Data sheet

# Power supply CP-T 24/5.0
# Primary switch mode power supply

The CP-T range of three-phase power supply units is the youngest member of ABB's power supply family. In terms of design and functionality, the new range perfectly supplements the existing products and extends the range appropriately. The devices can be supplied with a three-phase voltage as well as with two-phase mains. Here, ABB offers a power supply unit with 24 V DC output with 5 A and efficiency of up to 89 %. As in the case of all products, they are designed for an ambient temperature of up to 70 °C.




2CDC 271 043 S0009

## Characteristics

- Rated output voltage 24 V DC
- Output voltage adjustable via front-face rotary potentiometer "OUTPUT Adjust"
- Rated output current 5 A
- Rated output power 120 W
- Wide supply voltage range 3 x 400-500 V AC (340-575 V AC, 480-820 V DC)
- Two-phase supply with a derating of the output to 75 % possible / permitted
- High efficiency of up to 89 %
- Low power dissipation and low heating
- Free convection cooling (no forced cooling with ventilators)
- Ambient temperature range during operation -40...+70 °C
- Open-circuit, overload and short-circuit stable
- Integrated input fuse
- Redundancy unit CP-A RU offering true redundancy, available as accessory
- Signalling contact "13-14" (solid-state) for output voltage OK

## Approvals

UL 508, CAN/CSA C22.2 No.14[1)]

ANSI/ISA-12.12 (Class I, Div. 2, Hazardous Locations), CAN/CSA C22.2 No. 213[1)]

UL 60950, CAN/CSA C22.2 No. 60950[1)]

GB4943, GB9254, GB17625.1

GOST

[1)] Approvals refer to rated input voltage $U_{in}$

## Marks

CE

C-Tick pending

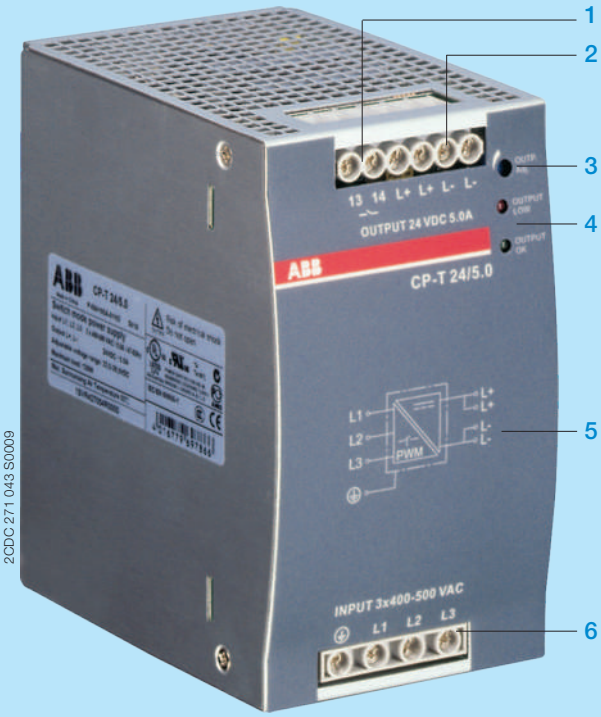
## Order data

### Power supply

| Type | Input voltage range | Rated output voltage | Rated output current | Order code |
|---|---|---|---|---|
| CP-T 24/5.0 | 340-575 V AC<br>480-820 V DC | 24 V DC | 5 A | 1SVR 427 054 R0000 |

### Accessory

| Type | Description | Order code |
|---|---|---|
| CP-A RU | The redundancy unit CP-A RU provides decoupling of two 24 V DC CP power supply units. | 1SVR 427 071 R0000 |




### 1 Signalling contact

OUTPUT 13-14: terminals - signalling contact

A solid-state output indicates the error-free operation of the output voltage.

