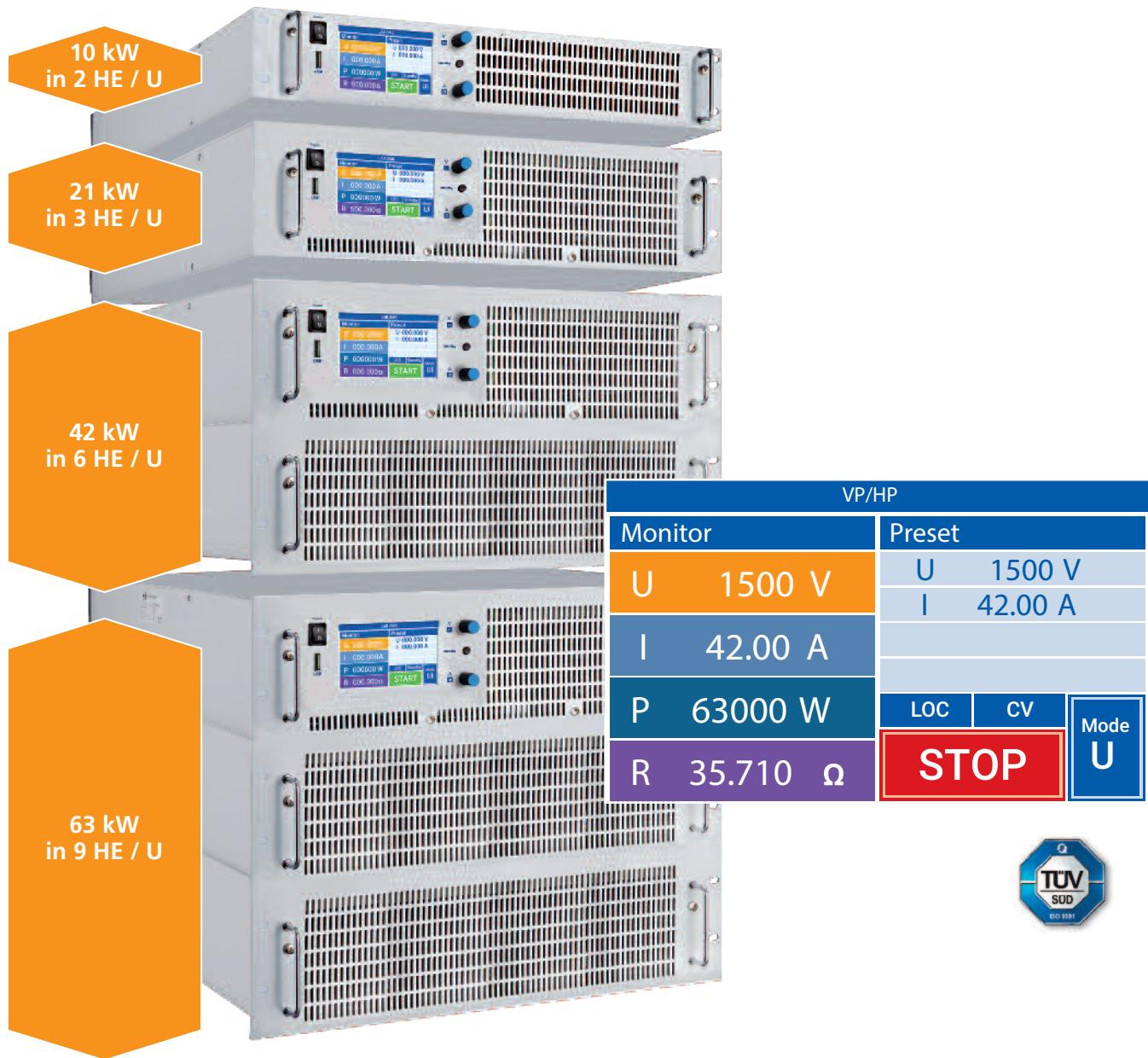




Your Power House
VPELECTRONIQUE

► DC Sources JD#HP

3 kW – 1,4 MW



DC Sources VP HP

3 – 63 kW

19" x 2-9 U x 440 – 620 mm



OVERVIEW

- 3 kW to 63 kW
- Output voltages up to 1500 V (2000 V)
- Output currents up to 2250 A
- Internal temperature regulated fan
- TFT touch display
- Constant voltage, current, resistance and power operation, as well as PV-array simulation
- USB stick, for example for data-log function
- Create any type of voltage or current curve via USB stick or digital interface (sequential operation) Script operation, in conjunction with the Datalog function, enables an independent stand-alone test field to be set up.
- Datalog function: Current operating values are saved to the USB stick at adjustable time intervals.
- ATI 5/10 galvanically isolated analog interface: 0 – 5 V or 0 – 10 V (user selectable) and soft interlock
- Adjustable filter function for the analog interface
- Digital interfaces IEEE488, RS485 RS232, LAN and USB
- Voltage rise time and current rise time (U and I slopes) are adjustable
- V_{max} and I_{max} can be set by the user in order to limit output voltage and output current
- A switch-off time, that starts once the Start button has been pressed, can be set
- Create V / I output characteristics (e.g. for PV-Sim, shading) which can be saved on USB stick
- "High speed" The rise and fall time for the DC output voltage is on average reduced by an order of magnitude compared to standard speeds.
- OVP, OTP, UVP and OCP protective functions
- Floating output
- Special versions available on request



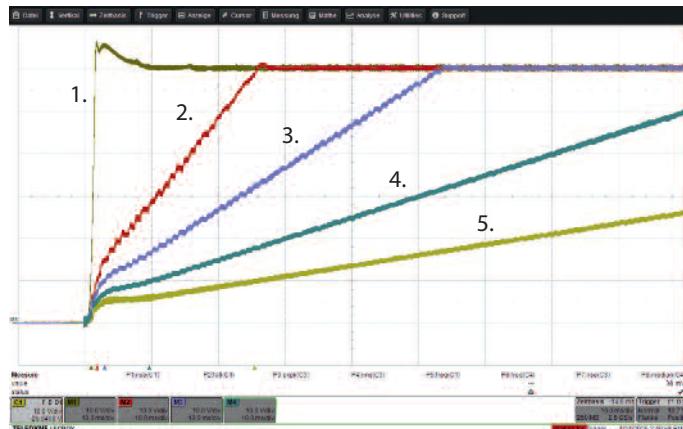
DESCRIPTION

The DC sources of the VP/HP series are characterized by a high power density of up to 21 kW in 3 U. The sources are controlled by a microcontroller which generates the parameters for the analog control. The professional version includes a comprehensive set of additional features which facilitate both daily work and adapting the source to the customer application.

