

DEH41689 User's Guide

HPC* Switches

New Generation



Note: Fuses are not supplied with the new HPC Switches.

Since this switch is available in a variety of configurations, please take a moment to compare the catalog number of your purchased switch with the catalog number key below. Installation of an incorrect switch could result in misapplication, lack of system coordination, or reduced system selectivity. If you have any questions, call the Customer Support Center at 800-843-3742. This is not an ordering guide. Order the new generation HPC switch by using the configuration tool to generate a complete switch catalog number. The table below shows the basic switch frames.

T	H	P	R	2	3	6	08	T
	</							

¹Replacement only: 800, 1200 & 1600A switches. 36" long per 2000A Outline. Fits in place of 1970's era HPC i.e. THPC3408, THPC3608, THPC3412, THPC3612, THPC3416, THPC3616 – GF and non-GF types.

²L = 42" Long 4000A. Fits in place of old HPC w/ GF i.e. THPC3640G3T or THPC3640BG3T.

New Generation HPC switch frame catalog numbering system.

Example – a switch with catalog number **THPR23608T** has the following features:

- New HPC Switch Legacy ID (**T**)
- New HPC Switch Legacy ID (**H**)
- New HPC Switch Legacy ID (**P**)
- Redesigned smaller frame size : 800A-16000A(**R**)
- New generation of switch (**2**)
- Three poles (**3**)
- 600 VAC (**6**)
- 800 A (**08**)
- Top Feed (**T**)

DEH41689

WARNINGS, CAUTIONS, AND NOTES AS USED IN THIS PUBLICATION

WARNINGS

Warning notices are used in this publication to emphasize hazardous voltages, currents, or other conditions that could cause personal injury are present in this equipment or may be associated with its use.

Warning notices are also used for situations in which inattention or lack of equipment knowledge could cause either personal injury or damage to equipment.

CAUTIONS

Caution notices are used for situations in which equipment might be damaged if care is not taken.

NOTES

Notes call attention to information that is especially significant to understanding and operating the equipment.

This document is based on information available at the time of its publication. While efforts have been made to ensure accuracy, the information contained herein does not cover all details or variations in hardware and software, nor does it provide for every possible contingency in connection with installation, operation, and maintenance. Features may be described herein that are not present in all hardware and software systems. ABB assumes no obligation of notice to holders of this document with respect to changes subsequently made.

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WARNING : Potential arc flash and shock hazard.

Turn Off and Lockout power prior to working on equipment.

Isolate all energy sources including control power.

Completely "Discharge" closing spring and "Open" HPC Switch.

If front cover will be removed for any reason, be sure to completely "Discharge" the closing spring again and "Open" the HPC switch to avoid pinch points and crushing hazards.

AVERTISSEMENT : Risque d'arc électrique et risque de choc électrique.

Arrêter et verrouiller l'alimentation avant d'effectuer du travail sur l'équipement.

Isoler toutes les sources d'énergie, y compris l'alimentation de contrôle.

Décharger complètement le ressort de la bobine de fermeture et ouvrir le commutateur

"HPC". Si le panneau avant est retiré, pour quelque raison, s'assurer de décharger complètement le ressort de la bobine de fermeture et ouvrir le commutateur "HPC" pour éviter les points de coincement et les risques d'écrasement.

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1-1 Overview

New generation HPC switches are designed to serve low-voltage power circuits and equipment. They are available with EntelliGuard Trip Units for operation of accessories and optional adjustable instantaneous and ground-fault detection. Basic current metering is standard on all new HPC switches with a trip unit. Class "L" fuses are not supplied with the new HPC switch. They are Fused Power Circuit Devices UL listed to the UL 977 Standard & bear the cULus marking for the USA & Canada. The new HPC switch shares many accessories with the ABB Power Break II circuit breaker.

1-2 Receiving the Switch

Unpack the switch and inspect it for shipping damage. Ensure that the switch has the proper current, voltage, and interruption ratings for the application by comparing the catalog number with the table in the Getting Started section on the inside front page.

The weights of the various frame sizes are listed in Table 1, for reference.

Frame Rating	Operation Type	Weight (lb)
800 A	Manual Electrical	81 90
1200 A and 1600 A	Manual Electrical	95 104
2000 A	Manual Electrical	110 119
2500 A and 3000 A	Manual Electrical	210 219
4000 A	Manual Electrical	400 409

Table 1: Weights of the various switch frame sizes, with and without a motor operator (fuses not included).

Storage

The switch should be placed in service immediately in its permanent location. However, if it must be stored for an indefinite period, it should be carefully protected against condensation, preferably by storage in a warm dry room. Switches for outdoor equipment should be stored in that equipment only when power is available and heaters are in operation, to prevent condensation.

The switch should be stored in a clean location, free from corrosive gases or fumes. In particular, protect the switch from moisture and cement dust, as that combination may be corrosive.

If the switch is stored for any length of time, it should be inspected periodically to ensure good mechanical condition.

1-3 Preparation for Installation**Lifting instructions**

Figure 1: Lifting the new HPC switch.

These instructions and the packaging of the new HPC Switch are designed to aid with safe removal and mounting of the switch. Adhere carefully to these instructions for protection of personnel and switch.

1. Remove 4 bolts holding switch to pallet.
2. Lift switch into mounting position with hooks placed in lifting holes in back plate. (4 lifting holes provided)

Do not attempt to lift switch horizontally by using only two diagonally opposite lifting holes.

Bolted Electrical Connections

Using an industry-accepted solvent, remove any foreign material from the line and load strap surfaces and the corresponding surfaces of the connecting bus. Ensure that the mating surfaces are smooth and free of burrs and nicks.

Place the bus connections in position and align the mounting holes. Insert and fasten the mounting bolts and washers according to specifications in Table 2.

Switch Frame	Bus Connection	
	Bolt Diam.	Torque (in-lb)
800A	(1) 1/2 in.	300
1600-2000A	(2) 1/2 in.	300
2500 A	(4) 3/8 in.	225
3000 A	(4) 3/8 in.	225
4000 A	(6) 1/2 in.	300

Table 2: Bolt sizes and mounting torques for bus connections.

Panel Cutouts and Clearances

Use the following information to prepare the equipment and assure proper clearances for installation and operation of the switch.

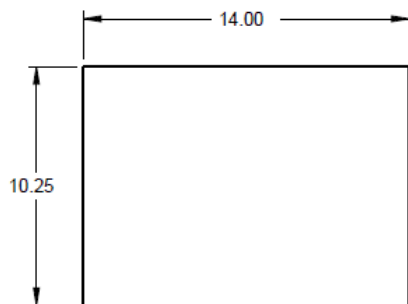


Figure 2: Front-panel escutcheon cutout dimensions (All dimensions are in inches).

Figures 3-12 show the front-panel escutcheon cutout patterns and the locations of the switch mounting bolts. The standard door cutout dimensions require a trim plate on the switch.

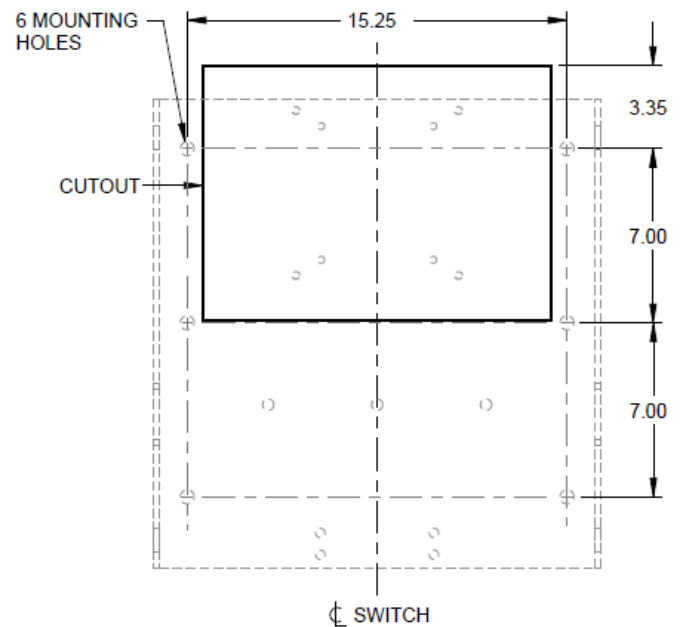


Figure 3: Locations of the front-panel escutcheon cutout and mounting holes, 800A Top Connected frame.

