ACT COMMUNICATIONS™

ACT 471-SEL
Selenium Hybrid Power Filter System

INSTALLATION, OPERATION & MAINTENANCE MANUAL

471-SEL-Inst: 15 08 19

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IMPORTANT NOTICE

THE ENTIRE CONTENT OF THIS MANUAL MUST BE READ AND FULLY UNDERSTOOD BEFORE ATTEMPTING ANY INSTALLATION OR ENERGIZATION OF THE ACT 471 Selenium Hybrid Power Filter Series.

If there are any questions about the operational status, or integrity of the electrical system prior to installation of the power filter, please consult a qualified trained electrician before attempting to continue.

If the minimum requirements of this manual are not followed, the power filter could become irreversibly damaged, and/or the electrical system could be left unprotected.

Choosing the right product for the application, along with correct installation methods, as defined within this manual, will allow the ACT 471 SELENIUM HYBRID POWER FILTER to provide the best possible protection for many years.

Failure to comply with the applicable requirements of this manual can void the POWER FILTER warranty.

! WARNING !

SPECIAL ATTENTION MUST BE GIVEN TO VERIFY THAT A PROPER NEUTRAL-GROUND (XO) BOND HAS BEEN MADE WHEN POWER IS SUPPLIED FROM AN UPSTREAM TRANSFORMER OR ANY OTHER TYPE OF SEPARATELY DERIVED POWER SOURCE.

FAILURE TO PROVIDE THIS BOND, AS REQUIRED PER ARTICLE 250.30 OF THE NATIONAL ELECTRICAL CODE, CAN RESULT IN ELEVATED PHASE TO GROUND SOURCE VOLTAGE POTENTIALS. THESE VOLTAGES CAN CAUSE DAMAGE TO ELECTRICAL EQUIPMENT AS WELL AS SAFETY HAZARDS INCLUDING FIRE, ELECTRICAL SHOCK, SERIOUS INJURY, OR DEATH.

Product Description

ACT 471 SELENIUM HYBRID POWER FILTER SERIES are Power Filters designed for both EMI and Temporary Over Voltages, designed for installation on low voltage electrical distribution systems. ACT 471 Filters are designed to protect electrical equipment loads against the damaging effects of transient voltages that can be induced or generated as a result of remote lightning, power equipment switching or high frequency disturbances.

The ACT 471 SELENIUM HYBRID POWER FILTER SERIES incorporates Selenium and Capacitor technology to achieve superior suppression of Power Quality events like high frequency noise (above 3kHz to 1 MHz) and temporary over voltages when selenium module is installed.

Other standard features include protection status indicating lights, an audible alarm with test and disable features, form C alarm contacts for remote monitoring.

The ACT 471 SELENIUM units described in this manual are self-contained wall mounted style and are ETL Listed (a Nationally Recognized Testing Lab (NRTL)), conforming to UL 1283. All published ratings are in accordance with ANSI / IEEE C62.41.1-2002, C62.41.2-2002 and NEMA LS1-1992 (R2000) recommended practices.

Model covered by this manual is: **ACT 471- with SEL and/or FA Power Filters**
Not all voltage types were tested and listed to UL 1283

Application Guidelines

Prior to installing any POWER FILTER, ensure that your facility electric supply system is properly installed and connected in accordance with all applicable national and local codes and safety procedures. All equipment and systems should be installed in accordance with manufacturer's instructions.

Utilize the personnel from your local utility, your engineering department, ACT application or Service engineering, or a competent consulting engineering firm for technical guidance or troubleshooting.

Understand your system, and the capabilities and limitations of POWER FILTERS and other power conditioning equipment like surge protection.

Select the proper ACT 471 Series Power Filter unit for your system voltage, configuration, and the anticipated surge environment. Some of the key parameters for selection are defined as:

MAXIMUM CONTINUOUS OPERATING VOLTAGE (MCOV)

This value defines the maximum line-to-line or line-to-neutral (Ground) continuous AC voltage that can be safely applied to the protector. MCOV levels for ACT 471 Series POWER FILTER are set at 120% of nominal system voltage. If there is a risk that the electrical system voltage could exceed MCOV, or if any unusually high power frequencies.

