

# **hakel<sup>®</sup>**

**Hz in Hearts**



**SPD for IT  
power supply systems**

## **Assortment of Hakel products:**

**Surge protection devices (SPD)**

**Surge protection devices + EMI filters (SPD+EMI)**

**Surge protection devices for photovoltaic applications (SPD PV)**

**Surge protection devices for it power supply systems (SPD IT)**

**Voltage limiting devices (VLD)**

**Gas discharge tubes for equipotential bonding (GDT)**

**Insulation monitoring devices (IMD)**

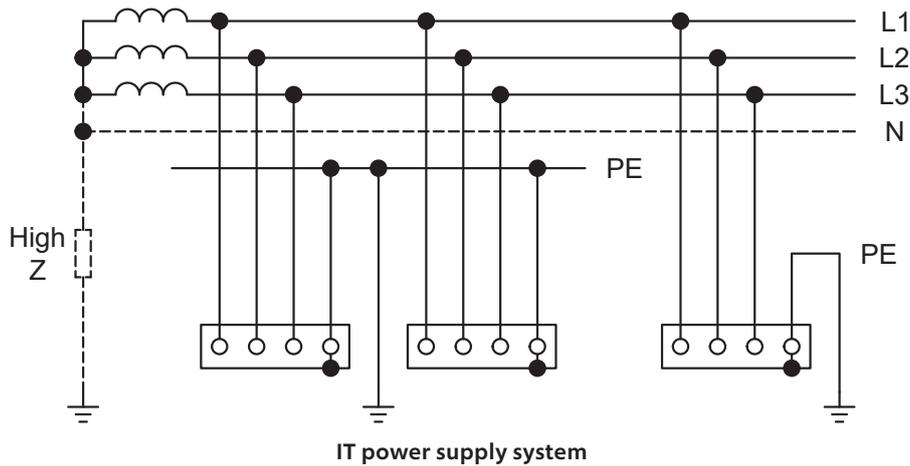
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# IT power supply system introduction

The power supply system marked with the letters IT (“Isolé” – insulated; “Terré” – grounding of inactive parts) is called an insulated system and all its active parts are isolated from the earth or have one pole of the system connected to the earth via high impedance. Inactive parts of the electrical installation are grounded, either individually or in groups, or together by one earthed protective conductor. They can be operated either with a brought out neutral (center conductor N) or without a brought out neutral (center conductor N). The insulated

system increases the operational reliability of the entire system and also the safety of persons who use it or are dependent on it. Therefore, the IT power supply system is mainly used in hospital facilities, heavy industry such as mining, metallurgy, engineering, shipbuilding, but also in traction systems and vehicles. The undeniable advantage of the insulated system is that the devices connected to this system can work continuously even in the case of the first fault, so-called the earth fault.



**Insulation monitoring device**

Although the entire system, connected to the IT power supply system, is at the first fault status and still operational, the fault must be eliminated (the insulation condition must be sufficiently increased) as soon as possible and the relevant person must be informed. In order to monitor and signal the state of the insulated system must be installed the

insulation monitoring devices or residual current monitoring relays in accordance with the standard HD 60364-4-41:2017. For medical premises, the HD 60364-7-710:2012 standard prescribes predominantly the insulation monitoring devices in order to increase the safety of the power supply system. Insulation monitoring devices detect a drop in insulation resistance below the set value and transmit information to the operator or to the relevant system according to the designer’s project or local regulations. If there is another ground fault in different active part (the second fault), the occurred short circuit will be switched off by the superior short-circuit protection / fuse. More information about the insulation monitoring devices, our wide range of these devices and their accessories can be found on our website.

In order to make the operation of insulated systems even more reliable and safer, it is important to install the surge protection devices as well. Given surge protectors are specially designed for these applications and they are intended for line-to-line voltage and not for line-to-neutral voltage as in usual TN power supply systems. This is due to the possibility of increasing the phase-to-phase voltage in the event of a ground fault, which can occur and last in the system for some time, until the fault is eliminated. If you install appropriate surge protection devices you can ensure reliable protection of all equipment connected to this system. As a protective element in lightning and surge arresters intended for IT power supply system serves a high-performance varistor. Compared to the spark gap, it has a several times lower response time and thus better suppresses the overvoltage between the working conductors (transverse overvoltage). In addition, it is able to discharge high impulse currents as well as eliminate the smallest overvoltage. This complex characteristic allows the varistor to be used as a type 1 protection at the beginning of the system as well as a type 3 protection close to the end equipment, which needs to be protected.