The maximum power available in 19" cabinets is 1.4 MW. Using multiple sources in conjunction with each other does not negatively impact the tolerances nor the speed of the sources. This is achieved through the modular internal design of the sources.

Additional scope of functions:

The source has some additional functions that simplify the daily work with the source, such as t-Enable: after a defined time the source is automatically put back into standby. Possible applications are for example the manual testing of varistors, or the examination of motor starting processes.



- Slope: A parameter which increases the rise time for both current and voltage when switching out of standby. One possible application is testing laser diodes.

1. Slope off (Option High speed)
2. Slope 2000 V/s
3. Slope 1000 V/s
4. Slope 500 V/s
5. Slope 250 V/s

- AI filter: A digitally adjustable filter for the analog interface. The filter enables the use of highly noisy analog signals as control signals in non-time critical applications.
- Lock front: The display of the source can be locked by a simple key combination. If the source is switched off while the display is locked, it will output the last set values right after being switched on again.
- Remember last settings: The source has the ability to restore the last stored values on restart while remaining in standby. This makes it easier to test applications that require frequent changes in setup and where the test source is often deactivated.

Protection functions for customer applications

UVLO: This function can switch off the output after a defined time if a short circuit occurs in the customer application when the device is operated in V constant mode.

OCP: This function switches the output off after a defined time if the specified current is exceeded.

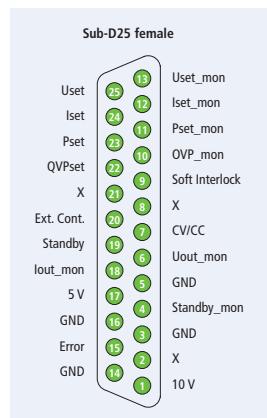


Galvanically isolated analog interface

By default, the DC sources of the VP/ HP-series have an ATI5/10 analog interface integrated. The logic levels can be configured to 0-5 V and 0-10 V by the customer.

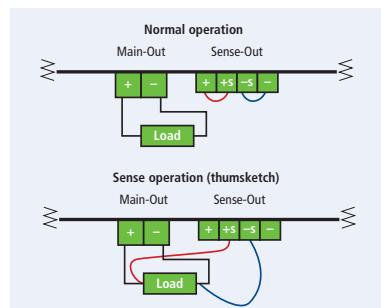
The ATI interface can be used to set the set-values for voltage, current, OVP and power.

The present set-values for voltage, current, power and OVP can also be read back via the interface.



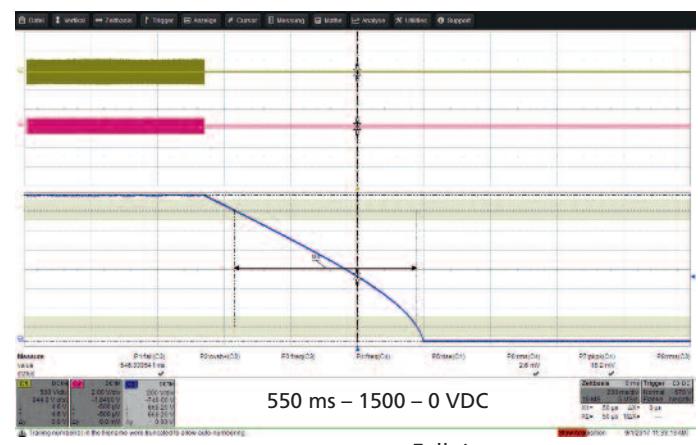
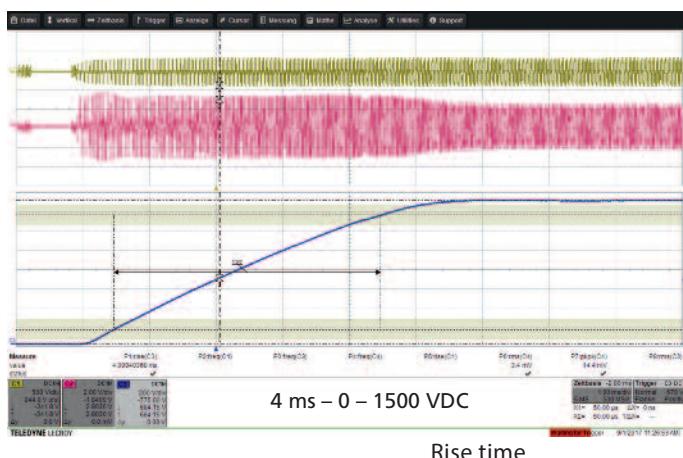
Sense function

The VP/HP series DC sources have a Sense function which allows to compensate the line resistance between the source output and the load, this is possible within the output characteristic field of 0 - 101% of the nominal voltage. A maximum of 10% of the maximum output voltage can be compensated.



High speed

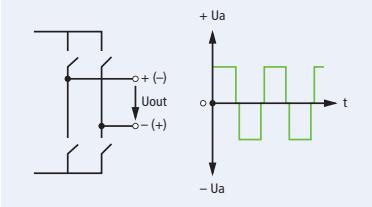
This option reduces the rise and fall times of the DC output voltage by an order of magnitude compared to standard times. This is achieved through the use of film capacitors which enable high-frequency pulse loads.





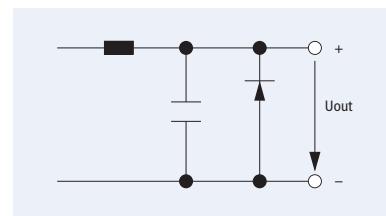
Polarity reversal

This option enables reversing the polarity of the DC output when the device is in Standby-Mode. This can be done manually or via an interface.



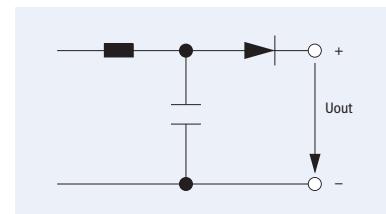
Protection against negative voltage

Protects against negative voltages, which commonly occur during the operation of motors/inductors. The selected diode can permanently conduct the maximum output current of the source.



