

Technical data

Data at $T_a = 25\text{ °C}$, $U_{in} = 230\text{ V AC}$ and rated values, typical values unless otherwise indicated

Input circuit - Supply circuit

		L (+), N (-)
Rated input voltage U_{in}		100-240 V AC
Input voltage range	AC	85-264 V AC
	DC	90-350 V DC (UL 508; UL/IEC 60950 approved up to 300 V DC)
Typical input current	at 115 V AC	typ. 1.12 A
	at 230 V AC	typ. 0.57 A
Typical power consumption		132 W
Frequency range	AC	45-65 Hz
Inrush current limiting, cold state	at 115 V AC	3.22 A
	at 230 V AC	7.08 A
I^2t	at cold start	0.6 A ² s, typical
Discharge current towards PE		< 3.5 mA
Hold-up time	at 115 V AC	min. 60 ms
	at 230 V AC	min. 60 ms
Internal input fuse		T4.0 A
Recommended backup fuse for wire protection at 1.5 mm ²		1 pole miniature circuit breaker ABB type S 200
	characteristic	B or C
	max. rating	16 A
Power factor correction (PFC)		yes
Transient overvoltage protection		yes, varistor

User interface

Indication of operational states			
Output voltage	LED 'OUTPUT OK' (green)	ON	> 22.0 V DC (>92 % of set output voltage)
		Flashing	< 21.5 V DC (<90 % of set output voltage)
Power reserve	LED 'I > I _R ' yellow	OFF	$I \leq I_R$
		ON	$I > I_R$

Output circuit - Power output

		L+, L-
Rated output voltage		24 V DC
Tolerance of the output voltage		± 1 %
Adjustment range of the output voltage		22.5-28.5 V DC
Rated output power		120 W
Rated output current I_r	$T_a \leq 60\text{ °C}$	5.0 A
	$T_a \leq 40\text{ °C}$	7.5 A continuously
Peak short-circuit current		18 A
Short-circuit current limit		7.5 A
Derating of the output current above 60 °C		2.5 %/°C
Maximum deviation with of output voltage	load change statical 10-90%	< 1 %
	dynamical 10-90%	< 2 %
	change of input voltage within the input voltage range	< 0.1 %
Control time	at rated load	< 1 ms
Starting time after applying the supply voltage	at rated load	435 ms, class C acc. to IEC/EN 61204
	with 3500 µF	
Rise time	at rated load	< 10 ms
	with 3500 µF	
Fall time		< 20 ms
Residual ripple and switching peaks	BW = 20 MHz	36 mVpp, class A acc. to IEC/EN 61204
Parallel connection		yes, up to 5 devices, to enable redundancy and to increase power, current not symmetrical
Series connection		yes, max. 2 devices to increase voltage

No-load, overload and short-circuit behavior	
Characteristic curve of output	U/I characteristic curve with power reserve
Short-circuit protection	continuous short-circuit stability
Short-circuit behavior	current limiting
Current limiting at short circuit	7.5 A
Resistance to reverse feed	35 V DC
Overload protection	constant current limitation; characteristic D acc. to IEC/EN 61204
Overtemperature protection	protection by switch off in case of overtemperature (thermal protection), automatic restart
No-load protection	continuous no-load stability
Starting of capacitive loads	unlimited

Signaling outputs

OUTPUT OK signaling output	
Type of output	relay, n/o contact
Contact material	Cd free
ON (contact closed)	> 22.0 V DC (>92 % of set output voltage)
OFF (contact open)	< 21.5 V DC (<90 % of set output voltage)
Contact ratings	max. switching voltage / current 30 V AC - 0.5 A / 24 V DC - 1 A (resistive load) min. switching voltage / current 5 V DC / 1 mA
Insulation voltage to any other electrical circuits	see isolation data

POWER RESERVE signaling output	
Type of output	transistor
Active / ON (closed)	$I \leq I_R$
OFF (open)	$I > I_R$
Ratings	voltage 24 V DC (same potential as power supply output L+) current 20 mA limited at 24 V, short-circuit proof

General data

Efficiency	at rated load	> 92,5 %
Power loss	at rated load	11.6 W
	at 50% of rated load	7.6 W
	at no load	3.6W
Duty time		100 %
MTBF	acc. to MIL 217 HDBK	on request
Dimensions (W x H x D)		40.0 x 129.4 x 136.0 mm (1.57 x 5.094 x 5.354 in)
Weight	net weight	0.75 kg (1.653 lb)
	gross weight	0.85 kg (1.874 lb)
Material of housing	cover	zinc-coated sheet-steel
	enclosure shell	aluminium
	front	plastic, PA6, V-0
Mounting		DIN rail (EN 60715), snap-on mounting without any tool
Mounting position		horizontal
Minimum distance to other units	horizontal	max. 25 mm (0.98 in)
	vertical	max. 25 mm (0.98 in)
Degree of protection (IEC/EN 60529)	enclosure / terminals	IP20 / IP20
Protection class (EN 61140)		I

