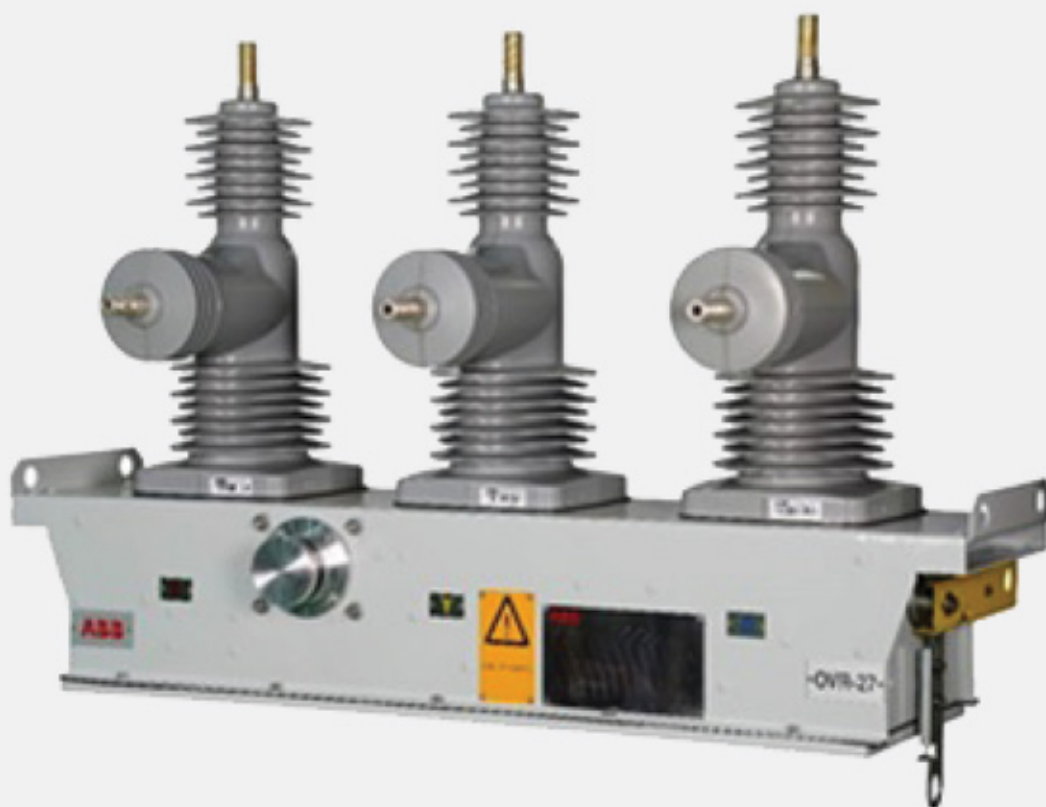


DESCRIPTIVE BULLETIN

# Three-phase outdoor vacuum recloser

Types OVR-15, OVR-27 and OVR-38  
for SCADA switch applications



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**ABB strives to offer its customers the latest technology, combined with superior performance and unparalleled service aimed at total customer satisfaction. This is especially true of our feeder automation products, where years of knowledge and modular manufacturing techniques allow our OVR outdoor vacuum reclosers to meet any need and schedule.**

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# Three-phase outdoor vacuum recloser

OVR-15, OVR-27 and OVR-38 are three-phase, gang-operated auto reclosers that are SCADA switch suitable for up to 38 kV distribution networks.

— 01 OVR-15 HV unit  
— 02 OVR-27 HV unit  
— 03 OVR-38 HV unit  
— 04 RER615\* 2.0 relay/  
SEL-751 relay as  
protection IED

These models are paired and fully type tested with RER615\*, an advanced and comprehensive, yet simple relay from ABB's Relion® family. They are complemented in their performance by advanced sensing technology and a single, bi-stable magnetic actuator as the operating mechanism.

OVR three-phase reclosers provide reliable performance and offer advanced capabilities such as power quality monitoring, ground fault detection using a wide choice of algorithms and other advanced features to protect outdoor networks and substations.

They are suitable for communication with control/load dispatch and network control centers on protocols such as IEC 60870-5-104/ IEC 60870-5-101/IEC 61850 as well as DNP3.0 and Modbus, making them ready for smart grid implementation for product-to-node communication.



## Operator safety at its best

Making your team's safety a top priority.

- Secure and safe manual emergency trip handle helps prevent accidental closing in emergencies
- No maintainable electronics in the HV cabinet eliminates the need for personnel access to the high voltage area



## Reliable in extreme conditions

Withstands harsh environments.

- Solid dielectric design with HCEP (hydrophobic cycloaliphatic epoxy polymer) insulation helps ensure performance over a longer service period
- State-of-the-art magnetic actuation and vacuum interrupters help maintain reliable switching performance over the lifetime of the recloser
- Reduced downtime because the recloser can be repaired on site



## Fast, easy to install and operate

Save on installation and maintenance.

- Site-ready units help reduce installation time, effort and cost
- Flexible mounting option for single/double pole or substation frame available
- Draw-out design for RER615 protection relay allows for quick and easy maintenance
- Changes in RER615 relay configuration can be managed from the front-panel HMI, web-based user interface or PCM600 connectivity tool
- Extensive protection functions to suit all network types
- Capable of supporting high-speed protection, interlocking, transfer switching, fault isolation and service restoration
- Integrated current and voltage measurement
- Flexibility in protection relay selection



01



02



03



04

\* Option for six voltage sensors available only with RER615 IED. Contact ABB for details.

