



**Shaft Lathe Foundation and Electrical
Modernization, B431
Puget Sound Naval Shipyard**

Project #N44255-17-D-4036/N44255-22-F-4356

**26 20 00
Interior Distribution System O&M**

**General Contractor: Doyon Project Services
Electrical Contractor: Safari Electric, LLC.**

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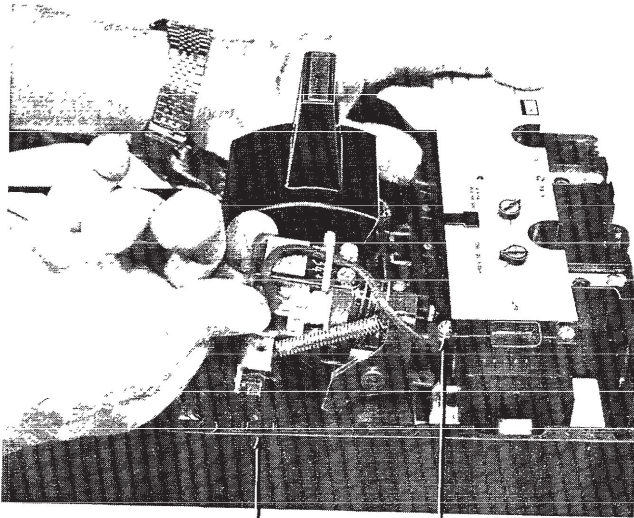
2.1 Safety Precautions

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Step 4

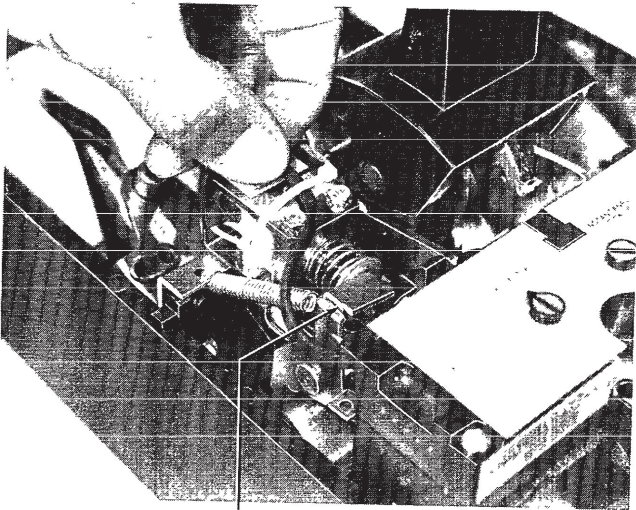
Clearance Check

NOTE: KEEP HANDS CLEAR OF BREAKER HANDLE AND MECHANISM DURING CHECK.



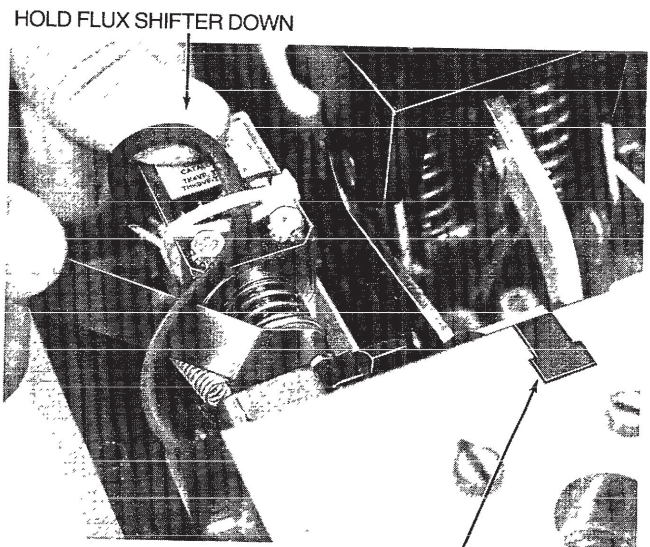
SLOT IN BREAKER BASE FOR FLUX SHIFTER FRAME

FLUX SHIFTER MOUNTING SCREW



FLUX SHIFTER RESET LEVER

Fig. 7



FLUX SHIFTER PLUG TO BE FLUSH WITH PROGRAMMER

Fig. 9

Fig. 8

Assembling MicroVersaTrip™ Trip Unit Systems

Step 5

Functional Check

NOTE: KEEP HANDS AWAY FROM BREAKER HANDLE AND MECHANISM DURING CHECK.

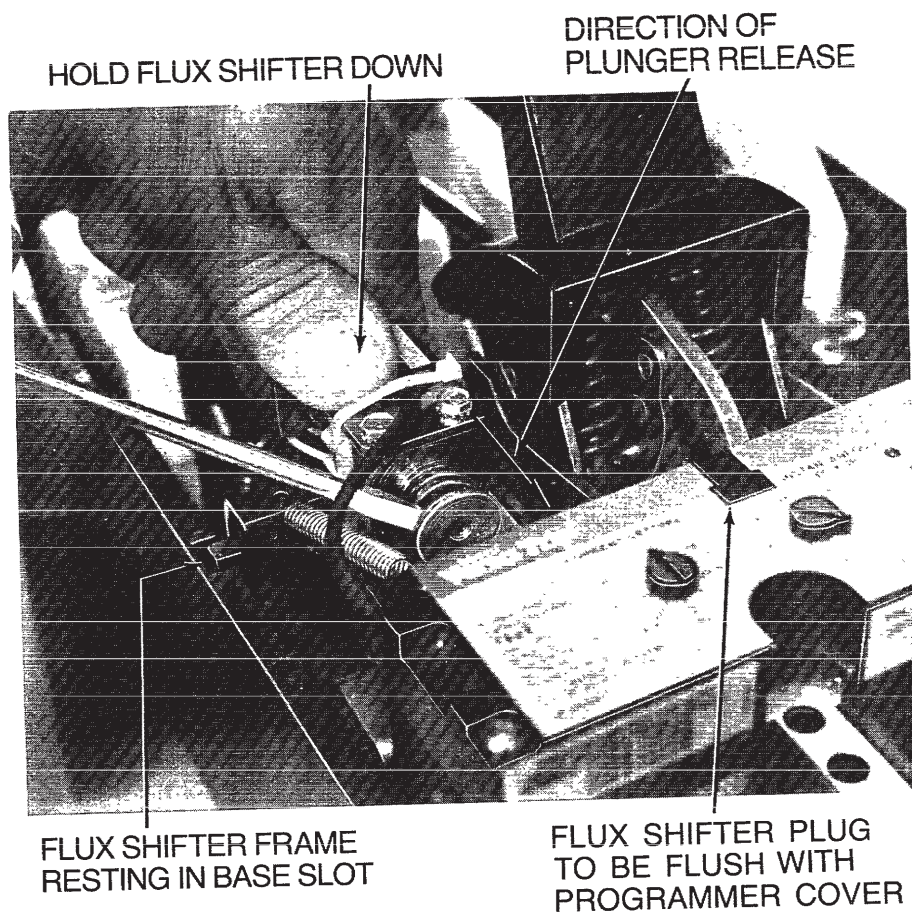


Fig. 10

⚠ DANGER / PELIGRO / DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Never operate energized switch with door open.
- Turn off switch before removing or installing fuses or making load side connections.
- Always use a properly rated voltage sensing device at all line and load fuse clips to confirm switch is off.
- Turn off power supplying switch before doing any other work on or inside switch.
- Do not use renewable link fuses in fused switches.

Failure to follow these instructions will result in death or serious injury.

PELIGRO DE DESCARGA ELÉCTRICA, EXPLOSIÓN O DESTELLO POR ARQUEO

- Utilice equipo de protección personal (EPP) apropiado y siga las prácticas de seguridad eléctrica establecidas por su Compañía, consulte la norma 70E de NFPA.
- Solamente el personal eléctrico especializado deberá instalar y prestar servicio de mantenimiento a este equipo.
- Nunca haga funcionar el interruptor energizado con la puerta abierta.
- Desconecte el interruptor antes de retirar o instalar los fusibles o realizar las conexiones del lado de carga.
- Siempre utilice un dispositivo detector de tensión nominal adecuado en todos los clips para fusibles en los lados de línea y carga para confirmar la desenergización del interruptor.
- Desenergice el interruptor antes de realizar cualquier otro trabajo dentro o fuera de él.
- No use fusibles renovables en los interruptores fusibles.

El incumplimiento de estas instrucciones podrá causar la muerte o lesiones serias.

RISQUE D'ÉLECTROCUTION, D'EXPLOSION OU D'ÉCLAIR D'ARC

- Portez un équipement de protection personnelle (ÉPP) approprié et observez les méthodes de travail électrique sécuritaire. Voir NFPA 70E.
- Seul un personnel qualifié doit effectuer l'installation et l'entretien de cet appareil.
- Ne faites jamais fonctionner l'interrupteur sous tension avec la porte ouverte.
- Mettez L'interrupteur hors tension avant d'enlever ou d'installer des fusibles ou de faire des raccords sur le côté charge.
- Utilisez toujours un dispositif de détection de tension ayant une valeur nominale appropriée sur tous les porte-fusibles du côté ligne et charge pour s'assurer que l'interrupteur soit hors tension.
- Coupez l'alimentation de l'interrupteur avant d'y faire tout autre travail.
- N'utilisez pas de fusibles renouvelables dans les interrupteurs à fusibles..

Si ces directives ne sont pas respectées, cela entraînera la mort ou des blessures graves.

CAUTION / PRECAUCIÓN / ATTENTION

HAZARD OF EQUIPMENT DAMAGE

Do not disassemble the switch line base assembly or remove the blade rotor when cleaning the line-side jaw or the switch blade. See Figure 3 on page 4.

Failure to follow this instruction can result in equipment damage.

PELIGRO DE DAÑO AL EQUIPO

No desmonte el ensamble de la base de línea del interruptor o retire el rotor de cuchilla al limpiar la mordaza del lado de línea o la cuchilla del interruptor, vea la figura 3 en la página 4.

El incumplimiento de esta instrucción puede causar daño al equipo.

RISQUE DE DOMMAGES MATÉRIELS

Ne démontez pas l'assemblage de la base de ligne de l'interrupteur ou ne retirez pas le rotor à lame lorsque vous nettoyez la mâchoire côté ligne ou la lame de l'interrupteur. Voir la figure 3 à la page 4.

Si cette précaution n'est pas respectée, cela peut entraîner des dommages matériels.

Safety Information

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this user guide or on the equipment to warn of hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of either symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ ⚠ DANGER
DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING
WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION
CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE
NOTICE is used to address practices not related to physical injury.

NOTE: Provides additional information to clarify or simplify a procedure.

Please Note

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction, installation, and operation of electrical equipment and has received safety training to recognize and avoid the hazards involved.

Electrical equipment should be transported, stored, installed, and operated only in the environment for which it is designed.

Maintenance

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, CSA Z462 or NOM-029-STPS.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Never operate energized switch with door open.
- Turn off switch before removing or installing fuses or making load side connections.
- Always use a properly rated voltage sensing device at all line and load fuse clips to confirm switch is off.
- Turn off power supplying switch before doing any other work on or inside switch.
- Do not use renewable link fuses in fused switches.

Failure to follow these instructions will result in death or serious injury.

▲ CAUTION**HAZARD OF EQUIPMENT DAMAGE**

Do not disassemble the switch line base assembly or remove the blade rotor when cleaning the line-side jaw or the switch blade. See Figure 4, page 26, Examples of Line Base Assemblies.

Failure to follow these instructions can result in injury or equipment damage.

Replacing the Viewing Window 30–200 A

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, CSA Z462 or NOM-029-STPS.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Never operate energized switch with door open.
- Turn off switch before removing or installing fuses or making load side connections.
- Always use a properly rated voltage sensing device at all line and load fuse clips to confirm switch is off.
- Turn off power supplying switch before doing any other work on or inside switch.
- Do not use renewable link fuses in fused switches.

Failure to follow these instructions will result in death or serious injury.

Hazard Categories and Special Symbols

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this bulletin or on the equipment to warn of hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of either symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates an imminently hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠ WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, **can result in** death or serious injury.

⚠ CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, **can result in** minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury. The safety alert symbol is not used with this signal word.

NOTE: Provides additional information to clarify or simplify a procedure.

Please Note

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

Section 2—Safety Precautions

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS-2011, or CSA Z462.
- This equipment must be installed and serviced only by qualified electrical personnel.
- Perform such work only after reading and understanding all of the instructions contained in this bulletin.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Before performing visual inspections, tests, or maintenance on this equipment, disconnect all sources of electric power. Assume all circuits are live until they are completely de-energized, tested, and tagged. Pay particular attention to the design of the power system. Consider all sources of power, including the possibility of backfeeding.
- Always practice lock-out/tag-out procedures according to OSHA requirements.
- Carefully inspect your work area, and remove any tools and objects left inside the equipment.
- Replace all devices, doors, and covers before turning on power to this equipment.
- All instructions in this manual are written with the assumption that the customer has taken these measures before performing maintenance or testing.

Failure to follow these instructions will result in death or serious injury.



WARNING: This product can expose you to chemicals including Phenyl Glycidyl Ether, which is known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.



WARNING: This product can expose you to chemicals including Methanol, which is known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Codes and Standards

It is the responsibility of the users of this document to use qualified electrical personnel and to comply with applicable federal, state and local electrical codes when installing electrical products and systems.

This document adheres to the codes and standards as outlined by the National Fire Protection Association® (NFPA). Refer to NFPA 70: 2014 Edition National Electrical Code (NEC®).

Disclaimer Statement

Electrical equipment should be installed, operated, serviced and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

Figure 32: Caution Label for Delta Wye or Wye Delta Connected Transformers



Electrical Testing

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS-2011, or CSA Z462.
- This equipment must be installed and serviced only by qualified electrical personnel.
- Perform such work only after reading and understanding all of the instructions contained in this bulletin.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Always practice lock-out/tag-out procedures according to OSHA requirements.
- Carefully inspect your work area, and remove any tools and objects left inside the equipment.
- Replace all devices, doors, and covers before turning on power to this equipment.
- All instructions in this manual are written with the assumption that the customer has taken these measures before performing maintenance or testing.

Failure to follow these instructions will result in death or serious injury.

Section 5—Operation

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS-2011, or CSA Z462.
- This equipment must be installed and serviced only by qualified electrical personnel.
- Perform such work only after reading and understanding all of the instructions contained in this bulletin.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Before performing visual inspections, tests, or maintenance on this equipment, disconnect all sources of electric power. Assume all circuits are live until they are completely de-energized, tested, and tagged. Pay particular attention to the design of the power system. Consider all sources of power, including the possibility of backfeeding.
- Always practice lock-out/tag-out procedures according to OSHA requirements.
- Carefully inspect your work area, and remove any tools and objects left inside the equipment.
- Replace all devices, doors, and covers before turning on power to this equipment.
- All instructions in this manual are written with the assumption that the customer has taken these measures before performing maintenance or testing.

Failure to follow these instructions will result in death or serious injury.

Section 6—Maintenance

Performing Visual and Mechanical Checks

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Only qualified personnel should clean, inspect maintain and test transformers.
- Turn off power supplying this equipment before working on it.
- Disconnect and electrically isolate power to the transformer so that no accidental contact can be made with energized parts.
- Discharge all static charges held by coils.

Failure to follow these instructions will result in death or serious injury.

Performing Electrical Testing

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Only qualified personnel should clean, inspect maintain and test transformers.
- Turn off power supplying this equipment before working on it.
- Disconnect and electrically isolate power to the transformer so that no accidental contact can be made with energized parts.
- Discharge all static charges held by coils.

Failure to follow these instructions will result in death or serious injury.

Perform the following electrical tests during maintenance:

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Safety Information

Important Information

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service or maintain it. The following special messages may appear throughout this bulletin or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of either symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

DANGER

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury. The safety alert symbol shall not be used with this signal word.

Please Note

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by ASCO Power Technologies for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction, installation, and operation of electrical equipment and has received safety training to recognize and avoid the hazards involved.

Precautions

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.
- This equipment must be effectively grounded per all applicable codes. Use an equipment-grounding conductor to connect this equipment to the power system ground.
- Confirm the SPD voltage rating on the module or nameplate label is not less than operating voltage the operating voltage.

Failure to follow these instructions will result in death or serious injury.



WARNING: This product can expose you to chemicals including DINP, which is known to the State of California to cause cancer, and DIDP which is known to the State of California to cause birth defects or other reproductive harm. For more information go to: www.P65Warnings.ca.gov.

NOTICE

LOSS OF BRANCH CIRCUIT POWER / LOSS OF SURGE SUPPRESSION

- Perform periodic inspection of the surge protective device status indicator lights as part of the preventative maintenance schedule.
- Promptly replace the surge protective device when an alarm state exists.
- Use dry contacts to signal an alarm state to the central supervisory system for unmanned, inaccessible, or critical installations.
- Use multiple surge protective devices to achieve redundancy for critical applications.

Failure to follow these instructions can result in equipment damage.

At end-of-life conditions, Surge Protective Devices (SPDs) can lose their ability to suppress power system transient voltage spikes and attempt to draw excessive current from the line. This SPD is equipped with overcurrent and overtemperature components that will automatically disconnect the surge suppression elements from the mains should the surge suppression elements reach end of life. Tripping of the branch circuit breaker or fuse feeding the SPD can occur. Mitigate the tripping of the branch circuit breaker or fuse feeding the SPD by coordinating the surge suppression elements with the branch circuits.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Do not energize the surge protective device until the electrical system is completely installed, inspected and tested.
- Ensure all conductors are connected.
- Verify the voltage rating of the device and system prior to energizing.
- Perform high-potential insulation testing, or any other tests where surge protective device components will be subjected to voltages higher than their rated turn-on voltage, with the neutral and surge protective device disconnected from the power source

Failure to follow these instructions will result in death or serious injury.

Introduction

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.
- This equipment must be effectively grounded per all applicable codes. Use an equipment-grounding conductor to connect this equipment to the power system ground.

Failure to follow these instructions will result in death or serious injury.

Unpacking and Preliminary Inspection

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Confirm the SPD voltage rating on the module or nameplate label is not less than operating voltage the operating voltage.

Failure to follow these instructions will result in death or serious injury.

Electrical

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Confirm the surge protective device voltage rating on the module or nameplate label is not less than the operating voltage.

Failure to follow these instructions will result in death or serious injury.

Location of Surge Protective Device (SPD)

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- On a high-leg delta installation, the high-leg of the power system must be connected to the B phase lug of the SPD.

Failure to follow these instructions will result in death or serious injury.

System Grounding

⚠ CAUTION

SPD DAMAGE AND POWER SYSTEM OVERVOLTAGE

- Ungrounded power systems are inherently unstable and can produce excessively high line-to-ground voltages during certain fault conditions. During these fault conditions any electrical equipment, including an SPD, may be subjected to voltages which exceed their designed ratings. This information is being provided to the user so that an informed decision can be made before installing any electrical equipment on an ungrounded power system.
- Resistance-grounded power systems must be maintained in a over-damped state to limit voltage overshoot and duration during operation.
- Verification and adjustment of correct power system damping should be done following power system modifications and periodically, as part normal system maintenance.

Failure to follow these instructions can result in injury or equipment damage.

NOTICE

LOSS OF SURGE SUPPRESSION

- Verify that the service entrance equipment is bonded to ground in accordance with all applicable codes.

Failure to follow these instructions can result in equipment damage.

NOTICE

INADEQUATE RACEWAY ELECTRICAL CONTINUITY

- Install an insulated grounding conductor inside a metallic raceway when the raceway is used as an additional grounding conductor. Size the conductor in accordance with all applicable codes.
- Maintain adequate electrical continuity at all raceway connections.
- Do not use isolating bushings to interrupt a metallic raceway run.
- Do not use a separate isolated ground for the surge protective device.
- Verify proper equipment connections to the grounding system.
- Verify ground grid continuity by inspections and testing as part of a comprehensive electrical maintenance program.

Failure to follow these instructions can result in equipment damage.

Parts List

Wiring and Installation

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.
- This equipment must be effectively grounded per all applicable codes. Use an equipment-grounding conductor to connect this equipment to the power system ground.
- Confirm the surge protective device voltage rating on the module or nameplate label is not less than the operating voltage.

Failure to follow these instructions will result in death or serious injury.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- For outdoor installation use and appropriate weather sealing at the nipple (o-ring, sealing conduit, etc).

Failure to follow these instructions will result in death or serious injury.

Operation

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.
- This equipment must be effectively grounded per all applicable codes. Use an equipment-grounding conductor to connect this equipment to the power system ground.

Failure to follow these instructions will result in death or serious injury.

Dry Contacts

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Use 600 Vac rated dry contact wiring.
- Dry contact wiring must have less than 1/16 in. (1.6mm) exposed wire from the dry contact block.
- Do not supply more than 24 Vdc / 24 Vac and no more than a current of 2 A.

Failure to follow these instructions will result in death or serious injury

Preventive Maintenance

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
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- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.
- This equipment must be effectively grounded per all applicable codes. Use an equipment-grounding conductor to connect this equipment to the power system ground.

Failure to follow these instructions will result in death or serious injury.



2.2 Operator Pre-start

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Assembling MicroVersaTrip™ Trip Unit Systems

General Information

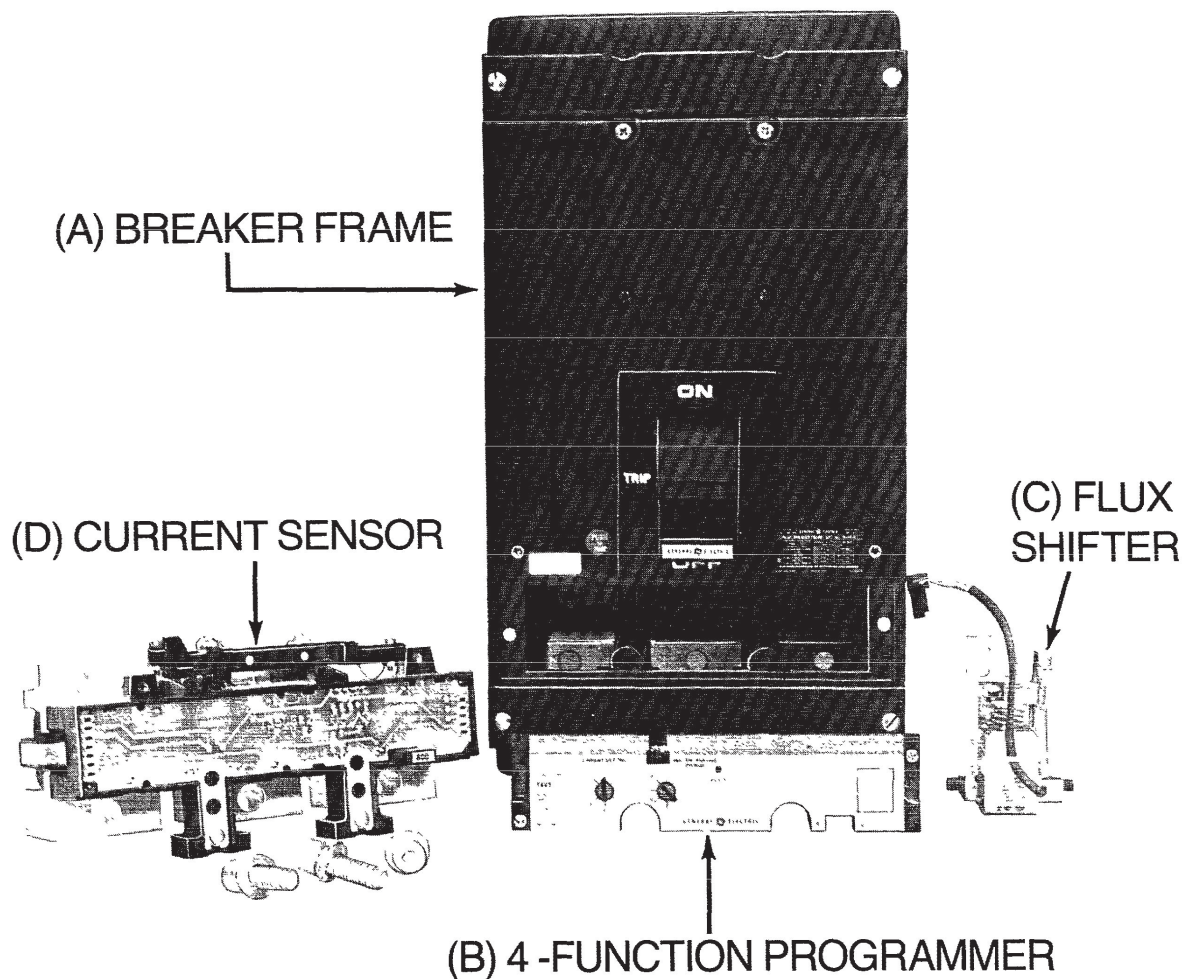
Remove components from cartons and check catalog numbers on components against carton labels. Following is a list of components necessary to assemble the General Electric TK4V-THK4V Model 6 frame molded case circuit breakers with a 4-function MicroVersaTrip trip unit (See FIGURE 1). A Model 6 circuit breaker frame is identified by a "MOD 6" stamp on the breaker side, and by an Underwriters Laboratories Inc. label in the handle. Presence of any other label, or of no label at all, in the handle indicates that the breaker frame is not Model 6 and is NOT suitable for field installation of MicroVersaTrip components.

- A. Breaker frame (catalog numbers TK4VF46, THK4VF46)
- B. 4-function programmer (catalog number T4VT series)

- C. Flux shifter (catalog number TKFS)
- D. Current sensor (catalog number TKCT series)

Necessary Tools:

- Electrician's Phillips head screwdriver
- Torque screwdriver with Phillips and flat blade bit
- Torque wrench with 1/4 inch hex bit (4 inch length)
- 1/16" feeler gauge
- Flat blade screwdriver
- Pliers



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Shipping and Storage Requirements

This equipment does not achieve its ratings until it is installed per record/as-built drawings, installed per the instructions contained in this document, and has operational environmental controls with appropriate settings to help mitigate environmental influences. This equipment can also be stored in a climate controlled area that uses both heating and cooling to maintain acceptable environmental conditions. Indoor and outdoor rated equipment is not suitable for outdoor storage.

- The equipment should be treated as if it is in storage until it is installed and operational. The storage area should be clean, dry (75% or less relative humidity), and climate controlled with proper ventilation.
- To keep the equipment dry, the use of heaters is required in some cases (for example, during seasonal or low periods of electrical loading and equipment de-energization).
 - Consult the Engineer of Record for the appropriate environmental control settings or means to mitigate environmental influences.
 - If so equipped, ensure that the thermostats and/or humidistats are set to mitigate condensation. A minimum of watts of heat per section is suggested, see table below.

Amperage Rating	Heat Wattage
30 to 200	5
400	25
600 to 800	50
1200	100

- If heaters are being used with the equipment that were not included in the equipment by Schneider Electric, they must be clean and free of debris and grease. Greasy and/or smoky heaters can contaminate electrical insulation and lead to dielectric breakdown and/or tracking.
- Shipping packaging is not suitable for and cannot be used by itself for equipment storage unless otherwise indicated on the shipping packaging labeling.
- When receiving equipment, the equipment may be at a lower temperature than the ambient air temperature. Allow time for the equipment temperature, including the temperature of internal components, to rise to the ambient air temperature before making openings in or otherwise disturbing the packaging. Condensation can occur on and inside the equipment if warm air contacts cold surfaces of the equipment. Moisture damage can occur, destroying the dielectric capabilities of the equipment and rendering it unusable.
- The factory shipping wrap around the equipment on shipping pallets is not suitable for non-enclosed over-the-road transportation that risks exposing the equipment to the elements. The factory shipping wrap around the equipment should remain on the equipment until the equipment is ready to be inspected and stored or inspected and installed. After receiving the equipment and allowing it to acclimate to the environment, remove the packaging and inspect the equipment for damage that may have occurred in transit. If damage is found or suspected, immediately file a claim with the carrier and notify your Schneider Electric representative.
- Follow these guidelines every time the equipment is moved to a new storage location or to its final destination.

Installation and Operation Requirements

This equipment does not achieve its ratings until it is installed per record/as-built drawings, installed per the instructions contained in this document, and has operational environmental controls with appropriate settings to help mitigate environmental influences. This equipment can also be operated in a climate controlled area that uses both heating and cooling to maintain acceptable environmental conditions. Indoor and outdoor rated equipment is not suitable for outdoor storage. In some cases (such as seasonal electrical loading, de-energized equipment, and standby/alternate power sources), the heat generated by equipment loading is insufficient to prevent condensation and alternate heat sources are required. If environmental controls such as a thermostat or humidistat are used, ensure their settings are sufficient to mitigate condensation and remain operational at all times. Consult the Engineer of Record for the appropriate environmental control settings.

Proposition 65 Information



WARNING: This product can expose you to chemicals including Lead and Lead Compounds, which are known to the State of California to cause cancer and cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Exposure to Moisture, Chemicals, and Condensation

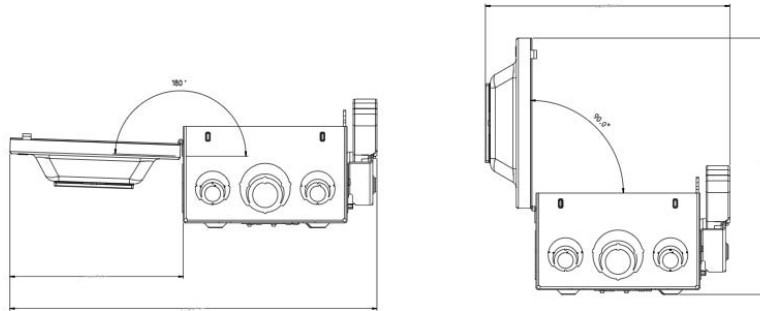
If liquids such as moisture, chemicals, and condensation contact the electronics, circuit breaker, fuses, bussing, or other electrical components, do not attempt to clean or repair the equipment as this may lead to unrepairable damage. If the equipment is energized, de-energize it. If equipment is not energized, do not energize it. Contact the Schneider Electric Customer Care Center at 888-778-2733.

Installation

Mounting

Safety Switches are tested for operation and environmental enclosure ratings in the vertical position, with ON in the up position.

Always check the drawings for required space for each safety switch. The footprint and door swing radius need to be taken into account.



Seismic Certifications

Equipment Installation for Seismic Applications

Introduction

Seismic certification is an optional feature for Safety Switch products and provides seismic conformance options to any of the building codes and seismic design standards identified in the [List of Supported Regional Building Codes and Seismic Design Standards, page 10](#). Safety Switches that are seismically certified have been certified to the seismic requirements of the listed code per the manufacturer's Certificate of Compliance (CoC). Equipment compliance labels and CoC's are provided with all seismically certified Safety Switches. Refer to the equipment CoC for certification details and applicable seismic parameters. To maintain the validity of this certification, the installation instructions provided in this section must be followed.

Table 1 - List of Supported Regional Building Codes and Seismic Design Standards

Country / Region	Code Reference ID	Code Name
Argentina	INPRES-CIRSOC103	Argentinean Standards for Earthquake Resistant Constructions
Australia	AS 1170.4-2007 (R2018)	Structural design actions, Part 4: Earthquake actions in Australia
Canada	NBCC	National Building Code of Canada
Chile	NCh 433.Of1996	Earthquake resistant design of buildings
China	GB 50011-2010 (2016)	Code for Seismic Design of Buildings
Colombia	NSR-10 Título A	Colombian Regulation of Earthquake Resistant Construction
Europe	Eurocode 8 EN1998-1	Design of structures for earthquake resistance – Part 1: General rules, seismic actions and rules for buildings
India	IS 1893 (Part 1) : 2016	Criteria for Earthquake Resistant Design of Structures Part 1 General Provisions and Buildings
Indonesia	SNI 1726:2019	Earthquake Resistance Planning Procedures for Building and Non-building Structures
Japan	Building Standard Law	The Building Standard Law of Japan
Mexico	CFE MDOC-15	Civil Works Design Manual, Earthquake Design
New Zealand	NZS 1170.5:2004+A1	Structural design actions, Part 5: Earthquake actions – New Zealand
Peru	N.T.E. - E.030	National Building Code, Earthquake-Resistant Design
Russia	СП 14.13330.2018	Building norms and regulations: Construction in seismic regions
Saudi Arabia	SBC 301	Saudi Building Code, Loads & Forces Requirements
Taiwan	CPA 2011	Seismic Design Code and Commentary for Buildings
Turkey	TBEC-2018	Turkey Buildings Earthquake Standard
United States	IBC per ASCE 7	International Building Code—IBC
	CBC per ASCE 7	California Building Code—CBC
	UFC per DoD	Uniform Facilities Criteria—UFC

Responsibility for Mitigation of Seismic Damage

The Safety Switch equipment is considered a non-structural building component as defined by regional building codes and seismic design standards. Equipment capacity was determined from tri-axial seismic shake-table test results in accordance with the International Code Counsel Evaluation Service (ICC ES) Acceptance Criteria for Seismic Certification by Shake-Table Testing of Nonstructural Components (ICC-ES AC156).

An equipment importance factor, I_p , that is greater than one ($I_p > 1.0$) is assumed and indicates that equipment functionality is required after a seismic event and after seismic simulation testing. This importance factor is applicable for designated seismic systems (i.e., special certification) servicing critical infrastructure and essential buildings where post-earthquake equipment functionality is a requirement.

Incoming and outgoing bus, cable, and conduit must also be considered as related but independent systems. These distribution systems must be designed and restrained to withstand the forces generated by the seismic event without increasing the load transferred to the equipment. For applications where seismic hazard exists, it is preferred that bus, cable, and conduit enter and exit the bottom of the equipment enclosure.

Seismic certification of nonstructural components and equipment by Schneider Electric is just one link in the total chain of responsibility required to maximize the probability that the equipment will be intact and functional after a seismic event. During a seismic event the equipment must be able to transfer the inertial loads that are created and reacted through the equipment's force resisting system and anchorage to the load-bearing path of the building structural system or foundation.

Anchorage of equipment (i.e., nonstructural supports and attachments) to the primary building structure or foundation is required to validate seismic conformance. The construction site structural engineer or engineer of record (EOR) or the registered design professional (RDP) is responsible for detailing the equipment anchorage requirements for the given installation. The installer and manufacturers of the anchorage system are responsible for assuring that the mounting requirements are met. Schneider Electric is not responsible for the specification and performance of equipment anchorage systems.

Tie-down Points for Rigid Wall Mounted Equipment

The equipment enclosure provides anchorage tie-down points to accept anchor attachments to the building structure or foundation. Indoor enclosures provide enclosure base frame clearance holes for bolted anchorage attachments, outdoor enclosures provide enclosure base frame clearance holes for bolted anchorage attachments please obtain drawings for actual locations.

Equipment installations of single, stand-alone safety switches must be anchored using all enclosure tie-down points as shown on drawings for indoor and outdoor applications respectively.

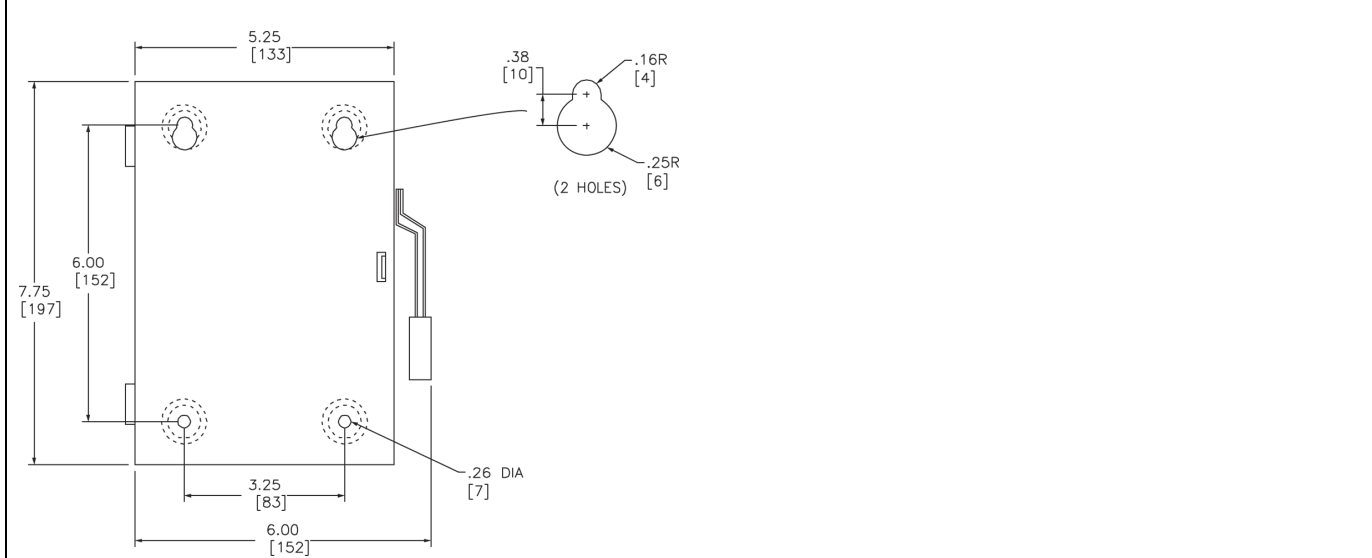
Equipment installations using welded supports and attachments in lieu of bolted supports and attachments must ensure the weld locations are distributed similarly to the locations of enclosure anchorage clearance holes. Welded supports and attachments must be properly sized to ensure the weldment withstand capacity exceeds the earthquake demand at location of equipment installation. Precautions shall be made to properly vent and shield the equipment enclosure during the field welding process. Schneider Electric is not responsible for equipment damage caused by field welded supports and attachments.

Anchorage Assembly Instructions

The bolted anchor assembly illustrates the equipment's as-tested attachment to the seismic shake-table test fixture. The equipment seismic rated capacity, as stated on the Schneider Electric CoC, was achieved with the identified size and grade attachment hardware. Field installed equipment attachment and support detailing shall be in accordance with the anchorage system requirements as defined by the construction site Engineer of Record (EOR) or Registered Design Professional (RDP).

Table 2 - Anchorage As-Tested

Light Duty Safety Switches

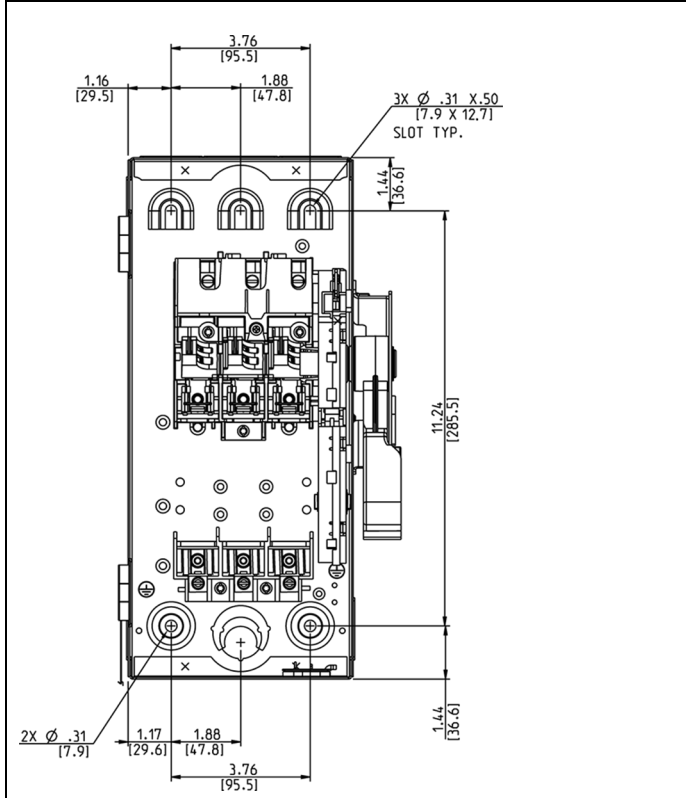


Type 1 – 30 A

1/4 in. grade 5 bolts and flat washer at four locations, torque to 8 ft–lbs.

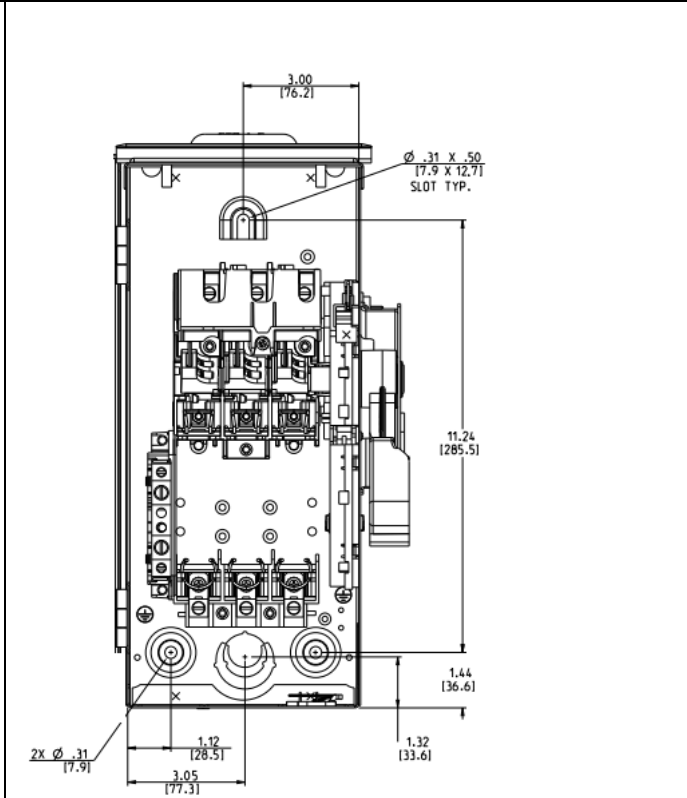
Dimensions: in. / [mm]

General Duty and Heavy Duty – Single and Double Throw



Type 1 30 AMP 240 V / 600 V Type 60 A 240 V

1/4 in. grade 5 bolts and flat washer at three locations, torque to 7 ft–lbs. Locations are top center, and two bottom locations.



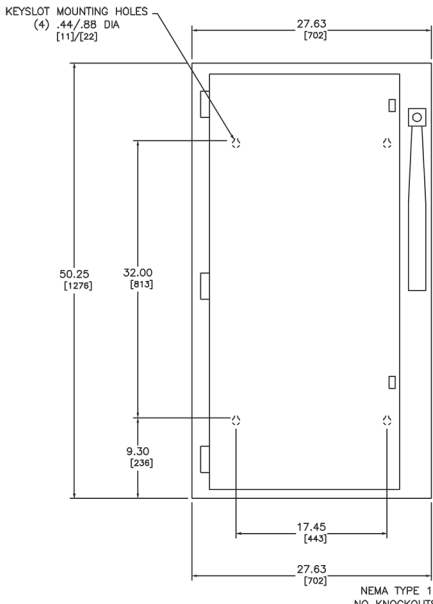
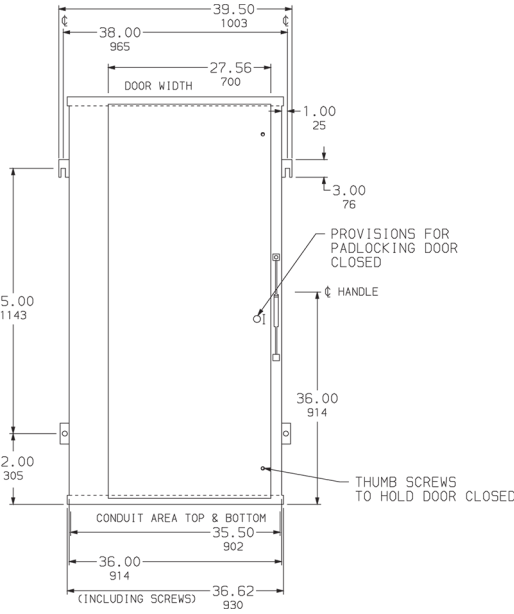
Type 3R 30 A 240 V / 600 V Type 60 A 240 V

1/4 in. grade 5 bolts and flat washer at three locations, torque to 7 ft–lbs.

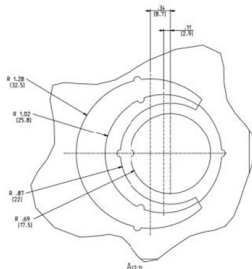
Table 2 - Anchorage As-Tested (Continued)

<p>Type 12 and Type 4X 30, 60, 100 A 240 V / 600 V</p> <p>1/4 in. grade 5 bolts and flat washer at four locations, torque to 7 ft-lbs. Top and bottom outside holes.</p>	<p>Type 1 and Type 3R 60 A 240V 100 A 240 V / 600 V</p> <p>1/4 in. grade 5 bolts and flat washer at four locations, torque to 7 ft-lbs.</p>
<p>Type 1 and Type 3R 200 A 240 V / 600 V</p> <p>1/4 in. grade 5 bolts and flat washer at four locations, torque to 7 ft-lbs.</p>	<p>Type 12 and Type 4X 100 and 200 A 240 V / 600 V</p> <p>1/4 in. grade 5 bolts and flat washer at four locations, torque to 7 ft-lbs.</p>

Table 2 - Anchorage As-Tested (Continued)

 <p>KEYSLOT MOUNTING HOLES (4) .44/.88 DIA [111]/[222]</p> <p>27.63 [702]</p> <p>50.25 [1276]</p> <p>32.00 [813]</p> <p>9.30 [236]</p> <p>17.45 [445]</p> <p>27.63 [702]</p> <p>NEMA TYPE 1 NO KNOCKOUTS</p> <p>Type 1, Type 3R 400, 600, 800, 1200 A 240 V / 600 V</p> <p>3/8 in. grade 5 bolts and flat washer at four locations, torque to 25 ft-lbs.</p>	 <p>39.50 [1003]</p> <p>38.00 [965]</p> <p>27.56 [700]</p> <p>DOOR WIDTH</p> <p>1.00 [25]</p> <p>3.00 [76]</p> <p>PROVISIONS FOR PADLOCKING DOOR CLOSED</p> <p>HANDLE</p> <p>36.00 [914]</p> <p>THUMB SCREWS TO HOLD DOOR CLOSED</p> <p>45.00 [1143]</p> <p>12.00 [305]</p> <p>CONDUIT AREA TOP & BOTTOM</p> <p>35.50 [902]</p> <p>36.00 [914]</p> <p>36.62 [930]</p> <p>(INCLUDING SCREWS)</p> <p>Type 12, and Type 4X – 400, 600, 800, 1200 A 240 V / 600 V</p> <p>7/16 in. grade 5 bolts and flat washer at four locations, torque to 40 ft-lbs.</p>
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Removal of Knock Outs



1. Determine the size required.
2. Remove the smallest knockout first.
Go across from the spot weld and apply force to break the knock out loose. Then crimp the knock out and twist until removed.
3. Removal of the second knockout full ring.
Two spot welds located across from each other. Go 90° from each spot weld apply force to break each side loose. Then pinch the two sides together and apply rotating force until removed.
4. Removal of the knock out partial ring.
Go 90° from either spot weld and apply force to break the side loose. The partial side apply force on each partial part of knock out. Pinch the three pieces together and apply rotating force until removed.
5. Repeat step 3 and 4 until the knock out side requirements are obtained.

Conduit Entry

Drilling into enclosures for creating conduit entry locations may be required. Protect internal components from metal filings, via drop cloths or orientation of drilling, to prevent foreign materials from contacting electrical connections points. An example of a connection point is lugs, blades, or fuse clips.

Locate conduit entries to comply with bending radius requirements for conductors.

Enclosure Ratings

All Schneider Electric enclosures are certified to UL 50 and UL 50E carrying a UL Type Rating. Ratings are equal to or greater than NEMA Ratings of same number.

Table 3 - Enclosure ratings

Type	Knockout information
Type 1 general purpose, indoor (ANSI49 gray paint on cold rolled steel)	Knockouts standard on 30–100 A enclosures; top, bottom and sidewalls
Type 3R rainproof, outdoor (ANSI49 gray paint on galvanized steel)	Knockouts standard on 30–100 A enclosures; bottom and sidewalls
Type 12 indoor, dust-tight, and drip-tight (ANSI49 gray paint on galvanized steel)	Type 12 has no knockouts (also suitable for Type 3R outdoor use)
Type 4, 4X, and 5 indoor or outdoor, watertight, dust-tight, and corrosion resistant (Type 304 or Type 316 stainless steel)	—
Type 4X indoor or outdoor, watertight and dust-tight, and corrosion resistant (fiberglass reinforced polyester)	—
Type 7/9 hazardous locations as defined in NEC Article 500 (copper free cast aluminum)	Class I, Divisions 1 and 2, Groups C and D
	Class II, Divisions 1 and 2, Groups E, F and G
	Class III, Divisions 1 and 2
Type 3R - 800 and 1200 A Heavy Duty shipped as Type 5 enclosure, removed drip screw for Type 3 Applications	—
Type 12 - may be used for Type 3R applications by removing drip screw	—

Section 3—Receiving, Handling and Storing

Receiving

1. Upon receipt, remove the packaging.
 - Immediately inspect the new transformer for shipping damage.
 - Refer to Replacement Parts and Accessories on page 41 for replacement parts, accessories (e.g., touch-up paint) and spare parts for minor damage.
2. Check the packing list against the product nameplate.
 - Verify that the order and shipment align with each other and that the shipment is complete.

NOTE: Follow Schneider Electric Conditions of Sale for shortages and errors.
3. Repackage the transformers for storage if they are not to be installed immediately.
 - Cover all ventilation openings to protect against exposure to moisture, dust and contaminants.
 - Leave packing materials intact until the transformers are ready to install.
4. Refer to “Conditions of Sale” for details regarding claims for equipment shortages and other errors. Contact your local Schneider Electric distributor for additional assistance.

Handling

Handle transformers carefully to avoid damage. Avoid subjecting the transformers to impact, jolting, jarring and rough handling. Ensure that transformers are transported in the upright position. When possible, transport transformers to the installation site while still mounted on their shipping pallets.

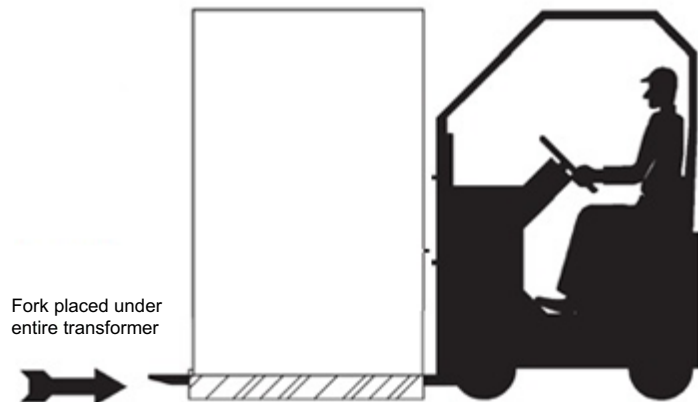
Verify that the weight of the transformer does not exceed the rated capacity of the handling equipment to be used.

Handling with Platform Dollies or Lifts, Pallet Jacks or Fork Trucks

Extreme care should be exercised when moving transformers from the bottom. See Figure 7.

- Use care to distribute the weight when transporting transformers using platform dollies, platform lifts, pallet jacks or fork trucks.
- Use hand trucks or forklifts only when the blades or forks are long enough to pass completely under the transformer enclosure or shipping pallet. Wider fork separation is preferred to distribute the weight of the unit evenly for increased stability.

Figure 7: Handling with a Fork Truck: Blades/Forks Placed under the Entire Transformer (Shipping Pallet Attached)



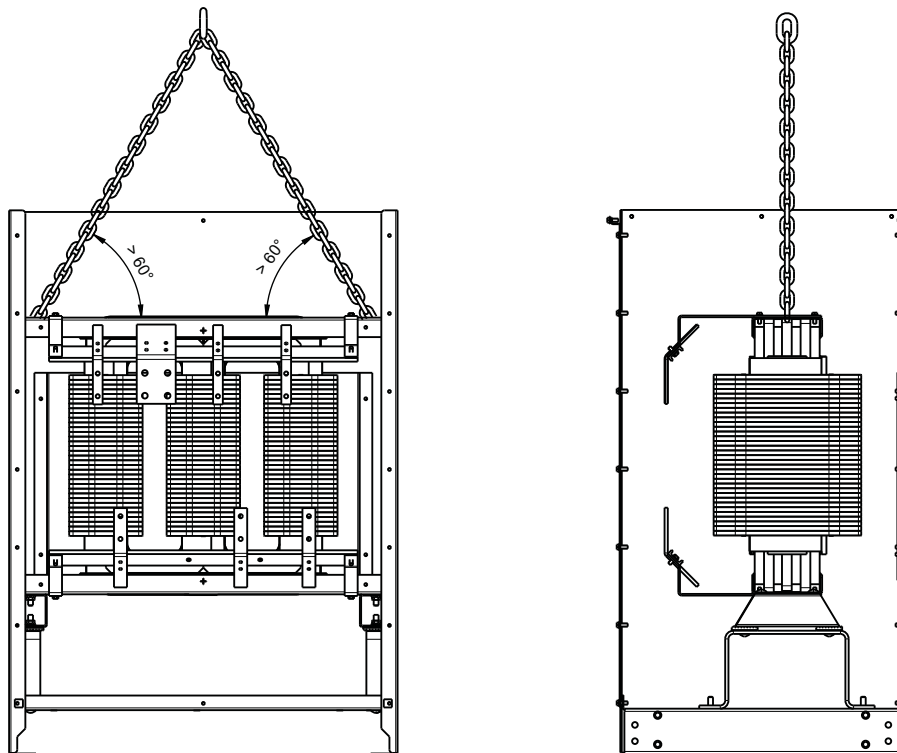
Handling with Cranes: Using Cables, Chains or Straps

When lifting the transformer from above, the use of spreader bars with cables or chains is permissible. This will help avoid damage to the enclosure or equipment.

The enclosure can be removed to allow the units to be transported through small openings, lifting as the same means as shown in Figure 8 on page 12, Figure 9 on page 13, and Figures 10 and 11 on page 15. Refer to Figures 34 and 35 in Replacement Parts and Accessories on page 41 for exploded views of parts and accessories.

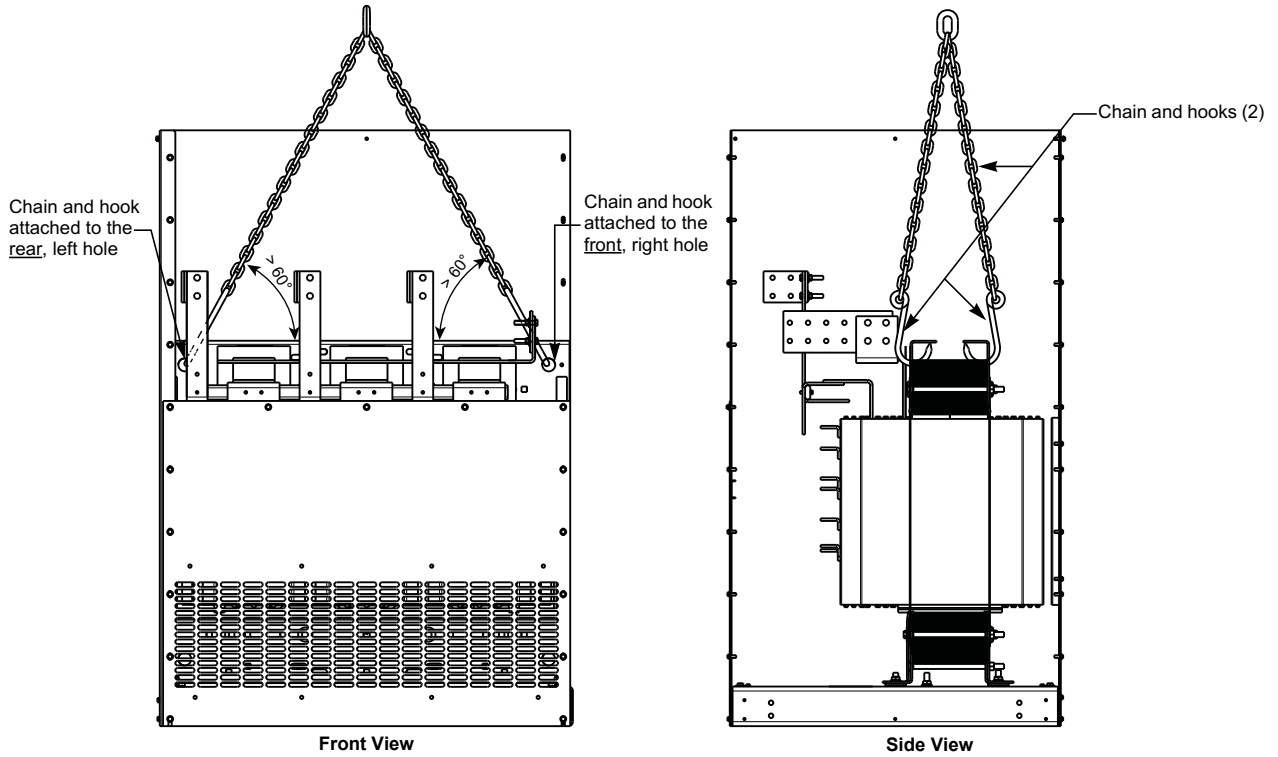
Ensure that the lifting cable pull angles are not less than 60 degrees from horizontal. See Figure 8 on page 12.

Figure 8: Two-Point Lift: Cable Pull Angles (Not Less than 60 Degrees from Horizontal)



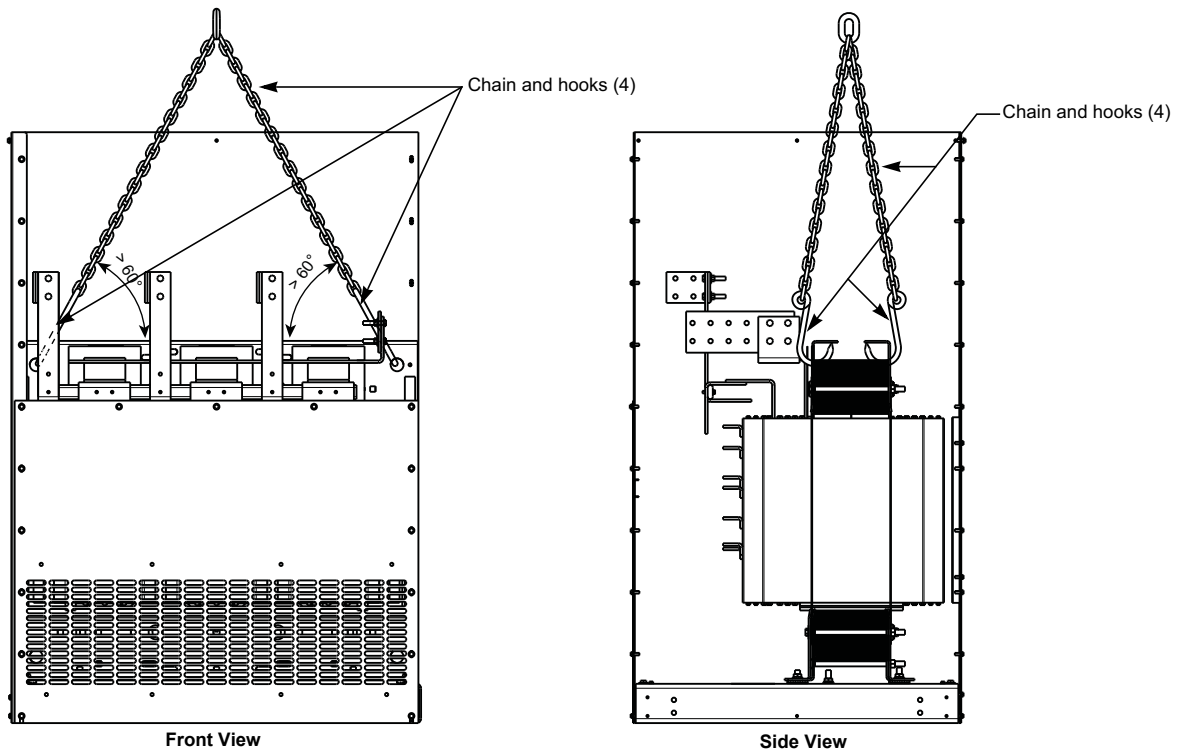
Refer to Figures 9 –11 on pages 13 – 15 for other permissible lifting and handling options.

Figure 9: Two-Point Lift: Handling with Chains, Hooks and Cross Corners (Not Less than 60 Degrees from Horizontal)



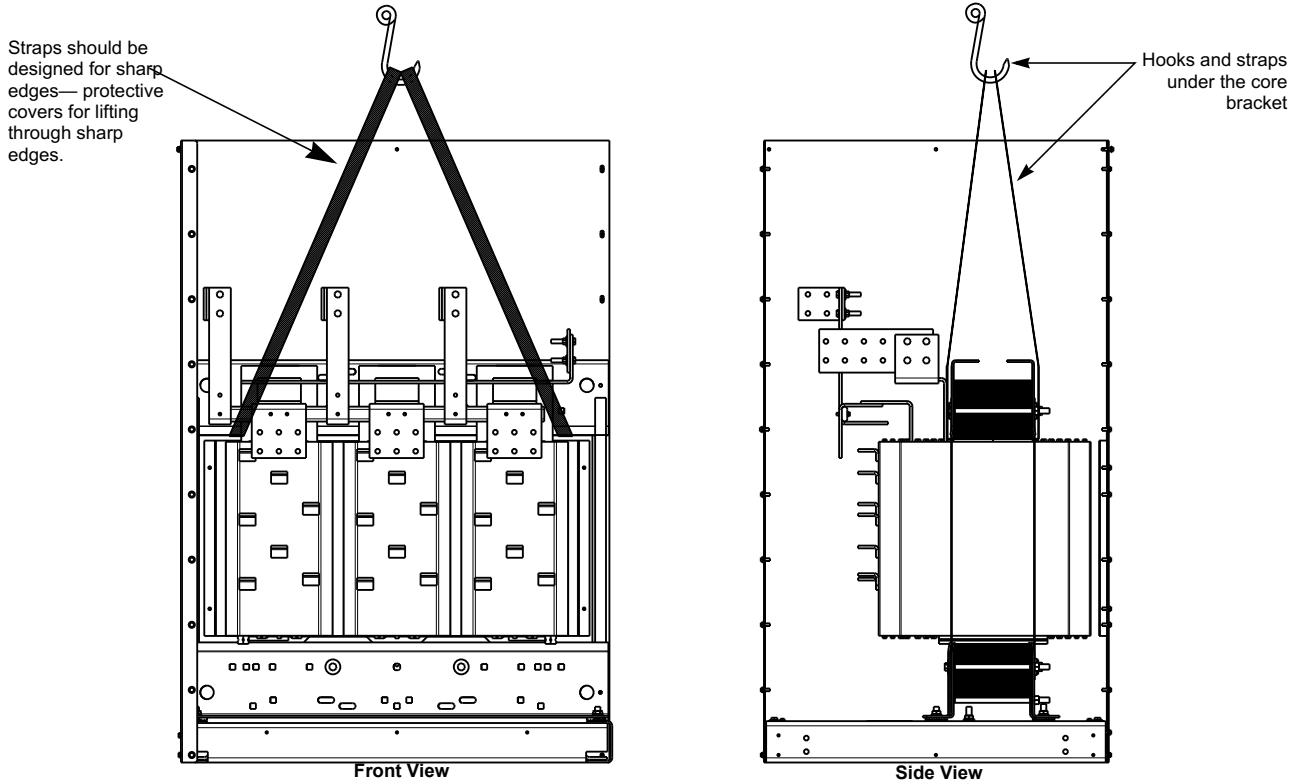
Two-point lift with chains and hooks: Top core bracket, right side and front hole. Rear bracket, left side and rear hole

Figure 10: Four-Point Lift: Handling with Chains, Hooks and Four Corners (Not Less than 60 Degrees from Horizontal)



Four-point lift: The hooks are in the front and back holes of the core bracket (4), with chains lifting on the hooks.

Figure 11: Four-Point Lift: Handling with a Strap and Hooks (Not Less than 60 Degrees from Horizontal)



Four-point lift: The straps are under the core brackets, with the front-to-back straps coming together at the top with a hook. Use straps with protective cover, core clamps edges are sharp.

Handling Enclosure Styles D, H and K after Removal of the Shipping Pallet

Hand trucks and forklifts can access and move the transformer via the front and rear openings below the bottom of the base. See Figure 12. Follow the same handling instructions (beginning on page 11) as if the pallet is still attached.

Figure 12: Handling with a Pallet Jack: Enclosure Styles D, E, H and K after Removing the Shipping Pallet



Storing

Leave the packing material that encloses the transformer in place until the unit is ready for its final placement and wiring. This will help to protect the transformer enclosure and internal parts from dirt, water, moisture contamination and physical damage during storage. Provide extra measures to protect the transformer when the original packing material cannot be retained.

Store transformers indoors in a clean, dry, and heated building with uniform temperatures and adequate air circulation. If necessary, install electric heating to maintain a uniform temperature above the ambient temperature to prevent condensation.

Protect transformers from weather and contamination when it is not possible to store the transformers indoors.

Before energizing the transformer, complete the steps in Pre-commissioning/Pre-energizing Checks and Testing along with the following steps:

1. Test the insulation resistance if storage in a controlled environment was not feasible. Refer to Insulation Resistance on page 39.
2. Dry the unit if test levels are unacceptable:
 - a. Use two heaters or lamps per coil at 120 V, 50 W to apply external heat to the coils.
 - b. Mount the heater or lamp directly below the coils located at the front and rear of the core.


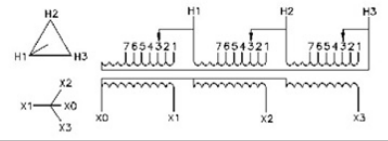

NOTE: Outdoor transformers are not weather resistant until they are properly and completely installed and energized. Treat outdoor transformers in exactly the same manner as indoor transformers until after they are installed.

Section 4—Installation

Locating/Placing Ventilated and Non-ventilated Transformers

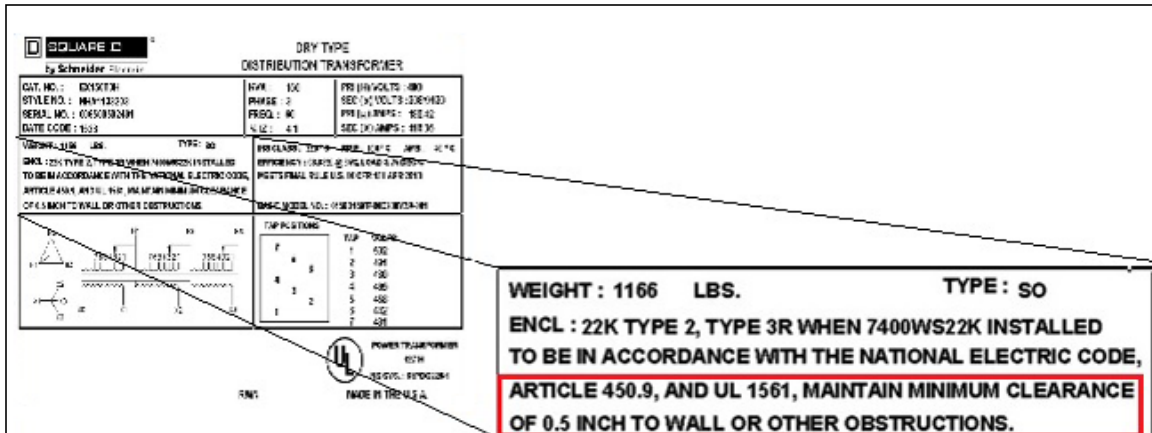
1. Remove all packaging material. Keep the shipping pallet attached to the transformer to assist with moving the unit to its final installation location.
2. Verify that the nameplate matches the description from the building layout drawings (kVA, primary and secondary voltages, etc.). See Figure 13.

Figure 13: Sample Nameplate

		DRY TYPE DISTRIBUTION TRANSFORMER																	
CAT. NO. : EX150T3H STYLE NO. : NHA1133203 SERIAL NO. : 006500502491 DATE CODE : 1523		KVA : 150 PHASE : 3 FREQ. : 60 % IZ : 4.1	PRI (H) VOLTS : 480 SEC (X) VOLTS : 208Y/120 PRI (H) AMPS : 180.42 SEC (X) AMPS : 416.36																
WEIGHT : 1166 LBS. ENCL : 22K TYPE 2, TYPE 3R WHEN 7400WS22K INSTALLED TO BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE, ARTICLE 450.9, AND UL 1561, MAINTAIN MINIMUM CLEARANCE OF 0.5 INCH TO WALL OR OTHER OBSTRUCTIONS.		TYPE : 50 INS CLASS : 220 °C EFFICIENCY : 98.83% @ 35% LOAD & 75 DEG C MEETS FINAL RULE U.S. 10 CFR 431 APR 2013	RISE : 150 °C AMB : 40 °C BASIC MODEL NO. : 065EX150T480D208Y2A-001																
		TAP POSITIONS <table border="1"> <thead> <tr> <th>TAP</th> <th>VOLTS</th> </tr> </thead> <tbody> <tr><td>1</td><td>502</td></tr> <tr><td>2</td><td>491</td></tr> <tr><td>3</td><td>480</td></tr> <tr><td>4</td><td>469</td></tr> <tr><td>5</td><td>458</td></tr> <tr><td>6</td><td>442</td></tr> <tr><td>7</td><td>431</td></tr> </tbody> </table>		TAP	VOLTS	1	502	2	491	3	480	4	469	5	458	6	442	7	431
TAP	VOLTS																		
1	502																		
2	491																		
3	480																		
4	469																		
5	458																		
6	442																		
7	431																		
RWN		 POWER TRANSFORMER 127 H INS SYS. : 65PDG220-1 MADE IN THE U.S.A.																	

3. Locate the unit per the building's layout drawing.
4. Verify the environment is suitable for the enclosure type.
5. Ensure the location is readily accessible to qualified personnel (per NEC 450.13). Units located in the open can be mounted on walls, columns, or otherwise supported from structures.
6. Ensure adequate ventilation since it is essential to properly cool ventilated transformers. Refer to National Electrical Code (NEC®) Article 450.
 - The minimum distance is marked on Nameplate NEC 450.9. See Figure 14 on page 18.
 - Minimum distance varies by enclosure style. See the approval drawing from Schneider Electric for minimum distance.
 - Clean, dry air is desirable.
 - Filtered air may reduce maintenance if the location of the transformer presents a problem.

Figure 14: Minimum Distance Marked on Nameplate NEC 450.9



7. Mount any accessories prior to installing the transformer when using wall or ceiling (trapeze) mounting.
 - a. Observe the four mounting hole locations in each enclosure base.
 - b. Obtain the actual dimensions via approval drawings from Schneider Electric.
 - c. Secure the units using one of two mounting methods: without floor mounting brackets (Figures 15–16 and Figure 17 on page 19) or with floor mounting brackets (Figures 18 and 19 on page 19).
8. Place the transformer in final position.

Figure 15: Mounting: Enclosure Styles D, H, K, and E

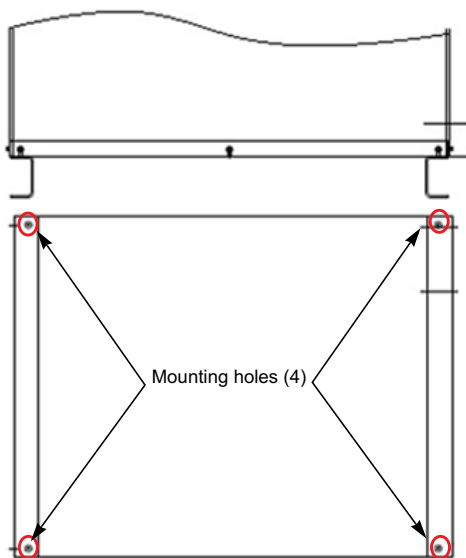


Figure 16: Enclosure D, H, K, and E

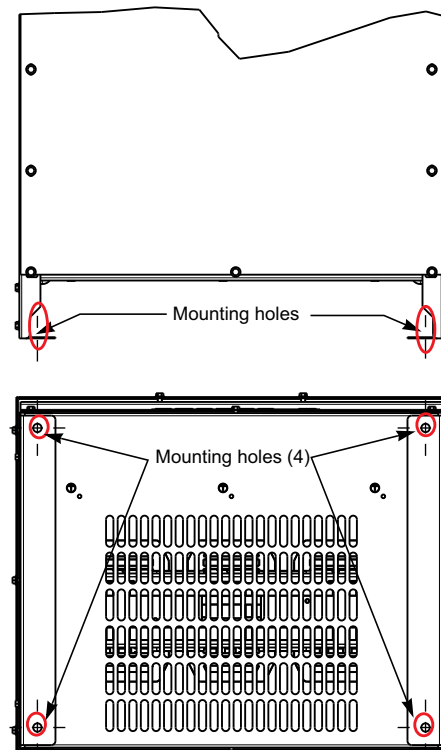
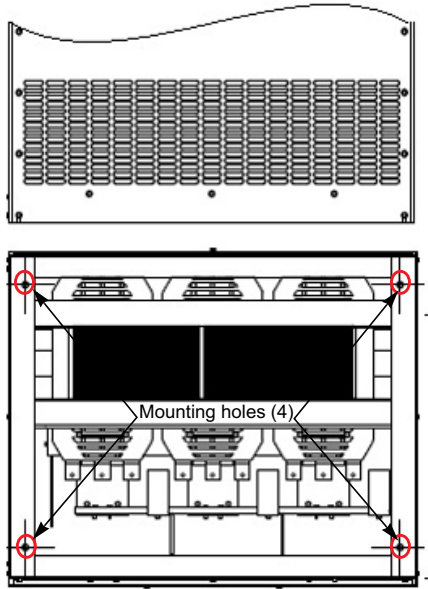


Figure 17: Mounting Enclosure Style J:
Ventilated



Units not for use on combustible floor (open bottom)

Figure 18: Floor Mounting Bracket: Enclosure Style K

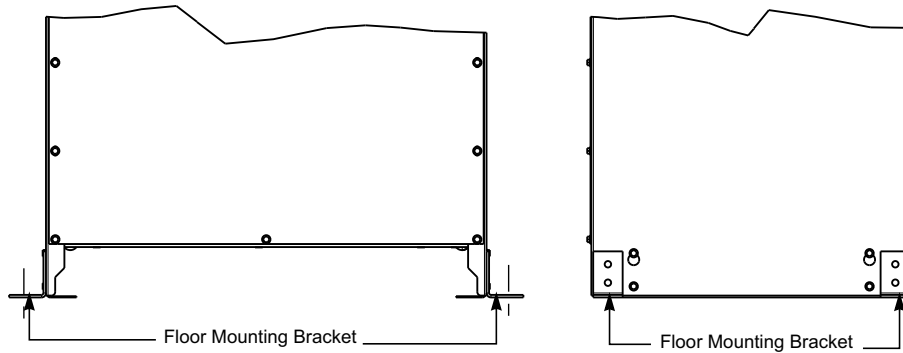
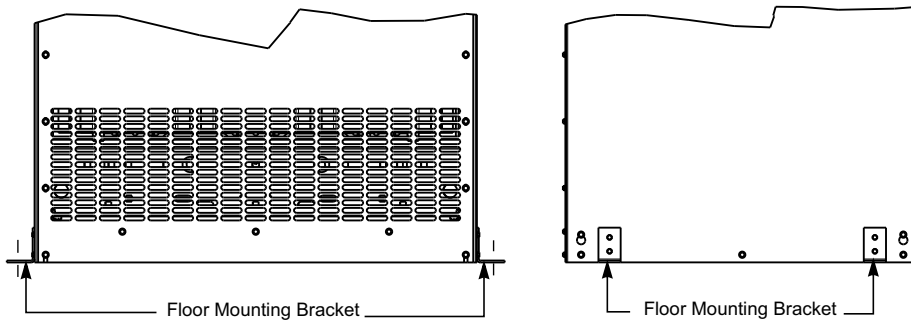


Figure 19: Floor Mounting Bracket: Enclosure Style K



All Enclosure Styles (D, E, F, H, K and J)

- Transformers Installed Indoors (Styles D, E, F, H, K and J):
 - Completely enclosed or completely enclosed with ventilated openings; complies with NEC 450.21 (A) Exception
 - Units greater than 112.5 kVA
 - Have 428°F (220°C) or 392°F (200°C) insulation systems; complies with 450.21 (B) Exception No. 2

See Figure 20.

Figure 20: Transformers Installed Indoors: NEC 450.21 Exceptions A or B from Sample Nameplate

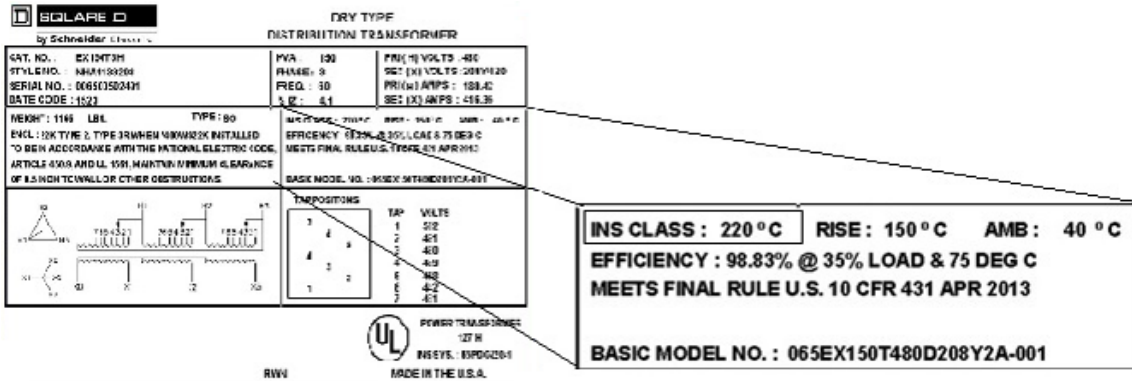


Table 1: Enclosure Clearances

Enclosure Style	Front Clearance	Side Clearance (in. / mm)	Rear Clearance (in. / mm)
D	Working Clearance for all styles vary substantially depending on voltage and specific application. Refer to NEC 110.26	0.50 / 12.7	Type EE – 3 / 76.2
H			All other styles – 6 / 152
E			3 / 76.2
K			3 / 76.2
J			0.50 / 12.7
F			0.50 / 12.7
			12 / 305

Transformers can be converted from Floor to Wall mounted (See Table 2 below and Figure 21 on page 21) or Floor to Trapeze mounted (See Table 3 and Figure 22 on page 22) using factory available kits. The kits are pre-punched to align with enclosure mounting holes; and, when the transformer is installed, holds the minimum clearance for the units. New Style K wall mounting bracket allows for 6 in. (152 mm) and 3 in. (76 mm) clearances, all other styles require a 6 in. (152 mm) clearance.

The factory kits do not include hardware, hardware must be supplied by the customer. Hardware includes the thread rod for trapeze mounting the transformers. The designer of record must size and choose the anchors and hardware because of the large variety of construction materials and techniques. Schneider Electric can not advise on the anchoring, the wall mounting, or sizing of rods for trapeze mounting.

Table 2: Converting from Floor to Wall Mounting (using factory kits)

Enclosure Style	Enclosure Number	Maximum Weight (lb. / kg)
D	17 – 20	700 / 317
H	17 – 18	700 / 317
E	17 – 20	700 / 317
K	17 – 20	850 / 386

Figure 21: Wall mounted transformer

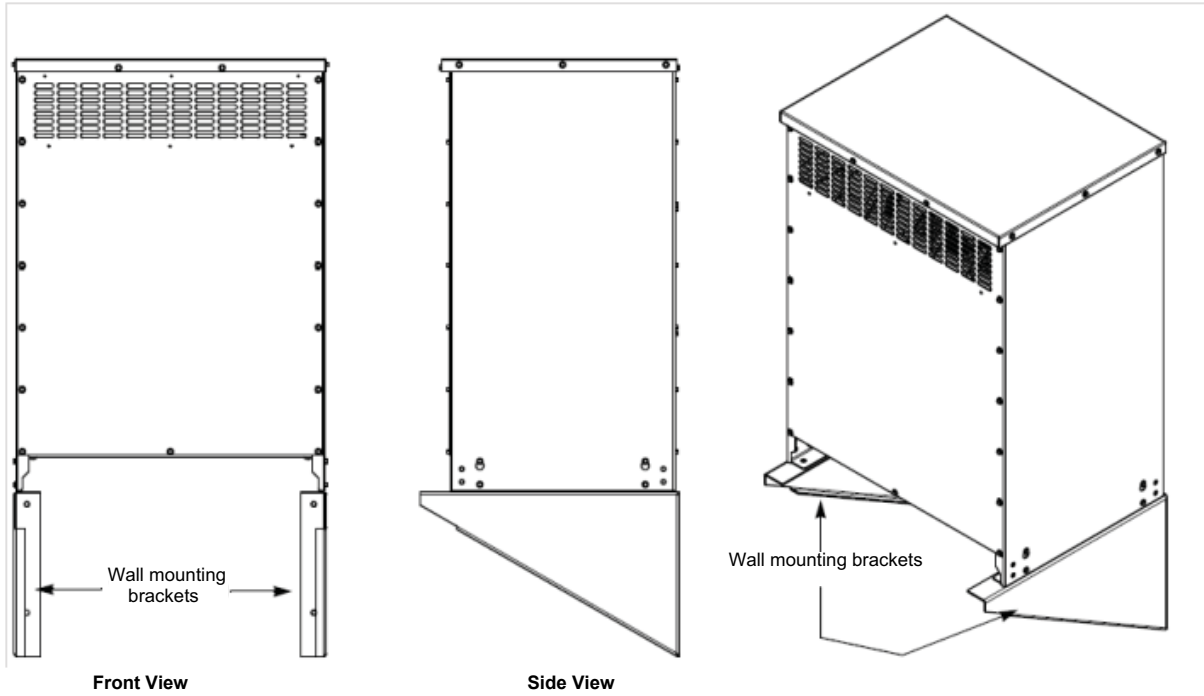
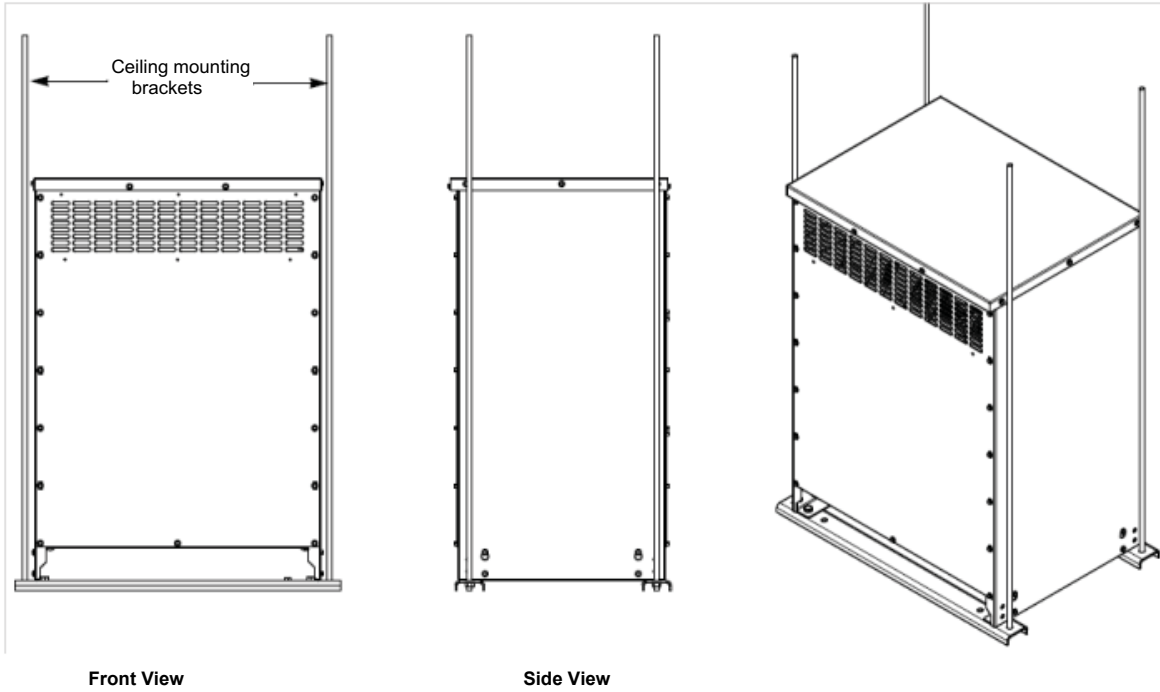


Table 3: Converting from Floor to Trapeze (Ceiling) Mounting (using factory kits)

Enclosure Style	Enclosure Number	Maximum Weight (lb. / kg)
D	17 – 24	1200 / 544
H	17 – 18	1200 / 544
E	17 – 22	1200 / 544
K	17 – 22	1200 / 544

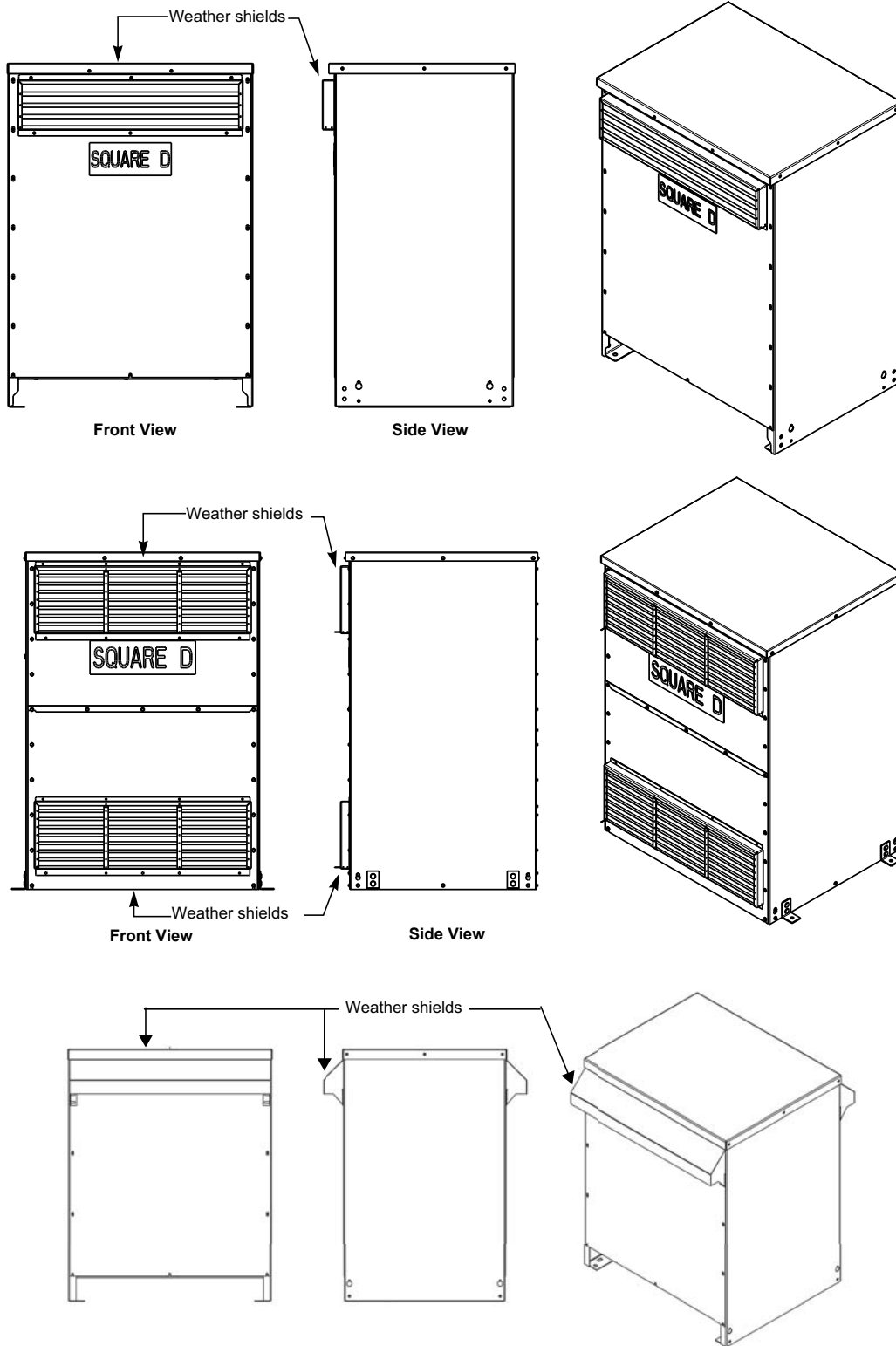
Figure 22: Trapeze (Ceiling) mounted transformer



Enclosure D, E, H, K, J can be converted to Type 3R using field installed kits. See Figure 23 on page 23.

Type F enclosure – must be factory order if installed outdoors.

Figure 23: Type 3R Enclosure Kits



Grounding

1. Permanently and adequately ground the enclosure and core assembly of dry-type transformers in accordance with NEC requirements.
 - Windings may be grounded with consideration given to local conditions and in accordance with the NEC.
 - The ground terminal bar must be UL listed for this purpose.
 - In accordance with NEC 450.10, the terminal bar shall be bonded to the enclosure in accordance with NEC 250.12 and shall not be installed on or over any ventilated openings.
2. Connect the transformer, related accessories and components to ground in accordance with NFPA 70 (NEC).
3. Terminate all grounding and bonding conductors at a common equipment ground point on the enclosure.
4. Remove paint from around the area where the ground terminal bar is mounted to increase contact with enclosure parts.
 - Enclosure Styles D, E and H: An area is available in the transformer's base to drill and mount the ground terminal bar.
 - Enclosure Style K: Three pre-drilled holes are stamped ground to mount the ground terminal bar.
 - Enclosure Style J: Two pre-drilled holes are stamped ground to mount the ground terminal bar.

Square D brand secondary lug kits include a four-conductor ground terminal bar. The bar can also be obtained as a separate device from Schneider Electric. Refer to Table 6 on page 45 and see Figure 24.

Figure 24: Four-conductor Ground Terminal Bar



Seismic Qualifications

Seismic limits for dry-type low voltage transformers are obtained from tri-axle shake table test results that are conducted in accordance with the AC156 test protocol. Certifications are based on the location where units are installed and building codes governing the installation.

Building codes results are available for CBC 2001, CBC 2007, CBC 2010, IBC 2000, IBC 2003, IBC 2006, IBC 2009, NBC 2005, NBCC 2005, NBCC 2010, NFPA 5000, UBC 94, CBC 95, UBC97 and UFC 3-310-04.

Contact your local Schneider Electric distributor, or call 1-888-Square D (1-888-778-2733) to obtain the specific level of Sds, z/h and Ip for each enclosure style.

The levels supplied are based on the units being mounted and the notes on the approval drawings of each part number. Drawings are available that include mounting dimensions, mounting hole dimensions, overall dimensions, unit weight and approximate center of gravity location to assist in a seismic qualification. Contact your local Schneider Electric distributor, or call 1-888-Square D (1-888-778-2733) to obtain these drawings.

Other parties are responsible for detailing the equipment connection and anchorage requirements (including the lateral restraint system, if appropriate) for the given transformer installation. The installer and manufacturers of the anchorage and lateral restraint system are responsible for ensuring that the mounting requirements are met.

Sound/Vibration Control

The transformer has been designed to minimize the amount of audible sound produced. Sound isolation pads are secured between the transformer mounting bracket and the enclosure using bolts and nuts. The mounting hardware is tightened prior to shipment to prevent damage.

Loosen the nut one full turn to float the transformer on the isolation pads, thereby isolating the transformer from the enclosure. This will reduce audible sound levels even further. See Figures 25 and 26.

Figure 25: Loosening the Nut One Full Turn (Four Places) Label

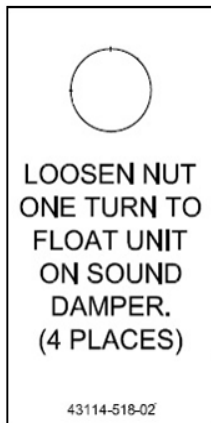
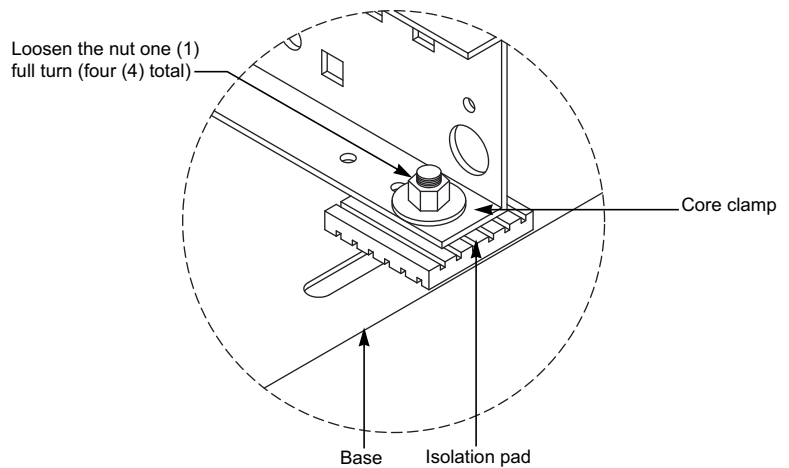


Figure 26: Floating the Transformer on the Isolation Pads/Sound Damper



In addition, the area where the transformer is located can affect the sound level:

- ❑ Try to avoid installing the transformer in a corner, narrow hall or in an area with smooth surfaces. Doing so can result in the sound being reflected and amplified.
- ❑ Securely fasten all the enclosure panels. Loose panels can result in rattling, thereby increasing the sound produced.
- ❑ Use flexible conduit, if possible.
- ❑ Ensure that the type of structure on which the transformer is mounted is strong enough to support the weight of the transformer.

Enclosure Style K

Enclosure Style K bolts are accessible from the front with an extension. See Figure 27.

Figure 27: Enclosure Style K: Bolts Accessible from the Front of the Transformer



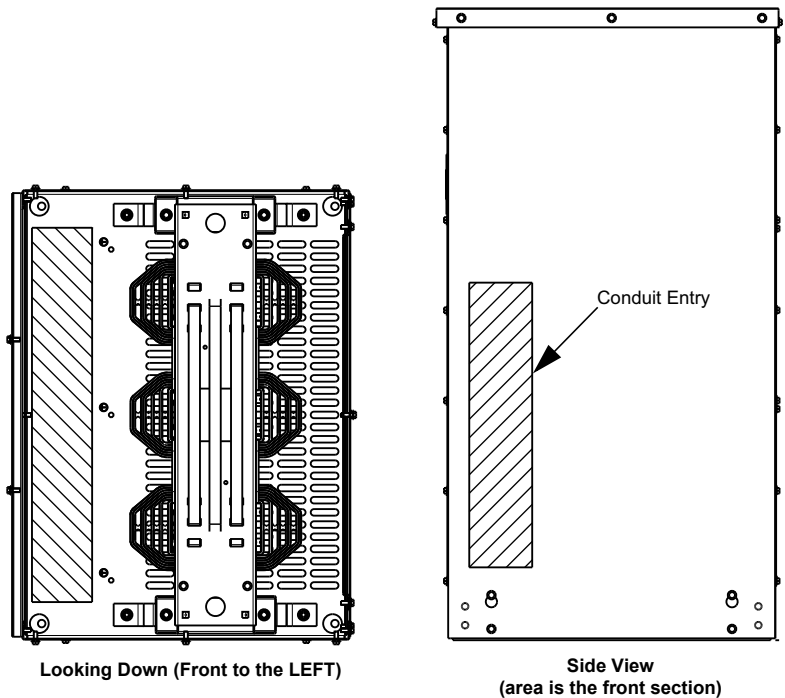
Enclosure Styles D, E, H and J

Enclosure Styles D, E, H and J bolts are accessible from the front. See Figure 26 on page 25 for the access for these enclosures.

Making Electrical Connections

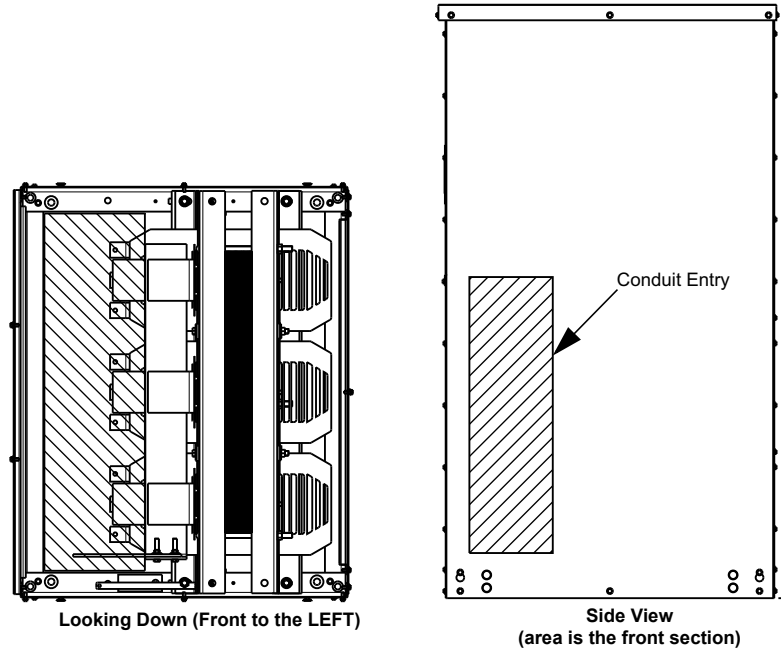
- ❑ Use flexible raceways, conduits and connectors, when possible, as attachments to transformer enclosures. This will help to reduce audible noise generation.
- ❑ Adhere to NFPA 70 (NEC) and minimum wire bending space requirements for the transformer enclosure. As an industry standard, bundle associated phase, neutral and equipment grounding conductors together within the transformer enclosure.
- ❑ Always use a calibrated torque wrench to tighten electrical connectors and terminals. For additional guidance, refer to Standard UL468A.
- ❑ Ensure that raceways, conduits and connectors enter the enclosure only in an area shown on the drawings. Access points for each enclosure style are listed below:
 - Enclosure Style D: (See Figure 28)
 - Front section of the transformer
 - Side and bottom access
 - Enclosure Style E: (See Figure 28)
 - Front section of the transformer
 - Side and bottom access
 - Enclosure Style H: (See Figure 28)
 - Front section of the transformer
 - Side and bottom access
 - Enclosure Style K: (See Figure 28)
 - Front section of the transformer
 - Side and bottom access

Figure 28: Access Point: Enclosure Styles D, E, H and K



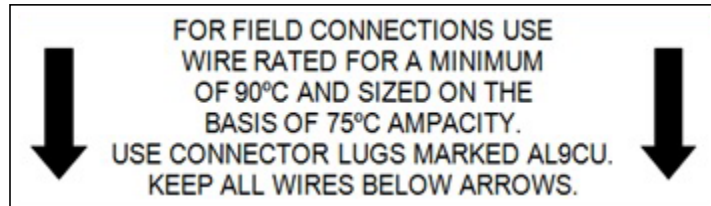
- Enclosure Style F:
 - Bottom section of the transformer
 - Air connection chambers offered if side access is needed
- Enclosure Style J: (See Figure 29)
 - Front section of the transformer
 - Side access
 - Open bottom access front to the core clamps

Figure 29: Access Point: Enclosure Style J



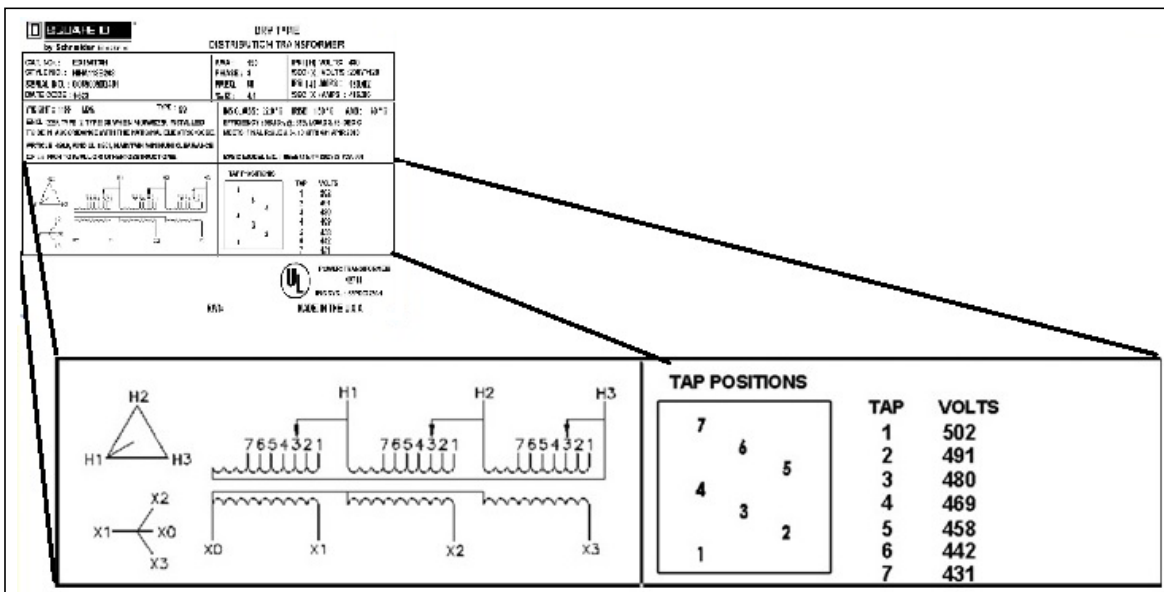
- Keep all access points below the top terminal board to prevent heat from exiting through the raceways, conduits and connectors. The sticker will show this top location on all enclosure styles (also shown on drawings). See Figure 30.

Figure 30: Label to Show Top Location on Enclosures (Access Points Below the Top Terminal Board)



- ❑ Ensure that the side access complies with NEC 312.6 (A): Minimum Wire-Bending at Terminals. Bottom access must comply with NEC 312.6 (B): Minimum Wire-Bending Space at Terminals.
- ❑ Follow UL 1561 which requires that all lugs be suitable for 194°F (90°C). In addition, the conductors' temperature rating table must be 167°F (75°C) for the size to meet the current requirements of the overcurrent protection device and nameplate currents. Refer to Table 5 on page 44, Table 6 on page 45 and Table 7 on page 46 for a list of Square D lug kits, wire ranges by kVA and US voltage systems.
- ❑ Make sure that the contact surface is clean. This will minimize the possibility of a high resistance contact which could cause localized heating and possible premature failure. Refer to Connections and Contact Surfaces on page 38 for instructions to apply an approved electrical compound.
- ❑ Connect phases to proper terminals for proper motor-rotation. The phase diagram is shown on nameplate. The nameplate also shows the taps locations and voltage rating for each tap. See Figure 31.

Figure 31: Phase Diagram, Tap Locations and Voltage Rating Marked on Nameplate



- ❑ Connecting the source of supply to the transformer secondary is permitted by NE C450.11 where the installation conforms to the manufacturer's instructions.

When the source of supply is connected to the transformer secondary, the inrush current will increase. The overcurrent device should be selected based on NEC 450.3(B) using the 250% allowance in order to reduce the potential for nuisance tripping during energization. Secondary overcurrent protection will be required.

Do not make any connections to the supply side HO or XO terminals on a WYE configured transformer winding. See Figure 32.

Figure 32: Caution Label for Delta Wye or Wye Delta Connected Transformers



Pre-commissioning/Pre-energizing Checks and Testing

Cleaning

1. Ensure that all of the packing material, including any packing material used inside the enclosure of the transformer used to support and protect the unit during shipping, have been removed.
2. Vacuum away as much dust as possible. Dust will act as a thermal insulating material which will increase the temperature of the unit and could possibly decrease operational life. Refer to Cleaning on page 38.

Visual and Mechanical Checks

Perform the following visual and mechanical checks below. In addition, refer to Performing Visual and Mechanical Checks on page 37 for a detailed listing of instructions.

- Visually inspect the transformer for physical damage. Repair any physical damage, if possible, and provide suitable protective barriers to prevent future damage.
- Compare the transformer nameplate information with the drawings and/or specifications for the installation.
- Verify proper connection of the taps in accordance with the nameplate information.
- Check the clearance of all electrical connections. Verify all connections for tightness with a calibrated torque wrench.
- Visually check the core, frame, enclosure, conduits, raceways and conductors for proper ground bonding. In addition, refer to Grounding and Bonding on page 39.

Electrical Testing

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS-2011, or CSA Z462.
- This equipment must be installed and serviced only by qualified electrical personnel.
- Perform such work only after reading and understanding all of the instructions contained in this bulletin.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Always practice lock-out/tag-out procedures according to OSHA requirements.
- Carefully inspect your work area, and remove any tools and objects left inside the equipment.
- Replace all devices, doors, and covers before turning on power to this equipment.
- All instructions in this manual are written with the assumption that the customer has taken these measures before performing maintenance or testing.

Failure to follow these instructions will result in death or serious injury.