### 2 Output

OUTPUT L+, L+, L-, L-: terminals - output

### 3 Adjustable output voltage

OUTPUT Adjust: potentiometer

The CP-T range types feature a continuously adjustable output voltage. Thus, they can be optimally adapted to the application, e.g. compensating the voltage drop caused by a long cable length.

### 4 Indication of operational states

OUTPUT LOW: red LED - output voltage too low
OUTPUT OK: green LED - output voltage OK

### 5 Circuit diagram

### 6 Wide input range

INPUT L1, L2, L3, PE: terminals - input

Optimised for worldwide applications: The CP-T power supply units can be supplied for a wide range of AC and DC voltages. Both kinds of power supply (three-phase and two-phase) are possible.

## Application

The primary switch mode power supply offers a three-phase supply voltage range of 3 x 400-500 V AC. A two-phase power supply is also possible and it can also be supplied by 480-820 V DC. Furthermore, this power supply unit is equipped with two generous capacitors, which ensure mains buffering of at least 20 ms. That is why the devices can be used worldwide also in high fluctuating networks and battery-powered plants.

## Operating mode

By means of the potentiometer "OUTPUT Adjust" the output voltage can be adjusted within a range of 22.5-28.5 V DC. Thus, the power supply can be optimally adapted to the application, e.g. compensating the voltage drop caused by a long line length.

The green LED "OUTPUT OK" is lightening during proper operation, i. e. when the output voltage exceeds 75 %.

The red LED "OUTPUT LOW" is lightening when the output voltage is less than 70 % of the rated output voltage.

Two-phase supply is permissible with a derating of the output to 75 %.

Signalling contact "13-14" (max. 60 V DC / 0.3 A) is ON when the output voltage exceeds 19.4 V.

## Installation

The device must be installed by qualified persons only and in accordance with the specific national regulations (e.g. VDE, etc.). The devices are maintenance-free chassis-mounted units.

### Before installation



DANGER!

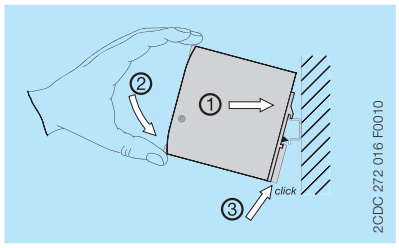
**Components with high stored energy and circuits with high voltage**

**Danger to be electrocuted!**

- ▶ Disconnect the system from the supply network and protect against switching on before any installation, maintenance or modification work.
- ▶ Do not introduce any objects into the unit and do not open the unit.
- ▶ Ensure that the service personnel is protected against inadvertent contact with parts carrying energy.

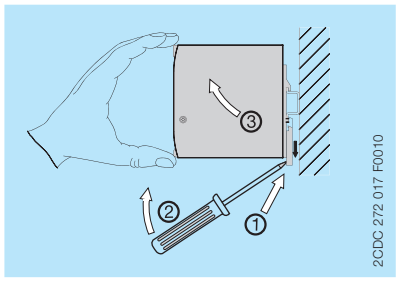
### Mounting

The switch mode power supply can be snapped on a DIN rail (TH 35-15 or TH 35-7.5 according to IEC/EN 60715) as shown in the accompanying picture. For that the device is set with its mounting rail slide on the upper edge of the mounting rail and locked by lifting it downwards.



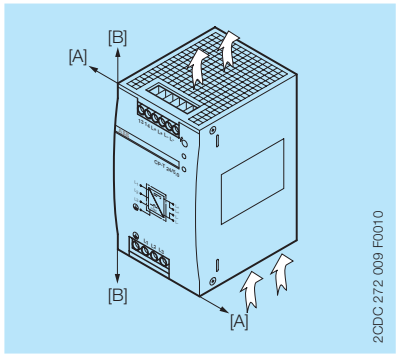

### Demounting

Remove the switch mode power supply as shown in the accompanying picture. For that the latching lever is pulled downwards by means of the screwdriver. Alternatively you can press the unlock button to release the device. Then in both cases the device can be unhinged from the mounting rail edge and removed.

