

wipos

wipos PSU3 Power supplies

Technical specification

Dok.-Nr. BA001383

Stand: 07/2025 (Rev. A)

INFO

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Subject to change

Subject to technical changes for reasons of continued development.

Industries & Applications


ePLAN
data portal

Features & Benefits

- ▶ **Wide 3 phase input range** for various AC power systems
- ▶ **Wide DC input range** for various DC power systems
- ▶ **Parallel mode switch** to activate load balancing behaviour
- ▶ **Two means of transient protection** increase process stability
- ▶ **Fast OVP control** protects sensitive loads
- ▶ **Very low inrush energy peak (I^2t)** saves cost for input line protection
- ▶ **Push-in terminals available** to serve individual application needs
- ▶ **High efficiency and low stand-by losses contribute to an eco-friendly energy footprint**
- ▶ **DC-OK and inhibit relay contacts** for professional integration into applications control architecture
- ▶ **Comprehensive boost power capabilities** support start-up into capacitive loads and increase system design flexibility
- ▶ Designed to meet the most accepted IEC safety standards
- ▶ Exceeds regulatory EMC standards on radiated emission (Class B), surge immunity and fast transients


Technical data abstract¹

Output voltage	nom.	24V _{DC}
Adjustment range	nom.	22.5 .. 29V _{DC}
Output current	nom.	10A
Boost current 1 ⁴	max.	12A / 300s
Boost current 2 ⁴	max.	15A / 60s
Overload behaviour		CC + Intermittent mode (Hiccup)
Hold-up time ²	min.	20 / 40ms
Frequency range	max.	47 .. 63Hz
AC input voltage	nom.	3x400 .. 500V _{AC}
AC input voltage range	max.	3x350 .. 575V _{AC}
DC input voltage	nom.	530 .. 675V _{DC}
DC input voltage	max.	450 .. 810V _{DC}
Inrush current ²	typ.	25 / 30A
Inrush energy ²	typ.	0.3 / 0.8A ² s
Output power	nom.	240W
Boost power 1 ⁴	max.	288W / 300s
Boost power 2 ⁴	max.	360W / 60s
Power factor	typ.	0.6
Conversion efficiency ²	typ.	93.1 / 93.2%
Power losses ²	typ.	17.8 / 17.5W
No-load consumption	max.	1.9 / 2.3W
Ambient operating temperature	max.	-25 .. +70°C (-13 .. +158°F)
	nom.	-25 .. +55°C (-13 .. +131°F)
Service lifetime ²	min.	125 000 / 136 000hrs
Service life MTBF ³	min.	5.7M / 1.8M hrs
Width		55mm (2 ¹ / ₁₆ in)
Height		129mm (5 ¹ / ₁₆ in)
Depth		138.2mm (5 ⁷ / ₁₆ in)
Weight		780g (1.72lb)

¹ All values refer to STC unless otherwise stated | ² 400/500V_{AC} | ³ 50% / 100% P_{out,nom}
⁴ See duty cycle 1/2 under „4. Performance“ on page 11

Certifications & Approvals


IEC EN 61010-1
IEC EN 61010-2-201
IEC EN 62368-1 (Ed.2)

UL CSA 61010-1
UL CSA 61010-2-201
E169904

UL CSA 62368-1 (Ed.2)
E197597

Compliance & Registration


EU Low Voltage Dir. 2014/35/EU
EU EMC Dir. 2014/30/EU
EU RoHS Dir. 2011/65/EU

Safety and EMC Reg. 2016
Hazard. Substances Reg. 2012


China RoHS Law SJ/T 11363-2006



Commercial information

Order codes	wipos PSU3 24-10 P
HS code	85044095
Life-cycle status	Launch
Product revision	D06
Single package	
Width	70mm (2 ³ / ₄ in)
Height	180mm (7 ³ / ₃₂ in)
Depth	166mm (6 ¹⁷ / ₃₂ in)
Gross weight	900g (1.98lb)
Bulk package	
Width	340mm (13 ²⁵ / ₆₄ in)
Height	205mm (8 ⁵ / ₆₄ in)
Depth	405mm (15 ¹⁵ / ₁₆ in)
Quantity	10 units
Pallet	
Width	1000mm (39 ³ / ₈ in)
Length	1200mm (47 ¹ / ₄ in)
Quantity	240 units
Manufacturer warranty	2 years

Model selector

Model name	Output Power	Output Voltage	Feature
WIPOS PSU3 24-5 P	120W	24V _{DC}	Push-in terminals
WIPOS PSU3 24-10 P	240W	24V _{DC}	Push-in terminals
WIPOS PSU3 24-20 P	480W	24V _{DC}	Push-in terminals
WIPOS PSU3 24-40 P	960W	24V _{DC}	Push-in terminals
WIPOS PSU3 48-5 P	240W	48V _{DC}	Push-in terminals
WIPOS PSU3 48-10 P	480W	48V _{DC}	Push-in terminals
WIPOS PSU3 48-20 P	960W	48V _{DC}	Push-in terminals



wipos UPS



Uninterruptible DC power supply

DC Input: 10 .. 60V_{DC}
DC Output: 10 .. 58V_{DC}
Output Power: 960W
Battery Input: 10 .. 58V_{DC}
Programmable with wipos PLAN Software

wipos UPS 960-20 P
with Display and keys as human interface & programming

wipos UPS 960-20 ECO
without Display and keys, programming only by USB-Interface & wipos PLAN Software

[wipos UPS](#)

wipos PSW



Wide range power supply

Input voltage range 1phase, 2phase, 3phase: 187 .. 550V_{AC}

wipos PSW 24-5
Output voltage: 23 .. 28V_{DC}
Output current nom.: 5A

wipos PSW 24-10
Output voltage: 23 .. 28V_{DC}
Output current nom.: 10A

wipos PSW 24-20
Output voltage: 23 .. 28V_{DC}
Output current nom.: 20A

wipos PSW 48-10
Output voltage: 45 .. 55V_{DC}
Output current nom.: 10A

[wipos PWS](#)



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List of abbreviations

avg.	<i>average</i>	The arithmetic average calculated from a row of values.
CC		Constant output current
CGD		Corner grounded delta (AC power system)
chap.		Chapter
Dir.		Directive
eCap		Electrolytic capacitor
EMC		Electromagnetic Compatibility
I_{ac}		AC input current under a particular operating condition
I_{out}		DC output current under a particular operating condition
I_{out_boost}		Available current reserve beyond I _{out_nom} (w/o a drop in U _{set}) that can be delivered for a limited time.
I_{out_nom}		Continuous nominal DC output current under STC.
I_{out_ol}		Max. intermittent DC output current in an overload situation and a shortfall of U _{set} .
I_{out_sc}		Max. short circuit DC output current and U _{out} close to zero.
ITU		International Telecommunication Union
max.	<i>maximum</i>	The maximum value which a parameter can assume, or which must not be exceeded.
MCB		Miniature circuit breaker
min.	<i>minimum</i>	The minimum value which a parameter can assume, or must not be fallen below.
MTBF		Mean Time Between Failure
nom.	<i>nominal</i>	The ideal or reference value of a technical parameter which is guaranteed under STC. All nominal values in this document refer to each other and represent the general specification of the device.
OCP		Overcurrent protection
OTP		Overtemperature protection
OVP		Overvoltage protection
PELV		Protective Extra Low Voltage
P_{out}		Output power under a particular operating condition with reference to P _{out_nom}
P_{out_boost}		Available power reserve beyond P _{out_nom} that can be delivered for a limited time.
P_{out_nom}		Nominal output power
PSU		Power supply unit
Reg.		Regulation
SELV		Safety Extra Low Voltage
STC		Standard test conditions (see „1. General“ on page 8)
typ.	<i>typical</i>	The typical value of a parameter is not guaranteed but can be assumed under STC. The min. or max. value must be determined during the engineering process of the end application.
U_{out}		DC output voltage under a particular operating condition
U_{out_nom}		Nominal DC output voltage
U_{set}		Manually set output voltage via voltage potentiometer
UVP		Undervoltage protection
V_{ac}		AC input voltage under a particular operating condition
V_{ac_nom}		Nominal AC input voltage
/		Separator between two values. The conditions to which the values refer can be found in the last column of the table.
..		Specifies a range of values.
<		The parameter is less than or equal to the specified value
>		The parameter is greater than or equal to the specified value

Table data structure

X. Technical category

Technical parameter	Characteristic (optional)	Values	Condition (optional)
---------------------	---------------------------	--------	----------------------

1. General

1.1 Proper handling of the product

The faultless and safe operation of the products requires proper transport, proper storage, set-up, assembly, installation, commissioning, operation and maintenance. The permissible ambient conditions must be observed. Instructions in the associated documentation must be observed.

1.2 Protection enclosure required

The device must be installed in a protective housing or control cabinet to which only qualified personnel have access.

1.3 Humid environments

Do not operate the device in a damp environment or in an environment where condensation is likely to occur.

1.4 Switch or circuit-breaker mounting position

A switch or circuit-breaker must be mounted near the equipment.

1.5 Observe country-specific regulations

In addition to the product documentation, the relevant country-specific regulations for the installation of the device must be observed.

1.6 Prohibited electrical/mechanical modifications

The product must not be modified in any way electrically or mechanically. Modifications can result in fatal injuries and damage to property.

1.7 Expiry of the manufacturer's warranty

The power supply is maintenance-free. Repairs can only be carried out by the manufacturer. Opening the housing voids the manufacturer's warranty.