SYSTEM CONFIGURATION

Protectors are available for single (split) phase with neutral and ground, three-phase grounded WYE, three-phase ungrounded WYE, three-phase high-leg delta, and for three-phase ungrounded delta systems. (See page 7 for transformer wiring schemes)

CONTINUES >

Application Guidelines *(continued)*

SHORT CIRCUIT CURRENT RATING

ACT 471 SEL POWER FILTERS can be service entrance installed and are regulatory listed for use on electrical systems with rated ampacity's of up to 200,000 symmetrical amperes maximum at 480V RMS.

ENVIRONMENTAL RATINGS

NEMA Ratings of 1, 4, 4x, and 12 are available. Please refer to the model number suffix to verify the correct enclosure for the application.

The ACT 471 POWER FILTER is designed to operate within an ambient temperature range of -40C (-40F) to +65C (+140F) with a relative humidity level between 5-95% non-condensing.

No electrical device can survive a continuous over voltage. However by selecting the ACT 471 SEL unit, it can survive and filter a Temporary over Voltage event for a limited time controlled by the specification of the power filter.

Should a condition occur that results in premature failure of the POWER FILTER, the suppression circuitry will short, allowing the integral fusing to interrupt current flow through the POWER FILTER fuse without disrupting power to the protected equipment.

The ACT 471 Advanced Filtering system filters power and frequency anomalies on the power line including temporary overvoltage's and should not be considered a surge suppression device. Installation of the ACT 471 SEL or FA options is not recommended without a system surge protection device (SPD) listed under UL 1449 being installed near the Advanced Power Filter. ACT Communications, Inc. offers a full line of Surge Protection Devices that are designed to protect a facility and the ACT 471-SEL power filter.

ACT 471 SEL Power Filter units is designed to filter in **common mode** (line-to-ground or Line-to-Neutral) protection.

Pre-Installation Requirements

Prior to energization of the ACT 471 SEL HYBRID POWER FILTER, it is critical that the following items have been addressed.

DO NOT ATTEMPT TO ENERGIZE THE POWER FILTER OR CONTINUE WITH THE INSTALLATION IF ALL OF THESE CONDITIONS HAVE NOT BEEN MET, OR ARE UNKNOWN.

1. SYSTEM CONFIGURATION AND VOLTAGE

Check the configuration and voltage supply ratings to ensure that the proper POWER FILTER model number has been selected for your system. The POWER FILTER model number can be found on the Regulatory label affixed to the inside of the POWER FILTER NEMA Enclosure. The POWER FILTER selection can be verified by comparing the Model Number to the correct electrical system described in the VOLTAGE RATINGS & POWER SOURCE CONFIGURATIONS. chart shown on page 7.

Pre-Installation Requirements *(continued)*

2. SYSTEM GROUNDING AND BONDING

Verify that a NEC (National Electrical Code) compliant X0 bond has been made at the upstream transformer or other separately derived system that feeds the POWER FILTER. Per NEC 250.30, this bond must be in place on all 3-Phase WYE, 3-Phase Hi-Leg Delta, and Single Phase Split-Systems. Refer to page 8 for an example of an installation that complies with NEC recommendations.

Verify that there have not been multiple instances of Neutral to Ground bonds on the electrical system. These bonds, while either intentional or accidental, result in Ground currents that can create differential voltage potentials between Neutral and Ground.

Redundant Neutral to Ground connections can result in damage to the POWER FILTER and are in violation of NEC.

An insulated grounding conductor that is identical in size and insulation material and thickness to the grounded and ungrounded circuit supply conductors, except that it is green in color with or without one or more yellow stripes, is to be installed as part of the circuit that supplies the filter. Electricians should make reference to Table 250-95 of the NEC regarding the appropriate size of the grounding conductor.

The grounding conductor mentioned is to be grounded to earth at the service equipment or other acceptable building earth ground such as the building frame in the case of a high-rise steel-frame structure.

