



Surge protective devices OVR DIN rail and NE12 product selector



Surge protective devices

OVR NE12 products

OVR DIN rail products



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Introduction

What is a transient surge?

A transient surge is a sudden (shorter than a millisecond) rise in the flow of power. Voltage can peak at 12x the nominal system voltage. Transient surges result from a number of sources, the most common of which are internal, such as load switching and even normal equipment operations. In fact, approximately 80% of transients are generated internally. External transients are the result of lightning and load switching by utilities and upstream facilities.

Internal load switching

Switching on/off any elements that create a sudden variation of load will also cause a sudden change in current flow and generate transient surges.

Lightning strikes

A lightning strike (direct or indirect) can have a destructive or disturbing effect on installations located up to several miles from the actual point of the strike. During a storm, underground cables can transmit energy from a lightning strike to equipment installed inside buildings.

A lightning protection device (such as a lightning rod or Faraday cage) installed on a building to protect against the risk of a direct strike can increase the risk of damage to electrical equipment connected to the main power supply near or inside the building.

The lightning protection device diverts the high strike current to ground, considerably raising the potential of the ground close to the building on which it is installed. This causes overvoltages on the electrical equipment directly via the ground terminals and induced via the underground supply cables.

Switching effects on power distribution

The switching of transformers, motors or inductances in general, variation of load, disconnection of circuit breakers or cut outs lead to overvoltages that penetrate a building. The closer the building is to a generating station, substation or upstream switching point, the higher the overvoltages may be.

Facilities and operations left unprotected are highly susceptible to the damaging effects of transients.

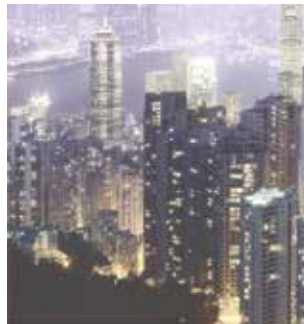
Such as:

- Catastrophic equipment failure
- Immediate operation shutdown
- Long term disruption of business
- Expensive equipment repair and replacement
- Data losses, system resets and network down time

In order to ensure protection from transient surges, installation of surge protective devices (SPD) is a must. ABB has a long history of engineering and manufacturing quality surge protective devices. This brochure will provide all the information needed to select the proper products to begin protecting any facility or operation.

ABB's family of surge protective devices include the following:

- OVR NE12 enclosed SPD for service entrance locations
- OVR DIN rail AC SPD for equipment protection
- OVR PV DIN rail DC SPD for photovoltaic installations
- OVR DIN rail data line SPD for sensitive communications networks



General points on lightning and its risks

Overvoltages due to direct lightning strikes

These can take two forms:

- When lightning strikes a lightning conductor or the roof of a building which is grounded, the lightning current is dissipated into the ground. The impedance of the ground and the current flowing through it create large difference of potential: this is the overvoltage. This overvoltage then propagates throughout the building via the cables, damaging equipment along the way.
- When lightning strikes an overhead low voltage line, the strike produces high currents which penetrate into the building creating large overvoltages. The damage caused by this type of overvoltage is usually catastrophic (e.g. fire in the electrical switchboard causing the destruction of buildings and industrial equipment) and results in explosions.



Direct lightning strike on a lightning conductor or the roof of a building



Direct lightning strike on an overhead line

Overvoltages due to the indirect effects of lightning strikes

Overvoltages are also produced when lightning strikes in the vicinity of a building, due to the increase in potential of the ground at the point of impact. The electromagnetic fields created by the lightning current generate inductive and capacitive coupling, leading to other overvoltages. Within a radius up to several kilometers, the electromagnetic field caused by lightning in clouds can also create sudden increases in voltage.

Although less spectacular than in the previous case, irreparable damage is also caused to sensitive equipment such as fax machines, computer power supplies and safety and communication systems.



Increase in ground potential



Magnetic field



Electrostatic field

Terminology of SPD electrical characteristics

SPD terminology

8/20 wave:

Current waveform which passes through equipment when subjected to an overvoltage (low energy).

Type 2 surge protective device (SPD)

Permanently connected SPDs intended for installation on the load side of the service equipment overcurrent device, including SPDs located at a branch panel. It has successfully passed testing to the standard with the 8/20 wave (class II test).

Metal oxide varistor (MOV)

A varistor is an electronic component with a “diode like” nonlinear current-voltage characteristic, used to protect circuits against excessive transient voltages. Most commonly composed of metal oxides.

Maximum continuous operating voltage (MCOV, U_c)

The maximum designated root mean square (rms) value of power frequency voltage that may be applied continuously between the terminals of the SPD.

Nominal discharge current (I_n)

Peak current value of an 8/20 waveform which the SPD is rated for based on the test program.

Maximum discharge current (I_{max})

Peak current value of an 8/20 waveform which can be safely discharged by the SPD, with an amplitude complying with the class II operating test sequence. $I_{max} > I_n$

Short circuit current rating (SCCR)

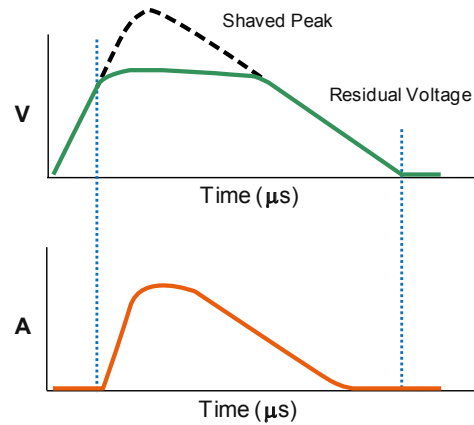
Maximum symmetrical fault current, at rated voltage, that the SPD can withstand without sustaining damage that exceeds acceptable criteria or creates a hazardous operating condition.

Voltage protection rating (VPR)

The value of the VPR is determined as the nearest highest value, taken from Table 63.1 of ANSI/UL 1449 3rd Edition, to the measured limiting voltage determined during the transient voltage surge suppression test using the combination wave generator at a setting of 6kV, 3kA.

Voltage protection level (U_p or U_{res})

The voltage let through by the SPD while diverting surge current to ground must not exceed the voltage withstand value of the equipment connected downstream.



* Graph depicts an 8/20 μ s wave

Notes:

Test wave 8/20 μ s according to IEEE # C62.62-200/UL 1449

The first number corresponds to the time from 10% to 90% of its peak value (8 μ s).

The second number corresponds to the time taken for the wave to descend to 50% of its peak value (20 μ s).

Common mode and / or differential mode protection

Common mode

Common mode overvoltages appear between the live conductors and ground, e.g. phase/ground or neutral/ground. A live conductor not only refers to the phase conductors but also to the neutral conductor.

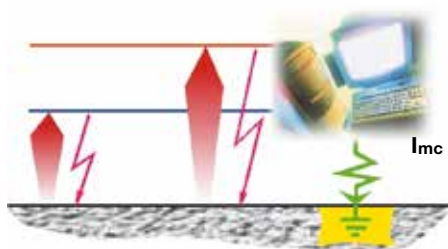
This overvoltage mode destroys equipment connected to ground (class I equipment) and also equipment not connected to ground (class II equipment) which is located near a grounded mass and which does not have sufficient electrical isolation (a few kilovolts).

Class II equipment not located near a grounded mass is theoretically protected from this type of attack.

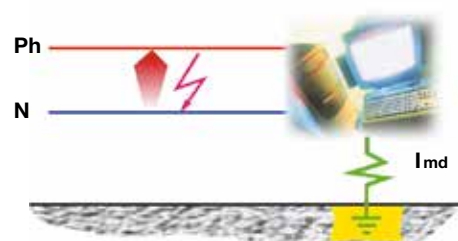
Differential mode

Differential mode overvoltages circulate between live conductors: phase/phase or phase/neutral.

These overvoltages have a potentially high damaging effect for all equipment connected to the electrical network, especially 'sensitive' equipment.



Note:
Common mode overvoltages affect all grounding systems.



UL 1449 Update to 3rd Edition

The Underwriters Laboratories (UL) standard for surge protective devices (SPDs) has been the primary safety standard for surge protection since the first edition was published in 1985, and updated to the second edition in 1996.

The objective of UL 1449 has always been to increase safety in terms of surge protection. Thus, major changes have recently been made to the surge protection standard.

The latest edition, known as UL 1449 3rd Edition, was published on September 29, 2006 and took effect September 2009, and is now also an ANSI standard. A revision was made on February 8, 2011.

To avoid confusion, the objective of this paper is to explain and summarize the major changes made to the standard.

The key updates are:

- Change in the standard's name
- The different type designations of surge protective devices
- The measured voltage protection level
- The Nominal discharge current

Change in the standard's name: From TVSS to SPDs

Prior to UL 1449 3rd Edition taking effect, the devices this standard covers were known as Transient Voltage Surge Suppressors (TVSS), operating on power circuits not exceeding 600 V. With the inception of the 3rd Edition, these devices are now known as Surge Protective Devices (SPDs), and may operate on power circuits not exceeding 1000 V.

This new designation moves the UL standard closer to the international designation and to IEC standards. The new edition is now renamed UL Standard for Safety for Surge Protective Devices, UL 1449.

The different type designations of surge protective devices

The new UL 1449 3rd Edition places SPDs into five different Type categories based on installation location within an electrical system. While Type 1, Type 2 and Type 3 categories refer to different types of SPDs that can be installed at specific locations, Type 4 and Type 5 categories refer to components used in an SPDs configuration.

Type 1 – “Permanently connected SPDs intended for installation between the secondary of the service transformer and the line side of the service equipment overcurrent device.”

Type 2 – “Permanently connected SPDs intended for installation on the load side of the service equipment overcurrent device.”



Type 3 – “Point of utilization SPDs, installed at a minimum conductor length of 10 meters (30 feet) from the electrical service panel.”

Type 4 – Component assemblies – “Component assembly consisting of one or more Type 5 components together with a disconnect (integral or external) or a means of complying with the limited current tests.”

