SPD Selection Guide

Type 1, Type 2, Type 3

HAKEL TRADE

Follow the right direction ...

... step by step ...

SPD SELECTION GUIDE

Lightning Protection Level I

Lightning Protection Level II

Lightning Protection Level III

Lightning Protection Level IV

TESTED BY VDE

PRODUCT GUARANTEE 5 YEARS

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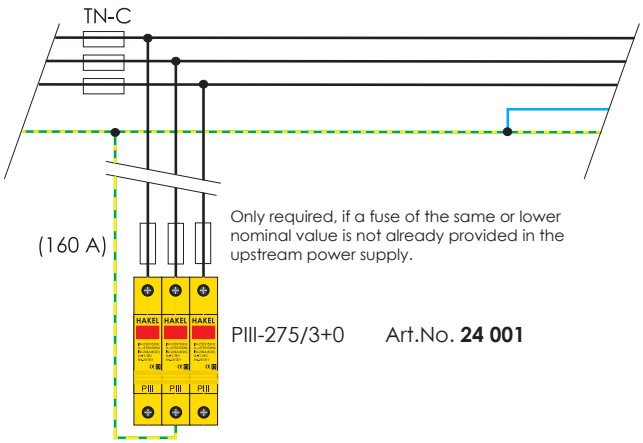
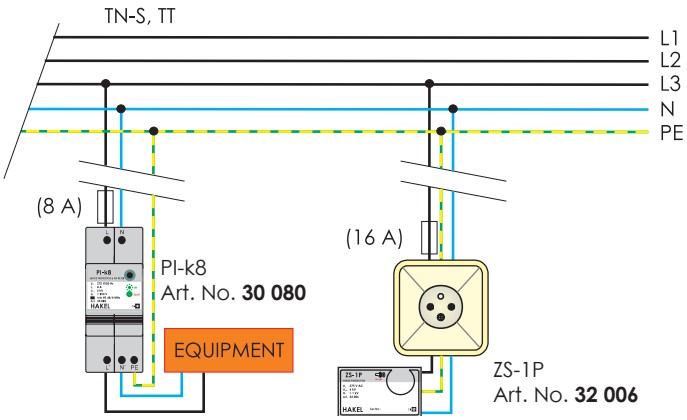
LIGHTNING PROTECTION LEVEL III and IV

Type 2 - at boundaries of LPZ 1-2 (surge arrester)		Coordination T2 and T3	System	Type 3 - at boundaries of LPZ 2-3 (surge arrester)			
				SPD + EMI filter		Additional SPD	
SPD type	Installation	< 5 m		SPD type	Installation	SPD type	Installation
 PIIIM-275/1+0	Subsidiary switchboard, Switchboards on every floor of the object or in every control panel	5 meters of cable or decoupling element PI-L(16-120 A/6 μH) *(Decoupling elements(PI-L) are installed for coordination of T2 and T3. These protect SPD T3 against destruction. If there is a distance between T2 and T3 < 5 m, it is necessary to use decoupling elements. The recommended connection is in series, hence is required to know the nominal voltage of existing conductor.*	TN-S, TT	 PI-k(8-150A)	To the switchboard, which is closest to the protected equipment *(In case of electronic control protection, the installation is directly to the appliance)*	 ZS-1.2T	*Outlet circuits which are longer than 20 m. Flush-mounted sockets and cable ducts. It is recommended to install SPD into the outlet circuit to every fourth socket or to the point of supply. The installation eliminates induced overvoltage which is enducing into the object's service cables.*
 PIII-275/3+0						 PI-p16	
 PIII-275/3+0	If the distance from T1 is > 30 m, then it is again necessary to install SPD T2			 PI-3k(16-120A)		 ZS-1I	
 SPU1-275	If the distance from T1 is > 30 m, then it is again necessary to install SPD T2	5 meters of cable or decoupling element PI-L(16-120 A/6 μH) *(Decoupling elements(PI-L) are installed for coordination of T2 and T3. These protect SPD T3 against destruction. If there is a distance between T2 and T3 < 5 m, it is necessary to use decoupling elements. The recommended connection is in series, hence is required to know the nominal voltage of existing conductor.*	TN-S, TT	 PI-k(8-150A)	Instalace do rozvaděče, který je co nejblíže chráněného zařízení. *(Pokud se chrání řídící elektronika, provádí se instalace přímo v daném zařízení)*	 ZS-1P	*Outlet circuits which are longer than 20 m. Flush-mounted sockets and cable ducts. It is recommended to install SPD into the outlet circuit to every fourth socket or to the point of supply. The installation eliminates induced overvoltage which is enducing into the object's service cables.*
 PIIIM-275/1+1	Subsidiary switchboard, Switchboards on every floor of the object or in every control panel					 PDU	
 SPU3-275	If the distance from T1 is > 30 m, then it is again necessary to install SPD T2					 Munos	
 PIIIM-275/3+1	Subsidiary switchboard, Switchboards on every floor of the object or in every control panel			 PI-3k(16-120A)		 ZS-1.1T	

