DISTRIBUTION SOLUTIONS

OVR-15, 27 and 38 outdoor vacuum recloser high voltage unit with SEL-751

Instruction, operation
and maintenance manual

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.

Table of contents

1 Introduction

This manual contains the information needed to install the high voltage (HV) unit of the OVR-15, 27 and 38 auto reclosers and put them into service.

For correct use of the product, please read this manual carefully along with the instruction, operation and maintenance manual for the low voltage (LV) 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 provided in this manual may not contain instructions for 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 to standardized configurations.

Only use original spare parts for maintenance operations. For more information, please refer to the recommended spare parts list included in this manual.

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

1.1. Environmental protection program
The OVR-15, 27 and 38 reclosers are manufactured in accordance with ISO 14000 standards (guidelines for environmental management).

Production processes are carried out in compliance with the standards for environmental protection in terms of reduction in energy consumption as well as in raw materials and production of waste materials. All this is thanks to the medium voltage apparatus manufacturing facility environmental management system.

1.2. X-ray emission standards
One of the physical properties of vacuum is the possibility of X-ray emission when the interrupter contacts are open and subjected to high voltage. Specific tests performed show that local emission at a distance of 10 cm from the interrupter or pole surface does not exceed 1 mSv/h. It follows that:

- At the rated service voltage, use of vacuum interrupters is absolutely safe.
- Application of the withstand voltage at industrial frequency, according to the IEC 62271-111 standard, is safe.
- Application of a voltage higher than the power frequency withstand voltage at the industrial frequency or direct current specified in the IEC standard is outside the guaranteed operating limits for the unit and may cause permanent damage to the unit.
- Limitation of the above-mentioned local phenomena, with interrupters with open contacts, depends on keeping the specified distance between the contacts. This condition is intrinsically guaranteed by correct operation of the operating mechanism and adjustments of the transmission system.

1.3. End of life recycle/disposal

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

During disposal of the product, it is important 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 1: Recycle/disposal methods

Raw material	Recycle	Environmental effects and reuse 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
Epoxy	Yes	Additive in refuse incineration
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

1.4. Product-related safety notices

The OVR-15, 27 and 38 reclosers should be installed within the design limitations as described on the unit's nameplate and in these instructions. In addition, always follow your company's safety procedures.

This recloser should not be used by itself as the sole means of isolating a medium voltage circuit. For the safety of personnel performing maintenance operations on the recloser or connecting equipment, all components should be electrically disconnected by means of a visible break and securely grounded.

This manual uses the terms "ground" and "grounding" as per IEEE. These are equivalent to IEC terms "earth" and "earthing."

This manual contains terms and expressions commonly used to describe this kind of equipment.

These instructions do not attempt to provide the user of this equipment every possible answer to questions that may arise in the application, operation and maintenance of the product.

Detailed descriptions of standard repair procedures, safety principles and service operations are not included. It is important to note that this document contains some warnings and cautions against some specific service methods that could cause personal injury to service personnel or could damage equipment or render it unsafe. These warnings do not cover every conceivable method in which service (whether or not recommended by ABB) may be performed.

Secondly, ABB cannot predict or investigate all potential hazards resulting from all conceivable service methods. Anyone using service procedures or tools, whether or not recommended by ABB, must be completely certain that both their personal safety and the safety of the equipment will not be jeopardized by the service method or tools selected.

All information contained in this manual is based on the latest product information available at the time of printing. The right is reserved to make changes at any time without notice.

Also, as improvements in assemblies and parts are made, some parts may differ in appearance than that depicted in illustrations; however, functionality will be equivalent.

1.5. Working on HV cabinets and mandatory safety procedures

When work on HV and/or LV units is required, observe the following mandatory 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. Once the recloser is opened, the handle locks and blocks close operation both electrically and mechanically until the handle is reset to its original (not operated) position.
b. Confirm the OPEN status of the recloser from the mechanical ON/OFF indicator and from the indication LEDs on the SEL-751.
c. Switch off all MCBs on LV unit's swinging door.
d. Follow the safety warning instructions on various warning labels provided on the LV and HV units.
e. Remove the control cable from both the HV and LV cabinets, and cover the 24-pin male connectors with the plastic caps provided.

Although hazard warnings relate to personal injury, it is also important to understand that under certain operational conditions, operation of damaged equipment may result in degraded process performance, potentially leading to personal injury or death. Therefore, comply fully with all warning and caution notices.

1.5. Warning texts and symbols

Warning texts and symbols are based on different degrees of urgency, which must be observed carefully. These are described below.

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.

IMPORTANT

Important indicates an operation or a suggestion for handling.

Warning symbols

The following warning symbols may appear on warning labels on the product itself.

The electrical warning icon indicates the presence of a hazard that could result in electrical shock.

Dangerous voltages can occur on the connectors even though the auxiliary voltage has been disconnected.

Only a competent electrician must be allowed to carry out the electrical installation.

National and local electrical safety regulations must always be followed.

Non-observance can result in death, personal injury or substantial property damage.

The warning icon indicates the presence of a hazard that could result in personal injury.

The equipment contains components that are sensitive to electrostatic discharge. Unnecessary touching of these electronic components must, therefore, be avoided.

2 Packing and transport

01 General symbols on packing case

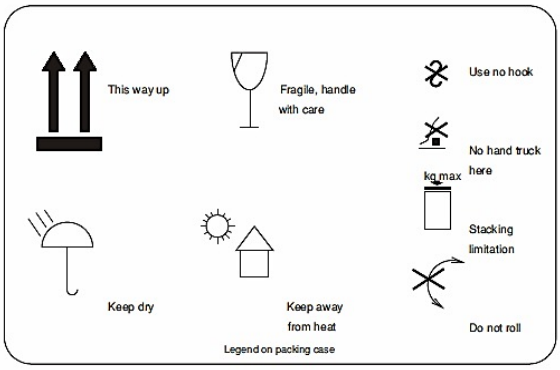
02 Packing case lifting arrangement

2.1 Goods marking

The recloser is transported in “Contact OPEN” position. The HV unit of the factory-assembled recloser may be transported in a different packing case than the LV unit and mounting brackets. Each case is marked on two sides with indelible black ink. Case markings include information such as case number, gross weight, etc.

Optional accessories, such as auxiliary power voltage transformer, terminal connectors, etc., may also be transported in a separate case.

In addition to the above, the cases are marked with the following symbols. These should be observed when choosing lifting equipment.



01

2.2 Documents

Documents provided with the recloser during dispatch include:

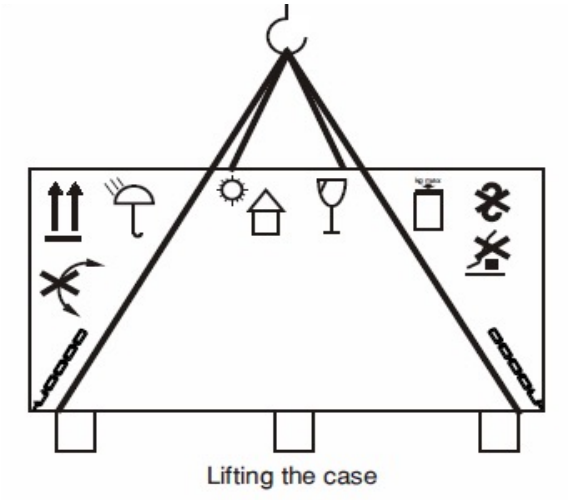
- Instruction manual
- Routine test certificate
- Drawings
- Packing list
- Other documents as mutually agreed in contract with ABB

2.3 Transport and lifting

The recloser must be transported in packed condition only. Before lifting the case, observe the information on it (such as symbols, weight, etc.).

The following precautions are to be taken during lifting:

- Ensure that packing cases are not placed on wet surfaces/waterlogged areas.
- Reclosers should not be stacked on top of one another.
- Reclosers should be lifted by a lifting device equipped with forks or slings. If a crane is used, slings must be used. The units must not be rolled or dropped.



02

3 Receipt and storage prior to installation

3.1 Receipt of recloser

Each recloser is assembled and tested at the factory. Prior to shipment, the equipment is thoroughly inspected to ensure a quality product free from defects. If damage is noticed, call the carrier at once for inspection, and request an inspection report. Afterwards, file a formal claim with the carrier, supported with the airway/ roadway bill.

Each delivery, on receipt, should be checked for:

- Shortages and discrepancies (verify against order and delivery documents)
- Any transit damage and material losses

Abnormality, if any, must be reported immediately to ABB, forwarding agents and the insurance company.

Instructions and literature packed with the recloser should be kept with the unit. Additional copies may be obtained upon request from the local ABB sales office. Following are the typical parts with which reclosers are generally shipped from factory.

