

SURGE PROTECTION DEVICES



 **Lovato**
electric

ENERGY AND AUTOMATION

TN-S SYSTEM INDUSTRIAL PLANT TYPICAL SIZING, THREE-PHASE + NEUTRAL

- A** SPD TYPE 1 E 2 $I_{imp} = 25\text{kA/pole}$
(ex.: SA1B4PA320R)

- B** SPD TYPE 1 E 2 $I_{imp} = 12.5\text{kA/pole}$
(ex.: SA0B4PA320R)

- C** SPD TYPE 2 $I_n = 20\text{kA/pole}$
(ex.: SG24PA300R)

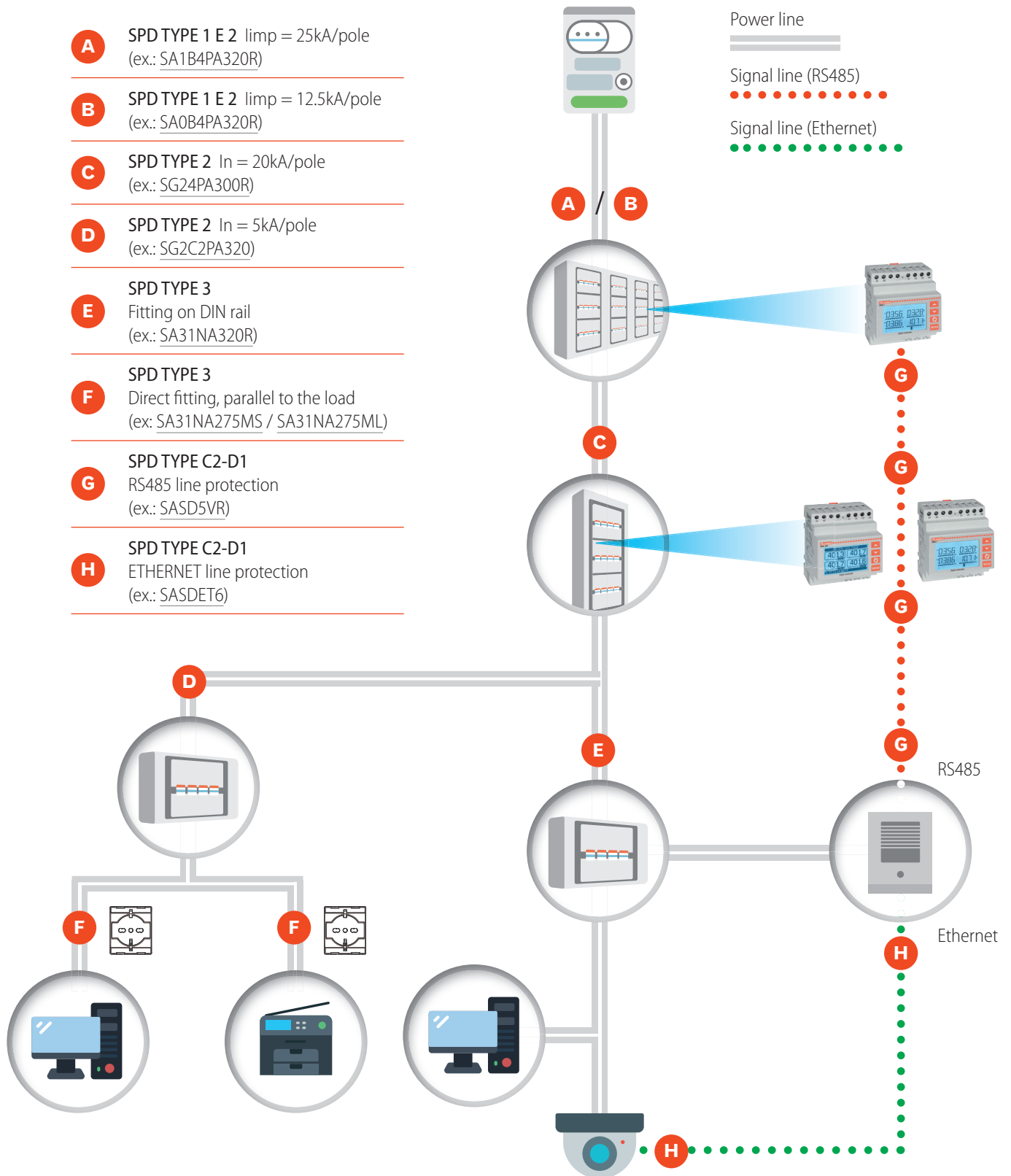
- D** SPD TYPE 2 $I_n = 5\text{kA/pole}$
(ex.: SG2C2PA320)

- E** SPD TYPE 3
Fitting on DIN rail
(ex.: SA31NA320R)

- F** SPD TYPE 3
Direct fitting, parallel to the load
(ex.: SA31NA275MS / SA31NA275ML)

- G** SPD TYPE C2-D1
RS485 line protection
(ex.: SASD5VR)

- H** SPD TYPE C2-D1
ETHERNET line protection
(ex.: SASDET6)



SPD SYSTEM CONFIGURATOR

INSTALLED IN THE ENERGY POINT OF DELIVERY (230/400VAC)

HV system |

Typical case: large industrial or commercial plant with cabin inside the final user's plant.

