

E-Series ACR with ADVC Controller

Installation, Operation and Maintenance Manual

11/2018



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 Environmental 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

The information provided in this documentation contains general descriptions and/or technical characteristics of the performance of the products contained herein. This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications. It is the duty of any such user or integrator to perform the appropriate and complete risk analysis, evaluation and testing of the products with respect to the relevant specific application or use thereof. Neither Schneider Electric nor any of its affiliates or subsidiaries shall be responsible or liable for misuse of the information contained herein. If you have any suggestions for improvements or amendments or have found errors in this publication, please notify us.

No part of this document may be reproduced in any form or by any means, electronic or mechanical, including photocopying, without express written permission of Schneider Electric.

All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

When devices are used for applications with technical safety requirements, the relevant instructions must be followed.

Failure to use Schneider Electric software or approved software with our hardware products may result in injury, harm, or improper operating results.

Failure to observe this information can result in injury or equipment damage.

© 2018 Schneider Electric. All rights reserved.

www.hime10.vii

Table of Contents



	Safety Information	5
	About the Book	7
Chapter 1	Introduction	9
	Scope of the Manual	10
	Design Overview	12
Chapter 2	Installation	17
	Transport, Handling and Workshop Tests	18
	Site Installation	23
Chapter 3	Communications and Accessories Installation	35
	Customer Accessories and Communication Equipment	36
	Input Output Expander (IOEX3) Installation	38
	Communication Ports	39
	Windows Switchgear Operating System (WSOS)	42
	SCADA Protocols	43
Chapter 4	Installation Testing	45
	Operator Tests	45
Chapter 5	Control Electronics Operation	51
	Introduction	51
Chapter 6	Operator Control Panel	57
	<i>se</i> VUE Panel Interface	58
	<i>flex</i> VUE Panel Interface	62
Chapter 7	Event Log	71
	Event Log	71
Chapter 8	Power System Measurements	75
	Power System Measurements	75
Chapter 9	Accessories Installation	79
	Accessories	80
	Input Output Expander Module (IOEX)	81
	Fast Trip Input Module (FTIM)	85
Chapter 10	Maintenance	95
	Overview	96
	Cleaning	97
	Battery Care	98
	ADVC Operating Conditions	100
	Replacement of Electronic Modules and Upgrades	101
Chapter 11	Ratings and Specifications	103
	Equipment and Crating Dimensions	104
	Switchgear Ratings	105
	Current Transformers	107
	Environmental	108
	Basic Timings	109
	ADVC General Specifications	110
	Controller EMC Type Tests	112
	Power System Measurements	114
Appendices		115
Appendix A	Replaceable Parts and Tools	117
	117
Appendix B	Dimensions	125
	125

Appendix C	Control Cable Service Drawing	129
	Control Cable Service Drawing	129
Appendix D	Calibration of Switch Gear and Controller	131
	131
Glossary	133

www.hime10.vn



Important Information

NOTICE

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.

www.hime10.vn

About the Book



At a Glance

Document Scope

This document describes the installation and maintenance procedures for the E-Series Automatic Circuit Recloser with ADVC Controller Range.

Validity Note

This document is valid for E-Series remotely controlled and monitored automatic circuit recloser (ACR) which consists of a E-Series automatic circuit recloser (ACR) combined with an ADVC Controller (ADVC).

Related Documents

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

You can download these technical publications and other technical information from our website at <https://www.schneider-electric.com/en/download>

Trademark Notice

All trademarks are owned by Schneider Electric Industries SAS or its affiliated companies.

www.hime10.vn

Chapter 1

Introduction

What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
Scope of the Manual	10
Design Overview	12

www.hime10.vn

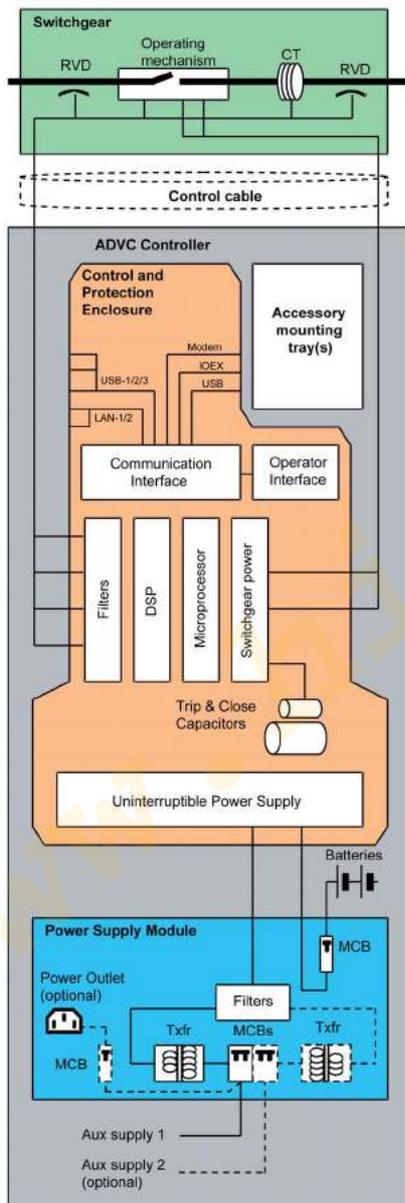
Scope of the Manual

This manual describes the installation and maintenance of the E-Series Automatic Circuit Recloser and the ADVC Controller.

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



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
	The bushing symbol indicates that the adjacent information applies only to the specified switchgear.
	The set symbol indicates that the adjacent information only relates to the ADVC SetVUE operator interface.
	The flex symbol indicates that the adjacent information only relates to the ADVC flexVUE operator interface.
Panel messages or Menu Navigation follows these icons in DOT MATRIX FONT	

Software Identification

The software loaded into the ADVC Controller 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.