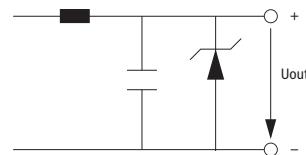
Decoupling diode

Protection against unwanted overvoltage being fed back into the source, if the overvoltages do not exceed 150% of the maximum output voltage. The decoupling diode facilitates battery operation since with it relays don't have to be used when connecting the source to a battery.



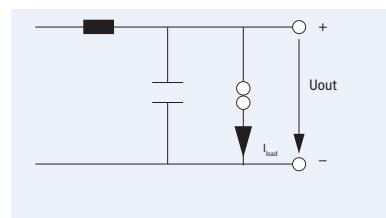
Passive overvoltage protection

Short overvoltage spikes are caught by the suppressor diode.



Active overvoltage protection

Long lasting overvoltage events can be caught by the internal electrical load.





Master-Slave function

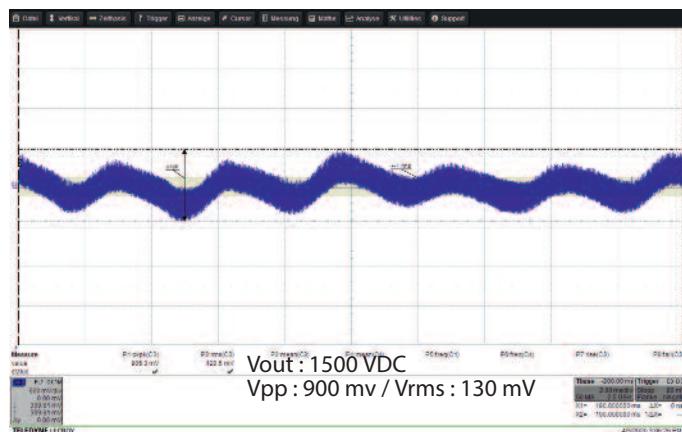
In Master - Slave mode, several independent sources can be used simultaneously. The sources can be connected in series, parallel, or both. This way the same sources can be used for different load conditions by changing their output connections.

If the master device fails, one of the slave devices takes over the function of the original master device.

Master \triangleq Slave

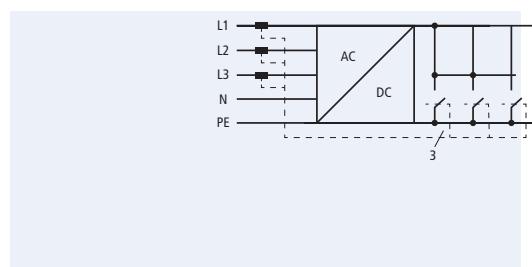
Ripple and noise

The amplitude of the AC voltage component on the DC output of a power supply. This characteristic is shown in the values for peak-to-peak voltage (V_{pp}) and rms voltage (V_{rms}), which are calculated at a specified bandwidth.



Emergency shutdown DC output

In the event of a mains failure, the DC output of the source is short circuited. This ensures that the output voltage is below 60 VDC within 10 s, which is in accordance with EN 61010-1.



Since this protection circuit is already integrated it doesn't need to be added by the user.

OUTPUT CURRENT 3 KW - 63 KW

Output power ¹	3kW	4kW	5kW	7kW	10kW	15kW
Height	2HE/U	2HE/U	2HE/U	2HE/U	3HE/U	3HE/U
Output voltage [V] ²	Output current [A]					
15	250	500 ³	500 ³	500 ³	750 ⁴	1000 ⁵
20	250	250	250	500 ³	500	750
25	240	240	240	480 ³	480	600
30	234	234	234	234	400	500
35	200	200	200	200	400	430
40	175	175	175	175	350	375
45	156	156	156	156	320	340
50	140	140	140	140	280	300
60	117	117	117	117	170	250
70	100	100	100	100	150	220
80	88	88	88	88	125	190
100	70	70	70	70	100	150
150	47	47	47	47	70	100
300	24	24	24	24	35	50
600	12	12	12	12	17	25
800	9	9	9	9	13	19
1000	7	7	7	7	10	15
1200	5,8	5,8	5,8	5,8	9	13
1500	4,7	4,7	4,7	4,7	7	10

Output power ¹	21 kW	30kW	35kW	42kW	49kW	56kW	63kW
Height	3HE/U	6HE/U	6HE/U	6HE/U	9HE/U	9HE/U	9HE/U
Output voltage [V] ²	Output current [A]				Output current [A]		
20	1250 ⁵	1500	1750 ⁶	2250 ⁶	-	-	-
25	1000 ⁵	1250	1500	1750 ⁶	2000	2250	-
30	700	940	1200	1400	1650	1900	2100
35	600	800	1000	1200	1400	1600	1800
40	525	700	900	1050	1240	1400	1575
45	470	630	800	950	1100	1250	1400
50	420	560	700	840	1000	1150	1260
60	350	470	600	700	840	950	1050
70	300	400	500	600	700	800	900
80	270	350	450	540	620	700	800
100	210	280	350	420	500	560	640
150	140	190	240	280	330	380	420
300	70	95	120	140	170	190	210
600	35	47	60	70	85	95	105
800	27	35	44	53	62	70	80
1000	21	28	35	42	49	56	63
1200	18	24	30	35	41	47	53
1500	14	19	24	28	33	38	42

¹ Higher output power on request² Voltage values are examples, any voltages at no extra charge, starting at one unit.³ 19" x 2 U x 600 mm⁴ 19" x 3 U x 620 mm⁵ 19" x 6 U x 620 mm⁶ 19" x 9 U x 620 mm