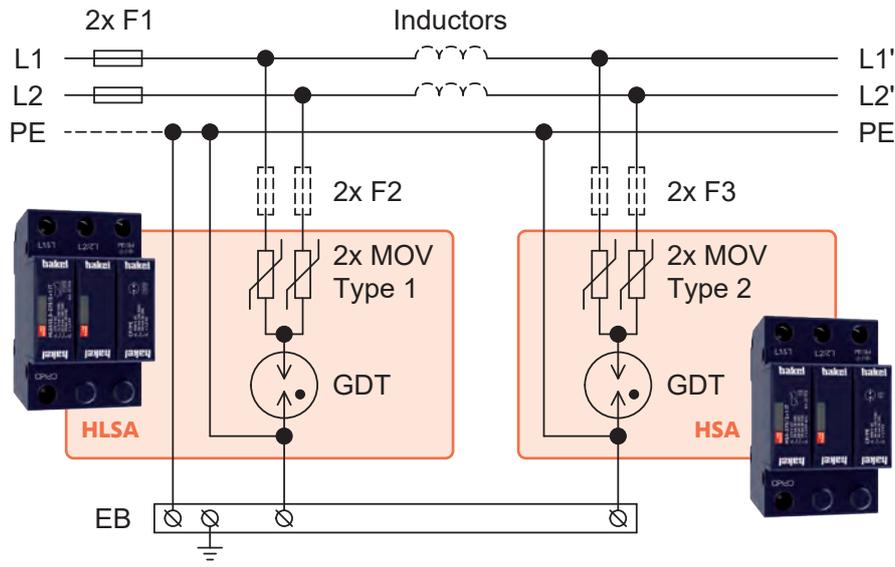
### High power varistor type 1+2



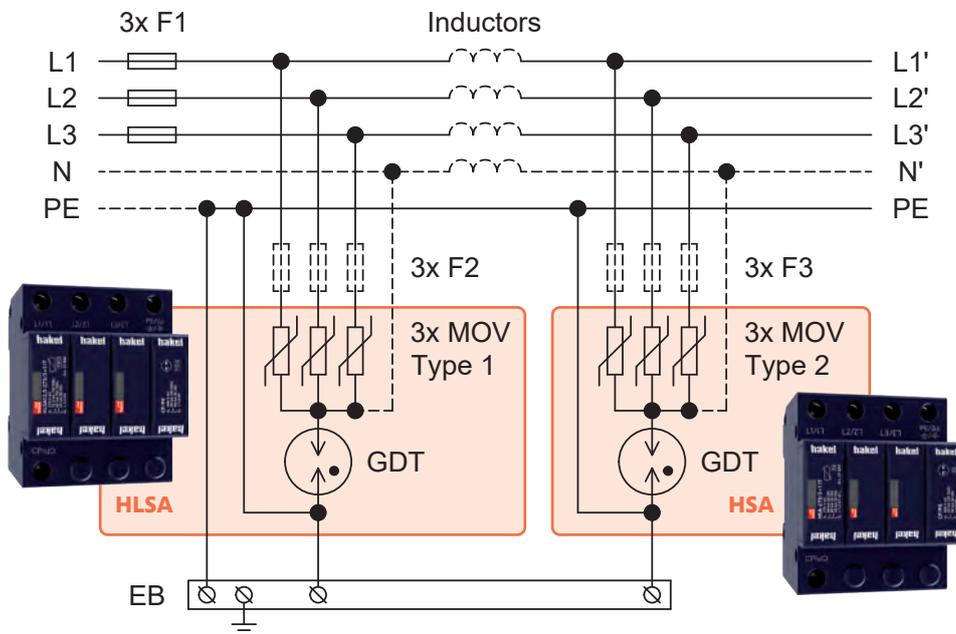
# IT power supply system introduction

However, it also has its disadvantage, namely leakage currents, which with a larger number of installed arresters in one IT power supply system can pose a certain risk of deterioration in the insulation resistance of given system. The sum of leakage currents of individual varistors could theoretically reach a critical value of the insulation resistance to which the insulation monitoring device would react. Therefore, it is necessary to add the gas discharge tube in series with

the varistor (or section of varistors for a three-phase system). Since the gas discharge tube acts in release state as a high resistance insulator, which separates galvanically the active parts from the inactive ones, it prevents the passage of leakage current from the surge protection to the ground. Below you will find the recommended connections for single-phase and three-phase IT power supply systems, with or without a brought out center.



One-phase IT power supply systems



Three-phase IT power supply systems

Note: Dashed lines show the wires and elements, which are optional according to the specific application. Fuses F2 and F3 are installed if the main fuse F1 has a higher rated current than the recommended value of the back-up fuse of the used surge protection. The decoupling inductor (HI) is installed if the line distance between the type 1+2 and type 2 surge arresters is less than 10 m.

