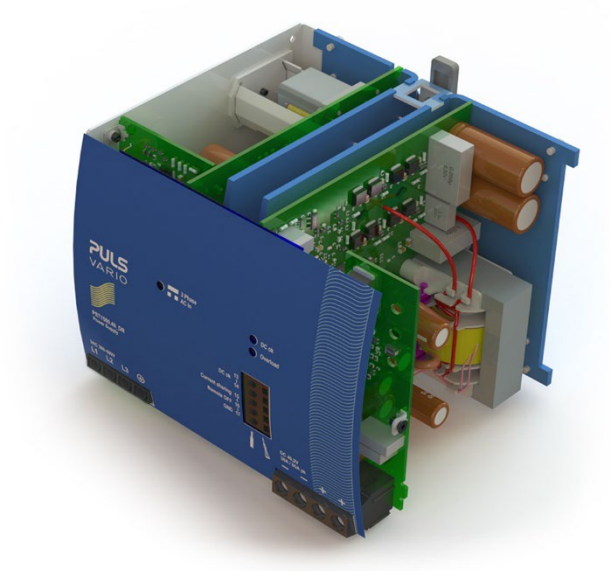


POWER SUPPLY 380-480Vac 49.2V 1.500W

- 30A / 1.500 W continuous
- 65A / 3.200 W_{peak} for 1 second
- 3AC 380-480 V wide-range input
- 97 % full load and excellent partial load efficiencies
- 6W no-load power consumption only
- braking resistor up to 50A & 750J
- Remote on/off
- DC-OK Relay Contact

GENERAL DESCRIPTION

The **PST1500.48_DR** is an industrial grade DIN-Rail power supply for the 3-phase mains system, perfectly suitable for driving DC & EC-motors.

The most outstanding features of the PST1500.48_DR are the compact size, the wide operating temperature range, the low input inrush current, the small no-load-powerloss and the very high efficiencies, which are achieved through various design technologies. The integrated chopper-resistor can absorb regenerative energy from braking DC/EC-motors.

High immunity to transients and power surges as well as low electromagneticemissions and an international approval package makes the use in nearly every application possible.

SHORT-FORM DATA

Output voltage	DC 49.2 V	
Output power	30A / 1.500 W	continuous @ +40 °C
	65A / 3.200 Wpk	1 second @ +40 °C
Derating linearly	+40 °C to +70 °C	@ 2.5% / K
Input voltage	3AC 380-480 V	+15% / -10%
Power factor	typ. 0,93	
AC Inrush current	max. 6 A	
Efficiency	typ. 97 %	@ nominal load
Losses	<6 W	@ no-load
	<60 W	@ nominal load
Hold-up time	10 ms	
Temperature range	-30 °C to +70 °C	
Size (wxhxd)	160x124x142 mm	
Weight	2000 g / 4.4 lb	

ORDER NUMBERS

Description:	Power supply PST1500.48_DR	
Order Number	**Input**	**Output**
96.149.000.0x	Screw con.	Screw con.
Accessories:	ZM1.WALL	
	ZM2.WALL	

MAJOR APPROVALS AND CONFORMITY

For details or a complete approval list, see chapter 21.

IEC 61010-1:2010

All parameters are specified at 49.2 V, 20 A, 400 Vac, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.

INDEX

TERMINOLOGY AND ABREVIATIONS

PE and ⏚ Symbol	PE is the abbreviation for **P**rotective **E**arth and has the same meaning as the symbol ⏚ .
Earth, Ground	This document uses the term "earth" which is the same as the U.S. term "ground".
T.b.d.	To be defined, value or description will follow later.
3AC 400 V	A figure displayed with the AC or DC before the value represents a nominal voltage with tolerances (usually ±15 %) included.

All parameters are specified at 49.2 V, 20 A, 400 Vac, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.

	E.g.: DC 12 V describes a 12 V battery disregarding whether it is full (13.7 V) or flat (10 V)
3x 400 Vac	A figure with the unit (Vac) at the end is a momentary figure without any additional tolerances included.
50 Hz vs. 60 Hz	As long as not otherwise stated, 3AC 400 V parameters are valid at 50 Hz mains frequency.
may	A key word indicating flexibility of choice with no implied preference.
shall	A key word indicating a mandatory requirement.
should	A key word indicating flexibility of choice with a strongly preferred implementation.

1. Intended Use

This device is designed for indoor use within cabinets or housings and is intended for commercial applications, such as in industrial control, process control, monitoring and measurement equipment.

Do not use this device in equipment where malfunction may cause severe personal injury or threaten human life. If this device is used in a manner outside of its specification, the protection provided by the device may be impaired.

2. Installation Instructions

⚠ DANGER Risk of electrical shock, fire, personal injury or death.

