iseg

HIGH VOLTAGE .EXACTLY.

HIGH VOLTAGE

FOR INDUSTRY AND RESEARCH

iseg

HIGH VOLTAGE .EXACTLY.

DC/DC

AC/DC

SYSTEMS

CONTROL

SOLUTIONS

INDEX

LARGE PRODUCT RANGE. HIGH QUALITY.

DC/DC

AC/DC

SYSTEMS

CONTROL

SOLUTIONS

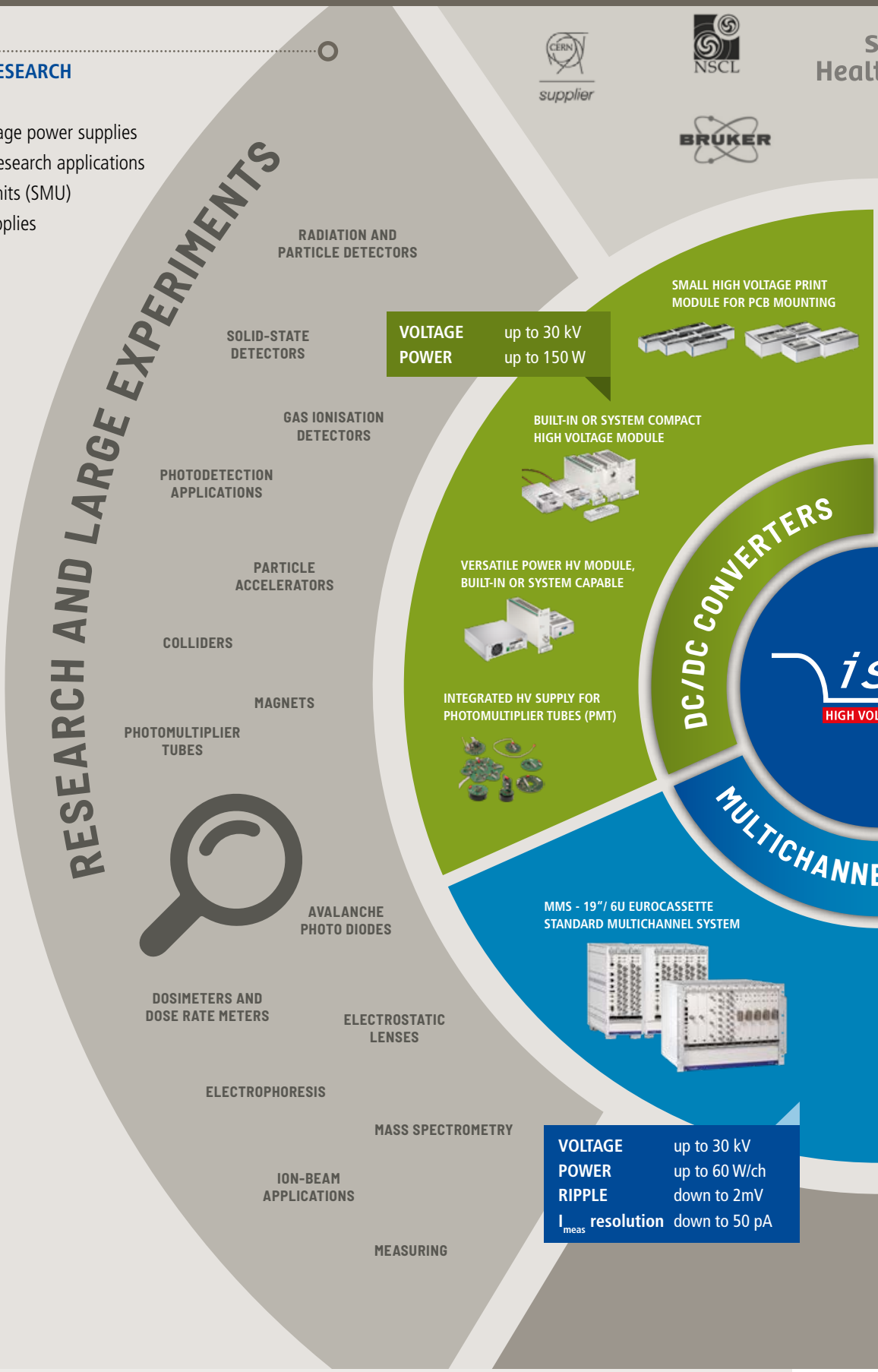
CUSTOM SOLUTIONS FOR INDUSTRY AND

FOR YOUR SPECIAL PURPOSE APPLICATIONS

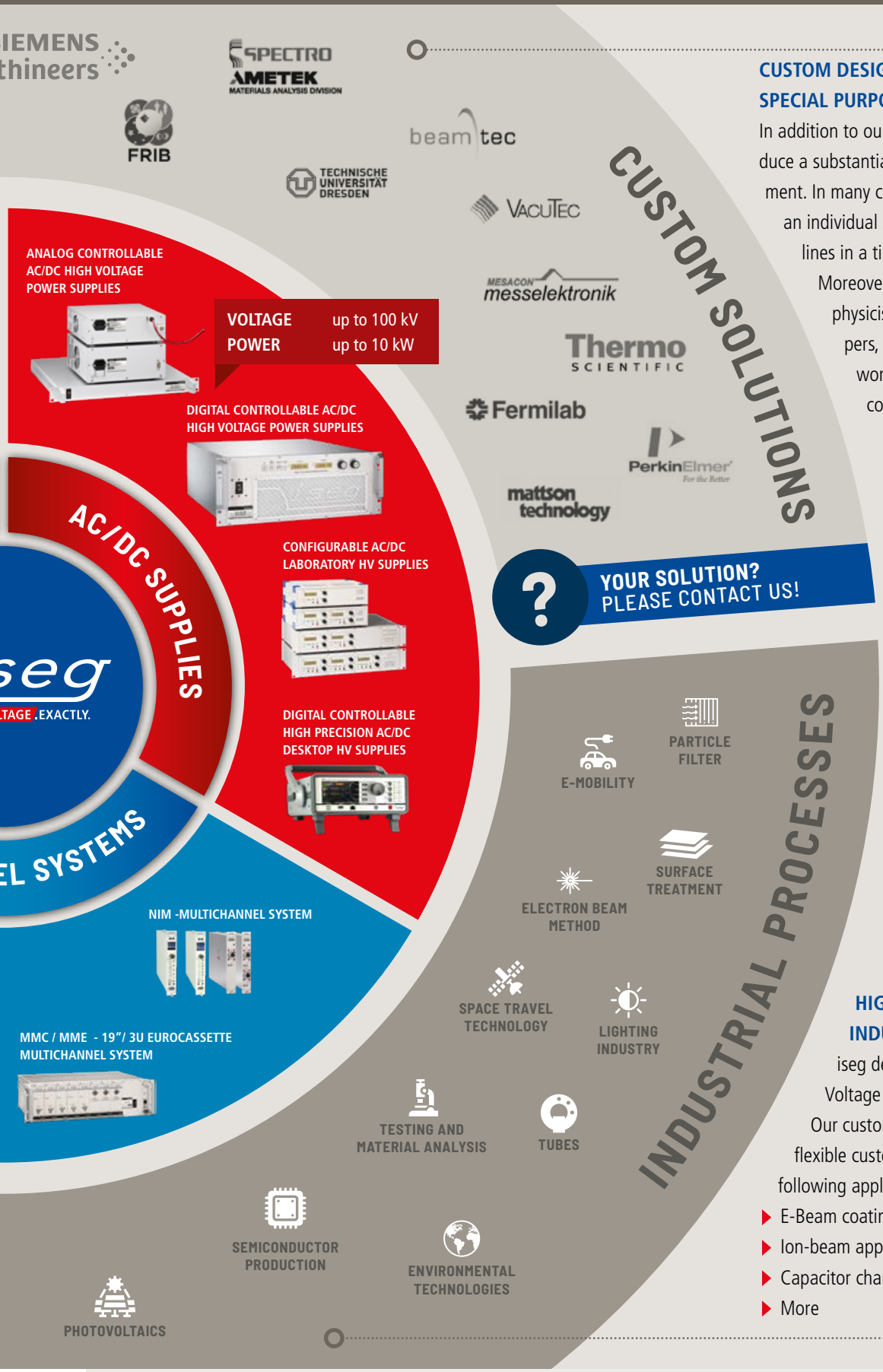
HIGH VOLTAGE SUPPLIES FOR RESEARCH AND LARGE EXPERIMENTS

iseg designs and produces high voltage power supplies for special purpose in industry and research applications

- High precision Source Measure Units (SMU)
- Large number of detector bias supplies
- Custom design for special purpose applications
- Wide range of product series and configurations



RESEARCH



CUSTOM DESIGN FOR SPECIAL PURPOSE APPLICATIONS

In addition to our standard product range we produce a substantial range of customer-specific equipment. In many cases it will be possible to generate an individual solution based on existing product lines in a time and cost-efficient manner.

Moreover, our experienced team consisting of physicists, hardware and software developers, electronic engineers and skilled workers is accepting the challenge of complicated assignments.

HIGH VOLTAGE FOR INDUSTRIAL PROCESSES

iseg develops high precise and reliable High Voltage Power Supplies in industry standards. Our customers benefit from best quality and flexible customized solutions in such as following applications

- E-Beam coating
- Ion-beam applications
- Capacitor charging
- More

HIGH VOLTAGE. EXACTLY.

INDEX

MORE THAN 30 YEARS OF EXPERIENCE IN HIGH VOLTAGE POWER SUPPLIES.

SPECIALIZED WITH EXPERIENCE

iseg is a german producer of high voltage power supplies for all fields of industry and research.

PROVEN TECHNOLOGY WITH BEST CHARACTERISTICS

By using modern, patented resonant converter technology iseg delivers efficient and high precise power supplies in small form factors and excellent electrical parameters.

VARIOUS PRODUCTS

iseg provides ready-to-use high voltage power supplies. An overview of our product range:

- DC/DC converters as print, built-in or 3U cassette versions with power up to 150 W
- AC/DC power supplies as desktop or 19" rack version with power up to 10 kW
- Integrated HV supplies for photomultiplier tubes (PMT)
- HV systems in different standards: 19" 6U/3U, VME and NIM

MADE IN GERMANY

All iseg products and solutions were developed and made in Germany. High standards are our daily base for quality assurance measures in development, production and management.

VACUTEC CHAMBERS WITH ISEG HARDWARE

VacuTec Messtechnik GmbH produce high quality ionization chambers for industrial applications. In addition to the conventional ionization chambers in traversing measuring systems and for detection of local defects serve the ionization chamber arrays. VacuTec implements APS High Voltage supplies in the measuring head housing. **www.vacutec-gmbh.de**

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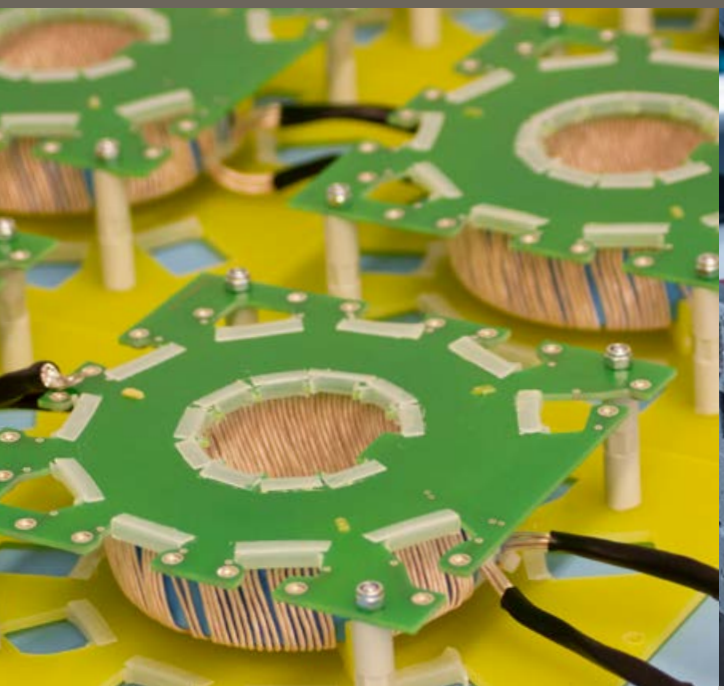

CONTEMPORARY CONTROL AND APPLICATION-RELATED INTERFACES

Control and monitoring capabilities are crucial factors for optimal integration of the high voltage power supply into laboratory and productive systems. Therefore different hardware and software solutions are available on different platforms.

- EPICS
- OPC / OPC-UA
- iCS: plug and work: integrated Ethernet / Wifi server with web browser access, Websocket-interface, hardware configuration, firmware updating, Python-Server etc.
- Free control and configuration tools
- Numerous libraries and code samples for ready-to-start implementation of your application

ENGINEERING YOUR INDVIDUAL SOLUTION

The iseg team has many years of experience in developing programmable high voltage power supplies and systems. Our custom solutions can help you engineer the impossible.

Custom units are ideal for high end complex projects, helping you research and explore new and unproven areas of technology. We can often design a system to match your exact specifications using one of our standard high voltage power supplies as a basis.

Output values, ramp profiles, voltage polarity, input range and response times can all be tailored to suit specific test and development needs.

If you are unable to find an appropriate solution for your requirements in this catalog please do not hesitate to contact us or one of our international sales representatives.

SUPPORT AND SERVICE

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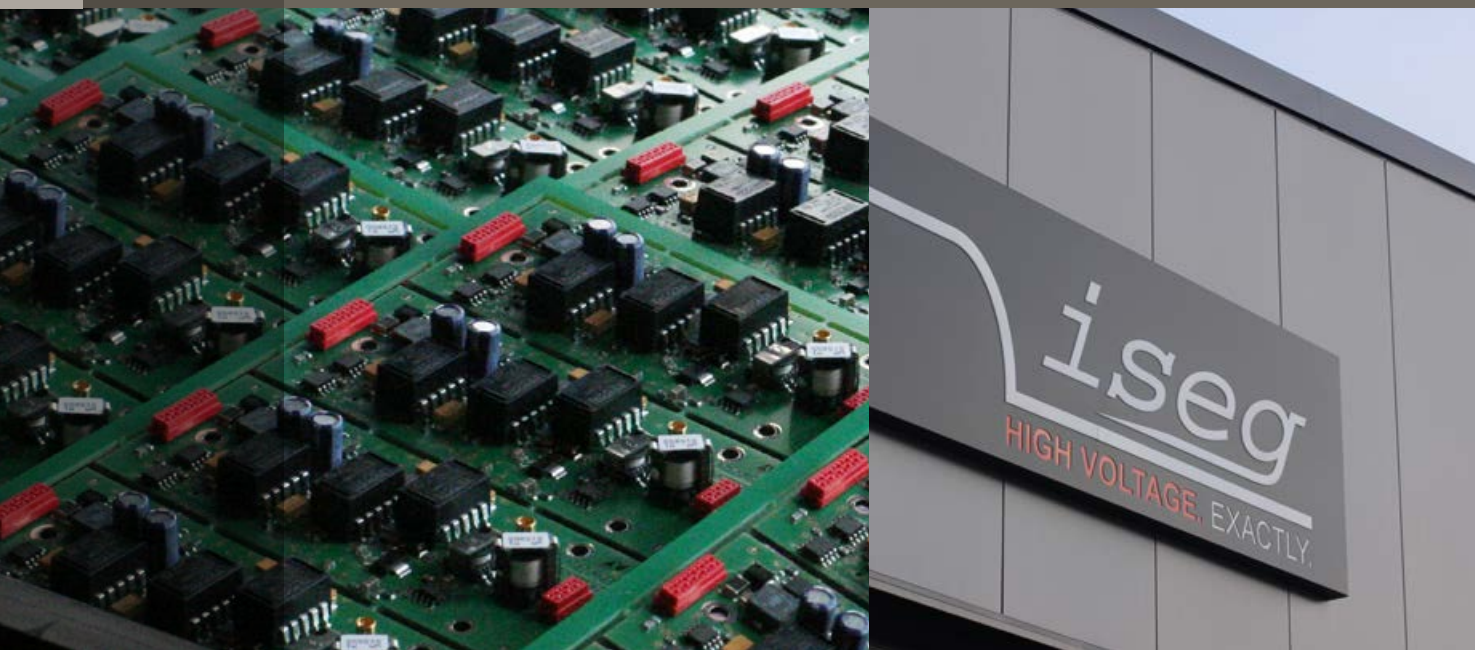
DIRECT VENDOR SUPPORT FOR ISEG PRODUCTS



DIRECT VENDOR SUPPORT

Best possible support means to get comprehensive service over the complete operating period of iseg devices.
Customer´s benefits are:

- Manufacturer´s guarantee, depending on series up to 3 years, prolongable by an extra charge
- Repair and service direct from manufacturer
- RMA handling with guaranteed return time
- Allocation of spare or test hardware at reasonable conditions
- Recalibration service with possibility of reminders
- Hardware and software support directly from developer
- Custom hardware and software development

WORLDWIDE SALES NETWORK

As customer and user of iseg hardware you benefit from a worldwide sales network. Qualified representatives advice and support you and your projects.

Our sales and marketing team

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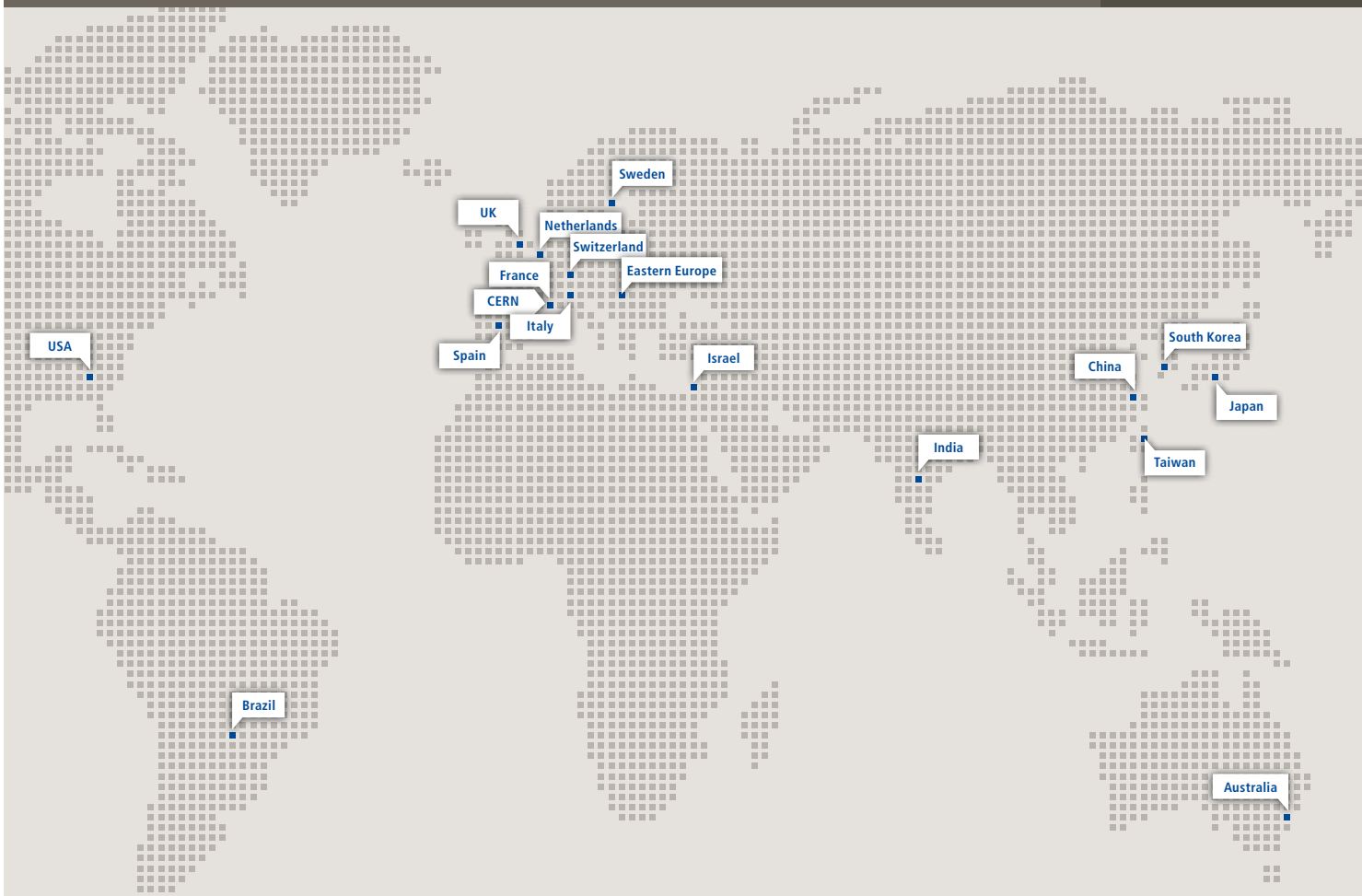
International company website.

www.iseg-hv.com/support/
Support area including RMA form, support request, product registration.

download.iseg-hv.com
Software download area

SALES NETWORK

WORLDWIDE REPRESENTATIVES FOR SALES AND SUPPORT



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DC/DC

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HIGH VOLTAGE CONVERTERS

DC/DC

FEATURES OVERVIEW

SEE COVER FOR SHORTCUT REFERENCE

TYPE	V_{nom}	V_{in}	CH	CASE FORMAT	INTERFACES	HV CONNECTORS	OPTIONS	PAGE
APS								10
0.5 W	0.2 - 1 kV	5 V	1	PCB module	AIO (pin)	pin	CUSTOM	10
1.0 W	0.2 - 1 kV	12 V	1	PCB module	AIO (pin)	pin	CUSTOM	10
BPS								11
1 W	0.5 - 3 kV	5 V	1	PCB module	AIO (pin)	pin	CUSTOM	11
3 W	0.3 - 3 kV	12 V	1	PCB module	AIO (pin)	pin	CUSTOM	11
4 W	0.5 - 6 kV	12 V	1	PCB module	AIO (pin)	pin	CUSTOM	11
CPS								12
12 W	0.5 - 30 kV	24 V	1	metal box	AIO (D-SUB9)	cable	CUSTOM	12
CPS-MINI								13
8 W	1 - 6 kV	24 V	1	PCB module	AIO (pin)	pin	CUSTOM	13
DPS								14
12 W	0.5 - 6 kV	24 V	1	metal box	AIO (D-SUB9)	cable | SHV	CUSTOM	14
DPS-MINI								15
9 W	0.5 - 10 kV	24 V	1	mini metal box	AIO (D-SUB9)	cable | SHV	CUSTOM	15
EPS								16
60 W	0.5 - 30 kV	24 V	1	metal box	AIO (D-SUB9)	cable | SHV | GES	CLD | ARC | CUSTOM	16
150 W	1 - 30 kV	24 V	1	metal box	AIO (D-SUB9)	cable	CLD | ARC | CUSTOM	16

ADVANTAGES

PROVEN TECHNOLOGY WITH BEST CHARACTERISTICS

By using modern, patented iseg resonant converter technology we deliver efficient and high precise power supplies with excellent electrical parameters.

CUSTOMIZED VERSIONS ON REQUEST

In addition to our standard product range we produce a substantial range of customer-specific equipment.

1 YEAR MANUFACTURER´S WARRANTY

Prolongable by an extra charge.

APS

SMALL HIGH VOLTAGE PRINT MODULE FOR PCB MOUNTING UP TO 1 W

AIO

CUSTOM

- **Patented resonance converter technology**
- **Controlled by analog set voltage**
- **Monitor voltage**
- **Low ripple and noise, low EMI**
- **Internal reference voltage**
- **Customized versions on request**

DATA SHEET

APS modules are very small DC/DC converters that can be mounted and soldered on PCBs. The output voltage is controllable with either an external potentiometer or an analog control voltage.

The patented resonance converter technology and moulded metal box shielding guarantee lowest electromagnetic interference and low ripple and noise of the output voltage.

SPECIFICATIONS

	APS 0.5 W	APS 1 W
Polarity	factory fixed, positive or negative	factory fixed, positive or negative
Ripple and noise [f >10 Hz]	typ. < 10 mV_{P-P}	typ. < 10 mV_{P-P}
Stability - [ΔV_{out} / ΔV_{in}]	< 1 • 10^{-3} • V_{nom}	< 1 • 10^{-3} • V_{nom}
Stability - [ΔV_{out} / ΔR_{load}]	< 2 • 10^{-3} • V_{nom}	< 2 • 10^{-3} • V_{nom}
Temperature coefficient	< 50 ppm / K	< 50 ppm / K
Supply voltage	4.5 - 5.5 V	11.5 - 15.5 V
Set / monitor voltage	0 - 2.5 V	0 - 5 V
Protection	overload and short circuit protected	overload and short circuit protected
HV connector	pin	pin
Case	metal box, moulded	metal box, moulded
Dimensions - L/W/H	40/16/12.2 mm	40/16/12.2 mm

CONFIGURATIONS APS 0.5 W

MODEL	V_{nom}	I_{nom}
APx 02 255 5	200 V	2.5 mA
APx 04 125 5	400 V	1.2 mA
APx 06 804 5	600 V	0.8 mA
APx 08 604 5	800 V	0.6 mA
APx 10 504 5	1 kV	0.5 mA

CONFIGURATIONS APS 1 W

MODEL	V_{nom}	I_{nom}
APx 02 505 12	200 V	5 mA
APx 04 255 12	400 V	2.5 mA
APx 06 165 12	600 V	1.6 mA
APx 08 125 12	800 V	1.2 mA
APx 10 105 12	1 kV	1 mA

OPTIONS & ORDER INFO

OPTION	ORDER INFO	EXAMPLE
POLARITY	positive: **x = p**, negative: **x = n**	AP**p** 02 255 5

BPS

SMALL HIGH VOLTAGE PRINT MODULE FOR PCB MOUNTING UP TO 4 W

SEE COVER FOR SHORTCUT REFERENCE

- **Patented resonance converter technology**
- **Controlled by analog set voltage**
- **Monitor voltages**
- **Wide supply range**
- **Low ripple and noise, low EMI**
- **Internal reference voltage**
- **Customized versions on request**

AIO

CUSTOM

DATA SHEET

BPS modules are small DC/DC converters that can be mounted and soldered on PCBs. The output voltage is controllable with either an external potentiometer or an analog control voltage.

The patented resonance converter technology and moulded metal box shielding guarantee lowest electromagnetic interference and low ripple and noise.

SPECIFICATIONS

	BPS 1 W	BPS 3 W	BPS 4 W
Polarity	factory fixed, positive or negative	factory fixed, positive or negative	factory fixed, positive or negative
Ripple and noise [f > 10 Hz]	typ. < 10-15 mV_{p-p}	typ. < 15-35 mV_{p-p}	typ. < 5 mV_{p-p}
Stability - [ΔV_{out} / ΔV_{in}]	< 5 • 10^{-4} • V_{nom}	< 5 • 10^{-4} • V_{nom}	< 2 • 10^{-4} • V_{nom}
Stability - [ΔV_{out} / ΔR_{load}]	< 2 • 10^{-3} • V_{nom}	< 2 • 10^{-3} • V_{nom}	< 5 • 10^{-4} • V_{nom}
Temperature coefficient	< 50 ppm / K	< 50 ppm / K	< 50 ppm / K
Supply voltage	4.5 - 5.5 V	11.5 - 15.5 V	11.4 - 12.6 V
Set / monitor voltage	0 - 2.5 V	0 - 5 V	0 - 5 V
Protection	overload and short circuit protected	overload and short circuit protected	overload and short circuit protected
HV connector	pin	pin	pin
Case metal	metal box, moulded	metal box, moulded	metal box, moulded
Dimensions - L/W/H	40/40/18 mm	40/40/18 mm	50 - 55/40/17 mm

CONFIGURATIONS

BPS 1 W	V_{nom}	I_{nom}	RIPPLE AND NOISE	BPS 3 W	V_{nom}	I_{nom}	RIPPLE AND NOISE	BPS 4 W	V_{nom}	I_{nom}	LENGTH
BPx 05 205 5	500 V	2 mA	typ. < 10 mV_{p-p}	**BPx 03 106 12**	300 V	10 mA	typ. < 15 mV_{p-p}	**BPx 05 805 12**	500 V	8 mA	50 mm
BPx 10 105 5	1 kV	1 mA	typ. < 10 mV_{p-p}	**BPx 05 605 12**	500 V	6 mA	typ. < 15 mV_{p-p}	**BPx 10 405 12**	1 kV	4 mA	50 mm
BPx 15 604 5	1.5 kV	0.6 mA	typ. < 10 mV_{p-p}	**BPx 10 305 12**	1 kV	3 mA	typ. < 20 mV_{p-p}	**BPx 20 205 12**	2 kV	2 mA	50 mm
BPx 20 504 5	2 kV	0.5 mA	typ. < 10 mV_{p-p}	**BPx 15 205 12**	1.5 kV	2 mA	typ. < 25 mV_{p-p}	**BPx 30 135 12**	3 kV	1.3 mA	50 mm
BPx 30 304 5	3 kV	0.3 mA	typ. < 15 mV_{p-p}	**BPx 20 155 12**	2 kV	1.5 mA	typ. < 30 mV_{p-p}	**BPx 40 105 12**	4 kV	1 mA	50 mm
				BPx 30 105 12	3 kV	1 mA	typ. < 35 mV_{p-p}	**BPx 60 674 12**	6 kV	0.67 mA	55 mm

OPTIONS & ORDER INFO

OPTION	ORDER INFO	EXAMPLE
Polarity	positive: **x = p**, negative: **x = n**	BP**n** 05 205 5

CPS

COMPACT BUILT-IN HIGH VOLTAGE MODULE

AIO

CUSTOM

- Patented resonance converter technology
- Available as metal box
- Combinable in a THQ AC/DC HV power supply
- INHIBIT
- Hardware limits for voltage and current
- Low ripple and noise, low EMI
- Customized versions on request

DATA SHEET

SPECIFICATIONS

Polarity	factory fixed, positive or negative
Ripple and noise [f >10 Hz]	< 10 kV: typ. < 2 • 10^{-5} • V_{nom} ≥ 10 kV: typ. < 5 • 10^{-5} • V_{nom}
Stability - [ΔV_{out} / ΔV_{in}]	< 1 • 10^{-4} • V_{nom}
Stability - [ΔV_{out} / ΔR_{load}]	< 2 • 10^{-4} • V_{nom}
Temperature coefficient	100 ppm / K
Supply voltage	22.8 - 25.2 V
Set / monitor voltage	0 - 5 V | optional: 0 - 10 V
Protection	overload and short circuit, INHIBIT, V/I-limit
Remote connector	D-Sub 9
HV connector	HV-cable
Case	metal box, moulded

CONFIGURATIONS

MODEL	V_{nom}	I_{nom}	L/W/H
CPx 05 206 24 5	500 V	20 mA	155/75/40 mm
CPx 10 106 24 5	1 kV	10 mA	155/75/40 mm
CPx 15 805 24 5	1.5 kV	8 mA	155/75/40 mm
CPx 20 605 24 5	2 kV	6 mA	155/75/40 mm
CPx 30 405 24 5	3 kV	4 mA	155/75/40 mm
CPx 40 305 24 5	4 kV	3 mA	155/75/40 mm
CPx 50 205 24 5	5 kV	2 mA	155/75/40 mm
CPx 70 155 24 5	7 kV	1.5 mA	155/75/40 mm
CPx 100 105 24 5	10 kV	1 mA	185/75/40 mm
CPx 150 604 24 5	15 kV	0.6 mA	185/75/40 mm
CPx 200 504 24 5	20 kV	0.5 mA	185/95/40 mm
CPx 300 304 24 5	30 kV	0.3 mA	185/95/40 mm

OPTIONS & ORDER INFO

OPTION:	ORDER INFO	EXAMPLE
Polarity	positive: **x = p**, negative: **x = n**	CP**p** 05 206 24 5
Set 0 - 10 V	**AO**	

CPS modules are highly stable analog controlled high voltage power supplies. They are available as compact metal box or system capable in 3U Eurocassette standard. Standard modules of the CPS series can be used as standalone DC/DC converters, combined to multichannel AC/DC supply in a THQ device or integrated in a modular MMC system. The output voltage is controllable via analog interface with either an external potentiometer (internal reference voltage) or an analogue control voltage.
To protect the connected load the modules are equipped with INHIBIT, current and voltage limits.

ALSO AVAILABLE AS SYSTEM CAPABLE 3U MMC VERSION
MMC

see page 58

COMBINABLE TO AC/DC SUPPLY IN A THQ SERIES
THQ

see page 29

CPS-MINI

SMALL HIGH VOLTAGE MODULE FOR PCB MOUNTING

SEE COVER FOR SHORTCUT REFERENCE

- **Patented resonance converter technology**
- **Available as mini-PCB**
- **INHIBIT**
- **Hardware limits for voltage and current**
- **Low ripple and noise, low EMI**
- **Customized versions on request**

AIO

CUSTOM

DATA SHEET

CPS-mini version for PCB mounting is available for space-saving applications.
CPS-mini modules are highly stable analog controlled high voltage power supplies. The output voltage is controllable via analog interface with either an external potentiometer (internal reference voltage) or an analogue control voltage.
To protect the connected load the modules are equipped with INHIBIT, current and voltage limits.

SPECIFICATIONS

Polarity	factory fixed, positive or negative
Ripple and noise [f >10 Hz]	$< 2.5 \bullet 10^{-6} \bullet V_{nom}$
Stability - [ΔV_{out} / ΔV_{in}]	$< 5 \bullet 10^{-5} \bullet V_{nom}$
Stability - [ΔV_{out} / ΔR_{load}]	$< 2 \bullet 10^{-4} \bullet V_{nom}$
Temperature coefficient	50 ppm / K
Supply voltage	22.8 - 25.2 V
Set / monitor voltage	0 - 5 V
Remote connector	pin
Protection	overload and short circuit, INHIBIT, V/I-limit
HV connector	pin
Case	metal box, moulded (PCB)

CONFIGURATIONS

MODEL	V_{nom}	I_{nom}	L/W/H
CPx 10 805 24 5	1 kV	8 mA	120/40/25 mm
CPx 20 405 24 5	2 kV	4 mA	120/40/25 mm
CPx 30 255 24 5	3 kV	2.5 mA	120/40/25 mm
CPx 40 205 24 5	4 kV	2 mA	120/40/25 mm
CPx 60 135 24 5	6 kV	1.3 mA	120/40/25 mm

OPTIONS & ORDER INFO

OPTION:	ORDER INFO	EXAMPLE
Polarity	positive: **x = p**, negative: **x = n**	CP**p** 10 805 24 5 M

DPS

HIGH PRECISION BUILT-IN HV MODULE

AIO
VLN
CUSTOM

- Patented resonance converter technology
- High precision, high stability
- Very low ripple and noise, low EMI
- Combinable in multichannel THQ AC/DC HV supply
- INHIBIT, adjustable hardware limits
- Polarity electronically switchable
- Customized versions on request

DATA SHEET

SPECIFICATIONS

Polarity	switchable
Ripple and noise [f >10 Hz]	typ. < 3 mV_{p-p}
Stability - [ΔV_{out} / ΔV_{in}]	< 1 • 10^{-5} • V_{nom}
Stability - [ΔV_{out} / ΔR_{load}]	< 5 • 10^{-5} • V_{nom}
Temperature coefficient	< 50 ppm / K
Supply voltage	22.8 - 25.2 V
Set / monitor voltage	0 - 5 V | optional: 0 - 10 V
Remote connector	D-Sub 9
Protection	overload and short circuit, INHIBIT, V/I-limit
HV connector	HV-cable | SHV (optional)
Case	metal box, moulded (THQ capable)

CONFIGURATIONS

MODEL	V_{nom}	I_{nom}	L/ W/H
DPR 05 106 24 5	500 V	10 mA	186/75/40 mm
DPR 10 106 24 5	1 kV	10 mA	186/75/40 mm
DPR 15 805 24 5	1.5 kV	8 mA	186/75/40 mm
DPR 20 605 24 5	2 kV	6 mA	186/75/40 mm
DPR 30 405 24 5	3 kV	4 mA	186/75/40 mm
DPR 40 305 24 5	4 kV	3 mA	186/75/40 mm
DPR 50 205 24 5	5 kV	2 mA	186/75/40 mm
DPR 60 155 24 5	6 kV	1.5 mA	186/75/40 mm

OPTIONS & ORDER INFO

ORDER	ORDER INFO	EXAMPLE
SHV connector	SHV	DPR 05 106 24 5 SHV
Set 0 - 10 V	AO	

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

ALSO AVAILABLE AS SYSTEM CAPABLE 3U MMC VERSION
MMC

see page 59

COMBINABLE TO AC/DC SUPPLY IN A THQ SERIES
THQ

see page 29

DPS-MINI

COMPACT BUILT-IN HIGH PRECISION HIGH VOLTAGE MODULE

SEE COVER FOR SHORTCUT REFERENCE

- **Patented resonance converter technology**
- **High precision, high stability**
- **Very low ripple and noise, very low EMI**
- **Very compact metal box**
- **INHIBIT**
- **Customized versions on request**

AIO

VLN

CUSTOM

DATA SHEET

DPS-mini modules are highly precise and highly stable analog controlled DC/DC high voltage supplies in a very compact metal box case. The output voltage is controllable via analog interface with either an external potentiometer (internal reference voltage) or an analog control voltage. To protect the connected load the modules are equipped with INHIBIT.

SPECIFICATIONS

Polarity	factory fixed, positive or negative
Ripple and noise [f >10 Hz]	typ. < 3 mV_{p-p}
Stability - [ΔV_{out} / ΔV_{in}]	< 1 • 10^{-5} • V_{nom}
Stability - [ΔV_{out} / ΔR_{load}]	< 5 • 10^{-5} • V_{nom}
Temperature coefficient	< 50 ppm / K
Supply voltage	22.8 - 25.2 V
Set / monitor voltage	0 - 5 V
Protection	overload and short circuit protected, INHIBIT
Remote connector	D-Sub 9
HV connector	HV-cable | SHV
Case	metal box, moulded

CONFIGURATIONS

MODEL	V_{nom}	I_{nom}	RIPPLE AND NOISE	L/W/H
DPx 05 156 24 5	500 V	15 mA	< 10 mV_{p-p}	109/62.5/25 mm
DPx 10 805 24 5	1 kV	8 mA	< 10 mV_{p-p}	109/62.5/25 mm
DPx 20 405 24 5	2 kV	4 mA	< 10 mV_{p-p}	109/62.5/25 mm
DPx 30 305 24 5	3 kV	3 mA	< 10 mV_{p-p}	109/62.5/25 mm
DPx 40 205 24 5	4 kV	2 mA	< 10 mV_{p-p}	109/62.5/25 mm
DPx 60 105 24 5	6 kV	1 mA	< 30 mV_{p-p}	109/68.5/31 mm
DPx 80 105 24 5	8 kV	1 mA	< 30 mV_{p-p}	98/74/22-24 mm
DPx 100 504 24 5	10 kV	0.5 mA	< 30 mV_{p-p}	103/74/25 mm

ORDER & OPTIONS

OPTION	ORDER INFO	EXAMPLE
Polarity	positive: **x = p**, negative: **x = n**	DP**p** 05 156 24 5_MS
SHV connector	**MS**	
Cable version	**MK**	

EPS

VERSATILE BUILT-IN POWER HV MODULE

AIO
ARC
CLD

DATA SHEET

EPS modules are versatile DC/DC high voltage power supplies with multiple options. The modules are available as compact metal box in 60 W and 150 W version or multichannel system capable in 3U Eurocassette-standard in 60 W. EPS modules can be used as standalone DC/DC converters, combined to AC/DC supply in a THQ series or integrated in a modular multichannel MMC system. The output voltage is controllable via analog interface with either an external potentiometer (internal reference voltage) or an analog control voltage.

To protect the connected load the modules are equipped with INHIBIT and INTERLOCK (optional).
The patented resonance converter technology and metal box shielding guarantee lowest electromagnetic interference. To fit best in different applications EPS modules can be equipped with ARC management or as capacitor charger with very low output voltage overshoot (option CLD).