Type 1, 2, 3 – Component assemblies – “Consists of a Type 4 component assembly with internal or external short circuit protection.”

Type 5 – “Discrete component surge suppressors, such as MOVs that may be mounted on a PWB, connected by its leads or provided within an enclosure with mounting means and wiring terminations.”

These new categories are by far the major changes applied to UL 1449 3rd Edition. SPDs installation location is now taken into account. The closer an SPD is installed to the equipment, the better the protection is. This is a push in the direction of providing stepped protection including external and internal surge protection.

The measured voltage protection level

One of the last changes found in the new UL 1449 3rd Edition, is the modification in the measured voltage protection level. The Measured Limiting Voltage (MLV) is the maximum magnitude of voltage measured at the application of a specific impulse wave shape.

When applying a certain surge current on the SPD the measured voltage at the device terminals is the so called “let-through voltage.” In UL 1449 2nd Edition, the let-through voltage was referred to as Suppressed Voltage Rating (SVR) and was calculated with a 0.5 kA surge wave form at 6 kV. The new designation is Voltage Protection Rating (VPR) and is calculated with a 3 kA surge wave form at 6 kV.

UL 1449 Update to 3rd Edition



The nominal discharge current: I_n

The nominal discharge current, known as I_n test, is new to UL 1449, coming from the IEC standard.

During the test, the SPD is subjected to 15 impulses at the selected nominal discharge current. In order to pass, the SPD cannot create a shock or fire hazard during the test, and nothing in the surge path can open during or after the test. The nominal discharge current values, with a 8/20 μ s wave shape, are selected by the manufacturer as follows:

Type 1: 10 or 20 kA

Type 2: 3, 5, 10 or 20 kA

Type 1, Type 2 and Type 4 SPDs (intended for Type 1 or Type 2 applications) are subjected to this test.

Sources: Underwriters Laboratories Inc., Standard for Safety, Surge Protective Devices (UL 1449 Third Edition, 2011)

The MLV will allow comparison of different types of SPDs with regards to the let-through voltage. However, it is important to note that the surge current used to measure the let-through voltage is six times higher in the 3rd Edition than in the 2nd Edition. This means that, comparing the obsolete SVR designation with the new VPR ratings will not be valid, as VPR ratings will of course be higher than SVR ratings.



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Product introduction

OVR NE12 enclosed SPD

Introduction

The OVR NE12 enclosed surge protective device (SPD) is the latest addition to ABB's extensive range of surge protection products. It is designed to be installed at the service entrance, thereby protecting the entire facility from the harmful effects of transient surges. These surges are the result of:

- Direct and indirect lightning strikes
- Power company load switching
- Upstream load switching at other facilities

Extensive damage and expensive repairs can result from these types of disturbances if surge protection is not present.

Features & benefits

The OVR NE12 is a multistage protector with fast acting varistor (MOV) and EMI/RFI noise attenuation filter to limit overvoltage to values compatible with the sensitive equipment connected to the network. In addition to the OVR NE12, ABB recommends adding OVR DIN rail SPDs at branch panels and equipment, creating a multi-level approach to protection.

General

- NEMA 12 enclosure
- All mode protection (L-L/L-N/L-G/N-G)
- Auxiliary contacts for remote monitoring
- Safety disconnect, fused
- LED power on/fault indicator
- Audible alarm

MOV technology

- 160kA or 320kA per phase
- Replaceable MOV blocks
- Visual and audible MOV replacement indication

Surge counter/diagnostic LCD display (optional)

- Count of surges 2kA and higher with time and date
- Visual diagnostic information

Applications

The OVR NE12 is suitable for protection for all manner of facilities and operations. It is designed with a NEMA Type 12 enclosure, and rated as a Type 2 SPD, requiring indoor installation on the load side of the main breaker or fuse.

Here are some examples of operations that would benefit from an OVR NE12 enclosed SPD:

- Critical power (hospitals, data centers, etc)
- Renewable energy
- Water/wastewater
- Communications
- Manufacturing
- Commercial

Specifications

- **Approvals: UL 1449 - 3rd Edition Listed, UL 1283, CSA 22.2 No. 8**
- Type 2 Surge Protective Device
- NEMA 12 enclosure
- Three service voltages (AC): 240/120V Split phase, 480V Delta and 480/277V Wye
- 160kA or 320kA per phase protection
- Short circuit current rating (SCCR): 200kA

ABB recommends the installation of the OVR NE12 enclosed SPD wherever uptime is a critical element of a facility or operation.



Product selection

OVR NE12 enclosed SPD

Choosing the correct model

There are three steps to choosing the correct OVR NE12 model:

1) Select service voltage

Consult qualified personnel if the facility or operation service voltage is unknown.

The OVR NE12 is available in three service voltages:

- 480V Delta
- 480Y/277V
- 240/120V Split phase

2) Select the surge capacity (I_{max})

The surge capacity is the maximum discharge current (I_{max}) per phase. Each MOV is capable of withstanding multiple surges below the maximum surge level.

Two protection levels are available:

- 160kA per phase
- 320kA per phase

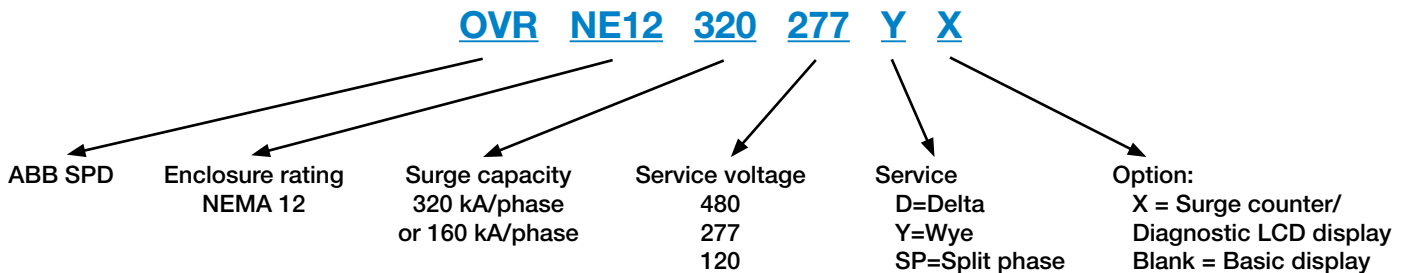
3) Choose a basic display or the surge counter/diagnostic LCD display

- Basic display: LED lights and alarm
- Surge counter/diagnostic LCD display: LED lights, alarm and LCD screen displaying percentage protection level, surge count and last surge date

Once these three steps are complete, consult the tables below and on page 10 to select the unit. If technical assistance is required, please call ABB Technical Support at (888) 385-1221 option #4.



OVR NE12 enclosed SPD part number diagram



Designation	Service voltage	Features		
		Default visualization Green/red LED	Audible alarm	Surge counter
OVRNE12320480DX	480V Delta	Yes	Yes	Yes
OVRNE12160480DX	480V Delta	Yes	Yes	Yes
OVRNE12320277YX	480Y/277V	Yes	Yes	Yes
OVRNE12160277YX	480Y/277V	Yes	Yes	Yes
OVRNE12320120SPX	240/120V Split phase	Yes	Yes	Yes
OVRNE12160120SPX	240/120V Split phase	Yes	Yes	Yes
OVRNE12320480D	480V Delta	Yes	Yes	No
OVRNE12160480D	480V Delta	Yes	Yes	No
OVRNE12320277Y	480Y/277V	Yes	Yes	No
OVRNE12160277Y	480Y/277V	Yes	Yes	No
OVRNE12320120SP	240/120V Split phase	Yes	Yes	No
OVRNE12160120SP	240/120V Split phase	Yes	Yes	No

Product selection

OVR NE12 enclosed SPD

OVR NE12 enclosed SPD

Surge capacity per phase kA	Service voltage	Catalog number	Description
320	480V Delta	OVRNE12320480DX	OVR NE12 enclosed SPD, 480V Delta, 320kA, w/ Surge counter
		OVRNE12320480D	OVR NE12 enclosed SPD, 480V Delta, 320kA
	480Y/277V	OVRNE12320277YX	OVR NE12 enclosed SPD, 480Y/277V, 320kA, w/ Surge counter
		OVRNE12320277Y	OVR NE12 enclosed SPD, 480Y/277V, 320kA
	240/120V SP	OVRNE12320120SPX	OVR NE12 enclosed SPD, 240/120V Split phase, 320kA, w/ Surge counter
		OVRNE12320120SP	OVR NE12 enclosed SPD, 240/120V Split Phase, 320kA
160	480V Delta	OVRNE12160480DX	OVR NE12 enclosed SPD, 480V Delta, 160kA, w/ Surge counter
		OVRNE12160480D	OVR NE12 enclosed SPD, 480V Delta, 160kA
	480Y/277V	OVRNE12160277YX	OVR NE12 enclosed SPD, 480Y/277V, 160kA, w/ Surge counter
		OVRNE12160277Y	OVR NE12 enclosed SPD, 480Y/277V, 160kA
	240/120V SP	OVRNE12160120SPX	OVR NE12 enclosed SPD, 240/120V Split phase, 160kA, w/ Surge counter
		OVRNE12160120SP	OVR NE12 enclosed SPD, 240/120V Split phase, 160kA

Replacement power supply and MOV block ¹⁾

Surge capacity kA	Service voltage	Catalog number	Description
160	480V Delta	OVR1N160480PS	OVR NE12 Power supply, 480V Delta, 160kA
		OVR1N160480	OVR NE12 MOV, 480V Delta, 160kA
	480Y/277V	OVR1N160277PS	OVR NE12 Power supply, 480Y/277V, 160kA
		OVR1N160277	OVR NE12 MOV, 480Y/277V, 160kA
	240/120V SP	OVR1N160120PS	OVR NE12 Power supply, 240/120V split phase, 160kA
		OVR1N160120	OVR NE12 MOV, 240/120V split phase, 160kA

