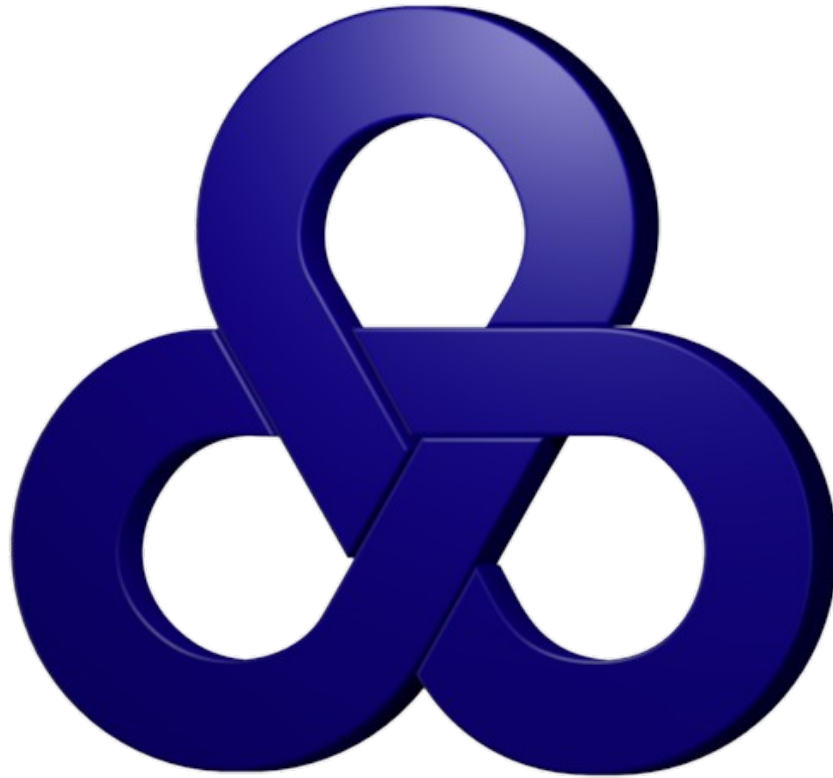




CONVEX S.A.



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DC Power Supply & Stationary NiCd Battery Charger Specification

CONVEX RO125532-DI

- Automatic Phase-controlled (SCR) Battery Charger
- Load Voltage Diode Regulator
- Alkaline (Ni Cd) Stationary batteries





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Chapter 1 - Getting Started

1-1 Safety Instructions

IMPORTANT SAFETY INSTRUCTIONS READ AND FOLLOW ALL SAFETY INSTRUCTIONS

Before using this equipment, read all instructions and cautionary markings on: A) this equipment, B) battery, and C) any other equipment to be used in conjunction with this equipment.

This manual contains important safety and operating instructions, and therefore should be filed for easy access.

Remove all jewelry, watches, rings, etc. before proceeding with installation or service.

Do not touch any uninsulated parts of this equipment, especially the input and output connections, as there is the possibility of electrical shock.

During normal operation, batteries may produce explosive gas. Never smoke, use an open flame, or create arcs in the vicinity of this equipment or the battery.

Maintain at least 200 mm clearance from all obstructions on the top, bottom and sides of this equipment. Allow sufficient clearance to open the front panel for servicing.

Turn this equipment off before connecting or disconnecting the battery to avoid a shock hazard and/or equipment damage.

Connect or disconnect the battery only when the battery charger is off to prevent arcing or burning.

De-energize all AC and DC inputs to the battery charger before servicing.

Do not operate battery charger if it has been damaged in any way. Refer to qualified service personnel.

Do not disassemble battery charger. Only qualified service personnel should attempt repairs. Incorrect reassembly may result in explosion, electrical shock, or fire.

Do not install the battery charger outdoors, or in wet or damp locations unless specifically ordered for that environment.

SAVE THESE INSTRUCTIONS



1-2 Introduction

CONVEX "RQ" Series devices are automatic and self-regulated Phase-controlled (SCR) Rectifiers / Battery Chargers.

This devices convert a three phase AC input to a reliable and uninterrupted DC supply, filtered, stabilized and protected against overload.

Power Control is performed with a six pulse controlled bridge (SCR) rectifier.

In the "-DI" series the control and instrumentation logic is operated with a microprocessor and a 4 line alphanumeric display of 20 characters per line which shows the equipment operating conditions, voltage, current and temperature measurements.

The equipment operation is fully automatic and does not require any command by the user.

Chapter 2 - Operating Modes

2-1 Automatic Operation Mode

Float Charging: (Constant Voltage Operation)

During normal operation, the Battery charger floats the batteries and supplies load current. The system regulates the output voltage to the preset Float Voltage (Vf) value, feeding the battery with a small current (maintenance) (If) and feeding the load with the required current up to the Battery Charger nominal current.

The Preset Float Voltage Control has two different operation modes, which can be selected from the configuration menu.

- Fixed: set by user
- Temperature Compensation: (*optional*) In this operating mode the Float Voltage is controlled by an automatic temperature compensation module.

