Set Series

PM**Set**™ E

Automatic Circuit Recloser with **PowerLogic** ADVC Controller

Installation, Operation, and Maintenance Manual

N00-807-05
07/2023

www.se.com

Legal Information

Set Series

Featuring outstanding medium-voltage (MV) and low-voltage (LV) switchboards, motor control centres and power distribution solutions for high-performance power applications, Schneider Electric's Set Series is best-in-class solutions based on high levels of safety and an optimised footprint. Built on a modular architecture and incorporating smart connected devices for maximum safety, reliability, performance and energy efficiency, the Set Series is delivered to customers directly from our Schneider Electric plants or via a global network of licensed partner panel builders, who are trained and audited to provide quality equipment and support.

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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 documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of this 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.

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 and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

About the Book

Document Scope

This document describes the installation and maintenance procedures for the PMSet™ E-Series Automatic Circuit Recloser (ACR) with PowerLogic ADVC Controller (ADVC) Range.

Validity Note

This document is valid for PMSet E-Series remotely controlled and monitored ACR which consists of a PMSet E-Series ACR combined with a PowerLogic ADVC.

Related Documents

Title of Documentation	Reference Number
E-Series Whitepaper	N00-803-01
Switchgear Brochure	N00-800-01
PowerLogic ADVC Operational Manual	N00-812-01

You can download these technical publications and other technical information from our website at www.se.com/ww/en/download/.

Trademark Notice

Green Premium™ Sustainable performance, by design

Well-being Performance

- RoHS Compliant
- SVHC Free
- SF6 Free

Circular Performance

- 60% Recyclable
- End of Life Instructions
- Maintenance Free

Resource Performance

- Optimized Energy Performance
- Reduced CO2 Emissions
- PEP (Product Enviromental Profile) Ecopassport Declaration

Schneider Electric's ecoDesign Way program was reviewed and validated by UL Environment to meet the requirements of the ANSI / IEC 62430

Introduction

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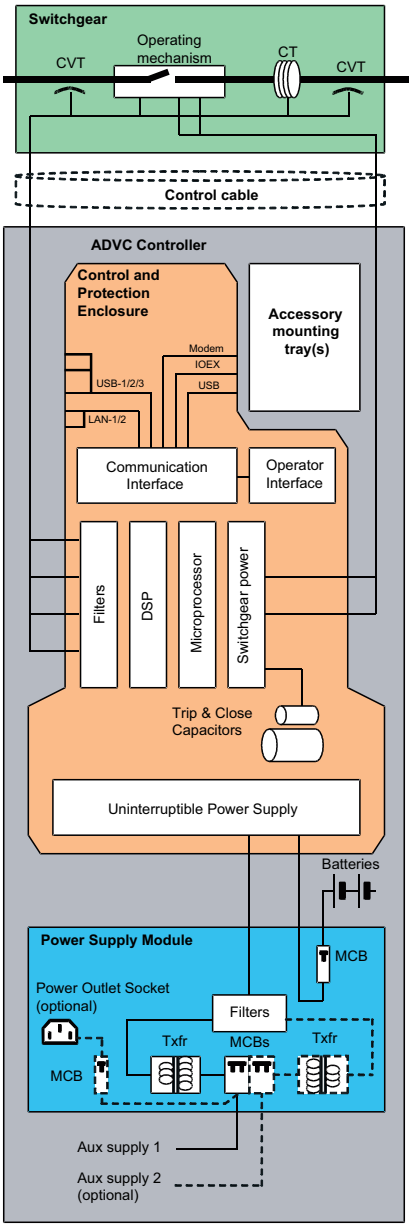
Scope of the Manual

This manual describes the installation and maintenance of the PMSet E-Series ACR with the PowerLogic ADVC.

While every care has been taken in the preparation of this manual, no responsibility is taken for loss or damage incurred by the purchaser or user due to any error or omission in the document. Inevitably, not all details of equipment are provided nor are instructions for every variation or contingency during installation, operation, or maintenance.

For additional information on specific problem or requirements, kindly contact the manufacturer or your distributor.

Switchgear and Controller Architecture



PowerLogic ADVC Controller block diagram

Symbols

The following symbols are used throughout this manual (and others). They are designed to give a quick way of indicating information that is designed for specific areas of interest.

Symbol	Meaning
set	The set symbol indicates that the adjacent information only relates to the PowerLogic ADVC SetVUE Operator Interface (O.I.)
flex	The flex symbol indicates that the adjacent information only relates to the PowerLogic ADVC flexVUE O.I.
Panel messages or Menu Navigation follows these icons in DOT MATRIX FONT.	

Software Identification

The software loaded into the PowerLogic ADVC is identified by its version number which has the form:

AXX-XX.XX.

This precisely identifies the software loaded into the microprocessor on the controller.

In order to obtain effective technical support from the manufacturer or your distributor, it is necessary to record the software version and to quote these when making your inquiry. Without this information, it is impossible for the customer service department to identify the software and provide correct support.

set The software version is shown on the Operator Control Panel (OCP) `Switchgear Wear/General Details` page, `App.Ver` in the field :

```
- - Switchgear Wear/General Details- - S
I Contact 100.0%        Cubicle S/N 1234
II Contact 100.0%      AppVer A44-01.01
III Contact 100.0%
```

NOTE: Images are for illustrative purposes only.

flex Switchgear Status can be found on the ***flex*VUE** at the following location:

OPERATOR MENU > Switchgear Status > Switchgear Info

For more information on how to use the O.I., refer to Operator Control Panel, page 62.

Revision Record

Level	Date	Comment
R00	December, 2017	First Release
R01	March, 2018	Second Release
R02	November, 2018	Third Release
R03	August, 2019	Fourth Release
R04	August, 2021	Fifth Release

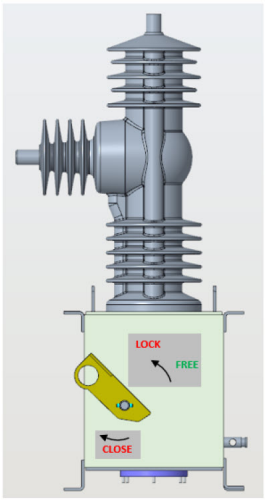
Design Overview

General

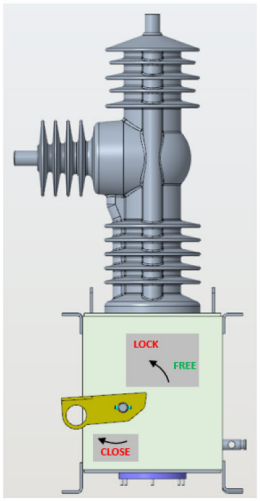
The PMSet E-Series remotely controlled and monitored ACR consists of a PMSet E-Series ACR combined with a PowerLogic ADVC.

The PMSet E-Series ACR:

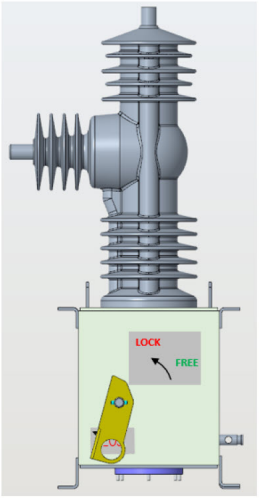
- consists of ganged operated vacuum interrupters insulated with hydrophobic cyclo-aliphatic epoxy resin mouldings.
- is operated by a single magnetic actuator for both tripping and closing.
- mechanism is enclosed in painted stainless steel tank.
- vacuum interrupters are over moulded with hydrophobic cyclo-aliphatic epoxy resin casting in each poles and bolted on stainless steel tank.
- surge arresters can be directly fitted to the mounting bracket (depending on mounting method) of the ACR and must be fitted at installation.
- has voltage measurement on each of the I-Side Bushings and X-Side Bushings, if external VTs are fitted.
- has current measurement on each phase.
- retains information such as serial number, switchgear type, operations and contact wear, independently of the PowerLogic ADVC.
- can be tripped from the ground by a hookstick and then lock out mechanically by further pulling the manual trip lever vertically down position, refer to closed condition, open condition (manual trip) and open lockout condition (after manual trip) images. Then be locked out electronically by opening the isolating switches located on the PowerLogic ADVC.



Closed condition



Open condition (Manual trip)



Open lockout condition (After Manual trip)

- has a clearly visible indicator at the bottom of the product that shows whether the ACR is tripped or closed, refer to ACR Dimensions, page 34.
- is connected to the PowerLogic ADVC via a control cable through the side of the cubicle, refer to ACR Dimensions, page 34.
- can be connected into a bare conductor system.
- cable installation practice to be followed in order to help prevent loose cables, free to move cables that have potential to come close to neighboring phase or reduce the phase-phase clearance.

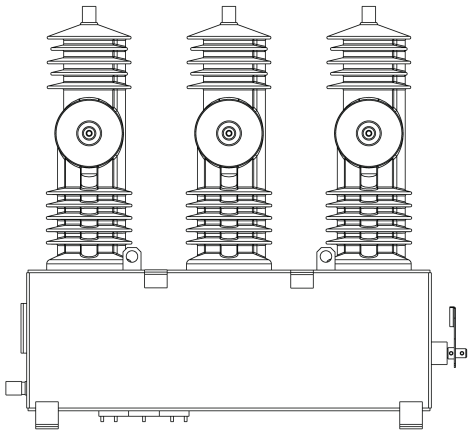
The PowerLogic ADVC reads and displays the information which is stored in the ACR and provides protection and communication properties for the ACR.

NOTE: For protection, communication, and measurement features, refer to the PowerLogic ADVC Operational Manual (N00-812).

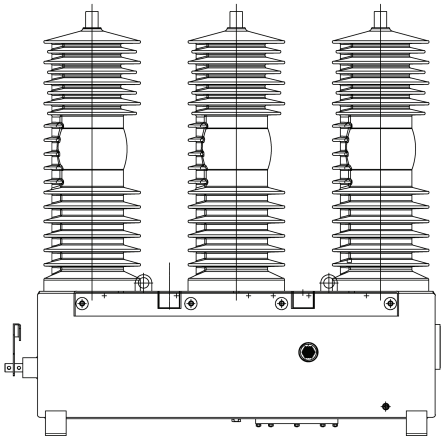
- The PowerLogic ADVC consists of:
  - an OCP mounted inside the enclosure.
  - an electronic switchgear controller that monitors the ACR, and provides communication and protection functions.
  - a power supply which also supplies power for customer equipment.
  - an accessories and customer equipment compartment.
- The PowerLogic ADVC is powered by an auxiliary voltage supply coming from 2×12 V batteries.
- The PowerLogic ADVC is connected to the ACR via a detachable control cable.

It has customer tray, which is a space for other optional equipments. Refer to Compact PowerLogic ADVC with flexVUE O.I. & Ultra PowerLogic ADVC with flexVUE O.I. in Customer Compartments, page 59.

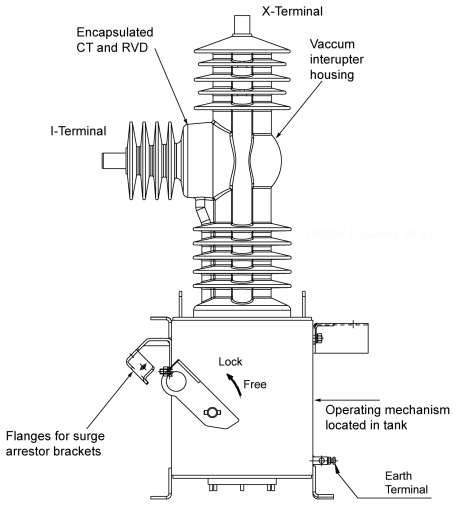
The customer compartment provides ample room for equipment. Standard communications cables can be used for connection to the communications ports on the PowerLogic ADVC and power is readily accessible from the programmable power terminal block. For more information, refer to Communications and Accessories Installation, page 38.



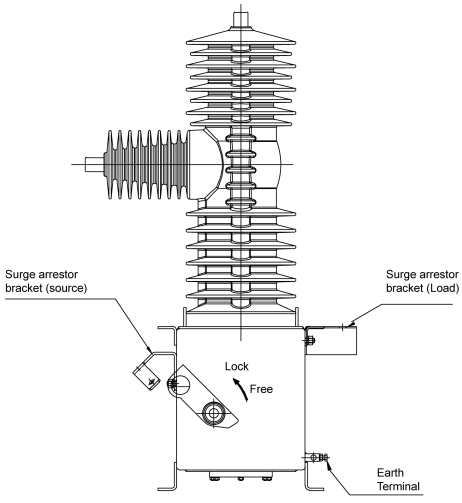
PMSet E-Series 27 kV



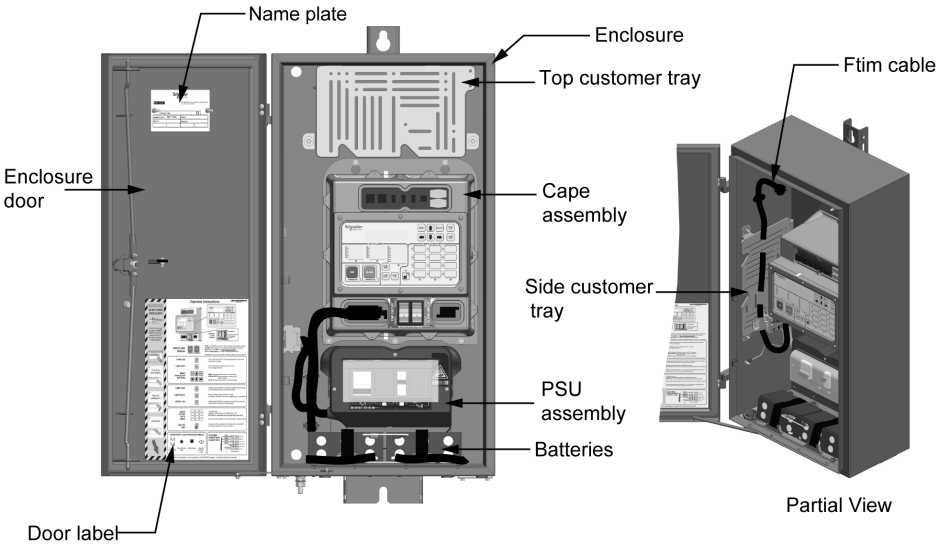
PMSet E-Series 38 kV



PMSet E-Series 27 kV ACR Construction



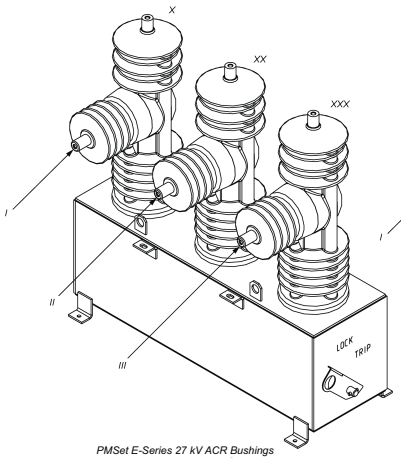
PMSet E-Series 38 kV ACR Construction



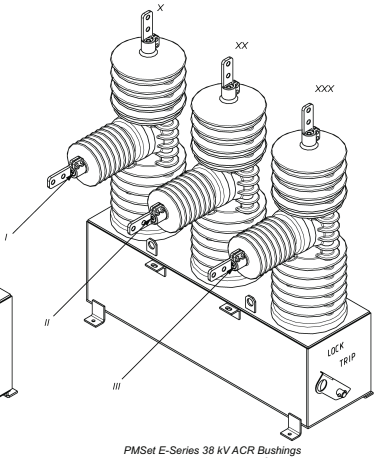
PowerLogic ADVC Controller Components

Terminology

The PMSet E-Series recloser bushings of both 27 kV and 38 kV are identified as I, II, and III on the same side as the Current Transformers (CT) and Resistive Voltage Dividers (RVD). The bushings on the other side are identified as X, XX, and XXX with RVDs.



PMSet E-Series 27 kV ACR Bushings

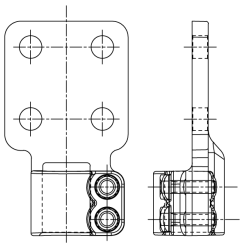


PMSet E-Series 38 kV ACR Bushings

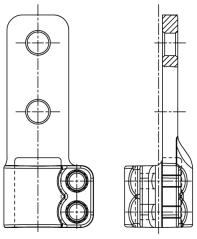
Accessory Options

Contact Schneider Electric for detailed drawing of any accessories. Below are the various accessory options available:

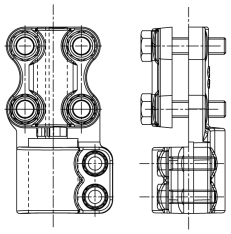
- **Connectors:**



27 kV/38 kV NEMA 4 Pad Connector



27 kV/38 kV NEMA 2 Pad Connector *



27 kV/38 kV Clamp Stud Connector

* 50 mm hole pitch also available on request

Either one of the above three connectors are required in 6 quantity or recloser.

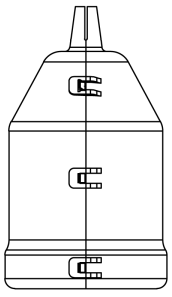
Conductor stems of PMSet E-Series switchgear are plated with silver.

The silver plated terminals of PMSet E-Series product can get tarnished due to atmospheric conditions.

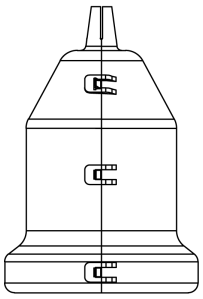
NOTICE
HAZARD OF IMPROPER JOINTS If the conductor stem is seen tarnished (brown or black) at the time of installation, then remove tarnish from the conductor by following appropriate procedure before assembling of any of the above connector on the conductors to have a proper joint. **Failure to follow these instructions can result in equipment damage.**

- **Bird guards:**

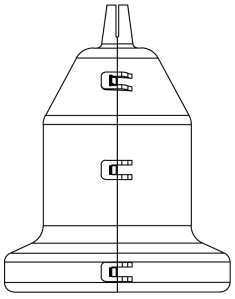
  The bird guards are suitable with each of the connector options. Three quantity of source side and three quantity of load side are required for recloser.



27 kV/38 kV Bird guard (I Side)



27 kV Bird guard (X Side)

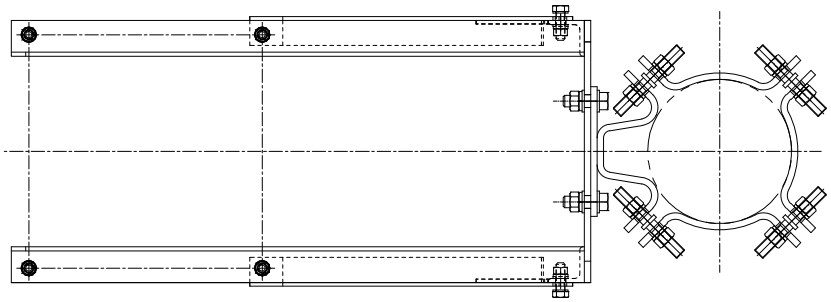


38 kV Bird guard (X Side)

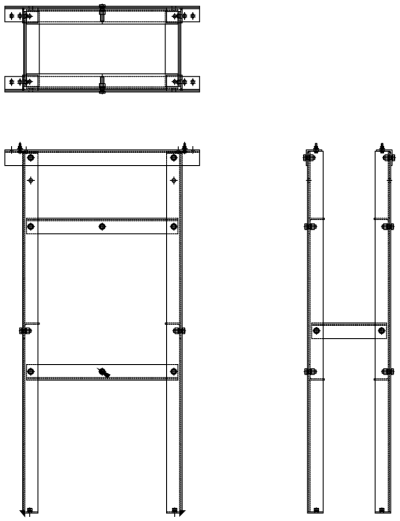
- **Mounting brackets:**

  There are three types of mounting brackets that can be used. Either one of these are required in one quantity per Recloser.

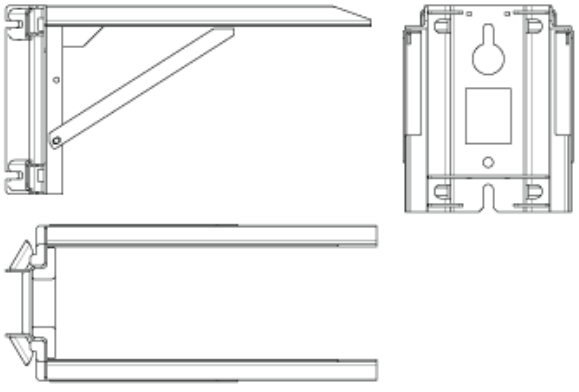
  - 27 kV/38 kV mounting bracket assembly
  - 27 kV/38 kV mounting bracket for wooden pole (through holes mounting)
  - 27 kV/38 kV substation mounting bracket



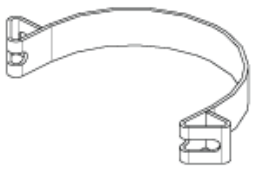
For Concrete poles



27 kV /38 kV Substation mounting bracket



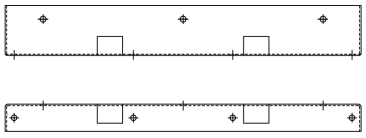
27 kV/38 kV mounting bracket for wooden pole (through holes mounting)
(Same mounting bracket for end and center mounting)



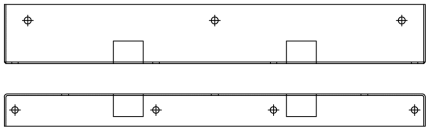
27 kV/38 kV Pole Clamp Band (if required)

- **Surge Arresters:**

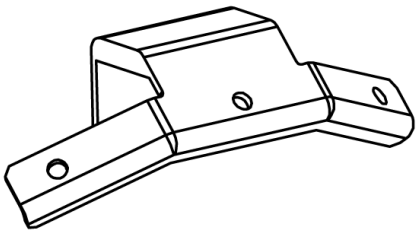
  Two surge arrester mounting brackets (load and source) are required in one quantity or recloser for mounting six surge arresters.



27 kV Surge arrester mounting bracket load

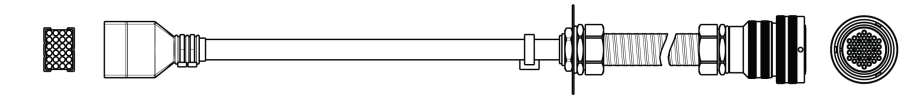


38 kV Surge arrester mounting bracket load



27 kV/38 kV Surge arrester mounting bracket Source

- **Control Cable:**



Installation

What's in This Chapter

Transport, Handling and Workshop Tests 17
Site Installation..... 24

Transport, Handling and Workshop Tests

General

Each crate includes the following:

- ACR
- Pole mounting bracket with clamps if required. If a substation mounting bracket was ordered, it must be attached to the outside of the crate.
- Six HV connectors if ordered.
- The appropriate mounting kit.
- PowerLogic ADVC cubicle (which normally contains two batteries unless arrangements have been made to ship batteries separately).
- If the storage is more than 6 months, need to conduct the tests before commissioning.
- Control cable.
- Bird guards if ordered.

On receipt, the contents must be checked for shipping damage and the manufacturer informed immediately if any is found.

NOTICE
HAZARD OF WATER INGRESS • Make sure that the PowerLogic ADVC is stored indoors until installation on site. • If storage outdoors is unavoidable, make sure that the PowerLogic ADVC is kept in an upright position. **Failure to follow these instructions can result in equipment damage.**

Unpacking Procedure

The basic list of tools which are required for unpacking are as follows:

- Battery screwdriver, drill or ratchet spanner with 8/10/12 mm socket to remove hexagon head screw/wood screw.
- Side-cutters for cutting plastic strapping and cable ties.
- Pry bar (crow bar/wrecking bar/jemmy) to remove nails and separate timber panels.
- Four D shackles.
- Two slings or a 4-leg chain (rated for lifting 500 kg min).
- Crane with a minimum working load limit of 500 kg to lift the ACR.

The following is the list of procedures for unpacking:

1. Remove the top panel by unscrewing the hexagon head screw/wood screw around the top of the crate.
2. Remove the front panel of the crate by unscrewing the wood screws on the sides and bottom of the panel (the front panel is the panel nearest the controller and mounting bracket).

3. Remove any accessories from the wooden cross-braces by unscrewing, or cutting the cable ties/strapping and lifting them out.

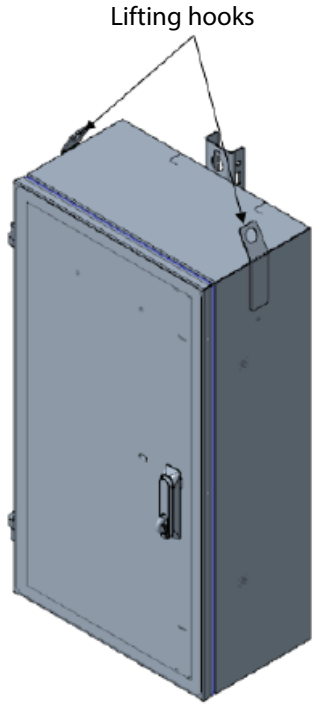
> **⚠ CAUTION**
>
> **HAZARD OF EQUIPMENT DAMAGE**
>
> - Two people are required to lift the heavy accessory (> 15 kg), or with a lifting equipment.
> - Visually inspect the equipment after opening the crate, and check for any damages.
>
> **Failure to follow these instructions can result in injury or equipment damage.**

4. Remove the cross-braces by unscrewing the wood screws from the sides of the crate.
5. Remove the control cable and any other accessories from behind or beside the ACR by unscrewing the cross-brace screws and cutting the strapping.
6. Remove the two cross-braces from the top of the ACR by unscrewing the wood screws on the sides of the crate.
7. Use the crowbar/pry bar to remove the remaining three crate panels.

> **⚠ CAUTION**
>
> **HAZARD OF EQUIPMENT DAMAGE INSIDE THE CRATE**
>
> Handle crowbar/pry bar carefully to help prevent the equipment damage inside the crate.
>
> **Failure to follow these instructions can result in injury or equipment damage.**

8. Remove the two screws that attach the controller to the crate base and lift it out of the crate.

> **⚠ CAUTION**
>
> **HAZARD OF EQUIPMENT DAMAGE**
>
> - Two people are required to lift the PowerLogic ADVC which weighs ~ 40 kg (88lb).
> - PowerLogic ADVC lifting hooks must be used for lifting with a lifting equipment. See the below image *Lifting hooks of PowerLogic ADVC.*
>
> **Failure to follow these instructions can result in injury or equipment damage.**



Lifting hooks of PowerLogic ADVC

9. Remove the screws that attach the mounting bracket to the base and lift it out of the crate.
10. Remove the four screws that attach the ACR to the crate base.
11. Fit D-shackles to the lifting points on the ACR and lift it out of the crate and onto the ground using the crane.

Unpacking Procedure for Substation Mounting Bracket

The basic list of tools which are required for unpacking are as follows:

- Battery screwdriver, drill or ratchet spanner with 8/10/12 mm socket to remove hexagon head screws/wood screws.
- Side-cutters for cutting plastic strapping and cable ties.

The following is the list of procedures for unpacking:

1. Remove the paperwork from the Packaging.
2. Remove the shrink wrapping from the pallet and parts.
3. Using the side-cutters, cut the cable ties to release the bolts and fastener kit.
4. Inspect the bolts and fasteners kit to make sure that all bolts and fasteners are present.

5. Using the battery screwdriver, drill or ratchet spanner with an 8/10/12 mm socket, remove all hexagon head screws/wood screws to release the sub-station brackets.
6. Inspect all parts prior to removing from the pallet.
7. Carefully remove each part from the pallet as required.

⚠CAUTION

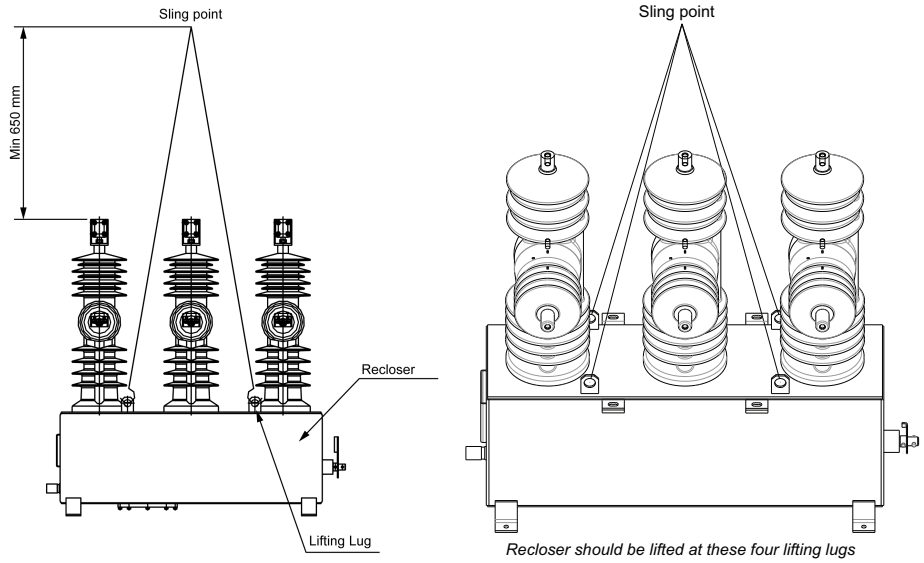
HAZARD OF EQUIPMENT DAMAGE

- Two people are required to lift the heavy accessory (> 15 kg), or with a lifting equipment.
- The timber pallet must be transported by hand pallet truck, crane, or forklift truck.

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

Recloser Lifting Procedure

The slinging recommendation is as shown in the above figure and perform the following procedures.



27 kV/38 kV Lifting configuration of the recloser (three-phase)

1. The slings/chains must be approved and in good condition.
2. Recloser to be lifted with the help of four lifting lugs.
3. The lifting hook must be placed minimum 650 mm above the top connector of bushings.
4. Make sure to balance the main tank weight so that the chains/sling does not touch the sides of the bushings throughout the lift.
5. When moving and lifting, special care must be taken not to damage the bushings and bushing terminals.

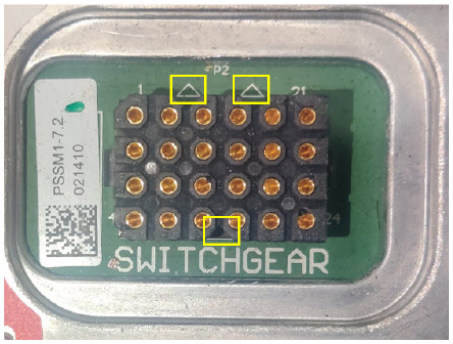
Control Cable Connection

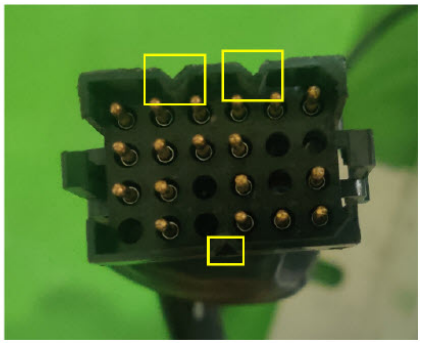
When installing or testing the ACR it is necessary to connect and disconnect the control cable either from the ACR, the PowerLogic ADVC or both. The control cable is plugged into the base of the ACR and the other end into the PowerLogic ADVC at the bottom, right-most side on the Control and Protection Enclosure (CAPE).

The following is the list of correct technique of the cable connection towards the controller side:

1. Power down the control cubicle by switching off all Miniature Circuit Breakers (MCBs). This must be done whenever connecting or disconnecting the control cable.
2. To connect the control cable towards ADVC side, hold the plug by the long sides, check orientation, gently locate it on the socket and push firmly home. Check whether it has locked by wriggling the plug.

NOTICE
HAZARD OF INCORRECT INSTALLATION While assembling the control cable connector (control cubicle end) and the control cubicle port, the V-notches on both sides must match for correct alignment. **Failure to follow these instructions can result in equipment damage.**



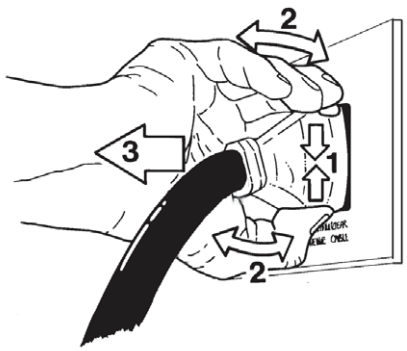


Check the v grooves for proper alignment.

Handling the control cable plug towards the controller side

- To disconnect the control cable towards PowerLogic ADVC side, refer to image handling the control cable plug
  1. Hold the plug by the short sides and grip hard to release the clips inside the plug (not visible).
  2. Wriggle the plug to allow the clips to release.
  3. Then pull out the plug.

⚠ CAUTION
HAZARD OF EQUIPMENT DAMAGE Do not pull out the plug by cable. **Failure to follow these instructions can result in injury or equipment damage.**

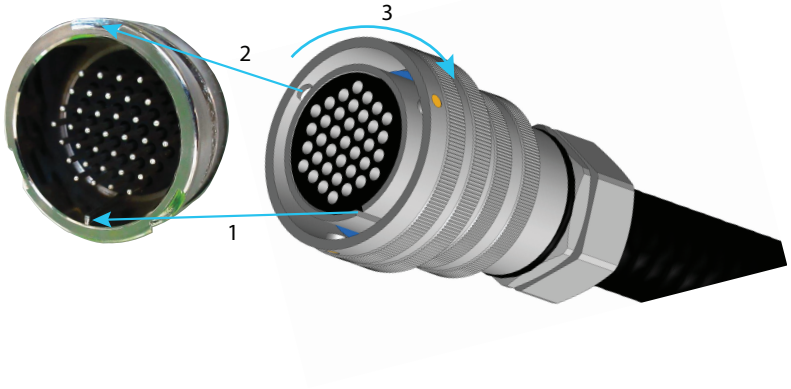


To disconnect the control cable towards ADVC

The following is the list of correct technique of the cable connection towards the switchgear side:

1. Power down the control cubicle by switching off all MCBs. This must be done whenever connecting or disconnecting the control cable.
2. To connect the control cable to the switchgear, match the slot of umbilical cable plug with recloser connector and rotate the plug cover clockwise till it *clicks* on the recloser connector. Heavy force is not required. Make sure to match slots properly.

