

## PROTECT RCS MIP

Modular switch-mode  
industrial applications rectifier



State of the art switch mode technology, N+1 redundant Protect RCS MIP rectifier system is designed to be scalable, simple to use and easy to maintain with hot swappable rectifier modules. 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.

### Typical applications

- Power generation
- T & D
- Oil & Gas
- Petrochemical and chemical
- Heavy industry
- Mining industry
- Transportation and signalling

## FEATURES

- Compact design and light weight
- High power density
- Low input current harmonics and high power factor, high efficiency
- High availability with N+1 redundancy of rectifier modules
- Low MTTR due to modular design
- Low DC voltage ripple for an optimized battery life time
- Power increase possibility on site
- Digital processing and setting of all parameters
- Monitoring of all parameters via the front panel display
- Built-in intelligent battery management
- Temperature-compensated charge voltage regulation
- Manual or automatic high rate charge
- Alarm- and event logger, with a date and time-stamped event log memory
- Large communication facility options
- Inbuilt programable logic control to provide a wide range of interaction possibilities with external systems

## BENEFITS

- Existing pre-defined configurations to permit reduced lead times
- Highly customizable with a fully comprehensive option list and fully flexible design
- Compatible with all industrial battery types including gas recombination, with easy parameter adjustment
- Reduces capital and operational expenses (CAPEX & OPEX)
- Ease of installation, start-up & maintenance, low Mean Time To Repair (MTTR)
- International service support

# 1 and 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	48 V	120 V
Maximum output current	50 A	100 A	80 A	45 A
Voltage range	17 – 29 V	17 – 29 V	34 – 58 V	84 – 145 V
Commissioning voltage	33 V	33 V	66 V	166 V
System earth	Floating			
Internal redundancy	Redundancy is possible in 3 rectifier system by adding N+1 modules			
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 indicates 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	IP20 according to IEC 60529			
Equipment color	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	Include battery tray in 3 rectifier system	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 % R H 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 electronic boards
- Common fault remote alarm
- Cabinet color RAL 7035 with protection IP20

- 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	48 V	110 V	220 V
INPUT				
Nominal input voltage	230 V ±20 % (+20 % -60 % functional) or 400 V ±10 % (+15 % -20 % functional)			
Frequency	50 Hz or 60 Hz, ±5 %			
Current consumption	Depends on configuration			
Inrush current	1.5 nominal peak current			
THDI	<5 %			
Power factor	0.99			
OUTPUT				
Output voltage	24 V	48 V	110 V	220 V
Maximum output current	900 A	720 A	270 A	144 A
Voltage range	17 – 29 V	34 – 58 V	84 – 145 V	155 – 260 V
Commissioning voltage	33 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			
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	Depending 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			
MECHANICAL				
Degree of protection	Standard IP21, optional IP43 (other protection as option)			
Equipment color	RAL 7035, powder coated, textured paint (special colors as option)			
Dimensions & weight	2000 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)			
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 % R H 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			

Protect RCS MIP configured system

## STANDARD SYSTEM

The Protect RCS 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.

- 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 color RAL 7035
- Power and control cable marking
- Detailed 3-D layout and component marking presented on rear door
- 180 degrees swing door with three points key lock
- Bottom cable entry
- Input/battery/output terminals
- Standard labeling/nameplate
- Low smoke – halogen free wires and cables

## OPTIONS

The standard system can be enhanced by additional options. The system specific drawing packages and user documentation will be automatically generated to reflect the actual option 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 and DC distribution panels/cabinets
- Inverters and converters for alternative AC and DC outputs
- AC and DC surge arrestors

### Alarms/Signaling/Measurement

- Relay card (8 free contacts each), 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
- High rate interlock (automatic and manual)
- Battery cell fault alarm
- Independent protection system to limit hydrogen emission (NF-C15-100)

### Communication

- RS232/RS485 interface
- RS232/RS485 Modbus protocol
- TCP/IP interface
- Protocol converters (Profibus DP, J-bus DNP3, IEC 61850)
- Monitoring and management software
- Modem

### Battery options

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

### Mechanical options

- IP43 protection cabinet
- Anti-condensation heater
- Interior light
- Special color
- Special markings

Additional options are available upon request.

Authorized distributor in Slovakia:

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