¹⁾ Consult the OVR NE12 installation and operation manual (document number 1SXU430222M0201) for power supply and MOV block replacement instructions

Service parts and accessories

Description	Catalog number	Extended description
3P SW 100A J FUSE 600V ²⁾	OS100GJ03	Fusible disconnect switch - 480V Delta and 240/120V split phase
3P+N SW 100A J FUSE 600V ²⁾	OS100GJ04N2	Fusible disconnect switch - 480Y/277V
PSTL HDL 6X65MM BLACK	OHB65J6	Enclosure door handle for fusible disconnect switch
PSTL SHAFT 6X150MM	OXp6X150	Metal shaft for fusible disconnect switch
3P LUG KIT 100A FUSED (6 LUGS)	OZXA-24	Terminal lug kit
WALL MOUNTING BRACKETS (4)	AA1206	Enclosure mounting brackets

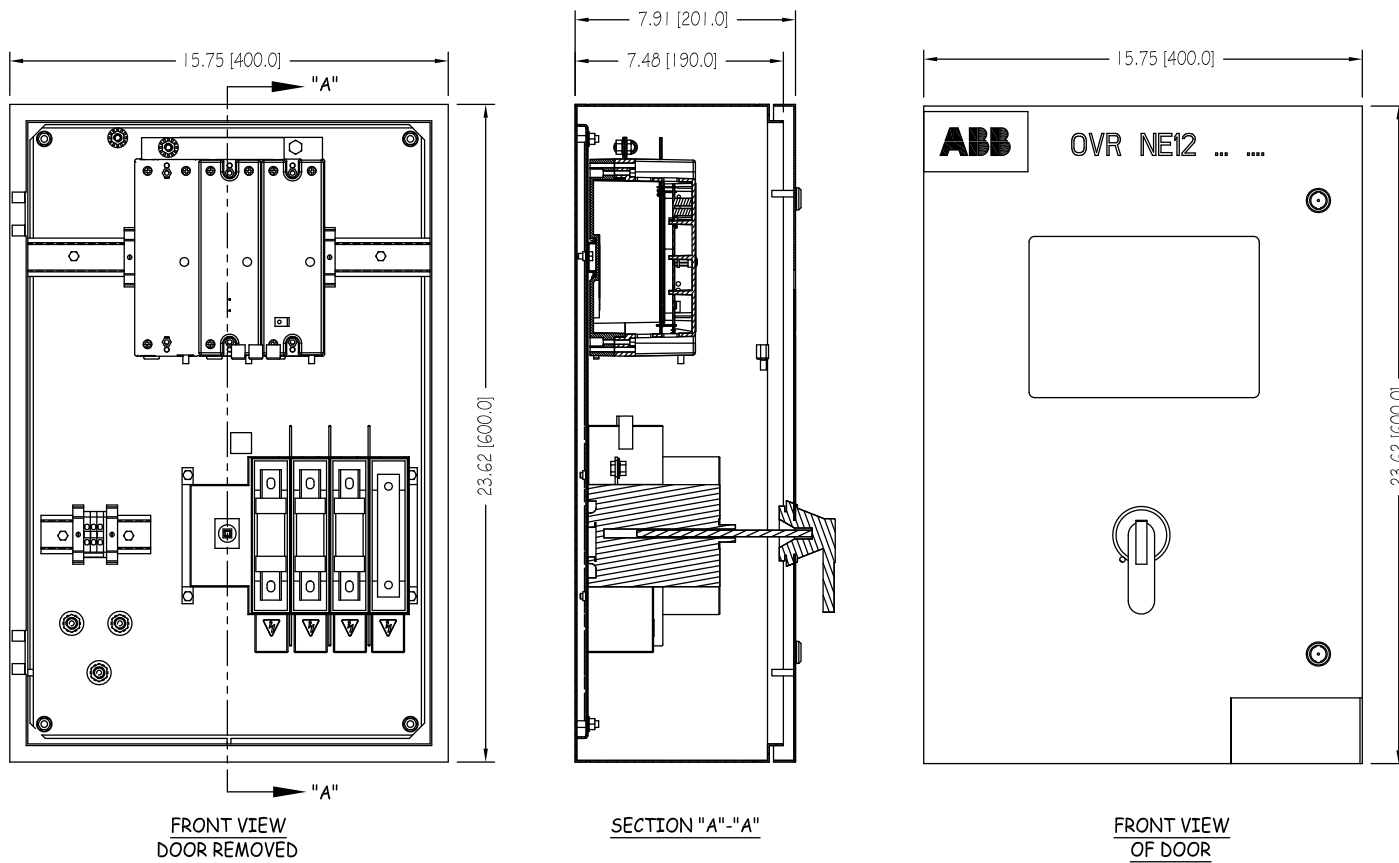
²⁾ Fuses by others (Type J 100A)

Technical data

OVR NE12 enclosed SPD

		OVRNE12320480DX OVRNE12320480D OVRNE12160480DX OVRNE12160480D	OVRNE12320277YX OVRNE12320277Y OVRNE12160277YX OVRNE12160277Y	OVRNE12320120SPX OVRNE12320120SP OVRNE12160120SPX OVRNE12160120SP
Technical characteristics				
Service voltage		480V Delta	480/277V Wye	240/120V Split phase
Application		Service entrance	Service entrance	Service entrance
Phases		3	3	2
Mode of protection		L-L / L-N / L-G / N-G	L-L / L-N / L-G / N-G	L-L / L-N / L-G / N-G
Surge capacity/phase (I _{max})	kA	160 or 320	160 or 320	160 or 320
Maximum continuous operating voltage (MCOV)	V	550	320	150
Voltage protection rating (VPR - UL 3rd Ed.)				
L-N	V	/	1200	900
L-L	V	1800	2000	1200
L-G	V	1800	1200	800
N-G	V	/	1200	800
Nominal discharge current (In)	kA	10	10	10
Short circuit current rating (SCCR)	kA	200	200	200
AC power frequency	Hz	50-60	50-60	50-60
Thermal fuse		Type J 100A	Type J 100A	Type J 100A
EMI/RFI filtering	dB	-30	-30	-30
Mechanical characteristics				
Connection terminals	Inches	1/4 - 5/16 - 3/8 - 1/2	1/4 - 5/16 - 3/8 - 1/2	1/4 - 5/16 - 3/8 - 1/2
Terminal torque	Nm	6-75	6-75	6-75
Auxiliary contact connection terminals	AWG	22 - 12	22 - 12	22 - 12
Auxiliary contact terminal torque	Nm	1	1	1
Front display		Yes	Yes	Yes
LED indicators		Yes	Yes	Yes
Audible alarm		Yes	Yes	Yes
Auxiliary contact		Yes	Yes	Yes
Surge counter		Yes - Option "X"	Yes - Option "X"	Yes - Option "X"
Enclosure material		Painted steel	Painted steel	Painted steel
Enclosure rating		NEMA 12	NEMA 12	NEMA 12
Dimensions H x W x D (approx.)	Inches	24" x 16" x 8"	24" x 16" x 8"	24" x 16" x 8"
Weight (approx.)	lbs	40	40	40
Miscellaneous characteristics				
Stocking temperature		32°F (0°C) to 104°F (40°C)	32°F (0°C) to 104°F (40°C)	32°F (0°C) to 104°F (40°C)
Operating temperature		32°F (0°C) to 104°F (40°C)	32°F (0°C) to 104°F (40°C)	32°F (0°C) to 104°F (40°C)
Maximum altitude		6600 feet (2000 m)	6600 feet (2000 m)	6600 feet (2000 m)
Fire resistance according to UL 94		V0	V0	V0
Approvals		ANSI/UL 1449 3rd Ed. Meets IEEE requirements	ANSI/UL 1449 3rd Ed. Meets IEEE requirements	ANSI/UL 1449 3rd Ed. Meets IEEE requirements
Replacement MOV block				
		OVR1N160480PS (power supply) OVR1N160480	OVR1N160277PS (power supply) OVR1N160277	OVR1N160120PS (power supply) OVR1N160120

Approximate dimensions OVR NE12 enclosed SPD





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Product introduction

OVR DIN rail SPD

Introduction

Over 80% of transient surges are caused by internal sources such as load switching and normal equipment operations. The installation of ABB OVR UL 1449 3rd Edition pluggable AC DIN rail SPDs will combat these surges and provide protection to valuable equipment and help keep an operation up and running. This new product range is approved as Type 4 recognized components and is usable in Type 2 applications. These products are of the same high quality as ABB UL 1449 2nd Edition devices, with improved safety as a result of additional testing required by the UL 1449 3rd Edition standard. Installation at branch panels, control panels and terminal equipment is recommended to provide the most complete protection.

Features & benefits

The OVR DIN rail SPDs utilize fast acting metal oxide varistor (MOV) technology to limit overvoltage to values compatible with the sensitive equipment connected to the network.

End of life indicator

This feature is standard on all ABB pluggable OVR DIN rail surge protectors. Each cartridge is equipped with a mechanical indicator which is green when the SPD is operational and protecting the system, and turns red when it has reached end of life. When this occurs, the cartridge must be replaced to guarantee protection.

Pluggable

The ability to efficiently maintain equipment is a key focus topic for industrial facilities. For this reason, ABB OVR DIN rail SPDs (excluding data line products) now utilize pluggable cartridges. Should one or more cartridges reach end of life, the electrical circuit does not have to be isolated, nor does the whole device have to be removed. Simply pull the dead cartridge from its housing and plug in a new one.

Remote indication (Optional - "TS" designation)

This function, achieved by wiring an integrated 3-point 1A volt-free contact, enables the operational state of the SPD to be monitored remotely.

