

Technical documentation

Last changed on: 2022-03-14

EHS Series

Versatile High Precision High Voltage Module with multiple Floating Options

- 4 / 8 / 16 / 24 / 32 / 48 channel, 100 V – 20 kV versions
- very low ripple and noise
- hardware voltage and current limits
- voltage and current control per channel
- programmable parameters (delayed trip etc.)



Document history

Version	Date	Major changes
3.7	2022-03-14	Description of VCT option removed (only on customer request), option VLN removed (only on customer request), overview with part number of connections, Pin assignment connections, new figure front view, improved description figure 7
3.6	2021-05-19	Improved description (Item code revision and customization, voltage specification for HV cables, discontinued modules EHS F1 01x, EHS 201 01x, discontinued HV Connectors I52, C15, new figures front views and dimensions)
3.5	2020-12-07	Improved description (Safety Current Loop, Safety Return (SRTN), F02 – High floating voltage, F20 – Very high floating voltage, Glossary)
3.4	2020-10-09	Improved description C-RTN, CCG, RTN (Table 14: front view 16/24/48 ch modules)
3.3	2020-09-23	Improved description Option Lower output current
3.2	2020-08-18	Improved documentation: Cable Order Guide
3.1	2020-06-29	Figure for Jumper configuration (CG-CFG), Improved documentation
3.0	2020-01-16	Improved documentation: safety information, glossary, Single Channel Inhibit
2.6	2019-11-12	Improved documentation: Warranty, Disposal, Accessories added, Fixed error
2.5	2019-07-23	Added HV connector and Figures
2.4	2019-06-19	Improved documentation
2.3	2019-06-03	Fixed Itemcodes, connector codes, Error in description
2.2	2018-09-17 2018-10-01 2018-12-03	Added Pin assignments R51.44, R51.46, I50.52 Notes revised CFG jumper information revised
2.1	2017-08-03	Fixed Itemcodes EHS CFG FLEX
2.0	2017-04-06	Relayouted documentation & fixes

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The information in this manual is subject to change without notice. We take no responsibility for any mistake in the document. We reserve the right to make changes in the product design without reservation and without notification to the users. We decline all responsibility for damages and injuries caused by an improper use of the device.

Safety


This section contains important security information for the installation and operation of the device. Failure to follow safety instructions and warnings can result in serious injury or death and property damage.

Safety and operating instructions must be read carefully before starting any operation.

We decline all responsibility for damages and injuries caused which may arise from improper use of our equipment.

Description of the safety instructions


DANGER!



“Danger!” indicates a severe injury hazard. The non-observance of safety instructions marked as “Danger!” will lead to possible injury or death.

DANGER!


WARNING!



“Warning!” indicates an injury hazard. The non-observance of safety instructions marked as “Warning!” could lead to possible injury or death.

WARNING!


CAUTION!



Advice marked as “Caution!” describe actions to avoid possible damages to property.

CAUTION!

INFORMATION



Advice marked as “Information” give important information.

INFORMATION



Read the manual.



Attention high voltage!

HIGH VOLTAGE



Important information.

Intended use

The device may only be operated within the limits specified in the data sheet. The permissible ambient conditions (temperature, humidity) must be observed. The device is designed exclusively for the generation of high voltage as specified in the data sheet. Any other use not specified by the manufacturer is not intended. The manufacturer is not liable for any damage resulting from improper use.

Qualification of personnel

A qualified person is someone who is able to assess the work assigned to him, recognize possible dangers and take suitable safety measures on the basis of his technical training, his knowledge and experience as well as his knowledge of the relevant regulations.

General safety instructions

- Observe the valid regulations for accident prevention and environmental protection.
- Observe the safety regulations of the country in which the product is used.
- Observe the technical data and environmental conditions specified in the product documentation.
- You may only put the product into operation after it has been established that the high-voltage device complies with the country-specific regulations, safety regulations and standards of the application.
- The high-voltage power supply unit may only be installed by qualified personnel.

Important safety instructions

WARNING!



WARNING!

To avoid injury of users it is not allowed to open the unit. There are no parts which can be maintained by users inside of the unit. Opening the unit will void the warranty.

WARNING!



WARNING!

The high-voltage cable must be professionally connected to the consumer/load and the connection insulated with the appropriate dielectric strength. Do not power the consumer/load outside of its specified range.

WARNING!



WARNING!

Before connecting or disconnecting HV cables or any operation on the HV output or the application, the unit has to be switched off and discharge of residual voltage has to be finished. Depending on application residual voltages can be present for long time periods.

WARNING!



WARNING!

Do not operate the unit in wet or damp conditions.

WARNING!



WARNING!

Do not operate the unit in an explosive atmosphere.

WARNING!



WARNING!

Do not operate the unit if you suspect the unit or the connected equipment to be damaged.

CAUTION!



CAUTION!

When installing the units, make sure that an air flow through the corresponding air inlet and outlet openings is possible.

CAUTION!



CAUTION!

The devices must only be used in combination with iseg approved crates.

INFORMATION



INFORMATION

Please check the compatibility with the devices used.

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1 General description

1.1 EHS Standard series

EHS Standard modules are multichannel high voltage power supplies in MMS system (Eurocard format). The output voltage features a high stability, low ripple and noise and low temperature coefficient. With up to 48 channels each single channel has an independent voltage and current control. By offering different configurations and options this module perfectly covers various types of applications such as detector supply, experimental setup or lab use. The EHS Standard module is available in three floating versions, Common Floating Ground (CFG), Floating Ground (FG) and Common Ground (CG).

1.2 EHS High Precision series

The EHS High Precision modules are multichannel high voltage power supplies in MMS system (Eurocard format) with exceptionally high stability, very low temperature coefficients and very low ripple and noise characteristics. With up to 16 channels each single channel has an independent voltage and current control. Compared to a standard module the High Precision EHS is equipped with a second current measurement range to precisely meter low currents. Switching between measurement ranges is done automatically. By offering different configurations and options this module perfectly covers various types of applications such as detector supply, experimental setup or lab use. The EHS High Precision module is available in two floating versions, Common Floating Ground (CFG) and Floating Ground (FG).

2 Technical data

2.1 EHS Standard series

SPECIFICATIONS	EHS CG	EHS CFG	EHS FG
Polarity	Factory fixed, positive or negative		
Floating principle	Common Ground	Common Floating Ground	Single Floating Ground
Potential difference	none	56 V channel/GND	20 V channel/channel/GND, optionally up to 2 kV
Ripple and noise (f > 10 Hz)	< 10 - 20 mV _{p-p} optionally VLN: < 3 - 5 mV _{p-p}	< 10 mV _{p-p}	
Ripple and noise (f > 1 kHz)	< 2 – 3 mV		
Stability			
Stability – [ΔV_{out} vs. ΔV_{in}]	< $1 \cdot 10^{-4} \cdot V_{nom}$		
Stability – [ΔV_{out} vs. ΔR_{load}]	< $5 \cdot 10^{-4} \cdot V_{nom}$	< $2 \cdot 10^{-4} \cdot V_{nom}$	
Long term stability (1h warmup) 24h	< $5 \cdot 10^{-5} \cdot V_{nom}$		
Temperature coefficient	< 50 ppm / K		
Resolution voltage setting	$2 \cdot 10^{-6} \cdot V_{nom}$		$4 \cdot 10^{-5} \cdot V_{nom}$
Resolution current setting	$2 \cdot 10^{-6} \cdot I_{nom}$		$4 \cdot 10^{-5} \cdot V_{nom}$
Resolution voltage measurement ⁽¹⁾	$2 \cdot 10^{-6} \cdot V_{nom}$		
Resolution current measurement ⁽¹⁾	$2 \cdot 10^{-6} \cdot I_{nom}$		
Measurement accuracy – The measurement accuracy is guaranteed in the range $1\% \cdot V_{nom} < V_{out} < V_{nom}$ and for 1 year			
Accuracy voltage measurement	$\pm (0.01\% \cdot V_{out} + 0.02\% \cdot V_{nom})$		
Accuracy current measurement	$\pm (0.02\% \cdot I_{out} + 0.02\% \cdot I_{nom})$		
Sample rates ADC (SPS)	5, 10, 25, 50, 60, 100, 500 ⁽²⁾		5, 10, 25, 50 ⁽²⁾ , 60
Digital filter averages	1, 16, 64 ⁽²⁾ , 256, 512, 1024		
Voltage ramp up / down	up to $0.2 \cdot V_{nom} / s$	up to $0.2 \cdot V_{nom} / s$ optionally up to $0.75 \cdot V_{nom} / s$	
Hardware limits	Potentiometer per module [V_{max} and I_{max}]		
Limit monitor voltage	2.5 V		
Digital interface	CAN		
Protection	Safety loop, overload and short circuit protected, optionally INHIBIT per channel (ID / IU, NID / NIU) (ATTENTION: there is only one short circuit or arc per second allowed!)		
HV connector	R51 SHV		
System connector	96 PIN (MMS HV compatible)		
Safety loop connector	Lemo 2pole (SL), (Figure 15)		
Limit monitor connector	Lemo 1pole, (Figure 16)	Lemo 2pole, (Figure 17)	Lemo 1pole, (Figure 16)
Case	19" plug-in cassette		
Dimensions – L/W/H	220mm / 8HP / 6U		

SPECIFICATIONS	EHS CG	EHS CFG	EHS FG
Operating temperature		0 ... 40 °C	
Storage temperature		-20 ... 60 °C	
Humidity		20 – 80 %, not condensing	
Notes:			
1) The resolution of measurable values depends on the settings of the sampling rate and the digital filter!			
2) Factory Settings			

Table 1: Technical data: Specifications EHS Standard

CONFIGURATIONS EHS STANDARD SERIES									
Type	V _{nom}	I _{nom}	Ch	Max. I _{in} (A) at 24V	Ripple (mV _{p-p}) >1kHz 10Hz-1kHz	HV connector Standard/opt.	Item Code	Options	
Common Ground									
EHS F1 05x	500 V	8 mA	16	4	3	10	R51.43	EH161005x805oooccrk	SLA, SLP, ID, IU
EHS 201 05x	500 V	8 mA	32	8	3	10	R51.45	EH321005x805oooccrk	SLA, SLP, ID, IU
EHS F1 10x	1 kV	4 mA	16	4	2	15	R51.43	EH161010x405oooccrk	SLA, SLP, ID, IU
EHS 201 10x	1 kV	4 mA	32	8	2	15	R51.45	EH321010x405oooccrk	SLA, SLP, ID, IU
EHS F1 20x	2 kV	2 mA	16	4	2	20	R51.43	EH161020x205oooccrk	SLA, SLP, ID, IU
EHS 201 20x	2 kV	2 mA	32	8	2	20	R51.45	EH321020x205oooccrk	SLA, SLP, ID, IU
EHS F1 30x	3 kV	1.3 mA	16	4	2	20	R51.43	EH161030x135oooccrk	SLA, SLP, ID, IU
EHS 201 30x	3 kV	1.3 mA	32	8	2	20	R51.45	EH321030x135oooccrk	SLA, SLP, ID, IU
EHS F1 40x	4 kV	1 mA	16	4	3	20	R51.43	EH161040x105oooccrk	SLA, SLP, ID, IU
EHS 201 40x	4 kV	1 mA	32	8	3	20	R51.45	EH321040x105oooccrk	SLA, SLP, ID, IU
Notes:									
replacement characters: o – options, c – connector, r – revision, k – customization, x – polarity (negative/positive/mix)									

Table 2: Technical data: Configurations of Standard

CONFIGURATIONS EHS STANDARD SERIES									
Type	V _{nom}	I _{nom}	Ch	Max. I _{in} (A) at 24V	Ripple (mV _{p-p}) >1kHz 10Hz-1kHz	HV connector Standard/opt.	Item Code	Options	
Common Floating Ground									
EHS 80 01x	100 V	10 mA	8	1	3	5	SHV, R51.41	EH080001x1060ooccrk	SLA, SLP, ID, IU
EHS F0 01x	100 V	10 mA	16	2	3	5	SHV, R51.43	EH160001x1060ooccrk	SLA, SLP, ID, IU
EHS 80 05x	500 V	15 mA	8	4	3	10	SHV, R51.41	EH080005x1560ooccrk	SLA, SLP, ID, IU
EHS F0 05x	500 V	15 mA	16	8	3	10	SHV, R51.43	EH160005x1560ooccrk	SLA, SLP, ID, IU
EHS 80 10x	1 kV	8 mA	8	4	3	10	SHV, R51.41	EH080010x8050ooccrk	SLA, SLP, ID, IU
EHS F0 10x	1 kV	8 mA	16	8	3	10	SHV, R51.43	EH160010x8050ooccrk	SLA, SLP, ID, IU
EHS 80 20x	2 kV	4 mA	8	4	3	10	SHV, R51.41	EH080020x4050ooccrk	SLA, SLP, ID, IU
EHS F0 20x	2 kV	4 mA	16	8	3	10	SHV, R51.43	EH160020x4050ooccrk	SLA, SLP, ID, IU
EHS 80 30x	3 kV	3 mA	8	4	3	10	SHV, R51.41	EH080030x3050ooccrk	SLA, SLP, ID, IU
EHS F0 30x	3 kV	3 mA	16	8	3	10	SHV, R51.43	EH160030x3050ooccrk	SLA, SLP, ID, IU
EHS 80 40x	4 kV	2 mA	8	4	3	10	SHV, R51.41	EH080040x2050ooccrk	SLA, SLP, ID, IU
EHS F0 40x	4 kV	2 mA	16	8	3	10	SHV, R51.43	EH160040x2050ooccrk	SLA, SLP, ID, IU
EHS 80 60x	6 kV	1 mA	8	3	3	10	S08	EH080060x1050ooccrk	SLA, SLP, ID, IU
EHS F0 60x	6 kV	1 mA	16	6	3	10	S08	EH160060x1050ooccrk	SLA, SLP, ID, IU
EHS 40 80x	8 kV	1 mA	4	2.2	3	10	S08	EH040080x1050ooccrk	SLA, SLP, ID, IU
EHS 40 100x	10 kV	0.75 mA	4	2.2	3	10	S10	EH040100x7540ooccrk	SLA, SLP, ID, IU
EHS 40 150x	15 kV	0.5 mA	4	2.2	3	10	S20	EH040150x5040ooccrk	SLA, SLP, ID, IU
EHS 40 200x	20 kV	0.4 mA	4	2.2	3	10	S20	EH040200x4040ooccrk	SLA, SLP, ID, IU
Floating Ground									
EHS 86 01x	100 V	10 mA	8	1.5	3	5	SHV, R51.47	EH086001x1060ooccrk	SLA, SLP, F02, F20, ID, IU
EHS F6 01x	100 V	10 mA	16	3	3	5	SHV, R51.48	EH166001x1060ooccrk	SLA, SLP, F02, F20, ID, IU
EHS 86 05x	500 V	15 mA	8	4.5	3	10	SHV, R51.47	EH086005x1560ooccrk	SLA, SLP, F02, F20, ID, IU
EHS F6 05x	500 V	15 mA	16	9	3	10	SHV, R51.48	EH166005x1560ooccrk	SLA, SLP, F02, F20, ID, IU
EHS 86 10x	1 kV	8 mA	8	4.5	3	10	SHV, R51.47	EH086010x8050ooccrk	SLA, SLP, F02, F20, ID, IU
EHS F6 10x	1 kV	8 mA	16	9	3	10	SHV, R51.48	EH166010x8050ooccrk	SLA, SLP, F02, F20, ID, IU
EHS 86 20x	2 kV	4 mA	8	4.5	3	10	SHV, R51.47	EH086020x4050ooccrk	SLA, SLP, F02, F20, ID, IU
EHS F6 20x	2 kV	4 mA	16	9	3	10	SHV, R51.48	EH166020x4050ooccrk	SLA, SLP, F02, F20, ID, IU
EHS 86 30x	3 kV	3 mA	8	4.5	3	10	SHV, R51.47	EH086030x3050ooccrk	SLA, SLP, F02, F20, ID, IU
EHS F6 30x	3 kV	3 mA	16	9	3	10	SHV, R51.48	EH166030x3050ooccrk	SLA, SLP, F02, F20, ID, IU
EHS 86 40x	4 kV	2 mA	8	4.5	3	10	SHV, R51.47	EH086040x2050ooccrk	SLA, SLP, F02, F20, ID, IU
EHS F6 40x	4 kV	2 mA	16	9	3	10	SHV, R51.48	EH166040x2050ooccrk	SLA, SLP, F02, F20, ID, IU
EHS 86 60x	6 kV	1 mA	8	3.5	3	10	S08	EH086060x1050ooccrk	SLA, SLP, F02, F20, ID, IU
EHS F6 60x	6 kV	1 mA	16	7	3	10	S08	EH166060x1050ooccrk	SLA, SLP, F02, F20, ID, IU
EHS 46 80x	8 kV	1 mA	4	2.5	3	10	S08	EH046080x1050ooccrk	SLA, SLP, F02, F20, ID, IU
EHS 46 100x	10 kV	0.75 mA	4	2.5	3	10	S10	EH046100x7540ooccrk	SLA, SLP, F02, F20, ID, IU
EHS 46 150x	15 kV	0.5 mA	4	2.5	3	10	S20	EH046150x5040ooccrk	SLA, SLP, F02, F20, ID, IU
EHS 46 200x	20 kV	0.4 mA	4	2.5	3	10	S20	EH046200x4040ooccrk	SLA, SLP, F02, F20, ID, IU
Notes: replacement characters: o – options, c – connector, r – revision, k – customization, x – polarity (negative/positive/mix)									

