN WHILE SWITCH IS OUT. For module replacement, see next section (Section 12. Troubleshooting and maintenance).
- To reapply power, line up cylindrical contacts of switch with fuse clips (DO NOT TOUCH CLIPS), seat switch by pressing firmly on handle and/or white enclosure.
- Observe internal green lights and external green/blue light illuminated.

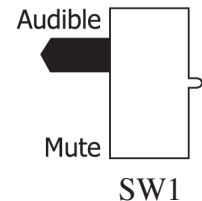
## 10. Beeper Mute Feature (Models with Upgraded Front Panel option)

The audible alarm will sound if a fault exists and SW1 on front panel circuit board is set to the “Audible” position.

Note: The beeper Mute switch is factory set to the “Audible” position.

To access the mute switch:

- Loosen clamps and open door – DO NOT TOUCH ANYTHING – HIGH VOLTAGE PRESENT.
- Observe circuit board mounted on back of front door.
- Locate slide switch labeled “SW1” (Audible/Mute).
- Move switch to the desired position. Switch is factory set to AUDIBLE position.
- Close door and secure clamps.



MCG surge protectors do not require any periodic maintenance. However, if the red “Protection Reduced” light on the front panel is illuminated, a fault condition exists. See *Appendix 2: Inside View (Page 10)*. When this occurs, follow the procedure below:

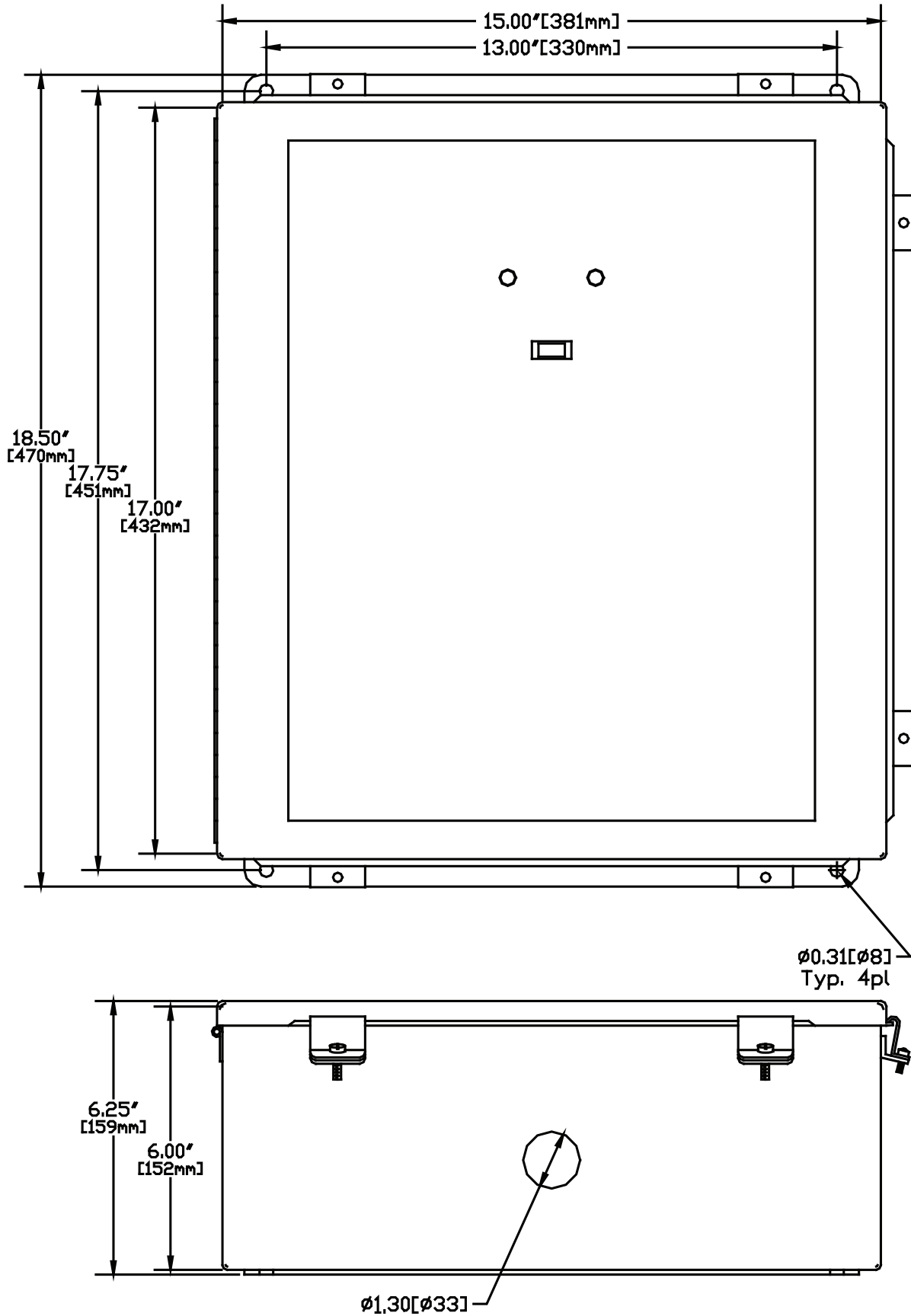
- a. Loosen clamps and open door – DO NOT TOUCH ANYTHING.
- b. Observe status lights next to modules – they are labeled (DS1, DS2, DS3, and DS4). These lights are green when the module protection circuits are 100% operational but change to red when there is a reduced protection condition.  
*Note: DS5 is not a module status light, it is the power supply monitoring light and it is always illuminated as long as DC power exists, even during a fault.*  
*Note: DS4 is not present in “-240D”, “-480D”, “-600D” models.*
