

HLSA6,5 PV 1000/2 M

- Lightning impulse current and surge arresters type T1+T2 intended for photovoltaic systems (PV) at U or Y connection.
- The advantage of the Y connection versus the U connection is the resistance to the earth connection of the working conductors and zero residual (leakage) current through the PE conductor.
- Particular varistor sectors, connected between the terminals L+, Land PE are equipped with internal disconnectors, which are activated when the varistors fail (overheat) and they are able to interrupt the DC current.
- Special construction of the internal disconnector allows installation without a back-up fuse.

- They are installed on the DC side in PV applications with external LPS, where a sufficient distance "s" is not observed.
- Suitable for level LPL III or IV.
- Ensure the equipotential bonding of plus and minus busbars of PV systems and the elimination of transient overvoltage resulting from the atmospheric discharges (including direct lightning strike to the PV system) or switching processes.
- M indication specifies a type of construction with removable module.
- **S** indication specifies a version with remote monitoring.

SPD connection type Maximum continuous operating voltage (+/-) Maximum continuous operating voltage (±/PE) Max. voltage of PV generator $U_{OCSTC} \le U_{CPV} / 1.2$ Short-circuit current rating IscPV 10 kA Impulse discharge current for class I test (10/350) Charge Q 3.25 As Specific energy for class I test W/R 10.56 kJ/ Total discharge current (10/350) ±->PE ITotal discharge current (8/20) ±->PE ITotal discharge current (8/20) ±->PE Itotal discharge current (8/20) Nominal discharge current for class II test (8/20) Voltage protection level at I _n (+/-) Voltage protection level at I _n (±/PE) Response time (±/PE) Housing material Degree of protection IP20 Operating temperature ### 5 ÷ 95 % Minimum cross-section of connected Cu conductors according to IEC 61643-32:2017 #### 1000 V D Total 000	^т уре		HLSA6,5 PV 1000/2 M
PV system type	est class according to EN 61643-11:2012 and EN 61643-31:2019		T1, T2
SPD connection type $ \begin{array}{ccccccccccccccccccccccccccccccccccc$	System		DC
Maximum continuous operating voltage (+/-) U_{CPV} 1 000 V D Maximum continuous operating voltage (±/PE) U_{CPV} 500 V D Max. voltage of PV generator $U_{OCSTC} \le U_{CPV}$ 1.2 U_{OCSTC} 830 V Short-circuit current rating I_{SCPV} 10 kA Impulse discharge current for class I test (10/350) I_{Imp} 6.5 kA Charge Q 3.25 As Specific energy for class I test I_{II} 10.56 kJ/Total discharge current (10/350) ±->PE I_{II} 12.5 kA Total discharge current (8/20) ±->PE I_{II} 12.5 kA Maximum discharge current (8/20) I_{II} 40 kA Moximum discharge current (8/20) I_{II} 40 kA Nominal discharge current for class II test (8/20) I_{II} 20 kA Voltage protection level at I_{II} (±/PE) I_{II} 40 kA Response time (±/-) I_{II} 40 kA I_{II} 40 kB Response time (±/-) I_{II} 40 kB Response time (±/PE) I_{II} 50 kB Response time (±/PE) $I_$	V system type		Ungrounded
