

OPUS HE 24-7.5 R12U F
 OPUS HE 48-10.0 R12U F
 OPUS HE 48-10.0 R12U P
 OPUS HE 60-10.0 R12U F
 OPUS HE 60-10.0 R12U P
 OPUS HE 110-10.0 R12U F
 OPUS HE 125-10.0 R12U F
 OPUS HE 220-10.0 R12U F



Product Description

OPUS HE power systems are robust, free convection cooled, N+1 redundant backup power solutions for critical infrastructure applications such as transmission and distribution substations, process industries, railway signalling and substations and telecommunications.

OPUS HE DC power systems consist of MHE rectifiers, VID+ controllers, Connections for mains and battery and load distribution MCB. System is configurable to match with requirements of the application.

19" 12U Rack delivers maximum 10 kW output power at 48, 60, 110, 125 and 220 VDC and 7.5 kW at 24 VDC output. 19" 12U Racks include slots for maximum 5 rectifier modules. Load distribution configuration of MCB quantity and current ratings can be configured per order. Wall mounting, IP21 cover kit, temperature sensor, battery block voltage monitoring and BLVD are options.

Features

- Efficiency up to 97%
- Convection cooling – no fans
- Outputs 24, 48, 60, 110, 125, 220 VDC
- 10.0 kW output power, 24VDC 7.5kW
- Configurable load distribution
- VID+ I/O controller, local and remote interfaces
12 x relays, Ethernet, Modbus, IEC61850, SNMP, RS-232
- Flexible design with full front cabling
- Options: Wall mounting and IP21 kit, BLVD contactor, battery block voltage monitoring
- Safety:
Rack: EN61439-1, EN61439-2
Low voltage switchgear controlgear assemblies
Rectifiers: EN 62368-1, EN 50124-1 rail
- EMC:
Rack: EN61439-1, EN61439-2
Rectifiers: EN 61000-6-1 / -2 / -3 / -4 / -5
EN 50121-4 rail, ETSI EN 300386 (48/60V)

Technical Specifications

General construction		Environment and standards	
Cooling	Natural convection	Temp. range	-25 ... +60°C, see derating, Start-up at -40°C
Protection	IP 20, Option IP21	Humidity max	95% relative humidity, non-condensing
Controller user interface	Display and local control in front panel	Altitude	Max 3km, full power up to 2km above sea level Derating 2% per 100 m between 2-3km
Connections	Behind front panel	Safety	Rack: EN61439-1, EN61439-2 Rectifiers: EN 62368-1, EN 50124-1 rail
Colour	Frame RAL 7024	EMC	Rack: EN61439-1, EN61439-2 Rectifiers: EN61000-6-1 / -2 / -3 / -4 Generic EN61000-6-5 Utility EN 50121-4 Rail, ETSI EN 300 386 (48/60V)
Dimensions & weight	Height 12U (533 mm) Width 19" (482 mm) Depth 395 mm Weight 20 kg w/o rectifiers		

AC Input	OPUS HE 24-7.5 R12U F	OPUS HE 48-10.0 R12U F/P	OPUS HE 60-10.0 R12U F/P	OPUS HE 110-10.0 R12U F	OPUS HE 125-10.0 R12U F	OPUS HE 220-10.0 R12U F
AC connection	TN-S system, 3W + N + PE, (3-phases, neutral and protective earth wires)					
Nominal input	220-240 VAC / 3 x 380-415 VAC (TN-S system) <i>Options: 1-phase supply 100-250VAC, 3-phase Delta/IT supply 3 x 173-250VAC</i>					
Input range	Max range: 85 – 300 VAC / 3 x 147–528 VAC Rated full power range: 180 – 275 VAC / 3 x 312–476 VAC (TN-S system) See derating curves below, 1200W per rectifier at 120VAC / 3 x 208VAC Temporary high voltage range 275 - 300VAC / 3 x 476 - 528VAC, continuous supply not recommended					
Input frequency	Rated 45 - 66 Hz, reduced power at 35 - 45 Hz. Shut down at 35 Hz					
Nominal current	16A @ 220/380V	22A @ 220/380VAC				
Maximum phase current	25A @ 85-130V	25A @ 85-180VAC				
Recommended mains fuse	3 x 25 A (TN-S)					
Main Switch	63A, 4-pole (L1-L2-L3-N)					
Rectifier input protection	MCB C16A / rectifier module					