- c. Make a note which lights are red.
- d. Remove power by shutting off upstream disconnect (or on models with internal disconnect option, see step 9 to remove power via internal disconnect switch, if desired).
- e. Confirm that power is removed by measuring Phase to Phase and Phase to Neutral (where applicable) voltages in protector with a DMM and by observing all lights extinguished.
- f. Locate the modules (Note: the modules contain the fuses and varistors). Three modules reside underneath the green barrier. This barrier must be removed first to gain access to these modules. Remove the four thumb screws and pull out the barrier. The fourth module (non-Delta models only) is located at the top-right section of the motherboard.
- g. The modules are removed by first unplugging the RJ cable from the module. Then use a 5/16” nut driver to loosen the mounting bolts from the module – three pieces typical.
- h. **IMPORTANT: CONFIRM THAT REPLACEMENT MODULE VOLTAGE MATCHES VOLTAGE OF ORIGINAL MODULES.** Install new module(s) and make sure that mounting bolts are tightened securely.
- i. Plug in RJ cable.
- j. Install barrier (where applicable) and tighten thumb screws.
- k. If your model has an internal disconnect switch, reapply power by lining up cylindrical contacts of switch with fuse clips (DO NOT TOUCH CLIPS), seat switch by pressing firmly on handle and/or white enclosure. Observe all green lights near modules illuminated – 100% protection restored.
- l. If your model does not have an internal disconnect switch, close door and secure clamps. Reapply power to surge protector by turning on dedicated circuit breaker (or fused disconnect). Observe on front panel green/blue light illuminated, red light extinguished – 100% protection restored.

