

PU1000

DC-DC Converter



PU1000-series 800 to 1000W

Input / Output

- Optimized input voltage ranges.
- Input ranges from 18 to 750V.
- Single outputs from 24 to 110 Vd.c.
- Reverse input voltage protection.

Operation

- High efficiency >88%.
- Operating temperature range -25 to +55°C.
- Fully encapsulated, meets IP20 as standard.
- Convection cooled.

Features

- Current sharing.
- Extra output with series diode.
- External output voltage sense.
- Inrush current limit.
- Overvoltage protection OVP.
- Alarm circuit with relay.
- Inhibit input / Power down.
- Output voltage adjustable on frontpanel.

EMC

- EN61000-6-3, Emission.
- EN61000-6-2, Immunity.
- EN/IEC61000-4-4, 4kV.
- EN/IEC61000-4-5 level 2&3.

Input and output ratings

Nominal inputs	Input range	Code
24 Vd.c.	18 to 32V	24
48 Vd.c.	38 to 60V	48
72 Vd.c.	50 to 90V	72
110, 127 Vd.c.	88 to 150V	110
220, 250 Vd.c.	175 to 300V	220
440, xxx Vd.c.	<750V	XXX

Input voltages meeting train standard EN50155/IEC60571, can be made on demand.

Voltage	Output	
	Current	Power
24V	33.4 - 41.7A	800 - 1000W
28V	28.6 - 35.7A	800 - 1000W
48V	16.7 - 20.9A	800 - 1000W
60V	13.4 - 16.7A	800 - 1000W
85V	11.8 A	1000W
110V	7.28 - 9.09A	800 - 1000W

PU1000

DC-DC Converter



PU1000-series 800 to 1000W

Input / Output

- Optimized input voltage ranges.
- Input ranges from 18 to 750V.
- Single outputs from 24 to 110 Vd.c.
- Reverse input voltage protection.

Operation

- High efficiency >88%.
- Operating temperature range -25 to +55°C.
- Fully encapsulated, meets IP20 as standard.
- Convection cooled.

Features

- Current sharing.
- Extra output with series diode.
- External output voltage sense.
- Inrush current limit.
- Overvoltage protection OVP.
- Alarm circuit with relay.
- Inhibit input / Power down.
- Output voltage adjustable on frontpanel.

EMC

- EN61000-6-3, Emission.
- EN61000-6-2, Immunity.
- EN/IEC61000-4-4, 4kV.
- EN/IEC61000-4-5 level 2&3.

Input and output ratings

Nominal inputs	Input range	Code
24 Vd.c.	18 to 32V	24
48 Vd.c.	38 to 60V	48
72 Vd.c.	50 to 90V	72
110, 127 Vd.c.	88 to 150V	110
220, 250 Vd.c.	175 to 300V	220
440, xxx Vd.c.	<750V	XXX

Input voltages meeting train standard EN50155/IEC60571, can be made on demand.

Voltage	Output	
	Current	Power
24V	33.4 - 41.7A	800 - 1000W
28V	28.6 - 35.7A	800 - 1000W
48V	16.7 - 20.9A	800 - 1000W
60V	13.4 - 16.7A	800 - 1000W
85V	11.8 A	1000W
110V	7.28 - 9.09A	800 - 1000W

Output ratings and type code

Output			Input				
Voltage	Current	Power	18 - 32V	38 - 60V	50 - 90V	88 - 150V	175 - 300V
24V	33.4A	800W	PU1000 24/24				
24V	41.7A	1000W		PU1000 48/24	PU1000 72/24	PU1000 110/24	PU1000 220/24
28V	28.6A	800W	PU1000 24/28				
28V	35.7A	1000W				PU1000 110/28	PU1000 220/28
48V	16.7A	800W	PU1000 24/48				
48V	20.9A	1000W		PU1000 48/48	PU1000 72/48	PU1000 110/48	PU1000 220/48
60V	13.4A	800W	PU1000 24/60				
60V	16.7A	1000W		PU1000 48/60	PU1000 72/60	PU1000 110/60	PU1000 220/60
85V	11.8A	1000W		PU1000 48/85	PU1000 72/85	PU1000 110/85	PU1000 220/85
110V	7.28A	800W	PU1000 24/110				
110V	9.09A	1000W		PU1000 48/110	PU1000 72/110	PU1000 110/110	PU1000 220/110