Refer to Maintenance on page 37 to perform the following pre-commissioning electrical testing:

- Measure contact resistance using a low resistance ohmmeter. Refer to Contact Resistance on page 39.
- Perform insulation resistance tests with an appropriate device. Refer to Insulation Resistance on page 39.
- Perform a turns ratio test on all taps and on the full winding voltages for each phase. Refer to Turns Ratio on page 39.
- Measure and record the winding resistances on larger transformers (>500 kVA). Refer to Winding Resistance on page 39.

Introduction

Note: For access to self-service tools and chat support visit se.com/us/en/work/support or call 1-888-778-2733 for technical assistance

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.
- This equipment must be effectively grounded per all applicable codes. Use an equipment-grounding conductor to connect this equipment to the power system ground.

Failure to follow these instructions will result in death or serious injury.

Proper installation is imperative to maximize the ASCO 425 SPDs effectiveness and performance. Follow the steps outlined in this instruction bulletin to ensure proper installation. Read the entire instruction bulletin before beginning the installation. These instructions are not intended to replace national or local electrical codes. Check all applicable electrical codes to verify compliance. Installation of ASCO 425 surge suppressors must only be performed by qualified electrical personnel.

Unpacking and Preliminary Inspection

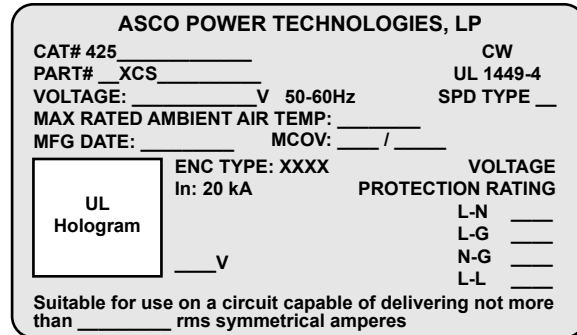
Inspect the entire shipping container for damage or signs of mishandling before unpacking the device. Remove the packing material and further inspect the device for any obvious shipping damage. If any damage is found and is a result of shipping or handling, immediately file a claim with the shipping company.

Storage

The device should be stored in a clean, dry environment. Storage temperature is -67 °F to +149 °F (-55°C to +65°C). All of the packaging materials should be left intact until the device is ready for installation.

Identification Nameplate

The identification nameplate is located on the side of the unit.



⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Confirm the SPD voltage rating on the module or nameplate label is not less than operating voltage the operating voltage.

Failure to follow these instructions will result in death or serious injury.

SPD Location Considerations

Environment

The device is designed to operate in an ambient temperature range of -13° F to +140° F (-25° C to +60° C) with a relative humidity of 0 to 95% non-condensing. This device has a Type 4X housing.

Audible Noise

The device background noise is negligible and does not restrict the location of the installation.

Mounting

The device has been designed to be surface mounted. An additional flush mount kit is also available if required (XMFMKITCW).

Service Clearance

The service clearance should meet all applicable code requirements.

Equipment Performance

To obtain optimum surge suppression, locate the SPD as close as possible to the circuitry being surge-limited to minimize the wire length. Minimizing the wire length reduces the impedance between the circuitry and the SPD.

Refer to the Voltage Protection Rating (VPR) values on the SPD nameplate. These VPR values were obtained by testing the SPD with six-inch long leads (per UL1449). For every additional foot of wire beyond six inches, the effective VPR increases by approximately 160 volts.

Electrical

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Confirm the surge protective device voltage rating on the module or nameplate label is not less than the operating voltage.

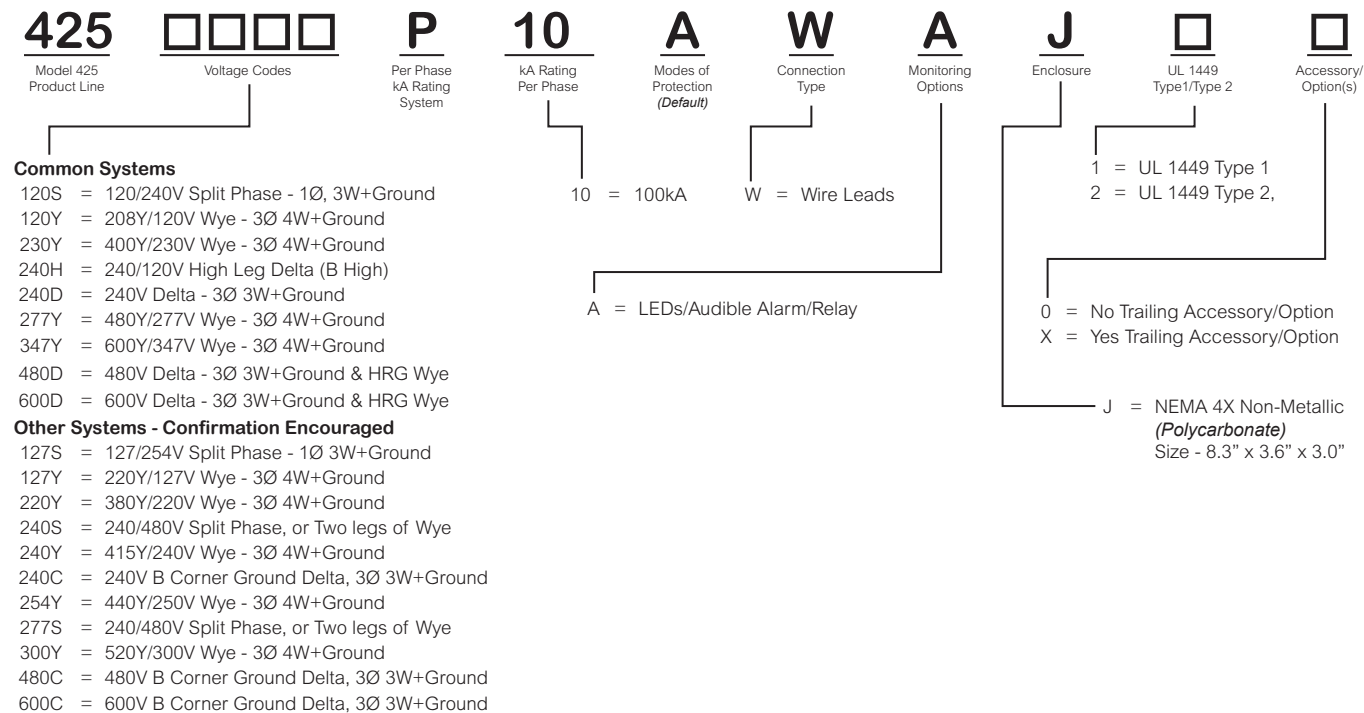
Failure to follow these instructions will result in death or serious injury.

Voltage Rating

Prior to mounting the SPD, verify that the device has the same voltage rating as the power distribution system in which it is installed. Compare the nameplate voltage or model number on the SPD with the nameplate of the electrical distribution equipment.

The specifier or user of the device should be familiar with the configuration and arrangement of the power distribution system in which the SPD is to be installed. The system configuration of any power distribution system is based strictly on how the secondary windings of the transformer supplying the service entrance main or load are configured. This includes whether or not the transformer windings are referenced to ground via a grounding conductor. The system configuration is not based on how any specific load or equipment is connected to a particular power distribution system. See Table 1 for the service voltage of each SPD.

Table 1: Model 425 Service Voltages



Location of Surge Protective Device (SPD)

UL 1449 Type 1 SPDs have been designed and approved for line side applications prior to the main service disconnect without supplemental overcurrent protection. Type 2 SPDs must be installed on the load side of the main Overcurrent Protective Device (OCPD). All installations should either provide or include a disconnecting means.

Type 1 SPDs can also be used in Type 2 applications (load side of OCPD). When SPDs are used on the load side, they must be installed per local codes.

Locate the SPD as close as possible to the circuit mains being surge-limited to minimize the wire length and optimize SPD performance. Avoid long wire runs so that the device will perform as intended. To reduce the impedance that the wire displays to surge currents, the phase, neutral, and ground conductors (wye and high-leg delta configurations), or phase and ground conductors (delta configurations), must be routed within the same conduit and tightly bundled or twisted together to optimize device performance. Avoid sharp bends in the conductors. See Figures 2 and 3.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- On a high-leg delta installation, the high-leg of the power system must be connected to the B phase lug of the SPD.

Failure to follow these instructions will result in death or serious injury.

Figure 2: SPD Wiring for Wye and High-Leg Delta Configurations

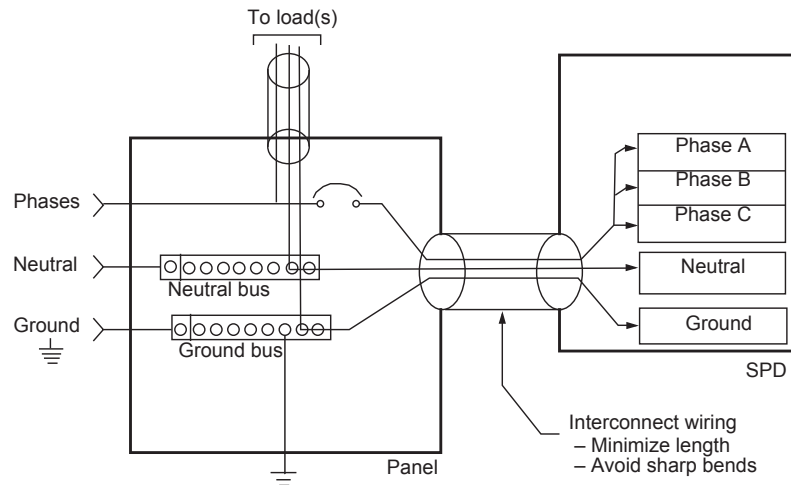
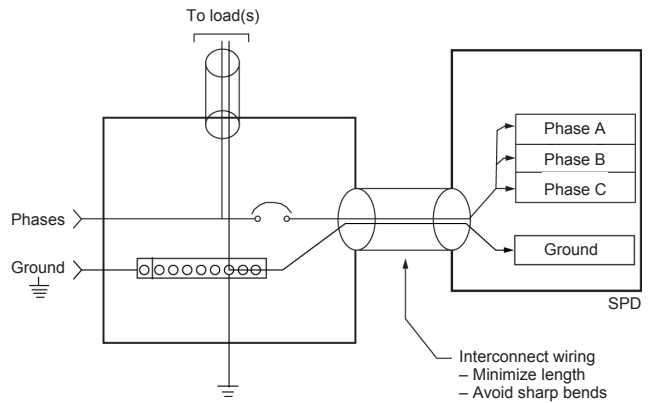


Figure 3: SPD Wiring for Delta Configurations



System Grounding

⚠ CAUTION

SPD DAMAGE AND POWER SYSTEM OVERVOLTAGE

- Ungrounded power systems are inherently unstable and can produce excessively high line-to-ground voltages during certain fault conditions. During these fault conditions any electrical equipment, including an SPD, may be subjected to voltages which exceed their designed ratings. This information is being provided to the user so that an informed decision can be made before installing any electrical equipment on an ungrounded power system.
- Resistance-grounded power systems must be maintained in a over-damped state to limit voltage overshoot and duration during operation.
- Verification and adjustment of correct power system damping should be done following power system modifications and periodically, as part normal system maintenance.

Failure to follow these instructions can result in injury or equipment damage.

NOTICE

LOSS OF SURGE SUPPRESSION

- Verify that the service entrance equipment is bonded to ground in accordance with all applicable codes.

Failure to follow these instructions can result in equipment damage.

The ASCO 425 has SPD elements connected from phase to ground. It is critical that there be a robust and effective connection to the building grounding structure. The grounding connection must utilize an equipment grounding conductor run with the phase and neutral connection of the power system. Do not connect the SPD to a separate isolated ground.

For proper voltage suppression by the ASCO 425 SPD, use a single-point ground system where the service entrance grounding electrode system is connected to, and bonded to, all other available electrodes, building steel, metal water pipes, driven rods, etc. (for reference, see NEC Art 250). The ground impedance measurement of the electrical system must be as low as possible and in compliance with all applicable codes for sensitive electronic and computer systems.

NOTICE

INADEQUATE RACEWAY ELECTRICAL CONTINUITY

- Install an insulated grounding conductor inside a metallic raceway when the raceway is used as an additional grounding conductor. Size the conductor in accordance with all applicable codes.
- Maintain adequate electrical continuity at all raceway connections.
- Do not use isolating bushings to interrupt a metallic raceway run.
- Do not use a separate isolated ground for the surge protective device.
- Verify proper equipment connections to the grounding system.
- Verify ground grid continuity by inspections and testing as part of a comprehensive electrical maintenance program.

Failure to follow these instructions can result in equipment damage.

Parts List

- 1 - Model 425 suppressor including 3 feet (.91 M) conductors
- 1 - Data Sheet

Wiring and Installation

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.
- This equipment must be effectively grounded per all applicable codes. Use an equipment-grounding conductor to connect this equipment to the power system ground.
- Confirm the surge protective device voltage rating on the module or nameplate label is not less than the operating voltage.

Failure to follow these instructions will result in death or serious injury.

Follow steps 1 through 7 to make wiring connections:

1. Turn off all power supplying this equipment before working on or inside any enclosure containing this equipment. If using Dry Contact, pre-plan its installation.
2. Confirm SPD is rated for your system by comparing voltage measurements to the Line Voltage (L-L, L-N) on the product label.
3. Identify proper location for the SPD. Locate as close as possible to the mains of the panel being surge-limited so the wires are as short as possible. Mount unit securely. Note: The SPD must be installed in an accessible location. See figure 5.
4. Mount SPD. For weather resistant applications additional sealing, O-ring is required. (not included) See figure 4.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- For outdoor installation use and appropriate weather sealing at the nipple (o-ring, sealing conduit, etc).

Failure to follow these instructions will result in death or serious injury.

5. Install in accordance with national and local electrical codes and match the branch circuit Overcurrent Protection Device (OCPD) to the wire size. For all wires, twist conductors 1/2 turn or more for every twelve inches of length.
6. Do not loop or coil wires. Be sure to maintain adequate wire bending space per NEC. Trim excessive wire length. Use on solidly grounded systems unless the SPD model is designed for installation on ungrounded/HRG systems.
7. Energize and confirm proper operation of green LED indicator.

Figure 4: Typical panel Installation

(Type 1 or individual equipment installations may vary)

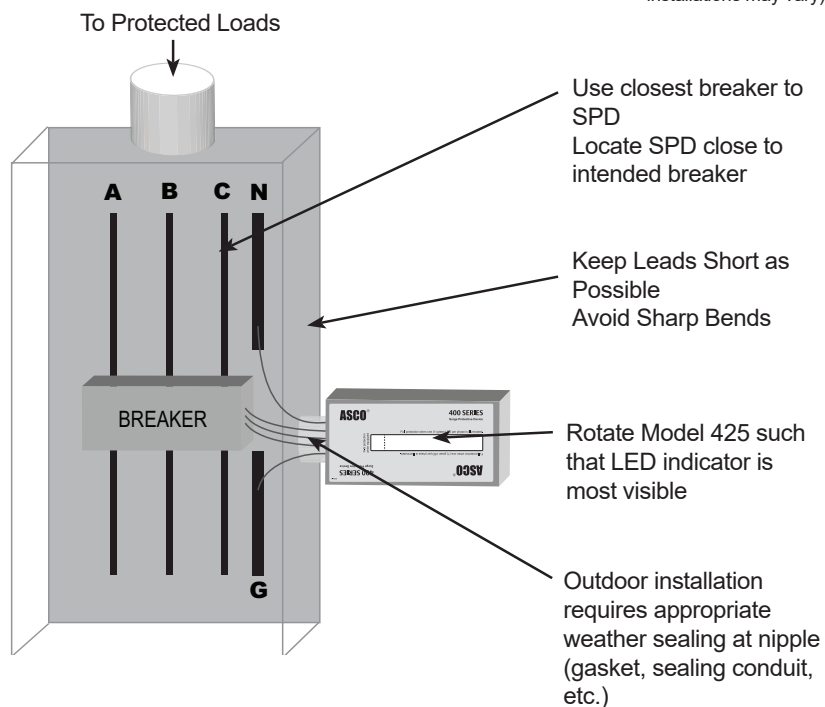


Figure 5: Parallel Wiring Diagram

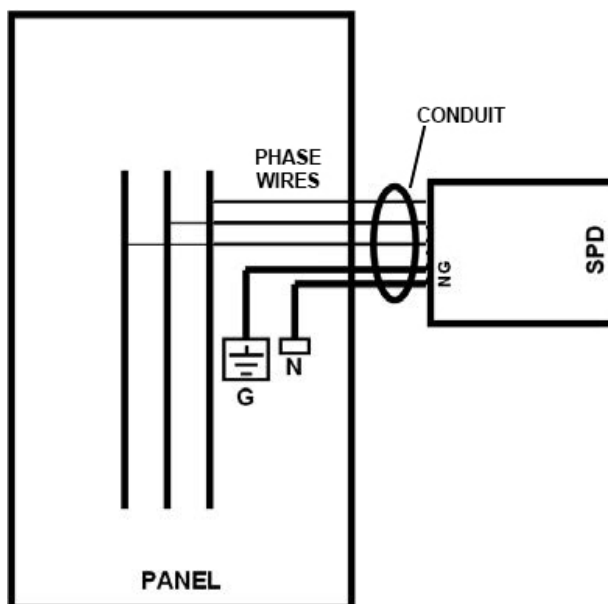
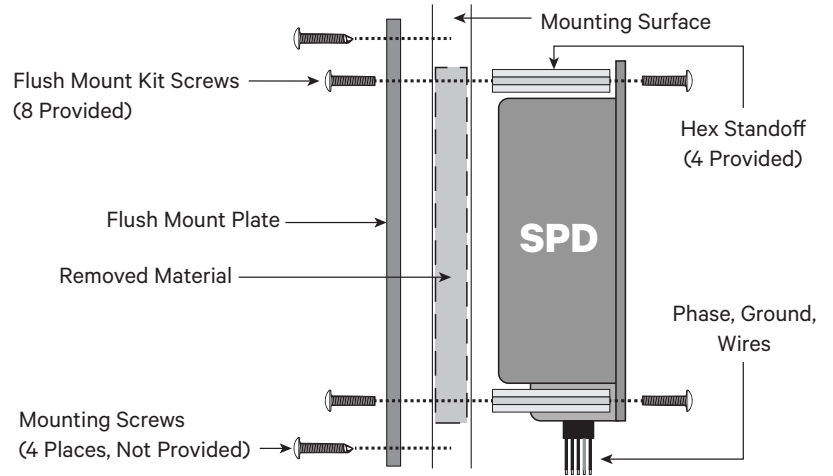


Figure 6: Flush Mount Diagram

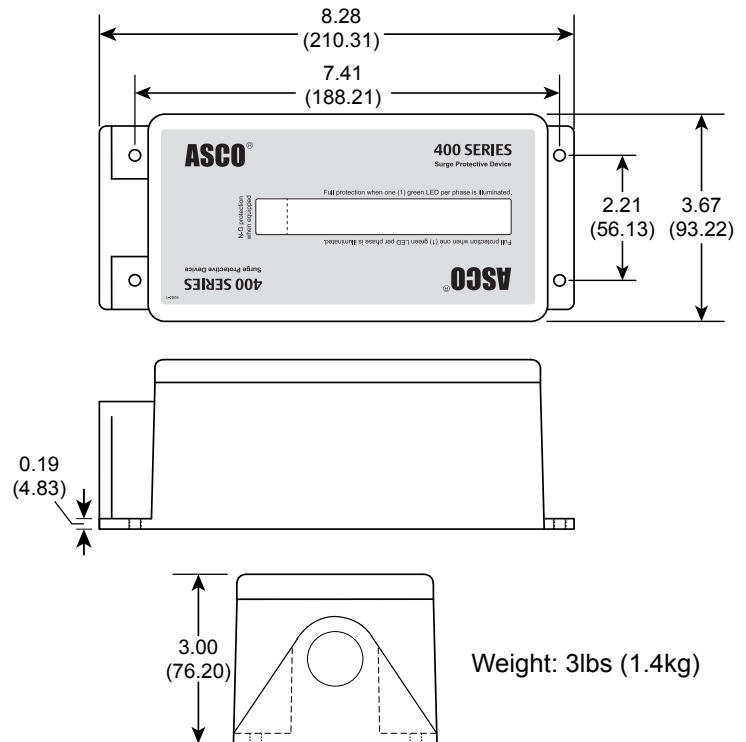


Surface Mount Installation

Note: Mount the unit as close as possible to the protected panel.

1. Make perforations on the wall according to the screw holes located on the enclosure. See Figure 7. (Rotate dimensions 90° as appropriate depending on orientation).
2. Configure the electrical conductor and conduit connection consistent with the installation instructions on page 12.

Figure 7: General Dimensions (in. / mm.)



Operation

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.
- This equipment must be effectively grounded per all applicable codes. Use an equipment-grounding conductor to connect this equipment to the power system ground.

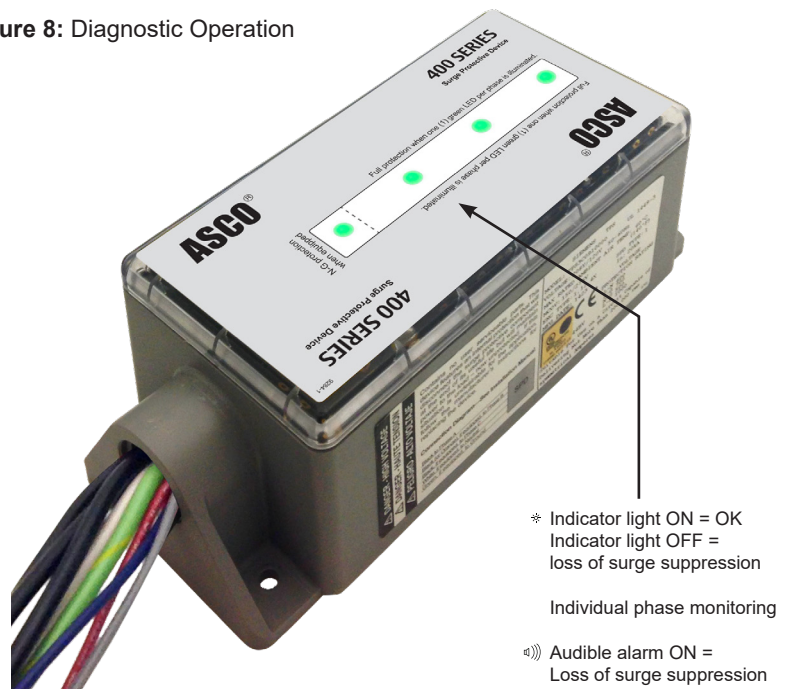
Failure to follow these instructions will result in death or serious injury.

LED Status Indicators

Diagnostic LEDs are located on the front of the ASCO 425 SPD device. They operate as follows:

- Verify that all phase voltages are present. If the LED is not illuminated, the device may not be installed correctly. Check the power supply and service voltage. Upon energizing the SPD, check the LED status. If all of the LEDs are illuminated, surge suppression is operating.
- If one or more LEDs are not illuminated, there is a loss of surge suppression on that phase.
- If an inoperative condition occurs the device must be replaced by qualified electrical personnel.

Figure 8: Diagnostic Operation



Dry Contacts

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Use 600 Vac rated dry contact wiring.
- Dry contact wiring must have less than 1/16 in. (1.6mm) exposed wire from the dry contact block.
- Do not supply more than 24 Vdc / 24 Vac and no more than a current of 2 A.

Failure to follow these instructions will result in death or serious injury

The ASCO 425 series SPD device is provided with dry contacts. These dry contact leads can be used for remote indication of the SPD operating status to a computer interface board or emergency management system. Also, these dry contact leads are designed to work with the SPD remote monitor option described in the following section.

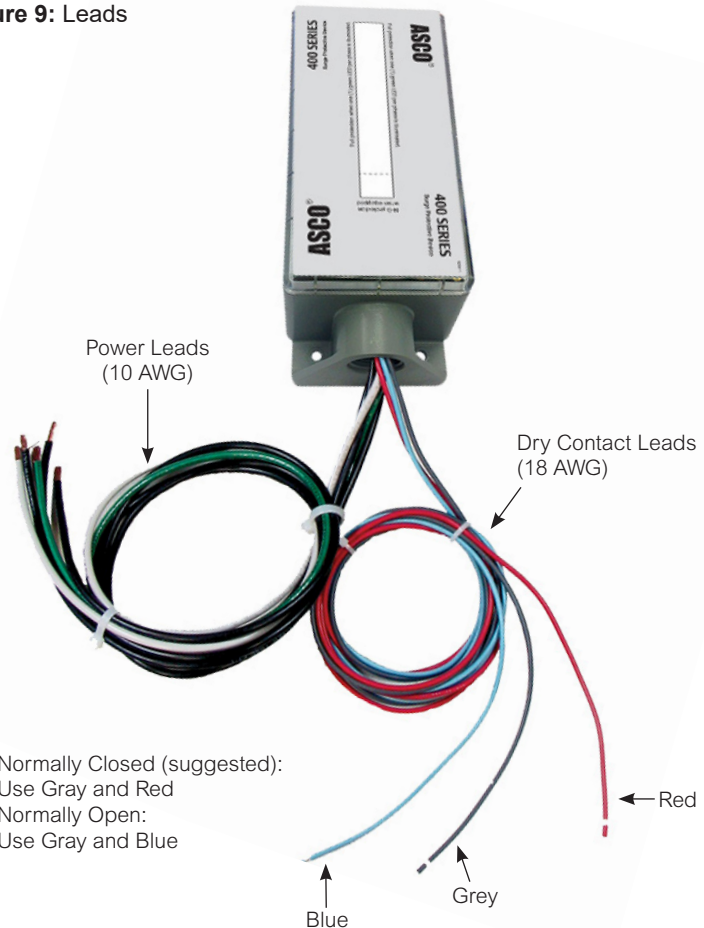
The dry contacts are designed for a maximum voltage of 24 V dc / 24 V ac and a maximum current of 2 A. Higher energy applications may require additional relay implementation outside the SPD. Damage to the SPD's relay caused by use with energy levels in excess of those discussed in this instruction bulletin is not covered by warranty. For application questions, call the Surge Technical Assistance Group at (800) 237-4567 or email customercare@ascopower.com

Connecting Form C Dry Contact & Audible Alarm

Three 3 ft. (.91 m) 18 AWG wires are included through the nipple. See Figure 9. Gray is Common, Blue is Normally Open and Red is Normally Closed when energized in its expected installation. (When not energized, the SPD is no longer in its 'Normal' state and contacts will be reversed.)

If the dry contacts are not utilized, insulate lead ends, coil and secure. Audible Alarm will still function correctly.

Figure 9: Leads





2.3 Start-up, Shutdown & Post-Shutdown Procedures

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Assembling MicroVersaTrip™ Trip Unit Systems

General Information

Remove components from cartons and check catalog numbers on components against carton labels. Following is a list of components necessary to assemble the General Electric TK4V-THK4V Model 6 frame molded case circuit breakers with a 4-function MicroVersaTrip trip unit (See FIGURE 1). A Model 6 circuit breaker frame is identified by a "MOD 6" stamp on the breaker side, and by an Underwriters Laboratories Inc. label in the handle. Presence of any other label, or of no label at all, in the handle indicates that the breaker frame is not Model 6 and is NOT suitable for field installation of MicroVersaTrip components.

- A. Breaker frame (catalog numbers TK4VF46, THK4VF46)
- B. 4-function programmer (catalog number T4VT series)

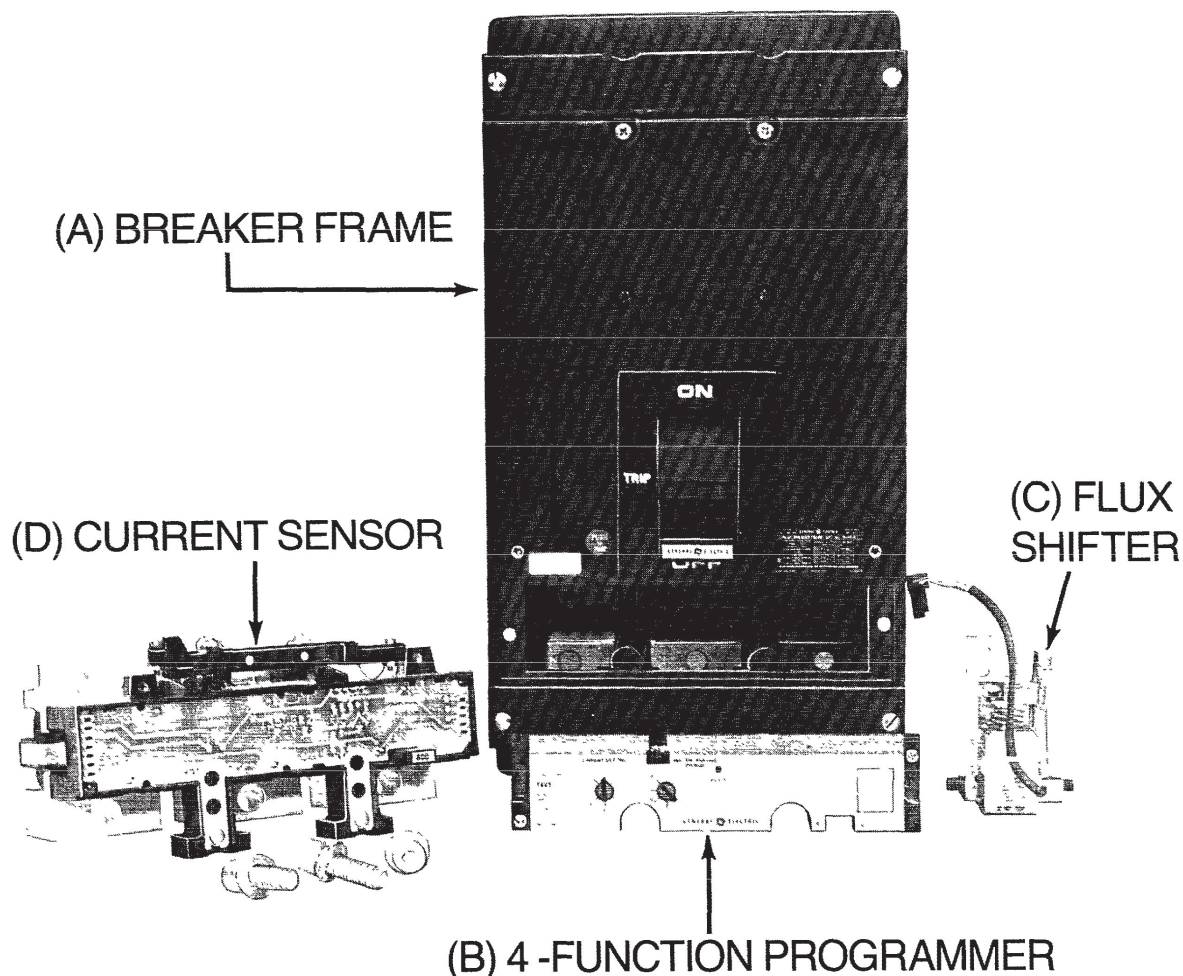
- C. Flux shifter (catalog number TKFS)
- D. Current sensor (catalog number TKCT series)

Necessary Tools:

- Electrician's Phillips head screwdriver
- Torque screwdriver with Phillips and flat blade bit
- Torque wrench with 1/4 inch hex bit (4 inch length)
- 1/16" feeler gauge
- Flat blade screwdriver
- Pliers

Assembly

To assemble the breaker, follow the steps listed below in order:



Step 1

Remove the breaker cover

Two slot head screws secure the lug covers at the line and load ends. After removing the two lug covers, loosen the six Phillips head screws securing the breaker cover. Remove the cover and remove and discard the two tubular spacers shown in FIG. 2. Remove the two shutters from handle and set aside (See FIG. 11 for picture of handle shutters).

Step 2

Install the Current Sensor

The breaker is held in the "ON" position during shipment by placement of a cotter pin in the breaker

mechanism. To remove, use pliers to straighten the end of the cotter pin (FIG. 3). Push the handle toward the load end of the breaker to relieve pressure on the pin; remove and discard the cotter pin (breaker handle will move to the "TRIP" position). Position the three screws provided in the left, center, and right mounting holes of the current sensor with the three flat washers provided (note a lockwasher is already captive on each screw). Slide the current sensor down into the cavity (FIG. 4), holding the breaker handle forward while sliding into position. When in place, tighten the three screws evenly to 125 inch-pounds. Hold trip bar back towards current sensor to reach center screw.

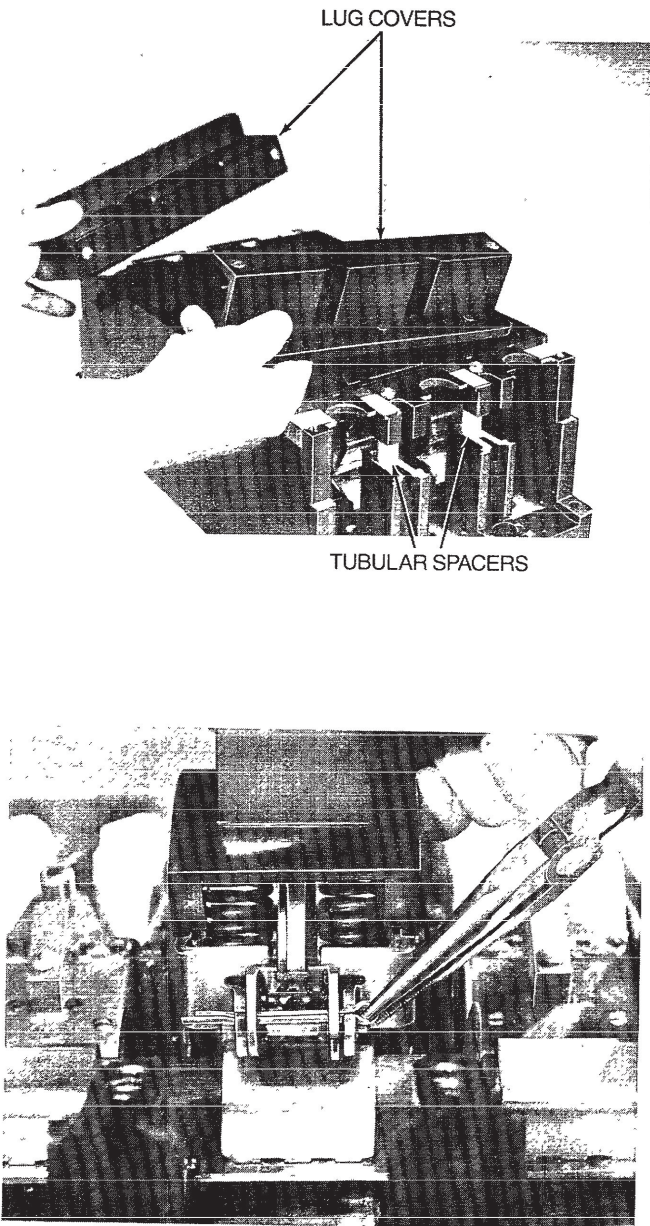


Fig. 2

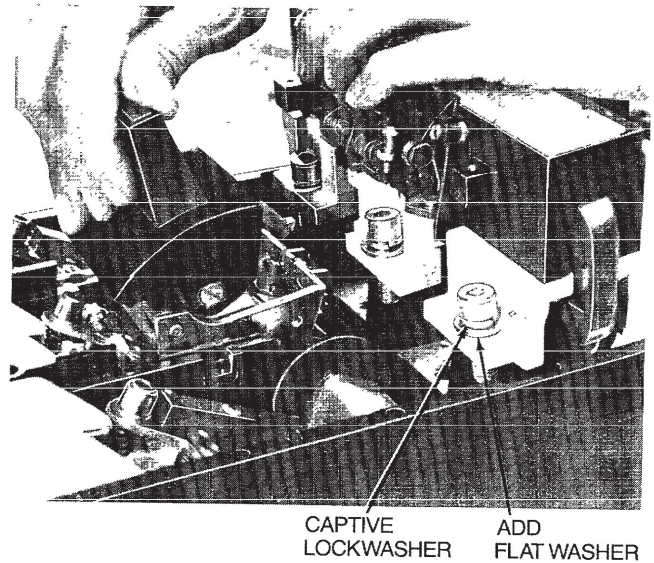


Fig. 4

Fig. 3

Assembling MicroVersaTrip™ Trip Unit Systems

Step 3

Install Programmer and Flux Shifter

Plug the flux shifter into the programmer (FIG. 5).

Then, dress the wires neatly in the three retaining grips in the programmer recess (FIG. 6). Slide the black protective sheath over the wires toward the flux shifter to allow correct wire length in the recess. Position programmer on current sensor and tighten the two programmer mounting screws to 10 inch-pounds.

NOTE: The black plug may pop up when placing the programmer in position. If so, push the plug back down flush with the top surface of the programmer after the programmer mounting screws have been tightened.

Next, install the flux shifter (FIG. 7). Holding the flux shifter frame down in its slot in the breaker base, tighten the flux shifter mounting screw to 10 inch-pounds. Dress the flux shifter wire lead inside the breaker housing (FIG. 8). Pull wire forward to remove slack at programmer end; the wire should not be taut, but should clear the flux shifter reset lever.

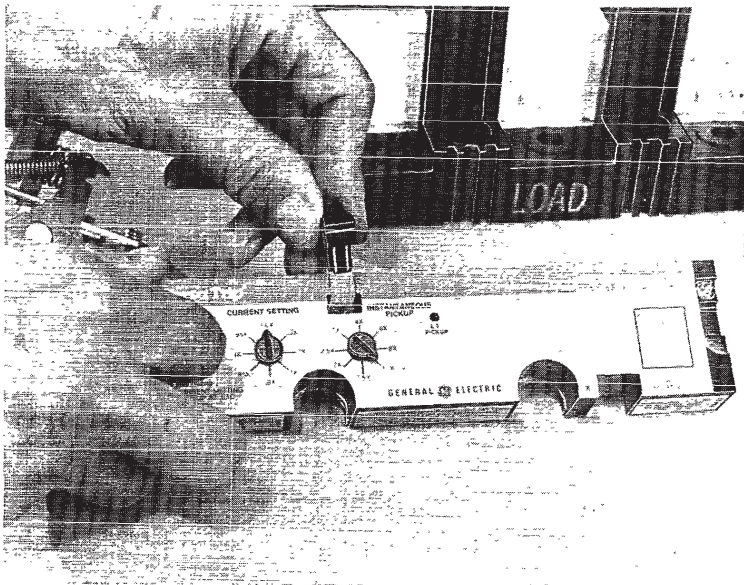


Fig. 5

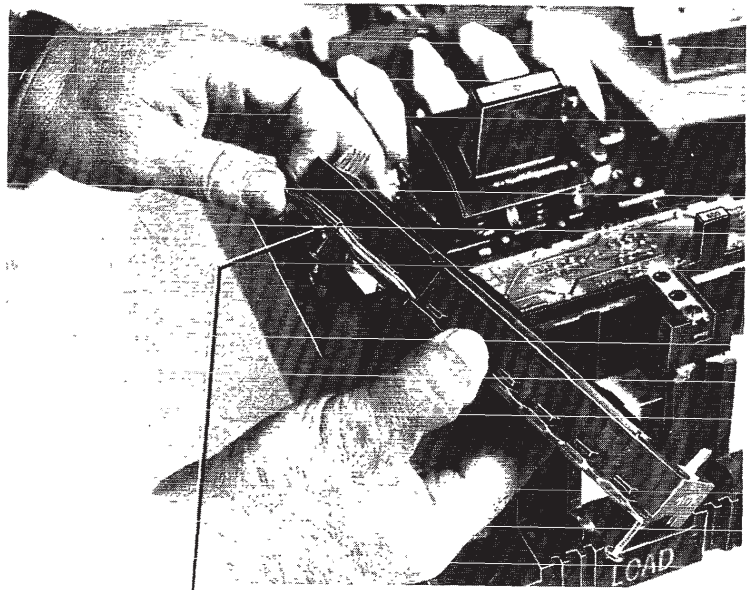


Fig. 6

SLIDE SHEATH OUT
OF RECESS AREA

Step 4

Clearance Check

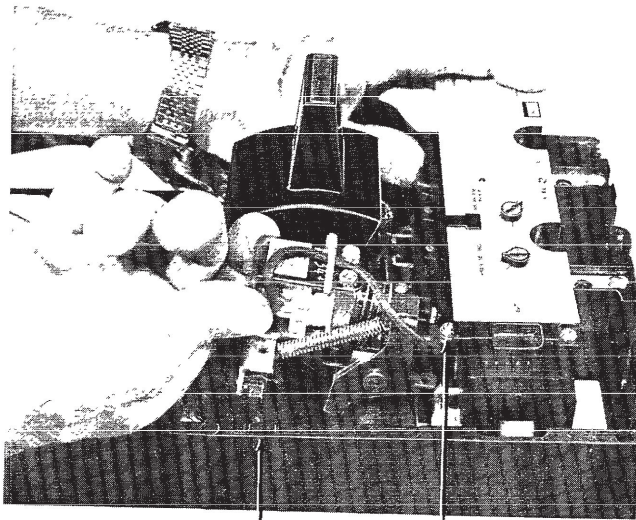
NOTE: Flux shifter plug should be flush with programmer cover.

While holding, the flux shifter down firmly so that its frame rests in the slot provided in the base, latch the breaker by moving the handle toward the load end, then turn the breaker "ON" by moving the handle toward the line end.

NOTE: KEEP HANDS CLEAR OF BREAKER HANDLE AND MECHANISM DURING CHECK.

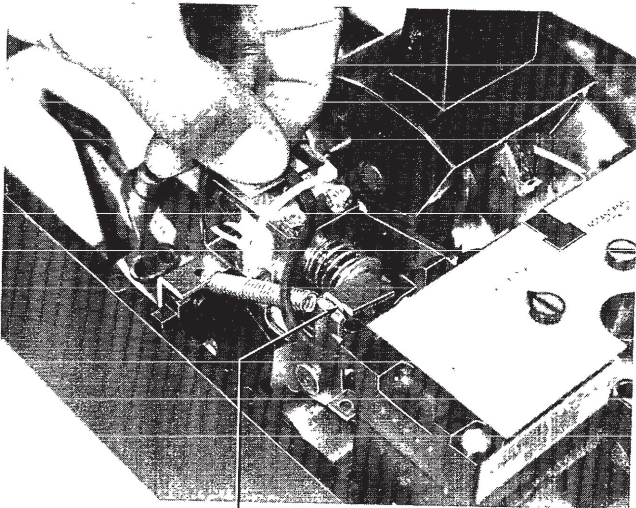
Next, still holding flux shifter down firmly in base, check that the clearance between the flux shifter plunger and the trip bar adjusting screw is between .001 to .063 inch (FIG. 9). If the measurement is off, do not attempt to adjust or use the breaker. Notify GE Construction Equipment Product Service, Plainville, Connecticut, that breaker does not meet the clearance specification.

NOTE: Discharge breaker mechanism by moving trip bar back towards current sensor BEFORE releasing pressure on the flux shifter.



SLOT IN BREAKER BASE
FOR FLUX SHIFTER FRAME

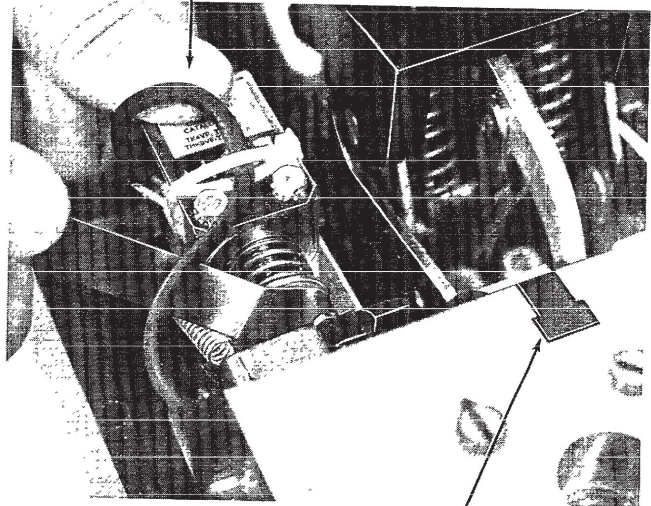
FLUX SHIFTER
MOUNTING SCREW



FLUX SHIFTER RESET LEVER

Fig. 7

HOLD FLUX SHIFTER DOWN



FLUX SHIFTER PLUG TO BE
FLUSH WITH PROGRAMMER

Fig. 9

Fig. 8

Assembling MicroVersaTrip™ Trip Unit Systems

Step 5

Functional Check

NOTE: Flux shifter plug to be flush with programmer cover.

While holding flux shifter down firmly so that its frame rests in the slot provided in the breaker base, latch the breaker by moving the handle toward the load end, then turn the circuit breaker "ON" by moving the handle toward the line end still holding the flux shifter down firmly in the base, place a

screwdriver against the back face of flux shifter plunger and flux shifter frame (FIG. 10). A slight leverage force will release the plunger and trip the breaker.

NOTE: KEEP HANDS AWAY FROM BREAKER HANDLE AND MECHANISM DURING CHECK.

Notify GE Construction Equipment Product Service, Plainville, Connecticut, if breaker is not working properly.

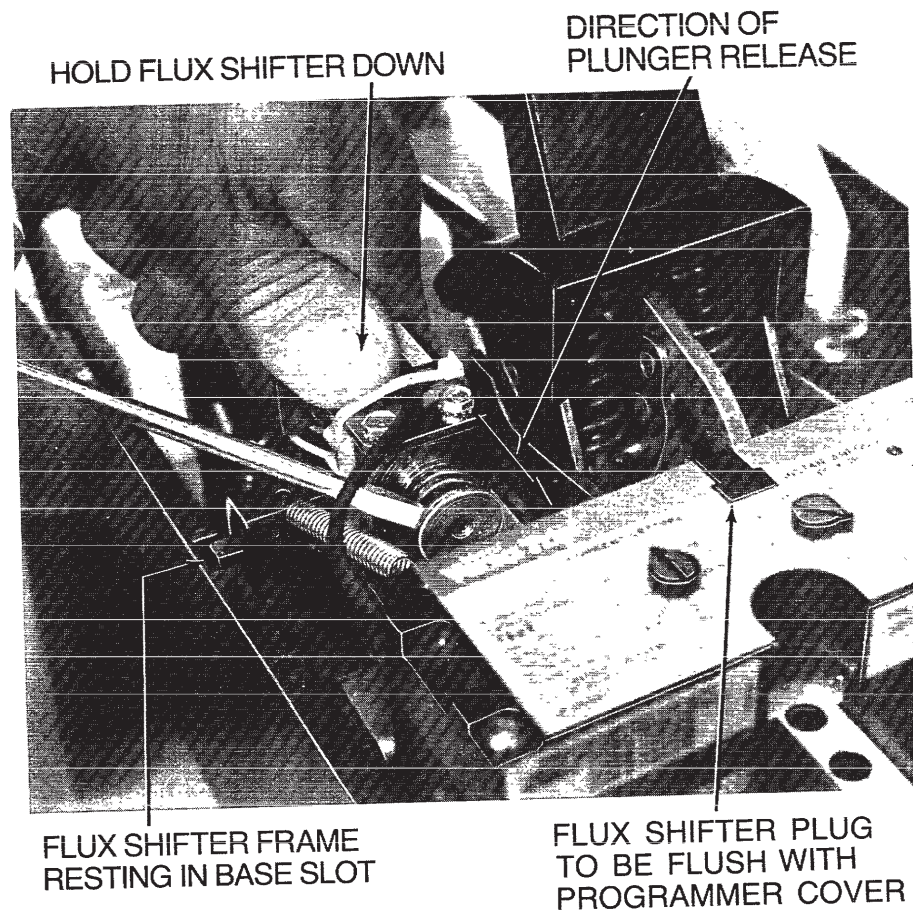


Fig. 10

Step 6

Replace the breaker cover

Replace the two shutters over breaker handle as shown in FIG. 11; the shutters must be oriented as shown to allow for proper cover placement. Slide shutters toward line end of breaker as far as shutter handle openings allow. Replace the breaker cover, and torque the six cover mounting screws to 25 inch-pounds (FIG. 12). For breakers requiring external ground fault connection, attach ground wire leads as indicated to the terminals shown in FIG. 12. Replace

the line and load end lug covers and tighten the slot head screws to 25 inch-pounds.

The breaker may again be checked by moving the handle to the "OFF" then "ON" position, and depressing the "PUSH TO TRIP" button. The breaker is now ready to be installed. Note that changes to the programmer settings may be made by removing the programmer window.

NOTE: For information on Neutral Current Transformer installation, refer to instruction No. GEK-72104.

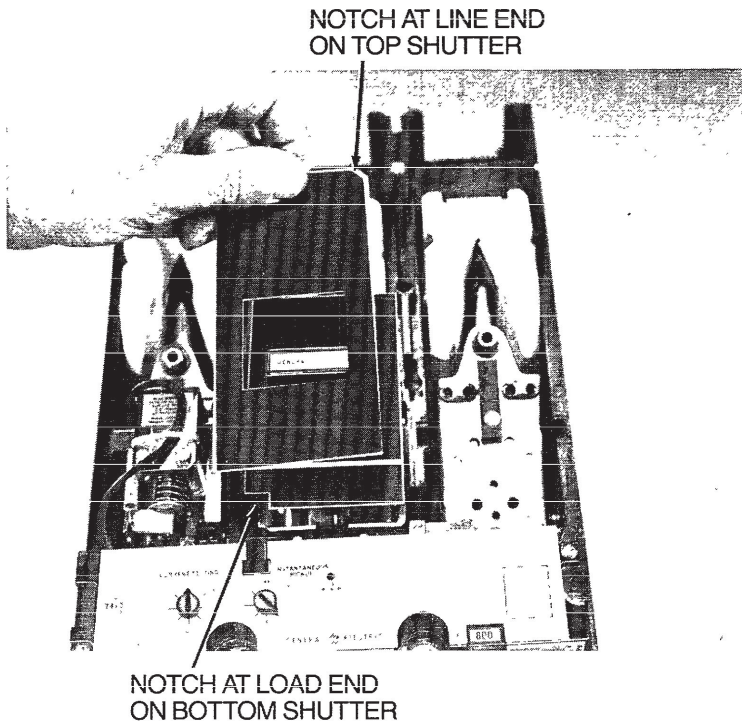
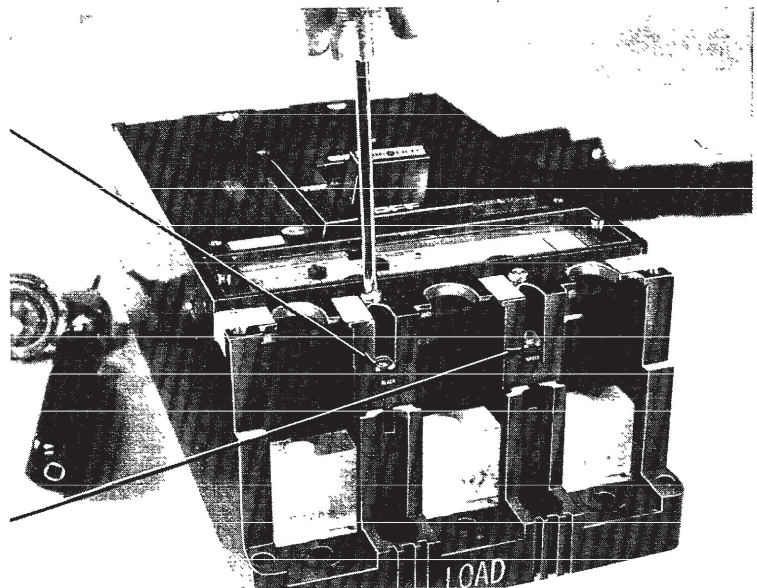


Fig. 11

EXTERNAL GROUND FAULT/NEUTRAL
CURRENT TRANSFORMER
CONNECTION TERMINAL
(WHITE WIRE)

Fig. 12

EXTERNAL GROUND FAULT/NEUTRAL
CURRENT TRANSFORMER
CONNECTION TERMINAL
(BLACK WIRE)



Maintenance

Introduction

Safety switches are properly lubricated at the factory. However, periodic cleaning and lubrication may be required. The maintenance interval between lubrications depends on the amount of switch usage and the ambient operating conditions. The maximum maintenance interval should not exceed one year for mechanical or current-carrying parts.

For additional information, refer to publication NFPA-70B, "Standard for Electrical Equipment Maintenance".

Unusual Performance Conditions

Contact Schneider Electric for information regarding performance under unusual conditions. Examples of unusual conditions are shown in table below:

Unusual Conditions
Ambient temperatures below -22°F (-30°C) or above 104°F (40°C)
Altitudes over 6600 ft (2012 m)
Corrosive or explosive environments
Abnormal vibration, shock, or tilting
Unusual operating duties

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, CSA Z462 or NOM-029-STPS.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Never operate energized switch with door open.
- Turn off switch before removing or installing fuses or making load side connections.
- Always use a properly rated voltage sensing device at all line and load fuse clips to confirm switch is off.
- Turn off power supplying switch before doing any other work on or inside switch.
- Do not use renewable link fuses in fused switches.

Failure to follow these instructions will result in death or serious injury.

Annual Maintenance Procedures

1. Turn off power supplying the switch before performing any work on or inside the switch.
2. Open the switch blades by moving the operating handle to the OFF (O) position.
3. Lock out or tag the switch, per local procedures.
4. Open the enclosure door.
5. Always use a properly rated voltage sensing device at all line and load-side lugs (terminals) to confirm power is off.

NOTE: Do not remove any parts from the switch or operating mechanism unless specifically instructed to do so in the following procedures. Vacuum any loose material from inside the switch. Wipe internal parts and the inside of the enclosure with a damp, lint-free cloth.

6. Visually inspect the switch for loose parts or hardware:
 - a. Retighten the hardware as needed. Refer to the wiring diagram for torque values.
 - b. Do not re-energize the switch if any worn or damaged parts are found. Replace them before re-energizing the switch.

Parts Removal

1. Remove the arc suppressor(s) or arc shield(s) from the switches by loosening the fastener(s) holding the suppressor(s) / shield(s) in place. See the examples provided.
2. Remove old grease and other contaminants from the line-side jaws and switchblades with a clean, lint-free cloth. If the lubricant has dried, remove it with CRC® HF Contact Cleaner, or equivalent, sprayed on a cloth.
3. Lubricate the cleaned areas with a thin film of Dow Corning®BG20 grease only.

NOTE: Do not substitute any other lubricant. Other lubricants may not be suitable for electrical applications and could alter the performance of the switch. Dow Corning BG20 is available from Square D (part number SWLUB).
4. Exercise the operating mechanism to ensure proper operation by opening and closing the switch five times with the door closed. Open the switch blades.

⚠ CAUTION

HAZARD OF EQUIPMENT DAMAGE

Do not disassemble the switch line base assembly or remove the blade rotor when cleaning the line-side jaw or the switch blade. See Figure 4, page 26, Examples of Line Base Assemblies.

Failure to follow these instructions can result in injury or equipment damage.

Figure 2 - Example of Arc Suppressors



Figure 3 - Example of Arc Shields

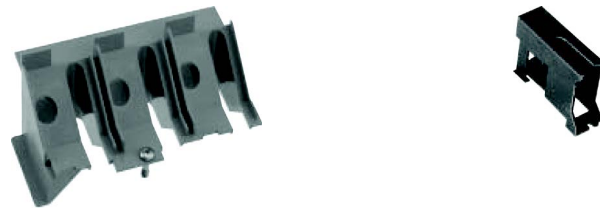
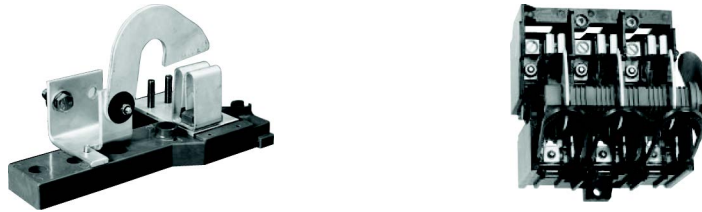
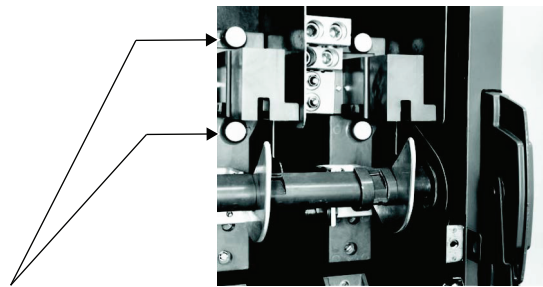


Figure 4 - Examples of Line Base Assemblies**Figure 5 - Insulating Plugs on Pole Unit**

Insulating plug

Parts Replacement

1. Reinstall the arc suppressor(s) or arc shield(s) according to the torque values in the table, page 26 below.
2. Ensure that the two insulating plugs in each phase (400–1200 A only) are firmly seated. See Figure 5.

Table 9 - Arc Suppressor Screw Torque Values

Switch Type	Torque Value
30–100 A	5–10 lb-in. (0,57–1,13 N•m)
200 A, F Series	10–20 lb-in. (1,13–2,26 N•m)
200 A, E Series	20–25 lb-in. (2,26–2,83 N•m)
400–800 A General Duty	20–25 lb-in. (2,26–2,83 N•m)
400–1200 A Heavy Duty	30–40 lb-in. (3,39–4,52 N•m)

Re-Energize the Switch

1. Close and latch the door.
2. Turn off all downstream loads.
3. Turn on power supplying the switch.
4. Turn on the switch.
5. Turn on all downstream loads.

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Pre-commissioning/Pre-energizing Checks and Testing

Cleaning

1. Ensure that all of the packing material, including any packing material used inside the enclosure of the transformer used to support and protect the unit during shipping, have been removed.
2. Vacuum away as much dust as possible. Dust will act as a thermal insulating material which will increase the temperature of the unit and could possibly decrease operational life. Refer to Cleaning on page 38.

Visual and Mechanical Checks

Perform the following visual and mechanical checks below. In addition, refer to Performing Visual and Mechanical Checks on page 37 for a detailed listing of instructions.

- Visually inspect the transformer for physical damage. Repair any physical damage, if possible, and provide suitable protective barriers to prevent future damage.
- Compare the transformer nameplate information with the drawings and/or specifications for the installation.
- Verify proper connection of the taps in accordance with the nameplate information.
- Check the clearance of all electrical connections. Verify all connections for tightness with a calibrated torque wrench.
- Visually check the core, frame, enclosure, conduits, raceways and conductors for proper ground bonding. In addition, refer to Grounding and Bonding on page 39.

Electrical Testing

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS-2011, or CSA Z462.
- This equipment must be installed and serviced only by qualified electrical personnel.
- Perform such work only after reading and understanding all of the instructions contained in this bulletin.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Always practice lock-out/tag-out procedures according to OSHA requirements.
- Carefully inspect your work area, and remove any tools and objects left inside the equipment.
- Replace all devices, doors, and covers before turning on power to this equipment.
- All instructions in this manual are written with the assumption that the customer has taken these measures before performing maintenance or testing.

Failure to follow these instructions will result in death or serious injury.

Refer to Maintenance on page 37 to perform the following pre-commissioning electrical testing:

- Measure contact resistance using a low resistance ohmmeter. Refer to Contact Resistance on page 39.
- Perform insulation resistance tests with an appropriate device. Refer to Insulation Resistance on page 39.
- Perform a turns ratio test on all taps and on the full winding voltages for each phase. Refer to Turns Ratio on page 39.
- Measure and record the winding resistances on larger transformers (>500 kVA). Refer to Winding Resistance on page 39.

Section 6—Maintenance

Performing Visual and Mechanical Checks

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Only qualified personnel should clean, inspect maintain and test transformers.
- Turn off power supplying this equipment before working on it.
- Disconnect and electrically isolate power to the transformer so that no accidental contact can be made with energized parts.
- Discharge all static charges held by coils.

Failure to follow these instructions will result in death or serious injury.

1. Perform a visual inspection of the transformer and its surrounding environment.
 - a. Inspect the enclosure for any physical damage.
 - b. Repair any damage, if possible.
 - c. Provide guards to prevent future damage.
2. Record operational data while the transformer is still energized and in service.
3. De-energize the transformer prior to performing work on the unit.
 - a. Follow all safety procedures to place the unit into an electrically safe condition.
 - b. Remove the access covers. Inspect for:
 - dirt on insulating surfaces and at areas which tend to restrict air flow.
 - loose connections.
 - the condition of tap changers or terminal boards.
 - the general condition of the transformer.
4. Inspect the enclosure, transformer, terminals, terminal boards, and insulators for signs of overheating from internal or external sources. Check for voltage creepage over insulating surfaces, evident by tracing or carbonization.
5. Check for evidence of rusting, corrosion and paint deterioration. Repair any rust and corrosion where necessary.

Frequency

The frequency at which transformers should be inspected depends on operating conditions.

For clean, dry locations, annual inspections may be sufficient. However, for other locations, such as where the air is contaminated with dust or chemical fumes, an inspection at three- or six-month intervals may be required. Usually after the first few inspection periods, a definite schedule can be set up based on the transformer's existing conditions.

Severe, Environmental or Special Events

- ❑ Perform routine inspections, maintenance, and testing after any severe electrical short circuit, ground fault, or environmental event (e.g., flooding) to determine the operational status of the transformer.
- ❑ Perform the inspections, maintenance and testing if the transformer has been out of service for an extended period of time. Place strip heaters to maintain the transformer temperature above ambient to prevent condensation from forming in the transformer during extended down time.

Cleaning

Connections and Contact Surfaces

A clean contact surface area is necessary, and terminals must be clean. Where the transformers are installed indoors or outdoors or in a harsh environment, the connections must be sealed with an approved electrical joint compound.

Apply the compound to exposed connections and the surface area before making a bolted connection.

Enclosures, Windings and Insulators

1. De-energize the transformer.
2. Follow the check list below to permit free circulation of air and to guard against insulation breakdowns and thermal performance issues:
 - ❑ Clean the transformer enclosure, windings and insulators by vacuuming or by blowing clean, dry, compressed air or nitrogen. Be sure to wear appropriate personal protective equipment (PPE) when cleaning.
NOTE: Vacuuming is the preferred first step for cleaning. Compressed air should have a dew point of -50°F (-45.5°C) or less, and a pressure at or below 25 psi.
 - ❑ Clean lead supports, tap changers, terminals boards, bushings and other major insulating surfaces with lint-free rags or soft bristle brushes.
NOTE: Do not use liquids, solvents or detergents, as they may deteriorate insulating materials.
 - ❑ Carefully inspect and thoroughly clean the ventilation openings (ducts) and winding assemblies. Remove any blockages.
 - ❑ Remove any trash and/or combustible materials from the area around the unit.

Performing Electrical Testing

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Only qualified personnel should clean, inspect maintain and test transformers.
- Turn off power supplying this equipment before working on it.
- Disconnect and electrically isolate power to the transformer so that no accidental contact can be made with energized parts.
- Discharge all static charges held by coils.

Failure to follow these instructions will result in death or serious injury.

Perform the following electrical tests during maintenance:

- ❑ Check all electrical contacts with a calibrated torque wrench.
- ❑ Verify proper spacing.
- ❑ Refer to the manufacturer's specifications for torque values.
- ❑ Check all external hardware for tightness.

Contact Resistance

- ❑ Use a low resistance ohmmeter to measure contact resistance.
 - a. Compare values with similar connections looking for unusually high contact resistance points.
 - b. Investigate any connections that may deviate from common values by more than 50% of the lowest values.
- ❑ An infrared scanning device may be used to look for abnormal temperatures at transformer contacts for energized units.

NOTE: Take care to follow the manufacturer's procedures, as small errors in scanner operation can cause significant errors in detected temperatures.

Insulation Resistance

- Insulation resistance checks may create a capacitive charge on a winding.
1. Ground each winding for at least one minute between tests to drain any static charge created during the test.
 2. Perform insulation resistance tests with an appropriate device.
 3. Test from winding-to-winding and winding-to-ground.
 4. Record all test results for comparison for future readings.
 - Values are installation site dependent and not pre-set at the factory. All testing is compliant to NEMA ST-20.
 - Insulation resistance readings should be at least 1 megohm.
 - Lower readings may indicate the presence of moisture and require a drying procedure to correct.

Winding Resistance

- On larger transformers (>500 kVA):
1. Measure the winding resistances and record for future reference.
 2. Compare the results with the values obtained during the pre-commissioning checks. Readings should not vary by more than 5% with adjacent coils and the pre-commissioning checks.
 3. Record the temperature at which these initial readings were taken.
 - Values are installation site dependent and not pre-set at the factory. All testing is compliant to NEMA ST-20.
 4. Adjust the resistance values based on any differences in temperature between current readings and pre-commissioning values.

Grounding and Bonding

1. Check for proper values of resistance between the system ground lug (or point) and the transformer enclosure, core, frame and clamps.
2. Compare with pre-commissioning values, looking for trends that may indicate a compromise in the quality of the ground bond.

Turns Ratio

1. Perform a turns ratio test on all taps and on the full winding voltages for each phase. Significant changes may indicate a loss of winding continuity.
 - a. Compare these values with those obtained during the pre-commissioning checks. Voltages between phases should not deviate by more than 0.5% from adjacent coils.
 - b. Investigate abnormal readings found outside of this limit.
2. Verify input and output voltages are correct for the tap and output voltages expected. Investigate abnormal readings.

Sound Isolation Pads

Inspect the sound isolation pads for signs of physical deterioration.

Coil Cooling Ducts

1. Inspect all coil cooling ducts for any accumulation of dust, dirt or other obstructions.
2. Follow standard cleaning procedures to ensure proper air flow.

Terminals

Ensure terminals are in good working condition for the proper operation of transformers.

- ❑ Inspect terminals for alignment, tightness (see torque requirements), pressure, burns or corrosion. Investigate and correct any signs of damage.
- ❑ Repair minor pitting, as long as the plating on the terminal has not been compromised.

Operation

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.
- This equipment must be effectively grounded per all applicable codes. Use an equipment-grounding conductor to connect this equipment to the power system ground.

Failure to follow these instructions will result in death or serious injury.

LED Status Indicators

Diagnostic LEDs are located on the front of the ASCO 425 SPD device. They operate as follows:

- Verify that all phase voltages are present. If the LED is not illuminated, the device may not be installed correctly. Check the power supply and service voltage. Upon energizing the SPD, check the LED status. If all of the LEDs are illuminated, surge suppression is operating.
- If one or more LEDs are not illuminated, there is a loss of surge suppression on that phase.
- If an inoperative condition occurs the device must be replaced by qualified electrical personnel.

Figure 8: Diagnostic Operation



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2.4 Normal Operations

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Section 5—Operation

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS-2011, or CSA Z462.
- This equipment must be installed and serviced only by qualified electrical personnel.
- Perform such work only after reading and understanding all of the instructions contained in this bulletin.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Before performing visual inspections, tests, or maintenance on this equipment, disconnect all sources of electric power. Assume all circuits are live until they are completely de-energized, tested, and tagged. Pay particular attention to the design of the power system. Consider all sources of power, including the possibility of backfeeding.
- Always practice lock-out/tag-out procedures according to OSHA requirements.
- Carefully inspect your work area, and remove any tools and objects left inside the equipment.
- Replace all devices, doors, and covers before turning on power to this equipment.
- All instructions in this manual are written with the assumption that the customer has taken these measures before performing maintenance or testing.

Failure to follow these instructions will result in death or serious injury.

Effects of Humidity

The standard dip and baked varnish process does not support the growth of fungus. The only concern when units are stored in high humidity areas is retaining the integrity of the insulation material. If units are properly maintained and cleaned at shut down prior to long periods of de-energization there should be no issue with fungus.

Humidity conditions are unimportant as long as the transformer is energized. However, follow the precautionary steps listed below if the transformer is de-energized, is allowed to cool to ambient temperature, and will exceed a shutdown of 12 hours (especially in high humidity conditions).

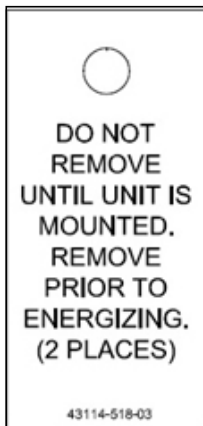
1. Place small strip heaters in the bottom of the unit shortly after shutdown to maintain the temperature of the unit a few degrees above that of the outside air.
2. Inspect the unit for evidence of moisture before returning it to service.
3. Check the insulation resistance. If evidence of moisture exists, or if the insulation resistance is less than 1 megohm, dry out the transformer by placing it in an oven or by blowing heated air over it.

Enclosure Temperature

The temperature rise on the enclosure exterior for ventilated transformers should not exceed 122°F (50°C), except as indicated in UL 1561.

Prior to Energizing the Transformers

Figure 33: Removing Temporary Braces



1. Remove any temporary braces. See Figure 33.
2. Check bolted electrical connections. Refer to Making Electrical Connections on page 27 for a detailed check list.
3. Remove excess dirt accumulations from the transformer windings and insulators to permit free circulation of air and to guard against the possibility of insulation breakdowns. Refer to Cleaning on page 38 for a detailed check list.
4. Perform insulation resistance tests with an appropriate device. Refer to Insulation Resistance on page 39 for a detailed instructions.
5. Perform a visual and mechanical check of the transformer and its surrounding environment. Refer to Performing Visual and Mechanical Checks on page 37 for a detailed check list.

Energizing the Transformer

1. Follow all safety precautions and requirements for PPE as outlined in NFPA 70E and any other applicable standards and/or codes.
 - a. Immediately de-energize the transformer if there is any indication of arcing (visual or audible) at any time during the initial start-up.
 - b. Investigate and correct the cause of the arcing before re-energizing the unit.
2. Investigate and correct sources of excessive noise. When energized, the transformer will make some audible noise. Excessive mechanical noise, hums or rattles may be an indication of improperly installed or tightened hardware or enclosure parts.
3. Measure and verify the primary and secondary phase-to-phase and phase-to-ground voltages for all windings.
 - a. Where applicable, measure and verify phase-to-neutral voltages, as well.
 - b. Record and save the values for future reference.

NOTE: Phase-to-phase, phase-to-ground and phase-to-neutral measurements will verify that the transformer is functioning per the nameplate voltages.

c. Measure phase-to-ground voltages.

d. Record and save the values for future reference.

NOTE: Phase-to-ground voltages will verify that the unit has been installed correctly.

4. Move one tap at a time, or verify that the jumper lands per the wiring diagram as shown on the nameplate. See Figure 31 on page 29.
NOTE: Do not change taps while the transformer is energized.
 - a. Adjust the transformer taps as necessary to match the actual voltage requirements.
 - b. Ensure taps are cleaned of varnish or other insulating material.
5. Perform a phase rotation check with an appropriate device for loads that are phase sensitive (e.g., certain motor or drive applications).
 - a. Follow the manufacturer's instructions for the device.
 - b. Correct phase rotation errors before energizing the transformer.

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Operation

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.
- This equipment must be effectively grounded per all applicable codes. Use an equipment-grounding conductor to connect this equipment to the power system ground.

Failure to follow these instructions will result in death or serious injury.

LED Status Indicators

Diagnostic LEDs are located on the front of the ASCO 425 SPD device. They operate as follows:

- Verify that all phase voltages are present. If the LED is not illuminated, the device may not be installed correctly. Check the power supply and service voltage. Upon energizing the SPD, check the LED status. If all of the LEDs are illuminated, surge suppression is operating.
- If one or more LEDs are not illuminated, there is a loss of surge suppression on that phase.
- If an inoperative condition occurs the device must be replaced by qualified electrical personnel.

Figure 8: Diagnostic Operation



Dry Contacts

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Use 600 Vac rated dry contact wiring.
- Dry contact wiring must have less than 1/16 in. (1.6mm) exposed wire from the dry contact block.
- Do not supply more than 24 Vdc / 24 Vac and no more than a current of 2 A.

Failure to follow these instructions will result in death or serious injury

The ASCO 425 series SPD device is provided with dry contacts. These dry contact leads can be used for remote indication of the SPD operating status to a computer interface board or emergency management system. Also, these dry contact leads are designed to work with the SPD remote monitor option described in the following section.

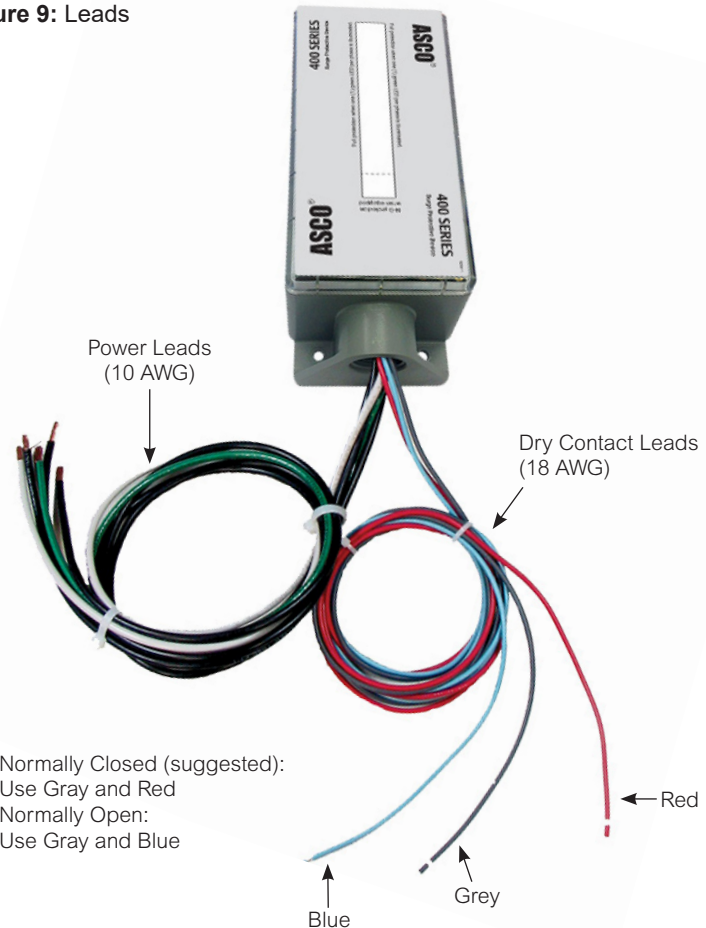
The dry contacts are designed for a maximum voltage of 24 V dc / 24 V ac and a maximum current of 2 A. Higher energy applications may require additional relay implementation outside the SPD. Damage to the SPD's relay caused by use with energy levels in excess of those discussed in this instruction bulletin is not covered by warranty. For application questions, call the Surge Technical Assistance Group at (800) 237-4567 or email customercare@ascopower.com

Connecting Form C Dry Contact & Audible Alarm

Three 3 ft. (.91 m) 18 AWG wires are included through the nipple. See Figure 9. Gray is Common, Blue is Normally Open and Red is Normally Closed when energized in its expected installation. (When not energized, the SPD is no longer in its 'Normal' state and contacts will be reversed.)

If the dry contacts are not utilized, insulate lead ends, coil and secure. Audible Alarm will still function correctly.

Figure 9: Leads



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2.5 Environmental Conditions

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Installation and Operation Requirements

This equipment does not achieve its ratings until it is installed per record/as-built drawings, installed per the instructions contained in this document, and has operational environmental controls with appropriate settings to help mitigate environmental influences. This equipment can also be operated in a climate controlled area that uses both heating and cooling to maintain acceptable environmental conditions. Indoor and outdoor rated equipment is not suitable for outdoor storage. In some cases (such as seasonal electrical loading, de-energized equipment, and standby/alternate power sources), the heat generated by equipment loading is insufficient to prevent condensation and alternate heat sources are required. If environmental controls such as a thermostat or humidistat are used, ensure their settings are sufficient to mitigate condensation and remain operational at all times. Consult the Engineer of Record for the appropriate environmental control settings.

Proposition 65 Information



WARNING: This product can expose you to chemicals including Lead and Lead Compounds, which are known to the State of California to cause cancer and cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Exposure to Moisture, Chemicals, and Condensation

If liquids such as moisture, chemicals, and condensation contact the electronics, circuit breaker, fuses, bussing, or other electrical components, do not attempt to clean or repair the equipment as this may lead to unrepairable damage. If the equipment is energized, de-energize it. If equipment is not energized, do not energize it. Contact the Schneider Electric Customer Care Center at 888-778-2733.

Enclosure Ratings

All Schneider Electric enclosures are certified to UL 50 and UL 50E carrying a UL Type Rating. Ratings are equal to or greater than NEMA Ratings of same number.

Table 3 - Enclosure ratings

Type	Knockout information
Type 1 general purpose, indoor (ANSI49 gray paint on cold rolled steel)	Knockouts standard on 30–100 A enclosures; top, bottom and sidewalls
Type 3R rainproof, outdoor (ANSI49 gray paint on galvanized steel)	Knockouts standard on 30–100 A enclosures; bottom and sidewalls
Type 12 indoor, dust-tight, and drip-tight (ANSI49 gray paint on galvanized steel)	Type 12 has no knockouts (also suitable for Type 3R outdoor use)
Type 4, 4X, and 5 indoor or outdoor, watertight, dust-tight, and corrosion resistant (Type 304 or Type 316 stainless steel)	—
Type 4X indoor or outdoor, watertight and dust-tight, and corrosion resistant (fiberglass reinforced polyester)	—
Type 7/9 hazardous locations as defined in NEC Article 500 (copper free cast aluminum)	Class I, Divisions 1 and 2, Groups C and D
	Class II, Divisions 1 and 2, Groups E, F and G
	Class III, Divisions 1 and 2
Type 3R - 800 and 1200 A Heavy Duty shipped as Type 5 enclosure, removed drip screw for Type 3 Applications	—
Type 12 - may be used for Type 3R applications by removing drip screw	—

Maintenance

Introduction

Safety switches are properly lubricated at the factory. However, periodic cleaning and lubrication may be required. The maintenance interval between lubrications depends on the amount of switch usage and the ambient operating conditions. The maximum maintenance interval should not exceed one year for mechanical or current-carrying parts.

For additional information, refer to publication NFPA-70B, "Standard for Electrical Equipment Maintenance".

Unusual Performance Conditions

Contact Schneider Electric for information regarding performance under unusual conditions. Examples of unusual conditions are shown in table below:


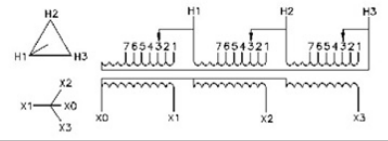

Unusual Conditions
Ambient temperatures below -22°F (-30°C) or above 104°F (40°C)
Altitudes over 6600 ft (2012 m)
Corrosive or explosive environments
Abnormal vibration, shock, or tilting
Unusual operating duties

Section 4—Installation

Locating/Placing Ventilated and Non-ventilated Transformers

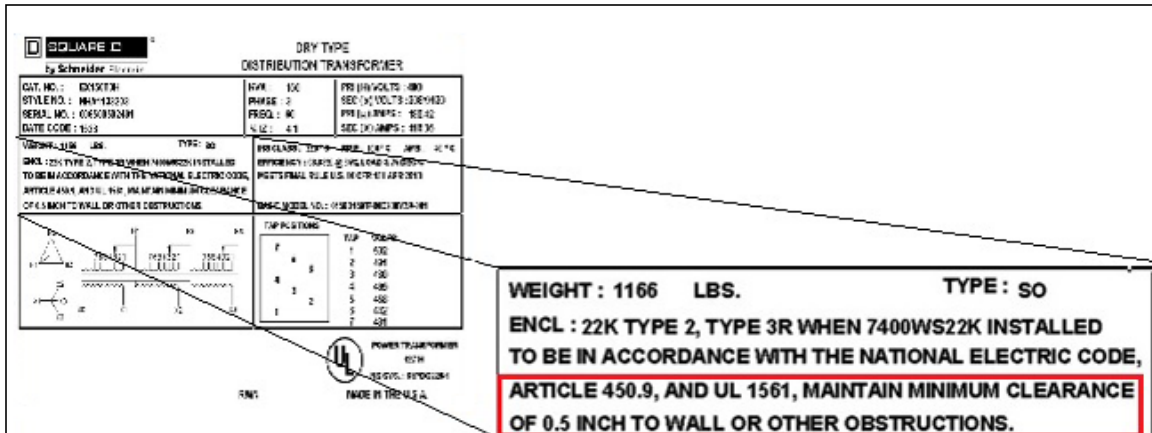
1. Remove all packaging material. Keep the shipping pallet attached to the transformer to assist with moving the unit to its final installation location.
2. Verify that the nameplate matches the description from the building layout drawings (kVA, primary and secondary voltages, etc.). See Figure 13.

Figure 13: Sample Nameplate

		DRY TYPE DISTRIBUTION TRANSFORMER																	
CAT. NO. : EX150T3H STYLE NO. : NHA1133203 SERIAL NO. : 006500502491 DATE CODE : 1523		KVA : 150 PHASE : 3 FREQ. : 60 % IZ : 4.1	PRI (H) VOLTS : 480 SEC (X) VOLTS : 208Y/120 PRI (H) AMPS : 180.42 SEC (X) AMPS : 416.36																
WEIGHT : 1166 LBS. ENCL : 22K TYPE 2, TYPE 3R WHEN 7400WS22K INSTALLED TO BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE, ARTICLE 450.9, AND UL 1561, MAINTAIN MINIMUM CLEARANCE OF 0.5 INCH TO WALL OR OTHER OBSTRUCTIONS.		TYPE : 50 INS CLASS : 220 °C EFFICIENCY : 98.83% @ 35% LOAD & 75 DEG C MEETS FINAL RULE U.S. 10 CFR 431 APR 2013	RISE : 150 °C AMB : 40 °C BASIC MODEL NO. : 065EX150T480D208Y2A-001																
		TAP POSITIONS <table border="1"> <thead> <tr> <th>TAP</th> <th>VOLTS</th> </tr> </thead> <tbody> <tr><td>1</td><td>502</td></tr> <tr><td>2</td><td>491</td></tr> <tr><td>3</td><td>480</td></tr> <tr><td>4</td><td>469</td></tr> <tr><td>5</td><td>458</td></tr> <tr><td>6</td><td>442</td></tr> <tr><td>7</td><td>431</td></tr> </tbody> </table>		TAP	VOLTS	1	502	2	491	3	480	4	469	5	458	6	442	7	431
TAP	VOLTS																		
1	502																		
2	491																		
3	480																		
4	469																		
5	458																		
6	442																		
7	431																		
		POWER TRANSFORMER 127 H INS SYS. : 65PDG220-1 MADE IN THE U.S.A.																	
RWN																			

3. Locate the unit per the building's layout drawing.
4. Verify the environment is suitable for the enclosure type.
5. Ensure the location is readily accessible to qualified personnel (per NEC 450.13). Units located in the open can be mounted on walls, columns, or otherwise supported from structures.
6. Ensure adequate ventilation since it is essential to properly cool ventilated transformers. Refer to National Electrical Code (NEC®) Article 450.
 - The minimum distance is marked on Nameplate NEC 450.9. See Figure 14 on page 18.
 - Minimum distance varies by enclosure style. See the approval drawing from Schneider Electric for minimum distance.
 - Clean, dry air is desirable.
 - Filtered air may reduce maintenance if the location of the transformer presents a problem.

Figure 14: Minimum Distance Marked on Nameplate NEC 450.9



7. Mount any accessories prior to installing the transformer when using wall or ceiling (trapeze) mounting.
 - a. Observe the four mounting hole locations in each enclosure base.
 - b. Obtain the actual dimensions via approval drawings from Schneider Electric.
 - c. Secure the units using one of two mounting methods: without floor mounting brackets (Figures 15–16 and Figure 17 on page 19) or with floor mounting brackets (Figures 18 and 19 on page 19).
8. Place the transformer in final position.

All Enclosure Styles (D, E, F, H, K and J)

- Transformers Installed Indoors (Styles D, E, F, H, K and J):
 - Completely enclosed or completely enclosed with ventilated openings; complies with NEC 450.21 (A) Exception
 - Units greater than 112.5 kVA
 - Have 428°F (220°C) or 392°F (200°C) insulation systems; complies with 450.21 (B) Exception No. 2

See Figure 20.

Figure 20: Transformers Installed Indoors: NEC 450.21 Exceptions A or B from Sample Nameplate

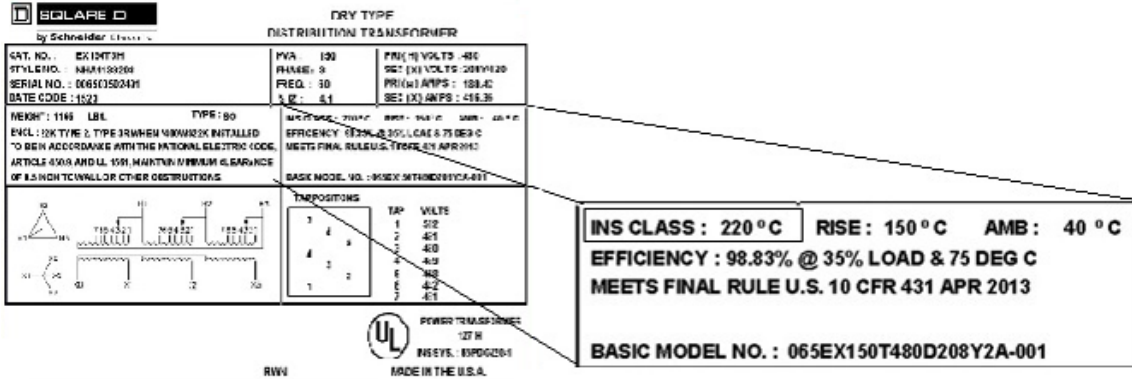


Table 1: Enclosure Clearances

Enclosure Style	Front Clearance	Side Clearance (in. / mm)	Rear Clearance (in. / mm)
D	Working Clearance for all styles vary substantially depending on voltage and specific application. Refer to NEC 110.26	0.50 / 12.7	Type EE – 3 / 76.2
H			All other styles – 6 / 152
E			3 / 76.2
K			3 / 76.2
J			0.50 / 12.7
F			0.50 / 12.7
			12 / 305

Section 5—Operation

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS-2011, or CSA Z462.
- This equipment must be installed and serviced only by qualified electrical personnel.
- Perform such work only after reading and understanding all of the instructions contained in this bulletin.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Before performing visual inspections, tests, or maintenance on this equipment, disconnect all sources of electric power. Assume all circuits are live until they are completely de-energized, tested, and tagged. Pay particular attention to the design of the power system. Consider all sources of power, including the possibility of backfeeding.
- Always practice lock-out/tag-out procedures according to OSHA requirements.
- Carefully inspect your work area, and remove any tools and objects left inside the equipment.
- Replace all devices, doors, and covers before turning on power to this equipment.
- All instructions in this manual are written with the assumption that the customer has taken these measures before performing maintenance or testing.

Failure to follow these instructions will result in death or serious injury.

Effects of Humidity

The standard dip and baked varnish process does not support the growth of fungus. The only concern when units are stored in high humidity areas is retaining the integrity of the insulation material. If units are properly maintained and cleaned at shut down prior to long periods of de-energization there should be no issue with fungus.

Humidity conditions are unimportant as long as the transformer is energized. However, follow the precautionary steps listed below if the transformer is de-energized, is allowed to cool to ambient temperature, and will exceed a shutdown of 12 hours (especially in high humidity conditions).

1. Place small strip heaters in the bottom of the unit shortly after shutdown to maintain the temperature of the unit a few degrees above that of the outside air.
2. Inspect the unit for evidence of moisture before returning it to service.
3. Check the insulation resistance. If evidence of moisture exists, or if the insulation resistance is less than 1 megohm, dry out the transformer by placing it in an oven or by blowing heated air over it.

Enclosure Temperature

The temperature rise on the enclosure exterior for ventilated transformers should not exceed 122°F (50°C), except as indicated in UL 1561.

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SPD Location Considerations

Environment

The device is designed to operate in an ambient temperature range of -13° F to +140° F (-25° C to +60° C) with a relative humidity of 0 to 95% non-condensing. This device has a Type 4X housing.

Audible Noise

The device background noise is negligible and does not restrict the location of the installation.

Mounting

The device has been designed to be surface mounted. An additional flush mount kit is also available if required (XMFMKITCW).

Service Clearance

The service clearance should meet all applicable code requirements.

Equipment Performance

To obtain optimum surge suppression, locate the SPD as close as possible to the circuitry being surge-limited to minimize the wire length. Minimizing the wire length reduces the impedance between the circuitry and the SPD.

Refer to the Voltage Protection Rating (VPR) values on the SPD nameplate. These VPR values were obtained by testing the SPD with six-inch long leads (per UL1449). For every additional foot of wire beyond six inches, the effective VPR increases by approximately 160 volts.

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2.6 Preventive Maintenance Plan and Schedule

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30–1200 A Safety Switches Maintenance Instructions

Instrucciones de servicio de mantenimiento para los interruptores de seguridad de 30 a 1 200 A

Directives d'entretien pour interrupteurs de sécurité, 30 à 1 200 A

Retain for future use. / Conservar para uso futuro. / À conserver pour usage ultérieur.

Class
Clase
Classe
3100

INTRODUCTION

Safety switches are properly lubricated at the factory. However, periodic cleaning and lubrication may be required. The maintenance interval between lubrications depends on the amount of switch usage and the ambient operating conditions. The maximum maintenance interval should not exceed one year for mechanical or current-carrying parts.

For additional information, refer to publication NFPA-70B, "Recommended Practice for Electrical Equipment Maintenance".

Unusual Performance Conditions

Contact Square D for information regarding performance under unusual conditions. Examples of unusual conditions are shown in Table 1 below:

INTRODUCCIÓN

Los interruptores de seguridad han sido lubricados correctamente en la fábrica; sin embargo, es necesario realizar limpieza y lubricación periódicamente. El intervalo de servicio de mantenimiento entre lubricaciones depende del uso del interruptor y de las condiciones ambientales de funcionamiento. El intervalo de servicio de mantenimiento máximo no debe exceder un año para las piezas mecánicas o conductoras de corriente.

Si desea obtener información adicional, consulte la publicación NFPA-70B, "Recommended Practice for Electrical Equipment Maintenance" (prácticas recomendadas de servicio de mantenimiento para el equipo eléctrico).

Condiciones de funcionamiento poco comunes

Póngase en contacto con Square D para obtener información con respecto al funcionamiento de este equipo bajo condiciones poco comunes. La tabla 1 muestra ejemplos de condiciones poco comunes:

INTRODUCTION

Les interrupteurs de sécurité sont lubrifiés de façon appropriée à l'usine. Toutefois, un nettoyage et une lubrification périodiques peuvent être nécessaires. L'intervalle d'entretien entre les lubrifications dépend de la fréquence d'utilisation de l'interrupteur et des conditions ambiantes de fonctionnement. L'intervalle d'entretien maximum ne doit pas dépasser un an pour les pièces mécaniques ou porteuses de courant.

Pour avoir d'autres renseignements, se reporter à la publication NFPA-70B, « Recommended Practice for Electrical Equipment Maintenance » (Pratique recommandée pour l'entretien des appareils électriques).

Conditions de performance inhabituelles

Contactez Square D pour avoir des informations sur la performance dans des conditions inhabituelles. Des exemples de conditions inhabituelles sont données au tableau 1 ci-dessous :

Table / Tabla / Tableau 1 : Unusual Conditions / Condiciones poco comunes / Conditions inhabituelles

• Ambient temperatures below -22 °F (-30 °C) or above 104 °F (40 °C) /	• Temperatura ambiente inferior a -30 °C (-22 °F) o superior a 40 °C (104 °F) /	• Températures ambiantes inférieures à -30 °C (-22 °F) ou supérieures à 40 °C (104 °F)
• Altitudes over 6600 ft (2012 m) /	• Altitudes de más de 2 012 m (6 600 pies) /	• Altitudes dépassant 2 012 m (6 600 pieds)
• Corrosive or explosive environments /	• Entornos corrosivos o explosivos /	• Environnements corrosifs ou explosifs
• Abnormal vibration, shock, or tilting /	• Vibración, sacudidas o inclinaciones anormales /	• Vibrations, chocs ou inclinaison anormaux
• Unusual operating duties /	• Servicio de funcionamiento poco común /	• Facteurs de fonctionnement inhabituels

⚠ DANGER / PELIGRO / DANGER**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Never operate energized switch with door open.
- Turn off switch before removing or installing fuses or making load side connections.
- Always use a properly rated voltage sensing device at all line and load fuse clips to confirm switch is off.
- Turn off power supplying switch before doing any other work on or inside switch.
- Do not use renewable link fuses in fused switches.

Failure to follow these instructions will result in death or serious injury.

PELIGRO DE DESCARGA ELÉCTRICA, EXPLOSIÓN O DESTELLO POR ARQUEO

- Utilice equipo de protección personal (EPP) apropiado y siga las prácticas de seguridad eléctrica establecidas por su Compañía, consulte la norma 70E de NFPA.
- Solamente el personal eléctrico especializado deberá instalar y prestar servicio de mantenimiento a este equipo.
- Nunca haga funcionar el interruptor energizado con la puerta abierta.
- Desconecte el interruptor antes de retirar o instalar los fusibles o realizar las conexiones del lado de carga.
- Siempre utilice un dispositivo detector de tensión nominal adecuado en todos los clips para fusibles en los lados de línea y carga para confirmar la desenergización del interruptor.
- Desenergice el interruptor antes de realizar cualquier otro trabajo dentro o fuera de él.
- No use fusibles renovables en los interruptores fusibles.

El incumplimiento de estas instrucciones podrá causar la muerte o lesiones serias.

RISQUE D'ÉLECTROCUTION, D'EXPLOSION OU D'ÉCLAIR D'ARC

- Portez un équipement de protection personnelle (ÉPP) approprié et observez les méthodes de travail électrique sécuritaire. Voir NFPA 70E.
- Seul un personnel qualifié doit effectuer l'installation et l'entretien de cet appareil.
- Ne faites jamais fonctionner l'interrupteur sous tension avec la porte ouverte.
- Mettez l'interrupteur hors tension avant d'enlever ou d'installer des fusibles ou de faire des raccordements sur le côté charge.
- Utilisez toujours un dispositif de détection de tension ayant une valeur nominale appropriée sur tous les porte-fusibles du côté ligne et charge pour s'assurer que l'interrupteur soit hors tension.
- Coupez l'alimentation de l'interrupteur avant d'y faire tout autre travail.
- N'utilisez pas de fusibles renouvelables dans les interrupteurs à fusibles.

Si ces directives ne sont pas respectées, cela entraînera la mort ou des blessures graves.

ANNUAL MAINTENANCE PROCEDURES

1. Turn off power supplying the switch before performing any work on or inside the switch.
2. Open the switch blades by moving the operating handle to the OFF (O) position.
3. Lock out or tag the switch, per local procedures.
4. Open the enclosure door.
5. Always use a properly rated voltage sensing device at all line and load-side lugs (terminals) to confirm power is off.

NOTE: Do not remove any parts from the switch or operating mechanism unless specifically instructed to do so in the following procedures. Vacuum any loose material from inside the switch. Wipe internal parts and the inside of the enclosure with a damp, lint-free cloth.

6. Visually inspect the switch for loose parts or hardware:
 - a. Retighten the hardware as needed. Refer to the wiring diagram.
 - b. Do not re-energize the switch if any worn or damaged parts are found. Replace them before re-energizing the switch.

PROCEDIMIENTOS DE SERVICIOS DE MANTENIMIENTO ANUALES

1. Desenergice el interruptor antes de realizar cualquier trabajo dentro o fuera de él.
2. Abra las cuchillas del interruptor moviendo la palanca de funcionamiento a la posición de abierto (O).
3. Bloquee o etiquete el interruptor de acuerdo con los procedimientos locales.
4. Abra la puerta del gabinete.
5. Siempre utilice un dispositivo detector de tensión nominal adecuado en todas las zapatas (terminales) del lado de línea y carga para confirmar la desenergización del equipo.

NOTA: No retire ninguna pieza del interruptor ni del mecanismo de funcionamiento a no ser que se le indique eso específicamente en los siguientes procedimientos. aspire el material suelto que se encuentra dentro del interruptor. Limpie las piezas internas y el interior del gabinete con una tela húmeda sin pelusas.

6. Realice una inspección visual al interruptor para ver si encuentra piezas o herrajes sueltos:
 - a. Vuelva a apretar los herrajes a medida que sea necesario. Consulte el diagrama de cableado.
 - b. No vuelva a energizar el interruptor si encuentra piezas desgastadas o dañadas; sustitúyalas antes de volver a energizar el interruptor.

PROCÉDURES D'ENTRETIEN ANNUEL

1. Couper l'alimentation de l'interrupteur avant d'effectuer tout travail sur ou à l'intérieur de l'interrupteur.
2. Ouvrir les lames de l'interrupteur en plaçant la manette de fonctionnement sur la position d'ARRÊT (O).
3. Verrouiller ou étiqueter l'interrupteur, selon les procédures locales.
4. Ouvrir la porte du coffret.
5. Toujours utiliser un dispositif de détection de tension à valeur nominale appropriée sur toutes les cosses (bornes) du côté ligne et charge pour s'assurer que l'interrupteur est hors tension.

REMARQUE : Ne retirez aucune pièce de l'interrupteur ou du mécanisme de fonctionnement sauf en cas d'instruction précise de le faire dans les procédures suivantes. Évacuer à l'aspirateur tous corps étrangers se trouvant à l'intérieur de l'interrupteur. Essuyer les pièces internes et l'intérieur du coffret à l'aide d'un chiffon mouillé, non pelucheux.

6. Inspecter visuellement l'interrupteur pour voir s'il y a des pièces ou de la quincaillerie desserrée :
 - a. Resserer la quincaillerie au besoin. Se reporter au schéma de câblage.
 - b. Ne pas remettre l'interrupteur sous tension en présence de pièces usées ou abîmées. Les remplacer avant de remettre l'interrupteur sous tension.

Parts Removal

1. Remove the arc supressor(s) or arc shield(s) from the switches by loosening the fastener(s) holding the suppressor(s) / shield(s) in place. See Figures 1 and 2.

Desmontaje de piezas

1. Retire el o los supresores o protectores de arco de los interruptores aflojando los sujetadores que los sostienen en su lugar. Ve a las figuras 1 y 2.

Démontage des pièces

1. Retirer le ou les supresseurs ou blindages d'arc des interrupteurs en desserrant les attaches qui les maintiennent en place. Voir les figures 1 et 2.

CAUTION / PRECAUCIÓN / ATTENTION

HAZARD OF EQUIPMENT DAMAGE	PELIGRO DE DAÑO AL EQUIPO	RISQUE DE DOMMAGES MATÉRIELS
<p>Do not disassemble the switch line base assembly or remove the blade rotor when cleaning the line-side jaw or the switch blade. See Figure 3 on page 4.</p> <p>Failure to follow this instruction can result in equipment damage.</p>	<p>No desmonte el ensamble de la base de línea del interruptor o retire el rotor de cuchilla al limpiar la mordaza del lado de línea o la cuchilla del interruptor, vea la figura 3 en la página 4.</p> <p>El incumplimiento de esta instrucción puede causar daño al equipo.</p>	<p>Ne démontez pas l'assemblage de la base de ligne de l'interrupteur ou ne retirez pas le rotor à lame lorsque vous nettoyez la mâchoire côté ligne ou la lame de l'interrupteur. Voir la figure 3 à la page 4.</p> <p>Si cette précaution n'est pas respectée, cela peut entraîner des dommages matériels.</p>
<ol style="list-style-type: none"> 2. Remove old grease and other contaminants from the line-side jaws and switchblades with a clean, lint-free cloth. If the lubricant has dried, remove it with CRC®-type HF Contact Cleaner, or equivalent, sprayed on a cloth. 3. Relubricate the cleaned areas with a thin film of Dow Corning® BG20 grease only. <i>NOTE: Do not substitute any other lubricant. Other lubricants may not be suitable for electrical applications and could alter the performance of the switch. Dow Corning BG20 is available from Square D (part number SWLUB).</i> 4. Exercise the operating mechanism to ensure proper operation by opening and closing the switch five times with the door closed. Open the switch blades. 	<ol style="list-style-type: none"> 2. Retire la grasa vieja y otros contaminantes de la mordaza del lado de línea y cuchillas del interruptor con una tela limpia sin pelusas. Si el lubricante se ha secado, retírelo con un limpiador de contacto CRC® tipo HF o uno equivalente, rociado en un pedazo de tela. 3. Vuelva a lubricar las áreas limpiadas con una capa delgada de grasa Dow Corning® BG20 solamente. <i>NOTA: No utilice otro tipo de lubricante; es posible que no sean adecuados para aplicaciones eléctricas y pueden alterar el funcionamiento del interruptor. La grasa Dow Corning BG20 se encuentra disponible de Square D (número de pieza SWLUB).</i> 4. Realice una prueba al mecanismo de funcionamiento y asegúrese de que funciona correctamente abriendo y cerrando el interruptor cinco veces con la puerta cerrada. Abra las cuchillas del interruptor. 	<ol style="list-style-type: none"> 2. Retirer toute graisse ancienne et autres polluants des mâchoires côté ligne et des lames de l'interrupteur à l'aide d'un chiffon propre et non pelucheux. Si le lubrifiant a séché, l'enlever avec un nettoyant pour contact CRC® de type HF ou l'équivalent, vaporisé sur un chiffon. 3. Relubrifier les zones propres avec une fine pellicule de graisse Dow Corning® BG20 uniquement. <i>REMARQUE : Ne substituer aucun autre lubrifiant. D'autres lubrifiants pourraient ne pas convenir pour des applications électriques et pourraient altérer le fonctionnement de l'interrupteur. Le Dow Corning BG20 est disponible chez Square D (n° de pièce SWLUB).</i> 4. Manœuvrer le mécanisme de fonctionnement pour s'assurer qu'il fonctionne correctement, en ouvrant et fermant l'interrupteur cinq fois avec la porte fermée. Ouvrir les lames de l'interrupteur.

FIG. 1 : Examples of Arc Suppressors / Ejemplos de supresores de arco / Exemples de supresseurs d'arc



FIG. 2 : Examples of Arc Shields / Ejemplos de protectores de arco / Exemples de blindages d'arc

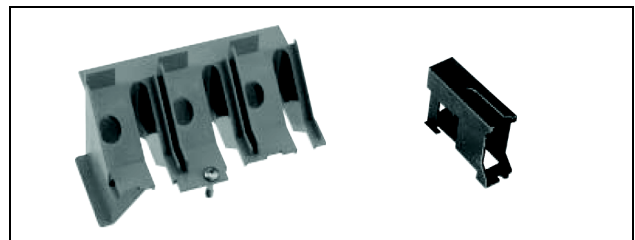


FIG. 3 : Examples of Line Base Assemblies / Ejemplos de ensamblajes de la base de línea / Exemples d'assemblages de la base de ligne

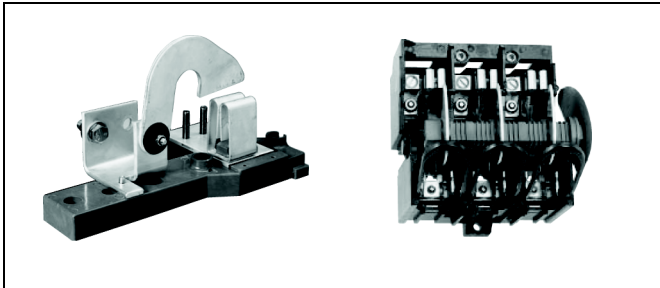
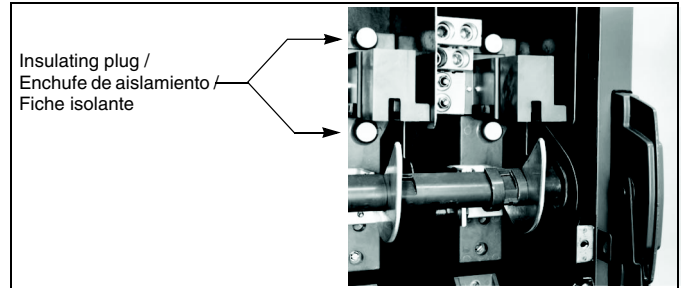


FIG. 4 : Insulating Plugs on Pole Unit / Enchufes de aislamiento en la unidad de polos / Fiches isolantes sur l'unité polaire



Parts Replacement

1. Reinstall the arc suppressor(s) or arc shield(s) according to the torque values in Table 2.
2. Ensure that the two insulating plugs in each phase (400–1200 A only) are firmly seated. See Figure 4.

Colocación de piezas

1. Vuelva a instalar el o los supresores o protectores de arco de acuerdo con los valores de par de apriete mostrados en la tabla 2.
2. Asegúrese de que los dos enchufes de aislamiento en cada fase (de 400 a 1 200 A solamente) estén bien apoyados, vea la figura 4.

Remise en place des pièces

1. Réinstaller le ou les supresseurs ou blindages d'arc conformément aux valeurs de couple indiquées au tableau 2.
2. S'assurer que les deux fiches isolantes de chaque phase (400 à 1 200 A seulement) sont bien en place. Voir la figure 4.