- Turn power off before working on the device. Protect against inadvertent re-powering.
- Do not open, modify or repair the device.
- Do not touch during power-on and immediately after power-off. Hot surfaces may cause burns.
- Install the device on DIN-Rail EN 60715 or EN 50022 with a height of 7.5 or 15 mm only. Sharp edges on the device may cause injury.
- If damages or malfunctioning occur during installation or operation, immediately turn power off and send unit to the factory for inspection.
- The device is designed as "Class of Protection I" equipment according to IEC 61140.
-

⚠ WARNING Risk of damages on the device

- Keep the following minimum installation clearances: 60 mm on top and bottom, and 10 mm left and right side if the device is permanently loaded with more than 50% of the nominal power.
- Increase the 10mm distance to 20mm if the adjacent device is a heat source (e.g. another power supply).– Do no block any openings on the device, as this may have severe effects on air circulation through the device.
- The ventilation openings must not be covered by more than 15% (e.g. by cable ducts)!
- The maximum surrounding air temperature is +70 °C (+158 °F). The operational temperature is the same as the ambient or surrounding air temperature and is defined 2 cm below the device.
- The device is designed to operate in areas between 5 % and 85 % relative humidity without condensation.
- Clean only with a damp cloth.

Obey the following installation instructions:

This device may only be installed and put into operation by qualified personnel. This device does not contain serviceable parts. The tripping of an internal fuse is caused by an internal defect.
Assure that during installation no moisture or dirt gets into the connections.

For TN, TT mains systems with earthed neutral the device is designed for overvoltage category III zones up to 2000 m (6560 ft) and for overvoltage category II zones up to 5000 m (16400 ft).

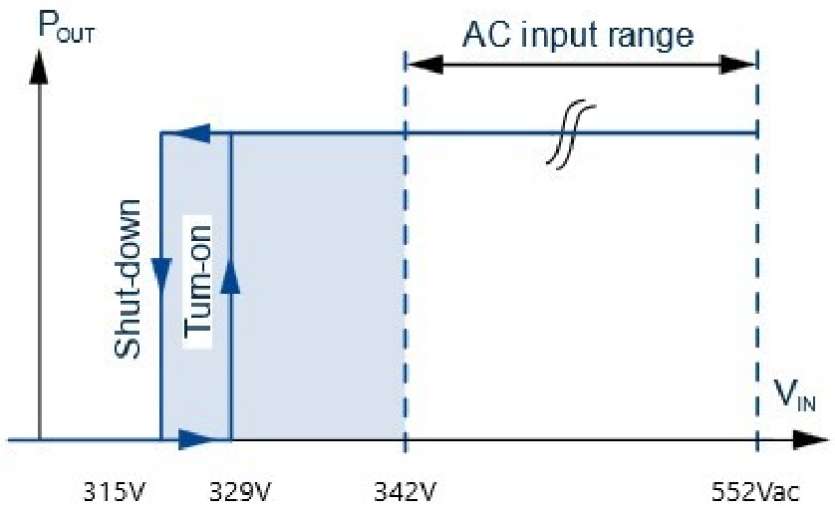
All parameters are specified at 49.2 V, 20 A, 400 Vac, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.

For TN, TT delta mains systems the device is intended for overvoltage category II zones up to 2000 m (6560 ft). The device is designed to be safe in case of a single phase loss and does not require an external protection. Functionality is limited see chapter 23.3.
The device is designed for altitudes up to 5000 m (16400 ft). Above 2000 m (6560 ft) a reduction in output current is required and the operation is limited according mains systems described above. The device is designed, tested and approved for branch circuits up to 20 A without additional protection device. If an external fuse is utilized, do not use circuit breakers smaller than 6 A B- or C-characteristic to avoid a nuisance trip. A disconnecting means shall be provided for the input of the device. This must be suitably located and easily accessible. The disconnecting means must be marked as the such for the device.

3. AC-Input

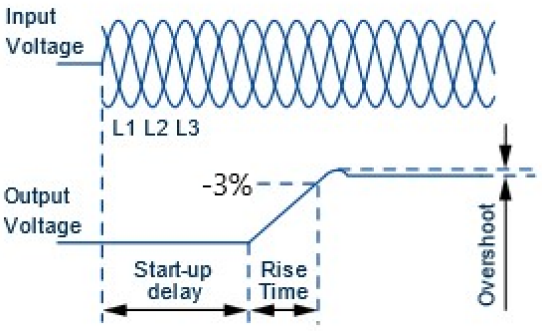
The device is suitable to be supplied from TN or TT mains networks. For more details, please review chapter 2? .