Table 3: Technical data: Configurations of Standard

CONFIGURATIONS EHS STANDARD SERIES									
Type	V _{nom}	I _{nom}	Ch	Max. I _{in} (A) at 24V	Ripple (mV _{p-p}) >1kHz 10Hz-1kHz		HV connector Standard/opt.	Item Code	Options
Common Floating Ground – (EHS FLEX)									
EHS F5 01x	100 V	10 mA	16	1	3	5	SHV	EH165001x1060ooccrk	SLA, SLP
EHS 185 01x	100 V	10 mA	24	1.5	3	5	R51.44	EH245001x1060ooccrk	SLA, SLP
EHS 305 01x	100 V	10 mA	48	3	3	5	R51.46	EH485001x1060ooccrk	SLA, SLP
EHS F5 05x	500 V	6 mA	16	3	3	10	SHV	EH165005x605ooccrk	SLA, SLP
EHS 185 05x	500 V	6 mA	24	4.5	3	10	R51.44	EH245005x605ooccrk	SLA, SLP
EHS 305 05x	500 V	6 mA	48	9	3	10	R51.46	EH485005x605ooccrk	SLA, SLP
EHS F5 10x	1 kV	3 mA	16	3	3	10	SHV	EH165010x305ooccrk	SLA, SLP
EHS 185 10x	1 kV	3 mA	24	4.5	3	10	R51.44	EH245010x305ooccrk	SLA, SLP
EHS 305 10x	1 kV	3 mA	48	9	3	10	R51.46	EH485010x305ooccrk	SLA, SLP
EHS F5 20x	2 kV	1.5 mA	16	3	3	10	SHV	EH165020x155ooccrk	SLA, SLP
EHS 185 20x	2 kV	1.5 mA	24	4.5	3	10	R51.44	EH245020x155ooccrk	SLA, SLP
EHS 305 20x	2 kV	1.5 mA	48	9	3	10	R51.46	EH485020x155ooccrk	SLA, SLP
EHS F5 30x	3 kV	1 mA	16	3	3	10	SHV	EH165030x105ooccrk	SLA, SLP
EHS 185 30x	3 kV	1 mA	24	4.5	3	10	R51.44	EH245030x105ooccrk	SLA, SLP
EHS 305 30x	3 kV	1 mA	48	9	3	10	R51.46	EH485030x105ooccrk	SLA, SLP
Notes: replacement characters: o – options, c – connector, r – revision, k – customization, x – polarity (negative/positive/mix)									

Table 4: Technical data: Configurations of Standard / Flex series

2.2 Technical data: EHS High Precision series

SPECIFICATIONS	EHS HP CFG	EHS HP FG
Polarity	Factory fixed, positive or negative	
Floating principle	Common Floating Ground	Single Floating Ground
Potential difference	56 V channel/GND	20 V channel/channel/GND, optionally up to 2 kV
Ripple and noise (f > 10 Hz)	< 3 – 10 mV _{p-p}	
Ripple and noise (f > 1 kHz)	< 1 – 2 mV _{p-p}	
Ripple and noise (f > 10 Hz – 0.1 Hz)	< 5 – 30 mV _{p-p}	
Stability		
Stability – [ΔV_{out} vs. ΔV_{in}]	< $1 \cdot 10^{-5} \cdot V_{nom}$	
Stability – [ΔV_{out} vs. ΔR_{load}]	< $1 \cdot 10^{-4} \cdot V_{nom}$	
Long Term Stability (1h Warmup) 24h	< $2 \cdot 10^{-5} \cdot V_{nom}$	
Temperature coefficient	< 30 ppm / K < 10 ppm / K (option T10)	
Resolution – The resolution of measurable values depends on the settings of the sampling rate and the digital filter!		
Resolution voltage setting	$2 \cdot 10^{-6} \cdot V_{nom}$	
Resolution current setting [$I_{out} > 20 \mu A$]	$2 \cdot 10^{-6} \cdot I_{nom}$	
Resolution voltage measurement ⁽¹⁾	$1 \cdot 10^{-6} \cdot V_{nom}$	
Resolution current measurement [$I_{out} > 20 \mu A$] ⁽¹⁾	$1 \cdot 10^{-6} \cdot I_{nom}$	
Resolution current measurement [$I_{out} < 20 \mu A$] (2nd range) ^{(1) (3)}	50pA	
Measurement accuracy – The measurement accuracy is guaranteed in the range $1\% \cdot V_{nom} < V_{out} < V_{nom}$ and 1 year		
Accuracy voltage measurement	$\pm (0.01\% \cdot V_{out} + 0.01\% \cdot V_{nom})$	
Accuracy current measurement [$I_{out} > 20 \mu A$]	$\pm (0.01\% \cdot I_{out} + 0.02\% \cdot I_{nom})$	
Accuracy current measurement [$I_{out} < 20 \mu A$] (2nd range) ^{(1) (3)}	$\pm (0.01\% \cdot I_{out} + 4 \text{ nA})$	
Sample rates ADC (SPS)	5, 10, 25, 50 ⁽²⁾ , 60, 100, 500	5, 10, 25, 50 ⁽²⁾ , 60
Digital filter averages	1, 16, 64 ⁽²⁾ , 256, 512, 1024	
Voltage ramp	$1 \cdot 10^{-6} \cdot V_{nom}$ up to $0.2 \cdot V_{nom}$	
Hardware limits	Potentiometer per module [V_{max} / I_{max}]	
Limit Monitor voltage	2.5 V	
Digital Interface	CAN	
Protection	Safety loop, overload and short circuit protected, optionally INHIBIT per channel (ID / IU, NID / NIU) (ATTENTION: there is only one short circuit or arc per second allowed!)	
HV connector	R51 SHV	
System connector	96 PIN	
Safety loop connector	Lemo 2pole (SL), (Figure 15)	
Limit monitor connector	Lemo 2pole, (Figure 17)	Lemo 1pole, (Figure 16)
Case	19 inch plug-in cassette	
Dimensions – L/W/H	220mm / 8HP / 6U	

SPECIFICATIONS	EHS HP CFG	EHS HP FG
Operating temperature		0 ... 40 °C
Storage temperature		-20 ... 60 °C
Humidity		20 – 80 %, not condensing
Notes:		
1) The resolution of measurable values depends on the settings of the sampling rate and the digital filter!		
2) Factory Settings		
3) not available with Option L (see 4.9 L – Lower output current (HP only))		

Table 5: Technical data: Specifications EHS High Precision

CONFIGURATIONS EHS HIGH PRECISION SERIES										
Type	V _{nom}	I _{nom}	Ch	Max. I _{in} (A) at 24V	Ripple (mV _{pp}) >1kHz 10Hz-1kHz 0.1-10Hz			HV Connector Standard/opt.	Item Code	Options
Common Floating Ground										
EHS 82 01x	100 V	10 mA	8	1	2	3	5	SHV, R51.41	EH082001x106ooccrk	SLA, SLP, TC, 1CR, ID, IU
EHS F2 01x	100 V	10 mA	16	2	2	3	5	SHV, R51.43	EH162001x106ooccrk	SLA, SLP, TC, 1CR, ID, IU
EHS 82 05x	500 V	10 mA	8	4	2	5	5	SHV, R51.41	EH082005x106ooccrk	SLA, SLP, TC, 1CR, ID, IU
EHS F2 05x	500 V	10 mA	16	8	2	5	5	SHV, R51.43	EH162005x106ooccrk	SLA, SLP, TC, 1CR, ID, IU
EHS 82 10x	1 kV	8 mA	8	4	2	5	5	SHV, R51.41	EH082010x805ooccrk	SLA, SLP, TC, 1CR, ID, IU
EHS F2 10x	1 kV	8 mA	16	8	2	5	5	SHV, R51.43	EH162010x805ooccrk	SLA, SLP, TC, 1CR, ID, IU
EHS 82 20x	2 kV	4 mA	8	4	2	5	5	SHV, R51.41	EH082020x405ooccrk	SLA, SLP, TC, 1CR, ID, IU
EHS F2 20x	2 kV	4 mA	16	8	2	5	5	SHV, R51.43	EH162020x405ooccrk	SLA, SLP, TC, 1CR, ID, IU
EHS 82 30x	3 kV	3 mA	8	4	2	5	10	SHV, R51.41	EH082030x305ooccrk	SLA, SLP, TC, 1CR, ID, IU
EHS F2 30x	3 kV	3 mA	16	8	2	5	10	SHV, R51.43	EH162030x305ooccrk	SLA, SLP, TC, 1CR, ID, IU
EHS 82 40x	4 kV	2 mA	8	4	2	5	10	SHV	EH082040x205ooccrk	SLA, SLP, TC, 1CR, ID, IU
EHS F2 40x	4 kV	2 mA	16	8	2	5	10	SHV	EH162040x205ooccrk	SLA, SLP, TC, 1CR, ID, IU
EHS 82 60x	6 kV	1 mA	8	3	2	10	15	S08	EH082060x105ooccrk	SLA, SLP, TC, 1CR, ID, IU
EHS F2 60x	6 kV	1 mA	16	6	2	10	15	S08	EH162060x105ooccrk	SLA, SLP, TC, 1CR, ID, IU
EHS 42 80x	8 kV	1 mA	4	2.2	2	5	10	S08	EH042080x105ooccrk	SLA, SLP, 1CR, ID, IU
EHS 42 100x	10 kV	0.75 mA	4	2.2	2	5	20	S10	EH042100x754ooccrk	SLA, SLP, 1CR, ID, IU
EHS 42 150x	15 kV	0.5 mA	4	2.2	2	5	30	S20	EH042150x504ooccrk	SLA, SLP, 1CR, ID, IU
EHS 42 200x	20 kV	0.4 mA	4	2.2	2	7	30	S20	EH042200x404ooccrk	SLA, SLP, 1CR, ID, IU
Notes:										
replacement characters: o – options, c – connector, r – revision, k – customization, x – polarity (negative/positive/mix)										

Table 6: Technical data: Configurations of Common Floating Ground

CONFIGURATIONS EHS HIGH PRECISION SERIES										
Type	V _{nom}	I _{nom}	Ch	Max. I _{in} (A) at 24V	Ripple (mV _{pp}) >1kHz 10Hz-1kHz 0.1-10Hz			HV Connector Standard/opt.	Item Code	Options
Common Floating Ground L										
EHS 82 01x	100 V	100 μA	8	0.4	1	1	5	SHV, R51.41	EH082001x104oooccrk	SLA, SLP, TC, ID, IU
EHS F2 01x	100 V	100 μA	16	0.8	1	1	5	SHV, R51.43	EH162001x104oooccrk	SLA, SLP, TC, ID, IU
EHS 82 05x	500 V	100 μA	8	0.4	1	5	5	SHV, R51.41	EH082005x104oooccrk	SLA, SLP, TC, ID, IU
EHS F2 05x	500 V	100 μA	16	0.8	1	5	5	SHV, R51.43	EH162005x104oooccrk	SLA, SLP, TC, ID, IU
EHS 82 10x	1 kV	100 μA	8	0.4	1	5	5	SHV, R51.41	EH082010x104oooccrk	SLA, SLP, TC, ID, IU
EHS F2 10x	1 kV	100 μA	16	0.8	1	5	5	SHV, R51.43	EH162010x104oooccrk	SLA, SLP, TC, ID, IU
EHS 82 20x	2 kV	100 μA	8	0.4	1	5	5	SHV, R51.41	EH082020x104oooccrk	SLA, SLP, TC, ID, IU
EHS F2 20x	2 kV	100 μA	16	0.8	1	5	5	SHV, R51.43	EH162020x104oooccrk	SLA, SLP, TC, ID, IU
EHS 82 30x	3 kV	100 μA	8	0.4	1	5	10	SHV, R51.41	EH082030x104oooccrk	SLA, SLP, TC, ID, IU
EHS F2 30x	3 kV	100 μA	16	0.8	1	5	10	SHV, R51.43	EH162030x104oooccrk	SLA, SLP, TC, ID, IU
EHS 82 40x	4 kV	100 μA	8	0.5	1	5	10	SHV	EH082040x104oooccrk	SLA, SLP, TC, ID, IU
EHS F2 40x	4 kV	100 μA	16	1	1	5	10	SHV	EH162040x104oooccrk	SLA, SLP, TC, ID, IU
EHS 82 60x	6 kV	100 μA	8	0.5	1	5	10	S08	EH082060x104oooccrk	SLA, SLP, TC, ID, IU
EHS F2 60x	6 kV	100 μA	16	1	1	5	10	S08	EH162060x104oooccrk	SLA, SLP, TC, ID, IU
EHS 42 80x	8 kV	100 μA	4	0.5	1	5	10	S08	EH042080x104oooccrk	SLA, SLP, ID, IU
EHS 42 100x	10 kV	100 μA	4	0.5	1	5	20	S10	EH042100x104oooccrk	SLA, SLP, ID, IU
EHS 42 150x	15 kV	100 μA	4	0.8	1	5	30	S20	EH042150x104oooccrk	SLA, SLP, ID, IU
EHS 42 200x	20 kV	100 μA	4	1	1	5	30	S20	EH042200x104oooccrk	SLA, SLP, ID, IU

Notes:
replacement characters: o – options, c – connector, r – revision, k – customization, x – polarity (negative/positive/mix)

