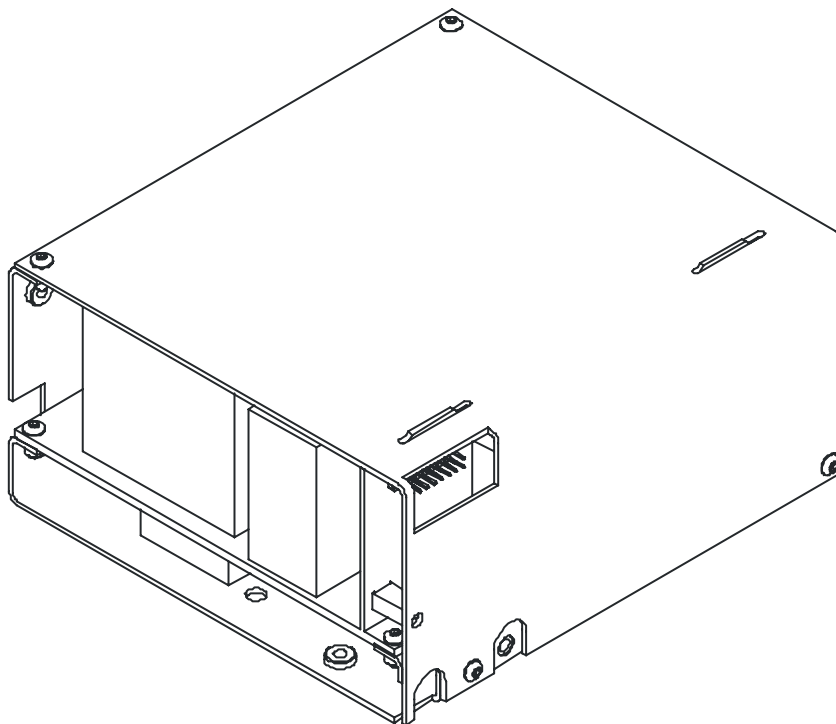


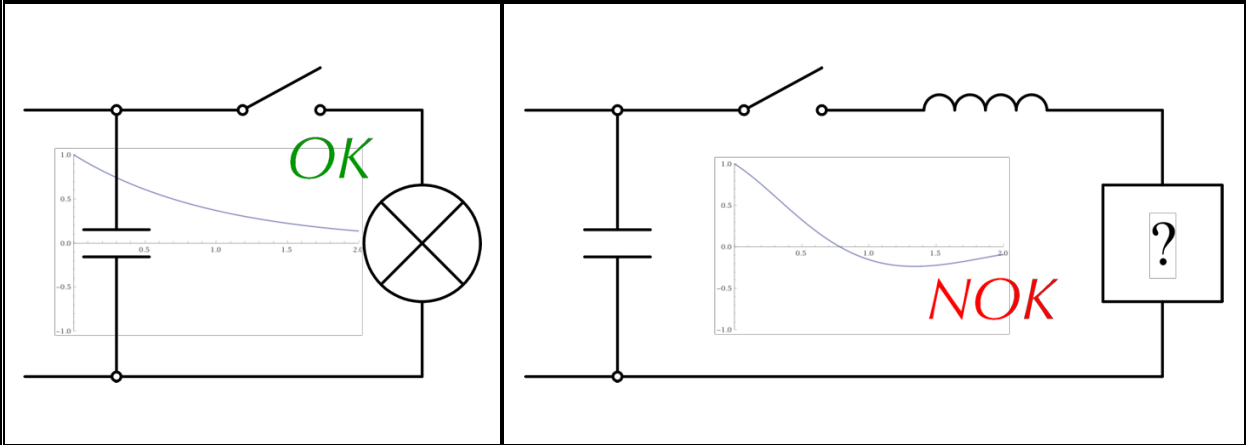
# PCP-17 capacitor charging module

## User manual



**Warning!** This equipment might be dangerous.  
Please read user manual before starting operations.

**Important note.** Module is sensitive to the reverse polarity applied to the output. If you aren't sure in your application, please contact the factory for the details.



## **Overview / Description**

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PCP-17 capacitor charging module is a high-frequency switch-mode converter, which transforms DC input (rectified mains) to regulated high voltage DC output to charge capacitors.

Output power is over 1750W for modifications with partial discharge (PD) and over 1500J/s for modifications with complete discharge (CD). Output voltage is customer defined in range up to 1500V (4000V on request).

Module is “industrial grade” and cannot be used in medical and aesthetic systems.