Maximum continuous operating voltage (\pm/PE) U_{CPV} 500 V DM Max. voltage of PV generator $U_{OCSTC} \le U_{CPV}$ / 1.2 U_{OCSTC} 830 V Short-circuit current rating I_{SCPV} 10 kA Impulse discharge current for class I test (10/350) I_{Imp} 6.5 kA Charge I_{Imp} 6.5 kA Charge I_{Imp} 6.5 kA Charge I_{Imp} 7.5 kA Charge I_{Imp} 8.3 kB Specific energy for class I test I_{Imp} 8.3 kB Specific energy for class I test I_{Imp} 8.3 kB Specific energy for class I test I_{Imp} 8.3 kB Specific energy for class I test I_{Imp} 8.3 kB Specific energy for class I test I_{Imp} 8.4 kB Maximum discharge current (8/20) I_{Imp} 8.5 kB Maximum discharge current (8/20) I_{Imp} 8.4 kB Maximum discharge current for class II test (8/20) I_{Imp} 8.4 kB Nominal discharge current for class II test (8/20) I_{Imp} 8.5 kB Notation level at I_{Imp} 8.7 kB Notation level at I_{Imp} 9.7 kB Notation level at I_{Imp} 9.7 kB Notation level at I_{Imp} 9.7 can be supposed time (I_{Imp}) 8.7 kB Notation material 8.7 kB Notation level end (I_{Imp}) 8.7 kB Notation material	SPD connection type		U
Max. voltage of PV generator $U_{OCSTC} \le U_{CPV} / 1.2$ U_{OCSTC} 830 V Short-circuit current rating I_{SCPV} 10 kA Impulse discharge current for class I test (10/350) I_{Imp} 6.5 kA Charge Q 3.25 As Specific energy for class I test W/R 10.56 kJ/ Total discharge current (10/350) ±->PE I_{Total} 12.5 kA Total discharge current (8/20) ±->PE I_{Total} 40 kA Maximum discharge current (8/20) I_{Imax} 40 kA Nominal discharge current for class II test (8/20) I_{Imax} 40 kA Voltage protection level at I_{In} (±/PE) I_{In} 20 kA Voltage protection level at I_{In} (±/PE) I_{In} 25 ns Response time (±/-) I_{In} 4 < 25 ns Response time (±/PE) I_{In} 4 < 25 ns Housing material Polyamid PA6, Upgree of protection P20 Polyamid PA6, Upgree of protection PA6, Upgree Operating temperature PA6, Upgree PA6, Upgre	Maximum continuous operating voltage (+/-)	U_{CPV}	1 000 V DC
Short-circuit current rating I_{SCPV} 10 kA Impulse discharge current for class I test (10/350) I_{imp} 6.5 kA Charge current (10/350) ±->PE I_{imp} 10.56 kJ/ Total discharge current (8/20) ±->PE I_{imp} 12.5 kA Total discharge current (8/20) I_{imp} 40 kA Maximum discharge current (8/20) I_{imp} 40 kA Nominal discharge current for class II test (8/20) I_{imp} 20 kA Voltage protection level at I_{imp} 40 kA Voltage protection level at I_{imp} 41 kV Voltage protection level at I_{imp} 42 kA I_{imp} 42 kB Response time (±/-) I_{imp} 42 c 25 ns Response time (±/PE) I_{imp} 42 c 25 ns Housing material Polyamid PA6, Upgree of protection I_{imp} 42 c 25 ns Humidity range I_{imp} 43 c 25 s 44 c 25 ns Humidity range I_{imp} 44 c 25 s 45 c 36 kW 64 c 36 kW 75 c 36	Maximum continuous operating voltage (±/PE)	U_{CPV}	500 V DC
Impulse discharge current for class I test (10/350) I _{Imp} 6.5 kA Charge Q 3.25 As Specific energy for class I test W/R 10.56 kJ/ Total discharge current (10/350) ±->PE I _{Total} 12.5 kA Total discharge current (8/20) ±->PE I _{Total} 40 kA Maximum discharge current (8/20) I _{max} 40 kA Nominal discharge current for class II test (8/20) I _n 20 kA Voltage protection level at I _n (+/-) U _p < 3.6 kV	Max. voltage of PV generator U _{OCSTC} ≤ U _{CPV} / 1.2	U _{ocstc}	830 V
Charge Q 3.25 As Specific energy for class I test W/R 10.56 kJ/ Total discharge current (10/350) ±->PE I _{Total} 12.5 kA Total discharge current (8/20) ±->PE I _{Total} 40 kA Maximum discharge current (8/20) I _{max} 40 kA Nominal discharge current for class II test (8/20) I _n 20 kA Voltage protection level at I _n (+/-) Voltage protection level at I _n (±/PE) Response time (+/-) Response time (±/PE) Housing material Degree of protection Operating temperature Humidity range RH 5 ÷ 95 % Minimum cross-section of connected Cu conductors according to IEC 61643-32:2017 N/R 10.56 kJ/ N/R 10.56 kJ/R 10.	Short-circuit current rating	I_{SCPV}	10 kA