Table / Tabla / Tableau 2 : Arc Suppressor Screw Torque Values / Valores de par de apriete del tornillo del supresor de arco / Valeurs de couple de serrage des vis des supresseurs d'arc

Switch Type / Tipo de interruptor / Type d'interrupteur	Torque Value / Valor de par de apriete / Valeur de couple
30–100 A	5–10 lb-in / lbs-pulg / lb-po (0,57–1,13 N•m)
200 A, F Series / Serie F / Série F	10–20lb-in / lbs-pulg / lb-po (1,13–2,26 N•m)
200 A, E Series / Serie E / Série E	20–25 lb-in / lbs-pulg / lb-po (2,26–2,83 N•m)
400–800 A General Duty / 400 a 800 A de uso general / 400 à 800 A, universel	20–25 lb-in / lbs-pulg / lb-po (2,26–2,83 N•m)
400–1200 A Heavy Duty / 400 a 1 200 A de uso pesado / 400 à 1 200 A, service intensif	30–40 lb-in / lbs-pulg / lb-po (3,39–4,52 N•m)

RE-ENERGIZE THE SWITCH

1. Close and latch the door.
2. Turn off all downstream loads.
3. Turn on power supplying the switch.
4. Turn on the switch.
5. Turn on all downstream loads.

RE-ENERGIZACIÓN DEL INTERRUPTOR

1. Cierre y ponga seguro a la puerta.
2. Desconecte todas las cargas descendentes.
3. Energice el interruptor.
4. Coloque el interruptor en la posición de cerrado (I).
5. Conecte todas las cargas descendentes.

REMISE DE L'INTERRUPTEUR SOUS TENSION

1. Fermer la porte de l'interrupteur.
2. Mettre hors tension toutes les charges en aval.
3. Mettre l'interrupteur sous tension.
4. Mettre l'interrupteur en position de marche (I).
5. Mettre sous tension toutes les charges en aval.

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

Solamente el personal especializado deberá instalar, hacer funcionar y prestar servicios de mantenimiento al equipo eléctrico. Schneider Electric no asume responsabilidad alguna por las consecuencias emergentes de la utilización de este material.

Seul un personnel qualifié doit effectuer l'installation, l'utilisation, l'entretien et la maintenance du matériel électrique. Schneider Electric n'assume aucune responsabilité des conséquences éventuelles découlant de l'utilisation de cette documentation.

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Maintenance

Introduction

Safety switches are properly lubricated at the factory. However, periodic cleaning and lubrication may be required. The maintenance interval between lubrications depends on the amount of switch usage and the ambient operating conditions. The maximum maintenance interval should not exceed one year for mechanical or current-carrying parts.

For additional information, refer to publication NFPA-70B, "Standard for Electrical Equipment Maintenance".

Unusual Performance Conditions

Contact Schneider Electric for information regarding performance under unusual conditions. Examples of unusual conditions are shown in table below:

Unusual Conditions
Ambient temperatures below -22°F (-30°C) or above 104°F (40°C)
Altitudes over 6600 ft (2012 m)
Corrosive or explosive environments
Abnormal vibration, shock, or tilting
Unusual operating duties

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, CSA Z462 or NOM-029-STPS.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Never operate energized switch with door open.
- Turn off switch before removing or installing fuses or making load side connections.
- Always use a properly rated voltage sensing device at all line and load fuse clips to confirm switch is off.
- Turn off power supplying switch before doing any other work on or inside switch.
- Do not use renewable link fuses in fused switches.

Failure to follow these instructions will result in death or serious injury.

Annual Maintenance Procedures

1. Turn off power supplying the switch before performing any work on or inside the switch.
2. Open the switch blades by moving the operating handle to the OFF (O) position.
3. Lock out or tag the switch, per local procedures.
4. Open the enclosure door.
5. Always use a properly rated voltage sensing device at all line and load-side lugs (terminals) to confirm power is off.

NOTE: Do not remove any parts from the switch or operating mechanism unless specifically instructed to do so in the following procedures. Vacuum any loose material from inside the switch. Wipe internal parts and the inside of the enclosure with a damp, lint-free cloth.

6. Visually inspect the switch for loose parts or hardware:
 - a. Retighten the hardware as needed. Refer to the wiring diagram for torque values.
 - b. Do not re-energize the switch if any worn or damaged parts are found. Replace them before re-energizing the switch.

Parts Removal

1. Remove the arc suppressor(s) or arc shield(s) from the switches by loosening the fastener(s) holding the suppressor(s) / shield(s) in place. See the examples provided.
2. Remove old grease and other contaminants from the line-side jaws and switchblades with a clean, lint-free cloth. If the lubricant has dried, remove it with CRC® HF Contact Cleaner, or equivalent, sprayed on a cloth.
3. Lubricate the cleaned areas with a thin film of Dow Corning®BG20 grease only.

NOTE: Do not substitute any other lubricant. Other lubricants may not be suitable for electrical applications and could alter the performance of the switch. Dow Corning BG20 is available from Square D (part number SWLUB).
4. Exercise the operating mechanism to ensure proper operation by opening and closing the switch five times with the door closed. Open the switch blades.

⚠ CAUTION

HAZARD OF EQUIPMENT DAMAGE

Do not disassemble the switch line base assembly or remove the blade rotor when cleaning the line-side jaw or the switch blade. See Figure 4, page 26, Examples of Line Base Assemblies.

Failure to follow these instructions can result in injury or equipment damage.

Figure 2 - Example of Arc Suppressors



Figure 3 - Example of Arc Shields

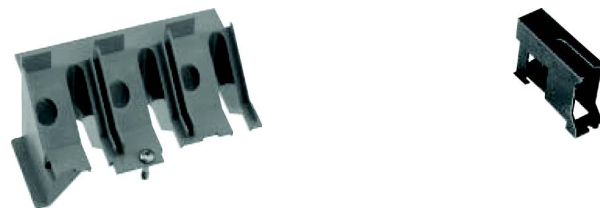
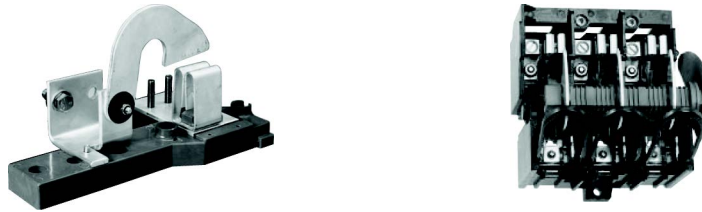
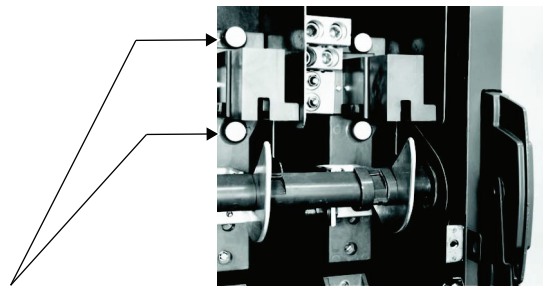


Figure 4 - Examples of Line Base Assemblies**Figure 5 - Insulating Plugs on Pole Unit**

Insulating plug

Parts Replacement

1. Reinstall the arc suppressor(s) or arc shield(s) according to the torque values in the table, page 26 below.
2. Ensure that the two insulating plugs in each phase (400–1200 A only) are firmly seated. See Figure 5.

Table 9 - Arc Suppressor Screw Torque Values

Switch Type	Torque Value
30–100 A	5–10 lb-in. (0,57–1,13 N•m)
200 A, F Series	10–20 lb-in. (1,13–2,26 N•m)
200 A, E Series	20–25 lb-in. (2,26–2,83 N•m)
400–800 A General Duty	20–25 lb-in. (2,26–2,83 N•m)
400–1200 A Heavy Duty	30–40 lb-in. (3,39–4,52 N•m)

Re-Energize the Switch

1. Close and latch the door.
2. Turn off all downstream loads.
3. Turn on power supplying the switch.
4. Turn on the switch.
5. Turn on all downstream loads.

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Section 6—Maintenance

Performing Visual and Mechanical Checks

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Only qualified personnel should clean, inspect maintain and test transformers.
- Turn off power supplying this equipment before working on it.
- Disconnect and electrically isolate power to the transformer so that no accidental contact can be made with energized parts.
- Discharge all static charges held by coils.

Failure to follow these instructions will result in death or serious injury.

1. Perform a visual inspection of the transformer and its surrounding environment.
 - a. Inspect the enclosure for any physical damage.
 - b. Repair any damage, if possible.
 - c. Provide guards to prevent future damage.
2. Record operational data while the transformer is still energized and in service.
3. De-energize the transformer prior to performing work on the unit.
 - a. Follow all safety procedures to place the unit into an electrically safe condition.
 - b. Remove the access covers. Inspect for:
 - dirt on insulating surfaces and at areas which tend to restrict air flow.
 - loose connections.
 - the condition of tap changers or terminal boards.
 - the general condition of the transformer.
4. Inspect the enclosure, transformer, terminals, terminal boards, and insulators for signs of overheating from internal or external sources. Check for voltage creepage over insulating surfaces, evident by tracing or carbonization.
5. Check for evidence of rusting, corrosion and paint deterioration. Repair any rust and corrosion where necessary.

Frequency

The frequency at which transformers should be inspected depends on operating conditions.

For clean, dry locations, annual inspections may be sufficient. However, for other locations, such as where the air is contaminated with dust or chemical fumes, an inspection at three- or six-month intervals may be required. Usually after the first few inspection periods, a definite schedule can be set up based on the transformer's existing conditions.

Severe, Environmental or Special Events

- ❑ Perform routine inspections, maintenance, and testing after any severe electrical short circuit, ground fault, or environmental event (e.g., flooding) to determine the operational status of the transformer.
- ❑ Perform the inspections, maintenance and testing if the transformer has been out of service for an extended period of time. Place strip heaters to maintain the transformer temperature above ambient to prevent condensation from forming in the transformer during extended down time.

Cleaning

Connections and Contact Surfaces

A clean contact surface area is necessary, and terminals must be clean. Where the transformers are installed indoors or outdoors or in a harsh environment, the connections must be sealed with an approved electrical joint compound.

Apply the compound to exposed connections and the surface area before making a bolted connection.

Enclosures, Windings and Insulators

1. De-energize the transformer.
2. Follow the check list below to permit free circulation of air and to guard against insulation breakdowns and thermal performance issues:
 - ❑ Clean the transformer enclosure, windings and insulators by vacuuming or by blowing clean, dry, compressed air or nitrogen. Be sure to wear appropriate personal protective equipment (PPE) when cleaning.
NOTE: Vacuuming is the preferred first step for cleaning. Compressed air should have a dew point of -50°F (-45.5°C) or less, and a pressure at or below 25 psi.
 - ❑ Clean lead supports, tap changers, terminals boards, bushings and other major insulating surfaces with lint-free rags or soft bristle brushes.
NOTE: Do not use liquids, solvents or detergents, as they may deteriorate insulating materials.
 - ❑ Carefully inspect and thoroughly clean the ventilation openings (ducts) and winding assemblies. Remove any blockages.
 - ❑ Remove any trash and/or combustible materials from the area around the unit.

Performing Electrical Testing

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Only qualified personnel should clean, inspect maintain and test transformers.
- Turn off power supplying this equipment before working on it.
- Disconnect and electrically isolate power to the transformer so that no accidental contact can be made with energized parts.
- Discharge all static charges held by coils.

Failure to follow these instructions will result in death or serious injury.

Perform the following electrical tests during maintenance:

- ❑ Check all electrical contacts with a calibrated torque wrench.
- ❑ Verify proper spacing.
- ❑ Refer to the manufacturer's specifications for torque values.
- ❑ Check all external hardware for tightness.

Contact Resistance

- ❑ Use a low resistance ohmmeter to measure contact resistance.
 - a. Compare values with similar connections looking for unusually high contact resistance points.
 - b. Investigate any connections that may deviate from common values by more than 50% of the lowest values.
- ❑ An infrared scanning device may be used to look for abnormal temperatures at transformer contacts for energized units.

NOTE: Take care to follow the manufacturer's procedures, as small errors in scanner operation can cause significant errors in detected temperatures.

Insulation Resistance

- Insulation resistance checks may create a capacitive charge on a winding.
1. Ground each winding for at least one minute between tests to drain any static charge created during the test.
 2. Perform insulation resistance tests with an appropriate device.
 3. Test from winding-to-winding and winding-to-ground.
 4. Record all test results for comparison for future readings.
 - Values are installation site dependent and not pre-set at the factory. All testing is compliant to NEMA ST-20.
 - Insulation resistance readings should be at least 1 megohm.
 - Lower readings may indicate the presence of moisture and require a drying procedure to correct.

Winding Resistance

- On larger transformers (>500 kVA):
1. Measure the winding resistances and record for future reference.
 2. Compare the results with the values obtained during the pre-commissioning checks. Readings should not vary by more than 5% with adjacent coils and the pre-commissioning checks.
 3. Record the temperature at which these initial readings were taken.
 - Values are installation site dependent and not pre-set at the factory. All testing is compliant to NEMA ST-20.
 4. Adjust the resistance values based on any differences in temperature between current readings and pre-commissioning values.

Grounding and Bonding

1. Check for proper values of resistance between the system ground lug (or point) and the transformer enclosure, core, frame and clamps.
2. Compare with pre-commissioning values, looking for trends that may indicate a compromise in the quality of the ground bond.

Turns Ratio

1. Perform a turns ratio test on all taps and on the full winding voltages for each phase. Significant changes may indicate a loss of winding continuity.
 - a. Compare these values with those obtained during the pre-commissioning checks. Voltages between phases should not deviate by more than 0.5% from adjacent coils.
 - b. Investigate abnormal readings found outside of this limit.
2. Verify input and output voltages are correct for the tap and output voltages expected. Investigate abnormal readings.

Sound Isolation Pads

Inspect the sound isolation pads for signs of physical deterioration.

Coil Cooling Ducts

1. Inspect all coil cooling ducts for any accumulation of dust, dirt or other obstructions.
2. Follow standard cleaning procedures to ensure proper air flow.

Terminals

Ensure terminals are in good working condition for the proper operation of transformers.

- ❑ Inspect terminals for alignment, tightness (see torque requirements), pressure, burns or corrosion. Investigate and correct any signs of damage.
- ❑ Repair minor pitting, as long as the plating on the terminal has not been compromised.

Preventive Maintenance

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.
- This equipment must be effectively grounded per all applicable codes. Use an equipment-grounding conductor to connect this equipment to the power system ground.

Failure to follow these instructions will result in death or serious injury.

Inspect the SPD periodically to maintain system performance and continued transient voltage surge suppression. During this inspection, check the state of the display LED status indicators.

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2.7 Troubleshooting Guides and Diagnostic Techniques

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Maintenance

Introduction

Safety switches are properly lubricated at the factory. However, periodic cleaning and lubrication may be required. The maintenance interval between lubrications depends on the amount of switch usage and the ambient operating conditions. The maximum maintenance interval should not exceed one year for mechanical or current-carrying parts.

For additional information, refer to publication NFPA-70B, "Standard for Electrical Equipment Maintenance".

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Contact Schneider Electric for information regarding performance under unusual conditions. Examples of unusual conditions are shown in table below:

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- Never operate energized switch with door open.
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- Do not use renewable link fuses in fused switches.

Failure to follow these instructions will result in death or serious injury.

Annual Maintenance Procedures

1. Turn off power supplying the switch before performing any work on or inside the switch.
2. Open the switch blades by moving the operating handle to the OFF (O) position.
3. Lock out or tag the switch, per local procedures.
4. Open the enclosure door.
5. Always use a properly rated voltage sensing device at all line and load-side lugs (terminals) to confirm power is off.

NOTE: Do not remove any parts from the switch or operating mechanism unless specifically instructed to do so in the following procedures. Vacuum any loose material from inside the switch. Wipe internal parts and the inside of the enclosure with a damp, lint-free cloth.

6. Visually inspect the switch for loose parts or hardware:
 - a. Retighten the hardware as needed. Refer to the wiring diagram for torque values.
 - b. Do not re-energize the switch if any worn or damaged parts are found. Replace them before re-energizing the switch.

Parts Removal

1. Remove the arc suppressor(s) or arc shield(s) from the switches by loosening the fastener(s) holding the suppressor(s) / shield(s) in place. See the examples provided.
2. Remove old grease and other contaminants from the line-side jaws and switchblades with a clean, lint-free cloth. If the lubricant has dried, remove it with CRC® HF Contact Cleaner, or equivalent, sprayed on a cloth.
3. Lubricate the cleaned areas with a thin film of Dow Corning®BG20 grease only.

NOTE: Do not substitute any other lubricant. Other lubricants may not be suitable for electrical applications and could alter the performance of the switch. Dow Corning BG20 is available from Square D (part number SWLUB).
4. Exercise the operating mechanism to ensure proper operation by opening and closing the switch five times with the door closed. Open the switch blades.

⚠ CAUTION

HAZARD OF EQUIPMENT DAMAGE

Do not disassemble the switch line base assembly or remove the blade rotor when cleaning the line-side jaw or the switch blade. See Figure 4, page 26, Examples of Line Base Assemblies.

Failure to follow these instructions can result in injury or equipment damage.

Figure 2 - Example of Arc Suppressors



Figure 3 - Example of Arc Shields

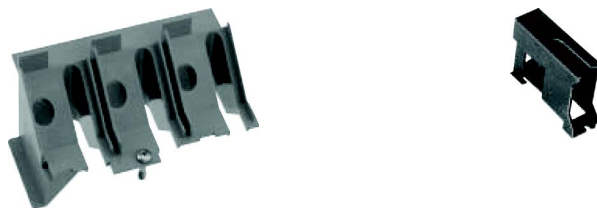
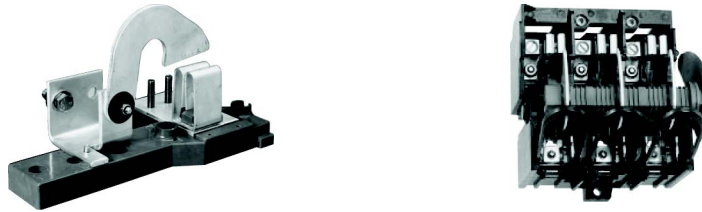
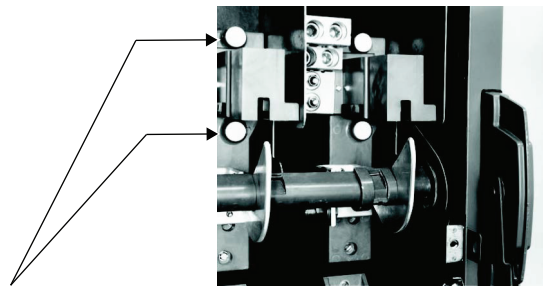


Figure 4 - Examples of Line Base Assemblies**Figure 5 - Insulating Plugs on Pole Unit**

Insulating plug

Parts Replacement

1. Reinstall the arc suppressor(s) or arc shield(s) according to the torque values in the table, page 26 below.
2. Ensure that the two insulating plugs in each phase (400–1200 A only) are firmly seated. See Figure 5.

Table 9 - Arc Suppressor Screw Torque Values

Switch Type	Torque Value
30–100 A	5–10 lb-in. (0,57–1,13 N•m)
200 A, F Series	10–20 lb-in. (1,13–2,26 N•m)
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400–800 A General Duty	20–25 lb-in. (2,26–2,83 N•m)
400–1200 A Heavy Duty	30–40 lb-in. (3,39–4,52 N•m)

Re-Energize the Switch

1. Close and latch the door.
2. Turn off all downstream loads.
3. Turn on power supplying the switch.
4. Turn on the switch.
5. Turn on all downstream loads.

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Energizing the Transformer

1. Follow all safety precautions and requirements for PPE as outlined in NFPA 70E and any other applicable standards and/or codes.
 - a. Immediately de-energize the transformer if there is any indication of arcing (visual or audible) at any time during the initial start-up.
 - b. Investigate and correct the cause of the arcing before re-energizing the unit.
2. Investigate and correct sources of excessive noise. When energized, the transformer will make some audible noise. Excessive mechanical noise, hums or rattles may be an indication of improperly installed or tightened hardware or enclosure parts.
3. Measure and verify the primary and secondary phase-to-phase and phase-to-ground voltages for all windings.
 - a. Where applicable, measure and verify phase-to-neutral voltages, as well.
 - b. Record and save the values for future reference.

NOTE: Phase-to-phase, phase-to-ground and phase-to-neutral measurements will verify that the transformer is functioning per the nameplate voltages.

- c. Measure phase-to-ground voltages.
- d. Record and save the values for future reference.

NOTE: Phase-to-ground voltages will verify that the unit has been installed correctly.

4. Move one tap at a time, or verify that the jumper lands per the wiring diagram as shown on the nameplate. See Figure 31 on page 29.
NOTE: Do not change taps while the transformer is energized.
 - a. Adjust the transformer taps as necessary to match the actual voltage requirements.
 - b. Ensure taps are cleaned of varnish or other insulating material.
5. Perform a phase rotation check with an appropriate device for loads that are phase sensitive (e.g., certain motor or drive applications).
 - a. Follow the manufacturer's instructions for the device.
 - b. Correct phase rotation errors before energizing the transformer.

Section 6—Maintenance

Performing Visual and Mechanical Checks

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

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- Disconnect and electrically isolate power to the transformer so that no accidental contact can be made with energized parts.
- Discharge all static charges held by coils.

Failure to follow these instructions will result in death or serious injury.

1. Perform a visual inspection of the transformer and its surrounding environment.
 - a. Inspect the enclosure for any physical damage.
 - b. Repair any damage, if possible.
 - c. Provide guards to prevent future damage.
2. Record operational data while the transformer is still energized and in service.
3. De-energize the transformer prior to performing work on the unit.
 - a. Follow all safety procedures to place the unit into an electrically safe condition.
 - b. Remove the access covers. Inspect for:
 - dirt on insulating surfaces and at areas which tend to restrict air flow.
 - loose connections.
 - the condition of tap changers or terminal boards.
 - the general condition of the transformer.
4. Inspect the enclosure, transformer, terminals, terminal boards, and insulators for signs of overheating from internal or external sources. Check for voltage creepage over insulating surfaces, evident by tracing or carbonization.
5. Check for evidence of rusting, corrosion and paint deterioration. Repair any rust and corrosion where necessary.

Frequency

The frequency at which transformers should be inspected depends on operating conditions.

For clean, dry locations, annual inspections may be sufficient. However, for other locations, such as where the air is contaminated with dust or chemical fumes, an inspection at three- or six-month intervals may be required. Usually after the first few inspection periods, a definite schedule can be set up based on the transformer's existing conditions.

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- ❑ Perform routine inspections, maintenance, and testing after any severe electrical short circuit, ground fault, or environmental event (e.g., flooding) to determine the operational status of the transformer.
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Cleaning

Connections and Contact Surfaces

A clean contact surface area is necessary, and terminals must be clean. Where the transformers are installed indoors or outdoors or in a harsh environment, the connections must be sealed with an approved electrical joint compound.

Apply the compound to exposed connections and the surface area before making a bolted connection.

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 - ❑ Clean the transformer enclosure, windings and insulators by vacuuming or by blowing clean, dry, compressed air or nitrogen. Be sure to wear appropriate personal protective equipment (PPE) when cleaning.
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NOTE: Do not use liquids, solvents or detergents, as they may deteriorate insulating materials.
 - ❑ Carefully inspect and thoroughly clean the ventilation openings (ducts) and winding assemblies. Remove any blockages.
 - ❑ Remove any trash and/or combustible materials from the area around the unit.

Performing Electrical Testing

⚠ DANGER

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- ❑ Check all electrical contacts with a calibrated torque wrench.
- ❑ Verify proper spacing.
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- ❑ Check all external hardware for tightness.

Contact Resistance

- ❑ Use a low resistance ohmmeter to measure contact resistance.
 - a. Compare values with similar connections looking for unusually high contact resistance points.
 - b. Investigate any connections that may deviate from common values by more than 50% of the lowest values.
- ❑ An infrared scanning device may be used to look for abnormal temperatures at transformer contacts for energized units.

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 2. Perform insulation resistance tests with an appropriate device.
 3. Test from winding-to-winding and winding-to-ground.
 4. Record all test results for comparison for future readings.
 - Values are installation site dependent and not pre-set at the factory. All testing is compliant to NEMA ST-20.
 - Insulation resistance readings should be at least 1 megohm.
 - Lower readings may indicate the presence of moisture and require a drying procedure to correct.

Winding Resistance

- On larger transformers (>500 kVA):
1. Measure the winding resistances and record for future reference.
 2. Compare the results with the values obtained during the pre-commissioning checks. Readings should not vary by more than 5% with adjacent coils and the pre-commissioning checks.
 3. Record the temperature at which these initial readings were taken.
 - Values are installation site dependent and not pre-set at the factory. All testing is compliant to NEMA ST-20.
 4. Adjust the resistance values based on any differences in temperature between current readings and pre-commissioning values.

Grounding and Bonding

1. Check for proper values of resistance between the system ground lug (or point) and the transformer enclosure, core, frame and clamps.
2. Compare with pre-commissioning values, looking for trends that may indicate a compromise in the quality of the ground bond.

Turns Ratio

1. Perform a turns ratio test on all taps and on the full winding voltages for each phase. Significant changes may indicate a loss of winding continuity.
 - a. Compare these values with those obtained during the pre-commissioning checks. Voltages between phases should not deviate by more than 0.5% from adjacent coils.
 - b. Investigate abnormal readings found outside of this limit.
2. Verify input and output voltages are correct for the tap and output voltages expected. Investigate abnormal readings.

Sound Isolation Pads

Inspect the sound isolation pads for signs of physical deterioration.

Coil Cooling Ducts

1. Inspect all coil cooling ducts for any accumulation of dust, dirt or other obstructions.
2. Follow standard cleaning procedures to ensure proper air flow.

Terminals

Ensure terminals are in good working condition for the proper operation of transformers.

- ❑ Inspect terminals for alignment, tightness (see torque requirements), pressure, burns or corrosion. Investigate and correct any signs of damage.
- ❑ Repair minor pitting, as long as the plating on the terminal has not been compromised.

Operation

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.
- This equipment must be effectively grounded per all applicable codes. Use an equipment-grounding conductor to connect this equipment to the power system ground.

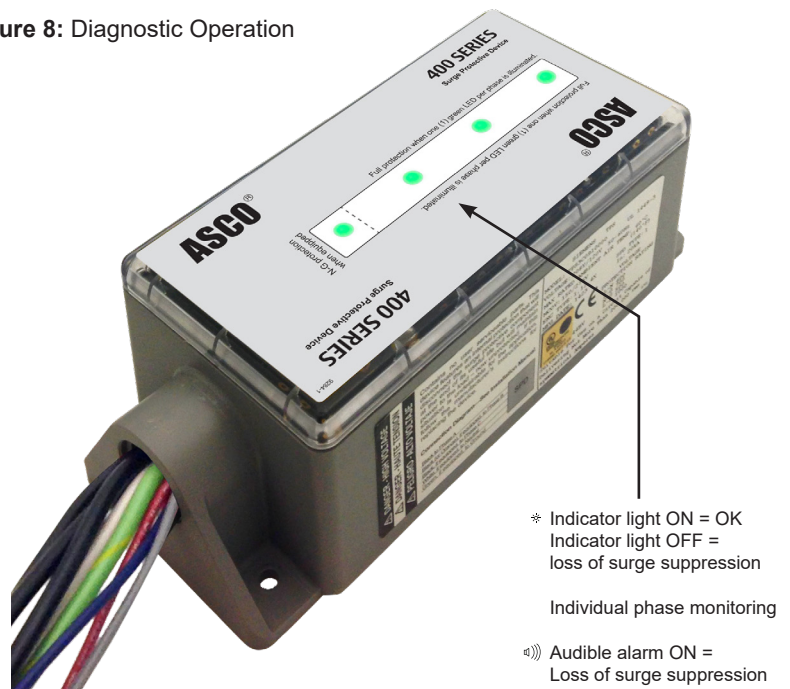
Failure to follow these instructions will result in death or serious injury.

LED Status Indicators

Diagnostic LEDs are located on the front of the ASCO 425 SPD device. They operate as follows:

- Verify that all phase voltages are present. If the LED is not illuminated, the device may not be installed correctly. Check the power supply and service voltage. Upon energizing the SPD, check the LED status. If all of the LEDs are illuminated, surge suppression is operating.
- If one or more LEDs are not illuminated, there is a loss of surge suppression on that phase.
- If an inoperative condition occurs the device must be replaced by qualified electrical personnel.

Figure 8: Diagnostic Operation



Dry Contacts

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Use 600 Vac rated dry contact wiring.
- Dry contact wiring must have less than 1/16 in. (1.6mm) exposed wire from the dry contact block.
- Do not supply more than 24 Vdc / 24 Vac and no more than a current of 2 A.

Failure to follow these instructions will result in death or serious injury

The ASCO 425 series SPD device is provided with dry contacts. These dry contact leads can be used for remote indication of the SPD operating status to a computer interface board or emergency management system. Also, these dry contact leads are designed to work with the SPD remote monitor option described in the following section.

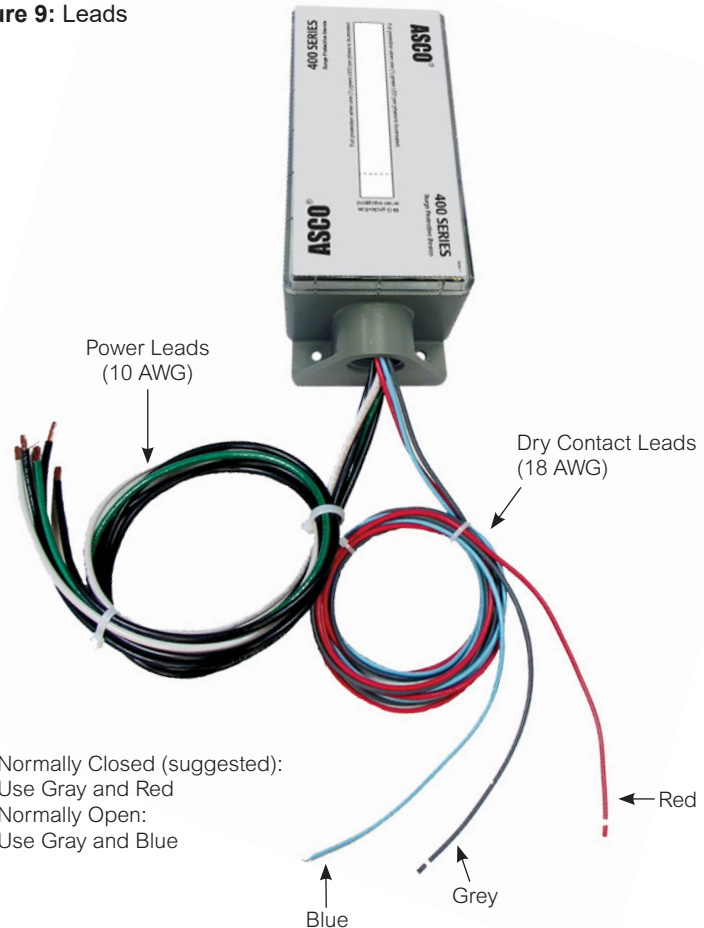
The dry contacts are designed for a maximum voltage of 24 V dc / 24 V ac and a maximum current of 2 A. Higher energy applications may require additional relay implementation outside the SPD. Damage to the SPD's relay caused by use with energy levels in excess of those discussed in this instruction bulletin is not covered by warranty. For application questions, call the Surge Technical Assistance Group at (800) 237-4567 or email customercare@ascopower.com

Connecting Form C Dry Contact & Audible Alarm

Three 3 ft. (.91 m) 18 AWG wires are included through the nipple. See Figure 9. Gray is Common, Blue is Normally Open and Red is Normally Closed when energized in its expected installation. (When not energized, the SPD is no longer in its 'Normal' state and contacts will be reversed.)

If the dry contacts are not utilized, insulate lead ends, coil and secure. Audible Alarm will still function correctly.

Figure 9: Leads



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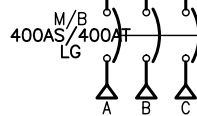


2.8 Wiring and Control Diagrams

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REV	DESCRIPTION	BY	DATE				
-	----	--	---/---/---	-	----	--	---/---/---

CKT NO	ACCESSORIES	TYPE	RATING AMP/P	S/N	S/N	RATING AMP/P	TYPE	ACCESSORIES	CKT NO
1									2
3		EDB	90/3			80/3	EDB		4
5									6
7									8
9		EDB	60/3			60/3	EDB		10
11									12
13									14
15		EDB	50/3			30/3	EDB		16
17									18
19									20
21		EDB	30/3			30/3	EDB		22
23									24
25									26
27		EDB	30/3			30/3	EDB		28
29									30
31	PREPARED SPACE	EDB	20/1			20/1	EDB	PREPARED SPACE	32
33	PREPARED SPACE	EDB	20/1			20/1	EDB	PREPARED SPACE	34
35	PREPARED SPACE	EDB	20/1			20/1	EDB	PREPARED SPACE	36
37	PREPARED SPACE	EDB	20/1			20/1	EDB	PREPARED SPACE	38
39	PREPARED SPACE	EDB	20/1			20/1	EDB	PREPARED SPACE	40
41	PREPARED SPACE	EDB	20/1			20/1	EDB	PREPARED SPACE	42



PHYSICAL DATA

ENCLOSURE Type 1
 Surface - Hinged
 FRONT CAT#: NC74VS3PNFHR
 BOX CAT#: MH74D9

DIMENSIONS:
 74"(1880mm)Hx20"(508mm)Wx8.75"(222mm)D

WIRE BENDING SPACE:
 TOP - 18.25"(464)mm
 BOTTOM - 14"(356)mm
 SIDE - 4.1"(105)mm

PBA: 559HR

BUSSING: 400A RATED COPPER BUS
 Silver/Tin Plated

OPTIONAL FEATURES:
 Copper GROUND BAR
 COPPER SOLID NEUTRAL

ELECTRICAL DATA

SYSTEM: 480Y/277V 3Ph 4W 60Hz
 System Ampacity: 400A
 18kA SYMS. SCCR

MAIN: MAIN BREAKER LG 400AS/400AT
 ACC: STD LSI
 Bottom FEED
 35kA AIR
 INCOMING CONDUCTORS(S) PER NEC, CEC, NOM:
 Wire Bending Space:
 Phase Lugs:1 - (2) 2/0 - 500 kcmil

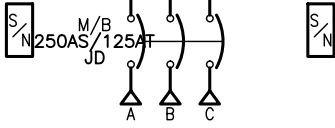
-----BRANCH SUMMATION-----

1 - 90A/3P EDB	2 - 60A/3P EDB
1 - 50A/3P EDB	5 - 30A/3P EDB
12 - 20A/1P-PS EDB	1 - 80A/3P EDB

JOB NAME: Building 431 Bremerton	EQUIPMENT DESIGNATION: D-22-C-Z1
JOB LOCATION:	EQUIPMENT TYPE: NF (Circuit Breaker Type) PANEL 1 OF 1
DRAWN BY: (Q2C)	DRAWING TYPE: ONE LINE DIAGRAM
ENGR:	SQUARE D by Schneider Electric
DATE: August 01 2022	
DRAWING STATUS: QUOTE	DWG# 0Q-3491691-98704499-01 PG 1 OF 1 REV -

REV	DESCRIPTION	BY	DATE				
-	----	--	---/---/---	-	-----	--	---/---/---

CKT NO	ACCESSORIES	TYPE	RATING AMP/P		RATING AMP/P	TYPE	ACCESSORIES	CKT NO	
1									
3		QOB	30/3		20/3	QOB			2
5									4
7									6
9		QOB	20/3		20/3	QOB			8
11									10
13									12
15		QOB	20/3		30/1	QOB			14
17					30/1	QOB			16
19		QOB	20/1		20/1	QOB			18
21		QOB	20/1		20/1	QOB			20
23		QOB	20/1		20/1	QOB			22
25		QOB	20/1		20/1	QOB			24
27		QOB	20/1		20/1	QOB			26
29		QOB	20/1		20/1	QOB			28
31		QOB	20/1		20/1	QOB			30
33		QOB	20/1		20/1	QOB	PREPARED SPACE		32
35	PREPARED SPACE	QOB	20/1		20/1	QOB	PREPARED SPACE		34
37	PREPARED SPACE	QOB	20/1		20/1	QOB	PREPARED SPACE		36
39	PREPARED SPACE	QOB	20/1		20/1	QOB	PREPARED SPACE		38
41	PREPARED SPACE	QOB	20/1		20/1	QOB	PREPARED SPACE		40
									42



PHYSICAL DATA

ENCLOSURE Type 1
 Surface - Hinged
 FRONT CAT#: NC50SHR
 BOX CAT#: MH50BE

DIMENSIONS:
 50"(1270mm)Hx20"(508mm)Wx5.75"(146mm)D

WIRE BENDING SPACE:
 TOP - 5"(127)mm
 BOTTOM - 12.05"(307)mm
 SIDE - 6.13"(156)mm

PBA: 707HR

BUSSING: 225A RATED COPPER BUS
 Silver/Tin Plated

OPTIONAL FEATURES:
 Copper GROUND BAR
 BLANK ENDWALLS
 COPPER SOLID NEUTRAL

ELECTRICAL DATA

SYSTEM: 208Y/120V 3Ph 4W 60Hz
 System Ampacity: 225A
 10kA SYMS. SCCR

MAIN: MAIN BREAKER JD 250AS/125AT
 ACC: STD LSI
 Bottom FEED
 25kA AIR
 INCOMING CONDUCTORS(S) PER NEC, CEC, NOM:
 Wire Bending Space:
 Phase Lugs:1 - #4 - 4/0 AWG

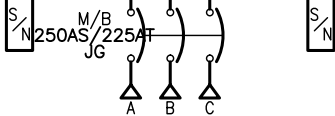
-----BRANCH SUMMATION-----

1 - 30A/3P QOB	4 - 20A/3P QOB
16 - 20A/1P QOB	9 - 20A/1P-PS QOB
2 - 30A/1P QOB	

JOB NAME: Building 431 Bremerton	EQUIPMENT DESIGNATION: D-22-R-Z1
JOB LOCATION:	EQUIPMENT TYPE: NQ (Circuit Breaker Type) PANEL 1 OF 1
DRAWN BY: (Q2C)	DRAWING TYPE: ONE LINE DIAGRAM
ENGR:	
DATE: August 01 2022	
DRAWING STATUS: QUOTE	DWG# 0Q-3491691-98706428-01 PG 1 OF 1 REV -

REV	DESCRIPTION	BY	DATE				
-	----	--	---/---/---	-	-----	--	---/---/---

CKT NO	ACCESSORIES	TYPE	RATING AMP/P		RATING AMP/P	TYPE	ACCESSORIES	CKT NO
1								2
3		EGB	60/3		30/3	EGB		4
5								6
7								8
9		EGB	30/3		30/3	EGB		10
11								12
13		EGB	20/1		20/1	EGB		14
15		EGB	20/1		20/1	EGB		16
17		EGB	20/1		20/1	EGB		18
19		EGB	20/1		20/1	EGB		20
21		EGB	20/1		20/1	EGB	PREPARED SPACE	22
23	PREPARED SPACE	EGB	20/1		20/1	EGB	PREPARED SPACE	24
25	PREPARED SPACE	EGB	20/1		20/1	EGB	PREPARED SPACE	26
27	PREPARED SPACE	EGB	20/1		20/1	EGB	PREPARED SPACE	28
29	PREPARED SPACE	EGB	20/1		20/1	EGB	PREPARED SPACE	30
31	PREPARED SPACE	EGB	20/1		20/1	EGB	PREPARED SPACE	32
33	PREPARED SPACE	EGB	20/1		20/1	EGB	PREPARED SPACE	34
35	PREPARED SPACE	EGB	20/1		20/1	EGB	PREPARED SPACE	36
37	PREPARED SPACE	EGB	20/1		20/1	EGB	PREPARED SPACE	38
39	PREPARED SPACE	EGB	20/1		20/1	EGB	PREPARED SPACE	40
41	PREPARED SPACE	EGB	20/1		20/1	EGB	PREPARED SPACE	42



PHYSICAL DATA

ENCLOSURE Type 1
 Surface - Hinged
 FRONT CAT#: NC56SHR
 BOX CAT#: MH56BE

DIMENSIONS:
 56"(1422mm)Hx20"(508mm)Wx5.75"(146mm)D

WIRE BENDING SPACE:
 TOP - 5"(127)mm
 BOTTOM - 12.75"(324)mm
 SIDE - 4.1"(105)mm

PBA: 553HR

BUSSING: COPPER BUS
 Silver/Tin Plated

OPTIONAL FEATURES:
 Copper GROUND BAR
 BLANK ENDWALLS
 COPPER SOLID NEUTRAL

ELECTRICAL DATA

SYSTEM: 480Y/277V 3Ph 4W 60Hz
 System Ampacity: 250A
 35kA SYMS. SCCR

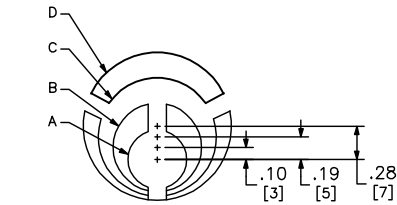
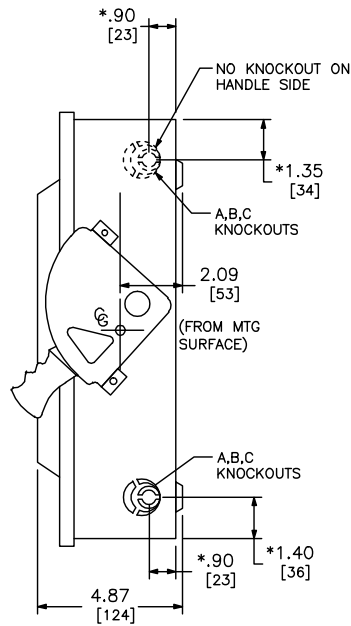
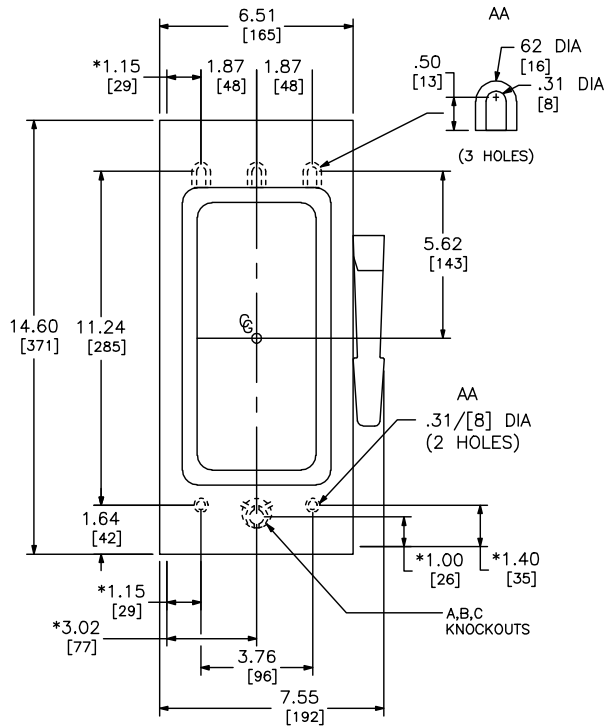
MAIN: MAIN BREAKER JG 250AS/225AT
 ACC: STD LSI
 Bottom FEED
 35kA AIR
 INCOMING CONDUCTORS(S) PER NEC, CEC, NOM:
 Wire Bending Space:
 Phase Lugs:1 - 3/0 - 350 kcmil

-----BRANCH SUMMATION-----

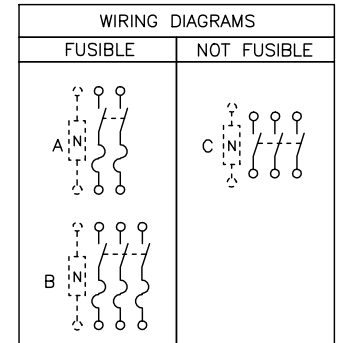
1 - 60A/3P EGB	3 - 30A/3P EGB
9 - 20A/1P EGB	21 - 20A/1P-PS EGB

JOB NAME: Building 431 Bremerton	EQUIPMENT DESIGNATION: C-15-C
JOB LOCATION:	EQUIPMENT TYPE: NF (Circuit Breaker Type) PANEL 1 OF 1
DRAWN BY: (Q2C)	DRAWING TYPE: ONE LINE DIAGRAM
ENGR:	 <small>by Schneider Electric</small>
DATE: August 01 2022	
DRAWING STATUS: QUOTE	DWG# 0Q-3491691-98707150-01 PG 1 OF 1 REV -

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TANGENT KNOCKOUT
(DIMENSION ON DRAWING TO CENTERLINE OF "A" KNOCKOUT)



TERMINAL LUGS			
AMPERES	MAX WIRE	MIN WIRE	TYPE
30	#6 AWG	#14 AWG	AL OR CU

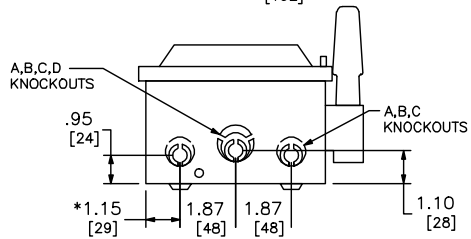
KNOCKOUTS				
SYMBOL	CONDUIT SIZE		DIAMETER	
	IN	MM	IN	MM
A	.50	13	.88	22
B	.75	19	1.13	29
C	1.00	25	1.38	35
D	1.25	32	1.75	44

NEMA TYPE 1

SEISMIC NOTES:
USE (4) 1/4" DIA GRADE 5 STEEL MOUNTING BOLTS @ HOLES AA
MAX CONFIGURED WEIGHT 10 LB FOR THE PURPOSE OF DETERMINING
SEISMIC ANCHORAGE REQUIREMENTS. FOR ALL OTHER APPLICATIONS,
CONTACT SQUARE D COMPANY.

*DIMENSIONS TO BOX (NOT COVER)

DUAL DIMENSIONS: INCHES
MILLIMETERS



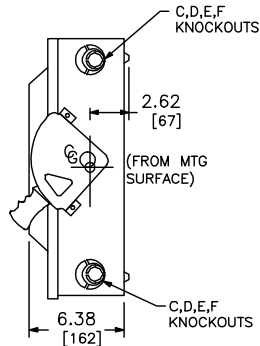
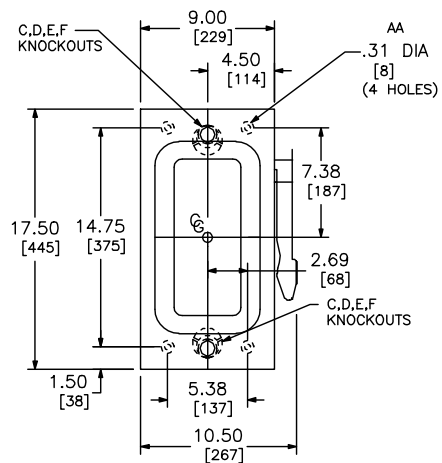
CATALOG NUMBER	VOLTAGE RATINGS	AMPERAGE RATINGS	WIRING DIAG	HORSEPOWER RATINGS													
				240VAC				480VAC				600VAC				250 VDC	600 VDC
				STD		MAX		STD		MAX		STD		MAX			
				1#	3#	1#	3#	1#	3#	1#	3#	1#	3#	1#	3#	STD	MAX
H221N	240VAC,250VDC	30	A	1 1/2	3	3	7 1/2								5		
H321N	240VAC,250VDC	30	D	1 1/2	3	3	7 1/2								5		
H361	600VAC,600VDC	30	B					3	5	7 1/2	15		7 1/2		5	10	15
H361N	600VAC,600VDC	30	B	-	-	-	-	3	5	7 1/2	15	-	7 1/2	-	5	10	15
HU361	600VAC,600VDC	30	C							7 1/2	20		10	30	5	10	15
HU361E	600VAC,600VDC	30	C							7 1/2	20		10	30	5	10	15

- NOTES:
UL LISTED - E2875
FINISH - GRAY BAKED ENAMEL
ALL NEUTRALS - INSULATED
▲ USE BOTH OUTER SWITCHING POLES
● USE BOTH SWITCHING POLES
■ IF CORNER GROUNDED DELTA, INSTALL NEUTRAL AND USE OUTER SWITCHING POLES FOR UNGROUNDED CONDUCTORS.
± FOR CORNER GROUNDED DELTA ONLY, USE OUTER SWITCHING POLES FOR UNGROUNDED CONDUCTORS.

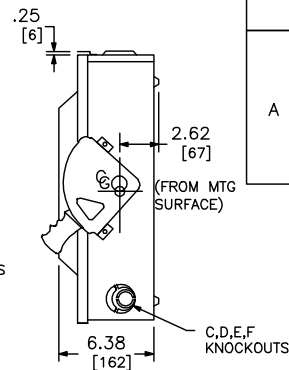
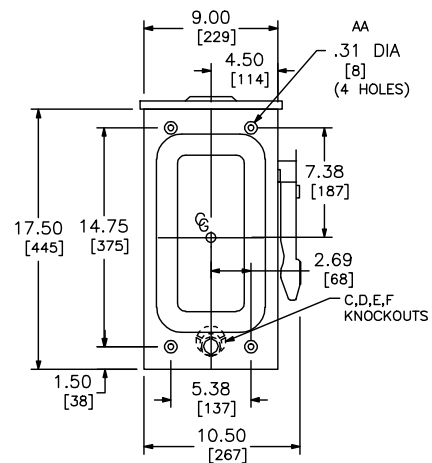
HEAVY DUTY SAFETY SWITCHES - SEISMIC
VISIBLE BLADE TYPE
30 AMPERE
ENCLOSURE - NEMA TYPE 1 GENERAL PURPOSE



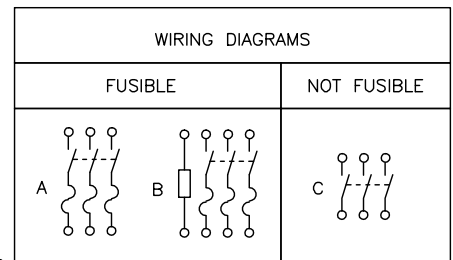
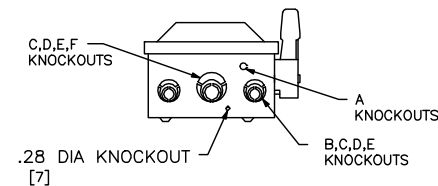
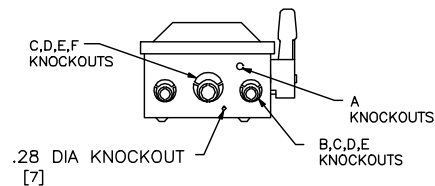
DWG# 2228S
NO.



NEMA TYPE 1



NEMA TYPE 3R▲



TERMINAL LUGS ‡			
AMPERES	MAX. WIRE	MIN. WIRE	TYPE
60	# 2 AWG	# 12 AWG	AL
	# 2 AWG	# 14 AWG	CU

KNOCKOUTS				
SYMBOL	CONDUIT SIZE		DIAMETER	
	IN	MM	IN	MM
A	.50	13	.88	22
B	.75	19	1.13	29
C	1.00	25	1.38	35
D	1.25	32	1.75	45
E	1.50	38	2.00	51
F	2.00	51	2.50	64

DUAL DIMENSIONS: INCHES
MILLIMETERS

CATALOG NUMBER	VOLTAGE RATINGS	WIRING DIAG	HORSEPOWER RATINGS						250 VDC	600 VDC	
			250VAC		480VAC		600VAC				
			STD	MAX	STD	MAX	STD	MAX			
H362	600VAC;600VDC	A	-	-	15	30	15	30	50	30	
H362RB	600VAC;600VDC	A	-	-	15	30	15	30	50	30	
H362N	600VAC;600VDC	B	-	-	15	30	15	30	50	-	
H362NRD	600VAC;600VDC	B	-	-	15	30	15	30	50	-	
HU362	600VAC;600VDC	C	-	10	20	20	50	25	60	10	30
HU362RB	600VAC;600VDC	C	-	10	20	20	50	25	60	10	30

SEISMIC NOTES:
USE (4) 1/4" DIA GRADE 5 STEEL MOUNTING BOLTS @ HOLES AA
MAX CONFIGURED WEIGHT 20 LB FOR THE PURPOSE OF DETERMINING
SEISMIC ANCHORAGE REQUIREMENTS. FOR ALL OTHER APPLICATIONS,
CONTACT SQUARE D COMPANY.

NOTES:
FINISH - GRAY BAKED ENAMEL.
UL LISTED - FILE E-2875
ALL NEUTRALS - INSULATED GROUNDABLE
SUITABLE FOR USE AS SERVICE EQUIPMENT
SHORT CIRCUIT CURRENT RATINGS:

10,000 AMPERES WITH CLASS H OR K FUSES
200,000 AMPERES WITH CLASS R FUSES HAVING CLASS R REJECTION KITS OR CLASS J FUSES.
WHEN MOUNTING THESE SWITCHES, ALLOW 4.00/[102] MIN. CLEARANCE
BETWEEN ENCLOSURES FOR OPENING OF SIDE HINGED DOOR.

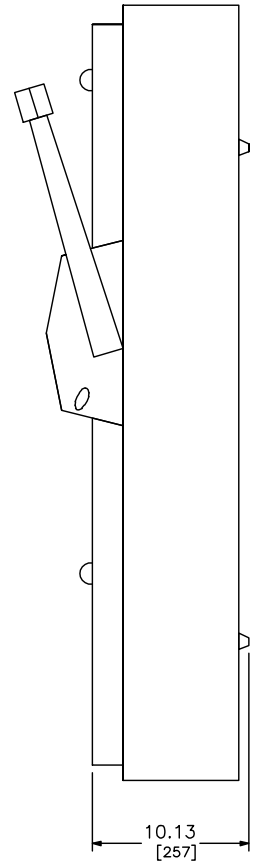
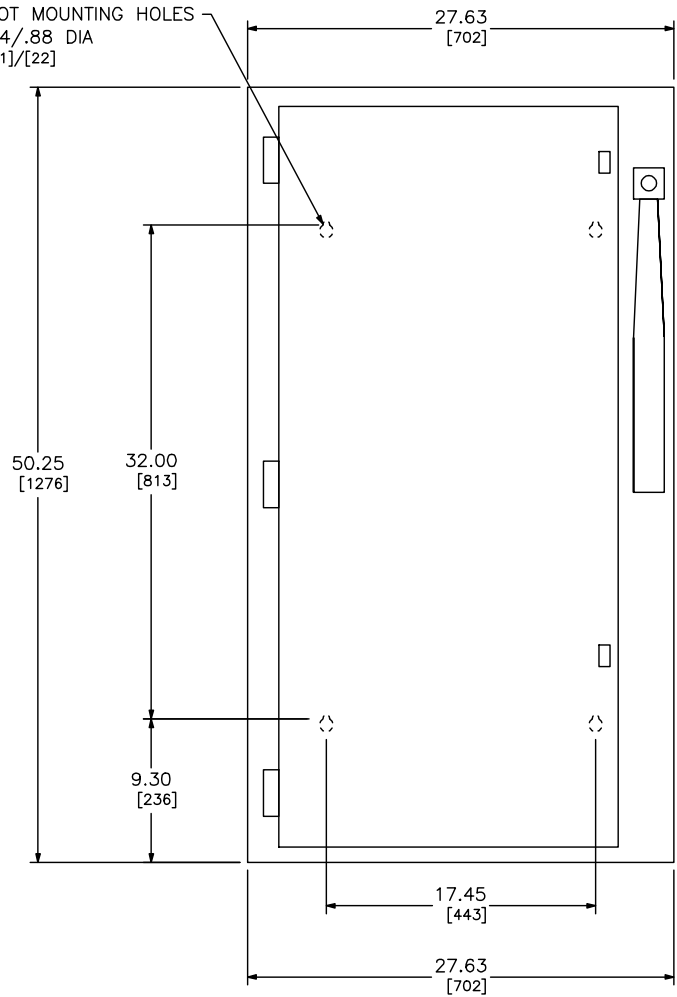
▲ NEMA TYPR 3R SWITCHES HAVE PROVISIONS FOR MAXIMUM 2.50/[64] BOLT-ON B-HUB.
‡ LUGS SUITABLE FOR 60°C OR 75°C COPPER OR ALUMINUM CONDUCTORS.

HEAVY DUTY SAFETY SWITCHES - SEISMIC
VISIBLE BLADE TYPE
60 AMPERE
ENCLOSURE - NEMA TYPE 1 GENERAL PURPOSE
NEMA TYPE 3R RAINPROOF



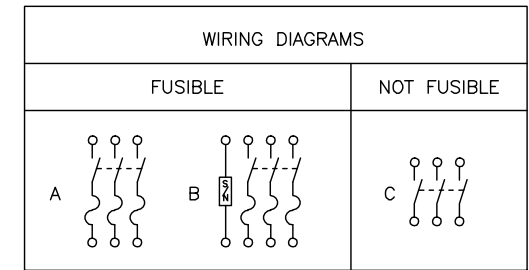
DWG# 1897S
NO.

KEYSLOT MOUNTING HOLES
(4) .44/.88 DIA
[111]/[222]



NEMA TYPE 1
NO KNOCKOUTS

NOTES:
FINISH - GRAY BAKED ENAMEL
UL LISTED - FILE E-154828
ALL NEUTRALS - INSULATED GROUNDABLE
SUITABLE FOR USE AS SERVICE EQUIPMENT
SHORT CIRCUIT CURRENT RATINGS:
10,000 AMPERES WHEN USED WITH OR PROTECTED BY CLASS H OR K FUSES.
200,000 AMPERES WHEN USED WITH OR PROTECTED BY CLASS R FUSES HAVING
CLASS R REJECTION KITS INSTALLED OR CLASS J FUSES.



NOTE: FOR SWITCHING DC USE TWO OUTSIDE POLES.

TERMINAL LUGS DATA			
AMPERES	MAX WIRE	MIN WIRE	TYPE
400	(1) 750 KCMIL OR	(1) #1/0 AWG OR	AL OR CU
	(2) 300 KCMIL	(2) #1/0 AWG	

DUAL DIMENSIONS: INCHES
MILLIMETERS

CATALOG NUMBER	MAX VOLTAGE RATINGS	WIRING DIAG	HORSEPOWER RATINGS							
			240VAC		480VAC		600VAC		250 VDC	600 VDC
			MAX	STD	MAX	STD	MAX	STD	MAX	MAX
H365	600VAC;600VDC	A	-	100	250	125	350	50	50	
H365N	600VAC;600VDC	B	-	100	250	125	350	50	50	
HU365	600VAC;600VDC	C	125	-	250	-	350	50	50	

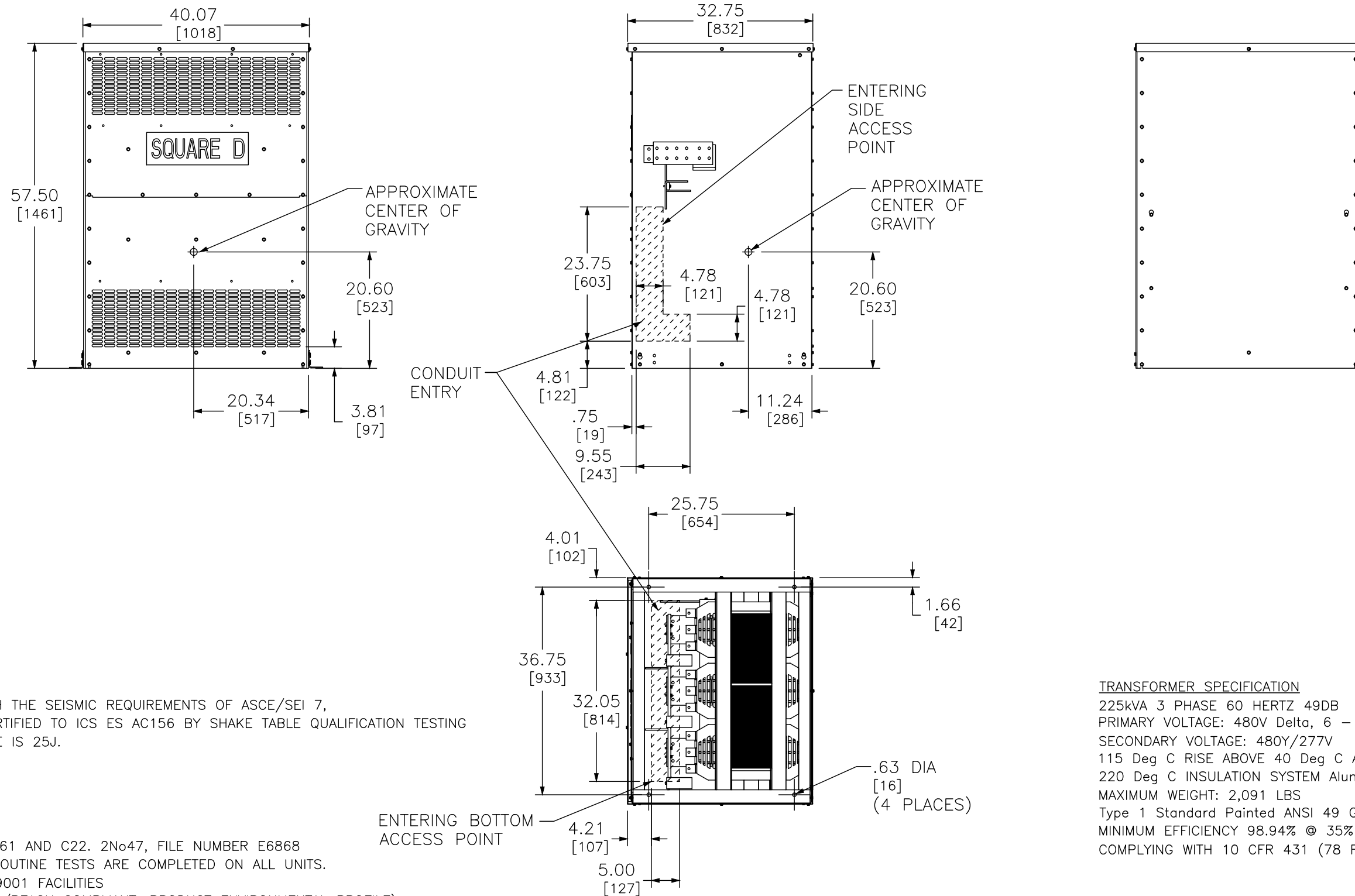
HEAVY DUTY SAFETY SWITCHES
VISIBLE BLADE TYPE
400 AMPERE
ENCLOSURE - NEMA TYPE 1 GENERAL PURPOSE



DWG# 1922
NO.

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REV	DESCRIPTION	BY	DATE						
-	----	--	--/--/--	-	----	--	--/--/--	-	----



SEISMIC QUALIFICATION

TO BE COMPLIANT WITH THE SEISMIC REQUIREMENTS OF ASCE/SEI 7, THIS UNIT IS SELF CERTIFIED TO ICS ES AC156 BY SHAKE TABLE QUALIFICATION TESTING THE ENCLOSURE ABOVE IS 25J.

NOTES:

- cULus LISTED TO UL1561 AND C22. 2No47, FILE NUMBER E6868
- NEMA ST-20 (2014) ROUTINE TESTS ARE COMPLETED ON ALL UNITS.
- MANUFACTURED IN ISO9001 FACILITIES
- GREEN PREMIUM (RoHS/REACH COMPLIANT, PRODUCT ENVIRONMENTAL PROFILE)
- REGISTERED TO DOE VIA 10 CFR 429 & NRCAN
- MINIMUM SIDE AND REAR CLEARANCE 1/2 INCH PER UL1561 ALCOVE TESTING.
- FRONT ACCESS MUST COMPLY WITH NEC WORK SPACE REQUIREMENTS.
- WIRE ACCESS SHOWN SHADED ABOVE. LOCATIONS ARE FRONT SIDES AND FRONT BOTTOM.

TRANSFORMER SPECIFICATION

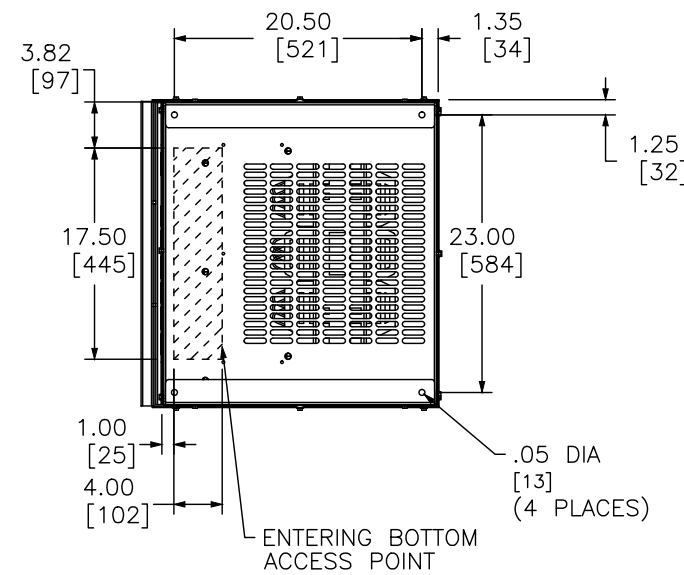
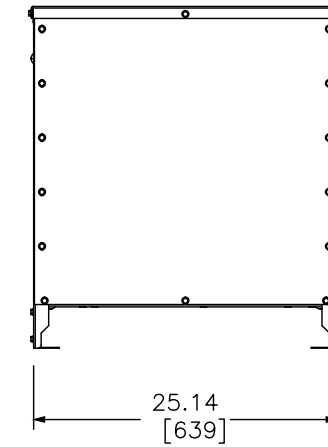
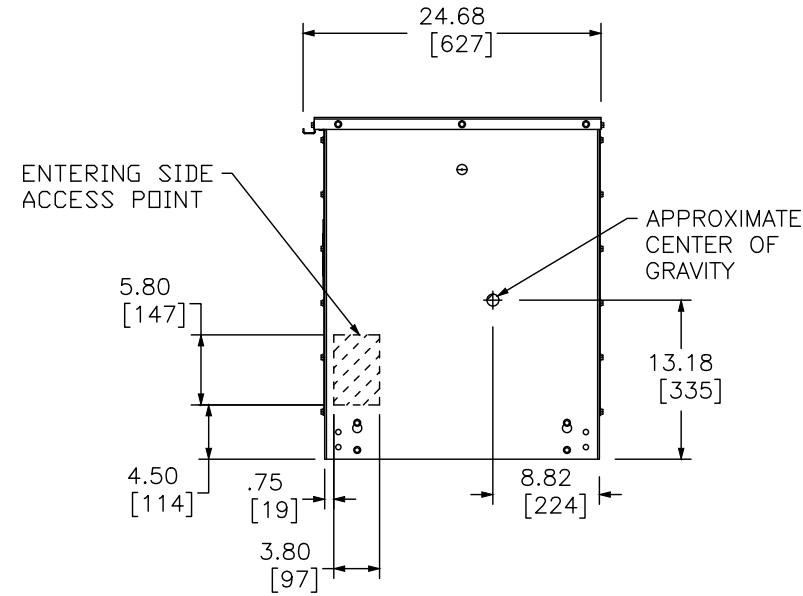
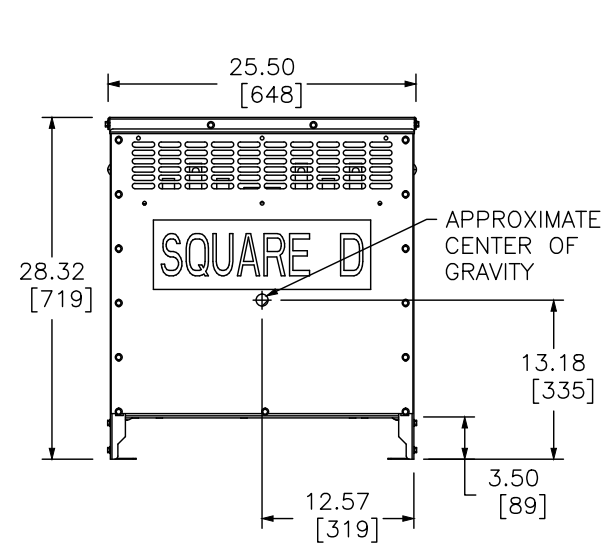
225kVA 3 PHASE 60 HERTZ 49DB
 PRIMARY VOLTAGE: 480V Delta, 6 - 2.5% 2+4- Taps
 SECONDARY VOLTAGE: 480Y/277V
 115 Deg C RISE ABOVE 40 Deg C AMBIENT
 220 Deg C INSULATION SYSTEM Aluminum WINDING
 MAXIMUM WEIGHT: 2,091 LBS
 Type 1 Standard Painted ANSI 49 Grey
 MINIMUM EFFICIENCY 98.94% @ 35% LOADING 75 Deg C
 COMPLYING WITH 10 CFR 431 (78 FR 23335-APRIL 18, 2013)

EX225T1814HF

DUAL DIMENSIONS: INCHES
MILLIMETERS

JOB NAME: Building 431 Bremerton	EQUIPMENT DESIGNATION: T225
JOB LOCATION:	EQUIPMENT TYPE: LV DISTRIBUTION TRANSFORMER
DRAWN BY: (Q2C)	DRAWING TYPE: ELEVATION VIEW
ENGR:	SQUARE D by Schneider Electric
DATE: August 01 2022	
DRAWING STATUS: QUOTE	NOT FOR CONSTRUCTION
DWG# FQ-3491691-98725830-01	PG 1 OF 1 REV -

REV	DESCRIPTION	BY	DATE						
-	----	--	--/--/--	-	----	--	--/--/--	-	----



SEISMIC QUALIFICATION

TO BE COMPLIANT WITH THE SEISMIC REQUIREMENTS OF ASCE/SEI 7, THIS UNIT IS SELF CERTIFIED TO ICS ES AC156 BY SHAKE TABLE QUALIFICATION TESTING THE ENCLOSURE ABOVE IS 18M.

NOTES:

cULus LISTED TO UL1561 AND C22. 2No47, FILE NUMBER E6868
 NEMA ST-20 (2014) ROUTINE TESTS ARE COMPLETED ON ALL UNITS.
 MANUFACTURED IN ISO9001 FACILITIES
 GREEN PREMIUM (RoHS/REACH COMPLIANT, PRODUCT ENVIRONMENTAL PROFILE)
 REGISTERED TO DOE VIA 10 CFR 429 & NRCAN
 MINIMUM SIDE AND REAR CLEARANCE 1/2 INCH PER UL1561 ALCOVE TESTING.
 FRONT ACCESS MUST COMPLY WITH NEC WORK SPACE REQUIREMENTS.
 WIRE ACCESS SHOWN SHADED ABOVE. LOCATIONS ARE FRONT SIDES AND FRONT BOTTOM.

TRANSFORMER SPECIFICATION

30kVA 3 PHASE 60 HERTZ 39DB
 PRIMARY VOLTAGE: 480V Delta, 6 - 2.5% 2+4- Taps
 SECONDARY VOLTAGE: 208Y/120V
 115 Deg C RISE ABOVE 40 Deg C AMBIENT
 220 Deg C INSULATION SYSTEM Aluminum WINDING
 MAXIMUM WEIGHT: 324 LBS
 Type 2 Standard Painted ANSI 49 Grey
 MINIMUM EFFICIENCY 98.23% @ 35% LOADING 75 Deg C
 COMPLYING WITH 10 CFR 431 (78 FR 23335-APRIL 18, 2013)

DUAL DIMENSIONS: INCHES
 MILLIMETERS

EXN30T3HF


JOB NAME: Building 431 Bremerton	EQUIPMENT DESIGNATION: T30
JOB LOCATION:	EQUIPMENT TYPE: LV DISTRIBUTION TRANSFORMER
DRAWN BY: (Q2C)	DRAWING TYPE: ELEVATION VIEW
ENGR:	 by Schneider Electric
DATE: August 01 2022	
DRAWING STATUS: QUOTE	NOT FOR CONSTRUCTION
DWG# FQ-3491691-98726199-01	PG 1 OF 1 REV -

Figure 4: Typical panel Installation

(Type 1 or individual equipment installations may vary)

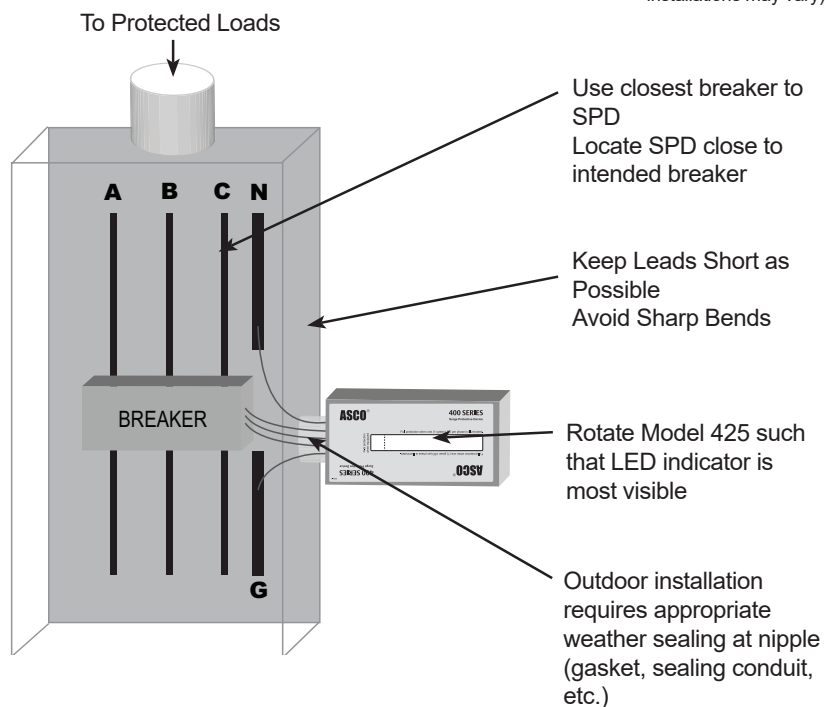
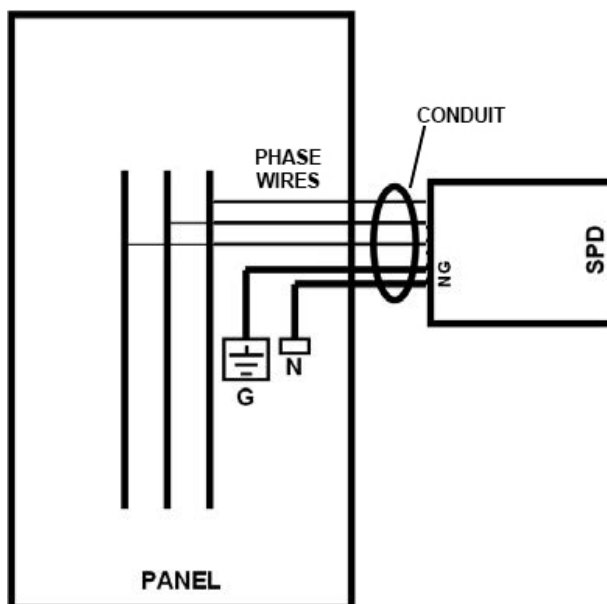


Figure 5: Parallel Wiring Diagram



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2.9 Maintenance and Repair Procedures

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30–1200 A Safety Switches Maintenance Instructions

Instrucciones de servicio de mantenimiento para los interruptores de seguridad de 30 a 1 200 A

Directives d'entretien pour interrupteurs de sécurité, 30 à 1 200 A

Retain for future use. / Conservar para uso futuro. / À conserver pour usage ultérieur.

Class
Clase
Classe
3100

INTRODUCTION

Safety switches are properly lubricated at the factory. However, periodic cleaning and lubrication may be required. The maintenance interval between lubrications depends on the amount of switch usage and the ambient operating conditions. The maximum maintenance interval should not exceed one year for mechanical or current-carrying parts.

For additional information, refer to publication NFPA-70B, "Recommended Practice for Electrical Equipment Maintenance".

Unusual Performance Conditions

Contact Square D for information regarding performance under unusual conditions. Examples of unusual conditions are shown in Table 1 below:

INTRODUCCIÓN

Los interruptores de seguridad han sido lubricados correctamente en la fábrica; sin embargo, es necesario realizar limpieza y lubricación periódicamente. El intervalo de servicio de mantenimiento entre lubricaciones depende del uso del interruptor y de las condiciones ambientales de funcionamiento. El intervalo de servicio de mantenimiento máximo no debe exceder un año para las piezas mecánicas o conductoras de corriente.

Si desea obtener información adicional, consulte la publicación NFPA-70B, "Recommended Practice for Electrical Equipment Maintenance" (prácticas recomendadas de servicio de mantenimiento para el equipo eléctrico).

Condiciones de funcionamiento poco comunes

Póngase en contacto con Square D para obtener información con respecto al funcionamiento de este equipo bajo condiciones poco comunes. La tabla 1 muestra ejemplos de condiciones poco comunes:

INTRODUCTION

Les interrupteurs de sécurité sont lubrifiés de façon appropriée à l'usine. Toutefois, un nettoyage et une lubrification périodiques peuvent être nécessaires. L'intervalle d'entretien entre les lubrifications dépend de la fréquence d'utilisation de l'interrupteur et des conditions ambiantes de fonctionnement. L'intervalle d'entretien maximum ne doit pas dépasser un an pour les pièces mécaniques ou porteuses de courant.

Pour avoir d'autres renseignements, se reporter à la publication NFPA-70B, « Recommended Practice for Electrical Equipment Maintenance » (Pratique recommandée pour l'entretien des appareils électriques).

Conditions de performance inhabituelles

Contactez Square D pour avoir des informations sur la performance dans des conditions inhabituelles. Des exemples de conditions inhabituelles sont données au tableau 1 ci-dessous :

Table / Tabla / Tableau 1 : Unusual Conditions / Condiciones poco comunes / Conditions inhabituelles

• Ambient temperatures below -22 °F (-30 °C) or above 104 °F (40 °C) /	• Temperatura ambiente inferior a -30 °C (-22 °F) o superior a 40 °C (104 °F) /	• Températures ambiantes inférieures à -30 °C (-22 °F) ou supérieures à 40 °C (104 °F)
• Altitudes over 6600 ft (2012 m) /	• Altitudes de más de 2 012 m (6 600 pies) /	• Altitudes dépassant 2 012 m (6 600 pieds)
• Corrosive or explosive environments /	• Entornos corrosivos o explosivos /	• Environnements corrosifs ou explosifs
• Abnormal vibration, shock, or tilting /	• Vibración, sacudidas o inclinaciones anormales /	• Vibrations, chocs ou inclinaison anormaux
• Unusual operating duties /	• Servicio de funcionamiento poco común /	• Facteurs de fonctionnement inhabituels

⚠ DANGER / PELIGRO / DANGER**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Never operate energized switch with door open.
- Turn off switch before removing or installing fuses or making load side connections.
- Always use a properly rated voltage sensing device at all line and load fuse clips to confirm switch is off.
- Turn off power supplying switch before doing any other work on or inside switch.
- Do not use renewable link fuses in fused switches.

Failure to follow these instructions will result in death or serious injury.

PELIGRO DE DESCARGA ELÉCTRICA, EXPLOSIÓN O DESTELLO POR ARQUEO

- Utilice equipo de protección personal (EPP) apropiado y siga las prácticas de seguridad eléctrica establecidas por su Compañía, consulte la norma 70E de NFPA.
- Solamente el personal eléctrico especializado deberá instalar y prestar servicio de mantenimiento a este equipo.
- Nunca haga funcionar el interruptor energizado con la puerta abierta.
- Desconecte el interruptor antes de retirar o instalar los fusibles o realizar las conexiones del lado de carga.
- Siempre utilice un dispositivo detector de tensión nominal adecuado en todos los clips para fusibles en los lados de línea y carga para confirmar la desenergización del interruptor.
- Desenergice el interruptor antes de realizar cualquier otro trabajo dentro o fuera de él.
- No use fusibles renovables en los interruptores fusibles.

El incumplimiento de estas instrucciones podrá causar la muerte o lesiones serias.

RISQUE D'ÉLECTROCUTION, D'EXPLOSION OU D'ÉCLAIR D'ARC

- Portez un équipement de protection personnelle (ÉPP) approprié et observez les méthodes de travail électrique sécuritaire. Voir NFPA 70E.
- Seul un personnel qualifié doit effectuer l'installation et l'entretien de cet appareil.
- Ne faites jamais fonctionner l'interrupteur sous tension avec la porte ouverte.
- Mettez l'interrupteur hors tension avant d'enlever ou d'installer des fusibles ou de faire des raccordements sur le côté charge.
- Utilisez toujours un dispositif de détection de tension ayant une valeur nominale appropriée sur tous les porte-fusibles du côté ligne et charge pour s'assurer que l'interrupteur soit hors tension.
- Coupez l'alimentation de l'interrupteur avant d'y faire tout autre travail.
- N'utilisez pas de fusibles renouvelables dans les interrupteurs à fusibles.

Si ces directives ne sont pas respectées, cela entraînera la mort ou des blessures graves.

ANNUAL MAINTENANCE PROCEDURES

1. Turn off power supplying the switch before performing any work on or inside the switch.
2. Open the switch blades by moving the operating handle to the OFF (O) position.
3. Lock out or tag the switch, per local procedures.
4. Open the enclosure door.
5. Always use a properly rated voltage sensing device at all line and load-side lugs (terminals) to confirm power is off.

NOTE: Do not remove any parts from the switch or operating mechanism unless specifically instructed to do so in the following procedures. Vacuum any loose material from inside the switch. Wipe internal parts and the inside of the enclosure with a damp, lint-free cloth.

6. Visually inspect the switch for loose parts or hardware:
 - a. Retighten the hardware as needed. Refer to the wiring diagram.
 - b. Do not re-energize the switch if any worn or damaged parts are found. Replace them before re-energizing the switch.

PROCEDIMIENTOS DE SERVICIOS DE MANTENIMIENTO ANUALES

1. Desenergice el interruptor antes de realizar cualquier trabajo dentro o fuera de él.
2. Abra las cuchillas del interruptor moviendo la palanca de funcionamiento a la posición de abierto (O).
3. Bloquee o etiquete el interruptor de acuerdo con los procedimientos locales.
4. Abra la puerta del gabinete.
5. Siempre utilice un dispositivo detector de tensión nominal adecuado en todas las zapatas (terminales) del lado de línea y carga para confirmar la desenergización del equipo.

NOTA: No retire ninguna pieza del interruptor ni del mecanismo de funcionamiento a no ser que se le indique eso específicamente en los siguientes procedimientos. aspire el material suelto que se encuentra dentro del interruptor. Limpie las piezas internas y el interior del gabinete con una tela húmeda sin pelusas.

6. Realice una inspección visual al interruptor para ver si encuentra piezas o herrajes sueltos:
 - a. Vuelva a apretar los herrajes a medida que sea necesario. Consulte el diagrama de cableado.
 - b. No vuelva a energizar el interruptor si encuentra piezas desgastadas o dañadas; sustitúyalas antes de volver a energizar el interruptor.

PROCÉDURES D'ENTRETIEN ANNUEL

1. Couper l'alimentation de l'interrupteur avant d'effectuer tout travail sur ou à l'intérieur de l'interrupteur.
2. Ouvrir les lames de l'interrupteur en plaçant la manette de fonctionnement sur la position d'ARRÊT (O).
3. Verrouiller ou étiqueter l'interrupteur, selon les procédures locales.
4. Ouvrir la porte du coffret.
5. Toujours utiliser un dispositif de détection de tension à valeur nominale appropriée sur toutes les cosses (bornes) du côté ligne et charge pour s'assurer que l'interrupteur est hors tension.

REMARQUE : Ne retirez aucune pièce de l'interrupteur ou du mécanisme de fonctionnement sauf en cas d'instruction précise de le faire dans les procédures suivantes. Évacuer à l'aspirateur tous corps étrangers se trouvant à l'intérieur de l'interrupteur. Essuyer les pièces internes et l'intérieur du coffret à l'aide d'un chiffon mouillé, non pelucheux.

6. Inspecter visuellement l'interrupteur pour voir s'il y a des pièces ou de la quincaillerie desserrée :
 - a. Resserrer la quincaillerie au besoin. Se reporter au schéma de câblage.
 - b. Ne pas remettre l'interrupteur sous tension en présence de pièces usées ou abîmées. Les remplacer avant de remettre l'interrupteur sous tension.

Parts Removal

1. Remove the arc supressor(s) or arc shield(s) from the switches by loosening the fastener(s) holding the suppressor(s) / shield(s) in place. See Figures 1 and 2.

Desmontaje de piezas

1. Retire el o los supresores o protectores de arco de los interruptores aflojando los sujetadores que los sostienen en su lugar. Ve a las figuras 1 y 2.

Démontage des pièces

1. Retirer le ou les supresseurs ou blindages d'arc des interrupteurs en desserrant les attaches qui les maintiennent en place. Voir les figures 1 et 2.

CAUTION / PRECAUCIÓN / ATTENTION

HAZARD OF EQUIPMENT DAMAGE	PELIGRO DE DAÑO AL EQUIPO	RISQUE DE DOMMAGES MATÉRIELS
<p>Do not disassemble the switch line base assembly or remove the blade rotor when cleaning the line-side jaw or the switch blade. See Figure 3 on page 4.</p> <p>Failure to follow this instruction can result in equipment damage.</p>	<p>No desmonte el ensamble de la base de línea del interruptor o retire el rotor de cuchilla al limpiar la mordaza del lado de línea o la cuchilla del interruptor, vea la figura 3 en la página 4.</p> <p>El incumplimiento de esta instrucción puede causar daño al equipo.</p>	<p>Ne démontez pas l'assemblage de la base de ligne de l'interrupteur ou ne retirez pas le rotor à lame lorsque vous nettoyez la mâchoire côté ligne ou la lame de l'interrupteur. Voir la figure 3 à la page 4.</p> <p>Si cette précaution n'est pas respectée, cela peut entraîner des dommages matériels.</p>
<ol style="list-style-type: none"> 2. Remove old grease and other contaminants from the line-side jaws and switchblades with a clean, lint-free cloth. If the lubricant has dried, remove it with CRC®-type HF Contact Cleaner, or equivalent, sprayed on a cloth. 3. Relubricate the cleaned areas with a thin film of Dow Corning® BG20 grease only. <i>NOTE: Do not substitute any other lubricant. Other lubricants may not be suitable for electrical applications and could alter the performance of the switch. Dow Corning BG20 is available from Square D (part number SWLUB).</i> 4. Exercise the operating mechanism to ensure proper operation by opening and closing the switch five times with the door closed. Open the switch blades. 	<ol style="list-style-type: none"> 2. Retire la grasa vieja y otros contaminantes de la mordaza del lado de línea y cuchillas del interruptor con una tela limpia sin pelusas. Si el lubricante se ha secado, retírelo con un limpiador de contacto CRC® tipo HF o uno equivalente, rociado en un pedazo de tela. 3. Vuelva a lubricar las áreas limpiadas con una capa delgada de grasa Dow Corning® BG20 solamente. <i>NOTA: No utilice otro tipo de lubricante; es posible que no sean adecuados para aplicaciones eléctricas y pueden alterar el funcionamiento del interruptor. La grasa Dow Corning BG20 se encuentra disponible de Square D (número de pieza SWLUB).</i> 4. Realice una prueba al mecanismo de funcionamiento y asegúrese de que funciona correctamente abriendo y cerrando el interruptor cinco veces con la puerta cerrada. Abra las cuchillas del interruptor. 	<ol style="list-style-type: none"> 2. Retirer toute graisse ancienne et autres polluants des mâchoires côté ligne et des lames de l'interrupteur à l'aide d'un chiffon propre et non pelucheux. Si le lubrifiant a séché, l'enlever avec un nettoyant pour contact CRC® de type HF ou l'équivalent, vaporisé sur un chiffon. 3. Relubrifier les zones propres avec une fine pellicule de graisse Dow Corning® BG20 uniquement. <i>REMARQUE : Ne substituer aucun autre lubrifiant. D'autres lubrifiants pourraient ne pas convenir pour des applications électriques et pourraient altérer le fonctionnement de l'interrupteur. Le Dow Corning BG20 est disponible chez Square D (n° de pièce SWLUB).</i> 4. Manœuvrer le mécanisme de fonctionnement pour s'assurer qu'il fonctionne correctement, en ouvrant et fermant l'interrupteur cinq fois avec la porte fermée. Ouvrir les lames de l'interrupteur.

FIG. 1 : Examples of Arc Suppressors / Ejemplos de supresores de arco / Exemples de supresseurs d'arc



FIG. 2 : Examples of Arc Shields / Ejemplos de protectores de arco / Exemples de blindages d'arc

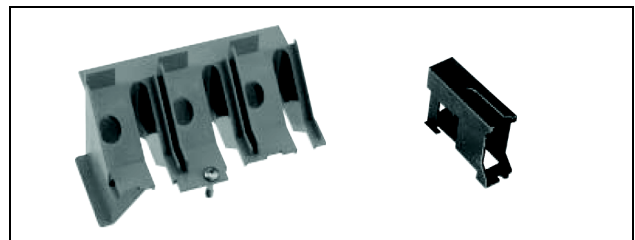


FIG. 3 : Examples of Line Base Assemblies / Ejemplos de ensambles de la base de línea / Exemples d'assemblages de la base de ligne

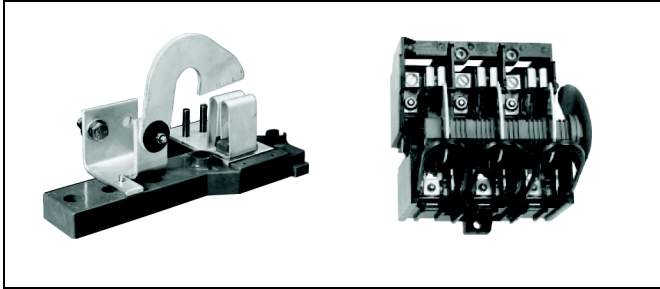
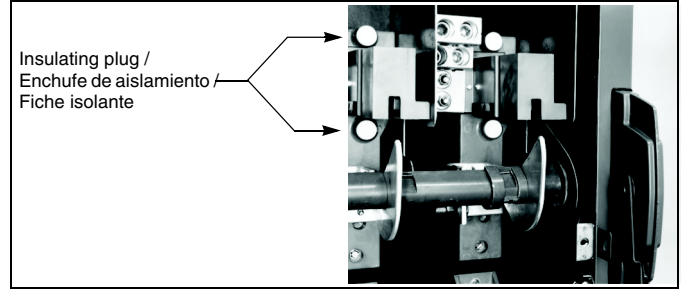


FIG. 4 : Insulating Plugs on Pole Unit / Enchufes de aislamiento en la unidad de polos / Fiches isolantes sur l'unité polaire



Parts Replacement

1. Reinstall the arc suppressor(s) or arc shield(s) according to the torque values in Table 2.
2. Ensure that the two insulating plugs in each phase (400–1200 A only) are firmly seated. See Figure 4.

Colocación de piezas

1. Vuelva a instalar el o los supresores o protectores de arco de acuerdo con los valores de par de apriete mostrados en la tabla 2.
2. Asegúrese de que los dos enchufes de aislamiento en cada fase (de 400 a 1 200 A solamente) estén bien apoyados, vea la figura 4.

Remise en place des pièces

1. Réinstaller le ou les supresseurs ou blindages d'arc conformément aux valeurs de couple indiquées au tableau 2.
2. S'assurer que les deux fiches isolantes de chaque phase (400 à 1 200 A seulement) sont bien en place. Voir la figure 4.

Table / Tabla / Tableau 2 : Arc Suppressor Screw Torque Values / Valores de par de apriete del tornillo del supresor de arco / Valeurs de couple de serrage des vis des supresseurs d'arc

Switch Type / Tipo de interruptor / Type d'interrupteur	Torque Value / Valor de par de apriete / Valeur de couple
30–100 A	5–10 lb-in / lbs-pulg / lb-po (0,57–1,13 N•m)
200 A, F Series / Serie F / Série F	10–20lb-in / lbs-pulg / lb-po (1,13–2,26 N•m)
200 A, E Series / Serie E / Série E	20–25 lb-in / lbs-pulg / lb-po (2,26–2,83 N•m)
400–800 A General Duty / 400 a 800 A de uso general / 400 à 800 A, universel	20–25 lb-in / lbs-pulg / lb-po (2,26–2,83 N•m)
400–1200 A Heavy Duty / 400 a 1 200 A de uso pesado / 400 à 1 200 A, service intensif	30–40 lb-in / lbs-pulg / lb-po (3,39–4,52 N•m)

RE-ENERGIZE THE SWITCH

1. Close and latch the door.
2. Turn off all downstream loads.
3. Turn on power supplying the switch.
4. Turn on the switch.
5. Turn on all downstream loads.

RE-ENERGIZACIÓN DEL INTERRUPTOR

1. Cierre y ponga seguro a la puerta.
2. Desconecte todas las cargas descendentes.
3. Energice el interruptor.
4. Coloque el interruptor en la posición de cerrado (I).
5. Conecte todas las cargas descendentes.

REMISE DE L'INTERRUPTEUR SOUS TENSION

1. Fermer la porte de l'interrupteur.
2. Mettre hors tension toutes les charges en aval.
3. Mettre l'interrupteur sous tension.
4. Mettre l'interrupteur en position de marche (I).
5. Mettre sous tension toutes les charges en aval.

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

Solamente el personal especializado deberá instalar, hacer funcionar y prestar servicios de mantenimiento al equipo eléctrico. Schneider Electric no asume responsabilidad alguna por las consecuencias emergentes de la utilización de este material.

Seul un personnel qualifié doit effectuer l'installation, l'utilisation, l'entretien et la maintenance du matériel électrique. Schneider Electric n'assume aucune responsabilité des conséquences éventuelles découlant de l'utilisation de cette documentation.

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www.schneider-electric.ca

Maintenance

Introduction

Safety switches are properly lubricated at the factory. However, periodic cleaning and lubrication may be required. The maintenance interval between lubrications depends on the amount of switch usage and the ambient operating conditions. The maximum maintenance interval should not exceed one year for mechanical or current-carrying parts.

For additional information, refer to publication NFPA-70B, "Standard for Electrical Equipment Maintenance".

Unusual Performance Conditions

Contact Schneider Electric for information regarding performance under unusual conditions. Examples of unusual conditions are shown in table below:

Unusual Conditions
Ambient temperatures below -22°F (-30°C) or above 104°F (40°C)
Altitudes over 6600 ft (2012 m)
Corrosive or explosive environments
Abnormal vibration, shock, or tilting
Unusual operating duties

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, CSA Z462 or NOM-029-STPS.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Never operate energized switch with door open.
- Turn off switch before removing or installing fuses or making load side connections.
- Always use a properly rated voltage sensing device at all line and load fuse clips to confirm switch is off.
- Turn off power supplying switch before doing any other work on or inside switch.
- Do not use renewable link fuses in fused switches.

Failure to follow these instructions will result in death or serious injury.

Annual Maintenance Procedures

1. Turn off power supplying the switch before performing any work on or inside the switch.
2. Open the switch blades by moving the operating handle to the OFF (O) position.
3. Lock out or tag the switch, per local procedures.
4. Open the enclosure door.
5. Always use a properly rated voltage sensing device at all line and load-side lugs (terminals) to confirm power is off.

NOTE: Do not remove any parts from the switch or operating mechanism unless specifically instructed to do so in the following procedures. Vacuum any loose material from inside the switch. Wipe internal parts and the inside of the enclosure with a damp, lint-free cloth.

6. Visually inspect the switch for loose parts or hardware:
 - a. Retighten the hardware as needed. Refer to the wiring diagram for torque values.
 - b. Do not re-energize the switch if any worn or damaged parts are found. Replace them before re-energizing the switch.

Parts Removal

1. Remove the arc suppressor(s) or arc shield(s) from the switches by loosening the fastener(s) holding the suppressor(s) / shield(s) in place. See the examples provided.
2. Remove old grease and other contaminants from the line-side jaws and switchblades with a clean, lint-free cloth. If the lubricant has dried, remove it with CRC® HF Contact Cleaner, or equivalent, sprayed on a cloth.
3. Lubricate the cleaned areas with a thin film of Dow Corning®BG20 grease only.

NOTE: Do not substitute any other lubricant. Other lubricants may not be suitable for electrical applications and could alter the performance of the switch. Dow Corning BG20 is available from Square D (part number SWLUB).
4. Exercise the operating mechanism to ensure proper operation by opening and closing the switch five times with the door closed. Open the switch blades.

⚠ CAUTION

HAZARD OF EQUIPMENT DAMAGE

Do not disassemble the switch line base assembly or remove the blade rotor when cleaning the line-side jaw or the switch blade. See Figure 4, page 26, Examples of Line Base Assemblies.

Failure to follow these instructions can result in injury or equipment damage.

Figure 2 - Example of Arc Suppressors



Figure 3 - Example of Arc Shields

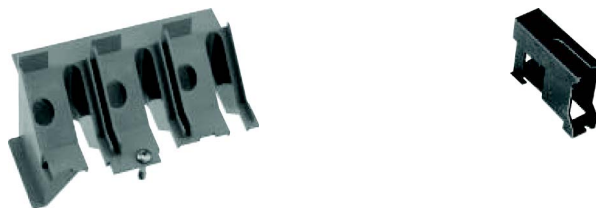
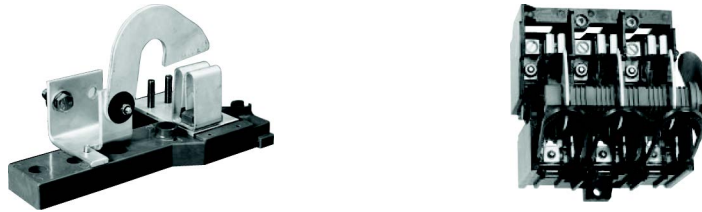
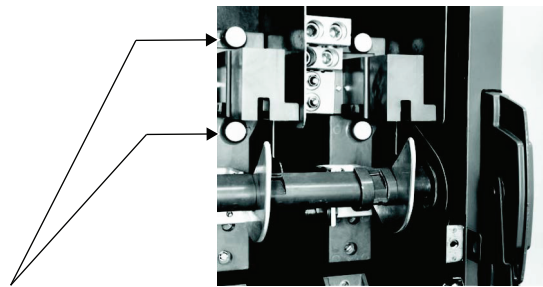


Figure 4 - Examples of Line Base Assemblies**Figure 5 - Insulating Plugs on Pole Unit**

Insulating plug

Parts Replacement

1. Reinstall the arc suppressor(s) or arc shield(s) according to the torque values in the table, page 26 below.
2. Ensure that the two insulating plugs in each phase (400–1200 A only) are firmly seated. See Figure 5.

Table 9 - Arc Suppressor Screw Torque Values

Switch Type	Torque Value
30–100 A	5–10 lb-in. (0,57–1,13 N•m)
200 A, F Series	10–20 lb-in. (1,13–2,26 N•m)
200 A, E Series	20–25 lb-in. (2,26–2,83 N•m)
400–800 A General Duty	20–25 lb-in. (2,26–2,83 N•m)
400–1200 A Heavy Duty	30–40 lb-in. (3,39–4,52 N•m)

Re-Energize the Switch

1. Close and latch the door.
2. Turn off all downstream loads.
3. Turn on power supplying the switch.
4. Turn on the switch.
5. Turn on all downstream loads.

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Section 6—Maintenance

Performing Visual and Mechanical Checks

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Only qualified personnel should clean, inspect maintain and test transformers.
- Turn off power supplying this equipment before working on it.
- Disconnect and electrically isolate power to the transformer so that no accidental contact can be made with energized parts.
- Discharge all static charges held by coils.

Failure to follow these instructions will result in death or serious injury.

1. Perform a visual inspection of the transformer and its surrounding environment.
 - a. Inspect the enclosure for any physical damage.
 - b. Repair any damage, if possible.
 - c. Provide guards to prevent future damage.
2. Record operational data while the transformer is still energized and in service.
3. De-energize the transformer prior to performing work on the unit.
 - a. Follow all safety procedures to place the unit into an electrically safe condition.
 - b. Remove the access covers. Inspect for:
 - dirt on insulating surfaces and at areas which tend to restrict air flow.
 - loose connections.
 - the condition of tap changers or terminal boards.
 - the general condition of the transformer.
4. Inspect the enclosure, transformer, terminals, terminal boards, and insulators for signs of overheating from internal or external sources. Check for voltage creepage over insulating surfaces, evident by tracing or carbonization.
5. Check for evidence of rusting, corrosion and paint deterioration. Repair any rust and corrosion where necessary.

Frequency

The frequency at which transformers should be inspected depends on operating conditions.

For clean, dry locations, annual inspections may be sufficient. However, for other locations, such as where the air is contaminated with dust or chemical fumes, an inspection at three- or six-month intervals may be required. Usually after the first few inspection periods, a definite schedule can be set up based on the transformer's existing conditions.

Severe, Environmental or Special Events

- ❑ Perform routine inspections, maintenance, and testing after any severe electrical short circuit, ground fault, or environmental event (e.g., flooding) to determine the operational status of the transformer.
- ❑ Perform the inspections, maintenance and testing if the transformer has been out of service for an extended period of time. Place strip heaters to maintain the transformer temperature above ambient to prevent condensation from forming in the transformer during extended down time.

Cleaning

Connections and Contact Surfaces

A clean contact surface area is necessary, and terminals must be clean. Where the transformers are installed indoors or outdoors or in a harsh environment, the connections must be sealed with an approved electrical joint compound.

Apply the compound to exposed connections and the surface area before making a bolted connection.

Enclosures, Windings and Insulators

1. De-energize the transformer.
2. Follow the check list below to permit free circulation of air and to guard against insulation breakdowns and thermal performance issues:
 - ❑ Clean the transformer enclosure, windings and insulators by vacuuming or by blowing clean, dry, compressed air or nitrogen. Be sure to wear appropriate personal protective equipment (PPE) when cleaning.
NOTE: Vacuuming is the preferred first step for cleaning. Compressed air should have a dew point of -50°F (-45.5°C) or less, and a pressure at or below 25 psi.
 - ❑ Clean lead supports, tap changers, terminals boards, bushings and other major insulating surfaces with lint-free rags or soft bristle brushes.
NOTE: Do not use liquids, solvents or detergents, as they may deteriorate insulating materials.
 - ❑ Carefully inspect and thoroughly clean the ventilation openings (ducts) and winding assemblies. Remove any blockages.
 - ❑ Remove any trash and/or combustible materials from the area around the unit.

Performing Electrical Testing

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Only qualified personnel should clean, inspect maintain and test transformers.
- Turn off power supplying this equipment before working on it.
- Disconnect and electrically isolate power to the transformer so that no accidental contact can be made with energized parts.
- Discharge all static charges held by coils.

Failure to follow these instructions will result in death or serious injury.

Perform the following electrical tests during maintenance:

- ❑ Check all electrical contacts with a calibrated torque wrench.
- ❑ Verify proper spacing.
- ❑ Refer to the manufacturer's specifications for torque values.
- ❑ Check all external hardware for tightness.

Contact Resistance

- ❑ Use a low resistance ohmmeter to measure contact resistance.
 - a. Compare values with similar connections looking for unusually high contact resistance points.
 - b. Investigate any connections that may deviate from common values by more than 50% of the lowest values.
- ❑ An infrared scanning device may be used to look for abnormal temperatures at transformer contacts for energized units.

NOTE: Take care to follow the manufacturer's procedures, as small errors in scanner operation can cause significant errors in detected temperatures.

Insulation Resistance

Insulation resistance checks may create a capacitive charge on a winding.

1. Ground each winding for at least one minute between tests to drain any static charge created during the test.
2. Perform insulation resistance tests with an appropriate device.
3. Test from winding-to-winding and winding-to-ground.
4. Record all test results for comparison for future readings.
 - Values are installation site dependent and not pre-set at the factory. All testing is compliant to NEMA ST-20.
 - Insulation resistance readings should be at least 1 megohm.
 - Lower readings may indicate the presence of moisture and require a drying procedure to correct.

Winding Resistance

On larger transformers (>500 kVA):

1. Measure the winding resistances and record for future reference.
2. Compare the results with the values obtained during the pre-commissioning checks. Readings should not vary by more than 5% with adjacent coils and the pre-commissioning checks.
3. Record the temperature at which these initial readings were taken.
 - Values are installation site dependent and not pre-set at the factory. All testing is compliant to NEMA ST-20.
4. Adjust the resistance values based on any differences in temperature between current readings and pre-commissioning values.

Grounding and Bonding

1. Check for proper values of resistance between the system ground lug (or point) and the transformer enclosure, core, frame and clamps.
2. Compare with pre-commissioning values, looking for trends that may indicate a compromise in the quality of the ground bond.

Turns Ratio

1. Perform a turns ratio test on all taps and on the full winding voltages for each phase. Significant changes may indicate a loss of winding continuity.
 - a. Compare these values with those obtained during the pre-commissioning checks. Voltages between phases should not deviate by more than 0.5% from adjacent coils.
 - b. Investigate abnormal readings found outside of this limit.
2. Verify input and output voltages are correct for the tap and output voltages expected. Investigate abnormal readings.

Sound Isolation Pads

Inspect the sound isolation pads for signs of physical deterioration.