Default shipment	High voltage (HV) cabinet
	Control cable (length as per order-specific drawings)
Optional items (Only if ordered separately)	Mounting brackets
	Auxiliary power cable (2x1.5 sq. mm)
	Terminal connectors for main power cable connections
	Insulating boots for main power connections
	Auxiliary power voltage transformers
	Any additional spares

3.2 Storage of recloser

The recloser with complete packing should always be stored indoors to protect it from direct sunlight, rain or snow. The recloser should be stored in its original transport units, where they are well protected from damage.

Reclosers can be stored up to three months from date of shipment from the factory. For longer storage, the packing must be removed and the recloser must be kept under controlled environmental conditions.

We define storage in controlled conditions as a place with:

- Leak-proof roof
- Solid, flat ground
- Relative humidity less than 50%
- Temperature 20 ˚C (+10 ˚C)
- The heating elements must be connected to the electric supply to protect the control equipment from corrosion or freezing damage.

Structures may be stored outdoors with proper care by avoiding any water accumulation or soil deposition. Spare parts should be stored indoors in their original packing.

IMPORTANT

The HV cabinets must be stored in the upright position to avoid moisture accumulation.

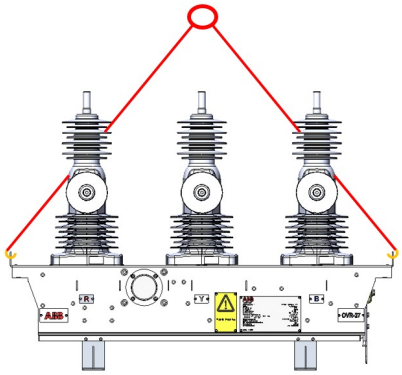
Recommended storage temperature range is 0 ˚C to +45 ˚C.

NOTICE

If the recloser is not placed into service immediately, it is essential that proper care be exercised in handling and storage to ensure good operating condition in the future. Please consult ABB if the recloser will be in storage for an extended period of time before installation.

3.3 Handling

Each HV cabinet comes with lifting brackets on the sides of the cabinet for lifting. A four-point lift using the loops in these brackets is strongly recommended. The approximate mass in kg is indicated on the rating plates on HV cabinets.



03 HV cabinet lifting details

03

NOTICE

Exercise care during lifting to avoid damage to the poles.

CAUTION

Do not place the recloser HV unit on an uneven surface. Placing the HV unit on an uneven surface may cause tilting/galling of the HV unit, causing damage to the equipment and injuries to nearby personnel.

NOTICE

A spreader bar should be used if necessary to ensure lifting straps do not press against and damage the poles or mechanical ON/OFF indicator.

NOTICE

Do not use a forklift to move the recloser because it may damage the mechanical ON/OFF position indicator, yellow trip handle and associated interlock.

4 Technical details

These operating instructions are applicable to the HV unit of the OVR-15, 27 and 38 medium voltage, three-phase, mechanically gang-operated vacuum reclosers.

Each OVR-15, 27 and 38 recloser has three vacuum interrupters, each assembled in a pole cast from an advanced hydrophobic cycloaliphatic epoxy polymer (HCEP). Together with the specialized control functions, the recloser will sense a pickup current (or other pre-configured condition) and automatically open, or "trip."

After a pre-configured open interval time, the recloser will close again. If the tripping condition still exists, the recloser will trip again and reclose. The OVR-15, 27 and 38 recloser can reclose up to three times in one operating cycle.

The standard OVR-15, 27 and 38 recloser control, SEL-751, will allow up to three closing operations before the recloser will "lock out" in the open position.

4.1 Table 2: Technical data for OVR-15, 27 and 38

No.	Technical characteristic	OVR-15	OVR-27	OVR-38
1	Installation			Outdoor, pole/substation mounting
2	Suitable as standard			IEC 62271-111/IEEE C37.60
3	Rated system voltage	15 kV	27 kV	38 kV
4	Rated frequency			50 / 60 Hz
5	Nominal current at 40 °C ambient	630 amps	1000 amps	1200 amps
6	Short time current withstand capability	12.5 kA rms for 3 sec.	12.5 kA rms for 3 sec.	16 kA rms for 3 sec.
7	Fault current breaking capability	12.5 kA rms	12.5 kA rms	16 kA rms
8	Making current capability	32.5 kAp	32.5 kAp	41.6 kAp
9	One-minute power frequency withstand capability (dry/wet)	50 kV rms/ 45 kV rms	60 kV rms/ 50 kV rms	70 kV rms/ 60 kV rms
10	Lightning impulse voltage withstand capability	110 kVp	125 kVp	170 kVp
11	Switching of line-charging current	2 A	5 A	5 A
12	Switching of cable-charging current	10 A	25 A	40 A
13	Operating sequence (reclosing sequence)			O – 0.2 s – CO – 2 s – CO – 2 s – CO – lockout
14	Closing time			≤ 65 ms
15	Opening time			≤ 40 ms
16	Number of operations at rated current			10,000 CO (With proper periodic maintenance, unit can perform up to 25,000 CO operations)
17	Insulating material of poles			Hydrophobic cycloaliphatic epoxy polymer (HCEP)
18	Type of operating mechanism			Magnetic actuator
19	Minimum creepage distance	481 mm	960 mm	1178 mm
20	Center-to-center distance between phases	394 mm	394 mm	394 mm
21	Mass of the auto recloser HV unit excluding mounting frame (approx.)	140 kg	145 kg	180 kg
22	Protection class for cabinet (HV and LV)			IP55
23	Maximum load on foundations (inclusive of the mass of the recloser)			11,600 N – compression (open operation) 7000 N – tension (close operation)
24	Suitable for wind speed up to			200 km/hr.
25	Ambient temperature range			-40 ˚C to +55 ˚C

For other technical details, please refer to the order-specific drawings.

5 General description of OVR-15, 27 and 38 recloser

— 04 OVR-15 HV cabinet overview

— 05 OVR-27/38 HV cabinet overview

5.1 High voltage assembly

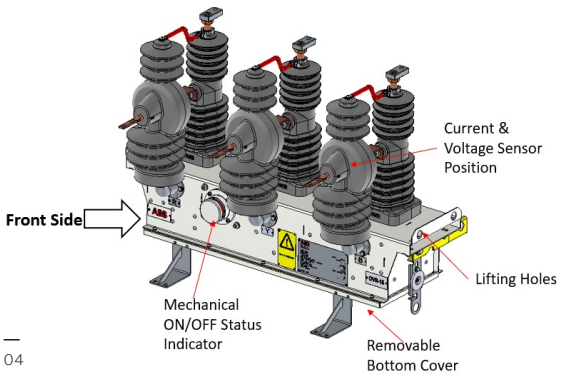
The high voltage assembly of the OVR-15, 27 and 38 consists of three poles mounted onto a common housing. Each of the poles is a separate assembly consisting of a vacuum interrupter assembled in an HCEP molded pole. All three poles are gang operated by a single coil magnetic actuator through a common operating shaft.

5.1.1 Housing

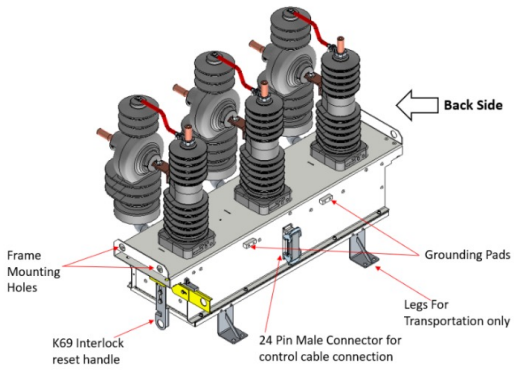
The HV unit housing is a stainless steel enclosure with a removable bottom cover. This housing is provided with legs for safe transportation and storage. However, these legs are not intended to be used for mounting the recloser on its structure.

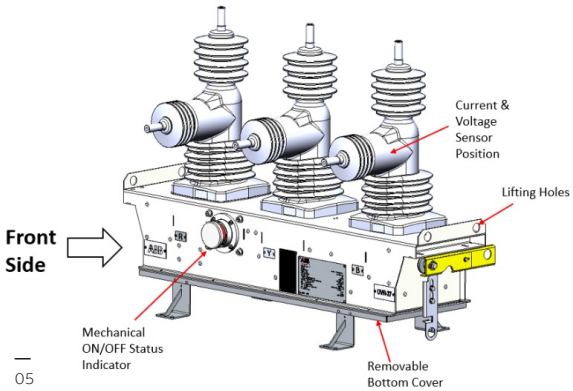
The HV unit has a dedicated name plate, showing important rating information, serial number and manufacturing year, mounted on the front side of the HV cabinet. The ON/OFF position indicator is also on the front side and is visible from ground.

A 50 W heater is provided in the HV cabinet to prevent condensation. The heater must be energized at all times.

