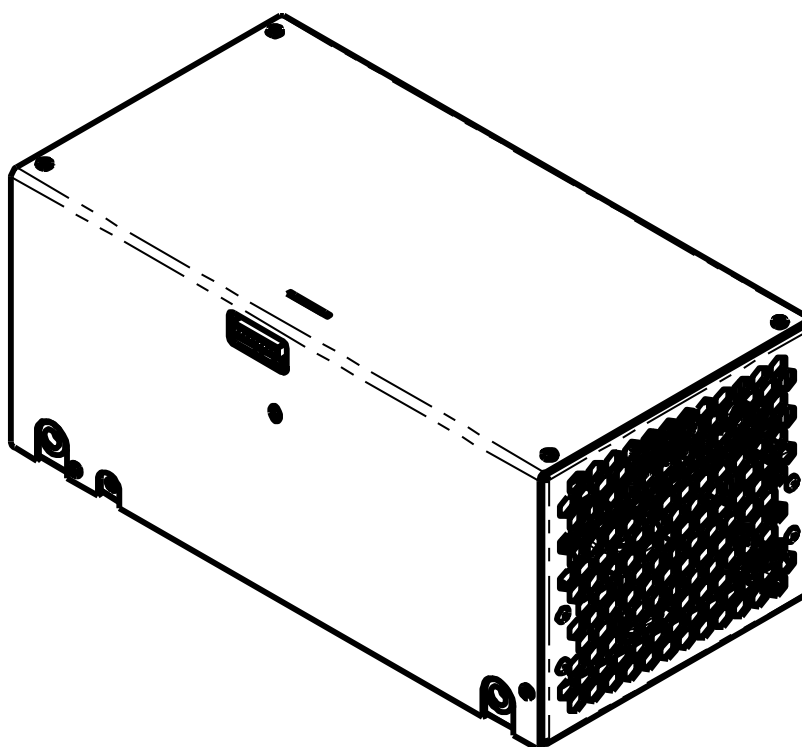


PCA-40 capacitor charging module

User manual



Overview / Description

PCA-40 capacitor charging module is a high-frequency switch-mode converter, which transforms AC input to regulated high voltage DC output to charge capacitors.

Maximal output power is 4000W in modifications for partial discharge and 3500J/s in modifications for complete discharge. Standard modifications cover output voltage range from 300V to 1500V (custom modifications with output voltage up to 4000V are available on request).

Standardly module is supplied in modification for partial discharge. Modification for complete discharge is available on request.

Module is “medical grade” and can be used for medical applications with no further modifications.

Cooling

Module is cooled with embedded fan. No external cooling is required.

Appearance



Connectors / Pins / Interface signals

INPUT:

Blue wires (2pcs) – 230VAC 50/60Hz input

HV OUTPUT:

Red wire – HV OUTPUT positive

Black wire – HV OUTPUT negative

GROUND: M4 thread

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 the chassis ground. Other grounding policies are available on request.

