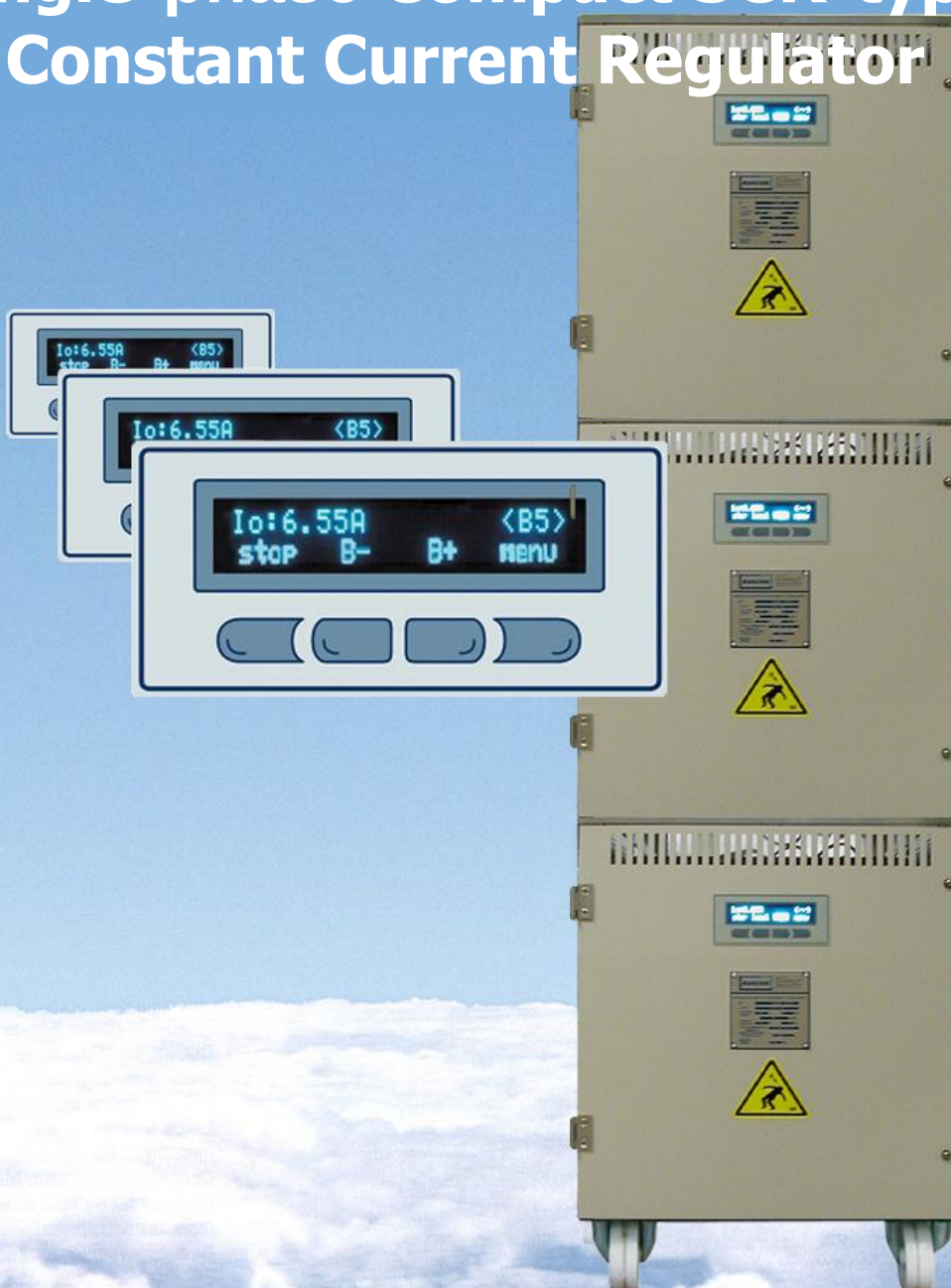




DIAM3100

Single-phase Compact SCR-type Constant Current Regulator



Compliance with standards:
ICAO Aerodrom design manual, part 5
IEC (61822)

RECORD OF CHANGES

Rev.	Pages	Description	From S/N	By	App.	Date
1.0		First issue		ED	RG	30/11/12
1.1		New codification	>2018	RG	RG	20/02/18
1.2		New logo		RG	RG	23/05/18
1.3		Remote control in separate notice, add multiwire inductance		ED	ED	30/10/19

WARRANTIES

Guarantee

AUGIER's goods are guaranteed for one year from delivery date on the signed delivery note, and are guaranteed to be free from defects in materials used, design and manufacture.

The guarantee covers repair, modification or replacement of parts or products recognised to be defective, in the shortest possible time, at AUGIER's cost, provided always that the goods have been properly handled and stored prior installation, properly installed and properly operated after installation.

Unless otherwise specifically laid down in contract, the guarantee does not cover:

- Costs of consignment to factory and re-consignment of defective goods to Buyer
- If these are repaired in AUGIER's factory;
- Travelling & sojourn expenses of AUGIER's personnel if goods have to be repaired on site; assembly and dismantling of any goods other than those recognised to be defective; expenses incurred for waiting times by AUGIER's personnel on site for reasons independent of their will;
- Unjustified travel expenses.

Guarantee shall not apply in the following cases:

- Defects in materials supplied by Buyer or from any designs imposed by them;
- Repairs or replacements due to normal wear and tear, or damages or accidents.
- Repairs or replacements due to damages or accidents resulting from negligence or lack of due care, inadequate supervision or maintenance, or erroneous use of the equipment or software;
- Any other causes for which AUGIER shall not be held responsible, e.g. resulting from an case of Force Majeure.
- When Buyer has replaced AUGIER's parts with other parts.

Buyer must inform AUGIER in writing and without delay of any defects in goods, giving all necessary information and detailed description of how equipment has been utilised, together with purchase date. Buyer undertakes not to have repairs carried out by third parties; any repairs carried out without AUGIER's express prior agreement shall invalidate the guarantee.

It is expressly agreed between the two parties that Buyer cannot avail himself of the beneficial dispositions contained in the guarantee without having first satisfied payment conditions laid down in contract

Disclaimers

This manual could contain technical or typographical errors. AUGIER reserves the right to make changes and revise this manual from time to time without obligation to notify any person or organisation of such changes or revision.

Values and measurements given in this manual are average values and are not binding. AUGIER disclaims any liability for damages suffered as a result of reliance on the information given in this manual, or the use of equipment or processes which this manual refers.

No guarantee is made that the use of the products, equipment, processes or information to which this manual refers will not infringe any third party's patent or rights. Information given does not release the buyer from making their own tests.

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 to Electromagnetic Compatibility
- 73/23/EEC with regard to Low Voltage Equipment

TABLE OF CONTENTS

RECORD OF CHANGE	I-2
WARRANTIES	I-3
SAFETY	I-4
TABLE OF CONTENTS	I-5

I	DESCRIPTION	I-11
I.1	OVERVIEW	I-11
I.2	MECHANICAL DESCRIPTION	I-12
I.2.1	DESCRIPTION	I-12
I.2.2	GENERAL MECHANICAL FEATURES	I-12
I.2.3	STORAGE CONDITIONS	I-12
I.2.4	DIMENSIONS	I-13
I.3	ELECTRICAL DESCRIPTION	I-15
I.3.1	BLOCK DIAGRAMS	I-15
I.3.1.1	Overview:	I-15
I.3.1.2	Electronic:	I-15
I.3.2	GENERAL CIRCUIT DIAGRAMS	I-15
I.3.3	GENERAL ELECTRICAL FEATURES	I-16
I.4	INSTRUCTIONS FOR USE	I-17
I.4.1	USER INTERFACE	I-17
I.4.2	CONTROL	I-18
I.4.3	LOCAL INFORMATION FEEDBACK	I-19
I.4.4	REMOTE INFORMATION FEEDBACK	I-19
I.4.1	CONFIGURATION SOFTWARE UTILITY	I-20
I.5	OPERATION	I-21
I.5.1	CONFIGURATION	I-22
I.5.2	SETTING	I-22
I.5.2.1	Current range:	I-22
I.5.3	PROTECTIONS	I-22
I.5.3.1	LV power monitoring:	I-22
I.5.3.2	“Open circuit”:	I-22
I.5.3.3	“Overcurrent”:	I-23
I.5.3.4	Cancelling “Open circuit” and “Overcurrent” faults:	I-23
I.5.4	AUTOMATIC OPERATION:	I-23
I.6	SUB-ASSEMBLIES	I-24
I.6.1	LOAD ADAPTATION	I-24
I.6.1.1	Adaptation to load:	I-24
I.6.1.2	Automatic load plate position computation:	I-24

I.7	OPTIONS	I-24
I.7.1	EARTH FAULT DETECTOR (EFD)	I-24
I.7.2	CUT OUT AND EARTHING PLATE	I-25
I.7.2.1	Normal position :	I-25
I.7.2.2	Safety position:	I-25
I.7.3	OUTPUT LIGHTING ARRESTORS	I-26
I.7.4	CASTERS	I-26
I.7.5	BURNT LAMP DETECTION:	I-26
I.7.6	WIG WAG	I-27
II	INSTALLATION	II-29
II.1	PREPARATION	II-29
II.1.1	EQUIPMENT RECEPTION	II-29
II.1.1.1	Equipment delivered:	II-29
II.1.1.2	Checking the equipment:	II-29
II.1.2	TRANSPORTATION	II-29
II.1.3	DEVICE LOCATION	II-30
II.1.4	STACKING DEVICES	II-30
II.1.5	CHECKING THE INSTALLATION	II-31
II.1.5.1	Single phase power supply :	II-31
II.1.5.2	LV Protection :	II-31
II.1.5.3	Lighting loop :	II-31
II.1.5.4	Control by remote control :	II-31
II.2	CONNECTIONS	II-32
II.2.1	POWER AND EARTH	II-32
II.2.1.1	LV supply:	II-32
II.2.1.2	Earthing	II-32
II.2.1.3	Lighting loop:	II-33
II.3	MULTI TERMINAL INDUCTANCE	II-34
II.4	REMOTE CONTROL CONNECTIONS	II-35
II.4.1.1	Connectors:	II-35
II.5	REMOTE CONTROL	II-36
II.6	CIRCUIT SELECTOR:	II-37
II.7	ADJUSTING THE CCR	II-38
II.7.1	ADAPTATION TO LOAD	II-38
II.7.2	PARAMETER MODIFICATION	II-39
II.7.2.1	Preferred configuration values:	II-39
II.7.2.2	Brightness values:	II-40
II.7.2.3	Value of "Open Circuit" protection level:	II-40
II.7.2.4	Value of "Overcurrent" protection levels:	II-40
III	COMMISSIONING	III-41