Step 3
(selection of SPD T2)

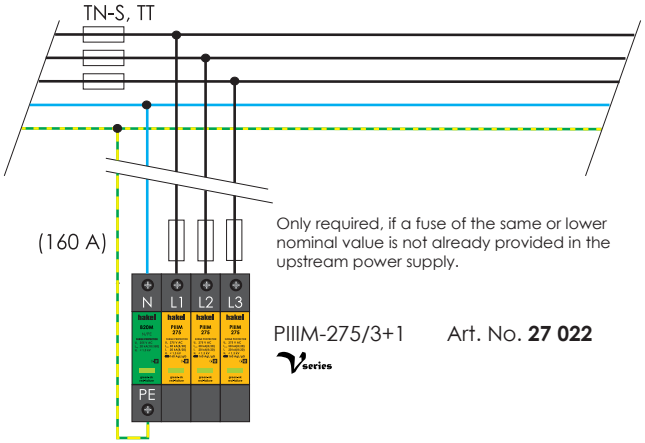


Step 4
(selection of SPD T3)

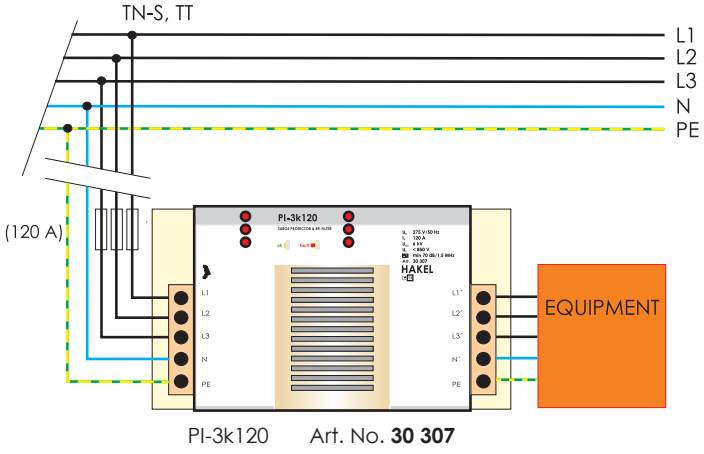


100 %
(property protection)