SPECIFICATIONS

	EPS 60 W	EPS 150 W
Polarity	factory fixed, positive or negative	factory fixed, positive or negative
Ripple and noise [f >10 Hz]	< 10kV: typ. < 5 • 10^{-4} • V_{nom} ≥ 10 kV: typ. < 2 • 10^{-2} • V_{nom}	< 10kV: typ. < 5 • 10^{-4} • V_{nom} ≥ 10 kV: typ. < 2 • 10^{-2} • V_{nom}
Stability [ΔV_{out} / ΔV_{in}]	ΔV_{out} < 0.01% • V_{nom}	ΔV_{out} < 0.01% • V_{nom}
Stability [ΔV_{out} / R_{load}]	ΔV_{out} < 0.02% • V_{nom}	ΔV_{out} < 0.02% • V_{nom}
Temperature coefficient	< 100 ppm / K	< 100 ppm / K
CLD - Repeat accuracy	< 0.01 • V_{out}	< 0.01 • V_{out}
Supply voltage	22.8 - 26.4 V	21 - 29 V
Set / monitor voltage	0 - 5 V | optional: 0 - 10 V	0 - 5 V | optional: 0 - 10 V
Protection	overload and short circuit, INHIBIT, overvoltage/overtemp	overload and short circuit, INHIBIT, overvoltage/overtemp
Remote connector	D-Sub 9	D-Sub 9
Interlock	optional	optional
HV connector	HV-cable	HV-cable
Case	metal box	metal box
Dimensions (L/W/H)	185/108/57 mm	170/188/60 mm

SEE COVER FOR SHORTCUT REFERENCE

- Patented resonance converter technology
- High efficiency
- Voltage and current control
- Low ripple and noise, low EMI
- Multiple options (INTERLOCK, ARC, CLD)
- Highly customizable, optimized versions on request

ALSO AVAILABLE AS SYSTEM CAPABLE 3U MMC VERSION

MMC

see page 60

COMBINABLE TO AC/DC SUPPLY IN A THQ SERIES

THQ

see page 29

CONFIGURATIONS

EPS 60 W	V_{nom}	I_{nom}	RIPPLE AND NOISE	EPS 150 W	V_{nom}	I_{nom}	RIPPLE AND NOISE
EPx 05 127 24 5	500 V	120 mA	$< 5 \bullet 10^{-4} \bullet V_{nom}$ *	**EPx 10 157 24 5**	1 kV	150 mA	$< 5 \bullet 10^{-4} \bullet V_{nom}$ *
EPx 10 606 24 5	1 kV	60 mA	$< 5 \bullet 10^{-4} \bullet V_{nom}$ *	**EPx 20 756 24 5**	2 kV	75 mA	$< 5 \bullet 10^{-4} \bullet V_{nom}$ *
EPx 15 406 24 5	1.5 kV	40 mA	$< 5 \bullet 10^{-4} \bullet V_{nom}$ *	**EPx 40 406 24 5**	4 kV	40 mA	$< 5 \bullet 10^{-4} \bullet V_{nom}$ *
EPx 20 306 24 5	2 kV	30 mA	$< 5 \bullet 10^{-4} \bullet V_{nom}$ *	**EPx 80 206 24 5**	8 kV	20 mA	$< 5 \bullet 10^{-4} \bullet V_{nom}$
EPx 30 206 24 5	3 kV	20 mA	$< 5 \bullet 10^{-4} \bullet V_{nom}$ *	**EPx 120 126 24 5**	12 kV	12.5 mA	$< 5 \bullet 10^{-4} \bullet V_{nom}$
EPx 40 156 24 5	4 kV	15 mA	$< 5 \bullet 10^{-4} \bullet V_{nom}$ *	**EPx 150 106 24 5**	15 kV	10 mA	$< 5 \bullet 10^{-4} \bullet V_{nom}$
EPx 50 126 24 5	5 kV	12 mA	$< 5 \bullet 10^{-4} \bullet V_{nom}$ *	**EPx 200 755 24 5**	20 kV	7.5 mA	$< 5 \bullet 10^{-4} \bullet V_{nom}$
EPx 60 106 24 5	6 kV	10 mA	$< 5 \bullet 10^{-4} \bullet V_{nom}$ *	**EPx 300 505 24 5**	30 kV	5 mA	$< 5 \bullet 10^{-4} \bullet V_{nom}$
EPx 80 705 24 5	8 kV	7 mA	$< 5 \bullet 10^{-4} \bullet V_{nom}$				
EPx 100 605 24 5	10 kV	6 mA	$< 5 \bullet 10^{-4} \bullet V_{nom}$				
EPx 150 405 24 5	15 kV	4 mA	$< 2 \bullet 10^{-2} \bullet V_{nom}$				
EPx 200 305 24 5	20 kV	3 mA	$< 2 \bullet 10^{-2} \bullet V_{nom}$				
EPx 300 205 24 5	30 kV	2 mA	$< 2 \bullet 10^{-2} \bullet V_{nom}$				

(* optional: $< 1 \bullet 10^{-4} \bullet V_{nom}$

OPTIONS & ORDER INFO

OPTION	ORDER INFO	EXAMPLE
Polarity	positive: **x = p**, negative: **x = n**	EP**p** 05 127 24 5
ARC management	**ARC**	
Capacitor charger	**CLD**	
Set 0 - 10 V	**AO**	

AC/DC

INDEX

HIGH VOLTAGE DEVICES

GPS
ANALOG CONTROLLABLE AC/DC HIGH VOLTAGE POWER SUPPLIES

HPS
DIGITAL CONTROLLABLE AC/DC HIGH VOLTAGE POWER SUPPLIES

FPS
FLOATING AC/DC LOW VOLTAGE SUPPLIES

THQ
HIGHLY CONFIGURABLE AC/DC LABORATORY HV SUPPLIES

SHR
SWITCHABLE HIGH END HIGH PRECISION AC/DC DESKTOP HV SUPPLIES

*) might be optional, see product details
**) Connector depends on V_{nom}, see product details

AC/DC

FEATURES OVERVIEW

SEE COVER FOR SHORTCUT REFERENCE

TYPE	CASE FORMAT	CH	V_{nom}	INTERFACES *	DISPLAY	HV CONNECTORS	OPTIONS	PAGE
GPS								**20**
350 W	10" / 81 mm / 254 mm	1	1 - 70 kV	AIO	-	GES | Cable | E70	CLD | ARC | A0 | CAR	20
300 W	19" / 1U / 410 mm	1	1 - 30 kV	AIO	-	SHV | GES	CLD | ARC | A0 | CAR	20
800 W	19" / 1U / 410 mm	1	1 - 15 kV	AIO	-	SHV | GES	CLD | ARC | A0 | CAR	20
4 kW	19" / 3U / 410 mm	1	1 - 4 kV	AIO	-	SHV	CLD | ARC	20
HPS								**22**
350 W	10" / 81 mm / 280 mm	1	1 - 70 kV	AIO|USB|CAN|ETH|RS232	1x LCD	GES	CLD | ARC	22
300 W	19" / 1U / 410 mm	1	1 - 30 kV	AIO|USB|CAN|IEE|ETH|RS232	2x LCD	SHV | GES	CLD | ARC	23
800 W	19" / 1U / 410 mm	1	1 - 15 kV	AIO|USB|CAN|IEE|ETH|RS232	2x LCD	SHV | GES	CLD | ARC	23
1.5 kW	19" / 2-4U / 410-550 mm	1	1 - 100 kV	AIO|SPS|USB|IEE|CAN|ETH|...	2x LCD	SHV | LEMO | GES	VLN | CLD | ARC-PRO | FCS	24
3 kW	19" / 2-4U / 410-550 mm	1	1 - 100 kV	AIO|SPS|USB|IEE|CAN|...	2x LCD	SHV | LEMO | GES	VLN | CLD | ARC-PRO | FCS	24
6 kW	19" / 4U / 500 mm	1	1 - 20 kV	AIO|SPS|USB|IEE|CAN|ETH|ETC|...	2x LCD	GES | LEMO	VLN | CLD | ARC-PRO | FCS	24
10 kW	19" / 4U / 500 mm	1	1 - 20 kV	AIO|SPS|USB|IEE|CAN|ETH|ETC|...	2x LCD	GES | LEMO	VLN | CLD | ARC-PRO | FCS	24
FPS								**27**
FPd	19" / 2U / 350 mm	1	10 - 40 V	AIO|USB|CAN|ETH|RS232	2x LCD	SHV | LEMO | Cable		27
THQ								**29**
THQ 1CH	Desktop	1	0.5 - 30 kV	AIO | USB	1x LCD	HV connector**		29
THQ 2CH	Desktop	2	0.5 - 15 kV	AIO | USB	2x LCD	HV connector**		29
THQ 1CH 2HE	19" / 2U / 305 mm	1	0.5 - 30 kV	AIO | USB	1x LCD	HV connector**		29
THQ 2CH 2HE	19" / 2U / 305 mm	2	0.5 - 30 kV	AIO | USB	2x LCD	HV connector**		29
THQ 3CH 2HE	19" / 2U / 305 mm	3	0.5 - 30 kV	AIO | USB	3x LCD	HV connector**		29
SHR								**30**
2x 20	Desktop portable	2	2 kV	ETHERNET | USB	TFT	SHV	L | TC | IHB | IHD	30
2x 60	Desktop portable	2	6 kV	ETHERNET | USB	TFT	SHV	L | TC | IHB | IHD	30
4x 20	Desktop portable	4	2 kV	ETHERNET | USB	TFT	SHV	L | TC | IHB | IHD	30
4x 60	Desktop portable	4	6 kV	ETHERNET | USB	TFT	SHV	L | TC | IHB | IHD	30

ADVANTAGES

PROVEN TECHNOLOGY WITH BEST CHARACTERISTICS

By using modern, patented iseg resonant converter technology we deliver efficient and high precise power supplies with excellent electrical parameters.

CUSTOMIZED VERSIONS ON REQUEST

In addition to our standard product range we produce a substantial range of customer-specific equipment.

UP TO 2 YEARS MANUFACTURER´S WARRANTY

Prolongable by an extra charge.

GPS

ANALOG CONTROLLABLE AC/DC HIGH VOLTAGE POWER SUPPLIES

AIO
ARC
CLD
CUSTOM
DATA SHEET

Devices of GPS series are analog controlled AC driven high voltage power supplies with a high power density at best output characteristics. Due to a wide range of customization possibilities, these devices are the perfect choice to match fixed requirements at a very reasonable price.

SPECIFICATIONS

	GPS COMPACT 350 W	GPS 300 W	GPS 800 W	GPS 4 kW
Polarity	factory fixed, positive or negative	factory fixed, positive or negative	factory fixed, positive or negative	factory fixed, positive or negative
Ripple and noise [f >10 Hz]	< 0.25% • V_{nom}	< 0.01% • V_{nom} [V_{out} ≤ 8 kV] < 0.05% • V_{nom} [V_{out} > 8 kV]	< 0.01% • V_{nom} [V_{out} ≤ 8 kV] < 0.05% • V_{nom} [V_{out} > 8 kV]	< 3 • 10^{-2} • V_{nom}
Stability	< 0.02% • V_{nom} *	< 0.05% • V_{nom} *	< 0.01% • V_{nom} *	0.05 % • V_{nom} *
Voltage regulation [ΔV_{out} / ΔV_{in}]	0.02 % [V_{out} ≥ 5 V]	0.01 % [V_{out} ≥ 5 V]	0.01 % [V_{out} ≥ 5 V]	0.02 % [V_{out} ≥ 5 V]
Temperature coefficient	< 200 ppm	< 200 ppm	< 200 ppm	< 200 ppm
Supply voltage	85 - 264 VAC with PFC	85 - 264 VAC with PFC	85 - 264 VAC with PFC	190 - 264 VAC with PFC
Set / monitor voltage	0 - 5 V | opt. 0 - 10 V	0 - 5 V | opt. 0 - 10 V	0 - 5 V | opt. 0 - 10 V	0 - 5 V | opt. 0 - 10 V
Protection	overload, ARC, short circuit, INHIBIT, overvoltage/overtemp	overload, ARC, short circuit, INHIBIT, overvoltage/overtemp	overload, ARC, short circuit, INHIBIT, overvoltage/overtemp	overload, ARC, short circuit, INHIBIT, overvoltage/overtemp
Case	10" metal box	19" 1U rack mountable	19" 1U rack mountable	10" metal box
Dimensions (L/W/H)	254/81/106 mm	410 mm / 19" / 1U	410 mm / 19" / 1U	306/170/460 mm

*) for 8h, after 0.5h warmup

OPTIONS & ORDER INFO

OPTION	ORDER INFO	EXAMPLE
Polarity	positive: **x = p**, negative: **x = n**	GP**p** 10 307 5
Set / monitor voltage 0 - 5 V (standard)	**y = 5**	GPp 10 307 **5**
Set / monitor voltage 0 - 10 V (optional)	**y = 10**	GPp 10 307 **10**
Capacitor charger	**CLD**	
ARC management	**ARC**	

Note: other product configurations and customizing on request

SEE COVER FOR SHORTCUT REFERENCE

- 300 W-4 kW / 1kV - 70 kV versions
- 19" case / compact box / custom specific
- Best control characteristics
- Analog I/O
- Capacitor charger option (CLD)
- ARC management option (ARC)
- Very low ripple and noise, very low EMI
- High efficiency up to 85%

CONFIGURATIONS

MODEL	V_{nom}	I_{nom}	L/W/H	HV CONNECTOR
GPS-COMPACT 350 W				
GPx 10 357 y	1 kV	350 mA	254/254/81 mm	G11 | Cable
GPx 20 177 y	2 kV	175 mA	254/254/81 mm	G11 | Cable
GPx 30 127 y	3 kV	120 mA	254/254/81 mm	G11 | Cable
GPx 50 706 y	5 kV	70 mA	254/254/81 mm	G11 | Cable
GPx 80 456 y	8 kV	45 mA	254/254/81 mm	G11 | Cable
GPx 100 356 y	10 kV	35 mA	254/254/81 mm	G11 | Cable
GPx 150 236 y	15 kV	23 mA	254/254/81 mm	G21 | Cable
GPx 200 186 y	20 kV	18 mA	254/254/81 mm	G21 | Cable
GPx 300 126 y	30 kV	12 mA	254/254/81 mm	G31 | Cable
GPx 400 905 y	40 kV	9 mA	254/254/106 mm	E70
GPx 500 705 y	50 kV	7 mA	254/254/106 mm	E70
GPx 600 605 y	60 kV	6 mA	254/254/106 mm	E70
GPx 700 505 y	70 kV	5 mA	254/254/106 mm	E70
GPS-1U 300 W				
GPx 10 307 y	1 kV	300 mA	410 mm / 19"/ 1U	SHV
GPx 20 157 y	2 kV	150 mA	410 mm / 19"/ 1U	SHV
GPx 30 107 y	3 kV	100 mA	410 mm / 19"/ 1U	SHV
GPx 40 756 y	4 kV	75 mA	410 mm / 19"/ 1U	SHV
GPx 60 506 y	6 kV	50 mA	410 mm / 19"/ 1U	SHV
GPx 80 356 y	8 kV	35 mA	410 mm / 19"/ 1U	SHV
GPx 120 256 y	12 kV	25 mA	410 mm / 19"/ 1U	G21
GPx 150 206 y	15 kV	20 mA	410 mm / 19"/ 1U	G21
GPx 200 156 y	20 kV	15 mA	410 mm / 19"/ 1U	G21
GPx 300 106 y	30 kV	10 mA	410 mm / 19"/ 1U	G31
GPS-1U 800 W				
GPx 10 807 y	1 kV	800 mA	410 mm / 19"/ 1U	SHV
GPx 20 407 y	2 kV	400 mA	410 mm / 19"/ 1U	SHV
GPx 30 257 y	3 kV	250 mA	410 mm / 19"/ 1U	SHV
GPx 40 207 y	4 kV	200 mA	410 mm / 19"/ 1U	SHV
GPx 60 137 y	6 kV	130 mA	410 mm / 19"/ 1U	SHV
GPx 80 107 y	8 kV	100 mA	410 mm / 19"/ 1U	SHV
GPx 120 656 y	12 kV	65 mA	410 mm / 19"/ 1U	G21
GPx 150 506 y	15 kV	50 mA	410 mm / 19"/ 1U	G21
GPS-3U 4 kW				
GPx 034 118 y	4 kV	1 A	308/431/170 mm	SHV

HPS COMPACT

DIGITALLY CONTROLLABLE AC/DC HIGH VOLTAGE POWER SUPPLY

AIO
DIO
CLD
CUSTOM

DATA SHEET

- 350 W compact box version
- Best control characteristics
- Multiple interface options
- Capacitor charger option (CLD)
- ARC management
- Very low ripple and noise, very low EMI
- Parallel operation for power increase

HPS compact is a digitally controlled AC driven high voltage power supply with high power density at best output characteristics. The processor controlled supply can flexibly be adapted to any kind of application by configuring many options. PWM controlled output parameters, small ripple and noise and stored energy, up to 85% efficiency and almost loss free switching of semiconductors makes HPS devices the most advanced AC/DC HV power supply for industrial and research applications.

SPECIFICATIONS

Power	350 W
Polarity	factory fixed, positive or negative
Efficiency	up to 85%
Ripple and noise [f >10 Hz]	$< 2 \bullet 10^{-3} \bullet V_{nom}$
Stability	0.05 % V_{nom}
Voltage regulation [ΔV_{out} / ΔV_{in}]	0.02 % [$V_{out} \geq 5$ V]
Temperature coefficient	< 200 ppm / K
Supply voltage	85 - 264 VAC with PFC
Switching frequency	30 - 70 kHz
Set / monitor voltage	-
Protection	overload, ARC and short circuit, INTERLOCK, overvoltage/overtemp
ARC management	ARC
Filament supply	not available
Interfaces	USB, CAN, Ethernet*, RS232*
Case	10" metal box
Dimensions (L/W/H)	254/81/106 mm

*) Option

CONFIGURATIONS

MODEL	V_{nom}	I_{nom}	HV CONNECTOR
HPx 10 357	1 kV	350 mA	G11
HPx 20 177	2 kV	175 mA	G11
HPx 30 127	3 kV	120 mA	G11
HPx 50 706	5 kV	70 mA	G11
HPx 80 456	8 kV	45 mA	G11
HPx 100 356	10 kV	35 mA	G11
HPx 150 236	15 kV	23 mA	G21
HPx 200 186	20 kV	18 mA	G21
HPx 300 126	30 kV	12 mA	G31
HPx 400 905	40 kV	9 mA	E70
HPx 500 705	50 kV	7 mA	E70
HPx 600 605	60 kV	6 mA	E70
HPx 700 505	70 kV	5 mA	E70

OPTIONS & ORDER INFO

OPTION	ORDER INFO	EXAMPLE
Polarity	positive: **x = p**, negative: **x = n**	HP**p** 10 357
Capacitor charger	**CLD**	
ARC management	**ARC**	
Interface options	Ethernet: **ETH** | RS232: **RS2**	

HPS 300 W / 800 W

DIGITALLY CONTROLLABLE AC/DC HIGH VOLTAGE POWER SUPPLIES

SEE COVER FOR SHORTCUT REFERENCE

- 300 W / 800 W / 1kV - 30 kV versions
- 19" rack mountable
- Best control characteristics
- Multiple interface options
- Capacitor charger option (CLD)
- ARC management
- Very low ripple and noise, very low EMI
- Parallel operation for power increase

AIO

DIO

CLD

CUSTOM

DATA SHEET

HPS devices are digitally controlled AC driven high voltage power supplies with high power density at best output characteristics. The processor controlled supplies can flexibly be adapted to any kind of application by configuring many options. PWM controlled output parameters, small ripple and noise and stored energy, up to 85% efficiency and almost loss free switching of semiconductors makes HPS devices the most advanced AC/DC HV power supply for industrial and research applications.

SPECIFICATIONS

	HPS 300 W	HPS 800 W
Power	300 W	800 W
Polarity	factory fixed, positive or negative	factory fixed, positive or negative
Efficiency	up to 80%	up to 85%
Ripple and noise [f >10 Hz]	$< 1 \bullet 10^{-4} \bullet V_{nom}$ [$V_{nom} \leq 8$ kV] $< 5 \bullet 10^{-4} \bullet V_{nom}$ [$V_{nom} > 8$ kV]	$< 1 \bullet 10^{-4} \bullet V_{nom}$ [$V_{nom} \leq 8$ kV] $< 5 \bullet 10^{-4} \bullet V_{nom}$ [$V_{nom} > 8$ kV]
Stability	0.02 % V_{nom} *	0.02 % V_{nom} *
Voltage regulation [$\Delta V_{out} / \Delta V_{in}$]	0.01 % [$V_{out} \geq 5$ V]	0.01 % [$V_{out} \geq 5$ V]
Temperatur coefficient	< 200 ppm / K	< 200 ppm / K
Supply voltage	85 - 264 VAC with PFC	85 - 264 VAC with PFC
Switching frequency	30 - 70 kHz	30 - 70 kHz
Set / monitor voltage	optional 0 - 5 V	optional 0 - 5 V
Protection	overload, ARC and short circuit, INTERLOCK, INHIBIT, overvoltage/overtemp	overload, ARC and short circuit, INTERLOCK, INHIBIT, overvoltage/overtemp
ARC management	ARC	ARC
Filament supply	not available	not available
Interfaces	USB, CAN, IEEE488.2 ** Ethernet **, RS232 **, AIO isolated **	USB, CAN, IEEE488.2 ** Ethernet **, RS232 **, AIO isolated **
Case	19" rack mountable	19" rack mountable
Dimensions (L/W/H)	410 mm / 19"/ 1U	410 mm / 19"/ 1U

*) for 8h, after 0.5h warmup **) optional

CONFIGURATIONS

MODEL	V_{nom}	I_{nom}	HV CONNECTOR
HPS 19" - 300 W			
HPx 10 307	1 kV	300 mA	SHV
HPx 20 157	2 kV	150 mA	SHV
HPx 30 107	3 kV	100 mA	SHV
HPx 40 756	4 kV	75 mA	SHV
HPx 60 506	6 kV	50 mA	SHV
HPx 80 356	8 kV	35 mA	SHV
HPx 120 256	12 kV	25 mA	G21
HPx 150 206	15 kV	20 mA	G21
HPx 200 156	20 kV	15 mA	G21
HPx 300 106	30 kV	10 mA	G31
HPS 19" - 800 W			
HPx 10 807	1 kV	800 mA	SHV
HPx 20 407	2 kV	400 mA	SHV
HPx 30 257	3 kV	250 mA	SHV
HPx 40 207	4 kV	200 mA	SHV
HPx 60 137	6 kV	130 mA	SHV
HPx 80 107	8 kV	100 mA	SHV
HPx 120 656	12 kV	65 mA	G21
HPx 150 506	15 kV	50 mA	G21

OPTIONS & ORDER INFO

OPTION	ORDER INFO	EXAMPLE
Polarity	positive: **x = p**, negative: **x = n**	HP**p** 10 307
Capacitor charger	**CLD**	
Interface options	Ethernet: **ETH** | IEEE 488: **IEE** | RS232: **RS2**	

OPTION	ORDER INFO
AIO isolated	**AIO** (0-5 V)
Rear HV connector (SHV only)	**HVR**

Note: other product configurations and customizing on request

HPS

DIGITALLY CONTROLLABLE AC/DC HIGH VOLTAGE POWER SUPPLIES

AIO
DIO
CLD
ARC PRO
CUSTOM

- 1.5 kW - 10 kW / 1kV - 100 kV versions
- 19" rack mountable
- Best control characteristics
- Multiple interface options
- Capacitor charger option (CLD)
- ARC management (ultrafast ARCpro optional)
- Very low ripple and noise, very low EMI
- Parallel operation for power increase

DATA SHEET

HPS devices are digitally controlled AC driven high voltage power supplies with high power density at best output characteristics. The processor controlled supplies can flexibly be adapted to any kind of application by configuring many options. PWM controlled output parameters, small ripple and noise and stored energy, up to 93% efficiency and almost loss free switching of semiconductors makes HPS devices the most advanced AC/DC HV power supply for industrial and research applications.

SPECIFICATIONS

	HPS 1.5 kW	HPS 3 kW	HPS 6 kW	HPS 10 kW
Power	1,500 W	3,000 W	6,000 W	10,000 W
Polarity	factory fixed positive or negative	factory fixed positive or negative	factory fixed positive or negative	factory fixed, positive or negative
Efficiency	up to 93%	up to 93%	up to 93%	up to 93%
Ripple and noise [f >10 Hz]	$< 3 \bullet 10^{-3} \bullet V_{nom}$ **	$< 5 \bullet 10^{-3} \bullet V_{nom}$ **	$< 9 \bullet 10^{-3} \bullet V_{nom}$ **	$< 9 \bullet 10^{-3} \bullet V_{nom}$ **
Stability	$0.05\ \% \bullet V_{nom}$ *	$0.05\ \% \bullet V_{nom}$ *	$0.05\ \% \bullet V_{nom}$ *	$0.05\ \% \bullet V_{nom}$ *
Voltage regulation [ΔV_{out} / ΔV_{in}]	0.01 % [$V_{out} \geq 5$ V]	0.01 % [$V_{out} \geq 5$ V]	0.01 % [$V_{out} \geq 5$ V]	0.01 % [$V_{out} \geq 5$ V]
Temperatur coefficient	$< 2 \bullet 10^{-4}$ / K	$< 2 \bullet 10^{-4}$ / K	$< 2 \bullet 10^{-4}$ / K	$< 2 \bullet 10^{-4}$ / K
Supply voltage	190 - 264 VAC with PFC	170 - 264 VAC with PFC	3 x 400 VAC ± 10%	3 x 400 VAC ± 10%
Switching frequency	80 - 130 kHz	70 - 90 kHz	60 - 80 kHz	60 - 80 kHz
Set / monitor voltage	0 - 5 V | opt. 0 - 10 V	0 - 5 V | opt. 0 - 10 V	0 - 5 V | opt. 0 - 10 V	0 - 5 V | opt. 0 - 10 V
Protection	overload, ARC and short circuit, INTERLOCK, INHIBIT, overvoltage/overtemp	overload, ARC and short circuit, INTERLOCK, INHIBIT, overvoltage/overtemp	overload, ARC and short circuit, INTERLOCK, INHIBIT, overvoltage/overtemp	overload, ARC and short circuit, INTERLOCK, INHIBIT, overvoltage/overtemp
ARC Management	ARC | optional: ARCpro	ARC | optional: ARCpro	ARC | optional: ARCpro	ARC | optional: ARCpro
Filament supply	optional	optional	optional	optional
Interfaces	USB, AIO isolated optional: IEEE 488.2, Ethernet, RS232, CAN, SPS (0-10V)	USB, AIO isolated optional: IEEE 488.2, Ethernet, RS232, CAN, SPS (0-10V)	USB, AIO isolated optional: IEEE 488.2, Ethernet, RS232, CAN, SPS (0-10V)	USB, AIO isolated optional: IEEE 488.2, Ethernet, RS232, CAN, SPS (0-10V)
Case	19" rack mountable	19" rack mountable	19" rack mountable	19" rack mountable
Dimensions (L/W/H)	410-550 mm / 19"/ 2-4U	410-550 mm / 19"/ 2-4U	410-550 mm / 19"/ 2-4U	500 mm / 19"/ 4U

*) for 8h, after 0.5h warmup **) option VLN: $< 5 \bullet 10^{-4} \bullet V_{nom}$ (not available for all configurations)

SEE COVER FOR SHORTCUT REFERENCE

CONFIGURATIONS

MODEL	V_{nom}	I_{nom}	HEIGHT/DEPTH	HV CONNECTOR
HPS 19" - 1.5 kW				
HPx 10 158 152	1 kV	1.5 A	2U	SHV
HPx 20 757 152	2 kV	750 mA	2U	SHV
HPx 30 507 152	3 kV	500 mA	2U	SHV
HPx 40 387 152	4 kV	380 mA	2U	SHV
HPx 60 257 152	6 kV	250 mA	2U	L11
HPx 80 197 152	8 kV	190 mA	2U	L11
HPx 100 157 152	10 kV	150 mA	2U	L11
HPx 120 137 152	12 kV	125 mA	2U	G21
HPx 150 107 152	15 kV	100 mA	2U 410 mm	G21
HPx 200 756 152	20 kV	75 mA	2U 410 mm	G21
HPx 300 506 152	30 kV	50 mA	3U 410 mm	G40
HPx 400 386 152	40 kV	38 mA	3U 410 mm	G40
HPx 500 306 152	50 kV	30 mA	3U 500 mm	G60
HPx 600 256 152	60 kV	25 mA	3U 500 mm	G60
HPx 800 206 152	80 kV	20 mA	4U 550 mm	G100
HPx A00 156 152	100 kV	15 mA	4U 550 mm	G100
HPS 19" - 3 kW				
HPx 10 308 302	1 kV	3 A	2U 410 mm	SHV
HPx 20 158 302	2 kV	1.5 A	2U 410 mm	SHV
HPx 30 108 302	3 kV	1 A	2U 410 mm	SHV
HPx 40 757 302	4 kV	750 mA	2U 410 mm	SHV
HPx 60 507 302	6 kV	500 mA	2U 410 mm	L11
HPx 80 387 302	8 kV	375 mA	2U 410 mm	L11
HPx 120 257 302	12 kV	250 mA	2U 410 mm	G21
HPx 150 207 302	15 kV	200 mA	2U 410 mm	G21
HPx 200 157 302	20 kV	150 mA	2U 410 mm	G21
HPx 300 107 302	30 kV	100 mA	3U 410 mm	G40
HPx 400 756 302	40 kV	75 mA	3U 410 mm	G40
HPx 500 606 302	50 kV	60 mA	3U 500 mm	G60
HPx 600 506 302	60 kV	50 mA	3U 500 mm	G60
HPx 800 386 302	80 kV	38 mA	4U 550 mm	G100
HPx A00 306 302	100 kV	30 mA	4U 550 mm	G100

CONFIGURATIONS

MODEL	V_{nom}	I_{nom}	HEIGHT/DEPTH	HV CONNECTOR
HPS 19" - 6 kW				
HPx 10 608 602	1 kV	6 A	4U 500 mm	G11
HPx 20 308 602	2 kV	3 A	4U 500 mm	L11
HPx 30 208 602	3 kV	2 A	4U 500 mm	L11
HPx 40 158 602	4 kV	1.5 A	4U 500 mm	L11
HPx 50 128 602	5 kV	1.2 A	4U 500 mm	L11
HPx 60 108 602	6 kV	1 A	4U 500 mm	L11
HPx 80 757 602	8 kV	750 mA	4U 500 mm	L11
HPx 100 607 602	10 kV	600 mA	4U 500 mm	L11
HPx 200 307 602	20 kV	300 mA	4U 500 mm	G21
HPS 19" - 10 kW				
HPx 10 109 103	1 kV	10 A	4U 500 mm	G11
HPx 20 508 103	2 kV	5 A	4U 500 mm	L11
HPx 30 348 103	3 kV	3.4 A	4U 500 mm	L11
HPx 40 258 103	4 kV	2.5 A	4U 500 mm	L11
HPx 50 208 103	5 kV	2 A	4U 500 mm	L11
HPx 60 178 103	6 kV	1.7 A	4U 500 mm	L11
HPx 80 138 103	8 kV	1.3 A	4U 500 mm	L11
HPx 100 108 103	10 kV	1 A	4U 500 mm	L11
HPx 200 507 103	20 kV	500 mA	4U 500 mm	G21

OPTIONS & ORDER INFO

OPTION	ORDER INFO	EXAMPLE
Polarity	positive: **x = p**, negative: **x = n**	HP**p** 10 158 152
Capacitor charger	**CLD**	
Front panel operation with LCD	**FP**	
Interface options	controller area network: **CAN** | industry analog I/O: **SPS** | EtherCAT: **ETC** | Ethernet: **ETH** | IEEE 488: **IEE** | RS232: **RS2**	
Very low noise: $< 5 \cdot 10^{-4} \cdot V_{nom}$ (*not available for all configurations)	**VLN**	
ARC management pro (ultrafast)	**ARCpro**	
ARC current limitation	**ACL**	
Two HV output connectors	**2HC**	
Integrated filament supply	**FCS**	
Higher voltage stability: $< 1 \cdot 10^{-4} \cdot V_{nom}$ (*not available for all configurations)	**HVS**	
Wide range input 400 - 480V +/- 10% (6 and 10kW only)	**WR4**	
Extended operating area	**EOA**	

HPS FOR E-BEAM APPLICATIONS

FILAMENT POWER SUPPLY

AIO
DIO
ARC pro
CUSTOM

- **HV supply with up to 2 integrated filament supply supplies for e-beam applications**
- **Filament supply on internal HV potential possible**
- **All HPS features and options available**

10 kW HPS WITH FILAMENT SUPPLY OPTION FOR E-BEAM COATING

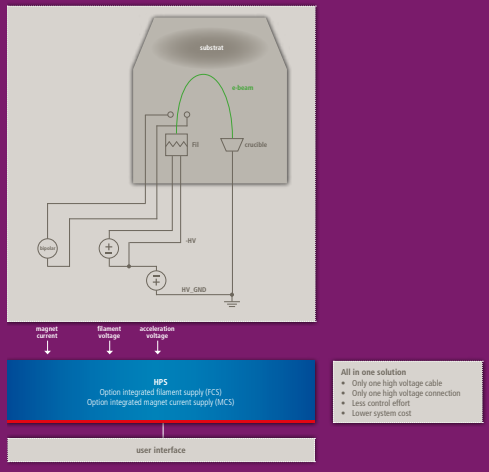
HPS high voltage power supplies with one or two integrated filament supplies (option FCS) are best prepared to fit major requirements in e-beam applications. Benefits of iseg FCS option are:

- only one high voltage cable / connection
- less control effort
- lower system cost

FCS CONFIGURATIONS

MODEL	V_{nom}	I_{nom}	V_{type}	P_{nom}	ISOLATION VOLTAGE
FPd 10 003 000	10 V	3.5 A	DC	35 W	0 V
FPa 10 005 060	10 V	5 A	AC	50 W	60 kV
FPd 12 006 000	12 V	6 A	DC	72 W	0 V
FPd 12 050 010	12 V	50 A	DC	500 W	10 kV
FPa 15 004 060	15 V	4 A	AC	60 W	60 kV
FPd 30 020 010	30 V	20 A	DC	600 W	10 kV
FPd 40 010 010	40 V	10 A	DC	400 W	10 kV

MORE ABOUT INTEGRATED E-BEAM SOLUTIONS - P. 78



FPS

FLOATING LOW VOLTAGE POWER SUPPLY

SEE COVER FOR SHORTCUT REFERENCE

- **Dedicated supply unit, e.g. for e-beam based coating applications**
- **Floating LV supply on HV potential via HV-in connector**
- **USB, AIO, CAN, RS232, Ethernet interfaces**
- **Optional front panel operation with LCD**
- **Special control mechanism, like direct filament heating control or parent emission regulation**

AIO

DIO

CUSTOM

DATA SHEET

The FPS series is a dedicated floating low voltage power supply. It can be used for example as filament supply in electron beam coating applications. The main advantage is the possibility to combine with HPS high voltage power supplies, where the FPS can be driven on high voltage potential of the HPS. Therefore the FPS has a HV-input connector and a HV output cable.

SPECIFICATIONS

Polarity	positive
Ripple and noise (f >10 Hz)	< 1.5 % • I_{nom}
Efficiency	> 90 %
Current regulation [ΔI_{out} / ΔI_{in}]	< 0.1% • I_{nom}
Temperature coefficient	<100 ppm • K^{-1}
Supply voltage	85 - 264 VAC
Switching frequency	68 - 280 kHz
Set / monitor voltage	0 - 10 V
Protection	overload, INHIBIT, INTERLOCK, hardware VI-limits, overtemp
Interfaces	AIO | USB | CAN | RS232 | ETHERNET
Case	19" rack mountable
Dimensions (L/W/H)	410 mm / 19" / 2U

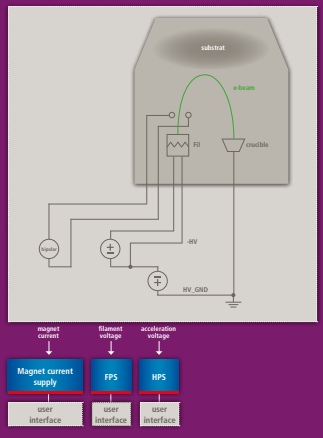
CONFIGURATIONS

MODEL	V_{nom}	I_{nom}	P_{nom}	ISOLATION VOLTAGE
FPd 010 060 010	10 V	60 A	600 W	10 kV
FPd 012 050 010	12 V	50 A	600 W	10 kV
FPd 020 030 010	20 V	30 A	600 W	10 kV
FPd 030 020 010	30 V	20 A	600 W	10 kV
FPd 040 015 010	40 V	15 A	600 W	10 kV
FPd 040 010 050	40 V	10 A	400 W	5 kV
FPd 012 008 050	12.5 V	8 A	100 W	5 kV

OPTIONS & ORDER INFO

OPTION	ORDER INFO
Front panel operation with LCD	**FP**
CAN interface	**CAN**
Ethernet interface	**ETH**
RS232 interface	**RS2**

MORE ABOUT E-BEAM SOLUTIONS - P. 78



HPS OPTIONS

400-480 V WIDE RANGE INPUT AND ETHERCAT INTERFACE

EtherCAT®

400-480V INPUT VOLTAGE

- EtherCAT interface is now optionally available for HPS from 3 kW to 10 kW
- flexible topology without switches or hubs
- easy configuration, highly robust and failsafe
- very high performance

- Devices equipped with the 400 V - 480 V widerange option can be operated with voltages between 360 V and 530 V (400 V - 480 V ± 10%)
- the use in European and American industrial networks is possible without an additional transformer
- higher power factor (cos phi) of about 0.9
- by the use of new semiconductor components a high efficiency factor can be reached

EtherCAT® is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

THQ

HIGHLY CONFIGURABLE AC/DC LABORATORY HV SUPPLY

SEE COVER FOR SHORTCUT REFERENCE

- 1 and 2 channel desktop version, 1-3 channel 19" rack version
- Can be equipped with CPS, DPS or EPS modules
- Common USB or analog interface per channel
- Cost efficient and flexible
- LCD and front panel operation
- 500 V - 30 kV / up to 150W per channel
- High precision / very low ripple and noise (with DPS)

THQ

AIO

DIO

CUSTOM

DATA SHEET

The inexpensive and robust desktop high voltage power supplies are equipped with proven high voltage modules of the CPS, DPS and EPS series.

The units are available with either 1, 2 or 3 high voltage channels in many variations and combinations.

The output voltage is controlled via the 10-turn potentiometer, the USB interface or the analog I/O. Output voltage or current is displayed on a LCD per channel.

19" THQ device equipped with three DPS modules

SPECIFICATIONS

	THQ DESKTOP	THQ 19"
Converter specs.	refer technical data CPS / DPS / EPS	refer technical data CPS / DPS / EPS
Channels	1/2	1-3
Display	2 line - 4 digit LCD per channel	2 line - 4 digit LCD per channel
Supply	100 - 264 VAC / 50/60 Hz fused with 2 A-slow	100 - 264 VAC / 50/60 Hz fused with 2 A-slow
Interfaces	USB, AIO per channel	USB, AIO per channel
HV connector *	SHV | LEMO	SHV | LEMO
Protection	overload and short circuit, INHIBIT	overload and short circuit, INHIBIT
Case	desktop case	19" rack mountable
Dimensions (L/W/H)	308/257/83 mm	305 mm / 19" / 2U

*) depends on module configuration

CONFIGURATIONS

MODEL	CASE	CHANNELS	MAX. OUTPUT VOLTAGE
THQ 1CH	Desktop	1	30 kV
THQ 1CH 2HE	19"	1	30 kV
THQ 2CH	Desktop	2	15 kV
THQ 2CH 2HE	19"	2	30 kV
THQ 3CH 2HE	19"	3	30 kV

OPTIONS & ORDER INFO

OPTION	ORDER INFO	EXAMPLE
Module type	CPS/DPS/EPS: **x = CP/DP/EP**	T2CP 150n (THQ with 2 CPS 15 kV negative channels)
19" version	2HE	

SHR

SWITCHABLE HIGH END HIGH PRECISION AC/DC DESKTOP HV SUPPLY

ETHERNET SWITCHABLE
HV-SMU
MULTIMODE HV TFT TOUCH

CUSTOM

ULN

DIO

DATA SHEET

The new SHR series represents a standalone High Precision HV labratory SMU - Source Measuring Unit - equipped with the finest iseg HV generation technology and iCS control system. The SHR provides up to 4 HV-channels, each with an independent voltage and current control and reversible polarity.

A completely new developed flexible 6kV channel provides a maximum versatility: With three electronically switchable HV-generation modes it can supply 4 mA up to voltages of 2 kV, 3 mA up to 4 kV or 2 mA up to 6 kV. Alternatively the SHR can be equipped with cost efficient 2kV/6mA fixed channels.

