MEDIUM VOLTAGE PRODUCTS

Three phase outdoor vacuum recloser

Type OVR-15, OVR-27 & OVR-38 for up to 38 kV applications

ABB strives to bring our customers the latest technology, combined with superior performance and unparalleled service aimed at total customer satisfaction. Our products are the natural choice for you. 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 & OVR-38 are three-phase ganged operated autoreclosers suitable for up to 38 kV distribution networks.

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 operating mechanism.

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

These are suitable for communication with Control / Load Dispatch & Network Control Centres on protocols such as IEC 60870- 5-104 / IEC 60870-5-101 / IEC 61850 as well as DNP3.0 & ModBus, making it ready for Smart Grid implementation for product to nodecommunication.

Operator safety at its best
Operator safety given prime importance with provision of:

- Secured and safe manual emergency trip handle to avoid closing in emergency situations
- No maintainable electronics in HV cabinet avoids operator to access the HV cabinet

Reliable in extreme conditions
Best suited for arduous site conditions

- Solid dielectric design with HCEP insulation material ensures performance over a longer service period
- State-of-the-art magnetic actuation and vacuum interrupters ensure switching performance over a lifetime
- Reduce down time as recloser can be repaired at site

Fast, easy-to-install and operate
Save your installation & maintenance

- Site ready units - reduced installation time, effort and cost
- Flexible mounting option for single/double pole or substation frame available
- Draw out design for protection relay for quick and easy maintenance
- Changes in relay configuration can be done from front panel HMI, web-based user interface or connectivity tool, PCM600
- Extensive protection functions to fit all network type
- Enabled to support high-speed protection, interlocking, transfer switching, fault isolation and service restoration

OVR-15 HV unit

OVR-27 HV unit

OVR-38 HV unit

RER615* 2.0 relay for Recloser Control

* SEL751 relay available as option. Contact ABB for details

Technical data

Parameter	Unit	OVR-15	OVR-27	OVR-38
System parameters				
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
Current switching parameters				
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
Switching performance				
Rated operating (reclosing) sequence		O-0.2s-CO-2s-CO-2s-CO Lock Out		
Minimum guaranteed mechanical operation (CO cycles)	Operations		10000*	
Minimum guaranteed operation (CO cycles) at rated continuous	Operations		10000*	
Maximum interrupting time	ms		55	
Maximum closing time	ms		65	
LV cabinet details				
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	Hrs.		24*	
Provision for powering communication modem	VDC/W		24/7	
Current sensor				
Type		Current transformer		
Current transformation ratio	A/A		600/1	
Class	%	5P15*	10P20*	10P20*
Voltage sensor				
Type		RVD	CVD	CVD Num-
ber of voltage sensors per recloser		3/6	3/6**	3/6**
Accuracy	%		3*	
Additional data				
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 (Hl 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) In-
terrupting 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	
Service conditions				
Ambient temperature range	°C		-40 to +55	
Maximum humidity	%		100	
Altitude	m		3000 (#)	

• Kindly contact factory for more options

For altitudes above 1000m, suitable de-rating has to be considered as per IEC 62271-111/IEEE C37.100.l -2007

** 3 sensors are in-built and additional 3 sensors can be separately provided on request

*** 110 Vdc supply voltage available on request.

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.

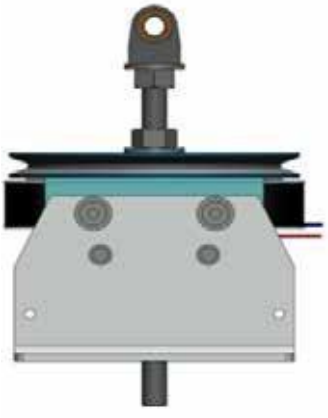
Magnetic actuators
OVR family reclosers were designed to have a lifetime of 10000 full load operations according to IEEE standard. ABB designed a simple, magnetically actuated operating mechanism that can dependably operate with only one moving part, unlike ordinary spring charged mechanisms.