 The software version is shown on the Operator Control Panel "Switchgear Wear/ General Details" page, in the field "App.Ver":

```
-- 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.

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

OPERATOR MENU → Switchgear Status → Switchgear Info

For more information on how to use the Operator Interface (O.I.), refer to Operator Control Panel (*see page 57*).

Revision Record

Level	Date	Comment
R00	December, 2017	First Release
R01	March, 2018	Second Release
R02	November, 2018	Third Release

Design Overview

General

The E-Series remotely controlled and monitored automatic circuit recloser (ACR) consists of a E-Series automatic circuit recloser (ACR) combined with an ADVC Controller (ADVC).

The E-Series ACR:

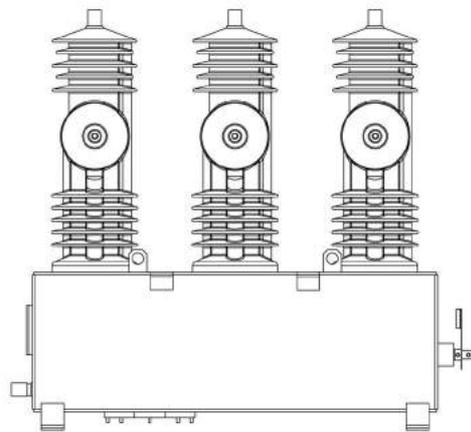
- consists of ganged operated vacuum interrupters insulated with cyclo-aliphatic epoxy resin mouldings.
- is operated by a single magnetic actuator for both tripping and closing.
- mechanism is enclosed in a stainless steel tank.
- vacuum interruptors are encapsulated with hydro-phobic cyclo-aliphatic epoxy resin casting and bolted on stainless steel tank.
- surge arresters can be directly fitted to the ACR, using surge arrester mounting bracket (depending on mounting method) and should be fitted at installation.
- has voltage measurement on each of the I- side bushing as well as X-Side of bushing.
- has current measurement on each phase.
- can be tripped from the ground by a hookstick and then lock out mechanically by further pulling the manual trip lever vertically down position. Then be locked out electronically by opening the isolating switches located on the ADVC.
- has a clearly visible indicator that shows whether the ACR is tripped or closed
- is connected to the ADVC Controller via a control cable through the base of the cubicle.
- can be connected into a bare conductor system.

The ADVC Controller reads and displays the information, and provides protection* and communication properties for the ACR.

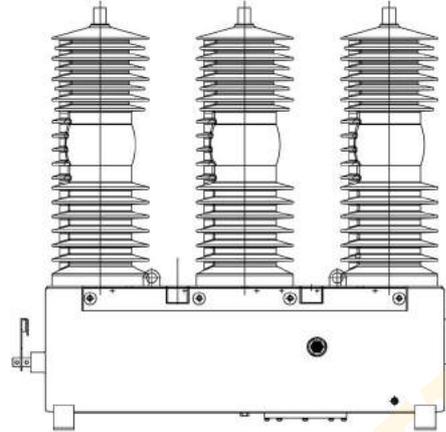
NOTE: * For protection, communication, and measurement features, refer the ADVC Controller Operational Manual (N00-812).

- The ADVC Controller consists of:
 - an operator control panel 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 ADVC Controller is powered by an auxiliary voltage supply coming from 2×12 V batteries.
- The ADVC is connected to the ACR via a detachable control cable.

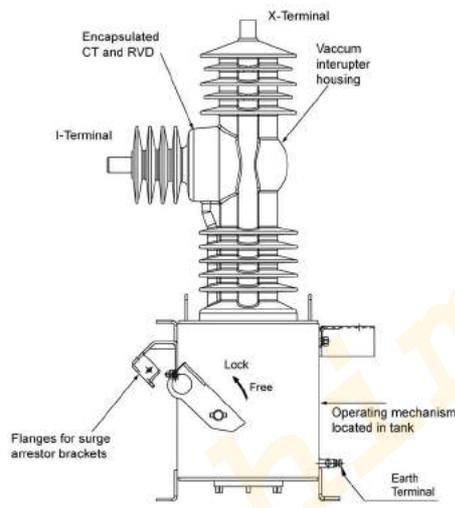
The customer compartment provides ample room for equipment. Standard communications cables can be used for connection to the communications ports on the ADVC and power is readily accessible from the programmable power terminal block. For more information, refer to Communications and Accessories Installation (see page 35).



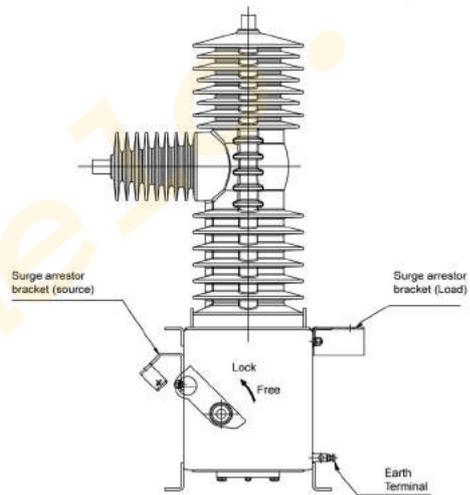
E-Series 27 kV



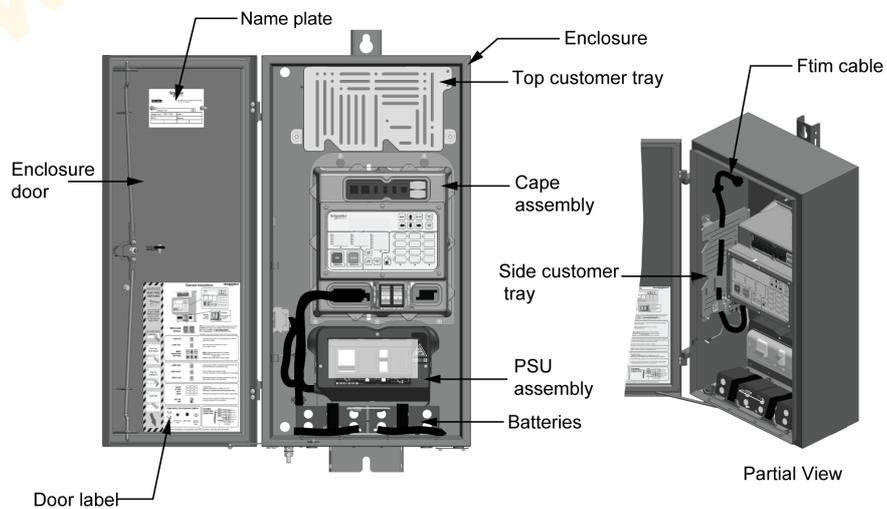
E-Series 38 kV



E-Series 27 kV ACR Construction



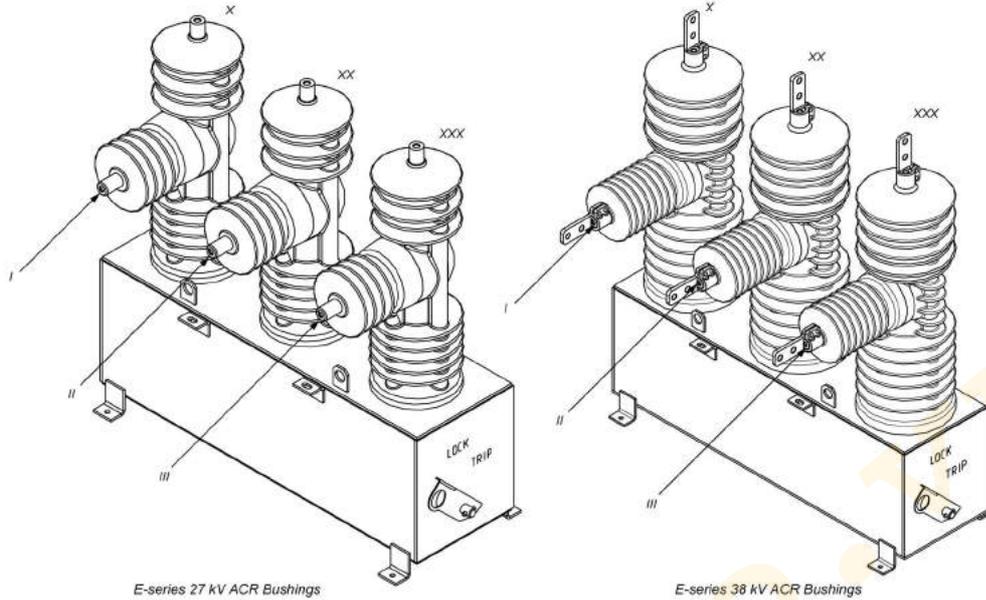
E-Series 38 kV ACR Construction



ADVC Controller Components

Terminology

The 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) CTs and (Resistive Voltage Dividers) RVDs. The bushings on the other side are identified as X, XX, and XXX with RVDs.

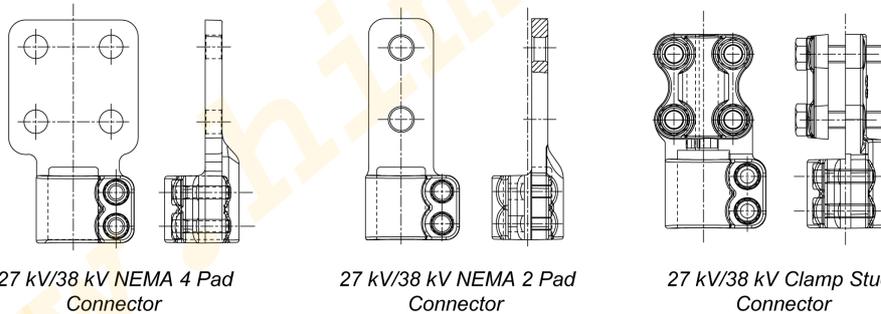


Accessory Options

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

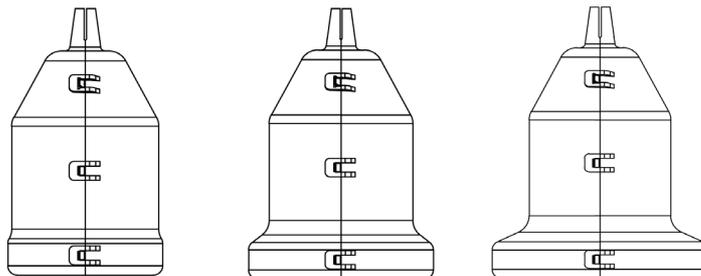
27 kV/38 kV Clamp Stud Connector

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

NOTE: Conductor stems of E-series switchgear are plated with silver. Silver plating can get tarnished due to atmospheric conditions. If such tarnish (black or brown) is seen 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.

- **Bird guards:**

The two types of bird guards are suitable for the three types of connectors. Three quantity of source side and three quantity of load side are required for recloser.



27 kV/38 kV Bird guard (I Side)

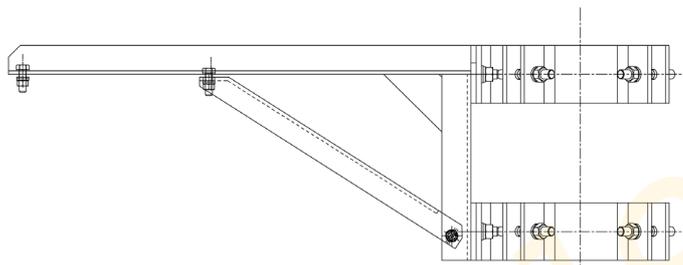
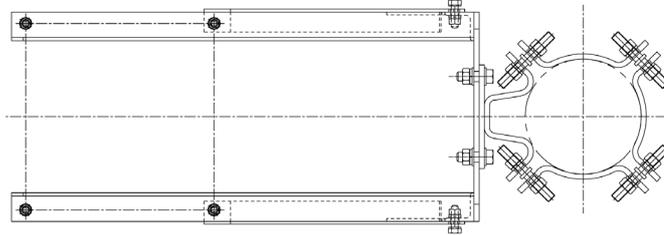
27 kV Bird guard (X Side)

38 kV Bird guard (X Side)

- **Mounting brackets:**

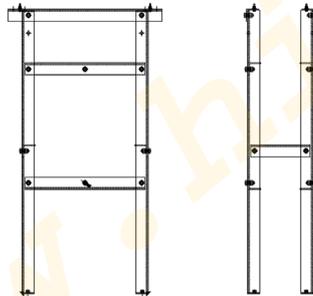
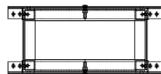
There are three types of mounting brackets that can be used. Either one of these which are required in one quantity per recloser.

- 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

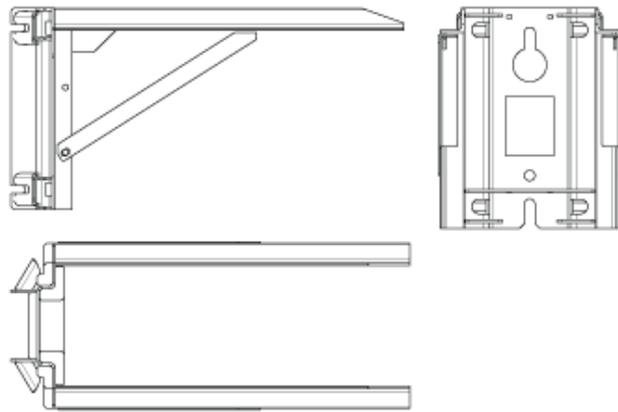


27 kV/38 kV Mounting bracket assembly
(Same mounting bracket for end and center mounting)

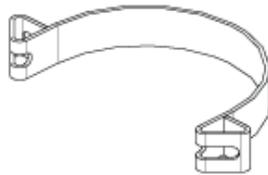
○



27 kV /38 kV Substation mounting bracket



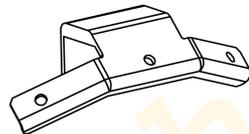
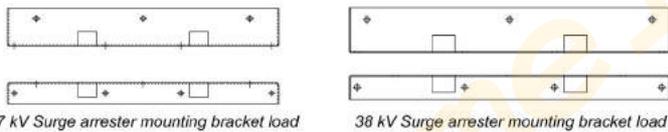
27 kV/38 kV mounting bracket for wooden pole (through holes mounting)
 (Same mounting bracket for end and center mounting)



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

- **Surge Arresters:**

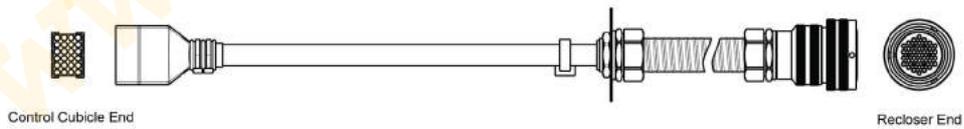
Two surge arrester mounting brackets (load and source) are required in one quantity or recloser for mounting six surge arresters.



27 kV/38 kV Surge arrester mounting bracket Source

- **Control Cable:**

For more details, refer to figure Control Cable Service Drawing ([see page 129](#)).



Chapter 2

Installation

What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
Transport, Handling and Workshop Tests	18
Site Installation	23

www.hime10.vn

Transport, Handling and Workshop Tests

General

Each crate includes the following:

- Automatic Circuit Recloser (ACR).
- Pole mounting bracket with clamps if required. If a substation mounting bracket was ordered, it should be attached to the outside of the crate.
- Six connectors if ordered.
- The appropriate mounting kit.
- ADVC Controller cubicle (which normally contains two batteries unless arrangements have been made to ship batteries separately).
- Control cable.
- Bird guards if ordered.

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