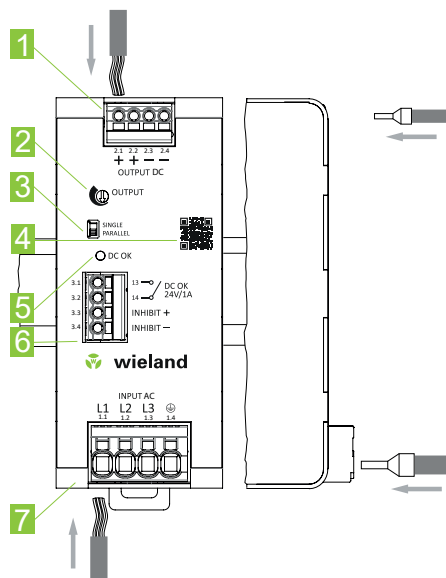
1.8 Use of third-party products

If third-party products and components are used for power or voltage increase, buffering (AC or DC side), EMC filtering, redundancies or for DC side load protection, it must be in accordance with the Wieland Electric product specification.

1.9 Standard test conditions

Unless otherwise stated, all values are specified in normal mounting position, at full load, nominal input and output voltages, 25°C (131°F) ambient temperature and a run-in time of 5 minutes.

1.10 Description of user elements



1 Push-in terminal, DC output

2 Single turn potentiometer for adjusting the output voltage

3 Dip-switch for configuration of single or parallel operation.

When changing the operating mode, the mains voltage must be disconnected.

4 Web link to product documentation

5 Green DC-OK status LED

6 Push-in terminal for signal contacts

7 Push-in terminal, AC input



For more detailed information on the input/output wiring and the connection of the signalling contacts, please refer to „9. Wiring & Connection“ on page 16.

Fig. 1: Description of user elements

2. Electrical output

Output voltage [U _{out_nom}]	nom.	24V _{DC}	
Adjustment range [U _{set}]	nom.	22.5 .. 29V _{DC}	
Adjustment tolerance	max.	±3%	at upper/lower end position of voltage potentiometer
Factory default		24V _{DC} (±0.1%)	
Output current [I _{out_nom}]	nom.	10A	22.5 .. 29V _{DC}
Boost current 1 [I _{out_boost1}]	max.	12A / 300s	280 .. 575V _{AC} , 22.5 .. 29V _{DC} , <55°C _{amb}
Boost current 2 [I _{out_boost2}]	max.	15A / 60s	280 .. 575V _{AC} , 24V _{DC} , <55°C _{amb}
Overload behaviour		Constant current + Intermittent mode (Hiccup)	see Fig. 3
SC hiccup current [I _{out_hc}]	max. avg.	15A / 0.3s 1.5A / 10s	
Short-circuit proof		yes, with auto-recovery	
Instant SC current [I _{out_sc}]	max.	36A / < 1ms	
Start-up delay	typ.	2.5s	
Rise time	typ. typ.	10ms 20ms	0% P _{out_nom} 100% P _{out_nom} , resistive load
Voltage overshoot	typ.	1.8V _{DC}	
Fall time	typ.	30ms	
Hold-up time	min.	20 / 40ms	400 / 500V _{AC}
Output capacitance	max.	16470μF	
Capacitive load start-up	max.	10000μF	22,5 .. 29V _{DC}
Feedback voltage	max.	35V _{DC}	
Return current	max.	10mA	OFF mode
Line regulation	max.	0.06%	350 .. 550V _{AC}
Load regulation	max. max.	0.6% 3.1%	350 .. 550V _{AC} 350 .. 550V _{AC} , parallel mode
Dynamic response	typ.	±400mV _{pp}	350 .. 550V _{AC} , 10..100% P _{out_nom} , transient frequency 10Hz
Ripple & noise voltage*	max. max.	10mV _{pp} 40mV _{pp}	350 .. 550V _{AC} , +25 .. +70°C _{amb} 350 .. 550V _{AC} , -25 .. +25°C _{amb}

*The measurement was performed with a short twisted pair cable using a 120μF eCap and a 0.1μF cCap connected in parallel. A bandwidth limit of 20MHz is required.

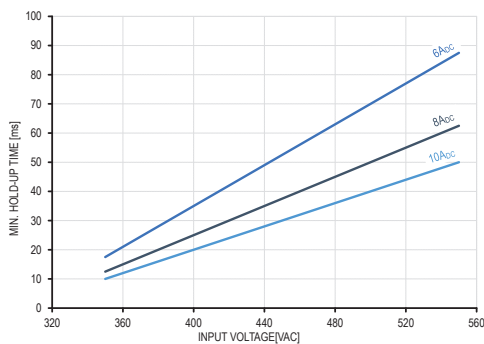


Fig. 2: Hold-up times under different load conditions and in dependence of the input voltage

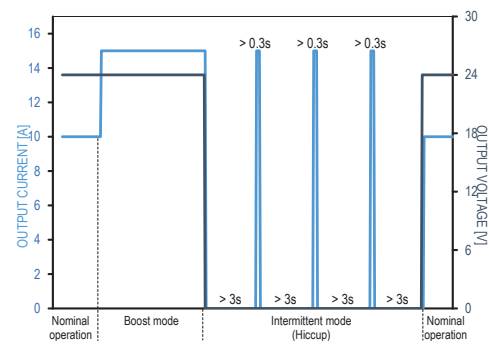


Fig. 3: Output current and voltage in different operation modes

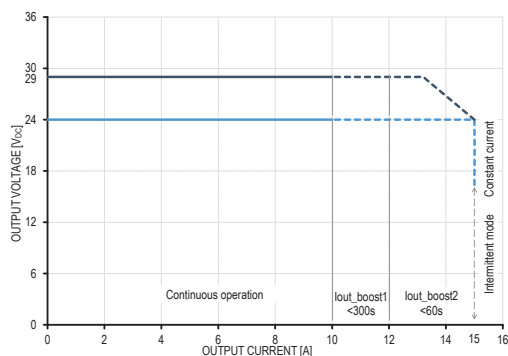


Fig. 4: Overcurrent capability up to 55°C_{amb}

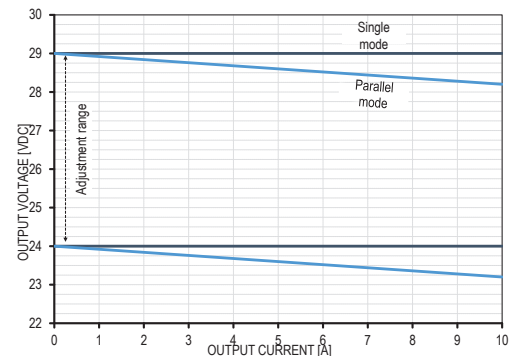


Fig. 5: Voltage drop in parallel mode in dependence of the load current

Unless otherwise stated, all values are specified in normal mounting position, at full load, nominal input and output voltages, 25°C (77°F) ambient temperature and a run-in time of 5 minutes.

3. Electrical input

AC power systems		TN, TT, IT (IEC 61010-1), CGD	
Mains Frequency	<i>nom.</i>	50 / 60Hz	
Frequency range	<i>max.</i>	47 .. 63Hz	
AC input voltage* [U _{in_nom}]	<i>nom.</i>	3x400 .. 500V _{AC}	3AC, PE
Voltage range	<i>max.</i>	3x350 .. 575V _{AC}	
DC Input voltage [U _{in_nom}]	<i>nom.</i>	530 .. 675V _{DC}	
DC Input voltage range	<i>max.</i>	450 .. 810V _{DC}	
Turn-ON voltage	<i>typ.</i>	310V _{AC}	
Turn-OFF voltage	<i>typ.</i>	275V _{AC}	
AC input current	<i>max.</i>	3x0.8A	According safety approval reports
AC input current RMS	<i>typ.</i>	3x0.59 / 3x0.50A	400 / 500V _{AC}
Crest factor	<i>typ.</i>	2.7 / 3.0	400 / 500V _{AC}
Inrush current	<i>typ.</i>	25 / 30A <3ms	400 / 500V _{AC} , 25°C _{amb} , cold start
Inrush energy	<i>typ.</i>	0.3 / 0.8A ² s	400 / 500V _{AC} , 25°C _{amb} , cold start
Input capacitance	<i>max.</i>	75μF	

*The product is also capable to operate with DC input voltage. Please contact your local support team (see page 25).

