

# 瞬时过电压保护 Protection Against Transient Overvoltages

OVR 电涌保护器  
OVR Surge Protective Device (SPD)

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线路保护产品



# 过电压：可怕回忆只会成 Overvoltages: no more

ABB 为保护主电源、次级电源线路以及电话和数据传输线路上的设备免于瞬时过电压侵害，采用现代工艺研制和进一步扩展它的产品系列。

所有电气设施都会受到过电压的影响。过电压可能产生于：

- 大气层放电 (闪电)
- 开关的分断操作
- 电路本身的寄生干扰

虽然这些过电压的能量通常很低，但是它们足以对电气负载产生极坏的损害，包括对敏感的电气和电子部件的损伤甚至损毁。这些器件通常在一些很昂贵的设备中：如家居和服务范围里的电脑，电视机，音响系统和电话交换箱，以及工业领域中的报警系统，控制单元和可编程控制系统，更不用说用于农业，畜牧业，冷藏库和水泵站中的自动化系统等等。

从安装的角度看，OVR电涌保护器很容易安装。ABB 提供两种不同的型式，一种采用固定式的设计，另一种是采用插拔式结构。它们适合最大放电电流 (10、15、40、65 和 100kA [8/20 $\mu$ s])，有单相和 3 相两个类型，同时提供共模保护 (相线对地，中性线对地) 及差模保护 (相线对中性线) 两种模式。整个保护也可以采用安装多级保护系统 (若干保护水平) 来获得。事实上，我们知道在 TT 和 TN-S 系统中相线和中性线之间的瞬时过电压是很常见的，它与对地过电压一样危险。在这些情况下，需要差模保护以保证用户和设备得到完全保护。

ABB has modernised and further extended its range of devices for protecting equipment on main and secondary power lines and telephone and data transmission lines against the risks of transient overvoltages.

All electrical installations can be subject to transient overvoltages that may originate in:

- atmospheric discharges (lightning)
- switch operations
- parasitic interference in the circuits themselves.

Although these overvoltages often have a low energy content, they can generate severe damage to electric loads that ranges from the deterioration to the destruction of the most sensitive electrical and electronic components. Such devices are often found in the most costly equipment: computers, televisions, hi-fi systems and telephone switchboards in the domestic and service sector, as well as alarm systems, control units and programmable logic switch for industry, not to mention automation systems for agriculture and livestock farming, freezers and pumping stations etc.

From an installation standpoint, OVR SPD are easy to install. ABB offers two different versions, one of which is a compact design while the other employs a system of withdrawable cartridges. A range of different models is offered for both, to suit the maximum discharge current (10, 15, 40, 65 and 100 kA [8/20  $\mu$ s]), available in either single-phase or three-phase versions. The protection offered is of the common (across live conductor to earth or neutral to earth) and differential mode (across live and neutral conductors). Total protection can be achieved also by installing a "cascaded" protection system (on several levels). It is in fact known that transient overvoltages across a phase and neutral are common in TT and TN-S systems and as dangerous as those to earth. In these cases differential mode protective is necessary to ensure complete protection of users and equipment.

# 成为过去 e than a nasty memory



安装 OVR 电涌保护器同样带来经济上的效益，因为对系统进行保护和预防潜在损害要胜于花费金钱去维修或者蒙受停产和营业中断的损失。全赖保护器上的工作状态显示装置所提供的本地（在保护器上）和远程（使用信号触点）指示，因此用户会得到更可靠的保护。OVR 系列电涌保护器具有结构紧凑（最多4个模块）、接线快速方便、以及可以安装到住宅、公寓的配电箱等优点。同样，插拔式 OVR...P 系列只需更换旧的芯体，便可省却维修的时间和成本。OVR 电涌保护器符合国际标准 IEC 61643-1 和国家标准 GB50057（2000 年版）。

The installation of the OVR SPD brings also about some economic benefits since it is better to protect the system and prevent potential damage than to have to tackle costly repairs and replacements or suffer from interrupted business or lost production. Thanks to the operating status indication offered by the SPD both locally (on the devices themselves) and remotely (using an accessory), the protection obtained is even more reliable. The OVR SPD offer the advantages of compact dimensions (max 4 modules) and fast and easy wiring, characteristics that mean they can also be installed in apartment consumer units. The new withdrawable-cartridge OVR...P SPD also guarantee the easy replacement of the old cartridge only, cutting maintenance times and costs. It is also important to note that the OVR SPD comply with the International Standard IEC 61643-1 and National Standard GB50057 (2000).

# OVR 电涌保护器的选用原则

## Principles for Choosing OVR SPD

为了使每种具体的应用都选择到正确的保护，需要考虑以下参数：

- 安装设备的类型和电气特征
- 保护器的具体电气参数
- 最大放电电流  $I_{max}$  和电压保护水平  $U_p$  (当电涌保护器动作时，SPD 两端上的最高限制电压)
- 地理区域中受雷击的危险程度
- 受保护设备的价值及其被破坏后的经济损失
- 接闪器是否同时存在

为了正确评估安装的要求，必须要把这些参数联系在一起分析。这不但让你针对个别保护器作出正确的选择，还可以评估进行多级保护水平的保护系统是否合适。

The following parameters need be taken into consideration in order to choose the appropriate protective devices for each specific application:

- type and electrical characteristics of the equipment in the installation
- specific electrical parameters of the protective device
- maximum discharge current  $I_{max}$  and voltage protection level  $U_p$  (maximum voltage that remains applied to the equipment in the installation while the protective device is discharging)
- lightning exposure risk of the geographical area
- value of the equipment to be protected and economic consequence of the damage
- presence of lightning conductor

These parameters must be analysed in relation to one another in order to evaluate your requirements correctly. This not only allows you to make the correct choice of each individual protective device but also to assess whether it would be appropriate to implement a multilevel (cascaded) protection system.

### 选择示例：使用固定式 OVR 电涌保护器进行两级或多级保护水平的保护

#### Selection example: protection on two or more levels using the compact version of OVR SPD

作为具体的示例，我们考虑两种保护器，分别具有 65kA ( $U_p = 2kV$ ) 和 15kA ( $U_p = 1.2kV$ ) 的最大放电电流。这些值表示保护器寿命结束需要替换前的运行能力。每个保护器只能承受一次最大电流的放电 (15kA 或 65kA) 或 20 次额定瞬时电流的放电 (分别为 5kA 和 20kA)。

如果被保护设备安装在次级线路上，它的绝缘电压小于 2kV，那么就需要使用 15kA 的保护器 ( $U_p = 1.2kV$ )。但是，安装在高危地方，也就是说过电压出现频率高的地方 (如经常闪电的地方)，会由于上述原因导致电涌保护器的寿命大大缩短。

这同样可能产生一个问题。当出现能量很大的过电压时，15kA 的保护器可能会来不及对被保护的负载进行保护就毁坏掉。在这种情况下，在次级线路前面的总电源线上安装 65kA 的保护器，以此实现两级保护水平的保护系统是最佳的解决方案。

通过安装多级保护水平的保护体系，如使用 15kA、40kA 和 65kA 的保护器，甚至可以得到更广泛，更有效的保护。

右侧的电路图是 3 级保护水平的多级保护的一个通用例子。为了体现完整性，同样提供了一个专用于电话和数据传输的例子。针对实际的安装要求和地区的危险，每一级保护也可以单独使用。例如，对于处于中/低风险地区的家庭和小型服务部门，第 2 级或第 3 级保护就已经足够了。

As a concrete example, let's consider the two types of protective devices with maximum discharge currents of 65 kA (residual voltage 2 kV) and 15 kA (residual voltage 1.2 kV) respectively. These values indicate the operating capacity of the protective device before it reaches the end of its life and needs to be replaced. Each protective device can only withstand a single maximum current discharge (15 kA or 65 kA) or 20 discharges at the rated transient discharge current (5 kA or 20 kA respectively).

If the equipment installed on the secondary line to be protected has an insulation voltage of less than 2 kV, it will be necessary to use the 15 kA protective device (1.2 kV residual voltage), which may, however, have too short an operating life for the above mentioned reasons if it is installed in a high-risk area, which is to say with high or very frequent overvoltages (areas with a high lightning risk, for example).