## Technical data

Parameter	Unit	OVR-15	OVR-27	OVR-38
<b>System parameters</b>				
Nominal operating voltage	kV	Up to 15	Up to 27	Up to 38
Rated maximum voltage	kV	15.5	27	38
Rated power frequency	Hz			50/60
Rated continuous normal current	A	630	1000	1200
Rated short time current withstand capacity for 3 sec.	kA	12.5	12.5	16
Rated peak withstand current	kAp	31.25	31.25	40
Rated lightning impulse withstand voltage (BIL)	kVp	110	125	170
Rated power frequency withstand voltage (1 min. dry)	kV	50	60	70
Rated power frequency withstand voltage (10 sec. wet)	kV	45	50	60
<b>Current switching parameters</b>				
Rated symmetrical interrupting current	kA	12.5	12.5	16
Rated line-charging current (LC)	A	2	5	5
Rated cable-charging current (CC)	A	10	25	40
<b>Switching performance</b>				
Rated operating (reclosing) sequence			O–0.2 s–CO–2 s–CO–2 s–CO lock out	
Minimum guaranteed mechanical operation (CO cycles)	Operations			10,000*
Minimum guaranteed operation (CO cycles) at rated continuous current	Operations			10,000*
Maximum interrupting time	ms			55
Maximum closing time	ms			65
<b>LV cabinet details</b>				
Auxiliary power supply				
Supply voltage	V (AC)			90–264 ***
Frequency	Hz			50/60
Maximum power consumption including HV cabinet	VA			250
Type of battery pack			Sealed lead acid rechargeable	
Standard battery bank offering	V (AH)			24 (18)*
Standard battery back-up	Hours			24*
Provision for powering communication modem	V DC/W			24/7
<b>Current sensor</b>				
Type				Current transformer
Current transformation ratio	A/A			600/1*
Class	%	5P15*	10P20*	10P20*
<b>Voltage sensor</b>				
Type		RVD	CVD	CVD
Number of voltage sensors per recloser		3/6**	3/6**	3/6**
Accuracy	%			3*
<b>Additional data</b>				
Insulation media				Solid insulation (HCEP)
Minimum external creepage distance (H2 to ground)	mm (inch)	480 (19)	960 (37.7)	1306 (51)
Minimum external creepage distance (HI to H2)	mm (inch)	480 (19)	1100 (43)	1272 (50)
Pollution level (IEC 60815)				Very heavy
Phase -to -phase clearance	mm (inch)	344 (13.6)	344 (13.6)	360 (14.17)
Minimum external arcing (strike) distance	mm (inch)	252 (10)	350 (14)	350 (14)
Interrupting media				Vacuum
Type of mechanism				Bi-stable magnetic actuator
Weight of HV unit + LV unit	kg (approx)	140 + 70	150 + 70	180 + 70
Ingress protection for cabinets				IP55
<b>Service conditions</b>				
Ambient temperature range	°C			-40 to +55
Maximum humidity	%			100
Altitude	m			3000 #

\* Contact factory for more options.

\*\* Three additional voltage sensors can be provided separately on request with solution using RER615 IED. (Six voltage sensor option is not available with SEL-751 IED.)

\*\*\* 110 V DC supply voltage available on request.

# For altitudes above 1000 m, suitable de-rating must be considered as per IEC 62271-111/IEEE C37.100.I -2007.



# Design philosophy

ABB has assembled the latest magnetic actuation technology, highest quality vacuum interrupters and most durable HCEP insulating material into the most dependable, cost-effective and lowest maintenance solution for recloser products.

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05 Actuator for reclosers  
—  
06 Interlock activated  
—  
07 Interlock released

## Magnetic actuators

The OVR family of reclosers was designed to provide a lifetime of 10,000 full load operations according to the IEEE standard. ABB designed a simple, magnetically actuated operating mechanism that can dependably operate with only one moving part, unlike typical spring-charged mechanisms.

The magnetic actuators are provided with high quality corrosion-resistant treatment to meet all environmental conditions. Bi-stable operation enables the reclosers to remain in the open or closed position, independent of auxiliary power.

## Advantages

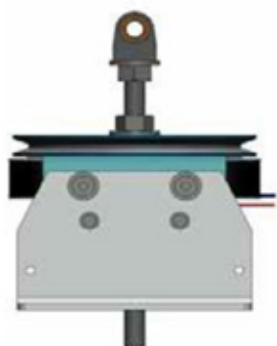
- 10,000 full load operations
- No lubrication or adjustments required — minimal maintenance
- Simple design
- Bi-stable — no power required to hold contacts open or closed

## Safer and more secure emergency manual trip arrangement

Manual trip and reset handle.

## Operator safety is key in the design of ABB reclosers

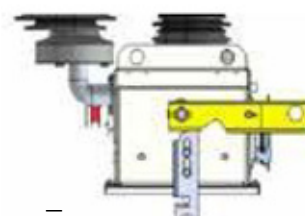
Provision is made to manually trip the recloser in case of emergency. The operator can easily perform manual tripping using a traditional insulated hook stick. Manual tripping of the recloser enables a mechanical interlock that blocks closing of the recloser both electrically and mechanically. This helps ensure the safety of the operating person as well as the system. A separate mechanical reset lever on the HV cabinet is used to reset the interlock after an emergency.



