

# Switch Mode Power Supply S8VS

## 15/30-W Models

**Compact, Thin Power Supplies That Mount Just About Anywhere to Contribute to Control Panel Downsizing**

- Compact, thin size: 22.5 × 85 × 96.5 mm (W × H × D).
- Three mounting directions (standard, horizontal, facing horizontal).
- Mounting directly onto the panel is possible.
- Safety standards:  
UL508/60950-1/1604, CSA C22.2 No. 14/60950-1/213,  
EN50178 (= VDE0160), EN60950-1 (= VDE0805).



## 60/90/120/180/240-W Models

**New Models with Total Run Time Monitor in Addition to Models with Maintenance Forecast Monitor**

- Compact size: 40 × 95 mm (W × H) (60-W Models).
- Status displayed on 3-digit, 7-segment display.
- Safety standards:  
UL508/60950, CSA C22.2 No. 14/60950,  
EN50178 (= VDE0160), EN60950 (= VDE0805).



## Features Common to All Models

- Mount to DIN-rail.
- Lead-free solder.

# Model Number Structure

## Model Number Legend

S8VS-       

1      2      3

### 1. Power Ratings

015: 15 W  
030: 30 W  
060: 60 W  
090: 90 W  
120: 120 W  
180: 180 W  
240: 240 W

### 2. Output voltage

05: 5 V  
12: 12 V  
24: 24 V

### 3. Configuration

#### 15-W, 30-W Models

None: Standard

#### 60-W Models

None: Standard

A: With maintenance forecast monitor  
B: With total run time monitor

#### 90-W, 120-W, 180-W, 240-W Models

None: Standard

A: With maintenance forecast monitor and undervoltage alarm (transistor (sinking))

B: With total run time monitor and undervoltage alarm (transistor (sinking))

AP: With maintenance forecast monitor and undervoltage alarm (transistor (sourcing))

BP: With total run time monitor and undervoltage alarm (transistor (sourcing))

## Ordering Information

| Power ratings | Input Voltage  | Output voltage | Output current | Alarm output | Model number             |              |
|---------------|----------------|----------------|----------------|--------------|--------------------------|--------------|
| 15 W          | 100 to 240 VAC | 5 V            | 2.0 A          | ---          | S8VS-01505 (See note 1.) |              |
|               |                | 12 V           | 1.2 A          |              | S8VS-01512               |              |
|               |                | 24 V           | 0.65 A         |              | S8VS-01524               |              |
| 30 W          |                | 5 V            | 4.0 A          | ---          | S8VS-03005 (See note 2.) |              |
|               |                | 12 V           | 2.5 A          |              | S8VS-03012               |              |
|               |                | 24 V           | 1.3 A          |              | S8VS-03024               |              |
| 60 W          |                | 24 V           | 2.5 A          | ---          | S8VS-06024               |              |
|               |                |                |                |              | S8VS-06024A              |              |
|               |                |                |                |              | S8VS-06024B              |              |
| 90 W          |                |                | 3.75 A         |              | ---                      | S8VS-09024   |
|               |                |                |                |              | Sinking                  | S8VS-09024A  |
|               |                |                |                |              | Sourcing                 | S8VS-09024AP |
|               |                |                |                |              | Sinking                  | S8VS-09024B  |
|               |                |                |                |              | Sourcing                 | S8VS-09024BP |
| 120 W         |                |                | 5 A            |              | ---                      | S8VS-12024   |
|               |                |                |                |              | Sinking                  | S8VS-12024A  |
|               |                |                |                |              | Sourcing                 | S8VS-12024AP |
|               |                |                |                |              | Sinking                  | S8VS-12024B  |
|               |                |                |                |              | Sourcing                 | S8VS-12024BP |
| 180 W         |                |                | 7.5 A          |              | ---                      | S8VS-18024   |
|               |                |                |                |              | Sinking                  | S8VS-18024A  |
|               |                |                |                |              | Sourcing                 | S8VS-18024AP |
|               |                |                |                |              | Sinking                  | S8VS-18024B  |
|               |                |                |                |              | Sourcing                 | S8VS-18024BP |
| 240 W         |                |                | 10 A           |              | ---                      | S8VS-24024   |
|               |                |                |                |              | Sinking                  | S8VS-24024A  |
|               |                |                |                |              | Sourcing                 | S8VS-24024AP |
|               |                |                |                |              | Sinking                  | S8VS-24024B  |
|               |                |                |                |              | Sourcing                 | S8VS-24024BP |

