16-channel High Voltage Bipolar Power Supply EBS F 030

V_O = - 3 kV to + 3 kV / 500 µA

Operators Manual

(Device with SN: 77xxx)

Contents

Attention!

-It is forbidden to use the unit if the covers have been removed.

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

Note

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.

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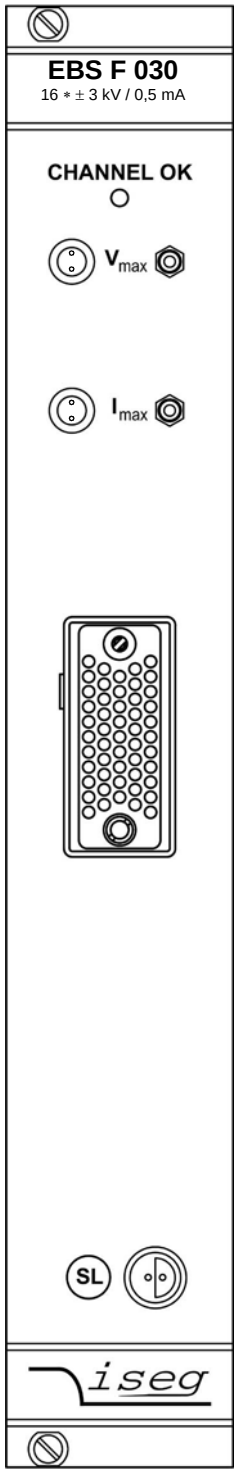
1. General information

The EBS F 030 is a 16-channel high voltage bipolar (4 quadrant) power supply in 6U Eurocard format. Each single channel is able to do both, sink or source 500µA. The unit is made of two separated PCBs (first channel 0 to 7, second channel 8 to 15).
The maximum voltage difference between the channels of one board(so 0 to 7 or 8 to 15) is 3000 V,
e.g. $V_{O\ CH0}$ = +1000 V $\Rightarrow$ $V_{O\ CHn} \geq$ -2000 V; (n= 1 to 7) or $V_{O\ CH8}$ = -2500 V $\Rightarrow$ $V_{O\ CHn} \leq$ +500 V; (n= 9 to 15). The setting of the voltage is limited by the firmware according to this rule.
The channels share a Floating Common-GND (C-RTN). This floating ground is insulated from the Common Crate Ground (CCG) of the crate and the metal case of the module with a 56 V hardware limit. The EBS F 030 was designed to be mounted in a crate. The powered system crate ECH xx8 (19“ rack) carries up to 8 modules. The device can be software controlled via CAN-bus directly by a PC or a similar controller. Using the W-ie-ner Mpod crate it is possible to implement up to 10 modules within this Crate, with control via Ethernet-Interface. This enables the user to crate a multi-channel high voltage system of any size easily.

