

INSTALLATION AND MAINTENANCE MANUAL

JOSLYN P/N 1457-40

AC SURGE PROTECTOR

400 Y/230 V RMS, 3 ϕ , 4 WIRE, GROUNDED WYE



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Excellence in Systems Protection

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I. SPECIFICATIONS

Joslyn P/N 1457-40
AC Surge Protector

APPLICATION:	400Y/230 Vac, 3 ϕ , 4 Wire plus Ground, Grounded Wye	
Voltage Rating Line-to-Neutral	220 - 250 Vac	
Power Rating	Unlimited	
Protection Modes	L-N, L-G, N-G	
Varistor Voltage, @ 1 mA dc, L-N	470 V	
L-G, N-G	660 V	
Suppression Voltage at Protector Terminals with	L-N	L-G, N-G
5 kA 8/20 μ s	980 V	1220 V
10 kA 8/20 μ s	1080 V	1305 V
20 kA 8/20 μ s	1560 V	1795 V
Minimum Life with 10 kA, 8/20 μ sec, per phase	2,000 Operations	
Maximum Surge Current Rating, per phase	100 kA 8/20 μ s	
per mode L-N, L-G	50 kA 8/20 μ s	
N-G	100 kA 8/20 μ s	
Operating Temperature Range	-40C to +85C	
Maximum Operating Altitude	5,000 Meters	
Power Consumption	Less Than 4.2 Watts	
Remote Monitoring Circuit Contact Rating	3 A @ 240 Vac 3 A @ 32 Vdc	

*Surge Currents greater than 28 kA 8/20 μ s may require replacing the fuse to restore protector function.

II. INSTALLATION

Joslyn P/N 1457-40

AC Surge Protector

The Joslyn AC Surge Protector P/N 1457-40 is intended for installation on power systems of nominally 400Y/230 Vac, (220-250 Vac phase to neutral), 4 wires plus ground, 3 phase, grounded wye, 50-60 Hz, unlimited kVA rating. It is intended to be installed at sites where there exists a conductor interconnecting the neutral service conductor and protector ground.

Location: For shunt connected protectors (i.e.: in parallel across the service), locate the protector on or as close to the service entrance cabinet as possible. It should be short-nippled directly to the service cabinet and located so that the wires used to connect to the bus are as short as possible. (The inductance of the wiring, about 1 micro Henry per meter, results in every 0.1 meter adding about 100 volts to the suppression voltage of the protector on a typical 10 kA lightning surge.) If the wire length exceeds .5 meter and very sensitive electronic equipment is to be protected, a sub-panel rated surge suppressor should be connected 10 m or more downstream.

Mounting: The protector may be mounted in any position using the four ϕ 7.8 mounting holes. See Figure 1 for protector dimensions.

Connections: Use the shortest and straightest path possible to shunt connect the protector to the power system, avoiding sharp bends or loops in the wire. Twist the wires together if possible. The protector should be connected directly to the bus on the load side of the main service disconnect or subpanel. If no tap is available on the bus, it may be connected to a 60 amp circuit breaker. A series connected protector can be located at any point on the load side of the main service disconnect. See Figure 2.

Wire Size: The wire size for the power circuit connections should be 16 - 70 mm² (AWG No. 6 to 2/0). 30 mm² (AWG No. 2) is the maximum size necessary for shut connecting the protector. Larger diameters can be used, but they will not result in any further measurable reductions in resistance or inductance.

Connect the Ground wire to the lug provided inside the protector cabinet.

Connect the Neutral wire to the terminal marked "Neutral" on the metallic circuit board.

Measure the voltage between the neutral and ground terminal. There should not be any voltage. If there is voltage, correct the wiring before installing any more wires.

Connect the 3 "hot" wires to the isolated terminals marked "Phase A", "Phase B", and "Phase C" in any sequence.

If permitted by wire/service size (generally 100 A or less), the protector should be series connected with the service wires entering and exiting the protector cabinet. The protector terminals are double lugged for this purpose. This installation method eliminates inductive overshoot from the shunt wiring method altogether. Refer to Figure 3.