   NOTE: Heavy force is not required. Make sure to match slots properly.



To disconnect the control cable towards ADVC.

⚠CAUTION

LOSS OF COMMUNICATION HAZARD

- Tighten the control cable clockwise until it clicks.
- The control cable must be properly attached between switchgear and controller.

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

- To disconnect the control cable,
  1. hold the plug cover.
  2. rotate anticlockwise till the umbilical cable connection become loose.
  3. then pull the umbilical cable away from the recloser connector. Heavy force is not required.

⚠CAUTION

HAZARD OF EQUIPMENT DAMAGE

Do not pull out the plug by the cable.

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

Testing and Configuring

The tests can be carried out on site or in the workshop as preferred.

Unpack the crate (refer to *unpacking procedure*) and put the HV cables, boots, and the control cable in a clean preserved place where they will not be damaged or soiled. Make a temporary earth connection between the PowerLogic ADVC and the ACR. 1 mm^2 copper wire is adequate for the purpose.

Remove the cover of the Cable entry from ACR and connect the ACR end of the control cable to the ACR cable connector.

Then connect the PowerLogic ADVC end of the cable to the socket at the lower right-hand corner of the CAPE located inside the PowerLogic ADVC cubicle. For more information refer to Site Procedure, page 25. The LV auxiliary supply (if applicable) must be connected as shown in Auxiliary Supply Connection, page 29.

Turn on the battery and auxiliary supply circuit breakers at the bottom of the control cubicle and perform the following tests:

1. Manual trip and close of the ACR.
2. If the power frequency test is performed, it has to be at 80% of the rated power frequency withstand level.
3. Configure the protection settings. For details on changing the settings, refer to the Operations Manual N00–812.
4. Perform primary current injection as required.
5. Perform secondary current injection (if required by your Authority) using a Test and Training Set (TTS).
6. Fit and test a radio or modem if required.
7. Attend to the battery using the care instructions given in Battery Care.
8. While replacement of battery, adhere to the PowerLogic ADVC manual battery specifications.

NOTICE

LOSS OF PROTECTION HAZARD

Maintain proper polarity when connecting and inserting batteries to avoid damage to electronic systems.

Failure to follow these instructions can result in equipment damage.

Transport to Site

If the unpacking and testing was carried out in the workshop, then the ACR and PowerLogic ADVC must be transported properly to site. It is recommended to carry out the following steps:

1. Turn off all PowerLogic ADVC MCBs and disconnect all auxiliary power supplies. Disconnect the control cable from both ACR and PowerLogic ADVC and replace the cover plate on the bottom of the ACR.
2. Transport the ACR, PowerLogic ADVC and all accessories carefully to the site.

Site Installation

General

The following steps are performed for installing the PowerLogic ADVC:

- The PowerLogic ADVC requires 200 VA auxiliary power supply.
-

⚠CAUTION

HAZARD OF EQUIPMENT DAMAGE

- The PowerLogic ADVC (Ver 50 or above) door is held open by a door stay mechanism which helps to prevent the door swinging or blowing shut.
- To disengage the door stay, follow the directions on the operator sheet located on the inside of the door.

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

Tools Required

- Torque wrench and metric socket set, normal engineers tools.
- Tools to prepare pole as required.
- Crane or other lift for ACR and PowerLogic ADVC, four D-shackles, and slings.

Parts Required (Not supplied by the manufacturer)

- Mounting parts for the PowerLogic ADVC. Either 20 mm steel strapping or 10 mm galvanized or stainless steel bolts, nuts, and so on.
- Fixing hardware for the control cable. This is a 27 mm (1 1/16 in) diameter sheathed conduit and can be fixed to the pole with ties, straps, P-clips, or saddles.
- Earth wire and lugs for the earthing wiring diagram and parts for LV mains auxiliary power connection. For more information, refer to figures Auxiliary Supply Connection, page 29, Center Mounting Example, page 34, and Utility Auxiliary Transformer, page 37.

- 20 mm sealing cable entry glands to suit auxiliary supply mains cables, 16 mm sealing cable entry glands to suit antenna or communications cable as required.
- Antenna, antenna feeder cable, and surge arrester as required if a modem is fitted (unless supplied by the manufacturer).

Site Procedure

NOTE: The PowerLogic ADVC has provision of two lifting hooks that can be used for easy lifting, refer to Lifting hooks of PowerLogic ADVC in Unpacking Procedure, page 17.

To erect and test the ACR and PowerLogic ADVC, carry out the following steps. Mounting details are given in figure ACR End Mounting and Dimensions, page 31.

1. Transport to site and carry out testing before erection as required.
2. Connect cable tails and surge arresters before raising the ACR. Refer to Surge Arrester Mounting and Terminating, page 28.
3. Make sure that the pole is of sufficient strength to support the ACR. A structural engineer may be needed to calculate the stresses involved.
4. Carefully mount the ACR mounting bracket on the power pole. For more information, refer to figures ACR end mounting and dimensions, page 31, Centre mounting example, page 34, and Centre mounting and dimensions, page 34.
5. Lift the ACR into position for more information. Refer to Recloser lifting procedure in Transport, Handling and Workshop Tests, page 17. For more information, refer to figures ACR end mounting and dimensions, page 31, Centre mounting example, page 34, and Centre mounting and dimensions, page 34.

⚠CAUTION

HAZARD OF EQUIPMENT DAMAGE

When lifting the ACR:

- Do not allow the slings to come in contact with the bushings or terminals.
- Avoid dropping objects on the sheds.

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

⚠CAUTION

HAZARD OF INOPERABLE EQUIPMENT

Make sure that equipment is not exposed to any sharp or pointed objects within the device.

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

6. Bolt the ACR to the mounting bracket with the four 12 mm nuts and bolts provided. Tighten to 50 N•m.

7. Complete the earth connections as described in Earthing (Grounding), page 29.

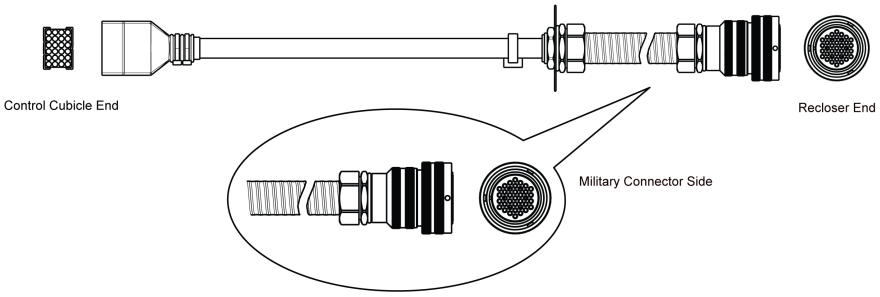
⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Carry out earthing wiring diagram as instructed.

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

8. Complete the power (HV) cable connections.
9. The control cable can be connected to the switchgear using military connector side of the control cable.



10. Run the control cable from the ACR down to the PowerLogic ADVC.

⚠CAUTION

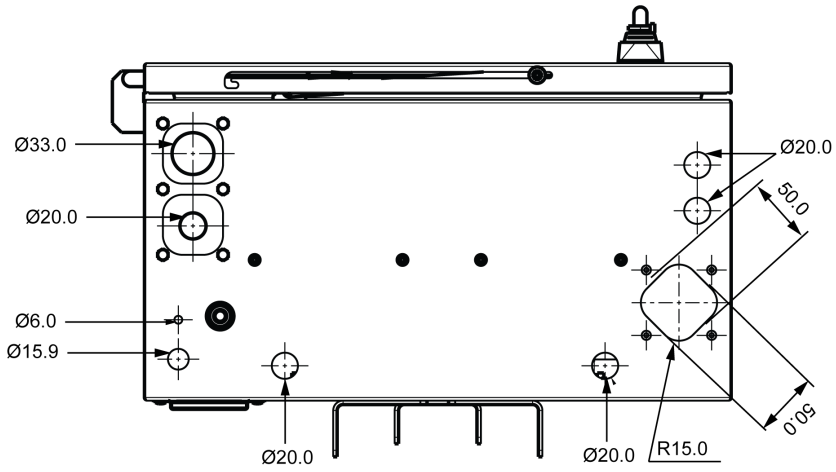
HAZARD OF EQUIPMENT DAMAGE

Use a spirit level for corect alignment and to minimize torque on the mounting brackets, when mounting the PowerLogic ADVC to a wooden pole.

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

11. If the PowerLogic ADVC cubicle is to be bolted to the pole, drill the top hole and fit the bolt. If it is to be strapped, feed the straps through the slots on the upper and lower mounting brackets.
12. Power down thePowerLogic ADVC by switching off all MCBs. This must be done whenever connecting or disconnecting the control cable from the PowerLogic ADVC.
13. Lift the PowerLogic ADVC into position and bolt or strap it to the power pole.
14. Attach the control cable to the power pole maintaining maximum available separation from the main earth bond (at 200 mm for wood and concrete poles and 150 mm for steel poles). Make sure that there is enough cable available at each end to permit connection to the equipment.

15. Connect the control cable from the ACR through the base of the PowerLogic ADVC 1



Cable Entry

and then to the switchgear socket 2 on the CAPE.

16. For more information about LV mains supply run auxiliary wiring as shown in figure Common Earthing and LV Supply, page 35. Make the connection inside the PowerLogic ADVC as shown in figure Auxiliary Supply Connection, page 29.
17. For more information about LV supply from a dedicated transformer supplied by the utility, connect as shown in figure Utility Auxiliary Transformer, page 37.
18. Fit the batteries if they are not already in place.

NOTICE
LOSS OF PROTECTION HAZARD • Maintain proper polarity when connecting and inserting batteries, to avoid damage to electronic systems. • Fitting the batteries with reverse polarity cause damage to the electronic systems. **Failure to follow these instructions can result in equipment damage.**

19. If communications equipment is to be installed, refer to Communications and Accessories Installation, page 38.

Surge Arrester Mounting and Terminating

The ACR is type tested for Impulse Withstand Voltages up to 125 kV depending on the model. For more information, refer to Ratings and Specifications, page 107. When there is a possibility that lightning or network switching conditions may produce peak voltages in excess of 70 % of the Impulse Withstand Voltage, the manufacturer recommends the use of suitably rated surge arresters connected to each terminal of the ACR.

Mounting brackets are provided for surge arresters on the ACR. The surge arresters must be mounted on the front and rear brackets provided and earthed as per the earthing instruction.

⚠CAUTION

HAZARD OF EQUIPMENT DAMAGE

Lightning induced damage to the ACR or PowerLogic ADVC voids the warranty , if surge arrestor is not fitted.

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

The user must check that phase/phase and phase/earth clearance is sufficient for their particular surge arresters and line voltages. For some types of surge arresters, the phase/earth clearance may be insufficient at the center phase on the pole side at higher voltages. In this case, the surge arrester can be mounted on the side of the power pole or an increased clearance ACR mounting bracket fitted.

Connections from the surge arresters to the cable tails can be made by stripping off the cable tail insulation and using a parallel or *T* type clamp to make the connection to the cable tail. The connection must be made far enough up the tail so that phase/phase and phase/earth clearances are maintained. It is good practice to tape the joint using heat shrink to maintain the cabling system insulation.

⚠CAUTION

HAZARD OF EQUIPMENT DAMAGE

Surge arresters must be mounted close to the ACR otherwise the protection they provide is reduced.

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

⚠CAUTION

X RAY RADIATION HAZARD

Do not apply voltage higher than rated maximum across the open contact without any appropriate shielding protection.

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

Earthing (Grounding)

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Do not earth surge arresters by a different path to help prevent damage to the control electronics or ACR.
- Any antenna must be bonded to the ACR or the main earth bond.

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

Refer to Common Earthing and LV Supply, page 35 shows the earthing common to the installations.

This arrangement earths the ACR frame and the surge arresters directly to earth through a main earth bond consisting of a copper conductor of 70 mm^2. Any surges flow down this path.

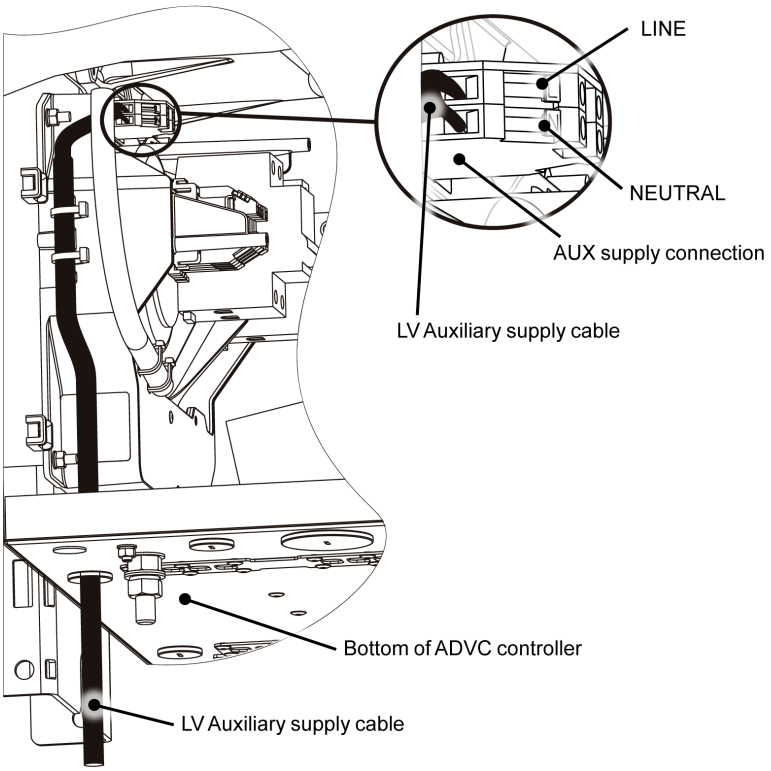
The control cubicle is connected to this main earth bond by a tee-off. The control cubicle electronics are internally protected from potential differences which may occur between the ACR frame and control cubicle frame while surge currents are flowing down the main earth bond. No other connections to earth from the control cubicle are allowed since surge currents will also flow in those paths. Follow this arrangement on both conducting and insulating power poles. Keep the main earth bond physically separated from the control cable, as they run down the power pole, by the maximum spacing available and at least 150 mm.

LV Auxiliary Power from Mains

Where the LV mains are connected to the control cubicle to provide auxiliary power, the connection must connect the neutral of the LV system to a tee-off from the main earth bond. For more information, refer to figure Common Earthing and LV Supply, page 35. A low voltage surge arrester must also be fitted from the LV phase connection to this tee-off.

This wiring diagram bonds the LV and HV earths and so protects the primary insulation of the auxiliary supply transformer in the control cubicle when surge currents are flowing. Fit additional LV surge arresters to the other LV phases (if they exist), to balance the supply for other users connected to the LV system.

If local conditions or wiring rules prohibit bonding the HV and LV systems in this way, providing the auxiliary supply to the control cubicle from the LV mains system is not possible. Instead, use one of the alternative arrangements detailed below.

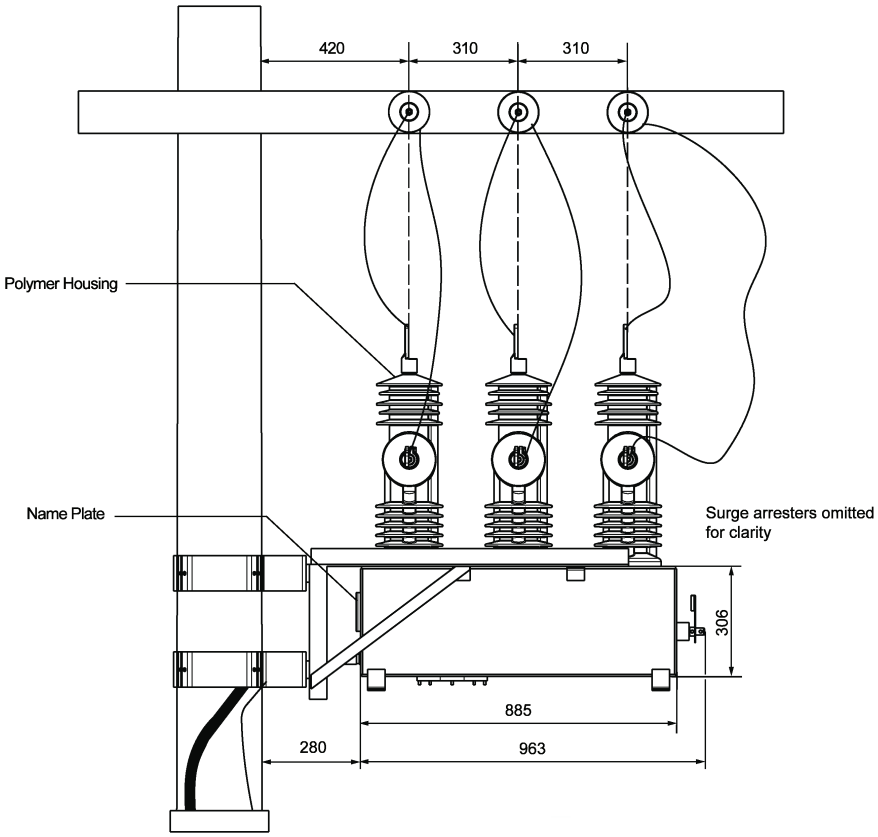


Auxiliary Supply Connection

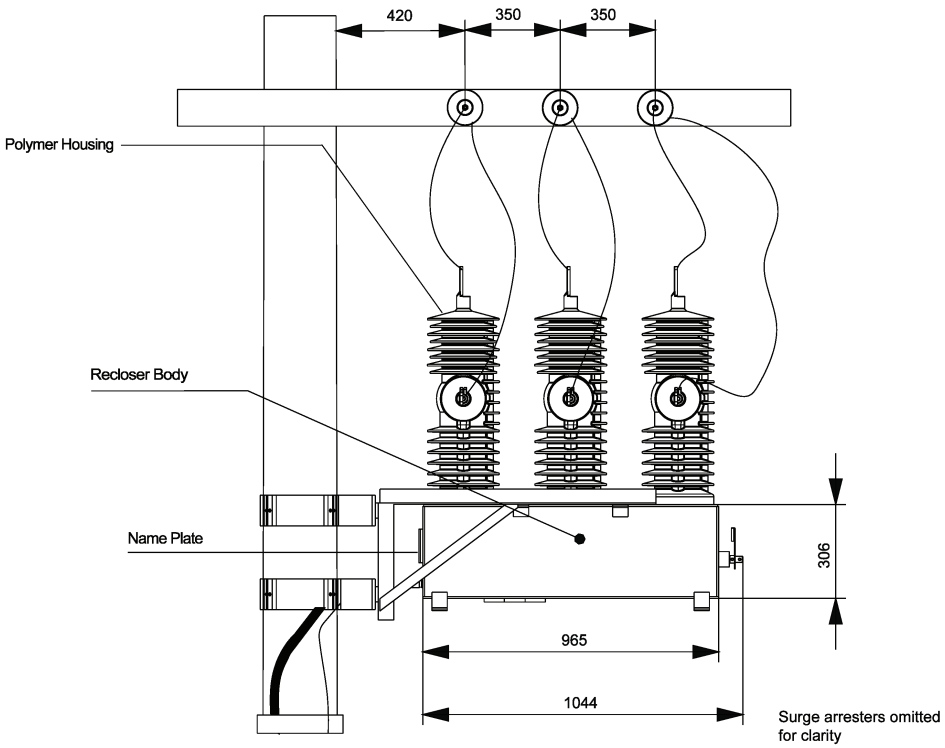
LV Auxiliary Power from Dedicated Utility Transformer

Refer to Utility Auxiliary Transformer, page 37 shows wiring and earthing if a dedicated transformer is supplied by the utility. This must not be used to supply any other equipment without consulting the manufacturer, which helps ensuring that no hazard is caused to the control cubicle electronics. Refer to Utility Auxiliary Transformer, page 37 shows that the transformer and any steelworks are earthed to the switchgear tank and that one side of the transformer secondary is earthed to the earth stud on the equipment panel inside the control cubicle.

ACR End Mounting and Dimensions

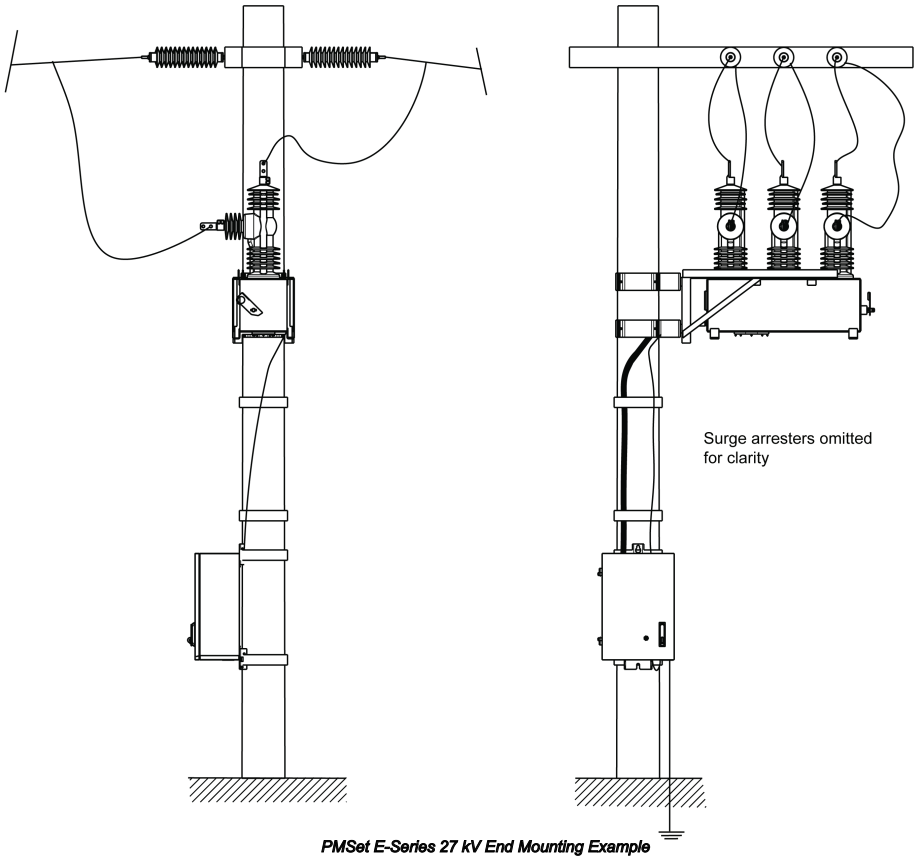


PMSet E-Series 27 kV ACR End Mounting and Dimensions

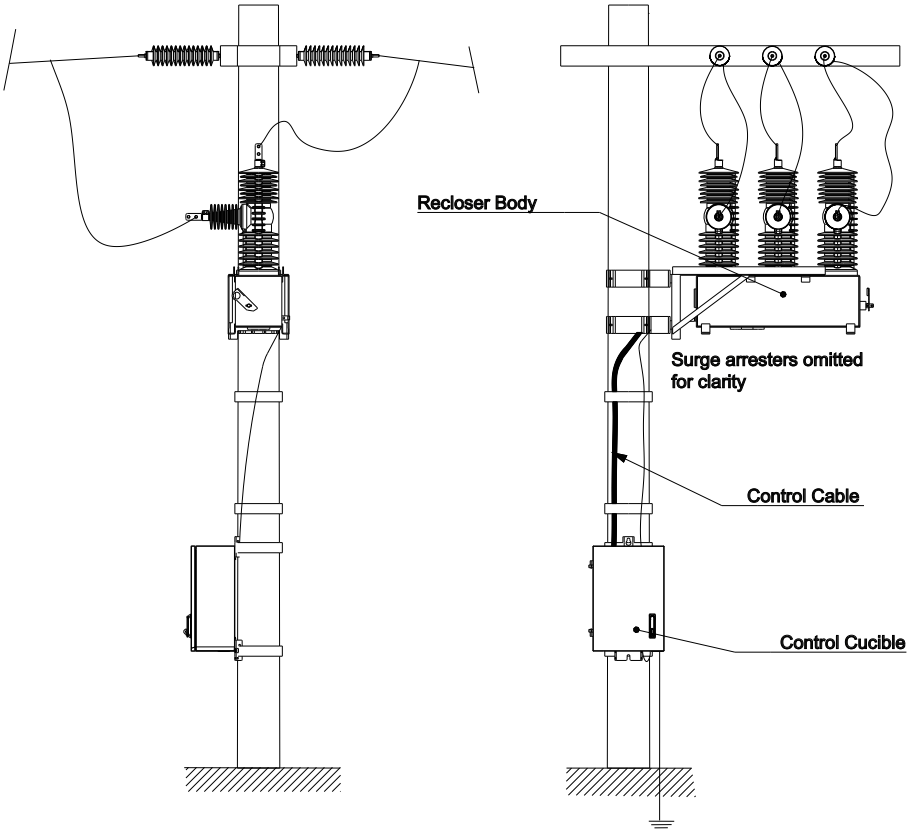


PMSet E-Series 38 kV ACR End Mounting and Dimensions

End Mounting Example



PMSet E-Series 27 kV End Mounting Example



PMSet E-Series 38 kV End Mounting Example

NOTE: The surge arresters is removed from the drawing for clarity.

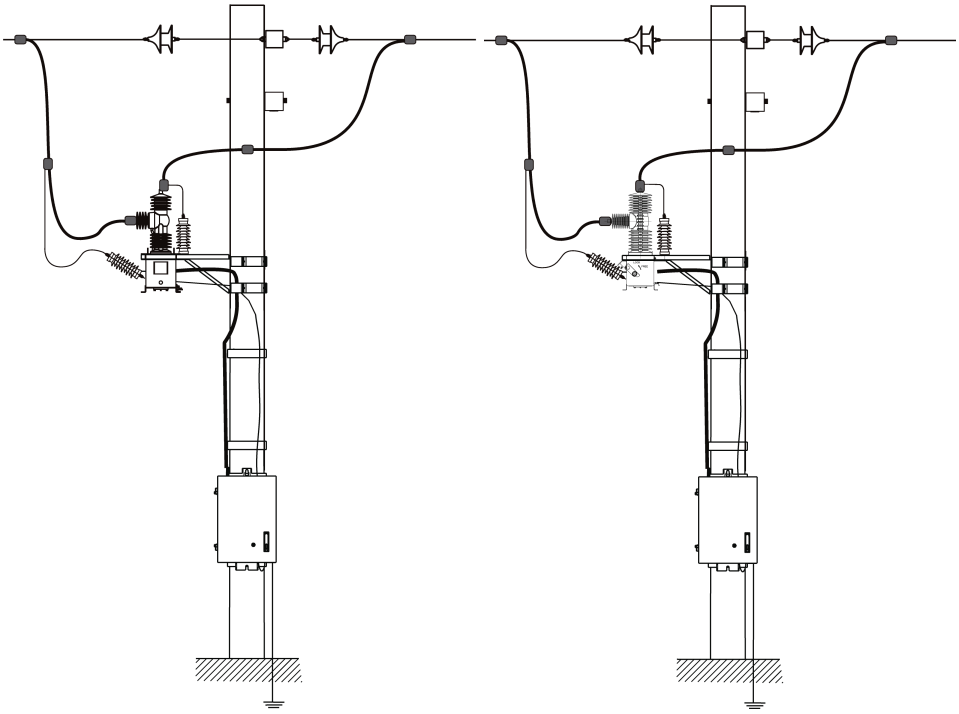
⚠CAUTION

HAZARD OF EQUIPMENT DAMAGE

It is mandatory to install surge arresters on both sides of the recloser otherwise the warranty of the recloser will be invalidated.

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

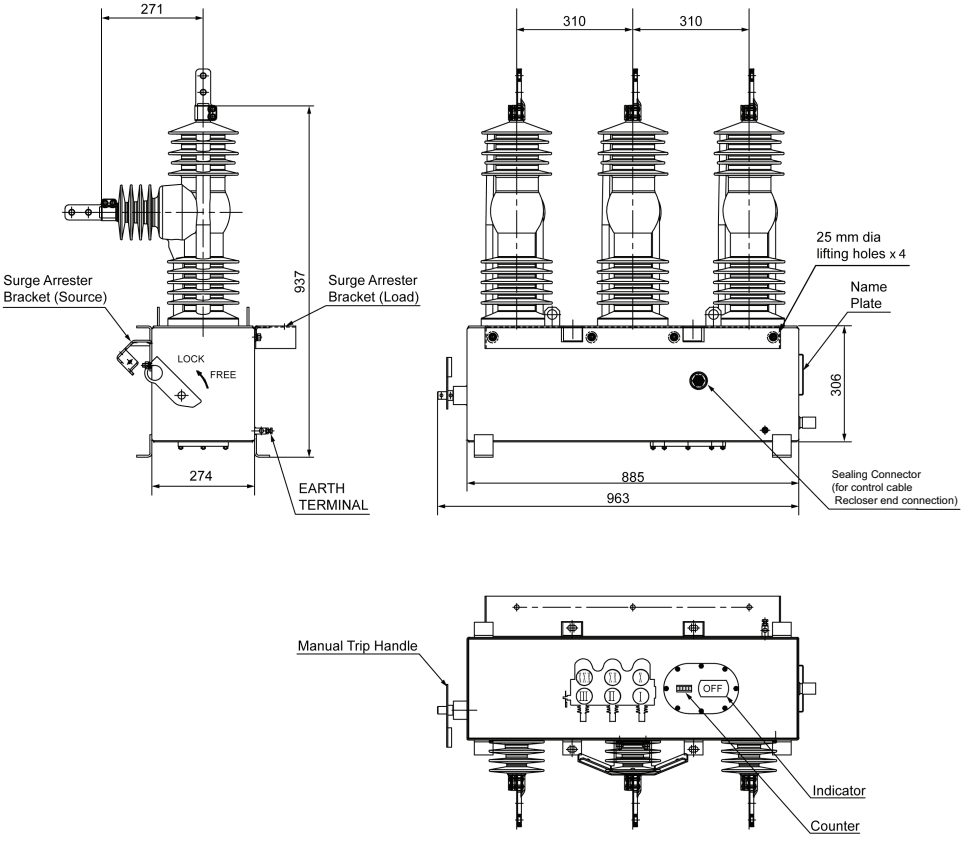
Centre Mounting Example



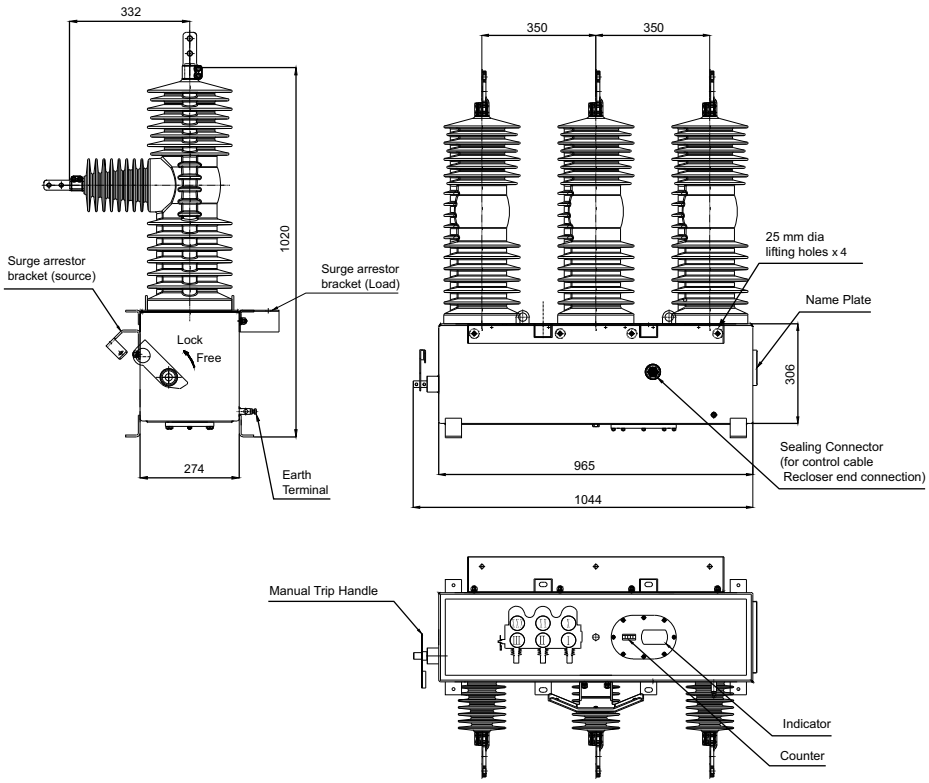
PMSet E-Series 27 kV Center Mounting Example

PMSet E-Series 38 kV Center Mounting Example

ACR Dimensions

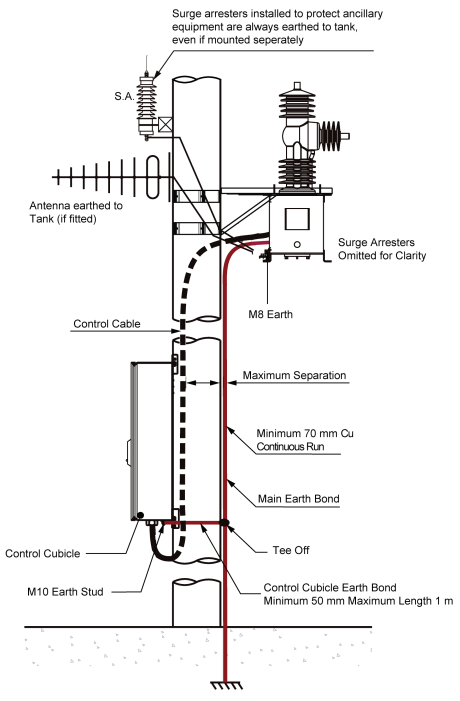


PMSet E-series 27 kV ACR dimensions

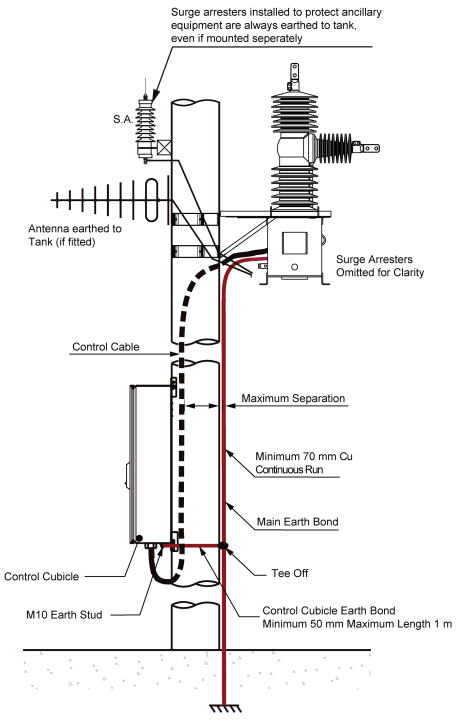


PMSet E-series 38 kV ACR dimensions

Common Earthing and LV Supply

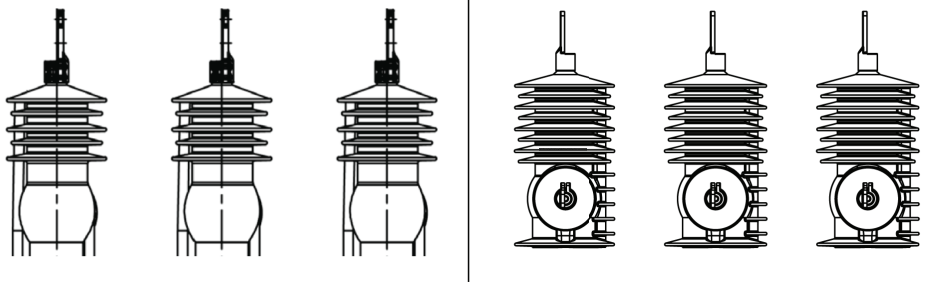


PMSet E-Series 27 kV Common Earthing for all Installations



PMSet E-Series 38 kV Common Earthing for all Installations

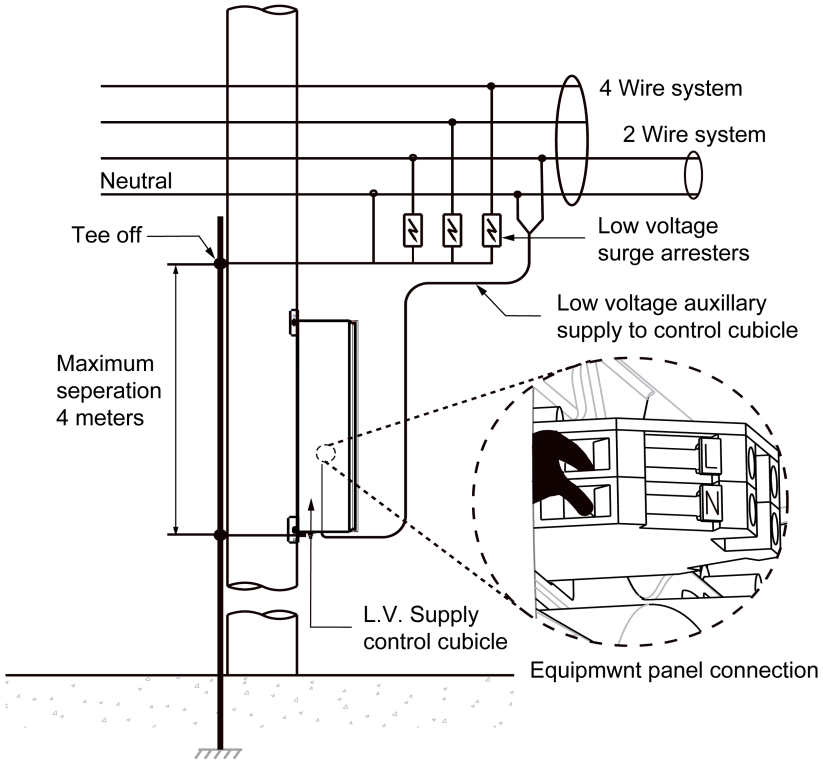
NOTE: While fitting the connectors to the switchgear, the orientation/faces of connectors must be parallel to each other as shown in the figure below.