III.1	PROCEDURE	III-41
III.2	TESTS	III-42
III.2.1	SHORT-CIRCUIT TESTS	III-42
III.2.2	OVERLOAD TESTS	III-42
III.2.3	OPEN-CIRCUIT TEST	III-42
IV	MAINTENANCE	IV-43
IV.1	FORMALISATION	IV-43
IV.2	PREVENTIVE	IV-43
IV.2.1	FIRST MONTHS	IV-43
IV.2.2	ANNUAL PROCEDURE	IV-43
IV.2.3	EVERY THREE YEARS	IV-43
IV.3	CORRECTIVE	IV-44
IV.3.1	COMPONENT LAYOUT	IV-44
IV.3.1.1	Door components	IV-44
IV.3.1.2	LV components	IV-45
IV.3.1.3	HV components	IV-45
IV.3.2	FAULT DIAGNOSIS	IV-46
IV.3.2.1	LV power fault:	IV-46
IV.3.2.2	“Open Circuit” fault:	IV-46
IV.3.2.3	“Overcurrent” fault:	IV-47
IV.3.2.4	Other faults	IV-48
IV.4	VERIFICATION PROCEDURES	IV-50
IV.4.1	THYRISTORS	IV-50
IV.5	SPARE PARTS LIST	IV-51
V	APPENDIX A: DIAGRAM	V-53
VI	APPENDIX B: JBUS TABLE	VI-54

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

DIAM3100 series CCRs are stackable fully static devices controlled by two thyristors (anti-parallel mounting type dimmer). They are designed to maintain a constant, pre-displayed and adjustable output current independently from the load and power supply fluctuations.

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.
- **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
 - IEC : 61822 (concern the present manual)

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 thyristors and associated driver boards, the master switch, the LV fuses 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 tapping terminals are also accessible from this side.

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.

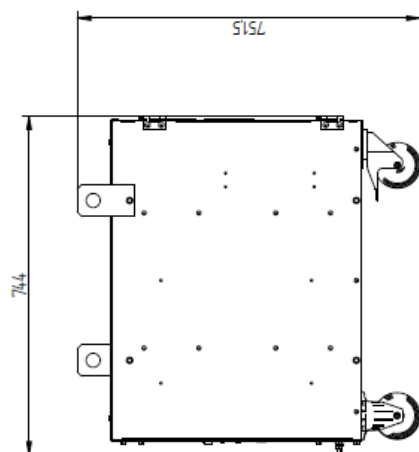
- Dimensions : 500mm Wide x 700mm Deep x 550mm High (+130mm for rollers)
- Protection Index for the Casing: IP 20.
- Usage: Ambient temperature from -20°C (IEC type) to +55°C with maximum relative humidity of 95%. Natural air cooling.
- Three units can be stacked, in order to save floor space.
- Weight : (Can be modified according options)

1 unit 6.5kVA : 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/+55°C.

6021562 DIAM 3100 rev 1-3.doc

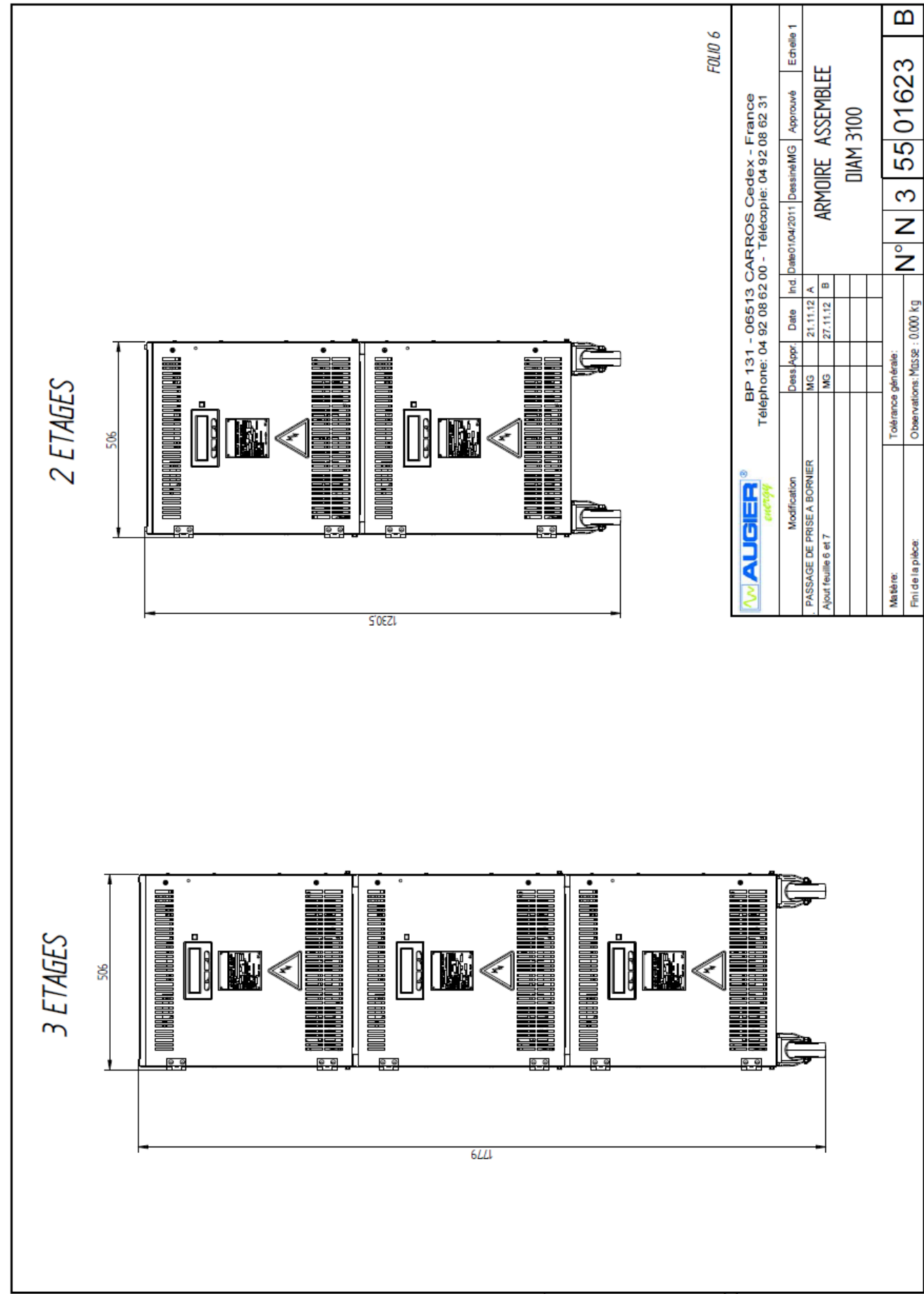


AUGIER
energy

BP 131 - 06513 CARROS Cedex - France
Téléphone: 04 92 08 62 00 - Télécopie: 04 92 08 62 31

[illegible]

Stacked CCRs :