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

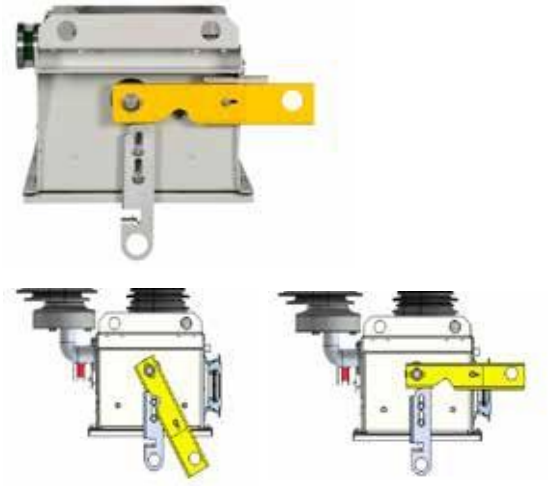
Advantages
- 10000 full load operations
- No lubrication or adjustments = minimal maintenance
- Simple design
- Bi-stable : no power required to hold contacts open or close

Secured and safe emergency manual trip arrangement
Manual trip & reset handle

Operator safety is given prime importance while designing ABB reclosers
Provision is made to manually trip the recloser in case of an emergency situation. The operator can easily perform manual tripping by the use of traditional insulated hook stick. When the recloser is manually tripped, a mechanical interlock is enabled, that blocks the closing of recloser both electrically as well as mechanically. This ensures safety of the operating person as well as the system. A separate mechanical resetting lever is provided on the HV cabinet to reset the interlock when the situation becomes normal.



Actuator for reclosers



Interlock activated

Interlock released

Vacuum interrupters
ABB has been developing and manufacturing vacuum interrupters since the early 1980s. Worldwide, more than two 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 fits very well with recloser requirements since it can easily handle frequent operations. Additionally, vacuum interrupters do not need any extra time to recover, so even the first reclosing operation (after 200-300m sec) is not a problem.

Advantages
- Maximum reliability
- Superior contact wear resistance
- Long life: 30000 full load operations for VI
- 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 impacts or damages
- Time-proven material, UV stable
  Tested at Koeberg (KIPTS)
- Few moving parts

Integrated voltage sensor and current transformer located on the horizontal busing connected to the RER615

ABB vacuum interrupter clean room

HCEP insulating material
The recloser's insulating material is Hydrophobic Cycloaliphatic Epoxy (HCEP), which has an outstanding superior performance than those using traditional CEP and silicon rubber insulations. Hydrophobic means resistant to water. This capability is an advantage because it prevents water from developing completely wetted, resistively conductive surfaces on outdoor insulation. As a result, leakage currents are reduced, which increases reliability by minimizing the risk of insulation flashover. Further more, reducing discharge activity translates into decreased insulator erosion and increased 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 - far more creep than required by equivalent ANSI standards, which focuses mainly on BIL performance:

Required creep vs OVR recloser Creep (Phase to ground)

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

Applications

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

A circuit breaker
Since 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 for protection of feeders on electrical faults. Since the controller (IED: Intelligent Electronic Device) of OVR is capable of providing DI/DO and status signals over different communication protocols, it can be integrated into SCADA, Load Despatch Centres or Network Control Centre by providing external communication equipment. It can also be used as a bus coupler inside a substation.

An outgoing bay of a substation
OVR can be used as an outgoing bay equipment in a substation. The inbuilt protective current and voltage sensor along with circuit breaker can be mounted on a single pole structure, which will help reduce the substation space and land requirement significantly.

A coupling circuit breaker or tie-point in a ring network
OVR with voltage sensor on both sides of vacuum interrupter can be used as a coupling circuit breaker in an overhead ring network. By applying voltage based scheme, OVR can automatically open and close, thus help in improving power supply availability.

Protective relay RER615

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

RER615 is a member of the Relion® product family and a 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, RER615 inside OVR reclosers meets today's requirements for smart grids and supports the protection of overhead line and cable feeders in isolated neutral, resistance earthed, compensated and solidly earthed networks.

RER615 is freely programmable with horizontal GOOSE communication, thus enabling sophisticated interlocking functions. The new adaptable standard configuration allows the IED to be taken into use right after the application specific parameters have been set. Via the IED's front panel HMI or a remote control system, one recloser can be controlled. 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 Protection and Control IED Manager PCM600.

