INSTALLATION AND MAINTENANCE MANUAL

JOSLYN P/N 1452-85-M
JOSLYN P/N 1452-85-MN

AC SURGE PROTECTOR

240/120 VAC, 3 PHASE, 4 WIRE, CENTER-TAP GROUNDED DELTA

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Excellence in Systems Protection

MNL14554585(T)

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I. **SPECIFICATIONS**

Joslyn P/N 1452-85-M and 1452-85-MN
AC Surge Protector

APPLICATION:	240/120 VAC, 3 ϕ, 4-Wire Center-Tap Grounded Delta
Voltage Rating Line-to-Neutral	120 VAC ϕ A & C, 208 VAC ϕ B
Power Rating	Unlimited
Protection Modes, -M	L-N
-MN	L-N, N-G
Varistor Voltage, @ 1 mA dc, L-N Primary Modules	210-260 VDC ϕ A & C, 420-520 VDC ϕ B
L-N Backup Modules	420-520 VDC ϕ A& C, 820-1000 VDC ϕB
N-G (-MN only)	420-520 VDC

Suppression Voltage at Protector Terminals with

	ϕ A & C	**ϕ B**
3 kA 8/20 µs	400 V	790 V
10 kA 8/20 µs	580 V	840 V
20 kA 8/20 µs	950 V	1250 V

Minimum Life 10 kA, 8/20 µsec Wave, per phase	2,000 Operations
Maximum Surge Current Rating, per phase	200 kA 8/20 µs*
Operating Temperature Range	-40°C to +65°C
Maximum Operating Altitude	5,000 Meters
Power Consumption	18 Watts
Remote Monitoring Circuit Contact Rating	3 A @ 240 VAC 3 A @ 32 VDC >1 A @ 60VDC

II. **INSTALLATION**
Joslyn P/N 1452-85-M and 1452-85-MN
AC Surge Protector

The Joslyn AC Surge Protector P/N 1452-85 is intended for installation on power systems of 240/120 VAC, 4 wires plus ground, 3 phase, center-tap grounded delta, 50-60 Hz, unlimited kVA rating. It is intended to be installed at the service entrance where the neutral is grounded.

Location: Locate the protector on or as close to the service 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 foot adding about 300 volts to the suppression voltage of the protector on a typical 10kA lightning surge.) If the wire length exceeds 18 inches and very sensitive electronic equipment is to be protected, a sub-panel rated surge suppressor should be connected 30 feet or more downstream.

Mounting: The protector may be mounted in any position using the four .31" mounting holes. See Figure 1 for protector dimensions. The protector may be mounted above, below, or beside the service cabinet. Drill or punch a hole in the protector housing for the conduit, selecting one of the possible locations shown in Figure 1.

Connections: Use the shortest and straightest path possible to connect the protector to the power system, avoiding sharp bends in the conduit or loops in the wire. Twist the wires together if possible. See Figure 2 for connection diagram. The protector should be connected directly to the bus on the load side of the main service disconnect. If no tap is available on the bus, it may be connected to a 60 amp breaker.

Wire Size: The wire size for the power circuit connections should be AWG No. 4 to 2/0. Size AWG No. 2 is typically used.

Installation: Measure the voltage between all phases and the neutral. The voltage must be between 110 and 127 volts on phases A and C and between 191 and 220 volts on phase B. If the voltage is not as stated, correct the problem before installing the protector.
Connect the green Ground wire to the terminal marked "Ground" inside the protector cabinet.
Connect the white Neutral wire to the terminal marked "Neutral" on the metallic circuit board.
Connect the 2 black "hot" wires to the isolated terminals marked "Phase A" and "Phase C" in any sequence.
Connect the orange "hot" wire to the terminal marked "Phase B".

Remote Monitoring Circuit: The two terminal blocks marked "Remote Monitoring Connection", on the relay board assembly provide connections to the dry monitoring relay contacts. If a closing of relay contacts is desired when a fuse opens, connect sensing wires to terminals 1 and 2. If an opening of relay contacts is desired when a fuse opens up, connect sensing wires to terminals 2 and 3.

Neutral to Ground Protection: If a P/N 1452-85-M is installed such that the length of wire between the protector neutral terminal and the ground buss is more than 5 feet, two Joslyn P/N 72362-01 N-G Protector assemblies should be installed in the protector. These are standard in P/N 1452-85-MN.

