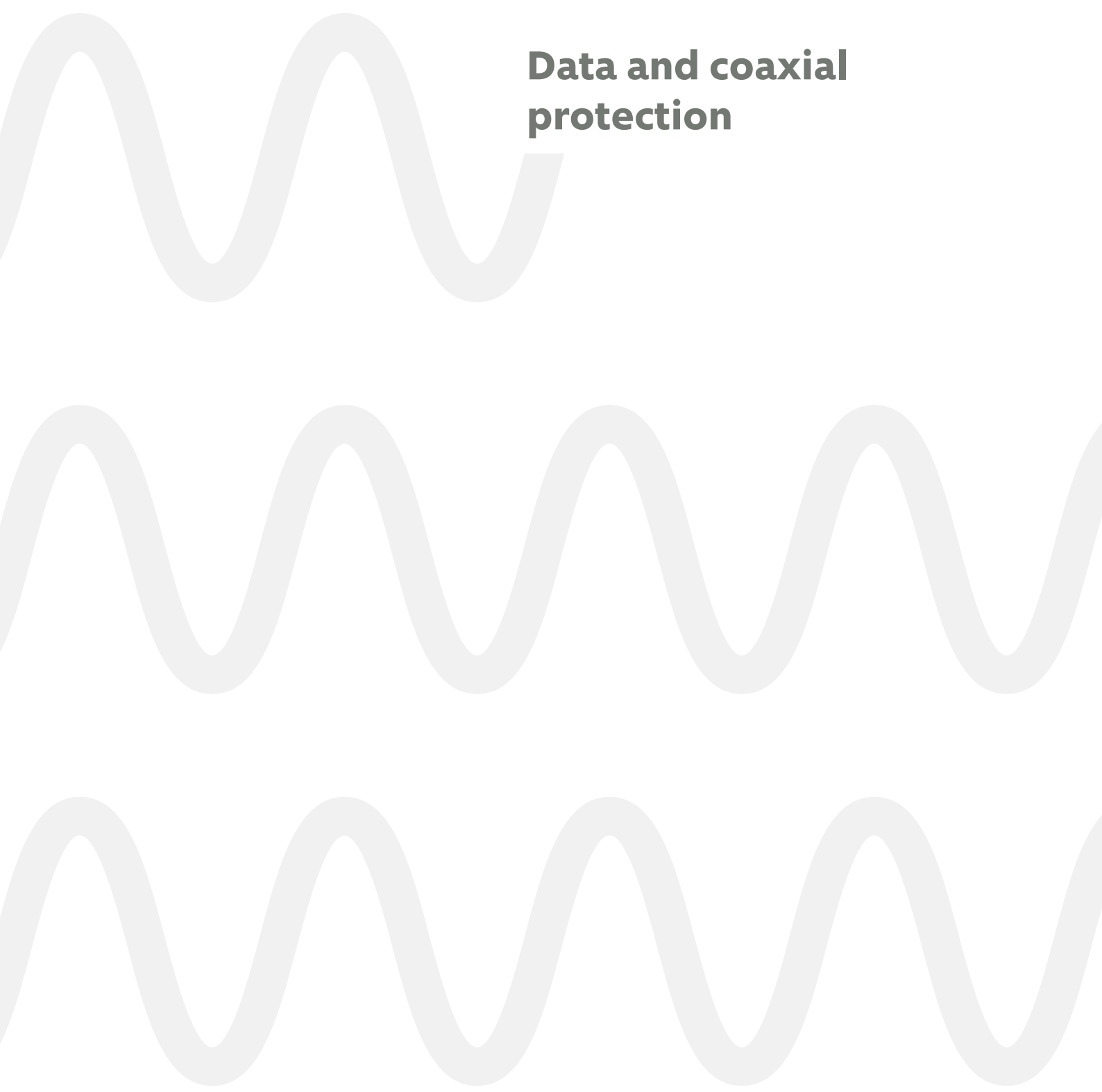


hakel®

Hz in Hearts

**Data and coaxial
protection**



The exchangeable SPD of data and information signals



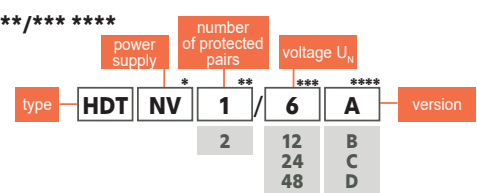
- no interruption of data transmission when the module is removed
- high current-carrying capacity
- high discharge capability
- wide range of voltage levels
- direct earthing on DIN rail
- one pair or two pairs lines
- meet the requirements of EN 61643-21
- suitable for use in industrial applications, especially in low-voltage ESS, FDAS systems and also in measurement and control systems against longitudinal and transverse overvoltage effects

HDT* is a basic range of surge protection devices designed for the protection of data, communication, measuring and control lines against surge effects. The exchangeable version is designed to ensure continuous operation of the system, so that the communication bus-bar is not interrupted when the module is removed. The connection interface is via screw terminals. These devices are recommended for use at the boundaries of LPZ 1-2-3 lightning protection zones according to EN 62305. All types provide effective protection of connected equipment against common mode and differential mode surge effects according to EN 61643-21.

