

# 3P Power

Passion Profession Perfection



## PRODUCT CATALOGUE

MRS Series Rectifier

MRS Series Rectifier - 2U ~ 13U FRONT ACCESS 4 ~ 48 POSITIONS



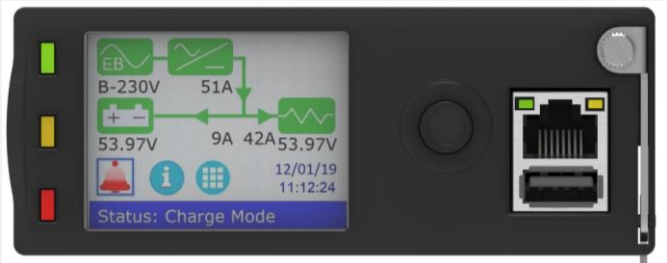
KEY FEATURES

- > 96% ~ 96.5% Efficiency Rectifiers
- Full Front Access
- Field Replaceable Controller
- Ethernet Comm. with SNMP
- Remote Monitoring & Control
- 48Vdc up to 192kW Output Capacity
- 3 LED Alarm/Status Indicators
- 4 Form-C Relay Alarms
- As many as Load & Battery Breakers
- Bulk Feed for External PDU
- LCD Display/Touchpad
- Easy Installation

|                                        |                                                               |                                      |
|----------------------------------------|---------------------------------------------------------------|--------------------------------------|
| MODEL                                  | MRS0203-009KW ~ MRS1348-192KW                                 |                                      |
| OUTPUT CAPACITY                        | 48Vdc / 9000W to 192000W                                      |                                      |
| INPUT PARAMETERS                       |                                                               |                                      |
| Voltage (nominal)                      | 1-phase 100-120/200-240Vac (L+N + PE)                         |                                      |
|                                        | 3-phase 230/400Vac (L1 L2 L3+N + PE)                          |                                      |
| Frequency                              | 45 to 66 Hz                                                   |                                      |
| Rectifier Power Factor                 | > 0.99 ( Typical )                                            |                                      |
| Protection Devices                     | Standard: Built-in AC Input MCB, Option: SPD 1Phase or 3Phase |                                      |
| OUTPUT PARAMETERS                      |                                                               |                                      |
| System Voltage                         | -48Vdc Nominal                                                |                                      |
| Maximum Capacity                       | Load                                                          | 125A ~ 3998A                         |
|                                        | Battery                                                       | 100A ~ 2000A discharge   0.1C ~ 0.3C |
| No. of Rectifier Slots                 | 4 ~ 48 Slots                                                  |                                      |
| DC DISTRIBUTION PARAMETERS             |                                                               |                                      |
| Loads Circuits                         | Customized                                                    |                                      |
| Bulk Feed For External PDU Connection  | 1 x 250A ~ 3900A                                              |                                      |
| Battery Circuits & Management          | 2 ~ 10 x 32A to 125A & LVBD @ 100A ~ 2000A                    |                                      |
| CONFIGURATION AND PHYSICAL INFORMATION |                                                               |                                      |
| Numbers of Rectifier per Sub-rack      | 4 Rectifier Modules ~ 48 Rectifier Modules                    |                                      |
| Approx. Gross Weight (kg) per Sub-rack | 12kg ~ 120kg                                                  |                                      |
| Dimensions in mm per Sub-rack          | 442 W x 500 D x 2U ~ 13U                                      |                                      |

