



DIAM4200 1 to 2.5KVA

Single-phase Compact Sinus Constant Current Regulator



RECORD OF CHANGES

Rev.	Pages	Description	From S/N	By	App.	Date
1.0		First issue		ED	RG	05-06-2015
1.1	50	Nomenclature corrections		RG	RG	19-05-2016
1.2		Corrections		RG	RG	05-07-2016

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SAFETY

Safety precautions

This equipment is normally used or connected to circuits that may employ dangerous and lethal voltages. Extreme caution should be exercised by operating or maintenance people when working on or with this equipment.

See IEC 61820 & 61821 standard (CCR type IEC), or FAA AC150/5340-26 advisory circular (CCR type FAA), concerning safety rules and precautions. While practical safety precautions have been incorporated in this equipment, the following rules must be strictly observed :

- **KEEP AWAY FROM LIVE CIRCUITS :**
Operating and maintenance people must at all time observe all safety regulations. Do not change components nor perform maintenance inside equipment with power ON or the lighting loop energised.
- **RESUSCITATION :**
Operating and maintenance personnel should familiarise and keep themselves trained with resuscitation techniques found in widely published manuals about first aid instructions.
- **ELECTROSTATIC DISCHARGE (ESD) :**
Electronic sub-assemblies and boards should be touched only for unavoidable operation (replacement, for example). Before to operate, maintenance people must first of all eliminate unwanted electronic charges, discharging his own body while touching a conductive earthed object or part. Electronic boards and components as power semiconductors must be stored and carried in a conductive packing.
- **DESTRUCTION :**
In case of dismantling, scrapping or placing out of service, the user must follow all the required precautions for component, materials or equipment elimination, according to the local rules.

EEC DIRECTIVES



This equipment complies with the requirements of EC directives :

- 89/336/EEC, 92/31/EEC and 93/68/EEC with regard of Electromagnetic Compatibility
- 73/23/EEC with regard of Low Voltage Equipment

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ABBREVIATIONS

Abbreviation	Definition
A	Ampere
AC	Alternating Current
B	Brightness
CCR	Constant Current Regulator
DC	Direct Current
HV	High Voltage
IT	Isolation Transformer
LFD	Lamp Fault Detector
LV	Low Voltage
OO	Out of order
V	Volt
VA	Volt-Ampere

I DESCRIPTION

I.1 OVERVIEW

DIAM4200 series CCRs are stackable fully static devices controlled by four Igbts (alternative dimmer). They are designed to maintain a constant, pre-displayed and adjustable output current independently from the load and power supply fluctuations.

Unlike the thyristors CCR, the power factor measured at the input of the CCR is the load power factor any of output level current (all brightness).

They are intended to offer a low voltage device, thus ensuring that voltage will not exceed 1000V on either side of the CCR.

These devices are specifically designed for airfield lighting on runways, taxiways, aprons. They meet IEC and international standards.

In order to do this, they use an adapted triggering and regulation mechanism that is not affected by external interference and does not emit measurable interference in the Aviation Band between 100 and 400 MHz.

This type of regulator uses natural air-cooling. The output current remains constant with an accuracy of +/-100mA for mains voltage fluctuations of +/-10% (IEC type). At the rated load and the rated or higher voltage, accuracy of regulation is maintained for all load between 0 and 100%, and for up to 30% of transformers with open secondary. The output power of the regulator can be adjusted to the load by means of transformers taps, by steps of 25%.

Here are some of its advantages:

- **Flexibility of use :**
The alphanumeric display and menu type keyboard allow the CCR to be configured without connection with a computer.
Regulation is fully digital which enables parameters to be simply modified for a particular load.
Emergency and warning messages are clearly displayed.
- **Simplicity:**
CCR type regulators have a very simplified architecture both for the electronic control unit and the LV and HV power parts.
No load tapped setting.
- **Construction:**
It has been optimised to keep the number and variety of spare parts to a strict minimum. The device is made up of modular sub-assemblies.
They can be stacked up to 3 CCRs one on top of the other.
- **Standards:**
 - ICAO: Airport design manual, part 5
 - CENELEC: prENV 50231
 - FAA: AC150/5345-10 L828 & L829
 - AENA: PPT02-05/13 (2013)
 - IEC: 61822 (CCRs), 61821 (Maintenance)

I.2 MECHANICAL DESCRIPTION

I.2.1 DESCRIPTION

Each CCR is housed in a cabinet fitted with removable lifting rings. The frame has two distinct parts: a control part (in front) and a power compartment (at the back).

- The **Control part** of the CCR contains all the components connected to the power supply with, for example, the mother board and associated driver boards, the master switch, the LV breaker and connection terminals. It is located after opening the front door. The main electronic circuit board and the EFD board are fitted to the front door of the cabinet. All these parts are accessible from the front of the CCR.
- The **Power part**, situated at the back of the CCR, contains all the components connected to the output loop such as the power transformer and the lightning arrestors (option). The power board is located on the rear door.
- The LV, loop connections are connected at the rear of the CCR. The remote control is connected in front of the CCR.

All these components are easily accessible from the front, or the back of the cabinet.

I.2.2 GENERAL MECHANICAL FEATURES

All regulator's component are contained in the same cabinet. Cabinets are provided with lifting rings and can be located side by side. Up to 3 units can be stacked.

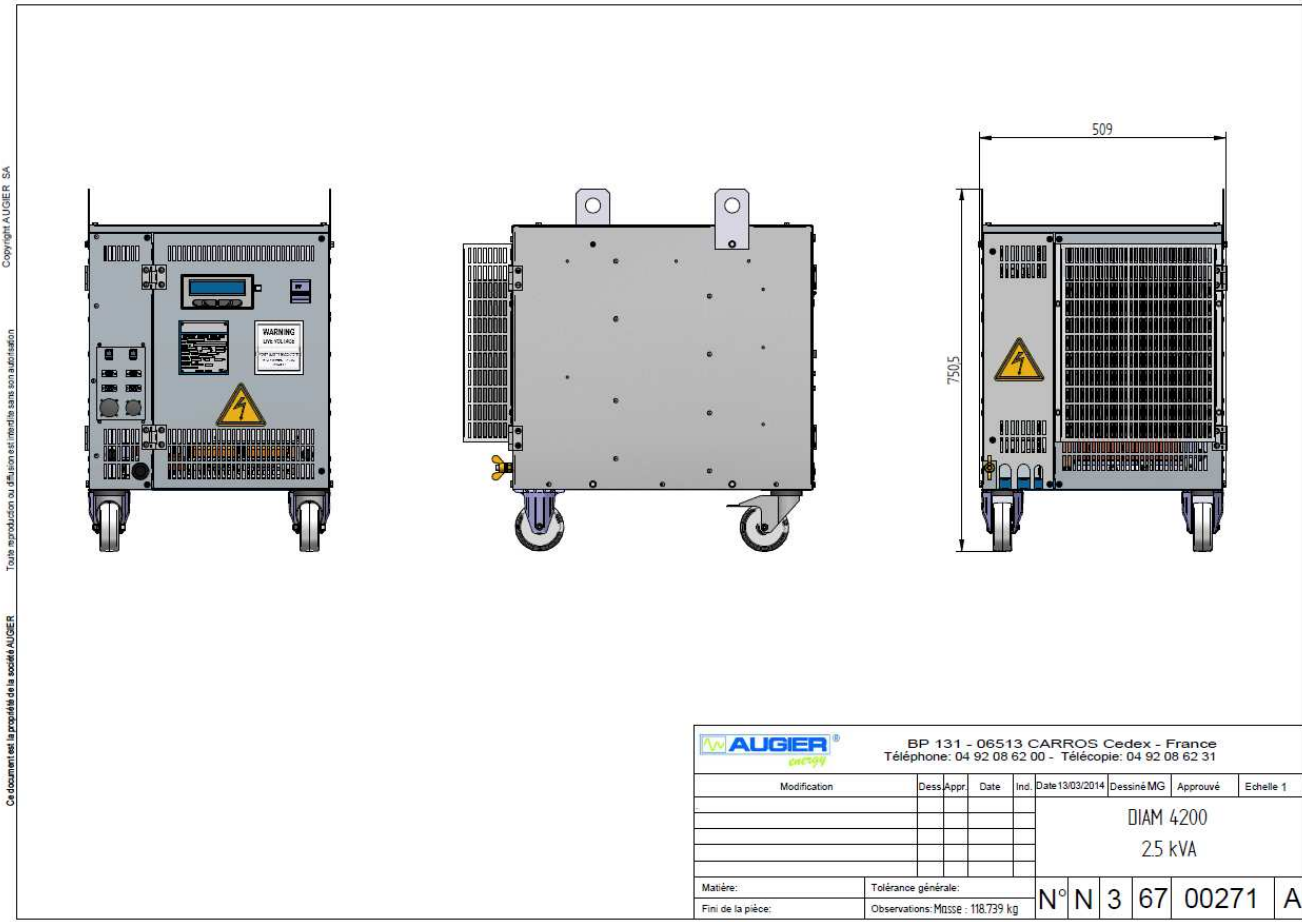
- Dimensions for 1 CCR: 530mm Wide x 730mm Deep x 550mm High (+130mm for rollers)
- Dimensions for 2 CCR: 530mm Wide x 730mm Deep x 1100mm High (+130mm for rollers)
- Dimensions for 3 CCR: 530mm Wide x 730mm Deep x 1650mm High (+130mm for rollers)
- Protection Index for the Casing: IP 20.
- Usage: Ambient temperature from 0°C (IEC type) to +50°C with maximum relative humidity of 95%. Natural air cooling.
- Three units can be stacked, in order to save floor space.
- Weight : (Can be modified according options)

1 unit 2.5kVA : 115kg

I.2.3 STORAGE CONDITIONS

The components are designed to be stored in a dry, airy location, sheltered from rain, water discharges and chemical agents. We must be consulted if the components are to be stored outside, or in an ambient temperature out of the range -40°C/+50°C.

I.2.4 DIMENSIONS



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Modification	Dess-Appr.	Date	Ind. Date 13/03/2014	Dessiné-MG	Approuvé	Echelle 1
				DIAM 4200 2.5 kVA		
Matière:	Tolérance générale:		N°	N	3	67
Fini de la pièce:	Observations: Masse : 118.739 kg					00271 A

Stacked CCRs :

2 Etages environ 233 KG

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Modification	Dess	Appr	Date	Int.	Date 13/03/2014	Dessiné MG	Approuvé	Echelle 1
DIAM 4200 25 kVA								
Matière:		Tolérance générale:		N°		N 3 67 00271		A
Fini de la pièce:		Observations: Masse : 118.739 kg						

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3 Etages environ 350 KG

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Modification	Dess	Appr	Date	Int.	Date 13/03/2014	Dessiné MG	Approuvé	Echelle 1
DIAM 4200 25 kVA								
Matière:		Tolérance générale:		N°		N 3 67 00271		A
Fini de la pièce:		Observations: Masse : 118.739 kg						

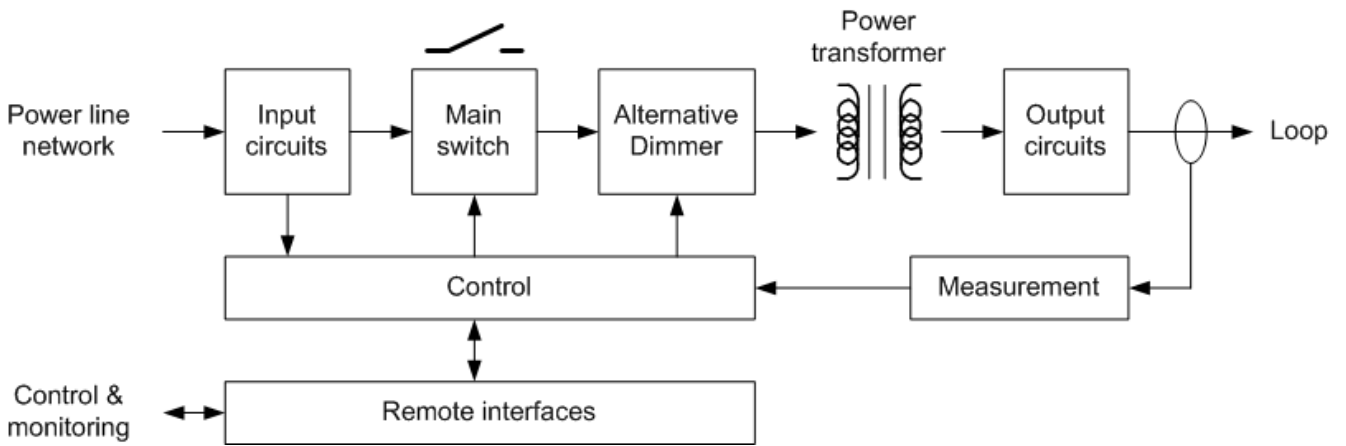
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I.3 ELECTRICAL DESCRIPTION

I.3.1 BLOCK DIAGRAMS

i See paragraph I.5 for the device operating description

I.3.1.1 Overview:



I.3.2 GENERAL CIRCUIT DIAGRAMS

i SEE: APPENDIX A: DIAGRAM

I.3.3 GENERAL ELECTRICAL FEATURES

- **Power supply voltage:**
Single phase: 220, 230, 240, 380, 400 or 415 Vac, +/-10% (IEC), 50/60Hz.
- **Maximum rated current:** 6.6 A
- **Number of Brightness Levels:** maximum 8, adjustable.
- **Heating Brightness (“Black current”):**
The CCR can produce “heating” level brightness at low current (1.8A preferred), which is used to remove condensation from the interior of the lamp lenses without lighting up their bulb. The symbol for local setting is ‘B0’.
- **Remote Control:** serial network, Ethernet (Modbus/TCP), souriau connectors
- **Output power:** 1KVA, 2.5KVA
- **Power factor:** > 98% (resistive load)
- **Efficiency :** > 80% at nominal voltage and rated resistive load.
- **Output Current Regulation:**
Better than $\pm 100\text{mA}$ under the following conditions: Power supply voltage $-10/+10\%$, Load: from 0 to 100%
- **Protection:**
The electronic circuitry is protected against fluctuations by the use of a Hall effect sensor for current measurement. Electronic board manages all overcurrent, open circuit or mains under/over voltage.
- **LV Protection:**
A circuit breaker for power and “glass” fuses on the circuit boards provide LV protection for electronic control.
- **Lightning arrestors :**
These regulators can be provided with output lightning arrestors (Option)

I.4 INSTRUCTIONS FOR USE

I.4.1 USER INTERFACE

Operating mode:

Stop mode :



Preferred information displayed: they can be changed by a long press on the “STOP” key, meanwhile the CCR is in Stop mode. The choice can be :

- Output current Io – Brightness state Bx (as seen in examples below and above)
- Output current Io – Output power Po (in kVA)
- Output current Io – Output voltage Uo

Local mode :



Access is given to B+ and B-, in order to increase / decrease the brightness step.

Remote control mode :



“Auto” is highlighted, in order to indicate the current state.

Brightness selection in local mode:



Decrease brightness in local mode

Increase brightness in local mode

Menus:



Access to menu



Keys used to navigate in the menus

Alarms and Warnings:

Alarm : (the CCR failed to supply the load); for example, the CCR is stopped by a loop open circuit :



Cancel fault(s)

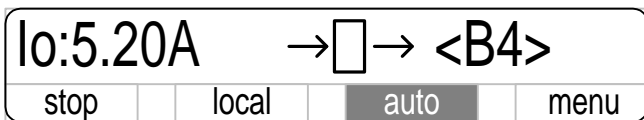
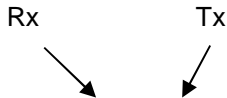
Warning : (the CCR doesn't stop; warning is only indicative); It is the case for EFD and LFD faults.