The entire system is customized so that it is realistic to make protection directly tailored to the specific needs of the user. It is therefore possible to produce special types of connections at the customer's request.

Product name specification

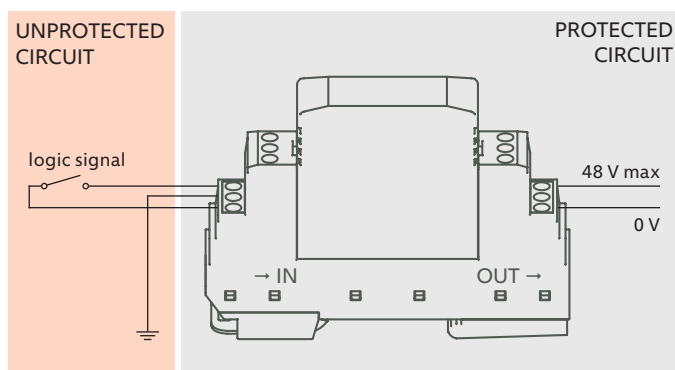
HDT **/* ******



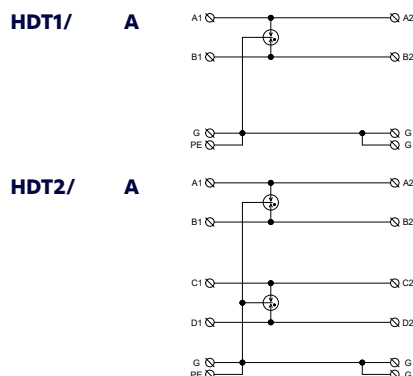
type	number of pairs	U _N (V DC)	U _C (V DC)	I _L (A)	I _n (kA)	transmission speed	inserted impedance	product art. no.	module art. no.
HDT1/A	1	48	57,6	5	15	100 Mbit/s	–	56 000	56 000/M
HDT2/A	2	48	57,6	5	15	100 Mbit/s	–	56 001	56 001/M
HDT1/6B	1	6	7,2	0,5	15	1 Mbit/s	0,8 Ω	56 002	56 002/M
HDT1/12B	1	12	14,4	0,5	15	1 Mbit/s	0,8 Ω	56 003	56 003/M
HDT1/24B	1	24	28,8	0,5	15	1 Mbit/s	0,8 Ω	56 004	56 004/M
HDT1/48B	1	48	57,6	0,5	15	1 Mbit/s	0,8 Ω	56 005	56 005/M
HDT2/6B	2	6	7,2	0,5	15	1 Mbit/s	0,8 Ω	56 006	56 006/M
HDT2/12B	2	12	14,4	0,5	15	1 Mbit/s	0,8 Ω	56 007	56 007/M
HDT2/24B	2	24	28,8	0,5	15	1 Mbit/s	0,8 Ω	56 008	56 008/M
HDT2/48B	2	48	57,6	0,5	15	1 Mbit/s	0,8 Ω	56 009	56 009/M
HDTNV1/6B	1	6	7,2	1,5	15	–	2,2 μH	56 002/NV	56 002/M
HDTNV1/12B	1	12	14,4	1,5	15	–	2,2 μH	56 003/NV	56 003/M
HDTNV1/24B	1	24	28,8	1,5	15	–	2,2 μH	56 004/NV	56 004/M
HDTNV1/48B	1	48	57,6	1,5	15	–	2,2 μH	56 005/NV	56 005/M
HDTNV2/6B	2	6	7,2	1,5	15	–	2,2 μH	56 006/NV	56 006/M
HDTNV2/12B	2	12	14,4	1,5	15	–	2,2 μH	56 007/NV	56 007/M
HDTNV2/24B	2	24	28,8	1,5	15	–	2,2 μH	56 008/NV	56 008/M
HDTNV2/48B	2	48	57,6	1,5	15	–	2,2 μH	56 009/NV	56 009/M
HDT1/6C	1	6	7,2	0,5	15	1 Mbit/s	0,8 Ω	56 018	56 018/M
HDT1/12C	1	12	14,4	0,5	15	1 Mbit/s	0,8 Ω	56 019	56 019/M
HDT1/24C	1	24	28,8	0,5	15	1 Mbit/s	0,8 Ω	56 020	56 020/M
HDT1/48C	1	48	57,6	0,5	15	1 Mbit/s	0,8 Ω	56 021	56 021/M
HDT2/6C	2	6	7,2	0,5	15	1 Mbit/s	0,8 Ω	56 022	56 022/M
HDT2/12C	2	12	14,4	0,5	15	1 Mbit/s	0,8 Ω	56 023	56 023/M
HDT2/24C	2	24	28,8	0,5	15	1 Mbit/s	0,8 Ω	56 024	56 024/M
HDT2/48C	2	48	57,6	0,5	15	1 Mbit/s	0,8 Ω	56 025	56 025/M
HDTNV1/6C	1	6	7,2	1,5	15	–	2,2 μH	56 018/NV	56 018/M
HDTNV1/12C	1	12	14,4	1,5	15	–	2,2 μH	56 019/NV	56 019/M
HDTNV1/24C	1	24	28,8	1,5	15	–	2,2 μH	56 020/NV	56 020/M
HDTNV1/48C	1	48	57,6	1,5	15	–	2,2 μH	56 021/NV	56 021/M
HDTNV2/6C	2	6	7,2	1,5	15	–	2,2 μH	56 022/NV	56 022/M
HDTNV2/12C	2	12	14,4	1,5	15	–	2,2 μH	56 023/NV	56 023/M
HDTNV2/24C	2	24	28,8	1,5	15	–	2,2 μH	56 024/NV	56 024/M
HDTNV2/48C	2	48	57,6	1,5	15	–	2,2 μH	56 025/NV	56 025/M
HDT1/6D	1	6	7,2	0,5	15	100 Mbit/s	0,8 Ω	56 034	56 034/M
HDT1/12D	1	12	14,4	0,5	15	100 Mbit/s	0,8 Ω	56 035	56 035/M
HDT1/24D	1	24	28,8	0,5	15	100 Mbit/s	0,8 Ω	56 036	56 036/M
HDT1/48D	1	48	57,6	0,5	15	100 Mbit/s	0,8 Ω	56 037	56 037/M
HDT2/6D	2	6	7,2	0,5	15	100 Mbit/s	0,8 Ω	56 038	56 038/M
HDT2/12D	2	12	14,4	0,5	15	100 Mbit/s	0,8 Ω	56 039	56 039/M
HDT2/24D	2	24	28,8	0,5	15	100 Mbit/s	0,8 Ω	56 040	56 040/M
HDT2/48D	2	48	57,6	0,5	15	100 Mbit/s	0,8 Ω	56 041	56 041/M

