EHQ 102M_PCI / 103M_PCI / 104L_PCI / 105L_PCI

Precision High Voltage Power Supplies in 3U Eurocard Format supply from PCI board

Operators Manual

Contents:

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 operators manual before any kind of operation.

Note

The information in this manual is subject to change without notice. We take no responsibility whatsoever 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 EHQ´s with option PCI are one channel high voltage supplies in a 3U Eurocard Chassis, 8TE wide. The units offers manual control and supply from the PCI board.
The high voltage supplies special provide high precision output voltage together with very low ripple and noise, even under full load. Separate 10%-steps hardware switches put voltage and current limits. An INHIBIT input protects connected sensitive devices.
The high voltage output protected against overload and short circuit. The output polarity can be switched over. The HV-GND is connected to the chassis and the powering GND.

2. Technical data

Type (with RS 232)		**EHQ 102M_PCI**	**EHQ 103M_PCI**	**EHQ 104L_PCI**	**EHQ 105L_PCI**
Output voltage V_O		0 ... 2 kV	0 ... 3 kV	0 ... 4 kV	0 ... 5 kV
Output current $I_{O\,24}$		0 ... 3 mA	0 ... 2 mA	0 ... 1 mA	0 ... 1 mA
Ripple and noise		< 2 mV_{P-P}			< 5 mV_{P-P}
Resolution of current measurement		1 µA; Option 0n1: $I_{O\,max}$ = 100 µA ⇒ 100 nA			
Resolution of voltage measurement		1 V			
Accuracy	current measurement	± (0,05% I_O + 0,02% $I_{O\,max}$ + 1 digit) for one year			
	voltage measurement	± (0,05% V_O + 0,02% $V_{O\,max}$ + 1 digit) for one year			
LCD display		4 digits with sign, switch controlled - voltage display in [V] - current display in [µA]			
Stability	ΔV_O (no load / load)	$< 5 * 10^{-5}$			
	$\Delta V_O/V_{INPUT}$	$< 5 * 10^{-5}$			
Temperature coefficient		$< 5 * 10^{-5}$/K			
Voltage control		CONTROL switch in position -manual: 10-turn potentiometer			
Rate of change of output voltage		HV -ON/OFF 500 V/s (hardware ramp)			
Protection		-separate current and voltage limit (hardware, rotary switch in10%-steps) -INHIBIT (external signal, TTL level, Low=active)			
Power requirement V_{INPUT}		**Option PCI:** ± 12 V (< 500 mA) and +5V (< 100 mA) from the PCI board			
Operating temperature		0 . . . 50 °C			
Storage temperature		-20 . . . +60 °C			
Packing		3U Euro cassette / 160 mm depth / 40,8 mm wide			
Connector		CompactPCI connector			
HV connector		SHV-Connector at the front panel			
Inhibit connector		1-pin Lemo-hub			

3. EHQ Description

The function is described at a block diagram of the EHQ. This can be found in Appendix A.

High voltage supply

A patented high efficiency resonance converter circuit, which provides a low harmonic sine voltage on the HV-transformer, is used to generate the high voltage. The high voltage is rectified using a high speed HV-rectifier, and the polarity is selected via a high-voltage switch. A consecutive active HV-filter damps the residual ripple and ensures low ripple and noise values as well as the stability of the output voltage. A precision voltage divider is integrated into the HV-filter to provide the set value of the output voltage, an additional voltage divider supplies the measuring signal for the maximum voltage control. A precision measuring and AGC amplifier compares the actual output voltage with the set value given by the DAC (computer control) or the potentiometer (manual control). Signals for the control of the resonance converter and the stabilizer circuit are derived from the result of the comparison. The two-stage layout of the control circuit results in an output voltage, stabilized with very high precision to the set point.
Separate security circuits prevent exceeding the front-panel switch settings for the current I_{max} and voltage V_{max} limits. A monitoring circuit prevents malfunction caused by low supply voltage.
The internal error detection logic evaluates the corresponding error signals and the external INHIBIT signal. It allows the detection of short overcurrent due to single flashovers in addition.