Alphanumeric display:

VFD display (16 x 140 pts) : upper text provide data information, and lower text the key definition.

Screen saver : The brightness decreases automatically or turn off after one hour if the keyboard is not used. Turns on again instantly when a key is pressed. (Function user-definable)

Rx: indicator Data reception on ETHERNET connection
 Tx: indicator Data transmission on ETHERNET connection



1.4.2 CONTROL

The device is controlled by mean of a 4 buttons on the keypad which allows to change the operating mode: "Stop" – Manual or "Local" mode – Remote or "Auto" control mode.

• **Stop mode:**



In that mode, "Stop" is highlighted. The CCR stops, whatever the current brightness orders (remote control or local selection). Menus can then be accessed.

• **Local mode:**



In that mode appears brightness controls : The brightness is chosen by pressing buttons **B-** and **B+** (from B0 to B7 maximum, according to the number of brightness levels configured).

• **Remote control mode:**

In that mode, "Auto" is highlighted. Operation of the CCR is controlled the serial network.



i See paragraph 1.5.2 to adjust brightness current and protection levels.

I.4.3 LOCAL INFORMATION FEEDBACK

Alphanumeric display:

- The display shows the RMS current flowing in the loop and the selected brightness (preferably).

In the “**Monitoring**” menu, the following information is shown:

- Uo: RMS output voltage in Vrms
- Po: RMS output power in KVA
- Ui: Mains power supply voltage in Vrms
- If option “LFD” is activated: Number of burnt lamps
- If option “Time meters” is activated: The operating time (powered on and for each brightness) in Hours

Warning:

WARNING is an indicative message, which does not change the regulation function, and supply function in connection with the load. (Except for mains warning)

If any warning have been detected, the following message(s) can be shown on the display:

- With the LFD option (“Burnt lamps”) :
“Level 1 Burnt lamps” (The current number of burnt lamps is greater than level 1)
“Level 2 Burnt lamps” (The current number of burnt lamps is greater than level 2)
- Mains power supply outside limits (Input voltage lower or greater than +/-10%)
- Regulation outside limits (as “error regulation” programmed values)

Fault:

ALARM represents a major fault of the CCR or due to an external event, which have stopped the CCR (in order to protect itself or the lighting loop).


In case of fault or damage, the display shows that the CCR stopped and that one or more faults have been detected. The following message(s) are shown on the display :

- Overcurrent Level 1 (after a trial to restart, the CCR cannot contain the output current which had reach the 1st level as programmed)
- Overcurrent Level 2 (ditto, for 2nd level)
- Overcurrent Level 3 (ditto, for 3rd level)
- Peak Overcurrent (ditto, for a 4th level, not configurable)
- Open circuit (the CCR detected an output current lower and during a greater time than the programmed parameters)

In order to re-start (after having fixed the fault), cancel the ALARM pressing the RESET key.

I.4.4 REMOTE INFORMATION FEEDBACK

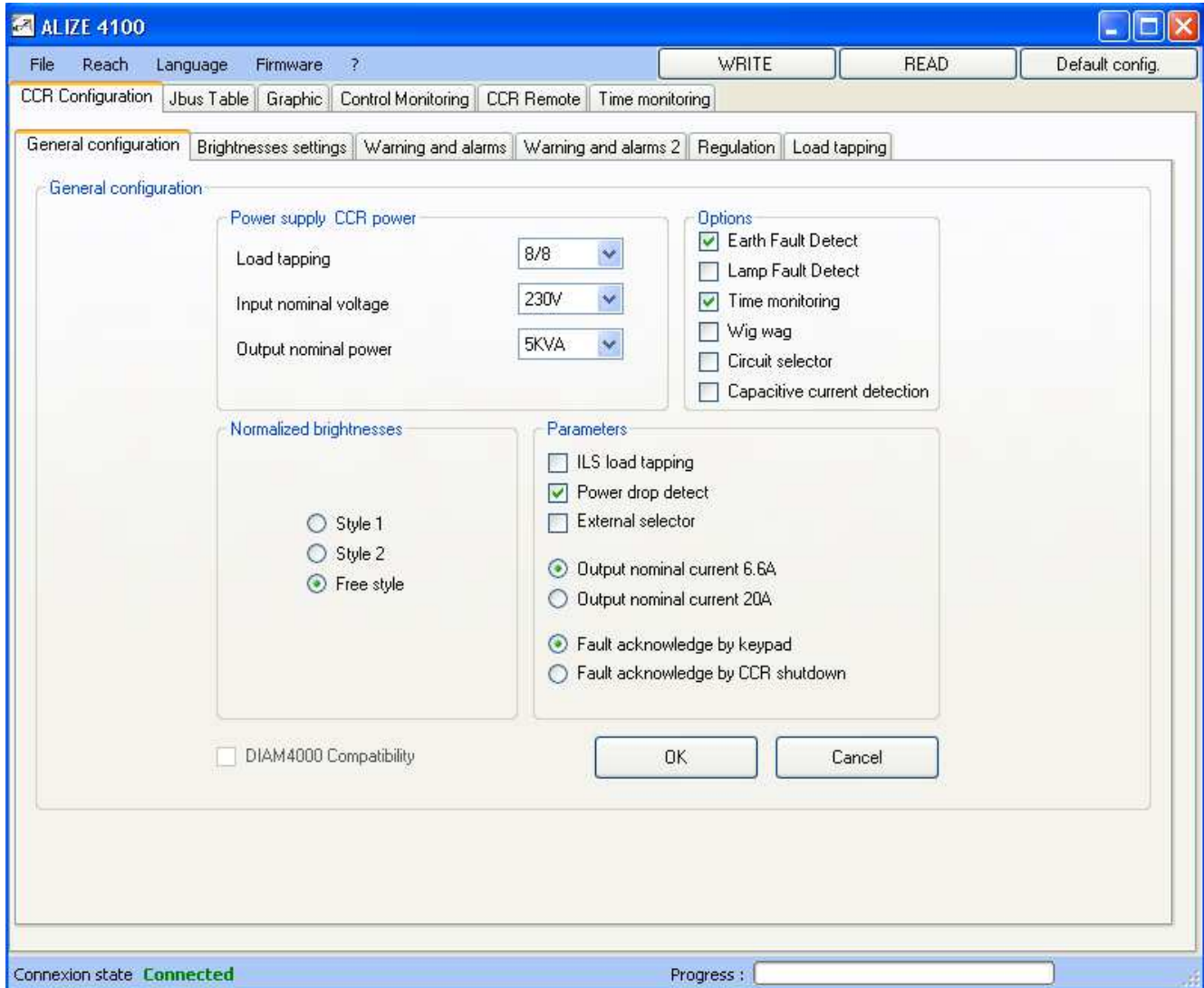
- RS485/RS422 Jbus link is fitted in standard.
- One supplementary RS485/RS422 Jbus link can be provided in option.
- One or two Insulated ETHERNET link can be provided in option.
- Multiwire remote control (SOURIAU CONNECTORS) can be provided in option.

 See II.2.for more details.

 See the JBUS table in the appendix b: jbus table, for more details.

I.4.1 CONFIGURATION SOFTWARE UTILITY

A software has been developed to set all parameters in the CCR. This software named ALIZE4100 can be download using the following link: <http://www.augier.com/soft/ALIZE4100.exe>





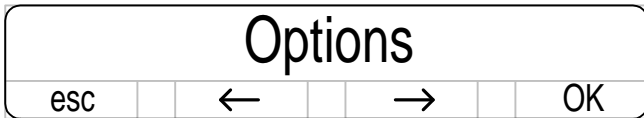
I.5 OPERATION

- i** The “*Parameter Access*” function must be activated before changing parameters, in order to avoid unwanted changes.

Pressing the **menu** touch, the display shows:



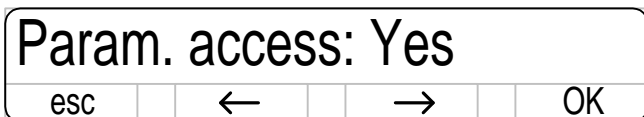
then scroll through the top-level menu items using the  and  keys. When the “*Options*” item is shown like:



press **OK** to go into the “*Options*” menu, then scroll through the items until the “*Param. access: NO*” item is displayed:



Press **modif** in order to modify the parameter. When the "NO" displayed blinks, it is possible to change the parameter : press < or > to in order to change “*NO*” to “*YES*” :



Save the modification by pressing **OK** .
Press **esc** twice to go back to the initial state.

ALL PARAMETERS ARE MODIFIED USING THE SAME PROCEDURE.

I.5.1 CONFIGURATION

The “*Configuration*” menu is used to define the basic parameters of the CCR (for example when replacing the main board):

- Rated mains voltage in Vrms: 240
- Rated power in KW : 2.5
- Number of brightness (Including B0): *from 1 to 8*
- Mains frequency in Hz: 50
- IEC type

I.5.2 SETTING

The “*Setting*” menu is used to assign values of current to brightness levels B0 to B7.

- Minimum value = 1 Arms
- Maximum value = 6.8 Arms

I.5.2.1 Current range:

The “*Regulation Error*” warning is triggered if the measured current is outside the ranges defined for each setting B0 to B7.

Each range is automatically calculated when a setting is changed (as described below) in the following way:

- Minimum value = Setting – 100mA
- Maximum value = Setting + 100mA

Nevertheless it is possible to set two limits of the current range manually using the “*Current range*” menu.

I.5.3 PROTECTIONS

I.5.3.1 LV power monitoring:

Mains voltage	Duration	CCR status
$U_i < 75\%$ of rated voltage	0s	CCR stops (Power supply Warning)
$U_i > 130\%$ of rated voltage	0s	CCR stops (Power supply warning)
$U_i < 85\%$ of rated voltage	60s	CCR stops (Power supply warning)
$U_i > 120\%$ of rated voltage	60s	CCR stops (Power supply warning)
$90\% < U_i < 110\%$ of rated voltage	0s	CCR automatically restarts

I.5.3.2 “Open circuit”:

Open Circuit Protection is activated if the output current goes below a defined value (*I level OC*) for a defined period (*Duration OC*). The CCR stops instantly, and the display shows the message “*Open Circuit*”.

Setting I level OC and Duration OC:

Go into the menu “*Alarms and Warnings*” then “*Open Circuit*”.

I.5.3.3 “Overcurrent”:

Overcurrent protection is activated if the output current goes above a defined value for a defined period. There are three adjustable Overcurrent levels:

Setting current levels I>> Level 1, I>> Level 2, I>> Level 3, Duration IL1, Duration IL 2, Duration IL 3 :
Go into the menu “Alarms and Warnings” then “Overcurrent”.

There is a fourth level, which is not adjustable : The fault “Peak Overcurrent!” occurs if the output current goes instantly above twice the nominal peak current (see IEC definition).

An Overcurrent fault can be automatically cancelled according to the value of the “Restarts number” parameter.

As each fault occurs, the number of faults is incremented. If the number of faults is greater than or equal to “Restarts number” in a period of less than 10s the fault is activated. The number of faults is reset to 0 after 10s without fault.

If the programmed number of restarts is reached without control of the current, the CCR stops instantly, and the display shows which level has been reached.

Setting the “Restarts number” parameter :
Go into the menu “Alarms and Warnings” then “Overcurrent”.

I.5.3.4 Cancelling “Open circuit” and “Overcurrent” faults:

Faults are memorised during a mains power loss :

Alarm message



to cancel any faults, press **reset** , when CCR is energised in the stop mode.

I.5.4 AUTOMATIC OPERATION:

The operation of the device is programmed into the software. In local mode, the brightness selected from the keyboard is activated, in remote control mode the highest priority is given to multiwire remote control (control terminal block), then to the ETHERNET communication interface

When a brightness level is activated, the motherboard turns on the main contactor and controls the thyristors optically in order to have an output current according to the desired setting.

It continually compares the loop current measurement coming from the measuring board (which uses a HALL effect sensor) and the requested setting, and then applies the error obtained to a digital regulator which generate thyristor control impulses and transmits them to the thyristor interface board.

The phase control for the thyristors is therefore constantly adjusted so that the true RMS current in the loop corresponds to the required setting with an accuracy better than 100mA.

i See paragraph I.3.1 for block diagrams of the system.

I.6 OPTIONS

I.6.1 EARTH FAULT DETECTOR (EFD)

This option is used to measure the insulation of the load with respect to earth.

The insulation controller, or “earth fault detector” continually checks the electrical resistance between the loop and earth. It uses the principle of continuous current injection at 500V and its range of measurement is between 1 kΩ and 65 MΩ.

The insulation resistance value can be seen in the “*Monitoring*” menu

Two comparison levels (warning and alarm) are available. They are preferably set at 1MΩ and 100kΩ.

Setting the *Level EFD1* and *Level EFD2* parameters:
Go into the menu “*Alarms and Warnings*” then “*Earth fault*”.

Remote indication :

- Each level passed is indicated by a contact relay
- The insulation resistance value, levels and warnings are transferred to the Jbus table.

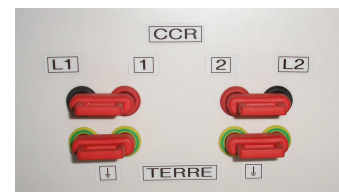
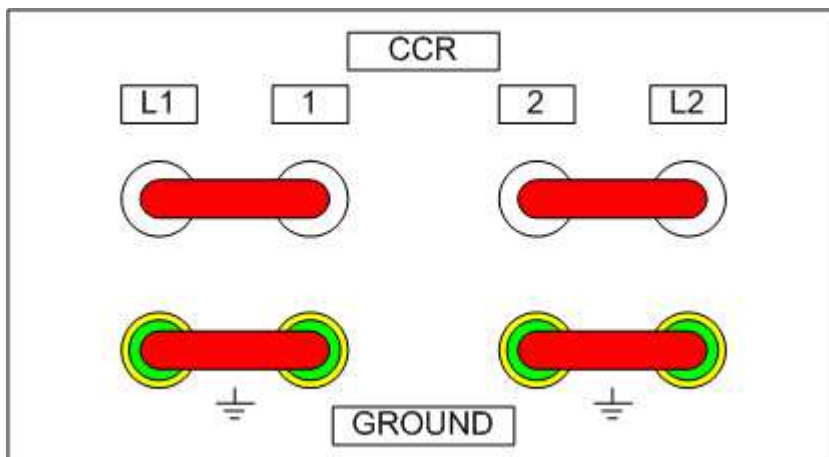
I.6.2 CUT OUT AND EARTHING PLATE

AUGIER’s experience regarding CCRs has been used to simplify the HV compartment and maintenance operations to the maximum.

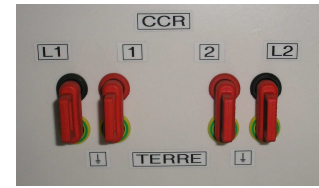
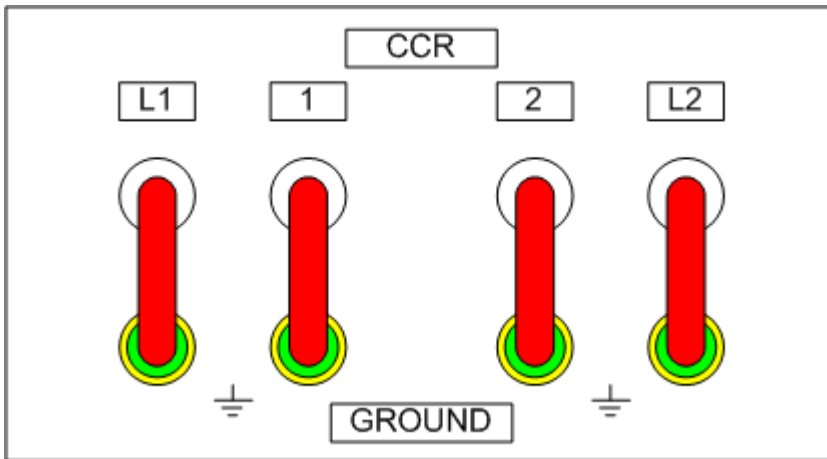
With that option, the CCR is equipped with a cut-out and earthing plate, using two jumpers which allows to carry out all maintenance and measurement operations, without unscrewing any load terminal or earth connection, and without requiring any special tools.