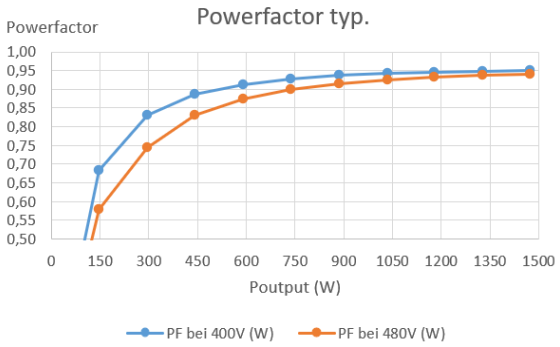
AC input voltage rated range AC input operating range	Nom.	3AC 380-480 V 3x 342-552 Vac	
Input frequency	Nom.	47–63 Hz	
Turn-on voltage	Typ.	3x 329 Vac	Steady-state value
Shut-down voltage	Typ.	3x 315 Vac	Steady-state value
Loss of one phase	2-phase operation is possible but thermally limited		
External input protection	max. 20A CC fuse		



		3AC 400 V	3AC 480 V	
Power factor	typ.	0.95	0.94	At 1500 W, (100% Load)
Start-up delay	typ.	0.55 s	0.50 s	At 1500 W symmetrical phase voltages
Rise time	typ.	29 ms	28 ms	
Turn-on overshoot	Max.	0.92 V	0.85 V	

All parameters are specified at 49.2 V, 20 A, 400 Vac, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.





All parameters are specified at 49.2 V, 20 A, 400 Vac, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.

4. DC-Input

Do not operate this power supply with DC-input voltage.

5. Input Inrush Current

		3AC 400 V	3AC 480 V	
Inrush current *)	max.	5.0 Apeak	4.9 Apeak	Temperature independent
	typ.	4.0 Apeak	3.9 Apeak	Temperature independent

*) The charging current into EMI suppression capacitors is disregarded in the first microseconds after switch-on.

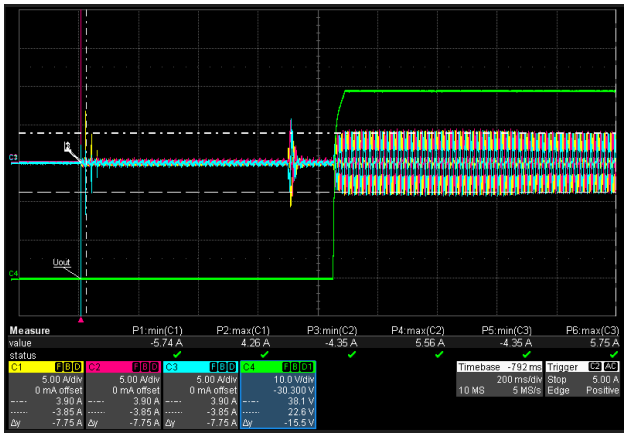


Fig. 5-1: Typical turn-on behavior at nominal load and 25°C ambient temperature

All parameters are specified at 49.2 V, 20 A, 400 Vac, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.

6. Output

The outputs provide a (SELV/ES1) rated voltage, which is galvanically isolated from the input voltage.

The device is designed to supply any kind of loads, including capacitive and inductive loads. If capacitors with a capacitance >30mF are connected to the output, the unit might charge the capacitor in hiccup mode.

Output voltage	Nom.	49.2 V	fixed
Line regulation	Max.	17 mV	Between 3x342 and 552 Vac input voltage change
Load regulation	Typ.	86 mV	Between 0 and 1500 W output load, static value
Ripple and noise voltage	Max.	260mVpp	Without load Bandwidth 20 Hz to 20 MHz, 50 Ohm
Ripple and noise voltage	Max.	60 mVpp	At 150-1500 W load Bandwidth 20 Hz to 20 MHz, 50 Ohm
Total output power	Nom.	1500 W	Up to +40 °C at ambient temperatures
	Nom.	938 W	At +55 °C at ambient temperatures
	Nom.	375 W	At +70 °C at ambient temperatures.
short term up to 1s	Nom.	3200W	Up to +40 °C at ambient temperatures
		2000W	Up to +55 °C at ambient temperatures
	Nom.	800 W	At +70 °C at ambient temperatures.
	Derate linearly between +40 °C and +70 °		
Overload/ short-circuit current	typ.	65 A / 0 A	At heavy overloads (when output voltage falls below 45,2 V), the power supply delivers continuous output current for 1,9 s. If the overload has been cleared, the device will operate normally.
Parallel Use			A maximum of 2 units can be used in parallel in order to achieve increased power-output by active load sharing
Back-feeding loads	Max.	50 A / 750 J	The unit is resistant and does not show a malfunction when a load feeds back voltage to the power supply. The threshold value for switching on the internal chopper-resistor is typically 52V. Values are for two outputs in total.

All parameters are specified at 49.2 V, 20 A, 400 Vac, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.

7. Hold-up Time

The hold-up time is the time during which a power supply's output voltage remains within specification following the loss of input power. The hold-up time is output load dependent. At no load, the hold-up time can be up to several seconds. The status LED is also on during this time.