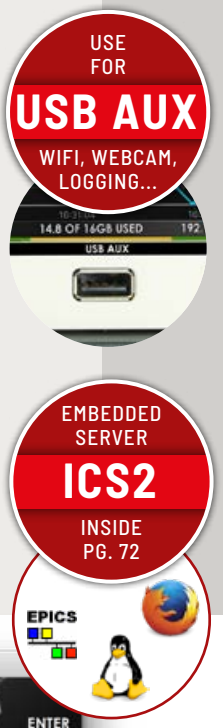
SPECIFICATIONS

	SHR STANDARD	SHR HIGH PRECISION
Polarity	electronically switchable	electronically switchable
Ripple and noise	< 10 mV	< 2 - 3 mV
Temperature coefficient	50 ppm / K	30 ppm/K | opt. 10 ppm/K (TC)
Resolution voltage setting	$2 \bullet 10^{-6} \bullet V_{nom}$	$2 \bullet 10^{-6} \bullet V_{nom}$
Resolution current setting	$2 \bullet 10^{-6} \bullet I_{nom}$	$2 \bullet 10^{-6} \bullet I_{nom}$
Resolution voltage measurement	$2 \bullet 10^{-6} \bullet V_{nom}$	$1 \bullet 10^{-6} \bullet V_{nom}$
Resolution current measurement - full range	$2 \bullet 10^{-6} \bullet I_{nom}$	$1 \bullet 10^{-6} \bullet I_{nom}$
Resolution current measurement - 2nd range	n/a	50 pA [I_{out} < 20µA]
Accuracy voltage measurement *	$\pm$ (0.01 % $\bullet$ V_{out} + 0.02 % $\bullet$ V_{nom})	$\pm$ (0.01 % $\bullet$ V_{out} + 0.01 % $\bullet$ V_{nom})
Accuracy current measurement *- full range	$\pm$ (0.01 % $\bullet$ I_{out} + 0.02 % $\bullet$ I_{nom})	$\pm$ (0.01 % $\bullet$ I_{out} + 0.01 % $\bullet$ I_{nom})
Accuracy current measurement *- 2nd range	n/a	$\pm$ (0.01 % $\bullet$ I_{out} + 4 nA)
Rate of voltage change	$1 \bullet 10^{-6} \bullet V_{nom}$/s up to 0.2 $\bullet$ V_{nom} / s	$1 \bullet 10^{-6} \bullet V_{nom}$/s up to 0.2 $\bullet$ V_{nom} / s
Supply voltage	100 - 264 VAC / 50-60 Hz	100 - 264 VAC / 50-60 Hz
Protection	INHIBIT, Safety loop, short circuit, overload, hardware V/I limits	INHIBIT, Safety loop, short circuit, overload, hardware V/I limits
Interfaces	Ethernet, USB(A) 2.0 (Host: Wifi, Logging, Webcam), USB(B) (remote control)	Ethernet, USB(A) 2.0 (Host: Wifi, Logging, Webcam), USB(B) (remote control)
HV connector	SHV	SHV
Case	desktop case	desktop case
Dimensions (L/W/H)	331/257/103 mm	331/257/103 mm

*) All specifications guaranteed from 1% · V_{mode} < V_{out} < V_{mode}

SEE COVER FOR SHORTCUT REFERENCE

- 2 / 4 channels, 2 kV / 6 kV versions
- Electronically switchable polarity
- 6 kV channel with electronical switchable modes: up to 2 kV/4 mA, 4 kV/3 mA or 6 kV/2 mA
- High precision / very low ripple and noise
- Ethernet / USB interfaces, integrated iCS2 on ARM Linux server hardware
- 4.3" TFT capacitive touch display
- Comprehensive features like logging, diagrammatic display and script control



A high quality 4.3" TFT shows detailled information and can be controlled by capacitive touch. All comprehensive features like logging, graphical display and customer specific plugins are also available by the precise jog-wheel and buttons.

SHRremote: remote the SHR simultaneously on WIN/LINUX/ MAC like a mirrored SHR display

CONFIGURATIONS

MODEL	CHANNELS	PRECISION	OUTPUT VOLTAGE	OUTPUT CURRENT	HV-MODES (V_{mode} / I_{mode})
SHR 20 20	2	Standard	2 kV	6 mA	2 kV / 6 mA
SHR 20 60	2	Standard	6 kV	4 mA	6 kV / 2 mA | 4 kV / 3 mA | 2 kV / 4 mA
SHR 40 20	4	Standard	2 kV	6 mA	2 kV / 6 mA
SHR 40 60	4	Standard	6 kV	4 mA	6 kV / 2 mA | 4 kV / 3 mA | 2 kV / 4 mA
SHR 22 20	2	High	2 kV	6 mA	2 kV / 6 mA
SHR 22 60	2	High	6 kV	4 mA	6 kV / 2 mA | 4 kV / 3 mA | 2 kV / 4 mA
SHR 42 20	4	High	2 kV	6 mA	2 kV / 6 mA
SHR 42 60	4	High	6 kV	4 mA	6 kV / 2 mA | 4 kV / 3 mA | 2 kV / 4 mA

Other configurations on request!

OPTIONS & ORDER INFO

OPTION	ORDER INFO
LOWER TEMP. COEFFICIENT (high precision version only)	TC
LOWER CURRENT (100 µA, high precision version only)	L
SINGLE CHANNEL INHIBIT - BNC CONNECTORS	IHB
DETECTOR INHIBIT (ORTEC, CANBERRA)	IHD

SYSTEMS

INDEX

SYSTEMS OVERVIEW

MMS

MMS HV compatible

MMS LV compatible

ISEG MMS SYSTEM

The 19"/ 6U Eurocassette standard based modular low and high voltage system is the common iseg and WIENER vendor specific multichannel standard. With a wide set of modules the MMS system provides the most advanced features in low and high voltage generation. Many international customers trust in the reliability, precision and quality of iseg modules. Together with the control and configuration server iCS2.5 running on crate controller CC24 iseg delivers cutting-edge solutions for high precision voltage supplying applications.

ISEG 3U SYSTEMS (MME, MMC)

MME

MMC

The systems MME and MMC
are based on 19"/ 3U Eurocassette standard.

MME can be used for combination of front-panel-controllable EHQ modules as an ideal modular lab system.

In the MMC system analog DC/DC modules of CPS, DPS and EPS series can be controlled digitally as a system.

NIM

NIM

Nuclear Instrumentation Modul-Standard

*) ETHERNET BY USE WITH ICSMINI

SYSTEMS

SYSTEMS OVERVIEW

SEE COVER FOR SHORTCUT REFERENCE

MODULES	CRATES	INTERFACES
EHS EHR EBS ESS	ECH 54A / 55A / 56A ECH 242 / 244 / 224	TOUCH DISPLAY ETHERNET | WIFI | CAN
WIENER LOW VOLTAGE MODULES	WIENER MPOD	ETHERNET | LCD+LOCAL CONTROL

MODULES	CRATES	INTERFACES
MME EHQ	MME ECH 104 / 134 / 108 / 138	CAN | RS232 |
MMC CPS-3U DPS-3U EPS-3U	MMC ECH 124 / 128 / 12A / 14A	USB | CAN | RS232 | ETHERNET

MODULES	CRATES	INTERFACES
NHR NHS NHQ	WIENER NIM COMPACT | PORTABLE WIENER NIM CE (CERN) | 6000	USB | CAN | RS232 | ETHERNET *

ADVANTAGES

PROVEN TECHNOLOGY WITH BEST CHARACTERISTICS

By using modern, patented iseg resonant converter technology we deliver efficient and high precise power supplies with excellent electrical parameters.

CUSTOMIZED VERSIONS ON REQUEST

In addition to our standard product range we produce a substantial range of customer-specific equipment.

UP TO 2 YEARS MANUFACTURER´S WARRANTY

Prolongable by an extra charge.

MMS MODULES

SERIES	DISPLAY	CHANNELS	V_{NOM}	NOISE	CH. SUPPLY PRINCIPLE	FLOATING VERSION	CONNECTORS	OPTIONS	PAGE	
EHS	LED	4/8/16/32/48	0.1 - 20 kV	LN | VLN* | ULN ***	Distinct Source	CG | CFG | FG **	R51 | SHV	L | TC	42	MMS HV
EHR	LED	4	2 / 4 / 6 kV	LN | ULN ***	Distinct Source	CFG	SHV	L | TC | INH	49	
EBS	LED	4/12/24	±0.5 - 3 kV	LN	Bipolar Distributor	CFG	R51 | SHV | LEM		48	MMS HV
ESS	LED	1	10 / 20 / 30 kV	LN	Distinct Source/Sink	FG	SHV | GES		50	
MPV	LED	4/8	8/16/30/60/120 V	LN	Distinct Source	FG	D-SUB		51	MMS LV

MME MODULES

SERIES	DISPLAY	CHANNELS	V_{NOM}	NOISE	CH. SUPPLY PRINCIPLE	FLOATING VERSION	CONNECTORS	OPTIONS	PAGE
EHQ	LCD	1	2 - 5 kV	LN	Distinct Source	CG	SHV		55

MMC MODULES

SERIES	DISPLAY	CHANNELS	V_{NOM}	NOISE	CH. SUPPLY PRINCIPLE	FLOATING VERSION	CONNECTORS	OPTIONS	PAGE
CPS-3U	-	1	0.5 - 30 kV	VLN	Distinct Source	CG	SHV	CLD | ARC	58
DPS-3U	-	1	0.5 - 6 kV	VLN	Distinct Source	CG	SHV		59
EPS-3U	-	1	0.5 - 30 kV	VLN	Distinct Source	CG	SHV	CLD | ARC	60

NIM MODULES

SERIES	DISPLAY	CHANNELS	V_{NOM}	NOISE	CH. SUPPLY PRINCIPLE	FLOATING VERSION	CONNECTORS	OPTIONS	PAGE
NHR	TFT	4	2 - 6 kV	LN | ULN***	Multimode Source	CFG	SHV	L | TC	65
NHS	TFT	6	0.1 - 6 kV	LN | VLN***	Distinct Source	CG	SHV	L | TC	66
NHQ	LCD	1/2	2 - 8 kV	LN	Distinct Source	CG	SHV	L | VHR | N24	68

*) with option VLN
**) with option F
***) as High Precision version

SYSTEMS

CRATES

SEE COVER FOR SHORTCUT REFERENCE

MMS CRATES

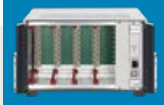
TYPE SERIES	DIMENSIONS (H/W/L)	MODULE-SLOTS	POWER MAX. HV|LV	HV/LV	INTERFACES	CONTROLLER	SOFTWARE	OPTIONS	PAGE
ECH 5xA	8U / 19"/ 462 mm	10	1,200 W	HV | LV	Ethernet | CAN	CC24 | CC23	iCS | EPICS | OPC	UPS	38
ECH 242	7U / 120 mm / 350 mm	2	200 W	HV	Ethernet | CAN	CC24 | CC23	EPICS | CC | iCS		40
ECH 224	7U / 235 mm / 350 mm	4	300 W	HV	CAN	-	EPICS | OPC | CC		40
ECH 244	7U / 235 mm / 350 mm	4	300 W	HV	Ethernet | CAN	CC24 | CC23	EPICS | CC | iCS		40
MPOD	8U / 19"/ 462 mm	10	3,000 W	HV | LV	Ethernet | CAN	MPODC / CC24	SNMP | EPICS | OPC | iCS		41
MPOD mini	5U / 19"/ 480 mm	4	600W | 1,600W	HV | LV	Ethernet | CAN	MPODC / CC24	SNMP | EPICS | OPC | iCS		41
MPOD micro	2-3U / 19"/ 480 mm	1/2	300-800 W	HV | LV	Ethernet | CAN	MPODC / CC24	SNMP | EPICS | OPC | iCS		41

MME CRATES

TYPE SERIES	DIMENSIONS (H/W/L)	MODULE-SLOTS	POWER MAX. HV|LV	HV/LV	INTERFACES	CONTROLLER	SOFTWARE	OPTIONS	PAGE
ECH 104	3U / 235 mm / 350 mm	4	200 W	HV	RS232	-	SCPI | TERM		54
ECH 134	3U / 235 mm / 350 mm	4	200 W	HV	CAN	-	CC		54
ECH 108	3U / 19" / 350 mm	8	200 W	HV	RS232	-	SCPI | TERM		54
ECH 138	3U / 19" / 350 mm	8	200 W	HV	CAN	-	CC		54

MMC CRATES

TYPE SERIES	DIMENSIONS (H/W/L)	MODULE-SLOTS	POWER MAX. HV|LV	HV/LV	INTERFACES	CONTROLLER	SOFTWARE	OPTIONS	PAGE
ECH 124	3U / 235 mm / 350 mm	4	120 W	HV	CAN | USB | Ethernet	MICC	iCS | CC | SCPI | TERM		56
ECH 128	3U / 19" / 350 mm	8	300 W	HV	CAN | USB | Ethernet	MICC	iCS | CC | SCPI | TERM		56
ECH 12A / 14A	3U / 19" / 350 mm	10	300 W	HV	CAN | USB | Etherne	tMICC	iCS | CC | SCPI | TERM		56

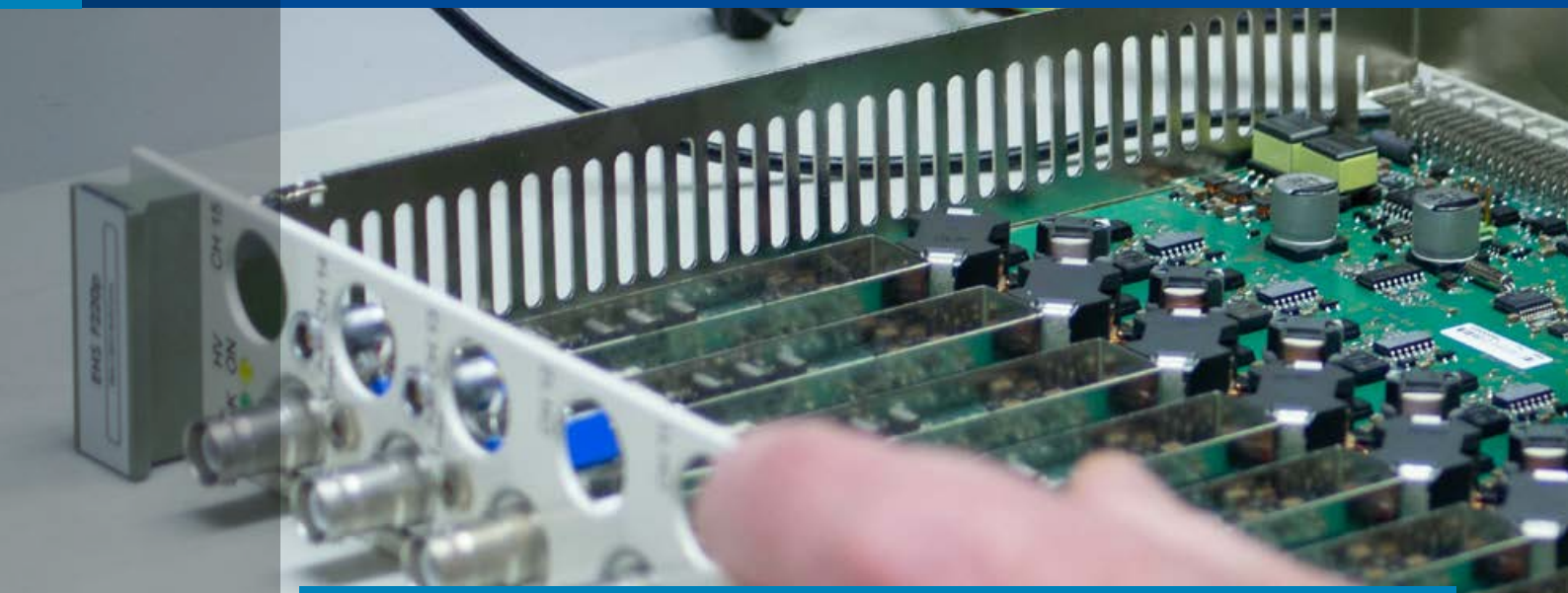


NIM CRATES

TYPE SERIES	DIMENSIONS (H/W/L)	MODULE-SLOTS	POWER MAX. HV|LV	HV/LV	INTERFACES	CONTROLLER	SOFTWARE	OPTIONS	PAGE
Compact	340 mm / 19" / 5U	9	150 W	HV	-	-	-	-	64
Portable	340 / 273 / 273 mm	7	150 W	HV	-	-	-	-	64
NIMPACT	518 mm / 19" / 5U	5 (7U)	300 W	HV	Ethernet	-	-	-	64
6000	620 mm / 19" / 7U	12	2,700 W	HV	Ethernet | RS232 | CAN		-	DIIS	64
NIM CE (CERN)	530 mm / 19" / 5U (7U)	12	300/600/1,920W	HV	Ethernet	-	-	-	64

MMS

OVERVIEW



MODULES

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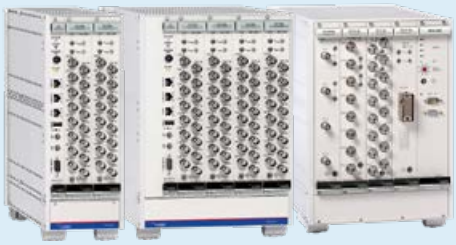
HIGH
POWER

CRATES

© CERN



ECH 5xA

VERSATILE 10 SLOT MMS HV CRATES FOR LOW AND HIGH VOLTAGE MODULES

UPS
MMS HV compatible
MMS LV compatible

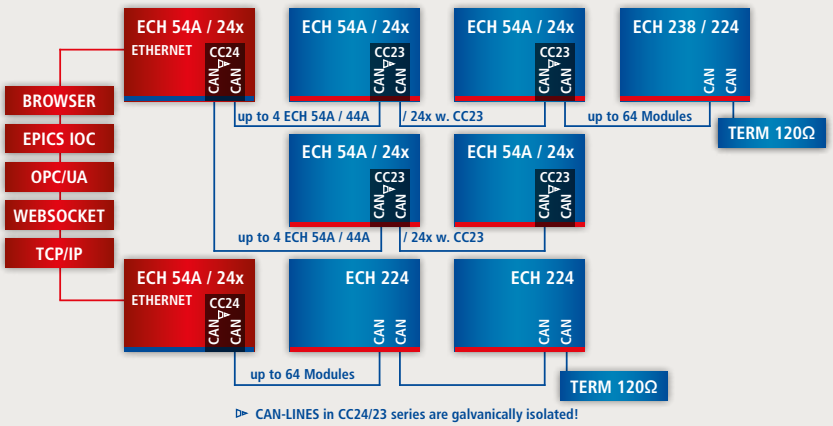
- 10 slots MMS Low and High Voltage modules
- Maintenance friendly ruggedized mechanics
- Ultra low noise 1.200 W power supply
- Optional capacitive touch display
- Optional UPS
- Free configurable analog/digital I/O: INHIBIT, INTERLOCK, etc.

SPECIFICATIONS

Controller	CC24 Master Controller or CC23 Slave Controller
Interfaces	Gigabit Ethernet, 2x CAN, 2x USB
Display unit	optional
Control	iCS, OPC, EPICS, API
Slots	10 MMS slots
Output power	1.200 W (opt. 600 W)
Supply voltage	100 - 240 VAC with PFC
Cooling	vertical, with integrated fans
Dimensions (L/W/H)	462 mm / 19"/ 8U

OPTIONS & ORDER INFO

OPTION	ORDER INFO	EXAMPLE
MMS compatibility:	4 = HV | 5 = LV | 6 = HV / LV	**ECH 56A**
Display unit	**DIS**	**ECH 54A-DIS**
Uninterruptible power supply	**UPS**	**ECH 54A-UPS**
Module cage reversed	**HVR**	**ECH 54A-HVR**



The iseg ECH 5xA crate series is the newest model line within the MMS system and supersedes ECH 4xA series. The 19" crate provides 10 MMS multichannel module slots. With two external electrical isolated CAN lines, powerful 1.200 W and optional UPS unit this ECH is perfectly prepared to reliably handle demanding HV supply tasks.

The crate can be ordered with two mounting modes: outputs at front or at rear side.

Furthermore the ECH 5xA system can extend with „old" ECH 238 8-slot crates. Thus one ECH 5xA can manage up to 128 modules via two CAN lines, for instance to upgrade existing installations with multiple options of Ethernet based connectivity.

CC24/CC23

UNIVERSAL APPLICABLE CONTROLLER BOARDS FOR MMS CRATES

SEE COVER FOR SHORTCUT REFERENCE

ICS

CAN

WIFI

MMS HV compatible

MMS LV compatible

EPICS

Using the master controller CC24 the crate is equipped with an integrated iseg communication server iCS2. This enables multiple connectivity and a quick and easy setup to control high voltage modules.

The ECH and connected High Voltage/Low Voltage modules can be managed intuitively with any modern webbrowser in a local Ethernet network or by a WiFi client using the optional USB wireless adapter, which provides an own dedicated wireless infrastructure. To survey a lab or experiment an USB webcam can also be easily connected and monitored inside the iCSmonitor while controlling the hardware.

Alternatively the integrated iCS2 also provides OPC-UA, HTTP, TCP/IP and EPICS IOC APIs. The ECH system can be extended by CAN bus with up to 8 ECH 5xA / 44A 10 slot crates equipped with CC23 slave controllers. It is possible to control up to 90 iseg HV modules, with a theoretical channel number of 4,320 HV channels (using EDS/EHS 48ch modules).

SYSTEM	CC24 WITH iCS
Interface	100/1000 MBIT Ethernet
WiFi	optional
Linux Server	embedded
Slave extensions	CC23 (via CAN)
Hardware interlock	onboard
Webserver	control & cofiguration
SNMP	integrated
EPICS IOC	integrated
OPC U/A	integrated
Logging	integrated
LabVIEW support	VI available
Software	
iseg CONTROL 1	ready
iseg CONTROL 2	ready

CONTROL & CONFIGURE BY iCS2 - LEARN MORE ON PAGE 72

ECH 242/224/244

2/4 SLOT MMS CRATES WITH ETHERNET / CAN INTERFACE

MMS HV compatible
UPS
CAN
ETH

- **Desktop version**
- **Integrated fan unit**
- **Ethernet with iCS2 (CC24) or CAN interface**
- **Works as ECH 44A and ECH 5xA extension**

ECH 242 / 224 / 244 are iseg crate series in MMS system. It is available as desktop version with 2 or 4 module slots.

ECH 242 / 244 crates can be equipped with intelligent CC24 master controller boards or CC23 slave extension controllers. This enables all features and advantages of the iCS2 system.

SPECIFICATIONS

	ECH 242	ECH 244	ECH 224
Interfaces	ETHERNET / CAN	ETHERNET / CAN	CAN
Controller	CC 24 / CC 23	CC 24 / CC 23	incl.
Slots (MMS)	2	4	4
Output power	200 W	300 W	300 W
UPS	-	-	-
Cooling	integrated fan unit	integrated fan unit	integrated fan unit
Supply voltage	100 - 264 VAC	100 - 264 VAC	100 - 264 VAC
Case	desktop	desktop	desktop
Dimensions (L/W/H)	350 mm / 120 mm / 7U	350 mm / 226 mm / 7U	350 mm / 226 mm / 7U

OPTIONS & ORDER INFO

OPTION	ORDER INFO
Integrated fan unit 1.5U	FAN

WIENER MPOD

HIGH/LOW VOLT MIX SYSTEM IN MMS WITH 1/2/4/10 SLOTS

SEE COVER FOR SHORTCUT REFERENCE

- **Mixed operation of iseg HV modules and Wiener LV-modules**
- **Ethernet, CAN, USB, INTERLOCK**
- **Low voltage floating modules with 8/4 channels at 50 / 100 W**
- **8 V / 16 V / 30 V / 60 V and 120 V versions**
- **Extremely low noise and ripple: < 3 mV_{pp} (0 - 20 MHz)**

MMS HV compatible

MMS LV compatible

CAN

ETH

learn more on www.wiener-d.com

The Wiener Mpod is an universal multichannel system for mixed operation of low voltage and high voltage modules. It is available as micro (1 or 2 slot), mini (4 slots) and full size (10 slots) 19" rack mountable devices. The position of the HV / LV output plugs can be chosen between front or back.

SPECIFICATIONS

	MPOD EC / MPOD LX	MPOD mini	MPOD micro
Interfaces	CAN, Ethernet	CAN, Ethernet	CAN, Ethernet
Connection	CAN, Ethernet, web-ready, SNMP	CAN, Ethernet, web-ready, SNMP	CAN, Ethernet, web-ready, SNMP
Controller	MpodC or CC24	MpodC or CC24	MpodC or CC24
Slots	10 HV / LV modules	4 HV / LV modules	1 / 2 HV / LV modules
Output power	up to 3,000 W	600 W (HV) / 1600 W (LV)	300 W (HV) / 800 W (LV)
Supply voltage	94 - 265 VAC	90 - 265 VAC	90 - 265 VAC
Case	rack	rack / desktop	rack / desktop
Dimensions (L/W/H)	460 mm / 19" / 8U	480 mm / 19" / 5U	480 mm / 19" / 2 or 3U

ORDER & OPTIONS

OPTION	ORDER INFO	EXAMPLE
Output on rear	**-R**	Mpod **EC-R**
Local control / display	**LX**	Mpod **micro 2 LX**

HIGH PRECISION
W-IE-NE-R
+
POWER SUPPLIES
iseg HIGH VOLTAGE EXACTLY.

EHS STANDARD

VERSATILE HIGH VOLTAGE MODULE IN MULTIPLE FLOATING VERSIONS

MMS HV
VLN
CFG
FG

- 4 / 8 / 16 / 32 channel, 100 V - 20 kV versions
- Low ripple and noise, very low noise option VLN
- Hardware voltage and current limits
- Voltage and current control per channel
- Programmable parameters (delayed trip etc.)

SPECIFICATIONS

	EHS CFG	EHS FG
Polarity	factory fixed, positive or negative	factory fixed, positive or negative
Potiential difference	56 V channel/GND	20 V channel/channel/GND, opt. up to 2 kV
Ripple and noise [f > 10 Hz]	< 10 mV_{p-p}	< 10 mV_{p-p}
Temperature coefficient	50 ppm / K	50 ppm / K
Resolution voltage setting	$2 \bullet 10^{-6} \bullet V_{nom}$	$4 \bullet 10^{-5} \bullet V_{nom}$
Resolution current setting	$2 \bullet 10^{-6} \bullet I_{nom}$	$4 \bullet 10^{-5} \bullet I_{nom}$
Resolution voltage measurement	$2 \bullet 10^{-6} \bullet V_{nom}$	$4 \bullet 10^{-5} \bullet V_{nom}$
Resulotion current measurement	$2 \bullet 10^{-6} \bullet I_{nom}$	$4 \bullet 10^{-5} \bullet I_{nom}$
Accuracy* voltage measurement	$\pm$ (0.01 % • V_{out} +0.02 % • V_{nom})	$\pm$ (0.01 % • V_{out} +0.02 % • V_{nom})
Accuracy* current measurement	$\pm$ (0.02 % • I_{out} +0.02 % • I_{nom})	$\pm$ (0.02 % • I_{out} +0.02 % • I_{nom})
Voltage ramp up / down	up to 0.2 •V_{nom} / s | opt. up to 0.75 •V_{nom} / s	up to 0.2 •V_{nom} / s | opt. up to 0.75 •V_{nom} / s
Protection	Safety loop, opt. INHIBIT per channel (ID / IU)	Safety loop, opt. INHIBIT per channel (ID / IU)
HV connector	R51 | SHV	R51 | SHV
Case	6U cassette, width 8 HP	6U cassette, width 8 HP

*) All specifications guaranteed from 1% · $V_{nom} < V_{out} < V_{nom}$

OPTIONS & ORDER INFO

OPTION	ORDER INFO	EXAMPLE
Polarity	positive: **x = p**, negative: **x = n**	EHS 80 05**p**
Floating	common floating ground CFG: **y = 0**, floating ground: **y = 6**	EHS 8**6** 05p F
Single channel INHIBIT - down	**ID**	
Single channel INHIBIT - up	**IU**	
Active safety loop	**SLA**	
Internally powered safety loop	**SLP**	
200 V isolation for floating GND	**F02** only with REDEL MULTIPIN 51 connector (R51)	
2000 V isolation for floating GND	**F20** only with REDEL MULTIPIN 51 connector (R51)	

SEE COVER FOR SHORTCUT REFERENCE

DATA SHEET

EHS modules are multichannel high voltage power supplies in MMS system (Eurocard format). With up to 32 channels each single channel has an independent voltage and current control. The module is made of high-precision components such as 24 bit ADC and up to 20 bit DAC and provides comprehensive safety features.

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 two floating versions, Common Floating Ground (CFG) and Floating Ground (FG).

CONFIGURATIONS

MODEL	CHANNELS	OUTPUT VOLTAGE	OUTPUT CURRENT	RIPPLE AND NOISE (10Hz-1kHz)
EHS COMMON FLOATING GROUND / FLOATING GROUND				
EHS 8y 01x	8	100 V	10 mA	5 mV
EHS Fy 01x	16	100 V	10 mA	5 mV
EHS 8y 05x	8	500 V	15 mA	10 mV
EHS Fy 05x	16	500 V	15 mA	10 mV
EHS 8y 10x	8	1 kV	8 mA	10 mV
EHS Fy 10x	16	1 kV	8 mA	10 mV
EHS 8y 20x	8	2 kV	4 mA	10 mV
EHS Fy 20x	16	2 kV	4 mA	10 mV
EHS 8y 30x	8	3 kV	3 mA	10 mV
EHS Fy 30x	16	3 kV	3 mA	10 mV
EHS 8y 40x	8	4 kV	2 mA	10 mV
EHS Fy 40x	16	4 kV	2 mA	10 mV
EHS 8y 60x	8	6 kV	1 mA	10 mV
EHS Fy 60x	16	6 kV	1 mA	10 mV
EHS 4y 80x	4	8 kV	1 mA	10 mV
EHS 4y 100x	4	10 kV	0.7 mA	10 mV
EHS 4y 150x	4	15 kV	0.5 mA	10 mV
EHS 4y 200x	4	20 kV	0.4 mA	10 mV

LHC AT CERN EQUIPPED WITH ISEG HV

The Large Hadron Collider (LHC) is the world´s largest particle accelerator, a 27 kilometre long ring of super-conducting magnets. In this accelerator there are four particle detectors (LHCb, Atlas, Alice and CMS), these are the four experiments from CERN. iseg delivered EHS and EDS modules for the LHC-B, Atlas and Alice detector.

EHS FLEX

REASONABLE HIGH VOLTAGE MODULE IN COMMON FLOATING GROUND

MMS HV
VLN
CFG

- 16 / 24 / 48 channel, 100 V - 3 kV versions
- Flexible channel combinations without additional cost
- Low ripple and noise, very low noise (VLN class)
- Hardware voltage and current limits
- Voltage and current control per channel
- Programmable parameters (delayed trip etc.)

DATA SHEET

CONFIGURATIONS

MODEL	CHANNELS	OUTPUT VOLTAGE	OUTPUT CURRENT	RIPPLE AND NOISE (10Hz-1kHz)
EHS COMMON FLOATING GROUND				
EHS F5 01x	16	100 V	10 mA	5 mV
EHS 185 01x	24	100 V	10 mA	5 mV
EHS 305 01x	48	100 V	10 mA	5 mV
EHS F5 05x	16	500 V	6 mA	10 mV
EHS 185 05x	24	500 V	6 mA	10 mV
EHS 305 05x	48	500 V	6 mA	10 mV
EHS F5 10x	16	1 kV	3 mA	10 mV
EHS 185 10x	24	1 kV	3 mA	10 mV
EHS 305 10x	48	1 kV	3 mA	10 mV
EHS F5 20x	16	2 kV	1.5 mA	10 mV
EHS 185 20x	24	2 kV	1.5 mA	10 mV
EHS 305 20x	48	2 kV	1.5 mA	10 mV
EHS F5 30x	16	3 kV	1 mA	10 mV
EHS 185 30x	24	3 kV	1 mA	10 mV
EHS 305 30x	48	3 kV	1 mA	10 mV

OPTIONS & ORDER INFO

OPTION	ORDER INFO	EXAMPLE
Polarity	positive: **x = p**, negative: **x = n**	EHS F5 01**p**
Active safety loop	**SLA**	
Internally powered safety loop	**SLP**	

EHS FLEX modules are multichannel high voltage power supplies in MMS system (Eurocard format). With up to 48 channels each single channel has an independent voltage and current control. The module is made of high-precision components such as 24 bit ADC and up to 20 bit DAC and provides comprehensive safety features.

The flexible layout of EHS FLEX allows an almost arbitrary combination of channels with different voltages and polarities within a single module to match a multitude of very specific custom requirements.

EHS STACK

HV MODULE IN FLOATING GROUND WITH STACKED OUTPUT CHANNELS

SEE COVER FOR SHORTCUT REFERENCE

- 8 / 16 channel, 100 V to 1 kV versions
- Cascadable channels in groups of 2, 4,8 or 16 channels
- Very low ripple and noise, very low temperature coefficient
- 4 kV floating voltage (optional 6 kV)
- Synchronized ramps
- Hardware voltage and current limit
- Voltage control and current measurement per channel
- Programmable parameters (voltage drop compensation, ...)

PERFECT FOR GEM DETECTORS

MMS HV

VLN

FG

DATA SHEET

The EHS STACK series are special designed EHS modules mainly for use with GEM - Gas Electron Multiplier detectors.

The outputs RETURN - floating HV-GND - of each channel are floating against each other and against ground. The channels are cascadable in groups of 2, 4, 8 or 16 Channels. The floating voltage is 4 kV. The nominal voltage of the individual channels can be configured up to 1,000 V. The maximum current per channel is 1 mA.

High Precision versions are equipped with a second 20 µA current measurement range.

SAMPLE CONFIGURATION

HV-CHANNEL	0	1	2	3		11	12	13	14	15
EMS 168 n001: 2 x 8 High Precision channels										
Group	G1	G1	G1	G1		G2	G2	G2	G2	G2
Polarity	n	n	n	n		n	n	n	n	n
Output voltage V_{nom} in V	800	400	800	400		400	800	400	800	400
Output current I_{nom} in mA	1	1	1	1	•••	1	1	1	1	1
Resolution of V_{set} in mV	40	20	40	20		20	40	20	40	20
Resolution of I_{set} in nA	20	20	20	20		20	20	20	20	20
Resolution of V_{meas} in mV	4	2	4	2		2	4	2	4	2
Resolution of I_{meas} in nA	5	5	5	5		5	5	5	5	5
Resolution of I_{meas} in pA*	100	100	100	100		100	100	100	100	100

* 2nd measurement range

SPECIFICATIONS

	EHS STACK STANDARD	EHS STACK HIGH PRECISION
Output voltage per channel	configurable, max. 1 kV	configurable, max. 1 kV
Output current per channel	max. 1 mA	max. 1 mA
Channels	8 / 16	8 / 16
Cascadability	Channels can be grouped individually (2, 4, 8, 16 groups)	Channels can be grouped individually (2, 4, 8, 16 groups)
Polarity	factory fixed, positive or negative	factory fixed, positive or negative
Potiential difference	4 kV (optional 6 kV)	4 kV (optional 6 kV)
Ripple and noise [f > 10 Hz]	< 5 mV_{p-p} (against RTN)	< 5 mV_{p-p} (against RTN)
Temperature coefficient	50 ppm / K	30 ppm / K
Resolution voltage setting	5 – 50 mV**	5 – 50 mV**
Resolution current setting	2 – 20 nA**	2 – 20 nA**
Resolution voltage measurement	1 – 5 mV**	1 – 5 mV**
Resulotion current meas. - 1st range	5 nA	5 nA
Resulotion current meas. - 2nd range	-	100 pA
Accuracy* voltage measurement	± (0.01 % • V_{out} +0.02 % • V_{nom})	± (0.01 % • V_{out} +0.02 % • V_{nom})
Accuracy* current meas. - 1st range	± (0.05 % • I_{out} +0.1 % • I_{nom})	± (0.02 % • I_{out} +0.02 % • I_{nom})
Accuracy* current meas. - 2nd range	-	± (0.02 % • I_{out} +10 nA)
Voltage ramp up / down	up to 0.2 V_{nom}/s	up to 0.2 • V_{nom}/s opt. up to 0.75 • V_{nom}/s
Protection	Safety loop, opt. INHIBIT per channel (ID / IU)	Safety loop, opt. INHIBIT per channel (ID / IU)
HV connector	R51	R51
Case	6U cassette, width 8 HP	6U cassette, width 8 HP

*) All specifications guaranteed from 1% · V_{nom} < V_{out} < V_{nom} | **) depends on configuration

OPTIONS & ORDER INFO

OPTION	ORDER INFO	EXAMPLE
Polarity	positive: **x = p**, negative: **x = n**	EHS 87 05**p**
Single channel INHIBIT - down	**ID**	
Single channel INHIBIT - up	**IU**	
Negated logic INHIBIT ID, IU	**N**	
Active safety loop	**SLA**	
Internally powered safety loop	**SLP**	

EHS HIGH PRECISION

VERSATILE HIGH PRECISION HV MODULE IN MULTIPLE FLOATING VERSIONS

MMS HV
ULN
CFG
FG
DATA SHEET

- 4 / 8 / 16 channel, 100 V - 20 kV versions
- Extreme high stability, low temperature coefficient
- Very low ripple and noise
- Second current measurement range 20 µA for high resolution
- Hardware voltage and current limits
- Voltage and current control per channel
- Programmable parameters (delayed trip etc.)

SPECIFICATIONS

	EHS HP CFG	EHS HP FG
Polarity	factory fixed, positive or negative	factory fixed, positive or negative
Potiential difference	56 V channel/GND	20 V channel/channel/GND, opt. up to 2 kV
Ripple and noise [f > 10 Hz]	< 3 - 10 mV | optional with low output current -L: < 1 - 2 mV	< 3 - 10 mV | optional with low output current -L: < 1 - 2 mV
Temperature coefficient	30 ppm/K | 10 ppm/K (option TC)	30 ppm/K | 10 ppm/K (option TC)
Resolution voltage setting	$2 \bullet 10^{-6} \bullet V_{nom}$	$2 \bullet 10^{-6} \bullet V_{nom}$
Resolution current setting [I_{out} > 20 µA]	$2 \bullet 10^{-6} \bullet I_{nom}$	$2 \bullet 10^{-6} \bullet I_{nom}$
Resolution voltage measurement	$1 \bullet 10^{-6} \bullet V_{nom}$	$1 \bullet 10^{-6} \bullet V_{nom}$
Resolution current measurement [I_{out} > 20 µA]	$1 \bullet 10^{-6} \bullet I_{nom}$	$1 \bullet 10^{-6} \bullet I_{nom}$
Resolution current measurement [I_{out} < 20 µA]	50 pA	50 pA
Accuracy* **voltage measurement**	$\pm$ (0.01 % • V_{out} + 0.01 % • V_{nom})	$\pm$ (0.01 % • V_{out} + 0.01 % • V_{nom})
Accuracy* **current measurement** [I_{out} > 20 µA]	$\pm$ (0.01 % • I_{out} + 0.02 % • I_{nom})	$\pm$ (0.01 % • I_{out} + 0.02 % • I_{nom})
Accuracy* **current measurement** [I_{out} < 20 µA]	$\pm$ (0.01 % • I_{out} + 4 nA)	$\pm$ (0.01 % • I_{out} + 4 nA)
Voltage ramp up / down	up to 0.2 •V_{nom} / s | opt. up to 0.75 •V_{nom} / s	up to 0.2 •V_{nom} / s | opt. up to 0.75 •V_{nom} / s
Protection	Safety loop, opt. INHIBIT per channel (D / IU, NID / NIU)	Safety loop, opt. INHIBIT per channel (D / IU, NID / NIU)
HV connector	R51 | SHV	R51 | SHV
Case	6U cassette, width 8 HP	6U cassette, width 8 HP

*) All specifications guaranteed from 1% · V_{nom} < V_{out} < V_{nom}

SI-PMT / APD SOLUTIONS, P. 82

low output current versions (L)

SEE COVER FOR SHORTCUT REFERENCE

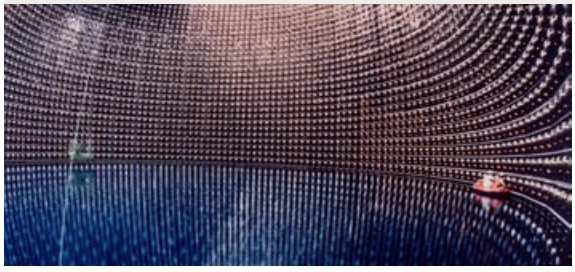
VCT

L

The EHS High Precision modules are multichannel high voltage power supplies in MMS system (Eurocard format) with best stability, 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 of measurement ranges is done automatically. The EHS High Precision module is available in two floating versions, Common Floating Ground (CFG) and Floating Ground (FG).

SUPER KAMIOKANDE PROJECT IN JAPAN EQUIPPED WITH ISEG HV

Super - Kamiokande is aneutrino detector near the Japanese community Kamioka. The detector observe in addition to the observation of neutrino proton decay. iseg delivered 510 modules of an adaptation of the EDS distributor HV-modules.