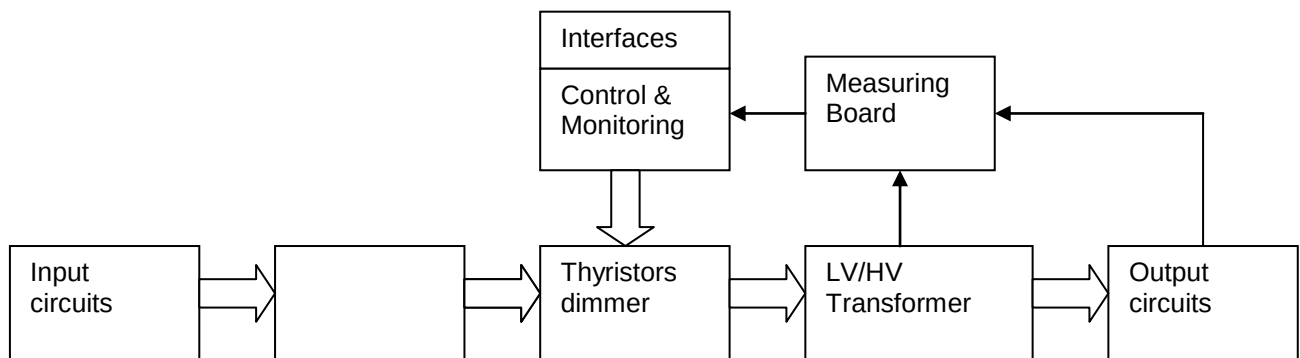


I.3 ELECTRICAL DESCRIPTION

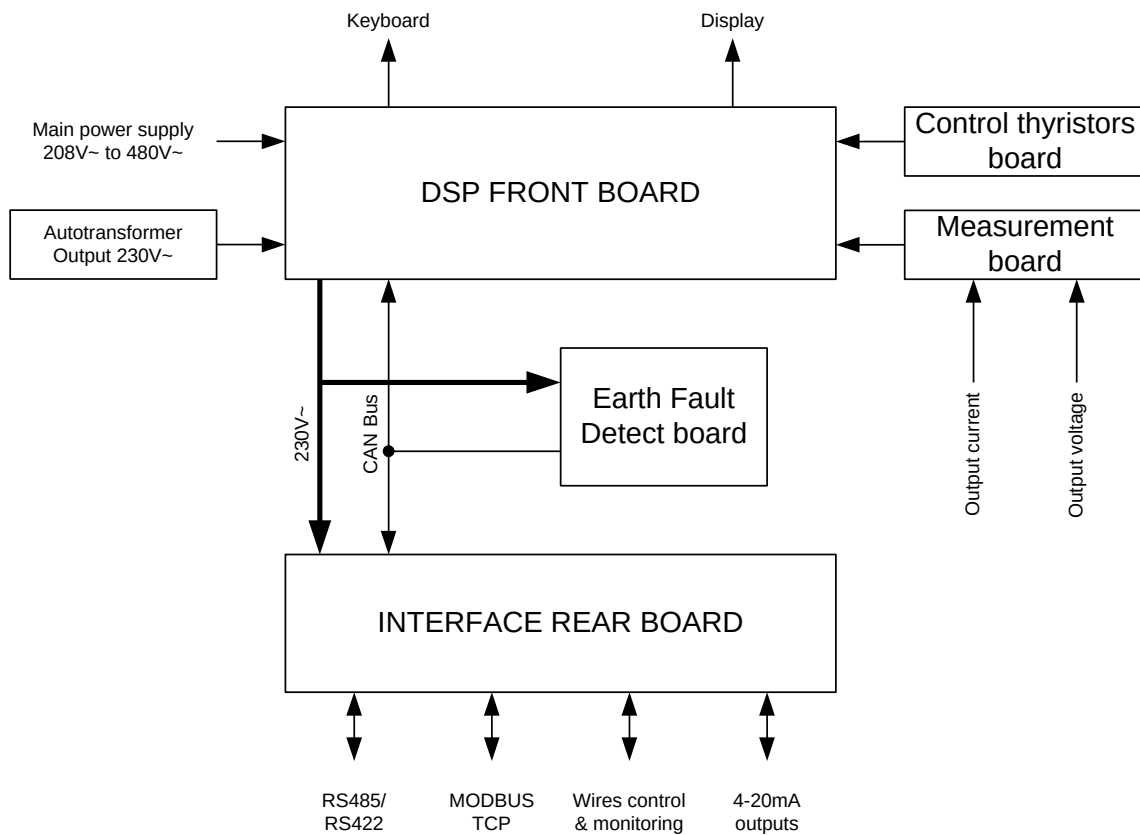
I.3.1 BLOCK DIAGRAMS

i See paragraph I.5 for the device operating description

I.3.1.1 Overview:



I.3.1.2 Electronic:



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 Hz $\pm 5\%$.
- **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, 4KVA, 5KVA or 6.5 KVA.
- **Power factor:** > 90%
- **Efficiency :** > 90% at nominal voltage and rated resistive load.
- **Output Current Regulation:**
Better than $\pm 100\text{mA}$ under the following conditions: Power supply voltage $-10/+10\%$, Frequency: $\pm 5\%$, Load: from 0 to 100%
- **Load adaptation:**
The output transformer is equipped with adjustment taps in order to adapt the rated output voltage of the CCR to the present load. Six terminals allow load adaptation with steps of 12.5%.
- **Protection:**
The electronic circuitry is protected against fluctuations by the use of a Hall effect sensor for current measurement, and fibre optics for thyristors control. Electronic board manages all overcurrent, open circuit or mains under/over voltage.
- **LV Protection:**
A set of power fuses, a set of fuses for auxiliaries power supply, and "glass" fuses on the circuit boards provide LV protection.
- **Lightning arrestors :**
These regulators are provided with output lightning arrestors.

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.

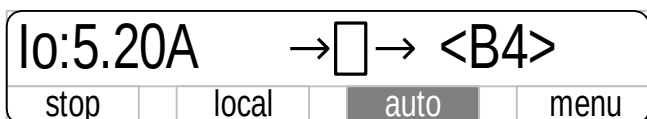
Alphanumeric display:

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.

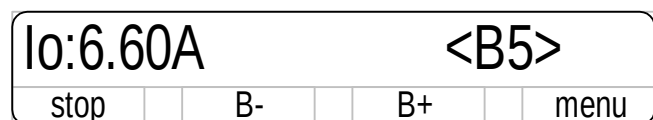
• Stop mode:



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.



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
- Load plate tap value from 0 to 100% (0 to 4/4 by increments of 1/4)
- 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.



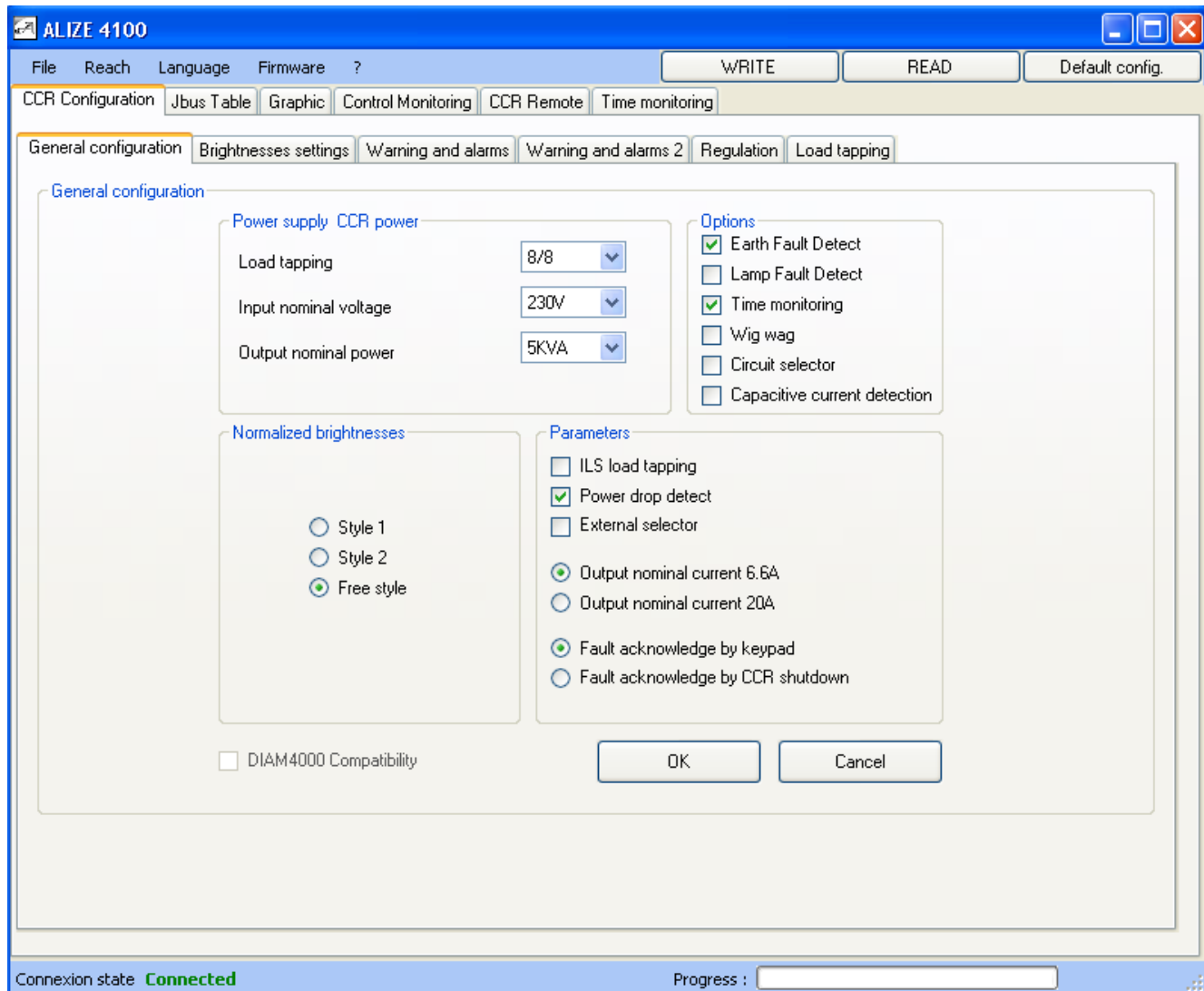
See II.2.for more details.



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:

Monitoring									
esc		←		→		OK			

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

Options									
esc		←		→		OK			

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

Param. access: No									
esc		←		→		modif			

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*” :

Param. access: Yes									
esc		←		→		OK			

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 : 6.5
- 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.

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

I.6 SUB-ASSEMBLIES

I.6.1 LOAD ADAPTATION

The main function of the load adaptation device is to adjust the power of the CCR to the installed power of the lighting loop..

This tapping can be accessed from the back of the CCR, dismantling the rear panel.

I.6.1.1 Adaptation to load:

The transformer comprises output terminals which allow load settings from 12.5% (1/8 load) to 100% (4/4). Six insulated terminals are used for this depending on the transformer.

I.6.1.2 Automatic load plate position computation:

An input current transformer is added in the primary power supply to compute automatically the position of the load plate when it changes. With this option, it is not necessary to set the load plate value each time the load plate value changes.

You can see the load plate value in the menu "Monitoring"

Monitoring					
esc		←		→	OK

At the item "Load tapping"

Load tapping: 6/8					
esc		←		→	

I.7 OPTIONS

I.7.1 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.

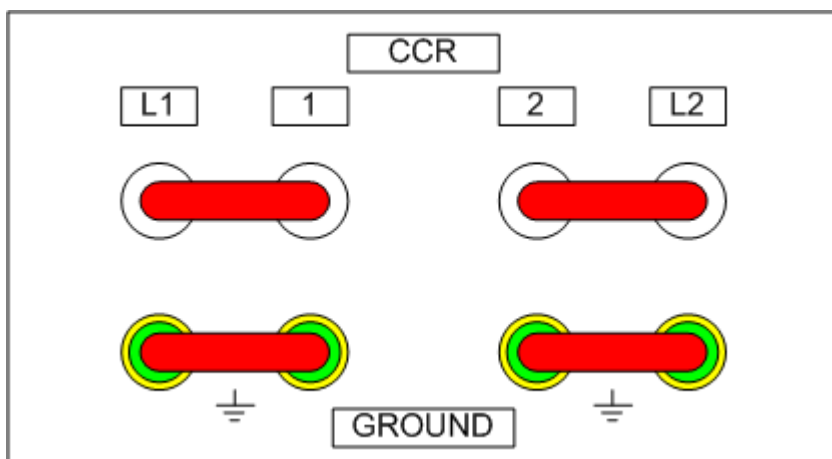
I.7.2 CUT OUT AND EARTHING PLATE

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

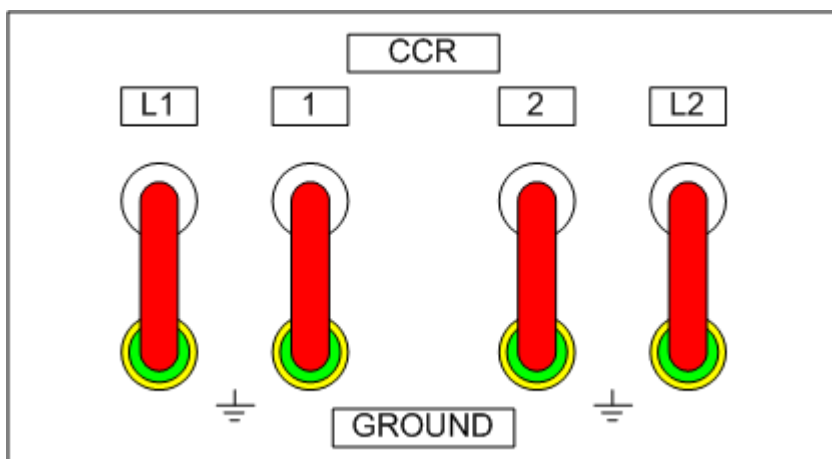
With that option, the CCR is equipped with an cut-out and earthing plate, using two jumpers which allows to carry out all maintenance and measurement operations, without unscrewing any load terminal or earth connection, and without requiring any special tools.