HDT*/A

HDT*/A contains only the 1st stage of protection, consisting of three-pole gas discharge tubes with a high discharge current of 15 kA. It is therefore a basic protection, which is suitable for less sensitive equipment. Transmission speed reaches values of 100 Mbit/s.



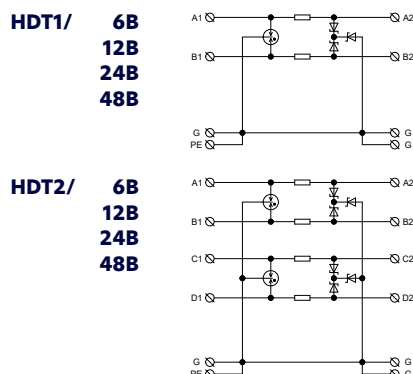
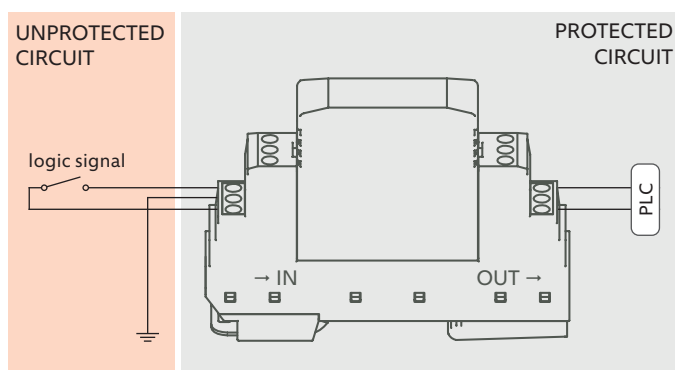
The number of protected pairs is optional within the range of 1-2 and it is produced for nominal operating voltage of 48 V DC. The rated load current of individual protected lines $I_L = 5$ A.