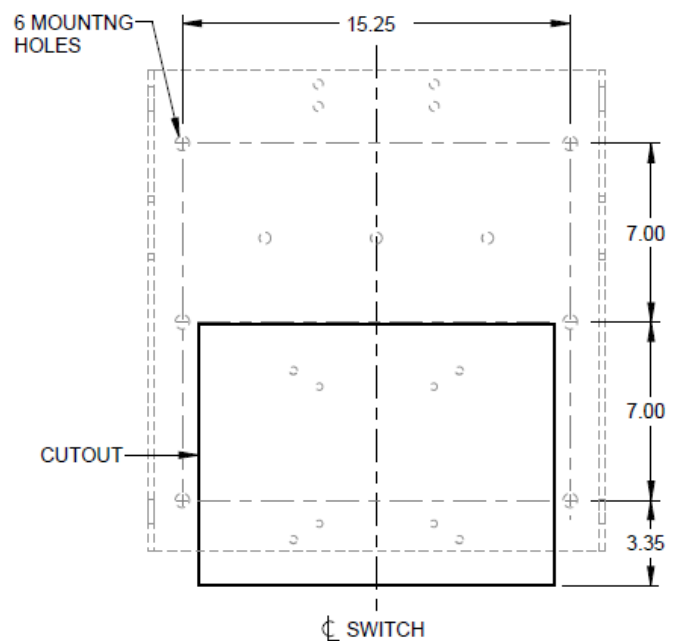


Figure 4: Locations of the front-panel escutcheon cutout and mounting holes, 800A Bottom Connected frame.

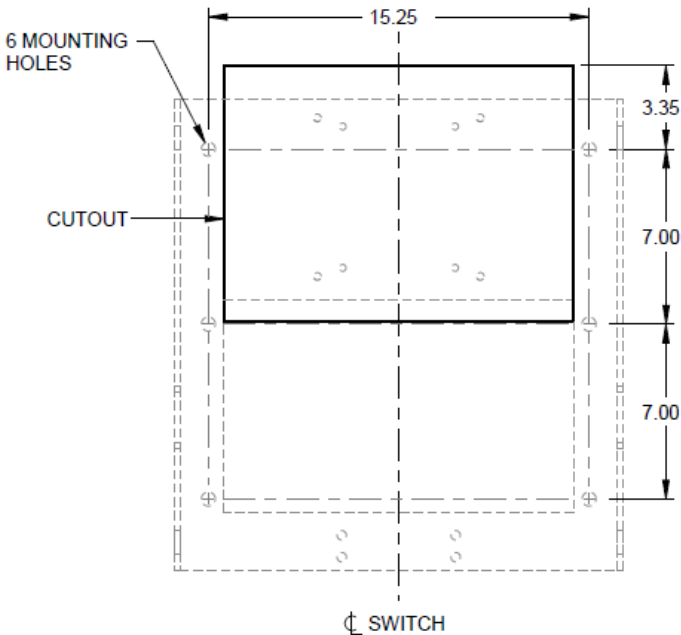


Figure 5: Locations of the front-panel escutcheon cutout and mounting holes, 1200A-1600A Top Connected frame.

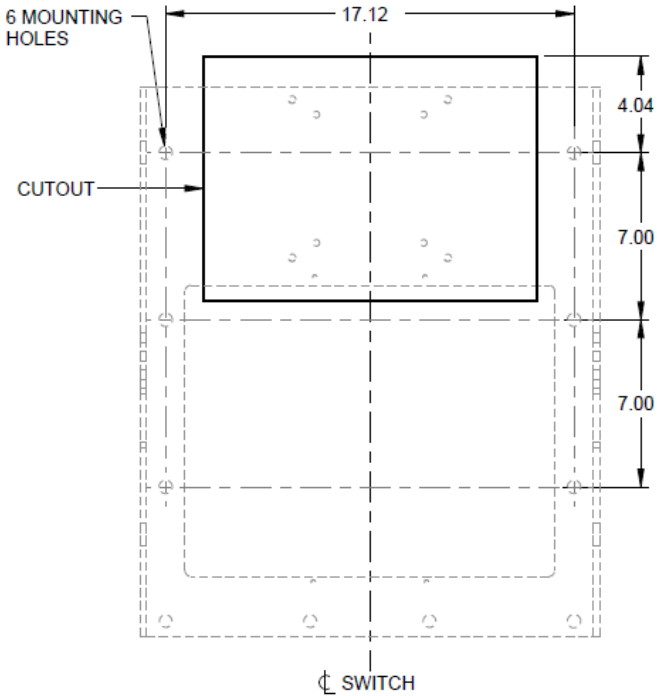


Figure 7: Locations of the front-panel escutcheon cutout and mounting holes, 2000A Top Connected frame.

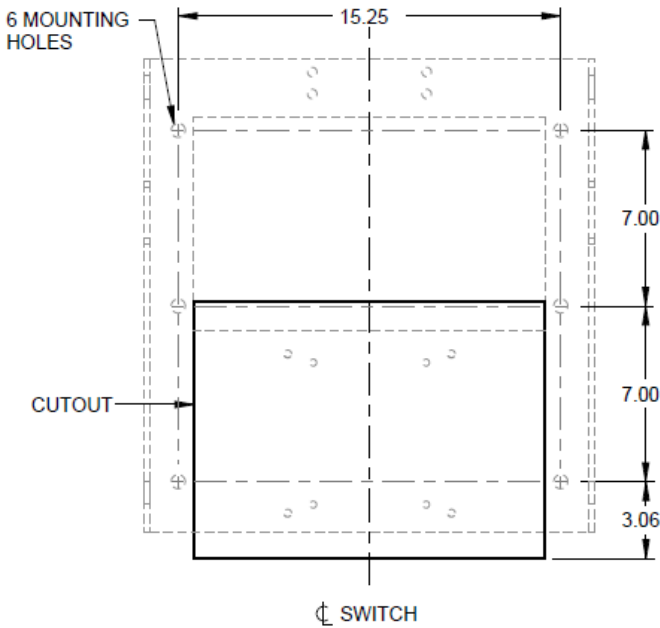


Figure 6: Locations of the front-panel escutcheon cutout and mounting holes, 1200A-1600A Bottom Connected frame.

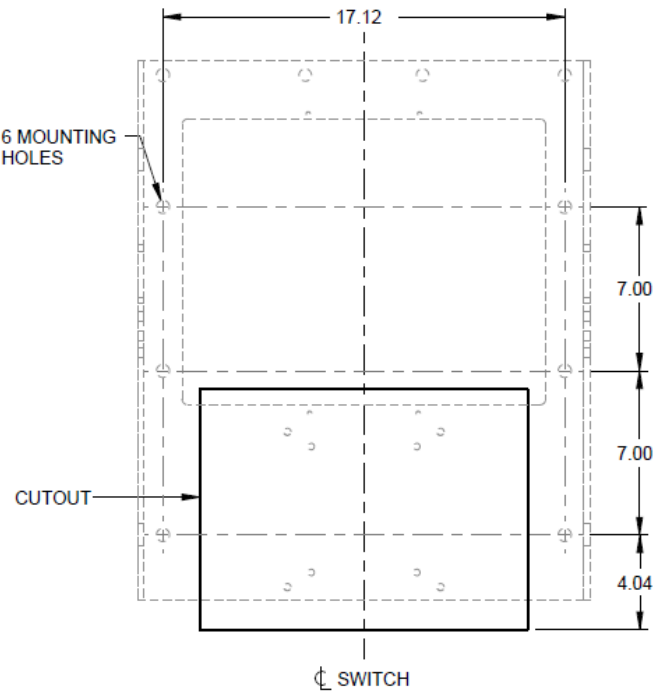


Figure 8: Locations of the front-panel escutcheon cutout and mounting holes, 2000A Bottom Connected frame.

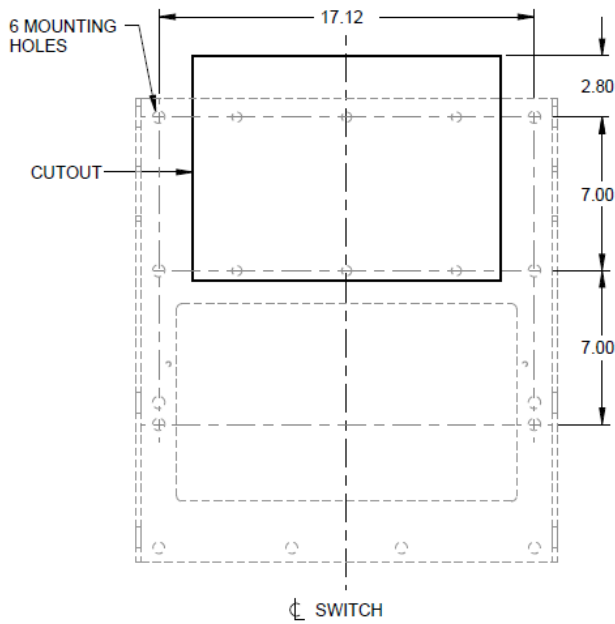


Figure 9: Locations of the front-panel escutcheon cutout and mounting holes, 2500A-3000A Top Connected frame.