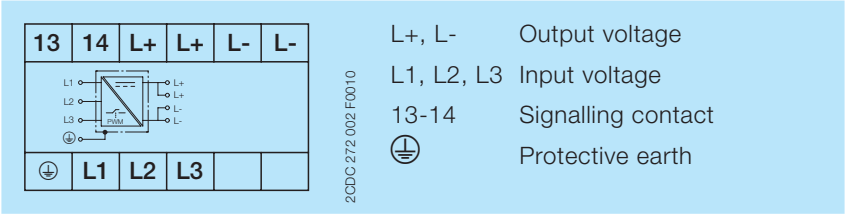



### Mounting position

The devices have to be mounted horizontally with the input terminals on the bottom. In order to ensure a sufficient convection, the minimum distance to other modules should not be less than 25 mm (0.98 in) in vertical and horizontal direction.



## Electrical connection




Connection diagram

Preparations:

– Connect to main according to the specific national regulations.
– Power supply cables and unit must be sufficiently fused. A disconnecting device has to be provided for the power supply to disengage unit and supply cables from supply mains if required.
– We recommend to choose the cable section as large as possible in order to minimize voltage drops.
– In order to ensure sufficient air-cooling the distance to other devices has to be considered.

Instructions:

1. Connect the input terminals L1, L2 and L3.
2. Connect the protective earth conductor to the terminal ⏚ (protection class I).
3. Provide a suitable disconnecting device (e.g. line protection switch) in the supply line acc. to IEC/EN 60950.
4. Rate the lines for the maximum output current (considering the short-circuit current) or provide a separate fuse protection. The input side is protected by an internal input fuse.
5. Observe the polarity.

The device is overload, short-circuit and open-circuit proof. The secondary side of the power supply unit is electrically isolated from the input and internally not earthed (SELV) and can therefore be earthed by the user according to the needs with L+ or L- (PELV).

## Operation



DANGER!

**High current**

**Risk of electric arcs and electric shocks!**

▶ Do not modify the installation (primary and secondary side).
▶ Intended use.



CAUTION!

**Depending on the operation conditions the enclosure can become very hot**

**Risk of burns!**

▶ In order to ensure sufficient air-cooling the distance to other devices has to be considered.

The device is intended for use as a primary switch mode power supply. Any other usage is not supported by the manufacturer. Other usage may impair safety and cause operational difficulties or destruction of the unit.

## Service

The internal fuse is not user-replaceable. If the internal fuse blows, most probably the device is defective. In this case, an examination of the switch mode power supply by the manufacturer is necessary.

## Technical data

Data at $T_a$ = 25 °C, $U_{in}$ = 3 x 400 V AC and rated values, unless otherwise indicated

| Input circuit - supply circuit | | L1, L2, L3 |
|---|---|---|
| Rated input voltage $U_{in}$ | | 3 x 400-500 V AC |
| Input voltage range | | 340-575 V AC |
| | | 480-820 V DC |
| Frequency range AC | | 47-63 Hz |
| Typical input current | | 0.36 A |
| Typical power consumption | | 135 W |
| Inrush current limiting | | 10 A |
| Power failure buffering time | | min. 20 ms |
| Internal input fuse | per phase | 2 A / 600 V AC |
| Recommended backup fuse | | 3 pole miniature circuit breaker ABB type S 203 |
| | characteristic | B or C |
| | max. rating | 20 A |
| Power factor correction (PFC) | | yes, passive, 0.55 |
| Discharge current | towards PE | < 3.5 mA |
| | input / output | < 0.25 mA |

| Indication of operational states | | |
|---|---|---|
| Output voltage | OUTPUT OK: green LED | output voltage OK |
| | OUTPUT LOW: red LED | output voltage too low |