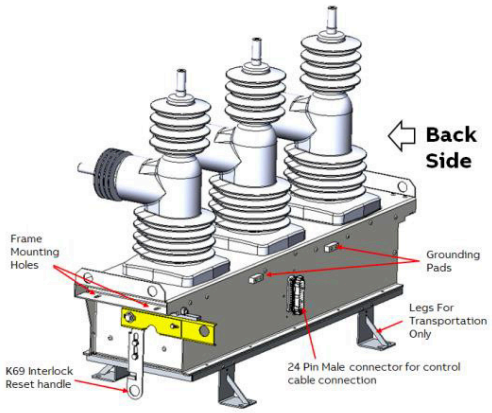


— 04





— 05



5.1.2 Recloser pole

Each of the three recloser poles consists of a vacuum interrupter inside a pole cast from an advanced hydrophobic cycloaliphatic epoxy polymer (HCEP). The upper and lower terminals for connecting medium voltage power conductors are made of ETP copper.

5.1.3 Current and voltage sensor

Current (I) sensing uses a current transformer (CT), and voltage (U) sensing uses a voltage divider. The sensor secondary connections are brought out of the pole via shielded cables. OVR-15 and 27 offer the option for either single or dual voltage sensing per pole.

5.1.4 Single coil magnetic actuator

The recloser is operated by a single coil magnetic actuator. One actuator gang operates all three poles through a common shaft mechanism. The magnetic actuator is bi-stable and does not require any continuous power to hold it in the ON or OFF position.

NOTICE

- Disassembly of the magnetic actuator is not allowed. Lubrication or maintenance is not required and will void the warranty.
- Should an actuator fail to operate, contact ABB Customer Service.

5.1.5 Emergency manual trip (K69) handle

A yellow handle on the side of the HV cabinet housing is provided for mechanically opening the recloser in an emergency. When viewed from the front of the cabinet (with rating plate visible), this handle can be seen on the right-hand side of the housing. The recloser can be mechanically opened by pulling this handle from ground level with a standard hook stick. See the mechanical opening information in the Operation section of this manual for details.

5.1.6 Mechanical ON/OFF position indicator

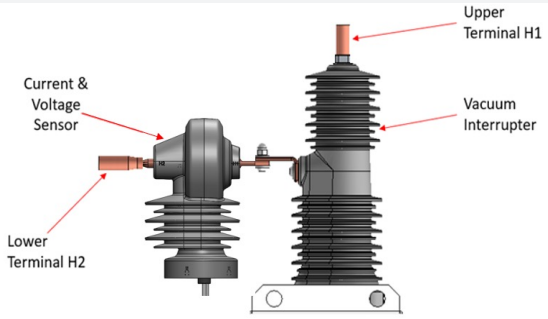
The HV cabinet includes a mechanical ON/OFF position indicator that can be viewed easily from ground level. The general color convention is:

	Close	Open
Default color coding	Red	Green
Option available on request*	Green	Open

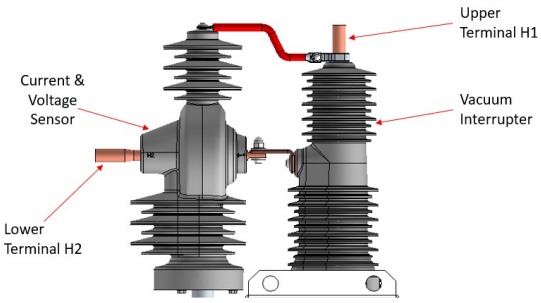
* Please check the order-specific documents to confirm color coding.

5.1.7 Status auxiliary limit switches

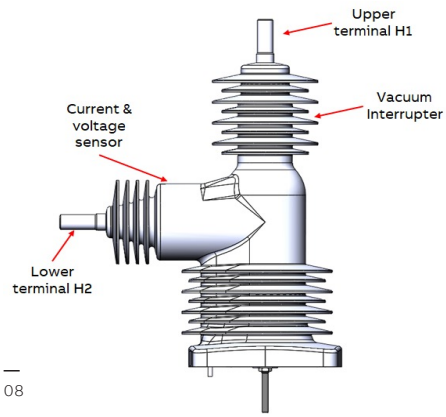
The status limit switches are mounted inside the HV cabinet housing. They are wired to provide recloser status information to the protection and control in the LV control cabinet.



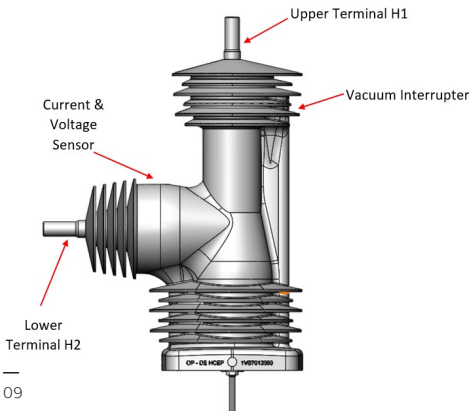
06 OVR-15 pole with single voltage sensor



07 OVR-15 pole with dual voltage sensor



08 OVR-27/38 pole with single voltage sensor



09 OVR-27 pole with dual voltage sensor

6 Standard production tests

Routine tests are performed on the OVR-15, 27 and 38 reclosers with the HV unit connected to its dedicated LV unit. 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. Contact resistance measurements on poles.
5. One-minute power frequency voltage withstand test on primary circuit of HV unit.
6. Partial discharge test.
7. Minimum trip and time-current test.
8. No-load mechanical operation test.

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

7 Installation

The OVR-15, 27 and 38 recloser can be installed in a substation frame or pole-mounting frame, or it can be mounted into a customer-supplied structure. Regardless of the frame or structure, all mounting methods require the recloser to be vertical, leveled and securely fastened. Follow your company guidelines and applicable codes for setting the height of the recloser, securing the frame to the pole or foundation and making connections.

Before shipping from the factory, the OVR-15, 27 and 38 recloser HV unit is tested as a system with its dedicated LV control cabinet. The HV unit and LV control cabinet that were tested together must be installed together. These units can be properly matched by the serial number indicated on each unit's rating plate.

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 must be less than one ohm (1 Ω).
- 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.

7.1 Tests before installation

7.1.1 Vacuum test procedure

It is recommended to conduct a one-minute power frequency voltage withstand test on each interrupter to verify that there has been no loss of vacuum during transportation or handling. Experience indicates that a vacuum interrupter with vacuum seal intact will withstand 40 kV AC (80% of 50 kV) for OVR-15, 45 kV AC (80% of 60 kV) for OVR-27 and 56 kV AC (80% of 70 kV) for OVR-38 across the open contacts. The same interrupter with leaked vacuum (open to normal atmosphere) will flashover at the gap at a much lower voltage.

⚠ WARNING

Radiation warning

High voltage applied across an open gap in a vacuum can produce X-ray radiation. However, no radiation is emitted when the recloser is closed because no gap exists. Also, X-ray radiation at one meter is below the concern level when the recloser is open to the specified contact spacing during testing (within specified voltages) or in normal service conditions. Danger could exist at voltages above those specified on the rating plate.

For testing, with recloser in open position, connect all the three upper terminals together with jumpers. Connect all three lower terminals together with separate jumper, and ground them to cabinet housing. Connect the high voltage to the top terminals.

During testing, it is mandatory that:

- HV and LV cabinets are connected properly with the control cable.
- Both HV and LV cabinets are securely grounded.
- LV cabinet is placed at least three meters away from HV cabinet.
- Personnel must stand at least three meters away from the apparatus before energizing the high voltage source.
- Do not apply voltage for more than 60 seconds.

If internal flashover occurs, isolate the phases, and test each one independently to identify the defective interrupter. Any defective pole assembly must be replaced prior to the recloser being installed and placed into service.

7.1.2 Contact resistance

Close the recloser with the help of the LV unit and associated connecting cable. Measure contact resistance with suitable equipment rated not less than 100 A DC. The value of contact resistance for each phase should not exceed 40 micro-ohms. Ensure that the contact resistance measurement kit's current-injection leads are connected only across the incoming and outgoing terminals of the pole.

NOTICE

If the vacuum interrupter/complete pole needs to be replaced, please contact ABB.

7.2 Mounting

The HV cabinet is shipped with mounting frame as per the type of mounting agreed upon at time of order. For details, refer to recloser mounting documents supplied with the order-bound drawings.

NOTICE

Do not use a forklift to move the recloser because it may damage the mechanical ON/OFF position indicator, yellow manual trip handle and associated interlock.

7.2.1 Pole mounting

For pole-mounting frames, perform the following:

1. Attach the lifting hooks on the sides of the recloser as indicated in section 3, Handling.
2. Complete the HV cabinet mounting on pole, as per detailed procedure in this manual.
3. If voltage transformers (VTs) are used, it is recommended to install the frame without the VTs and then install them after the recloser and VT mounting brackets are on the pole.
4. Make sure all hardware is fastened securely.