I.6.2.1 Normal position :

It is the operational position (jumpers In horizontal position).



I.6.2.2 Safety position:



By removing the two jumpers from the previous operating position as above, the CCR will be disconnected from the loop in a safe and clearly visible way. Then, placing the two jumpers in vertical position, CCR's output and the two loop's terminals (still isolated) will be short-circuited and grounded.

- ① This is the **safe position**, allowing works to be carried out on the field : CCR is short-circuited to the earth, and separately from the loop, also short-circuited and earthed.
- ① **WARNING** : Although the CCR and the loop are earthed, the CCR can be switched ON : In that case, it regulates a constant current through the jumpers.

I.6.3 OUTPUT LIGHTING ARRESTORS

This option consists of two lightning arrestors, which protect the CCR at each end of the loop. Current discharge is conducted through the CCR's main earth link, which must be of sufficient gauge.

If a particularly large current flow occurs (e.g. lightning strike directly on the loop cable), the lightning arrestor can short-circuit itself permanently, thus creating an "Earth fault". In this case, the two lightning arrestors must be replaced unconditionally.

I.6.4 CASTERS

CCRs can be delivered with casters (2 uni-directional, 2 omni with brakes)

I.6.5 BURNT LAMP DETECTION:

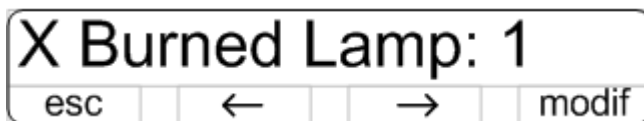
This option determines the number of burnt lamps in the output load.

This is carried out by measuring the load Voltage versus Current phase shift.

Internal parameters of the data collection system must be re-initialised each time the loop is modified (addition of transformers, replacement of transformers by more powerful ones, etc) or if any settings have been changed (load adjustment, for example).

To increase the accuracy of the measurement, it is necessary to perform the calibration with **0** lamp burned (1st stage) and **minimum 3%** of lamps burned (2nd stage).

Prior to performing the calibration, it is necessary to set the following parameter in the menu "Calibration":



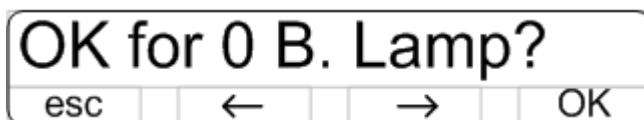
The X number must be set in function of the total number of lamps in the loop to realize the calibration (X can be set for 1 to 10 lamps).

Example: if the load loop is about 20 lamps, set the X parameter to 1 ($1/20 = 5\% > 3\%$).

Example: If the load loop is about 200 lamps, set the X parameter to 6 lamps. ($6/200 = 3\%$).

Initialisation can be carried out in two stages:

1. The loop should be connected up to the CCR with **no** burnt lamp (all lamps are working).
Go into the "Calibration" menu then:

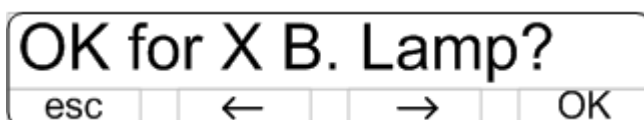


Press **OK** to start initialisation.

The message " Wait please..." blinks, meaning that data collection is in progress.

When the message stops flashing, data collection has been completed.

2. The loop should be connected up to the CCR with **X** lamp disconnected:
Go into the "Calibration" menu then



Press **OK** to start initialisation.
 The message “ *Wait please...*” flashes meaning that data collection is in progress.
 When the message stops flashing, data collection has been completed.

The number of fault lamps can be seen in the “*Monitoring*” menu

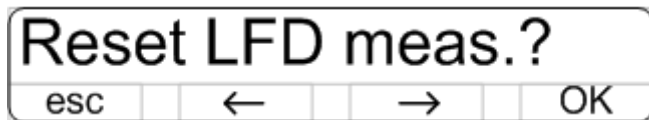
Two comparison levels (warnings level 1 & 2) are available. They are preferably fixed at 5 and 10.

Setting Level LFD1 and Level LFD2 parameters:
 Go into the menu “*Alarms and Warnings*” then “*Burnt Lamps Fault*”.

Remote back indication:

- Each level reached is indicated by a dry contact output
- The number of fault lamps, levels and warnings are transferred to the Jbus table.
-

To reset the stored values (for 0 and X lamp burned) during learning. Go in the menu “*Calibration*” then:

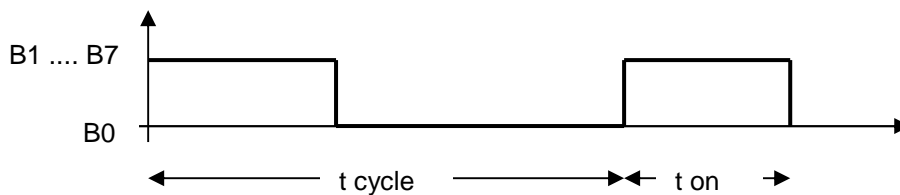


While pressing ‘OK’, learning is reset and to determine the number of burnt lamps on the output load, it is necessary to perform a new learning calibration (for 0 and X lamp burned).

I.6.6 WIG WAG

The CCR can operate in wig wag mode (LAHSO applications), activating the option flag in the “*Option*” menu.

In the menu “*Wig Wag*”, it is possible to modify the “*WigWag cycle*” and the “*WigWag ton*”.



II INSTALLATION

II.1 PREPARATION

II.1.1 EQUIPMENT RECEPTION

II.1.1.1 Equipment delivered:

The following are delivered with the CCR:

- The "Installation and Maintenance" instructions manual for the device
- Factory test report for the device

II.1.1.2 Checking the equipment:

When the device is received, check that the frame and its components (in particular the electronic and LV units) are in good mechanical condition with no distortion or signs of impact.

Check also that the power transformer shows no signs of being transported in a wrong position and that its protective packaging is not damaged.

II.1.2 TRANSPORTATION

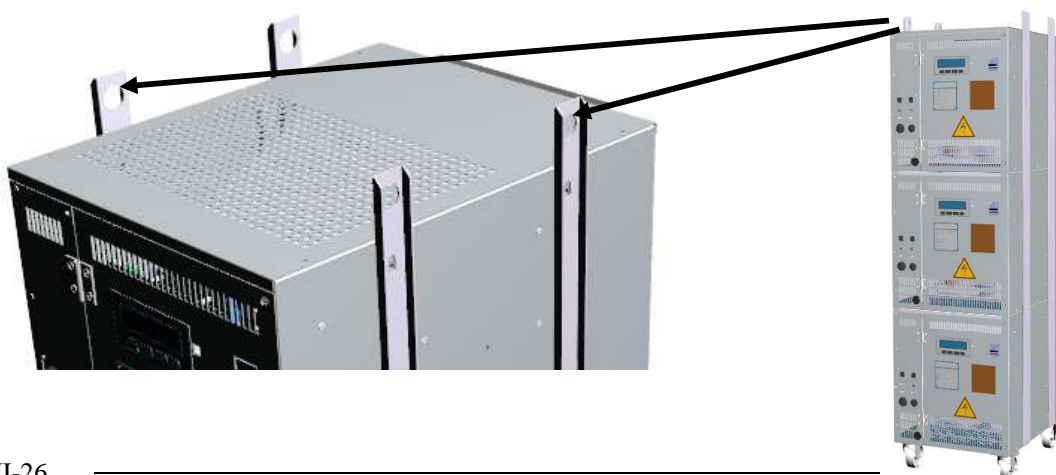
Stand alone CCR :

The CCR can be moved and transported using its rollers and the two removable lifting rings



Stacked CCR

Don't use the 2 small lifting rings shown above, but only the 4 long lifting rails shown below :



II.1.3 DEVICE LOCATION

In deciding the permanent operating location for the device, the following points must be kept in mind:

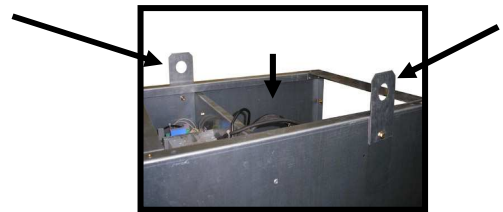
- An easy access must be kept to the front door with no obstruction.
- CCRs can be placed side-by-side, or stacked one on top of the other.
- Leave a 20cm gap at least at the back of the device to allow sufficient ventilation
- Environmental conditions must be such that the temperature does not go outside the range -20°C to +55°C and that relative humidity does not exceed a maximum of 95%.
- The location must be compatible with the "IP20" protection index of the CCR.

II.1.4 STACKING DEVICES

The cabinet of DIAM3100 is designed to be stacked (3 units maximum).
In order to achieve that disposition, frames have to be prepared as following :

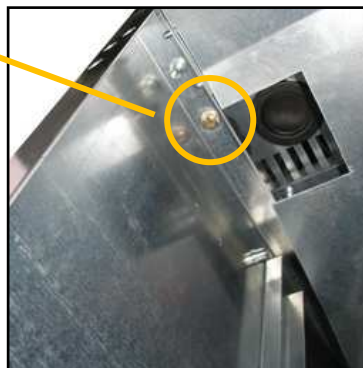
1. All CCRs :

- Remove the two lifting rings, and the top roof
- Fit and fix the CCR at its place



2. Upper CCRs :

- Remove the four casters
- Put the upper CCR onto the lowest, and fix it by means of screws (using the roller' screws) :



II.1.5 CHECKING THE INSTALLATION

Checking the suitability of the electrical installation in which the CCR is to be integrated, the following points must be observed:

II.1.5.1 Single phase power supply :

This must be compatible with the electrical characteristics of the device as shown on the rating plate and factory test report.

The rated mains voltage is recorded in the software on the motherboard and is required for calculations.

The configured rated voltage can be seen in the “*Configuration*” menu, and written on the identification plate, on the front panel.

i See paragraph I.3.3 for the electrical characteristics of DIAM CCRs.

II.1.5.2 LV Protection :

The LV protection for each CCR from the mains must be proportioned according to the power of the CCR, the rated voltage and the type of protection already present on the CCR.

The following tables are given for information only, for cable lengths between fuse boxes and CCRs of less than 30m (Circuit breaker examples : MG references)

Power	220 to 240V Power Supply		380 to 415V Power Supply	
	LV cable gauge	LV circuit breaker	LV cable gauge	LV circuit breaker
1KVA	6 mm ²	IC60N 20A D	4 mm ²	IC60N 16A D
2.5KVA	6 mm ²	IC60N 25A D	6 mm ²	IC60N 20A D

II.1.5.3 Lighting loop :

Check that the installed power corresponds to the power of the CCR, check the continuity of the loop and the number of lamps blown.

The rated output power is recorded in the software on the motherboard and is required for calculations.

The configured rated power can be seen in the “*Configuration*” menu

II.1.5.4 Control by remote control :

Check the remote control mode using ETHERNET, RS485 or SOURIAU link.

i See paragraph I.3.3 for the electrical characteristics of the DIAM4200 CCRs.

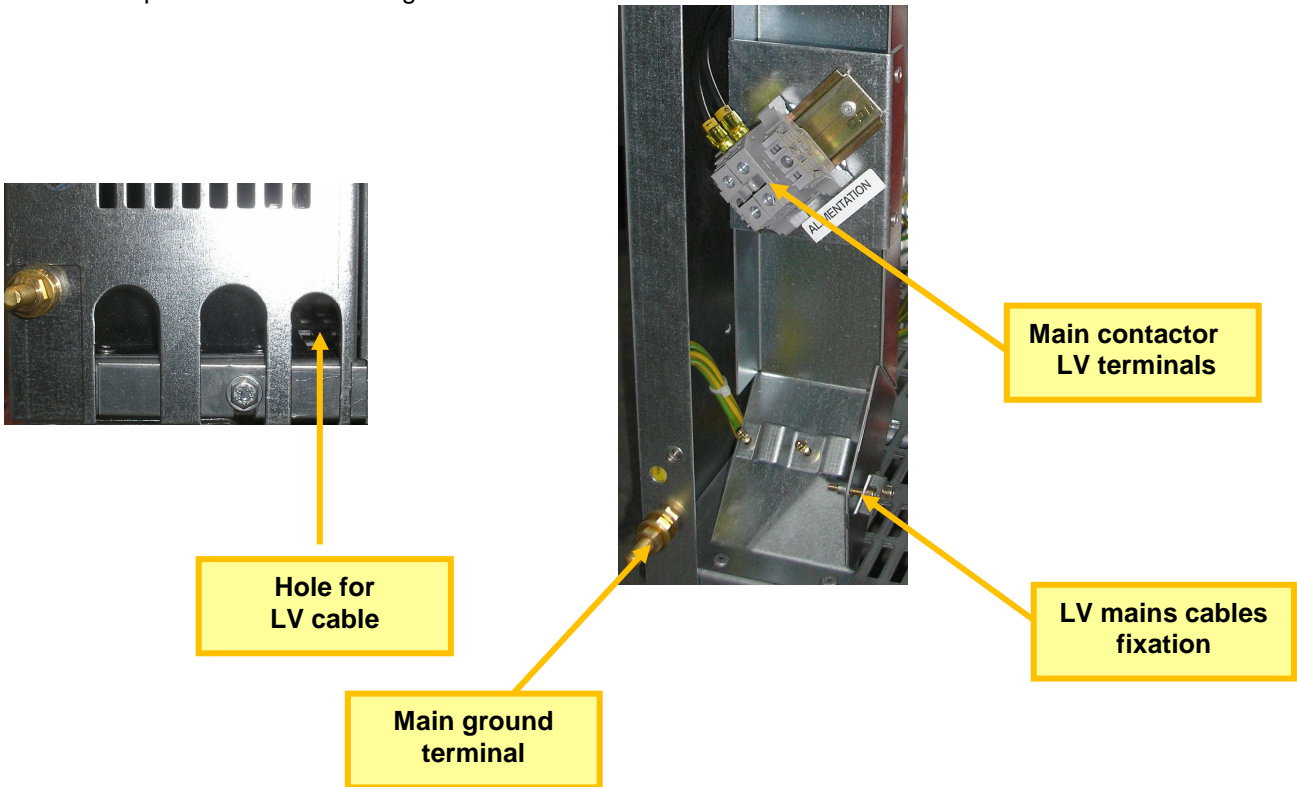
II.2 CONNECTIONS

II.2.1 POWER AND EARTH

i **N.B.:** before making any connections, make sure the installation is turned OFF.

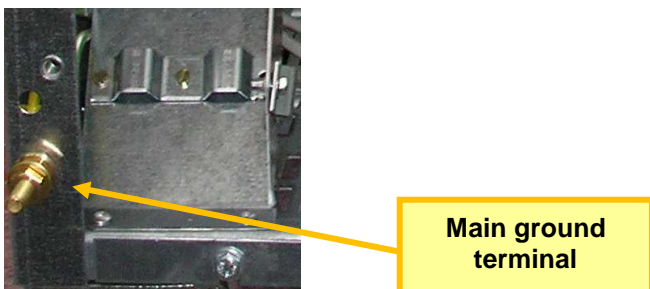
II.2.1.1 LV supply:

Connection to the mains is made at the rear of the CCR, by mean of the two screw terminals. The power cable run through the hole.