Surge arrester Type 2



Surge arrester Type 3

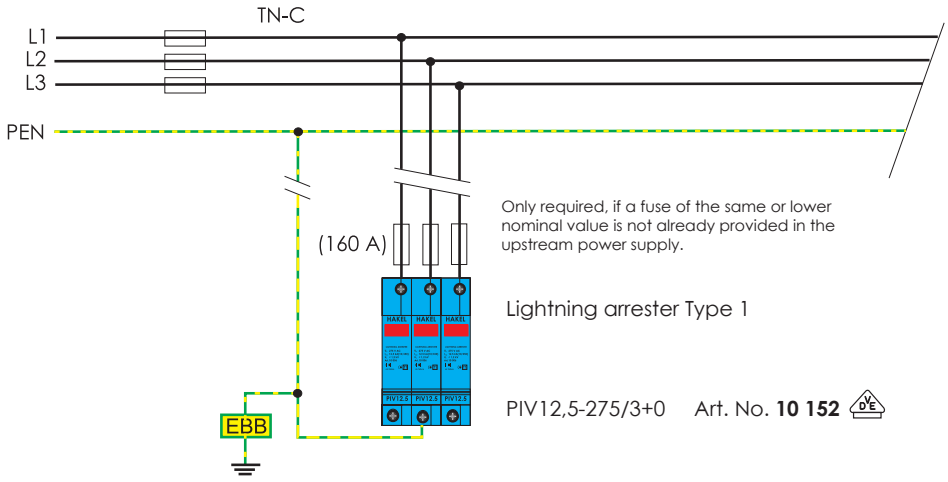


LIGHTNING PROTECTION LEVEL III and IV

Classification of typical objects	System	No. of phases	Circuit	Type 1-at boundaries of LPZ 0-1 (lightning arrester) SPD type	Installation	Coordination T1 and T2 < 5 m
Buildings with considerable level of protection LPL III and IV (I_{imp} = 50 kA) *LPL III* *Apartment houses* *Small administrative buildings* *Family houses* *Agricultural structures* *LPL IV* *Buildings and halls without occurrence of persons and internal equipment* **Objects with the main back-up fuse up to 63A connected by buried cable.**	TN-C	1	1+0	 SPC25	Main switchboard Surge arrester SPC contains two sections of varistors T1+T2. Coordination between T1 and T2 is secured by production.	
		3	3+0	 PIV12,5/3+0	Main switchboard	5 metres cable or decoupling element PI-L (16-120 A/6 µH)
				 SPC12,5/3+0	Main switchboard Surge arrester SPC contains two sections of varistors T1+T2. Coordination between T1 and T2 is secured by production.	
	TN-S	1	1+1	 SPC25/1+1	Main switchboard Surge arrester SPC contains two sections of varistors T1+T2. Coordination between T1 and T2 is secured by production.	
			2+0	 SPC25/2+0		
		3	3+1	 SPC12,5/3+1	Main switchboard Surge arrester SPC contains two sections of varistors T1+T2. Coordination between T1 and T2 is secured by production.	
			4+0	 PIV12,5/4+0	Main switchboard	5 metres cable or decoupling element PI-L (16-120 A/6 µH)

Step 1
(object selection)

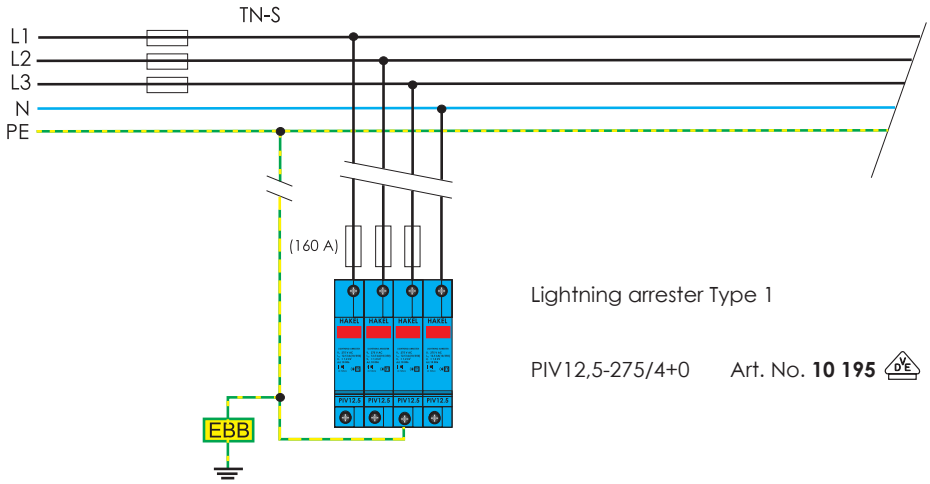
Step 2
(selection of SPD T1)



Only required, if a fuse of the same or lower nominal value is not already provided in the upstream power supply.