RER615 provides superior fault detection, isolation and restoration (FDIR) to lower the frequency and shorten the duration of faults (SAIFI/SAIDI). RER615 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
- 4 configurable physical push buttons
- Load profile and event logging
- Flexible auto reclosing function
- Six easily manageable setting groups
- Adaptable standard configuration for rapid commissioning
- Easy web-based parametrization tool with download possibility
- Same configuration tools as for other ABB Relion IEDs such as the 615/620/630 series
- Cyber security features such as audit trail
- Withdrawable-unit design
- Large, easy-to-read LCD screen with SLD, local control and parametrization possibilities with dedicated push buttons for safe operation
- Environmentally friendly design with RoHS compliance

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

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

Local HMI
The IED is available with a large display, suitable for front panel user interface along with single line diagram with dynamic status update. The SLD view can also be accessed using the web browser-based user interface. The default SLD can be modified according to user requirements by using the Graphical Display Editor in PCM600.

RER615 has dedicated three 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.

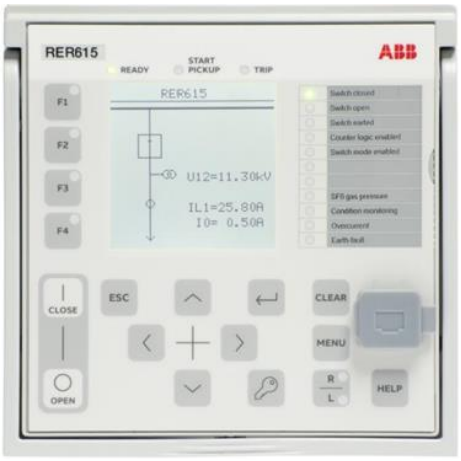
The local HMI includes a push button (L/R) for local/remote operation of the IED. When the IED is in the local mode, the IED can be operated only by using the local front panel user interface. When the IED is in the remote mode, the IED can execute commands sent from a remote location.

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

It 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
Offered 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
- The 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. The pre-trigger and post-trigger time is freely programmable
- Oscillographic data are 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 the 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 ±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 upto 11th harmonic for both current and voltage
- Total Harmonic Distortion (THD) of the current and voltage and Total Demand Distortion (TDD) of the current

Additional features
- Upto 6 protection groups
- Four-level access control with individual passwords for the 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 life indication
  - Recloser operation counter

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 earth-fault protection, low stage
- Non-directional earth-fault protection, high stage
- Non-directional earth-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

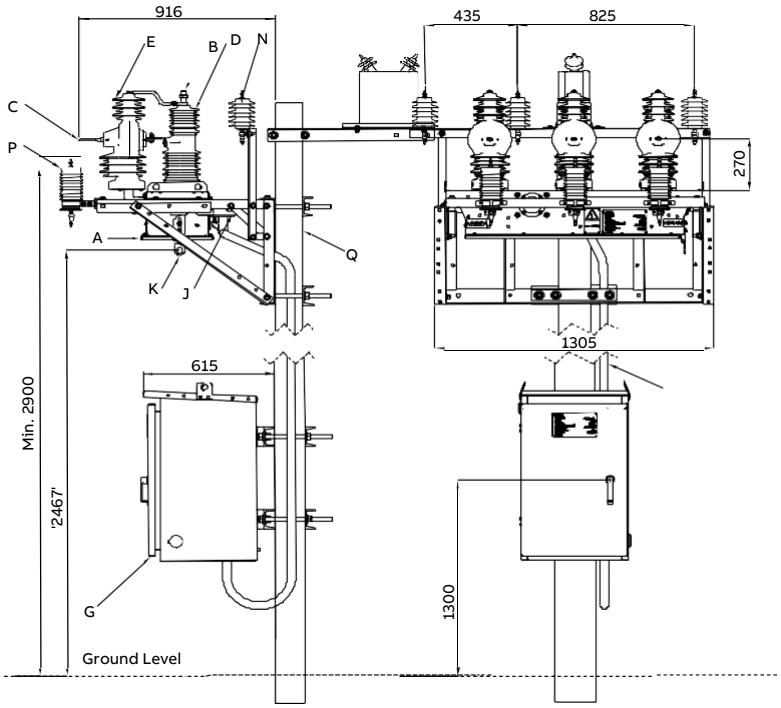
- Three-phase directional overcurrent protection, low stage
- Three-phase directional overcurrent protection, high stage
- Directional earth-fault protection, low stage
- Directional earth-fault protection, high stage
- Admittance based earth-fault protection
- Wattmetric based earth-fault protection
- Harmonics based earth-fault protection
- Residual overvoltage protection
- Three-phase under voltage protection
- Three-phase over voltage protection
- Positive-sequence under voltage protection
- Negative-sequence overvoltage protection
- Frequency protection