The CP terminal – Central Point is used for the purpose of measuring and testing the surge protection devices, e.g. using GIGATEST PRO measuring device. The CP will not be connected in a power supply system without a brought out neutral (N conductor). In a system with a brought out neutral, the CP terminal will be also used for connecting the N conductor in addition to the testing and measuring.

## Lightning and surge arresters T1+T2 for IT power supply systems

- HLSA\*/2+1 (S) IT is designed to limit the impulse surge and discharge the impulse currents at one-phase IT systems.
- Consists of high energy varistors in combination with gas discharge tube, which ensures zero leakage current in the PE conductor.
- The device is to be installed on the interface of zones **LPZ 0 – LPZ 1** and higher closest to where the overhead line enters the building.
- It is used in buildings with considerable levels of protection **LPL III and LPL IV**, such as small administration complexes, family houses or properties and halls without the incidence of persons and indoor equipment.
- In accordance with: EN 61643-11:2012 (IEC 61643-11:2011); UL94 V-0
- Installation acc. to: EN 62305:2011 (IEC 62305:2010); HD 60364-5-534:2016



	type	article no.	design dimension	$U_c$	$U_N$	$U_P$	$I_{imp}(10/350)$ L/PE / CP/PE	$I_n(8/20)$ L/PE / CP/PE
1	HLSA12,5-275/2+1 IT	27 574	3TE	275 V AC	230 V IT	< 1,2 kV	12,5 kA / 50 kA	25 kA / 50 kA
	HLSA12,5-275/2+1 S IT	27 575						
2	HLSA12,5-440/2+1 IT	27 584	5TE	440 V AC	400 V IT	< 1,8 kV	12,5 kA / 50 kA	25 kA / 50 kA
	HLSA12,5-440/2+1 S IT	27 585						
3	HLSA12,5-600/2+1 IT	27 586	5TE	600 V AC	500 V IT	< 2,4 kV	12,5 kA / 50 kA	25 kA / 50 kA
	HLSA12,5-600/2+1 S IT	27 587						
4	HLSA7-720/2+1 IT	27 588	7TE	720 V AC	600 V IT	< 2,6 kV	7 kA / 25 kA	25 kA / 30 kA
	HLSA7-720/2+1 S IT	27 589						
5	HLSA7-850/2+1 IT	27 590	7TE	850 V AC	720 V IT	< 3,3 kV	7 kA / 25 kA	25 kA / 30 kA
	HLSA7-850/2+1 S IT	27 591						

S – version with remote monitoring

Common characteristics		HLSA12,5-*/2+1 (S) IT	HLSA7-*/2+1 (S) IT
Test class according to EN 61643-11:2012 (IEC 61643-11:2011)		TYPE 1+2, CLASS I+II	
System		IT	
Maximum discharge current (8/20) L/PE	$I_{max}$	50 kA	
Charge L/PE	Q	6,25 As	3,5 As
Specific energy for class I test L/PE	W/R	39 kJ/Ω	12,25 kJ/Ω
Charge CP/PE	Q	25 As	12,5 As
Specific energy for class I test CP/PE	W/R	625 kJ/Ω	156 kJ/Ω
Total discharge current (10/350) L1+L2+CP->PE	$I_{Total}$	37,5 kA	21 kA
Total discharge current (8/20) L1+L2+CP->PE	$I_{Total}$	100 kA	50 kA
Response time L/CP	$t_A$	< 25 ns	
Response time L/PE	$t_A$	< 100 ns	
Max. back-up fuse		160 A gL / gG	
Short-circuit current rating at 160 A gL / gG	$I_{SCCR}$	60 kA <sub>rms</sub>	
LPZ		0-1 and higher	
Housing material		Polyamid PA6, UL 94 V-0	
Degree of protection of enclosure		IP20	
Operating temperature range	$\vartheta$	-40 °C ÷ +70 °C	
The minimal cross-section of the connected conductors according to standard HD 60364-5-534:2016 (at tightening moment of clamps 3 Nm; It's not valid for „V“ connection)		T1: 6 mm <sup>2</sup> (L, N), 16 mm <sup>2</sup> (PE, PEN)	
		T2: 2,5 mm <sup>2</sup> (L, N), 6 mm <sup>2</sup> (PE, PEN)	
Range of clamps fastening		1,5 ÷ 25 mm <sup>2</sup> (solid) / 1,5 ÷ 16 mm <sup>2</sup> (wire)	
The mounting method / operating position		DIN rail 35 mm / any	
Failure signalisation – optical function signalization		target clear – ok / target red – fault	
Potential free signal contact (S) (recommended cross-section of remote monitoring max. 1 mm <sup>2</sup> )		AC: 250 V / 1,5 A, DC: 250 V / 0,1 A	
Lifetime		min. 100 000 h	

Note: Versions of 720 V and 850 V aren't primarily intended for installation in buildings with the level of protection LPL III and LPL IV, their usage is determined from the risk calculation and installation topology.

