American CRS Equipment

CRS Industrial Power Equipment

PRODUCT MANUAL

# Sirius

## Manual for installation, use and maintenance

**Sirius 075 model : REV Axx**

Sirius 075 PFC model : REV Axx

**AIR COOLED**

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English




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## 1. INTRODUCTION

The present manual for use and maintenance serves as a reference for a complete guide and a quick identification of the machine and all its parts.

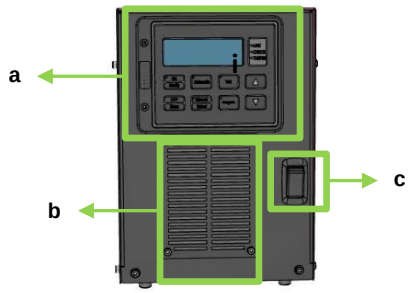
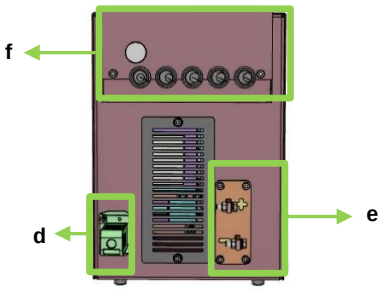
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## 2. GENERAL

### 2.1. Machine Parts

| *Model* | *Front View* | *Back View* |
|---|---|---|
| S075<br>Air cooled |  |  |

**LEGEND**

**a** Operator panel, with protection frame.
**b** Air filters
**c** Main I/O switch
**d** AC main input
**e** Output power bars
**f** Communications box (optionals)

## 3. SAFETY REGULATIONS

Read and carefully abide by the rules which are listed here under before installing, wiring, using, working or transporting the machine.

**WARNING!**

**The use of equipment for the power distribution in the galvanic plants, considering the high currents involved, involves dangers for oneself and other persons. The reading, knowledge and observance of the safety measures, here listed, are** a must which the careful operator, aware and faithful to his own duty, must follow for the maximum safety against any accident.

**WARNING!**

Do not try to install, to switch on or carry out the servicing or maintenance of this machine if you are not qualified to do so and if you have not read and understood this manual.

If you have doubts about the installation and the use of this machine ask the manufacturer (Customer care office).

**WARNING!**

Before installation, wiring, maintenance, service, inspection or reparation of this machine, be sure to turn OFF all input power with the main switch on the operator panel. Make sure whether the machine is powered ON or OFF.

Before setting-up the machine check that it has not any mechanical damages.

DO NOT REMOVE THE LOAD (BAR OR BARREL FROM THE BATH) BEFORE SETTING THE MACHINE IN STAND-BY MODE. This operation is extremely dangerous for the safety of the operators and the machine due to the voltage surge and could cause an explosion due to the development of hydrogen in proximity of the cathode element.

It is recommended to touch the machine wearing gloves, make sure that they are dry.

The accidental contact to ground can cause overheating and risks of fire.

Turn OFF the machine when is not being used and even in case of sudden suspension of electric power.

Do not touch the power connection lines when the machine is turned ON. Doing so may cause electric shock or burns.

**WARNING!**
RISK OF ELECTRIC SHOCK—High voltage warning—
Dangerous voltage is present on output bus bars. The professional installer must protect service personal from inadvertent contact with this dangerous voltage.




**PROHIBITED**
People having a heart pace maker are absolutely prohibited to get near this machine (less than 1.5m) and to the connection bar.

## LOCATION AND INSTALLATION



**WARNING!**

The installation of the machine must be in conformity with local regulations regarding safety measures.

Do not operate or store the machine in the following environments:

- Outdoors
- Exposed to direct sunlight
- Exposed to rain droplet
- Near equipment that produces sparks
- Subjected to vibration or shock
- In presence of conductive liquids (water solutions, acids, etc.)
- Near sources of heat



**WARNING!**

Select the input and output wires of diameters suitable for this machine. Not doing do may cause overheating or fire.

Install the machine in an area which can support its weight of it. Not doing so may cause the dropping of the machine, which can cause fire or injury.

The output power bars of the machine must be used only for electrical connections purpose and not as a mechanical support.

Absolutely avoid that the weight of the cables or copper plates of the bath starting from the machine create torsions on the output bars of the machine.

Make the output connections paying particular attention not to pass near the signal cables from/to other equipment. This is to avoid that the high currents involved may disturb the electronic equipment.

## OPERATION



**WARNING!**

Do not operate or store the machine in critical environments described in the present manual.

Do not remove the cover of the machine when the machine is turned ON. Doing so may cause electric shock or burns.

Before starting up the machine, ensure safety on the load side.

It is not recommended to work with CHECK LED. Maintenance to be done as soon as possible.

Do not spray water or other liquids which could prejudice the safety against the machine.

Avoid absolutely direct contact to metallic parts under voltage with skin or wet clothes. Doing so may cause electric shock.

**Do not leave the machine in operation unattended for a long time. Frequently check the status of the rectifier or monitor the status of rectifier via SCADA or PLC.**

## MAINTENANCE



**WARNING!**

The maintenance of the machine must be in conformity with local regulations regarding safety measures.

Before carrying out any maintenance or replacement operation, it is of utmost importance that the machine is turned OFF from the main switch on the operator panel. After turning it OFF make sure **to wait for at least 2 minutes** until all residual voltage inside the machine is discharged. In addition pay attention to the cooling elements which can reach a temperature of 80°C.

When performing maintenance, servicing or repairs make sure to wear suitable clothing.

## 4. TECHNICAL SPECIFICATIONS

### 4.1. Electrical specifications

| | | S075 model | S075 PFC model |
|---|---|---|---|
| Output | Output current | See rectifier's identification label | |
| | Output voltage | See rectifier's identification label | |
| | Operation Mode | Current Control or Voltage Control | |
| | Resolution | $V_{out}$≤ 25V / $I_{out}$≤ 25A - Min. step: 0.01 - Display resolution: 2 decimal digits<br>25V< $V_{out}$ ≤ 150V / 25A< $I_{out}$ ≤ 250A - Min. step: 0.1 - Display resolution: 1 decimal digits | |
| | Accuracy | 1% on full scale | |
| | Current regulation range | 5V ≤ $V_{out}$ < 60V : 2 - 100% of max current<br>60V ≤ $V_{out}$ ≤ 150V : 2 - 100% of max current | |
| | Voltage regulation range | 5V ≤ $V_{out}$ < 60V : 5 - 100% of max voltage<br>60V ≤ $V_{out}$ 150V : 5 - 100% of max voltage<br>- No voltage regulation without load - | |
| | Low frequency current ripple (RMS) | <1.0% of rated output current in current operation mode | |
| | Efficiency | 83% (typ.) @ rated load | |
| | Secondary withstand voltage | 500VAC 50Hz 1min. between secondary to earth | |
| | Pole to be connected to ground | Positive or Negative | |
| Main Supply | Line voltage | 120VAC or 230VAC for S075 / 230VAC only for S075 PFC ± 10% | |
| | Frequency | 50 - 60Hz | |
| | Neutral | USED | |
| | Power factor | > 0,6 @ rated load for S075 / >0.97 @ reated load for S075 PFC | |
| | Primary current | See rectifier's identification label | |
| | Earth leakage current | See EMC filter input specifications | |

