COMPACT-PLATINUM 4.0 Industrial1- 3Ph Battery Chargers

DC UPS
A SINGLE SYSTEM,
THREE DIFFERENT CONFIGURATIONS

We present the DC UPS of the COMPACT PLATINUM 4.0 series. These devices are the result of careful research and development carried out by our company, aimed at obtaining maximum reliability and the best performance in the field of direct current emergency power systems. The improvements made allow us today to offer a single system that can be proposed in three different basic electrical configurations with IGBT (chopper) or THYRISTOR conversion technology depending on the required currents.

SINGLE BRANCH

Product Code
1R

DOUBLE BRANCH

Product Code
2R

DOUBLE PARALLEL BRANCH

Product Code
2RP

MAIN FEATURES

✔ **POWER ELEMENT: IGBT OR THYRISTOR DEPENDING ON POWER**

✔ **ISOLATION TRANSFORMER ON AC INPUT LINE COMPLETE WITH ELECTROSTATIC SHIELD BETWEEN PRIMARY AND SECONDARY**

✔ **SYSTEM CONTROL WITH INDUSTRIAL PLC**

✔ **7 " TOUCHSCREEN PANEL**

✔ **CHARGING CURVE FOR AGM - PB - NiCd BATTERY**

✔ **3 CHARGING LEVELS INCLUDING MANUAL CHARGING COMPLETE WITH SAFETY TIMER**

✔ **HIGH MTBF AND LOW MTTR**

✔ **EASY MAINTENANCE WITH ACCESS FROM THE FRONT**

✔ **LOW RESIDUAL RIPPLE IN OUTPUT AND ON BATTERIES (RIPPLE)**

✔ **4 FULLY USER PROGRAMMABLE ALARM RELAYS**

✔ **TEMPERATURE COMPENSATION WITH PT100 SENSOR AND CORRECTION COEFFICIENT (Vel / ° C) SETTABLE BY THE USER**

✔ **AUTOMATIC BATTERY TEST WITH PROGRAMMABLE FREQUENCY**

INNOVATIVE SYSTEM CONTROL

The SYSTEM CONTROL is now based on an expandable Industrial PLC, characterized therefore by a very high reliability as well as by a considerable flexibility, it allows to satisfy a greater number of technical needs and consequent applications. This section, which constitutes the "intelligent" heart of our system, is now made in a special drawer located on the inside of the main door of the cabinet and FULLY REMOVABLE thanks to the presence of a polarized connector.

This solution introduces a very important advantage, in fact it is possible to replace this assembly while hot, with the machine running, without turning off the system. This is possible as the AC / DC conversion units recognize the loss of communication with the drawer and set themselves up in "AUTOMATIC SAVE MODE", actually working independently and guaranteeing continuity of operation. Once the drawer has been replaced and the connection re-established, the AC / DC units will return to operate under the automatic control of the PLC, resuming normal and complete operation.

NEW HMI

The HMI (Human Machine Interface) system has also been renewed, which now includes a touch panel, capacitive, 7" with excellent visibility characteristics, mechanical resistance to wear and connectivity with the outside world.

MORE SPACE FOR REMOTE CONNECTION

Finally, a great deal of space was reserved for REMOTE CONNECTION, in fact now it is possible to control, parameterize and manage these systems in absolute safety through the INTERNET network thanks to the standard presence of the **WEB SERVER function.** This has an undoubted advantage that significantly improves the maintenance and technical assistance aspects in critical installations.

APPLICATIONS

- Oil & Gas (petrochemical plants, offshore, pipeline).
- Electricity generation (power stations, hydroelectric, transmission, distribution, utilities).
- Transport (Airports, naval, rail).
- Process control (Mining industry, steel mills, paper production, etc.).
- Plants for desalination and water treatment.