Table 7: Technical data: Configurations of Common Floating Ground L

CONFIGURATIONS EHS HIGH PRECISION SERIES										
Type	V _{nom}	I _{nom}	Ch	Max. I _{in} (A) at 24V	Ripple (mV _{pp}) >1kHz 10Hz-1kHz 0.1-10Hz			HV Connector Standard/opt.	Item Code	Options
Floating Ground										
EHS 84 01x	100 V	10 mA	8	1,5	2	3	5	SHV, R51.47	EH084001x106ooccrk	SLA, SLP, TC, 1CR, F02, F20, ID, IU
EHS F4 01x	100 V	10 mA	16	3	2	3	5	SHV, R51.48	EH164001x106ooccrk	SLA, SLP, TC, 1CR, F02, F20, ID, IU
EHS 84 05x	500 V	10 mA	8	4.5	2	5	5	SHV, R51.47	EH084005x106ooccrk	SLA, SLP, TC, 1CR, F02, F20, ID, IU
EHS F4 05x	500 V	10 mA	16	9	2	5	5	SHV, R51.48	EH164005x106ooccrk	SLA, SLP, TC, 1CR, F02, F20, ID, IU
EHS 84 10x	1 kV	8 mA	8	4.5	2	5	5	SHV, R51.47	EH084010x805ooccrk	SLA, SLP, TC, 1CR, F02, F20, ID, IU
EHS F4 10x	1 kV	8 mA	16	9	2	5	5	SHV, R51.48	EH164010x805ooccrk	SLA, SLP, TC, 1CR, F02, F20, ID, IU
EHS 84 20x	2 kV	4 mA	8	4.5	2	5	5	SHV, R51.47	EH084020x405ooccrk	SLA, SLP, TC, 1CR, F02, F20, ID, IU
EHS F4 20x	2 kV	4 mA	16	9	2	5	5	SHV, R51.48	EH164020x405ooccrk	SLA, SLP, TC, 1CR, F02, F20, ID, IU
EHS 84 30x	3 kV	3 mA	8	4.5	2	5	10	SHV, R51.47	EH084030x305ooccrk	SLA, SLP, TC, 1CR, F02, F20, ID, IU
EHS F4 30x	3 kV	3 mA	16	9	2	5	10	SHV, R51.48	EH164030x305ooccrk	SLA, SLP, TC, 1CR, F02, F20, ID, IU
EHS 84 40x	4 kV	2 mA	8	4.5	2	5	10	SHV	EH084040x205ooccrk	SLA, SLP, TC, 1CR, F02, F20, ID, IU
EHS F4 40x	4 kV	2 mA	16	9	2	5	10	SHV	EH164040x205ooccrk	SLA, SLP, TC, 1CR, F02, F20, ID, IU
EHS 84 60x	6 kV	1 mA	8	3.5	2	10	15	S08	EH084060x105ooccrk	SLA, SLP, TC, 1CR, F02, F20, ID, IU
EHS F4 60x	6 kV	1 mA	16	7	2	10	15	S08	EH164060x105ooccrk	SLA, SLP, TC, 1CR, F02, F20, ID, IU
EHS 44 80x	8 kV	1 mA	4	2.5	2	5	10	S08	EH044080x105ooccrk	SLA, SLP, 1CR, F02, F20, ID, IU
EHS 44 100x	10 kV	0.75 mA	4	2.5	2	5	20	S10	EH044100x754ooccrk	SLA, SLP, 1CR, F02, F20, ID, IU
EHS 44 150x	15 kV	0.5 mA	4	2.5	2	5	30	S20	EH044150x504ooccrk	SLA, SLP, 1CR, F02, F20, ID, IU
EHS 44 200x	20 kV	0.4 mA	4	2.5	2	7	30	S20	EH044200x404ooccrk	SLA, SLP, 1CR, F02, F20, ID, IU
Floating Ground L										
EHS 84 01x	100 V	100 µA	8	0.8	1	1	5	SHV, R51.47	EH084001x104ooccrk	SLA, SLP, TC, F02, F20, ID, IU
EHS F4 01x	100 V	100 µA	16	1.5	1	1	5	SHV, R51.48	EH164001x104ooccrk	SLA, SLP, TC, F02, F20, ID, IU
EHS 84 05x	500 V	100 µA	8	0.8	1	5	5	SHV, R51.47	EH084005x104ooccrk	SLA, SLP, TC, F02, F20, ID, IU
EHS F4 05x	500 V	100 µA	16	1.5	1	5	5	SHV, R51.48	EH164005x104ooccrk	SLA, SLP, TC, F02, F20, ID, IU
EHS 84 10x	1 kV	100 µA	8	0.8	1	5	5	SHV, R51.47	EH084010x104ooccrk	SLA, SLP, TC, F02, F20, ID, IU
EHS F4 10x	1 kV	100 µA	16	1.5	1	5	5	SHV, R51.48	EH164010x104ooccrk	SLA, SLP, TC, F02, F20, ID, IU
EHS 84 20x	2 kV	100 µA	8	0.8	1	5	5	SHV, R51.47	EH084020x104ooccrk	SLA, SLP, TC, F02, F20, ID, IU
EHS F4 20x	2 kV	100 µA	16	1.5	1	5	5	SHV, R51.48	EH164020x104ooccrk	SLA, SLP, TC, F02, F20, ID, IU
EHS 84 30x	3 kV	100 µA	8	0.8	1	5	10	SHV, R51.47	EH084030x104ooccrk	SLA, SLP, TC, F02, F20, ID, IU
EHS F4 30x	3 kV	100 µA	16	1.5	1	5	10	SHV, R51.48	EH164030x104ooccrk	SLA, SLP, TC, F02, F20, ID, IU
EHS 84 40x	4 kV	100 µA	8	1	1	5	10	SHV	EH084040x104ooccrk	SLA, SLP, TC, F02, F20, ID, IU
EHS F4 40x	4 kV	100 µA	16	2	1	5	10	SHV	EH164040x104ooccrk	SLA, SLP, TC, F02, F20, ID, IU
EHS 84 60x	6 kV	100 µA	8	1	1	5	10	S08	EH084060x104ooccrk	SLA, SLP, TC, F02, F20, ID, IU
EHS F4 60x	6 kV	100 µA	16	2	1	5	10	S08	EH164060x104ooccrk	SLA, SLP, TC, F02, F20, ID, IU
EHS 44 80x	8 kV	100 µA	4	0.8	1	5	10	S08	EH044080x104ooccrk	SLA, SLP, F02, F20, ID, IU
EHS 44 100x	10 kV	100 µA	4	0.8	1	5	10	S10	EH044100x104ooccrk	SLA, SLP, F02, F20, ID, IU
EHS 44 150x	15 kV	100 µA	4	1	1	5	10	S20	EH044150x104ooccrk	SLA, SLP, F02, F20, ID, IU
EHS 44 200x	20 kV	100 µA	4	2	1	5	10	S20	EH044200x104ooccrk	SLA, SLP, F02, F20, ID, IU
Notes: replacement characters: o – options, c – connector, r – revision, k – customization, x – polarity (negative/positive/mix)										

Table 8: Technical data: Configurations of Floating Ground and Floating Ground L

2.3 Options

OPTIONS	OPTION CODE	EXAMPLE	ITEM CODE HEX CODING
POLARITY	Positive: x = p , Negative x = n	EHS 82 05 p	
VERY LOW NOISE (only EHS CG Series) ⁽²⁾	VLN		010
SINGLE CHANNEL INHIBIT - down	ID		400
SINGLE CHANNEL INHIBIT - up	IU		800
NEGATED LOGIC INHIBIT ID, IU	N		80
VOLTAGE CORRECTION by TEMPERATURE ⁽²⁾	VCT		008
LOWER TEMPERATURE COEFFICIENT	TC	T10	004
ACTIVE SAFETY LOOP	SLA		001
INTERNALLY POWERED SAFETY LOOP	SLP		002
ONLY ONE CURRENT RANGE FOR HIGH PRECISION MODULES	1CR		020
200 V ISOLATION FOR FLOATING GND	F02		100
2,000 V ISOLATION FOR FLOATING GND	F20		200
LOWER OUTPUT CURRENT ⁽¹⁾	L ($I_{nom} = 100 \mu A$)		-
Notes: ⁽¹⁾ - Requires option „1CR“ ⁽²⁾ - only on request			

Table 9: Technical data: Options and order information

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. The physical address of the module, determined by the slot position in the crate, is also accessible via this connector. Modules and crate controllers with different settings of bit rate do not work on the same CAN-Line.

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Note: For proper operation the module must be configured with the correct CAN bitrate, which meets the configuration of the crate controller, the module will be used with. The delivery condition is shown on the modules typeplate (side plate of the module).

Typically newer iseq crate controllers (CC24, CC23, CC238) are delivered with 250kBits/s standard. Wiener M-POD Controller and older iseq hardware is set on 125 kBit/s standard bitrate.

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EHS modules with Common Floating Ground (CFG) will be delivered with a jumper, which connects the module-GND with the crate-GND. To operate in CFG configuration the jumper (CG-CFG) on the module back must be removed. (see: *Figure 1: Jumper configuration on back side*)



Figure 1: Jumper configuration on back side

3.2 Module status

The module status is displayed by two LEDs on the front panel

green LED „OK“ on	all channels have the status “OK”
green LED „OK“ off	<p>an error occurred: safety loop is possibly not closed or the power supplies are out of tolerance or the threshold of V_{max}, I_{max}, I_{set} or I_{trip} (see function descriptions for details) has been exceeded</p> <p>LED will be switched off until the error has been fixed and the corresponding status bit has been erased via software interface.</p>
yellow LED on	one or more channels voltage on output is more than 56V
green LED blinking	Firmware update is stored into flash, do not switch of power supply, crate etc.

Table 10: Module status information

3.3 Hardware Limit

The maximum output voltage for all channels (hardware voltage limit) is defined by the position of the corresponding potentiometer V_{max} . The maximum output current for all channels (hardware current limit) is defined by the position of the corresponding potentiometer I_{max} . The highest 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 $102 \pm 2\% \cdot V_{nom}$ and $102 \pm 2\% \cdot I_{nom}$. The output voltage and current are limited to the specified value. If a limit is reached or exceeded in any channel the green LED “OK” at the front panel turns off.

3.4 Safety Loop

3.4.1 Safety Current Loop

A safety current loop can be implemented through the safety loop socket (SL) on the front panel and, if available, on the modules with 8, 16, 24 and 32 channels at the REDEL-connector between the SL contacts (pin 22 and pin 30). When the safety loop is active, high voltage can only be generated in a channel if the safety loop is completely closed (SL plug and in the case of Redel plug, pin22 and pin30 on the plug, in the cable or on the detector supply are bridged) 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 will be shut off without ramp, the corresponding bit in “ModuleStatus” is canceled and in “ModuleEventStatus” is set (see chapter 11 Appendix, “CAN_EDCP_Programmers-Guide.pdf”). 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. By factory setup the safety loop is not active (the corresponding bits are always set). The loop can be activated by removing the jumper “SL-disable” on the rear side of the module (Figure 1: Jumper configuration on back side).

3.4.2 Safety Return (SRTN)

In the case of the modules with 48 channels, safety current loop cannot be conducted over the Redel-connector because of the limited pin number. In order to only allow HV generation when the Redel plug is inserted, Pin26 of the Redel plug is used as a safety contact. Pin 26 must be connected to the RTN pins (Pin22 or Pin30) on the connector, in the cable or on the detector supply. If this connection is missing, high voltage generation is prohibited. If this connection is opened during operation, the output voltages are switched off without a ramp.

For the 48 channel modules the safety current loop is independently from the SRTN contact only to be supplied through the SL-socket. Deactivating the safety current loop by placing the “SL-disable” jumper (Figure 1: Jumper configuration on back side) does not deactivates the SRTN-mechanism.

3.5 Delayed Trip

3.5.1 Operating principle

The function "Delayed Trip" provides a user-configurable, time-delayed response to an increased output current (I_{out}) higher than the set current (I_{set}). The response to this kind of event can be, for example, to ramp down the channel with the programmed ramp. A detailed description for the configuration can be found in the manual "CAN_EDCP_Programmers-Guide.pdf", see chapter 11 Appendix.

By a programmable timeout with one millisecond resolution, the trip can be delayed up to four seconds. During this time, the output current is limited to the value of I_{set} (constant current mode).

The hardware regulation signals, constant voltage (CV) or constant current (CC), are sampled every millisecond by the microprocessor. Once the constant current mode is active, the programmed timeout counter is decremented. If the HV channel returns to constant voltage mode before timeout (i.e. $I_{out} < I_{set}$), the counter will be reset. So this process can be restarted if the current rises again.

3.5.2 Limitations

For some older types of HV modules with single-channel floating GND the current set value cannot be set exactly to zero (e.g., due to an uncompensatable offset). For these modules, the limitation of the output current to very low values ($< 0.5 \% I_{nom}$) is not guaranteed.

For all recent EHS models the value of the set current can be continuously adjusted with the type-specific resolution down to zero.

To guarantee a sufficient resolution for the current set values, a nominal current adequate to the application should be selected. iseq offers HV modules with nominal currents reduced to 100 μA or 10 μA in all voltage classes. These are designated e.g. for semiconductor detectors, which only require a few microampere operating current.

3.5.3 Modules with two current measurement ranges

High Precision HV modules with two current ranges are a particular case. In these HV modules the high current output is combined with a picoampere resolution in the low current measurement range. The range switching is done by the microprocessor depending on I_{meas} :

$$\begin{aligned} \text{High measuring range:} & \quad I_{nom-low} < I_{meas} < I_{nom} \\ \text{Low measuring range:} & \quad 0 < I_{meas} < I_{nom-low} \end{aligned}$$

The typical value for $I_{nom-low}$ is 20 μA .

As long as a set current in the high measuring range is used, everything is working as described above. If a set current in low measuring range is specified, the current limitation is set to 120 % of the low measuring range.

Example: $I_{nom-low} = 20 \mu\text{A} \rightarrow$ current limitation is set to 24 μA if $I_{set} = 10 \mu\text{A}$

Now the channel operates in the low measuring range only. A software comparison of set current I_{set} and measured current I_{meas} is performed in addition to the described hardware CC and CV signals sampling.

With this principle, two requirements are met:

- the output current will not exceed 24 microamps even during fast changes and
- the delayed trip function is extended into the region of very small currents (picoampere) for these HV modules.

For the software comparison, a delay between 80 milliseconds and 1 second must be expected. This depends on the modules ADC (Analog-to-digital-converter) configuration.

This time can be adjusted by changing the ADC sample rate to meet the requirements of the application. Higher ADC sample rates lead to shorter delays but also reduce the resolution.

If the *Delayed Trip* function is activated the voltage ramp should be limited to 1 % of V_{nom} before. Higher values could trigger a trip by internal charge balancing during a ramp, even though the output current does not exceed the set value I_{set} .

If the connected load contains capacities or if I_{set} is very small, it might be necessary to further reduce the ramp speed. Alternatively, the *Delayed Trip* can be activated only after the completion of the ramp.

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An activated KillEnable feature disables the Delayed Trip function.

An active *KillEnable* function disables the *Delayed Trip* function. If *KillEnable* is active and a trip occurs, the channel is shut down without ramp at the fastest hardware response time (smaller than 1 ms). However, the actual discharge time strongly depends on the connected load.

4 Options

4.1 Single Channel Inhibit (IU, ID, NIU, NID)

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INHIBIT is an external signal, that switches off the high voltage for the device or a specific channel.

Optionally it is possible to equip modules with an *INHIBIT* for each channel via a Sub-D connector (Figure 13) or LEMO-connector (Figure 14). The assignment of the channels is described in detail in the appendix, see chapter 7 Connectors assignments and 8 PIN assignments.

The INHIBIT signals are TTL-level, the signal logic and default states can be configured. The following settings are possible:

Option – IU (default)

INHIBIT signal logic: LOW-active (LOW → HV-generation stopped)
 default state: HIGH (internal pull-up resistor applied)
 open INHIBIT signal input: HV enabled

Option – ID

INHIBIT signal logic: LOW-active (LOW → HV-generation stopped)
 default state: LOW (internal pull-down resistor applied)
 open INHIBIT signal input: HV disabled

Option – NIU

INHIBIT signal logic: HIGH-active (HIGH → HV-generation stopped)
 default state: HIGH (internal pull-up resistor applied)
 open INHIBIT signal input: HV disabled

Option – NID

INHIBIT signal logic: HIGH-active (HIGH → HV-generation stopped)
 default state: LOW (internal pull-down resistor applied)
 open INHIBIT signal input: HV enabled

The INHIBIT signal must be applied for at least 100 ms to guarantee a detection. If an Inhibit signal is detected, the channel status bit 'Is External Inhibit' and the channel event status bit 'Event External Inhibit' are set. One of the following reactions to this signal can be programmed, see chapter "External channel inhibit" in the "CAN_EDCP_Programmers-Guide.pdf":

- No Action (default)
- Turn off the channel with ramp
- Shut down the channel without ramp
- Shut down all channels without ramp

When the INHIBIT is no longer active, the Inhibit flag must be reset before the voltage can be switched on again.

