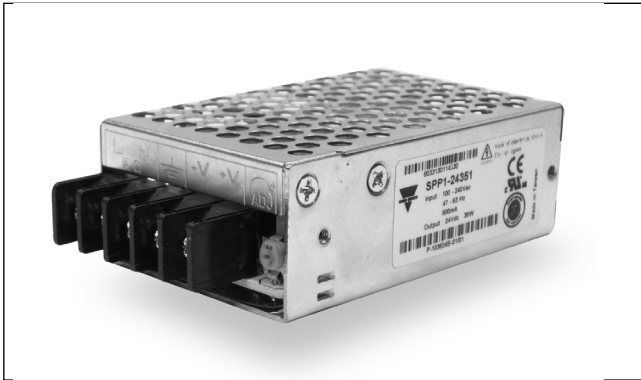


# Switching Power Supply Type SPP1 35W Enclosed type

CARLO GAVAZZI



- Universal AC input full range
- Short circuit protection
- Internal input filter
- High efficiency
- High average efficiency (meets ErP)
- Low stand-by power consumption
- CE, TUV, and cURus approved

## Product Description

Enclosed Switching Power Supply meets your needs for AC DC and DC DC power requirements. SPP provides the most flexible OEM system power solutions from 5V to 24V at 20W for industrial control and automation applications. All the range carries full certification and offers a wide range universal of input and screw terminal connections. It has been designed for its performance and compact dimensions.

## Ordering Key

**SP P1 24 35 1 X**

Model \_\_\_\_\_  
 Mounting (P1 = Panel) \_\_\_\_\_  
 Output voltage \_\_\_\_\_  
 Output power \_\_\_\_\_  
 Input Type \_\_\_\_\_  
 Optional features \_\_\_\_\_

Input type: 1= single phase

## Approvals



## Output Performance

| MODEL NO.                   | INPUT VOLTAGE | OUTPUT POWER | OUTPUT VOLTAGE | OUTPUT CURRENT | EFF. (min.) | EFF. (typ.) | EFF. (avg.) |
|-----------------------------|---------------|--------------|----------------|----------------|-------------|-------------|-------------|
| <b>Single Output Models</b> |               |              |                |                |             |             |             |
| <b>SPP1 05351</b>           | 88~264 VAC    | 30 WATTS     | + 5 VDC        | 6000 mA        | 80%         | 82%         | 82%         |
| <b>SPP1 12351</b>           | 88~264 VAC    | 36 WATTS     | +12 VDC        | 3000 mA        | 84%         | 86%         | 85%         |
| <b>SPP1 15351</b>           | 88~264 VAC    | 36 WATTS     | +15 VDC        | 2400 mA        | 85%         | 87%         | 85%         |
| <b>SPP1 24351</b>           | 88~264 VAC    | 36 WATTS     | +24 VDC        | 1500 mA        | 85%         | 87%         | 85%         |

## Output Data All specifications are at nominal values, full load, 25°C unless otherwise stated

|   |            |                                 |                             |
|---|------------|---------------------------------|-----------------------------|
| <b>Line regulation</b>                              | ± 0.5%     | <b>Voltage trim range</b>       |                             |
| <b>Load regulation</b>                              | ± 1%       | <b>5V Model</b>                 | 4.5 - 5.5VDC                |
| <b>Minimum load</b>                                 | 0%         | <b>12V Model</b>                | 10.8 - 13.2VDC              |
| <b>Turn on time</b> (full resistive load)           |            | <b>15V Model</b>                | 13.5 - 16.5VDC              |
| <b>Vi nom, Io nom</b>                               | 1000ms     | <b>24V Model</b>                | 21.6 - 27.6VDC              |
| <b>Vi nom, Io nom with 3500µF</b>                   | 1500ms     | <b>Rated continuous loading</b> |                             |
| <b>Transient recovery time</b>                      | 2ms        | <b>5V Model</b>                 | 9A@ 5VDC/8.1A @ 5.5VDC      |
| <b>Ripple and noise</b>                             | 100mVpp    | <b>12V Model</b>                | 5A@ 12VDC/4.5A @ 13.2VDC    |
| <b>Output voltage accuracy</b>                      | + 1%       | <b>15V Model</b>                | 4A @ 15VDC/3.6A @ 16.5VDC   |
| <b>Temperature coefficient</b>                      | ± 0.03%/°C | <b>24V Model</b>                | 2.5A @ 24VDC/2.15A @27.6VDC |
| <b>Hold up time</b> <b>Vi= 115VAC</b>               | 10ms       | <b>Reverse voltage</b>          |                             |
| <b>Vi= 230VAC</b>                                   | 80ms       | <b>5V Model</b>                 | 7.5VDC                      |
| <b>Voltage fall time (I<sub>o</sub>nom, Vi nom)</b> | 150ms      | <b>12V Model</b>                | 18VDC                       |
| <b>Voltage rise time</b>                            |            | <b>15V Model</b>                | 22VDC                       |
| <b>Vi nom, Io nom</b> (full resistive load)         | 150ms      | <b>24V Model</b>                | 35VDC                       |
| <b>Vi nom, Io nom with 3500µF CAP</b>               | 500ms      | <b>Capacitor load</b>           | 7000µF                      |

