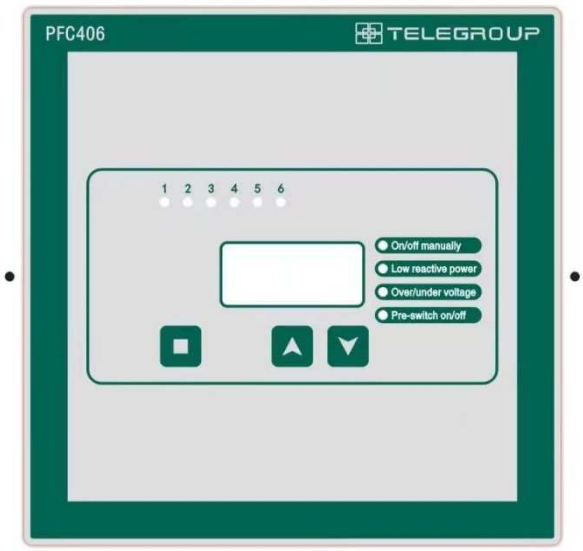
// ENG
// User Manual
// PFC Controller PFC406



Automatic PFC Systems

for Series R46

COMPANY WITH SOCIAL ACCOUNTABILITY SYSTEM CERTIFIED BY DNV GL = SA 8000 =

COMPANY WITH QUALITY SYSTEM CERTIFIED BY DNV GL = ISO 9001:2015 =

COMPANY WITH ENVIRONMENTAL SYSTEM CERTIFIED BY DNV GL = ISO 14001:2015 =

COMPANY WITH SAFETY SYSTEM CERTIFIED BY DNV GL = OHSAS 18001 =

REVISION INDEX

REVISION	DATE	DESCRIPTION
01	01/07/207	REVISION UPDATE
02	17/09/2018	REVISION UPDATE
03	19/05/2021	REVISION UPDATE

Identification	*Technical editing*	*Verified by*	*Approved by*
MUM- TL TLF	*Ing. Lorenzo Cassaresi*	*Ing. Massimo Cassaresi*	*Sig. Fabiano Bagnoli*

ANNEX

Wiring Diagram

Declarations of conformity Test certificate

Warranty certificate

1. INTRODUCTION

Purpose of the InstructionManual

This instruction manual is an integral part of the entire range of automatic power factor correction panels and is intended to provide all the information necessary for:

□ Know the product and its operation

□ Know the expected operating modes and limits ofuse

□ To sensitize operators correctly to security issues;

□ The correctinstallation;

□ Its correct and in safetyconditions;

□ Perform scheduled maintenance operations correctly andsafely;

□ To dismantle the product in safety conditions and in compliance with the regulations in force to protect the health of workers and theenvironment

The managers of the company departments, where this machine will be installed, have the obligation, according to current regulations, to read carefully the contents of this document and to make it read to the conductors and maintenance workers, for the parts that to them compete. The time spent for this purpose will be largely rewarded by the correct operation of the machine and its use in safety conditions

This document assumes that in the places, where the product has been destined, the current rules of safety and hygiene of the work are observed.

The instructions, drawings and documentation contained in this Manual are of a reserved technical nature, strictly owned by the manufacturer and can not be reproduced in any way, either fully or partially.

The Instruction Manual must accompany the product for its life time in all the passages of property that the same may have therefore must be favored a good conservation handling it with care, avoiding contact with fats, dirt and aggressive substances.

The manual must be kept intact, must not be removed, torn or arbitrarily modified any of its parts, must be stored in an environment protected from moisture and heat, in the vicinity of the product to which it refers.

The first page shows the revision index of the instruction manual with the descriptions of the changes made in the various revisions.

The sequence of the chapters responds to the temporal logic of the product life.

Telegroup S.r.l. having the responsibility to ensure that they are actually present in the points of use, only the updated versions of the Manual make available the updated versions of the manual on the Site www.telegroup.it.

Recipients

The manual in question is addressed to Installers, Operators, Maintenance Managers and to all personnel who can intervene or interface with the machine at any level.

It is divided into autonomous chapters aimed at specific figures for which the skills have been defined, necessary to operate on the machine in safe conditions.
The machine is an appliance intended for industrial use, and therefore professional and not generalized, so its use can only be entrusted to qualified technical personnel who:

□ has reached the age of majority(18),
□ both physically and mentally fit to perform work of particular technicaldifficulty,
□ has been adequately instructed on the use and maintenance of themachine,
□ has been judged by the entrepreneur to perform the task assigned tohim,
□ be able to understand and interpret the operator's manual and safetyinstructions,
□ know the emergency procedures and theirimplementation,
□ possess the ability to operate the specific type ofequipment,
□ is familiar with the specific rules of thecase,
□ understood the operating procedures outlined by themanufacturer.

Storage of the instruction manual

The Instruction Manual must be kept with care and must accompany the product in all the steps of ownership.
Storage should be taken care of with dirty care.
They must be removed, torn or arbitrarily modified from the parts.
The Manual should be stored in an environment protected from humidity and heat and in the vicinity of the product to which it refers.