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M2000 Controller Module



|                                                                                                                                                                                       |                                                                                                           |                                                                                                                                  |  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|--|
| MODEL / PART NUMBER                                                                                                                                                                   |                                                                                                           | MRCMS0020000 / HE513240                                                                                                          |  |
| GENERAL INFORMATION                                                                                                                                                                   |                                                                                                           |                                                                                                                                  |  |
| Operating Voltage                                                                                                                                                                     |                                                                                                           | 38 ~ 60Vdc                                                                                                                       |  |
| Power Consumption                                                                                                                                                                     |                                                                                                           | 4W (max)                                                                                                                         |  |
| Operating Environment                                                                                                                                                                 |                                                                                                           | -20°C to +6°C, 95% Humidity non-condensing                                                                                       |  |
| Display                                                                                                                                                                               |                                                                                                           | 2.2*, 320 x 240 resolution, 65k Colours TFT                                                                                      |  |
| Dimensions in mm                                                                                                                                                                      |                                                                                                           | 110 W x 130 D x 43 H                                                                                                             |  |
| IO UNITS                                                                                                                                                                              |                                                                                                           |                                                                                                                                  |  |
| Number of IO's supported                                                                                                                                                              |                                                                                                           | 4                                                                                                                                |  |
| Voltage sensing                                                                                                                                                                       |                                                                                                           | Bus Voltage + 5 channels, ± 72V                                                                                                  |  |
| Current sensing                                                                                                                                                                       |                                                                                                           | 3 channels, ± 50mV                                                                                                               |  |
| Temperature sensing                                                                                                                                                                   |                                                                                                           | 2 channels, -20°C to 100°C                                                                                                       |  |
| LVD control                                                                                                                                                                           |                                                                                                           | 3, NO/NC, 10A@60Vdc                                                                                                              |  |
| Digital Inputs                                                                                                                                                                        |                                                                                                           | 8, opto-isolated                                                                                                                 |  |
| Relay Outputs                                                                                                                                                                         |                                                                                                           | 8, NO/NC, 1 form C, 1A @ 48Vdc                                                                                                   |  |
| COMMUNICATION                                                                                                                                                                         |                                                                                                           |                                                                                                                                  |  |
| System control bus                                                                                                                                                                    |                                                                                                           | 2 x CAN V2.0b for communication with rectifiers and system units                                                                 |  |
| Serial bus                                                                                                                                                                            |                                                                                                           | 2 x RS485, MODBUS RTU master & devise modes                                                                                      |  |
| Modern Interface                                                                                                                                                                      |                                                                                                           | 1 x RS232, modem interface for remote monitoring over GPRS/GSM and SMS alarms                                                    |  |
| Ethernet                                                                                                                                                                              |                                                                                                           | 10.100 Base T, MDI/ MDI-X, IP protocols: HTTP, HTTPS, SNMP V2c/V3, SNTP, FTP,IPV4, IPV6 (Static, Stateless & State full, DHCPv6) |  |
| USB                                                                                                                                                                                   |                                                                                                           | USB 2.0 Type A, USB Flash Drive support                                                                                          |  |
| Web Interface                                                                                                                                                                         |                                                                                                           | HTML5, Java script base secure web interface, encrypted w/TLS                                                                    |  |
| SNMP                                                                                                                                                                                  |                                                                                                           | SNMP V2c/V3, Get/ Get Bulk/ Set/ TRAPS, multiple user profiles                                                                   |  |
| FUNCTIONS                                                                                                                                                                             |                                                                                                           |                                                                                                                                  |  |
| Battery                                                                                                                                                                               | Float, boost and equalize charge modes, configurable battery temperature compensation, manual charge mode |                                                                                                                                  |  |
|                                                                                                                                                                                       | Low voltage disconnect and under voltage pre-warning                                                      |                                                                                                                                  |  |
|                                                                                                                                                                                       | Back up time and SoC monitoring                                                                           |                                                                                                                                  |  |
|                                                                                                                                                                                       | Automatic battery health test, battery isolation for maintenance, symmetry supervision                    |                                                                                                                                  |  |
|                                                                                                                                                                                       | Li-ion battery support, settable charge profiles and communication with battery BMS                       |                                                                                                                                  |  |
| System                                                                                                                                                                                | AC voltage measurement, grid power /phase failure detect                                                  |                                                                                                                                  |  |
|                                                                                                                                                                                       | Integrated support for renewable (solar) hybrid system                                                    |                                                                                                                                  |  |
|                                                                                                                                                                                       | Alarm grouping, alarm output mapping and alarm naming                                                     |                                                                                                                                  |  |
|                                                                                                                                                                                       | User configuration analog alarm engine and Boolean logic alarms                                           |                                                                                                                                  |  |
|                                                                                                                                                                                       | User profile configuration & password protection                                                          |                                                                                                                                  |  |
| Rectifiers                                                                                                                                                                            | Application and configuration update locally or remotely, offline configuration tool                      |                                                                                                                                  |  |
|                                                                                                                                                                                       | Individual rectifier current, temperature and status monitoring                                           |                                                                                                                                  |  |
|                                                                                                                                                                                       | Power limited walk in, configurable power control in case of controller communication loss                |                                                                                                                                  |  |
|                                                                                                                                                                                       | Linear or cyclic rectifier sleep mode for system efficiency                                               |                                                                                                                                  |  |
|                                                                                                                                                                                       | Active current sharing up to 48 rectifiers in a sub-rack and system overload monitoring                   |                                                                                                                                  |  |
| LOGS                                                                                                                                                                                  |                                                                                                           |                                                                                                                                  |  |
| Up to 10,000 event logs, performance logs on SD card or internal memory based on user configurable parameters, 1,000 change logs, and energy & run hour logs for grid, battery and DG |                                                                                                           |                                                                                                                                  |  |
| Certifications                                                                                                                                                                        |                                                                                                           |                                                                                                                                  |  |
| Electromagnetic Compatibility (EMC)                                                                                                                                                   |                                                                                                           | ETSI EN 300 386 V2.1.1                                                                                                           |  |
| Safety                                                                                                                                                                                |                                                                                                           | EN 62368-1:2014                                                                                                                  |  |

