

# Power Safety

## Protect RCS

Rectifiers Chargers and DC Systems

SPRe - Single Phase Rectifier

TPRe - Three Phase Rectifier

### Designed for all industrial applications

- Oil & Gas, Petrochemicals  
Offshore, Onshore, Pipelines
- Energy and Power  
Generation, Transmission, Distribution
- Transportation  
Rail, Airports, Shipping
- Water  
Desalination, Treatment
- Instrumentation & Process Control  
Chemicals, Mining, Steel, Paper
- All Industrial Applications

### Robust, Reliable and Flexible

These are the latest generation of robust, industrial rectifiers, chargers and DC Systems from AEG Power Solutions. Using proven microprocessor controlled thyristor technology to provide high-reliability power supply and battery charging capabilities.

A more flexible approach to providing exact solutions.

Choose from:

- Standard system configurations and
- Customized systems - designed to comply with precise specifications



PERFECT IN FORM AND FUNCTION

**AEG**

# Power Safety

## Protect RCS

### Key Features

#### Protect RCS – key features

- Standard system configurations - cost effective, short lead time solutions
- Customized systems - enhance the standard system by selecting from an extensive range of options
- All systems built with advanced GCAU - Generic Control and Alarm Unit
- Communications system used to monitor and control the defined parameters locally or remotely.
- Choice of several types of batteries:
  - Nickel-cadmium – vented or gas recombination
  - Lead acid – vented or gas recombination
- Advance Battery Management
- Parallel operation
- Simplified maintenance
- High MTBF and low MTTR
  - Bespoke documentation; drawings, manuals
  - Total solutions – including switchgear, load distribution
- International Service support – comprehensive packages including;
- Product Services: Installation, Commissioning, Service Contracts...
- Site Services: Load testing, monitoring ...

#### Protect RCS Industrial rectifiers, Chargers & DC Systems

The Protect RCS DC System has been developed and designed to provide high reliability power supply and battery charging capability.

The Protect RCS DC System is a thyristor-controlled rectifier suitable for charging nickel-cadmium or lead-acid batteries while supplying DC loads. It can also be used without batteries as direct power supplies.

The range of DC Systems is available in the three levels:

- The first level consists of the Standard Rectifier with a compact set of alarms.
- The second level offers a set of Basic Options, extensive functions and alarms.
- The third level offers a full set of Extended Options, extensive functions and alarms allowing customization of the systems to comply with special customer requirements.

The rectifiers are built as independent modules, optional equipment like distribution boards, diode droppers etc. are installed in separate cubicle sections.

The cabinets are floor mounted and can be designed to meet special requirements. The batteries are mounted on free-standing racks or in cabinets together with or separated from the rectifier.

#### "GCAU" control card

The main control card GCAU (Generic Control and Alarm Unit) performs measurements, control charge process and provides a wide range of alarm and monitoring options. The same card is used in the single (SPRe) and the three phase (TPRe) systems.

The GCAU card uses a fully digital control algorithm and incorporates two micro controllers, using the latest micro controller technology to ensure a high degree of safety and reliability.

The tasks of these micro controllers are:

- Process communication and monitoring
- Regulation and synchronization

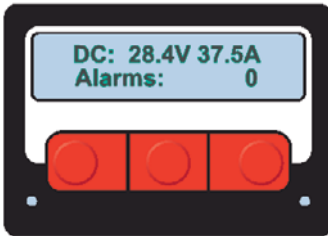
#### Applications

Designed to provide secure DC power for all Industrial applications; for Oil & Gas and Petrochemical Plants, Power Stations and Substations, Water Treatment Plants, Manufacturing Plants, Airports, Railways, etc

- Navigational Aids
- Emergency Lighting
- Fire & Gas Detection Systems
- Fire Fighting
- Emergency Shutdown Systems
- Radio & Telecommunications
- Signaling
- Telemetry
- Instrumentation & Process Control
- Gas Turbine Control
- Switchgear Tripping
- Motor Starting
- Lube-oil pump supply
- Power Generation, Transmission and Distribution

## System display

An extensive human interface ensures that all the important parameters are accessible from the front panel. A large 16 characters by 2 lines LCD unit displays all the relative information to the user. A three push button keyboard is used with 2 LEDs (green and red) indicating the charger state. The Display card is mounted on the front of the system and is controlled by the GCAU card. It is a plug-in device and is connected through two RJ 4-4 connectors with a 4-wire cable. All data and necessary power supply voltages are transferred over this cable.