Definitions and .pictograms

To facilitate the immediacy of the comprehension of the text in this paragraph the meaning of terms, abbreviations and pictograms used in the manual is clarified. Their use allows to quickly and univocally provide the information necessary for the correct use of the machine in safety conditions.
INSTALLER: One who mounts and installs a machine and follows the entire process that goes from the arrival to the destination of the components to the subsequent installation at the customer, to final testing and signing of acceptance documents, possibly coordinating a team of men with specializations different.
The figure, in detail, has the task of:

□ assemble the machine following the drawing and using the components at its disposal;
□ provide, during installation at the customer's site, the setting up and adjustment of the machine or system;

OPERATOR: The person in charge of installing, operating, regulating, cleaning, repairing and moving a machine and carrying out its maintenance;
DANGER: A potential source of injury or damage to health;
HAZARDOUS AREA: Any area inside and / or near a machine where the presence of a person constitutes a risk to the safety and health of that person;
EXPOSED PERSON: Any person who is completely or partially in a dangerous area;
RISK: Combination of the likelihood and severity of an injury or damage to health that may arise in a dangerous situation;
PROTECTIVE DEVICE: Device (other than a guard) which reduces the risk, alone or associated with a guard;
INTENDED USE: Use of the machine according to the information provided in the instructions for use;
USE INCORRECTLY REASONABLE FORCE: Use of the machine in a manner different from that indicated in the instructions for use, but which may derive from easily predictable human behavior.
RESIDUAL RISK: Risks that remain, despite the integrated protection measures adopted in the machine design and in spite of the protections and protection measures
complementary measures adopted.
SAFETY COMPONENT: Component:
□ intended to perform a security function;
□ whosefailureand/ormalfunctionjeopardizesthesafetyofpersons.(egliftinggear,fixed,movable,adjustable, etc. protector, electrical, electronic, optical, pneumatic, hydraulic device, which asserts, ie interlock, a protector, etc.).

PICTOGRAMS

The descriptions preceded by this symbol contain very important information / requirements, particularly with regard to safety. Failure to comply may result in dangers for the safety of the operators;

PICTOGRAMS RELATED TO SECURITY

• The pictograms in a triangle indicateDANGER.

• The pictograms contained in a circle impose a PROHIBITION /OBLIGATION.

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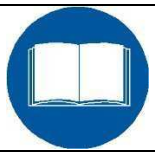
SYMBOL	DESCRIPTION
	Dangerous electrical voltage
	Generic danger
	Read the instructions first

2. SAFETYINSTRUCTIONS

Before installing and starting the unit, carefully read the following user manual and safety instructions

To reduce the risk of an electric shock, perform assembly in a controlled temperature and humidity area free of conductioncontaminants.
Disconnect all connections before maintenance or repair. Before maintenance, repair or transport, completely unplug the unit and disconnect all plugs or connectors.

Transportation and storage

Telegroup S.r.l. assumes no responsibility if the equipment is moved without the appropriate packaging, which however does not ensure impermeability to water, dust and aggressive chemical agents

□ Transport the machine with lifting equipment suitable for the dimensions and weight of themachine.

□ Always keep in verticalposition.

□ The appliance must always be storedinside.

□ During transport and storage refers to the following temperature range: -20 to + 50 ° C and, for short periods not exceeding 24 hours, up to + 70 °C.

Positioning

- Transferring the panel directly from a cold to a warm environment can cause condensation. Before being installed it must be absolutely dry. Please allow an acclimatization time of at least twohours.
- Do not install near water or in dampenvironments.
- Do not install in places near heatsources.
- **At least 40 cm must be left to promote heat dissipation. of free space around the walls of the equipment, naturally excluding the rear one. It is also necessary to allow the natural circulation of air inside the cabinets, avoiding carefully placing anything against the cooling openings.**

Installation

Do not operate the equipment in the presence of flammable gases or fumes. The activation of any electrical equipment in such an environment constitutes a safety risk. Do not place the machine in an unventilated area.

The power factor correction panel must be installed according to the instructions in this manual. Failure to recognize the risks related to electricity could prove fatal. Please keep this instruction manual for future reference.

User operations

The only operations allowed to the user are the following:

□ Activating and deactivating theunit

□ Use of userinterfaces

□ Connecting thecables

These operations must be performed according to the instructions provided in this manual.

During any operation, the user must pay the utmost attention and perform only what is indicated in the instructions. Any deviation from the instructions can be dangerous for the operator.

□ Position any cables so that no one can step on them or trip overthem.

□ The machine must be operated by experiencedpersonnel.

□ Never intervene on the livedevice,

□ if you also switch off without tension, use safetygloves.

□ Do not keep accumulated materials of any kind in the vicinity so as not to hinder the cooling of the equipment.

□ In case of maintenance or failure, report with a special sign that prohibits the insertion into the grid.

Operation and Maintenance

- For complete disconnection of the system: if there are batteries of capacitors inserted, proceed with their disconnection, following the instructions of "MAN mode". Open the main switch and wait at least 3 minutes for a complete discharge of the capacitors
- Ensure that no foreign objects or fluids can enter theequipment.
- This equipment operates at dangerous voltages, repairs must only be performed by qualified service personnel
- Disconnect the mains power supply before carrying out any service or repair. Check that there is no dangerous voltage inside.