DC Output	OPUS HE 24-7.5 R12U F	OPUS HE 48-10.0 R12U F/P	OPUS HE 60-10.0 R12U F/P	OPUS HE 110-10.0 R12U F	OPUS HE 125-10.0 R12U F	OPUS HE 220-10.0 R12U F
Grounding	2-pole, floating	1-pole, + grounded or 2-p floating		2-pole, floating		
Nominal voltage	24 VDC	48 VDC	60 VDC	108 VDC	120 VDC	216 VDC
Voltage factory setting	27.24 VDC	54.48 VDC	68.10 VDC	122.58 VDC	136.20 VDC	245.16 VDC
Voltage range	21-33 VDC	42-59 VDC	51-72 VDC	90-150 VDC	100-160 VDC	178-280 VDC
Quantity of rectifiers	Max 5 pcs					
Max current	312.5A @ 24V	208.5A @ 48V	166.7A @ 60V	92.5A @ 108V	83.3A @ 120V	46.3A @ 216V
Max Power	Max 7.5kW *)	Max 10kW	Max 10kW	Max 10kW	Max 10kW	Max 10kW
Static voltage regulation	± 2 % @ rack terminals (load, line, temp)			± 1 % @ rack terminals (load, line, temp)		
Rectifier output protection	MCB C63A	MCB C50A	MCB C40A	MCB C20A	MCB C20A	MCB C10A

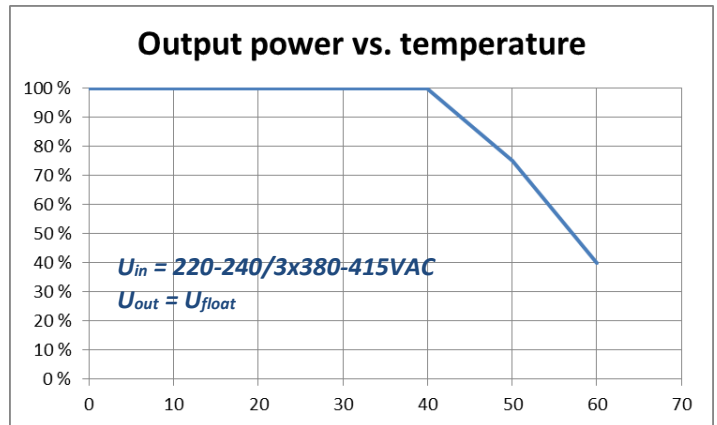
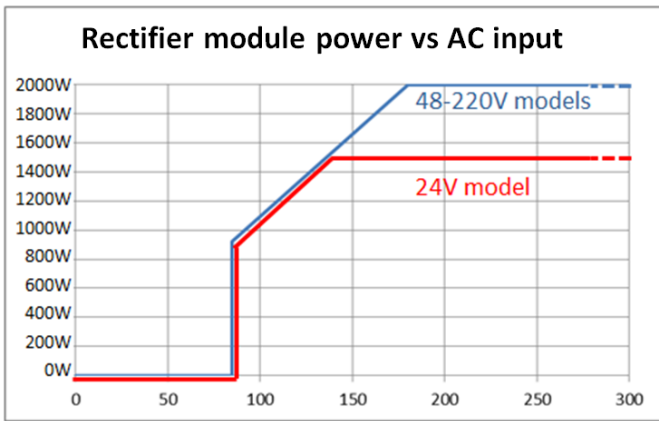
*) Battery MCB 250A, max battery current 250A

Battery connection	OPUS HE 24-7.5 R12U F	OPUS HE 48-10.0 R12U F/P	OPUS HE 60-10.0 R12U F/P	OPUS HE 110-10.0 R12U F	OPUS HE 125-10.0 R12U F	OPUS HE 220-10.0 R12U F
Protective device	MCB D250A 2-pole + aux	MCB D250A 2-pole + aux	MCB D200A 2-pole + aux	MCB D100A 2-pole + aux	MCB D100A 2-pole + aux	MCB D63A 2-pole + aux

