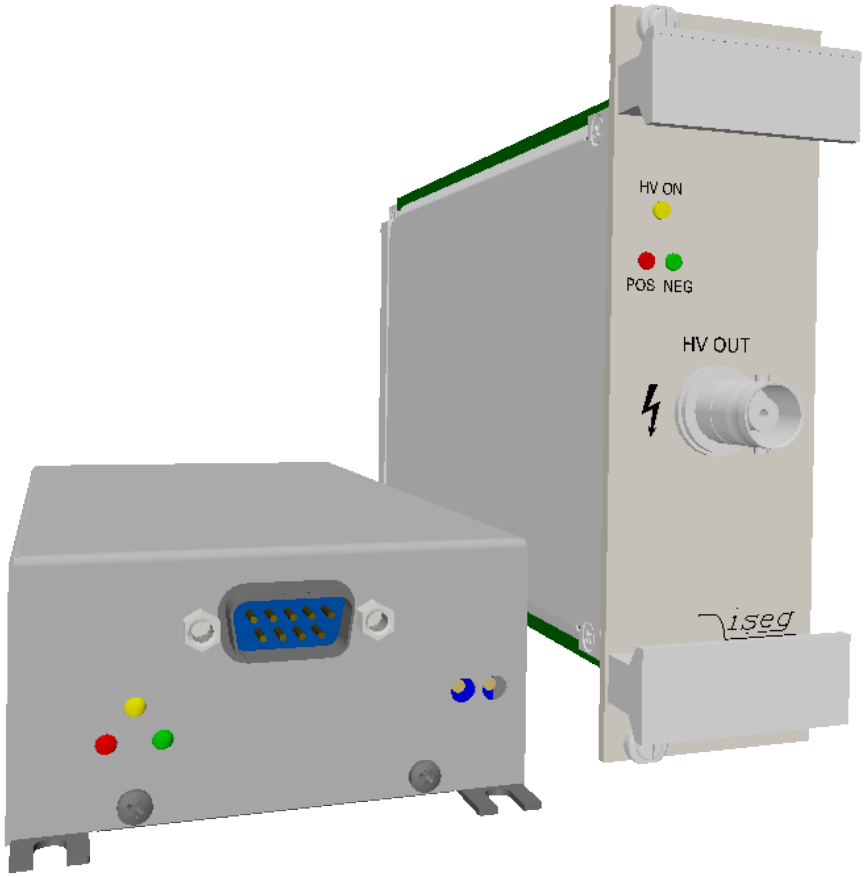
Technical documentation
Last changed on: 2022-11-07

DPS series

High Precision Built-in or System Capable High Voltage Power Supply Module

- Versions from 500 V – 6 kV
- patented resonance converter technology
- available as metal-box or 3U MMC version
- combinable in a multichannel THQ AC/DC HV power supply
- INHIBIT, adjustable hardware limits
- very low ripple and noise, low EMI
- high precision, high stability
- version with reversible polarity



Document history

Version	Date	Major changes
3.6	2023-04-18	HV cable connection (Figure 9: HV cable connection), Color of the LED negative fixed, Description and pictures (Jumper) edited under 3.4.3separation supply ground from signal ground, Glossary refresh
3.5	2022-11-07	short article names, rename document
3.4	2022-08-11	improved documentation
3.3	2021-12-07	Improved documentation connectors, revisions, Overview, Glossary, Table of Contents, Configurations for DP and DK modules, separation of the modules DPS compact metal box/ DPS 3U Euro cassette and DPSmini
3.2	2020-09-03	Improved documentation
3.1	2020-08-18	Improved documentation (Set / Monitor accuracy)
3.0	2020-07-13	Improved documentation (safety information, changing polarity)
2.5	2019-09-11	Improved documentation
2.4	2019-07-30	error correction
2.3	2019-06-13	Improved documentation
2.2	2019-03-25	Fixed dimensions for DPS mini Improved documentation
2.1	2017-08-30 2018-06-13	Fixed dimensions for DPS mini Improved documentation
2.0	2017-02-28	Relayouted documentation

Disclaimer / Copyright

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.

Depiction of the safety instructions

DANGER!

DANGER!

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

WARNING!

WARNING!

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

CAUTION!

CAUTION!

Advices marked as "Caution!" describe actions to avoid possible damages to property.

INFORMATION

INFORMATION

Advices marked as "Information" give important information.

Read the manual.

Attention 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!

Before changing the polarity of modules with switchable polarity, the high voltage generation must be switched off. The HV-Output including connected loads must not have any residual voltage.