### 4.2. General specifications

| | | S075 model | S075 PFC model |
|---|---|---|---|
| Technology | | Switching mode PWM, Forward Mosfet inverter | |
| Cooling systems | | Air | Air |
| Operation conditions | Location | Indoor use only | |
| | Ambient temperature | 0 - 40°C<br>(up to 50°C with 15% derating -air cooled) | |
| | Relative humidity | 15 - 85% not condensing | |
| | Filter obstruction (air cooled) | 15% max | |
| | Altitude | ≤ 2000m | |
| Degree of protection | Air cooled | IP31 | IP31 |
| Enclosure color | | RAL 3004 | RAL 3004 |
| Conformity of EU Directives | | 2006/95/EC - Low Voltage Directive | |
| | | 2004/108/EC - Electromagnetic Compatibility | |

### 4.3. Software and Serial interface

**Communication Protocols**

| | | |
|---|---|---|
| CRS-ASCII | Included | RS485(1) network |
| Modbus-RTU | Included | RS485(1) network |
| Profibus-DP | Optional with additional board | Profibus-DP network |
| DeviceNet | Optional with additional board | CAN bus network |
| Modbus/TCP | Optional with additional board | Ethernet |
| Profinet | Optional with additional board | Ethernet |
| EthernetIP | Optional with additional board | Ethernet |

**Communication Ports**

| |
|---|
| RS 485 (1) |
| RS 485 (2) |

All the above protocols are managed by only one software for DC / DCR / PP slow / PPR slow rectiers.
One specic software is required for PP fast / PPR fast rectiers.

### 4.4. Protection

**Burst & Surge**
According to standard EN61000-4-11 (Burst)
According to standard EN61000-4-5 (Surge)

**Output Short Circuit**
Default limit set to 25% of max. Iout
Detection time: 1ms

**Thermal Protection**
With PTC on each module

**Under Voltage lockout**
Not present

**Over Voltage lockout**
Present only on S075 120VAC.
Protect the S075 120Vac input voltage against wrong input voltage connections 230Vac.
In case of wrong connection, the input voltage sensig stops the AUX PSU and so on the rectifier.

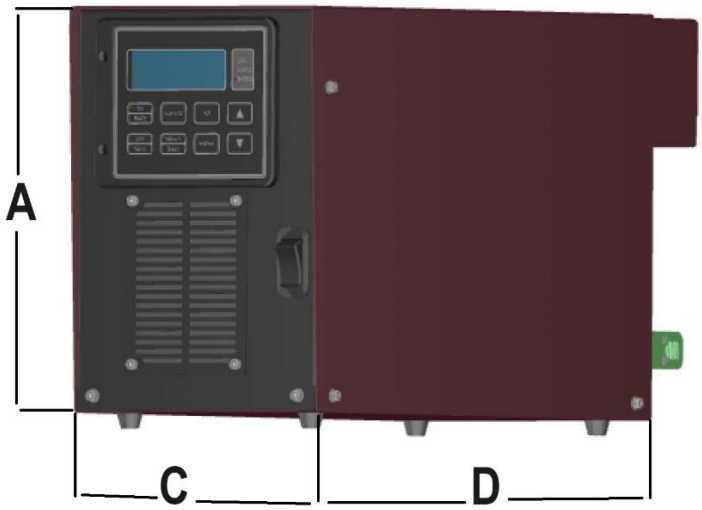
### 4.5. Total harmonic distortion of the absorbed current

The values reported in the table are referred to stable conditions of the mains single phase input line, properly sized (refer to short circuit ratio Rsce value according to the total installed power )

| S075 | | | S075 PFC | | |
|---|---|---|---|---|---|
| **Harmonic** | **Freq. (Hz)** | **Absorbed Current Distortions** | **Harmonic** | **Freq. (Hz)** | **Absorbed Current Distortions** |
| 3 | 150 | < 80% | 3 | 150 | <12% |
| 5 | 250 | < 67% | 5 | 250 | < 1% |
| 7 | 350 | < 50% | 7 | 350 | - |
| 9 | 450 | < 20% | 9 | 450 | - |
| 11 | 550 | < 9% | 11 | 550 | - |
| 13 | 650 | < 3% | 13 | 650 | - |
| 15 | 750 | < 3% | 15 | 750 | - |
| 17 | 850 | < 2% | 17 | 850 | - |
| 19 | 950 | < 4.8% | 19 | 950 | - |
| 21 | 1050 | < 4% | 21 | 1050 | - |
| 23 | 1150 | < 7% | 23 | 1150 | - |
| 25 | 1250 | < 2% | 25 | 1250 | - |
| THD | | MAX 120% | THD | | MAX 12% |

