Low voltage capacitor banks switched by contactors.

OPTIM P&P Series

INSTRUCTION MANUAL

(M063B01-03-19A)

CE

SAFETY PRECAUTIONS

Follow the warnings described in this manual with the symbols shown below.

	**DANGER** Warns of a risk, which could result in personal injury or material damage.

	**ATTENTION** Indicates that special attention should be paid to a specific point.

If you must handle the unit for its installation, start-up or maintenance, the following should be taken into consideration:

	Incorrect handling or installation of the unit may result in injury to personnel as well as damage to the unit. In particular, handling with voltages applied may result in electric shock, which may cause death or serious injury to personnel. Defective installation or maintenance may also lead to the risk of fire. Read the manual carefully prior to connecting the unit. Follow all installation and maintenance instructions throughout the unit's working life. Pay special attention to the installation standards of the National Electrical Code.
	**Refer to the instruction manual before using the unit** In this manual, if the instructions marked with this symbol are not respected or carried out correctly, it can result in injury or damage to the unit and /or installations.

CIRCUTOR, SA reserves the right to modify features or the product manual without prior notification.

DISCLAIMER

CIRCUTOR, SA reserves the right to make modifications to the device or the unit specifications set out in this instruction manual without prior notice.

CIRCUTOR, SA on its web site, supplies its customers with the latest versions of the device specifications and the most updated manuals.

www.circutor.com

	**CIRCUTOR,** recommends using the original cables and accessories that are supplied with the device.

CONTENTS

REVISION LOG

Table 1: Revision log.

Date	Revision	Description
02/15	M063B01-03-15A	Initial Version
04/16	M063B01-03-16A	Modification section: 3.9. - 6. - 7.
11/19	M063B01-03-19A	Modification section: 3.2. - 4.2. - 10.

Note: *The images of the units are solely for the purpose of illustration and may differ from the original unit.*

1.- VERIFICATION UPON RECEPTION

1.1.- RECEPTION PROTOCOL

Check the following points when you receive the unit:

a) The unit meets the specifications described in your order.
b) The unit has not suffered any damage during transport.
c) Perform an external visual inspection of the unit prior to switching it on.
d) Check that it has been delivered with the following:
- The unit manual
- The installed regulator manual.

⚠	If any problem is noticed upon reception, immediately contact the transport company and/or **CIRCUTOR's** after-sales service.

1.2.- TRANSPORT AND HANDLING

⚠	The transport, loading and unloading and handling of the unit must be carried out with proper precautions and using the proper manual and mechanical tools so as not to damage it. If the unit is not to be immediately installed, it must be stored at a location with a firm and level floor, and the storage conditions listed in the technical features section must be observed. In this case, it is recommended that the unit be stored with its original protective packaging.

To move the unit a short distance, the unit's floor support profiles facilitate handling with a pallet jack or forklift. (**Figure 1**)

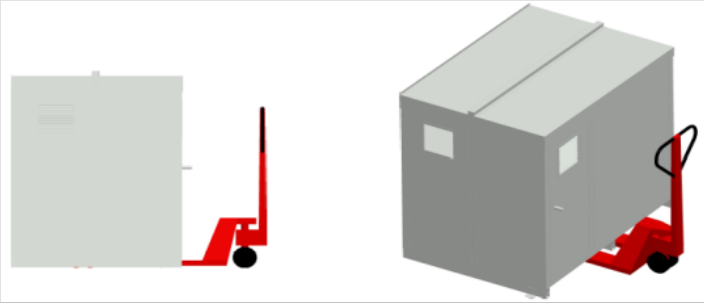

Figure 1: Transport with pallet jack.

⚠	The centre of gravity of some units may be found at a considerable height. Therefore, when handling with a forklift, it is recommended that the unit be securely fastened and that no abrupt manoeuvres made. The unit should not be lifted more than 20 cm off the ground

When unloading and moving the unit, use a forklift with forks long enough to support the entire length of the base. Otherwise, the forks should be long enough to support at least ¾ of said depth. The forks must be flat and supported firmly by the base. Raise the cabinet by placing the forks underneath the profile that supports the unit. (**Figure 2**).

	There might be an offset in the centre of gravity from the centre of the cabinet, as a result of the uneven distribution of loads inside the unit. The necessary precautions must be taken to prevent the unit from tipping over during abrupt operations.

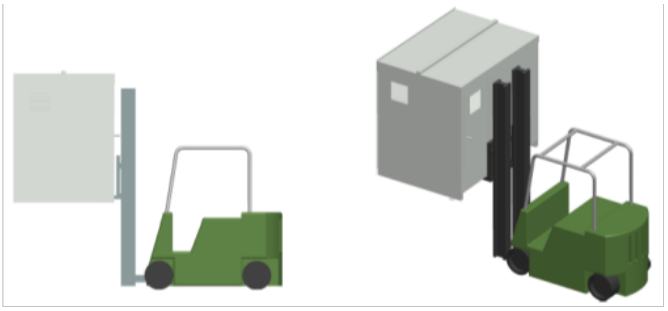

Figure 2: Unloading with a forklift.

1.3.- STORAGE

The following storage recommendations must be followed for the hybrid capacitor banks:

- ✓ Avoid placing them on uneven surfaces.
- ✓ Do not store them in outdoor areas, humid areas or areas exposed to splashing water.
- ✓ Avoid hot spots (maximum ambient temperature: 40 ºC)
- ✓ Avoid salty and corrosive environments.
- ✓ Avoid storing the units in areas where a lot of dust is generated or where the risk of chemical or other types of contamination is present.
- ✓ Do not place any weight on top of the unit cabinets.

2.- PRODUCT DESCRIPTION

The purpose of this manual is to assist during the installation, start-up and maintenance of **OPTIM P&P** series low voltage (LV) capacitor banks switched by contactors. Carefully read the manual to achieve the best performance from those units.

3.- INSTALLATION

3.1.- PRELIMINARY RECOMMENDATIONS

	In order to use the unit safely, it is critical that individuals who handle it follow the safety measures set out in the standards of the country where it is being used, use the personal protective equipment necessary, and pay attention to the various warnings indicated in this instruction manual.
	Installation or maintenance personnel should read and understand this manual before operating the unit. A copy of this manual should always be available to maintenance personnel for reference purposes
	Connecting the unit to the public mains must be carried out in compliance with the EN-IEC60204-1 standard, regarding the safety of LV electrical installations.
	It is recommended that several personnel are present when handling the unit for installation or maintenance. If damage or faults are detected during unit operation, or in circumstances that compromise safety, immediately stop work in that area and disconnect the unit in order to check it without voltage.

The manufacturer of the unit is not responsible for any damage resulting from failure by the user or installer to heed the warnings and/or recommendations set out in this manual, nor for damage resulting from the use of products or accessories that did not come with the unit or that were made by other manufacturers.

If an anomaly or malfunction is detected in the unit, do not use it to perform any operation.

	Modifying, upgrading or rebuilding the unit without written authorisation from the manufacturer is prohibited.
	The installation, operation and maintenance of low voltage (LV) units must only be carried out by authorised installers. LV regulations (Art. 22) specifically define the requirements that authorised installers must meet.

	Do not access the active elements of a capacitor bank with static operation that has been powered and might have voltages present. Wait at least **5 minutes** after the power supply has been disconnected.
	Do not touch the terminals or active parts of the unit until you have verified that voltage is not present. If you have to handle or touch the terminals or other control panel components, use adequately insulated personal protection equipment and tools.
	After any maintenance and before re-connecting the power supply to the unit, check that its enclosure is properly closed and that no items or tools were left inside that could cause a short-circuit.
	Do not disconnect the current transformer secondary without short-circuiting it first. The operation of a current transformer with an open secondary will cause an overvoltage that could damage it and electrocute the person handling it.

3.2.- PREPARATION

The **CIRCUTOR OPTIM P&P** static capacitor banks come ready for easy installation and start-up.

Remove the packaging of the unit and verify that its electrical features are suitable for connection to the available mains. To do so, check the features label located inside the cabinet next to the FP regulator, see **Figure 3**.

Key data to be checked:

- ✓ Mains frequency and voltage, U_n / f_n.
- ✓ Nominal power of the capacitor bank, Qn (kvar) and composition
- ✓ Current consumption, I_n . This current must be considered to select the proper size of the power supply cable of the unit and ultimately the circuit breakers and protection elements to be connected in front of it.
- ✓ Auxiliary control voltage, U_{aux}.(See ***"3.7.- AUXILIARY CONTROL VOLTAGE"***)
- ✓ Environmental conditions. (See ***"6.- TECHNICAL FEATURES"***)

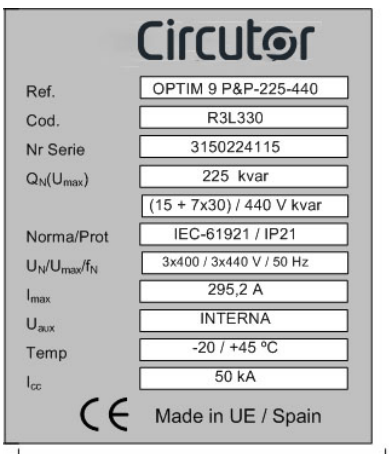

Figure 3: Features label.

3.3.- INSTALLATION LOCATION

It is important to maintain a minimum distance around the unit to facilitate cooling.

In self-supporting cabinets, the back and front sides of the cabinet must be kept at least **50 cm** away from walls of other units and other infrastructure to allow for ventilation.
In terms of the side walls, it is recommended that a separation of **10 cm** be maintained between adjacent cabinets.

On wall-mounted cabinets, it is recommended that at least **20 cm** of separation be maintained between the sides of adjacent cabinets.

Make sure the unit can be accessed easily.

The environmental conditions of the location where the unit is installed must not exceed the limits set forth in the technical features (See ***"6.- TECHNICAL FEATURES"***)

To ensure proper ventilation, the unit must be installed in a vertical position.

In accordance with the LVR, once the unit is installed, it must be protected against direct and indirect contacts; therefore, a circuit breaker and earth leakage protection for the capacitor bank power supply line should be installed.

3.4.-CONNECTION OF THE CAPACITOR BANK TO THE MAINS

	Check that the rated voltage of the capacitor bank matches the voltage between phases of the network to which it is being connected. Also check the operating circuit voltage (contactors). (See ***"3.7.- AUXILIARY CONTROL VOLTAGE"***)

	For feeding cables into the capacitor bank cabinet, always and only use the cable entry points available for this purpose. There is a cable entry point on the bottom (base of the cabinet) in all the models and also an entry point on the side in some models. **If another part of the cabinet is cut out to be used for cable entry, the CIRCUTOR manufacturer's guarantee shall be rendered void**.

