

SURGE PROTECTION DEVICES



 **Lovato**
electric

ENERGY AND AUTOMATION

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.

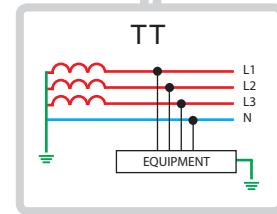
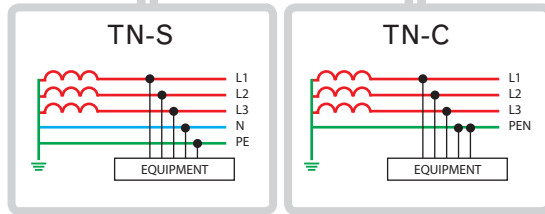


LV system |

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

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

- A** SPD TYPE 1 E 2 $I_{imp} = 25\text{kA/pole}$
(ex.: SA1B 4P A320R)

- B** SPD TYPE 1 E 2 $I_{imp} = 12.5\text{kA/pole}$
(ex.: SA0B 4P A320R)

- C** SPD TYPE 2 $I_n = 20\text{kA/pole}$
(ex.: SG2 4P A300R)

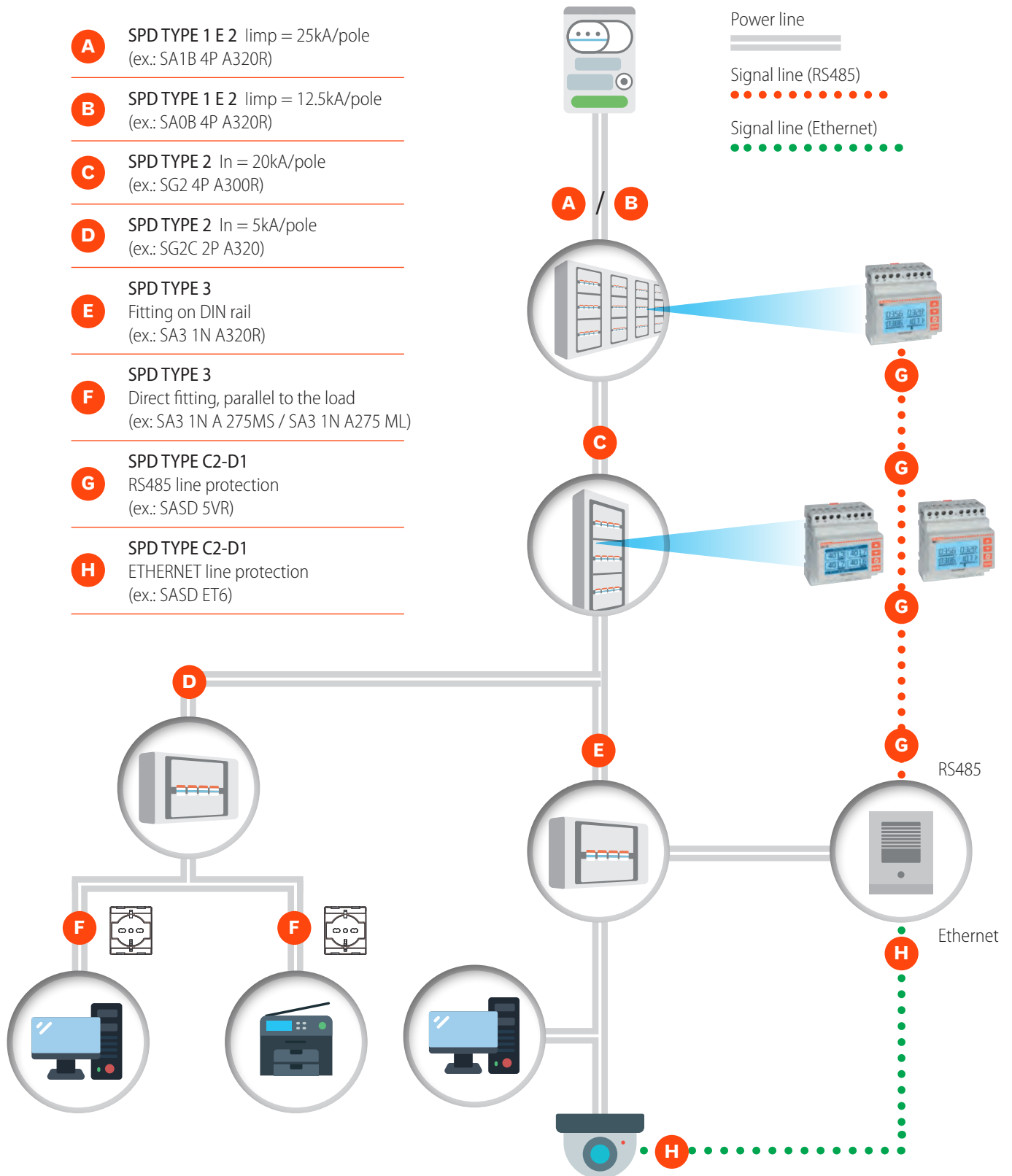
- D** SPD TYPE 2 $I_n = 5\text{kA/pole}$
(ex.: SG2C 2P A320)