CONFIGURATIONS

MODEL	CHANNELS	OUTPUT VOLTAGE	OUTPUT CURRENT	RIPPLE AND NOISE (10Hz-1kHz)	RIPPLE AND NOISE ON OPTION L
EHS 8y 01x	8	100 V	10 mA	3 mV	2 mV / CFG: 1 mV
EHS Fy 01x	16	100 V	10 mA	3 mV	2 mV / CFG: 1 mV
EHS 8y 05x	8	500 V	10 mA	5 mV	2 mV / CFG: 1 mV
EHS Fy 05x	16	500 V	10 mA	5 mV	2 mV / CFG: 1 mV
EHS 8y 10x	8	1 kV	8 mA	5 mV	2 mV / CFG: 1 mV
EHS Fy 10x	16	1 kV	8 mA	5 mV	2 mV / CFG: 1 mV
EHS 8y 20x	8	2 kV	4 mA	5 mV	2 mV / CFG: 1 mV
EHS Fy 20x	16	2 kV	4 mA	5 mV	2 mV / CFG: 1 mV
EHS 8y 30x	8	3 kV	3 mA	5 mV	2 mV / CFG: 1 mV
EHS Fy 30x	16	3 kV	3 mA	5 mV	2 mV / CFG: 1 mV
EHS 8y 40x	8	4 kV	2 mA	5 mV	2 mV / CFG: 1 mV
EHS Fy 40x	16	4 kV	2 mA	5 mV	2 mV / CFG: 1 mV
EHS 8y 60x	8	6 kV	1 mA	10 mV	2 mV / CFG: 1 mV
EHS Fy 60x	16	6 kV	1 mA	10 mV	2 mV / CFG: 1 mV
EHS 4y 80x	4	8 kV	1 mA	5 mV	2 mV / CFG: 1 mV
EHS 4y 100x	4	10 kV	0.7 mA	5 mV	2 mV / CFG: 1 mV
EHS 4y 150x	4	15 kV	0.5 mA	5 mV	2 mV / CFG: 1 mV
EHS 4y 200x	4	20 kV	0.4 mA	7 mV	2 mV / CFG: 1 mV

OPTIONS & ORDER INFO

OPTION	ORDER INFO	EXAMPLE
Polarity	positive: x = p, negative: x = n	EHS 82 05p
Floating	common floating ground CFG: y = 2	EHS 82 05p
	floating ground FG: y = 4	EHS 84 05p F
Lower temperature coefficient	TC	
Single channel INHIBIT - down	ID	
Single channel INHIBIT - up	IU	
Active safety loop	SLA	
Internally powered safety loop	SLP	
Lower output current	L (lower nominal output current)	

BIPOLAR 4 QUADRANT HIGH VOLTAGE MODULE WITH CFG

MMS HV

CFG

- 4 / 12 / 24 channel, 500 V / 3 kV and custom versions
- 4-quadrant, usable as bipolar current sink and source
- Perfect for electron optical systems and capacitive loads
- Low ripple and noise
- Hardware voltage and current limit
- Voltage control and current measurement per channel
- Programmable parameters (delayed trip etc.)

DATA SHEET

SPECIFICATIONS

Polarity	bipolar 4 quadrant
Ripple and noise	< 20 mV
Temperature coefficient voltage measurement	< 20 ppm / K
Temperature coefficient current measurement	< 100 ppm / K
Resolution voltage setting	$2 \bullet 10^{-6} \bullet V_{nom}$
Resolution voltage measurement	$2 \bullet 10^{-6} \bullet V_{nom}$
Resolution current measurement	$1 \bullet 10^{-4} \bullet I_{nom}$
Accuracy voltage measurement *	$\pm (0.01\ \% \bullet V_{out} + 0.02\ \% \bullet V_{nom})$
Accuracy current measurement *	$\pm (0.2\ \% \bullet I_{out} + 0.2\ \% \bullet I_{nom})$
Voltage ramp up / down	$1 \bullet 10^{-6} \bullet V_{nom}$ up to $1 \bullet V_{nom}$ / s
Protection	Safety loop
HV connector	R51 | SHV
Case	6U (8HP) cassette

*) All specifications guaranteed from $-V_{nom} < V_{out} < V_{nom}$

CONFIGURATIONS

MODEL	CHANNELS	OUTPUT VOLTAGE	OUTPUT CURRENT	MAX V_{DIFF} CH-TO-CH	HEIGHT
EBS C0 05	12	± 500 V	± 1 mA	1 kV	6U
EBS 180 05	24	± 500 V	± 1 mA	1 kV	6U
EBS C0 12	12	± 1.2 kV	± 1 mA	1.2 kV	6U
EBS 180 12	24	± 1.2 kV	± 1 mA	1.2 kV	6U
EBS C0 30	12	± 3 kV	± 0.5 mA	3 kV	6U
EBS 1803 0	24	± 3 kV	± 0.5 mA	3 kV	6U

Other configurations on request!

OPTIONS & ORDER INFO

OPTION	ORDER INFO
Active safety loop	**SLA**
Internally powered safety loop	**SLP**

The bipolar EBS distribution modules are multichannel high voltage power supplies in MMS system (Eurocard format) with full 4-quadrant capabilities. The EBS can be used as bipolar current sink and source, which perfectly covers requirements of electron optical systems or capacitive loads. The EBS is built in common floating ground principle to reduce voltage noise level. With up to 24 channels each single channel has an independent voltage control up to 3 kV channel-voltage-difference. The EBS configuration of output voltage and current can be customized on request. The module is made of high precision components such as 24 bit ADC and 20 bit DAC and provides comprehensive security features.

EHR

POLARITY SWITCHABLE HIGH END HIGH PRECISION HV MODULE

SEE COVER FOR SHORTCUT REFERENCE

- 4 channels
- Electronically switchable polarity for each channel independently
- 2 kV / 6 kV versions
- 6 kV channel with electronical switchable modes: up to 2 kV/4 mA, 4 kV/3 mA or 6 kV/2 mA
- High precision / very low ripple and noise
- Second current measurement range 20 µA for high precision version
- Voltage and current control per channel
- Hardware voltage and current limits

MMS HV

ULN

CFG

L

DATA SHEET

The new EHR series represents a system capable multichannel high voltage module - equipped with the finest iseg HV generation technology in MMS system (Eurocard format). The module is made of high-precision components such as 24 bit ADC and up to 20 bit DAC and provides comprehensive safety features.

The EHR provides 4 HV-channels, each with an independent voltage and current control and reversible polarity. A flexible 6kV channel provides a maximum versatility: With three electronically switchable HV-generation modes it can supply 4 mA up to voltages of 2 kV, 3 mA up to 4 kV or 2 mA up to 6 kV. Alternatively the EHR can be equipped with cost efficient 2kV/6mA fixed channels.

By offering different configurations and options this module perfectly covers various types of applications such as detector supply, experimental setup or lab use.

SPECIFICATIONS

	EHR STANDARD	EHR HIGH PRECISION
Polarity	electronically switchable	electronically switchable
Ripple and noise	< 10 mV	< 2 - 3 mV
Temperature coefficient	50 ppm / K	30 ppm/K | opt. 10 ppm/K (TC)
Resolution voltage setting	$2 \bullet 10^{-6} \bullet V_{nom}$	$2 \bullet 10^{-6} \bullet V_{nom}$
Resolution current setting	$2 \bullet 10^{-6} \bullet I_{nom}$	$2 \bullet 10^{-6} \bullet I_{nom}$
Resolution voltage measurement	$2 \bullet 10^{-6} \bullet V_{nom}$	$1 \bullet 10^{-6} \bullet V_{nom}$
Resolution current meas. - full range	$2 \bullet 10^{-6} \bullet I_{nom}$	$1 \bullet 10^{-6} \bullet I_{nom}$
Resolution current meas. - 2nd range	n/a	50 pA [I_{out} < 20µA]
Accuracy voltage measurement *	$\pm$ (0.01 % • V_{out} + 0.02 % • V_{nom})	$\pm$ (0.01 % • V_{out} + 0.01 % • V_{nom})
Accuracy current meas. *- full range	$\pm$ (0.01 % • I_{out} + 0.02 % • I_{nom})	$\pm$ (0.01 % • I_{out} + 0.01 % • I_{nom})
Accuracy current meas. *- 2nd range	n/a	$\pm$ (0.01 % • I_{out} + 4 nA)
Rate of voltage change	$1 \bullet 10^{-6} \bullet V_{nom}$/s up to 0.2 • V_{nom} / s	$1 \bullet 10^{-6} \bullet V_{nom}$/s up to 0.2 • V_{nom} / s
Protection	INHIBIT (option), Safety loop, short circuit, overload, hardware V/I limits	INHIBIT (option), Safety loop, hort circuit, overload hardware V/I limits
HV connector	SHV	SHV
Case	6U cassette, width 8 HP	6U cassette, width 8 HP

*) All specifications guaranteed from 1% · V_{mode} < V_{out} < V_{mode}

CONFIGURATIONS

MODEL	CHANNELS	PRECISION	OUTPUT VOLTAGE	OUTPUT CURRENT	HV-MODES (V_{mode} / I_{mode})
EHR 40 20	4	Standard	2 kV	6 mA	2 kV / 6 mA
EHR 40 60	4	Standard	6 kV	4 mA	6 kV / 2 mA | 4 kV / 3 mA | 2 kV / 4 mA
EHR 42 20	4	High	2 kV	6 mA	2 kV / 6 mA
EHR 42 60	4	High	6 kV	4 mA	6 kV / 2 mA | 4 kV / 3 mA | 2 kV / 4 mA

ESS

SINGLE CHANNEL 2 QUADRANT HV MODULE WITH FLOATING GROUND

MMS HV

FG

- 1 channel, 10 / 20 / 30 kV and customized versions
- 2-quadrant capabilities, usable as unipolar current sink and source
- Perfect for electron optical systems and capacitive loads
- Low ripple and noise
- Floating ground principle
- Programmable parameters (delayed trip etc.)

DATA SHEET

HIGHVOLTAGE UP TO 30 KV — HIGH — HIGHPOWER 40 W

SPECIFICATIONS

Polarity	factory fixed, positive or negative
Ripple and noise	< 0.6 - 2.5 V_{p-p}
Temperature coefficient	< 100 ppm / K
Resolution voltage setting	$2 \bullet 10^{-5} \bullet V_{nom}$
Resolution current setting	$2 \bullet 10^{-5} \bullet I_{nom}$
Resolution voltage measurement	$< 1 \bullet 10^{-5} \bullet V_{nom}$
Resolution current measurement	$< 1 \bullet 10^{-5} \bullet I_{nom}$
Accuracy voltage measurement *	$\pm$ (0.2 % $\bullet V_{out}$ + 0.1 % $\bullet V_{nom}$)
Accuracy current measurement *	$\pm$ (0.2 % $\bullet I_{out}$ + 0.1 % $\bullet I_{nom}$)
Voltage ramp up / down	up to 0.1 $\bullet V_{nom}$ / s | opt. up to 1 $\bullet V_{nom}$ / s
Protection	Safety loop
HV connector	SHV | GES
Case	6U cassette, width 8 HP

*) All specifications guaranteed from 1% · $V_{nom} < V_{out} < V_{nom}$

CONFIGURATIONS

MODEL	CHANNELS	OUTPUT VOLTAGE	OUTPUT CURRENT	RIPPLE AND NOISE
ESS 10 100x	1	10 kV	± 4mA	< 2.5 V_{P-P}
ESS 10 200x	1	20 kV	± 2mA	< 0.6 V_{P-P}
ESS 10 300x	1	30 kV	± 1mA	< 1 V_{P-P}

OPTIONS & ORDER INFO

OPTION	ORDER INFO	EXAMPLE
Polarity	positive: **x = p**, negative: **x = n**	ESS 10 100**p**
GES connector	**GES**	

The ESS module is a single channel high voltage power supply in MMS system (Eurocard format) with 2-quadrant capabilities.

It can be used as unipolar current sink and source, which perfectly covers requirements of electron optical systems or capacitive loads.

The ESS series is built in floating ground principle to reduce voltage noise level. The configuration of output voltage and current can be customized on request.
The module is made of high precision components such as 24 bit ADC and 16 bit DAC and provides comprehensive safety features.

SUITABLE FOR

PV TEST APPLICATIONS
ISOLATION TESTS

MPV MADE BY WIENER

HIGH PRECISION LOW VOLTAGE MULTICHANNEL POWER SUPPLY MODULES

SEE COVER FOR SHORTCUT REFERENCE

- 4 and 8 channel, 8 / 16 / 30 / 60 / 120 V versions
- Extremly low ripple and noise < 3 mV_{p-p}
- Very low output earth leakage current
- 15 bit resolution voltage and current setting / monitor, accuracy ±0.1% of full scale
- 15 bit resolution current monitor/limit, accuracy ±0.5 % o.f.s
- High stability, 0.2 % / 10 k
- Programmable parameters (trip, groups, sense type etc.)

learn more on www.wiener-d.com

MMS LV
FG
ULN

In combination with iseg high class high voltage multichannel MMS modules also Low Voltage power supply modules from WIENER can be used in LV compatible MMS crates. The MPV series are 6U Low Voltage modules with 4 or 8 channels with a maximum of 100 or 50 W per channel. All channels are individually controlled and monitored.

The outputs are in floating ground principle (125V ch/ch and 500V ch/GND) and have additional sensor lines per output to enable voltage loss compensation that is caused by long cable resistances. A control input for each channel can be used for INTERLOCK / INHIBIT or external hardware ON/OFF.

SPECIFICATIONS

STANDARD SERIES

	Channels	Voltage	I_{max}	Peak Power	V_{res}	I_{res}	Ripple and Noise
MPV 8008I	8	0 - 8 V	10 A	50 W / ch.	0.5 mV	0.5 mA	<3 mV_{p-p}
MPV 8016I	8	0 - 16 V	5 A	50 W / ch.	1 mV	0.25 mA	<2 mV_{p-p}
MPV 8030I	8	0 - 30 V	2.5 A	50 W / ch.	2 mV	0.12 mA	<2 mV_{p-p}
MPV 8060I	8	0 - 60 V	1 A	50 W / ch.	4 mV	0.06 mA	<2 mV_{p-p}
MPV 8120I	8	0 - 120 V	100 mA	50 W / ch.	4 mV	4 µA	<2 mV_{p-p}

HIGH PRECISION SERIES

	Channels	Voltage	I_{max}	Peak Power	V_{res}	I_{res}	Ripple and Noise
MPV 8008H	8	0 - 8 V	10 A	50 W / ch.	2 µV	3 µA	<3 mV_{p-p}
MPV 8016H	8	0 - 16 V	5 A	50 W / ch.	5 µV	1.5 µA	<2 mV_{p-p}
MPV 8030H	8	0 - 30 V	2.5 A	50 W / ch.	8 µV	760 nA	<2 mV_{p-p}
MPV 8060H	8	0 - 60 V	1 A	50 W / ch.	17 µV	300 nA	<2 mV_{p-p}
MPV 8120H	8	0 - 120 V	100 mA	50 W / ch.	40 µV	32 nA	<2 mV_{p-p}

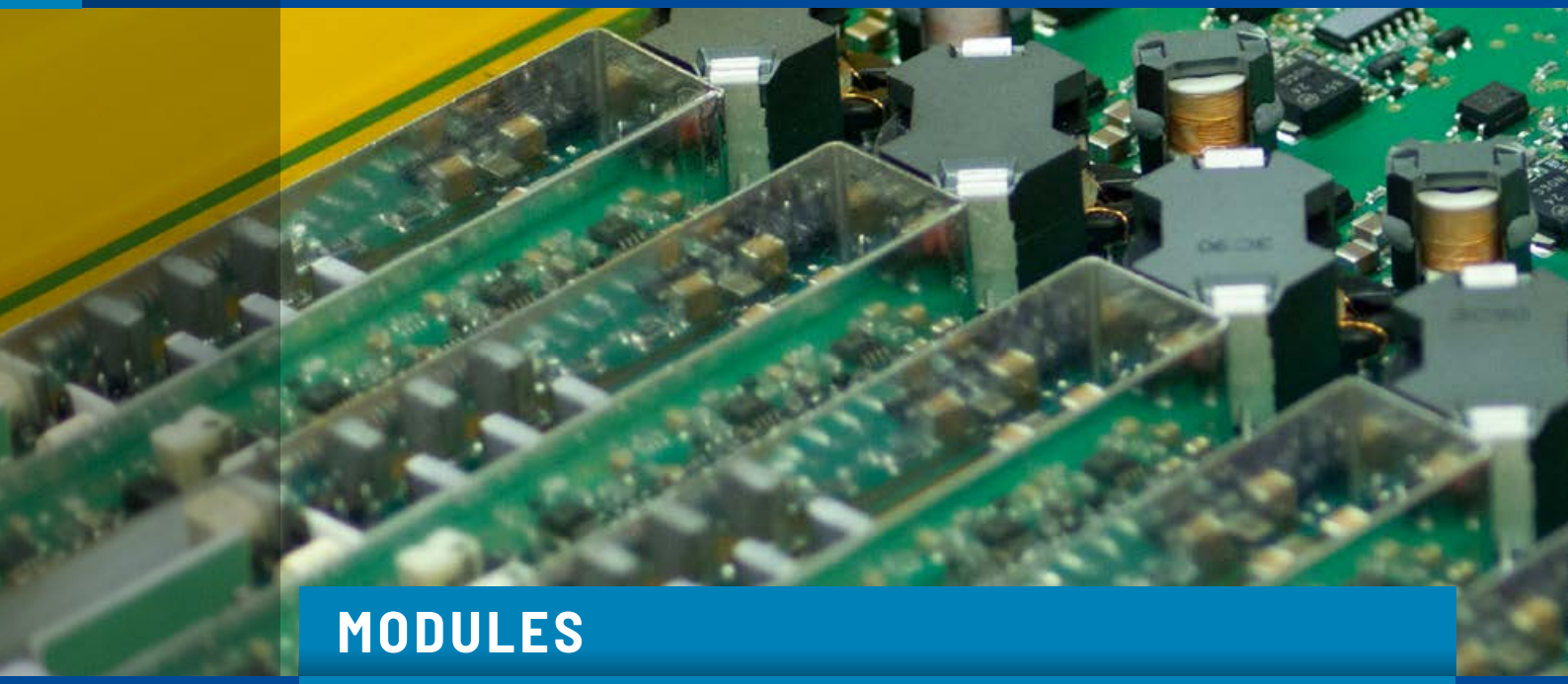
HIGH POWER SERIES

	Channels	Voltage	I_{max}	Peak Power	V_{res}	I_{res}	Ripple and Noise
MPV 4008I	4	0 - 8 V	20 A	100 W / ch.	0.5 mV	0.5 mA	<3 mV_{p-p}
MPV 4016I	4	0 - 16 V	10 A	100 W / ch.	1 mV	0.25 mA	<2 mV_{p-p}
MPV 4030I	4	0 - 30 V	5 A	100 W / ch.	2 mV	0.12 mA	<2 mV_{p-p}
MPV 4060I	4	0 - 60 V	2 A	100 W / ch.	4 mV	0.06 mA	<2 mV_{p-p}

HIGH PRECISION + POWER SUPPLIES
W-IE-NE-R
iseg HIGH VOLTAGE. EXACTLY.

SYSTEM MME / MMC

3U-SYSTEMS OVERVIEW



MODULES

MME

EHQ SERIES
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MMC

CPS 3U SERIES
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DPS 3U SERIES
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EPS 3U SERIES
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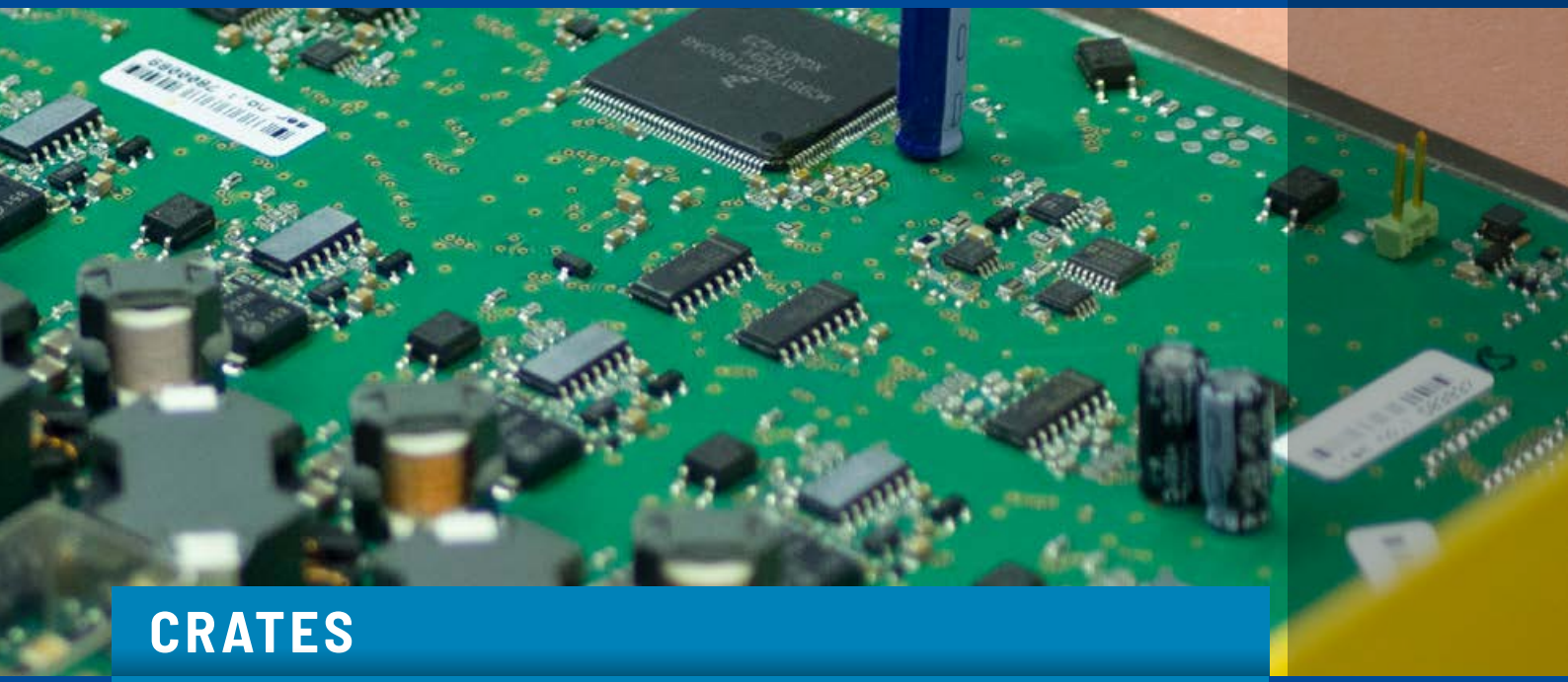

CRATES

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ECH 124
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ECH 128
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ECH 12A / ECH 14A
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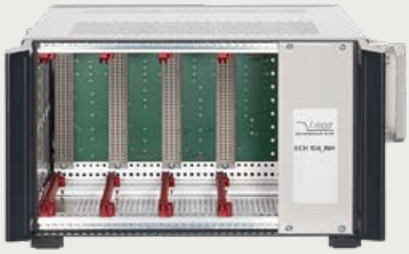
ECH 104/134/108/138

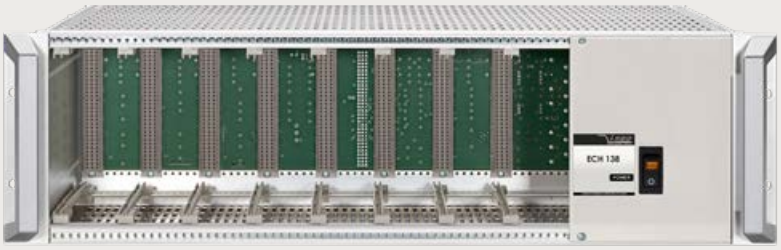
19"-3U 4/8 SLOT CRATE IN MME SYSTEM

MME

DIO

- 19" and desktop versions
- 4 / 8 MME slots
- 200 W power supply
- CAN or RS232 interfaces





DATA SHEET

The crate series ECH 104/134/108/138 stands for iseg MME systemcrates in half 19" or 19" racksize, 3U height and integrated 200 W power supply.

By the compact form factor they are suitable for desktop or mobile use. 4 or 8 MME slots are available. The crates can either be equipped with 4 or 8 separate RS232 connectors or with a common CAN interface connector.

SPECIFICATIONS / SPEZIFIKATION

	ECH 104	ECH 134	ECH 108	ECH 138
Connection	RS232	CAN	RS232	CAN
Controller	-	-	-	-
Slots (MME)	4	4	8	8
Output power	200 W	200 W	200 W	200 W
Supply voltage	100 - 264 VAC	100 - 264 VAC	100 - 264 VAC	100 - 264 VAC
UPS	-	-	-	-
Cooling	-	-	-	-
Dimensions (L/W/H)	375 mm / half 19" / 3U	375+45 mm / half 19" / 3U	350 mm / 19"/ 3U	308 mm / 19"/ 3U

EHQ

HIGH PRECISION SINGLE CHANNEL HIGH VOLTAGE MODULE

SEE COVER FOR SHORTCUT REFERENCE

- 1 channel, 2 / 3 / 4 / 5 kV and customized versions
- LCD for voltage and current display
- Switchable polarity
- Very low ripple and noise
- Front panel control with highly precise 10-turn potentiometer
- Hardware voltage and current limits with 10 % steps
- USB, RS232, CAN interfaces
- Programmable parameters (current trip, voltage ramp etc.)

MME

DIO

L

DATA SHEET

The established EHQ single channel HV module is cased in compact iseg MME-system (Eurocard format). EHQ series HV supplies are front panel controllable with a precise 10-turn potentiometer for voltage setting and a LCD to display voltage or current. For remote control EHQ is equipped with many interfaces (USB, RS232, CAN, optional analog I/O). The voltage ramp is hardware fixed and can be changed in remote operation. The high voltage output is short circuit and overload protected, an INHIBIT input over an external digital signal switches the HV off.

SPECIFICATIONS

	EHQ STANDARD
Polarity	switchable
Ripple and noise	< 2 - 5mV$_{P-P}$
Stability	< 5 • 10^{-5}• V$_{nom}$
Temperature coefficient	< 50 ppm / K
Resolution voltage measurement	1 V
Resolution current measurement	1µA | 100 nA (option **L**)
Accuracy voltage measurement *	± (0.05 % • Vout + 0.02 % • V$_{nom}$ + 1 digit)
Accuracy current measurement *	± (0.05 % • Iout + 0.02 % • I$_{nom}$ + 1 digit)
Voltage ramp hardware	500 V / s
Voltage ramp software	2 - 255 V / s
Protection	INHIBIT, short circuit, overload
HV connector	SHV
Case	3U cassette, width 8 HP

*) All specifications guaranteed from 1% · V$_{nom}$ < V$_{out}$ < V$_{nom}$

CONFIGURATIONS

MODEL	OUTPUT VOLTAGE	OUTPUT CURRENT	RIPPLE AND NOISE
EHQ 102M	2 kV	6 mA	2 mV$_{P-P}$
EHQ 103M	3 kV	4 mA	2 mV$_{P-P}$
EHQ 104M	4 kV	3 mA	2 mV$_{P-P}$
EHQ 105M	5 kV	2 mA	5 mV$_{P-P}$

Other configurations on request!

OPTIONS & ORDER INFO

OPTION	ORDER INFO	EXAMPLE
Analog I/O	**AIO**	
Low output current	**L** (100 µA)	
12V supply	**±12V = N12**	

ECH 124/128/12A/14A

19"-3U 4/8/10 SLOT CRATES IN MMC SYSTEM

MMC
AIO
DIO

- Up to 10 DC/DC converters in a system
- 19" and desktop versions
- 4 / 8 / 10 MMC slots
- Global safety loop
- CAN, USB and Ethernet interfaces

DATA SHEET

SPECIFICATIONS

	ECH 124	ECH 128	ECH 12A	ECH 14A
Connection	CAN, USB, Ethernet	CAN, USB, Ethernet	CAN, USB, Ethernet	CAN, USB, Ethernet
Controller	MICC	MICC	MICC	MICC
I/O	16x20bit analog out, 32x24bit analog in, 24 digital I/O	16x20bit analog out, 32x24bit analog in, 24 digital I/O	16x20bit analog out, 32x24bit analog in, 24 digital I/O	16x20bit analog out, 32x24bit analog in, 24 digital I/O
Slots (MMC)	4	8	10	10 MMC | 9 MMC + 1 MMS-3U
Output power	150 W	150 W	300 W	300 W
Supply voltage	100 - 264 VAC	100 - 264 VAC	100 - 264 VAC	100 - 264 VAC
UPS	-	-	-	-
Cooling	-	-	-	-
Protection	INHIBIT, KILL-ENABLE	INHIBIT, KILL-ENABLE	INHIBIT, KILL-ENABLE	INHIBIT, KILL-ENABLE
Dimensions (L/W/H)	315 mm / 249 mm / 3U	308 mm / 19"/ 3U	308 mm / 19"/ 3U	308 mm / 19"/ 3U

ION BEAM SOLUTION: see page 80 for special ion-beam solutions with ECH 14A crate series

ECH crates of 124 / 128 / 12A / 14 A in MMC design are ideally suited for mobile and stationary usage by it´s compact construction. In MMC system crates analog controlled DC/DC converters of CPS, DPS or EPS series can be digitally controlled by the MICC crate controller. Thereby versatile HV supply systems can be composed, which are either powerful (EPS), highly precise (DPS) or providing a cost saving coverage of a wide HV range (CPS).

MICC

20/24 BIT MMC SYSTEM CONTROLLER

SEE COVER FOR SHORTCUT REFERENCE

- **CAN, USB and Ethernet interfaces**
- **16 analog output with 20 Bit DAC**
- **32 analog inputs with 24 Bit ADC**
- **24 digital I/O ports**
- **Multiple MICC chainable via CAN**
- **Support of MMC module ID chip**

DATA SHEET

The universal MICC interface board connects the analog ports of MMC HV modules in 3U cassettes (CPS, DPS, EPS) with digital standard interfaces. This allows to integrate devices with an analog-I/O into computer-based control systems. The high resolution of analog inputs and outputs allows a very precise control of current and voltage of connected devices. It is possible, for instance, to control and measure an output voltage of 1,000 V with a resolution lower than 10 mV. For DPS cassette modules it is possible to switch polarity via this interface.

The controller supports following functions:

- Set and read of voltage and ramp
- HV on/off
- INHIBIT
- Electronically switch polarity for DPS
- Detects connected modules by ID chip

Analog modules (CPS, DPS, EPS series) which are equipped with an ID-chip are detected by the MICC automatically.

The MICC universal allows to setup systems, for example to control ion beam facilities. A MICC working as master (e.g. with Ethernet option) controls additional MICCs in the system as well as other devices with CAN interface, like HPS, FPS.

CPS 3U SERIES

SYSTEM CAPABLE COMPACT DC/DC HIGH VOLTAGE MODULE

MMC
AIO
CUSTOM

- Patented resonance converter technology
- INHIBIT
- Hardware limits for voltage and current
- Low ripple and noise, low EMI
- ID chip
- Customized versions on request

DATA SHEET

SPECIFICATIONS

Polarity	factory fixed, positive or negative
Ripple and noise [f >10 Hz]	< 10 kV: typ. < 2 • 10^{-5} • V_{nom}
	≥ 10 kV: typ. < 5 • 10^{-5} • V_{nom}
Stability - [ΔV_{out} / ΔV_{in}]	< 1 •10^{-4} • V_{nom}
Stability - [ΔV_{out} / ΔR_{load}]	< 2 •10^{-4} • V_{nom}
Temperature coefficient	100 ppm / K
Supply voltage	22.8 - 25.2 V
Set / monitor voltage	0 - 5 V
Remote connector	H15
Protection	overload and short circuit, INHIBIT, V/I-limit
HV connector	SHV | GES
Case	3U cassette (MMC capable)

CONFIGURATIONS

MODEL	V_{nom}	I_{nom}	HP/DEPTH	CONNECTOR
CKx 05 206 24 5	500 V	20 mA	8 HP / 40.64 mm	SHV
CKx 10 106 24 5	1 kV	10 mA	8 HP / 40.64 mm	SHV
CKx 15 805 24 5	1.5 kV	8 mA	8 HP / 40.64 mm	SHV
CKx 20 605 24 5	2 kV	6 mA	8 HP / 40.64 mm	SHV
CKx 30 405 24 5	3 kV	4 mA	8 HP / 40.64 mm	SHV
CKx 50 205 24 5	4 kV	3 mA	8 HP / 40.64 mm	SHV
CKx 40 305 24 5	5 kV	2 mA	8 HP / 40.64 mm	SHV
CKx 70 155 24 5	7 kV	1.5 mA	8 HP / 40.64 mm	SHV
CKx 100 105 24 5	10 kV	1 mA	12 HP / 61.0 mm	GES
CKx 150 604 24 5	15 kV	0.6 mA	12 HP / 61.0 mm	GES
CKx 200 504 24 5	20 kV	0.5 mA	12 HP / 61.0 mm	GES
CKx 300 304 24 5	30 kV	0.3 mA	12 HP / 61.0 mm	GES

OPTIONS & ORDER INFO

OPTION:	ORDER INFO	EXAMPLE
Polarity	positive: **x = p**, negative: **x = n**	CP**p** 05 206 24 5

CPS modules are highly stable analog controlled high voltage power supplies. They are available as compact metal box or system capable in 3U Eurocassette standard. Standard modules of the CPS series can be used as standalone DC/DC converters, combined to multichannel AC/DC supply in a THQ device or integrated in a modular MMC system.

To protect the connected load the modules are equipped with INHIBIT, current and voltage limits.

DPS 3U SERIES

SYSTEM CAPABLE DC/DC HIGH PRECISION HV MODULE

SEE COVER FOR SHORTCUT REFERENCE

- **Patented resonance converter technology**
- **High precision, high stability**
- **Very low ripple and noise, low EMI**
- **INHIBIT, adjustable hardware limits**
- **Polarity electronically switchable**
- **Customized versions on request**

MMC

AIO

VLN

CUSTOM

DATA SHEET

DPS modules are highly precise and highly stable analog controlled high voltage power supplies. They are available as compact metal box or system capable in 3U Euro-cassette standard.

The modules can be used as standalone DC/DC converters, combined to multichannel AC/DC supply in a THQ device or integrated in a modular MMC system.

The output voltage is controllable via analog interface with either an external potentiometer (internal reference voltage) or an analog control voltage. To protect the connected load the modules are equipped with INHIBIT, adjustable current and voltage limits.

SPECIFICATIONS

Polarity	switchable
Ripple and noise [f >10 Hz]	typ. < 3 mV_{p-p}
Stability - [ΔV_{out} / ΔV_{in}]	< 1 • 10^{-5} • V_{nom}
Stability - [ΔV_{out} / ΔR_{load}]	< 1 • 10^{-5} • V_{nom}
Temperatur coefficient	< 50 ppm / K
Supply voltage	22.8 - 25.2 V
Set / monitor voltage	0 - 5 V
Remote connector	H15
Protection	overload and short circuit, INHIBIT, V/I-limit
HV connector	SHV
Case	3U cassette (MMC capable)

CONFIGURATIONS

MODEL	V_{nom}	I_{nom}	HP/depth
DKR 05 106 24 5	500 V	10 mA	8 HP / 40.64 mm
DKR 10 106 24 5	1 kV	10 mA	8 HP / 40.64 mm
DKR 15 805 24 5	1.5 kV	8 mA	8 HP / 40.64 mm
DKR 20 605 24 5	2 kV	6 mA	8 HP / 40.64 mm
DKR 30 405 24 5	3 kV	4 mA	8 HP / 40.64 mm
DKR 40 305 24 5	4 kV	3 mA	8 HP / 40.64 mm
DKR 50 205 24 5	5 kV	2 mA	8 HP / 40.64 mm
DKR 60 155 24 5	6 kV	1.5 mA	8 HP / 40.64 mm

EPS 3U SERIES

VERSATILE SYSTEM CAPABLE DC/DC HV POWER-MODULE

MMC
AIO
ARC
CLD
CUSTOM

- **Patented resonance converter technology**
- **High efficiency**
- **Voltage and current control**
- **Low ripple and noise, low EMI**
- **Multiple options (ARC, CLD)**
- **Highly customizable, optimized versions on request**

DATA SHEET

EPS modules are versatile DC/DC high voltage power supplies with multiple options. The modules are available as system capable in 3U Eurocassette-standard in 60 W. EPS 3U modules can be integrated in a modular MMC system. To protect the connected load the modules are equipped with INHIBIT

The patented resonance converter technology and metal box shielding guarantee lowest electromagnetic interference. To fit best in different applications EPS modules can be equipped with ARC management or as capacitor charger with very low output voltage overshoot (option CLD).

SPECIFICATIONS

	EPS 60 W - 3U
Polarity	factory fixed, positive or negative
Ripple and noise [f >10 Hz]	< 10kV: typ. < 5 • 10^{-4} • V_{nom} ≥ 10 kV: typ. < 2 • 10^{-2} • V_{nom}
Stability [ΔV_{out} / ΔV_{in}]	ΔV_{out} < 0.01% • V_{nom}
Stability [ΔV_{out} / R_{load}]	ΔV_{out} < 0.02% • V_{nom}
Temperatur coefficient	< 100 ppm / K
CLD - Repeat accuracy	1% V_{out}
Supply voltage	22.8 - 26.4 V
Set / monitor voltage	0 - 5 V
Remote connector	H15
HV connector	SHV | GES
Protection	overload and short circuit, INHIBIT, overvoltage/overtemp
Case	3U cassette
Dimensions (L/W/H)	60.96 mm / 12HP / 3U

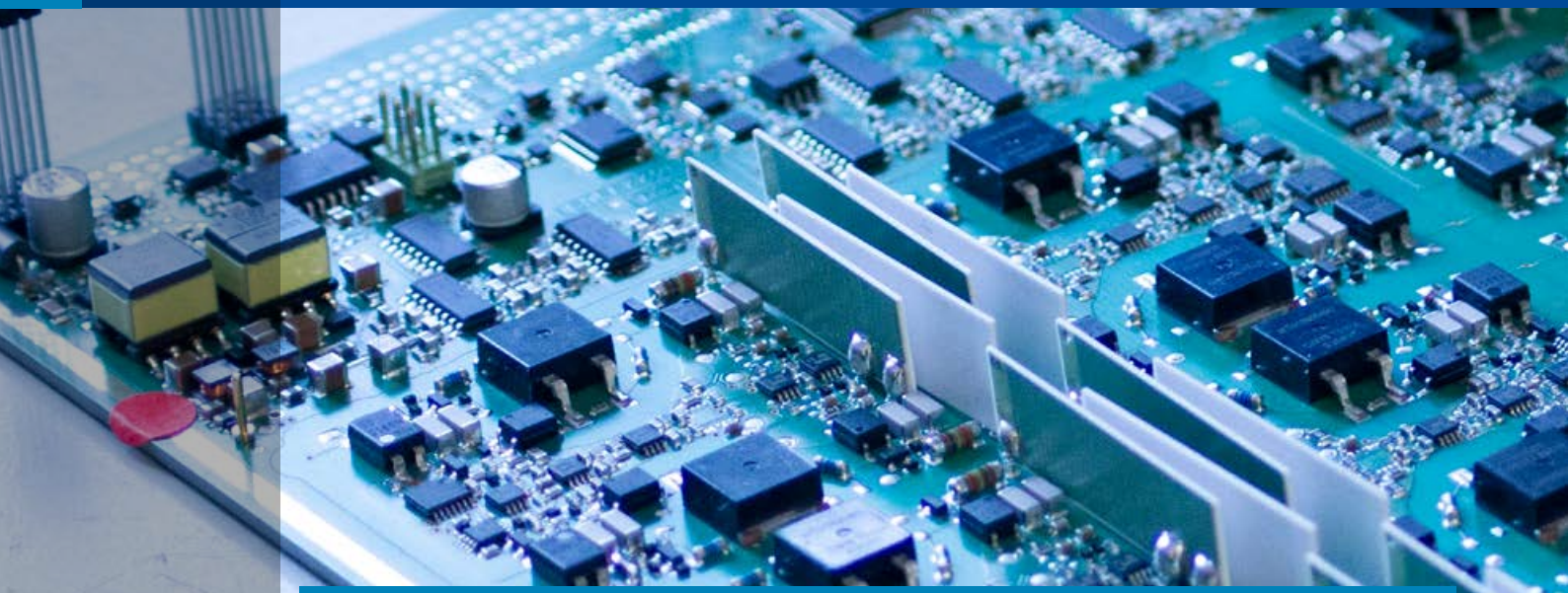
SEE COVER FOR SHORTCUT REFERENCE

CONFIGURATIONS

EPS 60 W	V_{nom}	I_{nom}	STANDARD RIPPLE (V_{p-p})	CONNECTOR
EKx 05 127 24 5	500 V	120 mA	0.1	SHV
EKx 10 606 24 5	1 kV	60 mA	0.1	SHV
EKx 15 406 24 5	1.5 kV	40 mA	0.1	SHV
EKx 20 306 24 5	2 kV	30 mA	0.2	SHV
EKx 30 206 24 5	3 kV	20 mA	0.5	SHV
EKx 40 156 24 5	4 kV	15 mA	2	SHV
EKx 50 126 24 5	5 kV	12 mA	2.5	SHV
EKx 60 106 24 5	6 kV	10 mA	0.5	SHV
EKx 80 705 24 5	8 kV	7 mA	4	GES
EKx 100 605 24 5	10 kV	6 mA	1	GES
EKx 150 405 24 5	15 kV	4 mA	120	GES
EKx 200 305 24 5	20 kV	3 mA	400	GES

OPTIONS & ORDER INFO

OPTION	ORDER INFO	EXAMPLE
Polarity	positive: **x = p**, negative: **x = n**	EP**p** 05 127 24 5
ARC management	**ARC**	
Capacitor charger	**CLD**	



MODULES

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NHR SERIES
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NHQ SERIES
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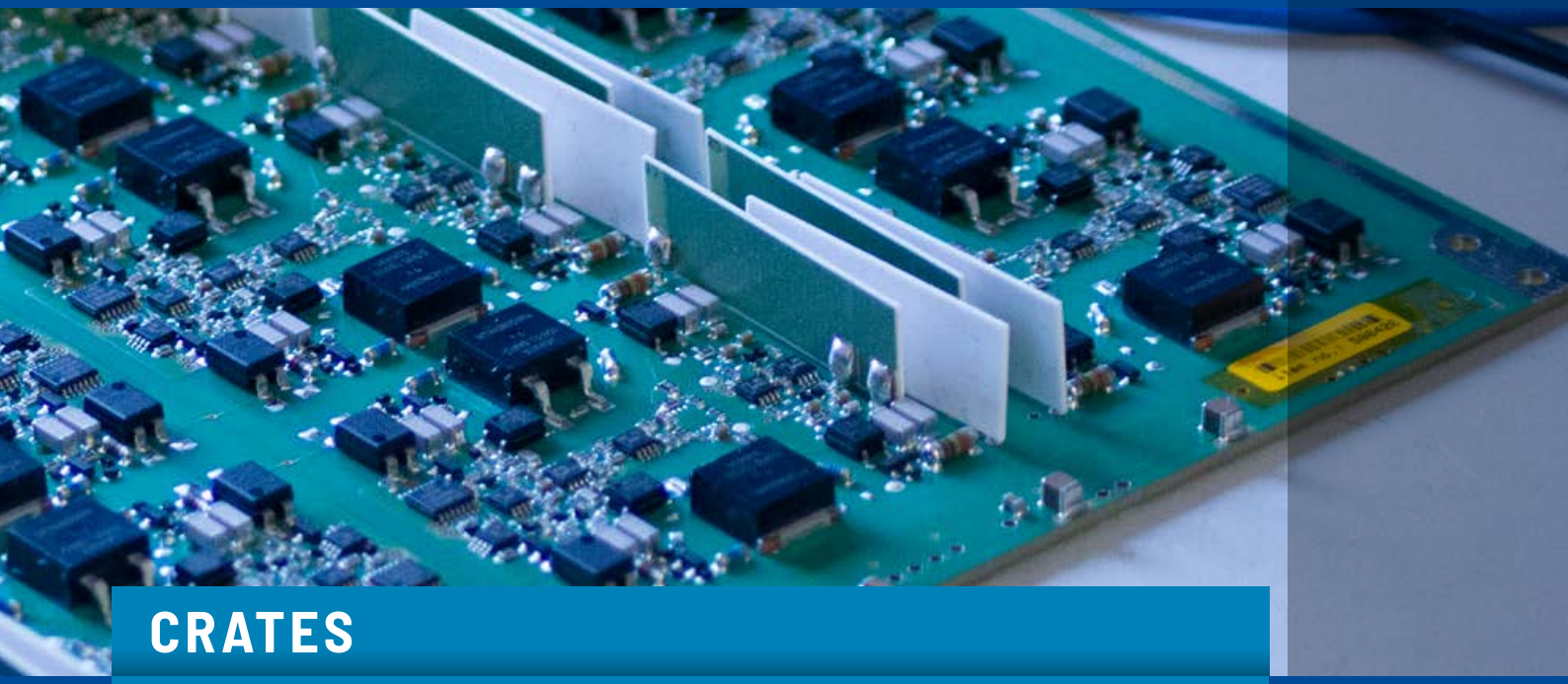

CRATES

WIENER NIM CRATES

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NIM CRATES MADE BY WIENER

HIGH QUALITY 19" AND DESKTOP CRATES IN NIM STANDARD

NIM

- 19" and desktop versions
- 6 / 12 NIM slots
- 150 - 2,700 W power supplies
- Linear regulated, low ripple and noise (< 3 mV)
- Optional with fan
- According NIM standard DOE/ER-0457T and IEC 801


NIM Compact


NIM Portable


NIMpact 5U


NIM 6000 series


NIM CE (CERN)

iseg offers various types of NIM crates made by WIENER for different purpose and power ranges. WIENER NIM crates are very ruggedized by using high quality components like „the black" NIM connector with lathed contacts which last for decades. The product range includes compact and portable version up to monitorable 19" versions.