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GENERAL TECHNICAL DATA

ELECTRICAL DATA

		IGBT			THY			
Output voltage Vcc		24	48	110	24	48	110	220
Input Voltage	1 Ph	230 Vac ± 10%			NOT AVAILABLE			
	3 Ph	400 Vac ± 10%						
Entry Frequency		50 ÷ 60 Hz ± 5%						
Input Voltage - Icc		≤ 10KA RMS (with standard IEC-nominal main input)						
Current Input Distortion	THD	≤ 27 (with nominal load)						
Input power factor		≥ 0.80 (With nominal voltage 100% load)						
I/O isolation		4kV with transformer						

OUTPUT DATA

Output current	Input type 1 Ph	10÷60 Amp		
	Input type 3 Ph	10÷100 Amp	100÷500 Amp	10÷250 Amp
Battery charging voltage	Floating (settable from HMI)	2,27 V/cell for VRLA battery type 2,2 ÷ 2,3 V/cell for VLA battery type 1,4 ÷ 1,5 V/cell for Ni-Cd battery type		
	Boost (settable from HMI)	2,4 ÷ 2,45V/cell for VLA battery type 1,5 ÷ 1,65 V/cell for Ni-Cd battery type		
	Manual settable from HMI	2,35 V/cell for VRLA battery type 2,7 V/cell for VLA battery type 1,7 V/cell for Ni-Cd battery type		
Current battery charging	(settable from HMI)	1 ÷ In Amp		
Current characteristic		CONSTANT		
Output voltage stability	(ref.INPUT MAIN VAR.)	1%		
Output voltage stability	(ref.LOAD VAR.)	1%		
Output voltage stability		1%		
Output ripple	RMS	1%		
Overload	(without battery)	2 In x 5 mS	<120% per 20 min >150% per 5 sec	

ENVIRONMENTAL DATA
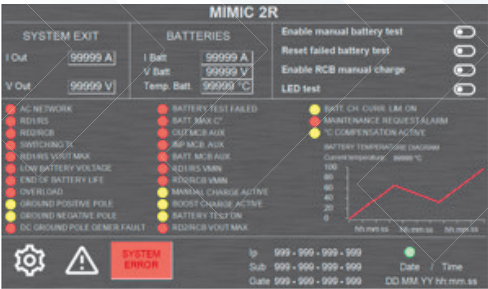
Noise level	Ref. EN50091	< 60 dBA (typical value with forced ventilation in operation)	
Emi		EN 61000-6-2 - EN 61000-6-4	
Operating temperature	°C	-10.......... +40	
Storage temperature	°C	-20...........+70	
Relative humidity	without condensation	< 95%	
Ventilation (on AC/DC conversion module)		Electronic temperature speed control	FORCED
Altitude	Mt.sl.m.	< 1000 (derating according EN62040-3)	

MECHANICAL DATA

Degree of protection - external	Ref. IEC 60259	IP 31 standard - others on request	
Degree of protection - internal	Ref. IEC 60259	IP 20 with open front door and additional protections inserted	
Paint		RAL 7035 cabinet RAL 7012 roof and base	
Dimensions (WxDxH) mm		To be defined according to the condition Iout/Autonomy	
IN/OUT cable connections		From the front with cable input from below	
Transportation		Base for handling with forklift	
Installation		From the floor	
Accessibility		Front	

PROTECTIONS

Input		Automatic Circuit Breacker	
Output		Manual Isolator	
Battery		Fuses	
General		Vout > / Vout< / Max.Temp. / Icc / Incorrect cyclic input	

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HMI - HUMAN MACHINE INTERFACE

All information regarding the system operating status is available on the 7 "color touch screen HMI (Human Machine Interface) operator panel with anti-reflective and scratch-resistant glass. The HMI is complete with a MODBUS TCP / IP and RTU interface (slave - server) for connection to external centralized control systems that use the same communication protocol, thanks to which the following functions are made available as standard:

1.1 WEB SERVER
Allows remote control of the system through an INTERNET browser

1.2 WEB MAIL
Allows e-mails to be sent to multiple recipients in case of an abnormal system

1.3 MANUALS AND TECHNICAL DRAWINGS
Allows viewing of these two types of documents directly from HMI for quick and hands-on on-site consultation.