### 4.6 Mechanical Data

**S075**

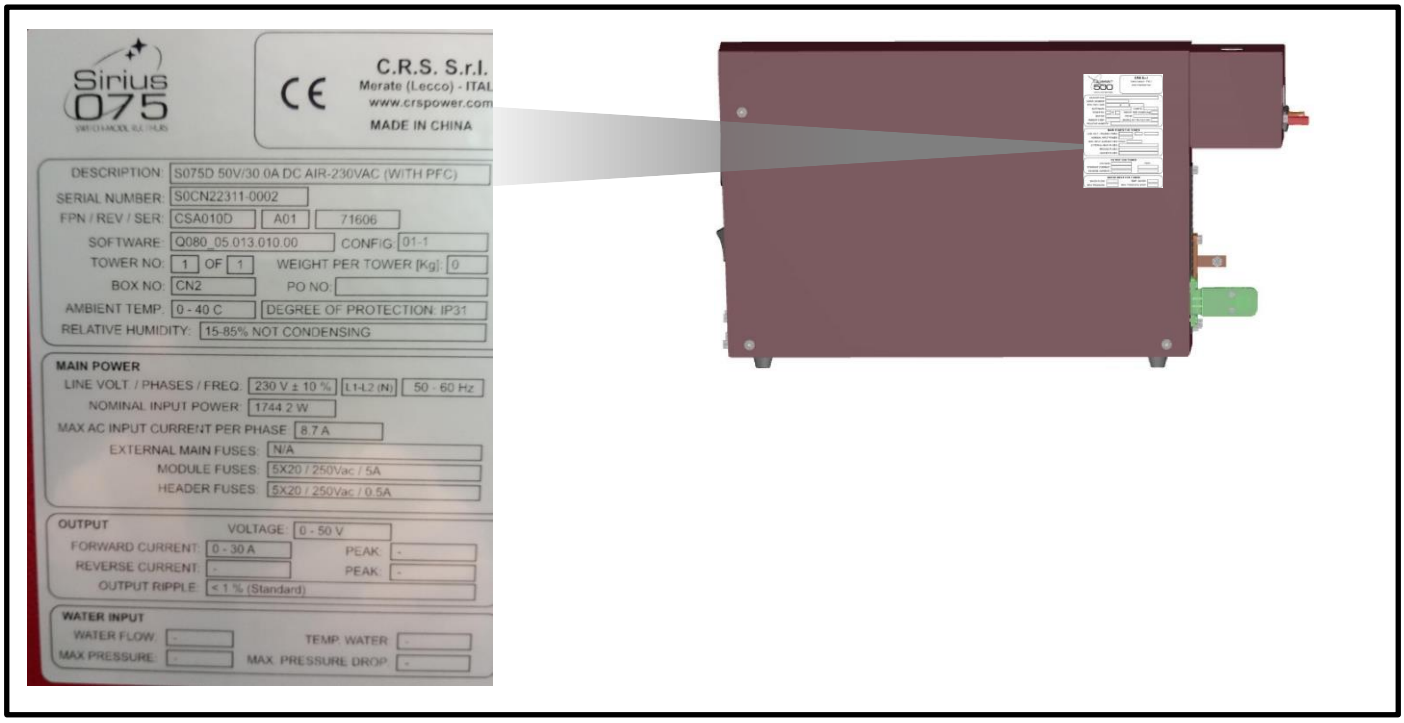



**S075**

| A (mm) | C (mm) | D (mm) | Weight (kg) |
|---|---|---|---|
| | | | Air |
| 270 | 190 | 397 | 8 |

## 5. IDENTIFICATION DATA

A label placed on the left/right side, front or rear of the rectifier indicates the machine type, serial number and the technical specifications of the machine:




**SECTION 1 - GENERAL**

| | |
|---|---|
| **DESCRIPTION:** | Indicates the output current and voltage of the machine, type and cooling system |
| **SERIAL NUMBER:** | Identification number of machine |
| **FPN / REV / SER:** | CRS Part Number / CRS revision number / CRS internal identification number |
| **SOFTWARE:** | Software installed on the machine |
| **CONFIG.:** | Machine configuration (See chapter 4.6) |
| **TOWER NO. / OF:** | Tower number and number of towers that compose the machine |
| **WEIGHT PER TOWER (kg):** | Weight per tower |
| **BOX NO.:** | CRS internal box number |
| **PO NO.:** | Customer purchase order number |
| **AMBIENT TEMP.:** | Ambient temperature (See chapter 4.1) |
| **DEGREE OF PROTECTION:** | Degree of protection (See chapter 4.2) |
| **RELATIVE HUMIDITY:** | Relative humidity (See chapter 4.2) |

**SECTION 2 - MAIN POWER PER TOWER**

| | |
|---|---|
| **LINE VOLT. / PHASES / FREQ.:** | Line voltage / Number of phases / Frequency |
| **NOMINAL INPUT POWER:** | Nominal Input power |
| **MAX. AC INPUT CURRENT PER PHASE:** | Maximum input current |
| **EXTERNAL MAIN FUSES:** | Type of main fuses installed |
| **MODULE FUSES:** | Type of fuses installed on module rack |
| **HEADER FUSES:** | Type of fuses installed on header |

**SECTION 3 - OUTPUT PER TOWER**

| | |
|---|---|
| **VOLTAGE:** | Output range of DC voltage |
| **FORWARD CURRENT:** | Output range of forward DC current |
| **FORWARD CURRENT PEAK:** | Output range of forward peak DC current (Only for PP & PPR type) |
| **REVERSE CURRENT:** | Output range of reverse DC current (Only for DCR ) |
| **REVERSE CURRENT PEAK:** | Output range of reverse peak DC current (Only for PPR type) |
| **OUTPUT RIPPLE:** | Output ripple |

## 6. INSTALLATION

**WARNING!**
The installation of the machine must be in conformity with local regulations regarding safety measures.

**Ignoring the regulations listed in the present manual may severely damage the operation of the machine.**

### 6.1. Transportation (Handling/Lifting)

All Quasar machines are wrapped in cellophane and positioned on a pallet or a wooden crate. The delicate transport of the machine is required to avoid abrupt hits to the structure; these can compromise the correct functioning of the machine itself.

**WARNING!**
Before setting-up the machine check that it does not have any mechanical damages.

### 6.2. Location

The machine must be installed:

1. Away from sources of heat.
2. Indoors in an area with enough natural airflow.
3. In the absence of the required aspiration of fumes, install the machine below the level of the tank so that the fumes do not affect the aspiration zone.
4. In order to favor the thermal dispersion and the maintenance operations, surrounding space on each side of the rectifier needs to be 50 cm on top, right, left, back sides and 100 cm on front side.
5. According to the IP / NEMA protection degree declared by CRS for the rectifier, and anyway absolutely avoid the use of the machine in the presence of conductive / aggressive liquids (watery solutions, acids and alkaline solutions, etc.).
6. Ensure that the operational surrounding area is dry, as all the objects present in it, including the machine.
7. Place the machine in an environment with a maximum temperature of 40˚C
8. Taking into account about operator access for service and maintenance operations (see chapter 10)

### 6.3. Power Supply Cables

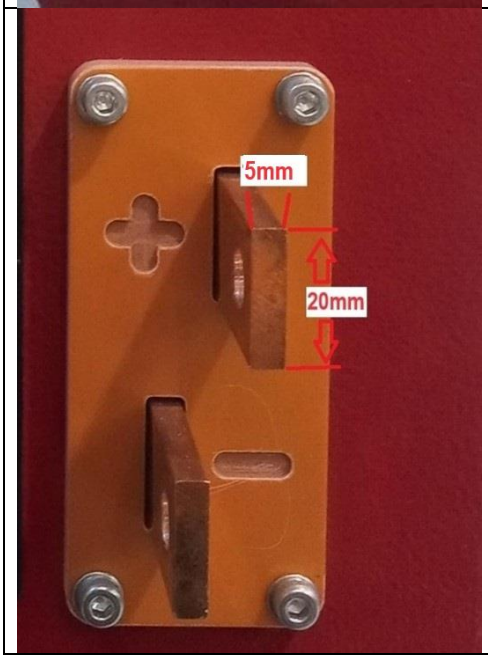
- Max input AC current per phase is reported on the identification data label placed on the rear of each rectifier.
- The power supply cables must be sized according to RMS input current (Iin_max) considering a proper insulation according to the RMS mains input voltage and their installation method.
- Refer to the international standard IEC 60364 “Electrical installations of buildings” part 5-52 “Selection and erection of electrical equipment” 2nd edition 2001-08” for the correct sizing of mains power supply cables.