## Input Data All specifications are at nominal values, full load, 25°C unless otherwise stated

|  |              |  |                     |        |
|--|--------------|--|---------------------|--------|
| <b>Rated input voltage</b> $I_{nom}$             | 100 - 240VAC | <b>Power dissipation</b><br>( $V_i$ : 230VAC, $I_o$ nom) | <b>5V Model</b>     | 8W     |
| <b>Voltage range</b>                             |              |  | <b>12V Model</b>    | 7W     |
| <b>AC IN</b>                                     | 88 - 264VAC  | <b>15V Model</b>   | 6.5W                |        |
| <b>DC IN</b>                                     | 120 - 375VDC | <b>24V Model</b>   | 6.5W                |        |
| <b>Rated input current</b>                       |              | <b>Frequency range</b>                                   | 47- 63Hz            |        |
| <b><math>V_i</math>: 115 / 230 VAC</b> $I_o$ nom | 620/400 mA   | <b>Leakage current</b>                                   | <b>Input-Output</b> | 0.25mA |
| <b><math>V_i</math>: 88 VAC,</b> $I_o$ nom       | 800mA        |  |                     |        |
| <b>Inrush current</b>                            |              |  |                     |        |
| <b><math>V_i</math>= 115VAC</b>                  | 20A          |  |                     |        |
| <b><math>V_i</math>= 230VAC</b>                  | 40A          |  |                     |        |

## Controls and Protection All specifications are at nominal values, full load, 25°C unless otherwise stated

|                             |                                   |                                |             |             |
|-----------------------------|-----------------------------------|--------------------------------|-------------|-------------|
| <b>Overload</b>             | 110 – 170%                        | <b>Over voltage protection</b> | <b>VDC</b>  |             |
| <b>Input fuse</b>           | T2A/250VAC internal <sup>1)</sup> |                                | <b>Min.</b> | <b>Max.</b> |
| <b>Output short circuit</b> | Hiccup mode                       | <b>5V Model</b>                | 5.75        | 6.75        |
|                             |                                   | <b>12V Model</b>               | 13.8        | 16.2        |
|                             |                                   | <b>15V Model</b>               | 17.25       | 20.25       |
|                             |                                   | <b>24V Model</b>               | 28.8        | 32.4        |

<sup>1)</sup> Fuse not replaceable by user

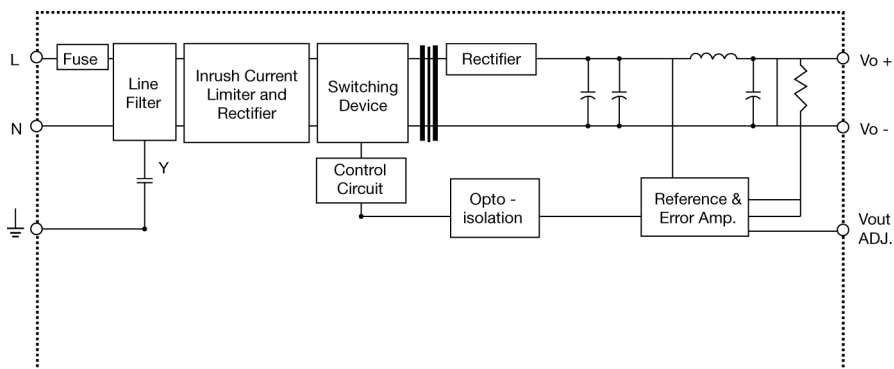
## General Data All specifications are at nominal values, full load, 25°C unless otherwise stated