Any attachment-plug receptacles in the vicinity of the filter are to be of a grounding type, and the grounding conductors serving these receptacles are to be connected to earth ground at the service equipment or other acceptable building earth ground such as the building frame in case of a high-rise steel-frame structure.

Pressure terminal or pressure splicing connectors and soldering lugs used in the installation of the filter shall be identified as being suitable for the material of the conductors. Conductors of dissimilar metals shall not be intermixed in a terminal or splicing connector where physical contact occurs between dissimilar conductors unless the device is identified for the purpose and conditions of use.

3. PRIMARY OVERCURRENT DISCONNECT

Confirm that the POWER FILTER will be installed on an electrical power system that has an upstream service disconnect breaker or fuse. Per NEC 285, installation of a POWER FILTER on the line (service) side of the main breaker is not allowed.

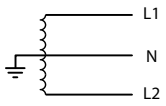
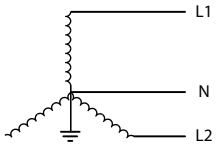
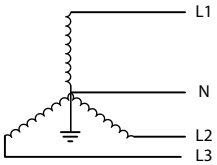
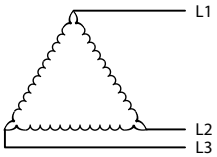
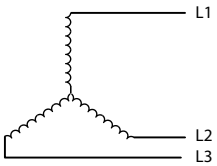
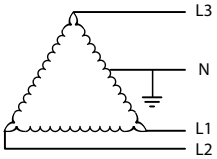
! WARNING !

THE EQUIPMENT COVERED BY THESE INSTRUCTIONS SHOULD BE INSTALLED AND SERVICED ONLY BY COMPETENT, QUALIFIED PERSONNEL UTILIZING PROPER SAFETY PRACTICES AND PROCEDURES.

THESE INSTRUCTIONS ARE WRITTEN FOR SUCH PERSONNEL AND ARE NOT INTENDED AS A SUBSTITUTE FOR ADEQUATE TRAINING AND EXPERIENCE IN SAFE PROCEDURES FOR THIS TYPE OF EQUIPMENT.

FAILURE TO PROVIDE THE X0 BOND WILL DAMAGE THE POWER FILTER AND VOID THE PRODUCT WARRANTY.

Voltage Ratings and Power Source Configurations

ACT MODEL	Nominal Voltage (50/60hZ)	MAXIMUM CONTINUOUS RMS OPERATING VOLTAGE	SYSTEM TYPE	SOURCE CONFIGURATION
ACT 120S	120 / 240V	150V (L-N / L-G)	Single Phase 3 Wire + Ground	
			Dual Phase 3 Wire Ground	
ACT 120Y ACT 220Y ACT 240Y ACT 277Y ACT 347Y	120 / 208V 220 / 380V 240 / 415V 277 / 480V 347 / 600V	150V (L-N / L-G) 320V (L-N / L-G) 320V (L-N / L-G) 320V (L-N / L-G) 420V (L-N / L-G)	Three Phase WYE, 4 Wire + Ground	
ACT 240D ACT 480D	240V 480V	270V (L-G) 550V (L-G)	Three Phase Delta, 3 Wire	
			Three Phase WYE, 3 Wire	
ACT 240H	120 / 240V	150V (L-N / L-G) Phase A & C 320V (L-N / L-G) Phase B	Three Phase Delta H-Leg, 4 Wire + Ground	

For other voltages or configurations please consult with an ACT Factory Representative before specifying or attempting to install ACT 471 SEL POWER FILTER.

Installation

BEFORE ATTEMPTING INSTALLATION, MAKE SURE THAT THE PRE-INSTALLATION REQUIREMENTS OF THIS MANUAL HAVE BEEN SATISFIED. IF THE STATUS OF THE PRE-INSTALLATION REQUIREMENTS IS NOT KNOWN, DO NOT ATTEMPT TO CONTINUE.