HOME PAGE
Where you can find **all the information** about how the system works.

3 ALARMS LOG
From this page you can see the history of alarms. Clear **ALARM HISTORY** is password protected.

1 MAIN MENU
From this page you can access the areas of the various sub-menus of the system.
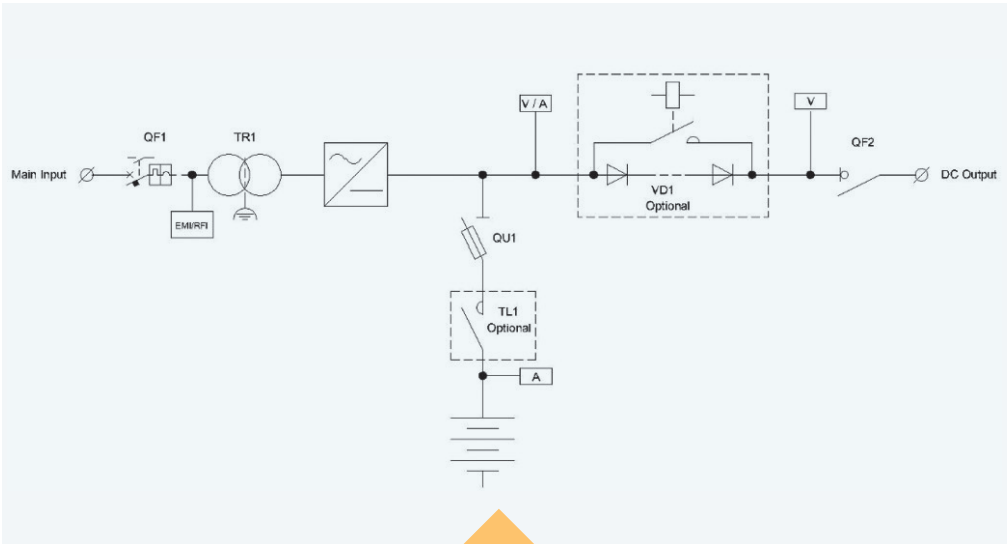
4 NETWORK CONFIGURATION
From this section, password-protected access, you can configure the IP parameters of the system's target corporate network.

5 MAIL SETTING
From this section you can configure the **MAIL SERVER** function that allows you to receive emails in case of system abnormalities. Each alarm generates an email when the **ON** state occurs and an on-the-spot alert to the **OFF** state. You can enter up to three mail recipients.

2 BATTERY TEMPERATURE GRAPH
Is displayed when the temperature compensation is activated and reports the trend of this parameter.
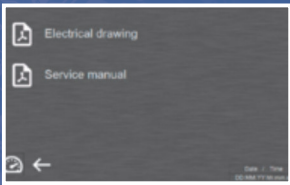
6 PDF DOCUMENTATION
From this page you can view on **HMI** the drawings and the technical manual for a quick and always available consultation.

COMPACT-PLATINUM 4.0 Industrial1- 3Ph Battery Chargers

DC UPS - BASIC SINGLE-LINE DIAGRAM - SINGLE BRANCH

STANDARD FUNCTIONS
- AC MCB with cont.aux.
- Floating charge
- Boost charge (f)
- Manual Charge (f)
- Temperature compensation(f)
- BATTERY (f) TEST Function
- DC EATHED sensor (f)
- Relay alarm card (f)
- **(f) - See FOCUS on later pages**

REPORTS AND MEASURES

HMI REPORTS
- AC main present
- AC/DC active
- Voltage output rectifier High/Low
- Load Floating
- Boost Charge (X)
- Manual Charge (X)
- Active Temperature Compensation(X)
- Battery charging current limitation active
- Positive pole on the ground
- Negative pole on the ground
- Output Overload
- Battery testing in progress
- Battery test failed
- Operating from batteries
- Low battery voltage
- End of battery drain
- High battery temperature(X)
- AC Input MCB OFF
- **(X)= HMI-enabled function**