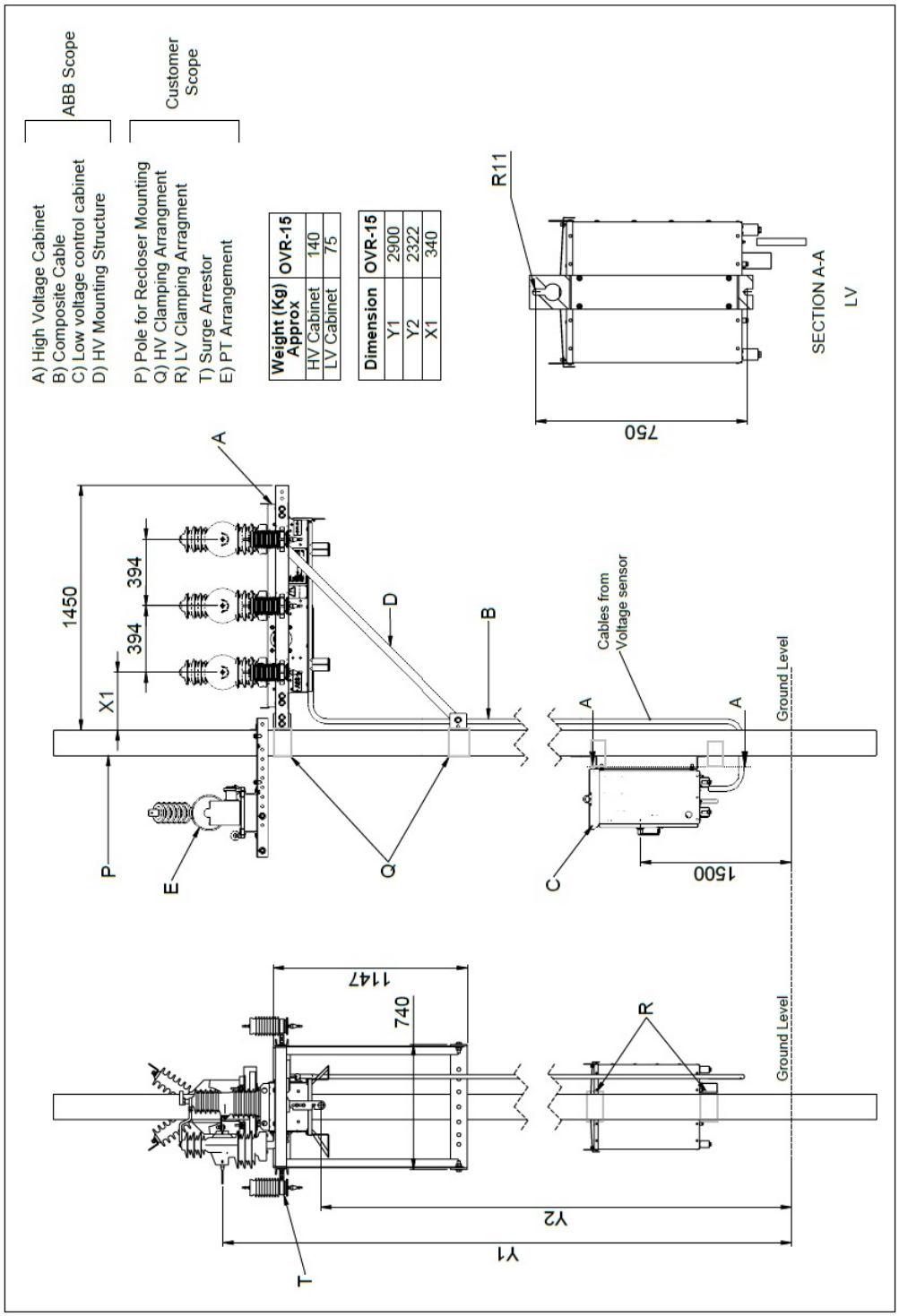
NOTICE

Do not exceed 750 N cantilever force on any of the bushing terminals in any direction. Failure to comply will result in permanent damage.

⚠ WARNING

Follow your company's procedures for electrical products/assemblies. This operation should be performed only after it has been determined there is no hazardous or unsafe condition for the operator, such as energized or live conductors.

—
10 General arrangement for OVR-15, flag-type mounting structure

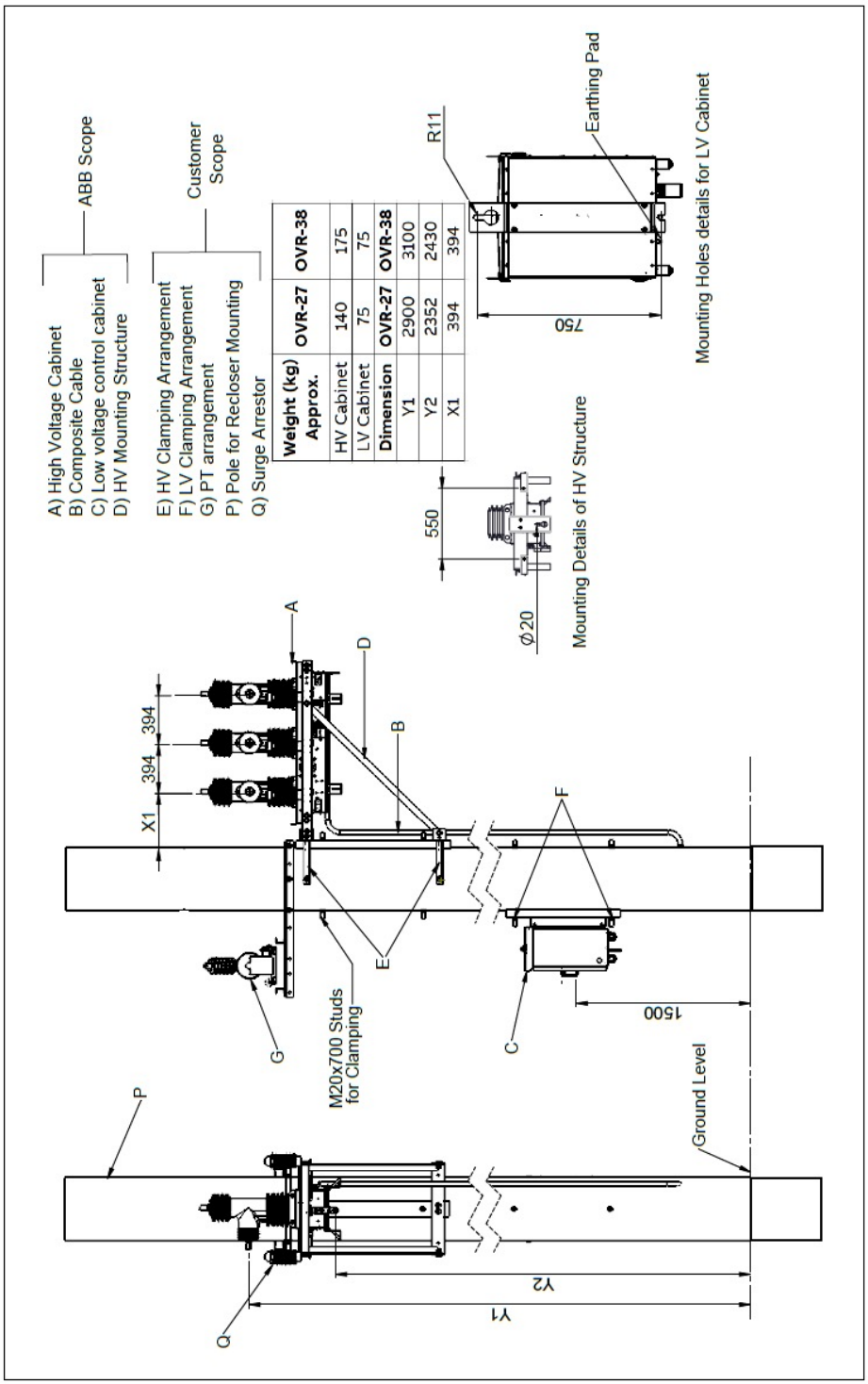


—
10

NOTICE

The height of the pole structure and recloser location shown are for reference only. These will vary depending on the user's installation.

—
11 General arrangement for OVR-27 and 38 with flag-type structure mounting



—
11

NOTICE

The height of the pole structure and recloser location shown are for reference only. These will vary depending on the user's installation.

12 Provisions for grounding connections on HV cabinet

13 Grounding connections proposed for OVR-15, 27, 38 pole-mounted arrangement

7.3 Grounding

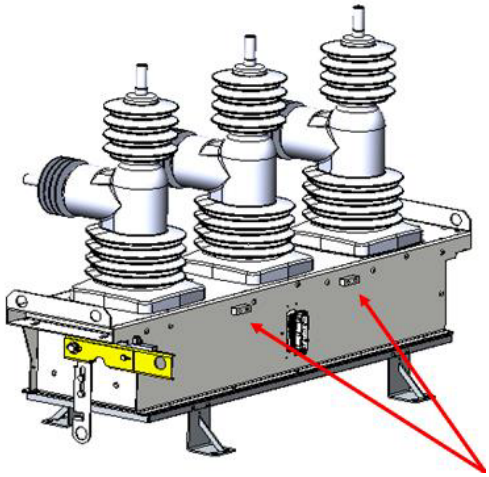
IMPORTANT

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 on 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 HV cabinet includes two stainless steel welded grounding pads for grounding. Each pad has an internal threaded hole (M8 for HV unit) as shown in the figure below. 80 sq. mm cross-section, solid copper strip/equivalent is recommended for grounding.