HDT*/B

Compared to the basic range A, in addition, it also contains a second stage consisting of suppressor diodes with a very fast response time. The inserted series impedance is made up of resistors, which do not distort the transmitted signal. Given connection provides a transmission speed of 1 Mbit/s, which is sufficient in most applications, especially in Fire Detection and Alarm Systems (FDAS), Electronic Security Systems (ESS) and Instrumentation and Control. This protection is suitable for most sensors, such as thermocouples,

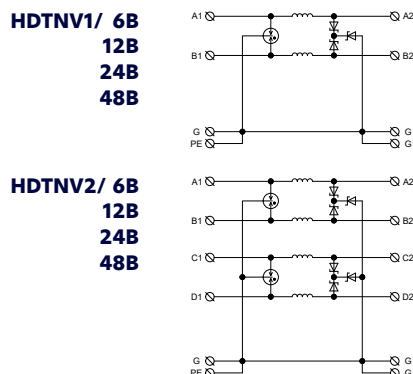
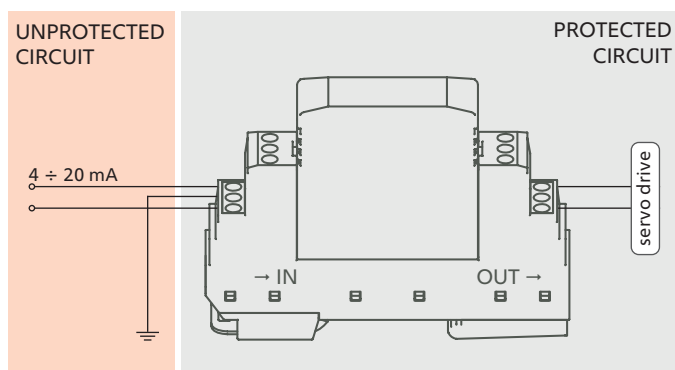
photocells, flow meters, pressure sensors etc., as well as for data center protection. It transmits data signals, whether logical e.g. RS 232, RS 485 or analog, using a current loop $4 \div 20$ mA. Wide use can be applied in industrial applications on PROFIBUS as well as in administrative and residential applications. The number of protected pairs is optional within the range of 1-2 and it is produced for nominal operating voltage of $6 \div 48$ V DC. The rated load current of individual protected lines $I_L = 0,5$ A.



HDTNV*/B

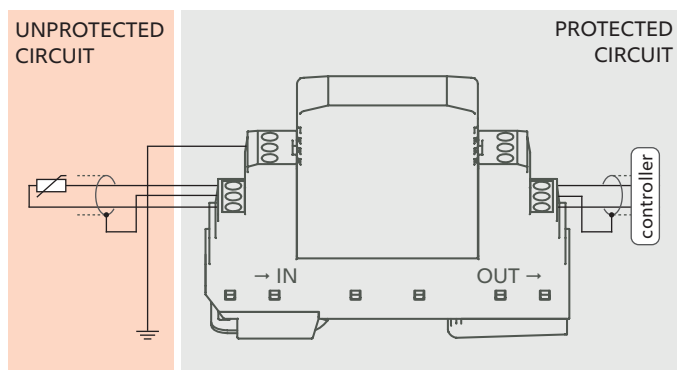
Compared to the basic range A, in addition, it also contains a second stage consisting of suppressor diodes with a very fast response time. The inserted series impedance is made up of inductors, which allow the nominal current up to 1,5 A permanently flow through the protection. This predetermines the equipment for protection of the power

supply line of the system, e.g. servo-actuators, power supply for CCTV cameras etc. It can also be used to protect analog data lines using a current loop of $4 \div 20$ mA. The number of protected pairs is optional within the range of 1-2 and it is produced for nominal operating voltage of $6 \div 48$ V DC.

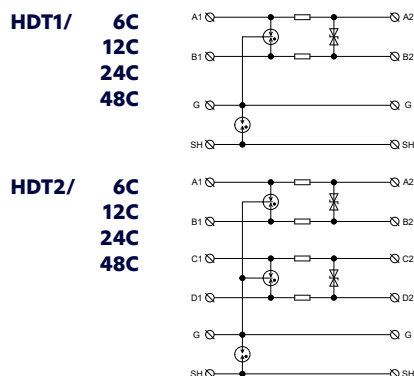


HDT*/C

Compared to the HDT*/*B range, in addition, it also contains the gas discharge tube between the PE and SH (shield) terminals. This is appropriate in cases, when it is not desirable to have a galvanic connection of conductor shield to equipotential bus-bar. The inserted series impedance is made up of inductors, which do not distort the transmitted signal. Given connection provides a transmission speed of 1 Mbit / s, which is sufficient in most applications, especially in Fire Detection and Alarm Systems (FDAS), Electronic Security Systems (ESS) and Instrumentation and Control. This protection is suitable