How to read our product code:

Example **PU1000 24/48**

PU1000 = Family code

24 = input voltage code 24

48 = Output voltage 48V

Features

- Current Sharing**
 Current sharing is used to balance the load between up to 10 units working in parallel. Even more units can be paralleled with special care. Contact Polyamp.
- Extra output with series diode**
 Use the series diode output when the output is connected in parallel with other power supplies to achieve redundancy.
- External output voltage sense**
 External sense is used when the voltage regulation at the load is critical. The sense can compensate voltage drops up to 5% of the nominal voltage.
- Inrush current limit**
 Models with input code 110 and 220 have an active inrush current limit. $I_{peak} < 6 \times I_{nom}$.
- Over voltage protection OVP**
 The output voltage is limited to 15% over nominal output voltage by an extra regulation circuit.
- 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 30V 0.5A (d.c. or a.c.)
- Inhibit input / Power down**
 The converter will shutdown if the inhibit input is short-circuit by a relay or electrical switch. The current through the short-circuit is 20mA. Note that there is no electrical isolation between the inhibit and the output.
- Reverse input voltage protection**
 All PU1000 has input reverse protection. On input code 24 and 48 with a parallel diode, which is dimensioned to blow an external input fuse. Other inputs use a input series thyristor.

Optional Features

- Conformally coating**
 For environment with high non condensing humidity max 98% RH.
- Mounting bracket L300-1**
 See figure 3.
- Vertical mount 19"-rack**
 Up to 4 units can be mounted vertically with L480-2, See figure 2.
- EN/IEC61000-4-5 level 4**
 Input filter to meet level 4 of 61000-4-5 (+/-2kV line to line, 4kV line to ground).
- Train input**
 Input voltage range according to train standard EN50155 and IEC60571.

General data / input data

Design topology	Push-Pull
Switching frequency	30 kHz
Emission / immunity	See page 4
Safety EN/IEC60950	Class I
Max. accepted input ripple ¹ 50-400Hz	2% of nominal voltage
Input power at no load	<15 W
Reverse input voltage protection	
24, 48, 72input code	Parallel diode
110, 220 input code	Series diode
Dimensions (D x W x H)	337x420x86mm
Weight	10 kg

- Higher ripple affects the input, contact factory

Output data

Source regulation	0.1%
Load regulation (0-100% load)	0.3%
Transient recovery time for 10%-90% load step to within 3% of nominal output voltage.	<3ms
Output ripple (60kHz) ²	Typ. 30mV p-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% to 110%
Current limit, rectangular.	105%
Remote sense	Yes
Soft start	Yes
Start-up time	1s
Hold-up time, contact factory	2-25ms
Efficiency ³	88-92%
Operating temperature range at 100% load.	-25 to +55°C
(Conduction cooling.) with derating ⁴	-25 to +70°C
Storage temperature range	-40 to +85°C

- Output ripple might increase to 0.5% RMS of Vout, when EN/IEC61000-4-3, 10V/m test is applied
- Lowest efficiency measured within the whole input voltage range at 100% load.
- Contact factory for derating as it depends on model. The alarm relay can not be used at +70°C.