		3AC 400 V	3AC 480 V	
Hold-up Time	typ.	25 ms	26 ms	At 750 W output load,
	min.	24,8 ms	25,2 ms	At 750 W output load,
	typ.	13 ms	13 ms	At 1500 W output load,
	min.	12,5 ms	12,8 ms	At 1500 W output load,

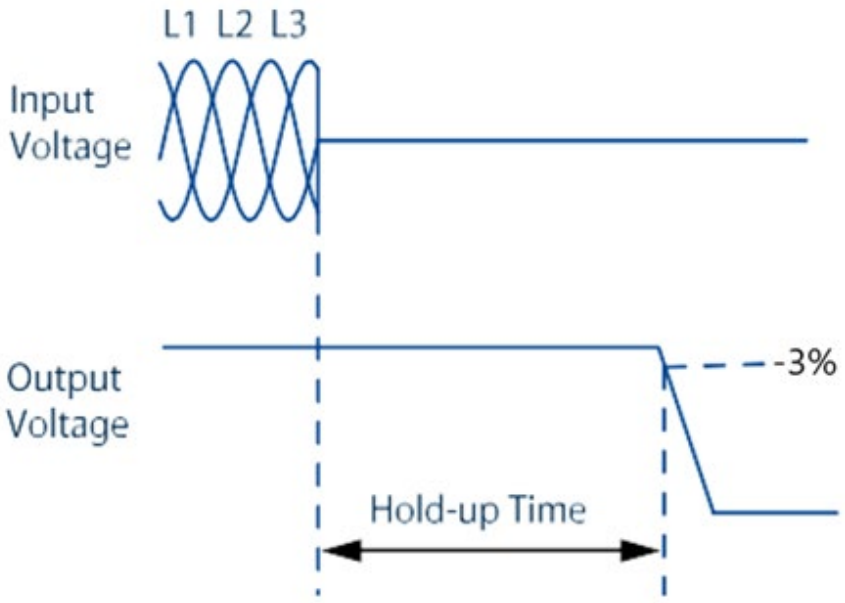


Fig. 7-1: Shut-down behavior, definitions

All parameters are specified at 49.2 V, 20 A, 400 Vac, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.

8. DC-OK Relay Contact

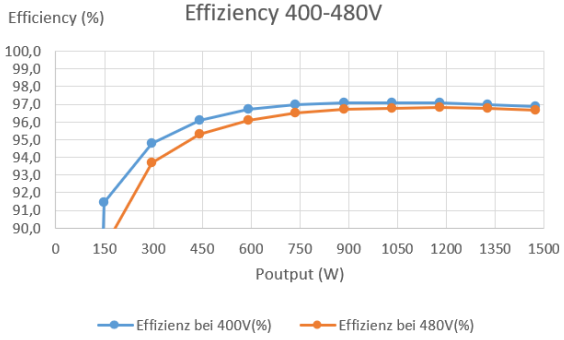
This feature monitors the output voltage, which is produced by the power supply itself. It is independent of an eventually present external voltage on the output of the power supply.

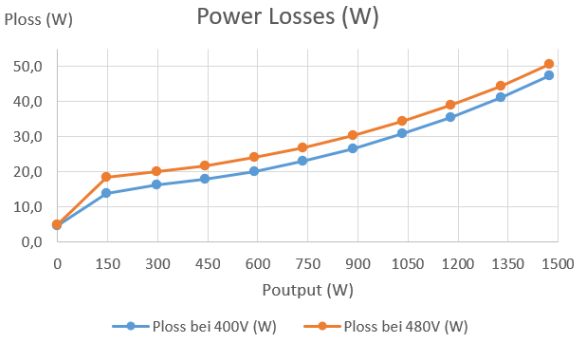
Contact closes	As soon as the output voltage reaches typ. 42 Vdc. The DC-OK Relay Contact is synchronized with the Status Led.
Contact opens	As soon as the output voltage dips below 42 Vdc. Short dips will be extended to a signal length of 100 ms. Dips Shorter than 1ms will be ignored.
Contact ratings	Maximal 125Vac/ 60 Vdc 0.5 A, 24 Vdc 1 A, resistive load Minimal permissible load: 1 mA at 5 Vdc

9. Efficiency and Power Losses

		3AC 400 V	3AC 480 V	
Efficiency	typ.	96,9 %	96,7%	At 49 V, 1500 W
Average efficiency	typ.	96,4 %	95,9 %	25 % at 300W, 25 % at 750 W, 25 % at 1180 W 25 % at 1500 W
Power losses	typ.	4,8 W	5,0 W	At 49 V, 0 W (no load)
	typ.	23 W	27 W	At 249 V, 750 W (half load)
	typ.	47 W	51 W	At 49 V, 1500 W (full load)

*) The average efficiency is an assumption for a typical application where the power supply is loaded with 20 % of the nominal load for 25 % of the time, 50 % of the nominal load for another 25 % of the time, 80 % of the nominal load for another 25 % of the time and with 100 % of the nominal load for the rest of the time.