Display: 9mm character height, two line by sixteen-character alpha numeric LCD with LED backlight.

## Batteries

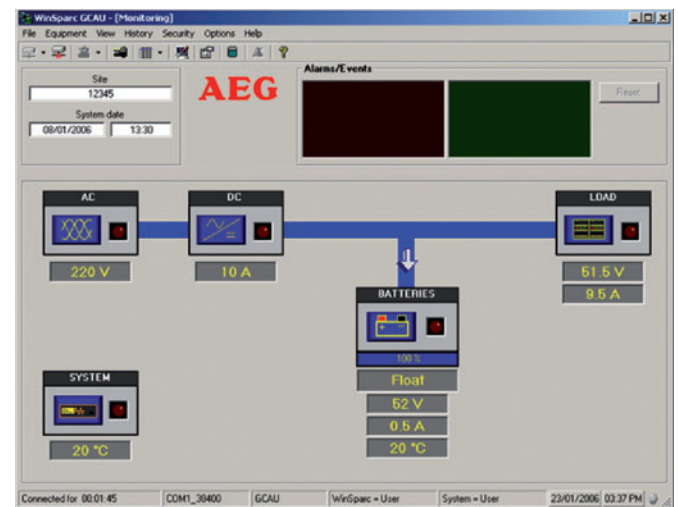
AEG Power Solutions has considerable in-house knowledge in battery technology and is able to offer expert advice on the specifying, selection, operation and testing of batteries. Our total system solutions include a wide range of products using lead acid and nickel-cadmium batteries in vented and gas recombination technologies. Batteries can be supplied on racks or inside cabinets which match the chargers and can be mechanically coupled to the charger cabinet if necessary. Replacement batteries can be supplied and installed by our Global Service Team.

## Monitoring software

The WINSPARC and WINSITE software (WINDOWS based) are the applications designed for the local and remote supervision of the control GCAU card in order to monitor and to configure the systems. The software function allows visualizing on a PC screen system data such as alarms, measurements, modes, and history. The remote commands can be sent to the system.

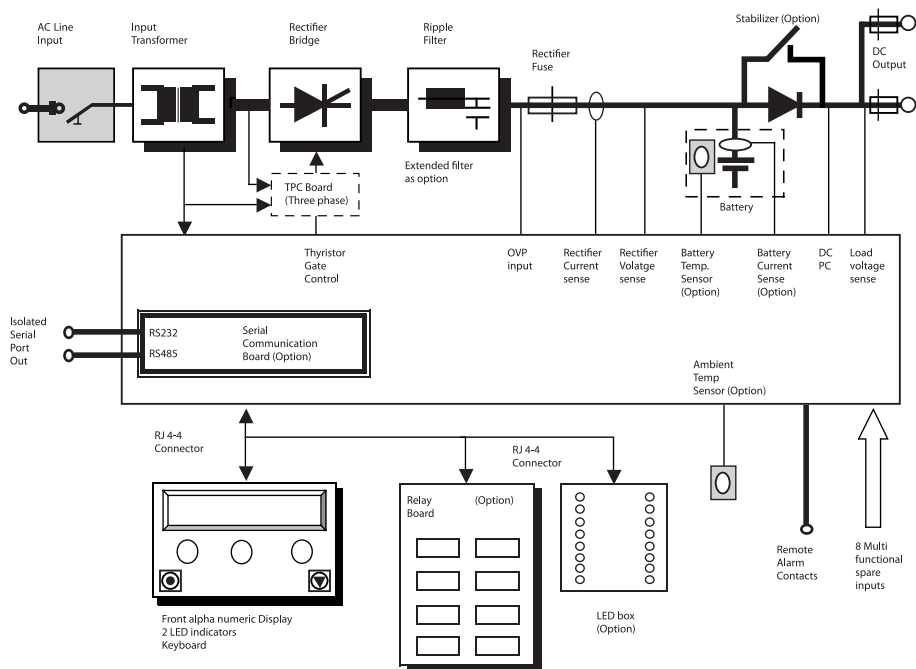
The available types of communication are:

- Locally (via PC port COMx – RS232/RS485)
- Remotely (via Modem or Ethernet Network TCP/IP )



# Protect RCS

## Block diagram of the rectifier



## Standard system

The Protect RCS range of systems have 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. A Standard Rectifier System without additional options provides a very cost effective, short lead time solution.