1. MOUNTING

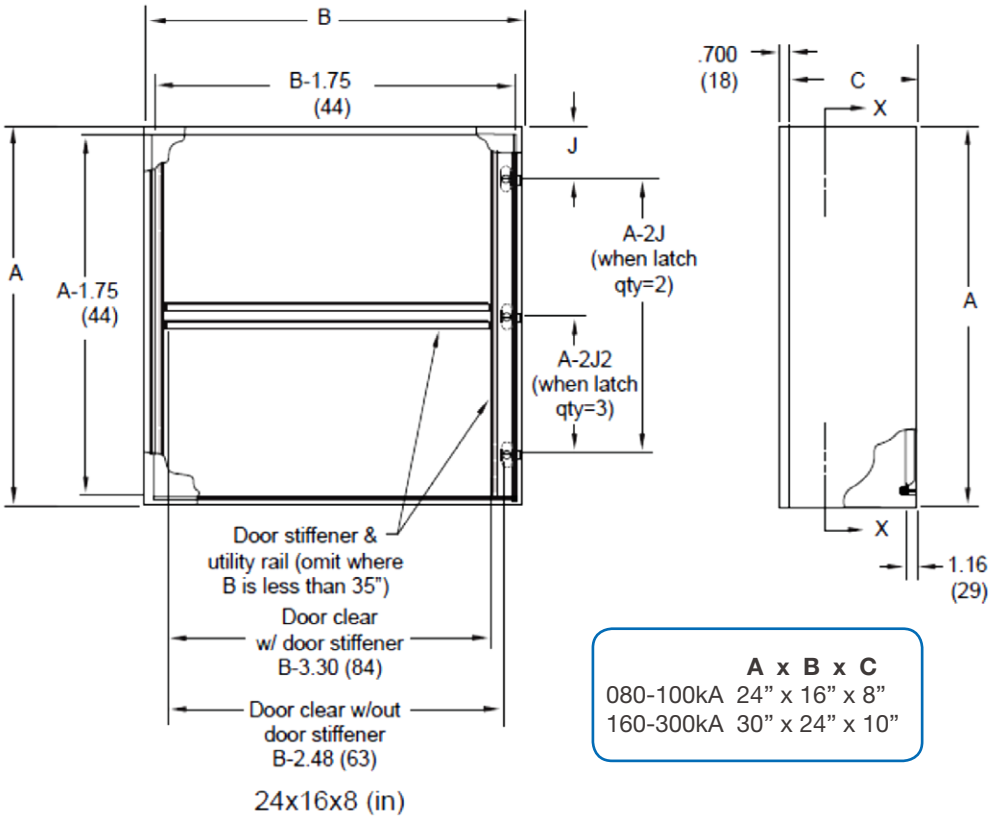
The ACT 471-SEL Wall Mounted POWER FILTER must be installed as close to the protected circuit as possible. Long power cable runs between the POWER FILTER and protected circuit will result in significantly reduced performance.

Select a mounting location that will allow for a minimum length of wire between the POWER FILTER and the power terminals of the electrical service panel. The POWER FILTER can be mounted in any orientation; however special consideration should be given to allow for periodic inspection of the diagnostic display panel. The POWER FILTER should be mounted to a secure structure or surface.

! WARNING !

2. DIMENSIONS AND RECOMMENDED CONDUIT ENTRANCE LOCATIONS

POWER MUST BE PROVEN DISCONNECTED BEFORE STARTING INSTALLATION, INSPECTION OR MAINTENANCE. FAILURE TO DO SO MAY CAUSE SERIOUS INJURY, DEATH AND/OR PROPERTY DAMAGE.



A x B x C
080-100kA 24" x 16" x 8"
160-300kA 30" x 24" x 10"

3. POWER CONNECTIONS

Compression terminals are provided on the POWER FILTER for connection to the electrical power system. These terminals will accommodate up to size 2/0 stranded copper conductors. The minimum required wire size for ACT 471-SEL is # 10 AWG. See page 13 for terminal location and identification.

Pressure terminal or pressure splicing connectors and soldering lugs used in the installation of the filter shall be identified as being suitable for the material of the conductors. Conductors of dissimilar metals shall not be intermixed in a terminal or splicing connector where physical contact occurs between dissimilar conductors unless the device is identified for the purpose and conditions of use.