Coil Cooling Ducts

1. Inspect all coil cooling ducts for any accumulation of dust, dirt or other obstructions.
2. Follow standard cleaning procedures to ensure proper air flow.

Terminals

Ensure terminals are in good working condition for the proper operation of transformers.

- ❑ Inspect terminals for alignment, tightness (see torque requirements), pressure, burns or corrosion. Investigate and correct any signs of damage.
- ❑ Repair minor pitting, as long as the plating on the terminal has not been compromised.

Preventive Maintenance

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.
- This equipment must be effectively grounded per all applicable codes. Use an equipment-grounding conductor to connect this equipment to the power system ground.

Failure to follow these instructions will result in death or serious injury.

Inspect the SPD periodically to maintain system performance and continued transient voltage surge suppression. During this inspection, check the state of the display LED status indicators.

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2.10 Removal and Replacement Instructions

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Assembling MicroVersaTrip™ Trip Unit Systems

General Information

Remove components from cartons and check catalog numbers on components against carton labels. Following is a list of components necessary to assemble the General Electric TK4V-THK4V Model 6 frame molded case circuit breakers with a 4-function MicroVersaTrip trip unit (See FIGURE 1). A Model 6 circuit breaker frame is identified by a "MOD 6" stamp on the breaker side, and by an Underwriters Laboratories Inc. label in the handle. Presence of any other label, or of no label at all, in the handle indicates that the breaker frame is not Model 6 and is NOT suitable for field installation of MicroVersaTrip components.

- A. Breaker frame (catalog numbers TK4VF46, THK4VF46)
- B. 4-function programmer (catalog number T4VT series)

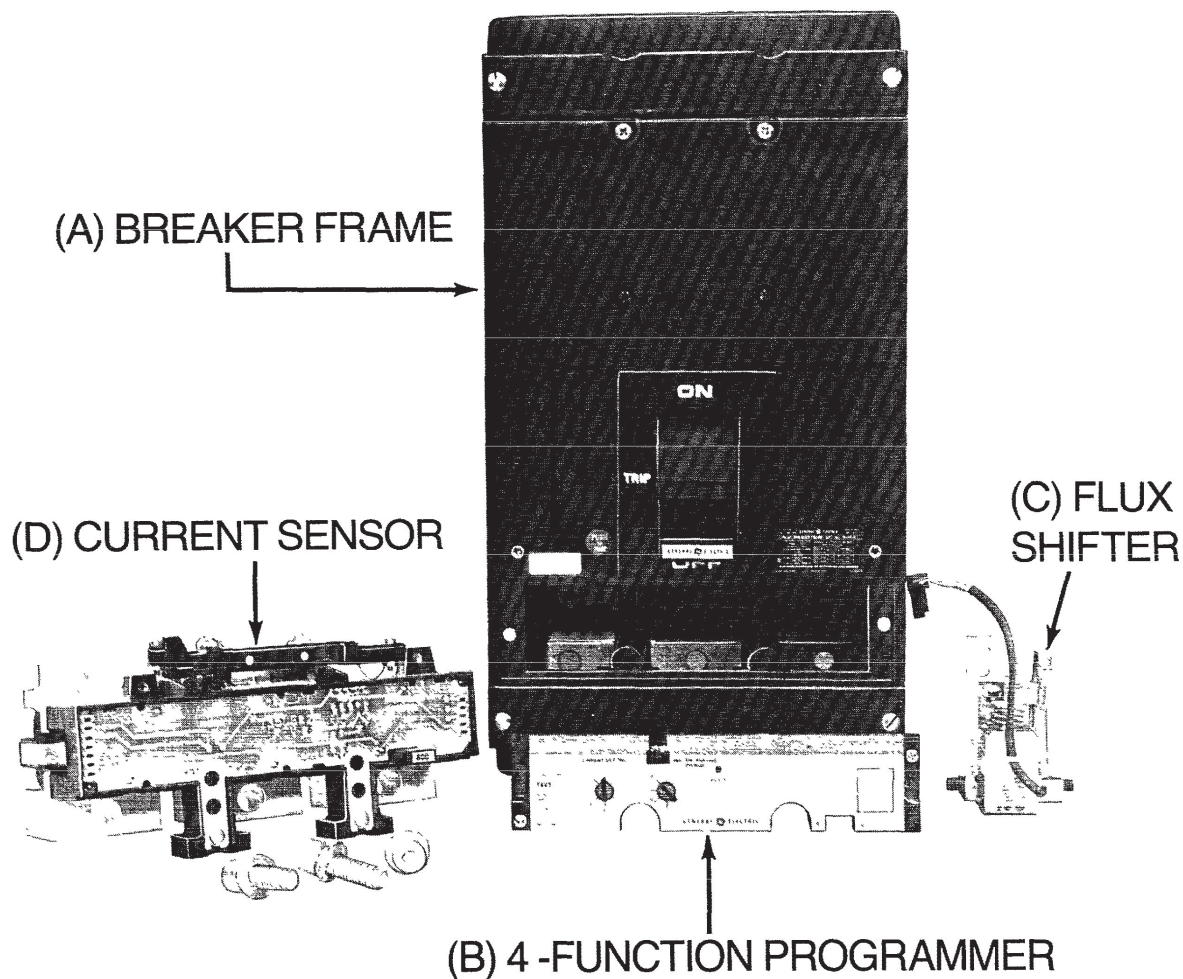
- C. Flux shifter (catalog number TKFS)
- D. Current sensor (catalog number TKCT series)

Necessary Tools:

- Electrician's Phillips head screwdriver
- Torque screwdriver with Phillips and flat blade bit
- Torque wrench with 1/4 inch hex bit (4 inch length)
- 1/16" feeler gauge
- Flat blade screwdriver
- Pliers

Assembly

To assemble the breaker, follow the steps listed below in order:



Step 1

Remove the breaker cover

Two slot head screws secure the lug covers at the line and load ends. After removing the two lug covers, loosen the six Phillips head screws securing the breaker cover. Remove the cover and remove and discard the two tubular spacers shown in FIG. 2. Remove the two shutters from handle and set aside (See FIG. 11 for picture of handle shutters).

Step 2

Install the Current Sensor

The breaker is held in the "ON" position during shipment by placement of a cotter pin in the breaker

mechanism. To remove, use pliers to straighten the end of the cotter pin (FIG. 3). Push the handle toward the load end of the breaker to relieve pressure on the pin; remove and discard the cotter pin (breaker handle will move to the "TRIP" position). Position the three screws provided in the left, center, and right mounting holes of the current sensor with the three flat washers provided (note a lockwasher is already captive on each screw). Slide the current sensor down into the cavity (FIG. 4), holding the breaker handle forward while sliding into position. When in place, tighten the three screws evenly to 125 inch-pounds. Hold trip bar back towards current sensor to reach center screw.

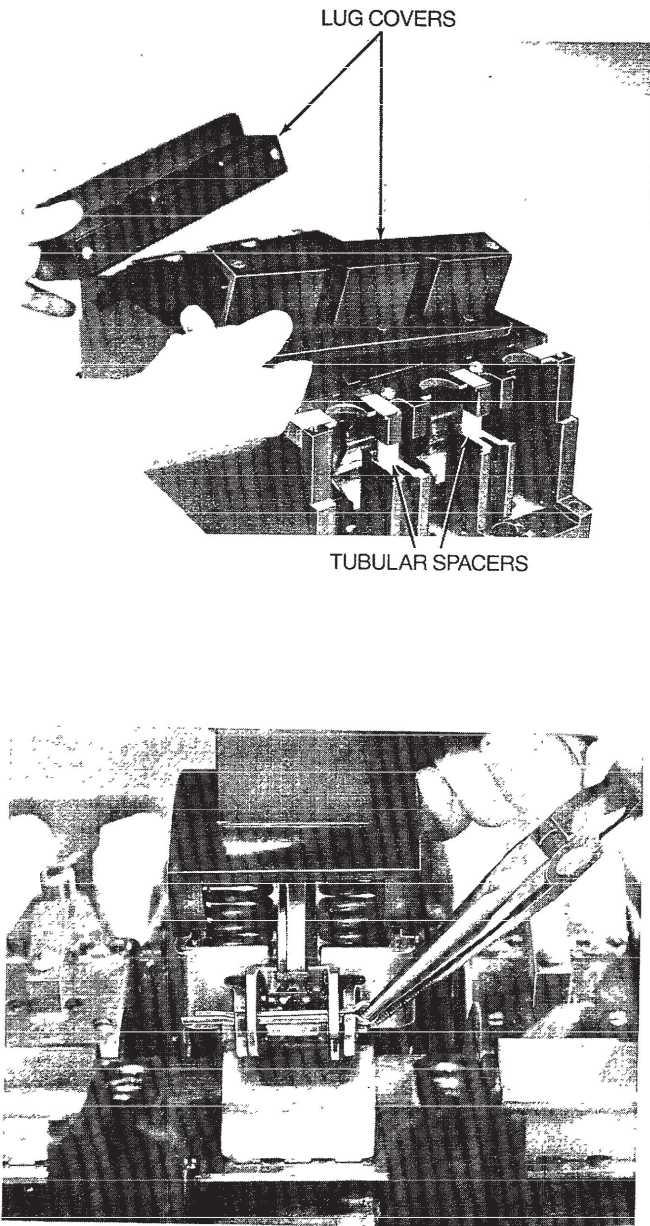


Fig. 2

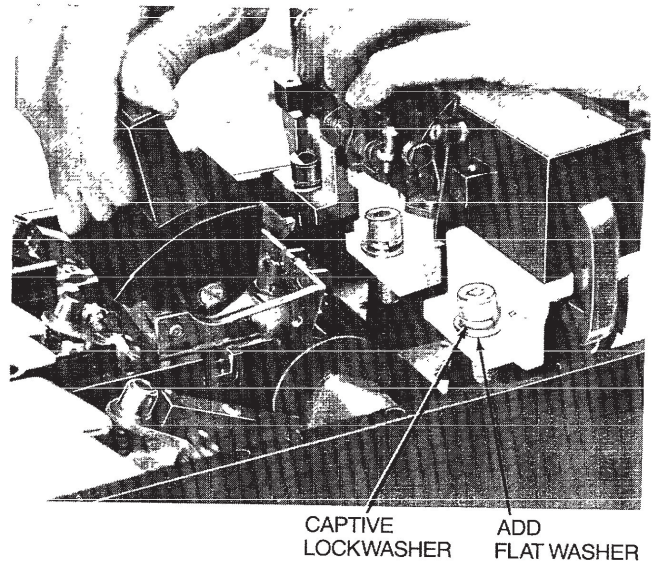


Fig. 4

Fig. 3

Assembling MicroVersaTrip™ Trip Unit Systems

Step 3

Install Programmer and Flux Shifter

Plug the flux shifter into the programmer (FIG. 5).

Then, dress the wires neatly in the three retaining grips in the programmer recess (FIG. 6). Slide the black protective sheath over the wires toward the flux shifter to allow correct wire length in the recess. Position programmer on current sensor and tighten the two programmer mounting screws to 10 inch-pounds.

NOTE: The black plug may pop up when placing the programmer in position. If so, push the plug back down flush with the top surface of the programmer after the programmer mounting screws have been tightened.

Next, install the flux shifter (FIG. 7). Holding the flux shifter frame down in its slot in the breaker base, tighten the flux shifter mounting screw to 10 inch-pounds. Dress the flux shifter wire lead inside the breaker housing (FIG. 8). Pull wire forward to remove slack at programmer end; the wire should not be taut, but should clear the flux shifter reset lever.

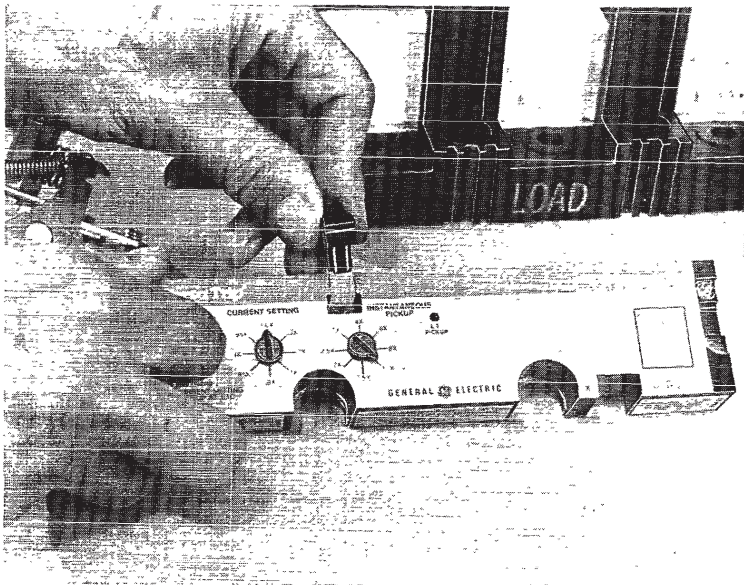


Fig. 5

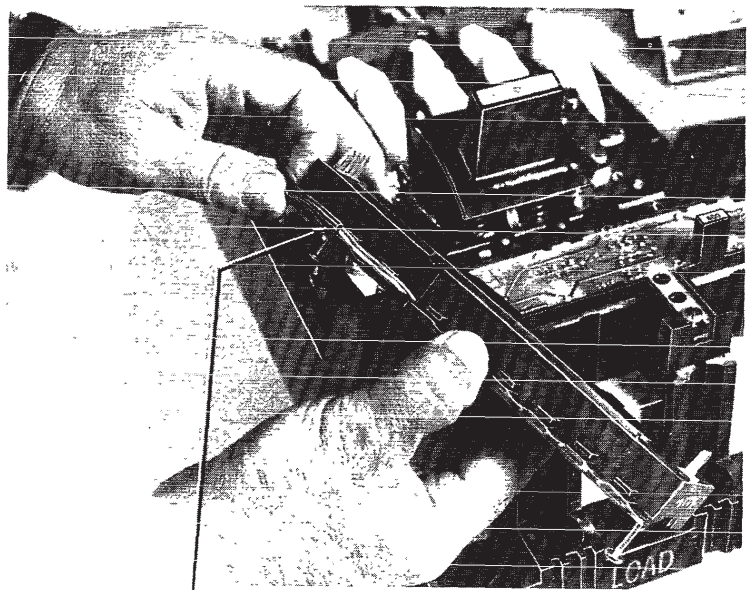


Fig. 6

SLIDE SHEATH OUT
OF RECESS AREA

Step 4

Clearance Check

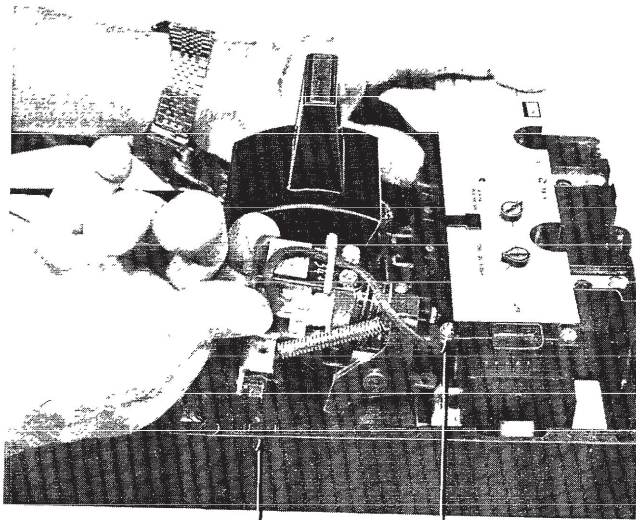
NOTE: Flux shifter plug should be flush with programmer cover.

While holding, the flux shifter down firmly so that its frame rests in the slot provided in the base, latch the breaker by moving the handle toward the load end, then turn the breaker "ON" by moving the handle toward the line end.

NOTE: KEEP HANDS CLEAR OF BREAKER HANDLE AND MECHANISM DURING CHECK.

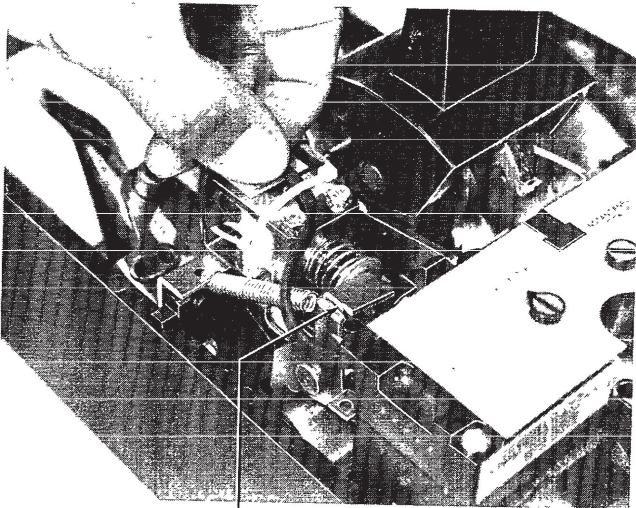
Next, still holding flux shifter down firmly in base, check that the clearance between the flux shifter plunger and the trip bar adjusting screw is between .001 to .063 inch (FIG. 9). If the measurement is off, do not attempt to adjust or use the breaker. Notify GE Construction Equipment Product Service, Plainville, Connecticut, that breaker does not meet the clearance specification.

NOTE: Discharge breaker mechanism by moving trip bar back towards current sensor BEFORE releasing pressure on the flux shifter.



SLOT IN BREAKER BASE
FOR FLUX SHIFTER FRAME

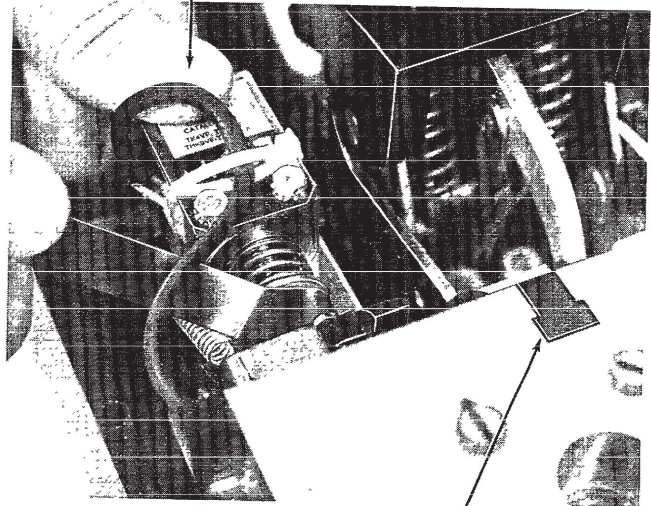
FLUX SHIFTER
MOUNTING SCREW



FLUX SHIFTER RESET LEVER

Fig. 7

HOLD FLUX SHIFTER DOWN



FLUX SHIFTER PLUG TO BE
FLUSH WITH PROGRAMMER

Fig. 9

Fig. 8

Assembling MicroVersaTrip™ Trip Unit Systems

Step 5

Functional Check

NOTE: Flux shifter plug to be flush with programmer cover.

While holding flux shifter down firmly so that its frame rests in the slot provided in the breaker base, latch the breaker by moving the handle toward the load end, then turn the circuit breaker "ON" by moving the handle toward the line end still holding the flux shifter down firmly in the base, place a

screwdriver against the back face of flux shifter plunger and flux shifter frame (FIG. 10). A slight leverage force will release the plunger and trip the breaker.

NOTE: KEEP HANDS AWAY FROM BREAKER HANDLE AND MECHANISM DURING CHECK.

Notify GE Construction Equipment Product Service, Plainville, Connecticut, if breaker is not working properly.

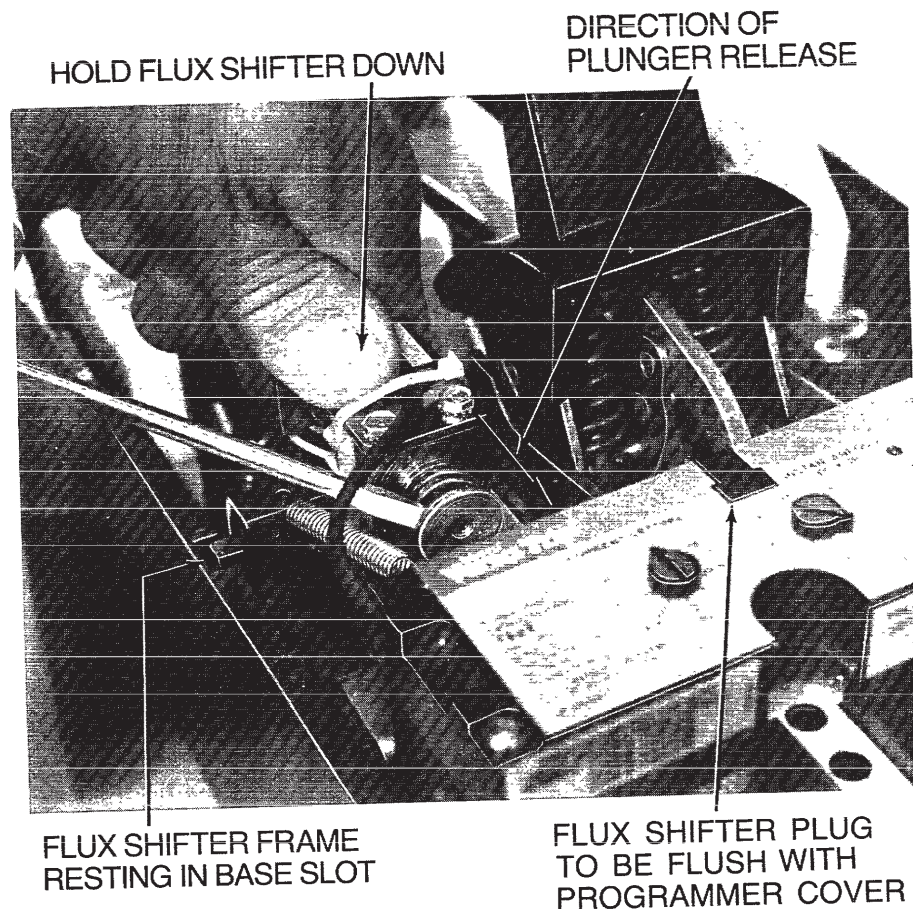


Fig. 10

Step 6

Replace the breaker cover

Replace the two shutters over breaker handle as shown in FIG. 11; the shutters must be oriented as shown to allow for proper cover placement. Slide shutters toward line end of breaker as far as shutter handle openings allow. Replace the breaker cover, and torque the six cover mounting screws to 25 inch-pounds (FIG. 12). For breakers requiring external ground fault connection, attach ground wire leads as indicated to the terminals shown in FIG. 12. Replace

the line and load end lug covers and tighten the slot head screws to 25 inch-pounds.

The breaker may again be checked by moving the handle to the "OFF" then "ON" position, and depressing the "PUSH TO TRIP" button. The breaker is now ready to be installed. Note that changes to the programmer settings may be made by removing the programmer window.

NOTE: For information on Neutral Current Transformer installation, refer to instruction No. GEK-72104.

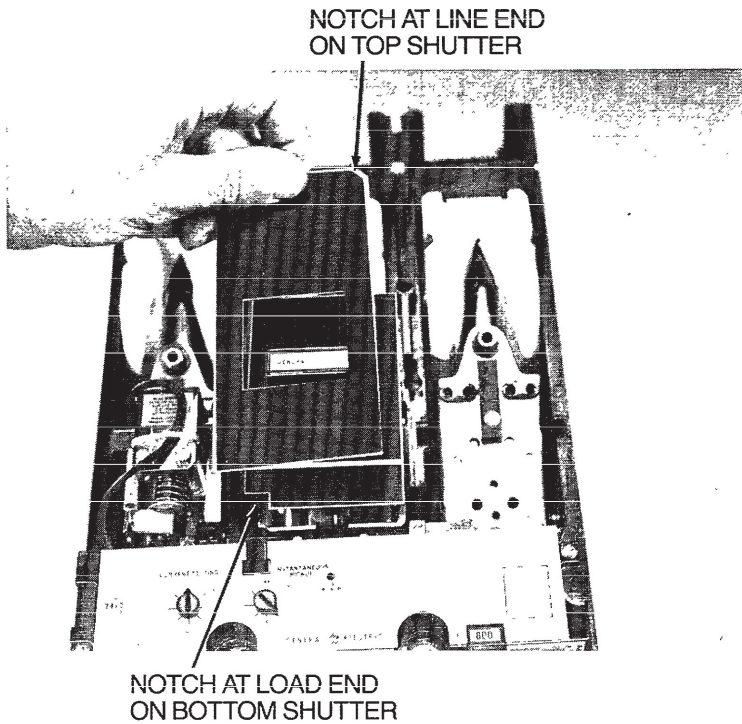
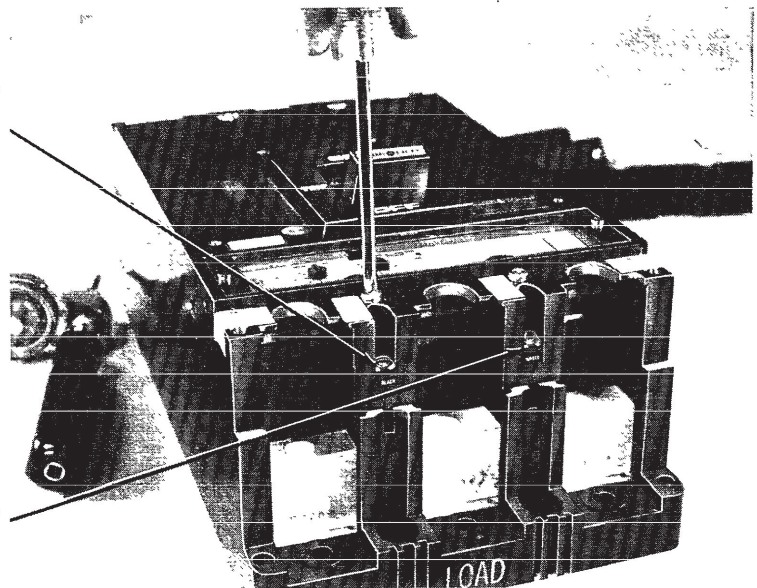


Fig. 11

EXTERNAL GROUND FAULT/NEUTRAL
CURRENT TRANSFORMER
CONNECTION TERMINAL
(WHITE WIRE)

Fig. 12

EXTERNAL GROUND FAULT/NEUTRAL
CURRENT TRANSFORMER
CONNECTION TERMINAL
(BLACK WIRE)





30–100 A, F Series Safety Switches—Lug Replacement Interruptores de seguridad de 30 a 100 A, serie F—Sustitución de zapatas Interrupteurs de sécurité de 30 à 100 A, série F—Remplacement de cosses

Series
Serie
Série
3100

Retain for future use. / Conservar para uso futuro. / À conserver pour usage ultérieur.

INTRODUCTION

This bulletin contains instructions for the replacement of the lugs in 30–100 A, F Series General Duty and Heavy Duty safety switches.

INTRODUCCIÓN

Este boletín contiene las instrucciones para la sustitución de las zapatas de los interruptores de seguridad de uso general y uso pesado de 30 a 100 A, serie F.

INTRODUCTION

Ce bulletin contient les directives de remplacement des cosses dans des interrupteurs de sécurité universels et pour service intensif de 30 à 100 A, série F.

SAFETY PRECAUTIONS

PRECAUCIONES DE SEGURIDAD

MESURES DE SÉCURITÉ

⚠ DANGER / PELIGRO / DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E
- This equipment must only be installed and serviced by qualified electrical personnel.
- Never operate energized switch with door open.
- Turn off switch before removing or installing fuses or making load side connections.
- Always use a properly rated voltage sensing device at all line and load fuse clips to confirm switch is off.
- Turn off power supplying switch before doing any other work on or inside switch.
- Do not use renewable link fuses in fused switches.

Failure to follow these instructions will result in death or serious injury.

PELIGRO DE DESCARGA ELÉCTRICA, EXPLOSIÓN O DESTELLO POR ARQUEO

- Utilice equipo de protección personal (EPP) apropiado y siga las prácticas de seguridad eléctrica establecidas por su Compañía, consulte la norma 70E de NFPA.
- Solamente el personal eléctrico especializado deberá instalar y prestar servicio de mantenimiento a este equipo.
- Nunca haga funcionar el interruptor energizado con la puerta abierta.
- Desconecte el interruptor antes de retirar o instalar los fusibles o realizar las conexiones del lado de carga.
- Siempre utilice un dispositivo detector de tensión nominal adecuado en todos los clips para fusibles en los lados de línea y carga para confirmar la desenergización del interruptor.
- Desenergice el interruptor antes de realizar cualquier otro trabajo dentro o fuera de él.
- No use fusibles renovables en los interruptores fusibles.

El incumplimiento de estas instrucciones podrá causar la muerte o lesiones serias.

RISQUE D'ÉLECTROCUTION, D'EXPLOSION OU D'ÉCLAIR D'ARC

- Portez un équipement de protection personnelle (ÉPP) approprié et observez les méthodes de travail électrique sécuritaire. Voir NFPA 70E.
- Seul un personnel qualifié doit effectuer l'installation et l'entretien de cet appareil.
- Ne faites jamais fonctionner l'interrupteur sous tension avec la porte ouverte.
- Mettez l'interrupteur hors tension avant d'enlever ou d'installer des fusibles ou de faire des raccordements sur le côté charge.
- Utilisez toujours un dispositif de détection de tension ayant une valeur nominale appropriée sur tous les porte-fusibles du côté ligne et charge pour s'assurer que l'interrupteur soit hors tension.
- Coupez l'alimentation de l'interrupteur avant d'y faire tout autre travail.
- N'utilisez pas de fusibles renouvelables dans les interrupteurs à fusibles.

Si ces précautions ne sont pas respectées, cela entraînera la mort ou des blessures graves.

RECEIVING, HANDLING, AND STORAGE

Upon receipt, carefully inspect the lug kit for damage that may have occurred during transit. If the lug kit is damaged, return it to the point of purchase for replacement.

RECEPCIÓN, MANEJO Y ALMACENAMIENTO

Al recibir el accesorio de zapatas, realice cuidadosamente una inspección visual para ver si encuentra daños que pudiesen haber ocurrido durante el transporte. Si encuentra algún daño, devuelva el accesorio o solicite otro nuevo al vendedor.

RÉCEPTION, MANUTENTION ET ENTREPOSAGE

À la réception, inspecter attentivement le kit de cosse afin de voir s'il montre des traces d'endommagement ayant pu se produire au cours du transport. S'il est endommagé, retourner le kit au lieu d'achat en vue de son remplacement.

REQUIRED TOOLS

- Flat-head screwdriver
- 5/16-inch hex socket
- Phillips™ screwdriver
- Fuse pullers

PARTS REMOVAL

1. Turn off all power supplying switch before working on or inside switch.
2. Open the door.

*NOTE: The switch must be in the **OFF (O)** position to open the door (Figure 1).*

3. Remove the arc shield (general duty) or the arc suppressor assembly (heavy duty), using a Phillips screwdriver to remove the mounting screw (Figure 2 on page 3, A).

4. Remove the conductors from the line and load lugs.

NOTE: On fusible switches, use fuse pullers to remove the fuses before replacing the load base lugs.

5. Remove the six hex head mounting screws and lugs (Figure 2, B).

HERRAMIENTAS NECESARIAS

- Desatornillador de punta plana
- Llave con hueco hexagonal de 5/16
- Destornillador Phillips™
- Extractor de fusibles

DESMONTAJE DE PIEZAS

1. Desenergice el interruptor antes de realizar cualquier trabajo en él.

2. Abra la puerta.

*NOTA: El interruptor deberá estar en la posición de **abierto (O)** para abrir la puerta. Vea la figura 1.*

3. Con un desatornillador Phillips, retire el tornillo de montaje para desmontar la protección contra arcos (en los interruptores de uso general) o el ensamble de supresor de arcos (en los interruptores de uso pesado), vea la figura 2 en la página 3, A.

4. Retire los conductores de las zapatas de línea y carga.

NOTA: En los interruptores de fusible, utilice extractores de fusibles para desmontar estos últimos antes de sustituir las zapatas de la base de carga.

5. Retire los seis tornillos de montaje hexagonales y las zapatas (vea la figura 2, B).

OUTILS NÉCESSAIRES

- Tournevis à tête plate
- Douille hex., 5/16 po
- Tournevis Phillips^{MC}
- Arrache-fusibles

DÉMONTAGE DES PIÈCES

1. Coupez l'alimentation de l'interrupteur avant d'y travailler.

2. Ouvrir la porte.

*REMARQUE : L'interrupteur doit se trouver à la position d'**arrêt (O)** pour ouvrir la porte (figure 1).*

3. Retirer le blindage d'arc (interrupteurs universels) ou l'assemblage de suppresseur d'arc (interrupteurs pour service intensif), en utilisant un tournevis Phillips pour retirer la vis de montage (figure 2 à la page 3, A).

4. Retirer les conducteurs des cosses de ligne et de charge.

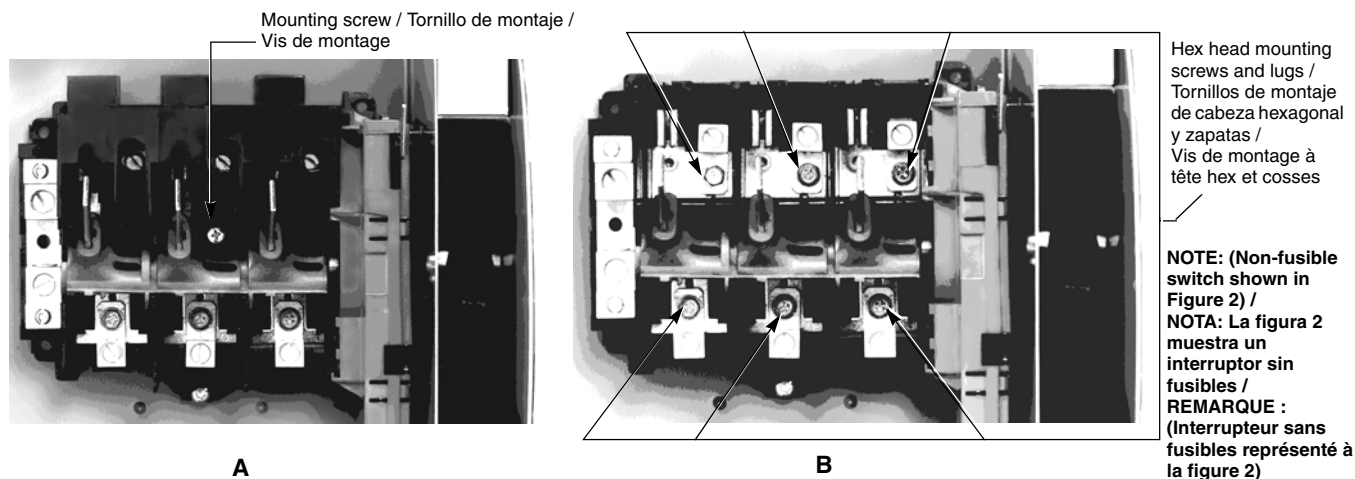
REMARQUE : Sur les interrupteurs à fusibles, utiliser un arrache-fusibles pour retirer les fusibles avant de remplacer les cosses de la base de charge.

5. Retirer les six vis de montage à tête hex et les cosses (figure 2, B).

Figure / Figura / Figure 1 : Switch in the OFF (O) Position / Interruptor en la posición de abierto (O) / Interrupteur en position d'arrêt (O)



**Figure / Figura / Figure 2 : Arc Shield/Arc Suppressor Assembly Mounting Screw Removal (A)
Hex Head Mounting Screws and Lugs Removal (B) /
Desmontaje del tornillo de montaje del ensamble de la protección contra arcos/supresor de
arcos (A) / Desmontaje de los tornillos de montaje de cabeza hexagonal y zapatas (B) /
Retrait de la vis de montage de l'assemblage de suppresneur d'arc/blindage d'arc (A)
Retrait des vis de montage à tête hex et des cosses (B)**



PARTS REPLACEMENT

1. Install the new lugs and hex head mounting screws from the lug kit. Torque the mounting screws to 40 lb-in (4.5 N•m).
2. Re-install the line and load conductors into the lugs. Refer to the wiring diagram on the door for torque values.
3. Re-install the arc shield or arc suppressor assembly. Torque the mounting screw to 10 lb-in (1.1 N•m).

SUSTITUCIÓN DE PIEZAS

1. Instale las nuevas zapatas y tornillos de montaje de cabeza hexagonal incluidos en el accesorio de zapatas. Apriete el tornillo de montaje a 4,5 N•m (40 lbs-pulg).
2. Vuelva a instalar los conductores de línea y carga en las zapatas. Consulte el diagrama de cableado ubicado en la puerta para obtener los valores de par de apriete.
3. Vuelva a instalar el ensamble de la protección contra arcos o supresor de arcos. Apriete el tornillo de montaje a 1,1 N•m (10 lbs-pulg).

REPLACEMENT DES PIÈCES

1. Installer les nouvelles cosses et les vis de montage à tête hex comprises dans le kit de cosses. Serrer les vis de montage à un couple de 4,5 N•m (40 lb-po).
2. Réinstaller les conducteurs de ligne et de charge dans les cosses. Se reporter au schéma de câblage situé sur la porte pour obtenir les valeurs de couple de serrage.
3. Réinstaller le blindage d'arc ou l'assemblage de suppresneur d'arc. Serrer la vis de montage à un couple de 1,1 N•m (10 lb-po).

⚠ DANGER / PELIGRO / DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Ensure that the arc suppressor/
arc shield is installed before
operating the switch.

**Failure to follow these
instructions will result in death or
serious injury.**

PELIGRO DE DESCARGA ELÉCTRICA, EXPLOSIÓN O DESTELLO POR ARQUEO

Asegúrese de que el supresor de arcos/
protección contra arcos esté instalado antes
de hacer funcionar el interruptor.

**El incumplimiento de estas
instrucciones podrá causar la muerte o
lesiones serias.**

RISQUE D'ÉLECTROCUTION, D'EXPLOSION OU D'ÉCLAIR D'ARC

Avant de faire fonctionner l'interrupteur,
assurez-vous que le suppresneur d'arc/
blindage d'arc est installé.

**Si ces précautions ne sont pas
respectées, cela entraînera la mort ou
des blessures graves.**

NOTE: On fusible switches, use fuse pullers to insert fuses into fuse clips. Insert only appropriate-sized and rated fuses for the application.

NOTE: If installing a copper lug kit, attach the label (supplied with the lug kit) near the wiring diagram.

4. Close the door.

NOTA: En los interruptores de fusible, utilice extractores de fusibles para insertar estos últimos en el clip. Inserte sólo fusibles de tamaño y valor nominal apropiados para la aplicación.

NOTA: Si va a instalar un accesorio de zapatas de cobre, coloque la etiqueta (incluida con el accesorio) junto al diagrama de cableado.

4. Cierre la puerta.

REMARQUE : Sur les interrupteurs à fusibles, utiliser un arrache-fusibles pour insérer les fusibles dans le porte-fusibles. Insérer uniquement des fusibles de taille et valeur nominale approprié pour l'application.

REMARQUE : En cas d'installation d'un kit de cosses en cuivre, fixer l'étiquette, comprise avec le kit, près du schéma de câblage.

4. Fermer la porte.

⚠ CAUTION / PRECAUCIÓN / ATTENTION

HAZARD OF EQUIPMENT DAMAGE

Do not force the handle to the **ON (I)** position with the door open. When the door is open, the mechanism interlock prevents the switch blades from closing and the handle from fully rotating.

Failure to follow this instruction can result in equipment damage.

PELIGRO DE DAÑO AL EQUIPO

No fuerce la palanca en la posición de **cerrado (I)** con la puerta abierta. Cuando está abierta la puerta, el bloqueo del mecanismo evita que se cierren las cuchillas del interruptor y que gire totalmente la palanca.

El incumplimiento de esta instrucción puede causar daño al equipo.

RISQUE DE DOMMAGES MATÉRIELS

Ne forcez pas la manette en position de **marche (I)** si la porte est ouverte. Quand la porte est ouverte, l'interverrouillage du mécanisme empêche les lames de l'interrupteur de se fermer et la manette de pivoter complètement.

Si cette précaution n'est pas respectée, cela peut entraîner des dommages matériels.

RE-ENERGIZE THE SWITCH

1. Turn off all downstream loads.
2. Turn on power supplying the switch.
3. Turn on the switch.
4. Turn on all downstream loads.

RE-ENERGIZACIÓN DEL INTERRUPTOR

1. Desconecte todas las cargas descendentes.
2. Energice el interruptor.
3. Coloque el interruptor en la posición de cerrado (I).
4. Conecte todas las cargas descendentes.

REMETTRE L'INTERRUPTEUR SOUS TENSION

1. Mettre hors tension toutes les charges en aval.
2. Mettre l'interrupteur sous tension.
3. Mettre l'interrupteur en position de marche (I).
4. Mettre sous tension toutes les charges en aval.

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

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Solamente el personal especializado deberá instalar, hacer funcionar y prestar servicios de mantenimiento al equipo eléctrico. Schneider Electric no asume responsabilidad alguna por las consecuencias emergentes de la utilización de este material.

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Seul un personnel qualifié doit effectuer l'installation, l'utilisation, l'entretien et la maintenance du matériel électrique. Schneider Electric n'assume aucune responsabilité des conséquences éventuelles découlant de l'utilisation de cette documentation.

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Replaces / Reemplaza / Remplace 40271-801-01 03/1996

Class / Clase / Classe 3100

F Series Safety Switches—Neutral Assembly Replacement

Interruptores de seguridad - serie F—Reemplazo del ensamble del neutro

Interrupteurs de sécurité série F—Remplacement de l'assemblage de neutre

Retain for future use. / Conservar para uso futuro. / À conserver pour usage ultérieur.

INTRODUCTION

This bulletin contains instructions for the installation or replacement of the neutral assembly in F Series General Duty and Heavy Duty safety switches.

INTRODUCCION

Este boletín contiene instrucciones sobre la instalación y el reemplazo del ensamble del neutro en los interruptores de uso general y uso pesado.

INTRODUCTION

Ce bulletin contient des directives concernant l'installation et le remplacement de l'assemblage de neutre dans les interrupteurs de sécurité universels et de fort calibre de la série F.

⚠ DANGER / PELIGRO / DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E
- This equipment must only be installed and serviced by qualified electrical personnel.
- Never operate energized switch with door open.
- Turn off switch before removing or installing fuses or making load side connections.
- Always use a properly rated voltage sensing device at all line and load fuse clips to confirm switch is off.
- Turn off power supplying switch before doing any other work on or inside switch.
- Do not use renewable link fuses in fused switches.

Failure to follow these instructions will result in death or serious injury.

PELIGRO DE DESCARGA ELÉCTRICA, EXPLOSIÓN O DESTELLO POR ARQUEO

- Utilice equipo de protección personal (EPP) apropiado y siga las prácticas de seguridad eléctrica establecidas por su Compañía, consulte la norma 70E de NFPA.
- Solamente el personal eléctrico especializado deberá instalar y prestar servicio de mantenimiento a este equipo.
- Nunca haga funcionar el interruptor energizado con la puerta abierta.
- Desconecte el interruptor antes de retirar o instalar los fusibles o realizar las conexiones del lado de carga.
- Siempre utilice un dispositivo detector de tensión nominal adecuado en todos los clips para fusibles en los lados de línea y carga para confirmar la desenergización del interruptor.
- Desenergice el interruptor antes de realizar cualquier otro trabajo dentro o fuera de él.
- No use fusibles renovables en los interruptores fusibles.

El incumplimiento de estas instrucciones podrá causar la muerte o lesiones serias.

RISQUE D'ÉLECTROCUTION, D'EXPLOSION OU D'ÉCLAIR D'ARC

- Portez un équipement de protection personnelle (ÉPP) approprié et observez les méthodes de travail électrique sécuritaire. Voir NFPA 70E.
- Seul un personnel qualifié doit effectuer l'installation et l'entretien de cet appareil.
- Ne faites jamais fonctionner l'interrupteur sous tension avec la porte ouverte.
- Mettez l'interrupteur hors tension avant d'enlever ou d'installer des fusibles ou de faire des raccordements sur le côté chargé.
- Utilisez toujours un dispositif de détection de tension ayant une valeur nominale appropriée sur tous les porte-fusibles du côté ligne et charge pour s'assurer que l'interrupteur soit hors tension.
- Coupez l'alimentation de l'interrupteur avant d'y faire tout autre travail.
- N'utilisez pas de fusibles renouvelables dans les interrupteurs à fusibles.

Si ces précautions ne sont pas respectées, cela entraînera la mort ou des blessures graves.

RECEIVING, HANDLING, STORAGE

Upon receipt, carefully inspect the device for damage that may have occurred during transit. If damaged, return the device to the point of purchase for replacement.

F Series safety switch products are shipped in corrugated cartons. Do not drop or perforate the cartons, or stack other objects on them. Rough handling may cause damage to the electrical components contained within.

RECEPCION, MANEJO Y ALMACENAMIENTO

Una vez recibido el dispositivo, inspecciónelo detenidamente para comprobar que no hayan ocurrido daños durante el transporte. Si está dañado, devuélvalo al sitio de adquisición para que le entreguen un reemplazo.

Los interruptores de seguridad de la serie F son enviados en cajas de cartón corrugado. No deje caer las cajas ni las perforar, ni tampoco les ponga objetos encima. Si no se manejan con cuidado, podrían dañarse los componentes eléctricos que contiene.

RÉCEPTION, MANUTENTION ET STOCKAGE

À la réception, examiner l'appareil pour voir s'il a été endommagé pendant le transport. En cas de dommage, renvoyer l'appareil au lieu d'achat pour qu'il soit remplacé.

Les interrupteurs de sécurité de la série F sont expédiés dans les cartons ondulés. Ne pas faire tomber ou perforer ces cartons, ni empiler des objets sur eux. Une manutention brutale risque d'endommager les composants électriques.

If the device is not placed in immediate service, store it in a clean, dry location to protect against dirt and moisture.

Si el dispositivo no se va a poner en servicio inmediatamente, guárdelo en un área limpia y seca para protegerlo contra el polvo y la humedad.

Si cet appareil n'est pas utilisé immédiatement, le stocker dans un endroit propre et sec pour le protéger de la saleté et de l'humidité.

Table / Tabla / Tableau 1 : Required Tools / Herramientas Necesarias / Outils exigés

<ul style="list-style-type: none"> • T25 TORX® bit or screwdriver • Robertson (square) No. 2 bit or screwdriver • Common blade tip screwdriver • 5/16 inch hex socket • Fuse pullers 	<ul style="list-style-type: none"> • Broca o desarmador T25 TORX® • Broca o desarmador Robertson (cuadrado) del no. 2 • Desarmador de punta común • Hueco hexagonal de 5/16 pulgada • Extractor de fusibles 	<ul style="list-style-type: none"> • Tournevis ou foret T25 TORX® • Tournevis ou foret N x 2 de Robertson (lame carrée) • Tournevis à lame ordinaire • Clé à douille à six pans de 5/16 de po • Arrache-fusibles
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REMOVAL

1. Turn off switch.
2. Open the cover.

DESMONTAJE

1. Desconecte el interruptor.
2. Abra la cubierta.

DÉMONTAGE

1. Mettre l'interrupteur hors tension.
2. Ouvrir le couvercle.



For line base mounted neutrals:

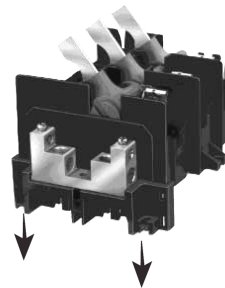
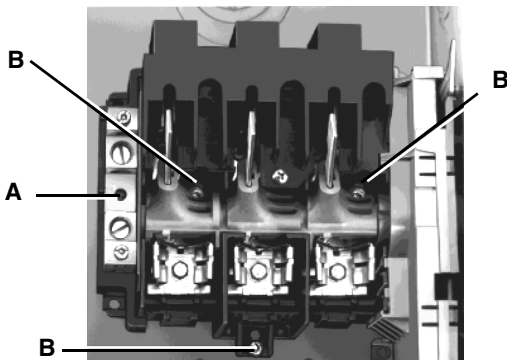
1. Use fuse pullers to remove the fuses from the fusible switches.
2. Remove the box bonding screw (A), if applicable.
3. Remove all conductors from the neutral and line base assemblies.
4. Locate and remove the three mounting screws (B) of the line base using a T25 TORX screwdriver.
5. Remove the line base assembly.

Para los neutros montados en la base de línea:

1. Utilice el extractor de fusibles para extraer los fusibles de los interruptores fusibles.
2. Retire el tornillo de conexión a la caja (A), si fuese aplicable.
3. Retire todos los conductores de los ensambles de las bases de línea y del neutro.
4. Localice y retire los tres tornillos de montaje (B) de la base de línea utilizando un desarmador T25 TORX.
5. Retire el ensamble de la base de línea.

Pour les neutres montés sur base de secteur :

1. Utiliser des arrache-fusibles pour retirer les fusibles des interrupteurs à fusible.
2. Retirer la vis d'attache de boîtier (A), le cas échéant.
3. Retirer tous les conducteurs des assemblages du neutre et de la base de secteur.
4. Rechercher et retirer les trois vis de montage (B) de la base de secteur en utilisant un tournevis T25 TORX.
5. Démontez l'assemblage de base de secteur.



Push the neutral assembly down until it slides past the line base. /

Presione hacia abajo el ensamble del neutro hasta que se deslice más allá de la base de línea. /

Abaisser l'assemblage du neutre en le poussant jusqu'à ce qu'il glisse au-dessous de la base de secteur.

REPLACEMENT

1. In the enclosure, engage the line base assembly with the handle and position to the mounting holes.

NOTE: On heavy duty switches, the mechanism operating shaft and interlock shaft extend through the enclosure side. Position the handle for proper alignment.

2. Install the three line base mounting screws.
Torque to 30 lb-in (3.4 N•m).

REEMPLAZO

1. En el gabinete, enganche el ensamble de la base de línea con la palanca y alinéelo con los agujeros de montaje.

NOTA: En los interruptores de uso pesado, los ejes de funcionamiento del mecanismo y de seguridad se extienden a través del lado del gabinete. Coloque la palanca de tal manera que esté alineada correctamente.

2. Instale los tres tornillos de montaje de la base de línea. Apriételes a 3,4 N•m (30 lbs-pulg).

REEMPLACEMENT

1. Placer dans le boîtier l'ensemble de base de secteur à l'aide de la manette et le positionner par rapport aux trous de montage.

REMARQUE : Avec les interrupteurs de fort calibre, l'arbre d'entraînement de l'appareil et l'arbre de verrouillage dépassent du côté du boîtier. Situer la manette pour réaliser un bon alignement.

2. Installer les trois vis de montage de base de secteur. Serrer avec un couple de 3,4 N•m (30 lb-po).

INSTALLATION

For line base mounted neutrals:

1. Align the grooves of the neutral assembly with the side rib of the line base. Make sure both grooves are interlocked.
2. Push the neutral assembly toward the back of the enclosure until it snaps into place. No screws are required.

For stand-alone applications:

1. Position the neutral assembly over the holes in the enclosure so that the insulator is between the neutral lug and switch base. (Place insulator to the right of lug.)
2. Install the two mounting screws and torque to 30 lb-in (3.4 N•m).

INSTALACION

Para los neutros montados en la base de línea:

1. Alinee las ranuras del ensamble del neutro con la costilla lateral de la base de línea. Asegúrese de que ambas ranuras estén enclavadas.
2. Empuje el ensamble del neutro hacia la parte posterior del gabinete hasta que encaje en su sitio. No se necesitan tornillos.

Para aplicaciones independientes:

1. Coloque el ensamble del neutro sobre los agujeros en el gabinete, ubicando el aislador entre la zapata del neutro y la base del interruptor. Coloque el aislador a la derecha de la zapata.
2. Instale los dos tornillos de montaje y apriételes a 3,4 N•m (30 lbs-pulg).

INSTALLATION

Pour les neutres montés sur base de secteur :

1. Aligner les rainures de l'ensemble du neutre avec la nervure latérale de la base de secteur. S'assurer que les deux rainures sont emboîtées.
2. Pousser l'ensemble du neutre vers l'arrière du boîtier jusqu'à ce qu'il s'installe avec un déclic. Les vis ne sont pas nécessaires.

Pour les applications autonomes :

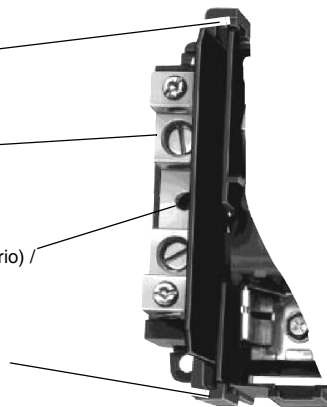
1. Placer l'ensemble du neutre sur les trous du boîtier de sorte que l'isolateur soit situé entre la cosse du neutre et la base de l'interrupteur. (Placer l'isolateur à droite de la cosse.)
2. Installer les deux vis de montage et serre à 3,4 N•m (30 lb-in).

Grooves—interlocked with side ribs /
Ranuras enclavadas con costillas laterales /
Rainures - emboîtées dans les nervures latérales

Neutral Assembly /
Ensamble del neutral /
Ensemble du neutre

Box bonding screw (when required) /
Tornillo de conexión a la caja (cuando fuese necesario) /
Vis de fixation à la boîte (le cas échéant)

Grooves—interlocked with side ribs /
Ranuras enclavadas con costillas laterales /
Rainures - emboîtées dans les nervures latérales



3. Install all conductors into the lugs of the neutral and line base assemblies. See the wiring diagram on the cover for torque values.

3. Instale todos los conductores en las zapatas de los ensambles de las bases de línea y del neutro. Consulte el diagrama de cableado situado en la cubierta para obtener los valores de par de apriete.

3. Installer tous les conducteurs dans les cosses des assemblages de neutre et de base de secteur. Voir le schéma de câblage sur le couvercle pour les valeurs de couple de serrage.

- | | | |
|--|--|---|
| <p>4. Install the box bonding screw, if applicable. Torque to 35 lb-in (4.0 N•m).</p> <p>5. Use fuse pullers to insert the fuses into the fuse clips provided. Insert only appropriately sized and rated fuses for the application.</p> <p>6. Close the cover.</p> | <p>4. Instale el tornillo de conexión a la caja, si fuese aplicable. Apriételo a 4,0 N•m (35 lbs-pulg).</p> <p>5. Utilice el extractor de fusibles para colocar los fusibles en los portafusibles provistos. Utilice solamente fusibles de clasificación y valor nominal apropiados para la aplicación.</p> <p>6. Cierre la cubierta .</p> | <p>4. Installer la vis d'attache de boîte, le cas échéant. Serrer avec un couple de 4,0 N•m (35 lb-po).</p> <p>5. Utiliser des arrache-fusibles pour insérer les fusibles dans les douilles de fusibles fournies. Insérer seulement des fusibles de taille et de calibre appropriés à l'application.</p> <p>6. Fermer le couvercle.</p> |
|--|--|---|

CAUTION / PRECAUCIÓN / ATTENTION

HAZARD OF EQUIPMENT DAMAGE

Do not force the handle to the ON position with the cover open. When the cover is open, the mechanism interlock prevents the switch blades from closing and the handle from fully rotating.

Failure to follow these instructions can result in equipment damage.

PELIGRO DE DAÑO AL EQUIPO

No fuerce la palanca a la posición "cerrado" con la cubierta protectora abierta. Cuando está abierta la cubierta, el mecanismo de protección evita que se cierren las cuchillas del interruptor y que gire completamente la palanca.

El incumplimiento de esta instrucción puede causar daño al equipo.

RISQUE DE DOMMAGES MATÉRIELS

Ne forcez pas la manette en position de marche quand le couvercle est ouvert. Quand le couvercle est ouvert, le mécanisme de verrouillage empêche les lames de se fermer et la manette de pivoter complètement.

Si cette précaution n'est pas respectée, cela peut entraîner des dommages matériels.

Turn switch on, then off.

The switch should close and open in a quick, steady motion.

Coloque la palanca del interruptor en la posición "cerrado" y luego en "abierto".

El interruptor deberá cerrar y abrir de manera rápida y constante.

Mettre l'interrupteur sous tension, puis hors tension.

L'interrupteur doit se fermer et s'ouvrir avec un mouvement rapide et uniforme



TO RE-ENERGIZE:

1. Turn OFF (O) all downstream loads.
2. Turn ON (I) power to the equipment in sequence; start at the source end of the system and work towards the load end.

PARA VOLVER A ENERGIZAR:

1. Desconecte todas las cargas de corriente descendiente.
2. Devuelva la alimentación al equipo secuencialmente. Comience con el extremo de la fuente del sistema y proceda hacia el extremo de carga.

POUR REMETTRE SOUS TENSION :

1. Mettre hors tension toutes les charges en aval.
2. Mettre les appareils sous tension l'un après l'autre; commencer par l'extrémité source du système, et continuer vers l'extrémité de la charge.

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30–1200 A Safety Switches Maintenance Instructions

Instrucciones de servicio de mantenimiento para los interruptores de seguridad de 30 a 1 200 A

Directives d'entretien pour interrupteurs de sécurité, 30 à 1 200 A

Retain for future use. / Conservar para uso futuro. / À conserver pour usage ultérieur.

Class
Clase
Classe
3100

INTRODUCTION

Safety switches are properly lubricated at the factory. However, periodic cleaning and lubrication may be required. The maintenance interval between lubrications depends on the amount of switch usage and the ambient operating conditions. The maximum maintenance interval should not exceed one year for mechanical or current-carrying parts.

For additional information, refer to publication NFPA-70B, "Recommended Practice for Electrical Equipment Maintenance".

Unusual Performance Conditions

Contact Square D for information regarding performance under unusual conditions. Examples of unusual conditions are shown in Table 1 below:

INTRODUCCIÓN

Los interruptores de seguridad han sido lubricados correctamente en la fábrica; sin embargo, es necesario realizar limpieza y lubricación periódicamente. El intervalo de servicio de mantenimiento entre lubricaciones depende del uso del interruptor y de las condiciones ambientales de funcionamiento. El intervalo de servicio de mantenimiento máximo no debe exceder un año para las piezas mecánicas o conductoras de corriente.

Si desea obtener información adicional, consulte la publicación NFPA-70B, "Recommended Practice for Electrical Equipment Maintenance" (prácticas recomendadas de servicio de mantenimiento para el equipo eléctrico).

Condiciones de funcionamiento poco comunes

Póngase en contacto con Square D para obtener información con respecto al funcionamiento de este equipo bajo condiciones poco comunes. La tabla 1 muestra ejemplos de condiciones poco comunes:

INTRODUCTION

Les interrupteurs de sécurité sont lubrifiés de façon appropriée à l'usine. Toutefois, un nettoyage et une lubrification périodiques peuvent être nécessaires. L'intervalle d'entretien entre les lubrifications dépend de la fréquence d'utilisation de l'interrupteur et des conditions ambiantes de fonctionnement. L'intervalle d'entretien maximum ne doit pas dépasser un an pour les pièces mécaniques ou porteuses de courant.

Pour avoir d'autres renseignements, se reporter à la publication NFPA-70B, « Recommended Practice for Electrical Equipment Maintenance » (Pratique recommandée pour l'entretien des appareils électriques).

Conditions de performance inhabituelles

Contactez Square D pour avoir des informations sur la performance dans des conditions inhabituelles. Des exemples de conditions inhabituelles sont données au tableau 1 ci-dessous :

Table / Tabla / Tableau 1 : Unusual Conditions / Condiciones poco comunes / Conditions inhabituelles

• Ambient temperatures below -22 °F (-30 °C) or above 104 °F (40 °C) /	• Temperatura ambiente inferior a -30 °C (-22 °F) o superior a 40 °C (104 °F) /	• Températures ambiantes inférieures à -30 °C (-22 °F) ou supérieures à 40 °C (104 °F)
• Altitudes over 6600 ft (2012 m) /	• Altitudes de más de 2 012 m (6 600 pies) /	• Altitudes dépassant 2 012 m (6 600 pieds)
• Corrosive or explosive environments /	• Entornos corrosivos o explosivos /	• Environnements corrosifs ou explosifs
• Abnormal vibration, shock, or tilting /	• Vibración, sacudidas o inclinaciones anormales /	• Vibrations, chocs ou inclinaison anormaux
• Unusual operating duties /	• Servicio de funcionamiento poco común /	• Facteurs de fonctionnement inhabituels

⚠ DANGER / PELIGRO / DANGER**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Never operate energized switch with door open.
- Turn off switch before removing or installing fuses or making load side connections.
- Always use a properly rated voltage sensing device at all line and load fuse clips to confirm switch is off.
- Turn off power supplying switch before doing any other work on or inside switch.
- Do not use renewable link fuses in fused switches.

Failure to follow these instructions will result in death or serious injury.

PELIGRO DE DESCARGA ELÉCTRICA, EXPLOSIÓN O DESTELLO POR ARQUEO

- Utilice equipo de protección personal (EPP) apropiado y siga las prácticas de seguridad eléctrica establecidas por su Compañía, consulte la norma 70E de NFPA.
- Solamente el personal eléctrico especializado deberá instalar y prestar servicio de mantenimiento a este equipo.
- Nunca haga funcionar el interruptor energizado con la puerta abierta.
- Desconecte el interruptor antes de retirar o instalar los fusibles o realizar las conexiones del lado de carga.
- Siempre utilice un dispositivo detector de tensión nominal adecuado en todos los clips para fusibles en los lados de línea y carga para confirmar la desenergización del interruptor.
- Desenergice el interruptor antes de realizar cualquier otro trabajo dentro o fuera de él.
- No use fusibles renovables en los interruptores fusibles.

El incumplimiento de estas instrucciones podrá causar la muerte o lesiones serias.

RISQUE D'ÉLECTROCUTION, D'EXPLOSION OU D'ÉCLAIR D'ARC

- Portez un équipement de protection personnelle (ÉPP) approprié et observez les méthodes de travail électrique sécuritaire. Voir NFPA 70E.
- Seul un personnel qualifié doit effectuer l'installation et l'entretien de cet appareil.
- Ne faites jamais fonctionner l'interrupteur sous tension avec la porte ouverte.
- Mettez l'interrupteur hors tension avant d'enlever ou d'installer des fusibles ou de faire des raccordements sur le côté charge.
- Utilisez toujours un dispositif de détection de tension ayant une valeur nominale appropriée sur tous les porte-fusibles du côté ligne et charge pour s'assurer que l'interrupteur soit hors tension.
- Coupez l'alimentation de l'interrupteur avant d'y faire tout autre travail.
- N'utilisez pas de fusibles renouvelables dans les interrupteurs à fusibles.

Si ces directives ne sont pas respectées, cela entraînera la mort ou des blessures graves.

ANNUAL MAINTENANCE PROCEDURES

1. Turn off power supplying the switch before performing any work on or inside the switch.
2. Open the switch blades by moving the operating handle to the OFF (O) position.
3. Lock out or tag the switch, per local procedures.
4. Open the enclosure door.
5. Always use a properly rated voltage sensing device at all line and load-side lugs (terminals) to confirm power is off.

NOTE: Do not remove any parts from the switch or operating mechanism unless specifically instructed to do so in the following procedures. Vacuum any loose material from inside the switch. Wipe internal parts and the inside of the enclosure with a damp, lint-free cloth.

6. Visually inspect the switch for loose parts or hardware:
 - a. Retighten the hardware as needed. Refer to the wiring diagram.
 - b. Do not re-energize the switch if any worn or damaged parts are found. Replace them before re-energizing the switch.

PROCEDIMIENTOS DE SERVICIOS DE MANTENIMIENTO ANUALES

1. Desenergice el interruptor antes de realizar cualquier trabajo dentro o fuera de él.
2. Abra las cuchillas del interruptor moviendo la palanca de funcionamiento a la posición de abierto (O).
3. Bloquee o etiquete el interruptor de acuerdo con los procedimientos locales.
4. Abra la puerta del gabinete.
5. Siempre utilice un dispositivo detector de tensión nominal adecuado en todas las zapatas (terminales) del lado de línea y carga para confirmar la desenergización del equipo.

NOTA: No retire ninguna pieza del interruptor ni del mecanismo de funcionamiento a no ser que se le indique eso específicamente en los siguientes procedimientos. aspire el material suelto que se encuentra dentro del interruptor. Limpie las piezas internas y el interior del gabinete con una tela húmeda sin pelusas.

6. Realice una inspección visual al interruptor para ver si encuentra piezas o herrajes sueltos:
 - a. Vuelva a apretar los herrajes a medida que sea necesario. Consulte el diagrama de cableado.
 - b. No vuelva a energizar el interruptor si encuentra piezas desgastadas o dañadas; sustitúyalas antes de volver a energizar el interruptor.

PROCÉDURES D'ENTRETIEN ANNUEL

1. Couper l'alimentation de l'interrupteur avant d'effectuer tout travail sur ou à l'intérieur de l'interrupteur.
2. Ouvrir les lames de l'interrupteur en plaçant la manette de fonctionnement sur la position d'ARRÊT (O).
3. Verrouiller ou étiqueter l'interrupteur, selon les procédures locales.
4. Ouvrir la porte du coffret.
5. Toujours utiliser un dispositif de détection de tension à valeur nominale appropriée sur toutes les cosses (bornes) du côté ligne et charge pour s'assurer que l'interrupteur est hors tension.

REMARQUE : Ne retire aucune pièce de l'interrupteur ou du mécanisme de fonctionnement sauf en cas d'instruction précise de le faire dans les procédures suivantes. Évacuer à l'aspirateur tous corps étrangers se trouvant à l'intérieur de l'interrupteur. Essuyer les pièces internes et l'intérieur du coffret à l'aide d'un chiffon mouillé, non pelucheux.

6. Inspecter visuellement l'interrupteur pour voir s'il y a des pièces ou de la quincaillerie desserrée :
 - a. Resserrer la quincaillerie au besoin. Se reporter au schéma de câblage.
 - b. Ne pas remettre l'interrupteur sous tension en présence de pièces usées ou abîmées. Les remplacer avant de remettre l'interrupteur sous tension.

Parts Removal

1. Remove the arc supressor(s) or arc shield(s) from the switches by loosening the fastener(s) holding the suppressor(s) / shield(s) in place. See Figures 1 and 2.

Desmontaje de piezas

1. Retire el o los supresores o protectores de arco de los interruptores aflojando los sujetadores que los sostienen en su lugar. Ve a las figuras 1 y 2.

Démontage des pièces

1. Retirer le ou les supresseurs ou blindages d'arc des interrupteurs en desserrant les attaches qui les maintiennent en place. Voir les figures 1 et 2.

CAUTION / PRECAUCIÓN / ATTENTION

HAZARD OF EQUIPMENT DAMAGE	PELIGRO DE DAÑO AL EQUIPO	RISQUE DE DOMMAGES MATÉRIELS
<p>Do not disassemble the switch line base assembly or remove the blade rotor when cleaning the line-side jaw or the switch blade. See Figure 3 on page 4.</p> <p>Failure to follow this instruction can result in equipment damage.</p>	<p>No desmonte el ensamble de la base de línea del interruptor o retire el rotor de cuchilla al limpiar la mordaza del lado de línea o la cuchilla del interruptor, vea la figura 3 en la página 4.</p> <p>El incumplimiento de esta instrucción puede causar daño al equipo.</p>	<p>Ne démontez pas l'assemblage de la base de ligne de l'interrupteur ou ne retirez pas le rotor à lame lorsque vous nettoyez la mâchoire côté ligne ou la lame de l'interrupteur. Voir la figure 3 à la page 4.</p> <p>Si cette précaution n'est pas respectée, cela peut entraîner des dommages matériels.</p>
<ol style="list-style-type: none"> 2. Remove old grease and other contaminants from the line-side jaws and switchblades with a clean, lint-free cloth. If the lubricant has dried, remove it with CRC®-type HF Contact Cleaner, or equivalent, sprayed on a cloth. 3. Relubricate the cleaned areas with a thin film of Dow Corning® BG20 grease only. <i>NOTE: Do not substitute any other lubricant. Other lubricants may not be suitable for electrical applications and could alter the performance of the switch. Dow Corning BG20 is available from Square D (part number SWLUB).</i> 4. Exercise the operating mechanism to ensure proper operation by opening and closing the switch five times with the door closed. Open the switch blades. 	<ol style="list-style-type: none"> 2. Retire la grasa vieja y otros contaminantes de la mordaza del lado de línea y cuchillas del interruptor con una tela limpia sin pelusas. Si el lubricante se ha secado, retírelo con un limpiador de contacto CRC® tipo HF o uno equivalente, rociado en un pedazo de tela. 3. Vuelva a lubricar las áreas limpiadas con una capa delgada de grasa Dow Corning® BG20 solamente. <i>NOTA: No utilice otro tipo de lubricante; es posible que no sean adecuados para aplicaciones eléctricas y pueden alterar el funcionamiento del interruptor. La grasa Dow Corning BG20 se encuentra disponible de Square D (número de pieza SWLUB).</i> 4. Realice una prueba al mecanismo de funcionamiento y asegúrese de que funciona correctamente abriendo y cerrando el interruptor cinco veces con la puerta cerrada. Abra las cuchillas del interruptor. 	<ol style="list-style-type: none"> 2. Retirer toute graisse ancienne et autres polluants des mâchoires côté ligne et des lames de l'interrupteur à l'aide d'un chiffon propre et non pelucheux. Si le lubrifiant a séché, l'enlever avec un nettoyant pour contact CRC® de type HF ou l'équivalent, vaporisé sur un chiffon. 3. Relubrifier les zones propres avec une fine pellicule de graisse Dow Corning® BG20 uniquement. <i>REMARQUE : Ne substituer aucun autre lubrifiant. D'autres lubrifiants pourraient ne pas convenir pour des applications électriques et pourraient altérer le fonctionnement de l'interrupteur. Le Dow Corning BG20 est disponible chez Square D (n° de pièce SWLUB).</i> 4. Manœuvrer le mécanisme de fonctionnement pour s'assurer qu'il fonctionne correctement, en ouvrant et fermant l'interrupteur cinq fois avec la porte fermée. Ouvrir les lames de l'interrupteur.

FIG. 1 : Examples of Arc Suppressors / Ejemplos de supresores de arco / Exemples de supresseurs d'arc



FIG. 2 : Examples of Arc Shields / Ejemplos de protectores de arco / Exemples de blindages d'arc

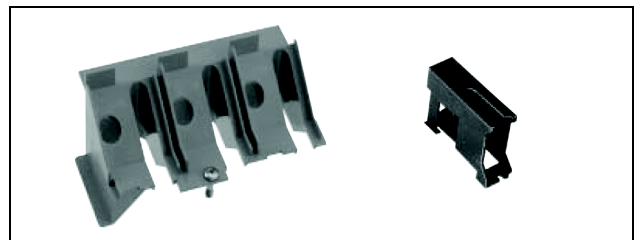


FIG. 3 : Examples of Line Base Assemblies / Ejemplos de ensambles de la base de línea / Exemples d'assemblages de la base de ligne

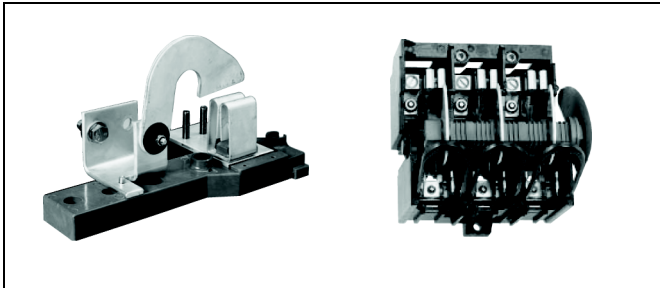
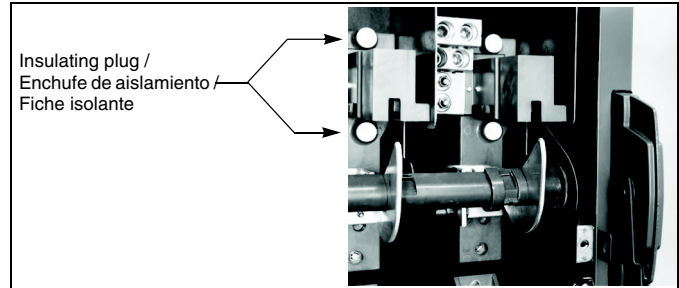


FIG. 4 : Insulating Plugs on Pole Unit / Enchufes de aislamiento en la unidad de polos / Fiches isolantes sur l'unité polaire



Parts Replacement

1. Reinstall the arc suppressor(s) or arc shield(s) according to the torque values in Table 2.
2. Ensure that the two insulating plugs in each phase (400–1200 A only) are firmly seated. See Figure 4.

Colocación de piezas

1. Vuelva a instalar el o los supresores o protectores de arco de acuerdo con los valores de par de apriete mostrados en la tabla 2.
2. Asegúrese de que los dos enchufes de aislamiento en cada fase (de 400 a 1 200 A solamente) estén bien apoyados, vea la figura 4.

Remise en place des pièces

1. Réinstaller le ou les supresseurs ou blindages d'arc conformément aux valeurs de couple indiquées au tableau 2.
2. S'assurer que les deux fiches isolantes de chaque phase (400 à 1 200 A seulement) sont bien en place. Voir la figure 4.

Table / Tabla / Tableau 2 : Arc Suppressor Screw Torque Values / Valores de par de apriete del tornillo del supresor de arco / Valeurs de couple de serrage des vis des supresseurs d'arc

Switch Type / Tipo de interruptor / Type d'interrupteur	Torque Value / Valor de par de apriete / Valeur de couple
30–100 A	5–10 lb-in / lbs-pulg / lb-po (0,57–1,13 N•m)
200 A, F Series / Serie F / Série F	10–20lb-in / lbs-pulg / lb-po (1,13–2,26 N•m)
200 A, E Series / Serie E / Série E	20–25 lb-in / lbs-pulg / lb-po (2,26–2,83 N•m)
400–800 A General Duty / 400 a 800 A de uso general / 400 à 800 A, universel	20–25 lb-in / lbs-pulg / lb-po (2,26–2,83 N•m)
400–1200 A Heavy Duty / 400 a 1 200 A de uso pesado / 400 à 1 200 A, service intensif	30–40 lb-in / lbs-pulg / lb-po (3,39–4,52 N•m)

RE-ENERGIZE THE SWITCH

1. Close and latch the door.
2. Turn off all downstream loads.
3. Turn on power supplying the switch.
4. Turn on the switch.
5. Turn on all downstream loads.

RE-ENERGIZACIÓN DEL INTERRUPTOR

1. Cierre y ponga seguro a la puerta.
2. Desconecte todas las cargas descendentes.
3. Energice el interruptor.
4. Coloque el interruptor en la posición de cerrado (I).
5. Conecte todas las cargas descendentes.

REMISE DE L'INTERRUPTEUR SOUS TENSION

1. Fermer la porte de l'interrupteur.
2. Mettre hors tension toutes les charges en aval.
3. Mettre l'interrupteur sous tension.
4. Mettre l'interrupteur en position de marche (I).
5. Mettre sous tension toutes les charges en aval.

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

Solamente el personal especializado deberá instalar, hacer funcionar y prestar servicios de mantenimiento al equipo eléctrico. Schneider Electric no asume responsabilidad alguna por las consecuencias emergentes de la utilización de este material.

Seul un personnel qualifié doit effectuer l'installation, l'utilisation, l'entretien et la maintenance du matériel électrique. Schneider Electric n'assume aucune responsabilité des conséquences éventuelles découlant de l'utilisation de cette documentation.

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Replacing the Viewing Window 30–200 A

⚠️ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, CSA Z462 or NOM-029-STPS.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Never operate energized switch with door open.
- Turn off switch before removing or installing fuses or making load side connections.
- Always use a properly rated voltage sensing device at all line and load fuse clips to confirm switch is off.
- Turn off power supplying switch before doing any other work on or inside switch.
- Do not use renewable link fuses in fused switches.

Failure to follow these instructions will result in death or serious injury.

Figure 6 - Unhook Snap from Cover

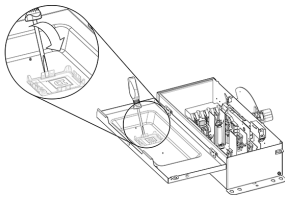
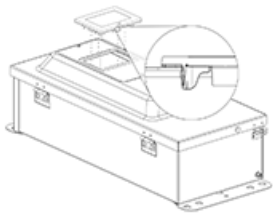


Figure 7 - Snaps in Place



1. Turn off power supplying the switch before performing any work on or inside the switch.
2. Open the switch blades by moving the operating handle to the OFF (O) position.
3. Lock out or tag the switch, per local procedures.
4. Open the enclosure door.
5. Always use a properly rated voltage sensing device at all line and load-side lugs (terminals) to confirm power is off.
6. From inside of front cover use a screw driver to unhook snap from cover and push window out (do on all snap locations). See Figure 6, page 30.
7. Center new window in the opening.
8. Apply equal force on window to snap into place.
9. Confirm that snaps are properly engaged. See Figure 7, page 30.
10. Close the door. Complete any lock out tag out procedures required. Energize, as required.

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Section 7—Replacement Parts and Accessories

See Figures 34 and 35 for transformer covers (top, rear and front) and side panels (left and right), and Figure 21 on page 21 and Figure 22 on page 22 for mounting brackets (wall and ceiling). Refer to Table 4 on page 43 for a listing of replacement and accessory parts.

Figure 34: Exploded Assembly for EX75T3H Energy Efficient Transformer with Enclosure Style 20K Front

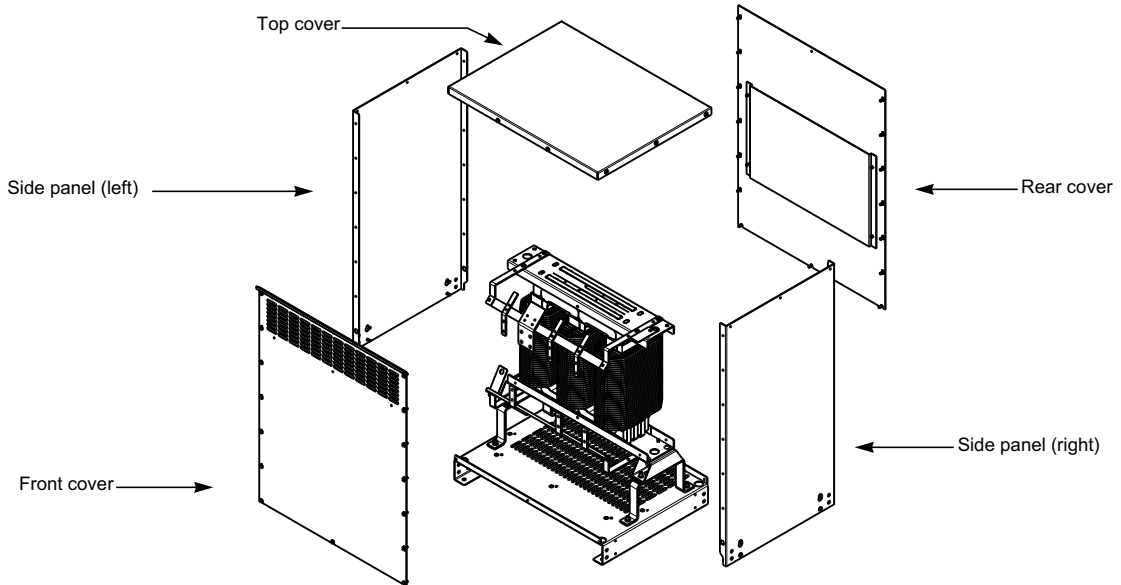
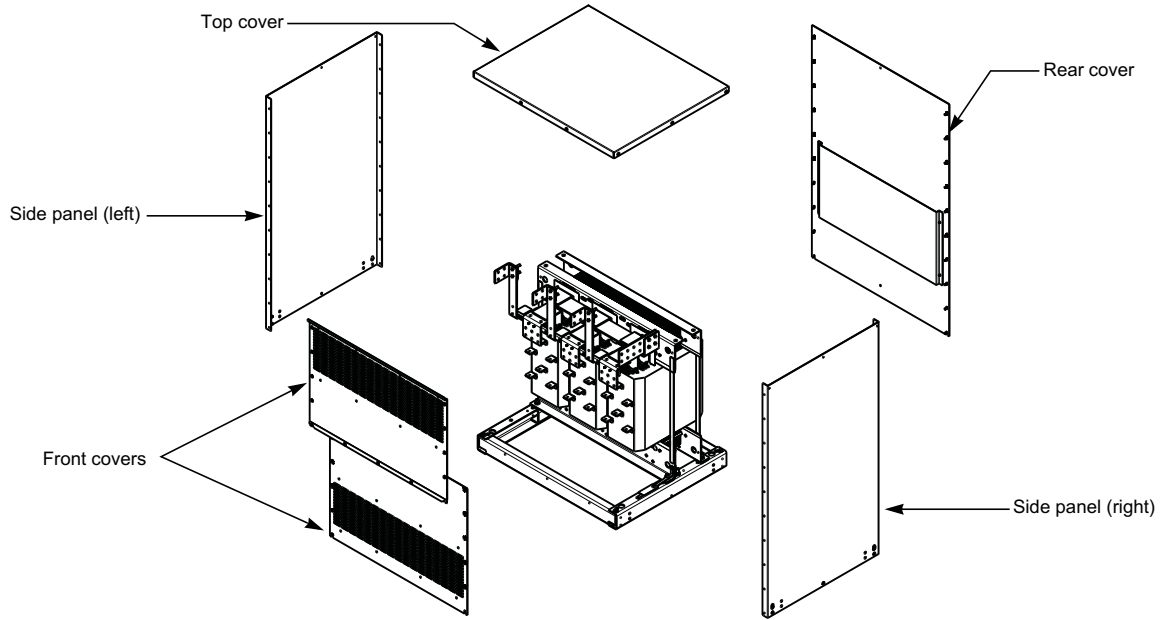


Figure 35: Exploded Assembly for EX300T3H Energy Efficient Transformer with Enclosure Style 25J Front



Refer to the Schneider Electric *Digest*, Section 14, Transformers or call 1-888-Square D (1-888-778-2733) to order replacement parts and accessories.

Refer to Table 4 for enclosure types (top, rear and front covers) side panels, weather-shields and mounting brackets (wall and ceiling).

Table 4: Covers, Side Panels, Weather Shields and Mounting Brackets

Enclosure	Top Cover	Rear Cover	Front Cover	Side Panel (Left and Right)	Weather-shield	Wall Mounting Bracket	Ceiling Mounting Bracket
	Catalog Number						
17D	4310191501	4310191601	4310191601	4310191701	WS363	WMB361362	CMB363
17E	4310191501	—	—	4310191701	—	WMB361362	CMB363
17H	4310191501	4305502003	4305502003	4310191702	WS363	WMB361362	CMB363
17K	7400TC17K	7400R17K	7400FNP17K	7400LR17K	7400WS17K	7400WMB17K	7400CMB17K
18D	4305502101	4305502001	4305502001	4305501001	WS363	WMB363364	CMB363
18E	4305502101	—	—	4305501001	—	WMB363364	CMB363
18H	4305502101	4305502003	4305502003	4310179701	WS363	WMB363364	CMB363
18K	7400TC18K	7400R18K	7400FNP18K	7400LR18K	7400WS18K	7400WMB18K	7400CMB18K
19D	4305501201	4305501101	4305501101	4305501001	WS364	WMB363364	CMB364
19E	—	—	—	—	—	—	—
19K	7400TC19K	7400R19K	7400FNP19K	7400LR19K	7400WS19K	7400WMB19K	7400CMB19K
20D	4305501201	4310192201	4310192201	4310179701	WS364	WMB363364	CMB364
20E	4305501201	—	—	4310179701	—	—	—
20K	7400TC20K	7400R20K	7400FNP20K	7400LR20K	7400WS20K	7400WMB20K	7400CMB20K
21D	4305512501	4300507404	4300507404	4305512601	WS364	—	CMB364
21E	4305512501	—	—	4305512601	—	—	CMB364
21K	7400TC21K	7400R21K	7400FNP21K	7400LR21K	7400WS21K	—	7400CMB21K
22D	4310189001	4310189102	4310189102	4310189201	WS380	—	CMB380
22E	4310189001	—	—	4310189201	—	—	CMB380
22K	7400TC22K	7400R22K	7400FNP22K	7400LR22K	7400WS22K	—	7400CMB22K
23E	—	—	—	—	—	—	—
24D	4310190701	4310190802	4310190802	4310190901	WS381	—	CMB381
24E	4310190701	—	—	4310190901	—	—	CMB381
24K	7400TC24K	7400R24K	7400FNP24K	7400LR24K	7400WS24K	—	7400CMB24K
25D	4310189901	4310190001	4310190001	4310190101	WS382	—	—
25E	4310189901	—	—	4310190101	—	—	—
25J	7400TC25J	7400R25J	7400FNP25J	7400LR25J	7400WS25J	—	—
26D	—	—	—	—	—	—	—
28D	—	—	—	—	—	—	—
28E	—	—	—	—	—	—	—
29D	—	—	—	—	—	—	—
30D	4310192601	(U)4310192901 (L)4310193001	(U)4310192901 (L)4310193001	4310192801	WS383	—	—
30E	4310192601	—	—	—	—	—	—
30J	7400TC30J	7400RU30J 7400RL30J	7400FU30J 7400FLNP30J	7400LR30J	7400WS30J	—	—
31D	—	—	—	—	—	—	—
31E	—	—	—	—	—	—	—
31J	7400TC31J	7400RU31J 7400RL31J	7400FU31J 7400FLNP31J	7400LR31J	7400WS31J	—	—

Touch-up Paint: Catalog Number PK49SP

Refer to Table 5 for available transformer lug kits. For additional information regarding terminal connectors, refer to the label on the reverse side of the transformer front panel. See Figure 36.

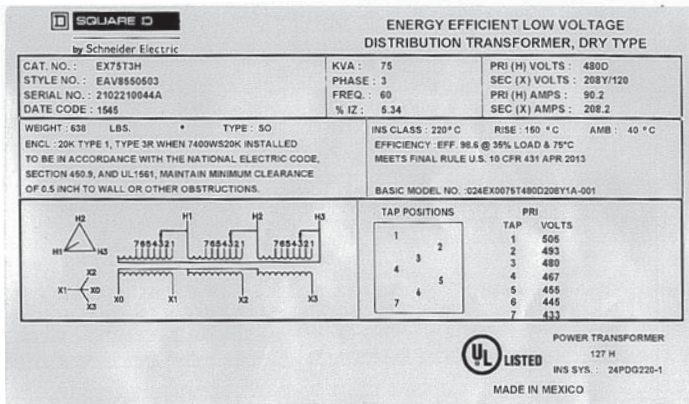
Table 5: VERSAtile™ Compression Lugs and Mechanical Set-Screw Types—UL Listed Lugs AL9CU

Transformer kVA Sizes	Kit Catalog Number	Terminal Lugs		Aluminum or Copper Conductor Range (AWG or kcmil)	Hardware Included	
		Qty.	Catalog Number		Qty.	Cap Screws
VERSAtile Compression Equipment Lugs						
15–37 ^{1/2} 1Ø	VCELSK1	8	VCEL02114S1	#8–1/0	8	1/4 in. x 1 in.
15–45 3Ø		5	VCEL030516H1	#4–300 kcmil	1	1/4 in. x 2 in.
50–75 1Ø	VCELSK2	13	VCEL030516H1	#4–300 kcmil	8	1/4 in. x 1 in.
75–112 ^{1/2} 3Ø					8	1/4 in. x 2 in.
100–167 1Ø	VCELSK3	3 26	VCEL030516H1	#4–300 kcmil	3	1/4 in. x 3/4 in.
150–300 3Ø			VCEL07512H1	#500–750 kcmil Al #500 kcmil Cu		
500 3Ø	VCELSK4	34	VCEL07512H1	#500–750 kcmil Al #500 kcmil Cu	21	3/8 in. x 2 in.

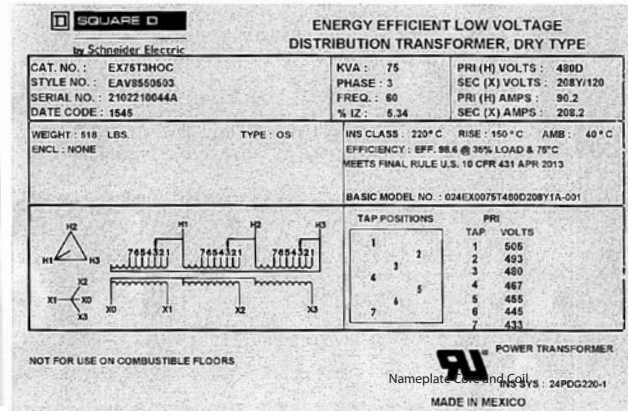
NOTE: Refer to UL 486A for torque values to be used with lug connection hardware.

Two nameplates are attached to each unit. See Figure 36. One on the front cover which is required by standards, the second nameplate is attached to the core and coil, providing installation information inside the unit. The second nameplate also carries a UR listing for the core and coil, allowing the enclosure to be removed and the device installed in the equipment.

Figure 36: Sample Nameplates



Attached to the Front Cover



Attached to the Core and Coil

Refer to Table 6 for Square D lug kits for the following dry-type transformers:

- Single-phase primary, single-phase secondary, three-phase Delta primary, three-phase secondary
- Single-phase primary and secondary, three-phase Wye secondary, three-phase Delta with center tap

Table 6: Square D Lug Kits for Dry-type Transformers

Catalog Number	Lugs per Kit	Wire Range	Cap Screws	Current Range	Grounding Lugs per Kit	Wire Range	Bonding Lugs per Kit	Wire Range
Single-phase Primary, Single-phase Secondary, Three-phase Delta Primary, Three-phase Secondary								
DASKP100	3	1/0–14 STR.	1/4 in. x 1 in.	Up to 100 A	Not Applicable	Not Applicable	Not Applicable	Not Applicable
DASKP250	3	350 kcmil–6 STR.	3/8 in. x 2 in.	101–250 A				
DASKP400	3	600 kcmil–4 STR. (2) 250 kcmil–1/0 STR.	3/8 in. x 2 in.	201–400 A				
DASKP600	6	600 kcmil–4 STR. (2) 250 kcmil–1/0 STR.	3/8 in. x 2 in.	601–800 A				
DASKP1000	9	600 kcmil–2 STR.	3/8 in. x 2 in.	601–800 A				
DASKP1200	12	600 kcmil–2 STR.	3/8 in. x 2 in.	801–1200 A				
Single-phase Primary and Secondary, Three-phase Wye Secondary, Three-phase Delta with Center Tap								
DASKGS100	5	1/0–14 STR.	1/4 in. x 1 in.	Up to 100 A	1	(4) 2/0–14 STR.	1	2–14 STR.
DASKGS250	5	350 kcmil–6 STR.	3/8 in. x 2 in.	101–250 A	1	(4) 2/0–14 STR.	1	2–14 STR.
DASKGS400	5	600 kcmil–4 STR. (2) 250 kcmil–1/0 STR.	3/8 in. x 2 in.	201–400 A	1	(4) 2/0–14 STR.	1	1/0–14 STR.
DASKGS600	10	600 kcmil–4 STR. (2) 250 kcmil–1/0 STR.	3/8 in. x 2 in.	601–800 A	1	(4) 350 kcmil–6 STR.	1	250 kcmil–6 STR.
DASKGS1000	15	600 kcmil–2 STR.	3/8 in. x 2 in.	601–800 A	1	(4) 350 kcmil–6 STR.	1	250 kcmil–6 STR.
DASKGS1200	20	600 kcmil–2 STR.	3/8 in. x 2 in.	801–1200 A	1	(4) 350 kcmil–6 STR.	1	250 kcmil–6 STR.
DASKGS2000	25	600 kcmil–2 STR.	3/8 in. x 2 in.	1201–2000 A	1	(4) 350 kcmil–6 STR.	1	250 kcmil–6 STR.

NOTE: Lugs are not supplied with transformer units. They must be purchased separately.
Refer to UL 486A for torque values to be used with lug connection hardware.

Refer to Table 7 for terminal mechanical and compression lugs and their appropriate wire ranges for dry-type transformers.

NOTE: All terminals allow for NEMA two-hole lugs.

Table 7: Terminal Sizes, Mechanical and Compression Lugs and Wire Ranges

kVA	300 Volts and Above		Below 300 Volts	
	Terminal Mechanical Lugs	Terminal Compression Lugs	Terminal Mechanical Lugs	Terminal Compression Lugs
15	2/0–14 AWG	(1) #12–10 AWG (1) #8–#1/0 AWG	2/0–14 AWG	(1) #8–#1/0 AWG
30	2/0–14 AWG	(1) #8–#1/0 AWG	350 kcmil–6 AWG	(1) #8–#1/0 AWG (1) #4–300 kcmil (1) 250–350 kcmil
45	2/0–14 AWG 350 kcmil–6 AWG	(1) #8–#1/0 AWG (1) #4–300 kcmil	350 kcmil–6 AWG (1) 600 kcmil–4 AWG or (2) Equal 250 kcmil–1/0 AWG	(1) 250–350kcmil (1) #2/0–500 kcmil (2) #4–300 kcmil
75	2/0–14 AWG 350 kcmil–6 AWG	(1) #8–#1/0 AWG (1) #4–300 kcmil (1) 250–350 kcmil	(1) 600 kcmil–4 AWG or (2) Equal 250 kcmil–1/0 AWG	(2) #2/0–500 kcmil (1) 400–600 kcmil AI (2) #4–300 kcmil (2) 250–350 kcmil
112.5	350 kcmil–6 AWG (1) 600 kcmil–4 AWG or (2) Equal 250 kcmil–1/0 AWG	(1) 250 kcmil–350 kcmil (1) #2/0–500 kcmil (2) #4–300 kcmil	(2) 350 kcmil–6 AWG (2) 600 kcmil–2 AWG	(3) 250–350 kcmil (3) #4–300 kcmil (2) 400–600 kcmil AI
150	(1) 600 kcmil–4 AWG or (2) Equal 250 kcmil–1/0 AWG	(1) 250–350 kcmil (2) #4–300 kcmil	(3) 350 kcmil–6 AWG (2) 600 kcmil–2 AWG	(3) #2/0–500 kcmil (3) #4–300 kcmil (3) 400–600 kcmil AI (4) 250–350 kcmil
225	1) 600 kcmil–2 AWG (2) 600 kcmil–2 AWG	(2) #2/0–500 kcmil (2) 400–600 kcmil AI (2) #4–300 kcmil	(3) 600 kcmil–2 AWG	(4) #4–300 kcmil (4) #2/0–500 kcmil
300	(2) 600 kcmil–2 AWG	(3) 250–350 kcmil (3) #2/0–500 kcmil (3) 400–600 kcmil AI	(4) 600 kcmil–2 AWG	(6) #2/0–500 kcmil (6) 400–600 kcmil AI
500	(3) 600 kcmil–2 AWG	(4) #4–300 kcmil (4) #2/0–500 kcmil	(6) 600 kcmil–2 AWG	(9) #2/0–500kcmil (9) 400–600 kcmil AI
750	(4) 600 kcmil–2 AWG	(6) #2/0–500 kcmil (6) 400–600 kcmil AI	(9) 600 kcmil–2 AWG	(15) #2/0–500 kcmil (15) 400–600 kcmil AI

NOTE: All terminals allow for NEMA two-hole lugs.

Refer to Table 8 for Square D ground bar kits.

Table 8: Square D Ground Bar Kits

Catalog Number	Grounding Lugs per Kit	Wire Range
DASKGTB100400	1	(4) 2/0–14 STR.
DASKGTB6002000	1	(4) 350 KCMIL–6 STR.



2.11 Spare Parts and Supply List

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NAVAL FACILITIES ENGINEERING COMMAND PROPULSION SHAFT LATHE FOUNDATION & SUPPORTING SYSTEMS, BUILDING 431

WORK ORDER No. N4425521F4446

CONTRACT No. N44255-20-D-0002

SEPTEMBER 2023

2.11 SPARE PARTS AND SUPPLY LIST

No spare parts provided.



OPTIMAL CONTROL SYSTEMS, INC.

2324 Three Lakes Road SE

Albany, OR 97322

Phone: (541) 967-9323

Fax: (541) 967-9485

Project No. 0922-13SAE

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2.12 Product Submittal Data

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Optimal Control Systems, Inc.

P.O. Box 462, Albany, OR 97321
2324 Three Lakes Rd, Albany, OR 97322
Phone: 541-967-9323 | Fax: 541-967-9485

JOB: Propulsion Shaft Lathe Foundation & Supporting Systems, BLDG 431

WO #: N4425521F4446

CRT #: N44255-20-D-002

REFERENCE DWG #: E-601

In substation "99" there is a 4000A, 480/277, 3 ϕ , 4W GE AV-3 Line SWBD. Key note #4 on DWG E-601 refers to providing circuit breakers rated at 400 amp in the GE SWBD at future locations of C-13-99 and C-15-99.

On investigation these open spots were found to be rated for a 1200-amp frame breaker GE K series.

After investigation, Optimal Control Systems recommends a reconditioned TK4V series circuit breaker (GE has discontinued the TK4V series, so using a new TK4V series is not feasible); circuit breaker is rated 400-800 amp with a T4VT trip unit. T4VT will have an 800-amp plug, and current setting will be set at 0.5 of rating plug.

The proposed breaker will directly fit into existing switchboard with no alteration needed to existing bus work.

The TK4V series breaker comes with the AV-3 series mounting points for handle operator. An AV-3 series handle operator will be provided with circuit breaker, so no alteration to existing door will be needed.

Circuit breaker will match existing series circuit breakers in switchboard.

Circuit breaker will be tested at NETA Standards.

Telek Day

541-967-9323

telek@optimalcontrol.net

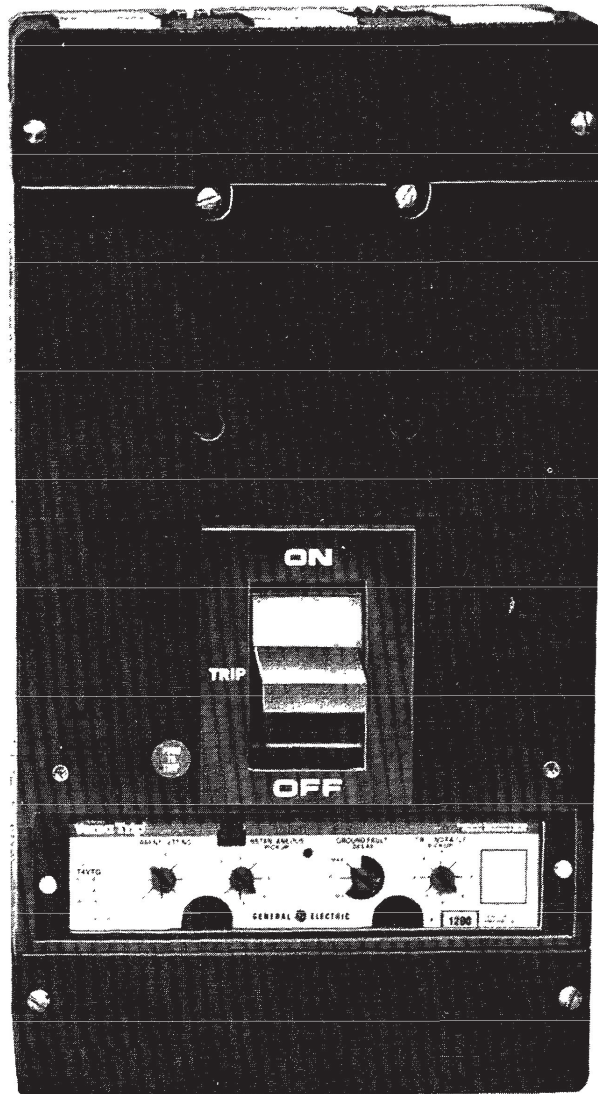
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Assembly
Instructions for
Model 6
Circuit Breakers



Molded Case Circuit Breakers

MicroVersaTrip™ Types TK4V and THK4V



Assembling MicroVersaTrip™ Trip Unit Systems

General Information

Remove components from cartons and check catalog numbers on components against carton labels. Following is a list of components necessary to assemble the General Electric TK4V-THK4V Model 6 frame molded case circuit breakers with a 4-function MicroVersaTrip trip unit (See FIGURE 1). A Model 6 circuit breaker frame is identified by a "MOD 6" stamp on the breaker side, and by an Underwriters Laboratories Inc. label in the handle. Presence of any other label, or of no label at all, in the handle indicates that the breaker frame is not Model 6 and is NOT suitable for field installation of MicroVersaTrip components.

- A. Breaker frame (catalog numbers TK4VF46, THK4VF46)
- B. 4-function programmer (catalog number T4VT series)

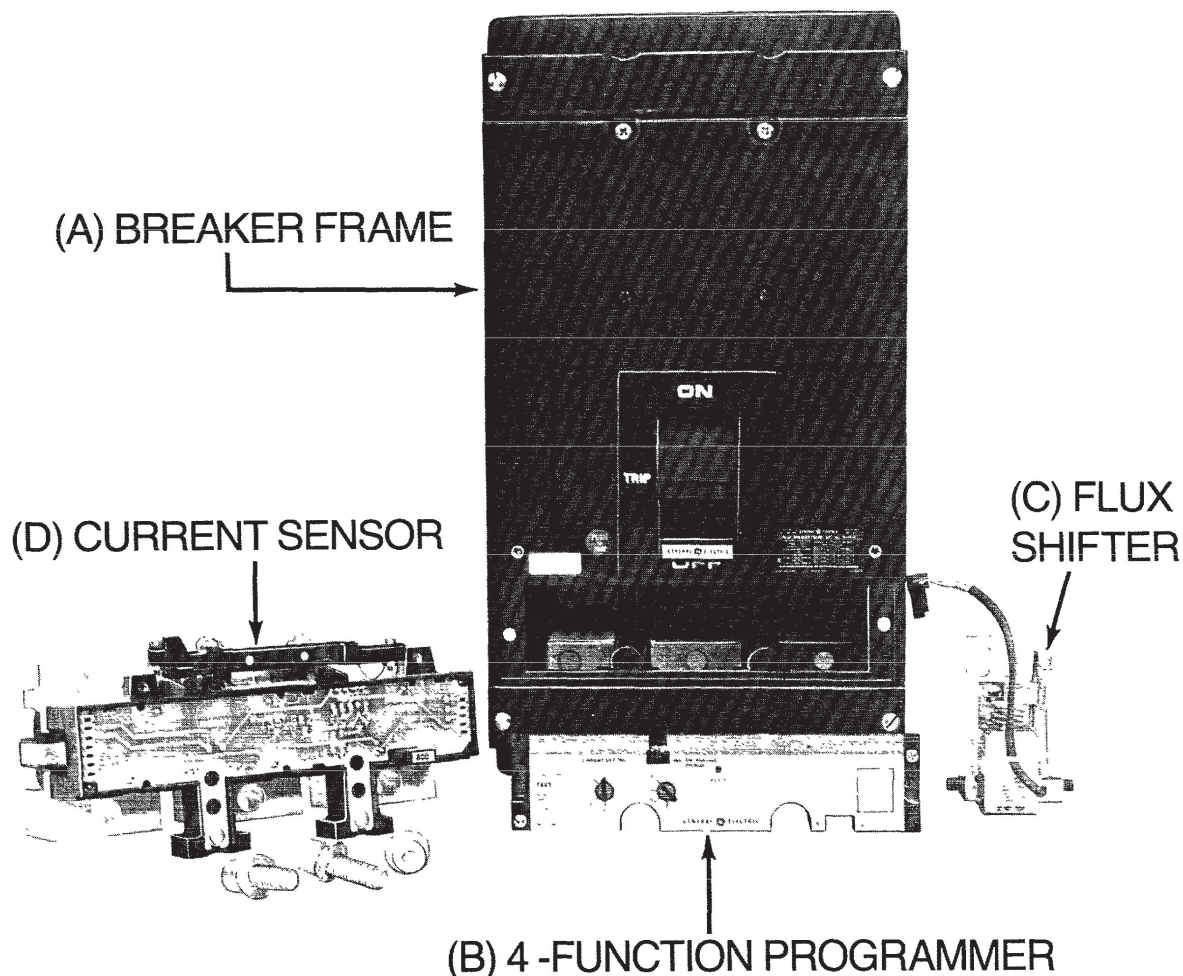
- C. Flux shifter (catalog number TKFS)
- D. Current sensor (catalog number TKCT series)

Necessary Tools:

- Electrician's Phillips head screwdriver
- Torque screwdriver with Phillips and flat blade bit
- Torque wrench with 1/4 inch hex bit (4 inch length)
- 1/16" feeler gauge
- Flat blade screwdriver
- Pliers

Assembly

To assemble the breaker, follow the steps listed below in order:



Step 1

Remove the breaker cover

Two slot head screws secure the lug covers at the line and load ends. After removing the two lug covers, loosen the six Phillips head screws securing the breaker cover. Remove the cover and remove and discard the two tubular spacers shown in FIG. 2. Remove the two shutters from handle and set aside (See FIG. 11 for picture of handle shutters).