### 6.4. Connection to the Main Line

Each machine needs to be connected to the main line according to the following points:

1. A manual circuit-breaker of an appropriate dimension pre-calculated as indicated in chapter 6.3.
2. Main line connections must be done by:

| | |
|---|---|
| S075 model: | single phases and PE cables connected with proper socket/plug system, provided with rectifier. |
| S075 PFC model: | single phases and PE cables connected with proper socket/plug system protected by AC box. |

| | | |
|---|---|---|
|  | | Main line:<br>120 Vac or 230 Vac<br><br>Phase-Neutral (single-phase)<br><br>L-N, PE<br><br>or Line to Line (2-phases)<br><br>L1-L2, PE |
|  | | Output copper bar dimension: |

-

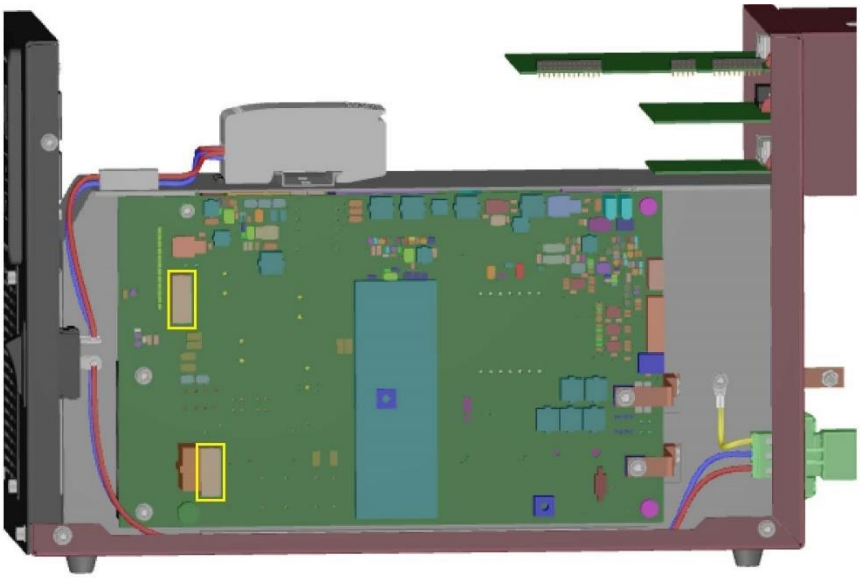
#### 6.4.1. E.M.C. filters

All S075 and S075 PFC machines are supplied with E.M.C. filter installed.

#### 6.4.2. Fuses

Sirius machines are supplied with below fuses, according to each model:

**S075 and S075 PFC models**
- On CPU card> Smd fuses are mounted on board (contact CRS technical office for information)
- Module fuses> N. 2 fuses 5x20mm T. Fuse values are reported on the identification label of the machine ( for UL compliance version 5x20 UL type)



### 6.5. Connection to the Treatment Tank

Connect the output power bars of the machine (See Fig. 13) to the treatment tank with a cable or with a copper plate of appropriate dimensions, taking particular care on locking the screws, considering the currents involved.

Deoxidize the output power bars of the machine with emery cloth and apply some ELECTROLITIC copper-based grease.
For rectifiers below 200V DC only the positive output pole of the machine can be connected to the earth. On request also the negative output pole can be connected to earth.

The dimensions of the output power bars are reported in “CRS_Qxxx_Conf_Spec” document.

Size theoutput bars of the connection between rectifiers and tanks according to the material/cables used for the connection, number of bars paralleled and their orientation, ambient temperature, maximum working temperature of the bars/cables accepted, max voltage drop accepted.

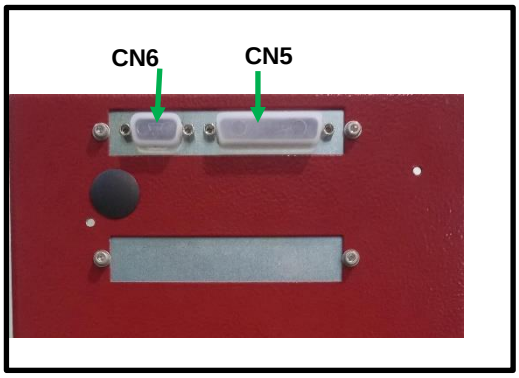
**WARNING!**
**Ignoring the rules listed here under could cause serious damage to the internal power components of the machine:**

1. The output power bars of the machine have to be used only for the purpose of electrical connections and not as a mechanical support.
2. Avoid absolutely that the weight of the cables or copper plates starting from the machine to connect the tanks create torsions on

the output bars of the machine.

3. Make the output connections paying particular attention not to pass near the signal / communication cables from/to other machine. This is to avoid that the high currents involved may disturb the electronic equipment.

## 7. RECTIFIER REAR CONNECTORS / COMMUNICATION PORTS




All Sirius machines are supplied with 2 male connectors Sub-D:
- CN5 (DB 25 pins male ) and CN6 (DB 9 pins male).
- both ports are located at the rear of the machine.

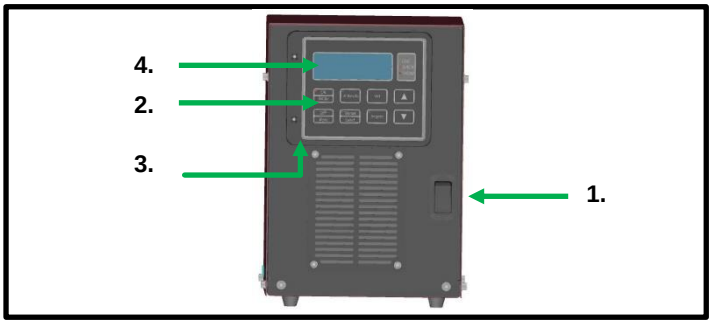
These connectors are used for different purposes: as interfaces with the daughter boards, to connect the rectifier to RS485 network and control some external devices by means of digital input / output ports.
Some of the pins can be configured for a proper function, please refer to the firmware manual of your machine for more details.

## 8. OPERATION

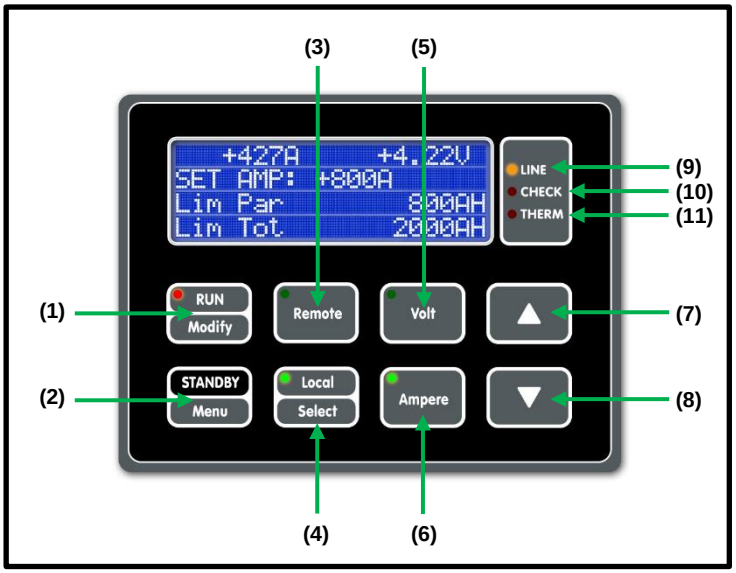
### 8.1. Operator control panel

The operator panel is composed by the following parts:

1. Main switch I/O
2. Keyboard (See chapter 8.1.1)
3. Frame to protect the keyboard
4. Display, 4 rows in blue backlight.