Digital control unit

A micro controller handles the internal control, evaluation and calibration functions of both channels. The actual voltages and currents are read cyclically by an ADC with connected multiplexer and processed for display on the 4 digit LCD display. The current and voltage hardware limits are retrieved cyclically several times per second. The reference voltage source provides a precise voltage reference for the ADC and generation of the control signals in the manual operation mode of the unit.
The set values for the corresponding channels are generated by a 16-Bit DAC in computer controlled mode.

Filter

A special property of the unit is a tuned filtering concept, which prevents radiation of electromagnetic interference into the unit, as well as the emittance of interference by the module. A filtering network is located next to the connectors for the supply voltage and the converter circuits of the individual devices are also protected by filters. The high-voltage filters are housed in individual metal enclosures to shield even minimum interference radiation.

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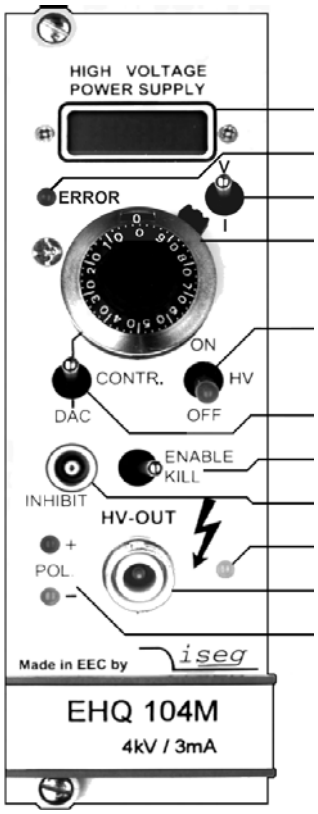
4. Front panel



[1] 4 digit LCD display
[2] Error indicator
[3] Measuring switch
[4] 10-turn potentiometer
[5] HV-ON switch
[6] CONTROL switch
[7] KILL switch
[8] INHIBIT input
[9] HV-ON indicator
[10] HV output
[11] Polarity indicator

5. Handling

The state of readiness of the unit is produced at the CompactPCI connector (see point 6) on the flipside.

The Output polarity is selectable with help of a rotary switch on the cover side (see appendix B). The chosen polarity is displayed by a LED on the front panel [11] and a sign on the LCD display [1].

Attention! It is not allowed to change the polarity under power!

An undefined switch setting (not at one of the end positions) will cause no output voltage.

High voltage output is switched on with HV-ON switch [5] at the front panel. The viability is signaled by the yellow LED [9].

Attention! If the CONTROL switch [6] is in upper position (manual control), high voltage is generated at HV-output [10] with a ramp speed from 500 V/s (hardware ramp) to the set voltage chosen via 10-turn potentiometer [4].
This is also the case, if remote control is switched over to manual control while operating.

If the CONTROL switch [6] is in lower position (DAC), high voltage will be activated only after receiving remote control commands.

Attention! This function is **not available** with option **PCI**! Please **don't use** the unit in **DAC mode**!

On the LCD [1] output voltage in [V] or output current in [µA] will be displayed depending on the position of the Measuring switch [3].

If working with manual control, output voltage can be set via 10-turn potentiometer [4] in a range from 0 to the set maximal voltage.

If the CONTROL switch [6] is switched over to remote control, the DAC takes over the last set output voltage of manual control.

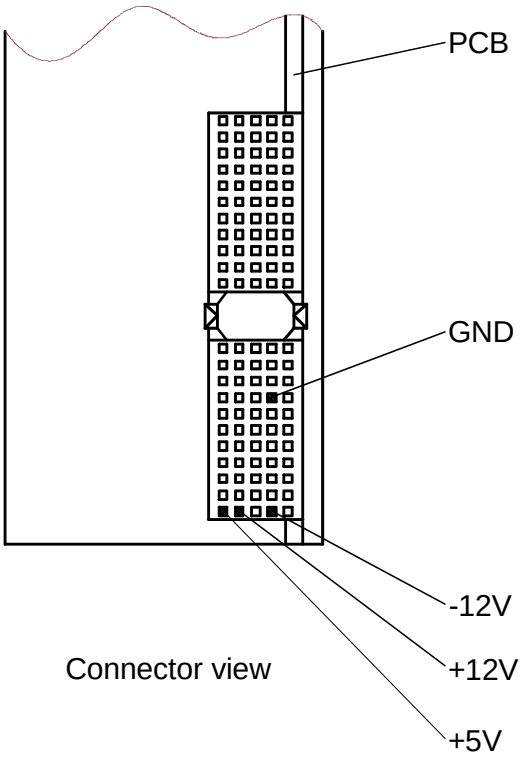
Maximum output voltage and current can be selected in 10%-steps with the rotary switches V_{max} and I_{max} (switch dialled to 10 corresponds to 100%) on the cover side (see appendix B).
The output voltage or current which exceed the limits is signaled by the red error LED on the front panel [2].