Nonobservance of this condition may damage the module.

CAUTION!

CAUTION!

The devices (3UC) must only be used in combination with iseg approved crates.

INFORMATION

INFORMATION

Please check the compatibility with the devices used.

Table of Contents

1. General description

DPS modules are highly precise and highly stable analog controlled high voltage power supplies. The modules are available as compact metal box or system capable in 3U Euro cassette. DPS modules (compact metal box) can be used as standalone DC/DC converters, DPS (compact metal box) can be combined to a multichannel AC/DC supply in a THQ AC/DC HV unit or integrated in a modular MMC system as 3U module. The output voltage is controllable via analog interface with either a potentiometer (internal reference voltage) or an analog control voltage. The polarity of standard DPS modules is electronically switchable. To protect the connected load the modules are equipped with INHIBIT, standard DPS modules are also equipped with adjustable current and voltage limits.

Customized versions can be produced on request.

2. Overview

2.1. DPS – compact metal box

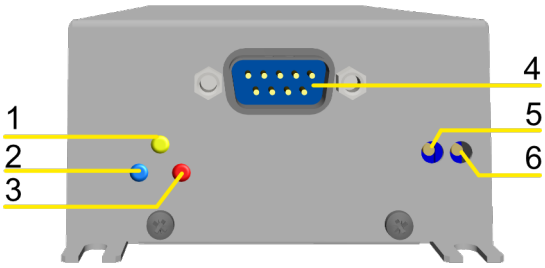


Figure 1: Front side

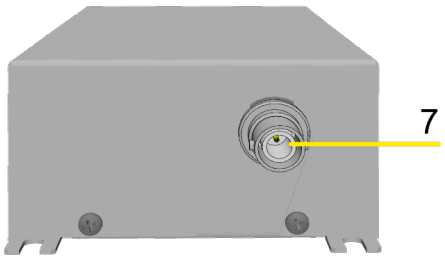


Figure 2: Back side – with HV connector

Number		Description	Detailed explanation in chapter
[1]	HV ON LED	Signals output voltage	3.4.2 Switchable Polarity
[2]	Polarity LED	voltage output is negative	3.4.2 Switchable Polarity
[3]	Polarity LED	voltage output is positive	3.4.2 Switchable Polarity
[4]	Interface connector	Power supply and control signal	5.1 Interface connector D-SUB 9 (compact metal box)
[5]	Current Limit	setting a limit for current (I_{nom})	3 Technical Data, 3.2 Specifications
[6]	Voltage Limit	setting a limit for voltage (V_{nom})	3 Technical Data, 3.2 Specifications
[7] [(1	High voltage output	Sample for DPS with SHV connector	Table 4: Configurations: DPS – compact metal box
Notes: [1)] – depending on model (SHV or cable)			

Table 1

2.2. DPS – 3U Euro cassette

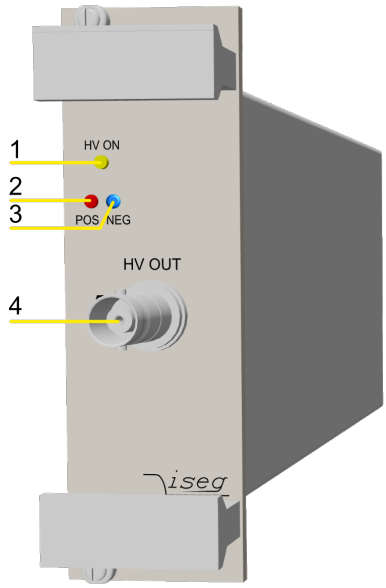


Figure 3: Front side, 3UC

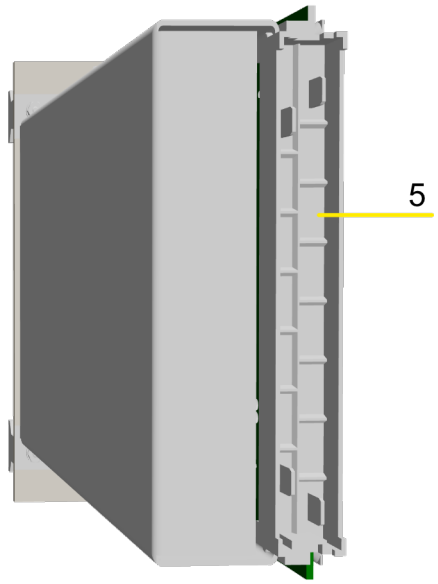


Figure 4: Back side, 3UC

Number		Description	Detailed explanation in chapter
[1]	HV ON LED	Signals output voltage	3.4.2 Switchable Polarity
[2]	Polarity LED	voltage output is positive	3.4.2 Switchable Polarity
[3]	Polarity LED	voltage output is negative	3.4.2 Switchable Polarity
[4]	High voltage output		3 Technical Data
[5]	Interface connector	Power supply and control signal	5.2 System connector H15 (3UC Euro cassette)