Lightning arrester Type 1

PIV12,5-275/3+0 Art. No. **10 152**



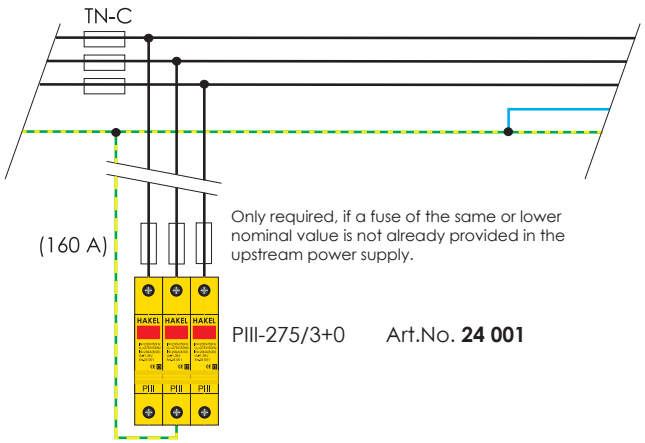
Lightning arrester Type 1

PIV12,5-275/4+0 Art. No. **10 195**

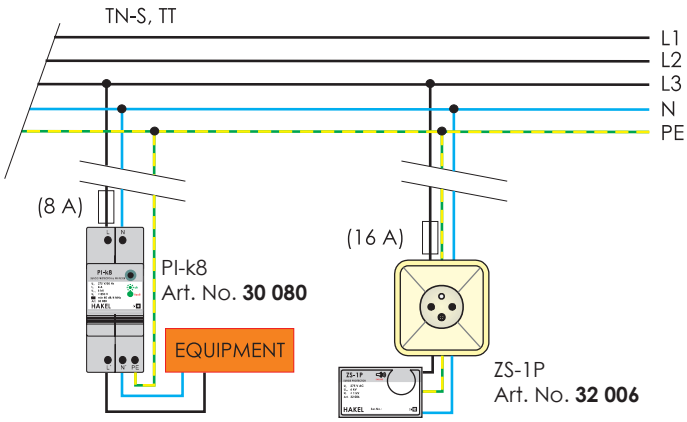
LIGHTNING PROTECTION LEVEL II

Type 2 - at boundaries of LPZ 1-2 (surge arrester)		Coordination T2 and T3	System	Type 3 - at boundaries of LPZ 2-3 (surge arrester)			
				SPD + EMI filter		Additional SPD	
SPD type	Installation	< 5 m		SPD type	Installation	SPD type	Installation
 PIIIM-275/1+0	Subsidiary switchboard, Switchboards on every floor of the object or in every control panel	5 meters of cable or decoupling element PI-L(16-120 A/6 μH)) *(Decoupling elements(PI-L) are installed for coordination of T2 and T3. These protect SPD T3 against destruction. If there is a distance between T2 and T3 < 5 m, it is necessary to use decoupling elements. The recommended connection is in series, hence is required to know the nominal voltage of existing conductor.*	TN-S, TT	 PI-k(8-150A)	To the switchboard, which is closest to the protected equipment *(In case of electronic control protection, the installation is directly to the appliance)*	 ZS-1.2T	*Outlet circuits which are longer than 20 m. Flush-mounted sockets and cable ducts. It is recommended to install SPD into the outlet circuit to every fourth socket or to the point of supply. The installation eliminates induced overvoltage which is enducing into the object's service cables.*
 PIII-275/3+0	If the distance from T1 is > 30 m, then it is again necessary to install SPD T2			 PI-3k(16-120A)		 PI-p16  ZS-1I	
 SPU1-275  PIIIM-275/1+1	Subsidiary switchboard, Switchboards on every floor of the object or in every control panel	5 meters of cable or decoupling element PI-L(16-120 A/6 μH)) *(Decoupling elements(PI-L) are installed for coordination of T2 and T3. These protect SPD T3 against destruction. If there is a distance between T2 and T3 < 5 m, it is necessary to use decoupling elements. The recommended connection is in series, hence is required to know the nominal voltage of existing conductor.*		 PI-k(8-150A)	To the switchboard, which is closest to the protected equipment *(In case of electronic control protection, the installation is directly to the appliance)*	 ZS-1P  PDU	*Outlet circuits which are longer than 20 m. Flush-mounted sockets and cable ducts. It is recommended to install SPD into the outlet circuit to every fourth socket or to the point of supply. The installation eliminates induced overvoltage which is enducing into the object's service cables.*
 SPU3-275  PIIIM-275/3+1	If the distance from T1 is > 30 m, then it is again necessary to install SPD T2			 PI-3k(16-120A)		 Munos  ZS-1.1T	

Step 3
(selection of SPD T2)

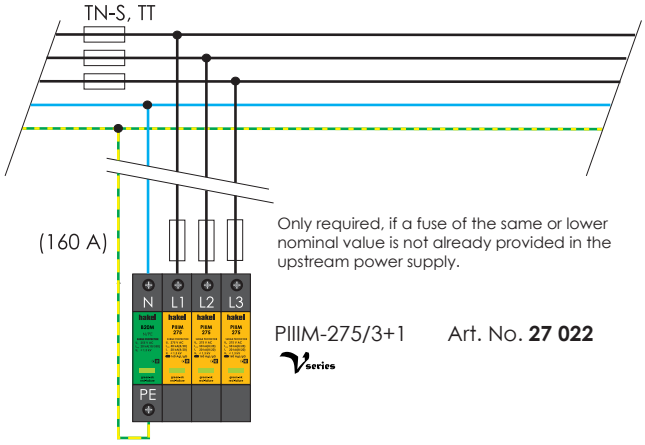


Step 4
(selection of SPD T3)

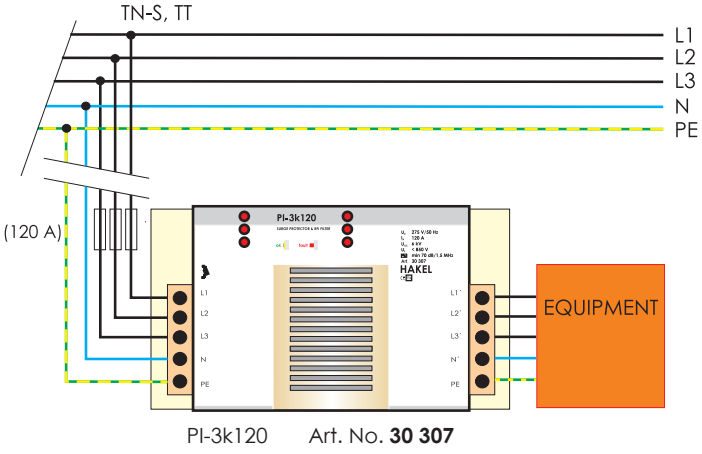


100 %
(property protection)