INPUT DATA 3KW - 15 KW

<i>Height</i>	3kW	2HE / U			3HE / U	
<i>Output power</i>		4kW	5kW	7kW	10kW	15kW
<i>Grid connection-information</i>						
<i>Grid connection</i>						
<i>Input 1P/230</i>						
<i>Input 3P/200</i>						
<i>Input 3P/208</i>						
<i>Input 3P/400</i>						
<i>Input 3P/440</i>						
<i>Input 3P/480</i>						
<i>Input current 1P/230 V /[Arms]¹</i>	22	28	33	x ²	x ²	x ²
<i>Input current 3P/200 V /[Arms]¹</i>	13.9	18.5	23.2	32.5	46.3	69.4
<i>Input current 3P/208 V /[Arms]¹</i>	13.4	17.8	22.3	31.2	44.5	66.7
<i>Input current 3P/400 V /[Arms]¹</i>	7	9.3	11.6	16.6	23.2	34.7
<i>Input current 3P/440 V /[Arms]¹</i>	6.4	8.5	10.6	14.8	21.1	31.6
<i>Input current 3P/480 V /[Arms]¹</i>	5.8	7.8	9.7	13.6	19.3	28.9
<i>Grid characteristics</i>						
<i>Transient inrush current³</i>			< 25			< 51
<i>Max. allowed asymmetry (3P-System)</i>						< 3%
<i>Leakage current</i>						< 35 mA
<i>Power factor</i>						> 0.7
<i>Harmonic content³</i>						50Hz = 72% 100Hz = 2% 150Hz = 0.9% 200Hz = 0.1% 250Hz = 11% 350 Hz = 0.6%
<i>Efficiency (typical)</i>						94%
<i>Circuit breaker information</i>						
<i>Recommended circuit breaker</i>	16 A Type D/K	16 A Type D/K	16 A Type D/K	32 A Type D/K	32 A Type D/K	63 A Type D/K
<i>3P/400 model (value and curve)</i>						

¹ for nominal current and nominal voltage

² not standard or not available

³ for nominal input voltage; the inrush current occurs only when first connecting to the grid



INPUT DATA 18 KW - 63 KW

	3HE / U Output power 21kW	30kW	6HE / U 35kW	45kW	49kW	56kW	9HE / U 63kW
Grid connection information							
<i>Grid connection</i>	3 wire (P+N+PE) / 4 wire (3P+PE) / 5 wire (P+N+PE)						
<i>Input 1P/230</i>	1 x 230 VAC (207-253 VAC 47-63Hz)						
<i>Input 3P/200</i>	3 x 200 VAC (180-220 VAC 47-63Hz)						
<i>Input 3P/208</i>	3 x 208 VAC (187-229 VAC 47-63Hz)						
<i>Input 3P/400</i>	3 x 400 VAC (360-440 VAC 47-63Hz)						
<i>Input 3P/440</i>	3 x 440 VAC (396-484 VAC 47-63Hz)						
<i>Input 3P/480</i>	3 x 480 VAC (432-528 VAC 47-63Hz)						
<i>Input current 1P/230 model /[Arms]¹</i>	x ²	x ²	x ²	x ²	x ²	x ²	x ²
<i>Input current 3P/200 model /[Arms]¹</i>	97.1	138.7	161.8	208	226.5	258.9	291.2
<i>Input current 3P/208 model /[Arms]¹</i>	93.4	133.4	155.6	200	217.8	248.9	280
<i>Input current 3P/400 model /[Arms]¹</i>	48.6	69.4	80.9	104	113.3	129.5	145.6
<i>Input current 3P/440 model /[Arms]¹</i>	44.2	63.1	73.6	94.6	103	117.7	132.4
<i>Input current 3P/480 model /[Arms]¹</i>	40.5	57.8	67.4	86.7	94.4	107.9	121.4
Grid characteristics							
<i>Inrush Transient current³</i>	< 76	< 102	< 127	< 153	< 178	< 203	< 229
<i>Max.allowed asymmetry (3P-System)</i>	<3%						
<i>Leakage current</i>	< 35 mA						
<i>Power factor</i>	> 0.7						
<i>Harmonic content³</i>	50Hz = 72% 100Hz = 2% 150Hz = 0.9% 200Hz = 0.1% 250Hz = 11% 350 Hz = 0.6%						
<i>Efficiency Type</i>	94%						
Circuit breaker information							
<i>Recommended circuit breaker 3P/400 model (value and curve)</i>	63 A Type D/K	80 A Type D/K	120 A Type D/K	120 A Type D/K	150 A Type D/K	150 A Type D/K	180 A Type D/K

¹ applies to rated input voltage

² not standard or not available

³ applies to rated input voltage; the inrush current occurs only when first connecting to the grid



DEVICE FEATURES

Device type	VP/HP	VP/HP/E	VP/HP	VP/HP/E
Function			/C	/CE
<i>TFT touch display²</i>	-	-	x	-
<i>TFT display²</i>	-	-	-	x
<i>7 Segment display</i>	-	x	-	-
<i>Graphic display</i>	x	-	-	-
<i>USB port</i>	x	-	-	-
<i>Master/slave function</i>	x	-	x	-
<i>Soft interlock</i>	x	-	x	-
<i>UI mode</i>	x	x	x	x
<i>UIP mode</i>	x	-	x	-
<i>UIR mode</i>	x	-	x	-
<i>Simulation of PV arrays</i>	x	-	x	-
SD-Slot	-	-	x	-

DEVICE DESIGNATION EXAMPLE

kW	V	Uin	Uin-Con.	+ Interface	+ Option	
VP/HP	21	100	3P/400	3P+E	USB	CC

► VP/HP | 150000 | 3P/400 | 3P+E | USB

<i>Standard VP/HP¹</i>	RS232	ATI 5/10	LAN	Master /Slave	Soft-Interlock	Graphic Display
<i>E-Version¹</i>	RS232	ATI 5/10	LAN			7 Segment display
<i>Mains input voltage</i>	1P/230	3P/200	3P/208	3P/400	3P/440	3P/480
<i>Grid connection</i>	1P+N+E		3P+E			3P+N+E