	Do not cut holes in other parts of the cabinet for feeding cables through or for installing support brackets. It may produce trimmings that can cause short-circuits.

3.5.-POWER CIRCUIT

Connect input terminals L1, L2 and L3 (power circuit) to the mains using proper sized cable in accordance with the LVR, ITC-BT-19.
Generally, the cables of the phases adhere to the following colour code: L1 (black), L2 (brown), L3 (grey).
If auxiliary voltage is required, the neutral cable will be connected to N (blue colour)

In order to determine the size of the phase cables, the nominal current I_n must be taken into account, indicated on the unit label, and it should be able to withstand an overload in transients of 1.5 times I_n. **The neutral cable will be a minimum of 1.5 mm².**

3.6.- EXTERNAL CIRCUIT BREAKER AND PROTECTION ELEMENTS

If the capacitor bank does not have an internal switch or isolation switch, it must be connected to a line that has an external switch or isolation switch.

	The protection elements, isolation switches and/or switches that are added externally to the capacitor bank must be of a minimum size to withstand a current 1.5 times greater than what is indicated on the label (LVR, ICT-BT-48) If an earth leakage protection for the capacitor bank is installed, its sensitivity and trip delay must be adjustable.

When the capacitor bank is connected to the mains, it is recommended that the current transformer (CT) is placed on the phase going to L1 (black cable).
Outputs S1 and S2 of the CT must be connected to the terminals with the same name.

3.7.- AUXILIARY CONTROL VOLTAGE

Control circuits are defined as those related with regulator output relays and the capacitor's operating contactors. These circuits are usually powered with an auxiliary voltage of 230 V ~ (the most common case) or other voltages such as 110 V ~ (frequently for 500 V or 690 V capacitor banks).

There are two possible ways of powering the circuit:

3.7.1. CAPACITOR BANK WITH AUXILIARY VOLTAGE OBTAINED FROM AN INTERNAL AUTOTRANSFORMER

Does not require connection of the external neutral. The label indicates U_{aux}/f … internal

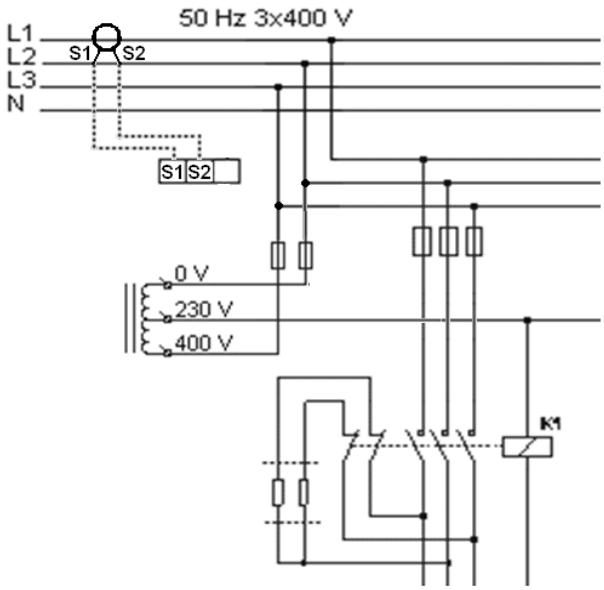

Figure 4: Auxiliary power supply with autotransformer.

3.7.2. CAPACITOR BANK WITH AUXILIARY VOLTAGE OBTAINED BETWEEN PHASE-NEUTRAL

Requires the connection of the external neutral to terminal N (see **Figure 5** and **Figure 7**)
The label indicates Uaux/f … (control voltage)

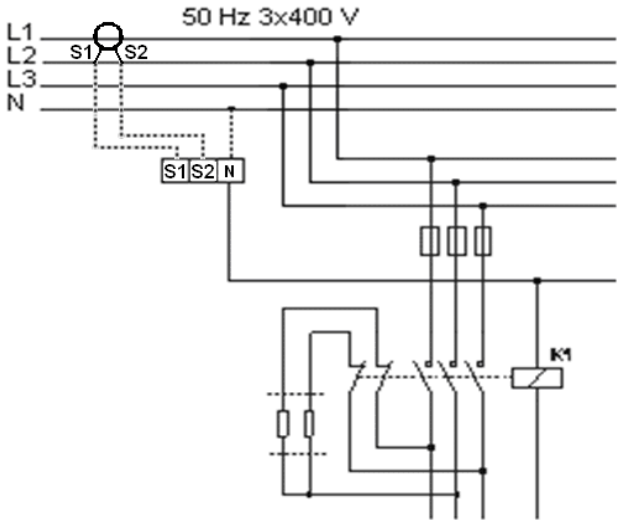

Figure 5: Auxiliary power supply with neutral.

3.8.- EARTH CABLE CONNECTION

Connect the earth cable to the capacitor bank's earth terminal located on the operating panel of the unit.
The earth cable cross-section will be selected in accordance with the admissible current limits established in the LVR (ITC-BT-19 – Internal or receiver installations) for each type of cable and their location.

3.9.- CURRENT TRANSFORMER (CT) CONNECTION

⚠	**A current transformer (CT) that is external to the capacitor bank must be installed to measure the total load current plus that of the capacitor bank** (**Figure 6**).

⚠	The standard transformer must have a nominal output of 5 A at the secondary. We recommend connecting the CT to phase L1 in the direction of the current flow from P1 to P2 (see **Figure 6**) and connecting the secondary (terminals S1, S2) to the terminals with the same name on the capacitor bank (see **Figure 6**)

⚠	Avoid current flow through the CT primary winding prior to connecting it to terminals S1 S2 of the bank. If the CT must be installed while the installation is under load, short-circuit S1 and S2 while they are not connected to the capacitor bank.

The current value of the CT primary winding must be equal to or slightly greater than the size of the mains switch of the installation. Therefore, the CT must be able to measure the maximum current expected to be consumed by all the loads being compensated.

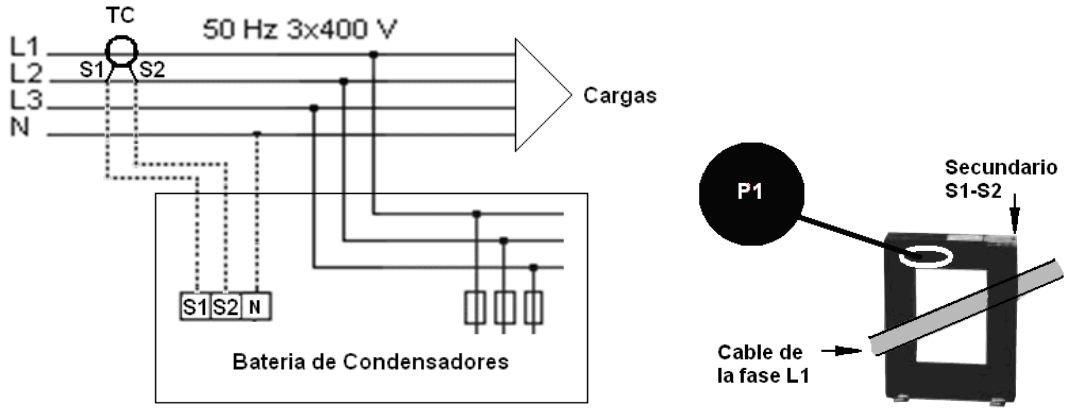

Figure 6: Installation of the external current transformer (CT).

The connection point of the CT for a capacitor bank that compensates an entire installation is after the mains switch of the installation.

To prevent excessive attenuation of the signal, it is recommended that the minimum cross-section of the secondary section winding cable (terminals S1, S2) is at least **2.5 mm²**.

Figure 7: Current transformer (CT) and neutral connection terminals (if required).

⚠	Any time you wish to change or disconnect a current transformer that is already installed, it is important to install the jumper connecting S1 and S2.

4.- CAPACITOR BANK START-UP

4.1.- BEFORE START-UP

The automatic capacitor banks include a power factor regulator.

	The operation of said regulator must be known prior to start-up; for this reason, all the capacitor banks include a specific manual for the regulator used. Ensure you have this manual available for the start-up process.

	In order to adjust the regulator incorporated to the capacitor bank and for optimum start-up, the installation load must be at least 30% or 40% of the nominal load for which the capacitor bank has been dimensioned. If all the stages are not included, they can be manually connected to check them all.

	During low load periods, the entire capacitor bank should not be connected manually, as in some cases resonance with the power transformer of the installation could occur.

	The capacitors are connected in manual mode, first allow enough time for the capacitors to discharge (as indicated in the capacitor bank's features label) before reconnecting them to the network. Otherwise, they could start-up out of phase with a voltage of up to $2xU_n$ causing the destruction of the capacitor.

4.2.- START-UP

	Apply the safety regulations listed in section "***3.- INSTALLATION***" of this manual before operating the units. **The National Electric Code of the country where the capacitor bank is installed or operated should be strictly followed.**

1.- Ensure that the inner circuit breaker that starts the regulator (**Figure 10**) is connected.

2.- Connect the power supply to the panel and check that the regulator display illuminates immediately. Otherwise, stop and check the previous step.

3.- Check the regulator's **cos φ** indication.
If the indication is out of range **0.5** to **1**, it may be possible that the current transformer and/or the power supply to the regulator are not properly connected.
Most of the regulators use only one current transformer. In this case, connect according to **Figure 9** (place the current transformer on phase L1 and take the power supply voltage from phases L2 and L3).

Figure 8: Plug&Play Computer Max Regulator. (Photo as an example, it may not coincide with the model used on your unit).

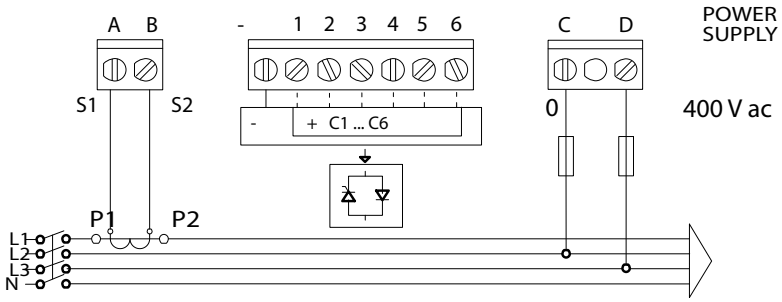

Figure 9: Connection of a regulator with only one CT. (If using Computer SMART III or Computer Plus, 3 CT are used. Check the specific manual.)

Figure 10: Two-pole circuit breaker for the auxiliary power circuit.

4.- Once ensured that the regulator is properly connected, adjust the regulator parameters for the installation you are attempting to compensate. For this, follow the instructions on the manual of the regulator, included with the capacitor bank.

