

# Power Supply CP-C.1 24/10.0

## Primary switch mode power supplies

The CP-C.1 power supplies are ABB's high-performance and most advanced range. With excellent efficiency, high reliability and innovative functionality it is prepared for the most demanding industrial applications. The CP-C.1 has a 50 % integrated power reserve and operates at an efficiency of more than 94 %. Furthermore it is equipped with overheat protection and active power factor correction. This together with a broad AC and DC input range and extensive worldwide approvals completes the CP-C.1 as the preferred choice for professional DC applications. Giving the power to control.



### Characteristics

- Rated output voltage 24 V DC
- Power reserve design delivers up to 150 % at  $T_a \leq 40^\circ\text{C}$  <sup>1)</sup>
- Output voltage adjustable via front-face rotary potentiometer "OUTPUT Adjust", 22.5-28.5 V
- Supply voltage range 100-240 V AC (85-264 V AC, 90-350 V DC) - approvals at DC supply valid up to 300 V DC
- Typical efficiency > 94 %
- Low power dissipation and low heating
- Free convection cooling (no forced cooling)
- Operation temperature range -25...+70 °C
- Open-circuit, overload and short-circuit stable
- Integrated input fuse
- Redundancy unit CP-A RU offering true redundancy, available as accessory
- DC OK - signaling output "13-14" (Relay), Power reserve signaling output " $I > I_R$ " (Transistor)

<sup>1)</sup> 22.5- 24 V: max 15A, 24-28.5 V: reduction of 1A/V

### Approvals <sup>1)</sup>



UL 508, CSA-C22.2 NO. 107.1-01

UL 60950-1, CAN/CSA C22.2 No.60950-1

SEMI F47



CB scheme: IEC 60950

### Marks



<sup>1)</sup> Approvals refer to rated input voltage  $U_{in}$

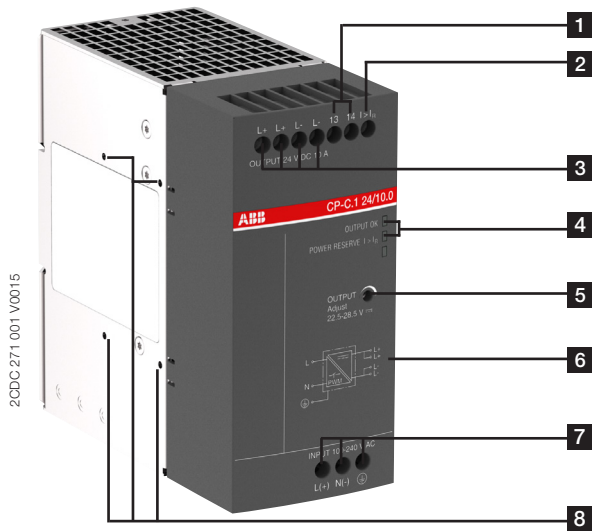
### Order data

Type	Input voltage range	Rated output voltage	Rated output current	Order code
CP-C.1 24/10.0	100-240 V AC	24 V DC	10 A	1SVR360663R1001

### Related products

Type	Input voltage range	Rated output	Rated output current	Order code
CP-A RU Redundancy module	10-28 V DC	24 V DC	1-40 A	1SVR427071R0000

## Functions



- 1** 13-14: DC o.k. relay output
- 2** I > I<sub>R</sub>: power reserve transistor output
- 3** OUTPUT L+, L-: terminals - output
- 4** Indication of operational states  
OUTPUT OK: Green LED  
POWER RESERVE I > I<sub>R</sub>: yellow LED
- 5** OUTPUT Adjust: rotary potentiometer -  
adjustment of output voltage 22.5 - 28.5
- 6** Circuit diagram
- 7** INPUT L, N, PE: terminals - input
- 8** Side mounting screwholes for DIN rail adapter / lateral mounting

## Application

The primary switch mode power supply CP-C.1 24/10.0 has a wide range AC or DC supply input. Furthermore the CP-C.1 24/10.0 is equipped with capacitors that ensure a hold-up time of at least 50 ms. This enables worldwide usage and permits safe operation in fluctuating networks and battery-powered applications.

The CP-C.1 has a robust metallic housing and reliable construction which enables usage in harsh industrial environments. The power reserve of up to 50 % enables trouble-free starting of heavy loads eliminating the need of usage of an oversized power supply.