3. GENERAL INFORMATION

Identification of the manufacturer

MANUFACTURER

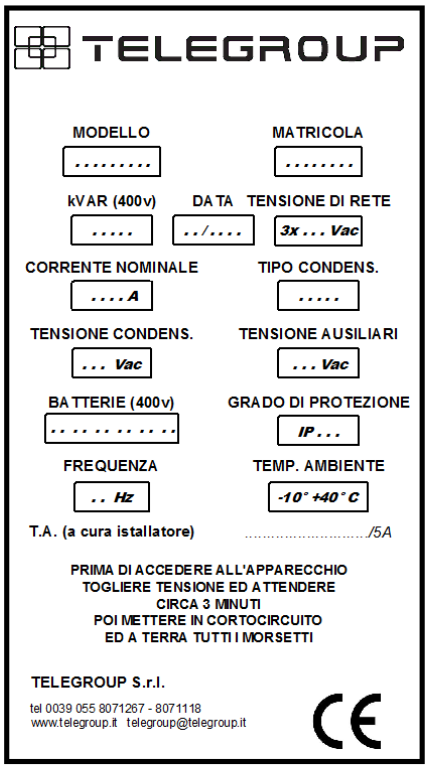
Telegroup S.r.l.
Via L. Da Vinci, 100 - Loc.Sambuca
50028 BARBERINO TAVARNELLE (FI) - ITALIA

CONTACTS

Tel. 055-8071267 / 8071118
Fax 055-8071338
e-mail:**telegroup@telegroup.it**
www.telegroup.it

Product Identification

The panel is identified by a CE plate on which the reference data are indelibly marked.



Statement

Telegroup S.r.l. has produced the product in compliance with the relevant Community Directives applicable at the time of its placing on the market / first commissioning, has satisfied the relevant requirements from the applicable directives and has provided the self-certification path for the affixing of the CE marking. Attached is a copy of the Machine Declaration of Conformity.

Commissioning

The product can only be put into service if properly installed, maintained in efficiency and used in accordance with the intended use. It is also forbidden to use it following constructive changes or additions

of other components that do not fall into ordinary or extraordinary maintenance without the product being declared again in compliance with the requirements of the reference directives and the regulations in force.

Safety Standards

The panel was created taking into account the indications given in the safety technical standards listed below:

Directive 2014/35/UE	Concerning the approximation of the laws of the Member States relating to electrical equipment intended to be used within certain voltage limits
Directive 2014/30/UE	Concerning the approximation of the laws of the Member States relating to electromagnetic compatibility and repealing Directive 89/336 / EEC
CEI EN 61921	Power capacitors. Low voltage PFC batteries

Warranty

The product is covered by warranty, as provided for in the general sales conditions. If during the period of validity malfunctions or faults of parts of the product occur, which fall within the cases indicated by the warranty, the Manufacturer, after the appropriate checks, will repair or replace the defective parts.
In order to take advantage of repairs under warranty, the purchaser must in any case ship the appliance to the manufacturer (Telegroup Srl Loc. Sambuca 50028 Tavarnelle Val di Pesa (FI)). The costs for shipping the product to be repaired or replaced are the responsibility of the purchaser; these products are therefore supplied ex-works of the seller.
The warranty right lapses if the faults claimed result from incorrect behavior and operations that do not comply with the indications given in this manual, caused by the purchaser, by his employees, by third parties or by improper use of the product:

□ incorrect power supply
□ incorrect installation
□ natural events (Lightning etc...)

It is recalled that modifications to safety devices and systems and any intervention other than ordinary and extraordinary maintenance, carried out without the express written authorization of the manufacturer, render the warranty void and relieve the manufacturer from any liability for damage caused by the defective product.
For all these reasons we advise our customers to always contact our Customer Service.
For all components not manufactured by the Seller the warranty conditions of the manufacturers are valid. With the repair or replacement of any defective parts, the seller's obligation must be deemed to have been fulfilled, thus remaining exempt from any claim for damages.

4 GENERAL DESCRIPTION OF THE PANEL

Sheet metal cabinet FE P02 epoxy powder coated gray RAL7035 with smooth / textured finish, equipped with slots for forced cooling of the air.

Front door for access to the internal parts interlocked to the main switch by means of a door-locking handle; closing bylocks.
Blind flange for cable passage located on the upper / lower part of the
equipment. Fixing of the equipment to the floor / wall.
General switch-disconnector with door lock and (pre-opening microswitch: switches the capacitors off, via contactors, before the isolator contacts open - optional -).

Other features see (APPENDIX).

Environmental Conditions

The machine is suitable for operating in environments that are:
• altitude not exceeding 1000 m s.l.m.;
• temperature between 0 ° C and + 40 ° C with relative humidity not higher than
85% It is forbidden to use the machine in environments thatare:
• Excessivelydusty;
• in corrosiveatmosphere;
• at risk offire;
• in an explosive atmosphere.