Electrical connection

Input circuits (L(+), N(-), PE)		
Wire size	fine-strand with(out) wire end ferrule / rigid	0.5-2.5 mm ² (20-12 AWG) / 0.5-4.0 mm ² (20-10 AWG)
Stripping length		8 mm (0.315 in)
Tightening torque		0.5 Nm (4.4 lb.in)
Output circuits (L+, L+, L-, L-)		
Wire size	fine-strand with(out) wire end ferrule / rigid	0.5-2.5 mm ² (20-12 AWG) / 0.5-4.0 mm ² (20-10 AWG)
Stripping length		8 mm (0.315 in)
Tightening torque		0.5 Nm (4.4 lb.in)
Signaling output (13-14, I > I _N)		
Wire size	fine-strand with(out) wire end ferrule / rigid	0.5-2.5 mm ² (20-12 AWG) / 0.5-4.0 mm ² (20-10 AWG)
Stripping length		8 mm (0.315 in)
Tightening torque		0.5 Nm (4.4 lb.in)

Environmental data

Ambient temperature range	operation	-25...+70 °C (-13 ... +158 °F)
	rated load	-25...+60 °C (-13 ... +140 °F)
	storage	-40...+85 °C (-13 ...+185 °F)
	transportation	-40...+85 °C (-40 ...+185 °F)
Climatic category (IEC/EN 60721-3-1)	storage	1K2 (-40...+85 °C / -40...+185 °F)
Climatic category (IEC/EN 60721-3-2)	transportation	2K2 (-40...+85 °C / -40...+185 °F)
Climatic category (IEC/EN 60721-3-3)	operation	3K3
Damp heat, cyclic (IEC/EN 60068-2-30)		95 % RH without condensation
Vibration, half-sine (IEC/EN 60068-2-6)		10-58 Hz, amplitude ±0.15 mm 58-150 Hz, 2 g, 10 sweep cycles each axis
Shock, half-sine (IEC/EN 60068-2-27)		30 g, 6 ms, 3 each axis bump 20 g, 11 ms, 100 each axis

Isolation data

Rated impulse withstand voltage U _{imp} (EN 50178)	input circuit / output circuit	4 kV (1.2/50 μS)
	input circuit / PE	4 kV (1.2/50 μS)
	input circuit / relay contact	4 kV (1.2/50 μS)
	output circuit / relay contact	0.5 kV (1.2/50 μS)
	relay contact / PE	0.5 kV (1.2/50 μS)
	output circuit / PE	0.5 kV (1.2/50 μS)
Overvoltage category (EN 50178)	< 2000m	III
	2000...5000m	II
Overvoltage category (EN 60950-1)	< 2000m	II
	2000...5000m	I
Pollution degree (IEC/EN 60950-1; EN 50178)		2
Test voltage between all isolated circuits, type test (IEC/EN 60950-1)	input circuit / output circuit	3 kV AC; 4242 V DC
	input circuit / PE	1.5 kV AC; 2121 V DC
	relay contact / output circuit	0.5 kV AC; 707 V DC
	output circuit / PE	0.5 kV AC; 707 V DC
Test voltage between all isolated circuits, routine test	input circuit / output circuit	1.5 kV AC; 2121 V DC
	input circuit / PE	1.5 kV AC; 2121 V DC
	relay contact / output circuit	1.5 kV AC; 2121 V DC
	output circuit / PE	0.5 kV DC
Protective separation (IEC/EN 60950-1)	input circuit / output circuit	Yes
	input circuit / relay contact	Yes

Standards

Product standard	IEC/EN 61204
Low Voltage Directive	2006/95/EC
EMC directive	2004/108/EC
RoHS directive	2011/65/EC
Electrical safety	IEC/EN 60950-1, IEC/EN 61204-7, UL/cUL Recognized UL 60950-1
Safety of ..., power supply units ...Particular requirements and tests for switch mode power supply units and transformers for switch mode power supply units	IEC/EN 61558-2-16 covered by IEC 60950-1
Electrical equipment of machines	EN 60204 (surge voltage category III)
Industrial control equipment	UL/cUL Listed UL 508 and CSA 22.2 No 107.1
Limitation of output power	UL 1012
Programmable controllers – Part 2: Equipment requirements and test references	IEC/EN 61131-2 applicable parts
Electronic equipment for use in power installations	EN 50178/VDE 0160
Protective extra low voltage	PELV (IEC/EN 61204)
Safety extra low voltage	SELV (IEC/EN 60950-1)
Protection for safety – Protection against electric shock	VDE 0100-410, IEC 60364-4-41
Limitation of harmonic line currents	According to IEC/EN 61000-3-2

