

# SPDE



## Single Phase Compact Power Supply



### Description

The SPDE series of DIN-rail mount power supplies encompasses high performance within an extremely compact footprint. Power ratings start from 75 W up to 480 W with 12, 24 and 48 VDC output. The SPDE achieves high operating efficiency of up to 94% @ 230 VAC. Features such as DC ok output relay (for SPDE..R models) and built-in protection functions ensure a high degree of reliability during operation.

All specifications are at nominal values, full load, 25°C unless otherwise stated.

### Benefits

- **Compact dimensions:** SPDE can save up to 50% panel-width space thanks to its ultra-slim design. The 480 W model is just 48 mm wide.
- **High efficiency:** The built-in PFC (on SPDE..R models) results in high operating efficiency up to 94%.
- **Flexible installation:** Universal AC/DC input range with AC voltage (90 VAC to 264 VAC) or with DC voltage (120 VDC to 370 VDC).
- **Integrated protection:** Output short circuit, over-current, over-voltage, over-temperature protection.
- **Wide operating temperature:** SPDE..R models can work in extreme temperatures from -40°C to +70°C (-40°F to +158°F).

### Applications

Installations with limited panel space, industrial equipment, machinery.

### Main functions

- Output short circuit, over-current, over-voltage and over-temperature protection
- DC OK relay indication (only in SPDE..R models)
- Built-in active PFC (only in SPDE..R models)

## References

### Order code

 **SPDE** ☐ ☐ 1 ☐

Enter the code entering the corresponding option instead of ☐.

| Code                     | Option     | Description        | Notes                |
|--------------------------|------------|--------------------|----------------------|
| <b>S</b>                 | -          | Switching          | Device typology      |
| <b>P</b>                 | -          | Power              |                      |
| <b>D</b>                 | -          | DIN rail           |                      |
| <b>E</b>                 | -          | High efficiency    | Mounting             |
| <input type="checkbox"/> | <b>12</b>  | 12 VDC             | Rated output voltage |
|                          | <b>24</b>  | 24 VDC             |                      |
|                          | <b>48</b>  | 48 VDC             |                      |
| <input type="checkbox"/> | <b>75</b>  | 75 W               | Rated output power   |
|                          | <b>120</b> | 120 W              |                      |
|                          | <b>190</b> | 192 W              |                      |
|                          | <b>240</b> | 240 W              |                      |
|                          | <b>480</b> | 480 W              |                      |
| <b>1</b>                 | -          | Single phase input | Input type           |
| <input type="checkbox"/> | -          | -                  |                      |
|                          | <b>R</b>   | Relay output       |                      |

### Selection guide

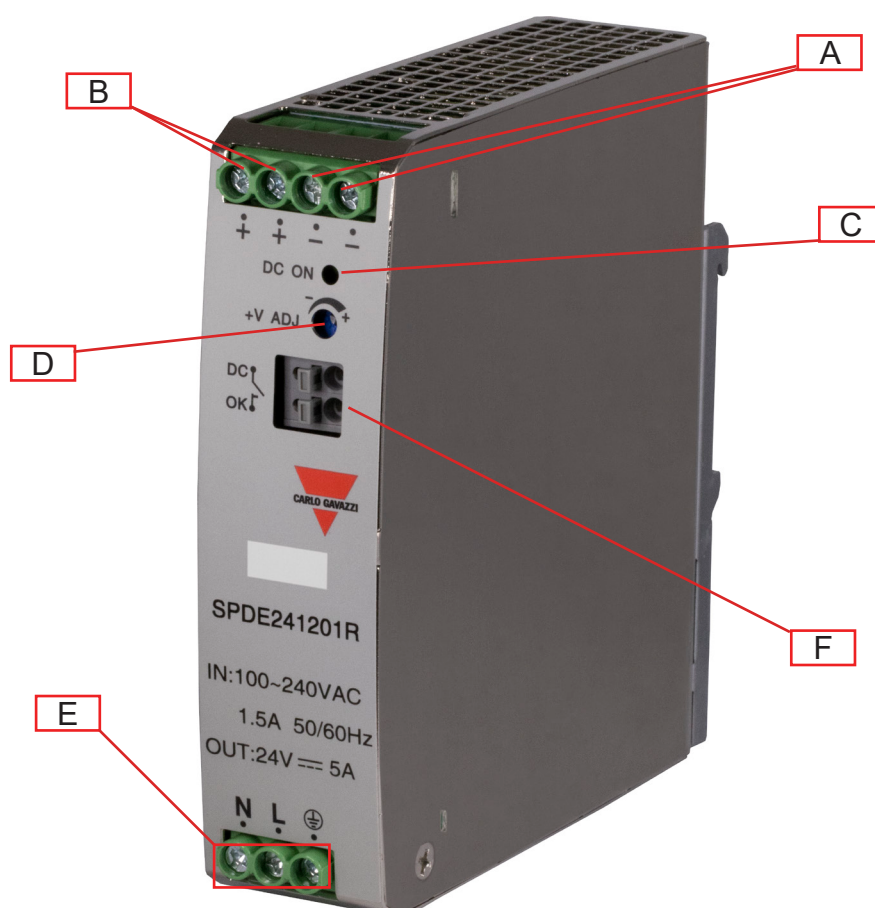
| Output Voltage | SPDE..75  | SPDE..120                 | SPDE..190   | SPDE..240   | SPDE..480   |
|----------------|-----------|---------------------------|-------------|-------------|-------------|
| <b>12 VDC</b>  | SPDE12751 | SPDE121201<br>SPDE121201R | SPDE121901R | -           | -           |
| <b>24 VDC</b>  | SPDE24751 | SPDE241201<br>SPDE241201R | -           | SPDE242401R | SPDE244801R |
| <b>48 VDC</b>  | SPDE48751 | SPDE481201<br>SPDE481201R | -           | SPDE482401R | SPDE484801R |

### Further reading

| Information             | Where to find it                                                                                                                                            | QR code                                                                               |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| SPDE datasheet          | <a href="https://gavazziautomation.com/images//PIM/DATASHEET/ENG/SPDE_DS_EN.pdf">https://gavazziautomation.com/images//PIM/DATASHEET/ENG/SPDE_DS_EN.pdf</a> |  |
| SPDE installation sheet | <a href="https://gavazziautomation.com/images/PIM/MANUALS/ENG/SPDE_IM.pdf">https://gavazziautomation.com/images/PIM/MANUALS/ENG/SPDE_IM.pdf</a>             |  |