- E** SPD TYPE 3
Fitting on DIN rail
(ex.: SA3 1N A320R)

- F** SPD TYPE 3
Direct fitting, parallel to the load
(ex.: SA3 1N A 275MS / SA3 1N A275 ML)

- G** SPD TYPE C2-D1
RS485 line protection
(ex.: SASD 5VR)

- H** SPD TYPE C2-D1
ETHERNET line protection
(ex.: SASD ET6)



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

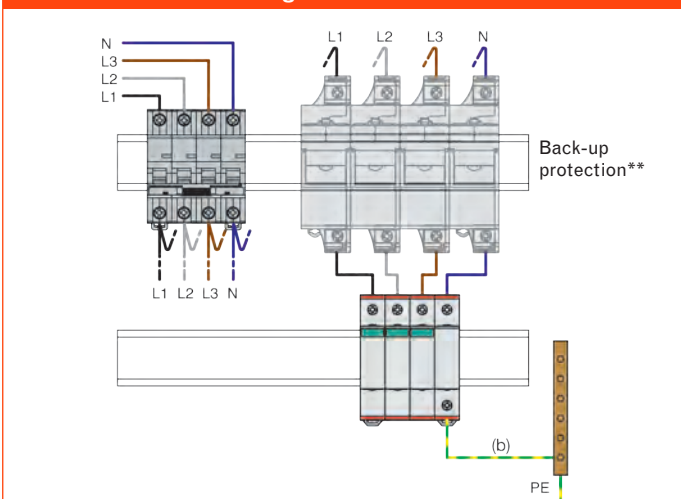
Protection device wiring rules

- 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.

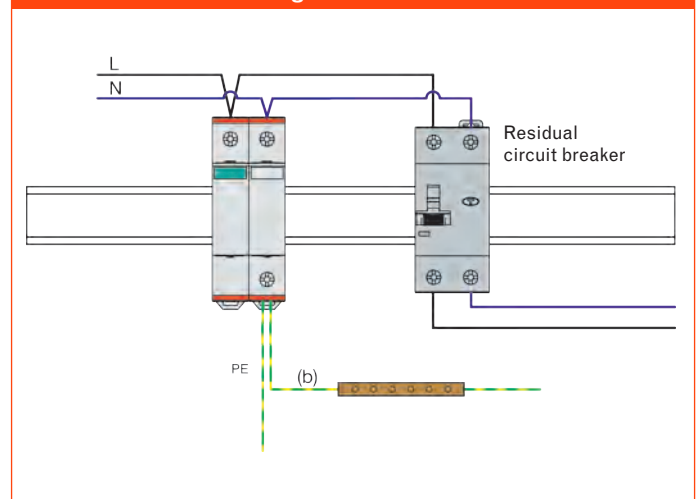
| Area | Type | Discharge capacity | Order code | DIN modules |
|-------------------------|------|----------------------|----------------------|-------------|
| URBAN | 2 | In 20kA (8/20) | SG2 3N A300 | 4 |
| NON-URBAN | 1-2 | limp 12.5kA (10/350) | SA0 3N A320R | 4 |
| NON-URBAN EXPOSED AREA* | 1-2 | limp 25kA (10/350) | SA1B 3N A320R | 8 |

| Area | Type | Discharge capacity | Order code | DIN modules |
|-------------------------|------|----------------------|----------------------|-------------|
| URBAN | 2 | In 20kA (8/20) | SG2 1N A300 | 2 |
| | | In 5kA (8/20) | SG2C 1N A320 | 1 |
| NON-URBAN | 1-2 | limp 12.5kA (10/350) | SA0 1N A320R | 2 |
| NON-URBAN EXPOSED AREA* | 1-2 | limp 25kA (10/350) | SA1B 1N A320R | 4 |

Installation and wiring



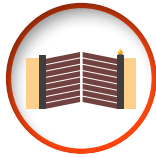
Installation and wiring



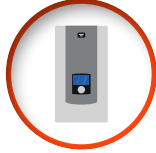
* Large direct lightning strikes.

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

PLANTS WITH ELECTRONIC EQUIPMENT



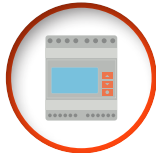
Electric gate



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



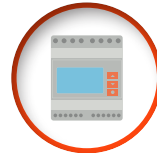
Videocameras



Switch Router



TVs / PCs



Electronic control units
Measurement devices

Protection device wiring rules

RS485

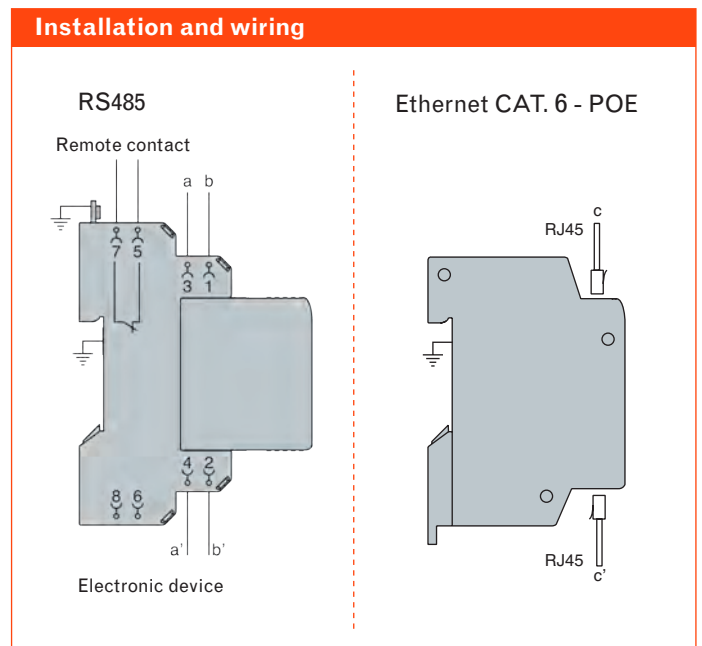
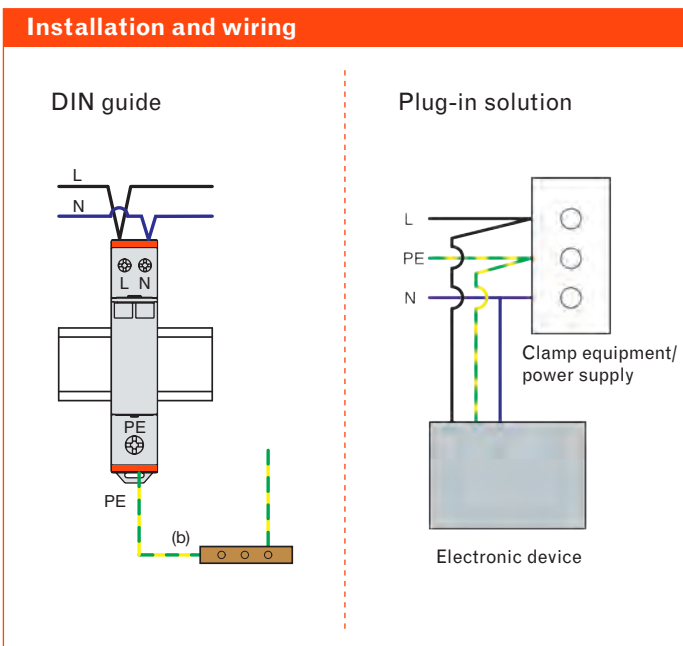
- Conductors a-b and a'-b' must not be in the same cable path.
- Replace the plug if the signal is lacking.