## **Cooling**

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Module contains no embedded fan, so forced air cooling with the external fan is required.

## **Appearance**

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## **Connectors / Pins / Interface signals**

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### **INPUT:**

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**Red** thick wire – 300V DC positive

**Black** thick (**blue** thick) wire – 300V DC negative

### **HV OUTPUT:**

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**Red** thin wire – HV OUTPUT positive

**Black** thin (**blue** thin) wire – HV OUTPUT negative

### **GROUND:** M4 thread

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Module should be grounded using this thread. It should be done before connecting module to the mains.

#### **Grounding policy**

HV OUTPUT negative and INTERFACE return are internally connected to each other, but (important) both aren't connected to the chassis ground. In the case of need you can connect them to the chassis by yourself.

Other grounding policies are available on request

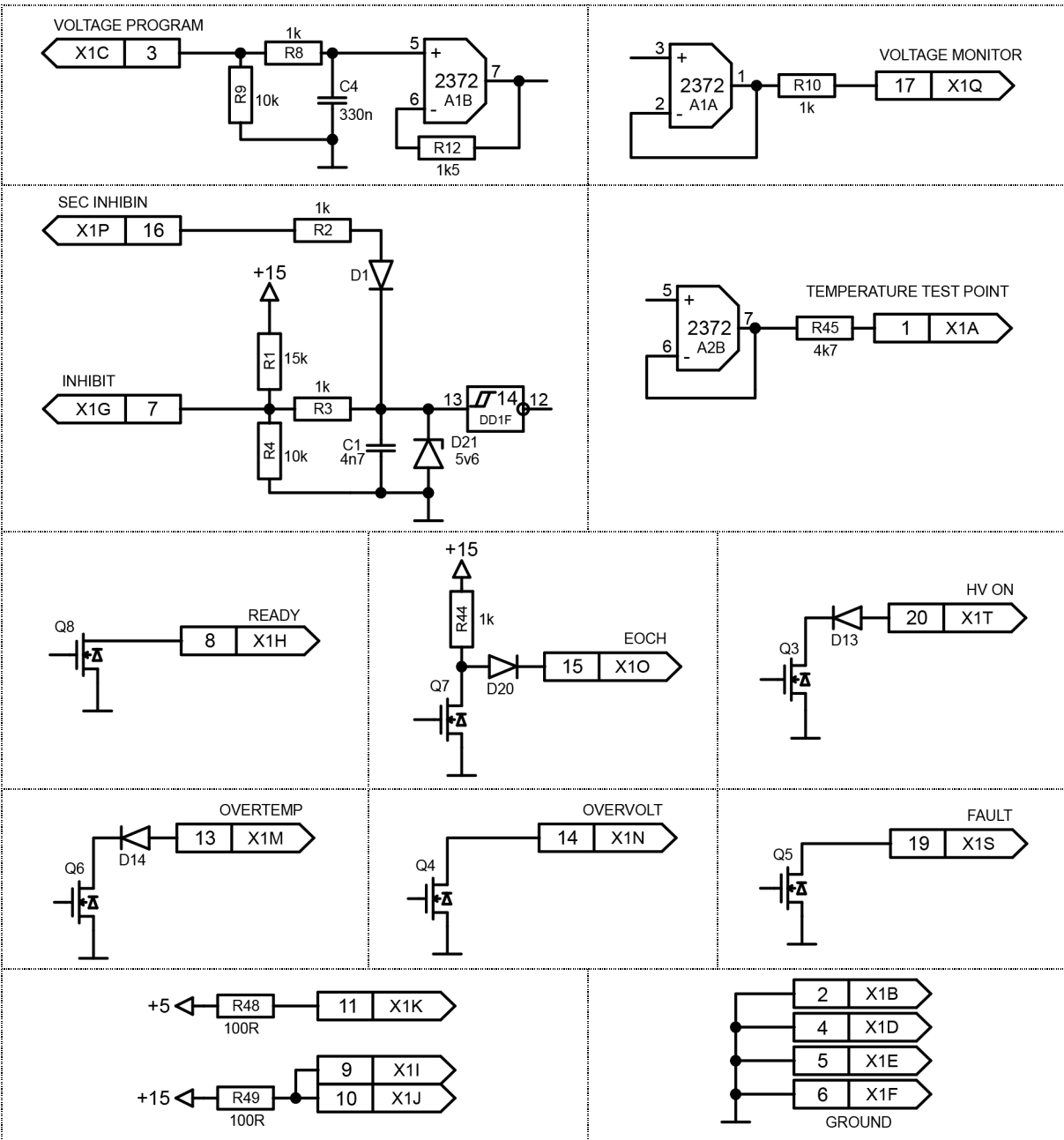
## INTERFACE: PLD-20

19	17	15	13	11	9	7	5	3	1
20	18	16	14	12	10	8	6	4	2

PIN (color)	DESIGNATION	DESCRIPTION
1 (-)	TEMP Test point	Module's internal temperature test point. Standardly is dysfunctional; but can be supplied on request.
2,4,5,6 (black)	Ground	PINS 2,4,5,6 are connected to the circuit ground of all internal circuits. The return signal connection for all interface signals should be made to one of these pins.
3 (yellow)	Voltage Program	A positive DC voltage applied to this pin controls the output voltage set point.  0-10V corresponds to 0-V <sub>MAX</sub>
7 (blue)	INHIBIT	The high voltage output is inhibited or enabled by this pin  0V – enabled; 5V or free-standing – inhibited
8 (green)	Ready Indicator	This pin is pulled to the ground, when the output voltage is equal to the program voltage (or higher than the program voltage)
9, 10 (red)	+15 V	These pins provide +15V DC that may be used for status LEDs etc.  Maximum output current 50mA
11 (orange)	+5 V	This pin provides +5V DC that may be used for status LEDs etc.  Maximum output current 50mA