| Output circuit | | L+, L+, L-, L- |
|---|---|---|
| Rated output power | | 120 W |
| Rated output voltage | | 24 V DC |
| Tolerance of the output voltage | | 0...+1 % |
| Adjustment range of the output voltage | | 22.5-28.5 V DC |
| Rated output current $I_r$ | $T_a \leq 60$ °C | 5 A |
| Derating of the output current | 60 °C < $T_a \leq 70$ °C | 2.5 %/°C |
| Signalling contact for output voltage OK | 13-14 | solid-state (max. 60 V DC, 0.3 A) |
| | threshold | 17.6-19.4 V |
| | insulation voltage | 500 V DC |
| Mininum fuse rating to achieve short-circuit protection | 13-14 | ≥ 60 V DC, ≤ 0.3 A fast-acting |
| Maximum deviation with | load change statical | ±1 % |
| | change of output voltage within the input voltage range | ±0.5 % |
| Control time | at rated load | < 2 ms |
| Starting time after applying the supply voltage | at $I_r$ | max. 1 s |
| | with 3500 µF | max. 1.5 s |
| Rise time | at rated load | max. 150 ms |
| | with 3500 µF | max. 500 ms |
| Fall time | | max. 150 ms |
| Residual ripple and switching peaks | BW = 20 MHz | 100 mV |
| Parallel connection | | not provided |
| Series connection | | not provided |

| Output circuit - no-load, overload and short-circuit behaviour | |
|---|---|
| Characteristic curve of output | combined U/I and hiccup mode |
| Short-circuit protection | continuous short-circuit proof |
| Short-circuit behaviour | current limiting |
| Resistance to reverse feed | approx. 35 V |
| Overload protection | hiccup mode |
| No-load protection | continuous no-load stability |
| Overtemperature protection | yes, automatic recovery after temperature went down |
| Starting of capacitive loads | 3500 µF |

| General data | | |
|---|---|---|
| Efficiency | | typ. 89 % |
| Duty time | | 100 % |
| Dimensions of housing (W x H x D) | | 74.3 x 124 x 118.8 mm (2.92 x 4.88 x 4.68 in) |
| Weight | | 0.780 kg (1.720 lb) |
| Material of housing | | metal |
| Mounting | | DIN rail (IEC/EN 60715), snap-on mounting without any tool |
| Mounting position | | horizontal |
| Minimum distance to other units | horizontal / vertical | 25 mm / 25 mm (0.98 in / 0.98 in) |
| Degree of protection | housing / terminals | IP20 / IP20 |
| Protection class | | I |

| Electrical connection - input circuit | | L1, L2, L3 |
|---|---|---|
| Wire size | fine-strand with wire end ferrule | 0.2-4 mm² (24-11 AWG) |
| | fine-strand without wire end ferrule | 0.2-6 mm² (24-10 AWG) |
| | rigid | 0.2-6 mm² (24-10 AWG) |
| Stripping length | | 8 mm (0.31 in) |
| Tightening torque | | 1 Nm (9 lb.in) |

| Electrical connection - output circuit | | L+, L+, L-, L- |
|---|---|---|
| Wire size | fine-strand with wire end ferrule | 0.2-4 mm² (24-11 AWG) |
| | fine-strand without wire end ferrule | 0.2-6 mm² (24-10 AWG) |
| | rigid | 0.2-6 mm² (24-10 AWG) |
| Stripping length | | 8 mm (0.31 in) |
| Tightening torque | | 0.6 Nm (5.5 lb.in) |

| Electrical connection - signalling circuit | | 13, 14 |
|---|---|---|
| Wire size | fine-strand with wire end ferrule | 0.2-4 mm² (24-11 AWG) |
| | fine-strand without wire end ferrule | 0.2-6 mm² (24-10 AWG) |
| | rigid | 0.2-6 mm² (24-10 AWG) |
| Stripping length | | 8 mm (0.31 in) |
| Tightening torque | | 0.6 Nm (5.5 lb.in) |