Specific energy for class I test W/R $10.56 \text{ kJ}/C$ Total discharge current $(10/350) \pm ->PE$ I_{Total} 12.5 kA Total discharge current $(8/20) \pm ->PE$ I_{Total} 40 kA Maximum discharge current $(8/20)$ I_{max} 40 kA Nominal discharge current for class II test $(8/20)$ I_n 20 kA Voltage protection level at I_n $(+/-)$ U_p $< 3.6 \text{ kV}$ Voltage protection level at I_n (\pm/PE) U_p $< 1.8 \text{ kV}$ Response time $(\pm/-)$ t_A $< 25 \text{ ns}$ Response time (\pm/PE) t_A $< 25 \text{ ns}$ Housing material Polyamid PA6, Upgree of protection $I_p = 1.0 \text{ m}$ $I_p = $	mpulse discharge current for class I test (10/350)	I _{imp}	6.5 kA
Total discharge current (10/350) \pm ->PE	Charge	Q	3.25 As
Total discharge current (8/20) \pm ->PE	Specific energy for class I test	W/R	10.56 kJ/Ω
Maximum discharge current (8/20) I_{max} 40 kA Nominal discharge current for class II test (8/20) I_{n} 20 kA Voltage protection level at I_{n} (+/-) I_{n} 4.3.6 kV Voltage protection level at I_{n} (±/PE) I_{n} 4.3.6 kV Response time (+/-) I_{n} 4.4 4.7 c 25 ns Response time (±/PE) I_{n} 4.4 c 25 ns Housing material I_{n} 4.7 Polyamid PA6, Upgree of protection I_{n} 5.95 % Minimum cross-section of connected Cu conductors according to IEC 61643-32:2017 I_{n} 8.7 Section of connected Cu conductors according to IEC 61643-32:2017	otal discharge current (10/350) ±->PE	I _{Total}	12.5 kA
Nominal discharge current for class II test (8/20) $I_{n} = 20 \text{ kA}$ Voltage protection level at I_{n} (+/-) $U_{p} = < 3.6 \text{ kV}$ Voltage protection level at I_{n} (±/PE) $U_{p} = < 1.8 \text{ kV}$ Response time (+/-) $t_{A} = < 25 \text{ ns}$ Response time (±/PE) $t_{A} = < 25 \text{ ns}$ Housing material $t_{p} = t_{p} = t_{p} = t_{p}$ Degree of protection $t_{p} = t_{p} = t_{p} = t_{p}$ Operating temperature $t_{p} = t_{p} = t_{p} = t_{p} = t_{p}$ Humidity range $t_{p} = t_{p} = t_{p} = t_{p} = t_{p}$ Minimum cross-section of connected Cu conductors according to IEC 61643-32:2017 $t_{p} = t_{p} = t_$	otal discharge current (8/20) ±->PE	I _{Total}	40 kA
Voltage protection level at I_n (+/-) $U_p < 3.6 \text{ kV}$ Voltage protection level at I_n (±/PE) $U_p < 1.8 \text{ kV}$ Response time (+/-) $t_A < 25 \text{ ns}$ Response time (±/PE) $t_A < 25 \text{ ns}$ Housing material $Polyamid PA6, U$ Degree of protection $IP20$ Operating temperature $\theta = -40 \div 70^{\circ}$ Humidity range $RH = 5 \div 95 \%$ Minimum cross-section of connected Cu conductors according to IEC 61643-32:2017 $S = 6 \text{ mm}^2 \text{ (L+, N)}$	Maximum discharge current (8/20)	I _{max}	40 kA
Voltage protection level at I_n (\pm /PE) U_p < 1.8 kV Response time (\pm /-) t_A < 25 ns Response time (\pm /PE) t_A < 25 ns Housing material Polyamid PA6, Upgree of protection $IP20$ Operating temperature θ 40 \div 70 ° Humidity range θ Minimum cross-section of connected Cu conductors according to IEC 61643-32:2017 θ 6 mm² (L+,	Iominal discharge current for class II test (8/20)	I _n	20 kA