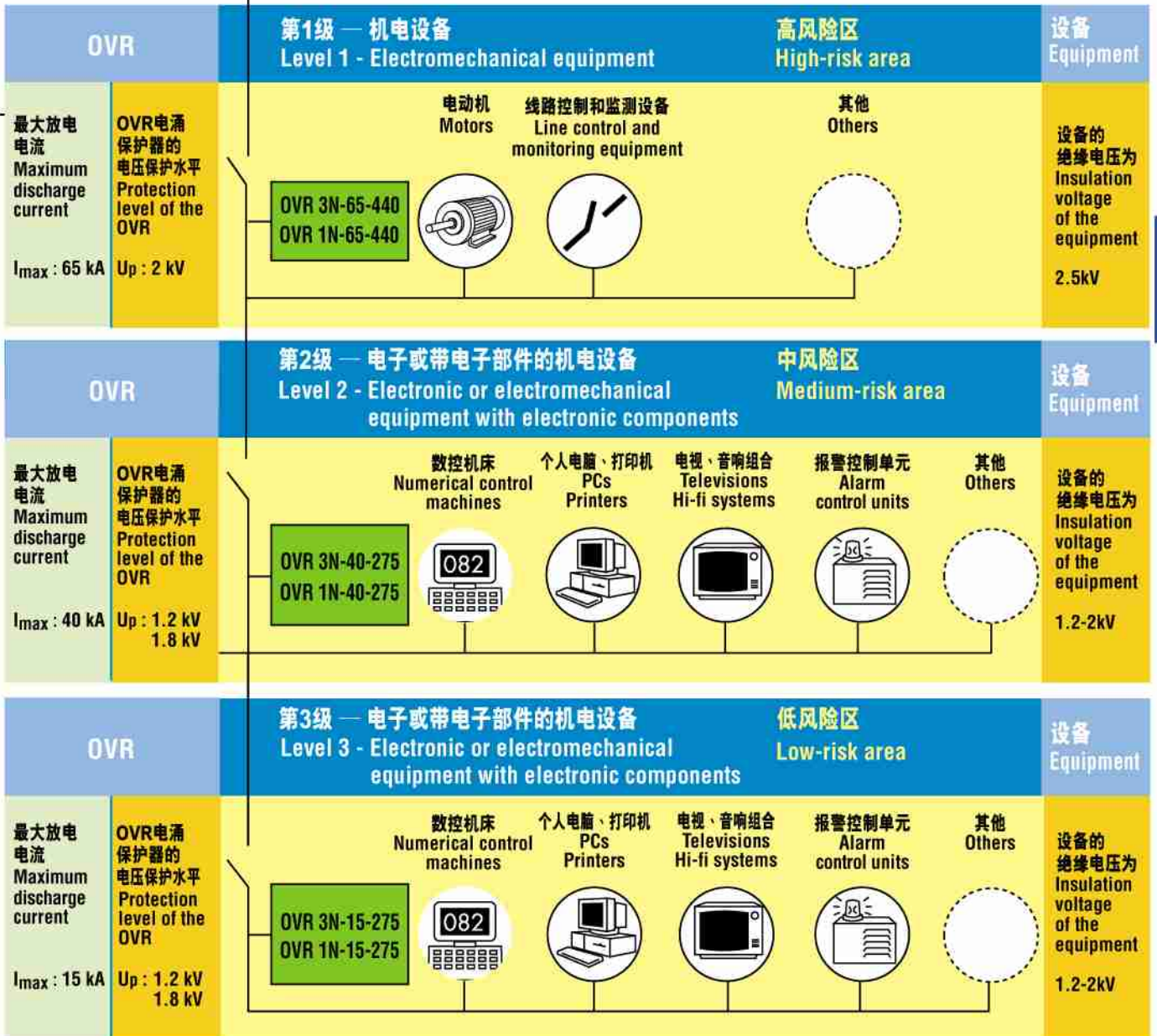
This would also cause a problem for the equipment in the installation. In the event of a high-energy overvoltage, the 15 kA protective device might reach the end of its service life immediately without managing to prevent damage to the electrical loads being protected. A two-level protection system could be the best solution in this case, obtained by installing the 65 kA protective device on the main power line upstream of the secondary line.

Even more extensive and effective protection could usefully be obtained by implementing cascaded systems that extend over more levels by, for example, using 15 kA, 40 kA and 65 kA protective devices.

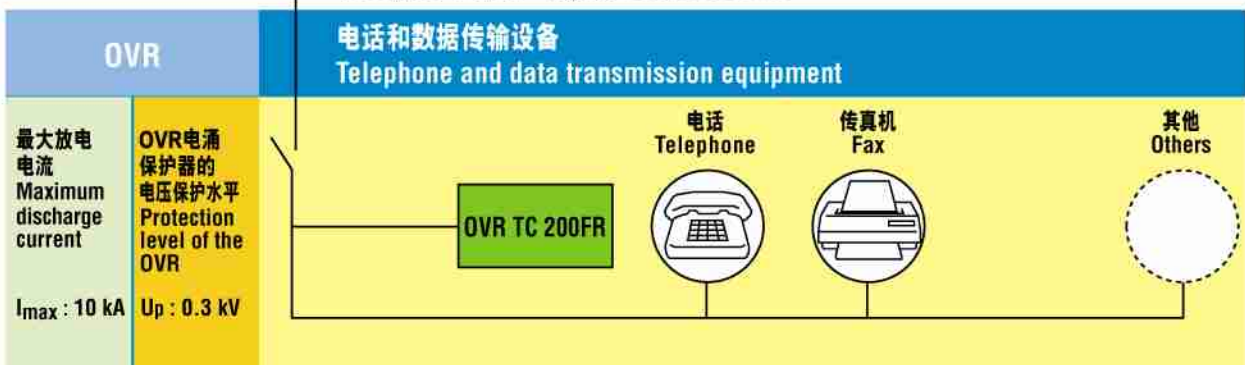
The alongside diagram shows a general example of cascaded protection on three levels. For the sake of completeness, a dedicated level is also shown for telephone and data transmission equipment. Each level can also be implemented individually to suit the actual installation requirements and risk level for the area. For example, level 2 and/or level 3 are often sufficient in residential and small service sector applications in medium/low-risk areas.

例 Example

230 V/400 V a.c. Line



48...200 V d.c. 电话线 Telephone Line



注：

电路图中设备的位置是以典型设备的绝缘电压作考虑的，每级OVR电涌保护器的电压保护水平 $U_p$ 需要考虑与绝缘电压的关系。实际操作上，应该参考每个被保护设备的铭牌上的数据（绝缘电压）。类似的考虑也适用于OVR...P 插拔式电涌保护器。

N.B.

The position of the equipment in the diagram takes into consideration the insulation voltage values of typical equipment, which need to be considered in relation to the protection level  $U_p$  of the OVR SPD. In practice, one should be guided by the rating plate data (insulation voltage) for each individual item to be protected.

Similar considerations apply regarding the use of OVR...P pluggable SPD.

## 闪电危险程度的定义 Definition of lightning risk levels

暴露于闪电的程度由每年每平方公里上出现闪电的次数 ( $N_g$ ) 决定。这数据可以从气象台获得。

大气层的危险程度和地理环境有关，应该认真评估。它可能会因为一些额外的因数而增加，如周围存在接闪器 (它使得用户必须强制性安装 65kA 的保护) 或者会产生瞬时过电压的设备。

同样应该注意的是，完全位于地下的供电网会对过电压敏感度稍低，但是当存在接闪器或体积庞大的物体接地时，危险程度会提高。因此，全为地下的供电网并不能免除过电压保护的需要。

总的来说，地区的风险越高，第一级保护遭受雷击的可能性越大。但选取 OVR 电涌保护器仍应做到安全、适用及经济。

The level of lightning exposure is defined by the number of lightning strokes per km<sup>2</sup> per year ( $N_g$ ). This level can be provided by the local meteorological offices. The average  $N_g$  level in Europe is 2.50 although it can even be higher than 10 in certain areas (Alps and mountainous areas).

The atmospheric risk level, which is defined in relation to the geographical area, should be evaluated carefully and possibly increased in relation to additional parameters such as, for example, the presence of nearby lightning conductors (which makes it compulsory to install 65 kA protection) or the presence of equipment in the installation that can generate transient overvoltage.

It should also be noted that a power supply network which is entirely underground is less sensitive to overvoltage, but that a higher risk level should be considered when lightning conductors or large objects connected to earth are present. Thus, a fully underground power supply network does not exempt from the need of over voltage protection.

In conclusion, the higher the risk level of the area, the higher the first level OVR SPD's  $I_{max}$  needs to be.



## 评估设备的价值 / 地区风险程度的比值 (只供参考) Evaluating the equipment cost/area risk level ratio (for reference only)

### 低风险区 Low-risk area

设备类型 Type of equipment		被保护设备的价值 (美元) Value of the equipment to be protected (in USD)		
		<1200	1200...5500	>5500
机电	Electromechanical	可选用 Optional	可选用 Optional	建议使用 Recommended
机电/电子	Electromechanical/ electronic	可选用 Optional	建议使用 Recommended	建议使用 Recommended
敏感电子	Sensitive Electronic	建议使用 Recommended	建议使用 Recommended	建议使用 Recommended

### 中风险区 Medium-risk area

设备类型 Type of equipment		被保护设备的价值 (美元) Value of the equipment to be protected (in USD)		
		<1200	1200...5500	>5500
机电	Electromechanical	可选用 Optional	建议使用 Recommended	建议使用 Recommended
机电/电子	Electromechanical/ electronic	可选用 Optional	建议使用 Recommended	强烈建议使用 Strongly recommended
敏感电子	Sensitive Electronic	建议使用 Recommended	强烈建议使用 Strongly recommended	强烈建议使用 Strongly recommended

### 高风险区 High-risk area

设备类型 Type of equipment		被保护设备的价值 (美元) Value of the equipment to be protected (in USD)		
		<1200	1200...5500	>5500
机电	Electromechanical	建议使用 Recommended	建议使用 Recommended	建议使用 Recommended
机电/电子	Electromechanical/ electronic	建议使用 Recommended	强烈建议使用 Strongly recommended	强烈建议使用 Strongly recommended
敏感电子	Sensitive Electronic	强烈建议使用 Strongly recommended	强烈建议使用 Strongly recommended	强烈建议使用 Strongly recommended

上面的图表 (纯粹用作示例) 表明合适的过电压保护系统之重要性与以下三个参数有关: 被保护设备的类型, 它们的价值和所在地区的风险。

在任何情况下都应谨记, 选择一级或多级的, 包括更高规格保护器 (如 65kA 保护器) 的系统都具体地取决于装置内设备成本与这些保护器成本之间的比较。其实, 仅使用低规格的保护器 (如 15kA 保护器) 在很多情况下都意味着冒险, 因为保护器本身可能会在短时间内损坏, 随之而来的是用户设备操作必需的安全性也会很快地降低。

The above table, which is provided purely by way of example, shows the importance of an appropriate overvoltage protection system in relation to three parameters: the type of equipment devices to be protected, their value and the area risk level.