12, 18	N/C	-
13 (white; black mark)	Over TEMP	This pin is pulled to the ground in the case of module's overheating (approx 72°C)
14 (white; blue mark)	Over Voltage Status	This pin is pulled to the ground when overvoltage occurs. The high voltage output is also disabled when this occurs
15 (green / yellow)	End of Charge Indicator	PIN15 is pulled to ground when the output voltage below the program voltage. Elsewise PIN15 is pulled to +15V.
16 (blue / white)	Secondary Inhibit	The HV OUTPUT is inhibited (when +15V are applied) or enabled (when 0V are applied or the pin is free standing). This pin should be used only to control parallel operations of two or more power modules.
17 (violet)	Voltage Monitor	The voltage at this is a buffered signal proportional to the instantaneous output.  0-10V corresponds to 0-V <sub>MAX</sub> Current capability 1,5mA; R <sub>out</sub> = 1kOhm

<p><b>19 (white; red mark)</b></p>	<p><b>Fault Indicator *</b></p>	<p>This pin is pulled to ground when some failure occurs. The high voltage output is disabled when this occurs</p> <p>Failures:</p> <ul style="list-style-type: none"> <li>• output short-circuit</li> <li>• overtemperature</li> <li>• overvoltage</li> <li>• output open circuit</li> <li>• charge timeout</li> </ul>
<p><b>20 (transparent)</b></p>	<p><b>HV ON Indicator</b></p>	<p>This pin is pulled to the ground, when module provides the power to the load</p>

\* see also **Faults** section



## Safety

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**Warning!** This equipment produces high voltages that can be very dangerous.  
Don't be careless around this equipment!

- During operations all the protective covers must be securely in place and all the electrical connections must be properly attached
- PCP-17 is designed to be installed inside a properly grounded metal. It is the customer's responsibility to ensure that personnel are prevented from accidental contacting of PCP-17 capacitor charger and its high voltage cables. **Casual contact could be fatal!**
- Do not handle the capacitance load until it has been discharged. Use an appropriate meter to check for complete discharge
- Disconnect module from the mains before making or changing any electrical or mechanical connections