# Structure

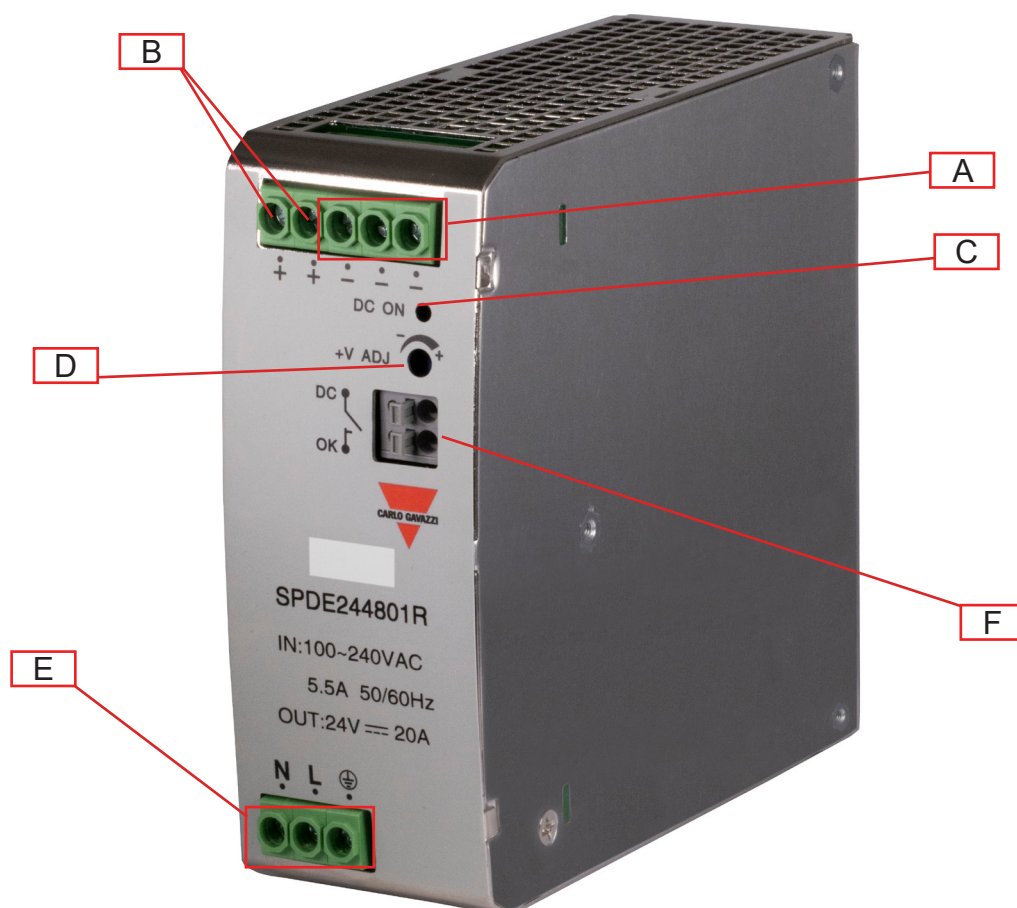
SPDE..75 / SPDE..120 / SPDE..190 / SPDE..240



| Element | Component       | Function                                                                                                                          |
|---------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------|
| A       | - V terminals   | Negative DC Output terminals                                                                                                      |
| B       | + V terminals   | Positive DC Output terminals                                                                                                      |
| C       | DC OK LED       | Green when output voltage is active                                                                                               |
| D       | VADJ trimmer    | Output voltage adjustment                                                                                                         |
| E       | Input terminals | L, N supply terminals and Protective Earth (PE)                                                                                   |
| F       | DC OK relay*    | Relay rating: 30 VDC / 1 A max. (resistive load)<br>Relay contacts closed when output voltage $\geq$ 90% of rated output voltage. |

\* applies to SPDE..R models only

## SPDE..480R



| Element | Component       | Function                                                                                                                          |
|---------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------|
| A       | - V terminals   | Negative DC Output terminals                                                                                                      |
| B       | + V terminals   | Positive DC Output terminals                                                                                                      |
| C       | DC OK LED       | Green when output voltage is active                                                                                               |
| D       | VADJ trimmer    | Output voltage adjustment                                                                                                         |
| E       | Input terminals | L, N supply terminals and Protective Earth (PE)                                                                                   |
| F       | DC OK relay     | Relay rating: 30 VDC / 1 A max. (resistive load)<br>Relay contacts closed when output voltage $\geq$ 90% of rated output voltage. |

# Features

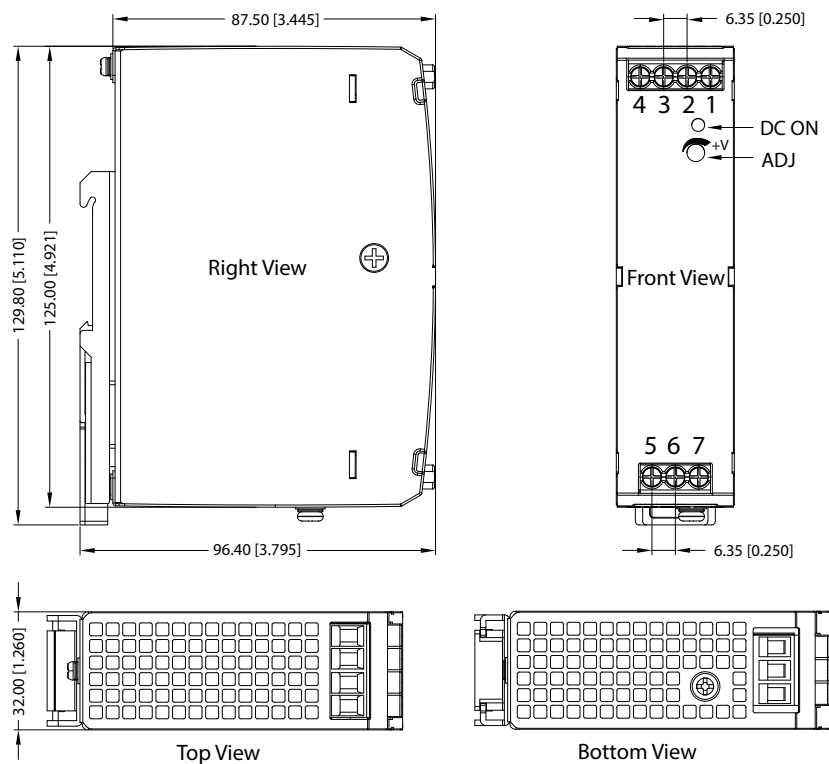
## General data

|                                   | SPDE..75                                     | SPDE..120                                    | SPDE..190    | SPDE..240                    | SPDE..480                    |
|-----------------------------------|----------------------------------------------|----------------------------------------------|--------------|------------------------------|------------------------------|
| Leakage current (input-output)    | <0.5 mA                                      | <1.0 mA                                      | <0.5 mA      |                              | <0.8 mA                      |
| Earth leakage current (input-GND) |                                              | -                                            | <1.0 mA      |                              | -                            |
| Efficiency                        | 86% (12 VDC)<br>89% (24 VDC)<br>90% (48 VDC) | 85% (12 VDC)<br>88% (24 VDC)<br>89% (48 VDC) | 92% (12 VDC) | 94% (24 VDC)<br>94% (48 VDC) | 94% (24 VDC)<br>94% (48 VDC) |
| Power loss @ nominal load         | ≤1.5W                                        | 15 W                                         | 23 W         |                              | 35 W                         |
| Power factor (full load)          |                                              |                                              |              |                              |                              |
| 115 VAC                           | -                                            | 0.98                                         |              |                              | 0.99                         |
| 230 VAC                           |                                              | 0.94                                         |              |                              | 0.99                         |
| Ingress protection                | IP20                                         |                                              |              |                              |                              |
| MTBF (MIL-HDBK-217F)              | >300,000 h                                   |                                              |              |                              |                              |
| Case material                     | Metal                                        |                                              |              |                              |                              |
| Weight                            | 350 g                                        | 410 g<br>490 g ± 10%*                        | 600 g        | 650 g                        | 980 g                        |

## Dimensions

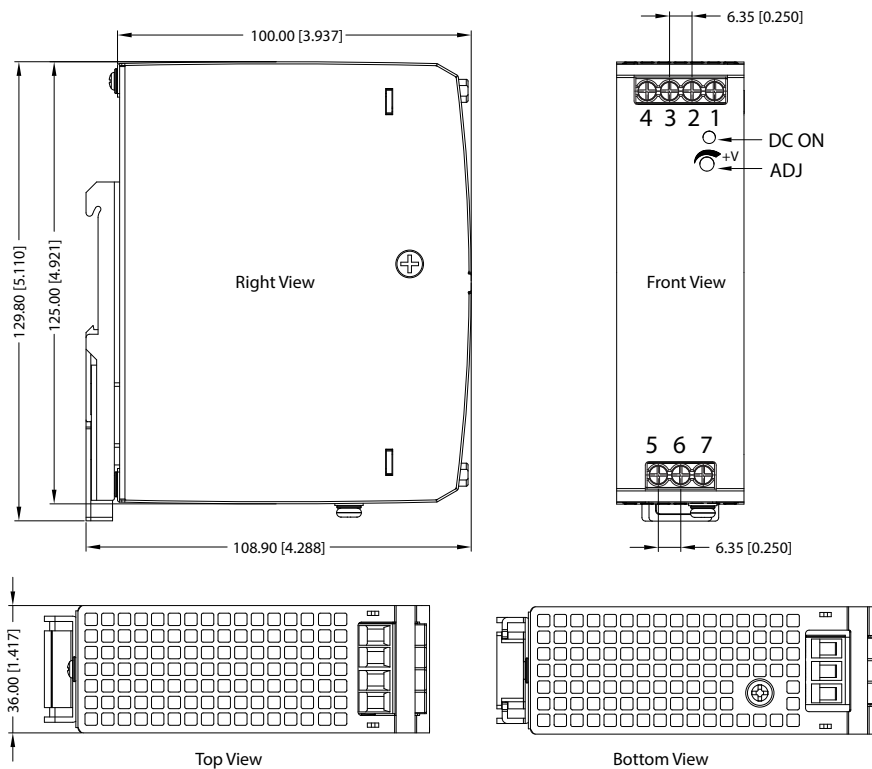
### SPDE..75

Unit: mm [inch]



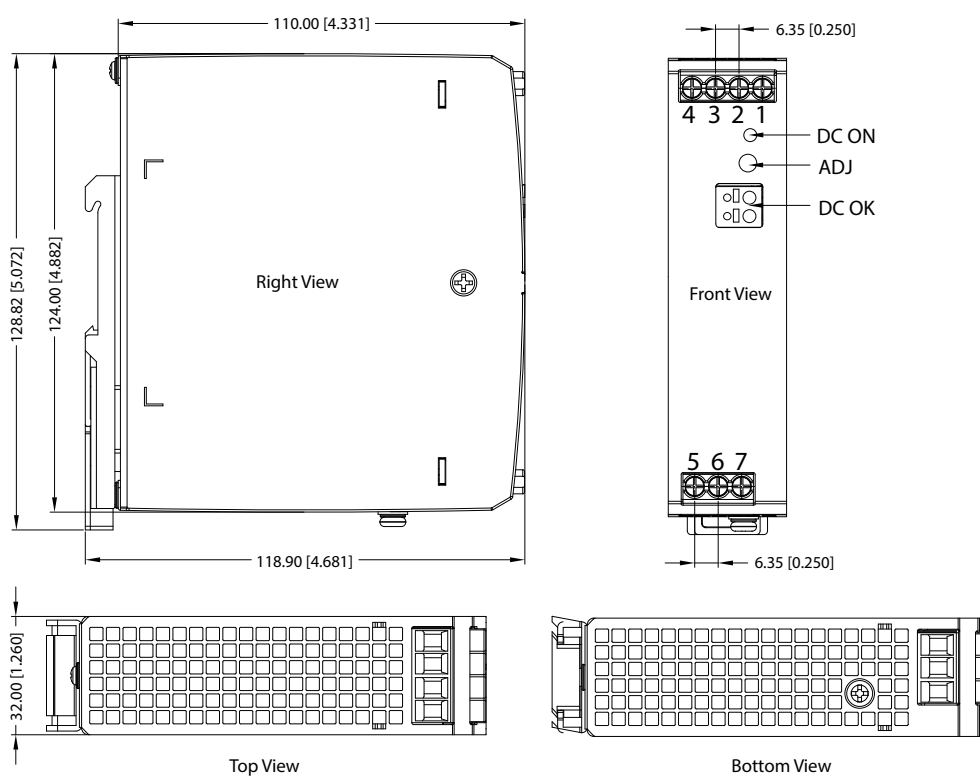
## SPDE..120

Unit: mm [inch]



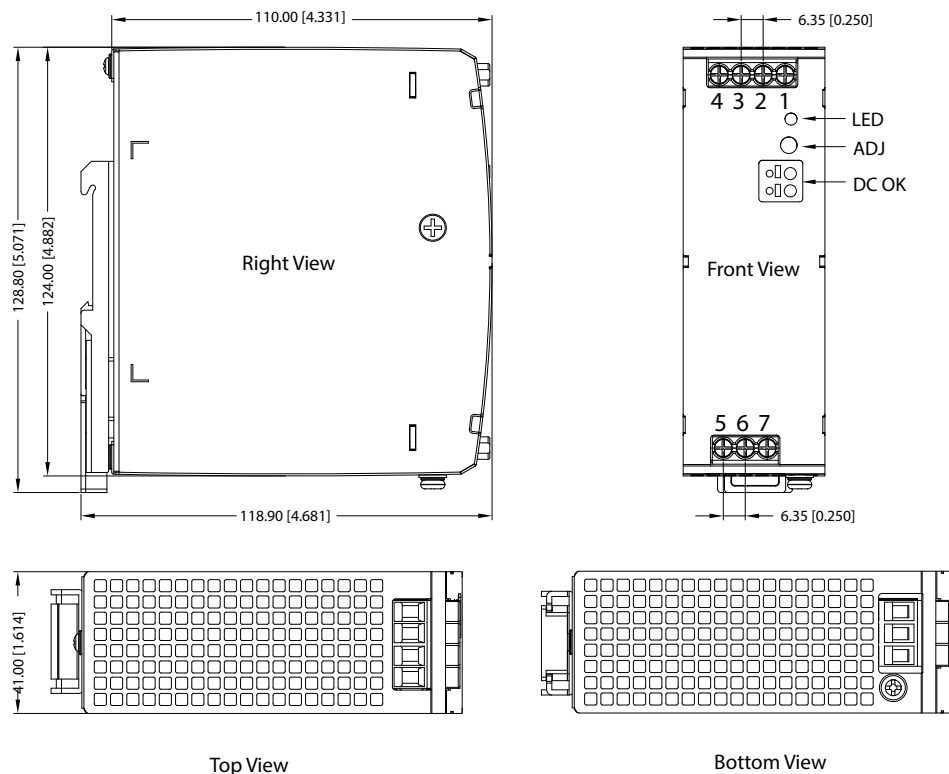
## SPDE..120..R

Unit: mm [inch]