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 | SA3 1N A320R | DIN guide | Series relays |
| | | SA3 1N A275MS | Box 503, board, duct | Audible |
| | | SA3 1N A275ML | | Visual |

| Application | Type | Order code | Install. | DIN modules |
|---|-------|------------|--------------|-------------|
| RS485 | CD-D1 | SASD 5VR | Guide DIN | 1/2 |
| Ethernet Cat. 6 Power over Ethernet (POE) | | SASD ET6 | | 1 |



PHOTOVOLTAIC SYSTEMS



DC side of photovoltaic systems

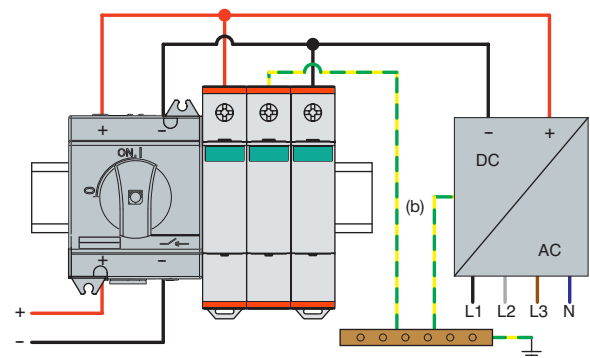


Protection device wiring rules

- 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 | 100A | SA2 DG 600 M2 | 2 |
| 1100VDC | 2 | 11000A | SG2 DG K10 M3 | 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} (A) | | | | |
| SA2 DG 600M2 | 2 | 600 | 600 | < 1.9 | 15 | 30 | 100 | 100 | 2 | - | Yes |
| SA2 DG 600M2R | 2 | 600 | 600 | < 1.9 | 15 | 30 | 100 | 100 | 2 | Yes | Yes |
| SG2 DG K10M3 | 2 | 1100 | 1100 | < 3.8 | 20 | 40 | 11000 | - | 3 | - | Yes |
| SG2 DG K10M3R | 2 | 1100 | 1100 | < 3.8 | 20 | 40 | 11000 | - | 3 | Yes | Yes |
| SG2 DG K50M3 | 2 | 1500 | 1500 | < 5 | 20 | 30 | 11000 | - | 3 | - | Yes |