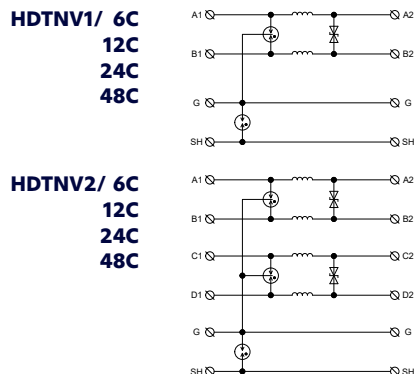
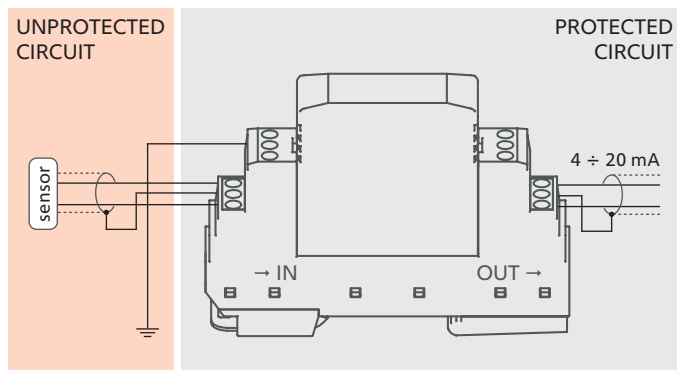
for most sensors, such as thermocouples, photocells, flow meters, pressure sensors etc., as well as for data center protection. It transmits data signals, whether logical e.g. RS 485 or analog, using a current loop $4 \div 20$ mA. Wide use can be applied in industrial applications on PROFIBUS as well as in administrative and residential applications. The number of protected pairs is optional within the range of 1-2 and it is produced for nominal operating voltage of $6 \div 48$ V DC. The rated load current of individual protected lines $I_L = 0,5$ A.



HDTNV*/*C

Compared to the HDTNV*/*B range, in addition, it also contains the gas discharge tube between the PE and SH (shield) terminals. This is appropriate in cases, when it is not desirable to have a galvanic connection of conductor shield to equipotential bus-bar. The inserted series impedance is made up of inductors, which allow the nominal current up to 1,5 A permanently flow through the protection. This

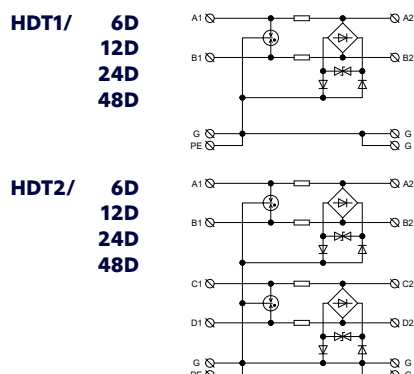
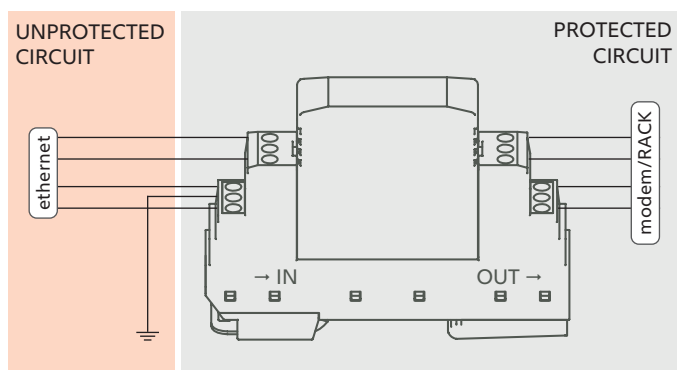
predetermines the equipment for protection of the power supply line of the system, e.g. servo-actuators, power supply for CCTV cameras etc. It can also be used to protect analog data lines using a current loop of $4 \div 20$ mA. The number of protected pairs is optional within the range of 1-2 and it is produced for nominal operating voltage of $6 \div 48$ V DC.



HDT*/D

Contains both 1st and 2nd stage of protection. The inserted series impedance is made up of inductors, which do not distort the transmitted signal. Due to different internal connection compared to previous series, this protection achieves higher transmission speeds up to

100 Mbit/s. The number of protected pairs is optional within the range of 1-2 and it is produced for nominal operating voltage of $6 \div 48$ V DC. The rated load current of individual protected lines $I_L = 0,5$ A.