**Note:** 1. The output capacity of the S8VS-01505 is 10 W.

2. The output capacity of the S8VS-03005 is 20 W.

# Specifications

## ■ Ratings/Characteristics

| Power ratings        |                                                | 15 W                                                                                                                                                                                                                                                                                 | 30 W                                                                   |
|----------------------|------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|
| Type                 |                                                | Standard                                                                                                                                                                                                                                                                             | Standard                                                               |
| Item                 |                                                |                                                                                                                                                                                                                                                                                      |                                                                        |
| Efficiency (typical) | 5-V models                                     | 72% min. (76% typ.)                                                                                                                                                                                                                                                                  | 70% min. (76% typ.)                                                    |
|                      | 12-V models                                    | 74% min. (79% typ.)                                                                                                                                                                                                                                                                  | 76% min. (83% typ.)                                                    |
|                      | 24-V models                                    | 77% min. (81% typ.)                                                                                                                                                                                                                                                                  | 80% min. (85% typ.)                                                    |
| Input                | Voltage                                        | 100 to 240 VAC (85 to 264 VAC)                                                                                                                                                                                                                                                       |                                                                        |
|                      | Frequency                                      | 50/60 Hz (47 to 450 Hz)                                                                                                                                                                                                                                                              |                                                                        |
|                      | Current                                        | 100 V input                                                                                                                                                                                                                                                                          | 0.45 A max.                                                            |
|                      |                                                | 200 V input                                                                                                                                                                                                                                                                          | 0.25 A max.                                                            |
|                      |                                                | 230 V input                                                                                                                                                                                                                                                                          | 5 V: (0.14 A typ.), 12 V/24 V (0.19 A typ.)                            |
|                      | Power factor                                   | ---                                                                                                                                                                                                                                                                                  |                                                                        |
|                      | Harmonic current emissions                     | Conforms to EN61000-3-2                                                                                                                                                                                                                                                              |                                                                        |
|                      | Leakage current                                | 100 V input                                                                                                                                                                                                                                                                          | 0.5 mA max.                                                            |
|                      |                                                | 200 V input                                                                                                                                                                                                                                                                          | 1.0 mA max.                                                            |
|                      |                                                | 230 V input                                                                                                                                                                                                                                                                          | 5 V/12 V/24 V: (0.30 mA typ.)                                          |
|                      | Inrush current (See note 1.)                   | 100 V input                                                                                                                                                                                                                                                                          | 25 A max. (20 A typ.) (for a cold start at 25°C)                       |
|                      |                                                | 200 V input                                                                                                                                                                                                                                                                          | 50 A max. (40 A typ.) (for a cold start at 25°C)                       |
|                      |                                                | 230 V input                                                                                                                                                                                                                                                                          | 5 V/12 V/24 V: (29 A typ.) (See note 6.)                               |
| Output               | Voltage adjustment range (See note 2.)         | -10% to 15% (with V.ADJ) (guaranteed)                                                                                                                                                                                                                                                |                                                                        |
|                      | Ripple                                         | 2.0% (p-p) max. (at rated input/output voltage)                                                                                                                                                                                                                                      |                                                                        |
|                      |                                                | f=20MHz measuring                                                                                                                                                                                                                                                                    | 5 V: (0.70%(p-p) typ.), 12 V:(0.48%(p-p) typ.), 24 V:(0.25%(p-p) typ.) |
|                      |                                                | f=100MHz measuring                                                                                                                                                                                                                                                                   | 5 V: (0.86%(p-p) typ.), 12 V:(0.56%(p-p) typ.), 24 V:(0.32%(p-p) typ.) |
|                      | Input variation influence                      | 0.5% max. (at 85 to 264 VAC input, 100% load)                                                                                                                                                                                                                                        |                                                                        |
|                      | Load variation influence (rated input voltage) | 2.0% max. (5 V), 1.5% max. (12 V, 24 V), (with rated input, 0 to 100% load)                                                                                                                                                                                                          |                                                                        |
|                      | Temperature variation influence                | 0.05%/°C max.                                                                                                                                                                                                                                                                        |                                                                        |
|                      | Start up time (See note 1 and 7.)              | 100 ms max. (at rated input/output voltage)                                                                                                                                                                                                                                          | 1,000 ms max. (at rated input/output voltage)                          |
|                      |                                                | 5 V: (6 ms typ.), 12 V: (12 ms typ.), 24 V: (18 ms typ.)                                                                                                                                                                                                                             | 5 V/12 V/24 V: (240 ms typ.)                                           |
|                      | Hold time (See note 1.)                        | 20 ms min. (at rated input/output voltage)                                                                                                                                                                                                                                           |                                                                        |
|                      |                                                | at 100% load                                                                                                                                                                                                                                                                         | 5 V: (328 ms typ.), 12V: (251 ms typ.), 24 V: (243 ms typ.)            |
|                      | Overload protection (See note 1.)              | 105% to 160% of rated load current, voltage drop, automatic reset                                                                                                                                                                                                                    |                                                                        |
|                      | Overvoltage protection (See note 1.)           | Yes (a zener diode clamp) (See note 3.)                                                                                                                                                                                                                                              |                                                                        |
|                      | Output voltage indication                      | No                                                                                                                                                                                                                                                                                   |                                                                        |
| Additional functions | Output current indication                      | No                                                                                                                                                                                                                                                                                   |                                                                        |
|                      | Peak-hold current indication                   | No                                                                                                                                                                                                                                                                                   |                                                                        |
|                      | Maintenance forecast monitor indication        | No                                                                                                                                                                                                                                                                                   |                                                                        |
|                      | Maintenance forecast monitor output            | No                                                                                                                                                                                                                                                                                   |                                                                        |
|                      | Total run time monitor indication              | No                                                                                                                                                                                                                                                                                   |                                                                        |
|                      | Total run time monitor output                  | No                                                                                                                                                                                                                                                                                   |                                                                        |
|                      | Undervoltage alarm indication                  | Yes (color: red)                                                                                                                                                                                                                                                                     |                                                                        |
|                      | Undervoltage alarm output                      | No                                                                                                                                                                                                                                                                                   |                                                                        |
|                      | Parallel operation                             | No                                                                                                                                                                                                                                                                                   |                                                                        |
|                      | Series operation                               | Models with 24-V output: Possible for up to 2 Power Supplies (with external diode)<br>Models with 5- or 12-V output: Not possible                                                                                                                                                    |                                                                        |
|                      | Operating ambient temperature                  | Refer to the derating curve in <i>Engineering Data</i> . (with no icing or condensation)                                                                                                                                                                                             |                                                                        |
|                      | Storage temperature                            | -25 to 65°C                                                                                                                                                                                                                                                                          |                                                                        |
|                      | Operating ambient humidity                     | 25% to 85% (Storage humidity: 25% to 90%)                                                                                                                                                                                                                                            |                                                                        |
|                      | Dielectric strength                            | 3.0 kVAC for 1 min. (between all inputs and outputs; detection current: 20 mA)<br>2.0 kVAC for 1 min. (between all inputs and PE terminals; detection current: 20 mA)<br>1.0 kVAC for 1 min. (between all outputs and PE terminals; detection current: 20 mA)                        |                                                                        |
| Other                | Insulation resistance                          | 100 MΩ min. (between all outputs and all inputs/ PE terminals) at 500 VDC                                                                                                                                                                                                            |                                                                        |
|                      | Vibration resistance                           | 10 to 55 Hz, 0.375-mm single amplitude for 2 h each in X, Y, and Z directions<br>10 to 150 Hz, 0.35-mm single amplitude (5 G max.) for 80 min. each in X, Y, and Z directions                                                                                                        |                                                                        |
|                      | Shock resistance                               | 150 m/s <sup>2</sup> , 3 times each in ±X, ±Y, and ±Z directions                                                                                                                                                                                                                     |                                                                        |
|                      | Output indicator                               | Yes (color: green)                                                                                                                                                                                                                                                                   |                                                                        |
|                      | EMI                                            | Conducted Emissions                                                                                                                                                                                                                                                                  | Conforms to EN61204-3 EN55011 Class B and based on FCC Class A         |
|                      |                                                | Radiated Emissions                                                                                                                                                                                                                                                                   | Conforms to EN61204-3 EN55011 Class B                                  |
|                      | EMS                                            | Conforms to EN61204-3 high severity levels                                                                                                                                                                                                                                           |                                                                        |
|                      | Approved standards                             | UL: UL508 (Listing, Class 2: Per UL1310), UL60950-1, UL1604 (Class I/Division2)<br>cUL: CSA C22.2 No.14 (Class 2), No.60950-1, No.213 (Class I/Division2)<br>EN/VDE: EN50178 (=VDE0160), EN60950-1 (=VDE0805)<br>SELV (EN60950/EN50178/UL60950-1)<br>According to VDE0106/P100, IP20 |                                                                        |
|                      | Weight                                         | 160 g max.                                                                                                                                                                                                                                                                           | 180 g max.                                                             |