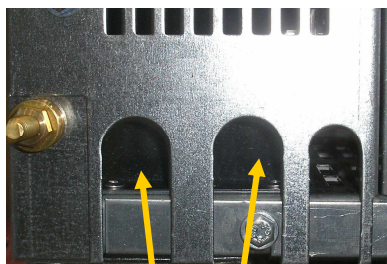
II.2.1.2 Earthing

The Main Earth circuit must be connected to the earthing stud situated in the lower part of the frame at the bottom right (external or internal connection, at the back)

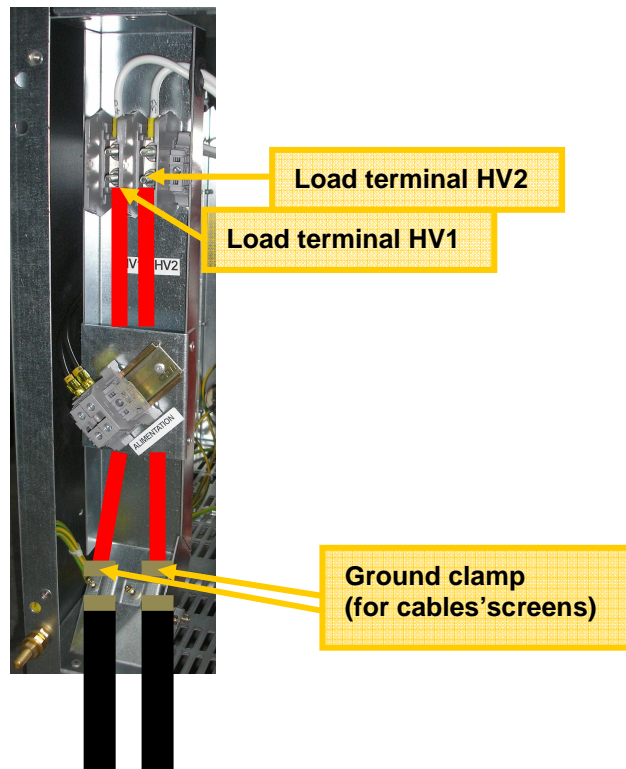


II.2.1.3 Lighting loop:

- Connect the two load cables to the “HV1” and “HV2” terminals on the two connectors
- If it exists, connect the cable screen (strap or braided) to the ground clamp.



Hole for loop cables



II.2.2 REMOTE CONTROL CONFIGURATION

Connections to the control system is made at the front of the CCR:

II.2.2.1 Connectors:



II.2.2.1 Remote control possibilities:

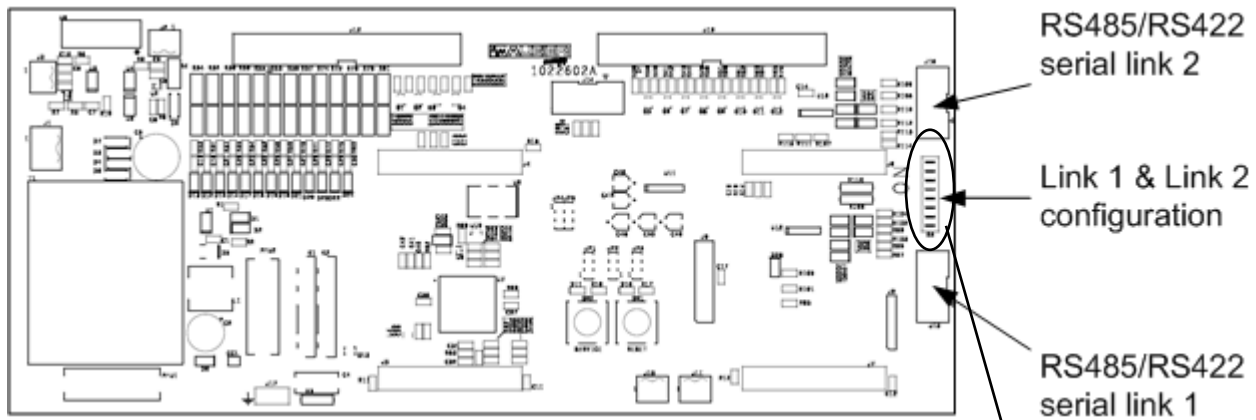
	RS485/RS422 JBUS 1	RS485/RS422 JBUS 2	ETHERNET 1	ETHERNET 2	SOURIAU
Standard	✓	-	-	-	-
1	✓	✓	-	-	-
2	-	-	✓	-	-
3	-	-	✓	✓	-
4	✓	-	✓	-	-
5	-	-	-	-	✓
6	✓	-	-	-	✓
7	✓	✓	-	-	✓
8	-	-	✓	-	✓
9	-	-	✓	✓	✓
10	✓	-	✓	-	✓

-: Not present

i **N.B.:** see [APPENDIX C: PART NUMBER IDENTIFICATION](#) and identification CCR to know the remote control available on the CCR.

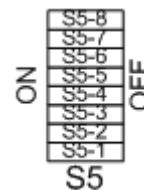
II.2.2.1 RS485/RS422 JBUS link:

Each serial link is equipped with two SubD 9-pin (1 female and 1 male sockets).
The links are electrically insulated from all the other circuits:



Sub D connectors:

Pin	RS422/RS485 function	Pin Type
1	T+	Output
2	T-	Output
3	NC	
4	NC	
5	NC	
6	R+	Input
7	R-	Input
8	NC	
9	NC	



RS422/RS485 network polarity and termination

Link number	Function	Dip switch
1	Termination impedance	S5-1
		S5-2
	Polarising resistors	S5-3
		S5-4
2	Termination impedance	S5-5
		S5-6
	Polarising resistors	S5-7
		S5-8

Polarising resistors.

Set the two switches to "ON" to activate the two polarising resistors on lines R- and R+. (value = 2200 ohms)

Generally, these switches are set to ON for the CCR on the end of the line. For all other CCRs linked on the same bus, leave them set to OFF.

Termination impedance.

- Set the two switches to "ON" to insert a 120 ohm resistance in the Jbus line.
- This impedance must *compulsorily* be inserted in the last CCR in the line, and *only* in this one.

N.B.: do not forget to connect similar impedance on the input line of the *master device* (plc or micro-computer), if this is placed at the end of the line and does not carry one.

Serial link parameters:

The asynchronous serial links are defined as follows:

Preferred parameters : 9600 baud, 8 data bits, 1 stop bits, no parity.
JBUS protocol with Id=1 at delivery.

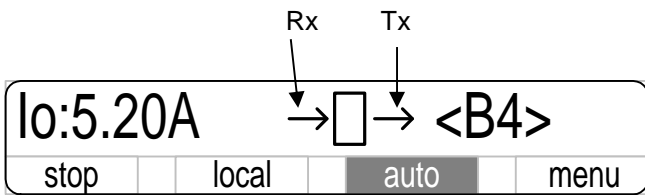
It is possible to change the speed and the ID in the “Serial Link” menu:

- Speed: **2400-4800-9600-19200** Baud
- ID: **1 to 249**

These changes are active after a device reset (mains disconnection).

The 2 serial links access to the same jbus table with the same priority (the last order is the one taken).

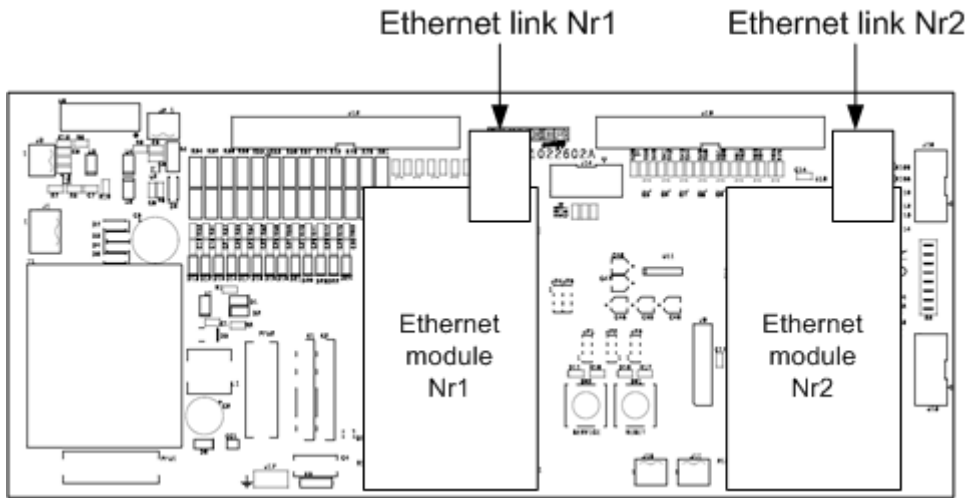
Communication (for the link 1 or 2) is shown on the display, by mean of 2 arrows Rx & Tx :



i The JBUS table is defined in appendix b: jbus table

II.2.2.2 Ethernet link:

Interface board connections:



DIAM3100 CCR can be equipped with one or two Ethernet interfaces. The used protocol is **MODBUS TCP** (port 502).

Supplied functions are : function 3 (number of words <= 100), function 6 and function 16 (number of words =1) Slave ID = 1.

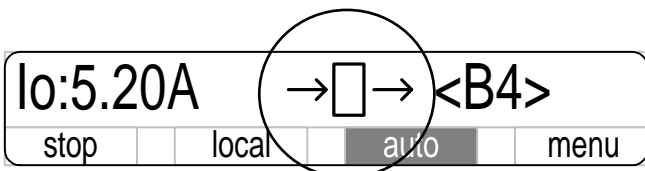
IP parameters:

Ethernet interface number	Default mask and address	Maximum number of sockets (clients)
1	Mask: 255.255.255.0 Address: 192.168.100.160	2
2	Mask: 255.255.255.0 Address: 192.168.100.161	2

The IP mask (4 bytes) and the IP address (4 bytes) are configurable in the following menu:



Communication is shown on the display, by mean of 2 arrows in & out :

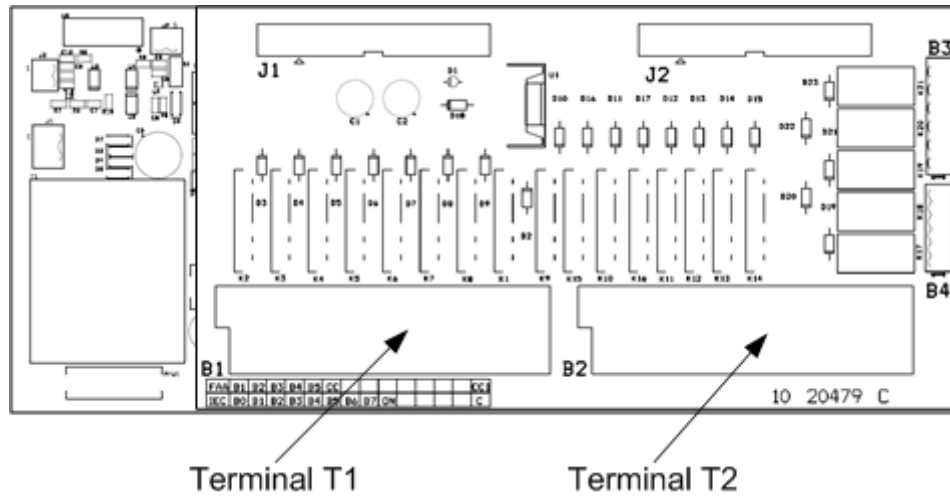


Connection of the network is made at the rear of the CCR (RJ45 8 pins)

i The JBUS table is described in appendix b: jbus table

II.2.2.1 SOURIAU multiwire remote control with 20 to 60Vdc control supply

This relay board is used for SOURIAU circular connectors, 12 and 19 pins.



II.2.2.1.1 Control (20 to 60 Vdc only) :

Terminal	T.Bloc	Function	SOURIAU	Pin Type
1	T1	B1 control	12b/9	Input voltage with respect to C
2	T1	B2 control	12b/2	Input voltage with respect to C
3	T1	B3 control	12b/3	Input voltage with respect to C
4	T1	B4 control	12b/4	Input voltage with respect to C
5	T1	B5 control	12b/5	Input voltage with respect to C
6	T1	“ON” control	12b/7	Input voltage with respect to C
14	T1	C	12b/1	Common to Pin1 to Pin 13 inputs (Note 2)

Note 2: for configuring the remote control type, see “Wiring remote control voltage configuration”.

II.2.2.1.2 Monitoring (dry contacts):

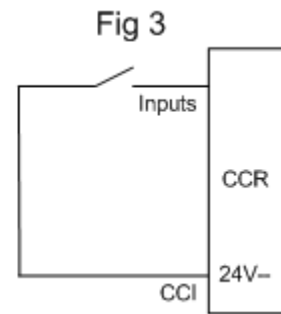
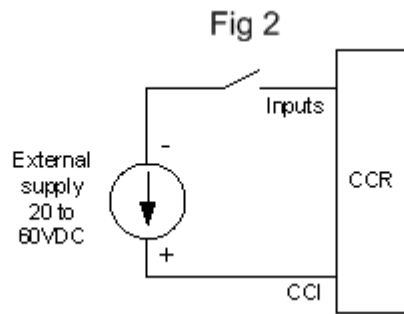
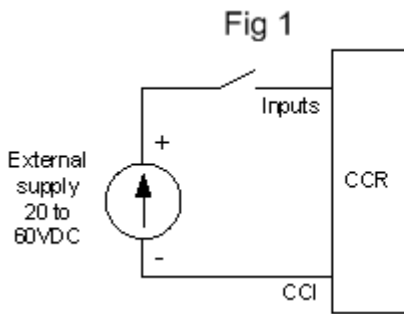
Terminal	T.Bloc	Function	SOURIAU	Pin Type
16-17	T1	B1 return	19b/1-2	Dry contact
18-19	T1	B2 return	19b/3-4	Dry contact
20-21	T1	B3 return	19b/5-6	Dry contact
22-23	T1	B4 return	19b/7-8	Dry contact
26	T1	Local	19b/12	Dry contact
27	T1	Common local/Remote	19b/11, 12b/6	Dry contact
28	T1	Remote	12b/10	Dry contact
29	T1	No power supply/no current	19b/18	Dry contact
30	T1	Common power supply/current	19b/17	Dry contact
31	T1	Power supply/current flow	19b/19	Dry contact
32-33	T1	Open circuit	19b/13-14	Dry contact
1-2	T2	Over current	19b/15-16	Dry contact
7-8	T2	Ground fault level 1	19b/9-10	Dry contact

Contact Relays: 125VAC / 2A or 125VDC / 2A resistive load

II.2.2.1.3 Wiring remote control voltage configuration

The DIAM CCR can be remotely controlled either by an external voltage (20 to 60 VDC positive or negative), or by “free potential” contacts (internal power supply 30VDC from the CCR). This choice is made by the values at address 70 in the Jbus table.