NOTE: Ensure that the ADVC Controller is stored indoors until installation on site. If storage outdoors is unavoidable, ensure that the ADVC Controller is kept in an upright position.

Unpacking Procedure

Procedure for Standard Crate

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 minimum).
- 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

HEAVY LOAD HAZARD

Two people are required to lift the heavy accessories.

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

NOTICE

RISK OF PERMANENT EQUIPMENT DAMAGE

Visual Inspect the Equipment after opening the crate, to check for any damages.

Failure to follow these instructions can result in 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 3 crate panels.

<i>NOTICE</i>
RISK OF EQUIPMENT DAMAGE INSIDE THE CRATE Take care crowbar/pry bar should not damage the equipment inside the crate. Failure to follow these instructions can result in equipment damage.

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

 CAUTION
HEAVY LOAD HAZARD The controller mass is approximately 40 kg (88 lb), hence two people are required to lift the controller. Failure to follow these instructions can result in injury or equipment damage.

9. Remove the screws securing the mounting bracket to the base and lift it out of the crate.
10. Remove the four screws securing 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:

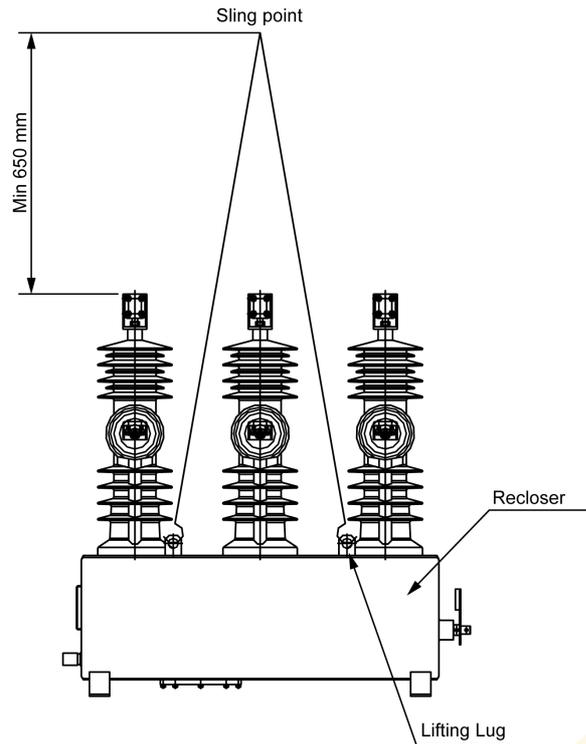
- Battery screwdriver, drill or ratchet spanner with 8/10/12 mm socket to remove hexagon head screws/wood screws.
- Side-cutters for cutting plastic strapping and cable ties.

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 ensure 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
RISK OF INJURY <ul style="list-style-type: none">• The timber pallet must be transported by hand pallet truck, crane, or forklift truck.• Two people are required to lift the heavy accessories. Failure to follow these instructions can result in injury or equipment damage.

Recloser Lifting Procedure



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

The wooden crate must be transported by hand pallet truck, crane, or forklift truck. The lifting procedure must be followed. The slinging recommendation is as shown in the above figure and perform the following procedures.

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

Control Cable Connection

NOTE: The control cubicle mass is approximately 40 kg (88 lb).

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

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

- Power down the control cubicle by switching off all Miniature Circuit Breakers (MCBs). This should be done whenever connecting or disconnecting the control cable.
- To connect the control cable, 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 wiggling the plug. If the plug cannot be pushed on with moderate force, then it has not been located properly. Heavy force is never required.
- To disconnect the control cable, Hold the plug by the short sides and grip hard to release the clips inside the plug (not visible). Wiggle the plug to allow the clips to release. Then pull out the plug.

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

- Power down the control cubicle by switching off all Miniature Circuit Breakers (MCBs). This should be done whenever connecting or disconnecting the control cable.
- To connect the control cable to the switch gear, 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.
- To disconnect the control cable, hold the plug cover and rotate anticlockwise till the umbilical cable connection become loose. Then pull the umbilical cable away from the recloser connector. Heavy force is not required.

NOTICE

HAZARD OF UNPROTECTED OUTPUTS

Never pull out the plug by the cable.

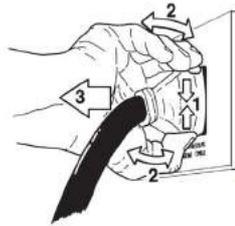
Failure to follow these instructions can result in equipment damage.

⚠ CAUTION

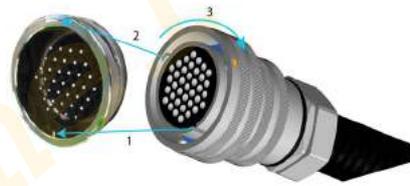
RISK OF LOSS OF COMMUNICATION BETWEEN SWITCHGEAR AND CONTROLLER IF THE CONTROL CABLE IS NOT PROPERLY SECURED

Tighten the Control Cable clockwise until it clicks.

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



Handling the control cable plug towards the controller side



Handling the control cable plug towards the switchgear side

Testing and Configuring

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

Unpack the crate as above and put the HV cables and the control cable in a clean preserved place where they will not be damaged or soiled. Make a temporary earth connection between the ADVC and the ACR. 1 mm² 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 ADVC Controller end of the cable to the socket at the lower right-hand corner of the CAPE located inside the ADVC cubicle. See Site Procedure (*see page 23*). The LV auxiliary supply (if applicable) should be connected as shown in Auxiliary Supply Connection (*see page 26*).

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

- Manual trip and close of the ACR.
- If the power frequency test is performed, it has to be at 80% of the rated power frequency withstand level.
- Configure the protection settings. For details on changing the settings, refer the Operations Manual N00 812.
- Perform primary current injection as required.
- Perform secondary current injection (if required by your Authority) using a Test and Training Set (TTS).
- Fit and test a radio or modem if required.

-
- Attend to the battery using the care instructions given in Battery Care.

<i>NOTICE</i>

HAZARD OF UNPROTECTED OUTPUTS

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 ADVC must be transported properly to site. It is recommended the following steps are carried out:

- Turn off all ADVC MCBs and disconnect all auxiliary power supplies. Disconnect the control cable from both ACR and ADVC and replace the cover at the side of the ACR.
- Transport the ACR, ADVC and all accessories in a secure manner to the site.

www.hime10.vn

Site Installation

General

The following steps are performed for installing the ADVC Controller:

- The ADVC Controller requires 200 VA.
- The ADVC Controller (Ver 50 or above) door is held open by a door stay mechanism which prevents 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.

Tools Required

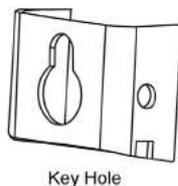
- Torque wrench and metric socket set, normal engineers tools.
- Tools to prepare pole as required.
- Crane or other lift for ACR and ADVC, four D-shackles, and slings.

Parts Required (Not supplied by the manufacturer)

- Mounting parts for the ADVC Controller. Either 20 mm steel strapping or 10 mm galvanised 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 figure Auxiliary Supply Connection (*see page 26*), Center Mounting Example (*see page 30*), and Utility Auxiliary Transformer (*see page 33*).
- 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 radio is fitted (unless supplied by the manufacturer).

Site Procedure

NOTE: The ADVC mounts have key holes as shown here so that you can lift the ADVC on to the mounting bolt and slide it into position.



To erect and test the ACR and ADVC, carry out the following steps. Mounting details are given in figure ACR End Mounting and Dimensions (*see page 27*).

1. Transport to site and carry out testing before erection as required.
2. Connect cable tails and surge arresters before raising the ACR. Refer Surge Arrester Mounting and Terminating (*see page 25*).
3. Ensure that the pole is of sufficient strength to support the ACR. A structural engineer may be needed to calculate the stresses involved.
4. Securely mount the ACR mounting bracket on the power pole. For more information, refer figures ACR End Mounting (*see page 27*), Center Mounting Example (*see page 30*), Center Mounting and Dimensions (*see page 29*).
5. Lift the ACR into position for more information please refer to Recloser lifting procedure (*see page 20*). For more information, refer figures ACR End Mounting (*see page 27*), Center Mounting Example (*see page 30*), Center Mounting and Dimensions (*see page 29*).

NOTICE

RISK 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 equipment damage.

NOTICE

RISK OF INOPERABLE EQUIPMENT

Ensure that you are not exposed to any sharp or pointed objects within the Device.

Failure to follow these instructions can result in equipment damage.

6. Bolt the ACR to the mounting bracket with the four 12 mm nuts and bolts provided. Tighten to 50 Nm.
7. Complete the earth connections as described in Earthing (Grounding) ([see page 26](#)).

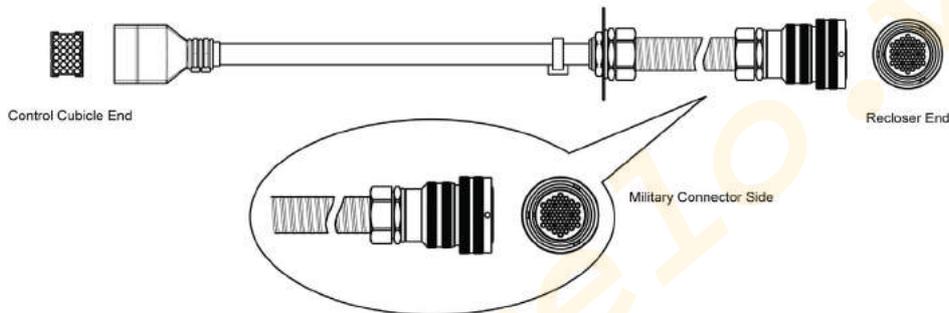
DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

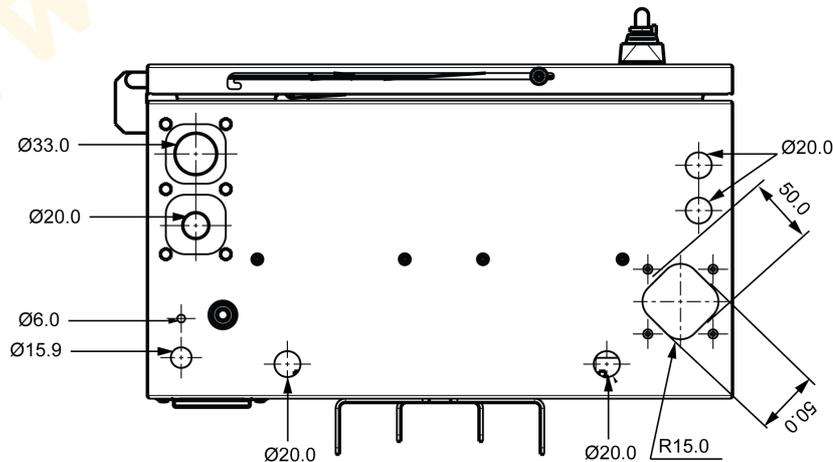
Carry out earthing wiring diagram as instructed.

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 ADVC.
11. If the 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 the ADVC by switching off all MCBs. This should be done whenever connecting or disconnecting the control cable from the ADVC.
13. Lift the 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). Ensure 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 ADVC



Cable Entry



and then to the switchgear socket **2** on the CAPE.

16. For LV mains supply run auxiliary wiring as shown in figure Common Earthing and LV Supply (*see page 31*). Make the connection inside the ADVC as shown in figure Auxiliary Supply Connection (*see page 26*).
17. For LV supply from a dedicated transformer supplied by the utility, connect as shown in figure Utility Auxiliary Transformer (*see page 33*).
18. Fit the batteries if they are not already in place.
19. If communications equipment is to be installed, refer to Communications and Accessories Installation (*see page 35*).

NOTICE

HAZARD OF UNPROTECTED OUTPUTS

- 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.

Surge Arrester Mounting and Terminating

The ACR is type tested for Impulse Withstand Voltages up to 150 kV/170 kV depending on the model. For more information, refer to Ratings and Specifications (*see page 103*). 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.

Lightning induced damage to the ACR or ADVC voids the warranty if surge arresters are not fitted. 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.

The user should 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 should 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

RISK OF INJURY AND EQUIPMENT DAMAGE

If the arresters are not mounted close to the ACR, the protection they provide is reduced.

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

CAUTION

RISK TO EMIT X-RAYS IF VOLTAGE HIGHER THAN RATED MAXIMUM IS APPLIED ACROSS THE OPEN CONTACT

Do not apply voltage higher than rated maximum across the open contact without being protected with appropriate shielding.

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

Earthing (Grounding)

⚡ ⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

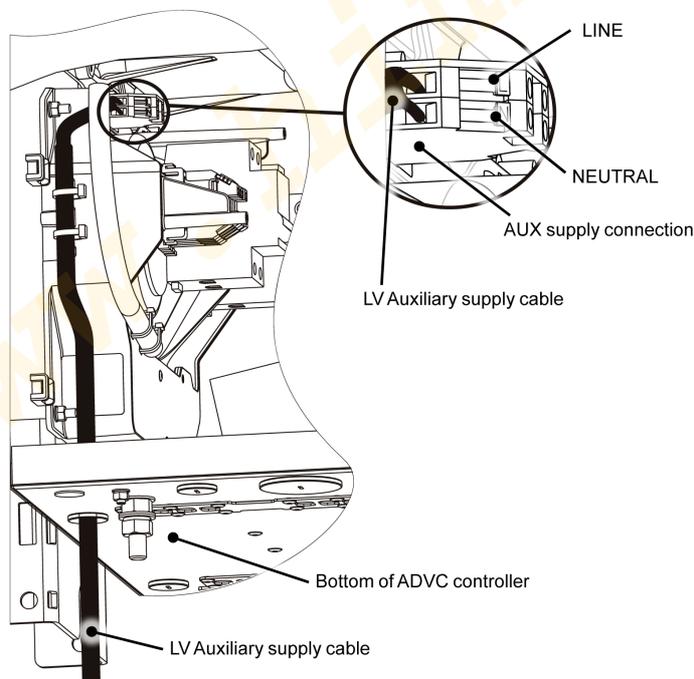
- Do not earth surge arresters by a different path, doing this may cause damage to the control electronics or ACR.
- Also, any antenna must be bonded to the ACR or the main earth bond.

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

Figure Common Earthing and LV Supply (*see page 31*) 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 mm². 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 figure Common Earthing and LV Supply (*see page 31*). 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.

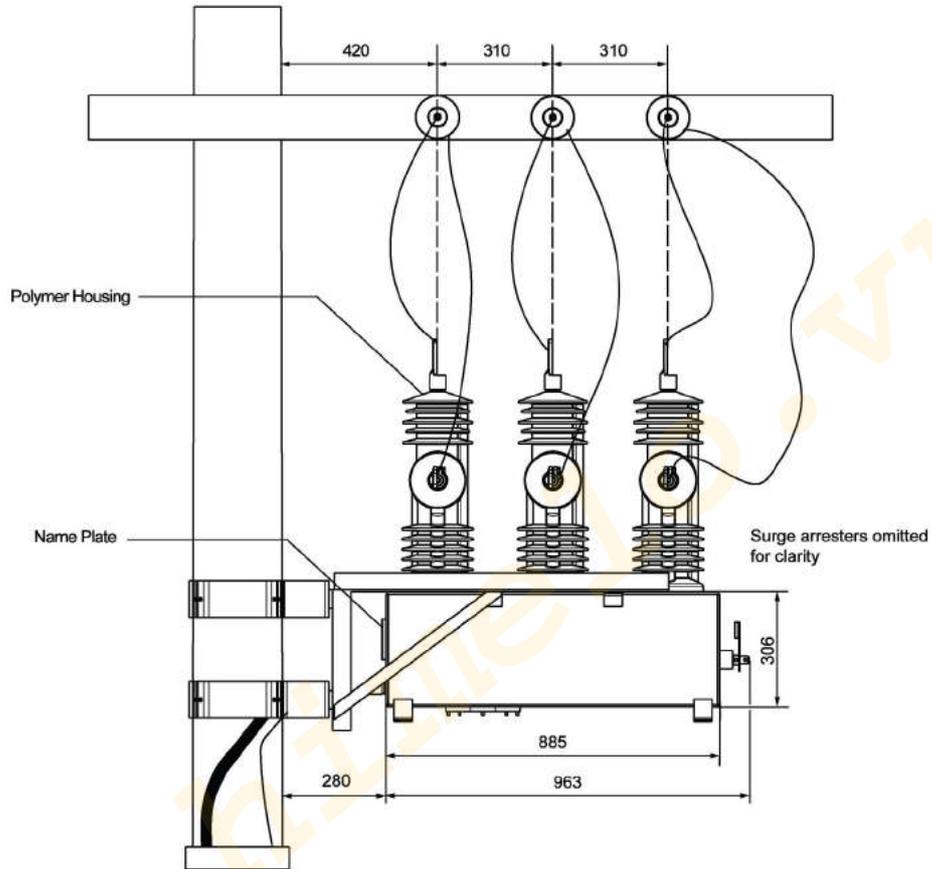


Auxiliary Supply Connection

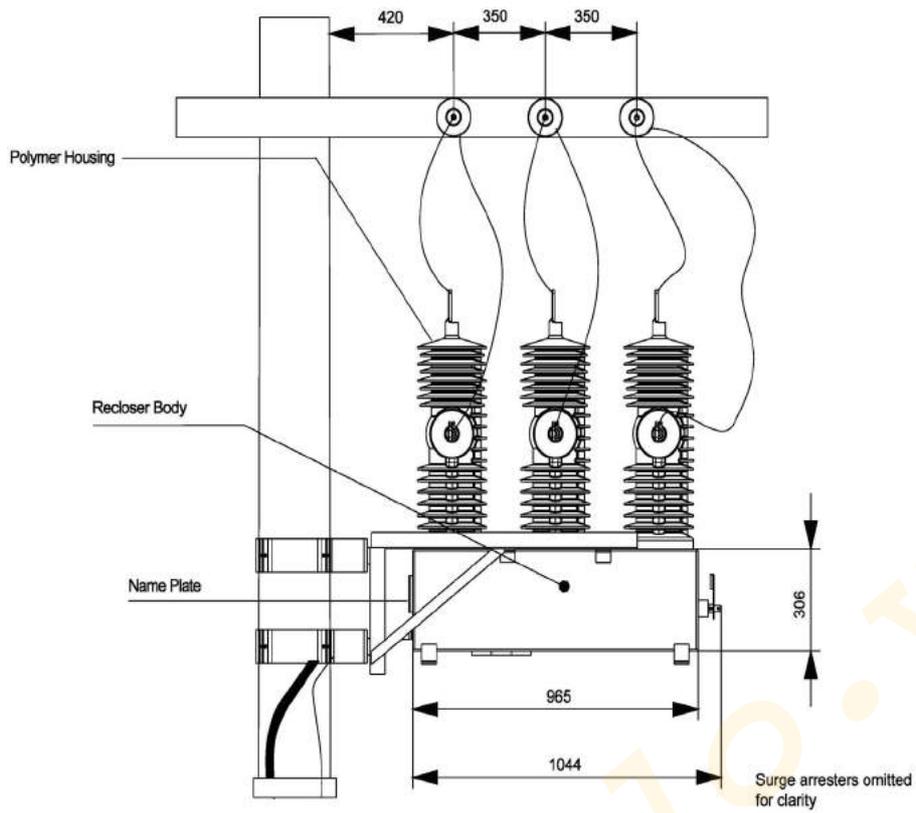
LV Auxiliary Power from Dedicated Utility Transformer

Figure Utility Auxiliary Transformer (*see page 33*) shows wiring and earthing if a dedicated transformer is supplied by the utility. This should not be used to supply any other equipment without consulting the manufacturer, which helps to ensure that no hazard is caused to the control cubicle electronics. Figure Utility Auxiliary Transformer (*see page 33*) 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