NOTE

<i>The user must install a temperature compensation probe on the batteries.</i>

Boost Charging (Equalize process):

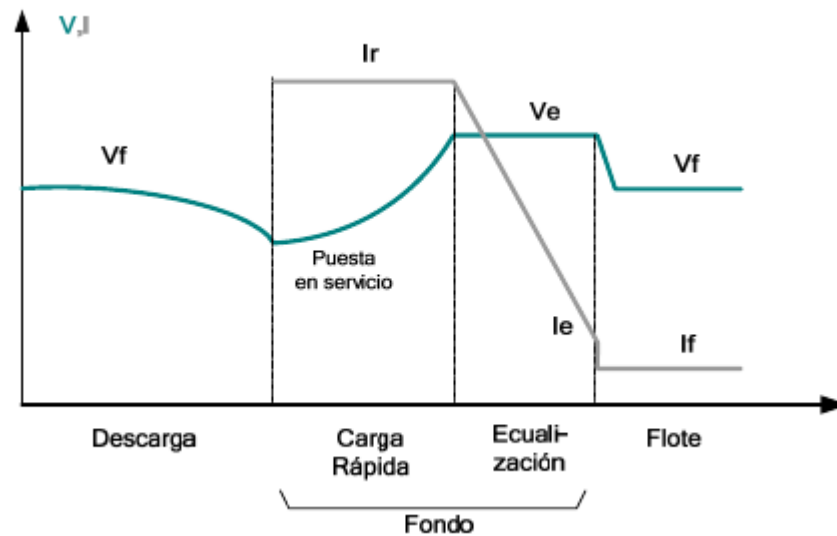
Whenever a battery runs down, it needs to be charged with higher current than normal in order to bring all cells a higher voltage for Boost charging the batteries. The charger provides this extra voltage.

Battery Boost Charging (Equalize process) is divided into two phases:

- *Constant Current Operation*
The charger feeds the battery with a constant current (Ir). During this phase the battery voltage will grow slowly.
- *Constant Voltage Operation*
When battery voltage reaches the Preset Boost Voltage Value (Ve), the logic control automatically terminates the Boost Charging Constant Current Operation phase launching a new Constant Voltage phase. The end of this phase is given by setting the Timer from 10 minutes to 24 hours, and / or when the battery charge current has a value equal or less to 30% of the set value (Ie). When one of these events occurs the logic control automatically returns the battery voltage to the Preset Float Voltage.

Starting & Ending the automatic Float / Boost cycle:

- Automatic: by detecting that the battery voltage is below the Voltage Preset Value "Start Automatic Float / Boost Cycle".
- Manual: by Manual Order the user may start or end the automatic Float / Boost Charging.



2-2 Manual Operation Mode

Setting the "SW" switch located on "LAZOS" Board to the "MAN" position, the Battery Charger changes to Manual Operation.

In this Operation mode, the user can adjust continuously the output voltage through the PM1 trimpot on "LAZOS" Board.

The Logic Control microprocessor will continue to operate checking all the alarms set for the Automatic mode, but will not control the Output Voltage.

Setting the "SW" switch to the "OFF" position, the Battery Charger returns to the Automatic Operation mode.



Chapter 3 - Current Limits

Battery Charger Maximum Current.

If at any of the above mentioned modes (Float, Boost or Manual), the total output current (the sum of the Load current and Boost Charge Current) tends to be larger than the set value of the Total Nominal Current, the Logic Control of the Battery Charger will maintain the Total Output Current constant and equal to this Nominal value, decreasing the output voltage.

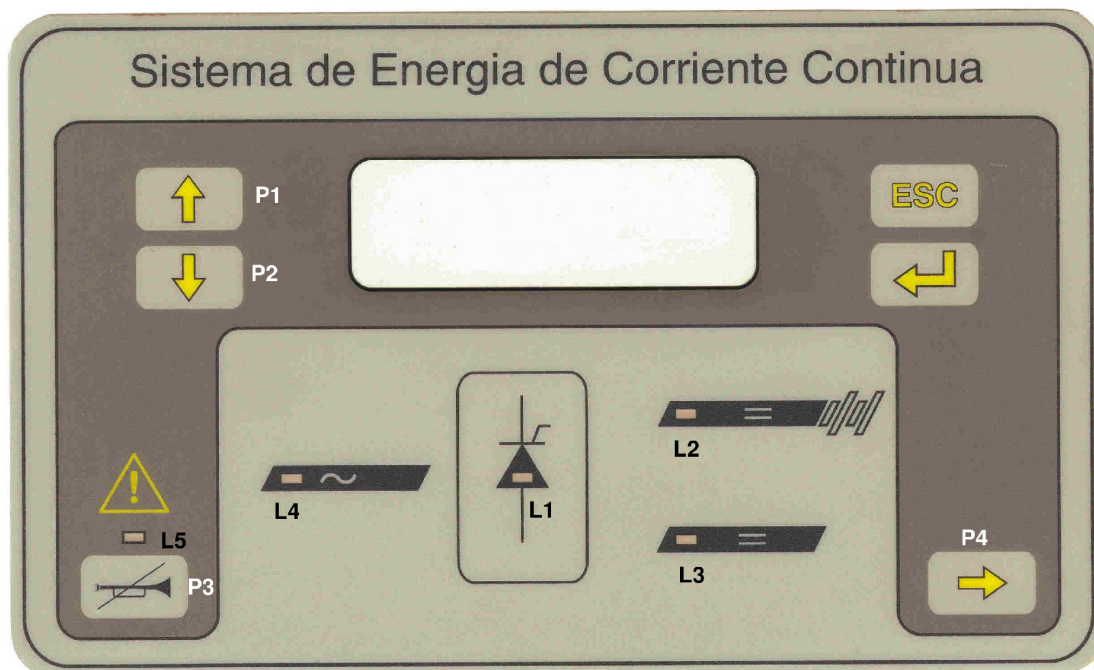
Chapter 4 - Monitoring and Control Software

The Control Logic of the Battery Charger (microprocessor type) performs all the operations of monitoring, instrumentation and control.