Outdoor Installation: The Joslyn P/N 1452-85 Protector is intended for indoor installation. If installed outdoors and there is any possibility of water accumulating in the protector, a hole should be drilled in the bottom of the cabinet to allow the water to drain out. A drain kit, Joslyn P/N 72207, is available to prevent insects from entering the drain hole.

III. **THEORY OF OPERATION**

Joslyn P/N 1452-85-M and 1452-85-MN
AC Surge Protector

The purpose of the Joslyn AC Surge Protector, P/N 1452-85, is to provide voltage clamping to neutral whenever instantaneous (surge) line-to-neutral voltage on phase A or C exceeds a level of approximately 300 volts peak or phase B exceeds 540 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 four protector modules, a fuse, and two monitoring circuits. Two protector modules on each phase provide the normal protection. The other two modules provide backup protection in case the first modules are overloaded.

Each protector module consists of several metal oxide varistors (MOV) 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.

Each phase of the protector has a monitoring circuit with two indicator lights on the cover of the protector enclosure. When the protector is in operating condition the lights are on. One light shows the primary protection is operating, and the other shows the backup protection is operable. Each phase also has 2 sets of relay contacts connected to 2 separate terminal strips for connection to external alarm circuits. Failure of either of the two primary modules per phase will result in a relay operation and remote indication. Terminals 1 and 2 on the terminal strips provide connections to the open contacts of all three relays in parallel and terminals 2 and 3 provide connections to the closed contacts of all three relays in series.

IV. **MAINTENANCE**

Joslyn P/N 1452-85-M and 1452-85-MN
AC Surge Protector

The Joslyn AC Surge Protector, P/N 1452-85, requires no scheduled maintenance. Except for the relay contacts in the monitoring circuit, there are no moving parts. There are no adjustments to make. Simple electrical tests will determine the condition of the unit.

The lights on the cover and the remote alarm circuits are used to monitor the condition of the protector. Proper operating conditions are indicated by the lights being on and the relay energized. If one or more of the lights are off or a remote alarm signal is obtained, one or a combination of the following conditions exists:

a) The LEDs are defective
b) The system voltage is off
c) The external fuses have opened
d) Internal fuses in modules have opened
e) Resistors or diodes in the LED circuit have opened
f) Relays are defective
g) The protector is defective

CAUTION

Hazardous voltages are present in the protector cabinet.

If one or more LEDs are off - -

1 Check the system voltage.
2. Check the fuse by measuring the voltage on the load side of the fuse.

If the system voltage is on, the fuse is intact, and the light is still not on or a remote alarm signal is obtained:

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 modules are operational, the LED is on, but a remote alarm signal is obtained, replace the relay.
3. If the LED still is not on, a series limiting resistor and/or the diode for the LED may be open. Check resistors for continuity and value

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

CAUTION

The following tests and procedures must be performed with the power off.

Varistor Voltage Test

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

a) Disconnect power.
b) Remove the fuse and relay on the phase to be tested.
c) Use a suitable Surge Protector Test Set, such as Joslyn Model 4010, and connect the positive test lead to the neutral terminal and the negative to the line terminal of the module. Operate Test Set in accordance with instructions and read the displayed value. This is the DC varistor voltage.

The following DC varistor voltage values are considered acceptable:

			Phases A & C	**Phase B**
1.	Factory specification for new Protector -	primary	240 to 300 VDC	420 to 520 VDC
		backup	420 to 520 VDC	820 to 1000 VDC
2.	Protector in use	primary	200 to 310 VDC	400 to 540 VDC
		backup	400 to 540 VDC	800 to 1020 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 neutral bracket and chassis.
e) Loosen 8-32 Nuts on top of protector module. Remove neutral bracket.
f) Slide protector toward circuit board and remove.

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

Replaceable Parts:

1. Protector Module, primary: Joslyn P/N 72233, Phases A & C, P/N 72116 Phase B.
   backup: Joslyn P/N 72116, Phases A & C, P/N 72363 Phase B.
2. N-G Protector (standard on –MN, available for –M), Joslyn P/N 72362-02
2. Fuse: Buss P/N FRN-R-60, Joslyn P/N 63569
3. LED Assembly: Joslyn P/N 72346-01
4. N-G Protector: Joslyn P/N 72317-01
5. Relay: Omron MY2-AC120, Joslyn P/N 51512
   Optional Equipment: Joslyn Model 4010 Surge Protector Test set