All parameters are specified at 49.2 V, 20 A, 400 Vac, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.

10. Lifetime Expectancy

The Lifetime expectancy shown in the table indicates the minimum operating hours (service life) and is determined by the lifetime expectancy of the built-in electrolytic capacitors. Lifetime expectancy is specified in operational hours and is calculated according to the capacitor's manufacturer specification.

The manufacturer of the electrolytic capacitors only guarantees a maximum life of up to 15 years (131 400 h). Any number exceeding this value is a calculated theoretical lifetime which can be used to compare devices.

	3AC 400 V	
Calculated lifetime expectancy	208 000 h	At 49 V, 1500 W and 25 °C
	73 600 h	At 49 V, 1500 W and 40 °C

11. Functional Diagram

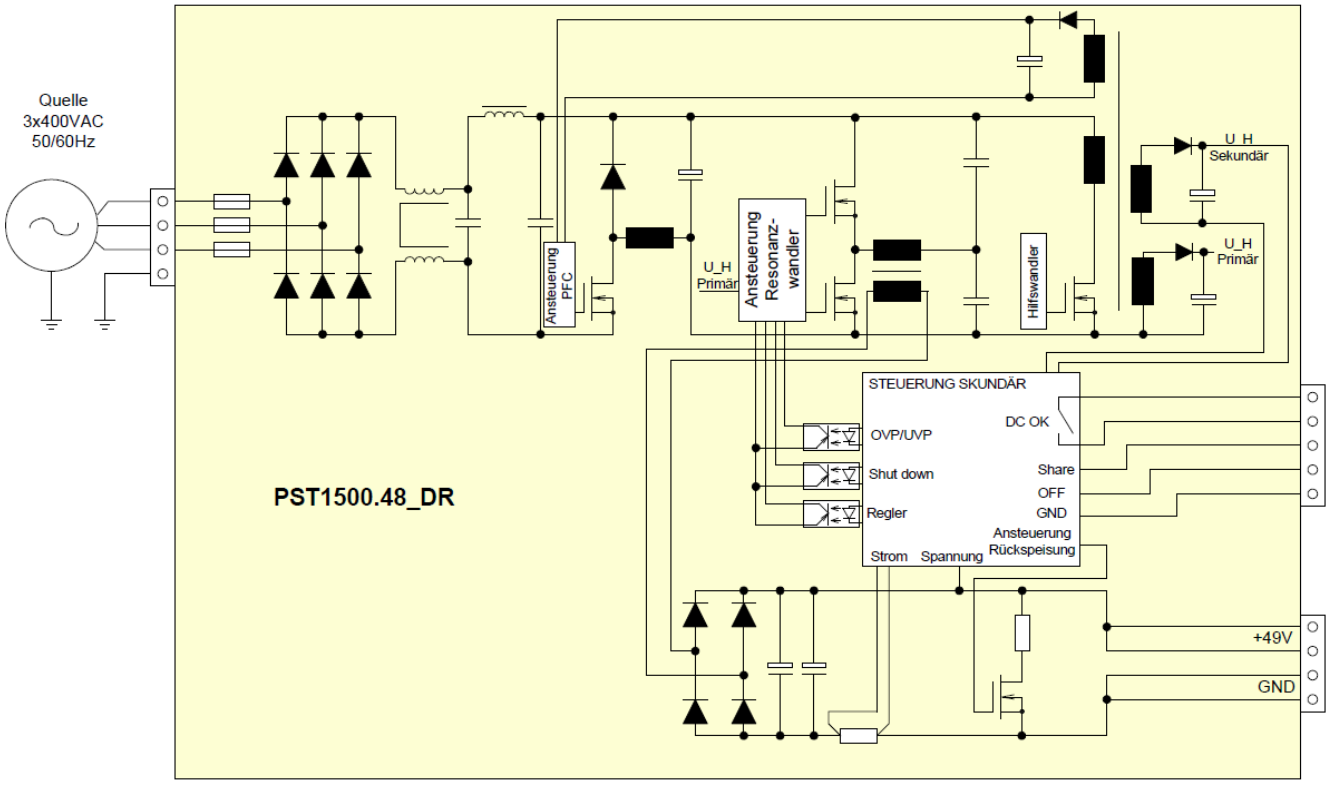
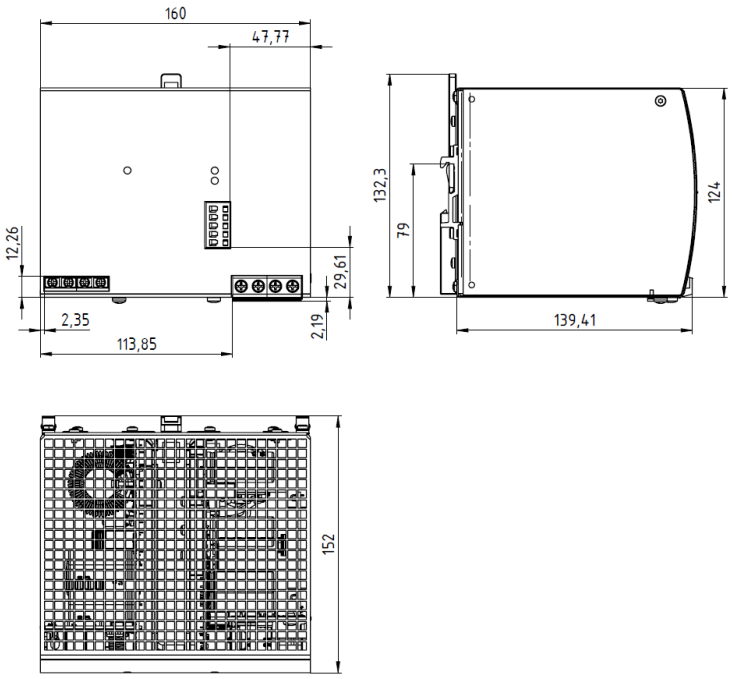