Installation *(continued)*

4. WIRE ROUTING

The length of wiring to the POWER FILTER must be kept at a minimum for the best performance. Wire lengths should be short, strait runs between the POWER FILTER and power source. Always avoid sharp bends when routing POWER FILTER conductors.

5. CIRCUIT BREAKER

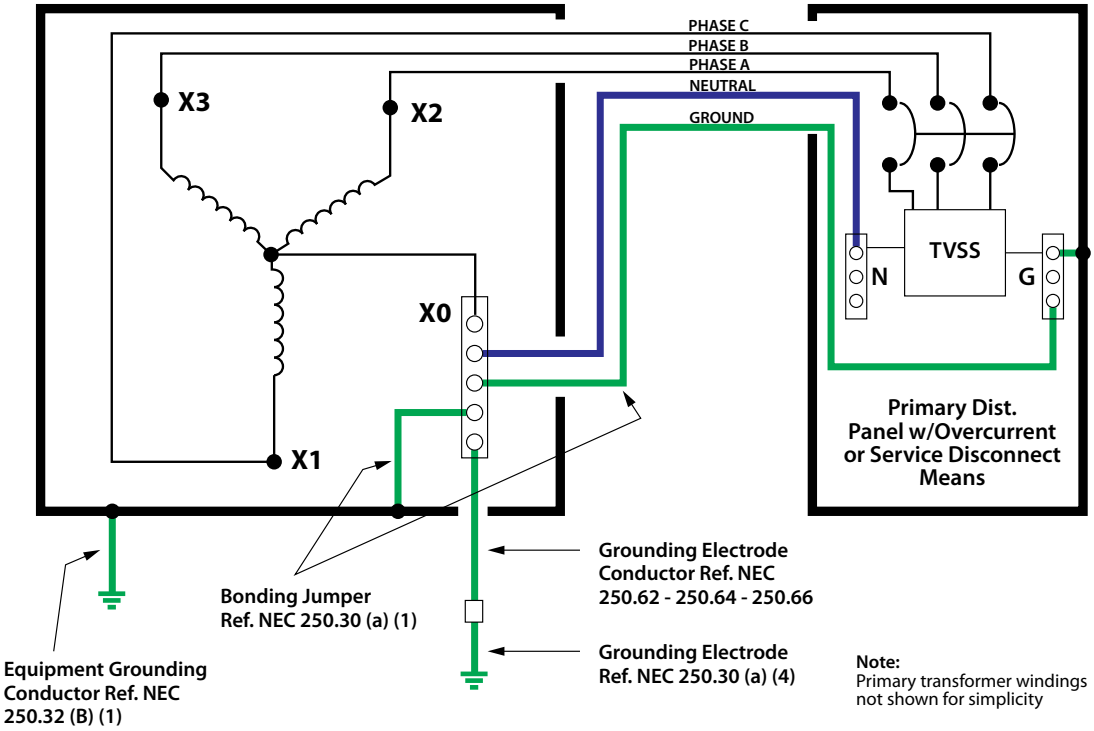
A dedicated circuit breaker is not required as long as the ACT 471 SEL POWER FILTER is installed on the load side of the system main over current disconnect breaker or fuse. However, a dedicated fuse or breaker upstream will greatly increase the serviceability of the Power Filter.

6. REMOTE ALARM CONTACTS

Remote Alarm Monitoring Contacts are provided on all ACT 471 SEL POWER FILTER models. If this type of monitoring is desired, refer to page 10 for the location and pin configuration of these contacts. The contacts are dry, 1 form C type, rated 240 VAC, 5 Amps maximum. Once the POWER FILTER has been energized and is found to be operating normally, the alarm contacts will only change if there is a failure within the POWER FILTER suppression circuitry, or if power has been disconnected from the POWER FILTER. Leaving the Remote Alarm Contacts unconnected will not affect the performance of the POWER FILTER.