#### 8.1.1. Keys and indicators



| | | |
|---|---|---|
| **(1) RUN (ON)/MODIFY** | Function1:<br>Function2: | Start the rectifier when it is in Local operating mode<br>Confirm data changed in a menu entry |
| | LED ON:<br>LED OFF: | Machine started<br>Machine stopped (**STANDBY**) |
| **(2) STANDBY (OFF)/MENU** | Function1:<br>Function2:<br>Function3:<br>Function4: | Machine stop **(STANDBY**)<br>Access the **Main Configuration Menu**<br>Leave a configuration menu<br>Reject changes in a menu entry |
| **(3) Remote (Automatic)** | Function: | The control of the machine is taken from PLC or SCADA |
| | LED ON:<br>LED BLINKING: | Machine operating in **Remote**<br>The machine is receiving data from remote. |
| **(4) Local (Manual)/SELECT** | Function1:<br>Function2:<br>Function3:<br>Function4: | The rectifier is controlled in **Local** by the Keypad or by the REM.<br>Sub-menu selection from menu top level<br>Make menu entry editable<br>Access the **Operating Mode Menu** |
| | LED ON: | Machine operatin in Local. |
| | LED BLINKING: | Data received by the machine if it is connected to a SCADA. |
| **(5) VOLT** | Function: | Manual selection of voltage driving mode<br>*In water cooled machine with voltage mode control, press this button and keep it down to read the water flow rate and the temperature of the inlet water.* |
| | LED ON:<br>LED BLINKING: | Machine in voltage driving mode<br>Machine in voltage drive mode connected to REM08 |
| **(6) AMPERE** | Function: | Manual selection of current driving mode<br>*In water cooled machine with current mode control, press this button and keep it down to read the water flow rate and the temperature of the inlet water.* |
| | LED ON:<br>LED BLINKING: | Machine in current driving mode<br>Machine in current driving mode connected to REM08 |
| **(7) ▲** | Function: | Increase value |
| **(8) ▼** | Function: | Decrease value |
| **(9) LINE** | LED ON: | Primary main voltage present |
| **(10) CHECK** | LED BLINKING: | Error detected. Check the display for the error message related to the fault |
| **(11) THERM** | LED ON: | Thermal protection activate |

### 8.2. Starting Up

**WARNING!**
**Before starting up the machine read carefully the safety regulations reported in chapter 3.**

**IMPORTANT: If no load is connected to the output power bars, the machine is not able to supply current or voltage, therefore ensure that there is a minimum load connected to the machine before switching it ON.**

1. Turn the main switch I/O in position “I“ (ON)

   The LED on **LINE** will light up if power is available. Either the LED on the **AUTOMATIC** or **MANUAL/SELECT** key will light up depending on the mode previously used. Either the **VOLT** or **AMPERE** LED will light up depending on the previous usage.

   A carousel will appear on the display bearing the name of the manufacturer and the identification of the software installed; Example of software: CRS Q080_XX.YYY.Z,
   **CRS** = Manufacturer
   **Q080** = Software name installed in DC machines.
   **XX**= (numerical data) Revision of the CPU in which the software is istalled.
   **YYY**= (numerical data) Revision of the software.
   **Z**= this number is reserved to special firmware.

2. At this stage, the machine is in STANB-BY mode and it is ready to supply current or voltage in any of the following modes:

   **- Manual operation mode**
   **- Automatic operation mode**

**If no any error are detected, see Chapter 9, the machine will display the message RECTIFIER OK**

### 8.3. Operation testing

1. If no load is connected than short the outputs bars connecting positive and negative together with a wire of adequate size. Caution: the machines with output voltage > 50 V must be tested under load that permits to achive minimum 10 % of the full voltage of the machine.

2. Set the machine in MANUAL operation mode by clicking the **MANUAL/SELECT** key once and then set the machine in current driven mode by clicking **AMPERE** key; the green LED's of both keys should be lit at this time.

3. Start the machine by clicking **ON/MODIFY** key; its red LED will light up.

4. Press the ▲ key until you read 2-5 % of the full output current on the display; then release the ▲ key. If the current on the display goes down to 0.0 A after releasing the ▲ key, the machine is failing; otherwise it means that the forward current hardware is working fine.

5. If the machine has the reverse polarity feature (DCR & PPR type) and the previous step was done successfully, then set the current to zero amperes by pressing the ▼ key until you read 0.0 A on the display: when 0.0 A have been reached, release the ▼ key. Press the ▼ key again until you read 2-5 % of the full output current on the display; then release the ▼ key. If the current on the display goes to 0.0 A after releasing the ▼ key, the machine is failing, otherwise it means that the reverse current hardware is working fine.

## 9. ERROR and MESSAGE TRACING

### 9.1. Machine Error Indicators

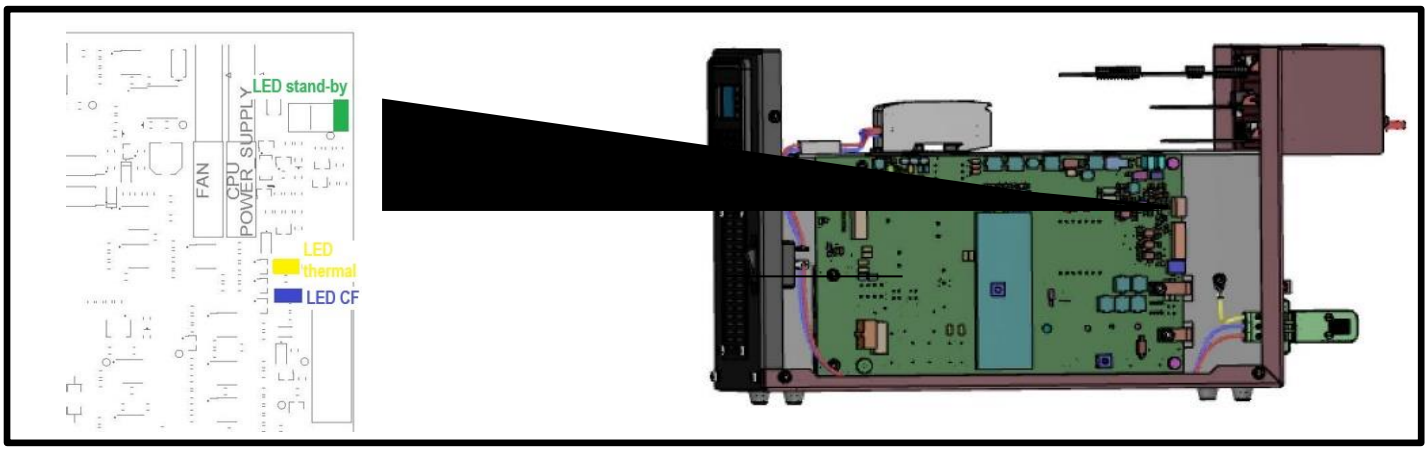
The errors are shown on the display of the machine through a short description.
Some of them are stored on CPU card, saved as LOG and checked at the display of the machine and/or with CRS Software manager program. In case the rectifier is connected through a fieldbus protocol , the LOG can be sent to PLC/Scada.
For errors map details refer to CRS software manual of the rectifier.