## Operations (single PCP-17)

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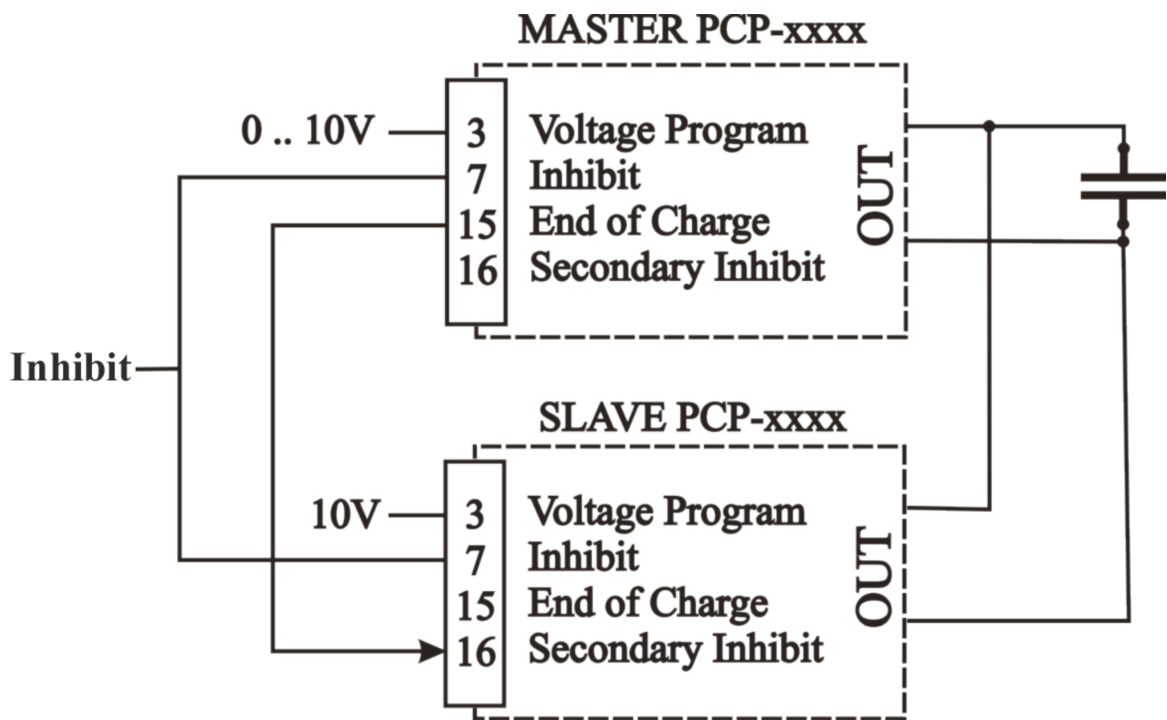
1. *Inhibit* the high voltage output (*PIN7* of *INTERFACE*)
2. Set the desired output voltage by applying a DC voltage to the *Voltage Program* (*PIN3* of *INTERFACE*)
3. Apply power to the module
4. *Enable* the high voltage output (*PIN7* of *INTERFACE*)
5. Operate, then *Disable* the high voltage output, then disconnect module from the mains

## Operations (two and more PCP-17 connected in parallel)

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To obtain 3.5 kW and more of the average output power, two and more PCP-17 units can be paralleled.

In this case one PCP-17 power supply is MASTER unit and operate as usually, other power supplies are SLAVE units. For correct operation *Secondary Inhibit* (*PIN16*) of SLAVE units should be connected to *End of Charge* (*PIN15*) of MASTER unit.



## Faults section

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Module sets *Fault* state in the following cases:

- *overheating* (temperature of the module exceeds approx. 72 °C level)
- *overvoltage* (voltage on the load exceeds 110% of  $V_{MAX}$  level)
- *short-circuit* at module's output (triggering threshold is about 0.8-1.0s)
- *open-circuit* at module's output
- *charging timeout* (value by default is about 5s, other timeouts can be set by request)

For most of faults once the *Fault* has occurred one should eliminate the Fault cause, afterthen “reboot” the module (this means to *DISABLE* module and *ENABLE* it again).

Exceptions:

- for *open-circuit* failure one should remove the power from the module and apply it again
- for *overheating* failure module may start its operations again if the temperature decreases rapidly (i.e. faster than in 5-10s) down to approx. 65 °C level