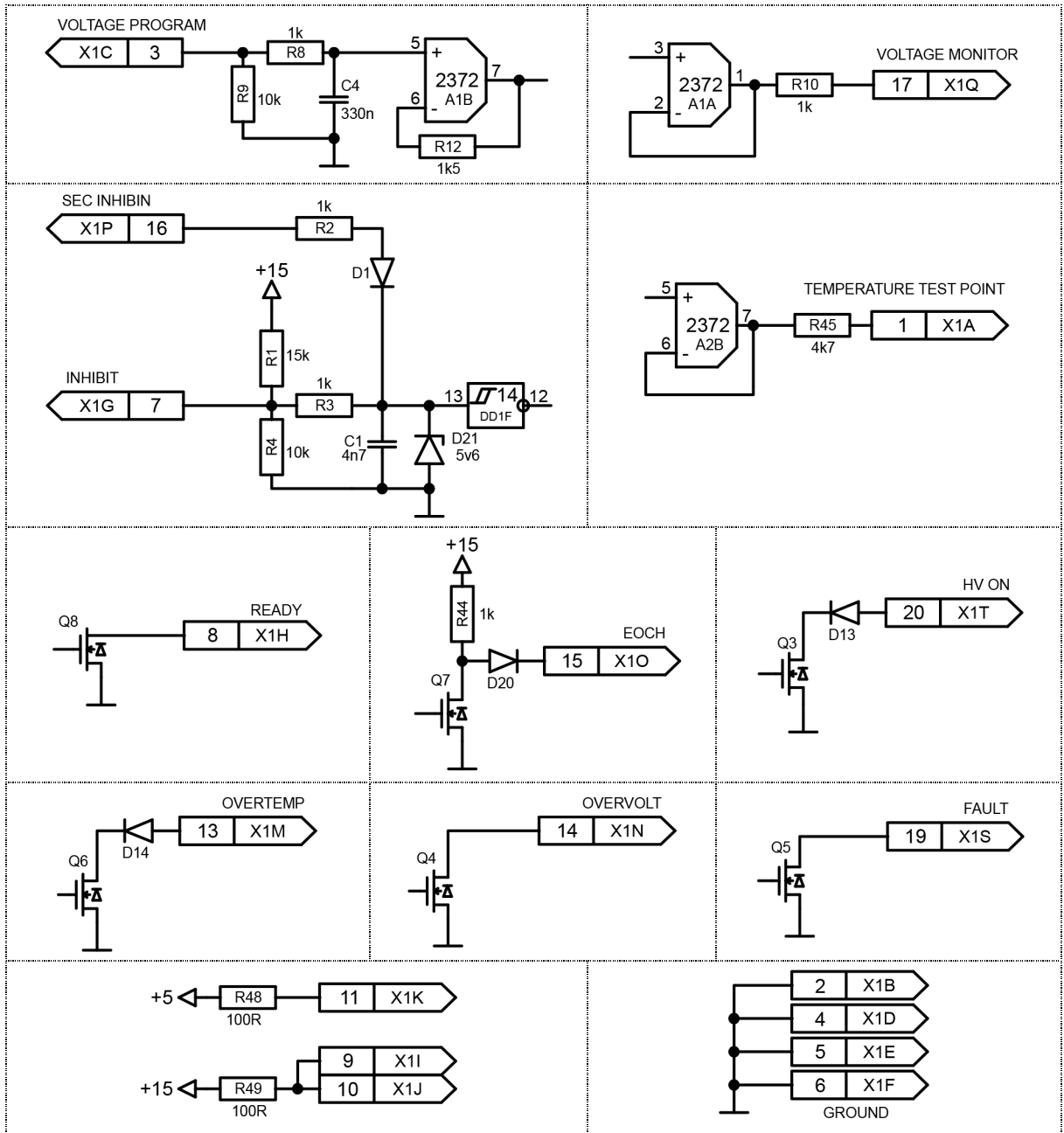
INTERFACE: MOLEX 0901301120

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 _{MAX}
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 _{MAX} Current capability 1,5mA; R _{out} = 1kOhm

<p>19 (white; red mark)</p>	<p>Fault Indicator *</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"> • output short-circuit • overtemperature • overvoltage • output open circuit • charge timeout
<p>20 (transparent)</p>	<p>HV ON Indicator</p>	<p>This pin is pulled to the ground, when module provides the power to the load</p>

* see also **Faults** section



Operations

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

Faults section

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

Specifications

ELECTRICAL

Input:	
Voltage	230 VAC, 50/60 Hz
Output:	
Maximal output voltage (V_{MAX})	user selectable in 300-1500V range (up to 4000V on request)
Maximal output power	>4000W (can be achieved in regime 70-100% V_{MAX} , 230VAC input, 25 °C, partial discharge modifications) >3500J/s (can be achieved in regime 0-100% V_{MAX} , 230VAC input, 25 °C, complete discharge modifications)
Stability	0.5%
Pulse to pulse	0.5%
Efficiency	More than 85%
PFC coefficient	0.98 (Active)
Leakage current	< 300 μ A
Safety standard compliance:	IEC 60601-1 for electrical safety IEC 61000-3-2 for active power factor correction (PFC) EN 55011 Class A safety requirements for EMI and leakage current
Protections:	from open circuit from short circuit from over-temperature from over-voltage shut down on charging timeout