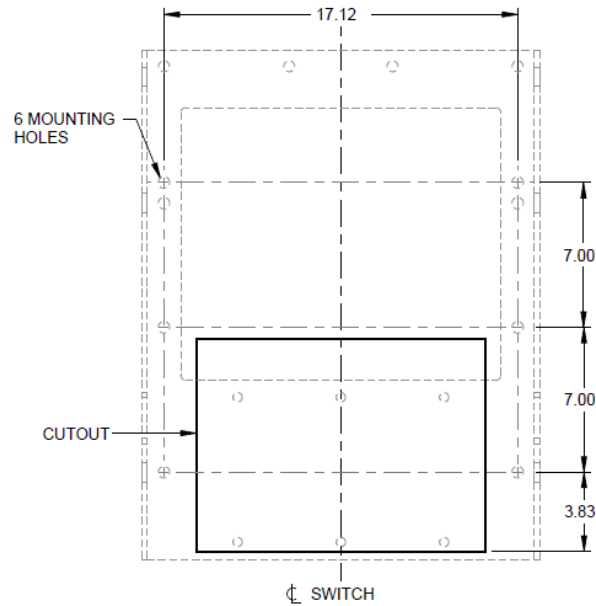
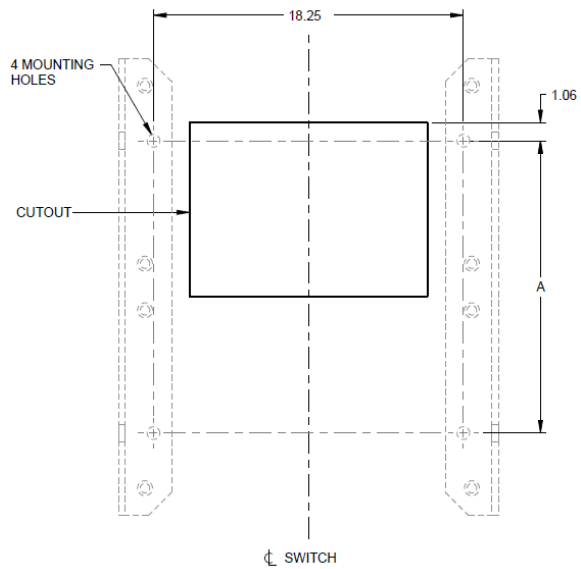
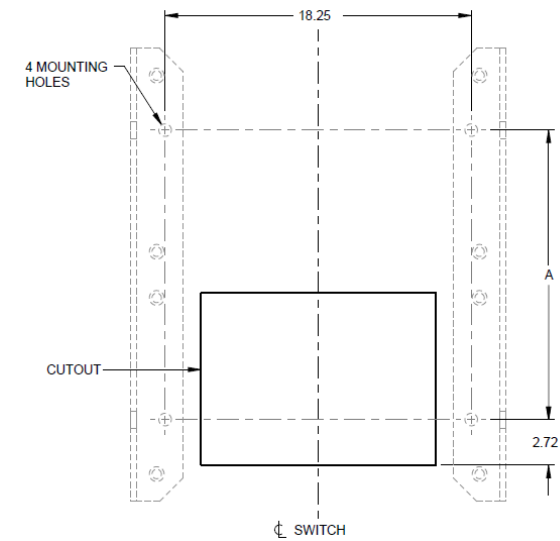


Figure 10: Locations of the front-panel escutcheon cutout and mounting holes, 2500A-3000A Bottom Connected frame.



Frame Type	A
C	17.25"
L	19.25"

Figure 11: Locations of the front-panel escutcheon cutout and mounting holes, 4000A Top Connected frame.



Frame Type	A
C	17.25"
L	19.25"

Figure 12: Locations of the front-panel escutcheon cutout and mounting holes, 4000A Bottom Connected frame.

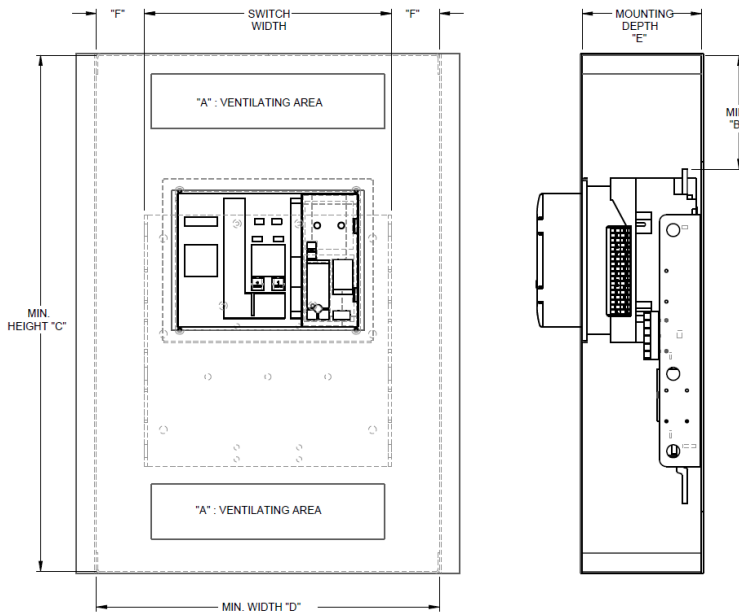
Enclosures Volume and Ventilation

Figure 13: Enclosure Dimensions, Volume and Ventilation Requirements.

Accessory Installation

The following accessories may be installed in the new HPC switch.

Refer to Chapter 3 of this publication for catalog numbers and to the instruction sheet supplied with each accessory for installation instructions.

- Motor Operator Mechanism
- Remote Close
- Undervoltage Release
- Shunt Trip with Lockout
- Bell Alarm—Alarm Only
- Bell Alarm with Lockout
- Auxiliary Switch Module
- Mechanical Counter
- Key Interlock Mounting Provision
- Push Button Cover
- Door Interlock
- Blown Fuse Protector

1-4 Switch Installation

Ensure that all accessory connections are secure. Line up the bolt holes in the enclosure with the attachment points on the switch, illustrated in Figures 3-12, insert the bolts and tighten. Use nonmagnetic material in the area between the line and load terminals to support the switch. Figure 13 and Table 3 give the enclosure requirements.

Data	Switch Ampere Rating					
	800A	1200A - 1600A	2000A	2500A	3000A	4000A
Min. Volume (Cubic inches)	6,062	6,495	9,380	9,380	9,380	17,347
"A" Min. Ventilation Top and Bottom (5) Square Inches	23	63	63	172	172	189
"B" Min. Line to Grd. (Inches)	2	2	2	2	2	9
"C" Min. Height (Inches)	28	30	40	40	40	52
"D" Width (Inches)	25	25	25	25	25	30
"E" Mounting Depth (Inches)	8.66	8.66	9.38	9.38	9.38	11.12
"F" Min. to Grd. Or Insulation (Inches)	3.5	3.5	3	3	3	3

Table 3: Enclosure Dimensions, Volume and Ventilation Requirements.

2-1 Standard Features

New HPC Switches are equipped with the following standard features. The letters are keyed to the switch photograph in Figures 13.

- A** Indicator: ON – Red
OFF – Green
- B** Indicator: CHARGED – Yellow
DISCHARGED – White
- C** ON button
- D** OFF button
- E** Manual charging handle
- F** Integral 36-point terminal block (12 auxiliary switches, A-B type), Block “A”
- G** Integral 36-point terminal block (all other connections), Block “B”
- H** Sealable hinged cover
- I** Cover mounting screws (4)
- J** Non-interchangeable fixed rating plug
- K** Test set connection port/Battery compartment
- L** Standard padlock provision
- M** Dust-resistant ventilation slots

2-2 Operating Instructions

Sequence of Operations

The sequence of operations that may be performed on the switch are listed in Table 4. Refer to Chapter 3 for information about accessory operation.

Operating Instructions for Manually Operated Switches

Charging the Mechanism Springs

Pull the operating handle down about 90° (until it stops). Repeat five more times to fully charge the springs. This will not close the switch contacts. The charge indicator will show CHARGED on a yellow background. When the springs are fully charged, the handle locks in the stored position.

NOTE: The switch cannot be closed unless the springs are fully charged and the handle is stored fully in.

NOTE: La fermeture de l'interrupteurne peut être réalisée à moins que les ressorts soient réarmés tout à fait, et le levier est complètement remis à la position d'emmagasinement.

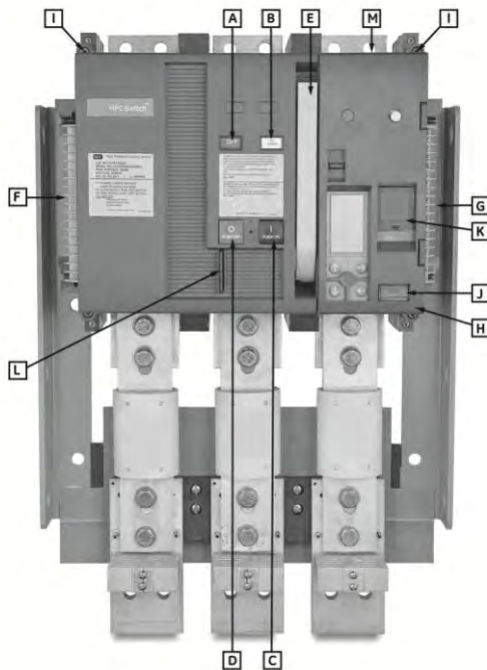


Figure 14 : Front of the switch, showing the locations of standard features.

