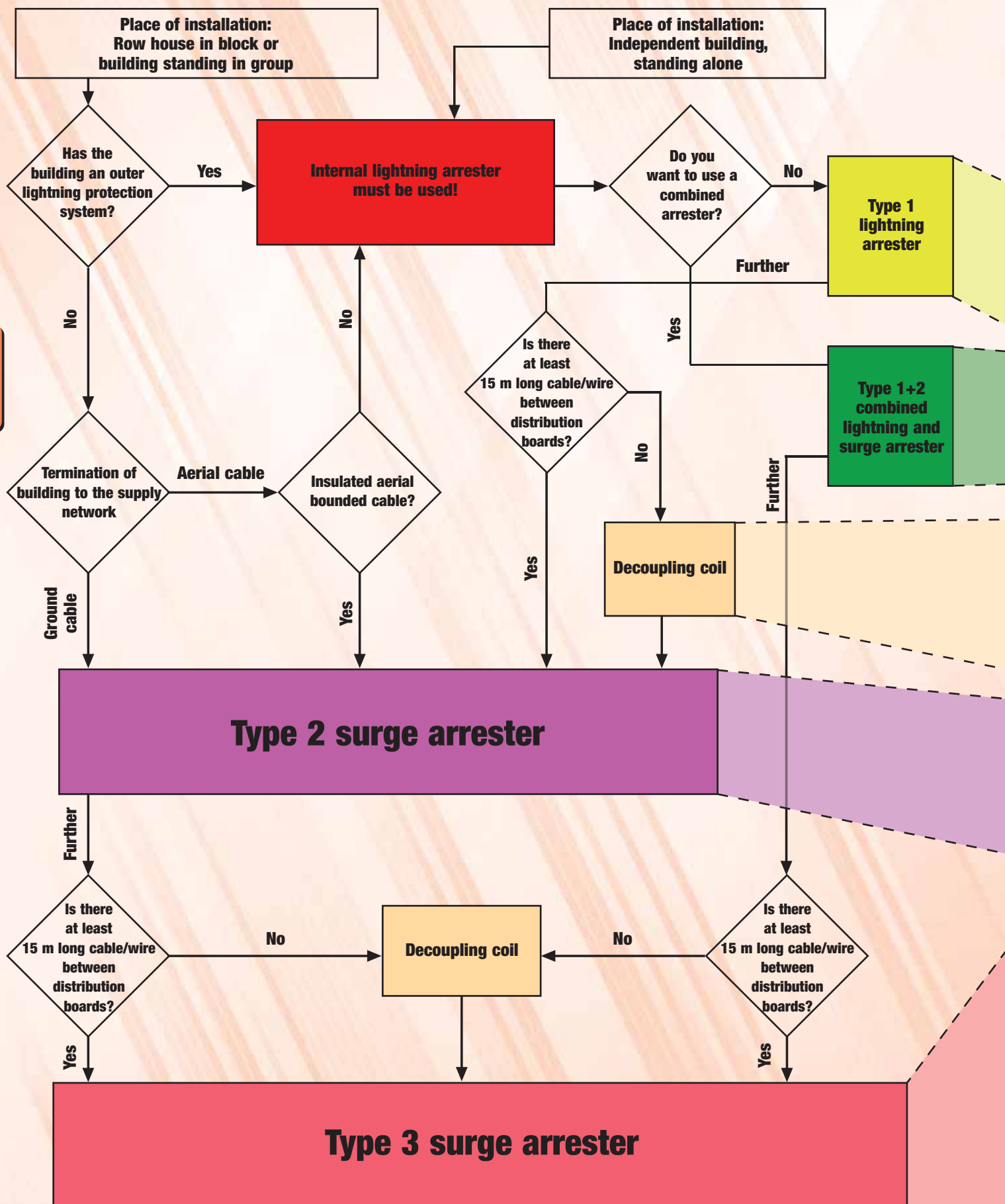


# Guide to find the suitable overvoltage protection



# Guide to find the suitable overvoltage protection

## Guide to find the suitable overvoltage protection

The process of planning the suitable internal lightning and overvoltage protection of buildings are very complex so we are suggest to contact with a professional to find the best solution!