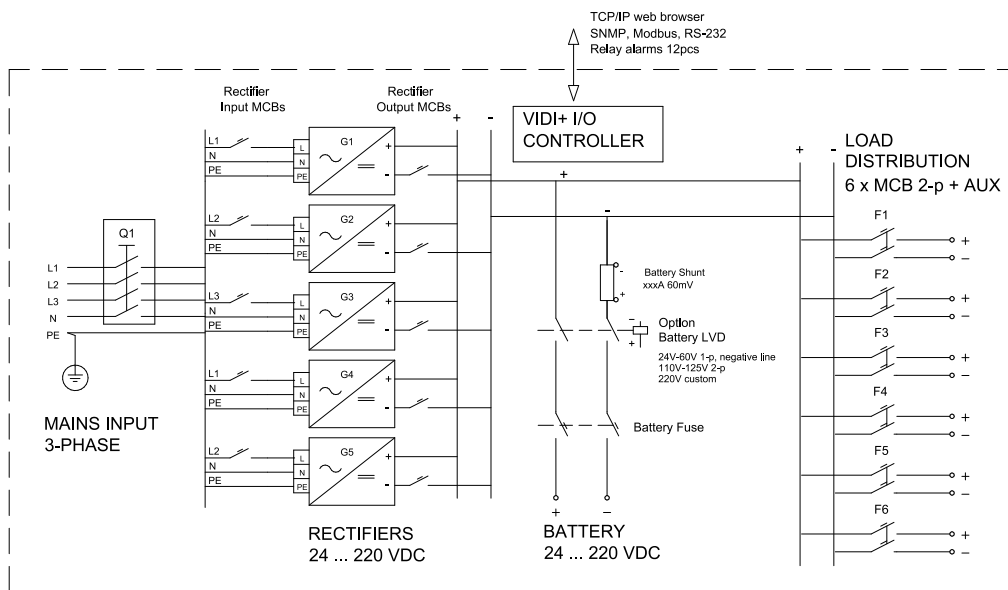
Load distribution	OPUS HE 24-7.5 R12U F	OPUS HE 48-10.0 R12U F/P	OPUS HE 60-10.0 R12U F/P	OPUS HE 110-10.0 R12U F	OPUS HE 125-10.0 R12U F	OPUS HE 220-10.0 R12U F
Protective device	Max 6 x MCB 2-p + aux, 2 A to 63 A	P: Max 10 x MCB 1-pole + aux F: max 6 x MCB 2-pole + aux 2A to 63A		Max 6 x MCB 2-pole + aux 2A to 63A		

Connection terminals	
Mains terminal	Q1 Main switch terminal blocks 10 mm ² , L1-L2-L3-N-PE
DC output	MCB screw terminals, 1.5mm ² ... 25 mm ² flexible cable, 1.5mm ² ... 35 mm ² rigid cable
Battery	MCB screw terminals, 1.5...35 mm ² flexible cable, 1...50 mm ² rigid cable
Alarms, Inputs	Configurable relay alarms 4 pcs (option up to 12), Spring terminals 0.75mm ² ... 1.5mm ² cable Configurable alarm/temp. inputs 4 pcs (option up to 12), Spring terminals 0.75mm ² ... 1.5mm ² cable