Electromagnetic environment

The machine is designed to operate correctly in an industrial-type electromagnetic environment, within the limits of Emission and Immunity provided for by the following harmonized standards:
□ CEIEN61000-6-2Electromagneticcompatibility(EMC)Genericstandards-Immunityforindustrialenvironments
□ CEIEN61000-6-4Electromagneticcompatibility(EMC)Genericstandards-Emissionforindustrialenvironments

Technical data of the equipment

On the product identification plate, the essential technical data are shown (General characteristics, Characteristics of capacitors Characteristics of power factor correction regulators),

SoundEmissions

The A-weighted equivalent continuous sound pressure level in the work stations does not exceed 45 db (A) during the working phase;

5 INSTALLATION

Inspection of the unit

Upon receipt of the equipment it is advisable to remove the product from the packaging and check for any damage caused by transport. If damage is found, inform the carrier responsible for the transport and your dealer. Keep the packing carton in case the product has to be sent back to the factory for repairs.

Connection

Caution!!! The correct connection and commissioning of an automatic power factor correction device is relatively simple, but must not in any way be entrusted to the case. As a result, the unit will not switch the capacitor banks on or off or it will function abnormally. Since the panels are all tested and tested on site, any operating anomalies will be due to incorrect connection and, in particular, to the incorrect positioning of the current transformer. Please therefore follow the instructions in this manual to be followed strictly in the sequence indicated.

Thanks for your collaboration

Place the panel in a ventilated position away from sources of heat: good air circulation is one of the most important characteristics for a correct and lasting operation. Leave a minimum space of 40 cm around the panel, so that the air can penetrate and exit freely. Do not place the equipment in humid and dusty places unless it has been requested with a particular degree of protection.

To assure the short-circuit withstand, it is necessary to install a three-phase fuse current regulators of the NH-aM type, or other devices with similar characteristics, upstream of the power factor correction boards,

both with rated current and breaking capacity higher than the supposed short-circuit current

When Icc is not known at the installation point, the short-circuit current at the transformer secondary can be roughly taken.

Power KVAR	Icc max kA
Da 7.5 a 40	1.5
Da 45 a 55	2.5
Da 65 a 75	8
Da 87.5 a 250	15
Da 275 a 400	20
Da 450 a 750	50

KVA	Vcc%	Icc kA
50	4	1,8
63	4	3,6
100	4	5,77
160	4	7,22
200	4	9,02
250	4	11,37
315	4	14,43
400	4	18,04
500	4	22,73
630	4	19,25
800	6	24,06
1000	6	30,07
1250	6	38,49
1600	6	48,11
2000	6	50,14

To connect an automatic PFC panel to the network, it is necessary to have a C.T. (current transformer) having a secondary rated current of 5 A not supplied with the product but charged to the customer.

The primary rated current of the C.T. must be chosen according to the rated current of the line regardless of the power of the power factor correction bearing in mind that the measuring range of the regulator current ranges from 8% to 110% of the current of the C.T. therefore, this condition must be met.

Eg: there is a circulating current of 200 / A. A T.A. will have to be chosen. whose current ranges from: 2500 A (8% of 2500 = 200 / A) and 180A (110% of 180 A = 200 / A). **It is a good rule to install a C.T. with a double primary current that is actually circulating, therefore, in the case of the example, a C.T. will be selected. with primary current of 400A.**

To connect the equipment to the network some simple operations are necessary that must be absolutely respected.

The sequence of the main operations necessary for this purpose can be summarized as follows:

1. Ground the secondary of C.T..

2. Supply the equipment with cables of adequate cross-section according to the ratedpower.

3. Power supply: three-phase + Pe (unless otherwiserequested)

4. Anchor the power cables to the main switch according to the phasesequence.

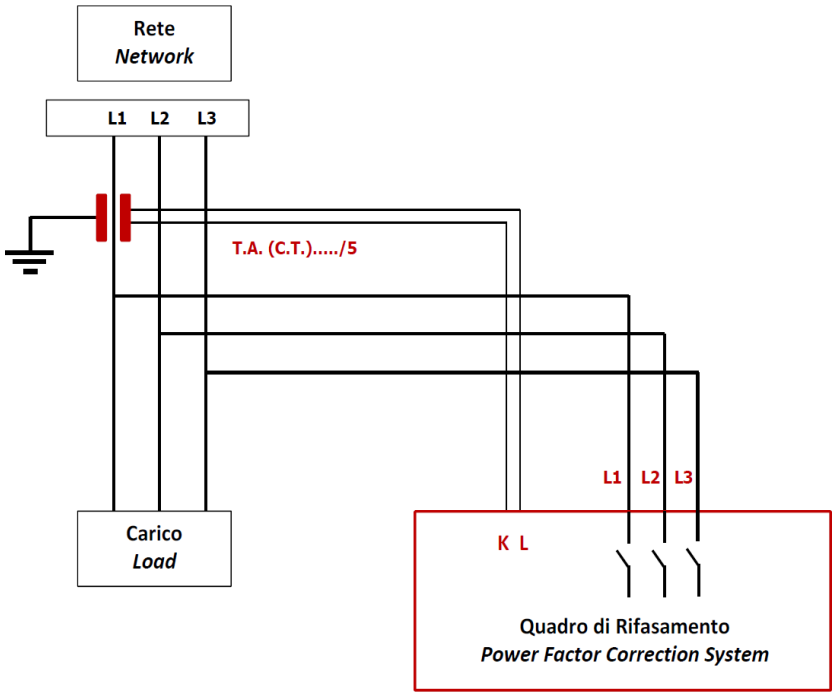
If you want to switch off the panel during operation, make sure, before opening the main switch, that you have disconnected all the batteries, following the instructions (see MAN mode)