4.3.- CHECKS ONCE THE CAPACITOR BANK HAS BEEN CONNECTED AND THE REGULATOR

1.- After start-up, make sure that the unit is operating correctly. A sign of proper operation is the display indicating a cos φ close to 1 and the reactive energy meter should stop (if it is electro-mechanical) or the blinking light of the indicator LED of the kvar.h/pulse ratio should reduce its rate.

2.- Check that the power supply voltage does not exceed the nominal value +10% (IEC 60831-1).

3.- Check the current absorbed by each capacitor.
Under normal conditions, it must be close to the nominal value indicated on its dataplate and never exceed 1.3 times this value constantly.

Continuous consumption over the nominal value may be caused by the presence of harmonics in the network or an excessively high power supply voltage. Both circumstances are harmful for capacitors.

4.- In accordance with the IEC 60831-1 Standard, the capacitor is prepared to operate at the permanent voltage assigned to it and with an overvoltage of up to 10% for 8 out of every 24 hours.

	Check the working temperature of the capacitors after they have been operating for 24 hours. The housing must be below 40 ºC.

5.- MAINTENANCE

5.1.- SAFETY REGULATIONS

Take the safety regulations listed in section of this manual into account before operating the units ***"3.1.- PRELIMINARY RECOMMENDATIONS"***
The National Electric Code of the country where the capacitor bank is installed or operated should be strictly followed.

5.2.- MAINTENANCE WITH THE CAPACITOR BANK DISCONNECTED

5.2.1. BASIC MAINTENANCE PROTOCOL

Monthly:

- ✓ Visually inspect the capacitors.
- ✓ Check the protection fuse.
- ✓ Control the ambient temperature (average of 35 ºC. In accordance with IEC 60831).
- ✓ Control the service voltage (especially during moments of low load, it must not exceed the nominal +10%).

Bi-annually:

- ✓ Keep the capacitor terminals clean.
- ✓ Verify the state of the contacts of operating elements.
- ✓ Check that the capacitor current is not lower than 25% nor greater than 120% of the nominal value by phase and that there is no phase unbalance greater than 15%.

Annually:

- ✓Carry out a dielectric rigidity test by applying **2.5 kV** for **1** second between the terminals of the capacitor and earth.
- ✓Check the capacity of the capacitors at the different steps.
One indirect check may be to check that the consumption is manual.
- ✓Check the tightness of all terminal connections.
- ✓Inspect the fuses.
- ***Power Circuit***: NH fuses. Check continuity and temperature.
- ***Power Circuit***: Check the continuity and temperature of the three-pole or four-pole circuit breaker.
- ***Control Circuit:*** Check the continuity and temperature of the two-pole circuit breaker.

5.2.2. TIGHTENING TORQUE OF THE ELECTRICAL CONNECTIONS

The connections must be tight.
The tightening torques for the fuse bases, circuit breakers and the contactors are indicated in **Table 3** , **Table 4** and **Table 4.**

Table 2:Tightening torques of the cables to the fuse bases.

Fuse base	Torque (Nm)
NH-00	15.2

Table 3:Torques of power cables to two-pole and three-pole circuit breakers.

Circuit breaker	Torque (Nm)
In ≤ 3 x 63 A	2
In ≤ 2 x 6 A	2

Table 4:Torques of cables to connector terminals

Model	Auxiliary (Nm)	Power (Nm)
CMC-12	1.3	1.6
CMC-18	1.3	2.2
CMC-32	1.3	2.9
CMC-40	1.3	2.9
CMC-50	1.3	4.5
CMC-65	1.3	4.5
CMC-75	1.3	4.5
CMC-85	1.3	5.1
CMC-150	1.3	9

5.2.3. KEY POINTS FOR INSPECTING CONTACTORS

✓ Check that the plastic parts are not blackened and do not show signs of burning or hardening.
✓ Check that the head is properly inserted.
✓Check the tightness of cables and terminals, as shown in **Table 4**.
✓ The terminals must be clean.
✓If the capacitor bank includes RD discharge resistors, check they are in good condition (that they are not open or show signs of burning). (**Figure 11**)

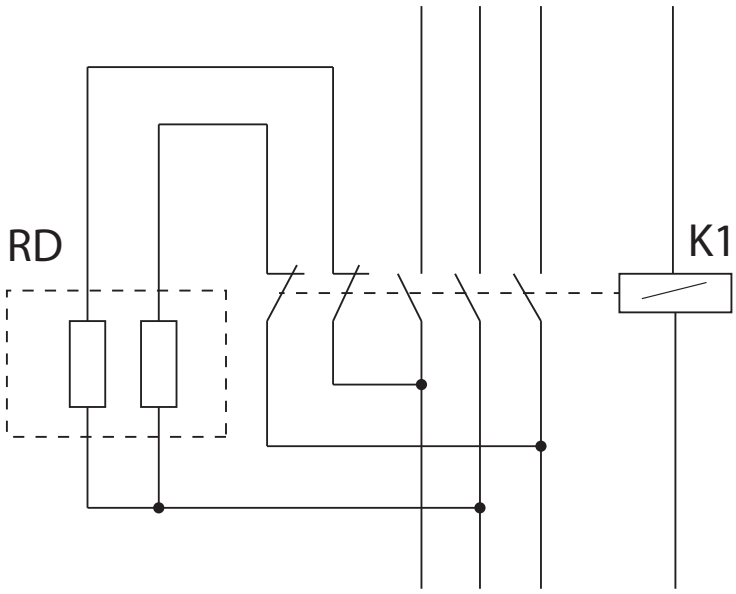

Figure 11: Connection of the discharge resistors.

✓***Cleaning the contactors***: In dirty environments (dust, sawdust, rust particles, etc.) vacuum the contactor periodically.
There is no estimated time frame for cleaning, it depends on the amount of dirt that is inside the capacitor bank.

5.2.4. KEY POINTS FOR INSPECTING CAPACITORS

✓Inspect the cables and terminals. They should not be overheated or blackened.

✓ The terminals must be clean.

✓ The slow discharge resistors must be in good condition. They must not be open or show signs of burning.

✓ Check the tightness of the capacitor terminals, as shown in **Table 5**.

Table 5:Torques of the cables to the capacitor terminals.

Cylindrical capacitor	Power terminal torque (Nm)	
CLZ FP	2	
Prismatic capacitor	**Torque Power terminal (Nm)**	**Torque Earth terminal (Nm)**
CV	4.49	6.2
CSB	21	6.2

5.2.5. KEY POINTS FOR INSPECTING THE REGULATOR

✓Check that the regulator does not show signs of deterioration and the display is lit as normal.

✓Inspect the cables and terminals. They should be clean and should not be hardened or overheated.

✓ Inspect the connections and the insertion of removable power strips:
- The power strips must be well fastened on removable regulators.
- Check that the terminals are tightened properly. The recommended torque is **0.6 Nm**.

5.2.6. CLEANING THE CABINET

✓ Remove possible metallic and non-metallic particles.
✓ Clean the inside of the cabinet.
✓ Clean ventilation grilles.

5.3.- MAINTENANCE WITH THE CAPACITOR BANK CONNECTED

✓ Check that the main switch turns on and off without having to force the mechanism.
✓ If there is an individual earth leakage protection for the capacitor bank, check its proper operation by pressing the test button.
✓ Check that the auxiliary control voltage is within the tolerance limits.
If the capacitor bank has an autotransformer, check that it is in good condition and shows no signs of deterioration.
✓ Force the connection and disconnection of the capacitors in manual mode. (refer to the regulator's manual before carrying out these actions) and perform the following checks:

- Check that the contactors connect and disconnect properly.
- Check that the contactor, once connected, does not rattle or vibrate.
- Check the consumption of the capacitors in each of the phases.
The nominal values are shown in **Table 6.**

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Table 6:Nominal consumption of the capacitor paths, by power and voltage.

Power	In, Current	
	3 x 230V ~	3 x 400V~
2.5 kvar	6.28 A	3.6 A
5 kvar	12.56 A	7.2 A
7.5 kvar	18.85 A	10.8 A
10 kvar	25.12 A	14.4 A
12.5 kvar	31.41 A	18 A
15 kvar	37.7 A	21.6 A
20 kvar	50.24 A	28.8 A
25 kvar	62.82 A	36 A
30 kvar	75.4 A	43.2 A
40 kvar	100.48 A	57.6 A
50 kvar	-	72 A
60 kvar	-	86.4 A
80 kvar	-	115 A

Note: *If consumption is ±25% less than that indicated in* ***Table 6*** *and the voltage is within the tolerance limits, this is usually a sign of degradation of the capacitors. If this is detected in any capacitor, it should be replaced with another capacitor.*

5.3.1. REGULATOR CHECKS

Refer to the manual of the specific regulator used in the capacitor bank. This manual is always supplied with the capacitor bank

✓ Check that there are no faulty segments on the display.

✓ Check that the keyboard is operating properly:

- Enter Setup and check the adjusted values
- Force the manual connection and disconnection of a step.

5.4.- ENVIRONMENTAL CONDITIONS

✓ Check that the maximum environmental conditions listed in section ***"6.- TECHNICAL FEATURES"*** are being observed.

6.- TECHNICAL FEATURES

Electrical features	
Usage voltage and nominal frequency	Un / fn, listed on the label
Design voltage	Un+ 10% (440 V for 400 V units)
Nominal power and distribution of steps	Qn and composition, (see label)
Total losses	< 0.5 W / kvar
Residual discharge voltage	75 V after 3 minutes
Overload capacity	1.3 In in all the elements
Contactor operating voltage	Uaux, marked on the label (1)
Current Transformer	Secondary winding 5 A, (Transformer In/5 A) ***NOTE***: *Minimum cable section of 2.5 mm².*

(1) For standard **OPTIM 3 P&P** and **OPTIM 5 P&P** models, supply external voltage with a 1.5 mm² cable. If "Internal" is marked, this circuit does not require power.
For the rest of the models, an autotransformer is already included for auxiliary power supply, so no external auxiliary power supply is required.