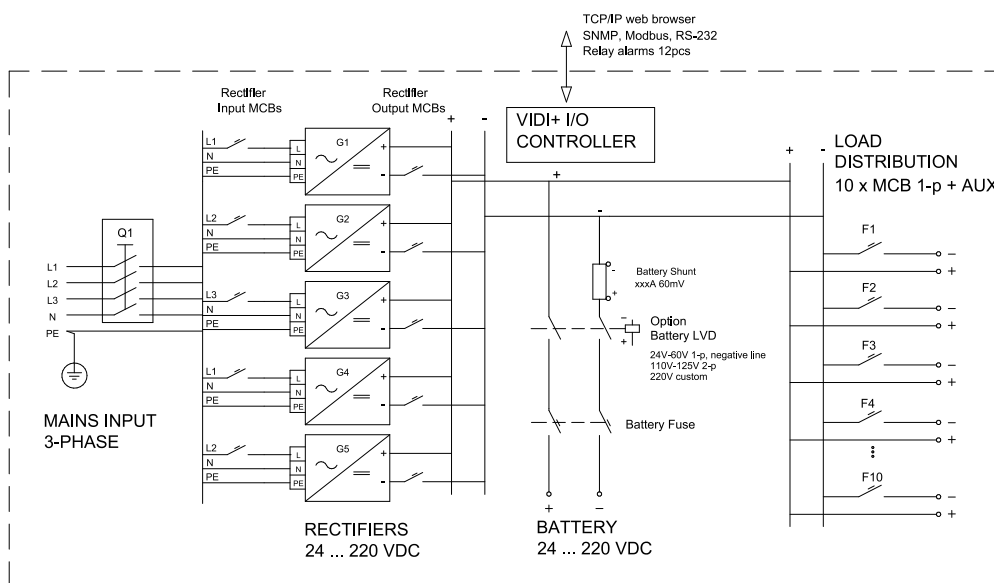
Derating curves



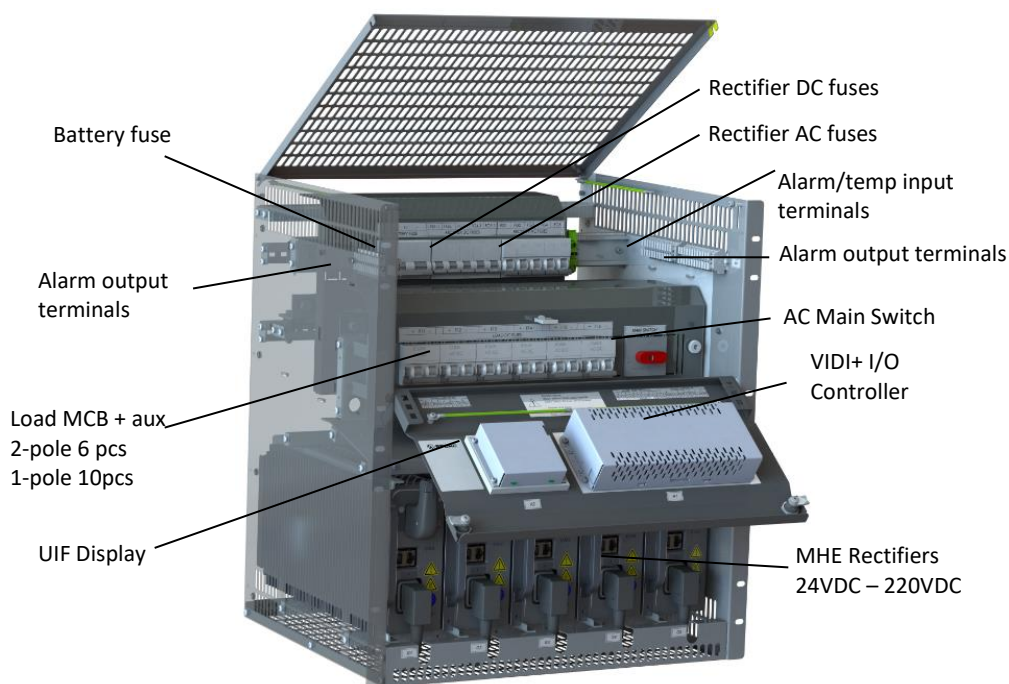
Block Diagram, 2-pole floating systems



Block Diagram, 1-pole systems, positive pole grounded , option negative pole grounded

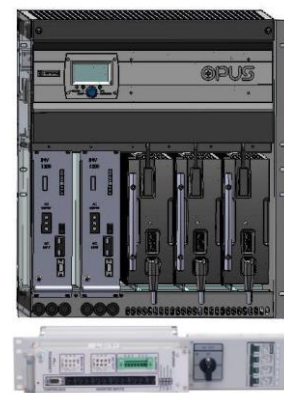


Layout drawings



Option:

Modular UPS rack 19" 12U
3 x Rectifier
2 x Inverter
Bypass & Manual bypass



Order Information

Systems, Description	Order number	Voltage / Current	Rectifiers	Order number
OPUS HE 24-7.5 R12U F	9220X0015094	24VDC / 62.5A – 312.5A	MHE24-1500	92I280
OPUS HE 48-10.0 R12U F	9220X0015102	48VDC / 41.7A – 208.5A	MHE48-2000	92I160
OPUS HE 48-10.0 R12U P	9220X0015095	48VDC / 41.7A – 208.5A	MHE48-2000	92I160
OPUS HE 60-10.0 R12U F	9220X0015103	60VDC / 33.3A – 166.7A	MHE60-2000	92I290
OPUS HE 60-10.0 R12U P	9220X0015096	60VDC / 33.3A – 166.7A	MHE60-2000	92I290
OPUS HE 110-10.0 R12U F	9220X0015097	110V / 18.5A – 92.5A	MHE110-2000	92I250
OPUS HE 125-10.0 R12U F	9220X0015098	125V / 16.7A – 83.3A	MHE125-2000	92I260
OPUS HE 220-10.0 R12U F	9220X0015099	220V / 9,3A – 46,3A	MHE220-2000	92I270

Controllers, Description	Order number	Options, Description	Order number
VIDI+ I/O System controller	94G910	VIDI-BM Block voltage monitoring	9040X0002338

Options, Description	Order number	Options, Description	Order number
Temperature Sensor	94M268	Battery LVD 200A 24V 1-P R 12U	94M434
Wall mounting and IP21 kit	8320X0002080	Battery LVD 48/60V 200A R 12U	8160X0011789
		Battery LVD 110/125V 100A R	8160X0000006

