

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

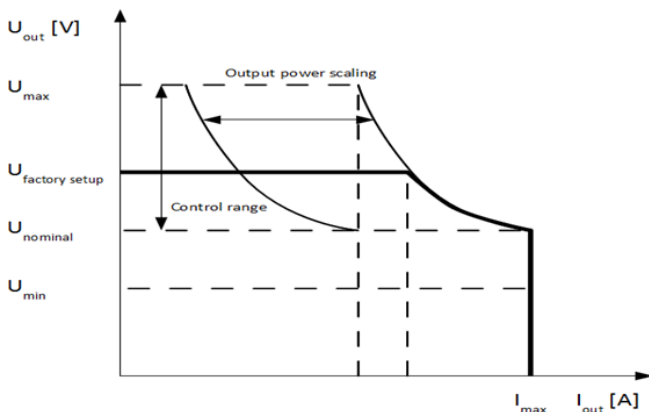


## Product Description

The MHE rectifier utilizes Efore’s long experience and latest technology on high performance industrial power supplies. MHE rectifiers are designed to meet demanding requirements of utility, industrial, rail and telecom applications with high efficiency and reliability requirements.

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
- Constant output power characteristics
- 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 Efore VIDI controller
- Flexible design with full front cabling
- EMC:
  - Generic EN 61000-6-1 / -2 / -3 / -4
  - Power Utility EN61000-6-5
  - Railway EN 50121-4
  - Telecom ETSI EN 300 386, ETSI EN 300 132-2
- Safety:
  - EN/IEC/UL 62368-1 (EN/IEC/UL 60950-1)
  - 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, rated full power range 180VAC – 275VAC					
Input range	Full range 85 – 300 VAC: Reduced output power 85-180VAC, linear derating, 920W @ 85 VAC , see curve page 3 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					
Reduced output power	85 – 180 VAC, Linear derating, 920W @ 85 VAC					
Input frequency	Rated 45 - 66 Hz, reduced power at 35 - 45 Hz. Shut down at 35 Hz					
Maximum current	9 A	12 A	12 A	12 A	12 A	12 A
Inrush current	Active limitation <20A, ETS 300 132-1					
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, 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 feature	User Programmable start-up delay 0-120sec, default 0sec					

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				
Short circuit current	< 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	Overvoltage shutdown Power limiting from temperature, under frequency, over voltage and under voltage Internal over temperature protection					

Features	MHE 24-1500	MHE 48-2000	MHE 60-2000	MHE 110-2000	MHE 125-2000	MHE 220-2000
Efficiency, typical 35-80% load, V <sub>in</sub> 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					
Visual Indications	LED: Green/Red/Yellow, see the rectifier user manual for more details					
Energy saving mode	See Efore VID1 controller manual					



Efore Plc  
P.O. Box 260 (Linnoitustie 4B), 02601 Espoo, FINLAND  
Tel. +358 9 478 466, Fax +358 9 4784 6500  
info@efore.com

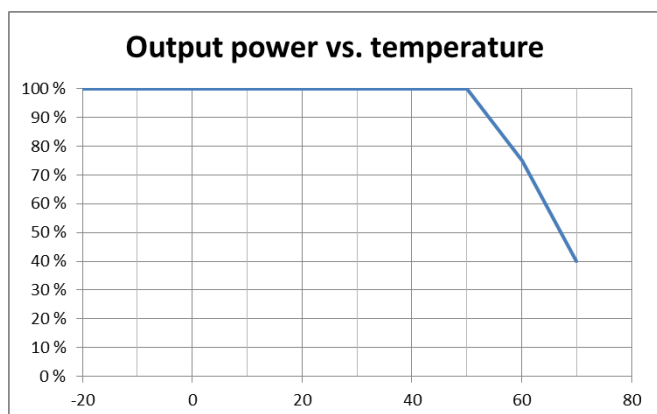
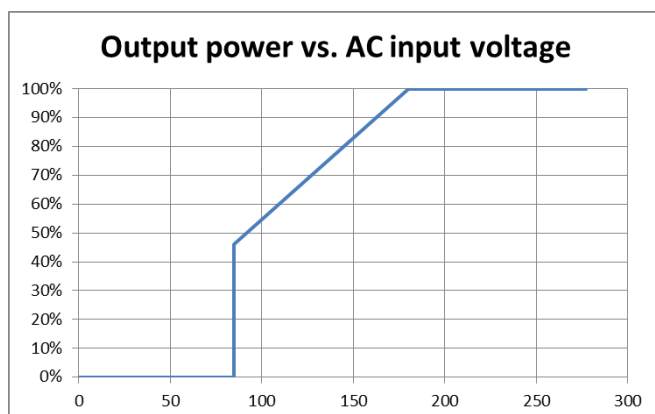
<b>Mechanical</b>		<b>MHE 24-1500, MHE 48-2000, MHE 60-2000, MHE 110-2000, MHE 125-2000, MHE 220-2000</b>
Dimensions (HxWxD)	169 x 83 x 357 mm (6.7 x 3.3 x 14.1 inch), see drawing	
Weight	3.80 kg (8.4 lbs)	
Protection class	IP20 / IEC 60529	

<b>Connections</b>		<b>MHE 24-1500, MHE 48-2000, MHE 60-2000, MHE 110-2000, MHE 125-2000, MHE 220-2000</b>
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 <sup>2</sup> (+ + - - )	
Connector, PowerCAN	2 pcs RJ-45	

<b>Environmental</b>	
Cooling	Natural convection
Acoustic noise	< 40 dB
Operating temperature	Full power: -25 / +50°C. Derating: from +50°C to +70°C, 40% available at 70°C, see curve Start-up at -40°C
Storage temperature	-40 / +85 °C
Humidity	95 % (relative humidity, non-condensing)
Altitude (max)	Full power: 2000 m (6500 feet) above sea level Reduced power: 3000 m (9800 feet) above sea level, 1% derating per 100m.

