EHS Standard HV Modules

16 or 32 Channels with Common-GND

Operator's Manual

Contents

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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 notification to the users.

Filename EH201xx as of 25.1.2013

1. General information

The EHS modules of this series are Standard multichannel high voltage power supplies in 6U Eurocard format. The output voltage features a high stability, low ripple and noise and low temperature coefficient. Each single channel has an independent voltage and current control. 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 20 bit DAC circuits.
The channels share a Common-GND, which is connected to the internal Crate-Ground.

The HV output at the module is available as a 51 pin REDEL HV connector.

2. Technical data

	EHS F1 05x[)1]	EHS 201 05x[)1]	EHS F1 10x[)1]	EHS 201 10x[)1]	EHS F1 20x[)1]	EHS 201 20x[)1]	EHS F1 30x[)1]	EHS 201 30x[)1]	EHS F1 40x[)1]	EHS 201 40x[)1]
HV channels per module	16	32	16	32	16	32	16	32	16	32
Output voltage $V_{O\ nom}$ [kV]	0.5		1		2		3		4	
Output current $I_{O\ nom}$ [mA]	8		4		2		1.3		1	
Resolution of voltage setting[*)] [mV]	1		2		5		10		10	
current setting[*)] [nA]	20		10		4		3		2	
voltage measurement[*)] [mV]	1		2		5		10		10	
current measurement[*)] [nA]	20		10		4		3		2	
[*)] with standard sample rate 500/s and digital filter 64										
Ripple and noise [mV_{P-P}]	typ. < 10 max. 20									
Option -LN (Low Noise)	typ. < 3 max. 5									
	- at max. load and $\lvert V_O \rvert > 1\% * V_{O\ nom}$ - f > 10 Hz									
Stability (no load/load and ΔV_{IN})	$0.05\% * V_{O\ nom}$									
Sample rates [samples/s]	5, 10, 25, 50, 60, 100, 500									
Digital filter averages	1, 16, 64, 256, 512, 1024									
The resolution of measurable values depends on the settings of the sampling rate and the digital filter!										
Accuracy of voltage measurement	$\pm (0.01\% * V_O + 0.02\% * V_{O\ nom})$									
Accuracy of current measurement	$\pm (0.02\% * I_O + 0.02\% * I_{O\ nom})$									
The measurement accuracy is guaranteed in the range $1\% * V_{O\ nom} < V_O \leq V_{O\ nom}$ and for 1 year										
Voltage ramp up / down [V/s]	$1 * 10^{-6} * V_{O\ nom}$ up to $0.2 * V_{O\ nom}$									
Temperature coefficient	$< \pm 50 * 10^{-6}/_K$									
Hardware limits V_{max} / I_{max}	potentiometer per module (V_{max} / I_{max} is the same for all channels)									

[)1] x=p polarity positive, x=n polarity negative

		EHS F1 05x)1	EHS 201 05x)1	EHS F1 10x)1	EHS 201 10x)1	EHS F1 20x)1	EHS 201 20x)1	EHS F1 30x)1	EHS 201 30x)1	EHS F1 40x)1	EHS 201 40x)1
Interface		CAN-Interface (potential free)									
Operating mode		Full module and channel control via CAN interface in EHS mode: EDCP (Enhanced Device Control Protocol)									
Module status		green LED turns on if all channels have the status “Ready” yellow LED turns on if one or more channels have the status “HV ON”									
HV output protection		Overload, short-circuit and arc protection; only one short-circuit or arc per second allowed.									
Protection loop (I_s) potential free (2 pin Lemo-socket, REDEL SL)		5 mA $< I_s <$ 20 mA $\Rightarrow$ module on $I_s <$ 0.5 mA $\Rightarrow$ module off									
Power requirements	HV channels	16					32				
V_{INPUT} +24 V	Input Current [A]	4					8				
V_{INPUT} +5 V	Input Current [A]	0.1					0.2				
Packing		6U Euro cassette (40.64 mm wide and 220 mm deep)									
Connector on the rear		96-pin connector according to DIN 41612									
HV connector		51 pin REDEL HV connector (R51)									
Operating temperature		0 ... +40 °C									
Storage temperature		-20 ... +60 °C									

)1 x=p polarity positive, x=n polarity negative

3. Handling

3.1 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.

3.2 Limits

The maximum output voltage for all channels (hardware voltage limit) is defined through the position of the corresponding potentiometer V_{max}.
The maximum output current for all channels (hardware current limit) is defined through the position of the corresponding potentiometer I_{max}.
The greatest possible set value for voltage and current is given by V_{max} – 2% and I_{max} – 2%, respectively.
It is possible to measure the hardware voltage and current limits at the sockets below the potentiometer. The socket voltages are proportional to the relative limits, where 2.5 V corresponds to 102 ± 2 % $V_{O\ nom}$ and 102 ± 2 % $I_{O\ nom}$.
The output voltage and current are limited to the specified value. If a limit is reached or exceeded in any channel the green LED on the front panel turns off.