Capacitor features	
Capacity tolerance	- 5% / + 10%
Insulation level from earth	3 kV /50 Hz
Impulse test	15 kV, ray-type wave 1.2/50 µs
Protections	Internal fuses and over-pressure system
In accordance with Standards	UNE EN 60831

Environmental features			
Maximum temperature of capacitors	Category D in accordance with EN 60831-1		
	Maximum during 1 h.	**24 h average**	**Annual mean**
	55 ºC	45 ºC	35 ºC
Cabinet ventilation	For outdoor Tamb > 30 ºC forced ventilation should be provided in the cabinet		
Maximum relative humidity	80%		
Maximum altitude	1000 m (For higher altitude, forced ventilation should always be provided)		
Protection degree	Marked on the label		

Mechanical features			
Model	**OPTIM 3 P&P**	**OPTIM 5 P&P**	**OPTIM 9 P&P**
Dimensions (Width x Height(2) x Depth)	400x600x260 mm	600x740x260 mm	700x1350x440 mm
Weight	40 Kg	55 Kg	134 Kg
Model	**OPTIM 8 P&P**	**OPTIM SC8 P&P**	**OPTIM SC12 P&P**
Dimensions (Width x Height(2) x Depth)	1000x1750x440 mm	1180x1340x460 mm	1930x1895x460 mm
Weight	265 Kg	155 Kg	595 Kg
Model	**OPTIM SC16 P&P**	**OPTIM 8L P&P**	**OPTIM 14L P&P**
Dimensions (Width x Height(2)x Depth)	2460x1895x460 mm	1200x1900x650 mm	2100x1900x650 mm
Weight	700 Kg	350 Kg	650 Kg
Model	**OPTIM 16L P&P**		
Dimensions (Width x Height(2)x Depth)	2400x1900x650 mm		
Weight	700 Kg		
Paint	Epoxy type, oven-dried		
Standard colours	RAL 7035 Grey; RAL 3005 Maroon		

(2) Maximum dimensions.

Standards	
Power capacitors. Low voltage power factor correction capacitor banks.	UNE-EN 61921:2004
Low voltage switchgear sets. Part 1: General rules.	UNE-EN 61439: 2012

7.- STANDARD ELECTRICAL DIAGRAMS

The electrical diagrams indicated in this manual are for the standard models in each range, and do not include the various additional accessories which these may equip, such as those listed below:

✓ Autotransformer for auxiliary power supply (in those models in which this is not fitted as standard).
✓ Forced ventilation system.
✓ General manual load cut-off switch.
✓ Circuit breaker for general protection.
✓ Earth leakage protection device.
✓ Automatic regulator not for the Plug & Play Computer Max range.

And they are exclusively for the standard 3 x 440 V / 50 Hz rated voltage range, for use in three-phase networks with a rated voltage of 3 x 400 V / 50 Hz.

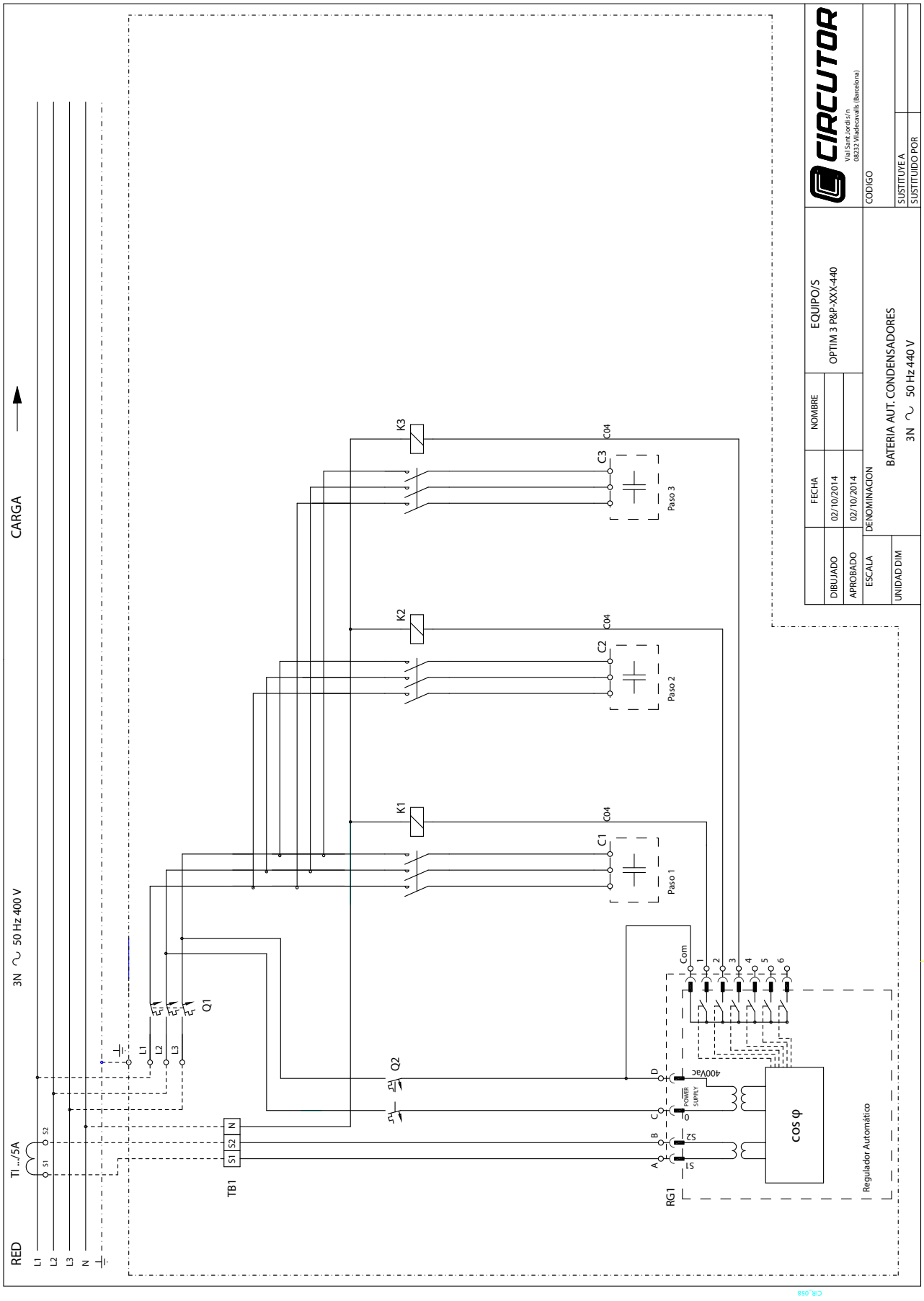

Figure 12: Standard electrical diagram of automatic capacitor banks in the OPTIM 3 P&P model.

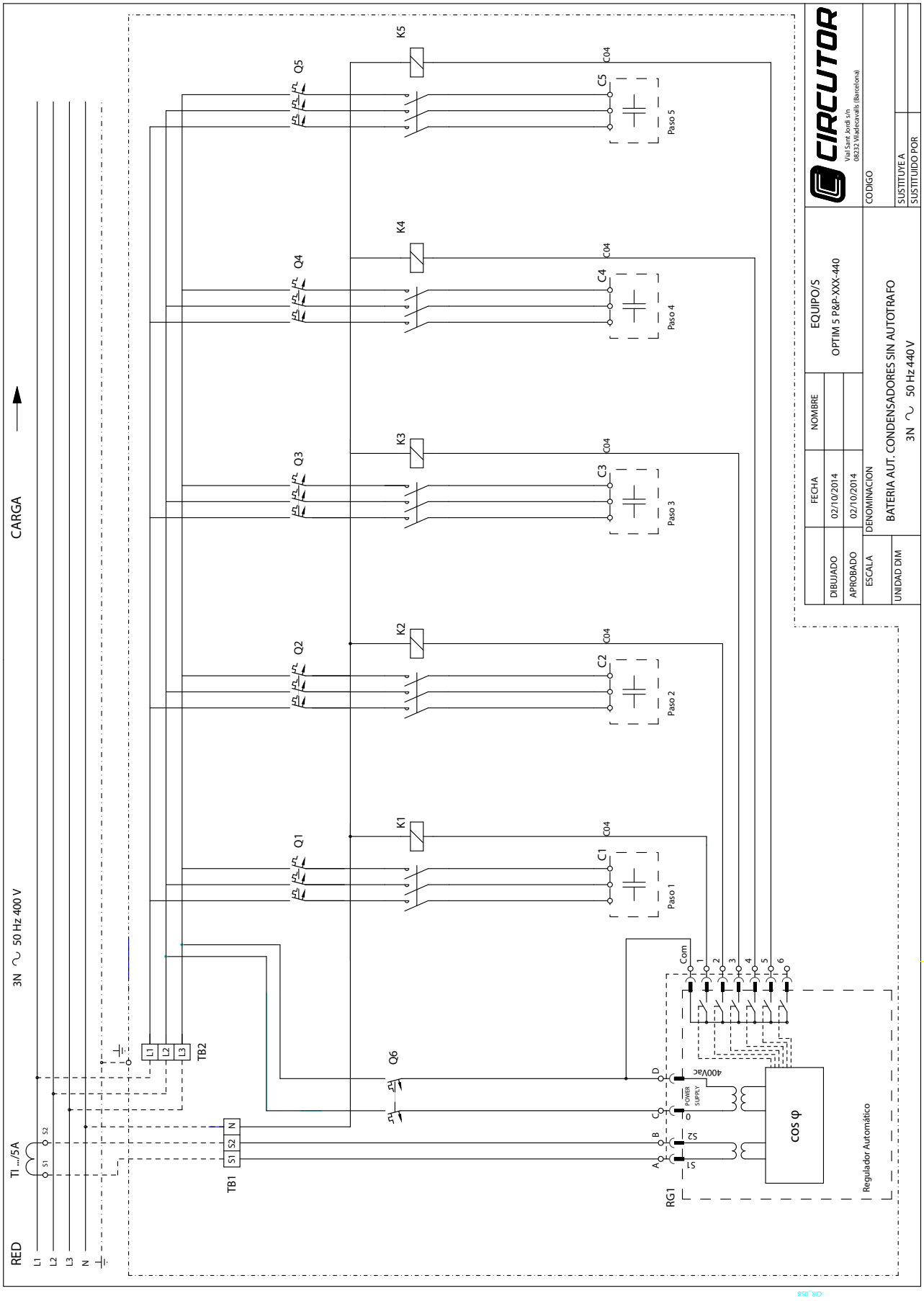

Figure 13: Standard electrical diagram of automatic capacitor banks in the OPTIM 5 P&P model.