Response time (+/-) $t_{A} < 25 \text{ ns}$ Response time (±/PE) $t_{A} < 25 \text{ ns}$ Housing material $t_{A} < 25 \text{ ns}$ Housing material $t_{A} < 25 \text{ ns}$ Polyamid PA6, Using temperature $t_{A} = t_{A} < 25 \text{ ns}$ Polyamid PA6, Using temperature $t_{A} = t_{A} < 25 \text{ ns}$ Polyamid PA6, Using temperature $t_{A} = t_{A} < 25 \text{ ns}$ Polyamid PA6, Using temperature $t_{A} = t_{A} < 25 \text{ ns}$ Polyamid PA6, Using temperature $t_{A} = t_{A} < 25 \text{ ns}$ Polyamid PA6, Using temperature $t_{A} = t_{A} < 25 \text{ ns}$ Polyamid PA6, Using temperature $t_{A} = t_{A} < 25 \text{ ns}$ Polyamid PA6, Using temperature $t_{A} = t_{A} < 25 \text{ ns}$ Polyamid PA6, Using temperature $t_{A} = t_{A} < 25 \text{ ns}$ Polyamid PA6, Using temperature $t_{A} = t_{A} < 25 \text{ ns}$ Polyamid PA6, Using temperature $t_{A} = t_{A} < 25 \text{ ns}$ Polyamid PA6, Using temperature $t_{A} = t_{A} < 25 \text{ ns}$ Polyamid PA6, Using temperature $t_{A} = t_{A} < 25 \text{ ns}$ Polyamid PA6, Using temperature $t_{A} = t_{A} < 25 \text{ ns}$ Polyamid PA6, Using temperature $t_{A} = t_{A} < 25 \text{ ns}$ Polyamid PA6, Using temperature $t_{A} = t_{A} < 25 \text{ ns}$ Polyamid PA6, Using temperature $t_{A} = t_{A} < 25 \text{ ns}$ Polyamid PA6, Using temperature $t_{A} = t_{A} < 25 \text{ ns}$ Polyamid PA6, Using temperature $t_{A} = t_{A} < 25 \text{ ns}$ Polyamid PA6, Using temperature $t_{A} = t_{A} < 25 \text{ ns}$ Polyamid PA6, Using temperature $t_{A} = t_{A} < 25 \text{ ns}$ Polyamid PA6, Using temperature $t_{A} = t_{A} < 25 \text{ ns}$ Polyamid PA6, Using temperature $t_{A} = t_{A} < 25 \text{ ns}$ Polyamid PA6, Using temperature $t_{A} = t_{A} < 25 \text{ ns}$ Polyamid PA6, Using temperature $t_{A} = t_{A} < 25 \text{ ns}$ Polyamid PA6, Using temperature $t_{A} = t_{A} < 25 \text{ ns}$ Polyamid PA6, Using temperature $t_{A} = t_{A} < 25 \text{ ns}$ Polyamid PA6, Using temperature $t_{A} = t_{A} < 25 \text{ ns}$ Polyamid PA6, Using temperature $t_{A} = t_{A} < 25 \text{ ns}$ Polyamid PA6, Using temperature $t_{A} = t_{A} < 25 \text{ ns}$ Polyamid PA6, Using temperature $t_{A} = t_{A} < 25 \text{ ns}$ Polyamid PA6, Using temperatur	oltage protection level at I _n (+/-)	U_p	< 3.6 kV
Response time (\pm /PE)	oltage protection level at I _n (±/PE)	U_p	< 1.8 kV
Housing material Polyamid PA6, L Degree of protection IP20 Operating temperature Humidity range RH 5 ÷ 95 % Minimum cross-section of connected Cu conductors according to IEC 61643-32:2017 S Polyamid PA6, L RH 5 ÷ 95 % 6 mm² (L+,	Response time (+/-)	t _A	< 25 ns
Degree of protection IP20 Operating temperature θ -40 ÷ 70 ° Humidity range RH θ 5 ÷ 95 % Minimum cross-section of connected Cu conductors according to IEC 61643-32:2017 S θ 6 mm² (L+,	Response time (±/PE)	t _A	< 25 ns
Operating temperature 9 -40 ÷ 70 ° Humidity range RH $5 \div 95 \%$ Minimum cross-section of connected Cu conductors according to IEC 61643-32:2017 S $6 \text{ mm}^2 \text{ (L+, }$	lousing material		Polyamid PA6, UL94 V-0
Humidity range RH $5 \div 95\%$ Minimum cross-section of connected Cu conductors according to IEC 61643-32:2017 S $6 \text{ mm}^2 \text{ (L+, }$	Degree of protection		IP20
Minimum cross-section of connected Cu conductors according to IEC 61643-32:2017 S 6 mm² (L+,	Operating temperature	Э	-40 ÷ 70 °C
	lumidity range	RH	5 ÷ 95 %
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Lightning and surge arresters T1+T2 for photovoltaic systems