For easier planning we have prepared a short guide in flow chart form where you can find the needed elements to protect your low voltage devices on the place of installation. Besides for non professional users we highly recommend to contact our colleagues to help you by phone or by e-mail.

The flow chart must start from the proper box according to the type of the place of installation and the arrows must follow until the type 3 arresters. For the minimal protection at least the type 2 and type 3 arresters must installed. The common place of type 1 and type 1+2 arresters is the main distribution board of building; we are suggest to install the type2 and type 3 arresters to the side distribution boards. If the length of supply cable/wire between type 3 arrester and the protected device is longer than 30 m the type 3 arrester have to repeat at the connection of device. For protection of data network we recommend to use our extension cords with data network protection option.

Further detailed information see on ANNEX on page K/8 - K/9!

### Type 1 lightning arrester



E/4

### Decoupling coil



E/8

### Surge arresters for DC



K/6

### Type 1+2 combined lightning and surge arrester



E/5

### Type 2 surge arrester



E/6 – E/8

### Type 3 surge arrester



E/7

### Protected multi-plug extension cords



E/35-E/36

# Surge protective devices

## Lightning and surge arresters

The function of lightning and surge protection systems is to protect the devices, functional isolations and overvoltage-sensitive consumer equipments of energy distribution systems against all lightning and overvoltage damages.

Due to the wide energy, voltage and frequency range of overvoltage it is advisable to develop one coordinative protection system covering the whole building; the outdoor lightning protection system is generally not sufficient to eliminate such malfunctions.

At most of types, the defected protection device can be made operative again by changing the damaged insert; these variants are also equipped with both optical operation signal and auxiliary status contact.



**Surge arresters for DC**

**K/6**



### Technical data of auxiliary contact

Type of contact:

CO contact or NO contact  
(depend on type of arrester)

Rated operational voltage:

230V; 50Hz

Rated operational current:

0.5A (AC15)

Terminal capacity:

1mm<sup>2</sup> flexible / 1.5 mm<sup>2</sup> solid

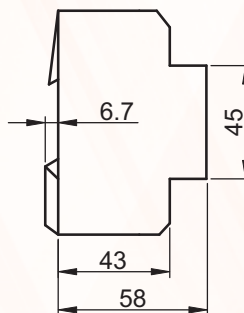
Ambient temperature:

-40 °C ... +80 °C



## Type 1 lightning arresters

These devices are applicable to arrest high energy current impulses (10/350µs waveform) which can appear in one- or three-phase overhead lines by lightning. These arresters have compact (block type) mounting form. The type 1 lightning arresters must be installed into the main distribution box of the building right after the first main current limitation device and before the power meter.



### RELEVANT STANDARD

**EN 61643-11**  
**IEC 60643-11**

### Technical data

Tracon code	TTV1-50-1P	TTV1-50-2P	TTV1-50-3P...	TTV1-50-4P
Main voltage	230 V, 50 Hz; 1~		3×230/400 V, 50 Hz; 3~	
Network system	TN, TT	TN, IT	TN, TT	TN, IT
Highest continuous voltage (U <sub>c</sub> ):	385V, AC			
Nominal discharge current (I <sub>n</sub> 8/20µs), (L-N):	100 kA	100 kA	3×100 kA	3×100 kA
Nominal discharge current (I <sub>n</sub> 8/20µs), (N-PE):	50 kA			
Protection level (U <sub>p</sub> ):	0,9/1,5 kV			
Follow current extinguishing capability	25 kA			
Follow current limitation	125 A gG			
Ambient temperature	-40 °C ... +55 °C			
Terminal capacity	solid: 2,5 - 35 mm <sup>2</sup> / flexible: 2,5 - 25 mm <sup>2</sup>			
Type of terminal	elevator clamp			
Integrated protection devices	spark gap, Varistor, thermal fuse			
Mounting	on 7.5 × 35 mm size mounting rail (EN 50022)			
Arresting signal	Red optical signal			
Auxiliary status contact	Integrated (1 pc NO contact)			
Flammability of housing	UL94-V0			