## Lightning and surge arresters T1+T2 for IT power supply systems

- HLSA\*/3+1 (S) IT is designed to limit the impulse surge and discharge the impulse currents at three-phase IT systems.
- Consists of high energy varistors in combination with gas discharge tube, which ensures zero leakage current in the PE conductor.
- The device is to be installed on the interface of zones **LPZ 0 – LPZ 1** and higher closest to where the overhead line enters the building.
- It is used in buildings with considerable levels of protection **LPL III and LPL IV**, such as small administration complexes, family houses or properties and halls without the incidence of persons and indoor equipment.
- In accordance with: EN 61643-11:2012 (IEC 61643-11:2011); UL94 V-0
- Installation acc. to: EN 62305:2011 (IEC 62305:2010); HD 60364-5-534:2016



	type	article no.	design dimension	$U_c$	$U_N$	$U_p$	$I_{imp}$ (10/350) L/PE / CP/PE	$I_n$ (8/20) L/PE / CP/PE
1	HLSA12,5-275/3+1 IT	27 804	4TE	275 V AC	3 x 230 V IT	< 1,2 kV	12,5 kA / 50 kA	25 kA / 50 kA
	HLSA12,5-275/3+1 S IT	27 810						
2	HLSA12,5-440/3+1 IT	27 824	7TE	440 V AC	3 x 400 V IT	< 1,8 kV	12,5 kA / 50 kA	25 kA / 50 kA
	HLSA12,5-440/3+1 S IT	27 830						
3	HLSA12,5-600/3+1 IT	27 844	7TE	600 V AC	3 x 500 V IT	< 2,4 kV	12,5 kA / 50 kA	25 kA / 50 kA
	HLSA12,5-600/3+1 S IT	27 850						
4	HLSA7-720/3+1 IT	27 864	10TE	720 V AC	3 x 600 V IT	< 2,6 kV	7 kA / 50 kA	25 kA / 50 kA
	HLSA7-720/3+1 S IT	27 870						
5	HLSA7-850/3+1 IT	27 884	10TE	850 V AC	3 x 720 V IT	< 3,3 kV	7 kA / 50 kA	25 kA / 50 kA
	HLSA7-850/3+1 S IT	27 890						

S – version with remote monitoring

Common characteristics		HLSA12,5-*/3+1 (S) IT	HLSA7-*/3+1 (S) IT
Test class according to EN 61643-11:2012 (IEC 61643-11:2011)		TYPE 1+2, CLASS I+II	
System		IT	
Maximum discharge current (8/20) L/PE	$I_{max}$	50 kA	
Charge L/PE	Q	6,25 As	3,5 As
Specific energy for class I test L/PE	W/R	39 kJ/Ω	12,25 kJ/Ω
Charge CP/PE	Q	25 As	
Specific energy for class I test CP/PE	W/R	625 kJ/Ω	
Total discharge current (10/350) L1+L2+L3+CP->PE	$I_{Total}$	50 kA	28 kA
Total discharge current (8/20) L1+L2+L3+CP->PE	$I_{Total}$	100 kA	
Response time L/CP	$t_A$	< 25 ns	
Response time L/PE	$t_A$	< 100 ns	
Max. back-up fuse		160 A gL / gG	
Short-circuit current rating at 160 A gL / gG	$I_{SCCR}$	60 kA <sub>rms</sub>	
LPZ		0-1 and higher	
Housing material		Polyamid PA6, UL 94 V-0	
Degree of protection of enclosure		IP20	
Operating temperature range	$\vartheta$	-40 °C ÷ +70 °C	
The minimal cross-section of the connected conductors according to standard HD 60364-5-534:2016 (at tightening moment of clamps 3 Nm; It's not valid for „V“ connection)		T1: 6 mm <sup>2</sup> (L, N), 16 mm <sup>2</sup> (PE, PEN)	
		T2: 2,5 mm <sup>2</sup> (L, N), 6 mm <sup>2</sup> (PE, PEN)	
Range of clamps fastening		1,5 ÷ 25 mm <sup>2</sup> (solid) / 1,5 ÷ 16 mm <sup>2</sup> (wire)	
The mounting method / operating position		DIN rail 35 mm / any	
Failure signalisation – optical function signalization		target clear – ok / target red – fault	
Potential free signal contact (S) (recommended cross-section of remote monitoring max. 1 mm <sup>2</sup> )		AC: 250 V / 1,5 A, DC: 250 V / 0,1 A	
Lifetime		min. 100 000 h	

Note: Versions of 720 V and 850 V aren't primarily intended for installation in buildings with the level of protection LPL III and LPL IV, their usage is determined from the risk calculation and installation topology.