2-pole MCB	Order number	1-pole MCB	Order number
C2A 2-p, Schneider C60H-DC	5540X0009012	C2A 1-p, Schneider iC60N	5540X0009683
C4A 2-p, Schneider C60H-DC	5540X0009014	C4A 1-p, Schneider iC60N	5540X0009684
C6A 2-p, Schneider C60H-DC	5540X0009016	C6A 1-p, Schneider iC60N	5540X0009685
C10A 2-p, Schneider C60H-DC	5540X0009017	C10A 1-p, Schneider iC60N	5540X0009686
C16A 2-p, Schneider C60H-DC	5540X0009020	C16A 1-p, Schneider iC60N	5540X0009687
C20A 2-p, Schneider C60H-DC	5540X0009021	C20A 1-p, Schneider iC60N	5540X0009688
C25A 2-p, Schneider C60H-DC	5540X0009023	C25A 1-p, Schneider iC60N	5540X0009689
C32A 2-p, Schneider C60H-DC	5540X0009025	C32A 1-p, Schneider iC60N	5540X0009690
C40A 2-p, Schneider C60H-DC	5540X0009026	C40A 1-p, Schneider iC60N	5540X0009691
C50A 2-p, Schneider C60H-DC	5540X0009027	C50A 1-p, Schneider iC60N	5540X0009692
C63A 2-p, Schneider C60H-DC	5540X0009028	C63A 1-p, Schneider iC60N	5540X0009693

Fuse monitoring	Order number	Fuse monitoring	Order number
Auxiliary contact, C60H-DC	5760X0008930	Auxiliary contact, iC60N series	5760X0009731

MHE 24-1500
MHE 48-2000
MHE 60-2000
MHE 110-2000
MHE 125-2000
MHE 220-2000

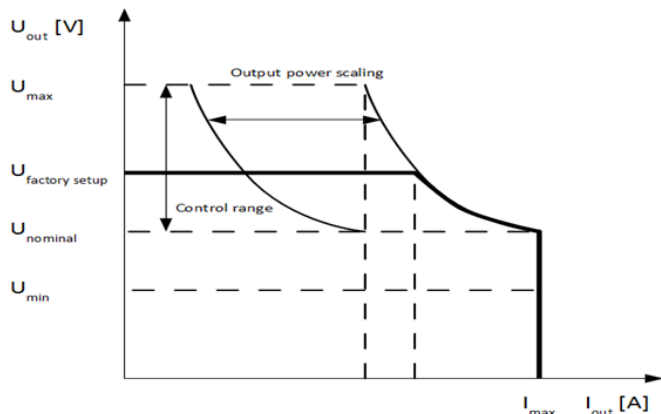


Product Description

The MHE rectifier utilizes Enedo's long experience and latest technology on high performance industrial power supplies. On top of generic IEC and UL/CSA certifications MHE rectifiers are certified for rail and metro system applications. Rectifiers meet demanding requirements of utility, industrial, rail and telecom applications with modern high efficiency modular technology.

MHE rectifiers are convection cooled and requires no fans. Rated output power is 2000 W in 48 V – 220 V output versions and 1500 W in 24 V version. Rectifier input is single phase, range 85-300 VAC.

Rectifiers can be operated either with a VIDi+ system controller or as stand-alone modules with or without batteries in the output.



Features

- Efficiency up to 97 %
- Convection cooled – No Fans
- MTBF 1 800 000 h @ 25°C, Telcordia SR-332
- Output models 24, 48, 60, 110, 125, 220 VDC
- 2000 W output power, 24 VDC 1500 W
- Lacquered PCB for rail and metro applications
- Nominal Input voltage 100-250 VAC, range 85-300 VAC
- Soft-start generator input feature
- Active load current sharing
- Internal over temperature protection
- Digital communication over CAN bus with VIDi controller
- Flexible design with full front cabling
- EMC:
 - Generic EN 61000-6 -1 / -2 / -3 / -4
 - Power Utility EN61000-6-5, surge level 2
 - Railway EN 50121-4 / -5 (signaling & substation)
 - Telecom ETSI EN 300386
- Safety:
 - EN/IEC/UL/CSA 62368-1
 - EN 50124-1 Railway insulation coordination