PMSet E-Series 27 kV Orientation of Connectors

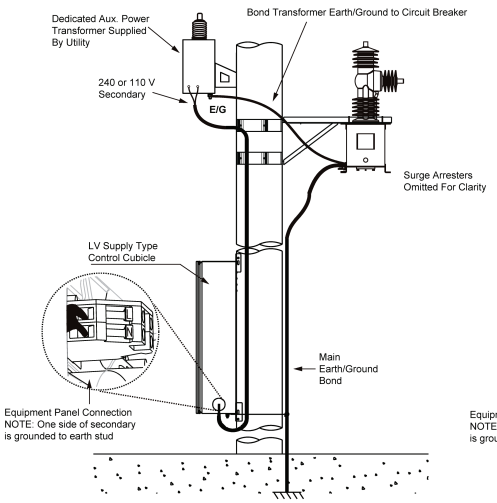
PMSet E-Series 38 kV Orientation of Connectors

L.V. Supply From 2 Wire or 4 Wire Mains System

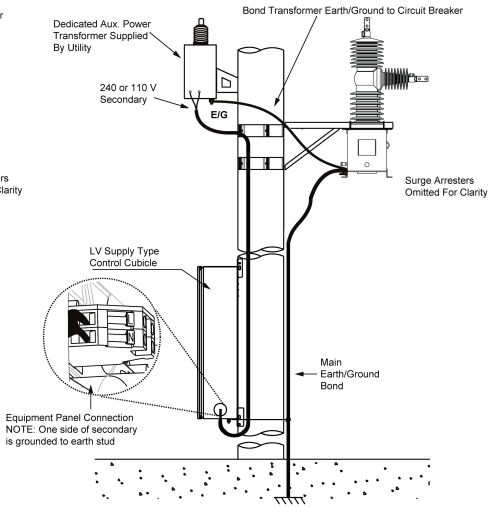


Common Earthing and LV Supply

Utility Auxiliary Transformer



PMSet E-Series 27 kV Utility Supplied Auxiliary Power Transformer



PMSet E-Series 38 kV Utility Supplied Auxiliary Power Transformer

Communications and Accessories Installation

What's in This Chapter

Customer Accessories and Communication Equipment....39
Input Output Expander Installation....41
Communication Ports....43
WSOS....46
SCADA Protocols....46

Customer Accessories and Communication Equipment

Radio Antenna

Mount the antenna and run the antenna feed or an external communication cable to the PowerLogic ADVC. The communication cable/radio antenna, enters the cubicle via the 16 mm hole that is provided below the cubicle.

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Switch off the PowerLogic ADVC before installing the accessories.

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

ULTRA Cubicle - Cable Entry (bottom view)

Protection of Radio Equipment

⚠CAUTION

HAZARD OF EQUIPMENT DAMAGE

- It is highly advisable to connect a gas discharge type of surge arrester in the antenna feed to the radio.
- Negligence to do so results in loss of radio and control electronics protection, if the ACR is subject to lightning activity, which could lead to complete electronic breakdown.

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

A feed-through or bulkhead type arrester fitted to the bottom of the control cubicle is recommended. If fitted internally, the surge arrester must be earthed to an equipment panel mounting stud by the shortest possible wire. Holes are provided for a bulkhead surge arrester.

NOTICE

HAZARD OF EQUIPMENT DAMAGE

- If a surge arrester is not fitted, then the co-axial earth screen must be earthed to the equipment panel by the shortest possible wire.
- A problem of this nature is not covered by the product general warranty arrangements.

Failure to follow these instructions can result in equipment damage.

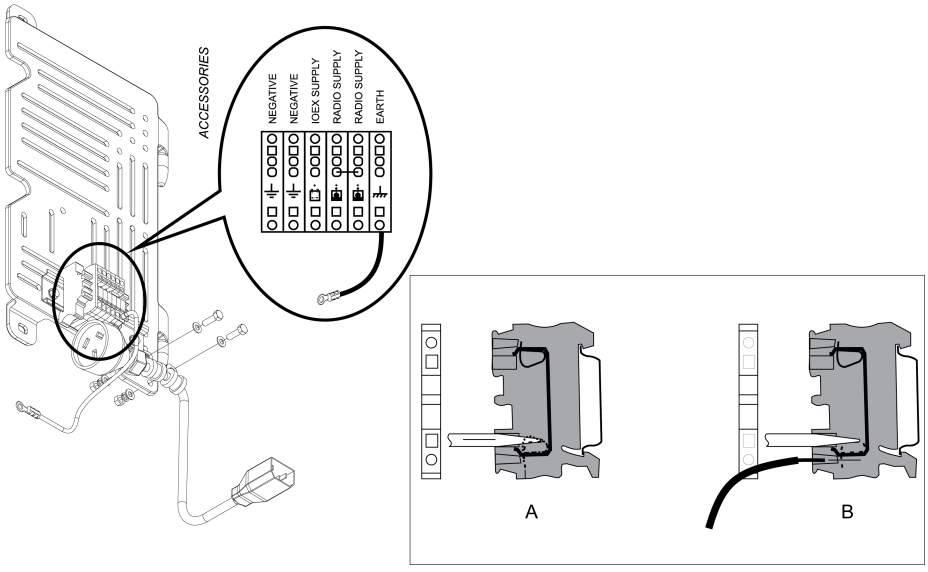
Customer Compartment

At the bottom of the customer equipment tray, is an accessory mounting rail to install the customer equipment and accessories.

Equipment installed in this compartment can be powered from the terminal block and can also be mounted on the rail.

Connecting to the Terminal Block

Step A: Insert a 4 mm screwdriver or similar tool into the square hole above the appropriate wiring point on the terminal block. Angle the head of the screwdriver slightly upwards and push it in, then lever it downwards.



Accessory Mounting Tray and Terminal Block

Step B: This action correctly positions the wiring clamp so that the stripped end of the cable can be inserted. Release and remove the screwdriver, then gently tug the inserted cable so that it is firmly gripped. Refer to above image.

Radio/Modem Power

The battery-backed power supply for a radio/modem is provided on the terminal block as described above. For correct radio connection point, refer to above figure for Accessory Mounting Tray and Terminal Block Connection.

The radio/modem power supply voltage is set by the user in the following menu page:

SYSTEM STATUS > RADIO > S > Radio Supply 12 V

ENGINEER MENU > CONFIGURATION MENU > RADIO SETTINGS > Radio Supply 12 V

This is a password protected parameter.

If there is an auxiliary power outage, then battery power can be conserved by automatically shutting down the radio/modem power supply. The shutdown takes place after the radio holdup time is elapsed. This parameter is set in:

System Status > RADIO > S: Radio Hold 60 min

ENGINEER MENU > CONFIGURATION MENU > RADIO SETTINGS > Radio Hold 60 min

If the Radio Hold time is set to zero, then the radio supply will not shut down except under special circumstances or until the unit power shutdown. The radio/ modem power supply is restored when the auxiliary supply returns to normal.

The radio/modem power supply can be turned on or off by the operator, for radio maintenance without entering a password in:

System Status > RADIO > S: Radio Supply ON/OFF

ENGINEER MENU > CONFIGURATION MENU > RADIO SETTINGS > Radio Supply ON/OFF

When there is shut down of the radio supply, it is indicated on these pages.

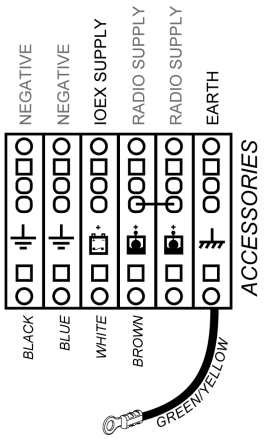
Input Output Expander Installation

Introduction

Input Output Expander (IOEX3) module is a die-cast, sealed enclosure that provides optically isolated inputs and voltage free outputs to allow connection to external devices.

Either one or two IOEX3 modules can be used with each PowerLogic ADVC. The second IOEX3 module is only available with the PowerLogic ADVC **ULTRA** cubicle, fitted with the optional upper customer tray. When two IOEX3 modules are used, they are designated as IOEX-A and IOEX-B.

IOEX3 modules, purchased at the time of initial ordering, comes readily installed in the cubicle, located on the customer tray, powered and earthed via the terminal block located accessory mounting rail on the side-mounted customer tray.



IOEX Supply and Earthing

If an IOEX3 module is purchased separately, refer to installation instructions available with the separate module. For more information on IOEX dimensions, refer to Dimensions, page 123.

If one IOEX3 is fitted in the factory, it is connected to IOEX/Windows Switchgear Operating System (WSOS) RS-232 Port, with the baud rate of 19,200 to match that of the IOEX3. If a second IOEX3 is fitted, it can be connected to either to the MODEM RS-232 Port or to any of the three USB ports, using a suitable USB to RS-232 converter. If it is necessary to modify the baud rate of an RS-232 port with an IOEX3 connected, for example, IOEX/WSOS Port; do the following:

Communications > IOEX/WSOS PORT - 1 > BAUD

ENGINEERING MENU > TELEMETRY MENU > CONFIG PORTS MENU > IOEX/WSOS

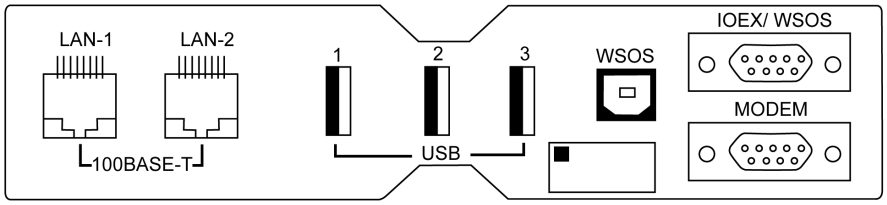
Default Settings for the IOEX3, including **Port Selection** and IOEX **Events Off/ On** are available in the following location:

Communications > IOEX+

ENGINEERING > TELEMETRY > Configure comms > IOEX Settings

Communication Ports

The PowerLogic ADVC3 has various communications ports.



They are:

- USB 2.0 device port
- 3 x USB 2.0 host ports
- 2 x 100Base-T Ethernet
- 2 x RS 232

These ports are typically used for any of the following three functions:

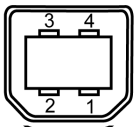
- WSOS5 communications
- SCADA communications
- IOEX

Table 1 Communications Port Allocation Table

Ports	Communication Protocols				
MODEM	WSOS	DNP3	IEC	MODBUS	IOEX
IOEX/WSOS	WSOS	DNP3	IEC	MODBUS	IOEX
USB - 1	WSOS	DNP3	IEC	MODBUS	IOEX
USB - 2	WSOS	DNP3	IEC	MODBUS	IOEX
USB - 3	WSOS	DNP3	IEC	MODBUS	IOEX
LAN - 1	WSOS	DNP3	IEC	MODBUS	
LAN - 2	WSOS	DNP3	IEC	MODBUS	
USB - WSOS	WSOS				

USB WSOS Port

The USB port (WSOS) on the controller uses a standard USB Type B receptacle.



Pinout for this port is according to the USB 2.0 specification as shown in the following table.

Table 2 USB Type B Port Pinout

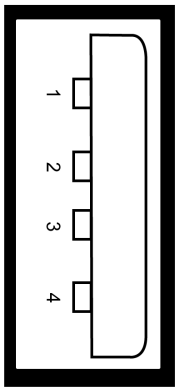
Pin	Name	Description
1	V_{BUS}	+5 V
2	D-	Data -
3	D+	Data +
4	GND	Ground

The USB port is dedicated to running the WSOS software and cannot be used for any other purpose. Connect a PC running WSOS to this port using a USB Type A to Type B cable.

NOTE: The WSOS version to use must be at least 5.16.xx, in order to connect, and communicate with the PowerLogic ADVC via USB.

USB General Purpose Ports

The PowerLogic ADVC comes with three general-purpose USB 2.0 Type A ports namely, USB-1, USB-2, and USB-3.



These ports can be configured to use a suitable USB-RS232 converter if there is a need for additional RS-232 ports. Protocols which can be configured to run on the RS-232 port, can then be configured to run off the USB-1/2/3 ports, with a converter attached to it.

The pinout for the these ports are according to the USB2.0 specification as shown in the following table.

Table 3 USB Type A port pin out

Pin	Name	Description
1	V_{BUS}	+5 V
2	D-	Data -
3	D+	Data +
4	GND	Ground

The USB Type A ports are not isolated from one another or from the controller electronics. Therefore, they can only be connected to devices inside the controller that are powered by the controller radio supply, including modems, optical isolators, and radios.

⚠CAUTION

HAZARD OF EQUIPMENT DAMAGE

- Use of USB ports connecting directly to other devices, outside the controller can cause damage and void warranty.
- If connections to other devices are required, then isolation interfaces must be used.

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

RS-232

Two RS-232 ports (Modem and IOEX/WSOS) are provided to connect to conventional modems that provide the correct signaling for the communications medium used, for example, optical fiber modem, telephone dial-up modem, or RS-232 radio modem. They can also be used to connect to a PC running WSOS via a null modem cable. The Modem port has additional *handshaking* lines, which are not available on the IOEX/WSOS port. Both the RS-232 ports have standard 9 pin D male connectors and the pin connections are as described the following table.

Tale 4 RS-232 Pin Connections

RS-232 Pin No	Direction	Use	IOEX/WSOS	MODEM
1	To PowerLogic ADVC	Data Carrier Detect (DCD)		Yes
2	To PowerLogic ADVC	Rx Data (RxD)	Yes	Yes
3	From PowerLogic ADVC	Tx Data (TxD)	Yes	Yes
4	From PowerLogic ADVC	Data Terminal ready (DTR)		Yes
5		0 V (ground/earth)	Yes	Yes
6	Not connected			
7	From PowerLogic ADVC	Request to Send (RTS)		Yes
8	To PowerLogic ADVC	Clear to Send (CTS)		Yes
9		Reserved	Reserved	Not connected

The RS-232 ports are not isolated from one another or from the controller electronics. Therefore, they can only be connected to devices inside the controller that are powered by the controller radio supply, including modems, optical isolators, and radios.

⚠CAUTION

HAZARD OF EQUIPMENT DAMAGE

- Use of serial ports to connect directly to other devices outside the controller can cause damage and void warranty.
- If connections to other devices are required, then isolation interfaces must be used.

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

Ethernet 100Base-T ports

The controller has two 100Base-T Ethernet ports, marked as LAN-1 and LAN-2. These ports use a standard RJ45 female connector. The pinouts of both the LAN-1 and LAN-2 ports are shown in the following table.

Table 5 Ethernet Pin Connections

Pin	Direction	Use
1	From PowerLogic ADVC	TxData(Tx+)
2	From PowerLogic ADVC	TxData(Tx-)
3	To PowerLogic ADVC	RxData(Rx+)
4	Reserved	

Pin	Direction	Use
5	Reserved	
6	To PowerLogic ADVC	RxData(Rx-)
7	Reserved	
8	Reserved	

WSOS software is permanently running on the Ethernet port and cannot be disabled. But this can be configured to run on just LAN-1 or LAN-2. Other protocols can also be configured to run on these ports at the same time, along with WSOS.

NOTE: The PowerLogic ADVC implements an internal switch for the LAN-1 and LAN-2 support. So, it is essential that if both ports need to be used, then they need to be configured for different subnets.

WSOS

WSOS is a software package that enables configuration, control, and monitoring of the controller on a Windows PC.

By default, WSOS is running on the IOEX/WSOS, USB (WSOS), and the 100 Base-T ports.

The default settings for IOEX/WSOS port are 115200 baud, 8 bit, no parity, and 1 stop bit. WSOS can also be configured to run on the Modem port or any other unused USB Type A ports if required, using a suitable USB-RS-232 converter interface.

NOTE: A suitable USB to RS-232 or USB to RS-485 converter needs to be installed and configured for using the USB type A ports for communication purposes.

SCADA Protocols

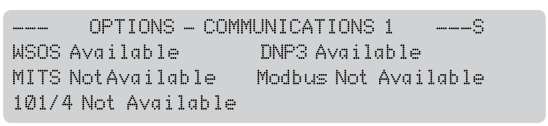
SCADA communications are available on the controller and supported protocols can be assigned to any of the RS-232 ports as well as the USB type A ports via a suitable USB to RS-232 converter. DNP3, IEC60870-5-104 and MODBUS communications protocols can also run on the LAN-1 or LAN-2 100 Base-T ports.

The currently supported protocols can be viewed in:

SYSTEM STATUS > OPTIONS > COMMUNICATIONS 1

ENGINEER MENU > CONFIGURATION MENU > FEATURE SELECTION > COMMUNICATIONS

Only DNP3 protocol is available by default. Other protocols must be made available before they appear in the communications menu.



NOTE: Images shown are for illustration purposes only.

Once you make a SCADA protocol available, its communication parameters can be configured. For more details, refer to the Operator Manual and specific protocol technical manuals.

Installation Testing

What's in This Chapter

Operator Tests 48

Operator Tests

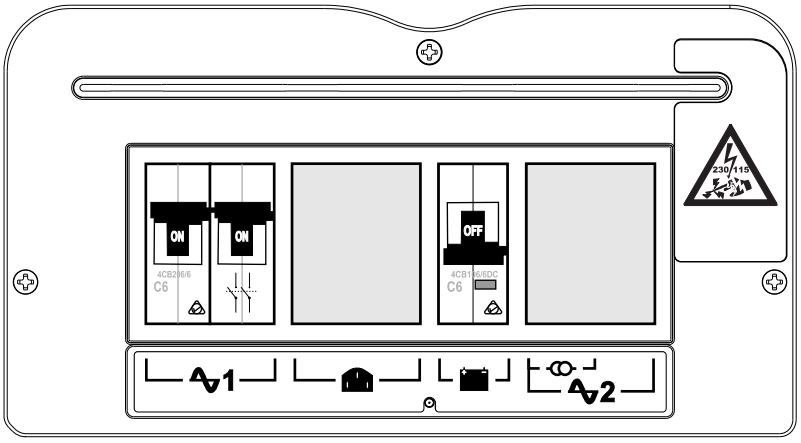
Overview

The following section details about the ACR installation. For more information, refer to Installation, page 16.

NOTE: Check that the installation and external connections have been carried out as described in this manual and in accordance with local regulations.

Check that no visible damage has occurred during the installation. Carry out any visual and electrical tests, such as insulation and contact resistance, considered necessary to prove that the installation is sound.

Powering up the PowerLogic ADVC



PowerLogic ADVC Controller PSU. located at the bottom of the cubicle

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Carry out earthing scheme as instructed.

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

⚠DANGER

HAZARD OF EXPLOSION, FIRE, OR CHEMICAL

- The batteries are capable of supplying high currents. Always turn off the battery circuit breaker before connecting or disconnecting the batteries in the cubicle.
- Never leave fly leads connected to the battery.

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

Steps	Action
1	Turn on the single pole battery circuit breaker, located above the icon.
2	Turn on the dual pole auxiliary supply circuit breaker, located above the 1 icon if the auxiliary supply is being provided by either an LV mains or dedicated auxiliary transformer.
3	If a second AC input is provided, the dual pole MCB located above the 2 icon must be turned on as well. (or)
4	Turn on the VT supply to cubicle circuit breaker if the auxiliary supply is being provided by an integrated transformer (single pole MCB above the icon, if fitted).

Steps	Action
5	Powering up the PowerLogic ADVC with the recloser connected will cause the PowerLogic ADVC to read data from the Switch Cable Entry Module (SCEM) card in the recloser. This will take up to 60 s during which time the message below will flash at the top of the display: **set READING > Do NOT disconnect Switchgear** The **System OK** Light Emitting Diodes (LED) on the OCP must also flash at this time to indicate that the PowerLogic ADVC is powered and functioning. **flex The flexVUE O.I. will create an ALERT with the same message.**
6	If the configuration file containing the settings to be used in operation has not previously been loaded, it must be loaded now using WSOS. Alternatively the settings could be entered via the OCP.

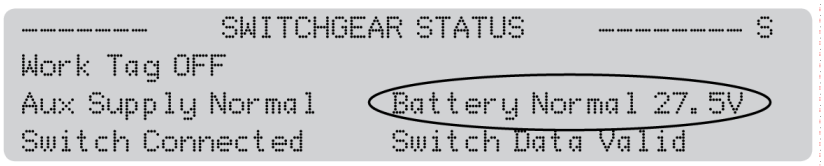
NOTE: For navigating through operator control interface display groups, refer to Operator Control Panel, page 62.

The ACR will now be ready for operation. Before energizing the recloser, you must perform the following checks to confirm that the equipment is fully operational and properly configured.

Battery

1. Check battery status, which is found on the following menu page:

   set System Status > SWITCHGEAR STATUS > S

   NOTE: Images shown are for illustration purposes only.

   flex OPERATOR MENU > SWITCHGEAR STATUS > SWITCHGEAR DATA > Battery Status

   The battery may be in any of the following four states: **Normal, OFF, Low, High**.

   ⚠DANGER

   HAZARD OF EXPLOSION, FIRE, OR CHEMICAL

   - If the battery status is **Low** but the voltage is close to the normal range lower limit, the battery must recharge providing the auxiliary supply is turned on.
   - If the voltage is low, the battery must be replaced.

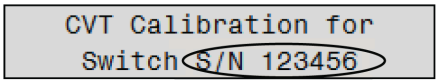
   Failure to follow these instructions will result in death or serious injury.

   At this point, the battery state must be Normal with a voltage within the range 23...29.5 V. **Aux Supply** status must be **Normal**. If not, you cannot perform the remaining battery checks at this stage.

2. Switch off the battery circuit breaker and check whether the battery status changes to off status in 3...5 s.
3. Refer to the Event Log for details on how to do this, and check that the bottom line of the display (the most recent event) displays the battery off event.
4. Again switch the battery ON.

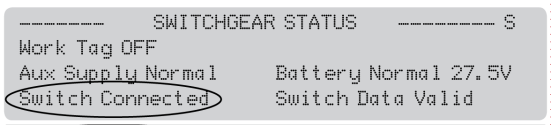
Connection between the PowerLogic ADVC and the Recloser

1. Power up the controller with the control cable plugged in on both the controller side as well as the switchgear side.
2. If the controller and the switchgear were calibrated at the Schneider Factory, the controller will display the serial number of the switchgear that it was calibrated.



3. If the switchgear serial number displayed does not match the serial number of the connected switch, or if this message is not displayed on the panel, then follow the process described in Load Calibration in Calibration of SwitchGear and Controller, page 127.
4. Check the switch status, which is found on the following menu page:

   set System Status > SWITCHGEAR STATUS > S



   flex OPERATOR MENU > SWITCHGEAR STATUS > SWITCHGEAR DATA > Switch Status

   The Switch status may be in either of the two states: `Connected` or `Disconnected`. `Connected` is the normal state. If Switch is `Disconnected`, check the control cable, paying attention to the individual pins in the plug at each end. If the status remains `Disconnected`, with the cable plugged in at both ends, the cable itself may be faulty.

5. Check, if the Switch Data status is `Valid`.

   In normal operation, Switch status will be `Connected`, and Switch Data `Valid`.

   If the control cable has been unplugged (Switch `Disconnected`, Switch Data `Invalid`) then re-plugged (Switch status `Connected`), the Switch Data status will remain `Invalid` for a few seconds, during the time taken by the controller to reinitialize the switch data.

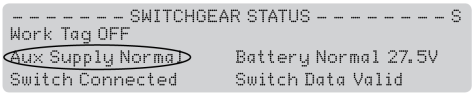
   If Switch data remains `Invalid`, do the following checks:

   - Examine each end of the control cable, checking for bent or broken pins and rectify if found. Also, check the connector at the switchgear and the socket at the *Switchgear* port in the PowerLogic ADVC for damage.
   - If the pins are OK, the cable itself may be faulty and the continuity of each core must be checked. Refer to the Cable Pin out Diagram. For details on the individual connections on both the switchgear side as well as the controller side of the control cable.

Auxiliary Supply

1. Check the Auxiliary Supply `Status`, which is found on the following menu page:

   set System Status > SWITCHGEAR STATUS > S

   NOTE: Images shown are for illustration purposes only.

   flex OPERATOR MENU > SWITCHGEAR STATUS > SWITCHGEAR DATA > Aux Supply Status

   The auxiliary supply may be in any of the following two states: `Normal` or `Fail`. The battery status must be `Normal`.
2. If using LV auxiliary supply, switch off the auxiliary supply. Check whether the Aux Supply `status` changes to `Fail` in 3...5 s.
3. Check, whether the battery voltage has dropped slightly (by ~ 2 V), while remaining in the Normal state.
4. Go to Event Log for details on how to do this and check that the bottom line of the display (the most recent event) contains the Aux Supply Off event.
5. Switch on the auxiliary supply again.

⚠ DANGER

HAZARD OF EXPLOSION, FIRE, OR CHEMICAL

- If the battery voltage is continuously dropping, then the battery state is **LOW** and the batteries may be flat.
- If the batteries are flat, they must be replaced.

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

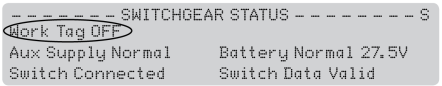
Work Tag

1. Check that **Local Control** is **ON**. This setting is found in the following:

   set System Status > Operator Settings - 1 > S

   flex Operator Menu > Operator Controls > LOCAL CONTROL ON
2. Check **Work Tag** Status on the following menu page.

   set System Status > SWITCHGEAR STATUS > S

   NOTE: Images shown are for illustration purposes only.

   OPERATOR MENU > OPERATOR CONTROLS > Work Tag Applied/OFF

   The Work Tag has two possible settings: `Applied` or `OFF`. `OFF` is the default setting.
3. Press the **SELECT** key to select the work tag field.

4. Press (➡ set) or (⬇ flex) to change the setting to `Applied`. Then press (**ENTER** set) or (**SELECT** flex) to activate the setting.

   The message: set `Work Tag Applied` will flash at the top of the display.

   flex `Work Tag Applied` will be displayed in the **Alerts Menu**, which is on the same level as that of the **Operator** and **Engineer** menus.

   NOTE: For more details, refer to the Event Log, check that the bottom line of the display (the most recent event) contains the Work Tag Applied event.

5. Return to WORK TAG STATUS and change the setting back to `OFF`.

Terminal Designation and Phase Rotation

The power system phase assigned to each set of bushings on the recloser must be correctly configured at the time of installation of the ACR. This process is called *setting the phasing*. Setting the phasing affects all the displays, events, and so on, that are concerned with switchgear terminals, for example: voltage measurements, live/dead terminal displays and maximum current events.

Normal/default Phasing is A, B and C for bushings I/X, II/XX and III/XXX respectively. Normal/ default phase rotation is ABC.

If the Phasing at the recloser and/or phase rotation of the network are different from the defaults, you must set the Phasing and/or the Phase rotation.

On the ***set*VUE** O.I., Phasing is set from the following:

set **SYSTEM STATUS > TERMINAL DESIGNATION/ROTATION > S**

1. Press the **SELECT** key to select the **A Phase** field.
2. Press ➡ to modify the setting. This will cycle A, B & C Phase through the six possible phase/bushing combinations.

```
- - - - TERMINAL DESIGNATION/ROTATION - - - S
A Phase = Bushings I + X       Phasing ABC
B Phase = Bushings II + XX
C Phase = Bushings III + XXX
```

   NOTE: Images shown are for illustration purposes only.

3. Press the **ENTER** key, when you have the required combination. The controller then orientates the currents and voltages to match the selection.
4. In the Phasing field, select the **phase rotation** - either ABC or ACB.

   NOTE: For more details, refer to the Event log, check that the bottom line of the display (the most recent event) contains the Work Tag Applied event.

5. After the phasing has been set, record the details on the label on the rear of the control cubicle door (above the operator panel) to indicate the non-standard relationship between the bushings and phases.

   NOTE: A-B-C remains steady and the associated I-II-III designation rotates through the six possible combinations as shown in the following order, when down arrow is used.

   a. A-B-C=I-II-III
   b. A-B-C=III-II-I
   c. A-B-C=II-III-I
   d. A-B-C=III-I-II
   e. A-B-C=II-I-III
   f. A-B-C=I-III-II

   For information on how to identify the individual bushings, refer to Terminology, ACR Bushings, page 12.

⚠CAUTION

HAZARD OF EQUIPMENT DAMAGE

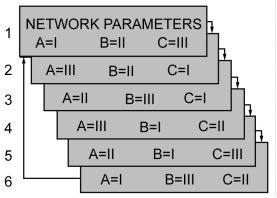
Incorrect terminal designation may cause incorrect operation, false trips, or even damage to the switchgear or controller.