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

ORDER CODES

| Order code | 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) | I _{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 | | | | | | | | | | | |
| SA1B 1N A320R | 230 | 320 | < 1.4 / < 1.3 | 25 | 25 | 100 | 50 | 250 | Yes - 335 V | 4 | Yes |
| SA1B 2P A320R | 230 | 320 | < 1.4 | 25 | 25 | 100 | 50 | 250 | Yes - 335 V | 4 | Yes |
| SA1B 3P A320R | 230/400 | 320 | < 1.4 | 25 | 25 | 100 | 50 | 250 | Yes - 335 V | 6 | Yes |
| SA1B 3N A320R | 230/400 | 320 | < 1.4 / < 1.5 | 25 | 25 | 100 | 50 | 250 | Yes - 335 V | 8 | Yes |
| SA1B 4P A320R | 230/400 | 320 | < 1.4 | 25 | 25 | 100 | 50 | 250 | Yes - 335 V | 8 | Yes |
| SPD TYPE 1-2 with removable cartridge | | | | | | | | | | | |
| SA0 1N A320R | 230 | 320 | < 1.5 / < 1.7 | 12.5 | 25 | 60 | 25 | 160 | Yes - 335 V | 2 | Yes |
| SA0 2P A320R | 230 | 320 | < 1.5 | 12.5 | 25 | 60 | 25 | 160 | Yes - 335 V | 2 | Yes |
| SA0 3P A320R | 230/400 | 320 | < 1.5 | 12.5 | 25 | 60 | 25 | 160 | Yes - 335 V | 3 | Yes |
| SA0 3N A320R | 230/400 | 320 | < 1.5 / < 1.7 | 12.5 | 25 | 60 | 25 | 160 | Yes - 335 V | 4 | Yes |
| SA0 4P A320R | 230/400 | 320 | < 1.5 | 12.5 | 25 | 60 | 25 | 160 | Yes - 335 V | 4 | Yes |
| SPD TYPE 1-2 monoblock | | | | | | | | | | | |
| SA0B 1N A320R | 230 | 320 | < 1.5 / < 1.5 | 12.5 | 20 | 50 | 50 | 250 | Yes - 335 V | 2 | Yes |
| SA0B 2P A320R | 230 | 320 | < 1.5 | 12.5 | 20 | 50 | 50 | 250 | Yes - 335 V | 2 | Yes |
| SA0B 3P A320R | 230/400 | 320 | < 1.5 | 12.5 | 20 | 50 | 50 | 250 | Yes - 335 V | 3 | Yes |
| SA0B 3N A320R | 230/400 | 320 | < 1.5 / < 1.5 | 12.5 | 20 | 50 | 50 | 250 | Yes - 335 V | 4 | Yes |
| SA0B 4P A320R | 230/400 | 320 | < 1.5 | 12.5 | 20 | 50 | 50 | 250 | Yes - 335 V | 4 | Yes |
| SPD TYPE 2 with removable cartridge | | | | | | | | | | | |
| SG2 1N A300 | 230 | 300 | < 1.5 / < 1.5 | - | 20 | 50 | 25/50 | 315/250 | Yes - 337 V | 2 | No |
| SG2 1N A300R | 230 | 300 | < 1.5 / < 1.5 | - | 20 | 50 | 25/50 | 315/250 | Yes - 337 V | 2 | Yes |
| SG2 2P A300 | 230 | 300 | < 1.5 | - | 20 | 50 | 25/05 | 315/250 | Yes - 337 V | 2 | No |
| SG2 2P A300R | 230 | 300 | < 1.5 | - | 20 | 50 | 25/50 | 315/250 | Yes - 337 V | 2 | Yes |
| SG2 3P A300 | 230/400 | 300 | < 1.5 | - | 20 | 50 | 25/50 | 315/250 | Yes - 337 V | 3 | No |
| SG2 3P A300R | 230/400 | 300 | < 1.5 | - | 20 | 50 | 25/05 | 315/250 | Yes - 337 V | 3 | Yes |
| SG2 3N A300 | 230/400 | 300 | < 1.5 / < 1.5 | - | 20 | 50 | 25/50 | 315/250 | Yes - 337 V | 4 | No |
| SG2 3N A300R | 230/400 | 300 | < 1.5 / < 1.5 | - | 20 | 50 | 25/50 | 315/250 | Yes - 337 V | 4 | Yes |
| SG2 4P A300 | 230/400 | 300 | < 1.5 | - | 20 | 50 | 25/05 | 315/250 | Yes - 337 V | 4 | No |
| SG2 4P A300R | 230/400 | 300 | < 1.5 | - | 20 | 50 | 25/50 | 315/250 | Yes - 337 V | 4 | Yes |
| SG2C 1N A320 | 230 | 320 | < 1.5 | - | 5 | 15 | 25/50 | 63 | Yes - 335 V | 1 | No |
| SG2C 1N A320 | 230 | 320 | < 1.5 | - | 5 | 15 | 25/05 | 63 | Yes - 335 V | 1 | No |
| SPD TYPE 3 | | | | | | | | | | | |
| SA3 1N A320R* | 230 | 320 | < 1.5 | - | - | - | 10 | 63 | Yes - 337 V | 1 | Yes |
| SA3 1N A275MS** | 230 | 275 | < 1.5 / < 1.7 | - | - | - | 1 | 16** | Yes - 337 V | - | No |
| SA3 1N A275ML** | 230 | 275 | < 1.5 / < 1.7 | - | - | - | 1 | 16** | Yes - 337 V | - | No |

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

SPD FOR PLANTS WITH DATA LINES

| Order code | Type | Rated voltage | Max. continuous voltage | Protection level | D1 Pulse current | C2 Rated current | Maximum current | Bandwidth | Current of I.L. load at 25°C | DIN modules | Relay output | Monoblock | Cartridge |
|------------|-----------------|---------------|-------------------------|----------------------------|------------------------------|------------------|----------------------------|------------|------------------------------|-------------|--------------|-----------|-----------|
| | IEC/EN 61643-21 | Un (VDC) | Uc (VDC) | Up (V) (line-line/line-PE) | I _{imp} 10/350 (kA) | In 8/20 (kA) | I _{max} 8/20 (kA) | Mhz | A | | | | |
| SASD 5VR | D1/C1 | 5 | 6 | / | 2.5 | 10 | 20 | 30 | 1 | 1/2 | Yes | - | Yes |
| SASD ET6 | 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.



