

# PROTECT MIP

## MODULAR SWITCH-MODE INDUSTRIAL APPLICATIONS RECTIFIER

### Input:

220/230/240 VAC 1 phase  
380/400/415 VAC 3 phase

### Output:

24 VDC; 50 – 900 A  
48 VDC; 40 – 720 A  
110 VDC; 15 – 270 A  
220 VDC; 8 – 144 A



AEG Power Solutions rectifiers assure permanent availability of all your global industrial applications including oil, gas & petrochemical, power generation, transportation and other infrastructures.

State of the art switch mode technology, N+1 redundant Protect MIP rectifier system is designed to be scalable, simple to use and via hot swappable rectifier modules easy to maintain. It allows you to benefit from low electromagnetic pollution and high efficiency, resulting in a cost effective system with reduced operating costs, short delivery time and prepared for possible future power expansion.

### Application and operating principle

Provides permanent DC power availability in combination with a parallel battery. Supplying a full range of DC consumers including constant voltage and current sources. The Protect MIP rectifier module can charge a wide variety of batteries, including: vented lead acid, valve regulated lead-acid (VRLA) or nickel-cadmium batteries (NiCd). The Protect MIP rectifier can furthermore be used as a direct power supply without batteries.

### Features & Benefits

- » Compact design and light weight
- » High power density
- » Sinusoidal input current and low harmonics to reduce installations and operating costs
- » High efficiency to reduce operating costs
- » High availability with N+1 internal redundancy
- » Low MTTR due to modular design
- » Low voltage ripple to prolong battery life time
- » Reliable operation due to advance protection (input, output, temperature, current, power) and high MTBF
- » Flexibility of scalable power
- » Control and alarm functions for remote management
- » Simplicity of use
- » Easy maintenance

# 3 RECTIFIER SYSTEM

SPECIFICATION

INPUT					
Nominal input voltage	230 VAC ±20 % 1 phase	230 VAC ±20 % 1 phase or 400 VAC ±10 % 3 phase			
Frequency	50 Hz or 60 Hz, ±5 %				
Current consumption	7.5 A	Depends on configuration			
Inrush current	1.5 nominal peak current				
THDI	<5 %				
Power factor	0.99				
OUTPUT					
Output voltage	24 V	24 V	30 V	48 V	120 V
Maximum output current	50 A	100 A	90 A	80 A	45 A
Voltage range	17 – 29 V	17 – 29 V	19 – 32 V	34 – 58 V	84 – 145 V
Commissioning voltage	33 V	33 V	37 V	66 V	166 V
System earth	Floating				
Internal redundancy	Redundancy in rectifier modules N+1 possible				
MANAGEMENT					
Common alarm connection	1 Form C relay contact – Rating 60 VAC @ 2 A, 24 VDC @ 2 A & 60 VDC @ 0.1 A				
Control panel	Multi-functional LCD with 2 LEDs indicate the system status				
PROTECTION					
Input/Battery/Load	Built-in mains input switch				
Protection	The rectifier has built-in protection functions against short circuit , over and under AC input voltage, over and under DC output voltage as well as high temperature				
MECHANICAL					
Degree of protection	IP21 according to IEC 60529				
Equipment colour	RAL 7035, powder coated, textured paint				
Dimensions & weight	932 x 432 x 425 mm (H x W x D), approx. 60 kg without batteries				
Acoustic noise @ 1 m	<55 dBA				
Battery compartment	Yes, include battery tray	Prepared for external battery connection			
Connections	Bottom or top				
ENVIRONMENTAL					
Type of cooling	Rectifiers are forced air cooling with electronic speed control				
Operating temperature	0 °C to +40 °C with a de-rating of 1.25 % / °C between 40 °C and 55 °C				
Storage temperature	-25 °C to +70 °C				
Operating humidity	10 % to 95 % RH non-condensing				
Installation height	0 to 1000 m – de-rating @ 1 % per 100 m above 1000 m up to 3000 m				
STANDARDS					
Safety	EN 60950-1				
EMC	EN 55022 Level B, EN 61000.6-1,2,3,4, EN 61000.3-2, EN 61000.3-3, EN21000, IEC 60146-1-1 Class B 2kV				
Environment	ROHS				
Approvals & Certification	CE				

## Standard system

The 3-rectifier system has been pre-configured with a number of the most commonly requested features built-in as standard.

- » Single system
- » Internal mains rectifier input switch Q1
- » Rectifier modules PM2000
- » Digital control card & LCD display
- » Tropicalized control electronics boards
- » Common fault remote alarm

- » Cabinet colour RAL 7035 with protection IP21
- » Power and control cable marking
- » Battery temperature sensor
- » Battery tray for NiCd SBLe 7.5/15/30, SBM 15/30,UP1M24/30 batteries – ONLY 24 V 50 A
- » Support for NiCd, lead acid batteries as well as prepared for external battery connection mBAT1 & 2
- » Bottom or top cable entry
- » Input/battery/output terminals
- » Standard labeling

## Options

- » Option 10 – Communication interface RS232 & RS485
- » Option 11 – Max 4 load mcb's 10 A–B; without aux contacts, no terminals
- » Option 12 – Relay card (8 contacts) wired to terminals with predefined alarms
- » Option 20 – Matching battery cabinet mBAT1
- » Option 21 – Matching battery cabinet mBAT2