### Assortment

Tracon code	Number of poles	W (mm)	Lightning impulse current (10/350 µs) I <sub>imp</sub> / pólus	Total Lightning impulse current (10/350 µs) I <sub>imptotal</sub>	Color	Type
<b>TTV1-50-1P</b>	1P	18	25 kA	50 kA	black	compact
<b>TTV1-50-2P</b>	2P	36	25 kA	50 kA	black	compact
<b>TTV1-50-3P</b>	3P	54	25 kA	50 kA	black	compact
<b>TTV1-50-3P+N/PE</b>	3P+N/PE	72	25 kA	50 kA	black	compact
<b>TTV1-50-4P</b>	4P	72	25 kA	50 kA	black	compact

The selection guide see on page E/2-3, the connection diagrams on page E/9.



# Surge protective devices

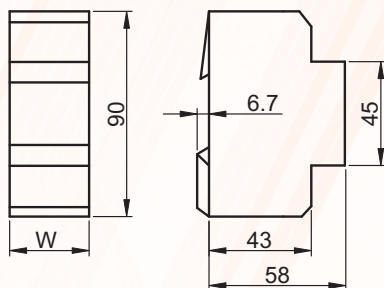
## Combined (type 1 + 2 ) lightning and surge arresters

The combined devices are applicable to arrest high energy current impulses (10/350µs waveform) which can appear in one- or three-phase overhead lines by lightning and/or discharge overvoltage occurred by switch-type (8/20µs wave-form) over-currents. These arresters have compact (block type) mounting form. The type 1 + 2 lightning arresters must be installed into the main distribution box of the building right after the first main current limitation device and before the power meter.

*Attention! The discharge capability of combined devices cannot reach the discharge capability of single devices!*

These devices can also be used in properly planned **photovoltaic (DC)** systems as well.

RELEVANT STANDARD
<b>EN 61643-11</b>
<b>IEC 60643-11</b>



### Technical data

Tracon code	TTV1+2-100...	TTV1+2-80...
Main voltage	230/400 V, 50 Hz	
Network system	TN, TT, IT	
Highest continuous voltage ( $U_c$ ):	385 V	320 V
Network system	385 V AC, 500 V DC	320 V AC, 420 V DC
Nominal discharge current ( $I_n$ 8/20 µs):	50 kA	40 kA
Protection level ( $U_p$ ):	2,4 kV	2,2 kV
NPE lightning impulse discharge current (10/350 µs):	25 kA	
Follow current limitation	125 A gG	
Follow current extinguishing capability	25 kA/AC	
Ambient temperature	-40 °C ... +55 °C	
Type of terminal	elevator clamp	
Integrated protection devices	Varistor, thermal fuse	
Mounting	on 7.5 × 35 mm size mounting rail (EN 50022)	
Auxiliary status contact	Integrated (1 pc CO contact)	
Arresting signal	Red optical signal	
Terminal capacity	solid: 6 - 35 mm <sup>2</sup> flexible: 6 - 25 mm <sup>2</sup>	
Flammability of housing	UL94-V0	