- Note:**
1. Refer to the *Engineering Data* section on page B-21 for details.
  2. If the V.ADJ adjuster is turned, the voltage will increase by more than +15% of the voltage adjustment range. When adjusting the output voltage, confirm the actual output voltage from the Power Supply and be sure that the load is not damaged.
  3. The overvoltage protection of the S8VS-015 uses a zener diode clamp. If the internal feedback circuit is destroyed by any chance, the load may be destroyed by the clamped output voltage (approx. 140% to 190% of the rated output voltage).
  4. To reset the protection, turn OFF the power supply for three minutes or longer and then turn the power supply back ON.
  5. The typical values indicate the values for an input condition of 230 VAC. All items are measured at a frequency of 50 Hz.
  6. The inrush current circuits do not differ for voltage specifications. Therefore, the typical values are the data values for 24-V models.
  7. The circuit forms are different, so the start up time is shorter only when using a 15-W power rating.

# Specifications

## ■ Ratings/Characteristics

| Power ratings<br>Type           |                                                       |                                               | 60 W                                                                                                                                                                                                                                                                                                                                                                                |                                 |                           | 90 W                                                                                                                                                                                    |                                                                    |                                |                                                                    |  |
|---------------------------------|-------------------------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|--------------------------------|--------------------------------------------------------------------|--|
|                                 |                                                       |                                               | Standard                                                                                                                                                                                                                                                                                                                                                                            | Maintenance<br>forecast monitor | Total run time<br>monitor | Standard                                                                                                                                                                                | Maintenance<br>forecast monitor                                    | Total run time<br>monitor      |                                                                    |  |
| Efficiency (typical)            |                                                       |                                               | 78% min. (86% typ.)                                                                                                                                                                                                                                                                                                                                                                 |                                 |                           | 80% min. (87% typ.)                                                                                                                                                                     |                                                                    |                                |                                                                    |  |
| Input                           | Voltage                                               |                                               | 100 to 240 VAC (85 to 264 VAC)                                                                                                                                                                                                                                                                                                                                                      |                                 |                           |                                                                                                                                                                                         |                                                                    |                                |                                                                    |  |
|                                 | Frequency                                             |                                               | 50/60 Hz (47 to 450 Hz)                                                                                                                                                                                                                                                                                                                                                             |                                 |                           |                                                                                                                                                                                         |                                                                    |                                |                                                                    |  |
|                                 | Current                                               | 100 V input                                   | 1.7 A max.                                                                                                                                                                                                                                                                                                                                                                          |                                 |                           | 2.3 A max.                                                                                                                                                                              |                                                                    |                                |                                                                    |  |
|                                 |                                                       | 200 V input                                   | 1.0 A max.                                                                                                                                                                                                                                                                                                                                                                          |                                 |                           | 1.4 A max.                                                                                                                                                                              |                                                                    |                                |                                                                    |  |
|                                 |                                                       | 230 V input                                   | (0.7 A typ.)                                                                                                                                                                                                                                                                                                                                                                        |                                 |                           | (0.9 A typ.)                                                                                                                                                                            |                                                                    |                                |                                                                    |  |
|                                 | Power factor                                          |                                               | ---                                                                                                                                                                                                                                                                                                                                                                                 |                                 |                           |                                                                                                                                                                                         |                                                                    |                                |                                                                    |  |
|                                 | Harmonic current emissions                            |                                               | Conforms to EN61000-3-2                                                                                                                                                                                                                                                                                                                                                             |                                 |                           |                                                                                                                                                                                         |                                                                    |                                |                                                                    |  |
|                                 | Leakage current                                       | 100 V input                                   | 0.5 mA max.                                                                                                                                                                                                                                                                                                                                                                         |                                 |                           |                                                                                                                                                                                         |                                                                    |                                |                                                                    |  |
|                                 |                                                       | 200 V input                                   | 1.0 mA max.                                                                                                                                                                                                                                                                                                                                                                         |                                 |                           |                                                                                                                                                                                         |                                                                    |                                |                                                                    |  |
|                                 |                                                       | 230 V input                                   | (0.40 mA typ.)                                                                                                                                                                                                                                                                                                                                                                      |                                 |                           | (0.35 mA typ.)                                                                                                                                                                          |                                                                    |                                |                                                                    |  |
| Inrush current<br>(See note 1.) | 100 V input                                           | 25 A max. (for a cold start at 25°C)          |                                                                                                                                                                                                                                                                                                                                                                                     |                                 |                           |                                                                                                                                                                                         |                                                                    |                                |                                                                    |  |
|                                 | 200 V input                                           | 50 A max. (for a cold start at 25°C)          |                                                                                                                                                                                                                                                                                                                                                                                     |                                 |                           |                                                                                                                                                                                         |                                                                    |                                |                                                                    |  |
|                                 | 230 V input                                           | (47 A typ.)                                   |                                                                                                                                                                                                                                                                                                                                                                                     |                                 |                           |                                                                                                                                                                                         | (38 A typ.)                                                        |                                |                                                                    |  |
| Output                          | Voltage adjustment range (See note 2.)                |                                               | −10% to 15% (with V.ADJ.) (guaranteed)                                                                                                                                                                                                                                                                                                                                              |                                 |                           |                                                                                                                                                                                         |                                                                    |                                |                                                                    |  |
|                                 | Ripple                                                |                                               | 2.0% (p-p) max. (at rated input/output voltage)                                                                                                                                                                                                                                                                                                                                     |                                 |                           |                                                                                                                                                                                         |                                                                    |                                |                                                                    |  |
|                                 |                                                       | f=20MHz measuring                             | (0.29% (p-p) typ.)                                                                                                                                                                                                                                                                                                                                                                  |                                 |                           | (0.38% (p-p) typ.)                                                                                                                                                                      |                                                                    |                                |                                                                    |  |
|                                 |                                                       | f=100MHz measuring                            | (0.32% (p-p) typ.)                                                                                                                                                                                                                                                                                                                                                                  |                                 |                           | (0.42% (p-p) typ.)                                                                                                                                                                      |                                                                    |                                |                                                                    |  |
|                                 | Input variation influence                             |                                               | 0.5% max. (at 85 to 264 VAC input, 100% load)                                                                                                                                                                                                                                                                                                                                       |                                 |                           |                                                                                                                                                                                         |                                                                    |                                |                                                                    |  |
|                                 | Load variation influence (rated input voltage)        |                                               | 1.5% max. (with rated input, 0 to 100% load)                                                                                                                                                                                                                                                                                                                                        |                                 |                           |                                                                                                                                                                                         |                                                                    |                                |                                                                    |  |
|                                 | Temperature variation influence                       |                                               | 0.05%/°C max.                                                                                                                                                                                                                                                                                                                                                                       |                                 |                           |                                                                                                                                                                                         |                                                                    |                                |                                                                    |  |
|                                 | Start up time (See note 1.)                           | 1,000 ms max. (at rated input/output voltage) |                                                                                                                                                                                                                                                                                                                                                                                     |                                 |                           |                                                                                                                                                                                         |                                                                    |                                |                                                                    |  |
|                                 |                                                       | (270 ms typ.)                                 |                                                                                                                                                                                                                                                                                                                                                                                     |                                 |                           |                                                                                                                                                                                         |                                                                    | (260 ms typ.)                  |                                                                    |  |
|                                 | Hold time (See note 1.)                               | 20 ms min. (at rated input/output voltage)    |                                                                                                                                                                                                                                                                                                                                                                                     |                                 |                           |                                                                                                                                                                                         |                                                                    |                                |                                                                    |  |