In case of error reported in the display of the CPU, in order to make a troubleshooting of the module, it is necessary to open the cover of the rectifier- see the paragraph 9.2

### 9.2. Power Module Error Indicators

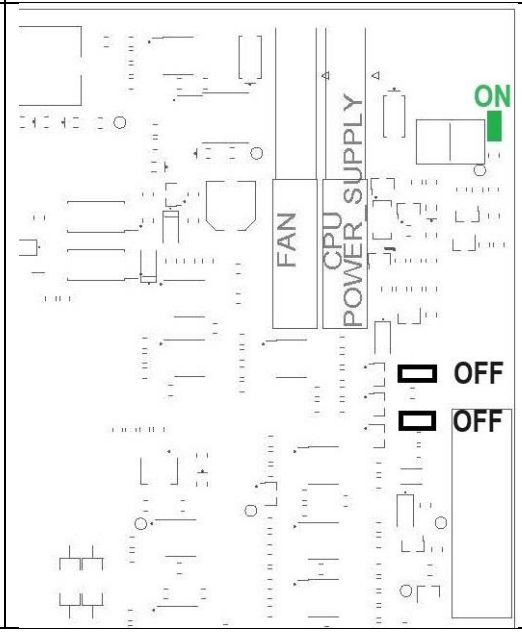
After removing the cover, it is possible to see the status of the leds. All power modules have 3 LED’s per half module and 6 LED’s

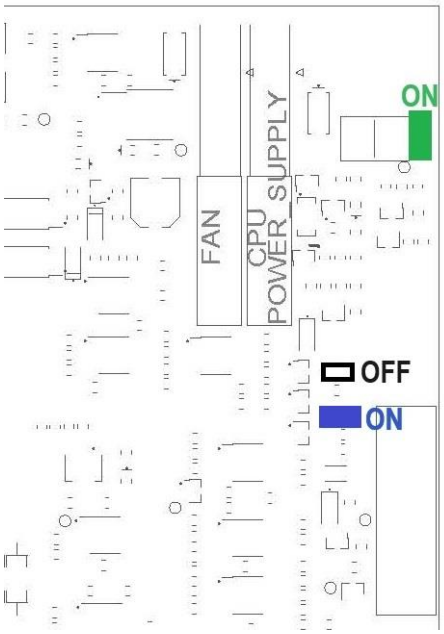
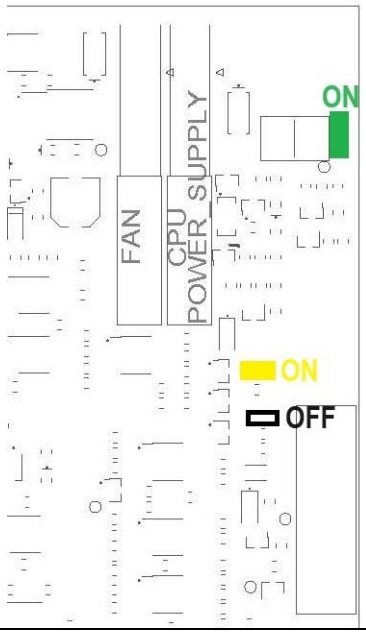
per full module: **blue, yellow and green** which indicate the state of the module.

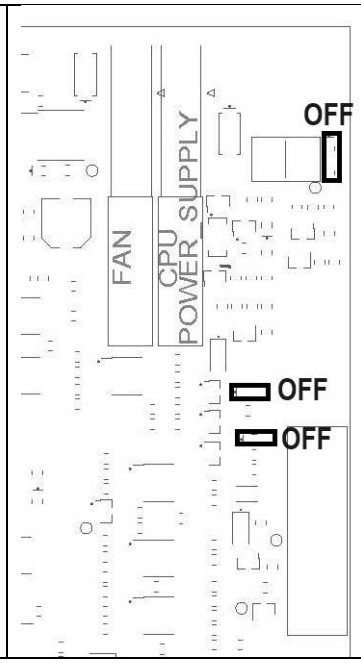



LED LEGEND:

- GREEN STAND-BY
- YELLOW THERMAL
- BLUE CF

| REF | INDICATOR | CONDITION OF THE POWER MODULE | WHAT TO DO |
|---|---|---|---|
| **A** |  | **A**. The led GREEN is ON, and the led yellow and blue are OFF.<br>The rectifier is in stand-by mode | |

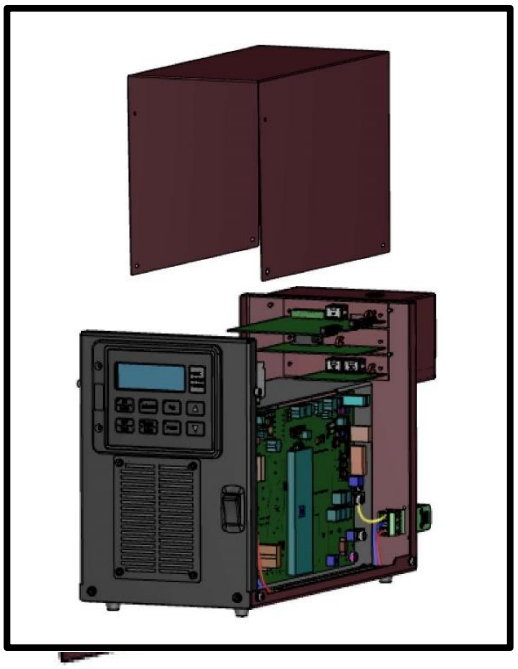
| | | | |
|---|---|---|---|
| **B** |  | **B1**. If the machine is in RUN mode, then the power module is in its normal functioning condition (supplying current). The intensity of the blue LED is directly proportional to the intensity of the supplied current and therefore with low current values, blue led may not be visible.<br><br>**B2**. If the machine is in RUN mode but the blue LED is off, it means that power module is FAULTY.<br><br>**B3** the blue LED is ON but the machines is not delivering the correct current. | In case of condition B2 and B3<br><br>The power board could be a problem. The module has to be inspected. Please contact the CRS Service Center. |
| **C** |  | **C1** Power module is not functioning as it is in THERMAL condition (overheating); in this case the power module stop to supply output current.<br><br>When temperature of the power components of the power module returns to normal, the power module will go to condition **B1**.<br><br>**C2** In stand by mode, or after the module is cooled down, the yellow LED remain ON. | C1 The module has to be inspected:<br>Check if the fans are fine;<br>In case of frequent overheating of the module, replace the power module, see also Chapter 9.1.<br><br>C2: the thermal sensor has an issue |

| | | | |
|---|---|---|---|
| **D** |  | The power module is completely FAULTY.<br><br>If all the led are off the power card are off then the power supply for the internal circuits is faulty. | Replace the power module. |