Step 2

Install the Current Sensor

The breaker is held in the "ON" position during shipment by placement of a cotter pin in the breaker

mechanism. To remove, use pliers to straighten the end of the cotter pin (FIG. 3). Push the handle toward the load end of the breaker to relieve pressure on the pin; remove and discard the cotter pin (breaker handle will move to the "TRIP" position). Position the three screws provided in the left, center, and right mounting holes of the current sensor with the three flat washers provided (note a lockwasher is already captive on each screw). Slide the current sensor down into the cavity (FIG. 4), holding the breaker handle forward while sliding into position. When in place, tighten the three screws evenly to 125 inch-pounds. Hold trip bar back towards current sensor to reach center screw.

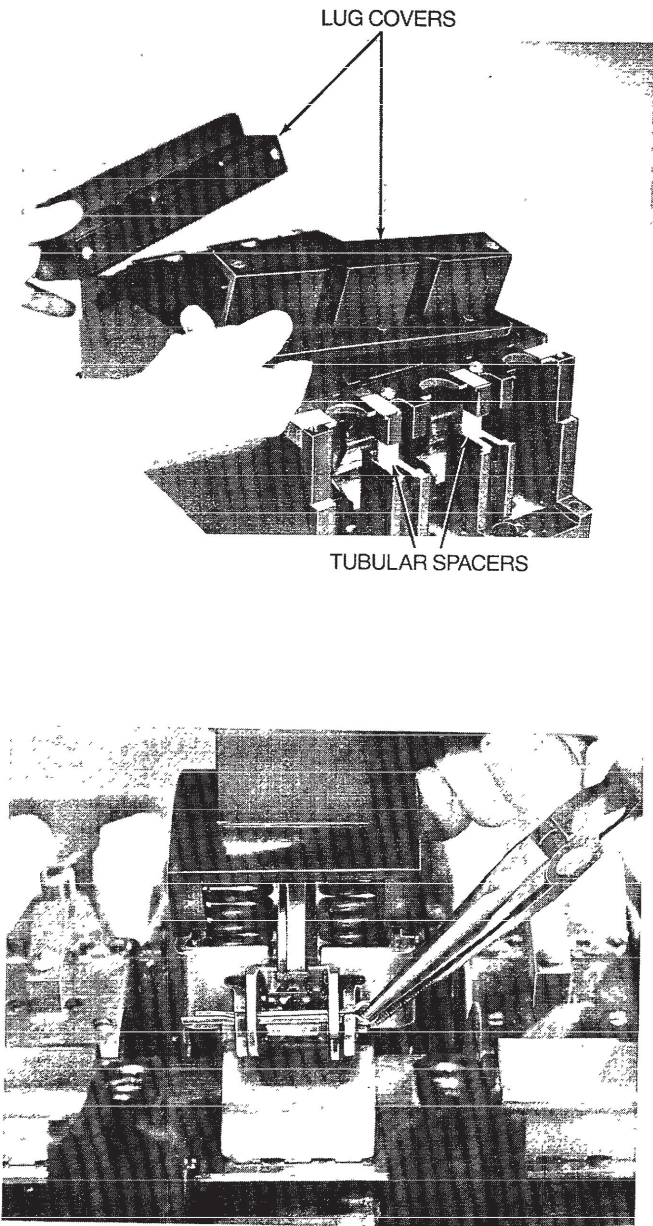


Fig. 2

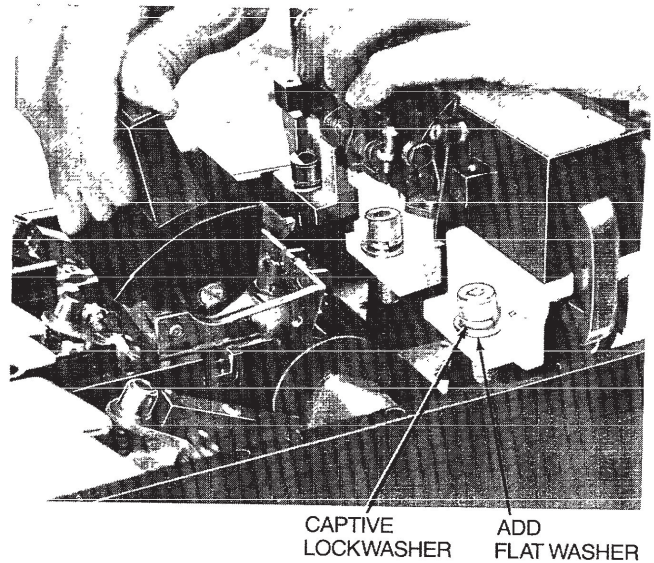


Fig. 4

Fig. 3

Assembling MicroVersaTrip™ Trip Unit Systems

Step 3

Install Programmer and Flux Shifter

Plug the flux shifter into the programmer (FIG. 5).

Then, dress the wires neatly in the three retaining grips in the programmer recess (FIG. 6). Slide the black protective sheath over the wires toward the flux shifter to allow correct wire length in the recess. Position programmer on current sensor and tighten the two programmer mounting screws to 10 inch-pounds.

NOTE: The black plug may pop up when placing the programmer in position. If so, push the plug back down flush with the top surface of the programmer after the programmer mounting screws have been tightened.

Next, install the flux shifter (FIG. 7). Holding the flux shifter frame down in its slot in the breaker base, tighten the flux shifter mounting screw to 10 inch-pounds. Dress the flux shifter wire lead inside the breaker housing (FIG. 8). Pull wire forward to remove slack at programmer end; the wire should not be taut, but should clear the flux shifter reset lever.

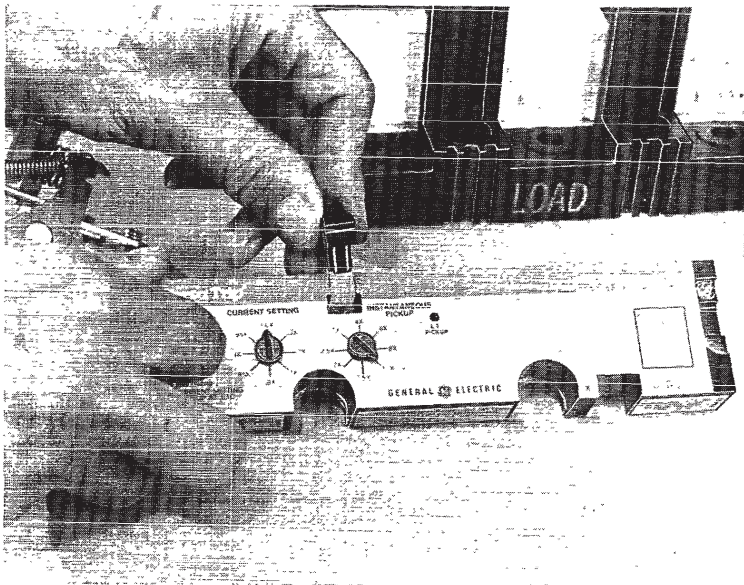


Fig. 5

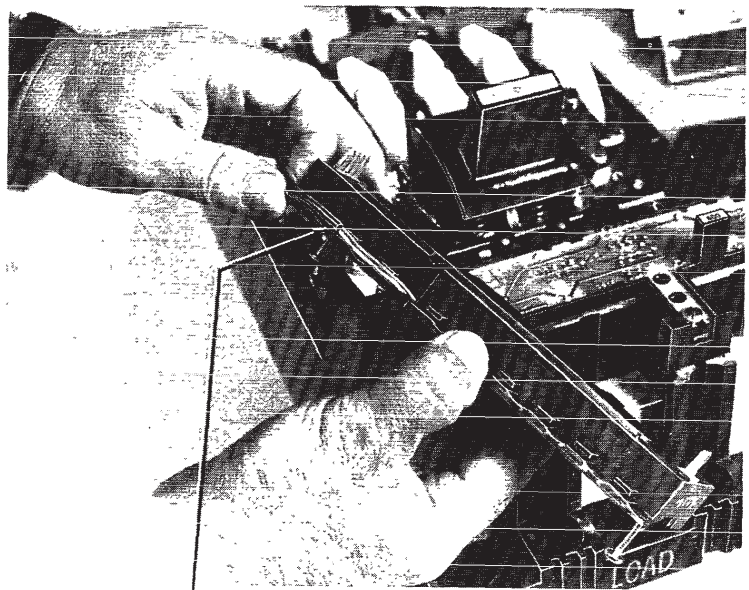


Fig. 6

SLIDE SHEATH OUT
OF RECESS AREA

Step 4

Clearance Check

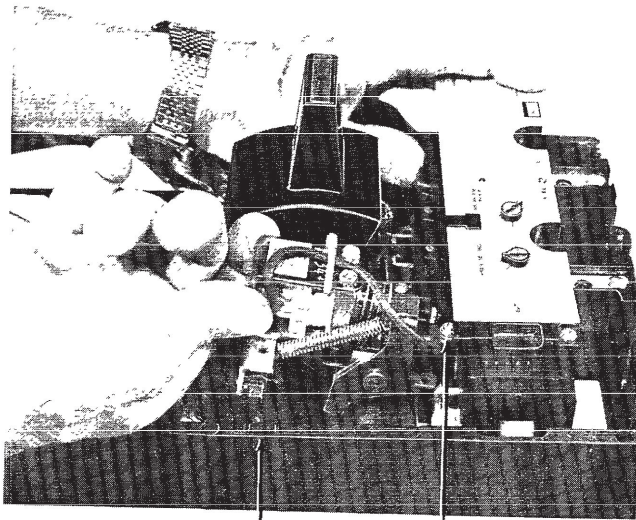
NOTE: Flux shifter plug should be flush with programmer cover.

While holding, the flux shifter down firmly so that its frame rests in the slot provided in the base, latch the breaker by moving the handle toward the load end, then turn the breaker "ON" by moving the handle toward the line end.

NOTE: KEEP HANDS CLEAR OF BREAKER HANDLE AND MECHANISM DURING CHECK.

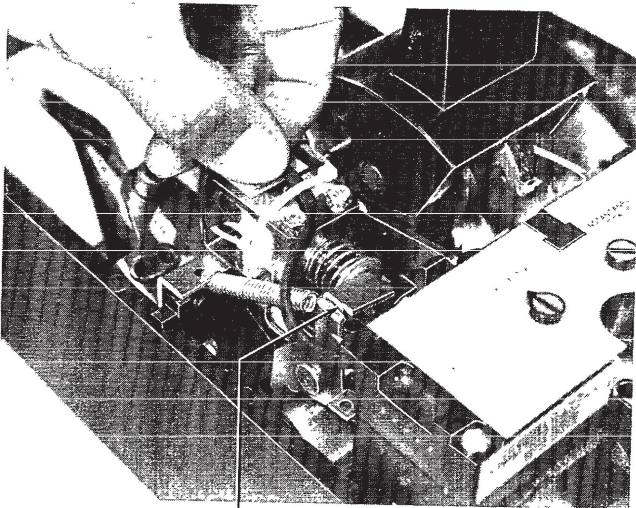
Next, still holding flux shifter down firmly in base, check that the clearance between the flux shifter plunger and the trip bar adjusting screw is between .001 to .063 inch (FIG. 9). If the measurement is off, do not attempt to adjust or use the breaker. Notify GE Construction Equipment Product Service, Plainville, Connecticut, that breaker does not meet the clearance specification.

NOTE: Discharge breaker mechanism by moving trip bar back towards current sensor BEFORE releasing pressure on the flux shifter.



SLOT IN BREAKER BASE
FOR FLUX SHIFTER FRAME

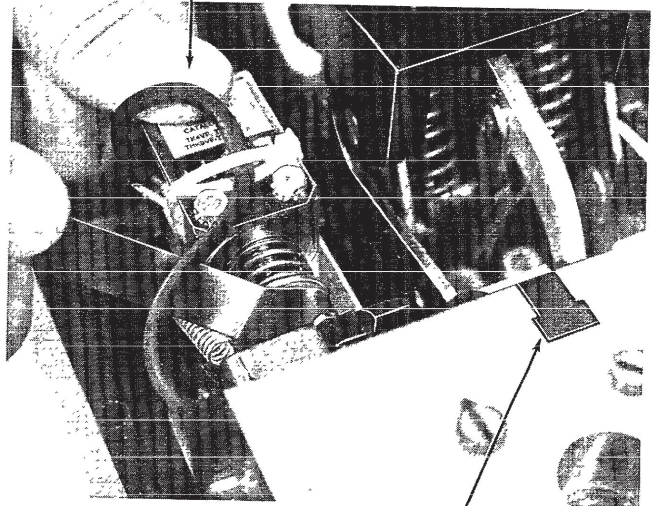
FLUX SHIFTER
MOUNTING SCREW



FLUX SHIFTER RESET LEVER

Fig. 7

HOLD FLUX SHIFTER DOWN



FLUX SHIFTER PLUG TO BE
FLUSH WITH PROGRAMMER

Fig. 9

Fig. 8

Assembling MicroVersaTrip™ Trip Unit Systems

Step 5

Functional Check

NOTE: Flux shifter plug to be flush with programmer cover.

While holding flux shifter down firmly so that its frame rests in the slot provided in the breaker base, latch the breaker by moving the handle toward the load end, then turn the circuit breaker "ON" by moving the handle toward the line end still holding the flux shifter down firmly in the base, place a

screwdriver against the back face of flux shifter plunger and flux shifter frame (FIG. 10). A slight leverage force will release the plunger and trip the breaker.

NOTE: KEEP HANDS AWAY FROM BREAKER HANDLE AND MECHANISM DURING CHECK.

Notify GE Construction Equipment Product Service, Plainville, Connecticut, if breaker is not working properly.

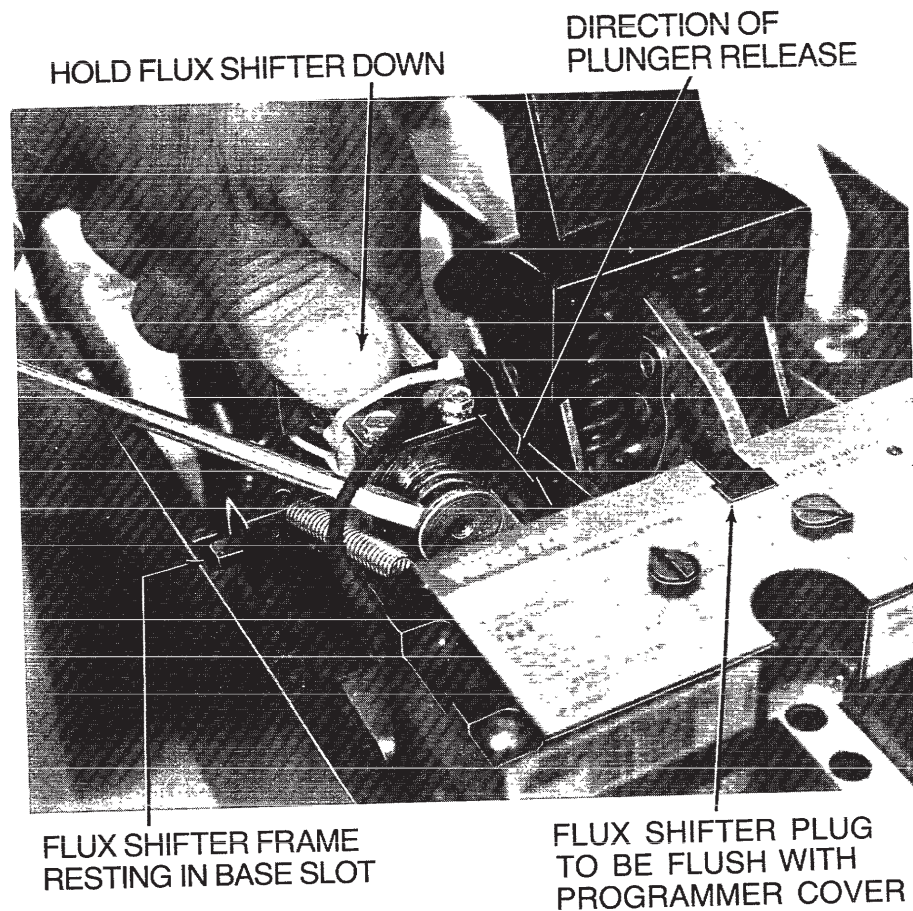


Fig. 10

Step 6

Replace the breaker cover

Replace the two shutters over breaker handle as shown in FIG. 11; the shutters must be oriented as shown to allow for proper cover placement. Slide shutters toward line end of breaker as far as shutter handle openings allow. Replace the breaker cover, and torque the six cover mounting screws to 25 inch-pounds (FIG. 12). For breakers requiring external ground fault connection, attach ground wire leads as indicated to the terminals shown in FIG. 12. Replace

the line and load end lug covers and tighten the slot head screws to 25 inch-pounds.

The breaker may again be checked by moving the handle to the "OFF" then "ON" position, and depressing the "PUSH TO TRIP" button. The breaker is now ready to be installed. Note that changes to the programmer settings may be made by removing the programmer window.

NOTE: For information on Neutral Current Transformer installation, refer to instruction No. GEK-72104.

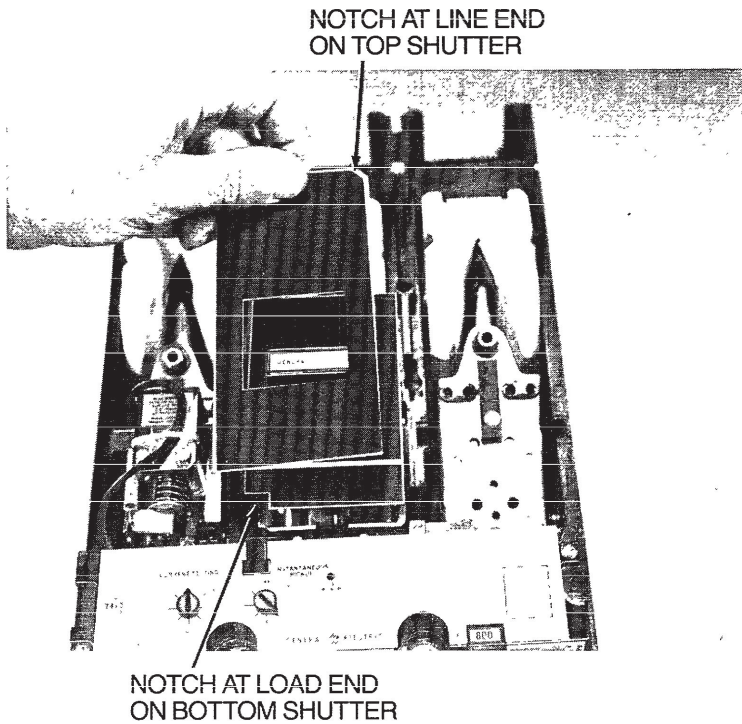
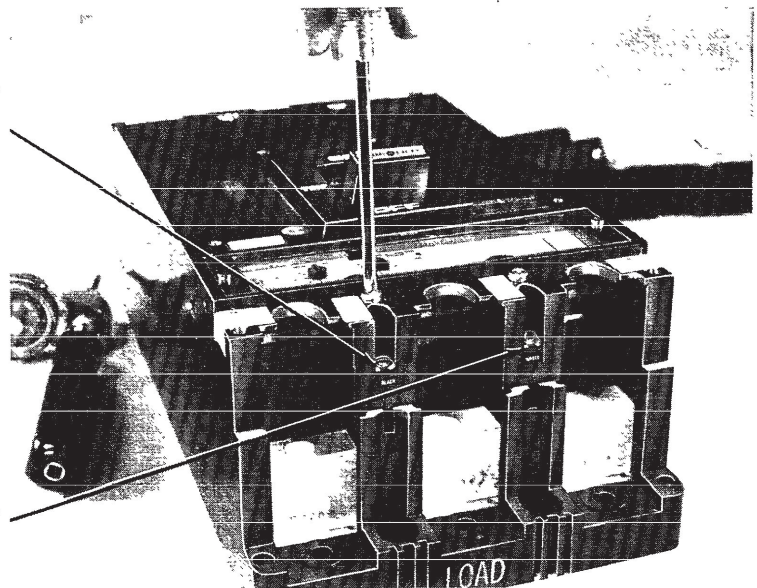


Fig. 11

EXTERNAL GROUND FAULT/NEUTRAL
CURRENT TRANSFORMER
CONNECTION TERMINAL
(WHITE WIRE)

Fig. 12

EXTERNAL GROUND FAULT/NEUTRAL
CURRENT TRANSFORMER
CONNECTION TERMINAL
(BLACK WIRE)



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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 General Electric Company

For further information
call or write your local
General Electric
Sales Office or . . .

General Electric
Company
41 Woodford Avenue
Plainville, CT 06062 U.S.A.

Outside the U.S. write Construction Equipment Export Operation
411 Theodore Fremd Ave., Rye, NY 10580

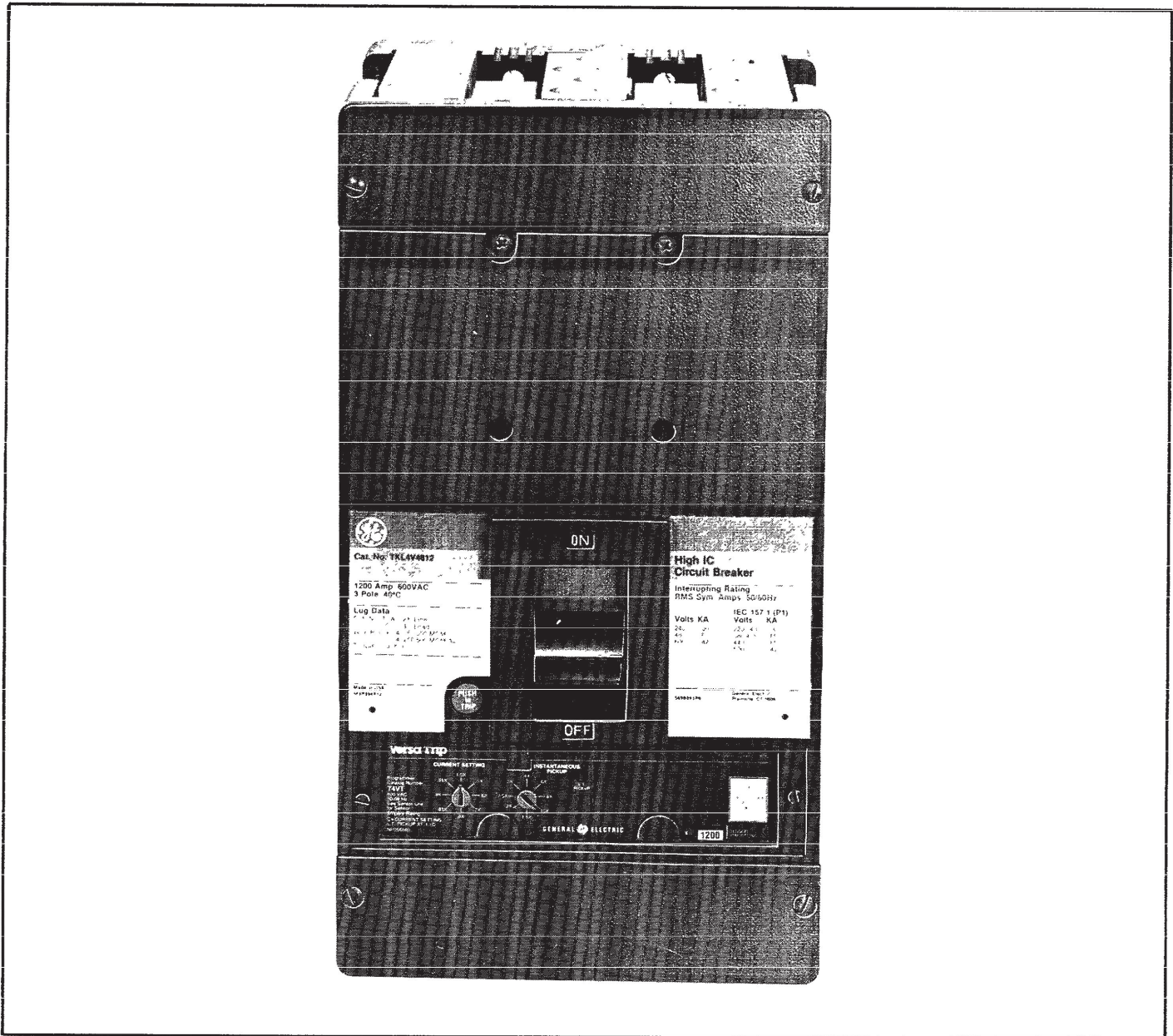
GENERAL  **ELECTRIC**

Model 7
Circuit Breakers

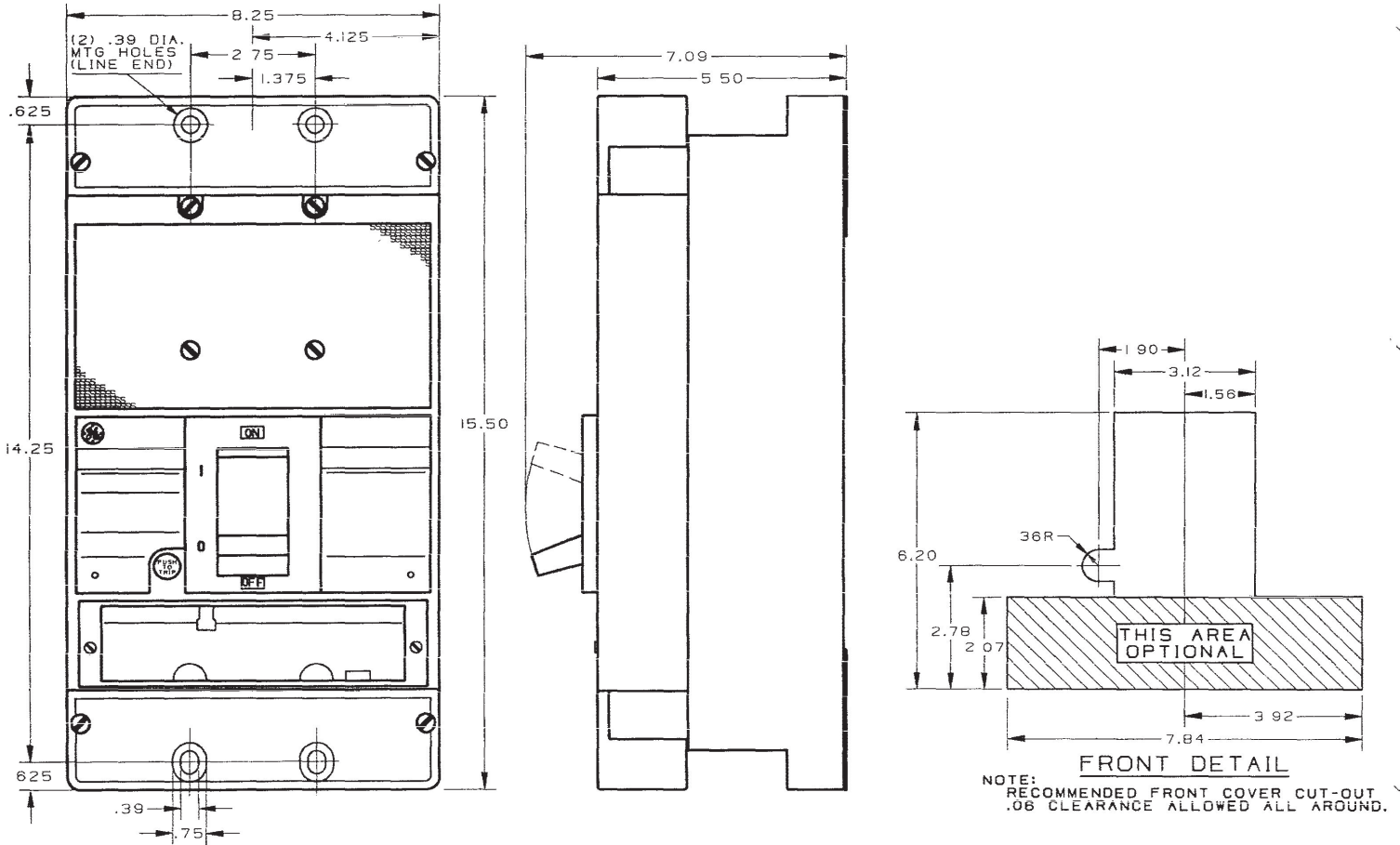


Molded Case Circuit Breakers

MicroVersaTrip® Types TK4V, THK4V and TKL4V



OUTLINE DRAWING TK4V, THK4V, TKL4V



LUG AND LUG COVER SELECTION

Circuit breakers are provided without lugs, and with end covers (suitable for bus connection). Lugs and lug covers are available. See Table 1.

- Lug covers used with lug connectors
- End covers used when bus connecting to breaker
- Lugs TCAL81 and TCAL81A have a new wire range: (3) 3/0-500 MCM CU/AL

- New Wire Range (for upper terminals):
 - TCAL81/91 (3) 3/0-500 MCM CU/AL
 - TCO81A/91 (3) 3/0-500 MCM CU
 - TCAL121/131 (4) 250-350 MCM CU or (4) 250-500 MCM AL
 - TCO121/131 (4) 250-400 MCM CU

Frame Type	Sensor Rating (Amps)	Standard Lugs CU/AL Cat. No.	Optional CU Only Lug Cat. No.	Lug Covers Cat. No.	End Covers Cat. No.
K1200	800	TCAL81① TCAL91②	TCO81A① TCO91②	286A8066G3	286A8066G2
	1000 1200	TCAL121① TCAL131②	TCO121① TCO131②	286A8066G1	286A8066G2

Table 1

- ①For upper (line) terminals
- ②For lower (load) terminals

ACCESSORIES

Internally mounted accessories are UL listed, and field installable, except for bell alarm which is only factory installed. Available accessories are listed in Table 2.

- For detail information on accessories application see GE BuyLog GEP-1100 and GEP-746.

Accessory Installation	Pole Mounting			Lead Exit		Total Number of Accessories Within Any One Circuit Breaker
	Left	Center	Right	Side ^①	Back ^②	
Auxiliary Switches			✓	✓	✓	Any One Plus Bell Alarm
Shunt Trip			✓	✓	✓	
Bell Alarm Switch		✓		✓	✓	
Undervoltage Release			✓	✓	✓	
Combination Shunt Trip with Aux Sw			✓	✓	✓	
Combination Undervoltage with Aux Sw			✓	✓	✓	

Table 2

EXTERNAL ACCESSORIES

- Motor-operated mechanisms
- Back-connected studs
- Mechanical interlocks
- Padlocking devices
- Handle operator
 - TDA, flange-mounted, variable depth
 - TDM, door-mounted, variable depth
 - TDR, integral mechanism, fixed depth

For complete list of external accessories see GE BuyLog® GEP-1100 and GEP-746.

APPLICATION INFORMATION

For information on derating, time current curves, inspection, and testing refer to GE publication GET-2779.

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 General Electric Company

For further information
call or write your local
General Electric
Sales Office or . . .

General Electric
Company
41 Woodford Avenue
Plainville, CT 06062 U.S.A.

Outside the U.S. write Construction Equipment Export Operation,
411 Theodore Fremd Ave., Rye, N.Y. 10580 U.S.A.

GENERAL  **ELECTRIC**

Heavy Duty Safety Switches



NEMA Type 1



NEMA Type 3R



NEMA Type
4, 4X, 5
Stainless Steel



NEMA Type 12

Visible blade heavy duty safety switches are designed for application where maximum performance and continuity of service are required. All heavy duty safety switches feature quick-make, quick-break operating mechanism, a dual cover interlock and a color coded indicator handle. They are suitable for use as service equipment when equipped with a field- or factory-installed neutral assembly or equipment grounding kit, unless a 600Y/347 V or 480 Y/277 V, 1000 A or greater, solidly grounded WYE system is used, per NEC 230-95. Heavy duty safety switches are UL Listed (except as noted). Files E2675 and E154828 meet or exceed the NEMA Standard KS1. For UL Listed short circuit current ratings, see

UL Listed Maximum Short Circuit Current Ratings-AC only, page 3-12.

[1] For Rainproof Bolt-On Hubs and Watertight Hubs see [Hubs](#), page 3-16.
 [2] Complete rating is NEMA Type 3, 3R, 4, 4X, 5 and 12. For NEMA Type 3R applications, remove drain screw from bottom endwall.
 [3] See [316 Grade Stainless Steel—NEMA Type 3, 3R, 4, 4X, 5, 12](#), page 3-13.
 [4] Also suitable for NEMA Type 3R application by removing drain screw from bottom endwall.
 [5] Factory included to prevent inadvertent contact with live parts per .UL 869A and NEC Service entrance barrier requirements.
 [6] For switching dc, use two outside switching poles.
 [7] For corner grounded delta systems, use switching poles for ungrounded conductors. See data bulletin 2700DB0202 for additional information.
 [8] 60 ampere switch with 30 ampere fuse spacing and clips. Must use 60 A enclosure accessories including electrical interlocks.
 [9] For corner grounded delta systems, use switching poles for ungrounded conductors.
 [10] Suitable for NEMA Type 5 applications with drain screw installed.

600 Volt—Single Throw Fusible

Table 3.14: 600 Volt—Single Throw Fusible

Am-peres	NEMA Type 1 Indoor	NEMA Type 3R Rainproof (Bolt-on Hubs [11])	NEMA Type 4, 4X, 5 [12] 304 Stainless Steel (316 stainless [13]) Dust tight, Watertight, Corrosion Resistant (Watertight Hubs [11])	NEMA Type 12K With Knockouts (Watertight Hubs [11])	NEMA Type 3R, 5 or 12 [14] Without Knockouts (Watertight Hubs [11])	Line Side Barriers Factory Included [15]	Horsepower Ratings				dc [16]	
							480 Vac		600 Vac			
							Std. (Using Fast Acting, One Time Fuses)	Max. (Using Dual Element, Time Delay Fuses)	Std. (Using Fast Acting, One Time Fuses)	Max. (Using Dual Element, Time Delay Fuses)	3Ø	3Ø
Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.							

3

SAFETY SWITCHES

4-Wire (3 Blades and Fuseholders, 1 Neutral)—600 Vac, 600 Vdc												
30	H361N	H361NRB				Factory included	5	15	7-1/2	20	—	15
60	H362N	H362NRB	Use three-wire devices, See Field-Installed Neutral Assemblies, page 3-19			Factory included	15	30	15	50	—	30
100	H363N	H363NRB				Factory included	25	60	30	75	—	50
200	H364N	H364NRB	H364NDS	H364NA	H364NAWK	Factory included	50	125	60	150	40	50
400	H365N	H365NR	H365NDS	—	H365NAWK	LSBG602	100	250	125	350	50	50
600	H366N	H366NR	H366NDS	—	H366NAWK	LSBG602	150	400	200	500	50	50
800	H367N	H367NR [18]	—	—	H367NAWK	LSBF602	200	500	250	500	—	50
1200	H368N	H368NR [18]	—	—	H368NAWK	LSBF602	200	500	250	500	—	50

Accessories: see page 3-16

Dimensions: NEMA Type 1 and 3R, see page 3-22

Dimensions: NEMA Type 4, 4X and 5 Stainless and NEMA Type 12, see page 3-23

[11] For Rainproof Bolt-On Hubs and Watertight Hubs see Hubs, page 3-16.

[12] Complete rating is NEMA Type 3, 3R, 4, 4X, 5 and 12..

[13] See 316 Grade Stainless Steel 3 Pole 600 Vac, 600 Vdc, page .

[14] Also suitable for NEMA Type 3R application by removing drain screw from bottom endwall.

[15] Factory included to prevent inadvertent contact with live parts per UL 869A and NEC Service entrance barrier requirements.

[16] For switching dc, use two outside switching poles.

[17] For corner grounded delta systems, use switching poles for ungrounded conductors. See data bulletin 2700DB0202 for additional information.

[18] Suitable for NEMA Type 5 applications with drain screw installed.

[19] 60 A switch with 30 A fuse spacing and clips. Must use 60 A enclosure accessories including electrical interlocks.

[20] Not suitable for use as service equipment.

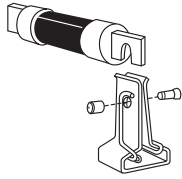
Class H, R, J, and L Fuse Provisions:

Class H or K Fuse Provisions: Fusible Square D 30–600 A heavy duty safety switches accept Class H or K fuses as standard. With Class H or K fuses installed, the switch is UL Listed for use on systems with up to 10 kA available fault current.

Class R Fuse Provisions: Fusible Square D 30–600 A heavy duty safety switches will accept Class R fuses as standard. A field-installed rejection kit is available which, when installed, rejects all but Class R fuses. With the installation of the rejection kit and Class R fuses, the switch is UL Listed for use on systems with up to 200 kA available fault current. See [Class R Fuse Kits, page 3-17](#).

Class J Fuse Provisions: Provisions for installing Class J fuses are included in 30–400 A 600 Volt, and 100–400 A 240 Volt, fusible heavy duty safety switches. Conversion to Class J fuse spacing requires relocating the load side fuse base assembly from the standard Class H fuse location to an alternate position as marked in the enclosure. With Class J fuses installed, the switch is UL Listed for use on systems with up to 200 kA available fault current. Switches rated 600 A, 240 or 600 Volt, require the addition of an adapter kit, H600J. One kit per three-pole switch.

Class L Fuse Provisions: Fusible 800 A and 1200 A safety switches use Class L bolt-in fuses and are rated for use on systems with up to 200 kA at 600 Vac maximum. 1200 A switches accept class L fuses from 601–1200 A, 800 A switches accept class L fuses from 601–800 A.



Class R Fuse

[21] For Rainproof Bolt-On Hubs and Watertight Hubs see [Hubs, page 3-16](#).

[22] Complete rating is NEMA Type 3, 3R, 4, 4X, 5 and 12.

[23] For 316 stainless, see [316 Grade Stainless Steel—NEMA Type 3, 3R, 4, 4X, 5, 12, page 3-13](#).

[24] Also suitable for NEMA Type 3R application by removing drain screw from bottom endwall.

[25] Factory Included to prevent inadvertent contact with live parts per UL 869A and NEC service entrance barrier requirements.

[26] For switching dc, use two outside switching poles.

[27] Suitable for NEMA Type 5 applications with drain screw installed.

[28] Switches with EI suffix are stocked with factory-installed electrical interlocks with one normally-open and one normally-closed contact.

[29] Use 60 A enclosure accessories, including electrical interlocks.

[30] Not suitable for use as service equipment.

[31] No knockouts are provided.

[32] Requires 60 A accessories. See [NEMA Type 4, 4X, 5, 7, 9, and 12, page 3-23](#) for series rating.

[33] HU461AWK (Series F6) is rated 5 hp@250 Vdc, 15 hp@600 Vdc.

[34] Factory Included to prevent inadvertent contact with live parts. UL 869A and NEC service entrance barrier requirements.

UL Listed Maximum Short Circuit Current Ratings—AC only

Table 3.16: Fusible Safety Switches

NOTE: Consult the wiring diagram of the switch to verify the UL Listed short circuit current rating.

Heavy Duty Safety Switch Type	UL Listed Fuse Class	UL Listed Short Circuit Current Ratings
Fusible	H, K	10 kA
	R, J, L	200 kA [35]

[35] On 600 V, 200 A switches, 100,000 A max. on corner grounded delta when protected by Class J or R fuses.

[36] For NEMA Type 4X Fiberglass Reinforced Polyester switches, see page 3-13.

[37] NEMA Type 7/9 SCCR 10 kAIR 600 Vac maximum.

[38] Ampere rating of fuse or circuit breaker not to exceed switch ampere rating.

Equipment Grounding Kits

Equipment grounding kits are available for field installation.

Table 3.34: Equipment Grounding Kits and Terminal Data [82] [83]

Amperes	Series Number	Standard Cat. No.	Terminal Data AWG/kcmil	Optional Copper Only Cat. No.	Terminal Data AWG/kcmil
30	F5-F6	GTK03 [84]	(2) 14-4 Cu or (2) 12-4 Al or (4) 14-12 Cu or (4) 12-10 Al	GTK03C [84] [85]	(2) 14-6 Cu
60	F5-F6 (600 V)	GTK0610	(2) 14-1/0 Cu or (2) 12-1/0 Al and (2) 14-6 Cu or (2) 12-6 Al	GTK0610C	(2) 14-1/0 Cu and (2) 14-6 Cu
60	F5-F6 (240 V)	GTK03	(2) 14-4 Cu or (2) 12-4 Al or (4) 14-12 Cu or (4) 12-10 Al	GTK03C	(2) 14-6 Cu
100	F5-F6	GTK0610	(2) 14-1/0 Cu or (2) 12-1/0 Al and (2) 14-6 Cu or (2) 12-6 Al	GTK0610C	(2) 14-1/0 Cu and (2) 14-6 Cu
200	F5-F6	PKOGTA2	(2) 10-2/0 Cu or (2) 6-2/0 Al	PKOGTC2	(2) 14-4 Cu
400 and 600	E4-E5	PKOGTA2 [86]	(2) 10-2/0 Cu or (2) 6-2/0 Al	PKOGTC3	(4) 14-1/0 Cu
800	E4	PKOGTA7	(4) 4-350 Al/Cu	—	—
1200	E4	PKOGTA8	(8) 4-350 Al/Cu	—	—

[75] For series not shown in chart refer to the switch wiring diagram.

[76] For solid Neutral Assembly Kits for Krydon™ enclosure see Table 3.20.

[77] For Solid Neutral Assembly Kits for Fiberglass Reinforced Poyester enclosures see Table 3.19.

[78] Neutrals cannot be installed in 4 or 6 pole switches or receptacle switches.

[79] See page 3-22 and page 3-23 for safety switch series.

[80] The following 30 A Series F5-F6 switches use SN0610 or SN0610C: H3612, H3612RB, H3612A, H3612AWK, HU3612, HU3612RB, HU3612A and HU3612AWK.

[81] For 200% neutral, order (2) SN20A Neutral Kits and (1) SN20NI Neutral Jumper Kit.

[82] For series not shown in table refer to the switch wiring diagram.

[83] Equipment Ground Kits (Al/Cu) are factory installed standard in 30-200 A Series F NEMA Type 4/4X/5 (stainless steel), 12 and 12K. Equipment Ground Kits are standard factory installed on all receptacle switches and all Series F 30-200 A, 4 and 6 pole switches.

[84] H2212AWK accepts GTK03 or GTK03C. H3612A or AWK accepts GTK03C. H3612 and H3612RB accepts GTK0610 HU3612AWK accepts GTK03C. HU3612A accepts GTK0610C. HU3612RB accepts GTK0610 or GTK0610C.

[85] Optional copper equipment grounding kit for the 4 and 6 pole 30 A F Series: H461DS, H461AWK, HU461DS, HU661DS and HU661AWK accepts GTK03C HU461AWK accepts GTK0610C.

[86] Two required if equipment grounding conductors are run in parallel.

Catalog Number Description

Table 14 - Heavy Duty Switch Catalog Number Description

Number Segment	Character	Description	H	3	2	1	N	RB	—
Type of Switch	Fusible	H = Heavy duty							
	Non-Fusible	HU = Heavy duty							
Blades – Switched Poles	2	Two-poles							
	3	Three-poles							
	4	Four-poles							
	6	Six-poles							
Voltage Rating	2	240 Vac / 250 Vdc Maximum							
	6	600 Vac / 600 Vdc Maximum							
Ampere Rating	1	30 A							
	2	60 A							
	3	100 A							
	4	200 A							
	5	400 A							
	6	600 A							
	7	800 A							
	8	1200 A							
Neutral	N	Factory-installed neutral (neutrals are field-installable on most heavy duty safety switches).							
Enclosure	No suffix	NEMA Type 1							
	A	NEMA Type 12K							
	AWK	NEMA Type 12 (without Knock Outs)							
	DF	NEMA Type 4X Fiberglass Reinforced Polyester							
	DS	NEMA Type 4, 4X, and 5 (NEMA Type 304 stainless steel)							
	DX	NEMA Type 4X Krydon™ Fiberglass Reinforced Polyester							
	R	NEMA Type 3R							
	RB	NEMA Type 3R (with bolt-on hub provision)							
	SS	NEMA Type 4, 4X, and 5 (NEMA Type 316 stainless steel)							
		See Table 21 on page 24	NEMA Type 7 / 9 (Cast aluminum)						
Factory Modifications	CLR	Class R fuse kit (Rejects all but Class R fuses)							
	EI or EI2	Electrical interlock kit (EI = 1 NO / 1 NC contacts. EI2 = 2 NO / 2 NC contacts)							
	GL	Equipment ground lugs ³¹							

31. Equipment Ground Kits (Al/Cu) are factory installed standard in 30–200 A, Series F, NEMA Type 4/4X/5 (stainless steel), 12 and 12K. Equipment Ground Kits are standard on all receptacle switches and Series F, 30–200 A, four- and six-pole switches.

Table 14 - Heavy Duty Switch Catalog Number Description (Continued)

Number Segment	Character	Description	H	3	2	1	N	RB	—
	LI, SI, or LI2	Voltage indicators ³²							
	KI, KI2 or KIKI	Key interlocks ³³							
	LK	Compression lugs (Heavy Duty 800 A and 1200 A only)							
	LOG ³⁴	Lock-Off Guard							
	NP	Phenolic legend plate. Customer must provide legend text.							
	PB(xx)	Push buttons, pilot lights, selector switches. The customer must provide the catalog number of the control device to be installed (contact Schneider Electric for the complete catalog number).							
	SLC	Copper lugs (30–600 A)							
	SP(xx)	Special paint colors (For suffix xx see Table 40 on page 39)							
	SPLO	Lock-on provision							
	VW	Viewing window							
	WA	Appleton™ interlocked receptacle							
	WC	Crouse-Hinds Arkrite™ interlocked receptacle							
	WH	Hubbellock™ interlocked receptacle							

32. LI = Load side indicator. SI = Line side indicator. LI2 = Line and load side indicators.

33. KI = 1 lock. KI2 = 1 lock with 2 cylinders. KIKI = 2 locks.

34. Not available for NEMA Type 4X fiberglass, NEMA Type 4/4X/5 stainless steel and NEMA Type 7/9 enclosures.

Heavy Duty Safety Switches

Product Description

Series F



The Square D™ by Schneider Electric brand Heavy Duty Safety Switch is designed to be tough, reliable and provide exceptional performance in the most grueling conditions; from commercial and institutional to industrial and manufacturing facilities. F Series safety switches provide significantly higher levels of mechanical endurance than NEMA Type KS-1 or UL98 standards require. The design life of a F-Series switch is a minimum of three times the NEMA requirement.

An abundance of copper is used in the heaviest current carrying power paths of all Square D by Schneider Electric Heavy Duty Safety Switches. The more copper for current carrying paths, the lower the temperature rise. Managing temperatures inside the switch is the key to providing greater service life.

All heavy duty safety switches feature a quick-make, quick-break operating mechanism, a dual cover interlock and a color-coded indicator handle.

Applications

Heavy duty safety switches are designed for the following applications:

- Commercial and industrial installations
- Up to 600 Vac or 600 Vdc maximum
- Up to 200,000 rms symmetrical amperes short circuit current
- 30–1200 A
- Horsepower ratings
- Load-make, load-break rated for the switch current rating
- Seismically Qualified to the:
 - 2010 ASCE 7
 - 2012 International Building Code (IBC)
 - 2013 California Building Code (CBC)
 - State of California's Office of Statewide Health Planning and

Standards

Visible Blades



Heavy duty safety switches are manufactured in accordance with these standards:

- UL98, Standard for enclosed and dead front switches. UL Listed;
 - 30–200 A, see file E2875
 - 400–1200 A, see file E154828
- NEMA Standards Publication KS1 and KS2 enclosed switches
- Federal Specifications WS-865C for Type HD

Configuration

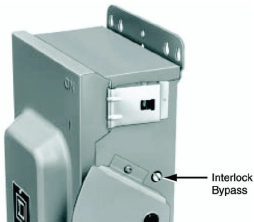
Operating Mechanism Series F



- Two- or three-, fusible switched poles-, with or without, insulated groundable solid neutral
- Four- or six-, fusible switched poles-, without insulated, grounded, solid neutral
- Two-, three-, four-, or six-, non-fusible switched poles-, without insulated, grounded, solid neutral
- Three, fusible switched poles-, without insulated, grounded, solid neutral, interlocked to Appleton™, Crouse-Hinds™, or Hubbellock™ receptacle
- Three, non-fusible switched poles, without insulated, grounded, solid neutral-, interlocked to Appleton, Crouse-Hinds, or Hubbellock receptacle

Construction

Mechanical Lugs

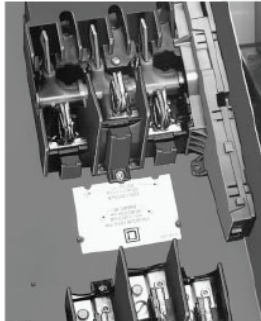


- Visible blades for positive blade position indication
- Optional viewing window allows visual verification of blade position without opening door; not available on NEMA Type 4X fiberglass reinforced polyester enclosures or NEMA Type 7/9 enclosures
- Red and black handle indicates the ON (red) or OFF (black) switch position - except NEMA Type 7/9 enclosures
- Series F handle, mechanism and lock plate are field replaceable
- Side-opening, left hinged covers
- Highly visible embossed ON-OFF marking / ON-OFF labels are used on NEMA Type 4X fiberglass reinforced polyester enclosures
- Quick-make, quick-break, operating mechanism
- Standard with plated aluminum lugs which accept both Cu and Al wires
- Front removable mechanical lugs
- Dual cover interlock prevents the cover from being opened when the switch is ON and prevents the switch from being turned ON when the cover is open
- An interlock bypass is provided for access by authorized personnel

Fuse Pullers

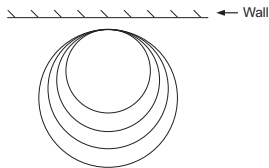


Class J Fuse Provisions Alternate mounting holes make for easy conversion to Class J fuses



- Factory installed fuse pullers are standard on 30–100 A, NEMA Type 4/4X/5 stainless steel, NEMA Type 4X fiberglass reinforced polyester and NEMA Type 12 or 12K switches; Available as a kit for field installation on 30–100 A, F Series switches, NEMA Type 1 and 3R switches
- 30–600 A switches are shipped with standard Class H fuse spacing. These switches will accept Class R fuses also; A field-installed rejection kit is available, which when installed, rejects all but Class R fuses;
- See page 32 for Class R Fuse Kits
- Fuse load base(s) can be repositioned to accept Class J fuses on
- 30–600 A, 600 V switches and 100–600 A, 240 V switches;
- 600 A switches also require a mounting kit (catalog number H600J)
- Multiple padlock provision in OFF position (three 3/16-5/16 in. (4-7 mm) shank padlocks)
- Provisions to lock ON with one 3/8 in. (9 mm) padlock available factory installed, except for NEMA Type 7/9 and NEMA Type 4X fiberglass reinforced polyester switches
- Tangential knockouts, where provided, lessen the need for conduit offset bends
- Lock-OFF provision is standard on all heavy duty safety switches

Tangential Knockouts



Enclosures

NEMA Type 1



- NEMA Type 1 general purpose, indoor (ANSI-49 grey paint on cold rolled steel)
 - Knockouts standard on 30–200 A enclosures; top, bottom and sidewalls

Equipment Grounding Kits

GTK0610 Field- installed Equipment Grounding Kit



Equipment grounding kits available for factory or field installation.

- UL Listed
- For factory installation add suffix GL

-
60. For series not shown in chart refer to the switch wiring diagram.
 61. For Solid Neutral Assembly Kits for Krydon™ enclosures, see Table 19 on page 24.
 62. For Solid Neutral Assembly Kits for Fiberglass Reinforced Polyester enclosures, see Table 17 on page 23.
 63. Neutrals cannot be installed in four- or six-pole switches or receptacle switches.
 64. See page 58 through 62 for safety switch series.
 65. The following 30 A Series F5–F6 switches use SN0610 or SN0610C: H3612, H3612RB, H3612A, H3612AWK, HU3612, HU3612RB, HU3612A and HU3612AWK.
 66. For 200% neutral, order two SN20A Neutral Kits and one SN20NI Neutral Jumper Kit.

Table 29 - Equipment Grounding Kits and Terminal Data

Amperes ^{67 68}	Series ⁶⁹	Catalog Number	Terminal Data AWG/kcmil	Optional Copper Only Catalog Number	Terminal Data AWK/kcmil
30	F5-F6	<i>GTK03</i> ₇₀	(2) 14-4 Cu or (2) 12-4 Al or (4) 14-12 Cu or (4) 12-10 Al	<i>GTK03C</i> _{70 71}	(2) 14-6 Cu
60	F5-F6 (600 V)	<i>GTK0610</i>	(2) 14-1/0 Cu or (2) 12-1/0 Al and (2) 14-6 Cu or (2) 12-6 Al	<i>GTK0610C</i>	(2) 14-1/0 Cu and (2) 14-6 Cu
60	F5-F6 (240V)	<i>GTK03</i>	(2) 14-4 Cu or (2) 12-4 Al or (4) 14-12 Cu or (4) 12-10 Al	<i>GTK03C</i>	(2) 14-6 Cu
100	F5-F6	<i>GTK0610</i>	(2) 14-1/0 Cu or (2) 12-1/0 Al and (2) 14-6 Cu or (2) 12-6 Al	<i>GTK0610C</i>	(2) 14-1/0 Cu and (2) 14-6 Cu
200	F5-F6	<i>PKOGTA2</i>	(2) 10-2/0 Cu or (2) 6-2/0 Al	<i>PKOGTC2</i>	(2) 14-4 Cu
400 and 600	E4-E5	<i>PKOGTA2</i> ₇₂	(2) 10-2/0 Cu or (2) 6-2/0 Al	<i>PKOGTC3</i>	(4) 14-1/0 Cu
800	E4	<i>PKOGTA7</i>	(4) 4-350 Al/Cu	—	—
1200	E4	<i>PKOGTA8</i>	(8) 4-350 Al/Cu	—	—

67. For series not shown in chart refer to the switch wiring diagram.

68. Equipment ground kits (Al/Cu) are factory installed standard in 30–200 A Series F NEMA Type 4/4X/5 (stainless steel), 12 and 12K. Equipment ground kits are standard factory installed on all receptacle switches and all enclosure Series F 30–200 A, four- and six-pole switches.

69. See page 57 through page 61 for safety switch series.

70. H2212AWK accepts GTK03 or GTK03C. H3612A or AWK accepts GTK03C. H3612 and H3612RB accepts GTK0610. HU3612AWK accepts GTK03C. HU3612A accepts GTK0610C. HU3612RB accepts GTK0610 or GTK0610C.

71. Optional copper equipment grounding kit for the four- and six-pole 30 A F Series: H461DS, H461AWK, HU461DS, HU661DS and HU661AWK accepts GTK03C. HU461AWK accepts GTK0610C.

72. Two required if equipment grounding conductors are run in parallel.

General Information

UL Listed Maximum Short Circuit Current Ratings

NOTE: Consult the wiring diagram of the switch to verify the UL Listed short circuit current rating.

Fusible Safety Switches

Table 41 - Fusible Safety Switches

Heavy Duty Safety Switch Type	UL Listed Fuse Class	UL Listed Short Circuit Current Ratings
Fusible	H, K	10 kA
	R, J, L	200 kA ⁹⁴

94. On 600 V, 200 A switches, 100,000 A max. on corner grounded delta when protected by Class J or R fuses.

Non-Fusible Safety Switches

- **Systems equal or less than 10 kAIR SCCR**; Any brand of circuit breaker or fuse not exceeding the ampere rating of the switch may be used in conjunction with a non-fusible safety switch, see Table 43 below
- **Systems above 10 kAIR SCCR**; The UL Listed short circuit current rating for Square D non-fusible switches is based upon the switch being used in conjunction with fuses or Square D circuit breakers or Mag-Gard motor circuit protectors, see Table 43 below

Table 42 - Non-Fusible Safety Switches

Switch Rating (A) ⁹⁶	Fuse Class or Circuit Breaker Type ⁹⁷	3-Phase			250 Vdc / 600 Vdc
		240 Vac	480 Vac	600 Vac	
With Upstream Fuse Protection					
All	H, K	10 kA	10 kA	10 kA	Up to 10 kA
	R, T, J, L	200 kA	200 kA	200 kA	
With Upstream Circuit Breaker Protection					
All	Any brand circuit breaker	10 kA	10 kA	10 kA	Up to 10 kA
30–100	HD	25 kA	18 kA	14 kA	
30–100	HG	65 kA	35 kA	18 kA	
30–100	HJ	65 kA	35 kA	25 kA	
30–100	HL	65 kA	35 kA	35 kA	
30–100	HR	65 kA	35 kA	35 kA	
200	HD, JD	25 kA	18 kA	14 kA	
200	HG, JG	65 kA	35 kA	18 kA	
200	HJ, JJ	65 kA	35 kA	25 kA	
200	HL, JL	65 kA	35 kA	35 kA	
200	HR, JR	65 kA	35 kA	35 kA	
400	LA	22 kA	22 kA	22 kA	
400	LH	25 kA	25 kA	25 kA	
400–600	LD	25 kA	18 kA	14 kA	
400–600	LG	65 kA	35 kA	18 kA	
400–600	LJ	100 kA	65 kA	25 kA	
400–600	LL	100 kA	65 kA	50 kA	
400–600	LR	100 kA	65 kA	65 kA	

95. For NEMA Type 4X Fiberglass Reinforced Polyester switches, see Table 17 and 18 on page 22.

96. NEMA Type 7/9 SCCR 10 kAIR 600 Vac maximum.

97. Ampere rating of fuse or circuit breaker not to exceed switch ampere rating.

Terminal Lug Data

Table 43 - Terminal Lug Data

Rating (A) ⁹⁸	Wires Per Phase and Neutral	Wire Range Wire Bending Space Per NEC Table 312.6 AWG/kcmil	Lug Wire Range AWG/kcmil	Optional ⁹⁹ Versa-Crimp™ Compression Lug Field-Installed	Optional Copper Only Versa-Crimp™ Compression Lug Field-Installed ^{99 100}
30	1	12–6 (Al) or 14–6 (Cu)	12–2 (Al) or 14–2 (Cu)	—	C10–14 ¹⁰¹ , D8–14, or E6–14
	2	12–10 (Al) or 14–10 (Cu)			
60 ¹⁰²	1	12–3 (Al) or 14–3 (Cu)	12–2 (Al) or 14–2 (Cu)	—	C10–14 ¹⁰¹ , D8–14, or E6–14
100 ¹⁰³	1	12–1/0 (Al) or 14–1/0 (Cu)	12–1/0 (Al) or 14–1/0 (Cu)	VCEL02114S1	VCELC02114S1
200 ¹⁰⁴	1	6–250 (Al/Cu)	6–300 (Al/Cu)	VCEL030516H1	VCELC030516H1
400 ¹⁰⁵	1 or 2	1/0–750 (Al/Cu) or 1/0–300 (Al/Cu)	1/0–750 (Al/Cu) and 1/0–300 (Al/Cu)	VCEL07512H1 or	VCELC07512H1 or
				VCEL030516H1 ¹⁰⁶ and	VCELC030516H1 ¹⁰⁷ and
				VCEL05012H1	VCELC05012H1
600	2	3/0–500 (Al/Cu)	3/0–500 (Al/Cu)	VCEL05012H1	VCELC05012H1
800	3	3/0–750 (Al/Cu)	3/0–750 (Al/Cu)	H8LKE2 ¹⁰⁸	—
1200	4	3/0–750 (Al/Cu)	3/0–750 (Al/Cu)	H12LKE2	—

98. 30–100 A switches suitable for 140°F (60°C) or 167°F (75°C) conductors. 200–1200 A switches suitable for 167°F (75°C) conductors.

99. Hubbell Versa-Crimp™ unless otherwise noted.

100. For NEMA Type 1, 12/3R, 12K and 4/4X/5 stainless steel switches only.

101. Order C10–14, D8–14 and E6–14 from Thomas and Betts.

102. H60XBD and H60XBDAA — use 167°F (75°C) copper wire only. #6 AWG copper wire required for 60 A rating.

103. H100XBD and H100XBDAA — use 167°F (75°C) copper wire only. #3 AWG copper wire required for 100 A rating.

104. H225XJG and H225XJGAA — use 167°F (75°C) copper wire only. Lug wire range is #3 AWG – 350 kcmil. Not UL Listed due to inadequate wire bending space (5 in. (127 mm) on the ON end, 6 in. (152 mm) on the OFF end).

105. Maximum wire bending space allows for (1) 600 kcmil or (2) 300 kcmil Al/Cu on NEMA Type 4/4X/5 stainless steel and NEMA Type 12 switches.

106. For NEMA Type 1 and 3R only. For NEMA Type 4/4X/5 stainless steel and NEMA Type 12/3R, 12K use VCEL03038H1 (Al/Cu) or VCELC03038H1 (Cu only). Order two PK516KN mounting kits when installing VCEL030516H1 lugs. Only one kit is required on two-pole switches. PK561KN consists of four 5/16–18 (7 mm) Keps Nuts.

107. For NEMA Type 4/4X/5 stainless steel and NEMA Type 12/3R, 12K use VCEL03038H1 (Al/Cu) or VCELC03038H1 (Cu only). Order two PK516KN mounting kits when installing VCEL030516H1 or VCELC030516H1 lugs. Only one kit is required on two-pole switches. PK561KN consists of four 5/16–18 (7 mm) Keps Nuts.

108. For 800 and 1200 A compression lug kits, see Table 37 on page 35 for additional information.

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Product data sheet

Specifications

SQUARE D

Green Premium™



30A 3P SN Type1 600VAC/DC Heavy Duty Fusible Safety Switch

CH361N

Main

Product	Single Throw Safety Switch
Disconnect Type	Fusible disconnect
Number of Poles	3
Electrical Connection	Lugs
Duty Rating	Heavy duty

Complementary

Line Rated Current	30 A
Factory Installed Neutral	Neutral (factory installed)
Mounting Type	Surface
Voltage Rating	600 V AC/DC
Motor power hp	5 hp 480 V AC 50...60 Hz 3 phases NEC 240.6 15 hp 480 V AC 50...60 Hz 3 phases NEC 430.52 7.5 hp 600 V AC 50...60 Hz 3 phases NEC 240.6 20 hp 600 V AC 50...60 Hz 3 phases NEC 430.52 15 hp 600 V DC
Wire Size	AWG 12...AWG 6 aluminum AWG 14...AWG 6 copper
Tightening torque	45 lbf.in (5.08 N.m) 0.02 in ² (13.3 mm ²) AWG 6 40 lbf.in (4.52 N.m) 0.01 in ² (8.367 mm ²) AWG 8 35 lbf.in (3.95 N.m) 0.00...0.01 in ² (2.06...5.261 mm ²) AWG 14...AWG 10
Height	14.6 in (370.84 mm)
Width	7.55 in (191.77 mm)
Depth	4.87 in (123.70 mm)

Environment

Certifications	CSA
Enclosure Rating	NEMA 1 galvanized steel

Packing Units

Package 1 Weight	8.30 lb(US) (3.765 kg)
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Offer Sustainability

Sustainable offer status	Green Premium product
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Disclaimer: This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications

REACH Regulation	REACH Declaration
REACH free of SVHC	Yes
EU RoHS Directive	Compliant EU RoHS Declaration
Mercury free	Yes
RoHS exemption information	Yes
China RoHS Regulation	China RoHS declaration Product out of China RoHS scope. Substance declaration for your information
Environmental Disclosure	Product Environmental Profile
PVC free	Yes

Product data sheet

Specifications

SQUARE D

Green Premium™



60A 3P SN Type1 600VAC/DC Heavy Duty Fusible Safety Switch

CH362N

Main

Product	Single Throw Safety Switch
Disconnect Type	Fusible disconnect
Number of Poles	3
Electrical Connection	Lugs
Duty Rating	Heavy duty

Complementary

Line Rated Current	60 A
Factory Installed Neutral	Neutral (factory installed)
Mounting Type	Surface
Voltage Rating	600 V AC/DC
Motor power hp	15 hp 480 V AC 50...60 Hz 3 phases NEC 240.6 30 hp 480 V AC 50...60 Hz 3 phases NEC 430.52 15 hp 600 V AC 50...60 Hz 3 phases NEC 240.6 50 hp 600 V AC 50...60 Hz 3 phases NEC 430.52 30 hp 600 V DC
Wire Size	AWG 14...AWG 3 copper or aluminum
Tightening torque	50 lbf.in (5.65 N.m) AWG 3) 45 lbf.in (5.08 N.m) AWG 6...AWG 4) 40 lbf.in (4.52 N.m) AWG 8) 50 lbf.in (5.65 N.m) 0.00...0.01 in ² (2.06...5.261 mm ²) AWG 14...AWG 10) 50 lbf.in (5.65 N.m) AWG 14...AWG 10)
Height	17.5 in (444.50 mm)
Width	10.5 in (266.70 mm)
Depth	6.38 in (162.05 mm)

Environment

Certifications	CSA
Enclosure Rating	NEMA 1 galvanized steel

Packing Units

Unit Type of Package 1	PCE
Number of Units in Package 1	1
Package 1 Weight	15.66 lb(US) (7.103 kg)

Disclaimer: This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications

Package 1 Height	7.20 in (18.288 cm)
Package 1 Width	10.70 in (27.178 cm)
Package 1 Length	20.00 in (50.8 cm)

Offer Sustainability

Sustainable offer status	Green Premium product
REACH Regulation	REACH Declaration
REACH free of SVHC	Yes
EU RoHS Directive	Compliant EU RoHS Declaration
Mercury free	Yes
RoHS exemption information	Yes
China RoHS Regulation	China RoHS declaration Product out of China RoHS scope. Substance declaration for your information
Environmental Disclosure	Product Environmental Profile
PVC free	Yes

Product data sheet

Specifications

SQUARE D

Green Premium™



400A 3P SN Type1 600VAC/DC Heavy Duty Fusible Safety Switch

CH365N

Main

Product	Single Throw Safety Switch
Disconnect Type	Fusible disconnect
Number of Poles	3
Electrical Connection	Lugs
Duty Rating	Heavy duty

Complementary

Line Rated Current	400 A
Factory Installed Neutral	Neutral (factory installed)
Mounting Type	Surface
Voltage Rating	600 V AC/DC
Motor power hp	100 hp 480 V AC 50...60 Hz 3 phases NEC 240.6 250 hp 480 V AC 50...60 Hz 3 phases NEC 430.52 125 hp 600 V AC 50...60 Hz 3 phases NEC 240.6 350 hp 600 V AC 50...60 Hz 3 phases NEC 430.52 50 hp 250 V DC 50 hp 600 V DC
Wire Size	AWG 1/0...750 kcmil copper or aluminum
Tightening torque	550 lbf.in (62.14 N.m) AWG 1/0...750 kcmil
Height	50.25 in (1276.35 mm)
Width	27.63 in (701.80 mm)
Depth	10.13 in (257.30 mm)

Environment

Certifications	CSA
Enclosure Rating	NEMA 1 galvanized steel

Packing Units

Unit Type of Package 1	PCE
Number of Units in Package 1	1
Package 1 Weight	180.00 lb(US) (81.647 kg)
Package 1 Height	50.24 in (127.6 cm)

Disclaimer: This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications

Package 1 Width	27.64 in (70.2 cm)
Package 1 Length	10.12 in (25.7 cm)

Offer Sustainability

Sustainable offer status	Green Premium product
REACH Regulation	REACH Declaration
REACH free of SVHC	Yes
EU RoHS Directive	Compliant EU RoHS Declaration
Mercury free	Yes
RoHS exemption information	Yes
China RoHS Regulation	China RoHS declaration Product out of China RoHS scope. Substance declaration for your information
Environmental Disclosure	Product Environmental Profile
PVC free	Yes
Halogen content performance	Halogen free plastic parts product



LV Transformers EZ Selector–Selection Assistance

LV Transformers EZ Selector

Steps to select an LV transformer.

1. Select product type:
 - Three Phase – Energy Efficient – EX (DOE 2016)
 - Three Phase – Energy Efficient – EX, K-13 Rated (DOE 2016)
 - Three Phase – Energy Efficient – EX, Watchdog Low Temperature Rise (DOE 2016)
 - Single Phase – Energy Efficient – EE (DOE 2016)
 - Three Phase – Resin Encapsulated
 - Single Phase – Resin Encapsulated
2. Select kVA Rating – 15, 30, 45, 75, 112.5, 150, 225, 300, 500, or 750 kVA
3. Select Primary Voltage – 208, 240, 480, or 600 Vac Delta
4. Select Secondary Voltage – 208Y/120, 240 Vac Delta 120 V CT, 480Y/277
5. Select Mounting – Floor, Wall
6. Select Enclosure – Indoor (Type 1), Indoor (Type 2), Indoor/Outdoor (Type 3R), Indoor/Outdoor (Type 4X)
7. Select Temperature Rise – 55°C, 80°C, 115°C, 150°C
8. Select Material – Aluminum, Copper
9. Select Sound Level – 39 dB (6 dB below), 44 dB (6 dB below), 47 dB (3 dB below), 49 dB (6 dB below), 54 dB (6 dB below), 58 dB (6 dB below)

Additional Information

Search for “LV Transformers ” from our technical FAQs page: www.schneider-electric.us/en/faqs

For catalog information, please use this link: [LV Transformer Documents](#)

General Purpose Dry Type 600 Volts and Below Overview

The Energy Policy and Conservation Act of 1975 (EPCA), update in the Energy Policy Act of 2005, authorized the Department of Energy (DOE) to evaluate and set minimum efficiency levels for Low Voltage Distribution Transformers. The DOE published a final rule prescribing new energy conservation standards for distribution transformers. 78 FR 23335 (April 18, 2013).

10 CFR 431.196: The efficiency of a low-voltage dry-type distribution transformer manufactured on or after January 1, 2016, shall be no less than that required for their kVA rating in the table below. Low-voltage dry-type distribution transformers with kVA ratings not appearing in the table shall have their minimum efficiency level determined by linear interpolation of the kVA and efficiency values immediately above and below that kVA rating. All efficiency values are at thirty-five percent of nameplate-rated load temperature corrected to 75°C, determined according to the DOE Test Method for Measuring the Energy Consumption of Distribution Transformers under Appendix A to Subpart K of 10 CFR part 431. https://www1.eere.energy.gov/buildings/appliance_standards/standards.aspx?productid=55&action=viewcurrent

Energy Conservation Standards for Low-Voltage Dry-Type Distribution Transformers			
Single phase		Three phase	
kVA	Efficiency %	kVA	Efficiency %
15	97.70	15	97.89
25	98.00	30	98.23
37.5	98.20	45	98.40
50	98.30	75	98.60
75	98.50	112.5	98.74
100	98.60	150	98.83
167	98.70	225	98.94
250	98.80	300	99.02
333	98.90	500	99.14
—	—	750	99.23
—	—	1000	99.28

Distribution transformer means a transformer that (1) has an input voltage of 34.5 kV or less; (2) has an output voltage of 600 V or less; (3) is rated for operation at a frequency of 60 Hz; and (4) has a capacity of 10 to 2500 kVA for liquid-immersed units and 15 to 2500 kVA for dry-type units.

Low voltage dry-type distribution transformer means a distribution transformer that: has an input voltage of 600 V or less, is air-cooled, and not used oil as a coolant.

The following product offering must comply with the table above:

- Three- and single-phase
- Step up and step down transformers
- General purpose ventilated transformers (isolation transformers)
- Watchdog general purpose ventilated transformers (low temperature rise)
- Transformers designed for harmonic applications (K-rated, harmonic mitigating, data center transformers, etc.)
- General purpose open core and coil transformers

The following low voltage transformers do not need to comply with the table above:

- Auto-transformers
- Drive isolation transformers
- Non-ventilated transformers
- Resin encapsulated transformers
- Buck boost transformers
- Control transformers (machine tool)
- Medical isolation panel transformers compliance with UL 1047 (tables 30.1 and 30.2) (SPECIAL IZ — LOW LEAKAGE)

New Three-Phase Offering from Square D — DOE 2016 EX

- Exceed the efficiency levels from 10 CFR 431.196
- Terminals sized to handle wire ranges to match Square D circuit breakers, switches, panelboards, etc. Located to meet NEC bending radius and layout to simplify connections
- IZ Levels to allow for designing with the minimum AIC Panels available
- In-rush current limited to expand the Square D circuit breaker options at both 125 and 250% sizing
- Sound level at 3 dB for all designs, but up to 6–10 dB below on certain units—QUIET QUALITY
- 1/2 in. clearance from the rear and side, **UL 1561alcove testing all enclosures to not exceed 90°C on adjacent walls**
- Four product families of the DOE 2016 EX: General purpose, aluminum and copper windings, 150°C rise; Watchdog, low temperature rise, aluminum and copper windings, 115 or 80°C rise; Two solutions for harmonic loads: K-13 Wye secondary, harmonic mitigating transformers and K-9 ZigZag secondary, harmonic mitigating transformers.

[1] Efficiencies are determined at the following reference conditions: (1) for no-load losses, at the temperature of 20°C; (2) for load-losses, at the temperature of 75°C and 35% of nameplate load. (Source: Table 4–2 of National Electrical Manufacturers Association (NEMA) Standard TP–1–2002, *Guide for Determining Energy Efficiency for Distribution Transformers*.)

DOE 2016 Energy Efficient Three Phase

Table 14.2: EXN & EX Three-Phase 60 Hz, 480Y/277 Vac Secondary; UL Listed

kVA	Catalog No.	Minimum Efficiency @ 35% 75°C	Full Capacity Taps	Degree C Temp. Rise	Insulation Class	%IZ	Sound Level	Weight (lbs)[2]	Enclosure[3]
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480 Vac Delta Primary, Aluminum Windings									
15	EXN15T1814H	97.89%	6-2.5%2+4-	150	220	4.62%	39 dB	191	17M
30	EXN30T1814H	98.23%	6-2.5%2+4-	150	220	3.50%	39 dB	333	18M
45	EXN45T1814H	98.40%	6-2.5%2+4-	150	220	3.95%	39 dB	373	19M
75	EXN75T1814H	98.60%	6-2.5%2+4-	150	220	5.03%	44 dB	531	20M
112.5	EXN112T1814H	98.74%	6-2.5%2+4-	150	220	3.53%	44 dB	730	21M
150	EXN150T1814H	98.83%	6-2.5%2+4-	150	220	3.08%	44 dB	1012	22M
225	EX225T1814H	98.94%	6-2.5%2+4-	150	220	4.6%	52 dB	1450	25J
300	EX300T1814H	99.02%	6-2.5%2+4-	150	220	5.4%	52 dB	1860	25J
500	EX500T76H	99.14%	4-2.5%2+2-	150	220	—	57 dB	2915	30J

[2] Not for construction. Contact your local Schneider Electric representative for certified prints.
 [3] For enclosure styles, see Table 14.8 Enclosure Dimensions and Accessories, page 14-8
 [4] 3156 Catalog Numbers are shipped connected as 240 V.
 [5] 3155 Catalog Numbers are shipped connected as 240 V.

Watchdog transformers, by design, reduce energy consumption at loads greater than 50% loading, giving fewer BTUs/hour at those loading levels. The life expectancy is greater than that of 150°C rise General Purpose units.

- Aluminum or copper windings
- Two temperature rise options: 115°C rise on 220°C insulation systems (15% continuous emergency overload capacity); 80°C rise on 220°C insulation systems (30% continuous emergency overload capacity)

Table 14.4: EXN & EX Three Phase 60 Hz; UL Listed

kVA	Catalog No.	Minimum Efficiency @ 35% 75°C	Full Capacity Taps	Degree C Temp. Rise	Insulation Class	%I _Z	Sound Level	Weight (lbs) [6]	Enclosure [7]
480 V Delta Primary, 208Y/120 Secondary, Aluminum Windings									
15	EXN15T3HF	97.89%	6-2.5%2+4-	115	220	3.98%	39 dB	184	17M
30	EXN30T3HF	98.23%	6-2.5%2+4-	115	220	2.92%	39 dB	324	18M
45	EXN45T3HF	98.40%	6-2.5%2+4-	115	220	3.46%	39 dB	400	19M
75	EXN75T3HF	98.60%	6-2.5%2+4-	115	220	5.07%	44 dB	527	20M
112.5	EXN112T3HF	98.74%	6-2.5%2+4-	115	220	3.30%	44 dB	806	21M
150	EXN150T3HF	98.83%	6-2.5%2+4-	115	220	3.29%	44 dB	1012	22M
225	EX225T3HF	98.94%	6-2.5%2+4-	115	220	4.5%	49 dB	1825	24J
300	EX300T3HF	99.02%	6-2.5%2+4-	115	220	30.0%	49 dB	1975	25J
500	EX500T68HF	99.14%	4-2.5%2+2-	115	220	4.9%	56 dB	3100	30J
750	EX750T68HF	99.23%	4-2.5%2+2-	115	220	5.0%	58 dB	4125	31J

[6] Not for construction. Contact your local Schneider Electric representative for certified prints.

[7] For enclosure styles, see Table 14.8 Enclosure Dimensions and Accessories, page 14-8

Enclosures and Accessories



Style D and H—Type 2 Rated
Converts to Type 3R with Weathershield



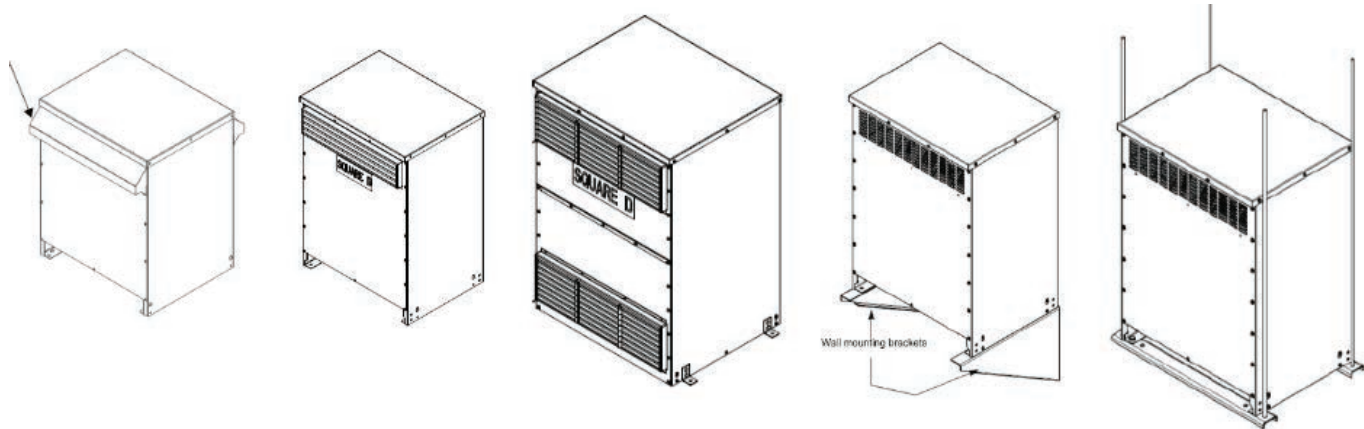
Style M—Type 2 Rated
Converts to Type 3R with Weathershield



Style J—Type 1 Rated
Converts to Type 2 with Drip Shield
Converts to Type 3R with Weathershield

Table 14.8: Enclosure Dimensions and Accessories

Enclosure Number/ Style	Height		Width ^[13]		Depth		Mounting	Weathershield	Wall Mounting Bracket ^[14]	Ceiling Mounting Bracket ^[15]	Drip Shield	
	in.	mm	in.	mm	in.	mm						
17	D	27	686	20	508	16	406	Floor	WS363	WMB361362	CMB363	—
	H	37	940	20	508	16	406	Floor	WS363	WMB361362	CMB363	—
18	D	30	762	20	508	20	508	Floor	WS363	WMB363364	CMB363	—
	H	37	940	20	508	20	508	Floor	WS363	WMB363364	CMB363	—
19	D	30	762	30	762	20	508	Floor	WS364	WMB363364	CMB364	—
20	D	37	940	30	762	20	508	Floor	WS364	WMB363364	CMB364	—
21	D	37	940	30	762	24	610	Floor	WS364	—	CMB364	—
22	D	43.8	1111	32	813	27	686	Floor	WS380	—	CMB380	—
24	D	49.5	1257	35	889	28.5	724	Floor	WS381	—	CMB381	—
25	D	49.5	1257	41	1041	32	813	Floor	WS382	—	—	—
26	D	57.5	1461	41	1041	32	813	Floor	WS382	—	—	—
28	D	60	1524	56	1422	36	914	Floor	WS370A	—	—	—
29	D	68	1727	56	1422	36	914	Floor	WS370A	—	—	—
30	D	71	1803	48	1219	36	914	Floor	WS383	—	—	—
31	D	74	1880	56	1422	40.5	1029	Floor	WS384	—	—	—
17	M	23.98	609	21.50	546	21.18	538	Floor	7400WS17M	7400WMB17M	7400CMB17M	—
18	M	28.31	719	25.51	648	24.69	627	Floor	7400WS18-M19M	7400WMB18M19M20-M	7400CMB18M19M20M	—
19	M	29.33	745	25.51	648	25.94	659	Floor	7400WS18-M19M	7400WMB18M19M20-M	7400CMB18M19M20M	—
20	M	33.50	851	30.08	764	27.44	697	Floor	7400WS20M	7400WMB18M19M20-M	7400CMB18M19M20M	—
21	M	37.52	953	31.30	795	28.43	722	Floor	7400WS21M	n/a	7400CMB21M	—
22	M	40.59	1031	33.66	855	32.56	827	Floor	7400WS22M	n/a	7400CMB22M	—
24	—	—	—	—	—	—	—	—	—	—	—	—
25	J	57.5	1461	40.1	1019	32.75	832	Floor	7400WS25J	—	—	7400DS25J
30	J	71	1803	48.25	1226	37.9	963	Floor	7400WS30J	—	—	7400DS30J
31	J	76	1930	56	1422	44.5	1130	Floor	7400WS31J	—	—	7400DS31J



New Optional Floor Mounting Kit — Enclosures M and J

[13] These dimensions are not for construction. Contact your local Schneider Electric.

[14] Wall mounting brackets are used with units weighing no more than 700 lbs.

[15] Ceiling mounting brackets are used with units weighing no more than 1200 lbs.

Class **7400** / Refer to Catalog **7400CT0601**



Table 14.9: Mechanical Lug Kits

Catalog No.	Lugs Per Kit	Wire Range	Cap Screws	Current Range	Grounding Lugs per Kit	Wire Range	Bonding Lugs per Kit	Wire Range
Single-Phase Primary, Single-Phase Secondary, Three-Phase Delta Primary, Three-Phase Delta Secondary								
DASKP100	3	1/0–14 STR	1/4 x 1 in.	Up to 100 A	Not applicable	Not applicable	Not applicable	Not applicable
DASKP250	3	350 kcmil–6 STR	3/8 x 2 in.	101 to 250 A				
DASKP400	3	600 kcmil–4 STR (2) 250 kcmil–1/0 STR	3/8 x 2 in.	201 to 400 A				
DASKP600	6	600 kcmil–4 STR (2) 250 kcmil–1/0 STR	3/8 x 2 in.	601 to 800 A				
DASKP1000	9	600 kcmil–2 STR	3/8 x 2 in.	601 to 800 A				
DASKP1200	12	600 kcmil–2 STR	3/8 x 2 in.	801 to 1200 A				
Single-Phase Primary and Secondary, Three-Phase Wye Secondary, Three-Phase Delta with Center Tap								
DASKGS100	5	1/0–14 STR	1/4 x 1 in.	Up to 100 A	1	(4) 2/0 to 14 STR	1	2 to 14 STR
DASKGS250	5	350 kcmil–6 STR	3/8 x 2 in.	101 to 250 A	1	(4) 2/0 to 14 STR	1	2 to 14 STR
DASKGS400	5	600 kcmil–4 STR (2) 250 kcmil–1/0 STR	3/8 x 2 in.	201 to 400 A	1	(4) 2/0 to 14 STR	1	1/0 to 14 STR
DASKGS600	10	600 kcmil–2 STR	3/8 x 2 in.	601 to 800 A	1	(4) 350 kcmil to 6 STR	1	250 kcmil to 6 STR
DASKGS1000	15	600 kcmil–2 STR	3/8 x 2 in.	601 to 800 A	1	(4) 350 kcmil to 6 STR	1	250 kcmil to 6 STR
DASKGS1200	20	600 kcmil–2 STR	3/8 x 2 in.	801 to 1200 A	1	(4) 350 kcmil to 6 STR	1	250 kcmil to 6 STR
DASKGS2000	25	600 kcmil–2 STR	3/8 x 2 in.	1201 to 2000 A	1	(4) 350 kcmil to 6 STR	1	250 kcmil to 6 STR

Lugs are not supplied with transformer units. They must be purchased separately.

Schneider Electric Low Voltage Transformers have been qualified to the site-specific requirements of the following listed model building code and/or standard. (International Building Code, California Building Code, Uniformed Building Code). Qualification based on tri-axial shake table test results conducted in accordance with the AC156 test protocol3 (Acceptance Criteria for Seismic Qualification Testing of Nonstructural Components).

- Enclosure 1A to 11A, 12C to 16C, 12B to 15B (Resin Encapsulated Transformers)
- Enclosure 17D to 31D, 17H to 18H, 17K to 22K, 25J to 31J (Ventilated Transformers)
- Enclosure 17K to 20K with wall mounting bracket (Ventilated Transformers)
- Enclosure 17E to 31E (Non-ventilated Transformers)
- Enclosure MPZ A, AA, B, BB, C, CC (MPZB)

Product is Listed for installation in Hospitals State of California–OSHPD Special Seismic Certification Preapproval OSP-0023-10.

Product Description

The Square D™ Distribution Transformer is designed to supply power throughout the building. The transformer permits the use of multiple voltages in the design of the system.

Some advantages to designing a system with low voltage transformers:

- Distributes a voltage higher than required by the load to limit wire losses and voltage drop
- Addition of source impedance to the system, reducing common overcurrent at normal voltages
- Mitigates harmonics through an internal magnetic circuit
- Allows system grounding closer to the load, reducing capacitive noise
- Can be designed for any output voltage that is required.

A few disadvantages to designing a system with low voltage distribution transformers:

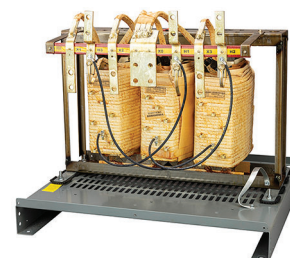
- Reduces overall efficiency of the system due to internal losses within the transformer
- Added heat to the building if installed indoors and in the HVAC system.

The impact on the efficiency of the system and the concerns for improvements in the market for energy consumption have led to low voltage distribution transformers being regulated through the Energy Policy and Conservation Act (United States) and Natural Resources (Canada).

Below are the efficiency ratings of Three-Phase Low Voltage Dry-Type Distribution Transformers:

Three-Phase	
kVA	Efficiency (%)
15	97.89
30	98.23
45	98.40
75	98.60
112.5	98.74
150	98.83
225	98.94
300	99.02
500	99.14
750	99.23
1000	99.28

NOTE: All efficiency values are at 35% of nameplate-rated load, determined according to the U.S. Department of Energy (DOE) Test Method for Measuring the Energy Consumption of Distribution Transformers under Appendix A to Subpart K of 10 CFR part 431.



EXN Energy Efficient Transformer Family

Square D transformers manufactured by Schneider Electric™ are optimized for performance, including the following components:

- **Coil**—Designed to reduce the losses with customized wire configurations used exclusively by Schneider Electric. Computer-controlled winding equipment minimizes variability during the winding process. Aluminum conductors are standard with copper conductors available as a factory option.
- **Insulation System**—The system consists of a conductor wrap or coating, layer insulation, air gap spacing, and varnish material. The system is UL listed for a specific maximum temperature for average temperature rise, hot spot, and ambient temperature. Schneider Electric's EXN family of transformers have a 428°F (220°C) insulation system, with an average temperature rise maximum of 302°F (150°C).
- **Core**—EXN Transformers are designed with high-grade grain oriented, non-aging silicon steel laminations with high magnetic permeability, low hysteresis, and low eddy current losses. The computer-aided process allows the design to keep the magnetic flux densities well below the saturation point. The laminations are carefully and evenly stacked via distributive gap laminations, then clamped together to ensure an efficient magnetic circuit while providing a quiet quality offering of low voltage transformers.
- **Terminals**—Sized to allow the lugs to align with all corresponding Schneider Electric equipment (such as circuit breakers, switches, panelboards, switchboards, etc.). The terminal positioning separates the Primary and Secondary terminals and meets the National Electrical Code® (NEC®) minimum wire bending requirements. **Lugs are not shipped with the transformer.** This allows the installer the flexibility to order what is needed to meet any distribution system requirements. **NOTE:** Both mechanical and compression lug kits are available from Schneider Electric.

Terminals are standardized to National Electrical Manufacturers Association® (NEMA®) two-pole pad dimensions.

Codes and Standards

NEMA ST-20—100% routine testing prior to shipment; other ST-20 testing available at time of order, to be included when shipped.

UL1561 and CSA22.2 No. 47—Third party Certified by UL – File E6868; cULus Labeled

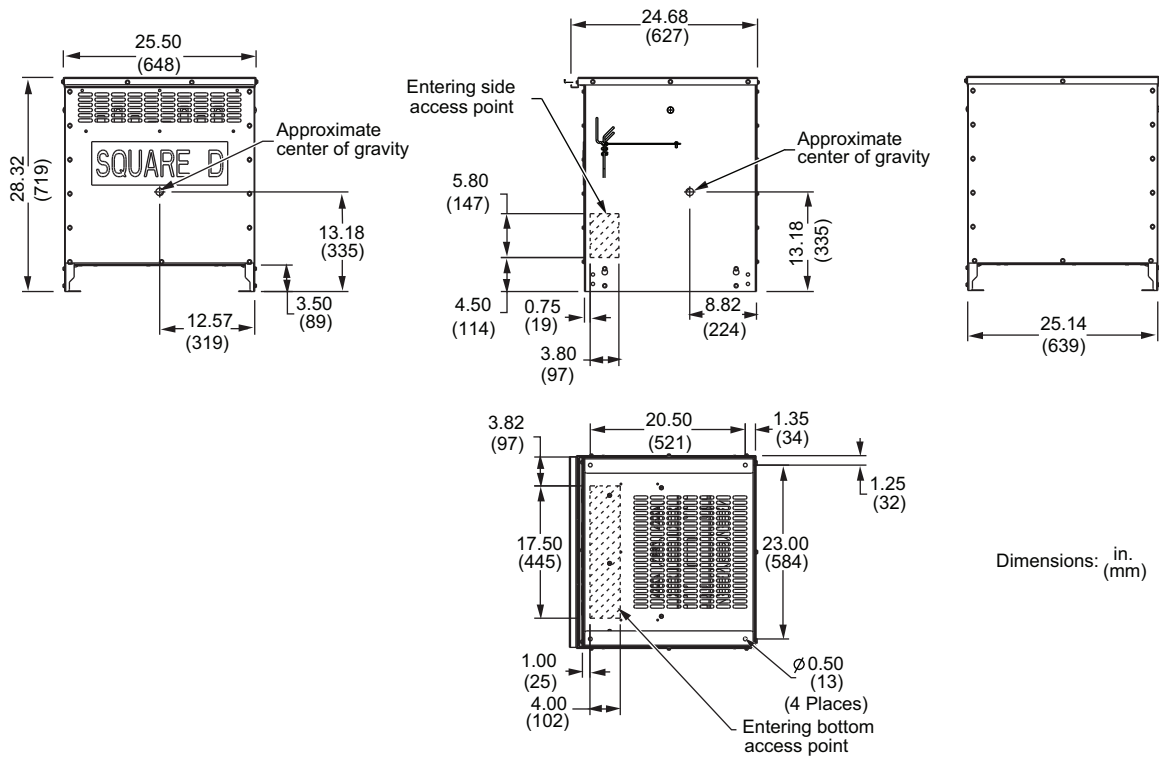
Energy Efficient Registration—Department of Energy 10 CFR 429; Natural Resources Canada – via UL

Manufactured in ISO 9001 Facilities—Product Environmental Profile – RoHS/ REACH

EXN — Enclosure 18M

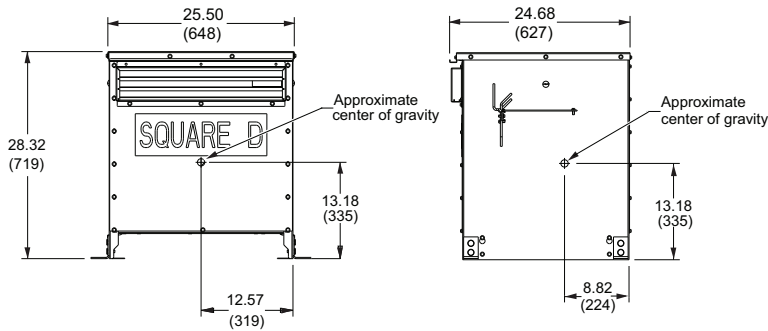
Cat. No.	DOE 2016 Efficiency	Winding Material	Temp. Rise 220°C Insulation	Core Loss	Coil Loss	%IZ	%IX	X/R	Weight (lbs.)
30 kVA, 480 Delta 6-2.5% 2+4- Pri Taps, 208Y/120, Sound Level 39 dB									
<i>EXN30T3H</i>	98.28%	Al	150°C	80	1044	3.80	1.58	0.49	303
<i>EXN30T3HCU</i>	98.38%	Cu	150°C	68	1049	4.08	2.24	0.65	356
<i>EXN30T3HF</i>	98.31%	Al	115°C	97	778	2.92	1.41	0.57	324
<i>EXN30T3HFCU</i>	98.39%	Cu	115°C	68	974	3.98	2.42	0.69	358
<i>EXN30T3HB</i>	98.30%	Al	80°C	86	835	4.37	3.44	1.31	345
<i>EXN30T3HBCU</i>	98.52%	Cu	80°C	90	589	2.76	1.99	1.04	407

18M Dimensions

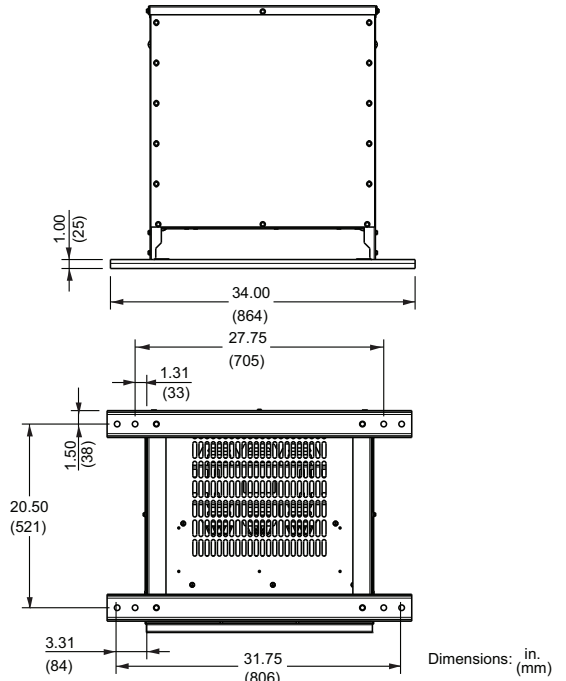


18M Accessories

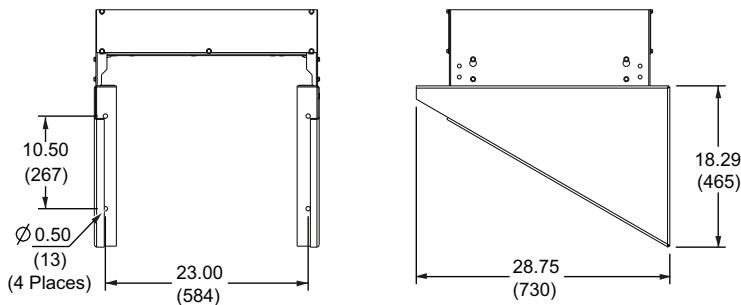
Weathershield — Convert from Type 2 to Type 3R: 7400WS18M19M



Ceiling Mounting Bracket: 7400CMB18M19M20M



Wall Mounting Bracket: 7400WMB18M19M20M

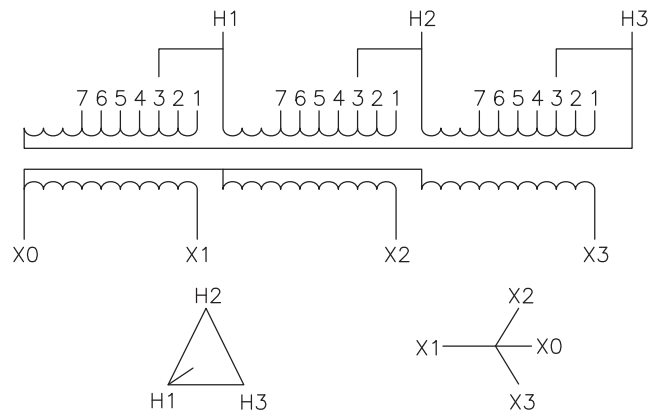


Transformer Connections

Voltage Code "3"		Voltage Code "65"		Voltage Code "1814"	
Primary Volts	2-2.5% FCAN 4-2.5% FCBN	Primary Volts	2-2.5% FCAN 4-2.5% FCBN	Primary Volts	2-2.5% FCAN 4-2.5% FCBN
504	1	630	1	504	1
492	2	615	2	492	2
480	3	600	3	480	3
468	4	585	4	468	4
456	5	570	5	456	5
444	6	555	6	444	6
432	7	540	7	432	7

Voltage Code "3156"	
Primary Volts	Full Capacity Taps
248	1
240	2
232	3
216	4
208	5
200	6
192	7

NOTE: Per UL 1561, unit shipped connected to 240 V tap.
Nameplate has nominal connections for 240 V and 208 V.



Overcurrent Protection

When voltage is applied to the input winding of a transformer, there can be a brief period of inrush current until the transformer core stabilizes. Inrush lasts approximately six power cycles, or about 0.1 seconds. The magnitude of the inrush varies depending on when the switch closes on the power wave, so that inrush can be anywhere from zero to greater than the full load current rating of the transformer.

In addition, the impedance of the supply system can influence the amount of inrush current the transformer can draw. To avoid tripping circuit breakers or blowing fuses on the primary side of the transformer during energizing, careful coordination of fuse sizes or circuit breaker handle ratings and magnetic trip settings is essential. This coordination requires information about maximum possible inrush to be expected from the particular transformer in question.

In order to provide optimal coordination and prevent possible inrush nuisance tripping, the primary overcurrent protection should be adjusted based on the maximum inrush current. This will result in the primary overcurrent protection exceeding the 125% allowance in the NEC for primary-only protection, and secondary protection will be required.

Inrush Information

Cat. No.	Primary Voltage	Primary Nameplate Current	Max RMS Inrush Amperes	RMS Peak Inrush Multiplier
<i>EXN30T3H</i>	480	36.08	536	13.86X
<i>EXN30T3HCU</i>			430	11.92X
<i>EXN30T3HF</i>			616	17.07X
<i>EXN30T3HFCU</i>			418	11.57X
<i>EXN30T3HB</i>			389	10.77X
<i>EXN30T3HBCU</i>			581	16.10X
<i>EXN30T3HNL</i>			616	17.07X
<i>EXN30T3HCUNL</i>			418	11.57X
<i>EXN30T3HNLP</i>			420	11.64X
<i>EXN30T3HCUNLP</i>			581	16.10X
<i>EXN30T65H</i>	600	28.87	399	13.80X
<i>EXN30T65HCU</i>			360	12.47X
<i>EXN30T1814H</i>	480	36.08	532	14.73X
<i>EXN30T6H</i>			547	15.15X
<i>EXN30T6HCT</i>			547	15.15X
<i>EXN30T3155H</i>	240	72.17	1031	14.28X
	208		1127	13.53X
<i>EXN30T3156H</i>	240		1059	14.67X
	208		1222	14.21X

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Product data sheet

Specifications

SQUARE D

Green Premium™



Low voltage transformer, DOE 2016, dry type, 3 phase, 30kVA, 480V pri, 208Y/120V sec, Al, 115C rise, Type 2

EXN30T3HF

Main

Range of product	Square D
Product or component type	DOE 2016 energy efficient transformer
Device short name	DOE 2016
Transformer type	Energy efficient
Device application	Low voltage electrical distribution

Complementary

Box number	18M
Network number of phases	3 phases
Rated operational power in VA	30 kVA
Network frequency	60 Hz
Type of cooling	Natural convection
Primary voltage	480 V delta
Number of tap-offs	2 2.5 % FCAN 4 2.5 % FCBN
Primary operational current	36.08 A 83.27 A 30 kVA
Secondary voltage	208Y/120 V
Coil Material	Aluminium
Basic IMP level (BIL)	10 kV
Temperature Rise	115 °C 220 °C insulated
DOE Efficiency	98.31 % 35 % 167 °F (75.0 °C)
Sound Level	6 dB NEMA ST-20 39 dB
%IZ	2.92 %
%IX	1.41 %
X/R Ratio	0.57
Inrush current	616 A
Let Through Current	2.85 kA
Transformer Losses	97 no load (core loss) 778 load loss (coil loss)

Disclaimer: This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications

Transformer BTU/HR	405 16.6 % 497 25 % 995 50 % 1824 75 % 2986 100 %
Height	28.31 in (719 mm)
Depth	24.69 in (627 mm)
Width	25.51 in (648 mm)
Net weight	323.99 lb(US) (146.96 kg)
Mounting support	Floor Floor, with 7400FMB Ceiling, with 7400CMB18M19M20M Wall, with 7400WMB18M19M20M
Degree of protection	UL type 2 UL type 3R, with 7400WS18M19M20M
Electrical connection	2 Hole Nema Pad secondary 0.44 in (11.1 mm) 4 Hole Nema Pad sec - XO 0.44 in (11.1 mm) 2 Hole Nema Pad primary 0.44 in (11.1 mm)
Number of mounting holes	0.51 in (13 mm)

Environment

Ambient air temperature for operation	104 °F (40 °C)
Average ambient air temperature for operation	30 °C
Standards	UL 1561 CSA C22.2 No 47 NEMA ST-20

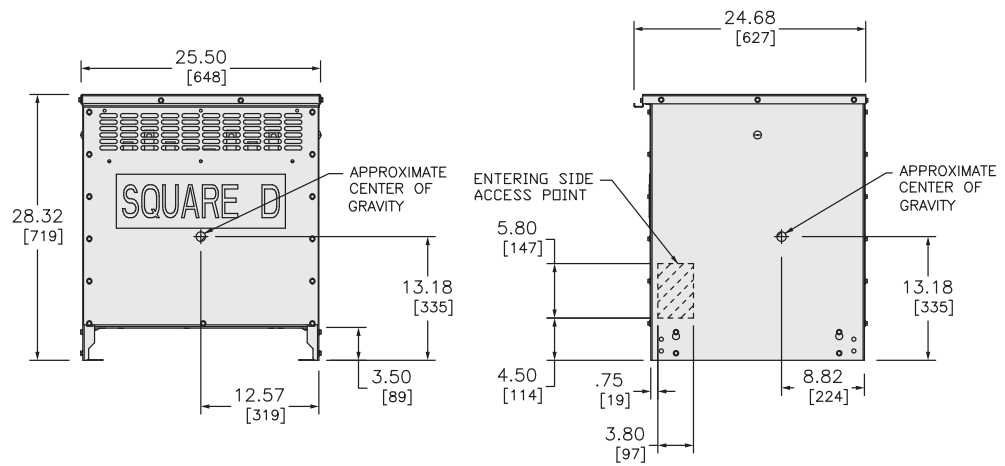
Packing Units

Unit Type of Package 1	PCE
Number of Units in Package 1	1
Package 1 Weight	485.00 lb(US) (219.992 kg)
Package 1 Height	28.31 in (71.9 cm)
Package 1 Width	25.51 in (64.8 cm)
Package 1 Length	24.69 in (62.7 cm)

Offer Sustainability

Sustainable offer status	Green Premium product
REACH Regulation	REACH Declaration
REACH free of SVHC	Yes
EU RoHS Directive	Compliant EU RoHS Declaration
Toxic heavy metal free	Yes
Mercury free	Yes
RoHS exemption information	Yes
China RoHS Regulation	China RoHS declaration Pro-active China RoHS declaration (out of China RoHS legal scope)
Environmental Disclosure	Product Environmental Profile
PVC free	Yes
Halogen content performance	Halogen free plastic parts product

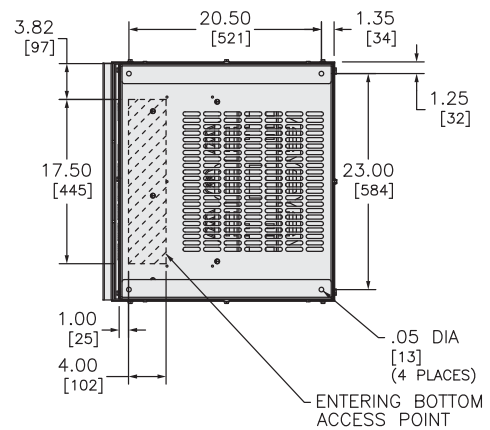
Dimensions



EXN30T3HF

in.
[mm]

ALL DIMENSIONS ARE APPROXIMATE.
 REFER TO TECHNICAL DRAWINGS AND
 DOCUMENTATION FOR COMPLETE INFORMATION.