Surge arrester Type 2



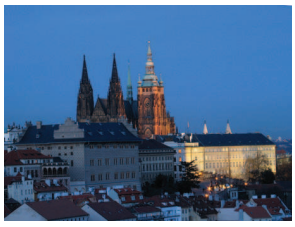
Surge arrester Type 3



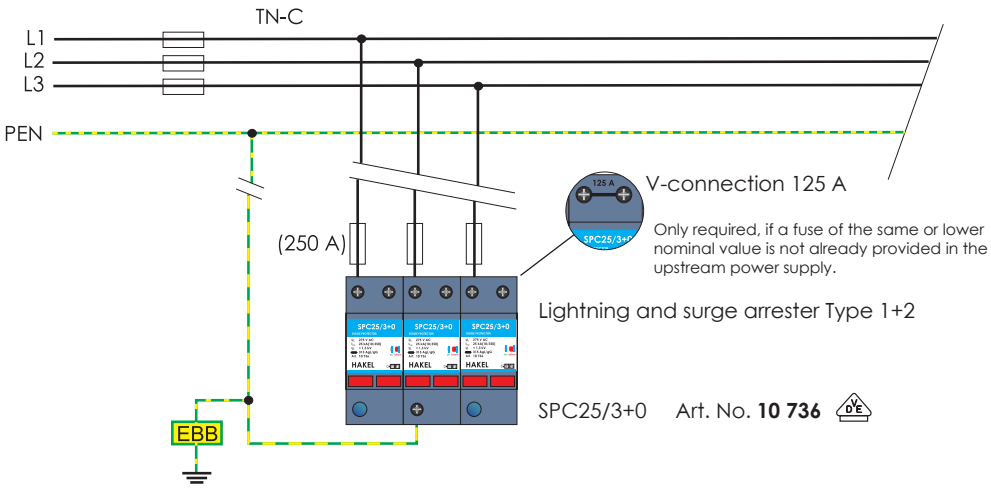
LIGHTNING PROTECTION LEVEL II

Classification of typical objects	System	No. of phases	Circuit	Type 1-at boundaries of LPZ 0-1 (lightning arrester) SPD type	Installation	Coordination T1 and T2 < 5 m
Buildings with considerable level of protection LPL II (I_{imp} = 75 kA) *Industrial buildings* *Administrative buildings* *Schools* *Supermarkets* *Cathedrals* **Objects connected by buried cable.**	TN-C	1	1+0	 HS50-50	Substation Switchboard (kWh) Main switchboard	5 metres cable or decoupling element PI-L (16-120 A/15 µH)
		3	3+0	 SPC25/3+0	Main switchboard Surge arrester SPC contains two sections of varistors T1+T2. Coordination between T1 and T2 is secured by production.	
	TN-S	1	1+1	 HS50-50/1+1	Substation Switchboard (kWh) Main switchboard	5 metres cable or decoupling element PI-L (16-120 A/15 µH)
			2+0	 HS50-50/2+0		
		3	3+1	 SPC25/3+1	Main switchboard Surge arrester SPC contains two sections of varistors T1+T2. Coordination between T1 and T2 is secured by production.	
			4+0	 SPC25/4+0		

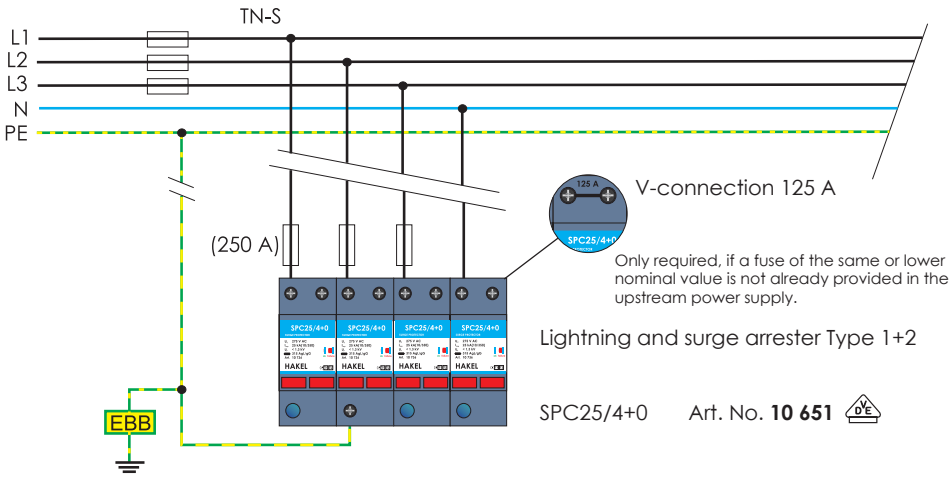
Step 1
(object selection)