| at 100% load                    |                                                       | (220 ms typ.)                                 |                                                                                                                                                                                                                                                                                                                                                                                     |                                 |                           |                                                                                                                                                                                         |                                                                    | (190 ms typ.)                  |                                                                    |  |
| Additional functions            | Overload protection (See note 1.)                     |                                               | 105% to 160% of rated load current, voltage drop, intermittent, automatic reset                                                                                                                                                                                                                                                                                                     |                                 |                           |                                                                                                                                                                                         |                                                                    |                                |                                                                    |  |
|                                 | Overvoltage protection (See notes 1 and 3.)           |                                               | Yes                                                                                                                                                                                                                                                                                                                                                                                 |                                 |                           |                                                                                                                                                                                         |                                                                    |                                |                                                                    |  |
|                                 | Output voltage indication (See note 4.)               |                                               | No                                                                                                                                                                                                                                                                                                                                                                                  | Yes (selectable) (See note 5.)  |                           |                                                                                                                                                                                         | No                                                                 | Yes (selectable) (See note 5.) |                                                                    |  |
|                                 | Output current indication (See note 4.)               |                                               | No                                                                                                                                                                                                                                                                                                                                                                                  | Yes (selectable) (See note 6.)  |                           |                                                                                                                                                                                         | No                                                                 | Yes (selectable) (See note 6.) |                                                                    |  |
|                                 | Peak-hold current indication (See note 4.)            |                                               | No                                                                                                                                                                                                                                                                                                                                                                                  | Yes (selectable) (See note 7.)  |                           |                                                                                                                                                                                         | No                                                                 | Yes (selectable) (See note 7.) |                                                                    |  |
|                                 | Maintenance forecast monitor indication (See note 4.) |                                               | No                                                                                                                                                                                                                                                                                                                                                                                  | Yes (selectable)                |                           |                                                                                                                                                                                         | No                                                                 | Yes (selectable)               |                                                                    |  |
|                                 | Maintenance forecast monitor output                   |                                               | No                                                                                                                                                                                                                                                                                                                                                                                  |                                 |                           |                                                                                                                                                                                         | Yes (open collector output), 30 VDC max., 50 mA max. (See note 8.) |                                | No                                                                 |  |
|                                 | Total run time monitor indication (See note 4.)       |                                               | No                                                                                                                                                                                                                                                                                                                                                                                  |                                 |                           | Yes (selectable)                                                                                                                                                                        |                                                                    | No                             | Yes (selectable)                                                   |  |
|                                 | Total run time monitor output                         |                                               | No                                                                                                                                                                                                                                                                                                                                                                                  |                                 |                           |                                                                                                                                                                                         |                                                                    |                                | Yes (open collector output), 30 VDC max., 50 mA max. (See note 8.) |  |
|                                 | Undervoltage alarm indication (See note 4.)           |                                               | No                                                                                                                                                                                                                                                                                                                                                                                  | Yes (selectable)                |                           |                                                                                                                                                                                         | No                                                                 | Yes (selectable)               |                                                                    |  |
|                                 | Undervoltage alarm output terminals                   |                                               | No                                                                                                                                                                                                                                                                                                                                                                                  |                                 |                           |                                                                                                                                                                                         | Yes (open collector output), 30 VDC max., 50 mA max. (See note 8.) |                                |                                                                    |  |
|                                 | Parallel operation                                    |                                               | No                                                                                                                                                                                                                                                                                                                                                                                  |                                 |                           |                                                                                                                                                                                         |                                                                    |                                |                                                                    |  |
|                                 | Series operation                                      |                                               | Yes for up to 2 Power Supplies (with external diode)                                                                                                                                                                                                                                                                                                                                |                                 |                           |                                                                                                                                                                                         |                                                                    |                                |                                                                    |  |
| Other                           | Operating ambient temperature                         |                                               | Refer to the derating curve in <i>Engineering Data</i> . (with no icing or condensation)                                                                                                                                                                                                                                                                                            |                                 |                           |                                                                                                                                                                                         |                                                                    |                                |                                                                    |  |
|                                 | Storage temperature                                   |                                               | −25 to 65°C                                                                                                                                                                                                                                                                                                                                                                         |                                 |                           |                                                                                                                                                                                         |                                                                    |                                |                                                                    |  |
|                                 | Operating ambient humidity                            |                                               | 25% to 85% (Storage humidity: 25% to 90%)                                                                                                                                                                                                                                                                                                                                           |                                 |                           |                                                                                                                                                                                         |                                                                    |                                |                                                                    |  |
|                                 | Dielectric strength                                   |                                               | 3.0 kVAC for 1 min. (between all inputs and outputs/ alarm outputs; detection current: 20 mA)<br>2.0 kVAC for 1 min. (between all inputs and PE terminals; detection current: 20 mA)<br>1.0 kVAC for 1 min. (between all outputs/ alarm outputs and PE terminals; detection current: 20 mA)<br>500 VAC for 1 min. (between all outputs and alarm outputs; detection current: 20 mA) |                                 |                           |                                                                                                                                                                                         |                                                                    |                                |                                                                    |  |
|                                 | Insulation resistance                                 |                                               | 100 MΩ min. (between all outputs/ alarm outputs and all inputs/ PE terminals) at 500 VDC                                                                                                                                                                                                                                                                                            |                                 |                           |                                                                                                                                                                                         |                                                                    |                                |                                                                    |  |
|                                 | Vibration resistance                                  |                                               | 10 to 55 Hz, 0.375-mm single amplitude for 2 h each in X, Y, and Z directions<br>10 to 150Hz, 0.35-mm single amplitude (5 G max.) for 80 min each in-X, Y, and Z directions                                                                                                                                                                                                         |                                 |                           |                                                                                                                                                                                         |                                                                    |                                |                                                                    |  |
|                                 | Shock resistance                                      |                                               | 150 m/s², 3 times each in ±X, ±Y, and ±Z directions                                                                                                                                                                                                                                                                                                                                 |                                 |                           |                                                                                                                                                                                         |                                                                    |                                |                                                                    |  |
|                                 | Output indicator                                      |                                               | Yes (color: green)                                                                                                                                                                                                                                                                                                                                                                  |                                 |                           |                                                                                                                                                                                         |                                                                    |                                |                                                                    |  |
|                                 | EMI                                                   | Conducted Emissions                           | Conforms to EN61204-3 EN55011 Class A and based on FCC Class A<br>Conforms to EN61204-3 EN55011 Class B (See note 9.)                                                                                                                                                                                                                                                               |                                 |                           |                                                                                                                                                                                         |                                                                    |                                |                                                                    |  |
|                                 |                                                       | Radiated Emissions                            | Conforms to EN61204-3 EN55011 Class A<br>Conforms to EN61204-3 EN55011 Class B (See note 9.)                                                                                                                                                                                                                                                                                        |                                 |                           |                                                                                                                                                                                         |                                                                    |                                |                                                                    |  |
|                                 | EMS                                                   |                                               | Conforms to EN61204-3 high severity levels                                                                                                                                                                                                                                                                                                                                          |                                 |                           |                                                                                                                                                                                         |                                                                    |                                |                                                                    |  |
|                                 | Approved standards                                    |                                               | UL: UL508 (Listing, Class 2: Per UL1310), UL60950<br>cUL: CSA C22.2 No.14 (Class 2), No.60950<br>EN/VDE: EN50178 (=VDE0160), EN60950 (=VDE0805)<br>SELV (EN60950/EN50178/UL60950-1)<br>According to VDE0106/P100, IP20                                                                                                                                                              |                                 |                           | UL: UL508 (Listing), UL60950<br>cUL: CSA C22.2 No.14, No.60950<br>EN/VDE: EN50178 (=VDE0160), EN60950 (=VDE0805)<br>SELV (EN60950/EN50178/UL60950-1)<br>According to VDE0106/P100, IP20 |                                                                    |                                |                                                                    |  |
|                                 | Weight                                                |                                               | 330 g max.                                                                                                                                                                                                                                                                                                                                                                          |                                 |                           | 490 g max.                                                                                                                                                                              |                                                                    |                                |                                                                    |  |