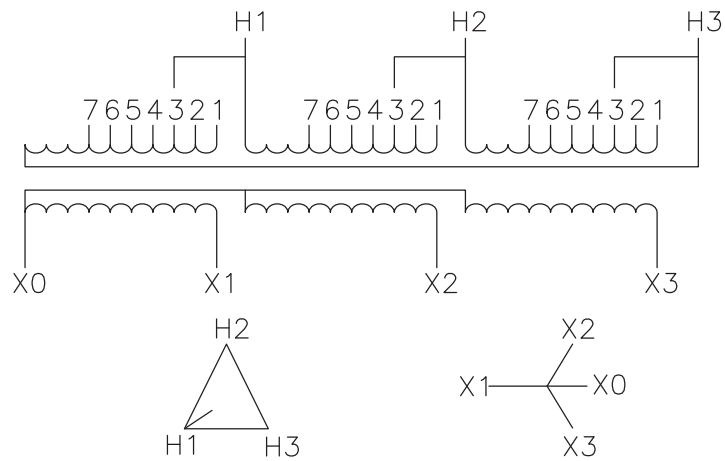


Wiring Diagram

IN EACH PHASE CONNECT TO TAPS	
PRIMARY VOLTS	2-2.5% FCAN 4-2.5% FCBN
504	1
492	2
480	3
468	4
456	5
444	6
432	7

EXN30T3HF

NOTE: ACTUAL VOLTAGES &
NAMEPLATE VALUES MAY NOT
MATCH VOLTAGE IN TABLE



REFER TO TECHNICAL DRAWINGS AND DOCUMENTATION FOR
COMPLETE INFORMATION.

Product data sheet

Specifications

SQUARE D

Green Premium™



Low voltage transformer, DOE 2016, dry type, 3 phase, 225kVA, 480V pri, 480/277V sec, Al, 150C rise, Type 1

EX225T1814HF

Main

Range of product	Square D
Product or component type	Transformer
Device short name	DOE 2016
Transformer type	Energy efficient
Device application	Low voltage electrical distribution

Complementary

Network number of phases	3 phases
Rated operational power in VA	225 kVA
Network frequency	60 Hz
Type of cooling	Natural convection
Primary voltage	480 V delta
Number of tap-offs	2 2.5 % FCAN 4 2.5 % FCBN
Secondary voltage	480Y/277 V
Coil Material	Aluminium
Basic IMP level (BIL)	10 kV
Temperature Rise	150 °C 220 °C insulated
DOE Efficiency	99.04 % 35 % 167 °F (75.0 °C)
Sound Level	6 dB NEMA ST-20 49 dB
%IZ	0.046 %
%IX	0.0418 %
X/R Ratio	2.13
Let Through Current	5.9 kA
Transformer Losses	324.0 no load (core loss) 4423.0 load loss (coil loss)
Transformer BTU/HR	1521.406516442696 16.6 % 2048.778012125 25 % 4878.510024499999 50 % 9594.730045125 75 % 16197.438074 1.0 %

Disclaimer: This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications

Height	57.52 in (1461 mm)
Depth	32.76 in (832 mm)
Width	40.08 in (1018 mm)
Net weight	1450.00 lb(US) (657.71 kg)
Mounting support	Floor Floor, with 7400FMB
Degree of protection	UL type 1 UL type 2, with 7400DS25J UL type 3R, with 7400WS25J
Electrical connection	4 Hole Nema Pad primary 0.44 in (11.1 mm) 6 Hole Nema Pad secondary 0.44 in (11.1 mm) 8 Hole Nema Pad sec - XO 0.44 in (11.1 mm)

Environment

Ambient air temperature for operation	104 °F (40 °C)
Average ambient air temperature for operation	30 °C
Standards	UL 1561 CSA C22.2 No 47 NEMA ST-20

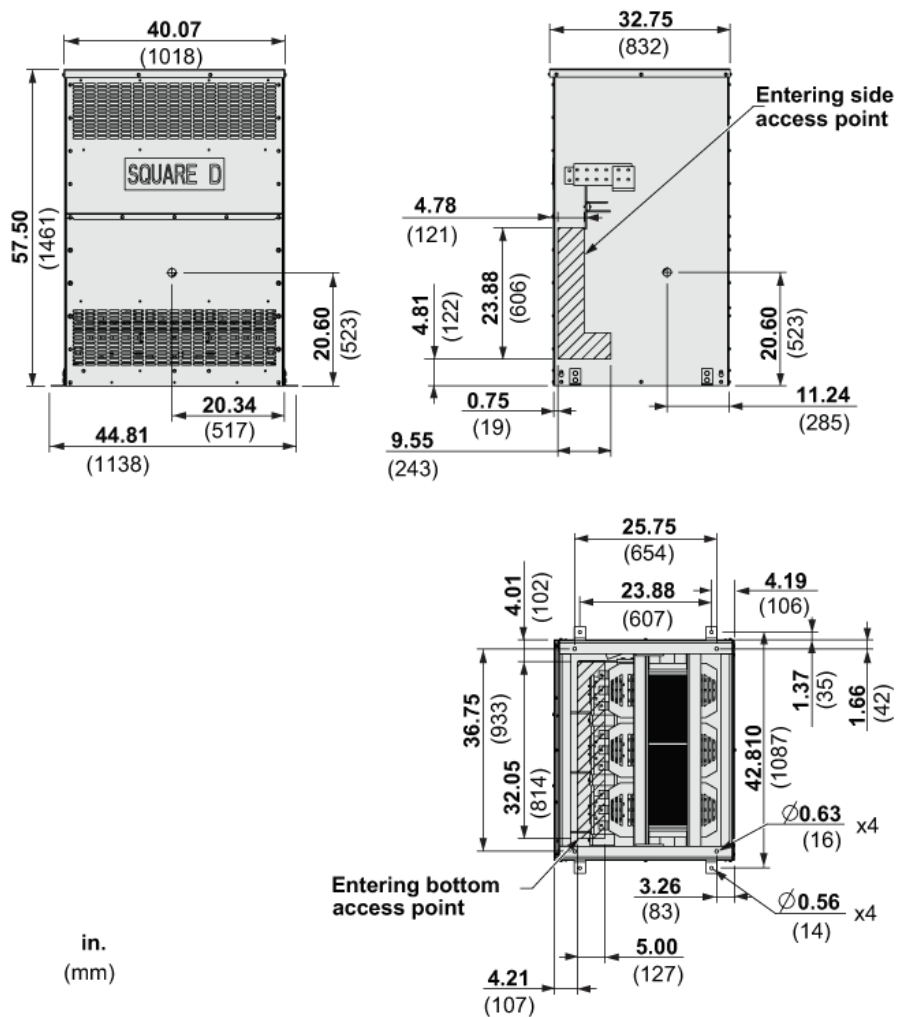
Packing Units

Unit Type of Package 1	PCE
Number of Units in Package 1	1
Package 1 Weight	1718.00 lb(US) (779.272 kg)
Package 1 Height	57.64 in (146.4 cm)
Package 1 Width	35.00 in (88.9 cm)
Package 1 Length	42.64 in (108.3 cm)

Offer Sustainability

Sustainable offer status	Green Premium product
REACH Regulation	REACH Declaration
REACH free of SVHC	Yes
EU RoHS Directive	Compliant EU RoHS Declaration
Toxic heavy metal free	Yes
Mercury free	Yes
RoHS exemption information	Yes
China RoHS Regulation	China RoHS declaration Pro-active China RoHS declaration (out of China RoHS legal scope)
Environmental Disclosure	Product Environmental Profile
PVC free	Yes
Halogen content performance	Halogen free plastic parts product

Approximate Dimensions



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Branch Panels – AC Power (Robust Option)

Dangerous power disturbances can exist anywhere in a facility. In fact, a large portion of transients are generated by equipment from within a facility. Installing surge protection at the electrical service entrance and distribution panels are prudent choices. However, in most cases these choices don't go far enough in securing overall power quality protection for individual pieces of equipment operating within a building. In order to be fully protected, we strongly recommend surge protection be installed at specific sensitive loads or anything drawing an AC current.

ASCO encourages customers to install surge protection at key branch panelboards, and recommend surge protection be installed at specific sensitive loads, including uninterruptible power supplies (UPS), computers or other mission-critical equipment found within a facility.

The **ASCO Model 425** surge protective device is a multi-phase, multi-mode distribution panel mounted surge protective device that offers continuous protection from damaging transients and electrical line noise, perfect for facility-wide applications and its compact size allows it to be easily retrofitted on existing panelboards. It's also manufactured using an array of surge components with built-in redundancy and reliability is ANSI/UL 1449 Fourth Edition Listed and backed by a worry-free 10-year replacement warranty.



ASCO Model 425

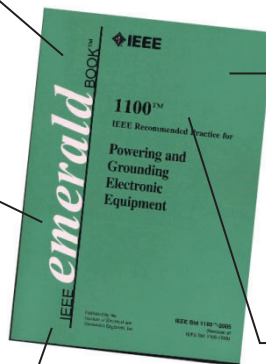
Voltage	Wire Lead Connection (Recommended installation using a Circuit Breaker)
	Part Number
120/240VAC, Single Phase, 3W+G	425120SP10AWAJ10
120/208VAC, 3 Phase WYE, 4W+G	425120YP10AWAJ10
277/480VAC, 3 Phase WYE, 4W+G	425277YP10AWAJ10
480VAC, 3 Phase Delta, 3W+G	425480DP10AWAJ10
240VAC, 3 Phase Delta, 3W+G	425240DP10AWAJ10

IEEE Standard

IEEE Standard 1100 Section 4.4.5.2 "A single lightning or switching surge often causes immediate, but not readily apparent physical damage to semiconductor devices. This damage then finally appears at some later time..."

IEEE Standard 1100 Section 8.6.2 "...Recommended SPD installation practice is for all lead lengths to be short and shaped to minimize open-loop geometry between the various conductors...by twisting all the phase, neutral, and equipment grounding conductors together; and by avoiding any sharp bends and coils in the conductors."

IEEE Standard 1100 Section 8.6.3 "Facilities housing electronic load equipment of any type should have service entrances equipped with ...Category "C" surge protective devices, as specified in IEEE Std C62.41-1991."



IEEE Standard 1100 Section 8.6.4 "...it is recommended that additional surge protective devices of listed Category "B" or Category "A," as specified in IEEE Std C62.41-1991, be applied to downstream electrical switchboards and panelboards, and panelboards on the secondary side of separately derived systems if they support communications, ITE, signaling, television, or other form of electronic load equipment."

IEEE Standard 1100 Section 8.6.5 "...It is recommended practice that both the input circuit to the UPS and the associated bypass circuits (including the manual bypass circuit) be equipped with effective Category "B" SPD"



425 Series SPDs

ASCO by Schneider Electric Hard Wired Surge Protective Devices (SPDs)

ASCO by Schneider Electric brand 425 Surge Protective Devices (SPDs) are robust surge suppression in a rugged polycarbonate enclosure.

The compact design of the 425 Series allows surge suppression to be externally installed adjacent to electrical distribution equipment. They are designed to provide high-quality surge suppression for a wide variety of commercial, industrial or institutional applications.

Features

Superior Performance

ASCO brand 425 Series SPDs utilize a high-energy parallel design that provides all modes of suppression at 100,000 peak Amps of surge current rating per phase. The 425 Series SPDs contain a suppression circuit that provides robust, cost effective transient protection.



www.se.com

Life Is 

Schneider
Electric

Each MOV is individually fused and incorporates patented overvoltage technology innovations that provide superior overvoltage withstand capability for systems with unstable power, without compromising transient clamping performance.

These products have a NEMA type 4X rating suitable for installing indoors, outdoors, or in other harsh environments.

Warranty

ASCO 425 Series SPDs have a 10-year limited warranty.

Features	Advantages	Benefits
NEMA 4X Rated	Allows installation in outdoor applications	Provides surge suppression to vulnerable equipment powered from weather-exposed panels
Overvoltage technology	Superior overvoltage withstand and surge suppression	Longer product life and increased tolerance to unstable power conditions
EMI/RFI Noise Rejection	Increased transient suppression	Improves surge suppression to the equipment
LED Status Indication	Allows visual indication of the suppressor's status	Provides immediate response if suppressor is damaged
Audible Alarm/Dry Contacts	Provides audible indication and changed relay state of failed components	Immediate notification through audible alarm, and remote signaling via dry contacts, if reduced suppression occurs
Coordinated Fuse Technology	Coordinated fusing allows disconnection methods for thermal and high-current events with no external overcurrent protection required	Provides premium surge suppression while managing both thermal and overcurrent end-of-life events

Specifications

XDSE Series SPDs	
Performance	
Surge Current Rating per Phase	100kA
Inominal (I _n)	20kA
Short Circuit Current Rating	200kAIC (3Ø models)
Modes of Protection	All
Fusing	
Thermal Fusing	Yes
Overcurrent Fusing	Yes
EMI/RFI Filtering	-25 dB
Operating Frequency	50/60 Hz
Repetitive Impulse	5,000
Mechanical Description	
Enclosure	Non-Metallic
NEMA Ratings	NEMA 4X
Conduit Fitting	3/4" Threaded Hub
Lead Wires	#10 AWG, 3 feet (0.91 meter)
Dry Contact Wires	#18 AWG, 3 feet (0.91 meters)
Mounting Method/Circuit Type	Parallel
Operating Altitude	Sea Level-12,000' (3,658 m)
Storage Temperature	-40° F (-40° C) to 140° F (60° C)
Operating Temperature	-25° C (-13° F) to +85° C (185° F)
Operating Humidity	0 to 95% non-condensing
Weight	3 lbs. (1.4 kg.)
Options	
Remote Monitor	TVS12RMU
Flush Mount Kit	XMFMKITCW

Flexible Installation

ASCO 425 Series SPDs are connected into the panel via the included 10AWG wire leads. The compact design allows for easy mounting near the circuit breaker to minimum lead length which maximizes device performance.

Devices can be surface mounted or flush mounted with optional XMFMKITCW flush mount kit

Listings and Performance

- Type 1: UL 1449 4th Edition, CSA 22.2 No. 269.1
- Complies with UL 96A Master Label requirements for Lighting Protection Systems

425 Series Ordering Options

Voltage	Surge Current Rating	Catalog Numbers	UL 1449 Test Data					
			Voltage Protection Ratings (VPR)				SCCR	MCOV
			L-N	L-G	N-G	L-L		
120V, 1Ø, 2W+G, Single [1]	100kA	425120NP10AWAJ10	700	600	600	-	100kA	150
120/240V, 1Ø, 3W+G, Split [2][7]	100kA	425120SP10AWAJ10	600	700	600	1000	100kA	150
208Y/120V, 3Ø, 4W+G, Wye [3][7]	100kA	425120YP10AWAJ10	600	700	600	1000	200kA	150
240V, 1Ø, 3W+G, Split [4][7]	100kA	425240SP10AWAJ10	1200	1200	1000	1800	200kA	320
240V, 3Ø, 3W+G, Delta	100kA	425240DP10AWAJ10	-	1800	-	1800	200kA	320
240/120V, 3Ø, 4W+G, HLD [7]	100kA	425240HP10AWAJ10	600/1200	700/1200	600	1000	200kA	150/320
480Y/277V, 3Ø, 4W+G, Wye [5][7]	100kA	425277YP10AWAJ10	1200	1200	1000	1800	200kA	320
480V, 3Ø, 3W+G, Delta [6]	100kA	425480DP10AWAJ10	-	1200	-	1200	200kA	552
600Y/347V, 3Ø, 4W+G, Wye [7]	100kA	425347YP10AWAJ20	1500	1500	1500	2500	200kA	420

[1] 120V series also applies to the following voltage 127V.

[2] 120/240V series also applies to the following voltage 127/254V.

[3] 208Y/120V series also applies to the following voltage 220Y/127V.

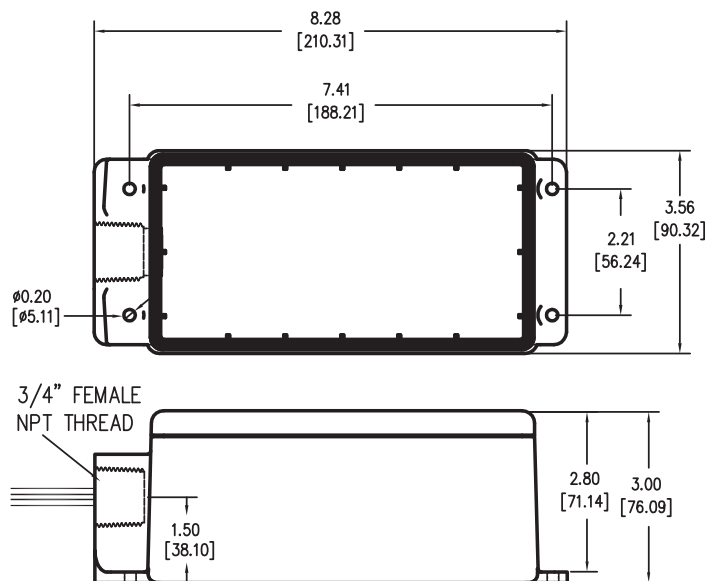
[4] 240V series also applies to the following voltage 277V.

[5] 480Y/277V series also applies to the following voltages 380Y/220V, 400Y/230V and 415Y/240V.

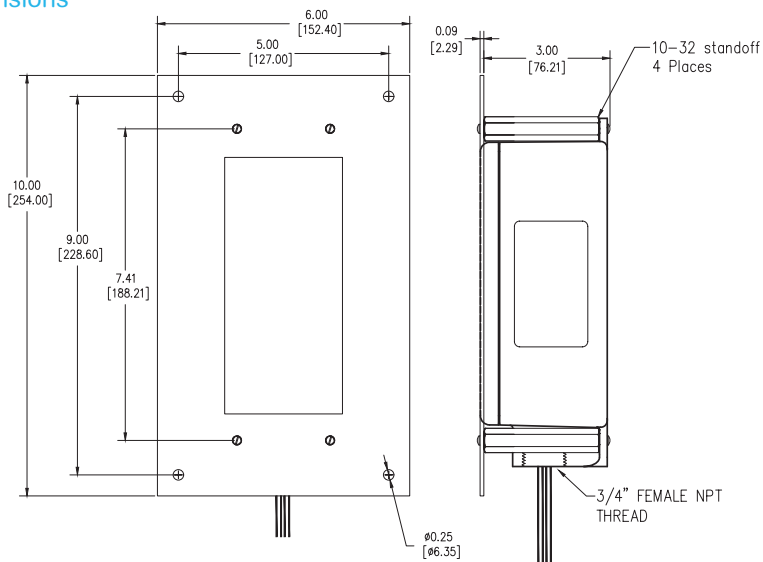
[6] 480V Delta series also applies to the following voltage 480Y/277V HRG.

[7] Do not use on ungrounded systems. Systems must be solidly grounded.

Dimensions



Flush Mount Kit Dimensions



se.com/us/en/work/support

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Electric

Schneider Electric
6700 Tower Cir #700
Franklin, TN 37067

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Features:

- UL 1449 Fourth Edition listed
- 100kA per phase ratings
- Type 1: UL 1449 4th Edition, CSA 22.2 No. 269.1
- 20kA Inominal (I_n)
- 200kA SCCR's (most models)
- Complies with UL 96A 12th Edition master label requirements for lightning protection systems
- Voltage specific design – highly configurable
- All MOV suppression elements monitored
- All modes of protection
- 10-year limited warranty

Performance Specifications

Surge Capacities	L-N	L-G	N-G
100kA Per Phase	50kA	50kA	50kA
UL 1449 Fourth Edition listed, cUL			
UL 1449 Fourth Edition type 1, CSA 22.2 No. 269.1			
UL 1449 Fourth Edition tested Inominal (I_n): 20kA			
UL 1449 Fourth Edition tested SCCR: 200kA (100kA for 240S/120V)			
Repetitive impulse: 5,000 hits			
Less than 1 nanosecond response time			

Physical Specifications

Relative humidity range: 0 - 95% non-condensing
Operating frequency: 47 - 63 Hz (also 400Hz on <480V)
Operating temperature: -25° C (-13° F) to +85° C (185° F)
Weight: 3 lbs. (1.4 kg)
NEMA 4X polycarbonate enclosure – UL 746C(f1) & UL 94-5VA
Dimensions: 8.3 x 3.6 x 3.0 in. (211 x 91 x 77 mm)
3/4" threaded hub - weather resistant 4X
Pre-wired with 3 feet (0.91 meter) of #10 AWG conductor
Pre-wired dry contacts leads, 3 feet (0.91 meter) #18 AWG
Typical connection: 30A breaker

Design Attributes

Designed, manufactured and tested consistent with:
- ANSI/IEEE C62.41.1-2002, C62.41.2-2002, C62.45-2002, C62.62-2010, C62.72-2016, IEEE SA 1100-2005 (Emerald Book)
- NEC® Article 285
- NEC® Articles 620.51(E), 645.18, 670.6, 695.15, 700.8 and 708 requiring SPDs
- Complies with UL 96A 12th Edition master label requirements for lightning protection systems and NFPA 780 lightning protection
- IEC 61643, CE
For external mounting on electrical distribution equipment
Individually fused and thermally protected MOVs
Solid state bidirectional operation

Diagnostic Monitoring

100% monitoring – every MOV is monitored, including N-G
Green LED Status indicator per phase
Phase loss monitoring (toggles LED & dry contacts)
Audible alarm and form C dry contacts (Contacts rated 24V, 2A)

Quality, Standards & Validation

Type 1: UL 1449 Fourth Edition, cUL
UL file: VZCA.E321351 at www.UL.com
RoHS-compliant
IEC 61643, CE
10-year limited warranty
Operational test performed before shipment
ISO 9001:2008 quality management system
ISO 17025:2005 laboratory qualification

Model 425 Ordering Options

Connection	Monitoring	kA Rating Per Phase	Catalog Number
Wire Leads	Lights, Alarm, Contacts	100kA	425□□□□P10AWAJ10

Choose Voltage Code

Optional Kits

XMFMKITCW

Model 425 flush mount kit
(Ordered separately)

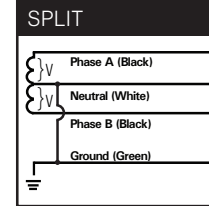
RM

Model 425 remote monitor
(Ordered separately)

Voltage Code

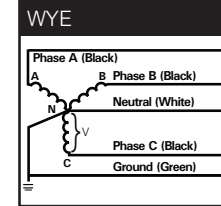
120/240V Split Phase (Fig. 1)	120S
208Y/120V Wye (Fig. 2)	120Y
380Y/220V, 400Y/230V, 415Y/240V (Fig. 2)	230Y
240/120V Delta High Leg (Fig. 3)	240H
240V Delta (Fig. 4)	240D
480Y/277V Wye (Fig. 2)	277Y
600Y/347V Wye (Fig. 2)	347Y
480V Delta (Fig. 4)	480D
600V Delta (Fig. 4)	600D

Figure 1



2 Phases, 1 Neutral,
1 Ground

Figure 2



3 Phases, 1 Neutral,
1 Ground

Figure 3

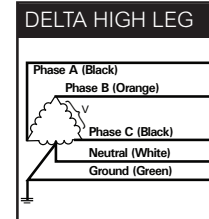
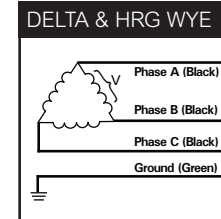
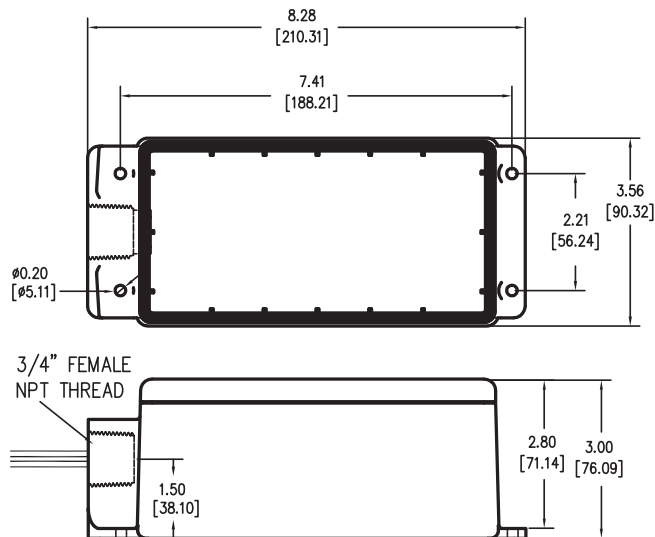


Figure 4

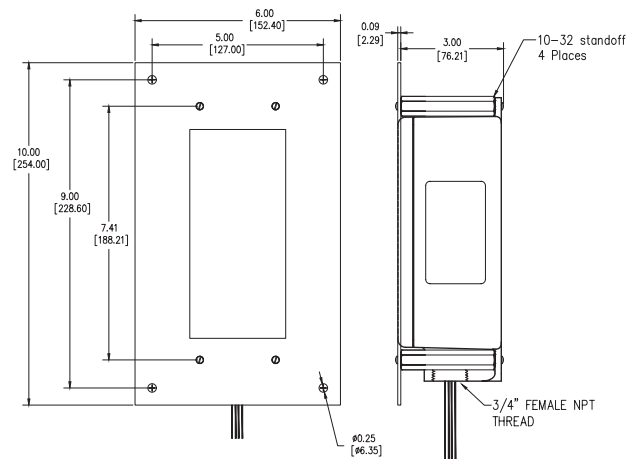


Dimensions (in. / mm)

Model 425 Unit



Flush Mount Kit



Performance Data

Common Power Systems	UL 1449 Fourth Edition Test Data							
	Voltage Protection Ratings (VPR - 3kA)				I _n	SCCR	MCOV	
	L-N	L-G	N-G	L-L				
120S = 120/240V 1Ø, 3 wire	600	700	600	1000	20kA	100k	150	
240H = 120/240V 3Ø, 4 wire High Leg Delta	600/1200	700/1200	600	1000	20kA	200k	150/320	
120Y = 208Y/120V 3Ø, 4 wire Wye	600	700	600	1000	20kA	200k	150	
277Y = 480Y/277V 3Ø, 4 wire Wye	1200	1200	1000	1800	20kA	200k	320	
480D = 480V 3Ø, Delta	-	1800	-	1800	20kA	200k	552	
230Y = 380Y/220V, 400Y/230V, 415Y/240V Wye, 3Ø 4W + ground	1200	1200	1000	1800	20kA	200k	320	
347Y = 600Y/347V 3Ø, 4 wire Wye	1500	1500	1500	2500	20kA	200k	420	



2.13 Manufacturer's Instructions

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NAVAL FACILITIES ENGINEERING COMMAND PROPULSION SHAFT LATHE FOUNDATION & SUPPORTING SYSTEMS, BUILDING 431

WORK ORDER No. N4425521F4446

CONTRACT No. N44255-20-D-0002

SEPTEMBER 2023

2.13 MANUFACTURER'S INSTRUCTIONS

No SD-08 Manufacturer's Instructions submittals required per Section 26 11 13.00 19.



OPTIMAL CONTROL SYSTEMS, INC.

2324 Three Lakes Road SE

Albany, OR 97322

Phone: (541) 967-9323

Fax: (541) 967-9485

Project No. 0922-13SAE

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2.14 O&M Submittal Data

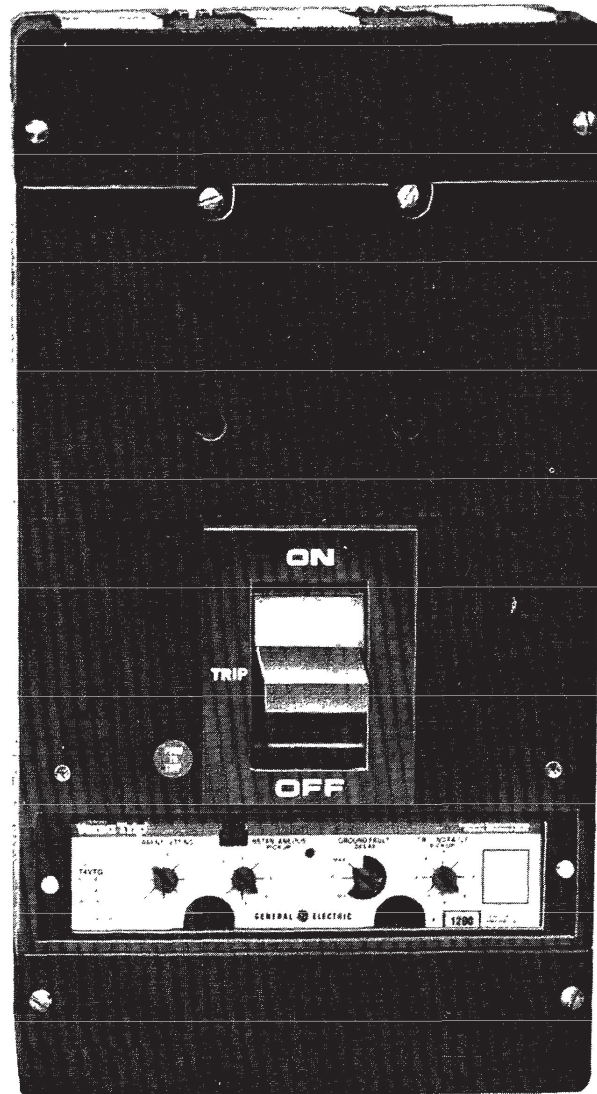
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Assembly
Instructions for
Model 6
Circuit Breakers



Molded Case Circuit Breakers

MicroVersaTrip™ Types TK4V and THK4V



Assembling MicroVersaTrip™ Trip Unit Systems

General Information

Remove components from cartons and check catalog numbers on components against carton labels. Following is a list of components necessary to assemble the General Electric TK4V-THK4V Model 6 frame molded case circuit breakers with a 4-function MicroVersaTrip trip unit (See FIGURE 1). A Model 6 circuit breaker frame is identified by a "MOD 6" stamp on the breaker side, and by an Underwriters Laboratories Inc. label in the handle. Presence of any other label, or of no label at all, in the handle indicates that the breaker frame is not Model 6 and is NOT suitable for field installation of MicroVersaTrip components.

- A. Breaker frame (catalog numbers TK4VF46, THK4VF46)
- B. 4-function programmer (catalog number T4VT series)

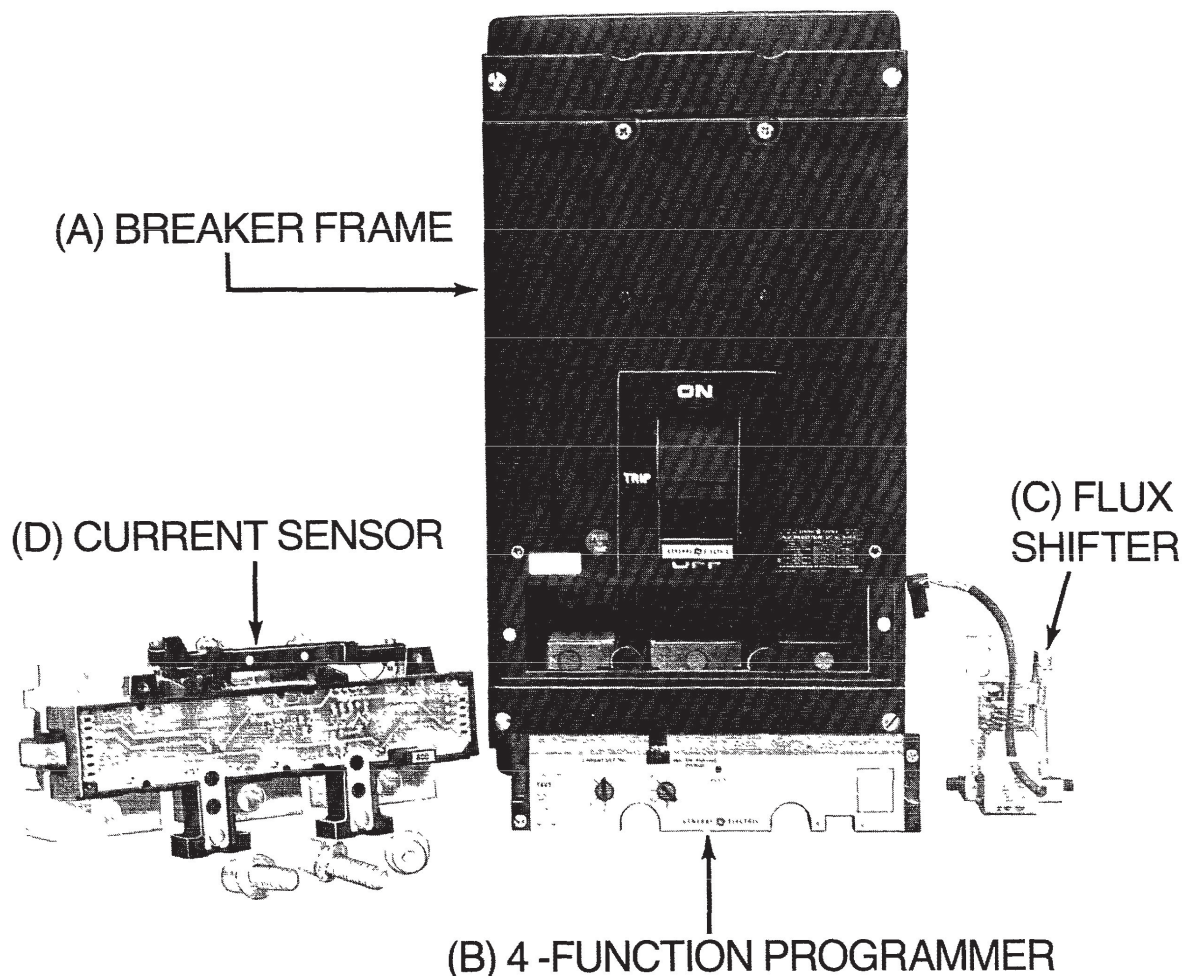
- C. Flux shifter (catalog number TKFS)
- D. Current sensor (catalog number TKCT series)

Necessary Tools:

- Electrician's Phillips head screwdriver
- Torque screwdriver with Phillips and flat blade bit
- Torque wrench with 1/4 inch hex bit (4 inch length)
- 1/16" feeler gauge
- Flat blade screwdriver
- Pliers

Assembly

To assemble the breaker, follow the steps listed below in order:



Step 1

Remove the breaker cover

Two slot head screws secure the lug covers at the line and load ends. After removing the two lug covers, loosen the six Phillips head screws securing the breaker cover. Remove the cover and remove and discard the two tubular spacers shown in FIG. 2. Remove the two shutters from handle and set aside (See FIG. 11 for picture of handle shutters).

Step 2

Install the Current Sensor

The breaker is held in the "ON" position during shipment by placement of a cotter pin in the breaker

mechanism. To remove, use pliers to straighten the end of the cotter pin (FIG. 3). Push the handle toward the load end of the breaker to relieve pressure on the pin; remove and discard the cotter pin (breaker handle will move to the "TRIP" position). Position the three screws provided in the left, center, and right mounting holes of the current sensor with the three flat washers provided (note a lockwasher is already captive on each screw). Slide the current sensor down into the cavity (FIG. 4), holding the breaker handle forward while sliding into position. When in place, tighten the three screws evenly to 125 inch-pounds. Hold trip bar back towards current sensor to reach center screw. Hold trip bar back towards current sensor to reach center screw.

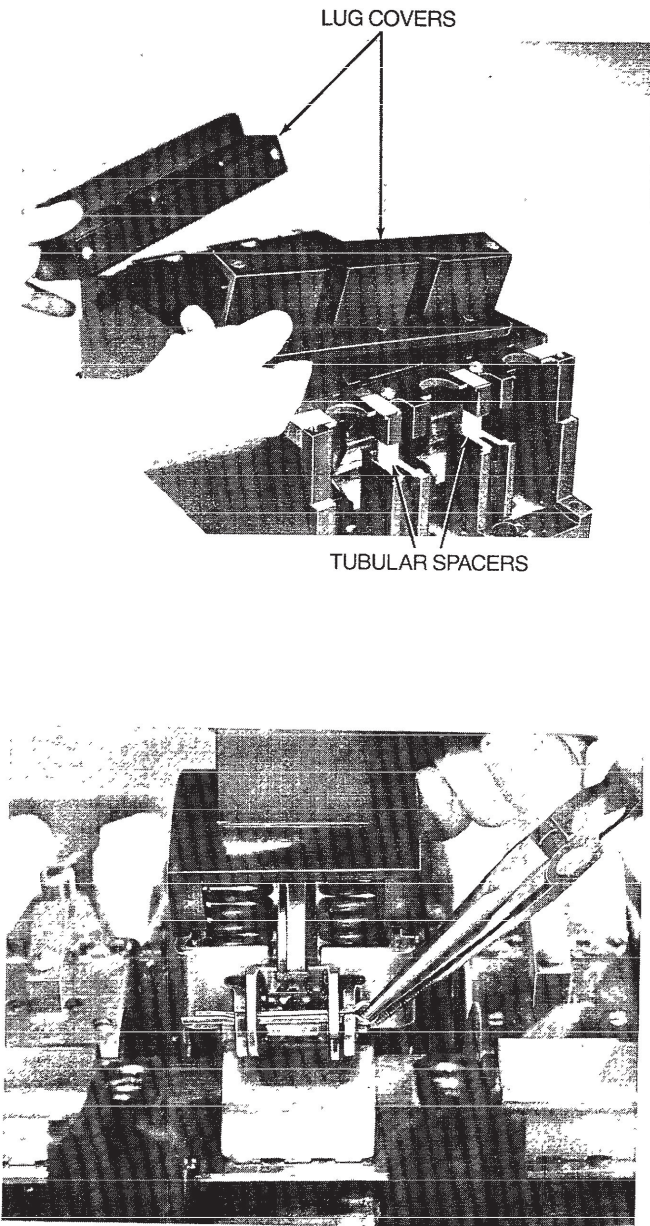


Fig. 2

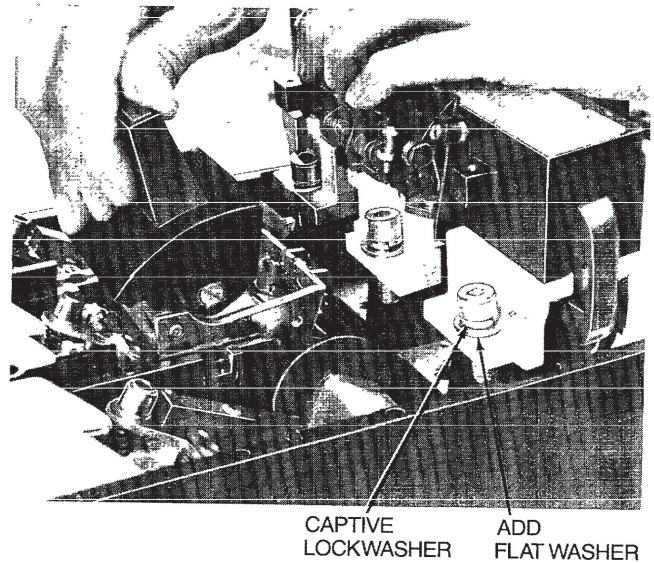


Fig. 4

Fig. 3

Assembling MicroVersaTrip™ Trip Unit Systems

Step 3

Install Programmer and Flux Shifter

Plug the flux shifter into the programmer (FIG. 5).

Then, dress the wires neatly in the three retaining grips in the programmer recess (FIG. 6). Slide the black protective sheath over the wires toward the flux shifter to allow correct wire length in the recess. Position programmer on current sensor and tighten the two programmer mounting screws to 10 inch-pounds.

NOTE: The black plug may pop up when placing the programmer in position. If so, push the plug back down flush with the top surface of the programmer after the programmer mounting screws have been tightened.

Next, install the flux shifter (FIG. 7). Holding the flux shifter frame down in its slot in the breaker base, tighten the flux shifter mounting screw to 10 inch-pounds. Dress the flux shifter wire lead inside the breaker housing (FIG. 8). Pull wire forward to remove slack at programmer end; the wire should not be taut, but should clear the flux shifter reset lever.

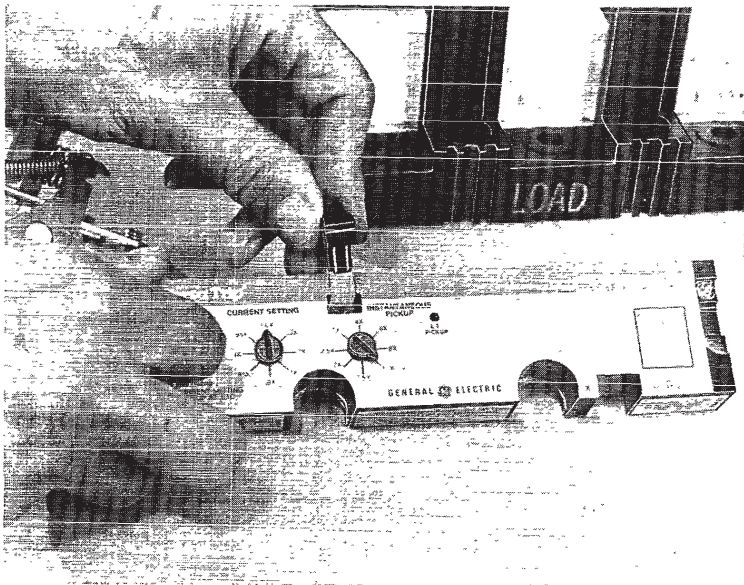


Fig. 5

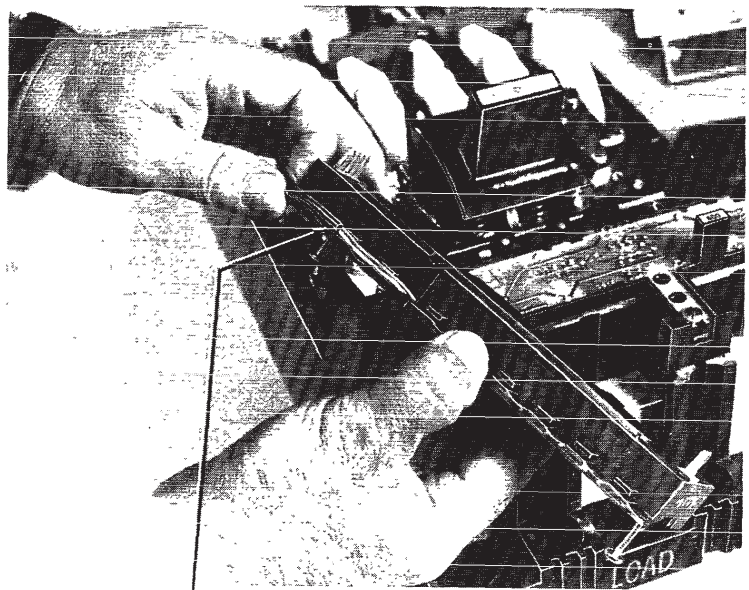


Fig. 6

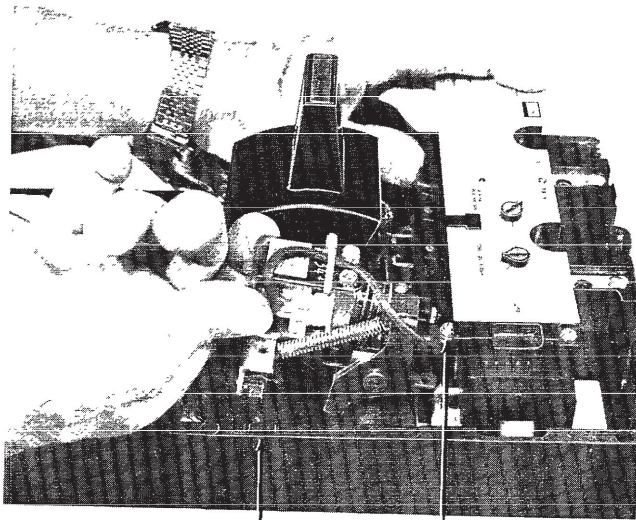
SLIDE SHEATH OUT
OF RECESS AREA

Step 4

Clearance Check

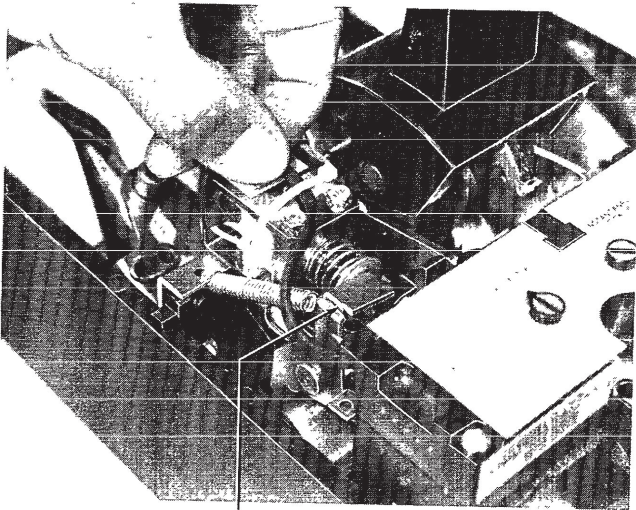
NOTE: Flux shifter plug should be flush with programmer cover.

While holding, the flux shifter down firmly so that its frame rests in the slot provided in the base, latch the breaker by moving the handle toward the load end, then turn the breaker "ON" by moving the handle toward the line end.



SLOT IN BREAKER BASE
FOR FLUX SHIFTER FRAME

FLUX SHIFTER
MOUNTING SCREW



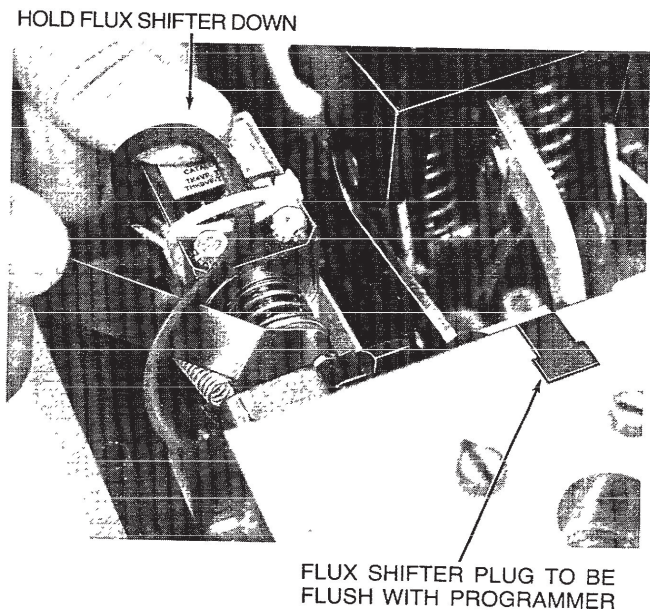
FLUX SHIFTER RESET LEVER

NOTE: KEEP HANDS CLEAR OF BREAKER HANDLE AND MECHANISM DURING CHECK.

Next, still holding flux shifter down firmly in base, check that the clearance between the flux shifter plunger and the trip bar adjusting screw is between .001 to .063 inch (FIG. 9). If the measurement is off, do not attempt to adjust or use the breaker. Notify GE Construction Equipment Product Service, Plainville, Connecticut, that breaker does not meet the clearance specification.

NOTE: Discharge breaker mechanism by moving trip bar back towards current sensor BEFORE releasing pressure on the flux shifter.

Fig. 7



HOLD FLUX SHIFTER DOWN

FLUX SHIFTER PLUG TO BE
FLUSH WITH PROGRAMMER

Fig. 9

Fig. 8

Assembling MicroVersaTrip™ Trip Unit Systems

Step 5

Functional Check

NOTE: Flux shifter plug to be flush with programmer cover.

While holding flux shifter down firmly so that its frame rests in the slot provided in the breaker base, latch the breaker by moving the handle toward the load end, then turn the circuit breaker "ON" by moving the handle toward the line end still holding the flux shifter down firmly in the base, place a

screwdriver against the back face of flux shifter plunger and flux shifter frame (FIG. 10). A slight leverage force will release the plunger and trip the breaker.

NOTE: KEEP HANDS AWAY FROM BREAKER HANDLE AND MECHANISM DURING CHECK.

Notify GE Construction Equipment Product Service, Plainville, Connecticut, if breaker is not working properly.

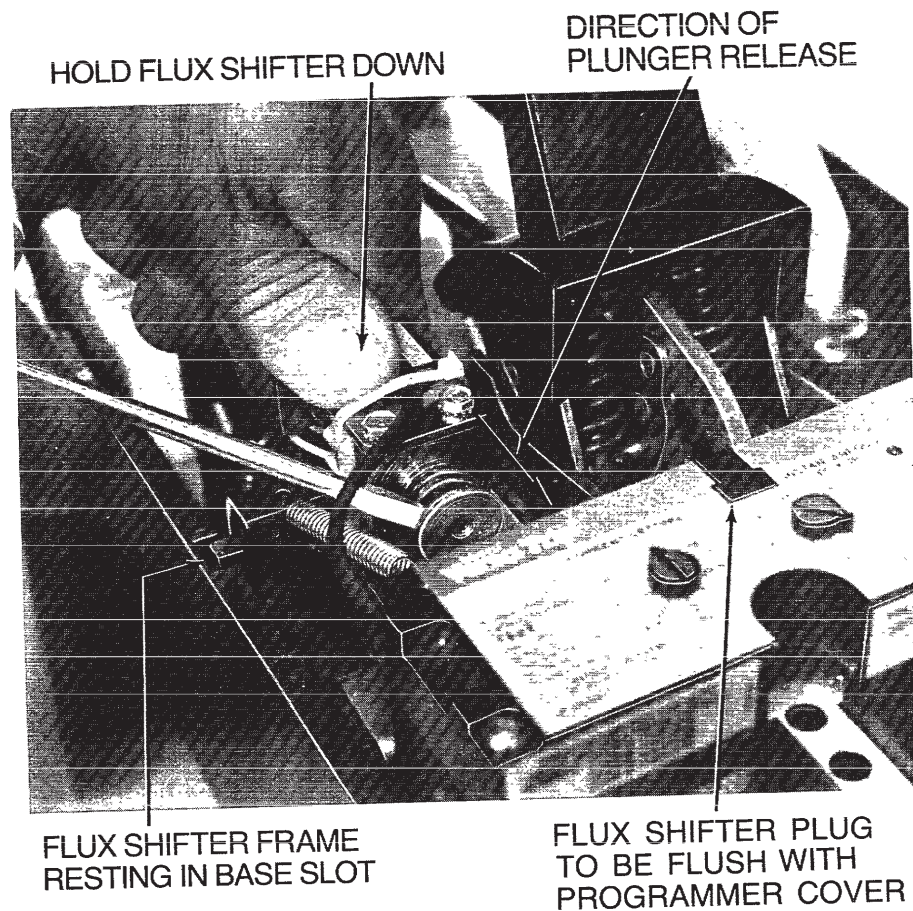


Fig. 10

Step 6

Replace the breaker cover

Replace the two shutters over breaker handle as shown in FIG. 11; the shutters must be oriented as shown to allow for proper cover placement. Slide shutters toward line end of breaker as far as shutter handle openings allow. Replace the breaker cover, and torque the six cover mounting screws to 25 inch-pounds (FIG. 12). For breakers requiring external ground fault connection, attach ground wire leads as indicated to the terminals shown in FIG. 12. Replace

the line and load end lug covers and tighten the slot head screws to 25 inch-pounds.

The breaker may again be checked by moving the handle to the "OFF" then "ON" position, and depressing the "PUSH TO TRIP" button. The breaker is now ready to be installed. Note that changes to the programmer settings may be made by removing the programmer window.

NOTE: For information on Neutral Current Transformer installation, refer to instruction No. GEK-72104.

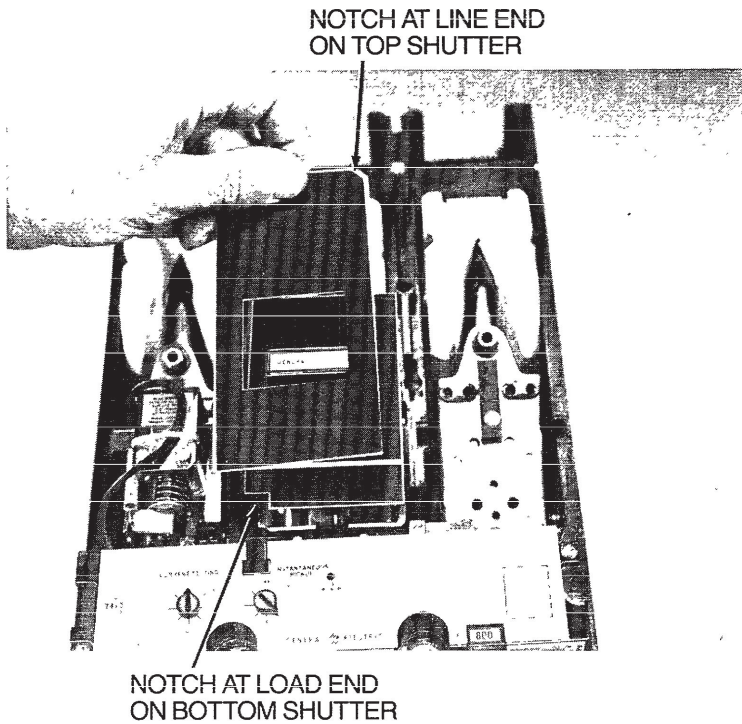
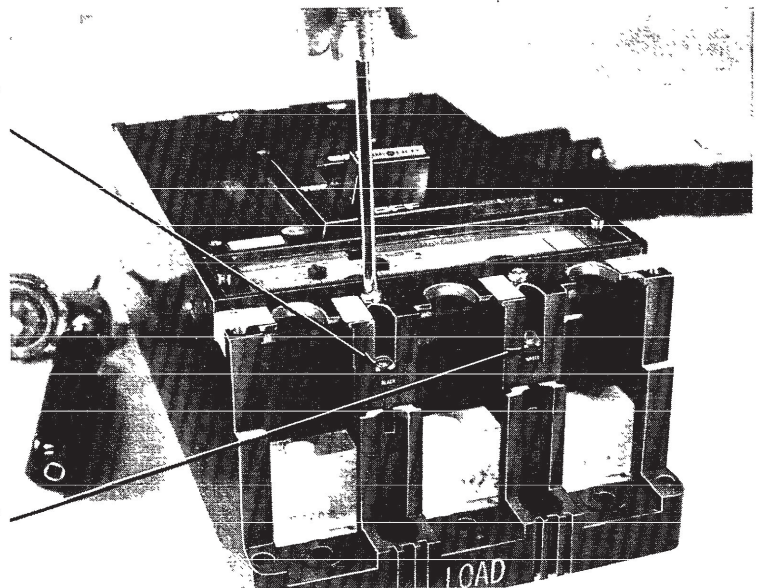


Fig. 11

EXTERNAL GROUND FAULT/NEUTRAL
CURRENT TRANSFORMER
CONNECTION TERMINAL
(WHITE WIRE)

Fig. 12

EXTERNAL GROUND FAULT/NEUTRAL
CURRENT TRANSFORMER
CONNECTION TERMINAL
(BLACK WIRE)



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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 General Electric Company

For further information
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GENERAL  **ELECTRIC**



30–1200 A Safety Switches Maintenance Instructions

Instrucciones de servicio de mantenimiento para los interruptores de seguridad de 30 a 1 200 A

Directives d'entretien pour interrupteurs de sécurité, 30 à 1 200 A

Retain for future use. / Conservar para uso futuro. / À conserver pour usage ultérieur.

Class
Clase
Classe
3100

INTRODUCTION

Safety switches are properly lubricated at the factory. However, periodic cleaning and lubrication may be required. The maintenance interval between lubrications depends on the amount of switch usage and the ambient operating conditions. The maximum maintenance interval should not exceed one year for mechanical or current-carrying parts.

For additional information, refer to publication NFPA-70B, "Recommended Practice for Electrical Equipment Maintenance".

Unusual Performance Conditions

Contact Square D for information regarding performance under unusual conditions. Examples of unusual conditions are shown in Table 1 below:

INTRODUCCIÓN

Los interruptores de seguridad han sido lubricados correctamente en la fábrica; sin embargo, es necesario realizar limpieza y lubricación periódicamente. El intervalo de servicio de mantenimiento entre lubricaciones depende del uso del interruptor y de las condiciones ambientales de funcionamiento. El intervalo de servicio de mantenimiento máximo no debe exceder un año para las piezas mecánicas o conductoras de corriente.

Si desea obtener información adicional, consulte la publicación NFPA-70B, "Recommended Practice for Electrical Equipment Maintenance" (prácticas recomendadas de servicio de mantenimiento para el equipo eléctrico).

Condiciones de funcionamiento poco comunes

Póngase en contacto con Square D para obtener información con respecto al funcionamiento de este equipo bajo condiciones poco comunes. La tabla 1 muestra ejemplos de condiciones poco comunes:

INTRODUCTION

Les interrupteurs de sécurité sont lubrifiés de façon appropriée à l'usine. Toutefois, un nettoyage et une lubrification périodiques peuvent être nécessaires. L'intervalle d'entretien entre les lubrifications dépend de la fréquence d'utilisation de l'interrupteur et des conditions ambiantes de fonctionnement. L'intervalle d'entretien maximum ne doit pas dépasser un an pour les pièces mécaniques ou porteuses de courant.

Pour avoir d'autres renseignements, se reporter à la publication NFPA-70B, « Recommended Practice for Electrical Equipment Maintenance » (Pratique recommandée pour l'entretien des appareils électriques).

Conditions de performance inhabituelles

Contactez Square D pour avoir des informations sur la performance dans des conditions inhabituelles. Des exemples de conditions inhabituelles sont données au tableau 1 ci-dessous :

Table / Tabla / Tableau 1 : Unusual Conditions / Condiciones poco comunes / Conditions inhabituelles

• Ambient temperatures below -22 °F (-30 °C) or above 104 °F (40 °C) /	• Temperatura ambiente inferior a -30 °C (-22 °F) o superior a 40 °C (104 °F) /	• Températures ambiantes inférieures à -30 °C (-22 °F) ou supérieures à 40 °C (104 °F)
• Altitudes over 6600 ft (2012 m) /	• Altitudes de más de 2 012 m (6 600 pies) /	• Altitudes dépassant 2 012 m (6 600 pieds)
• Corrosive or explosive environments /	• Entornos corrosivos o explosivos /	• Environnements corrosifs ou explosifs
• Abnormal vibration, shock, or tilting /	• Vibración, sacudidas o inclinaciones anormales /	• Vibrations, chocs ou inclinaison anormaux
• Unusual operating duties /	• Servicio de funcionamiento poco común /	• Facteurs de fonctionnement inhabituels

⚠ DANGER / PELIGRO / DANGER**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Never operate energized switch with door open.
- Turn off switch before removing or installing fuses or making load side connections.
- Always use a properly rated voltage sensing device at all line and load fuse clips to confirm switch is off.
- Turn off power supplying switch before doing any other work on or inside switch.
- Do not use renewable link fuses in fused switches.

Failure to follow these instructions will result in death or serious injury.

PELIGRO DE DESCARGA ELÉCTRICA, EXPLOSIÓN O DESTELLO POR ARQUEO

- Utilice equipo de protección personal (EPP) apropiado y siga las prácticas de seguridad eléctrica establecidas por su Compañía, consulte la norma 70E de NFPA.
- Solamente el personal eléctrico especializado deberá instalar y prestar servicio de mantenimiento a este equipo.
- Nunca haga funcionar el interruptor energizado con la puerta abierta.
- Desconecte el interruptor antes de retirar o instalar los fusibles o realizar las conexiones del lado de carga.
- Siempre utilice un dispositivo detector de tensión nominal adecuado en todos los clips para fusibles en los lados de línea y carga para confirmar la desenergización del interruptor.
- Desenergice el interruptor antes de realizar cualquier otro trabajo dentro o fuera de él.
- No use fusibles renovables en los interruptores fusibles.

El incumplimiento de estas instrucciones podrá causar la muerte o lesiones serias.

RISQUE D'ÉLECTROCUTION, D'EXPLOSION OU D'ÉCLAIR D'ARC

- Portez un équipement de protection personnelle (ÉPP) approprié et observez les méthodes de travail électrique sécuritaire. Voir NFPA 70E.
- Seul un personnel qualifié doit effectuer l'installation et l'entretien de cet appareil.
- Ne faites jamais fonctionner l'interrupteur sous tension avec la porte ouverte.
- Mettez l'interrupteur hors tension avant d'enlever ou d'installer des fusibles ou de faire des raccordements sur le côté charge.
- Utilisez toujours un dispositif de détection de tension ayant une valeur nominale appropriée sur tous les porte-fusibles du côté ligne et charge pour s'assurer que l'interrupteur soit hors tension.
- Coupez l'alimentation de l'interrupteur avant d'y faire tout autre travail.
- N'utilisez pas de fusibles renouvelables dans les interrupteurs à fusibles.

Si ces directives ne sont pas respectées, cela entraînera la mort ou des blessures graves.

ANNUAL MAINTENANCE PROCEDURES

1. Turn off power supplying the switch before performing any work on or inside the switch.
2. Open the switch blades by moving the operating handle to the OFF (O) position.
3. Lock out or tag the switch, per local procedures.
4. Open the enclosure door.
5. Always use a properly rated voltage sensing device at all line and load-side lugs (terminals) to confirm power is off.

NOTE: Do not remove any parts from the switch or operating mechanism unless specifically instructed to do so in the following procedures. Vacuum any loose material from inside the switch. Wipe internal parts and the inside of the enclosure with a damp, lint-free cloth.

6. Visually inspect the switch for loose parts or hardware:
 - a. Retighten the hardware as needed. Refer to the wiring diagram.
 - b. Do not re-energize the switch if any worn or damaged parts are found. Replace them before re-energizing the switch.

PROCEDIMIENTOS DE SERVICIOS DE MANTENIMIENTO ANUALES

1. Desenergice el interruptor antes de realizar cualquier trabajo dentro o fuera de él.
2. Abra las cuchillas del interruptor moviendo la palanca de funcionamiento a la posición de abierto (O).
3. Bloquee o etiquete el interruptor de acuerdo con los procedimientos locales.
4. Abra la puerta del gabinete.
5. Siempre utilice un dispositivo detector de tensión nominal adecuado en todas las zapatas (terminales) del lado de línea y carga para confirmar la desenergización del equipo.

NOTA: No retire ninguna pieza del interruptor ni del mecanismo de funcionamiento a no ser que se le indique eso específicamente en los siguientes procedimientos. aspire el material suelto que se encuentra dentro del interruptor. Limpie las piezas internas y el interior del gabinete con una tela húmeda sin pelusas.

6. Realice una inspección visual al interruptor para ver si encuentra piezas o herrajes sueltos:
 - a. Vuelva a apretar los herrajes a medida que sea necesario. Consulte el diagrama de cableado.
 - b. No vuelva a energizar el interruptor si encuentra piezas desgastadas o dañadas; sustitúyalas antes de volver a energizar el interruptor.

PROCÉDURES D'ENTRETIEN ANNUEL

1. Couper l'alimentation de l'interrupteur avant d'effectuer tout travail sur ou à l'intérieur de l'interrupteur.
2. Ouvrir les lames de l'interrupteur en plaçant la manette de fonctionnement sur la position d'ARRÊT (O).
3. Verrouiller ou étiqueter l'interrupteur, selon les procédures locales.
4. Ouvrir la porte du coffret.
5. Toujours utiliser un dispositif de détection de tension à valeur nominale appropriée sur toutes les cosses (bornes) du côté ligne et charge pour s'assurer que l'interrupteur est hors tension.

REMARQUE : Ne retire aucune pièce de l'interrupteur ou du mécanisme de fonctionnement sauf en cas d'instruction précise de le faire dans les procédures suivantes. Évacuer à l'aspirateur tous corps étrangers se trouvant à l'intérieur de l'interrupteur. Essuyer les pièces internes et l'intérieur du coffret à l'aide d'un chiffon mouillé, non pelucheux.

6. Inspecter visuellement l'interrupteur pour voir s'il y a des pièces ou de la quincaillerie desserrée :
 - a. Resserrer la quincaillerie au besoin. Se reporter au schéma de câblage.
 - b. Ne pas remettre l'interrupteur sous tension en présence de pièces usées ou abîmées. Les remplacer avant de remettre l'interrupteur sous tension.

Parts Removal

1. Remove the arc supressor(s) or arc shield(s) from the switches by loosening the fastener(s) holding the suppressor(s) / shield(s) in place. See Figures 1 and 2.

Desmontaje de piezas

1. Retire el o los supresores o protectores de arco de los interruptores aflojando los sujetadores que los sostienen en su lugar. Ve a las figuras 1 y 2.

Démontage des pièces

1. Retirer le ou les supresseurs ou blindages d'arc des interrupteurs en desserrant les attaches qui les maintiennent en place. Voir les figures 1 et 2.

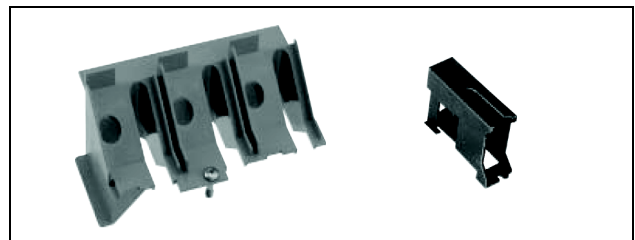
CAUTION / PRECAUCIÓN / ATTENTION

HAZARD OF EQUIPMENT DAMAGE	PELIGRO DE DAÑO AL EQUIPO	RISQUE DE DOMMAGES MATÉRIELS
<p>Do not disassemble the switch line base assembly or remove the blade rotor when cleaning the line-side jaw or the switch blade. See Figure 3 on page 4.</p> <p>Failure to follow this instruction can result in equipment damage.</p>	<p>No desmonte el ensamble de la base de línea del interruptor o retire el rotor de cuchilla al limpiar la mordaza del lado de línea o la cuchilla del interruptor, vea la figura 3 en la página 4.</p> <p>El incumplimiento de esta instrucción puede causar daño al equipo.</p>	<p>Ne démontez pas l'assemblage de la base de ligne de l'interrupteur ou ne retirez pas le rotor à lame lorsque vous nettoyez la mâchoire côté ligne ou la lame de l'interrupteur. Voir la figure 3 à la page 4.</p> <p>Si cette précaution n'est pas respectée, cela peut entraîner des dommages matériels.</p>
<ol style="list-style-type: none"> 2. Remove old grease and other contaminants from the line-side jaws and switchblades with a clean, lint-free cloth. If the lubricant has dried, remove it with CRC®-type HF Contact Cleaner, or equivalent, sprayed on a cloth. 3. Relubricate the cleaned areas with a thin film of Dow Corning® BG20 grease only. <i>NOTE: Do not substitute any other lubricant. Other lubricants may not be suitable for electrical applications and could alter the performance of the switch. Dow Corning BG20 is available from Square D (part number SWLUB).</i> 4. Exercise the operating mechanism to ensure proper operation by opening and closing the switch five times with the door closed. Open the switch blades. 	<ol style="list-style-type: none"> 2. Retire la grasa vieja y otros contaminantes de la mordaza del lado de línea y cuchillas del interruptor con una tela limpia sin pelusas. Si el lubricante se ha secado, retírelo con un limpiador de contacto CRC® tipo HF o uno equivalente, rociado en un pedazo de tela. 3. Vuelva a lubricar las áreas limpiadas con una capa delgada de grasa Dow Corning® BG20 solamente. <i>NOTA: No utilice otro tipo de lubricante; es posible que no sean adecuados para aplicaciones eléctricas y pueden alterar el funcionamiento del interruptor. La grasa Dow Corning BG20 se encuentra disponible de Square D (número de pieza SWLUB).</i> 4. Realice una prueba al mecanismo de funcionamiento y asegúrese de que funciona correctamente abriendo y cerrando el interruptor cinco veces con la puerta cerrada. Abra las cuchillas del interruptor. 	<ol style="list-style-type: none"> 2. Retirer toute graisse ancienne et autres polluants des mâchoires côté ligne et des lames de l'interrupteur à l'aide d'un chiffon propre et non pelucheux. Si le lubrifiant a séché, l'enlever avec un nettoyant pour contact CRC® de type HF ou l'équivalent, vaporisé sur un chiffon. 3. Relubrifier les zones propres avec une fine pellicule de graisse Dow Corning® BG20 uniquement. <i>REMARQUE : Ne substituer aucun autre lubrifiant. D'autres lubrifiants pourraient ne pas convenir pour des applications électriques et pourraient altérer le fonctionnement de l'interrupteur. Le Dow Corning BG20 est disponible chez Square D (n° de pièce SWLUB).</i> 4. Manœuvrer le mécanisme de fonctionnement pour s'assurer qu'il fonctionne correctement, en ouvrant et fermant l'interrupteur cinq fois avec la porte fermée. Ouvrir les lames de l'interrupteur.

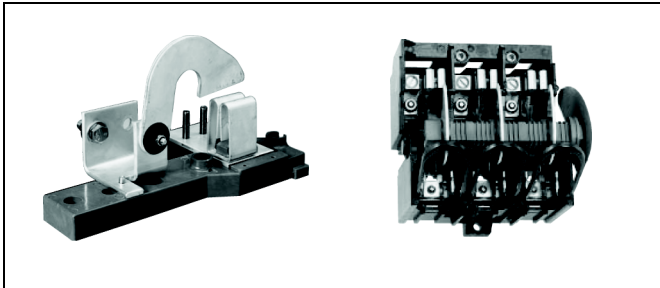
FIG. 1 : Examples of Arc Suppressors / Ejemplos de supresores de arco / Exemples de supresseurs d'arc



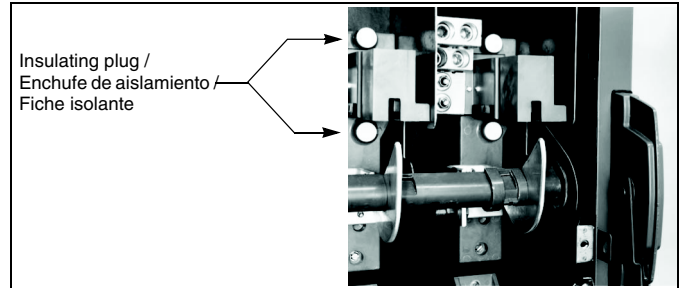
FIG. 2 : Examples of Arc Shields / Ejemplos de protectores de arco / Exemples de blindages d'arc



**FIG. 3 : Examples of Line Base Assemblies /
Ejemplos de ensambles de la base de línea /
Exemples d'assemblages de la base de ligne**



**FIG. 4 : Insulating Plugs on Pole Unit /
Enchufes de aislamiento en la unidad de polos /
Fiches isolantes sur l'unité polaire**



Parts Replacement

1. Reinstall the arc suppressor(s) or arc shield(s) according to the torque values in Table 2.
2. Ensure that the two insulating plugs in each phase (400–1200 A only) are firmly seated. See Figure 4.

Colocación de piezas

1. Vuelva a instalar el o los supresores o protectores de arco de acuerdo con los valores de par de apriete mostrados en la tabla 2.
2. Asegúrese de que los dos enchufes de aislamiento en cada fase (de 400 a 1 200 A solamente) estén bien apoyados, vea la figura 4.

Remise en place des pièces

1. Réinstaller le ou les supresseurs ou blindages d'arc conformément aux valeurs de couple indiquées au tableau 2.
2. S'assurer que les deux fiches isolantes de chaque phase (400 à 1 200 A seulement) sont bien en place. Voir la figure 4.

**Table / Tabla / Tableau 2 : Arc Suppressor Screw Torque Values /
Valores de par de apriete del tornillo del supresor de arco /
Valeurs de couple de serrage des vis des supresseurs d'arc**

Switch Type / Tipo de interruptor / Type d'interrupteur	Torque Value / Valor de par de apriete / Valeur de couple
30–100 A	5–10 lb-in / lbs-pulg / lb-po (0,57–1,13 N•m)
200 A, F Series / Serie F / Série F	10–20lb-in / lbs-pulg / lb-po (1,13–2,26 N•m)
200 A, E Series / Serie E / Série E	20–25 lb-in / lbs-pulg / lb-po (2,26–2,83 N•m)
400–800 A General Duty / 400 a 800 A de uso general / 400 à 800 A, universel	20–25 lb-in / lbs-pulg / lb-po (2,26–2,83 N•m)
400–1200 A Heavy Duty / 400 a 1 200 A de uso pesado / 400 à 1 200 A, service intensif	30–40 lb-in / lbs-pulg / lb-po (3,39–4,52 N•m)

RE-ENERGIZE THE SWITCH

1. Close and latch the door.
2. Turn off all downstream loads.
3. Turn on power supplying the switch.
4. Turn on the switch.
5. Turn on all downstream loads.

RE-ENERGIZACIÓN DEL INTERRUPTOR

1. Cierre y ponga seguro a la puerta.
2. Desconecte todas las cargas descendentes.
3. Energice el interruptor.
4. Coloque el interruptor en la posición de cerrado (I).
5. Conecte todas las cargas descendentes.

REMISE DE L'INTERRUPTEUR SOUS TENSION

1. Fermer la porte de l'interrupteur.
2. Mettre hors tension toutes les charges en aval.
3. Mettre l'interrupteur sous tension.
4. Mettre l'interrupteur en position de marche (I).
5. Mettre sous tension toutes les charges en aval.

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

Solamente el personal especializado deberá instalar, hacer funcionar y prestar servicios de mantenimiento al equipo eléctrico. Schneider Electric no asume responsabilidad alguna por las consecuencias emergentes de la utilización de este material.

Seul un personnel qualifié doit effectuer l'installation, l'utilisation, l'entretien et la maintenance du matériel électrique. Schneider Electric n'assume aucune responsabilité des conséquences éventuelles découlant de l'utilisation de cette documentation.

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Square D™ Safety Switch User Manual

Class 3130 / 3110

User Manual

GEX75737

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Safety Information

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this user guide or on the equipment to warn of hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of either symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ ⚠ DANGER
DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING
WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION
CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE
NOTICE is used to address practices not related to physical injury.

NOTE: Provides additional information to clarify or simplify a procedure.

Please Note

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction, installation, and operation of electrical equipment and has received safety training to recognize and avoid the hazards involved.

Electrical equipment should be transported, stored, installed, and operated only in the environment for which it is designed.

Shipping and Storage Requirements

This equipment does not achieve its ratings until it is installed per record/as-built drawings, installed per the instructions contained in this document, and has operational environmental controls with appropriate settings to help mitigate environmental influences. This equipment can also be stored in a climate controlled area that uses both heating and cooling to maintain acceptable environmental conditions. Indoor and outdoor rated equipment is not suitable for outdoor storage.

- The equipment should be treated as if it is in storage until it is installed and operational. The storage area should be clean, dry (75% or less relative humidity), and climate controlled with proper ventilation.
- To keep the equipment dry, the use of heaters is required in some cases (for example, during seasonal or low periods of electrical loading and equipment de-energization).
 - Consult the Engineer of Record for the appropriate environmental control settings or means to mitigate environmental influences.
 - If so equipped, ensure that the thermostats and/or humidistats are set to mitigate condensation. A minimum of watts of heat per section is suggested, see table below.

Amperage Rating	Heat Wattage
30 to 200	5
400	25
600 to 800	50
1200	100

- If heaters are being used with the equipment that were not included in the equipment by Schneider Electric, they must be clean and free of debris and grease. Greasy and/or smoky heaters can contaminate electrical insulation and lead to dielectric breakdown and/or tracking.
- Shipping packaging is not suitable for and cannot be used by itself for equipment storage unless otherwise indicated on the shipping packaging labeling.
- When receiving equipment, the equipment may be at a lower temperature than the ambient air temperature. Allow time for the equipment temperature, including the temperature of internal components, to rise to the ambient air temperature before making openings in or otherwise disturbing the packaging. Condensation can occur on and inside the equipment if warm air contacts cold surfaces of the equipment. Moisture damage can occur, destroying the dielectric capabilities of the equipment and rendering it unusable.
- The factory shipping wrap around the equipment on shipping pallets is not suitable for non-enclosed over-the-road transportation that risks exposing the equipment to the elements. The factory shipping wrap around the equipment should remain on the equipment until the equipment is ready to be inspected and stored or inspected and installed. After receiving the equipment and allowing it to acclimate to the environment, remove the packaging and inspect the equipment for damage that may have occurred in transit. If damage is found or suspected, immediately file a claim with the carrier and notify your Schneider Electric representative.
- Follow these guidelines every time the equipment is moved to a new storage location or to its final destination.

Installation and Operation Requirements

This equipment does not achieve its ratings until it is installed per record/as-built drawings, installed per the instructions contained in this document, and has operational environmental controls with appropriate settings to help mitigate environmental influences. This equipment can also be operated in a climate controlled area that uses both heating and cooling to maintain acceptable environmental conditions. Indoor and outdoor rated equipment is not suitable for outdoor storage. In some cases (such as seasonal electrical loading, de-energized equipment, and standby/alternate power sources), the heat generated by equipment loading is insufficient to prevent condensation and alternate heat sources are required. If environmental controls such as a thermostat or humidistat are used, ensure their settings are sufficient to mitigate condensation and remain operational at all times. Consult the Engineer of Record for the appropriate environmental control settings.

Proposition 65 Information



WARNING: This product can expose you to chemicals including Lead and Lead Compounds, which are known to the State of California to cause cancer and cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Exposure to Moisture, Chemicals, and Condensation

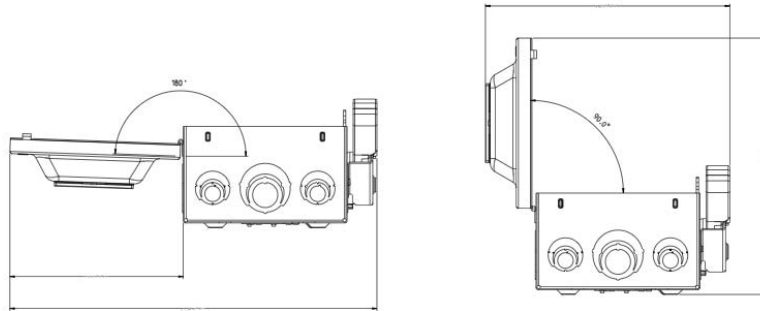
If liquids such as moisture, chemicals, and condensation contact the electronics, circuit breaker, fuses, bussing, or other electrical components, do not attempt to clean or repair the equipment as this may lead to unrepairable damage. If the equipment is energized, de-energize it. If equipment is not energized, do not energize it. Contact the Schneider Electric Customer Care Center at 888-778-2733.

Installation

Mounting

Safety Switches are tested for operation and environmental enclosure ratings in the vertical position, with ON in the up position.

Always check the drawings for required space for each safety switch. The footprint and door swing radius need to be taken into account.



Seismic Certifications

Equipment Installation for Seismic Applications

Introduction

Seismic certification is an optional feature for Safety Switch products and provides seismic conformance options to any of the building codes and seismic design standards identified in the [List of Supported Regional Building Codes and Seismic Design Standards](#), page 10. Safety Switches that are seismically certified have been certified to the seismic requirements of the listed code per the manufacturer's Certificate of Compliance (CoC). Equipment compliance labels and CoC's are provided with all seismically certified Safety Switches. Refer to the equipment CoC for certification details and applicable seismic parameters. To maintain the validity of this certification, the installation instructions provided in this section must be followed.

Table 1 - List of Supported Regional Building Codes and Seismic Design Standards

Country / Region	Code Reference ID	Code Name
Argentina	INPRES-CIRSOC103	Argentinean Standards for Earthquake Resistant Constructions
Australia	AS 1170.4-2007 (R2018)	Structural design actions, Part 4: Earthquake actions in Australia
Canada	NBCC	National Building Code of Canada
Chile	NCh 433.Of1996	Earthquake resistant design of buildings
China	GB 50011-2010 (2016)	Code for Seismic Design of Buildings
Colombia	NSR-10 Título A	Colombian Regulation of Earthquake Resistant Construction
Europe	Eurocode 8 EN1998-1	Design of structures for earthquake resistance – Part 1: General rules, seismic actions and rules for buildings
India	IS 1893 (Part 1) : 2016	Criteria for Earthquake Resistant Design of Structures Part 1 General Provisions and Buildings
Indonesia	SNI 1726:2019	Earthquake Resistance Planning Procedures for Building and Non-building Structures
Japan	Building Standard Law	The Building Standard Law of Japan
Mexico	CFE MDOC-15	Civil Works Design Manual, Earthquake Design
New Zealand	NZS 1170.5:2004+A1	Structural design actions, Part 5: Earthquake actions – New Zealand
Peru	N.T.E. - E.030	National Building Code, Earthquake-Resistant Design
Russia	СП 14.13330.2018	Building norms and regulations: Construction in seismic regions
Saudi Arabia	SBC 301	Saudi Building Code, Loads & Forces Requirements
Taiwan	CPA 2011	Seismic Design Code and Commentary for Buildings
Turkey	TBEC-2018	Turkey Buildings Earthquake Standard
United States	IBC per ASCE 7	International Building Code—IBC
	CBC per ASCE 7	California Building Code—CBC
	UFC per DoD	Uniform Facilities Criteria—UFC

Responsibility for Mitigation of Seismic Damage

The Safety Switch equipment is considered a non-structural building component as defined by regional building codes and seismic design standards. Equipment capacity was determined from tri-axial seismic shake-table test results in accordance with the International Code Counsel Evaluation Service (ICC ES) Acceptance Criteria for Seismic Certification by Shake-Table Testing of Nonstructural Components (ICC-ES AC156).

An equipment importance factor, I_p , that is greater than one ($I_p > 1.0$) is assumed and indicates that equipment functionality is required after a seismic event and after seismic simulation testing. This importance factor is applicable for designated seismic systems (i.e., special certification) servicing critical infrastructure and essential buildings where post-earthquake equipment functionality is a requirement.

Incoming and outgoing bus, cable, and conduit must also be considered as related but independent systems. These distribution systems must be designed and restrained to withstand the forces generated by the seismic event without increasing the load transferred to the equipment. For applications where seismic hazard exists, it is preferred that bus, cable, and conduit enter and exit the bottom of the equipment enclosure.

Seismic certification of nonstructural components and equipment by Schneider Electric is just one link in the total chain of responsibility required to maximize the probability that the equipment will be intact and functional after a seismic event. During a seismic event the equipment must be able to transfer the inertial loads that are created and reacted through the equipment's force resisting system and anchorage to the load-bearing path of the building structural system or foundation.

Anchorage of equipment (i.e., nonstructural supports and attachments) to the primary building structure or foundation is required to validate seismic conformance. The construction site structural engineer or engineer of record (EOR) or the registered design professional (RDP) is responsible for detailing the equipment anchorage requirements for the given installation. The installer and manufacturers of the anchorage system are responsible for assuring that the mounting requirements are met. Schneider Electric is not responsible for the specification and performance of equipment anchorage systems.

Tie-down Points for Rigid Wall Mounted Equipment

The equipment enclosure provides anchorage tie-down points to accept anchor attachments to the building structure or foundation. Indoor enclosures provide enclosure base frame clearance holes for bolted anchorage attachments, outdoor enclosures provide enclosure base frame clearance holes for bolted anchorage attachments please obtain drawings for actual locations.

Equipment installations of single, stand-alone safety switches must be anchored using all enclosure tie-down points as shown on drawings for indoor and outdoor applications respectively.

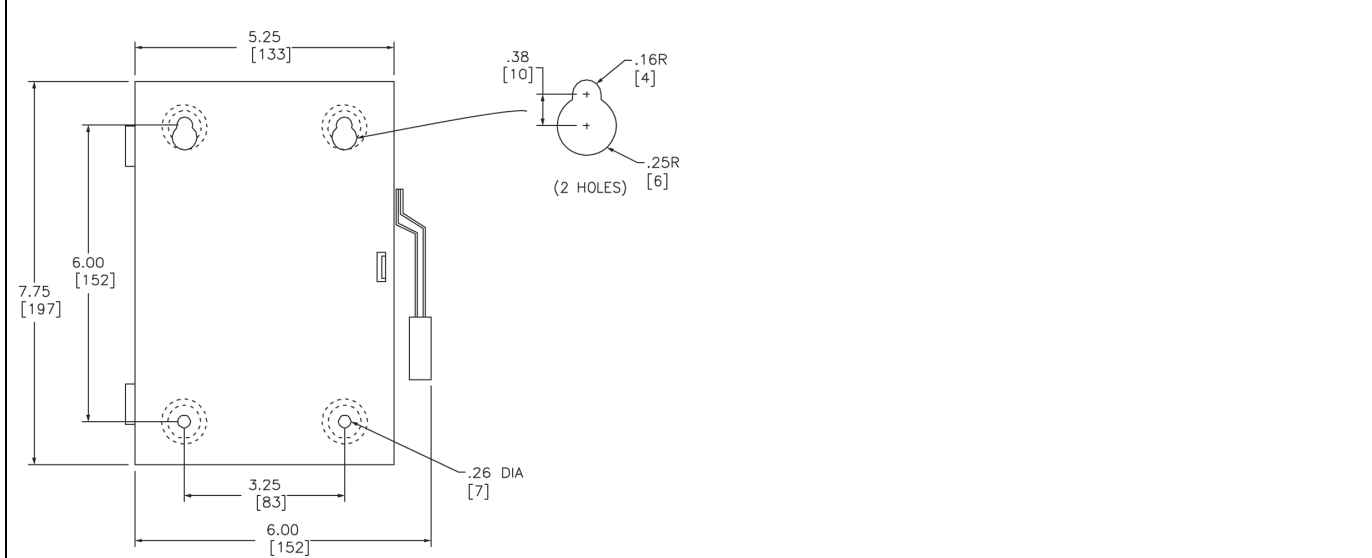
Equipment installations using welded supports and attachments in lieu of bolted supports and attachments must ensure the weld locations are distributed similarly to the locations of enclosure anchorage clearance holes. Welded supports and attachments must be properly sized to ensure the weldment withstand capacity exceeds the earthquake demand at location of equipment installation. Precautions shall be made to properly vent and shield the equipment enclosure during the field welding process. Schneider Electric is not responsible for equipment damage caused by field welded supports and attachments.

Anchorage Assembly Instructions

The bolted anchor assembly illustrates the equipment's as-tested attachment to the seismic shake-table test fixture. The equipment seismic rated capacity, as stated on the Schneider Electric CoC, was achieved with the identified size and grade attachment hardware. Field installed equipment attachment and support detailing shall be in accordance with the anchorage system requirements as defined by the construction site Engineer of Record (EOR) or Registered Design Professional (RDP).

Table 2 - Anchorage As-Tested

Light Duty Safety Switches

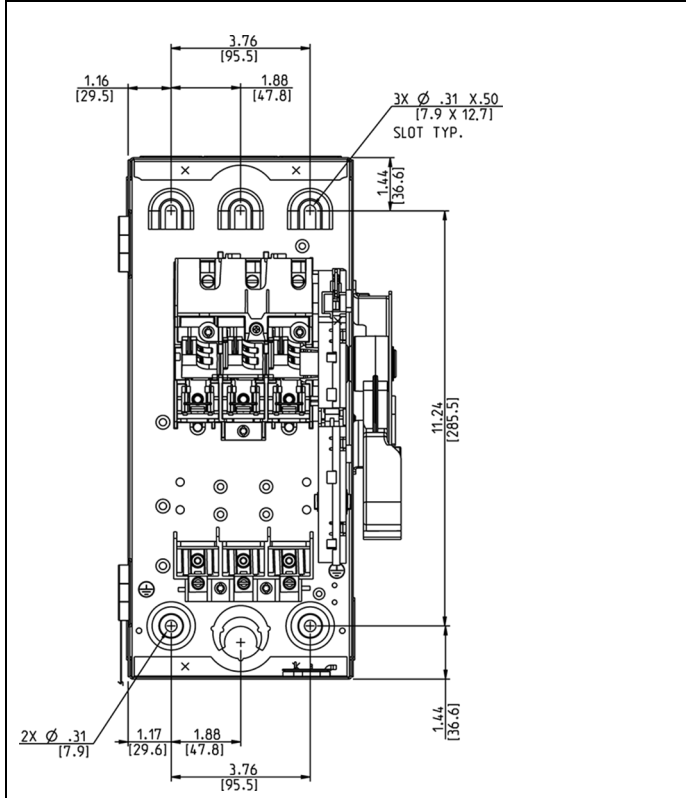


Type 1 – 30 A

1/4 in. grade 5 bolts and flat washer at four locations, torque to 8 ft–lbs.

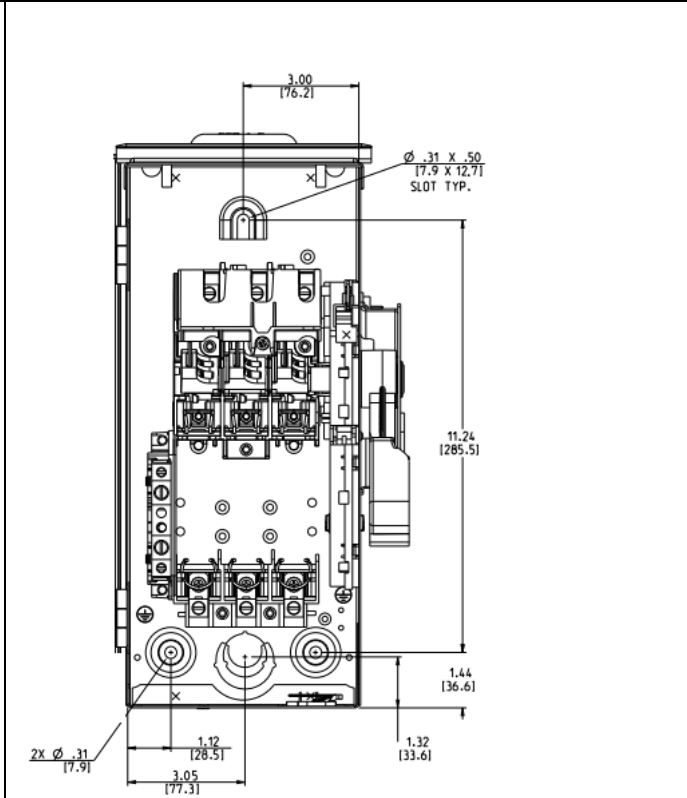
Dimensions: in. / [mm]

General Duty and Heavy Duty – Single and Double Throw



Type 1 30 AMP 240 V / 600 V Type 60 A 240 V

1/4 in. grade 5 bolts and flat washer at three locations, torque to 7 ft–lbs. Locations are top center, and two bottom locations.



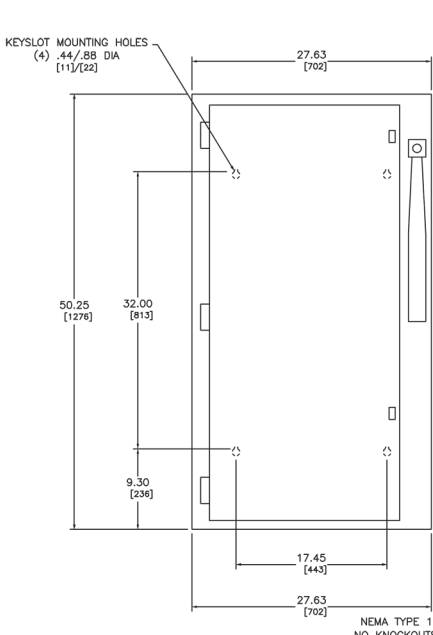
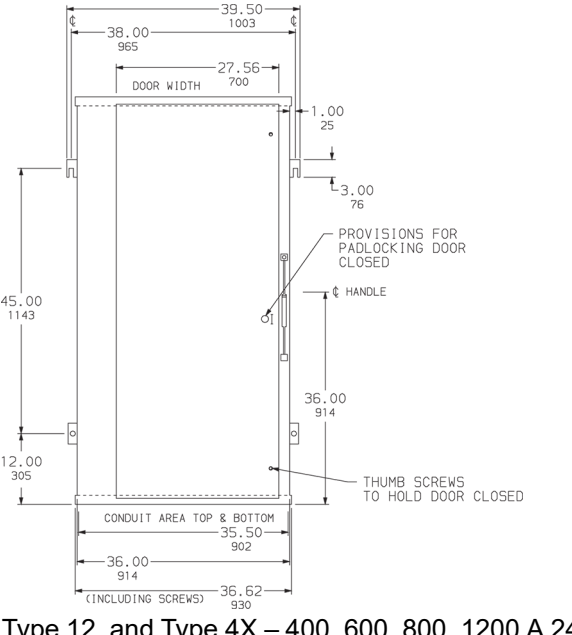
Type 3R 30 A 240 V / 600 V Type 60 A 240 V

1/4 in. grade 5 bolts and flat washer at three locations, torque to 7 ft–lbs.

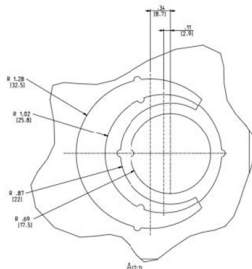
Table 2 - Anchorage As-Tested (Continued)

<p>Type 12 and Type 4X 30, 60, 100 A 240 V / 600 V</p> <p>1/4 in. grade 5 bolts and flat washer at four locations, torque to 7 ft-lbs. Top and bottom outside holes.</p>	<p>Type 1 and Type 3R 60 A 240V 100 A 240 V / 600 V</p> <p>1/4 in. grade 5 bolts and flat washer at four locations, torque to 7 ft-lbs.</p>
<p>Type 1 and Type 3R 200 A 240 V / 600 V</p> <p>1/4 in. grade 5 bolts and flat washer at four locations, torque to 7 ft-lbs.</p>	<p>Type 12 and Type 4X 100 and 200 A 240 V / 600 V</p> <p>1/4 in. grade 5 bolts and flat washer at four locations, torque to 7 ft-lbs.</p>

Table 2 - Anchorage As-Tested (Continued)

 <p>KEYSLOT MOUNTING HOLES (4) .44/.88 DIA [111]/[222]</p> <p>27.63 [702]</p> <p>50.25 [1276]</p> <p>32.00 [813]</p> <p>9.30 [236]</p> <p>17.45 [445]</p> <p>27.63 [702]</p> <p>NEMA TYPE 1 NO KNOCKOUTS</p> <p>Type 1, Type 3R 400, 600, 800, 1200 A 240 V / 600 V</p> <p>3/8 in. grade 5 bolts and flat washer at four locations, torque to 25 ft-lbs.</p>	 <p>39.50 [1003]</p> <p>38.00 [965]</p> <p>27.56 [700]</p> <p>DOOR WIDTH</p> <p>1.00 [25]</p> <p>3.00 [76]</p> <p>PROVISIONS FOR PADLOCKING DOOR CLOSED</p> <p>HANDLE</p> <p>36.00 [914]</p> <p>12.00 [305]</p> <p>45.00 [1143]</p> <p>THUMB SCREWS TO HOLD DOOR CLOSED</p> <p>CONDUIT AREA TOP & BOTTOM</p> <p>35.50 [902]</p> <p>36.00 [914]</p> <p>36.62 [930]</p> <p>(INCLUDING SCREWS)</p> <p>Type 12, and Type 4X – 400, 600, 800, 1200 A 240 V / 600 V</p> <p>7/16 in. grade 5 bolts and flat washer at four locations, torque to 40 ft-lbs.</p>
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Removal of Knock Outs



1. Determine the size required.
2. Remove the smallest knockout first.
Go across from the spot weld and apply force to break the knock out loose. Then crimp the knock out and twist until removed.
3. Removal of the second knockout full ring.
Two spot welds located across from each other. Go 90° from each spot weld apply force to break each side loose. Then pinch the two sides together and apply rotating force until removed.
4. Removal of the knock out partial ring.
Go 90° from either spot weld and apply force to break the side loose. The partial side apply force on each partial part of knock out. Pinch the three pieces together and apply rotating force until removed.
5. Repeat step 3 and 4 until the knock out side requirements are obtained.

Conduit Entry

Drilling into enclosures for creating conduit entry locations may be required. Protect internal components from metal filings, via drop cloths or orientation of drilling, to prevent foreign materials from contacting electrical connections points. An example of a connection point is lugs, blades, or fuse clips.

Locate conduit entries to comply with bending radius requirements for conductors.

Enclosure Ratings

All Schneider Electric enclosures are certified to UL 50 and UL 50E carrying a UL Type Rating. Ratings are equal to or greater than NEMA Ratings of same number.

Table 3 - Enclosure ratings

Type	Knockout information
Type 1 general purpose, indoor (ANSI49 gray paint on cold rolled steel)	Knockouts standard on 30–100 A enclosures; top, bottom and sidewalls
Type 3R rainproof, outdoor (ANSI49 gray paint on galvanized steel)	Knockouts standard on 30–100 A enclosures; bottom and sidewalls
Type 12 indoor, dust-tight, and drip-tight (ANSI49 gray paint on galvanized steel)	Type 12 has no knockouts (also suitable for Type 3R outdoor use)
Type 4, 4X, and 5 indoor or outdoor, watertight, dust-tight, and corrosion resistant (Type 304 or Type 316 stainless steel)	—
Type 4X indoor or outdoor, watertight and dust-tight, and corrosion resistant (fiberglass reinforced polyester)	—
Type 7/9 hazardous locations as defined in NEC Article 500 (copper free cast aluminum)	Class I, Divisions 1 and 2, Groups C and D
	Class II, Divisions 1 and 2, Groups E, F and G
	Class III, Divisions 1 and 2
Type 3R - 800 and 1200 A Heavy Duty shipped as Type 5 enclosure, removed drip screw for Type 3 Applications	—
Type 12 - may be used for Type 3R applications by removing drip screw	—

Fusible Safety Switches

Table 4 - Ratings for Fuses

Class	Cartridge fuse	Ampere Rating
Light Duty Safety Switches		
Plug	10 kA short circuit	30
Light and General Duty Safety Switches from the factory cartridge fuses		
H	10 kA short circuit	30 to 600
K	10 kA short circuit	30 to 600
R	10 kA short circuit	30 to 600
	100 kA short circuit ¹	30 to 600
T	100 kA short circuit	800
		400 and 600 ²
Heavy Duty Safety Switches from the factory cartridge fuses		
H	10 kA short circuit	30 to 600
K	10 kA short circuit	30 to 600
R	10 kA short circuit	30 to 600
	200 kA short circuit ³	30 to 600
L	200 kA short circuit	800 to 1200
Safety Switches Field Modified		
General Duty		
J	100 kA short circuit	30 to 600
Heavy Duty		
J	200 kA Short Circuit	100 to 200 ⁴
		30 to 400 ⁵
		600 ^{6 7}

NOTE: AIC ratings are for the switch, fuse, and/or rejection clip combination.

Table 5 - UL Class Ratings for Fuses

Class	Voltage	Maximum Interruption Rating
Current limiting fuses		
R	250 Vac	200,000 A rms symmetrical
	600 Vac	
	300 Vdc	
	600 Vdc	
Terminals modified to provide rejection feature		
J	600 Vac	200,000 A rms symmetrical

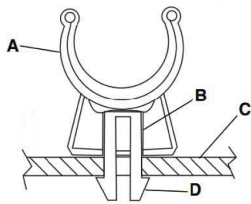
1. Class R Rejection clips field installed.
2. Factory Special
3. Class R rejection clips field installed.
4. 240 V
5. 600 V
6. 240 V or 600 V
7. Requires kit H600J.

Table 5 - UL Class Ratings for Fuses (Continued)

Class	Voltage	Maximum Interruption Rating
T	300 Vac	200,000 A rms symmetrical
	600 Vac	200,000 A rms symmetrical
	125 Vdc	200,000 A rms symmetrical
	300 Vdc	200,000 A rms symmetrical
L	600 Vac	ac: 200,000 A rms symmetrical
		dc: 50,000 A
	600 Vdc	dc: 100,000 A
K	250 Vac	50,000 A rms symmetrical
	600 Vac	100,000 A rms symmetrical
		200,000 A rms symmetrical
Non-Current Limiting Fuses		
H	250 Vac	10,000 A rms symmetrical
	600 Vac	
Plug	125 Vac	10,000 A rms symmetrical

Class R Rejection Clip Kits

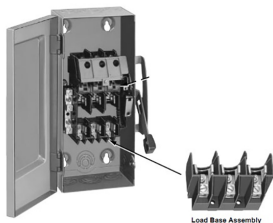
It is required to obtain full rating of Class R fuses, without clips the system rating is reduced to 10 kAIC, since switch can have Class H or Class K still installed.



Ampere Rating	Voltage Rating	Kit Catalog
30	240 V	RFK03L
30	600 V	RFK03H
30 ⁸		RFK06
30 ⁹		RFK06
60	240 V	RFK03H
60	600 V	RFK06H
100	240 V and 600 V	RFK10
200		RFK1020
400		RFK4060
600		RFK4060

- Turn OFF (O) all power supplying switch and follow lockout/tag-out procedures.
 - NOTE:** Each fuse has rejection provisions on one end only. Ears on adapter fit into small slots in molded base, near fuse clip (A) on line end.
- Push fuse adapter (B) firmly into slot in molded base (C) with circular portion going into slot in either side of fuse clip. Make sure ears (D) of adapter snap into base so adapter cannot be removed.
- Refer to the Class R Rejection Clip Kits for additional information.
 - NOTE:** Class J fuses require moving of the Load Base Assembly to holes marked on the devices. 600 A also requires Kit: H600J.

Moving the Load Base Assembly



- Remove two mounting screws (can be used for remounting) that have load base located for Type H, K and R fuses.
- Align load base for mounting location for Type J fuses.
- Use screws to reattach load base. Refer to the table below for the appropriate torque value.

Amperage	Torque
30 A	20–30 lb–in. (2.26–3.39 N•m)
60 A	25–35 lb–in. (2.82–3.95 N•m)
100 A	
200 A	30–50 lb–in. (3.39–5.65 N•m)
400 A	55–60 lb–in. (6.21–6.78 N•m)
600 A	

8. Four pole
9. With receptacle

Non-Fusible Safety Switch Short Circuit Current Rating

Table 6 - Non-Fusible Safety Switches, NEMA Type 7/9 SCCR 10 kAIR 600 Vac maximum


Switch Rating (A)	Fuse or Circuit Breaker Type ¹⁰	240 Vac	480 Vac	600 Vac	250 Vdc
Switch Ratings (A)	With Upstream Fuse Protection	240 Vac	480 Vac	600 Vac	250 Vdc/ 600 Vdc
ALL	H, K	10 kA	10 kA	10 kA	up to 10 kA
	R, T, J, L	200 kA	200 kA	200 kA	up to 10 kA
Switch Ratings (A)	With Upstream Circuit Breaker Protection	240 Vac	480 Vac	600Y/347 Vac	250 Vdc
30, 60, 100	BD	25 kA	18 kA	14 kA	up to 10 kA
30, 60, 100	BG	65 kA	35 kA	18 kA	up to 10 kA
30, 60, 100	BJ	100 kA	65 kA	25 kA	up to 10 kA
30, 60, 100	BK	100 kA	65 kA	65 kA	up to 10 kA
Switch Ratings (A)	With Upstream Circuit Breaker Protection	240 Vac	480 Vac	600 Vac	250 Vdc
ALL	Any brand circuit breaker	10 kA	10 kA	10 kA	up to 10 kA
30, 60, 100	HD	25 kA	18 kA	14 kA	up to 10 kA
30, 60, 100	HG	65 kA	35 kA	18 kA	up to 10 kA
30, 60, 100	HJ	65 kA	35 kA	18 kA	up to 10 kA
30, 60, 100	HL	65 kA	35 kA	35 kA	up to 10 kA
30, 60, 100	HR	65 kA	35 kA	35 kA	up to 10 kA
30, 60, 100	FA	14 kA	14 kA	14 kA	up to 10 kA
30, 60, 100	FH	18 kA	18 kA	18 kA	up to 10 kA
200	HD, JD	25 kA	18 kA	14 kA	up to 10 kA
200	HG, JG	65 kA	35 kA	18 kA	up to 10 kA
200	HJ, JJ	65 kA	65 kA	25 kA	up to 10 kA
200	HL, JL	65 kA	35 kA	35 kA	up to 10 kA
200	HR, JR	65 kA	35 kA	35 kA	up to 10 kA
400	LA	25 kA	25 kA	25 kA	up to 10 kA
400	LH	25 kA	25 kA	25 kA	up to 10 kA
400, 600	LD	25 kA	18 kA	14 kA	up to 10 kA
400, 600	LG	65 kA	35 kA	18 kA	up to 10 kA
400, 600	LJ	100 kA	65 kA	25 kA	up to 10 kA
400, 600	LL	100 kA	65 kA	50 kA	up to 10 kA
400, 600	LR	100 kA	65 kA	65 kA	up to 10 kA

10. Ampere rating of fuse or circuit breaker not to exceed switch ampere rating.

Ground Kits

Ground Kits are required to be obtained as a field installed item on Type 1 and Type 3R enclosures. The enclosures are factory installed on Type 12 and Type 4X enclosures. (200 A) Light Duty 30 A switches come with factory installed ground kits.

All units ship with a bonded neutral bar that comes with factory installed ground terminal.

Ground lug mounting locations are identified by the ground symbol  stamped onto the back of enclosure. Ground the enclosure in accordance with code requirements.