MRS Series Rectifier - 2U ~ 13U FRONT ACCESS 4 ~ 48 POSITIONS

High Efficiency  
Rectifier Module



|                                        |                                                                              |                         |  |
|----------------------------------------|------------------------------------------------------------------------------|-------------------------|--|
| MODEL / PART NUMBER                    |                                                                              | MRMS04830000 / HE513470 |  |
| OUTPUT CAPACITY                        |                                                                              | 48Vdc / 3000W           |  |
| RECTIFIER MODULE INPUT PARAMETERS      |                                                                              |                         |  |
| Input Power Factor                     | 0.99 @ Nominal Input                                                         |                         |  |
| Input Voltage                          | 90 to 300Vac                                                                 |                         |  |
| Input Current                          | 19.0A Maximum                                                                |                         |  |
| Input Frequency                        | 44 - 66 Hz                                                                   |                         |  |
| THD                                    | < 5% (50% to 100% Load)                                                      |                         |  |
| Protection & Galvanic Isolation        | Off < 90-300Vac < Off                                                        |                         |  |
|                                        | Line & Neutral input fuses                                                   |                         |  |
|                                        | MOV Transient Protection                                                     |                         |  |
|                                        | Input to Output: 3000Vac, Input to Ground: 1500Vac, Output to Ground: 500Vdc |                         |  |
| RECTIFIER MODULE OUTPUT PARAMETERS     |                                                                              |                         |  |
| Adjustable Voltage Range               | 42.0Vdc - 58.0Vdc                                                            |                         |  |
| Output Power                           | 3000W above 176Vac, 1520W @ 90Vac                                            |                         |  |
| Maximum Current                        | 62.5A @ 48Vdc                                                                |                         |  |
| Current Sharing                        | ± 5% of max. current                                                         |                         |  |
| Static Voltage Regulation              | ± 0.5% for 10% - 100% load                                                   |                         |  |
| Dynamic Voltage Regulation             | ± 5% for 10% - 90% load & 90% - 10% load, < 20ms Regulation Time             |                         |  |
| Ripple Noise                           | < 300mV p-p at 200MHz BW & < 10ms Hold up Time Ripple                        |                         |  |
| Protection                             | Over voltage shutdown                                                        |                         |  |
|                                        | Short circuit proof                                                          |                         |  |
|                                        | Hot-Plugin inrush current limiting                                           |                         |  |
|                                        | Over temperature shut-off                                                    |                         |  |
| Efficiency                             | Output fuse                                                                  |                         |  |
|                                        | 96% peak                                                                     |                         |  |
| COMMUNICATION                          |                                                                              |                         |  |
| Communication Interface                | Can Bus                                                                      |                         |  |
| ENVIRONMENTAL                          |                                                                              |                         |  |
| Type of Cooling                        | Fan Cool                                                                     |                         |  |
| Operating Temperature                  | - 40°C to +75°C Linear de-rating from 50°C onwards                           |                         |  |
| Storage Temperature                    | - 40°C to +85°C                                                              |                         |  |
| Humidity                               | 95% Non-condensing                                                           |                         |  |
| Noise                                  | ≤ 55dB                                                                       |                         |  |
| MTBF                                   | > 500,000 Hours (30°C ambient)                                               |                         |  |
| Environmental                          | EN 300019-1-1/-2/-3, ROHS complied                                           |                         |  |
| CONFIGURATION AND PHYSICAL INFORMATION |                                                                              |                         |  |
| Numbers of Rectifier per Sub-rack      | 3 Rectifier Modules per MR23 Sub-rack                                        |                         |  |
| Gross Weight (kg) per Rectifier        | 2kg                                                                          |                         |  |
| Dimensions in mm per Rectifier         | 269 D x 105 W x 40.8 H                                                       |                         |  |
| Dimensions in mm per Sub-rack          | 442 W x 358 D x 89 H (2U)                                                    |                         |  |
| LED Indication                         |                                                                              |                         |  |
| Green                                  | No Fault                                                                     |                         |  |
|                                        | Rectifier comm. Ok                                                           |                         |  |
|                                        | Sleep Mode                                                                   |                         |  |
| Yellow (Warnings)                      | Input Low/High, rectifier in power de-rate mode, current limit               |                         |  |
|                                        | Rectifier comm. Fail                                                         |                         |  |
| Red (Alarms)                           | Abnormal temp or input shutdown, low o/p voltage alarm, over-voltage         |                         |  |
|                                        | Rectifier fan fail                                                           |                         |  |
| Certifications                         |                                                                              |                         |  |
| Electromagnetic Compatibility (EMC)    | Conducted Emission CISPR 32 (Class B), Radiated Emission CISPR 32 (Class B)  |                         |  |
| Safety                                 | EN 62368                                                                     |                         |  |