7. PRE-ENERGIZATION CHECK

Once all of the pre-installation conditions have been met and the ACT 471 SEL POWER FILTER has been installed, the POWER FILTER can now be energized. For POWER FILTER Operational Status, refer to Operation and Maintenance Sections, pages 12 & 13.



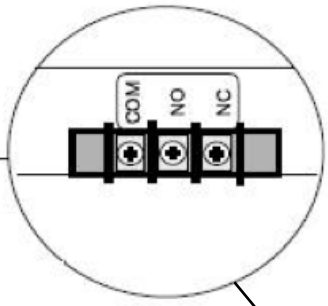
Example of an NEC Compliant Grounding Arrangement for a Separately Derived Power System

Power Terminals & Remote Alarm Locations

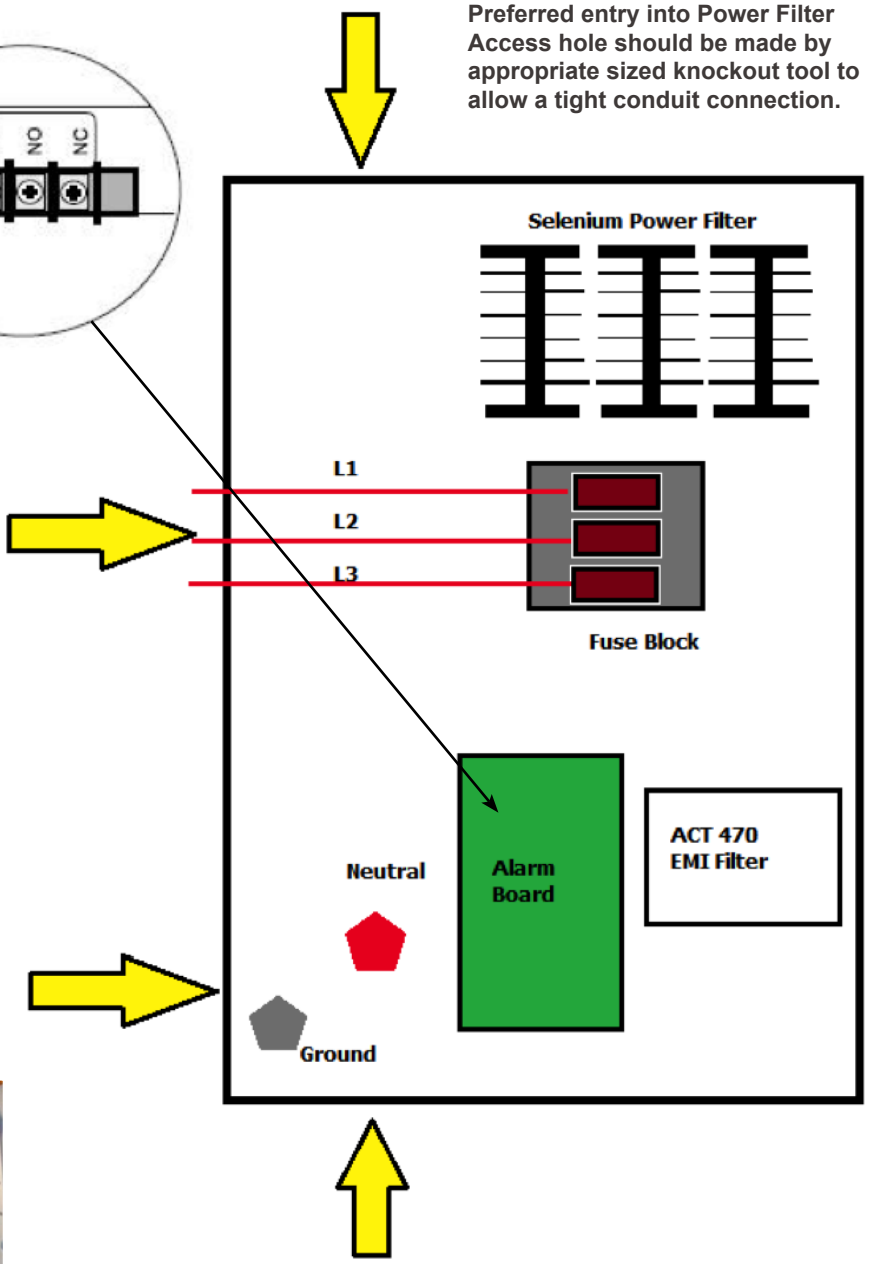
Remote Alarm Monitoring Contact Terminals