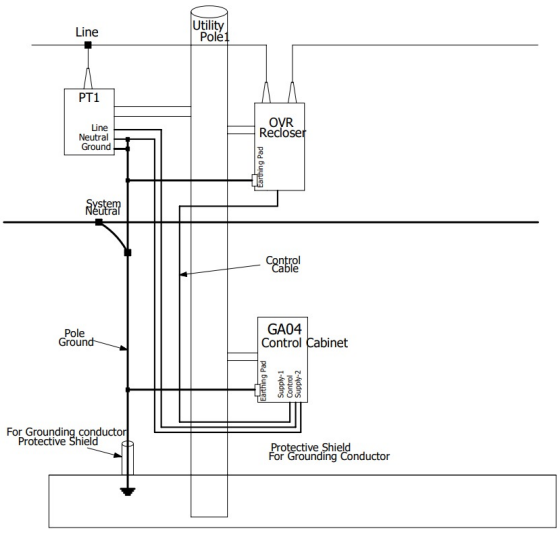
If auxiliary power voltage transformer is used, it should be grounded to the main ground conductor leading from the recloser HV cabinet to ground. It is mandatory that the HV cabinet is firmly grounded as shown in this section when installed.

For the proper operation of electronic components, the total impedance of the on-site grounding grid must be less than one ohm (1 Ω).



12

1. Surge arrestors not indicated on drawing must be provided on incoming and outgoing medium voltage terminals of the recloser.
2. All devices interfacing with the LV cabinet, including HV cabinet (recloser), auxiliary power transformer (PT), surge arrestors, etc., must be connected to the same pole ground.
3. All connections of the LV cabinet must be routed in close proximity to and parallel with their corresponding ground paths for adequate surge protection.
4. The LV control cabinet must be grounded to its own pole ground.
5. The neutral of the secondary winding of the auxiliary pole-mounted transformer must be grounded at the transformer level.
6. The pole-grounding conductor must be a continuous conductor.



13

NOTICE

The grounding cables used must be the same for all components.

— 14 Line connections for OVR-15 pole
— 15 Line connections for OVR-27 SVS pole/ OVR- 38 pole
— 16 Line connections for OVR-27 DVS pole

7.4 Arrester protection

Surge arresters can be connected on both high voltage (source and load) sides of the recloser. It is recommended that the arrester grounds be connected to the recloser ground and continued to the pole ground.

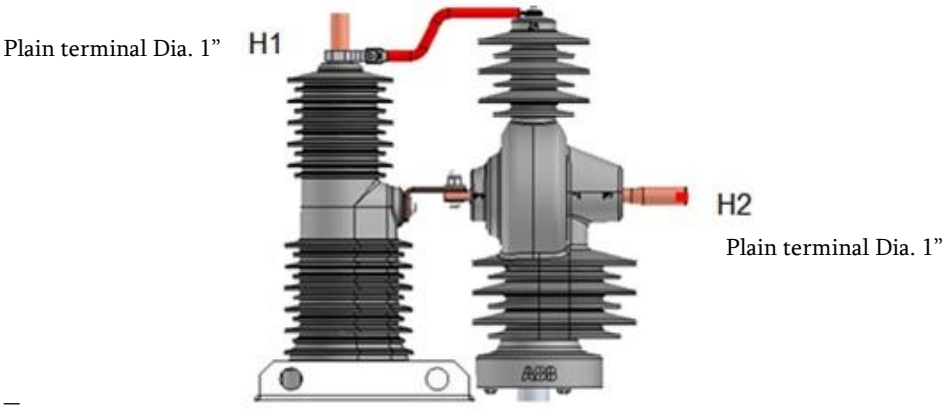
The leads connecting the arresters to the recloser pole terminals should be as short as possible to limit stray inductance and to maximize the arresters' effectiveness.

7.5 Line connections

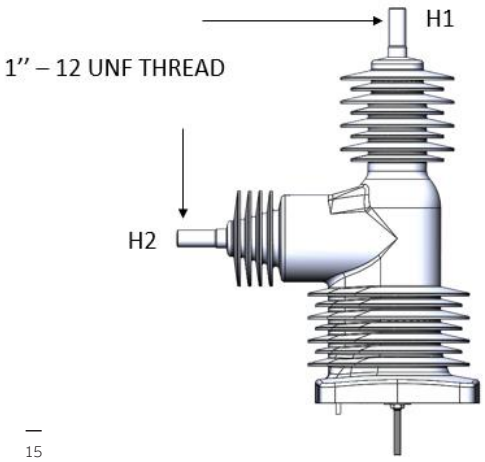
The recloser is connected in series with the line. The medium voltage line conductors are to be connected to the OVR terminals H1 and H2 via suitable terminal connectors/clamps. Both these terminals are silver-plated copper. The fasteners use for connectors must be torqued between 50 to 60 NM (442 to 531 inch-lb). Respective H1 and H2 terminal line connections for OVR-15 and OVR-27/38 are shown in the figures below.

The general convention for power connection is H1 terminal on the source side and H2 terminal on the load side. However, the terminals can be connected in reverse order if site requirements dictate.

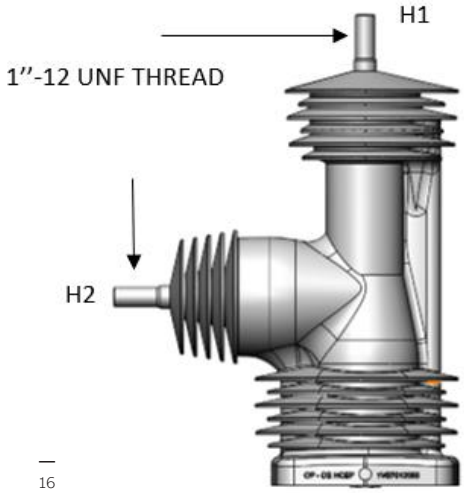
If a voltage transformer (PT) is used for providing external AC auxiliary power to the LV cabinet, it is recommended to connect the PT on the source side of the recloser so that auxiliary power is available even if the recloser is in open condition during service. This will avoid unnecessary draining of recloser battery backup power.



— 14



— 15



— 16

7.6 Final inspections before energizing

The recloser 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.

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.

Once the recloser has been installed fully with all mechanical and electrical connections completed, conduct the following mandatory inspection before energizing the recloser on the main lines:

1. Ensure that the recloser is properly leveled and securely anchored.
2. Perform a final check to ensure all hardware is tightened.
3. Securely tighten terminals and ground connections.
4. Verify that control cable is properly connected, routed and secured.
5. Ensure that both the HV and LV cabinets are grounded as described in this manual.

8 Recloser operation

17 Recloser closed position

18 Recloser manually tripped position

The following are descriptions of the recloser's major operations. Please refer to the operation procedure table in this section for more details.

8.1 Closing

The OVR-15, 27 and 38 reclosers can be closed electrically via the pushbutton on the SEL-751 front-panel HMI. For safety reasons, the OVR-15, 27 and 38 reclosers cannot be closed manually via hook stick.

8.2 Opening

The OVR-15, 27 and 38 reclosers can be opened mechanically as well as electrically. The recloser can be opened electrically with the pushbutton on the SEL-751 front-panel HMI.

8.3 Mechanical (manual) opening

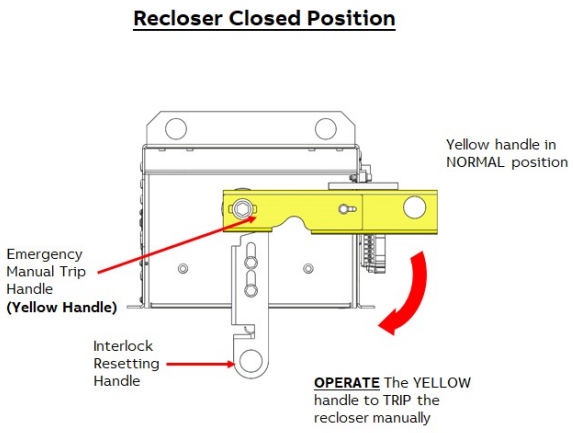
If for any reason it is not possible to electrically open the recloser main contacts (for example, LV cabinet door is locked or electrical opening is disabled/de-energized), the high voltage unit may be safely opened mechanically with the use of a standard insulated hook stick from ground level (a hook stick is not in ABB's scope of supply).