On/Off Indicator	Charge Indicator	Main Switch Contacts	Condition of Charging Springs	Next Permissible Operating Function
OFF	DISCHARGED	Open	Discharged	Mechanism may be charged
OFF	CHARGED	Open	Charged	Contacts may be closed
ON	DISCHARGED	Closed	Discharged	Mechanism may be recharged or Contacts may be opened
ON	CHARGED	Closed	Charged	Contacts may be opened

Table 4: Sequence of operations that may be performed with new HPC Switches.

Closing the Switch

Close the switch contacts with either of the following methods:

- Depress the ON button on the front of the switch.
- Energize the (optional) Remote Close accessory by applying rated voltage to terminals 16 and 34 on terminal block B.

CAUTION: The main switch contacts cannot be closed if any of the following conditions exist:

- The Bell Alarm with Lockout was not reset after a ground fault lockout.
- The Undervoltage Release is not energized.
- The Shunt Trip with Lockout is energized.

These conditions must be reset before the switch can be closed. These conditions will mechanically block all electrical and mechanical means of closing.

ATTENTION: Les principaux contacts de l'interrupteur ne peuvent pas être fermés si l'une des conditions suivantes existe:

- Si la réarmature du déclencheur n'est pas réalisée après le verrouillage en position "ouvert" provenant du courant de surcharge.
- Si le minimum de tension (UVR) n'est pas sous tension.
- Le déclenchement shunt avec blocage est actionné.

Ces conditions doivent être réinitialisés avant l'interrupteur peut être fermé. Ces conditions vont bloquer mécaniquement tous les électrique et mécanique moyens de fermer l'interrupteur.

CAUTION: If the switch latch is held in the tripped position by any of the following conditions and an attempt is made to close the main switch contacts, the mechanism will "crash" (the closing springs discharge with no motion of the switch contact arms). The switch has been designed and tested to withstand more than 100 crash operations, but repeated attempts to close a locked-out switch will damage the switch mechanism.

- The Key interlock or padlock is in the locked OFF condition.

ATTENTION: Si le cliquet de l'interrupteur est tenu en position de déclenchement dans n'importe quelle des conditions suivantes et que l'on tente de fermer les contacts de l'interrupteur principal, le mécanisme subira un "crash" (les ressorts de fermeture se détendent sans que les bras des contacts du disjoncteur ne bougent). L'interrupteur a été conçu et testé pour résister à plus de 100 opérations de type "crash," cependant des tentatives répétées ayant pour but de fermer un interrupteur bloqué endommageront le mécanisme de l'interrupteur.

- Si le verrou de clé ou le cadenas est verrouillé en position OFF.

Opening the Switch

Open the switch contacts with either of the following methods:

- Depress the OFF button on the front of the switch.
- Energize the (optional) Shunt Trip with Lockout accessory or de-energize the (optional) Undervoltage Release accessory.

Additional Instructions for Motor-Operated Switches

Charging the Mechanism Springs

The mechanism closing springs may also be charged by the following method:

- Apply rated control power at terminals 18 & 36.
- Short terminals 17 and 35 on the right terminal block, with a push button or similar device, for a minimum of five seconds.
- If power is lost during the charge cycle, finish charging the springs by cycling the charging handle until the indicator shows CHARGED on a yellow background. When the springs are fully charged, the handle locks in the stored position.

Automatic Operation

Connect terminals 17 and 35 on the terminal block on the right side of the switch with a jumper wire. The Motor Operator will automatically recharge the switch closing springs whenever the switch closes.

CAUTION: Do not wire switches for automatic charge and automatic close as this could result in repeated closures into a fault.

ATTENTION: Ne pas raccorder les interrupteurs pour la fermeture et la charge automatique car cela pourrait résulter dans des fermetures répétées sur un défaut électrique.

Padlock Operation

The padlock prevents the switch from closing by holding the trip latch in the tripped position. To install the padlock, use the following procedure:

1. Open the switch (press the OFF button).
2. Grasp the padlock tab and pull it out until it is fully extended, as illustrated in Figure 15. Note that if the switch contacts are closed, the padlock tab will not extend.
3. Insert the padlock; the switch will not close.

As many as three $\frac{1}{4}$ " to $\frac{3}{8}$ " padlocks may be attached at one time.

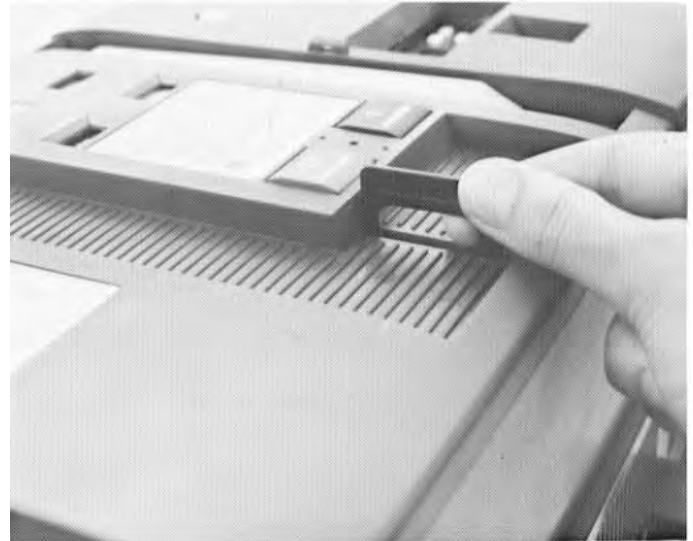


Figure 15: Side view of the switch, showing the padlock tab extended.

Periodic Operational Checks

Approximately once a year, verify that the switch is operating correctly by opening and closing the mechanism.

Wiring Notes

Figure 16 illustrates the terminal block installed on the right side of the switch. Table 5 lists the device connections to the terminal block. Each terminal point will accept the following connections:

- Bare stripped wire – one #12 AWG or two #14 AWG.
- Ring or spade connectors – two per terminal.

The terminal screws should be tightened to 7–9 in-lb torque.

The left terminal block is blank unless the optional Auxiliary Switch Module accessory is ordered. See Table 16 for the device connections to the Auxiliary Switch Module terminal block.

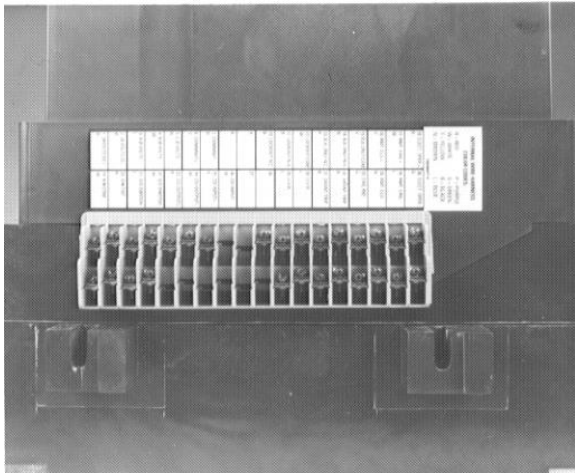


Figure 16: Terminal block mounted on the right side of the new HPC Switch.

Terminal	Terminal
18 Motor Operator +	36 Motor Operator –
17 Remote Charge ①	35 Remote Charge ①
16 Remote Close +	34 Remote Close –
15 Bell Alarm only Com	33 Charge Indicator
14 Bell Alarm only NO	32 Shunt Trip
13 Bell Alarm only NC	31 Shunt Trip
12 Bell Alarm Lockout Com	30 Undervoltage Release
11 Bell Alarm Lockout NO	29 Undervoltage Release
10 Bell Alarm Lockout NC	28 Programmable input + for GF alarm or RELT
9 UVR Indicator com	27 Programmable input - for GF alarm or RELT
8 UVR Indicator N.O.	26 Zone-Select Input –
7 comm –	25 Zone-Select Input +
6 comm +	24 Zone-Select Output –
5 C Phase Volts	23 Zone-Select Output +
4 B Phase Volts	22 Programmable output - for GF alarm or RELT ②
3 A Phase volts	21 Programmable output+ for GF alarm or RELT ②
2 24 Vdc –	20 Neutral Hi/Low Tap
1 24 Vdc +	19 Neutral common Tap

① Do not apply voltage; see wiring diagram (Figure 16). Place a jump wire from terminal 17 to terminal 35 for automatic charge

② If RELT is provided on the Trip Unit, GF alarm cannot be the programmed output. GF alarm can however be communicated on Modbus if the trip unit has communication capability

Table 5: Accessory connections to the right-side terminal block B.