Mechanical drawing

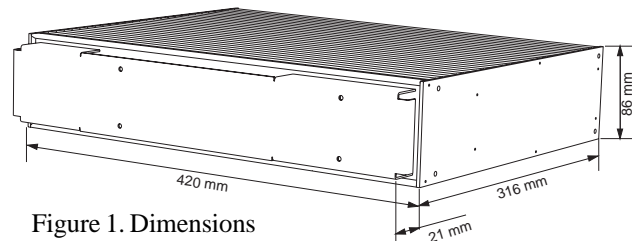


Figure 1. Dimensions

Weight: 10 kg

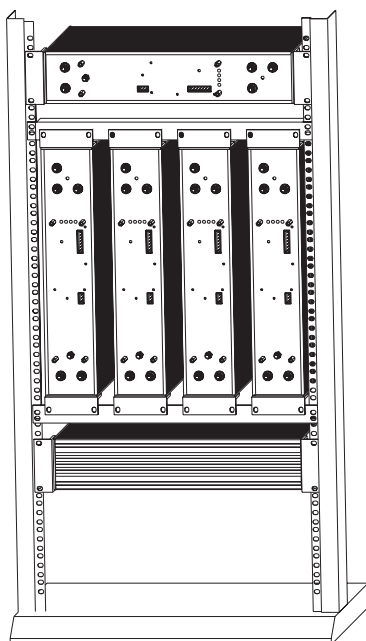


Figure 2. 19''-rack mounting

← Single unit PU600/1000 mounted as one 19'' unit using standard brackets L89-1.

← 4 units PU600/1000 mounted vertically using standard L89-1 brackets and L480-2 (Optional).

← Single unit PU600/1000 mounted backwards as one 19'' unit using standard brackets L89-1.

PU600/1000 wall mounted. Using mounting brackets L300-1 (Optional)

PU600/1000 wall mounted. Using standard brackets L89-1. (Please note only vertical mounting is recommended)

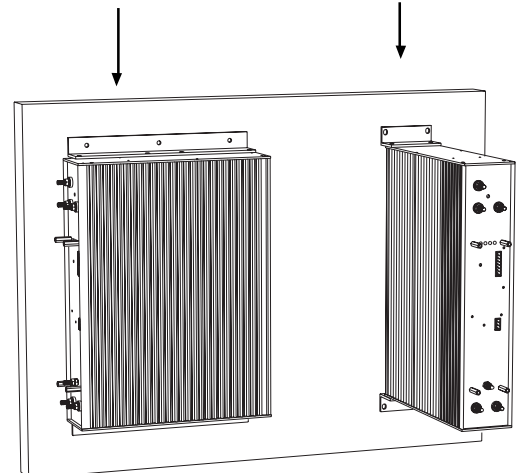


Figure 3. Wall and chassis mount.

PU1000 meets the requirements defined by CE mark as apparatus.

PU1000 meets requirements of EMC directive and low voltage directive (LVD).

Thus a PU1000 can be used as free standing unit or in installations as well as systems designed according to "The modular approach". PU1000 can be used in installation without further EMC tests, if our installation instructions are followed. 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.

Isolation testable levels		Test voltage
Safety class/Installation category		Class II / Class I
Input / output:	Input code: 24, 48, 72	2kVd.c.
	Input code: 110, 220	2.5kVa.c. / 4kVd.c.
Input / Alarm	Input code: 24, 48, 72	2kVd.c.
	Input code: 110, 220	2.5kVa.c. / 4kVd.c.
Input / Case	Input code: 24, 48, 72	2kVd.c.
	Input code: 110, 220	2.5kVa.c. / 4kVd.c.
Alarm / Case	Input code: 24, 48, 72	2kVd.c.
	Input code: 110, 220	2.5kVa.c. / 4kVd.c.
Output / Case on <75Vd.c. output		2kVd.c.
Output / Alarm		2kVd.c.
Output / Case on >75Vd.c.		2.5kVa.c. / 4kVd.c.