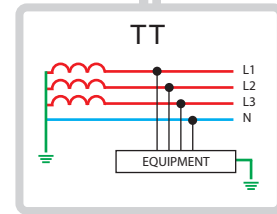
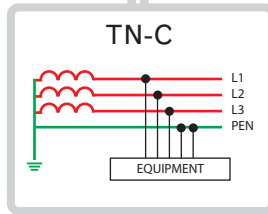
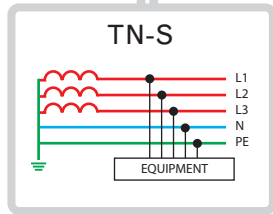


LV system |

Typical case: small/medium industrial/commercial plant or residential plant.



DISTRIBUTION SYSTEM



SPD **before** the first plant residual circuit breaker

SPD **after** the first plant residual circuit breaker

	SINGLE-PHASE	THREE-PHASE + NEUTRAL	THREE-PHASE	SINGLE-PHASE	THREE-PHASE + NEUTRAL	SINGLE-PHASE	THREE-PHASE + NEUTRAL
URBAN AREA	SG22PA300	SG24PA300	SG23PA300	SG21NA300	SG23NA300	SG22PA300	SG24PA300
NON-URBAN AREA	SA0B2PA320R	SA0B4PA320R	SA0B3PA320R	SA01NA320R	SA03NA320R	SA02PA320R	SA04PA320R
EXPOSED NON-URBAN AREA	SA1B2PA320R	SA1B4PA320R	SA1B3PA320R	SA1B1NA320R	SA1B3NA320R	SA1B2PA320R	SA1B4PA320R

LOVATO ELECTRIC SPD TYPE TO BE CHOSEN DEPENDING ON THE AREA

- URBAN AREA:** Area subjected to induced overvoltages with 8/20 μ s waveform (SPD Type 2).
- NON-URBAN AREA:** An area subjected to major direct lightning strikes with a 10/350 μ s waveform and to induced overvoltages with an 8/20 μ s waveform (SPD Types 1 and 2).
- EXPOSED NON-URBAN AREA:** An area subjected to large direct lightning strikes with a 10/350 μ s waveform and induced overvoltages with an 8/20 μ s waveform (SPD Types 1 and 2).

NOTE: This scheme represents typical configurations. In any case, the choice of the SPDs must be made in accordance with CEI64-8 and with any applicable standards for the plant design.

SURGE PROTECTION DEVICES

THREE-PHASE PLANTS, DELIVERY IN LV



Industrial plants



Residential complexes and public locations



Offices



AC side of three-phase photovoltaic systems

Protection device wiring rules

- Wiring as illustrated in the figure.
- Connection length to the equipotential bar within 0.5 metres (b).
- Replace the protection plug device when the status indicator turns red.

SINGLE-PHASE PLANTS, DELIVERY IN LV



Homes



AC side of three-phase photovoltaic systems

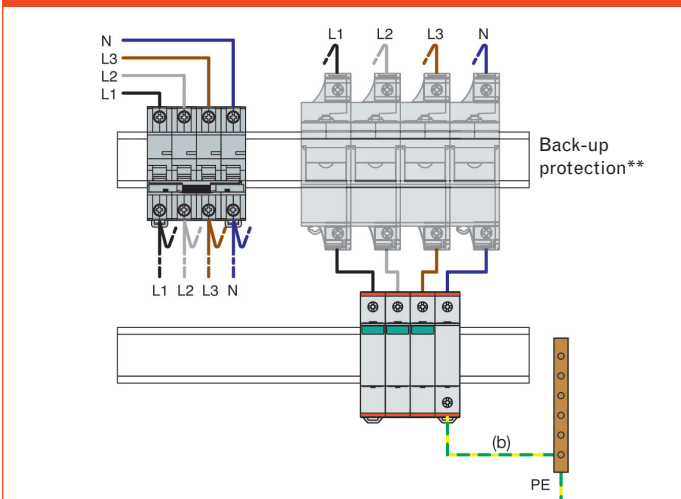
Protection device wiring rules

- Wiring before the first plant residual circuit breaker.
- In/out wiring as shown in the figure below.
- Connection length to the equipotential bar within 0.5 metres (b).
- Replace the protection plug residual current breaker device when the status indicator turns red.