Technical Specifications

AC Input	MHE 24-1500	MHE 48-2000	MHE 60-2000	MHE 110-2000	MHE 125-2000	MHE 220-2000
Input voltage	Nominal 100VAC - 250VAC					
Input range	Max range 85 – 300 VAC Rated full power range: 48-220V models 180VAC – 275VAC, 24V models 140-275VAC See derating curves at page 3, 1200W power available at nominal 120VAC input Temporary high voltage range 275-300VAC, continuous supply voltage above 275VAC not recommended					
Start-up / shut down limits	Start-up voltage 90VAC / Shut down at 85 VAC Shut down over voltage limit 300VAC / re-start at 290VAC					
Input frequency	Rated 45 - 66 Hz, reduced power at 35 - 45 Hz. Shut down at 35 Hz					
Maximum current	12.5A @ U _{in} 85-130V	12.5A @ U _{in} 85-180V	12.5A @ U _{in} 85-180V	12.5A @ U _{in} 85-180V	12.5A @ U _{in} 85-180V	12.5A @ U _{in} 85-180V
Max current at U _{nom} 220VAC	8 A	11 A	11 A	11 A	11 A	11 A
Inrush current	ETS 300 132-1, Active limitation typical <20A					
Power factor (typical)	>0.99 at 85-275VAC input					
THD (typical)	< 5% @ 100%, < 9% @ 50% at 85-275VAC input					
Input protection	External MCB 16A C-curve (24V C10A or C16A), Internal varistor and gas discharge tube for transient surge protection, Automatic shut-off above 300 VAC (restart at 290 VAC)					
Generator start-up ramp	7 seconds ramp from 200W to full 2kW controlled by Input power, used with generator input supply (User programmable feature, enable/disable, default disable)					
Start-up delay	Default start-up time approx. 5 sec, User Programmable additional delay 0-120s (+15% / 0%).					

DC Output	MHE 24-1500	MHE 48-2000	MHE 60-2000	MHE 110-2000	MHE 125-2000	MHE 220-2000
Voltage range	21-33 VDC	42-59 VDC	51-72 VDC	90-150 VDC	100-160 VDC	178-280 VDC
Voltage factory setting	27.24 VDC	54.48 VDC	68.10 VDC	122.58 VDC	136.20 VDC	245.16 VDC
Maximum current @ nominal output	62.5 A @ 24 V	41.7 A @ 48 V	33.3 A @ 60 V	18.5 A @ 108 V	16.7 A @ 120 V	9.3 A @ 216 V
Constant output power	1500 W	2000 W				
Current limit	< 65 A	< 45 A	< 35 A	< 20 A	< 20 A	< 10 A
Type of Current limit	MHE rectifier supplies constant short circuit current 500sec, then hiccup mode in 500sec cycles					
Hold-up time	> 20 ms at 80% load, output voltage reduces from float voltage to nominal					
Static voltage regulation	± 0.5 % (load, line, temperature)					
Dynamic load regulation	± 5.0 % for 10%-90% or 90%-10% load step, recovery time < 2.0 ms					
Ripple and noise	< 50 mVp-p	< 100 mVp-p	< 115 mVp-p	< 225 mVp-p	< 250 mVp-p	< 450 mVp-p
Output protection	Output overvoltage shutdown Power limiting & shutdown based on: temperature, input voltage and frequency, derating curves page 3					

Features	MHE 24-1500	MHE 48-2000	MHE 60-2000	MHE 110-2000	MHE 125-2000	MHE 220-2000
Efficiency, typical 30-70% load, V _{in} 230VAC	> 95 %	> 96 %	> 96 %	> 96 %	> 96%	> 95%
MTBF, calculated	> 1 800 000 h @ 25°C, Telcordia SR-332, Method I-D, Ground Fixed uncontrolled environment					
Dielectric strength, type test	Input – GND (basic), 2 kVAC or 2.83 kVDC, 1 min Input - Output (reinforced) 3.75kVac or 5.3 kVDC, 1 min Output – GND (basic) 2 kVAC or 2.83 kVDC, 1 min					
Load current share	± 5 % from true average current between the modules (>50% load, controlled by VID1)					
Alarms	Mains fault alarm, Low output voltage alarm, Overvoltage shutdown alarm, Rectifier alarm, Temperature Alarm, Totally +40 configurable system alarms via VID1 controller					