WIENER NIM CRATE SPECIFICATIONS

	Compact	Portable	NIMpact	NIM CE (CERN)	6000
Slots (NIM)	10	5	12	12	12
Output power	150 W	150 W	300 W	300 / 600 / 1,920 W	up to 2,700 W
$I_{out\ total}$ at ±6 V	5 A	5 A	15 / 8.6 A	17 / 45 / 80 A	up to 90 A
$I_{out\ total}$ at ±12 V	3 A	3 A	3.4 / 3.4 A	3.4 / 8 / 20 A	up to 46 A
$I_{out\ total}$ at ±24 V	1.5 A	1.5 A	3.4 / 6.9 A	3.4 / 8 / 10 A	up to 23 A
Active cooling	no	no	optional fan (fixed)	by fan tray (removable)	by fan tray (removable)
Protection	overload, short circuit	overload, short circuit	overload, short circuit	overload, short circuit	overload, short circuit
Remote control / monitoring	no	no	Ethernet (opt.)	Display, CAN, Ethernet (opt.)	Display, Ethernet, RS232, CAN
Dimensions (L/W/H)	340 mm / 19"/ 5U	340 / 273 / 273 mm	518 mm /19" / 5U (7U w. fan)	530 mm / 19" / 5U (7U w. fan)	620 mm / 19" / 7U


„black series": high quality NIM connectors

SI-PMT SOLUTIONS, P. 82

OPTIONS FOR SI-PHOTOMULTIPLIERS:
low output current versions (L)

NHS

VERSATILE HIGH PRECISION HIGH VOLTAGE MODULE IN NIM STANDARD

SEE COVER FOR SHORTCUT REFERENCE

- 6 channel, 100 V - 6 kV versions
- Very low ripple and noise
- Front panel control with 1,44" TFT display
- Hardware voltage and current limits
- Voltage and current control per channel
- USB, CAN interfaces
- Programmable parameters

NIM
ULN
L
DIO

DATA SHEET

The iseg NHS modules are multi channel high voltage power supplies in 1/12 NIM standard cassette format. With up to 6 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. Several NHS modules can be daisy-chained by CAN and controlled with a single USB connection or by iseg iCS system. The module is made of best components such as 24 bit ADC and 20 bit DAC, an excellent front panel control with TFT display plus comprehensive security features.

SPECIFICATIONS

	NHS STANDARD	NHS HIGH PRECISION
Polarity	factory fixed, positive or negative	factory fixed, positive or negative
Ripple and noise	< 10 mV	< 5 mV
Temperature coefficient	50 ppm / K	30 ppm/K | opt. 10 ppm/K (TC)
Resolution voltage setting	$2 \bullet 10^{-6} \bullet V_{nom}$	$2 \bullet 10^{-6} \bullet V_{nom}$
Resolution current setting	$2 \bullet 10^{-6} \bullet I_{nom}$	$2 \bullet 10^{-6} \bullet I_{nom}$
Resolution voltage measurement	$2 \bullet 10^{-6} \bullet V_{nom}$	$1 \bullet 10^{-6} \bullet V_{nom}$
Resolution current measurement full range	$2 \bullet 10^{-6} \bullet I_{nom}$	$1 \bullet 10^{-6} \bullet I_{nom}$
Resolution current measurement 2nd range	n/a	50 pA [I_{out} < 20µA]
Accuracy voltage measurement*	$\pm (0.01\ \% \bullet V_{out} + 0.02\ \% \bullet V_{nom})$	$\pm (0.01\ \% \bullet V_{out} + 0.01\ \% \bullet V_{nom})$
Accuracy current measurement* full range	$\pm (0.01\ \% \bullet I_{out} + 0.02\ \% \bullet I_{nom})$	$\pm (0.01\ \% \bullet I_{out} + 0.01\ \% \bullet I_{nom})$
Accuracy current measurement* 2nd range	n/a	$\pm$ (0.1 % • I_{out} + 4 nA)
Voltage ramp up / down	up to 0.2 • V_{nom} / s opt. up to 0.75 • V_{nom} / s	up to 0.2 • V_{nom} / s opt. up to 0.75 • V_{nom} / s
Protection	INHIBIT, Safety loop, short circuit, overload, hardware V/I limits	
HV connector	SHV | BNC	SHV | BNC
Case	1/12 NIM cassette	1/12 NIM cassette

*) All specifications guaranteed from 1% · $V_{nom} < V_{out} < V_{nom}$

OPTIONS & ORDER INFO

OPTION	ORDER INFO	EXAMPLE
Polarity	pos.: **x = p**,neg.: **x = n**	NHS 60 10**p**
	mix: **x = x**	NHS 60 10**x**
Standard	**y=0**	NHS 6**0** 10p
High precision	**y=2**	NHS 6**2** 10p
Lower temp. coefficient	**TC**	
Lower output currrent	**L** (100 µA, high precision version only)	
INHIBIT - down / up	**ID / IU**	

CONFIGURATIONS

MODEL	OUTPUT VOLTAGE	OUTPUT CURRENT	HV CONNECTOR
NHS 6y 01x	100 V	10 mA	BNC
NHS 6y 05x	500 V	15 mA | 10 mA [high pr.]	SHV | opt. BNC
NHS 6y 10x	1 kV	8 mA	SHV
NHS 6y 20x	2 kV	4 mA	SHV
NHS 6y 30x	3 kV	3 mA	SHV
NHS 6y 40x	4 kV	2 mA	SHV
NHS 6y 60x	6 kV	1 mA	SHV

Other configurations on request!

NHR

REVERSIBLE HIGH PRECISION HV MODULE IN NIM STANDARD

NIM
ULN
L
DIO

- 4 channels, 2 / 6 kV versions
- Electronically switchable polarity
- 6 kV channel with switchable HV-modes: up to 2 kv / 4 mA, 4 kV / 3 mA or 6 kV / 2 mA
- Ultra low ripple and noise
- Front panel control with 1.44" TFT display
- Hardware voltage and current limits, control & measure per channel
- USB and CAN interface, programmable parameters

SPECIFICATIONS

	NHR STANDARD	NHR HIGH PRECISION
Polarity	electronically switchable	electronically switchable
Ripple and noise	< 10 mV	< 2-3 mV
Temperature coefficient	50 ppm / K	30 ppm/K | opt. 10 ppm/K (TC)
Resolution voltage setting	$2 \bullet 10^{-6} \bullet V_{nom}$	$2 \bullet 10^{-6} \bullet V_{nom}$
Resolution current setting	$2 \bullet 10^{-6} \bullet V_{nom}$	$2 \bullet 10^{-6} \bullet I_{nom}$
Resolution voltage measurement	$2 \bullet 10^{-6} \bullet V_{nom}$	$1 \bullet 10^{-6} \bullet V_{nom}$
Resolution current measurement - full range	$2 \bullet 10^{-6} \bullet I_{nom}$	$1 \bullet 10^{-6} \bullet I_{nom}$
Resolution current measurement - 2nd range	n/a	50 pA [I_{out} < 20µA]
Accuracy voltage measurement *	$\pm$ (0.01 % $\bullet V_{out}$ + 0.02 % $\bullet V_{nom}$)	$\pm$ (0.01 % $\bullet V_{out}$ + 0.01 % $\bullet V_{nom}$)
Accuracy current measurement *- full range	$\pm$ (0.01 % $\bullet I_{out}$ + 0.02 % $\bullet I_{nom}$)	$\pm$ (0.01 % $\bullet I_{out}$ + 0.01 % $\bullet I_{nom}$)
Accuracy current measurement *- 2nd range	n/a	$\pm$ (0.01 % $\bullet I_{out}$ + 4 nA)
Voltage ramp up / down	$1 \bullet 10^{-6} \bullet V_{nom}$/s up to 0.2 $\bullet V_{nom}$ / s opt. up to 0.75 $\bullet V_{nom}$ / s	$1 \bullet 10^{-6} \bullet V_{nom}$/s up to 0.2 $\bullet V_{nom}$ / s opt. up to 0.75 $\bullet V_{nom}$ / s
Protection	INHIBIT, Safety loop, short circuit, overload, hardware V/I limits	INHIBIT, Safety loop, short circuit, overload, hardware V/I limits
HV connector	SHV	SHV
Case	1/12 NIM cassette	1/12 NIM cassette

*) All specifications guaranteed from 1% · V_{nom} < V_{out} < V_{nom}

CONFIGURATIONS

MODEL	CHANNELS	PRECISION	OUTPUT VOLTAGE	OUTPUT CURRENT	OUTPUT MODES
NHR 20 20	2	Standard	2000 V	6 mA	2 kV / 6 mA
NHR 20 60	2	Standard	6000 V	4 mA	6 kV / 2 mA | 4 kV / 3 mA | 2 kV / 4 mA
NHR 40 20	4	Standard	2000 V	6 mA	2 kV / 6 mA
NHR 40 60	4	Standard	6000 V	4 mA	6 kV / 2 mA | 4 kV / 3 mA | 2 kV / 4 mA
NHR 22 20	2	High	2000 V	6 mA	2 kV / 6 mA
NHR 22 60	2	High	6000 V	4 mA	6 kV / 2 mA | 4 kV / 3 mA | 2 kV / 4 mA
NHR 42 20	4	High	2000 V	6 mA	2 kV / 6 mA
NHR 42 60	4	High	6000 V	4 mA	6 kV / 2 mA | 4 kV / 3 mA | 2 kV / 4 mA

Other configurations on request!

SEE COVER FOR SHORTCUT REFERENCE

See channel settings at runtime

Setup each channel individually

Select prefered output mode

Select preferred polarity

HV-MODE SWITCHABLE
UNIVERSAL
SWITCHABLE POLARITY

DATA SHEET

The iseg NHR modules are multi-channel high voltage power supplies in 1/12 NIM standard cassette format. The iseg technology combines ultra precise high voltage generation and measurement in pico amp range.

The NHR series provides up to 4 channels, each with an independent voltage and current control and electronically reversible polarity. The 6 kV channel provides a maximum of versatility: with three electronically switchable HV-generation modes it can supply 4 mA up to voltages of 2 kV, 3 mA up to 4 kV or 2 mA up to 6 kV. Alternatively the NHR can be equipped with cost efficient 2 kV / 6 mA channels with one HV output mode.

Several NHR modules can be daisy-chained by CAN and controlled with a single USB connection or by optional iseg iCS system via Ethernet. The module is made of best components such as 24 bit ADC and 20 bit DAC, an excellent front panel control with TFT display plus comprehensive security features.

iCS MINI, P. 90

FOR MORE FLEXIBILITY AND CONNECTIVITY:
Controllable with iCS Mini

OPTIONS & ORDER INFO

OPTION	ORDER INFO
Lower temperature coefficient	TC
Lower current (100 µA, high precision version only)	L
Single channel INHIBIT - down	ID
Single channel INHIBIT - up	IU

NHQ

SINGLE/DUAL CHANNEL HV MODULE IN NIM STANDARD

NIM
VLN
L
AIO
DIO

- 1 / 2 channels, 2 / 3 / 4 / 5 / 6 / 8 / 10 kV and customized versions
- LCD for voltage and current display
- Switchable polarity
- Low ripple and noise
- Front panel control with high precise 10-turn potentiometers
- Hardware voltage and current limits with 10 % step
- RS232, analog I/O, CAN (optional)
- Programmable parameters (current trip, ramp speed etc.)

SPECIFICATIONS

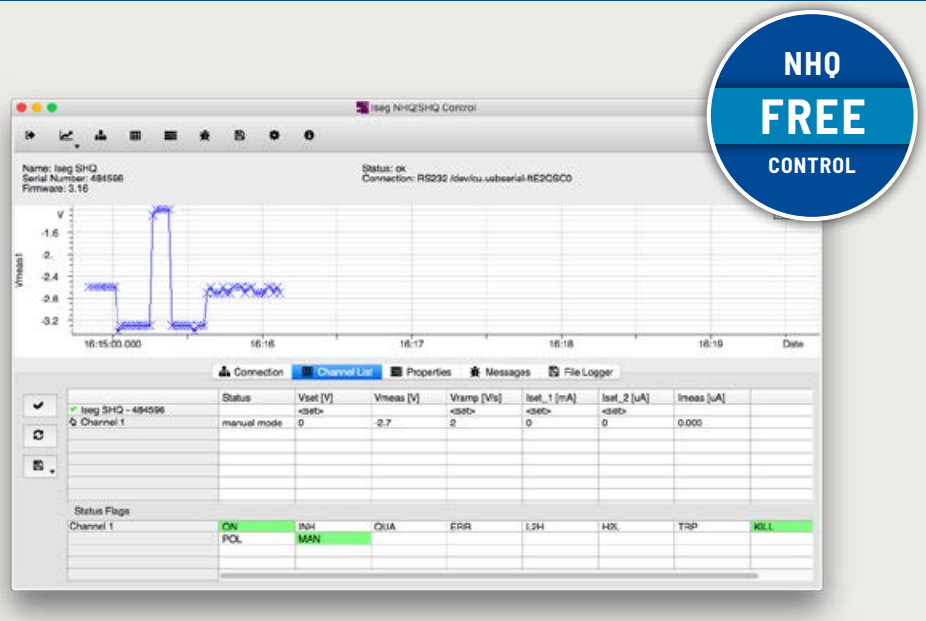
	NHQ STANDARD	NHQ LOW COST
Polarity	switchable	switchable
Ripple and noise	< 2 | 5 | 50 mV_{P-P}	< 50 mV_{P-P}
Stability	$< 5 \bullet 10^{-5} \bullet V_{nom}$	$< 2 \bullet 10^{-4} \bullet V_{nom}$
Temperature coefficient	< 50 ppm / K	< 100 ppm / K
Resolution voltage setting	1 V	1 V
Resolution voltage measurement - display	1 V	1 V
Resolution voltage measurement - remote	1 V	n/a
Resolution current measurement - display	1 µA	1 µA
with options	L: 100 nA [I_{nom} = 100 µA]	L: 100 nA [I_{out} < 100 µA]
Resolution current measurement - remote	1µA	-
with options	L: 100 nA [I_{nom} = 100 µA]	n/a
Accuracy voltage measurement *	± (0.05 % • V_{out} + 0.02 % • V_{nom} + 1 digit)	± (0.05 % • V_{out} + 0.02 % • V_{nom} + 1 digit)
Accuracy current measurement *	± (0.05 % • I_{out} + 0.02 % • I_{nom} + 1 digit)	± (0.05% • I_{out} + 0.05% • I_{nom} + 1 digit)
Voltage ramp - hardware	500 V / s	500 V / s
Voltage ramp - software	2 - 255 V / s	n/a
Protection	INHIBIT, hardware V/I limits (10% steps)	INHIBIT, hardware V/I limits (10% steps)
HV connector	SHV | LEMO	SHV | LEMO
Case	1/12 HP NIM cassette	1/12 HP NIM cassette

*) All specifications guaranteed from 1% · V_{nom} < V_{out} < V_{nom}

OPTIONS & ORDER INFO

OPTION	ORDER INFO	EXAMPLE
Channels	1 channel version: **n = 1**, 2 channel version: **n = 2**	NHQ 202M
±24 V supply only	**±24 V = N24**	
Very high voltage resolution 10 mV	**VHR**	
Lower output current	**104 (100 µA)**	

SEE COVER FOR SHORTCUT REFERENCE



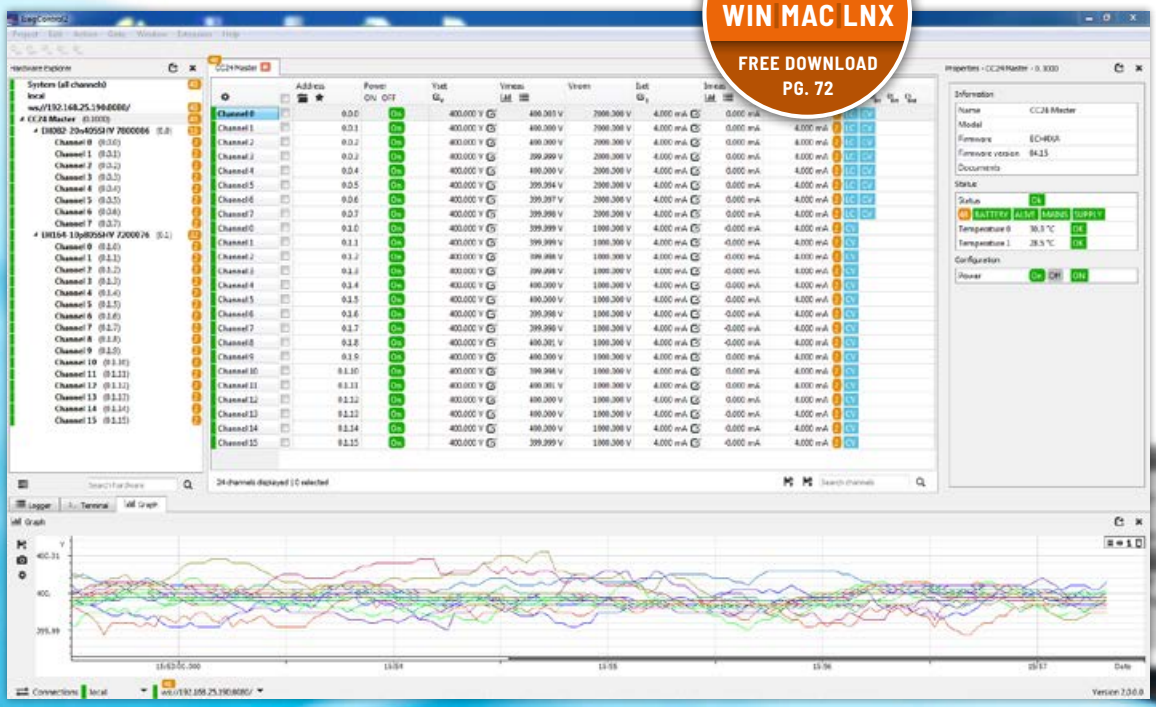
DATA SHEET

The established NHQ single/dual channel HV module is cased in compact 1/12 NIM format. The NHQ series HV supplies are front panel controllable with a precise 10-turn potentiometer per channel for voltage setting and a common LCD for display of voltage or current. For remote control the NHQ comes with RS232, analog I/O or optional CAN-interface. The voltage ramp is hardware fixed and can be changed in remote operation. The high voltage output is short circuit and overload protected. The INHIBIT tiggers the HV switch-off over an external digital signal. function over external digital.

CONFIGURATIONS

MODEL	OUTPUT VOLTAGE	OUTPUT CURRENT	RIPPLE AND NOISE	INTERFACE	CONNECTOR
NHQ STANDARD					
NHQ n02M	2 kV	6 mA	2 mV_{P-P}	RS232	SHV
NHQ n03M	3 kV	4 mA	2 mV_{P-P}	RS232	SHV
NHQ n04M	4 kV	3 mA	2 mV_{P-P}	RS232	SHV
NHQ n05M	5 kV	2 mA	5 mV_{P-P}	RS232	SHV
NHQ n06L	6 kV	1 mA	5 mV_{P-P}	RS232	SHV
NHQ LOW COST					
NHQ 212M	2 kV	6 mA	50 mV_{P-P}	AIO	SHV
NHQ 213M	3 kV	4 mA	50 mV_{P-P}	AIO	SHV
NHQ 214M	4 kV	3 mA	50 mV_{P-P}	AIO	SHV
NHQ 215M	5 kV	2 mA	50 mV_{P-P}	AIO	SHV
NHQ 216L	6 kV	1 mA	50 mV_{P-P}	AIO	SHV
Other configurations on request!					

HV CONTRO



ISEG CONTROL2

WIN MAC LNX

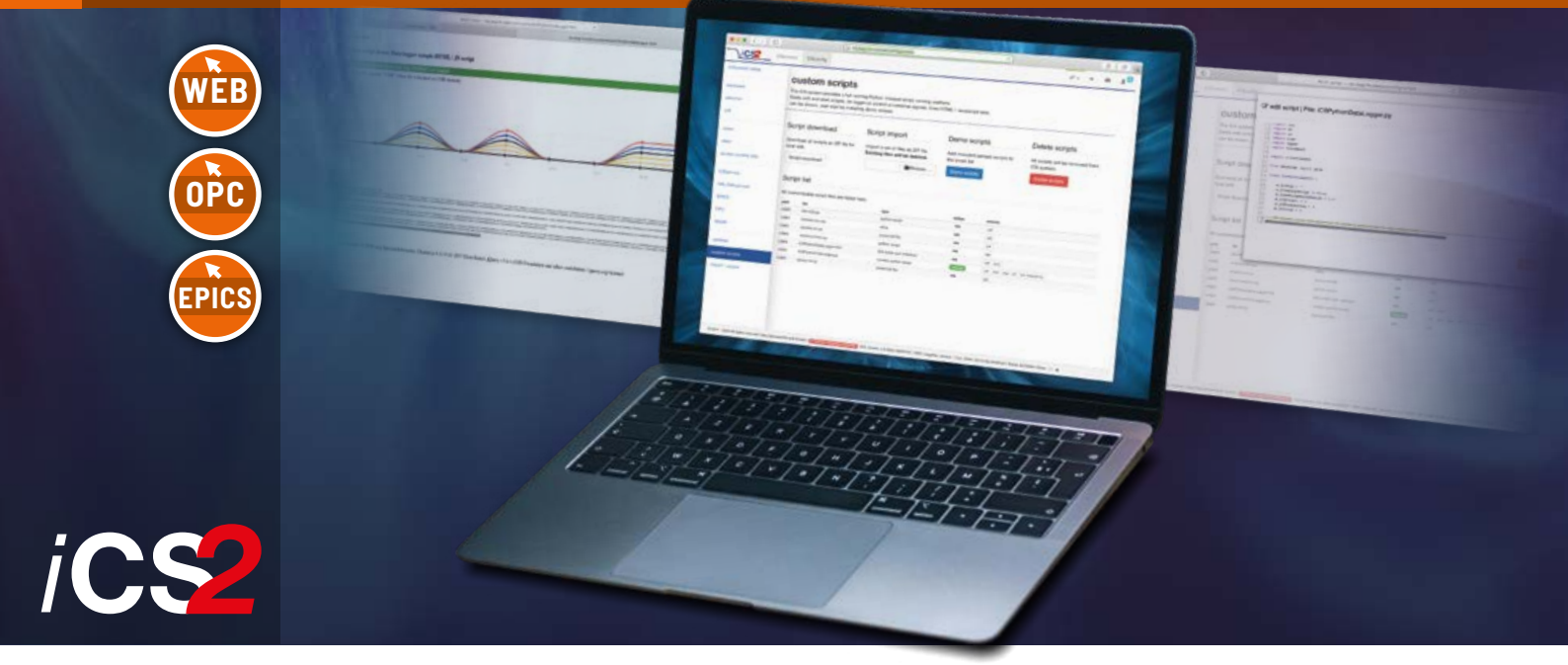
FREE DOWNLOAD

PG. 72

L SOLUTIONS

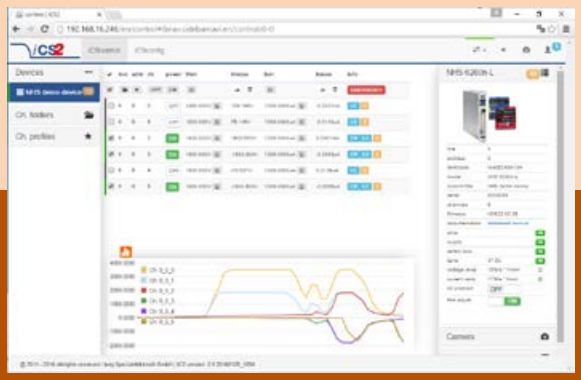
ISEG COMMUNICATION SERVER 2

COMPLETE SOFTWARE SOLUTION FOR CONTROL AND CONFIGURATION



- Software system running on iCSmini or intelligent controller CC24 or SHR
- Controlling, monitoring and service of almost every iseg HV device with CAN or USB / RS232 interface
- Setup without software installation, easy network integration, webcam and WiFi support, logging etc.
- Integrated user management
- iCSmonitor: webbrowser based user interface with controlling, monitoring, charts, channelgroups/-profiles and more
- iCSconfig: easy webbrowser based configuration tool for iseg hardware, firmware update
- Many software services included: EPICS, SNMP, OPC-UA, HTTP, TCP/IP, Websocket

CONTROL & MONITOR



HARDWARE CONFIG & UPDATE

TEST IT NOW ONLINE
ICS.ISEG-HV.COM

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SEE COVER FOR SHORTCUT REFERENCE

EDIT

your python script directly on browser or locally with access to all hardware parameters.

UPLOAD

and start the script directly on iCS capable device.

CREATE

your own visualisation easily in HTML / Javascript / CSS.

python

You can easily create your own visualisation for example in HTML / Javascript / CSS. This new feature made thousands of applications possible. Some examples are: data logging, event driven voltage channel control, testing,external control of voltage (by temperature changes), block rampup. Start easily with the iseg datalogger example, which stores measured values directly on USB flash drive.

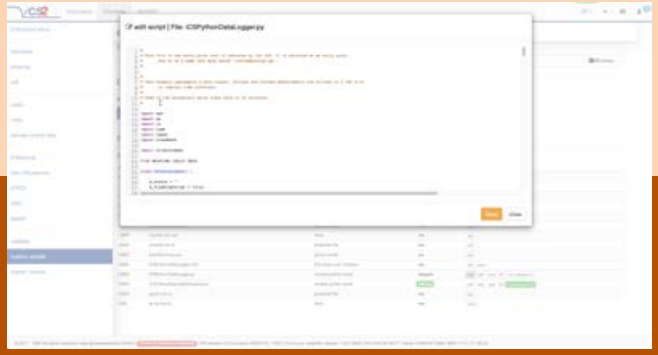
The iseg Communication Server iCS2 is a software solution, running on iCSmini2 or the intelligent MMS crate controller CC24.

iCS2 is capable to control a large number of different iseg hardware, which is equipped with CAN or serial interfaces.

A web browser based interface for hardware control and configuration can be used for quick platform independent access. It has basic control features but also channel groups, saved profiles, charts and live logging. iCS2 also provides many preinstalled software services like SNMP, EPICS IOC, OPC-UA or access over HTTP, websocket or TCP/IP.

CREATE & RUN CUSTOM APPS

CREATE & EDIT OWN PYTHON SCRIPTS



ISEG CONTROL 2

UNIFIED CONTROL SOFTWARE FOR ALMOST EVERY ISEG DEVICE

MAC WIN LIN

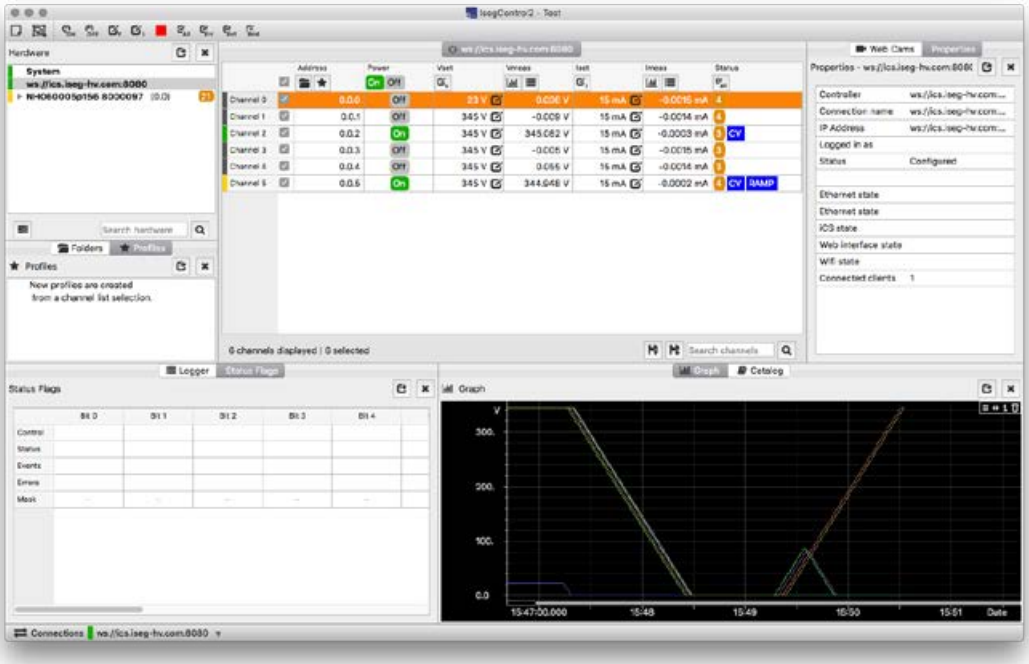
- One software for nearly every iseg device
- Available for Linux, Windows and Mac OS
- Supports CAN, USB and Ethernet interfaces
- Runs as iCS client with CC24 controller, standalone iCS2mini or SHR desktop supply
- Feature rich: logging, channel profiles, stored setups CSV export, Python scripting and more

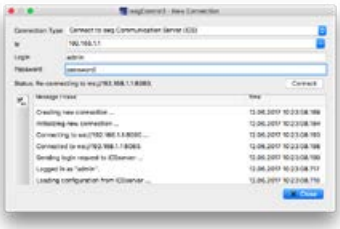
ISEG CONTROL2
WIN MAC LNX
FREE DOWNLOAD
PG. 72

2 CONTROL

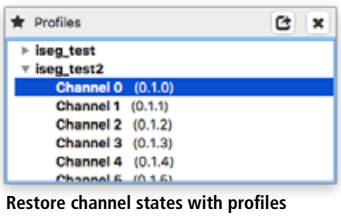
isegControl2 is the most powerful and unified control software for almost every iseg device, which is equipped with a digital control interface. It is designed using latest software technologies and is available for Linux, Windows and Mac OS.

With numerous features like comprehensive logging, graphical analysis, device parameter setting, channel profiles and much more isegControl2 is the most sophisticated tool for handling iseg HV supplies. By a plugin technology the application can be extended by custom features.





Multiple Hardware Connections



Restore channel states with profiles

Python Script engine - custom control

ISEG FOR CONTROL SYSTEMS

ISEG SOLUTIONS FOR CONTROL SYSTEMS

SEE COVER FOR SHORTCUT REFERENCE

EPICS (WINDOWS, LINUX)

iseg provides EPICS support (Experimental Physics and Industrial Control System) for almost all CAN controllable iseg HV hardware for use with prevalent worldwide applied experimental physics and control system.The EPICS input / output controller (iseg IOC) provides access to all parameters of HV modules, crates and other iseg high voltage devices.
The iseg IOC requires an access ready hardware abstraction layer (iseg HAL).

OPC SERVER / CLIENT (WINDOWS)

With the OPC server / client solution iseg provides a windows based possibility to control hardware via CAN interface. The iseg OPC server provides a dedicated namespace. The iseg OPC client provides frontend visualization for basic device operations.

OPC-UA SERVER (LINUX)

iseg delivers vendor libraries for development of customer side OPC-UA infrastructures. The OPC-UA libraries are wrapping the iseg hardware abstraction layer (iseg HAL).

E-MOBILITY

PARTICLE FILTER

PHOTODETECTION APPLICATIONS

PHOTOMULTIPLIER TUBES

TESTING AND MATERIAL ANALYSIS

COLLIDERS

SOLID-STATE DETECTORS

ION-BEAM APPLICATIONS

PHOTOVOLTAICS

SEMICONDUCTOR PRODUCTION

MEASURING

DOSIMETERS AND DOSE RATE METERS

GAS IONISATION DETECTORS

ELECTRON BEAM METHOD

PARTICLE ACCELERATORS

SURFACE TREATMENT

MAGNETS

SPACE TRAVEL TECHNOLOGY

AVALANCHE PHOTO DIODES

SOLUTIONS

TUBES

ENVIRONMENTAL TECHNOLOGIES

LIGHTING INDUSTRY

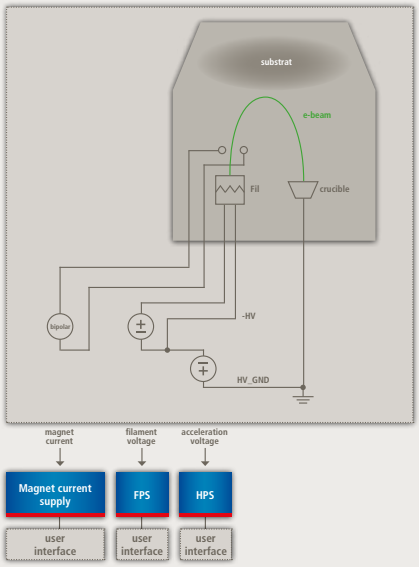
ELECTROSTATIC LENSES

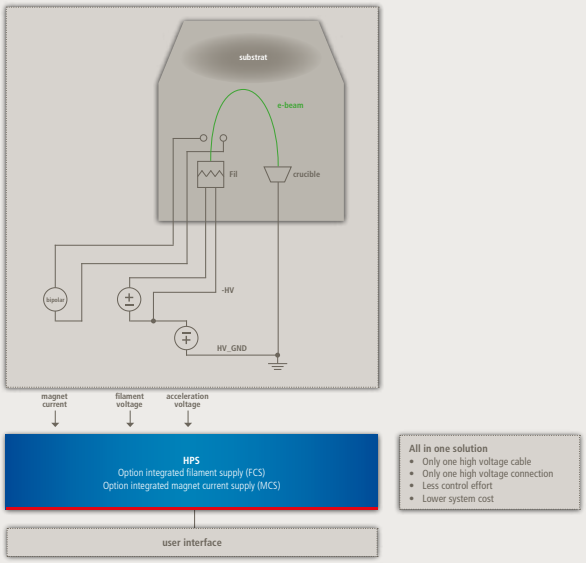
MASS SPECTROMETRY

ELECTROPHORESIS

E-BEAM COATING SOLUTIONS

HV SOLUTIONS FOR ELECTRON-BEAM COATING APPLICATIONS





High voltage devices of the class HPS equipped with suitable options are ideally suited as a power supply for electron beam coating. The necessary filament supply is available both as a standalone device and integrated into a HPS.

- Ultrafast configurable ARC management, full ARC recovery in less than 5 ms (option ARC)
- Permanent ARCs possible
- Current limitation during an ARC to less than 4 A (option ACL)
- Increased process integrity by micro ARC detection (with the option ACL - full micro ARC recovery in less than 1 ms)
- Possible parallel operation of two electron beam processes
- Stand alone or integrated filament supply (integrated up to 2 per HPS)
- Direct filament current control or configurable parent emission regulation
- Programmable controller parameters of the emission control
- Configurable minimum and maximum filament current
- HV generator as well as filament supply programmable via USB interface (ARC management, controller parameters, etc.)

Very simple integration into the plant control via analog interface or complex control with a digital interface (Ethernet, EtherCAT, CAN, IEEE-488, RS232).