## 10. SCHEDULED MAINTENANCE

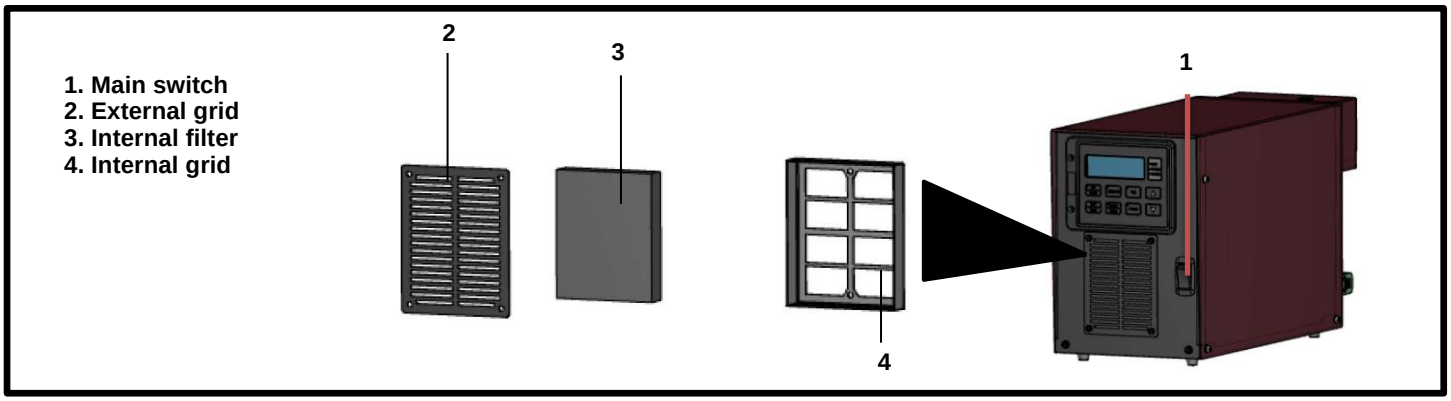
The machine does not need scheduled or frequently maintenance with regards to the operating functions. The only maintenance needed regards the cleaning of the filters and the cooling elements such as the analysis of the cooling water and its correct treatment.
Maintenance becomes necessary in case of errors indicated on the display or with the display LED's.

**WARNING!**
The maintenance of the machine must be in compliance with safety regulations.
Before carrying out any maintenance and service operation on the rectfier, it is mandatory that the machine is turned OFF from the main switch on the operator panel.
! Pay attention: if necessary to make service and remove the COVER, THE MACHINE MUST BE ELETTRICALLY DISCONNECTED FROM THE MAIN LINE.



After turning the I/O switch OFF make sure **to wait for at least 2 minutes** until all residual voltage inside the machine is discharged. In addition pay attention don't touch the cooling elements which can reach a temperature of 80°C during operation.

### 10.1. Cleaning operation






The scheduled cleaning may prevent the presence of air polluting elements in the filters and in the cooling elements.

**WARNING!**
The lack of cleaning may cause irreparable damages to the machine.

#### 10.1.1. Filters

Internal polyurethane filters need to be cleaned at least once every 3 months and be replaced with new filters once a year.

**Internal Filters** - of intermediate cooling units

1. Turn the main switch I/O (1) in position "O" (OFF) and wait for at least 2 minutes until all residual voltage inside the machine is discharged.
2. Remove the external grid (2). Pay attention on the cooling elements which can reach a temperature of 80°C.
3. Extract the internal filters (3) from their respective internal grid (4).
4. Replace or clean the internal filters. Use water to clean filters and let them dry before placing them back again.
5. Place back the internal filters (3).
6. Place back the external grid (2).

#### 10.1.2. Cooling elements

1. Turn the main switch I/O in position "O" (OFF) and wait for at least 2 minutes until all residual voltage inside the machine is discharged.
2. Remove the lids. Pay attention on the cooling elements which can reach a temperature of 80°C.
3. Extract the internal filters from their respective internal grid.
4. Clean the processing residue deposited on the cooling elements. This operation needs to be carried out using compressed air.
5. Place back the internal filters.
6. Place back the lids.

### 10.2. Condition of the cables

Check periodically the condition and the aspect of the insulation of power cables starting from the AC box of the machine.

### 10.3. Replacement of Components

**WARNNG!**
Before replacing any component make sure to switch OFF the machine from the main I/O switch on the operator panel. After turning it OFF make sure to wait for at least 2 minutes until all residual voltage inside the machine is discharged. In addition pay attention to the cooling elements which can reach a temperature of 80°C.

#### 10.3.1. Replacement of the power module

1. Turn the main switch I/O in position “O“ (OFF) and wait for at least 2 minutes until all residual voltage inside the machine is discharged.
2. Unscrew the external screws of the cover and remove it. Pay attention on the cooling elements which can reach a temperature of 80°C.
3. Disconnect the input line connector **A**, the flat cables **B**, the 2vias connector **C** and the four vias connector **D**, by unclamping its connectors, indicated on Fig 10.4.1.a .
4. Unscrew the 4 screw M4 that fix the power module to the schassies, indicated on Fig 10.4.1.b .
5. Unscrew the 2 screw M5 of the output cables of the power module that connect the power module to the copper bus bar, indicated on Fig 10.4.1.b.
6. Fold the output cables towards outwards, the flat cables **B** the top and pull out the power module forwards from the schassies, as indicated on Fig 10.4.1.c.
7. To mount the new power module, simply follow the steps from last to first. For the M5 screw of output cables in Fig 10.4.1.c use a mounting torque of 2.2 N·m.