4-1 Navigating through Menus

Name	Button
Up Arrow	P1
Down Arrow	P2
Mute	P3
Right Arrow	P4
Enter	Enter
Esc	Esc

Name	Led
Rectifier Failure Alarm Led	L1
Battery output Alarm Led	L2
Load output Alarm Led	L3
Input voltage Alarm Led	L4
System failure Led	L5



Get to the Main-Menu by pressing repeatedly the <Esc> key.

From the Main-Menu, press <P2> for navigating through the menu list, select the desired menu and then press <Enter> to access it.

Press the <Esc> button to go back to the previous menu.

TIP

press <P3> to mute the alarm

press <Enter> in the Main-Menu for a fast access to the Measurement-Menu

The following table shows the available menus:

Menu List	
Screen Name	Translation
<i>Comandos</i>	Commands
<i>Alarmas</i>	Alarms
<i>Estados del Rectificador</i>	Operating Modes
<i>Teleseñales</i>	Remote Alarm Contact
<i>Histórico</i>	History Log
<i>Mediciones</i>	Measurement
<i>Temperaturas</i>	Temperature
<i>Fusibles</i>	Fuses
<i>Configuración</i>	Settings
<i>Reloj (Fecha y Hora)</i>	Clock (Date and Time)

4-2 Available Commands

Get to the “Menú-Comandos” by following the steps in 4-1.

Use the <P1> and <P2> buttons to navigate through the menu, and then press <Enter> to select the desired option.

Turn ON the Battery Charger:

Select the “ENCENDIDO” option and press <Enter>. The system will ask if you want to turn ON the battery charger, press <Enter> again to do so.

When the Rectifier Failure LED turns GREEN, press repeatedly the <Esc> key to get back to the Main-Menu.

**Turn OFF the Battery Charger:**

Select the "ENCENDIDO" option and press <Enter>. The system will ask if you want to turn ON the battery charger, press <Esc> to turn it OFF.

When the Rectifier Failure LED turns RED, press repeatedly the <Esc> key to get back to the Main-Menu.

Manual Order to start the automatic Boost Charge cycle.

Select the "ORDEN DE CARGA" option. The system will ask if you want to change to Boost Charge stage, press <Enter> again to do so.

Manual Order to End the automatic Boost Charge cycle. (Float Order)

Select the "ORDEN DE FLOTE" option. The system will ask if you want to change to Float Stage, press <Enter> again to do so.

Remember that this action will not take place if the batteries are discharged.

Formación: Optional

Prueba: Optional

4-3 Settings

The user can select the following Battery Charger settings and configurations:

Set the Float Voltage

Set the Boost Charge (Equalized) Voltage

Set the Battery charge Current

Set the Low Battery Voltage Alarm

Set the Low Load Voltage Alarm

Set the High Load Voltage Alarm

Set the Starting Voltage of the Boost Charger Cycle

Set the Time of the Equalization Charging Batteries Timer

Set the Discharged Battery Voltage Alarm

Set the Load Switch Off Voltage (Optional)

Check the high voltage Float alarm Setting

Check the High Voltage Boost Charge (Equalizing) alarm Setting

Check the high Load current alarm Setting

Check the High total rectifier current alarm Setting

Check the Time remaining in the Equalizer Timer

Check the battery current value for ending the Equalization cycle Setting

Check the Temperature for High Temperature Alarm Setting

Get to the "Menú-Configuración" by following the steps in 4-1, then enter the password.

Through this menu the operating values of the battery charger are set. Press buttons "P1" and "P2" to select the following settings and verifications, press "Enter" to select the value to be modified, press "P1" and "P2" to enter the new value then press "Enter" again to record the value; if you press "Esc" the new value is not registered.

Press repeatedly the <Esc> key to get back to the Main-Menu.

V. Nominal Batería: Battery Nominal Voltage value

Aj. Tension de Flote: there are two modes:

Ajuste manual: The user sets the Float Voltage value of the battery, adjusting range + / -10% of the Nominal Float Value.

Ajuste Automático: The Battery Charger sets the Float Voltage Value, this value is automatically set according to a preset list (factory setting) that adjusts the value according to the battery temperature; the Battery Charger adjusts the Float Voltage Value once per minute.

Aj. Tension de Carga: Sets the value of the boost charge voltage of the batteries, adjusting range + / -10% of nominal charge.

Aj. I. Batería: Sets the value of the boost battery current, adjusting range 0 to +10% of nominal current battery.

Aj. Batería Baja: Sets the value for low voltage battery alarm, adjusting range + / -10% of the low battery value.

Aj. V. Consumo Baja: Sets the value for low voltage Load alarm, adjusting range + / -10% of low consumption.

Aj. V. Consumo Alta: Sets the value for high voltage Load alarm, adjusting range + / -10% of the nominal value of high consumption.

Aj. Orden de Carga: Checks the battery voltage value when it changes from Float charging to Boost charging, this value is 2% below the nominal voltage value of the battery.

Aj. Valor Timer: Sets the time between Equalization and Float, adjusting range 10 min. to 24 hours.

Aj. Fin de Autonomía: Checks the Battery Voltage Value for Discharged Battery Alarm

Aj. Corte de Consumo: Sets the Battery voltage value for low battery voltage alarm, adjusting range + / -10% of the nominal Load Voltage (Optional)

V. Carga Alta: Checks the Voltage Value for Boost Charge high Voltage Alarm, this parameter is not adjustable, and its value is 3% higher than the setting made for the Boost Charging Voltage.