2. Technical data

	EBS F 030
Output current I_O	- 500 µA to + 500 µA
per channel at V_O	-3000 V to +3000 V voltage difference between the channels of one board must be less or equal than 3000 V
Ripple and noise *)	f = 10 Hz to 100 MHz: typ. 10 mV, max. 50 mV (under all load conditions)
Hardware current trip	Potentiometer $I I_{max} I$ for 16 channels
Hardware voltage limit	Potentiometer $I V_{max} I$ for 16 channels
Interface	CAN interface, potential free
Data format	floating-point single precision (setting and measurement)
Voltage setting *)	Resolution better than 50 mV
Voltage measurement *)	Resolution better than 50 mV
	Accuracy: $\pm$ (0,01% $*$ V_O + 0,02% $*$ V_{nom}) for one year Temperature coefficient $< 5 * 10^{-5}/_K$
Current measurement *)	Resolution better than 200 nA
	Accuracy: $\pm$ (0,1% $*$ I_O + 0,4% $*$ I_{nom}) for one year Temperature coefficient $< 2 * 10^{-3}/_K$
)* - with standard sample rate 500/s and digital filter 64	
Stability V_O	$< 5 * 10^{-5}$ (no load/load and ΔV_{IN})
Rate of voltage change	up to 3000 V/s
Operating mode	Full module and channel control via CAN interface in EHS mode: EDCP (Enhanced Device Control Protocol) see Manual CAN interface
Module status	Status ready of all channels indicated with green LED
Protection loop (I_s) (2 pin Lemo-socket)	5 mA < I_s < 20 mA $\Rightarrow$ module on I_s < 0,5 mA $\Rightarrow$ module off
Power requirements V_{IN}	+ 24 V (4 A) and + 5 V (0,1 A)
Packing	16-channels in 6U Euro cassette (W/D: 40,64 / 220 mm)
Connector	96-pin connector according to DIN 41612
HV connectors	51-pin Redel Multipin-Connector for channel 0 to 15 16 pins HV-out, ch**0** to ch**15** 4 pins Floating Common-GND, **C-RTN** 4 pins Common Crate Ground, **CCG** (connected to the metal box, the grounded guidings of the connector and to the HV cable shield) 2 pins Safety Loop, **SL PIN 22**, **SL PIN 30**



3. Handling

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

The maximum output current and voltage for the channels 0 to 16 are defined through the position of the corresponding potentiometer I_{max} resp. V_{max}.
It is possible to measure the hardware limits, which has been set with reference to the maximum possible current resp. voltage at the according 2-pin socket. 100 % I_{max} resp. V_{max} corresponds to 2,5 V. The output current and voltage will be limited to the setting value after it exceeds the threshold and the corresponding green LED on the front panel is 'OFF'.
At the bottom on the right side of the front panel is the 2-pin LEMO socket for the safety loop. This connector is installed in-line with the upper (SL PIN 22) and lower SL contacts (SL PIN 30) on the HV connector (see the pin designation on the front panel or in the pin assignment). The safety loop will be closed by connection of the load with help of a connection between PIN 22 and 30 on the HV cable side of the connector. If the safety loop is active then output voltage on all channels is present only if a current of any polarity is flowing in a range of 5 to 20 mA (i.e. safety loop closed). If the safety loop is opened during operation then the output voltages on all channels are shut off without ramp and the corresponding bit in the 'Status module' will be cancelled. After the loop will be closed again the channels must be switched 'ON' and a new set voltage must be given before it is able to offer an output voltage.
The pins of the loops are potential free, the internal voltage drop is ca. 3 V. Coming from the factory the safety loops are not active (the corresponding bit is always set). Removing of an internal jumper on the rear side of the unit makes the loops active.
(s. App. B "Operator's Manual CAN-Interface").

Pin assignment 96-pin connector according to DIN 41612:

PIN		PIN		PIN		Data
a1 a3 a5		b1 b3 b5		c1 c3 c5		+5V +24V GND
a11		b11		c11		@CAN_GND ⎫ @CANL ⎬ potential free @CANH ⎭
a13						RESET
		b13				OFF with ramp (e.g. at power fail)
a30 a31 a32	A4 A2 A0	b30 b31 b32	A5 A3 A1	c30 c31 c32	GND GND GND	⎫ ⎬ Address field ⎭ module address (A0 ... A5)

The hardware signal "OFF with ramp" (Pulse High-Low-High, pulse width ≤ 100 µs) on pin b13 will be shut off the output voltage for all channels with a ramp analogue to the Group access "Channel ON/**OFF"**. The ramp speed is defined to V_{OUTmax} / 50 s. This is the actually module ramp speed after "OFF with ramp".
With help of the Group access "Channel **ON**/OFF**"** all channels are switched "ON" again.

With the address field a30/b30 ..... a32/b32 the module address will be coded.
(see item 4.4, description 11bit-Identifier).
Connected to GND ⇒ A(n) = 0 ; contact open ⇒ A(n) = 1

Pin assignment Multipin Redel HV connector: