

Operator's Manual

Modular 2 Quadrants High Voltage Power Supply ESS series



Basic Information

It is strongly recommended to read the operator's manual before operation.

To avoid injury of users it is not allowed to open the unit. There are no parts which can be maintained by users inside of the unit. Opening the unit will void the warranty.

The mains connector is equipped with basic insulation and a protective earth conductor. The unit may only be operated with protective earth conductor connected.

We decline all responsibility for damages and injuries caused by an improper use of the module. It is strongly recommended to read the operators manual before operation.

The information in this manual is subject to change without notice. We take no responsibility for any error in the document. We reserve the right to make changes in the product design without reservation and without notification to the users.

Warning! Violation of guidelines marked with „Warning“ can lead to death or severe injury



Attention! Violation of guidelines marked with „Attention!“ can lead to damages of the unit or the application



Note! Text marked with „Note!“ point at specialties or options.



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1. Safety notes

Warning!



To avoid injury of users it is not allowed to open the unit. Before any operations on the HV output or the application, the unit has to be switched off and discharge of residual voltage has to be finished. Depending on application residual voltages can be present for long time periods. These residual voltages can lead to severe injuries.

Only accessories which meet the manufacturer's specifications shall be used. If the equipment is used in a manner not specified by this manual, the protection provided by the equipment may be impaired. We decline all responsibility for damages and injuries caused by an improper use of the module.

2. Short description

The ESS series modules are 2 quadrants single channel high voltage power supplies in 6U Eurocard format. The data for set and measure values are given in a format of floating point single precision values. The modules are equipped with 24 bit ADC and 16 bit DAC circuits. The channel GND is insulated from the Crate-Ground (CCG) up to ± 50 V (with a 60V hardware limit). The HV output at the module is available with SHV (Kings) or GES.

3. Technical data

Table 1: Technical Data, Device class

	ESSx ¹⁾ 100 405 24	ESSx ¹⁾ 200 205 24
Output voltage V _{nom} [kV]	10	20
Output current I _{nom} [mA]	±4 (source and sink)	±2 (source and sink)
HV-connector	SHV 10 kV (Kings 1064-1) or GES 10 kV (HB 11)	SHV 20 kV (Kings 1764-1) or GES 20 kV (HB 21)
Output power P _{nom} [W]	40	
Polarity	¹⁾ x = p: positive	¹⁾ x = n: negative
Efficiency	> 80% (V _{in} = 24 V, P _{nom})	
Voltage ripple and noise	Voltage control: $\Delta v < 0.05\% * V_{nom}$	
Stability	$\Delta v < 0.05\% * V_{nom}$ (for 8 h with constant conditions, after 1 h warmup)	
Voltage regulation	$\Delta v < 0.1\% * V_{nom}$ (ΔV_{in} , $0 \leq I_o \leq I_{nom}$)	
Current regulation	$\Delta i < 0.1\% * I_{nom}$ (ΔV_{in} , $0 \leq V_o \leq V_{nom}$)	
Voltage repeatability	< 0.1% * V _{nom}	
Accuracy	Voltage: 0.1% * V _{nom} + 0.5% * V _{out} Current: 0.1% * I _{nom} + 0.5% * I _{out}	for one year for one year
Voltage set-point resolution	$2 * 10^{-5} * V_{nom}$	
Voltage/Current read back resolution	$1 * 10^{-5} * V_{nom} / 1 * 10^{-5} * I_{nom}$	
Sampling rate	>50 Hz	
Temperature coefficient	$1 * 10^{-4}/K$	
Interface	CAN interface (potential free)	
Connector on the rear	96 pin connector according to DIN 41612	
Power requirements V _{INPUT} +24 V	2.5 A	
Power requirements V _{INPUT} +5 V	0.5 A	
Protection	supply voltage, over voltage, over current, over temperature, short circuit, arc	
Status	green LED turns on if the module has the status "Ready" yellow LED turns on if the module has the status "HV ON"	
Interlock	Isolated current loop	
Operating conditions	Temperature: 10°C to 40 °C Humidity: 20% to 90%, no condensation	
Storage conditions	Temperature: -25°C to 80 °C Humidity: 20% to 90%, no condensation	
Dimensions	6U Euro cassette (40.64 mm wide and 220 mm deep)	
Weight	ca. 1.4 kg	

4. Handling

4.1 Connection

The supply voltages and the CAN interface are connected to the module via a 96-pin connector on the rear side of the module.

4.2 Safety Loop

A safety loop can be implemented via the safety loop socket (SL) on the front panel. If the safety loop is active then an output voltage is only present if the safety loop is closed. An internal current source (open circuit voltage 15 V / short circuit current max. 40 mA) will drive a current of ca. 12 mA through the loop.

If the safety loop is opened during the operation the output voltages are shut off without ramp and the corresponding bits in the 'ModuleStatus' (see manual "Operator's Manual CAN-Interface" 5.5.2.1 ModuleStatus) and ModuleEventStatus (5.5.2.3 ModuleEventStatus) are cancelled. After closing the loop again the ModuleEventStatus has to be reset and the channels have to be switched ON.

The loop connectors are potential free, the impedance of the closed loop is less than 200 Ohm.

5. Pin assignment and connector layout

Table 2: Pin assignment of the 96-pin connector according to DIN 41612:

pin		pin		pin		comment
a1	+5V	b1	+5V	c1	+5V	power supply
a2	GND	b2	GND	c2	GND	
a3	+24V	b3	+24V	c3	+24V	
a5	GND	b5	GND	c5	GND	
a11	@CAN_GND	b11	@CAN_L	c11	@CAN_H	CAN bus interface, potential free
a13	/RESET	b13	/HW_RMPDWN			external control signals
a30	A4	b30	A5			address field:
a31	A2	b31	A3	c31	GND	set module address (A0 ... A5); pin connected to GND => address bit = 0
a32	A0	b32	A1	c32	GND	pin open => address bit = 1
	/RESET					active low; global reset of the module; HV generation is stopped immediately
	/HW_RMPDWN					pulse form: high – low – high with a puls-width from 1µs to 100 µs
						function: ramp down all channels immediately with a ramp speed of $V_{nom}/50s$ Note: after activating this signal the ramp speed is set to $V_{nom}/50s$

6. Dimensional drawing

Picture 1: Dimensional Drawing