SEE COVER FOR SHORTCUT REFERENCE

HPS WITH INTEGRATED FILAMENT SUPPLY

NOW WITH ETHERCAT

PG. 28

INTEGRATED SUPPLY (PAGE 26)

- HV supply with up to 2 integrated filament supply units for e-beam coating applications
- Filament supply on internal HV potential
- All HPS features and options available
- Optional front panel operation with LCD

FPS FILAMENT SUPPLY

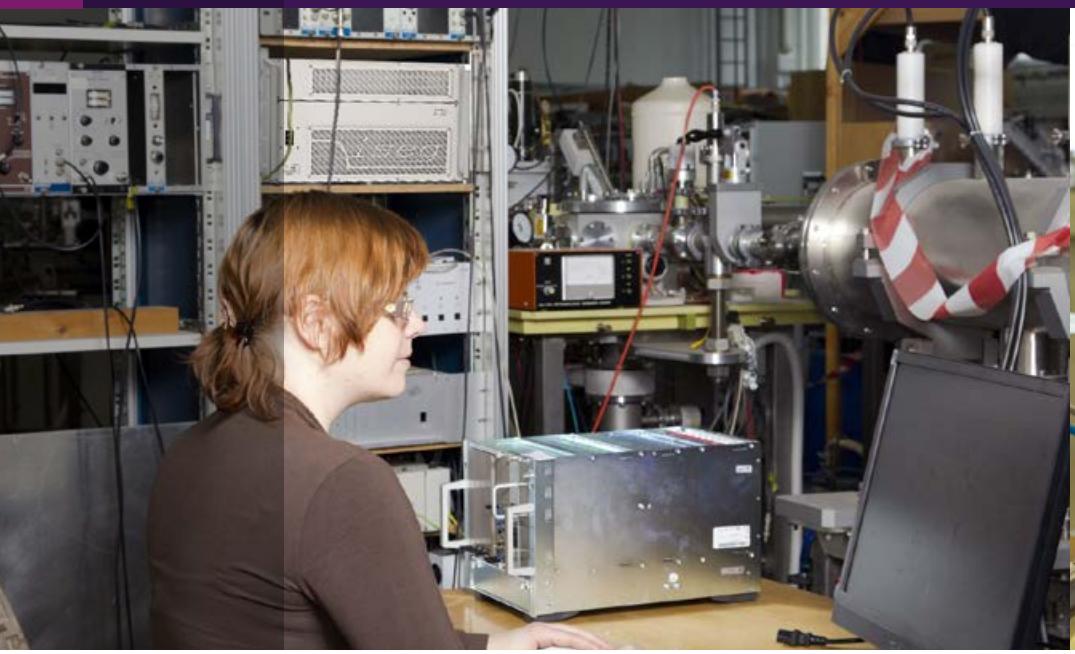
HPS HIGH VOLTAGE SUPPLY

DEDICATED SUPPLIES (PAGE 27)

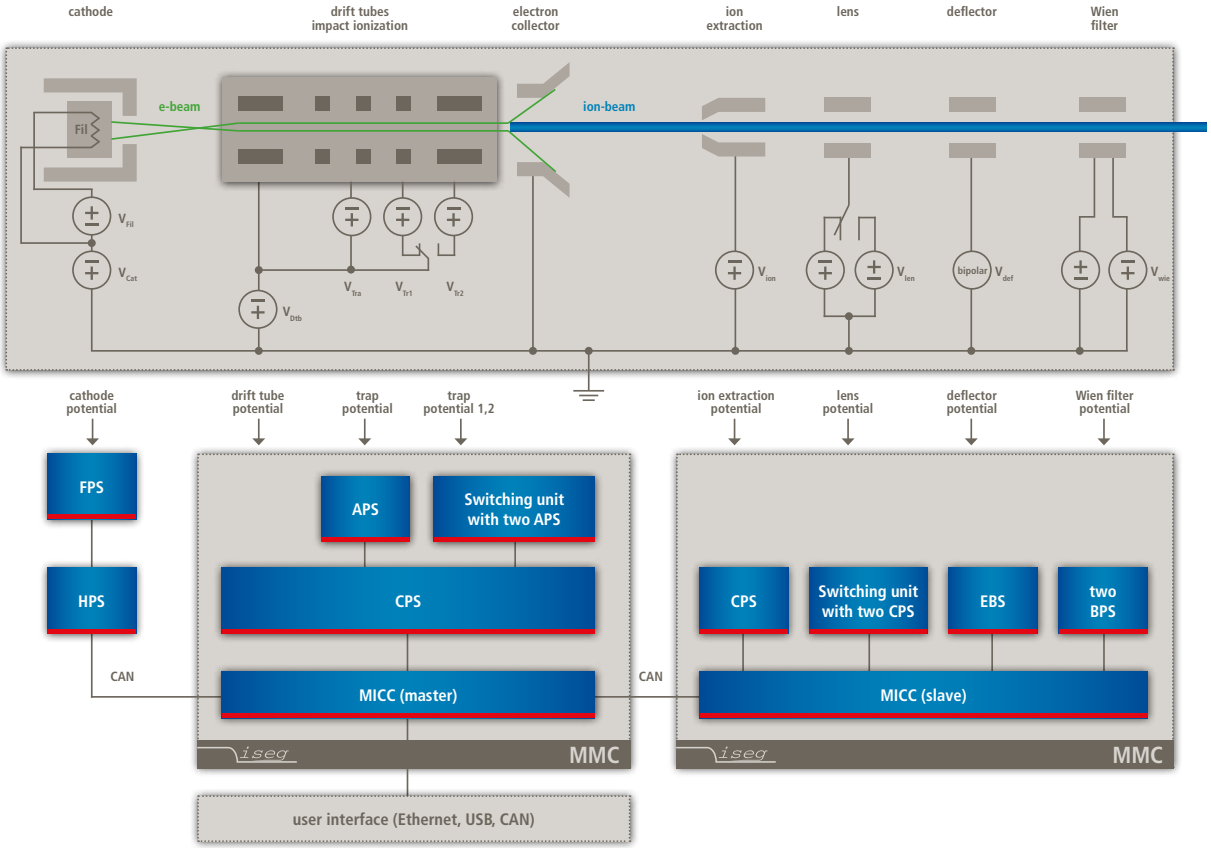
- Dedicated filament supply unit for e-beam based coating applications
- Filament supply on HV potential via HV-in connector
- USB, AIO, CAN, RS232, Ethernet, EtherCAT interfaces
- Optional front panel operation with LCD
- Direct heating control or parent emission regulation

ION BEAM SOLUTIONS

ISEG SOLUTIONS FOR THE SUPPLY OF ION BEAM PROCESSES



System of different high voltage generators and switches to drive an ion-beam application. The system can be controlled by only one digital interface. The system is almost arbitrarily expandable due to the master slave operation of the MMC.



EBS 3U - BIPOLAR 4 CHANNEL HV MODULE

The 3U version of the EBS fits into the special MMS slot of the ECH14A MMC crate. It features up to four channels with an output voltage up to 500 V. With its 4 quadrant operation it is very suitable for use as a voltage supply for a deflector unit in an ion beam application.

WIEN FILTER HV SUPPLY

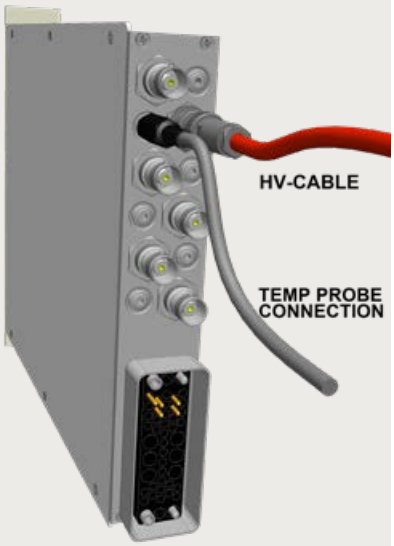
3U HV power module which consists of two BPS and fits into any MMC crate.
The module is very suitable for use as a supply for a Wien-filter in an ion beam application.

HV SWITCH

The 3U switching module with two inputs and one output fits into any MMC crate.
The output is connected via the switch with one of the inputs. The module can be used with two CPS modules to drive electrostatic lens in an ion beam application.

SI-PHOTOMULTIPLIER / APD

SUPPLY SOLUTIONS FOR SILICIUM PM / AVALANCHE PHOTODIODE



TEMPERATURE-DEPENDENT VOLTAGE CORRECTION (OPTION VCT ON REQUEST)

For detectors such as SiPM and APD, where the gain is depending on the supply voltage and to some extend on the temperature, iseg provides detector supplies with a temperature-dependent voltage correction per channel. For each channel the temperature is measured directly at the detector via a small external temperature sensor. The supply can be adjusted automatically at a very high resolution according to a temperature drift to compensate for changes in gain. The correction factor is user adjustable. The measured temperatures can be obtained via the interface.

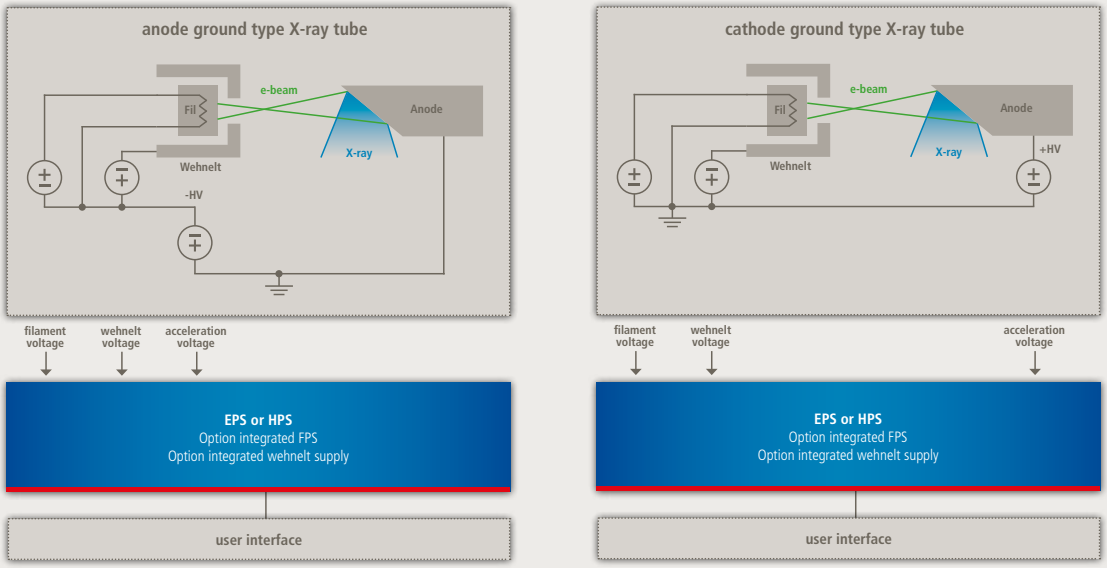
HIGH PRECISION HV MODULES WITH REDUCED OUTPUT CURRENT (OPTION L)

For highly sensitive detectors with a current consumption in the range of a few µA, such as semiconductor detectors, but also special drift or ionization chambers, high precision modules with a maximum output current of 100 µA are provided. This allows a resolution of the measured or set currents down to 100 pA. The stored energy in the HV channel is significantly reduced and the output current can be precisely limited to very small values for detector protection. Programmable protection features such as KILL-ENABLE and the Delayed Trip with or without a voltage ramp are provided.

X-RAY SOLUTIONS

ISEG SOLUTIONS FOR SUPPLY OF X-RAY APPLICATIONS

SEE COVER FOR SHORTCUT REFERENCE



High voltage devices of EPS and HPS series equipped with suitable options are ideally suited as power supply for X-ray tubes. The necessary filament supply (cathode ground type X-ray tube or anode ground type X-ray tube) can be integrated into the EPS or HPS.

SYSTEM SPECIFICATIONS (EXAMPLE):

- Stability of the output voltage up to 0.01%,
- Low ripple of output voltage
- Temperature coefficient less than 30 ppm/K
- ARC Management, ARC detection, ARC protection
- Interlock safety system
- Two mains connections for separate supply of the control unit and the power unit of the device
- Integrated filament supply (floating version up to 80 kV)
- Direct filament current control or configurable parent emission regulation
- Configurable minimum and maximum filament current
- Different voltages on top of high voltage potential (e.g. supply for filament and wehnelt cylinder)
- HV generator as well as filament supply programmable via USB interface (ARC management, controller parameters, etc.)

Very simple integration into the plant control via analogue interface or complex control with a digital interface (Ethernet, EtherCAT, CAN, IEEE-488, RS232)

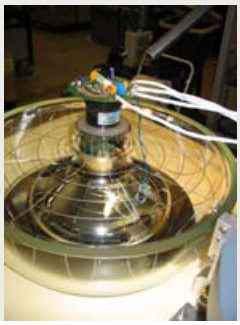
PHOTOMULTIPLIER TUBES (PMT)

PHQ INTEGRATED HV SUPPLIES FOR PHOTOMULTIPLIER TUBES

AIO
VLN
CUSTOM

- DC/DC HV supply compactly integrated in PMT socket
- Low ripple and noise, low EMI
- Low power consumption
- High linearity even at high pulse load and rates by stabilized dynode voltages
- Control- and monitor capabilities
- Safe anode current limitation for PMT protection
- Multichannel capable in MMP system
- Custom design for all kinds of PMTs

DATA SHEET



Photomultipler with PHQ socket supply

SPECIFICATIONS	
Ripple and noise [f >10 Hz]	< 10 mV
Stability [ΔV_{out}]	$< 1 \bullet 10^{-4} \bullet V_{nom}$
Temperature coefficient	$< 5 \bullet 10^{-5}$/ K

EXEMPLARY TYPES

MODEL	PMT-TYPE	V_{nom}	POWER DISSIPATION	DYNODES
ET ENTERPRISES				
PHQ 9352	9352	2.5 kV	0.3 W	6
PHQ 9266	9266	1.3 kV	0.3 W	10
PHQ 9823	9823	2.5 kV	0.3 W	14
PHOTONIS				
PHQ 2960	XP2960	1.6 kV	0.4 W	8
PHQ 9266	XP3230 / 40	1.3 kV	0.3 W	10
PHQ 3112	XP3112	1.4 kV	0.1 W	10
PHQ 2020 *	XP2020	3 kV	1 W	14
HAMAMATSU				
PHQ 7081-10	R7081	2 kV	0.15 W	10
PHQ 2059	R2059	3 kV	0.8 W	12
PHQ 329-02	R329-02	2.4 kV	0.5 W	12
PHQ 580	R580	1.8 kV	0.3 W	10
PHQ 6231	R6231	1.5 kV	0.15 W	8
PHQ 1306	R1306	1.5 kV	0.15 W	8
PHQ 7x8619 **	R8619	1.6 kV	1.5 W	8
PHQ 9420	R9420	1.5 kV	0.18 W	8

DEVELOPMENT AND PRODUCTION FOR ANY OTHER PMT TYPE POSSIBLE. PLEASE CONTACT US!

(*1 the voltage divider and terminal meet the specifications of Photonis S563, PHQ 2020 is also suitable for XP2233, XP2237, XP2254, XP2262, XP4222, XP4228 and many others

(** array with 7 PMTs R8619 and digital interface

iseg PHQ modules are developed as direct HV supply of modern photo multiplier tubes (PMT) with the high voltage power supply integrated in the PMT socket. Advantages of PMT-integrated power supplies are:

- No HV cabling or connectors necessary
- No separate HV supply needed
- Small form factor
- Increase of reliability
- Power dissipation reduced by factor 10 and more
- High temperature stability and thermal balance

PHQ AT HESS EXPERIMENT

H.E.S.S. is a system that investigates cosmic gamma rays in the energy range from 10s of GeV to 10s of TeV. The name H.E.S.S. stands for High Energy Stereoscopic System. The instrument allows scientists to explore gamma-ray sources with iseg DC/DC high voltage converters. **www.mpi-hd.mpg.de/hfm/HESS/**

© Christian Föhr, MPIK, Heidelberg

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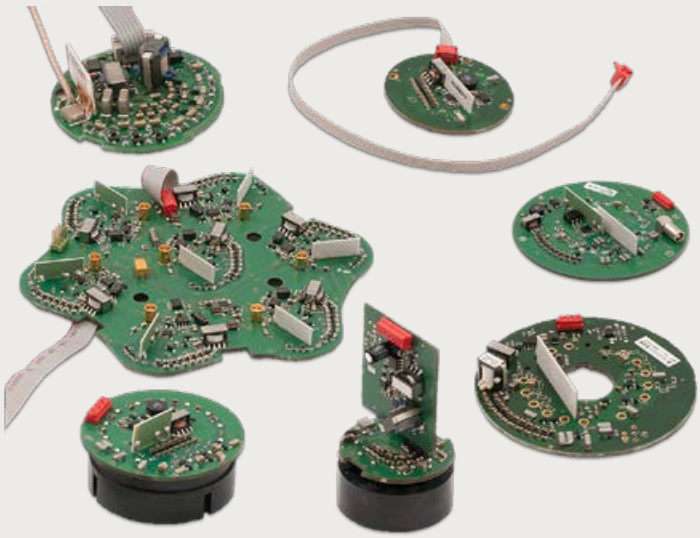
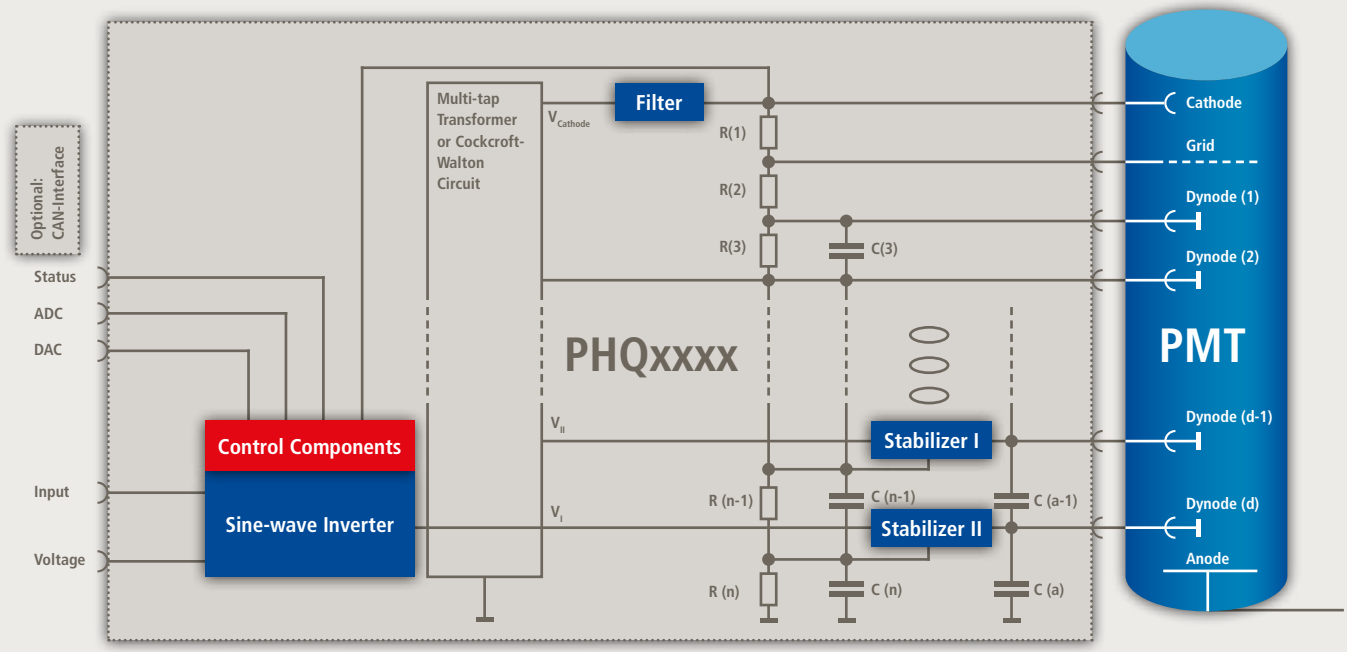


Schematic of PHQxxxx



CAPACITOR-CHARGING

HIGH VOLTAGE POWER SUPPLIES FOR EFFICIENT CAPACITOR CHARGING

APP NOTE

HPS in use
in a millisecond
anneal system

Technological processes that require a high power density for a short time window are often supplied with energy that is temporarily stored in capacitors. The low internal resistance of special capacitors means that currents of several thousand amperes can be made available. This makes it possible to generate magnetic fields strong enough to plastically deform materials or to make special lamps shine brighter than the sun for a fraction of a second. Beforehand the converted energy must be stored in the capacitor by means of a charging process.

THE MAIN ADVANTAGES OF ISEG SUPPLIES FOR CAPACITOR-CHARGING ARE:

- Charging without overshooting (low overshoot) of the output voltage
- Trickle charging: when the nominal voltage is reached, the voltage on the capacitor is regulated
- Leakage currents from the capacitor are compensated by the charger
- Very good repeat accuracy
- Permitted charge/discharge frequency depends on the nominal output voltage
- Can be configured with many digital interfaces
- Can be connected in parallel to increase the output power

EXTENDED OPERATION AREA (EOA)

PARTICLE FILTER

HIGH VOLTAGE FOR ELECTROSTATIC FILTER

SEE COVER FOR SHORTCUT REFERENCE

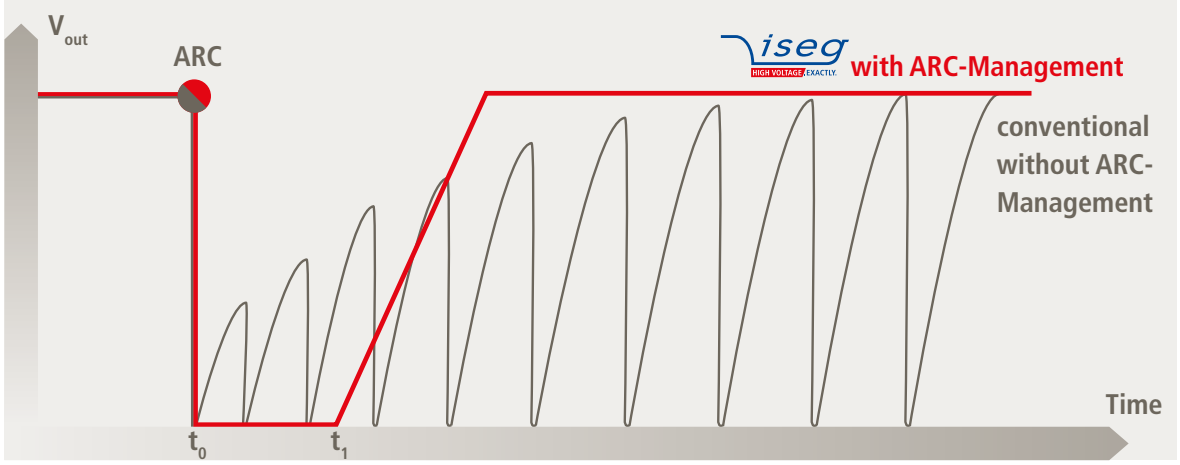
APP NOTE

Electrostatic precipitators or electrostatic particle filters are used to clean waste gases, especially in processes that emit a large quantity of waste gas particles. The high-voltage supplies required for this must be easy to integrate into the specific set-up.

THE MAIN ADVANTAGES OF ISEG SUPPLIES FOR PARTICLE FILTER ARE:

- ARC Management, ARC detection, ARC protection
- Short-circuit-proof
- Flashover-proof
- Can be operated in idle mode (no load)
- High efficiency of the high-voltage supply of up to 93%
- Can be operated at up to 50°C (122°F) ambient temperature
- Customisable with short development times
- Also suitable for mobile applications, e.g. cleaning machines and street sweeping vehicles

STABLE PROCESS WITH ARC-MANAGEMENT



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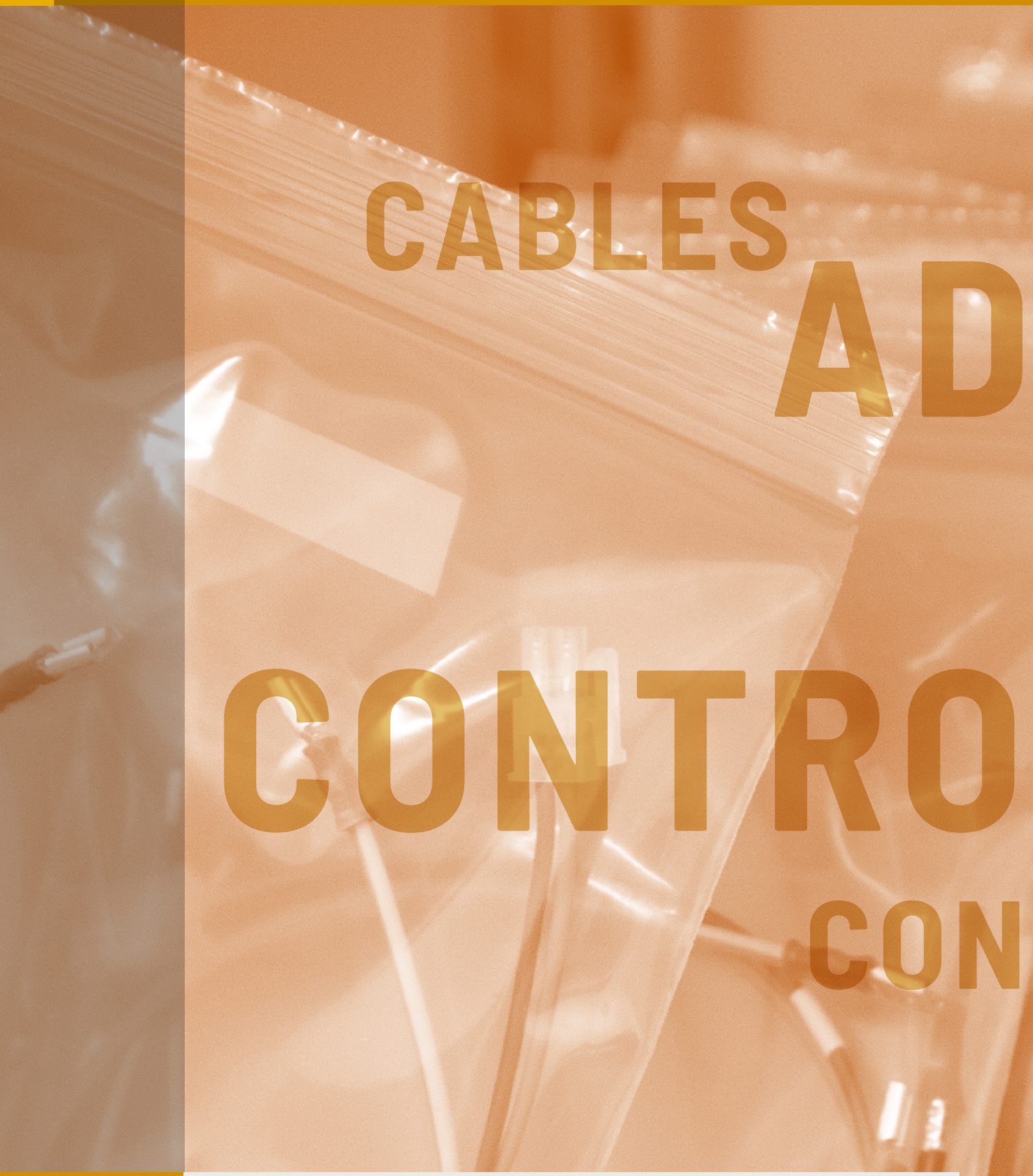


APTERS

ACCESSORIES

LLER

NECTORS

iCS MINI

ETHERNET CONTROLLER WITH INTEGRATED ISEG COMMUNICATION SERVER

WIFI
CAN
ETH

- **Upgrade your existing iseg hardware with full iseg communication server (iCS2) features**
- **Preinstalled iCS2, easy to setup, plug and work**
- **All iCS2 services available for many iseg devices**
- **Ethernet, WiFi, CAN, RS232 interfaces**
- **Small form factor, robust flash memory technology**
- **Webcam support for lab supervision**
- **WiFi hotspot included (deactivatable)**

The iCSmini2 is a small ready to work controller box running the iCS system. It enables quick and easy access to iseg hardware by providing all benefits of the iCS2 (see page 80). The integrated Cortex A9 QuadCore platform is equipped with industry standard CAN, serial RS232, 3xUSB, RJ45-Ethernet hardware interfaces and a WiFi access point.

Almost every iseg HV supply device with CAN, USB, RS232 or Ethernet interface can now be controlled, configured and updated very easily (please refer to compatibility list).

For rack or cabinet installations rack and top-hat rail (EN60715) mount kits are available.

For native application control several software solutions are available:

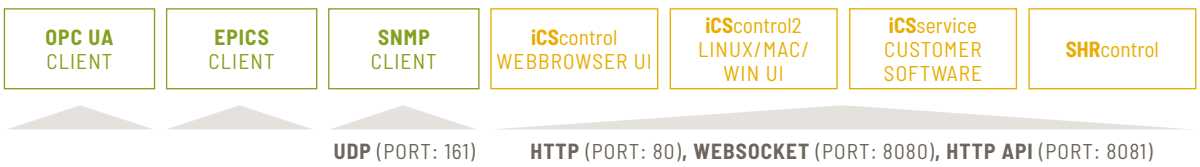
- iseg SNMP Control
- isegControl (Linux, Windows, Mac)
- isegHalRemote-Library

- Ethernet and WiFi (opt.) connectivity
- Embedded Linux-Server with iCS control system
- 1 CAN D-SUB9, 1 RS-232 D-SUB9, 3 USB-A connectors
- Controls wide range of iseg Power Supplies, Crates, Modules, Devices (see compatibility list)
- Small form factor
- Rack and top-hat rail (EN 60715) mount kits available
- Preconfigured services: EPICS, SNMP, HTTP, SOAP, Websocket
- Webbrowser based control and configuration system Easy configuration and firmware updates of connected hardware

19" rack mount kit

SEE COVER FOR SHORTCUT REFERENCE

EPICS



ACCESSORIES

CONNECTORS AND CABLES

iseg assembles HV cables with different connectors for HV supplies on request.

- 500V to 100kV
- 1 to 52 PINs
- Different manufactures

HIGH VOLTAGE CONNECTORS

mark	manufacturer	max. voltage	pins	option code
RADIALL MULTIPIN 52	Radiall	3 kV	52	I52
REDEL MULTIPIN 51	Lemo	6 kV	51	R51
FISCHER-CONNECTOR	Fischer	10 kV	5	F15
BNC	div.	500 V	1	BNC
GES-CONNECTOR	GES	10 kV	1	G11
	GES	20 kV	1	G21
	GES	30 kV	1	G31
	GES	40 kV	1	G40
	GES	60 kV	1	G60
	GES	100 kV	1	G100
LEMO-CONNECTOR	LEMO	10 kV	1	L10
	LEMO	16 kV	1	L16
	LEMO	30 kV	1	L30
SHV-CONNECTOR	Radiall	8 kV	1	S08
	Kings	10 kV	1	S10
	CPE	15 kV	1	S15
	Kings	20 kV	1	S20
ISEG	iseg	70 kV	1	E70

ACCESSORIES

CAN ADAPTERS

SEE COVER FOR SHORTCUT REFERENCE

For trouble-free operation of CAN controlled iseg devices we recommend the CAN interfaces of PEAK-System Technik GmbH.

CAN ADAPTERS		
	standard	optical isolated
PCAN-USB Adapter 1-channel	598110	598155
PCAN-USB Pro-Adapter 2-channel	-	598163
PCAN Dongle PS/2	598031	598216
PCAN mini-PCIe 1-channel	598210	-
PCAN PCI-Express 1-channel	-	520144
PCAN PCI-Express 2-channel	-	598161
PCAN PCI 1-channel	598053	598128
PCAN PCI 2-channel	520034	520044

iCS MINI, P. 90

FOR MORE FLEXIBILITY AND CONNECTIVITY:
Use iCS mini instead of CAN Adapters

INDEX

INFORMATION
LEDGE

KILL-ENABLE

Is a global control signal for the module. It defines the behaviour as a consequence to the exceedance of a given limit (V_{max}, I_{max}, I_{set}, I_{trip}). If KILL-ENABLE is activated a channel that exceeds one of the limits (V_{max}, I_{max}, I_{set}) will be shut down within a hardware response time of < 1 ms. A channel that exceeds the limit I_{trip} will be turned off (HV generator off) after a software response time of 10 to 1000 ms, depending on the ADC sampling rate.

INHIBIT

Modules equipped with the option INHIBIT 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.

SAFETY LOOP

The Safety Loop (SL) is a galvanically isolated current loop. With an activated Safety Loop High-Voltage can only be switched on if the loop is closed and fed with a current between 5 and 20 mA. Opening the loop will immediately shut down the high voltage generation. The Safety Loop can be deactivated with a jumper on the back side of the module. The safety loop connector is located on the front panel. Modules with a multipin HV connector provide additional SL-contacts on this connector.

INTERLOCK

The INTERLOCK is a galvanically isolated current loop. In this current loop there are no other semiconductor devices. With open interlock the gate pulses of the power semiconductors of the high voltage generation are blocked by mechanical relays (certified in accordance with IEC/EN 60950 and UL 60950, fulfils the Telcordia requirements according GR 1089 and FCC part 68). With open interlock the high voltage generation is blocked.

INFORMATION

INTERFACES

ANALOG I/O

Analog interface for voltage/current setting and monitoring, INHIBIT / ON, REMOTE. 0 - 5 V and 0 - 10 V versions are available, mostly via electrically isolated D-SUB-9 connector. Function and pin assignment are device dependend.

SPS

Industry standard 24 V / 0 -10 V analog interface with separated connectors for digital and analog signals.

CAN

Controller Area Network. Digital serial bus interface, terminated with 120 Ω on each end.
iseg´s standard system for bus connected modular systems.

USB

Universal serial bus interface for direct device communication.

RS232

Digital serial interface, typically on a D-SUB-9 connector.

ETHERNET

Standard network connection usable in Ethernet infrastructures. Depending on device or control system different protocols and services are available: SNMP, SCPI, EPICS, HTTP (Browser, Websocket, REST), OPC, OPC-U/A.

IEEE 488

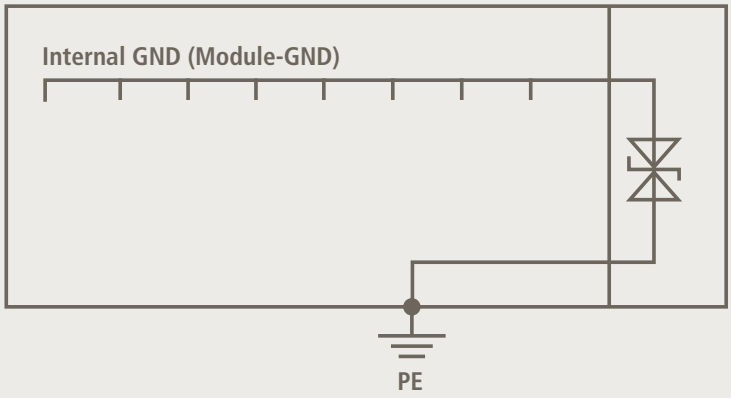
8-bit parallel bus standard. Also known as GPIB (general purpose interface bus)

VMEbus

Bus standard in VME system. Connected via module connector to VME-crate

INFORMATION

FLOATING VERSIONS

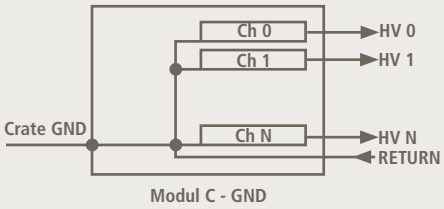


AC / DC SUPPLIES

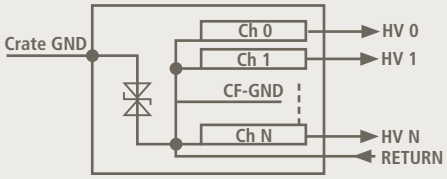
For high voltage devices of the HPS series the system ground (HV_GND) can be galvanically separated from the protective ground (PE). This is done by opening a short circuit connector. This ensures a greater process integrity at ARC endangered applications (e.g. electron beam coating). The maximum voltage between system ground and PE is limited by a protection circuit to less than 200 V.

CRATES

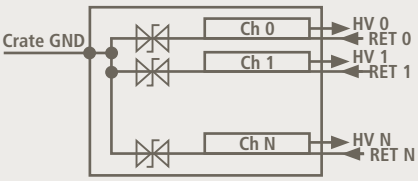
MMS-ECH series crates are designed to provide an internal GND which is connected with the modules, but is galvanically isolated from the PE and the crate case to avoid ground loops via the PE. The maximum voltage between the internal GND and the PE is limited by a protection circuit to less than 60 V.



Modul C - GND



Modul CF - GND



Modul F - GND

MODULE VERSIONS

In order to improve the stability and noise properties of the high voltage channels in widely branched systems, iseg provides several options for the galvanic isolation between modules or channels.
This allows to avoid ground loops and equalizing currents. For modules with single channel floating it is possible within some limits to switch polarities interchanging the connections or to connect channels in series.

COMMON GROUND | CG

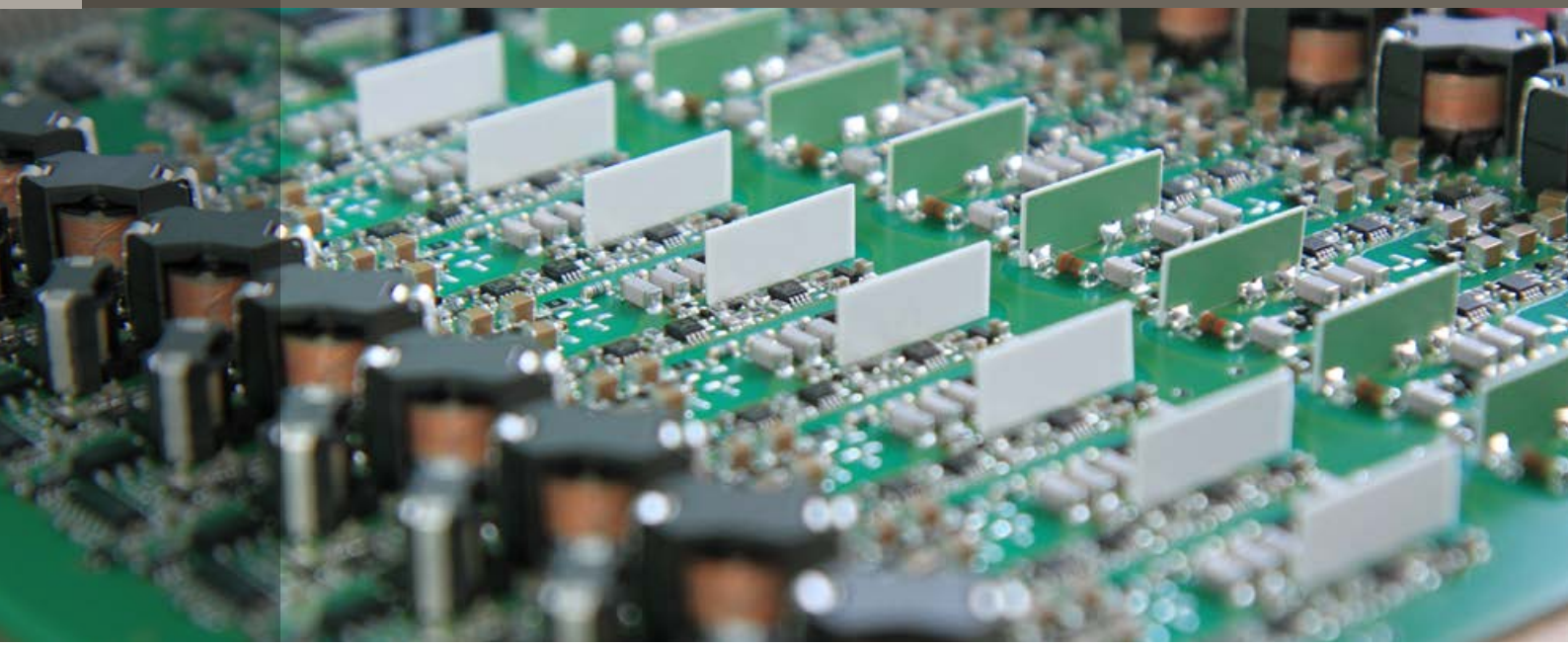
All channels and the processing unit are galvanically connected. Within a crate all CG modules are galvanically connected.

COMMON FLOATING GROUND | CFG

All channels and the processing unit are galvanically connected. The module GND is isolated from the GND of the crate.
Within a crate all modules with CFG are galvanically isolated.
A protection circuit prevents differences in the potentials between the module CF-GND and the crate GND of more than 60 V.

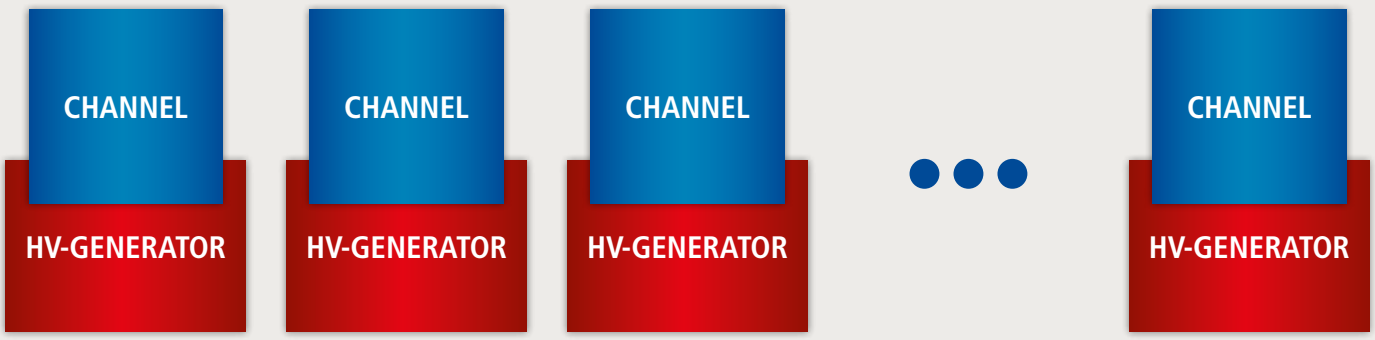
FLOATING GROUND | FG

All channels are galvanically isolated from each other and from the module GND. By default a protection circuit prevents differences in the potentials between the channels and the module GND of more than 25 V.
As an option this isolation can be designed to enable potential differences up to 2,000 V. With this option the user is responsible not to exceed the maximum ground potential differences!