| Environmental data | | |
|---|---|---|
| Ambient temperature range | operation | -40...+70 °C |
| | rated load | -40...+60 °C |
| | storage | -40...+85 °C |
| Damp heat, cyclic | IEC/EN 60068-2-30 | 95 % without condensation |
| Vibration, sinusoidal | IEC/EN 60068-2-6 | 2 g, 10-500 Hz, 2G, each along X, Y, Z axes 60 min / cycle |
| Shock, half-sine | IEC/EN 60068-2-27 | 15 g, 11 ms, 3 axes, 6 faces, 3 times for each face |

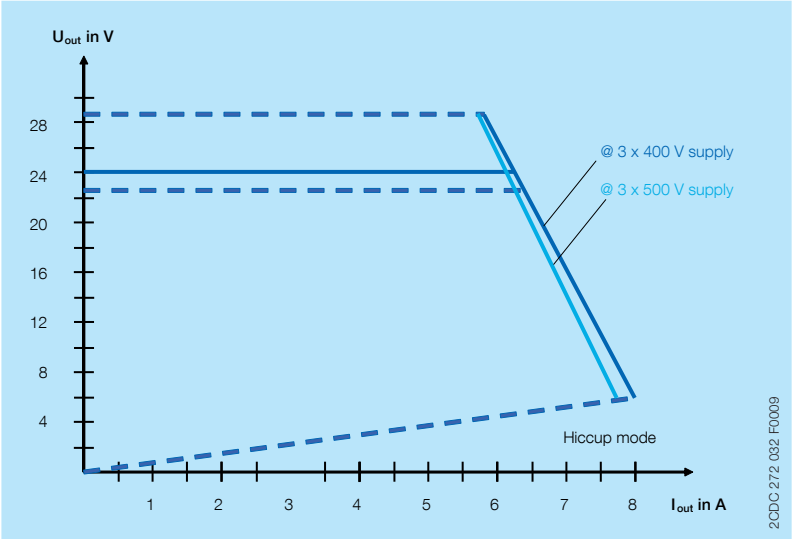
| Isolation data | | |
|---|---|---|
| Rated insulation voltage $U_i$ | input circuit / output circuit | 3 kV AC |
| | input / PE | 1.5 kV AC |
| | output / PE | 0.5 kV AC; 0.71 kV DC |
| | signalling contact / PE | 0.5 kV DC |
| Pollution degree | | 2 |
| Overvoltage category | UL/EN/IEC 60950-1 | II |

| Standards | |
|---|---|
| Product standard | EN 61204-3 |
| Low Voltage Directive | 2006/95/EC |
| EMC Directive | 2004/108/EC |
| RoHS Directive | 2002/95/EC |
| Electrical safety | EN 60950-1, UL 60950-1, UL 508, EN 61558-1, EN 61558-2-17, EN 60204-1 |
| Protective low voltage | SELV |

| Electromagnetic compatibility | | |
|---|---|---|
| Interference immunity to | | IEC/EN 61000-6-2 |
| electrostatic discharge | IEC/EN 61000-4-2 | level 4 (air discharge 15 kV / contact discharge 8 kV) |
| radiated, radio-frequency, electromagnetic field | IEC/EN 61000-4-3 | level 3 (10 V/m) |
| electrical fast transient/burst | IEC/EN 61000-4-4 | level 4 (4 kV / 2.5 kHz) |
| surge | IEC/EN 61000-4-5 | L-L level 3 (2 kV) / L-PE level 4 (4 kV) |
| conducted disturbances, induced by radio-frequency fields | IEC/EN 61000-4-6 | level 3 (10 V) |
| power frequency magnetic fields | IEC/EN 61000-4-8 | level 4 (30 A/m) |
| voltage dips, short interruptions and voltage variations | IEC/EN 61000-4-11 | dips: >95 % 0.5 ms / >30 % 0.5 ms interruptions: >95 % 250 ms |
| Interference emission | | IEC/EN 61000-6-3 |
| high-frequency radiated | IEC/CISPR 22, EN 55022 | class B |
| high-frequency conducted | IEC/CISPR 22, EN 55022 | class B |
| limits for harmonic current emissions | IEC/EN 61000-3-2 | class A |