Manual opening can be performed by quickly and firmly pulling down the yellow emergency manual trip handle located on the side of the HV unit. This will mechanically open all three poles simultaneously.

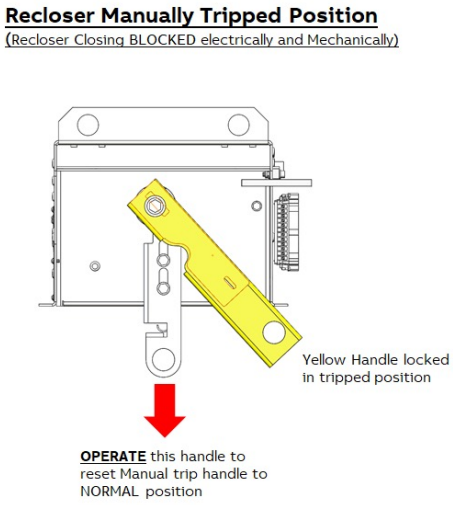
The OVR-15, 27 and 38 reclosers have a safe and secure manual trip arrangement. When the recloser is opened manually, the yellow handle remains locked in and blocks any further close operation of the recloser (CLOSE BLOCKED).

Because an emergency is commonly the reason for manually opening a recloser, it is important that the recloser not be closed again after a manual open. To ensure that the recloser stays open, provision is made inside the recloser that no electrical close command can be initiated from the LV cabinet either locally or remotely. For added safety, the OVR-15, 27 and 38 recloser HV unit is mechanically locked even if an electrical command is forced from the LV unit.

Therefore, after the emergency has been addressed, the yellow manual trip handle must be manually reset into its normal position to enable closing operation. This is performed by pulling down the interlock reset handle with a hook stick.



17



18

9 Inspection and maintenance

The OVR-15, 27 and 38 reclosers require minimal maintenance if handled properly. Frequency of operation and local environmental conditions should be considered when determining the maintenance schedule.

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

To provide long, reliable service, the recloser should be inspected at regular intervals. Operating experience, environmental conditions, number of operations, magnitude of current interrupted 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. Additionally, it is recommended that ABB service personnel should be called in to check service performance and for repair work.

9.1 Activities before performing any maintenance on the recloser HV unit

1. Follow all instructions described previously in this section.
2. Disconnect the power supply from both sides of the HV unit.
3. Ensure that isolators on both sides of the feeder are open properly and securely locked out.
4. Ensure that the main circuit is properly grounded.
5. Follow all safety procedures as dictated by your country, region/locality and company policy.

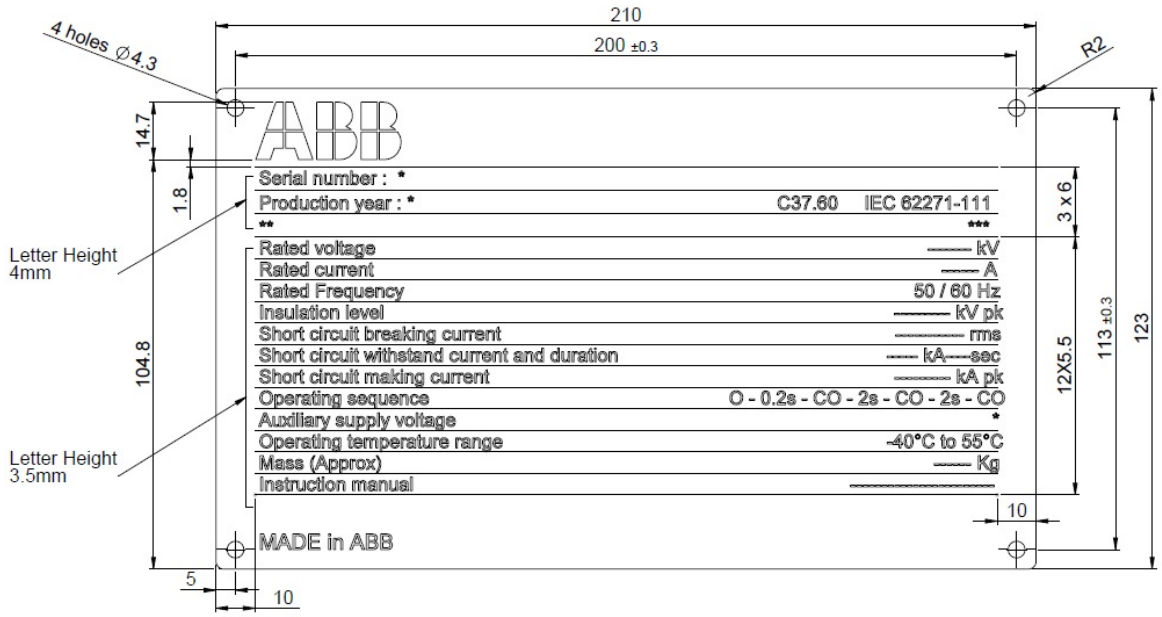
9.2 Table 3: Recommended inspection and maintenance plan

No.	Tests/ inspections	Work to be performed	Recommended interval for installations in normal environment	Recommended interval for installations in extreme environment
1	Visual inspections	Check pole terminals for cleanliness, damage (bends/breaks) and tightness of connections	18 months (adjust interval according to experience)	12 months (adjust interval according to experience)
		Poles can be cleaned with a mild detergent		
		Check for visible corrosion or damage to metal parts and cables		
		Check all connections of metal parts (nuts, bolts, hardware)		
		Check that all ground connections are secured and undamaged		
		Check that all name plates, rating plates and labels are clearly legible and secured		
		Check for any loose wire connections		
2	Function tests	Battery general condition and terminals	6 months	6 months
		Fault-free operation of communication modules (if applicable)	6 months	6 months
		Protection test using secondary injection equipment in conjunction with recloser function test (see the installation and commissioning section of the control and protection relay instruction manual)	4 years (adjust interval according to experience)	2 years (adjust interval according to experience)
		Measure insulation resistance (value should be more than 100 mega-ohms)		
		Proper/smooth operation of emergency manual trip (K69) handle	12 months	12 months
3	Replacements	Battery replacement (Refer to product documentation from the battery manufacturer for instructions on optimal use of battery life based on frequency/duration of external auxiliary supply failures and extent of battery discharge during such conditions)	3 to 5 years	3 to 5 years

It may be required to remove the SEL-751 and batteries for replacements.
On the basis of results obtained during periodic inspections, it is possible to set the optimal time interval for carrying out maintenance work.