It should in all cases be remembered that the choice of a system on one or more levels that also includes protective devices with higher specifications (such as 65 kA devices, for example) is justified in particular by the cost of the equipment in the installation compared to the cost of these protective devices. Indeed, only using protective devices with lower specifications (such as 15 kA protective devices, for example) will in many cases mean one runs the risk of the protective devices themselves deteriorating in a short period of time, with this being accompanied by a rapid fall in safety where the requisite operating condition of the user equipment is concerned.

# 用于保护设备的保护器 Protective Devices for Equipment

## 固定式电涌保护器 - 单极 Compact OVR - Single Pole



适用于 TN-C 或 IT 系统<sup>1)</sup>  
For use in TN-C or IT Systems<sup>1)</sup>

### 技术参数 Technical characteristics:

			OVR 15-275	OVR 15-440	OVR 40-275	OVR 40-440	OVR 65-275	OVR 65-440
额定电压	Rated voltage $U_N$	[V]	230	400	230	400	230	400
最大持续工作电压	Max con. operation voltage $U_c$	[V]	275	440	275	440	275	440
频率	Frequency	[Hz]	50	50	50	50	50	50
最大放电电流 (8/20 $\mu$ s)	Max discharge current $I_{max}$ (8/20 $\mu$ s)	[kA]	15	15	40	40	65	65
放电次数	No. of discharges $I_{max}$	[No.]	1	1	1	1	1	1
额定放电电流 (8/20 $\mu$ s)	Rated discharge current $I_N$ (8/20 $\mu$ s)	[kA]	5	5	10	10	20	20
放电次数	No. of discharges $I_N$	[No.]	20	20	20	20	20	20
内部短路 耐受电流	Int. short circuit withstand current	[kA]	10	10	25	25	25	25
电压保护水平	Protection level $U_p$	[kV]	1.2	1.8	1.2	1.8	1.5	2
响应时间	Response time	[ns]		< 20				
漏电流	Leakage current	[ $\mu$ A]		< 20				
后备保护	Back up protection		参见20页的表 Refer to table in P.20					
端子 相线/中性线 地线	Terminals P/N Earth	[mm <sup>2</sup> ] [mm <sup>2</sup> ]	16 (软线 flexible), 25 (硬线 rigid)					
防护等级	Degree of protection		IP 203					
阻燃等级	Fire resistance		V <sub>0</sub> (符合UL94)					
工作湿度	Humidity range		≤ 95%					
温度范围	Temperature	[°C]	-40...+80					
17.5 mm 模块	17.5 mm module	[No.]	1					
标准	Standards		IEC 61643-1, GB 50057 (2000年版)					

<sup>1)</sup> IT系统应选用Uc值为440V的OVR产品

<sup>1)</sup> Should use OVR with  $U_c = 440V$  in IT System



# 固定式电涌保护器 - 多极 Compact OVR - Multi-Pole

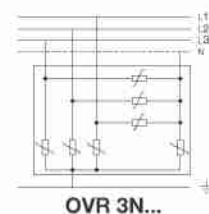
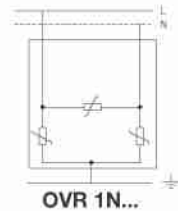
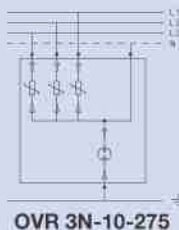


## 适用于 TT 或 TN-S 系统 For use in TT or TN-S Systems

### 技术参数 Technical characteristics:

			OVR 1N-10-275	OVR 3N-10-275	OVR 1N-15-275	OVR 3N-15-275	OVR 1N-40-275	OVR 3N-40-275
额定电压	Rated voltage $U_n$	[V]	230 / 400	230 / 400	230 / 400	230 / 400	230 / 400	230 / 400
最大持续工作电压	Max con. operating voltage $U_c$	[V]	275 / 440	275 / 440	275 / 440	275 / 440	275 / 440	275 / 440
频率	Frequency	[Hz]	50	50	50	50	50	50
最大放电电流 (8/20 $\mu$ s)	Max discharge current $I_{max}$ (8/20 $\mu$ s)	[kA]	10	10	15	15	40	40
放电次数	No. of discharges $I_{max}$	[No.]	1	1	1	1	1	1
额定放电电流 (8/20 $\mu$ s)	Rated discharge current $I_n$ (8/20 $\mu$ s)	[kA]	3	3	5	5	10	10
放电次数	No. of discharges $I_n$	[No.]	20	20	20	20	20	20
内部短路耐受电流	Int. short circuit withstand current	[kA]	10	10	10	10	25	25
电压保护水平	Voltage Protection level $U_p$	[kV]	1	1	1.2 / 1.8	1.2 / 1.8	1.2 / 1.8	1.2 / 1.8
响应时间	Response time	[ns]			< 20			
漏电流	Leakage current	[ $\mu$ A]			< 20			
后备保护	Back up protection				参见20页的表 Refer to table in P.20			
保护模式	Mode of protection				L-PE, N-PE, L-N			
端子	Terminals							
相线/中性线	P/N	[mm <sup>2</sup> ]			16 (软线 flexible), 25 (硬线 rigid)			
地线	Earth	[mm <sup>2</sup> ]			35 (软线 flexible), 50 (硬线 rigid)			
防护等级	Degree of protection				IP 203			
阻燃等级	Fire resistance				V <sub>0</sub> (符合UL94)			
工作湿度	Humidity range				≤ 95%			
温度范围	Temperature	[°C]			-40...+80			
17.5 mm 模块	17.5 mm modules	[No.]	2	4	2	4	2	4
标准	Standard				IEC 61643-1, GB 50057 (2000年版)			

### 内部结构图 Internal Schematic



# 用于保护设备的保护器 Protective Devices for Equipment

## 插拔式电涌保护器 Pluggable OVR

插拔式



OVR...P 插拔式采用与固定式电涌保护器相同的工作原理和选择准则。它由基座、一个中性芯体和一个或多个相芯体组成。当芯体到达寿命终点时，你只用更换实际出故障的芯体。由于它无须断开或重新接线，所以大大地节省了时间。除此之外，它们的技术性能同样有了提高：OVR...P 装置的电压保护水平  $U_p$  甚至更低，由此可以确保更大的保护。

The OVR...P pluggable SPDs adopt the same operating principle and choice criteria as the compact SPDs, and are composed of a base, a neutral cartridge and one or more phase cartridges, meaning that you can now change only the cartridge or cartridges that have actually failed when they reach the end of their service life. Installation times are consequently much shorter since it isn't necessary to disconnect and rewire the device. What's more, their technical performance has also been improved: the voltage protection level  $U_p$  of the OVR...P devices is even lower, thus ensuring greater protection.

## 插拔式的特点 Features of pluggable version

更换损坏芯体的操作特别安全：

- 1) 为了更换芯体，必需打开开关柜内的门 (由专业的人员完成)。
- 2) 由于芯体侧面是塑料材料，所以抽出芯体时不会接触到带电触头。
- 3) 由于在芯体底部有独特的「箭头」所以安装时不可能把相芯体和中性芯体的位置互换。

The operation for changing failed cartridges is particularly safe :

- 1) in order to change the cartridge one has to open the electrical switchboard's inner door (qualified personnel);
- 2) the live contacts are inaccessible during the withdrawal phase thanks to a plastic side wall on the cartridge;
- 3) it's impossible to swap a phase cartridge for a neutral cartridge and vice versa thanks to an exclusive mechanical "arrow" system on the base.

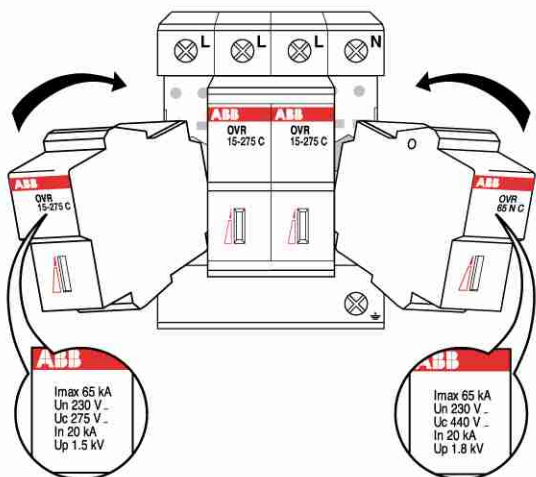


### OVR...P TS 底座的工作状态指示

OVR...P TS 的特点是有个辅助遥控触头，当安装在底座上的一个或多个芯体使用寿命结束时，它会通过一个转换触头遥控打开报警灯或蜂鸣器。芯体上也有本地指示 (红 / 白指示器)。

### Status Indicator in OVR...P TS bases

The OVR...P TS bases feature an auxiliary remote contact for signalling the end of the product's service life that makes it possible to activate an alarm light or buzzer remotely using a change-over contact when one or more of the cartridges installed on it reach the end of their service lives. There is also local indication (white/red indicator) on the cartridge.