Low voltage control cabinet

- IP55 design
- Housing made from 2 mm thick stainless steel for better corrosion resistance
- Contains major equipment like protective relay (RER615 OR SEL751) controller, battery bank, capacitorsand accessories
- Ample space for mounting communications equipment
- Three point latching with pad lockable handle
- Suitably ventilated design
- Means provided to keep the door in fully open position to have an unhindered access during maintenance

Dimensional drawings of 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

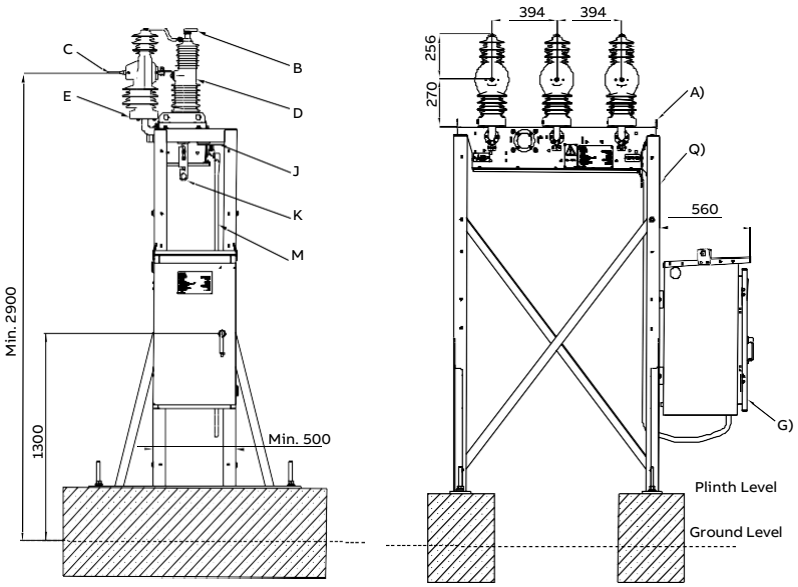
N) Incoming surge arresters
P) Outgoing surge arresters
Q) Pole for recloser mounting

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
G) Low voltage control cabinet
J) Manual trip handle
K) Interlock release lever
M) Composite cable

ABB scope

Q) Mounting structure

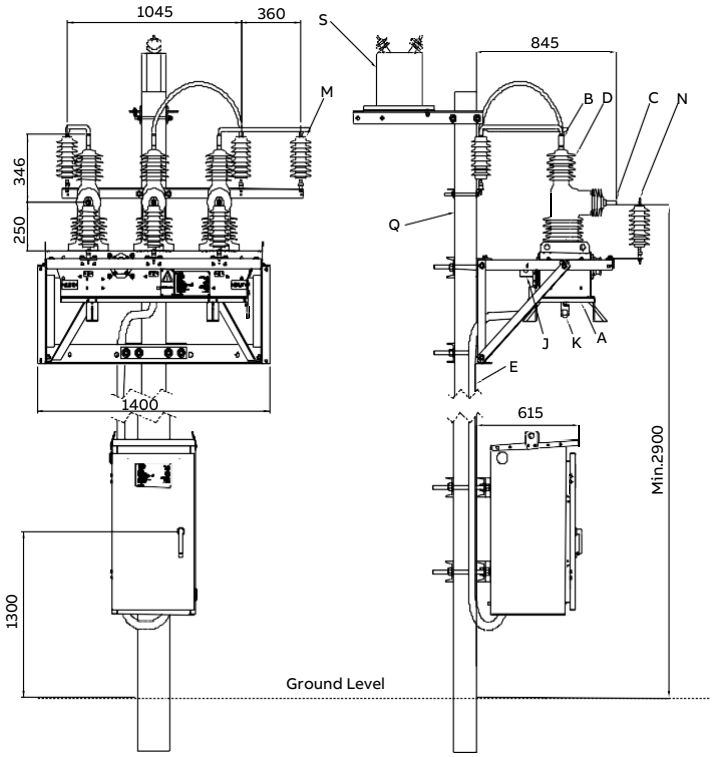
Customer scope (Indicative representation)