CONTROL INPUTS CONFIGURATION										
Inputs configuration	Fig	Jbus address	B7	B6	B5	B4	B3	B2	B1	B0
External voltage +20V to +60V-- to control the inputs	1	70	X	0	X	X	X	X	0	0
External voltage -20V to -60V-- to control the inputs	2	70	X	1	X	X	X	X	0	0
Contacts to control the inputs. 24V-- internal voltage	3	70	X	0	X	X	X	X	0	1



II.2.2.2 Circuit selector:

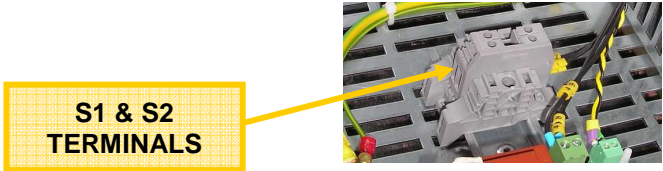
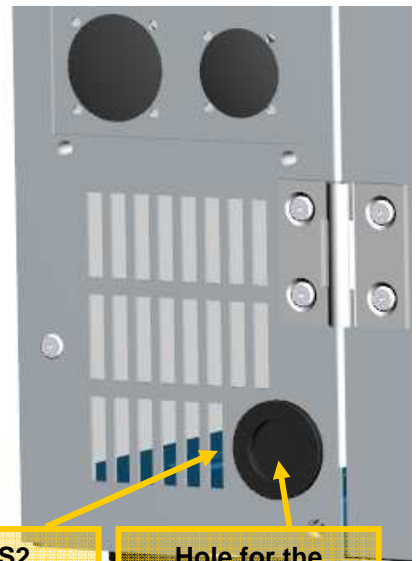
External CS :

The DIAM CCR has two electrical interlock terminals, **terminal S1 and S2** , located at the left front of the CCR, which must be connected to the door contact and circuit selector interlock.

When the CCR is used with a circuit selector, it must be stopped about 100ms before the circuit is selected. This is automatically done by the selector itself (Augier) by connecting terminals S1 & S2 to the selector interlock mechanism, or by remote control.

Operation without selectors:

The two terminals S1 & S2 must be short-circuited, (Strap wired at delivery) in order to work without CS contact.



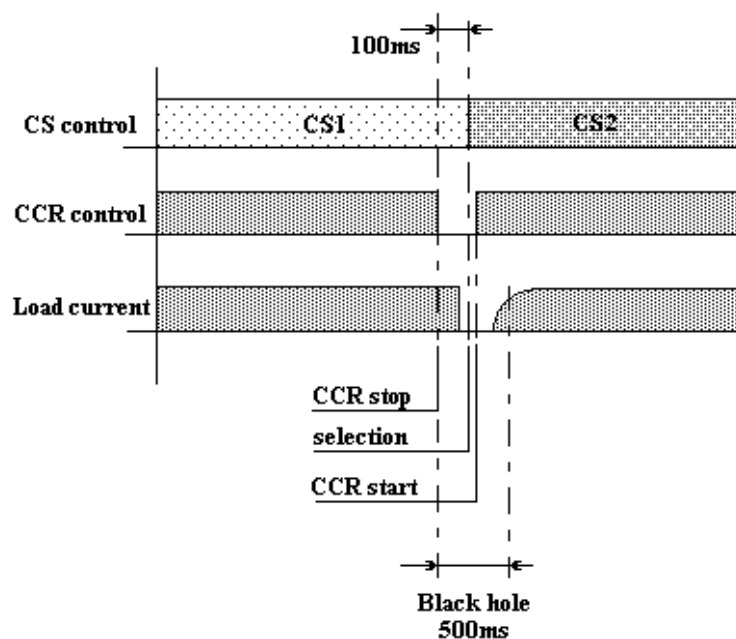
Operation with selectors:

The good practice, to select or un-select a way, is to do it at null current. Thus, no overcurrent can appear and lamps remain protected. At the contrary, an instantaneous short circuit (total or partial) of the load will create an instantaneous overcurrent proportional to the load reduction, during the regulation time. These repeated overcurrents cause a reduction of the lifespan of lamps. So, when used with a circuit selector, the regulator must be stopped 100ms approximately before changing a circuit.

That can be carried out by the selector itself (Augier selector) by cabling terminals S1 and S2 with interlock terminals of the selector, or by the monitoring system.

While S1/S2 are connected, the CCR shall be stopped if the selector box is opened, giving access to the H V load connections.

Chronogram of operation :



II.3 ADJUSTING THE CCR

II.3.1 PARAMETER MODIFICATION

Preferably, and according to the CCR, the parameters are **pre-set in the factory as ordered**, so it is not necessary to reconfigure them during device installation and commissioning.

II.3.1.1 Preferred configuration values:

The preferred configuration (if no precision on orders, or in case of new mother board) is as follow :

- Setting

I B0 = 1.50 A

I B1 = 2.80 A

I B2 = 3.40 A

I B3 = 4.10 A

I B4 = 5.20 A

I B5 = 6.60 A

Brightness number = 6

Maxi current = Setting value + 100mA

Mini current = Setting value - 100mA

- Protection

Earth fault level 1 = 1M Ω (if option present)

Earth fault level 2 = 100K Ω (if option present)

Restarts number = 1

Over-current level 1 = 6.80 A (+ 3%)

Disable time = 2.50 s

Over-current level 2 = 6.93 A (+ 5%)

Disable time = 1s

Over-current level 3 = 8.25A (+ 25%)

Disable time = 200 ms

Open circuit current = 1.00A

Disable time = 600 ms

- Burnt lamps

Burnt lamps level 1 = 5 (if option present)

Burnt lamps level 2 = 10 (if option present)

Calibration cancelled.

- Wig wag

Cycle time = 2.5s

On time = 1.7s

- USB link

Slave Id = 1

Baud Rate = 38400

- Jbus RS485 link

Slave Id = 1

Baud Rate = 9600

II.3.1.2 Brightness values:

See paragraph I.5.2

- ① If the CCR does not supply the desired current, either it is in overload or the load contains transformers with open secondaries (missing or burnt lamps)

II.3.1.3 Value of “Open Circuit” protection level:

See paragraph I.5.3.2

II.3.1.4 Value of “Overcurrent” protection levels:

See paragraph I.5.3.3

III COMMISSIONING

After that all installation operations defined in the previous section have been completed, the DIAM3100 CCR can be commissioned.

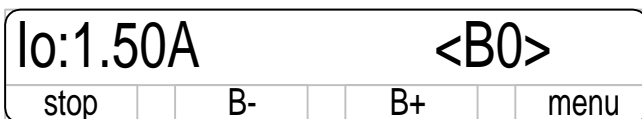
III.1 PROCEDURE

1. Set the tapping as shown in § **Errore. L'origine riferimento non è stata trovata.**
2. Close the fuse box master switches
3. Close the front panel of the DIAM3100
4. Switch on the power to installation

i The display light up:



5. Set the IP address of the CCR, as shown in II.2.2.2
6. Press **local** button, the display seems to:



i The CCR starts up and the output current is displayed on the front panel.

7. Progressively increase the brightness levels using the selection buttons while systematically checking the current value shown by the numeric display, maximum brightness being fixed at 6.6A.
8. Decrease the brightness levels again, then stop the CCR by pressing **stop** button

i If the CCR does not supply the desired current, see paragraph IV.3.3.4

9. Check operation of the CCR in remote control mode. (Press **auto** button)

III.2 TESTS

III.2.1 SHORT-CIRCUIT TESTS

- i** **DO NOT** carry out this test if there is any doubt about the operation of the CCR, or if there is a fault or breakdown.
1. Switch off the CCR from the power.
 2. Completely disconnect the lighting loop.
 3. Short circuit terminals “HV1” and “HV2” on the outputs,
 4. Connect the CCR to the power.
 5. Put the CCR in “Local” mode.
- i** The CCR starts up and the output current is displayed on the front panel.
6. Progressively increase the brightness levels using the selection buttons while systematically checking the current value shown by the numeric display, maximum brightness being fixed at 6.6A.
 7. Decrease the brightness levels again then stop the CCR.
 8. Disconnect from the power, connect the Lighting loop, and eventually re-adjust the load tapping.
- i** If there is any problem (e.g. tripping out, Overcurrent), do not repeat the tests: check the connections again (ground, circuit board terminals, fibre optic connections, etc) and check the state of the thyristors before starting up again.

III.2.2 OVERLOAD TESTS

This test can be carried out as part of a breakdown investigation, to allow a device already in service to be put back into operation without knowing its state, and without damages for the lighting loop.

Move the tapping cable of the load plate so that the maximum power of the CCR would be much less than the loop power. This ensures that, even for a direct short-circuit of the thyristors (or equivalent: “full wave” voltage on the load terminals, boards non-operational, etc) the current delivered by the equipment will always be lower than 6.6A.

For example:

6.5VA CCR with a load of 2.5kVA; optimum load adaptation is 4/8. To place it in overload state and test the device, put them in position 2/8. On start-up, the correct adjustment of the first brightness levels can be ascertained (up to a current of about 5A), but in case of failure, the device cannot deliver more than about 5A in this position.

For example If the thyristors are faulty (short-circuit), the CCR will deliver 5A as soon as it is started up whatever the brightness setting (no danger of Overcurrent into the lamps), which will show up a fault in regulation, control or the thyristors.

Sum-up :

In order to achieve an “overload test”, DECREASE the output tapping of the CCR, in order to OVERLOAD the CCR

- i** See load adaptation table, paragraph **Errore. L'origine riferimento non è stata trovata.**

III.2.3 OPEN-CIRCUIT TEST

Physically disconnect the loop (or remove jumpers of the Cut-out option) and start the CCR: the device should stop after about 0.3s (running time) with the fault indication.

IV MAINTENANCE

IV.1 FORMALISATION

To follow maintenance procedures correctly, the following points must be observed:

- Create a maintenance file containing the headings “Date”, “Time”, “Maintenance Engineer”, “CCR reference”, “Problem definition”, “Solution applied”, and “Time spent”
- The spare parts monitoring sheet (with their control numbers) should be completed if necessary.
- An overall maintenance operation book or folder for each maintenance post will be kept up to date with these sheets. It will gather together, in particular, all the device test reports and references to the initial states of the devices.
- A regular examination of these different documents will allow the status of the system to be monitored, facilitate management of spare part batches and improve, if necessary, maintenance procedures.

IV.2 PREVENTIVE

IV.2.1 FIRST MONTHS

In the first months of use, check the tightness of terminals and connections, particularly for HV or LV power circuits :

- Input terminals, fuse-holders, contactor
- Output terminals, all screwed connections.

IV.2.2 ANNUAL PROCEDURE

- Remove dust from the bottoms of the casings to avoid accumulation, which could prevent proper cooling.
- Remove dust from the electronic circuit boards and LV elements.
- Check the tightness of power connections (Lighting loop, Power, Earth)
- Check operative functions, in local and remote control.

IV.2.3 EVERY THREE YEARS

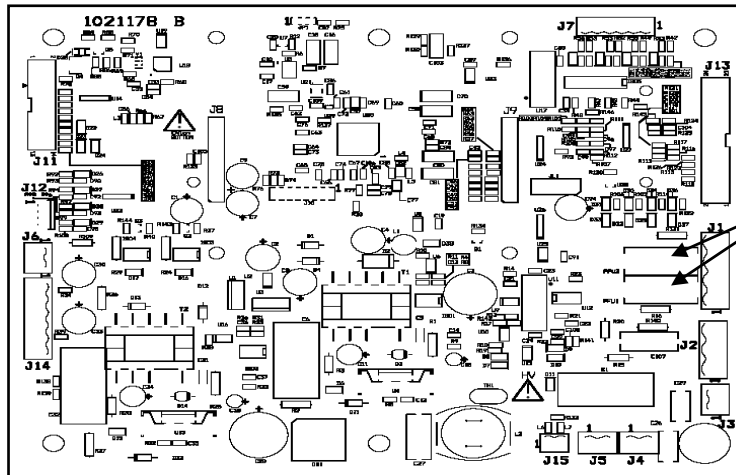
The frequency with which these operations are carried out will depend on the usage of the CCR:

- Start by a general visual inspection
- Check internal connections (tightness of screws and terminals),
- Check the correct correspondence between: current setting, displayed value, measured value (use an insulated true RMS ammeter and clamp of sufficient accuracy)

In case of discordance, a calibration of the CCR can be carried out.