Table 2

3. Technical Data

3.1. Specifications

SPECIFICATIONS	DPS	DPS 3UC
Output voltage V_{nom}	500 V – 6 kV	
Polarity	Switchable	
Ripple and noise (f > 10 Hz) (1	typ. < 3 mV_{p-p}, max. 7 mV_{p-p}	
Stability – [ΔV_{out} vs. ΔV_{in}] (1	< 1 •10^{-5} • V_{nom}	
Stability – [ΔV_{out} vs. ΔR_{load}] (1	< 5• 10^{-5} • V_{nom}	
Temperatur coefficient	50 ppm/K	
Supply voltage V_{in}	22.8 – 25.2V	
Supply current I_{in} at V_{out} = 0 at V_{out} = V_{nom} / with load	 < 120 mA < 800 mA	
Set / Monitor voltage V_{set}	0 – 5 V | opt. 0 – 10 V	0 – 5 V
Set / Monitor accuracy	± 1 % • V_{nom}	
Voltage ramp up/down	0.25 • V_{nom} / s	
Protection	Overload and short circuit protected (**ATTENTION: there is only one short circuit or arc per second allowed!**)	
	INHIBIT, V/I-limit (setting with potentiometer LIMIT I resp. V)	INHIBIT
Remote connector	D-Sub 9	H15
HV connector	HV-cable (2 | SHV	SHV
Case	metal box (also THQ version)	3U cassette (MMC capable)
Dimensions – L/W/H	185/75/40 mm^3	160mm/8HP/3U
Operating temperature	0 – 40 °C	
Storage temperature	-20 – 85°C	
Humidity	max. 70 %	

Notes:
1) – Specifications for stability, ripple and noise are guaranteed in the range 2% • V_{nom} < V_{out} ≤ V_{nom}; I_{set} ≥ 4% I_{nom} for DPS mini
2) – the HV cable has a length of 600mm as standard, see Figure 9: HV cable connection

Table 3: Technical data: Specifications

3.2. Configurations

CONFIGURATIONS DPS – compact metal box								
	V_{nom}	**I_{nom}**	**Standard Ripple** (mV_{p-p})	**Internal Capacitance nominal** (nF)	**Damping Resistor** (kOhm)	**Discharge Resistor** (MOhm)	**HV connector** [1]	**Item Code**
DPR 05 106	500 V	10 mA	7	450	0,22	12	cable	DP005106r24ooooccRk
DPR 10 106	1 kV	10 mA	7	240	0.22	12	cable	DP010106r24ooooccRk
DPR 15 805	1.5 kV	8 mA	7	130	0,22	12	cable	DP015805r24ooooccRk
DPR 20 605	2 kV	6 mA	7	20	0,22	25	cable	DP020605r24ooooccRk
DPR 30 405	3 kV	4 mA	7	22	0,22	25	cable	DP030405r24ooooccRk
DPR 40 305	4 kV	3 mA	7	27	0.22	30	cable	DP040305r24ooooccRk
DPR 50 205	5 kV	2 mA	7	10	0.68	30	cable	DP050205r24ooooccRk
DPR 60 155	6 kV	1.5 mA	7	10	0.68	30	cable	DP060155r24ooooccRk
Notes: replacement characters: o – options, c – connector, R – revision, k – customization, y – monitor voltages 1) – the HV cable has a length of 600mm as standard, see Figure 9: HV cable connection								

Table 4: Configurations: DPS – compact metal box

CONFIGURATIONS DPS – 3U Euro cassette								
	V_{nom}	**I_{nom}**	**Standard Ripple** (mV_{p-p})	**Internal Capacitance nominal** (nF)	**Damping Resistor** (kOhm)	**Discharge Resistor** (MOhm)	**HV connector**	**Item Code**
DPR 05 106	500 V	10 mA	7	450	0.1	12	SHV	DK005106r2450ooccRk
DPR 10 106	1 kV	10 mA	7	240	0.1	12	SHV	DK010106r2450ooccRk
DPR 15 805	1.5 kV	8 mA	7	130	0.1	12	SHV	DK015805r2450ooccRk
DPR 20 605	2 kV	6 mA	7	40	0.1	25	SHV	DK020605r2450ooccRk
DPR 30 405	3 kV	4 mA	7	40	0.1	25	SHV	DK030405r2450ooccRk
DPR 40 305	4 kV	3 mA	7	27	0.22	30	SHV	DK040305r2450ooccRk
DPR 50 205	5 kV	2 mA	7	10	0.68	30	S08	DK050205r2450ooccRk
DPR 60 155	6 kV	1.5 mA	7	10	0.68	30	S08	DK060155r2450ooccRk
Notes: replacement characters: o – options, c – connector, R – revision, k – customization								