10 Typical rating plate details

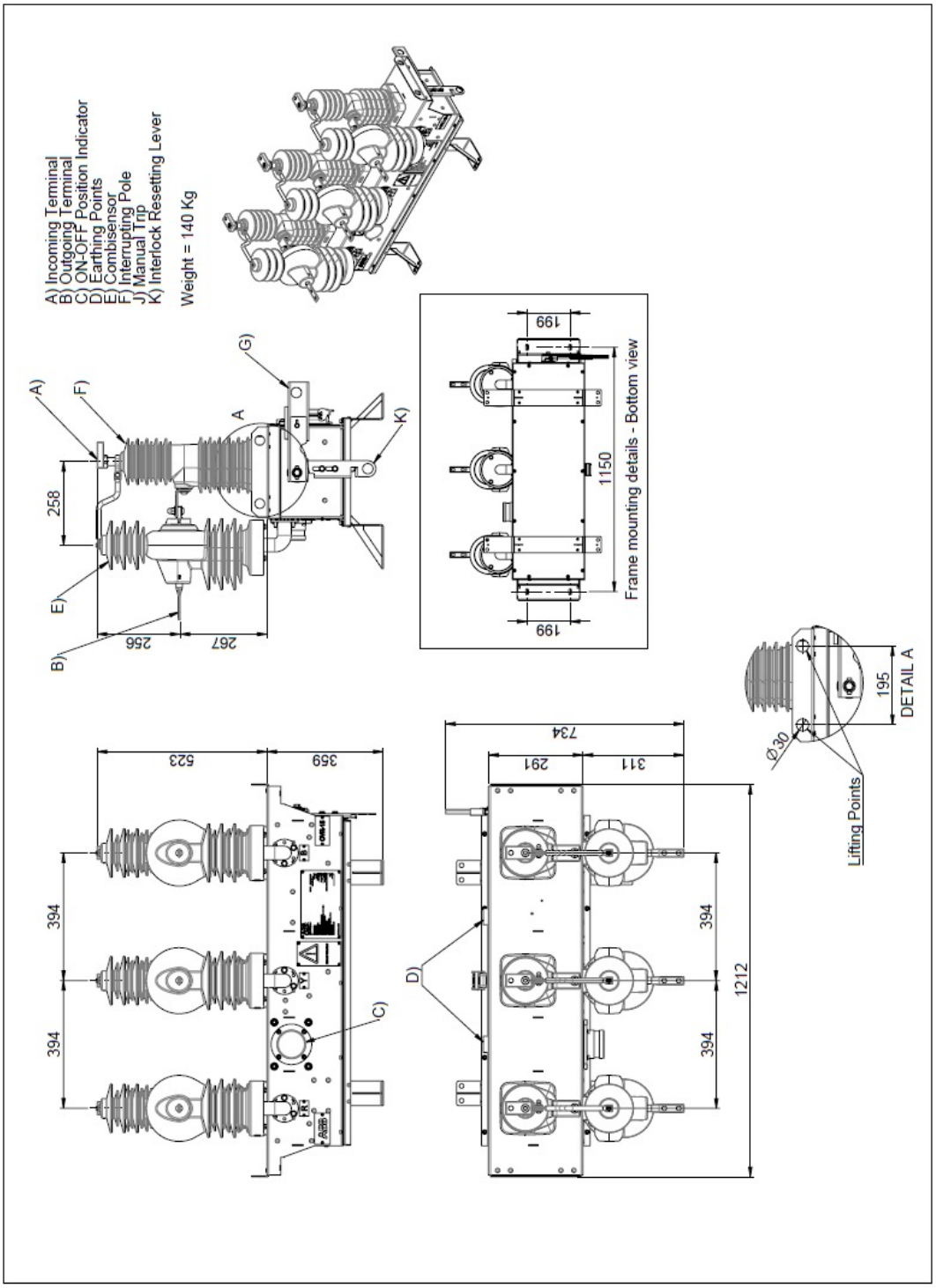
10.1 Rating plate on OVR HV cabinet



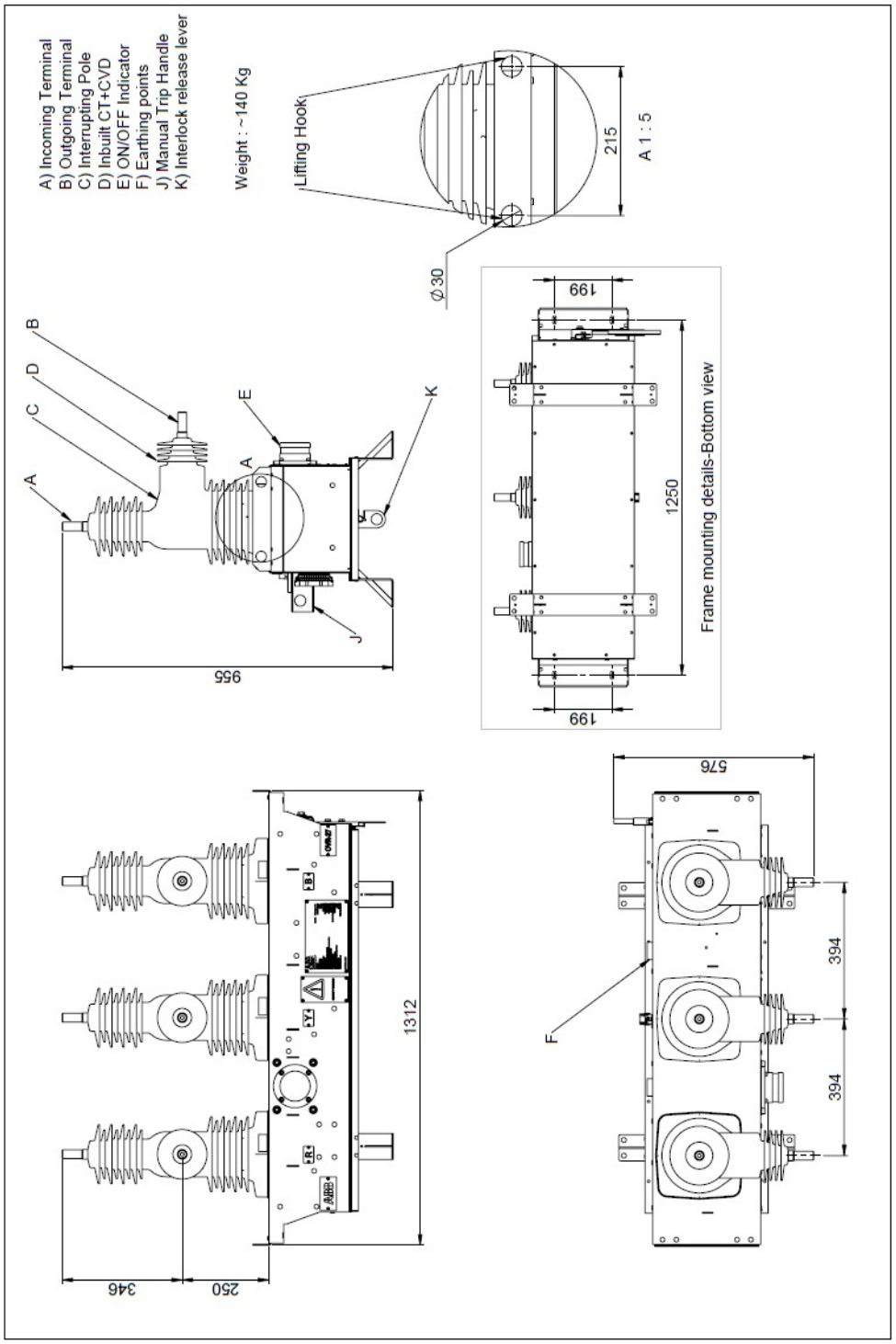
Description			Product
Product name	OVR-15 HV cabinet	OVR-27 HV cabinet	OVR-38 HV cabinet
Rated voltage	15.5 kV	27 kV	38 kV
Rated current	630 A	1000 A	1200 A
Insulation level	50 kV rms/110 kV pk	60 kV rms/125 kV pk	70 kV rms/170 kV pk
Short circuit breaking current	12.5 kA rms	12.5 kA rms	16 kA rms
Short circuit withstand current and duration	12.5 kA 3 sec.	12.5 kA 3 sec.	16 kA 3 sec.
Short circuit making current (peak)	31.25 kA pk	31.25 kA pk	41.6 kA pk
Mass (approx.) (kg)	140	140	175
Instruction manual			1VYN301701-CR

11 General arrangement drawings

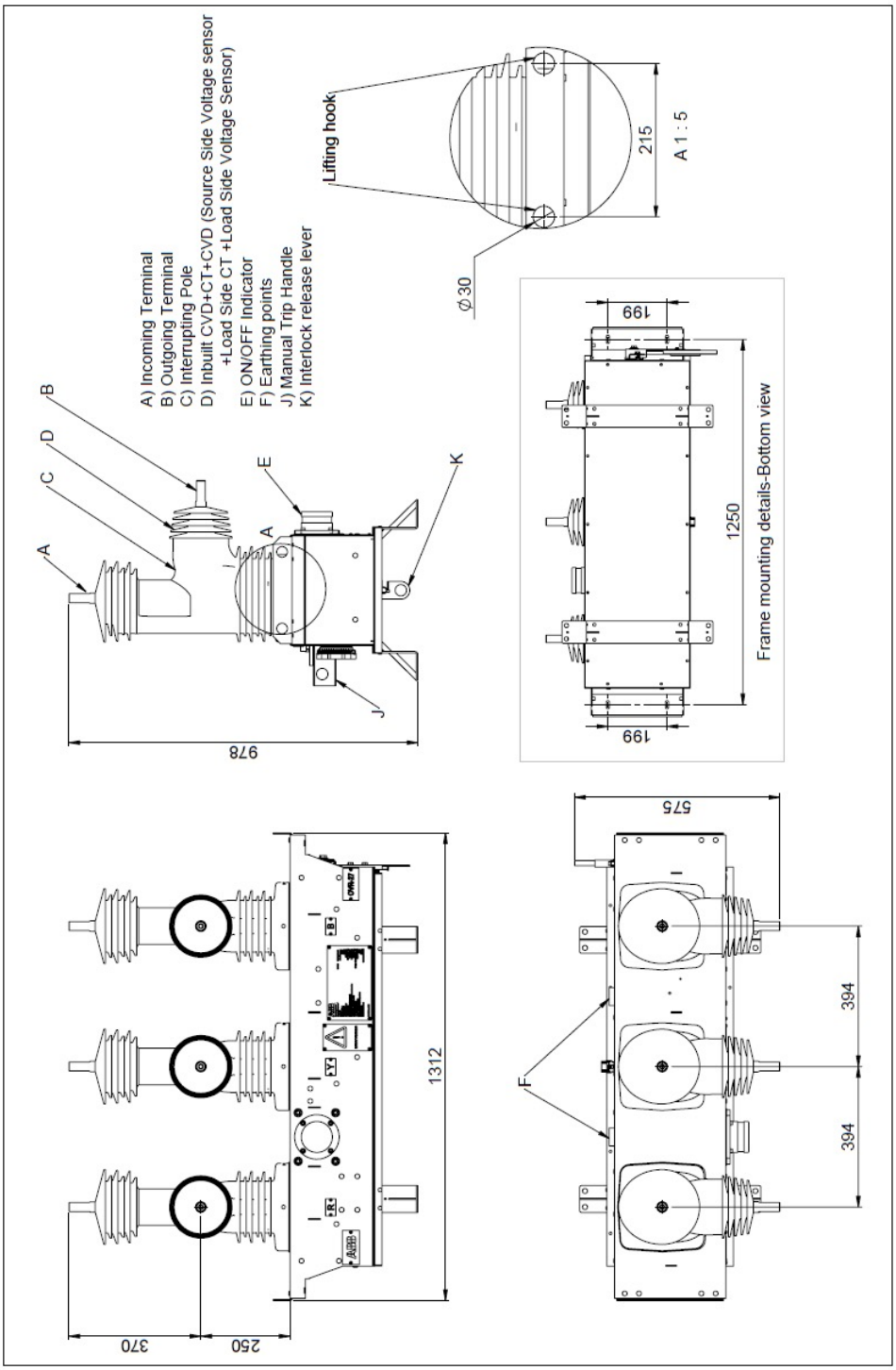
11.1 OVR-15 HV cabinet general arrangement