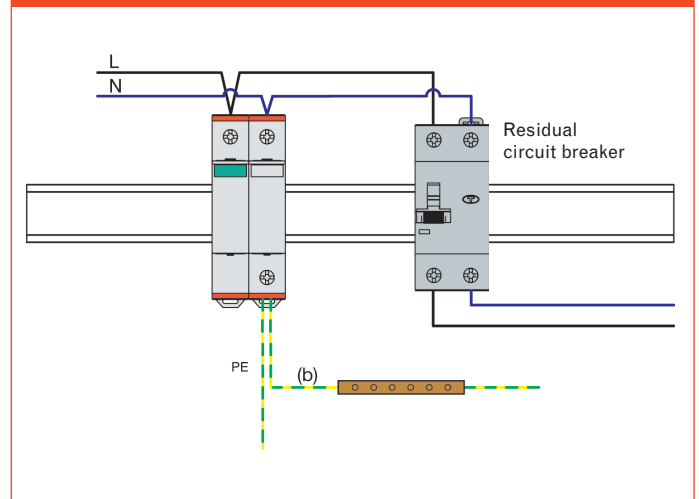
Area	Type	Discharge capacity	Order code	DIN modules
URBAN	2	In 20kA (8/20)	SG23NA300	4
NON-URBAN	1-2	limp 12.5kA (10/350)	SA03NA320R	4
NON-URBAN EXPOSED AREA*	1-2	limp 25kA (10/350)	SA1B3NA320R	8

Area	Type	Discharge capacity	Order code	DIN modules
URBAN	2	In 20kA (8/20)	SG21NA300	2
		In 5kA (8/20)	SG2C1NA320	1
NON-URBAN	1-2	limp 12.5kA (10/350)	SA01NA320R	2
NON-URBAN EXPOSED AREA*	1-2	limp 25kA (10/350)	SA1B1NA320R	4

Installation and wiring



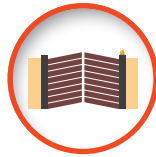
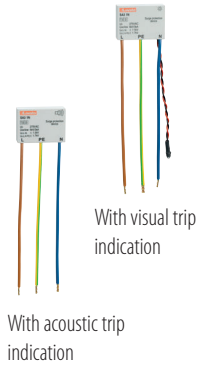
Installation and wiring



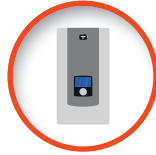
* Large direct lightning strikes.

** Back-up protection required when line thermal-magnetic circuit breaker is higher than 125 A (SA1B.. AND SG2..), 80A (SA0..).

PLANTS WITH ELECTRONIC EQUIPMENT



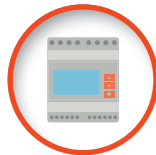
Electric gate



Boilers / Stoves Air Conditioners



TVs / PCs



Electronic control units

Protection device wiring rules

DIN guide

- Connection length to the equipotential bar within 0.5 metres (b).
- Replace the plug when the status indicator turns red.

Plug-in solution

- Replace the protection device when the visual signalling turns off or when the audible signalling activates.

PLANTS WITH DATA LINES



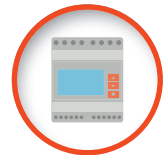
Videocameras



Switch Router



TVs / PCs



Electronic control units
Measurement devices

Protection device wiring rules

RS485

- Conductors a-b and a'-b' must not be in the same cable path.
- Replace the plug if the signal is lacking.

Ethernet Cat. 6 - POE

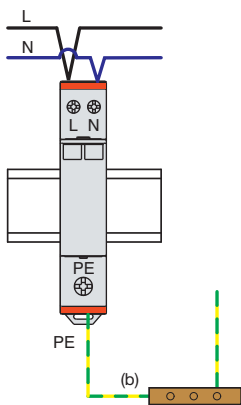
- The Ethernet cables c-c' must not be in the same cable path.
- Replace the protection device if the signal is lacking.