MEASUREMENTS ON HMI
- Output voltage
- Output current
- Current battery charge
- Battery temperature

COMMUNICATION (MODBUS SLAVE TCP / IP)
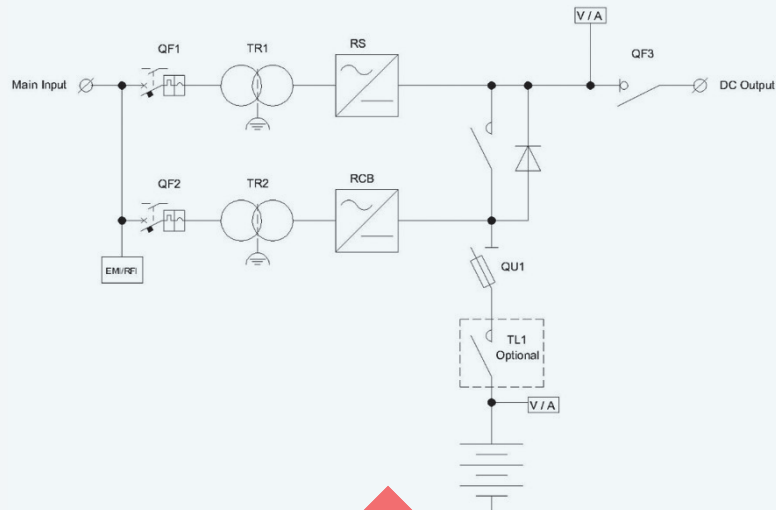
Word individual for electrical parameters:
- Output voltage to loads
- Output current to loads
- Battery recharge current
- Battery temperature

DOUBLEWORD ALARMS
- Showing all the signals present on the HMI

Code
1R

COMPACT-PLATINUM 4.0 Industrial1- 3Ph Battery Chargers

DC UPS - BASIC SINGLE-LINE DIAGRAM - DOUBLE BRANCH

STANDARD FUNCTIONS
• AC MCB with cont.aux.

SERVICES BRANCH RS
• Normal exercise voltage
• Emergency operating voltage (f)

BATTERY CHARGE BRANCH-RCB
• Floating charge
• Boost charge (f)
• Manual Charge (f)
• Emergency operating voltage (f)
• Temperature compensation (f)
• BATTERY TEST Function (f)

SYSTEM
• POWERBOOST Function (f)
• Relay alarm card (f)
• **(f) - See FOCUS on later pages**

REPORTS AND MEASURES HMI REPORTS
• AC main present
• AC/DC -RS-active
• AC/DC -RCB-active
• RS-output voltage High / Low
• RCB-output voltage High / Low
• RCB-Floating Charge
• RCB- Boost Charge(X)
• RCB-Manual Charge (X)
• Active Temperature Compensation(X)
• Battery charging current limitation active
• Positive pole on the ground
• Negative pole on the ground
• Output Overload
• Battery testing in progress
• Battery test failed
• Operating from batteries
• Low battery voltage
• End of battery drain
• High battery temperature(X)
• AC Input MCB OFF
• **(X)= HMI-enabled function**

MEASUREMENTS ON HMI
• Output voltage
• Output current
• Battery voltage
• Current battery charge
• Battery temperature