Technical features of the remote indicator

- 1 NO (normally open) contact and 1 NC (normally closed) contact
- Min. load: 12 VDC - 10 mA
- Max. load: 250 VAC - 1 A
- Connection cross section: 1.5 mm² (16 AWG)

Specifications

- **UL 1449 3rd Edition - Type 4 Recognized Component**
- I_{max} - 15kA and 40kA
- Maximum continuous operating voltage (U_c) - 175, 320, 440, 550 and 660 VAC
- Configuration - 1L, 2L, 3L, N, 1N, 2N, 3N

ABB recommends a multi-level approach to surge protection. Combining OVR DIN rail SPDs with the OVR NE12 enclosed SPD will ensure the facility or operation is fully protected.



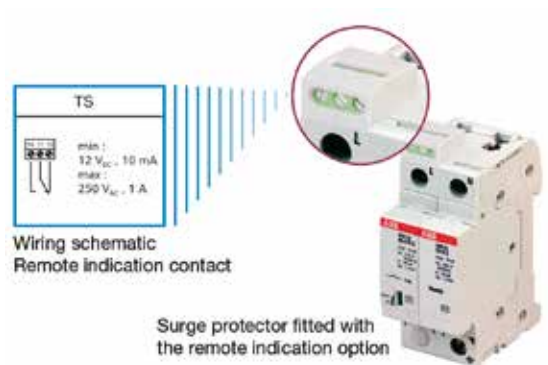
End-of-life indicator



NOTE: A surge protector that has reached end of life does not interrupt service, it simply disconnects itself, and the system is no longer protected.



NOTE: Pluggable surge protector cartridges are equipped with a "key" matched to each part number base, preventing incorrect replacements.



Product selection

OVR DIN rail SPD

Choosing the correct model

1) Determine the service voltage

Consult qualified personnel if the facility or operation service voltage is unknown.

2) Select the SPD maximum continuous operating voltage (MCOV, U_c)

The MCOV should correspond to the service voltage.

Example: If the service voltage is 480V Delta, an SPD with 550V or 660V MCOV will be required.

Surge protection devices must also provide a level of protection compatible with the withstand voltage of the equipment. This withstand voltage depends on the type of equipment and its sensitivity. The incoming surge protector may not provide adequate protection by itself, as certain electrical phenomena may greatly increase its residual voltage if cable lengths exceed 10m. A second SPD may be necessary. See Coordination below.

3) Select the SPD surge capacity (I_{max})

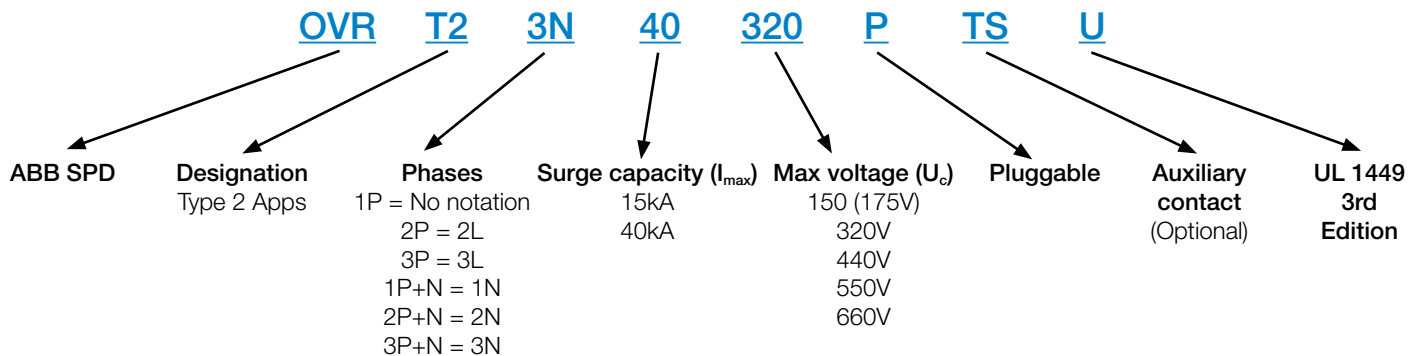
Surge capacity is the amount of energy the SPD can withstand from a single surge event. The higher the surge capacity, the longer the device will protect the system. A second surge protector may be required if the surge capacity of the first is not capable of diverting all surge current to ground. See Coordination below.

4) Remote monitoring (Optional)

Integrated auxiliary contact for remote monitoring available on models with "TS" designation.

Consult the Service Voltage and Location table on page 16 for help in the selection of SPDs.

OVR DIN rail SPD - Part number diagram



Complete facility protection

Installing surge protection at the main distribution panel is only the beginning of protecting the entire operation. As most transient surges are created internally, it is necessary to install surge protection at sub-distribution panels (equipment protection) to be fully protected. Stepping down the I_{max} level from the service entrance panel toward equipment to be protected is recommended.

For example, if a 40kA I_{max} SPD is installed in the main distribution panel, then 15kA I_{max} SPDs should be installed in sub-distribution panels for equipment protection.

Coordination

It may be necessary to add a second surge protector, wired to the incoming unit, to achieve the required voltage protection and/or surge capacity. For Type 2 or 4 SPDs, installing this second unit a minimum of 1m from the first unit will allow the two to work together, achieving the required protection.

Wiring rules

The impedance of the cables increases the voltage across the connected equipment. Therefore, the length of the cable between the surge protector and the equipment should be minimized.

The surge protective device should be installed as close to the equipment to be protected as possible. If this is not possible (the equipment is over 30m from the panel), then a second surge protector must be installed.

Product selection

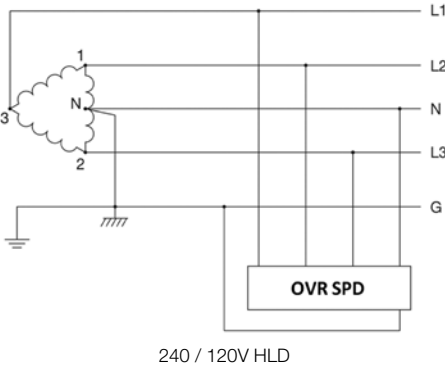
Service voltage and location

Service voltage and location

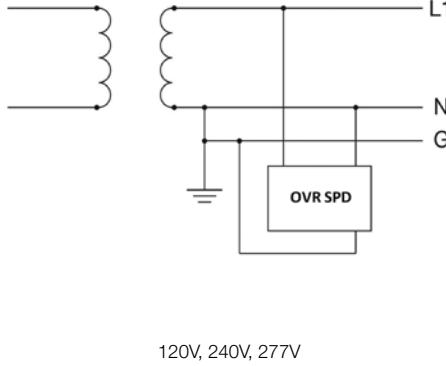
Network	Service voltage	Number of wires	Service entrance	Main distribution panel	Sub-distribution panel
			OVR NE12 enclosed SPD	OVR DIN rail SPD	OVR DIN rail SPD
Delta	240/120V HLD	4W+G	----	OVRT23N40320PTSU	OVRT23N15320PU
	240V	3W+G	----	OVRT23L40320PTSU	OVRT23L15320PU
	480V	3W+G	OVRNE12320480D(X) OVRNE12160480D(X)	OVRT23L40550PTSU	OVRT23L40550PTSU
	600V	3W+G	----	3 x OVRT240660PTSU	3 x OVRT240660PTSU
Single phase	120V	2W+G	----	OVRT21N40150PTSU	OVRT21N15150PU
	240V	2W+G	----	OVRT21N40320PTSU	OVRT21N15320PU
	277V	2W+G	----	OVRT21N40320PTSU	OVRT21N15320PU
Split phase	240/120V	3W+G	OVRNE12320120SP(X) OVRNE12160120SP(X)	OVRT22N40150PTSU	OVRT22N15150PU
	480/240V	3W+G	----	OVRT22N40320PTSU	OVRT22N15320PU
Wye	208/120V	4W+G	----	OVRT23N40150PTSU	OVRT23N15150PU
	480/277V	4W+G	OVRNE12320277Y(X) OVRNE12160277Y(X)	OVRT23N40320PTSU	OVRT23N15320PU
	600/347V	4W+G	----	OVRT23N40440PTSU	OVRT23N40440PTSU

General wiring diagrams - DIN rail devices

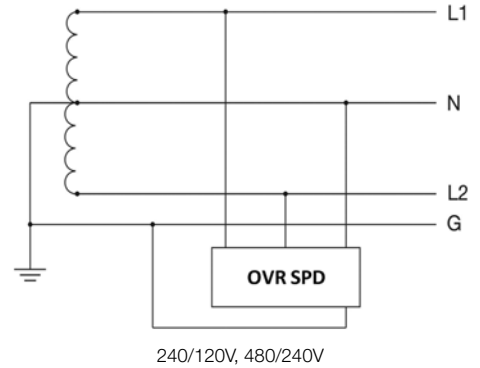
Delta



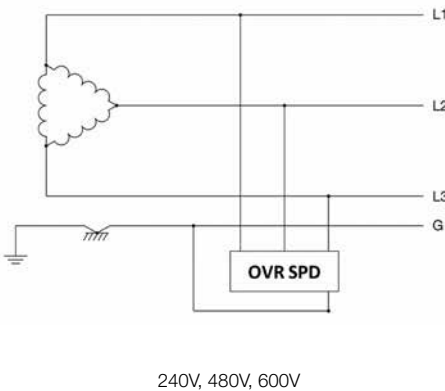
Single phase



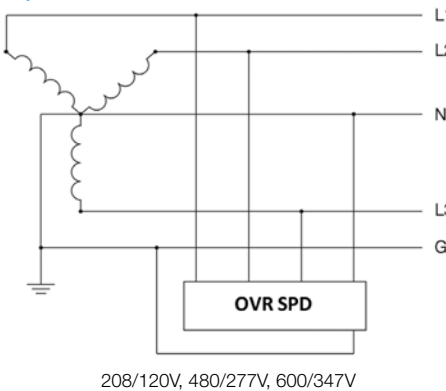
Split phase



Delta



Wye



NOTE: Multiple pole SPDs shown. Wiring diagrams for reference only.

Product selection

OVR DIN rail SPD

Consult the Service Voltage and Location table on page 16 for proper SPD selection. The following tables also present information on service voltage compatibility. Please note that multiple SPDs may be required depending on service voltage. Contact ABB Technical Support with any questions.