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08 Integrated voltage  
sensor and current  
transformer located  
on the horizontal bushing  
connected to the IED  
inside the control cabinet

—  
09 ABB vacuum  
interrupter clean room

### Vacuum interrupters

ABB has been developing and manufacturing vacuum interrupters since the early 1980s. Worldwide, more than seven million ABB vacuum interrupters are in service. ABB's vacuum interrupter facility uses the latest technologies in high quality mass production to produce the next generation of vacuum interrupters. These new generation vacuum interrupters are robust for universal application.

Vacuum technology is ideal for use in reclosers because it can easily handle frequent operations. Additionally, vacuum interrupters do not require extra recovery time, so even the first reclosing operation (after 200–300 msec.) is not an issue.

### Advantages

- Maximum reliability
- Superior contact wear resistance
- Long life: 30,000 full load operations for vacuum interrupters
- Eco-efficient

### Pole assembly

ABB pole assemblies are constructed of UV-resistant HCEP encapsulating material and are designed to provide a rated 10,000 full load operations without maintenance.

### Advantages

- Resistant to external impact or damage
- Time-proven material, UV-stable, tested at Koeberg (KIPTS)
- Fewer moving parts



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10 HCEP insulation

**HCEP insulating material**

The recloser’s insulating material is hydrophobic cycloaliphatic epoxy polymer (HCEP), which offers outstanding performance compared to traditional cycloaliphatic epoxy (CEP) and silicone rubber insulation. The hydrophobic, or water-resistant, capability is an advantage because it helps prevent water from developing completely wetted, resistively conductive surfaces on outdoor insulation. This helps reduce leakage currents, increasing reliability by minimizing the risk of insulation flashover. Reducing discharge activity also helps decrease insulator erosion and increases insulator life expectancy.

**Why do we need hydrophobicity?**

- Improved water beading and runoff
- Lower leakage currents
- Less discharge activity
- Lower flashover probability
- Less erosion of insulation
- Better reliability
- Improved life expectancy

**Advantages**

- Improved performance in heavily polluted areas
- Improved weather resilience and reduced outdoor aging
- Increased life expectancy
- Enhanced reliability
- Light weight for easy handling
- Exceptional mechanical strength attributed to epoxy-based design

**HCEP does not become resistively conductive when exposed to moisture from CEP to HCEP.**

	CEP	HCEP
Design versatility	+	+
Manufacturing process	+	+
Number of interfaces	+	+
Animal attack	+	+
Hydrophobicity	-	+
Thermal shock resistance	-	+
Low flashover possibility	-	+

+ = positive  
- = negative

**Contamination performance**

Contamination performance is dependent on the amount of creepage/leakage distance available on a recloser bushing (pole). This is why all ABB reclosers use HCEP insulation that exceeds IEC Level IV requirements for environments with very heavy pollution — offering far more creep than required by equivalent ANSI standards, which focus mainly on BIL performance.



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**Required creep vs OVR recloser creep (phase-to-ground)**

Pollution	Rated medium voltage					
	15 kV		27 kV		38 kV	
Level	Required creep (mm)	ABB standard creep (mm)	Required creep (mm)	ABB standard creep (mm)	Required creep (mm)	ABB standard creep (mm)
I - Light	248	—	432	—	608	—
II - Medium	310	—	540	—	760	—
III - Heavy	388	—	675	—	950	—
IV - Very heavy	481	480	837	960	1178	1288



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# Applications

**An auto recloser SCADA switch**

The OVR can be used as an auto recloser for increasing reliability of feeders. It offers the flexibility to be mounted with ease on a support structure in a substation or on a single/double-pole or lattice structure in the field. It can be powered by an auxiliary power transformer (sold separately) mounted on the distribution line itself. The OVR can act as a complete protection solution mounted on poles in remote areas.

**A circuit breaker/SCADA switch**

Since the OVR uses vacuum interruptions and can make and break fault currents, it can also be used as a circuit breaker inside a substation or remote feeders, as a pole-mounted circuit breaker or as a SCADA switch for protecting feeders on electrical faults. Since the OVR's controller (IED: intelligent electronic device) is capable of providing DI/DO and status signals over different communication protocols, it can be integrated into SCADA, load dispatch centers or a network control center with the addition of external communication equipment. It can also be used as a bus coupler inside a substation.

**An outgoing bay of a substation**

The OVR can be used as outgoing bay equipment in a substation. The built-in protective current and voltage sensor, along with circuit breaker, can be mounted on a single-pole structure, helping significantly reduce use of substation space and land.

**A coupling circuit breaker or tie-point in a ring network**

When equipped with the RER615 relay and voltage sensors on both sides of the vacuum interrupter, the OVR can be used as a coupling circuit breaker/SCADA switch in an overhead ring network. By applying a voltage-based scheme, the OVR can automatically open and close, helping improve power supply availability.



# Protective relay RER615

RER615 is a recloser relay designed for remote control and monitoring, protection, fault indication, power quality analysis and automation in medium voltage secondary distribution systems, including radial, looped and meshed distribution networks, with or without distributed power generation.

The RER615 relay is a member of ABB's Relion® product family and part of its 615 protection and control product series. The 615 series IEDs are characterized by their compactness and withdrawable-unit design. Re-engineered from the ground up, the 615 series has been designed to unleash the full potential of the IEC 61850 standard for communication and interoperability between substation automation devices.

With RER615, grid reliability can be enhanced, ranging from basic, non-directional overload protection to extended protection functionality with power quality analysis. Thus, using the RER615 inside an OVR recloser meets today's requirements for smart grids and supports protection of overhead line and cable feeders in isolated neutral, resistance grounded, compensated and solidly grounded networks.