### Assortment

Tracon code	Number of poles	W (mm)	Lightning impulse current (10/350 µs) $I_{imp}$	Maximal discharge current (8/20µs) $I_{max}$	Color	Type
<b>TTV1+2-100-1P</b>	1P	27	8 kA	100 kA	grey	compact
<b>TTV1+2-100-2P</b>	2P	54	8 kA	100 kA	grey	compact
<b>TTV1+2-100-3P</b>	3P	81	8 kA	100 kA	grey	compact
<b>TTV1+2-100-4P</b>	4P	108	8 kA	100 kA	grey	compact
<b>TTV1+2-100-3P+N/PE</b>	3P+N/PE	108	8 kA	100 kA	grey	compact
<b>TTV1+2-80-1P</b>	1	27	8 kA	80 kA	grey	compact
<b>TTV1+2-80-2P</b>	2	54	8 kA	80 kA	grey	compact
<b>TTV1+2-80-3P</b>	3	81	8 kA	80 kA	grey	compact
<b>TTV1+2-80-4P</b>	4	108	8 kA	80 kA	grey	compact
<b>TTV1+2-80-3P+N/PE</b>	3P+N/PE	108	8 kA	80 kA	grey	compact

The selection guide see on page E/2-3, the connection diagrams on page E/9.



## SCAN THE QR CODE!

- Check our new products
- Be updated

Our assortment is expanding quickly and continuously! This catalogue reflects the status in November 2013.  
Be up to date by our web page!

## Type 2 surge arresters

The type 2 surge arresters are applicable to discharge overvoltage caused by switch-type (8/20μs wave-form) over currents.

The type 2 arresters must be installed into sub-distribution boards (at condominium into distribution boards of flats) after main distribution boards containing type 1 arresters.

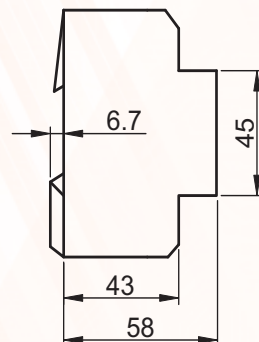
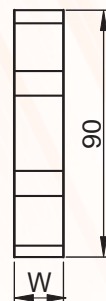
For proper operation at least 10- 15 m cable or wire must be placed between type 1 and type 2 arresters. Otherwise a decoupling coil has to be installed between the two devices. These protectors are modular types with changeable insert; the auxiliary contact is built-in into the housing of the device.



RELEVANT STANDARD

**EN 61643-11**

**IEC 60643-11**



### Technical data

Tracon code	TTV2-60...	TTV2-40...	TTV2-30...	TTV2-20...
Rated voltage:	230 V, 3×230/400 V			
Network system	TN, TT, IT			
Highest continuous voltage (U <sub>c</sub> ):	385/440 V	385 V	385 V	385/440 V
Protection level (U <sub>p</sub> ):	1,5 kV	1,5 kV	1,6 kV	1,5 kV
Follow current limitation	125A gG			
Follow current extinguishing capability	10 kA/AC			
Ambient temperature	-40 °C ... +55 °C			
Type of terminal	elevator clamp			
Integrated protection devices	Varistor, thermal fuse			
Mounting	on 7.5 × 35 mm size mounting rail (EN 50022)			
Auxiliary status contact	Integrated (1 pc NO contact)			
Arresting signal	Red optical signal			
Terminal capacity	solid: 6 - 35 mm <sup>2</sup> flexible: 6 - 25 mm <sup>2</sup>			
Flammability of housing	UL94-V0			