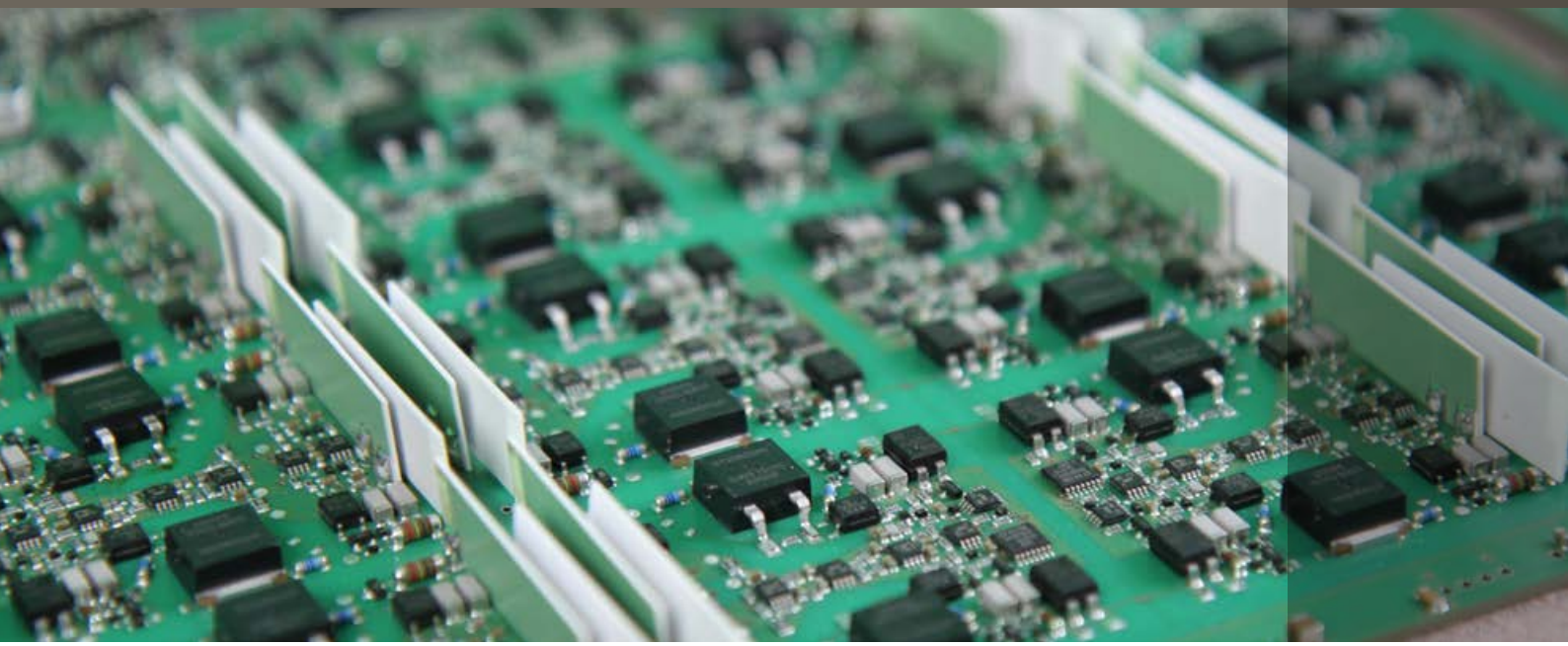


DISTINCT SOURCE - ONE GENERATOR PER CHANNEL

Multichannel Standard or High Precision HV modules are equipped with a distinct HV generator in each channel. All channels can be operated independently in a constant voltage or a constant current mode with a very precise setting and measurement of both values. High precision modules provide a second current measurement range that allows a measurement resolution of a few pA.



DISTINCT SOURCE - ONE GENERATOR / CHANNEL

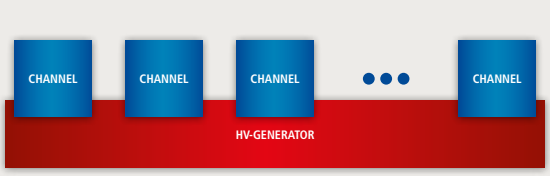


DISTRIBUTOR

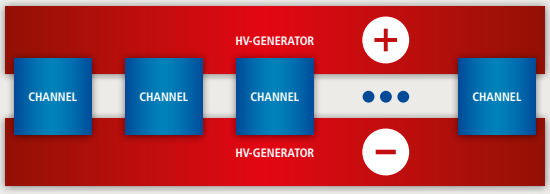
A Distributor module has a single HV source to supply up to 24 HV channels. This principle allows very inexpensive multichannel HV supplies. The voltage in each channel can be controlled independently between 0 V and V_{nom}. A current measurement is provided per channel and allows a resolution down to $1 \cdot 10^{-4} \cdot I_{nom}$. Ripple and noise of the output voltage is comparable to values of distinct source HV modules. There are some limitations in the maximum output voltage and power (currently limited to 3 kV and 1.5 W per channel). A constant current mode is not available. If a hardware or software current limit is exceeded the channel is switched of with or without a ramp (configurable).

BIPOLAR DISTRIBUTOR

A bipolar distributor HV-module has a positive and a negative HV source to supply up to 12 HV channels. These channels can be operated in a real four-quadrant mode, i.e. as a current source or sink in both polarities. They can be driven continuously through the zero-point in current and voltage. All other properties are the same as for the unipolar distributor module.



DISTRIBUTOR

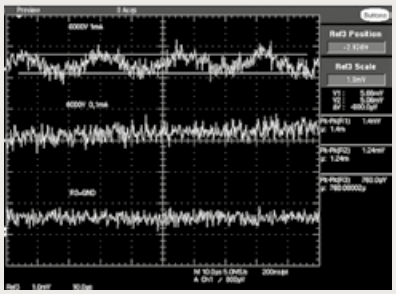


BIPOLAR DISTRIBUTOR

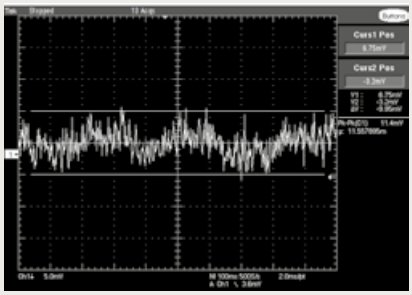
LN

VLN

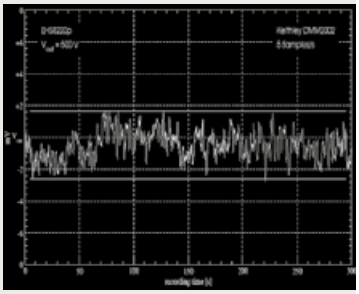
ULN



10 µs / DIV
R1 EHS 8060: 6000 V/1 mA | V_{P-P} = 1.4 mV
R2 EHS 8060: 6000 V/0.1 mA | V_{P-P} = 0.4 mV
R3 Ground noise of the oscilloscope 0.8 mV



100 ms / DIV
EHS 8060: 6000 V/1 mA | V_{P-P} = 11 mV



50 s / DIV
EHS 8220p | V_{out} = 500 V | V_{P-P} = 4 mV

LOW NOISE	V_{P-P} < 5 mV [f > 1 kHz] | V_{P-P} typ. < 20 mV / V_{P-P} max. 30 mV	[1 kHz > f > 10 Hz]
VERY LOW NOISE	V_{P-P} < 1 mV [f > 1 kHz] | V_{P-P} typ. < 3 mV / V_{P-P} max. 5 mV	[1 kHz > f > 10 Hz]
ULTRA LOW NOISE	V_{P-P} < 1 mV [f > 1 kHz] | V_{P-P} typ. < 3 mV / V_{P-P} max. 5 mV	**[1 kHz > f > 0.1 Hz]**

All multichannel modules are optimized for a low ripple of the output voltage. The output ripple consists of three components with different frequencies:

The fundamental oscillation of the converter, which is in the region of 40 to 120 kHz. The filters in all modules are designed to keep this component below 5 mV at full-load, in most module types even below 1-2 mV. Since this component depends on the load it decreases significantly if the load is reduced.

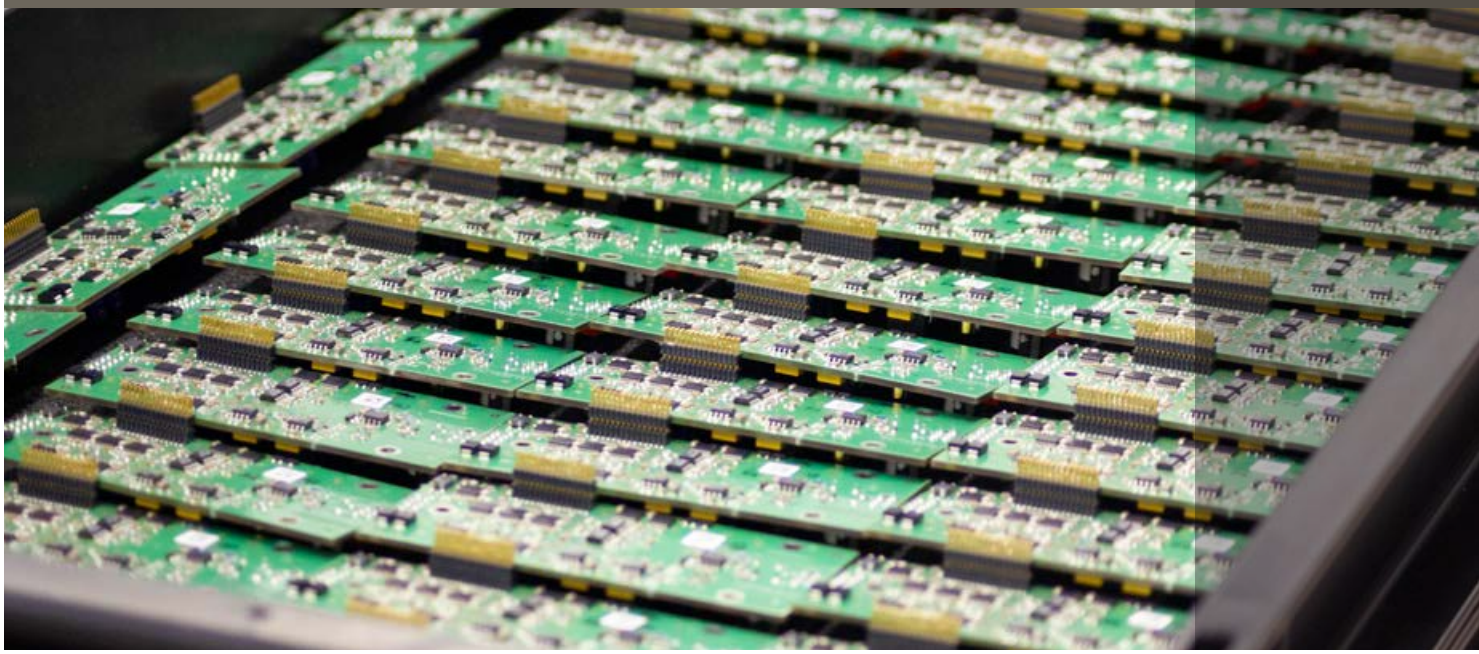
Noise caused by non-ideal electronic parts (finite time constants, finite amplification, ground noise) in the control circuit. The frequency of this noise component is in the range of 10 Hz up to a few kHz. Typically this component is below 10 mV, for Standard and High Precision modules with a maximum output voltage up to 4 kV it is below 3 mV. This is achieved by using a dual circuit control for the output voltage, which also guarantees a very good stability of the output voltage under all load conditions.

The frequency interval from 10 to 0.01 Hz is typically not very relevant for spectroscopic applications. In this range a ground noise of analoge parts of the reference voltage generation and control circuits, typically of the order of nano- or microvolts, can result in a noise of some 10 millivolts in the output voltage due to the large amplification factor (> 1000). In case these low frequency noise components may interfere with an application, e.g. for electron-optical implementations, low-noise high precision modules should be employed, which keep this noise component below 5 mV.

Below those frequency ranges a change of temperature can lead to a drift of the output voltage. The operation mode „DAC fineadjustment" allows to supress this drift to a greatest possible extend.

INFORMATION

DATA FORMAT, RESOLUTION VS. ACCURACY



The EHS- and VHS- multichannel modules are equipped with 24 bit ADC- and 20 bit DAC-circuits. This allows a very high precision and resolution of set and measured values. Data is transferred using the Floating Point Single Precision Format as specified in IEE 754 (23 bit mantissa and 8 bit exponent). The ADC sampling rate and the digital filter (used by the internal controller for processing measured values) are adjustable within certain limits. This allows the modification of resolution and sampling rate of the measured values. A high sampling rate enables fast data logging but reduces the resolution. The digital filter can be used to improve the resolution again.

The resolution and the accuracy of measured values are different parameters. The resolution is typically much higher than the totalaccuracy of a measured value. This is illustrated by the following example:

- EHS 82 40p (High Precision 4 kV / 2 mA)
- Measurement in range <20 µA, accuracy ±(0.01 % I_{out} + 4 nA), measured value: 5.02045 µA
- The true value of current can be in the range from 5.01595 µA to 5.02495 µA

If the current increases by 50 pA, the measured value would change to 5.02050 µA. Thus it is possible to detect this change in current, although the absolute accuracy is much less precise.

A change in the module temperature can lead to a drift of the measured values of < 50 ppm/K. The absolute accuracy is valid only for one year, due to aging effects. Because of that the modules should be recalibrated at regular intervals.

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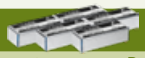
APS



Model	Item code	V_{nom}	I_{nom}	V_{in}	P_{nom}	Ripple	HV Connectors	Case format	Page
APx 02 255 5	AP002255x05	200 V	2.5 mA	5 V	0.5 W	typ. < 10 mV	PIN	PCB module	10
APx 04 125 5	AP004125x05	400 V	1.2 mA	5 V	0.5 W	typ. < 10 mV	PIN	PCB module	10
APx 06 804 5	AP006804x05	600 V	0.8 mA	5 V	0.5 W	typ. < 10 mV	PIN	PCB module	10
APx 08 604 5	AP008604x05	800 V	0.6 mA	5 V	0.5 W	typ. < 10 mV	PIN	PCB module	10
APx 10 504 5	AP010504x05	1 kV	0.5 mA	5 V	0.5 W	typ. < 10 mV	PIN	PCB module	10
APx 02 505 12	AP002505x12	200 V	5 mA	12 V	1 W	typ. < 10 mV	PIN	PCB module	10
APx 04 255 12	AP004255x12	400 V	2.5 mA	12 V	1 W	typ. < 10 mV	PIN	PCB module	10
APx 06 165 12	AP006165x12	600 V	1.6 mA	12 V	1 W	typ. < 10 mV	PIN	PCB module	10
APx 08 125 12	AP008125x12	800 V	1.2 mA	12 V	1 W	typ. < 10 mV	PIN	PCB module	10
APx 10 105 12	AP010105x12	1 kV	1 mA	12 V	1 W	typ. < 10 mV	PIN	PCB module	10

replacement characters | x - polarity: P = positive, N = negative

BPS

Model	Item code	V_{nom}	I_{nom}	V_{in}	P_{nom}	Ripple	HV Connectors	Case format	Page
BPx 05 205 5	BP005205x05	500 V	2 mA	5 V	1 W	typ. < 10 mV	PIN	PCB module	11
BPx 10 105 5	BP010105x05	1 kV	1 mA	5 V	1 W	typ. < 10 mV	PIN	PCB module	11
BPx 15 604 5	BP015604x05	1.5 kV	0.6 mA	5 V	1 W	typ. < 10 mV	PIN	PCB module	11
BPx 20 504 5	BP020504x05	2 kV	0.5 mA	5 V	1 W	typ. < 10 mV	PIN	PCB module	11
BPx 30 304 5	BP030304x05	3 kV	0.3 mA	5 V	1 W	typ. < 15 mV	PIN	PCB module	11
BPx 03 106 12	BP003106x12	300 V	10 mA	12 V	3 W	typ. < 15 mV	PIN	PCB module	11
BPx 05 605 12	BP005605x12	500 V	6 mA	12 V	3 W	typ. < 15 mV	PIN	PCB module	11
BPx 10 305 12	BP010305x12	1 kV	3 mA	12 V	3 W	typ. < 20 mV	PIN	PCB module	11
BPx 15 205 12	BP015205x12	1.5 kV	2 mA	12 V	3 W	typ. < 25 mV	PIN	PCB module	11
BPx 20 155 12	BP020155x12	2 kV	1.5 mA	12 V	3 W	typ. < 30 mV	PIN	PCB module	11
BPx 30 105 12	BP030105x12	3 kV	1 mA	12 V	3 W	typ. < 35 mV	PIN	PCB module	11
BPx 05 805 12	BP005805x12	500 V	8 mA	12 V	4 W	typ. < 5 mV	PIN	PCB module	11
BPx 10 405 12	BP010405x12	1 kV	4 mA	12 V	4 W	typ. < 5 mV	PIN	PCB module	11
BPx 20 205 12	BP020205x12	2 kV	2 mA	12 V	4 W	typ. < 5 mV	PIN	PCB module	11
BPx 30 135 12	BP030135x12	3 kV	1.3 mA	12 V	4 W	typ. < 5 mV	PIN	PCB module	11
BPx 40 105 12	BP040105x12	4 kV	1 mA	12 V	4 W	typ. < 5 mV	PIN	PCB module	11
BPx 60 674 12	BP060674x12	6 kV	0.5 mA	12 V	4 W	typ. < 5 mV	PIN	PCB module	11

replacement characters | x - polarity: P = positive, N = negative

CPS

Model	Item code	V_{nom}	I_{nom}	V_{in}	P_{nom}	Ripple	HV Connectors	Case format	Page
CPx 05 206 24 5	CP005206x2450	500 V	20 mA	24 V	12 W	typ. < 10 mV	cable	metal box	12
CPx 10 106 24 5	CP010106x2450	1 kV	10 mA	24 V	12 W	typ. < 20 mV	cable	metal box	12
CPx 15 805 24 5	CP015805x2450	1.5 kV	8 mA	24 V	12 W	typ. < 30 mV	cable	metal box	12
CPx 20 605 24 5	CP020605x2450	2 kV	6 mA	24 V	12 W	typ. < 40 mV	cable	metal box	12
CPx 30 405 24 5	CP030405x2450	3 kV	4 mA	24 V	12 W	typ. < 60 mV	cable	metal box	12
CPx 40 305 24 5	CP040305x2450	4 kV	3 mA	24 V	12 W	typ. < 80 mV	cable	metal box	12
CPx 50 205 24 5	CP050205x2450	5 kV	2 mA	24 V	12 W	typ. < 100 mV	cable	metal box	12
CPx 70 155 24 5	CP070155x2450	7 kV	1.5 mA	24 V	12 W	typ. < 150 mV	cable	metal box	12
CPx 100 105 24 5	CP100105x2450	10 kV	1 mA	24 V	12 W	typ. < 500 mV	cable	metal box	12
CPx 150 604 24 5	CP150604x2450	15 kV	0.6 mA	24 V	12 W	typ. < 750 mV	cable	metal box	12
CPx 200 504 24 5	CP200504x2450	20 kV	0.5 mA	24 V	12 W	typ. < 1000 mV	cable	metal box	12
CPx 300 304 24 5	CP300304x2450	30 kV	0.3 mA	24 V	12 W	typ. < 1500 mV	cable	metal box	12

replacement characters | x - polarity: P = positive, N = negative

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CPSmini

Model	Item code	V_{nom}	I_{nom}	V_{in}	P_{nom}	Ripple	HV Connectors	Case format	Page
CP**x** 10 805 24 5	CM010805**x**2450	1 kV	8 mA	24 V	8 W	typ. < 5 mV	cable	mini metal box for PCB	13
CP**x** 20 405 24 5	CM020405**x**2450	2 kV	4 mA	24 V	8 W	typ. < 10 mV	cable	mini metal box for PCB	13
CP**x** 30 255 24 5	CM030255**x**2450	3 kV	2.5 mA	24 V	8 W	typ. < 15 mV	cable	mini metal box for PCB	13
CP**x** 40 205 24 5	CM040205**x**2450	4 kV	2 mA	24 V	8 W	typ. < 20 mV	cable	mini metal box for PCB	13
CP**x** 60 125 24 5	CM060135**x**2450	6 kV	1.3 mA	24 V	8 W	typ. < 30 mV	cable	mini metal box for PCB	13

replacement characters | **x - polarity: P = positive, N = negative**

DPS

Model	Item code	V_{nom}	I_{nom}	V_{in}	P_{nom}	Ripple	HV Connectors	Case format	Page
DPR 05 106 24 5	DP005106R2450	500 V	10 mA	24 V	12 W	< 7 mV	cable | SHV	metal box	14
DPR 10 106 24 5	DP010106R2450	1 kV	10 mA	24 V	12 W	< 7 mV	cable | SHV	metal box	14
DPR 15 805 24 5	DP015805R2450	1.5 kV	8 mA	24 V	12 W	< 7 mV	cable | SHV	metal box	14
DPR 20 605 24 5	DP020605R2450	2 kV	6 mA	24 V	12 W	< 7 mV	cable | SHV	metal box	14
DPR 30 405 24 5	DP030405R2450	3 kV	4 mA	24 V	12 W	< 7 mV	cable | SHV	metal box	14
DPR 40 305 24 5	DP040305R2450	4 kV	3 mA	24 V	12 W	< 7 mV	cable | SHV	metal box	14
DPR 50 205 24 5	DP050205R2450	5 kV	2 mA	24 V	12 W	< 7 mV	cable | SHV	metal box	14
DPR 60 155 24 5	DP060155R2450	6 kV	1.5 mA	24 V	12 W	< 7 mV	cable | SHV	metal box	14

R = reversible polarity

DPSmini

Model	Item code	V_{nom}	I_{nom}	V_{in}	P_{nom}	Ripple	HV Connectors	Case format	Page
DP**x** 05 156 24 5	DM005156**x**2450	500 V	15 mA	24 V	9 W	< 10 mV	cable | SHV	mini metal box	15
DP**x** 10 805 24 5	DM010805**x**2450	1 kV	8 mA	24 V	9 W	< 10 mV	cable | SHV	mini metal box	15
DP**x** 20 405 24 5	DM020405**x**2450	2 kV	4 mA	24 V	9 W	< 10 mV	cable | SHV	mini metal box	15
DP**x** 30 305 24 5	DM030305**x**2450	3 kV	3 mA	24 V	9 W	< 10 mV	cable | SHV	mini metal box	15
DP**x** 40 205 24 5	DM040205**x**2450	4 kV	2 mA	24 V	9 W	< 10 mV	cable | SHV	mini metal box	15
DP**x** 60 105 24 5	DM060105**x**2450	6 kV	1 mA	24 V	9 W	< 30 mV	cable | SHV	mini metal box	15
DP**x** 80 105 24 5	DM080105**x**2450	8 kV	1 mA	24 V	9 W	< 30 mV	cable | SHV	mini metal box	15
DP**x** 100 504 24 5	DM100504**x**2450	10 kV	0.5 mA	24 V	9 W	< 30 mV	cable | SHV	mini metal box	15

replacement characters | **x - polarity: P = positive, N = negative**

EPS 60W

Model	Item code	V_{nom}	I_{nom}	V_{in}	P_{nom}	Ripple	HV Connectors	Case format	Page
EP**x** 05 127 24 5	EP005127**x**2450	500 V	120 mA	24 V	60 W	< 0.1 V	cable	metal box	16
EP**x** 10 606 24 5	EP010606**x**2450	1 kV	60 mA	24 V	60 W	< 0.1 V	cable	metal box	16
EP**x** 15 406 24 5	EP012506**x**2450	1.5 kV	40 mA	24 V	60 W	< 0.1 V	cable	metal box	16
EP**x** 20 306 24 5	EP015406**x**2450	2 kV	30 mA	24 V	60 W	< 0.2 V	cable	metal box	16
EP**x** 30 206 24 5	EP030206**x**2450	3 kV	20 mA	24 V	60 W	< 0.5 V	cable	metal box	16
EP**x** 40 156 24 5	EP040156**x**2450	4 kV	15 mA	24 V	60 W	< 2 V	cable	metal box	16
EP**x** 50 126 24 5	EP050126**x**2450	5 kV	12 mA	24 V	60 W	< 2.5 V	cable	metal box	16
EP**x** 60 106 24 5	EP060106**x**2450	6 kV	10 mA	24 V	60 W	< 0.5 V	cable	metal box	16
EP**x** 80 705 24 5	EP080705**x**2450	8 kV	7 mA	24 V	60 W	< 4 V	cable	metal box	16
EP**x** 100 605 24 5	EP100605**x**2450	10 kV	6 mA	24 V	60 W	< 1 V	cable	metal box	16
EP**x** 150 405 24 5	EP150405**x**2450	15 kV	4 mA	24 V	60 W	< 120 V	cable	metal box	16
EP**x** 200 305 24 5	EP200305**x**2450	20 kV	3 mA	24 V	60 W	< 400 V	cable	metal box	16
EP**x** 300 205 24 5	EP300205**x**2450	30 kV	2 mA	24 V	60 W	< 500 V	cable	metal box	16

replacement characters | **x - polarity: P = positive, N = negative**

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EPS 150W

Model	Item code	V_{nom}	I_{nom}	V_{in}	P_{nom}	Ripple	HV Connectors	Case format	Page
EPx 10 157 24 5	EP010157x2450	1 kV	150 mA	24 V	150 W	< 0.2 V	cable	metal box	16
EPx 20 756 24 5	EP020756x2450	2 kV	75 mA	24 V	150 W	< 1 V	cable	metal box	16
EPx 40 406 24 5	EP040406x2450	4 kV	40 mA	24 V	150 W	< 2 V	cable	metal box	16
EPx 80 206 24 5	EP080206x2450	8 kV	20 mA	24 V	150 W	< 1 V	cable	metal box	16
EPx 120 126 24 5	EP120126x2450	12 kV	12.5 mA	24 V	150 W	< 2 V	cable	metal box	16
EPx 150 106 24 5	EP150106x2450	15 kV	10 mA	24 V	150 W	< 1 V	cable	metal box	16
EPx 200 755 24 5	EP200755x2450	20 kV	7.5 mA	24 V	150 W	< 2 V	cable	metal box	16
EPx 300 505 24 5	EP300505x2450	30 kV	5 mA	24 V	150 W	< 3 V	cable	metal box	16

replacement characters | x - polarity: P = positive, N = negative

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GPS Compact 350 W

Model	Item code	V_{nom}	I_{nom}	Ripple	HV Connectors	Case format (W/H/L)	Page
GP**x** 10 357	GP010357**x**0005	1 kV	350 mA	$< 2 \cdot 10^{-3} \cdot V_{nom}$	GES HB11	10" / 81mm / 254mm	20
GP**x** 20 177	GP020177**x**0005	2 kV	175 mA	$< 2 \cdot 10^{-3} \cdot V_{nom}$	GES HB11	10" / 81mm / 254mm	20
GP**x** 30 127	GP030127**x**0005	3 kV	120 mA	$< 2 \cdot 10^{-3} \cdot V_{nom}$	GES HB11	10" / 81mm / 254mm	20
GP**x** 50 706	GP050706**x**0005	5 kV	70 mA	$< 2 \cdot 10^{-3} \cdot V_{nom}$	GES HB11	10" / 81mm / 254mm	20
GP**x** 80 456	GP080456**x**0005	8 kV	45 mA	$< 2 \cdot 10^{-3} \cdot V_{nom}$	GES HB11	10" / 81mm / 254mm	20
GP**x** 100 356	GP100356**x**0005	10 kV	35 mA	$< 2 \cdot 10^{-3} \cdot V_{nom}$	GES HB11	10" / 81mm / 254mm	20
GP**x** 150 236	GP150236**x**0005	15 kV	23 mA	$< 2 \cdot 10^{-3} \cdot V_{nom}$	GES HB31	10" / 81mm / 254mm	20
GP**x** 200 186	GP200186**x**0005	20 kV	18 mA	$< 2 \cdot 10^{-3} \cdot V_{nom}$	GES HB31	10" / 81mm / 254mm	20
GP**x** 300 126	GP300126**x**0005	30 kV	12 mA	$< 2 \cdot 10^{-3} \cdot V_{nom}$	GES HB31	10" / 81mm / 254mm	20
GP**x** 400 905	GP400905**x**0005	40 kV	9 mA	$< 2 \cdot 10^{-3} \cdot V_{nom}$	E70	10" / 81mm / 254mm	20
GP**x** 500 705	GP500705**x**0005	50 kV	7 mA	$< 2 \cdot 10^{-3} \cdot V_{nom}$	E70	10" / 81mm / 254mm	20
GP**x** 600 605	GP600605**x**0005	60 kV	6 mA	$< 2 \cdot 10^{-3} \cdot V_{nom}$	E70	10" / 81mm / 254mm	20
GP**x** 700 505	GP700505**x**0005	70 kV	5 mA	$< 2 \cdot 10^{-3} \cdot V_{nom}$	E70	10" / 81mm / 254mm	20

replacement characters | **x - polarity: P = positive, N = negative**

GPS 300 W

Model	Item code	V_{nom}	I_{nom}	Ripple	HV Connectors	Case format (W/H/L)	Page
GP**x** 10 307	GP010307**x**0005	1 kV	300 mA	$< 1 \cdot 10^{-4} \cdot V_{nom}$	SHV	19" / 1U / 410mm	20
GP**x** 20 157	GP020157**x**0005	2 kV	150 mA	$< 1 \cdot 10^{-4} \cdot V_{nom}$	SHV	19" / 1U / 410mm	20
GP**x** 30 107	GP030107**x**0005	3 kV	100 mA	$< 1 \cdot 10^{-4} \cdot V_{nom}$	SHV	19" / 1U / 410mm	20
GP**x** 40 756	GP040756**x**0005	4 kV	75 mA	$< 1 \cdot 10^{-4} \cdot V_{nom}$	SHV	19" / 1U / 410mm	20
GP**x** 60 506	GP060506**x**0005	6 kV	50 mA	$< 1 \cdot 10^{-4} \cdot V_{nom}$	SHV	19" / 1U / 410mm	20
GP**x** 80 356	GP080356**x**0005	8 kV	35 mA	$< 1 \cdot 10^{-4} \cdot V_{nom}$	SHV	19" / 1U / 410mm	20
GP**x** 120 256	GP120256**x**0005	12 kV	25 mA	$< 5 \cdot 10^{-4} \cdot V_{nom}$	G21	19" / 1U / 410mm	20
GP**x** 150 206	GP150206**x**0005	15 kV	20 mA	$< 5 \cdot 10^{-4} \cdot V_{nom}$	G21	19" / 1U / 410mm	20
GP**x** 200 156	GP200156**x**0005	20 kV	15 mA	$< 5 \cdot 10^{-4} \cdot V_{nom}$	G21	19" / 1U / 410mm	20
GP**x** 300 106	GP300106**x**0005	30 kV	10 mA	$< 5 \cdot 10^{-4} \cdot V_{nom}$	G31	19" / 1U / 410mm	20

replacement characters | **x - polarity: P = positive, N = negative**

GPS 800 W

Model	Item code	V_{nom}	I_{nom}	Ripple	HV Connectors	Case format (W/H/L)	Page
GP**x** 10 807	GP010807**x**0005	1 kV	800 mA	$< 1 \cdot 10^{-4} \cdot V_{nom}$	SHV	19" / 1U / 410mm	20
GP**x** 20 407	GP020407**x**0005	2 kV	400 mA	$< 1 \cdot 10^{-4} \cdot V_{nom}$	SHV	19" / 1U / 410mm	20
GP**x** 30 257	GP030257**x**0005	3 kV	250 mA	$< 1 \cdot 10^{-4} \cdot V_{nom}$	SHV	19" / 1U / 410mm	20
GP**x** 40 207	GP040207**x**0005	4 kV	200 mA	$< 1 \cdot 10^{-4} \cdot V_{nom}$	SHV	19" / 1U / 410mm	20
GP**x** 60 137	GP060137**x**0005	6 kV	130 mA	$< 1 \cdot 10^{-4} \cdot V_{nom}$	SHV	19" / 1U / 410mm	20
GP**x** 80 107	GP080107**x**0005	8 kV	100 mA	$< 1 \cdot 10^{-4} \cdot V_{nom}$	SHV	19" / 1U / 410mm	20
GP**x** 120 656	GP120656**x**0005	12 kV	65 mA	$< 5 \cdot 10^{-4} \cdot V_{nom}$	G21	19" / 1U / 410mm	20
GP**x** 150 506	GP150506**x**0005	15 kV	50 mA	$< 5 \cdot 10^{-4} \cdot V_{nom}$	G21	19" / 1U / 410mm	20

replacement characters | **x - polarity: p = positive, n = negative**

GPS 4 kW

Model	Item code	V_{nom}	I_{nom}	Ripple	HV Connectors	Case format (W/H/L)	Page
GP**x** 40 108		4 kV	1 A	$< 3 \cdot 10^{-2} \cdot V_{nom}$	SHV	19" / 3U / 410mm	20

replacement characters | **x - polarity: P = positive, N = negative**

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TECHNICAL DATA OVERVIEWS

HPS Compact 350 W

Model	Item code	V_{nom}	I_{nom}	Ripple	HV Connectors	Case format (W/H/L)	Page
HPx 10 357	H010357x0000	1 kV	350 mA	$< 2 \bullet 10^{-3} \bullet V_{nom}$	G11	10" / 81mm / 280mm	22
HPx 20 177	H020177x0000	2 kV	175 mA	$< 2 \bullet 10^{-3} \bullet V_{nom}$	G11	10" / 81mm / 280mm	22
HPx 30 127	H030127x0000	3 kV	120 mA	$< 2 \bullet 10^{-3} \bullet V_{nom}$	G11	10" / 81mm / 280mm	22
HPx 50 706	H050706x0000	5 kV	70 mA	$< 2 \bullet 10^{-3} \bullet V_{nom}$	G11	10" / 81mm / 280mm	22
HPx 80 456	H080456x0000	8 kV	45 mA	$< 2 \bullet 10^{-3} \bullet V_{nom}$	G11	10" / 81mm / 280mm	22
HPx 100 356	H100356x0000	10 kV	35 mA	$< 2 \bullet 10^{-3} \bullet V_{nom}$	G11	10" / 81mm / 280mm	22
HPx 150 236	H150236x0000	15 kV	23 mA	$< 2 \bullet 10^{-3} \bullet V_{nom}$	G31	10" / 81mm / 280mm	22
HPx 200 186	H200186x0000	20 kV	18 mA	$< 2 \bullet 10^{-3} \bullet V_{nom}$	G31	10" / 81mm / 280mm	22
HPx 300 126	H300126x0000	30 kV	12 mA	$< 2 \bullet 10^{-3} \bullet V_{nom}$	G31	10" / 81mm / 280mm	22
HPx 400 905	H400905x0000	40 kV	9 mA	$< 2 \bullet 10^{-3} \bullet V_{nom}$	E70	10" / 81mm / 280mm	22
HPx 500 705	H500705x0000	50 kV	7 mA	$< 2 \bullet 10^{-3} \bullet V_{nom}$	E70	10" / 81mm / 280mm	22
HPx 600 605	H600605x0000	60 kV	6 mA	$< 2 \bullet 10^{-3} \bullet V_{nom}$	E70	10" / 81mm / 280mm	22
HPx 700 505	H700505x0000	70 kV	5 mA	$< 2 \bullet 10^{-3} \bullet V_{nom}$	E70	10" / 81mm / 280mm	22

replacement characters | **x - polarity: P = positive, N = negative**

HPS 300 W

Model	Item code	V_{nom}	I_{nom}	Ripple	HV Connectors	Case format (W/H/L)	Page
HPx 10 307	H010307x0000	1 kV	300 mA	$< 1 \bullet 10^{-4} \bullet V_{nom}$	SHV	19" / 1U / 410mm	23
HPx 20 157	H020157x0000	2 kV	150 mA	$< 1 \bullet 10^{-4} \bullet V_{nom}$	SHV	19" / 1U / 410mm	23
HPx 30 107	H030107x0000	3 kV	100 mA	$< 1 \bullet 10^{-4} \bullet V_{nom}$	SHV	19" / 1U / 410mm	23
HPx 40 756	H040756x0000	4 kV	75 mA	$< 1 \bullet 10^{-4} \bullet V_{nom}$	SHV	19" / 1U / 410mm	23
HPx 60 506	H060506x0000	6 kV	50 mA	$< 1 \bullet 10^{-4} \bullet V_{nom}$	SHV	19" / 1U / 410mm	23
HPx 80 356	H080356x0000	8 kV	35 mA	$< 1 \bullet 10^{-4} \bullet V_{nom}$	SHV	19" / 1U / 410mm	23
HPx 120 256	H120256x0000	12 kV	25 mA	$< 5 \bullet 10^{-4} \bullet V_{nom}$	G21	19" / 1U / 410mm	23
HPx 150 206	H150206x0000	15 kV	20 mA	$< 5 \bullet 10^{-4} \bullet V_{nom}$	G21	19" / 1U / 410mm	23
HPx 200 156	H200156x0000	20 kV	15 mA	$< 5 \bullet 10^{-4} \bullet V_{nom}$	G21	19" / 1U / 410mm	23
HPx 300 106	H300106x0000	30 kV	10 mA	$< 5 \bullet 10^{-4} \bullet V_{nom}$	G31	19" / 1U / 410mm	23

replacement characters | **x - polarity: P = positive, N = negative**

HPS 800 W

Model	Item code	V_{nom}	I_{nom}	Ripple	HV Connectors	Case format (W/H/L)	Page
HPx 10 807	H010807x0000	1 kV	800 mA	$< 1 \bullet 10^{-4} \bullet V_{nom}$	SHV	19" / 1U / 410mm	23
HPx 20 407	H020407x0000	2 kV	400 mA	$< 1 \bullet 10^{-4} \bullet V_{nom}$	SHV	19" / 1U / 410mm	23
HPx 30 257	H030257x0000	3 kV	250 mA	$< 1 \bullet 10^{-4} \bullet V_{nom}$	SHV	19" / 1U / 410mm	23
HPx 40 207	H040207x0000	4 kV	200 mA	$< 1 \bullet 10^{-4} \bullet V_{nom}$	SHV	19" / 1U / 410mm	23
HPx 60 137	H060137x0000	6 kV	130 mA	$< 1 \bullet 10^{-4} \bullet V_{nom}$	SHV	19" / 1U / 410mm	23
HPx 80 107	H080107x0000	8 kV	100 mA	$< 1 \bullet 10^{-4} \bullet V_{nom}$	SHV	19" / 1U / 410mm	23
HPx 120 656	H120656x0000	12 kV	65 mA	$< 5 \bullet 10^{-4} \bullet V_{nom}$	G21	19" / 1U / 410mm	23
HPx 150 506	H150506x0000	15 kV	50 mA	$< 5 \bullet 10^{-4} \bullet V_{nom}$	G21	19" / 1U / 410mm	23

replacement characters | **x - polarity: P = positive, N = negative**

HPS 1.5 kW

Model	Item code	V_{nom}	I_{nom}	Ripple	HV Connectors	Case format (W/H/L)	Page
HPx 10 158 152	H010158x0000	1 kV	1.5 A	$< 3 \bullet 10^{-3} \bullet V_{nom}$	SHV	19" / 2U / 410mm	24
HPx 20 757 152	H020757x0000	2 kV	750 mA	$< 3 \bullet 10^{-3} \bullet V_{nom}$	SHV	19" / 2U / 410mm	24
HPx 30 507 152	H030507x0000	3 kV	500 mA	$< 3 \bullet 10^{-3} \bullet V_{nom}$	SHV	19" / 2U / 410mm	24
HPx 40 387 152	H040387x0000	4 kV	380 mA	$< 3 \bullet 10^{-3} \bullet V_{nom}$	SHV	19" / 2U / 410mm	24
HPx 60 257 152	H060257x0000	6 kV	250 mA	$< 3 \bullet 10^{-3} \bullet V_{nom}$	L11	19" / 2U / 410mm	24
HPx 80 197 152	H080197x0000	8 kV	190 mA	$< 3 \bullet 10^{-3} \bullet V_{nom}$	L11	19" / 2U / 410mm	24
HPx 100 157 152	H100157x0000	10 kV	150 mA	$< 3 \bullet 10^{-3} \bullet V_{nom}$	L11	19" / 2U / 410mm	24
HPx 120 137 152	H120137x0000	12 kV	125 mA	$< 3 \bullet 10^{-3} \bullet V_{nom}$	G21	19" / 2U / 410mm	24
HPx 150 107 152	H150107x0000	15 kV	100 mA	$< 3 \bullet 10^{-3} \bullet V_{nom}$	G21	19" / 2U / 410mm	24