Electromagnetic compatibility

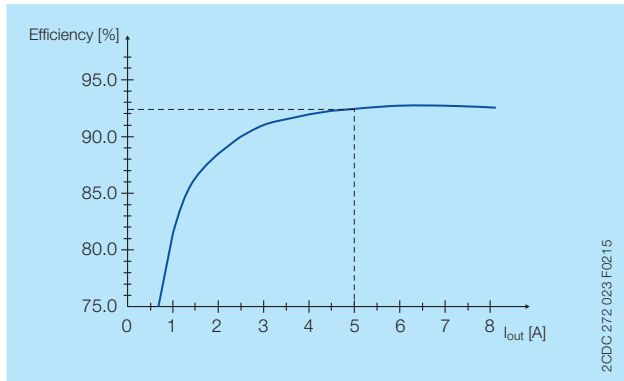
Low-voltage power supplies, d.c. output – Part 3: Electromagnetic compatibility (EMC)	IEC/EN 61204-3	
Interference immunity to		IEC/EN 61000-6-1 and IEC/EN 61000-6-2
electrostatic discharge (ESD)	IEC/EN 61000-4-2	Level 4, 8 kV / 15 kV
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	Level 3, 10 V/m
electrical fast transient/burst	IEC/EN 61000-4-4	Level 3, 2 kV
surge	IEC/EN 61000-4-5	L-N 2 kV (Level 3), L/N-PE 4 kV (Level 4)
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	
damped oscillatory magnetic fields	IEC/EN 61000-4-10	
voltage dips, short interruptions and voltage variations	IEC/EN 61000-4-11	Class 3
ring waves	IEC/EN 61000-4-12	
harmonics and interharmonics	IEC/EN 61000-4-13	
conducted, common mode disturbances in the frequency range 0 Hz to 150 kHz	IEC/EN 61000-4-16	10 V
damped oscillatory wave immunity test	IEC/EN 61000-4-18	
Interference emission		IEC/EN 61000-6-3 and IEC/EN 61000-6-4
Limits – Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)	IEC/EN 61000-3-2	Class A
Limits – Limitation of voltage changes „voltage fluctuations and flicker in public low-voltage supply systems, „for equipment with rated current ≤ 16 A per phase and not subject“ to conditional connection	IEC/EN 61000-3-3	compliant
Emission standard for residential commercial and light-industrial environments	IEC/EN 61000-6-3	compliant
Emission standard for industrial environments	IEC/EN 61000-6-4	compliant
Information technology equipment Radio disturbance characteristics Limits and methods of measurement	IEC/CISPR 22, EN 55022	Class B
Industrial scientific and medical (ISM) radio-frequency equipment Electromagnetic disturbance characteristics Limits and methods of measurement	IEC/CISPR 11, EN 55011	Class B
Voltage sags	SEMI F47	compliant
Federal Communications Commission	FCC15	compliant

Technical diagrams

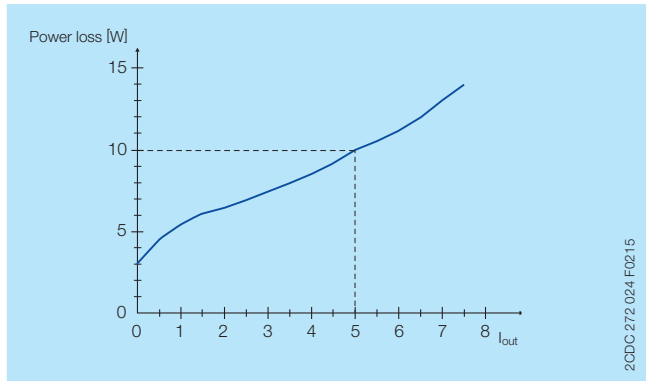
Data at $T_a = 25\text{ }^\circ\text{C}$, $U_{in} = 230\text{ V AC}$ and rated values, typical values unless otherwise indicated

Efficiency diagrams

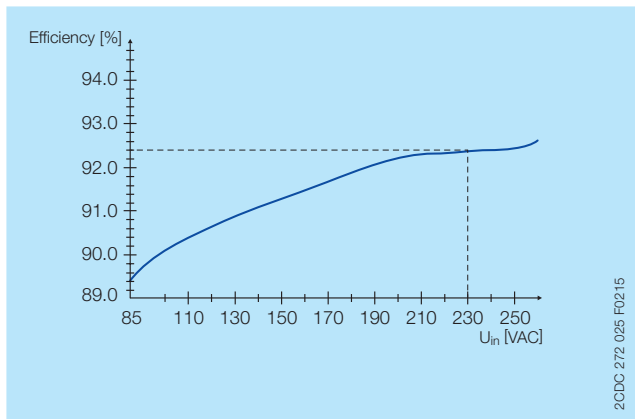
The efficiency and thus the power loss depends on the output current, input voltage, output voltage and ambient temperature as illustrated in the diagrams below.