### Assortment

Tracon code	Number of poles	W (mm)	Nominal discharge (8/20μs) I <sub>n</sub>	Maximal discharge current (8/20μs) I <sub>max</sub>	Color	Type
<b>TTV2-60-1P</b>	1P	18	30kA	60kA	grey	changeable
<b>TTV2-60-2P</b>	2P	36	30kA	60kA	grey	changeable
<b>TTV2-60-3P</b>	3P	54	30kA	60kA	grey	changeable
<b>TTV2-60-3P+N/PE</b>	3P+N/PE	72	30kA	60kA	grey	changeable
<b>TTV2-60-4P</b>	4P	72	30kA	60kA	grey	changeable
<b>TTV2-40-1P</b>	1P	18	20kA	40kA	grey	changeable
<b>TTV2-40-2P</b>	2P	36	20kA	40kA	grey	changeable
<b>TTV2-40-3P</b>	3P	54	20kA	40kA	grey	changeable
<b>TTV2-40-3P+N/PE</b>	3P+N/PE	72	20kA	40kA	grey	changeable
<b>TTV2-40-4P</b>	4P	72	20kA	40kA	grey	changeable
<b>TTV2-30-1P+N/PE*</b>	1P+N/PE	18	15kA	30kA	grey	changeable
<b>TTV2-30-3P+N-PE**</b>	3P+N-PE	36	15kA	30kA	grey	changeable
<b>TTV2-20-1P</b>	1P	18	10kA	20kA	grey	changeable
<b>TTV2-20-2P</b>	2P	36	10kA	20kA	grey	changeable
<b>TTV2-20-3P</b>	3P	54	10kA	20kA	grey	changeable
<b>TTV2-20-3P+N/PE</b>	3P+N/PE	72	10kA	20kA	grey	changeable
<b>TTV2-20-4P</b>	4P	72	10kA	20kA	grey	changeable

\* 2 pcs arrester in one module width for one phase TNC-S and TNS type networks

\*\* 4 pcs arrester in two modules width for three phase TNC-S and TNS type networks

The selection guide see on page E/2-3, the connection diagrams on page E/9.



# Surge protective devices



## Type 3 surge arresters (fine protection)

The arresters of type 3 must be installed as close to the protected device as possible. These arresters are secondary protection devices and applicable to protection against discharge overvoltage occurred by switch-type (8/20µs wave-form) over-currents. These arresters have compact (block type) construction.

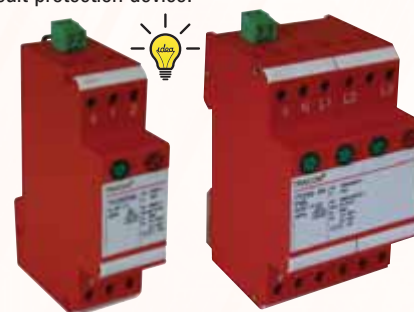
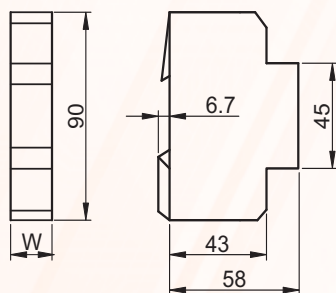
**Attention!**

*The type 3 devices alone cannot provide complete protection of electric devices against overvoltage!*

Tracon code	TTV3-10-1P+N/PE	TTV3-10-3P+N/PE	TTV3-5-1P+N-PE
Type	Modular	Modular	Build-in type
Main voltage	230 V, 50 Hz; 1~	3×230/400 V, 50 Hz; 3~	230 V, 50 Hz; 1~
Network system	TN, TT	TN, IT	TN, IT
Highest continuous voltage( $U_c$ ):	385/440 V		255 V AC
Rated thermal current ( $I_n$ ):	16 A		-
Protection level ( $U_p$ ):	1,5 kV		-
Follow current limitation	16 A gG		-
Nominal discharge current	10 kA		-
Ambient temperature	-40 °C ... +55 °C	-40 °C ... +55 °C	-20 °C ... +55 °C
Type of terminal	elevator clamp		
Integrated protection devices	spark gap, Varistor, thermal fuse		
Auxiliary status contact	integrated (1 pc NC contact)		-
Arresting signal:	Red optical signal		acoustic
Terminal capacity	Solid: 1,5 - 4 mm <sup>2</sup> Flexible: 1,5 - 2,5 mm <sup>2</sup>		3 pcs 1,5 mm <sup>2</sup> integrated wire
Flammability of housing	UL94-V0		

## Modular (block) type

These types of arresters have to be connected in series or parallel with the protected device and can be mounted into distribution boards for one- and three-phase networks. In case of serial connection the device to be protected has to be installed after the short circuit protection device.

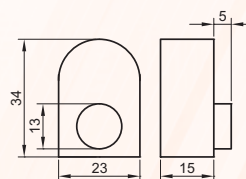


Tracon code	Number of poles	W (mm)	Nominal discharge current (8/20µs) $I_n$	Maximal discharge current (8/20µs) $I_{max}$	Color	Type
TTV3-10-1P+N/PE	1P+N/PE	36	5 kA	10 kA	red	modular
TTV3-10-3P+N/PE	3P+N/PE	72	5 kA	10 kA	red	modular

## Compact type arrester for wall box mount

This arrester can be built into electronic actuating devices, household devices, channels or deep wall boxes with parallel connection.

The protection unit is integrated into a plastic case; in case of arresting an acoustic signal give message to the user.



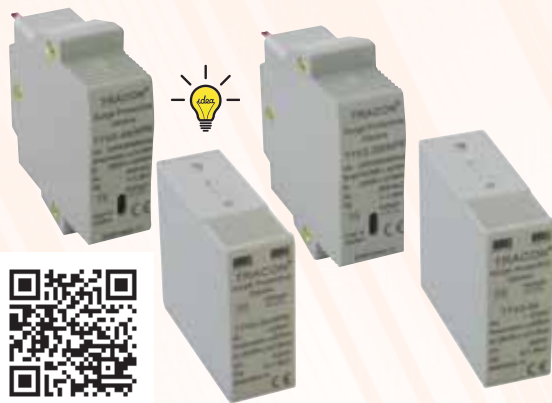
Tracon code	Number of poles	Nominal discharge current (8/20µs) $I_n$	Maximal discharge current (8/20µs) $I_{max}$	Color	Type
TTV3-5-1P+N-PE	1P+N-PE	2,5 kA	5 kA	purple	compact

See the selection guide on page E/2-3, the connection diagrams on page E/9.



# Surge protective devices

## Inserts for type 2 arresters



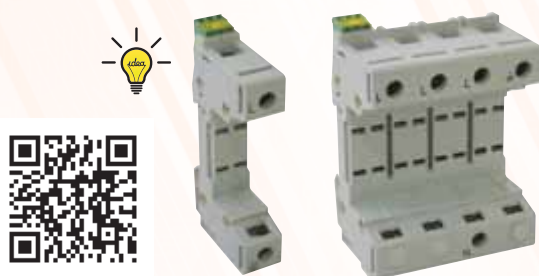
These inserts can be used for type 2-es changeable version arresters. The inserts can be changed easily and an optical sign informs the user about the operation mode.  
Width: 1 module.

Tracon code	Type	$I_n$	$I_{max}$	W (mm)	Color
<b>TTV2-60-M</b>	Type 2	30 kA	60 kA	18	grey
<b>TTV2-40-M</b>	Type 2	20 kA	40 kA	18	grey
<b>TTV2-30-A-M*</b>	Type 2	15 kA	30 kA	18	grey
<b>TTV2-30-B-M**</b>	Type 2	15 kA	30 kA	18	grey
<b>TTV2-20-M</b>	Type 2	10 kA	20 kA	18	grey
<b>TTV2-40-NPE-M</b>	Type 2	20 kA	40 kA	18	grey

\*2P insert for **TTV2-30-3P+N/PE** arrester

\*\*1P+N/PE insert for **TTV2-30-1P+N/PE** and **TTV2-30-3P+N/PE** arresters.