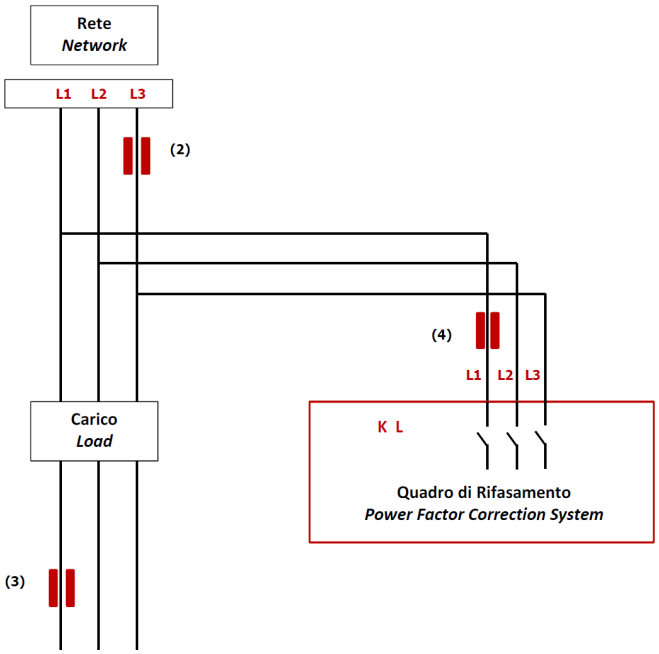
• The C.T. must be positioned on the **phase (R - L1), upstream of the loads and the line that feeds the power factor correctionpanel.**

• The phase sequence **(R (L1) - S (L2) -T (L3))** must be respected when connecting the line to the power factor correctionpanel.

• This condition can be easily checked with the aid of a voltmeter: by measuring, between the phase where the C.T. **(the R)** and the phase anchored on the **R terminal** of the automatic power factor correction switch, the voltage **must be"0".**

• **The positioning of the C.T. It is essential for the correct functioning of the appliance**. The relative diagram is shown in the figurealongside



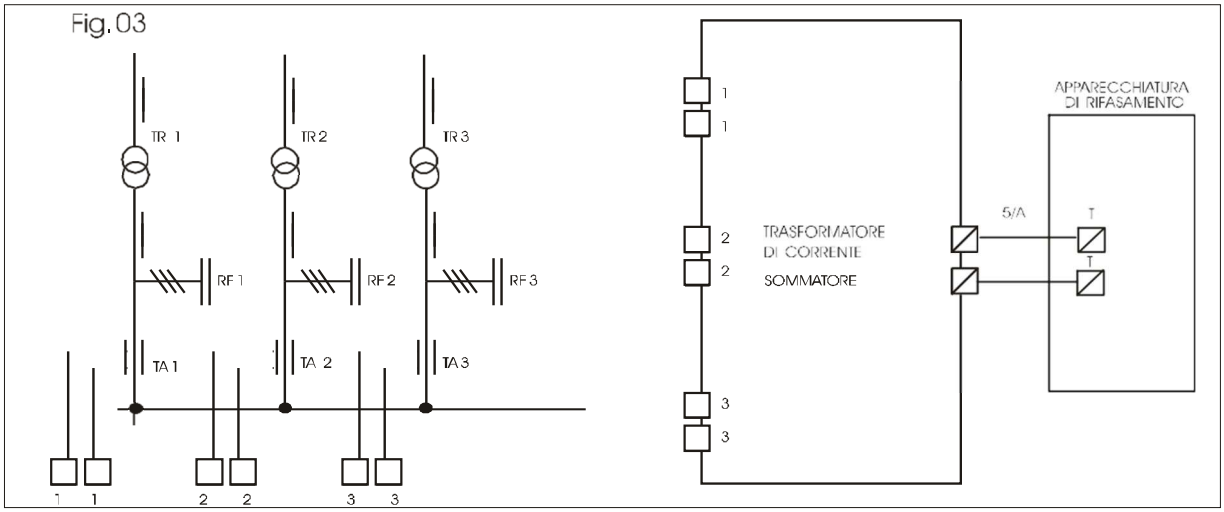


The following are some possible positions of the C.T. wrong:

Position 2: despite being the C.T. installed upstream, and installed on phase L3 (T) instead of L1 (R)
Position 3: the C.T is installed on the load line!
Position 4: the C.T. it is installed on the phases that feed the pfc!

The insertion of an automatic power factor correction device in the presence of MV transformers. If there are batteries of capacitors of the fixed type, on the transformers, the C.T. necessary for the control of the automatic PFC device to be placed downstream of the fixed capacitors.

Fig. 03



The figure shows the connection of a power factor correction equipment in the presence of MV connected transformers in parallel

NOTE. It is necessary to use a Sum C.T. with 2 or 3 inputs depending on whether there are 2 or 3 transformers, to which the cables coming from the C.T .. must be connected. The output of the Sum C.T. must be connected to the automatic PFC Panel.
Set the C.T. Primary (the ways to set this parameter are described in Appendix B) as the sum of the two or three C.T Primary.