Normal Status Indication:
NO – COM = Closed
NC – COM = Open

Alarm Status Indication:
NO – COM = Open
NC – COM = Closed

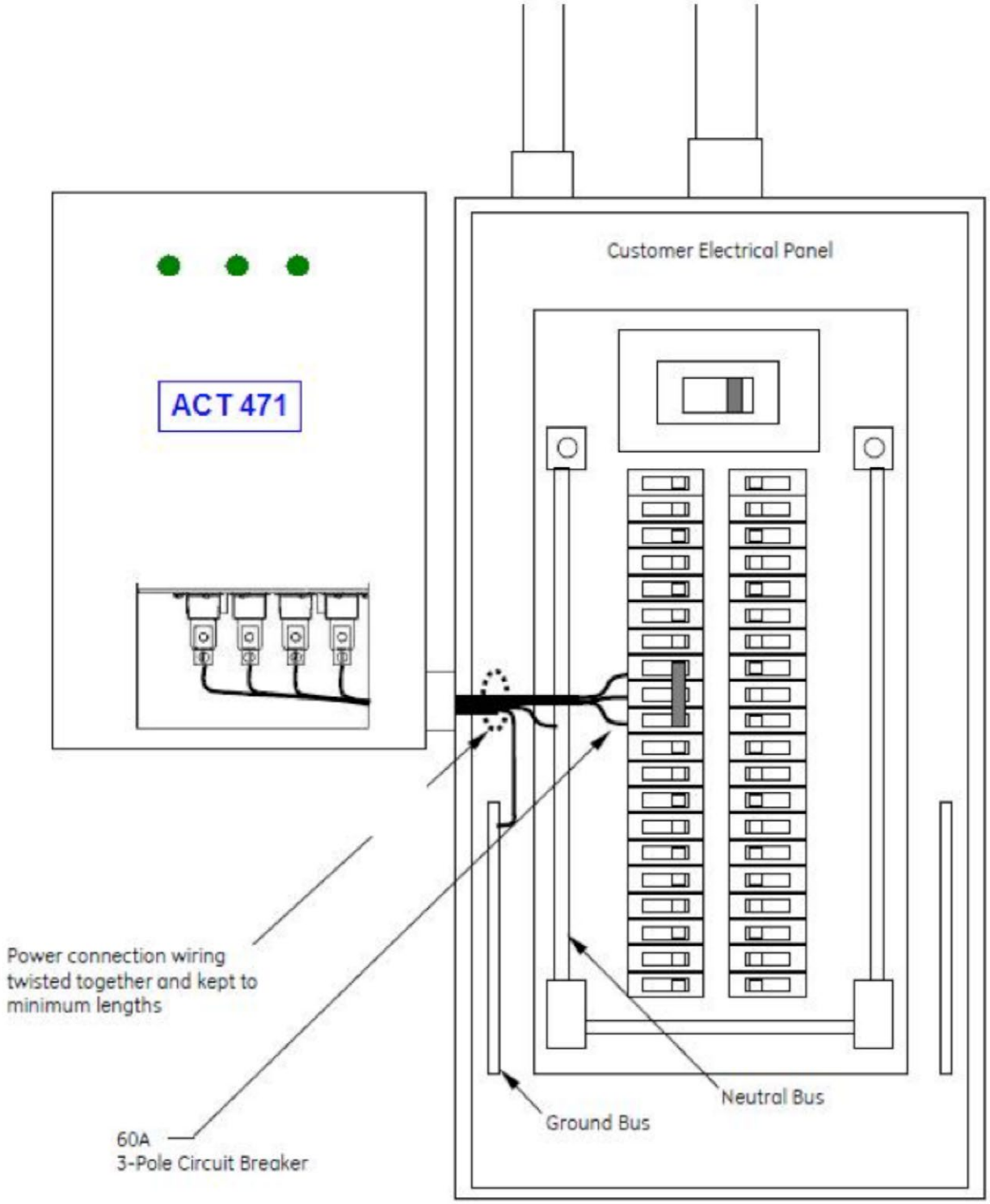


Preferred entry into Power Filter Access hole should be made by appropriate sized knockout tool to allow a tight conduit connection.