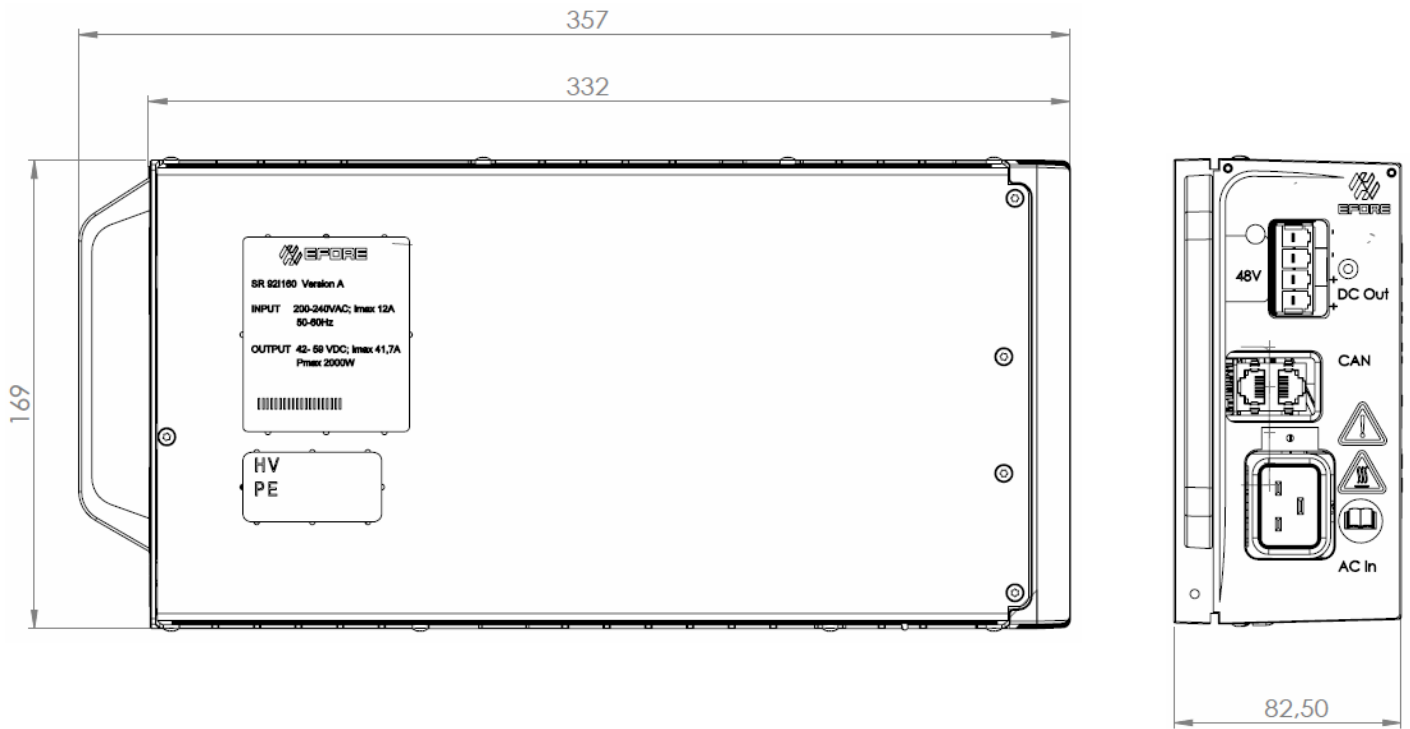
<b>Applicable Standards</b>	
EMC	Generic IEC61000-6-1, IEC61000-6-2, IEC61000-6-3, IEC61000-6-4 Power Utility immunity EN61000-6-5 Telecom ETSI EN 300 386, ETSI EN 300 132-2 (48/60V) Railway EN 50121-4
Environment	Operation: ETS 300 019-2-3 cl T3.2 Storage: ETS 300 019-2-1 cl T1.2 Transportation: ETS 300 019-2-2 cl T2.3
Safety	EN/IEC/UL 62368-1 (EN/IEC/UL 60950-1) EN 50124-1 (Railway, not connected to contact line)
Approvals	CE CB pending, UL pending, EAC pending
Quality	Manufacture and design conform to ISO 9001, ISO 14001

## Derating curves



Efore Plc  
P.O. Box 260 (Linnoitustie 4B), 02601 Espoo, FINLAND  
Tel. +358 9 478 466, Fax +358 9 4784 6500  
info@efore.com

# Main dimensions



## Order Information

Description	Order number
MHE 24-1500	921280
MHE 48-2000	921160
MHE 60-2000	921290
MHE 110-2000	921250
MHE 125-2000	921260
MHE 220-2000	921270

EFORE may change product specifications and accordingly the information presented in this document. Customers are responsible for their products and applications using EFORE products. EFORE assumes no liability from the use of its products outside of specifications. No license is granted to any intellectual property rights by this document. EFORE DISCLAIMS ALL REPRESENTATIONS AND WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.



Efore Plc  
 P.O. Box 260 (Linnoitustie 4B), 02601 Espoo, FINLAND  
 Tel. +358 9 478 466, Fax +358 9 4784 6500  
 info@efore.com