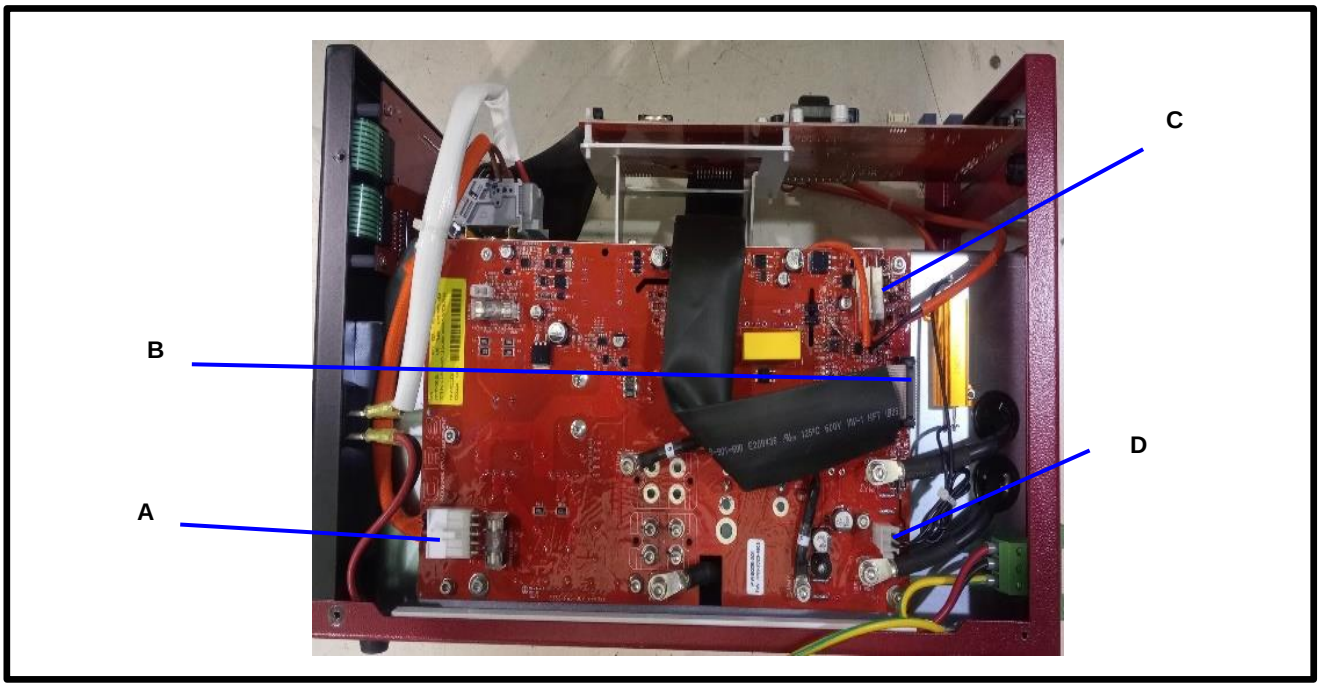



**Fig 10.4.1.a**

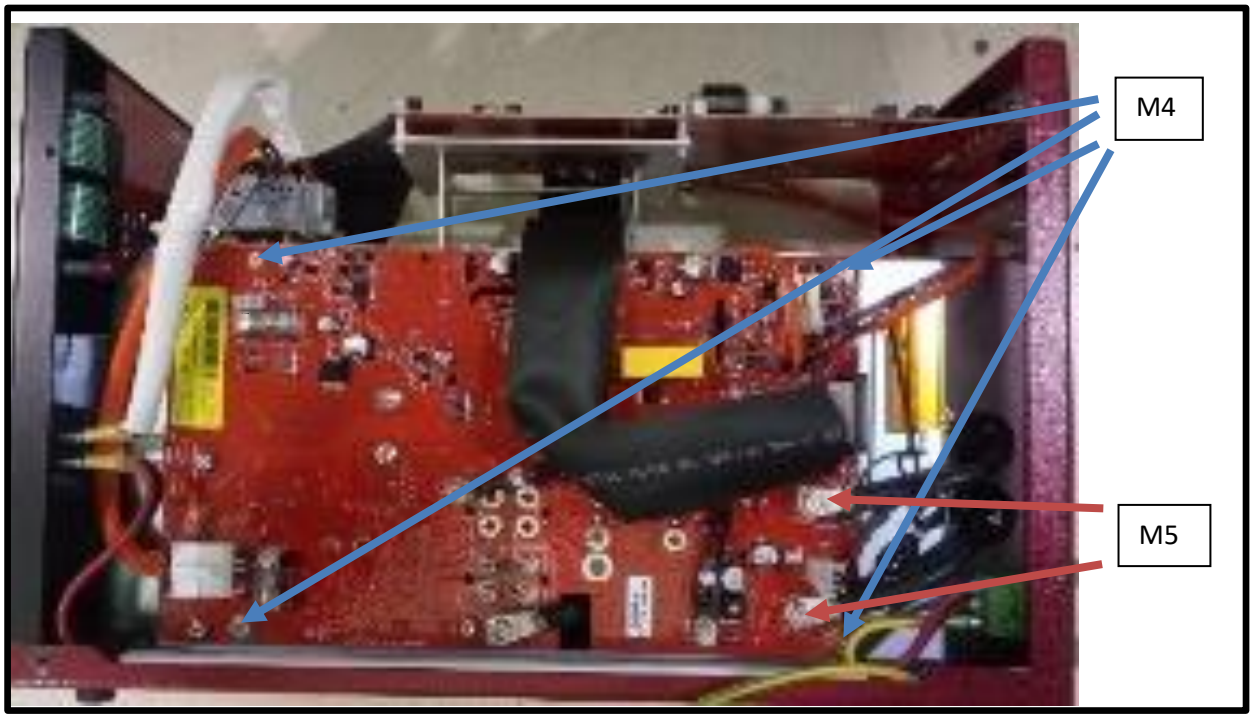



**Fig 10.4.1.b**



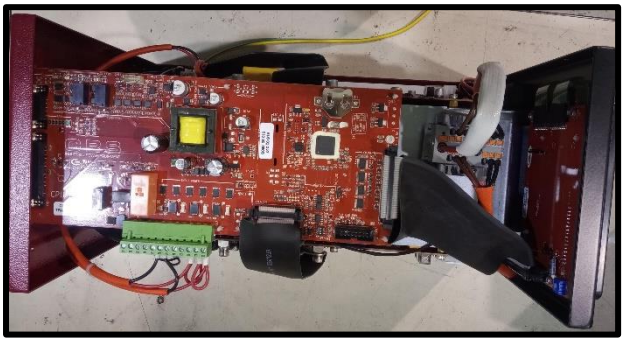
**Fig 10.4.1.c**

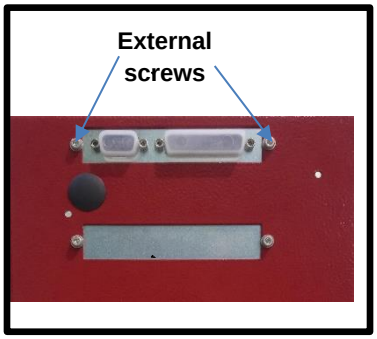
### 10.3.2. Replacement the CPU card

Check for Revision No of the CPU card before replacing it. The part number is CPU080 and it is written on the label of the board followed by the number of revision. The corresponding software installed is Q080_XX… see par. .

1. Turn the main switch I/O in position “O“ (OFF) and wait for at least 2 minutes until all residual voltage inside the machine is discharged.
2. Unscrew the external screws of the top cover and remove it.
3. Disconnect the flat cable that connects the CPU card to the display, the 2 bus flat cables that connect the CPU card to the power modules and the reverse driving flat cable (if a DCR or PPR machine is installed).
4. Disconnect the CPU power connector pulling it outwards.
5. Unscrew the 2 external screws located on the rear of the machine.
6. Remove the CPU card from the 4 plastic supports that are holding it and replace it.
7. Place back all components in the reverse order.








## 11. STORAGE

In the case of a temporary stop of the machine, it is necessary to store it in a dry and aired environment to prevent the creation of condensation drops which would damage the electric parts.

## 12. APPENDICES

The appendices are found on the following pages.

### 12.1. Appendices documents

Contact CRS S.r.l. customer care office to request any of the documents listed below.

| No. | CONCEPT | REFERENCE FILE |
|---|---|---|
| 1 | | |
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