## Standard electrical components

- Input terminals
- Internal input power switch
- Input isolation transformer
- 6 pulse rectifier bridge
- Control card GCAU
- Output filter L1-C1 ripple voltage < 5% RMS without battery
- Rectifier fuse
- Rectifier shunt
- Common fault remote alarm
- LCD display with keyboard

## Standard mechanical components

- Floor mounted cabinet 19"
- Cabinet protection degree IP21
- Colour RAL 7035 - Powdered textured painting
- Cabinet with natural cooling (except TPRE 110V-400A/500A)
- Rear panel with air outlet
- Swing door 180 degrees with two key locks
- Bottom cable entry
- Cable gland plate on the roof
- Standard labelling/nameplate
- Standard PVC cable
- Standard cable marking
- None isolated aluminium earth bar

## Protect RCS – options

The Standard System can be enhanced by the addition of some Basic and Engineering Options. 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:

### Alarms/signaling/measurement options

- LED indicators in front panel
- Relay cards with 8 contacts
- Analog meters
- Temperature alarm
- High ripple voltage alarm
- Low electrolyte level alarm
- Audible alarm

### Communication

- RS232 / RS485 Interface
- RS232/ RS485 Modbus Protocol
- TCP/IP interface
- Protocol converters (Profibus DP, J-bus)
- Monitoring and Management Software (WINSPARC/WINSITE)
- Modem

### Control options

- Remote rectifier shutdown
- Remote high rate charge
- Float/Auto/High rate internal switch

### Input/Battery/Load options

- Special mains input voltages
- 12 Pulse rectifier with isolation transformer
- Input MCB / fuse / switch or contactor
- Mains change-over switch
- EMC filtering
- 24 V and 48 V telecom filter
- Battery MCB fuse / switch

- Load MCB / fuse / switch
- Fuse / MCB trip alarm
- Blocking diode for parallel redundancy
- High DC voltage trip
- Battery temperature compensation
- High rate interlock
- Battery/ load current measurement
- End of discharge contactor
- Remote voltage sensing (battery)
- Battery room fan control during high rate charge
- Battery fuse box
- Diode dropper
- DC Distributions
- Advance Battery Monitoring

### Mechanical

- Interior light
- Cabinet heater
- Analog meters in front panel
- Protection
  - External cabinet: up to IP54
  - External wall-mounted cabinet: IP41
  - Open-door cabinet: IP20
- Interior single-phase outlet
- Special colour
- Vermin proof protection plates
- Customised cabinets (paints, etc.)
- Special treatment
  - Tropicalization, relative humidity up to 95 %, etc
- Low smoke wiring (halogen-free)
- Special markings
- Door mounted on/off switch
- Top cable entry
- Air filters
- Ventilation 100 % redundant

Additional options are available or request

# Protect RCS

## INPUT

Protect RCS Single phase (SPRe)	Single phase 230 Vac $\pm$ 10% (220 V, 240 V)
Protect RCS Three Phase (TPRe)	Three phase 400 Vac $\pm$ 10% (380 V, 415 V) Other voltages available as option
Exceptional variations	+ 15 / -20 % (functional)
Frequency	50 Hz or 60 Hz $\pm$ 6%