## Power reserve

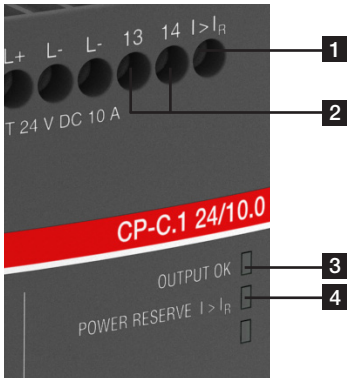
The primary switch mode power supply CP-C.1 is equipped with a power reserve to handle start-up of particularly heavy loads for example during the start-up (e.g. of a process or a motor). To ensure that heavy loads are started up the CP-C.1 delivers up to 50 % of the nominal current to secure the operation of the application. This status is indicated by the yellow LED giving a clear visual status of the operation mode and through the transistor output I > I<sub>R</sub>.

## Signaling output

For the communication of the status of the power supply CP-C.1 is equipped with an output relay to signal DC OK as well as a transistor output to indicate when the power reserve is active. This signal can be used for communication to a higher level control system e.g. a PLC.

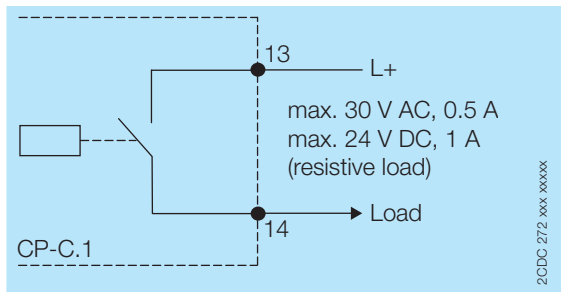
### Status indication and signaling output for OUTPUT OK and Power Reserve function

The CP-C.1 features integrated status indication LEDs on the front of the power supply.

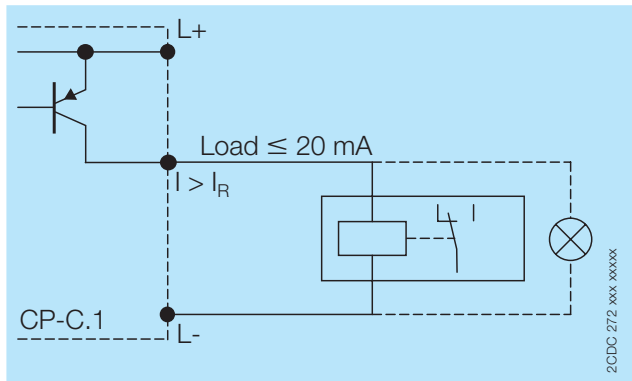


- 1** Transistor output  $I > I_R$  can be used to signal the status of the power reserve mode
- 2** Output relay 13-14 can be used for signaling of the status of the output voltage
- 3** OUTPUT OK green LED indicates status of the output voltage
- 4** POWER RESERVE yellow LED indicates when the power supply is in power reserve mode

### LED and relay state table



Output OK - relay output



Power reserve -transistor output

### LEDs and signaling outputs

Output voltage	$\geq 22.5 \text{ V DC}$	Output OK: LED green	Relay 13-14 closed
	$< 21.5 \text{ V DC}$		Relay 13-14 open
Output current	$I \leq I_R$	Power reserve: LED yellow OFF	Transistor $I > I_R$ ON (closed)
	$I > I_R$		Transistor $I > I_R$ OFF (open)

It is possible to use the messaging and signaling functionality with power supplies connected in parallel. A parallel operation of power supplies has no influence on the function.

## Operating mode

### Parallel operation

There are two main reasons for a parallel connection of power supplies:

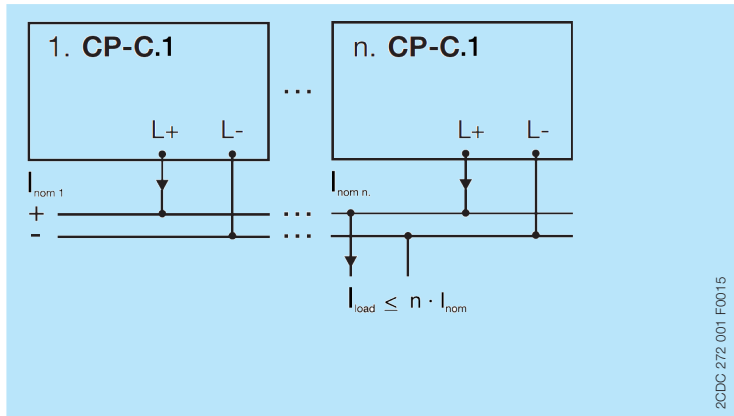
- Increase of power
- Fail-safety, redundancy

Up to 5 devices of the same type can be connected in parallel. For safe and reliable operation it is important to follow the recommendations given in the following section.