Ampere Rating	Product	Voltage Rating ac	Ground Kit (ALCU)	Wire Range	Ground Kit Copper only (Heavy duty)	Wire Range
30	General Duty	240	PK3GTA1	(3) 14 - 4 AWG CU (3) 12 - 4 AWG AL (6) 14 - 12 AWG CU (6) 12 - 10 AWG AL	n/a	—
30	Heavy Duty	240 and 600	GTK03	(2) 14 - 4 AWG CU (2) 12 - 4 AWG AL or (4) 14-12 AWG CU (4) 12-10 AWK AL	GTK03C	(2) 14 - 6 AWG CU
60	General Duty Heavy Duty	240	GTK03	(2) 14 - 4 AWG CU (2) 12 - 4 AWG AL or (4) 14-12 AWG CU (4) 12-10 AWK AL	GTK03C	(2) 14 - 6 AWG CU
60	Heavy Duty	600	GTK0610	(2) 14 - 1/0 AWG CU (2) 12 - 1/0 AWG AL and (2) 14-6 AWG CU (2) 12-6 AWK AL	GTK0610C	(2) 14 - 1/0 AWG CU and (2) 14 - 6 AWG CU
100	General Duty Heavy Duty	240 and 600	GTK0610	(2) 14 - 1/0 AWG CU (2) 12 - 1/0 AWG AL and (2) 14-6 AWG CU (2) 12-6 AWK AL	GTK0610C	(2) 14 - 1/0 AWG CU and (2) 14 - 6 AWG CU
200	General Duty Heavy Duty	240 and 600	PKOGTA2	(2) 10 - 2/0 AWG CU (2) 6 - 2/0 AWG AL	PKOGTC2	(2) 14 - 4 AWG CU
400	General Duty Heavy Duty	240 and 600	PKOGTA2	(2) 10 - 2/0 AWG CU (2) 6 - 2/0 AWG AL	PKOGTC3	(2) 14 - 1/0 AWG CU
600	General Duty Heavy Duty	240 and 600	PKOGTA2	(2) 10 - 2/0 AWG CU (2) 6 - 2/0 AWG AL	PKOGTC3	(2) 14 - 1/0 AWG CU
800	General Duty	240	PKOGTA3	(6) 6 - 3/0 AWG CU (6) 6 - 3/0 AWG AL	n/a	—
800	Heavy Duty	240 and 600	PKOGTA7	(4) 4 AWG - 300 kcmil CU (4) 4 AWG - 300 kcmil AL	n/a	—
1200	Heavy Duty	240 and 600	PKOGTA8	(8) 4 AWG - 300 kcmil CU (8) 4 AWG - 300 kcmil AL	n/a	—

Insulated Neutral Assemblies

Insulated neutral assemblies are available as factory or field installed devices. All insulated neutrals come with a bonding screw or jumper, allowing the items to be used as service entrance equipment.

Factory installed insulated neutrals are shipped not bonded, use for all applications in the United States and Mexico. They cannot be used for service entrance applications in Canada.

Shipped factory bonded is used for all applications in Canada. It can only be used for service entrance applications in the United States and Mexico.

NOTE: CANADA ONLY - Devices shipped factory bonded, the bonding screw must be removed for all non-service entrance applications.

Ampere Rating	Product	Voltage Rating ac	Neutral Kit (ALCU)	Wire Range	Neutral Kit Copper only	Wire Range	
30	Heavy Duty	240 and 600	SNO3	(2) 14 – 3 AWG CU (2) 14 – 3 AWG AL plus SVC Ground (1) 14 -3 AWG CU (1) 14 – 3 AWG AL	SNO3C	(2) 14 – 6 AWG CU plus SVC Ground (1) 14 -6 AWG CU	
60		240	SNO3	(2) 14 – 3 AWG CU (2) 14 – 3 AWG AL plus SVC Ground (1) 14 -3 AWG CU (1) 14 – 3 AWG AL	SNO3C	(2) 14 – 6 AWG CU plus SVC Ground (1) 14 -6 AWG CU	
60		600	SNO610	(2) 14 – 1/0 AWG CU (2) 14 – 1/0AWG AL plus SVC Ground (2) 14 -6 AWG CU (2) 14 – 6 AWG AL	SNO610C	(2) 14 – 2/0 AWG CU plus SVC Ground (3) 14 -6 AWG CU	
100		240 and 600		SNO610	(2) 14 – 1/0 AWG CU (2) 14 – 1/0AWG AL plus SVC Ground (2) 14 -6 AWG CU (2) 14 – 6 AWG AL	SNO610C	(2) 14 – 2/0 AWG CU plus SVC Ground (3) 14 -6 AWG CU
200				SN20A	(2) 6 AWG – 250 kcmil CU (2) 6 AWG – 250 kcmil AL plus SVC Ground (2) 14 -10 AWG CU (2) 14 – 10 AWG AL	SN20C	(2) 6 AWG – 250 KCMIL CU plus SVC Ground (1) 14 -1/0 AWG CU
400				H600SN	(2) 1 AWG– 750 kcmil CU (2) 1 AWG – 750 kcmil AL plus SVC Ground (1) 4 AWG – 300 kcmil CU (1) 4 AWG – 300 kcmil AL	H600SNC	(2) 6 AWG – 600 kcmil CU and (2) 2 AWG – 350 kcmil CU plus SVC Ground (1) 6 AWG – 250 kcmil CU
600				H600SN	(2) 1 AWG– 750 kcmil CU (2) 1 AWG – 750 kcmil AL plus SVC Ground (1) 4 AWG – 300 kcmil CU (1) 4 AWG – 300 kcmil AL	H600SNC	(2) 6 AWG – 600 kcmil CU and (2) 2 AWG – 350 kcmil CU plus SVC Ground (1) 6 AWG – 250 kcmil CU
800				H800SNE4	(6) 3/0 AWG - 750 kcmil CU (6) 3/0 AWG 750 kcmil AL plus SVC Ground (2) 6 AWG – 350 kcmil CU (2) 6 AWG – 350 kcmil AL	n/a	—
1200				H1200SNE4	(8) 3/0 AWG - 750 kcmil CU (8) 3/0 AWG 750 kcmil AL plus SVC Ground (2) 6 AWG – 350 kcmil CU (2) 6 AWG – 350 kcmil AL	n/a	—

Line Side Barriers

General duty and heavy duty single throw units 30, 60, 100, and 200 A switches are design to provide protection from inadvertent contact on incoming terminals. Internal components comply with IP2X ratings and UL 869A .

Field Installed barriers are available for 400, 600, 800, and 1200 A devices and when installed, provide protection from inadvertent contact on incoming terminals.

Ampere	Product	Voltage Rating AC	Two Pole	Three Pole
400	Heavy Duty	240	LSBG202	LSBG203
		600	LSBG602	LSBG602
600		240	LSBG202	LSBG203
		600	LSBG602	LSBG602
800		240	LSBF202	LSBF203
		600	LSBF602	LSBF602
1200		240	LSBF202	LSBF203
		600	LSBF602	LSBF602

Wire insulation is part of the touch protective system, the tables below give the amount of conductor that should be exposed.

Table 7 - General Duty Safety Switches

Ampere	Voltage	Wire Strip
30	240	0.47 in. / 12 mm
60		
100		0.60 in. / 15 mm
200		0.87 in. / 22 mm
400		1.25 in. / 32 mm
600		
800		

Figure 1 - Stripped Wire



Table 8 - Heavy Duty Safety Switches

Ampere	Voltage	Wire Strip
30	240	0.47 in. / 12 mm
60		
100		0.60 in. / 15 mm
200		0.87 in. / 22 mm
400		1.50 in. / 38 mm
600		
800		
1200		1.50 in. / 38 mm (top) 2.70 in. / 69 mm (bottom)
30	600	0.47 in. / 12 mm
60		
100		0.60 in. / 15 mm
200		0.87 in. / 22 mm
400		1.50 in. / 38 mm
600		
800		
1200		1.50 in. / 38 mm (top) 2.70 in. / 69 mm (bottom)

Service Entry Requirements

USA and Mexico

Switches not factory bonded are shipped suitable for use as service equipment.

Switches that are shipped from the factory with a bonded neutral are suitable only for use as service equipment.

Enclosure must be grounded via the ground terminal.

Devices require line side barriers.

Devices need neutral kit installed.

Bonding Screw must be driven into enclosure; bonding the insulated neutral to the enclosure. The enclosure must be ground using the ground terminal.

Canada

Switches that are shipped from the factory with a bonded insulated neutral are suitable for use as service equipment. The enclosure must be grounded using the ground terminal.

Devices require line side barriers.

NOTE: Canada factory bonded insulated neutral can be un-bonded and used for other applications other than the service entrance.

Maintenance

Introduction

Safety switches are properly lubricated at the factory. However, periodic cleaning and lubrication may be required. The maintenance interval between lubrications depends on the amount of switch usage and the ambient operating conditions. The maximum maintenance interval should not exceed one year for mechanical or current-carrying parts.

For additional information, refer to publication NFPA-70B, "Standard for Electrical Equipment Maintenance".

Unusual Performance Conditions

Contact Schneider Electric for information regarding performance under unusual conditions. Examples of unusual conditions are shown in table below:

Unusual Conditions
Ambient temperatures below -22°F (-30°C) or above 104°F (40°C)
Altitudes over 6600 ft (2012 m)
Corrosive or explosive environments
Abnormal vibration, shock, or tilting
Unusual operating duties

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, CSA Z462 or NOM-029-STPS.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Never operate energized switch with door open.
- Turn off switch before removing or installing fuses or making load side connections.
- Always use a properly rated voltage sensing device at all line and load fuse clips to confirm switch is off.
- Turn off power supplying switch before doing any other work on or inside switch.
- Do not use renewable link fuses in fused switches.

Failure to follow these instructions will result in death or serious injury.

Annual Maintenance Procedures

1. Turn off power supplying the switch before performing any work on or inside the switch.
2. Open the switch blades by moving the operating handle to the OFF (O) position.
3. Lock out or tag the switch, per local procedures.
4. Open the enclosure door.
5. Always use a properly rated voltage sensing device at all line and load-side lugs (terminals) to confirm power is off.

NOTE: Do not remove any parts from the switch or operating mechanism unless specifically instructed to do so in the following procedures. Vacuum any loose material from inside the switch. Wipe internal parts and the inside of the enclosure with a damp, lint-free cloth.

6. Visually inspect the switch for loose parts or hardware:
 - a. Retighten the hardware as needed. Refer to the wiring diagram for torque values.
 - b. Do not re-energize the switch if any worn or damaged parts are found. Replace them before re-energizing the switch.

Parts Removal

1. Remove the arc suppressor(s) or arc shield(s) from the switches by loosening the fastener(s) holding the suppressor(s) / shield(s) in place. See the examples provided.
2. Remove old grease and other contaminants from the line-side jaws and switchblades with a clean, lint-free cloth. If the lubricant has dried, remove it with CRC® HF Contact Cleaner, or equivalent, sprayed on a cloth.
3. Lubricate the cleaned areas with a thin film of Dow Corning®BG20 grease only.

NOTE: Do not substitute any other lubricant. Other lubricants may not be suitable for electrical applications and could alter the performance of the switch. Dow Corning BG20 is available from Square D (part number SWLUB).
4. Exercise the operating mechanism to ensure proper operation by opening and closing the switch five times with the door closed. Open the switch blades.

⚠ CAUTION

HAZARD OF EQUIPMENT DAMAGE

Do not disassemble the switch line base assembly or remove the blade rotor when cleaning the line-side jaw or the switch blade. See Figure 4, page 26, Examples of Line Base Assemblies.

Failure to follow these instructions can result in injury or equipment damage.

Figure 2 - Example of Arc Suppressors



Figure 3 - Example of Arc Shields

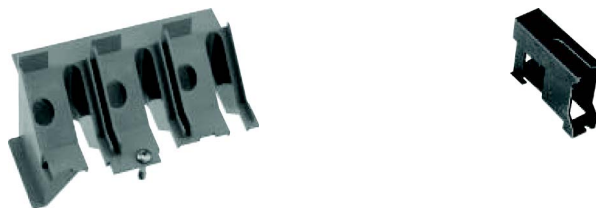
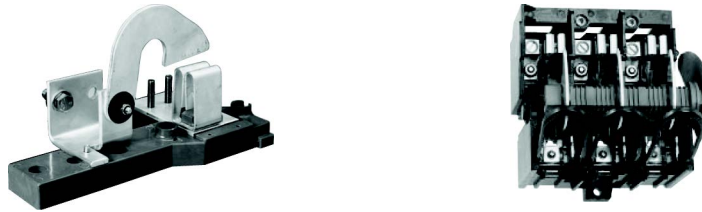
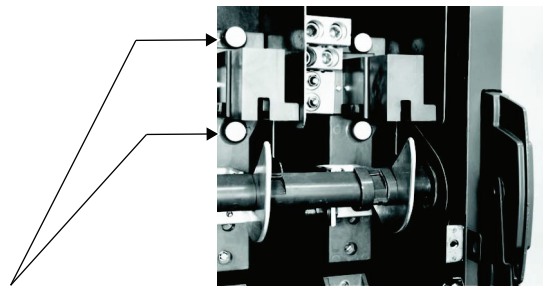


Figure 4 - Examples of Line Base Assemblies**Figure 5 - Insulating Plugs on Pole Unit**

Insulating plug

Parts Replacement

1. Reinstall the arc suppressor(s) or arc shield(s) according to the torque values in the table, page 26 below.
2. Ensure that the two insulating plugs in each phase (400–1200 A only) are firmly seated. See Figure 5.

Table 9 - Arc Suppressor Screw Torque Values

Switch Type	Torque Value
30–100 A	5–10 lb-in. (0,57–1,13 N•m)
200 A, F Series	10–20 lb-in. (1,13–2,26 N•m)
200 A, E Series	20–25 lb-in. (2,26–2,83 N•m)
400–800 A General Duty	20–25 lb-in. (2,26–2,83 N•m)
400–1200 A Heavy Duty	30–40 lb-in. (3,39–4,52 N•m)

Re-Energize the Switch

1. Close and latch the door.
2. Turn off all downstream loads.
3. Turn on power supplying the switch.
4. Turn on the switch.
5. Turn on all downstream loads.

Wiring Diagrams


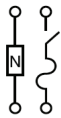
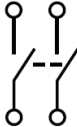
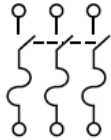
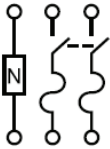
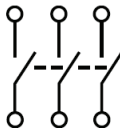
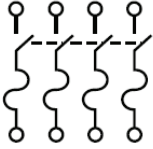
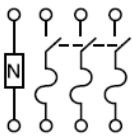
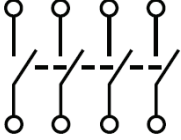
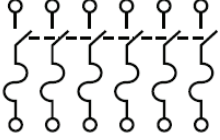
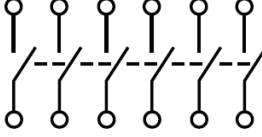
Fuse	Fused with Neutral	Non-Fused
<p>Two-wire (2 blades and fuse holder)</p> 	<p>Two-wire (1 blade and fuse holder)</p> 	<p>Two-wire (2 blades)</p> 
<p>Three-wire (3 blades and fuse holders)</p> 	<p>Three-wire (2 blades and fuse holder)</p> 	<p>Three-wire (3 blades)</p> 
<p>Four-wire (4 blades and fuse holders)</p> 	<p>Four-wire (3 blades and fuse holders)</p> 	<p>Four wires (4 blades)</p> 
<p>Six-wire (6 blades and fuse holders)</p> 	<p>—</p>	<p>Six-wires (6 blades)</p> 

Table 10 - Double-Throw Safety Switches

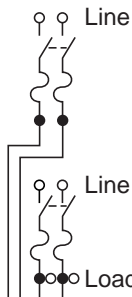
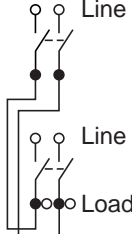
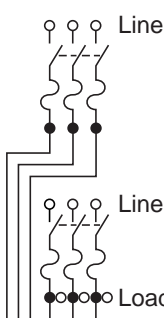
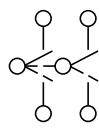
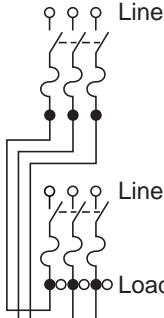
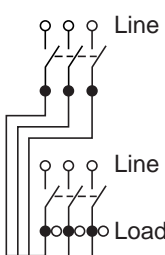
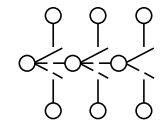
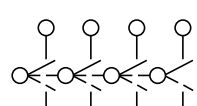
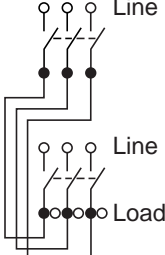
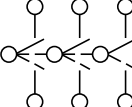
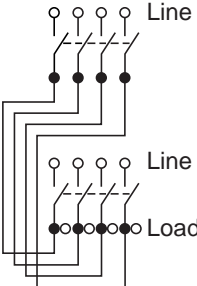
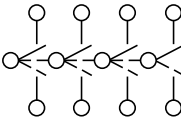
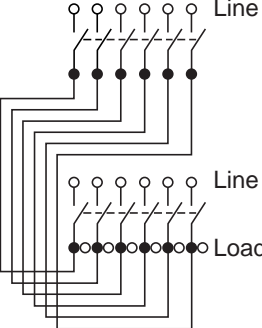
Fuse	Non-Fused
 <p>Fusible—2P, 240 Vac—250 Vdc</p>	 <p>Non-Fusible—2P, 240 Vac—250 Vdc</p>
 <p>Fusible—3P, 240 Vac—250 Vdc</p>	
 <p>Fusible 3P, 600 Vac—600 Vdc</p>	 <p>Non-Fusible—3P, 240 Vac—250 Vdc</p>
—	
—	 <p>Non-Fusible—4P, 240 Vac</p>

Table 10 - Double-Throw Safety Switches (Continued)

Fuse	Non-Fused
—	 <p>Non-Fusible 3P, 600 Vac—600 Vdc</p>
—	
—	 <p>Non-Fusible 4P, 600 Vac—600 Vdc</p>
—	
—	 <p>Non-Fusible 6P, 600 Vac—600 Vdc</p>

Replacing the Viewing Window 30–200 A

⚠️ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, CSA Z462 or NOM-029-STPS.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Never operate energized switch with door open.
- Turn off switch before removing or installing fuses or making load side connections.
- Always use a properly rated voltage sensing device at all line and load fuse clips to confirm switch is off.
- Turn off power supplying switch before doing any other work on or inside switch.
- Do not use renewable link fuses in fused switches.

Failure to follow these instructions will result in death or serious injury.

Figure 6 - Unhook Snap from Cover

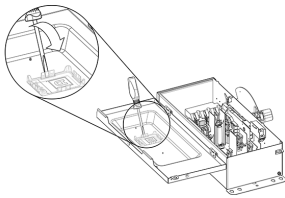
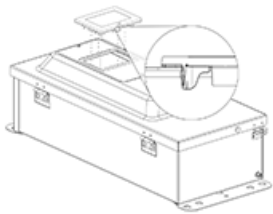


Figure 7 - Snaps in Place



1. Turn off power supplying the switch before performing any work on or inside the switch.
2. Open the switch blades by moving the operating handle to the OFF (O) position.
3. Lock out or tag the switch, per local procedures.
4. Open the enclosure door.
5. Always use a properly rated voltage sensing device at all line and load-side lugs (terminals) to confirm power is off.
6. From inside of front cover use a screw driver to unhook snap from cover and push window out (do on all snap locations). See Figure 6, page 30.
7. Center new window in the opening.
8. Apply equal force on window to snap into place.
9. Confirm that snaps are properly engaged. See Figure 7, page 30.
10. Close the door. Complete any lock out tag out procedures required. Energize, as required.

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As standards, specifications, and design change from time to time,
please ask for confirmation of the information given in this publication.

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GEX75737

Dry-Type Transformers

1000 Volts and Below

Class 7400

Instruction Bulletin

43006-850-01

Rev. 03, 07/2018

Retain for future use.



by Schneider Electric

Hazard Categories and Special Symbols

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this bulletin or on the equipment to warn of hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of either symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates an imminently hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠ WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, **can result in** death or serious injury.

⚠ CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, **can result in** minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury. The safety alert symbol is not used with this signal word.

NOTE: Provides additional information to clarify or simplify a procedure.

Please Note

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

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ENGLISH

Section 1—Introduction

This instruction bulletin provides installation, operation and maintenance instructions for dry-type transformers 1000 volts and below for use in commercial and industrial applications.

NOTE: This bulletin should be used only by qualified personnel.

The following dry-type transformer product families are included in this instruction bulletin. Typical transformers are shown in Figures 1–6.

- Low Voltage Distribution Transformers, Three-phase and Single-phase
 - General Purpose—50 and 60 Hz
 - Energy Efficient (EE)—60 Hz
 - Energy Efficient 2016 (EX)—60 Hz
 - Non-linear Offering (NL, NP or NLP)—50 and 60 Hz
 - Harmonic Mitigating Transformers (HM)—50 and 60 Hz
 - Open Core and Coil (OC)
- Drive Isolation Transformers (DIT)
- Non-ventilated Transformers (NV)

Figure 1: Energy Efficient 2016 Transformers (EX)



Figure 2: Energy Efficient 2016 Transformers (EX)



Figure 3: Open Core and Coil



Figure 4: Energy Efficient (EE) Ventilated Transformer



Figure 5: Non-Linear (NL, NP, NLP) and Harmonic Mitigating (HM)



Figure 6: Non-ventilated Transformer



Section 2—Safety Precautions

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS-2011, or CSA Z462.
- This equipment must be installed and serviced only by qualified electrical personnel.
- Perform such work only after reading and understanding all of the instructions contained in this bulletin.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Before performing visual inspections, tests, or maintenance on this equipment, disconnect all sources of electric power. Assume all circuits are live until they are completely de-energized, tested, and tagged. Pay particular attention to the design of the power system. Consider all sources of power, including the possibility of backfeeding.
- Always practice lock-out/tag-out procedures according to OSHA requirements.
- Carefully inspect your work area, and remove any tools and objects left inside the equipment.
- Replace all devices, doors, and covers before turning on power to this equipment.
- All instructions in this manual are written with the assumption that the customer has taken these measures before performing maintenance or testing.

Failure to follow these instructions will result in death or serious injury.



WARNING: This product can expose you to chemicals including Phenyl Glycidyl Ether, which is known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.



WARNING: This product can expose you to chemicals including Methanol, which is known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Codes and Standards

It is the responsibility of the users of this document to use qualified electrical personnel and to comply with applicable federal, state and local electrical codes when installing electrical products and systems.

This document adheres to the codes and standards as outlined by the National Fire Protection Association® (NFPA). Refer to NFPA 70: 2014 Edition National Electrical Code (NEC®).

Disclaimer Statement

Electrical equipment should be installed, operated, serviced and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

Section 3—Receiving, Handling and Storing

Receiving

1. Upon receipt, remove the packaging.
 - Immediately inspect the new transformer for shipping damage.
 - Refer to Replacement Parts and Accessories on page 41 for replacement parts, accessories (e.g., touch-up paint) and spare parts for minor damage.
2. Check the packing list against the product nameplate.
 - Verify that the order and shipment align with each other and that the shipment is complete.

NOTE: Follow Schneider Electric Conditions of Sale for shortages and errors.
3. Repackage the transformers for storage if they are not to be installed immediately.
 - Cover all ventilation openings to protect against exposure to moisture, dust and contaminants.
 - Leave packing materials intact until the transformers are ready to install.
4. Refer to “Conditions of Sale” for details regarding claims for equipment shortages and other errors. Contact your local Schneider Electric distributor for additional assistance.

Handling

Handle transformers carefully to avoid damage. Avoid subjecting the transformers to impact, jolting, jarring and rough handling. Ensure that transformers are transported in the upright position. When possible, transport transformers to the installation site while still mounted on their shipping pallets.

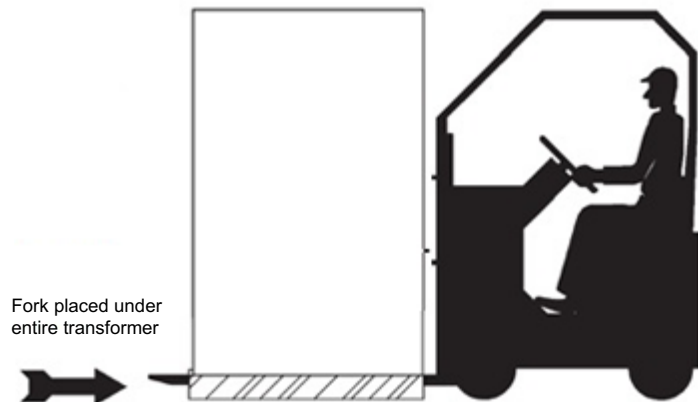
Verify that the weight of the transformer does not exceed the rated capacity of the handling equipment to be used.

Handling with Platform Dollies or Lifts, Pallet Jacks or Fork Trucks

Extreme care should be exercised when moving transformers from the bottom. See Figure 7.

- Use care to distribute the weight when transporting transformers using platform dollies, platform lifts, pallet jacks or fork trucks.
- Use hand trucks or forklifts only when the blades or forks are long enough to pass completely under the transformer enclosure or shipping pallet. Wider fork separation is preferred to distribute the weight of the unit evenly for increased stability.

Figure 7: Handling with a Fork Truck: Blades/Forks Placed under the Entire Transformer (Shipping Pallet Attached)



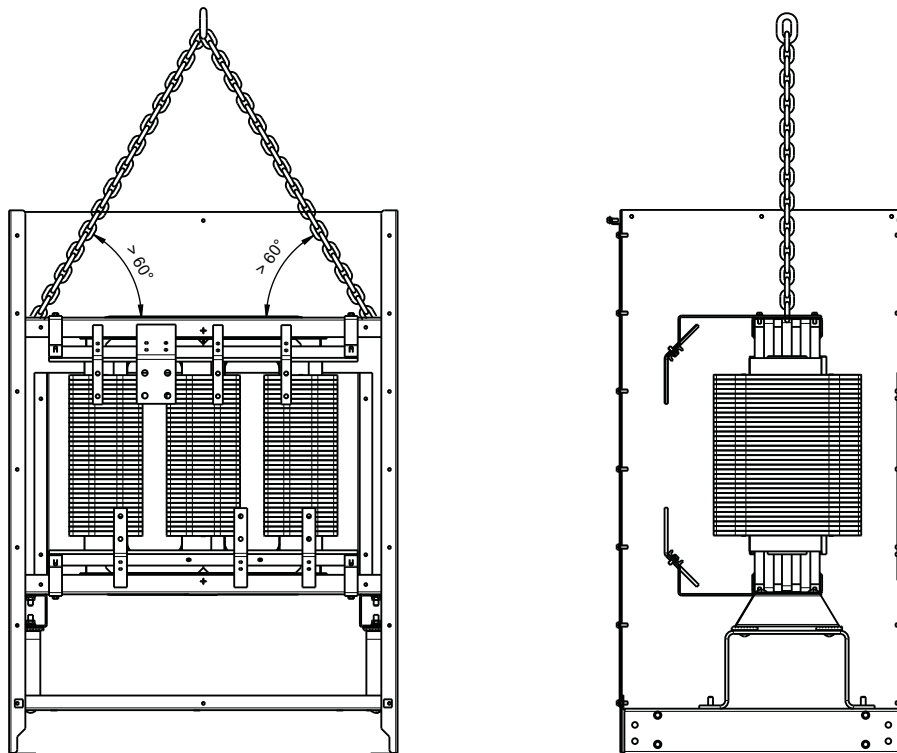
Handling with Cranes: Using Cables, Chains or Straps

When lifting the transformer from above, the use of spreader bars with cables or chains is permissible. This will help avoid damage to the enclosure or equipment.

The enclosure can be removed to allow the units to be transported through small openings, lifting as the same means as shown in Figure 8 on page 12, Figure 9 on page 13, and Figures 10 and 11 on page 15. Refer to Figures 34 and 35 in Replacement Parts and Accessories on page 41 for exploded views of parts and accessories.

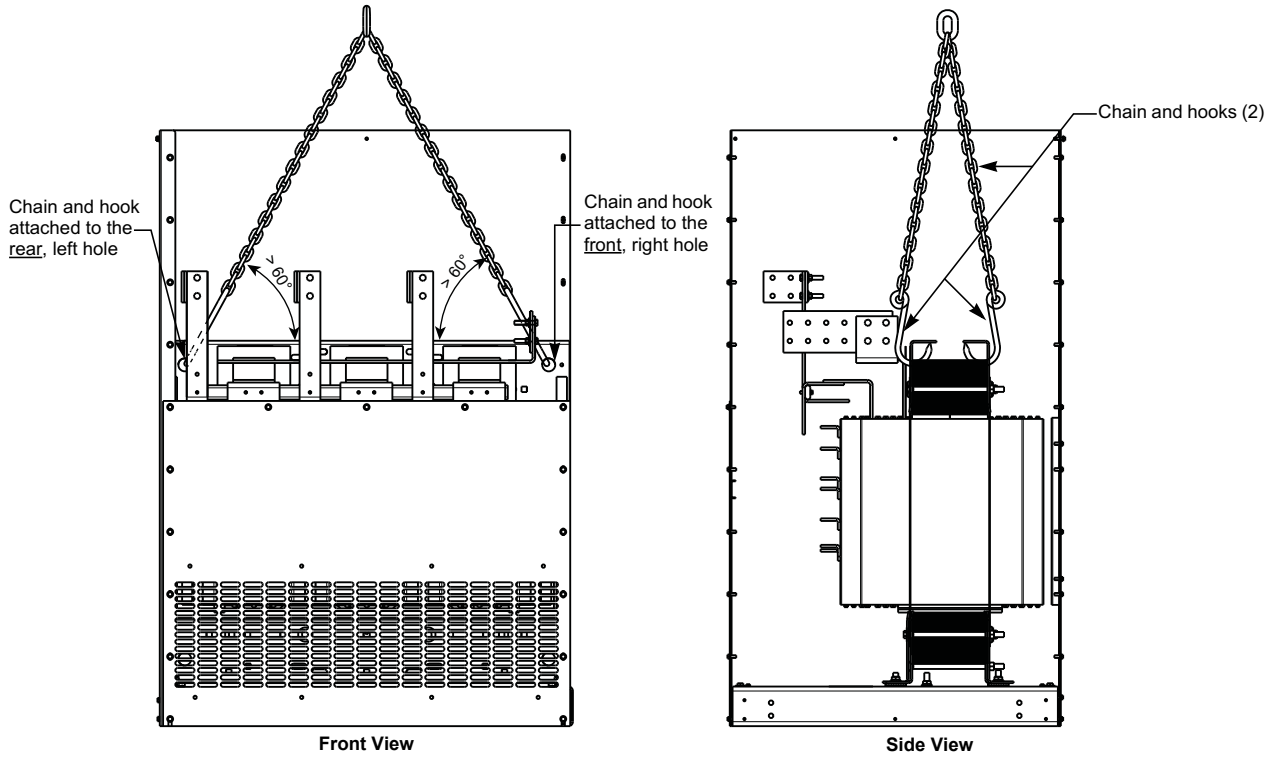
Ensure that the lifting cable pull angles are not less than 60 degrees from horizontal. See Figure 8 on page 12.

Figure 8: Two-Point Lift: Cable Pull Angles (Not Less than 60 Degrees from Horizontal)



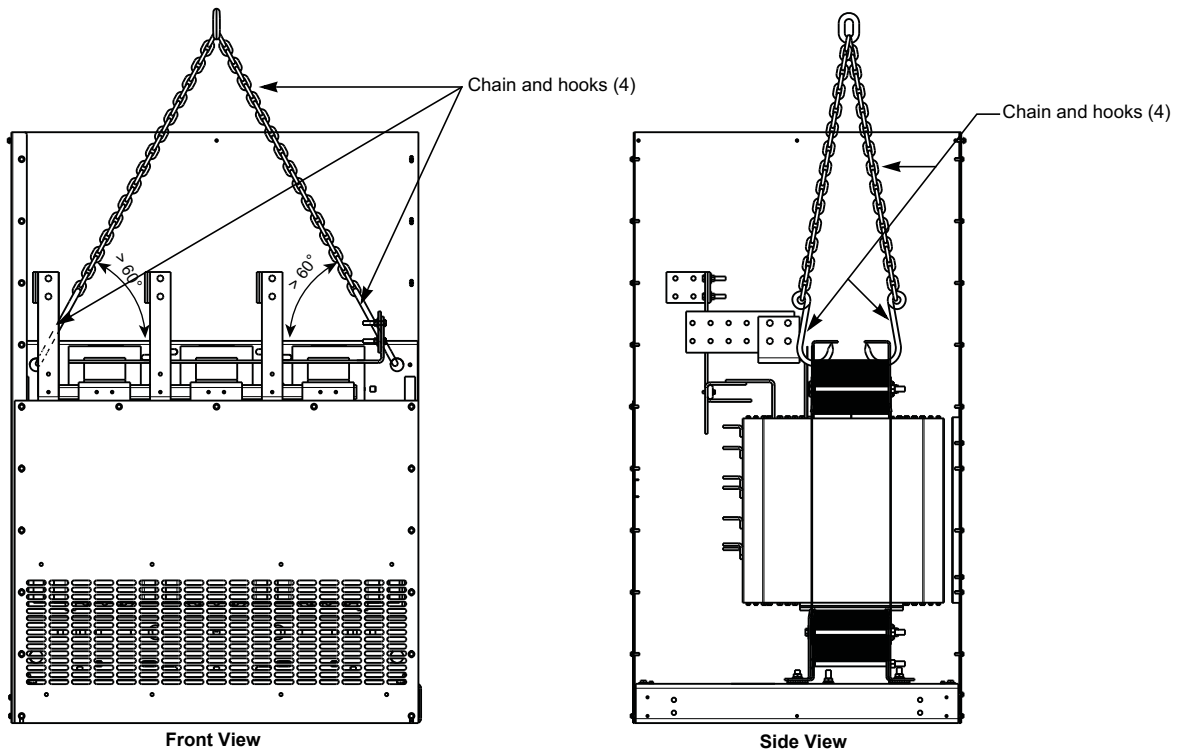
Refer to Figures 9 –11 on pages 13 – 15 for other permissible lifting and handling options.

Figure 9: Two-Point Lift: Handling with Chains, Hooks and Cross Corners (Not Less than 60 Degrees from Horizontal)



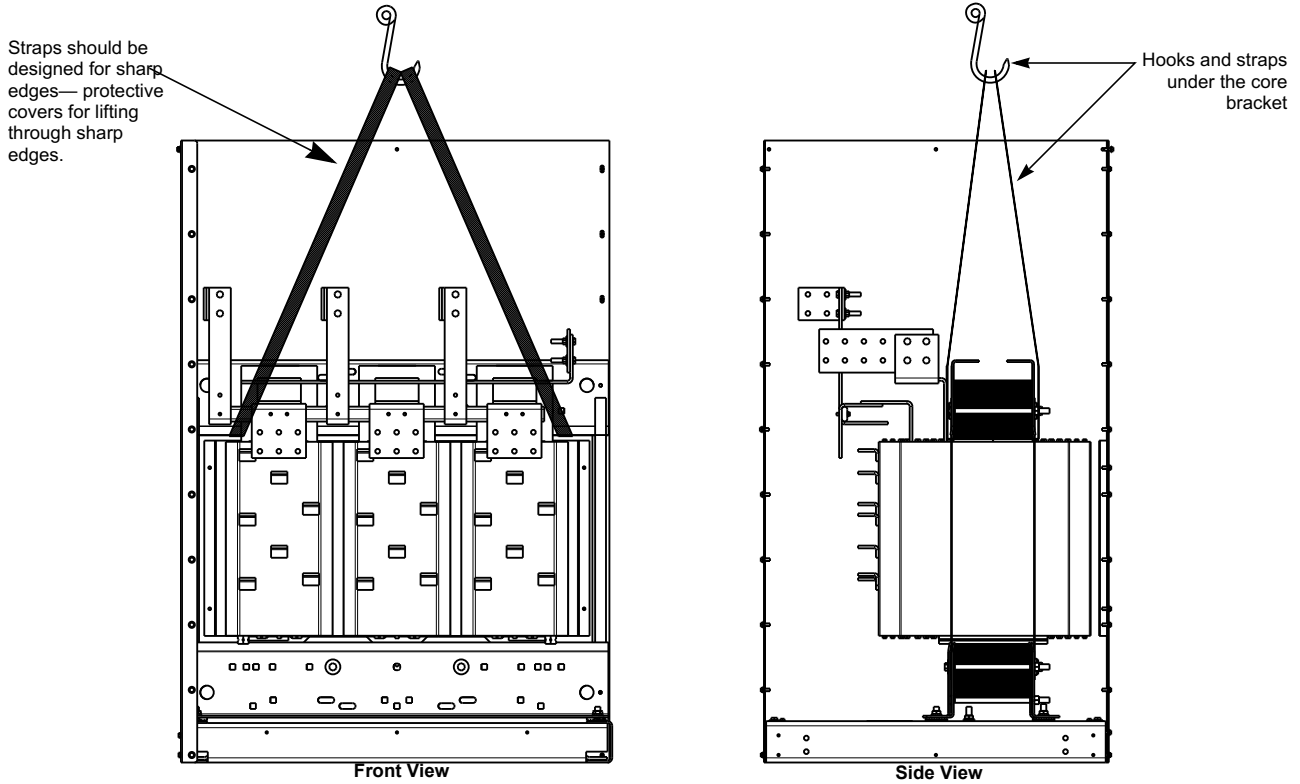
Two-point lift with chains and hooks: Top core bracket, right side and front hole. Rear bracket, left side and rear hole

Figure 10: Four-Point Lift: Handling with Chains, Hooks and Four Corners (Not Less than 60 Degrees from Horizontal)



Four-point lift: The hooks are in the front and back holes of the core bracket (4), with chains lifting on the hooks.

Figure 11: Four-Point Lift: Handling with a Strap and Hooks (Not Less than 60 Degrees from Horizontal)



Four-point lift: The straps are under the core brackets, with the front-to-back straps coming together at the top with a hook. Use straps with protective cover, core clamps edges are sharp.

Handling Enclosure Styles D, H and K after Removal of the Shipping Pallet

Hand trucks and forklifts can access and move the transformer via the front and rear openings below the bottom of the base. See Figure 12. Follow the same handling instructions (beginning on page 11) as if the pallet is still attached.

Figure 12: Handling with a Pallet Jack: Enclosure Styles D, E, H and K after Removing the Shipping Pallet



Storing

Leave the packing material that encloses the transformer in place until the unit is ready for its final placement and wiring. This will help to protect the transformer enclosure and internal parts from dirt, water, moisture contamination and physical damage during storage. Provide extra measures to protect the transformer when the original packing material cannot be retained.

Store transformers indoors in a clean, dry, and heated building with uniform temperatures and adequate air circulation. If necessary, install electric heating to maintain a uniform temperature above the ambient temperature to prevent condensation.

Protect transformers from weather and contamination when it is not possible to store the transformers indoors.

Before energizing the transformer, complete the steps in Pre-commissioning/Pre-energizing Checks and Testing along with the following steps:

1. Test the insulation resistance if storage in a controlled environment was not feasible. Refer to Insulation Resistance on page 39.
2. Dry the unit if test levels are unacceptable:
 - a. Use two heaters or lamps per coil at 120 V, 50 W to apply external heat to the coils.
 - b. Mount the heater or lamp directly below the coils located at the front and rear of the core.


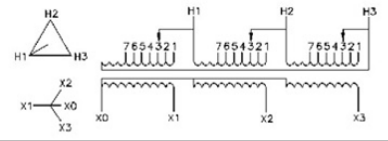

NOTE: Outdoor transformers are not weather resistant until they are properly and completely installed and energized. Treat outdoor transformers in exactly the same manner as indoor transformers until after they are installed.

Section 4—Installation

Locating/Placing Ventilated and Non-ventilated Transformers

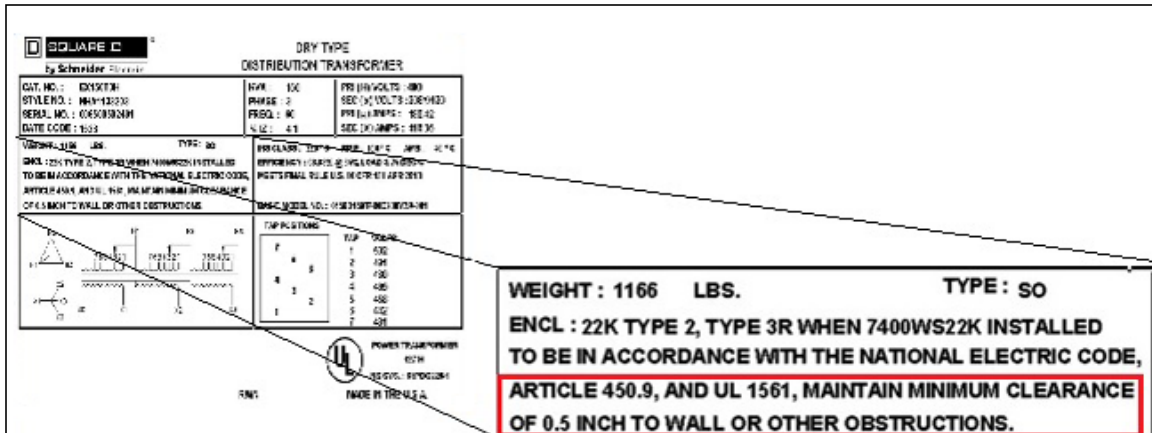
1. Remove all packaging material. Keep the shipping pallet attached to the transformer to assist with moving the unit to its final installation location.
2. Verify that the nameplate matches the description from the building layout drawings (kVA, primary and secondary voltages, etc.). See Figure 13.

Figure 13: Sample Nameplate

		DRY TYPE DISTRIBUTION TRANSFORMER																	
CAT. NO. : EX150T3H STYLE NO. : NHA1133203 SERIAL NO. : 006500502491 DATE CODE : 1523		KVA : 150 PHASE : 3 FREQ. : 60 % IZ : 4.1	PRI (H) VOLTS : 480 SEC (X) VOLTS : 208Y/120 PRI (H) AMPS : 180.42 SEC (X) AMPS : 416.36																
WEIGHT : 1166 LBS. ENCL : 22K TYPE 2, TYPE 3R WHEN 7400WS22K INSTALLED TO BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE, ARTICLE 450.9, AND UL 1561, MAINTAIN MINIMUM CLEARANCE OF 0.5 INCH TO WALL OR OTHER OBSTRUCTIONS.		TYPE : 50 INS CLASS : 220 °C EFFICIENCY : 98.83% @ 35% LOAD & 75 DEG C MEETS FINAL RULE U.S. 10 CFR 431 APR 2013	RISE : 150 °C AMB : 40 °C BASIC MODEL NO. : 065EX150T480D208Y2A-001																
		TAP POSITIONS <table border="1"> <thead> <tr> <th>TAP</th> <th>VOLTS</th> </tr> </thead> <tbody> <tr><td>1</td><td>502</td></tr> <tr><td>2</td><td>491</td></tr> <tr><td>3</td><td>480</td></tr> <tr><td>4</td><td>469</td></tr> <tr><td>5</td><td>458</td></tr> <tr><td>6</td><td>442</td></tr> <tr><td>7</td><td>431</td></tr> </tbody> </table>		TAP	VOLTS	1	502	2	491	3	480	4	469	5	458	6	442	7	431
TAP	VOLTS																		
1	502																		
2	491																		
3	480																		
4	469																		
5	458																		
6	442																		
7	431																		
RWN		 POWER TRANSFORMER 127 H INS SYS. : 65PDG220-1 MADE IN THE U.S.A.																	

3. Locate the unit per the building's layout drawing.
4. Verify the environment is suitable for the enclosure type.
5. Ensure the location is readily accessible to qualified personnel (per NEC 450.13). Units located in the open can be mounted on walls, columns, or otherwise supported from structures.
6. Ensure adequate ventilation since it is essential to properly cool ventilated transformers. Refer to National Electrical Code (NEC®) Article 450.
 - The minimum distance is marked on Nameplate NEC 450.9. See Figure 14 on page 18.
 - Minimum distance varies by enclosure style. See the approval drawing from Schneider Electric for minimum distance.
 - Clean, dry air is desirable.
 - Filtered air may reduce maintenance if the location of the transformer presents a problem.

Figure 14: Minimum Distance Marked on Nameplate NEC 450.9



7. Mount any accessories prior to installing the transformer when using wall or ceiling (trapeze) mounting.
 - a. Observe the four mounting hole locations in each enclosure base.
 - b. Obtain the actual dimensions via approval drawings from Schneider Electric.
 - c. Secure the units using one of two mounting methods: without floor mounting brackets (Figures 15–16 and Figure 17 on page 19) or with floor mounting brackets (Figures 18 and 19 on page 19).
8. Place the transformer in final position.

Figure 15: Mounting: Enclosure Styles D, H, K, and E

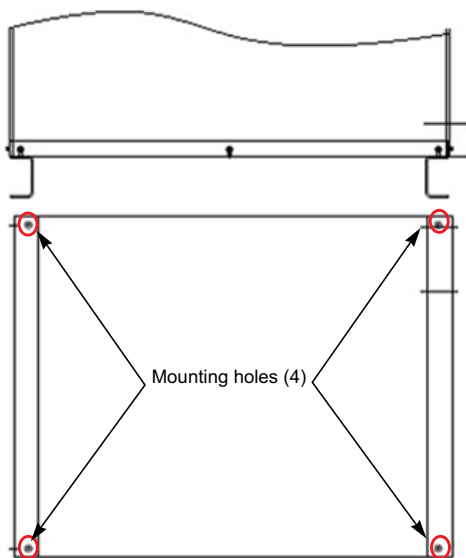


Figure 16: Enclosure D, H, K, and E

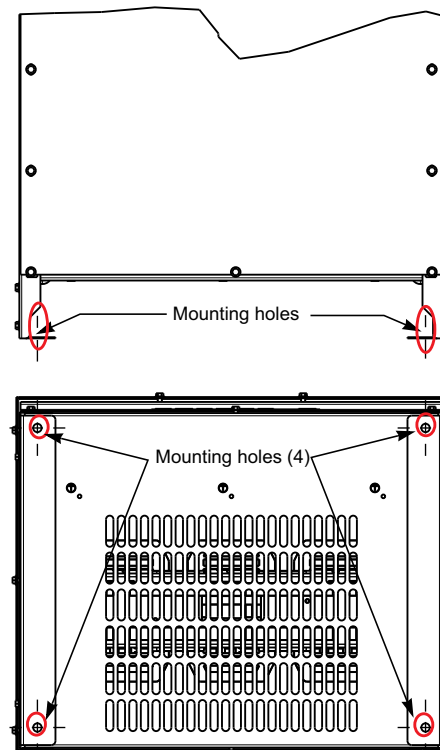
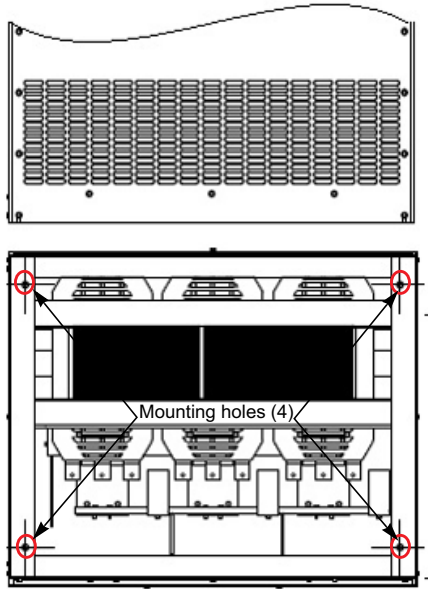


Figure 17: Mounting Enclosure Style J:
Ventilated



Units not for use on combustible floor (open bottom)

Figure 18: Floor Mounting Bracket: Enclosure Style K

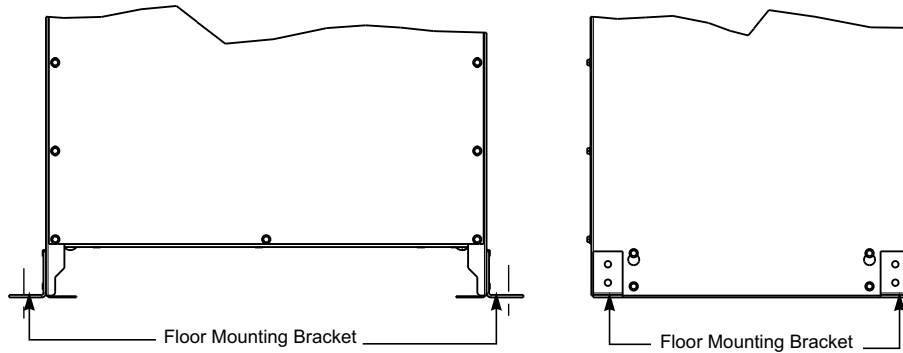
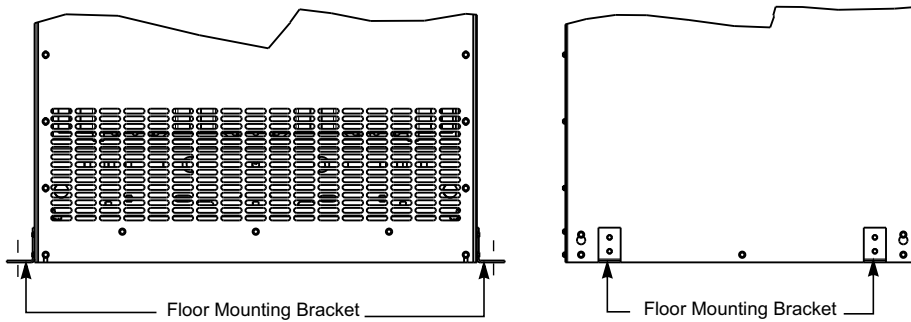


Figure 19: Floor Mounting Bracket: Enclosure Style K



All Enclosure Styles (D, E, F, H, K and J)

- Transformers Installed Indoors (Styles D, E, F, H, K and J):
 - Completely enclosed or completely enclosed with ventilated openings; complies with NEC 450.21 (A) Exception
 - Units greater than 112.5 kVA
 - Have 428°F (220°C) or 392°F (200°C) insulation systems; complies with 450.21 (B) Exception No. 2

See Figure 20.

Figure 20: Transformers Installed Indoors: NEC 450.21 Exceptions A or B from Sample Nameplate

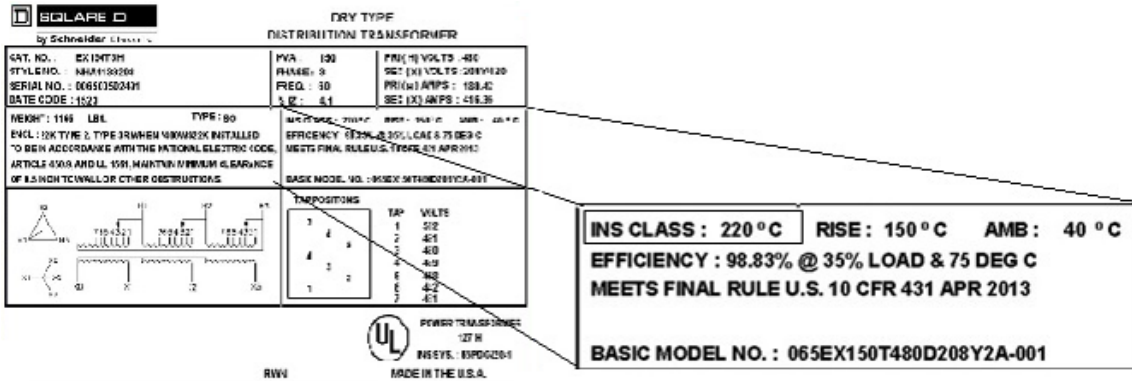


Table 1: Enclosure Clearances

Enclosure Style	Front Clearance	Side Clearance (in. / mm)	Rear Clearance (in. / mm)
D	Working Clearance for all styles vary substantially depending on voltage and specific application. Refer to NEC 110.26	0.50 / 12.7	Type EE – 3 / 76.2
H			All other styles – 6 / 152
E			3 / 76.2
K			3 / 76.2
J			0.50 / 12.7
F			0.50 / 12.7
			12 / 305

Transformers can be converted from Floor to Wall mounted (See Table 2 below and Figure 21 on page 21) or Floor to Trapeze mounted (See Table 3 and Figure 22 on page 22) using factory available kits. The kits are pre-punched to align with enclosure mounting holes; and, when the transformer is installed, holds the minimum clearance for the units. New Style K wall mounting bracket allows for 6 in. (152 mm) and 3 in. (76 mm) clearances, all other styles require a 6 in. (152 mm) clearance.

The factory kits do not include hardware, hardware must be supplied by the customer. Hardware includes the thread rod for trapeze mounting the transformers. The designer of record must size and choose the anchors and hardware because of the large variety of construction materials and techniques. Schneider Electric can not advise on the anchoring, the wall mounting, or sizing of rods for trapeze mounting.

Table 2: Converting from Floor to Wall Mounting (using factory kits)

Enclosure Style	Enclosure Number	Maximum Weight (lb. / kg)
D	17 – 20	700 / 317
H	17 – 18	700 / 317
E	17 – 20	700 / 317
K	17 – 20	850 / 386

Figure 21: Wall mounted transformer

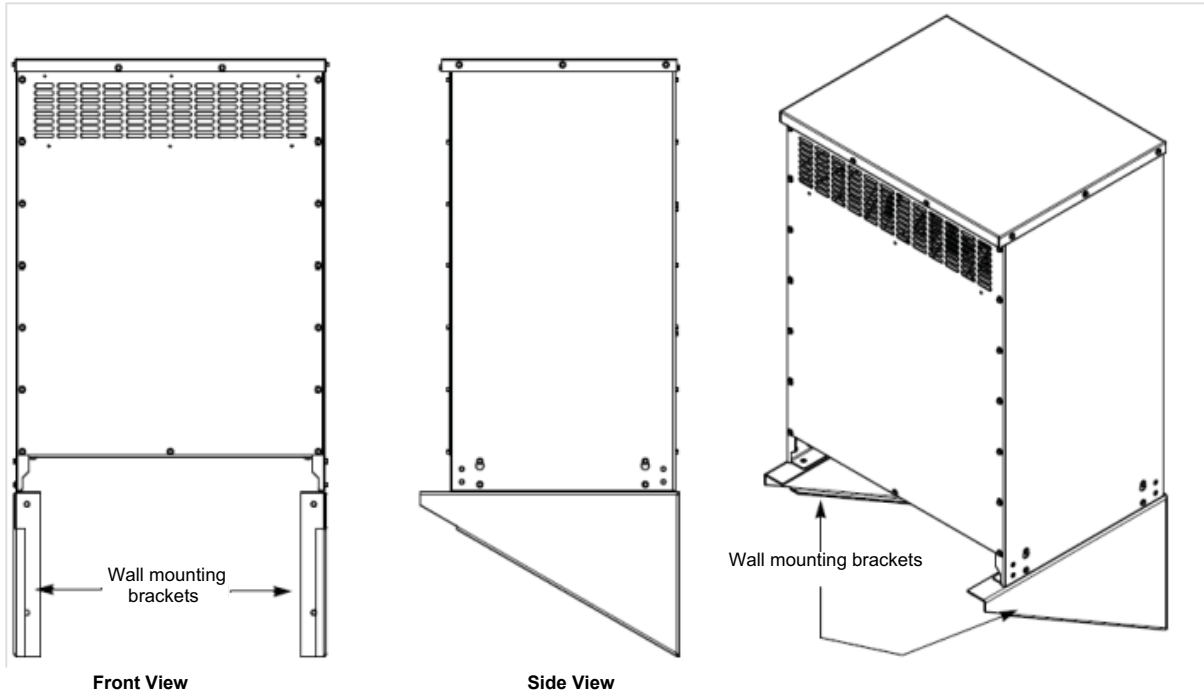
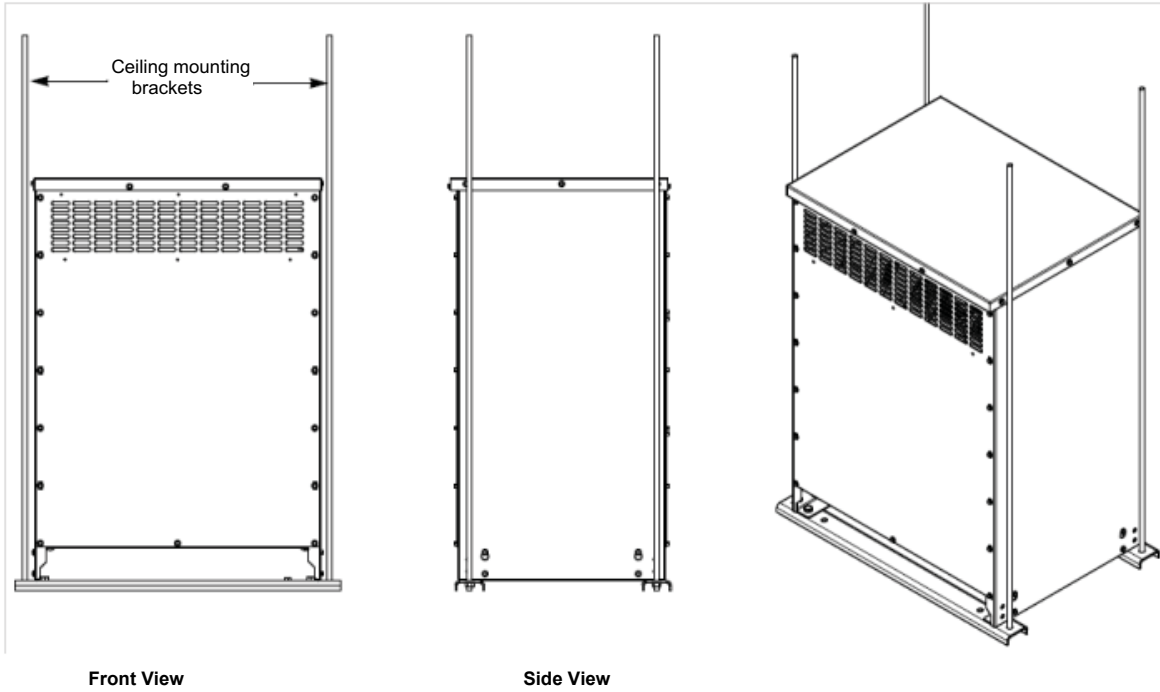


Table 3: Converting from Floor to Trapeze (Ceiling) Mounting (using factory kits)

Enclosure Style	Enclosure Number	Maximum Weight (lb. / kg)
D	17 – 24	1200 / 544
H	17 – 18	1200 / 544
E	17 – 22	1200 / 544
K	17 – 22	1200 / 544

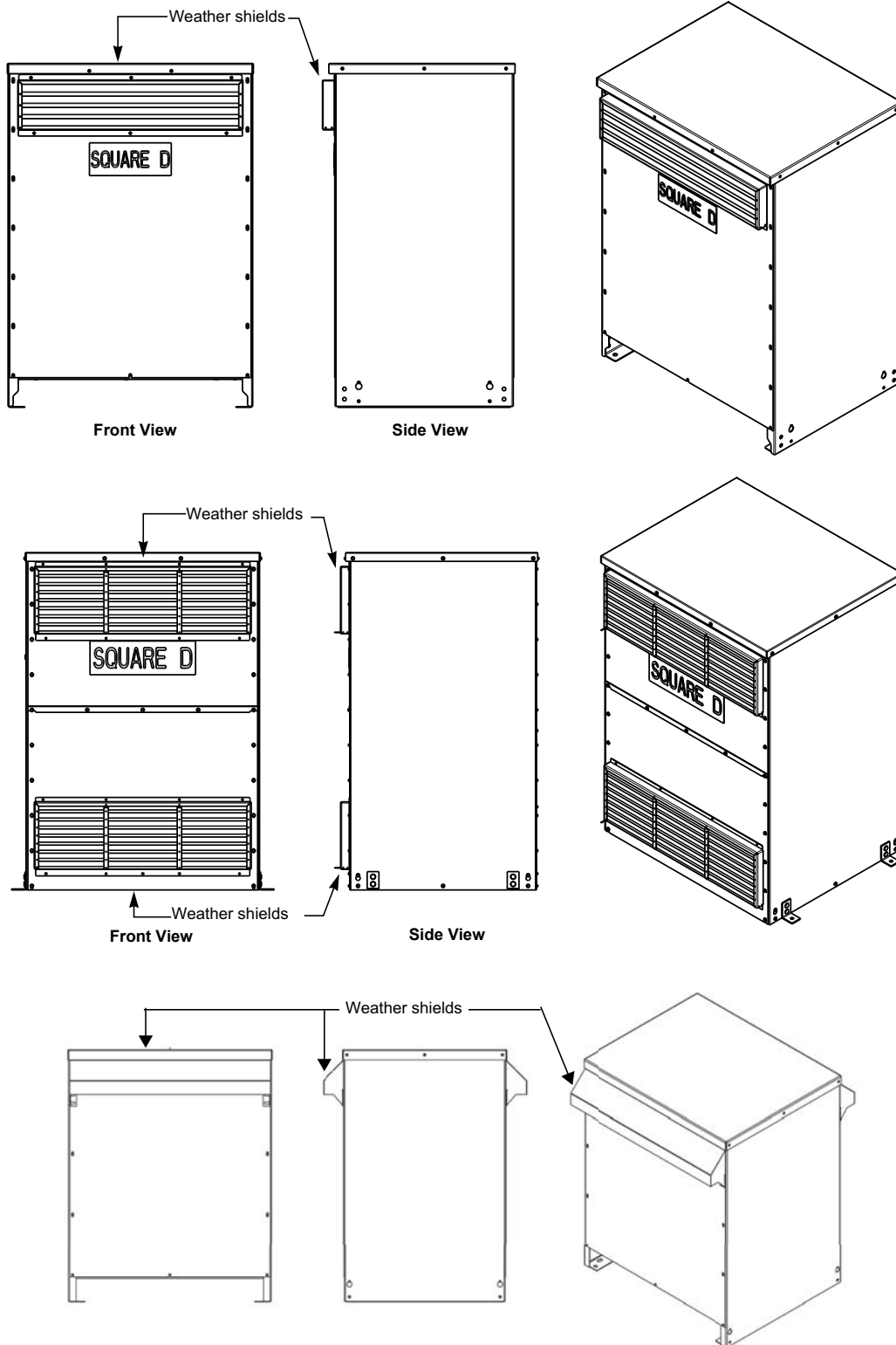
Figure 22: Trapeze (Ceiling) mounted transformer



Enclosure D, E, H, K, J can be converted to Type 3R using field installed kits. See Figure 23 on page 23.

Type F enclosure – must be factory order if installed outdoors.

Figure 23: Type 3R Enclosure Kits



Grounding

1. Permanently and adequately ground the enclosure and core assembly of dry-type transformers in accordance with NEC requirements.
 - Windings may be grounded with consideration given to local conditions and in accordance with the NEC.
 - The ground terminal bar must be UL listed for this purpose.
 - In accordance with NEC 450.10, the terminal bar shall be bonded to the enclosure in accordance with NEC 250.12 and shall not be installed on or over any ventilated openings.
2. Connect the transformer, related accessories and components to ground in accordance with NFPA 70 (NEC).
3. Terminate all grounding and bonding conductors at a common equipment ground point on the enclosure.
4. Remove paint from around the area where the ground terminal bar is mounted to increase contact with enclosure parts.
 - Enclosure Styles D, E and H: An area is available in the transformer's base to drill and mount the ground terminal bar.
 - Enclosure Style K: Three pre-drilled holes are stamped ground to mount the ground terminal bar.
 - Enclosure Style J: Two pre-drilled holes are stamped ground to mount the ground terminal bar.

Square D brand secondary lug kits include a four-conductor ground terminal bar. The bar can also be obtained as a separate device from Schneider Electric. Refer to Table 6 on page 45 and see Figure 24.

Figure 24: Four-conductor Ground Terminal Bar



Seismic Qualifications

Seismic limits for dry-type low voltage transformers are obtained from tri-axle shake table test results that are conducted in accordance with the AC156 test protocol. Certifications are based on the location where units are installed and building codes governing the installation.

Building codes results are available for CBC 2001, CBC 2007, CBC 2010, IBC 2000, IBC 2003, IBC 2006, IBC 2009, NBC 2005, NBCC 2005, NBCC 2010, NFPA 5000, UBC 94, CBC 95, UBC97 and UFC 3-310-04.

Contact your local Schneider Electric distributor, or call 1-888-Square D (1-888-778-2733) to obtain the specific level of Sds, z/h and Ip for each enclosure style.

The levels supplied are based on the units being mounted and the notes on the approval drawings of each part number. Drawings are available that include mounting dimensions, mounting hole dimensions, overall dimensions, unit weight and approximate center of gravity location to assist in a seismic qualification. Contact your local Schneider Electric distributor, or call 1-888-Square D (1-888-778-2733) to obtain these drawings.

Other parties are responsible for detailing the equipment connection and anchorage requirements (including the lateral restraint system, if appropriate) for the given transformer installation. The installer and manufacturers of the anchorage and lateral restraint system are responsible for ensuring that the mounting requirements are met.

Sound/Vibration Control

The transformer has been designed to minimize the amount of audible sound produced. Sound isolation pads are secured between the transformer mounting bracket and the enclosure using bolts and nuts. The mounting hardware is tightened prior to shipment to prevent damage.

Loosen the nut one full turn to float the transformer on the isolation pads, thereby isolating the transformer from the enclosure. This will reduce audible sound levels even further. See Figures 25 and 26.

Figure 25: Loosening the Nut One Full Turn (Four Places) Label

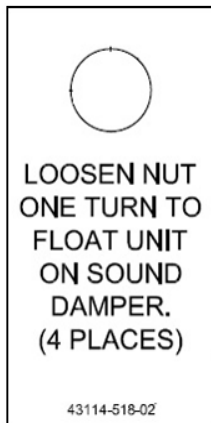
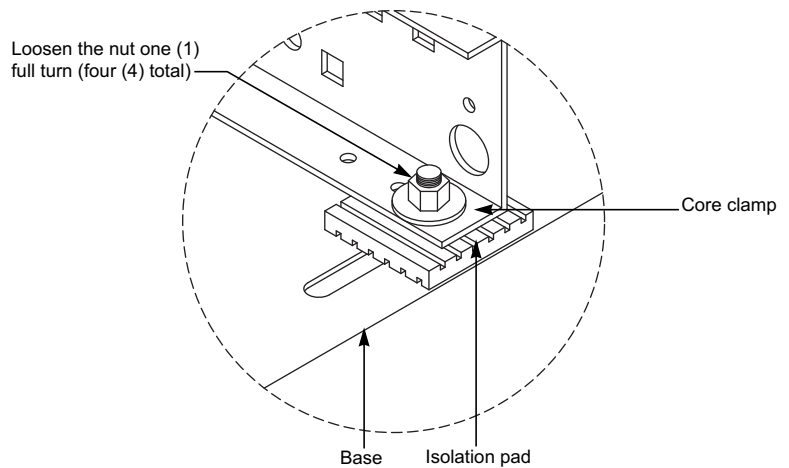


Figure 26: Floating the Transformer on the Isolation Pads/Sound Damper



In addition, the area where the transformer is located can affect the sound level:

- ❑ Try to avoid installing the transformer in a corner, narrow hall or in an area with smooth surfaces. Doing so can result in the sound being reflected and amplified.
- ❑ Securely fasten all the enclosure panels. Loose panels can result in rattling, thereby increasing the sound produced.
- ❑ Use flexible conduit, if possible.
- ❑ Ensure that the type of structure on which the transformer is mounted is strong enough to support the weight of the transformer.

Enclosure Style K

Enclosure Style K bolts are accessible from the front with an extension. See Figure 27.

Figure 27: Enclosure Style K: Bolts Accessible from the Front of the Transformer



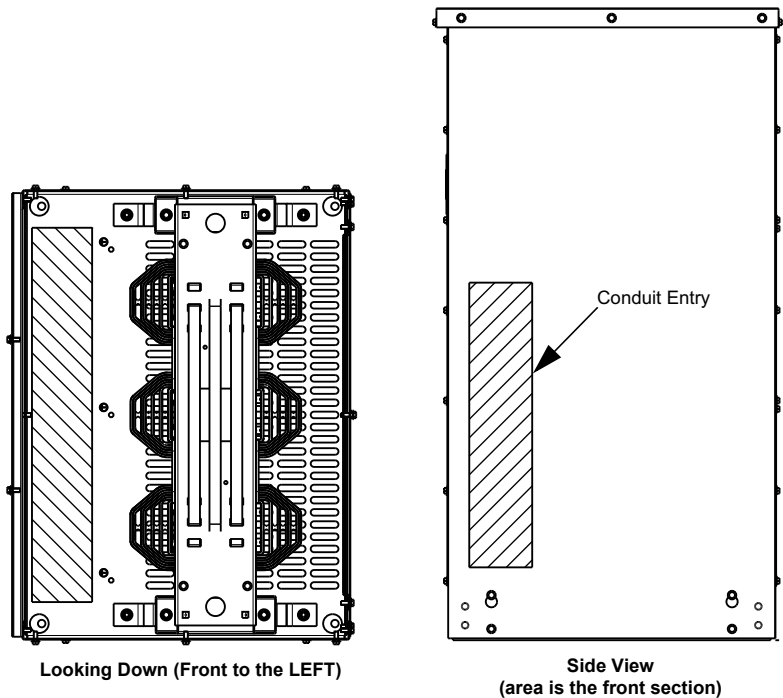
Enclosure Styles D, E, H and J

Enclosure Styles D, E, H and J bolts are accessible from the front. See Figure 26 on page 25 for the access for these enclosures.

Making Electrical Connections

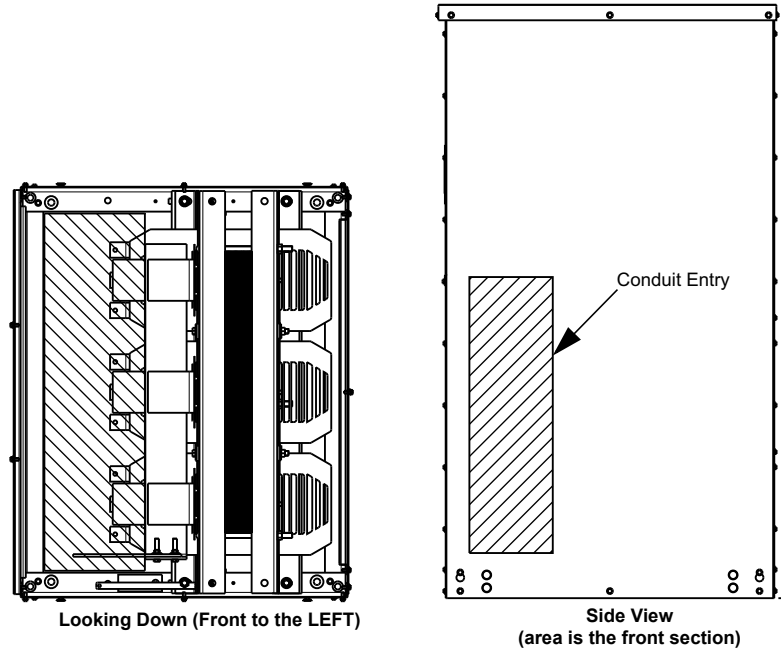
- ❑ Use flexible raceways, conduits and connectors, when possible, as attachments to transformer enclosures. This will help to reduce audible noise generation.
- ❑ Adhere to NFPA 70 (NEC) and minimum wire bending space requirements for the transformer enclosure. As an industry standard, bundle associated phase, neutral and equipment grounding conductors together within the transformer enclosure.
- ❑ Always use a calibrated torque wrench to tighten electrical connectors and terminals. For additional guidance, refer to Standard UL468A.
- ❑ Ensure that raceways, conduits and connectors enter the enclosure only in an area shown on the drawings. Access points for each enclosure style are listed below:
 - Enclosure Style D: (See Figure 28)
 - Front section of the transformer
 - Side and bottom access
 - Enclosure Style E: (See Figure 28)
 - Front section of the transformer
 - Side and bottom access
 - Enclosure Style H: (See Figure 28)
 - Front section of the transformer
 - Side and bottom access
 - Enclosure Style K: (See Figure 28)
 - Front section of the transformer
 - Side and bottom access

Figure 28: Access Point: Enclosure Styles D, E, H and K



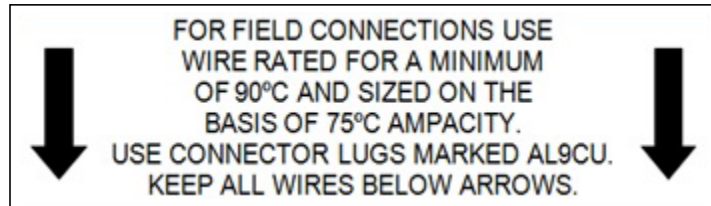
- Enclosure Style F:
 - Bottom section of the transformer
 - Air connection chambers offered if side access is needed
- Enclosure Style J: (See Figure 29)
 - Front section of the transformer
 - Side access
 - Open bottom access front to the core clamps

Figure 29: Access Point: Enclosure Style J



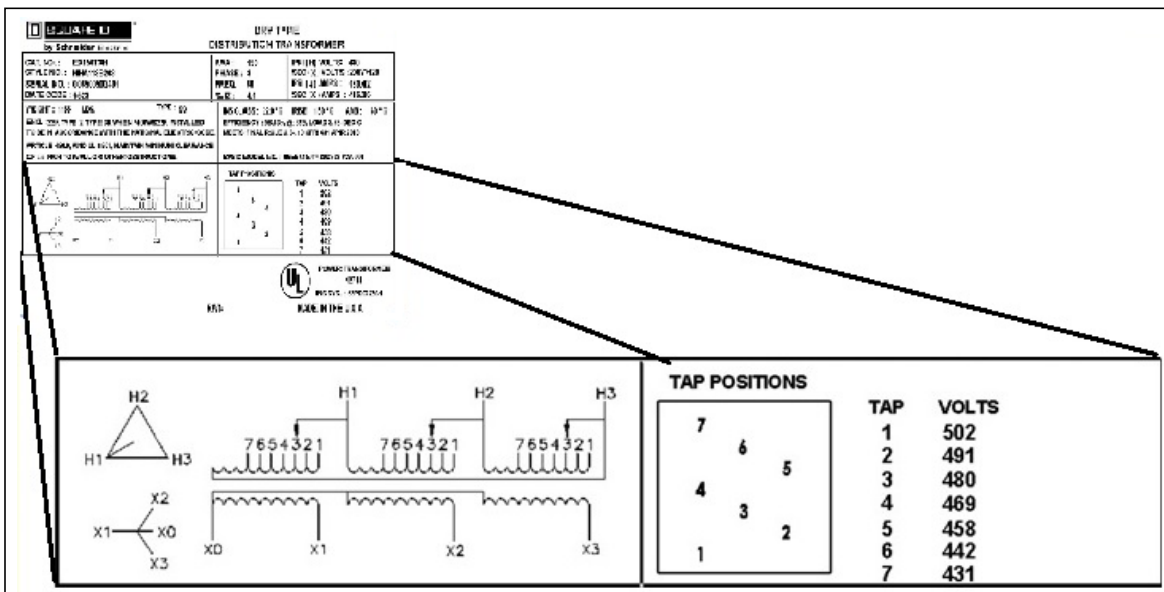
- Keep all access points below the top terminal board to prevent heat from exiting through the raceways, conduits and connectors. The sticker will show this top location on all enclosure styles (also shown on drawings). See Figure 30.

Figure 30: Label to Show Top Location on Enclosures (Access Points Below the Top Terminal Board)



- ❑ Ensure that the side access complies with NEC 312.6 (A): Minimum Wire-Bending at Terminals. Bottom access must comply with NEC 312.6 (B): Minimum Wire-Bending Space at Terminals.
- ❑ Follow UL 1561 which requires that all lugs be suitable for 194°F (90°C). In addition, the conductors' temperature rating table must be 167°F (75°C) for the size to meet the current requirements of the overcurrent protection device and nameplate currents. Refer to Table 5 on page 44, Table 6 on page 45 and Table 7 on page 46 for a list of Square D lug kits, wire ranges by kVA and US voltage systems.
- ❑ Make sure that the contact surface is clean. This will minimize the possibility of a high resistance contact which could cause localized heating and possible premature failure. Refer to Connections and Contact Surfaces on page 38 for instructions to apply an approved electrical compound.
- ❑ Connect phases to proper terminals for proper motor-rotation. The phase diagram is shown on nameplate. The nameplate also shows the taps locations and voltage rating for each tap. See Figure 31.

Figure 31: Phase Diagram, Tap Locations and Voltage Rating Marked on Nameplate



- ❑ Connecting the source of supply to the transformer secondary is permitted by NE C450.11 where the installation conforms to the manufacturer's instructions.

When the source of supply is connected to the transformer secondary, the inrush current will increase. The overcurrent device should be selected based on NEC 450.3(B) using the 250% allowance in order to reduce the potential for nuisance tripping during energization. Secondary overcurrent protection will be required.

Do not make any connections to the supply side HO or XO terminals on a WYE configured transformer winding. See Figure 32.

Figure 32: Caution Label for Delta Wye or Wye Delta Connected Transformers



Pre-commissioning/Pre-energizing Checks and Testing

Cleaning

1. Ensure that all of the packing material, including any packing material used inside the enclosure of the transformer used to support and protect the unit during shipping, have been removed.
2. Vacuum away as much dust as possible. Dust will act as a thermal insulating material which will increase the temperature of the unit and could possibly decrease operational life. Refer to Cleaning on page 38.

Visual and Mechanical Checks

Perform the following visual and mechanical checks below. In addition, refer to Performing Visual and Mechanical Checks on page 37 for a detailed listing of instructions.

- Visually inspect the transformer for physical damage. Repair any physical damage, if possible, and provide suitable protective barriers to prevent future damage.
- Compare the transformer nameplate information with the drawings and/or specifications for the installation.
- Verify proper connection of the taps in accordance with the nameplate information.
- Check the clearance of all electrical connections. Verify all connections for tightness with a calibrated torque wrench.
- Visually check the core, frame, enclosure, conduits, raceways and conductors for proper ground bonding. In addition, refer to Grounding and Bonding on page 39.

Electrical Testing

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS-2011, or CSA Z462.
- This equipment must be installed and serviced only by qualified electrical personnel.
- Perform such work only after reading and understanding all of the instructions contained in this bulletin.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Always practice lock-out/tag-out procedures according to OSHA requirements.
- Carefully inspect your work area, and remove any tools and objects left inside the equipment.
- Replace all devices, doors, and covers before turning on power to this equipment.
- All instructions in this manual are written with the assumption that the customer has taken these measures before performing maintenance or testing.

Failure to follow these instructions will result in death or serious injury.

Refer to Maintenance on page 37 to perform the following pre-commissioning electrical testing:

- Measure contact resistance using a low resistance ohmmeter. Refer to Contact Resistance on page 39.
- Perform insulation resistance tests with an appropriate device. Refer to Insulation Resistance on page 39.
- Perform a turns ratio test on all taps and on the full winding voltages for each phase. Refer to Turns Ratio on page 39.
- Measure and record the winding resistances on larger transformers (>500 kVA). Refer to Winding Resistance on page 39.

Section 5—Operation

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS-2011, or CSA Z462.
- This equipment must be installed and serviced only by qualified electrical personnel.
- Perform such work only after reading and understanding all of the instructions contained in this bulletin.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Before performing visual inspections, tests, or maintenance on this equipment, disconnect all sources of electric power. Assume all circuits are live until they are completely de-energized, tested, and tagged. Pay particular attention to the design of the power system. Consider all sources of power, including the possibility of backfeeding.
- Always practice lock-out/tag-out procedures according to OSHA requirements.
- Carefully inspect your work area, and remove any tools and objects left inside the equipment.
- Replace all devices, doors, and covers before turning on power to this equipment.
- All instructions in this manual are written with the assumption that the customer has taken these measures before performing maintenance or testing.

Failure to follow these instructions will result in death or serious injury.

Effects of Humidity

The standard dip and baked varnish process does not support the growth of fungus. The only concern when units are stored in high humidity areas is retaining the integrity of the insulation material. If units are properly maintained and cleaned at shut down prior to long periods of de-energization there should be no issue with fungus.

Humidity conditions are unimportant as long as the transformer is energized. However, follow the precautionary steps listed below if the transformer is de-energized, is allowed to cool to ambient temperature, and will exceed a shutdown of 12 hours (especially in high humidity conditions).

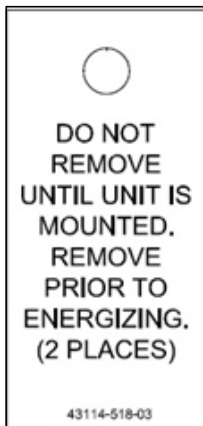
1. Place small strip heaters in the bottom of the unit shortly after shutdown to maintain the temperature of the unit a few degrees above that of the outside air.
2. Inspect the unit for evidence of moisture before returning it to service.
3. Check the insulation resistance. If evidence of moisture exists, or if the insulation resistance is less than 1 megohm, dry out the transformer by placing it in an oven or by blowing heated air over it.

Enclosure Temperature

The temperature rise on the enclosure exterior for ventilated transformers should not exceed 122°F (50°C), except as indicated in UL 1561.

Prior to Energizing the Transformers

Figure 33: Removing Temporary Braces



1. Remove any temporary braces. See Figure 33.
2. Check bolted electrical connections. Refer to Making Electrical Connections on page 27 for a detailed check list.
3. Remove excess dirt accumulations from the transformer windings and insulators to permit free circulation of air and to guard against the possibility of insulation breakdowns. Refer to Cleaning on page 38 for a detailed check list.
4. Perform insulation resistance tests with an appropriate device. Refer to Insulation Resistance on page 39 for a detailed instructions.
5. Perform a visual and mechanical check of the transformer and its surrounding environment. Refer to Performing Visual and Mechanical Checks on page 37 for a detailed check list.

Energizing the Transformer

1. Follow all safety precautions and requirements for PPE as outlined in NFPA 70E and any other applicable standards and/or codes.
 - a. Immediately de-energize the transformer if there is any indication of arcing (visual or audible) at any time during the initial start-up.
 - b. Investigate and correct the cause of the arcing before re-energizing the unit.
2. Investigate and correct sources of excessive noise. When energized, the transformer will make some audible noise. Excessive mechanical noise, hums or rattles may be an indication of improperly installed or tightened hardware or enclosure parts.
3. Measure and verify the primary and secondary phase-to-phase and phase-to-ground voltages for all windings.
 - a. Where applicable, measure and verify phase-to-neutral voltages, as well.
 - b. Record and save the values for future reference.

NOTE: Phase-to-phase, phase-to-ground and phase-to-neutral measurements will verify that the transformer is functioning per the nameplate voltages.

- c. Measure phase-to-ground voltages.
- d. Record and save the values for future reference.

NOTE: Phase-to-ground voltages will verify that the unit has been installed correctly.

4. Move one tap at a time, or verify that the jumper lands per the wiring diagram as shown on the nameplate. See Figure 31 on page 29.
NOTE: Do not change taps while the transformer is energized.
 - a. Adjust the transformer taps as necessary to match the actual voltage requirements.
 - b. Ensure taps are cleaned of varnish or other insulating material.
5. Perform a phase rotation check with an appropriate device for loads that are phase sensitive (e.g., certain motor or drive applications).
 - a. Follow the manufacturer's instructions for the device.
 - b. Correct phase rotation errors before energizing the transformer.

Section 6—Maintenance

Performing Visual and Mechanical Checks

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Only qualified personnel should clean, inspect maintain and test transformers.
- Turn off power supplying this equipment before working on it.
- Disconnect and electrically isolate power to the transformer so that no accidental contact can be made with energized parts.
- Discharge all static charges held by coils.

Failure to follow these instructions will result in death or serious injury.

1. Perform a visual inspection of the transformer and its surrounding environment.
 - a. Inspect the enclosure for any physical damage.
 - b. Repair any damage, if possible.
 - c. Provide guards to prevent future damage.
2. Record operational data while the transformer is still energized and in service.
3. De-energize the transformer prior to performing work on the unit.
 - a. Follow all safety procedures to place the unit into an electrically safe condition.
 - b. Remove the access covers. Inspect for:
 - dirt on insulating surfaces and at areas which tend to restrict air flow.
 - loose connections.
 - the condition of tap changers or terminal boards.
 - the general condition of the transformer.
4. Inspect the enclosure, transformer, terminals, terminal boards, and insulators for signs of overheating from internal or external sources. Check for voltage creepage over insulating surfaces, evident by tracing or carbonization.
5. Check for evidence of rusting, corrosion and paint deterioration. Repair any rust and corrosion where necessary.

Frequency

The frequency at which transformers should be inspected depends on operating conditions.

For clean, dry locations, annual inspections may be sufficient. However, for other locations, such as where the air is contaminated with dust or chemical fumes, an inspection at three- or six-month intervals may be required. Usually after the first few inspection periods, a definite schedule can be set up based on the transformer's existing conditions.

Severe, Environmental or Special Events

- ❑ Perform routine inspections, maintenance, and testing after any severe electrical short circuit, ground fault, or environmental event (e.g., flooding) to determine the operational status of the transformer.
- ❑ Perform the inspections, maintenance and testing if the transformer has been out of service for an extended period of time. Place strip heaters to maintain the transformer temperature above ambient to prevent condensation from forming in the transformer during extended down time.

Cleaning

Connections and Contact Surfaces

A clean contact surface area is necessary, and terminals must be clean. Where the transformers are installed indoors or outdoors or in a harsh environment, the connections must be sealed with an approved electrical joint compound.

Apply the compound to exposed connections and the surface area before making a bolted connection.

Enclosures, Windings and Insulators

1. De-energize the transformer.
2. Follow the check list below to permit free circulation of air and to guard against insulation breakdowns and thermal performance issues:
 - ❑ Clean the transformer enclosure, windings and insulators by vacuuming or by blowing clean, dry, compressed air or nitrogen. Be sure to wear appropriate personal protective equipment (PPE) when cleaning.
NOTE: Vacuuming is the preferred first step for cleaning. Compressed air should have a dew point of -50°F (-45.5°C) or less, and a pressure at or below 25 psi.
 - ❑ Clean lead supports, tap changers, terminals boards, bushings and other major insulating surfaces with lint-free rags or soft bristle brushes.
NOTE: Do not use liquids, solvents or detergents, as they may deteriorate insulating materials.
 - ❑ Carefully inspect and thoroughly clean the ventilation openings (ducts) and winding assemblies. Remove any blockages.
 - ❑ Remove any trash and/or combustible materials from the area around the unit.

Performing Electrical Testing

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Only qualified personnel should clean, inspect maintain and test transformers.
- Turn off power supplying this equipment before working on it.
- Disconnect and electrically isolate power to the transformer so that no accidental contact can be made with energized parts.
- Discharge all static charges held by coils.

Failure to follow these instructions will result in death or serious injury.

Perform the following electrical tests during maintenance:

- ❑ Check all electrical contacts with a calibrated torque wrench.
- ❑ Verify proper spacing.
- ❑ Refer to the manufacturer's specifications for torque values.
- ❑ Check all external hardware for tightness.

Contact Resistance

- ❑ Use a low resistance ohmmeter to measure contact resistance.
 - a. Compare values with similar connections looking for unusually high contact resistance points.
 - b. Investigate any connections that may deviate from common values by more than 50% of the lowest values.
- ❑ An infrared scanning device may be used to look for abnormal temperatures at transformer contacts for energized units.

NOTE: Take care to follow the manufacturer's procedures, as small errors in scanner operation can cause significant errors in detected temperatures.

Insulation Resistance

- Insulation resistance checks may create a capacitive charge on a winding.
1. Ground each winding for at least one minute between tests to drain any static charge created during the test.
 2. Perform insulation resistance tests with an appropriate device.
 3. Test from winding-to-winding and winding-to-ground.
 4. Record all test results for comparison for future readings.
 - Values are installation site dependent and not pre-set at the factory. All testing is compliant to NEMA ST-20.
 - Insulation resistance readings should be at least 1 megohm.
 - Lower readings may indicate the presence of moisture and require a drying procedure to correct.

Winding Resistance

- On larger transformers (>500 kVA):
1. Measure the winding resistances and record for future reference.
 2. Compare the results with the values obtained during the pre-commissioning checks. Readings should not vary by more than 5% with adjacent coils and the pre-commissioning checks.
 3. Record the temperature at which these initial readings were taken.
 - Values are installation site dependent and not pre-set at the factory. All testing is compliant to NEMA ST-20.
 4. Adjust the resistance values based on any differences in temperature between current readings and pre-commissioning values.

Grounding and Bonding

1. Check for proper values of resistance between the system ground lug (or point) and the transformer enclosure, core, frame and clamps.
2. Compare with pre-commissioning values, looking for trends that may indicate a compromise in the quality of the ground bond.

Turns Ratio

1. Perform a turns ratio test on all taps and on the full winding voltages for each phase. Significant changes may indicate a loss of winding continuity.
 - a. Compare these values with those obtained during the pre-commissioning checks. Voltages between phases should not deviate by more than 0.5% from adjacent coils.
 - b. Investigate abnormal readings found outside of this limit.
2. Verify input and output voltages are correct for the tap and output voltages expected. Investigate abnormal readings.

Sound Isolation Pads

Inspect the sound isolation pads for signs of physical deterioration.

Coil Cooling Ducts

1. Inspect all coil cooling ducts for any accumulation of dust, dirt or other obstructions.
2. Follow standard cleaning procedures to ensure proper air flow.

Terminals

Ensure terminals are in good working condition for the proper operation of transformers.

- ❑ Inspect terminals for alignment, tightness (see torque requirements), pressure, burns or corrosion. Investigate and correct any signs of damage.
- ❑ Repair minor pitting, as long as the plating on the terminal has not been compromised.

Section 7—Replacement Parts and Accessories

See Figures 34 and 35 for transformer covers (top, rear and front) and side panels (left and right), and Figure 21 on page 21 and Figure 22 on page 22 for mounting brackets (wall and ceiling). Refer to Table 4 on page 43 for a listing of replacement and accessory parts.

Figure 34: Exploded Assembly for EX75T3H Energy Efficient Transformer with Enclosure Style 20K Front

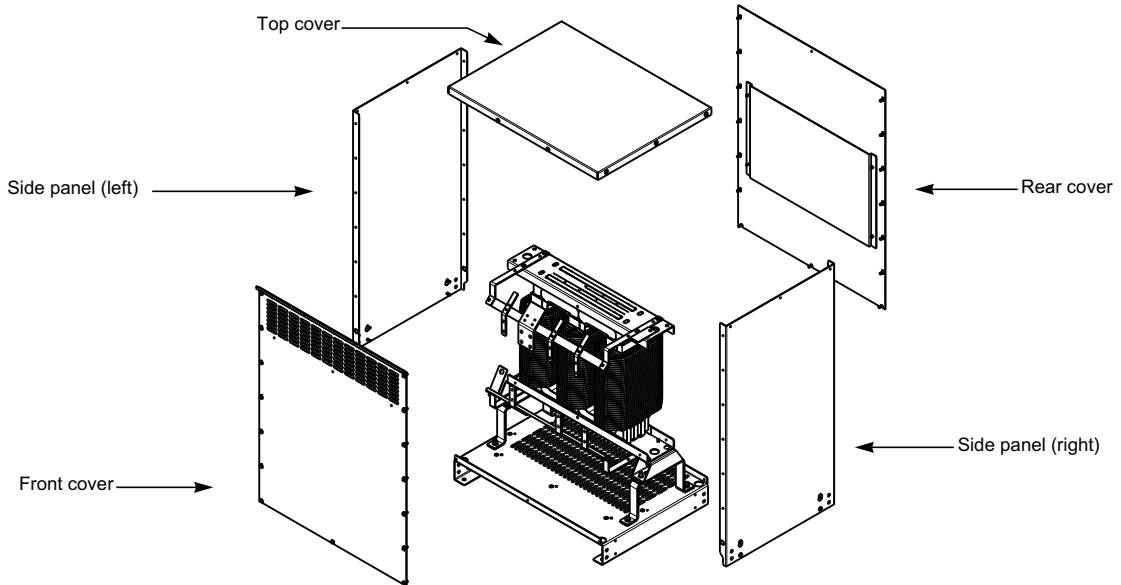
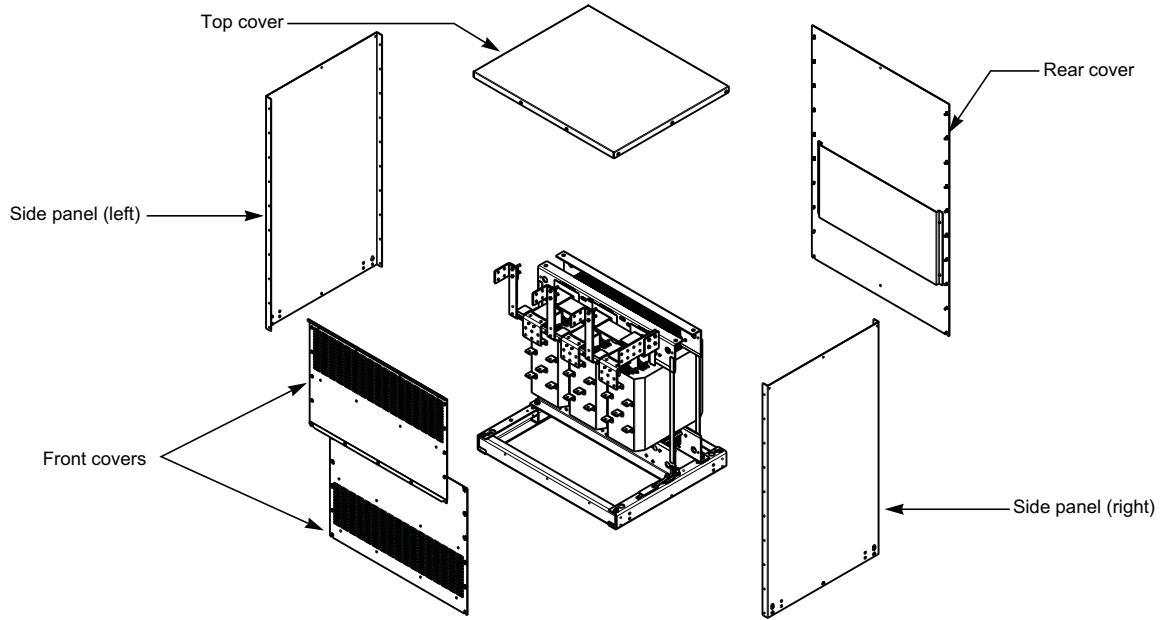


Figure 35: Exploded Assembly for EX300T3H Energy Efficient Transformer with Enclosure Style 25J Front



Refer to the Schneider Electric *Digest*, Section 14, Transformers or call 1-888-Square D (1-888-778-2733) to order replacement parts and accessories.

Refer to Table 4 for enclosure types (top, rear and front covers) side panels, weather-shields and mounting brackets (wall and ceiling).

Table 4: Covers, Side Panels, Weather Shields and Mounting Brackets

Enclosure	Top Cover	Rear Cover	Front Cover	Side Panel (Left and Right)	Weather-shield	Wall Mounting Bracket	Ceiling Mounting Bracket
	Catalog Number						
17D	4310191501	4310191601	4310191601	4310191701	WS363	WMB361362	CMB363
17E	4310191501	—	—	4310191701	—	WMB361362	CMB363
17H	4310191501	4305502003	4305502003	4310191702	WS363	WMB361362	CMB363
17K	7400TC17K	7400R17K	7400FNP17K	7400LR17K	7400WS17K	7400WMB17K	7400CMB17K
18D	4305502101	4305502001	4305502001	4305501001	WS363	WMB363364	CMB363
18E	4305502101	—	—	4305501001	—	WMB363364	CMB363
18H	4305502101	4305502003	4305502003	4310179701	WS363	WMB363364	CMB363
18K	7400TC18K	7400R18K	7400FNP18K	7400LR18K	7400WS18K	7400WMB18K	7400CMB18K
19D	4305501201	4305501101	4305501101	4305501001	WS364	WMB363364	CMB364
19E	—	—	—	—	—	—	—
19K	7400TC19K	7400R19K	7400FNP19K	7400LR19K	7400WS19K	7400WMB19K	7400CMB19K
20D	4305501201	4310192201	4310192201	4310179701	WS364	WMB363364	CMB364
20E	4305501201	—	—	4310179701	—	—	—
20K	7400TC20K	7400R20K	7400FNP20K	7400LR20K	7400WS20K	7400WMB20K	7400CMB20K
21D	4305512501	4300507404	4300507404	4305512601	WS364	—	CMB364
21E	4305512501	—	—	4305512601	—	—	CMB364
21K	7400TC21K	7400R21K	7400FNP21K	7400LR21K	7400WS21K	—	7400CMB21K
22D	4310189001	4310189102	4310189102	4310189201	WS380	—	CMB380
22E	4310189001	—	—	4310189201	—	—	CMB380
22K	7400TC22K	7400R22K	7400FNP22K	7400LR22K	7400WS22K	—	7400CMB22K
23E	—	—	—	—	—	—	—
24D	4310190701	4310190802	4310190802	4310190901	WS381	—	CMB381
24E	4310190701	—	—	4310190901	—	—	CMB381
24K	7400TC24K	7400R24K	7400FNP24K	7400LR24K	7400WS24K	—	7400CMB24K
25D	4310189901	4310190001	4310190001	4310190101	WS382	—	—
25E	4310189901	—	—	4310190101	—	—	—
25J	7400TC25J	7400R25J	7400FNP25J	7400LR25J	7400WS25J	—	—
26D	—	—	—	—	—	—	—
28D	—	—	—	—	—	—	—
28E	—	—	—	—	—	—	—
29D	—	—	—	—	—	—	—
30D	4310192601	(U)4310192901 (L)4310193001	(U)4310192901 (L)4310193001	4310192801	WS383	—	—
30E	4310192601	—	—	—	—	—	—
30J	7400TC30J	7400RU30J 7400RL30J	7400FU30J 7400FLNP30J	7400LR30J	7400WS30J	—	—
31D	—	—	—	—	—	—	—
31E	—	—	—	—	—	—	—
31J	7400TC31J	7400RU31J 7400RL31J	7400FU31J 7400FLNP31J	7400LR31J	7400WS31J	—	—

Touch-up Paint: Catalog Number PK49SP

Refer to Table 5 for available transformer lug kits. For additional information regarding terminal connectors, refer to the label on the reverse side of the transformer front panel. See Figure 36.

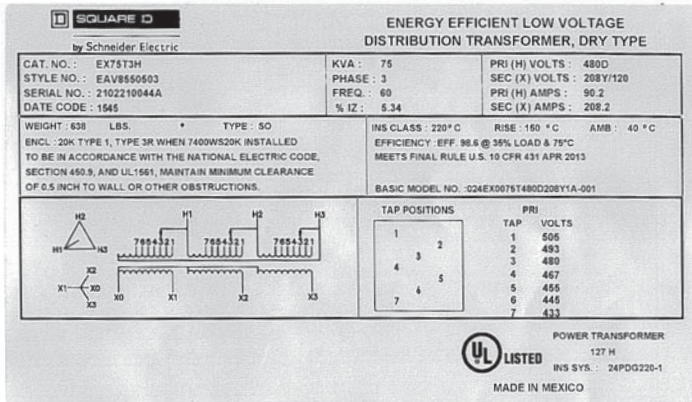
Table 5: VERSAtile™ Compression Lugs and Mechanical Set-Screw Types—UL Listed Lugs AL9CU

Transformer kVA Sizes	Kit Catalog Number	Terminal Lugs		Aluminum or Copper Conductor Range (AWG or kcmil)	Hardware Included	
		Qty.	Catalog Number		Qty.	Cap Screws
VERSAtile Compression Equipment Lugs						
15–37 ^{1/2} 1Ø	VCELSK1	8	VCEL02114S1	#8–1/0	8	1/4 in. x 1 in.
15–45 3Ø		5	VCEL030516H1	#4–300 kcmil	1	1/4 in. x 2 in.
50–75 1Ø	VCELSK2	13	VCEL030516H1	#4–300 kcmil	8	1/4 in. x 1 in.
75–112 ^{1/2} 3Ø					8	1/4 in. x 2 in.
100–167 1Ø	VCELSK3	3 26	VCEL030516H1	#4–300 kcmil	3	1/4 in. x 3/4 in.
150–300 3Ø			VCEL07512H1	#500–750 kcmil Al #500 kcmil Cu		
500 3Ø	VCELSK4	34	VCEL07512H1	#500–750 kcmil Al #500 kcmil Cu	21	3/8 in. x 2 in.

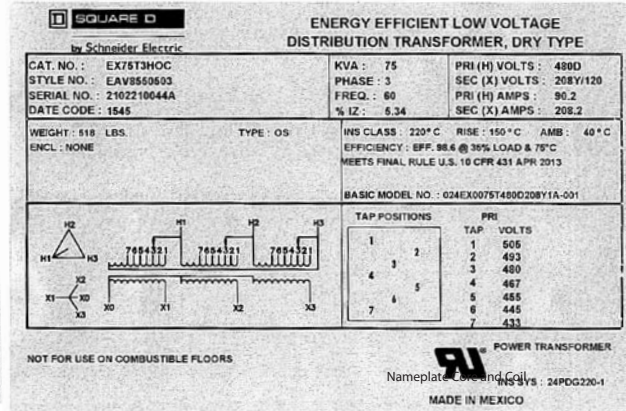
NOTE: Refer to UL 486A for torque values to be used with lug connection hardware.

Two nameplates are attached to each unit. See Figure 36. One on the front cover which is required by standards, the second nameplate is attached to the core and coil, providing installation information inside the unit. The second nameplate also carries a UR listing for the core and coil, allowing the enclosure to be removed and the device installed in the equipment.

Figure 36: Sample Nameplates



Attached to the Front Cover



Attached to the Core and Coil

Refer to Table 6 for Square D lug kits for the following dry-type transformers:

- Single-phase primary, single-phase secondary, three-phase Delta primary, three-phase secondary
- Single-phase primary and secondary, three-phase Wye secondary, three-phase Delta with center tap

Table 6: Square D Lug Kits for Dry-type Transformers

Catalog Number	Lugs per Kit	Wire Range	Cap Screws	Current Range	Grounding Lugs per Kit	Wire Range	Bonding Lugs per Kit	Wire Range
Single-phase Primary, Single-phase Secondary, Three-phase Delta Primary, Three-phase Secondary								
DASKP100	3	1/0–14 STR.	1/4 in. x 1 in.	Up to 100 A	Not Applicable	Not Applicable	Not Applicable	Not Applicable
DASKP250	3	350 kcmil–6 STR.	3/8 in. x 2 in.	101–250 A				
DASKP400	3	600 kcmil–4 STR. (2) 250 kcmil–1/0 STR.	3/8 in. x 2 in.	201–400 A				
DASKP600	6	600 kcmil–4 STR. (2) 250 kcmil–1/0 STR.	3/8 in. x 2 in.	601–800 A				
DASKP1000	9	600 kcmil–2 STR.	3/8 in. x 2 in.	601–800 A				
DASKP1200	12	600 kcmil–2 STR.	3/8 in. x 2 in.	801–1200 A				
Single-phase Primary and Secondary, Three-phase Wye Secondary, Three-phase Delta with Center Tap								
DASKGS100	5	1/0–14 STR.	1/4 in. x 1 in.	Up to 100 A	1	(4) 2/0–14 STR.	1	2–14 STR.
DASKGS250	5	350 kcmil–6 STR.	3/8 in. x 2 in.	101–250 A	1	(4) 2/0–14 STR.	1	2–14 STR.
DASKGS400	5	600 kcmil–4 STR. (2) 250 kcmil–1/0 STR.	3/8 in. x 2 in.	201–400 A	1	(4) 2/0–14 STR.	1	1/0–14 STR.
DASKGS600	10	600 kcmil–4 STR. (2) 250 kcmil–1/0 STR.	3/8 in. x 2 in.	601–800 A	1	(4) 350 kcmil–6 STR.	1	250 kcmil–6 STR.
DASKGS1000	15	600 kcmil–2 STR.	3/8 in. x 2 in.	601–800 A	1	(4) 350 kcmil–6 STR.	1	250 kcmil–6 STR.
DASKGS1200	20	600 kcmil–2 STR.	3/8 in. x 2 in.	801–1200 A	1	(4) 350 kcmil–6 STR.	1	250 kcmil–6 STR.
DASKGS2000	25	600 kcmil–2 STR.	3/8 in. x 2 in.	1201–2000 A	1	(4) 350 kcmil–6 STR.	1	250 kcmil–6 STR.

NOTE: Lugs are not supplied with transformer units. They must be purchased separately.
Refer to UL 486A for torque values to be used with lug connection hardware.

Refer to Table 7 for terminal mechanical and compression lugs and their appropriate wire ranges for dry-type transformers.