## 芯体 Cartridge

Imax	型号 Type	
	不带安全储备系统 Without res	带安全储备系统 With res
15kA	OVR 15-275 C OVR 15-440 C	OVR 15-275s C OVR 15-440s C
40kA	OVR 40-275 C OVR 40-440 C	OVR 40-275s C OVR 40-440s C
65kA	-	OVR 65-275s C OVR 65-440s C
中性线 Neutral	OVR 65 N C	-

# 用于保护设备的保护器 Protective Devices for Equipment

## 插拔式电涌保护器 - 单极 Pluggable OVR - Single Pole

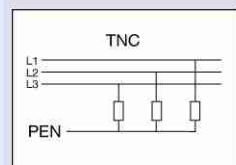
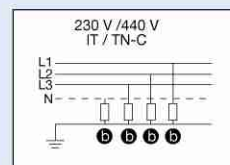
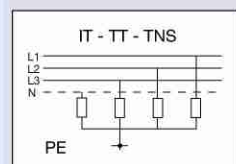
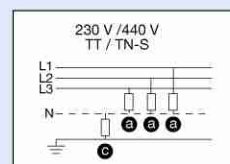


适用于 TN-C 或 IT 系统<sup>1)</sup>  
For use in TN-C or IT Systems<sup>1)</sup>

### 技术参数 Technical characteristics:

		OVR 15-275 P		OVR 15-440 P		OVR 40-275 P		OVR 40-440 P		OVR 65-275 P		OVR 65-440 P		OVR 100-275 P		OVR 100-440 P		OVR 100 N P		OVR HL-15-255s P TS		OVR HL-15-440s P TS		
额定电压	Rated voltage $U_n$	[V]	230	400	230	400	230	400	230	400	230	400	230	400	230	400	400	230	400	230	400	230	400	
最大持续工作电压	Max con. operation voltage $U_c$	[V]	275	440	275	440	275	440	275	440	275	440	275	440	275	440	440	255	440	255	440	255	440	
频率	Frequency	[Hz]	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	
冲击电流 (10/350 $\mu$ s)	Impulse current $I_{imp}$	[kA]	-	-	-	-	-	-	-	-	-	-	10	10	10	10	10	15	15	15	15	15	15	
最大放电电流 (8/20 $\mu$ s)	Max discharge current $I_{max}$	[kA]	15	15	40	40	65	65	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	
放电次数	No. of discharges $I_{max}$	[No.]	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-	-	-	-	-	-	
额定放电电流 (8/20 $\mu$ s)	Rated discharge current $I_n$	[kA]	5	5	10	10	20	20	30	30	30	30	30	30	30	30	30	-	-	-	-	-	-	
放电次数	No. of discharges $I_n$	[No.]	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	-	-	-	-	-	-	
内部短路耐受电流	Int. short circuit withstand current	[kA]	10	10	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	
电压保护水平	Voltage Protection level $U_p$	[kV]	1.2	1.8	1.2	1.8	1.5	2	1.2	1.8	1.2	1.8	1.2	1.8	1.2	1.8	1.2	1.2	1.2	1.2	1.2	1.2		
响应时间	Response time	[ns]	< 20																					
漏电流	Leakage current	[ $\mu$ A]	< 20																					
后备保护	Back up protection		参见20页的表 Refer to table in P.20																					
端子	Terminals																							
相线/中性线	P/N	[mm <sup>2</sup> ]	16 (软线 flexible), 25 (硬线 rigid)																					
地线	Earth	[mm <sup>2</sup> ]	16 (软线 flexible), 25 (硬线 rigid)																					
防护等级	Degree of protection		IP 203																					
阻燃等级	Fire resistance		V <sub>0</sub> (符合UL94)																					
工作湿度	Humidity range		$\leq 95\%$																					
温度范围	Temperature	[ $^{\circ}$ C]	-40...+80																					
17.5 mm 模块	17.5 mm module	[No.]	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	
标准	Standards		IEC 61643-1, GB 50057 (2000年版)																			IEC 61643-1, EN61643-11		

<sup>1)</sup> IT系统应选用 $U_c$ 值为440V的OVR产品 <sup>1)</sup> Should use OVR with  $U_c = 440V$  in IT System



# 插拔式电涌保护器 - 多极 Pluggable OVR - Multi-Pole



## 适用于 TT 或 TN-S 系统 For use in TT or TN-S Systems

### 技术参数 Technical characteristics:

		OVR 1N-15-275 P	OVR 3N-15-275 P	OVR 1N-40-275 P	OVR 1N-40-440 P	OVR 3N-40-275 P	OVR 3N-40-385 P	OVR 3N-40-440 P	OVR 1N-65-275 P	OVR 1N-65-440 P	OVR 3N-65-275 P	OVR 3N-65-440 P	OVR 2-15-75 P <sup>1)</sup>
额定电压	Rated voltage $U_n$	[V] 230 / 400	230 / 400	230 / 400	230 / 400	230 / 400	230 / 400	230 / 400	230 / 400	230 / 400	230 / 400	230 / 400	70
最大持续工作电压	Max con. operating voltage $U_c$	[V] 275 / 440	275 / 440	275 / 440	440	275 / 440	385 / 440	440	275 / 440	440	275 / 440	440	75
频率	Frequency	[Hz] 50	50	50	50	50	50	50	50	50	50	50	50
最大放电电流 (8/20 $\mu$ s)	Max discharge current $I_{max}$ (8/20 $\mu$ s)	[kA] 15	15	40	40	40	40	40	65	65	65	65	15
放电次数	No. of discharges $I_{max}$	[No.] 1	1	1	1	1	1	1	1	1	1	1	1
额定放电电流 (8/20 $\mu$ s)	Rated discharge current $I_n$ (8/20 $\mu$ s)	[kA] 5	5	15	15	15	20	15	20	20	20	20	5
放电次数	No. of discharges $I_n$	[No.] 20	20	20	20	20	20	20	20	20	20	20	20
内部短路耐受电流	Int. short circuit withstand current	[kA] 10	10	25	25	25	25	25	25	25	25	25	10
电压保护水平	Voltage protection level $U_p$	[kV] 1.2	1.2	1.2	1.8	1.2	1.7	1.8	1.5	2	1.5	2	0.6 / 0.3 <sup>2)</sup>
响应时间	Response time	[ns]				< 20							
漏电流	Leakage current	[ $\mu$ A]				< 20							
后备保护	Back up protection					参见20页的表 Refer to table in P.20							
保护模式	Mode of protection					L-PE, N-PE, L-N							+...+,...E, ...E
端子	Terminals												
相线/中性线	P/N	[mm <sup>2</sup> ]				16 (软线 flexible), 25 (硬线 rigid)							
地线	Earth	[mm <sup>2</sup> ]											
防护等级	Degree of protection					IP 203							
阻燃等级	Fire resistance					V <sub>0</sub> (符合UL94)							
工作湿度	Humidity range					≤ 95%							
温度范围	Temperature	[°C]				-40...+80							
17.5 mm 模块	17.5 mm module	[No.] 2	4	2	2	4	4	4	2	2	4	4	2
标准	Standards					IEC 61643-1, GB50057 (2000年版)							

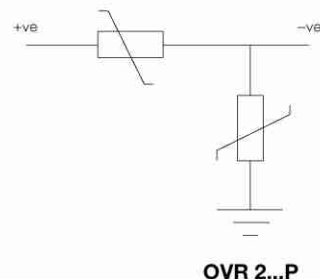
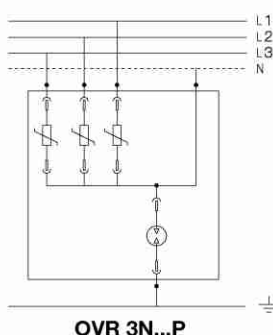
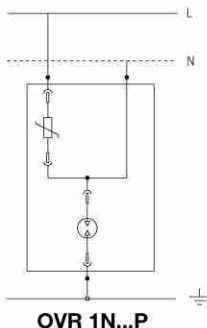
1) 该电涌保护器适用于小于 70 V 的交流或直流的电网，其应用范围包括充电器、太阳能供电系统及低电压设备等

1) This SPD is designed to protect the very low voltage AC or DC networks (up to 70 V). It can be applied to battery charger, solar power supply and equipment with very low voltage.