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High Efficiency  
Rectifier Module



|                                        |                                                                              |                         |  |
|----------------------------------------|------------------------------------------------------------------------------|-------------------------|--|
| MODEL / PART NUMBER                    |                                                                              | MRMS04840000 / HE513370 |  |
| OUTPUT CAPACITY                        |                                                                              | 48Vdc / 4000W           |  |
| RECTIFIER MODULE INPUT PARAMETERS      |                                                                              |                         |  |
| Input Power Factor                     | 0.99 @ Nominal Input                                                         |                         |  |
| Input Voltage                          | 90 to 300Vac                                                                 |                         |  |
| Input Current                          | 25.0A Maximum                                                                |                         |  |
| Input Frequency                        | 44 - 66 Hz                                                                   |                         |  |
| THD                                    | < 5% (50% to 100% Load)                                                      |                         |  |
| Protection & Galvanic Isolation        | Off < 90-300Vac < Off                                                        |                         |  |
|                                        | Line & Neutral input fuses                                                   |                         |  |
|                                        | MOV Transient Protection                                                     |                         |  |
|                                        | Input to Output: 3000Vac, Input to Ground: 1500Vac, Output to Ground: 500Vdc |                         |  |
| RECTIFIER MODULE OUTPUT PARAMETERS     |                                                                              |                         |  |
| Adjustable Voltage Range               | 42.0Vdc - 58.0Vdc                                                            |                         |  |
| Output Power                           | 4000W above 176Vac, 2050W @ 90Vac                                            |                         |  |
| Maximum Current                        | 83.3A @ 48Vdc                                                                |                         |  |
| Current Sharing                        | ± 5% of max. current                                                         |                         |  |
| Static Voltage Regulation              | ± 0.5% for 10% - 100% load                                                   |                         |  |
| Dynamic Voltage Regulation             | ± 5% for 10% - 90% load & 90% - 10% load, < 20ms Regulation Time             |                         |  |
| Ripple Noise                           | < 300mV p-p at 200MHz BW & < 10ms Hold up Time Ripple                        |                         |  |
| Protection                             | Over voltage shutdown                                                        |                         |  |
|                                        | Short circuit proof                                                          |                         |  |
|                                        | Hot-Plugin inrush current limiting                                           |                         |  |
|                                        | Over temperature shut-off                                                    |                         |  |
|                                        | Output fuse                                                                  |                         |  |
| Efficiency                             | 96.5% peak                                                                   |                         |  |
| COMMUNICATION                          |                                                                              |                         |  |
| Communication Interface                | Can Bus                                                                      |                         |  |
| ENVIRONMENTAL                          |                                                                              |                         |  |
| Type of Cooling                        | Fan Cool                                                                     |                         |  |
| Operating Temperature                  | - 40°C to +75°C Linear de-rating from 50°C onwards                           |                         |  |
| Storage Temperature                    | - 40°C to +85°C                                                              |                         |  |
| Humidity                               | 95% Non-condensing                                                           |                         |  |
| Noise                                  | ≤ 55dB                                                                       |                         |  |
| MTBF                                   | > 500,000 Hours (30°C ambient)                                               |                         |  |
| Environmental                          | EN 300019-1-1/-2/-3, ROHS complied                                           |                         |  |
| CONFIGURATION AND PHYSICAL INFORMATION |                                                                              |                         |  |
| Numbers of Rectifier per Sub-rack      | 3 Rectifier Modules per MR23 Sub-rack                                        |                         |  |
| Gross Weight (kg) per Rectifier        | 2kg                                                                          |                         |  |
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| LED Indication                         |                                                                              |                         |  |
| Green                                  | No Fault                                                                     |                         |  |
|                                        | Rectifier comm. Ok                                                           |                         |  |
|                                        | Sleep Mode                                                                   |                         |  |
| Yellow (Warnings)                      | Input Low/High, rectifier in power de-rate mode, current limit               |                         |  |
|                                        | Rectifier comm. Fail                                                         |                         |  |
| Red (Alarms)                           | Abnormal temp or input shutdown, low o/p voltage alarm, over-voltage         |                         |  |
|                                        | Rectifier fan fail                                                           |                         |  |
| Certifications                         |                                                                              |                         |  |
| Electromagnetic Compatibility (EMC)    | Conducted Emission CISPR 32 (Class B), Radiated Emission CISPR 32 (Class B)  |                         |  |
| Safety                                 | EN 62368                                                                     |                         |  |

## 3P Power One Stop Solution



**3P**Power

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