NOTE: All terminals allow for NEMA two-hole lugs.

Table 7: Terminal Sizes, Mechanical and Compression Lugs and Wire Ranges

kVA	300 Volts and Above		Below 300 Volts	
	Terminal Mechanical Lugs	Terminal Compression Lugs	Terminal Mechanical Lugs	Terminal Compression Lugs
15	2/0–14 AWG	(1) #12–10 AWG (1) #8–#1/0 AWG	2/0–14 AWG	(1) #8–#1/0 AWG
30	2/0–14 AWG	(1) #8–#1/0 AWG	350 kcmil–6 AWG	(1) #8–#1/0 AWG (1) #4–300 kcmil (1) 250–350 kcmil
45	2/0–14 AWG 350 kcmil–6 AWG	(1) #8–#1/0 AWG (1) #4–300 kcmil	350 kcmil–6 AWG (1) 600 kcmil–4 AWG or (2) Equal 250 kcmil–1/0 AWG	(1) 250–350kcmil (1) #2/0–500 kcmil (2) #4–300 kcmil
75	2/0–14 AWG 350 kcmil–6 AWG	(1) #8–#1/0 AWG (1) #4–300 kcmil (1) 250–350 kcmil	(1) 600 kcmil–4 AWG or (2) Equal 250 kcmil–1/0 AWG	(2) #2/0–500 kcmil (1) 400–600 kcmil AI (2) #4–300 kcmil (2) 250–350 kcmil
112.5	350 kcmil–6 AWG (1) 600 kcmil–4 AWG or (2) Equal 250 kcmil–1/0 AWG	(1) 250 kcmil–350 kcmil (1) #2/0–500 kcmil (2) #4–300 kcmil	(2) 350 kcmil–6 AWG (2) 600 kcmil–2 AWG	(3) 250–350 kcmil (3) #4–300 kcmil (2) 400–600 kcmil AI
150	(1) 600 kcmil–4 AWG or (2) Equal 250 kcmil–1/0 AWG	(1) 250–350 kcmil (2) #4–300 kcmil	(3) 350 kcmil–6 AWG (2) 600 kcmil–2 AWG	(3) #2/0–500 kcmil (3) #4–300 kcmil (3) 400–600 kcmil AI (4) 250–350 kcmil
225	1) 600 kcmil–2 AWG (2) 600 kcmil–2 AWG	(2) #2/0–500 kcmil (2) 400–600 kcmil AI (2) #4–300 kcmil	(3) 600 kcmil–2 AWG	(4) #4–300 kcmil (4) #2/0–500 kcmil
300	(2) 600 kcmil–2 AWG	(3) 250–350 kcmil (3) #2/0–500 kcmil (3) 400–600 kcmil AI	(4) 600 kcmil–2 AWG	(6) #2/0–500 kcmil (6) 400–600 kcmil AI
500	(3) 600 kcmil–2 AWG	(4) #4–300 kcmil (4) #2/0–500 kcmil	(6) 600 kcmil–2 AWG	(9) #2/0–500kcmil (9) 400–600 kcmil AI
750	(4) 600 kcmil–2 AWG	(6) #2/0–500 kcmil (6) 400–600 kcmil AI	(9) 600 kcmil–2 AWG	(15) #2/0–500 kcmil (15) 400–600 kcmil AI

NOTE: All terminals allow for NEMA two-hole lugs.

Refer to Table 8 for Square D ground bar kits.

Table 8: Square D Ground Bar Kits

Catalog Number	Grounding Lugs per Kit	Wire Range
DASKGTB100400	1	(4) 2/0–14 STR.
DASKGTB6002000	1	(4) 350 KCMIL–6 STR.

**Dry-Type Transformers—1000 Volts and Below
Instruction Bulletin**

ENGLISH

Schneider Electric
800 Federal Street
Andover, MA 01810 USA
1-888-778-2733
www.schneider-electric.us

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Model 425

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Safety Information

Important Information

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service or maintain it. The following special messages may appear throughout this bulletin or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of either symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

DANGER

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury. The safety alert symbol shall not be used with this signal word.

Please Note

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by ASCO Power Technologies for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction, installation, and operation of electrical equipment and has received safety training to recognize and avoid the hazards involved.

Precautions

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.
- This equipment must be effectively grounded per all applicable codes. Use an equipment-grounding conductor to connect this equipment to the power system ground.
- Confirm the SPD voltage rating on the module or nameplate label is not less than operating voltage the operating voltage.

Failure to follow these instructions will result in death or serious injury.



WARNING: This product can expose you to chemicals including DINP, which is known to the State of California to cause cancer, and DIDP which is known to the State of California to cause birth defects or other reproductive harm. For more information go to: www.P65Warnings.ca.gov.

NOTICE

LOSS OF BRANCH CIRCUIT POWER / LOSS OF SURGE SUPPRESSION

- Perform periodic inspection of the surge protective device status indicator lights as part of the preventative maintenance schedule.
- Promptly replace the surge protective device when an alarm state exists.
- Use dry contacts to signal an alarm state to the central supervisory system for unmanned, inaccessible, or critical installations.
- Use multiple surge protective devices to achieve redundancy for critical applications.

Failure to follow these instructions can result in equipment damage.

At end-of-life conditions, Surge Protective Devices (SPDs) can lose their ability to suppress power system transient voltage spikes and attempt to draw excessive current from the line. This SPD is equipped with overcurrent and overtemperature components that will automatically disconnect the surge suppression elements from the mains should the surge suppression elements reach end of life. Tripping of the branch circuit breaker or fuse feeding the SPD can occur. Mitigate the tripping of the branch circuit breaker or fuse feeding the SPD by coordinating the surge suppression elements with the branch circuits.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Do not energize the surge protective device until the electrical system is completely installed, inspected and tested.
- Ensure all conductors are connected.
- Verify the voltage rating of the device and system prior to energizing.
- Perform high-potential insulation testing, or any other tests where surge protective device components will be subjected to voltages higher than their rated turn-on voltage, with the neutral and surge protective device disconnected from the power source

Failure to follow these instructions will result in death or serious injury.

Introduction

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.
- This equipment must be effectively grounded per all applicable codes. Use an equipment-grounding conductor to connect this equipment to the power system ground.

Failure to follow these instructions will result in death or serious injury.

Note: For access to self-service tools and chat support visit se.com/us/en/work/support or call 1-888-778-2733 for technical assistance

Proper installation is imperative to maximize the ASCO 425 SPDs effectiveness and performance. Follow the steps outlined in this instruction bulletin to ensure proper installation. Read the entire instruction bulletin before beginning the installation. These instructions are not intended to replace national or local electrical codes. Check all applicable electrical codes to verify compliance. Installation of ASCO 425 surge suppressors must only be performed by qualified electrical personnel.

Unpacking and Preliminary Inspection

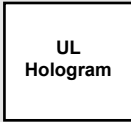
Inspect the entire shipping container for damage or signs of mishandling before unpacking the device. Remove the packing material and further inspect the device for any obvious shipping damage. If any damage is found and is a result of shipping or handling, immediately file a claim with the shipping company.

Storage

The device should be stored in a clean, dry environment. Storage temperature is -67 °F to +149 °F (-55°C to +65°C). All of the packaging materials should be left intact until the device is ready for installation.

Identification Nameplate

The identification nameplate is located on the side of the unit.

ASCO POWER TECHNOLOGIES, LP		
CAT# 425 _____	CW	
PART# XCS _____	UL 1449-4	
VOLTAGE: _____ V 50-60Hz	SPD TYPE _____	
MAX RATED AMBIENT AIR TEMP: _____		
MFG DATE: _____	MCOV: _____ / _____	
	ENC TYPE: XXXX	VOLTAGE
	In: 20 kA	PROTECTION RATING
		L-N _____
		L-G _____
		N-G _____
		L-L _____
		_____ V
Suitable for use on a circuit capable of delivering not more than _____ rms symmetrical amperes		

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Confirm the SPD voltage rating on the module or nameplate label is not less than operating voltage the operating voltage.

Failure to follow these instructions will result in death or serious injury.

SPD Location Considerations

Environment

The device is designed to operate in an ambient temperature range of -13° F to +140° F (-25° C to +60° C) with a relative humidity of 0 to 95% non-condensing. This device has a Type 4X housing.

Audible Noise

The device background noise is negligible and does not restrict the location of the installation.

Mounting

The device has been designed to be surface mounted. An additional flush mount kit is also available if required (XMFMKITCW).

Service Clearance

The service clearance should meet all applicable code requirements.

Equipment Performance

To obtain optimum surge suppression, locate the SPD as close as possible to the circuitry being surge-limited to minimize the wire length. Minimizing the wire length reduces the impedance between the circuitry and the SPD.

Refer to the Voltage Protection Rating (VPR) values on the SPD nameplate. These VPR values were obtained by testing the SPD with six-inch long leads (per UL1449). For every additional foot of wire beyond six inches, the effective VPR increases by approximately 160 volts.

Electrical

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Confirm the surge protective device voltage rating on the module or nameplate label is not less than the operating voltage.

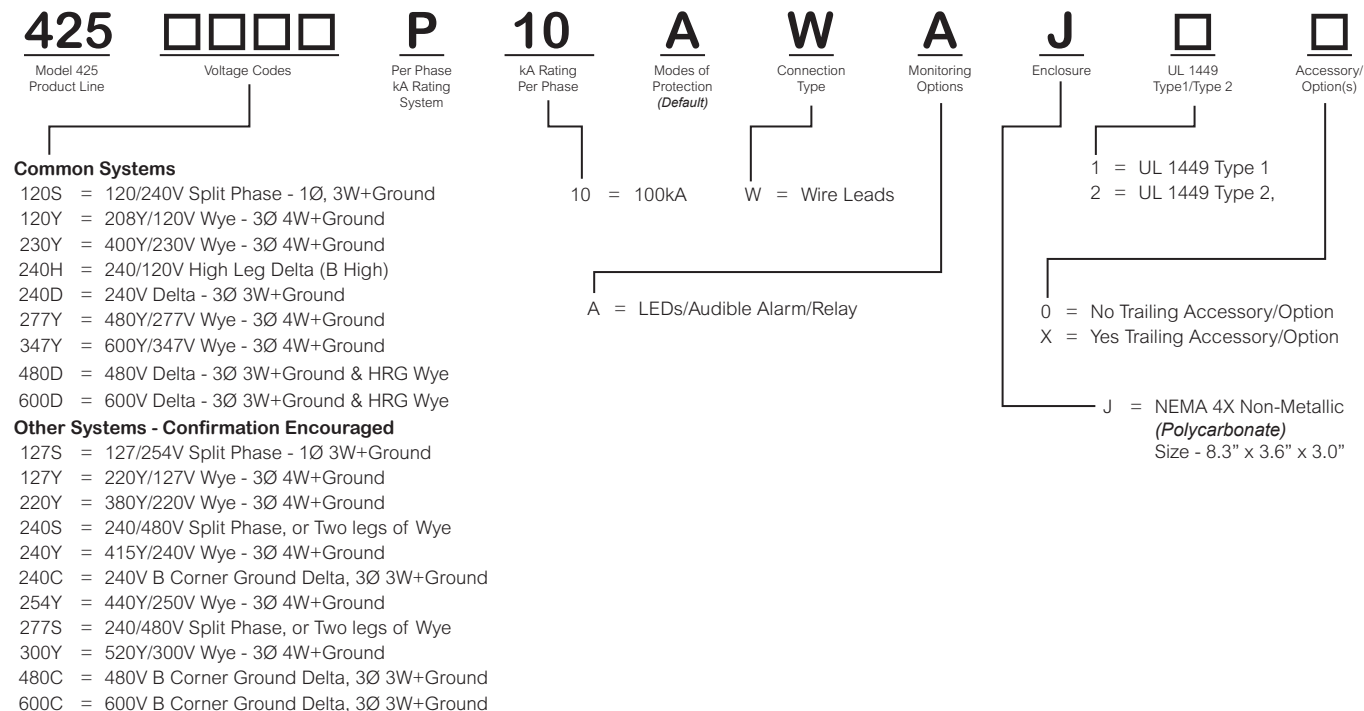
Failure to follow these instructions will result in death or serious injury.

Voltage Rating

Prior to mounting the SPD, verify that the device has the same voltage rating as the power distribution system in which it is installed. Compare the nameplate voltage or model number on the SPD with the nameplate of the electrical distribution equipment.

The specifier or user of the device should be familiar with the configuration and arrangement of the power distribution system in which the SPD is to be installed. The system configuration of any power distribution system is based strictly on how the secondary windings of the transformer supplying the service entrance main or load are configured. This includes whether or not the transformer windings are referenced to ground via a grounding conductor. The system configuration is not based on how any specific load or equipment is connected to a particular power distribution system. See Table 1 for the service voltage of each SPD.

Table 1: Model 425 Service Voltages



Location of Surge Protective Device (SPD)

UL 1449 Type 1 SPDs have been designed and approved for line side applications prior to the main service disconnect without supplemental overcurrent protection. Type 2 SPDs must be installed on the load side of the main Overcurrent Protective Device (OCPD). All installations should either provide or include a disconnecting means.

Type 1 SPDs can also be used in Type 2 applications (load side of OCPD). When SPDs are used on the load side, they must be installed per local codes.

Locate the SPD as close as possible to the circuit mains being surge-limited to minimize the wire length and optimize SPD performance. Avoid long wire runs so that the device will perform as intended. To reduce the impedance that the wire displays to surge currents, the phase, neutral, and ground conductors (wye and high-leg delta configurations), or phase and ground conductors (delta configurations), must be routed within the same conduit and tightly bundled or twisted together to optimize device performance. Avoid sharp bends in the conductors. See Figures 2 and 3.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- On a high-leg delta installation, the high-leg of the power system must be connected to the B phase lug of the SPD.

Failure to follow these instructions will result in death or serious injury.

Figure 2: SPD Wiring for Wye and High-Leg Delta Configurations

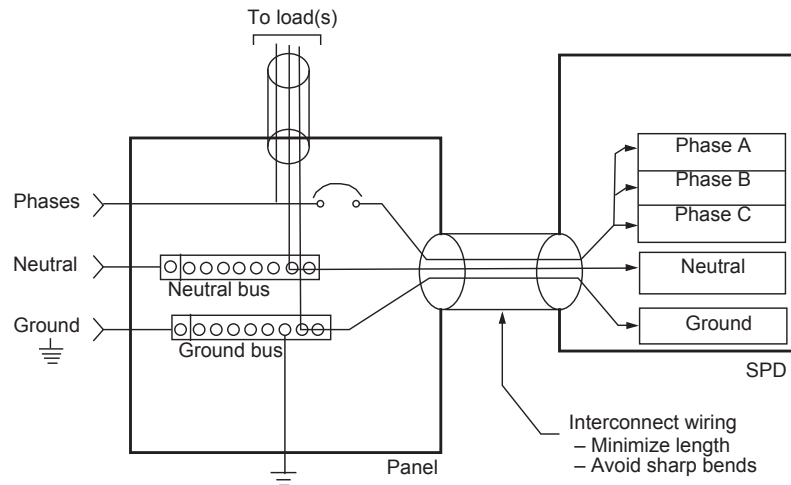
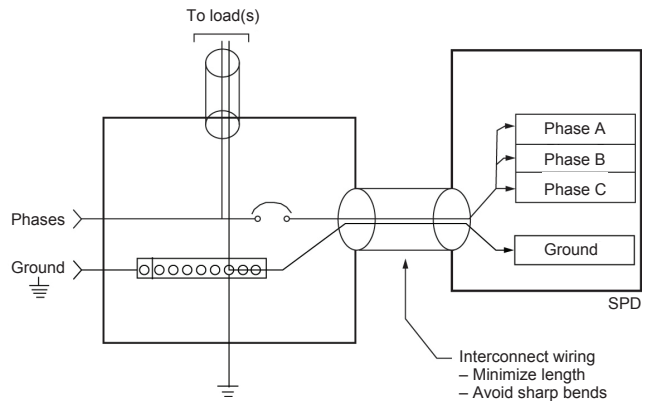


Figure 3: SPD Wiring for Delta Configurations



System Grounding

⚠ CAUTION

SPD DAMAGE AND POWER SYSTEM OVERVOLTAGE

- Ungrounded power systems are inherently unstable and can produce excessively high line-to-ground voltages during certain fault conditions. During these fault conditions any electrical equipment, including an SPD, may be subjected to voltages which exceed their designed ratings. This information is being provided to the user so that an informed decision can be made before installing any electrical equipment on an ungrounded power system.
- Resistance-grounded power systems must be maintained in a over-damped state to limit voltage overshoot and duration during operation.
- Verification and adjustment of correct power system damping should be done following power system modifications and periodically, as part normal system maintenance.

Failure to follow these instructions can result in injury or equipment damage.

NOTICE

LOSS OF SURGE SUPPRESSION

- Verify that the service entrance equipment is bonded to ground in accordance with all applicable codes.

Failure to follow these instructions can result in equipment damage.

The ASCO 425 has SPD elements connected from phase to ground. It is critical that there be a robust and effective connection to the building grounding structure. The grounding connection must utilize an equipment grounding conductor run with the phase and neutral connection of the power system. Do not connect the SPD to a separate isolated ground.

For proper voltage suppression by the ASCO 425 SPD, use a single-point ground system where the service entrance grounding electrode system is connected to, and bonded to, all other available electrodes, building steel, metal water pipes, driven rods, etc. (for reference, see NEC Art 250). The ground impedance measurement of the electrical system must be as low as possible and in compliance with all applicable codes for sensitive electronic and computer systems.

NOTICE

INADEQUATE RACEWAY ELECTRICAL CONTINUITY

- Install an insulated grounding conductor inside a metallic raceway when the raceway is used as an additional grounding conductor. Size the conductor in accordance with all applicable codes.
- Maintain adequate electrical continuity at all raceway connections.
- Do not use isolating bushings to interrupt a metallic raceway run.
- Do not use a separate isolated ground for the surge protective device.
- Verify proper equipment connections to the grounding system.
- Verify ground grid continuity by inspections and testing as part of a comprehensive electrical maintenance program.

Failure to follow these instructions can result in equipment damage.

Parts List

- 1 - Model 425 suppressor including 3 feet (.91 M) conductors
- 1 - Data Sheet

Wiring and Installation

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.
- This equipment must be effectively grounded per all applicable codes. Use an equipment-grounding conductor to connect this equipment to the power system ground.
- Confirm the surge protective device voltage rating on the module or nameplate label is not less than the operating voltage.

Failure to follow these instructions will result in death or serious injury.

Follow steps 1 through 7 to make wiring connections:

1. Turn off all power supplying this equipment before working on or inside any enclosure containing this equipment. If using Dry Contact, pre-plan its installation.
2. Confirm SPD is rated for your system by comparing voltage measurements to the Line Voltage (L-L, L-N) on the product label.
3. Identify proper location for the SPD. Locate as close as possible to the mains of the panel being surge-limited so the wires are as short as possible. Mount unit securely. Note: The SPD must be installed in an accessible location. See figure 5.
4. Mount SPD. For weather resistant applications additional sealing, O-ring is required. (not included) See figure 4.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- For outdoor installation use and appropriate weather sealing at the nipple (o-ring, sealing conduit, etc).

Failure to follow these instructions will result in death or serious injury.

5. Install in accordance with national and local electrical codes and match the branch circuit Overcurrent Protection Device (OCPD) to the wire size. For all wires, twist conductors 1/2 turn or more for every twelve inches of length.
6. Do not loop or coil wires. Be sure to maintain adequate wire bending space per NEC. Trim excessive wire length. Use on solidly grounded systems unless the SPD model is designed for installation on ungrounded/HRG systems.
7. Energize and confirm proper operation of green LED indicator.

Figure 4: Typical panel Installation

(Type 1 or individual equipment installations may vary)

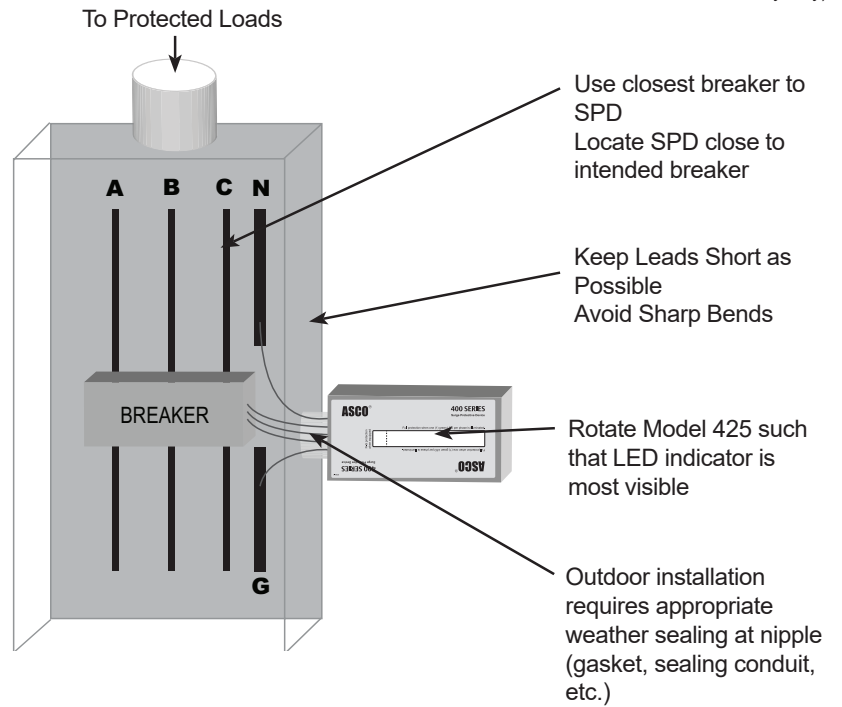


Figure 5: Parallel Wiring Diagram

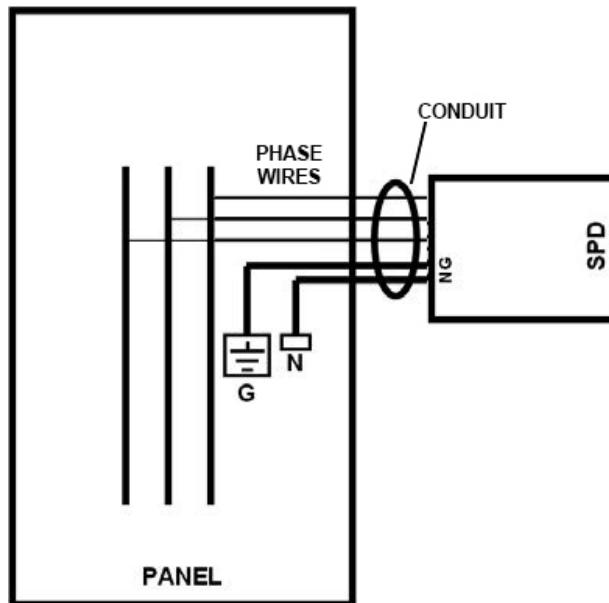
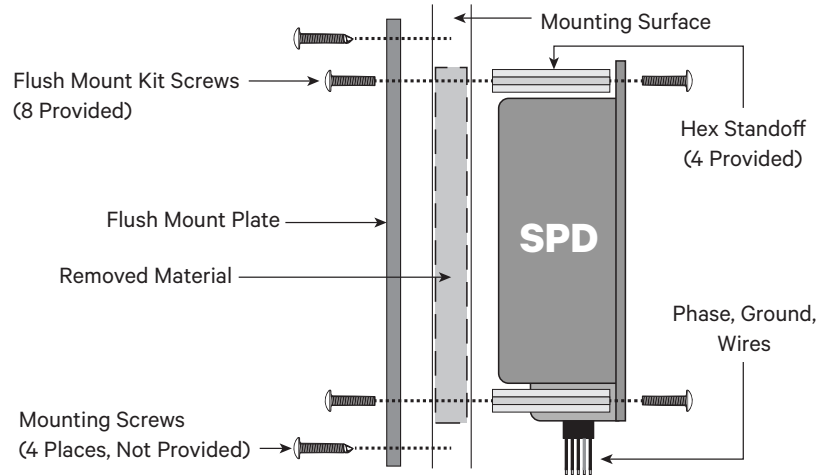


Figure 6: Flush Mount Diagram

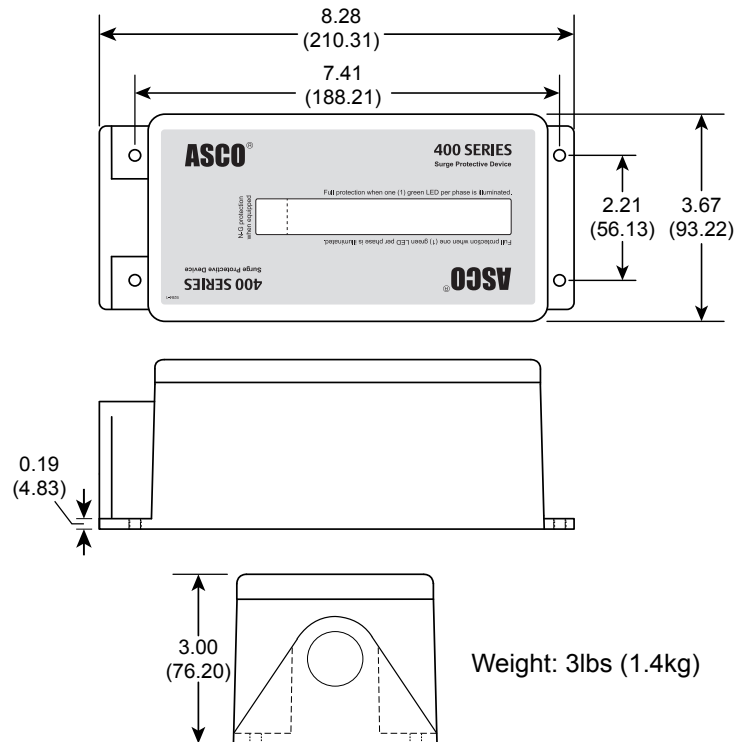


Surface Mount Installation

Note: Mount the unit as close as possible to the protected panel.

1. Make perforations on the wall according to the screw holes located on the enclosure. See Figure 7. (Rotate dimensions 90° as appropriate depending on orientation).
2. Configure the electrical conductor and conduit connection consistent with the installation instructions on page 12.

Figure 7: General Dimensions (in. / mm.)



Operation

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.
- This equipment must be effectively grounded per all applicable codes. Use an equipment-grounding conductor to connect this equipment to the power system ground.

Failure to follow these instructions will result in death or serious injury.

LED Status Indicators

Diagnostic LEDs are located on the front of the ASCO 425 SPD device. They operate as follows:

- Verify that all phase voltages are present. If the LED is not illuminated, the device may not be installed correctly. Check the power supply and service voltage. Upon energizing the SPD, check the LED status. If all of the LEDs are illuminated, surge suppression is operating.
- If one or more LEDs are not illuminated, there is a loss of surge suppression on that phase.
- If an inoperative condition occurs the device must be replaced by qualified electrical personnel.

Figure 8: Diagnostic Operation



Dry Contacts

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Use 600 Vac rated dry contact wiring.
- Dry contact wiring must have less than 1/16 in. (1.6mm) exposed wire from the dry contact block.
- Do not supply more than 24 Vdc / 24 Vac and no more than a current of 2 A.

Failure to follow these instructions will result in death or serious injury

The ASCO 425 series SPD device is provided with dry contacts. These dry contact leads can be used for remote indication of the SPD operating status to a computer interface board or emergency management system. Also, these dry contact leads are designed to work with the SPD remote monitor option described in the following section.

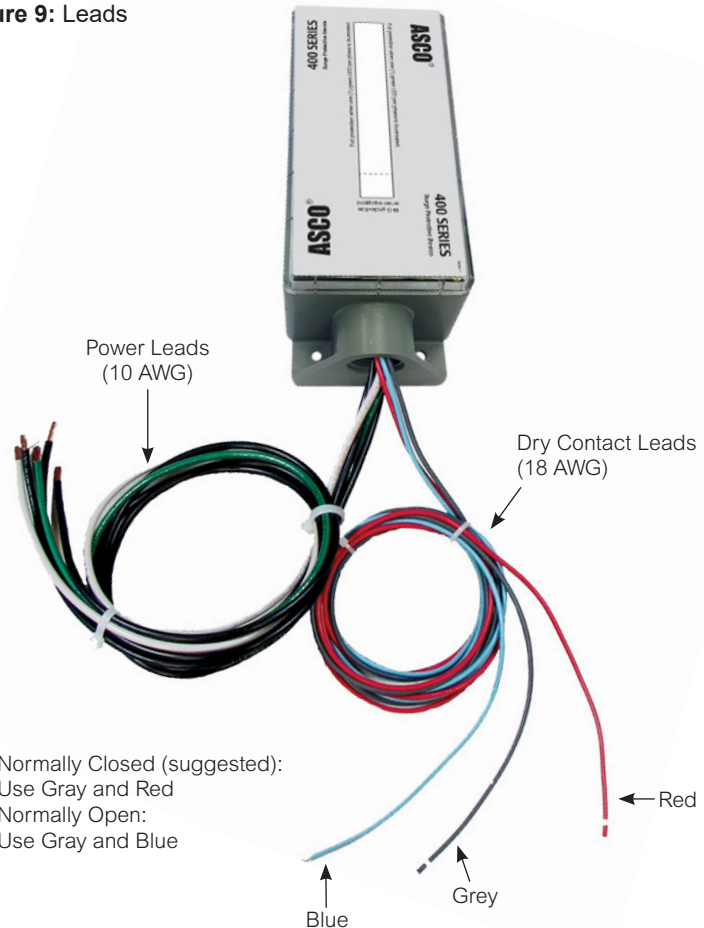
The dry contacts are designed for a maximum voltage of 24 V dc / 24 V ac and a maximum current of 2 A. Higher energy applications may require additional relay implementation outside the SPD. Damage to the SPD's relay caused by use with energy levels in excess of those discussed in this instruction bulletin is not covered by warranty. For application questions, call the Surge Technical Assistance Group at (800) 237-4567 or email customercare@ascopower.com

Connecting Form C Dry Contact & Audible Alarm

Three 3 ft. (.91 m) 18 AWG wires are included through the nipple. See Figure 9. Gray is Common, Blue is Normally Open and Red is Normally Closed when energized in its expected installation. (When not energized, the SPD is no longer in its 'Normal' state and contacts will be reversed.)

If the dry contacts are not utilized, insulate lead ends, coil and secure. Audible Alarm will still function correctly.

Figure 9: Leads



Remote Monitor Option

The remote monitor option has two LEDs, one red and one green, and an audible alarm with an enable/disable switch. Normal status is a lit green LED, and no audible alarm. To test the integrity of the remote monitor, press the push-to-test switch. The green LED will turn off, the red LED will turn on, and the alarm will sound, if the alarm is enabled. Releasing the switch will complete the test; the red LED will turn off, the green LED will turn on and the alarm will shut off.

If suppression on any phase is lost, the green LED will turn off, the red LED will illuminate and an alarm will sound. The audible alarm can be silenced by pushing the alarm enable/disable/test switch. The alarm will silence and the green alarm LED will not be lit. The red LED will continue to be illuminated until the inoperative condition has been cleared.

The remote monitor includes a 120 V ac to 12 V dc adapter with a six-foot power cord. Connections are made to the ASCO 425 device via the dry contact lead wires, connected directly into the remote monitor's internal terminal block. . To extend the remote monitor further (up to 1,000 ft. (305 m), use an additional length of solid or stranded 22 to 14 AWG wire (not provided).



Preventive Maintenance

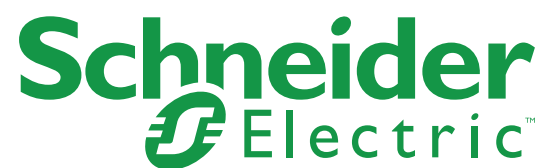
DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, NOM-029-STPS or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.
- This equipment must be effectively grounded per all applicable codes. Use an equipment-grounding conductor to connect this equipment to the power system ground.

Failure to follow these instructions will result in death or serious injury.

Inspect the SPD periodically to maintain system performance and continued transient voltage surge suppression. During this inspection, check the state of the display LED status indicators.



6700 Tower Cir #700
Franklin, TN 37067

se.com/us/en/work/support
1-888-778-2733

While every precaution has been taken to ensure accuracy and completeness in this literature, Schneider Electric assumes no responsibility, and disclaims all liability for damages resulting from use of this information or for any errors or omissions.

IO-70060 RevM 10-2021



2.15 Parts Identification

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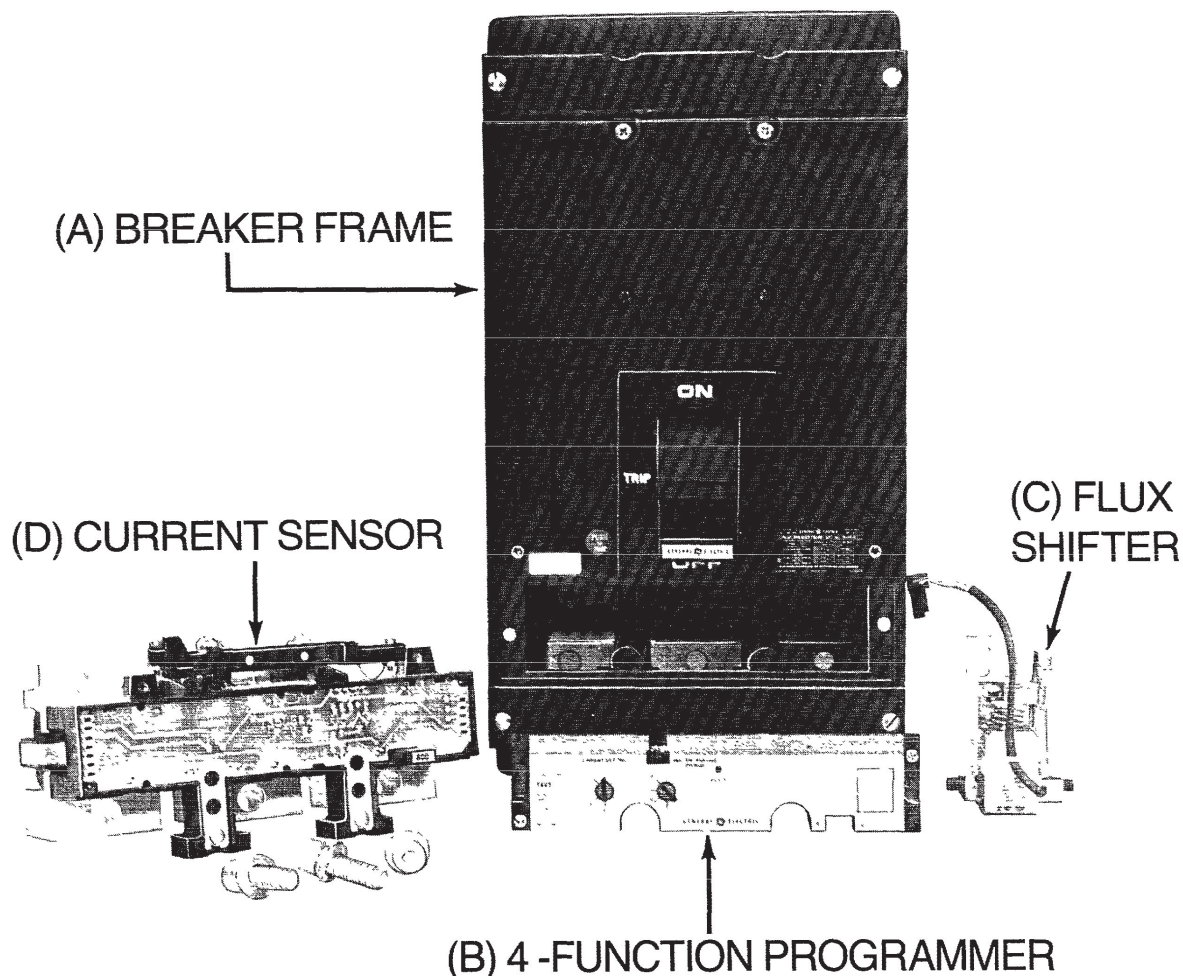
Assembling MicroVersaTrip™ Trip Unit Systems

General Information

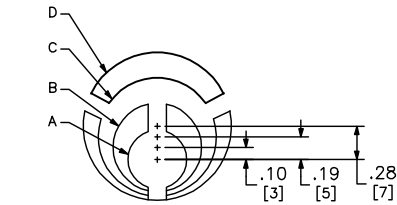
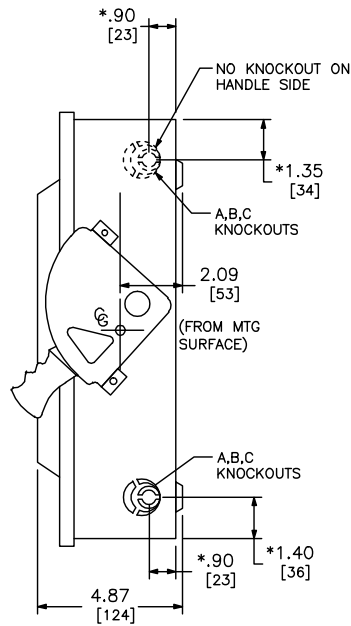
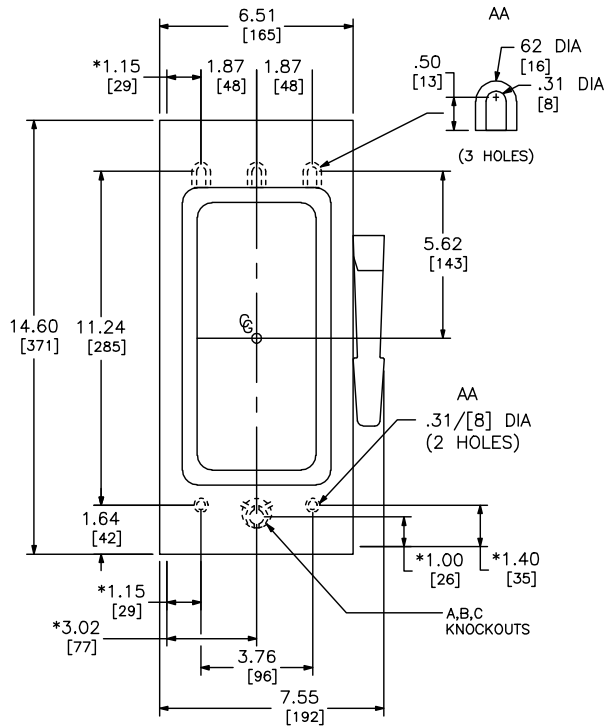
Remove components from cartons and check catalog numbers on components against carton labels. Following is a list of components necessary to assemble the General Electric TK4V-THK4V Model 6 frame molded case circuit breakers with a 4-function MicroVersaTrip trip unit (See FIGURE 1). A Model 6 circuit breaker frame is identified by a "MOD 6" stamp on the breaker side, and by an Underwriters Laboratories Inc. label in the handle. Presence of any other label, or of no label at all, in the handle indicates that the breaker frame is not Model 6 and is NOT suitable for field installation of MicroVersaTrip components.

- A. Breaker frame (catalog numbers TK4VF46, THK4VF46)
- B. 4-function programmer (catalog number T4VT series)

- C. Flux shifter (catalog number TKFS)
- D. Current sensor (catalog number TKCT series)



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TANGENT KNOCKOUT
(DIMENSION ON DRAWING TO CENTERLINE OF "A" KNOCKOUT)

NEMA TYPE 1

SEISMIC NOTES:
USE (4) 1/4" DIA GRADE 5 STEEL MOUNTING BOLTS @ HOLES AA
MAX CONFIGURED WEIGHT 10 LB FOR THE PURPOSE OF DETERMINING
SEISMIC ANCHORAGE REQUIREMENTS. FOR ALL OTHER APPLICATIONS,
CONTACT SQUARE D COMPANY.

WIRING DIAGRAMS	
FUSIBLE	NOT FUSIBLE

TERMINAL LUGS			
AMPERES	MAX WIRE	MIN WIRE	TYPE
30	#6 AWG	#14 AWG	AL OR CU

KNOCKOUTS				
SYMBOL	CONDUIT SIZE		DIAMETER	
	IN	MM	IN	MM
A	.50	13	.88	22
B	.75	19	1.13	29
C	1.00	25	1.38	35
D	1.25	32	1.75	44

*DIMENSIONS TO BOX (NOT COVER)

DUAL DIMENSIONS: INCHES
MILLIMETERS

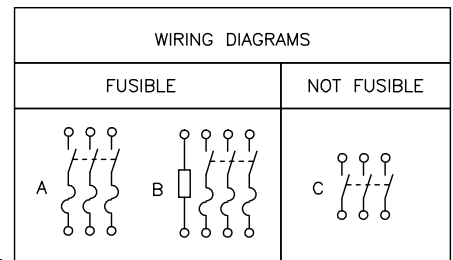
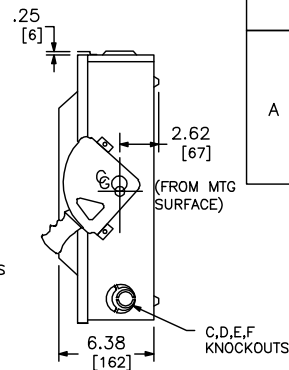
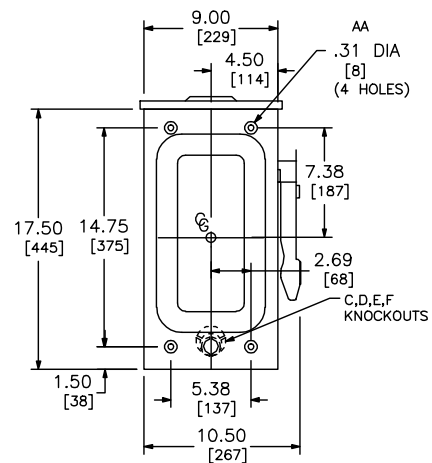
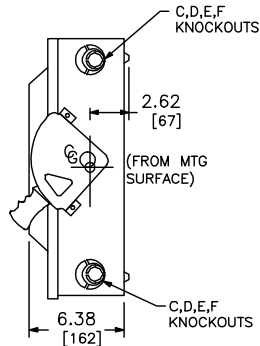
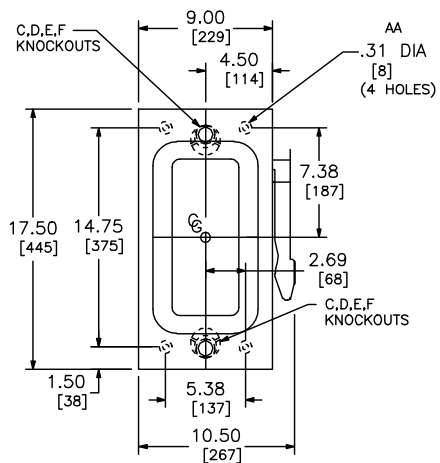
CATALOG NUMBER	VOLTAGE RATINGS	AMPERAGE RATINGS	WIRING DIAG	HORSEPOWER RATINGS													
				240VAC				480VAC				600VAC				250 VDC	600 VDC
				STD		MAX		STD		MAX		STD		MAX			
				1#	3#	1#	3#	1#	3#	1#	3#	1#	3#	1#	3#	STD	MAX
H221N	240VAC,250VDC	30	A	1 1/2	3	3	7 1/2								5		
H321N	240VAC,250VDC	30	D	1 1/2	3	3	7 1/2								5		
H361	600VAC,600VDC	30	B					3	5	7 1/2	15		7 1/2		5	10	15
H361N	600VAC,600VDC	30	B	-	-	-	-	3	5	7 1/2	15	-	7 1/2	-	5	10	15
HU361	600VAC,600VDC	30	C							7 1/2	20		10	30	5	10	15
HU361E	600VAC,600VDC	30	C							7 1/2	20		10	30	5	10	15

- NOTES:
UL LISTED - E2875
FINISH - GRAY BAKED ENAMEL
ALL NEUTRALS - INSULATED
▲ USE BOTH OUTER SWITCHING POLES
● USE BOTH SWITCHING POLES
■ IF CORNER GROUNDED DELTA, INSTALL NEUTRAL AND USE OUTER SWITCHING POLES FOR UNGROUNDED CONDUCTORS.
‡ FOR CORNER GROUNDED DELTA ONLY, USE OUTER SWITCHING POLES FOR UNGROUNDED CONDUCTORS.

HEAVY DUTY SAFETY SWITCHES - SEISMIC
VISIBLE BLADE TYPE
30 AMPERE
ENCLOSURE - NEMA TYPE 1 GENERAL PURPOSE

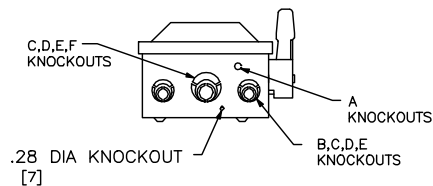


DWG# 2228S
NO.

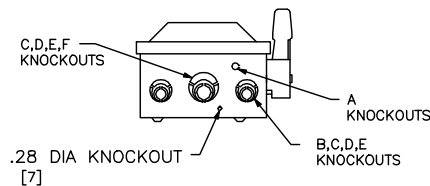


TERMINAL LUGS ‡			
AMPERES	MAX. WIRE	MIN. WIRE	TYPE
60	# 2 AWG	# 12 AWG	AL
	# 2 AWG	# 14 AWG	CU

KNOCKOUTS				
SYMBOL	CONDUIT SIZE		DIAMETER	
	IN	MM	IN	MM
A	.50	13	.88	22
B	.75	19	1.13	29
C	1.00	25	1.38	35
D	1.25	32	1.75	45
E	1.50	38	2.00	51
F	2.00	51	2.50	64



NEMA TYPE 1



NEMA TYPE 3R▲

DUAL DIMENSIONS: INCHES
MILLIMETERS

SEISMIC NOTES:
USE (4) 1/4" DIA GRADE 5 STEEL MOUNTING BOLTS @ HOLES AA
MAX CONFIGURED WEIGHT 20 LB FOR THE PURPOSE OF DETERMINING
SEISMIC ANCHORAGE REQUIREMENTS. FOR ALL OTHER APPLICATIONS,
CONTACT SQUARE D COMPANY.

NOTES:
FINISH - GRAY BAKED ENAMEL.
UL LISTED - FILE E-2875
ALL NEUTRALS - INSULATED GROUNDABLE
SUITABLE FOR USE AS SERVICE EQUIPMENT
SHORT CIRCUIT CURRENT RATINGS:

10,000 AMPERES WITH CLASS H OR K FUSES
200,000 AMPERES WITH CLASS R FUSES HAVING CLASS R REJECTION KITS OR CLASS J FUSES.
WHEN MOUNTING THESE SWITCHES, ALLOW 4.00/[102] MIN. CLEARANCE
BETWEEN ENCLOSURES FOR OPENING OF SIDE HINGED DOOR.

▲ NEMA TYPR 3R SWITCHES HAVE PROVISIONS FOR MAXIMUM 2.50/[64] BOLT-ON B-HUB.
‡ LUGS SUITABLE FOR 60°C OR 75°C COPPER OR ALUMINUM CONDUCTORS.

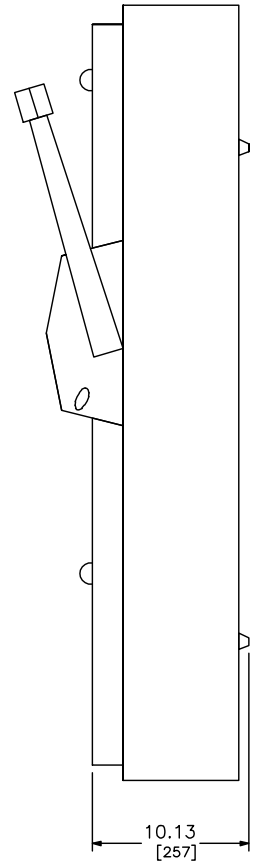
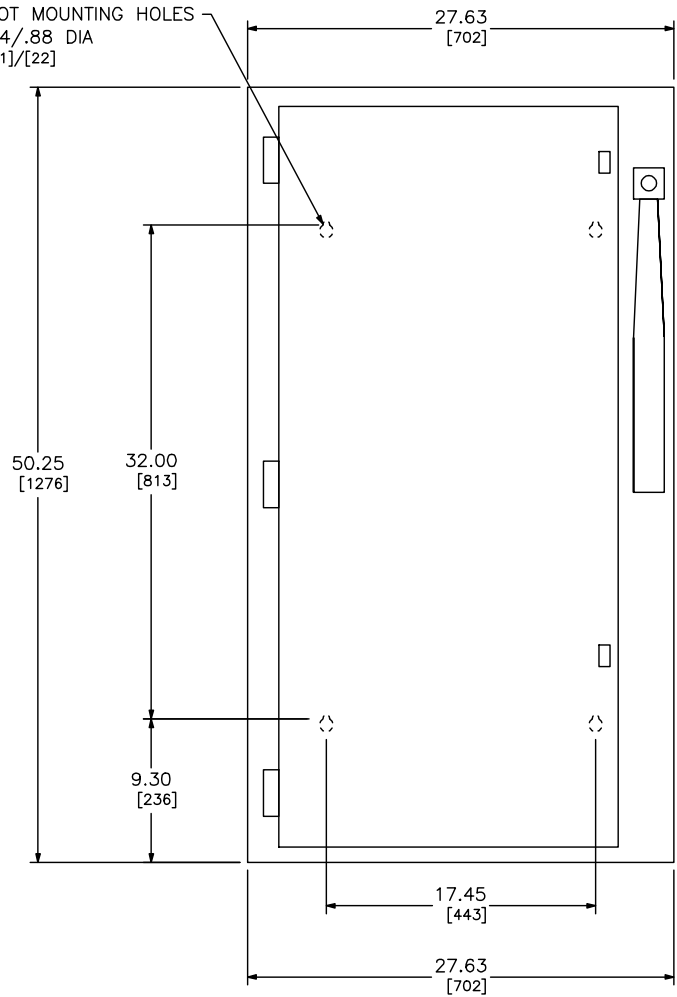
CATALOG NUMBER	VOLTAGE RATINGS	WIRING DIAG	HORSEPOWER RATINGS										
			250VAC			480VAC			600VAC			250 VDC	600 VDC
			STD	MAX		STD	MAX		STD	MAX			
H362	600VAC;600VDC	A	-	-	-	15	-	30	15	-	50	-	30
H362RB	600VAC;600VDC	A	-	-	-	15	-	30	15	-	50	-	30
H362N	600VAC;600VDC	B	-	-	-	15	-	30	15	-	50	-	-
H362NRB	600VAC;600VDC	B	-	-	-	15	-	30	15	-	50	-	-
HU362	600VAC;600VDC	C	-	10	20	-	20	50	25	60	10	30	-
HU362RB	600VAC;600VDC	C	-	10	20	-	20	50	25	60	10	30	-

HEAVY DUTY SAFETY SWITCHES - SEISMIC
VISIBLE BLADE TYPE
60 AMPERE
ENCLOSURE - NEMA TYPE 1 GENERAL PURPOSE
NEMA TYPE 3R RAINPROOF



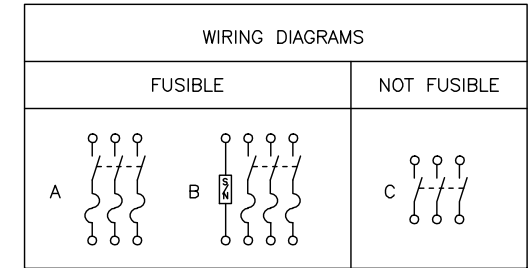
DWG# 1897S
NO.

KEYSLOT MOUNTING HOLES
(4) .44/.88 DIA
[111]/[222]



NEMA TYPE 1
NO KNOCKOUTS

NOTES:
FINISH - GRAY BAKED ENAMEL
UL LISTED - FILE E-154828
ALL NEUTRALS - INSULATED GROUNDABLE
SUITABLE FOR USE AS SERVICE EQUIPMENT
SHORT CIRCUIT CURRENT RATINGS:
10,000 AMPERES WHEN USED WITH OR PROTECTED BY CLASS H OR K FUSES.
200,000 AMPERES WHEN USED WITH OR PROTECTED BY CLASS R FUSES HAVING
CLASS R REJECTION KITS INSTALLED OR CLASS J FUSES.



NOTE: FOR SWITCHING DC USE TWO OUTSIDE POLES.

TERMINAL LUGS DATA			
AMPERES	MAX WIRE	MIN WIRE	TYPE
400	(1) 750 KCMIL OR	(1) #1/0 AWG OR	AL OR CU
	(2) 300 KCMIL	(2) #1/0 AWG	

DUAL DIMENSIONS: INCHES
MILLIMETERS

CATALOG NUMBER	MAX VOLTAGE RATINGS	WIRING DIAG	HORSEPOWER RATINGS						
			240VAC		480VAC		600VAC		
			MAX	STD	MAX	STD	MAX	STD	
H365	600VAC;600VDC	A	-	100	250	125	350	50	50
H365N	600VAC;600VDC	B	-	100	250	125	350	50	50
HU365	600VAC;600VDC	C	125	-	250	-	350	50	50

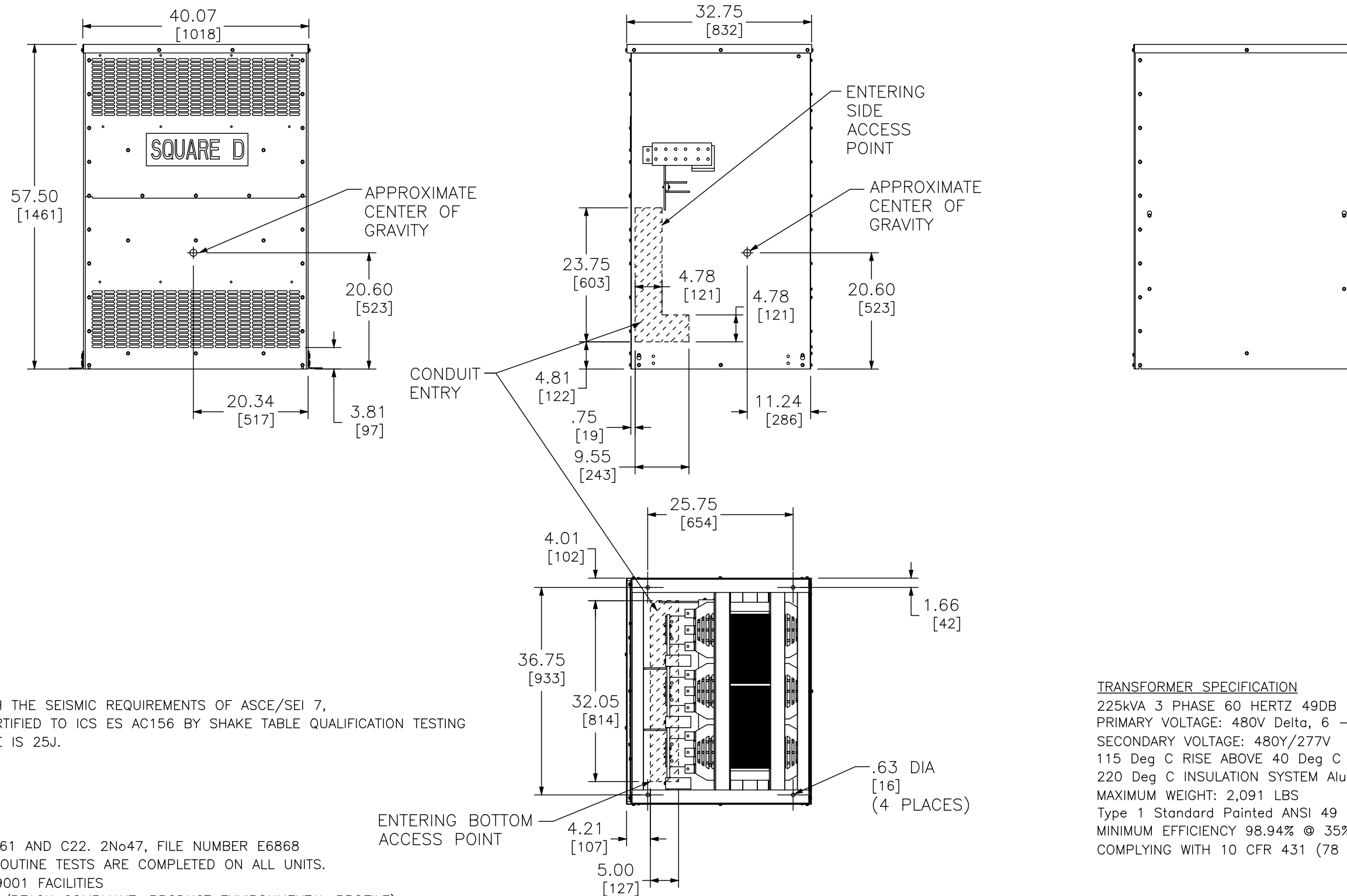
HEAVY DUTY SAFETY SWITCHES
VISIBLE BLADE TYPE
400 AMPERE
ENCLOSURE - NEMA TYPE 1 GENERAL PURPOSE



DWG# 1922
NO.

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REV	DESCRIPTION	BY	DATE						
-	----	--	--/--/--	-	----	--	--/--/--	-	----



SEISMIC QUALIFICATION

TO BE COMPLIANT WITH THE SEISMIC REQUIREMENTS OF ASCE/SEI 7, THIS UNIT IS SELF CERTIFIED TO ICS ES AC156 BY SHAKE TABLE QUALIFICATION TESTING THE ENCLOSURE ABOVE IS 25J.

NOTES:

- cULus LISTED TO UL1561 AND C22. 2No47, FILE NUMBER E6868
- NEMA ST-20 (2014) ROUTINE TESTS ARE COMPLETED ON ALL UNITS.
- MANUFACTURED IN ISO9001 FACILITIES
- GREEN PREMIUM (RoHS/REACH COMPLIANT, PRODUCT ENVIRONMENTAL PROFILE)
- REGISTERED TO DOE VIA 10 CFR 429 & NRCAN
- MINIMUM SIDE AND REAR CLEARANCE 1/2 INCH PER UL1561 ALCOVE TESTING.
- FRONT ACCESS MUST COMPLY WITH NEC WORK SPACE REQUIREMENTS.
- WIRE ACCESS SHOWN SHADED ABOVE. LOCATIONS ARE FRONT SIDES AND FRONT BOTTOM.

TRANSFORMER SPECIFICATION

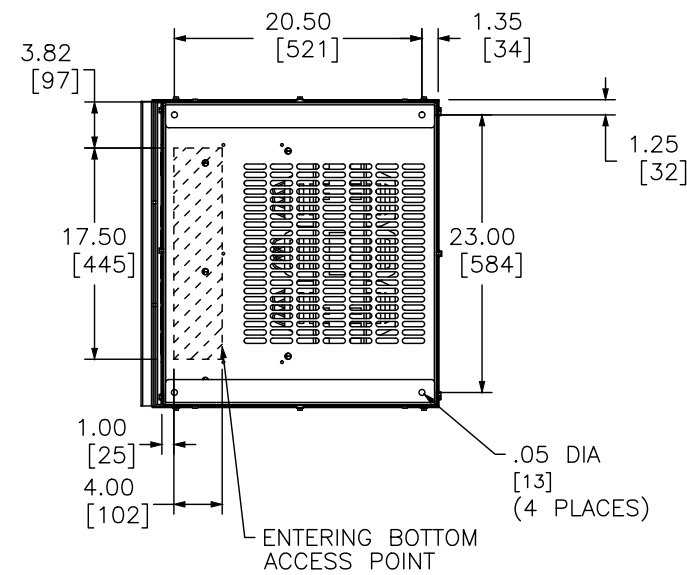
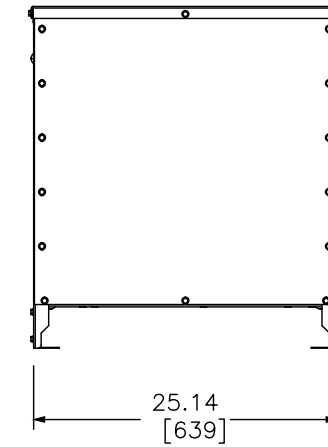
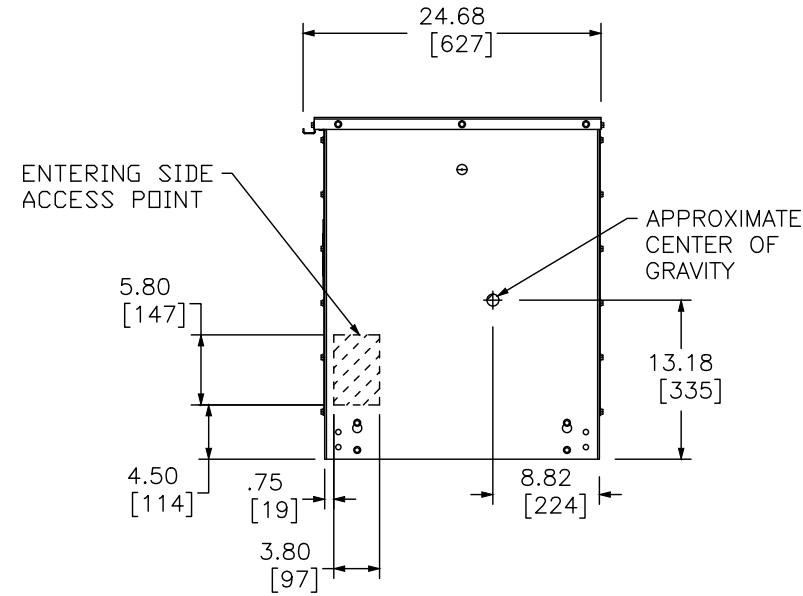
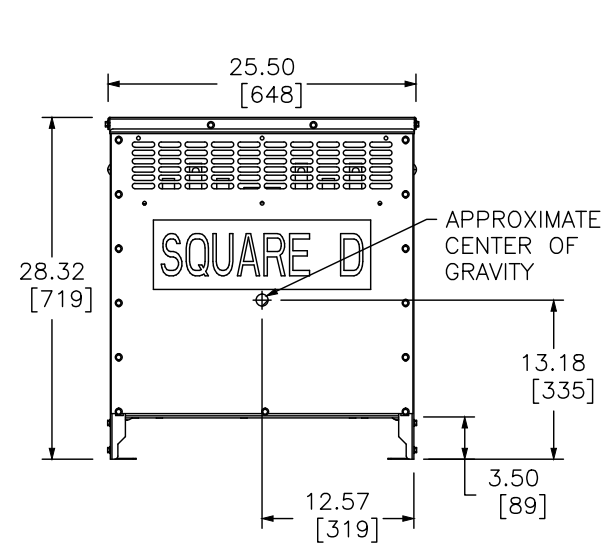
225kVA 3 PHASE 60 HERTZ 49DB
 PRIMARY VOLTAGE: 480V Delta, 6 - 2.5% 2+4- Taps
 SECONDARY VOLTAGE: 480Y/277V
 115 Deg C RISE ABOVE 40 Deg C AMBIENT
 220 Deg C INSULATION SYSTEM Aluminum WINDING
 MAXIMUM WEIGHT: 2,091 LBS
 Type 1 Standard Painted ANSI 49 Grey
 MINIMUM EFFICIENCY 98.94% @ 35% LOADING 75 Deg C
 COMPLYING WITH 10 CFR 431 (78 FR 23335-APRIL 18, 2013)

EX225T1814HF

DUAL DIMENSIONS: INCHES
MILLIMETERS

JOB NAME:	Building 431 Bremerton	EQUIPMENT DESIGNATION:	T225
JOB LOCATION:		EQUIPMENT TYPE:	LV DISTRIBUTION TRANSFORMER
DRAWN BY:	(Q2C)	DRAWING TYPE:	ELEVATION VIEW
ENGR:		SQUARE D by Schneider Electric	
DATE:	August 01 2022		
DRAWING STATUS:	QUOTE	NOT FOR CONSTRUCTION	DWG# FQ-3491691-98725830-01
			PG 1 OF 1 REV -

REV	DESCRIPTION	BY	DATE						
-	----	--	--/--/--	-	----	--	--/--/--	-	----



SEISMIC QUALIFICATION

TO BE COMPLIANT WITH THE SEISMIC REQUIREMENTS OF ASCE/SEI 7, THIS UNIT IS SELF CERTIFIED TO ICS ES AC156 BY SHAKE TABLE QUALIFICATION TESTING THE ENCLOSURE ABOVE IS 18M.

NOTES:


cULus LISTED TO UL1561 AND C22. 2No47, FILE NUMBER E6868
 NEMA ST-20 (2014) ROUTINE TESTS ARE COMPLETED ON ALL UNITS.
 MANUFACTURED IN ISO9001 FACILITIES
 GREEN PREMIUM (RoHS/REACH COMPLIANT, PRODUCT ENVIRONMENTAL PROFILE)
 REGISTERED TO DOE VIA 10 CFR 429 & NRCAN
 MINIMUM SIDE AND REAR CLEARANCE 1/2 INCH PER UL1561 ALCOVE TESTING.
 FRONT ACCESS MUST COMPLY WITH NEC WORK SPACE REQUIREMENTS.
 WIRE ACCESS SHOWN SHADED ABOVE. LOCATIONS ARE FRONT SIDES AND FRONT BOTTOM.

TRANSFORMER SPECIFICATION

30kVA 3 PHASE 60 HERTZ 39DB
 PRIMARY VOLTAGE: 480V Delta, 6 - 2.5% 2+4- Taps
 SECONDARY VOLTAGE: 208Y/120V
 115 Deg C RISE ABOVE 40 Deg C AMBIENT
 220 Deg C INSULATION SYSTEM Aluminum WINDING
 MAXIMUM WEIGHT: 324 LBS
 Type 2 Standard Painted ANSI 49 Grey
 MINIMUM EFFICIENCY 98.23% @ 35% LOADING 75 Deg C
 COMPLYING WITH 10 CFR 431 (78 FR 23335-APRIL 18, 2013)

DUAL DIMENSIONS: INCHES
 MILLIMETERS

EXN30T3HF

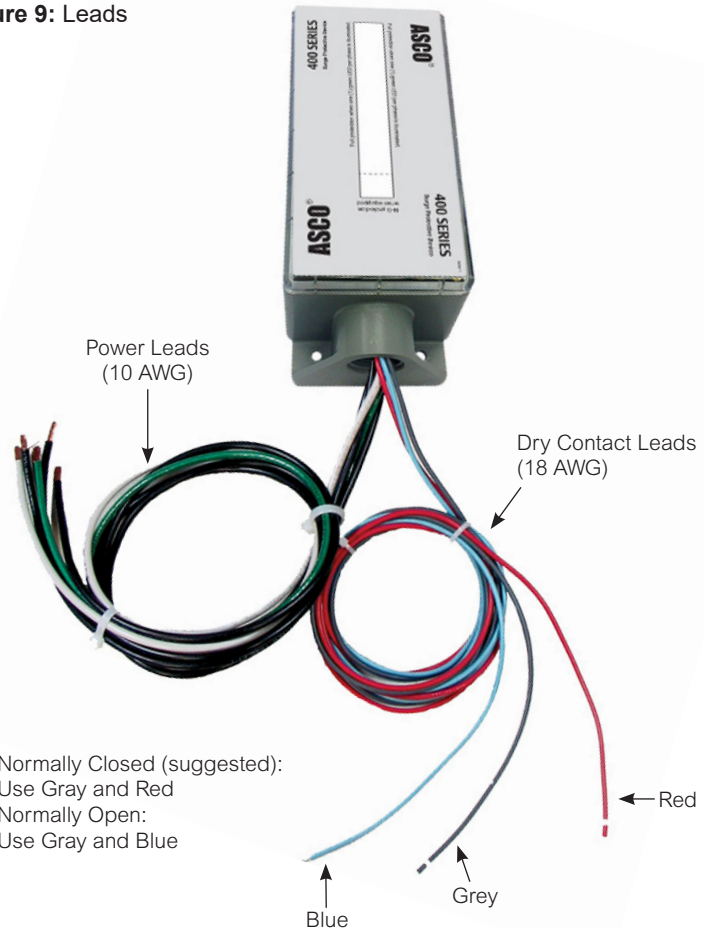
JOB NAME: Building 431 Bremerton	EQUIPMENT DESIGNATION: T30
JOB LOCATION:	EQUIPMENT TYPE: LV DISTRIBUTION TRANSFORMER
DRAWN BY: (Q2C)	DRAWING TYPE: ELEVATION VIEW
ENGR:	 by Schneider Electric
DATE: August 01 2022	
DRAWING STATUS: QUOTE	NOT FOR CONSTRUCTION
DWG# FQ-3491691-98726199-01	PG 1 OF 1 REV -

Connecting Form C Dry Contact & Audible Alarm

Three 3 ft. (.91 m) 18 AWG wires are included through the nipple. See Figure 9. Gray is Common, Blue is Normally Open and Red is Normally Closed when energized in its expected installation. (When not energized, the SPD is no longer in its 'Normal' state and contacts will be reversed.)

If the dry contacts are not utilized, insulate lead ends, coil and secure. Audible Alarm will still function correctly.

Figure 9: Leads



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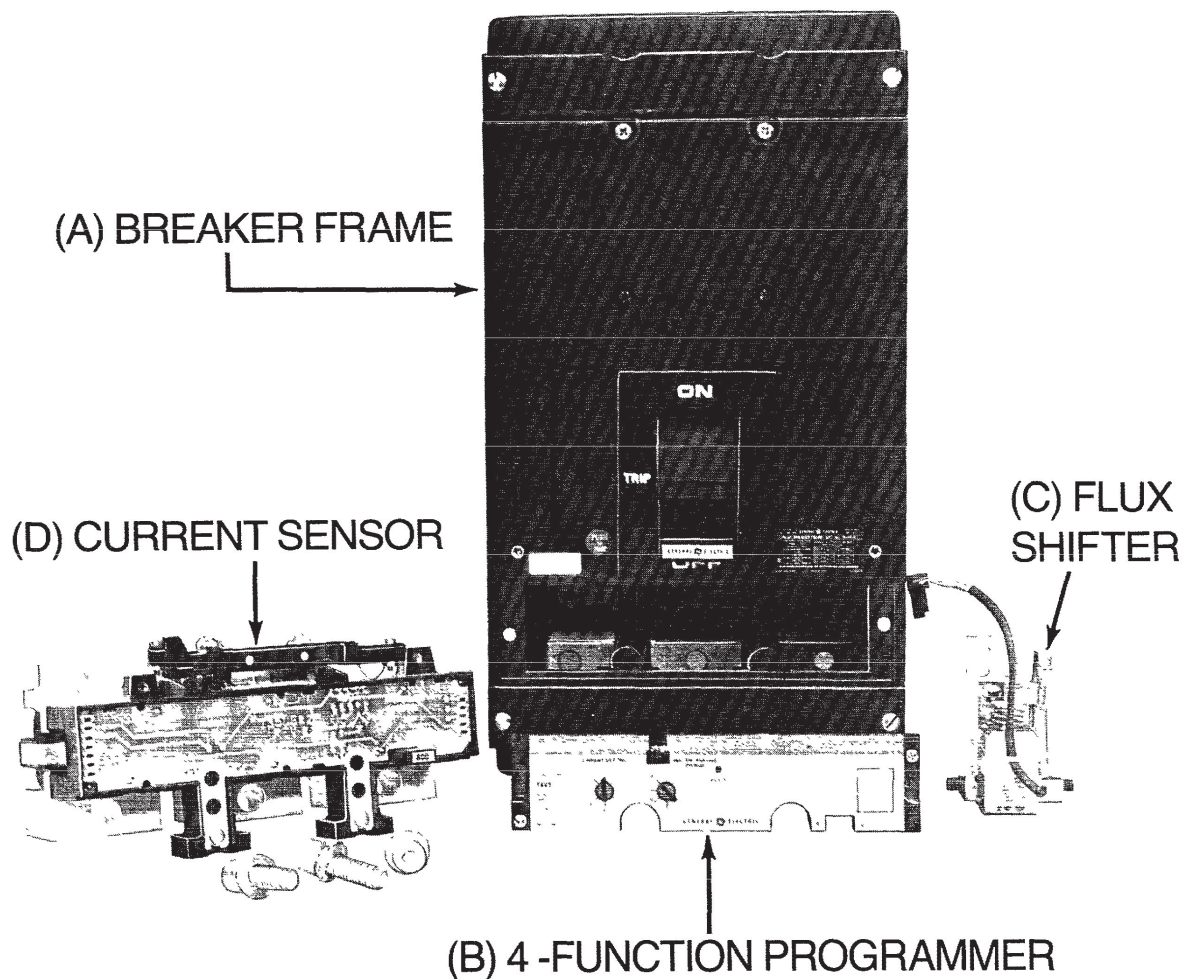
2.16 Testing Equipment and Special Tool Information

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Assembling MicroVersaTrip™ Trip Unit Systems

Necessary Tools:

- Electrician's Phillips head screwdriver
- Torque screwdriver with Phillips and flat blade bit
- Torque wrench with 1/4 inch hex bit (4 inch length)
- 1/16" feeler gauge
- Flat blade screwdriver
- Pliers



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REQUIRED TOOLS

- Flat-head screwdriver
- 5/16-inch hex socket
- Phillips™ screwdriver
- Fuse pullers

HERRAMIENTAS NECESARIAS

- Desatornillador de punta plana
- Llave con hueco hexagonal de 5/16
- Destornillador Phillips™
- Extractor de fusibles

OUTILS NÉCESSAIRES

- Tournevis à tête plate
- Douille hex., 5/16 po
- Tournevis Phillips^{MC}
- Arrache-fusibles

Table / Tabla / Tableau 1 : Required Tools / Herramientas Necesarias / Outils exigés

<ul style="list-style-type: none">• T25 TORX® bit or screwdriver• Robertson (square) No. 2 bit or screwdriver• Common blade tip screwdriver• 5/16 inch hex socket• Fuse pullers	<ul style="list-style-type: none">• Broca o desarmador T25 TORX®• Broca o desarmador Robertson (cuadrado) del no. 2• Desarmador de punta común• Hueco hexagonal de 5/16 pulgada• Extractor de fusibles	<ul style="list-style-type: none">• Tournevis ou foret T25 TORX®• Tournevis ou foret N x 2 de Robertson (lame carrée)• Tournevis à lame ordinaire• Clé à douille à six pans de 5/16 de po• Arrache-fusibles
---	--	---

2. Remove old grease and other contaminants from the line-side jaws and switchblades with a clean, lint-free cloth. If the lubricant has dried, remove it with CRC® HF Contact Cleaner, or equivalent, sprayed on a cloth.
3. Lubricate the cleaned areas with a thin film of Dow Corning®BG20 grease only.

NOTE: Do not substitute any other lubricant. Other lubricants may not be suitable for electrical applications and could alter the performance of the switch. Dow Corning BG20 is available from Square D (part number SWLUB).

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2.17 Warranty Information

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Standard Terms and Conditions of Sale

1. Contract Terms

These Standard Terms and Conditions of Sale (“Conditions of Sale”) shall apply to any purchase or procurement of Products or Services by the legal entity procuring such Products or Services (“Purchaser”) from the legal entity of the Schneider Electric division that provided the proposal or is selling the Products and Services (“SE”). To the extent that there is a conflict between these Conditions of Sale and a valid signed master agreement between the Purchaser and SE, the specific conflicting terms of the master agreement shall prevail. To the extent that there is a conflict between these Conditions of Sale and another set of SE terms and conditions issued to the Purchaser as part of the proposal or quotation process, the specific conflicting terms of the proposal or quotation document shall prevail. Any other variation from these Conditions of Sale shall require the signed consent of an authorized SE representative.

2. Prices

Unless otherwise stated in an applicable quotation or proposal, all prices are subject to change without notice. In the event of a net price change and unless otherwise agreed to in writing, prices for orders scheduled for immediate release shall be those in effect at time of order entry. Prices for orders placed for future shipment without an agreed price and ship date will be billed at the pricing in effect as of the shipment date. All clerical errors are subject to correction.

Services Assumptions: SE’s work estimates are based on work performed during normal work hours (8 hours) between the hours of 06:00 and 18:00 local time, Monday to Friday, holidays excepted. Unless specified in writing the following are chargeable in addition to base rates: overtime or premium hours, travel costs, specialized tools and test goods, utility shutdowns, any delays or site issues not caused by SE, additional trips for postponement or delay. No on-site orientation, safety training, work required for site specific requirements is included in a quotation unless expressly specified by SE. Current rates are in SE’s then current SE Field Services Demand Labor Rates document. Field specialists bill a 4-hour minimum charge for travel where Services are performed in less than 4 hours, and an 8-hour minimum charge for Services otherwise.

3. Taxes

Unless otherwise set out in SE’s proposal or quotation, prices do not include taxes, duties or any other governmental levies, all of which are payable by Purchaser. Except as may be otherwise provided in the relevant Purchase Order, the price excludes all present or future sales taxes, revenue or excise taxes, value-added taxes, import and export duties and any other taxes, surcharges or duties now existing or hereafter imposed by governmental authorities upon equipment and/or services quoted by SE. The Purchaser shall be responsible for all such taxes, duties and charges resulting from these Conditions of Sale or any associated purchase. SE is required to impose taxes on orders and shall invoice the Purchaser for such taxes and/or fees according to applicable law, statutes, or regulations, unless SE furnishes the Purchaser at the time of order with a properly completed exemption certificate(s) acceptable to the authorities imposing the tax or fees. Any changes in foreign exchange rates, sales taxes, customs tariffs or other taxes shall be chargeable to the Purchaser.

4. Terms of payment

Terms are net 30 days from date of invoice. Late payments will be subject to interest charges at the rate of two percent (2%) per month. Invoices for pro-rata payments become due on the date of shipment. If at Purchaser’s request, shipments are delayed beyond the scheduled date, payments for the Products and Services completed to date will be invoiced to the Purchaser, as a percentage of the total Purchase Order price when SE was originally prepared to ship. Products held for the Purchaser shall be at the risk and expense of the Purchaser. If completion of Services is delayed more than 30 days after originally scheduled delivery date and not caused solely by SE, SE reserves the right to ship all Products to the Purchaser who will accept responsibility for Products including payment. Failure to pay any applicable payment on its due date shall automatically cause all installment amounts to become payable and in addition to SE’s other lawful remedies, SE reserves the right to suspend or cancel the PO. If Purchaser fails to pay SE for the Products and Services, SE reserves the right to file in its sole discretion any liens, charges, security interests, or similar encumbrances against the applicable property, building, land, or Products and Services and Purchaser consents to such filings and registrations.

5. Delivery and Schedule

Dates for delivery, schedule, or execution for Services or Products set out on a Purchase Order are subject to confirmation by SE and until such confirmation may change solely based on SE’s circumstances. All confirmed dates are based on the prompt receipt by SE of all required information enabling achievement of such dates and SE reserves the right to change such dates in the event additional information is necessary or other information was not provided. **DISCLAIMER:** The Purchaser acknowledges that the Products or part thereof are produced in, or otherwise sourced from, or will be installed in areas already affected by, or that may be affected in the future by, the prevailing COVID-19 epidemics/pandemic and that the situation may trigger stoppage, hindrance or delays in SE’s (or its subcontractors) capacity to produce, deliver, install or service the products, irrespective of whether such stoppage, hindrance or delays are due to measures imposed by authorities or deliberately implemented by SE (or its subcontractors) as preventive or curative measures to avoid harmful contamination exposure of SE’s (or its subcontractors’) employees. The Purchaser therefore recognizes that such circumstances shall be considered as a cause for excusable delay not exposing SE to

Standard Terms and Conditions of Sale

contractual sanctions including without limitation, delay penalties, liquidated or other damages or termination for default.

6. Risk of loss

Unless otherwise specifically agreed by the Parties, the Products are delivered Ex Works (Incoterms 2010) and the risk of loss or damage shall pass to the Purchaser upon collection of the Products by the first carrier at SE's premises, plants or warehouses. Delivery of Products by SE will be deemed to be made to the Purchaser upon obtaining a signed receipt from the carrier showing receipt of the Products in good order. Title passes on full payment.

7. Substitutions

SE may furnish suitable substitutes for Products unobtainable because of priorities or regulations established by governmental authority or non-availability of materials from suppliers, provided such substitutions do not adversely affect the technical soundness of the Products. SE assumes no liability for deviation from published dimensions and descriptive information not essential to proper performance of the Products.

8. Shortage

Claims for shortages or errors must be submitted to SE within 30 days after invoice date, and failure to give such notice shall constitute unqualified acceptance and a waiver of all such claims by the Purchaser.

9. Installments

SE reserves the right to make shipments in installments, unless otherwise expressly stipulated in a specific Purchase Order; and all such installments when separately invoiced shall be paid for when due per invoice without regard to subsequent shipments. Delay in shipment of any installment shall not relieve Purchaser of its obligation to accept remaining shipments.

10. Force Majeure

SE will be excused from and not be liable for any non-performance of a Purchase Order if such delay or non-performance is due to any cause beyond the reasonable control of SE, or which SE could not reasonably foresee or reasonably provide against, and which prevents SE from carrying out the terms of the Purchase Order. This includes but is not limited to the following: epidemic, pandemic, public health emergency, war, revolution, insurrection or hostilities (whether declared or not), riot, economic upheaval, civil commotion or uprising, flood, earthquake, tempest, hurricane, lightning or other natural disaster; fire or explosion; strike, lockout, or other industrial disturbance whether at SE or one of its suppliers; sabotage, accident, cyber attack, embargo, car shortage, wrecks or delays in transportation, non-delivery of materials or order or action of government authority. Any delay resulting from such cause shall extend the date of delivery accordingly. SE reserves the right to cancel a Purchase Order, if in its opinion such circumstances threaten or cause extended delay in the performance thereof.

11. Purchaser's Cybersecurity Obligations

Purchaser's Obligations for Its Systems: Purchaser is solely responsible for the implementation and maintenance of a comprehensive security program ("Security Program") that contains reasonable and appropriate security measures and safeguards to protect its computer network, systems, machines, and data (collectively, "Systems"), including those Systems on which it runs the Products or which it uses with the Services, against Cyber Threats. "Cyber Threat" means any circumstance or event with the potential to adversely impact, compromise, damage, or disrupt Purchaser's Systems or that may result in any unauthorized access, acquisition, loss, misuse, destruction, disclosure, and/or modification of Purchaser's Systems, including any data, including through malware, hacking, or similar attacks.

Without limiting the foregoing, Purchaser shall at a minimum:

- (a) have qualified and experienced personnel with appropriate expertise in cybersecurity maintain Purchaser's Security Program, and have such personnel regularly monitor cyber intelligence feeds and security advisories applicable to Purchaser's Systems or Purchaser's industry;
- (b) promptly update or patch its Systems or implement other appropriate measures based on any reported Cyber Threats and in compliance with any security notifications or bulletins, whether publicly disclosed on SE's security notification webpage at <https://www.se.com/ww/en/work/support/cybersecurity/security-notifications.jsp> or otherwise provided to Purchaser;
- (c) regularly monitor its Systems for possible Cyber Threats;
- (d) regularly conduct vulnerability scanning, penetration testing, intrusion scanning, and other cybersecurity testing on its Systems; and
- (e) meet the recommendations of SE's Recommended Cybersecurity Best Practices, available at <https://www.se.com/us/en/download/document/7EN52-0390/>, as may be updated by SE from time to time, and then-current industry standards.

Purchaser's Use of the Products, Software, and Services: SE may release Updates and Patches for its Products, Software, and Services from time to time. Purchaser shall promptly install any Updates and Patches for such Products, Software, or Services as soon as they are available in accordance with SE's installation instructions and using the latest version of the

Standard Terms and Conditions of Sale

Products or Software, where applicable. An "Update" means any software that contains a correction of errors in a Product, Software, or Service and/or minor enhancements or improvements for a Product, Software, or Service, but does not contain significant new features. A "Patch" is an Update that fixes a vulnerability in a Product, Software, or Service. Purchaser understands that failing to promptly and properly install Updates or Patches for the Products, Software, or Services may result in the Products, Software, or Services or Purchaser's Systems becoming vulnerable to certain Cyber Threats or result in impaired functionality, and SE shall not be liable or responsible for any losses or damages that may result.

Identification of Cyber Threats: If Purchaser identifies or otherwise becomes aware of any vulnerabilities or other Cyber Threats relating to the Products, Software, or Services for which SE has not released a Patch, Purchaser shall promptly notify SE of such vulnerability or other Cyber Threat(s) via the SE Report a Vulnerability page (<https://www.se.com/ww/en/work/support/cybersecurity/report-a-vulnerability.jsp#Customers>) and further provide SE with any reasonably requested information relating to such vulnerability (collectively, "Feedback"). SE shall have a non-exclusive, perpetual and irrevocable right to use, display, reproduce, modify, and distribute the Feedback (including any confidential information or intellectual property contained therein) in whole or part, including to analyze and fix the vulnerability, to create Patches or Updates for its customers, and to otherwise modify its Products, Software, or Services, in any manner without restrictions, and without any obligation of attribution or compensation to Purchaser; provided, however, SE shall not publicly disclose Purchaser's name in connection with such use or the Feedback (unless Purchaser consents otherwise). By submitting Feedback, Purchaser represents and warrants to SE that Purchaser has all necessary rights in and to such Feedback and all information it contains, including to grant the rights to SE described herein, and that such Feedback does not infringe any proprietary or other rights of third parties or contain any unlawful information.

12. Standard Warranty

SE warrants:

- (a) Products manufactured by SE under its own brands and supplied by SE as part of the Purchase Order, if any, against defects in material and workmanship of those Products arising under normal use for a period of 12 months from the date of commissioning or 18 months from the date of shipment from SE, whichever occurs first.
- (b) Services performed by SE's personnel as part of the Purchase Order, if any, will be performed by qualified personnel with care, skill and diligence, in accordance with the applicable generally accepted standards recognized by the industry for a period of 12 months from the date of invoice.
- (c) Software provided with the Products will perform its essential functions during the warranty period applicable to the Products.

Exclusive Warranty Remedies: In the event of any warranty covered defects or deficiencies in Products in subsections (a) above, or Services in subs. (b) above, or Software in subs. (c) above, the sole and exclusive obligation of SE shall be to re-perform the Services, or repair or replace the defective Products or part of the Products, or provide an update to the Software to correct the non-conformance or replace the Software with the latest available version containing a correction, at SE's sole discretion. SE shall have no other obligation to provide updates or revisions. The foregoing warranty coverage is contingent on Purchaser providing prompt notification to SE once such defect or deficiency is reasonably apparent to Purchaser.

Exclusions & Limitations: This warranty shall not apply (a) to Products or Software not manufactured by SE, (b) Services not provided directly by SE, (c) to Products, Software or Services that has been repaired or altered by anyone other than SE so as, in SE's judgment, affects the same adversely, (d) Seller's conformance with Buyer's design of the Products, Software, or Services; or (e) to Products, Software or Services that appear to be subjected to negligence, accident, or damage by circumstances beyond SE's control, or improper any non-SE operation, maintenance or storage, or to other than normal use or service. The foregoing warranties do not cover reimbursement for labor, transportation, removal, installation, temporary power, or any other expenses that may be incurred in connection with repair or replacement. THESE WARRANTIES, CONDITIONS, AND EXCLUSIONS ARE EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESS OR IMPLIED WARRANTIES, CONDITIONS, REPRESENTATIONS AND GUARANTEES (EXCEPT WARRANTIES OF TITLE), INCLUDING, BUT NOT LIMITED, TO IMPLIED WARRANTIES OF MERCHANTABILITY, MERCHANTABILITY, AND FITNESS FOR A PARTICULAR PURPOSE. SE MAKES NO WARRANTY THAT THE PRODUCTS, SOFTWARE OR SERVICES WILL MEET PURCHASER'S REQUIREMENTS, OR THAT PURCHASER'S USE OF THE PRODUCTS, SOFTWARE OR SERVICES WILL BE UNINTERRUPTED, SECURE, OR ERROR-FREE. SE DOES NOT REPRESENT, WARRANT, OR GUARANTEE THAT THE PRODUCTS, SOFTWARE OR SERVICES WILL BE SECURE OR FREE FROM VULNERABILITIES, CORRUPTION, ATTACK, VIRUSES, INTERFERENCE, HACKING, OR OTHER SECURITY INTRUSIONS OR CYBER THREATS, AND SE DISCLAIMS ANY LIABILITY IN RELATION THERETO. EXCEPT AS MAY BE PROVIDED IN WRITING BY SE, SE SHALL NOT BE SUBJECT TO ANY OTHER OBLIGATIONS OR LIABILITIES WHATSOEVER THAN AS STATED ABOVE WITH REGARD TO PRODUCTS, SOFTWARE AND SERVICES SOLD BY SE TO PURCHASER. BY USING THE PRODUCTS, SOFTWARE OR SERVICES, PURCHASER UNDERSTANDS THESE LIMITATIONS AND AGREES THAT PURCHASER ACCESSES AND USES THE PRODUCTS, SOFTWARE AND SERVICES AT PURCHASER'S OWN DISCRETION AND RISK AND THAT PURCHASER WILL BE SOLELY RESPONSIBLE FOR ANY DAMAGES TO PURCHASER'S SYSTEMS OR ASSETS OR LOSSES THAT RESULT FROM SUCH ACCESS OR USE.

Non-SE Products, Software or Services: With respect to Products or Software not manufactured by SE, or Services

Standard Terms and Conditions of Sale

provided by non-SE providers, the warranty obligations of SE shall in all respects conform and be limited to the warranty actually extended to SE by such non-SE supplier.

13. Return of Products

No Products may be returned without first obtaining SE's written permission and a returned material identification tag. Returned Products must be of current manufacture, in the original packaging, unused, undamaged and in saleable condition. Returned Products must be securely packed to reach SE without damage and labeled with the return authorization number. For any returns, SE will be pay the carrier and deduct the freight charges from the credit unless if returns result from SE error, freight charges will be paid by SE. Any cost incurred by SE to put Products in first class condition will be charged to the Purchaser. Returns must originate from the original Purchaser account number. Returns will be credited at the original price paid as indicated on the invoice or Purchase Order associated to the Products being returned as provided by the Purchaser. If no invoice number or Purchase Order number is provided, then credit will be issued based on the into stock price in effect 12 months prior to date of return authorization and will also have an additional 25% processing fee applied. SE Products, which are listed in the current product list as returnable and which are accepted for credit, not involving a SE error, shall be assessed a restocking fee of 25% of the invoice price.

14. Intellectual Property

SE retains ownership of all right, title and interest (including copyright and patent rights) in and to the intellectual property relating to Products and Services and work product relating to these. Nothing in these Conditions of Sale constitutes a transfer or conveyance of any right, title or interest in such intellectual property, including without limitation any software or firmware contained in those, except the limited right to use it as provided in the documentation. As to Products proposed and furnished by SE, SE shall defend any suit or proceeding brought against Purchaser so far as based on a claim that such Products constitute an infringement of any copyright, trademark or patent in the United States or Canada. This obligation shall be effective only if Purchaser shall have made all payments then due hereunder and if SE is notified promptly in writing and given authority, information, and assistance at SE's expense for the defense of the same. In the event the use of such Products by Purchaser is enjoined in such a suit, SE shall, at its expense, and at its sole option, either (a) procure for the Purchaser the right to continue using such Products (b) modify such Products to render them non-infringing, or (c) replace such Products with non-infringing Products. SE will not be responsible for any compromise or settlement made without its written consent. The foregoing states the entire liability of SE for patent, trademark or copyright infringement, and in no event shall SE be liable if any infringement charge is based on the use of SE Products for a purpose other than that for which it was sold by SE. As to any Products or Services furnished by SE to Purchaser and manufactured or provided in accordance with designs proposed by Purchaser, the Purchaser shall indemnify SE against any award made against SE for patent, trademark, or copyright infringements.

15. Software

Any software or computer information, in whatever form, that is provided with Products manufactured by SE or as part of Services (collectively, the "Software"), is licensed to Purchaser solely pursuant to standard licenses of SE or its supplier of such Software, which licenses are hereby incorporated by reference and are available upon request. Purchaser shall not reverse engineer, decompile, disassemble or apply any process, technique, or procedure or make any attempt to ascertain or derive the source code of any Product, Software or Services.

16. LIMITATION OF LIABILITY

NOTWITHSTANDING ANY PROVISION OF THESE CONDITIONS OF SALE OR ANY OTHER CONTRACT DOCUMENT TO THE CONTRARY, IN NO EVENT SHALL EITHER PARTY, ITS OFFICERS, DIRECTORS, AFFILIATES OR EMPLOYEES BE LIABLE FOR ANY FORM OF INDIRECT, SPECIAL, CONSEQUENTIAL, OR PUNITIVE DAMAGES, INCLUDING, BUT NOT LIMITED TO, LOSS OF USE, LOSS OF PRODUCTION, LOSS OF PRODUCT, LOSS OF REVENUE OR PROFITS, OR LOSS OF DATA OR BUSINESS INFORMATION, WHETHER SUCH DAMAGES ARISE IN CONTRACT OR TORT, IRRESPECTIVE OF FAULT, NEGLIGENCE OR STRICT LIABILITY OR WHETHER SUCH PARTY HAS BEEN ADVISED IN ADVANCE OF THE POSSIBILITY OF SUCH DAMAGES. NOTWITHSTANDING ANY OTHER PROVISION OF THESE CONDITIONS OF SALE OR ANY OTHER CONTRACT DOCUMENT TO THE CONTRARY, AND TO THE EXTENT PERMITTED BY APPLICABLE LAW, THE MAXIMUM LIABILITY OF SE FOR DAMAGES HEREUNDER SHALL NOT EXCEED THE AMOUNTS ACTUALLY PAID BY PURCHASER TO SE FOR THE PRODUCT OR SERVICE GIVING RISE TO A CLAIM.

17. Indemnification

Purchaser agrees to indemnify, defend, and hold harmless SE from and against any and all claims, lawsuits, demands, actions, or other proceedings brought against it by any third party due to, arising out of, or related to (a) Purchaser's use of Products, Software or Services in a manner not permitted by these Conditions of Sale, (b) Purchaser's failure to comply with Section 11, including Purchaser's failure maintain a Security Program in compliance with Section 11 or Purchaser's failure to promptly and properly install Updates and Patches for the Products, Software or Services in accordance with Section 11, (c) Purchaser's violation of these Conditions of Sale or the master agreement, (d) any information that Purchaser submits, transmits, or makes available to SE, including but not limited to as part of the Feedback, or (e) Purchaser's violation of any law, regulation, or third party rights. Purchaser shall pay any and all costs, damages, and

Revision Date: 2/2023

Standard Terms and Conditions of Sale

expenses, including, without limitation, reasonable attorneys' fees and costs awarded against or otherwise incurred by SE in connection with or arising from any such claim, lawsuit, action, demand, or other proceeding. SE, at its expense, may assume the exclusive defense and control of any matter subject to indemnification by Purchaser, in which event Purchaser agrees to cooperate with SE in asserting any available defenses.

18. Insurance

SE shall maintain reasonable insurance coverage (e.g., commercial general liability, worker's compensation, automobile) in such amounts as SE deems appropriate in accordance with industry practice. Certificate of insurance evidencing this may be provided on request.

19. Import and Export

The Products and Services provided by SE under these Conditions of Sale contain or may contain components and/or technologies from the United States of America ("US"), the European Union ("EU") and/or other nations. Purchaser acknowledges and agrees that the Products, assignment and/or usage of the Products, Software, Services, information, other deliverables and/or the embedded technologies (hereinafter referred to as "Deliverables") under these Conditions of Sale shall fully comply with related applicable US, EU and other national and international export control laws and/or regulations.

Unless applicable export license/s has been obtained from the relevant authority and SE has approved, the Deliverables shall not (i) be exported and/or re-exported to any destination and party (may include but not limited to an individual, group and/or legal entity) restricted by the applicable export control laws and/or regulations; or (ii) be used for those purposes and fields restricted by the applicable export control laws and/or regulations. Purchaser also agrees that the Deliverables will not be used either directly or indirectly in any rocket systems or unmanned air vehicles; nor be used in any nuclear weapons delivery systems; and will not be used in any design, development, production or use for any weapons which may include but not limited to chemical, biological or nuclear weapons.

If any necessary or advisable licenses, authorizations or approvals are not obtained, whether arising from inaction by any relevant government authority or otherwise, or if any such licenses, authorizations or approvals are denied or revoked, or if the applicable export control laws and/or regulations would prohibit SE from fulfilling any order, or would in SE's judgment otherwise expose SE to a risk of liability under the applicable export control laws and/or regulations if it fulfilled the order, SE shall be excused from all obligations under such order and/or these Conditions of Sale.

20. Health and Safety Compliance

SE employees shall not perform Services that, in their sole opinion, are not free of reasonably foreseeable harm. This includes working on any equipment, whether provided by SE, Purchaser or otherwise, that in such SE employees' sole opinion has not been placed in an electrically safe working condition. Purchaser warrants that site and working conditions shall meet or exceed those specified by applicable Occupational Health and Safety Act and Regulations. Purchaser shall inform SE of: (a) Known hazards, or reasonably foreseeable hazards, that are related to SE's scope of Services and the site where the Services will be performed; and (b) Information about the worksite necessary to identify hazards and assess risk for the protection of the health and safety of SE personnel. This information might include, but is not limited to: (i) Providing an accurate up-to-date single line diagram of the electrical distribution system; (ii) Providing relevant Workplace Hazardous Materials Information System (WHMIS) information such as Material Safety Data Sheets (MSDS) and floor plans indicating areas where hazardous materials are located and emergency exits for service rooms and other areas of operation; and (iii) Other site specific information relative to the Purchaser's operation, process and safety systems. Any hazardous materials requiring remediation in SE's sole opinion will be separately chargeable to Purchaser and will be a condition precedent to SE's performance of such Services.

21. Witness of Tests & Factory Inspections

Normal production schedules do not provide the opportunity for Purchaser to witness routine factory tests on Products or make factory inspections. Witnessing of tests or factory inspections by the Purchaser may result in delays of production for which SE will not be responsible and which may result in additional charges and delayed scheduling to Purchaser. Witness testing and factory inspections must be requested at time of quotation, are subject to additional costs and must be confirmed at Purchase Order entry. Standard SE factory testing and inspection will apply. SE will notify Purchaser fourteen (14) calendar days prior to scheduled witness testing or inspection. In the event Purchaser is unable to attend, the Parties may mutually agree on a rescheduled date. However, SE, at its sole option, may consider the witness tests or inspection waived, and ship and invoice the Products and the witness testing charges. Purchaser will be responsible for paying for all scheduled witness testing, whether or not Purchaser attends.

22. Patterns and Tools

Notice will be given if special patterns or tools are required to complete any Purchase Order. Charges for such patterns or tools do not convey title thereto or the right to remove them from SE's plant. If patterns or tools are not used for a period of two years, SE shall have the right to scrap them without notice.

23. Nuclear Applications

Standard Terms and Conditions of Sale

Unless otherwise agreed in writing by a duly authorized representative of SE, Products sold hereunder are not intended for use in or in connection with any nuclear facility or activity. Purchaser hereby represents and warrants that such Products shall not be used in or in connection with any nuclear facility or activity. If so used, SE disclaims all liability for any damage, injury or contamination; and Purchaser agrees and indemnifies SE against any such liability, whether arising as a result of breach of contract, warranty or tort (including negligence) or otherwise.

24. Nature of Relationship

Purchaser agrees that SE is an independent contractor and nothing in these Conditions of Sales creates between SE and Purchaser a relationship of partners, joint venturers, or agents of each other, and no Party may so represent itself any of these manners.

25. Termination

Any Purchase Order may be terminated by the Purchaser only upon 30 days' notice to SE and upon payment of reasonable and proper termination charges based on the price of the terminated Purchase Order and reimbursement of all costs and expenses associated with the order caused by such termination and shall include a reasonable profit. Special or custom ordered Products is not cancelable after final acceptance OR approval OF drawings for the commencement of manufacturing.

26. Cancellation

SE shall have the right to cancel any Purchase Order at any time by written notice for any material breach of these Conditions of Sale by the Purchaser, including material delays by Purchaser or its authorized representatives in releasing Products for manufacture or approval drawings and excessive changes to specifications or drawings.

27. Amendments

No amendment, supplement, modification, waiver or termination of the Purchase Order or these Conditions of Sale is binding unless executed in writing by both Parties.

28. Antibribery and Corruption

28.1 Purchaser acknowledges that SE is committed to eliminating all risk of bribery and corruption, influence peddling, money laundering and tax evasion or the facilitation thereof in its business activities. Purchaser must immediately notify SE of any suspected, or known, breaches of Anti-Corruption Law. Purchaser may raise this alert through their point of contact or through the Trust Line: <https://secure.ethicspoint.eu/domain/media/en/gui/104677/index.html>.

28.2 None of Purchaser's employees, beneficial owners, shareholders, or any other person who is involved in or will benefit from the performance of the Contract or has an interest in Purchaser:

(a) is a civil servant, public or governmental official;

(b) is an official or employee of SE or one of its affiliates; or

(c) has been convicted of, or otherwise been subjected to any administrative sanction or penalty for, any offence involving fraud, bribery, corruption, influence peddling, money laundering, or any other criminal offence involving dishonesty as an element. Buyer will immediately notify SE if any such individuals are the subject of any investigation into any such offenses.

28.3 Purchaser undertakes and covenants to SE that it shall not, alone or in conjunction with any other person, directly or indirectly, offer, pay, give, promise to pay or give, or authorize the payment or giving of any money, gift, undue advantage, or anything of value to any employee, official or authorized representatives of SE.

28.4 In the event Purchaser has concerns related to ethics, compliance or SE's Principles of Responsibility, and/or any potential violations of these policies, Purchaser is welcome to make use SE's GreenLine. The GreenLine is SE's global helpline for external stakeholders. It is a confidential channel through which Purchasers can ask questions and raise concerns. Reports can be made using the link below: "<https://secure.ethicspoint.eu/domain/media/en/gui/104677/index.html>."

29. Applicable Laws

All matters arising out of or relating to the execution, construction, interpretation or breach thereof, are to be governed by the laws of the state of Delaware, USA without regard to the conflict of law provisions thereof. The Parties agree that the United Nations Convention on Contracts for the International Sale of Goods does not apply to these Conditions of Sale.



2.18 Testing and Performance Data

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SQUARE D

by **Schneider** Electric

August 30, 2023

Project Name: US Navy Bremerton – Bldg
431

Catalog Number: **EX225T1814HF / EXN30T3HF**

Dear Customer:

This letter is to certify that all Low Voltage Dry Type transformers are tested and designed to the following standards.

Square D transformer facilities are ISO 9001 compliant. We also comply with the following design and performance standards.

Ventilated Design: UL 1561
 NEMA ST-20
 DOE U.S. 10 CFR 431
 CSA Standard C22.2 No. 47-M90

Tests completed per applicable standards on *every* transformer before shipping
(**Routine** Tests per NEMA Standard ST-20 Table 4-1):

- Visual
- Polarity and Phase Relation
- Ratio-tests
- No-load Losses
- Dielectric – Applied potential and Induced potential

Tests completed per applicable standards on the *first design* of each unit (**Design** Tests per NEMA Standard ST-20 Table 4-1):

- Impedance
- Load Loss
- Dielectric

Tests completed per applicable Standards on a *typical design of the product line*
(**Prototype** Tests per NEMA Standard ST-20 Table 4-1):

- Temperature rise
- Double overload/insulation (as requested by UL)
- Enclosure tests (as requested by UL)
- Audible Sound Level

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2.19 Contractor Information

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NAVAL FACILITIES ENGINEERING COMMAND

PROPULSION SHAFT LATHE FOUNDATION & SUPPORTING SYSTEMS, BUILDING 431

WORK ORDER No. N4425521F4446

CONTRACT No. N44255-20-D-0002

SEPTEMBER 2023

2.19 CONTRACTOR INFORMATION

General Contractor

Name Doyon Government Group
Address 3450 South 344th Way, Suite 100 Federal Way, WA 98001
Telephone Number 253-344-5300

Electrical Contractor

Name Safari Electric LLC
Address 6536 Kitsap Way, Bremerton, WA 98312
Telephone Number 360-813-3505

Equipment Supplier

Name Optimal Control Systems, Inc.
Address 2324 Three Lakes Road, Albany, OR 97322
Telephone Number 541-967-9323

Manufacturer

Name Schneider Electric
Address 3600 136th Place SE # 300, Bellevue, WA, 98006
Telephone Number 206-236-4120



OPTIMAL CONTROL SYSTEMS, INC.

2324 Three Lakes Road SE
Albany, OR 97322
Phone: (541) 967-9323
Fax: (541) 967-9485
Project No. 0922-13SAE

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2.20 Additions to O&M Data

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NAVAL FACILITIES ENGINEERING COMMAND PROPULSION SHAFT LATHE FOUNDATION & SUPPORTING SYSTEMS, BUILDING 431

WORK ORDER No. N4425521F4446

CONTRACT No. N44255-20-D-0002

SEPTEMBER 2023

2.20 ADDITIONS TO O&M DATA

No Additions to O&M Data required per Section 26 11 13.00 19.



OPTIMAL CONTROL SYSTEMS, INC.

2324 Three Lakes Road SE

Albany, OR 97322

Phone: (541) 967-9323

Fax: (541) 967-9485

Project No. 0922-13SAE

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