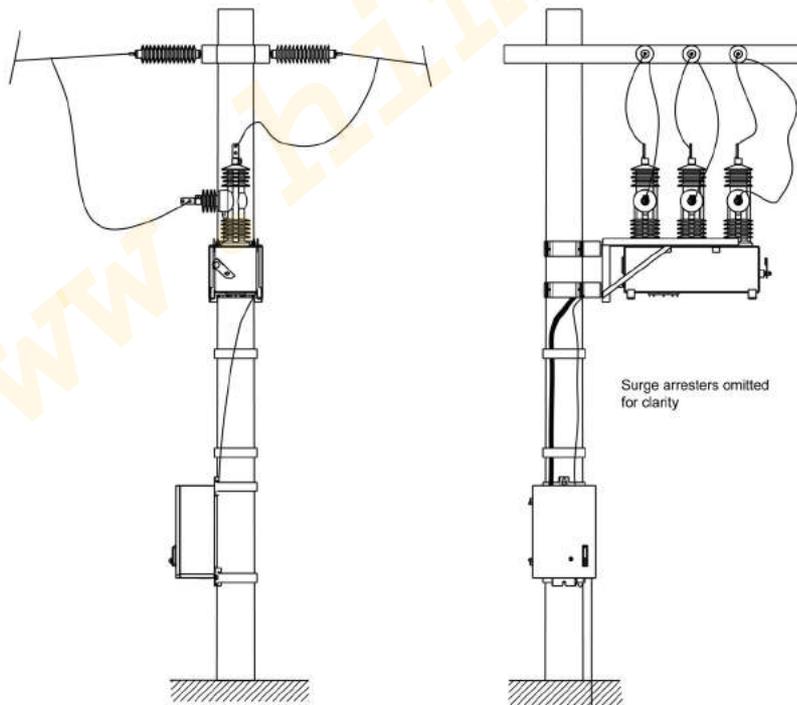


E-series 27 kV ACR End Mounting and Dimensions

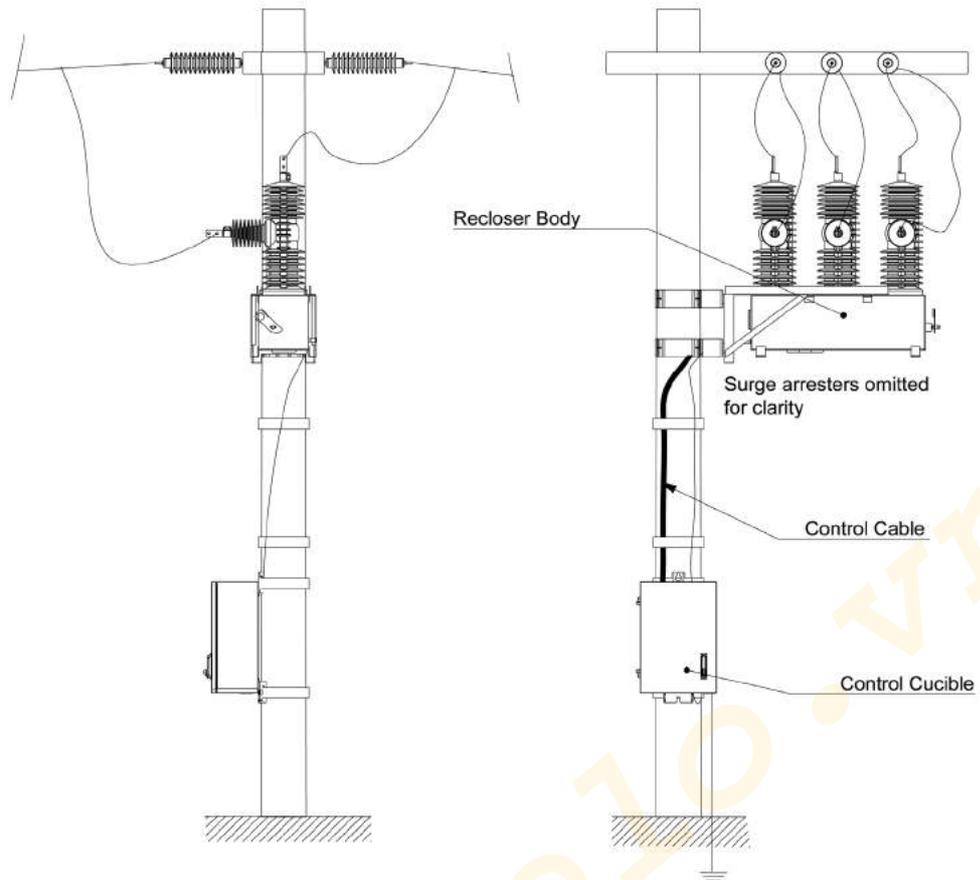


E-series 38 kV ACR End Mounting and Dimensions

End Mounting Example



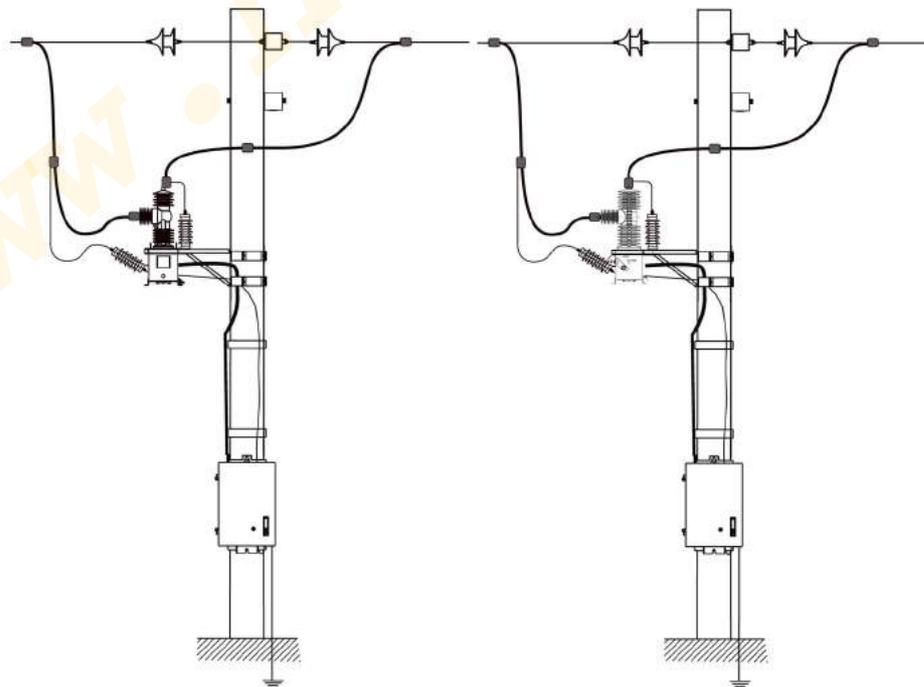
E-series 27 kV End Mounting Example



E-series 38 kV End Mounting Example

NOTE: The surge arresters have been removed from the drawing for clarity. It is mandatory to install surge arresters on both sides of the recloser otherwise the warranty of the recloser will be invalidated.

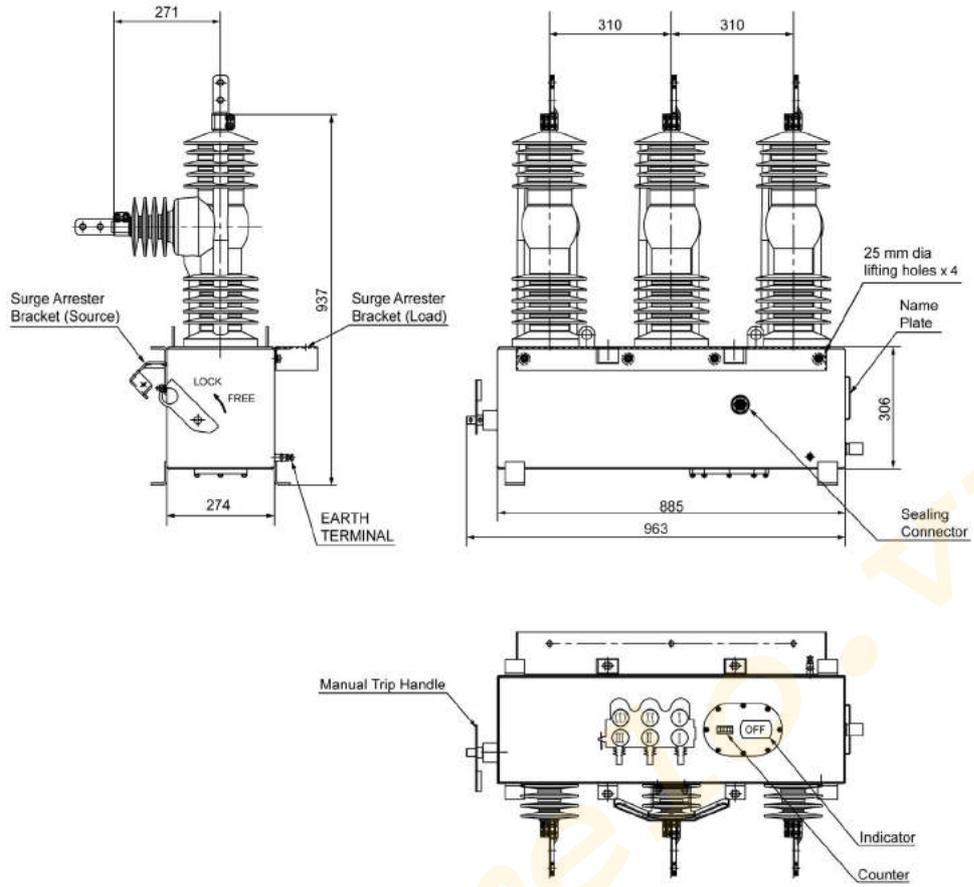
Centre Mounting Example



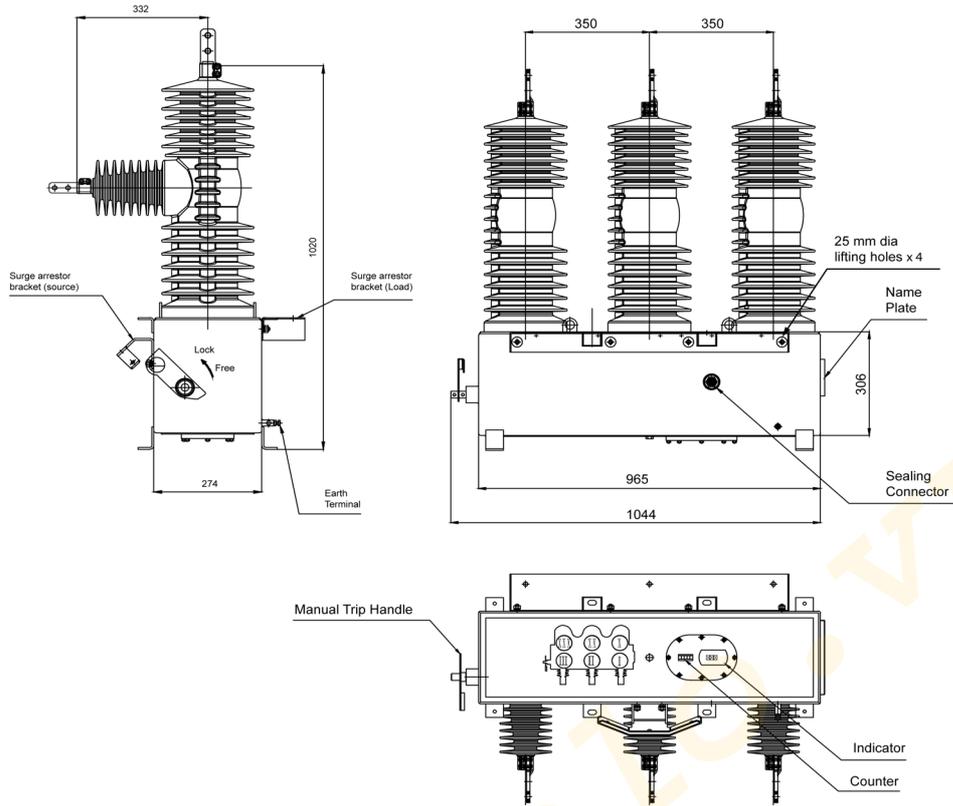
E-series 27 kV Center Mounting Example

E-series 38 kV Center Mounting Example

ACR Dimensions

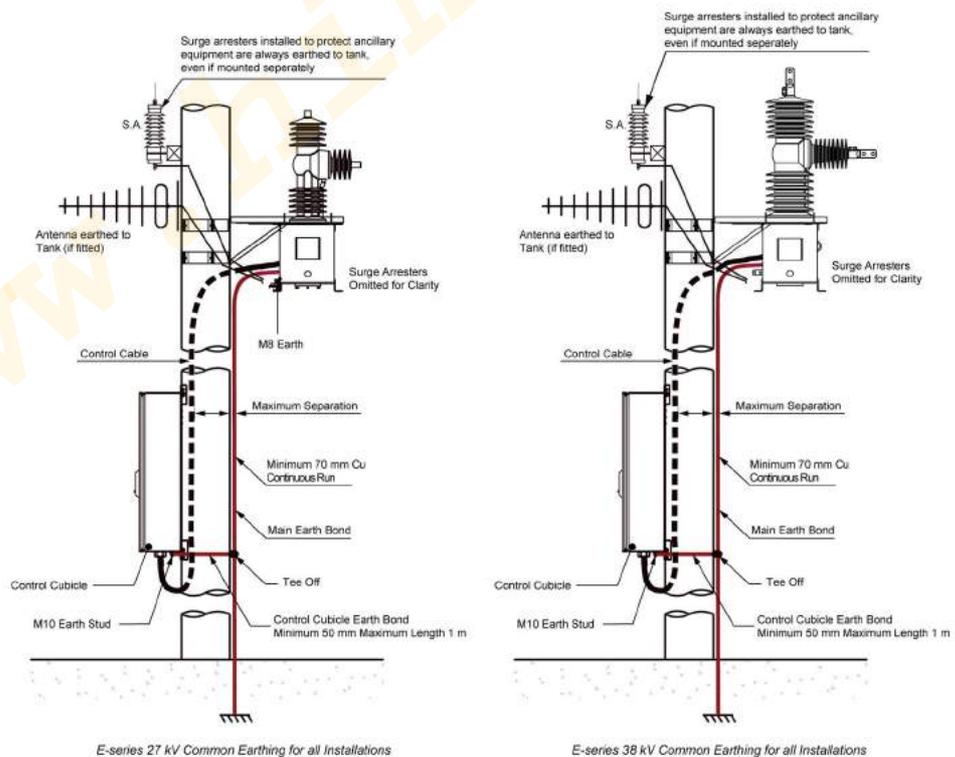


E-series 27 KV ACR dimensions



E-series 38 KV ACR dimensions

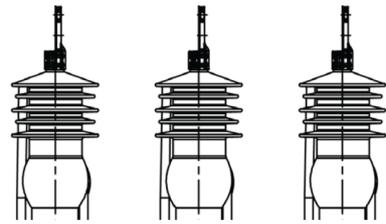
Common Earthing and LV Supply



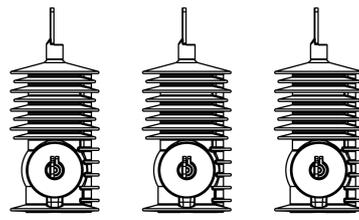
E-series 27 KV Common Earthing for all Installations

E-series 38 KV Common Earthing for all Installations

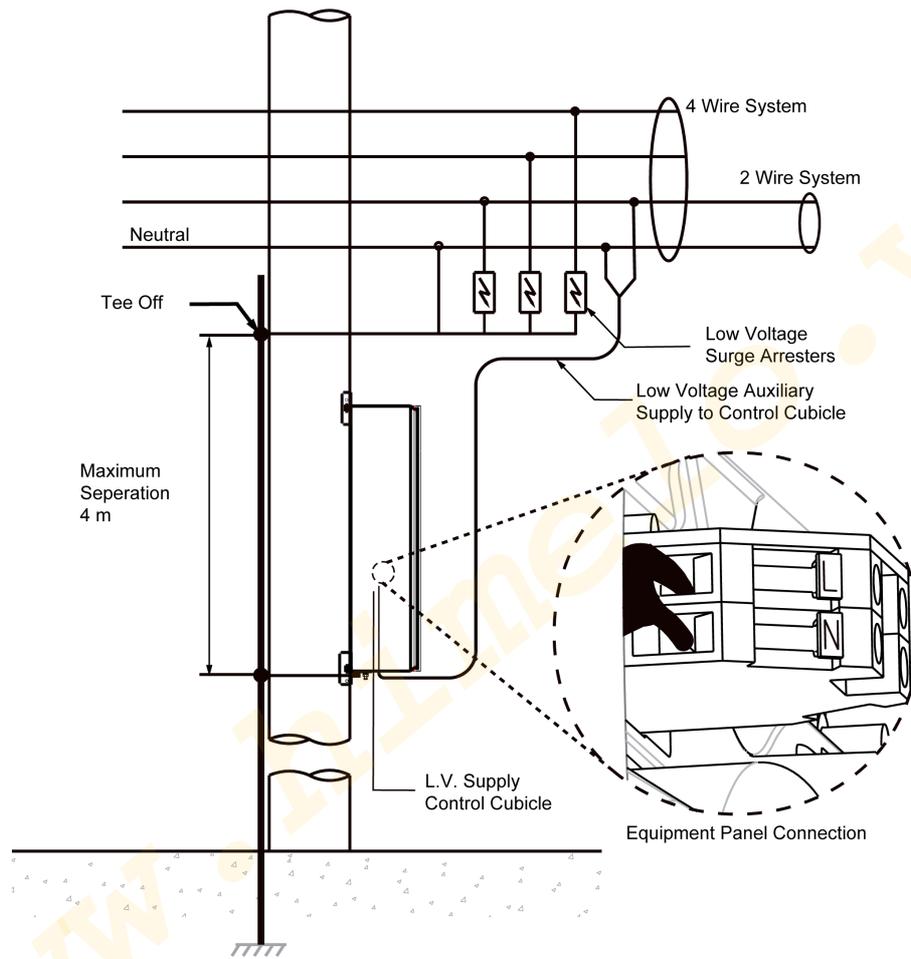
NOTE: While fitting the connectors to the switchgear, the orientation/faces of connectors should be parallel to each other as shown in the figure below.



E-series 27 kV Orientation of Connectors

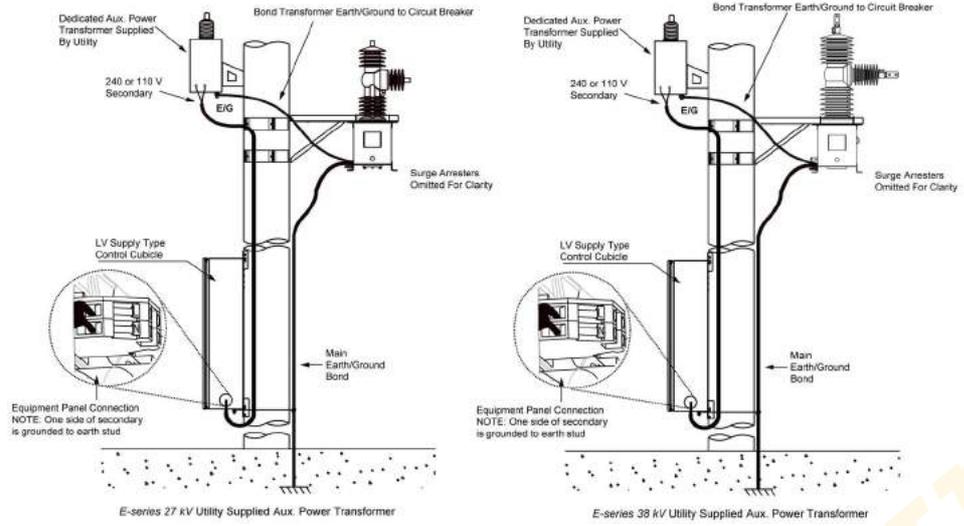


E-series 38 kV Orientation of Connectors



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

Utility Auxiliary Transformer



www.hime10.vn

Chapter 3

Communications and Accessories Installation

What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
Customer Accessories and Communication Equipment	36
Input Output Expander (IOEX3) Installation	38
Communication Ports	39
Windows Switchgear Operating System (WSOS)	42
SCADA Protocols	43

www.hime10.vn

Customer Accessories and Communication Equipment

Radio Antenna

Mount the antenna and run the antenna feed or an external communication cable to the 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 ADVC before installing the accessories.

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



Communications Cable Entry

ULTRA Cubicle - Cable Entry (bottom view)

Protection of Radio Equipment

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.

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

If a surge arrester is not fitted, then the co-axial earth screen should be earthed to the equipment panel by the shortest possible wire.

NOTE: A problem of this nature is not covered by the product general warranty arrangements.

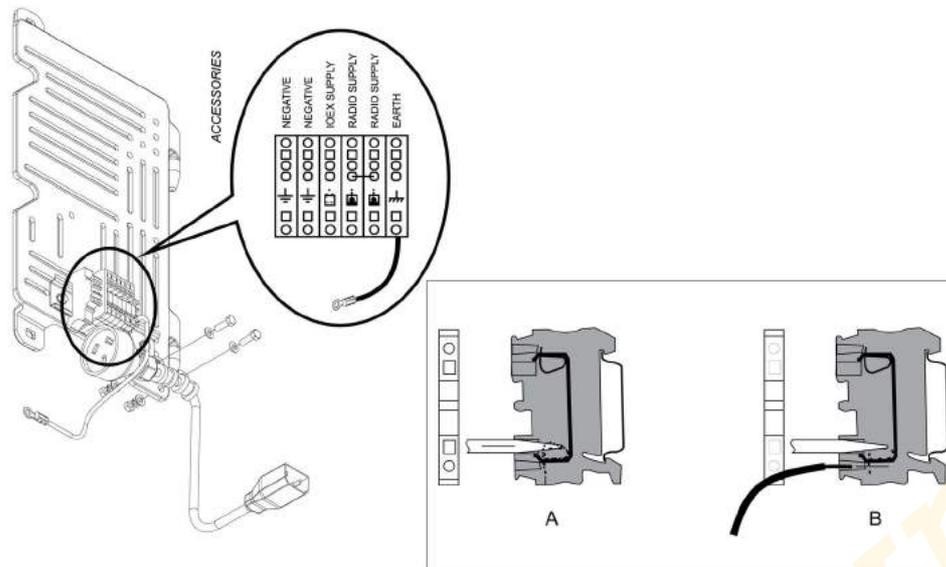
Customer Compartment

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 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:

set SYSTEM STATUS → RADIO → S → Radio Supply 12 V

flex 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:

set System Status → RADIO → S: Radio Hold 60 min

flex 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:

set System Status → RADIO → S: Radio Supply ON/OFF

flex 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.

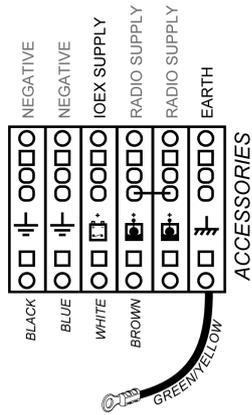
Input Output Expander (IOEX3) Installation

Introduction

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 ADVC Controller. The second IOEX3 module is only available with the 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 Dimensions ([see page 125](#))

If one IOEX3 is fitted in the factory, it is connected to IOEX/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:

set Communications → IOEX/WSOS PORT - 1 → BAUD

flex ENGINEERING MENU → TELEMETRY MENU → CONFIG PORTS MENU → IOEX/WSOS

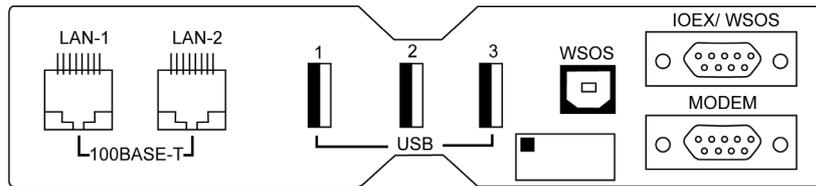
Default Settings for the IOEX3, including **Port Selection** and **IOEX Events Off/On** are available in the following location:

set Communications → IOEX+

flex ENGINEERING → TELEMETRY → Configure comms → IOEX Settings

Communication Ports

The ADVC Controller 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:

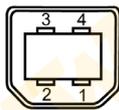
- WSOS communications
- SCADA communications
- IOEX

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.

USB Type B Port Pinout

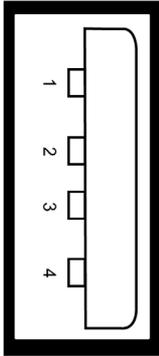
Pin	Name	Description
1	V _{BUS}	+5 V
2	D-	Data -
3	D+	Data +
4	GND	Ground

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 should be at least 5.16.xx, in order to connect, and communicate with the ADVC Controller via USB

USB General Purpose Ports

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

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.

NOTICE

RISK 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 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" line, which is 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.

RS-232 Pin Connections

RS-232 Pin No	Direction	Use	IOEX / WSOS	MODEM
1	To ADVC	Data Carrier Detect (DCD)		Yes
2	To ADVC	Rx Data (RxD)	Yes	Yes
3	From ADVC	Tx Data (TxD)	Yes	Yes
4	From ADVC	Data Terminal ready (DTR)		Yes
5		0 V (ground/earth)	Yes	Yes

RS-232 Pin No	Direction	Use	IOEX / WSOS	MODEM
6	Not connected			
7	From ADVC	Request to Send (RTS)		Yes
8	To 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.

NOTICE

RISK OF PERMANENT 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 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.

Ethernet Pin Connections

Pin	Direction	Use
1	From ADVC	TxData(Tx+)
2	From ADVC	TxData(Tx-)
3	To ADVC	RxData(Rx+)
4	Reserved	
5	Reserved	
6	To ADVC	RxData(Rx-)
7	Reserved	
8	Reserved	

Windows Switchgear Operating System (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 ADVC Controller 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.

Windows Switchgear Operating System (WSOS)

Windows Switchgear Operating System (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 100Base-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.

www.hime10.vn

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 100Base-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.

