

DISTRIBUTION SOLUTIONS

OVR-15, 27 and 38 outdoor vacuum recloser low voltage unit with SEL-751 feeder protection relay

Instruction, operation and maintenance manual for North American applications



For your safety

- Ensure that the installation location and environment are suitable for the apparatus.
- Allow installation, commissioning and maintenance operations to be performed only by qualified personnel with relevant knowledge of the apparatus.
- Comply with all applicable local and national codes, standards and working procedures during installation, commissioning and maintenance.
- Read and strictly follow the information and instructions provided in this manual.
- Ensure that the rated performance of the apparatus is not exceeded during service.
- Make certain this manual and the necessary information for safety intervention are available to all personnel operating the apparatus.

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1 Important safety notes and warnings

The operation of equipment relies on correct handling, installation and maintenance. Ignoring these essential requirements can result in harm to individuals, equipment failure and damage to property.

Safety, as explained in this instruction book, encompasses two aspects:

- Personal injury
- Damage to products or property

1.1 Safety notations

Safety notations are important indicators that inform personnel about potential risks of death, injury or property damage. These notations are placed prior to the step where the particular condition is relevant. There are three levels of hazard notations, accompanied by a single safety notice. They are as follows:

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 when there is a danger that can lead to equipment damage only.

For the proper installation, operation and maintenance of this equipment, it is essential that personnel possess a comprehensive understanding of local, regional, industry, government and OSHA safety procedures, as well as commonly accepted safe working practices. Furthermore, individuals working in or around this equipment must exercise common sense and good judgment to recognize potential hazards for themselves and others in the vicinity. These instructions are specifically designed for fully qualified personnel and should not be considered a substitute for adequate training, experience and supervision.

If any clarification or additional information is required, please direct your inquiries to the nearest ABB sales office. When communicating with ABB regarding the product covered in this IOM manual, always include the ABB-assigned order number.

This product should be installed in accordance with the specified design limitations indicated on its nameplate and in these instructions.

Additionally, it is crucial to adhere to your company's safety procedures.

This recloser should never be relied upon as the sole means of isolating a high voltage circuit. To ensure the safety of personnel conducting maintenance operations on the recloser or connecting equipment, all components must be electrically disconnected using a visible break and securely grounded.

This product is intended for operation and maintenance by qualified individuals who have received thorough training and possess knowledge of the associated hazards. This publication is exclusively intended for such qualified individuals and should not be considered a substitute for adequate training and experience in the safety procedures for this device.

This document does not provide detailed descriptions of standard repair procedures, safety principles and service operations. It is important to note that certain warnings and cautions are included to prevent personal injury to service personnel or damage to equipment. However, these warnings do not encompass all conceivable service methods, whether recommended by ABB or not. Furthermore, ABB cannot anticipate or investigate every potential hazard resulting from all conceivable service methods. Therefore, anyone using service procedures or tools, regardless of ABB's recommendations, must ensure that both personal safety and equipment safety are not compromised by the selected service method or tools.

All information contained in this manual is based on the most up-to-date product information available at the time of printing. ABB reserves the right to make changes without notice.

2 Introduction

2.1 General instructions

Please carefully read these instructions before proceeding with installation and refer to them as a guide throughout the installation and initial operation process. It is essential to keep these instructions filed together with other instruction books, drawings and descriptive data of the recloser. This book should always be easily accessible for future reference during the equipment's installation, operation and maintenance. By using these instructions, you will help ensure the proper maintenance of the equipment and extend its useful life.

2.2 Scope of instructions

This manual contains the information needed to install the low voltage (LV) cabinet of the medium voltage OVR-15, 27 and 38 vacuum recloser and put it into service.

For correct use of the product, please read this manual carefully along with the instruction, operation and maintenance manual for the high voltage unit.

OVR-15, 27 and 38 reclosers are designed for different installation configurations. However, the mounting structure for this apparatus allows further technical-construction modifications (at the customer's request) to adapt to special installation requirements. Consequently, the information given in this manual may sometimes not contain instructions concerning special configurations.

In addition to this manual, it is, therefore, always necessary to consult the latest technical documentation (electric circuit and wiring diagrams, assembly and installation drawings, any protection coordination studies, etc.), especially regarding any variants requested in relation to the standardized configurations.

Only use original spare parts for maintenance operations. For further information, please refer to the ABB sales office.

All installation, commissioning, operation and maintenance must be carried out by skilled personnel with in-depth knowledge of the apparatus.

2.3 Mandatory safety procedures for working on LV cabinet

When working on the LV cabinet, it is mandatory to follow these minimum procedures:

- a. Isolate the recloser from the power system on both sides. Put recloser in OPEN condition by operating the yellow emergency manual trip handle.
- b. Confirm the OPEN status of the recloser from the mechanical ON/OFF indicator, from SLD on LCD display and the indication LEDs on the SEL-751 HMI.
- c. Always put the SERVICE/DISCHARGE selector switch in the LV cabinet to DISCHARGE position.
- d. Follow the safety warning instructions on various warning labels provided on the LV and HV units.
- e. Remove the control cable from both HV and LV cabinets and cover the 24-pin male connectors with the plastic caps provided.

Although warning hazards are related to personal injury, it is necessary to understand that under certain operational conditions, operation of damaged equipment may result in degraded process performance leading to personal injury or death. Therefore, comply fully with all warning and caution notices.

3 Receiving, handling and storage

01 Lifting the LV cabinet

The LV cabinet undergoes assembly and testing at the factory before it is made ready for shipment. This equipment is carefully packed and sent out from the factory in impeccable condition. If any damage is observed, it is important to immediately contact the carrier for inspection and request an inspection report. Along with the paid freight bill, inspection report and invoice, file a formal claim with the carrier. Additionally, make sure to inform the local ABB sales office.