## Technical diagrams

### Output behaviour



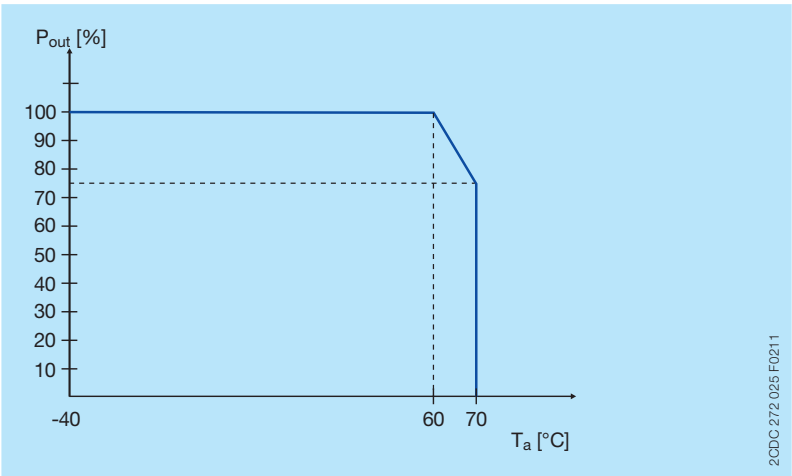

Characteristic curve of output at $T_a$ = 25 °C

The switch mode power supply CP-T 24/5.0 is able to supply at 24 V DC output voltage and

- at an ambient temperature of:
  ≤ 60 °C a continuous output current of approx. 5 A
- at ambient temperatures of:
  60 °C < $T_a$ ≤ 70 °C the output power has to be reduced by 2.5 % per °C temperature increase.

If the switch mode power supply is loaded with an output current > 5 A, the operating point is passing through the U/I characteristic curve shown.