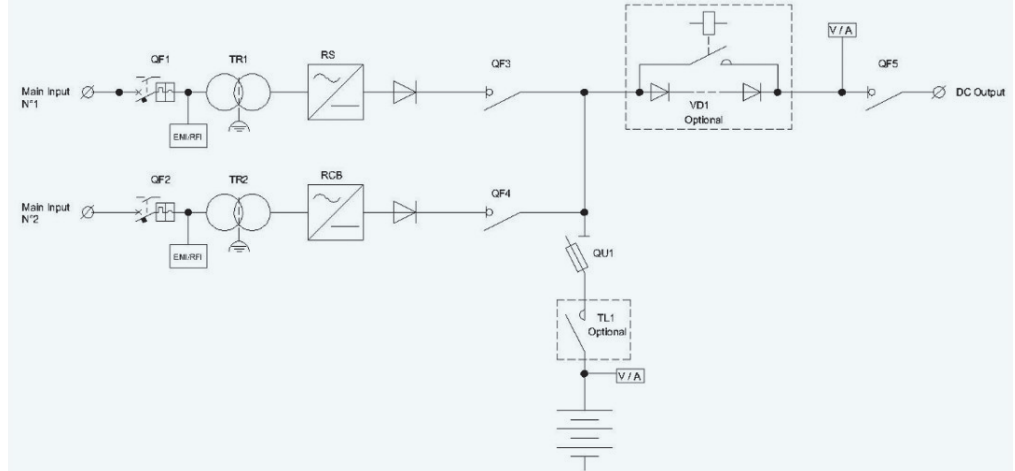**COMMUNICATION (MODBUS SLAVE TCP / IP)**

Word individual for electrical parameters:
• Output voltage to loads
• Output current to loads
• Battery voltage
• Battery recharge current
• Battery temperature

DOUBLEWORD ALARMS
• Showing all the signals present on the HMI

Code
2R

COMPACT-PLATINUM 4.0 Industrial1- 3Ph Battery Chargers

DC UPS - BASIC SINGLE-LINE DIAGRAM - DOUBLE PARALLEL BRANCH

STANDARD FUNCTIONS
• AC MCB with cont.aux.
• Floating charge
• Boost charge (f)
• Manual Charge (f)
• Temperature compensation (f)
• BATTERY (f) TEST Function
• DC EATHED sensor (f)
• Relay alarm card (f)
• **(f) - See FOCUS on later pages**

REPORTS AND MEASURES HMI REPORTS
• AC main present
• AC/DC -Rect.1-active
• AC/DC -Rect.2-active
• Load-output voltage High / Low
• Battery-output voltage High / Low
• Floating Charge
• Boost Charge (X)
• Manual Charge (X)
• Active Temperature Compensation(X)
• Battery charging current limitation active
• Positive pole on the ground
• Negative pole on the ground
• Output Overload
• Battery testing in progress
• Battery test failed
• Operating from batteries
• Low battery voltage
• End of battery drain
• High battery temperature(X)
• AC Input MCB OFF
• **(X) - HMI-enabled function**

MEASUREMENTS ON HMI
• Output voltage
• Output current
• Battery voltage
• Current battery charge
• Battery temperature

COMMUNICATION (MODBUS SLAVE TCP / IP)

Word individual for electrical parameters:
• Output voltage to loads
• Output current to loads
• Battery voltage
• Battery recharge current
• Battery temperature

DOUBLEWORD ALARMS:
• Showing all the signals present on the HMI

Code
2RP

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FOCUS

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BOOST CHARGE (REF. DIN 41772) - Fig.x1

This type of charging is recommended for tubular plate technology and/or NiCd batteries.The system is fully automatic as the charging current required by the batteries is read and this, by means of possible settings, determines the transition from FLOATING to BOOST and vice versa.This type of charge is protected by software security timers (fixed time of 12 hours) that automatically disables the feature automatically.
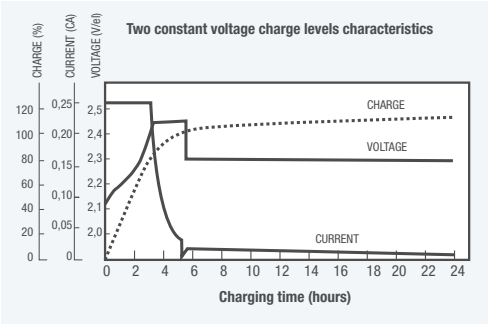

Two constant voltage charge levels characteristics

Fig. x1

FROM HMI you can:
• Activate and deactivate the function.
• Set the Boost charge voltage.
• Set the Ah capacity of the batteries required by the algorithm for proper operation.