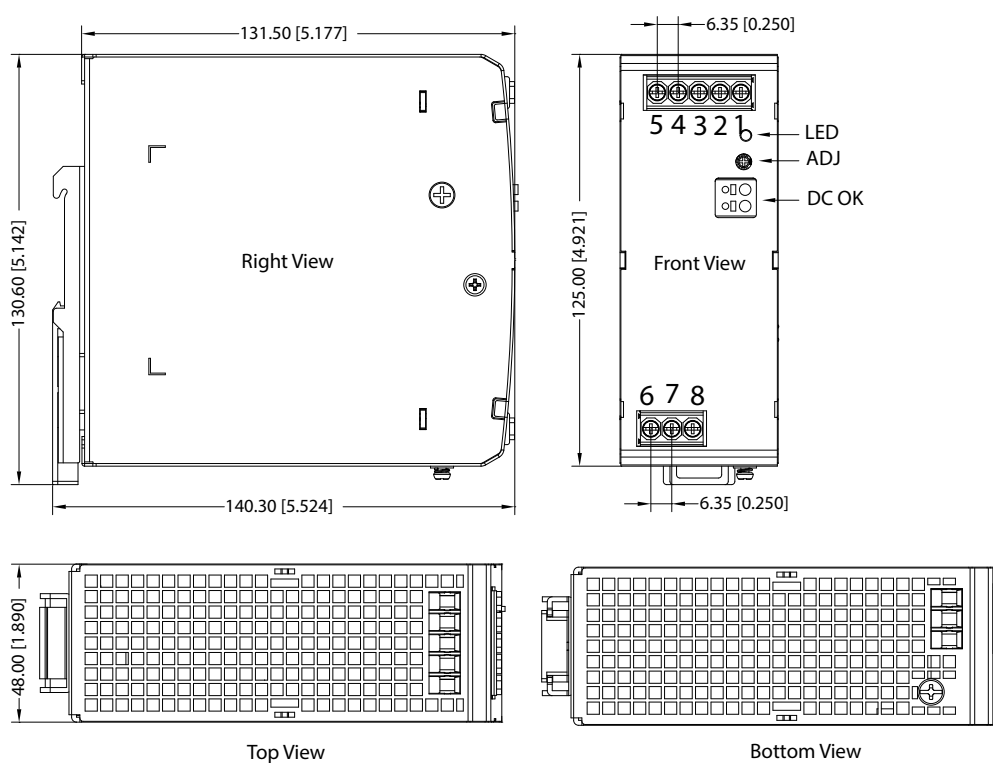
## SPDE..190 / SPDE..240

Unit: mm [inch]



## SPDE..480

Unit: mm [inch]

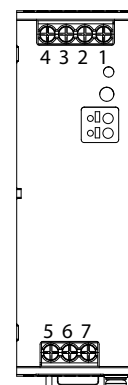


## Connection diagram

### Terminal markings

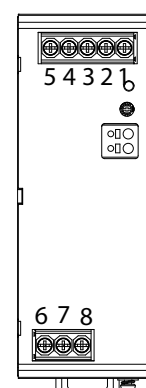
#### SPDE..75 / SPDE..120 / SPDE..190 / SPDE..240

| Terminal | Designation     | Description                                                    |
|----------|-----------------|----------------------------------------------------------------|
| 1        | -V <sub>o</sub> | Negative output terminal                                       |
| 2        | -V <sub>o</sub> | Negative output terminal                                       |
| 3        | +V <sub>o</sub> | Positive output terminal                                       |
| 4        | +V <sub>o</sub> | Positive output terminal                                       |
| 5        | AC(N)           | Input terminals (neutral conductor, no polarity with DC input) |
| 6        | AC(L)           | Input terminals (phase conductor, no polarity with DC input)   |
| 7        | PE              | Ground this terminal to minimize high frequency emissions      |



#### SPDE..480

| Terminal | Designation     | Description                                                    |
|----------|-----------------|----------------------------------------------------------------|
| 1        | -V <sub>o</sub> | Negative output terminal                                       |
| 2        | -V <sub>o</sub> | Negative output terminal                                       |
| 3        | -V <sub>o</sub> | Negative output terminal                                       |
| 4        | +V <sub>o</sub> | Positive output terminal                                       |
| 5        | +V <sub>o</sub> | Positive output terminal                                       |
| 6        | AC(N)           | Input terminals (neutral conductor, no polarity with DC input) |
| 7        | AC(L)           | Input terminals (phase conductor, no polarity with DC input)   |
| 8        | PE              | Ground this terminal to minimize high frequency emissions      |



## Environmental

|                       | SPDE..75                        | SPDE..120                                                           | SPDE..190                       | SPDE..240 | SPDE..480                       |
|-----------------------|---------------------------------|---------------------------------------------------------------------|---------------------------------|-----------|---------------------------------|
| Operating temperature | -30°C to 70°C<br>-22°F to 158°F | -20°C to 60°C<br>-4°F to 140°F<br>-40°C to 70°C*<br>-40°F to 158°F* | -40°C to 70°C<br>-40°F to 158°F |           | -30°C to 70°C<br>-22°F to 158°F |
| Storage temperature   | -40°C to 85°C<br>-40°F to 185°F |                                                                     |                                 |           |                                 |
| Humidity              | <95% RH Non-condensing          |                                                                     |                                 |           |                                 |
| Temperature derating  | Refer to derating diagram       |                                                                     |                                 |           |                                 |

\* applies to SPDE..R models only

## Compatibility and conformity

|                                                            | SPDE..75                                                                            | SPDE..120                                            | SPDE..190                               | SPDE..240 | SPDE..480               |
|------------------------------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------|-----------------------------------------|-----------|-------------------------|
| Safety standards                                           | UL/EN62368-1<br>UL61010-1                                                           | EN62368-1<br>UL61010-1<br>UL61010-2-201 <sup>1</sup> | EN62368-1<br>UL61010-1<br>UL61010-2-201 |           | EN62368-1<br>UL61010-1  |
| Approvals                                                  |  |                                                      |                                         |           |                         |
| Conducted (CS)<br>IEC/EN 61000-4-6                         | 10 Vrms (PC A)                                                                      |                                                      |                                         |           |                         |
| Voltage dips and interruptions<br>IEC/EN61000-4-11         | 0% (PC B)<br>70% (PC B)                                                             |                                                      |                                         |           | 0% (PC A)<br>70% (PC A) |
| EMC emission<br>CE: CISPR32/EN55032<br>RE: CISPR32/EN55032 | CLASS B<br>CLASS B                                                                  | CLASS A<br>CLASS A                                   | CLASS B<br>CLASS B                      |           |                         |
| Harmonic current                                           | IEC/EN61000-3-2 CLASS A                                                             |                                                      | IEC/EN61000-3-2 CLASS A and CLASS D     |           |                         |
| EMC immunity                                               | EN61000-4-2, EN61000-4-3, EN61000-4-4, EN61000-4-5,<br>EN61000-4-6, EN61000-4-11    |                                                      |                                         |           |                         |
| Vibration resistance                                       | 10 ~ 500 Hz, 2G, 10 min. / 1 cycle, period for 60 min. Each along X, Y, Z axes.     |                                                      |                                         |           |                         |