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

flex On the PowerLogic ADVC flexVUE O.I., Terminal Designation is set from the following:

ENGINEER MENU > CONFIGURATION MENU > SYSTEM SETTINGS > NETWORK PARAMETERS > TERMINAL DESIGNATION/ROTATION

1. Press the **SELECT** key and then use ↑ and ↓ to cycle through the possible combinations of bushing/phase relationship until the one representing the correct physical connection is found.



   NOTE: Images shown are for illustration purposes only.

2. Press the **SELECT** key when the required combination is displayed. The controller then orientates the currents and voltages to match the selection.

   Use the ↑ and ↓ to scroll to the **Phasing ABC** option and select the correct phase rotation (either ABC or ACB) at:

   flex **ENGINEER MENU > CONFIGURATION MENU > SYSTEM SETTINGS > NETWORK PARAMETERS > TERMINAL DESIGNATION/ROTATION > Phasing ABC**

   NOTE: For more details, refer to Event log, check that the bottom line of the display (the most recent event) contains the Work Tag Applied event.

3. After the phasing has been set, you must record the details on the label on the rear of the control cubicle door (above the operator panel) to indicate the non-standard relationship between the bushings and phases.

Power Flow Direction Setting

The recloser is a symmetrical device meaning that, either side (I or X) can be connected to the supply. So, after installation, the controller must be configured to designate, which is the source side.

The power flow direction may be either **Source I**, **Load X** or **Source X**, **Load I** and is configured on page:

SYSTEM STATUS > PHASE VOLTAGE and POWER FLOW

ENGINEER MENU > CONFIGURATION MENU > SYSTEM SETTINGS > METERING PARAMETERS > Source I, Load X

Changing this setting, reverses the power flow direction but does not affect the phasing.

Power flow direction setting is used to determine:

- which power flow direction is positive for instantaneous metering purposes, when power is a signed value.
- whether power flow is forward or reverse for calculation of historical records.
- whether the source or load corresponds to (I) or (X) on the voltage measurement displays.
- which power flow direction is considered positive by Automatic Protection Group Selection.
- which is the source or load for Live Load Blocking.
- which power flow direction is considered forward by Directional Blocking/Protection.

Tripping and Closing

If system conditions allow, tripping or closing can be carried out.

- Trip and close the recloser from the PowerLogic ADVC. For more information on the trip and close controls, refer to Operator Control Panel, page 62.
- Trip and close cause the **TRIP** or **CLOSE** LED to illuminate, which indicates the on/off status respectively on the bottom of the recloser.

Enable/Disable Switches

For each of the **TRIP** and **CLOSE** keys in turn, test **ENABLE** and **DISABLE** by:

1. Disable either mechanism (e.g.**CLOSE**) using Disabled Switches located underneath the O.I.
2. Go to the **EVENT LOG** and check that the bottom line of the display (the most recent event) contains the Close Coil Disconnect event. (For the same test of the **TRIP** mechanism the Event Log must display Trip Coil Disconnect).
3. With both mechanisms disabled, check that pressing each of the **CLOSE** and **TRIP** keys are ineffective.
4. Enable both **TRIP** and **CLOSE** mechanisms.

NOTE: For more details, refer to the Event Log, check that the bottom line of the display (the most recent event).

Mechanical Trip

Step	Action
1	Use a hook stick to manually trip the recloser via the manual trip lever.
2	For more details, refer to the Event Log, check that the bottom line of the display (the most recent event) contains the Mechanical Trip event.
3	With the manual trip lever still in the lock position, attempt to close the switchgear from the **CLOSE** key on the control panel. The switchgear must not close and the `event log` must display: • Panel `Close Request` • `Mechanical Interlocked` • `Operation Denied`
4	Use the hook stick to return the manual trip lever to its normal position and check that the switchgear can be closed from the operator panel.

Primary Injection Testing

If the recloser can be isolated from the network, primary injection testing can be performed if required.

Secondary Injection Testing

If secondary injection testing is required to test protection settings but operation of the recloser is not possible, secondary injection can be performed with a suitable current injection set and the TTS in standalone mode connected to the PowerLogic ADVC, with the recloser disconnected.

If tripping and closing of the recloser is possible and preferred, perform secondary injection testing with the TTS in parallel mode.

NOTE: Any secondary injection must use a frequency, which corresponds to the frequency set in the controller.

Control Electronics Operation

What's in This Chapter

Introduction.....57

Introduction

Overview

The PowerLogic ADVC is designed for outdoor pole mounted operation. Both the **ULTRA** and **COMPACT** cubicles are vented and insulated to minimize internal temperature variation and maximize battery life. For more information about cubicle dimensions, refer to Appendix B PowerLogic ADVC **COMPACT** Dimensions, page 124 and PowerLogic ADVC **ULTRA** Dimensions, page 124.

Sealing and Condensation

All cubicle vents are screened against vermin entry and the cubicle door is sealed with replaceable foam tape.

Complete sealing against water entry under all conditions is not expected, for example, during operation in the rain. Instead, the design is such that, if any water enters, it drains out of the bottom without affecting the electrical or electronic parts. A rain shield on the PSU helps to protect MCBs, if the door is open during driving rain. The extensive use of stainless steel and other corrosion proof materials helps to ensure that the presence of moisture has no detrimental effects.

Condensation can be expected to form under some atmospheric conditions such as, tropical storms. However, condensation is on metal surfaces, where it is of no consequence. The water runs out in the same way as any other water entering the cubicle. Condensation runs out of the bottom or be dried by ventilation and self-heating.

All electronic modules are fully sealed to IP65 and are self-heating.

Auxiliary Power Source

The auxiliary supply is used to maintain charge on the sealed lead-acid batteries that provide stand-by power, when auxiliary power is lost. The controller monitors the status of both the auxiliary and battery supplies.

A low-power mode is activated when the batteries are nearly exhausted. This typically occurs due to loss of the auxiliary supply. Low-power mode minimizes power consumption, while still maintaining critical functionality.

Controller

The controller consists of three submodules.

- Power Supply Unit (PSU)
- CAPE with O.I.
- Customer Compartment

For more information, refer to PowerLogic ADVC Block Diagram, page 61.

PSU Module

The PSU module supplies power to the CAPE, and controls the supply from external auxiliary sources.

The power supply module encloses all 115/230 Vac mains connections. Internally, it provides terminals for the auxiliary power supply connection. Cable-tie points are provided to attach the auxiliary supply cables. Circuit breakers are used to help protect and switch the battery and auxiliary power supplies on/off. A durable cover is used to enclose all the terminations.

NOTE: The 115/230 Vac mains connection can handle a -20 %...+ 10 % variance from the auxiliary supply.

CAPE Module

The main module of control electronics is the CAPE. The CAPE digitizes the CT signals and Capacitive Voltage Transformer (CVT) signals from the recloser. These are used to provide various data for the operator.

The CAPE module contains the Protection and Communications (PCOM) board, Power Supply and Switchgear Module (PSSM) board, trip/close capacitors, and O.I. assembled into a housing that provides protection from the environment, sealing, and EMC shielding.

The CAPE performs the following functions:

- O.I.
- Operating the external communications interface to allow monitoring and control from a remote computer or operator over a communications link.
- Switchgear Monitoring and Control
- Communicating with WSOS5 over an RS-232, USB or Ethernet link. The IOEX/WSOS port is by default configured for WSOS connection. USB type B (WSOS) and Ethernet ports are permanently configured for WSOS.
- Supply power to all electronic circuits and the customer compartment.

PCOM Submodule

The PCOM submodule contains a Digital Signal Processor (DSP), which samples the current and voltage signals from the switchgear and processes them to derive the basic power system information such as current, voltage, frequency, real power, reactive power, and so on. This is then used by the General Purpose Processor to provide PCOM functions for example, over-current protection. It also presents this data to the outside world via various communications protocols.

PSSM

The PSSM fulfills power supply and switchgear functionality.

The power supply function controls and filters the supply from external auxiliary supplies. Power is supplied to all the electronic submodules in the PowerLogic ADVC and customer compartment. It also manages the battery power level and performs battery testing.

The switchgear interface function provides controlled pulses of current to trip and close the switchgear.

O.I.

The O.I. is mounted on the CAPE and is accessed by opening the cubicle door. Operators can view switchgear and system data as well as control and configure the system via the O.I. The O.I. has its own electronic processing and driver circuit, and OCP with Liquid Crystal Display (LCD), membrane keyboard, and status LEDs.

WSOS5 Interface

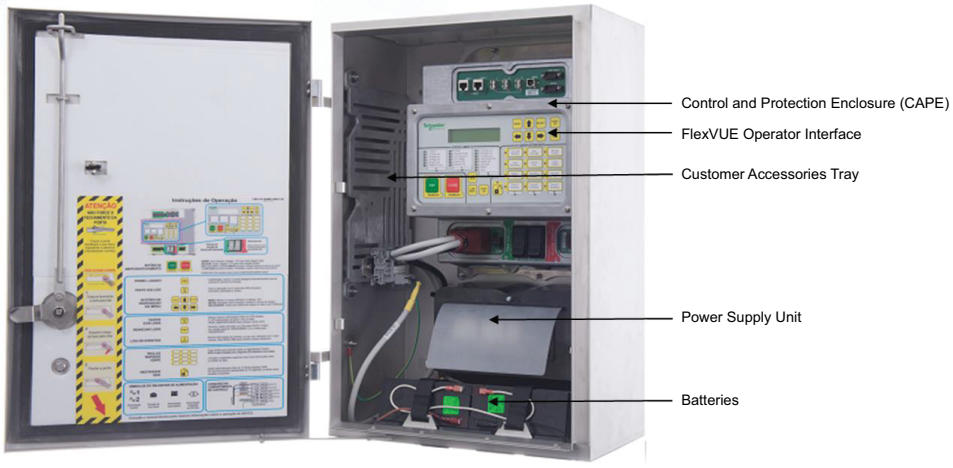
To use WSOS5 to upload or download data, connect between either:

- a serial port on the WSOS PC and the IOEX/WSOS RS-232 Port. Use an RS-232, DB9 female to DB9 female, crossover cable (also known as Null Modem).
- USB on the WSOS PC and the USB port on the controller. Use a standard USB Type A to Type B cable.
- 100 Base-T Ethernet ports. Either a standard Ethernet cable or a cross-over cable can be used.

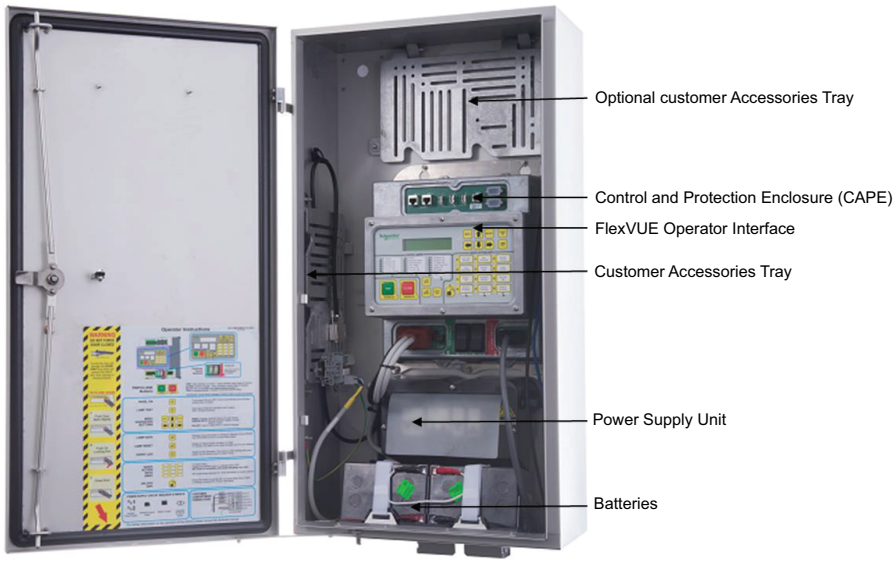
Customer Compartments

The **COMPACT** cubicle compartment is fitted with an accessory tray that facilitates the mounting of your equipment, for example, a radio or modem.

The **ULTRA** cubicle has one standard, and one optional accessory tray to allow for more equipment. The standard tray has a terminal block for the radio power supply and power for accessories such as an IOEX3.



*Compact PowerLogic ADVC with flex***VUE** *O.I.*



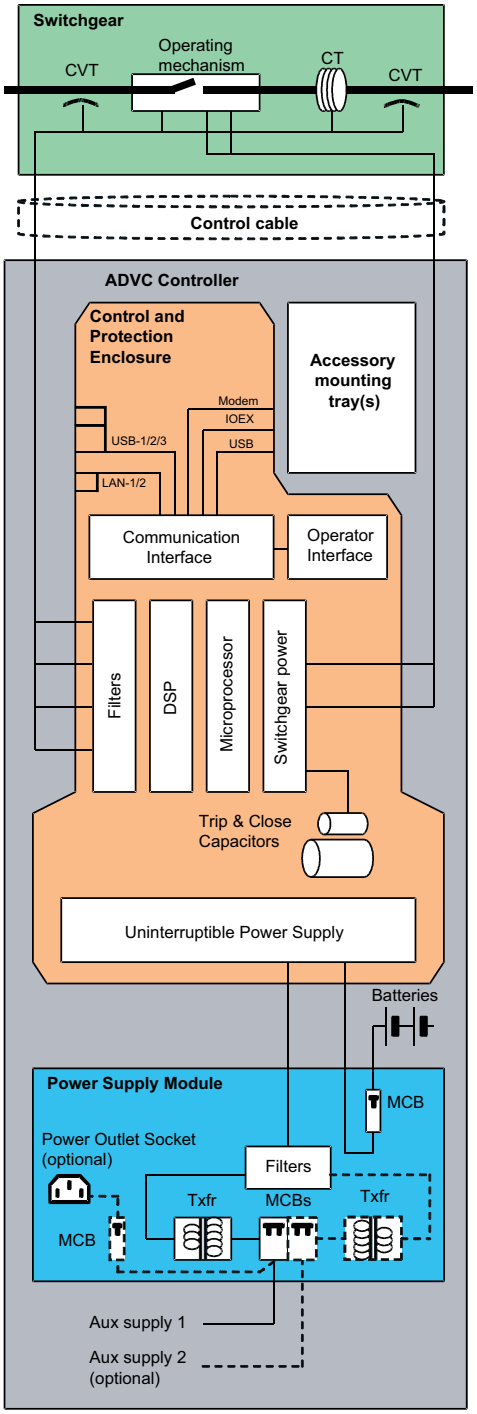
*Ultra PowerLogic ADVC with flex***VUE** *O.I.*

Ancillary Equipment

The PowerLogic ADVC is fitted with a standard customer compartment tray that facilitates the mounting of ancillary equipment, for example, a radio or modem including any special interfaces. The compartment has a terminal block for the radio supply and power for accessories such as, an IOEX3.

Standard Customer Compartment Tray

PowerLogic ADVC Block Diagram



PowerLogic ADVC Controller block diagram

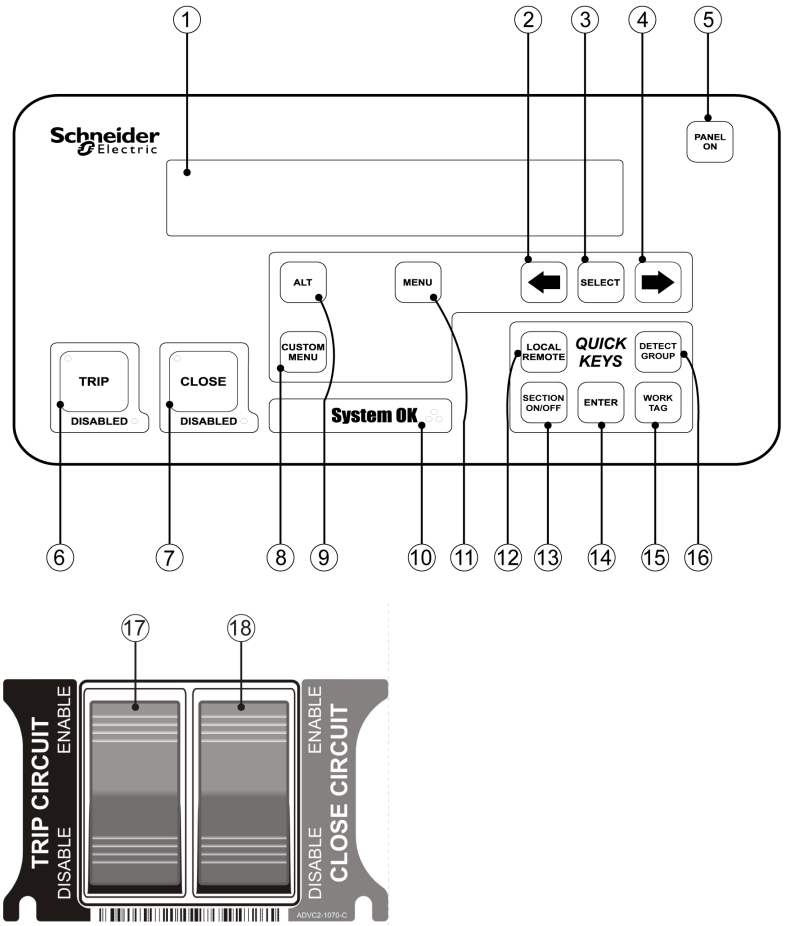
OCP

What's in This Chapter

***set*VUE** Panel Interface 63
***flex*VUE** Panel Interface 68

*set*VUE Panel Interface

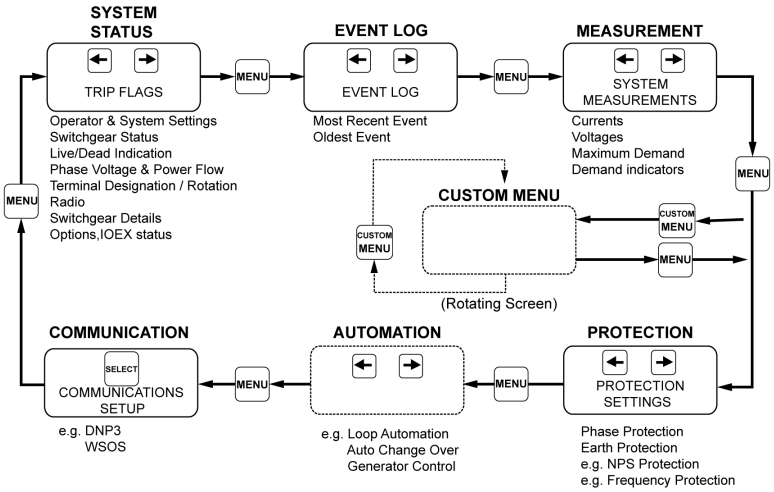
*set*VUE Panel



S.No	Item	Description
1	Display	Back-lit LCD, 4 line with 40 characters per line.
2	**LEFT** scroll key	Selects the previous screen in a display group or, if a setting is selected, decreases its value.
3	**SELECT** key	Selects a data field/setting so that it can be changed.
4	**RIGHT** scroll key	Selects the next screen in a display group or, if a setting is selected, increases its value.
5	**PANEL ON** key	Turns on the O.I. The O.I. turns on when the cubicle door is opened if a door proximity switch is fitted.
6	**Trip** key	Generates a Trip request to the CAPE when the panel is active. An LED is embedded in the key to indicate its operation. Another LED is used to indicate whether this keys operation is DISABLED.
7	**Close** key	Generates a Close request to the CAPE when the panel is active. An LED is embedded in the key to indicate its operation. Another LED is used to indicate whether this keys operation is DISABLED.
8	**CUSTOM MENU** key	Grants access to the custom menu, which was configured using WSOS5. The custom menu is configured to provide a regular, updated data display by allowing a cycle of up to 12 screens.
9	**ALT** key	Grants access to an alternative event log display.
10	**SYSTEM OK**	The three **System OK** LEDs flash while the controller is operating normally.
11	**MENU** scroll key	Displays the first page of the next group. Pressing the **MENU** key after changing a setting causes the setting change to take effect.
12	**Configurable Quick** Key	Default linkage is to LOCAL/REMOTE.
13	**Configurable Quick** Key	Default linkage is to AUTO ON/OFF.

S.No	Item	Description
14	**ENTER** key	Press this key in order to commit a setting change that has been made. (Unlike the adjacent Quick Keys, the **ENTER** key is not configurable.)
15	**Configurable Quick** Key	Default linkage is to **PROT.GROUP**.
16	**Configurable Quick** Key	Default linkage is to **EARTH PROT**.
17	Enable/ Disable**TRIP** switch	Disables all **trip** Operations. When the switch is in the Disable position the trip coil in the recloser is electrically disconnected from the control electronics. Thus the switch provides a physical isolation point for the control circuitry. The recloser cannot be opened, and an audible alarm in the panel sounds and the DISABLED LED in the **TRIP** key will flash. The **TRIP** key operates normally when the switch is in the Enable position. This switch also stops a close operation, so that the switchgear cannot be carrying load without the ability to trip.
18	Enable/ Disable**CLOSE** switch	**Disables all close operations**. When the switch is in the Disable position the close coil in the recloser is electrically disconnected from the control electronics. Thus the switch provides a physical isolation point for the control circuitry. The recloser cannot be closed and an audible alarm in the panel will sound and the DISABLED LED in the **CLOSE** key will flash. The **CLOSE** key operates normally when the switch is in the Enable position.

Display Groups



Navigating the menu Structure

For more details on configuring the custom menu, refer to the diagram inside the controller door or to the Installation and Maintenance Manual for details of Navigation within groups.

For details on Navigation within groups, refer to PowerLogic ADVC Operations Manual for more details. To use the custom menu, press the **CUSTOM MENU** button.

Display Screen Layout

The display area consists of four lines, each forty character long.

NOTE: Images shown are for illustration purposes only.

```
--------------    PAGE TITLE    --------------S
Field                  Field
Field                  Field
Field                  Field
```

The top line of the display is the page title. To the right of the title is a letter, indicating the display group to which the page belongs:

Display Group Codes	
Code	**Display Group**
S	**System Status Display Group**
P	**Protection Display Group**
D	**Detection Display Group**
M	**Measurement Display Group**
A	**Automation Display Group**
C	**Communications Setup**
E	**Event Log**

The next three lines are the data on display. Most displays have six data fields. A field may contain either:

- a setting, which can be changed - ON/OFF is the most common; or
- a status

Changing Settings

Three types of settings can be changed:

- Operator settings
- Password protected settings
- Protection settings

Operator Settings

To change an operator setting:

Steps	Action
1	Navigate to the display page containing the setting to be changed.
2	Press the **MENU** key to step through the Display Groups.
3	Communications Group (only) is divided into subgroups for different protocols. Press **SELECT** to display the subgroup required.
4	When the Display Group containing the setting to be changed is displayed, press ⬅ or ➡ to locate the correct page.
5	Press **SELECT** until the field containing the setting to be changed is flashing.
6	Once you have selected the field to be changed, use ⬅ or ➡ to change its setting.
7	Press **ENTER** to put the new setting into service.

NOTE: If a **QUICK KEY** is linked to the setting to be changed, you can use it to go directly to the relevant display page where the field with that setting will be selected. For more information, refer to Quick Keys, page 66.

Password Protected Settings

Some settings are password protected. You are prompted for a password before you can change the setting. To enter the password:

Step	Action
1	Press either of the ⬅ / ➡ keys until the first character of the password is displayed.
2	Press the **SELECT** key to move to the next character selection.
3	Repeat Steps 1 and 2 until the password is complete.
4	Press **ENTER**.

While the operator panel remains ON, you will not be required to enter the password again.

The default factory password is **AAAA** but you can change it using the WSOS5 program. The factory password does not have to be remembered - the controller prompts you for it automatically.

Protection Settings

Protection settings are password protected. To change a protection setting, follow the steps detailed in the Operator Settings section above but, in addition, enter the password when prompted. When you have completed the setting change by pressing **ENTER**, the following message flashes at the top of the screen:

```
Active Protection Setting has changed.
```

At this point, the changed setting is displayed but not in service. If further setting changes are required, they can be made now.

When you have completed making all the setting changes you require, press **ENTER**. The following text is displayed:

```
CHANGED ACTIVE PROTECTION SETTING [A]
```

The changed active PROTECTION SETTINGS are now in service.

Select the **MENU** or **ENTER** key to continue.

The changed settings are now in service. Press **MENU** or **ENTER** to return to the normal menu display.

Quick Keys

The operator settings that you will frequently change can each be linked to a **QUICK KEY**. You use a **QUICK KEY** for instant display and selection of the linked setting which, otherwise, you would have to find by navigation.

You can link operator settings to individual Quick Keys using the O.I. or **WSOS5**.

A **QUICK KEY** can be set to blank if it is not required.

Otherwise, any one of the settings in below table, can be linked to one of the four Quick Keys.

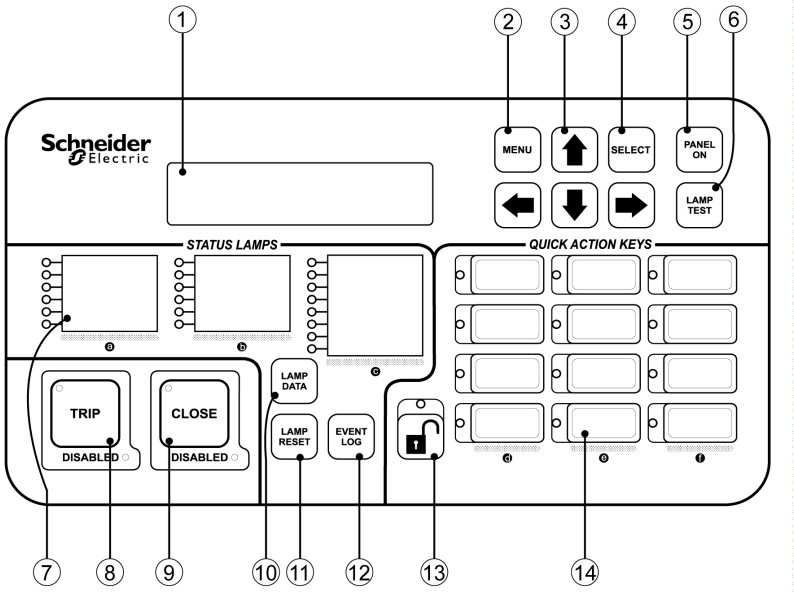
Configurable Quick Key Settings	
Setting	**Default status**
LOCAL/Remote/Hit & Run	Default setting, upper left key
Loop Auto ON/OFF	Configurable
Protection Group	Default setting, lower right key
Reset Flags	Configurable
Work Tag ON/OFF	Configurable

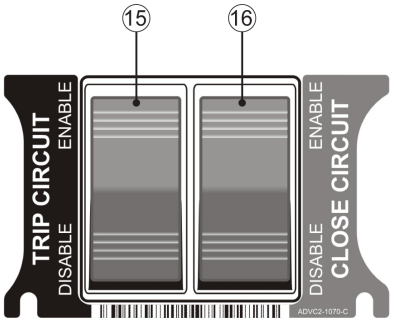
Configurable Quick Key Settings	
Setting	**Default status**
Auto ON/OFF Protection OFF	Default setting, lower left key
Cold Load ON/OFF	Configurable
Earth Protection	Default setting, upper right key
Live Block	Configurable
Negative Phase Sequence Protection OFF/ON/ Alarm	Configurable
Detection Group	Configurable
Earth Detection	Configurable
Section ON/OFF	Configurable

For more information, refer to the PowerLogic ADVC Operations manual (N00-812).

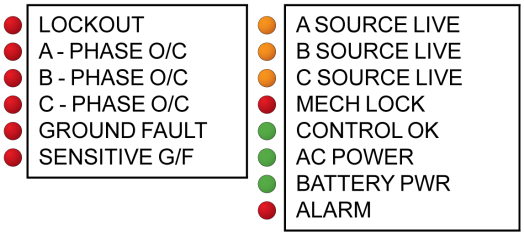
*flex*VUE Panel Interface

*flex*VUE Panel





S.No.	Item	Description
1	Display	Back-Lit LCD. 2 × 20 character display.
2	**MENU** key	Allows the user to enter the configuration menu from where it is possible to navigate the menu structure, select fields and edit settings. Navigating these pages is described separately.
3	Arrow/Navigation keys	Helps browse between display groups, fields, and change values.
4	**SELECT** key	Selects fields or values when changes are made.
5	**PANEL ON** key	Turns the panel on or off. An optional door switch is available to turn on the panel, when an operator opens the door and off, when the door is closed. If the controller is fitted with this option, the button can be used to turn the panel on/off while the door is open. Closing the door turns off the panel.
6	**LAMP TEST** key	Tests all lamps on the panel. The purpose is to alert the user of any lamps or colors that may not be working correctly. The test simultaneously cycles all lamps through red, orange, and green.
7	**Indicator LEDs**	Provide instant indication of the controller and switchgear status. Depending on the configuration, the lamps can be red, green, or orange and on, off or FLASHING. The multiple colors allow for grouping of similar functions for example, red for protection, orange for voltage and green for system health.

S.No.	Item	Description
		 **[For example]** The configuration of the status lamps can be changed within WSOS Version 5.
8	**TRIP** key	Trips the switchgear to Lockout and the green lamp located inside the button indicates the open state of the recloser.
9	**CLOSE** key	Closes the switchgear and the red lamp located inside the button indicates the close state.
10	**LAMP DATA** key	Provides the operator with additional data specific to each status lamp.
11	**LAMP RESET** key	Resets the status lamps. Lamps requiring further attention from the operator remains lit. **NOTE:** Some of the status lamps such as *controller power* and *terminal live* are continuously updated and therefore not affected by the reset command.
12	**EVENT LOG** key	Displays the recloser and controller Event Log on the LCD display. Older events can be viewed by pressing the UP arrow key.
13	Quick Action Key Unlock	To use the Quick Action Keys (QAK), an operator must first press the **unlock** key. The lamp above the **unlock** key remains lit while the QAK are active. To deactivate the QAK an operator can press the **unlock** key again. The lamp turns off. Alternatively the QAK will be deactivated automatically a short configurable delay after the last quick action key was selected.
14	QAK	Allows the user to activate/deactivate functions directly from the interface without having to use the menu. The status of the function is indicated by the lamp next to the button. The lamp can be configured to be red, green, or orange in color and flashing. Before using the QAK, it is necessary to unlock the keys using the unlock button described above. Pressing a quick action key applies that action without any further confirmation and the lamp next to the key indicates the new status.
15	Enable/ Disable **TRIP CIRCUIT** key	Disables all trip operations. When the switch is in the Disable position, the trip coil in the recloser is electrically disconnected from the control electronics. Thus the switch provides a physical isolation point for the control circuitry. The recloser cannot be opened, and an audible alarm in the panel sounds and the DISABLED LED in the **TRIP** key flashes. The **TRIP** key operates normally when the switch is in the Enable position. This switch also stops a close operation, so that the switchgear cannot be closed unless it is able to trip.
16	Enable/ Disable **CLOSE CIRCUIT** key	Disables all close operations. When the switch is in the disable position, the close coil in the recloser is electrically disconnected from the control electronics. Thus the switch provides a physical isolation point for the control circuitry. The recloser cannot be closed and an audible alarm in the panel sounds and the DISABLED LED in the **CLOSE** key flashes. The **CLOSE** key operates normally when the switch is in the Enable position.

Default Configuration

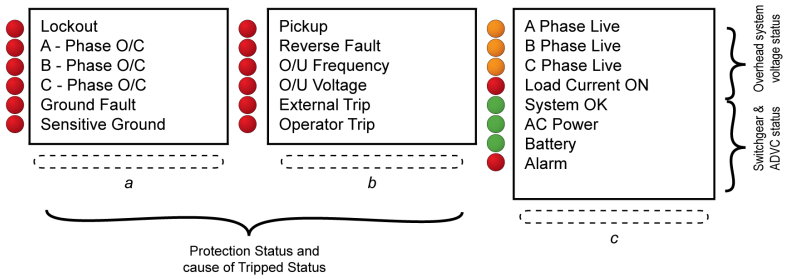
The status lamps and the QAK are programmed in the factory to a default configuration. This can be changed to suit the needs of the user through WSOS5.

Status Lamps

These lamps are used to indicate the controller and switchgear status. The default configuration is shown below. Each lamp indicates that the state of the function described next to it. When a state is active, the lamp is lit.

Example:

When, the recloser is in Lockout the lamp next to **Lockout** is on. Conversely, if the lamp is off, the recloser is not in a lockout state.



It is possible that more than one lamp is lit at a given time.

Example:

When, a recloser tripped to lockout due to an overcurrent fault on Phase A, both **Lockout** and **A-Phase O/C** lamps are lit.

LED#	Color	Description	Possible Causes
Column A			
a-1	Red	**Lockout**	Recloser has tripped to lock-out due to a protection sequence or operator command. Automatic close operations are not possible and the operator has to close the recloser using the control panel or a remote command.
a-2	Red	**A-Phase O/C**	The most recent protection trip of the recloser was caused by an over current detected fault on the network phase/s indicated.
a-3	Red	**B-Phase O/C**	
a-4	Red	**C-Phase O/C**	
a-5	Red	**Ground Fault**	A ground fault has caused the recloser to trip.
a-6	Red	**Sensitive Ground**	The recloser has tripped due to a sensitive ground fault.
Column B			
b-1	Red	**Pickup**	One of the protection elements has picked up. For example, when the phase current exceeds the trip setting value.
b-2	Red	**Reverse Fault**	Protection has detected a fault on the source side of the recloser.
b-3	Red	**O/U Frequency**	An over or under frequency detected fault has caused the recloser to trip.
b-4	Red	**O/U Voltage**	The switchgear has tripped due to the operation of an external device.
b-5	Red	**External Trip**	The switchgear has tripped due to the operation of an external device.
b-6	Red	**Operator**	A local or remote operator has tripped the recloser.
Column C			
c-1	Orange	**A Phase Live**	The source or load side bushing of the phases/s indicated are live.
c-2	Orange	**B Phase Live**	
c-3	Orange	**C Phase Live**	
c-4	Red	**Load Current On**	A current greater than 2 A is flowing through one or more phases.