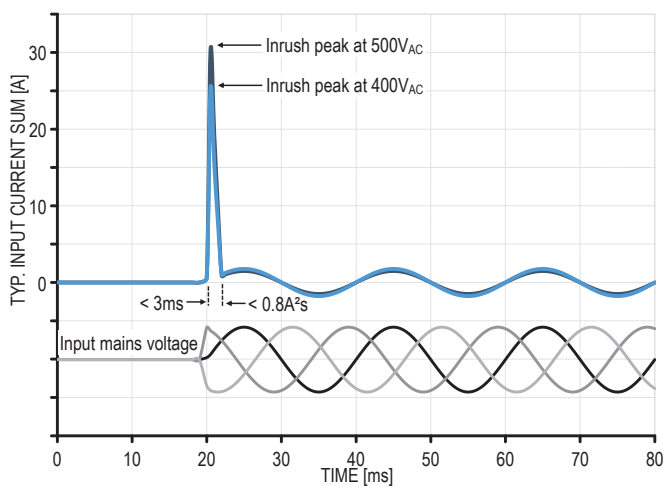


Fig. 6: Inrush current and energy during start-up phase

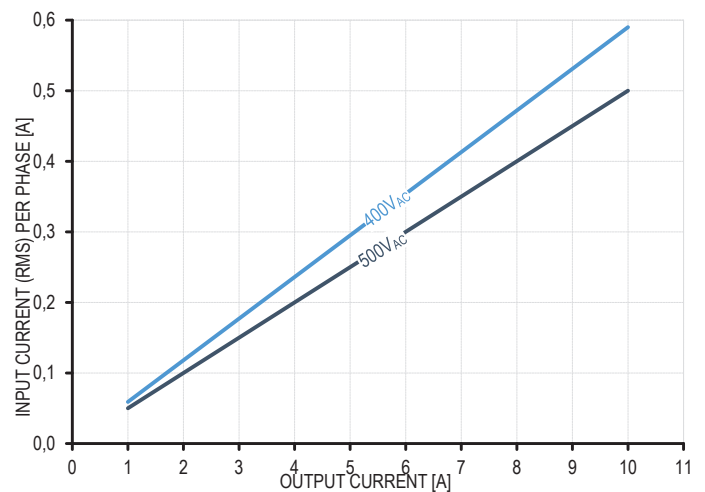


Fig. 7: Typical input current per phase in dependence of the load current

4. Performance

Output power [P _{out_nom}]	<i>nom.</i>	240W	
Boost power 1 [P _{out_boost1}]	<i>max.</i>	288W / 300s	280 .. 575V _{AC} , 24V _{DC} , <55°C _{amb}
Boost power 2 [P _{out_boost2}]	<i>max.</i>	360W / 60s	280 .. 575V _{AC} , 24V _{DC} , <55°C _{amb}
Duty cycle 1	<i>max.</i>	0.20	See boost power 1
Duty cycle 2	<i>max.</i>	0.15	See boost power 2
Dropped phase power	<i>max.</i>	240W	2x400 .. 500V _{AC} , not compliant with IEC/EN 61000-3-2 harmonic currents
Apparent input power	<i>typ.</i>	430 / 429VA	400 / 500V _{AC}
Active input power	<i>typ.</i>	258 / 258W	400 / 500V _{AC}
Reactive input power	<i>typ.</i>	344 / 343Var	400 / 500V _{AC}
Power factor	<i>typ.</i>	0.6	
Conversion efficiency	<i>typ.</i> <i>avg.*</i>	93.1 / 93.2% 92.3 / 91.9%	400 / 500V _{AC} , 100% P _{out_nom} 400 / 500V _{AC} , 25 .. 100% P _{out_nom}
Power losses	<i>typ.</i> <i>avg.*</i>	17.8 / 17.5W 19.5 / 20.6W	400 / 500V _{AC} , 100% P _{out_nom} 400 / 500V _{AC} , 25 .. 100% P _{out_nom}
No-load consumption	<i>max.</i>	1.9 / 2.3W	400 / 500V _{AC} , 0% P _{out_nom}
Stand-by consumption	<i>max.</i>	1.4 / 2.0W	400 / 500V _{AC} , Inhibit status HIGH (see Fig. 23)

*Average efficiency under 25%, 50%, 75% and 100% load conditions, according to eco-design requirements of EU commission regulation 2019/1782.

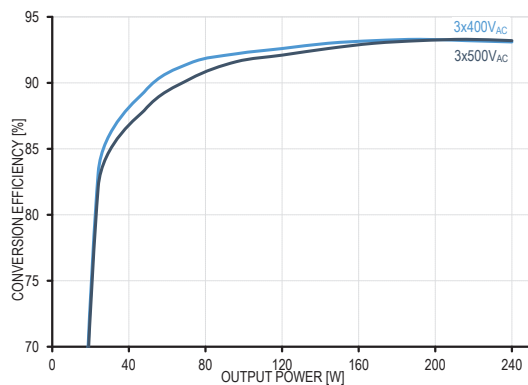


Fig. 8: Conversion efficiency in dependence of the output power

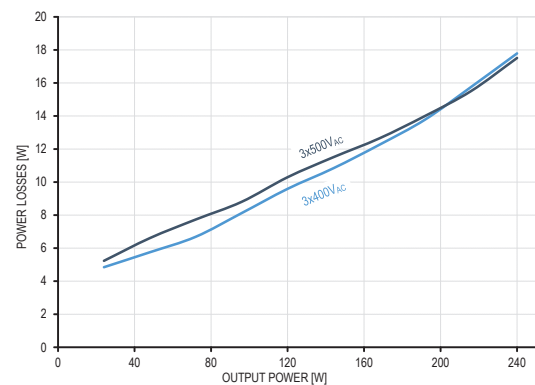


Fig. 9: Power losses in dependence of the output power

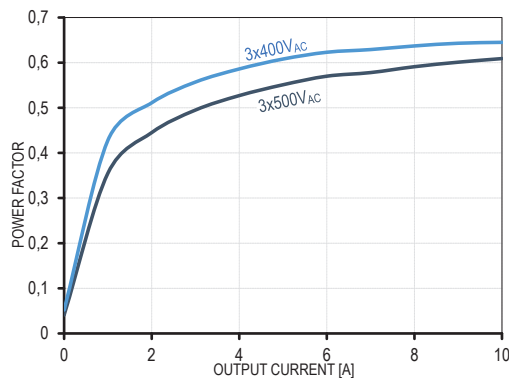


Fig. 10: Input power factor in dependence of the output current

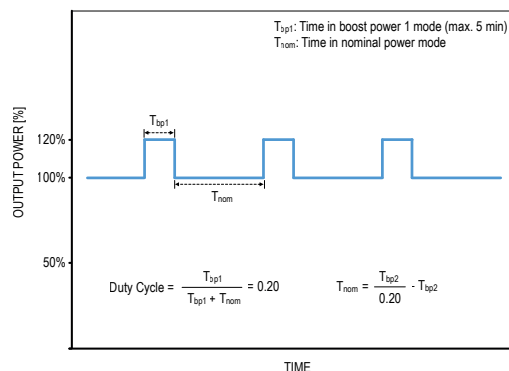


Fig. 11: Period and frequency of use of boost power 1 in normal mounting position

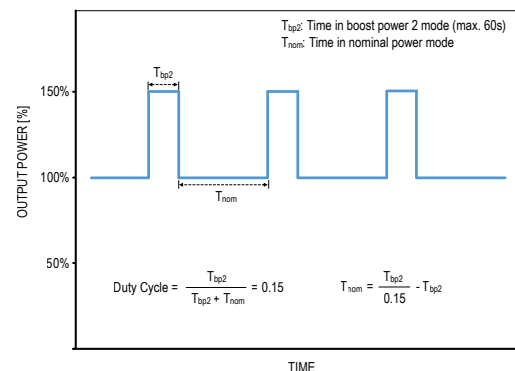


Fig. 12: Period and frequency of use of boost power 2 in normal mounting position

Unless otherwise stated, all values are specified in normal mounting position, at full load, nominal input and output voltages, 25°C (77°F) ambient temperature and a run-in time of 5 minutes.

5. Ambient conditions

Ambient storage temperature	<i>max.</i>	-40 .. +85°C _{amb} (-40 .. +185°F _{amb})	
Ambient operating temperature	<i>max.</i>	-25 .. +70°C _{amb} (-13 .. +158°F _{amb})	normal mounting position, >55°C _{amb} (>131°F _{amb}) rotated ±90° around X or Y axis rotated 180°
	<i>nom.</i>	-25 .. +55°C _{amb} (-13 .. +131°F _{amb})	
	<i>nom.</i>	-25 .. +45°C _{amb} (-13 .. +113°F _{amb})	
	<i>nom.</i>	-25 .. +45°C _{amb} (-13 .. +113°F _{amb})	
Power derating*	<i>min.</i>	2.4W/°C _{amb} (1.33W/°F _{amb})	normal mounting position, >55°C _{amb} (>131°F _{amb})
	<i>min.</i>	5.8W/°C _{amb} (3.20W/°F _{amb})	rotated ±90° around X or Y axis, >45°C _{amb} (>113°F _{amb})
	<i>min.</i>	5.8W/°C _{amb} (3.20W/°F _{amb})	rotated 180°, >45°C _{amb} (>113°F _{amb})
Cooling concept		Natural convection	
Relative storage humidity IEC 60068-2-30	<i>max.</i>	95%	non-condensing
Relative operation humidity IEC 60068-2-30	<i>max.</i>	95%	non-condensing
Operating altitude	<i>nom.</i>	3000mASL (9842ftASL)	not UL approved, reduced OVC
	<i>max.</i>	6000mASL (19685ftASL)	
Percental power derating	<i>min.</i>	5% per 1000m (5% per 3281ft)	>3000mASL (>9842ftASL)
Temperature derating	<i>min.</i>	5°C per 1000m (9°F per 3281ft)	>3000mASL (>9842ftASL)
Atmospheric pressure	<i>nom.</i>	689hPa	
	<i>max.</i>	469 .. 1070hPa	
Pollution degree IEC 60664-1, IEC 62477-1		2	
Vibration sinusoidal IEC 60068-2-6		2g / 10 .. 500Hz, 1 hour/direction X,Y,Z	non-operating, mounted on DIN rail
Shock test sinusoidal halfwave IEC 60068-2-27		30g / 11ms ±5ms, 3 bumps/direction, 9 bumps total	non-operating, mounted on DIN rail
Audible noise		Some audible noise may be heard during no load, overload or short circuit.	

*Not actively controlled

 For altitudes above 3000mASL (9842ftASL) the next lower OVC must be considered.