Table 5: Configurations: DPS – 3U Euro cassette

3.3. Options

OPTIONS / ORDER INFO	INFO	EXAMPLE
Set / monitor voltage [1]	0 – 5V, **standard** 0 – 10V, optional	DPR 05 106
3UC	**3U,** Height unit based on the 19-inch standard housing, MMC capable version	
Notes: 1) – only for compact metal box		

Table 6: Technical data: Options and order information

3.4. Functional description

If the high voltage excitation is switched on and off via PIN ON, it rises or falls by means of ramp up (see 3.4.2 Switchable Polarity) to the maximum set voltage via V_{SET}. A monitor voltage for the output current and output voltage is available via the I_{MON} and V_{MON} connections. The pin REF (reference) can be used for the V_{SET} voltage via an additional circuit (see Figure 5: VSET)

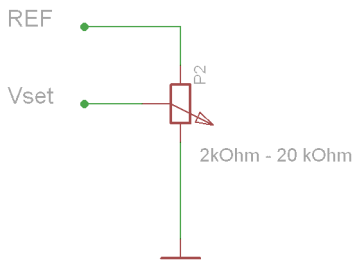


Figure 5: VSET

3.4.1. INHIBIT [1]

Modules equipped with the option INHIBIT [2] provide the possibility to shut down single channels, a group of channels (monitor group) or the entire module with or without ramp, triggered by an external signal.

3.4.2. Switchable Polarity

The polarity can be switched via the input POL:

signal	level	polarity
POL	High or NC	➔ positive
POL	Low	➔ negative

INFORMATION

INFORMATION

Switching the polarity is only possible with output voltages from 0 to 64 V. At higher voltages, the changeover process is blocked to protect the changeover relay.

If the level at the POL input (see chapter 5 Connectors and PIN assignments) changes from high to low or from low to high, the generation of high voltage is stopped first. If the voltage has fallen below 64V, the polarity is switched and the voltage value specified at input V_{set} is approached with a voltage ramp of 0.25 • V_{nom}/ s.

1 Only for 3U Euro cassette
2 Only for 3U Euro cassette

3.4.3. separation supply ground from signal ground

In version 3UC, the supply ground (0V) can be separated from the signal ground (GND) by removing the jumper. See Figure 6: view of the top and Figure 7: detail view of Figure 7: view of the top (Jumper red marked).

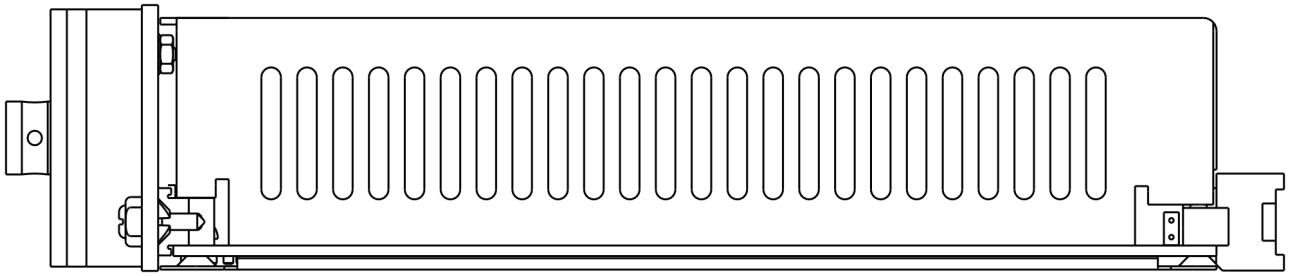


Figure 6: view of the top

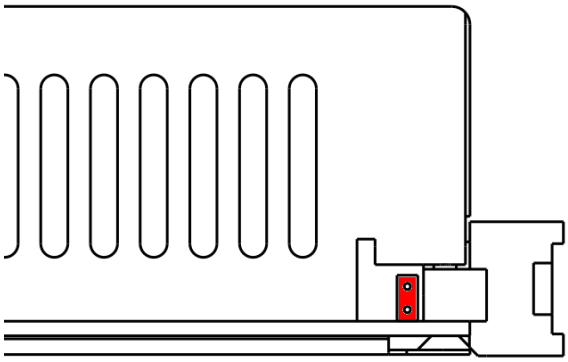


Figure 7: detail view of Figure 7: view of the top (Jumper red marked)

