High Voltage Power Supply EHS F0 vvx)1

16 HV channels with COMMON-GND

Art. no.:	EHS F0-40**x**)1205(SHV or R51)	()1x = **p**: **+** or)1x = **n**: **-** 4 kV/ 2 mA)
	EHS F0-30**x**)1305(SHV or R51)	()1x = **p**: **+** or)1x = **n**: **-** 3 kV/ 3 mA)
	EHS F0-20**x**)1405(SHV or R51)	()1x = **p**: **+** or)1x = **n**: **-** 2 kV/ 4 mA)
	EHS F0-10**x**)1805(SHV or R51)	()1x = **p**: **+** or)1x = **n**: **-** 1 kV/ 8 mA)
	EHS F0-05**x**)1156(SHV or R51)	()1x = **p**: **+** or)1x = **n**: **-** 0.5 kV/ 15 mA)

Operator's manual

Contents

1. General information

2. Technical data

3. Handling

Operator's manual CAN-Interface

Attention!

-It is not allowed 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 EHS F0vvx)1 is a 16-channel high voltage power supply module in 6U Eurocard format. The 16-channel module is added at two 8-channel modules, which are controlled independently of each other. Each single channel per module is independently controllable with voltage and current control. The EHS F0vvx)1 is made to be mounted into a 19" crate. The powered system crate ECH xx8 (19" rack) carries up to 8 modules. It is also possible to supply the modules separately with the necessary power. The device is software controlled via CAN-bus directly through a PC or a similar controller. It is possible to create a multi-channel high voltage system of any configurable size. The HV outputs at the EHS F0vvx)1 are equipped with SHV connectors or REDEL Multipin HV connector with Common-GND. Optionally it is possible to install an hardware INHIBIT for each channel.

2. Technical data

EHS	**F005p**	**F005n**	**F010p**	**F010n**	**F020p**	**F020n**	**F030p**	**F030n**	**F040p**	**F040n**
Output voltage $\mathbf{V_{O\ nom}}$	+ 500 V	– 500 V	+ 1 kV	– 1 kV	+ 2 kV	– 2 kV	+ 3 kV	– 3 kV	+ 4 kV	– 4 kV
Output per channel $\mathbf{I_{O\ nom}}$	15 mA		8 mA		4 mA		3 mA		2 mA	
Resolution of voltage setting)*	20 mV		40 mV		80 mV		120 mV		160 mV	
current setting)*	600 nA		320 nA		160 nA		120 nA		80 nA	
voltage measurement)*	10 mV		20 mV		40 mV		60 mV		80 mV	
current measurement)*	300 nA		160 nA		80 nA		60 nA		40 nA	
)* **with standard sample rate 500/s, digital filter 64 and only guarantied in the setting range**										
Accuracy voltage measurement	$\pm$ (0,01% ∗ V_O + 0,02% ∗ $V_{O\ nom}$ + 1 digit) (for one year) only guarantied in the setting range **1% ∗ $\mathbf{V_{O\ nom}}$** < $V_O \leq V_{O\ nom}$									
Accuracy current measurement	$\pm$ (0,01% ∗ I_O + 0,02% ∗ $I_{O\ nom}$ + 1 digit) (for one year) only guarantied in the setting range **1% ∗ $\mathbf{V_{O\ nom}}$** < $V_O \leq V_{O\ nom}$									
Ripple and noise	< 10 mV									
Stability V_O	< 0,01% * $V_{O\ nom}$ (no load/load and Δ V_{IN})									
Temperature coefficient V_O	< 5 ∗ 10^{-5} /K									
Hardware limits V_{max} / I_{max}	potentiometer per module (V_{max} / I_{max} is the same for all channels)									
Interface	CAN-Interface (potential free)									
Operating mode	Full module and channel control via CAN interface in EHS mode: EDCP (Enhanced Device Control Protocol) or EHQ mode: DCP (Device Control Protocol) see manual CAN interface									
Module status	green LED at channels 0-15 will work with status ready									
Protection loop (I_s) potential free (2 pin Lemo-socket and REDEL SL)	5 mA < I_s < 20 mA ⇒ module on I_s < 0,5 mA ⇒ module off									
Optional INHIBIT per channel	About Sub-D-9 connector INHIBIT (TTL level)									
INHIBIT 0-7 / Channel	0	1	2	3	4	5	6	7	GND	
Sub-D-9 connector / PIN	1	2	3	4	5	6	7	8	9	
INHIBIT 8-15 / Channel	8	9	10	11	12	13	14	15	GND	
Sub-D-9 connector / PIN	1	2	3	4	5	6	7	8	9	