4.2 SLA – Active safety loop

Actively opens the Safety loop in case of a trip or a delayed trip. This option allows to shut down other modules and devices by interrupting the SL when a trip is detected.

4.3 SLP – Internally powered safety loop

Internal current source for the Safety Loop (no galvanic isolation of the SL and the crate GND).

4.4 1CR – One current measurement range only (HP series)

Only one current measurement range for High Precision Modules.

4.5 F02 – High floating voltage

200 V isolation for Modules with Floating Ground (FG).

With option “F02” the floating voltage is internally not limited. The user is responsible to limit potential differences between individual channel – GNDs and Crate – GND. Exceeding the isolation voltage can damage the module.

4.6 F20 – Very high floating voltage

2.000 V isolation for Modules with Floating Ground (FG).

With option “F20” the floating voltage is internally not limited. The user is responsible to limit potential differences between individual channel – GNDs and Crate – GND. Exceeding the isolation voltage can damage the module.

4.7 TC – Lower temperature coefficient

Improved temperature coefficient of 10ppm/K (T10). This is only for 8 channels common floating ground modules available.

4.8 VLN

Reduced ripple see chapter 2 Technical data.

4.9 L – Lower output current (HP only)

The output current is limited to a lower value, e.g. 100 μ A. With this option only one current measurement range available.

5 Front panel versions

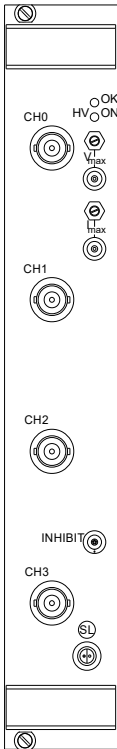
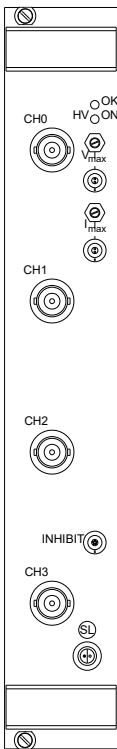
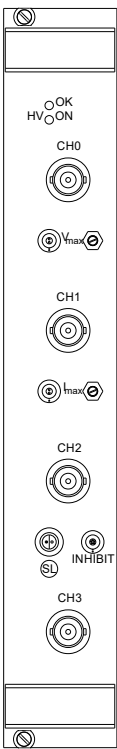
FRONT PANELS				
Channels	4	4	4	
Floating	FG / CFG	FG / CFG	FG / CFG	
HV Connector	SHV	S10	S20	
Options	INHIBIT	INHIBIT	INHIBIT	
Figure	 <p>Diagram of a 4-channel front panel with SHV connector. It features four channels (CH0, CH1, CH2, CH3) and an INHIBIT terminal. Each channel has a main output terminal and a smaller terminal labeled V_{max}. The top section includes HV ON and OK indicators.</p>	 <p>Diagram of a 4-channel front panel with S10 connector. It features four channels (CH0, CH1, CH2, CH3) and an INHIBIT terminal. Each channel has a main output terminal and a smaller terminal labeled V_{max}. The top section includes HV ON and OK indicators.</p>	 <p>Diagram of a 4-channel front panel with S20 connector. It features four channels (CH0, CH1, CH2, CH3) and an INHIBIT terminal. Each channel has a main output terminal and a smaller terminal labeled V_{max}. The top section includes HV ON and OK indicators.</p>	
<p>Notes:</p> <p>CFG: Common Floating Ground FG: Floating Ground CG: Common Ground</p>				

Table 11: front view 4ch modules

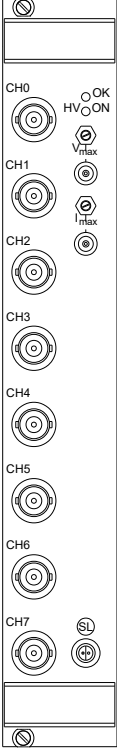
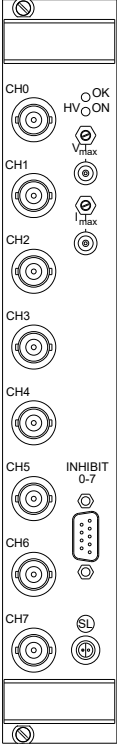
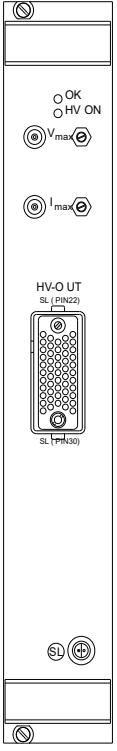
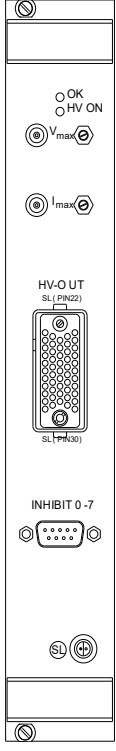
FRONT PANELS				
Channels	8	8	8	8
Floating	FG / CFG	FG / CFG	FG / CFG	FG / CFG
HV Connector	SHV	SHV	R51	R51
Options	-	INHIBIT	-	INHIBIT
Figure				
Notes:	CFG: Common Floating Ground FG: Floating Ground CG: Common Ground			

Table 12: front view 8ch modules

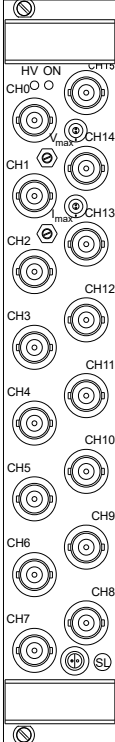
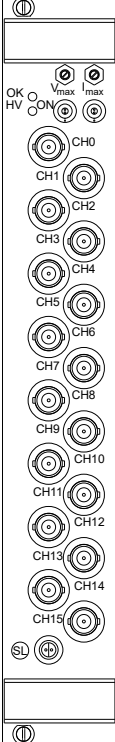
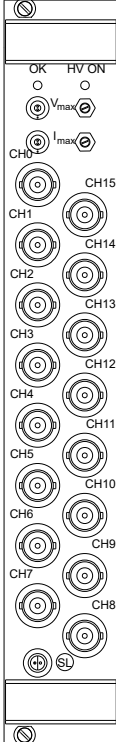
FRONT PANELS				
Channels	16	16	16	
Floating	FG / CFG	CG	FLEX	
HV Connector	SHV	SHV	SHV	
Options	-	-	-	
Figure				
Notes:	CFG: Common Floating Ground FG: Floating Ground CG: Common Ground			

Table 13: front view 16ch modules

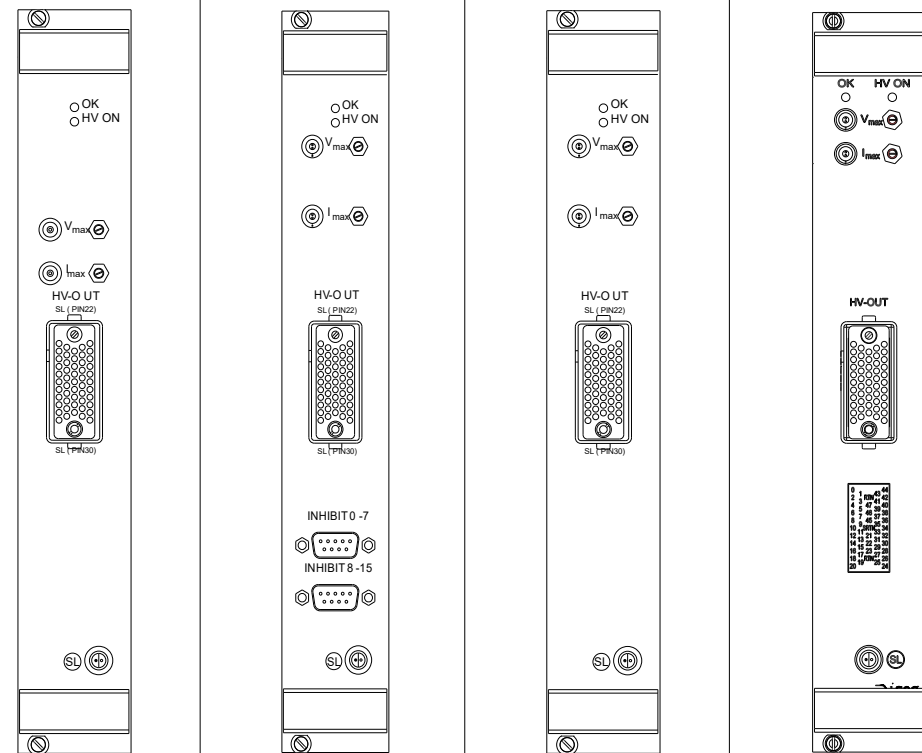
FRONT PANELS				
Channels	16 / 32	16	16 / 48	16 / 24 / 48
Floating	CG	CFG	CFG / FG	FLEX
HV Connector	R51	R51	R51	R51
Options	-	INHIBIT	-	-
Figure				
<p>Notes:</p> <p>CFG: Common Floating Ground FG: Floating Ground CG: Common Ground</p>				