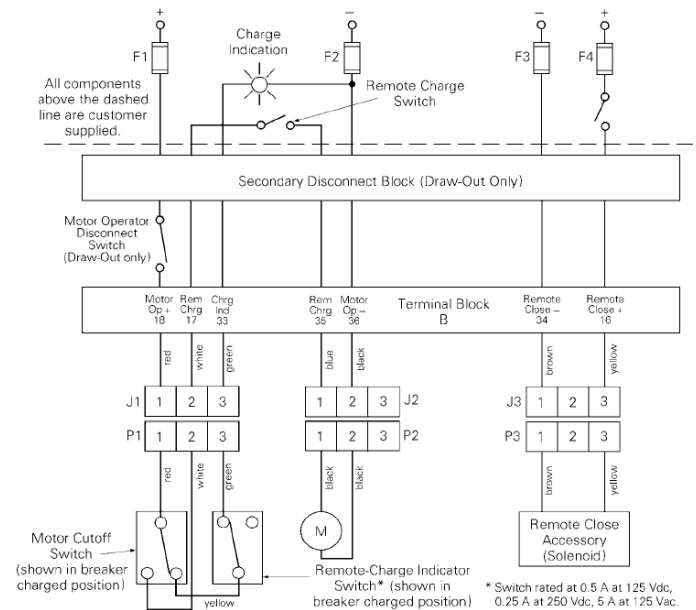


Figure 17: Wiring diagram of the Motor Operator Mechanism and Remote Close accessories.

2-3 Trip Unit Setup

See DEH4567 for detailed instructions on setting up the EntelliGuardTU Trip Unit.

3-1 Blown Fuse Protector

The Blown Fuse Protector (factory installed) is an accessory which includes components mounted on and external to the new HPC Switch. Control wiring is connected from one end of each fuse mounting bus-strap to a 6 pt. terminal block mounted on the side of the new HPC Switch. A shunt trip Lockout device or UVR trip device is included based on the Catalog No.'s below for remote opening of the new HPC switch in the event of a blown fuse to avoid single phasing. The accessory also includes a pin-wheel style Blown Fuse Detector equipped with 3 trigger fuses + 1 spare. Wiring from the pin-wheel device to the new HPC switch is the responsibility of the switchboard builder.

Catalog Number (factory installed)	Catalog Number (field installed kit) ¹	Trip Accessory Provided	Operating Voltage
BFSPSTL120AC	BFSPSTL120ACR	SPSTL120	120VAC
BFSPSTL208AC	BFSPSTL208ACR	SPSTL208	208VAC
BFSPSTL240AC	BFSPSTL240ACR	SPSTL240	240VAC
BFSPUV120AC	BFSPUV120ACR	SPUV120AC	120VAC
BFSPUV208AC	BFSPUV208ACR	SPUV208AC	208VAC
BFSPUV240AC	BFSPUV240ACR	SPUV240AC	240VAC

Table 6: Blown Fuse Protector catalog number.

Operation: If any of the Class "L" fuses opens on the new HPC switch, the trigger fuse wired across the Class "L" fuse will blow and the trigger will rotate the pin wheel to operate a microswitch with both NO and NC contacts. The microswitch is used to switch externally provided control power to the shunt trip lockout or UVR to open the new HPC Switch.

Replacement of blown Class "L" fuses and trigger fuses will be necessary. Mersen/Shawmut trigger fuse TI-600 or Bussman KAZ trigger fuses are used.

¹For field installable kits only, the Pin wheel style Blown Fuse Detector is not included due to UL accessory listing requirements.

Source the Bolt switch PW-2 Blown Fuse Detector separately and follow that manufacturer's instructions for mounting and use.

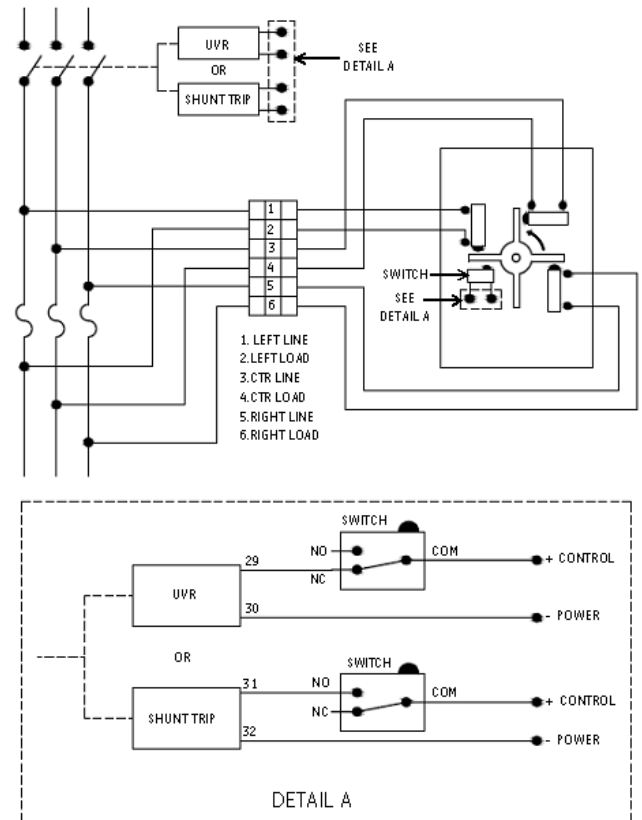


Figure 18: Blown Fuse Protector Wiring Diagram.

Chapter 3 -- Accessory Operation

3-2 Plug-In Accessory Compartment

Several of the accessories are installed in the accessory compartment on the front of the switch. Figure 19 illustrates this compartment and the locations of each of the plug-in accessory modules.

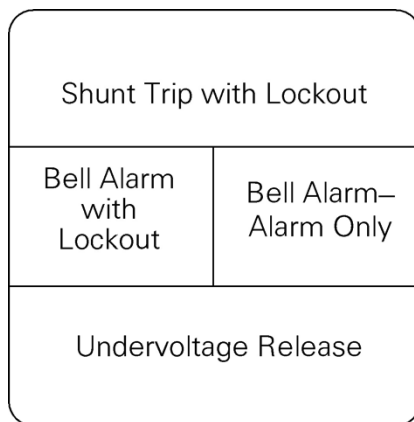


Figure 19. Location of the plug-in accessory modules in the compartment on the front of the switch.

3-3 Bell Alarm-Alarm Only

The Bell Alarm-Alarm Only module, shown in Figure 20, provides a switch to remotely indicate that the switch has tripped. It is reset either automatically when the switch is reclosed or manually by firmly pressing the yellow button on the front of the Bell Alarm-Alarm Only module.



Figure 20: Bell Alarm-Alarm Only module.

The Trip Unit activates the Bell Alarm-Alarm Only for protection trips only.

The catalog numbers for the Bell Alarm - Alarm Only (factory installed) are listed in Table 7. For installation instructions see GEH6275.

Catalog No.	Contact Rating
SPBAA240	6 A at 240 Vac 0.25 A at 250 Vdc 0.50 A at 125 Vdc
SPBAA600 ①	6 A at 600 Vac 0.25 A at 250 Vdc 0.50 A at 125 Vdc

①

600 V version is not UL listed.

Table 7: Bell Alarm-Alarm Only catalog numbers, factory installed.

Operation

The Bell Alarm-Alarm Only provides normally open (NO) and normally closed (NC) outputs available at the terminal block on the right side of the switch, as illustrated in Figure 21. The outputs change state whenever a new HPC Switch trips open by means of the trip unit detecting a fault, either instantaneous or ground fault.

The Bell Alarm-Alarm Only accessory resets automatically, returning the outputs to their normal configuration, when the new HPC Switch is reclosed. The Bell Alarm-Alarm Only can also be reset manually, before the switch is reclosed, by pressing the reset button on the front of the module.

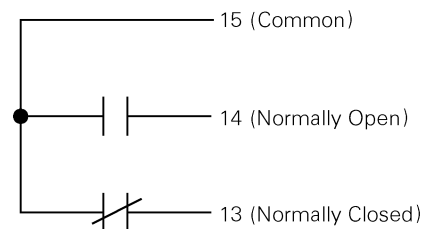


Figure 21: Bell Alarm-Alarm Only connections on the right terminal block. The contacts are shown in the reset state.

3-4 Bell Alarm with Lockout

The Bell Alarm with Lockout module, shown in Figure 22, prevents reclosing of the switch after a protective trip until the Bell Alarm with Lockout is reset. It can only be reset by firmly pressing the yellow button on the front of the module. This module also provides a switch to remotely indicate that the new HPC Switch has tripped.

The Trip Unit activates the Bell Alarm with Lockout for protection trips only.

The catalog numbers for the factory installed Bell Alarm with Lockout (factory installed) are listed in Table 8. For installation instructions see GEH6278.



Figure 22 : Bell Alarm with Lockout module.

Catalog No.	Contact Rating
SPBAL240	6 A at 240 Vac 0.25 A at 250 Vdc 0.50 A at 125 Vdc
SPBAL600 ①	6 A at 600 Vac 0.25 A at 250 Vdc 0.50 A at 125 Vdc

① The 600 V version is not UL listed.

Table 8: Bell Alarm with Lockout catalog numbers, factory installed.

Operation

The Bell Alarm with Lockout prevents reclosing of the switch after a protective trip until the yellow reset button on the front of the module is pressed. This trip can be caused by a ground fault condition or instantaneous fault detected by the Trip Unit.