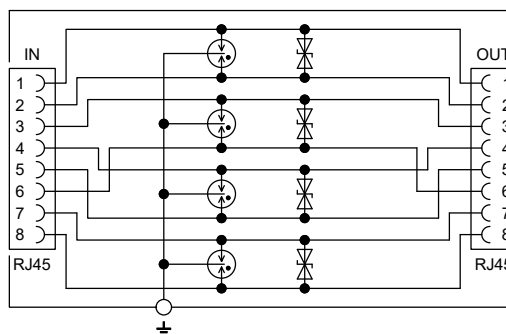
Surge protection devices of data and information signals



- connection input RJ 45 / output RJ 45
- rated load current 1 A
- low voltage protection level U_p
- high transmission speed 500 Mbit/s
- normative conformity with category 6A/EA, ISO/IEC 11801
- the possibility of using PoE+ according to IEEE 802.3at
- the possibility of direct grounding on DIN rail

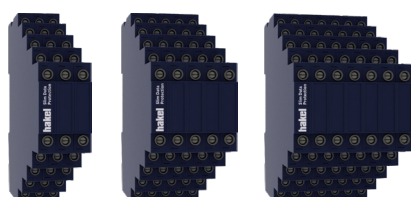
HT-NET PoE+ 6cat 802.3at Xseries

These surge protection devices intended for computer networks are specially designed for securing a faultless data transfer within computer networks category 6 which enables to transmit the supply of PoE+ 802.3at – power supply for IP cameras. They protect input electronic circuits of network cards against damage caused by surge effects in the Lightning Protection Zones Concept at the boundaries of LPZ 1-2-3 according to EN 62305. It is recommended to use these protection devices at the input of protected equipment.

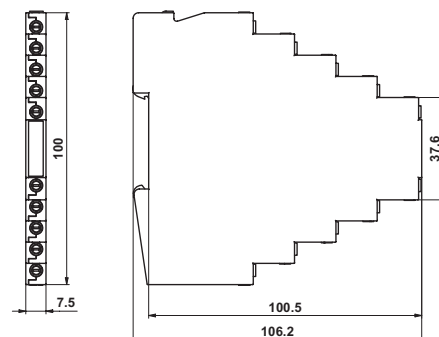


Thin data protection

This protection excels in little space requirements in the control cabinet, because its width is only 7.5 mm. The number of protected pairs is optional within the range from 1-2 and can also protect the 3-wire systems. It is produced for nominal operating voltage of $6 \div 48$ V DC. The entire system is customized so that it is realistic to make protection directly tailored to the specific needs of the user. It is therefore possible to produce special types of connections at the customer's request.



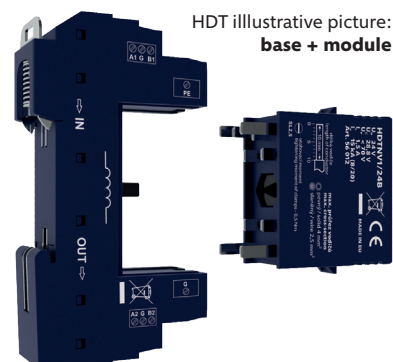
**SOLUTIONS
ON CUSTOMER'S
REQUEST**



- width 7.5 mm only
- two protected pairs
- protection of 3-phase systems
- wide range of voltage levels

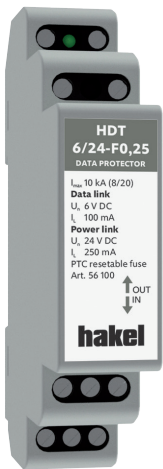
To see the full range of surge protectors
please visit our website

www.hakel.com



HDT illustrative picture:
base + module

The module of data surge protection and overcurrent protection



possibility to choose nominal values of voltages and currents according to your requirements

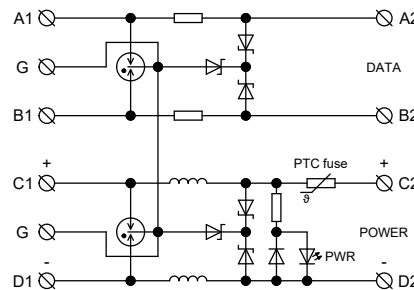
- data surge protection for 6 V DC in combination with overcurrent and surge protection of the 24 V DC power supply line
- high discharge capability $I_n = 10 \text{ kA (8/20)}$
- low voltage protection level $U_p < 40 \text{ V}$
- protects in two stages, both against impulse currents and overvoltage
- makes the service faster and reduces its maintenance interventions
- suitable for Instrumentation and Control (I&C) applications
- meet the standard requirements EN 61643-21 (IEC 61643-21)

HDT/6/24-F0,25 and HDT/6/24-F1,1

HDT/6/24-F* is a range of combined two-stage surge protection intended for a low voltage data and power supply lines routed by a common cable. An example might be a pair of RS485 data line wires and a pair of 24 V DC power line wires routed by a common cable from the control system to remote sensors requiring an external supply voltage. The module can also be used to connect many other types of analog or digital sensors with symmetrical or asymmetrical output. The protection module must be installed just before the protected device.