We use the product standard Low voltage power supplies, DC outputs EN/IEC61204-3 and the generic EMC standards:
EN/IEC61000-6-2 (Immunity)
EN/IEC61000-6-3 (Emission)

EMC

EMC-standards	EMC-performance		Remarks
Emission standards	Input	Output	
EN55011/EN55022 (0.15-30MHz)	Level B	Level B	
EN55011/EN55022 (30-1000MHz)	Level B		Enclosure test
Immunity standards	IEC/EN61000-6-2		
EN/IEC61000-4-2	8 kV/15 kV		Contact / air, Enclosure test
EN/IEC61000-4-3	10 V/m AM-Modulated		Output ripple can increase to 0.5% of Vout Enclosure test
EN/IEC61000-4-3	10 V/m Pulse modulated		Enclosure test
EN/IEC61000-4-4	4 kV	4 kV	
EN/IEC61000-4-5, Input code 24, 48, 72	0.5kV / 1 kV	0.5kV / 1 kV	Line-line 2Ω / Line-case 12Ω
EN/IEC61000-4-5, Input code 110 ¹ , 220 ¹	1kV / 2 kV	0.5kV / 1 kV	
EN50155 Figure 4, 1.8kV 1.5/50μs	Yes		Line-line 100 Ω
EN/IEC61000-4-6	10 V _{RMS}	10 V _{RMS}	AM-Modulated
EN/IEC61000-4-8	Not sensitive		Enclosure test
EN/IEC61000-4-10	Not sensitive		Enclosure test

¹ Higher level 2kV / 4kV with external filters, contact factory.

Contact

For updates on this datasheet we refer to www.polyamp.com
Specifications subject to change without notice.

Distributor



Polyamp AB Box 229 597 25 Åtvidaberg Sweden
Telephone: +46 120 854 00 Telefax: +46 120 854 05
<http://www.polyamp.se>, <http://www.polyamp.com>
E-mail: info@polyamp.se

Output ratings and type code

Output			Input				
Voltage	Current	Power	18 - 32V	38 - 60V	50 - 90V	88 - 150V	175 - 300V
24V	33.4A	800W	PU1000 24/24				
24V	41.7A	1000W		PU1000 48/24	PU1000 72/24	PU1000 110/24	PU1000 220/24
28V	28.6A	800W	PU1000 24/28				
28V	35.7A	1000W				PU1000 110/28	PU1000 220/28
48V	16.7A	800W	PU1000 24/48				
48V	20.9A	1000W		PU1000 48/48	PU1000 72/48	PU1000 110/48	PU1000 220/48
60V	13.4A	800W	PU1000 24/60				
60V	16.7A	1000W		PU1000 48/60	PU1000 72/60	PU1000 110/60	PU1000 220/60
85V	11.8A	1000W		PU1000 48/85	PU1000 72/85	PU1000 110/85	PU1000 220/85
110V	7.28A	800W	PU1000 24/110				
110V	9.09A	1000W		PU1000 48/110	PU1000 72/110	PU1000 110/110	PU1000 220/110

How to read our product code:

Example **PU1000 24/48**

PU1000 = Family code

24 = input voltage code 24

48 = Output voltage 48V

Features

- **Current Sharing**
Current sharing is used to balance the load between up to 10 units working in parallel. Even more units can be paralleled with special care. Contact Polyamp.
- **Extra output with series diode**
Use the series diode output when the output is connected in parallel with other power supplies to achieve redundancy.
- **External output voltage sense**
External sense is used when the voltage regulation at the load is critical. The sense can compensate voltage drops up to 5% of the nominal voltage.
- **Inrush current limit**
Models with input code 110 and 220 have an active inrush current limit. $I_{peak} < 6 \times I_{nom}$.
- **Over voltage protection OVP**
The output voltage is limited to 15% over nominal output voltage by an extra regulation circuit.
- **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 30V 0.5A (d.c. or a.c.)
- **Inhibit input / Power down**
The converter will shutdown if the inhibit input is short-circuit by a relay or electrical switch. The current through the short-circuit is 20mA. Note that there is no electrical isolation between the inhibit and the output.
- **Reverse input voltage protection**
All PU1000 has input reverse protection. On input code 24 and 48 with a parallel diode, which is dimensioned to blow an external input fuse. Other inputs use a input series thyristor.