III. THEORY OF OPERATION

Joslyn P/N 1457-40

AC Surge Protector

The purpose of the Joslyn AC Surge Protector, P/N 1457-40, is to provide voltage clamping whenever the instantaneous (surge) line-to-neutral voltage exceeds a level of approximately 500 volts peak. The protector responds in nanoseconds, and automatically restores itself to normal condition after termination of the surge condition. No power-follow occurs and the disturbance to the line voltage is minimal.

Each phase of the protector consists of two protector modules (one connected to neutral and one to ground), a fuse, and two monitoring circuits. Two additional modules are connected between neutral and ground. Refer to connection diagram of Figure 2.

Each protector module consists of several metal oxide varistors (MOVs) in parallel. Each MOV has its own fuse. The fuse will blow before the maximum surge current rating of the MOV is exceeded. The fuses also help to balance the current distribution among the MOVs.

A replaceable fuse is provided for each phase to disconnect the protector module from the power source in the event of a continued overvoltage or excessive surge current. The fuse may be blown by surge currents exceeding 28,000 amperes. The fuse can be removed to disconnect the protector from the line for test purposes without having to turn off the power to the equipment the protector is protecting. In addition to the replaceable fuse, each protector module is internally fused in case of failure of the clamping components in a shorted mode.

Each phase of the protector has a monitoring circuit with an indicator light on the cover of the protector enclosure. When the protector is in operating condition the light is on. No monitoring is provided for the neutral-ground modules.

IV. MAINTENANCE

Joslyn P/N 1457-40

AC Surge Protector

The Joslyn AC Surge Protector, P/N 1457-40, requires no scheduled maintenance. There are no adjustments to make. Simple electrical tests will indicate the condition of the unit.

The neon lights on the cover are used to monitor the condition of the protector. Proper operating conditions are indicated by the lights being lit. If the lights are off or a combination of the following conditions exists:

- a) The bulbs have burned out;
- b) The system voltage is off;
- c) The external fuses have opened;
- d) Internal fuses in modules have opened;
- e) Resistors in the light circuit have opened.

If one or more lights are off - -

1. Check the system voltage.
2. Check the fuse.
3. Replace the bulb if the fuse is intact and the system voltage is on.

If the system voltage is on and the fuse is intact, and the bulb has been replaced and is still not on:

1. Measure voltage between monitoring wire terminal (located on terminal block) of corresponding phase (A, B or C) and neutral. Voltage must read same as supply voltage. If no voltage can be measured, both modules may be defective and should be replaced.
2. If light still is not on, a series limiting resistor or wire connection for the light may be open. Check connections for continuity and resistors for value.

If the fuse is open - -

1. Test the protector modules for dc clamping voltage as noted in the next section.
2. If the module is within specification limits, replace the fuse.

The following test will determine the condition of the protector modules:

CAUTION

It is desirable to test the protector with the power off. If this is not practical, extreme caution must be observed when testing with power on and the fuses removed. Hazardous voltages are present at the line terminals.

DC Varistor Voltage Test

The DC varistor voltage of the Protector Modules may be tested as follows:

- a) Disconnect power.
- b) Remove the fuse and light bulb on the phase to be tested.
- c) Use a suitable Surge Protector Test Set, such as Joslyn Model 4010, which will measure varistor clamping voltage at 1mA, and connect test leads between the 9mm (3/8") terminal on the arrester side of the fuse and the neutral terminal. Operate Test Set in accordance with instructions and read the displayed value. This is the dc varistor voltage at 1 mA. Reverse leads and test again as above.

Tests of the neutral-ground module can be made directly across the module terminals or at the main Neutral and Ground Terminals. The service neutral conductor must be disconnected for this test.

The following DC varistor voltage values are considered acceptable:

	L-N	L-G, N-G
1. Factory specification for new Protector	420 to 520 Vdc	595 - 725 Vdc
2. Protector in Use	400 to 540 Vdc	565 - 745 Vdc

To replace a Protector Module, proceed as follows:

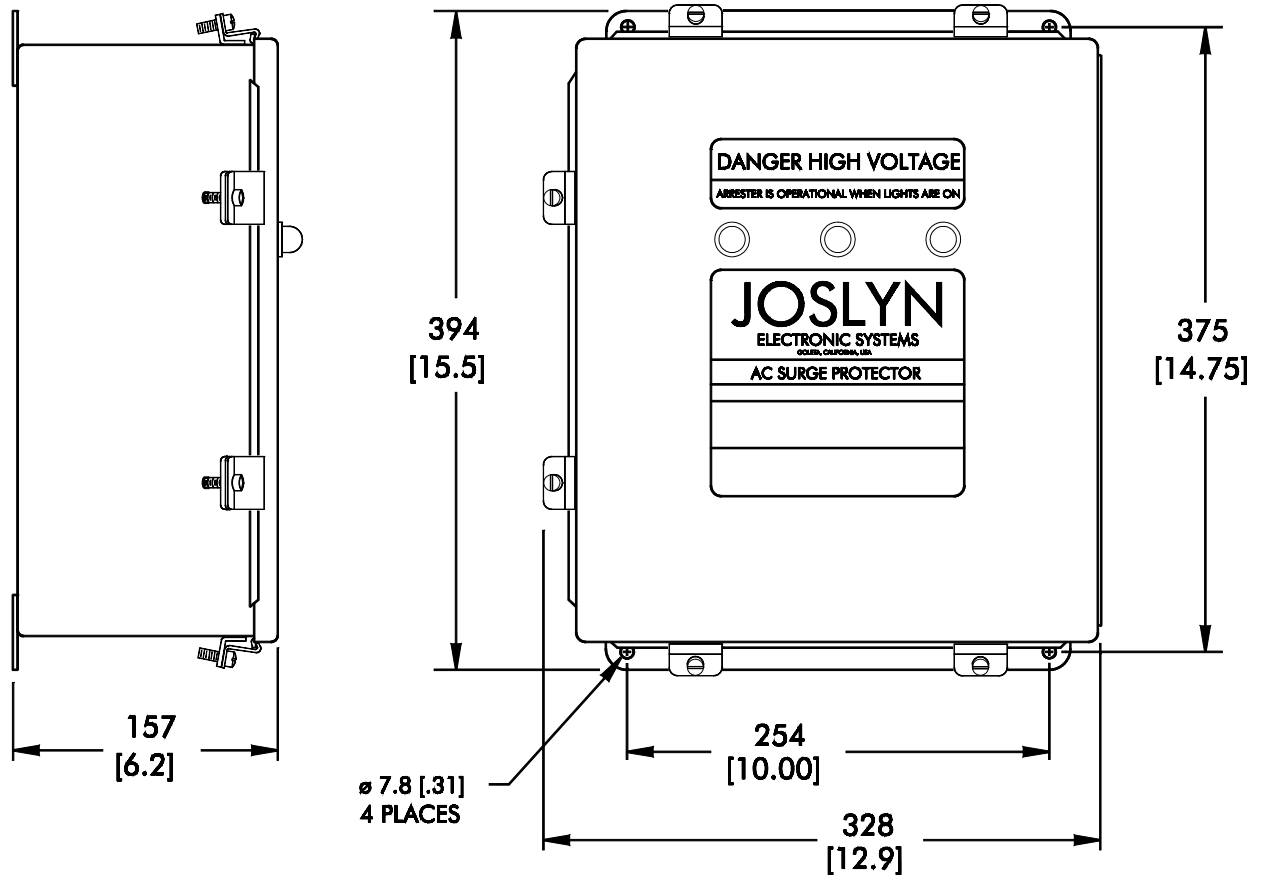
- a) Disconnect power.
- b) Remove fuses.
- c) Disconnect monitoring lead of module to be removed from terminal block.
- d) Remove 10-32 Screw from protector module ground bracket and chassis.
- e) Loosen 8-32 Nuts on top of protector module. Remove ground bracket.
- f) Slide protector toward relay bracket and remove.

To install a new Protector Module the steps above are reversed.