One pole

Catalog number	Service voltage ¹⁾	Max. discharge current (I_{max} , 8/20 μ s, kA)	Aux. contact - remote monitoring	Replacement cartridge
OVRT215150PU	120V Single Phase, 240/120V Split Phase, 208/120V Wye	15	No	OVRT215150CU
OVRT215320PU	240/120V HLD, 240V Delta, 240V Single Phase, 277V Single Phase, 480/240V Split Phase, 480/277V Wye	15	No	OVRT215320CU
OVRT240150PU	120V Single Phase, 240/120V Split Phase, 208/120V Wye	40	No	OVRT240150CU
OVRT240150PTSU	120V Single Phase, 240/120V Split Phase, 208/120V Wye	40	Yes	OVRT240150CU
OVRT240320PU	240/120V HLD, 240V Delta, 240V Single Phase, 277V Single Phase, 480/240V Split Phase, 480/277V Wye	40	No	OVRT240320CU
OVRT240320PTSU	240/120V HLD, 240V Delta, 240V Single Phase, 277V Single Phase, 480/240V Split Phase, 480/277V Wye	40	Yes	OVRT240320CU
OVRT240440PTSU	600/347V Wye	40	Yes	OVRT240440CU
OVRT240550PTSU	480V Delta	40	Yes	OVRT240550CU
OVRT240660PTSU	600V Delta	40	Yes	OVRT240660CU

1) May require multiple SPDs

Two pole

Catalog number	Service voltage ¹⁾	Max. discharge current (I_{max} , 8/20 μ s, kA)	Aux. contact - remote monitoring	Replacement cartridge ²⁾
OVRT22L15150PU	120V Single phase, 240/120V Split phase, 208/120V Wye	15	No	OVRT215150CU
OVRT22L15320PU	240/120V HLD, 240V Delta, 240V Single phase, 277V Single phase, 480/240V Split phase, 480/277V Wye	15	No	OVRT215320CU
OVRT22L40150PTSU	120V Single phase, 240/120V Split phase, 208/120V Wye	40	Yes	OVRT240150CU
OVRT22L40320PTSU	240/120V HLD, 240V Delta, 240V Single phase, 277V Single phase, 480/240V Split phase, 480/277V Wye	40	Yes	OVRT240320CU

1) May require multiple SPDs

2) May require up to two replacement cartridges

Three pole

Catalog number	Service voltage ¹⁾	Max. discharge current (I_{max} , 8/20 μ s, kA)	Aux. contact - remote monitoring	Replacement cartridge ²⁾
OVRT23L15150PU	240/120V Split phase, 208/120V Wye	15	No	OVRT215150CU
OVRT23L15320PU	240/120V HLD, 240V Delta, 480/240V Split phase, 480/277V Wye	15	No	OVRT215320CU
OVRT23L40150PTSU	240/120V Split phase, 208/120V Wye	40	Yes	OVRT240150CU
OVRT23L40320PTSU	240/120V HLD, 240V Delta, 480/240V Split phase, 480/277V Wye	40	Yes	OVRT240320CU
OVRT23L40440PTSU	240V Delta, 480/240V Split phase, 600/347V Wye	40	Yes	OVRT240440CU
OVRT23L40550PTSU	480V Delta	40	Yes	OVRT240550CU

1) May require multiple SPDs

2) May require up to three replacement cartridges

Product selection

OVR DIN rail SPD

One pole + neutral

Catalog number	Service voltage ¹⁾	Max. discharge current (I_{max} , 8/20 μ s, kA)	Aux. contact - remote monitoring	Replacement cartridge ²⁾
OVRT21N15150PU	120V Single phase, 240/120V Split phase, 208/120V Wye	15	No	OVRT215150CU, OVRT270NCU
OVRT21N15320PU	240/120V HLD, 240V Single phase, 277V Single phase, 480/240V Split phase, 480/277V Wye	15	No	OVRT215320CU, OVRT270NCU
OVRT21N40150PTSU	120V Single phase, 240/120V Split phase, 208/120V Wye	40	Yes	OVRT240150CU, OVRT270NCU
OVRT21N40320PTSU	240/120V HLD, 240V Single phase, 277V Single phase, 480/240V Split phase, 480/277V Wye	40	Yes	OVRT240320CU, OVRT270NCU
OVRT21N40440PTSU	600/347V Wye	40	Yes	OVRT240440CU, OVRT270NCU
OVRT21N40550PTSU	600/347V Wye	40	Yes	OVRT240550CU, OVRT270NCU
OVRT21N40660PTSU	600/347V Wye	40	Yes	OVRT240660CU, OVRT270NCU

1) May require multiple SPDs

2) May require up to one phase and one neutral replacement cartridges

Two pole + neutral

Catalog number	Service voltage ¹⁾	Max. discharge current (I_{max} , 8/20 μ s, kA)	Aux. contact - remote monitoring	Replacement cartridge ²⁾
OVRT22N15150PU	240/120V Split phase, 208/120V Wye	15	No	OVRT215150CU, OVRT270NCU
OVRT22N15320PU	240/120V HLD, 480/240V Split phase, 480/277V Wye	15	No	OVRT215320CU, OVRT270NCU
OVRT22N40150PTSU	240/120V Split phase, 208/120V Wye	40	Yes	OVRT240150CU, OVRT270NCU
OVRT22N40320PTSU	240/120V HLD, 480/240V Split phase, 480/277V Wye	40	Yes	OVRT240320CU, OVRT270NCU
OVRT22N40440PTSU	600/347V Wye	40	Yes	OVRT240440CU, OVRT270NCU
OVRT22N40550PTSU	600/347V Wye	40	Yes	OVRT240550CU, OVRT270NCU
OVRT22N40660PTSU	600/347V Wye	40	Yes	OVRT240660CU, OVRT270NCU

1) May require multiple SPDs

2) May require up to two phase and one neutral replacement cartridges.

Product selection

OVR DIN rail SPD

Three pole + neutral

Catalog number	Service voltage	Max. discharge current (I_{max} , 8/20 μ s, kA)	Aux. contact - remote monitoring	Replacement cartridge ¹⁾
OVRT23N15150PU	208/120V Wye	15	No	OVRT215150CU OVRT270NCU
OVRT23N15320PU	480/277V Wye, 240/120V HLD	15	No	OVRT215320CU OVRT270NCU
OVRT23N40150PTSU	208/120V Wye	40	Yes	OVRT240150CU OVRT270NCU
OVRT23N40320PTSU	480/277V Wye, 240/120V HLD	40	Yes	OVRT240320CU OVRT270NCU
OVRT23N40440PTSU	600/347V Wye	40	Yes	OVRT240440CU OVRT270NCU
OVRT23N40550PTSU	600/347V Wye	40	Yes	OVRT240550CU OVRT270NCU
OVRT23N40660PTSU	600/347V Wye	40	Yes	OVRT240660CU OVRT270NCU

1) May require up to three phase and one neutral replacement cartridges

Neutral

Catalog number	Service voltage	Max. discharge current (I_{max} , 8/20 μ s, kA)	Aux. contact - remote monitoring	Replacement cartridge
OVRT270NPU	HLD, Single Phase, Split Phase and Wye	70	No	OVRT270NCU

Replacement cartridges

Catalog number
OVRT215150CU
OVRT215320CU
OVRT240150CU
OVRT240320CU
OVRT240440CU
OVRT240550CU
OVRT240660CU
OVRT270NCU

NOTE: These replacement cartridges are usable only with the new OVR DIN rail product range shown in this brochure.



Technical data

OVR DIN rail SPD

Electrical characteristics

Type / Test class		UL 1449 3rd Ed. - Type 4 for Type 2 apps IEC 61 643-1 2nd Ed - T2 / II
Frequency	Hz	50-60
Response time	ns	<25
Operating current (I_c)	mA	<0.1
Short circuit withstand current (I_{sc})	kA	200
Integrated thermal disconnecter		Yes
State indicator		Yes
Safety reserve		No
Remote indicator		Optional
Disconnecter curve	Circuit breaker - B or C A	≤ 125
	Class J fuse A	≤ 100

Mechanical characteristics

Wire range - solid wire	AWG	4-14
Wire range - stranded wire	AWG	6-14
Stripping length	in	0.5
Tightening torque	in-lbs	24.5
Degree of protection		NEMA 1

Remote indicator (Optional)

Type of contact		1 NO / 1 NC
Minimum load		12 VDC / 10 mA
Maximum load		250 VAC / 1 A
Connection cross section	AWG	16

Miscellaneous characteristics

Operating temperature	F	-40° to 176°
Maximum altitude	ft	6562
Color of housing / Fire resistance according to UL 94		Gray RAL 7035 / V-0
Reference standards		UL 1449 3rd Ed, IEC 61 643-1 2nd Ed