I.7.2.1 Normal position :

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



I.7.2.2 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.

- i** 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.
- i** **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.7.3 OUTPUT LIGHTING ARRESTORS

This option consists of two lighting 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.7.4 CASTERS

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

I.7.5 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":

X Burned Lamp: 1				
esc	←	→	modif	

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:

OK for 0 B. Lamp?				
esc	←	→	OK	

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

OK for X B. Lamp?				
esc	←	→	OK	

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.

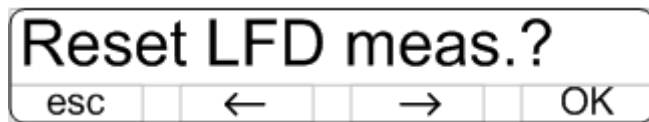
Setting Level LFD1 and Level LFD2 parameters:

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:

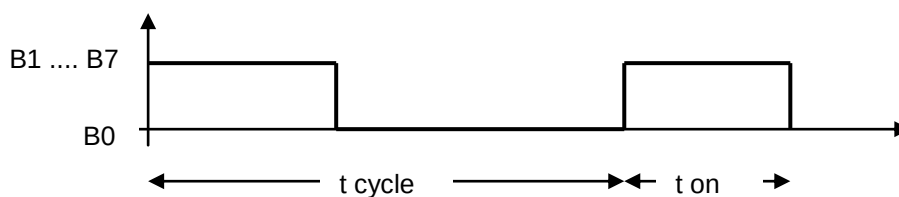


While pressing ‘OK’, learning is reset and to determine the number of burnt lamps on the output load, it is necessary to perform a new learning calibration (for 0 and X lamp burned).

I.7.6 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 tcycle*” 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.

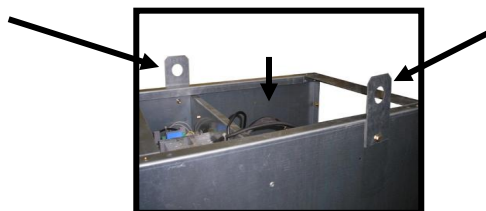
II.1.4 STACKING DEVICES

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 :

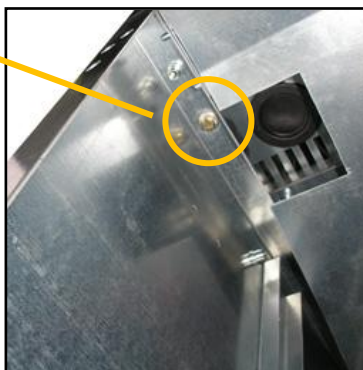
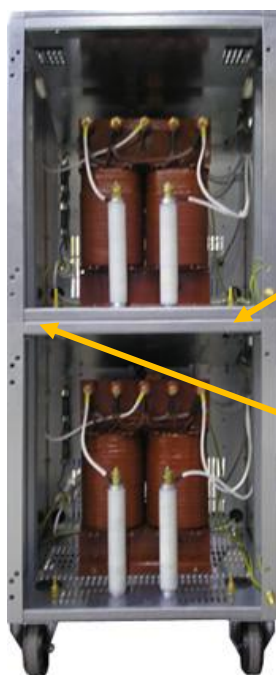
1. All CCRs :

- 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.

 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)

220 to 240V Power Supply			380 to 415V Power Supply	
Power	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
4KVA	10 mm ²	IC60N 40A D	6 mm ²	IC60N 25A D
5KVA	16 mm ²	IC60N 50A D	10 mm ²	IC60N 32A D
6.5 kVA	16 mm ²	IC60N 63A D	10 mm ²	IC60N 40A 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.

 See paragraph I.3.3 for the electrical characteristics of the DIAM3100 CCRs.

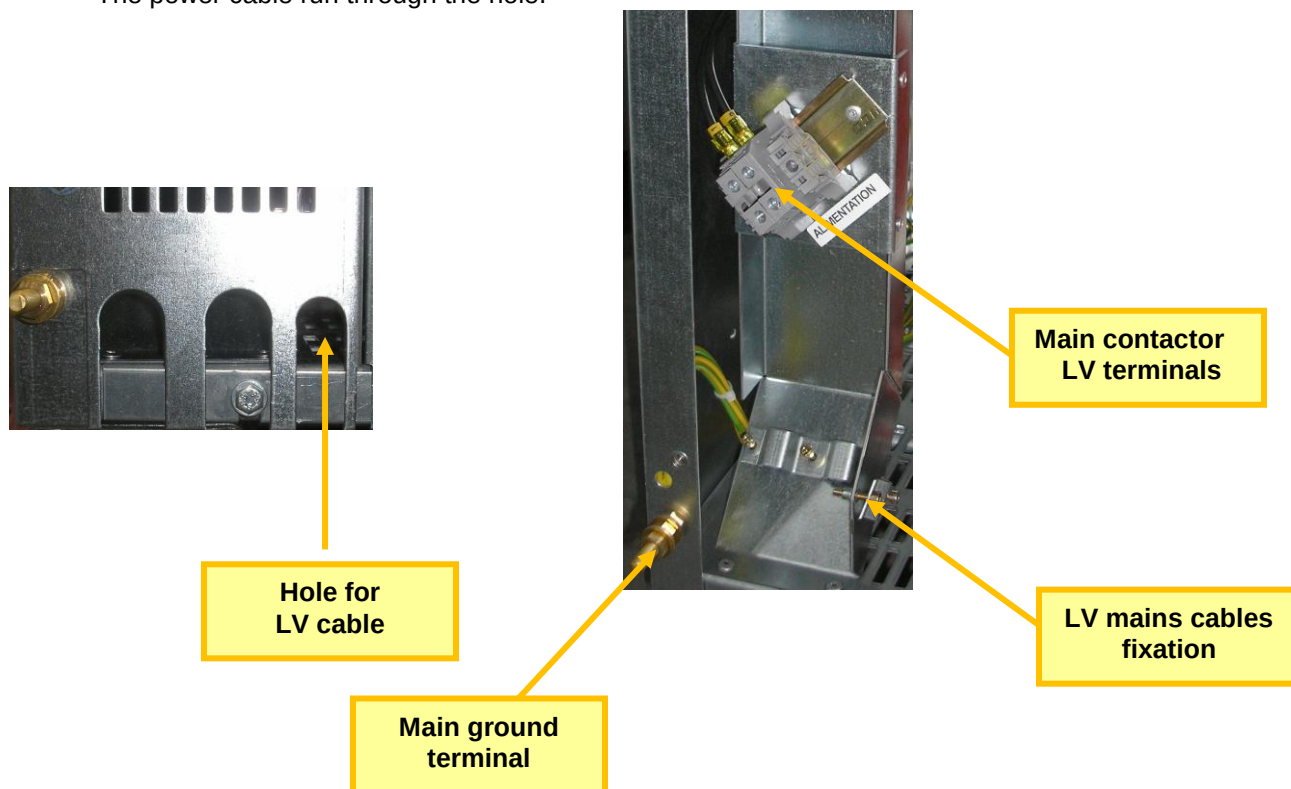
II.2 CONNECTIONS

II.2.1 POWER AND EARTH

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

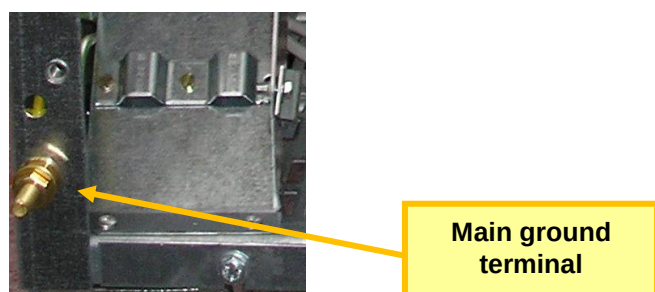
II.2.1.1 LV supply:

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.



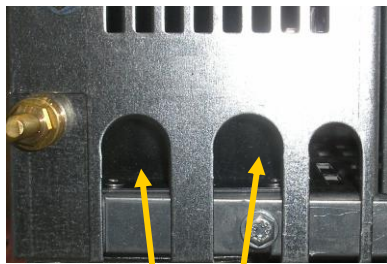
II.2.1.2 Earthing

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)

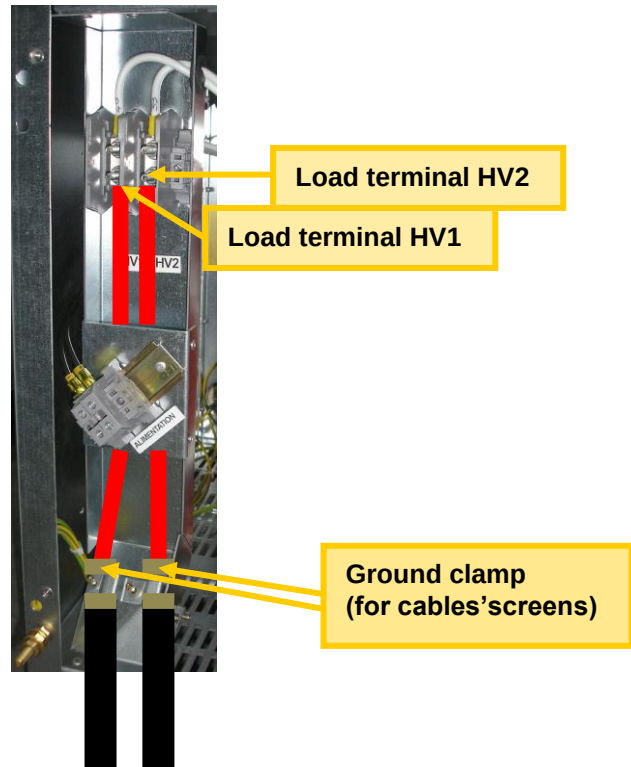


II.2.1.3 Lighting loop:

- 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.