Table 14: front view 16/24/48 ch modules

6 Dimensional Drawings

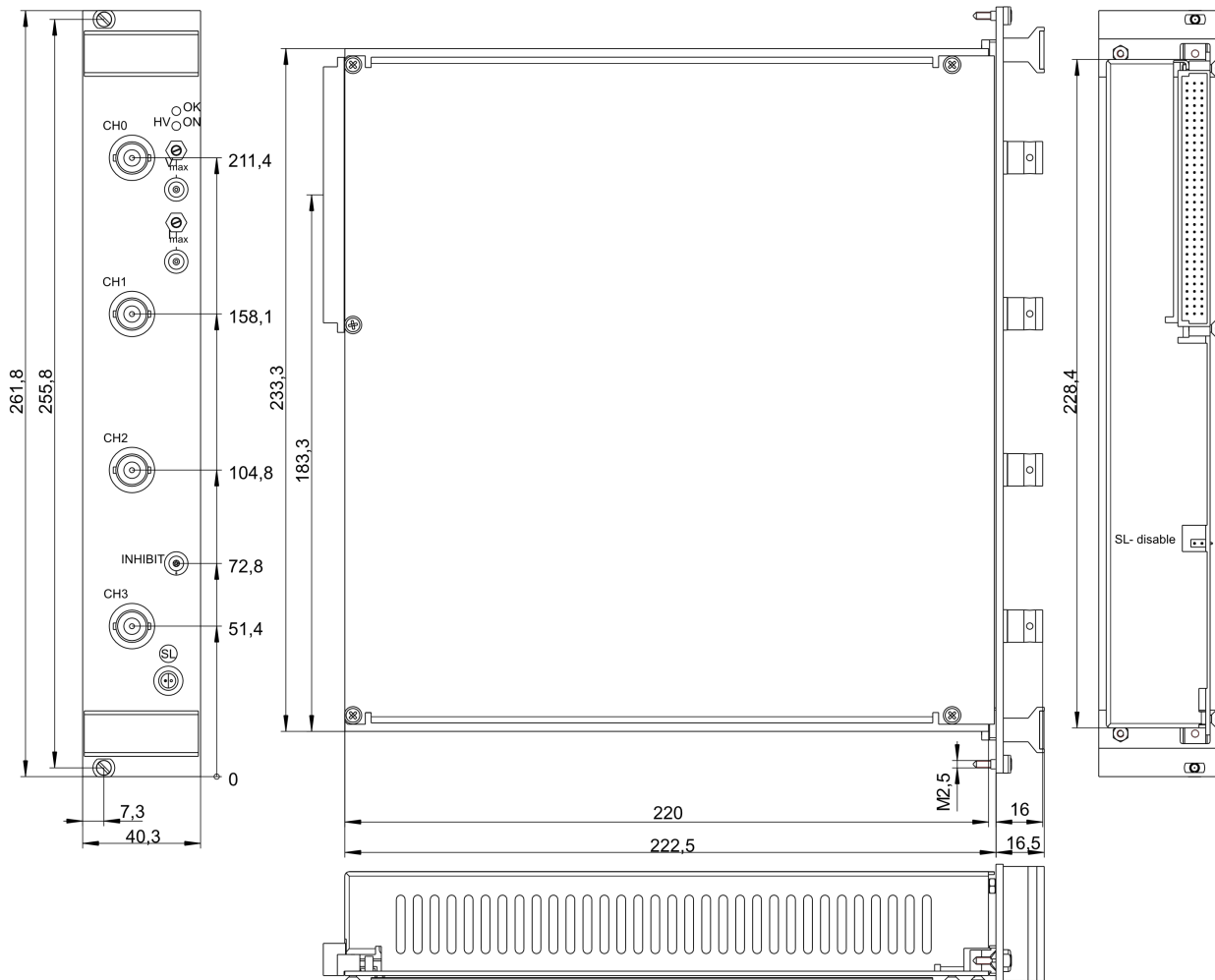


Figure 2: 4 channels with SHV in Floating Ground / Common Floating Ground

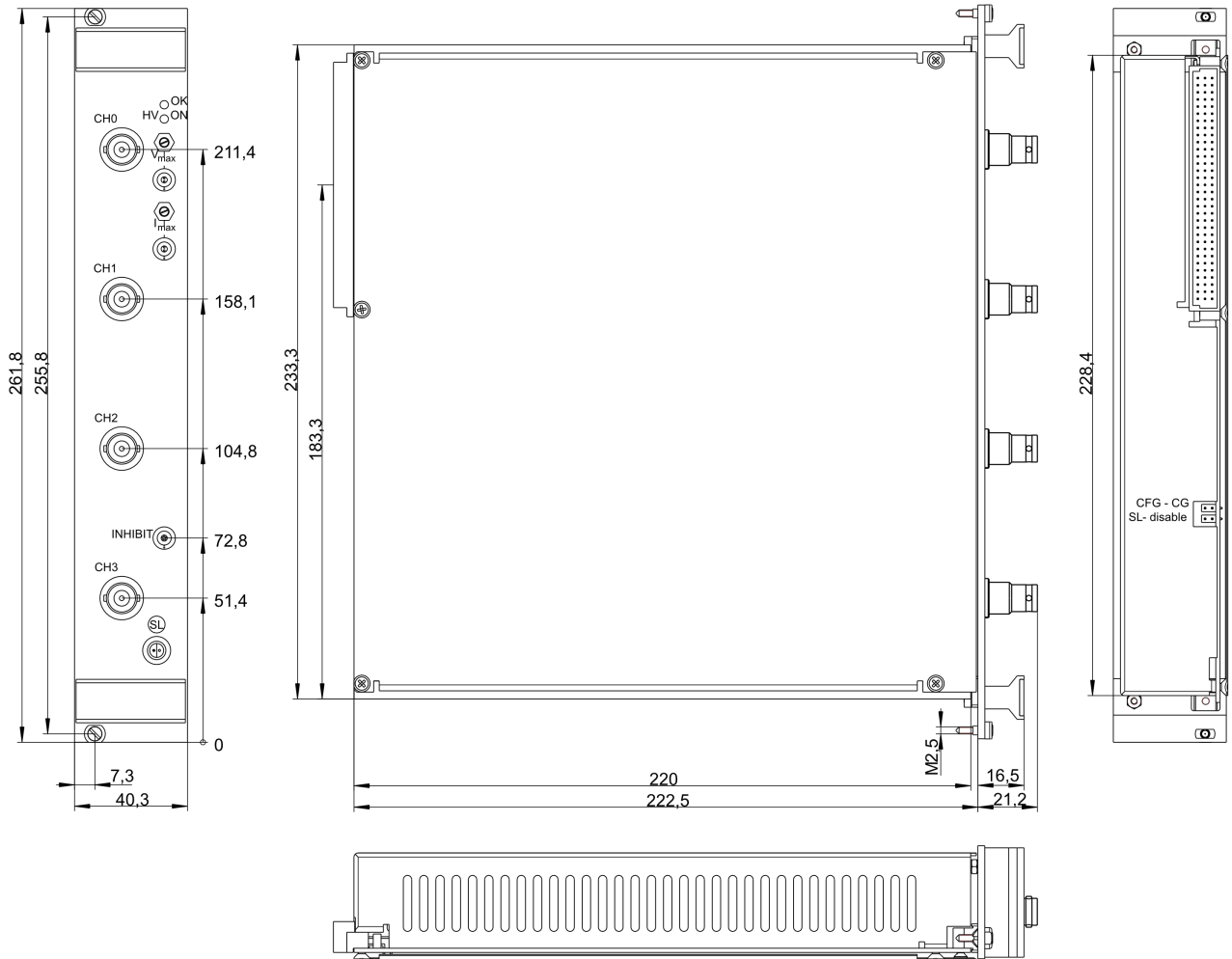


Figure 3: 4 channels with S10 in Floating Ground or Common Floating Ground

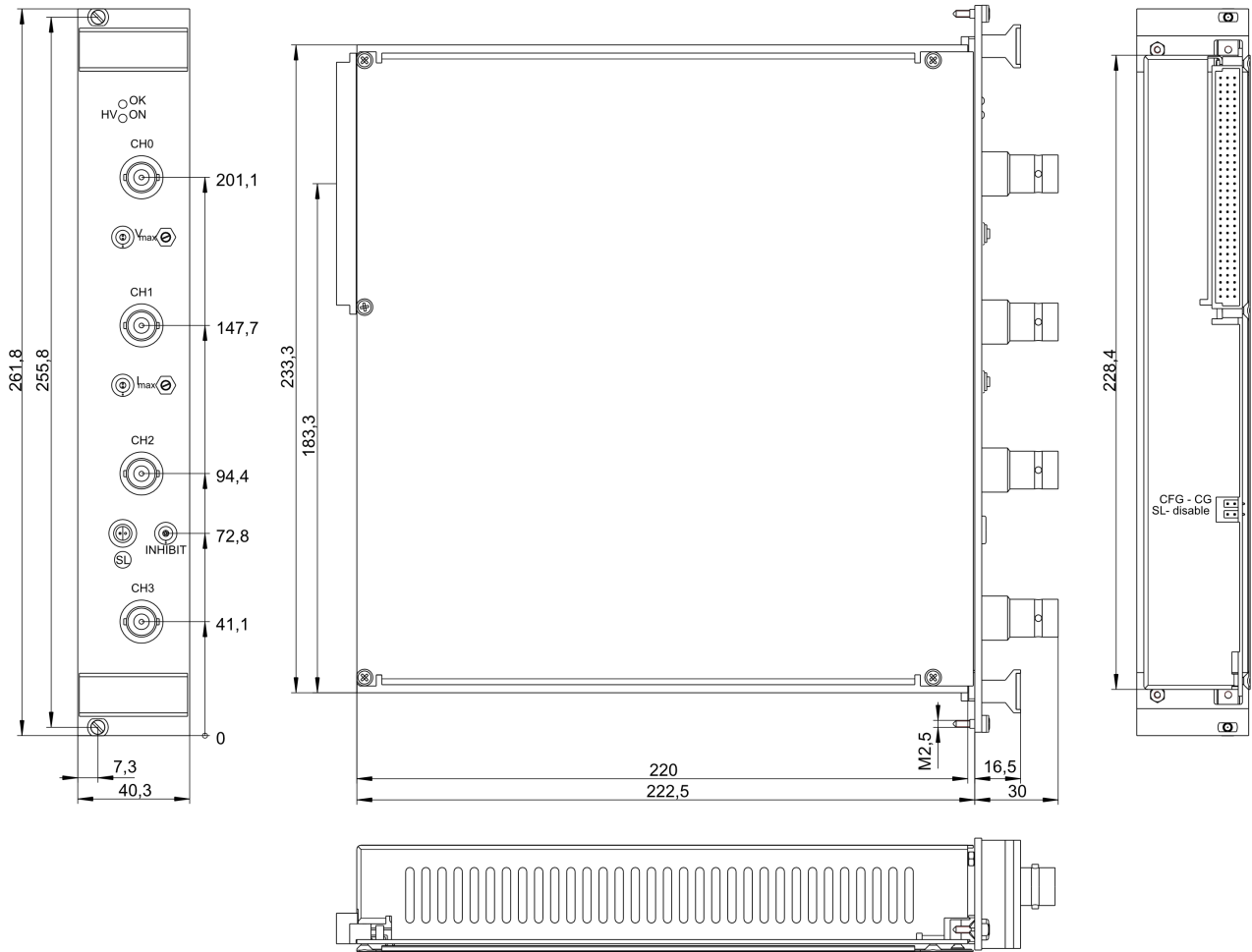


Figure 4: 4 channels with S20 in Floating Ground or Common Floating Ground

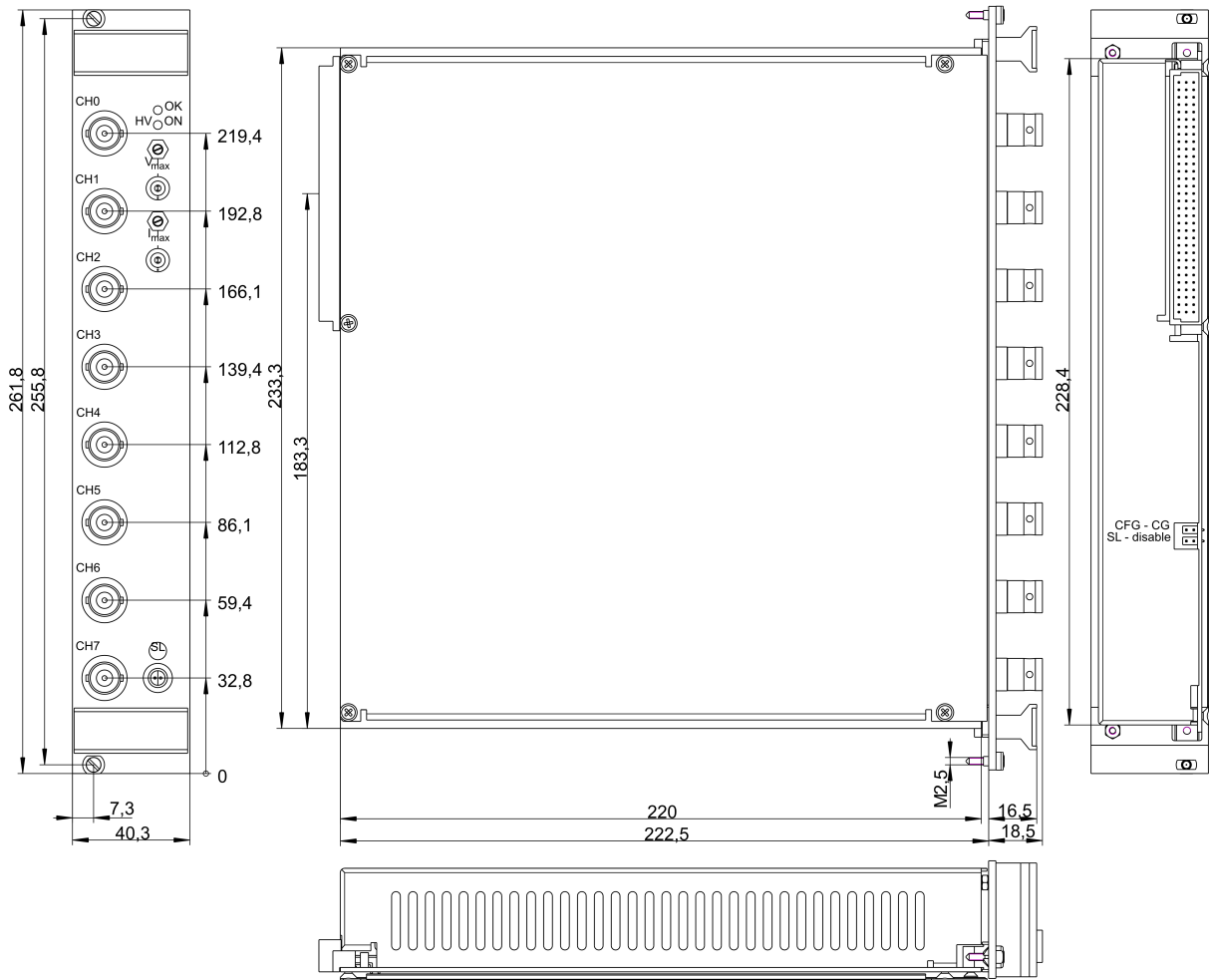


Figure 5: 8 channels with SHV in Floating Ground or Common Floating Ground

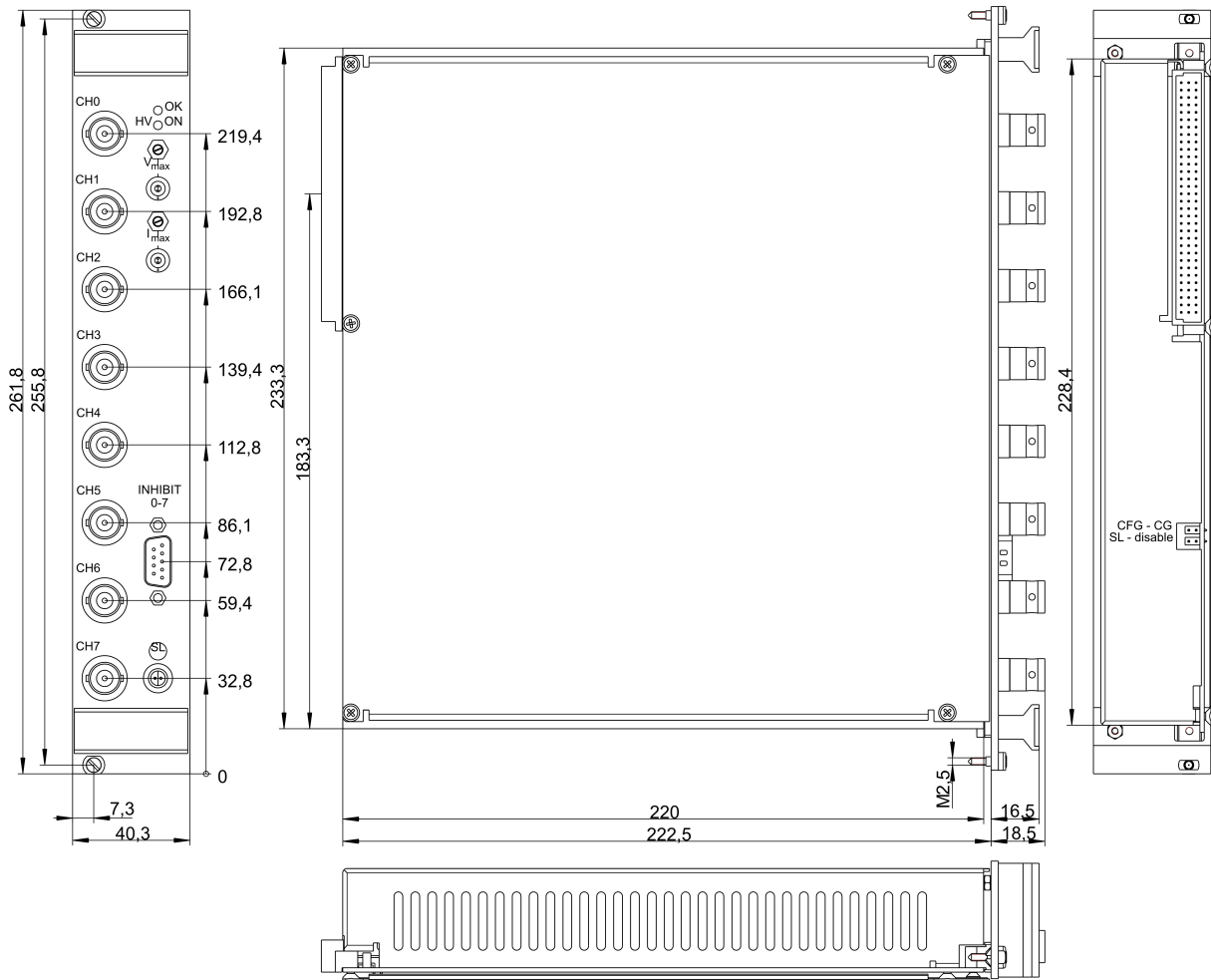


Figure 6: 8 channels with SHV in Floating Ground or Common Floating Ground and Inhibit