1. applies to SPDE..R models only

2. applies to SPDE..75 only

## Insulation

|                                                 | SPDE..75           | SPDE..120                         | SPDE..190          | SPDE..240 | SPDE..480 |
|-------------------------------------------------|--------------------|-----------------------------------|--------------------|-----------|-----------|
| Insulation / withstand voltage (input / GND)    | 2.0 kVAC / < 10 mA |                                   |                    |           |           |
| Insulation / withstand voltage (input / output) | 4.0 kVAC / < 10 mA |                                   | 3.0 kVAC / < 10 mA |           |           |
| Insulation / withstand voltage (output / GND)   | 0.5 kVAC / < 10 mA |                                   |                    |           |           |
| Output / DC OK*                                 | -                  | 30 VDC / 1A max. (resistive load) |                    |           |           |
| Insulation resistance                           | ≥ 50 MΩ            | ≥ 100 MΩ                          | ≥ 50 MΩ            |           | ≥ 100 MΩ  |
| Overvoltage category                            | II                 |                                   |                    |           |           |
| Pollution degree                                | 2                  |                                   |                    |           |           |

\* applies to SPDE..R models only

## Inputs

|                     | SPDE..75           | SPDE..120          | SPDE..190          | SPDE..240 | SPDE..480 |
|---------------------|--------------------|--------------------|--------------------|-----------|-----------|
| Rated input voltage | -                  |                    | 100 VAC to 240 VAC |           | -         |
| Input voltage range | 90 VAC to 264 VAC  |                    | 85 VAC to 264 VAC  |           |           |
|                     | 120 VDC to 370 VDC | 127 VDC to 370 VDC | 120 VDC to 370 VDC |           |           |
| AC current (max)    |                    |                    |                    |           |           |
| 115 VAC             | <2.0 A             | <3.0 A             | <3.0 A             |           | <5.5 A    |
| 230 VAC             | <1.0 A             | <1.6 A             | <1.5 A             |           | <2.5 A    |
| Frequency range     | 47 Hz to 63 Hz     |                    |                    |           |           |
| Inrush current      |                    |                    |                    |           |           |
| 115 VAC             | 25 A               | 30 A               | 15 A               |           | 20 A      |
| 230 VAC             | 45 A               | 55 A               | 30 A               |           | 40 A      |

## Outputs

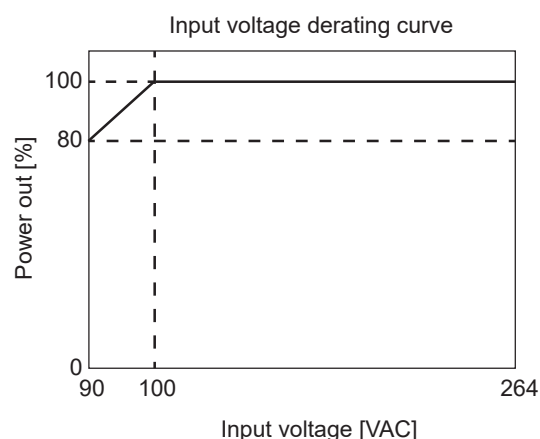
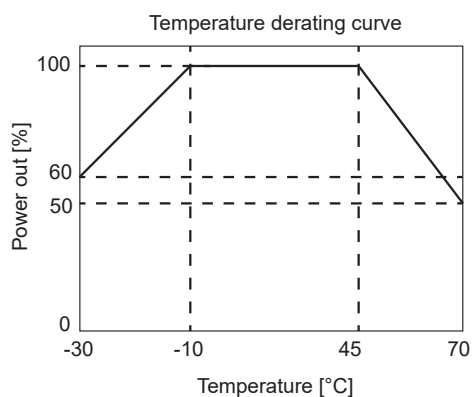
|                                      | SPDE..75                               | SPDE..120                                                    | SPDE..190                    | SPDE..240    | SPDE..480                                             |
|--------------------------------------|----------------------------------------|--------------------------------------------------------------|------------------------------|--------------|-------------------------------------------------------|
| Output power                         | 75 W                                   | 120 W                                                        | 192 W                        | 240 W        | 480 W                                                 |
| Voltage accuracy                     | ±2 % (12 VDC)<br>±1 % (24/48 VDC)      |                                                              | ±2 %                         | ±1 %         | ±1%                                                   |
| Line regulation                      | ±0.5 %                                 |                                                              |                              |              |                                                       |
| Load regulation                      | ±1.0 %                                 |                                                              |                              |              |                                                       |
| Voltage regulation span              |                                        |                                                              |                              |              |                                                       |
| 12 VDC                               | 12 V to 14 V                           | 12 V to 14 V                                                 | 12 V to 14 V                 |              |                                                       |
| 24 VDC                               | 24 V to 28 V                           | 24 V to 28 V                                                 |                              | 24 V to 28 V | 24 V to 28 V                                          |
| 48 VDC                               | 48 V to 53 V                           | 48 V to 55 V                                                 |                              | 48 V to 53 V | 48 V to 56 V                                          |
| Rated output current                 |                                        |                                                              |                              |              |                                                       |
| 12 VDC                               | 6.3 A                                  | 10 A                                                         | 16 A                         |              |                                                       |
| 24 VDC                               | 3.2 A                                  | 5 A                                                          |                              | 10 A         | 20 A                                                  |
| 48 VDC                               | 1.6 A                                  | 2.5 A                                                        |                              | 5 A          | 10 A                                                  |
| Ripple and noise<br>20 MHz bandwidth |                                        |                                                              |                              |              |                                                       |
| 12 VDC                               | < 80 mV                                | < 100 mV                                                     | 75 - 150 mV                  |              |                                                       |
| 24 VDC                               | < 120 mV                               | < 120 mV                                                     |                              | 60 - 120 mV  | <100 mV                                               |
| 48 VDC                               | < 150 mV                               | < 150 mV                                                     |                              | 75 - 150 mV  | <120 mV                                               |
| Hold up time                         | ≥ 12 ms (115 VAC)<br>≥ 60 ms (230 VAC) | ≥ 8 ms (115 VAC)<br>≥ 16 ms (230 VAC)                        | ≤ 20 ms                      |              | ≤ 22 ms                                               |
| Set-up time                          | < 3 s                                  | 2.5 s (115 VAC)<br>1.2 s (230 VAC)<br>< 3 s*                 | < 1 s                        |              | < 3 s                                                 |
| Rise time                            | -                                      | ≤ 60 ms<br>≤ 100 ms*                                         | < 100 ms                     |              | < 150 ms                                              |
| Turn-on overshoot                    | < 10 %                                 |                                                              |                              |              |                                                       |
| Overshoot and undershoot             | ±10%                                   |                                                              | < 10 %                       |              | ±10%                                                  |
| Power boost                          | -                                      | 110%~150% of<br>rated output<br>current within<br>1 s / 3 s* | 150% of rated output current |              | 110%~150% of<br>rated output<br>current within<br>1 s |

\* applies to SPDE..R models only

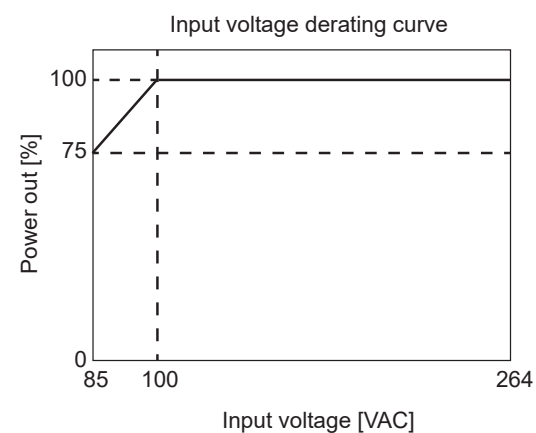
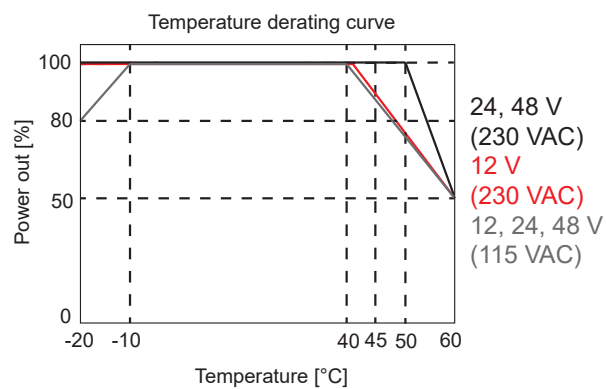
# Performance