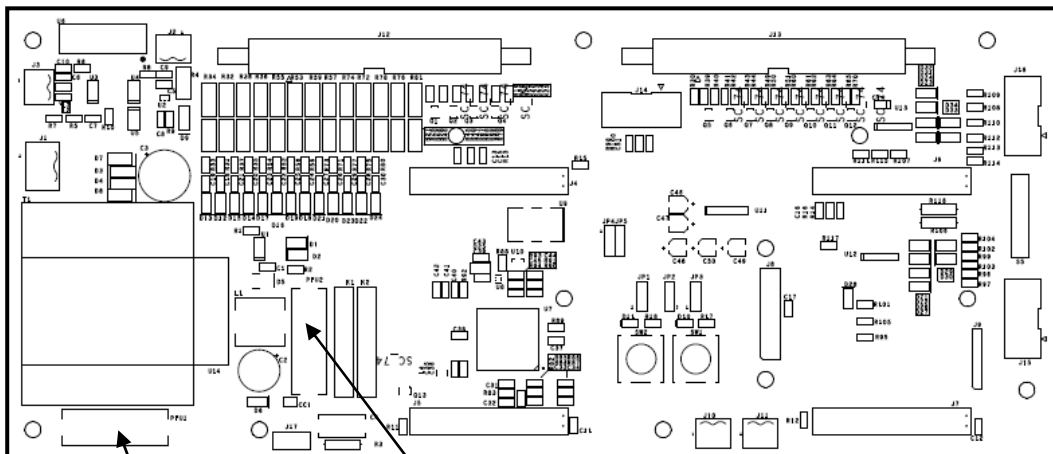
IV.3 CORRECTIVE

IV.3.1 MOTHER BOARD FUSES



FUSES 250V/1AT

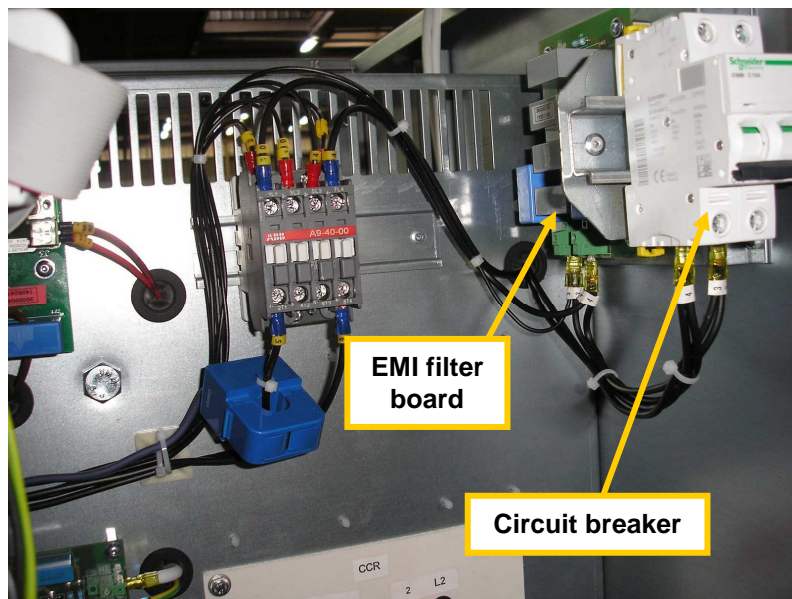
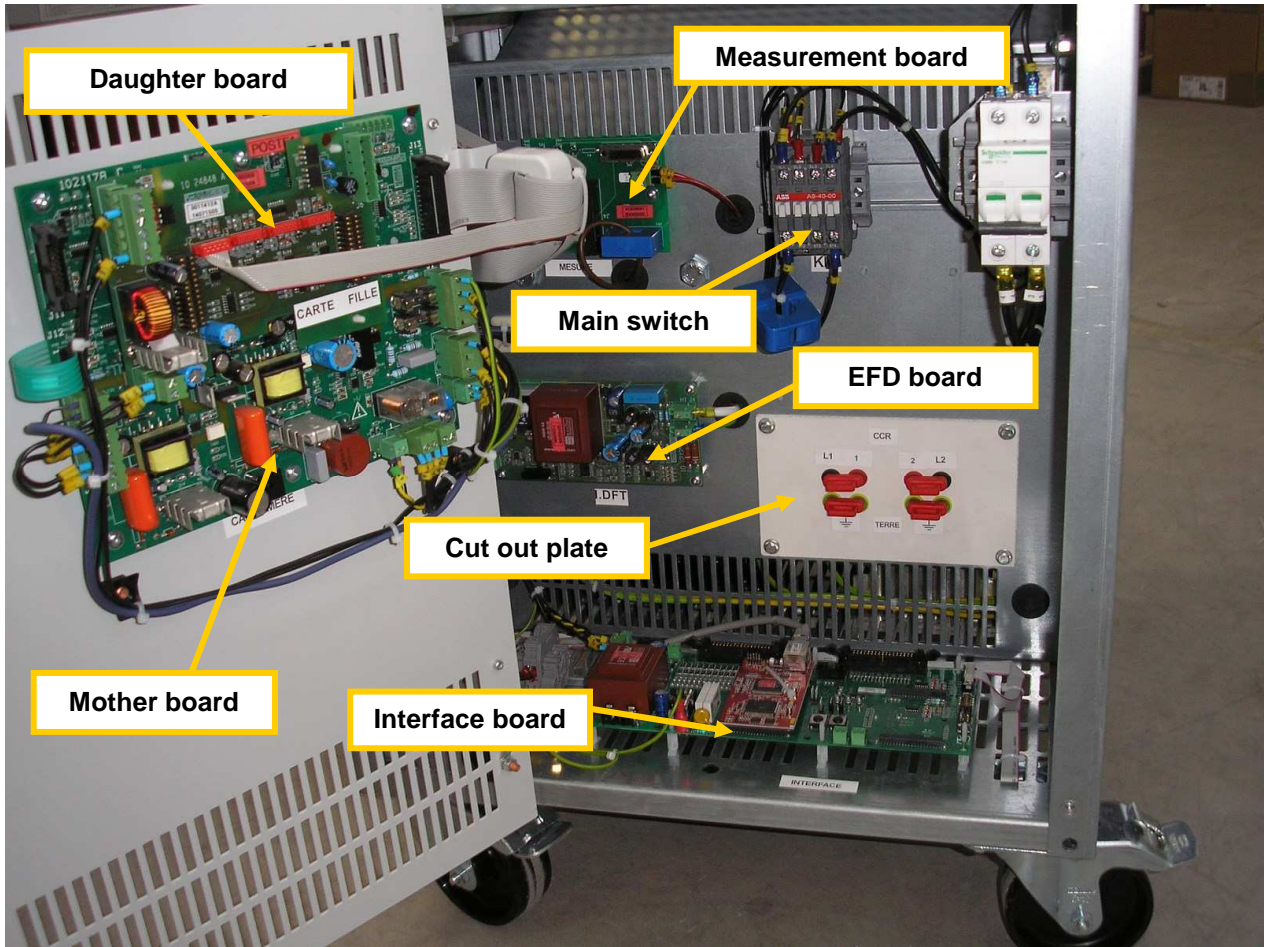
IV.3.2 INTERFACE BOARD FUSES



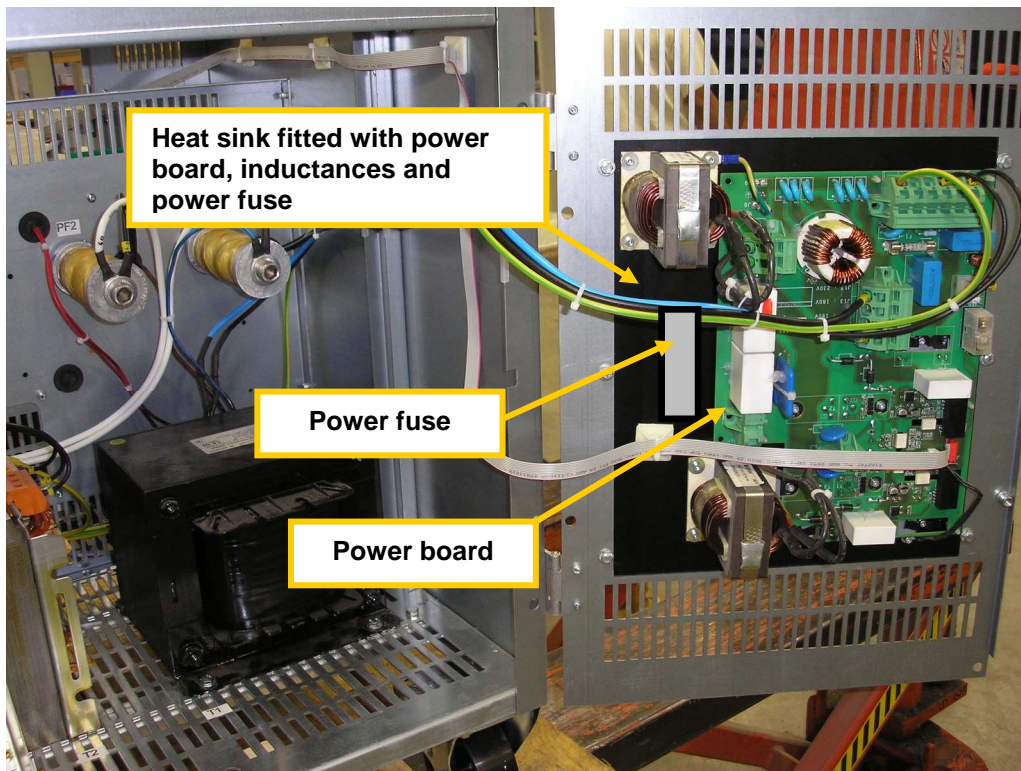
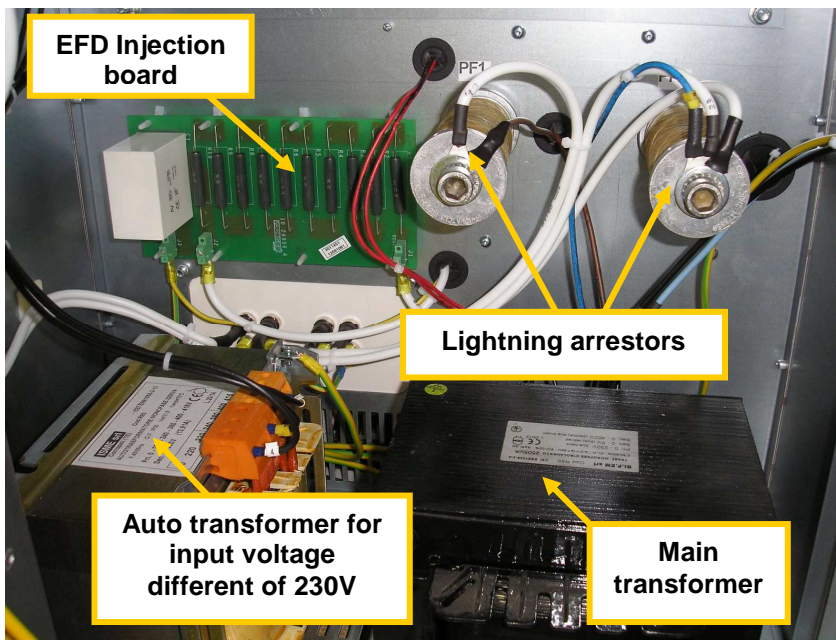
FUSE 250V/100mAT

FUSE 250V/500mAT

IV.3.2.1 In front of the CCR



IV.3.2.2 At the rear of the CCR



IV.3.3 FAULT DIAGNOSIS

 See paragraph I.5.3 for a description of the following protections.

IV.3.3.1 LV power fault:

Symptom	Fault	Action
The CCR has stopped	LV power fault	Check the voltage level of the LV power supply
The message: “ALARM : Bad supply” is displayed		Check parameter settings in the “Configuration” menu

IV.3.3.2 “Open Circuit” fault:

Symptom	Fault	Action
The CCR has stopped	Lighting loop open	Measure the continuity of the loop (on the transformer primaries and secondaries)
The message: “ALARM: I << Open Cir.” is displayed	Output current < 1.0A for more than 500 ms	Measure the output current value
		Large load increase on the loop caused by circuit switching
	Measuring board to motherboard link fault	Check state of the ribbon cable between measuring board and motherboard
	Protection detection level setting on motherboard	Check setting of the level in the menu “Alarms and warnings” then “Open circuit”

IV.3.3.3 “Overcurrent” fault:

Symptom	Fault	Action
The CCR has stopped	Output current > programmed level	Large load decrease on the loop caused by circuit switching
The message: “ALARM : I >> Level 1, 2 or 3”	Overload combined with load decrease by switching	Check the number of ITs open due to missing or fault lamps
or “ALARM : I >> Peak value” is displayed	Levels too low	Check levels in the menu “Alarms and Warnings” then “Overcurrent”.

IV.3.3.4 Other faults

Symptom	Fault	Action
Output current insufficient The message "Warning: Regulation error" is displayed	Large number of ITs open CCR power insufficient	Check the number of ITs open due to missing or fault lamps Check that the installed power is not greater than the power of the CCR
Display remains off when CCR is connected to the power	Motherboard protection faulty Motherboard faulty	Check state of fuses F1 and F2 on the motherboard (T1A) Check motherboard with "Diagnostic" function of ALIZE software
CCR does not work in remote control mode	Remote control protection fuse faulty Wrong configuration of remote control type Insufficient remote control voltage	Check fuse F1 (T100mA) and F2 (T500mA) on the interface board. Check configuration of remote control type Check remote control voltage (from 20 to 60VDC? Or 120Vac)
"FAULT: Power board!"	Power board fault	Check fuse on power board and replace the board if fuse burn after replacement and test.
"FAULT:Power fuse!"	Fuse burn on power board	Replace the fuse. If fuse burn after replacement and test, replace the power board.
"WARNING : EFD level 1" "WARNING : EFD level 2"	None from the CCR point of view. Light intensity may be impacted.	Check primary cables status as well as primary connectors. Check warning thresholds.
"WARNING : No EFD"	No isolation measurement .	Check EFD board connexions. Replace EFD board.
"WARNING : LFD level 1" "WARNING : LFD level 2"	Possible output regulated current instability. Possible loss of CAT conditions.	Replace burnt lamps. Check warning thresholds. Perform function learning again.
"WARNING : Meas. lamps"	No output voltage measurement. Inconsistent measure.	Check wire position in current sensor for proper current direction, using ALIZE4100 ("graphic" display, all curves must be phased) Perform "lamp burnt" learning again.

Symptom	Fault	Action
"ALARM : BAD Interface"	No remote control	Check remote control board connexions. Replace remote control board. Check mother board.
"WARNING : BAD Freq."	CCR stops for internal protection.	Check supply network. Frequency out of range or asymmetrical wave shape.
"WARNING : TC-TS board"	No multiwire remote control	Replace relay remote control board.
"WARNING : Power Drop"	None for the CCR More than 10% output power losses.	FAA : informative warning
"WARNING : Temp. level 1" "FAULT : Temp. level 2"	Main transformer overheat.	AENA: Check environmental conditions.
«ALARM : BAD SUPPLY»	CCR stops or does not start	Check supply network voltage, CCR nominal voltage setting (see "configuration" menu) or input voltage measurement (see "Supervision" menu). Refer to chapter I.5.3.1
« Warning : Power Temp. »	Heat sink temperature > 90°C	Check the rear of the CCR, heat sink must be free of dust or other.
« Warning : Temp. Sensor »	Probe on heat sink is broken	Check the connection of the sensor. Replace its if broken (R 25°C = 10KΩ)

IV.4 SPARE PARTS LIST

CCR DIAM4200 1 & 2.5kVA:

Description	Voltage	REFERENCES	
		1 kVA	2,5 kVA
Circuit Breaker DJ	220/240V	IC60N 6A C 10.25249	IC60N 16A C 10.25251
	380/415V	IC60N 4A C 10.25248	IC60N 10A C 10.25250
Contactor KM	220/240V	AF9 4000	10.27053
	380/415V	AF9 4000	10.27053
Supressor RC2	220/240V	Incorporated into the contactor reference	
	380/415V	Incorporated into the contactor reference	
Main Transformer T1	220V	To be defined	To be defined
	230V	10.26723	10.24847
	240V	To be defined	To be defined
	380V	To be defined	To be defined
	400V	10.26724	10.26711
	415V	To be defined	To be defined
Auxiliary Autotransformer T2	220V	To be defined	10.26448
	230V	No transformer needed	
	240 to 415V	To be defined	10.26448
* LV Lightning arrestors PFI		DS41-400	10.19975
* HV Lightning arrestors PF1, PF2		CEA3	10.17854
* Jumper for earthing plate			10.25705
* Earth Injection board MDT			30.11451
* Earth Interface board I.DFT			30.10029
Mother board			30.10026
Power board			30.11637
Daughter board			30.11412
Measurement board			30.08004
Remote control Interface board			30.10028
CEM board	220/240V		30.10087
	380/415V		30.10068
Wires interface board	IEC		30.08928
	FAA		30.09259
Display			30.12449
4 keys keypad			10.20483
Cables links		Mother board / TC-TS => 30.10352 Mother board / Measurement => 30.08947	