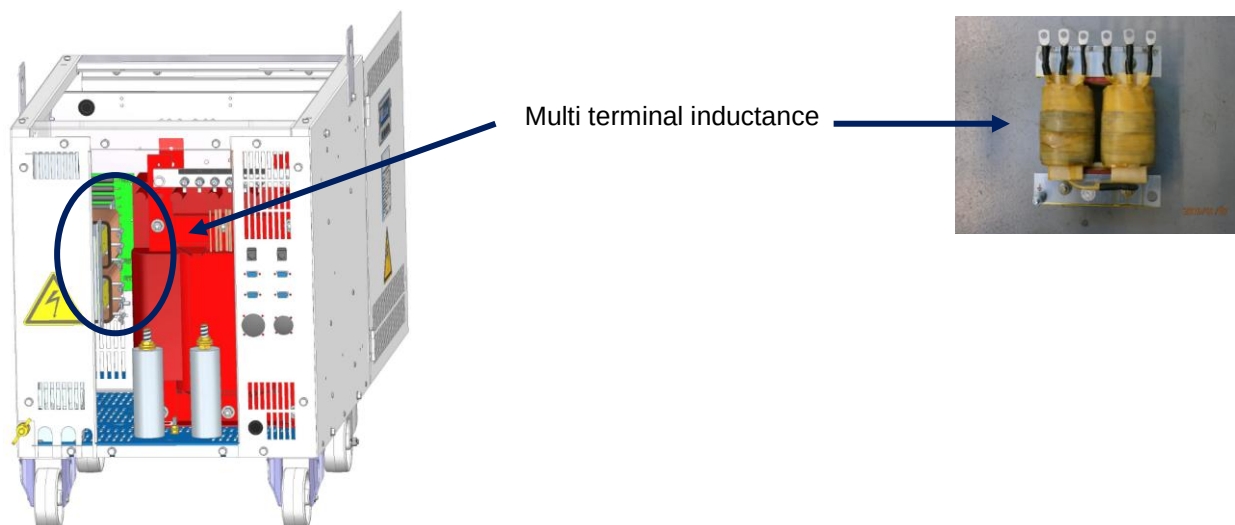


Hole for loop
cables



II.3 MULTI TERMINAL INDUCTANCE

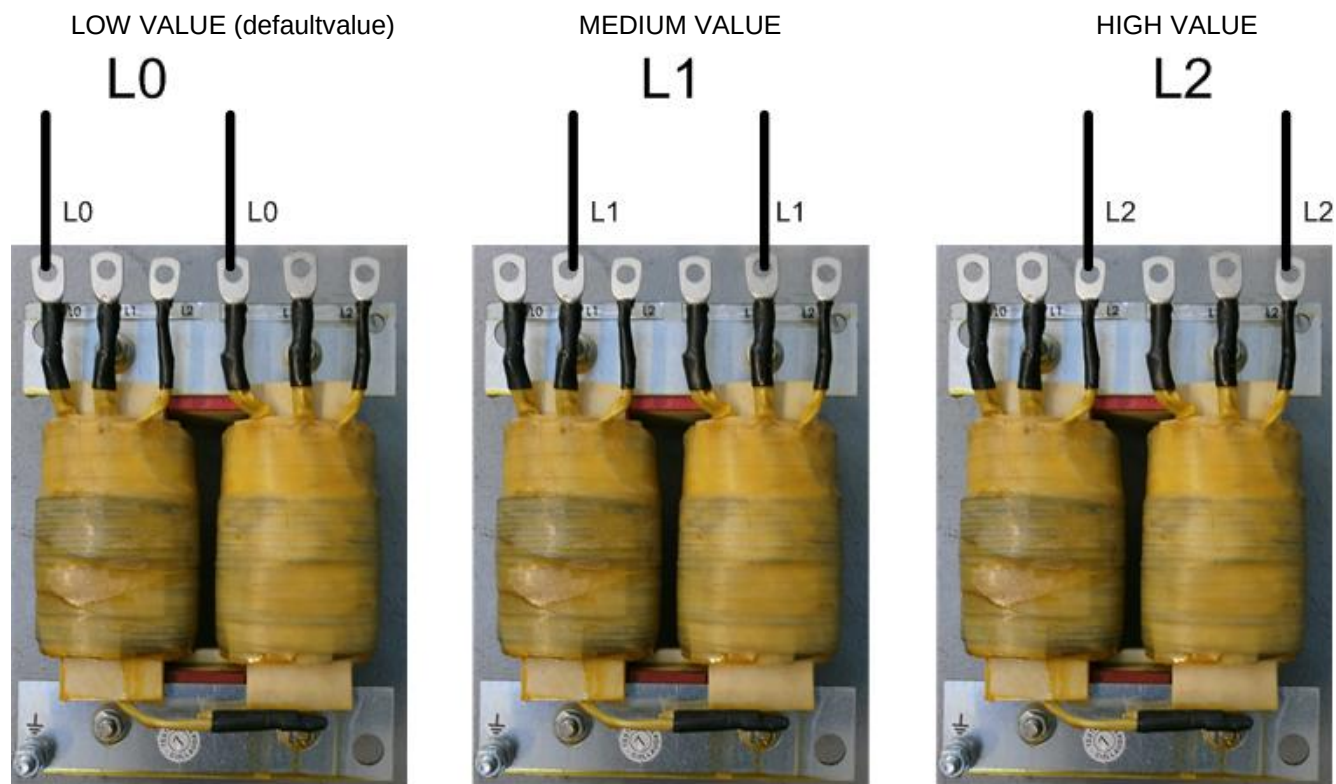
An inductance is in the CCR to filter the input current. Position in the CCR:



The inductance has 3 values available (L0, L1 and L2). L0 (the lower value) is selected by default. Depending of the loop load, the output current can be unstable.

It can be necessary to increase the inductance value.

It is possible to select L1 or L2 inductance moving the cables connections according to the following drawing:



This inductance is connected to live parts, power down supply on the CCR before moving connections!

II.4 REMOTE CONTROL CONNECTIONS

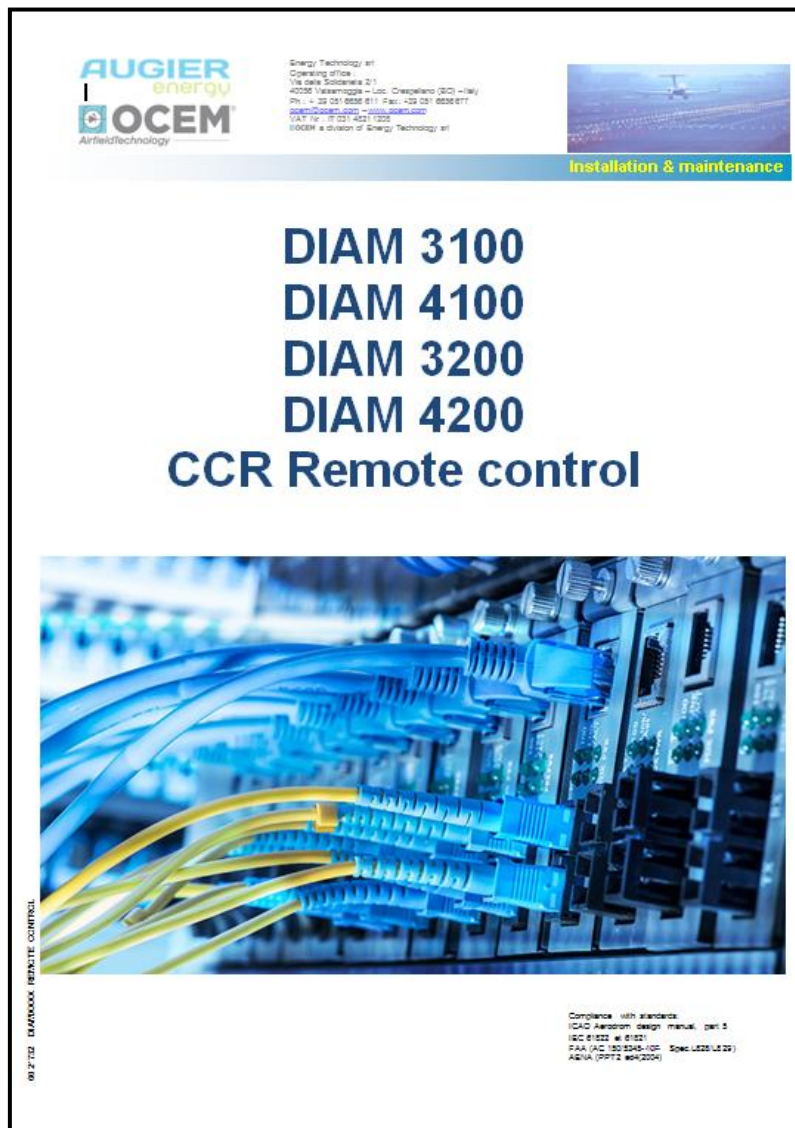
Connections to the control system is made at the rear of the CCR:

II.4.1.1 Connectors:



II.5 REMOTE CONTROL

i FOR ALL REMOTE INFORMATION, SEE NOTICE 6021732.



II.6 CIRCUIT SELECTOR:

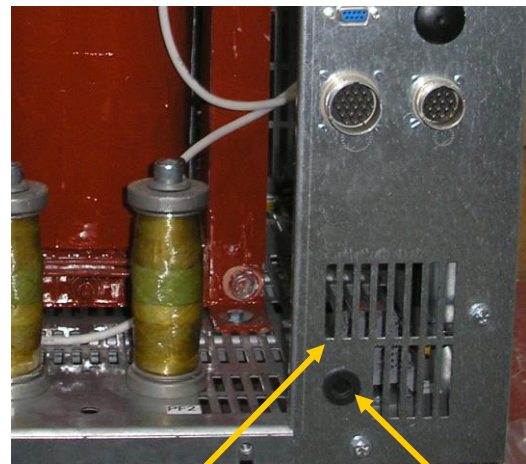
External CS :

The DIAM CCR has two electrical interlock terminals, **terminal S1 and S2**, located at the right rear 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.



