POLYAMP

- A secure part of your system

DC/DC Converters
PU500 series
400 to 500 W 24 - 60 V

INPUT / OUTPUT

- Optimized input voltage ranges
- Input ranges from 18 to 300 Vd.c.
- Single outputs from 24 to 60 Vd.c.
- Reverse input voltage protection
- Input EN 50155 IEC 60571

FEATURES

- Overvoltage protection OVP
- Alarm circuit with relay
- Remote sense
- Inhibit input / Power down
- Output voltage adjustable on front panel

OPERATION

- Operating temperature range -25 to +70°C
- High efficiency >88%
- Fully encapsulated, meets IP20 as standard
- Convection cooled

EMC

- EN IEC 61000-6-3, Emission.
- EN IEC 61000-6-2, Immunity.
- EN IEC 61000-4-3, 10 V/m
- EN IEC 61000-4-4, 4 kV.
- EN IEC 61000-4-5 level 2 & 3.
- EN 50121-3-2 train

INPUT			
Code	Nominal inputs	Input range	Stop level
24	24 Vd.c.	18 - 32 V	< 14 V
48	48 Vd.c.	38 - 60 V	< 33 V
110	110, 127 Vd.c.	93 - 150 V	< 77 V
220	220, 250 Vd.c.	187 - 300 V	< 154 V

Other input ranges can be made on demand.
Input range, is the range we guarantee full output performance, Uout +10%, Iout +5%.
The converter works down to the stop levels.
The output voltage might decrease to approx. -10% of nominal output at the stop level.

OUTPUT		
Voltage	Current	Power
24 V	16.7 - 20.9 A	400 - 500 W
28 V	14.3 - 17.9 A	400 - 500 W
36 V	11.2 - 13.9 A	400 - 500 W
48 V	8.4 - 10.5 A	400 - 500 W
60 V	6.7 - 8.4 A	400 - 500 W

DC OUTPUT			DC INPUT			
Voltage	Current	Power	18 - 32 V	38 - 60 V	88 - 150 V	175 - 300 V
24 V	16.7 A	400 W	PU500 24/24			
24 V	20.9 A	500 W		PU500 48/24	PU500 110/24	PU500 220/24
28 V	14.3 A	400 W	PU500 24/28			
28 V	17.9 A	500 W		PU500 48/28	PU500 110/28	PU500 220/28
36 V	13.9 A	500 W		PU500 48/36		
48 V	8.4 A	500 W	PU500 24/48			
48 V	10.5 A	500 W		PU500 48/48	PU500 110/48	PU500 220/48
60 V	6.7 A	500 W	PU500 24/60			
60 V	8.4 A	500 W		PU500 48/60	PU500 110/60	PU500 220/60

How to read our product code:
Example PU500 110/48
PU500= Family code and power
110 = Input voltage code 110
48 = Output voltage 48 V

NRE might be changed if other input/output combinations are demanded

T= Train Inputs
1) 110T = 77 - 150 Vd.c.
2) 220T = 154 - 300 Vd.c.

FEATURES

Overvoltage protection OVP

The output voltage is limited to 15 % over nominal output voltage by an extra regulation circuit.

External output voltage sense

External sense is used when the output voltage regulation at the load is critical. The sense can compensate voltage drops up to 5% of the nominal voltage.

Over / Under voltage alarm

The built in relay changes to alarm state if the converter output voltage is not within 90 to 115 % of nominal output.
The user can select NO or NC relay function. The relay rating is 30 V 0.3 A (d.c. or a.c.), for higher voltage please contact Polyamp.

Inhibit input / Power down

The unit allows remote start and shutdown of the converter by an external signal voltage of 5 to 12 V, max 35 mA.

Operating temperature range

The PU500 series is rated to +55°C @ 100% load and continuous operation. However PU500 is designed for operation up to +70°C with derating. Temporary temperature rise e.g. as described in EN 50155 T3 up to +85°C can be accepted as the cooling system has a thermal inertia. -40°C is optional as we need to test each batch.

T-INPUT RANGES MOBILE APPLICATIONS			
Input	Uin range S1	Uin 0.1s S2	Code
36 V	25.2 - 45 V	21.6 - 50.4 V	36T
48 V	33 - 60 V	28.8 - 69 V	48T
72 V	50.4 - 90 V	43 - 101 V	72T
110 V	77 - 138 V	66 - 154 V	110T

OPTIONAL FEATURES

Train input

Input voltage range according to train standard EN 50155 and IEC 60571, see train T-inputs below.

Inrush current limit with NTC

Reduce the inrush current during start up. the input voltage range will be affected.

Conformally coating, option I

For environment with high non condensing humidity max 98 % RH.