## 11b. Troubleshooting and Maintenance, Con't (400LS/560LS Models)

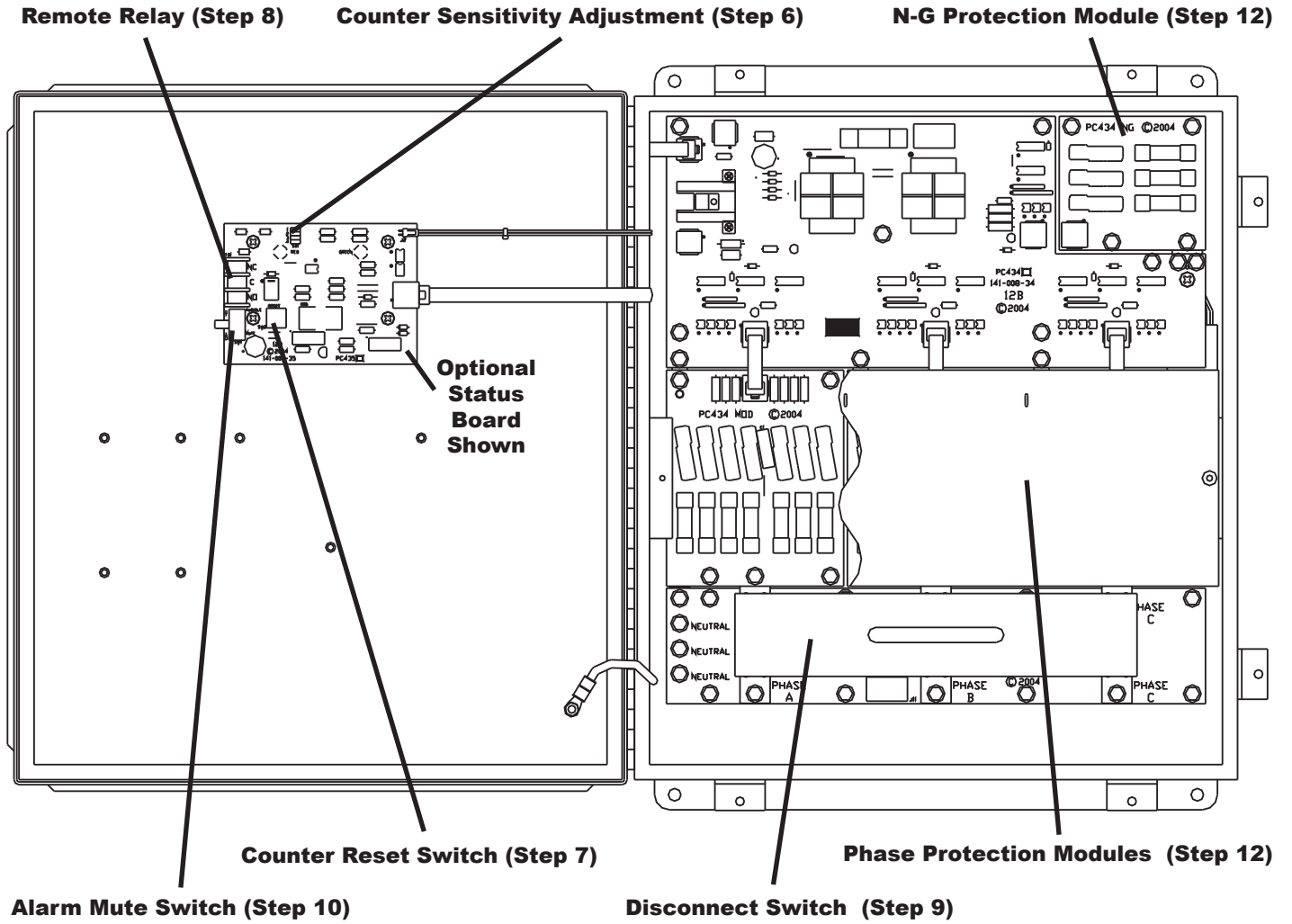
The 400LS/560LS Series do not require any periodic maintenance. However, if the red “Protection Reduced” light on the front panel is illuminated, a fault condition exists. See *Appendix 2: Inside View (Page 10)*. When this occurs, follow the procedure below:

- a. Loosen clamps and open door – DO NOT TOUCH ANYTHING.
- b. Observe status lights next to modules – they are labeled DS1, DS2, ...DS7.  
*Note: DS7 not present in “-240D”, “-480D”, and “-600D” models. The status lights are green when module protection circuits are 100% operational but change to red when there is a reduced protection condition. DS8 is not a module status light, it is the power supply monitoring light and it is always illuminated as long as DC power exists, even during a fault.*
- c. Make a note which lights are red.
- d. Remove power by shutting off upstream disconnect (or on models with internal disconnect option, see step 9 to remove power via internal disconnect switch, if desired).
- e. Confirm that power is removed by measuring Phase to Phase and Phase to Neutral (where applicable) voltages in protector with a DMM and by observing all lights extinguished.
- f. Locate the modules (Note: the modules contain the fuses and varistors). Six modules reside underneath the barrier. This barrier must be removed first to gain access to these modules. Remove the four thumb screws and pull out the barrier. The seventh and eighth modules are the Neutral-Ground modules (where applicable) and are located at the top-right of the motherboard.
- g. The modules are removed by first unplugging the RJ cable from the module. Then use a 5/16” nut driver to loosen the mounting bolts from the module. To remove the lower module(s), a 3/8” nut driver is needed. Use the 3/8” nut driver to loosen the three standoffs which hold down the bottom module. *Note: If DS7 is red, both Neutral-Ground modules should be replaced.*
- h. **IMPORTANT: CONFIRM THAT REPLACEMENT MODULE VOLTAGE MATCHES VOLTAGE OF ORIGINAL MODULES.** Install new module(s) and make sure that mounting bolts/standoffs are tightened securely.
- i. Plug in RJ cable.
- j. Install barrier (where applicable) and tighten thumb screws.
- k. If your model has an internal disconnect switch, reapply power by lining up cylindrical contacts of switch with fuse clips (DO NOT TOUCH CLIPS), seat switch by pressing firmly on handle and/or white enclosure. Observe all green lights near modules illuminated – 100% protection restored.
- l. If your model does not have an internal disconnect switch, close door and secure clamps. Reapply power to surge protector by turning on dedicated circuit breaker (or fused disconnect). Observe on front panel green/blue light illuminated, red light extinguished – 100% protection restored.