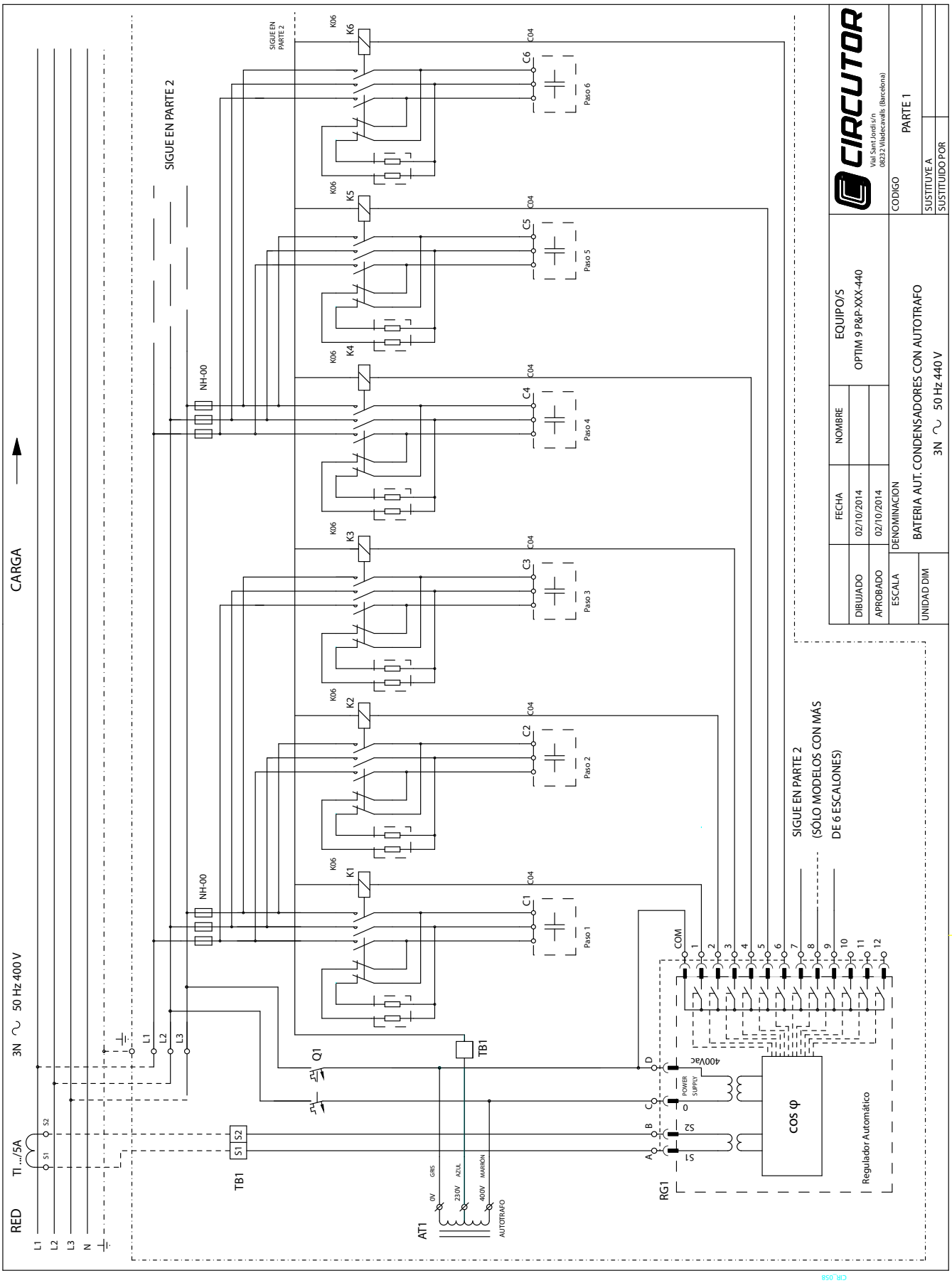

Figure 14: Standard electrical diagram of automatic capacitor banks in the OPTIM 9 P&P (1/2) model.

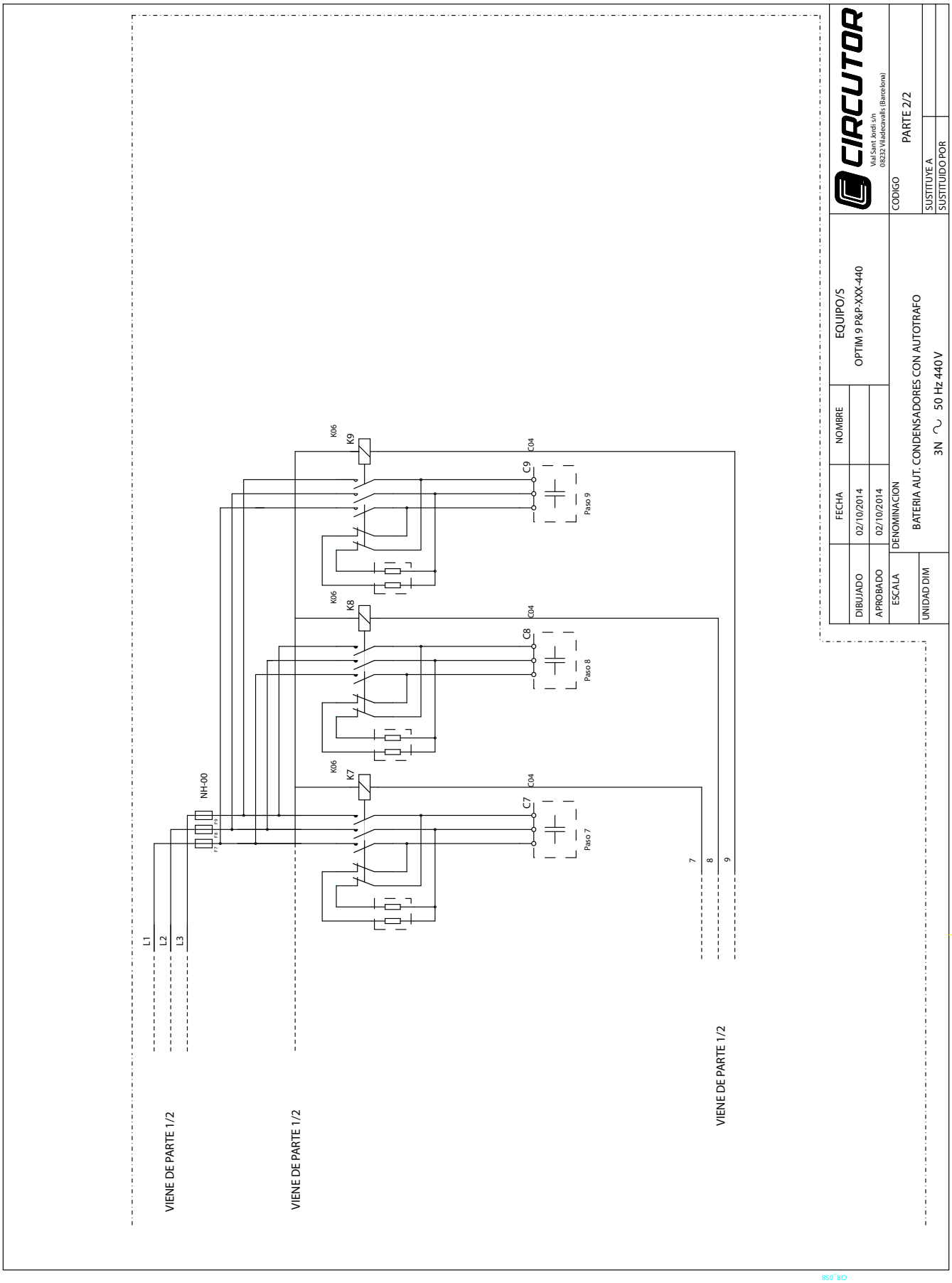

Figure 15: Standard electrical diagram of automatic capacitor banks in the OPTIM 9 P&P (2/2) model.

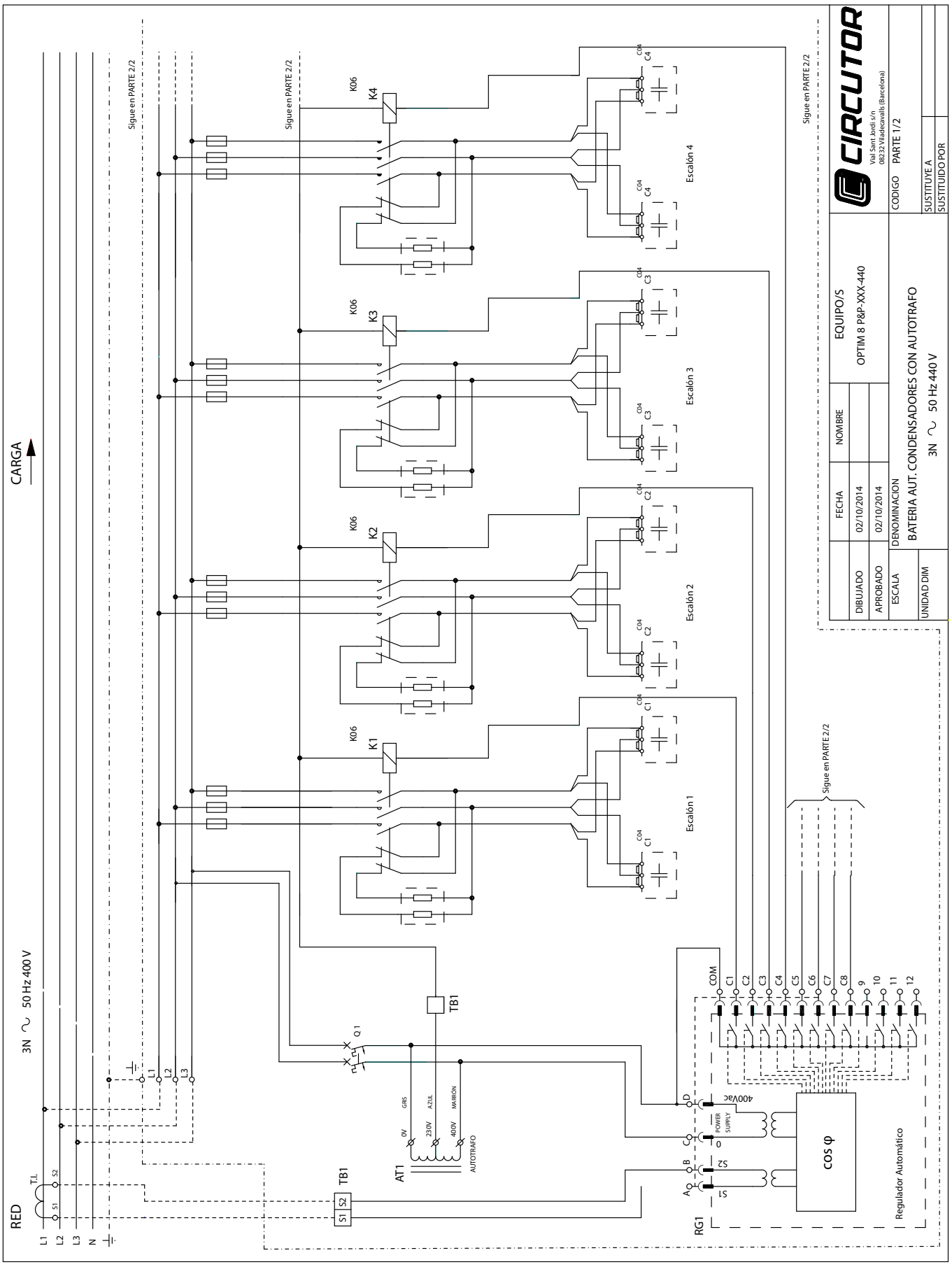

Figure 16:Standard electrical diagram of automatic capacitor banks in the OPTIM 8 P&P (1/2) model.