The 1st stage of surge protection consists of three-pole gas discharge tubes, the 2nd stage is using transils. The overcurrent protection of the power supply line is ensured by a PPTC resettable fuse. The fuse heats up during the overcurrent and its internal resistance increases by several levels. This will limit (not interrupt) the flowing current. The green LED has only an orientation function about the presence of

voltage on the power supply line. To reset the resettable fuse, the circuit must be switched off and let the fuse cool down. Unlike a standard fuse, resettable fuses do not have to be changed, which can reduce the service interventions or make the service faster.



Why HAKEL?



more than 25 years of experience



certified ISO 9001



guarantee 5 years



made in Czech Republic



own testing laboratory



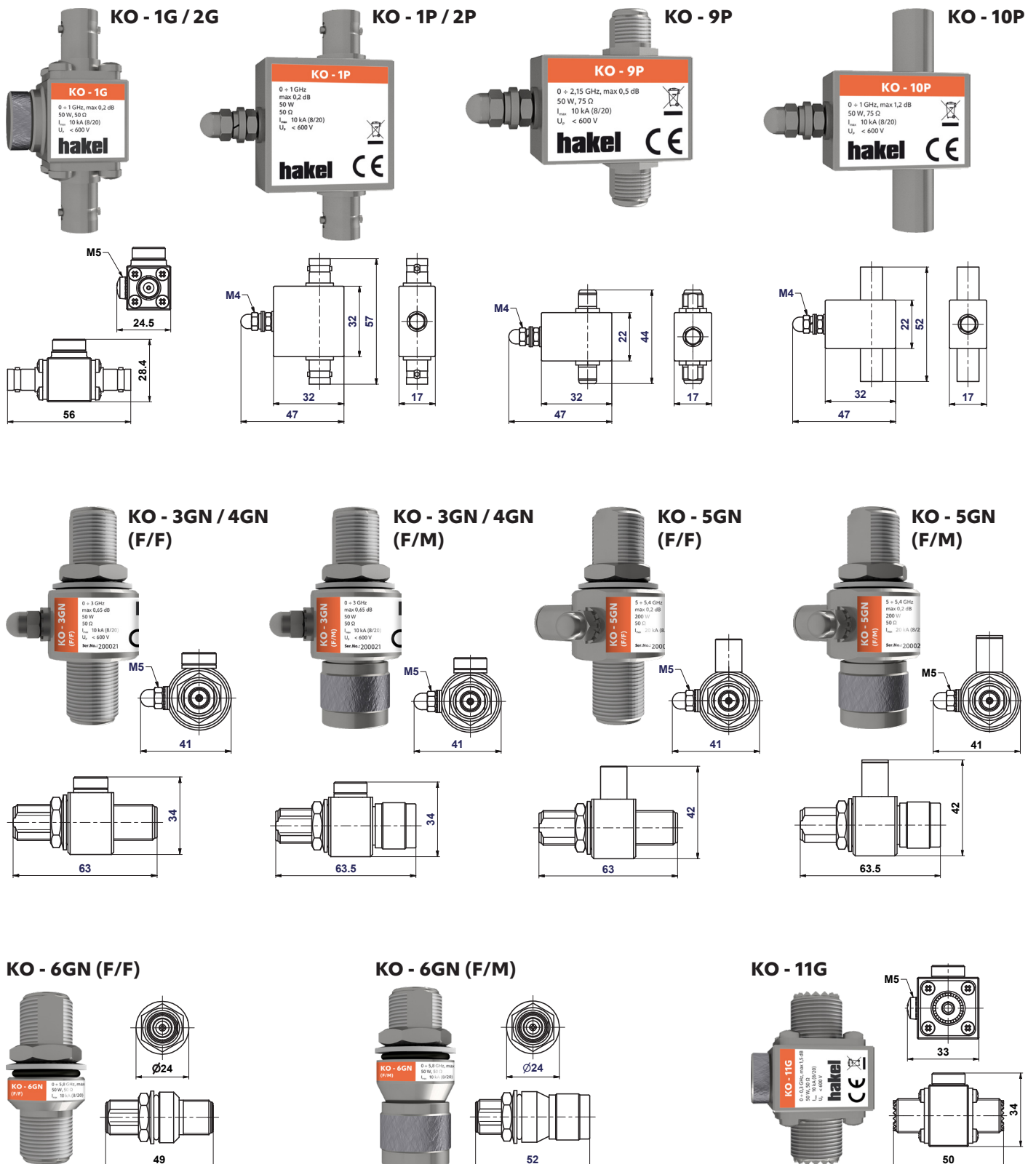
worldwide export

Coaxial high-frequency protection

KO* is an innovated coaxial high-frequency protection range designed for protection of equipment connected to an aerial system by means of coaxial cables. Special gas discharge tubes with maximum discharge current $I_{\max} (8/20) = 10 \text{ kA}$ (or 20 kA in case of KO - 5GN) ensure a reliable protection of the receiving and transmitting systems even against a lightning stroke nearby. Hakel company offers a wide range of coaxial