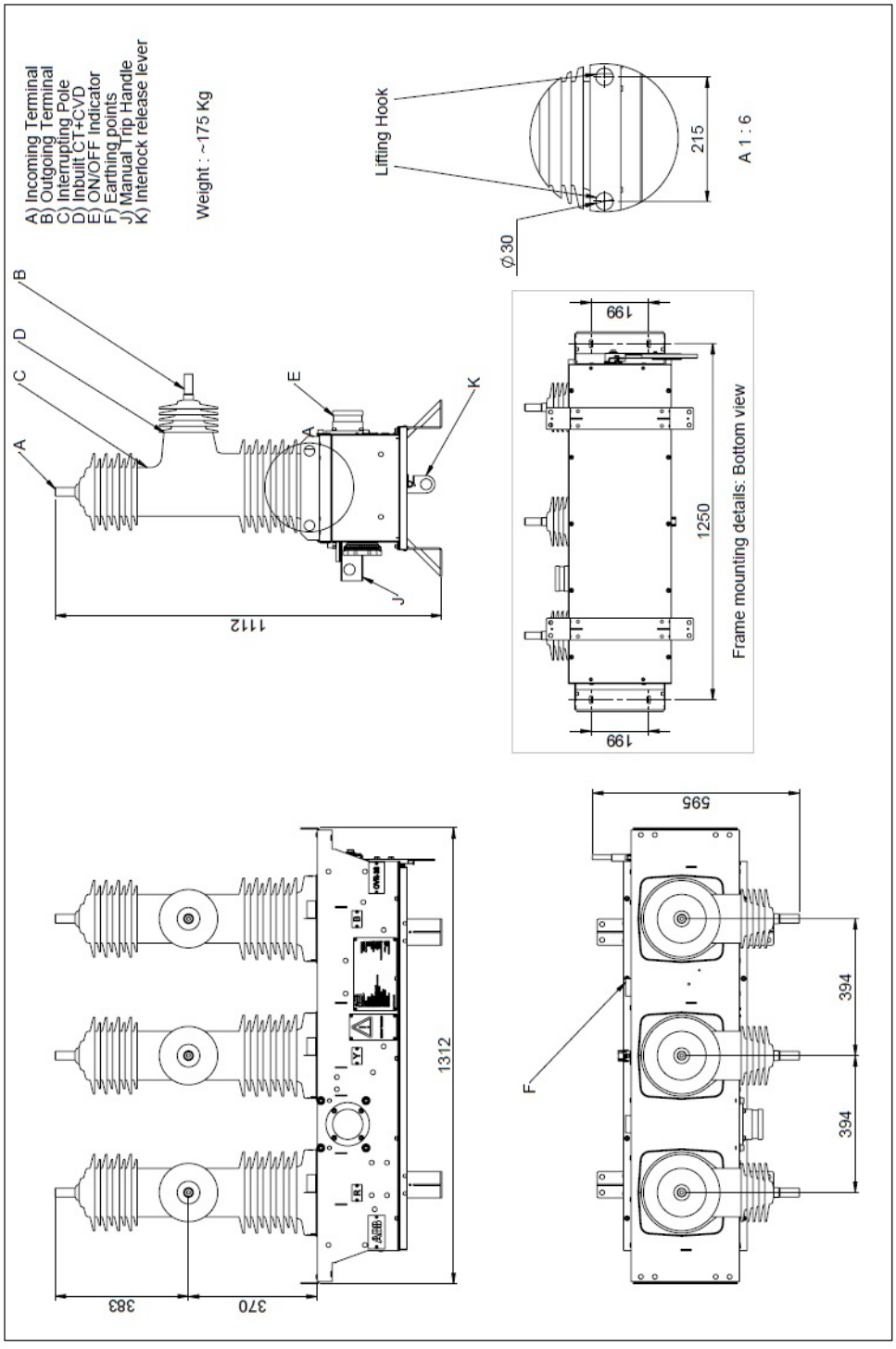
11.2 OVR-27 HV cabinet with single voltage sensing general arrangement



11.3 OVR-27 HV cabinet with dual voltage sensing general arrangement



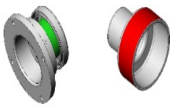
11.4 OVR-38 HV cabinet general arrangement



12 Recommended spare parts

The following spares should be kept in stock to address any contingency.

12.1 Table 4: List of recommended spare parts for OVR-15, 27 and 38 reclosers

No.	Description	Part no.	Displayed as
1.	Auxiliary limit switch for position indication, 1 NO + 1 NC	LXW22A-11MB	
2.	Composite control cable a) 6 meter length b) 9 meter length c) 12 meter length d) 15 meter length	 a) 2REA033935P001 b) 2REA029897P0001 c) 2REA033938P0001 d) 2REA033939P0001	
3.	Heater 230 V AC, 50 W	GCE0990162P0101	
4.	Oil damper	2REA026181P0001	
5.	Indicator assembly and ON indicator cap	2REA028893A0001 2REA028553P0001	
6.	CT protection resistor, 25 W, 25 ohm	2REA029829A0001	
7.	Discrete components assembly, CVD circuit for OVR-27 and OVR-38	2RGA021696A0001	
8.	ACM with counterpart connectors	1VCF689234R0017	
9.	Programmable charger and connectors	2REA052988P0001 2REA052988P0002	

Additionally, we recommend regular monitoring of battery health (because batteries have limited lifetime depending on service and environmental conditions) and procurement of replacements in advance when they are nearing their end of life.

Notes

Disclaimer

The data, examples and diagrams in this manual are included solely for the concept or product description and are not to be deemed as a statement of guaranteed properties. All persons responsible for using the equipment addressed in this manual must satisfy themselves that each intended application is suitable and acceptable, including that any applicable safety or other operational requirements are compiled with. Any risk in applications where a system failure and/or product failure would create a risk for harm to property or persons (including but not limited to personal injuries or death) shall be the sole responsibility of the person or entity applying the equipment and those so responsible are hereby requested to ensure that all measures are taken to exclude or mitigate such risks.

This product has been designed to be connected to medium voltage distribution networks. It is the sole responsibility of the person or entity responsible for the network administration to ensure a secure connection to the network and take necessary measures to protect the product and the network, its system and interface included against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or thefts. ABB is not liable for any such damages and/or losses.

This product is intended to be operated and maintained by qualified personnel, thoroughly trained and knowledgeable with regards to the associated hazards involved. This publication is written only for such qualified personnel and is not intended to be a substitute for adequate training and experience in the safety procedures for this device.

This document has been carefully checked by ABB, but deviations cannot be completely ruled out. If any errors are detected, the reader is kindly requested to notify the manufacturer. Other than under explicit contractual commitments, in no event shall ABB be responsible or liable for any loss or damage resulting from the use if this manual or the application of the equipment.

Additional information

We reserve the right to make technical changes or modify the contents of this document without prior notice. With regard to purchase orders, the agreed particulars shall prevail. ABB AG does not accept any responsibility whatsoever for potential errors or possible lack of information in this document.

For more information, please contact:

ABB India Limited
Plot 34, 79
MIDC Estate, Satpur,
Nashik, MH 422007, India
Phone: +91 253-2201-200
Fax: +91 253-2351-260
Email: ppmvsupport@in.abb.com

new.abb.com/medium-voltage

ABB de México S.A. de C.V.
Av. Central 310 Parque Logístico
San Luis Potosí
78395, México
Phone: +52 55 8525 9486
Email: contacto.abb@mx.abb.com

ABB SAU
Norberto Lopez 3600
El Jagüel, Buenos Aires
B1805ABT, Argentina
Phone: +54 11 5984 3560
Email: ar-epdsgarantia@abb.com

ABB US
305 Gregson Drive
Cary, NC 27511
Email: customer.service.group@us.abb.com

1VYN301701-CR/ REV-A / OCTOBER 2023