3.1 Receiving Inspection

Upon receiving the shipment, it is crucial to promptly inspect it to ensure that the correct materials have been received. If any items are missing, notify the local ABB sales office immediately. As you unpack the items, compare them against the shipping list.

Make sure to keep the instructions and literature that come with the recloser together with the unit. The low voltage control cabinet serves as a convenient storage location for the instruction book, schematic diagram, connection diagram, frame assembly drawing, high voltage wiring diagram and outline drawing of the unit. If you need additional copies or a certified test report, you can request them from the local ABB sales office.

The recloser's enclosure door has a documentation bin on its inner side, and the front swinging panel above the relay also provides access to it.

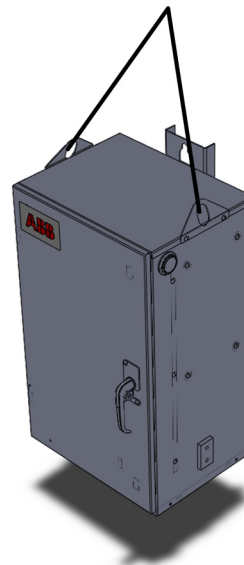
3.2 Handling the equipment

The LV cabinet come with welded brackets on the sides for lifting. A four-point lift is highly recommended, using the loops in these brackets. The approximate mass in kg is separately provided on the HV and LV cabinet nameplates. Before performing any loading operations, ensure that all necessary precautions to protect personnel and materials have been taken into account.

CAUTION

Please observe the following precautions:

1. Verify that the crane or hoist being used has the capacity to lift the LV cabinet assembly. The weight of the assembly can be found on the drawings and on the nameplates.
2. Choose rigging gear that has a capacity greater than the weight of the LV cabinet assembly.
3. Use only the provided lifting rings on the LV cabinet to lift it.
4. Exercise care during lifting to avoid damage to the poles.
5. Do not place the recloser LV unit on an uneven surface, which might result in tilting and/or galling of the HV unit, causing damage to the equipment and injuries to nearby personnel.



3.3 Storing the equipment

For long-term storage, it is recommended to store the cabinets indoors. If either cabinet needs to be stored outdoors, make sure to activate the anti-condensation heaters inside the LV control cabinet. It is also recommended to use a heater in the recloser head.

NOTICE

The OVR recloser and control cabinet must be stored in an upright position to avoid moisture buildup.

The LV control cabinet includes rechargeable batteries. These batteries need to be supplied with power of the correct voltage and frequency through the charger assembly. It is advisable to periodically check the battery voltage.

NOTICE

Battery is disconnected for transportation. Reconnect the batteries prior to use.

If the LV cabinet will not be put into immediate use, it is crucial to handle and store it properly to help ensure good operating condition in the future. Accessories and cables can be stored separately in a box. For long-term storage, these boxes should be placed indoors to prevent water accumulation and rust on the equipment.

4 General description

— 02 OVR-15, 27 and 38 LV cabinet
— 03 LV control cabinet overview

4.1 LV cabinet assembly

Each OVR-15, 27 and 38 recloser LV cabinet contains an intelligent battery charger, capacitors, control modules, relay and battery with hardwired circuits.

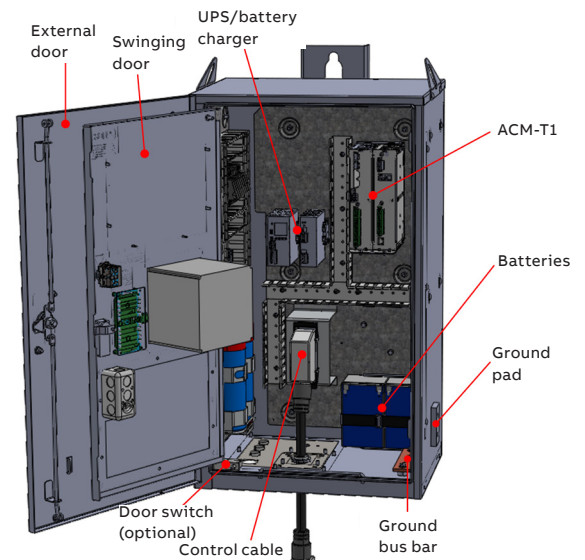
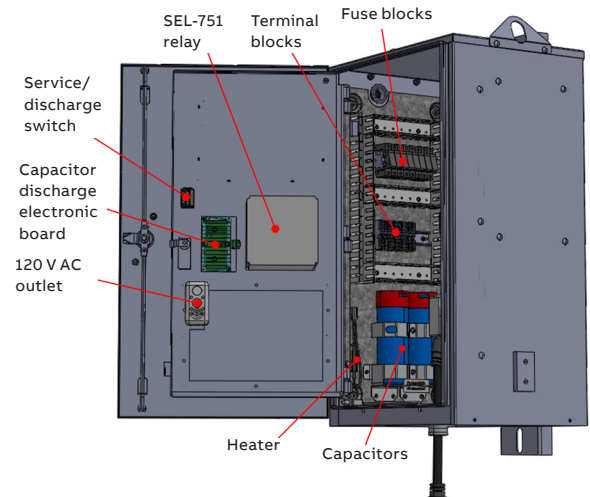


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4.2 Housing

A weatherproof, IP65-rated cabinet houses the low voltage control components. The LV cabinet has an outer hinged swinging door with padlocking provision. The SEL-751 control and protection relay is mounted on an inner hinged swinging door to allow front and rear access. The service/discharge switch and a convenient outlet for laptop charging are mounted on the front side of the inner swinging door for easy operator access. Fuse blocks, terminal blocks and other devices, including space for mounting an optional radio modem, are provided on the side/rear and front panels inside the cabinet.

The floor of the LV cabinet is equipped with a removable gland plate to provide entry to the auxiliary power cable and communication cables. A 50 W thermostatically controlled heater is provided to prevent condensation in the LV cabinet.