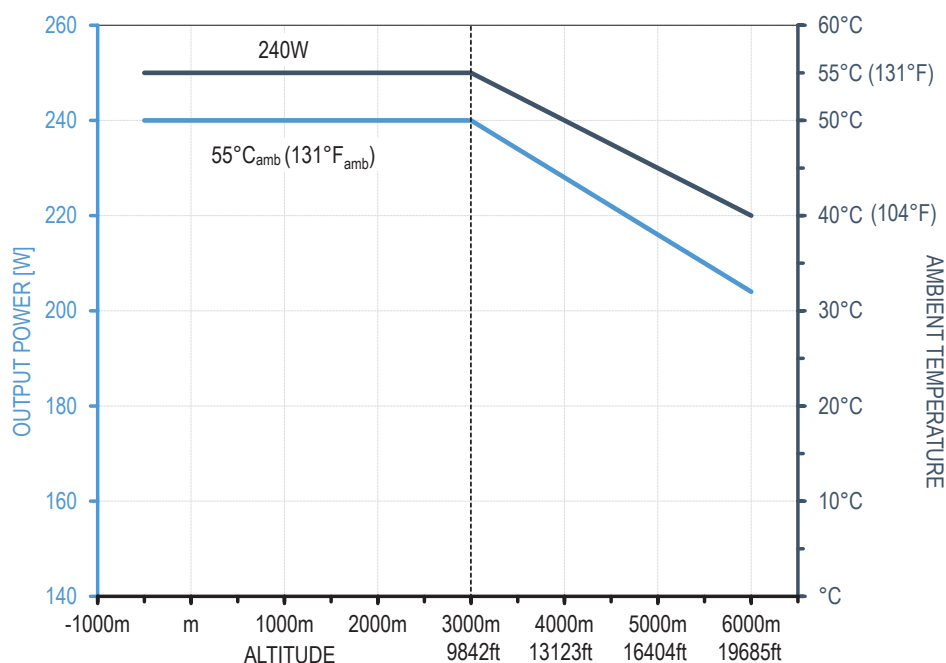


Fig. 13: Output power and ambient temperature derating at increasing altitudes

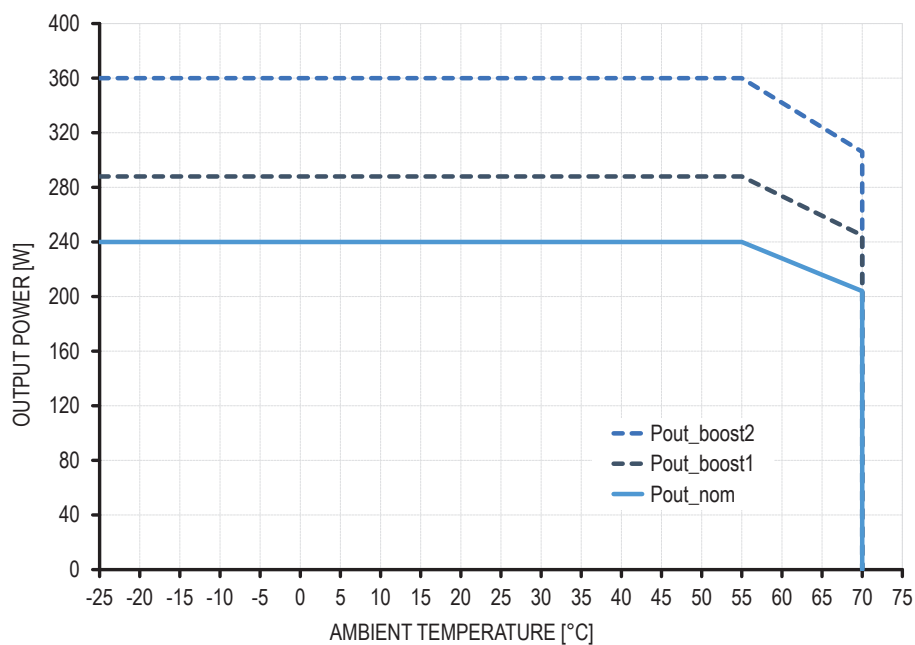


Fig. 14: Available output power in dependence of the ambient temperature for normal mounting position

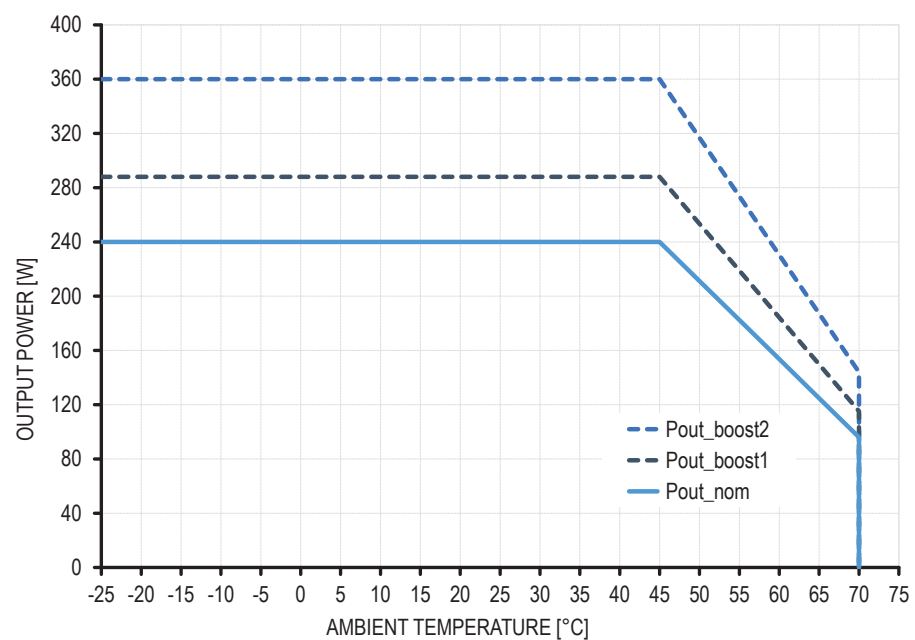
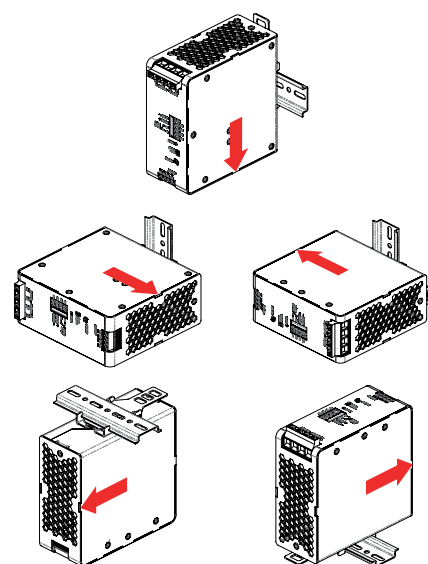
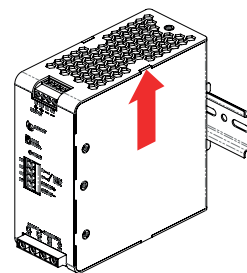
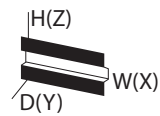


Fig. 15: Available output power in dependence of the ambient temperature for rotated mounting positions



6. Reliability and Service lifetime

Service lifetime	<i>min.</i>	44 000 / 48 000hrs	400 / 500V _{AC} , 100% P _{out_nom} , 40°C _{amb} , 24/7
	<i>min.</i>	82 000 / 78 000hrs	400 / 500V _{AC} , 75% P _{out_nom} , 40°C _{amb} , 24/7
	<i>min.</i>	125 000 / 136 000hrs	400 / 500V _{AC} , 100% P _{out_nom} , 25°C _{amb} , 24/7
Early life MTBF Telcordia SR-332 Issue 4	<i>min.</i>	1.1M / 1.0M / 0.8M hrs	25 / 40 / 55°C _{amb} , 50% P _{out_nom}
	<i>min.</i>	0.79M / 0.65M / 0.55M hrs	25 / 40 / 55°C _{amb} , 100% P _{out_nom}
Service life MTBF Telcordia SR-332 Issue 4	<i>min.</i>	5.7M / 4.0M / 2.2M hrs	25 / 40 / 55°C _{amb} , 50% P _{out_nom}
	<i>min.</i>	1.8M / 1.4M / 0.9M hrs	25 / 40 / 55°C _{amb} , 100% P _{out_nom}

 The maximum service lifetime guaranteed by the eCap manufacturer is 131 400hrs (15 years). All values above are theoretically calculated.

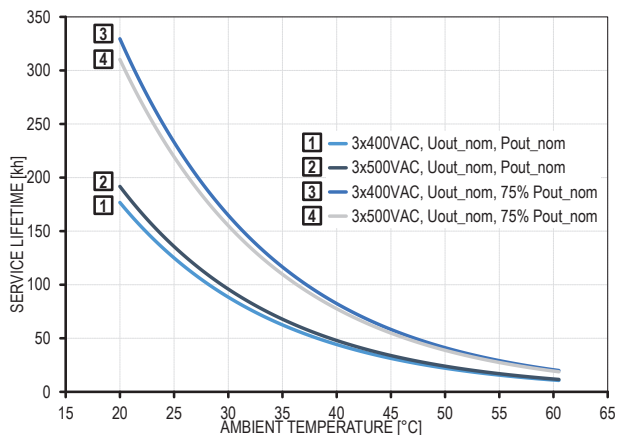


Fig. 16: Power supply service lifetime in dependence of ambient temperature

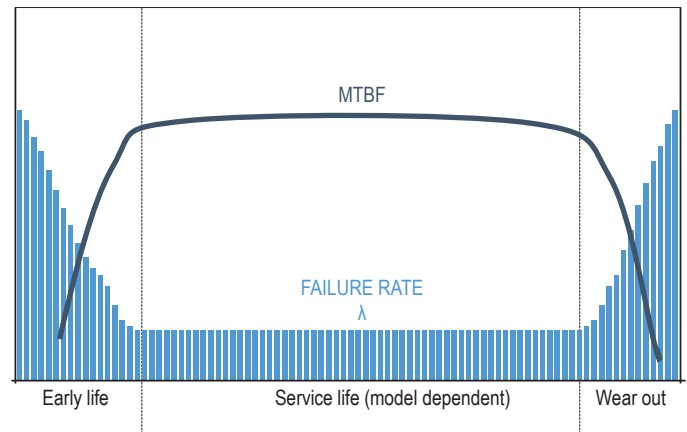


Fig. 17: Generic diagram visualising failure rate and MTBF values during the products life-cycle