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Model	Item code	V_{nom}	I_{nom}	Ripple	HV Connectors	Case format (W/H/L)	Page
HPx 200 756 152	H200756x0000	20 kV	75 mA	$< 3 \bullet 10^{-3} \bullet V_{nom}$	G21	19" / 2U / 410mm	24
HPx 300 506 152	H300506x0000	30 kV	50 mA	$< 3 \bullet 10^{-3} \bullet V_{nom}$	G40	19" / 3U / 410mm	24
HPx 400 386 152	H400386x0000	40 kV	38 mA	$< 3 \bullet 10^{-3} \bullet V_{nom}$	G40	19" / 3U / 410mm	24
HPx 500 306 152	H500306x0000	50 kV	30 mA	$< 3 \bullet 10^{-3} \bullet V_{nom}$	G60	19" / 3U / 410mm	24
HPx 600 256 152	H600256x0000	60 kV	25 mA	$< 3 \bullet 10^{-3} \bullet V_{nom}$	G60	19" / 3U / 410mm	24
HPx 800 206 152	H800206x0000	80 kV	20 mA	$< 3 \bullet 10^{-3} \bullet V_{nom}$	G100	19" / 4U / 550mm	24
HPx A00 156 152	HA00156x0000	100 kV	15 mA	$< 3 \bullet 10^{-3} \bullet V_{nom}$	G100	19" / 4U / 550mm	24

replacement characters | x - polarity: P = positive, N = negative

HPS 3 kW

Model	Item code	V_{nom}	I_{nom}	Ripple	HV Connectors	Case format (W/H/L)	Page
HPx 10 308 302	H010308x0000	1 kV	3 A	$< 5 \bullet 10^{-3} \bullet V_{nom}$	SHV	19" / 2U / 410mm	24
HPx 20 158 302	H020158x0000	2 kV	1.5 A	$< 5 \bullet 10^{-3} \bullet V_{nom}$	SHV	19" / 2U / 410mm	24
HPx 30 108 302	H030108x0000	3 kV	1 A	$< 5 \bullet 10^{-3} \bullet V_{nom}$	SHV	19" / 2U / 410mm	24
HPx 40 757 302	H040757x0000	4 kV	750 mA	$< 5 \bullet 10^{-3} \bullet V_{nom}$	SHV	19" / 2U / 410mm	24
HPx 60 507 302	H060507x0000	6 kV	500 mA	$< 5 \bullet 10^{-3} \bullet V_{nom}$	L11	19" / 2U / 410mm	24
HPx 80 387 302	H080387x0000	8 kV	375 mA	$< 5 \bullet 10^{-3} \bullet V_{nom}$	L11	19" / 2U / 410mm	24
HPx 120 257 302	H120257x0000	12 kV	250 mA	$< 5 \bullet 10^{-3} \bullet V_{nom}$	G21	19" / 2U / 410mm	24
HPx 150 207 302	H150207x0000	15 kV	200 mA	$< 5 \bullet 10^{-3} \bullet V_{nom}$	G21	19" / 2U / 410mm	24
HPx 200 157 302	H200157x0000	20 kV	150 mA	$< 5 \bullet 10^{-3} \bullet V_{nom}$	G21	19" / 2U / 410mm	24
HPx 300 107 302	H300107x0000	30 kV	100 mA	$< 5 \bullet 10^{-3} \bullet V_{nom}$	G40	19" / 3U / 410mm	24
HPx 400 756 302	H400756x0000	40 kV	75 mA	$< 5 \bullet 10^{-3} \bullet V_{nom}$	G40	19" / 3U / 410mm	24
HPx 500 606 302	H500606x0000	50 kV	60 mA	$< 5 \bullet 10^{-3} \bullet V_{nom}$	G60	19" / 3U / 410mm	24
HPx 600 506 302	H600506x0000	60 kV	50 mA	$< 5 \bullet 10^{-3} \bullet V_{nom}$	G60	19" / 3U / 410mm	24
HPx 800 386 302	H800386x0000	80 kV	38 mA	$< 5 \bullet 10^{-3} \bullet V_{nom}$	G100	19" / 4U / 550mm	24
HPx A00 306 302	HA00306x0000	100 kV	30 mA	$< 5 \bullet 10^{-3} \bullet V_{nom}$	G100	19" / 4U / 550mm	24

replacement characters | x - polarity: P = positive, N = negative

HPS 6 kW

Model	Item code	V_{nom}	I_{nom}	Ripple	HV Connectors	Case format (W/H/L)	Page
HPx 10 608 602	H010608x0000	1 kV	6 A	$< 9 \bullet 10^{-3} \bullet V_{nom}$	G11	19" / 4U / 500mm	24
HPx 20 308 602	H020308x0000	2 kV	3 A	$< 9 \bullet 10^{-3} \bullet V_{nom}$	L11	19" / 4U / 500mm	24
HPx 30 208 602	H030208x0000	3 kV	2 A	$< 9 \bullet 10^{-3} \bullet V_{nom}$	L11	19" / 4U / 500mm	24
HPx 40 158 602	H040158x0000	4 kV	1.5 A	$< 9 \bullet 10^{-3} \bullet V_{nom}$	L11	19" / 4U / 500mm	24
HPx 50 128 602	H050128x0000	5 kV	1.2 A	$< 9 \bullet 10^{-3} \bullet V_{nom}$	L11	19" / 4U / 500mm	24
HPx 60 108 602	H060108x0000	6 kV	1 A	$< 9 \bullet 10^{-3} \bullet V_{nom}$	L11	19" / 4U / 500mm	24
HPx 80 757 602	H080757x0000	8 kV	750 mA	$< 9 \bullet 10^{-3} \bullet V_{nom}$	L11	19" / 4U / 500mm	24
HPx 100 607 602	H100607x0000	10 kV	600 mA	$< 9 \bullet 10^{-3} \bullet V_{nom}$	L11	19" / 4U / 500mm	24
HPx 200 307 602	H200307x0000	20 kV	300 mA	$< 9 \bullet 10^{-3} \bullet V_{nom}$	G21	19" / 4U / 500mm	24

replacement characters | x - polarity: P = positive, N = negative

HPS 10 kW

Model	Item code	V_{nom}	I_{nom}	Ripple	HV Connectors	Case format (W/H/L)	Page
HPx 10 109 103	H010109x0000	1 kV	10 A	$< 9 \bullet 10^{-3} \bullet V_{nom}$	G11	19" / 4U / 500mm	24
HPx 20 508 103	H020508x0000	2 kV	5 A	$< 9 \bullet 10^{-3} \bullet V_{nom}$	L11	19" / 4U / 500mm	24
HPx 30 348 103	H030348x0000	3 kV	3.4 A	$< 9 \bullet 10^{-3} \bullet V_{nom}$	L11	19" / 4U / 500mm	24
HPx 40 258 103	H040258x0000	4 kV	2.5 A	$< 9 \bullet 10^{-3} \bullet V_{nom}$	L11	19" / 4U / 500mm	24
HPx 50 208 103	H050208x0000	5 kV	2 A	$< 9 \bullet 10^{-3} \bullet V_{nom}$	L11	19" / 4U / 500mm	24
HPx 60 178 103	H060178x0000	6 kV	1.7 A	$< 9 \bullet 10^{-3} \bullet V_{nom}$	L11	19" / 4U / 500mm	24
HPx 80 138 103	H080138x0000	8 kV	1.3 A	$< 9 \bullet 10^{-3} \bullet V_{nom}$	L11	19" / 4U / 500mm	24
HPx 100 108 103	H100108x0000	10 kV	1 A	$< 9 \bullet 10^{-3} \bullet V_{nom}$	L11	19" / 4U / 500mm	24
HPx 200 507 103	H200507x0000	20 kV	500 mA	$< 9 \bullet 10^{-3} \bullet V_{nom}$	G21	19" / 4U / 500mm	24

replacement characters | x - polarity: P = positive, N = negative

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FPS

Model	Item code	Vnom	Inom	Isolation voltage	HV Connectors	Case format (W/H/L)	Page
Fpd 010 060 010	F010060D010	10 V	60 A	10 kV	HV cable	19" / 2U / 350 mm	27
Fpd 012 050 010	F012050D010	12 V	50 A	10 kV	HV cable	19" / 2U / 350 mm	27
Fpd 020 030 010	F020030D010	20 V	30 A	10 kV	HV cable	19" / 2U / 350 mm	27
Fpd 030 020 010	F030020D010	30 V	20 A	10 kV	HV cable	19" / 2U / 350 mm	27
Fpd 040 015 010	F040015D010	40 V	15 A	10 kV	HV cable	19" / 2U / 350 mm	27
Fpd 040 010 010	F040010D005	40 V	10 A	5 kV	S08	19" / 2U / 350 mm	27
Fpd 012 008 050	F12e008D005	12.5 V	8 A	5 kV	S08	19" / 2U / 350 mm	27

D = DC generation output voltage

SHR

Model	Item code	Channels	Precision	V_{nom}	I_{nom}	Ripple	Output Modes	HV-Connectors	Page
SHR 20 20	SR020020R605	2	Standard	2 kV	6 mA	< 10 mV	2 kV / 6 mA	SHV	30
SHR 20 60	SR020060R405	2	Standard	6 kV	4 mA	< 10 mV	6 kV / 2 mA | 4 kV / 3 mA | 2 kV / 4 mA	SHV	30
SHR 40 20	SR040020R605	4	Standard	2 kV	6 mA	< 10 mV	2 kV / 6 mA	SHV	30
SHR 40 60	SR040060R405	4	Standard	6 kV	4 mA	< 10 mV	6 kV / 2 mA | 4 kV / 3 mA | 2 kV / 4 mA	SHV	30
SHR 22 20	SR022020R605	2	High	2 kV	6 mA	< 2 mV	2 kV / 6 mA	SHV	30
SHR 22 60	SR022060R405	2	High	6 kV	4 mA	< 3 mV	6 kV / 2 mA | 4 kV / 3 mA | 2 kV / 4 mA	SHV	30
SHR 42 20	SR042020R605	4	High	2 kV	6 mA	< 2 mV	2 kV / 6 mA	SHV	30
SHR 42 60	SR042060R405	4	High	6 kV	4 mA	< 3 mV	6 kV / 2 mA | 4 kV / 3 mA | 2 kV / 4 mA	SHV	30

R = reversible polarity

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MMS CRATES

Model	Item code	Slots	Output power	Supply Voltage	Interfaces	Option	Dimensions (W/H/L)	Page
ECH 5xA		10	1200 W	100 - 240 VAC	Ethernet, Wifi, CAN	UPS	19"/ 8U / 480 mm	38
ECH 242		2	200 W	100 - 264 VAC	Ethernet, Wifi. CAN		120 mm / 7U / 350 mm	40
ECH 224		4	300 W	100 - 264 VAC	CAN		235 mm / 7U /350 mm	40
ECH 244		4	300 W	100 - 264 VAC	Ethernet, Wifi, CAN		235 mm / 7U / 350 mm	40
ECH 238		8	1200 W	110 - 240 VAC	CAN	UPS	19" / 6U / 450 mm	40

EHS Standard Common Floating Ground (CFG)

Model	Item code	Channel	Floating	V_{nom}	I_{nom}	V_{set} res.	I_{set} res.	Ripple	V_{meas} res.	I_{meas} res. Range 1	I_{meas} res. Range 2	Page
EHS n001x	EHn0001x106	8 / 16	CFG	100 V	10 mA	0.2 mV	20 nA	5 mV	0.2 mV	20 nA	N/A	42
EHS n005x	EHn0005x156	8 / 16	CFG	500 V	15 mA	1 mV	30 nA	10 mV	1 mV	30 nA	N/A	42
EHS n010x	EHn0010x805	8 / 16	CFG	1 kV	8 mA	2 mV	16 nA	10 mV	2 mV	16 nA	N/A	42
EHS n020x	EHn0020x405	8 / 16	CFG	2 kV	4 mA	5 mV	8 nA	10 mV	4 mV	8 nA	N/A	42
EHS n030x	EHn0030x305	8 / 16	CFG	3 kV	3 mA	6 mV	6 nA	10 mV	6 mV	6 nA	N/A	42
EHS n040x	EHn0040x205	8 / 16	CFG	4 kV	2 mA	8 mV	4 nA	10 mV	8 mV	4 nA	N/A	42
EHS n060x	EHn0060x105	8 / 16	CFG	6 kV	1 mA	12 mV	2 nA	10 mV	12 mV	2 nA	N/A	42
EHS 4080x	EH040080x105	4	CFG	8 kV	1 mA	16 mV	2 nA	10 mV	16 mV	2 nA	N/A	42
EHS 40100x	EH040100x754	4	CFG	10 kV	0.7 mA	20 mV	1.5 nA	10 mV	20 mV	1.5 nA	N/A	42
EHS 40150x	EH040150x504	4	CFG	15 kV	0.5 mA	20 mV	1.5 nA	10 mV	20 mV	1.5 nA	N/A	42
EHS 40200x	EH040200x404	4	CFG	20 kV	0.4 mA	50 mV	1 nA	10 mV	50 mV	1 nA	N/A	42

replacement characters | n - number of channels: 8 = 8 channels, F = 16 channels | x - polarity: P = positive, N = negative

Option L => I_{nom}=100µA, I_{set} resolution 200pA, I_{meas} only first range with resolution 100 pA

EHS Standard Floating Ground (FG)

Model	Item code	Channel	Floating	V_{nom}	I_{nom}	V_{set} res.	I_{set} res.	Ripple	V_{meas} res.	I_{meas} res. Range 1	I_{meas} res. Range 2	Page
EHS n601n F	EHn6001x106	8 / 16	FG	100 V	10 mA	2 mV	200 nA	5 mV	0.2 mV	20 nA	N/A	42
EHS n605n F	EHn6005x156	8 / 16	FG	500 V	15 mA	10 mV	300 nA	10 mV	1 mV	30 nA	N/A	42
EHS n610x F	EHn6010x805	8 / 16	FG	1 kV	8 mA	20 mV	160 nA	10 mV	2 mV	16 nA	N/A	42
EHS n620x F	EHn6020x405	8 / 16	FG	2 kV	4 mA	40 mV	80 nA	10 mV	4 mV	8 nA	N/A	42
EHS n630x F	EHn6030x305	8 / 16	FG	3 kV	3 mA	60 mV	60 nA	10 mV	6 mV	6 nA	N/A	42
EHS n640x F	EHn6040x205	8 / 16	FG	4 kV	2 mA	80 mV	40 nA	10 mV	8 mV	4 nA	N/A	42
EHS n660x F	EHn6060x105	8 / 16	FG	6 kV	1 mA	120 mV	20 nA	10 mV	12 mV	2 nA	N/A	42
EHS 4680x F	EH046080x105	4	FG	8 k V	1 mA	200 mV	20 nA	10 mV	16 mV	2 nA	N/A	42
EHS 46100x F	EH046100x754	4	FG	10 kV	0.7 mA	200 mV	15 nA	10 mV	20 mV	1.5 nA	N/A	42
EHS 46150x F	EH046150x504	4	FG	15 kV	0.5 mA	200 mV	15 nA	10 mV	20 mV	1.5 nA	N/A	42
EHS 46200x F	EH046200x404	4	FG	20 kV	0.4 mA	400 mV	10 nA	10 mV	50 mV	1 nA	N/A	42

replacement characters | n - number of channels: 8 = 8 channels, F = 16 channels | x - polarity: P = positive, N = negative

Option L => I_{nom}=100µA, I_{set} resolution 200pA, I_{meas} only first range with resolution 100 pA

EHS Flex | Common Floating Ground (CFG)

Model	Item code	Channel	Floating	V_{nom}	I_{nom}	V_{set} res.	I_{set} res.	Ripple	V_{meas} res.	I_{meas} res. Range 1	I_{meas} res. Range 2	Page
EHS n5 01x	EHn5001x106	16 / 24 / 48	CFG	100 V	6 mA	0.2 mV	12 nA	5 mV	0.2 mV	12 nA	N/A	44
EHS n5 05x	EHn5005x605	16 / 24 / 48	CFG	500 V	6 mA	1 mV	12 nA	10 mV	1 mV	12 nA	N/A	44
EHS n5 10x	EHn5010x305	16 / 24 / 48	CFG	1 kV	3 mA	2 mV	6 nA	10 mV	2 mV	6 nA	N/A	44
EHS n5 20x	EHn5020x155	16 / 24 / 48	CFG	2 kV	1.5 mA	5 mV	3 nA	10 mV	4 mV	3 nA	N/A	44
EHS n5 30x	EHn5030x105	16 / 24 / 48	CFG	3 kV	1 mA	6 mV	2 nA	10 mV	6 mV	2 nA	N/A	44

replacement characters | n - number of channels: F = 16 channels, 18 = 24 channels, 30 = 48 channels | x - polarity: P = positive, N = negative

Option L => I_{nom}=100µA, I_{set} resolution 200pA, I_{meas} only first range with resolution 100 pA

EHS High Precision Common Floating Ground (CFG)

MMS

Model	Item code	Channel	Floating	V_{nom}	I_{nom}	V_{set} res.	I_{set} res.	Ripple	V_{meas} res.	I_{meas} res. Range 1	I_{meas} res. Range 2	Page
EHS n201x	EHn2001x106	8 / 16	CFG	100 V	10 mA	0.2 mV	20 nA	3 mV	0.1 mV	10 nA	50 pA	46
EHS n205x	EHn2005x106	8 / 16	CFG	500 V	10 mA	1 mV	20 nA	5 mV	0.5 mV	10 nA	50 pA	46
EHS n210x	EHn2010x805	8 / 16	CFG	1 kV	8 mA	2 mV	16 nA	5 mV	1 mV	8 nA	50 pA	46
EHS n220x	EHn2020x405	8 / 16	CFG	2 kV	4 mA	5 mV	8 nA	5 mV	2 mV	4 nA	50 pA	46
EHS n230x	EHn2030x305	8 / 16	CFG	3 kV	3 mA	6 mV	6 nA	5 mV	3 mV	3 nA	50 pA	46
EHS n240x	EHn2040x205	8 / 16	CFG	4 kV	2 mA	8 mV	4 nA	5 mV	4 mV	2 nA	50 pA	46
EHS n260x	EHn2060x105	8 / 16	CFG	6 kV	1 mA	12 mV	2 nA	5 mV	6 mV	1 nA	50 pA	46
EHS 4280x	EH042080x105	4	CFG	8 kV	1 mA	16 mV	2 nA	5 mV	8 mV	1 nA	50 pA	46
EHS 42100x	EH042100x754	4	CFG	10 kV	0.7 mA	20 mV	1.5 nA	5 mV	10 mV	1 nA	50 pA	46
EHS 42150x	EH042150x504	4	CFG	15 kV	0.5 mA	20 mV	1 nA	5 mV	10 mV	0.5 nA	50 pA	46
EHS 42200x	EH042200x404	4	CFG	20 kV	0.4 mA	50 mV	1 nA	10 mV	20 mV	0.5 nA	50 pA	46

replacement characters | n - number of channels: 8 = 8 channels, F = 16 channels | x - polarity: P = positive, N = negative

Option L => I_{nom}=100 µA, I_{set} resolution 200 pA, I_{meas} only first range with resolution 100 pA

EHS High Precision Floating Ground (FG)

MMS

Model	Item code	Channel	Floating	V_{nom}	I_{nom}	V_{set} res.	I_{set} res.	Ripple	V_{meas} res.	I_{meas} res. Range 1	I_{meas} res. Range 2	Page
EHS n401x F	EHn4001x106	8 / 16	FG	100 V	10 mA	0.2 mV	200 nA	3 mV	0.1 mV	10 nA	50 pA	46
EHS n405x F	EHn4005x106	8 / 16	FG	500 V	10 mA	1 mV	200 nA	3 mV	0.5 mV	10 nA	50 pA	46
EHS n410x F	EHn4005x106	8 / 16	FG	1 kV	8 mA	2 mV	160 nA	3 mV	1 mV	8 nA	50 pA	46
EHS n420x F	EHn4020x405	8 / 16	FG	2 kV	4 mA	5 mV	80 nA	5 mV	2 mV	4 nA	50 pA	46
EHS n430x F	EHn4030x305	8 / 16	FG	3 kV	3 mA	6 mV	60 nA	5 mV	3 mV	3 nA	50 pA	46
EHS n440x F	EHn4040x205	8 / 16	FG	4 kV	2 mA	8 mV	40 nA	5 mV	4 mV	2 nA	50 pA	46
EHS n460x F	EHn4060x105	8 / 16	FG	6 kV	1 mA	12 mV	20 nA	5 mV	6 mV	1 nA	50 pA	46
EHS 44800x F	EH044080x105	4	FG	8 kV	1 mA	16 mV	20 nA	5 mV	8 mV	1 nA	50 pA	46
EHS 44100x F	EH044100x754	4	FG	10 kV	0.7 mA	20 mV	15 nA	5 mV	10 mV	1 nA	50 pA	46
EHS 44150x F	EH044100x754	4	FG	15 kV	0.5 mA	20 mV	10 nA	5 mV	10 mV	0.5 nA	50 pA	46
EHS 44200x F	EH044200x404	4	FG	20 kV	0.4 mA	50 mV	10 nA	10 mV	20 mV	0.5 nA	50 pA	46

replacement characters | n - number of channels: 8 = 8 channels, F = 16 channels | x - polarity: P = positive, N = negative

Option L => I_{nom}=100 µA, I_{set} resolution 200 pA, I_{meas} only first range with resolution 100 pA

EBS Bipolar Distributor HV Modules, full 4-quadrant capability, independent voltage control and current measurement per channel | Common Floating Ground (CFG)

MMS

Model	Item code	Channel	Floating	V_{nom}	I_{nom}	V_{set} res.	I_{set} res.	Ripple	V_{meas} res.	I_{meas} res. Range 1	I_{meas} res. Range 2	Page
EBS n005	EBn0005105	4 / 12 / 24	CFG	+/-500 V	+/- 1 mA	1 mV	100 nA	20 mV	1 mV	100 nA	N/A	48
EBS n012	EBn0012105	12 / 24	CFG	+/-1.2 kV	+/- 1 mA	2.4 mV	100 nA	20 mV	2.4 mV	100 nA	N/A	48
EBS n012-L	EBn0012504	12 / 24	CFG	+/-1.2 kV	+/- 0.5 mA	2.4 mV	50 nA	20 mV	2.4 mV	50 nA	N/A	48
EBS n030	EBn0030504	12 / 24	CFG	+/-3 kV	+/- 0.5 mA	6 mV	50 nA	20 mV	6 mV	50 nA	N/A	48

replacement characters | n - number of channels: 4 = 4 channels, C = 12 channels, 18 = 24 channels

EHR Polarity switchable High End High Precision HV Module | Common Floating Ground (CFG)

MMS

Model	Item code	Channels	Precision	V_{nom}	I_{nom}	Ripple	Output Modes	HV-Connectors	Page
EHR 40 20	ER040020R605	4	Standard	2 kV	6 mA	< 10 mV	2 kV / 6 mA	SHV	49
EHR 40 60	ER040060R405	4	Standard	6 kV	4 mA	< 10 mV	6 kV / 2 mA | 4 kV / 3 mA | 2 kV / 4 mA	SHV	49
EHR 42 20	ER042020R605	4	High	2 kV	6 mA	< 2 mV	2 kV / 6 mA	SHV	49
EHR 42 60	ER042060R405	4	High	6 kV	4 mA	< 3 mV	6 kV / 2 mA | 4 kV / 3 mA | 2 kV / 4 mA	SHV	49

R = reversible polarity

PRODUCT INDEX SYSTEMS

TECHNICAL DATA OVERVIEWS

ESS HV Modules, 2-quadrant capability, voltage source and current sink in one channel | Common Ground (CG)

MMS

Model	Item code	Channel	Floating	V_{nom}	I_{nom}	V_{set} res.	I_{set} res.	Ripple	V_{meas} res.	I_{meas} res.		Page
										Range 1	Range 2	
ESS 10 100**x**	ES010100**x**405	1	CG	10 kV	± 4 mA	200 mV	80 nA	< 1 V	100 mV	40 nA	N/A	50
ESS 10 200**x**	ES010200**x**205	1	CG	20 kV	± 2 mA	400 mV	40 nA	< 0.6 V	200 mV	20 nA	N/A	50
ESS 10 300**x**	ES010300**x**105	1	CG	30 kV	± 1 mA	600 mV	20 nA	< 2.5 V	300 mV	10 nA	N/A	50

replacement characters | **x - polarity: P = positive, N = negative**

MME CRATES

MME

Model	Item code	Slots	Output power	Supply Voltage	Interfaces	Dimensions (W/H/L)	Page
ECH 104	G104022	4	200 W	100 - 264 VAC	RS232	235 mm / 3U / 350 mm	54
ECH 134	G134201	4	200 W	100 - 264 VAC	CAN	235 mm / 3U / 350 mm	54
ECH 108	G108022	8	200 W	100 - 264 VAC	RS232	19"/ 3U / 350 mm	54
ECH 138	G138022	8	200 W	100 - 264 VAC	CAN	19"/ 3U / 350 mm	54

MME MODULES

MME

Model	Item code	Channel	V_{nom}	I_{nom}	Ripple and Noise	V_{meas} res.	I_{meas} res.		Page
							Standard	Option L	
EHQ 102M	E10-20	1	2 kV	6 mA	2 mV	1 V	1 µA	100 nA	55
EHQ 103M	E10-30	1	3 kV	4 mA	2 mV	1 V	1 µA	100 nA	55
EHQ 104M	E10-40	1	4 kV	3 mA	2 mV	1 V	1 µA	100 nA	55
EHQ 105M	E10-50	1	5 kV	2 mA	5 mV	1 V	1 µA	100 nA	55

MMC CRATES

MMC

Model	Item code	Slots	Output power	Supply Voltage	Interfaces	Dimensions (W/H/L)	Controller	Page
ECH 124	G124151	4	120 W	100 - 264 VAC	CAN, USB, Ethernet	235 mm / 3U / 350 mm	MICC	56
ECH 128	G128151	8	120 W	100 - 264 VAC	CAN, USB, Ethernet	235 mm / 3U / 350 mm	MICC	56
ECH 12A	G12A301	10	300 W	100 - 264 VAC	CAN, USB, Ethernet	350 mm / 19"/ 3U	MICC	56
ECH 14A	G14A301	10+1	300 W	100 - 264 VAC	CAN, USB, Ethernet	350 mm / 19"/ 3U	MICC	56

CPS 3U

MMC

Model	Item code	V_{nom}	I_{nom}	V_{in}	P_{nom}	Ripple	HV Connectors	Case format	Page
CK**x** 05 206 24 5	CK005206**x**2450	500 V	20 mA	24 V	12 W	typ. < 10 mV	SHV	3U cassette	58
CK**x** 10 106 24 5	CK010106**x**2450	1 kV	10 mA	24 V	12 W	typ. < 20 mV	SHV	3U cassette	58
CK**x** 15 805 24 5	CK015805**x**2450	1.5 kV	8 mA	24 V	12 W	typ. < 30 mV	SHV	3U cassette	58
CK**x** 20 605 24 5	CK020605**x**2450	2 kV	6 mA	24 V	12 W	typ. < 40 mV	SHV	3U cassette	58
CK**x** 30 405 24 5	CK030405**x**2450	3 kV	4 mA	24 V	12 W	typ. < 60 mV	SHV	3U cassette	58
CK**x** 40 305 24 5	CK040305**x**2450	4 kV	3 mA	24 V	12 W	typ. < 80 mV	SHV	3U cassette	58
CK**x** 50 205 24 5	CK050205**x**2450	5 kV	2 mA	24 V	12 W	typ. < 100 mV	SHV	3U cassette	58
CK**x** 70 155 24 5	CK070155**x**2450	7 kV	1.5 mA	24 V	12 W	typ. < 150 mV	SHV	3U cassette	58
CK**x** 100 105 24 5	CK100105**x**2450	10 kV	1 mA	24 V	12 W	typ. < 500 mV	GES	3U cassette	58
CK**x** 150 604 24 5	CK150604**x**2450	15 kV	0.6 mA	24 V	12 W	typ. < 750 mV	GES	3U cassette	58
CK**x** 200 504 24 5	CK200504**x**2450	20 kV	0.5 mA	24 V	12 W	typ. < 1000 mV	GES	3U cassette	58
CK**x** 300 304 24 5	CK300304**x**2450	30 kV	0.3 mA	24 V	12 W	typ. < 1500 mV	GES	3U cassette	58

replacement characters | **x - polarity: P = positive, N = negative**

PRODUCT INDEX SYSTEMS

TECHNICAL DATA OVERVIEWS

DPS 3U

MMC

Model	Item code	V_{nom}	I_{nom}	V_{in}	P_{nom}	Ripple	HV Connectors	Case format	Page
DKR 05 106 24 5	DK005106R2450	500 V	10 mA	24 V	12 W	< 7 mV	SHV	3U cassette	59
DKR 10 106 24 5	DK010106R2450	1 kV	10 mA	24 V	12 W	< 7 mV	SHV	3U cassette	59
DKR 15 805 24 5	DK015805R2450	1.5 kV	8 mA	24 V	12 W	< 7 mV	SHV	3U cassette	59
DKR 20 605 24 5	DK020605R2450	2 kV	6 mA	24 V	12 W	< 7 mV	SHV	3U cassette	59
DKR 30 405 24 5	DK030405R2450	3 kV	4 mA	24 V	12 W	< 7 mV	SHV	3U cassette	59
DKR 40 305 24 5	DK040305R2450	4 kV	3 mA	24 V	12 W	< 7 mV	SHV	3U cassette	59
DKR 50 205 24 5	DK050205R2450	5 kV	2 mA	24 V	12 W	< 7 mV	SHV	3U cassette	59
DKR 60 155 24 5	DK060155R2450	6 kV	1.5 mA	24 V	12 W	< 7 mV	SHV	3U cassette	59

R = reversible polarity

EPS 3U

MMC

Model	Item code	V_{nom}	I_{nom}	V_{in}	P_{nom}	Ripple	HV Connectors	Case format	Page
EK**x** 05 127 24 5	EK005127**x**2450	500 V	120 mA	24 V	60 W	< 0.1 V	SHV	3U cassette	60
EK**x** 10 606 24 5	EK010606**x**2450	1 kV	60 mA	24 V	60 W	< 0.1 V	SHV	3U cassette	60
EK**x** 15 406 24 5	EK012506**x**2450	1.5 kV	40 mA	24 V	60 W	< 0.1 V	SHV	3U cassette	60
EK**x** 20 306 24 5	EK015406**x**2450	2 kV	30 mA	24 V	60 W	< 0.2 V	SHV	3U cassette	60
EK**x** 30 206 24 5	EK030206**x**2450	3 kV	20 mA	24 V	60 W	< 0.5 V	SHV	3U cassette	60
EK**x** 40 156 24 5	EK040156**x**2450	4 kV	15 mA	24 V	60 W	< 2 V	SHV	3U cassette	60
EK**x** 50 126 24 5	EK050126**x**2450	5 kV	12 mA	24 V	60 W	< 2.5 V	SHV	3U cassette	60
EK**x** 60 106 24 5	EK060106**x**2450	6 kV	10 mA	24 V	60 W	< 0.5 V	SHV	3U cassette	60
EK**x** 80 705 24 5	EK080705**x**2450	8 kV	7 mA	24 V	60 W	< 4 V	GES	3U cassette	60
EK**x** 100 605 24 5	EK100605**x**2450	10 kV	6 mA	24 V	60 W	< 1 V	GES	3U cassette	60
EK**x** 150 405 24 5	EK150405**x**2450	15 kV	4 mA	24 V	60 W	< 120 V	GES	3U cassette	60
EK**x** 200 305 24 5	EK200305**x**2450	20 kV	3 mA	24 V	60 W	< 400 V	GES	3U cassette	60
EK**x** 300 205 24 5	EK300205**x**2450	30 kV	2 mA	24 V	60 W	< 500 V	GES	3U cassette	60

replacement characters | **x - polarity: P = positive, N = negative**

NIM CRATES

NIM

Model	Item code	Slots	Output power	Supply Voltage	Dimensions (W/H/L)	Page
NIM Crates made by WIENER						
Compact		12	150 W	230 V / 50Hz	19" / 5U / 340 mm	64
Portable		12	150 W	230 V / 50Hz	273mm / 273mm / 340 mm	64
NIMpact		12	300 W	230 V / 50Hz	19" / 5U (7U w. fan) / 518 mm	64
6000		7	up to 2,7 kW	230 V / 50Hz	19" / 7U / 620 mm	64

NHR Standard - Electronically switchable polarity, HV generator per channel, 3 HV-generator modes independent voltage and current control per channel

NIM

Model	Item code	Channel	Floating	V_{nom}	I_{nom}	HV-Modes	V_{set} res.	I_{set} res.	Ripple	V_{meas} res.	I_{meas} res.		Page
											Range 1	Range 2	
NHR 20 20	NR020020R605	2	CFG	2 kV	6 mA	2kv/6mA	4 mV	12 nA	10 mV	4 mV	12 nA	N/A	66
NHR 20 60	NR020060R405	2	CFG	6 kV	4 mA	6kV/2mA|4kV/3mA|2kV/4mA	12 mV	8 nA	10 mV	12 mV	8 nA	N/A	66
NHR 40 20	NR040020R605	4	CFG	2 kV	6 mA	2kv/6mA	4 mV	12 nA	10 mV	4 mV	12 nA	N/A	66
NHR 40 60	NR040060R405	4	CFG	6 kV	4 mA	6kV/2mA|4kV/3mA|2kV/4mA	12 mV	8 nA	10 mV	12 mV	8 nA	N/A	66

R = reversible polarity

PRODUCT INDEX SYSTEMS

TECHNICAL DATA OVERVIEWS

NHR High Precision - Electronically switchable polarity, HV generator per channel, 3 HV-generator modes independent voltage and current control per channel

Model	Item code	Channel	Floating	V_{nom}	I_{nom}	HV-Modes	V_{set} res.	I_{set} res.	Ripple	V_{meas} res.	I_{meas} res.		Page
											Range 1	Range 2	
NHR 22 20	NR022020R605	2	CFG	2 kV	6 mA	2kv/6mA	4 mV	12 nA	2 mV	2 mV	6 nA	50 pA	66
NHR 22 60	NR022060R405	2	CFG	6 kV	4 mA	6kV/2mA|4kV/3mA|2kV/4mA	12 mV	8 nA	3 mV	6 mV	4 nA	50 pA	66
NHR 42 20	NR042020R605	4	CFG	2 kV	6 mA	2kv/6mA	4 mV	12 nA	2 mV	2 mV	6 nA	50 pA	66
NHR 42 60	NR042060R405	4	CFG	6 kV	4 mA	6kV/2mA|4kV/3mA|2kV/4mA	12 mV	8 nA	3 mV	6 mV	4 nA	50 pA	66

R = reversible polarity

NHS Standard - HV generator per channel, independent voltage and current control per channel

Model	Item code	Channel	Floating	V_{nom}	I_{nom}	HV-Modes	V_{set} res.	I_{set} res.	Ripple	V_{meas} res.	I_{meas} res.		Page
											Range1	Range2	
NHS 60 01**x**	NH060001**x**106	6	CG	100 V	10 mA		0.2 mV	20 nA	3 mV	0.2 mV	20 nA	N/A	65
NHS 60 05**x**	NH060005**x**156	6	CG	500 V	15 mA		1 mV	30 nA	10 mV	1 mV	30 nA	N/A	65
NHS 60 10**x**	NH060010**x**805	6	CG	1 kV	8 mA		2 mV	16 nA	10 mV	2 mV	16 nA	N/A	65
NHS 60 20**x**	NH060020**x**405	6	CG	2 kV	4 mA		5 mV	8 nA	10 mV	4 mV	8 nA	N/A	65
NHS 60 30**x**	NH060030**x**305	6	CG	3 kV	3 mA		6 mV	6 nA	10 mV	6 mV	6 nA	N/A	65
NHS 60 40**x**	NH060040**x**205	6	CG	4 kV	2 mA		8 mV	4 nA	10 mV	8 mV	4 nA	N/A	65
NHS 60 60**x**	NH060060**x**105	6	CG	6 kV	1 mA		12 mV	2 nA	10 mV	12 mV	2 nA	N/A	65

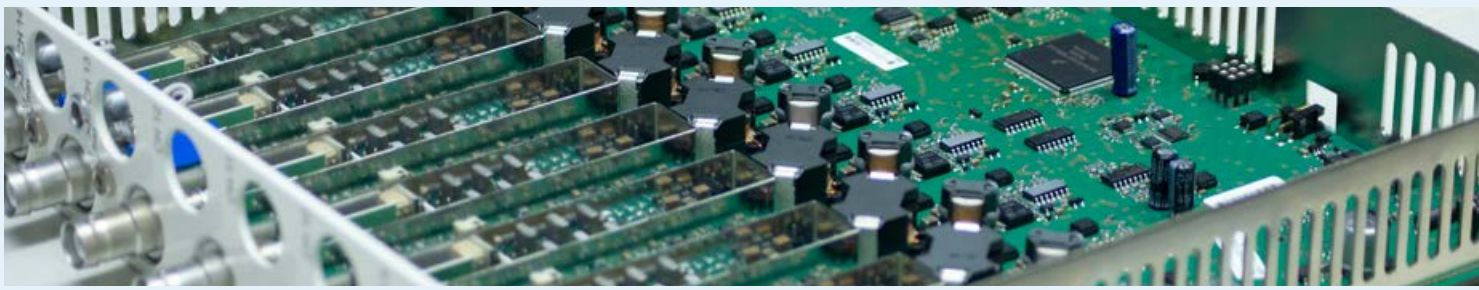
replacement characters | **x - polarity: P = positive, N = negative**

NHQ Standard - Laboratory HV Modules, display (LCD) and 10-turn potentiometer, switchable polarity

Model	Item code	Channel	Floating	V_{nom}	I_{nom}	V_{set} res.	Ripple	V_{meas} res.	I_{meas} res.		Page
									Range1	Range2	
NHQ 102M	N10-20	1	CG	2 kV	6 mA	1 V	2 mV	1 V	1 µA	N/A	68
NHQ 103M	N10-30	1	CG	3 kV	4 mA	1 V	2 mV	1 V	1 µA	N/A	68
NHQ 104M	N10-40	1	CG	4 kV	3 mA	1 V	2 mV	1 V	1 µA	N/A	68
NHQ 105M	N10-50	1	CG	5 kV	2 mA	1 V	5 mV	1 V	1 µA	N/A	68
NHQ 106L	N10-60	1	CG	6 kV	1 mA	1 V	5 mV	1 V	1 µA	N/A	68
NHQ 202M	N20-20	2	CG	2 kV	6 mA	1 V	2 mV	1 V	1 µA	N/A	68
NHQ 203M	N20-30	2	CG	3 kV	4 mA	1 V	2 mV	1 V	1 µA	N/A	68
NHQ 204M	N20-40	2	CG	4 kV	3 mA	1 V	2 mV	1 V	1 µA	N/A	68
NHQ 205M	N20-50	2	CG	5 kV	2 mA	1 V	5 mV	1 V	1 µA	N/A	68
NHQ 206L	N20-60	2	CG	6 kV	1 mA	1 V	5 mV	1 V	1 µA	N/A	68

NHQ Low Cost

Model	Item code	Channel	Floating	V_{nom}	I_{nom}	V_{set} res.	Ripple	V_{meas} res.	I_{meas} res.		Page
									Range1	Range2	
NHQ 212M	N21-20	2	CG	2 kV	6 mA	1 V	50 mV	1 V	1 µA	N/A	68
NHQ 213M	N21-30	2	CG	3 kV	4 mA	1 V	50 mV	1 V	1 µA	N/A	68
NHQ 214M	N21-40	2	CG	4 kV	3 mA	1 V	50 mV	1 V	1 µA	N/A	68
NHQ 215M	N21-50	2	CG	5 kV	2 mA	1 V	50 mV	1 V	1 µA	N/A	68
NHQ 216L	N21-60	2	CG	6 kV	1 mA	1 V	50 mV	1 V	1 µA	N/A	68



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SHORTCUT REFERENCE

OPTIONS

SHORTCUT	MEANING
0N1	better current resolution for 2nd meas. range
1CR	one current range only
2MA	2nd measurement range
2HC	two HV output connectors
3UC	3U eurocassette version
ACL	ARC current limitation
ARC	ARC management
ARCpro	ultrafast configurable ARC management
CLD	capacitor charger
CUSTOM	customizable configurations
EOA	extended operating area
FAN	additional fan unit
FCS	integrated filament current supply
FP	with front panel operation
HCU	high current output
HVR	high voltage connector on rear side
HVS	higher voltage stability
ID	single-channel INHIBIT - down
IL	INTERLOCK
IU	single-channel INHIBIT - up
INH	INHIBIT
IWP	current setting with 10-turn potentiometer
L	low current output
LCD	display with front panel control
MS	with HV connector
MK	with HV cable
N12	±12 V supply voltage version
N24	±24 V supply voltage only
TC	improved temperature coefficient
UPS	uninterruptible power supply
VCT	voltage correction by temperature
VHR	very high resolution
VLN	very low noise
WR4	Wide range input 400 - 480V +/- 10%

RIPPLE AND NOISE CLASSIFICATION

SHORTCUT	MEANING	PAGE
LN	low noise	102
VLN	very low noise	102
ULN	ultra low noise	102

FLOATING VERSIONS

SHORTCUT	MEANING	PAGE
CG	common ground	99
CFG	common floating ground	99
FG	floating ground	99

SUPPLY PRINCIPLES

SHORTCUT	MEANING	PAGE
DISTINCT SOURCE	one generator per channel	100
DISTRIBUTOR	distributor	101
BIP. DISTRIBUTOR	bipolar distributor	101

INTERFACES

SHORTCUT	MEANING	PAGE
AIO	analog I/O (standard 0-5 V)	97
SPS	industry analog I/O: (24 V digital I/O, 0-10 V analog I/O)	97
DIO	at least one digital interface out of the following:	
CAN	controller area network	97
ETC	EtherCAT	97
ETH	Ethernet	97
IEE	IEEE 488.2 interface	97
RS2	RS232 serial interface	97
USB	universal serial bus	97

HV CONNECTORS

SHORTCUT	MEANING	PAGE
BNC	BNC connector	92
CABLE	HV cable without connector	92
F15	Fischer connector	92
E70	iseg HV connector	92
GES	GES connector	92
LEM	LEMO connector	92
I52	Radiall multipin 52 connector	92
R51	Redel multipin 51 connector	92
SHV	SHV connector	92

SOFTWARE

SHORTCUT	MEANING	PAGE
ISEGCONTROL1	iCS, VME, SNMP, OPCclassic	74
ISEGCONTROL2	iCS, CAN, USB	74
EPICS	exp. physics & industrial control system	75
ICS	iseg communication server	72
CC	CAN control	75
SCPI	SCPI control	75
TERM	iseg terminal	75

SYMBOLS

SHORTCUT	MEANING
V_{nom}	nominal output voltage
V_{out}	output voltage
V_{set}	set value of output voltage
V_{mon}	monitor voltage
V_{meas}	digital measured value of voltage
V_{p-p}	peak to peak ripple voltage
V_{in}	input / supply voltage
V_{type}	type of output voltage (AC, DC)
ΔV_{out} [Δ_{Vin}]	deviation of V_{out} dep. on variation of supply voltage
ΔV_{out} [ΔR_{load}]	deviation of V_{out} dep. on variation of output load
I_{nom}	nominal output current
I_{out}	output voltage
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
CH	channel(s)
HV	high voltage
LV	low voltage

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