**S1 & S2
TERMINALS**

**Hole for the
cable**

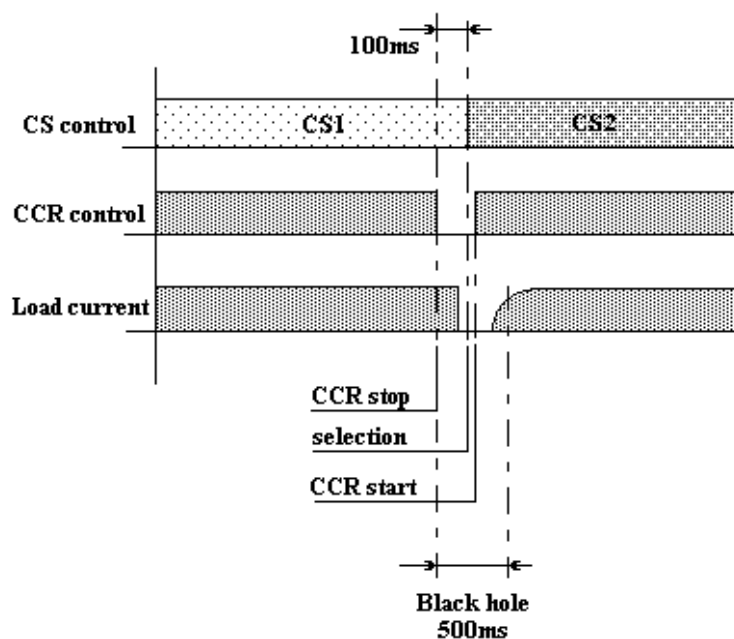
Operation with selectors:

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.

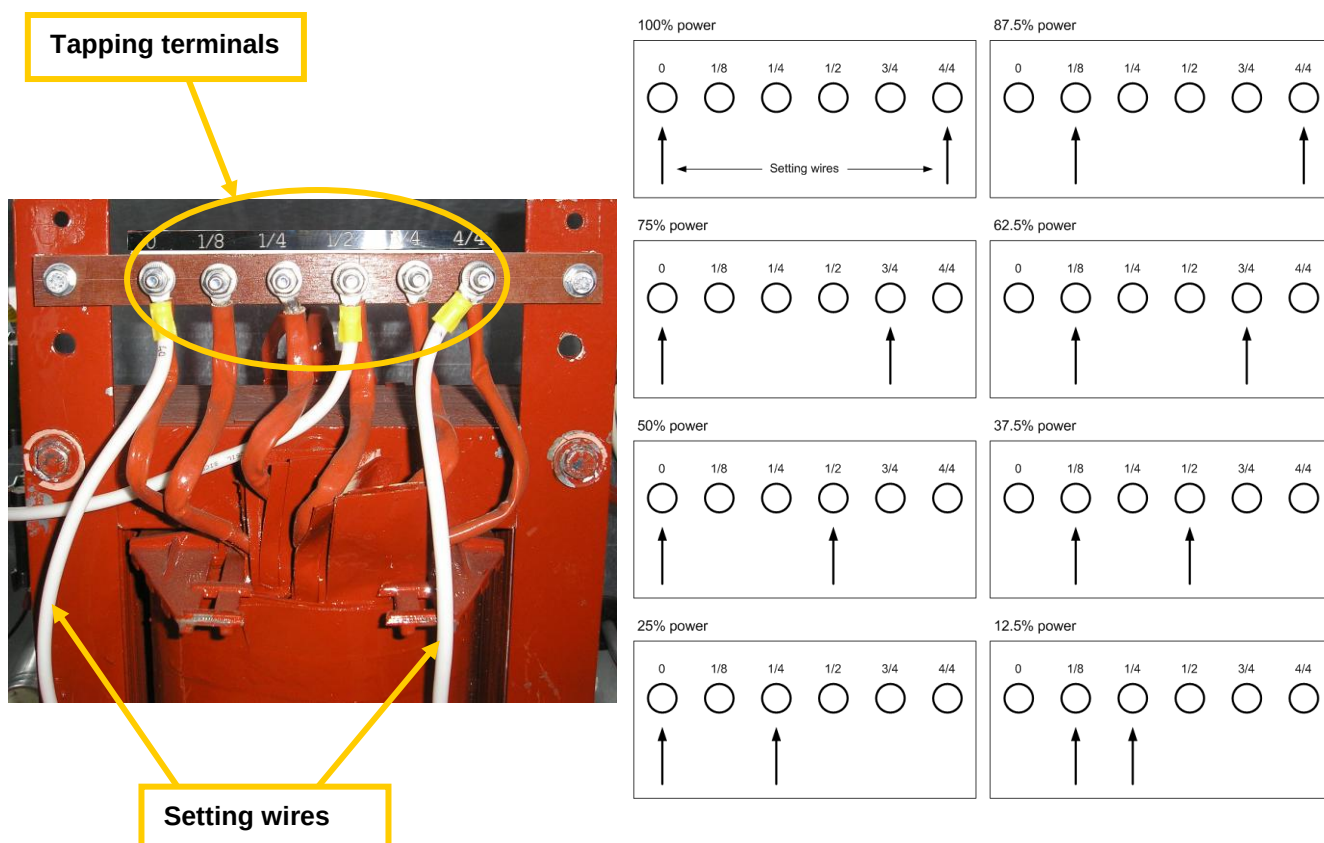
Chronogram of operation :



II.7 ADJUSTING THE CCR

II.7.1 ADAPTATION TO LOAD

Adjusting the CCR output power to that installed, using the load plate : This can be done by moving the load setting wires between 1/8 and 8/8. For example, if the load is equivalent to 60% of the rated power of the CCR, the setting is to the nearest value above, i.e. 6/8 = 75%.



Note : If the load power is not known, set the load plate straps to 8/8 (default factory position).

WARNING :
For all brass screws and bolts of that load plate ,
A TIGHTENING TORQUE RANGING BETWEEN 6.5 and 7 Nm MUST BE RESPECTED

II.7.2 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.7.2.1 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.7.2.2 Brightness values:

See paragraph I.5.2



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.7.2.3 Value of “Open Circuit” protection level:

See paragraph I.5.3.2

II.7.2.4 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 § II.7.1
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 **Erreur ! Source du renvoi introuvable.**
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.3.2.4

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 II.7.1

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

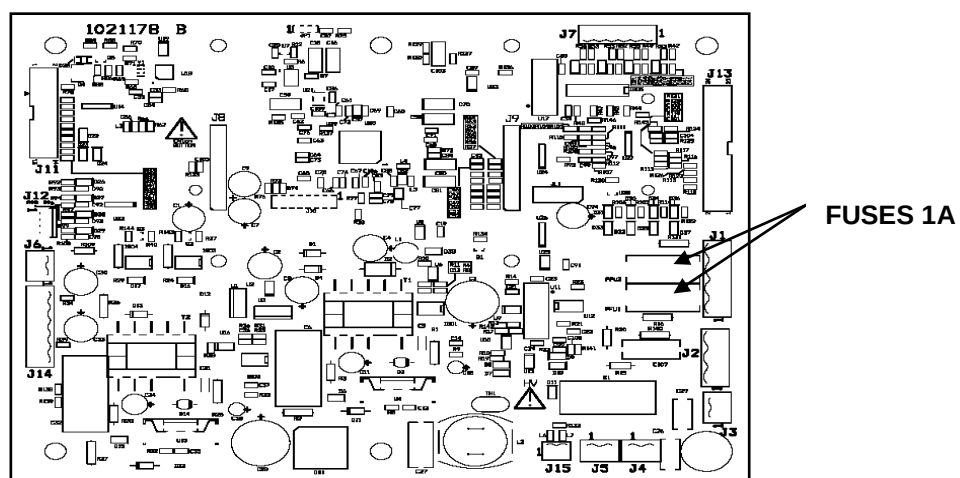
The frequency with which these operations are carried out will depend on the usage of the CCR:

- 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.