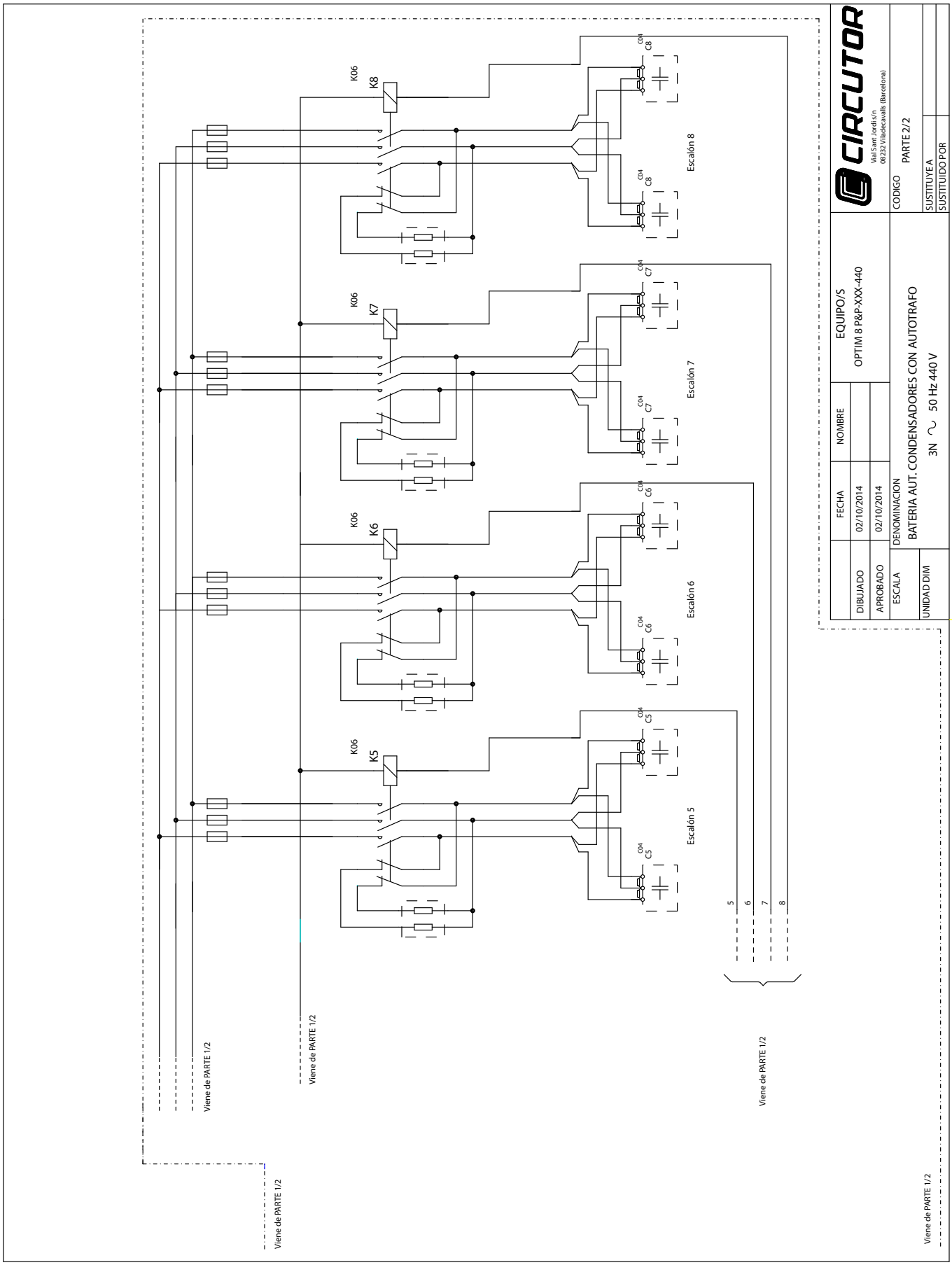

Figure 17:Standard electrical diagram of automatic capacitor banks in the OPTIM 8 P&P (2/2) model.

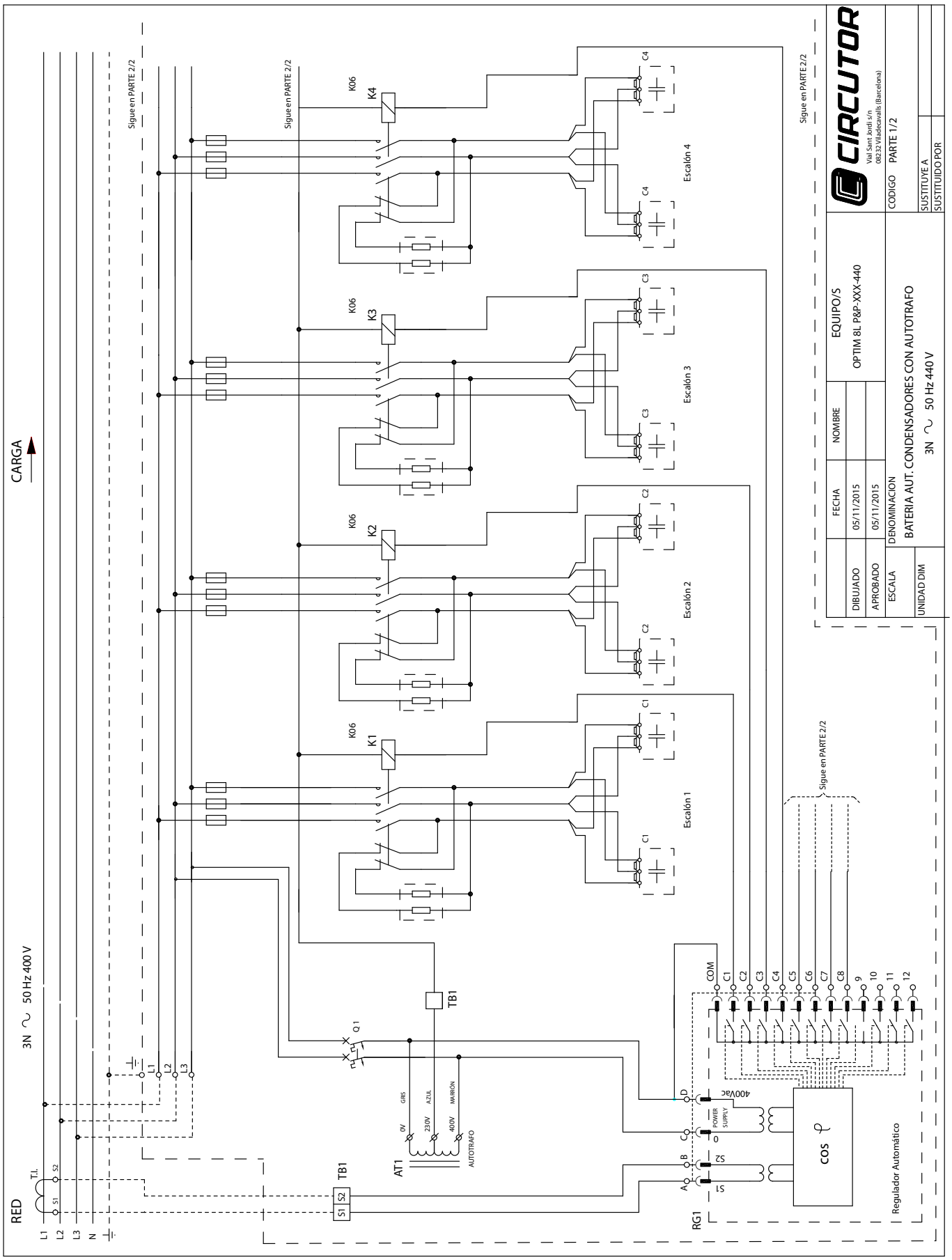

Figure 18:Standard electrical diagram of automatic capacitor banks in the OPTIM 8L P&P (1/2) model.

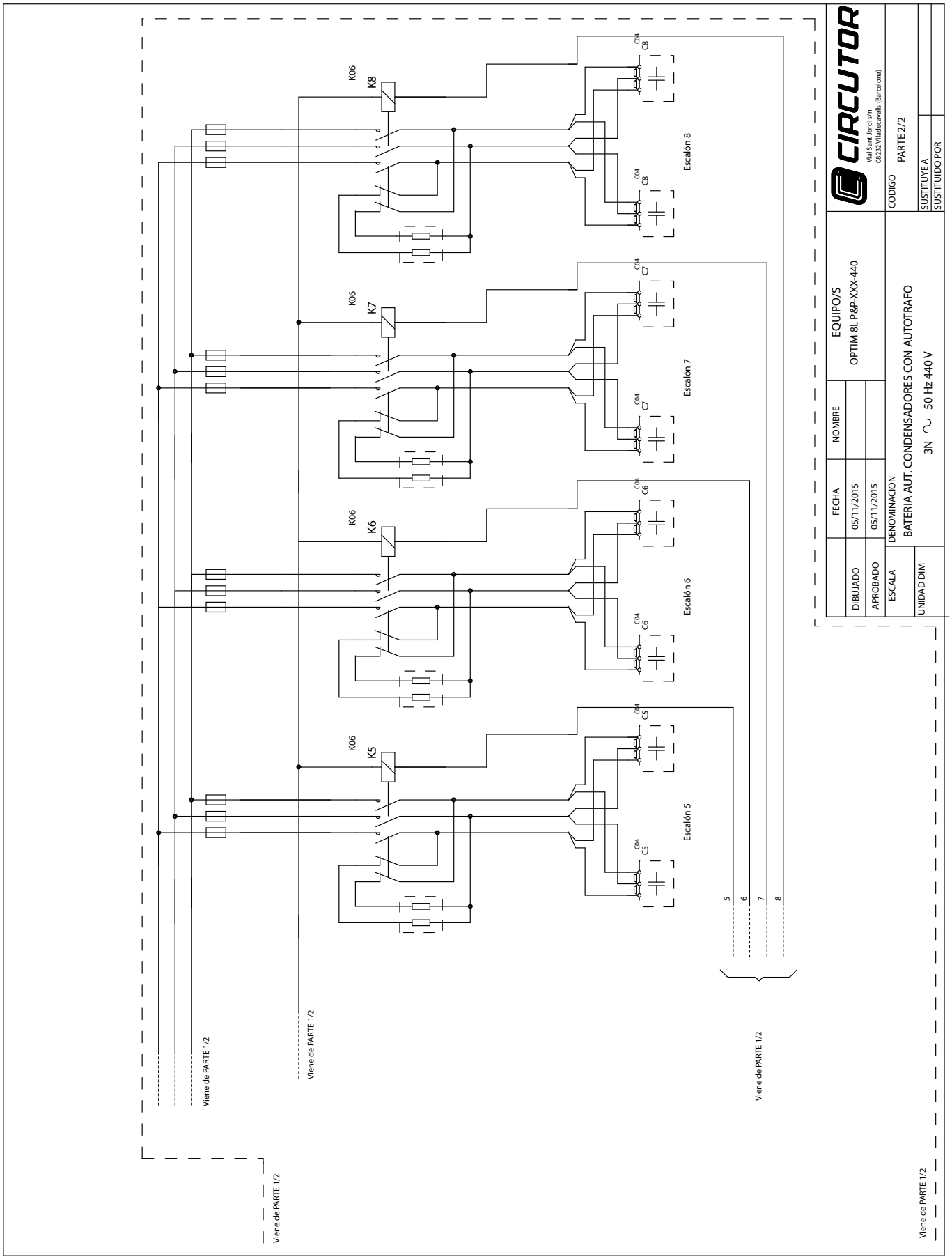

Figure 19:Standard electrical diagram of automatic capacitor banks in the OPTIM 8L P&P (2/2) model.