- Note:**
1. Refer to the *Engineering Data* section on page B-21 for details.
  2. If the V.ADJ adjuster is turned, the voltage will increase by more than +15% of the voltage adjustment range (by more than +10% for 240-W models). When adjusting the output voltage, confirm the actual output voltage from the Power Supply and be sure that the load is not damaged.
  3. To reset the protection, turn OFF the power supply for three minutes or longer and then turn the power supply back ON.
  4. Displayed on 7-segment LED. (character height: 8 mm)
  5. Resolution of output voltage indication: 0.1 V; Precision of output voltage indication: ±2% (percentage of output voltage value, ±1 digit)
  6. Resolution of output current indication: 0.1 A; Precision of output current indication: ±5% F.S. ±1 digit max. (specified by rated output voltage)
  7. Resolution of peak-hold current indication: 0.1 A; Precision of peak-hold current indication: ±5% F.S. ±1 digit max. (specified by rated output voltage); Signal width required for peak-hold current: 20 ms
  8. A Type and B Type: Sinking, AP Type and P Type: Sourcing
  9. To ensure the emission rating, a ferrite ring core should be used in all cabling (TDK HF60T, HF70RH or equivalent model).
  10. The typical values indicate the values for an input condition of 230 VAC. All items are measured at a frequency of 50 Hz.