LED#	Color	Description	Possible Causes
c-5	Green	**System OK**	The controller is functioning normally. Maintenance may be required when the lamp is flashing red. For more information, consult the event log.
c-6	Green	**AC Power**	Flashing red LED when auxiliary power is off.
c-7	Green	**Battery**	Flashing red LED when battery is off or test failed.
c-8	Red	**Alarm**	Flashing red LED when **TRIP** or **CLOSE** circuits are isolated, contact life is low or the switchgear is locked.

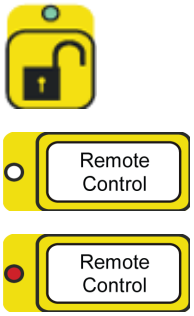
QAK

The QAK allow the operator to select functions directly from the panel. Selecting a quick action applies that action without any additional confirmation and the LED next to the key indicates that the action was performed.

Before selecting a quick action, the operator must first unlock the **QAK**. This is done by pressing the **unlock** key.

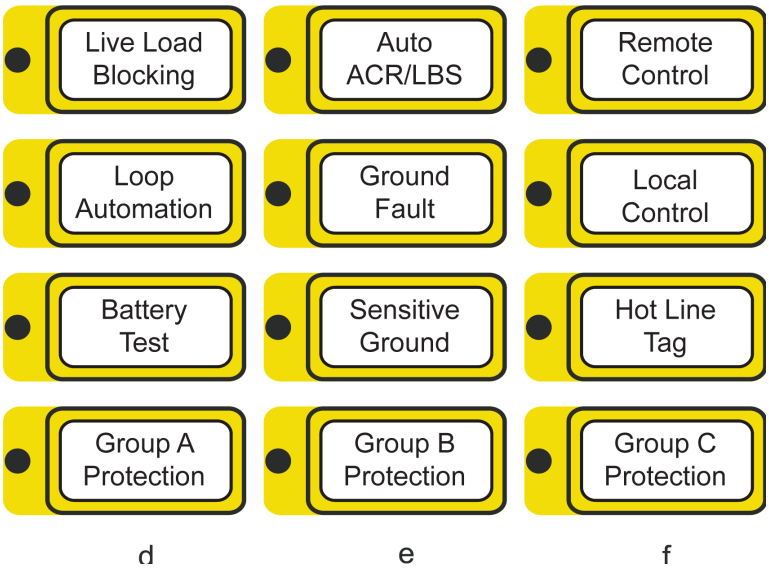
Example:

To, activate supervisory control (Remote Control) an operator must press the following keys:



It is possible to press a sequence of QAK while the unlock LED is lit. The keys will be locked automatically after a short delay after the last key press or alternatively when the **unlock** key is pressed a second time.

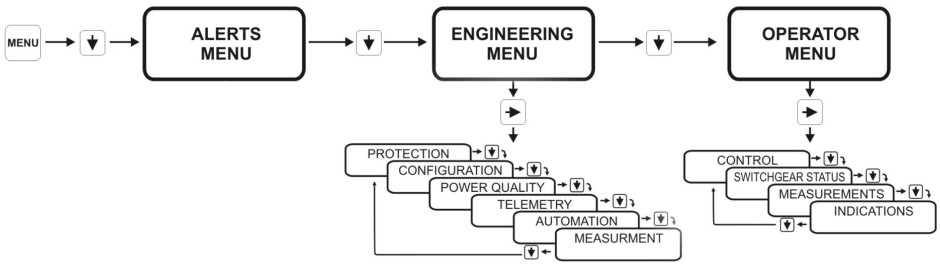
This controller is programmed with a default quick action key configuration that provides access to frequently used actions. The default configuration is shown below.



LED#	Color	Description	Possible Causes
Column D			
d-1	Red	Live Load Blocking	The key toggles the Live Load Blocking feature on/off. A red LED indicator
d-2	Red	Loop Automation	Turns the Loop Automation feature on/off.
d-3	Red	Battery Test	This QAK performs a battery Test and the result is displayed in the Event Log.
d-4	Red	Group A Protection	Activates the settings configured in Protection Group A.
Column E			
e-1	Red	Auto ACR/LBS	The key toggles the Auto Reclose feature on/off. A red LED indicator shows when Auto Reclose is on.
e-2	Red	Ground Fault	Turns Ground (Earth) Fault protection on/off.
e-3	Red	Sensitive Ground Fault	Turns Sensitive Ground (Earth) Fault protection on/off.
e-4	Red	Group B Protection	Activates protection settings configured in Protection Group B.
Column F			
f-1	Red	Remote Control	The key turns REMOTE control on and LOCAL control off. A red LED indicator shows when the controller is in Remote mode.
f-2	Red	Local Control	The key turns LOCAL control on and REMOTE control off. A red LED indicator shows when the controller is in Local mode.
f-3	Red	Hot Line Tag	Hot LineTag (WorkTag) is applied using this QAK. Hot Line Tagging helps to ensure that closing cannot take place and also activates the Hot Line Tag protection settings.
f-4	Red	Group C Protection	Activates protection settings configured in Protection Group C.

Display Groups

The ***flex*VUE** O.I. displays are organized into three logical groups. Within each group is a menu of pages and those pages have various sub-menus.



Navigating the Menu Structure

Refer to the diagram inside the controller door or to the Installation and Maintenance Manual for details of Navigation within groups.

Display Screen Layout

The display area consists of two lines, each 20 character long as shown below.

```
PAGE TITLE
Options
```

The top line of the display is the page title. The top line of the display shows the current menu position and the second line lists the options available one option at a time. An operator uses the UP and DOWN arrows to scroll through the list of options. The RIGHT arrow will progress to the next level of the option shown on the second line of the display. Use the LEFT arrow to go back one level. When an operator is editing a setting, the top line of the display shows a few basic instructions and the bottom line shows the setting value.

Changing Settings

Three types of settings can be changed:

- Operator settings
- Password protected settings
- Protection settings

Operator Settings

Find the display page containing the setting to be changed:

Step	Action
1	Press the **MENU** key to enter the menu structure.
2	Press the ↓ arrow and then the → arrow to enter the **Operator Menu**.
3	Use the ← or → arrow keys to navigate to the setting to be changed.
4	Press **SELECT** key.
5	Use ↑ or ↓ arrow keys to change the setting.
6	Press the **SELECT** key to accept the change, or press the ← arrow to escape and leave the setting unchanged.

Alternatively, if a QAK operates the setting you wish to change:

Step	Action
1	Press the **QAK UNLOCK**.
2	Press the required Quick Action Key within 10 s (Configurable).

NOTE: Actions are executed without any confirmation via the arrow or select keys. The LED indicates the new state.

Password Protected Settings

Some settings are password protected. You will be prompted for a password before you can change the setting. To enter the password:

Step	Action
1	Press the ↑ or ↓ arrows until you find the required character for the password.
2	Press the → arrow key.
3	Repeat steps 1 and 2 until the password is complete.
4	Press **SELECT** to enter the password. While the operator panel remains ON, you will not be required to enter the password again.

The default factory password is **AAAA** but you can change it using WSOS5 software. The factory password does not need to be remembered - the controller prompts you for it automatically.

Alerts Menu

The***flex*VUE** panel provides the user with a specific location to deal with alerts from the controller. The **ALERTS MENU** is found as part of the **MAIN MENU** on the O.I. You can view these alerts in the same way you would view any other menu options. Alerts are split into two categories, critical and normal.

Normal Alerts

All normal alerts go into the **ALERTS MENU**. The activation of a normal alert causes the title line of the current display to show:

xx Alerts Active

This alternates with the current display title at a sufficient rate that the current display is easily readable so that panel usage and field editing can easily continue. **XX** is the number of alerts that are present at the time.

The displayed number of normal alerts may change from one flash to the next if a new alert is added or an old one is removed.

The title of the alert menu contains the number of alerts that are present. This is shown as:

ALERT MENU X/Y

Where **X** is the alert currently displayed and **Y** is the total number of alerts present.

A normal alert message will generally be longer than 20 characters and will automatically scroll to allow viewing of the complete message. If, a normal alert is present a beep occurs at a fixed time interval.

All buttons function normally while a normal alert is present.

Critical Alerts

A critical alert will completely subvert the operation of the LCD display regardless of what is being displayed. There is no way to remove the critical alert from the display while it is active.

If a critical alert is present, a beep occurs at a fixed time interval.

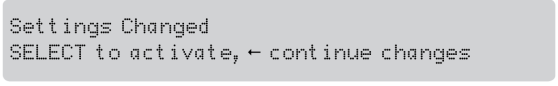
All buttons except for the navigation buttons (←, →, ↑ , ↓ **MENU**, **SELECT**, **LAMP DATA**, **EVENT LOG**) operates normally while a critical alert is present.

Activating Protection Settings

When settings are changed in the Active protection group (via the ***flex*VUE** O.I.), those new settings are saved but will not be put into service until they are made ACTIVE.

When changing Active Protection Group settings, once the first setting is changed the following screen appears: (scrolling)

NOTE: Images shown are for illustration purposes only.



This message is displayed if:

- Settings are changed within the **ACTIVE PROTECTION GROUP**.
- The current setting is the first one to be changed.
- Before changing this setting; all the current settings were ACTIVE in service.

Once this message is displayed, there are three options:

- **NO ACTION:** The new setting will automatically go in service if the operator ignores the above message and turns off the O.I., or the interface turns off automatically.
- **PRESS SELECT:** If the operator presses the **SELECT** key, the new setting is put into service immediately. The operator can continue to browse the menu. With all the current settings in active service, if the operator makes another setting change the above message is prompted when the first of the new settings are saved.
- **PRESS THE ARROW:** This allows the operator to browse other settings and allow them to be changed.

Exiting the Protection Menu

The operator will not be prompted to ACTIVATE the settings again until they try to exit the **PROTECTION MENU**, when the following screen appears:

NOTE: Images shown are for illustration purposes only.

The operator has to press the **UP** or **DOWN ARROW** key. That displays the following:

NOTE: Images shown are for illustration purposes only.

NOTE: Images shown are for illustration purposes only.

When the operator scrolls to **YES** and presses **SELECT**, the settings are put in service. If the operator selects **NO** and presses the **SELECT** key, the following message is displayed: (scrolling)

NOTE: Images shown are for illustration purposes only.

Re-Entering the Protection Menu

The operator may exit the **Protection Menu** without activating the saved settings, and then re-enter the **Protection Menu** at a later time. In this case the process will run through the same activation sequence as shown in Exiting the Protection Menu, page 75, providing the settings haven't already been put into service by a panel shutdown.

Event Log

Introduction

The PowerLogic ADVC maintains a log of up to 100,000 events that record changes to the status of the switchgear, control electronics, and PowerLogic ADVC logic. The log also records critical setting changes. The events can be viewed via the O.I. in the **EVENT LOG** display group.

The event log display updates automatically as new events occur. The most recent event appears on the bottom line of the display and older events are scrolled upwards. When the event log is full, the oldest events are deleted to allow new events to be logged as they occur.

All events are date and time stamped to a 1 ms resolution and displayed in the order that they occurred. The source of each event is also recorded.

It is possible to apply event category filters when viewing events via the O.I.

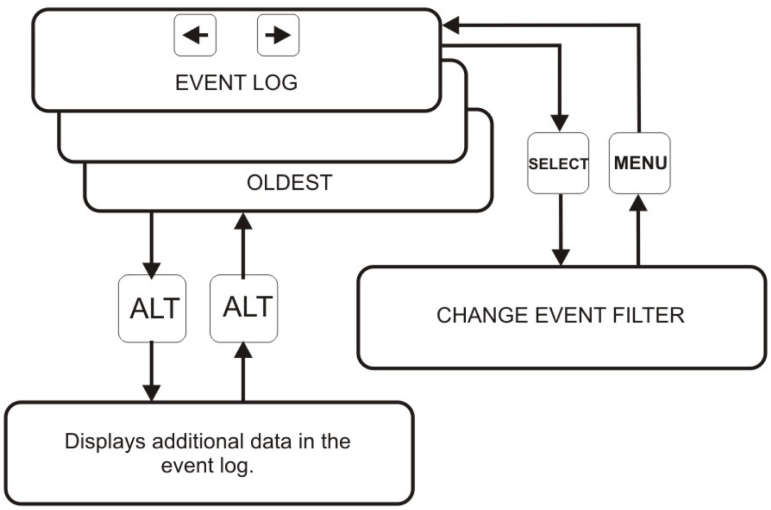
WSOS5 software can also be used to upload and display the event log. In addition to O.I.- like time stamp, source identification and filter category features, it also allows text searches and go to a particular date/time. The event log can be saved as a text file or as a .csv file. For more information, refer to the WSOS5 help file.

Reading the Event Log

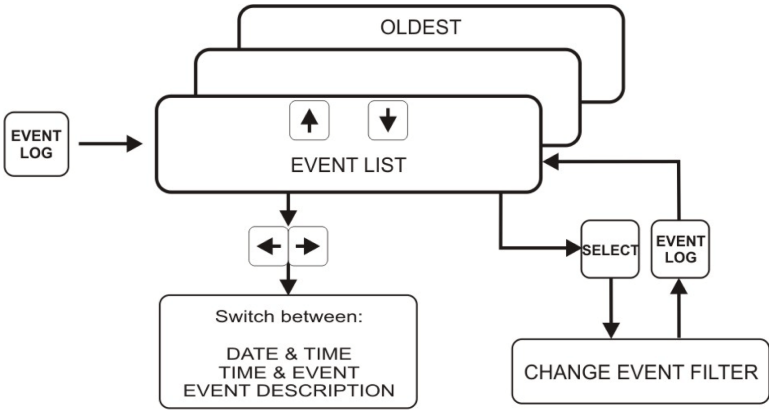
On the ***set*VUE** panel, the event log display group is one of the main display groups.

On the ***flex*VUE** panel, the event log is found via a dedicated key on the O.I.

The **EVENT LOG** is navigated slightly differently depending on which O.I. is installed. For more information on navigation diagrams, refer to figures below for setVUE Navigation Diagram and flexVUE Navigation Diagram.



*set***VUE** *Navigation Diagram*



*flex***VUE** *Navigation Diagram*

Description	set	flex
Number of Events shown on screen	4 Maximum	2 Maximum
Key to Scroll to OLDER events	⬅	⬆
Key to Scroll to NEWER events	➡	⬇
Show the **CHANGE EVENT FILTER** screen	**SELECT**	**SELECT**
Return to **EVENTLOG** from **FILTER** screen	**MENU**	**EVENT LOG**
View additional information about event (if available)	**ALT**	**EVENT LOG**
Switch between **DATE/TIME,TIME/ EVENT&EVENTDESCRIPTION**	-	⬅ ➡

Typical Event Log Trip Sequence Display

The following **EVENTLOG** is an example of a phase trip sequence with two trips to lockout (some events are not displayed for simplicity).

---------- EVENTLOG ----------E	**Comment**
08/06/05 09:27:52.64 Lockout	Lockout
08/06/05 09:27:52.63 C 305 Amp	C phase current at trip
08/06/05 09:27:52.63 B 302 Amp	B phase current at trip
08/06/05 09:27:52.63 A 303 Amp	A phase current at trip
08/06/05 09:27:52.36 Prot Trip 2	2nd trip after 17.26s
08/06/05 09:27:52.36 Phase Prot Trip	Phase element trip
08/06/05 09:27:52.36 Prot Group A Active	Protection group A
08/06/05 09:27:35.10 Pickup	Pickup again
08/06/05 09:27:33.70 Automatic Reclose	1st reclose
08/06/05 09:27:33.69 C 302 Amp	C phase current at trip
08/06/05 09:27:33.69 B 300 Amp	B phase current at trip
08/06/05 09:27:33.69 A 301 Amp	A phase current at trip
08/06/05 09:27:33.42 Prot Trip 1	1st trip after 17.27s
08/06/05 09:27:33.42 Phase Prot Trip	Phase element trip
08/06/05 09:27:33.42 Prot Group A Active	Protection group A
08/06/05 09:27:16.15 Pickup	Start of fault (pick up)

NOTE: Images shown are for illustration purposes only.

The following **EVENTLOG** is an example of a sequence reset (some events are not displayed for simplicity).

---------- EVENT LOG ----------E	Comment
09/01/05 10:39:22.50 Sequence Reset	Sequence reset after 10s
09/01/05 10:39:12.50 Automatic Reclose	1st reclose
09/01/05 10:39:12.49 C Max 301 Amp	Max C phase fault current
09/01/05 10:39:12.49 B Max 302 Amp	Max B phase fault current
09/01/05 10:39:12.49 A Max 300 Amp	Max A phase fault current
09/01/05 10:39:12.22 Prot Trip 1	1st trip after 17.27s
09/01/05 10:39:12.22 Phase Prot Trip	Phase element trip
09/01/05 10:39:12.22 Prot Group A Active	Protection group A
09/01/05 10:38:54.95 Pickup	Start of fault (pick up)

NOTE: Images shown are for illustration purposes only.

Display of Events

set The difference in the display on the ***set*VUE** and ***flex*VUE** are shown in the following example.

Consider the following events, as shown on the ***set*VUE**:

NOTE: Images shown are for illustration purposes only.

```
09/01/15  10:39:12.49  B Max 302 Amp
09/01/15  10:39:12.49  C Max 301 Amp
09/01/15  10:39:12.50  Automatic Reclose
09/01/15  10:39:12.50  Sequence Reset
```

flex The ***flex*VUE**, by default, would display the bottom two lines (the most recent) first. See below:

```
10:39  Automatic Recl
10:39  Sequence Reset
```

NOTE: Images shown are for illustration purposes only.

From this screen, a complete **TIME** or **EVENT DESCRIPTION** is available by pressing the ⬅ or ➡ keys respectively:

For the **TIME**, press ⬅:

NOTE: Images shown are for illustration purposes only.

```
09/01/15 10:39:12.50
09/01/15 10:39:12.50
```

For the **EVENT DESCRIPTION** press ➡:

```
Automatic Reclose
Sequence Reset
```

In this example, pressing the ⬇ twice would scroll to the next two events.

```
10:39  B Max 302 Amp
10:39  C Max 301 Amp
```

Setting Change Events

A settings change can come from various sources - WSOS5, O.I., SCADA protocol, and IOEX. The controller includes in its log, information regarding the source of each setting change.

If the **ALT** key (set) or **EVENT LOG** key (flex) is pressed whilst the event log is on the display then the date and time details are replaced with extra information that includes the setting source and, if applicable, the protection group, curve, and trip number. Pressing the **ALT** (set) or **EVENT LOG** (flex) key redisplays the date and time information.

Identifier	Settings change source
WSOS	WSOS5
OCP	Operator Control Panel
PTCL	SCADA protocol
IOEX	IOEX

As it is possible for multiple WSOS5 applications to be simultaneously connected to the controller via Ethernet, a source identification of **WSOS** can be insufficient information. For WSOS5 over Ethernet connections the first four letters of the PC login name are logged. The usage of **WSOS** is therefore restricted to serial port point-to-point communication links only.

set For example, a ***set*VUE** event log display that looks like this:

```
08/06/15 11:05:50.25  Very Inv IEC255
08/06/15 11:07:15.66  Parity EVEN
08/06/15 11:09:23.03  Work Tag Applied
08/06/15 11:10:35.19  Load Supply ON
```

becomes:

```
WSOS Phase Trip 2 D   Very Inv IEC255
OCP  RS232-B          Parity EVEN
PTCL                  Work Tag Applied
                      Load Supply ON
```

NOTE: Images shown are for illustration purposes only.

When the **ALT** key is pressed.

In the above example it can be seen that:

- WSOS5 has been used to set a Very Inverse IEC255 curve for phase trip 2, group D.
- The O.I. has been used to set the controller's RS-232 port communications parity to EVEN.
- The work tag has been applied via a SCADA protocol communications link.
- The controller has detected restoration of load supply. There is no setting change source associated with this event.

flex The ***flex*VUE** screen might look like this:

```
11:05 Very Inv IEC255
11:07 Parity EVEN
```

Pressing **EVENT LOG** would change it to:

```
WSOS Phase Trip 2 D
OCP RS232 – B
```

NOTE: Images shown are for illustration purposes only.

Power System Measurements

Introduction

The CT signals and CVT signals from the recloser are digitized by the PowerLogic ADVC and used to provide various data for the operator.

The PowerLogic ADVC measures up to 10 power system components:

- A, B, C, phase and spill currents
- Phase to earth voltage on all six terminals

The PowerLogic ADVC uses the above measurements to derive many system measurements including:

- frequency
- phase to phase voltages
- total and per phase power (kW, kVA,and kVAR)
- total and per phase Power Factor (PF)
- harmonics
- earth current, and
- sequence components

In addition, the PowerLogic ADVC also measures internal values such as:

- CAPE temperature
- auxiliary voltage
- battery voltage

Power System Frequency

The controller must be set for the correct power system frequency (either 50 Hz or 60 Hz). This can be set on page:

set **SYSTEM STATUS > PHASE VOLTAGE and POWER FLOW**

flex **ENGINEER MENU > CONFIGURATION MENU > SYSTEM SETTINGS > NETWORK PARAMETERS > System Frequency 50 Hz/60 Hz**

NOTE: The setting to change the display between Phase- Phase or Phase-Earth voltages is found at the following location:

- set **SYSTEM STATUS > PHASE VOLTAGE and POWER FLOW > Display Phase > Phase Voltage**
- flex **ENGINEER MENU > CONFIGURATION MENU > System Settings > Metering Parameters > Display Voltage Phase/ Earth Voltage or Phase/Phase Voltage**

Real Time Displays

There are a number of measurements that are shown in real time within the PowerLogic ADVC. The measurements are:

- **SYSTEM MEASUREMENTS** (Including average voltage, current and power)
- A, B and C Phase Current (includes phase angles)
- Earth Current (includes phase angle)
- Sequence Currents (Inps, Ipps)

- A, B, and C Phase Voltage (shown as phase-phase or phase-earth)
- Sequence Voltages (Vzps, Vpps and Vnps)
- A, B, and C Phase Power
- A, B, and C Phase Maximum Demand Indicator (MDI)

System Measurements

SYSTEM MEASUREMENTS-M

```
-------   SYSTEM MEASUREMENTS   ---------- M
Current     120 A       Power P      6754 kW
Voltage   33000 V       Power Q      1191 kVAR
Frequency  50.00Hz      PF  0.98
```

NOTE: Images shown are for illustration purposes only.

OPERATOR MENU > MEASUREMENTS > SYSTEMS MEASUREMENTS

NOTE: Scroll through Average Current, Average Voltage, Frequency, PF, 3PH Power P [Kw], 3PH Power Q [kVAR] and PF

This is a summary of the system measurements. Current and voltage values displayed are an average of the three phases. Frequency is measured on the first available bushing and is displayed as `Unavailable` if all the bushings are dead.

- **Current:**

  SYSTEM MEASUREMENTS > Current > M

```
 ------------------   CURRENT  ---------------M
A Phase      120 A  0°  Earth           0A  0°
B Phase      120 A  0°  Ipps          120A  0°
C Phase      120 A  0°  Inps            0A  0°
```

  NOTE: Images shown are for illustration purposes only.

  ENGINEER MENU > MEASUREMENTS > CURRENT

  NOTE: Scroll through Magnitude and Angle - A, B, C and Earth and Sequence - I1 (Ipps), I2 (Inps).

  These screens display the Current and Phase Angle for each Phase, Earth Current, Positive Phase Sequence Current (Ipps) and Negative Phase Sequence Current (Inps).

- **Voltage:**

```
SOURCE         VOLTAGE       LOAD    - M
33000V   0°      A-B         0°    33000 V
33000V 240°      B-C       240°    33000 V
33000V 120°      C-A       120°    33000 V
```

  SYSTEM MEASUREMENTS > Voltage > M

  NOTE: Images shown are for illustration purposes only.

  ENGINEER MENU > MEASUREMENTS > VOLTAGE > PHASE/LINE \SRC-LD

  NOTE: Scroll through **A**, **B** and **C** - Phase.

- **Sequence Voltage:**

  SYSTEM MEASUREMENTS > Sequence Voltage > M

  NOTE: Images shown are for illustration purposes only.

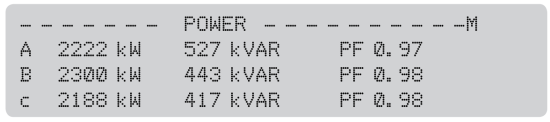
  ENGINEER MENU > MEASUREMENTS > VOLTAGE > SEQUENCE

  NOTE: Scroll through **Vpps**, **Vnps** and **Vzps**.

  These screens display the zero, positive and negative phase sequence voltages.

- **Power:**

  SYSTEM MEASUREMENTS > Power > M



  NOTE: Images shown are for illustration purposes only.

  ENGINEER MENU > MEASUREMENTS > POWER > 3 -Phase, A, B & C-Phase

  NOTE: Scroll through Real Power, Apparent and Reactive Power, PF.

  These screens display real and reactive power, as well as the PF on a per phase basis. Real Power (kW) is a signed quantity unless Power Flow Unsigned has been selected on page:

  SYSTEM STATUS > PHASE VOLTAGE > and POWER FLOW:

  Power Flow Signed/Unsigned

  ENGINEER MENU > CONFIGURATION > SYSTEM SETTINGS > METERING PARAMETERS > Power Signed/Unsigned

  PF is an unsigned quantity.

  MDIs

  SYSTEM MEASUREMENTS > Daily, Weekly, Monthly, Maximum Demand

  ENGINEER MENU > MEASUREMENTS > DEMAND > DAILY, WEEKLY, MONTHLY MAX DEMAND

  NOTE: Scroll through Date, Total kWh, Peak Period, Power/PF.

  The MDI on the ***flex*VUE** panel is available in a different location at the following menu:

  OPERATOR MENU > MEASUREMENTS - MAX DEMAND IND

  NOTE: Scroll through A, B, C Phase Max and Time and Reset MDI.

  These screens display real and reactive power, as well as the PF on a per phase basis. Daily, Weekly and Monthly Demand Indicators display collected historical data while the MDI contains a mixture of real-time and historical data.

Accessories Installation

What's in This Chapter

Accessories 85
IOEX 85
FTIM 88

Accessories

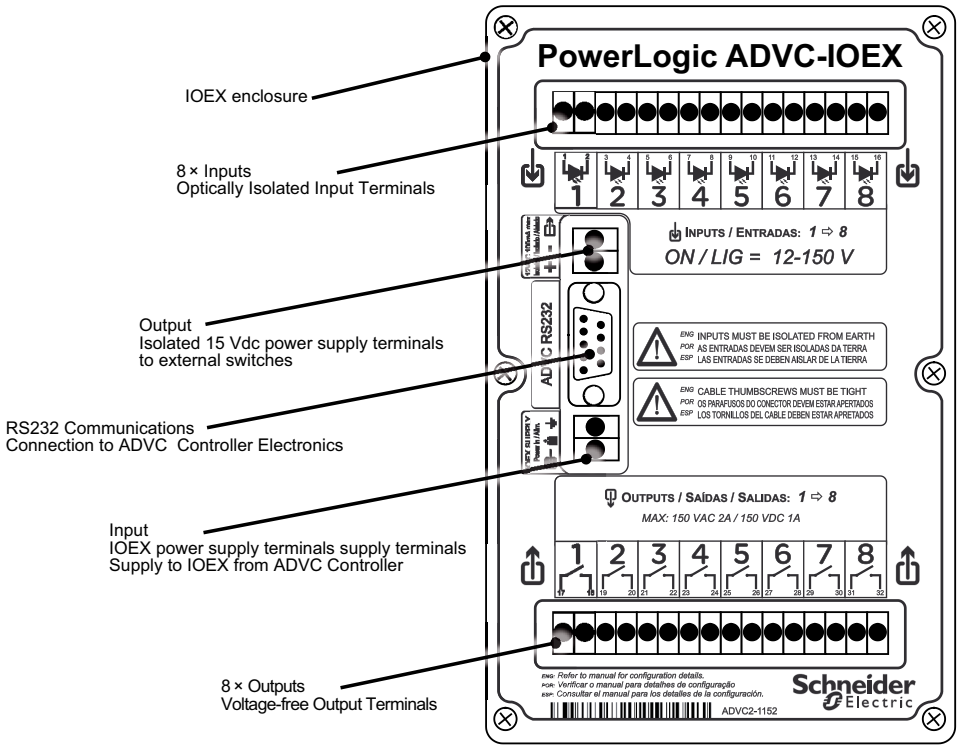
There are a number of accessories available for the PowerLogic ADVC that can be used to extend the capabilities of the switchgear and the controller.

This section contains details on the installation of the following accessories. Refer to these sections if you need to install:

- IOEX
- Fast Trip Input Module (FTIM)
- General Purpose Outlet (GPO)

IOEX

The IOEX is a PowerLogic ADVC Range accessory that accepts external control signals from third-party devices. It provides optically isolated inputs and voltage-free outputs. These allow connection of an external protection relay or Remote Terminal Unit (RTU). The electronic circuit is installed in a die cast, sealed enclosure which is attached to the upper accessory mounting tray of PowerLogic ADVC **ULTRA** controller.



IOEX Compatibility

The IOEX is compatible with the **ULTRA** model of the PowerLogic ADVC range where the upper accessory tray is used to mount the IOEX module. The controller electronics includes a regulated power supply for the IOEX module/s. Connection to the power supply is via two terminals mounted on the side accessory tray.

RS-232 communications is used to interface the IOEX module/s to the control electronics.

The PowerLogic ADVC **ULTRA** model includes the following features to accommodate the IOEX module/s:

- Upper accessory tray for up to two IOEX modules.
- Additional holes in the base of the controller for IOEX cable entry.

- Cable tie point on the cubicle side helps to protect the cables.

  NOTE: Shielded cable (not supplied) for external connections and the EMC gland are essential for reliable operation.

Parts Supplied with The IOEX

The following parts are supplied with each IOEX module:

- 1 x IOEX module
- 1x RS-232 cable
- 1 x Power cable
- 4 x MS stainless steel screws and washers.
- 1 x EMC cable gland

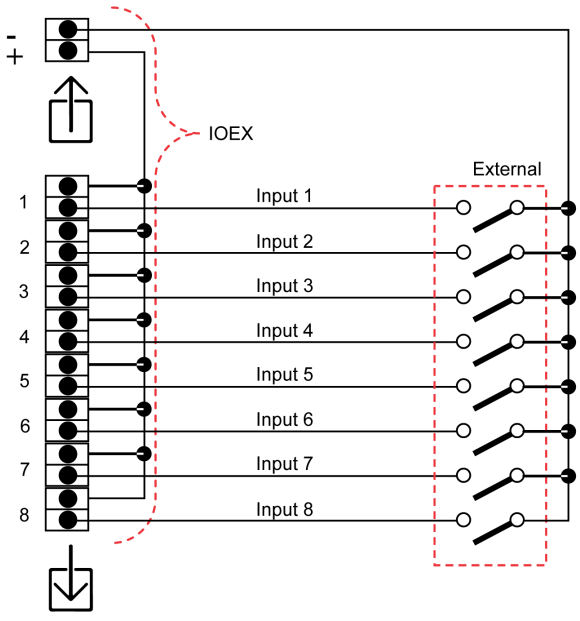
IOEX Specifications

Description	Value
Isolated power supply output:	12...15 Vdc 100 mA maximum
IOEX power supply input:	18...36 Vdc, 200 mA maximum. Supplied by controller electronics.
Optically isolated inputs:	Eight inputs per IOEX module.ON=12...150 Vdc,12...150 Vac.OFF=0...3 Vdc,0...3 Vac
Voltage-free outputs:	Eight outputs per IOEX module.150 Vdc at 1 A maximum 150 VAC RMS at 2 A Non-inductive maximum.
Dimensions [mm]:	188 high,119.5 wide, 37 deep.
Controller connection:	RS232 – DB9 Male/Female cable (part number ADC–640).

IOEX Electrical Connections

Connecting Inputs Using Built-in Isolated Supply

The IOEX has a built-in isolated power supply that can be used as field excitation voltage. The following connection diagram describes using this DC voltage as a source to supply the external switches.



NOTICE

HAZARD OF UNEXPECTED INPUT ACTIVATION

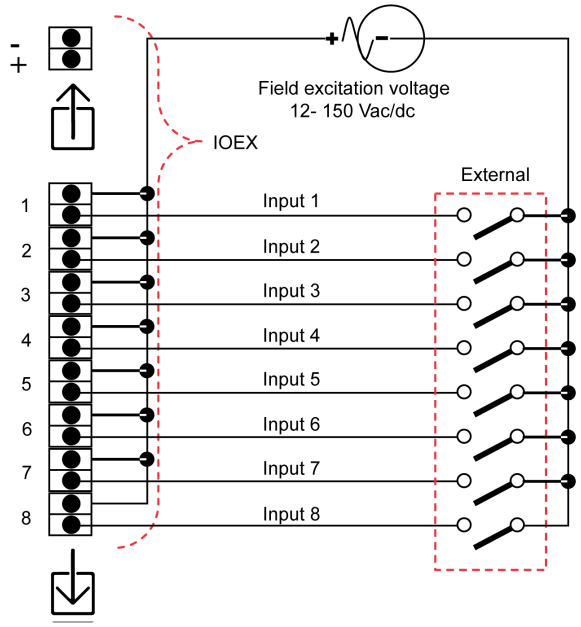
Isolate the field excitation power supply from earth.

Failure to follow these instructions can result in equipment damage.

Connecting Inputs Using an External Source

It is also possible to use a custom AC or DC source for field excitation of the external switches. This supply must be isolated from earth.

Field excitation voltage: 12 Vac/dc...150 Vac/dc.