2)  $U_p$ : 正极对负极: 0.3kV  
正极对地: 0.6kV

2) Positive pole to negative pole: 0.3kV  
Positive pole to earth: 0.6kV

## 内部结构图 Internal Schematic



# OVR 选型表

## OVR Selection Table

IEC 试验分级 IEC Class	冲击电流 $I_{imp}$ (10/350 $\mu$ s) (kA)	最大放电电流 $I_{max}$ (8/20 $\mu$ s) (kA)	最大工作电压 (P-N) $U_c$ Maximum operating voltage (P-N) $U_c$ (V)	固定式 Compact			插拔式 Pluggable			
				单极 1-Pole	单极+中性线 1-Pole+N	三极+中性线 3-Pole+N	单极 1-Pole	单极+中性线 1-Pole+N	三极+中性线 3-Pole+N	
第一级 Class I	15	-	255 440	-	-	-	OVR HL-15-255s P TS OVR HL-15-440s P TS	-	-	
第二级 Class II	10	100	275	-	-	-	OVR 100-275s P TS <sup>1)</sup>	-	-	
			440	-	-	-	OVR 100-440s P TS <sup>1)</sup> OVR 100 N P <sup>2)</sup>	-	-	
	-	65	275	OVR 65-275s	-	-	OVR 65-275s P OVR 65-275s P TS	OVR 1N-65-275s P OVR 1N-65-275s P TS	OVR 3N-65-275s P OVR 3N-65-275s P TS	
			440	OVR 65-440s	-	-	OVR 65-440s P OVR 65-440s P TS	-	OVR 3N-65-440s P OVR 3N-65-440s P TS	
	-	40	275	OVR 40-275	OVR 1N-40-275	OVR 3N-40-275	OVR 40-275 P OVR 40-275s P TS OVR 40-275s P	OVR 1N-40-275 P OVR 1N-40-275s P OVR 1N-40-275s P TS	OVR 3N-40-275 P OVR 3N-40-275s P OVR 3N-40-275s P TS	
			385	-	-	-	-	-	OVR 3N-40-385 P OVR 3N-40-385 P TS	
			440	OVR 40-440 OVR 40-440s	-	-	OVR 40-440 P OVR 40-440s P OVR 40-440s P TS	-	OVR 3N-40-440 P OVR 3N-40-440 P TS OVR 3N-40-440s P TS	
	-	15	275	OVR 15-275	OVR 1N-15-275	OVR 3N-15-275	OVR 15-275 P OVR 15-275s P OVR 15-275s P TS	OVR 1N-15-275 P OVR 1N-15-275s P OVR 1N-15-275s P TS	OVR 3N-15-275 P OVR 3N-15-275s P OVR 3N-15-275s P TS	
			440	OVR 15-440	-	-	OVR 15-440 P OVR 15-440s P OVR 15-440s P TS	-	-	
	-	10	275	-	OVR 1N-10-275	OVR 3N-10-275	-	-	-	
					<b>双极 2-Pole</b>					
	-	15	75	-	-	-	-	OVR 2-15-75s P TS OVR 2-15-75 P	-	

<sup>1)</sup> 连接相线和中性线 Connect between L and N

<sup>2)</sup> 连接中性线和地线 Connect between N and PE

### 型号说明

例 eg. **OVR** 3 N - **65** - **440** s P TS

#### 极数 No. of pole

- 1N** 单极+中性线 1-Pole + Neutral
- 2** 双极 (可用于直流电网) 2-Pole (Can be used in DC network)
- 3N** 三极+中性线 3-Pole + Neutral

\* 对于单极模块或插拔式芯体，无此虚线框内的字母和数字。  
For single pole or cartridge, this box is blank

#### 特殊或附加功能 Additional features

- S** 安全储备保护系统 Safety Reserve System (res)
- P** 插拔式 Pluggable
- TS** 远方报警信号接点 Signal Contact

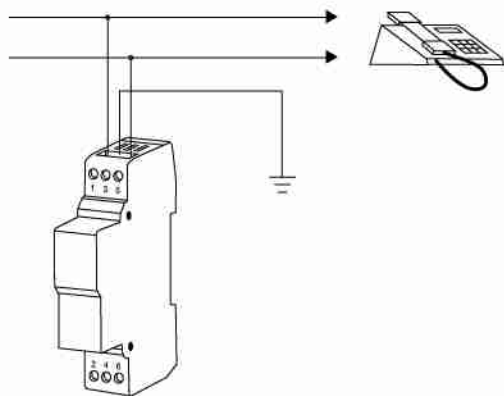
\* 不带附加特殊功能时，无此虚线框内的字母  
This box is blank if OVR without above features

最大工作电压 (L-N) Max. operating voltage (L-N)  $U_c$  (V)

最大放电电流 Max. discharge current  $I_{max}$  (kA; 8/20 $\mu$ s)

# 用于保护电话和数据传输线路的装置 Protective Devices for Telephone & Data Transmission Lines

## OVR TC



OVR TC 传输线路电涌保护器，用于保护与电话线、电脑通信线路或电流回路相连接的设备。

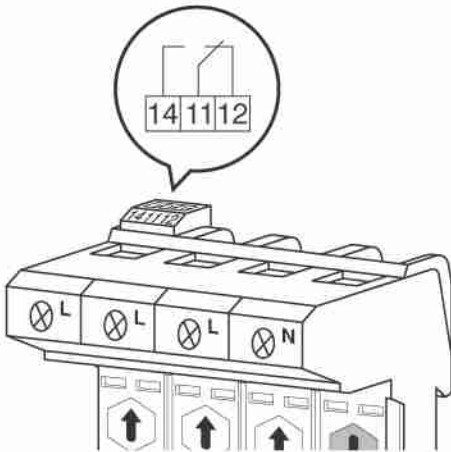
The OVR TC SPD for transmission lines is intended for the protection of equipment connected onto telephone, computer communication links or current loops.

### 技术参数 Technical characteristics:

			OVR TC 6V	OVR TC 12V	OVR TC 24V	OVR TC 48V	OVR TC 200FR	OVR TC 200V	
额定电压	Rated voltage $U_N$	[V]	6	12	24	48	200	200	
最大放电电流 (8/20 $\mu$ s)	Max transient discharge current $I_{Tmax}$ (8/20 $\mu$ s)	[kA]	10	10	10	10	10	10	
放电次数	No. of discharges $I_{max}$	[No.]	1	1	1	1	1	1	
额定放电电流	Rated transient discharge current $I_N$	[kA]	5	5	5	5	5	5	
放电次数	No. of discharges $I_N$	[No.]	10	10	10	10	10	10	
电压保护水平	Voltage protection level $U_p$	[V]	15	20	35	70	300	700	
带宽	Bandwidth	[MHz]	10	2	4	6	3	100	
最大传送信号工作电压	Max voltage of signal to be transmitted	[V]	7	14	27	53	220	220	
工作状态指示	Status indicator		有 Yes						没有 No
配合OVR SIGN遥控单元	Compatible with OVR SIGN		可以 Yes						不可以 No
保护对数	No. of protected pair		1						
保护模式	Protection type		串联 Series						并联 Parallel
端子	Terminals	[mm <sup>2</sup> ]	0.5 - 2.5						
防护等级	Degree of protection		IP 203						
阻燃等级	Fire resistance		V <sub>0</sub> (符合UL94)						
工作温度	Operating temperature	[°C]	-20...+40						
贮存温度	Storage temperature	[°C]	-40...+80						
17.5 mm 模块	17.5 mm module	[No.]	1						
标准	Standards		IEC 61643-1, GB 50057 (2000年版)						

# 发出工作状态信号的 TS 或 OVR SIGN

## Signalling the operating status with TS or OVR SIGN



### 从插拔式电涌保护器的基座发生信号

插拔式电涌保护器 OVR...P TS 基座的特点是有一摇控触头，当安装在基座上的一个或多个芯体使用寿命结束时，它会通过一个转换触头遥控打开报警灯或蜂鸣器。同时芯体上也有工作状态指示（红/白指示窗口）。

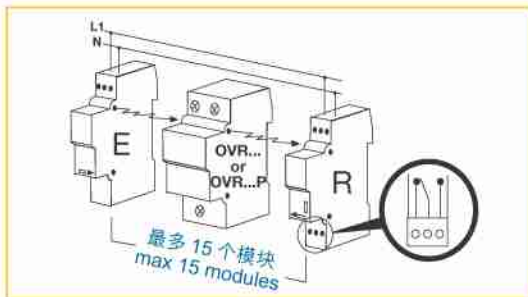
### Signalling with pluggable OVR...P TS

The OVR...P TS bases feature an auxiliary remote contact for signalling the end of the product's service life that makes it possible to activate an alarm light or buzzer remotely using a change-over contact when one or more of the cartridges installed on it reach the end of their service lives. There is also status indication (white/red indicator) on the cartridge.



OVR SIGN 是固定式和插拔式 OVR 电涌保护器的补充附件。安装了它，可以得到最多 15 个模块的工作状态信号（正常工作或本地/遥控警报）。该附件包括两个模块：发射模块 E，它安装在被监测保护器的左侧；以及接收模块 R，安装在右侧。当有一个电涌保护器出现故障时，后者可以激活远程报警灯或蜂鸣器（使用一个转换触头）。

The OVR SIGN is a complementary accessory both for compact and pluggable SPD. It makes it possible to signal the operating status (normal operation or any local/remote alarm) of one or more SPD, up to a maximum of 15 modules. This accessory comprises 2 modules: an emitter module E, which needs to be installed to the left of the devices to be monitored, and a receiver module R installed to the right. The latter makes it possible to activate a remote alarm light or buzzer (using a change-over contact) when one of the SPDs develops a fault.