— 03

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04 Battery charger
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05 Actuator control module (ACM)

4.3 Programmable battery charger

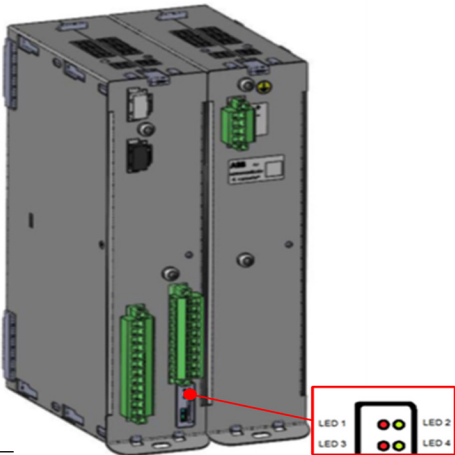
The programmable battery charger converts the auxiliary AC power supply connected from external PT or equivalent to suitable DC power supply required for components such as battery, SEL-751, ACM and external communication modem, if applicable. Proper handling of the battery charger is mandatory.



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4.4 Actuator control module

The actuator control module (ACM) gets its power supply from the intelligent battery charger. The ACM regulates the closing and tripping signals to the magnetic actuator as per feedback from the HV unit and interaction with relay by charging/ discharging the capacitors. The ACM is hardwired to the SEL-751 relay to perform operations.



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LED status				Description
1	2	3	4	
OFF	Blinking fast	OFF	OFF	Normal condition — ACM ready to perform operations
Blinking slowly	Blinking fast	OFF	OFF	Close operation is not allowed
ON	Blinking fast	OFF	OFF	Neither open nor close operations are allowed
Don't care		Blinking slowly		Boot loader started, but firmware is missing
ON	OFF	ON	OFF	File system error
OFF	OFF	ON	ON	Initial condition at start-up; if LEDs remain in this condition, the CPI has not started
ON	ON	ON	ON	This state shows for 3 seconds indicating ACM, can receive firmware upgrades

4.5 Rechargeable batteries

The LV unit is supplied with two 12 V batteries connected in series and securely mounted in the LV cabinet for providing backup power to the recloser in case of external auxiliary power failure. The batteries are protected by separate fuse block.

Typically, the battery bank ensures minimal stand-by backup power for 24 hours at 20 °C from a fully charged initial condition. However, the actual backup duration depends on various site conditions, including:

- Ambient temperature and initial condition of the battery (temperature and storage period before commissioning, periodic charge/discharge, battery maintenance)
- Frequency of external auxiliary power outages and duration of each outage (i.e., the number of charging/discharging cycles) and depth of each discharge
- Percent charging (terminal voltage) of the battery at the time of external auxiliary power outage

A battery temperature sensor is provided near the battery bank terminals. Battery charging temperature range is -15 °C to 40 °C.

The batteries provided are sealed regulated lead acid (SRLA) batteries, which are temperature and charging voltage sensitive. Although maintenance by way of water topping is not required, a regular check and assurance of proper charging voltage, depth of discharge and operating temperature is needed.

06 LVC battery

In case of loss of external auxiliary power supply, the intelligent battery charger switches over to battery bank for power and continues to conduct its function. The recloser will operate if the battery bank voltage remains above 20.5 V. Below 20.5 V, a load management algorithm activates within the intelligent battery charger and disconnects the power feed to the ACM, SEL-751 and optional radio modem. The purpose of this is to delay the batteries going into deep discharge mode. With the relay not being powered, the recloser will not be able to perform any operation.

NOTICE

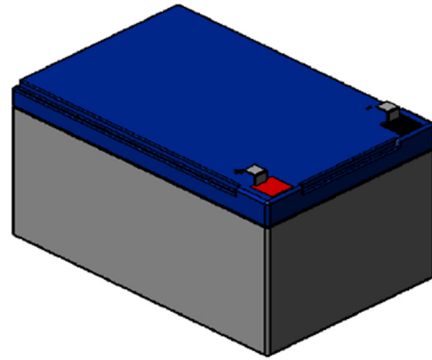
- In the case of frequent and long duration external power outages, the battery undergoes frequent discharge and charge cycles. This reduces battery capacity, charging efficiency and overall service life.
- During consistent long duration outage, the battery bank voltage may drop below 18 V (9 V per battery), indicating battery may have deep discharged and now cannot be charged again. At this point, the battery must be completely replaced with a brand new, fully charged equivalent battery.
- Connection of any additional load to the battery is strictly prohibited, and ABB will not be liable for any adverse impact this can cause to recloser performance, including battery life.

Handling reclosers during long outages

1. If battery bank is healthy and in fully charged condition (i.e., ≥ 24 V DC), no special attention is required if the power outage is of < 24 hours in duration.
2. If a power outage lasts more than 24 hours OR typically > 10 CO operations after power failure, it is considered a long duration power outage requiring special attention to the batteries.
3. During long outages, the batteries may become drained to such a level that they may go into deep discharge state (i.e., battery bank voltage goes below 18 V).
4. In this situation, the recloser will not be able to recharge the batteries automatically, and external charging may be required. Such a situation may also damage batteries permanently, thus requiring battery replacement.

NOTICE

5. To avoid this, if a power outage is expected to last more than 24 hours, switch OFF the battery fuse block at the beginning of the outage. When power resumes, switch it back ON.
6. If a power outage lasts more than a month, charge the batteries externally at regular intervals to ensure that battery bank voltage is always more than 21 V DC.



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4.6 Capacitor discharge switch

A two-position (I/O) selector switch is provided in the LV cabinet. In normal situations when the recloser is in service, this switch should be in the "I" (service) position. If maintenance needs to be conducted inside the LV cabinet, the switch should be moved to the "O" (discharge) position to ensure the operator's safety from charged capacitors.