## Arrester bases



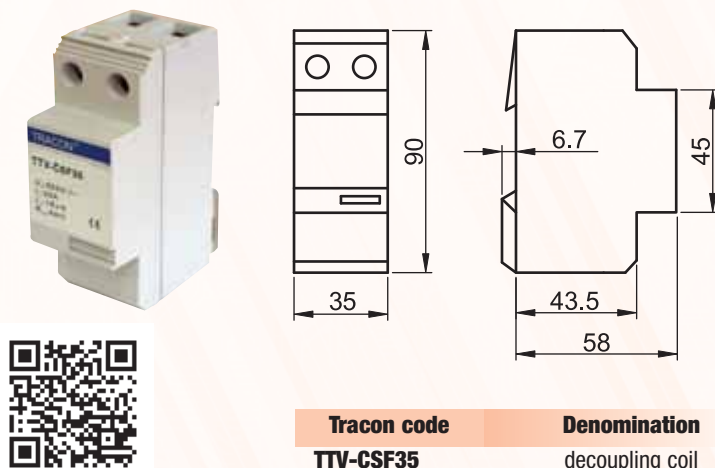
These bases can be used for type 2-es changeable version arresters and having 1 pc NO operation signal contact.

Tracon code	Number of poles	W (mm)	Color
<b>TTV2-BASE-1P</b>	1P	18	grey
<b>TTV2-BASE-2P</b>	2P	36	grey
<b>TTV2-BASE-3P</b>	3P	54	grey
<b>TTV2-BASE-4P</b>	4P	72	grey

## Decoupling coil

For well coordinated operation between the type 1 lightning arrester and the type 2 surge arrester, in complex lightning and overvoltage protection systems sufficient value of cable/wire impedance must be provided to enable voltage drop.

This condition is satisfied if the length of cable/wire is at least 10 – 15 meters. If this condition cannot be satisfied, an inductive reactance (decoupling coil) must be used.



### Technical data

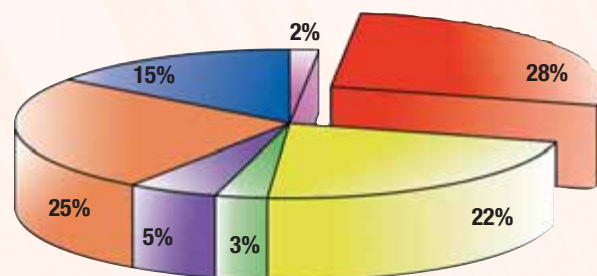
Rated voltage:	500 V AC/DC;
Rated frequency:	50 Hz;
Rated thermal current:	35 A;
Rated inductance:	18 $\mu$ H $\pm$ 10%;
Ballast fuse:	35 A gL/gG;
Rated short circuit breaking capacity using max. ballast fuse:	50 kA RMS;
Operational ambient temperature:	-40°C ... +115°C;
Terminal capacity:	min. 1.5 mm <sup>2</sup> solid/flexible; max 25 mm <sup>2</sup> flexible;
Mounting:	on mounting rails according to EN50022;
Housing material:	hot-melt plastic, UL 94 V0
Width:	2 modules;

Tracon code	Denomination
<b>TTV-CSF35</b>	decoupling coil

## Distribution of insurance damages

The most frequent damages paid yearly by Insurance Companies are caused by lightning and overvoltage as it can be read well from the picture below.

- Storm damages (2 %)
- Lightning and overvoltage (28 %)**
- Robbing, vandalism (22 %)
- Fire damages (3 %)
- Flooding, drainage (5 %)
- Human omission (25 %)
- Other (15 %)