Fig. 12-1: Functional Diagram PST1500.40_DR

All parameters are specified at 49.2 V, 20 A, 400 Vac, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.

12. Dimensions and Connector Variants

PST1500.48_DR



Width	160 mm / 6.3"	Housing body material	Aluminium alloy
Height	124 mm / 4.9"	Housing cover material	Galvanized steel sheet
Depth	142 mm / 5.6"	Installation clearances	See chapter 2
Weight	2000 g / 4.4 lb	Suitable wiring	See chapter 8.2.2

8.2.2. Installation Instruction

The mechanical connection between the power supply unit and the end application is made by snapping the power supply unit onto a DIN rail according to EN 60715 or EN 50022 with a height of 7.5 or 15 mm.
Mount the device in a way that the output and input terminals are on the bottom of the device.
This device is designed for convection cooling and does not require an external fan.
Do not obstruct air circulation.
The ventilation openings must not be covered by more than 15% (e.g. by cable ducts)!

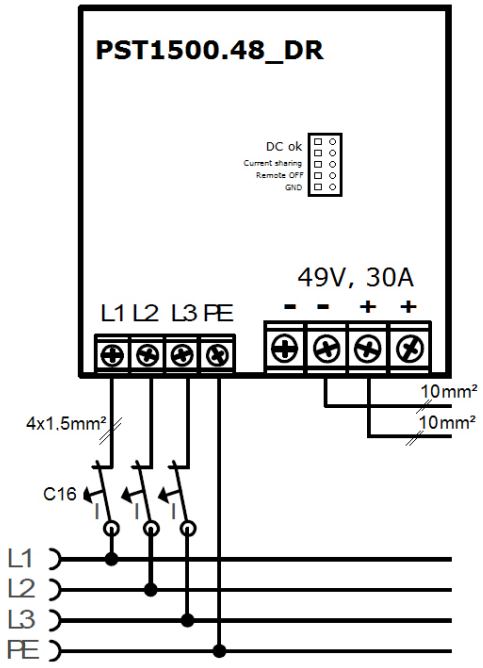
The connection terminals are designed finger-safe in accordance with IP20 and are suitable for field and factory wiring.

Type	**Input**	**Output**	**DC-OK, Shutdown, Share**
	Screw connection	Screw connection	Spring Clamp connection
Solid wire	0.5-6mm2	0.5-16mm2	0.15-1.5mm2
Flexible wire	0.5-4mm2	0.5-10mm2	0.15-1.5mm2
American Wire Gauge	AWG 20-10	AWG 22-8	AWG 26-14
Max. wire diameter	2.8mm (incl. ferrule)	5.2mm (incl. ferrule)	1.5mm (incl. ferrule)
Stripping lenght	7 mm / 0.28 in	12 mm / 0.5 in	7 mm / 0.28 in
Screwdriver	3.5mm- Slotted screwdriver or Phillips screwdriver Nr. 2	3.5mm- or 5mm- Slotted screwdriver or Phillips screwdriver Nr. 2	3mm- Slotted screwdriver (to open the spring)
Recommended tightning torque	1 Nm, 9 lb.in	2.3 Nm, 20.5 lb.in	Not applicable