## Current derating

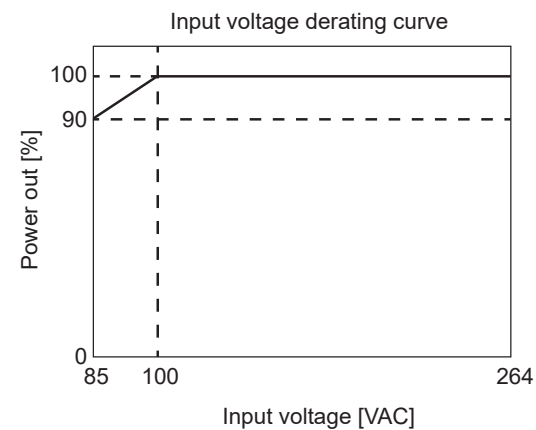
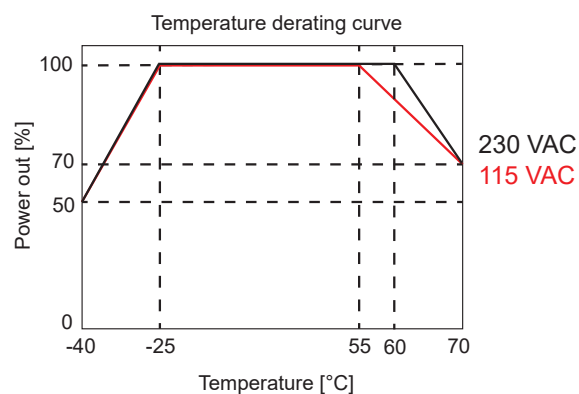
### SPDE..75



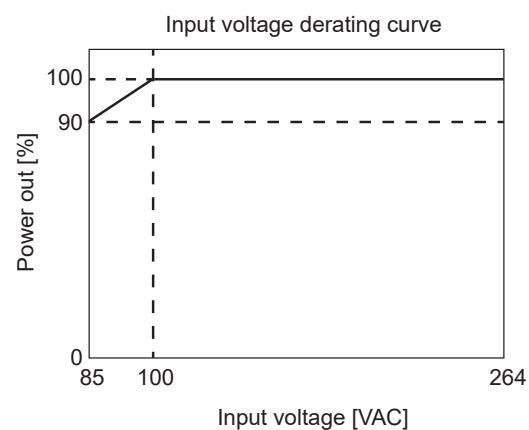
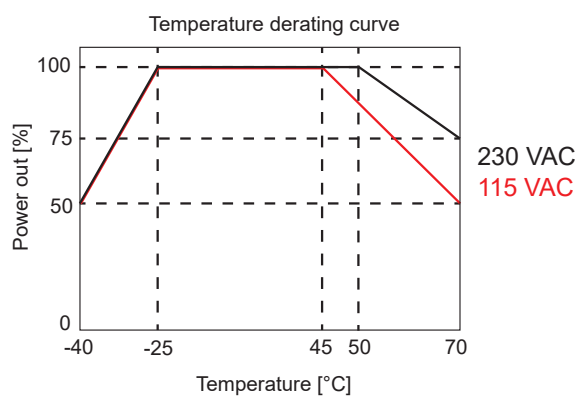
### SPDE..120



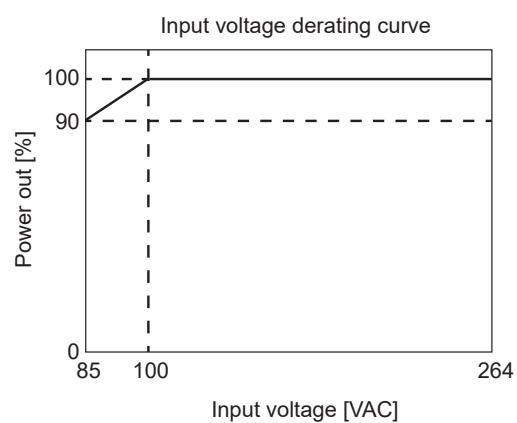
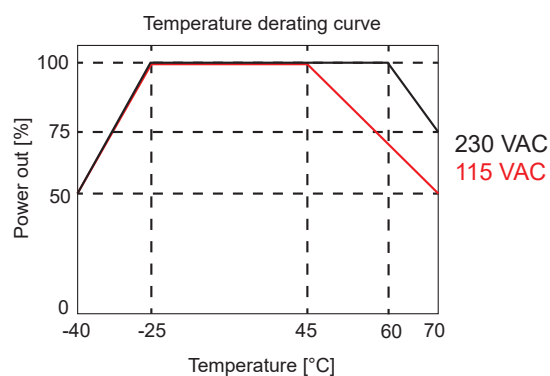
### SPDE..120..R



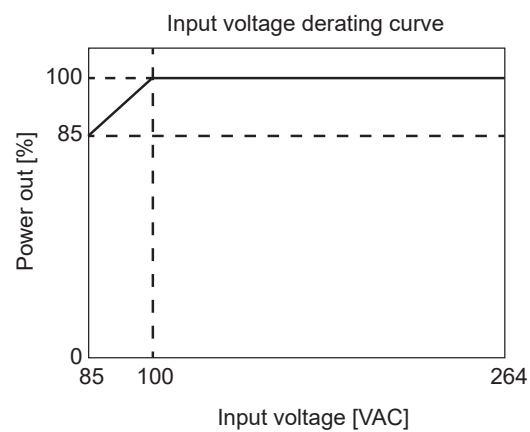
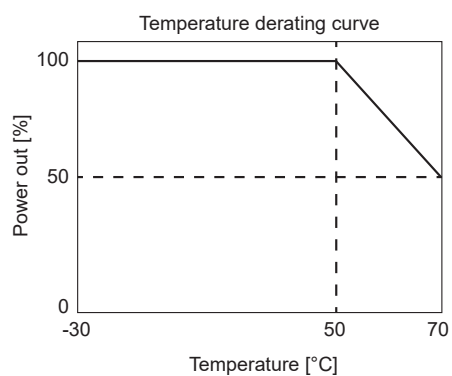
## SPDE..190