Optional Features

- **Conformally coating**
For environment with high non condensing humidity max 98% RH.
- **Mounting bracket L300-1**
See figure 3.
- **Vertical mount 19"-rack**
Up to 4 units can be mounted vertically with L480-2, See figure 2.
- **EN/IEC61000-4-5 level 4**
Input filter to meet level 4 of 61000-4-5 (+/-2kV line to line, 4kV line to ground).
- **Train input**
Input voltage range according to train standard EN50155 and IEC60571.

General data / input data

Design topology	Push-Pull
Switching frequency	30 kHz
Emission / immunity	See page 4
Safety EN/IEC60950	Class I
Max. accepted input ripple ¹ 50-400Hz	2% of nominal voltage
Input power at no load	<15 W
Reverse input voltage protection	
24, 48, 72input code	Parallel diode
110, 220 input code	Series diode
Dimensions (D x W x H)	337x420x86mm
Weight	10 kg

- Higher ripple affects the input, contact factory

Output data

Source regulation	0.1%
Load regulation (0-100% load)	0.3%
Transient recovery time for 10%-90% load step to within 3% of nominal output voltage.	<3ms
Output ripple (60kHz) ²	Typ. 30mV p-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% to 110%
Current limit, rectangular.	105%
Remote sense	Yes
Soft start	Yes
Start-up time	1s
Hold-up time, contact factory	2-25ms
Efficiency ³	88-92%
Operating temperature range at 100% load.	-25 to +55°C
(Conduction cooling.) with derating ⁴	-25 to +70°C
Storage temperature range	-40 to +85°C

- Output ripple might increase to 0.5% RMS of Vout, when EN/IEC61000-4-3, 10V/m test is applied
- Lowest efficiency measured within the whole input voltage range at 100% load.
- Contact factory for derating as it depends on model. The alarm relay can not be used at +70°C.

Mechanical drawing

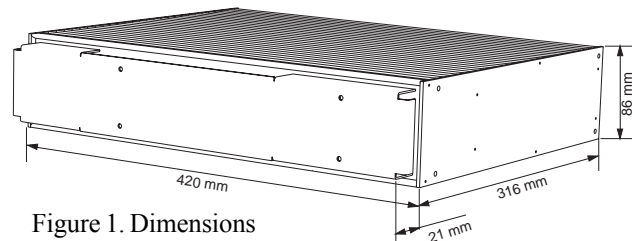


Figure 1. Dimensions

Weight: 10 kg

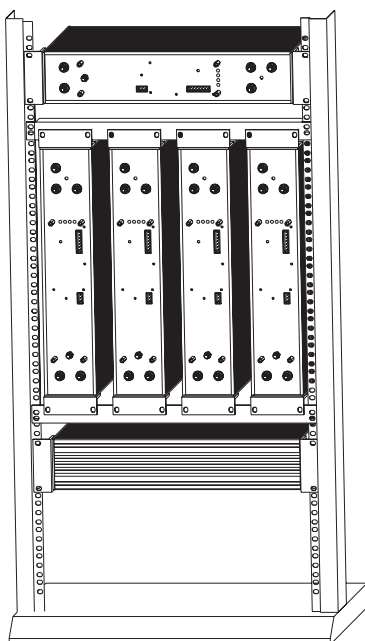


Figure 2. 19"-rack mounting

← Single unit PU600/1000 mounted as one 19" unit using standard brackets L89-1.

← 4 units PU600/1000 mounted vertically using standard L89-1 brackets and L480-2 (Optional).

← Single unit PU600/1000 mounted backwards as one 19" unit using standard brackets L89-1.