V. Flote Alta: Checks the voltage value for high voltage Float alarm, this parameter is not adjustable, and its value is 3% above the setting made for the Floating Charge Voltage.



I. Consumo Alta: Checks the value for high Load current alarm, this parameter is not adjustable, and its value is 5% higher than the nominal Load current specified by the charger.

I. Rectificador Alta: Checks the value for High total rectifier current alarm, this parameter is not adjustable, and its value is 5% higher than the nominal Total current specified by the battery charger.

Tiem falt Timer (H/M): Displays the time remaining in the equalization timer.

I. Pasaje Min A flote: Checks the battery current value for ending the Equalization cycle, this parameter is not adjustable, and its value is the 30% of the adjusted value of the battery current.

Temperatura Alta: Checks the value for the High temperature alarm of the battery charger.

4-4 Voltage, Current and Temperature Measurement

Voltage and Current

Get to the “Menú-Mediciones” by following the steps in 4-1.

Use the <P1> and <P2> buttons to navigate through the menu, and then press <Enter> to select the desired option.

There are available:

- Battery Voltage
- Battery Current
- Load Voltage
- Load Current
- Battery Charger Output Voltage
- Battery Charger Output Current
- Input AC Voltage
- Input AC Current (optional)

Press repeatedly the <Esc> key to get back to the Main-Menu.

Temperature

Get to the “Menú-Temperaturas” by following the steps in 4-1.

The internal temperature of the battery charger and the temperature of the batteries will be displayed.

Press repeatedly the <Esc> key to get back to the Main-Menu.

4-5 The Alarm System

Get to the “Menú-Alarmas” by following the steps in 4-1.

Use the <P1> and <P2> buttons to navigate through the menu, and then press <Enter> to select the desired option.

Press repeatedly the <Esc> key to get back to the Main-Menu.

The battery charger has three kinds of alarms:

1) AC Input Voltage Alarms

- High Voltage AC Input
- Low Voltage AC Input
- AC Input Phase Failure
- Incorrect Sequence of AC Input Phase

When the Charger detects one of the above AC states the buzzer alarm sounds, the Input voltage Alarm Led, Rectifier Failure Alarm Led and the System failure Led turn RED. Opening the AC Input Voltage Alarms Menu, the user can see which of these states the AC Input Voltage is detecting.

When the AC Input returns to values within the Charger operating range, the Input voltage Alarm Led and the Rectifier Failure Alarm Led turn GREEN but the System failure Led stays RED to alert the user that there has been an anomaly.

Pressing the Mute button the General Alarm LED turns GREEN.

2) Battery Output Alarms

- Low Output Battery Voltage
- High Output Battery Voltage, in both floating charging and boost charging
- Positive ground
- Negative ground

When the Charger detects one of the above states, the buzzer alarm sounds, and both the Battery output Alarm Led and the System failure LED turn RED. Opening the Battery Alarms Menu, the user can see which of these states the Battery Charger is detecting.

When the Battery anomaly ends, the Battery output Alarm Led turns GREEN but the System failure Led stays RED to alert the user that there has been an anomaly.

Pressing the Mute button the General Alarm LED turns GREEN.

3) Load Output Alarms

- Low Load Output Voltage
- High Load Output Voltage
- Positive Ground
- Negative Ground

- Low Load Output Current
- Load Switch Off (Optional Contactor assembly)

When the Charger detects one of the above states the buzzer alarm sounds, the Load output Alarm Led and the System failure LED turn RED . Opening the Load Output Alarms Menu, the user can see which of these states the Battery Charger is detecting.

When the Load Output anomaly ends, the Load output Alarm Led turns GREEN but the System failure Led stays RED to alert the user that there has been an anomaly.

Pressing the Mute button the General Alarm LED turns GREEN.

<i>TIP</i>

<i>In any of the above open the 'History Log' to see which was the failure.</i>

4-6 Remote Alarm Contact

Get to the “Menú-Telesseñales” by following the steps in 4-1.

Use the <P1> and <P2> buttons to navigate through the menu, and then press <Enter> to select the desired option.

Press repeatedly the <Esc> key to get back to the Main-Menu.

The battery charger has seventeen kinds of remote alarm contacts:

- 1) Anomalous Input AC
It turns ON when the Charger detects an AC Input Voltage Alarm.
- 2) Out of Order Rectifier
It is always ON. It turns OFF when the charger is shutdown, either by the user or as an automatic protection against: SCR Fuse Blow, AC Input Failure, Output High Voltage
- 3) Battery Output Alarm
It turns ON when the Charger detects a Battery Output Failure.
- 4) Load Output Alarm
It turns ON when the Charger detects a Load Output Failure.
- 5) Blown SCR Fuse
It turns ON when one of the three SCR fuses blows.
- 6) Blown Battery Fuse
It turns ON when there is a blown battery fuse.



7) Low Battery Voltage

It is always ON. It turns OFF when voltage reaches the set value for low voltage battery alarm.

8) High Battery Voltage

It turns ON when the 'Float Voltage' or the 'Boost Charge Voltage' is 3% higher than the set value.

9) Blown Load Fuse

It turns ON when there is a blown load fuse.

10) Low Load Voltage

It is always ON. It turns OFF when the load voltage output value reaches the set value for low load voltage alarm.

11) High Load Voltage

It turns ON when the load output voltage value reaches the set value for high load voltage alarm.

12) Grounded DC Terminal

It turns ON when one of the charger DC terminals (+ or -) is grounded.

13) Manual Operation Mode

It turns ON when the charger is set in Manual Mode.