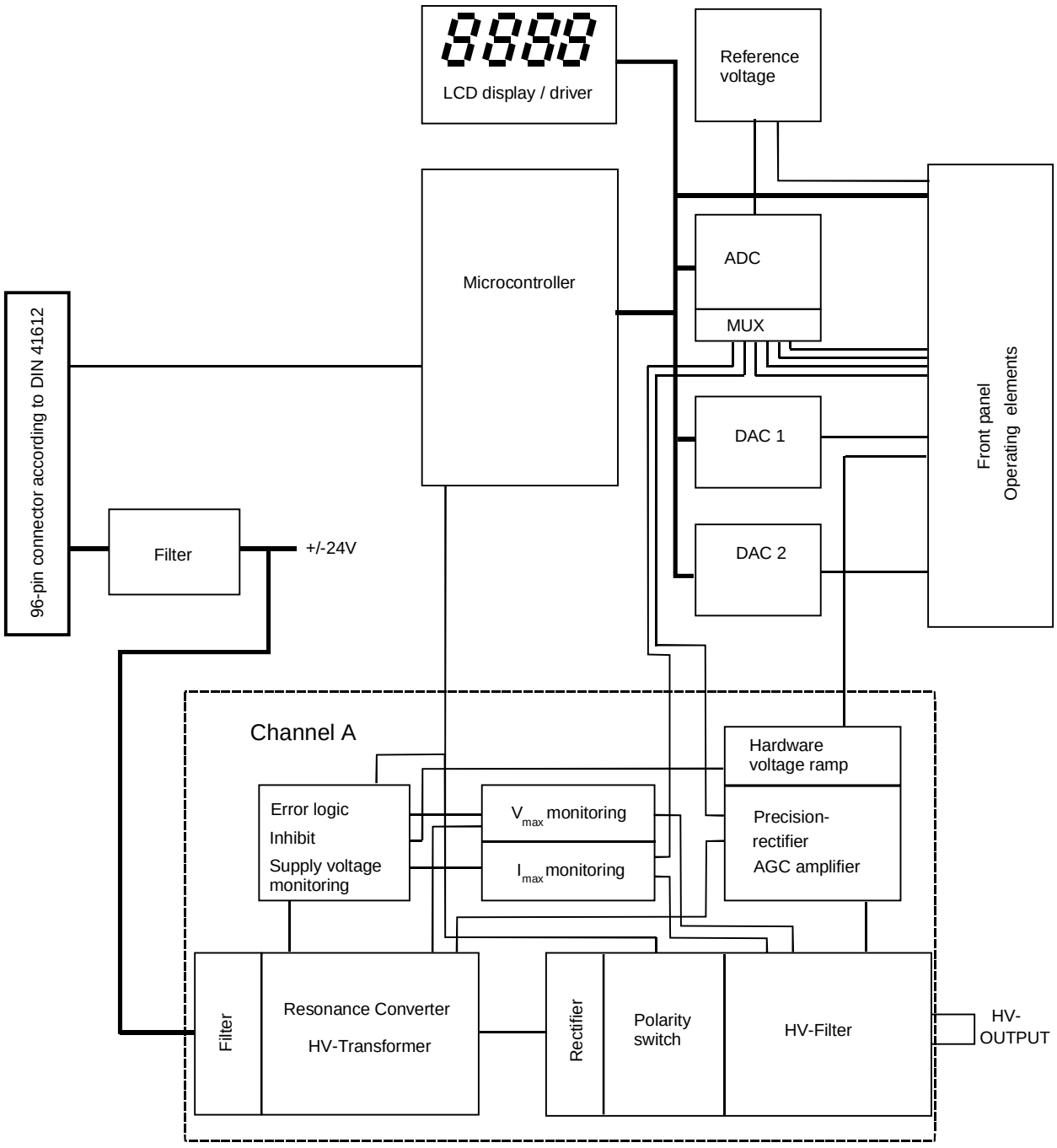
Function of KILL switch [7]:

Switch to the right position: (ENABLE KILL)	The output voltage will be shut off permanently without ramp on exceeding V_{max}, I_{max} or in the presence of an INHIBIT signal (Low=active) at the INHIBIT input [8]. Restoring the output voltage is possible after operating the switches HV-ON [5] or KILL [7].
Note:	When capacitance is effective at the HV-output or when the rate of change of output voltage is high (hardware ramp) at high load, then the KILL function will be released by the current charging the condenser. In this case use a small rate of output change (software ramp) or select ENABLE KILL not until output voltage is set voltage.
Switch to the left position: (DISABLE KILL)	The output voltage will be limited to V_{max}, output current to I_{max} respectively; INHIBIT shuts the output voltage off without ramp, the previous voltage setting will be restored with hardware ramp on INHIBIT no longer being present.

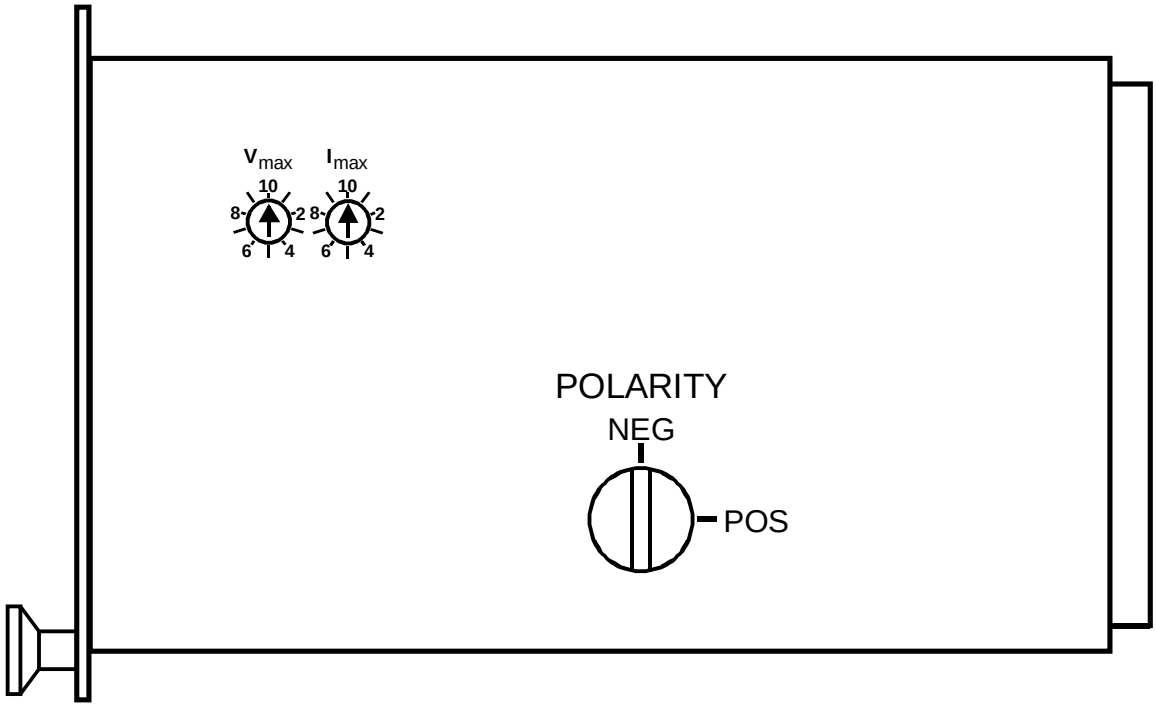
6. CompactPCI connector

Pin assignment CompactPCI connector on the flip side





Appendix A: Block diagram EHQ



Appendix B: EHQ side cover

Polarity rotary switch (e.g.: polarity negative)
Rotary switches for V_{max} and I_{max}

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