High Precision High Voltage Power Supply EHS F205x$^{)1}$-F

16 HV channels with Floating-GND

Art. no.: EH162-05**x**$^{)1}$106FR51 ($^{)1}$x = **p**: **+** or $^{)1}$x = **n**: **-** 500 V/ 10 mA)
EH162-05**x**$^{)1}$106FSHV ($^{)1}$x = **p**: **+** or $^{)1}$x = **n**: **-** 500 V/ 10 mA)
EH162-05**x**$^{)1}$106FERA ($^{)1}$x = **p**: **+** or $^{)1}$x = **n**: **-** 500 V/ 10 mA)

Operator's manual

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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 F205x[)1] - F is a High Precision 16-channel high voltage power supply in 6U Eurocard format. Each single channel is independently controllable with voltage and current control. The outputs RTN - floating HV-GND - and HV of each channel are both floating against each other and against ground.
The EHS F205 x[)1] - F 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 unit is software controlled via CAN-Interface directly through a PC or similar controller in this cases. Using the w-ie-ner Mpod crate it is able to carries up to 10 modules with control via Ethernet-Interface. It is possible to create a multi-channel high voltage system of any configurable size. The HV output at the EHQ F205 x[)1] - F is available with REDEL Multipin HV connector, isolated built-in SHV connector or LEMO connector ERA.0S.302.CLL.

2. Technical data

	EHS F205x[)1]-F	
Output voltage $\mathbf{V_{O\ nom}}$	[)1]x = **p**: **+** 500 V	[)1]x = **n**: **-** 500 V
Output per channel $\mathbf{I_{O\ nom}}$	10 mA	
Floating voltage	Connector RTN to GND: ≤ |20 V| Connector HV to GND: ≤ |20 V| + |V_O|	
Resolution of voltage setting[*)]	10 mV	
Resolution of current setting[*)]	**1% ∗ $I_{O\ nom}$ < I_O ≤ $I_{O\ nom}$:** 100 nA	
Resolution of voltage measurement[*)]	10 mV	
Resolution of current measurement[*)]	1st measurement range **$I_{O\ nom}$ ≥ I_O > 20 µA** : 10 nA	2nd measurement range **20µA ≥ I_O** > 0 : 50 pA
[*)] **with standard sample**	**rate 50/s and digitalfilter 64**	
The resolution of settings	**are only guarantied in the setting range 1% ∗ $V_{O\ nom}$ < V_O ≤ $V_{O\ nom}$.**	
The smallest ensured measurable	**values are depending on the accuracy of the measurements !**	
Accuracy of voltage measurement	± (0,01% ∗ V_O + 0,01% ∗ $V_{O\ nom}$)	
Accuracy of current measurement	1st measurement range ± (0,1% ∗ I_O + 0,01% ∗ $I_{O\ nom}$)	2nd measurement range ± (0,1% ∗ I_O + 1 nA)
The accuracy of measurements	**are only guarantied in the setting range 1% ∗ $V_{O\ nom}$ < V_O ≤ $V_{O\ nom}$**	
Ripple and noise	f > 10 Hz: < 5 mV (at max. load and |V_O| > 5 V)	
Stability of output voltage	< 50 mV (no load/load and Δ V_{IN})	
Temperature coefficient	< ± 50 ∗ $10^{-6}/_K$	
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	

	EHS F205x[)1]-F								
Optional INHIBIT per channel	About Sub-D-9 connectors INHIBIT (TTL level)								
INHIBIT / Channel	0/8	1/9	2/10	3/11	4/12	5/13	6/14	7/15	GND
Sub-D-9 connector / PIN	1	2	3	4	5	6	7	8	9
Power requirements V_{INPUT}	+ 24 V (< 3,5 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	REDEL-Connector (EH162-10x[)*]805FR51) isolated built-in SHV connector (EH162-10x[)*]805FSHV) or LEMO connector ERA.0S.302.CLL (EH162-10x[)*]805FERA)								
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 $\pm$ 2 % $V_{O\ nom}$ and 102 $\pm$ 2 % $I_{O\ nom}$ 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-9 connectors INHIBIT 0-7 and INHIBIT 8-15.
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).

The connector RTN - floating HV-GND (outside of the SHV connector) - of each channels should be connected to ground at a certain chosen point. Otherwise it must be sure, that the potential between RTN and GND should not exceed the amount of $\left|20\ V\right|$.

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 @CANH } potential free
a13		b13				RESET OFF with ramp (e.g. 10s after power fail)
a30 a31 a32	A4 A2 A0	b30 b31 b32	A5 A3 A1	c31 c32	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 $V_{O\ nom}$ / 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

Pin assignment REDEL HV connector

See the drawing on the right side.