The RER615 relay is freely programmable with horizontal GOOSE communication, enabling sophisticated interlocking functions. The new adaptable standard configuration makes the IED ready for use immediately after application-specific parameters have been set. The recloser can be controlled via the IED's front-panel HMI or a remote control system.

To protect the IED from unauthorized access and to maintain the integrity of information, the IED is provided with a four-level, role-based user-authentication system with individual passwords for the viewer, operator, engineer and administrator levels. The access control system applies to the front-panel HMI, embedded web browser-based HMI and PCM600 protection and control IED manager.

The RER615 relay provides superior fault detection, isolation and restoration (FDIR) to reduce the frequency and shorten the duration of faults (SAIFI/ SAIDI) and offers a variety of features to enhance grid reliability.

- Sophisticated protection functionality to detect, isolate and restore power in all types of networks
- Especially powerful in compensated networks (including recloser tripping curves)
- Integrated power quality measurement, including voltage dips and swells logging
- Freely programmable
- Four configurable physical pushbuttons
- Load profile and event logging
- Flexible auto-reclosing function
- Six easily manageable settings groups
- Adaptable standard configuration for rapid commissioning
- Easy web-based parametrization tool with download possibility
- Same configuration tools as other ABB Relion IEDs, such as the 615/620/630 series
- Cybersecurity features, such as audit trail
- Withdrawable-unit design
- Large, easy-to-read LCD screen with SLD, local control and parametrization possibilities with dedicated pushbuttons for safe operation
- Environmentally friendly design with RoHS compliance

The RER615 supports a variety of communication protocols for remote communication in addition to IEC 61850 (with GOOSE messaging), including:

- IEC 60870-5-101
- IEC 60870-5-104
- DNP3 level 2
- Modbus

10 RER615 front fascia

11 Large LCD screen with single-line diagram

### Local HMI

The RER615 IED is available with a large display, suitable for front-panel user interface, along with a single-line diagram (SLD) with dynamic status update. The SLD view can also be accessed using the web browser-based user interface. The default SLD can be modified to suit user requirements using the graphical display editor in PCM600.

The RER615 has three dedicated LEDs to display status of internal relay failure and protection status. Eleven user-programmable LEDs are also available for display of protection trips or status of binary inputs.

The local HMI includes a pushbutton (L/R) for local or remote operation of the RER615 IED. When the IED is in local mode, it can be operated only from the local front-panel user interface. When the IED is in remote mode, it can execute commands sent from a remote location.

### Communication

The IED supports a variety of communication protocols, including IEC 61850 and the most common remote control protocols, including IEC 60870-5-104, IEC 60870-5-101, Modbus and DNP3. Operational information and controls are available through these protocols.

The RER615 IED supports simultaneous event reporting to five different clients over the station bus. The IED can send binary signals to other IEDs (so called horizontal communication) using GOOSE profile, as defined by the IEC 61850 standard.

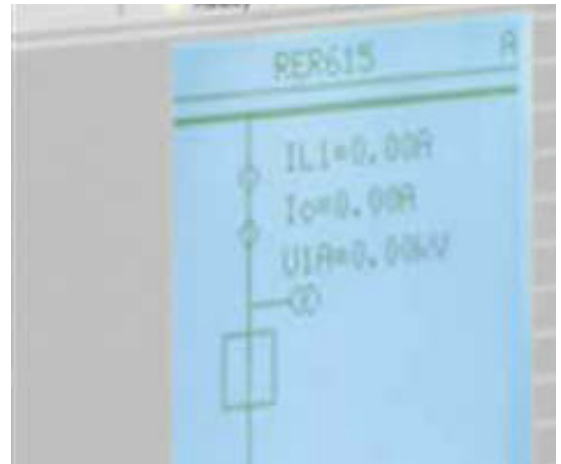
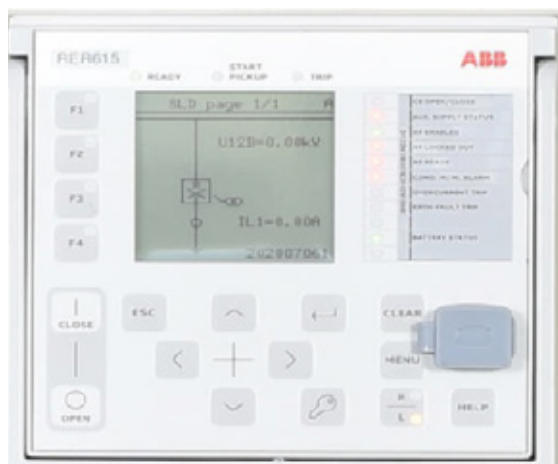
### Communication ports

#### Front:

- One RJ-45 Ethernet connector for IED configuration and access using web browser-based HMI

#### Rear:

- One RJ-45 for Ethernet communication
- One RS-485/RS-232 for serial communication
- One input for IRIG-B for GPS time synchronizing (For other options, please contact factory)



**Inputs and outputs**

The standard configuration provides three-phase current inputs and six\* sensor voltage inputs. The phase-current inputs are rated 1/5 A and the residual current input 0.2/I A. The binary channels have 12 inputs and 10 outputs.

**Oscillographic data**

- The IED is provided with a disturbance recorder with up to 12 analog and 64 binary signal channels
- Storage capacity of 500 fundamental cycles of monitored waveform data at 32 samples per cycle
- Programmable storage rate of 32/16/8 samples per cycle
- Analog channels can be set to record either the waveform or the trend of the currents and voltages measured
- Multiple trigger options are also available; pre-trigger and post-trigger time is freely programmable
- Oscillographic data is stored in globally acceptable COMTRADE format

**Event record**

- Stores 1024 sequence-of-events (SoE) information, with associated time stamps in non-volatile memory
- Facilitates detailed pre- and post-fault analyses of feeder faults and disturbances
- Event records can be downloaded on site or remotely through communication interfaces

**Fault record**

- Stores last 128 fault records, enabling the user to analyze power system events
- All events recorded with associated time stamps
- Fault records can be downloaded on site or remotely through communication interfaces

**Measurement data**

- Current measurements
  - Phase current
  - Residual current
  - Positive and negative sequence currents

- Voltage measurements
  - Phase-to-phase/phase voltages
  - Residual voltage
  - Positive and negative sequence voltages
- Power measurement
  - P, Q, S, power factor
- Energy measurement
- Frequency measurement with accuracy of  $\pm 10$  MHz
- All data can be downloaded on site or remotely through communication interfaces

**Load profile recorder**

- Load profile recorder captures and stores longer time history of measurement values (currents, voltages, powers) to IED non-volatile memory
- Up to 12 quantities selectable
- Settable time interval for quantities from 1 minute to 180 minutes; quantity averaged over selected period is stored to load profile as COMTRADE format

**Power quality**

- Records voltage sags, swells, unbalance and interruptions
- Individual harmonic component monitoring up to 11th harmonic for both current and voltage
- Total harmonic distortion (THD) of current and voltage and total demand distortion (TDD) of current

**Additional features**

- Up to six protection groups
- Four-level access control with individual passwords for viewer, operator, engineer and administrator levels
- Hotline tagging feature available
- Cold load pick-up
- More than 50 curves to choose from
- Recloser condition monitoring
  - Provides information for recloser maintenance
  - Vacuum interrupter balance of life indication
  - Recloser operation counter

\* Six voltage sensors are required on the HV unit of the recloser to measure voltages.

—  
12 Recloser control  
cabinet with  
SEL-751 IED

—  
13 Recloser control  
cabinet with Relion®  
RER615 IED

### Protection functions

- Three-phase, non-directional overcurrent protection, low stage
- Three-phase, non-directional overcurrent protection, high stage
- Three-phase, non-directional overcurrent protection, instantaneous stage
- Non-directional ground-fault protection, low stage
- Non-directional ground-fault protection, high stage
- Non-directional ground-fault protection, instantaneous stage
- Phase discontinuity protection
- Three-phase thermal protection for feeders, cables and distribution transformers
- Circuit breaker failure protection
- Three-phase inrush detector
- Master trip
- Available with up to 39 recloser curves, 5 ANSI curves, 7 IEC curves, 2 special curves and 1 user-programmable curve

### Optional protection function

- Three-phase, directional overcurrent protection, low stage
- Three-phase, directional overcurrent protection, high stage
- Directional ground-fault protection, low stage
- Directional ground-fault protection, high stage
- Admittance-based ground-fault protection
- Wattmetric-based ground-fault protection
- Harmonics-based ground-fault protection
- Residual overvoltage protection
- Three-phase undervoltage protection
- Three-phase overvoltage protection
- Positive-sequence undervoltage protection
- Negative-sequence overvoltage protection
- Frequency protection



### SEL-751 relay as alternative to RER615

- To meet customer needs for a solution with other local relays, ABB offers the option of a SEL-751 relay as IED instead of the RER615
- The SEL-751 offers basic feeder protection settings, including basic auto-reclosing function to use the recloser as a SCADA switch
- Since the SEL-751 relay does not allow the option to connect six voltage sensor inputs, the recloser SCADA switch is only available with three voltage sensors
- Refer to SEL-751 documentation for more details on features available with specific relay ordering codes

### Low voltage control cabinet

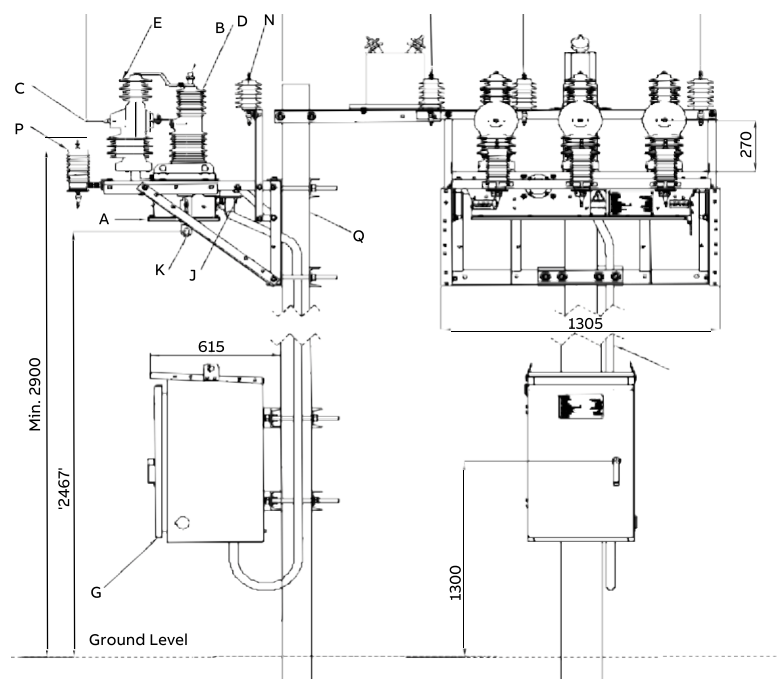
- IP55 design
- Housing made from stainless steel for better corrosion resistance
- Contains major equipment, such as protective relay (RER615 OR SEL-751) controller, battery bank, capacitors and accessories
- Ample space for mounting communications equipment
- Three-point latching with padlockable handle
- Suitably ventilated design
- Provision to keep door in fully open position for unhindered maintenance access