* Optional equipment

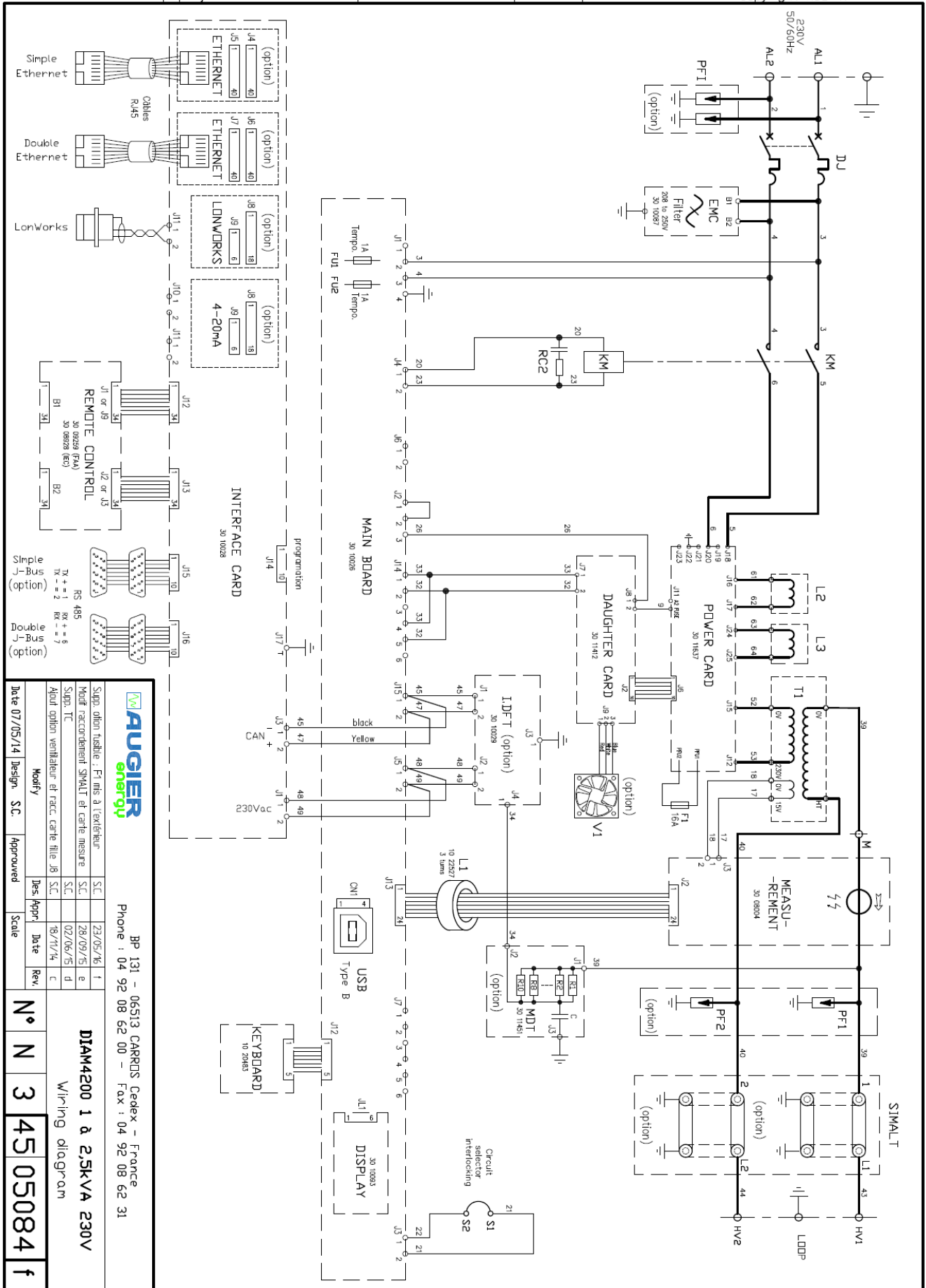
V APPENDIX A: DIAGRAM

DIAM4200 1 to 2.5KVA 230V

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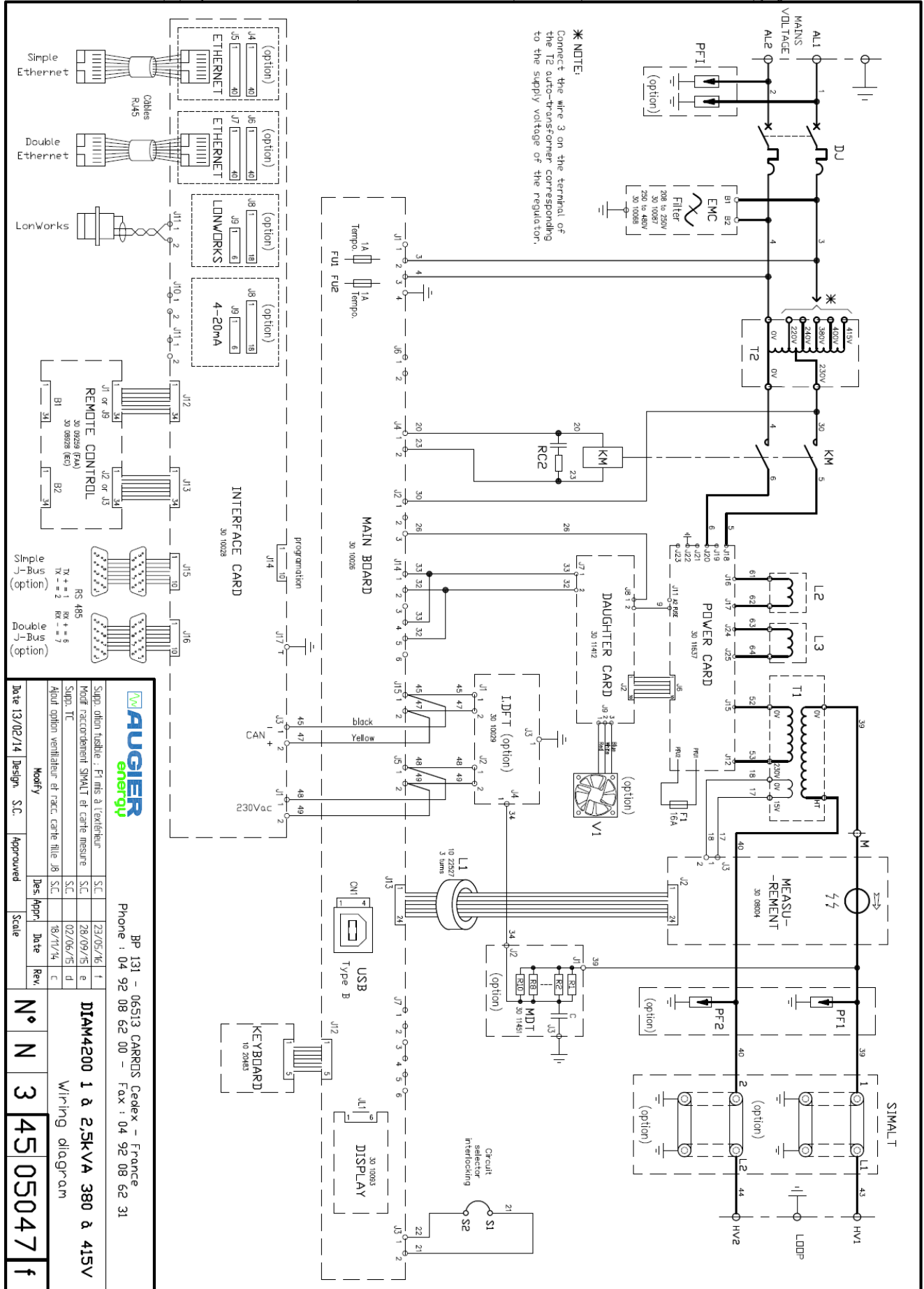


DIAM4200 1 to 2.5KVA 220, 240, 380, 400, 415 V

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AUGIER energy		BP 131 - 06513 CARRORS Cedex - France	
Support option fusible : Et mis à l'extérieur		S.C.	23/05/16 f
Modif raccourcissement SIMALTI et carte mesure		S.C.	28/09/15 e
Support TIC		S.C.	02/06/15 d
Ajusté option vérification et tracé carte fille J8		S.C.	16/11/14 c
Date	Modif	Des. Appr.	Date
13/02/14			
Design	S.C.	Approved	Scale
DIAM4200 1 à 2,5KVA 380 & 415V		Wiring diagram	
N°	N	3	45 05047 f

VI APPENDIX B: JBUS TABLE

Adr.	R/W	Mode	Memory	Label	Detail	Bit clear	Bit set	Default Value	Comments
0	R		Ram	Warnings	Bit0	Stop	Start	0	Main switch status
					Bit1	OK	Pb power line	0	Power supply over range
					Bit2	OK	Pb EFD	0	Level 1 or Level 2 or EFD board defect
					Bit3	OK	Pb current	0	Open circuit or Over current or Regulation error
					Bit4	OK	Pb regul	0	Regulation error
					Bit5	OK	Pb open circuit	0	Open circuit
					Bit6	OK	Pb Overcurrent	0	Over current
					Bit7	Local or Stop	Remote control		Bit 7:8, 0:0 = Local , 0:1 = Stop, 1:0 = Remote
					Bit8	Local or Remote	Stop mode		
					Bit9	OK	EFD level 1 warning	0	Earth fault detect (OPTION)
					Bit10	OK	EFD level 2 warning	0	Earth fault detect (OPTION)
					Bit11	OK	LFD level 1 warning	0	Lamp fault detect (OPTION)
					Bit12	OK	LFD level 2 warning	0	Lamp fault detect (OPTION)
					Bit13	OK	Internal failure	0	CCR internal problem
1	R		Ram	Brightness back indication				0 : Stop 1 : Brightness B1 2 : Brightness B2 3 : Brightness B3 4 : Brightness B4 5 : Brightness B5 6 : Brightness B6 7 : Brightness B7 8 : Brightness B0 (Heat)	
2	R		Ram	Io loop current				*10mA	
3	R		Ram	U injection EFD				500	
4	R		Ram	Uo loop voltage					
5									
6	R		Ram	Mains voltage Ui					
7	R		Ram	Mains current li					
8	R		Ram	Output power Po					
9									
10	R		Ram	EFD Resistance					
11	R		Ram	Number of burnt lamps					
12	R		Ram	Open load ratio measurement					

Adr.	R/W	Mode	Memory	Label	Detail	Bit clear	Bit set	Default Value	Comments
13	R		Ram	Heat sink temperature					Only for DIAM4200
14	R			EFD board status	Bit0		Communication error		
					Bit1		Internal error		
15	R			Interface board status	Bit0		Communication error		
					Bit1		Internal error		
16	R		Eeprom	Status flags	Bit0	No EFD HV (500V--)	EFD HV (500V--)		EFD Option
					Bit1	No Uaux	Uaux present		Auxiliary voltage
					Bit2	Maintenance	Loop		CIMALT position
					Bit3	No power drop	10% or greater Power drop		Power drop
					Bit4	No time overlap	Time overlap		Time management (OPTION)
17	R		Eeprom	Mother board firmware version					1 to 255
18	R		Eeprom	Mother board firmware correction					0 to 255
19	R			EFD board firmware version					1 to 255
20	R			Interface board firmware version					1 to 255
21	R		Ram	Phase shift U I					0 to 500
22	R/W		Eeprom	Load plate					*1/8
23	R/W	Sup	Eeprom	Rated mains voltage				230	*V 208V, 220V, 230V, 240V, 380V, 400V ,415V ,480V
24	R/W	Sup	Eeprom	Rated power				5000	*VA, 1KVA, 2.5KVA, 4KVA, 5KVA, 7.5KVA, 10KVA, 15KVA, 20KVA, 25KVA, 30KVA
25	R/W	Sup	Eeprom	Serial link ID				1	1 to 249
26	R/W	Sup	Eeprom	Serial link speed				9600	In Baud 2400, 4800, 9600, 19200
27	R		Eeprom	USB link speed				3840	*10 Baud 960, 1920, 3840, 5760, 11520
28	R		Eeprom	USB link Id				1	1 to 15
29	R/W	Sup	Eeprom	B0 setting				150	*10mA
30	R/W	Sup	Eeprom	B1 setting				280	*10mA
31	R/W	Sup	Eeprom	B2 setting				340	*10mA
32	R/W	Sup	Eeprom	B3 setting				410	*10mA
33	R/W	Sup	Eeprom	B4 setting				520	*10mA
34	R/W	Sup	Eeprom	B5 setting				660	*10mA
35	R/W	Sup	Eeprom	B6 setting				660	*10mA
36	R/W	Sup	Eeprom	B7 setting				660	*10mA
37	R/W	Sup	Eeprom	Nb of Brightness				6	1 to 8

Adr.	R/W	Mode	Memory	Label	Detail	Bit clear	Bit set	Default Value	Comments
38	R/W	Sup	Eeprom	R Level EFD1				1000	*KΩ(10KΩ to 10MΩ)
39	R/W	Sup	Eeprom	R Level EFD2				100	*KΩ(10KΩ to 10MΩ)
40	R/W	Sup	Eeprom	Level 1 Overcurrent				680	*10mA (0 to 9Arms)
41	R/W	Sup	Eeprom	Level 2 Overcurrent				693	*10mA (0 to 9Arms)
42	R/W	Sup	Eeprom	Level 3 Overcurrent				825	*10mA (0 to 9Arms)
43	R/W	Sup	Eeprom	No of restarts				3	0 to 255
44	R/W	Sup	Eeprom	Open circuit level				100	*10mA (0 to 9Arms)
45	R/W	Sup	Eeprom	Open circuit time delay				60	*10ms (20ms to 2.5s)
46	R/W	Sup	Eeprom	Overcurrent level 1 time delay				250	*10ms (20ms to 2.5s)
47	R/W	Sup	Eeprom	Overcurrent level 2 time delay				100	*10ms (20ms to 2.5s)
48	R/W	Sup	Eeprom	Overcurrent level 3 time delay				20	*10ms (20ms to 2.5s)
49	R/W	Sup	Eeprom	Level B0 maxi				IB0+0.1A	*10mA (1 to 6.8Arms)
50	R/W	Sup	Eeprom	Level B0 mini				IB0-0.1A	*10mA (1 to 6.8Arms)
51	R/W	Sup	Eeprom	Level B1 maxi				IB1+0.1A	*10mA (1 to 6.8Arms)
52	R/W	Sup	Eeprom	Level B1 mini				IB1-0.1A	*10mA (1 to 6.8Arms)
53	R/W	Sup	Eeprom	Level B2 maxi				IB2+0.1A	*10mA (1 to 6.8Arms)
54	R/W	Sup	Eeprom	Level B2 mini				IB2-0.1A	*10mA (1 to 6.8Arms)
55	R/W	Sup	Eeprom	Level B3 maxi				IB3+0.1A	*10mA (1 to 6.8Arms)
56	R/W	Sup	Eeprom	Level B3 mini				IB3-0.1A	*10mA (1 to 6.8Arms)
57	R/W	Sup	Eeprom	Level B4 maxi				IB4+0.1A	*10mA (1 to 6.8Arms)
58	R/W	Sup	Eeprom	Level B4 mini				IB4-0.1A	*10mA (1 to 6.8Arms)
59	R/W	Sup	Eeprom	Level B5 maxi				IB5+0.1A	*10mA (1 to 6.8Arms)
60	R/W	Sup	Eeprom	Level B5 mini				IB5-0.1A	*10mA (1 to 6.8Arms)
61	R/W	Sup	Eeprom	Level B6 maxi				IB6+0.1A	*10mA (1 to 6.8Arms)
62	R/W	Sup	Eeprom	Level B6 mini				IB6-0.1A	*10mA (1 to 6.8Arms)
63	R/W	Sup	Eeprom	Level B7 maxi				IB7+0.1A	*10mA (1 to 6.8Arms)
64	R/W	Sup	Eeprom	Level B7 mini				IB7-0.1A	*10mA (1 to 6.8Arms)
65	R/W	Sup	Eeprom	Language				0	0 : French, 1 : English 2: Spanish
66	R/W	Sup	Eeprom	Wig-Wag cycle time				25	*100ms (1s to 25s)
67	R/W	Sup	Eeprom	Wig-Wag time				17	*100ms (1s to 25s)
68	R/W	Sup	Eeprom	Display brightness				8	1..8

Adr.	R/W	Mode	Memory	Label	Detail	Bit clear	Bit set	Default Value	Comments
69	R/W	Sup	Eeprom	Parameters 1	Bit0	Without "ON" order	With "ON" order	0	Run Order "ON"
					Bit1	Run to B0	Run to B1	0	Default brightness
					Bit2	Live Voltage	Current flow in the loop	0	
					Bit3	Standard remote priority	Reverse remote priority	0	
					Bit4	Loop current+power	Ground insulation	0	4-20mA loop current outputs
					Bit5	No remote fail safe	Remote fail safe	0	Option
					Bit6	Circuit selector: Alternate	Circuit selector: Simultaneous	0	Option circuits selector
					Bit7	No Fluo pannel regul.	Fluo pannel regulation	0	Fluo pannel regulation
					Bit8	EFD HV always present	EFD HV if loop current	0	EFD High Voltage supply (500V--)
					Bit9	No li measurement	li meausrement	1	
70	R/W		Eeprom	Interface board control	Bit0	External Uaux supply	Internal Uaux supply	0	U control voltage type Ext/Int
					Bit1	24V-- Uaux supply	120V~ Uaux supply	0	U control voltage 24V--/120V~
					Bit2	Simple Jbus link	Double Jbus link	0	If Jbus option
					Bit3	No Lonworks link	Lonworks link	0	Option
					Bit4	FAA type	IEC type	0	Standard type
					Bit5	Simple TCP/IP link	Double TCP/IP link	0	If TCP/IP option
					Bit6	Wire common -	Wire common +	0	Wire control polarization
71	R/W	Cal	Eeprom	Calibrating current				660	*10mA (1 to 6.8Arms)
72	R/W	Cal	Eeprom	Io equalizer				1000	800 to 1200
73	R/W	Cal	Eeprom	Uo equalizer				1000	500 to 2000
74	R/W	Cal	Eeprom	Ui equalizer				1000	500 to 2000
75	R/W	Cal	Eeprom	li equalizer				1000	500 to 2000
76	R		Eeprom	Operating time clock					H2, H1 see note 1
77	R		Eeprom	Operating time clock					H0, M, see note 1
78	R		Eeprom	Powered-on time clock					H2, H1, see note 1
79	R		Eeprom	Powered-on time clock					H0, M, see note 1
80	R		Eeprom	Brightness B0 time clock					H2, H1, see note 1
81	R		Eeprom	Brightness B0 time clock					H0, M, see note 1
82	R		Eeprom	Brightness B1 time clock					H2, H1 see note 1
83	R		Eeprom	Brightness B1 time clock					H0, M see note 1
84	R		Eeprom	Brightness B2 time clock					H2, H1 see note 1
85	R		Eeprom	Brightness B2 time clock					H0, M see note 1