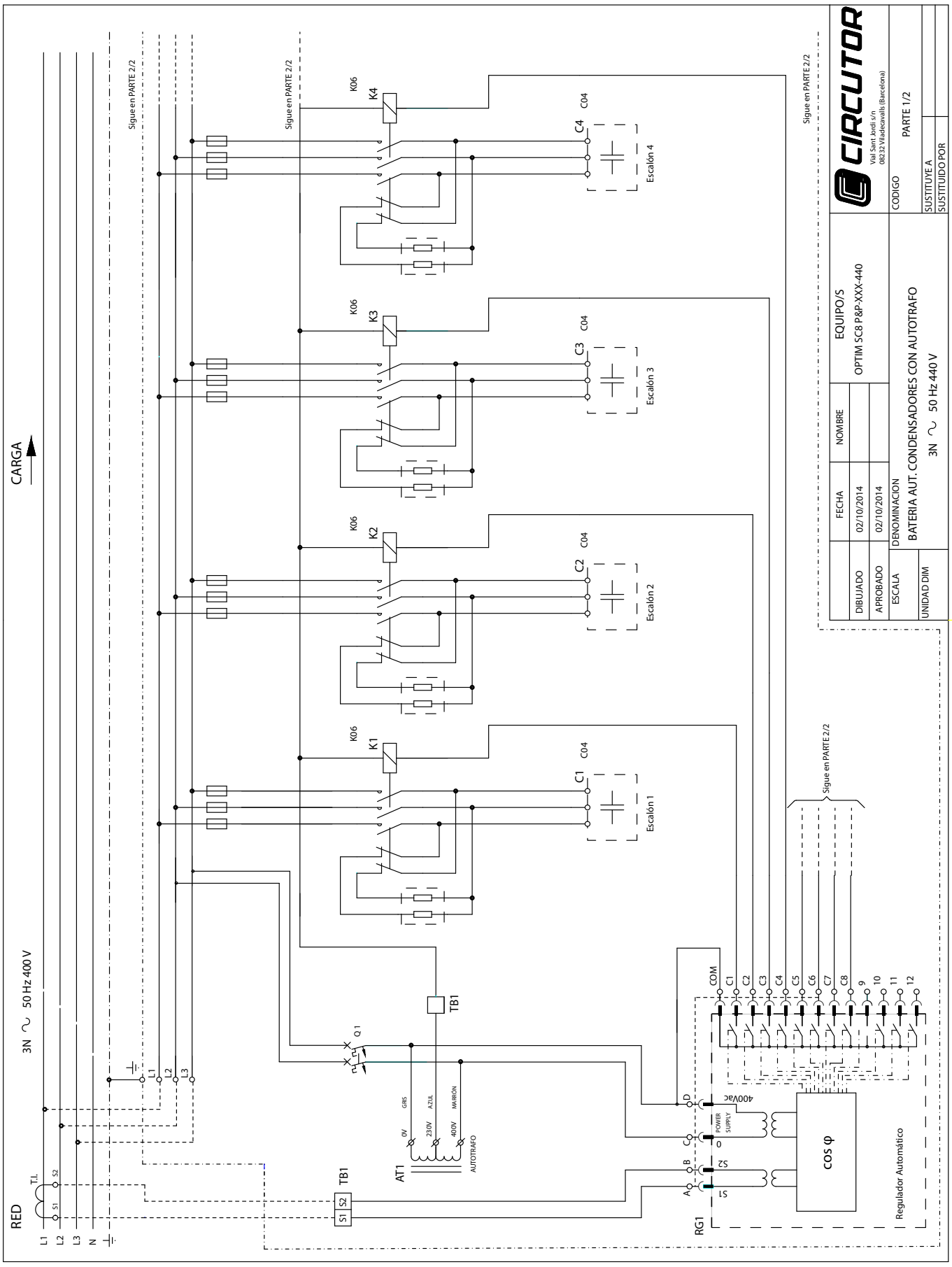

Figure 20:Standard electrical diagram of automatic capacitor banks in the OPTIM SC8 P&P (1/2) model.

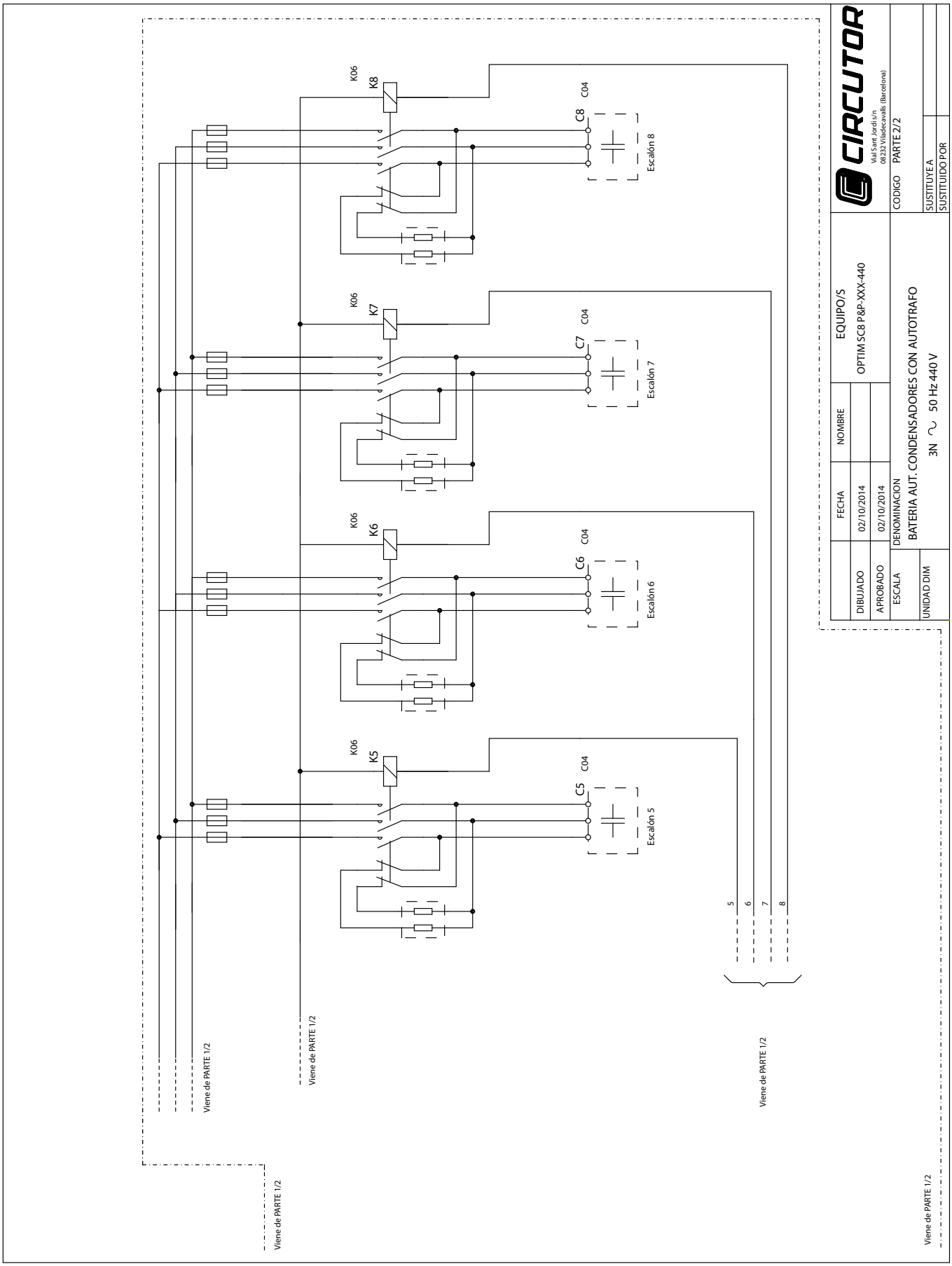

Figure 21:Standard electrical diagram of automatic capacitor banks in the OPTIM SC8 P&P (2/2) model.

8.- MAINTENANCE AND TECHNICAL SERVICE

In the case of any query in relation to device operation or malfunction, please contact the **CIRCUTOR, SA** Technical Support Service.

Technical Assistance Service
Vial Sant Jordi, s/n, 08232 - Viladecavalls (Barcelona)
Tel: 902 449 459 (España) / +34 937 452 919 (outside of Spain)
email: sat@circutor.com

9.- GUARANTEE

CIRCUTOR guarantees its products against any manufacturing defect for two years after the delivery of the units.

CIRCUTOR will repair or replace any defective factory product returned during the guarantee period.

• No returns will be accepted and no unit will be repaired or replaced if it is not accompanied by a report indicating the defect detected or the reason for the return.
•The guarantee will be void if the units has been improperly used or the storage, installation and maintenance instructions listed in this manual have not been followed. “Improper usage” is defined as any operating or storage condition contrary to the national electrical code or that surpasses the limits indicated in the technical and environmental features of this manual.
• **CIRCUTOR** accepts no liability due to the possible damage to the unit or other parts of the installation, nor will it cover any possible sanctions derived from a possible failure, improper installation or “improper usage” of the unit. Consequently, this guarantee does not apply to failures occurring in the following cases:
- Overvoltages and/or electrical disturbances in the supply;
- Water, if the product does not have the appropriate IP classification;
- Poor ventilation and/or excessive temperatures;
- Improper installation and/or lack of maintenance;
- Buyer repairs or modifications without the manufacturer’s authorisation.