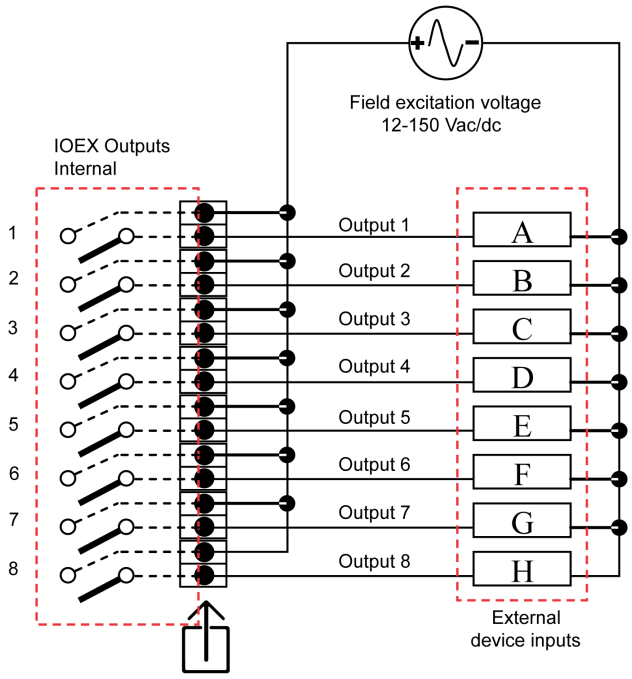
NOTICE

HAZARD OF UNEXPECTED INPUT ACTIVATION

- Field excitation must not be provided from the battery nor the radio power supply.
- Isolate the field excitation power supply from earth or use double pole switching for all inputs.

Failure to follow these instructions can result in equipment damage.

IOEX Voltage-Free Outputs



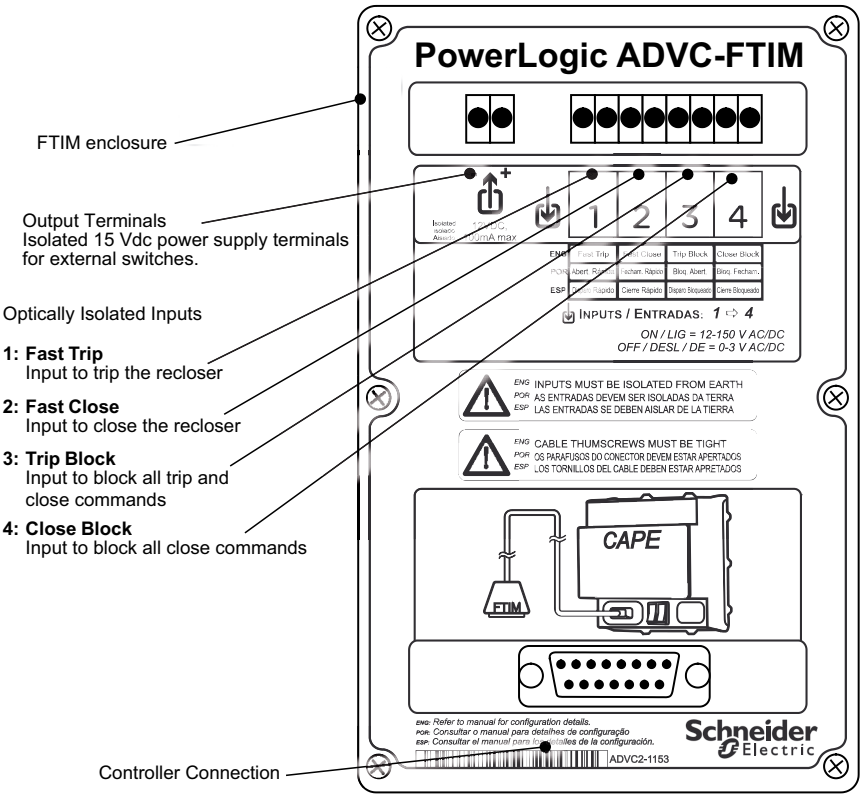
NOTICE
HAZARD OF UNEXPECTED INPUT ACTIVATION • Field excitation must not be provided from the battery nor the radio power supply. • Isolate the field excitation power supply from earth or use double pole switching for all inputs. **Failure to follow these instructions can result in equipment damage.**

FTIM

General

The FTIM is a PowerLogic ADVC range accessory that accepts external control signals from third-party devices. It provides optically isolated inputs. These allow connection of an external protection relay or RTU. The electronic circuit is installed in a die cast, sealed enclosure which is attached to the upper accessory mounting tray of PowerLogic ADVC **ULTRA** controller.

It is possible to interface external trip, close, or block signals to the recloser controller via the FTIM.



FTIM Compatibility

The FTIM is compatible with the PowerLogic ADVC range. If a controller is to be used with an FTIM, a connection cable for the module has to be included during manufacturing. It is therefore necessary to specify the intended use of an FTIM when ordering the controller. Note this connection cable cannot be retrofitted in the field.

Part Number	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
86xxxx2xxx	8	6	x	x	x	x	2	x	x	x
86xxxx3xxx	8	6	x	x	x	x	3	x	x	x
86xxxx5xxx	8	6	x	x	x	x	5	x	x	x

NOTE: The part number has to start with **86** and the 7th digit must be a **2**, **3** or **5**.

Parts Supplied with The FTIM

The following parts are supplied with each FTIM.

- 1 x FTIM module
- 4 x M5 stainless steel screws
- 4 x flat washers and 4 x spring washer
- 1 x EMC cable gland

FTIM Specifications

Description	Value
Isolated power supply output	12...15 Vdc, 100 mA maximum
Optically isolated inputs:	ON = 12...150 Vdc, 12...150 Vac
Dimensions (mm)	188 high, 119.5 wide, 37 deep.
Dimensions (mm)	Shielded cable with shielded 15-pin D-type connector

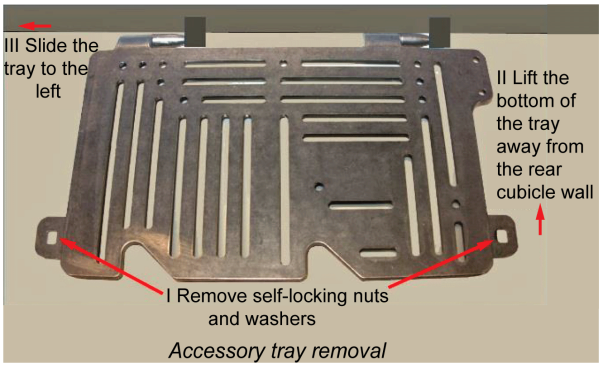
IOEX and FTIM Installation

The IOEX and/or FTIM must be fitted to the accessory mounting tray.

1. **Removing and installing the mounting tray:**

   The upper accessory mounting tray can be removed in three steps:

   - Undo and remove the self-locking nuts and washers
   - Rotate the accessory tray to the slide-out position by lifting the bottom of the tray away from the cubicle; and
   - Slide the tray to the left.

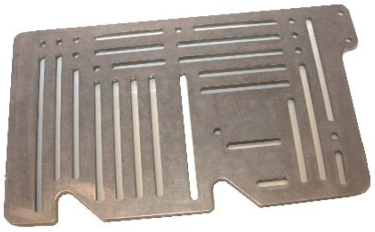


Accessory tray removal

To install the upper tray, locate the accessory tray hinges to the left of the brackets in the top corner of the cubicle. Use the corner as a guide and slide the tray to your right. The self-locating hinges guide the tray into the brackets. Continue to slide the tray until the hinges are completely inside the brackets.

Rotate the tray into the lock-down position and fasten the nuts.

2. **Attaching the IOEX:**
    - Remove the upper accessory mounting tray from the PowerLogic ADVC **ULTRA** cubicle.
    - The design of the mounting tray provides flexibility in terms of how the device is mounted.
    - It is recommended that Nyloc nuts be used for fastening the device where possible.
    - Slot width on the tray is 6 mm; bolts may require stacking mud-guard washers with standard washers for bolts smaller than M5. For example, for M3 bolts, it is recommended to use M5 mud-guard washers, M3 flat washer, and a M3 Nyloc nut.
    - Holes provided on the customer tray act as a guide holes to identify the equipment position for installation. It is recommended that at least one guide hole is used for installing the device.
    - Fit the tray containing the IOEX in the upper accessory mounting space using the existing mounting points. Refer to below figure for Accessory tray removal.

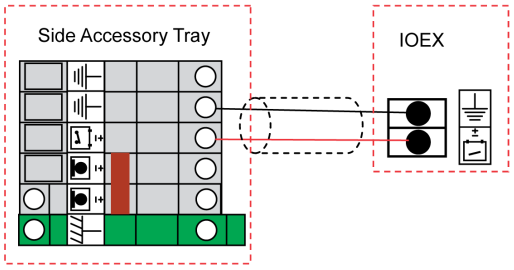


Accessory tray mounting provisions

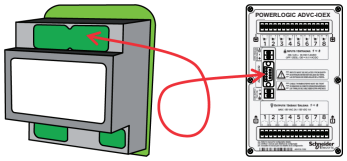
3. **Connect the IOEX to the controller:**
   - Connect the IOEX power supply lead to the terminals on the side accessory tray. The terminals are marked with the following symbols.


Ground Terminal


IOEX Positive power terminal



   - Using the RS233 cable (ADC-640), connect the IOEX/WSOS Port on the PowerLogic ADVC to the IOEX.
   - Before you can use the IOEX, make `IOEX available` in the WSOS Feature Selection tool, download the configuration map, and select the IOEX communication port. For more information, refer to the PowerLogic ADVC Operation Guide (PowerLogic ADVC2- 1160) and Configurable IOEX manual (N00-685).



⚠WARNING

HAZARD OF EQUIPMENT DAMAGE

When connecting the FTIM to the CAPE, the controller must be switched off to help avoid unwanted trip/close operation.

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

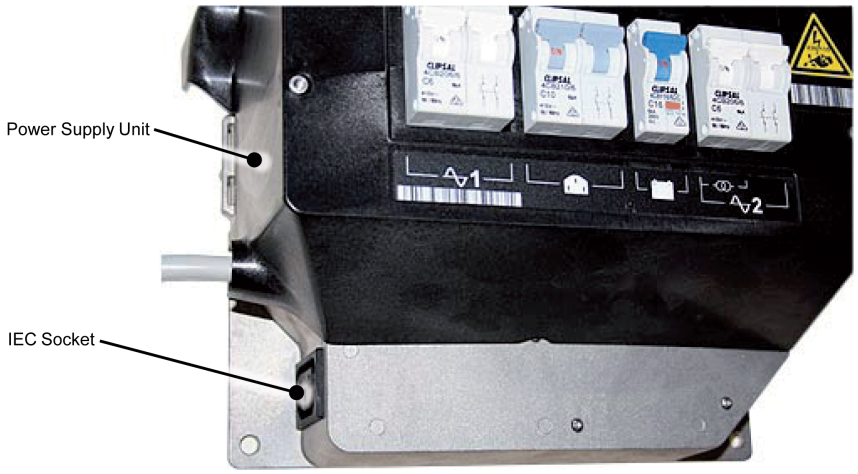
NOTICE

HAZARD OF UNEXPECTED INPUT ACTIVATION

Field excitation must not be provided from the battery nor the radio power supply.

Failure to follow these instructions can result in equipment damage.

4. **If Connecting an FTIM**
   - Turn off power to the controller.



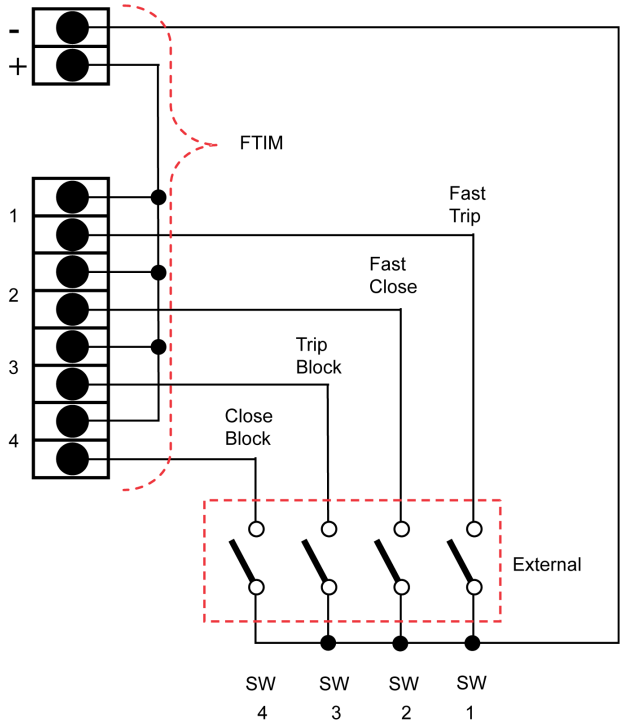
   - Connect the shielded 15-pin D-connector to the FTIM. Fasten the connector properly to provide a reliable connection.

   - Turn all power to the controller on when the installation is complete.

FTIM Electrical Connections

Using The Built-in Isolated Supply

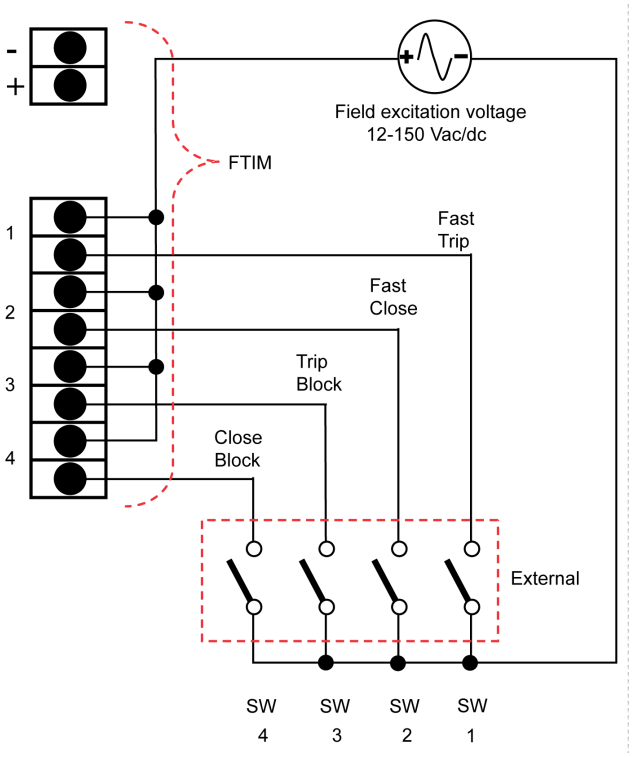
The FTIM has a built-in isolated power supply that can be used as field excitation voltage. The following connection diagram describes using this DC voltage as a source to supply the external switches.



Using an External Source

It is also possible to use a custom AC or DC source for field excitation of the external switches. This supply must be isolated from earth.

Field excitation voltage: 12 Vac/dc...150 Vac/dc.



NOTICE

HAZARD OF UNEXPECTED INPUT ACTIVATION

- Field excitation must not be provided from the battery nor the radio power supply.
- Isolate the field excitation power supply from earth or use double pole switching for all inputs.

Failure to follow these instructions can result in equipment damage.

Shielded Cable

For the external connections, shielded cable with the following main characteristics is recommended:

Operating Temperature:

-55 °C...+105 °C

Voltage Rating:

600 V

Product Description:

- Conductor: stranded tinned copper
- Area Conductor: 0.22 mm^2
- External Diameter: 6...12 mm
- Screen Diameter: 5 mm minimum
- Insulation: Colour-Coded PVC

- Shield: Braided Tinned Copper (90 % coverage)
- Jacket: PVC

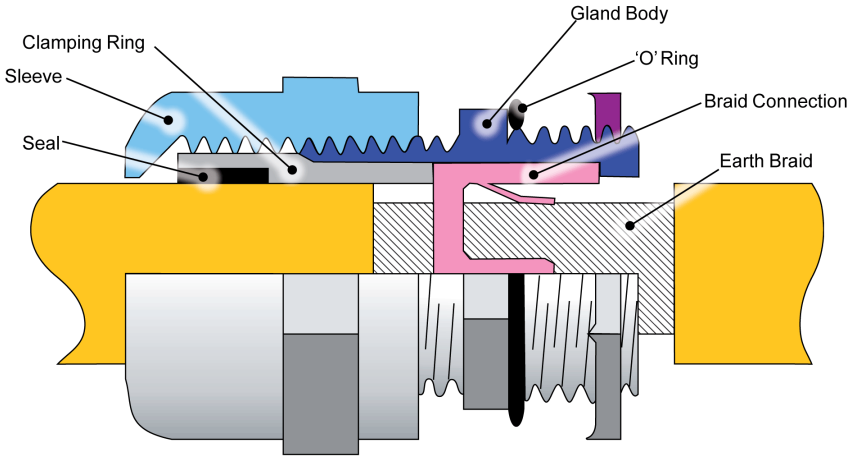
Picture of the shielded cable (not supplied)

Customer Cable Installation

EMC Gland Specification

An M20 EMC cable gland with the following main characteristics is required:

- Diameter, cable maximum: 12 mm
- Diameter, cable minimum: 6 mm
- Diameter, cable screen minimum: 5 mm
- Material: Brass
- Plating: Nickel
- Thread size: M20
- Length, thread: 8 mm
- IP Rating:IP68



⚠WARNING

HAZARD OF BEHAVIOUR

Correct installation of the EMC gland is essential for reliable operation.

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

⚠CAUTION

HAZARD OF EQUIPMENT DAMAGE

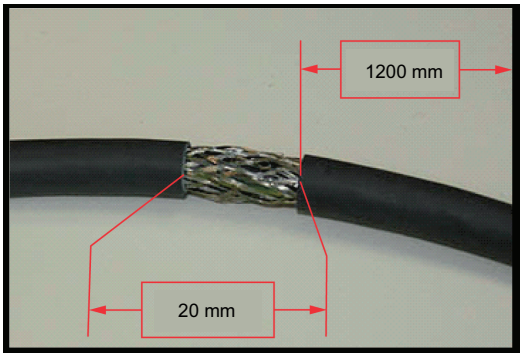
Do not push the cable in the opposite direction, to help avoid damaging the gland.

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

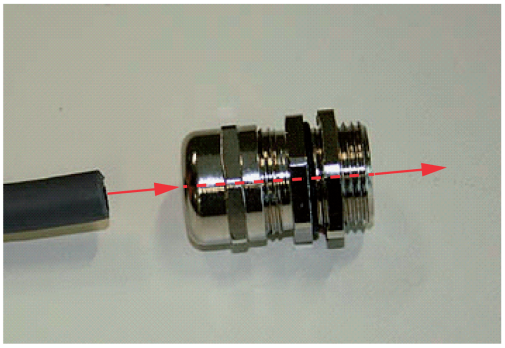
EMC Gland Installation

Follow the following procedure for the EMC gland installation:

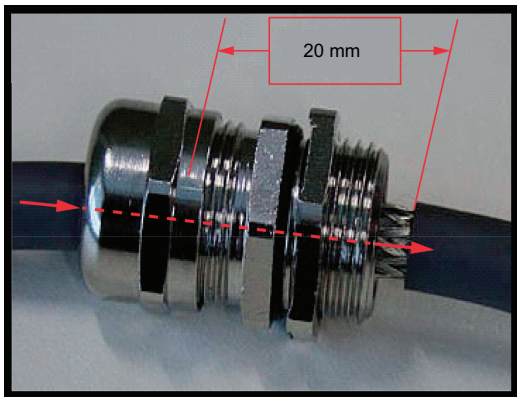
1. At 1200 mm from the cable-end that is connected to the IOEX/FTIM, remove 20 mm of the plastic sheath to expose the earth braid.



2. Push the end of the cable that is connected to the IOEX/FTIM through the cable gland in the direction as shown.



3. Continue pushing the cable through the gland, until the earth braid aligns with the gland.

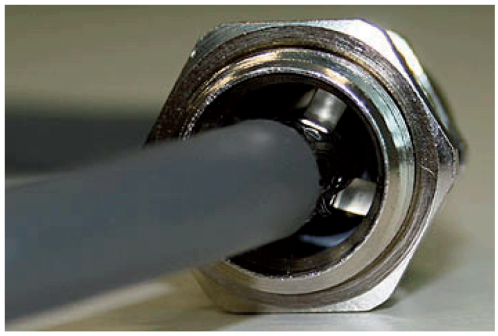


NOTICE

HAZARD OF IMPROPER EARTHING

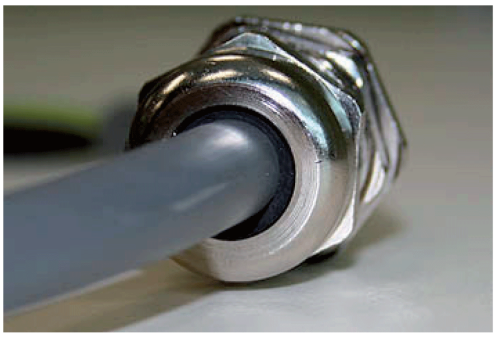
Make sure that the earth braid is in contact with the braid connection ring in the gland.

Failure to follow these instructions can result in equipment damage.

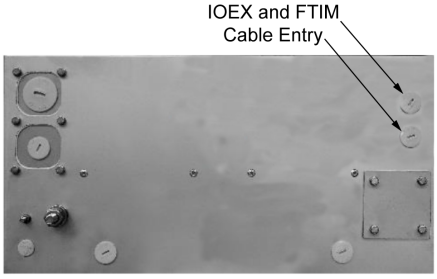


NOTE: Shielded cable is essential for reliable operation. Refer to figure.

4. Make sure that the seal and clamping mechanism is overlapping with the plastic sheath. Tighten the gland sleeve to firmly grip the cable in place.



5. Select a 20 mm hole in the base of the controller. The two holes on the right-hand side are provided for this purpose.



6. Remove the plug and fit the cable with gland.

Cable termination

1. Use cable ties to fix the cable to the cubicle wall.
2. Cut the cable to the appropriate length, and terminate the cable at the IOEX/FTIM connectors.

NOTE: Auxiliary power supply 1 is used to supply power to the GPO socket.

GPO

The GPO allows the user to power extra devices such as a laptop computer while operating the PowerLogic ADVC.

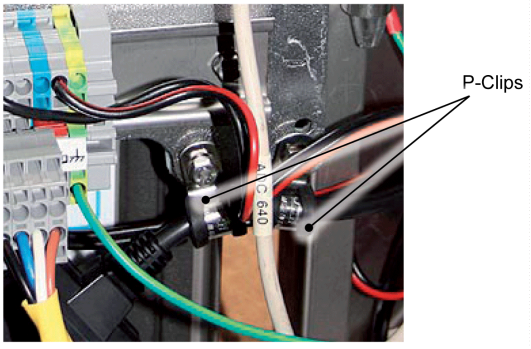
Compatibility

Controller: PowerLogic ADVC **ULTRA** and **COMPACT**

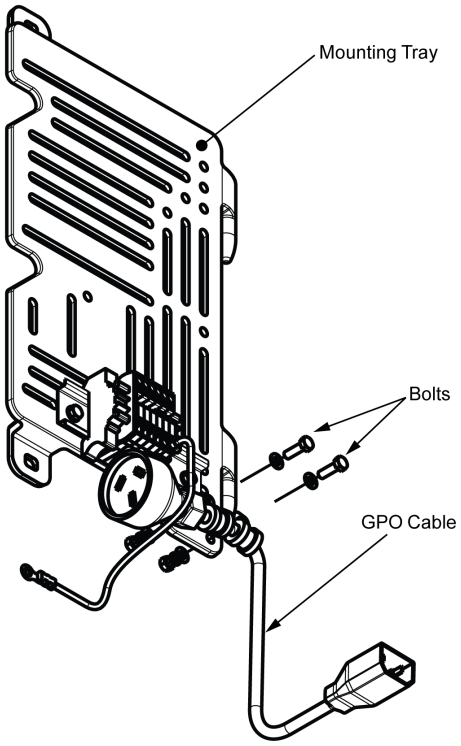
Power Supply: Models equipped with the IEC power outlet option

GPO Cable Installation

1. Remove the side accessory mounting tray.
2. Fit the two P-clips around the GPO cable.



3. Using the bolts provided, fix the cable to the accessory mounting tray.



4. Install the accessory mounting tray in the normal position.

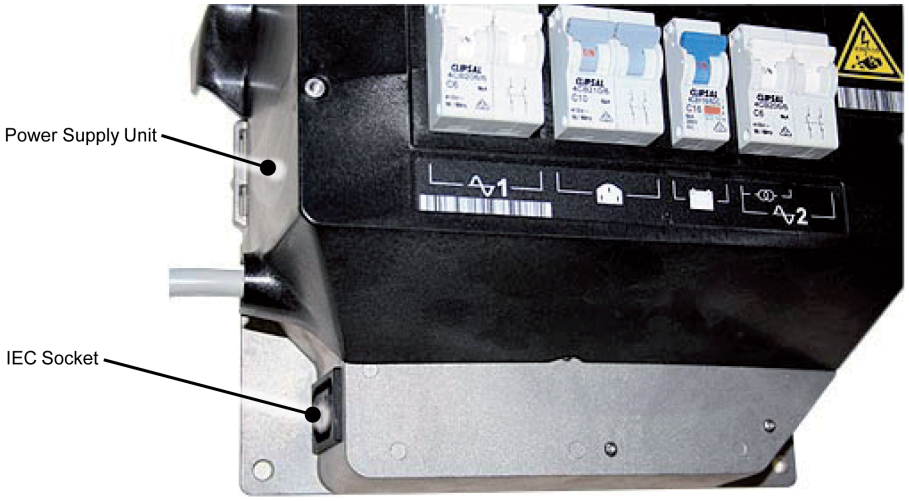
⚠DANGER

HAZARD OF EXPLOSION

Rate the auxiliary 1 power source appropriately to provide GPO current required.

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

5. Plug the IEC male cable end connector into the female connector on the side of the power supply module.



GPO Cable Ratings

Voltage: 110 Vac or 240 Vac

Current: 2 A maximum

Maintenance

What's in This Chapter

Overview 101
Cleaning 101
Battery Care 102
PowerLogic ADVC Operating Conditions 104
Replacement of Electronic Modules and Upgrades 106

Overview

Maintenance can be carried out using standard electricians and mechanics tools. No user maintenance of the ACR mechanism is required.

The ACR must be returned to the manufacturer for refurbishment if the mechanical duty or breaking duty is exceeded. This is checked by examining the remaining contact life on the OCP. When the remaining contact life in any phase approaches zero, the ACR has reached the end of its life and must be replaced.

NOTE: A alert message is displayed in the event log when the remaining contact life reaches 20%.

NOTICE

HAZARD OF INOPERABLE EQUIPMENT

- The bushing boots must be checked every five years, cleaned if necessary.
- Check the pointer and make sure that it is free from mechanical obstructions.

Failure to follow these instructions can result in equipment damage.

PowerLogic ADVC Maintenance

Maintenance of the PowerLogic ADVC is required every five years. The manufacturer recommends the work described below.

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Avoid water entering into the circuit breakers or general power outlet, when working on the PowerLogic ADVC with the door open during heavy rain.

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

Cleaning

Every five years the external bushings as well as tank must be checked and cleaned if necessary. The external manual trip lever must be checked and make sure that it is free from mechanical obstructions. Make sure the ON-OFF indicator as well as the operations counter are cleaned and visible from ground. In areas of high atmospheric pollution more frequent cleaning may be required. Check for excessive dirt on the cubicle, particularly the roof, and clean off.

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Make sure that the mesh covering the air vents and the water drainage holes in the base are clean.

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

Door Seal

Check the door sealing rubber for perishing or undue hardening. If necessary, renew the seal.

Battery Care

NOTICE

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

The battery is predicted to provide good performance for the recommended five-year service period. This is based on the battery manufacturer's data. No battery warranty is given by the manufacturer of the PowerLogic ADVC.

Failure to follow these instructions can result in equipment damage.

Once in service, batteries need little care. Procedures for storage and other contingencies are as follows:

- Batteries must be stored at a temperature of between 0 °C...30 °C (32...86 F) and cycled every six months. Batteries must be stored for a maximum of one year.
- Batteries must be cycled before putting into service if they have not been cycled within three months. When shipped by the manufacturer the batteries have been cycled within the previous 30 days.
- If the batteries become exhausted in service and are left for more than two weeks without auxiliary supply being restored to the PowerLogic ADVC they must be taken out, cycled and have their capacity checked before being returned to service.

To cycle a battery, discharge with a 10 Ω, 15 W resistor to a terminal voltage of 10 V. Next, recharge it with a voltage regulated DC supply set to 13.8 V. A 3 A current limited supply is appropriate.

More information on the battery care is available from the battery manufacturer.

Battery Replacement

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- These batteries are capable of supplying high currents. Always turn off the battery circuit breaker before connecting or disconnecting the batteries in the cubicle.
- Never leave flying leads connected to the battery.

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

NOTE: Make sure that battery polarity is correct.

Battery replacement is recommended after a period of five years. For more information, refer to Battery Care.

The procedure for the replacement of the batteries is as follows:

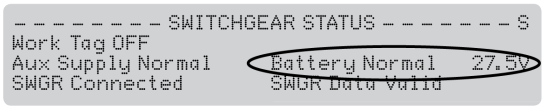
1.
2. Turn off the battery circuit breaker.
3. Unplug batteries and replace with new batteries.

4. Turn on the battery circuit breaker and make sure that `BATTERY NORMAL` status is restored via:

   SYSTEM STATUS > Switchgear Status > -S

   NOTE: Images shown are for illustration purposes only.

   For example:

   or

   OPERATOR MENU > SWITCHGEAR STATUS > SWITCHGEAR DATA > Battery Status

   NOTE: Images shown are for illustration purposes only.

   For example:

Battery Heater Accessory

NOTE: Make sure that battery polarity is correct.

Where the battery heater accessory has been fitted the following procedure must be followed:

1. Turn off the battery circuit breaker.
2. Disconnect batteries and heater.
3. Remove batteries and replace with new batteries.
4. Return the heater mat to its original position, close straps.
5. Reconnect batteries and heater.
6. Turn on the battery circuit breaker and make sure that *Battery Normal status*, is restored. To do this, see Step 3 of Battery Replacement, page 100.

NOTICE
HAZARD OF INOPERABLE EQUIPMENT Battery heater breakdown is reported in the Event Log. **Failure to follow these instructions can result in equipment damage.**

PowerLogic ADVC Operating Conditions

Abnormal Operating Conditions

The operation of the capacitor charging inverter can be affected under abnormal conditions such as when the battery capacity is very low. The following features are used to help protect the PowerLogic ADVC in this situation while still allowing the ACR to keep operating.

Low Power Mode

When the batteries are nearly exhausted, the PowerLogic ADVC will change its capacitor charging mode from normal to low power. In low power mode the controller takes longer to charge the capacitors and the radio supply is shut down. A **Low Power Mode** event is logged whenever this happens.

When a trip occurs in low power mode, the recloser will go to lockout if the capacitors cannot be recharged quickly enough. Operator close and trip operations can be performed, but at a longer time interval than normal. If an operator trip or close request is denied, a **Cap Charg** event will be logged.

To return to normal power mode, the auxiliary supply must have been switched back on for a minimum of 15 min, and the batteries may have to be replaced.

Excess Close Operations

During testing it is possible to carry out so many trip/close operations that the capacitor charging inverter shuts itself down before it overheats. It takes more than 20 operations within a minute to do this and is not going to happen while in service (it only happens during excessive testing).

When this happens the inverter shuts down for 5 min and a **Cap Excess Closes** event is logged. During this time all trip/close requests will be denied.

Defect Finding

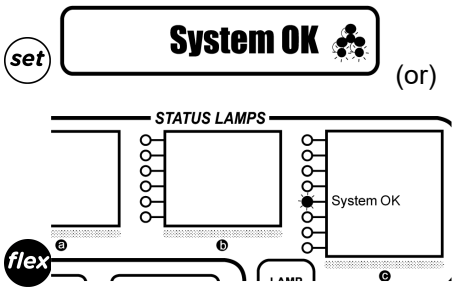
PowerLogic ADVC Check

Defect finding within the PowerLogic ADVC involves determining whether the defect lies in the electronic modules, the wiring or elsewhere. The electronic modules are user replaceable items. Other defects require the PowerLogic ADVC to be returned to the factory.

A suggested defect finding approach is as follows:

- If the **System OK** LED(s), located on the on the O.I., are flashing then the CAPE microprocessor is running. If the O.I. does not operate then follow Step 4.

  System OK LEDs are located in different places on the setVUE and flexVUEpanels:

  NOTE: Default location - can be configured differently.