| Item                            | Power ratings                                         |                                      | 120 W                                                                                                                                                                                                                                                                                                                                                                               |                                                                    |                                                                    | 180 W               |                                                                    |                                                                    | 240 W                           |                                                                    |                                                                    |
|---------------------------------|-------------------------------------------------------|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|--------------------------------------------------------------------|---------------------|--------------------------------------------------------------------|--------------------------------------------------------------------|---------------------------------|--------------------------------------------------------------------|--------------------------------------------------------------------|
|                                 | Type                                                  |                                      | Standard                                                                                                                                                                                                                                                                                                                                                                            | Maintenanc<br>e forecast<br>monitor                                | Total run<br>time<br>monitor                                       | Standard            | Maintenanc<br>e forecast<br>monitor                                | Total run<br>time<br>monitor                                       | Standard                        | Maintenanc<br>e forecast<br>monitor                                | Total run<br>time<br>monitor                                       |
| Efficiency (typical)            |                                                       |                                      | 80% min. (87% typ.)                                                                                                                                                                                                                                                                                                                                                                 |                                                                    |                                                                    | 80% min. (88% typ.) |                                                                    |                                                                    | 80% min. (86% typ.)             |                                                                    |                                                                    |
| Input                           | Voltage                                               |                                      | 100 to 240 VAC (85 to 264 VAC)                                                                                                                                                                                                                                                                                                                                                      |                                                                    |                                                                    |                     |                                                                    |                                                                    |                                 |                                                                    |                                                                    |
|                                 | Frequency                                             |                                      | 50/60 Hz (47 to 63 Hz)                                                                                                                                                                                                                                                                                                                                                              |                                                                    |                                                                    |                     |                                                                    |                                                                    |                                 |                                                                    |                                                                    |
|                                 | Current                                               | 100 V input                          | 1.9 A max.                                                                                                                                                                                                                                                                                                                                                                          |                                                                    |                                                                    | 2.9 A max.          |                                                                    |                                                                    | 3.8 A max.                      |                                                                    |                                                                    |
|                                 |                                                       | 200 V input                          | 1.1 A max.                                                                                                                                                                                                                                                                                                                                                                          |                                                                    |                                                                    | 1.6 A max.          |                                                                    |                                                                    | 2.0 A max.                      |                                                                    |                                                                    |
|                                 |                                                       | 230 V input                          | (0.6 A typ.)                                                                                                                                                                                                                                                                                                                                                                        |                                                                    |                                                                    | (0.9 A typ.)        |                                                                    |                                                                    | (1.2 A typ.)                    |                                                                    |                                                                    |
|                                 | Power factor                                          |                                      | 0.95 min.                                                                                                                                                                                                                                                                                                                                                                           |                                                                    |                                                                    |                     |                                                                    |                                                                    |                                 |                                                                    |                                                                    |
|                                 | Harmonic current emissions                            |                                      | Conforms to EN61000-3-2                                                                                                                                                                                                                                                                                                                                                             |                                                                    |                                                                    |                     |                                                                    |                                                                    |                                 |                                                                    |                                                                    |
|                                 | Leakage current                                       | 100 V input                          | 0.5 mA max.                                                                                                                                                                                                                                                                                                                                                                         |                                                                    |                                                                    |                     |                                                                    |                                                                    |                                 |                                                                    |                                                                    |
|                                 |                                                       | 200 V input                          | 1.0 mA max.                                                                                                                                                                                                                                                                                                                                                                         |                                                                    |                                                                    |                     |                                                                    |                                                                    |                                 |                                                                    |                                                                    |
|                                 |                                                       | 230 V input                          | (0.43 mA typ.)                                                                                                                                                                                                                                                                                                                                                                      |                                                                    |                                                                    | (0.45 mA typ.)      |                                                                    |                                                                    | (0.45 mA typ.)                  |                                                                    |                                                                    |
| Inrush current<br>(See note 1.) | 100 V input                                           | 25 A max. (for a cold start at 25°C) |                                                                                                                                                                                                                                                                                                                                                                                     |                                                                    |                                                                    |                     |                                                                    |                                                                    |                                 |                                                                    |                                                                    |
|                                 | 200 V input                                           | 50 A max. (for a cold start at 25°C) |                                                                                                                                                                                                                                                                                                                                                                                     |                                                                    |                                                                    |                     |                                                                    |                                                                    |                                 |                                                                    |                                                                    |
|                                 | 230 V input                                           | (41 mA typ.)                         |                                                                                                                                                                                                                                                                                                                                                                                     |                                                                    | (34 mA typ.)                                                       |                     |                                                                    | (39 mA typ.)                                                       |                                 |                                                                    |                                                                    |
| Output                          | Voltage adjustment range (See note 2.)                |                                      | −10% to 15% (with V.ADJ.) (guaranteed)                                                                                                                                                                                                                                                                                                                                              |                                                                    |                                                                    |                     |                                                                    |                                                                    | ±10% (with V.ADJ.) (guaranteed) |                                                                    |                                                                    |