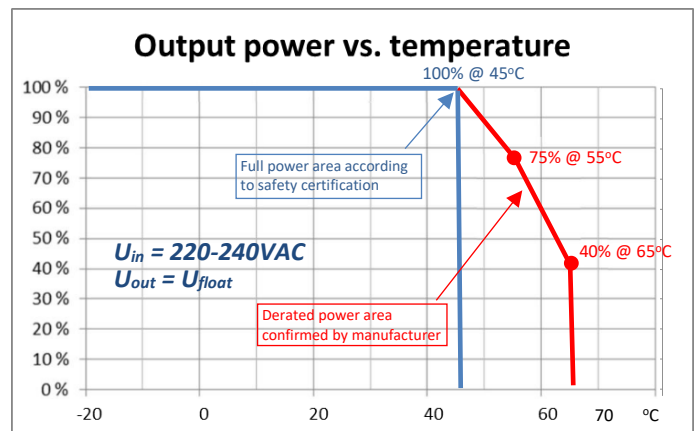
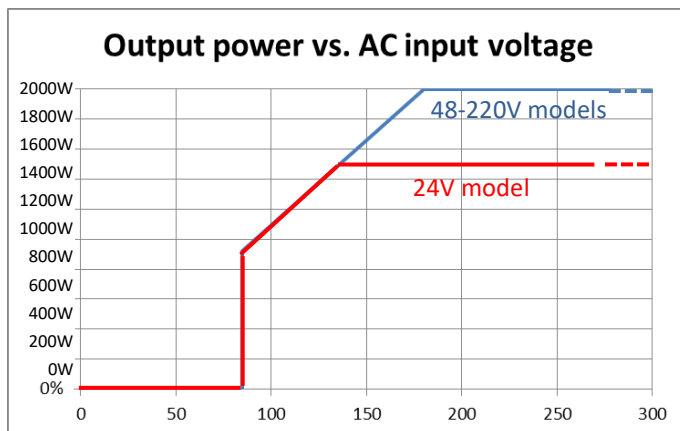
Dimensions (HxWxD)	169 x 83 x 357
	mm, see drawing
Weight	4.6 kg
Protection class, IEC 60529	IP20 when counter-connector in place, DC connector IP10 without counter-connector

Connections	
Connector, AC	Appliance inlet IEC 60320-1, C20 style, 16 A male
Connector, DC	Phoenix terminal PC 5/ 4-G-7.62, 4 x 4mm ² (+ + - -)
Connector, PowerCAN	2 pcs RJ-45

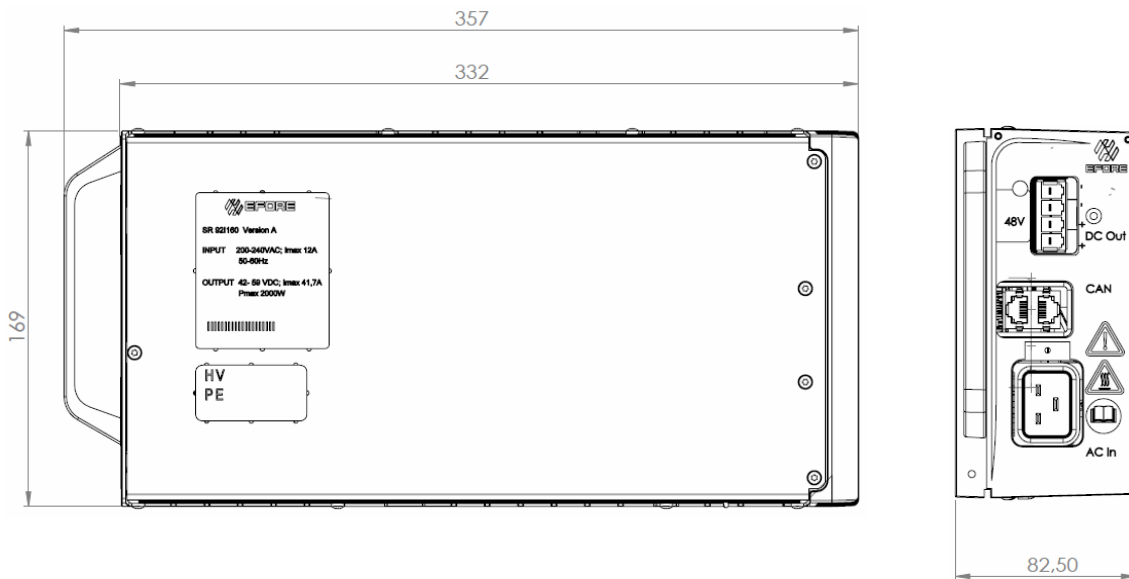
Environmental	
Cooling	Natural convection
Acoustic noise	< 40 dB
Operating temperature	Full power according to Safety Certification -25°C ... +45°C, Start-up at -40°C Derated power at +45°C ... +65°C, max 40% power at 65°C, see curve below
Storage temperature	-40 °C ... +85 °C
Environmental protection	Lacquered PCB
Humidity	95 % relative humidity, non-condensing
Altitude according to EN 62368-1	Full power: 2000 m (6500 feet) above sea level De-rating -2% / 100m above 2000m, max altitude 5000m