7. Dimensions & Mechanical data

Enclosure material	Aluminum	
Cover material	Aluminum	
Inflammability class UL 94	V0	incl. connection terminals
Width	55.0mm (2 ¹¹ / ₆₄ in)	
Height	129.0mm (5 ⁵ / ₆₄ in)	
Depth Push-in terminal model (-A1)	138.2mm (5 ⁷ / ₁₆ in)	w/o DIN rail
Weight	780g (1.72lb)	
Lever arm	<i>max.</i> 62mm (2 ⁷ / ₁₆ in)	into the direction of Y axis
Torsional moment on DIN rail	<i>max.</i> 0.47Nm (4.2lb in)	into the direction of Z axis
Enclosure openings	<i>max.</i> 7mm (9/ ₃₂ in)	
DIN rail types IEC 60715	TH 35-7.5, TH 35-15	

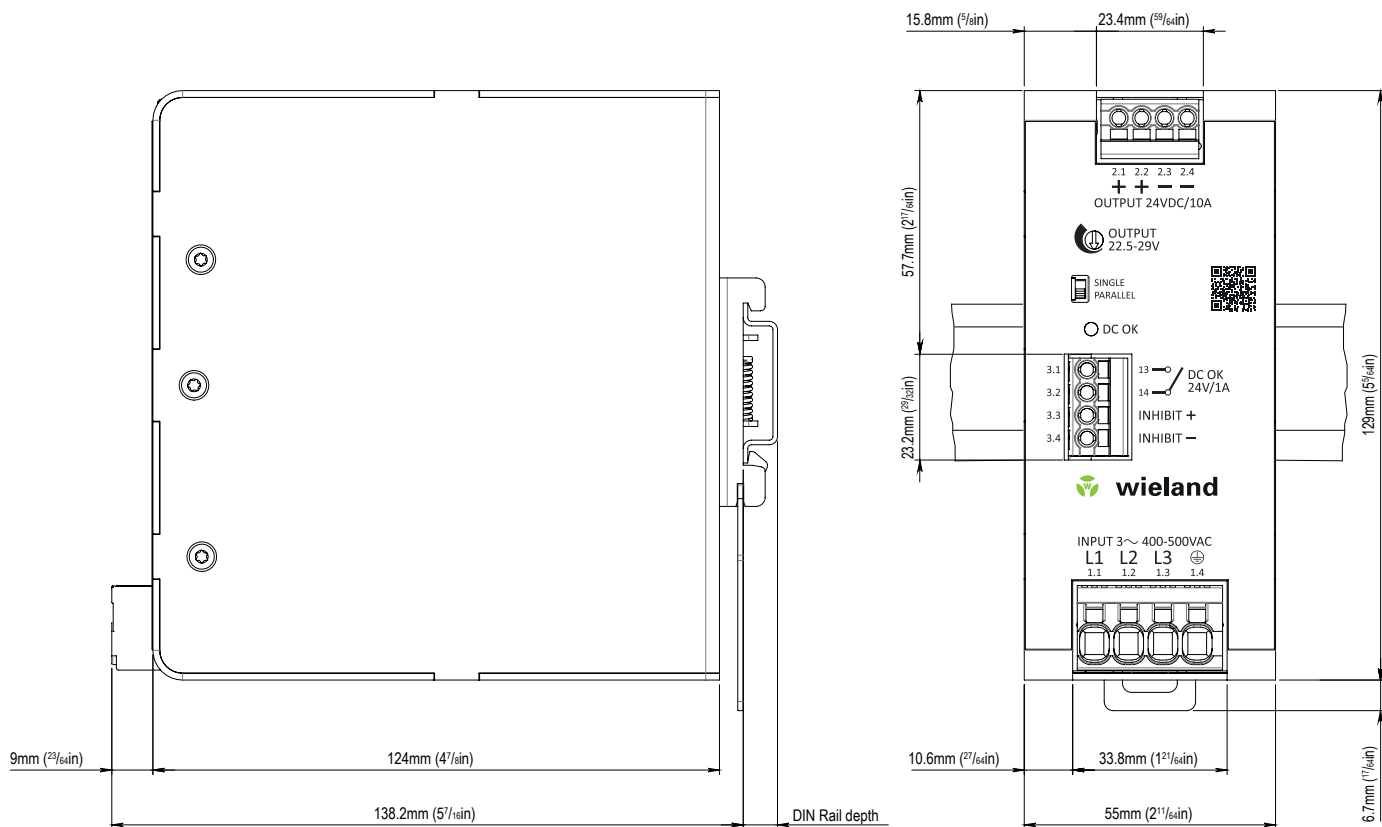


Fig. 18: Dimension drawing of DRB240-24-3-A1

8. Installation clearances

Vertically (Z axis)

Top side	1	min.	40mm (1 ³⁷ / ₆₄ in)
Bottom side	2	min.	20mm (2 ⁵ / ₃₂ in)

installation above heat sources not permitted

Horizontally (X axis)

Left side / Right side	3a 4a	min.	15mm (1 ⁹ / ₃₂ in)
Left side / Right side	3b 4b	min.	5mm (3 ¹ / ₁₆ in)

to heat sources (same power rating)
to passive components

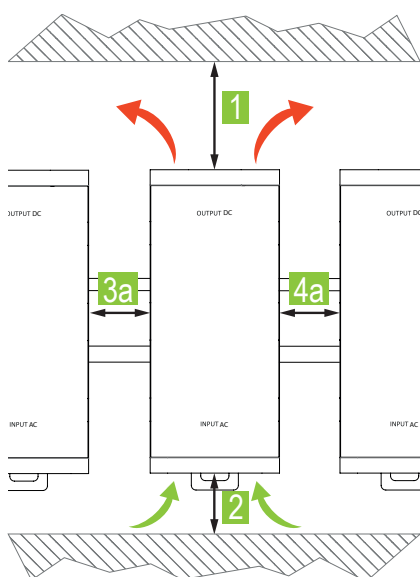


Fig. 19: Installation clearances to heat sources

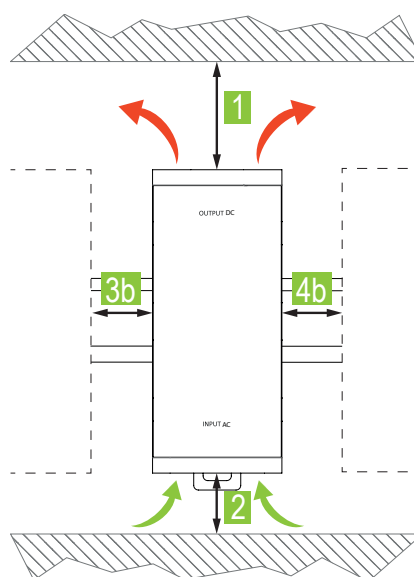


Fig. 20: Installation clearances to passive components

9. Wiring & Connection

wipos PSU3 24-10 P

	Input	Output	Signaling
Terminal type	Push-in	Push-in	Push-in
Recommended screw driver	SL 0.6x3.5mm (SL 1/32 x 9/64in)	SL 0.5x3.0mm (SL 1/64 x 1/8in)	SL 0.5x3.0mm (SL 1/64 x 1/8in)
Solid wire	0.2-10.0mm ² (24-8AWG)	0.2-2.5mm ² (26-12AWG)	0.2-2.5mm ² (26-12AWG)
Flexible wire	0.2-6.0mm ² (24-8AWG)	0.2-2.5mm ² (26-12AWG)	0.2-2.5mm ² (26-12AWG)
Standard ferrules*	0.25-4.0mm ²	0.2-1.5mm ²	0.2-1.5mm ²
Uninsulated ferrules*	0.25-6.0mm ²	0.2-2.5mm ²	0.2-2.5mm ²
Stripping length	15mm (19/32in)	9-10mm (23/64 - 25/64in)	9-10mm (23/64 - 25/64in)

*The ferrules must be selected to match the stripping length.

i In compliance to IEC/EN/UL 62368-1 (Ed.2) ferrules are required if flexible wires are used. In compliance with IEC/EN/UL 61010-1, 61010-2-201 appropriate copper wires must be used that withstand operating temperatures of at least 75°C (167°F) in ambients NOT exceeding 40°C (104°F), and 90°C (194°F) in ambients exceeding 40°C (104°F).

10. Signaling & Control

DC OK

Type	Relay contact	
Characteristic	N/O	
Closing	$U_{out} > 95\% U_{set}$	duration min. 100ms
Opening	$U_{out} < 85\% U_{set}$	duration min. 100ms
Resistive load	<i>nom.</i> 1A	24V _{DC}
	<i>max.</i> 0.5A	60V _{DC}
Trigger hysteresis	<i>typ.</i> 0.6V	

Remote ON/OFF

Type	Electrical contact
Characteristic	Inhibit
ON threshold	<i>max.</i> 3V
OFF threshold	<i>min.</i> 4.5V
Restart delay	<i>max.</i> 6s
Input voltage	<i>max.</i> 30V
Input current	<i>max.</i> 10mA
Reference potential	Isolated
Parallel connection	yes
Active discharging	no