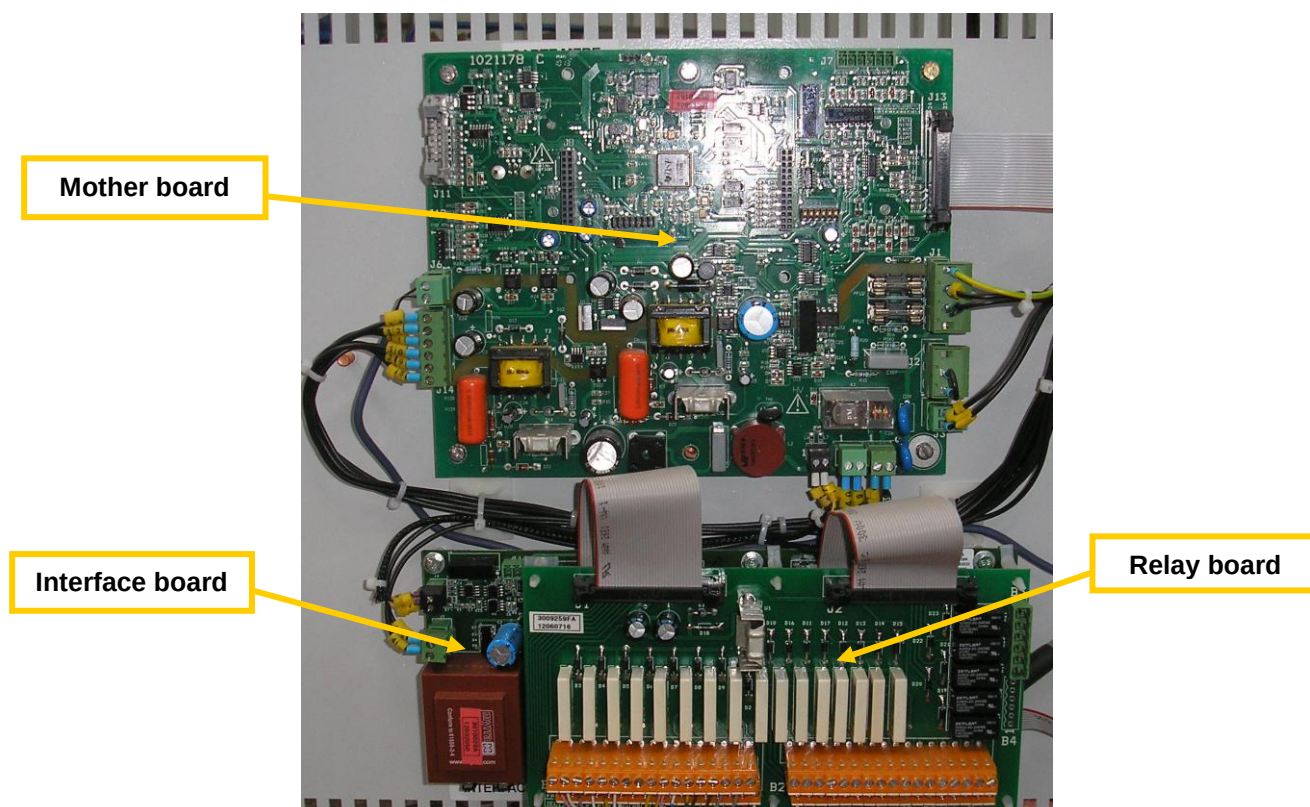
IV.3 CORRECTIVE

Motherboard fuses

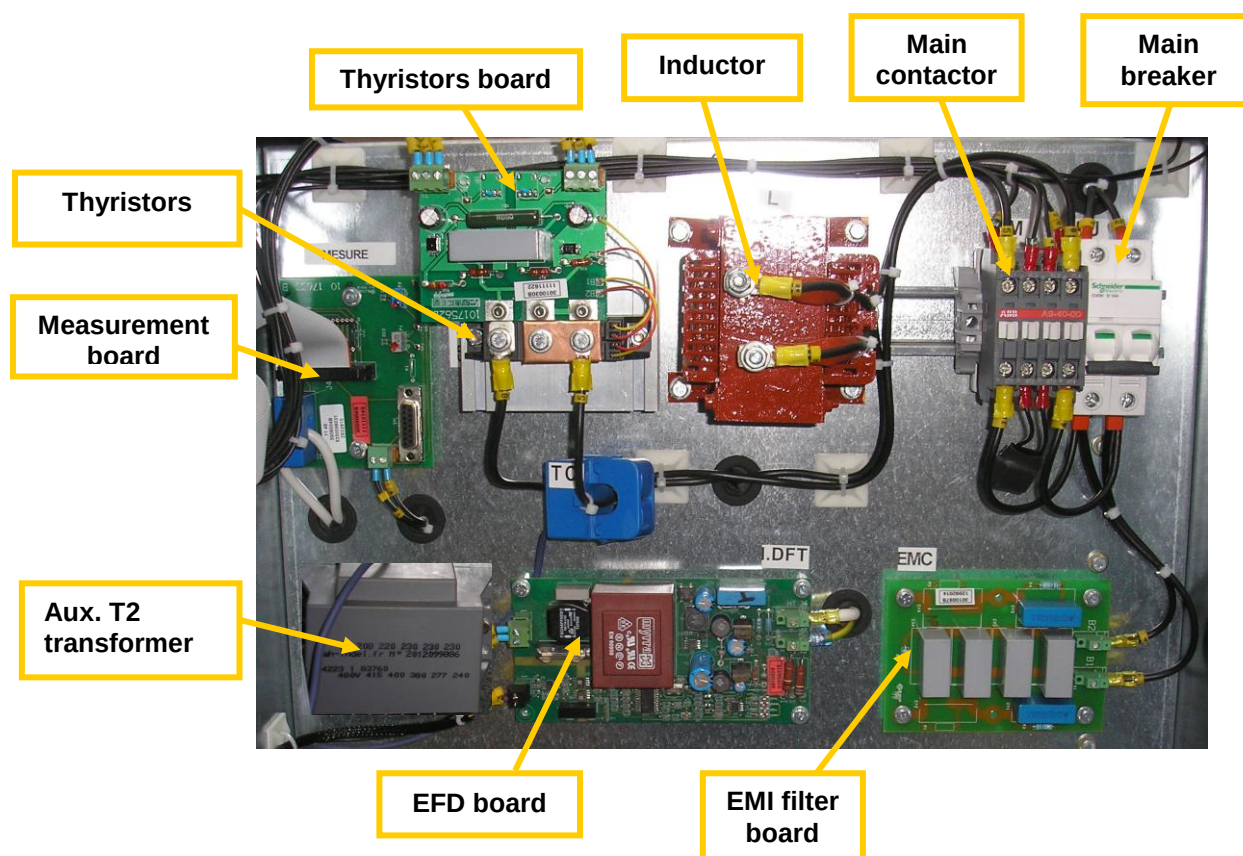


IV.3.1 COMPONENT LAYOUT

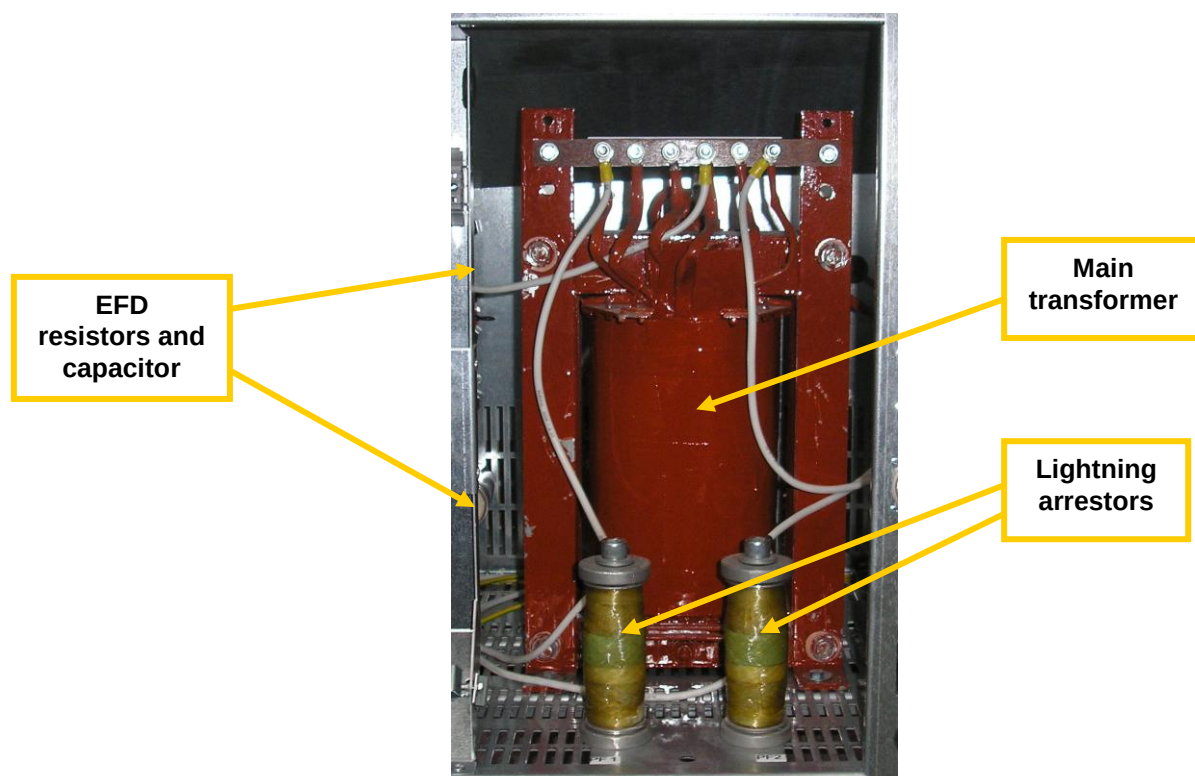
IV.3.1.1 Door components



IV.3.1.2 LV components



IV.3.1.3 HV components



IV.3.2 FAULT DIAGNOSIS

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

IV.3.2.1 LV power fault:

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

IV.3.2.2 "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:	Output current < 1.0A for more than 500 ms	Measure the output current value
"ALARM: I << Open Cir."		Large load increase on the loop caused by circuit switching
is displayed		Check the state of the fibre optic cables between the regulation board and the thyristor control boards
		Check state of the ribbon cable between measuring board and motherboard
		Measure the state of the thyristors
		Check setting of the level in the menu "Alarms and warnings" then "Open circuit"
		Measure the state of the thyristors

IV.3.2.3 “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” or “ALARM : I >> Peak value” is displayed	Overload combined with load decrease by switching	Check the adaptation of the load plate to the loop power
	Faulty Thyristors in short-circuit	Check the number of ITs open due to missing or fault lamps Measure the state of the thyristors Test in overload
	Fibre optic cables disconnected or faulty	Check the state of the fibre optic cables between the regulation board and the thyristor control boards
	Levels too low	Check levels in the menu “Alarms and Warnings” then “Overcurrent”.

IV.3.2.4 Other faults

Symptom	Fault	Action
Output current insufficient with load plate set to a position less than 8/8	Overload	Check the adaptation of the load plate to the loop power
The message <i>“Warning: Regulation error”</i> is displayed	Large number of ITs open	Check the number of ITs open due to missing or fault lamps
	CCR power insufficient	Check that the installed power is not greater than the power of the CCR
Display remains off when CCR is connected to the power	CCR LV protection faulty	Check LV fuses
	Motherboard protection faulty	Check state of fuses F1 and F2 on the motherboard (T1A)
	Motherboard faulty	Check motherboard with “Diagnostic” function of ALIZE software
CCR does not work in remote control mode	Remote control protection fuse faulty	Check fuse F1 (T100mA) and F2 (T500mA) on the interface board.
	Wrong configuration of remote control type	Check configuration of remote control type
	Insufficient remote control voltage	Check remote control voltage (from 20 to 60VDC? Or 120Vac)
Some brightness levels do not work in remote control mode	Faulty link	Check the wiring for the remote control links
The master switch does not close for a brightness command which causes a fault	Faulty link	Check the wiring for the remote control links
	Command photoMOS defective	Check photoMOS operation with “Diagnostic” function of ALIZE software
	Power supply fault	Check state of fuse F3 on the motherboard (T315mA)
LV power protection fuses trip during a brightness command	Thyristors faulty	Check state of the thyristors
	Thyristor control boards faulty	Replace the boards
The switch does not close	Power supply fault	Check state of fuse F4 on the motherboard (T315mA)
<i>“WARNING : EFD level 1”</i> <i>“WARNING : EFD level 2”</i>	None from the CCR point of view. Light intensity may be impacted.	Check primary cables status as well as primary connectors. Check warning thresholds.
<i>“WARNING : No EFD”</i>	No isolation measurement .	Check EFD board connexions. Replace EFD board.

