




## Application Note

# 1606-XL60DR

- World-wide approvals (    ) for industry
- Input: AC 230V/115V, DC 160...375V
- Output: 24V/2.5A

- High overload current, no switch-off
- Wide-Range Input
- N+1 redundancy, RDY relay contact

### Input

|               |  |
|---------------|--|
| Input voltage | AC100...120/200...240V (switchable), 47...63 Hz (85...132V AC / 176...264V AC, 160...375V DC, see also "Output: Continuous Loading") |
|---------------|--|

Wide-Range Input: With the switch in the 230V position the power-supply unit operates at low and moderate loads at any input voltage between 95 and 264V AC (see 'Output' at the right side).

Note: At DC input, always leave the switch in the 230V position

|                                 |  |
|---------------------------------|--|
| Input current                   | < 1.3 A (switch in 115V position)<br>< 0.7 A (switch in 230V position) |
| DC input current at open output | typ. 5.3 mA at 110V DC, 3.9 mA at 300V DC (preserves battery sources)  |
| Inrush current                  | typ. < 25 A at 264V AC and cold start                                  |

If you intend to protect the primary side of the power supply with a fuse or a circuit breaker, a 10 A slow acting fuse (HBC) or a supplementary protector 1492-SPU1C100 is recommended. In order to meet local requirements, please consult local codes and regulations for proper installation.

|                    |  |
|--------------------|--|
| Transient handling | Transient resistance acc. to VDE 0160 / W2 (750 V / 1.3 ms), for <i>all</i> load conditions. |
| Hold up time       | > 20 ms at 196V AC, 24V/2.5 A (see diagram)  |

### Efficiency, Reliability etc.

|                            |  |
|----------------------------|--|
| Efficiency                 | typ. 86.5 % (230V AC, 24V/2.5 A)   |
| Losses                     | typ. 9.4 W (230V AC, 24V/2.5 A)  |
| MTBF                       | 700,000 h acc. to Siemensnorm SN 29500 (24V/2.5 A, 230V AC, T <sub>amb</sub> = +40 °C) |
| Life cycle (electrolytics) | The unit exclusively uses longlife electrolytics, specified for +105°C.                |

### Construction / Mechanics

#### Housing dimensions and Weight

- W x H x D 49 mm x 124 mm x 102 mm (+ DIN rail)
- Free space for ventilation above/below 25 mm recommended right 10 mm recommended (front view)
- Weight 470 g

#### Design advantages:

- Input and output pluggable by means of Combicon® plug connector.
- Wire Size Input/Output Stranded 22...12 AWG (0.2...2.5 mm<sup>2</sup>), Solid 22...12 AWG (0.2...2.5 mm<sup>2</sup>)
- Tightening Torque 3.5 lbs in (0.4 Nm) recommended (pluggable)

- Ensure strain relief of the plug connectors when installing the unit.



- Input and output are strictly apart from each other and so cannot be mixed up (input below, output above).

### Output

|                      |        |
|----------------------|--------|
| Rated output voltage | 24V DC |
|----------------------|--------|

For balanced current sharing during parallel operation:

Soft characteristic (25.2V DC ±2% at no-load, 24V DC ±0.5% at nominal load, almost linear characteristic curve)

|                          |  |
|--------------------------|--|
| Output noise suppression | Radiated EMI values below EN50081-1, even when using long, unscreened output cables. |
|--------------------------|--|

|  |  |
|--|--|
| Ambient temperature range T <sub>amb</sub> | Operation: -10°C...+70°C (>60°C: Derating)<br>Storage: -25°C...+85°C |
|--|--|

| Continuous loading (at T <sub>amb</sub> = -10°C...+60°C, convection cooling), see also diagram. For start at T <sub>amb</sub> < 0°C and low input voltage, please contact Rockwell Automation. | Switch | AC/DCin    | I <sub>out</sub> |
|--|--------|------------|------------------|
| * For start with DC input > 95V DC needed  | 230V   | 176...264V | ACin 2.5 A       |
|  |        | 95...176V  | ACin 1.5 A       |
|  |        | 160...375V | DCin 2.5 A       |
|  |        | 120...160V | DCin 2.0 A       |
|  | 115V   | 80*...120V | DCin 1.5 A       |
|  | 115V   | 85...132V  | ACin 2.5 A       |