## OUTPUT

Nominal voltage (Udc)	24 V 48 V 110 V 220 V (Other voltages available as non-standard option)					
Range of operating voltage	Floating charge 75 % to 125 % of Udc Nominal					
	High rate charge 75 % to 135 % of Udc Nominal					
	Commissioning charge 75 % to 140 % of Udc Nominal					
Static voltage regulation	$\pm$ 0.5 % under the following conditions: <ul style="list-style-type: none"> <li>• at float charge</li> <li>• 0-100 % DC load variation</li> <li>• input voltage <math>\pm</math> 10 %</li> <li>• input frequency <math>\pm</math> 6 %</li> <li>• temperature from 0°C to 40°C</li> </ul>					
Dynamic voltage regulation	Using standard filter and the battery connected (capacity higher than 5 times I nom)					
	<table border="1"> <thead> <tr> <th>Load step</th> <th>Deviation</th> </tr> </thead> <tbody> <tr> <td>10-90 %</td> <td>-5 %</td> </tr> <tr> <td>90%-10 %</td> <td>+5 %</td> </tr> </tbody> </table>	Load step	Deviation	10-90 %	-5 %	90%-10 %
Load step	Deviation					
10-90 %	-5 %					
90%-10 %	+5 %					
Current regulation	0-2 % of current limit					
Long-term stability of UDC	0.15 % for 1000 hours					
Temperature coefficient of UDC	0.18 % per °C					
Charging characteristic	Constant current / constant voltage (I/U as per IEC 478-1) during float charge					
Input/Output isolation	2500 VAC between input/output and electrical earth					
Insulation resistance	> 200 M $\Omega$ , 500 VDC					
Ripple	Max 2 % rms of nom. DC voltage, with a battery Ah capacity of 5 times the charger nom rating, battery connected (see our filter options). 2.5 % rms typical (max 5 %) on rectifier output, battery not connected.					

## PROTECTION

	<ul style="list-style-type: none"> <li>• Polarity reversal of battery (blows battery fuse, optional)</li> <li>• Soft-start function 0 to 100 %</li> <li>• Short-circuits</li> <li>• Limited to 100 % of rated current</li> <li>• Internal DC fuse</li> <li>• Non-volatile storage of system parameters and user setting</li> <li>• Mains failure shutdown</li> <li>• Rectifier failure shutdown</li> <li>• High-voltage DC shutdown</li> <li>• Thermal protection</li> </ul>
EMC emissions	Generic emission standards IEC/EN 61000-6-4 and generic immunity standards IEC/EN 61000-6-2 available as standard option.
Safety	According to IEC/EN 62040-1-2 standard

## ENVIRONMENTAL

Ambient temperature	Operating: 0°C to + 40°C Derate from 40°C to 55°C by lowering the output current by 1.25% per °C. Storage: -25°C to +70°C
Relative humidity	Operation: from 20 % to 95 % non condensing. Storage: from 15 % to 90 % (in original packaging).
Acoustic noise	Typical 45-65 dB(A)
Altitude	Up to 1000m, derate from 1000 to 4000m by lowering the output current by 7 % per 1000 m.
Tropicalisation	Suitable for ambient temperature and relative humidity specified above and for ambient air free from dust and corrosive gases.

## Protect RCS – Single Phase Range (including systems with Basic Options)

Rectifier Type	Nominal DC output Voltage V	Nominal DC output Current A	Standard Systems & Basic Options Dimensions <sup>1</sup>			Weight <sup>2</sup> (approx) KG
			Height (mm)	Width (mm)	Depth (mm)	
24SPRe10	24	10	1200	600	821	85
24SPRe15	24	15	1200	600	821	95
24SPRe25	24	25	1200	600	821	105
24SPRe50	24	50	1200	600	821	160
24SPRe75	24	75	1200	600	821	180
24SPRe100	24	100	1200	600	821	195
48SPRe10	48	10	1200	600	821	95
48SPRe15	48	15	1200	600	821	100
48SPRe25	48	25	1200	600	821	145
48SPRe50	48	50	1200	600	821	200
48SPRe75	48	75	1600	600	821	295
110SPRe10	110	10	1200	600	821	110
110SPRe15	110	15	1200	600	821	145
110SPRe25	110	25	1200	600	821	190
110SPRe50	110	50	1200	600	821	345