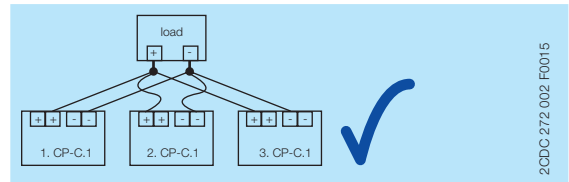
### Parallel connection of power supplies for increased power

If the current required by the load is higher than a single power supply can deliver, for example after the expansion of an existing installation, an increase of the output power can be obtained by connecting power supplies in parallel. The following prerequisites have to be fulfilled when connecting power supplies in parallel for the purpose of increased power:

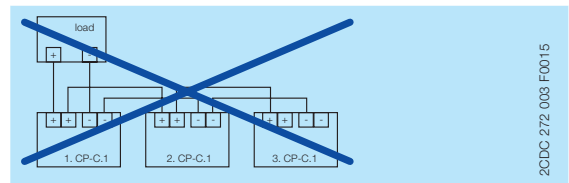
- The paralleled devices must be identical.
- The following has to be observed when connecting the power supplies in order to prevent different voltage drops on the supply lines or at the terminals which would lead to unbalanced load at the common connection point (refer to "Current balance"):
  - Identical lengths of the load supply lines.
  - Identical conductor cross sections of the load supply lines.
  - Terminal screws have to be fastened with the same torque to guarantee equal contact resistances.
  - The output voltages of the power supplies must not differ by more than 50 mV. Otherwise, safe operation is not possible (refer to "Balancing of power supplies").



Installation for increased power



Correct wiring for increased power



Incorrect wiring for increased power

Important:

The devices must not be connected directly to each other! This could lead to an overload of the terminals since the terminals are dimensioned for the maximum output current of a single power supply only. Always use a common connection point!

### Parallel connection of power supplies for redundancy

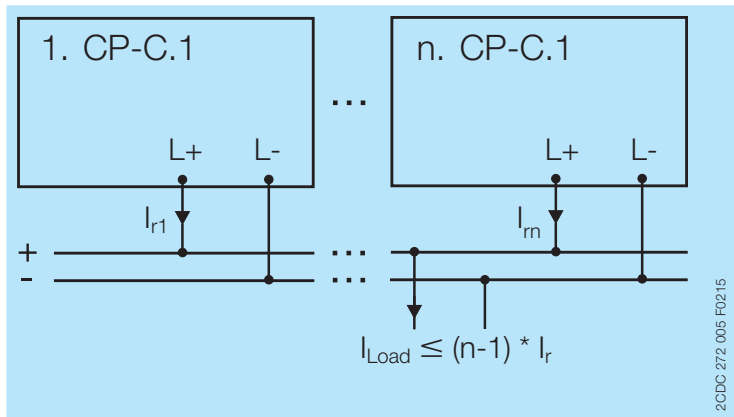
Several power supplies are connected in parallel in order to guarantee continuous operation of the system if one power supply fails. CP-C.1 can be used in two different redundancy modes depending on what type of redundancy is required:

- Simple redundancy, n+1
- True redundancy

**Simple redundancy, n+1 redundancy**

For simple or n+1 redundancy, the power supplies are connected in parallel like for the increase of capacity. To achieve redundancy the current required by the load must not exceed the maximum output power of one single power supply (in case of "1+1 redundancy") or n powersupplies (where n is max. 4).

It is recommended to connect the primary sides of the power supplies to different phases of the mains in order to obtain continuous operation of the system if one phase fails.



**Simple redundancy n+1 setup**

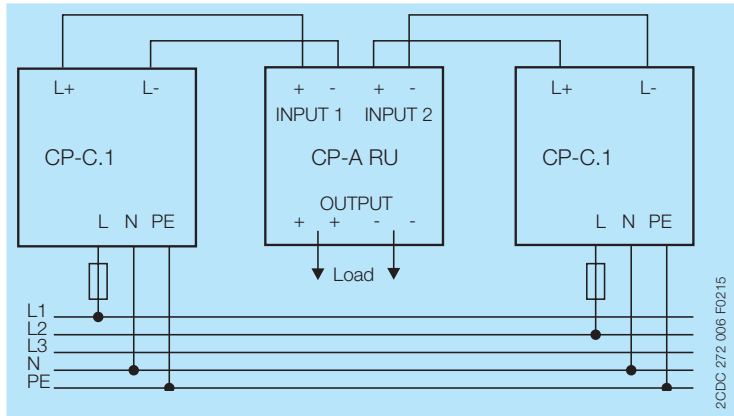
**True redundancy**

True redundancy gives higher system availability compared to simple or n+1 redundancy.

In a true redundancy setup the power supplies are decoupled from each other with decoupling diodes. This protects the individual power supplies from affecting each other in case of failure of one unit or short-circuit on the secondary side or in the wiring.

For output currents up to 40 A the ABB CP-A RU (available as an accessory) can be used.

The inputs of these units are connected to the terminals L+ and L- of the power supplies. The loads are supplied directly from the outputs of the redundancy unit.