■ LOVATO ELECTRIC LTD

Lovato House - Providence Drive Lye
STOURBRIDGE
West Midlands - DY9 8HQ - ENGLAND
Tel. +44 01384 899700
sales@Lovato.co.uk
www.Lovato.co.uk

■ LOVATO ELECTRIC GmbH

Im Ermlisgrund 30
76337 WALDBRONN
GERMANY
Tel. +49 7243 766 937 0
info@LovatoElectric.de
www.LovatoElectric.de

■ LOVATO ELECTRIC SP. Z O.O.

ul. Zachodnia 3
55-330 Błonie k. Wrocławia
POLAND
Tel. +48 71 7979010
info@LovatoElectric.pl
www.LovatoElectric.pl

ООО Ловато Электрик

107023, г. Москва
ул. Суворовская, д.19, стр. 2,
RUSSIA
Тел: +7 (495) 998-50-80
info@LovatoElectric.ru
www.LovatoElectric.ru

■ LOVATO ELECTRIC SAS

IMMEUBLE DANICA B
21 Avenue Georges Pompidou
FRANCE
Tel. +33 4 72 91 31 35
info@LovatoElectric.fr
www.LovatoElectric.fr

■ LOVATO ELECTRIC CORPORATION

4500, Garand Street
Laval, Quebec CANADA
H7L 5Z6
Tel. +579-641-1253
info@Lovato.ca
www.Lovato.ca

■ LOVATO ELECTRIC S.L.U

Pol. Ind. Llinars Park
C/. de la Tecnología, 102
Passatge B, Nau 9
08450 LLINARS DEL VALLÈS - SPAIN
Tel. +34 93 7812016
LovatoElectric@LovatoElectric.es
www.LovatoElectric.es

■ LOVATO ELEKTRIK LTD

Araylar Sanayi Sitesi
No:9A/36 Özvatan Caddesi
Tepeören Mahallesi 34959 Tuzla
Istanbul, TURKEY
Tel. +90 216 499 86 86
info@LovatoElectric.com.tr
www.LovatoElectric.com.tr

LOVATO ELECTRIC CO LTD

Shanghai, CHINA
上海市虹井路288号燎申虹桥国际中心B座701单元
邮编: 201103
电话: +86 021 62961837
info@LovatoElectric.cn
www.LovatoElectric.cn

■ LOVATO ELECTRIC INC

2017 Georgetown Blvd.
CHESAPEAKE, VA 23325
UNITED STATES
Tel. +1 757 545-4700
info@LovatoUsa.com
www.LovatoUsa.com

■ LOVATO ELECTRIC. S.R.O.

Cizovska 488
397 01 PISEK
CZECH REPUBLIC
Tel. +420 226 203210
Lovato@LovatoElectric.cz
www.LovatoElectric.cz

■ LOVATO ELECTRIC ME FZE

#A101-9, First Floor, Block A
DSO-Operations and Facility Centre
DUBAI SILICON OASIS
Dubai, UAE
Tel. +971 4 371 2713
info@lovatoelectric.ae
www.LovatoElectric.ae

■ LOVATO ELECTRIC SRL

Muntenia Business Center,
Splaiul Unirii nr. 16, et. 6, cam. 601
RO-040035, sector 4,
Bucarest, ROMANIA
Tel. +40 372 074 155
info@LovatoElectric.ro
www.LovatoElectric.ro



ENERGY AND AUTOMATION

www.LovatoElectric.com

LOVATO ELECTRIC S.P.A.

Via Don E. Mazza, 12
24020 Gorle (Bergamo), Italy

tel. +39 035 4282111
info@LovatoElectric.com

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