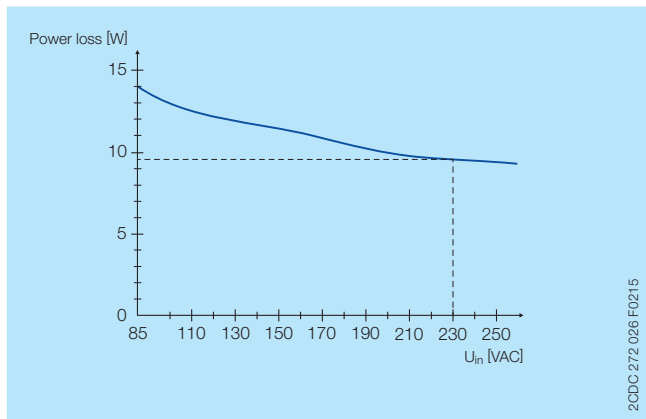
Typical efficiency over output current



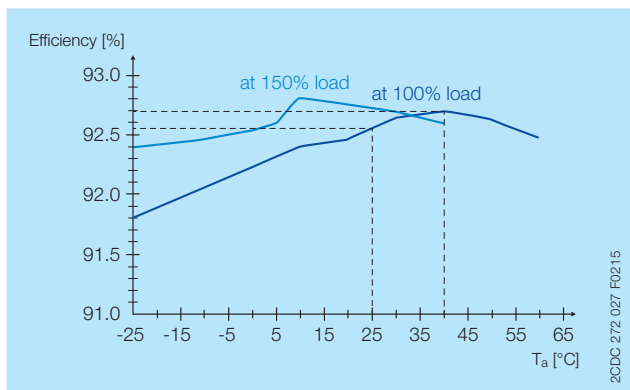
Typical power loss over output current



Typical efficiency over AC input voltage

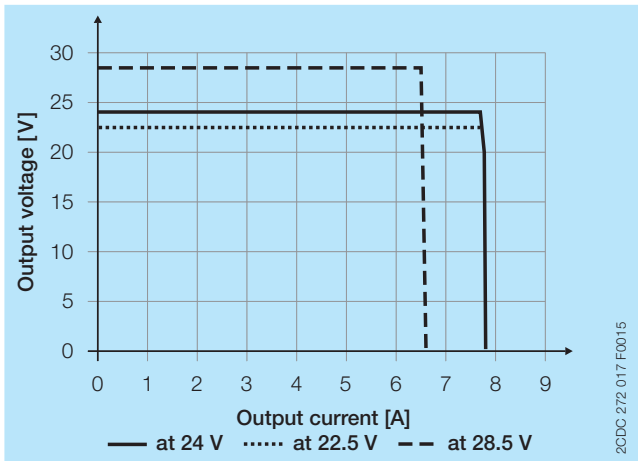


Typical power loss over AC input voltage



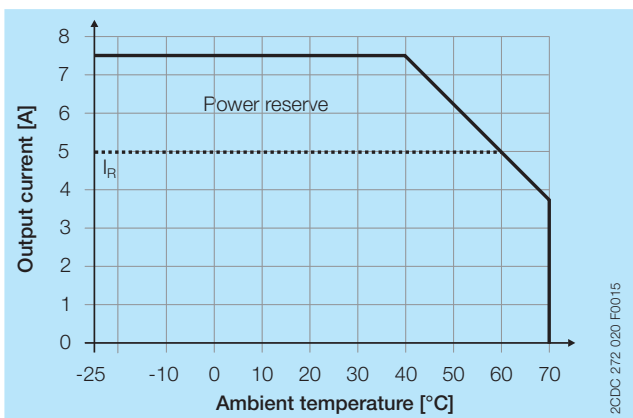
Typical efficiency over ambient temperature

Characteristic curve of output



Characteristic curve of output at T_a = 25 °C

Characteristic curve of temperature



Characteristic curve of temperature at U_{out} = 24 V

The switch mode power supply CP-C.1 24/5.0 is able to supply at 24 V DC output voltage and at an ambient temperature of

- ≤ 40 °C a continuous output current of typ. ≤ 7.5 A
- ≤ 60 °C the rated current of 5 A

At ambient temperatures of > +60 °C up to +70 °C the output power has to be reduced by 2.5 % per Celcius temperature increase.

At thermal overload the device will switch-off as soon as the internal temperature exceeds the acceptable level. The exact ambient temperature threshold depends on positioning, orientation and placement of the power supply.

If the switch mode power supply is loaded with an output current > 7.5 A, the operating point is passing through the U/I characteristic curve shown.