MANUAL CHARGE

This type of charging is recommended for tubular plate technology and/or NiCd batteries.The function activates by push button on HMI
This type of charge is protected by software security timers (fixed time of 12 hours) that automatically disables the feature automatically.

FROM HMI you can:
• Activate and deactivate the function
• Set the Manual charge voltage.

BATTERY TEST

This function gives a further step of reliability to the system. During the Battery Test, the AC / DC section lowers its output voltage to a safety value, thus forcing the accumulators to deliver energy to the load. At the same time, the trend of the battery discharge curve is monitored and, if this exceeds the set setpoint values, the BATT.FAULT TEST alarm is triggered and the AC / DC section will instantly return to the FLOATING CHARGE value.

The presence of this function is very important to prevent anomalies in the BATTERY circuit that would, on the contrary, be found only during scheduled maintenance operations or in the event of a black-out with consequent loss of load.A second very important aspect that the BATTERY TEST this arrangement consists in reducing the phenomenon of SOLPHATION OF THE PLATES in the accumulators; this occurs when the battery remains in buffer charge for a long time without ever being used and leads to an exponential increase in the value of the internal resistance (Ri) of the accumulator. At this point, the more the Ri increases, the less the battery will be able to circulate current, putting the load at risk. Thanks to the periodic intervention of the AUTOMATIC BATTERY TEST, the exchange of ions between the positive and negative plates is triggered in the accumulator; this drastically reduces the SOLPHATION phenomenon by keeping the battery intact.
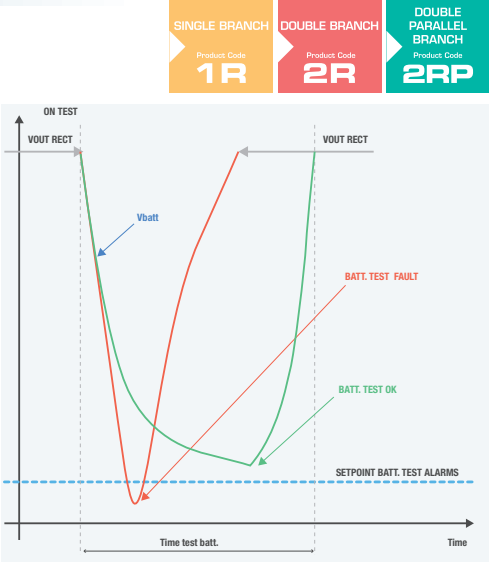

Fig. x2

Fig.x2 shows the trend of the system output voltage, when the BATTERY TEST is running.
The function is standard in two ways:

• **AUTOMATIC**
  The system tests the battery circuit at a user-programmable frequency.

• **MANUAL**
  It is possible at any time to carry out the TEST in MANUAL mode.

FROM HMI you can:
• Activate and deactivate the function
• Set the AUT TEST repeat days, in the range 1 to 45 days.

TEMPERATURE COMPENSATION

This function allows you to adapt the FLOATING charging voltage according to the ambient temperature in which the batteries operate, whether it is installed inside the rectifier, in a separate cabinet, or in an open shelf located in a technical room. The temperature is measured by means of a PT100 sensor to be positioned near the battery.
The correction of the charging voltage occurs in the temperature range 25 - 35 °C with fixed sampling at 10sec.; the correction acts only if the system is in FLOATING charge. After the temperature of 35 ° C, the correction is blocked at the value reached to allow the battery to be recharged anyway and an alarm is generated / stored on the HMI.

FROM HMI you can:
• Activate and deactivate the function
• Set the correction coefficient (V / el x ° C)
• Standard setting = 0.003V / cell
• Set the number of battery elements required by the algorithm for proper operation

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DC POLARITY ON THE GROUND SENSOR

There is a fixed-threshold sensor (about 15mA, referring to the system's output terminals) that detects possible loss of insulation of the output poles and batteries present in the system. This sensor is NOT similar to an ISOLAMENT CONTROL instrument but is provided to give an initial indication of any abnormality. The circuit detects the loss of insulation of the POSITIVE pole or the NEGATIVE pole differentiated .