|                                 | Ripple                                                |                                      | 2.0% (p-p) max. (at rated input/output voltage)                                                                                                                                                                                                                                                                                                                                     |                                                                    |                                                                    |                     |                                                                    |                                                                    |                                 |                                                                    |                                                                    |
|                                 |                                                       | f=20MHz measuring                    | (0.66%(p-p) typ.)                                                                                                                                                                                                                                                                                                                                                                   |                                                                    |                                                                    | (0.45%(p-p) typ.)   |                                                                    |                                                                    | (0.13%(p-p) typ.)               |                                                                    |                                                                    |
|                                 |                                                       | f=100MHz measuring                   | (0.67%(p-p) typ.)                                                                                                                                                                                                                                                                                                                                                                   |                                                                    |                                                                    | (0.52%(p-p) typ.)   |                                                                    |                                                                    | (0.21%(p-p) typ.)               |                                                                    |                                                                    |
|                                 | Input variation influence                             |                                      | 0.5% max. (at 85 to 264 VAC input, 100% load)                                                                                                                                                                                                                                                                                                                                       |                                                                    |                                                                    |                     |                                                                    |                                                                    |                                 |                                                                    |                                                                    |
|                                 | Load variation influence (rated input voltage)        |                                      | 1.5% max. (with rated input, 0 to 100% load)                                                                                                                                                                                                                                                                                                                                        |                                                                    |                                                                    |                     |                                                                    |                                                                    |                                 |                                                                    |                                                                    |
|                                 | Temperature variation influence                       |                                      | 0.05%/°C max.                                                                                                                                                                                                                                                                                                                                                                       |                                                                    |                                                                    |                     |                                                                    |                                                                    |                                 |                                                                    |                                                                    |
|                                 | Start up time (See note 1.)                           |                                      | 1,000 ms max. (at rated input/output voltage)                                                                                                                                                                                                                                                                                                                                       |                                                                    |                                                                    |                     |                                                                    |                                                                    |                                 |                                                                    |                                                                    |
|                                 | Hold time (See note 1.)                               |                                      | (380 ms typ.)                                                                                                                                                                                                                                                                                                                                                                       |                                                                    |                                                                    | (530 ms typ.)       |                                                                    |                                                                    | (780 ms typ.)                   |                                                                    |                                                                    |
|                                 |                                                       |                                      | 20 ms min. (at rated input/output voltage)                                                                                                                                                                                                                                                                                                                                          |                                                                    |                                                                    |                     |                                                                    |                                                                    |                                 |                                                                    |                                                                    |
| at 100% load                    |                                                       | (60 ms typ.)                         |                                                                                                                                                                                                                                                                                                                                                                                     |                                                                    | (60 ms typ.)                                                       |                     |                                                                    | (30 ms typ.)                                                       |                                 |                                                                    |                                                                    |
| Additional functions            | Overload protection (See note 1.)                     |                                      | 105% to 160% of rated load current, voltage drop, intermittent, automatic reset                                                                                                                                                                                                                                                                                                     |                                                                    |                                                                    |                     |                                                                    |                                                                    |                                 | 105% to 160% of rated load current, voltage drop, automatic reset  |                                                                    |
|                                 | Overvoltage protection (See notes 1 and 3.)           |                                      | Yes                                                                                                                                                                                                                                                                                                                                                                                 |                                                                    |                                                                    |                     |                                                                    |                                                                    |                                 |                                                                    |                                                                    |
|                                 | Output voltage indication (See note 4.)               |                                      | No                                                                                                                                                                                                                                                                                                                                                                                  | Yes (selectable)<br>(See note 5.)                                  |                                                                    | No                  | Yes (selectable)<br>(See note 5.)                                  |                                                                    | No                              | Yes (selectable)<br>(See note 5.)                                  |                                                                    |
|                                 | Output current indication (See note 4.)               |                                      | No                                                                                                                                                                                                                                                                                                                                                                                  | Yes (selectable)<br>(See note 6.)                                  |                                                                    | No                  | Yes (selectable)<br>(See note 6.)                                  |                                                                    | No                              | Yes (selectable)<br>(See note 6.)                                  |                                                                    |
|                                 | Peak-hold current indication (See note 4.)            |                                      | No                                                                                                                                                                                                                                                                                                                                                                                  | Yes (selectable)<br>(See note 7.)                                  |                                                                    | No                  | Yes (selectable) (See note 7.)                                     |                                                                    | No                              | Yes (selectable)<br>(See note 7.)                                  |                                                                    |
|                                 | Maintenance forecast monitor indication (See note 4.) |                                      | No                                                                                                                                                                                                                                                                                                                                                                                  | Yes (selectable)                                                   | No                                                                 | No                  | Yes (selectable)                                                   | No                                                                 | No                              | Yes (selectable)                                                   | No                                                                 |
|                                 | Maintenance forecast monitor output                   |                                      | No                                                                                                                                                                                                                                                                                                                                                                                  | Yes (open collector output), 30 VDC max., 50 mA max. (See note 8.) | No                                                                 | No                  | Yes (open collector output), 30 VDC max., 50 mA max. (See note 8.) | No                                                                 | No                              | Yes (open collector output), 30 VDC max., 50 mA max. (See note 8.) | No                                                                 |
|                                 | Total run time monitor indication (See note 4.)       |                                      | No                                                                                                                                                                                                                                                                                                                                                                                  |                                                                    | Yes (selectable)                                                   | No                  |                                                                    | Yes (selectable)                                                   | No                              |                                                                    | Yes (selectable)                                                   |