## Specification

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### ELECTRICAL

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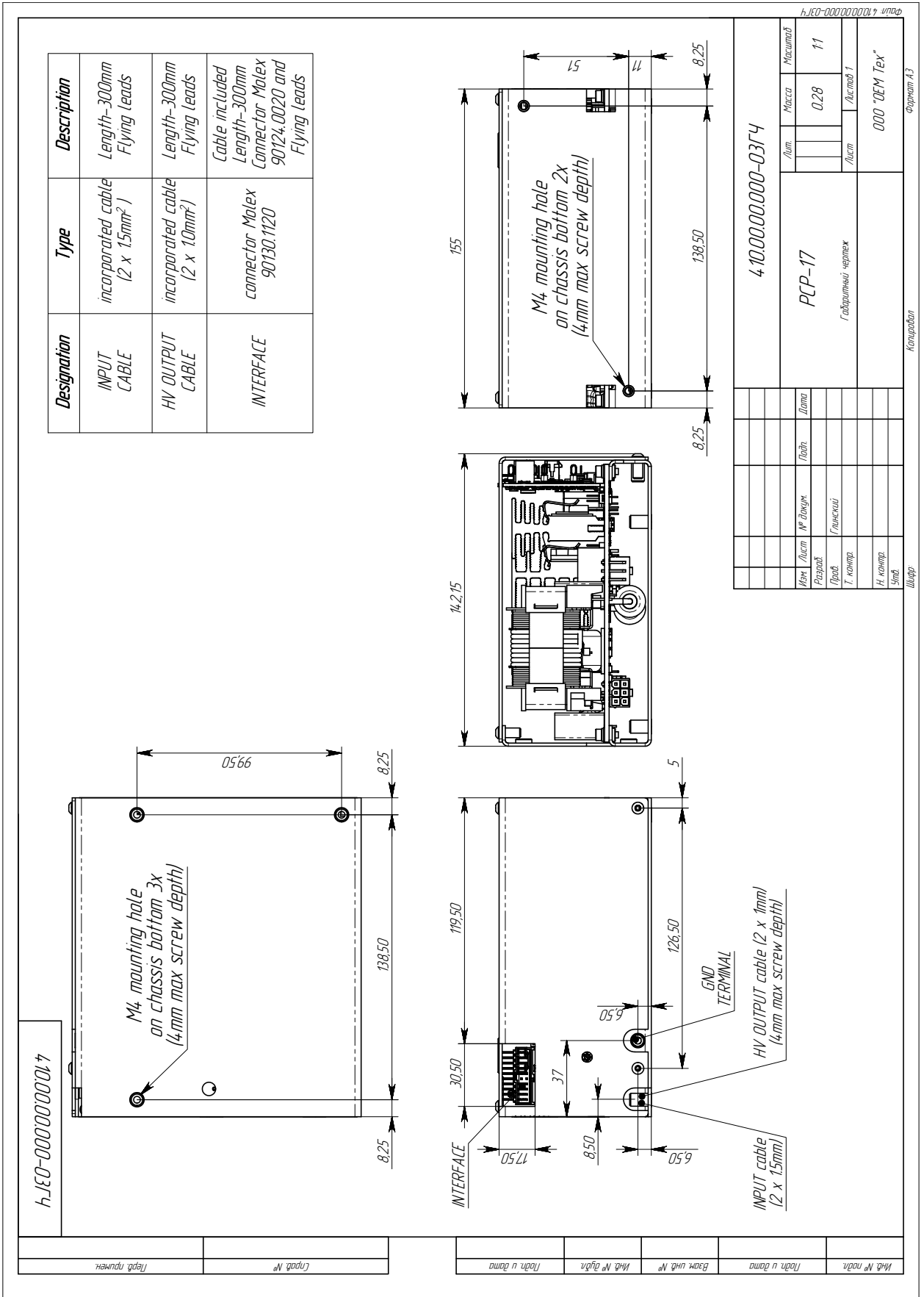
<b>Input:</b>	
Voltage	300 VDC (rectified 230 VAC)
<b>Output:</b>	
Maximal output voltage ( $V_{MAX}$ )	user selectable in 300-1500V range (up to 4000V on request)
Maximal output power	>1750W (can be achieved in regime 70-100% $V_{MAX}$ , 230VAC input, 25 °C, partial discharge modifications) >1500J/s (can be achieved in regime 0-100% $V_{MAX}$ , 230VAC input, 25 °C, complete discharge modifications)
Stability	0.5% of $V_{MAX}$
Pulse to pulse	0.5% of $V_{MAX}$
Efficiency	More than 85%
PFC coefficient	~ 0.90
<b>Protections:</b>	from open circuit from short circuit from over-temperature from over-voltage shut down on charging timeout
<b>Cooling</b>	Forced air (external fan required)
<b>Environment:</b>	
Operation temperature	+10... +40 °C
Storage temperature	-20 ... +60 °C
Humidity	90%, non-condensing

## **MECHANICAL**

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Dimensions	see dimensional drawing below
Weight	approx 1.3 kg

# Dimensions



## How to order?

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PCP-17-XXXX-YY, where

XXXX means  $V_{MAX}$  voltage (user selectable in 300V-1500V range, up to 4000V on special request)

YY means either CD (complete discharge modification) or PD (partial discharge modification); if YY is missed PD modification will be supplied

Examples (the most popular modifications):

PCP-17-300V-PD	300V, partial discharge
PCP-17-500V-PD	500V, partial discharge
PCP-17-700V-PD	700V, partial discharge
PCP-17-1000V-PD	1000V, partial discharge
PCP-17-1000V-CD	1000V, complete discharge
PCP-17-1500V-CD	1500V, complete discharge

Other modifications are available on request.