-40 or +70 °C operating temperature

For temperature extensions like -40°C, +70°C and T3 +85°C 10 min, please contact factory, as rating depends on model.

EN IEC 61000-4-5 level 4

External varistor + surge arrestor mounted from pole to ground. With this filter the input meets level 4 of EN IEC61000-4-5 (+/-2 kV line to line, 4 kV line to ground)

Mounting brackets L216-1

See figure 3.

19” rack mounting set 2U

To mount two PU500 together to form a full 19” rack unit 2U, see fig 2.

19” rack mounting bracket L86-3

To mount one PU500 to form a full 19” rack unit 2U, see fig 2.

Empty box

To produce a full 19”-rack 2U unit. Includes 19”-rack mounting set see fig 3.

GENERAL DATA | INPUT DATA

LABEL	VALUE
Design topology	Push-Pull
Switching frequency	40 kHz
Emission / Immunity	See page 4
Electric Safety EN IEC61204-7:2018	Class I, See page 4
Ingression Protection IP	IP20
Input power at no load	Output < 50 V max 12 W Output > 50 V max 17 W
Max. accepted input ripple[1] 50 - 400 Hz	1 % of nominal voltage
Reverse input voltage protection	Parallel diode[2] < Uin < 60V Series diode < Uin > 60V
Vibration and shock	
EN/IEC 61373 Body mounted	Class B
IEC 60721-3-5	Class 5M2
IEC 60068-2-27 Bump	30 g 6 ms
IEC 60068-2-64 Random vibration	1.68gRMS
EN 45545-2 Fire protection 4.3.2 rule 1 and figure 1	HL1, HL2, HL3
Dimensions (D x W x H)	232 x 210 x 86 mm
Weight	4.2 kg
Power connectors	0.5 - 4 mm^2
Signal connectors	0.25 - 2.5 mm^2

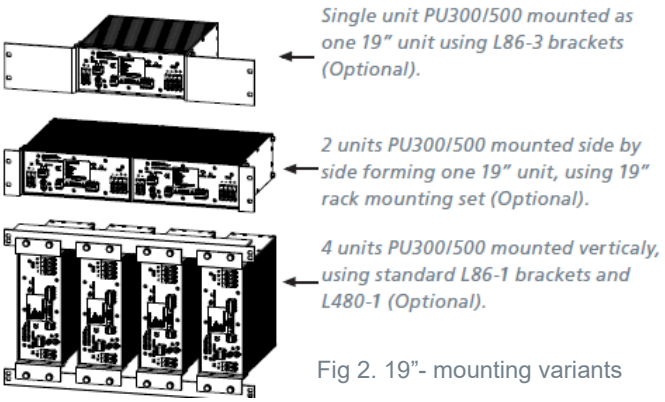
1. Higher ripple affects the input, contact factory
2. The converter do not start at reverse voltage
3. The output ripple might increase to 0.5% RMS of Vout, when IEC 61000-4-3, 10 V/m test is applied
4. Relay is also rated 300 Vdc 20 mA, switch current depends on voltage. The relay cannot be used >+70°C

OUTPUT DATA

LABEL	VALUE
Source regulation	0.1%
Load regulation (0 to 100% load) with sense connected	0.2%
Load regulation (0-100% load), no sense	0.5%
Transient recovery time for 10 to 90% load step to within 3% of nominal output voltage.	<3 ms
Output ripple (80 kHz) Vp-p[3]	15 mVp-p
Input ripple attenuation to output 50 to 400 Hz	150:1
Emission / Immunity	See page 4
Temperature coefficient	0.02%/°C
Min output adjustment range adjustable with a 15 turn potentiometer	95 - 110%
Current limit, rectangular	105%
Remote sense	Yes
Softs start	Yes
Alarm relay rating (a.c. & d.c.)	30 V 300 mA[4]
Start up time	1 s
Hold up time, contact factory	2 - 25 ms
Efficiency[5]	88 - 91%
Operating temperature range at 100% load. (Convection cooling) with derating[6]	-25 to +55°C -25 to +70°C
Storage temperature range	-40 to + 85°C

5. Lowest efficiency measured within the whole input voltage range at 100% load
6. Contact factory for derating as depends on model. The alarm relay can not be used at +70°C

Option:19” rack mounting



Single unit PU300/500 mounted as one 19” unit using L86-3 brackets (Optional).

2 units PU300/500 mounted side by side forming one 19” unit, using 19” rack mounting set (Optional).

4 units PU300/500 mounted verticaly, using standard L86-1 brackets and L480-1 (Optional).