## Lightning and surge arresters T1+T2 for IT power supply systems

- HLSA21-600/3+1 M (S) IT is designed to limit the impulse surge and discharge the impulse currents at three-phase IT systems, where higher discharge currents are required.
- Consists of high energy varistors in combination with gas discharge tube, which ensures zero leakage current in the PE conductor.
- The device is to be installed on the interface of zones **LPZ 0 – LPZ 1** and higher closest to where the overhead line enters the building.
- It is used in buildings with considerable levels of protection **LPZ II**, such as bigger administration complexes, industrial buildings, schools, supermarkets, museums, cathedrals etc.
- Type of construction with removable module.
- In accordance with: EN 61643-11:2012 (IEC 61643-11:2011); UL94 V-0
- Installation acc. to: EN 62305:2011 (IEC 62305:2010); HD 60364-5-534:2016



	type	article no.	design dimension	$U_c$	$U_N$	$U_P$	$I_{imp}$ (10/350) L/PE / CP/PE	$I_n$ (8/20) L/PE / CP/PE
1	HLSA21-600/3+1 M IT	16 191	10TE	600 V AC	3 x 500 V IT	< 2,2 kV	21 kA / 65 kA	20 kA / 50 kA
	HLSA21-600/3+1 M S IT	16 190						

M – type of construction with removable module | S – version with remote monitoring

Other characteristics	HLSA21-600/3+1 M (S) IT	
Test class according to EN 61643-11:2012 (IEC 61643-11:2011)	TYPE 1+2, CLASS I+II	
System	IT	
Maximum discharge current (8/20) L/PE	$I_{max}$	50 kA
Charge L/PE	Q	10,5 As
Specific energy for class I test L/PE	W/R	110,25 kJ/Ω
Charge CP/PE	Q	32,5 As
Specific energy for class I test CP/PE	W/R	1056 kJ/Ω
Total discharge current (10/350) L1+L2+L3+CP->PE	$I_{Total}$	63 kA
Total discharge current (8/20) L1+L2+L3+CP->PE	$I_{Total}$	100 kA
Response time L/CP	$t_A$	< 25 ns
Response time L/PE	$t_A$	< 100 ns
Max. back-up fuse		160 A gL / gG
Short-circuit current rating at 160 A gL / gG	$I_{SCCR}$	60 kA <sub>rms</sub>
LPZ		0-1 and higher
Housing material		Polyamid PA6, UL 94 V-0
Degree of protection of enclosure		IP20
Operating temperature range	$\vartheta$	-40 °C ÷ +70 °C
The minimal cross-section of the connected conductors according to standard HD 60364-5-534:2016 (at tightening moment of clamps 3 Nm; It's not valid for „V“ connection)		T1: 6 mm <sup>2</sup> (L, N), 16 mm <sup>2</sup> (PE, PEN)
		T2: 2,5 mm <sup>2</sup> (L, N), 6 mm <sup>2</sup> (PE, PEN)
Range of clamps fastening		1,5 ÷ 25 mm <sup>2</sup> (solid) / 1,5 ÷ 16 mm <sup>2</sup> (wire)
The mounting method / operating position		DIN rail 35 mm / any
Failure signalisation – optical function signalization		target clear – ok / target red – fault
Potential free signal contact (S) (recommended cross-section of remote monitoring max. 1 mm <sup>2</sup> )		AC: 250 V / 1,5 A, DC: 250 V / 0,1 A
Lifetime		min. 100 000 h