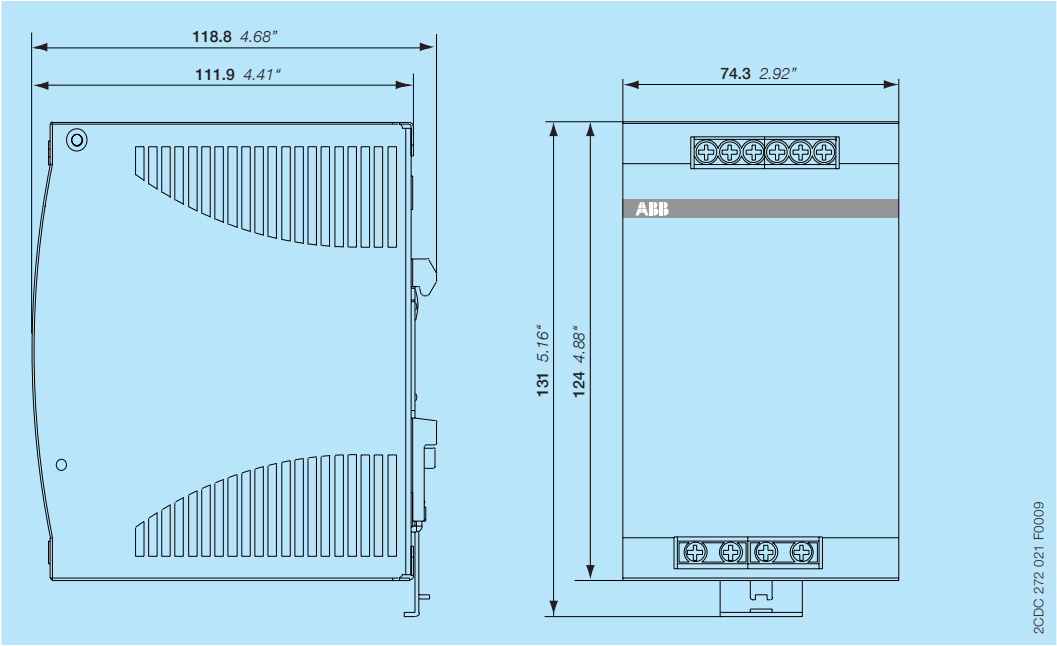
### Temperature behaviour



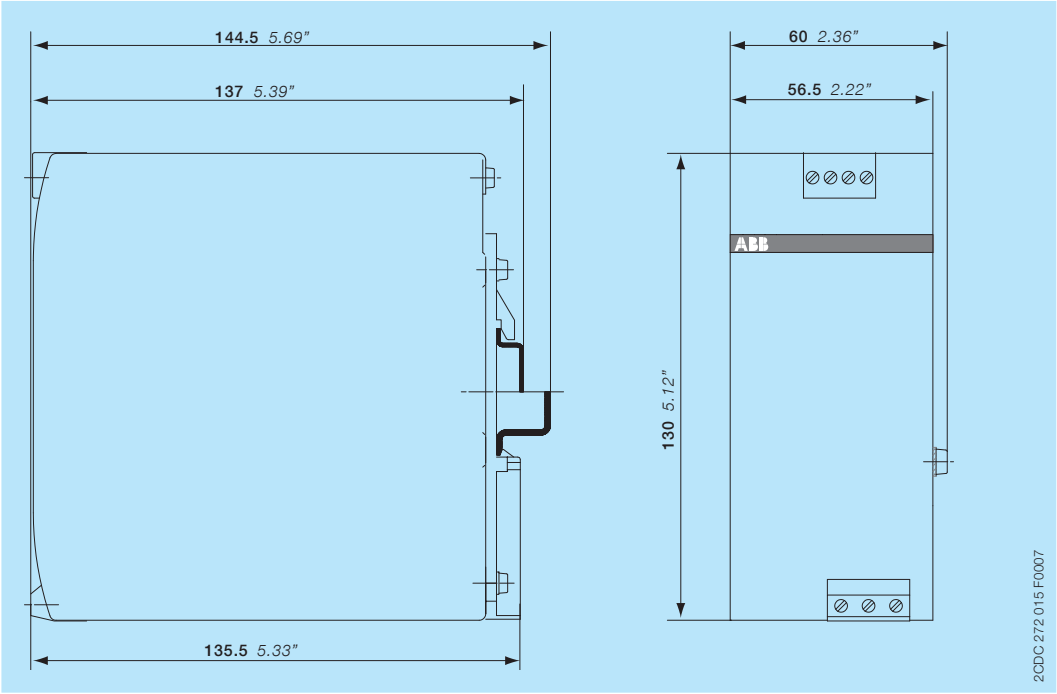

Characteristic curve of temperature at rated load

## Dimensions

in **mm** and inches




Power supply




Accessory redundancy unit CP-A RU

## Further documentation

| Document title | Document type | Document number |
|---|---|---|
| Electronic products and relays | Technical catalogue | 2CDC 110 004 C020x |
| Power supply units | Application manual | 2CDC 114 048 M020x |
| Redundancy unit CP-A RU | Data sheet | 2CDC 114 036 D0202 |

You can find the documentation on the internet at www.abb.com/lowvoltage -> Control Products -> Power Supplies

## CAD system files

You can find the CAD files for CAD systems at http://abb-control-products.partcommunity.com/PARTcommunity/Portal/abb-control-products -> Low Voltage Products & Systems -> Control Products -> Power Supplies.

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**Document number 2CDC114067D0201** printed in Germany (08/12)

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