Application	Type	Order code	Install.	Trip indication
Installation near the equipment to be protected	3	SA31NA320R	DIN guide	Series relays
		SA31NA275MS	Box 503, board, duct	Audible
		SA31NA275ML		Visual

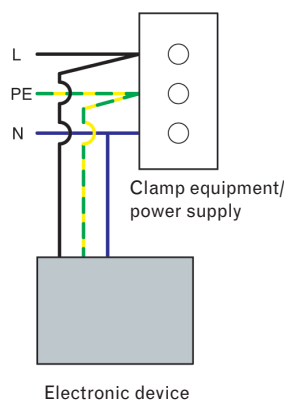
Application	Type	Order code	Install.	DIN modules
RS485	CD-D1	SASD5VR	Guide DIN	1/2
Ethernet Cat. 6 Power over Ethernet (POE)		SASDET6		1

Installation and wiring

DIN guide

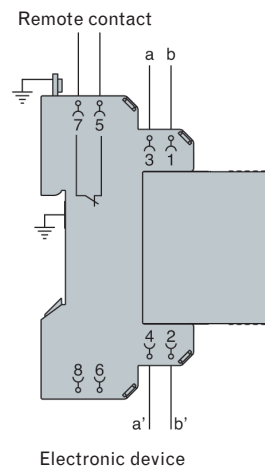


Plug-in solution

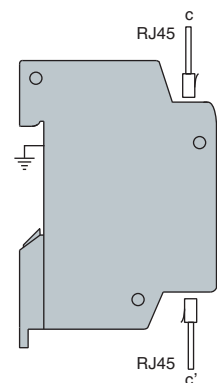


Installation and wiring

RS485



Ethernet CAT. 6 - POE



PHOTOVOLTAIC SYSTEMS



DC side of photovoltaic systems

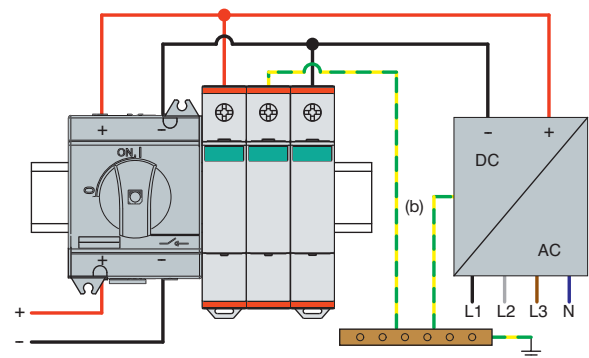


Protection device wiring rules

- Wiring as illustrated in the figure.
- Connection length to the equipotential bar within 0.5 metres (b), with a minimum section of 6mm².
- Replace the protection plug device when the status indicator turns red.



Installation and wiring



Max. rated voltage	Type	Short circuit current I _{scpv}	Order code	DIN modules
600VDC	2	11kA	SG2DG600M2	2
1100VDC	2	11kA	SA2EDGK10M3	3

Order code	Type	Rated voltage	Max. continuous voltage	Protection level	Rated current	Maximum current	Short circuit current	Backup fuse gPV (A)	DIN modules	Relay output	Cartridge
	IEC/EN 61643-11	U _n (VDC)	U _{cpv} (VDC)	U _p (kV) (L-N/N-PE)	I _n 8/20 (kA) pole	I _{max} 8/20 (kA) pole	I _{scpv} (kA)				
SG2DG600M2	2	600	600	< 1,9	15	30	11	100	2	-	Si
SG2DG600M2R	2	600	600	< 1,9	15	30	11	100	2	Si	Si
SG2DGK10M3	2	1100	1100	< 3,8	20	40	11	-	3	-	Si
SG2DGK10M3R	2	1100	1100	< 3,8	20	40	11	-	3	Si	Si
SA2EDGK10M	2	1100	1100	< 4	20	40	9	-	3	-	Si
SG2DGK50M3	2	1500	1500	< 5	20	30	11	-	3	-	Si

All AC protection devices are compliant with the IEC/EN 61643-11 standard.