## Surge arresters T2 for IT power supply systems

- HSA\* /2+1 (S) IT is designed to limit the impulse surge at one-phase IT systems.
- Consists of high energy varistors in combination with gas discharge tube, which ensures zero leakage current in the PE conductor and its parameters allow a complex usage.
- The device is to be installed on the interface of zones **LPZ 1 – LPZ 2** in to subsidiary switchboards and control panels.
- In accordance with: EN 61643-11:2012 (IEC 61643-11:2011); UL94 V-0
- Installation acc. to: EN 62305:2011 (IEC 62305:2010); HD 60364-5-534:2016



	type	article no.	design dimension	$U_c$	$U_N$	$U_p$ at $I_n$ / at $U_{oc}$	$I_{max}$ (8/20) L/CP	$I_n$ (8/20) L/CP
1	HSA-275/2+1 IT	27 572	3TE	275 V AC	230 V IT	< 1,2 kV / < 0,8 kV	50 kA	20 kA
	HSA-275/2+1 S IT	27 573						
2	HSA-440/2+1 IT	27 576		440 V AC	400 V IT	< 1,7 kV / < 1,4 kV	40 kA	15 kA
	HSA-440/2+1 S IT	27 577						
3	HSA-600/2+1 IT	27 578		600 V AC	500 V IT	< 2,1 kV / < 1,7 kV		
	HSA-600/2+1 S IT	27 579						
4	HSA-720/2+1 IT	27 580		720 V AC	600 V IT	< 2,6 kV / < 2,0 kV		
	HSA-720/2+1 S IT	27 581						
5	HSA-850/2+1 IT	27 582		850 V AC	720 V IT	< 3,3 kV / < 2,5 kV		
	HSA-850/2+1 S IT	27 583						

S – version with remote monitoring

Common characteristics		HSA-*/2+1 (S) IT
Test class according to EN 61643-11:2012 (IEC 61643-11:2011)		TYPE 2, CLASS II
System		IT
Open circuit voltage	$U_{oc}$	6 kV
Total discharge current (8/20) L1+L2+CP->PE	$I_{Total}$	50 kA
Response time L/CP	$t_A$	< 25 ns
Response time L/PE	$t_A$	< 100 ns
Max. back-up fuse		160 A gL / gG
Short-circuit current rating at 160 A gL / gG	$I_{SCCR}$	60 kA <sub>rms</sub>
LPZ		1-3
Housing material		Polyamid PA6, UL94 V-0
Degree of protection of enclosure		IP20
Operating temperature range	$\vartheta$	-40 °C ÷ +70 °C
The minimal cross-section of the connected conductors according to standard HD 60364-5-534:2016 (at tightening moment of clamps 3 Nm; It's not valid for „V“ connection)		T2: 2,5 mm <sup>2</sup> (L, N), 6 mm <sup>2</sup> (PE, PEN)
Range of clamps fastening		1,5 ÷ 25 mm <sup>2</sup> (solid) / 1,5 ÷ 16 mm <sup>2</sup> (wire)
The mounting method / operating position		DIN rail 35 mm / any
Failure signalisation		optical function signalization target clear – ok optical function signalization target red – fault
Potential free signal contact (S) (recommended cross-section of remote monitoring max. 1 mm <sup>2</sup> )		AC: 250 V / 1,5 A, DC: 250 V / 0,1 A
Lifetime		min. 100 000 h

## Surge arresters T2 for IT power supply systems

- HSA\* /3+1 (S) IT is designed to limit the impulse surge at three-phase IT systems.
- Consists of high energy varistors in combination with gas discharge tube, which ensures zero leakage current in the PE conductor and its parameters allow a complex usage.
- The device is to be installed on the interface of zones **LPZ 1 – LPZ 2** in to subsidiary switchboards and control panels.
- In accordance with: EN 61643-11:2012 (IEC 61643-11:2011); UL94 V-0
- Installation acc. to: EN 62305:2011 (IEC 62305:2010); HD 60364-5-534:2016



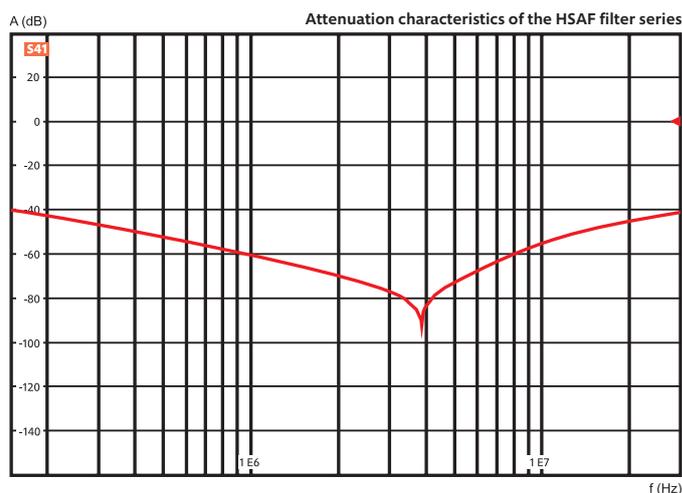
	type	article no.	design dimension	$U_c$	$U_N$	$U_p$ at $I_n$ / at $U_{oc}$	$I_{max}$ (8/20) L/CP	$I_n$ (8/20) L/CP
1	HSA-275/3+1 IT	27 604	4TE	275 V AC	3 x 230 V IT	< 1,2 kV / < 0,8 kV	50 kA	20 kA
	HSA-275/3+1 S IT	27 610						
2	HSA-440/3+1 IT	27 624		440 V AC	3 x 400 V IT	< 1,7 kV / < 1,4 kV	40 kA	15 kA
	HSA-440/3+1 S IT	27 630						
3	HSA-600/3+1 IT	27 644		600 V AC	3 x 500 V IT	< 2,1 kV / < 1,7 kV	40 kA	15 kA
	HSA-600/3+1 S IT	27 650						
4	HSA-720/3+1 IT	27 664		720 V AC	3 x 600 V IT	< 2,6 kV / < 2,0 kV	40 kA	15 kA
	HSA-720/3+1 S IT	27 670						
5	HSA-850/3+1 IT	27 684		850 V AC	3 x 720 V IT	< 3,3 kV / < 2,5 kV	40 kA	15 kA
	HSA-850/3+1 S IT	27 690						

S – version with remote monitoring

Common characteristics		HSA-*/3+1 (S) IT
Test class according to EN 61643-11:2012 (IEC 61643-11:2011)		TYPE 2, CLASS II
System		IT
Open circuit voltage	$U_{oc}$	6 kV
Total discharge current (8/20) L1+L2+L3+CP->PE	$I_{Total}$	50 kA
Response time L/CP	$t_A$	< 25 ns
Response time L/PE	$t_A$	< 100 ns
Max. back-up fuse		160 A gL / gG
Short-circuit current rating at 160 A gL / gG	$I_{SCCR}$	60 kA <sub>rms</sub>
LPZ		1-3
Housing material		Polyamid PA6, UL94 V-0
Degree of protection of enclosure		IP20
Operating temperature range	$\vartheta$	-40 °C ÷ +70 °C
The minimal cross-section of the connected conductors according to standard HD 60364-5-534:2016 (at tightening moment of clamps 3 Nm; It's not valid for „V“ connection)		T2: 2,5 mm <sup>2</sup> (L, N), 6 mm <sup>2</sup> (PE, PEN)
Range of clamps fastening		1,5 ÷ 25 mm <sup>2</sup> (solid) / 1,5 ÷ 16 mm <sup>2</sup> (wire)
The mounting method / operating position		DIN rail 35 mm / any
Failure signalisation		optical function signalization target clear – ok optical function signalization target red – fault
Potential free signal contact (S) (recommended cross-section of remote monitoring max. 1 mm <sup>2</sup> )		AC: 250 V / 1,5 A, DC: 250 V / 0,1 A
Lifetime		min. 100 000 h

## Surge arresters T3 with EMI/RFI filter for AC IT power supply systems

- HSAF16 (S) IT is a two-stage surge arrester intended for IT power supply systems. Between two given stages is integrated a high-frequency filter at one-phase IT systems.
- Contains an improved thermal fuse.
- Activation of the thermal fuse is signalled by an integral indicator light.
- The device is to be installed on the interface of zones **LPZ 2 – LPZ 3** as close as possible to the protected device (max. 5 m).
- Available with remote monitoring.
- There must be Hakel's lightning and surge arrester T1 and T2 installed before the HSAF16 IT.
- In accordance with: EN 61643-11:2012 (IEC 61643-11:2011) EN 55017:2011 (CISPR 17:2011); UL94 V-0
- Installation acc. to: EN 62305 (IEC 62305:2010); HD 60364-5-534:2016



type	article no.	design dimension	$I_L$	$U_{oc}$	$U_c$	$U_p$ at $U_{oc}$		asymmetrical attenuation of filter (band-stop filter)
						L1/ L2	L1/PE, L2/PE	
1	HSAF16 IT	3TE	16 A	6 kV	275 V AC	< 1400 V	< 900 V	min. 80 dB at 4 MHz
2	HSAF16 S IT	4TE						min. 40 dB (0,15 ÷ 30 MHz)

S – version with remote monitoring

Other characteristics	HSAF16 S IT	
Test class according to EN 61643-11:2012 (IEC 61643-11:2011)	TYPE 3, CLASS III	
System	IT	
Nominal voltage	$U_N$	230 V AC
Nominal discharge current $I_n$ (8/20)	$I_n$	3 kA
Response time	$t_A$	< 25 ns (L1/ L2) < 100 ns (L1/PE, L2/PE)
Power loss at winding temp. 20 °C	< 3,5 W	
Back-up fuse	16 A	
LPZ	2-3	
Housing material	Polyamid PA6, UL 94 V-0	
Degree of protection of enclosure	IP20	
Operating temperature range	$\vartheta$	-40 °C ÷ +55 °C
Cross-section of the connected conductors	2,5 ÷ 4 mm <sup>2</sup> Cu	
The mounting method / operating position	DIN rail 35 mm / any	
Failure signalisation	optical function signalization target clear – ok optical function signalization target red – fault	
Lifetime	min. 100 000 h	

## Why HAKEL?



more than 25 years  
of experience



own testing laboratory



support  
within 24 hours



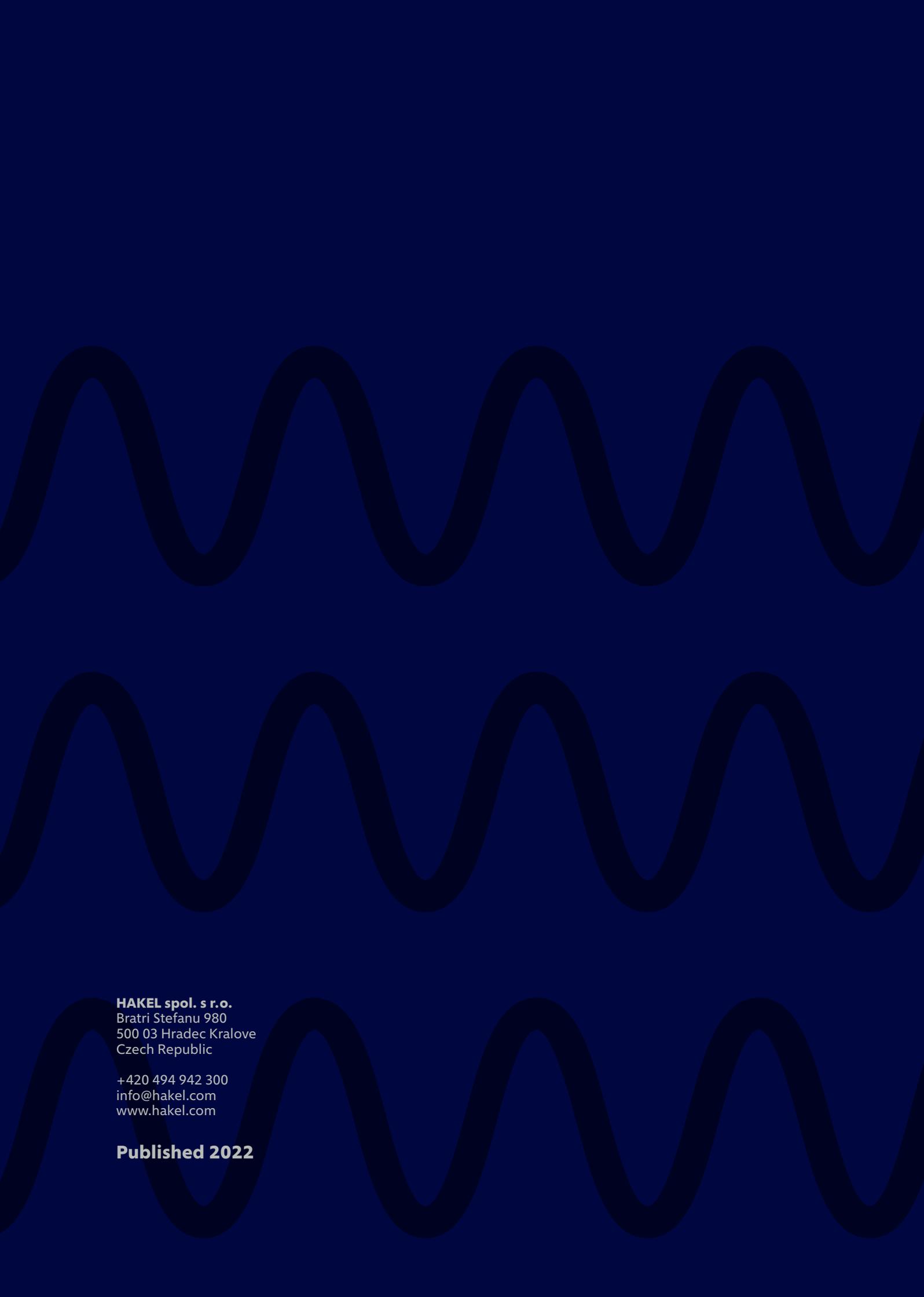
made in  
Czech Republic



certified ISO 9001



worldwide export



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