Replaceable Parts:

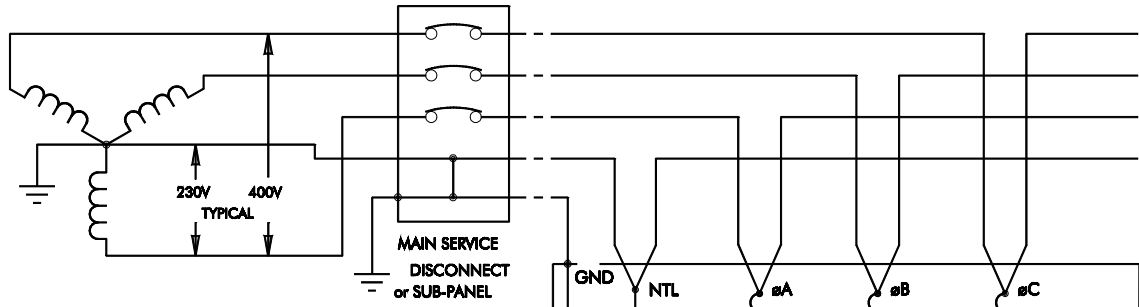
1. Protector Module: L-N	Joslyn P/N 72116
2. Protector Modules: L-G, N-G	Joslyn P/N 72444
3. Fuse: Buss P/N FRN-R-60	Joslyn P/N 63569
4. Light Bulb: B2A (NE51H)	Joslyn P/N 49504

Optional Equipment: Joslyn Model 4010-01 Surge Protector Test Set



METAL NEMA 4 (I.P. 66) ENCLOSURE

FIGURE 1
DIMENSIONS



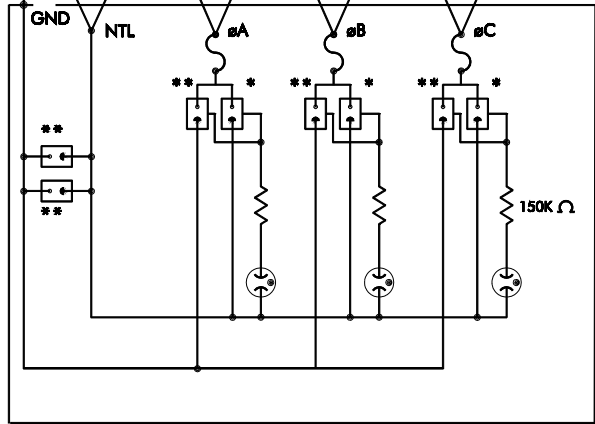
INSTALLATION INSTRUCTIONS:

1. Check system voltage for 220-250V line-to-neutral.
2. Verify neutral grounding as illustrated.
3. Install protector as close as possible to the service to be protected. Using at least size 6 AWG (4MM) wire.
4. Series connect protector (shown) as permitted by wire size.

REPLACEABLE PARTS

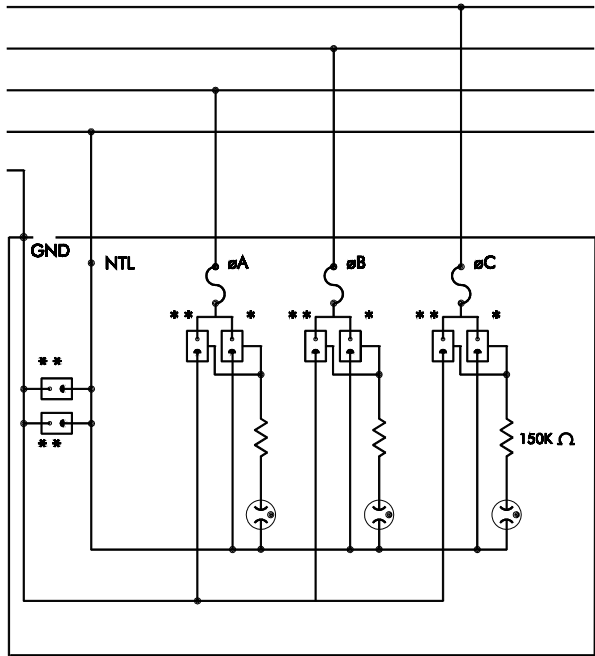
- * Protector Module: Joslyn P/N 72116 (3 per arrester)
- * * Protector Module: Joslyn P/N 72444 (5 per arrester)
- Fuse: Bus FRN-R-60 Joslyn P/N: 63569
- Light Bulb: NE-51H (B2A) Joslyn P/N: 49504
- Rated frequency: 50-60Hz.
- Maximum rated ambient air temperature: 85° C

WARNING: For continued protection against risk of fire, replace only with same type and rating of fuse.