# Dimensional drawings — OVR-15

## Pole-mounted



- A) High voltage cabinet
- B) Incoming terminal
- C) Outgoing terminal
- D) Interrupting pole
- E) Combisensor
- J) Manual trip handle
- K) Interlock releasing lever
- L) Composite cable

ABB scope

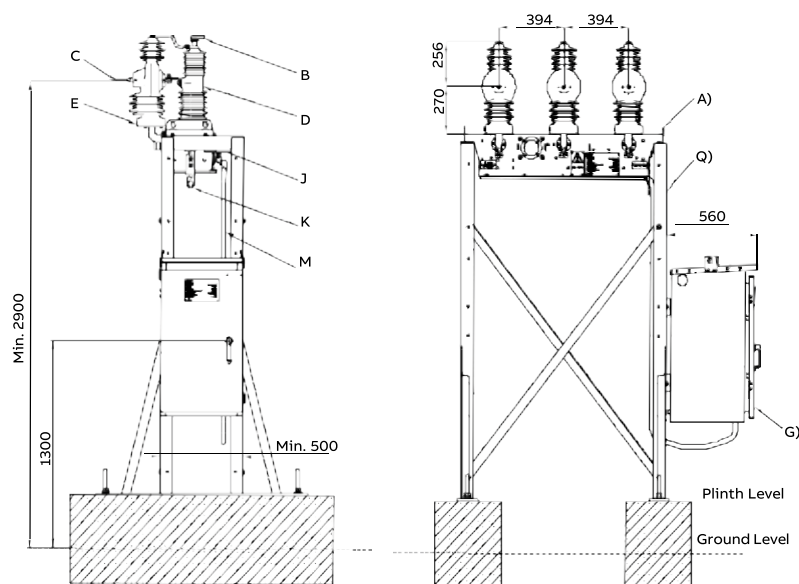
- N) Incoming surge arresters
- P) Outgoing surge arresters
- Q) Pole for recloser mounting

Customer scope

Weight:  
 HV cabinet assembly: ~140 kg  
 LV cabinet assembly: ~100 kg

Indicative dimensions in mm

## Substation-mounted



- A) High voltage cabinet
- B) Incoming terminal
- C) Outgoing terminal
- D) Interrupting pole
- E) Combisensor
- J) Manual trip handle
- K) Interlock release lever
- M) Composite cable

ABB scope

- Q) Mounting structure

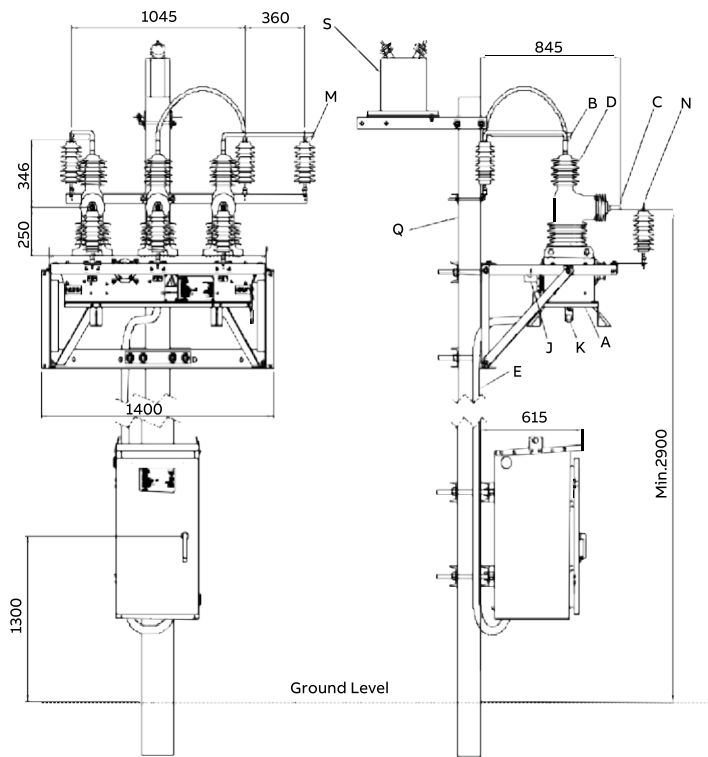
Customer scope  
(Indicative representation)

Weight:  
 HV cabinet assembly: ~140 kg  
 LV cabinet Assembly: ~100 kg

Indicative dimensions in mm

# Dimensional drawings — OVR-27

## Pole-mounted



- A) High voltage cabinet
- B) Incoming terminal
- C) Outgoing terminal
- D) Interrupting pole with sensors
- E) Composite cable
- J) Manual trip handle
- K) Interlock release lever

ABB scope

- M) Incoming surge arresters
- N) Outgoing surge arresters
- Q) Pole for recloser mounting
- R) Conductors
- S) PT & its mounting arrangement
- T) Outgoing SA mounting plate