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

Indicative dimensions in mm

Dimensional drawings of 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

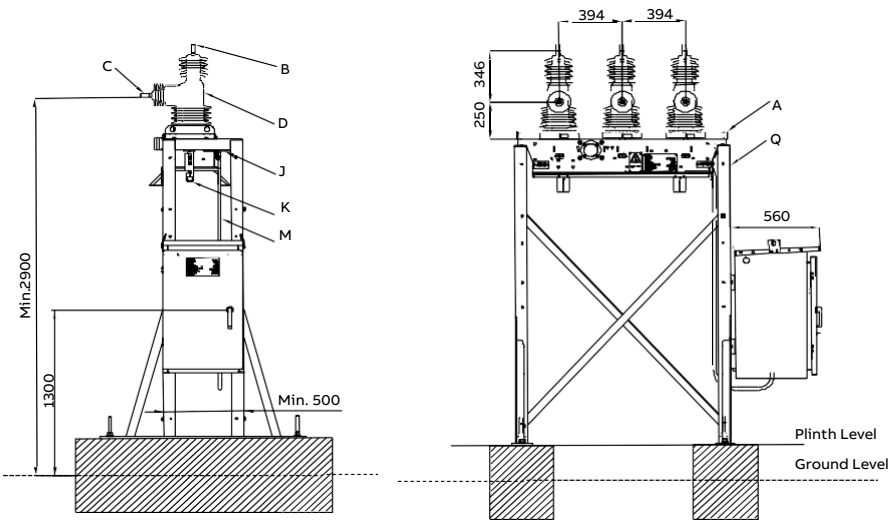
Customer scope (Indicative representation)