- If the display is operating, check the
  - set **SYSTEM STATUS > Switchgear Status > S**
  - flex **OPERATOR MENU > SWITCHGEAR STATUS > SWITCHGEAR DATA > Battery Status**

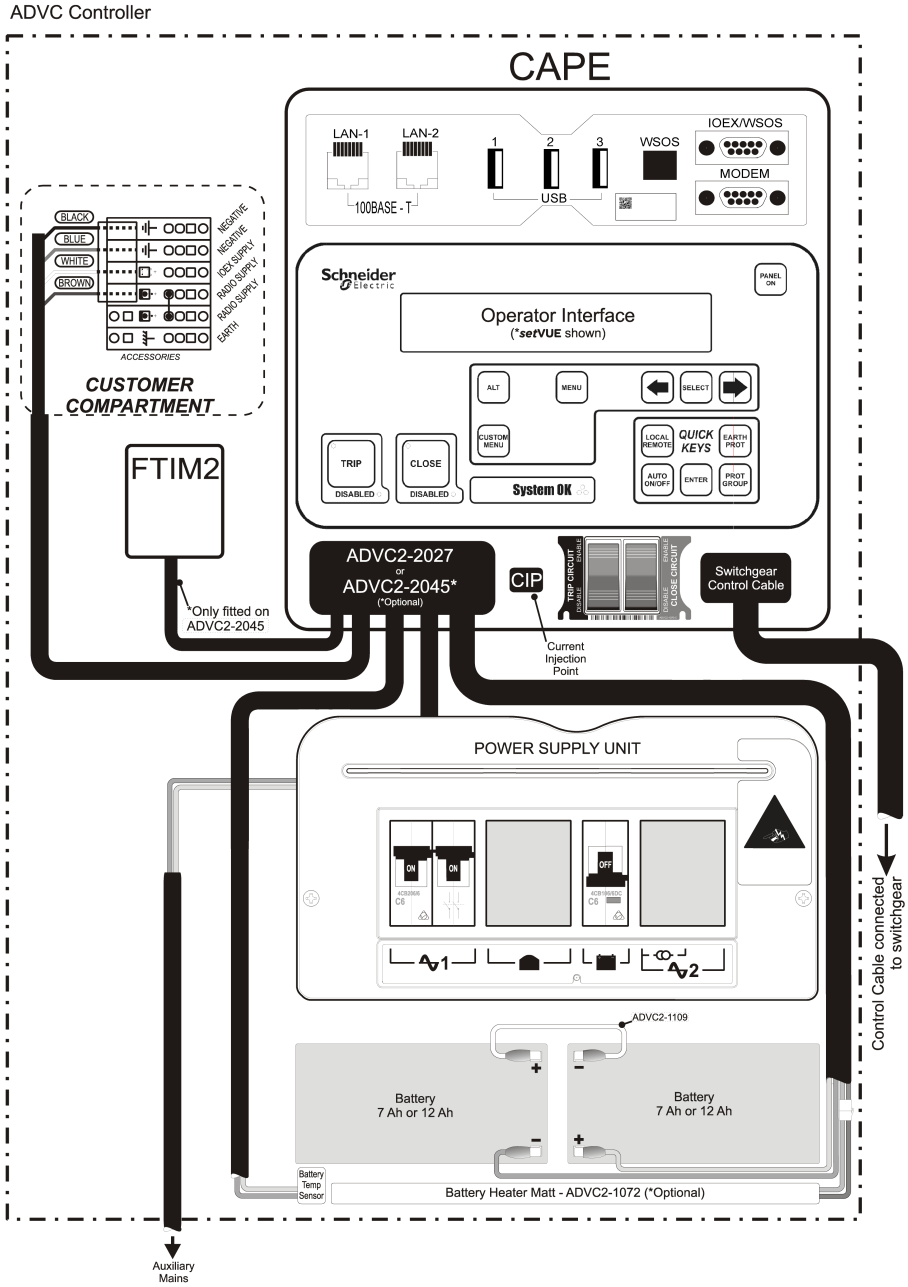
    and
  - flex **OPERATOR > SWITCHGEAR STATUS > SWITCHGEAR DATA > Aux Supply Status**

    page for an indications of any power supply problems (Aux Supply Fail and/or Battery OFF) which can be traced and rectified.
- If the **System OK** LED is not flashing, check for loss of power. Check that the battery circuit breaker is on and that full battery voltage is present at the terminals. Check the presence of aux. supply on the aux. supply circuit breaker. Check that the supply between the PSU and CAPE has not been disconnected. Rectify if a problem is discovered.
- If power supply is present then attempt to go on-line with WSOS to determine whether the CAPE is functioning correctly. Replace the CAPE if required.
- If this does not rectify the problem then the PowerLogic ADVC must be returned for factory repair.

Replacement of Electronic Modules and Upgrades

Electronic modules are user replaceable. Care must be taken to avoid damage to the modules while they are outside the cubicle and replacement must only be carried out by competent personnel. CAPE firmware can be upgraded through WSOS. For more information, refer to the ADVC Operator Manual.

NOTICE
HAZARD OF INOPERABLE EQUIPMENT Removal of parts from modules will void the warranty. **Failure to follow these instructions can result in equipment damage.**



Ratings and Specifications

What's in This Chapter

Equipment and Crating Dimensions 108
Switchgear Ratings 108
CTs 109
Environmental 110
Basic Timings 110
PowerLogic ADVC General Specifications 110
Controller EMC Type Tests 111
Power System Measurements 113

Equipment and Crating Dimensions

Equipment Weights		
Description	**Weight kg (lbs) - 27 kV Rating**	**Weight kg (lbs) - 38 kV Rating**
Control cable	6 (13)	6 (13)
Control cubicle	37 (81) (without accessories and with 7 Ah batteries)	37 (81) (without accessories and with 7 Ah batteries)
Pole Mounted ACR	135 (298)	195 (430)
Pole mounting bracket	35 (71)	35 (71)
Surge Arrester Mounting Bracket	4.3 (9.5)	6 (13.2)
Gross weight of crate	275 (606)	360 (794)
Dimensions mm (in)		
Cubicle (for more information, refer to Appendix B, Dimensions, page 123	1000 x 375 x 305 mm (39.4 in x 14.8 in x 12.0 in)	1000 x 375 x 305 mm (39.4 in x 14.8 in x 12.0 in)
Crate Dimensions (mm/in)		
Width	1140/44.8	1140/44.8
Depth	1080/42.5	1080/42.5
Height	1140/44.8	1220/48

Switchgear Ratings

Description	**27 kV Rating**	**38 kV Rating**
Rated maximum voltage	27 kV	38 kV
Rated Continuous Current	630 A	800 A
Rated Frequency	50/60 Hz	50/60 Hz
Rated Cable Charging Interrupting Current	25 A	40 A
Rated Line Charging Interrupting Current	5 A	5 A
Rated Symmetrical Interrupting Current	12.5 kA	16 kA
Rated Asymmetrical Making Current (Peak)	32.5 kA	41.6 kA
Rated Asymmetrical Making Current (RMS)	12.5 kA	16 kA
Short Time Current for 3 s	12.5 kA	16 kA
Short Time Current Recovery Time	180 s	180 s
Rated Impulse Withstand Voltage	150 kV	170 kV
Rated Impulse Withstand Voltage (15.5 kV Rating) - 110 kV	NA	NA
Power Frequency Withstand Phase/Earth and across interrupter	60 kV	70 kV
Opening/Closing Mechanism	Latching magnetic actuator	Latching magnetic actuator
D.C. Resistance Terminal/Terminal	< 120 µΩ	< 120 µΩ
Tank Construction	Stainless steel	Stainless steel
Bushings/VI Housings	Outdoor hydro-phobic Cyclo- Aliphatic Epoxy Resin	Outdoor hydro-phobic Cyclo-Aliphatic Epoxy Resin
Maintenance Interval	5 years	5 years
Earthing	M8 stud provided	M8 stud provided
Applicable standards	IEC62271-111 and IEEE C37.60	IEC62271-111 and IEEE C37.60

Breaking Duty

Description	27 kV/38 kV Rating
Mechanical operations	10000

Circuit breaker is rated for ANSI C37.60 duty cycle. Contact wear is automatically calculated for each interrupter by the control cubicle based on fault current and mechanical operations.

The remaining contact life is shown on the OCP.

Duty Cycle

Maximum allowable duty cycle at full short current rating:

- Open-0.5 s-close
- Open-2 s-close
- Open-2 s-close
- Open followed by 300 s recovery time

Terminal Clearance/Creepage

Description	27 kV Rating	38 kV Rating
Insulator Material Type	Outdoor hydro-phobic Cyclo-Aliphatic Epoxy Resin	Outdoor hydro-phobic Cyclo-Aliphatic Epoxy Resin
Center to center distance between phases	310 mm	350 mm
Creepage distance	770 mm	1216 mm
Taut String clearance phase/earth (centre mount bracket)	260 mm	325 mm
Taut String clearance phase/earth (end mount bracket)	260 mm	325 mm
Taut String clearance phase/phase	265 mm	310 mm

CTs

There is no access to CT connections on the equipment. This data is supplied for information only.

Description	27 kV/38 kV Rating
Ratio	1000:1
Accuracy 10 A to 800 A	±1%
Accuracy 800 A to 16000 A	±2.5%

Environmental

Part	27 kV/38 kV Rating
Operating Temperature(1)	-40º C...+50º C
Operating Humidity	0...100%
Operating Solar Radiation	1.1 kW/m² maximum
Operating Altitude(2)	3000 m maximum
(1) Temperature range depends on control cubicle versions. (2) Altitudes above 1000 m must be de-rated per IEEE C37.60.	

Basic Timings

Part	27 kV/38 kV Rating
Contact Close from energisation of close coil(1)	< 50 ms
Opening Time(1)	< 35 ms
Interrupting Time(1)	< 45 ms
Fault Clearing Time on Instantaneous protection for fault > 4 x Setting Current	< 70 ms
Time to contact part from receipt of trip command by operator, telemetry protocol, or IOEX	< 150 ms
Time to contact touch from receipt of close command by operator, telemetry protocol, or IOEX	< 150 ms
(1) The precise definition of these times is given in IEEE C37.60	

PowerLogic ADVC General Specifications

Cubicle material	**COMPACT**	304 stainless steel
	ULTRA	316 stainless steel
Cubicle shell sealing	**COMPACT**	IP 54
	ULTRA	IP 65
Electronic enclosure sealing		IP 65
Wind loading resistance of structure		> 160 km/hr
Wind loading on door when latched in open position		> 60 km/hr
Angle of door opening		135°
Standard ambient operating temperature range		-10 °C...50 °C
Extended operating temperature range (battery heater required) ULTRA Only		-40 °C...50 ° C
Electronics Temperature Range		-40 °C...50 °C
Maximum radiation		1.1 kW/m²
Humidity		0...100%
Standard control cable length(1)		7 m (23 in)
Maximum vertical separation from ACR with standard control cable		5 m (16.4 in)
Auxiliary supply voltage (LV AC mains supply)		As Ordered 115/230 Vac nominal -20%...+10%

Required auxiliary supply rating	100 VA
Battery (With battery heater option, 12 Ah batteries are standard.)	2 x 12 V 7.2 Ah
Battery hold up time from fully charged at 25 °C	28 hrs with 7 Ah 48 hrs with 12 Ah
Capacity available for communications, hold up time (no heater, OCP, or IOEX) 13.8 V TX:2.1 A, 15 min, RX 320 mA	20 hrs
Battery recharge time (new battery to 80% nominal capacity)	10 hrs
Battery replacement interval(2)	Five yrs
Battery Low Voltage(3)	23 V
Battery High Voltage(3)	33 V
Earthing(4)	10 mm earth stud
Battery Heater Power (where fitted)	10 W
Battery Heater Element Life	30,000 hrs
Radio/Modem A radio or modem may be fitted by the manufacturer or by the utility, for remote communications. Space, power, and data interfaces are provided within the control cubicle.	
Radio/Modem Power Supply Voltage (set by user)	5...15 Vdc
Radio/Modem Power Supply Continuous Current(5)	3 A
Radio/Modem Power Supply Maximum Current	8 A for 30 s with 10% duty cycle
Radio/Modem Power Supply continuous power	45 W
Radio/Modem Power Supply peak power	120 W for 15 min at 10% duty cycle
Radio/Modem Space on Radio Panel	300 x 250 x 150 mm
Radio/Modem Interface	V23, RS-232, RS-485
Radio/Modem Power Shutdown Time (user configurable)	1...1440 min
Shutdown time increment	10 s
Control Electronics	
Continuous Primary current	800 A
Continuous secondary current	0.8 A
Short time primary current	16 kA for 3 s
Short time secondary current	12 A for 3 s
Short time current recovery time	60 s
Required auxiliary supply rating	32 Vac, 100 VA
Real time clock hold time	20 days
Recloser Operations	20 in 1 min, 1 per minute thereafter
(1) Other control cable lengths available -4, 11, and 20 m. (2) Battery replacement interval is influenced by environmental temperature. (3) Temperature compensated at 48 m V/°C. (4) Earthing details in described in Earthing (Grounding) must be strictly adhered to. (5) For an external VT, the maximum continuous current drawn from the radio supply must be limited to 0.5 A.	

Controller EMC Type Tests

Immunity Tests			
Standard	**Description**	**Application**	**Test Level**
IEC 61000-4-2	Electrostatic Discharge	Contact	± 8 kV

Immunity Tests			
Standard	**Description**	**Application**	**Test Level**
		Air	± 15 kV
IEC 61000-4-3	Radiated Electromagnetic Field (Antennae transmitting 3m away)	Four faces (Door open)	10 V/m, 80 MHz...1000 MHz
			10 V/m, 1000 MHz...2700 MHz
IEC 61000-4-4	Fast Transient (5ns/50ns 5 kHz, 15 ms burst 300 ms spaced)	A.C. Power Port	± 4 kV
		RS232 (WSOS)	± 4 kV
		RS232 (Modem)	± 4 kV
		USB (WSOS)	± 4 kV
		USB1 + USB to RS485 isolated converter	± 4 kV
		LAN 1	± 4 kV
		LAN 2	± 4 kV
		Umbilical port	± 4 kV
		IOEX2 port input	± 4 kV
		IOEX2 port output	± 4 kV
		FTIM2 port	± 4 kV
IEC 61000-4-5	Surge	A.C. Power Port	± 4 kV line-to-earth, ± 2 kV line-to-line, 1.25/50 µs
		RS232 (WSOS)	± 4 kV, 1.25/50 µs
		RS232 (Modem)	± 4 kV, 1.25/50 µs
		USB (WSOS)	± 4 kV, 1.25/50 µs
		USB1 + USB to RS485 isolated converter	± 4 kV, 1.25/50 µs
		LAN 1	± 4 kV, 10/700 µs
		LAN 2	± 4 kV, 10/700 µs
		Umbilical port	± 4 kV, 1.25/50 µs
		IOEX2 port input	± 4 kV, 1.25/50 µs
		IOEX2 port output	± 4 kV, 1.25/50 µs
		FTIM2 port	± 4 kV, 1.25/50 µs
IEC 61000-4-6	Conduced Disturbances	A.C. Power Port	10 V RMS
		RS232 (WSOS)	10 V RMS
		RS232 (Modem)	10 V RMS
		USB (WSOS)	10 V RMS
		USB1 + USB to RS485 isolated converter	10 V RMS
		LAN 1	10 V RMS
		LAN 2	10 V RMS
		Umbilical port	10 V RMS
		IOEX2 port intput	10 V RMS
		IOEX2 port output	10 V RMS
		FTIM2 port	10 V RMS
IEC 61000-4-8	Power Frequency Magnetic Field	Three axis X, Y, Z	100 A/m continuous, 1000 A/m for 1 s
IEC 61000-4-11	Voltage Dips and Interruptions	A.C. Power Port	Voltage dips - 0% 1 cycle, 40% for 10 cycles, 70% for 25 cycles, 80% for 250 cycles

Immunity Tests			
Standard	**Description**	**Application**	**Test Level**
			Voltage interruptions - 0% for 250 cycles
IEC 61000-4-12	Oscillatory Wave immunity test	A.C. Power Port	1 kV common mode, 0.5 kV differential mode
		Umbilical port	2.5 kV common mode
IEC 61000-4-16	Conducted Common mode disturbances 0...150 kHz (direct on L and N)	A.C. Power Port	30 V continuous, 300 V 1 s, 50/60 Hz
		Umbilical port	30 V continuous, 300 V 1 s, 50/60 Hz
IEC 61000-4-18	Damped Oscillatory Wave (Decaying waveform)	A.C. Power Port	2.5 kV common mode, 1 kV diff. at 100 kHz and 1 MHz
		Umbilical port	2.5 kV common mode at 100 kHz and 1 MHz

Emmissions			
Standard	**Description**	**Application**	**Test Level**
EN 61000-6-4	Emission for Industrial Environmental	A.C. Power Port + Enclosure	Class A
EN 61000-3-2	Harmonics	A.C. Power Port (50 Hz & 60 Hz)	Class A
EN 61000-3-3	Voltage Fluctuations and Flicker	A.C. Power Port (50 Hz & 60 Hz)	Pst < 1, Pl < 0.65%,Dc < 3.3%,Dmax < 4%,Dt < 3.3% for less 500 ms
FCC Part 15 Subpart B (Similar to EN 61000-6-4 but American standard)	Radio Frequency Devices: Unintentional radiators	A.C. Power Port + Enclosure	Class A digital devices
		Mains set to 110 VAC 60 HZ	

Power System Measurements

HV line measurements on the three phases are made as follows:

Description	Value
Voltage Range (RMS Phase/Earth)	2...15 kV
Voltage Resolution	1 V
Voltage Accuracy(1)	2.5% ± 25 V
Live Terminal Threshold Voltage range(2)	2...15 kV
Live Terminal Threshold Voltage setting resolution(2)	1 V
Live Terminal Threshold Voltage accuracy(1),(2)	5% ± 250 V
Live Terminal Threshold Hysteresis	-20%
Phase Current Range (True RMS)(3)	2.5...800 A
Earth Current Range (True RMS)(3)	1...800 A
Current Resolution	1 A
Phase Current Accuracy(1)	2.5% ± 2 A over range 10...800 A
Earth Current Accuracy(1)	2.5% ± 2 A over range 1...800 A
Apparent Power Range	0...36 MVA
Apparent Power Resolution	1 kVA
Apparent Power Accuracy(1)	± 5% over range 20...800 A
Real Power Range(5)	-36...36 MW

Real Power Accuracy(1),(5)	± 5% of apparent power
Real Power Resolution	1 kW
Reactive Power Range(4)	0...36 MVAR
Reactive Power Resolution	1 kVAR
Reactive Power Accuracy(1)	± 5% of apparent power
Unsigned PF	0.5...1.0
PF Resolution	0.01
PF Accuracy	± 0.05
Measurement Filter Time Constant (Step Response)	2 s
Measurement Update Rate	0.5 s

(1) Includes accuracy of switchgear current and voltage transformers.

(2) Used for Live/Dead display, Live Load Blocking, and Loss of Supply Detection.

(3) Measurements are zeroed for currents less than lower value in range.

(4) In database for transmission by a protocol.

(5) Used to accumulate kWh reading for weekly maximum demand data.

Appendices

What's in This Part

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Control Cable Service Drawing 126
Calibration of SwitchGear and Controller 127

Replaceable Parts and Tools

Tank Global Parts List

All the replacement parts are listed in the following table which are available from the manufacturer.

Category	Part Number	Part Description
Bare terminal	994000030	BT KIT RL2 2 HOLE PALM 6X
	994000060	BT KIT RL2 2 HOLE PALM ANSI 6X
Cable boots	990000345	BUSHING BOOT GREASE & SPANNER KIT
	990000325	BUSHING BOOT GREASE DOW CORNING 7 300G
	990000315	BUSHING BOOT CLAMPING RING 1 ONLY
	990000331	BUSHING BOOT KIT 27KV 150BIL 3X
	990000306	BUSHING BOOT KIT 38KV 170BIL 3X
Control cable	998002200	CONTROL CABLE EXTENSION PTCC TO ADVC2/3
	990001030	CONTROL CABLE N ONLY - 11M
	990001035	CONTROL CABLE N ONLY - 20M
	990001005	CONTROL CABLE N ONLY - 4M
	990001015	CONTROL CABLE N ONLY - 7M
	992000175	CONTROL CABLE PMSET PMSET U/W/RL - 15M
	992000100	CONTROL CABLE PMSET U/W/RL - 20M
	992000045	CONTROL CABLE PMSET U/W/RL - 11M
	992000030	CONTROL CABLE PMSET U/W/RL - 7M
	992000035	CONTROL CABLE PMSET U/W/RL - 8M
Gas tools	999700065	GAS FILL TOOL SF6 N & RL
	999700066	GAS FILL TOOL DRY AIR N GREEN
	999700045	GAS GAUGE N SERIES 0-100KPA
	999700050	GAS GAUGE RL SERIES 0-200KPA
Stick -hook	999700080	HOOK STICK TELESCOPING 35FT
HV cable	990000270	HV 250A 80MM 1xALLUG2HOLE
	990000280	HV 340A 120MM 1xALLUG2HOLE
	990000265	HV 400A 185MM 1xALLUG2HOLE
	990000212	HV 400A 1xALPALM2HOLE KIT WITH SCREWS
	990000201	HV 630A 240MM 1xCULUG2HOLE
	990000205	HV 800A 1xCUPALM2HOLE KIT WITH SCREWS
	990000275	HV 800A 400MM 1xCULUG2HOLE
	990000600	HV CABLE 250A 3M 80MM 1xALLUG&PALM2HOLE
	990000607	HV CABLE 250A 3M 80MM 6xALLUG&PALM2HOLE
	990000601	HV CABLE 250A 4M 80MM 1xALLUG&PALM2HOLE
	990000602	HV CABLE 250A 4M 80MM 6xALLUG&PALM2HOLE
	990000603	HV CABLE 250A 6M 80MM 1xALLUG&PALM2HOLE
	990000604	HV CABLE 250A 6M 80MM 6xALLUG&PALM2HOLE
	990000620	HV CABLE 340A 3M 120MM 1xALLUG&PALM2HOLE
	990000623	HV CABLE 340A 3M 120MM 6xALLUG&PALM2HOLE
	990000650	HV CABLE 400A 10M 180MM 1xALLUG&PALM2HOL
	990000651	HV CABLE 400A 10M 180MM 6xALLUG&PALM2HOL
	990000640	HV CABLE 400A 3M 180MM 1xALLUG&PALM2HOLE

Category	Part Number	Part Description
	990000665	HV CABLE 400A 3M 180MM 3xALLUG&PALM2HOLE
	990000660	HV CABLE 400A 3M 180MM 6xALLUG&PALM2HOLE
	990000641	HV CABLE 400A 4M 180MM 1xALLUG&PALM2HOLE
	990000670	HV CABLE 400A 4M 180MM 6xALLUG&PALM2HOLE
	990000642	HV CABLE 400A 5M 180MM 1xALLUG&PALM2HOLE
	990000680	HV CABLE 400A 5M 180MM 6xALLUG&PALM2HOLE
	990000643	HV CABLE 400A 6M 180MM 1xALLUG&PALM2HOLE
	990000695	HV CABLE 400A 6M 180MM 3xALLUG&PALM2HOLE
	990000690	HV CABLE 400A 6M 180MM 6xALLUG&PALM2HOLE
	990000645	HV CABLE 400A 8M 180MM 1xALLUG&PALM2HOLE
	990000646	HV CABLE 400A 8M 180MM 6xALLUG&PALM2HOLE
	990003225	HV CABLE 630A 1M 240MM 1xCULUG&PALM2HOLE
	990003190	HV CABLE 630A 1M 240MM 6xCULUG&PALM2HOLE
	990003150	HV CABLE 630A 3M 240MM 1xCULUG&PALM2HOLE
	990003145	HV CABLE 630A 3M 240MM 3xCULUG&PALM2HOLE
	990003100	HV CABLE 630A 3M 240MM 6xCULUG&PALM2HOLE
	990003135	HV CABLE 630A 4M 240MM 1xCULUG&PALM2HOLE
	990003155	HV CABLE 630A 4M 240MM 3xCULUG&PALM2HOLE
	990003105	HV CABLE 630A 4M 240MM 6xCULUG&PALM2HOLE
	990003130	HV CABLE 630A 6M 240MM 1xCULUG&PALM2HOLE
	990003170	HV CABLE 630A 6M 240MM 3xCULUG&PALM2HOLE
	990003115	HV CABLE 630A 6M 240MM 6xCULUG&PALM2HOLE
	990003180	HV CABLE 630A 7M 240MM 1xCULUG&PALM2HOLE
	990003181	HV CABLE 630A 7M 240MM 6xCULUG&PALM2HOLE
	990003182	HV CABLE 630A 10M240MM 6xCULUG&PALM2HOLE
	990003230	HV CABLE 800A 3M 400MM 1xCULUG&PALM2HOLE
	990000115	HV CABLE 800A 3M 400MM 6xCULUG&PALM2HOLE
	990000116	HV CABLE 800A 4M 400MM 1xCULUG&PALM2HOLE
	990000117	HV CABLE 800A 4M 400MM 6xCULUG&PALM2HOLE
	990000170	HV CABLE 800A 5M 400MM 1xCULUG&PALM2HOLE
	990000171	HV CABLE 800A 5M 400MM 6xCULUG&PALM2HOLE
	990003120	HV CABLE 800A 6M 400MM 1xCULUG&PALM2HOLE
	990003121	HV CABLE 800A 6M 400MM 6xCULUG&PALM2HOLE
	990000120	HV CABLE XLPE 250A 80MM CABLE PER METRE
	990000125	HV CABLE XLPE 400A 180MM CABLE PER METRE
	990000130	HV CABLE XLPE 630A 240MM CABLE PER METRE
Mounting bracket	992000010	MOUNTING BRACKET CENTRE PMSET U-SERIES
	992000005	MOUNTING BRACKET END PMSET U-SERIES
	994000005	MOUNTING BRACKET POLE RL SERIES
	992500005	MOUNTING BRACKET POLE PMSET W-SERIES
Clamp band	990000400	MOUNTING POLE CLAMP BAND KIT 230-270 1X
	990000405	MOUNTING POLE CLAMP BAND KIT 270-310 1X
	990000410	MOUNTING POLE CLAMP BAND KIT 310-360 1X
Mounting bracket	992000092	MOUNTING SUB PMSET U-SERIES 2290MM ULTRA ONLY
Rating plate	990000810	RATING PLATE - ADVC2
	990000815	RATING PLATE - RECLOSER & LBS

Category	Part Number	Part Description
MDIM	999900215	RL2 MDIM ASSEMBLY
Retrofit kit	994000245	RL2 - MA & FA MOTOR PACK V3 RETROFIT KIT
SCEM	999900050	SCEM 11A N SERIES 15KV/27KV
	999900055	SCEM 11B PMSET U-SERIES
	999900060	SCEM 11C N SERIES 38KV
	999900065	SCEM 11D PMSET W-SERIES
	999900070	SCEM 12 RL2 SERIES 15KV/27KV
	999900220	SCEM 13 RL2 SERIES 38KV
	999900145	SCEM ASSEMBLY BOSS-CEM11
Arrestors	990000505	SURGE ARRESTER 12KV ABB MWK10 1X
	990000510	SURGE ARRESTER 15KV ABB MWK12 1X
	990000515	SURGE ARRESTER 21KV ABB MWK17 1X
	990000520	SURGE ARRESTER 24KV ABB MWK18 1X
	990000525	SURGE ARRESTER 30KV ABB MWK24 1X
	990000530	SURGE ARRESTER 36KV ABB MWK30 1X
	990000535	SURGE ARRESTER 38KV ABB MWK36 1X
	990000507	SURGE ARRESTER 12KV ABB MWK10 2X
	990000512	SURGE ARRESTER 15KV ABB MWK12 2X
	990000517	SURGE ARRESTER 21KV ABB MWK17 2X
	990000522	SURGE ARRESTER 24KV ABB MWK18 2X
	990000506	SURGE ARRESTER 12KV ABB MWK10 6X
	990000511	SURGE ARRESTER 15KV ABB MWK12 6X
	990000516	SURGE ARRESTER 21KV ABB MWK17 6X
	990000521	SURGE ARRESTER 24KV ABB MWK18 6X
	990000526	SURGE ARRESTER 30KV ABB MWK24 6X
	990000531	SURGE ARRESTER 36KV ABB MWK30 6X
	990000536	SURGE ARRESTER 38KV ABB MWK36 6X
	990000560	SURGE ARRESTER 12KV BRITECH OB12 1X
	990000562	SURGE ARRESTER 15KV BRITECH OB15 1X
	990000540	SURGE ARRESTER 21KV BRITECH OB21 1X
	990000566	SURGE ARRESTER 24KV BRITECH OB24 1X
	990000570	SURGE ARRESTER 30KV BRITECH OB30 1X
	990000572	SURGE ARRESTER 36KV BRITECH OB36 1X
	990000574	SURGE ARRESTER 38KV BRITECH OB38 1X
	990000576	SURGE ARRESTER 12KV BRITECH OB12 2X
	990000578	SURGE ARRESTER 15KV BRITECH OB15 2X
	990000580	SURGE ARRESTER 21KV BRITECH OB21 2X
	990000582	SURGE ARRESTER 24KV BRITECH OB24 2X
	990000584	SURGE ARRESTER 12KV BRITECH OB12 6X
	990000586	SURGE ARRESTER 15KV BRITECH OB15 6X
	990000588	SURGE ARRESTER 21KV BRITECH OB21 6X
	990000590	SURGE ARRESTER 24KV BRITECH OB24 6X
	990000594	SURGE ARRESTER 30KV BRITECH OB30 6X
	990000596	SURGE ARRESTER 36KV BRITECH OB36 6X
	990000598	SURGE ARRESTER 38KV BRITECH OB38 6X
	994000000	SURGE ARRESTER BRACKET RL2 15KV & 27KV

Category	Part Number	Part Description
	994000070	SURGE ARRESTER BRACKET RL2 38KV
	992000015	SURGE ARRESTER BRACKET U CENTRE MNT (I)
	992000020	SURGE ARRESTER BRACKET U END MNT (II)
TTS	990003035	TEST - BREAKOUT TEST CABLE
	990003012	TEST - CABLE 4M
	990003065	TEST - SVIIS & CABLE - N U W RL SERIES
	990003010	TEST - TTS - CURRENT INJ CABLE 4M
	990003000	TEST - TTS - TEST AND TRAINING SET
CVT	992000050	PMSET U-SERIES EXTERNAL CVT KIT 3 PHASE
Connectors	992000095	U/PMSET W-SERIES 630A 2 HOLE ANSI PALM 1X
	992000096	PMSET U-SERIES HJ 630A 2 HOLE ANSI PALM 6X
	992000065	PMSET U/W-SERIES 400A 15TP 1X
	992000066	PMSET U-SERIES HJ 400A 15TP 6X
	992000060	PMSET U/W-SERIES 630A 30TP 1X
	992000061	PMSET U-SERIES HJ 630A 30TP 6X
VT	990000079	VT EXT PH-PH 11KV/240V VT ONLY
	990000710	VT EXT PH-PH 11KV/110V VT ONLY
	990000725	VT EXT PH-PH 15KV/240V VT ONLY
	990000077	VT EXT PH-PH 22KV/240V VT ONLY
	990000084	VT EXT PH-PH 33KV/110V VT ONLY
	990000705	VT EXT PH-PH 33KV/240V VT ONLY
	990000755	VT EXT SWER 12.7KV/240V VT ONLY
	990003205	VT EXT SWER 19KV/240V VT ONLY
	990000071	VT ECS EXT PH-PH 11KV/240V VT ONLY
	990000072	VT ECS EXT PH-PH 11KV/110V VT ONLY
VT cable	990000086	VT HV 2X CABLE KIT 250A 1.5M 80MM
	990000087	VT HV 2X CABLE KIT 250A 3M 80MM
	990000099	VT HV 2X CABLE KIT 250A 4M 80MM
	990000088	VT HV 1X CABLE KIT 250A 3M 80MM SWER
	990000765	VT LVCABLE FUSEDSHEATH 13MADVC2 240/110V
	990000078	VT LV CABLE KIT 13M
Connectors	992000097	PMSET W-SERIES HJ 630A 2 HOLE ANSI PALM 2X
	992500062	PMSET W-SERIES HJ 630A 30TP 2X
	992000067	PMSET W-SERIES HJ 400A 15TP 2X
Bird gaurds	994000145	WILDLIFE GUARD N & RL SERIES 6X
	992000190	WILDLIFE GUARD PMSET U-SERIES 6X
	992500075	WILDLIFE GUARD PMSET W-SERIES 2X
Connectors	995000001	PMSET E-SERIES 630A 2 HOLE ANSI PALM 6X
	995000003	PMSET E-SERIES 630A 4 HOLE ANSI PALM 6X
	995000005	PMSET E-SERIES 630A 6X
	995000011	PMSET E-SERIES 630A 2 HOLE ANSI PALM AUS MKT 6X
Mounting bracket	995000102	SURGE ARRESTER BRACKET PMSET E-SERIES
	995000104	MOUNTING BRACKET POLE PMSET E-SERIES
	995000106	MOUNTING SUB PMSET E-SERIES 1750MM ULTRA ONLY
Crate	995000200	CRATE PMSET E-SERIES & POWERLOGIC ADVC3
Control cable	995000302	CONTROL CABLE E ONLY - 7M

Category	Part Number	Part Description
	995000304	CONTROL CABLE E ONLY - 11M
	995000306	CONTROL CABLE E ONLY - 20M
Bird gaurds	995000150	WILDLIFE GUARD PMSET E-SERIES 6X
Installation manual	998001508	INSTALL MANUAL PMSET E-SERIES POWERLOGIC ADVC3 ENG
Bird guards	995000152	WILDLIFE GUARD PMSET E-SERIES LOAD 1X
	995000156	WILDLIFE GUARD PMSET E-SERIES SOURCE 1X
connectors	995000001	E 38 SERIES 630A 2 HOLE ANSI PALM 6X
	995000003	E 38 SERIES 630A 4 HOLE ANSI PALM 6X
	995000005	E 38 SERIES 630A 6X
	995000011	PMSET E-SERIES 630A 2 HOLE ANSI PALM AUS MKT 6X
Mounting bracket	995000101	SURGE ARRESTER BRACKET E 38 SERIES
	995000104	MOUNTING BRACKET POLE E 38 SERIES
	995000106	MOUNTING SUB PMSET E-SERIES 1750MM ULTRA ONLY
Crate	995000400	CRATE E38 SERIES & ADVC3
Control cable	995000302	CONTROL CABLE E ONLY - 7M
	995000304	CONTROL CABLE E ONLY - 11M
	995000306	CONTROL CABLE E ONLY - 20M
Bird gaurds	995000151	E 38 WILDLIFE GUARD PMSET E-SERIES 6X
Installation manual	998001508	INSTALL MANUAL PMSET E-SERIES ADVC3 ENG
Bird gaurds	995000153	WILDLIFE GUARD PMSET E-SERIES LOAD 1X
	995000155	WILDLIFE GUARD PMSET E-SERIES SOURCE 1X
Mounting bracket	995000108	STANDARD MOUNTING BRACKET BY SCHNEIDER
HV cable	990003068	Trip-close box for reclosers

PowerLogic ADVC Global Parts List

All the replacement parts are listed in the following table which are available from the manufacturer.