6. COMMISSIONING

INSTRUCTIONS FOR SETTING THE POWER FACTOR REGULATOR PFC406

The **PFC406** is an automatic power factor correction regulator based on a microprocessor control circuit, capable of connecting or disconnecting the capacitor banks necessary to reach and maintain the set average cosphi. The instrument performs an RMS value measurement that allows operation and correct display even in the presence of distorted waveforms. The central microprocessor unit manages all the adjustment procedures.

 It allows you to view the main parameters relating to power factor correction, therefore the Power Factor, the Reactive Power, Currents, Voltages, etc ..

 It has an automatic blocking function for low reactive power to be inserted, effectively preventing oscillation and thus improving the life of the contactors and capacitors;

 Adopt CA sampling technology; it is characterized by high immunity to harmonics and voltage pulses in the network;

 Using new data acquisition and control technology, detection is more accurate, allowing errors to be detected under low load or over current conditions;

 All control parameters are fully digitally adjustable, easy to set and data is not lost when turned off;

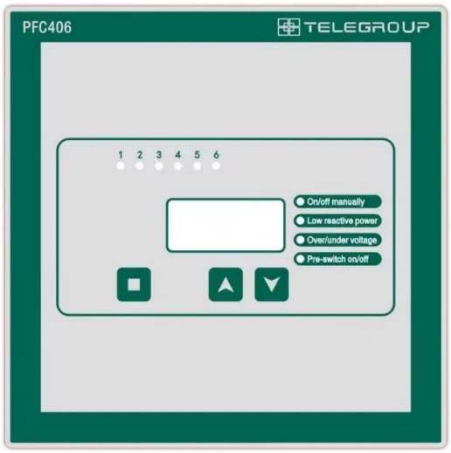
 It can work in both Automatic and Manual mode;

 It is equipped with Overvoltage and Minimum Voltage protections;

 Automatically recognizes the connection polarity of the CTs. and therefore of the current drawn;

 It allows you to set the discharge delay of the Capacitors, in order to ensure that they can reach a correct residual voltage, before starting a new insertion.

First of all, connect the secondary of the C.T. to the ground.



<u>Attention: the parameters of the PFC406 controller are already preset and must not be modified</u>.

The only parameter to be set by the installer is the value of the primary of the current transformer (T.A); follow the procedure below.

A. At the first power up the symbol C--0 appears on the display

A. Press for 3 seconds and then release the button to access the parameters menu,

B. The symbol 0.95 b. will appear which indicates the cosphi value set (0.95)

C. Press the button 8 times to select the code of the function relating to the setting of the CT primary, it is necessary to specifically modify the function indicated by the symbol P.

D. Press the button or the button to select the value (Ampere) of the Primary of the CT present in the system.

E. After the CT primary value has been set, eg.

P. 100 if the CT present in the system is 100 A

.press the button for 3 seconds, display will visualize icon 0--0

the Controller will save the settings, and will return to Automatic Mode.

Technical features

 Voltmetric Input: Nominal Voltage: AC 230 V / 400 V ± 20%
 Amperometric Input: Nominal Current: AC 5 A
 Frequency: 50/60 Hz
 Sensitivity Measurements: 50 mA
 Insulation voltage: 690V
 Degree of protection IP40
 Relay Output Range: AC 220V / 5A or AC 380V / 3A
DC 12V / 20mA
 Altitude: <1000m
 Relative humidity: <50% at 40 ° C; <85% at 20 ° C;
 Operating temperature: -30 ° C +50 ° C

Function of the front buttons

Press to enter manual mode; keep pressed for about 3 s to enter or exit the parameter setting

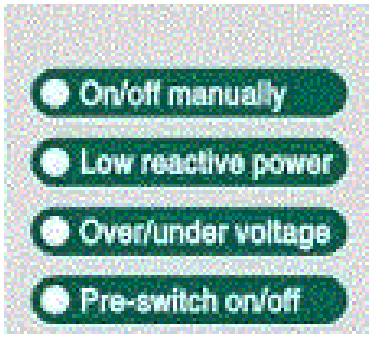
Allows you to increase values when editing parameters.

Allows you to reduce the values while modifying the parameters.

Display Description

Power Factor | Load Current | Reactive Power needed to achieve the desired Power Factor | Operating Voltage

List of LEDs on the Controller to indicate the operating modes / protections



If the LEDs on the Controller are on, they indicate that the following Modes / Protections are activated.

- On/OFF manual (Manual Mode ON/OFF)
- Low Reactive Power (Prevents Switching Oscillations)
- Over/under voltage (Overvoltage / Undervoltage Protection)
- Pre-switch on/off (indicate the imminent insertion or disconnection of a Capacitor Bank)

Parameters Table. All values are factory set with the exception of the CT primary P.

IT IS FORBIDDEN TO MODIFY THE PARAMETERS, EXCEPT FOR THE P VALUE, OR THE WARRANTY WILL BE VOID!!