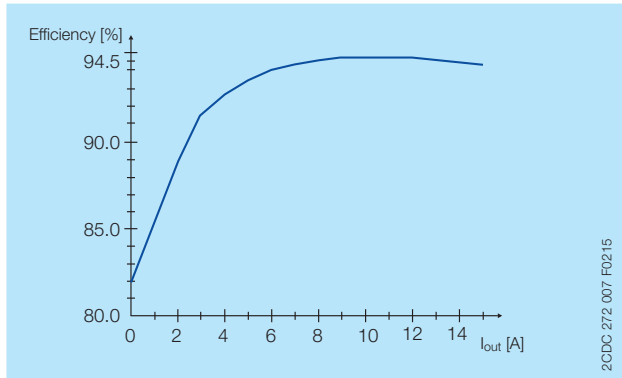
**True redundancy using a CP-A RU diode decoupling unit**

### Adjustable output voltage

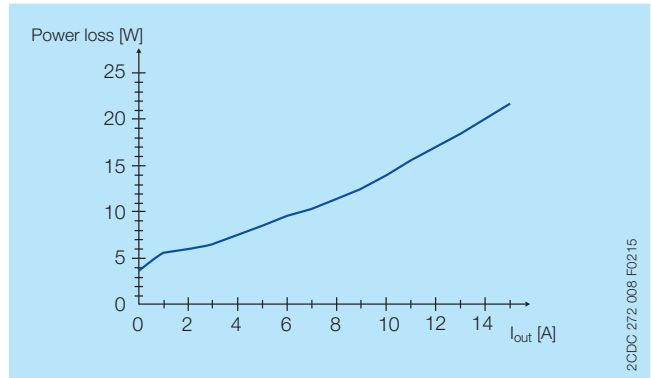
The CP-C range power supplies feature a continuously adjustable output voltage of 22.5 to 28.5 V DC. Thus they can be optimally adapted to the application, e.g. compensating the voltage drop caused by a long line length.

### Efficiency diagrams

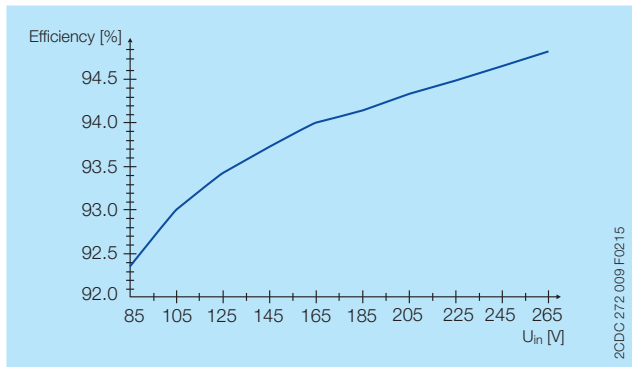
The efficiency and thus the power losses depends on the output current, input voltage, output voltage and ambient temperature as illustrated in the diagrams below.



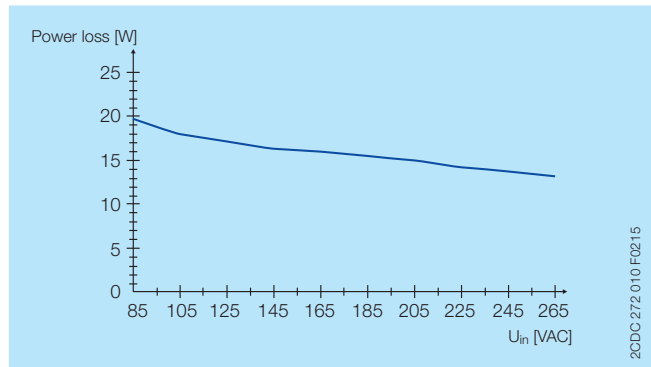
Efficiency over output current 10 A



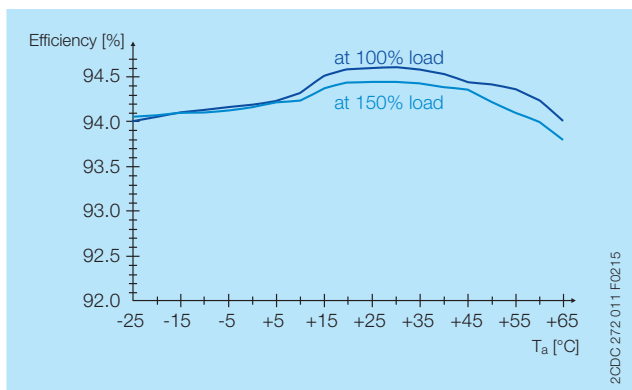
Power loss over output current 10 A



Efficiency over input voltage 230 V DC



Power loss over AC input voltage



Efficiency over ambient temperature range