OPTIONS LIST

Option	Option for	VP/HP	VP/HP/E
DC	<i>DC Input selectable between 250 - 750 VDC</i>	x	x
ATE	<i>ATE without manual control</i>	x	x
IEEE 448	<i>IEEE 488 interface</i>	x	x
RS 485	<i>RS 485 interface</i>	x	x
USB	<i>USB interface</i>	x	x
2000 V	<i>2000 VDC output voltage (Application must be considered, contact us)</i>	x	x
HS	<i>Hightspeed, secondary rise and fall time shortened by a factor of 10</i>	x	x
PW	<i>Polarity reversal. Only in standby</i>	x	x
RVP	<i>Reverse voltage protection</i>	x	x
DD	<i>Decoupling diode</i>	x	x
POP	<i>Passive overvoltage protection</i>	x	x
AOP	<i>Active overvoltage protection</i>	x	x
USB Port	<i>USB-Stick</i>	x	-
IIO	<i>Increased insulation (2000 VDC) between DC output and earth at output voltages up to 300 VDC.</i>	x	x
E	<i>Reduced functions</i>	-	x
CC	<i>Conformal coating</i>	x	x
MRI AC	<i>Interlock for mains input, according to machine guidelines</i>	x	x
MRI DC	<i>Interlock for DC output, according to machine guidelines</i>	x	x
NA	<i>DC output emergency shutdown: The DC output is safely short-circuited when the mains supply is switched off.</i>	x	x
SC	<i>Cover for mains and DC connections</i>	x	x
C	<i>TFT-Touch display²</i>	x	
CE	<i>TFT display²</i>	-	x
SD	<i>SD-Slot, only with the option GD</i>	x	-
3y	<i>Extended warranty 3 years</i>	x	x
5y	<i>Extended warranty 5 years</i>	x	x

¹ maximum 3 digital interfaces

² Available from september 2020

Output ripple	Output ripple										
	Voltage range in [V] for spec. below	0-15	16-35	36-70	71-120	121-350	351-700	701-900	901-1150	1151-1400	1401-1500
	Voltage ripple (mVpp) 20MHz	40	80	140	140	900	350	350	400	850	900
	Voltage ripple (mVpp) 300kHz	15	35	60	60	400	250	250	300	500	550
	Voltage ripple (mVrms) 20MHz	15	35	60	60	400	150	150	150	150	200
	Voltage ripple (mVrms) 300kHz	10	25	40	40	300	100	100	100	100	150
	Current ripple (Vpp)	< 0.5% of F.S. of I _{max} from one 7KW-Unit									
	Current ripple (Arms)	600	380	260	220	60	30	25	15	12	12
	Output speed										
	Voltage range in [V] for spec. below	0-15	16-35	36-70	71-120	121-350	351-700	701-900	901-1150	1151-1400	1401-1500
Insulation	Rise time, full load	6ms	6ms	12ms	20ms	20ms	20ms	40ms	40ms	40ms	6ms
	Rise time, no load	5ms	5ms	10ms	10ms	10ms	10ms	10ms	20ms	20ms	5ms
	Fall time, full load	15ms	15ms	20ms	20ms	40ms	50ms	60ms	80ms	100ms	25ms
	Fall time, no load	tf < 5s @ U _a < 60V									
	Dynamic response time during load variations	< 3ms									
	Primary / secondary	0-300V									
	Primary / earth	3000 VAC									
	DC output / earth	2150 VDC									
	500 VDC	2000 VDC									
	Output stability										
Accuracy of SET-Value	Static regulation	$\pm 0.1\%$ F.S.									
	Voltage stability during line variation	$\pm 0.02\%$ F.S.									
	Current stability during line variation	$\pm 0.02\%$ F.S.									
	Voltage stability during load variation	$\pm 0.05\%$ F.S. $\pm 20mV$									
	Current stability during load variation	$\pm 0.05\%$ F.S. $\pm 20mA$									
	Accuracy of SET-Value										
	Voltage	0.1%									
	Current	0.2%									
	Voltage during sense operation	0.50%									
	Voltage during M/S-serial operation	0.1% x N (N : number of devices)									
Resolution of displayed value	Current during M/S-parallel operation	0.2% x N (N: number of devices)									
	Voltage range in [V] for spec. below	20V - 99.99V			100.0V - 999.9V			1000V - 1500V			
	Voltage	00.00			000.0			0000			
	Voltage during M/S-serial operation	N x 0.01			N x 000.1			N x 0001			
	Current range in [A] for spec. below	0.000A - 9.999A	10.00A - 99.99A			100.0A - 999.9A			1000A - 99999A		
	Current	0.000	00.00			000.0			00000		
	Current during M/S-parallel operation	N x 0.001	N x 0.01			N x 000.1			N x 00001		



DEVICE FUNCTION

Device function	
OVP	<i>Over Voltage Protection: is adjustable between 0% and 120% of maximum voltage</i>
OCP	<i>Over Current Protection: is realised by the current setpoint. The output current can not go over the set output current</i>
OTP	<i>Over Temperature Protection: If the internal heat sink temperature is above 90°C the device will automatically shut down</i>
UVLO	<i>Under Voltage Lockout: The device shuts down the voltage falls below this value</i>
UI-MODE	<i>Operating mode: Voltage- and current-limited output</i>
UIP-MODE	<i>Operating mode: UI-MODE with additional power limit. Only for VP/HP</i>
UIR-MODE	<i>Operating mode: UI-MODE with adjustable internal resistance</i>
PV-SIM-MODE	<i>Simulation of a photovoltaic array. Only for VP/HP</i>
SLOPE-FUNCTION	<i>Adjustable rise time for current and voltage. Range-minimum 1A/s resp. 1V/s range-maximum is 30ms to V_{max} resp. I_{max}. Only for VP/HP</i>
AI-FILTER	<i>Adjustable moving average filter for set-values that are transmitted over the analog interface. The interval over which the average is calculated can be configured between 0s and 80s.</i>
t-ENABLE	<i>Adjustable operating time after pressing the start button (Standby). The operating time is configurable between 1s and ca. 18h. Only for VP/HP</i>



INTERFACES

Digital outputs (CV, Standby, Error)	Output type: Open collector with pull-up resistor 10kΩ after +5V Isinkmax: 50mA
Digital inputs (Ext. control, standby)	Input resistance: 47kΩ Maximum input voltage: 50V High level: Uin > 2V Low level: Uin < 0.8V
Analog output (Xmon)	Output resistance : 100 Ω Minimum permissible load resistance : 2k Ω Minimum load resistance for ± 0.1% accuracy: 100kΩ
Analog input (Xset)	Input resistance: 1M Ω Maximum permissible input voltage: 25V
Reference voltage	Reference voltage Uref: 10V ± 10mV Output resistance: < 10Ω
5V - supply voltage	Maximum output current: 10mA (not short-circuit-proof) Output voltage: 5V ± 300 mV Maximum output current: 50mA (not short-circuit-proof)
Set-Value accuracy (V/A) when using internal reference	± 0.5%
Response time	< 10ms
Signal inputs (RxD,CTS)	Maximum input voltage: ± 25V Input resistance: 5kΩ (Type)
Signal outputs (TxD,RTS)	Switching thresholds: UH < -3V, UL > +3V Output voltage (at RL > 3kΩ): min ± 5V, Type ± 9V, max ± 10V Output resistance: < 300Ω Short circuit current: Type ± 10mA
Maximum input voltage	± 5V
Input resistance	> 12 kΩ
Output current	± 60 mA Max
High level	Ud > 0.2V
Low level	Ud < -0.2V
Number of devices	up to 8
Maximum voltage	1000V
Maximum power standard device	VP/HP 504 kW
Maximum power custom device	1.4 MW