|                                  |                      |   |                        |              |
|----------------------------------|----------------------|---|------------------------|--------------|
| <b>Ambient temperature</b>       | -40°C to +71°C       | <b>MTBF</b> (Bellcore issue 6 @ 40°C, GB) | <b>5V Model</b>        | 666000 Hours |
| <b>Derating (+56°C to +71°C)</b> | 2.5%/°C (see curve)  |   | <b>12V Model</b>       | 695000 Hours |
| <b>Relative humidity</b>         | 20 ~ 95%RH           |   | <b>15V Model</b>       | 712000 Hours |
| <b>Storage</b>                   | -40°C to +85°C       |   | <b>24V Model</b>       | 716000 Hours |
| <b>Protection degree</b>         | IP20                 |   | <b>Case material</b>   | Metal        |
| <b>Cooling</b>                   | Free air convection  | <b>Altitude IEC 60068-2-13</b>            | 4850m                  |              |
| <b>Insulation voltage</b>        |                      | <b>Stand-by power consumption</b>         | 0.3W                   |              |
| <b>Input-Output</b>              | 3.000VAC/4242VDC min | <b>Dimensions LxWxD mm(inch)</b>          | 78(3.07)x51(2)x28(1.1) |              |
| <b>Input-FG</b>                  | 1.500VAC/2121VDC min | <b>Weight</b>                             | 180g                   |              |
| <b>Insulation resistance I/O</b> | 100MΩ min (@ 500VDC) |   |                        |              |
| <b>Switching Frequency</b>       | 65Khz                |   |                        |              |

## Norms and Standards

|                             |  |           |                        |
|-----------------------------|--|-----------|------------------------|
| <b>Vibration resistance</b> | meets IEC 60068-2-6<br>(10-500Hz, 2G, along X, Y, Z<br>each Axis, 60 min for each<br>Axis) | <b>CE</b> | EN 61000-6-3, EN 55022 |
| <b>Shock resistance</b>     | meets IEC 60068-2-27<br>(15G, 11ms, 3 Axis, 6 faces,<br>3 times for each face)             |           | Class B, EN 61000-3-2, |
| <b>UL / cUL</b>             | UL60950-1, Recognized  |           | EN 61000-3-3,          |
| <b>TUV</b>                  | EN 60950 - 1CB scheme  |           | EN 61000-6-2,          |
|                             |  |           | EN 55024,              |
|                             |  |           | EN 61000-4-2,          |
|                             |  |           | EN 61000-4-3,          |
|                             |  |           | EN 61000-4-4,          |
|                             |  |           | EN 61000-4-5,          |
|                             |  |           | EN 61000-4-6,          |
|                             |  |           | EN 61000-4-8,          |
|                             |  |           | EN 61000-4-11,         |
|                             |  |           | ENV 50204,             |
|                             |  |           | EN 61204-3             |