Button	Code	Code meaning	Parameter range	Reference
Press ▣ to choose Parameters Press ▲ or ▼ To modify parameters	b.	Setpoint Cosφ	0.70 IND ~ 0.70 CAP	0.95 IND
	F.	Limit Threshold	0.70 IND ~ 0.70 CAP	0.97 IND
	C.	Switch on Delay	Standard 1~180 s Fast 0.1~180 s	30 s 20 s
	E.	Switch off delay		
	d.	Overvoltage threshold	230-280 V or 400-500 V	240/440 V
	L.	Output circuit	1 - 12	Actual configuration
	d.	Discharge delay	0~240s Note 1)	60 s
	n.	Operating Voltage	230 V/400 V Note 2)	Actual wiring
	P.	Primary C.T. Value	10 A ~ 5000 A Note 3)	Actual configuration
	q.	Reactive Power	0-150 kVAr	Actual configuration

Note 1) This parameter is used to protect the capacitors, as it is necessary to provide for a discharge time after their disconnection, so that they can only be switched on again after the set period;

Note 2) The voltage value of 400V indicates that the voltage is taken between the second and third phase, Line to Line Voltage V23, (Three-phase systems); the voltage value of 230V indicates that the voltage is taken between the phase and the neutral (single-phase systems).

Note 3) This value is the value of the Primary of the C.T. , for example for a C.T. Ratio "500A / 5A", must be set to "500".

Overvoltage and undervoltage protection

When the operating voltage becomes higher than the value set for the overvoltage threshold, the overvoltage indicator lights up; when the operating voltage becomes lower than 0.8 x Working voltage (400 V in the three-phase system), the minimum voltage light turns on; in both protection modes, the power factor correction batteries are disconnected within 60 seconds.

Anti Switching Oscillations function

When the Green Low Reactive Power LED lights up, it simply means that the Reactive Power required by the Load is lower than the minimum Reactive Power value that can be entered from the Power factor correction panel. Although the Power Factor is lower than the target value, the Controller will avoid the insertion of the power factor correction banks, avoiding a condition of oscillation and therefore continuous, undesired maneuvers of the contactors. In this case, it is therefore normal that the capacitor banks are not inserted and the Panel will continue to operate in the Automatic Mode and to insert the power factor correction capacitor banks only when the Reactive Power required by the Load increases.

Low Load and CT Failure Recognition

The icon on the Controller display  indicates that the current absorbed by the load is very low, or that there is no load or that in any case no absorbed current is detected (e.g. CT fault, interruption of the cable from the secondary of the CT)

Pre-insertion and pre-disconnection indication

If the Load Power Factor is less with respect to the set threshold, the pre-insertion LED lights up and if the period for which this condition persists exceeds the setting the insertion delay time, the necessary power factor correction capacitor banks are inserted; if the Load Power Factor is higher than the Limit threshold, the pre-Disconnection light turns on and if the period for which this condition persists exceeds the setting value of the Switch off delay, the relative capacitor banks are disconnected; if the Power Factor is greater than the set threshold and less than the Limit threshold, the capacitive banks inserted remain active.

Recognition of incorrect installation

It is possible to detect the incorrect installation of the CT or the incorrect voltage sampling (see Par 5.) if a negative Power Factor value is displayed on the display; the latter condition can also occur in the case of capacitive load.

- **7. DISPOSAL**

Do not dispose of electrical or electronic equipment in household waste.

For proper disposal, contact the local center for collection / recycling / reuse, or handling of hazardous waste, and act in accordance with local laws.

The following symbols on the product indicate:

The treatment of waste from electrical and electronic equipment must take place at appropriate local collection centers that comply with local laws.

TELEGROUP capacitors are made without PCBs,in compliance with decre en.216 of 24.05.88.Capacitors not in use and out of service must be disposed of according to the local laws and regulations in force in each country and in accordance with the European Directives.The capacitors must be disposed of in compliance with the European Waste Identification Code(CER2002).

- **8. USE OF THE DEVICE**
  - **a. Intended use**

Any use of the equipment of parts different from that described above must be considered an incorrect or improper use of the same.

The use of products / materials other than those specified by the Manufacturer, which may cause damage to the product and dangerous situations for the user, is considered incorrect or improper.

Power factor correction of three-phase, symmetrical and balanced electrical systems, with voltages and currents (almost sinusoidal, therefore with a very modest content of harmonious currents and voltages OR with a high content of currents and harmonic voltages) and with a correct short-circuit coordination between the network Electrical and the Equipment

For the choice of the most suitable type of equipment for your system contact Telegroup TECHNICAL ASSISTANCE. S.r.l ..

The Equipment must be used correctly in order to ensure the initial degree of safety.

After use, at the end of its life, the equipment must be disposed of, taking into account the laws, of the place, which regulate the disposal of this type of waste.

- **b. Contraindications of use**

The equipment must not be used for purposes other than those shown in this manual;

□ In an explosive, corrosive or high concentration of combustible dust orgas;

□ In a flammable atmosphere;

□ Exposed to the weather;

□ With safety devices excluded or not working;

9. MAINTENANCE

a. Ordinary and extraordinarymainten ance Premise

The information in this paragraph is given in compliance with CEI EN 61439-1 prf. 6.2.2.

Maintenance and repair must be carried out by SPECIALIZED personnel and "TRAINED PERSONS". Maintenance and repair that are not carried out properly can be a source of serious danger to the user.

Before starting maintenance and repair operations, carefully read the instructions in this Technical Manual to avoid damage to people, pets and property.