STANDARD SPECIFICATIONS

EMC and safety standards	
<i>Safety standard</i>	<i>EN 60950</i>
<i>Emission</i>	<i>EN 61000-6-4:2007</i>
<i>Immunity</i>	<i>EN 61000-6-2:2005</i>
<i>and laboratory equipment</i>	<i>EN 61010-1:2010</i>
Ambient conditions	
<i>Cooling method</i>	<i>Fans</i>
	<i>0 - 50°C</i>
	<i>-20°C - 70°C</i>
<i>Humidity</i>	<i>< 80 %</i>
<i>Operating height</i>	<i>< 2000 m</i>
<i>Vibration</i>	<i>10-55Hz / 1 min / 2G XYZ</i>
<i>Shock</i>	<i>< 20G</i>
<i>Protection class</i>	<i>IP 20</i>
	<i>II</i>
<i>Pollution degree</i>	<i>II</i>
Weight/Dimensions	
<i>VP/HP 3-7 kW</i>	<i>14 kg / 19" x 2 U x 440mm</i>
<i>VP/HP 10 kW</i>	<i>26 kg / 19" x 2 U x 600mm</i>
<i>VP/HP 15 kW</i>	<i>26 kg / 19" x 3 U x 620mm</i>
<i>VP/HP 21 kW</i>	<i>33 kg / 19" x 3 U x 620mm</i>
<i>VP/HP 28 kW</i>	<i>52 kg / 19" x 6 U x 620mm</i>
<i>VP/HP 35 kW</i>	<i>59 kg / 19" x 6 U x 620mm</i>
<i>VP/HP 42 kW</i>	<i>66 kg / 19" x 6 U x 620mm</i>
<i>VP/HP 49 kW</i>	<i>85 kg / 19" x 9 U x 620mm</i>
<i>VP/HP 56 kW</i>	<i>92 kg / 19" x 9 U x 620mm</i>
<i>VP/HP 63 kW</i>	<i>99 kg / 19" x 9 U x 620mm</i>
<i>Fan level</i>	<i>42-43 dB</i>