OFF mode

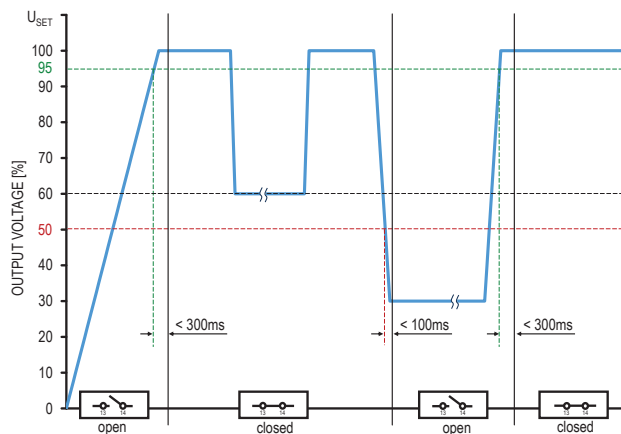


Fig. 21: DC-OK relay status in dependence of output voltage changes

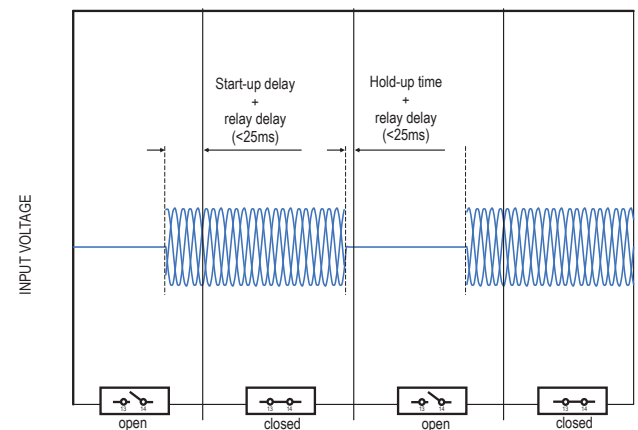


Fig. 22: DC-OK relay status in dependence of AC mains connection

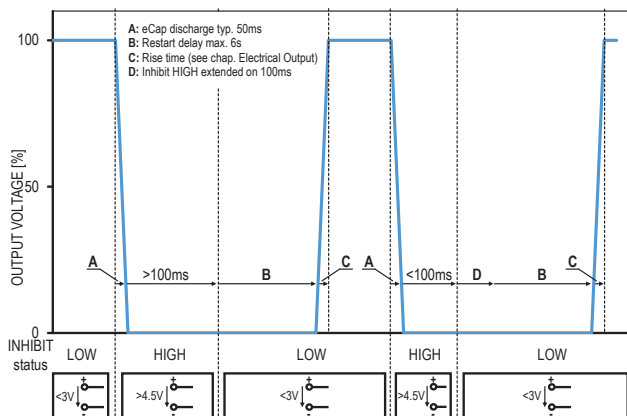


Fig. 23: Control of the output voltage in dependence of the inhibit relay status.

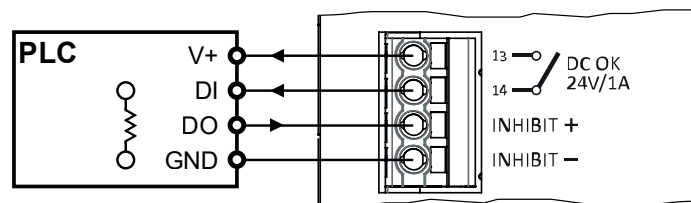
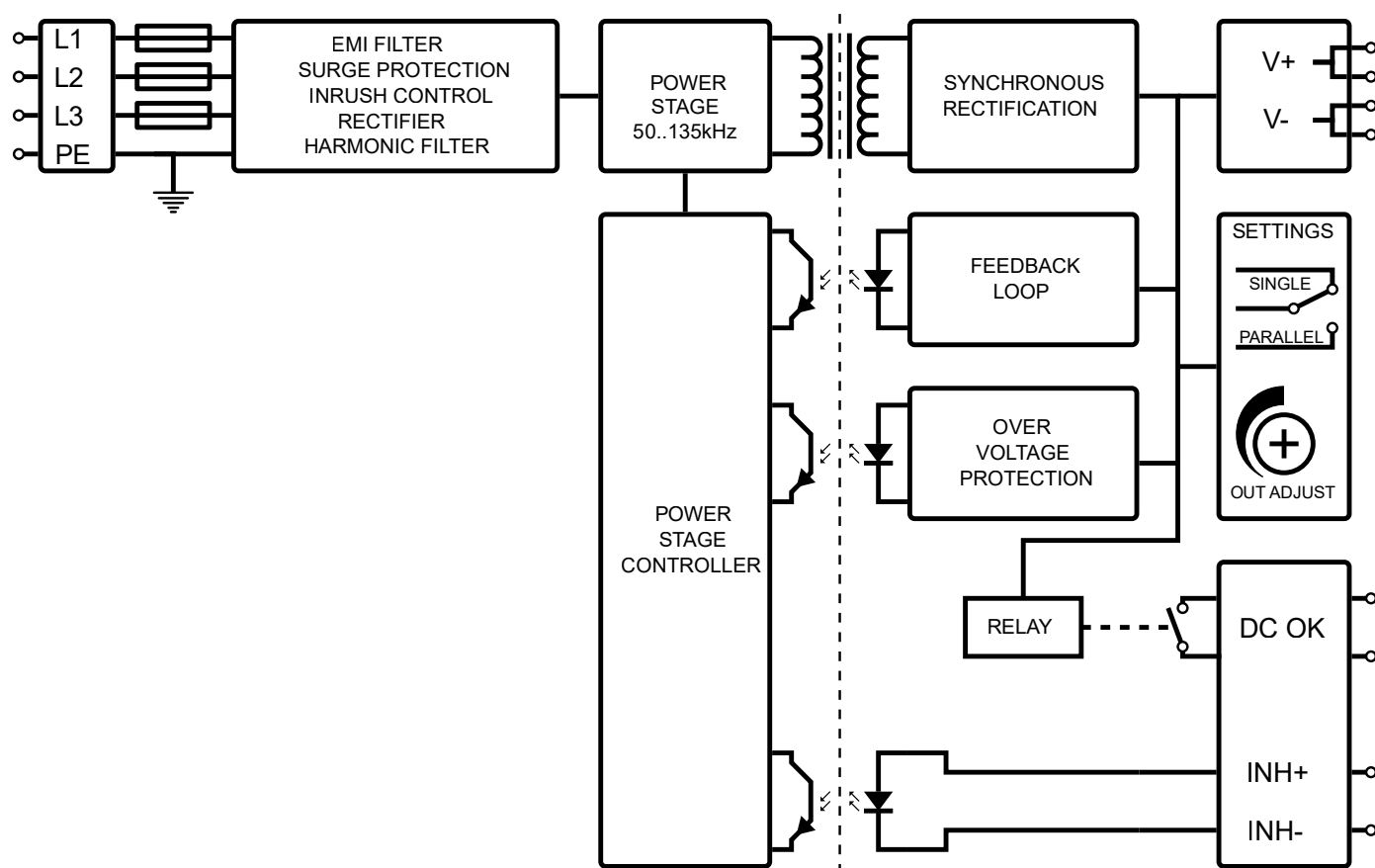


Fig. 24: Generic connection diagram of DC OK and INHIBIT contacts

11. Block diagram



Switching frequencies are depending on U_{in} , U_{out} and I_{out} .

12. Device protection

Ingress protection degree IEC 60529	IP 20		
NEMA classification NEMA 250-2018	NEMA 1		
Output overtemperature protection (OTP)	Yes, with auto-recovery		
Output overvoltage protection (OVP)	<i>max.</i>	32.7V _{DC} , with auto-recovery	
Undervoltage protection threshold (UVP)	<i>max.</i>	270V _{AC}	
Output overcurrent protection (OCP)	<i>min.</i>	135%, with auto-recovery	
Integrated input fuse	3x T3.15A at L pins		not DC capable, not user replaceable
Recommended MCB types IEC 60898-1, UL 1077	B or C characteristic, 6/8/10A		
Transient protection			
1st level	MOV (Metal Oxide Varistor)		
2nd level	GDT (Gas Discharge Tube)		

 When installed in an end-product, the maximum branch circuit rating must not exceed 20A (IEC/UL 62368-1 Ed.2). If the upstream supply provides a higher ampacity than 20A, an external protection device is required.

13. Electrical Safety

Class of protection IEC 61140	I		PE connection required
Electrical energy source classification IEC 62368-1	ES1		
Safety Extra Low Voltage IEC 61010-2-201, IEC 60950-1	SELV		
Protective Extra Low Voltage IEC 60204-1	PELV		Output must be earthed in the end application
Protective ground resistance	<i>max.</i>	100mΩ	
Ground leakage current IEC 60990	<i>max.</i>	0.9mA	TN/TT mains, 3x575V _{AC} , 50Hz
	<i>max.</i>	1.0mA	TN/TT mains, 3x575V _{AC} , 60Hz
Touch current IEC 60990	<i>max.</i>	40μA	TN/TT mains, 3x575V _{AC} , 50Hz
	<i>max.</i>	50μA	TN/TT mains, 3x575V _{AC} , 60Hz
Overvoltage category IEC 61010-1, IEC 62368-1 (Ed.2)	II		<3000mASL (<9842ftASL)

13.1 Overvoltage category design

Underlying IEC standard	61010-1	62368-1 ¹⁾	60950-1	61558-2-16 ²⁾	62477-1	61204-7	60664-1
Mains transient voltage	II	II	II	III	III	III	III
Creepage & Clearance	III	II	III	II	III	III	III

¹⁾ Edition 2

²⁾ not applicable along with IEC 61204-7

13.2 Insulation strength

		Type test (60s) IEC 61010-1	Routine test (3s) IEC 61010-1	Field test (3s)
Input / Output	A	3510V _{AC}	3510V _{AC}	3510V _{AC}
Input / PE	B	2210V _{AC}	2210V _{AC}	2210V _{AC}
Input / DC OK	C	3510V _{AC}		3510V _{AC}
Input / INHIBIT	D	3510V _{AC}		3510V _{AC}
Output / PE	E	1390V _{AC}	1390V _{AC}	1390V _{AC}
Output / DC OK	F	1390V _{AC}		1390V _{AC}
Output / INHIBIT	G	1390V _{AC}		1390V _{AC}
DC OK / INHIBIT	H	1390V _{AC}		1390V _{AC}