# CONFIGURED RECTIFIER SYSTEM

SPECIFICATION

System	24 V	30 V	48 V	110 V	220 V
<b>INPUT</b>					
Nominal input voltage	230 V $\pm 20\%$ (+20 % -60 % functional) or 400 V $\pm 10\%$ (+15 % -20 % functional)				
Frequency	50 Hz or 60 Hz, $\pm 5\%$				
Current consumption	Depends on configuration				
Inrush current	1.5 nominal peak current				
THDI	<5 %				
Power factor	0.99				
<b>OUTPUT</b>					
Output voltage	24 V	30 V	48 V	110 V	220 V
Maximum output current	900 A	810 A	720 A	270 A	144 A
Voltage range	17 – 29 V	19 – 32 V	34 – 58 V	84 – 145 V	155 – 260 V
Commissioning voltage	33 V	37 V	66 V	166 V	302 V
System earth	Floating / positive or negative output connected to earth				
Static voltage regulation	<1 %				
Dynamic voltage regulation	Load change 10 – 90 %, 90 % – 10 % – deviation 5 %				
Current regulation	0 to +6 %				
Ripple voltage	Max. 0.2 % rms of nom. DC voltage, provided battery Ah capacity is 5 times the charger nom. rating (battery connected) Max. 0.2 % rms typical (max. 5 %) on rectifier output, battery not connected				
<b>MANAGEMENT</b>					
Common alarm connection	1 Form C relay contact – Rating 60 VAC @ 2 A, 24 VDC @ 2 A & 60 VDC @ 0.1 A				
Control panel	Multi-functional LCD with 2 LEDs indicate the system status				
<b>PROTECTION</b>					
Input/Battery/Load	Depends on configuration				
Soft start	Yes				
Protection	The rectifier has built-in protection functions against short circuit, over and under AC input voltage, over and under DC output voltage as well as high temperature				
Decoupling fuse	Yes – within rectifier				
<b>MECHANICAL</b>					
Degree of protection	Standard IP21, optional IP42 (other protection as option)				
Equipment colour	RAL 7035, powder coated, textured paint (special colours as option)				
Dimensions & weight	1800 x 600 x 800 mm – (other cabinets as option), weight depends on configuration				
Acoustic noise @ 1 m	<55 dBA				
Connections	Bottom (top cable as option)				
<b>ENVIRONMENTAL</b>					
Type of cooling	Rectifiers are forced air cooling with electronic speed control				
Operating temperature	0 °C to +40 °C with a de-rating of 1.25 % / °C between 40 °C and 55 °C				
Storage temperature	-25 °C to +70 °C				
Operating humidity	10 % to 95 % RH non-condensing				
Installation height	0 to 1000 m – de-rating @ 1 % per 100 m above 1000 m up to 3000 m				
<b>STANDARDS</b>					
Safety	EN 60950-1				
EMC	EN 55022 Level B, EN 61000.6-1,2,3,4, EN 61000.3-2, EN 61000.3-3, EN21000, IEC 60146-1-1 Class B 2kV				
Environment	ROHS				
Approvals & Certification	CE				

## Standard system

The Protect MIP configured system has been pre-configured with a number of the most commonly requested features built-in as standard.

These systems are available "off-the-shelf" with standard drawings and standard user documentation.

### Standard configuration

- » Single system
- » Input voltage configuration 1 or 3 phase
- » Internal rectifier input switch Q1
- » 19" sub-rack with up to 18 hot swappable rectifier modules
- » Digital control card GCAU
- » Multi-functional LCD display with 2 LEDs indicate the system status
- » Tropicalized control electronics boards
- » Common fault remote alarm
- » Floor mounted cabinet with protection IP21
- » Cabinet colour RAL 7035
- » Power and control cable marking
- » Detailed 3-D layout and component marking presented on rear door
- » 180 degrees swing door with three key locks
- » Bottom cable entry
- » Input/battery/output terminals
- » Standard labeling/nameplate

### Service options:

- » Pro Care Preventive Maintenance
- » Turnkey solutions
- » Installation & commissioning
- » Maintenance services
- » E-Service/remote (battery) monitoring
- » 24/7 hotline global onsite contracts
- » Onsite training
- » Onsite battery replacement
- » Power quality assessment
- » Load bank & site capacity

## Options

The standard system can be enhanced by the addition of options. The system specific drawing packages and user documentation will be automatically generated to reflect the actual options configuration.

To provide exact solutions for each application, we offer a wide range of options:

### Protections

- » AC Input – switch, fuses, breakers
- » Input contactor with external door switch
- » DC Load – switch, fuses or breakers, including AC & DC distribution panels/cabinets
- » Inverters and converters for alternative AC and DC outputs
- » AC and DC surge arrestors

### Alarms/Signaling/Measurement

- » Relay card, LED Box
- » Alarms on protection devices
- » Analog meters for AC and DC measurements
- » Remote commands via analog and digital inputs, eg. boost charge, battery room fan, remote shutdown

### Communications

- » EIA232, EIA485 with Profibus
- » SNMP/TCP IP
- » IEC61850

### Battery options

- » Battery protection – switch, fuses, breakers,
- » Low Voltage Disconnect (LVD)
- » Battery shunt for battery measurement
- » Matching battery cabinets
- » Battery temperature probe

### Mechanical options

- » IP42 protection cabinet
- » Anti-condensation heater
- » Interior light
- » Special wiring eg. low smoke, halogen free
- » Special colour
- » Special markings

Additional options are available on request.



## AEG Power Solutions

Approach your local AEG Power Solutions representative for further support. Contact details can be found on:

[www.aegps.com](http://www.aegps.com)