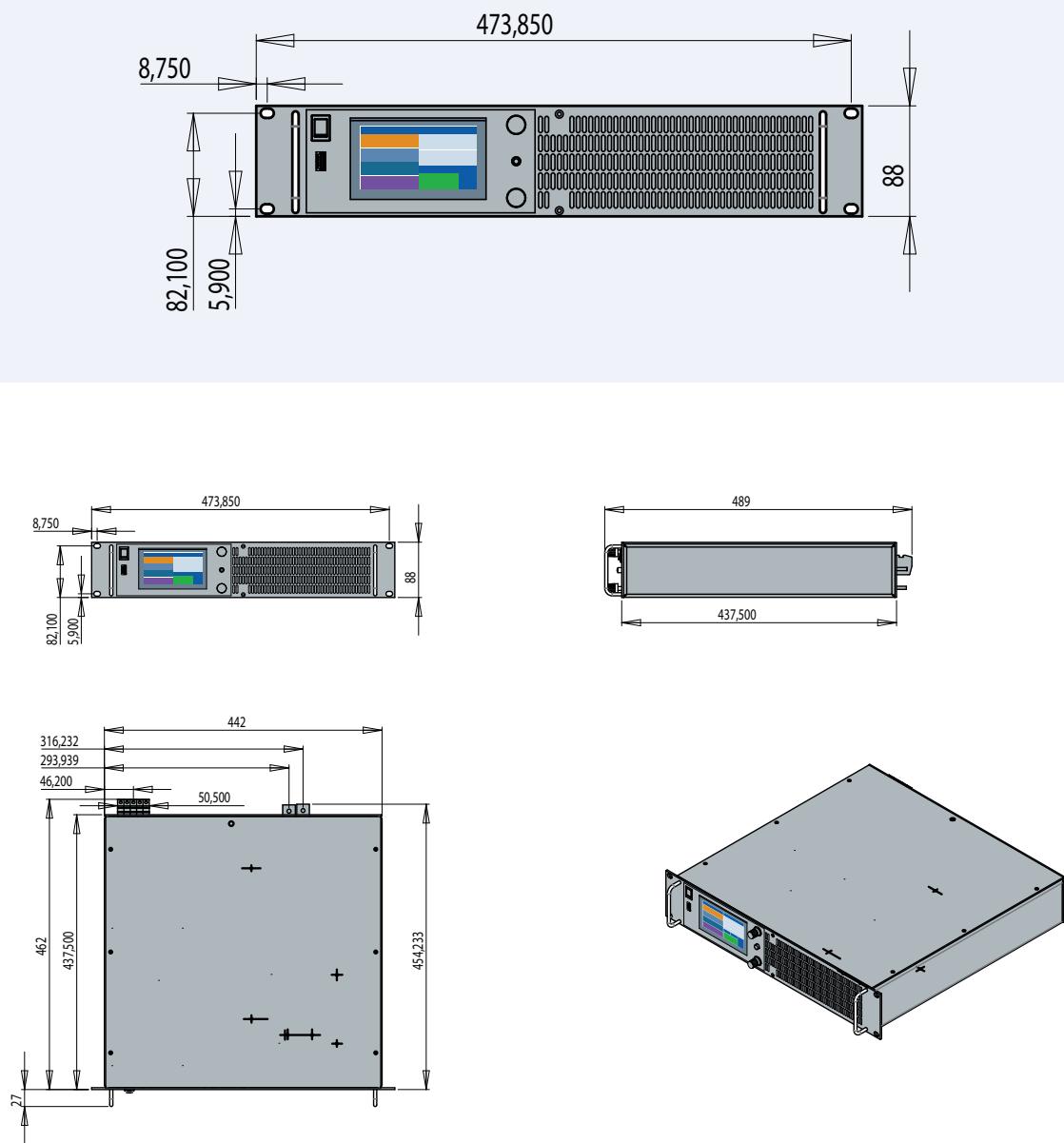


Your Power House
VPELECTRONIQUE

TECHNICAL DRAWINGS

Doc. IA-0032

► VP/HP 3 kW-7 kW 2 HE / U



All values in mm

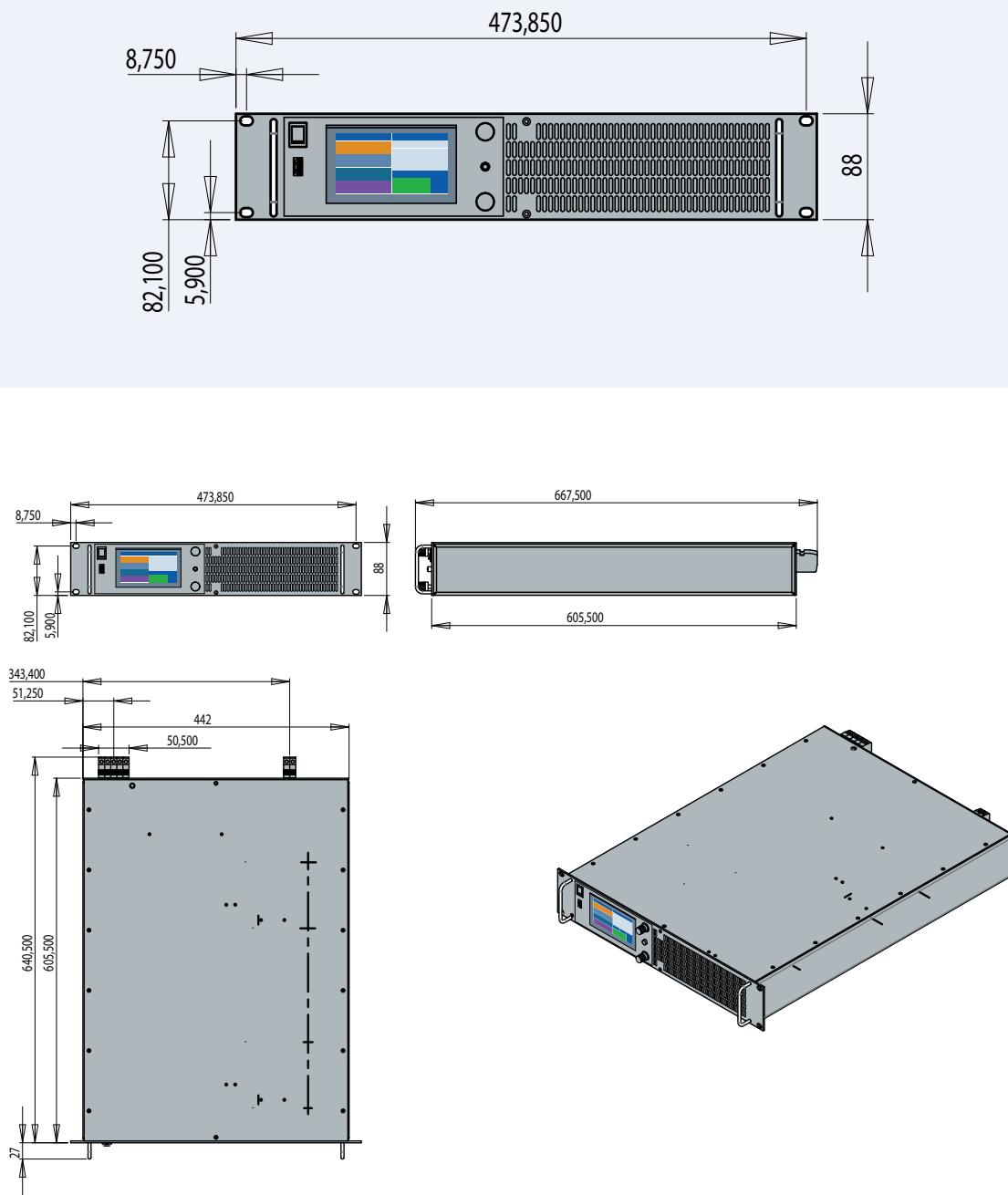


Your Power House
VPELECTRONIQUE

TECHNICAL DRAWINGS

Doc. IA-0032

► VP/HP 10 kW 2 HE / U



All values in mm

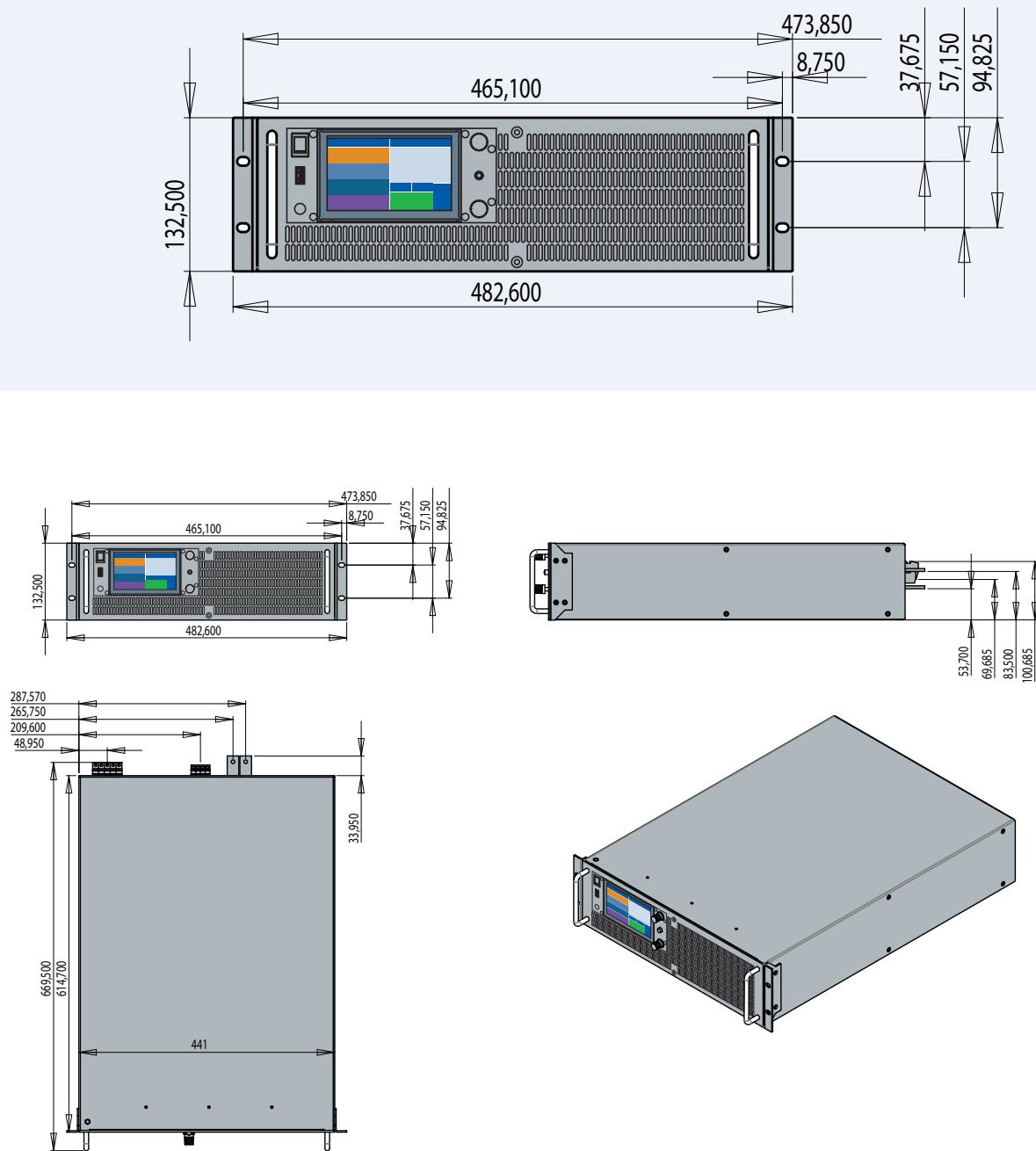


Your Power House
VPELECTRONIQUE

TECHNICAL DRAWINGS

Doc. IA-0032

► VP/HP 15 kW - 21 kW 3 HE / U