FROM HMI you can:
• Activate and deactivate the function.

EMERGENCY VOLTAGE - REVERSIBILITY

Typical function of the 2R configuration. In the event of failure of an
AC / DC section of the system, the remainder automatically goes to a higher voltage value (usually the Vfloating value) to also allow the batteries to be recharged simultaneously.

FROM HMI you can:
• Set the EMERGENCY voltage

FLOATING CHARGE (RIF. DIN 41773) - Fig.x3

This recharge has two different phases:
• **PHASE 1:** the current is constant and the voltage increases
• **PHASE 2:** The current decreases and the voltage is constant

When the recharging current falls below a certain value, the batteries are considered charged and the cycle is over. In this situation the output goes to the floating value which is the minimum value necessary for correct recharging maintenance battery. Figure x3 shows the progress of the function.
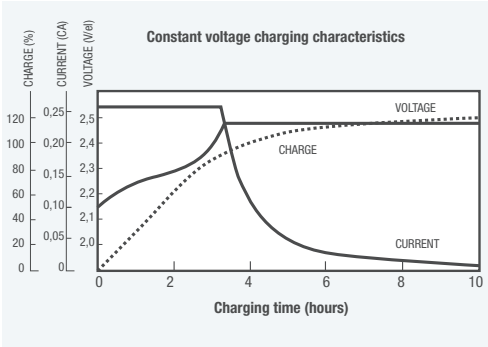

Constant voltage charging characteristics

Fig. x3

ALARMS RELAY CARD

There is a board consisting of 7 alarm relays with SPDT type contact shown on removable and polarized printed circuit terminals. The electrical contacts have a range of 5Amp to 250Vac

There are three fixed alarms respectively:

• **AC MAINS PRESENCE** - wired in positive logic
• **GENERAL FAILURE** - wired in positive logic
• **LOW BATTERY VOLTAGE**

While it is possible to configure the remaining 4 from the HM.
FROM HMI you can:
Configure 4 alarms depending on the menu on HMI.

POWERBOOST FUNCTION

Typical function of the 2R configuration. In case of overload on RS, the RCB branch automatically intervenes by putting itself in parallel with the load together with the entire battery bank.

The device automatically transforms its configuration from DOUBLE BRANCH to SINGLE BRANCH with TWO UNITS IN PARALLEL only for the time that the overload persists; in this condition, the output voltage of the entire system will go to the FLOATING CHARGE voltage value to also allow the simultaneous recharging of the battery bank.

It is important to emphasize that both branches must have the same power and the same characteristics. With this type of system in all respects, a "REDUNDANCY AND PARALLEL POWER" configuration is created in order to increase the reliability of the system and ensure a high degree of safety towards the load.

INPUT TRANSFORMER

The power transformer is made with a core of first choice laminations (optional the solution with oriented crystals) and an electrostatic screen between primary and secondary. It produces the reduction of the input voltage to the most appropriate value for the operation of the conversion system and isolation from the network (4kV).

The transformer is made with class F supports and insulators (155 ° C) while the windings are in electrolytic copper class H double insulation (220 ° C). There is an electrostatic shield connected to earth between primary and secondary.

The transformers comply with the Standard CEI EN 61558-2-4-file 4971 classification CEI 96-7.

WIRING - CABLE TYPE - SECTIONS

• Power cables AC and DC sections = FS17 CPR Cca-s3,d1,a3 (cable cross-sections according to power)

• Signaling and control cables = FS17 CPR Cca-s3,d1,a3 (sections 1mmq)

• Signaling and control cables = FRO-HP CPR Cca-s3,d1,a3

• FLAT CABLE = Flame Classification FT1,FT2

• Data transmission cables = Cavo RJ45 - CAT5 FTP