MiniLine
with plug-in screw terminals

- 24-28 V DC/50 W output power
- 100-240 V Wide Range Input (85-264 V AC permitted)
- DCok output
- PULS Overload Design™ (does not switch off at overload but delivers up to 1.5 times nominal current)
- with load sharing for reliable parallel operation
- NEC Class 2 Power Supply
**Technical Data ML50.111**

### Input

- **Input voltage**: AC100-240V (Wide Range), 47...63 Hz
- **Admiss. limits**: AC 85...264V (DC 85...375V)
- **Input current**: <1.0A (@ AC 100V, 500W), <0.6A (@ 196V AC, 500W)
- **External Fusing**: Not required, unit provides internal fuse (T3AH, not accessible)
- **Transient immunity**: Transient resistance acc. to VDE 0160 / W2 (750V / 1.3ms), over entire load range
- **Hold-up time**: >17ms @ AC 230V, 24V / 2.1A
- **Rated continuous**: >97ms @ AC 196V, 24V / 2.1A
- **Efficiency**: typ. 88.5% (@ AC 230V, 24V / 2.1A) (see also diagram below)
- **Losses**: typ. 6.8W (@ AC 230V, 24V / 2.1A)
- **MTBF (Reliability)**: ca. 600,000 h acc. to Siemensnorm SN 29500 (24V/2.1A, AC 230V, Tamb = +40°C)

Prior to shipment, every unit undergoes the following tests in order to isolate any defective units which might suffer an early failure:
- Run-in/burn-in (Full load, Tamb = +60°C, on/off cycle)
- Functional test (100%)

### Construction, Mechanics, Installation

Robust plastic housing (US Patent No. D442, 923S), fine ventilation grid on built-in orientation; Vin and Tamb (convection cooling); for details see derating diagram below

- **Dimensions and weight**: 45mm x 75mm x 91mm (+ DIN rail)
- **Weight**: 240g
- **Mounting orientation**: or (cf. "Output")
- **Ventilation/Cooling**: Normal convection, no fan required
- **Free space f. cooling**: recom.: 25mm on sides with ventilation grid

Easy snap-on mounting onto the DIN-rail (TS35/7,5 or TS35/15). Unit sits safely and firmly on the rail; no tools required even to remove mating connectors enclosed.

**Connector size range – input:**
- Flexible/solid cable: 0.3 - 4mm² (28-12 AWG)
- Wire strip length: Ferrules admissible, 6mm recommended

**Connector size range – output:**
- Flexible cable: 0.3 - 2.5mm² (28-12 AWG)
- Solid cable: 0.3 - 2.5mm² (28-12 AWG)
- Wire strip length: Ferrules admissible, 7mm recommended

**Design details – for your advantage:**
- Standard plugs, meet various connector families (e.g CombiCon)
- Plugs allow measurement access

### Output (incl. Logic)

- **Output voltage**: DV 24-28V, adj. by front panel potentiometer
- **preset**: 24V ±0.5% @ 2.1A (25V at no load, see ‘Parallel operation’)
- **Voltage regulation**: stat. ±2.5% Vout (see ‘Parallel operation’)
dyn. ±2% Vout overall
- **Ripple/Noise**: ≤50mVpp (20MHz bandwidth, 50Ω measurement)
- **Overvoltage prot. (OVP)**: ≤40V
- **Output noise suppression**: Radiated EMI values below EN 61000-6-3, even when using long (>2m), unscreened output cables
- **Rated continuous**: up to 2.1A @ 24V / up to 1.8A @ 28V depending on built-in orientation, VIN and Tamb (convection cooling); for details see derating diagram below

**Overload behaviour**

PULS Overload Design™: No switch-off at over-load/short-circuit, instead: up to 1.5 \( I_{rated} \) so you need no oversizing to start awkward loads.