Output protected against short circuit, open circuit and overload

|                       |  |
|-----------------------|--|
| Derating              | typ. 1.5 W/K (at T <sub>amb</sub> = +60°C...+70°C)           |
| Voltage regulation    | better than 2% V <sub>out</sub> overall                      |
| Ripple / Noise        | < 30 mV <sub>pp</sub> , (20 MHz bandwidth, 50 Ω measurement) |
| Overvolt. protection  | typ. 32V   |
| Parallel operation    | yes; current sharing via soft characteristic (see diagram)   |
| Power back immunity   | 26V  |
| Front panel indicator | Green LED  |

#### RDY relay contact

- Type normally open contact
- closes when output voltage > 22.1V ±4%
- opens when output voltage < 19.8V ±4%
- Electrical isolation 500V DC to output voltage
- Contact rating 1A at 28V DC

## Start / Overload Behavior

|                |                                  |
|----------------|----------------------------------|
| Start-up delay | typ. 0.1 s                       |
| Rise time      | ca. 5...20 ms, depending on load |

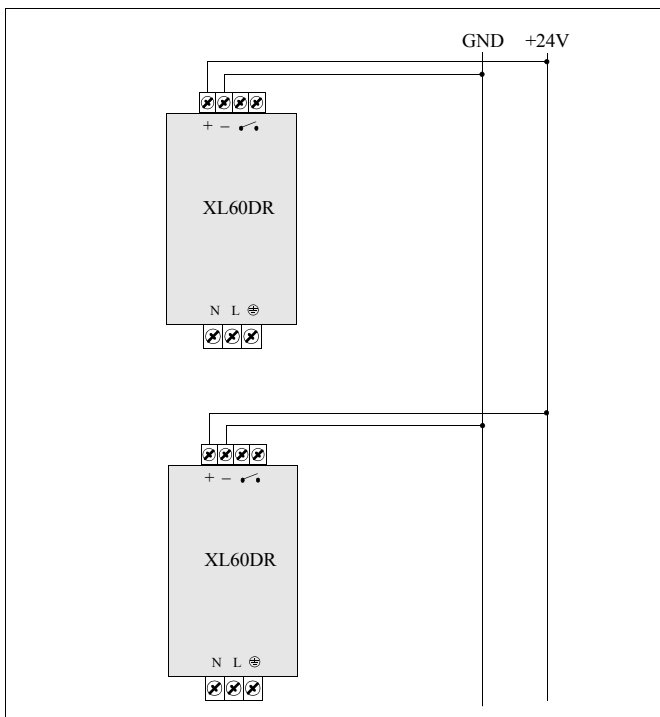
### Overload Behavior

- Special Overload Design – no disconnection, no hiccup if overloaded (see diagram)
  - high overload current (up to  $1.5 I_{Nom}$ ),  $V_{out}$  is gradually reduced with increasing current.

### Advantages:

- High short-circuit current, giving large 'start-up window': unit starts reliably even with awkward loads (DC-DC converters, motors).
- No 'sticking' such as can occur with fold-back characteristics
- Secondary fuses operate reliably

### Power wiring



Specifications valid for 230V AC input voltage, +25°C ambient temperature, and 5 min run-in time, unless otherwise stated. They are subject to change without prior notice

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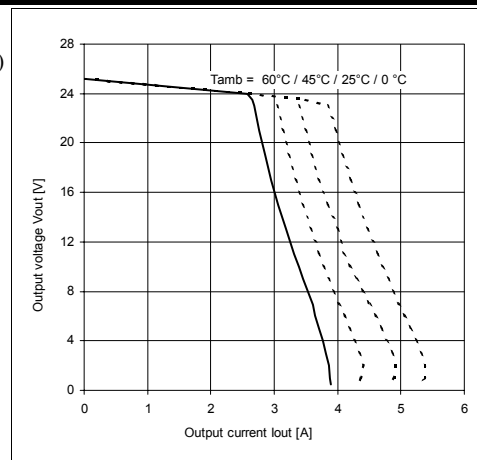
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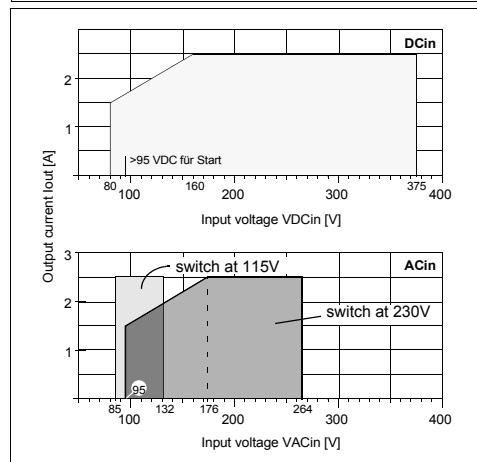
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### Output characteristic (min.)



### Output Current over Input Voltage (min.)



### Hold-up time (min.)