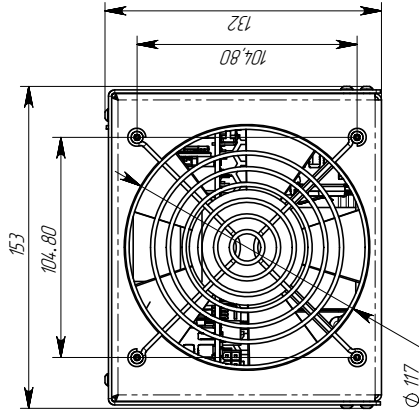
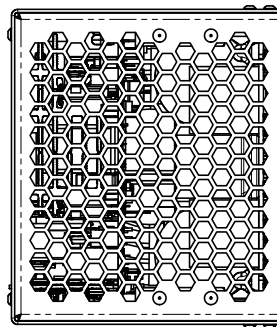
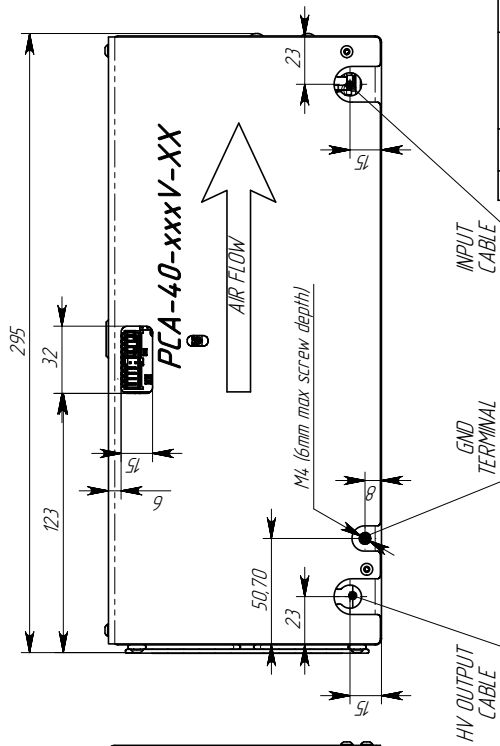
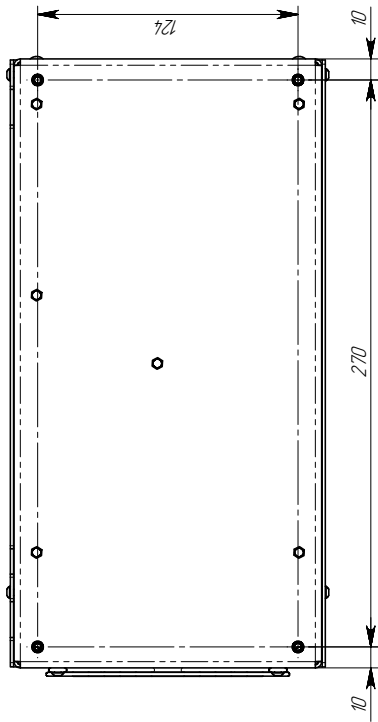
Isolation:	4000VAC input to output; 4000VAC input to chassis
Cooling:	Forced air (build in fan)
Environment:	
Operation temperature	+10... +40 °C
Storage temperature	-20 ... +60 °C
Humidity	90%, non-condensing

MECHANICAL

Dimensions	see dimensional drawing below
Weight	approx 4.0 kg

Dimensions

Designation	Type	Description
INPUT CABLE	incorporated cable	Length-500mm Flying leads
HV OUTPUT CABLE	incorporated cable	Length-500mm Flying leads
INTERFACE	connector: Malex 90130 1120	Cable included Length-300mm Connector: Malex 90124.0020 and Flying leads



PCA-40 Enclosure Case	
Mass	102
Scale	12

How to order?

PCA-40-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):

PCA-40-500V-PD	500V, partial discharge
PCA-40-700V-PD	700V, partial discharge
PCA-40-1000V-PD	1000V, partial discharge
PCA-40-1500V-PD	1500V, partial discharge
PCA-40-1000V-CD	1000V, complete discharge
PCA-40-1500V-CD	1500V, complete discharge

Other modifications are available on request.