"I" service mode: For normal operation of recloser, the selector switch must be put in service mode. All the fuse blocks are in ON condition, and the capacitors are kept fully charged by the ACM.

"O" discharge mode: Since the LV cabinet houses charged capacitors, it is mandatory that the operator must properly discharge them before conducting any maintenance inside the LV cabinet. For safely discharging the capacitors, a capacitor discharge circuit is provided in the LV cabinet.

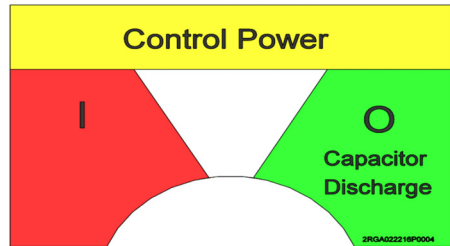
The operator must put the selector switch into "O" discharge mode, which will result in the capacitors being connected to the discharge circuit. In "O" discharge mode, the capacitors are no longer charged.

07 Capacitor
discharge label

08 SEL-751 relay
front view

A red LED on the discharge circuit indicates the process of capacitor discharge. Discharging of the capacitors to a safe level takes a few minutes. The red LED starts glowing as soon as the switch is put in discharge mode and continues to glow until the capacitors are discharged to a safe level (about 2 V).

The operator should wait until this red LED indication is turned OFF before touching any component inside the LV cabinet. In discharge mode, protection and control are not available for the recloser.



In "O" discharge mode, the selector switch also disconnects the AC power source and the batteries, thus, the relay, UPS and ACM are turned off.

4.7 External auxiliary supply monitoring

In the event of loss of external auxiliary power supply, the programmable battery charger sends a signal to the SEL-751 relay over an independent binary input. Thus, the status of availability of external auxiliary power to the LV unit can be monitored remotely if communication setup is available.

4.8 SEL-751 relay

The OVR-15, 27 and 38 recloser LV cabinet is supplied with the microprocessor-based SEL-751 intelligent electronic device (IED). This technologically advanced relay integrates all traditional recloser control functions with new advanced functions, such as three-phase inrush and programming flexibility, providing a wide range of metering and remote control options.

In the SEL-751, all card slot connections are made with terminal blocks that are affixed to the frame of the IED. This is powered by the charging device.



Because the SEL-751 is pre-programmed at the ABB factory to ensure proper operation with the OVR recloser, we highly recommend backing up the relay configuration settings before putting the unit into service. In the event that you need to reboot the relay to original factory settings, you may lose the ABB pre-programmed settings and can use the backup to restore them. Otherwise, you will need to contact the ABB service team to obtain the file with the proper settings.

5 Standard production tests

The OVR-15, 27 and 38 recloser LV cabinet is tested thoroughly at the factory before shipping.

The standard factory production tests include:

1. Verification of wiring as per approved wiring diagram
2. Electrical operation:
 - a. Close and open in local/remote modes
 - b. Overcurrent response and automatic reclosing through primary injection
3. Functional checks of manual controls (K69) and associated electrical and mechanical close block
4. Minimum trip and time-current test
5. No-load mechanical operation test

A standard routine test report with a summary of results is shipped with the product as part of the documentation package.

6 Installation

09 LVC grounding provisions

The OVR-15, 27 and 38 recloser LV unit can be installed in a substation frame or pole-mounting frame, or it can be mounted into a customer-supplied structure. Regardless of mounting method, it is imperative that the LV unit be vertical, leveled and securely fastened.

Before shipping from the factory, the OVR-15, 27 and 38 recloser LV control cabinet is tested as part of a system. The HV unit and LV control cabinet that were tested together as a set must be installed together as a set. The units must be properly matched by the serial numbers listed on the rating plates provided on each unit.

NOTICE

- All metal mounting frames and structures must be commonly grounded to the grounding grid at the installation site. For proper operation of the electronic components, the total impedance of the grounding grid on site should be less than one ohm ($1\ \Omega$)
- It is also mandatory to ensure that all grounding connections to the welded star grounding pad inside the LV cabinet are always intact and secured.
- Be careful not to bend the cable beyond a radius of 12 inches to avoid damage to the cable.

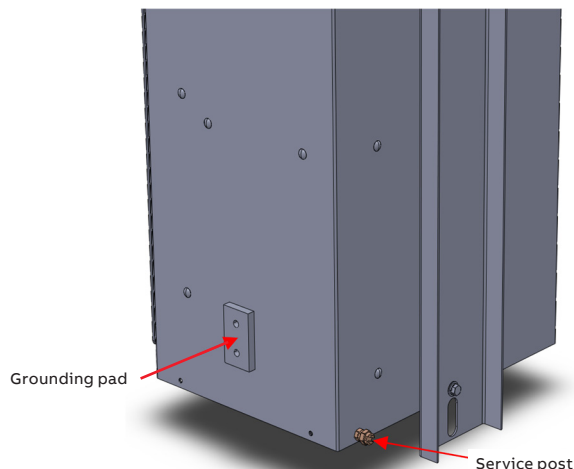
6.1 Grounding

NOTICE

Always follow international, national, local and company-specific regulations when grounding the equipment.