CIRCUTOR, SA – Vial Sant Jordi, s/n
08232 Viladecavalls (Barcelona) Spain
(+34) 937 452 900 – info@circutor.com

(ES) DECLARACIÓN UE DE CONFORMIDAD

La presente declaración de conformidad se expide bajo la exclusiva responsabilidad de CIRCUTOR con dirección en **Vial Sant Jordi, s/n – 08232 Viladecavalls (Barcelona) España**

Producto:

Baterias automáticas de condensadores, BT

Serie:

OPTIM 3 P&P, OPTIM 5 P&P, OPTIM 8 P&P, OPTIM 8L P&P, OPTIM 9 P&P, OPTIM 14L P&P, OPTIM 16L P&P

Marca:

CIRCUTOR

EL objeto de la declaración es conforme con la legislación de armonización pertinente en la UE, siempre que sea instalado, mantenido y usado en la aplicación para la que ha sido fabricado, de acuerdo con las normas de instalación aplicables y las instrucciones del fabricante

2014/35/UE: Low Voltage Directive 2014/30/UE: Electromagnetic Compatibility Directive
2011/65/UE: RoHS2 Directive

Está en conformidad con la(s) siguiente(s) norma(s) u otro(s) documento(s) normativos(s):

IEC 61010-1:2010+AMD1:2016 CSV Ed 3.0 IEC 61000-6-2:2016 Ed 3.0
IEC 61000-6-4:2006+AMD1:2010 CSV Ed 2.1 IEC 60831-1:2014 Ed 3.0
IEC 61439-1:2011 Ed 2.0

Año de marcado "CE":

2015

(EN) EU DECLARATION OF CONFORMITY

This declaration of conformity is issued under the sole responsibility of CIRCUTOR with registered address at **Vial Sant Jordi, s/n – 08232 Viladecavalls (Barcelona) Spain**

Product:

LV automatic capacitor banks

Series:

OPTIM 3 P&P, OPTIM 5 P&P, OPTIM 8 P&P, OPTIM 8L P&P, OPTIM 9 P&P, OPTIM 14L P&P, OPTIM 16L P&P

Brand:

CIRCUTOR

The object of the declaration is in conformity with the relevant EU harmonisation legislation, provided that it is installed, maintained and used for the application for which it was manufactured, in accordance with the applicable installation standards and the manufacturer's instructions

2014/35/UE: Low Voltage Directive 2014/30/UE: Electromagnetic Compatibility Directive
2011/65/UE: RoHS2 Directive

It is in conformity with the following standard(s) or other regulatory document(s):

IEC 61010-1:2010+AMD1:2016 CSV Ed 3.0 IEC 61000-6-2:2016 Ed 3.0
IEC 61000-6-4:2006+AMD1:2010 CSV Ed 2.1 IEC 60831-1:2014 Ed 3.0
IEC 61439-1:2011 Ed 2.0

Year of CE mark:

2015

(FR) DÉCLARATION UE DE CONFORMITÉ

La présente déclaration de conformité est délivrée sous la responsabilité exclusive de CIRCUTOR dont l'adresse postale est **Vial Sant Jordi, s/n – 08232 Viladecavalls (Barcelone) Espagne**

Produit:

batteries automatiques de condensateurs BT

Série:

OPTIM 3 P&P, OPTIM 5 P&P, OPTIM 8 P&P, OPTIM 8L P&P, OPTIM 9 P&P, OPTIM 14L P&P, OPTIM 16L P&P

Marque:

CIRCUTOR

L'objet de la déclaration est conforme à la législation d'harmonisation pertinente dans l'UE, à condition d'avoir été installé, entretenu et utilisé dans l'application pour laquelle il a été fabriqué, conformément aux normes d'installation applicables et aux instructions du fabricant

2014/35/UE: Low Voltage Directive 2014/30/UE: Electromagnetic Compatibility Directive
2011/65/UE: RoHS2 Directive

Il est en conformité avec la(les) suivante (s) norme(s) ou autre(s) document(s) réglementaire (s):

IEC 61010-1:2010+AMD1:2016 CSV Ed 3.0 IEC 61000-6-2:2016 Ed 3.0
IEC 61000-6-4:2006+AMD1:2010 CSV Ed 2.1 IEC 60831-1:2014 Ed 3.0
IEC 61439-1:2011 Ed 2.0

Année de marquage « CE »:

2015

Viladecavalls (Spain), 17/10/2017
General Manager: Ferran Gil Torné

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(Barcelona) Spain
Tel.(+34) 93 745 29 00

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08232 Viladecavalls (Barcelona) Spain
(+34) 937 452 900 – info@circutor.com

(DE)

KONFORMITÄTSERKLÄRUNG UE

Vorliegende Konformitätserklärung wird unter alleiniger Verantwortung von CIRCUTOR mit der Anschrift, Vial Sant Jordi, s/n – 08232 Viladecavalls (Barcelona) Spanien, ausgestellt

Produkt:

NS-Automatische Kompensationsanlagen

Serie:

OPTIM 3 P&P, OPTIM 5 P&P, OPTIM 8 P&P, OPTIM 8L P&P, OPTIM 9 P&P, OPTIM 14L P&P, OPTIM 16L P&P

Marke:

CIRCUTOR

Der Gegenstand der Konformitätserklärung ist konform mit der geltenden Gesetzgebung zur Harmonisierung der EU, sofern die Installation, Wartung undVerwendung der Anwendung seinem Verwendungszweck entsprechend gemäß den geltenden Installationsstandards und der Vorgaben des Herstellers erfolgt.

2014/35/UE: Low Voltage Directive 2014/30/UE: Electromagnetic Compatibility Directive

2011/65/UE: RoHS2 Directive

Es besteht Konformität mit der/den folgender/folgenden Norm/Normen oder sonstigem/sonstiger Regelwerk/Regelwerken

IEC 61010-1:2010+AMD1:2016 CSV Ed 3.0 IEC 61000-6-2:2016 Ed 3.0
IEC 61000-6-4:2006+AMD1:2010 CSV Ed 2.1 IEC 60831-1:2014 Ed 3.0
IEC 61439-1:2011 Ed 2.0

Jahr der CE-Kennzeichnung:

2015

(PT)

DECLARAÇÃO DA UE DE CONFORMIDADE

A presente declaração de conformidade é expedida sob a exclusiva responsabilidade da CIRCUTOR com morada em **Vial Sant Jordi, s/n – 08232 Viladecavalls (Barcelona) Espanha**

Producto:

baterias automáticas de condensadores BT

Série:

OPTIM 3 P&P, OPTIM 5 P&P, OPTIM 8 P&P, OPTIM 8L P&P, OPTIM 9 P&P, OPTIM 14L P&P, OPTIM 16L P&P

Marca:

CIRCUTOR

O objeto da declaração está conforme a legislação de harmonização pertinente na UE, sempre que seja instalado, mantido e utilizado na aplicação para a qual foi fabricado, de acordo com as normas de instalação aplicáveis e as instruções do fabricante.

2014/35/UE: Low Voltage Directive 2014/30/UE: Electromagnetic Compatibility Directive

2011/65/UE: RoHS2 Directive

Está em conformidade com a(s) seguinte(s) norma(s) ou outro(s) documento(s) normativo(s):

IEC 61010-1:2010+AMD1:2016 CSV Ed 3.0 IEC 61000-6-2:2016 Ed 3.0
IEC 61000-6-4:2006+AMD1:2010 CSV Ed 2.1 IEC 60831-1:2014 Ed 3.0
IEC 61439-1:2011 Ed 2.0

Ano de marcação "CE":

2015

(IT)

DICHIARAZIONE DI CONFORMITÀ UE

La presente dichiarazione di conformità viene rilasciata sotto la responsabilità esclusiva di CIRCUTOR, con sede in **Vial Sant Jordi, s/n – 08232 Viladecavalls (Barcellona) Spagna**

prodotto:

Batterie automatiche di condensatori, BT

Serie:

OPTIM 3 P&P, OPTIM 5 P&P, OPTIM 8 P&P, OPTIM 8L P&P, OPTIM 9 P&P, OPTIM 14L P&P, OPTIM 16L P&P

MARCHIO:

CIRCUTOR

L'oggetto della dichiarazione è conforme alla pertinente normativa di armonizzazione dell'Unione Europea, a condizione che venga installato, mantenuto e utilizzato nell'ambito dell'applicazione per cui è stato prodotto, secondo le norme di installazione applicabili e le istruzioni del produttore.

2014/35/UE: Low Voltage Directive 2014/30/UE: Electromagnetic Compatibility Directive

2011/65/UE: RoHS2 Directive

È conforme alle seguenti normative o altri documenti normativi:

IEC 61010-1:2010+AMD1:2016 CSV Ed 3.0 IEC 61000-6-2:2016 Ed 3.0
IEC 61000-6-4:2006+AMD1:2010 CSV Ed 2.1 IEC 60831-1:2014 Ed 3.0
IEC 61439-1:2011 Ed 2.0

Anno di marcatura "CE":

2015

Viladecavalls (Spain), 17/10/2017
General Manager: Ferran Gil Torné

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PL

DEKLARACJA ZGODNOŚCI UE

Niniejsza deklaracja zgodności zostaje wydana na wyłączną odpowiedzialność firmy CIRCUTOR z siedzibą pod adresem: **Vial Sant Jordi, s/n – 08232 Viladecavalls (Barcelona) Hiszpania**

produk:

Automatyczne baterie kondensatorów NN

Seria:

OPTIM 3 P&P, OPTIM 5 P&P, OPTIM 8 P&P, OPTIM 8L P&P, OPTIM 9 P&P, OPTIM 14L P&P, OPTIM 16L P&P

marka:

CIRCUTOR

Przedmiot deklaracji jest zgodny z odnośnymi wymaganiami prawodawstwa harmonizacyjnego w Unii Europejskiej pod warunkiem, że będzie instalowany, konserwowany i użytkowany zgodnie z przeznaczeniem, dla którego został wyprodukowany, zgodnie z mającymi zastosowanie normami dotyczącymi instalacji oraz instrukcjami producenta

2014/35/UE: Low Voltage Directive 2014/30/UE: Electromagnetic Compatibility Directive

2011/65/UE: RoHS2 Directive

Jest zgodny z następującą(ymi) normą(ami) lub innym(i) dokumentem(ami) normatywnym(i):

IEC 61010-1:2010+AMD1:2016 CSV Ed 3.0 IEC 61000-6-2:2016 Ed 3.0
IEC 61000-6-4:2006+AMD1:2010 CSV Ed 2.1 IEC 60831-1:2014 Ed 3.0
IEC 61439-1:2011 Ed 2.0

Rok oznakowania "CE":

2015

Viladecavalls (Spain), 17/10/2017
General Manager: Ferran Gil Torné

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