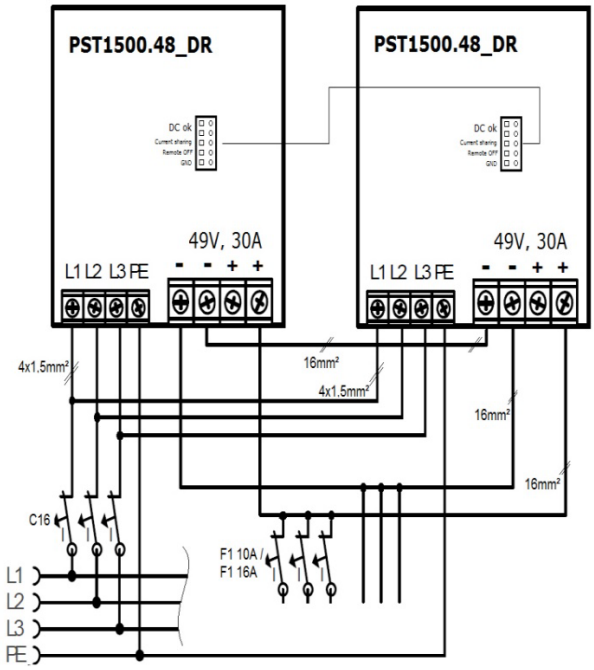
All parameters are specified at 49.2 V, 20 A, 400 Vac, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.

a) Use suitable copper cables that are designed for at least the following operating temperatures:
+60°C for ambient temperatures up to +45°C and +75°C for ambient temperatures up to +60°C
+90°C for ambient temperatures up to +70°C.
b) Observe the national installation rules and regulations!
c) Make sure that all individual wires of a strand are plugged into the connection terminal!
d) Do not use the device without a PE connection.
e) Unused terminals should be tightened securely.
f) Ferrules are allowed.

Single Installation



Parallel operation



13. User Interface

LED Signaling

DC OK LED

Green	On	-> DC output voltage above 42 Vdc
	Off	-> DC output voltage below 42 Vdc

Overload LED

Red	On	-> output current above 30 A (time&energy counted during overload)
	Off	-> output current below 30 A & overload counter empty

3 Phase AC in LED

Green	On	-> 3 Phase input available
	Flashing	-> 2 Phase input only
	Off	-> 1 Phase or no AC input available

All parameters are specified at 49.2 V, 20 A, 400 Vac, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.

14. EMC

The EMC behavior of the device is designed for applications in industrial environment as well as in residential, commercial and light industry environments.

The device is investigated according to EN IEC 61000-6-2:2019; EN 61000-6-2:2005/corrigendum Sep.2005, EN IEC 61000-6-4:2019; EN 61000-6-4:2007/A1:2011, EN-61000-4-5

EMC immunity

Surge voltage on AC input	EN 61000-4-5	Lx to Ly L to -PE	1 kV 2 kV	Criterion A Criterion A

Performance criterions:
A: The device shows normal operation behavior within the defined limits.
C: Temporary loss of function is possible. The device may shut-down and restarts by itself. No damage or hazards for the device will occur.

MC Emission

Conducted emission AC input lines	EN 55022, FCC Part 15	Class
Radiated emission	EN 55011 FCC Part 15	Class A
Harmonics	EN 61000-3-2	Pass for Class A equipment
Voltage fluctuations, flicker	EN 61000-3-3	Pass tested with constant current loads, non pulsing

This device complies with FCC Part 15 rules.

Operation is subjected to following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

15. Environment

Operational temperature	-30 °C to +70 °C (-22 °F to 158 °F)	Operational temperature is the same as the ambient or surrounding temperature and is defined as the air temperature 2cm below the unit.
Storage temperature	-40 °C to +85 °C (-40 °F to 185 °F)	For storage and transportation
Output derating	2.5 % / K	Between +40 °C and +70 °C (104 °F to 158 °F)
	The derating is not hardware controlled. The user has to take care to stay below the derated current limits in order not to overload the unit.	
Humidity	5 to 85 % r.h.	Non-condensating, According to IEC 60068-2-30
Atmospheric pressure	54-110k Pa	
Altitude	Up to 5000 m (16 400 ft)	
Over-voltage category	III	According to IEC 60664-1
	II	For TN & TT mains systems with earthed neutral monitoring for altitudes up to 2000 m According to IEC 60664-1 For TN & TT mains systems with earthed neutral monitoring for altitudes between 2000 m and

All parameters are specified at 49.2 V, 20 A, 400 Vac, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.

		5000 m According to IEC 60664-1 For TT mains systems monitoring for altitudes up to 2000 m
Degree of pollution	3	According to IEC 62477-1, not conductive
LABS compatibility	Yes	
Audible noise	< 36 db	