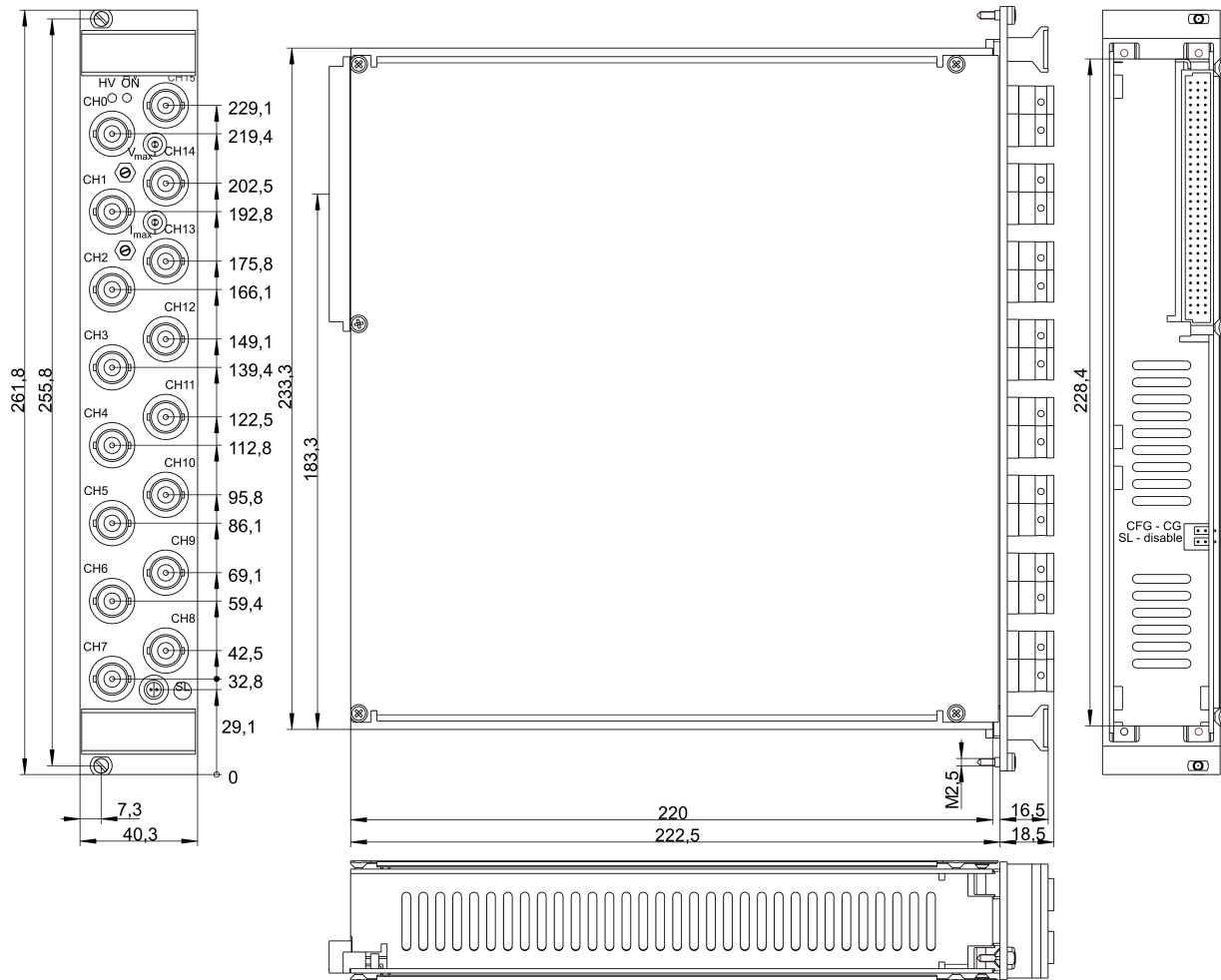


Figure 7: 16 channels with SHV in Common Ground

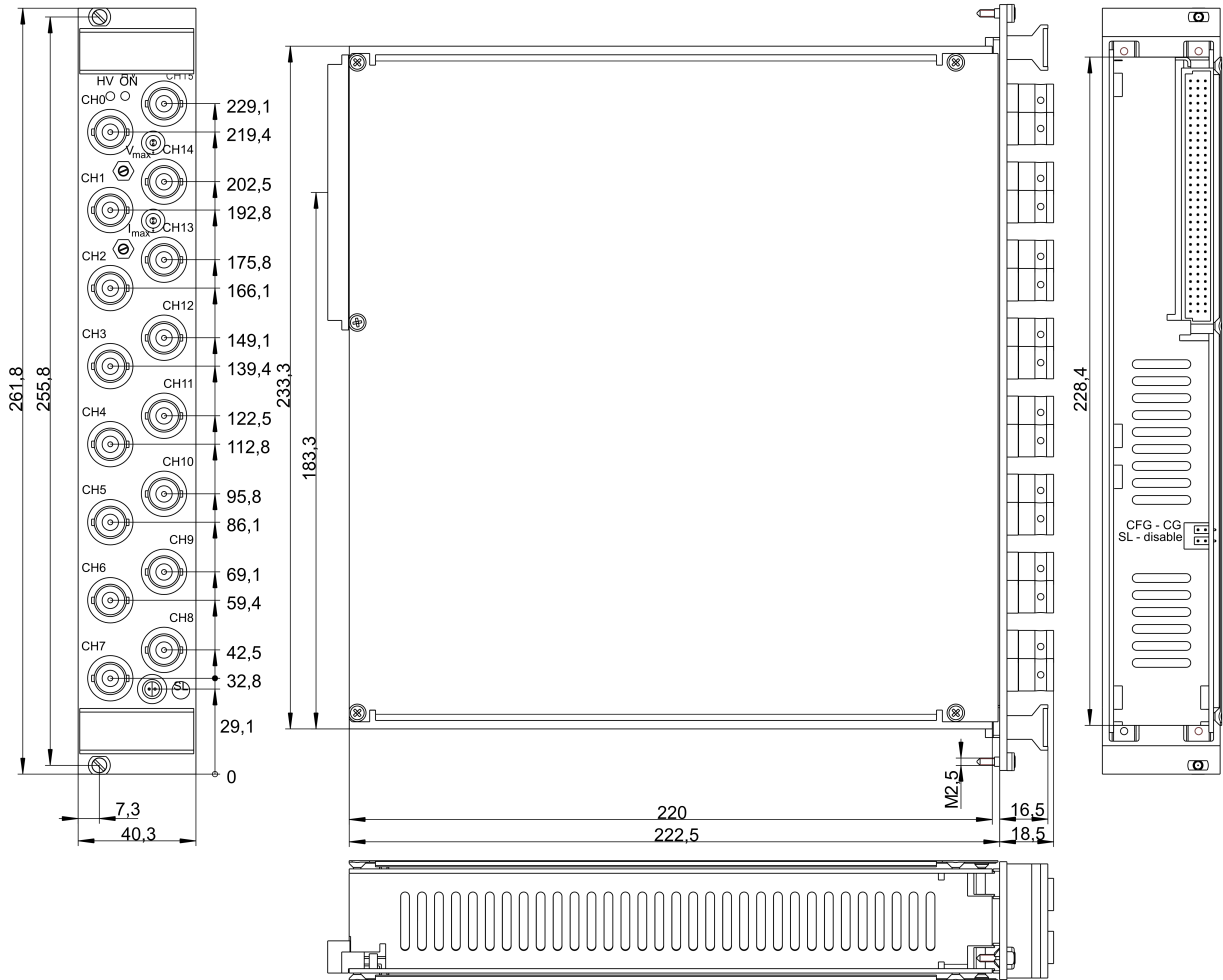


Figure 8: 16 channels in Floating Ground or Common Floating Ground with SHV

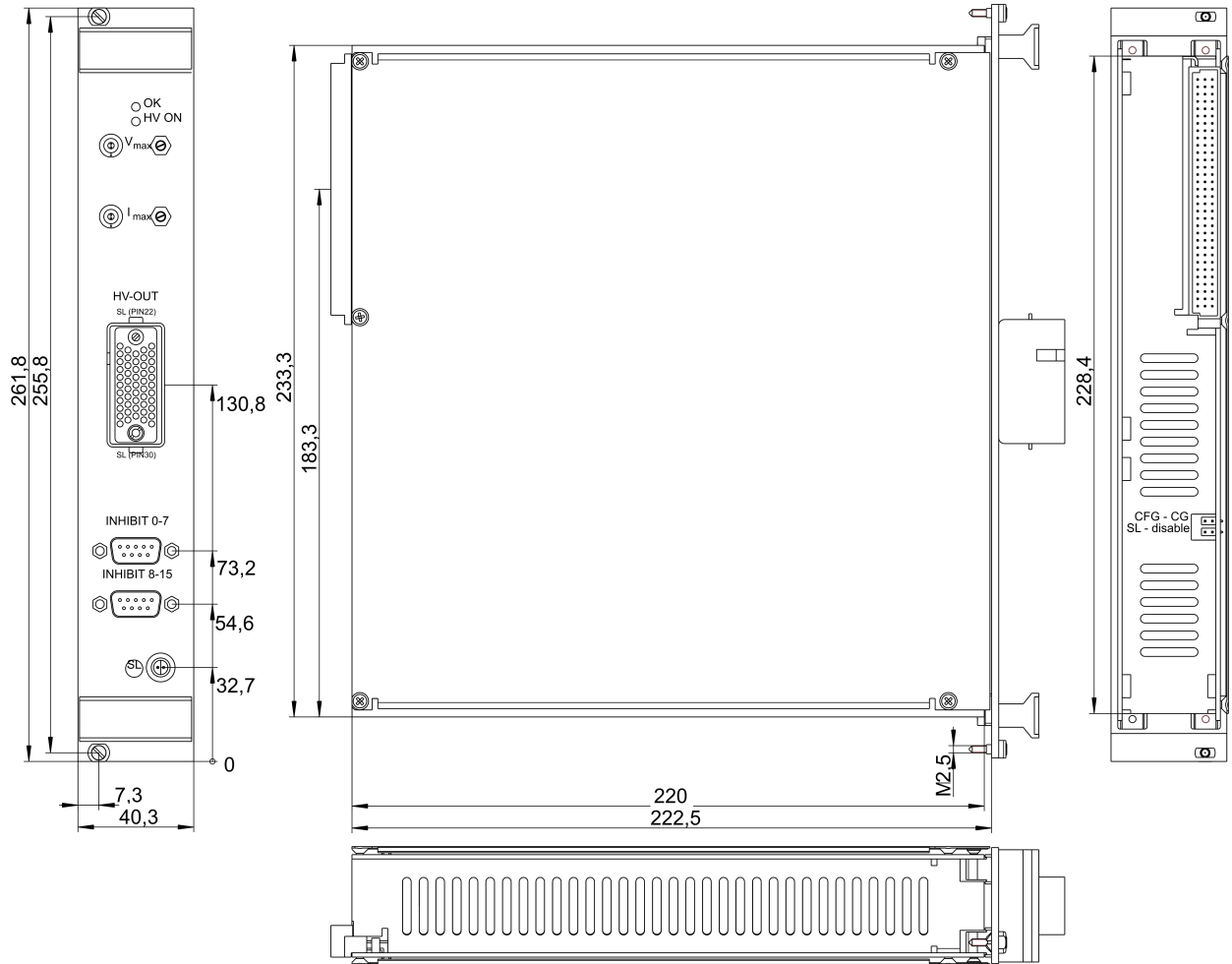


Figure 9: 16 channels in Common Floating Ground with Redel and Inhibit

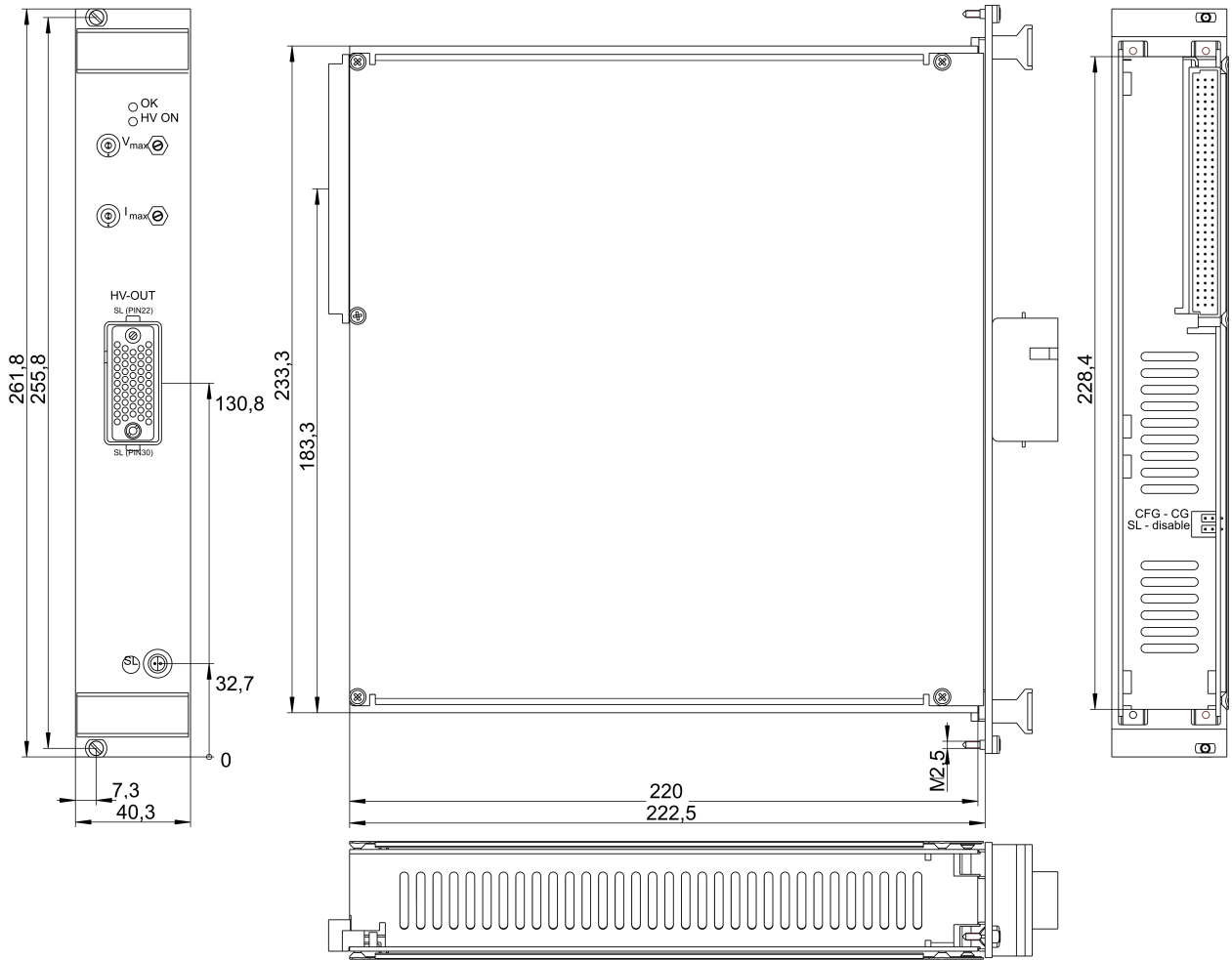


Figure 10: 8, 16, 48 channels in Floating Ground or Common Floating Ground with Redel