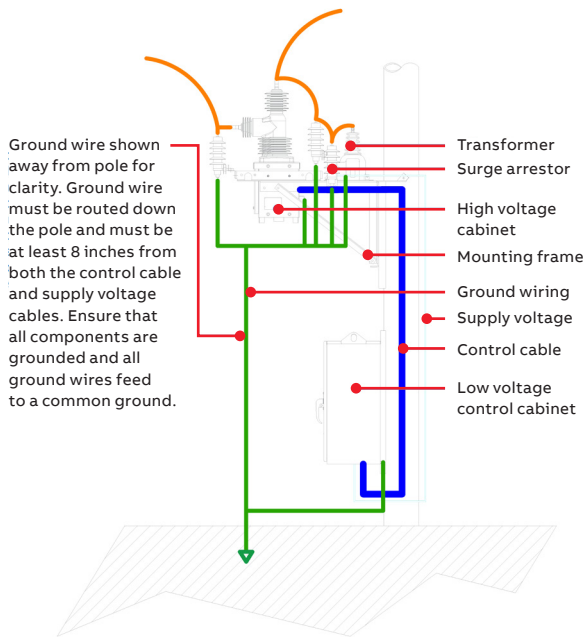
All metal mounting frames and structures must be commonly grounded to the grounding grid at the installation site. Grounding is important to ensure proper operation of all electronic components, as well as to prevent penetration of EMC noise and other transients into the sensitive electronic circuits (SEL-751 relay, ACM, radios, etc.). Each LV cabinet includes one stainless steel welded grounding pad and a service post connector for grounding (figure 9).

For the proper operation of electronic components, it is mandatory that the total impedance of the grounding grid on site be less than one ohm ($1\ \Omega$). It is also mandatory to ensure that all the grounding connections to the welded star grounding pad inside the LV cabinet are always intact and secured.

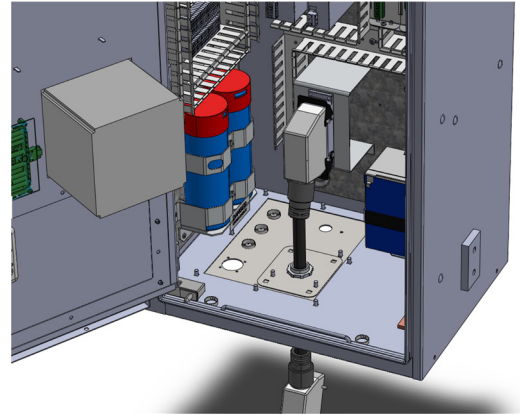


- 10 Recloser and LVC grounding
- 11 Control cable connection to the HV cabinet
- 12 Control cable connection to the LV cabinet

Refer to figure 10 for grounding recommendations for the installation of the OVR recloser and the LV cabinet.



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NOTICE

1. Minimum bending radius for the control cable is 12 inches. Bending the cable to a radius less than 12 inches may damage the cable.
2. As a best practice, the control cable must be clamped to the pole at regular intervals along its length.

6.2 Connecting the HV and LV cabinets by control cable

For normal operation, the HV and LV units are required to be connected with a shielded control cable. The control cable is supplied as per specified length with 24-pin connectors and locking clips on both ends for connection to 24-pin connector counterparts on the HV and LV cabinets.

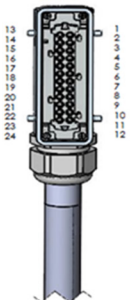
6.3 Connecting the auxiliary supply

The control cabinet requires external auxiliary power supply. Please refer the approved/as-built drawings for the auxiliary supply voltage/frequency applicable to your recloser.

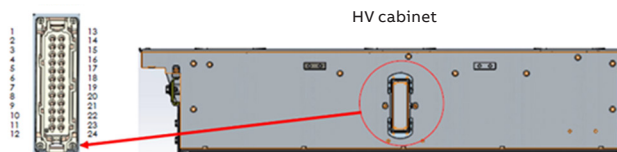
If specified during the ordering stage, an optional auxiliary supply cable can be supplied with the recloser. It is a black, jacketed, 2 x 1.5 sq. mm auxiliary power cable with a circular 3-pin connector on one end.

If the auxiliary control power is to be obtained from a pole-mounted VT (PT), the power rating of the VT (PT) should be 1000 VA. Unless specified, such a VT (PT) will not be in ABB's scope of supply.

24-pin cable female connector for HV cabinet



24-pin male connector for HV cabinet



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CAUTION

Follow instructions on the warning label provided on the inner swinging panel (door).

6.4 Final inspections before energizing

The LV unit should be tested for mechanical and electrical operation before it is energized in the power system. Note that the recloser is shipped in the OPEN (OFF) condition from the factory.

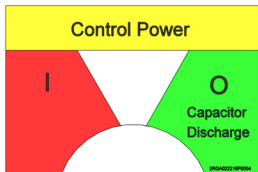
When the LV cabinet has been installed completely with all mechanical and electrical connections completed, conduct the following mandatory inspection before energizing the recloser on the main lines.

1. Ensure the LV cabinet is properly leveled and securely anchored.
2. Recheck the tightness of all hardware.
3. Securely tighten terminals and ground connections.
4. Check control cable is properly connected, routed and secured.
5. Ensure both the HV and LV cabinets are grounded as described in this manual.

NOTICE

Do not ground either side of the battery or attach ground to the terminals of the actuator operating coils. This will result in permanent damage to the unit.

Table 2: Operation procedure

1.	Initial conditions at time of shipping	When shipped from factory, OVR-15, 27 and 38 reclosers have the following status: • Recloser interrupter contacts in OPEN (OFF) condition. • All fuse blocks in LV cabinet in OFF position. • Discharge selector switch in “O” discharge position with capacitors fully discharged. • Battery physically disconnected from main circuit.
2.	Preparation before powering ON	1. Complete installation of LV and HV units. 2. Install other optional equipment, such as surge arrestors, auxiliary control transformer (PT), etc. 3. Connect and properly route the control cable between the LV and HV units. Check that all male/female connections are firmly secured on both HV and LV units. 4. Connect and route all ground connections. 5. Ensure that the emergency manual trip (K69) handle is reset and BLOCK CLOSE is released. 6. Connect 12 V batteries physically as instructed.
3.	To power ON the LV cabinet with auxiliary power	1. Connect auxiliary power cable to the circular connector on the LV cabinet. Check wiring diagram provided in order-bound drawings. 2. Switch ON the auxiliary power from the source. 3. Check availability of auxiliary power on terminals in the LV cabinet. 4. Switch ON the fuse blocks (CA7 and CA8) on the inner left panel of the LV cabinet.
4.	To connect auxiliary supply to charging device and heater circuits	• Switch ON fuse blocks (CA1 to CA6). • The thermostatically controlled heaters in the HV and LV cabinets may also turn ON. • The auxiliary power outlet is also powered up.
5.	To connect batteries to charging device	1. Check and firmly connect the 2-pin male/female battery connectors in the battery circuit. Check schematic diagram supplied with the documents for details. 2. Connect the red and black cables to the batteries' spade terminals. This will connect the two 12 V DC batteries in series. Confirm that voltage across the battery terminals is about 24 V DC. 3. Switch ON the battery fuse block (CA9) to connect the batteries to the charging device.
6.	If a radio modem is added on site, follow these instructions to power it ON	1. Check the schematic diagram provided with the documents to confirm the pins on the charging device for powering the radio modem. It can support up to 7 W at a DC voltage between 19 V to 29 V. 2. Complete the physical wiring for power supply with an addition of fuse blocks. Space is allocated on the inner left panel of the LV cabinet for mounting the fuse blocks. 3. Hardwire the modem to a suitable port of the SEL-751 relay as per the requirements of the communication protocol. The modem antenna can be connected outside the LV box by routing the antenna wire through the LV box's bottom gland plate.
7.	To start capacitor charging	Switch the capacitor discharge selector in the LV cabinet from “O” position to “I” position.  Placing the selector in the “I” position enables the AC power source and the batteries, thus, the relay, UPS and ACM are all powered on.
8.	Observations when ACM power is ON	When the fuse blocks (CA7 and CA8) of the charging device are turned ON: • ACM will conduct internal tests initially with both RED and GREEN LEDs blinking. It may take about two minutes for the recloser to become ready from each initial energization. • Successful energization will be indicated by the GREEN LED becoming steady and the RED LED continuously OFF. This indicates that the ACM (recloser) is ready for operation. The SEL-751 relay is fully powered up when the LCD screen and LEDs on its HMI are fully lit.
9.	AR Ready indication on relay LED	When the ACM completes all the internal tests and fully charges the capacitors, the “AR Ready” LED on the SEL-751 relay turns GREEN, indicating that the recloser is ready for operation. (Please refer to the approved/as-built wiring diagram for a detailed description of the SEL-751 LED indications applicable to your unit.)
10.	CLOSE operation	To close the recloser: • Confirm the emergency manual trip (K69) handle is reset. • Confirm the recloser status is OPEN by referring to the relay HMI (dedicated LED or recloser OPEN symbol on the LCD screen SLD) and the ON/OFF position indicator on the HV unit. • Press the (I) button on the relay HMI. Relay will display message, “CLOSE CBXCBR1? YES/NO.” • Press the ENTER pushbutton on the YES option. This closes the recloser.
11.	OPEN operation	To open/trip the recloser: • Confirm the recloser status as CLOSED by referring to the relay HMI (dedicated LED or recloser CLOSE symbol on the LCD screen SLD) and the mechanical ON/OFF indicator on the HV unit. • Press the (O) button on the relay HMI. Relay will display message, “OPEN CBXCBR1? YES/NO.” • Press the ENTER pushbutton on the YES option. This opens the recloser.

7 Inspection and maintenance

The OVR-15, 27 and 38 LV units will require minimal maintenance if handled properly. Frequency of operation and local environmental conditions should be considered when determining an appropriate maintenance schedule.

To a large extent, the safety and successful functioning of any apparatus or system connected with the recloser depends on the proper installation, commissioning, programming and configuration of the unit.

To provide long, reliable service, the LV unit should be inspected at regular intervals. Operating experience, environmental conditions, the number of operations and any unusual service conditions should guide you in establishing a maintenance schedule.

Maintenance work must only be carried out by trained personnel who know and respect all safety regulations. In addition, it is recommended that ABB service personnel should be called in to check service performance and for repair work.

7.1 Activities to complete before performing any maintenance on recloser LV unit

(Perform this in conjunction with instructions in the HV unit instruction manual.)

1. OPEN the recloser with the emergency manual trip (K69) handle. This enables the mechanical as well as electrical BLOCK CLOSE (recloser cannot be closed unless the K69 handle is manually reset).
2. Confirm the recloser OPEN status on the SEL-751 relay HMI and on the mechanical ON/OFF indicator on the HV cabinet.
3. Switch OFF all fuse blocks to disconnect AC auxiliary power and battery backup.
4. Put the LV cabinet's capacitor discharge selector switch in the "O" discharge position. This will connect the capacitors to the discharge circuit.

5. Wait until the capacitors are discharged to a safe level (when the RED LED on the discharge circuit stops glowing).
6. Because the SEL-751 relay and optional radio modem are supplied by the charging device, switching OFF the power supply also switches OFF the charging device, SEL-751 relay and any connected radio modem.
7. Thus, all the electrical controls/measurements and protections/communications of the recloser are switched OFF, and the recloser LV cabinet is ready for maintenance.

7.2 Additional activities to complete before performing any maintenance on recloser LV unit

1. Complete all activities described in section 7.1.
2. Ensure that the main circuit is properly grounded.
3. Follow all safety practices required by national and local codes as well as company policies.

NOTICE

Control cabinets are recloser voltage-range specific. Please contact the factory before mixing high voltage recloser units and recloser cabinets.

NOTICE

Do not ground either side of the battery or attach ground to the terminals of the actuator operating coils. This will result in permanent damage to the unit.

8 Common issues and troubleshooting

Table 3: Troubleshooting chart for OVR reclosers
(Please read this table in conjunction with the approved/as-built wiring diagram.)

No.	Trouble/malfunction	Indication/observation	Possible causes	Remedy/troubleshooting
1	Auxiliary power failure	No voltage across auxiliary supply terminals in LV unit	- External auxiliary power connection to LV unit is loosely connected - External auxiliary power may be OFF	- Properly connect the auxiliary power supply cable to the plug inside the LV unit - Check and correct the status of the external power supply
		Voltage is present across auxiliary power terminals in LV unit, but auxiliary power outlet and heater(s) do not have power	Fuse blocks (CA1 to CA4) are OFF	Switch ON the fuse blocks (CA1 to CA4)
2	ACM/SEL-751 does not power up even after main auxiliary fuse block is ON and auxiliary supply is available for more than 60 seconds	Charging device is defective (its LED is not glowing continuously)	If LED is not glowing	Charging device is defective; consult ABB representative.
		None of the LEDs (RED/GREEN) on ACM glow	Fuse blocks (CA7 and CA8) are OFF	Switch ON the fuse blocks (CA7 and CA8)
		No LEDs on SEL-751 HMI glow and LCD screen does not light up		
3	Recloser (AR) is NOT ready; OPEN and CLOSE operations not possible from SEL-751 or from remote	One or more blinking RED LEDs on ACM	Manual lock-out activated; emergency manual trip (K69) handle has been operated and is locked in operated/tripped position	Reset the emergency manual trip handle to release the manual lock-out
		AR Ready LED on relay glowing RED	Control cable between LV and HV units is loose or not connected	Connect and secure the control cable between the HV and LV units
			Capacitors not sufficiently charged	- Put selector switch in "O" DISCHARGE position - Allow capacitors to fully discharge (follow warning label guidelines) - Check capacitor connections to ACM for loose contact and correct polarity as per wiring diagram - Check capacitor health; replace capacitors if needed
		Wrong recloser ON/OFF status on SEL-751 HMI (mismatch with mechanical ON/OFF indicator/ LEDs on SEL-751) -OR- Relay LED or SLD on relay LCD shows both ON and OFF or no status	The wiring, mounting or setting of the 52a/b auxiliary limit switch may be loose or wrong (52a/b auxiliary limit switch is mounted in HV unit) -OR- The 52a/b auxiliary limit switch is faulty/ damaged (52a/b auxiliary limit switch is mounted in HV unit)	- Check, secure and correct the wiring of 52a/b auxiliary limit switch as per approved/as-built schematic - Check and correct the mounting/setting of the 52a/b auxiliary limit switch - Replacement of the 52a/b switch may be required if it is found to be faulty or damaged - Contact ABB Customer Service Group

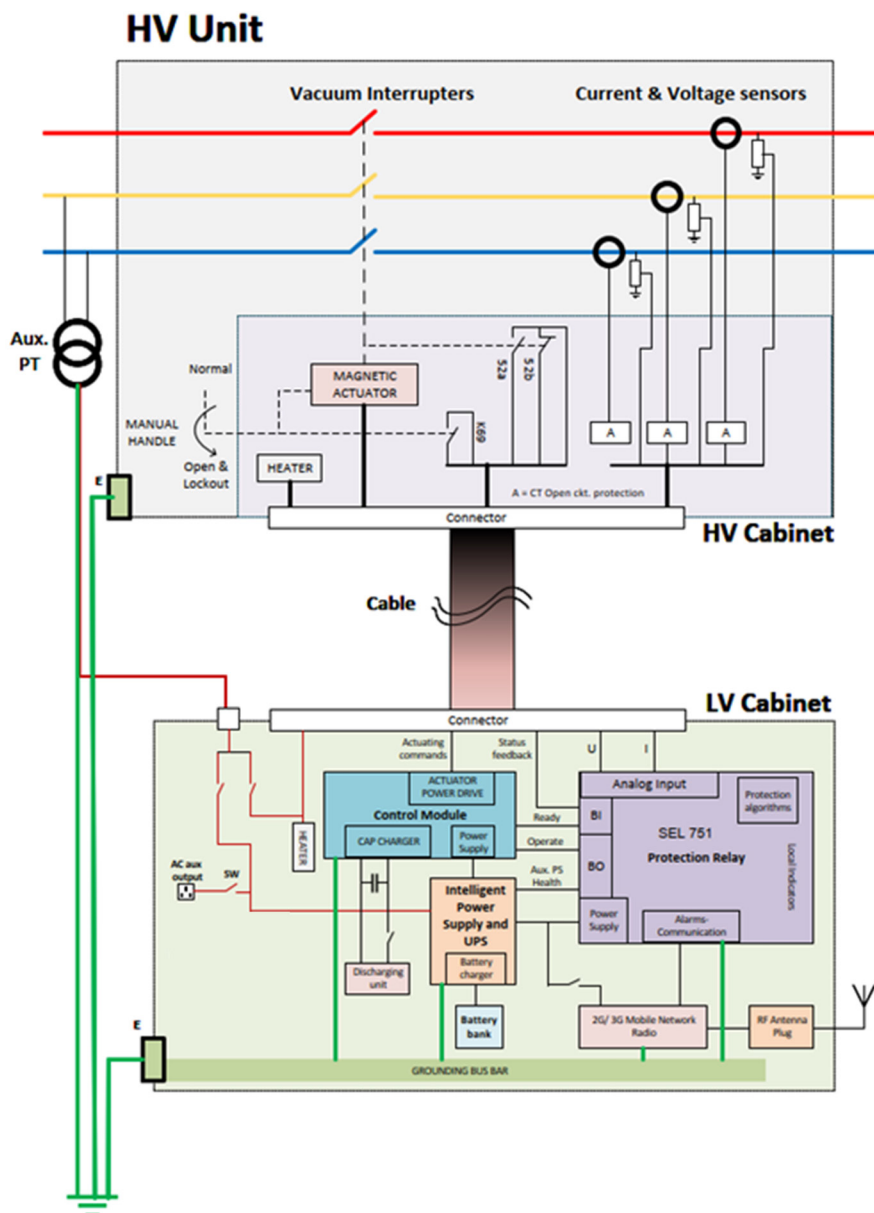
No.	Trouble/malfunction	Indication/observation	Possible causes	Remedy/troubleshooting
4	Recloser (AR) is ready, but CLOSE operation is not possible from SEL-751 local HMI or remote	SYN CHECK LED (if applicable) on relay HMI turns RED	The phase sequence of the MV power connections on both sides of the recloser do not match each other	Check and correct the phase sequence of the MV power cable connections to the recloser terminals
			Synchronizing and energization check conditions are not being satisfied as per settings of SECRSYN function block	Check system voltage parameter and network status
5	Battery failure	Battery status LED on relay HMI turning RED	Fuse block for battery is OFF	Switch ON the fuse block for battery
			Battery connections to charging device are loose or have the wrong polarity	Check, correct and secure battery connections to charging device with correct polarities
			Battery unhealthy (battery may have undergone deep discharge or excessive temperatures or exceeded its working lifespan)	Check battery health and replace battery if needed
6	Condition monitoring (This is a proactive alarm about a recloser condition which may need attention in the near future)	Condition monitoring alarm on relay HMI turning RED	ACM is taking more than 20 seconds to become ready	Follow steps in no. 3 above
			Out of the rated life of 10,000 CO operations, 9000 CO operations have been completed and only the last 1000 CO operations remain	Contact the nearest ABB Customer Service Group for further advice
			Recloser has completed a greater number of open operations on higher currents (fault currents)	
			Recloser is in inactive (no close/open operations) stage for more than 2000 days after the latest ON/OFF operation while LV unit is powered ON	