3.3 Safety Loop

A safety loop can be implemented via the safety loop socket (SL) on the front panel and between the SL-contacts (Pin 22 and PIN 30) at the REDEL-connector. If the safety loop is active then an output voltage in any channel is only present if the safety loop on both connectors is closed and an external current in a range of 5 to 20mA of any polarity is driven 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 internal voltage drop is approx. 3 V. In the factory setup the safety loop is not active (the corresponding bits are always set). The loop can be activated by removing the internal jumper. (see operator's manual for the CAN-Interface, app. B).

4. Pin assignment and connector layout

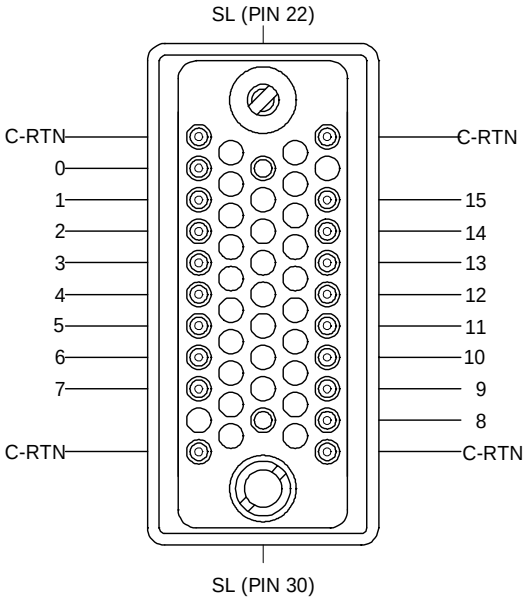
Pin assignment of the 96-pin connector according to DIN 41612:

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: set module address (A0 ... A5); pin connected to GND => address bit = 0 pin open => address bit = 1
a31	A2	b31	A3	c31	GND	
a32	A0	b32	A1	c32	GND	

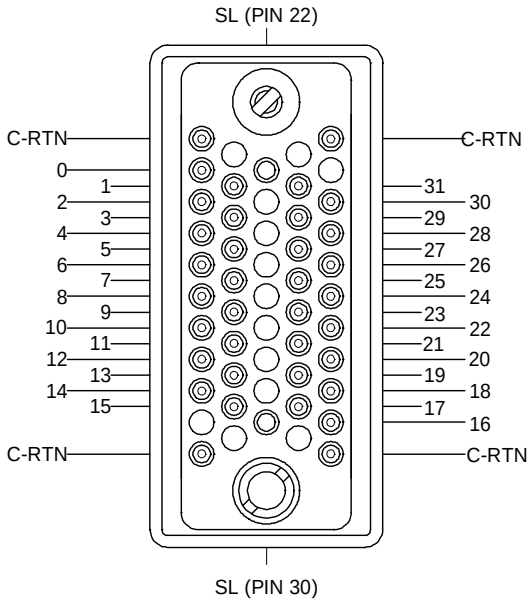
/RESET	active low; global reset of the module; HV generation is stopped immediately	
/HW_RMPDWN	pulse form:	high – low – high
	pulse-width:	1µs … 100µs
	function:	ramp down all channels immediately with a ramp speed of V_{nom}/50s Note: after activating this signal the ramp speed is set to V_{nom}/50s

51 pin REDEL HV connector

EHS F1xxx



EHS 201xxx



C-RTN is connected with the Modul-GND and the shield

5. Order Information

Item Code	Type	Polarity	Channels	V_{nom}	I_{nom}	HV Connector
EH161-05p405	EHS F105p	positive	16	500V	8mA	REDEL
EH161-05n405	EHS F105n	negative	16	500V	8mA	REDEL
EH161-10p405	EHS F110p	positive	16	1000V	4mA	REDEL
EH161-10n405	EHS F110n	negative	16	1000V	4mA	REDEL
EH161-20p405	EHS F120p	positive	16	2000V	2mA	REDEL
EH161-20n405	EHS F120n	negative	16	2000V	2mA	REDEL
EH161-30p135	EHS F130p	positive	16	3000V	1.3mA	REDEL
EH161-30n135	EHS F130n	negative	16	3000V	1.3mA	REDEL
EH161-40p105	EHS F140p	positive	16	4000V	1mA	REDEL
EH161-40n105	EHS F140n	negative	16	4000V	1mA	REDEL
EH321-05p405	EHS 20105p	positive	32	500V	8mA	REDEL
EH321-05n405	EHS 20105n	negative	32	500V	8mA	REDEL
EH321-10p405	EHS 20110p	positive	32	1000V	4mA	REDEL
EH321-10n405	EHS 20110n	negative	32	1000V	4mA	REDEL
EH321-20p405	EHS 20120p	positive	32	2000V	2mA	REDEL
EH321-20n405	EHS 20120n	negative	32	2000V	2mA	REDEL
EH321-30p135	EHS 20130p	positive	32	3000V	1.3mA	REDEL
EH321-30n135	EHS 20130n	negative	32	3000V	1.3mA	REDEL
EH321-40p105	EHS 20140p	positive	32	4000V	1mA	REDEL
EH321-40n105	EHS 20140n	negative	32	4000V	1mA	REDEL

Option Low Noise: **Item Code-LN**