EHS	F005p	F005n	F010p	F010n	F020p	F020n	F030p	F030n	F040p	F040n
Power requirements V_{INPUT}	+ 24 V (< 7,0 A) and + 5 V (< 0,4 A)									
Packing	16-channels in 6U Euro cassette (40,64 mm wide and 220 mm deep)									
Connector on the rear	96-pin connector according to DIN 41612									
HV connector	SHV connectors or REDEL Multipin HV connector									
Operating temperature	0 ... +40 °C									
Storage temperature	-20 ... +60 °C									

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 module will be controlled in the chosen CAN operating mode, factory setting is “EHS mode”.

The maximum output voltage for the channels 0 to 15 is defined through the position of the corresponding potentiometer V_{max}.
The maximum output current for the channels 0 to 15 is defined through the position of the corresponding potentiometer I_{max}.
The greatest possible set value of voltage or current follows from V_{max} – 2% resp. I_{max} – 2%.
It is possible to measure the hardware voltage and current limit, which have been set with reference to the maximum possible voltage and current at the socket below. 102 % V_{max} and 102 % I_{max} corresponds to 2,5 V.
The output voltage and current will be limited to the setting value after it exceeds the threshold and the corresponding green LED on the front panel is ‘OFF‘.

The safety loop is including the SL-contact Pin 22 and PIN 30 at the REDEL-connector and the safety loop socket (SL) on the front panel. If the safety loop is active then output voltage on all channels is only present if the safety loop is closed and an external current in a range of 5 to 20 mA of any polarity is flowing into the loop. If the safety loop is opened during operation then the output voltages are shut off without ramp and the corresponding bit in the ‘ModuleStatus’ (see manual CAN interface 5.5.2.1) and ModuleEventStatus (see manual CAN interface 5.5.2.3) will be cancelled. After the loop will be closed again the ModuleEventStatus (see manual CAN interface 5.5.2.3) must be restored and the channels must be switched ‘ON’. The pins of the loop are potential free, the internal voltage drop is ca. 3 V. Coming from the factory the safety loop is not active (the corresponding bits are always set). By removing of the internal jumper the loop will become active (see operator’s manual CAN-Interface, app. C).

Optionally it is possible to install an INHIBIT for each channel (n= 0 to 15) via the Sub-D connectors INHIBIT 0-7 and INHIBIT 8-15 (only with REDEL HV connector).
When the INHIBIT contact pin (n) will be connected to GND or TTL-LOW potential then the HV-PS on this channel will be switched OFF without ramp permanently and the green LED on front panel is off.

The INHIBIT active time (LOW potential) has to be minimal 100 ms!

When the INHIBIT is no longer active (TTL-HIGH potential or not connected), then the INHIBIT flag has to be erased before the voltage can switched ON again (see manual CAN interface 5.5.1.3).

Pin assignment 96-pin connector according to DIN 41612:

PIN		PIN		PIN		Data
a1		b1		c1		+5V
a3		b3		c3		+24V
a5		b5		c5		GND
a11						@CAN_GND ⎫
		b11				@CANL ⎬ potential free
				c11		@CANH ⎭
a13						RESET
		b13				OFF with ramp (e.g. 10s after power fail)
a30	A4	b30	A5			⎫
a31	A2	b31	A3	c31	GND	⎬ Address field
a32	A0	b32	A1	c32	GND	⎭ 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.

Connected to GND ⇒ A(n) = 0 ; contact open ⇒ A(n) = 1