### 技术参数 Technical characteristics:

额定电压	Rated voltage $U_n$	[V]	230
17.5mm 模块数量	17.5mm module		1 + 1
可监测 17.5mm 模块数量	Max no. of 17.5mm module to be monitored		15
监测状态下收/发模块的消耗电流 230V	Emitter / receiver current consumption at 230V in watch state	[mA]	<10
远程指示触点数据 - 最小电压	Contact data - min voltage	[V]	5 VDC
最小电流	- min current	[mA]	10
最大电压 (50 Hz)	- max voltage (50 Hz)	[V]	250
最大电流 (50 Hz)	- max current (50 Hz)	[A]	5
光通路指示	Optical link visualization		通过收、发模块上的LED by LED on emitter and receiver
工作状态指示	Status indicator		接收模块上的红色指示窗口 Red indicator on receiver
端子	Terminal	[mm <sup>2</sup> ]	2.5 硬线 rigid
防护等级	Degree of protection		IP 203
阻燃等级	Fire resistance		V <sub>0</sub> (符合UL94)
工作湿度	Humidity range		≤ 95%
温度范围	Temperature	[°C]	-40... +80

OVR 附加功能




## 工作状态指示 Status Indicator

由于在所有的装置上都有一个指示器，它会在产品上显示它们的工作状态。

The operating status of the protective device can be indicated on the product thanks to an indicator that is present on all the devices and shows their operation status.


单元正面有一个指示器，指示电涌保护器的工作状态：



电涌保护器正常工作 (指示器为白色)

电涌保护器出现故障，应立即更换 (指示器为红色)

The front of the unit features an indicator that shows the SPD's operating status:



SPD in normal operation (indicator white)

SPD failed, replace immediately (indicator red)

## 安全储备系统 Safety Reserve System (res)

在特别强烈的雷击时，可能会超过首端电涌保护器的最大额定值。因此，大部分高 $I_{max}$ 的电涌保护器带有res  $\Delta$ 安全储备系统。

However, in the event a particularly violent stroke, the maximum ratings of the head arrester may be exceeded. Most of SPD with a high  $I_{max}$  are therefore fitted with the **res**  $\Delta$  safety reserve system.

在电涌保护器受到破坏后，res  $\Delta$ 安全储备系统便提供相同保护等级的后备保护，不过时间有限 (限制通流能力)。

In case of arrester destruction, the **res**  $\Delta$  safety reserve system provides a safety reserve with the same protection level but for a limited period of time (limited flowing capacity).

后备功能使得在更换电涌保护器前的一段时间也能维持保护功能。

The reserve allows the SPD replacement while maintaining the equipment protection.


进入后备状态，设备与保护器的电力供应不中断。

Going over to the reserve occurs with supply continuity for the equipment and protective devices.

Res  $\Delta$ 系统可以实现预防性维护，大大提高安全性及可靠性。

The **res**  $\Delta$  safety reserve system allows the preventive maintenance of the protection chain for enhanced safety.

单元正面有一个指示器，指示电涌保护器的工作状态：




电涌保护器正常工作 (指示器为白色)

电涌保护器处于后备工作状态 (尽快更换)。在这种状态下，保护器的电气性能降低，应尽快更换保护器

电涌保护器出现故障，应立即更换 (指示器为红色)

The front of the unit features an indicator that shows the SPD's operating status:



SPD in normal operation (indicator white)

SPD in reserve operation. The electrical performance of the devices is reduced in this condition. Please replace the device as soon as possible

SPD failed, replace immediately (indicator red)

# 一般安装规则

## General Installation Rules

### 如何安装电涌保护器？

装置中的瞬时过电压会在很短的时间内产生很大的电流（数十千安）。

在装置中的其他保护装置（微型断路器、剩余电流动作保护器、低压开关和熔断器等）也受到同样的冲击。所以它们必须与电涌保护器配合使用。

在同一网络中，当需要安装多台电涌保护器时，它们之间必须配合。

闪电产生的瞬时过电压会在电气设备中产生非常大的电流（数十千安）而且在很短时间内流动（数微秒）。

当安装电涌保护器时，必须考虑这些电涌。因为连接电线对于这些电流有很高的阻抗（电线阻抗在频率为 50Hz 时可以忽略）。

### How to install SPD ?

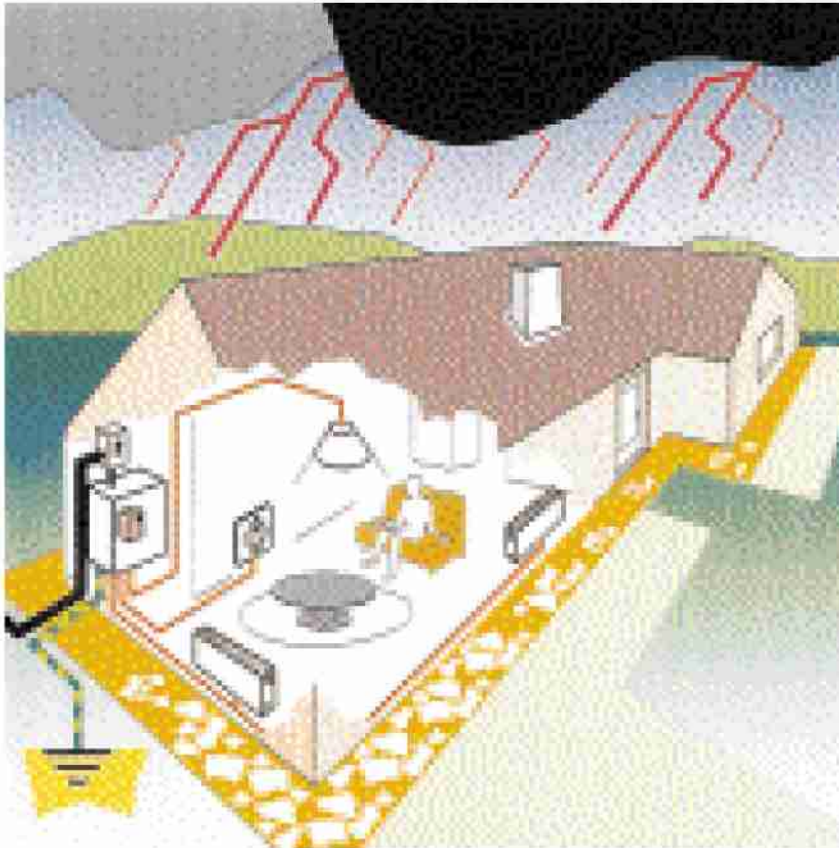
The Presence of transient overvoltages in installations generates high intensity currents (several tens of kA) over very short periods.

The other protective devices present in the installation (MCB, RCD breakers and fuses, etc.) undergo the same stresses and must be coordinated with the SPD.

The SPD must be coordinated between themselves where it is necessary to install several devices on the same network.

The transient overvoltages generated by lightning generate in electrical equipment very high intensity currents (several tens of kA) that flow over very short times (a few microseconds).

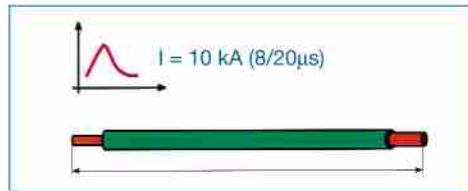
These surges must be taken into account when installing SPD as the impedance values of the connecting wires are very high at these currents (due to the wire impedance which is negligible at 50 Hz).



以下范例表示 1 米长电线两端的电压为  $U = L \frac{di}{dt}$

The following example shows that the voltage across a 1 m long wire will be  $U = L \frac{di}{dt}$

1 米对应 1 微亨利  
=>  $U = 1200 \text{ V}$



1 meter corresponds to 1 microhenry  
=>  $U = 1200 \text{ V}$

### 1. 标准

SPD 与相线以及与接地端子的连接线必须尽可能地短。因为这些连接线的阻抗会削弱电涌保护器提供的保护功能。

### 1. Standard

The connections between the SPD and live conductors and the earthing terminal must be as short as possible as the impedance of these connections reduces the protection provided by the SPD.

### 2. 位置

为了实现有效的保护，建议安装一个进线装置，在设备的入口处就分流闪电的电流。

### 2. Location

For an effective protection, installing a head protective device is recommended to shunt the lightning current at the installation input, before it propagates.

### 3. 安装电涌保护器

是为了保持被保护设备两端剩余电压较低，图 2 较图 1 为优。

### 3. SPD connection

Wiring diagram 2 should be preferred over diagram 1 in order to maintain a low residual voltage across the equipment to be protected.

当一个开关装置与一个电涌保护器串联时，电缆长度  $L$  必须尽可能短 (图 3)。

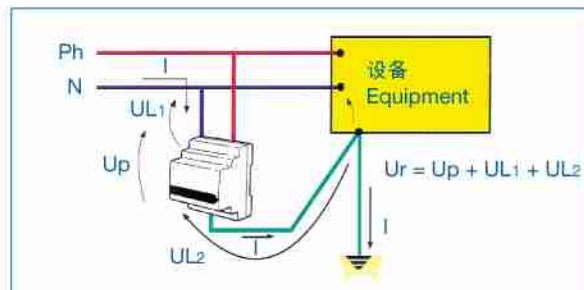


图 1 Diagram 1

Where a switching elements is used in series with the SPD, the cable length «L» must be as short as possible (diagram 3).

图 1：该接线图表示被保护设备上的电压高于电涌保护器的剩余电压

图 2：被保护设备电压等于电涌保护器的剩余电压

图 3：电缆长度  $L$  必须尽可能短，这样被保护设备上的电压才等于电涌保护器剩余电压

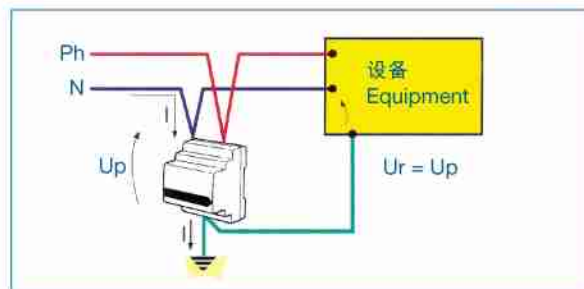


图 2 Diagram 2

Diagram 1 :  
This wiring diagram shows a voltage higher than the SPD residual voltage on the protected equipment.

Diagram 2 :  
The voltage on the protected equipment is equal to SPD residual voltage.

Diagram 3 :  
The cable length (L) must be as short as possible for the voltage on the protected equipment to be equal to the SPD residual voltage.

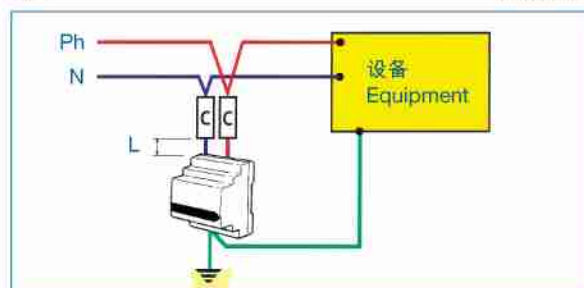


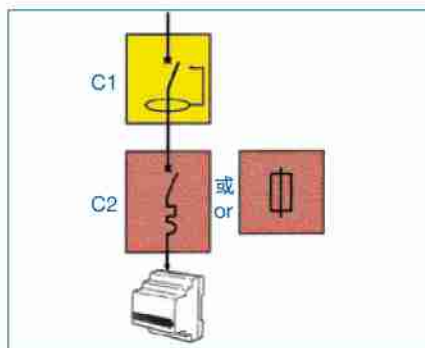
图 3 Diagram 3

# 一般安装规则 General Installation Rules

## 4. 相关开关元件的选用

所有电涌保护器都装有一个内置热分断元件。

但是，它们必须安装一个上级保护器以防止短路电流，以及一个漏电保护器来保护间接接触。



## 4. Choice of the associated switching element

All SPD are fitted with a built-in thermal disconnecter.

However, they must be equipped with an upstream protection element for protection against short-circuit currents and with a residual current protection element for protection against indirect contact.

	C1 剩余电流动作保护器 Residual current protection		C2 过载及短路保护 Overload and short circuit protection		
	RCD $I_{\Delta n} \geq 100 \text{ mA}$		熔断器 Fuse		微型断路器 MCB
	Type S 型	瞬时 Instantaneous	14 x 51	22 x 58	
OVR - 10	可以 Yes	可能 Possible **	25 A	32 A	16 A C 特性
OVR - 15	可以 Yes	可能 Possible **	25 A	32 A	16 A C 特性
OVR - 40	可以 Yes	可能 Possible **	50 A	40 A	32 A C 特性
OVR - 65	可以 Yes	可能 Possible **	-	80 A	50 A C 特性
OVR - 100	不可以 No	不可以 No	-	80 A	63 A C 特性
OVR - HL15	不可以 No	不可以 No	-	80 A	63 A C 特性

\*) 在遵守一般安装规则的情况下，可以修改 C2 的数值。

\*\*\*) 可以使用瞬时剩余电流动作保护器 ( $I_{\Delta n} \geq 100 \text{ mA}$ )，但是不推荐。因为它可能过早脱扣，这虽然不影响电涌保护器的效能，却会影响其运行的连续性。

\*) The values specified for C2 can be modified by respecting the general installation rules.

\*\*) Using an instantaneous residual current protective device ( $I_{\Delta n} \geq 100 \text{ mA}$ ) is possible but not recommended as the protective device may be tripped untimely. This has no consequence on the SPD effectiveness but only on service continuity.

## 5. 开关元件的连接

根据应用，有三种接线图。

图 4. 把工作的持续性放在首位。

微型断路器脱扣时，电涌保护器断开，设备仍然工作，但设备就失去保护。

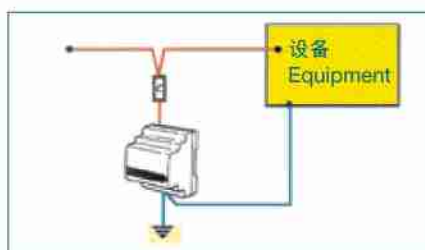


图 4

Diagram 4

图 5. 把保护功能放在首位

微型断路器脱扣时，电涌保护器与被保护设备都断电。设备断电因而不受电压影响。

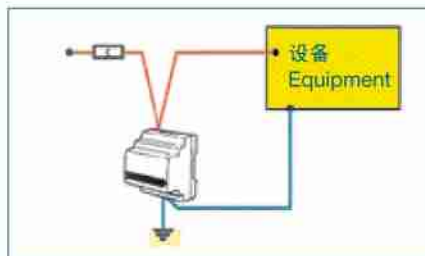


图 5

Diagram 5

图 6. 当既要求供电连续，又需要保护性时，必须选择图 6，使用多重保护 (两个平行连接的电涌保护器)

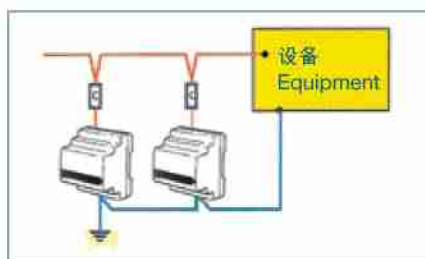


图 6

Diagram 6

## 5. Switching element connection

Three wiring diagrams are possible according to the utilization.

In the diagram 4, service priority is overriding.

When the disconnecter opens, the SPD is isolated but the equipment is still powered. However, it is no longer protected.

In the wiring diagram 5, protection is overriding. When the disconnecter opens, both the SPD and the protected equipment are isolated. The equipment is no longer powered, hence it is no longer submitted overvoltages.

When both service continuity and protection are required, wiring diagram 6 must be selected, with redundant protection (two parallel-connected SPDs).

### 6. 设备与电涌保护器距离的重要性

为了有较高的保护，电涌保护器必须尽可能靠近被保护设备。

电涌保护器设备的距离必须少于 30 米。

如果这不能做到，就必须再安装另一个电涌保护器尽可能接近被保护设备。

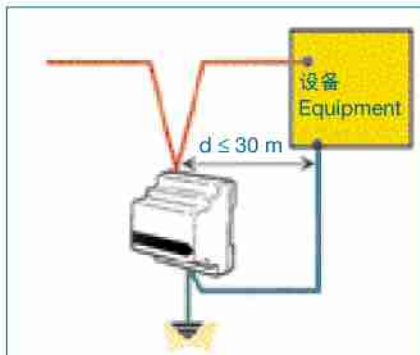


图 7 Diagram 7

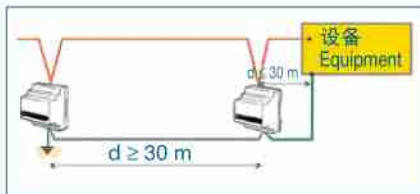


图 8 Diagram 8

### 6. Importance of equipment to SPD distance

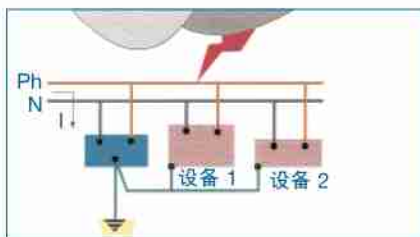
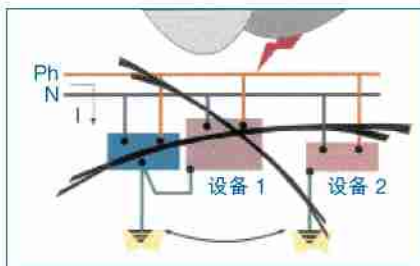
The SPD must be located as close as possible to the protected equipment for superior effectiveness.

The distance between the SPD and the protected equipment must be less than 30 m.

When this cannot be achieved, another SPD must be installed as close as possible to the equipment.

### 7. 接地等电位的重要性

检查设备的各个部件是否做了接地等电位，这很重要。这个预防措施可以避免形成环路或避免雷电流从一个电路对另一个电路的感应效应。



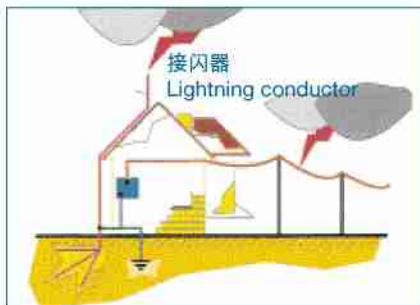
### 7. Importance of earth equipotentiality

It is essential to check the earth equipotentiality of the various items of equipment. This precaution allows avoiding the loops or induced effects of lightning current from one circuit to another.

### 8. 接闪器

当一座建筑物使用接闪器作为雷击保护措施时，必须使用 100 / 65kA 的电涌保护器来保护电气设备。电涌保护器接地端必须与接闪器接地端连接，后者的接地电阻必须小于或等于 10 欧姆。

如果装置中有敏感的设备，必须安装第 2 个电涌保护器。

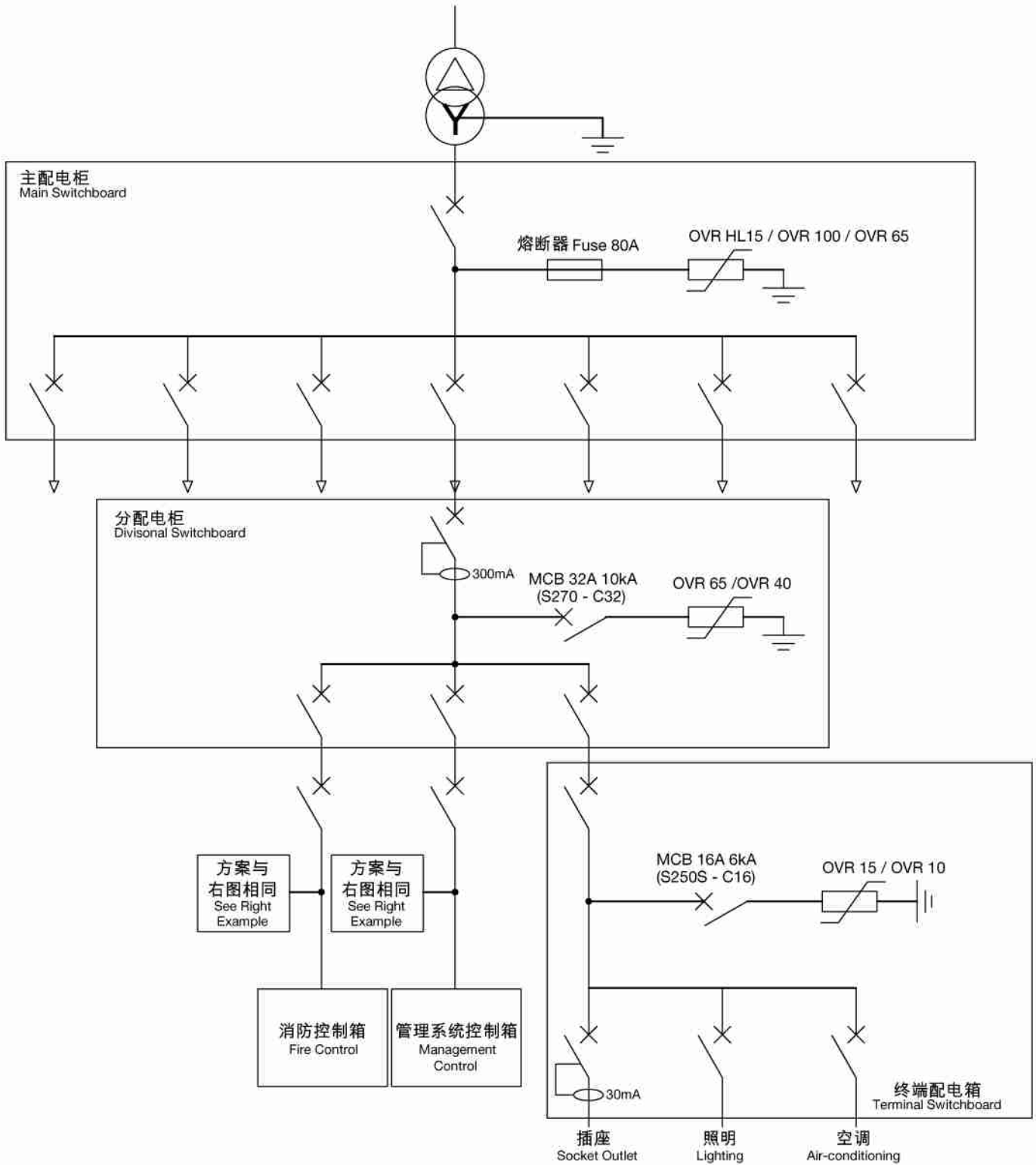


### 8. Case of a lightning conductor

Where a building is protected from lightning strokes by means of a lightning conductor, the electrical installation must be protected by using a 100/65 kA rated SPD. The arrester earth must be connected to the lightning conductor earth, which must be less than or equal to 10 ohm.

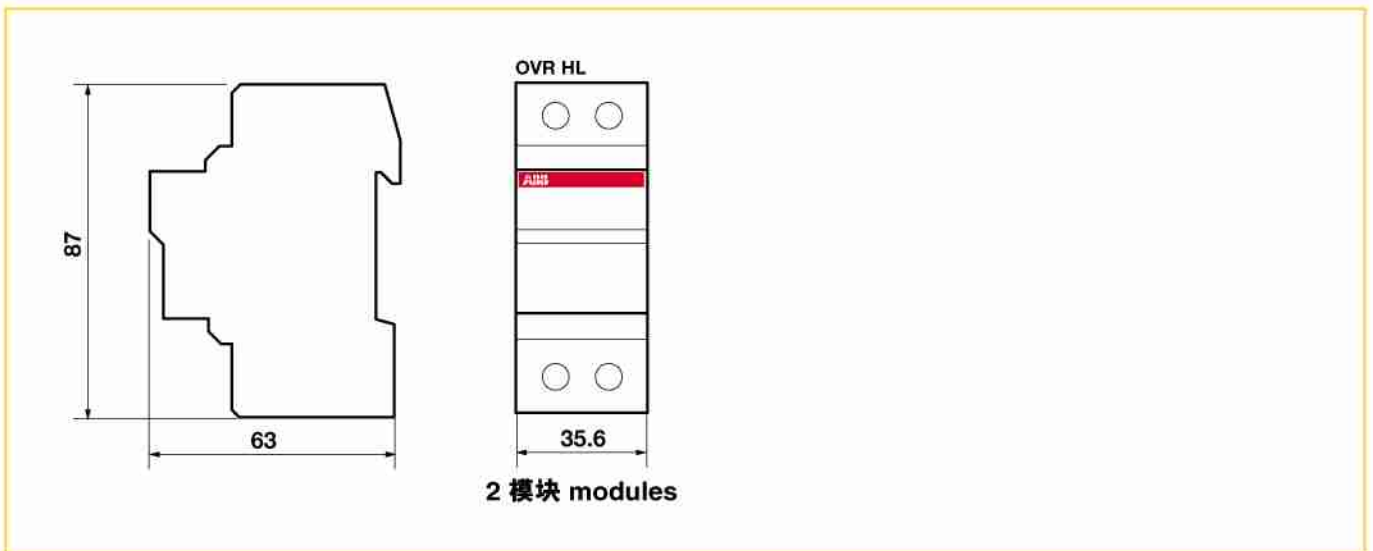
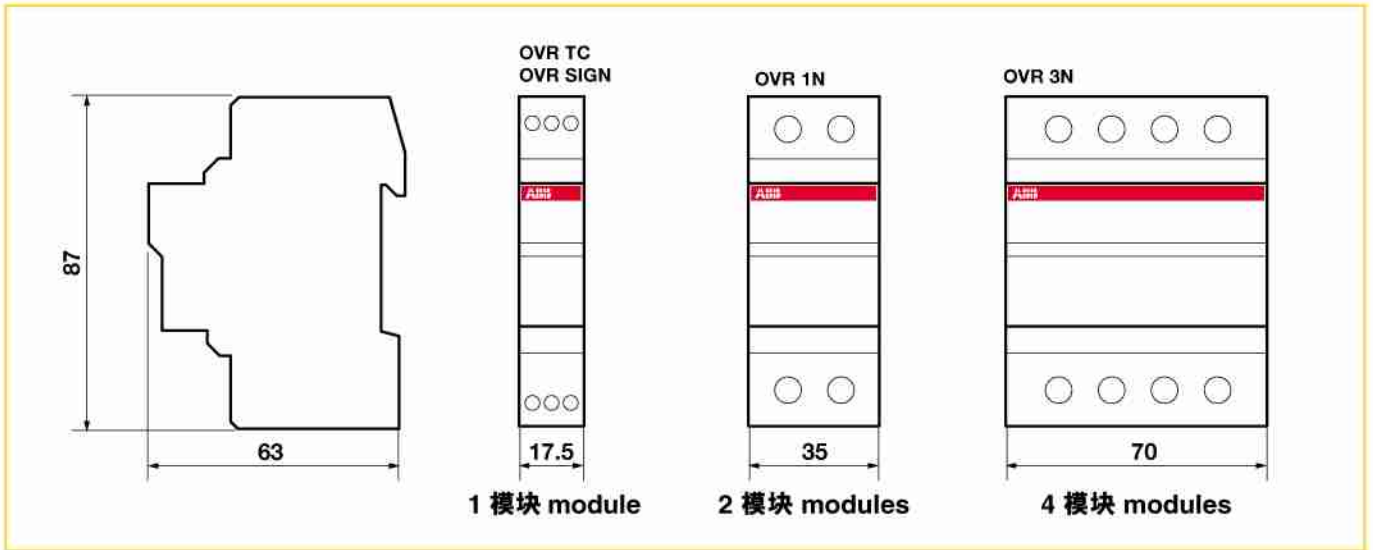
If the installation contains sensitive equipment, a second SPD must be installed.

# 应用实例 Example



# 外型尺寸图

## Overall dimensions





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