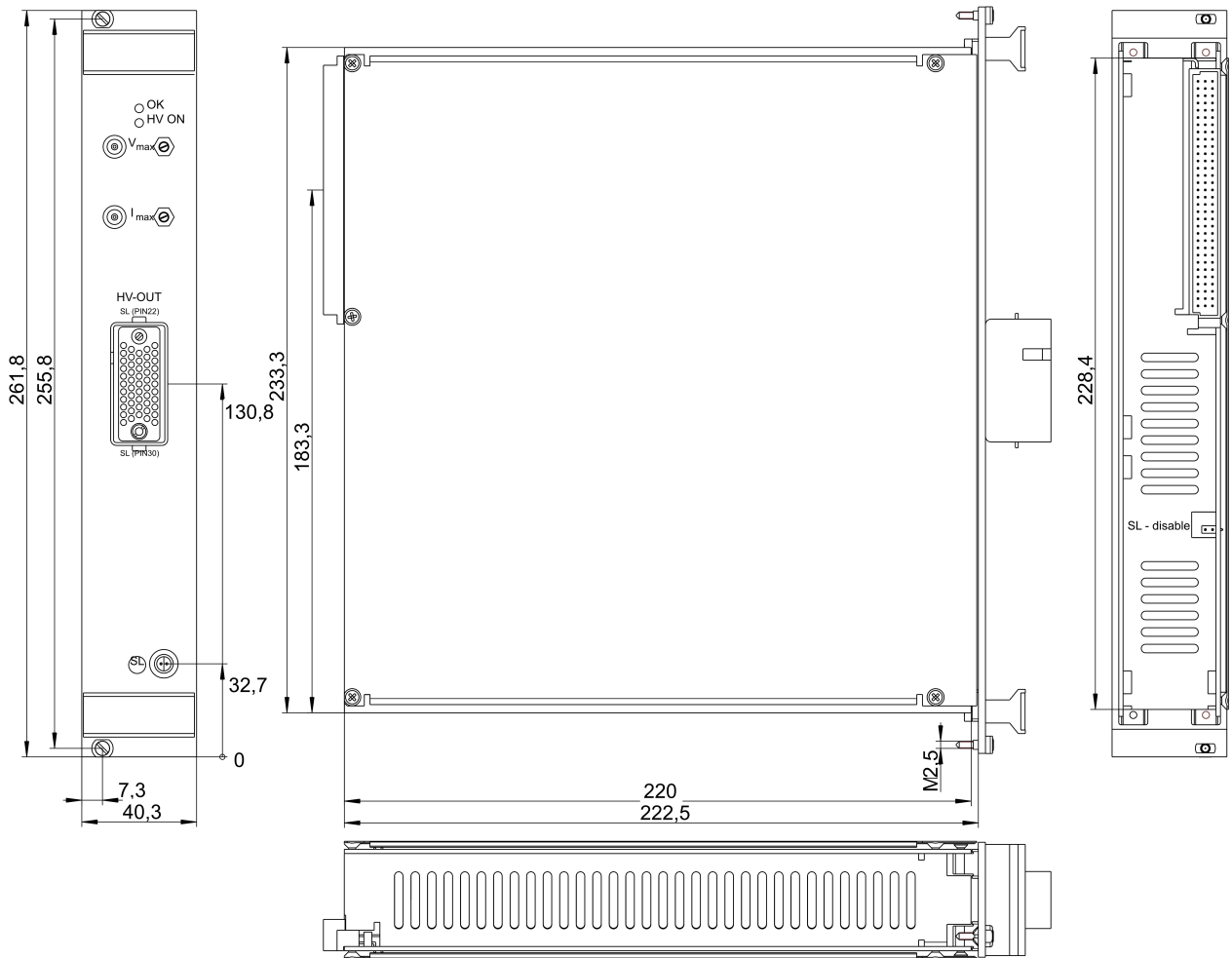


Figure 11: 16 , 32 channels in Common Ground with Redel

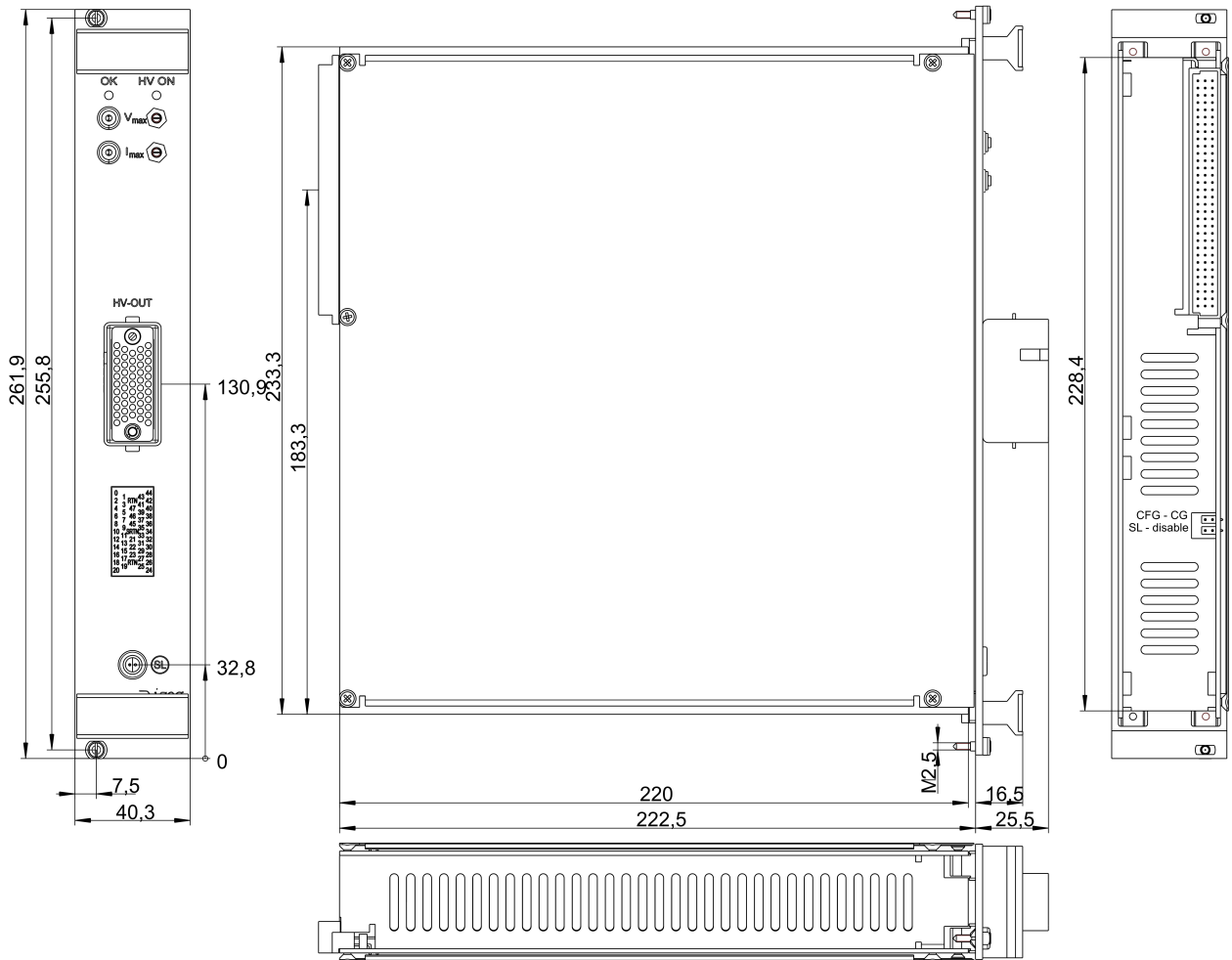
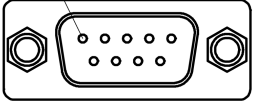
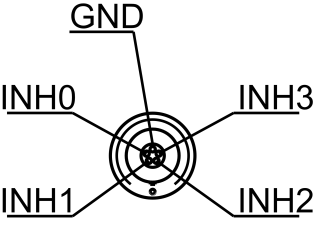


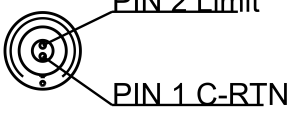



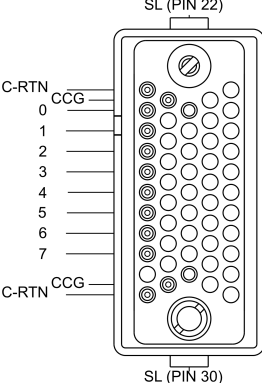
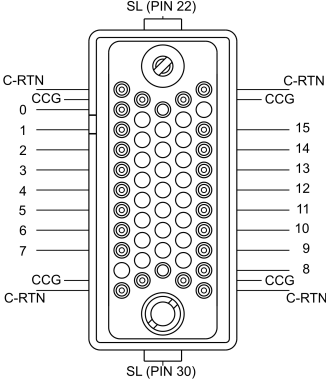
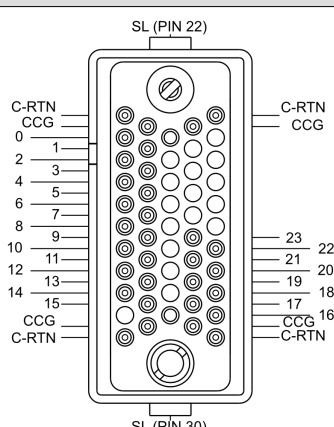
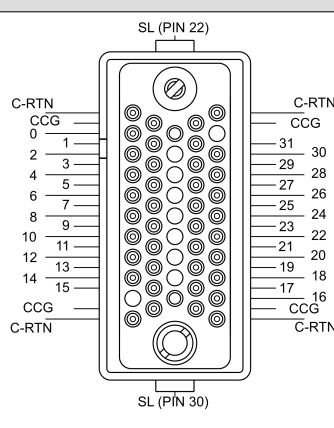
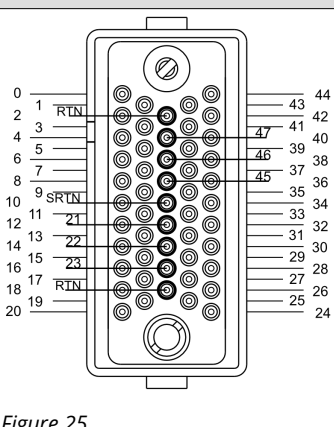


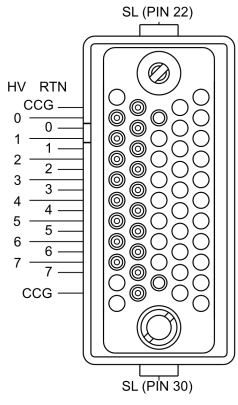
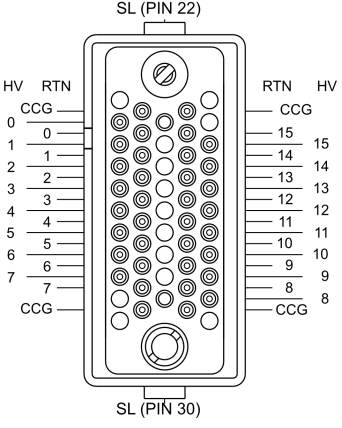
Figure 12: 16, 24, 48 channels in FLEX with Redel

7 Connectors assignments

CONNECTORS – POWER SIDE		PART NUMBERS (manufacturer code / iseg accessory parts item code)	
INHIBIT D-SUB9 – male		CABLE SIDE	
 Figure 13	connector D SUD9 Female, (DIN 41652) manufacturer various manufacturer iseg part number		
INHIBIT socket 5pol		CABLE SIDE	
 Figure 14	part number FGG.00.305.CLAD35 manufacturer LEMO Elektronik GmbH iseg part number Z592723		
SAFETY LOOP		CABLE SIDE	
 Figure 15	part number FFA.0S.302.CLAC manufacturer LEMO Elektronik GmbH iseg part number Z592312		
LIMIT monitor socket 1pol CG/FG		CABLE SIDE	
 Figure 16	part number FFA.00.250.CTAC31 manufacturer LEMO Elektronik GmbH iseg part number Z200793		
LIMIT monitor socket 2pol CFG		CABLE SIDE	
 Figure 17	part number FGG.00.302.CLAD30 manufacturer LEMO Elektronik GmbH iseg part number Z201466		
SHV		CABLE SIDE	
 Figure 18	part number R317.005.000 manufacturer Radiall iseg part number Z592474		

CONNECTORS – POWER SIDE		PART NUMBERS (manufacturer code / iseg accessory parts item code)	
S10		CABLE SIDE	
 <p>Figure 19</p>	part number	1065-1QD	
	manufacturer	Kings Electronics	
	iseg part number	Z592512	
S20		CABLE SIDE	
 <p>Figure 20</p>	part number	1765-1	
	manufacturer	Kings Electronics	
	iseg part number	Z592668	
R51.41 Redel		CABLE SIDE	
 <p>Figure 21</p>	connector	SAG.H51.LLZBG	iseg part number Z200325
	Straight plug with key and cable collet	ERA.05.403.ZLL1	Z592263
	Connector contacts (female)	EGG.3B.665.ZZM	Z592262
	Contacts Safety Loop (female)	LEMO Elektronik GmbH	
	manufacturer		
	Notes:		
	SL: Safty Loop	C-RTN: Common Return	CCG: Common Crate Ground
R51.43 Redel		CABLE SIDE	
 <p>Figure 22</p>	connector	SAG.H51.LLZBG	iseg part number Z200325
	Straight plug with key and cable collet	ERA.05.403.ZLL1	Z592263
	Connector contacts (female)	EGG.3B.665.ZZM	Z592262
	Contacts Safety Loop (female)	LEMO Elektronik GmbH	
	manufacturer		
	Notes:		
	SL: Safty Loop	C-RTN: Common Return	CCG: Common Crate Ground

CONNECTORS – POWER SIDE		PART NUMBERS (manufacturer code / iseg accessory parts item code)	
R51.44	Redel	CABLE SIDE	
 <p>Figure 23</p>		<p>connector iseg part number</p> <p>Straight plug with key and cable collet SAG.H51.LLZBG Z200325</p> <p>Connector contacts (female) ERA.05.403.ZLL1 Z592263</p> <p>Contacts Safety Loop (female) EGG.3B.665.ZZM Z592262</p> <p>manufacturer LEMO Elektronik GmbH</p> <p>Notes: SL: Safty Loop CCG: Common Crate Ground C-RTN: Common Return</p>	
R51.45	Redel	CABLE SIDE	
 <p>Figure 24</p>		<p>connector iseg part number</p> <p>Straight plug with key and cable collet SAG.H51.LLZBG Z200325</p> <p>Connector contacts (female) ERA.05.403.ZLL1 Z592263</p> <p>Contacts Safety Loop (female) EGG.3B.665.ZZM Z592262</p> <p>manufacturer LEMO Elektronik GmbH</p> <p>Notes: SL: Safty Loop CCG: Common Crate Ground C-RTN: Common Return</p>	
R51.46	Redel	CABLE SIDE	
 <p>Figure 25</p>		<p>connector iseg part number</p> <p>Straight plug with key and cable collet SAG.H51.LLZBG Z200325</p> <p>Connector contacts (female) ERA.05.403.ZLL1 Z592263</p> <p>Contacts Safety Loop (female) EGG.3B.665.ZZM Z592262</p> <p>manufacturer LEMO Elektronik GmbH</p> <p>Notes: RTN: Return SRTN: Safety Return PIN 21, 22, 23, 45, 46, 47, RTN, SRTN middle row, marked</p>	

CONNECTORS – POWER SIDE		PART NUMBERS (manufacturer code / iseg accessory parts item code)	
R51.47	Redel	CABLE SIDE	
 <p>Figure 26</p>	<p>connector</p> <p>Straight plug with key and cable collet</p> <p>Connector contacts (female)</p> <p>Contacts Safety Loop (female)</p> <p>manufacturer</p> <p>Notes:</p> <p>RTN: Return</p>	<p>iseg part number</p> <p>Z200325</p> <p>Z592263</p> <p>Z592262</p> <p>LEMO Elektronik GmbH</p> <p>CCG: Common Crate Ground</p>	
R51.48	Redel	CABLE SIDE	
 <p>Figure 27</p>	<p>connector</p> <p>Straight plug with key and cable collet</p> <p>Connector contacts (female)</p> <p>Contacts Safety Loop (female)</p> <p>manufacturer</p> <p>Notes:</p> <p>RTN: Return</p>	<p>iseg part number</p> <p>Z200325</p> <p>Z592263</p> <p>Z592262</p> <p>LEMO Elektronik GmbH</p> <p>CCG: Common Crate Ground</p>	

8 PIN assignments

8.1 INHIBIT – D-SUB9

PIN	INHIBIT 1	INHIBIT 2
1	CHANNEL 0	CHANNEL 8
2	CHANNEL 1	CHANNEL 9
3	CHANNEL 2	CHANNEL 10
4	CHANNEL 3	CHANNEL 11
5	CHANNEL 4	CHANNEL 12
6	CHANNEL 5	CHANNEL 13
7	CHANNEL 6	CHANNEL 14
8	CHANNEL 7	CHANNEL 15
9	GND	GND

8.2 INHIBIT – socket 5pol

PIN	NAME	DESCRIPTION
1	GND	Ground
2	Inhibit 0	Inhibit channel 0
2	Inhibit 1	Inhibit channel 1
3	Inhibit 2	Inhibit channel 2
4	Inhibit 3	Inhibit channel 3

8.3 Safety Loop socket

PIN	NAME	DESCRIPTION
1	Safety loop	Safety loop
2	Safety loop	Safety loop

8.4 Limit monitor – socket 1pol

PIN	NAME	DESCRIPTION
1	Limit	Limit (I_{max} or V_{max})
2	GND	Ground

8.5 Limit monitor – socket 2pol

PIN	NAME	DESCRIPTION
1	C-RTN	Common Return
2	Limit	Limit

8.6 Redel – R51.41

PIN	NAME	DESCRIPTION	PIN	NAME	DESCRIPTION	PIN	NAME	DESCRIPTION
2	Ch0	Output Channel 0				1	C-RTN	Common Return
3	Ch1	Output Channel 1				11	C-RTN	Common Return
4	Ch2	Output Channel 2				12	CCG	Common Crate Ground
5	Ch3	Output Channel 3				21	CCG	Common Crate Ground
6	Ch4	Output Channel 4				22	SL	Safety Loop
7	Ch5	Output Channel 5				30	SL	Safety Loop
8	Ch6	Output Channel 6						
9	Ch7	Output Channel 7						