Step 2
(selection of SPD T1)



SPC25/3+0 Art. No. **10 736**



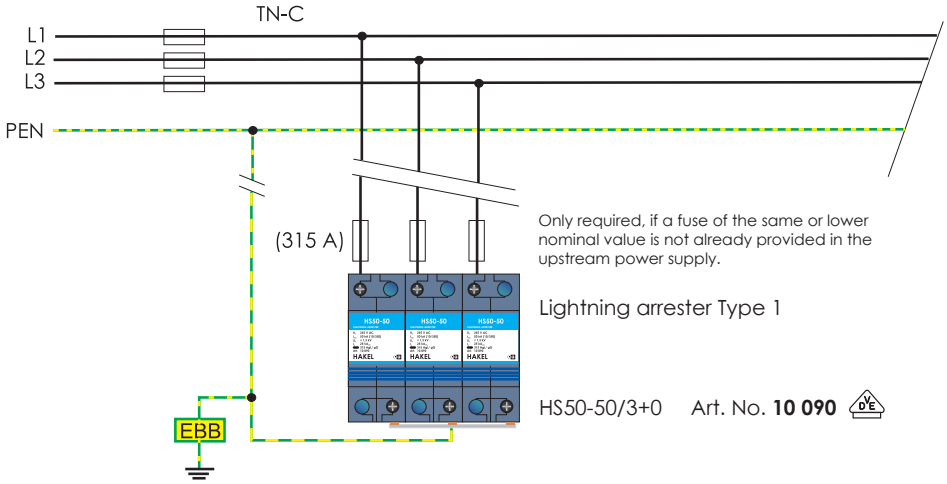
SPC25/4+0 Art. No. **10 651**

LIGHTNING PROTECTION LEVEL I

Classification of typical objects	System	No. of phases	Circuit	Type 1-at boundaries of LPZ 0-1 (lightning arrester)		Coordination T1 and T2
				SPD type	Installation	< 5 m
Buildings with considerable level of protection LPL I (I_{imp} = 100 kA) *Hospitals* *Banks* *Transmission point for GSM,BTS* *Water stations* *Power plants* *Aerodrome control tower* *Buildings with danger of explosion* ***Bigger industrial buildings*** ***Buildings with particular importance***	TN-C	1	1+0	 HS50-50	Substation Switchboard (kWh) Main switchboard	5 metres cable or decoupling element PI-L (16-120 A/15µH)
		3	3+0	 HS50-50/3+0	Substation Switchboard (kWh) Main switchboard	
	TN-S	1	1+1	 HS50-50/1+1	Substation Switchboard (kWh) Main switchboard	5 metres cable or decoupling element PI-L (16-120 A/15µH)
			2+0	 HS50-50/2+0		
		3	3+1	 SPC25/3+1	Main switchboard Surge arrester SPC contains two sections of varistors T1+T2. Coordination between T1 and T2 is secured by production.	
			4+0	 SPC25/4+0		

Step 1
(object selection)

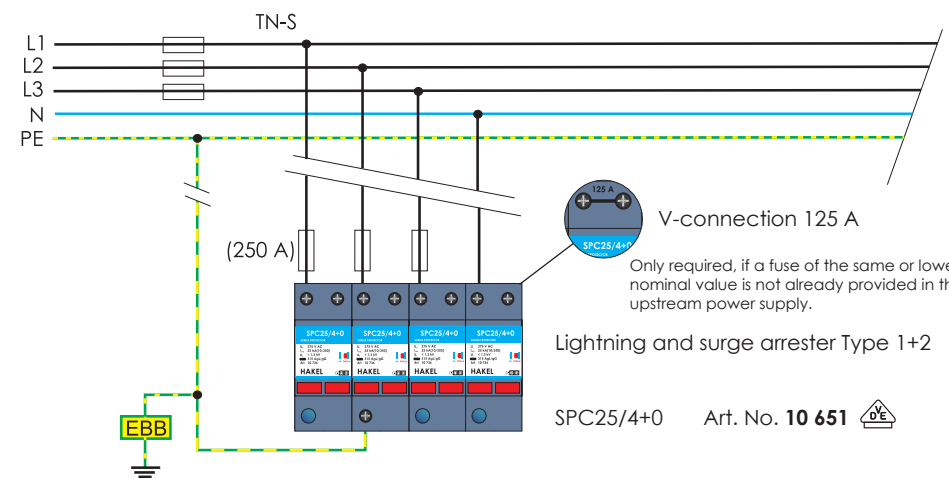
Step 2
(selection of SPD T1)



Only required, if a fuse of the same or lower nominal value is not already provided in the upstream power supply.