protectors for various connector types and transmission power grades enabling usage in many applications. These coaxial protectors are recommended for use in the Lightning Protection Zones Concept at the boundaries of LPZ 0-1 and higher according to EN 62305.

Note: can be produced in different U_c voltages



type		KO - 1G	KO - 2G	KO - 1P	KO - 2P	KO - 9P	KO - 10P
Connector type		BNC				F	TV
Max. continuous operating voltage	U _C	90 V DC	200 V DC	90 V DC	200 V DC	90 V DC	90 V DC
Rated load current	I _L	2,5 A				0,5 A	
D1 Max. lightning impulse current (10/350)	I _{imp}	2 kA					
C2 Nominal discharge current I _n (8/20)	I _n	5 kA					
C3 Voltage protection level at 1 kV/μs	U _P	< 600 V					
Max. discharge current (8/20)	I _{max}	10 kA					
Frequency range	B	0 ÷ 1 GHz				0 ÷ 2,15 GHz	0 ÷ 1 GHz
Max. transmission power capacity		50 W	400 W	50 W	400 W	50 W	50 W
Insertion loss		< 0,2 dB				< 0,5 dB	< 1,2 dB
Return loss		> 20 dB					
Characteristic impedance		50 Ω				75 Ω	
Degree of protection of enclosure		IP20					
Category tested acc. to IEC 61643:21-2000		C1, C2, C3, D1					
Operating temperature range	ϑ	-30 °C ÷ +70 °C					
Weight		70 g		25 g			
Article number		55 001	55 002	55 007	55 015	55 016	55 017

type		KO - 3GN (F/F)	KO - 3GN (F/M)	KO - 4GN (F/F)	KO - 4GN (F/M)	KO - 5GN (F/F)	KO - 5GN (F/M)
Connector type		N					
Max. continuous operating voltage	U _c	90 V DC		350 V DC		–	–
Rated load current	I _L	5 A				–	–
D1 Max. lightning impulse current (10/350)	I _{imp}	2 kA				5 kA	
C2 Nominal discharge current I _n (8/20)	I _n	5 kA				10 kA	
C3 Voltage protection level at 1 kV/μs	U _p	< 600 V		< 850 V		< 2 V	
Max. discharge current (8/20)	I _{max}	10 kA				20 kA	
Frequency range	B	0 ÷ 3 GHz				5 ÷ 5,4 GHz	
Max. transmission power capacity		50 W		400 W		200 W	
Insertion loss		< 0,65 dB				< 0,2 dB	
Return loss				> 20 dB			
Characteristic impedance				50 Ω			
Degree of protection of enclosure				IP65			
Category tested acc. to IEC 61643:21-2000				C1, C2, C3, D1			
Operating temperature range	ϑ			-30 °C ÷ +70 °C			
Weight				134 g			
Article number		55 018	55 019	55 020	55 021	55 024	55 025

type		KO - 6GN (F/F)	KO - 6GN (F/M)	KO - 11G
Connector type		N		UHF
Max. trvalé provozní napětí	U_c	135 V DC		90 V DC
Rated load current	I_L	5 A		
D1 Max. lightning impulse current (10/350)	I_{imp}	1 kA		2 kA
C2 Nominal discharge current I_n (8/20)	I_n	5 kA		
C3 Voltage protection level at 1 kV/ μ s	U_p	< 500 V		< 600 V
Max. discharge current (8/20)	I_{max}	10 kA		
Frequency range	B	0 ÷ 5,8 GHz		0 ÷ 0,3 GHz
Max. transmission power capacity		50 W		
Insertion loss		< 0,2 dB		< 1,5 dB
Return loss		> 20 dB		
Characteristic impedance		50 Ω		
Degree of protection of enclosure		IP65		IP20
Category tested acc. to IEC 61643:21-2000		C1, C2, C3, D1		
Operating temperature range	ϑ	-30 °C ÷ +70 °C		
Weight		91 g		25 g
Article number		55 126	55 026	55 011



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