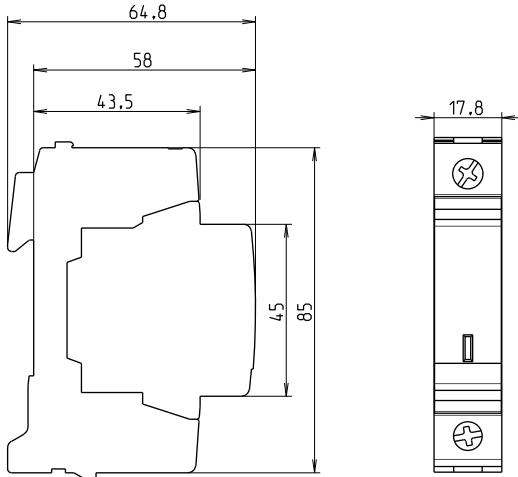
Technical data

OVR DIN rail SPD

Catalog number	Max. discharge current (I_{max} , 8/20 μ s, kA)	Maximum continuous operating voltage (U_c)	Voltage protection rating, kV
OVRT215150PU	15	175	0.6
OVRT215320PU	15	320	1.0
OVRT240150PU	40	175	0.6
OVRT240150PTSU	40	175	0.6
OVRT240320PU	40	320	1.0
OVRT240320PTSU	40	320	1.0
OVRT240440PTSU	40	440	1.3
OVRT240550PTSU	40	550	1.7
OVRT240660PTSU	40	660	1.9
OVRT270NPU	70	255	1.2
OVRT22L15150PU	15	175	0.6
OVRT22L15320PU	15	320	1.0
OVRT22L40150PTSU	40	175	0.6
OVRT22L40320PTSU	40	320	1.0
OVRT23L15150PU	15	175	0.6
OVRT23L15320PU	15	320	1.0
OVRT23L40150PTSU	40	175	0.6
OVRT23L40320PTSU	40	320	1.0
OVRT23L40440PTSU	40	440	1.3
OVRT23L40550PTSU	40	550	1.7
OVRT21N15150PU	15	175	0.6 / 0.7 (L-N / L-G)
OVRT21N15320PU	15	320	1.0 / 1.1 (L-N / L-G)
OVRT21N40150PTSU	40	175	0.6 / 0.7 (L-N / L-G)
OVRT21N40320PTSU	40	320	1.0 / 1.1 (L-N / L-G)
OVRT21N40440PTSU	40	440	1.3 / 1.4 (L-N / L-G)
OVRT21N40550PTSU	40	550	1.7 / 1.8 (L-N / L-G)
OVRT21N40660PTSU	40	660	1.9 / 2.0 (L-N / L-G)
OVRT22N15150PU	15	175	0.6 / 1.2 / 0.7 (L-N / N-G / L-G)
OVRT22N15320PU	15	320	1.0 / 1.2 / 1.1 (L-N / N-G / L-G)
OVRT22N40150PTSU	40	175	0.6 / 1.2 / 0.7 (L-N / N-G / L-G)
OVRT22N40320PTSU	40	320	1.0 / 1.2 / 1.1 (L-N / N-G / L-G)
OVRT22N40440PTSU	40	440	1.3 / 1.2 / 1.4 (L-N / N-G / L-G)
OVRT22N40550PTSU	40	550	1.7 / 1.2 / 1.8 (L-N / N-G / L-G)
OVRT22N40660PTSU	40	660	1.9 / 1.2 / 2.0 (L-N / N-G / L-G)
OVRT23N15150PU	15	175	0.6 / 1.2 / 0.7 (L-N / N-G / L-G)
OVRT23N15320PU	15	320	1.0 / 1.2 / 1.1 (L-N / N-G / L-G)
OVRT23N40150PTSU	40	175	0.6 / 1.2 / 0.7 (L-N / N-G / L-G)
OVRT23N40320PTSU	40	320	1.0 / 1.2 / 1.1 (L-N / N-G / L-G)
OVRT23N40440PTSU	40	440	1.3 / 1.2 / 1.4 (L-N / N-G / L-G)
OVRT23N40550PTSU	40	550	1.7 / 1.2 / 1.8 (L-N / N-G / L-G)
OVRT23N40660PTSU	40	660	1.9 / 1.2 / 2.0 (L-N / N-G / L-G)