Applicable Standards	
EMC	Generic IEC61000-6-1, IEC61000-6-2, IEC61000-6-3, IEC61000-6-4 Power Utility immunity EN61000-6-5, surge level 2, 2kV line to ground Railway EN 50121-4 signaling systems, EN50121-5 substation environment Telecom ETSI EN 300 386
Safety	EN 62368-1:2014+A11:2017, UL 62368-1 2nd Ed. CAN/CSA C22.2 NO. 62368-1-14 Railway EN 50124-1, Indoor use, Not connected to contact line, Pollution degree 2, Overvoltage category 2
Environment	Operation: ETS 300 019-2-3 cl T3.2 Storage: ETS 300 019-2-1 cl T1.2
Certifications	CE Declaration of Conformity CB Certificate, CB test report UL 62368-1 and CAN/CSA C22.2 NO. 62368-1-14 Certificate & Listing report TÜV Rail and metro system certification: 50121-4/-5, EN 50124-1
Quality	Manufacturing and design conform to ISO 9001, ISO 14001

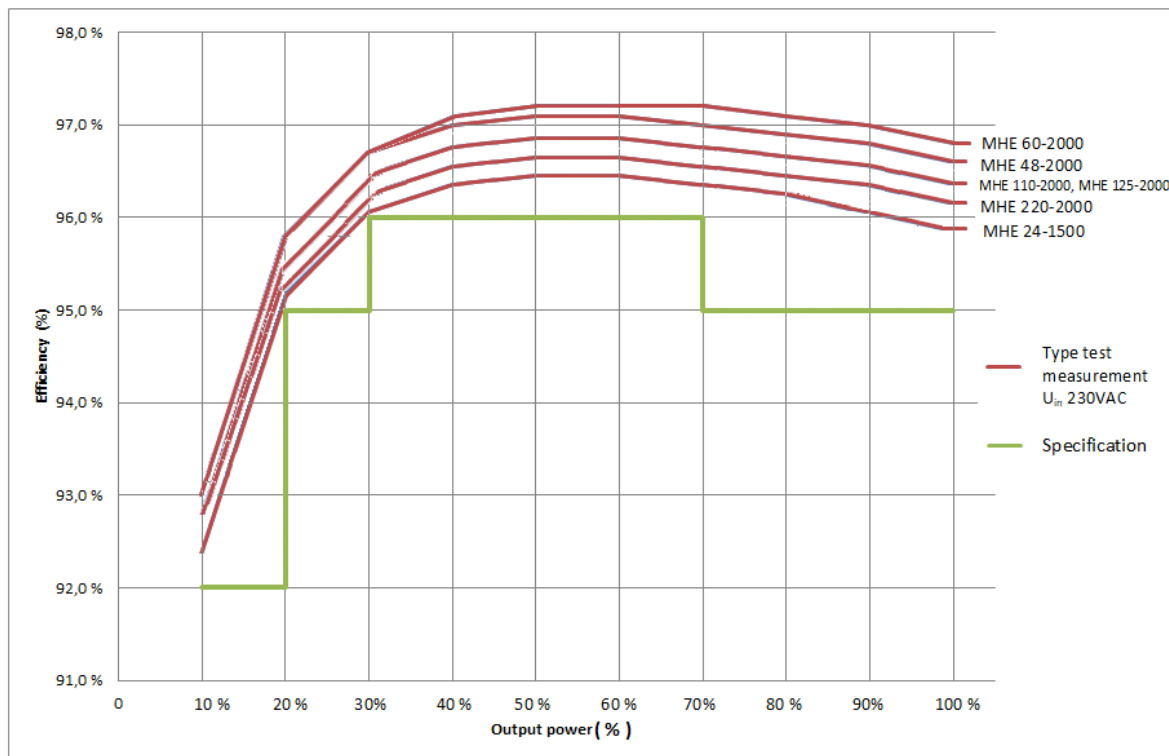
Derating curves



Main dimensions



Efficiency curves



Order Information

Description	Order number	Voltage / Current
MHE 24-1500	921280	24VDC / 62.5A
MHE 48-2000	921160	48VDC / 41.7A
MHE 60-2000	921290	60VDC / 33.3A
MHE 110-2000	921250	110VDC / 18.5A
MHE 125-2000	921260	125VDC / 16.7A
MHE 220-2000	921270	220VDC / 9.3A