Lightning arrester Type 1

HS50-50/3+0 Art. No. **10 090**



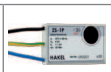
V-connection 125 A

Only required, if a fuse of the same or lower nominal value is not already provided in the upstream power supply.

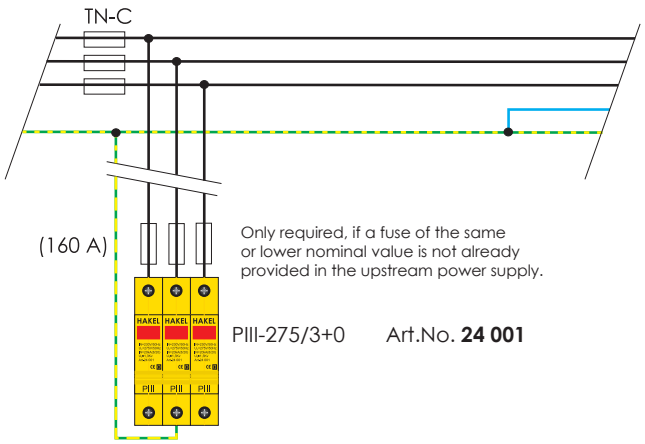
Lightning and surge arrester Type 1+2

SPC25/4+0 Art. No. **10 651**

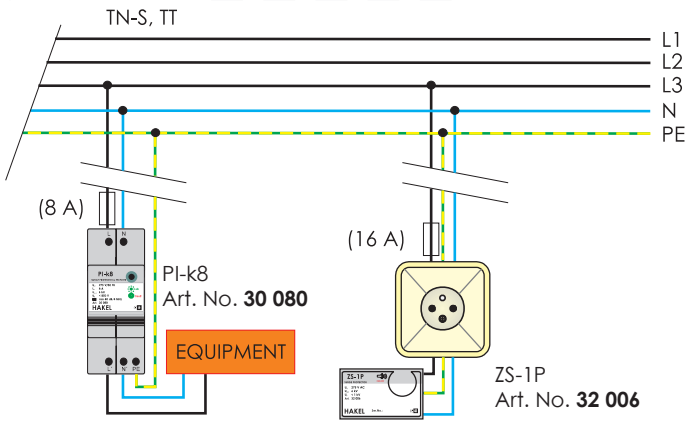
LIGHTNING PROTECTION LEVEL I

Type 2 - at boundaries of LPZ 1-2 (surge arrester)		Coordination T2 and T3	System	Type 3 - at boundaries of LPZ 2-3 (surge arrester)			
				SPD + EMI filter		Additional SPD	
SPD type	Installation	< 5 m		SPD type	Installation	SPD type	Installation
 PIIIM-275/1+0	Subsidiary switchboard, Switchboards on every floor of the object or in every control panel	5 meters of cable or decoupling element PI-L(16-120 A/6 μH) *(Decoupling elements(PI-L) are installed for coordination of T2 and T3. These protect SPD T3 against destruction. If there is a distance between T2 and T3 < 5 m, it is necessary to use decoupling elements. The recommended connection is in series, hence is required to know the nominal voltage of existing conductor.*	TN-S, TT	 PI-k(8-150A)	To the switchboard, which is closest to the protected equipment *(In case of electronic control protection, the installation is directly to the appliance)*	 ZS-1.2T	*Outlet circuits which are longer than 20 m. Flush-mounted sockets and cable ducts. It is recommended to install SPD into the outlet circuit to every fourth socket or to the point of supply. The installation eliminates induced overvoltage which is enducing into the object's service cables.*
 PIII-275/3+0				 PI-3k(16-120A)		 PI-p16  ZS-1I	
 SPU1-275  PIIIM-275/1+1	Subsidiary switchboard, Switchboards on every floor of the object or in every control panel	5 meters of cable or decoupling element PI-L(16-120 A/6 μH) *(Decoupling elements(PI-L) are installed for coordination of T2 and T3. These protect SPD T3 against destruction. If there is a distance between T2 and T3 < 5 m, it is necessary to use decoupling elements. The recommended connection is in series, hence is required to know the nominal voltage of existing conductor.*	TN-S, TT	 PI-k(8-150A)	To the switchboard, which is closest to the protected equipment *(In case of electronic control protection, the installation is directly to the appliance)*	 ZS-1P  PDU  Munos  ZS-1.1T	*Outlet circuits which are longer than 20 m. Flush-mounted sockets and cable ducts. It is recommended to install SPD into the outlet circuit to every fourth socket or to the point of supply. The installation eliminates induced overvoltage which is enducing into the object's service cables.*
 SPU3-275  PIIIM-275/3+1	If the distance from T1 is > 30 m, then it is again necessary to install SPD T2			 PI-k(8-150A)  PI-3k(16-120A)			