In addition, the Bell Alarm with Lockout provides normally open (NO) and normally closed (NC) alarm outputs available at the terminal block on the right side of the switch, as illustrated in Figure 23. These outputs are returned to their normal state when the Bell Alarm with Lockout yellow reset button is firmly pressed.

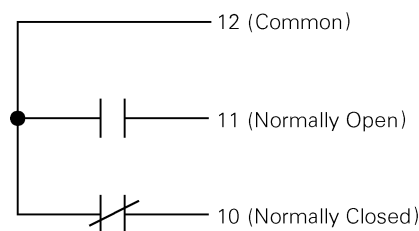


Figure 23: Bell Alarm with Lockout connections on the right terminal block. The contacts are shown in the reset state.

3-5 Shunt Trip with Lockout

The Shunt Trip with Lockout module, shown in Figure 24, allows the switch to be opened electrically from a remote location and prevents the switch from closing while the accessory is energized.



Figure 24: Shunt Trip with Lockout module.

If the switch is equipped with a Trip Unit, it is configured so that only protective trips will activate a Bell Alarm–Alarm Only or Bell Alarm with Lockout.

The catalog numbers for the Shunt Trip's with Lockout (factory installed) for various voltage applications are listed in Table 9. For installation instructions see GEH6284 or GEH6519.

Catalog Number	Voltage Rating ①	Peak Inrush Current, A ②	Nominal RMS Current, mA
SPSTL012	12 Vdc	19	300
SPSTL024	24 Vac 24 Vdc	15	300
SPSTL048	48 Vac 48 Vdc	7.5	200
SPSTL120	120 Vac 125 Vdc	3.0	80
SPSTL208	208 Vac	1.9	60
SPSTL240	240 Vac 250 Vdc	1.5	45
SPSTL480 ③	480 Vac	0.75	20
SPSTL600 ③	600 Vac	0.60	16

① 24–600 Vac devices are rated for 50/60 Hz.

② Peak inrush current is present for 2–6 ms after activation. This number is provided so that fuses and supplies can be chosen appropriately.

③ Ratings for 480 Vac and 600 Vac devices are at the input of the upstream transformer, included with the accessory and specified in GEH6519, which powers the device. For voltage and current ratings at the switch terminal block, see SPSTL120.

Table 9: Catalog numbers and voltages for the Shunt Trip with Lockout, factory installed.

Operation

Apply control voltages to terminals 31 and 32 of the terminal strip on the right side of the switch to open the switch. The Shunt Trip with Lockout will cause the switch to open when the control voltage is greater than 75% of the dc-rated value or 55% of the ac-rated value.

3-6 Undervoltage Release

The Undervoltage Release (UVR) module, shown in Figure 25, opens the switch when the input control voltage drops to 35–60% of its rated value and prevents an open switch from closing until the input control voltage is greater than 80% of the rated value.

If the switch is equipped with a Trip Unit, it is configured so that only protective (ground fault or instantaneous) trips will activate a Bell Alarm–Alarm Only or Bell Alarm with Lockout.



Figure 25: UndervoltageRelease module.

The catalog numbers for the UVR (factory installed) for various voltage applications are listed in Table 10. For installation instructions see GEH6285 or GEH520.

Operation

Apply control voltage to terminals 29 and 30 of the terminal strip on the right side of the switch. When the applied control voltage is above 80% of the UVR's rated value, the switch can be closed. When the voltage drops to 35–60% of the rated value, the UVR will open the switch.

Catalog Number	Voltage Rating ^①	Peak Inrush Current, A ^②	Nominal RMS Current, mA
SPUV012DC	12 Vdc	19	300
SPUV024DC	24 Vdc	15	140
SPUV048DC	48 Vdc	7.5	70
SPUV125DC	125 Vdc	3	30
SPUV250DC	250 Vdc	1.5	15
SPUV024AC	24 Vac	15	370
SPUV048AC	48 Vac	7.5	210
SPUV120AC	120 Vac	3	80
SPUV208AC	208 Vac	1.9	60
SPUV240AC	240 Vac	1.5	45
SPUV480AC ^③	480 Vac	0.75	20
SPUV600AC ^③	600 Vac	0.60	16

- ① 24–600 Vac devices are rated for 50/60 Hz.
- ② Peak inrush current is present for 2–6 ms after activation. This number is provided so that fuses and supplies can be chosen appropriately.
- ③ Ratings for 480 Vac and 600 Vac devices are at the input of the upstream transformer, included with the accessory and specified in GEH6520, which powers the device. For voltage and current ratings at the switch terminal block, see SPUV120AC.

Table 10: Catalog numbers and voltages for the Undervoltage Release, factory installed

3-7 Motor Operator Mechanism

The Motor Operator Mechanism, shown in Figure 26, provides a means of remotely or automatically charging the springs that close the switch. Table 11 lists the catalog numbers for the available Motor Operator Mechanism models. For installation instructions see GEH6281.

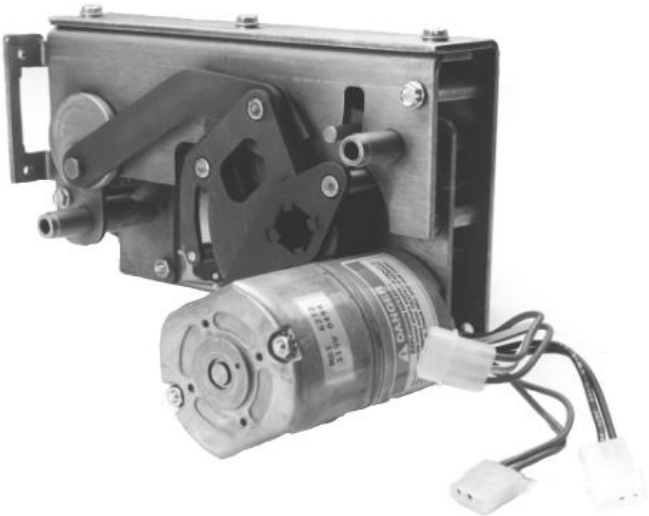


Figure 26: Motor Operator Mechanism.

Catalog No.	Voltage Rating
SPE024	24 Vdc
SPE048	48 Vdc
SPE072	72 Vdc
SPE120	120 Vac
SPE125	125 Vdc
SPE240	240 Vac

Table 11: Catalog numbers and operating voltages for the Motor Operator Mechanism, factory installed

Remote Operation

The switch closing springs can be charged remotely by shorting terminals 17 and 35 on the terminal block on the right side of the switch, with a push button or similar device, for a minimum of five seconds while rated control power is applied at terminals 18 and 36.

Automatic Operation

Connect terminals 17 and 35 on the terminal block on the right side of the switch with a jumper wire. The Motor Operator will automatically recharge the switch closing springs whenever the switch closes.

CAUTION: Do not wire switches for automatic charge and automatic close as this could result in repeated closures into a fault.

ATTENTION: Ne pas raccorder les interrupteurs pour la fermeture et la charge automatique car cela pourrait résulter dans des fermetures répétées sur un default électrique.

3-8 Remote Close

The Remote Close accessory, shown in Figure 27, provides a means of remotely closing the switch after the springs have been charged. Table 12 lists the catalog numbers for the available models. For installation instructions see GEH6283.

Remote Operation

The switch can be closed remotely, provided that the springs are charged, by applying the rated voltage to terminals 16 and 34 on the terminal block on the right side of the switch.

The Remote Close accessory is continuously rated and has an anti-pump feature that prevents a motor-operated switch from repeatedly closing into a fault. Closing control voltage must be removed and reapplied for each switch closure.



Figure 27: Remote Close accessory.

Catalog No.	Voltage Rating
SPRCS024	24 Vdc
SPRCS048	48 Vdc
SPRCS072	72 Vdc
SPRCS120	120 Vac
SPRCS125	125 Vdc
SPRCS240	240 Vac

Table 12: Catalog numbers and operating voltages for the Remote Close accessory, factory installed

3-9 Key Interlock Mounting Provision

The Key Interlock Mounting Provision provides mounting for one to four key locks. The ABB catalog number is SPK4 (factory installed).

The key locks must have a zero extension when the bolt is withdrawn with 0.75-inch extension when the bolt is extended. The lock may be up to 1.50 inch wide. Catalog numbers for suitable locks from Kirk Key Interlock Co. and Superior Interlock Co. are listed in Table 13. For installation instructions see GEH6279.

# Locks	Kirk Key Cat. No.	Superior Cat. No.	Approx. Lock Length
1	KFN00001_①	S105827Y	2.38"
2	KFN00002_①	S105828Y	3.38"
3	KFN00003_①	S105829Y	4.38"
4	KFN00004_①	S105827-4	5.48"

① Final digit may be 0, 1, 2, or 3 depending on key removable positions.

Table 13: Catalog numbers of Key Interlock models.