All values in mm

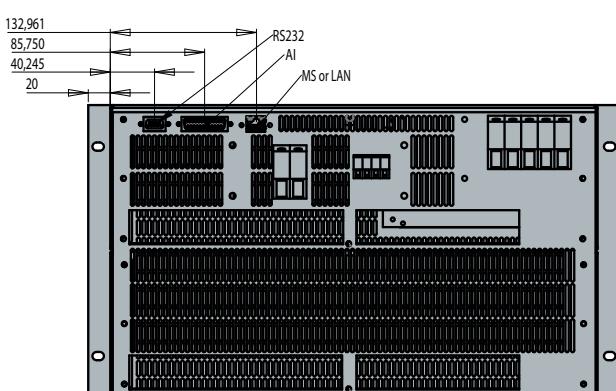
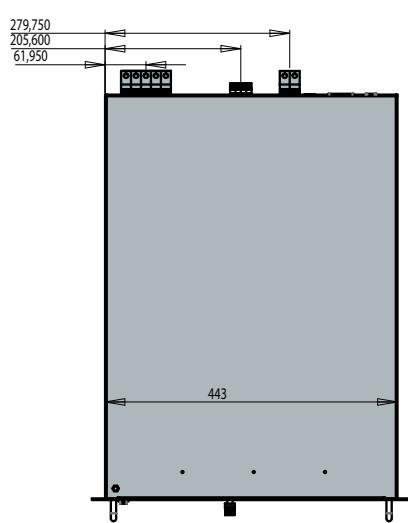
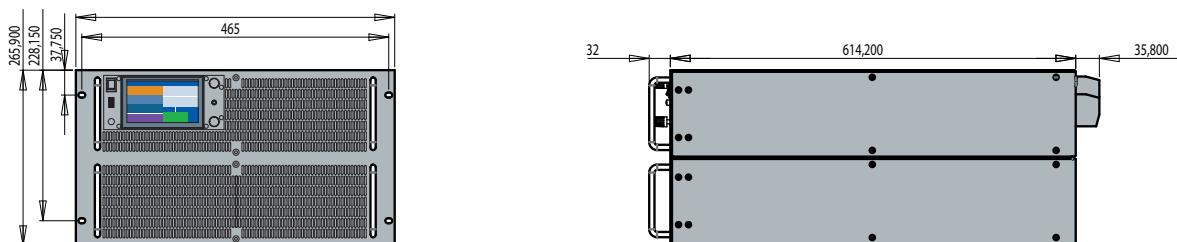
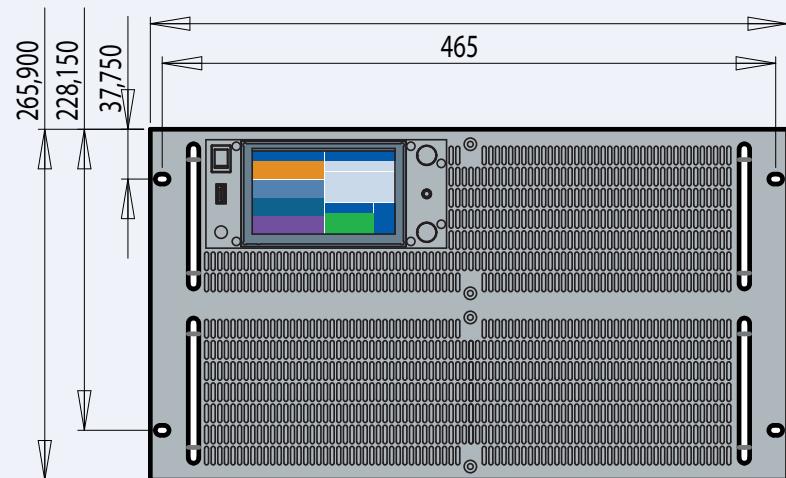


Your Power House
VPELECTRONIQUE

TECHNICAL DRAWINGS

Doc. IA-0032

► VP/HP 28 kW - 42 kW 6 HE / U



The exact position of the interface can be changed by the manufacturer due to different device parameters

All values in mm



TECHNICAL DRAWINGS

► VP/HP 49 kW - 63 kW 9 HE / U