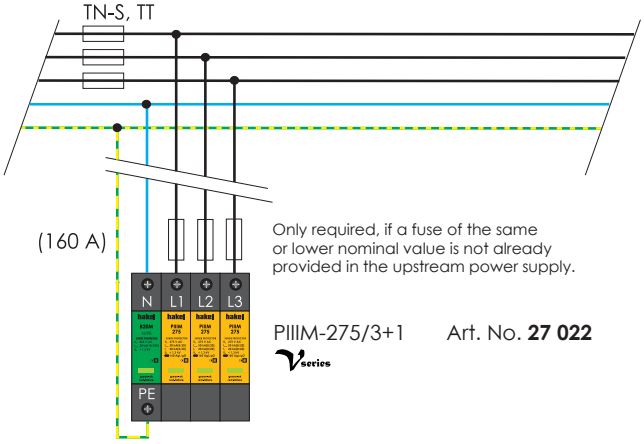
Step 3
(selection of SPD T2)



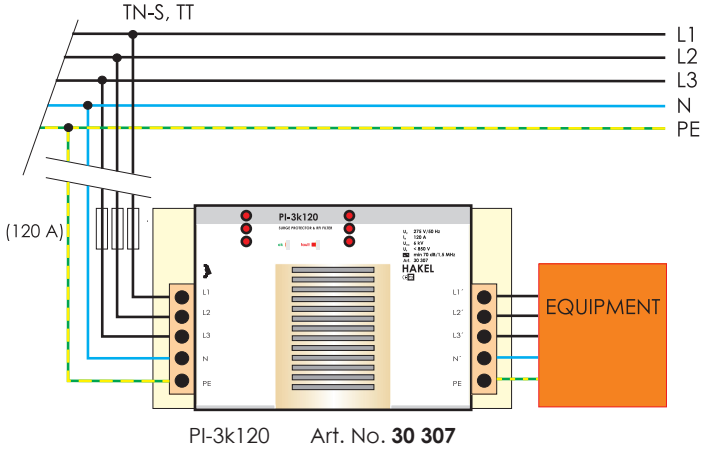
Step 4
(selection of SPD T3)



Surge arrester Type 2



Surge arrester Type 3



PIVM12,5 - 275/3+1 DS Lightning arrester type 1. I_{imp} = 12,5 kA, I_{max} = 100 kA. Easy installation of phase and neutral conductors.

PIVM7 - 275/3+1 DS Lightning arrester type 1. I_{imp} = 7 kA, I_{max} = 50 kA. Easy installation of phase and neutral conductors.

PIIIM - 275/3+1 DS Surge arrester type 2. I_n = 20 kA, I_{max} = 50 kA. Easy installation of phase and neutral conductors.

HUF is designed for using in AC parts of photovoltaic systems or other types of AC electrical installations. Supplied software application HUF MONITOR (works under Windows operational system) finds regular series port after SW loading and gives the user these options:
1) to continuously monitor the current voltage values of all connected phases
2) to continuously monitor the current frequency of connected AC networks
3) to reset the hold time within the range of 60 - 300s

HVG is a Voltage Guard designed for AC network systems. Its biggest advantage is fixed setting of hold time, which ensures disconnection of protected appliances after every deviation of the mains voltage from the restricted voltage limits. The basic setting is 300 seconds.

HT-ISDN Hakel Transmition-ISDN is designed to protect telecommunication lines which transfer ISDN technology. Casing of this protector is made out of light alloy, which ensures high mechanical and thermal resistance. I_n = 1 kA.

HT-DATA Hakel Transmition-DATA is designed to protect transmission of data and information signals. Casing of this protector is made out of light alloy, which ensures high mechanical and thermal resistance. I_{max} = 10 kA.

HT-CCTV Hakel Transmition-CCTV is designed to protect video transmission equipment, which process the transferred video signal. Casing of this protector is made out of light alloy, which ensures high mechanical and thermal resistance. I_{max} = 5kA.

HT-TEL Hakel Transmition-TEL is designed to protect telecommunications equipment. Casing of this protector is made out of light alloy, which ensures high mechanical and thermal resistance. I_{max} = 2 kA.

HAKEL TRADE

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