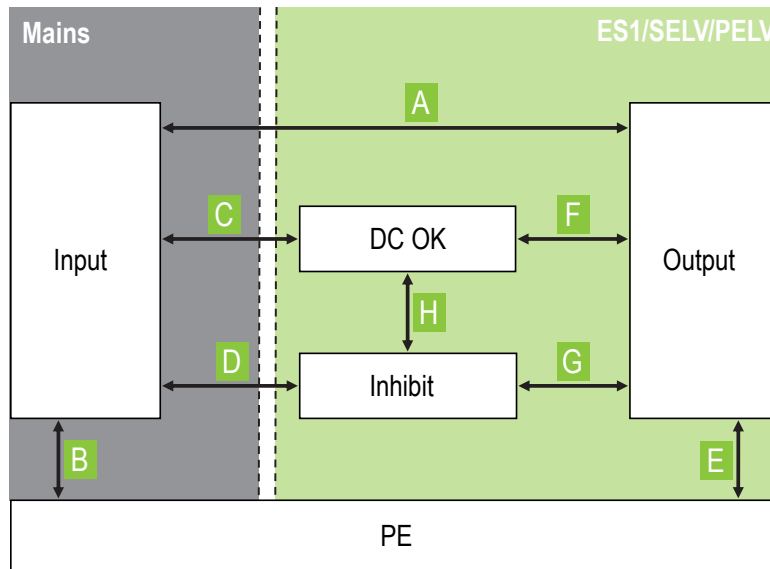


Fig. 25: Schematic of the insulation paths

13.3 HIPOT test

Apart from routine and type test, the end user might need to check the insulation strength during the final inspection and testing to guarantee the electrical safety of the end application. Therefore, a high-voltage test (HIPOT test) can be performed in the field. The following conditions must be observed:

- ▶ As every HIPOT test causes stress on the power supplies safety insulation, avoid frequent HIPOT testing or excessive test voltages
- ▶ The test voltages and durations, as indicated under „13.2 Insulation strength“ on page 19, must not be exceeded
- ▶ The test voltages rise and fall time should be between 2 and 4 seconds
- ▶ For the HIPOT test of the insulation path (B) between Input and PE, the gas discharge tube (GDT) must be disconnected

Disconnection of the GDT:

- 1) Completely remove the connection screw (marked with an arrow) with a Torx X10. (see Fig. 26)
- 2) Keep the screw in a safe place.
- 3) After completion of testing, reconnect the GDT only with the original screw to avoid risk of electrical shock or damage.
- 4) Fasten the screw with a Torx X10 not exceeding a tightening torque of 0.7 Nm.

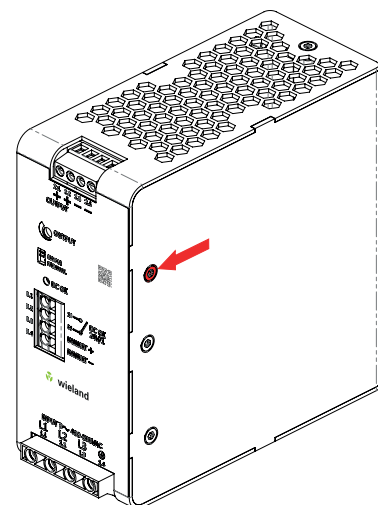


Fig. 26: Position of the connection screw for the GDT

i According to EN 60204-1 (Safety of machinery - Electrical equipment of machines), an individual HIPOT test of the power supply isn't required. During the HIPOT test of the end application, the power supply can be disconnected and only installed once the test has been completed.

14. Electromagnetic immunity

Investigated under generic standards IEC/EN 61000-6-2 (2019) - Immunity for industrial environments.

Electrostatic contact discharge IEC/EN 61000-4-2	4kV	Criterion A	330Ω / 150pF
Electrostatic air discharge IEC/EN 61000-4-2	8kV	Criterion A	330Ω / 150pF
Electromagnetic RF field¹⁾ IEC/EN 61000-4-3	10V/m 3V/m 1V/m	Criterion A Criterion A Criterion A	80MHz..1GHz 1.4GHz..2GHz 2GHz..2.7GHz
Fast transients (burst) IEC/EN 61000-4-4			
Input ²⁾	4kV	Criterion A	5kHz
Output	2kV	Criterion A	5kHz
Signal contact ²⁾	2kV	Criterion A	5kHz
Surge voltages IEC/EN 61000-4-5			
Input symmetrical (L-L) ²⁾	2kV	Criterion A	2Ω+18μF, for φ = 0°,90°,180°,270°
Input asymmetrical (L-PE) ²⁾	4kV	Criterion A	12Ω+9μF, for φ = 0°,90°,180°,270°
Output symmetrical (L-L)	0.5kV	Criterion A	2Ω+18μF
Output asymmetrical (L-PE)	1kV	Criterion A	12Ω+9μF
Signal line asymmetrical (Signal-PE)	1kV	Criterion A	42Ω+0.5μF
Conducted disturbances Input, signal line, PE³⁾ IEC/EN 61000-4-6	10V	Criterion A	150kHz..80MHz
Power frequency magnetic field IEC/EN 61000-4-8	30A/m	Criterion A	50Hz, 60s each axis (x, y, z)
Voltage dips/sags and interruptions IEC/EN 61000-4-11, 61000-4-34	500ms 200ms 20ms 5000ms	Criterion A Criterion A Criterion A Criterion C	400V _{AC} at 70%, 50Hz 400V _{AC} at 40%, 50Hz 400V _{AC} at 0%, 50Hz 400V _{AC} at 0%, 50Hz
SEMI F47-0706	1000ms 500ms 200ms 20ms	Criterion A Criterion A Criterion A Criterion A	400V _{AC} at 80%, 50Hz 400V _{AC} at 70%, 50Hz 400V _{AC} at 50%, 50Hz 400V _{AC} at 0%, 50Hz

¹⁾ Except for the ITU broadcast frequency bands 87..107MHz, 174..230MHz and 470..790MHz, where the level shall be 3V/m.

²⁾ Exceeds the requirements of the European Low Voltage Directive 2014/35/EU

³⁾ Except for the ITU broadcast frequency bands 47..68MHz, where the level shall be 3V.

Performance level definitions:

Criterion A:

The device continues operation as intended during and after the test. The specified performance level accepts a change of ±10% on nominal output voltage and current. There is neither a violation of the performance level, nor a loss of function if the device is used as intended.

Criterion B:

The device continues operation as intended after the test. The specified performance level accepts a change of ±10% on nominal output voltage and current. There is neither a violation of the performance level, nor a loss of function if the device is used as intended. During the test a violation of the performance level is allowed.

Criterion C:

A temporary loss of function is allowed, provided the function is auto-recoverable, or can be restored by the operation of the controls.

15. Electromagnetic emission

Investigated under generic standards IEC/EN 61000-6-3 (2007) + A1 (2011) / AC (2012) - Emission standard for residential, commercial and light-industrial environments.

Conducted noise emission input EN 55011, CISPR 11	Class B	150kHz..30MHz
Radiated noise emission input EN 55011, CISPR 11	Class B	30MHz..1GHz
Harmonic currents input IEC/EN 61000-3-2	Class A	0kHz..2kHz
Total harmonic distortion (THD) input IEC/EN 61000-3-2	127% per phase	Order 1..40
Voltage changes, voltage fluctuations and flicker input IEC/EN 61000-3-3	PASS	50Hz

Unless otherwise stated, all values are specified in normal mounting position, at full load, nominal input and output voltages, 25°C (77°F) ambient temperature and a run-in time of 5 minutes.

16. Certifications & Approvals



UL 61010-1
CAN/CSA-C22.2 No. 61010-1

Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements

UL 61010-2-201
CAN/CSA-C22.2 No. 61010-2-201

Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 2-201: Particular requirements for control equipment
UL file: E169904

IEC EN 61010-1

Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements



IEC EN 61010-2-201

Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 2-201: Particular requirements for control equipment

IEC EN 62368-1 (Ed.2)

Audio/video, information and communication technology equipment - Part 1: Safety requirements



UL 62368-1 (Ed. 2)

Audio/video, information and communication technology equipment - Part 1: Safety requirements
UL file: E197597

17. Designed to meet

The safety design of the product complies additionally with the following harmonised standards.

IEC 60950-1	Information technology equipment - Safety - Part 1: General requirements
IEC/EN 62477-1	Safety requirements for power electronic converter systems and equipment - Part 1: General
IEC/EN 61204-7	Low-voltage switch mode power supplies - Part 7: Safety requirements
IEC/EN 61558-2-16	Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1100 V - Part 2-16: Particular requirements and tests for switch mode power supply units and transformers for switch mode power supply units
EN 60204-1	Safety of machinery - Electrical equipment of machines - Part 1: General requirements

18. Compliance & Registration



Conformity with health, safety, and environmental protection standards for products sold within the European Economic Area (EEA).



UKCA (UK Conformity Assessed) is the product marking that is used for certain goods being placed on the United Kingdom market.



The Waste Electrical and Electronic Equipment Directive (WEEE Directive) is the European Community Directive 2012/19/EU on collection, recycling and recovery targets for all types of electrical goods.



The Restriction of Hazardous Substances Directive 2011/65/EU (RoHS 2) regulates the use of certain hazardous substances in electrical and electronic equipment.



Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) is a European Union regulation that addresses the production and use of chemical substances, and their potential impacts on both human health and the environment.