PU600/1000 wall mounted. Using standard brackets L89-1. (Please note only vertical mounting is recommended)

PU600/1000 wall mounted. Using mounting brackets L300-1 (Optional)

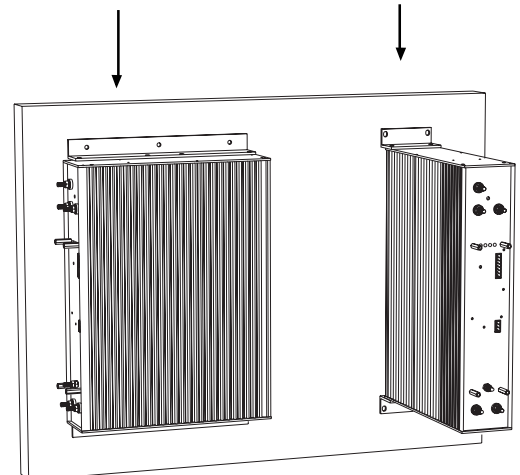


Figure 3. Wall and chassis mount.

PU1000 meets the requirements defined by CE mark as apparatus.

PU1000 meets requirements of EMC directive and low voltage directive (LVD).

Thus a PU1000 can be used as free standing unit or in installations as well as systems designed according to "The modular approach". PU1000 can be used in installation without further EMC tests, if our installation instructions are followed. 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.

Isolation testable levels		Test voltage
Safety class/Installation category		Class II / Class I
Input / output:	Input code: 24, 48, 72	2kVd.c.
	Input code: 110, 220	2.5kVa.c. / 4kVd.c.
Input / Alarm	Input code: 24, 48, 72	2kVd.c.
	Input code: 110, 220	2.5kVa.c. / 4kVd.c.
Input / Case	Input code: 24, 48, 72	2kVd.c.
	Input code: 110, 220	2.5kVa.c. / 4kVd.c.
Alarm / Case	Input code: 24, 48, 72	2kVd.c.
	Input code: 110, 220	2.5kVa.c. / 4kVd.c.
Output / Case on <75Vd.c. output		2kVd.c.
Output / Alarm		2kVd.c.
Output / Case on >75Vd.c.		2.5kVa.c. / 4kVd.c.

We use the product standard Low voltage power supplies, DC outputs EN/IEC61204-3 and the generic EMC standards:
 EN/IEC61000-6-2 (Immunity)
 EN/IEC61000-6-3 (Emission)

EMC

EMC-standards	EMC-performance		Remarks
Emission standards	Input	Output	
EN55011/EN55022 (0.15-30MHz)	Level B	Level B	
EN55011/EN55022 (30-1000MHz)	Level B		Enclosure test
Immunity standards	IEC/EN61000-6-2		
EN/IEC61000-4-2	8 kV/15 kV		Contact / air, Enclosure test
EN/IEC61000-4-3	10 V/m AM-Modulated		Output ripple can increase to 0.5% of Vout Enclosure test
EN/IEC61000-4-3	10 V/m Pulse modulated		Enclosure test
EN/IEC61000-4-4	4 kV	4 kV	
EN/IEC61000-4-5, Input code 24, 48, 72	0.5kV / 1 kV	0.5kV / 1 kV	Line-line 2Ω / Line-case 12Ω
EN/IEC61000-4-5, Input code 110 ¹ , 220 ¹	1kV / 2 kV	0.5kV / 1 kV	
EN50155 Figure 4, 1.8kV 1.5/50μs	Yes		Line-line 100 Ω
EN/IEC61000-4-6	10 V _{RMS}	10 V _{RMS}	AM-Modulated
EN/IEC61000-4-8	Not sensitive		Enclosure test
EN/IEC61000-4-10	Not sensitive		Enclosure test

¹ Higher level 2kV / 4kV with external filters, contact factory.

Contact

For updates on this datasheet we refer to www.polyamp.com
 Specifications subject to change without notice.

Distributor



Polyamp AB Box 229 597 25 Åtvidaberg Sweden
 Telephone: +46 120 854 00 Telefax: +46 120 854 05
<http://www.polyamp.se>, <http://www.polyamp.com>
 E-mail: info@polyamp.se