Table 15: pin assignment, Redel – R51.41

8.7 Redel – R51.43

PIN	NAME	DESCRIPTION	PIN	NAME	DESCRIPTION	PIN	NAME	DESCRIPTION
2	Ch0	Output Channel 0	50	Ch8	Output Channel 8	1	C-RTN	Common Return
3	Ch1	Output Channel 1	49	Ch9	Output Channel 9	11	C-RTN	Common Return
4	Ch2	Output Channel 2	48	Ch10	Output Channel 10	41	C-RTN	Common Return
5	Ch3	Output Channel 3	47	Ch11	Output Channel 11	51	C-RTN	Common Return
6	Ch4	Output Channel 4	46	Ch12	Output Channel 12	12	CCG	Common Crate Ground
7	Ch5	Output Channel 5	45	Ch13	Output Channel 13	21	CCG	Common Crate Ground
8	Ch6	Output Channel 6	44	Ch14	Output Channel 14	31	CCG	Common Crate Ground
9	Ch7	Output Channel 7	43	Ch15	Output Channel 15	40	CCG	Common Crate Ground
						22	SL	Safety Loop
						30	SL	Safety Loop

Table 16: pin assignment, Redel – R51.43

8.8 Redel – R51.44

PIN	NAME	DESCRIPTION	PIN	NAME	DESCRIPTION	PIN	NAME	DESCRIPTION
2	Ch0	Output Channel 0	13	Ch1	Output Channel 1	1	C-RTN	Common Return
3	Ch2	Output Channel 2	14	Ch3	Output Channel 3	11	C-RTN	Common Return
4	Ch4	Output Channel 4	15	Ch5	Output Channel 5	41	C-RTN	Common Return
5	Ch6	Output Channel 6	16	Ch7	Output Channel 7	51	C-RTN	Common Return
6	Ch8	Output Channel 8	17	Ch9	Output Channel 9	12	CCG	Common Crate Ground
7	Ch10	Output Channel 10	18	Ch11	Output Channel 11	21	CCG	Common Crate Ground
8	Ch12	Output Channel 12	19	Ch13	Output Channel 13	31	CCG	Common Crate Ground
9	Ch14	Output Channel 14	20	Ch15	Output Channel 15	40	CCG	Common Crate Ground
50	Ch16	Output Channel 16	39	Ch17	Output Channel 17	22	SL	Safety Loop
49	Ch18	Output Channel 18	38	Ch19	Output Channel 19	30	SL	Safety Loop
48	Ch20	Output Channel 20	37	Ch21	Output Channel 21			
47	Ch22	Output Channel 22	36	Ch23	Output Channel 23			

Table 17: pin assignment, Redel – R51.44

8.9 Redel – R51.45

PIN	NAME	DESCRIPTION	PIN	NAME	DESCRIPTION	PIN	NAME	DESCRIPTION
2	Ch0	Output Channel 0	13	Ch1	Output Channel 1	1	C-RTN	Common Return
3	Ch2	Output Channel 2	14	Ch3	Output Channel 3	11	C-RTN	Common Return
4	Ch4	Output Channel 4	15	Ch5	Output Channel 5	41	C-RTN	Common Return
5	Ch6	Output Channel 6	16	Ch7	Output Channel 7	51	C-RTN	Common Return
6	Ch8	Output Channel 8	17	Ch9	Output Channel 9	12	CCG	Common Crate Ground
7	Ch10	Output Channel 10	18	Ch11	Output Channel 11	21	CCG	Common Crate Ground
8	Ch12	Output Channel 12	19	Ch13	Output Channel 13	31	CCG	Common Crate Ground
9	Ch14	Output Channel 14	20	Ch15	Output Channel 15	40	CCG	Common Crate Ground
50	Ch16	Output Channel 16	39	Ch17	Output Channel 17	22	SL	Safety Loop
49	Ch18	Output Channel 18	38	Ch19	Output Channel 19	30	SL	Safety Loop
48	Ch20	Output Channel 20	37	Ch21	Output Channel 21			
47	Ch22	Output Channel 22	36	Ch23	Output Channel 23			
46	Ch24	Output Channel 24	35	Ch25	Output Channel 25			
45	Ch26	Output Channel 26	34	Ch27	Output Channel 27			
44	Ch28	Output Channel 28	33	Ch29	Output Channel 29			
43	Ch30	Output Channel 30	32	Ch31	Output Channel 31			

Table 18: pin assignment, Redel – R51.45

8.10 Redel – R51.46

PIN	NAME	DESCRIPTION	PIN	NAME	DESCRIPTION	PIN	NAME	DESCRIPTION
1	Ch0	Output Channel 0	12	Ch1	Output Channel 1	22	RTN	Return
2	Ch2	Output Channel 2	13	Ch3	Output Channel 3	26	SRTN	Safety Return
3	Ch4	Output Channel 4	14	Ch5	Output Channel 5	30	RTN	Return
4	Ch6	Output Channel 6	15	Ch7	Output Channel 7			
5	Ch8	Output Channel 8	16	Ch9	Output Channel 9			
6	Ch10	Output Channel 10	17	Ch11	Output Channel 11			
7	Ch12	Output Channel 12	18	Ch13	Output Channel 13			
8	Ch14	Output Channel 14	19	Ch15	Output Channel 15			
9	Ch16	Output Channel 16	20	Ch17	Output Channel 17			
10	Ch18	Output Channel 18	21	Ch19	Output Channel 19			
11	Ch20	Output Channel 20	27	Ch21	Output Channel 21			
28	Ch22	Output Channel 22	29	Ch23	Output Channel 23			
51	Ch24	Output Channel 24	40	Ch25	Output Channel 25			
50	Ch26	Output Channel 26	39	Ch27	Output Channel 27			
49	Ch28	Output Channel 28	38	Ch29	Output Channel 29			
48	Ch30	Output Channel 30	37	Ch31	Output Channel 31			
47	Ch32	Output Channel 32	36	Ch33	Output Channel 33			
46	Ch34	Output Channel 34	35	Ch35	Output Channel 35			
45	Ch36	Output Channel 36	34	Ch37	Output Channel 37			
44	Ch38	Output Channel 38	33	Ch39	Output Channel 39			
43	Ch40	Output Channel 40	32	Ch41	Output Channel 41			
42	Ch42	Output Channel 42	31	Ch43	Output Channel 43			
41	Ch44	Output Channel 44	25	Ch45	Output Channel 45			
24	Ch46	Output Channel 46	23	Ch47	Output Channel 47			

Table 19: pin assignment, Redel – R51.46

8.11 Redel – R51.47

PIN	NAME	DESCRIPTION	PIN	NAME	DESCRIPTION	PIN	NAME	DESCRIPTION
2	Ch0	Output Channel 0	13	Ch0	Return, Channel 0	12	CCG	Common Crate Ground
3	Ch1	Output Channel 1	14	Ch1	Return, Channel 1	21	CCG	Common Crate Ground
4	Ch2	Output Channel 2	15	Ch2	Return, Channel 2			
5	Ch3	Output Channel 3	16	Ch3	Return, Channel 3			
6	Ch4	Output Channel 4	17	Ch4	Return, Channel 4			
7	Ch5	Output Channel 5	18	Ch5	Return, Channel 5			
8	Ch6	Output Channel 6	19	Ch6	Return, Channel 6			
9	Ch7	Output Channel 7	20	Ch7	Return, Channel 7			

Table 20: pin assignment, Redel – R51.47

8.12 Redel – R51.48

PIN	NAME	DESCRIPTION	PIN	NAME	DESCRIPTION	PIN	NAME	DESCRIPTION
2	Ch0	Output Channel 0	13	Ch0	Return, Channel 0	12	CCG	Common Crate Ground
3	Ch1	Output Channel 1	14	Ch1	Return, Channel 1	21	CCG	Common Crate Ground
4	Ch2	Output Channel 2	15	Ch2	Return, Channel 2	31	CCG	Common Crate Ground
5	Ch3	Output Channel 3	16	Ch3	Return, Channel 3	40	CCG	Common Crate Ground
6	Ch4	Output Channel 4	17	Ch4	Return, Channel 4			
7	Ch5	Output Channel 5	18	Ch5	Return, Channel 5			
8	Ch6	Output Channel 6	19	Ch6	Return, Channel 6			
9	Ch7	Output Channel 7	20	Ch7	Return, Channel 7			
50	Ch8	Output Channel 8	39	Ch8	Return, Channel 8			
49	Ch9	Output Channel 9	38	Ch9	Return, Channel 9			
48	Ch10	Output Channel 10	37	Ch10	Return, Channel 10			
47	Ch11	Output Channel 11	36	Ch11	Return, Channel 11			
46	Ch12	Output Channel 12	35	Ch12	Return, Channel 12			
45	Ch13	Output Channel 13	34	Ch13	Return, Channel 13			
44	Ch14	Output Channel 14	33	Ch14	Return, Channel 14			
43	Ch15	Output Channel 15	32	Ch15	Return, Channel 15			

Table 21: pin assignment, Redel – R51.48

9 Accessories

CAUTION!



CAUTION!

Only use genuine iseg parts like power cables, CAN cables and terminators for stable and safe operation.

ACCESSORY ITEM	ORDER ITEM CODE
SHV coupler screw for RG58	Z590162
SHV coupler screw for RG58, >5kV	Z592474
Kings 10kV HV cable plug single pole (1065-1)	Z592512
Kings 20kV HV cable plug single pole (1765-1)	Z592668
Lemo plug 2-pole without collet chuck (SL)	Z592312
1-pin LEMO connector, FFA.00.250.CTAC31	Z200793
2-pin LEMO connector, FGG.00.302.CLAD30	Z201466
5-pin LEMO plug	Z592723

Table 22: Accessories

10 Order guides

CABLE ORDER GUIDE					
POWER SUPPLY SIDE CONNECTOR	V _{max}	CABLE CODE	CABLE DESCRIPTION	LOAD SIDE CONNECTOR	ORDER CODE LLL = length in m ⁽¹⁾
R51.41-G	≤ 4 kV	07	HV cable 6kV Kerpen SL-v2YCeHI 37xAWG26/7red	R51.41-A	RG41_C07-LLL_RA41
R51.43-G	≤ 4 kV	07	HV cable 6kV Kerpen SL-v2YCeHI 37xAWG26/7red	R51.43-A	RG43_C07-LLL_RA43
R51.44-G	≤ 4 kV	07	HV cable 6kV Kerpen SL-v2YCeHI 37xAWG26/7red	R51.44-A	RG44_C07-LLL_RA44
R51.45-G	≤ 4 kV	07	HV cable 6kV Kerpen SL-v2YCeHI 37xAWG26/7red	R51.45-A	RG45_C07-LLL_RA45
R51.46-G	≤ 4 kV	08	HV cable 6kV Kerpen SL-v2YCeHI 56xAWG26/7red	R51.46-A	RG46_C08-LLL_RA46
R51.47-G	≤ 4 kV	07	HV cable 6kV Kerpen SL-v2YCeHI 37xAWG26/7red	R51.46-A	RG47_C07-LLL_RA47
R51.48-G	≤ 4 kV	07	HV cable 6kV Kerpen SL-v2YCeHI 37xAWG26/7red	R51.48-A	RG45_C07-LLL_RA45
SHV	≤ 5 kV	04	HV cable shielded 30kV (HTV-30S-22-2)	open	SHV_C04-LLL
S08	≤ 8 kV	04	HV cable shielded 30kV (HTV-30S-22-2)	open	S08_C04-LLL
S10	≤ 10 kV	04	HV cable shielded 30kV (HTV-30S-22-2)	open	S10_C04-LLL
S20	≤ 20 kV	02	Lemo HV cable shielded 30kV (Lemo 130660)	open	S20_C02-LLL

Notes:
¹⁾ Length building examples: 10cm → 0.1, 2.5m → 2.5, 12m → 012, 999m → 999

Table 23: Guideline for cable ordering

CONFIGURATION ORDER GUIDE (item code parts)									
EH	16	0	030	P	305	000	02	0	0
High Voltage, Distinct Source	No. of channels	Class	V _{nom}	Polarity	I _{nom} (nA)	Option (hex)	HV-Connector	Revision	Customized Version
		0 = Standard (CFG) 1 = Standard (CG) 2 = High Precision (CFG) 4 = High Precision (FG) 5 = Flex channels (CFG) 6 = Standard (FG)	three significant digits • 100V. For Example: 030 = 3000V	p = positive n = negative x = mix	two significant digits + number of zeros. For Example: 305 = 3mA	Sum of the hex codes (see 2 Technical data and 2.3 Options) For Example: IU + TC = 804	02 / 03 = SHV 04 = S10 05 = S20 41 to 48 = Redel Multipin (see 7 Connectors assignments)	one digit 0 = no revision For Example: A = first revision B = second revision	one digit 0 = no customization

Table 24: Item code parts for different configurations

11 Appendix

For more information please use the following download links:

This document http://download.iseg-hv.com/SYSTEMS/MMS/EHS/iseg_datasheet_EHS_en.pdf
Archives http://download.iseg-hv.com/SYSTEMS/MMS/EHS/archive
CAN EDCP Programmers-Guide http://download.iseg-hv.com/SYSTEMS/MMS/CAN_EDCP_Programmers-Guide.pdf
iseg Hardware Abstraction Layer http://download.iseg-hv.com/SYSTEMS/MMS/isegHardwareAbstractionLayer.pdf

Manufacturers website (connectors)	
LEMO Elektronik GmbH	https://www.lemo.com/
GES electronic	https://www.ges-highvoltage.com/
Kings Electronics	https://www.winconn.com/
Radiall	https://www.radiall.com/

12 Glossary

SHORTCUT	MEANING
V_{nom}	nominal output voltage
V_{out}	output voltage
V_{set}	set value of output voltage
V_{mon}	monitor voltage of output voltage
V_{meas}	digital measured value of output voltage
V_{p-p}	peak to peak ripple voltage
V_{in}	input / supply voltage
V_{type}	type of output voltage (AC, DC)
V_{ref}	internal reference voltage
V_{max}	limit (max.) value of output voltage
$\Delta V_{out} [\Delta V_{in}]$	deviation of V_{out} depending on variation of supply voltage
$\Delta V_{out} [\Delta R_{load}]$	deviation of V_{out} depending on variation of output load
V_{bounds}	Voltage bounds, a tolerance tube $V_{set} \pm V_{bounds}$ around V_{set} .
I_{nom}	nominal output current
I_{out}	output current
I_{set}	set value of output current
I_{mon}	monitor voltage of output current
I_{meas}	digital measured value of current
I_{trip}	current limit to shut down the output voltage
I_{in}	input / supply current
I_{max}	limit (max.) value of output current
I_{limit}	Current Limit.
I_{bounds}	Current bounds, a tolerance tube $I_{set} \pm I_{bounds}$ around I_{set} .
P_{nom}	nominal output power
P_{in}	input power
P_{in_nom}	nominal input power
T	temperature
T_{REF}	Reference temperature
ON	HV ON/OFF
/ON	HV OFF/ON
CH	channel(s)
HV	high voltage
LV	low voltage
GND	signal ground
INH	Inhibit
POL	Polarity
KILL	KillEnable

13 Warranty & service

This device is made with high care and quality assurance methods. The factory warranty is Standard 36 months. Please contact the iseg sales department if you wish to extend the warranty.

CAUTION!



CAUTION!

Repair and maintenance may only be performed by trained and authorized personnel.

For repair please follow the RMA instructions on our website: www.iseg-hv.com/en/support/rma

14 Disposal

INFORMATION



INFORMATION

All high-voltage equipment and integrated components are largely made of recyclable materials. Do not dispose the device with regular residual waste. Please use the recycling and disposal facilities for electrical and electronic equipment available in your country.

15 Manufacturer contact

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