```
---  OPTIONS - COMMUNICATIONS 1  ---S
WSOS Available      DNP3 Available
MITS NotAvailable  Modbus Not Available
101/4 Not Available
```

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.

www.hime10.vn

Chapter 4

Installation Testing

Operator Tests

Overview

The following section details about the ACR installation. For more information, refer Installation (see page 17).

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 ADVC



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  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  icon should be turned on as well. (or)

Steps	Action
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).
5	Powering up the ADV C with the recloser connected causes the ADV C to read data from the switch gear. This takes up to 60 seconds during which time the message below flash at the top of the display:  READING → Do NOT disconnect Switchgear The System OK LED on the OCP should also flash at this time to indicate that the ADV C is powered and functioning.  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 should be loaded now using WSOS. Alternatively the settings could be entered via the OCP.

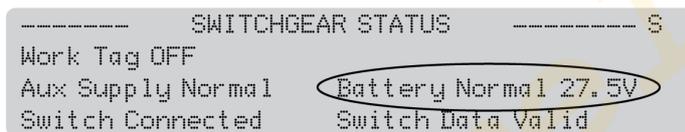
NOTE: If you are familiar with navigating operator control interface display groups, proceed with the checks described below. For more information refer, Operator Control Panel ([see page 57](#)) before proceeding.

The ACR will now be ready for operation. Before energizing the recloser, you should 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:

 **System Status → SWITCHGEAR STATUS → S**



NOTE: Images shown are for illustration purposes only

 **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

- Check the battery status is low (close to the normal range of lower voltage limit), recharge the battery providing auxiliary supply is ON.
- Replace the battery if the voltage is very low.

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

At this point, the battery state should be Normal with a voltage within the range 23 to 29.5 V. **Aux Supply** status should 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 seconds.
3. Refer Event Log ([see page 71](#)) 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 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.

```
CVT Calibration for
Switch S/N 123456
```

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. (*see page 132*)
4. Check the Switch status which can be found on the following menu page:

 **System Status → SWITCHGEAR STATUS → S**

```
----- SWITCHGEAR STATUS ----- S
Work Tag OFF
Aux Supply Normal    Battery Normal 27.5V
Switch Connected     Switch Data Valid
```

 **OPERATOR MENU → SWITCHGEAR STATUS → SWITCHGEAR DATA → Switch Status**

The switch status may be in either of 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 that 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 ADVC for damage.
- If the pins are OK, the cable itself may be faulty and the continuity of each core should 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:

 **System Status → SWITCHGEAR STATUS → S**

```
----- SWITCHGEAR STATUS ----- S
Work Tag OFF
Aux Supply Normal    Battery Normal 27.5V
Switch Connected     Switch Data Valid
```

NOTE: Images shown are for illustration purposes only.

 **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 should 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 seconds.
3. Check, whether the battery voltage has dropped slightly (by approximately 2 V), while remaining in the **Normal** state.
4. Go to Event Log (*see page 71*) 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

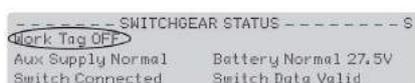
1. Check that **Local Control** is **ON**. This setting is found in the following:

 **System Status** → **Operator Settings - 1** → **S**

 **Operator Menu** → **Operator Controls** → **LOCAL CONTROL ON**

2. Check **Work Tag** Status on the following menu page

 **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 (→ ) or (↓ ) to change the setting to *Applied*. Then press (**ENTER** ) or (**SELECT** ) to activate the setting.

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

 **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 the Event Log (*see page 71*), 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.

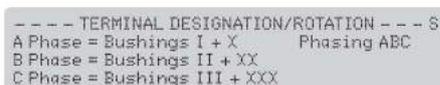
If the Phasing at the recloser and/or phase rotation of the network are different from the defaults, you must set the Phasing and/or the Phase rotation.

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

 **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.



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 the Event log (*see page 71*), 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.

1. A-B-C=I-II-III
2. A-B-C=III-II-I
3. A-B-C=II-III-I
4. A-B-C=III-I-II
5. A-B-C=II-I-III
6. A-B-C=I-III-II

For information on how to identify the individual bushings, refer Terminology ACR Bushings. (*see page 14*).

NOTICE

RISK OF EQUIPMENT DAMAGE

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

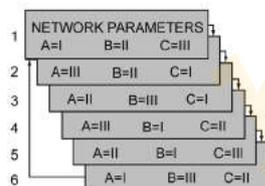
Failure to follow these instructions can result in equipment damage.



On the 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:



ENGINEER MENU → CONFIGURATION MENU → SYSTEM SETTINGS → NETWORK PARAMETERS → TERMINAL DESIGNATION/ROTATION → Phasing ABC

NOTE: For more details, refer the Event log (*see page 71*), 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 should 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 (APGS).
- 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 ADVC. For more information on the trip and close controls, refer Operator Control Panel ([see page 57](#)).
- 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:

- Disable either mechanism (e.g. **CLOSE**) using Disabled Switches located underneath the O.I.
- 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 should display Trip Coil Disconnect.)
- With both mechanisms disabled, check that pressing each of the **CLOSE** and **TRIP** keys are ineffective.
- Enable both **TRIP** and **CLOSE** mechanisms.

NOTE: For more details, refer Event Log ([see page 71](#)), 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 Event Log (see page 71), 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 should not close and the event log should display: <ul style="list-style-type: none">• 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.

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 Test and Training Set (TTS) in standalone mode connected to the ADVG, 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

Primary Injection Testing

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

www.hime10.vn

Chapter 5

Control Electronics Operation

Introduction

Overview

The 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 Appendix B ADVC **COMPACT** Dimensions and ADVC **ULTRA** Dimensions (*see page 127*).

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 protects 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)
- Control and protection enclosure (CAPE) with Operating Interface (O.I.)
- Customer Compartment

For more information, refer to ADVC Block Diagram (*see page 55*).

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 secure the auxiliary supply cables. Circuit breakers are used to 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 % variance from the auxiliary supply.

CAPE Module

The main module of control electronics is the Control and Protection Enclosure (CAPE). The CAPE digitizes the current transformer (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 PCOM board, 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:

- Operator Interface (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.

Protection and Communications Submodule (PCOM)

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 (GPP) to provide protection and communications functions for example, over-current protection. It also presents this data to the outside world via various communications protocols.

Power Supply and Switchgear Module (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 ADVC Controller 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.

Operator Interface

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 operator control panel with LCD, membrane keyboard, and status LEDs.

WSOS5 Interface

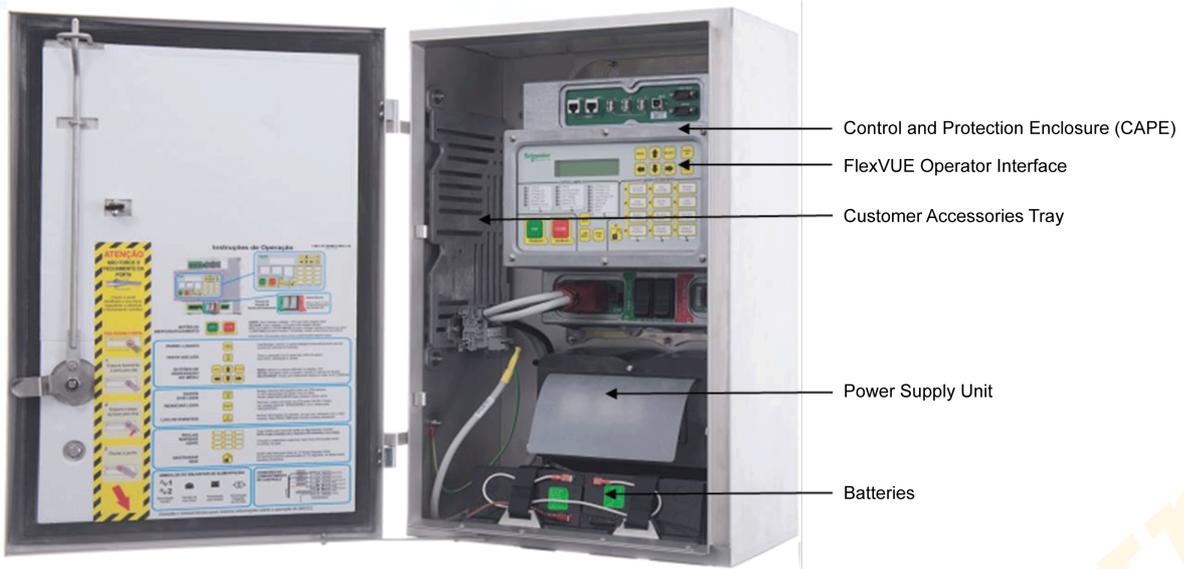
To use WSOS5 to upload or download data, connect between either:

- 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.
- 100Base-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 ADVC with flexVUE O.I.



Ultra ADVC with flexVUE O.I.

Ancillary Equipment

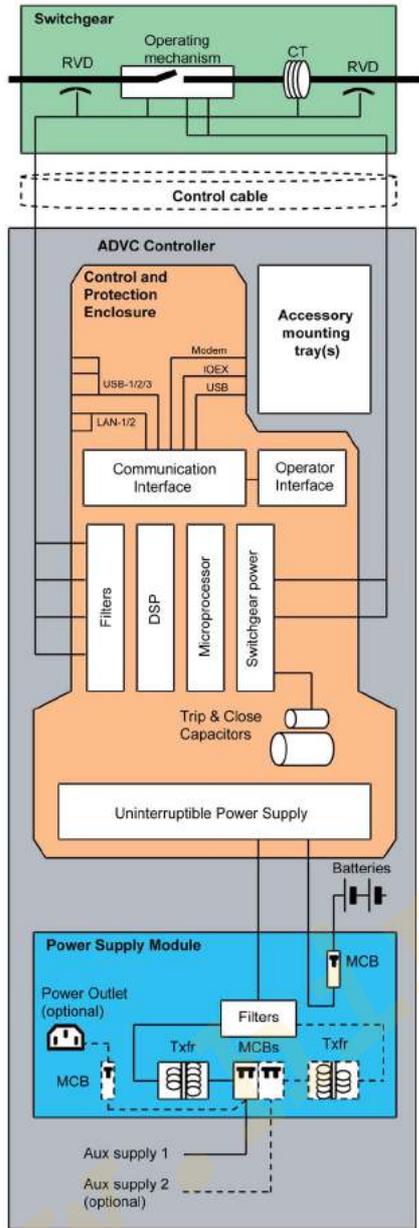
The ADVC Controller is fitted with a standard customer compartment tray that facilitates the mounting of ancillary equipment, for example, a radio or modem including any special interfaces. The compartment has a terminal block for the radio supply and power for accessories such as, an IOEX3.



Standard Customer Compartment Tray

www.hime10.vn

ADVC Block Diagram



ADVC Controller block diagram

www.hime10.vn

Chapter 6

Operator Control Panel

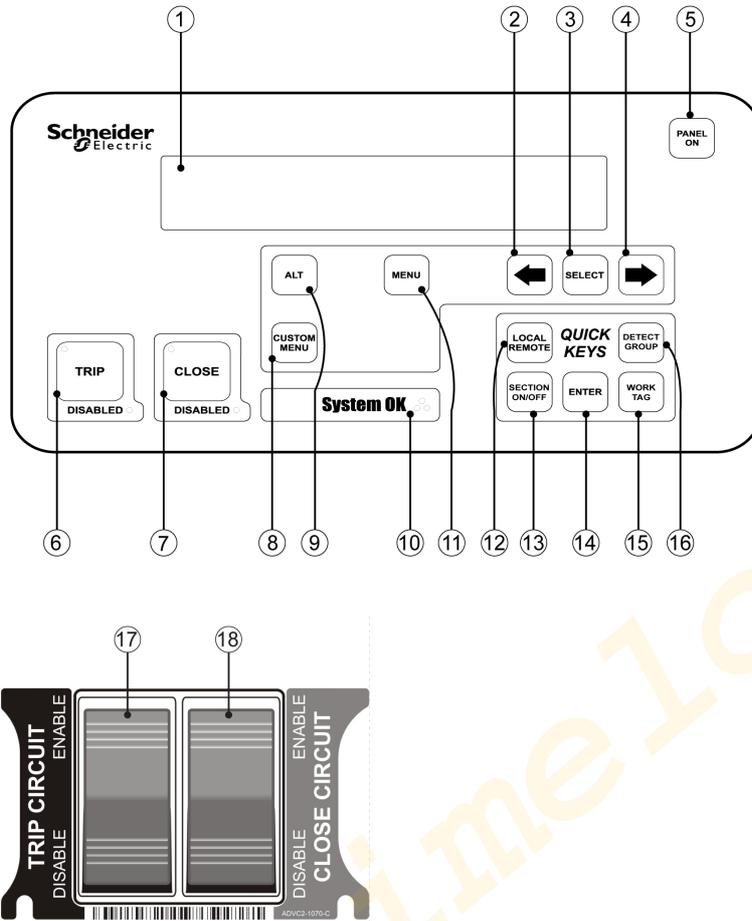
What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
<i>se</i> VUE Panel Interface	58
<i>flex</i> VUE Panel Interface	62

www.hime10.vn

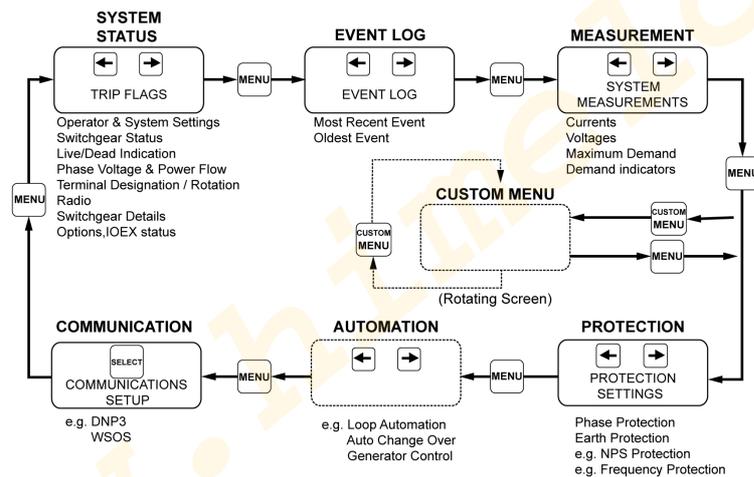
seVUE Panel Interface



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

S.No	Item	Description
13	Configurable Quick Key	Default linkage is to AUTO ON/OFF
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

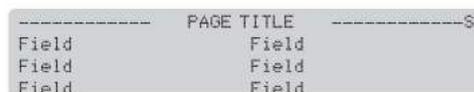
For more details on configuring the custom menu, refer to the diagram inside the controller door or to the Installation and Maintenance Manual for details of Navigation within groups.

For details on Navigation within groups, refer to ADVC Controller 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.



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 Quick Keys (*see page 61*).

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 Windows Switchgear Operator System (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 Operator Interface or **WSOS5**.

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

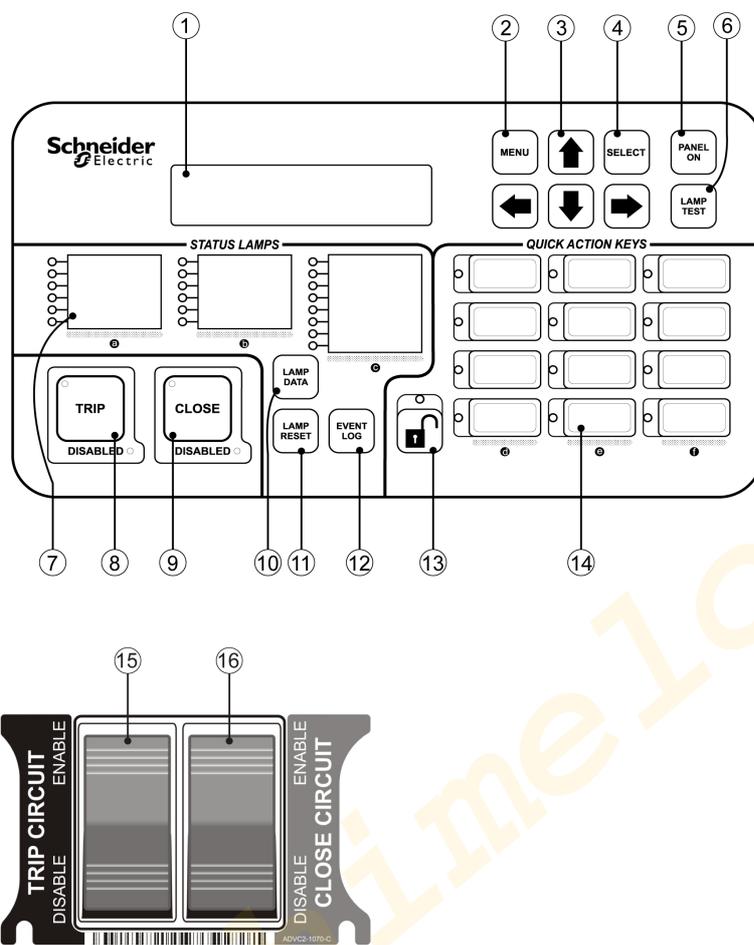
Otherwise, any one of the settings in below table, can be linked to one of the four Quick Keys.

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
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 ADVC Controller Operations manual (N00-812).

flexVUE Panel Interface



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.

S.No.	Item	Description
7	Indicator LEDs	<p>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.</p> <div style="display: flex; justify-content: space-around; border: 1px solid black; padding: 5px;"> <div style="width: 45%;"> <ul style="list-style-type: none"> ● LOCKOUT ● A - PHASE O/C ● B - PHASE O/C ● C - PHASE O/C ● GROUND FAULT ● SENSITIVE G/F </div> <div style="width: 45%;"> <ul style="list-style-type: none"> ● A SOURCE LIVE ● B SOURCE LIVE ● C SOURCE LIVE ● MECH LOCK ● CONTROL OK ● AC POWER ● BATTERY PWR ● ALARM </div> </div> <p>[For example] The configuration of the status lamps can be changed within WSOS Version 5.</p>
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, an operator must first press the unlock key. The lamp above the unlock key remains lit while the quick action keys are active. To deactivate the quick action keys an operator can press the unlock key again. The lamp turns off. Alternatively the quick action keys will be deactivated automatically a short configurable delay after the last quick action key was selected.
14	Quick Action Keys (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 quick action keys, 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

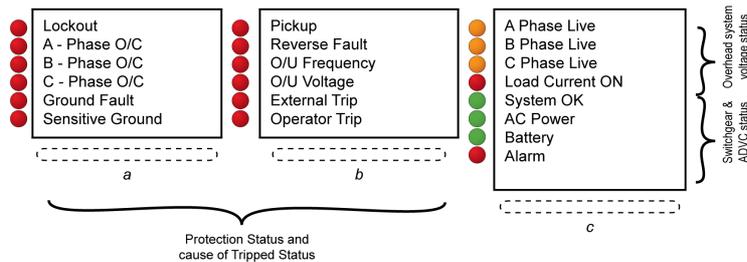
The status lamps and the quick action keys are programmed in the factory to a default configuration. This can be changed to suit the needs of the user through Windows Switchgear Operating System (WSOS5).

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.

For 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.

For 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	

LED#	Color	Description	Possible Causes
c-4	Red	Load Current On	A current greater than 2 A is flowing through one or more phases.
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.

Quick Action Keys (QAK)

The quick action keys 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 **Quick Action** keys. This is done by pressing the **unlock** key.

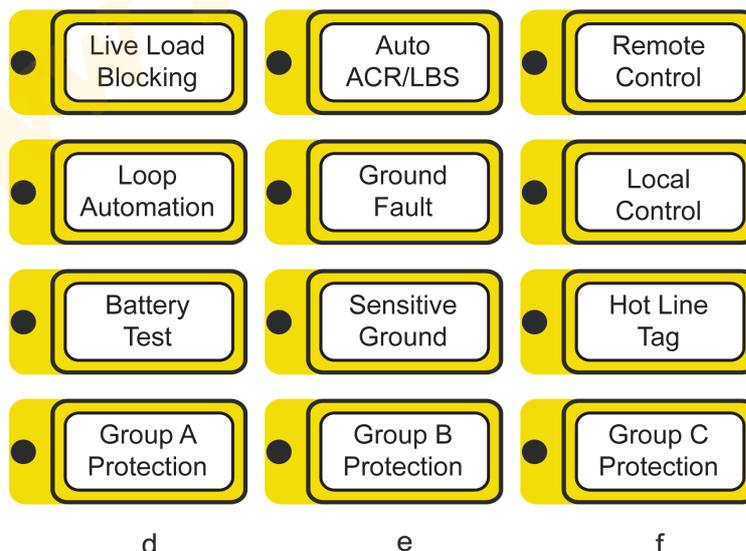
Example:

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



It is possible to press a sequence of quick action keys 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.

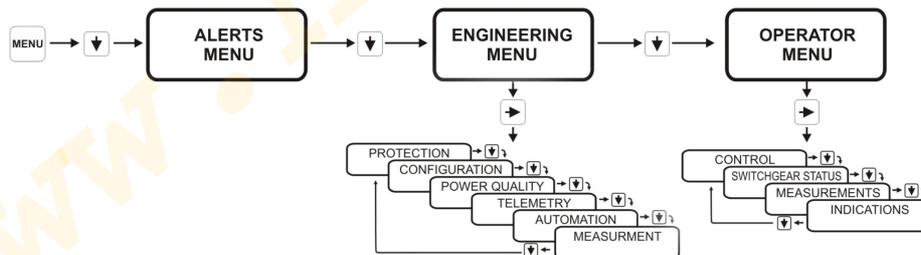
This controller is programmed with a default quick action key configuration that provides access to frequently used actions. The default configuration is shown below.



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 Line Tag (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 *flexVUE* 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.

```
EDIT, ESC, or SELECT
<< setting to change >>
```

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 Windows Switchgear Operator System (WSOS5) software. The factory password does not need to be remembered - the controller prompts you for it automatically.

Alerts Menu

The *flexVUE* 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 operator interface. 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.

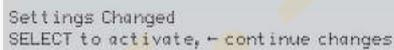
All buttons except for the navigation buttons (←, →, ↑, ↓, **MENU**, **SELECT**, **LAMP DATA**, **EVENT LOG**) operates normally while a critical alert is present.

Activating Protection Settings

When settings are changed in the Active protection group (via the *flexVUE* 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.



Settings Changed
SELECT to activate, ← continue changes

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

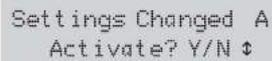
Once this message is displayed, there are three options:

- **NO ACTION:** The new setting will automatically go in service if the operator ignores the above message and turns off the operator interface, 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:

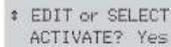
NOTE: Images shown are for illustration purposes only.



```
Settings Changed A
Activate? Y/N
```

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

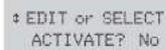
NOTE: Images shown are for illustration purposes only.



```
EDIT or SELECT
ACTIVATE? Yes
```



Images shown are for illustration purposes only.



```
EDIT or SELECT
ACTIVATE? No
```

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.



```
Continue
Settings activate on panel shutdown
```

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** ([see page 68](#)), providing the settings haven't already been put into service by a panel shutdown.

www.hime10.vn