## Protect RCS – Three Phase Range (including systems with Basic Options)

24TPRe25	24	25	1200	600	821	145
24TPRe50	24	50	1200	600	821	185
24TPRe75	24	75	1200	600	821	250
24TPRe100	24	100	1200	600	821	285
24TPRe150	24	150	1600	600	821	305
24TPRe200	24	200	1600	600	821	345
24TPRe300	24	300	2000	600	821	*(4)
24TPRe400	24	400	2000 (2065 max) <sup>3</sup>	900	821	*(4)
24TPRe500	24	500	2000 (2065 max) <sup>3</sup>	900	821	*(4)
48TPRe25	48	25	1200	600	821	190
48TPRe50	48	50	1200	600	821	215
48TPRe75	48	75	1600	600	821	315
48TPRe100	48	100	1600	600	821	340
48TPRe150	48	150	1600	600	821	495
48TPRe200	48	200	1600	600	821	515
48TPRe300	48	300	2000	600	821	*(4)
48TPRe400	48	400	2000 (2065 max) <sup>3</sup>	900	821	*(4)
48TPRe500	48	500	2000 (2065 max) <sup>3</sup>	900	821	*(4)
110TPRe25	110	25	1200	600	821	215
110TPRe50	110	50	1600	600	821	365
110TPRe75	110	75	1600	600	821	495
110TPRe100	110	100	1600	600	821	520
110TPRe150	110	150	1600	600	821	585
110TPRe200	110	200	2000 (2065 max) <sup>3</sup>	900	821	770
110TPRe300	110	300	2000 (2065 max) <sup>3</sup>	900	821	*(4)
110TPRe400	110	400	2000 (2065 max) <sup>3</sup>	900	821	*(4)
110TPRe500	110	500	2080	1200	821	*(4)

1. Dimensions may vary for systems with Extended Options. 2. Weights may vary depending on selection of Basic Options and Extended Options. 3. Cabinet with additional fan cooling – top cover 65mm Height. 4. Weights on request. Please consult AEG Power Solutions for alternative systems.

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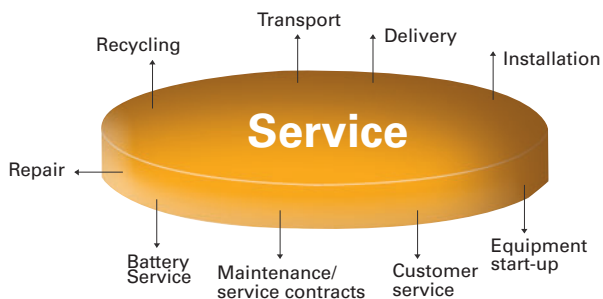
Protect RCS – Single Phase Range (including systems with Basic Options)

Rectifier Type	Nominal DC output Voltage V	Nominal DC output Current A	Standard Systems + Basic Options Dimmensions <sup>1</sup>			Weight <sup>2</sup> (approx) KG
			Height (mm)	Width (mm)	Depth (mm)	
220TPRe25	220	25	1600	600	821	250
220TPRe50	220	50	1600	600	821	390
220TPRe75	220	75	1600	600	821	550
220TPRe100	220	100	2000	900	821	570
220TPRe150	220	150	2000	900	821	620
220TPRe200	220	200	2000	900	821	830
220TPRe300	220	300	2000	900	821	*(4)
220TPRe400	220	400	2080	1200	821	*(4)
220TPRe500	220	500	2080	1200	821	*(4)

1. Dimensions may vary for systems with Extended Options. 2. Weights may vary depending on selection of Basic Options and Extended Options. 3. Cabinet with additional fan cooling – top cover 65mm Height. 4. Weights on request. Please consult AEG Power Solutions for alternative systems.

## Power services

Advanced power supplies require advanced technical service and support. Our customers know that they can count on AEG Power Solutions specialists to deliver the right service and support rapidly and efficiently.



## A comprehensive range of services are available

- Product Services
- Refurbishment
- Consulting
- Load Bank & Capacity Testing
- Installation & Commissioning
- Facility & equipment Management
- Battery Monitoring
- Spare Parts
- Battery Replacement
- In-house/Express Repair
- Training
- Remote Monitoring
- Power Quality Services
- Service Contracts - 24/7 Global Service Coverage
- Corrective Maintenance
- Design & Build - Turnkey Solutions

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