14) Load Switch OFF

It turns ON when the battery voltage value reaches the set value.

15) Boost Charge

It turns ON when the charger is in Boost Charge mode.

16) Overload

It turns ON when the Load Current is 5% higher than maximum specified value

17) Low Load Current

It turns ON when the load output current is less than the adjusted value.

4-7 Detecting Blown Fuses

Get to the “Menú-Fusibles” by following the steps in 4-1.

Use the <P1> and <P2> buttons to navigate through the menu, and then press <Enter> to select the desired option.

Press repeatedly the <Esc> key to get back to the Main-Menu.

SCR Bridge Rectifier Protection Fuse:

If during any of the Battery Charges operating mode one of the SCR Bridge Rectifier Protection Fuses blows (three fuses in a three-phase system, one fuse in a single phase system) the Battery Chargers TURNS OFF, the System failure LED and the Rectifier Failure LED turn RED and the Buzzer sounds.

There is not an automatic restart, the user has to replace the blown fuse and then restart the Battery Charger.

Output Battery Fuse:

If during any of the Battery Charger operating modes the output battery protection fuse blow, the Battery Alarm LED and the System failure LED turn RED, the buzzer sounds and the Battery Output Voltage sets to the nominal voltage value of the battery.

There is no need to keep the battery in the floating state or in the boost charging state, in this way unnecessary power loss in the Load Voltage Diode Regulator module is avoided.

When the fuse is replaced, the Battery Charger restarts in the operating mode prior to the blown.

Load Fuse:

If during any of the Battery Charger operating modes the Load output fuse blows, the load output Alarm LED and System failure LED turn RED, and the buzzer sounds.

4-8 Real-time clock

Get to the “Menú-Reloj (Fecha y Hora)” by following the steps in 4-1.

Use the <P1> and <P2> buttons to adjust the values in this order:

1. set the day, and then press <Enter>
2. set the month, and then press <Enter>
3. set the year, , and then press <Enter>
4. set the hour, and then press <Enter>
5. set the minutes, and then press <Enter>

Press repeatedly the <Esc> key to get back to the Main-Menu.

4-9 Rectifier Status

Get to the “Menu- Estados Rectificador” by following the steps in 4-1.

The following table shows the different states with their names.

Screen Name	Explanation
OPERANDO	The battery charger is ON and working
APAGADO	The battery charger is OFF
INHIBIDO - ENCENDIDO	The battery charger is ON but one of the AC Input Voltage Alarms is ON. When the AC Input returns to values within the Charger operating range, the battery charger automatically start.
INHIBIDO - APAGADO	The battery charger is OFF but one of the AC Input Voltage Alarms is ON.
FLOTE	The Operating Mode is set to Float
CARGA	The Operating Mode is set to Boost Charge
MANUAL	The Operating Mode is set to Manual
AUTOMATICO	The Operating Mode is set to Automatic

Press repeatedly the <Esc> key to get back to the Main-Menu.

4-10 History Log

The system keeps a history log of the last 30 events, with their date and time.

This data is saved on an EEPROM memory, meaning that the records won't be deleted even if the battery charger is unplugged.

The data storage method is FIFO, so the event n. 31 will overwrite the oldest event on the list.

Get to the “Menú-Histórico” by following the steps in 4-1.

Use the <P1> and <P2> buttons to navigate through the event list.

Press repeatedly the <Esc> key to get back to the Main-Menu.

TIP

check that the clock is properly set because events will be recorded whit this date and time.



Chapter 5 - Installation & Maintenance

5-1 Installation

WARNING

Read carefully all this user's manual before attempting to do anything. Remember that a mistake may cause severe damage to the equipment.
--

Locate the Battery Charger and Batteries in their definitive location. Avoid places with poor air ventilation. Maintain at least 200 mm clearance from all obstructions on the top, bottom and sides of this equipment. Allow sufficient clearance to open the front panel for servicing. The equipment enclosure must be properly grounded.

Verify that the AC input Switch is OFF.

Remove both the Battery fuses and Load fuses (or open DC Switch according configuration).

The AC Input terminals must be wired to AC Main 3 x 220 Vac. / 50/60 Hz input Line (3 Wire) (RST)

Check the polarity of the battery cables before connecting them to the batteries input terminals (- BATERIA +).

Connect the Load cables to the Load Input terminals (- CONSUMO +)

WARNING

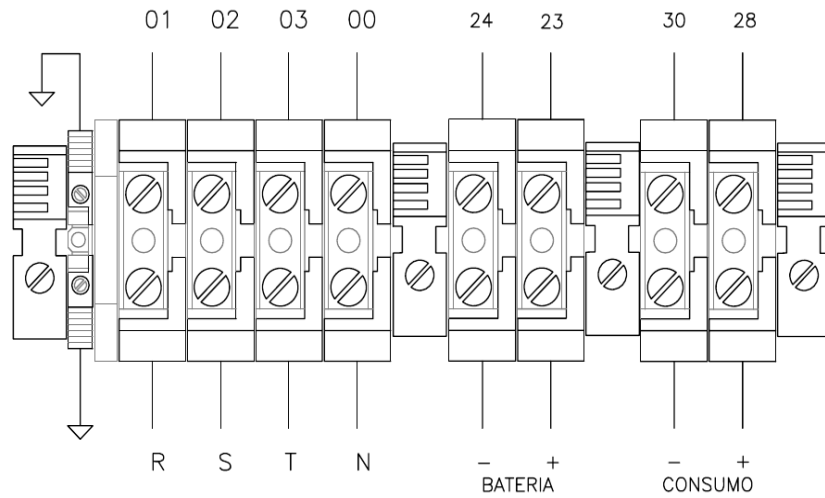
A wrong battery connection may cause severe damage to the equipment.
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TIP