For 400LS and 560LS models with "-Mx" suffix, enclosure depth is 7.75" (197mm) and overall depth is 8.00" (203mm)



## Addendum, Power Quality Meter Wiring (For LS series models with meter option)

**IMPORTANT:** Your MCG LS series surge protector with meter is prewired to your system's AC power internally. No high voltage meter connections need to be made.

**NOTE: DO NOT REMOVE METER FROM PROTECTOR FOR EXTERNAL LOW VOLTAGE WIRING CONNECTIONS. ALL EXTERNAL LOW VOLTAGE FIELD WIRING TERMINATES TO THE TERMINAL BLOCKS LOCATED AT THE TOP OF THE PROTECTOR. SEE BELOW FOR WIRING INSTRUCTIONS.**

### 1) LS series meter Current Transducer (C.T.) Wiring:

The meter in your LS series protector requires external current transducers (CTs) to monitor current. If you have purchased these, refer to the below procedure for wiring to the CT terminal block inside your LS series protector:

**CAUTION: USE ONLY 1 or 0.333VAC C.T.s with the meter.**

- 1) Remove power to protector by turning off external circuit breaker. Loosen clamps and open door.
- 2) Locate **TBZ** (terminal block Z) labeled "**C.T. INPUTS (1 or 0.333VAC)**" on the top inside wall. See picture below showing TBZ.
- 3) Remove hole plug (if equipped) from right top hole and discard. Install an appropriately sized UL Listed cord grip (strain relief) connector - 3/4" trade size (user supplied) into the 0.875" mounting hole at the right, top of the protector near TBZ. **Use this hole for current transformer wiring ONLY.**
- 4) Feed C.T. wires (maximum 14 AWG) through cord grip connector allowing enough wire length to reach their terminal block screws. **DO NOT LEAVE ANY SERVICE LOOPS OR SLACK INSIDE OF ENCLOSURE.** Slack or service loops may be left outside of enclosure. Tighten cord grip connector and ensure wires are secured inside the connector.
- 5) Terminate C.T. wires with insulated spade or insulated ring crimp terminals (for #6 size screw/stud) - user supplied. Observe label at TBZ and route each pair of C.T. wires through their appropriate nylon zip tie.
- 6) Secure wires to terminal block - tighten screws to 12 lb.-in. torque. Use top row terminals only.
- 7) While holding zip tie base against enclosure wall, tighten zip ties around each pair of wires to secure them. Trim off excess zip tie material.
- 8) Close door and secure clamps.
- 9) Apply power to protector. Observe protection present indicator LED illuminated and power meter energized. Refer to meter C.T. set up instructions (enclosed).



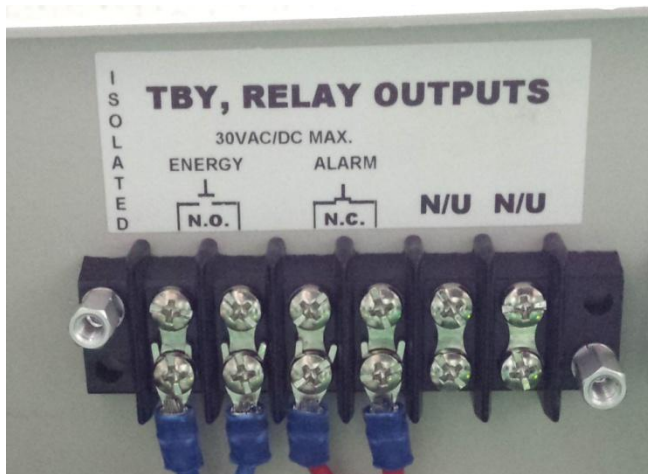
TBZ, Current Transducer Wiring Location

## 2) LS series meter Relay Output Wiring:

Important: Power Quality Meter Output Rated maximum 30 Vac/dc, maximum 86 mA.