Adr.	R/W	Mode	Memory	Label	Detail	Bit clear	Bit set	Default Value	Comments
86	R		Eeprom	Brightness B3 time clock					H2, H1 see note 1
87	R		Eeprom	Brightness B3 time clock					H0, M see note 1
88	R		Eeprom	Brightness B4 time clock					H2, H1 see note 1
89	R		Eeprom	Brightness B4 time clock					H0, M see note 1
90	R		Eeprom	Brightness B5 time clock					H2, H1 see note 1
91	R		Eeprom	Brightness B5 time clock					H0, M see note 1
92	R		Eeprom	Brightness B6 time clock					H2, H1 see note 1
93	R		Eeprom	Brightness B6 time clock					H0, M see note 1
94	R		Eeprom	Brightness B7 time clock					H2, H1 see note 1
95	R		Eeprom	Brightness B7 time clock					H0, M see note 1
96	R/W	Sup	Eeprom	Operating time clock level				39	H2, H1 see note 1 (10000 Hours)
97	R/W	Sup	Eeprom	Operating time clock level				4096	H0, M see note 1 (10000 Hours)
98	R/W	Sup	Eeprom	Level 1 of no of burnt lamps				5	1 to 20
99	R/W	Sup	Eeprom	Level 2 of no of burnt lamps				10	1 to 20
100	R/W		Eeprom	BRIGHTNESS CCR CONTROL					0 : Stop 1 : Brightness B1 2 : Brightness B2 3 : Brightness B3 4 : Brightness B4 5 : Brightness B5 6 : Brightness B6 7 : Brightness B7 8 : Brightness B0 (Heat)
101	R		Ram	EFD injection control					EFD board control (OPTION)
102	R/W	Cal	Eeprom	CCR control in remote mode					
103	R/W	Cal	Eeprom	Selector control in remote mode					
104	R/W	Sup	Eeprom	Options	Bit0	-	-		
					Bit1	-	EFD Opt.		
					Bit2	-	Fault lamps Opt.		
					Bit3		Option Time mon.		
					Bit4		Opt.4-20mA		
					Bit5		Opt. Wig Wag		
					Bit6		Opt. circuit selector		
					Bit7		Opt. TCP/IP		
					Bit8		Opt. Jbus RS485/RS422		
					Bit9		Opt. ICc detection		
105	R/W	Cal	Eeprom	Initialisation parameter					

Adr.	R/W	Mode	Memory	Label	Detail	Bit clear	Bit set	Default Value	Comments
106	R/W	Sup	Eeprom	Memory 0 lamps B0					0 to 1000
107	R/W	Sup	Eeprom	Memory 0 lamps B1					0 to 1000
108	R/W	Sup	Eeprom	Memory 0 lamps B2					0 to 1000
109	R/W	Sup	Eeprom	Memory 0 lamps B3					0 to 1000
110	R/W	Sup	Eeprom	Memory 0 lamps B4					0 to 1000
111	R/W	Sup	Eeprom	Memory 0 lamps B5					0 to 1000
112	R/W	Sup	Eeprom	Memory 0 lamps B6					0 to 1000
113	R/W	Sup	Eeprom	Memory 0 lamps B7					0 to 1000
114	R/W	Sup	Eeprom	Memory X lamps B0					0 to 1000
115	R/W	Sup	Eeprom	Memory X lamps B1					0 to 1000
116	R/W	Sup	Eeprom	Memory X lamps B2					0 to 1000
117	R/W	Sup	Eeprom	Memory X lamps B3					0 to 1000
118	R/W	Sup	Eeprom	Memory X lamps B4					0 to 1000
119	R/W	Sup	Eeprom	Memory X lamps B5					0 to 1000
120	R/W	Sup	Eeprom	Memory X lamps B6					0 to 1000
121	R/W	Sup	Eeprom	Memory X lamps B7					0 to 1000
122	R/W	Sup	Ram	Password					0 to 9999
123	R	Cal		Signal reading pointer					
124	R		Ram	Interface board inputs status	Bit0	Off	On		IN1
					Bit1	Off	On		IN2
					Bit2	Off	On		IN3
					Bit3	Off	On		IN4
					Bit4	Off	On		IN5
					Bit5	Off	On		IN6
					Bit6	Off	On		IN7
					Bit7	Off	On		IN8
					Bit8	Off	On		IN9
					Bit9	Off	On		IN10
					Bit10	Off	On		IN11
					Bit11	Off	On		IN12
					Bit12	Off	On		IN13
					Bit13	External Uaux supply	Internal Uaux supply		U control voltage type Ext/Int
					Bit14	24V-- Uaux supply	120V~ Uaux supply		U control voltage 24V--/120V~
					Bit15	Common -	Common +		Wire control polarization

Adr.	R/W	Mode	Memory	Label	Detail	Bit clear	Bit set	Default Value	Comments
125	R		Ram	Interface board relays status 1	Bit0	Off	On		OUT_K17
					Bit1	Off	On		OUT_K18
					Bit2	Off	On		OUT_K19
					Bit3	Off	On		OUT_K20
					Bit4	Off	On		OUT_K21
					Bit5	Off	On		OUT_K22
					Bit6	Off	On		OUT_K23
					Bit7	Off	On		OUT_K24
					Bit8	Off	On		
					Bit9	Off	On		
					Bit10	Off	On		
					Bit11	Off	On		
					Bit12	Off	On		
					Bit13	Off	On		
					Bit14	Off	On		
					Bit15	Off	On		
126	R		Ram	Interface board relays status 2	Bit0	Off	On		OUT_K1
					Bit1	Off	On		OUT_K2
					Bit2	Off	On		OUT_K3
					Bit3	Off	On		OUT_K4
					Bit4	Off	On		OUT_K5
					Bit5	Off	On		OUT_K6
					Bit6	Off	On		OUT_K7
					Bit7	Off	On		OUT_K8
					Bit8	Off	On		OUT_K9
					Bit9	Off	On		OUT_K10
					Bit10	Off	On		OUT_K11
					Bit11	Off	On		OUT_K12
					Bit12	Off	On		OUT_K13
					Bit13	Off	On		OUT_K14
					Bit14	Off	On		OUT_K15
					Bit15	Off	On		OUT_K16

Adr.	R/W	Mode	Memory	Label	Detail	Bit clear	Bit set	Default Value	Comments
127	R		Ram	Input auxiliary inputs	Bit0	Off	On		AUX1
					Bit1	Off	On		AUX2
					Bit2	Off	On		AUX3
					Bit3	Off	On		AUX4
128	R			Phase angle				0 to 100	
129	R/W		Eeprom	IP Mask module 1 (bytes 0&1)			255.255	65535 (0 to 65535)	
130	R/W		Eeprom	IP Mask module 1 (bytes 2&3)			255.0	65280 (0 to 65535)	
131	R/W		Eeprom	IP Adress module 1 (bytes 0&1)			192.168	(49320) (0 to 65535)	
132	R/W		Eeprom	IP Adress module 1 (bytes 2&3)			100.160	(25760) (0 to 65535)	
133	R/W		Eeprom	IP Mask module 2 (bytes 0&1)			255.255	65535 (0 to 65535)	
134	R/W		Eeprom	IP Mask module 2 (bytes 2&3)			255.0	65280 (0 to 65535)	
135	R/W		Eeprom	IP Adress module 2 (bytes 0&1)			192.168	(49320) (0 to 65535)	
136	R/W		Eeprom	IP Adress module 2 (bytes 2&3)			100.161	(25761) (0 to 65535)	
137	R/W	Sup	Eeprom	Regulation gain (start)			100	1 to 200	
138	R/W	Sup	Eeprom	Delai Regulation gain (run)			100	*20ms (0 to 65535)	
139	R/W	Sup	Eeprom	Regulation gain (run)			130	1 to 200	
140	R/W	Sup	Eeprom	Remote fail safe mode: Time out			250	x20ms, 5 to 65535 (100ms to 20min)	
141	R/W	Sup	Eeprom	Remote fail safe mode: Default brightness			3	0:Stop 1: Brightness B1 2: Brightness B2 3: Brightness B3 4: Brightness B4 5: Brightness B5 6: Brightness B6 7: Brightness B7 8: Brightness B0	
142	R/W	Sup	Eeprom	Fluo pannel option (time)			25	*20ms (0 to 65535)	
143	R/W	Sup	Eeprom	Fluo pannel option (current)			500	*10mA (100 to 660)	
144	R/W	Sup	Eeprom	Memory power B0					
145	R/W	Sup	Eeprom	Memory power B1					
146	R/W	Sup	Eeprom	Memory power B2					
147	R/W	Sup	Eeprom	Memory power B3					
148	R/W	Sup	Eeprom	Memory power B4					
149	R/W	Sup	Eeprom	Memory power B5					
150	R/W	Sup	Eeprom	Memory power B6					
151	R/W	Sup	Eeprom	Memory power B7					
152	R			Phase shift Capacitive current				0 to 100%	
153.. 189									

Adr.	R/W	Mode	Memory	Label	Detail	Bit clear	Bit set	Default Value	Comments
190	R	Ram		Word 1 switch over					
191									
192	R	Ram		Word 2 switch over					
193									
194	R/W	Sup		Soft download					85 in decimal
195	R		Ram	Mother board number					
196	R/W	Sup	Eeprom	Main menu display number				0	0: Output current, Brightness 1: Output current, Output voltage 2: Output current, Output power 3: Selector position (if option present)
197	R/W	Sup	Eeprom	Circuit selector: Circuits qty				5	1 to 5 (OPTION)
198	R/W	Sup	Eeprom	Circuit selector: Circuit in local mode				0	0 to 5 in alternate mode, 0 to 31 in simultaneous mode (OPTION)
199	R/W		Eeprom	Circuit selector: Circuit in remote mode				0	0 to 5 in alternate mode, 0 to 31 in simultaneous mode (OPTION)
200.. 230									
231	R/W	Sup	Eeprom	Parameters 2	Bit0	Photo MOS TCTS board	Relay TCTS board	1	for FAA standard
					Bit1	ILS load plate	No ILS load plate	1	
					Bit2	No power drop measure	Power drop measure	1	for FAA standard
					Bit3	6.6A nominal	20A nominal	0	
					Bit4	Reset by switch	Reset by power up	0	
					Bit5	No external selector	External selector	0	Lonworks Selector
					Bit6		AENA2004	0	transformer temp protection
232.. 248									
249	R		Ram	Lonworks interface flags					
250.. 511									

Note1 : The 4 bytes are coded: H2-H1-H0-M (H2,H1,H0 to compute the hours and M for minutes)
 Example: Reading operating time:
 Contents of address @106: 0x0102 in Hexadecimal, and of address @108 : 0x0324 in hexadecimal
 The time is interpreted as: 0x010203 hours and 0x24 minutes (66051 Hours and 36 minutes)

R: Read, W :Write
 Mode "Sup": Write access via ID 250
 Mode "Cal": Words used for calibrating the device (DO NOT USE)

VII APPENDIX C: PART NUMBER IDENTIFICATION

DIAM4200 PART NUMBER IDENTIFICATION

The DIAM4200 regulator is identified by a serial ordering number which indicates its type and particularity. If needed, add all useful precision and options.

Example : D42-IEC-1-5-50-15-400-B21-530 = DIAM4200 compliant to IEC, 6.6A, 5 brightness, 50Hz, 15kVA, 400Vac, with a multiwire interface (dry contacts), Jbus serial network, lightning arrestors on output terminals, Circuit breaker, EFD and LFD

D **4** **2** - **I** **E** **C** - **1** - **5** - **5** **0** - **1** **5** - **4** **0** **0** - **B** **2** **1** - **5** **3** **0**

Serie	D42: DIAM 4200		
Type	IEC: IEC type 828: L-828 FAA Type (Options as described in L828 advisory are included) 829: L-829 FAA Type (Options as described in L829 advisory are included) AXX : AENA compliance (A29 = AENA PPT2-1995; A04 = AENA PPT2/04/04-2004)		
Class	1: Class1 (output current 6.6A)		
Style	3: Style 1 (Class1 : 4.8A, 5.5A, 6.6A) 5: Style 2 (Class1 : 2.8A, 3.4A, 4.1A, 5.2A, 6.6A) A : 5 brightness, AENA values X: Number of brightness, up to 8 (not counting B0 = "black" current) : Values of currents must be specified separately		
Freq.	50: 50 Hz 60: 60Hz		
Output power	01: 1kVA 02: 2.5kVA 04: 4kVA	05: 5kVA 07: 7.5kVA 10: 10kVA	15: 15kVA
Supply	XXX: Input voltage :For power up to 2,5KVA: 220, 230, 240, 380, 400, 415 Vrms For power from 5KVA to 15KVA: 230, 400 Vrms		
Control	0X : No multiwire interface AX : INTERNAL source Remote control BX : EXTERNAL 20 to 60 Vdc Rem. Control CX : AENA terminal block DX : Cylindrical sockets (SOURIAU) GX : INTERNAL 120Vac remote control HX : EXTERNAL 120Vac remote control (Only one letter must be selected)	00X : No multiwire interface A1X or B1X : NEGATIVE common monitoring (IEC interface board) A2X or B2X: free common monitoring (FAA interface board, dry contacts) C2X D2X G2X H2X (Only one figure must be selected)	XX0 : No communication network XX1 : 1 x JBus RS485 port XX2 : 2 x Jbus RS485 ports XX3 : 1 x Lonwork port XX4 : 1 x Ethernet port XX5 : 1 x Jbus and 1 x Ethernet ports XX6 : 2 x Ethernet ports XX7 : 1 x Lonwork port + 1 x JBus RS485 port (Only one figure must be selected)
Regular Options	0XX : No extra protection options, 1XX : Lightning arrestors (outputs) 2XX : Lightning arrestors (inputs) 4XX : Circuit Breaker (see Note 1) (Final number : add all needed weights)	X0X : No extra monitoring options, X1X : Earth Fault Detector (EFD) X2X : Lamp Failure Detector (LFD) X4X : Time meters (each brightness) (Final number : add all needed weights)	XX0 : No extra options XX1 : Cut-out / earthing jumpers XX2 : Casters (unidirectional) XX4 : ECB option included (Final number : add all needed weights)
Other Options :	ICSx (Integrated Circuit selector x-ways) Or specify : (FAA cut-out, IP other than IP21...)		

Note 1 : Circuit breaker is **not optional** and always included in D42 CCR family, whatever the choice 4 (compatibility of the part number with other CCR family)

VIII NOTES

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