**Protection**

Unit is protected against (also permanent) short-circuit, overload and open-circuit

**Derating**

see diagram below

**Parallel operation**

Yes; load sharing by inclined characteristic curve (\( V_{out} \) = -1V between \( I_{out} = 0A \) and \( I_{out} = I_{rated} \))

**Power back immunity**: 35V

**Operation indicator**

Green LED (DC OK), threshold: \( V_{out} = 20V \pm 4% \)

**Voltage regulation stat.**: ±2.5% \( V_{out} \) overall

**Hold-up time with ACin (Vout = 24V, typ. + min.)**: >17ms @ 230V, >97ms @ 196V, >171ms @ 230V

**Efficiency Hold-up time with ACin (Vout = 24V, typ.)**: >17ms @ AC 100V, 24V / 2.1A

**DC OK output**

To feed a 24V relay (R coil > 700 Ω), Relay operates, if output voltage exceeds threshold value Free-wheeling diode for relay is included in the power supply unit

**Threshold**

\( V_{out} = 20V ±4\% \)

### Environmental Data, EMC, Safety

- **Ambient temperature range**: measured 25mm below unit
- **storage, transport**: -25°C ... +85°C
- **operation**: -10°C ... +70°C (for derating see diagram below)
- **Humidity**: max. 95% (without condensation)
- **Electromagnetic emissions (EMI)**
  - Class B (EN 55011, EN 55022)
  - Class 8 (EN 55011, EN 55022)
  - EN 61000-6-2 (Includes EN 61000-6-1)
- **Electromagnetic immunity (EMI)**
  - SELV (EN60950, VDE0100/T.410, PELV (EN50178)
  - Class I (EN60950) / IP20 (EN60529)

- **Safe low voltage:**
  - SELV (EN60950, VDE0100/T.410, PELV (EN50178)
  - Prot. class/degree:
    - Class I (EN60950) / IP20 (EN60529)

- **The PSU complies with all major safety approvals for EU (EN 60950, EN 60204-1, EN 50178), USA (UL 60950, E137006, UL508 LISTED, E198865), Canada (CAN/CSA-C22.2 No 60950 [CUR], CAN/CSA-C22.2 No. 14 [CUL]), CB Scheme (IEC 60950).**

Further design details – for your advantage:
- All terminals are easy to reach as mounted on the front panel.
- Input and output are strictly apart from each other (below/above) and have different wire access (90°/270° wiring), so cannot be mixed up

### Output characteristic \( V_{out} / I_{out} \) (min.)

- **Output current**: I_{out} [A]
- **Output voltage**: V_{out} [V]
- **Derating**: Rated continuous

### Efficiency (@ V_{out} = 24V, typ.)

- **Efficiency**: %
- **Derating**: Rated continuous

### Derating of output power

- **Power back immunity**: 35V
- **Operation indicator**
  - Green LED (DC OK), threshold: \( V_{out} = 20V \pm 4% \)
- **Output voltage**: \( V_{out} \) [V]
- **Efficiency Hold-up time with ACin (Vout = 24V, typ.)**: >17ms @ AC 100V, 24V / 2.1A

### Hold-up time with ACin (Vout = 24V, typ. + min.)

- **Efficiency**: %
- **Output voltage**: \( V_{out} \) [V]
- **Efficiency Hold-up time with ACin (Vout = 24V, typ.)**: >17ms @ AC 100V, 24V / 2.1A

### PLUG Connectors

**Connectors**

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- **Dimensions and weight**: 45mm x 75mm x 91mm (+ DIN rail)
- **Weight**: 240g
- **Mounting orientation**: or (cf. "Output")
- **Ventilation/Cooling**: Normal convection, no fan required
- **Easy snap-on mounting onto the DIN-rail (TS35/7,5 or TS35/15). Unit sits safely and firmly on the rail; no tools required even to remove mating connectors enclosed.

**Connector size range – input:**
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- Wire strip length: Ferrules admissible, 7mm recommended

**Connector size range – output:**
- Flexible cable: 0.3 - 2.5mm² (28-12 AWG)
- Solid cable: 0.3 - 2.5mm² (28-12 AWG)
- Wire strip length: Ferrules admissible, 6mm recommended

**Design details – for your advantage:**
- Standard plugs, meet various connector families (e.g CombiCon)
- Plugs allow measurement access