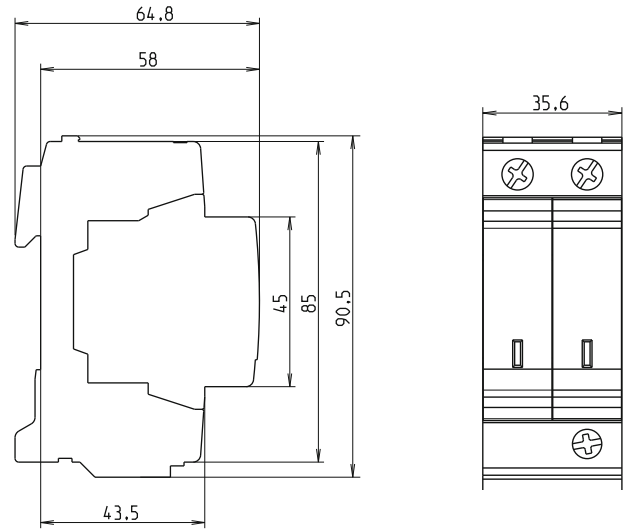
Approximate dimensions OVR DIN rail SPD

One pole

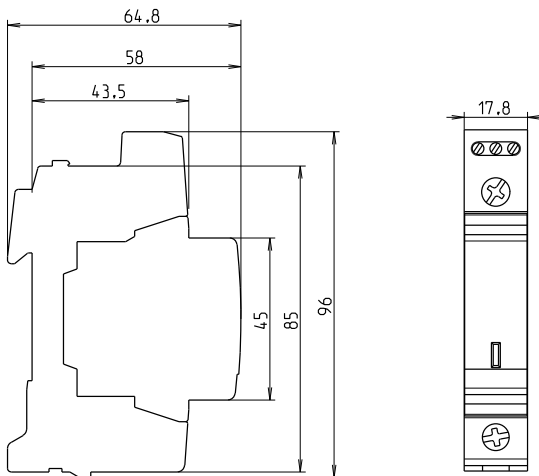


OVRT215150PU
OVRT215320PU
OVRT240150PU
OVRT240320PU
OVRT270NPU

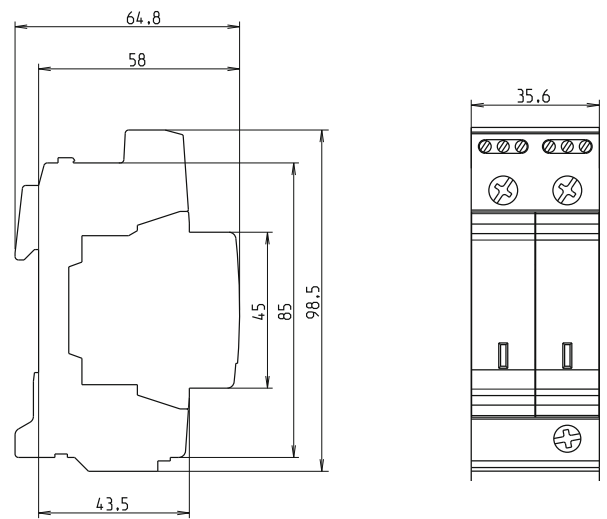
Two pole



OVRT22L15150PU
OVRT22L15320PU

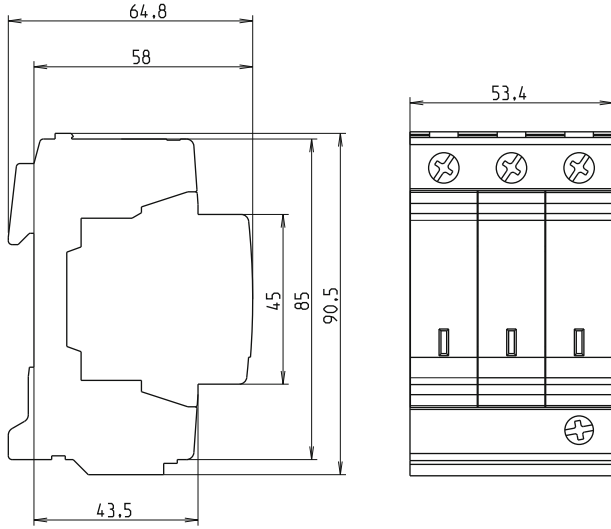


OVRT240150PTSU
OVRT240320PTSU
OVRT240440PTSU
OVRT240550PTSU
OVRT240660PTSU



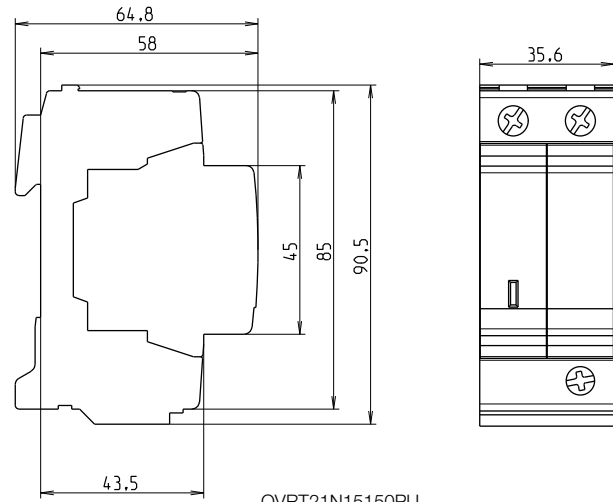
OVRT22L40150PTSU
OVRT22L40320PTSU

Three pole

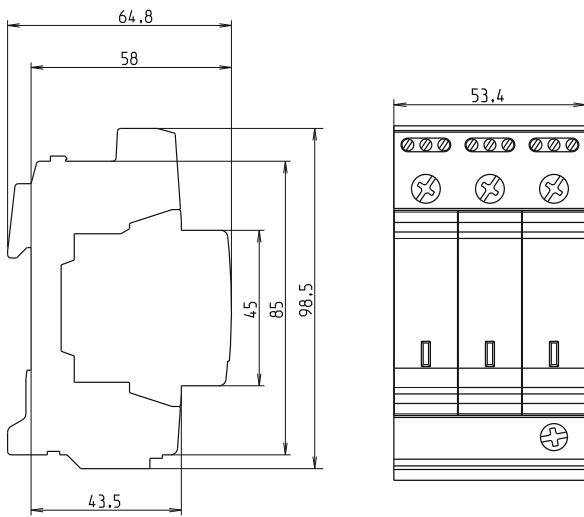


OVRT23L15150PU
OVRT23L15320PU

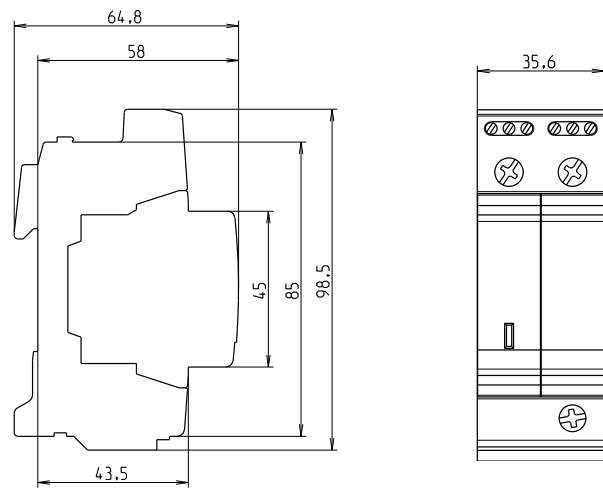
One pole + neutral



OVRT21N15150PU
OVRT21N15320PU



OVRT23L40150PTSU
OVRT23L40320PTSU
OVRT23L40440PTSU
OVRT23L40550PTSU

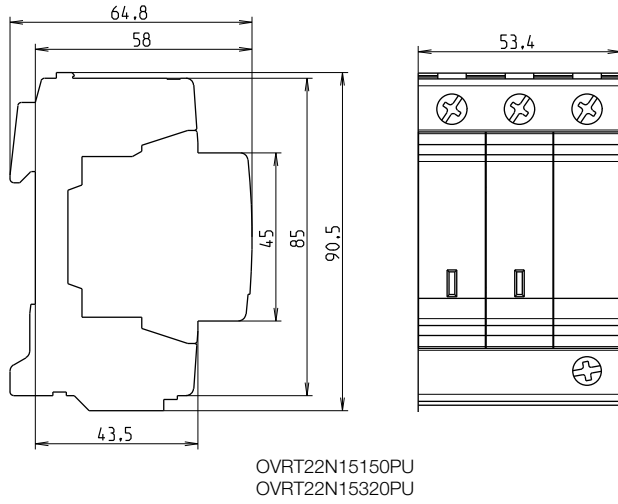


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OVRT21N40320PTSU
OVRT21N40440PTSU
OVRT21N40550PTSU
OVRT21N40660PTSU

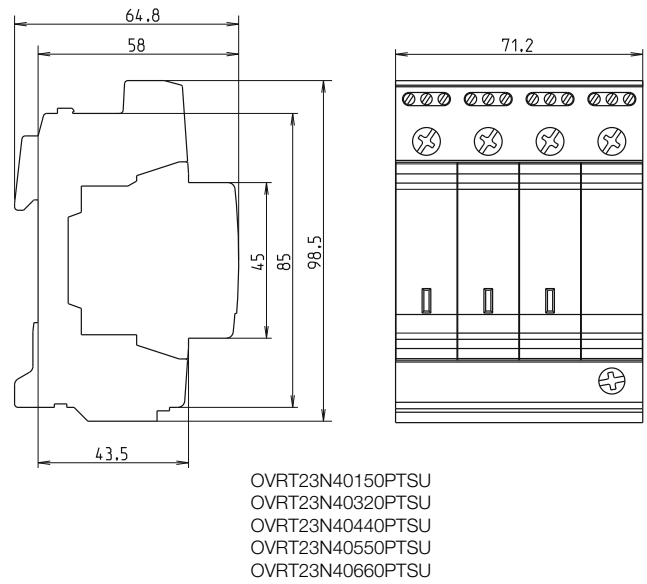
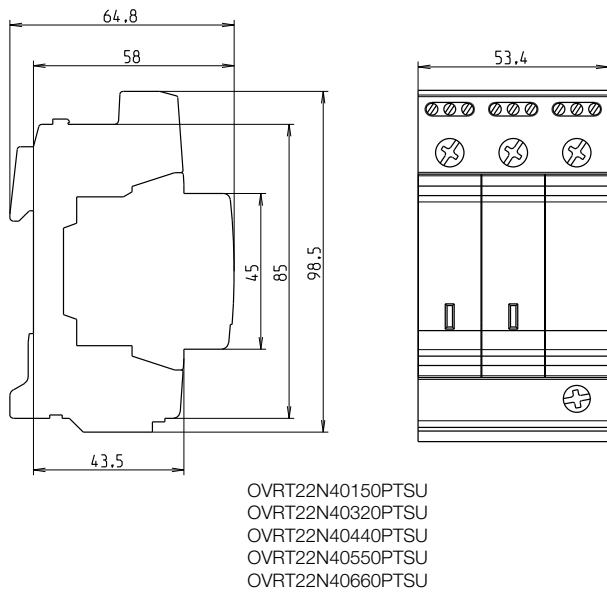
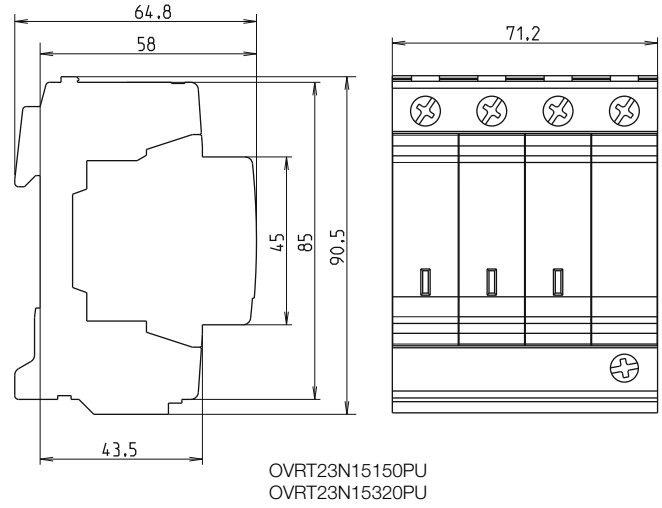
Approximate dimensions

OVR DIN rail SPD

Two pole + neutral



Three pole + neutral



UL 1449 2nd Edition to 3rd Edition

Cross reference

Previous ABB catalog number - UL 1449 2nd Edition parts	New ABB catalog number - UL 1449 3rd Edition parts	Previous ABB catalog number - UL 1449 2nd Edition parts	New ABB catalog number - UL 1449 3rd Edition parts
OVR15150	OVRT215150PU	OVR3L15275P	OVRT23L15320PU
OVR15150SP		OVR3L40275SP	OVRT23L40320PTSU
OVR15275	OVRT215320PU	OVR3L65275SP	
OVR40150P	OVRT240150PU	OVR3N15150	OVRT23N15150PU
OVR40150		OVR3N15320	OVRT23N15320PU
OVR40150SP		OVR3N40150SP	OVRT23N40150PTSU
OVR65150SP		OVR3N40320PTS	OVRT23N40320PTSU
OVR40150SPTS		OVR3N15275	
OVR40275P	OVR3N40320P		
OVR40275SP	OVR3N40320SPTS		
OVR40-320P	OVR3N100320SPTS		
OVR65275SP	OVR3N40275SP		
OVR100275SP	OVR3N65275SP		
OVR40320SP	OVR3N40320SP		
OVR65320SP	OVR3N65320SP		
OVR100320SP	OVR3N65320SPTS		
OVR40275SPTS	OVR3N100320SP		
OVR40320SPTS	OVRN340320SPTS		
OVR65275SPTS	OVRT240320PTSU	OVR3N40440SP	OVRT23N40440PTSU
OVR100320SPTS		OVRN365440S	
OVR15275PTS		OVR3N65440SP	
OVR40440	OVRT240440PTSU	OVR1N15150	OVRT21N15150PU
OVR40440SP		OVR1N15150SPTS	
OVR40-320D440P		OVR1N40150SP	OVRT21N40150PTSU
OVR40440SPTS		OVR1N40150SPTS	
OVR65440SPTS		OVR1N65150SP	
OVR15440		OVRN140275P	OVRT21N40320PTSU
OVR65440SP		OVRN140275PTS	
OVR100440S		OVR4L65440S	OVRT23L40440PTSU + OVRT240440PTSU
OVR100440SP			
OVR15550		OVRT240550PTSU	
OVR65550S			
OVR40550			
OVR40550S			
OVR40660PTS	OVRT240660PTSU		
OVR40660P			
OVR40660SP			
OVR40660SPTS			
OVR15660			
OVR40660S			
OVR65660S			
OVR65NP	OVRT270NPU		
OVR100NP			

Photovoltaic surge protection

OVR PV DIN rail SPD

Introduction

Providing power with photovoltaic (PV) solar panels is an ever increasing part of public utilities' renewable energy portfolios, designed to provide electricity in an economical manner, within the context of regulations and scarce resources. Installations are frequently in isolated areas, and combined with the large surface area of a group of panels, the risk of damage from direct and indirect lightning strikes is high.

To mitigate this risk, ABB recommends the installation of OVR PV surge protective devices on the DC portion of the system. ABB provides a wide range of surge protection devices that have been specifically designed for photovoltaic systems.