## SPDE..240

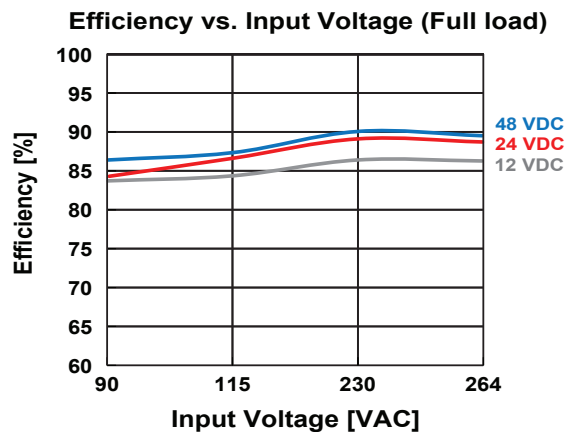
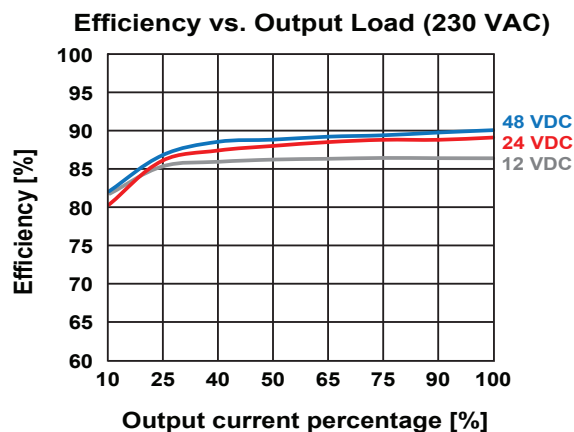


## SPDE..480

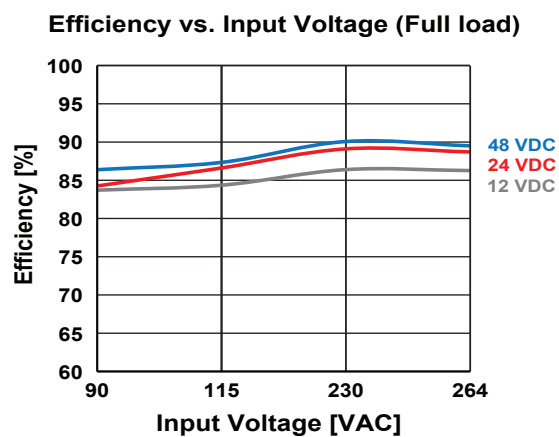
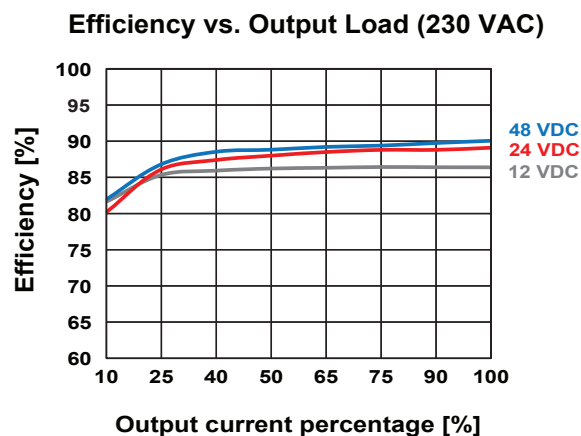


## Efficiency

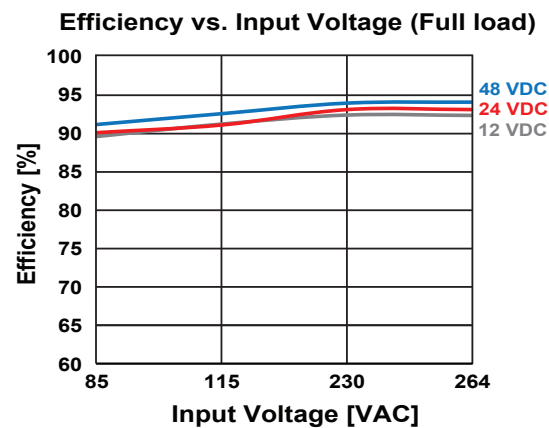
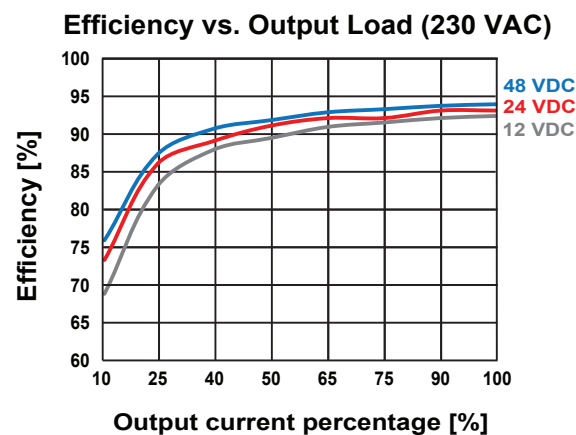
### SPDE..75



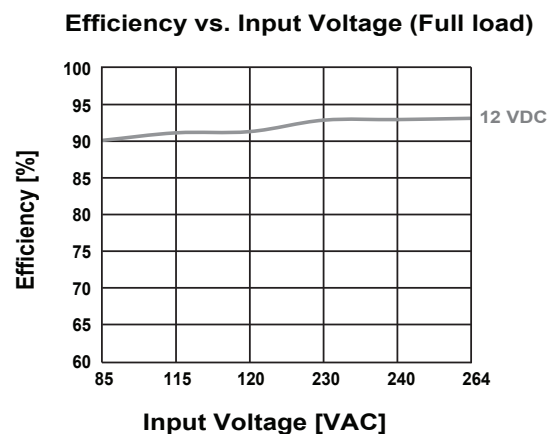
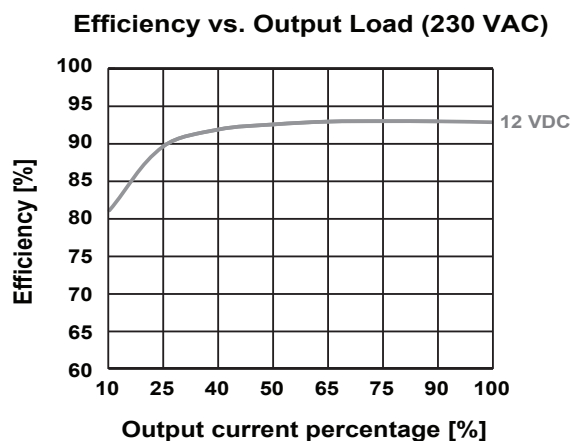
### SPDE..120



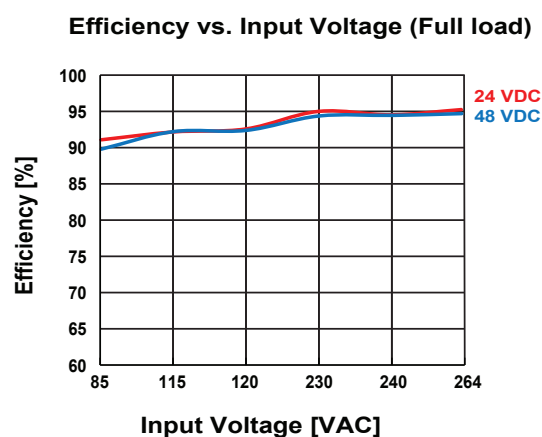
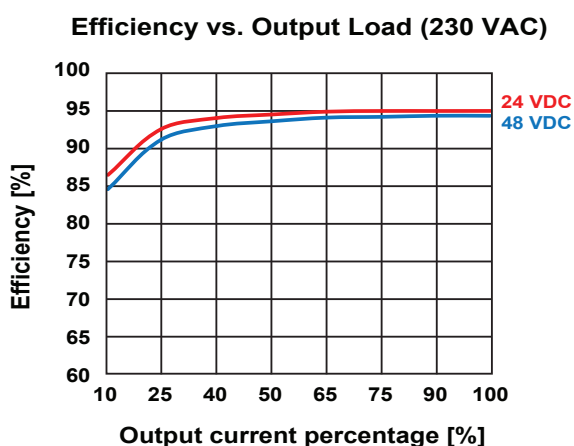
### SPDE..120R