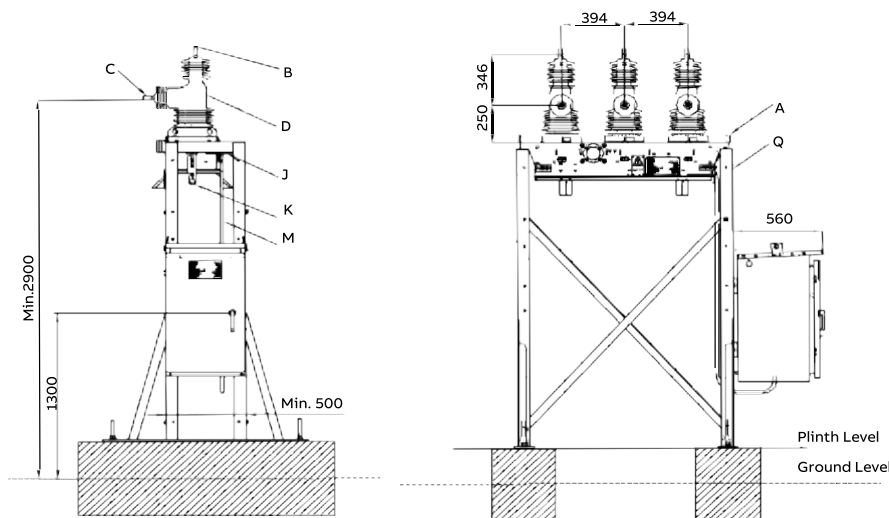
Customer scope  
(Indicative representation)

Weight:  
HV cabinet assembly: ~140 kg  
LV cabinet Assembly: ~ 100 kg

Note:  
Conductor must be routed  
as shown to maintain safety  
clearances

Indicative dimensions in mm

## Substation-mounted



- A) High voltage cabinet
- B) Incoming terminal
- C) Outgoing terminal
- D) Interrupting pole integrated with sensors
- J) Manual trip handle
- K) Interlock release lever
- M) Composite cable

ABB scope

- Q) Mounting structure

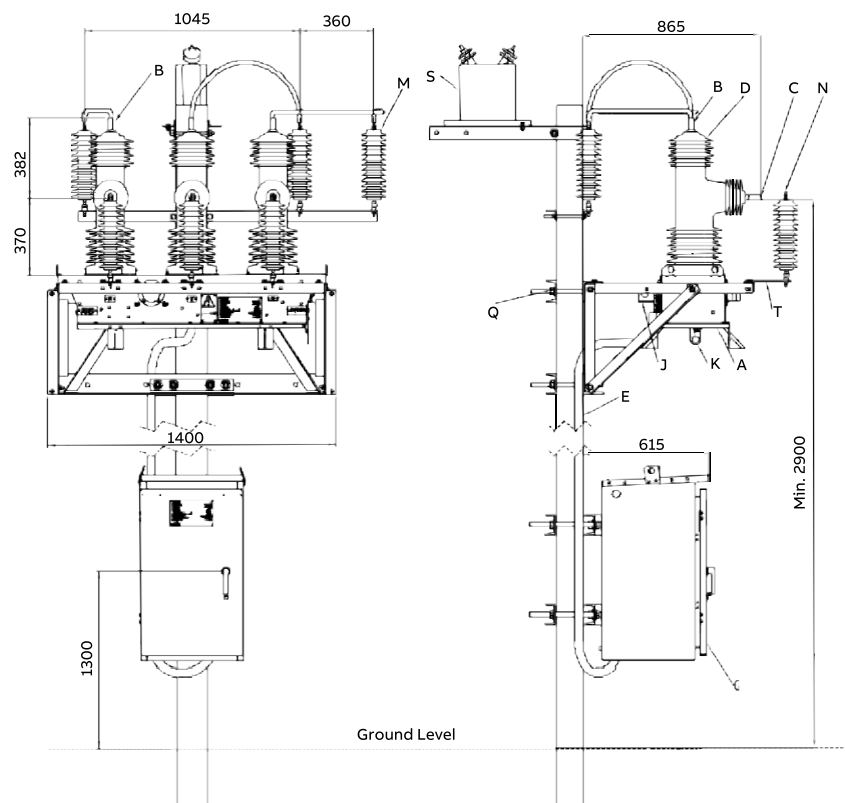
Customer scope

Weight:  
HV cabinet assembly: ~140 kg  
LV cabinet assembly: ~ 100 kg

Indicative dimensions in mm

# Dimensional drawings — OVR-38

## Pole-mounted



- A) High voltage cabinet
- B) Incoming terminal
- C) Outgoing terminal
- D) Interrupting pole integrated with sensors
- E) Composite cable
- G) Low voltage control cabinet
- J) Manual trip handle
- K) Interlock release lever

ABB scope

- M) Incoming surge arresters
- N) Outgoing surge arresters
- Q) Pole for recloser mounting
- R) Conductors
- S) PT & its mounting arrangement

Customer scope  
(Indicative representation)

Weight:

HV cabinet assembly: ~175 kg

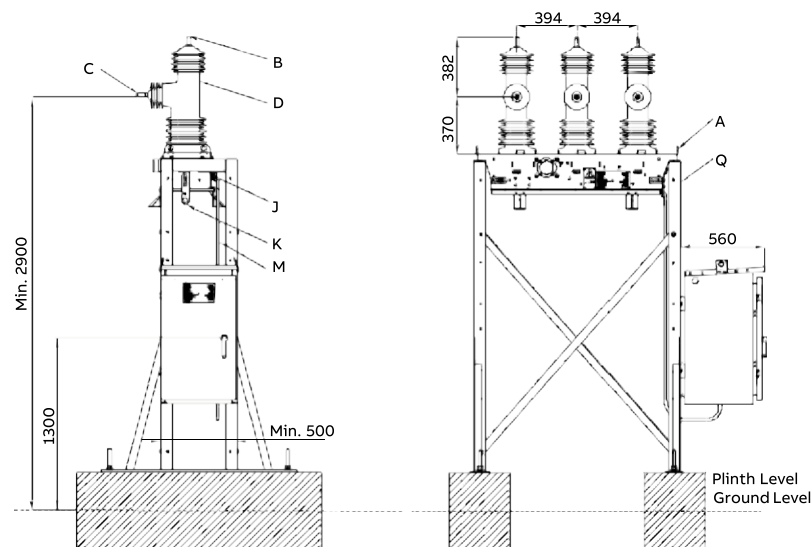
LV cabinet assembly: ~100 kg

Note:

Conductor must be routed as shown to maintain/get safety clearances

Indicative dimensions in mm

## Substation-mounted



- A) High voltage cabinet
- B) Incoming terminal
- C) Outgoing terminal
- D) Interrupting pole integrated with sensors
- J) Manual trip handle
- K) Interlock release lever
- M) Composite cable

ABB scope

- Q) Mounting structure

Customer scope  
(Indicative representation)

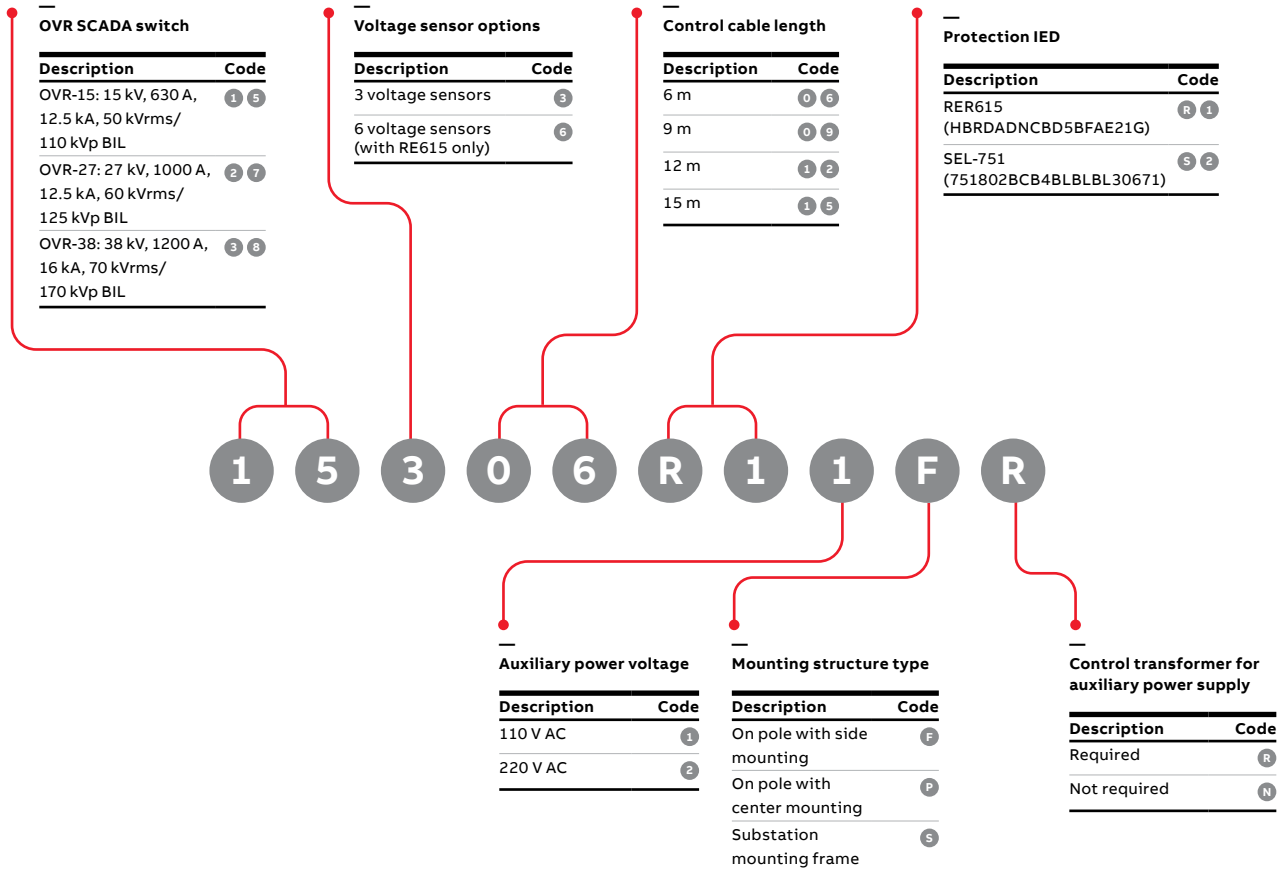
Weight:

HV cabinet assembly: ~175 kg

LV cabinet assembly: ~100 kg

Indicative dimensions in mm

# Ordering guide



**Additional information**

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**[new.abb.com/medium-voltage](http://new.abb.com/medium-voltage)**

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