The above illustration represents the interior view of Wall Mounted POWER FILTER models with and without disconnect switch. Various orientations are possible and will not affect the performance of the POWER FILTER if wire connections and cable length are kept to a minimum.

Installation Example



Operation

After applying power to the POWER FILTER, verify that the protection monitoring circuits are functioning correctly. If all status alarms indicate "normal" (Green LED's), the POWER FILTER has been successfully installed and is operational.

1. LINE STATUS INDICATORS

The green line status LED's provide visual indication of POWER FILTER health status. As long as the POWER FILTER is connected to the electrical system supply voltage and the POWER FILTER suppression circuitry is functional, the green indicators will be illuminated. There is one green indicator per each protected phase.

2. ALARM STATUS INDICATOR

When illuminated, the red Alarm Status Indicator LED will provide notification of a POWER FILTER failure condition. Verify the Alarm Status Indicator is not illuminated upon startup.

3. REMOTE ALARM CONTACTS

Remote Alarm Contacts are available to remotely monitor the health status of the POWER FILTER. An alarm condition will result in a status change of the contacts. These contacts do not affect the performance of the POWER FILTER and are not required to be connected for the POWER FILTER to function as intended.

4. Audible Alarm ENABLE / DISABLE SWITCH

Enable Position - This is the normal position for the position switch. In the enable position, the Audible Alarm will sound in the event of a POWER FILTER failure mode.

Disable Position - This position will silence the Audible Alarm if desired. The disable switch will not disable or disconnect the POWER FILTER from the electrical power system.

! WARNING !

UPON ENERGIZATION OF THE POWER FILTER, IF ANY OF THE LAMPS OR ALARMS INDICATES AN ABNORMAL CONDITION, POWER SHOULD PROMPTLY BE DISCONNECTED FROM THE POWER FILTER. THE ELECTRICAL SYSTEM SHOULD BE INSPECTED AND THE PRE-INSTALLATION REQUIREMENTS SHOULD BE VALIDATED. DO NOT ATTEMPT TO LEAVE POWER APPLIED TO THE POWER FILTER, OR RE-ENERGIZE THE POWER FILTER IN THE EVENT OF AN ALARM CONDITION.

PLEASE CONTACT YOUR LOCAL ACT REPRESENTATIVE FOR FURTHER ASSISTANCE.

Maintenance

ACT does not provide a specific schedule for preventative maintenance as conditions will vary based on location and the environmental factors presented at each installation site. However, periodic inspections should be scheduled to verify that the POWER FILTER does not indicate a failure mode.

Inspections should also be made to check the integrity of electrical supply connections / terminations to the POWER FILTER to ensure continued reliable performance.

Servicing / Troubleshooting

The ACT 471 SEL HYBRID POWER FILTER Series contains user serviceable parts, but requires no calibration. The rugged design of the POWER FILTER should provide many years of service.

Should a condition occur that results in premature failure of the ACT 471 SEL HYBRID POWER FILTER, the integral POWER FILTER fusing will safely interrupt current flow through the POWER FILTER without disrupting power to the protected equipment.

If a change in operational status/alarm indication occurs, a qualified (licensed) electrician should inspect the electrical system to verify electrical system integrity. If the POWER FILTER remains in alarm after system inspection/corrections have been made, the POWER FILTER should be replaced. For further assistance, contact your local sales representative or call ACT Communications, Inc. at 1-903-583-8097.

Notice

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation, or maintenance.

Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the ACT Communications, Inc.