The main features of the OVR PV surge protectors are:

- Built-in thermal protection with 25A DC breaking capacity
- Removable cartridges for easy maintenance with no need to isolate the line
- Remote signalling contact for monitoring the operating status (TS versions)
- No subsequent short-circuit current
- No risk if the polarity is reversed
- Approvals: UL 1449 3rd Ed - Type 1, IEC



OVR PV DIN rail SPD

Catalog number	Maximum continuous operating voltage, U_{cpv}	Max. discharge current (I_{max} , 8/20 μ s, kA)	Aux. contact - remote monitoring	Number of poles	Replacement cartridge
OVRPV15600PU	600	15	No	3	OVRPV15600CU
OVRPV15600PTSU	600	15	Yes	3	OVRPV15600CU
OVRPV40600PU	600	40	No	3	OVRPV40600CU
OVRPV40600PTSU	600	40	Yes	3	OVRPV40600CU
OVRPV15800PU	800	15	No	3	OVRPV15800CU
OVRPV15800PTSU	800	15	Yes	3	OVRPV15800CU
OVRPV40800PU	800	40	No	3	OVRPV40800CU
OVRPV40800PTSU	800	40	Yes	3	OVRPV40800CU
OVRPV151000PU	1000	15	No	3	OVRPV151000CU
OVRPV151000PTSU	1000	15	Yes	3	OVRPV151000CU
OVRPV401000PU	1000	40	No	3	OVRPV401000CU
OVRPV401000PTSU	1000	40	Yes	3	OVRPV401000CU

Replacement cartridges

Catalog number

OVRPV15600CU
 OVRPV15800CU
 OVRPV151000CU
 OVRPV40600CU
 OVRPV40800CU
 OVRPV401000CU

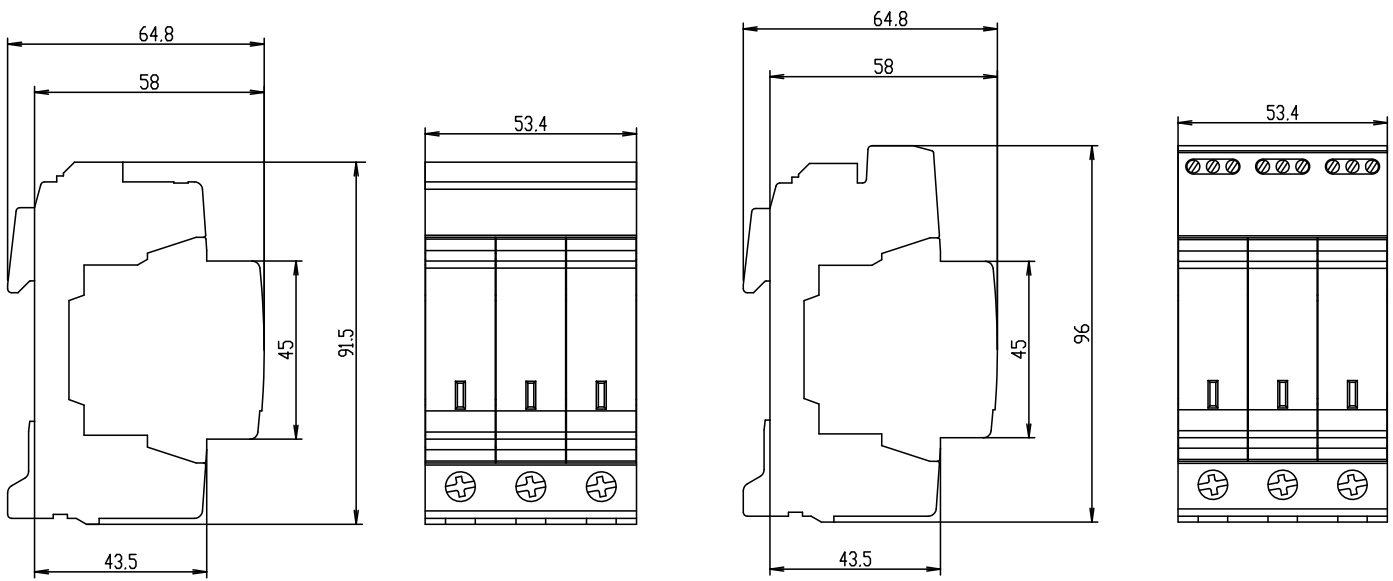
NOTE: These replacement cartridges are only usable with the new OVR PV DIN rail product range shown in this brochure.



Installation of OVR SPD on photovoltaic networks



OVR PV approximate dimensions



OVRPV15600PU
OVRPV40600PU
OVRPV15800PU
OVRPV40800PU
OVRPV151000PU
OVRPV401000PU

OVRPV15600PTSU
OVRPV40600PTSU
OVRPV15800PTSU
OVRPV40800PTSU
OVRPV151000PTSU
OVRPV401000PTSU

Technical data

OVR PV DIN rail SPD

Electrical characteristics

Type of networks		Photovoltaic - DC side
Number of poles / Type of current		3 / DC
Type / Test class		UL 1449 3rd Ed. - Type 1 IEC 61 643-11 - T2 / II
Follow current interrupt rating (I_n)	A	None
Response time	ns	<25
Ground residual current (I_{PE})	μ A	< 50
Short circuit withstand current (I_{scwpv})	kA	10
Integrated thermal disconnecter		Yes
State indicator		Yes
Safety reserve		No
Remote indicator		Optional
Overcurrent protection ①		
	Circuit breaker - B or C curve	A
	Class J fuse	A
		Not required
		Not required

Mechanical characteristics

Wire range - solid wire	AWG	4-14
Wire range - stranded wire	AWG	6-14
Stripping length	in	0.5
Tightening torque	in-lbs	24.5

Remote indicator (Optional)

Type of contact		1 NO / 1 NC
Minimum load		12 VDC / 10 mA
Maximum load		250 VAC / 1 A
Connection cross section	AWG	16

Miscellaneous characteristics

Degree of protection		NEMA 1 / IP 20
Operating temperature	F	-40° to 176°
Maximum relative humidity	%	93
Maximum altitude	ft	6562
Weight	lb	0.75
Color of housing / Fire resistance according to UL 94		Gray RAL 7035 / V-0
Reference standards		UL 1449 3rd Ed / IEC 61 643-11 / UTE C 61-740-51

① UL approved without overcurrent protection. If continuity of service is preferred, a 10A gpv fuse is recommended.

Data/telecom surge protection

OVR Data/Telecom DIN rail SPD

Introduction

In order to ensure complete protection for equipment in a facility, telecommunication lines entering the installation must have surge protection. Doing so will keep computers, fax machines and other data and communications equipment safe.

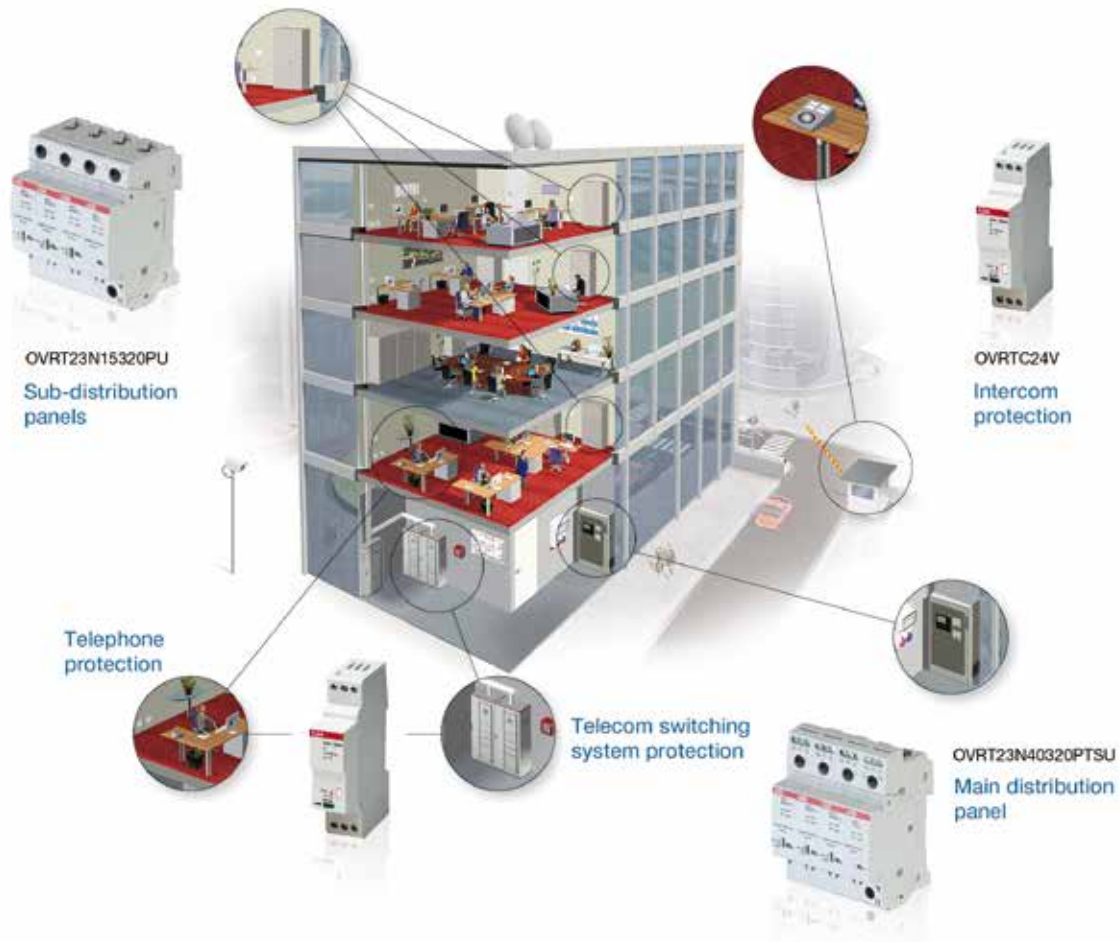
The main features of OVR data line surge protectors are:

- 10kA maximum discharge current
- Nominal voltage: 6, 12, 24, 48 and 200 VDC
- Visual life indicator
- UL 497B approved

OVR Data/Telecom DIN rail SPD

Catalog number	Maximum continuous operating voltage (U _c)	Max. discharge current (I _{max} , 8/20μs, kA)
OVRTC06V	7	10
OVRTC12V	14	10
OVRTC24V	27	10
OVRTC48V	53	10
OVRTC200V ¹⁾	220	10
OVRTC200FR	220	10

¹⁾ Connection type is parallel. All other parts, series.



Other documentation

OVR NE12 enclosed SPD



Installation and operation manual
OVR NE12 Enclosed Surge Protective
Devices - Type 2
1SXU430222M0201

OVR DIN rail SPD



Data sheets

1SXU430019D0201-1SXU430028D0201
1SXU430031D0201-1SXU430061D0201



Data sheets

1SXU430001L0201 - 1SXU430018L0201

OVR PV DIN rail SPD



Data sheets

1SXU430072D0201-1SXU430083D0201

OVR data/telecom DIN rail SPD



Data sheets

1SXU430084D0201-1SXU430089D0201

Notes

Notes

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