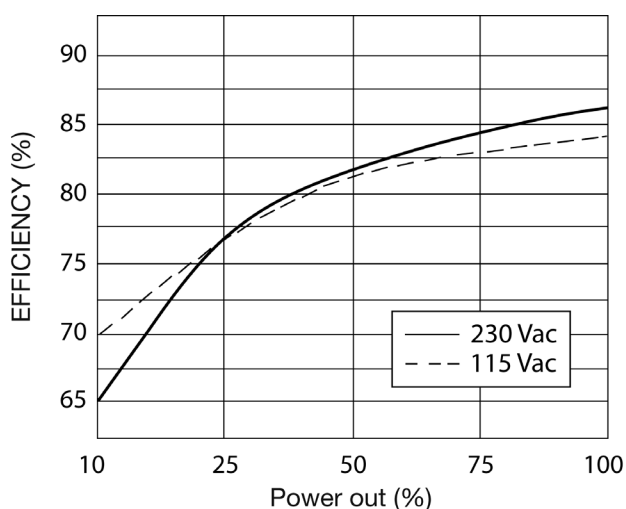
## Block Diagrams



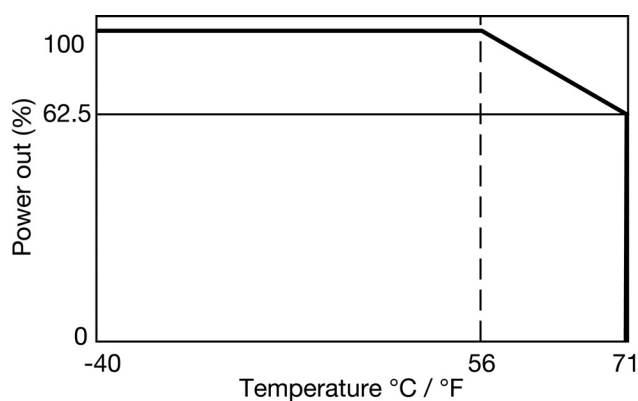
## Pin Assignment and Front Controls

| Pin No. | Designation | Description  |
|---------|-------------|--|
| 1       | L           | Input terminals (phase conductor, no polarity at DC input)   |
| 2       | N           | Input terminals (neutral conductor, no polarity at DC input) |
| 3       | ⊕           | Ground this terminal to minimize high-frequency emissions    |
| 4       | -           | Negative output terminal                                     |
| 5       | +           | Positive output terminal                                     |
|         | Vout ADJ    | Trimmer-potentiometer for Vout adjustment                    |
|         | DC ON       | Operation indicator LED                                      |

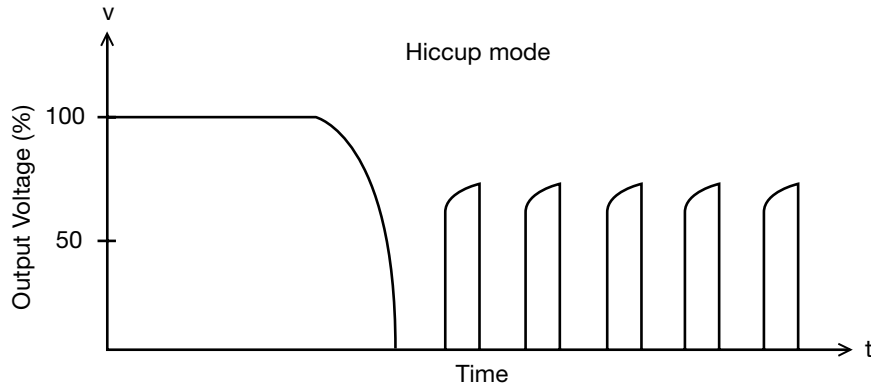
## Typ. Efficiency Curve



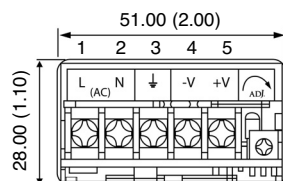
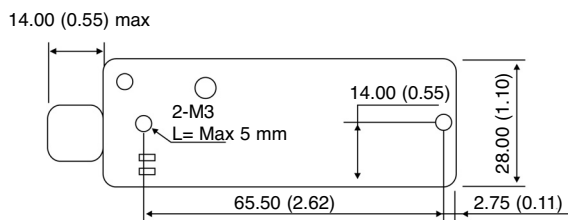
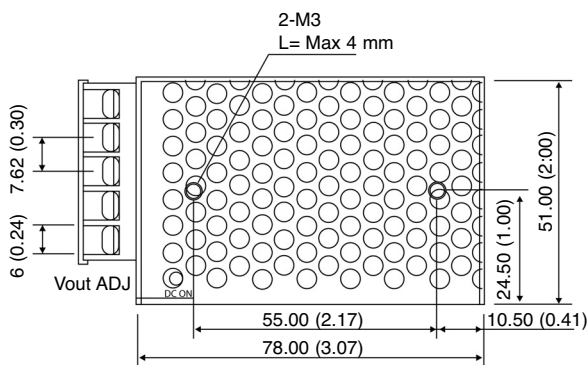
## Derating Diagram



## Typ. Current Limited Curve



## Mechanical Drawings mm (inches)



## Installation

|  |  |
|--|--|
| Ventilation and cooling  | Ventilation/Cooling Normal convection  |
| Connector size range<br>Spring terminal  | AWG22-12 (0.2~2.5mm <sup>2</sup> )<br>flexible/solid cable,<br>connector can withstand<br>torque at maximum<br>0.90 Nm (8 lb/in) |
| Max. torque for terminal<br>Input terminals<br>Output terminals                          | 0.56Nm (5.0lb-in)<br>0.56Nm (5.0lb-in)   |
| General tolerances mm(in.)<br>0.00 (0.00) ÷ 30.00 (1.18)<br>30.00 (1.18) ÷ 120.00 (4.72) | ±0.30 (0.01)<br>±0.50 (0.02)   |