4. Dimensional drawings

4.1. DPS – compact metal box

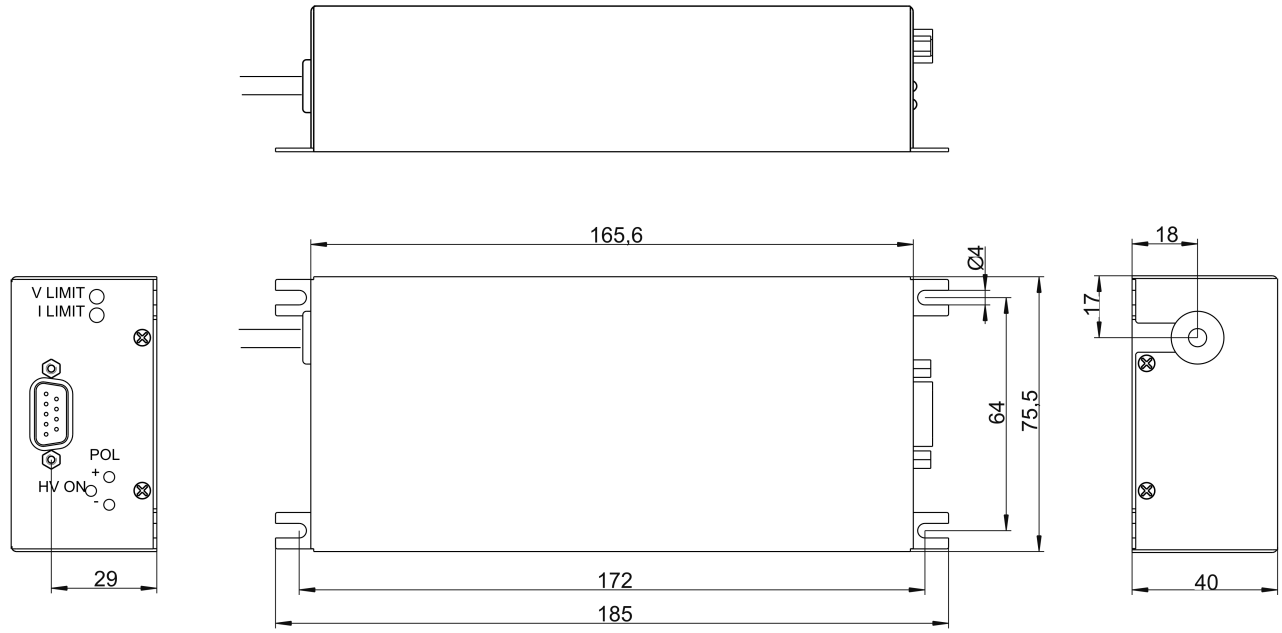


Figure 8: dimensional drawing DPS with cable

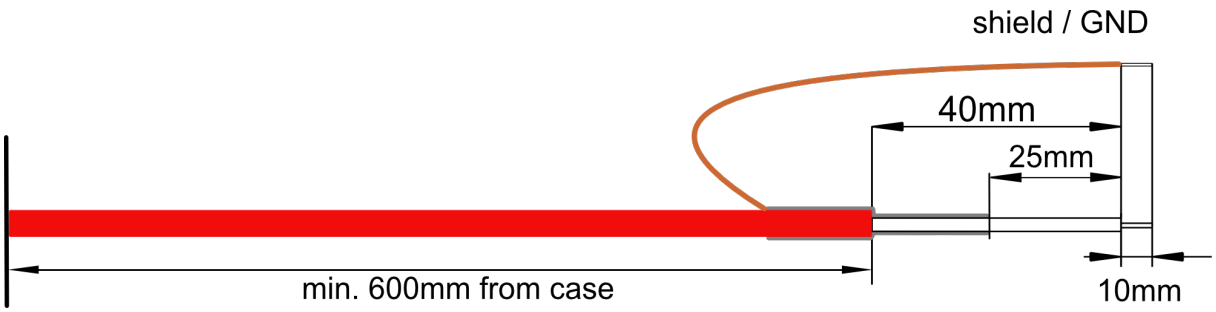


Figure 9: HV cable connection

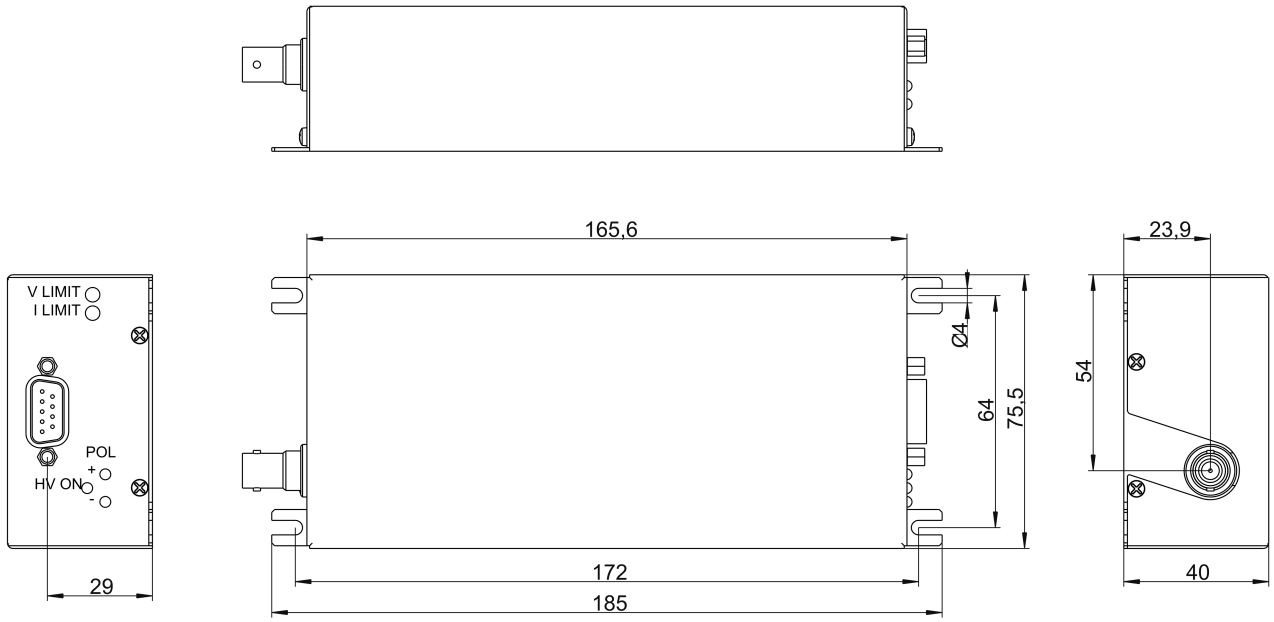


Figure 10: dimensional drawing DPS with SHV

4.2. DPS – 3UC Euro cassette

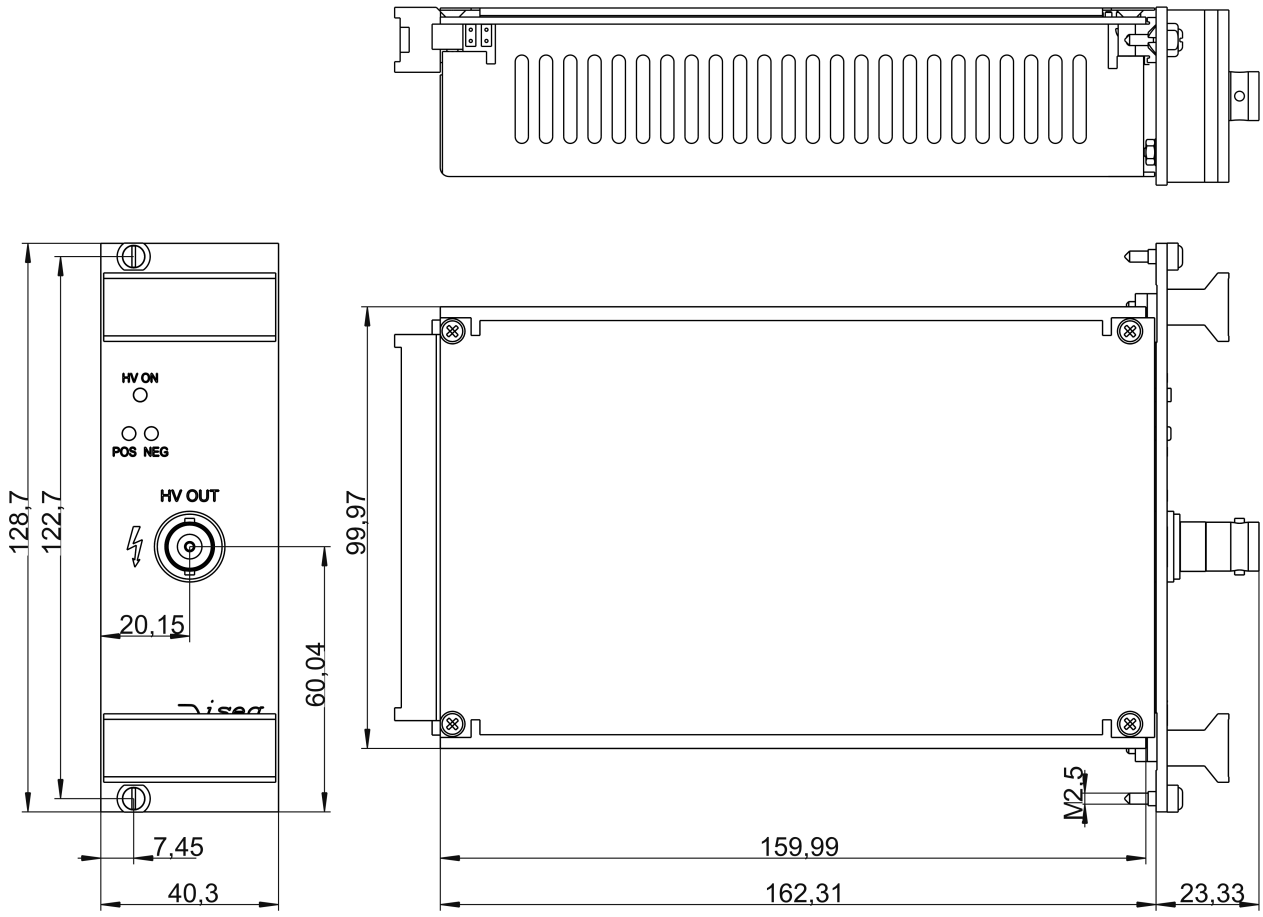


Figure 11: dimensional drawing DPS 3UC

5. Connectors and PIN assignments

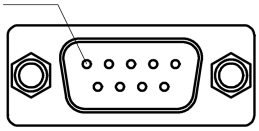
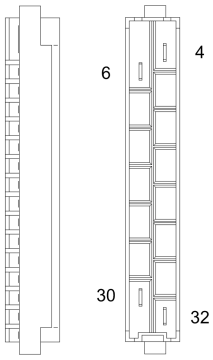
CONNECTORS – POWER SIDE	PART NUMBERS (manufacturer code / iseg accessory parts item code)		