16. Safety and Protection Features

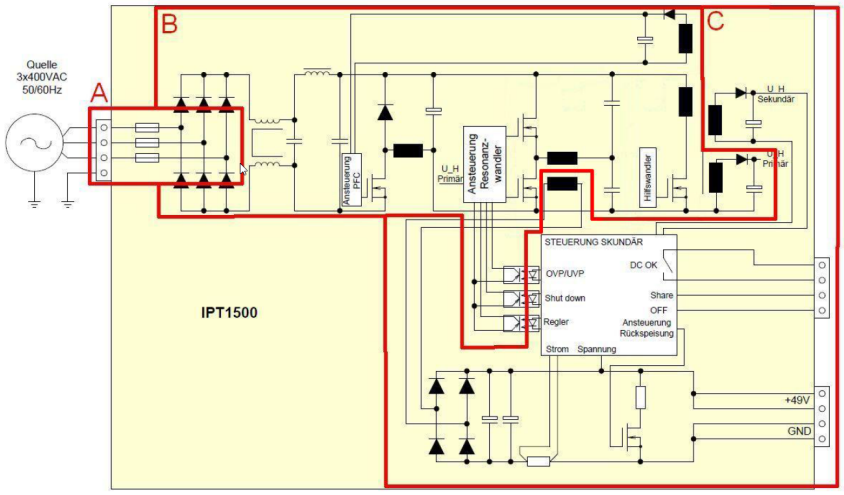
PE resistance	max.	0.1 Ohm	Resistance between PE terminal and the housing
Input/Output separation		SELV	IEC/EN/UL 61010-1
Output over-voltage protection	typ.	55 Vdc	In case of an internal defect, a redundant circuit limits the maximum output voltage. The output shuts down and automatically attempts to restart
Class of protection			According to IEC 61140 A PE (Protective Earth) connection is required
Ingress protection		IP 20	According to EN/IEC 60529
Over-temperature protection		Included	Output shut down with automatic restart. Temperature sensors are installed on critical components inside the unit and turns the unit off in safety critical situations, which can happen e.g. when ambient temperature is too high, ventilation is obstructed or the de-rating requirements are not followed. There is no correlation between the operating temperature and turn-off temperature since this is dependent on input voltage, load and installation methods.
Input transient protection		MOV (Metal Oxide Varistor) and Gas Discharge Tube	
Internal input fuse		Included	Not user replaceable slow-blow high-breaking capacity fuse
Touch current (leakage current)	max.	1.8 mA	At 3x 480 Vac, 60 Hz, TN- & TT-mains Lower currents at lower voltages and frequencies.

All parameters are specified at 49.2 V, 20 A, 400 Vac, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.

17. Dielectric Strength

The negative terminal of the output is isolated to earth within the unit (SELV). The output is insulated from the input by a double or reinforced insulation.

Type and routine tests are conducted by the manufacturer.



Type test (Pri-Sec)	60 s	3500 Vac
Routine test (Pri-Sec)	5 s	3000 Vac
Routine test (Pri-earth)	3 s	1500 Vac

18. Approvals and Fulfilled Standards

IEC 61010

Safety

CB Scheme Certificate
IEC 61010-1 - Electrical Equipment for Measurement, Control and Laboratory Use

NRTL 61010

Listed equipment for category NMTR - UL 61010--1 - Electrical equipment for measurement, control and laboratory use
Applicable for US and Canada

19. Regulatory Compliance

EU Declaration of Conformity

CE

Trade conformity assessment for Europe
The CE mark indicates conformance with the European

- EMC directive
- Low-voltage directive (LVD)
- RoHS directive

REACH Regulation (EU)

REACH COMPLIANT

Manufacturer's Statement
EU regulation regarding the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) fulfilled.

20. Accessories

ZM1.WALL

ZM2.WALL

All parameters are specified at 49.2 V, 20 A, 400 Vac, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.

21. Application Notes

21.1. Repetitive Pulse Loading

Typically, a load current is not constant and varies over time. This power supply is designed to support loads with a higher short-term power demand (BonusPower). The short-term duration is hardware controlled by an output power manager and is available on a repeated basis.

If the average load is higher than the sum of all output power, the output voltage will dip, thermally induced.

To avoid this, the following rules should be followed:

a) Don´t take full bonus power longer than 1 second

b) In case of full bonus power over 1 second, stay 30 seconds below nominal power

c) The average power over 30 seconds should be lower than the nominal output power of the device

21.2. External Input Protection

The device is designed, tested and approved for branch circuits up to 20 A (UL) without additional protection device. If an external fuse is utilized, do not use circuit breakers smaller than 6 A B- or C-Characteristic to avoid a nuisance trip.

21.3. Inductive and Capacitive Loads

The unit is designed to supply any kind of loads, including capacitive and inductive loads. If extreme large capacitors, such as EDLCs (electric double layer capacitors or "UltraCaps") with a capacitance larger than 30mF are connected to the output, the unit might charge the capacitor or the output might trip.

21.4. Back Feeding Loads

Loads such as decelerating motors and inductors can feed voltage back to the power supply. This feature is also called return voltage immunity or resistance against Back- E.M.F. (**E**lectro **M**agnetic **F**orce).

This power supply is resistant up to 50 A and 750 Joule and does not show malfunctioning when a load feeds back voltage to the power supply within this limitation.

21.5. Mounting Orientations

The device can be mounted in one orientation only. The listed lifetime and MTBF values from this datasheet apply for the standard mounting orientation.

A

Standard Orientation