<i>We recommend the installation of a battery fuse located as close as possible to it.</i>
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NOTE

<i>All the input / output wiring must be properly sized for the maximum current</i>



5-2 Startup

Check carefully all the input / output connections

Connect the input power with the AC Input Switch

Rectifier Failure LED	GREEN
Battery output Alarm LED	RED
Load output Alarm LED	RED
Input voltage Alarm LED	RED
System failure LED	RED
Buzzer	Sound

Place the Battery Fuse (or Close DC Switch according to configuration)
The Battery Output Alarm LED should be GREEN

Place the Load Fuse (or Close DC Switch according to configuration)

Switch On the Battery Charger

Rectifier Failure LED	GREEN
Battery output Alarm LED	GREEN
Load output Alarm LED	GREEN
Input voltage Alarm LED	GREEN
System failure LED	GREEN
Buzzer	Mute

The Battery Voltage slowly reaches the value of the "Timer trigger voltage" (constant current phase). At that point the equalization timer starts and the battery voltage is stabilized at the Boost Charge Voltage during the time set in the set-up menu (constant voltage phase). When preset time elapses the charger stops the automatic charge cycle and returns to the Float Charge Mode.

NOTE

<i>It is advisable to set the Timer to a minimum value when AC Main faults are frequent and of short duration and to a maximum value when AC Main faults produce a deep battery discharge.</i>
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5-3 Maintenance

When performing a monthly maintenance routine, also check:

- the Output Battery Voltage in Float and in Boost charge
- the Output Load Voltage in Float and in Boost charge
- the battery Boost charge current.
- the automatic Float / Boost Charge process

5-4 Storing The Battery Charger

The Battery Charger is fully automatic, it does not require any manual operation and must stay permanently connected to the AC Input and switched on.

If the system must be switched off or disconnected from the AC input for more than a day we recommend to disconnect the batteries from the battery charger.

If you store the Battery Charger for more than a few days before installation you should store it in its original shipping container, and in a temperature controlled, dry climate.

Room temperatures of 0 to 50° C are acceptable.

Storage should not exceed 2 years due to the limited shelf life of the DC filter capacitors when they are not in service.

Chapter 6 – Technical Data
6-1 Performance Specifications

1. AC Input	
Nominal Voltage	3 x 380 / 220 V with neutral (4 wire)
Voltage Range	+ 10% / - 1% (Optional: - 15%)
Rated Frequency	50/60 Hz (auto sensing)
Frequency Range	48 / 62.5 Hz
2. Battery Output	
Nominal Voltage	110 Vdc
Battery Type	NiCd
Number of Cells	85
Nominal Capacity	100 AH
Float Voltage	119 Vdc
Boost Charge Voltage	136 Vdc
Regulation	+/- 1%
Automatic Boost Charge Order	99.45 Vdc
Boost Charge Current	30 Amp
3. Load Output	
Nominal Voltage	110 Vdc
Admitted Range	+/- 10%
Nominal Load Current	25 Amp
Ripple Content in the DC Output	1%
4. Total Current	
Nominal Output Current	50 Amp
5. Protections	
Overload	Electronic current limit
AC Input	Thermal magnetic circuit breaker, 3 poles
Output to Battery	Fuse DIN 14x51 – 50 Amp
Output to Load	Fuse DIN 10x38 – 25 Amp
6. LED and Buzzer	
Rectifier Failure	
Battery output Alarm	
Load output Alarm	
Input voltage Alarm	
System failure	
Buzzer	



6-2 Environmental Conditions

1. Environmental conditions	
Maximum ambient temperature	+ 45 °C
Minimum Temperature	- 5 °C
Relative Humidity (percent)	95% without condensation
Maximum altitude above mean sea level	1000 m
Ventilation	Natural convection
2. Enclosure	
Style	Floor-mounting
Dimensions mm (width x depth. X height)	900 x 450 x 1650
	Maintain at least 200 mm of free air on top, bottom and both sides for cooling air.
	Allow at least 900 mm front clearance for access to the charger for operation and maintenance.
Weight	190 Kg
Color	RAL 7032
Protection	IP33