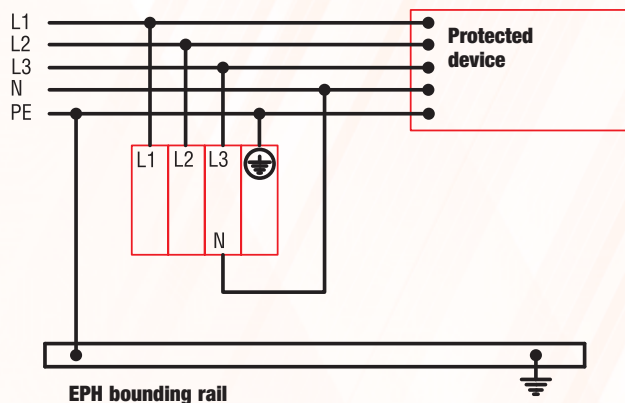
# Surge protective devices



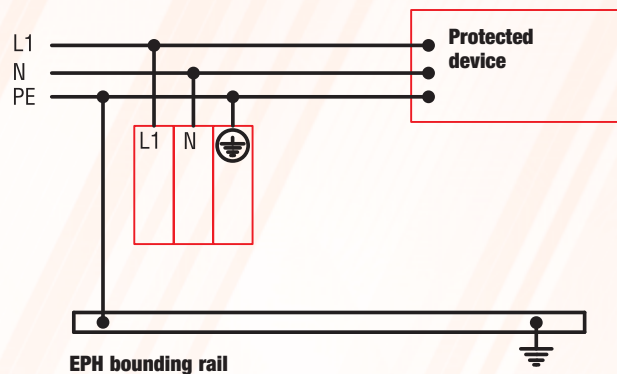
## Examples of connection of surge protection devices

The necessary number of surge protection devices – to be installed – is defined by the number of conductors independent from PE. This way by looking through the basic wiring diagrams of the three-phase energy supplying network you will see that for TN-C network 3 pcs, for TN-S, TT and IT network 4 pcs of one-pole surge protection devices or a corresponding number of multi-pole surge protection devices should be installed at every protection point.

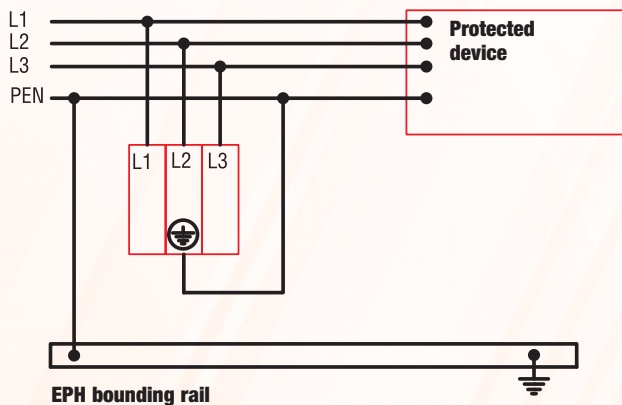
**TN-S Three phases + N/PE link**



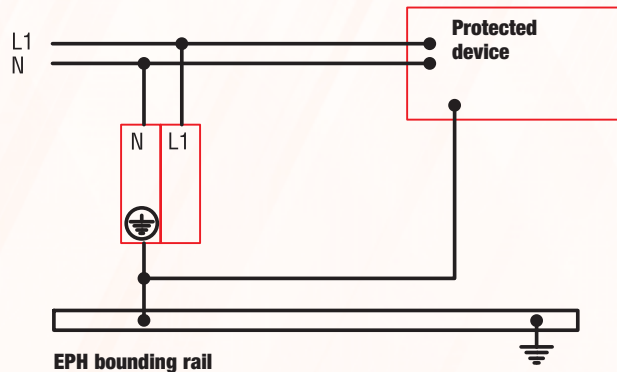
**TT- One phase + N/PE link**



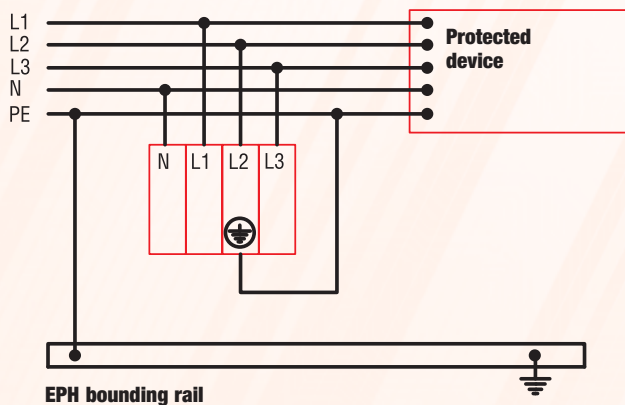
**TN-C Three phases link**



**TT- One phase link**



**TN-S Three phases + neutral link**



**IT- Three phases link**