Operation

The Key Interlock prevents the switch from closing by holding the padlock tab extended, thus keeping the trip latch in the tripped position. A secondary padlock lever is included with the Key Interlock, since the Key Interlock blocks easy access to the standard padlock hasp. To operate, use the following procedure:

1. Open the switch (press the OFF button).
2. Grasp the padlock tab and pull it out, as illustrated in Figure 29. Note that if the switch contacts are closed, the padlock tab will not pull out.
3. Turn the key, securing the padlock tab in the extended position. The switch cannot be closed until the Key Interlock is disengaged.
4. Rotate the secondary padlock lever out and assemble padlocks as desired.



Figure 28: Side view of the switch, showing the padlock tab extended with the Key Interlock installed.

CAUTION: Repeated attempts to close a locked-out switch will damage the switch mechanism.

ATTENTION: Les tentatives à maintes fermer un interrupteur verrouillé en position "ouvert" endomageront le mécanisme de l'commutateur.

3-10 Mechanical Counter

The Mechanical Counter, shown in Figure 29, counts the number of times the switch is closed. The catalog number of the factory installed Mechanical Counter is SPCOUNTER (factory installed). For installation instructions see GEH6280.



Figure 29: Mechanical Counter.

3-11 Auxiliary Switch Module

The Auxiliary Switch Module, shown in Figure 30, provides remote indication of the new HPC Switch main contact position through the terminals on the terminal block on the left side of the switch.

Auxiliary Switch Modules are available with 4, 8, and 12 switches with ratings of 6 A at 240 Vac or 600 Vac. Additional ratings of 0.5 A at 125 Vdc and 0.25 A at 250 Vdc apply to all models. Catalog numbers are listed in Table 14. For installation instructions see GEH6274.

Operation

Each auxiliary switch provides two outputs that can be used to indicate switch main contact position. The A output is open or closed the same as the switch, while the B output is the opposite to the new HPC switch contacts. Figure 32 is a wiring diagram of each auxiliary switch.

The connections for the auxiliary switch outputs are found on the terminal block on the left side of the switch and are listed in Table 16.



Figure 30: Auxiliary Switch Module with 12 switches.

# Switches	240 Vac	600 Vac ①
4	SPAS240AB4	SPAS600AB4
8	SPAS240AB8	SPAS600AB8
12	SPAS240AB12	SPAS600AB12

① 600 Vac devices are not UL listed.

Table 14 : Auxiliary Switch Module catalog numbers, factory installed.

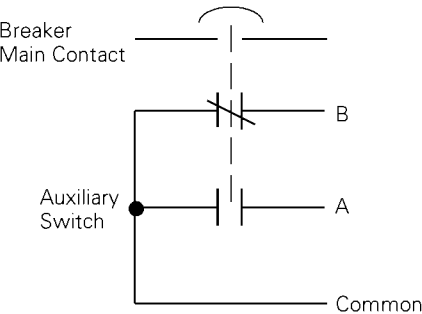


Figure 31: Auxiliary switch wiring diagram.

Terminal (upper)	Terminal (lower)
1 Auxiliary12 A	19 Auxiliary 11A
2 Auxiliary12 B	20 Auxiliary 11B
3 Auxiliary12 common	21 Auxiliary 11common
4 Auxiliary10 A	22 Auxiliary 9A
5 Auxiliary10 B	23 Auxiliary 9B
6 Auxiliary10 common	24 Auxiliary 9common
7 Auxiliary8 A	25 Auxiliary 7A
8 Auxiliary8 B	26 Auxiliary 7B
9 Auxiliary8 common	27 Auxiliary 7common
10 Auxiliary 6A	28 Auxiliary 5A
11 Auxiliary 6B	29 Auxiliary 5B
12 Auxiliary 6common	30 Auxiliary 5common
13 Auxiliary 4A	31 Auxiliary 3A
14 Auxiliary 4B	32 Auxiliary 3B
15 Auxiliary 4common	33 Auxiliary 3common
16 Auxiliary 2A	34 Auxiliary 1A
17 Auxiliary 2B	35 Auxiliary 1B
18 Auxiliary 2common	36 Auxiliary 1common

Table 15: Auxiliary switch positions on the terminal board on the left side of the switch, Block A.

3-12 Door Interlock

The Door Interlock, shown in Figure 32, prevents the casual opening of the enclosure door, particularly while the new HPC Switch is ON. The catalog number of the factory installed Door Interlock is SPDIL (factory installed). For installation instructions see GEH6276.

Operation

The Door Interlock prevents the opening of the enclosure door unless the locking lever is disengaged. The lever can be disengaged easily with the switch OFF or with somewhat greater difficulty with the switch ON, as described below.

Opening Door with Switch Off

To open the enclosure door when the switch is OFF, pull up on the padlock tab and slide the Door Interlock lever counter-clockwise until it no longer obstructs the door. When the door is reclosed, simply slide the lever back into the locking position.

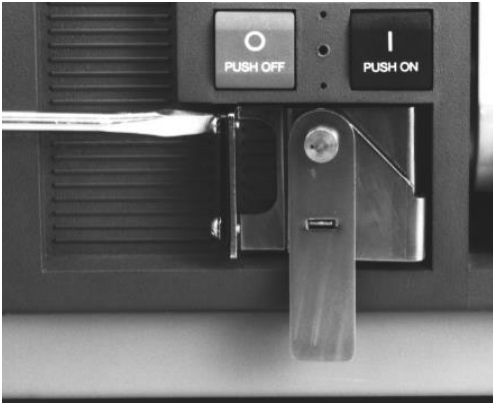


Figure 32: Door Interlock accessory installed on the switch.

Opening Door with Switch On

The Door Interlock can be defeated, to allow opening the enclosure door with the switch ON, even though the padlock tab cannot be lifted. Depress the interlock spring with a screwdriver in the slot on the top of the locking lever and push the lever counter-clockwise to disengage it from the spring. Remove the screwdriver; then continue rotating the locking lever until it clears the door.

3-13 Push Button Cover

The Push Button Cover, shown in Figure 33, prevents accidental or unauthorized closing or opening of the switch with the local push buttons. It consists of two unbreakable, individually sealable Lexan® shields, one over the PUSH ON button and one over the PUSH OFF button. The catalog number is SPPBCOVER (factory installed). For installation instructions see GEH6282.

Operation

Close the cover and put a sealing wire or wire tie in the slot. Each of the covers may be sealed independently.



Figure 33: Push Button Cover.

3-14 Neutral Current Sensors

When the ground-fault option is selected in a trip unit for a 3 phase 4-wire power system (e.g.120/208VAC or 277/480 VAC), an external neutral sensor must be inserted in the neutral lead of the power system to complete the ground-fault protective circuit.



Figure 34: TSVG Neutral Current Sensor.

Neutral Current Sensors ①

HPC Switch Frame (Amps)	HPC Switch Sensor Rating (Amps)	Neutral Sensor rating or tap Settings (Amps)	Catalog Number of sensor mounted on copper busbars
800	800	800/400	TSVG308A
1200	1200	1200/600 ②	TSVG812A
	1600	1600/1000 ②	TSVG816A
1600	1600	1600/1000	TSVG816A
2000	2000	2000/1200	TSVG820A
2500	2500	2500/1800	TSVG825A
3000	3000	3000/2400	TSVG830A
4000	4000	4000/3000	TSVG940A

- ① Match neutral current sensor rating (or tap setting) to new HPC Switch sensor rating.
- ② At time of initial product release, the 1200A new HPC Switch was using 1600A installed sensors and a 1200A rating plug. Later models may use 1200A phase sensors. Match Neutral sensor tap to HPC sensor rating.
- ③ Outline Drawings 139C5016SH1 & SH2.

Table 16: TSVG Neutral Current Sensor catalog numbers.

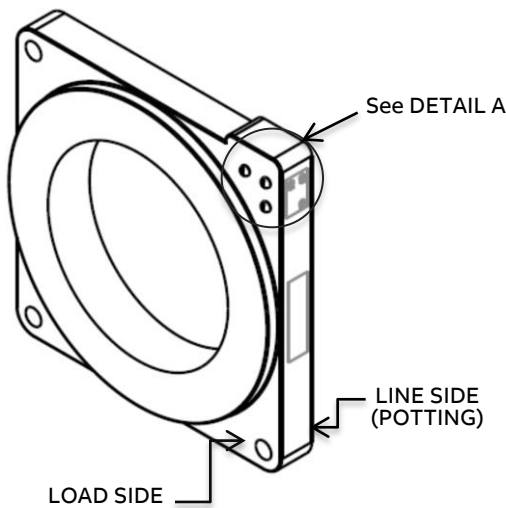


Figure 35: SSVG Neutral Current Sensor.