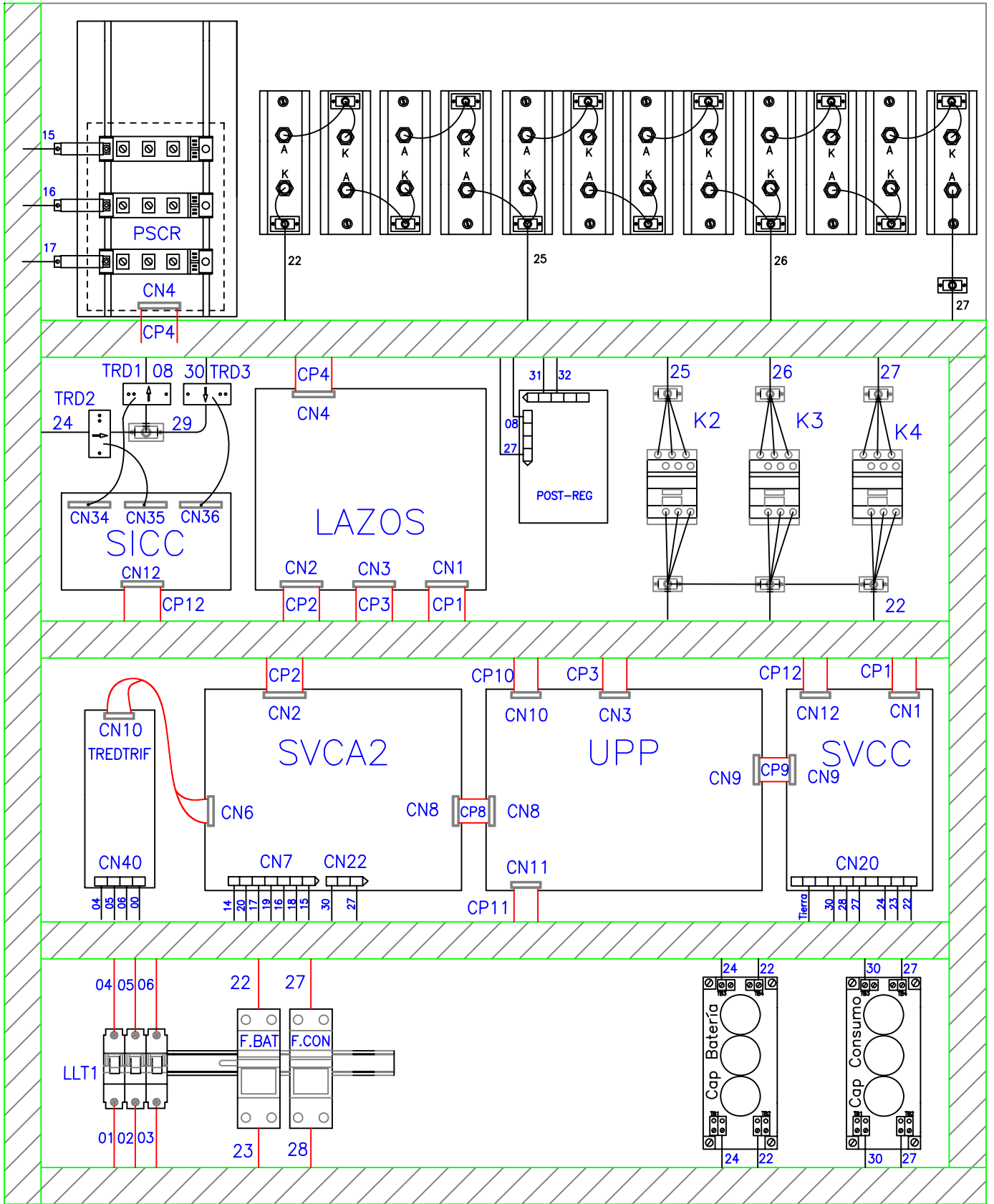


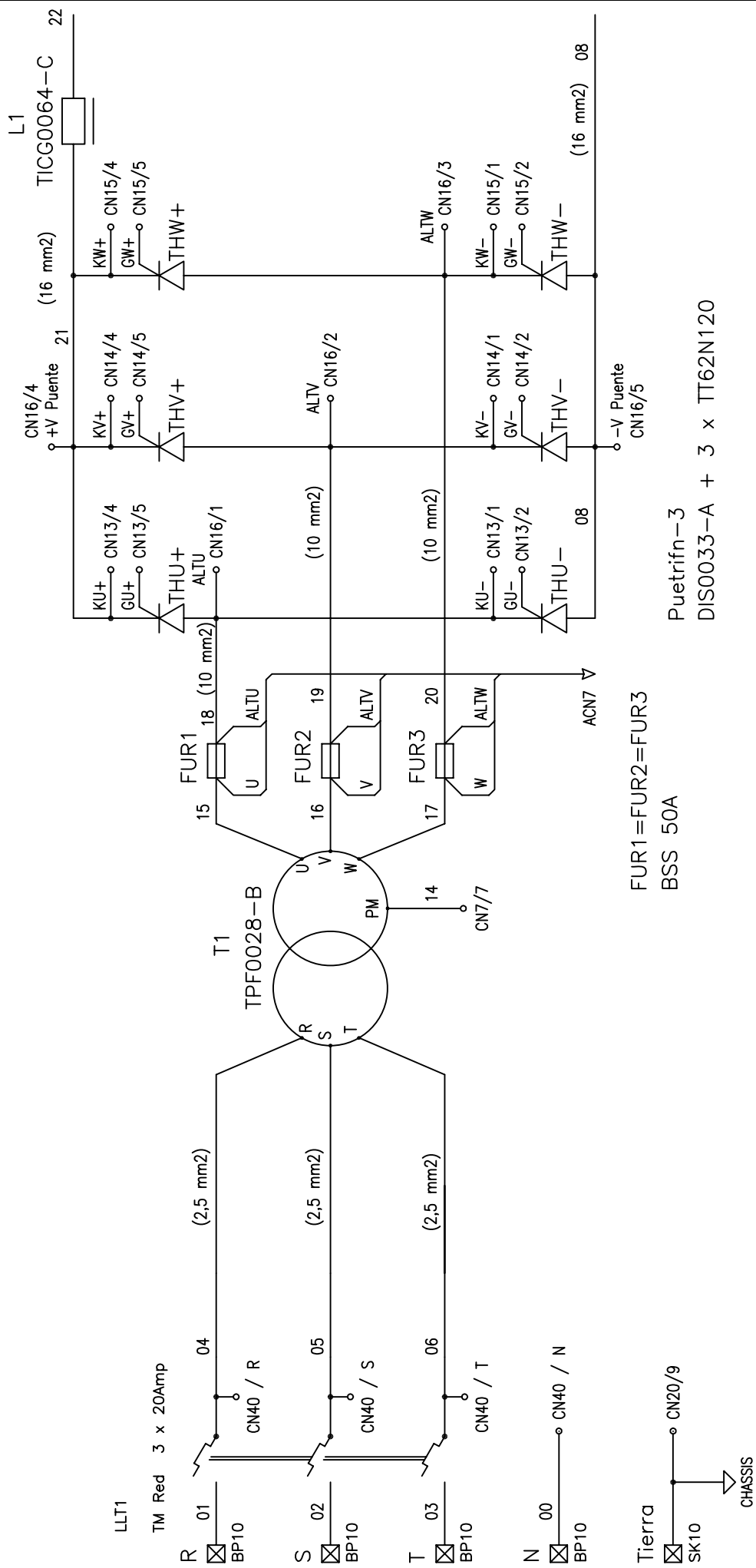
Telesenales Rectificador Trifasico con Display Inteligente