The meter in your LS series protector has two relay outputs: 1) a normally open contact for Energy and 2) a normally closed contact for Alarm. See picture below showing TBY. Refer to meter wiring instructions for **external** wiring details. Refer to the below procedure for wiring to the relay contacts inside your LS series protector:

- 1) Remove power to protector by turning off external circuit breaker. Loosen clamps and open door.
- 2) Locate **TBY** (terminal block Y) labeled **"RELAY OUTPUTS"** on the top inside wall.
- 3) Remove hole plug (if equipped) from left top hole and discard. Install an appropriately sized UL Listed cord grip (strain relief) connector - 3/4" trade size (user supplied) into the 0.875" mounting hole at the left, top of the protector near TBY. **Use this hole (left) for relay output wiring and communication wiring only.**
- 4) Feed relay wiring (up to 4 wires maximum – 2 per each set of contacts - maximum 14 AWG) through cord grip connector allowing enough wire length to reach their terminal block screws. **DO NOT LEAVE ANY SERVICE LOOPS OR SLACK INSIDE OF ENCLOSURE.** Slack or service loops may be left outside of enclosure. Tighten cord grip connector and ensure wires are secured inside the connector.
- 5) Terminate wires with insulated spade or insulated ring crimp terminals (for #6 size screw/stud) - user supplied. Observe label at TBY and route each pair relay contact wires through their appropriate nylon zip tie.
- 6) Secure wires to terminal block - tighten screws to 12 lb.-in. torque. Use top row terminals only.
- 7) While holding zip tie base against enclosure wall, tighten zip ties around each pair of wires to secure them. Trim off excess zip tie material.
- 8) Close door and secure clamps.
- 9) Apply power to protector. Observe protection present indicator LED illuminated and power meter energized. Refer to meter RELAY set up instructions (enclosed).

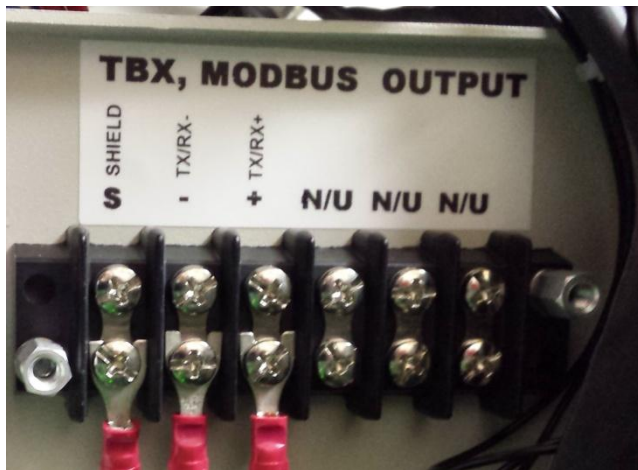


**TBY, Relay Outputs Wiring Location**

### 3) LS series meter MODBUS (or other communication protocol) Wiring:

Certain meters offered with the LS series protector have a MODBUS (or other) communications output. Refer to meter wiring instructions (enclosed) for **external** MODBUS (or other) wiring details. Refer to the below procedure for wiring to the communication output ports of the meter inside your LS series protector:

- 1) Remove power to protector by turning off external circuit breaker. Loosen clamps and open door.
- 2) Locate **TBX** (terminal block X) labeled "**MODBUS OUTPUT**" (or other) on the left inside wall. See picture below showing TBX.
- 3) Remove hole plug (if equipped) from left top hole and discard. Install an appropriately sized UL Listed cord grip (strain relief) connector - 3/4" trade size (user supplied) into the 0.875" mounting hole at the left, top of the protector near TBY. TBX and TBY both utilize the left conduit hole. **Use this hole (left) for communication wiring and relay output wiring only.**
- 4) Use Belden 1120A (or equal) cabling (maximum 14 AWG) for MODBUS (or other RS485) wiring. Remove cable jacket and shield foil leaving 2" of wire length for TX/RX+, TX/RX-, and Drain wire. Feed cable(s) through cord grip connector allowing just enough wire length to reach their terminal block screws. **DO NOT LEAVE ANY SERVICE LOOPS OR SLACK INSIDE OF ENCLOSURE.** Slack or service loops may be left outside of enclosure. Tighten cord grip connector and ensure wires are secured inside the connector.
- 5) Terminate wires with insulated spade or insulated ring crimp terminals (for #6 size screw/stud) - user supplied. Observe label at TBX and route all wires through the nylon zip tie.
- 6) Secure wires to terminal block - tighten screws to 12 lb.-in. torque. Use top row terminals only.
- 7) While holding zip tie base against enclosure wall, tighten zip tie around the wires to secure them. Trim off excess zip tie material.
- 8) Close door and secure clamps.
- 9) Apply power to protector. Observe protection present indicator LED illuminated and power meter energized. Refer to meter MODBUS (or other communications protocol) set up instructions (enclosed).



**TBX, Communication Wiring Location (MODBUS or Other)**