9 General OVR-15, 27 and 38 block diagram

13 Typical block diagram OVR

The recloser can be shipped with one of three different mounting options: a pole-mounting frame, a substation frame or no frame at all. The following section outlines recommended installation procedures for each frame type.

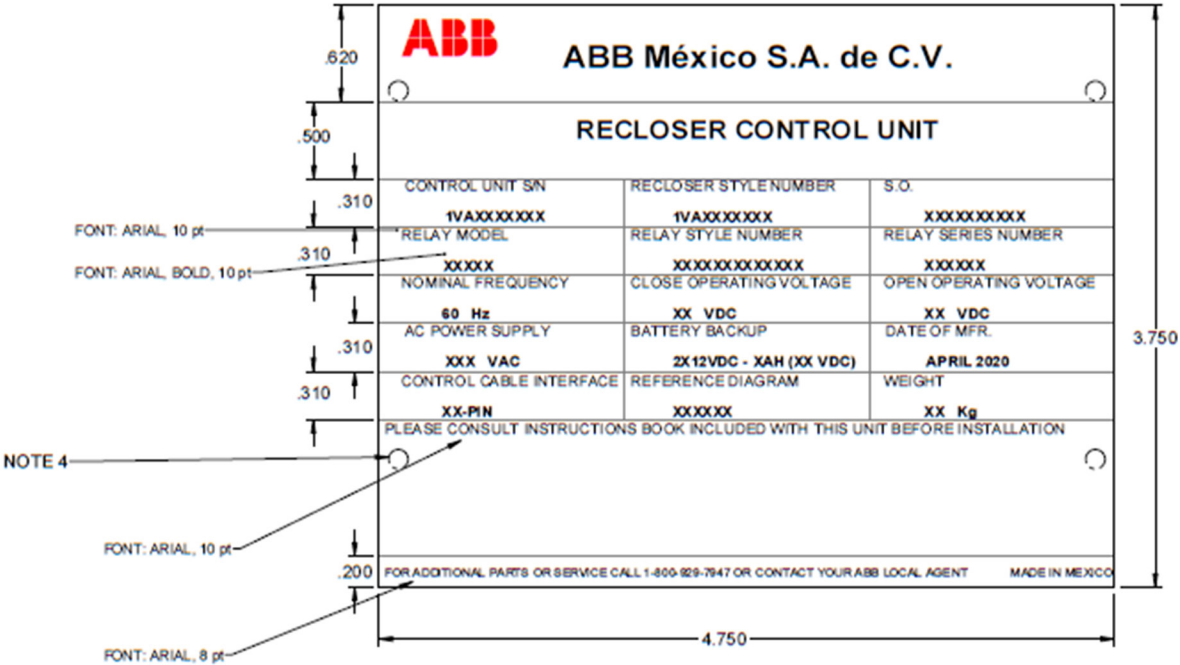
9.1 Typical block diagram — OVR gang-operated system





10 Typical drawings

14 LVC nameplate





11 End-of-life recycling/disposal

ABB is committed to complying with relevant legal and other statutory requirements for environmental protection according to the ISO 14001 standard. The duty of the end user is to facilitate end-of-life recycling and disposal according to the applicable regulations.

During disposal of product, it is necessary to follow all local legal requirements in force. Disposal can be carried out either thermally in an incineration plant or by storing on a waste site.

Following are the methods of recycle/disposal:

Table 4: Recycle/disposal methods

Raw material	Recycle	Environmental effects and re-use processes
Iron	Yes	Separate, use instead of new source (ore)
Stainless steel	Yes	Separate, use instead of new source (ore)
Copper	Yes	Separate, use instead of new source (ore)
Brass	Yes	Separate, use instead of new source (ore)
Aluminum	Yes	Separate, use instead of new source (ore)
Zinc	Yes	Separate, use instead of new source (ore)
Thermoplastic	Yes	Make granulate, re-use or apply as energy superior
Rubber	Yes	Cut into pieces and use as high-grade energy
Packing foil	Yes	Cut into pieces and use for landfills
Wooden pallet	Yes	High-grade energy additive in refuse incineration

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