COM	Red Anormal (TS1)	Cable CP 11
N.C.		
N.O.		
COM	Rectificador Inhibido (TS2)	
N.O.		
N.C.		
COM	Batería Anormal (TS3)	
N.C.		
N.O.		
COM	Consumo Anormal (TS4)	
N.C.		
N.O.		

N.C.		
N.O.		

Placa Ethernet		Cable CP40
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FUR1 = FUR2 = FUR3
BSS 50A

Puetrifn-3
DIS0033-A + 3 x TT62N120

CONVEX

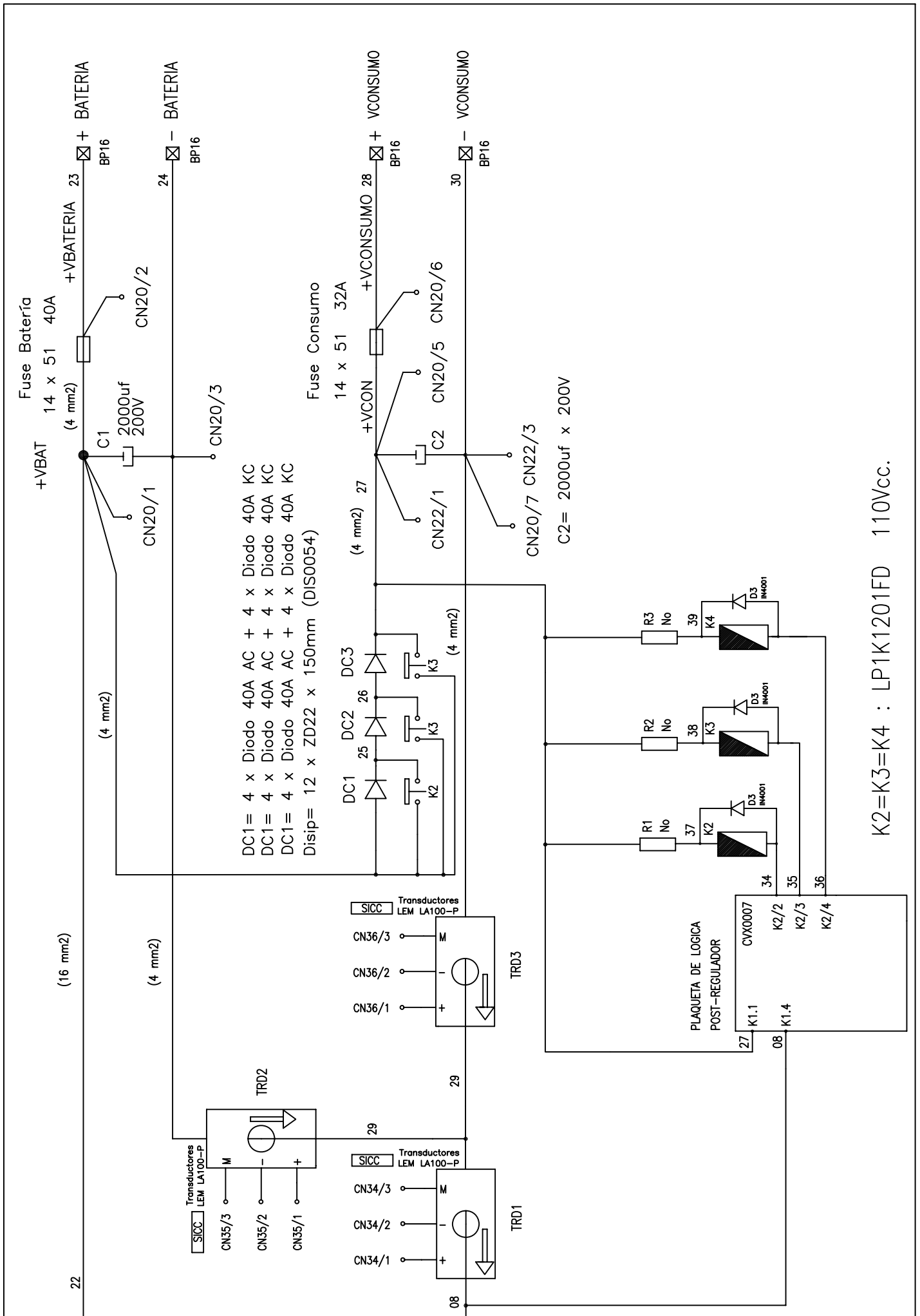
RO125532-DI

FECHA: 10/06/2010

HOJA: 1/2

ARCH: RO125532-DI

CARP: R3Ø DISPLAY



K2=K3=K4 : LP1K1201FD 110Vcc.