Fig 2. 19”- mounting variants

Standard mechanics and optional wall mounting

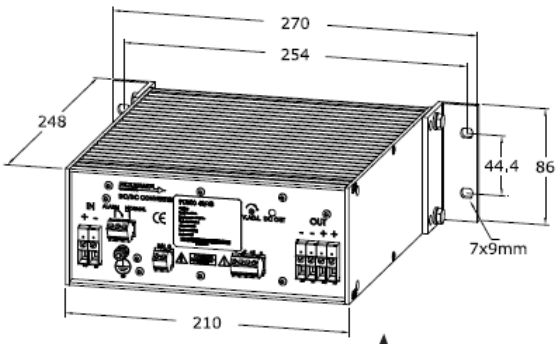


Figure 1. Dimensions

Weight: 4.2 kg

PU300/500 wall mounted. Using standard brackets L86-1

PU300/500 wall mounted. Using mounting brackets L216-1 (Optional)

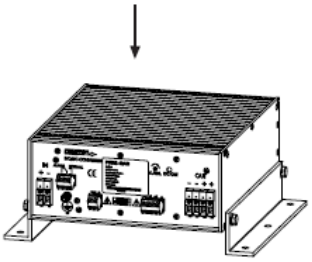


Fig. 3 wall mounting

CE MARK

PU500-series meets the requirements defined by CE mark as an apparatus.

This means they meet requirements stated by EMC directive and low voltage directive (LVD) as well as 2015/863 (RoHS 3) directive.

PU500--series is in respect to EMC, as stand alone unit. Can also be installed in any other environment by a professional installer.

PU500-series use the electric safety standard EN IEC 61204-7:2018. On EMC it meets the requirements of EN IEC 61204-3:2018, and the generic EMC standards:

EN IEC 61000-6-2 (Immunity)
EN IEC 61000-6-3 (Emission)

SAFETY STANDARD EN IEC 61204-7:2018

ISOLATION TESTABLE LEVELS		TEST VOLTAGE
Input/Output	Input code: 24, 36, 48	2 kVd.c.
	Input code: 110, 220	3 kVa.c.| 4.3 kVd.c.
Input/Signal*	Input code: 24, 36, 48	2 kVd.c.
Input/Case	Input code: 24, 36, 48	2 kVd.c.
	Input code: 110, 220	3 kVa.c.| 4.3 kVd.c.
Output/Case		2 kVd.c.
Output/Signal*		2 kVd.c.
Case/Signal	Input code: 24, 36, 48	2 kVd.c.
	Input code: 110, 220	3 kVa.c.| 4.3 kVd.c.

Please note that product standards can demand different levels or other basic standard tests. We test according to levels below. For higher levels or other tests, contact factory.

EMC

EMC STANDARDS	TEST VOLTAGE		NOTES
Emission standards	**EN IEC 61000-6-3**		**Commercial and light-industrial environments**
	Input	**Output**	
EN 55016 CISPR16 (0.15 - 30 MHz)	OK	OK	Optional EN 55022 level B
EN 55016 CISPR16 (30 - 1000 MHz)	OK		Enclosure test
Immunity standards	**EN IEC 61000-6-2**		**Industrial environments**
EN IEC 61000-4-2	8 kV | 15 kV		Connectors | Air, Enclosure test
EN IEC 61000-4-3, see note 3	20 V/m AM-modulated		Output ripple can increase to 0.5% of Vout. Enclosure test
EN IEC 61000-4-4	±4 kV	±4 kV	
EN IEC 61000-4-5 input code 24, 48 EN IEC 61000-4-5 input code 110, 220 EN 50121-3-2, EN 50121-4 train	±0.5 kV | ±1 kV ±1 kV | ±2 kV ±1 kV | ±2 kV	±0.5 kV | ±1 kV ±1 kV | ±2 kV ±1 kV | ±2 kV	Line-line 2 Ω | Line-case 12 Ω Line-line 2 Ω | Line-case 12 Ω Line-line 42 Ω | Line-case 42 Ω
EN IEC 61000-4-6	10 V_{RMS}	10 V_{RMS}	AM-modulated
EN IEC 61000-4-8	Not sensitive		Enclosure test
EN IEC 61000-4-10	Not sensitive		Enclosure test

We use the EMC product standard "Low voltage power supplies DC output" EN 61204-3 as base for measurement principles. The Immunity EMC levels are elevated in order to comply to EN 50121-3-2 (IEC 62236-3-2) Railway application: Rolling stock – Apparatus, and EN 50121-4 (IEC 62236-4) , Railway application: Signaling and telecommunication apparatus. Also to meet relevant parts of IEC 61000-6-5 Generic Standards – Immunity for power stations and substation environments.

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POLYAMP
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