Neutral Current Sensors ①

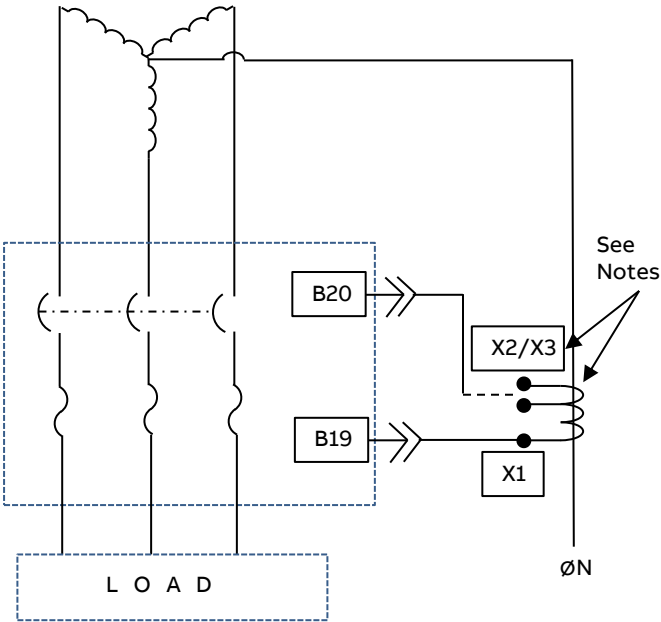
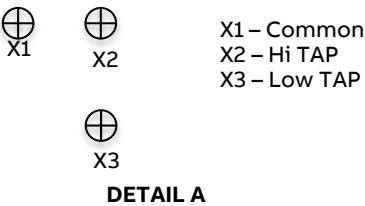
HPC Switch Frame (Amps)	HPC Switch Sensor Rating (Amps)	Neutral Sensor rating or tap Settings (Amps)	Catalog Number of Window Sensor	Inside Diameter (inches)
800	800	800/400	SSVG808W	4.25
1200	1200	2000/1200 ②	SSVG820W	5.63
	1600	1600/1000 ②	SSVG816W	5.63
1600	1600	1600/1000	SSVG816W	5.63
2000	2000	2000/1200 ②	SSVG820W	5.63
2500	2500	2500/1800	SSVG825W	5.63
3000	3000	4000/3000	SSVG940W	6.50
4000	4000	4000/3000	SSVG940W	6.50

① Match neutral current sensor rating (or tap setting) to new HPC Switch sensor rating.

② At time of initial product release, the 1200A new HPC Switch was using 1600A installed sensors and a 1200A rating plug. Later models may or may not use 1200A phase sensors. Match Neutral sensor tap to HPC sensor rating.

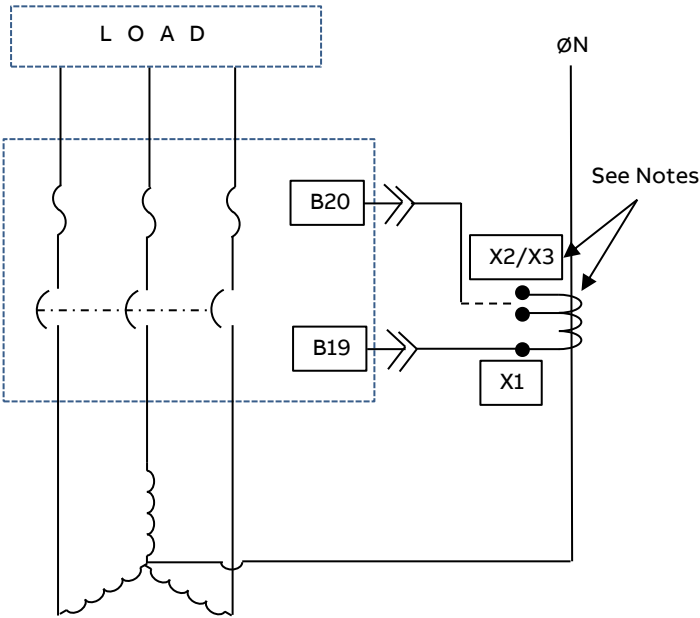
③ Outline Drawing 10112973P1.

Table 17: SSVG Neutral Current Sensor catalog numbers.



Note:
In forward fed applications, the potting side of the CT should **face the transformer.**
X2 is high tap setting and X3 is low tap setting. Select tap setting to match switch sensor. Reference table 17 of DEH 41689. Note that 1200A frame uses 1600A sensor. In all other cases the frame size matches the sensor.

Figure 36: Wiring Diagram of Neutral Current Sensor for Forward Feed Applications



Note:
In reverse fed applications, the potting side of the CT should ***face the load***.

X2 is high tap setting and X3 is low tap setting. Select tap setting to match switch sensor. Reference table 17 of DEH41689. Note that 1200A frame uses 1600A sensor. In all other cases the frame size matches the sensor.

Figure 37: Wiring Diagram of Neutral Current Sensor for Reverse Feed Applications

3-15 Front Connected Terminals

Terminals bolt directly to the line or load terminals of the Breaker. Order one Terminal per line or load pole. Terminals Catalog numbers and ratings are listed in Table 18.

Max Amp Rating	Voltage Rating
800-2000	SP20FCC ①
2000	SPS20FCA ②
2500	SPS25FCC ①
3000	SPS30FCC ①
4000	SPS40FCC ①
4000	SPS40LFCC ① ③

- ① Copper.
- ② Aluminum.
- ③ Extra-long terminals, alternate with SPS40FCC for ease of installation.

Table 18: Front Connected Terminals catalog numbers

Chapter 4 -- Trouble-Shooting Guide

The following guide is provided for troubleshooting and isolating common problems. It does not cover every possible situation. Contact the Customer Support Center at 800-843-3742 if any problem is not resolved by these procedures.

Symptom	Possible Cause	Corrective Action
1. The switch does not close when the ON button is pressed and there is no sound of the closing spring releasing.	The closing spring is not fully charged.	On a manually operated switch, operate the handle until the indicator shows CHARGED. On an electrically operated switch, check that the voltage to the motor operator is at least 85% of nominal. See GEH6281, <i>Motor Operator Mechanism</i> . If the motor ran full cycle but the CHARGE indicator did not drop, cycle the manual charging handle one time. Contact customer support for "logic" adjustment procedure.
	The Bell Alarm with Lockout is deployed.	Correct the condition that initiated the bell alarm, then firmly depress the yellow plunger on the Bell Alarm with Lockout module to reset the lockout. See GEH6278, <i>Bell Alarm with Lockout</i> .
	The Undervoltage Release is not energized.	See GEH6285, <i>Undervoltage Release</i> , for details on energizing the UVR.
	The Trip Unit is not properly installed.	See DEH4567, Trip Unit installation procedure. Follow the Power Break II Trip Unit procedure.
2. The switch does not close when the ON button is pressed, but the closing spring is heard to release.	The Trip Unit detected a fault and immediately tripped the switch.	Clear the fault, then recharge the closing spring and close the switch. For fault diagnostics, see DEH4567,
	The Shunt Trip w/Lockout is energized.	See GEH6284 & GEH6519, <i>Shunt Trip & Shunt Trip w/Lockout</i> , for instructions on de-energizing the unit.
	The switch is locked in the OFF position by a padlock or key interlock.	After ensuring that the safety reason for locking the switch no longer applies, remove the padlock or key interlock. See GEH6279, Key Interlock Mounting Provision.
3. The switch can be opened locally, but not remotely.	There is a problem with the Shunt Trip w/Lockout.	See the trouble-shooting instructions in GEH6284 & GEH6519, <i>Shunt Trip & Shunt Trip w/Lockout</i> .
	There is a problem with the Undervoltage Release.	See the trouble-shooting instructions in GEH6285, <i>Undervoltage Release</i> .

For any other problems related to new HPC Switch accessories, consult the corresponding User's Guide:

- GEH6274, *Auxiliary Switch Module*
- GEH6275, *Bell Alarm – Alarm Only*
- GEH6276, *Door Interlock*
- GEH4546, *Lugs & Adapters for 800–2000 A Frames*
- GEH6278, *Bell Alarm with Lockout*
- GEH6279, *Key Interlock Mounting Provision*
- GEH6280, *Mechanical Counter*
- GEH6281, *Motor Operator Mechanism*
- GEH6282, *Push Button Cover*
- GEH6283, *Remote Close*
- GEH6284, *Shunt Trip and Shunt Trip with Lockout* (except 480 and 600 Vac)
- GEH6519, *Shunt Trip and Shunt Trip with Lockout, 480 & 600 Vac*
- GEH6285, *Undervoltage Release* (except 480 and 600 Vac)
- GEH6520, *Undervoltage Release, 480 & 600 Vac*
- DEH41694, *Instructions, HPC* Heat Sink Installation*
- DEH41695, *Instructions, HPC* Blown Fuse Protector*
- DEH4567, *EntelliGuard* TU Trip Unit*
- Outline Drawings:
 - 10112083P1:800A Top Feed HPC Switch
 - 10112083P2:800A Bottom Feed HPC Switch
 - 10112083P3:1200/1600A Top Feed HPC Switch
 - 10112083P4:1200/1600A Bottom Feed HPC Switch
 - 10112083P5:2000A Top Feed HPC Switch
 - 10112083P6 2000A Bottom Feed HPC Switch
 - 10112083P7:2500/3000A Top Feed HPC Switch
 - 10112083P8:2500/3000A Bottom Feed HPC Switch
 - 10112083P11:4000A Top Feed HPC Switch
 - 10112083P12:4000A Bottom Feed HPC Switch