

E-Beam PowerSupply for LH Electron Guns

HV 10.1 VC

MANUAL



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1. Abridged Description

Operation:

- Supply and control of electron beam evaporators
- Designed for robust, continuous operation

Maximum Starting Voltage:

- -4, -6, -8 or -10 kV DC, selectable
- regulated output voltage

Emission Current:

- maximum 1 A

Starting Power:

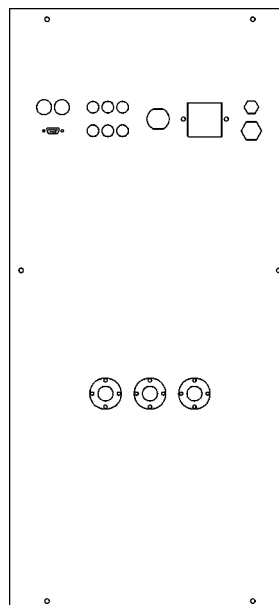
- maximum 10 kW at -10 kV DC

Temporary Flashovers:

- balanced via lined-up impulse protective choke in cathode heating transformer

Sustained Short-circuit Current:

- Unit turns off for protection of evaporator and power supply, automatic reset



2. Technical Data

Connecting Voltage:	3 x 400 V $\pm$ 10 % + N + PE
Frequency:	50 Hz / 60 Hz
Connecting Current:	18 A
Connecting Power:	12 kVA
Mains Fuse:	25 A
Starting Voltage:	four selectable ranges (-2 ... -4 kV, -4 ... -6 kV, -6 ... -8 kV, -8 ... -10 kV), voltage regulated within ranges
Starting Power:	10 kW at -10 kV
Emission Current:	maximum -1 A
HV Measurement:	potential free, 0...10 V DC according to 0...-10 kV
Current Measurement:	potential free, 0...10 V DC according to 0...-1 A
Interlock Connections:	twofold, potential 24 V DC
Auxiliary Voltage:	3 x 400 V + N + PE, fused 2 AT
Ambient Temperature:	$\leq$ 40 °C
Cooling:	forced air (fans)
Humidity:	$\leq$ 65 % rel. humidity, no aggressive dusts or gases
Earthing Wire:	minimum 10 mm ² copper wire (cable socket M8)
Protection:	IP 20
Dimensions:	440 mm width x 500 mm depth x ca. 900 mm height, designed for mounting into 19" cabinet
Mass:	about 180 kg

3. Scope of Supply

- High Voltage Supply Unit incl. 5 m power cable with connector
- two interlock connectors (internally bridged)
- this operation manual

4. Safety Regulations

Caution! Danger! High Voltage!

Output voltage (10.000 volts) is absolutely deadly!

The inside of the unit is maintenance-free. In case of repairs please observe the following, prior to opening the unit:

- work done by qualified personnel only
- plug main fuses
- wait one minute before opening unit, condensers must discharge first
- earth all parts and high voltage condensers via earthing hook

The manufacturer is not responsible and/or liable for damages on the high voltage supply unit due to repairs without approval.

5. Shipment and Packing

Goods-In Inspection

Check if packing is undamaged.

Check completeness according to delivery note.

Please immediately contact your dealer if delivery is not according to your order.

Complaints

Unpack the high voltage supply unit together with representative of freight forwarder and check housing from all sides for damages.

If high voltage supply unit is damaged during shipment or does not meet the given specifications please contact your dealer at once.

Keep all packing material for possible inspection and/or return shipment.

6. Installation of Unit

Installation has to be done by qualified personnel only!

1. Check mains voltage at installation site. At permanent over- or undervoltage change primary taps of transformers T1 ($\pm 10\%$) and T2 ($\pm 5\%$).

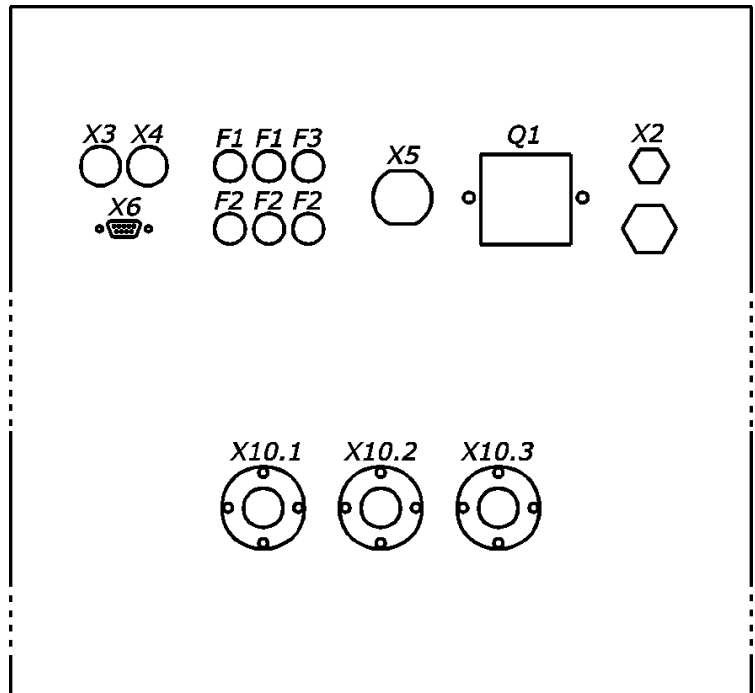
Connect via 25 A-fuses.

2. Earth the unit using bolt at rear side (use at least 10 mm² copper wire).
3. Connect cathode heating transformer and electron current evaporator (UKH01) to socket X10. (see Leybold instructions)
4. Plug interlock connectors into sockets X3 and X4.
Replace connector's internal bridge by external contact (NC) if needed.
5. Connect CAN-Interface to socket X6 or use external control cable connected to screw-clamps X2 inside high voltage supply unit.
6. Switch on main contactor Q1 at unit's rear side. The unit then is ready for operation.

7. Rear Side

At the unit's rear side the following parts are located:

- Connecting cable and socket X1
- Main protection switch Q1
- Interlock connector X3 and X4 for external locking
- auxiliary supply X5 (3x400V+N+PE, max. 2A)
- Connector X6 for CAN-Interface
- Cable clamp for external control cable (X2)
- Fuses F1 (2x2AT), F2 (3x2AT) and F3 (1x1AT)
- High Voltage clutch X10 (threefold)
- Earthing bolt



8. Plug Connections

X2 – internal control

1	+	Actual value high voltage
2	-	(0...10 V DC corresponding to 0...-10 kV DC)
3	+	Actual value emission current
4	-	(0...10 V DC corresponding to 0...-1 A DC)
5		external ON-button
6		
7		external OFF-button
8		
9		contact (NO) K1 „short circuit relay“
10		
11		contact (NO) K2 „HV On“
12		
13		contact (NO) A1.K1 „Emission ready“
14		
15		contact (NO) K4 „HV Fault“
16		
17		contact (NC) Q1 „Overload“
18		
19	GND	Supply CAN-Interface
20	+5V	

X5 – Auxiliary voltage 400 V

1	neutral
2	phase L1
3	phase L2
4	phase L3
5	PE

9. General Description

The high voltage supply unit produces a direct voltage (DC) for up to three electron beam evaporators.

The circuit drawing (see appendix) contains the following pages:

- page 1: power cord and socket X1
main protection switch Q1
power relay K2
safety relay K1
thyristor unit A1
high voltage transformer T1
varistors R4
- page 2: high voltage rectifier V1
smoothing capacitors C1 and C2
filter chokes L1 and L2
discharge resistor R1
series resistors R2
shunt resistors R3
voltage divider board A2
high voltage connectors X10
- page 3: adjustment board A3
isolation amplifier A4
analogue output X2
- page 4: auxiliary voltage X5
control transformer T2
fuses F1 – F3
control circuit 230 V AC
fans E1, E2
- page 5: power supply A5
control relay K3 (24 V DC)
interlock connectors X3, X4
timing relay K4
- page 6: thyristor unit A1
set value potentiometer R5
- page 7: connectors X2
CAN interface X6
CAN interface supply

10. Operation

Switch-on of unit

- switch-on main switch Q1
- contact X2.11–X2.12 breaks
- safety relay K1 closes
- close interlocks X3 and X4

Switch-on of high voltage

- connect external break-contact (HV Off) at X2.7–X2.8 and external make-contact (HV On) at X2.5–X2.6
- or
- connect external switch at X2.5–X2.8
- push HV On-button
- relay K3 closes
- safety relay K1 opens
- main relay K2 closes
- thyristor unit A1 supplies transformer T1
- output voltage occurs at sockets X10
- terminals clamps at X2.1–X2.2 will have analogue voltage (0...10 V according to 0...-10 kV)

Switch-off of high voltage

- push HV Off-button
- relay K3 and main relay K2 open, power supply for thyristor unit A1 switches off
- safety relay K1 closes

Switch-off using interlock

- opening of any interlock contact X3 or X4 permanently switches off high voltage.

short circuit and overcurrent protection

- after short circuits or overcurrents of short duration thyristor unit switches off and on. High voltage will return automatically.

Faults concerning thyristor unit

- time delayed contact at X2.15–X2.16 (overtemperature, missing or wrong phase)

11. High Voltage Selection

The requested high voltage may be selected on the clamps of transformer T1:

-4 kV, -6 kV, -8 kV or -10 kV (factory setting)

Adjust position of rotating switch S1 on thyristor unit A1 for the selected output voltage:

pos. voltage range

- | | |
|---|------------------|
| 1 | -2 kV ... -4 kV |
| 2 | -4 kV ... -6 kV |
| 3 | -6 kV ... -8 kV |
| 4 | -8 kV ... -10 kV |

Adjust output voltage within selected range using potentiometer R5.

12. Mains Voltage Adaptation

Check mains voltage at installation site. At permanent over- or undervoltage change primary taps of transformers T1 ($\pm 10\%$) and T2 ($\pm 5\%$) to appropriate voltage.

13. Check List

High voltage does not switch on:

- Check if main contactor Q1 is closed.
- Check if fuses F1 to F3 are defective.
- Check all phase voltages.
- Check if interlock chain is closed.

High voltage switches on but no reading:

- Check if cathode is shorted (inside evaporator).
- Check or replace isolation amplifier A4.

14. Appendix

- circuit drawings
- parts list