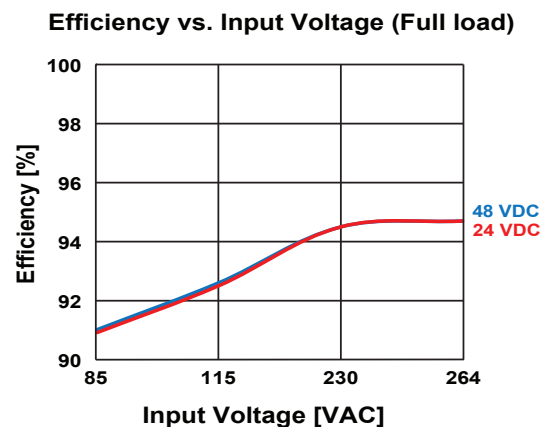
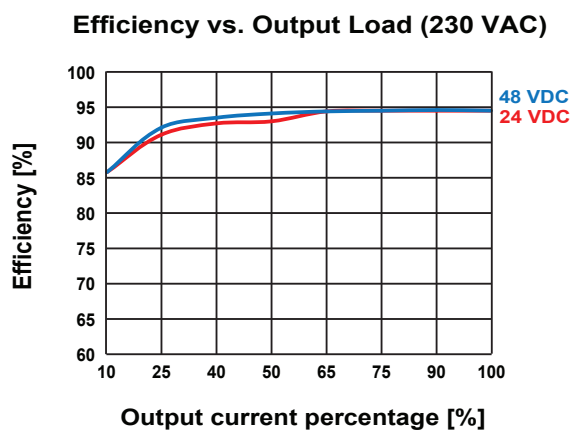
## SPDE..190



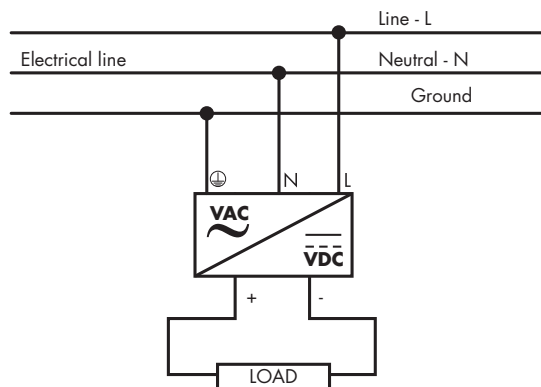
## SPDE..240



## SPDE..480



## Wiring diagram

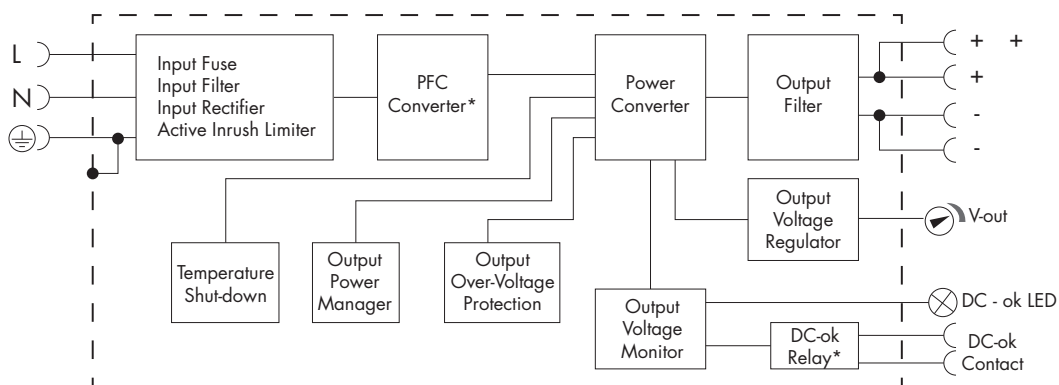


## Connection specification

|                                            | SPDE..75                                 | SPDE..120                       | SPDE..190                     | SPDE..240 | SPDE..480                    |
|--------------------------------------------|------------------------------------------|---------------------------------|-------------------------------|-----------|------------------------------|
| Terminal type                              | Screw terminals with Phillips screw head |                                 |                               |           |                              |
| Screw driver blade                         | 3.5 mm slotted or Phillips               |                                 |                               |           |                              |
| Tightening torque (recommended)            | 0.4 Nm                                   |                                 | 0.79 Nm                       |           | 0.5 Nm                       |
| Conductor cross section (input terminals)  | 0.14 - 6 mm²<br>(26 - 10 AWG)            |                                 | 0.14 - 6 mm²<br>(26 - 10 AWG) |           | 0.5 - 6 mm²<br>(20 - 10 AWG) |
| Conductor cross section (PE connection)    |                                          |                                 | 4 - 6 mm²<br>(12 - 10 AWG)    |           |                              |
| Conductor cross section (output terminals) |                                          |                                 |                               |           | 1.5 - 6 mm²<br>(16 - 10 AWG) |
| DC OK relay output*                        | -                                        | 0.25 - 1.5 mm²<br>(24 - 16 AWG) |                               |           |                              |

\* applies to SPDE..R models only

## Block diagram



\* only in SPDE..R versions

## Operating description

### Control and protection

|                                    |                              | SPDE..75                                                                  | SPDE..120                                          | SPDE..190     | SPDE..240 | SPDE..480                                                           |
|------------------------------------|------------------------------|---------------------------------------------------------------------------|----------------------------------------------------|---------------|-----------|---------------------------------------------------------------------|
| <b>Overvoltage protection</b>      |                              |                                                                           |                                                    |               |           |                                                                     |
| 12 VDC                             |                              | ≤ 17 V                                                                    | ≤ 16 V                                             | ≤ 18 V        |           |                                                                     |
| 24 VDC                             |                              | ≤ 33 V                                                                    | ≤ 33 V                                             |               | ≤ 35 V    | 29 - 35 V                                                           |
| 48 VDC                             |                              | ≤ 60 V                                                                    | ≤ 60 V                                             |               | ≤ 60 V    | 56 - 60 V                                                           |
| <b>Over-current protection</b>     | 100% ~ 150% of rated current | Constant current mode, automatic recover after fault condition is removed |                                                    | Self-recovery |           | The output turned off after working normally for 1 s, self-recovery |
|                                    | >150% of rated current       |                                                                           |                                                    |               |           | Automatic recover after fault condition is removed                  |
| <b>Current limiting</b>            |                              | < 2 A                                                                     | < 2.7 A (115 VAC)<br>< 1.6 A (230 VAC)<br>< 1.5 A* | < 4 A         |           | < 5.5 A                                                             |
| <b>Short circuit protection</b>    |                              | Constant current, continuous, self-recovery                               |                                                    |               |           | Hiccup, continuous, self-recovery                                   |
| <b>Over temperature protection</b> |                              | Output voltage turn off, re-power on for recover after the temp. drops.   | Output voltage turn off, re-power on for recover.  | 80°C          |           | 60°C to 90°C                                                        |
| <b>Reverse voltage protection</b>  |                              | No                                                                        |                                                    |               |           |                                                                     |