D-SUB9 – male	**CABLE SIDE**		
PIN 1  *Figure 12*	connector	D SUD9, Female	(DIN 41652)
	manufacturer	various manufacturer	
	iseg part number		
SHV	**CABLE SIDE**		
 *Figure 13*	part number	57K101-006N3	
	manufacturer	Rosenberger	
	iseg part number	Z590162	
S08	**CABLE SIDE**		
 *Figure 14*	part number	R317.005.000	
	manufacturer	Radiall	
	iseg part number	Z592474	
H15	**CABLE SIDE**		
 *Figure 15*	connector	Female power plug type H15, compatible with iseg crates	(DIN 41612 / IEC 60603-2)
	manufacturer	various manufacturer	
	iseg part number		

Table 7

5.1. Interface connector D-SUB 9 (compact metal box)

PIN	NAME	DESCRIPTION	VALUE	
1	**0V** [1]	Supply ground	0 V	
2	**IMON**	I_{mon} Monitor voltage of output current	0 ... 5 V	(optionally: 0 ... 10 V)
3	**ON**	HV ON/OFF with voltage ramp	TTL-level: LOW HIGH or not connected	 ➜ HV ON ➜ HV OFF
4	**POL**	Polarity	HIGH or not connected LOW	➜ positive ➜ negative
5	**VIN**	V_{in} Supply voltage	+24 V DC	
6	**GND** [1]	Signal ground		
7	**VMON**	V_{mon} Monitor voltage	0 ... 5 V	(optionally: 0 ... 10 V)
8	**VSET**	V_{set} Set value of output voltage	0 ... 5V	(optionally: 0 ... 10 V)
9	**REF**	V_{ref} Internal reference voltage	5 V	(optionally: 10V)