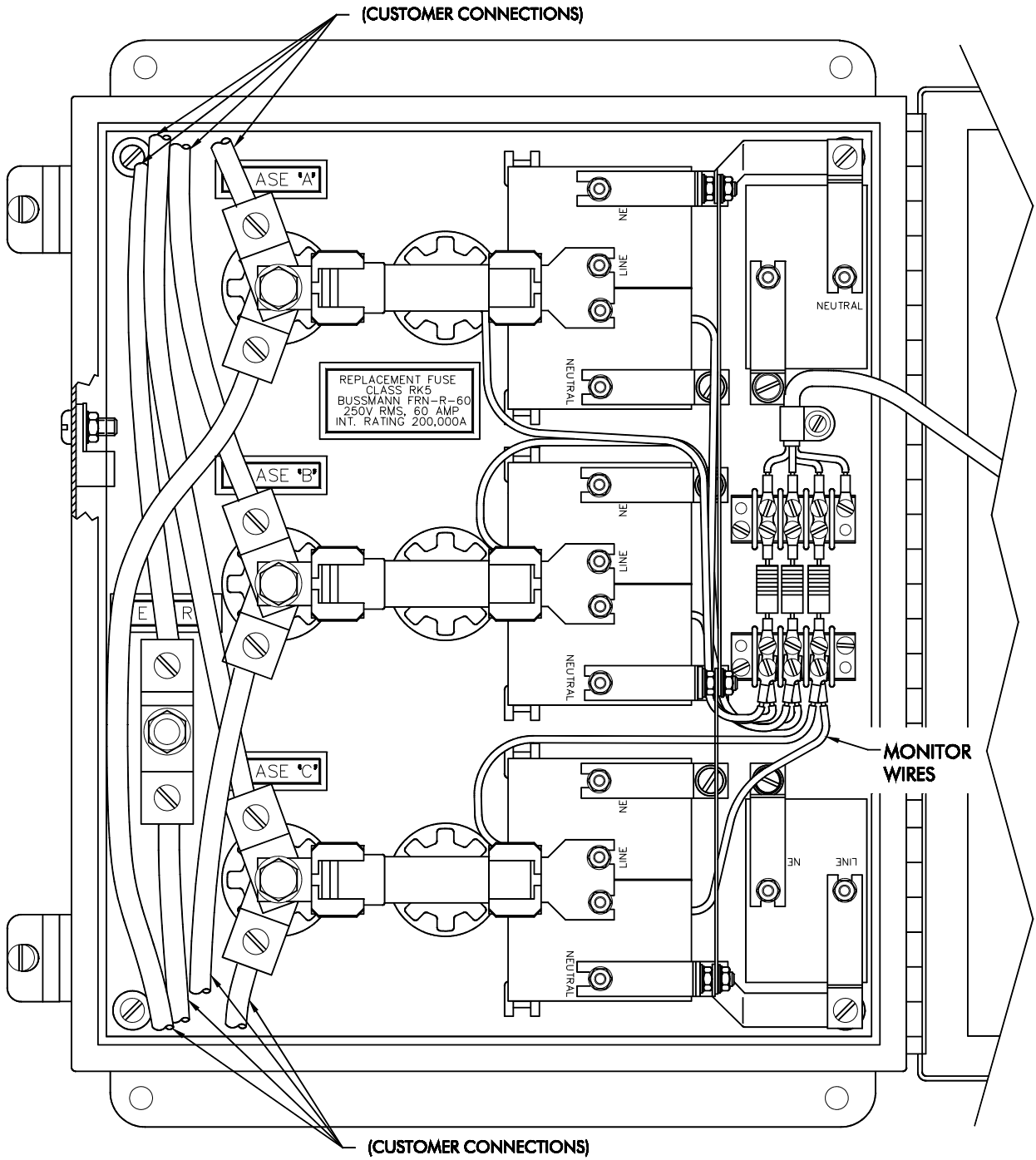
AC POWER PROTECTOR P/N 1457-40
SERIES CONNECTED

24579 A



AC POWER PROTECTOR P/N 1457-40
SHUNT CONNECTED

**FIGURE 2
CONNECTION DIAGRAM**



**FIGURE 3,
INTERNAL
CONFIGURATION**