|                                 | Total run time monitor output                         |                                      | No                                                                                                                                                                                                                                                                                                                                                                                  |                                                                    | Yes (open collector output), 30 VDC max., 50 mA max. (See note 8.) | No                  |                                                                    | Yes (open collector output), 30 VDC max., 50 mA max. (See note 8.) | No                              |                                                                    | Yes (open collector output), 30 VDC max., 50 mA max. (See note 8.) |
|                                 | Undervoltage alarm indication (See note 4.)           |                                      | No                                                                                                                                                                                                                                                                                                                                                                                  | Yes (selectable)                                                   |                                                                    | No                  | Yes (selectable)                                                   |                                                                    | No                              | Yes (selectable)                                                   |                                                                    |
|                                 | Undervoltage alarm output terminals                   |                                      | No                                                                                                                                                                                                                                                                                                                                                                                  | Yes (open collector output), 30 VDC max., 50 mA max. (See note 8.) |                                                                    | No                  | Yes (open collector output), 30 VDC max., 50 mA max. (See note 8.) |                                                                    | No                              | Yes (open collector output), 30 VDC max., 50 mA max. (See note 8.) |                                                                    |
|                                 | Parallel operation                                    |                                      | No                                                                                                                                                                                                                                                                                                                                                                                  |                                                                    |                                                                    |                     |                                                                    |                                                                    |                                 |                                                                    |                                                                    |
|                                 | Series operation                                      |                                      | Yes for up to 2 Power Supplies (with external diode)                                                                                                                                                                                                                                                                                                                                |                                                                    |                                                                    |                     |                                                                    |                                                                    |                                 |                                                                    |                                                                    |
| Other                           | Operating ambient temperature                         |                                      | Refer to the derating curve in <i>Engineering Data</i> . (with no icing or condensation)                                                                                                                                                                                                                                                                                            |                                                                    |                                                                    |                     |                                                                    |                                                                    |                                 |                                                                    |                                                                    |
|                                 | Storage temperature                                   |                                      | −25 to 65°C                                                                                                                                                                                                                                                                                                                                                                         |                                                                    |                                                                    |                     |                                                                    |                                                                    |                                 |                                                                    |                                                                    |
|                                 | Operating ambient humidity                            |                                      | 25% to 85% (Storage humidity: 25% to 90%)                                                                                                                                                                                                                                                                                                                                           |                                                                    |                                                                    |                     |                                                                    |                                                                    |                                 |                                                                    |                                                                    |
|                                 | Dielectric strength                                   |                                      | 3.0 kVAC for 1 min. (between all inputs and outputs/ alarm outputs; detection current: 20 mA)<br>2.0 kVAC for 1 min. (between all inputs and PE terminals; detection current: 20 mA)<br>1.0 kVAC for 1 min. (between all outputs/ alarm outputs and PE terminals; detection current: 20 mA)<br>500 VAC for 1 min. (between all outputs and alarm outputs; detection current: 20 mA) |                                                                    |                                                                    |                     |                                                                    |                                                                    |                                 |                                                                    |                                                                    |
|                                 | Insulation resistance                                 |                                      | 100 MΩ min. (between all outputs/ alarm outputs and all inputs/ PE terminals) at 500 VDC                                                                                                                                                                                                                                                                                            |                                                                    |                                                                    |                     |                                                                    |                                                                    |                                 |                                                                    |                                                                    |
|                                 | Vibration resistance                                  |                                      | 10 to 55 Hz, 0.375-mm single amplitude for 2 h each in X, Y, and Z directions<br>10 to 150Hz, 0.35-mm single amplitude (5 G max.) for 80 min each in-X, Y, and Z directions                                                                                                                                                                                                         |                                                                    |                                                                    |                     |                                                                    |                                                                    |                                 |                                                                    |                                                                    |
|                                 | Shock resistance                                      |                                      | 150 m/s², 3 times each in ±X, ±Y, and ±Z directions                                                                                                                                                                                                                                                                                                                                 |                                                                    |                                                                    |                     |                                                                    |                                                                    |                                 |                                                                    |                                                                    |
|                                 | Output indicator                                      |                                      | Yes (color: green)                                                                                                                                                                                                                                                                                                                                                                  |                                                                    |                                                                    |                     |                                                                    |                                                                    |                                 |                                                                    |                                                                    |
|                                 | EMI                                                   | Conducted Emissions                  | Conforms to EN61204-3 EN55011 Class A and based on FCC Class A<br>Conforms to EN61204-3 EN55011 Class B (See note 9.)                                                                                                                                                                                                                                                               |                                                                    |                                                                    |                     |                                                                    |                                                                    |                                 |                                                                    |                                                                    |
|                                 |                                                       | Radiated Emissions                   | Conforms to EN61204-3 EN55011 Class A<br>Conforms to EN61204-3 EN55011 Class B (See note 9.)                                                                                                                                                                                                                                                                                        |                                                                    |                                                                    |                     |                                                                    |                                                                    |                                 |                                                                    |                                                                    |
|                                 | EMS                                                   |                                      | Conforms to EN61204-3 high severity levels                                                                                                                                                                                                                                                                                                                                          |                                                                    |                                                                    |                     |                                                                    |                                                                    |                                 |                                                                    |                                                                    |
|                                 | Approved standards                                    |                                      | UL: UL508 (Listing), UL60950<br>cUL: CSA C22.2 No.14, No.60950<br>EN/VDE: EN50178 (=VDE0160), EN60950 (=VDE0805)<br>SELV (EN60950/UL50178/UL60950-1)<br>According to VDE0106/P100, IP20                                                                                                                                                                                             |                                                                    |                                                                    |                     |                                                                    |                                                                    |                                 |                                                                    |                                                                    |
|                                 | Weight                                                |                                      | 550 g max.                                                                                                                                                                                                                                                                                                                                                                          |                                                                    |                                                                    | 850 g max.          |                                                                    |                                                                    | 1,150 g max.                    |                                                                    |                                                                    |