Notes:
Case is connected to GND
[1)] internally connected

Table 8: PIN Assignment D-SUB 9

5.2. System connector H15 (3UC Euro cassette)

PIN	NAME	DESCRIPTION	VALUE
6	**0V**	Supply ground	
8	**REF**	V_{ref} Internal reference voltage	5 V
10	**0V**	Supply ground	
12	**GND**	Signal ground	
14	**IMON**	I_{mon} Monitor voltage of output current	0 ... 5 V
16	**ON**	HV ON/OFF with voltage ramp	TTL-level: LOW ➜ HV ON HIGH or not connected ➜ HV OFF
18	**VIN_C** [1]	V_{in_s} Supply voltage (Control)	+24 V DC
20	**VSET**	V_{set} Set value of output voltage	0 ... 5 V
22	**POL**	Polarity	HIGH or not connected ➜ positive LOW ➜ negative
24	**VMON**	V_{mon} Monitor voltage	0 ... 5 V
26	**VIN** [1]	V_{in} Supply voltage (Power)	+24 V DC
28	**ISET**	I_{set} Set voltage of output current	0 ... 5 V
30	**KILL_ENA** [2]	Killenable, high active	TTL-level
32	**INH**	Inhibit, LOW = active, shut down the output voltage	TTL-level: LOW ➜ HV OFF HIGH or not connected ➜ HV ON

Notes:
Case is connected to **0V** and with Jumper J1 connected to **GND**, see chapter3.4.3 separation supply ground from signal ground
[1] internally connected
[2] If KillEnable is active the occur of Inhibit will trigger a Kill-signal. This signal will switch off the HV immediately without ramp. Restoring the output voltage is only possible after operating KILL-ENA or HV_ON.

Table 9: PIN Assignment 3U Euro cassette (H15)

6. Order guides

CONFIGURATION ORDER GUIDE (item code parts)									
Dx	**030**	**405**	**r**	**24**	**50**	**000**	**02**	**0**	**0**
Type	V_{nom}	I_{nom} (nA)	Polarity	Input Voltage	Monitor Voltage	Option	HV-Connector	Revision	Customized Version
x = P Metal box x = K 3U Cassette x = T for THQ	three significante digits • 100V For Example: 030 = 3000V	two significante digits + number of zeros For Example: 405 = 4mA	r = reversible	two significante digits For Example: 24 = 24 Volt	two significante digits 1.th hex • 1V 2.th dez • 0,1V For Example: 50 = 5V A0 = 10V		00 = Cable 02 /03 = SHV	one digit 0 = no revision For Example: A = first revision B = second revision	one digit 0 = no custo-mization For Example: 1 -first custo-mization

Table 10: Configuration item code

CABLE ORDER GUIDE					
POWER SUPPLY SIDE CONNECTOR	**V_{max}**	**CABLE CODE**	**CABLE DESCRIPTION**	**LOAD SIDE CONNECTOR**	**ORDER CODE** LLL = length in m [1]
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*
Notes: [1] Length building examples: 10cm ➜ 0.1, 2.5m ➜ 2.5, 12m ➜ 012, 999m ➜ 999					

Table 11: Guideline for cable ordering

7. Revisions

date	**revision**	**modification**
2021-07-30	A	• Additional LED for signaling the output voltage • separation supply ground from signal ground [1]
Notes: 1) – only 3UC modules		

Table 12

8. Appendix

For more information please use the following download links:

This document https://iseg-hv.com/download/DC_DC/DPS/iseg_datasheet_DPS_en.pdf
DPS series https://iseg-hv.com/en/products/detail/DPS
Archives https://iseg-hv.com/download/?dir=DC_DC/DPS/archive
Cables and Connectors https://iseg-hv.com/download/ACCESSORIES/Adapters%20and%20Cables/iseg_Cables%20and%20Connectors_en.pdf

Manufacturers website (connectors)	
Radiall	https://www.radiall.com/
Rosenberger	https://www.rosenberger.com/

9. Glossary

SHORTCUT	MEANING
0V	Supply ground
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_{IN_C}	V_{in_s} Supply voltage (Control)
V_{type}	type of output voltage (AC, DC)
V_{ref}	internal reference voltage
V_{max}	limit (max.) value of output voltage
V_{limit}	voltage limit
ΔV_{out} – $[\Delta V_{in}]$	deviation of V_{out} depending on variation of supply voltage
ΔV_{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	HV OFF
CH	channel(s)
HV	high voltage
LV	low voltage
GND	signal ground
INH	Inhibit

POL	Polarity
KILL	KillEnable

Table 13: Glossary

10. Warranty & Service

This device is made with high care and quality assurance methods. The standard factory warranty is 12 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

11. 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.

12. Manufacturer contact

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