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

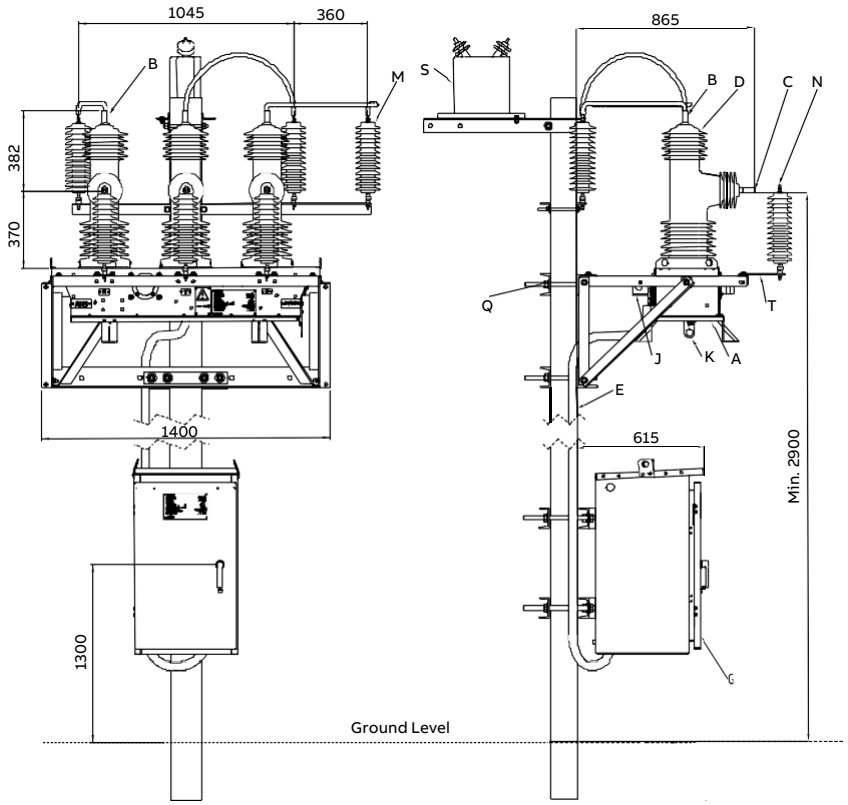
Customer scope

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

Indicative dimensions in mm

Dimensional drawings of 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

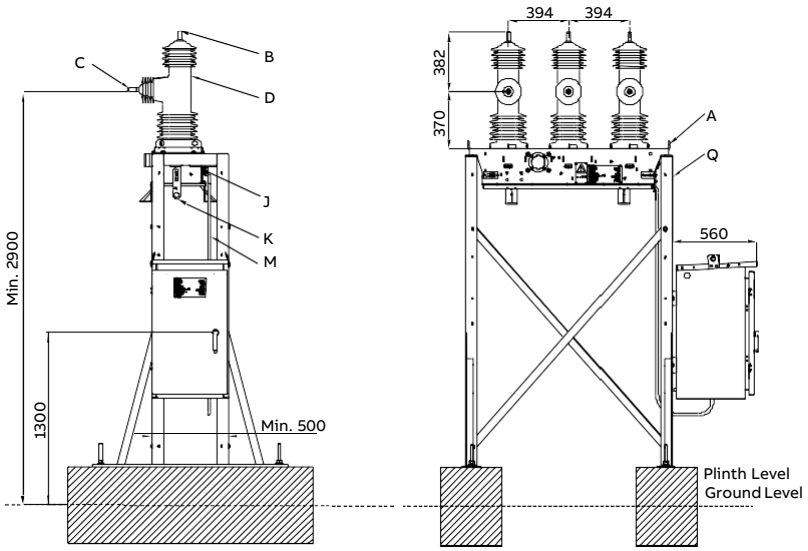
Customer scope (Indicative representation)

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

					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
		Style number																							
#	**Description**	**OVR-15**	**OVR-27**	**OVR-38**																					
1 & 2	Rated short time current capacity																								
	15.5 kV	15	NA	NA	1	5																			
	27 kV	NA	27	NA	2	7																			
	38 kv	NA	NA	38	3	8																			
3 & 4	Rated short time current capacity																								
	12.5 kA for 3 sec	12	12	12			1	2																	
	16 kA for 3 sec	NA	16**	16			1	6																	
5,6 & 7	Basic insulation level																								
	50 kVrms / 110 kVp	110	110	110					1	1	0														
	60 kVrms / 125 kVp	NA	125	125					1	2	5														
	70 kVrms / 170 kVp	NA	NA	170					1	7	0														
8 & 9	Rated normal current																								
	630A	06	06	06								0	6												
	1000A	NA	10	10								1	0												
	1200 A	NA	NA	12								1	2												
10	Voltage sensors options																								
	3 voltage sensors	3	3	3										3											
	6 voltage sensors	6	6	NA*										6											
	No voltage sensors	0	NA	NA										0											
11	Syncro check function																								
	Required	1	NA*	NA*											1										
	Not required	0	0	0											0										
12, 13 & 14	Communication protocol																								
	IEC 61850+1EC 60870-5-101 & 104 protocol	R6B	R6B	R6B												R	6	B							
	IEC 61850+DNP3+Modbus protocol	R6C	R6C	R6C												R	6	C							
	IEC 61850+1EC 60870-5-101 & 104 + DNP3 protocol	R6D	R6D	R6D												R	6	D							
15 & 16	Control cable length																								
	6m	06	06	06															0	6					
	9m	09	09	09															0	9					
	12m	12	12	12															1	2					
17 & 18	Auxiliary power supply voltage																								
	110 V AC	1A	1A	1A																	1	A			
	220 V AC	2A	2A	2A																	2	A			
19	Control transformer for auxiliary power supply																								
	Required																						1		
	Not required																						0		
20 & 21	Mounting structure type																								
	Pole mounting arrangement (central mounting)	PC	PC	PC																				P	C
	Pole mounting arrangement (side mounting)	PS	PS	PS																				P	S
	Substation mounting frame	SF	SF	SF																				S	F
	NA = Not available	*= Available on request												**= OVR-38 will be offered											

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.
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