19. Typical use-cases

19.1 Parallel Operation

For the purpose of power increase, power supplies can be paralleled. Furthermore, a paralleling can be done for limited redundancy purposes in order to backup malfunctions occurring on the primary (AC) side of the power supplies. The following measures must be taken into account:

- ▶ Only power supplies of the same series and power rating must be paralleled
- ▶ The dip switch on the front side of the power supplies must be switched to PARALLEL
- ▶ Load wiring shall be identical in terms of length and cross section
- ▶ The output voltage of the power supplies shall be adjusted to the same value ($\pm 100\text{mV}$)
- ▶ All paralleled power supplies must be operated under the same ambient conditions
- ▶ The power supplies must not be operated under any condition which requires a power derating (e.g. altitudes above 3000mASL (9842ftASL), temperatures above $55^\circ\text{C}_{\text{amb}}$ ($131^\circ\text{F}_{\text{amb}}$), mounting orientations others than the normal mounting position, etc.)
- ▶ If more than three power supplies are paralleled, each output must be protected by a decoupling module (e.g. Wieland Electric wipos PSU3 series), MCB, diode, or fuse
- ▶ The increased installation clearances must be considered (see „8. Installation clearances“ on page 15)

 In parallel operations the values of output load regulation, inrush currents, EMI, harmonic and leakage currents will increase.

 When changing the operating mode between SINGLE and PARALLEL, the mains voltage must be disconnected.

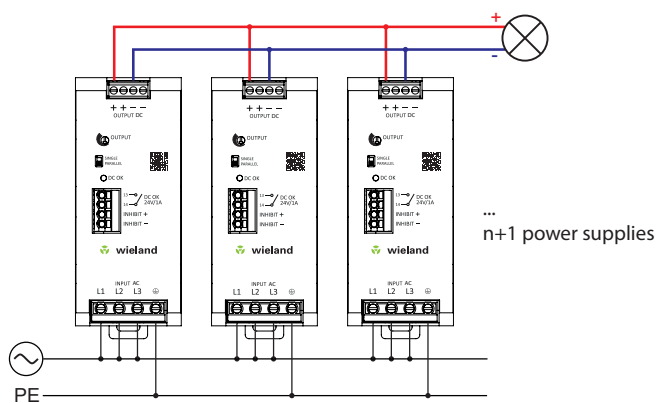


Fig. 27: Connection scheme of n+1 power supplies paralleled for the purpose of power increase

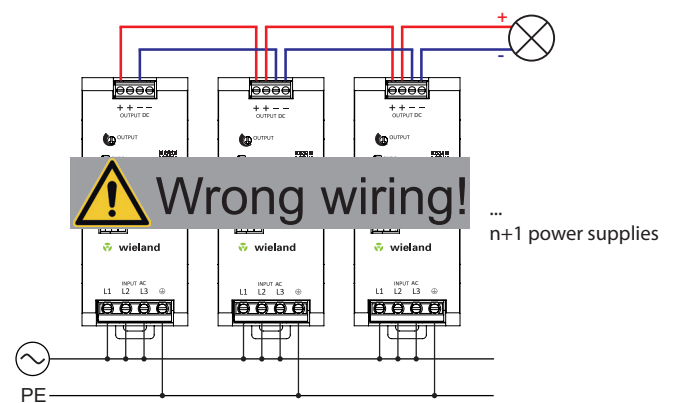


Fig. 28: Example of a wrong connection scheme

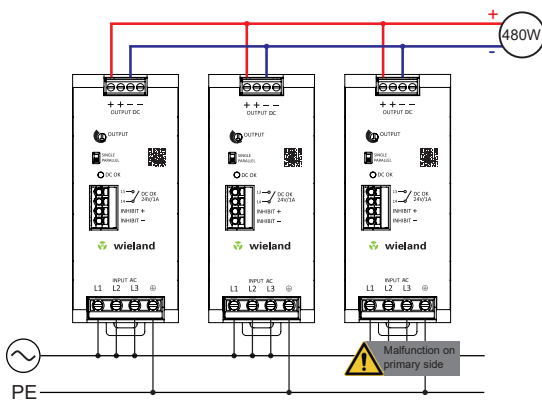


Fig. 29: Connection scheme of n+1 power supplies paralleled for the purpose of a 480W limited redundancy

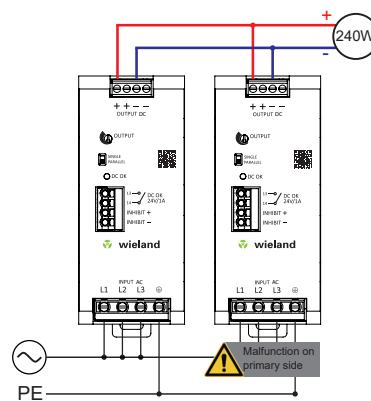


Fig. 30: Connection scheme of 1+1 power supplies paralleled for the purpose of a 240W limited redundancy

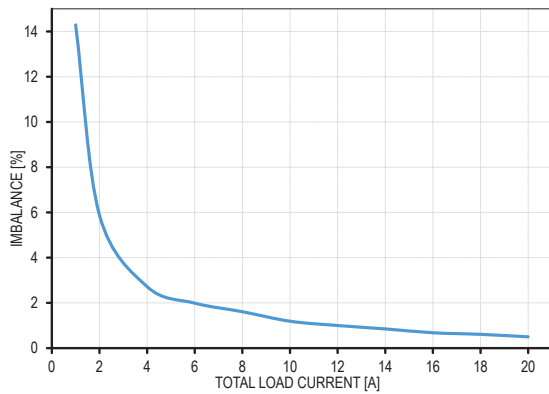


Fig. 31: Typical load sharing behaviour of two power supplies in parallel mode

19.2 Series operation

For the purpose of higher load voltages, power supplies can be connected in series. The following measures must be taken into account:

- ▶ The output voltage sum must not exceed 250V_{DC}
- ▶ If the output voltage sum exceeds 60V_{DC}, a safeguard against unintended touching must be considered
- ▶ Only power supplies of the same series and power rating must be connected in series
- ▶ The dip switch on the front side of the power supplies must be switched to SINGLE
- ▶ All power supplies in series must be operated under the same ambient conditions
- ▶ The power supplies must not be operated under any condition which requires a power derating (e.g. altitudes above 3000mASL (9842ftASL) , temperatures above 55°C_{amb} (131°F_{amb}), mounting orientations others than the normal mounting position, etc.)
- ▶ The increased installation clearances must be considered (see „8. Installation clearances“ on page 15)

i In series operations the values of output load regulation, inrush currents, EMI, harmonic and leakage currents will increase.

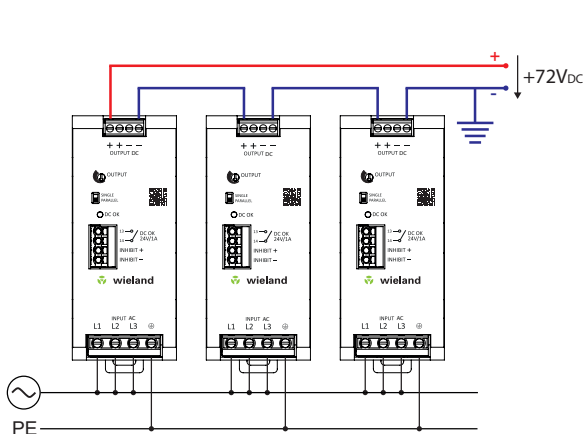


Fig. 32: Connection scheme for series operation with positive voltage level

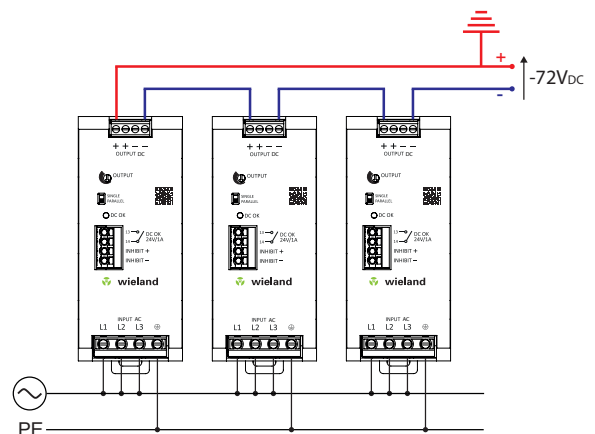


Fig. 33: Connection scheme for series operation with negative voltage level

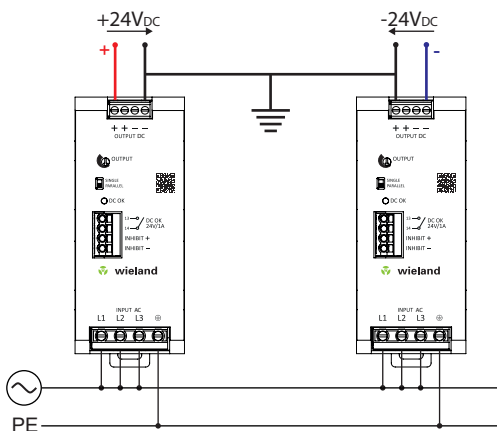


Fig. 34: Connection scheme for series operation with centre tap

19.3 Two-phase operation

The device is capable to run continuously on two phases of a 3-phase power grid. A power derating under nominal conditions is not required. All conditions associated with a power derating must be carefully considered.

Please note if running on two phases:

- ▶ Power losses will increase and can no longer be guaranteed as specified for 3-phase operation
- ▶ Hold-up times as specified for 3-phase operation can no longer be guaranteed
- ▶ The device will go into OTP mode if operating permanently at input voltages below 350V_{AC}
- ▶ The device is no more compliant with IEC/EN 61000-3-2 harmonic current limits
- ▶ Safety approvals under UL 61010-1, -2-201 and UL 62368-1 (Ed.2) are no more applicable

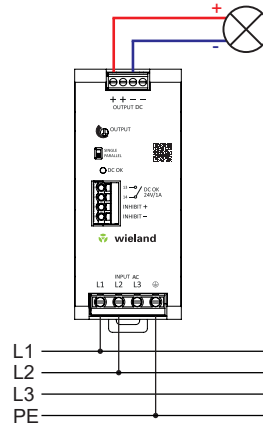


Fig. 35: Connection diagram for 2-phase operation



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