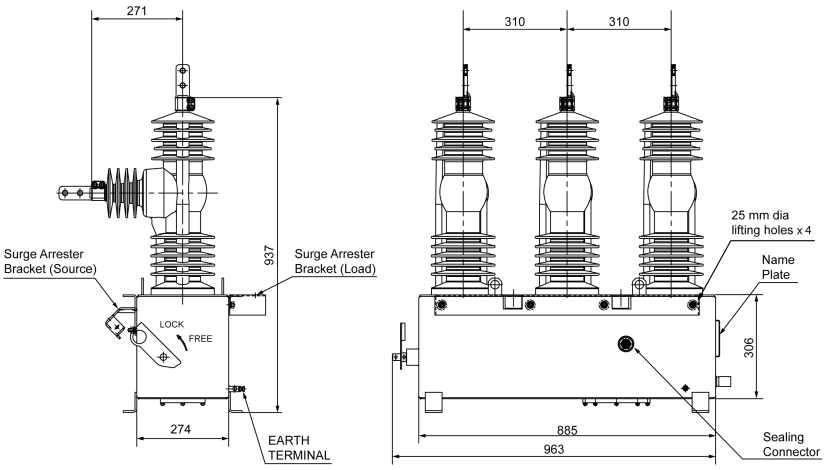
Category	Part Number	Part Description
Battery	998000055	POWERLOGIC ADVC2/3 BATTERY 2X 12V 12AH LRG CSB
	998000056	POWERLOGIC ADVC2/3 BATTERY 2X 12V 12AH LRGP YUASA
	997000000	POWERLOGIC ADVC2/3 BATTERY 2X 12V 7.2AH STD CSB
Heater mat	998002050	POWERLOGIC ADVC2/3 BATTERY HEATER MAT
CAPE	998002003	POWERLOGIC ADVC3 CAPE FLEXVUE ENG
	998002013	POWERLOGIC ADVC3 CAPE FLEXVUE ESP
	998002023	POWERLOGIC ADVC3 CAPE FLEXVUE POR
	998002235	POWERLOGIC ADVC3 CAPE SETVUE ENG
DOOR	998002065	POWERLOGIC ADVC2/3 COMPACT DOOR NO DOOR LABEL
ENCLOSURE	998002045	POWERLOGIC ADVC2/3 COMPACT ENCLOSURE NO DOOR LABEL
RADIO	998001055	POWERLOGIC ADVC2/3 COMS RADIO ENERGEX UTILINET
MODEM	997000115	POWERLOGIC ADVC2/3 COMS MODEM BNC CABLE KIT
	998001041	POWERLOGIC ADVC2/3 COMS MODEM MAESTRO E200 E205XT02
RADIO	998001120	POWERLOGIC ADVC2/3 COMS RADIO KIT TRIO ER450
	997000165	POWERLOGIC ADVC2/3 COMS RADIOSUPPRESSOR 125-1000MHZ
	998001115	POWERLOGIC ADVC2/3 COMS RADIO KIT TRIO JR900

Category	Part Number	Part Description
DIN RAIL	998001025	POWERLOGIC ADVC2/3 DINRAIL TBLOCK FOR CUSTOMER TRAY
CUSTOMER TRAY	998002030	POWERLOGIC ADVC2/3 CUSTOMER TRAY
DOOR	998002300	POWERLOGIC ADVC2/3 DOOR LABEL FLEXVUE ENG
	998002310	POWERLOGIC ADVC2/3 DOOR LABEL FLEXVUE ESP
	998002320	POWERLOGIC ADVC2/3 DOOR LABEL FLEXVUE POR
	998002305	POWERLOGIC ADVC2/3 DOOR LABEL SETVUE ENG
FTIM	998002055	POWERLOGIC ADVC2/3 FTIM FIELD INSTALL KIT 1X
GPO CABLE	998001000	POWERLOGIC ADVC2/3 GPO CABLE AUS
	998001075	POWERLOGIC ADVC2/3 GPO CABLE AUS SPARES KIT
	998001065	POWERLOGIC ADVC2/3 GPO CABLE EU-A EUROPE CEE 7/5
	998001090	POWERLOGIC ADVC2/3 GPO CABLE EU-A EUROPE CEE 7/5KIT
	998001070	POWERLOGIC ADVC2/3 GPO CABLE EU-B EUROPE CEE 7/4
	998001095	POWERLOGIC ADVC2/3 GPO CABLE EU-B EUROPE CEE 7/4KIT
	998001015	POWERLOGIC ADVC2/3 GPO CABLE SOUTH AFRICAN
	998001010	POWERLOGIC ADVC2/3 GPO CABLE UK
	998001085	POWERLOGIC ADVC2/3 GPO CABLE UK SPARES KIT
	998001005	POWERLOGIC ADVC2/3 GPO CABLE US
	998001080	POWERLOGIC ADVC2/3 GPO CABLE US SPARES KIT
HMI INSERT	998001135	POWERLOGIC ADVC2/3 HMI INSERTS AUSGRID RL SERIES
	998001125	POWERLOGIC ADVC2/3 HMI INSERTS ERGON RL SERIES
	998001130	POWERLOGIC ADVC2/3 HMI INSERTS ERGON PMSET W-SERIES
IOEX	998002070	POWERLOGIC ADVC2/3 IOEX3 FIELD INSTALL KIT 1X
PSU	998002191	POWERLOGIC ADVC2/3 PSU ULTRA 115 DUAL FTIM
	998002181	POWERLOGIC ADVC2/3 PSU ULTRA 115 DUAL FTIM GPO
	998002110	POWERLOGIC ADVC2/3 PSU COMPACT/ULTRA 115
	998002130	POWERLOGIC ADVC2/3 PSU ULTRA 115 FTIM
	998002120	POWERLOGIC ADVC2/3 PSU ULTRA 115 FTIM GPO
	998002170	POWERLOGIC ADVC2/3 PSU ULTRA 115 FTIM INT
	998002160	POWERLOGIC ADVC2/3 PSU ULTRA 115 FTIM INT GPO
	998002100	POWERLOGIC ADVC2/3 PSU COMPACT/ULTRA 115 GPO
	998002150	POWERLOGIC ADVC2/3 PSU COMPACT/ULTRA 115 INT
	998002140	POWERLOGIC ADVC2/3 PSU COMPACT/ULTRA 115 INT GPO
	998002196	POWERLOGIC ADVC2/3 PSU ULTRA 230 DUAL FTIM
	998002186	POWERLOGIC ADVC2/3 PSU ULTRA 230 DUAL FTIM GPO
	998002115	POWERLOGIC ADVC2/3 PSU COMPACT/ULTRA 230
	998002135	POWERLOGIC ADVC2/3 PSU ULTRA 230 FTIM
	998002125	POWERLOGIC ADVC2/3 PSU ULTRA 230 FTIM GPO
	998002175	POWERLOGIC ADVC2/3 PSU ULTRA 230 FTIM INT
	998002165	POWERLOGIC ADVC2/3 PSU ULTRA 230 FTIM INT GPO
	998002105	POWERLOGIC ADVC2/3 PSU COMPACT/ULTRA 230 GPO
	998002155	POWERLOGIC ADVC2/3 PSU COMPACT/ULTRA 230 INT
	998002145	POWERLOGIC ADVC2/3 PSU COMPACT/ULTRA 230 INT GPO
	998002080	POWERLOGIC ADVC2/3 PSU TOROIDAL 115/230V-32V 100VA
SURGE SUPPRESSOR	998001105	POWERLOGIC ADVC2/3 SURGE SUPPRESSOR CABLE KIT
DOOR	998002060	POWERLOGIC ADVC2/3 ULTRA DOOR - NO DOOR LABEL
ENCLOSURE	998002040	POWERLOGIC ADVC2/3 ULTRA ENCLOSURE - NO DOOR LABEL

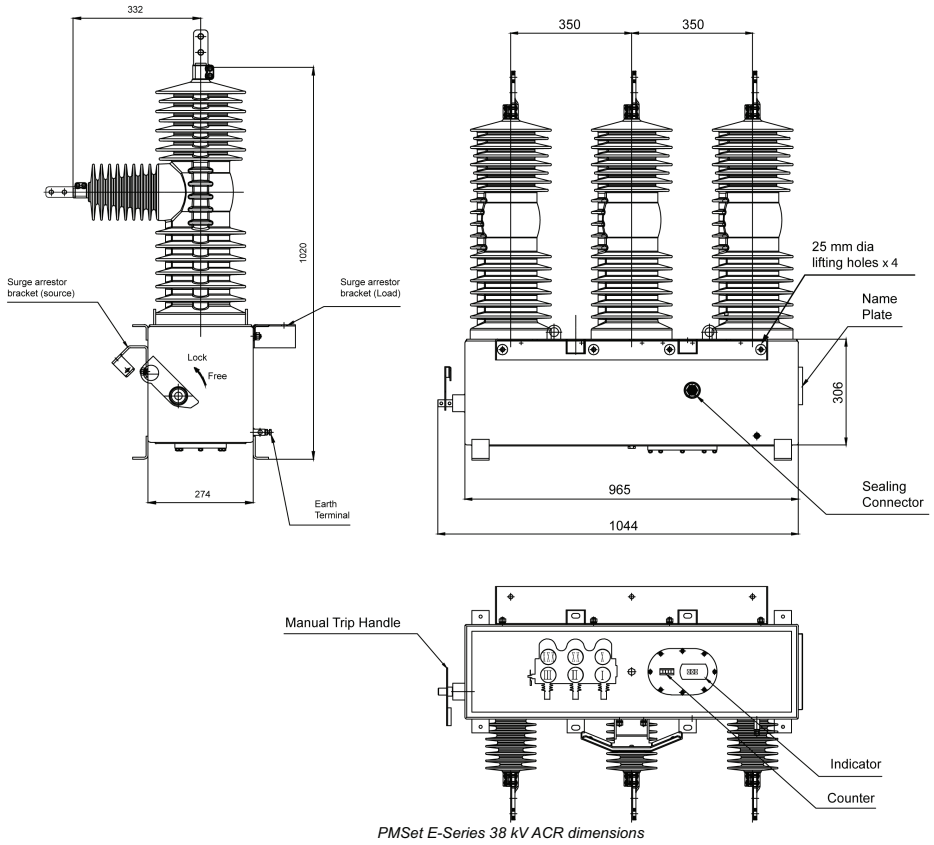
Category	Part Number	Part Description
USB CABLE	998001045	POWERLOGIC ADVC2/3 USB CABLE
	998000100	POWERLOGIC ADVC2/3 USB TO SERIAL CONVERTER
PSU	998002195	POWERLOGIC ADVC2/3 PSU ULTRA 230 SCEM GPO INDOPLN
RL	998002197	RL adapter cable for POWERLOGIC ADVC, PTCC

Dimensions

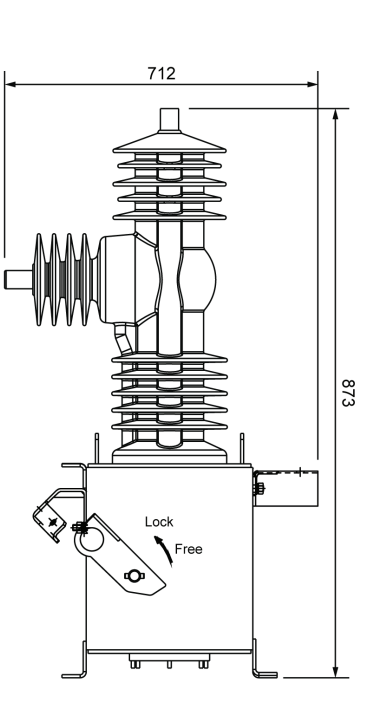
ACR



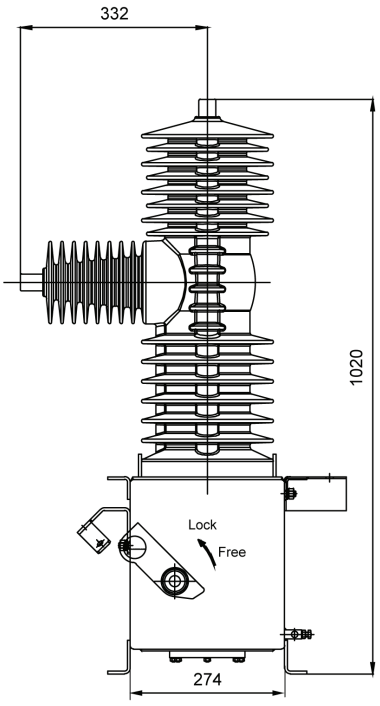
PMSet E-Series 27 KV ACR dimensions



PMSet E-Series 38 kV ACR dimensions

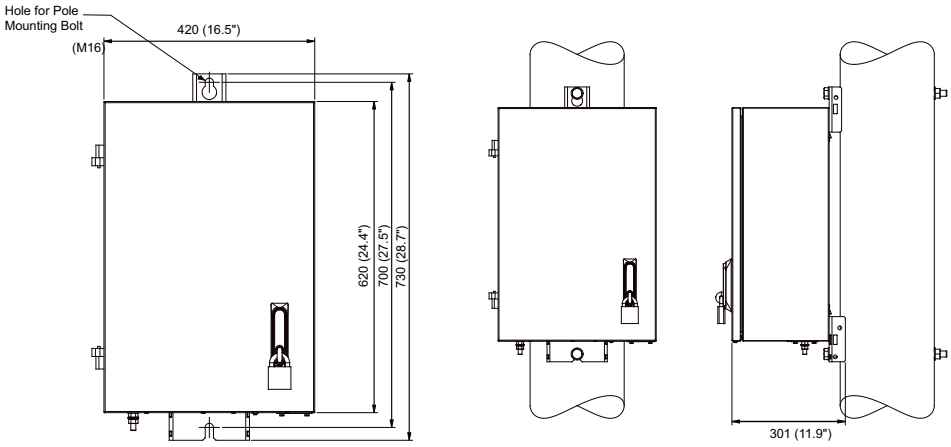


PMSet E-Series 27 KV ACR dimensions



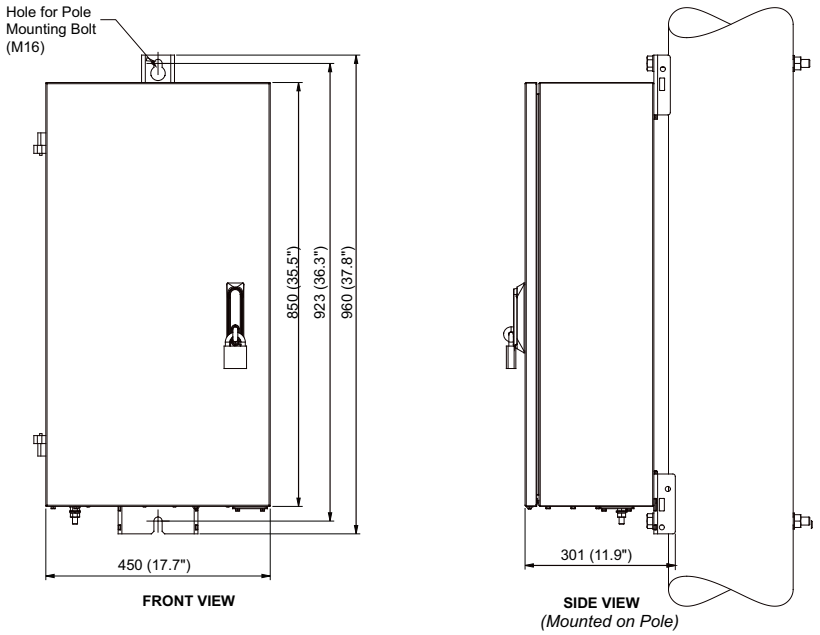
PMSet E-Series 38 KV ACR dimensions

PowerLogic ADVC COMPACT



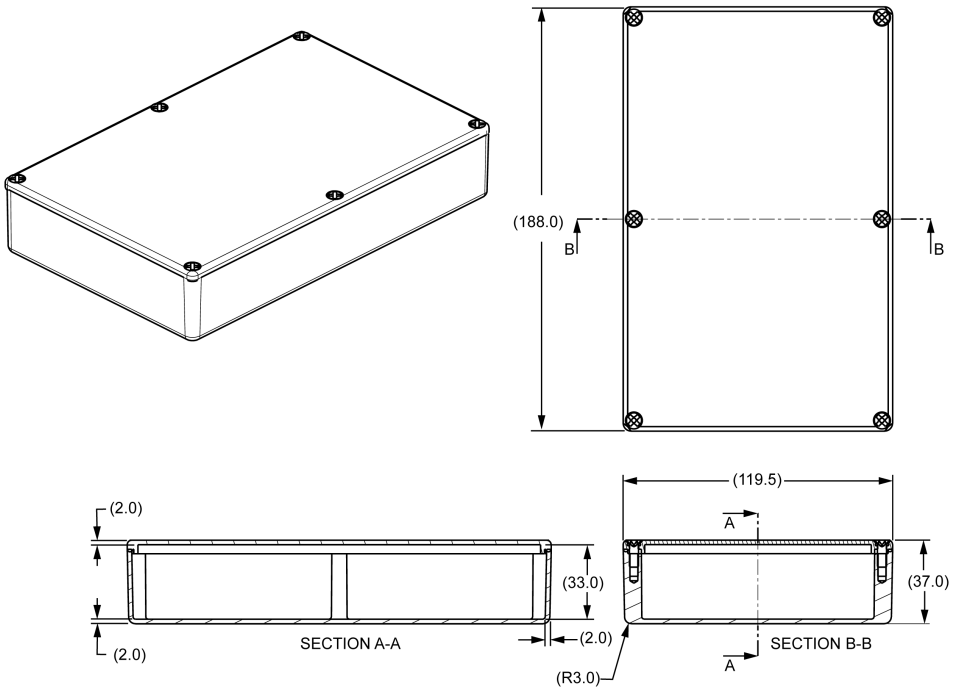
Front and Side View of PowerLogic ADVC **COMPACT** *cubicle*

PowerLogic ADVC ULTRA



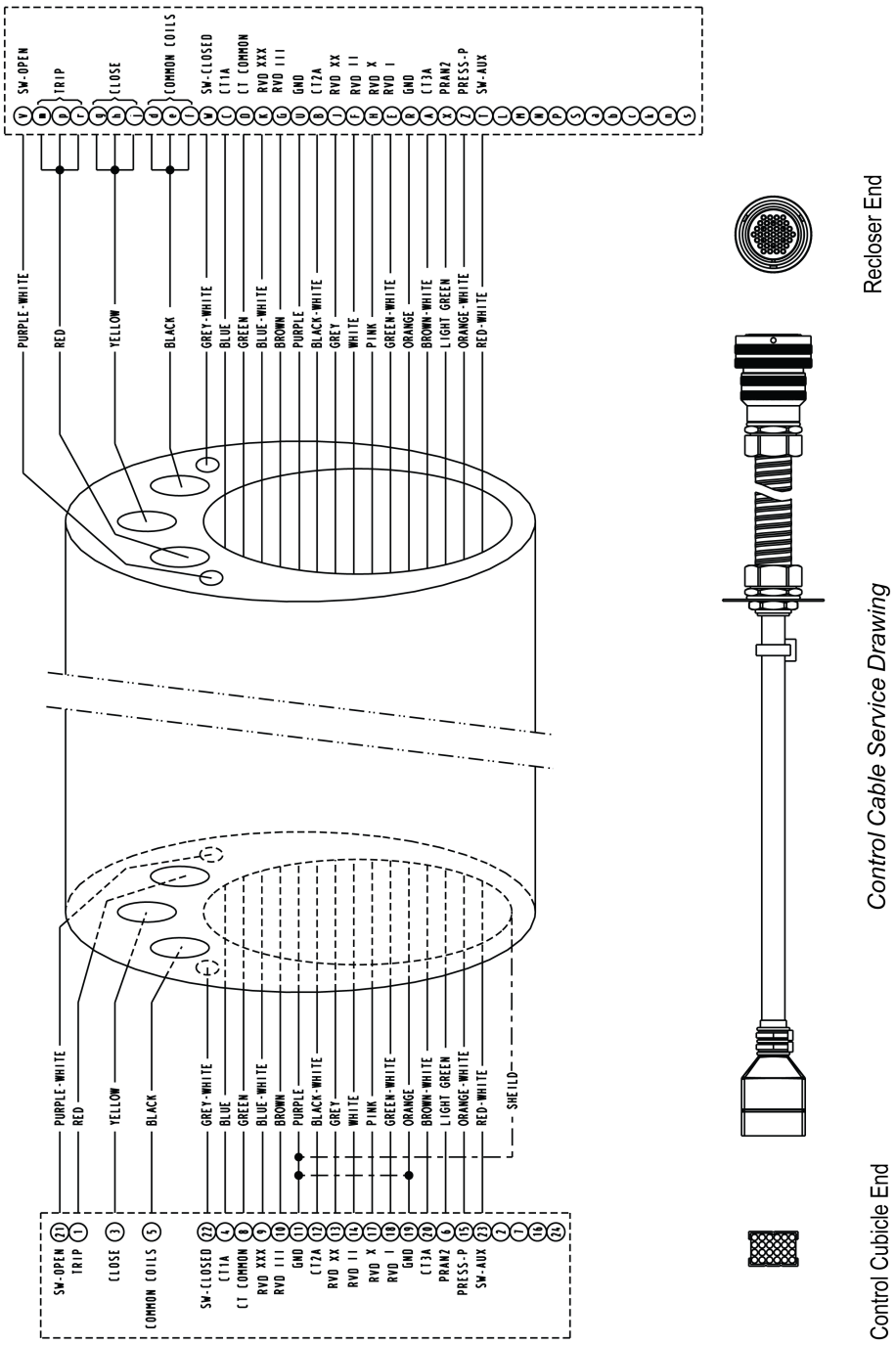
Front and Side View of PowerLogic ADVC **ULTRA** *Cubicle*

IOEX3



IOEX 3 Dimensions

Control Cable Service Drawing



Calibration of SwitchGear and Controller

Calibration of switchgear or controller in the event of detected failure or replacement of switchgear or controller

The PowerLogic ADVC and PMSet E - Series switchgear are integrated together during Level - 3 testing inside the Schneider Electric Plant. It is recommended to use same controller and same switchgear together for better performance. The integration means all the information related to calibration data of switchgear (Static data and dynamic data) is stored inside the controller during Level - 3 testing.

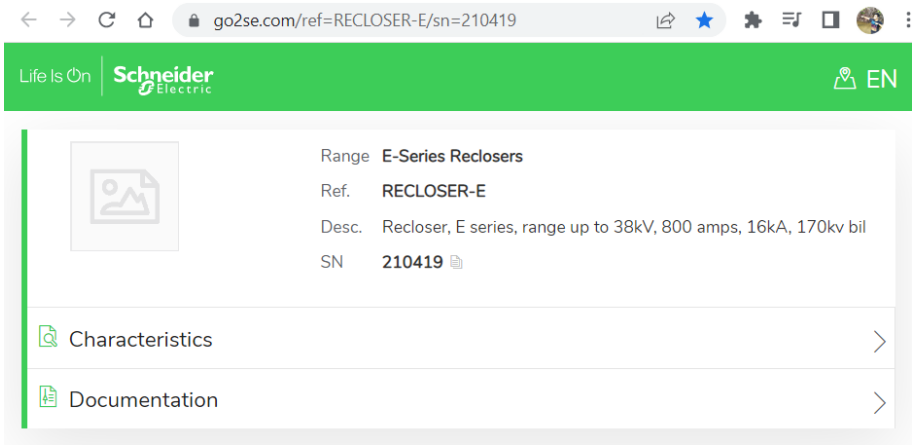
However, there is a possibility of mixing of the controllers at customer site or customer might have to change the switchgear or controller due to specific issues in such scenario following process must be followed.

NOTE: Following options are provided to customer by Schneider Electric to restore the information related to calibration data of switchgear.

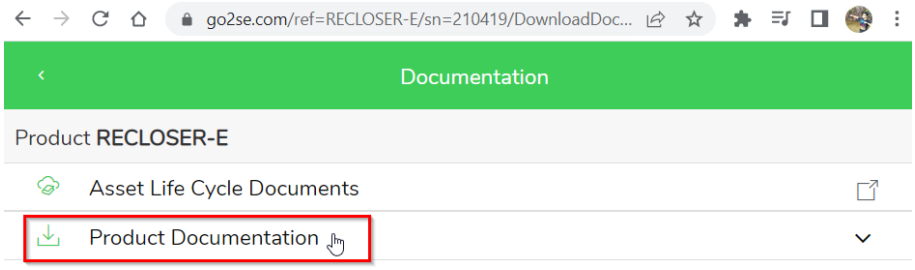
1. Option 1 confirms the assurance of the static data of the switchgear for dynamic data customer need to retrieve the information from event log or mechanical operation counter located at the bottom of switchgear.
2. Option 2 provide full information to customer about the static and dynamic calibration data of the switchgear.

Option 1: Recording of Information by QR Code.

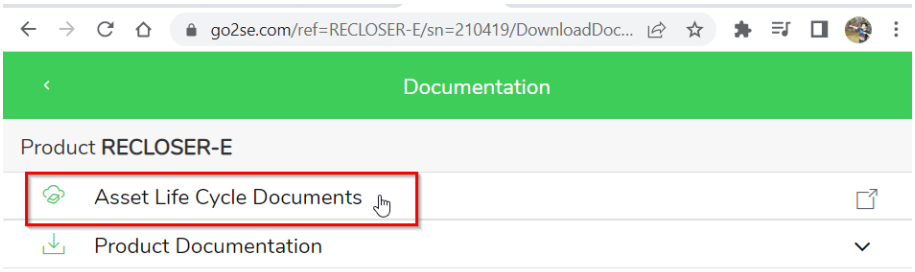
1. PMSet E-Series range of switchgear is provided with the QR code on the name plate of the switchgear.
2. The QR code needs to be scanned by a smart device such as I Phone or Android phone with a QR code scanner application to be used for scanning My Schneider.
3. After scanning the QR code, the link will direct to this page:



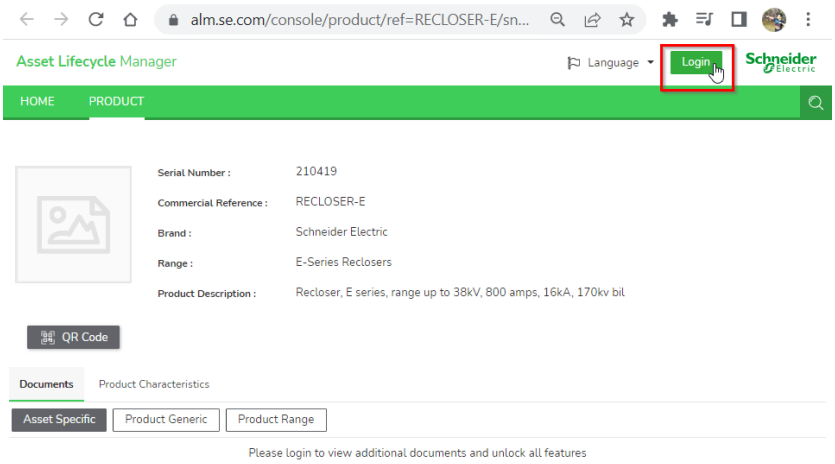
4. Click on documentation, which will redirect to a new window of documentation.



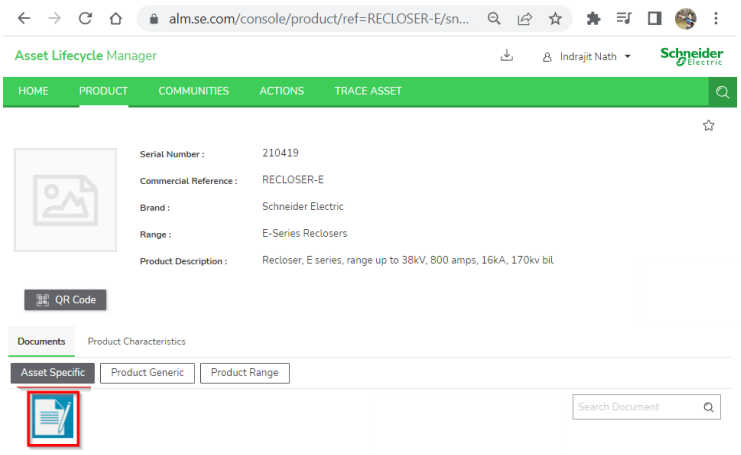
5. Click on asset life cycle management which will redirect to a new window of asset life cycle management.



6. Login to asset life cycle management if not done login already.



7. After login, the call file can be downloaded which is under the tab of asset specific tab in asset life cycle management.



8. The calibration file provides the information which consists of type of switchgear, date of manufacture, bushing calibration and serial number.
9. Dynamic switchgear data consists of number of operations and the resulting wear information of each phase. This data changes with every operation of the switchgear (manual or automatic). Numbers of operations are available on the operation counter mounted at the bottom of switchgear.
10. The safe repository contains calibration files of the switchgear linked with Serial number of switchgear.
11. Download the information and save it on your computer or on smart device.
12. Connect your computer to PowerLogic ADVC using USB cable.
13. With the help of WSOS upload the information or calibration file in the new controller or remove old file from old controller to upload new file in case switchgear is replaced.

Option 2: Fixing USB Key Directly on the USB Port of PowerLogic ADVC (USB Key Not in Scope of Schneider Electric)

A calibration file may be placed on a USB key from one of the following sources:

1. The factory (i.e. supplied with the switchgear/controller). Dynamic data will be default.
2. The Schneider Electric online store (via QR code). Dynamic data will be default.
3. Exported from WSOS5 on a PC. Dynamic data may be default depending on the source of the calibration file (refer to the following item).
4. Exported from an PowerLogic ADVC. Dynamic data of the PowerLogic ADVC will be the written to the calibration file on the USB key.

Dynamic switchgear data consists of number of operations and the resulting wear information of each phase. This data changes with every operation of the switchgear (manual or automatic).

> **NOTE:** Numbers of operations are available on the operation counter mounted at the bottom of switchgear.

Static switchgear data consists of the switchgear type, date of manufacture, bushing calibration, and serial number.

Having obtained the calibration file on the USB key it may be installed on a PowerLogic ADVC by directly inserting the USB key in the USB3 port of the PowerLogic ADVC.

The calibration files on the USB key are required to be one per directory. The directory name may be any valid name however calibration files written by the PowerLogic ADVC have the serial number as the directory name. The calibration file in the directory must be named **maintenance.cal** to be recognized.

Navigate via the O.I. to the Calibration page.

flex **ENGINEER > MAINTENANCE > CALIBRATION**

set **STATUS MENU > CALIBRATION**

The options available are to **Load a Calibration** or to **Save a Calibration**.

Load Calibration

Select the Load Calibration option and follow the prompts to select the required directory from which to load the calibration data. The USB key may hold many calibration files. Once selected the calibration file directory has been selected the details will be read from the file **directory/maintenance.cal** on the USB key and written into the internal store of the PowerLogic ADVC and made active. This process will override any existing PMSet E-Series calibration information on the PowerLogic ADVC. The switchgear serial number is part of the calibration file and this will be written to the PowerLogic ADVC as part of this process.

Save Calibration

Select the Save Calibration option. After password verification, Save Calibration will cause the calibration information stored on the PowerLogic ADVC to be written to a file on the USB key. The file will be stored in the directory named using the stored serial number of the switchgear and given a file name **maintenance.cal** (that is, **directory/maintenance.cal**).

> **NOTE:** The serial number of the switchgear may be altered at any time by the user. If this happens then a new calibration file (that is, **directory/maintenance.cal**) will be created on the USB key when saving (either automatically or manually).

Operational Updates

If a USB key is inserted in USB3 port of the PowerLogic ADVC, and left in place, the dynamic data, when it changes, will be written to the USB key.

This mechanism provides a means to restore the dynamic calibration data if the PowerLogic ADVC attached to the switchgear is replaced. Simply remove the USB key and then insert it in the new PowerLogic ADVC and follow the above **Load Calibration** procedure.

NOTE: The USB key must be installed by customer on site during the installation.

Glossary

A

ACR: Automatic Circuit Recloser

ADVC: ADVC Controller

C

CAPE: Control and Protection Enclosure

CT: Current Transformer

CVT: Capacitive Voltage Transducer

D

DSP: Digital Signal Processor

F

FTIM: Fast Trip Input Module

G

GPO: General Purpose Outlet

I

IOEX: Input Output Expander

L

LCD: Liquid Crystal Display

LED: Light Emitting Diode

M

MCB: Miniature Circuit Breaker

MDI: Maximum Demand Indicators

O

O.I: Operator Interface

OCP: Operator Control Panel

P

PCOM: Protection and Communication Module

PF: Power Factor

PSSM: Power Supply and Switchgear Module

PSU: Power Supply Unit

PTCC: Pole Top Control Cubicle

Q

QAK: Quick Action Keys

R

RTU: Remote Terminal Unit

RVD: Resistive Voltage Divider

S

SCEM: Switchgear Cable Entry Module

T

TTS: Test and Training Set

W

WSOS: Windows Switchgear Operating System

Schneider Electric
35 rue Joseph Monier
92500 Rueil Malmaison
France

+ 33 (0) 1 41 29 70 00

www.se.com

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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