Symptom	Fault	Action
<i>"WARNING : LFD level 1"</i> <i>"WARNING : LFD level 2"</i>	Possible output regulated current instability. Possible loss of CAT conditions.	Replace burnt lamps. Check warning thresholds. Perform function learning again.
<i>"WARNING : Meas. lamps"</i>	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.
<i>"ALARM : BAD Interface"</i>	No remote control	Check remote control board connexions. Replace remote control board. Check mother board.
<i>"WARNING : BAD Freq."</i>	CCR stops for internal protection.	Check supply network. Frequency out of range or asymmetrical wave shape.
<i>"WARNING : TC-TS board"</i>	No multiwire remote control	Replace relay remote control board.
<i>"WARNING : Power Drop"</i>	None for the CCR More than 10% output power losses.	FAA : informative warning
<i>"WARNING : Temp. level 1"</i> <i>"FAULT : Temp. level 2"</i>	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

IV.4 VERIFICATION PROCEDURES

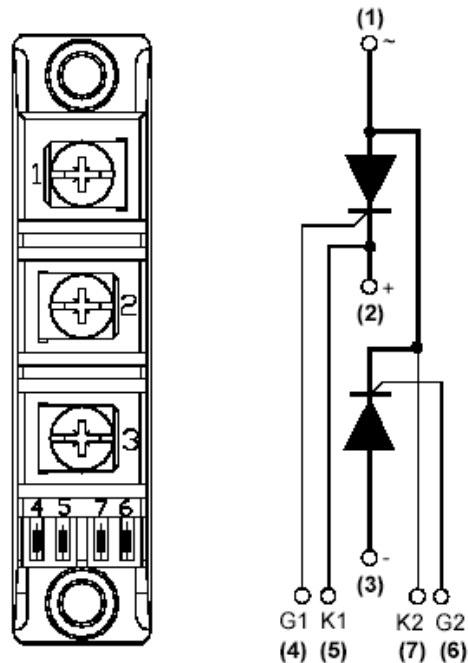
IV.4.1 THYRISTORS

The state of the thyristors can be checked as follows using an ohmmeter:

- Between **pin 1** and **pin 2**, and between **pin 3** and **pin 1** : **Several $M\Omega$** , otherwise the Thyristors are in short-circuit
- Between **pin 4** “G1” and **pin 5** “K1”, between **pin 6** “G2” and **pin 7** “K2”: **A few Ω** otherwise the trigger-gates are cut

Examples:

“IRKT 41/12”



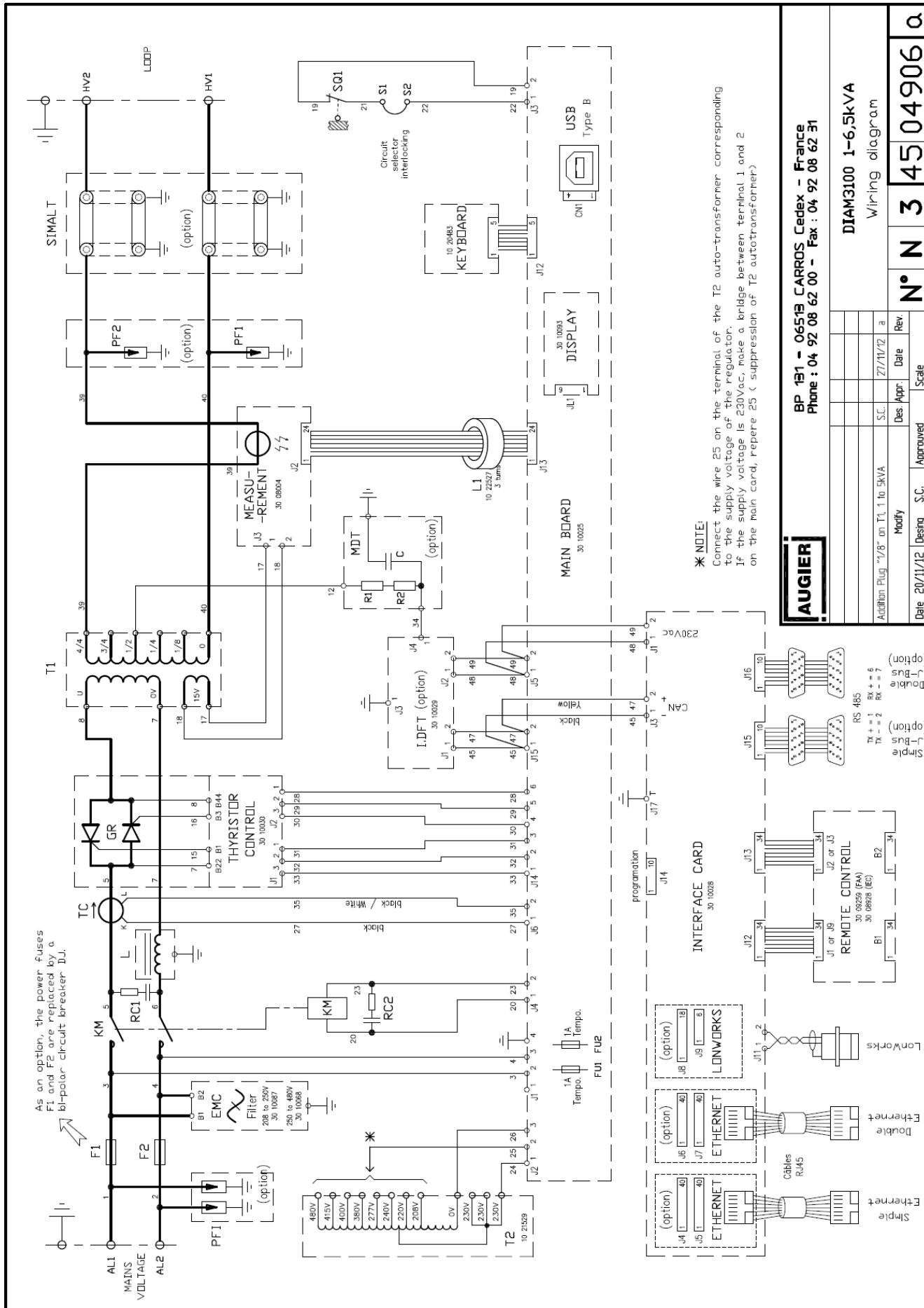
IV.5 SPARE PARTS LIST

CCR DIAM3100:

Désignations	Mains voltage	REFERENCES				
		1 kVA	2.5 kVA	4 kVA	5 kVA	6.5 kVA
Fuses F1, F2	220/240V	10x38 10A gG 10.05768	10x38 16A gG 10.05891	10x38 25A gG 10.17586	14x51 32A gG 10.05894	14x51 40A gG 10.05895
	380/415V	10x38 6A gG 10.08770	10x38 10A gG 10.05768	10x38 16A gG 10.05891	10x38 20A gG 10.07058	10x38 25A gG 10.17586
Circuit breaker DJ	220/240V	IC60N 10A B 10.25237	IC60N 16A B 10.25238	IC60N 25A B 10.25240	IC60N 32A B 10.25241	IC60N 40A B 10.25242
	380/415V	IC60N 6A C 10.25249	IC60N 10A B 10.25237	IC60N 16A B 10.25238	IC60N 20A B 10.25239	IC60N 25A B 10.25240
Contactor KM	220/240V	AF09 4000 10.27053		AF16 4000 10.27054		AF26 4000 10.27055
	380/415V	AF9 4000 10.27053			A16 4000 10.27054	
Circuit RC1	220/415V	PMZ 2035RE6100K150R30 10.10382				
Inductor L	220/240V		30 13172	30 13173	30 13174	30 13175
	380/415V		30 13181	30 13182	30 13183	30 13184
Thyristors GR	220/415V	46A 1200V 10.14225				
Heat sink (thyristors)		APV 99 L:75 10.18108				
Door contact SQ1		10.08192				
Main transformer T1	220V		30.10503		30.10513	
	230V		30.10504		30.10514	
	240V		30.10734		30.10736	10.23124
	380V		30.10505		30.10515	
	400V		30.10506		30.10449	
	415V		30.10507		30.10516	

Désignations	Mains voltage	REFERENCES				
		1 kVA	2,5 kVA	4 kVA	5 kVA	6,5 kVA
Auxiliary transformer T2	220V	10.21529				
	230V					
	240/415V	10.21529				
LV L. Arrester PFI		DS41-400 10.19975				
HV L. Arrester PF1, PF2		CEA3 10.17854				
R1 (MDT plate)		47kOhms 28W 13x70 10.10432				
R2 (MDT plate)		47kOhms 28W 13x70 10.10432				
C (MDT plate)		MKM 450V 20μF 10.10439				
EFD board		30.10029				
EFD fuse		10.22514 (250V 100mAT 5x20)				
Thyristors board		30.10030				
Mother board		30.10025				
Fuses PFU1, PFU2 (Mother board)		10.22638 (250V 1AT 5x20)				
Measurement board		30.08004				
Rem. Control board		30.10028				
Fuses PFU1, PFU2 (Rem. control board)		FU1: 10.22514 (250V 100mAT 5x20) ; FU2: 10.19783 (250V 500mAT 5x20)				
Wire interface board		30.13547				
Display		30.10093				
4 keys keypad		10.20483				
Cut out/earthing plate		30.11851				
Jumper for earthing plate		10.25705				
Ribbon cable		Rem. Control board/ Wire interface board => 30.10352, Mother board / Measurement board => 30.08947				

V APPENDIX A: DIAGRAM



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,
					Bit8	Local or Remote	Stop mode		1:0 = Remote
					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	*V
4	R		Ram	Uo loop voltage					*V
5									
6	R		Ram	Mains voltage Ui					*V
7	R		Ram	Mains current Ii					*A (OPTION)
8	R		Ram	Output power Po					*VA
9									
10	R		Ram	EFD Resistance					*KOhms (1..65000)
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)

