VHS Standard HV Modules
with Common-GND and VME Interface

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.

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1. General information

The VHS modules are High Voltage power supplies in 6U VME format, in single width (up to 6 kV) and in double width (up to 10 kV). The units are controlled exclusively via the VME bus system. 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 is 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 BNC connectors (100 V), SHV connectors (500 V up to 8 kV) or KINGS connectors (10 kV).

2. Technical data

	VHS 4001x[1]	VHS 4005x[1]	VHS 4010x[1]	VHS 4020x[1]	VHS 4030x[1]	VHS 4040x[1]	VHS 4060x[1]	VHS 4080x[1]	VHS 20100x[1]
HV channels per module	4	4	4	4	4	4	4	4	2
Output voltage $V_{O\ nom}$ [kV]	0.1	0.5	1	2	3	4	6	8	10
Output current $I_{O\ nom}$ [mA]	10	15	8	4	3	2	1	1	0.5
Resolution of voltage setting[*)] [mV]	1	2	4	5	10	10	15	20	30
current setting[*)] [nA]	100	150	80	40	30	20	10	10	5
voltage measurement[*)] [mV]	1	2	4	5	10	10	15	20	30
current measurement*[)] [nA]	100	150	80	40	30	20	10	10	5
Ripple and noise [mV_{P-P}]	< 5	< 10					< 30		
	- at max. load and $\lvert V_O \rvert > 1\% * V_{O\ nom}$ - f > 10 Hz								
Stability (no load/load and ΔV_{IN})	$0{,}02\% * V_{O\ nom}$								
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]	$1*10\text{-}6 * V_{O\ nom}$ 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)								

*) with standard sample rate 500/s and digital filter 64

	VHS 4001x)1	VHS 4005x)1	VHS 4010x)1	VHS 4020x)1	VHS 4030x)1	VHS 4040x)1	VHS 4060x)1	VHS 4080x)1	VHS 20100x)1
Interface	VME-Interface								
Module status	green LED turns on if all channels have the status “ready”								
Protection loop (I_s) potential free (2 pin Lemo-socket SL)	5 mA < I_s < 20 mA ⇒ module on I_s < 0,5 mA ⇒ module off								
Power requirements V_{INPUT}	± 12 V (< 2 A) and + 5 V (< 0,2 A)								
Packing	6U VME cassette (single or double width and 164 mm deep)								
Connector on the rear	96-pin connector according to DIN 41612								
HV connector	BNC connector (BNC) 100 V SHV connector (SHV) 500 V up to 8 kV KINGS connector (KNG) 10 kV								
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 VME 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

The socket for the safety loop (global interlock signal) is in the middle of the front panel. If the safety loop is active then an output voltage in any channel 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 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’ and ModuleEventStatus (see manual “Operator’s Manual VHS-Interface” 2.2.1 Module Registers) are cleared. After closing the loop again the ModuleEventStatus has to be reset and the channels have to be switched ON.
The pins of the loop 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 jumper “ILK”, which can be found on the topside of the board (see manual “Operator’s Manual VHS-Interface”, app. B).

4. Order Information

Item Code	Type	Polarity	Channels	V_{nom}	I_{nom}	HV Connector
VH020100p504KNG	VHS 20100p	positive	2	10000V	0.5mA	KINGS
VH020100n504KNG	VHS 20100n	negative	2	10000V	0.5mA	KINGS
VH040-80p105SHV	VHS 4080p	positive	4	8000V	1mA	SHV
VH040-80n105SHV	VHS 4080n	negative	4	8000V	1mA	SHV
VH040-60p105SHV	VHS 4060p	positive	4	6000V	1mA	SHV
VH040-60n105SHV	VHS 4060n	negative	4	6000V	1mA	SHV
VH040-40p205SHV	VHS 4040p	positive	4	4000V	2mA	SHV
VH040-40n205SHV	VHS 4040n	negative	4	4000V	2mA	SHV
VH040-30p305SHV	VHS 4030p	positive	4	3000V	3mA	SHV
VH040-30n305SHV	VHS 4030n	negative	4	3000V	3mA	SHV
VH040-20p405SHV	VHS 4020p	positive	4	2000V	4mA	SHV
VH040-20n405SHV	VHS 4020n	negative	4	2000V	4mA	SHV
VH040-10p805SHV	VHS 4010p	positive	4	1000V	8mA	SHV
VH040-10n805SHV	VHS 4010n	negative	4	1000V	8mA	SHV
VH040-05p156SHV	VHS 4005p	positive	4	500V	15mA	SHV
VH040-05n156SHV	VHS 4005n	negative	4	500V	15mA	SHV
VH040-01p106BNC	VHS 4001p	positive	4	100V	10mA	BNC
VH040-01n106BNC	VHS 4001n	negative	4	100V	10mA	BNC