Туре		HLSA6,5 PV 1000/2 M
Minimum cross-section of connected Cu conductors according to IEC 61643-32:2017	S	2.5 mm ² (L+, L-)
(doesn't apply to "V" connection) for T2	3	6 mm² (PE)
Clamp fastening range (solid conductor)		2.5 ÷ 35 mm ²
Clamp fastening range (stranded conductor)		$2.5 \div 25 \text{ mm}^2$
Tightening moment		4 Nm
Installation		On DIN rail 35 mm
Modular width		2 TE
Operating position		Any
Product placement environment		Internal
SPD failure mode		OCFM
Signalling at the device		Optic
Importance of local signaling		OK – green target FAULT – red target
Remote signalling		No
Pluggable version		Yes
Article number of the varistor spare module		16 379
Lifetime		> 100 000 h
Designed according to standards		
Requirements and test methods for SPDs for photovoltaic installations		IEC 61643-31:2018
Safety of Flammability of Plastic Materials		UL 94
Application standards		
Protection against lightning		IEC 62305:2010
Selection and application principles for SPDs connected to photovoltaic installations		IEC 61643-32:2017
Selection and application principles for SPDs connected to photovoltaic installations		CLC/TS 51643-32:2020
Low-voltage electrical installations – Photovoltaic (PV) systems		HD 60364-7-712:2016
Ordering, packaging and additional data		
Mass	m	271 g
Mass (including the packaging)	m	286 g
Packaging dimensions (H x W x D)		43 x 112 x 87 mm
Packaging value	V	0.42 dm ³
ETIM group		EG000021
ETIM class		EC001457
Customs tariff no.		85363010
EAN code		8590681172292
Art. number		16 372

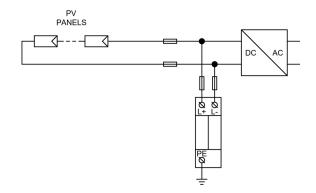


The link in the QR code leads to the online presentation of the **HLSA6,5 PV 1000/2 M**. There, in addition to the always up-to-date data sheet, you will also find all diagrams and drawings, declarations of conformity, or 2D or 3D models and other necessary materials. For more information, visit **www.hakel.com**





Application wiring diagram (installation)



Internal diagram