ORDER CODES

Order code	Pole arrangement	Rated voltage	Max. continuous voltage	Protection level	Pulse current	Rated current	Maximum current	Short circuit current	Backup fuse gL/gg	Immunity to TOV	DIN modules	Relay output
		Un (VAC)	Uc (V)	Up (kV) (L-N/N-PE)	Imp 10/350 (kA) pole	In 8/20 (kA) pole	I _{max} 8/20 (kA) pole	I _{sc} 50 Hz (kA)	A	V		
SPD TYPE 1-2 monoblock												
SA1B1NA320R	1P+N	230	320	< 1.4 / < 1.3	25	25	100	50	250	Yes - 335 V	4	Yes
SA1B2PA320R	2P	230	320	< 1.4	25	25	100	50	250	Yes - 335 V	4	Yes
SA1B3PA320R	3P	230/400	320	< 1.4	25	25	100	50	250	Yes - 335 V	6	Yes
SA1B3NA320R	3P+N	230/400	320	< 1.4 / < 1.5	25	25	100	50	250	Yes - 335 V	8	Yes
SA1B4PA320R	4P	230/400	320	< 1.4	25	25	100	50	250	Yes - 335 V	8	Yes
SPD TYPE 1-2 with removable cartridge												
SA01NA320R	1P+N	230	320	< 1.5 / < 1.7	12,5	25	60	25	160	Yes - 335 V	2	Yes
SA02PA320R	2P	230	320	< 1.5	12,5	25	60	25	160	Yes - 335 V	2	Yes
SA03PA320R	3P	230/400	320	< 1.5	12,5	25	60	25	160	Yes - 335 V	3	Yes
SA03NA320R	3P+N	230/400	320	< 1.5 / < 1.7	12,5	25	60	25	160	Yes - 335 V	4	Yes
SA04PA320R	4P	230/400	320	< 1.5	12,5	25	60	25	160	Yes - 335 V	4	Yes
SPD TYPE 1-2 monoblock												
SA0B1NA320R	1P+N	230	320	< 1.5 / < 1.5	12,5	20	50	50	250	Yes - 335 V	2	Yes
SA0B2PA320R	2P	230	320	< 1.5	12,5	20	50	50	250	Yes - 335 V	2	Yes
SA0B3PA320R	3P	230/400	320	< 1.5	12,5	20	50	50	250	Yes - 335 V	3	Yes
SA0B3NA320R	3P+N	230/400	320	< 1.5 / < 1.5	12,5	20	50	50	250	Yes - 335 V	4	Yes
SA0B4PA320R	4P	230/400	320	< 1.5	12,5	20	50	50	250	Yes - 335 V	4	Yes
SPD TYPE 2 with removable cartridge												
SG21NA300	1P+N	230	300	< 1.5 / < 1.5	-	20	50	25/50	315/250	Yes - 337 V	2	No
SG21NA300R	1P+N	230	300	< 1.5 / < 1.5	-	20	50	25/50	315/250	Yes - 337 V	2	Yes
SG22PA300	2P	230	300	< 1.5	-	20	50	25/50	315/250	Yes - 337 V	2	No
SG22PA300R	2P	230	300	< 1.5	-	20	50	25/50	315/250	Yes - 337 V	2	Yes
SG23PA300	3P	230/400	300	< 1.5	-	20	50	25/50	315/250	Yes - 337 V	3	No
SG23PA300R	3P	230/400	300	< 1.5	-	20	50	25/50	315/250	Yes - 337 V	3	Yes
SG23NA300	3P+N	230/400	300	< 1.5 / < 1.5	-	20	50	25/50	315/250	Yes - 337 V	4	No
SG23NA300R	3P+N	230/400	300	< 1.5 / < 1.5	-	20	50	25/50	315/250	Yes - 337 V	4	Yes
SG24PA300	4P	230/400	300	< 1.5	-	20	50	25/50	315/250	Yes - 337 V	4	No
SG24PA300R	4P	230/400	300	< 1.5	-	20	50	25/50	315/250	Yes - 337 V	4	Yes
SG2C1NA320	1P+N	230	320	< 1.5	-	5	15	6	63	Yes - 335 V	1	No
SG2C2PA320	2P	230	320	< 1.5	-	5	15	6	63	Yes - 335 V	1	No
SPD TIPO 3												
SA31NA320R*	1P+N	230	320	< 1.5	-	-	-	10	63	Yes - 337 V	1	Yes
SA31NA275MS**	1P+N	230	275	< 1.5 / < 1.7	-	-	-	1	16**	Yes - 337 V	-	No
SA31NA275ML**	1P+N	230	275	< 1.5 / < 1.7	-	-	-	1	16**	Yes - 337 V	-	No

* SPD with removable cartridge ** SPD with reduced dimensions, protection MCB/B 16A.

Order code	Type	Rated voltage	Max. continuous voltage	Protection level	D1 Pulse current	C2 Rated current	Maximum current	Bandwidth	Current of iL load at 25°C	DIN modules	Relay output	Monoblock	Cartridge
	IEC/EN 61643-21	Un (VDC)	Uc (VDC)	Up (V) (line-line/line-PE)	Imp 10/350 (kA)	In 8/20 (kA)	I _{max} 8/20 (kA)	Mhz	A				
SASD5VR	D1/C1	5	6	/	2.5	10	20	30	1	1/2	Yes	-	Yes
SASDET6	C2/C3	48	50	150/550	1	10	10	250 Cat. 6	1	1	-	Yes	-

All AC protection devices are compliant with the IEC/EN 61643-11 standard.



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