Regular maintenance ensures the equipment level of safety and perfect initial operation.

Operator safety

It is essential that the persons in charge of maintenance are professionally qualified and follow normal safety procedures.

Incorrect maintenance can cause damage to persons or property, for which the manufacturer can not be held responsible.

The automatic rephasing device is equipped with an operating element, so it is necessary to disconnect all the capacitor batteries before disconnecting the panel from the mains.

WARNING! Before accessing the appliance, wait at least three minutes after having disconnected the voltage, then short-circuiting and grounding all the capacitors (CEI EN 60831-1 / prf.22 standard).

Avoid disconnecting a battery and re-insert it manually, in a shorter time than 30 s necessary for the discharge of the capacitors

Maintenance notes

The standardization of the components and the circuit part, as well as the rational arrangement of the elements used, facilitate at any time the operations of maintenance and control of the efficiency of the panel.

Automatic power factor correction equipment is designed and implemented with the aim of minimizing maintenance interventions, however it is necessary to carry out some periodic checks every year:

□ check the tightening of the screws of all power connections (operation to be carried out also during commissioning).

□ check the efficiency of the ventilation system. It is advisable to use a heater and blow hot air on the control thermostats: at a temperature of about 35 ° C the fans must become operative, then at about 50 ° C, the interruption of the auxiliary circuits that determine the block must be detected of the rephaser. Wait for the protections to cool down for a few minutes and check for normaloperation.

□ check the integrity of the protections (fuses,etc.).

□ clean the ventilation ducts of the panel. In the rephasing units with external protection class IP 40 - 54, clean or replace thefilters.

□ clean the panel from dust or other, taking particular care of all those components that could create insulation problems (busbar supports, capacitor plates,etc.).

□ check the absence of condensation on the livecomponents.

□ check the integrity of the insulation relative to the power and auxiliarycables.

□ ascertain the correct functioning of the electronic regulator, by performing the manual insertion of the batteries and checking the closing of the contactors corresponding to the individual outputs. Return the regulator to Automatic mode and make sure that the inductive LED lights up and the appropriate batteries are inserted at regular intervals when inductive loads (motors, transformers, discharge lamps, etc.) are present. Make sure that the controller calibration does not determine a "rolling" condition (repeated switching on / off of thebatteries).

□ check that the discharge resistors mounted on the individual capacitors are not interrupted orburned.

□ check that the condenser overpressure devices have notintervened.

□ control the current absorption of the individual drawers, by performing the measurement on each of the three phases, recording the values and comparing them with the nominal ones. In case of variation greater than 20% check each individual capacitor and replace it if out of service. We recommend consulting the Ns. Technical Office if the currents absorbed by the single groups exceed, due to the network harmonics, the nominalvalues.

It is good practice to note on a "MAINTENANCE CARD" any actions taken with the DATE of execution and relative observations.

□ check the efficiency of the pre-insertion resistors mounted on the single contactors (if present). If interruptions are found, it will be necessary to replace the entire contactor since the operation in the absence of resistances, causes a deterioration on the corresponding powercontacts.

□ check the status of the electrical contacts of the contactors, in order to avoid damage to the capacitors as a result of the operation of contactors with completely worn contacts. Traces of soot in the screw housing or near the output terminals (power cables) indicate wear. Pay particular attention to the contactors of batteries 1 and 2, as they are more susceptible to on / off. Never work on the contacts with abrasivematerials.

□ removing the power contacts from their housing (eg contactor replacement), mark them and reassemble them in exactly the sameposition.

□ check that there is no oxidation and / or corrosion of the components, in particular of rawcopper.

□ check that there are no deformations in the insulation of the power cables, caused by excessively high working temperatures, in particular on the output poles of the blocking inductances and on the connections of the fuse bases.

□ check the condition of surfaces: painting or othertreatments.

Before proceeding, in the search for the fault that determines the total or partial non-functioning, remember to check that the connections, related to the wiring of the current circuit and power, have been performed as we indicated.

In fact, by not respecting the phase of the voltage and / or of the current, the apparatus does not work properly and can even stop after a certain period of apparently regular function

a) Replacing thefuses.

• Before replacing a power fuse or auxiliary fuse remove the causes that caused theevent.

• Replace them with types congruent with theoriginal

b) replacement ofcontactors.

• The contactors have a useful life of around 100,000 operations and must therefore be replaced after reaching this number. If you are not able to evaluate the number of maneuvers reached, you must periodically inspect the contacts and take the necessarymeasures.

• Replace them with types that are completely congruent with theoriginals.

c) Replacing thecapacitors

The capacitors must be replaced, with others of the same SERIES, whenever the following anomalies are found:

□ Loss ofliquid.

□ Case throatraised.

□ Absorbed fundamental current of less than 20% of the rated voltage at the ratedvoltage.

Perform accurate maintenance whenever the equipment is subject to unusual and unpredictable phenomena.
(EgIntervention of fuses, accidental bumps, exceptional presence of powders orliquids).

b. Assistance

For questions and / or problems, call the After Sales assistance office at one of the following telephone numbers, asking for a technical representative:

Tel.055-8071267

Tel.055-8071118

Or send an email to the following address:

service@telegroup.it Please keep the following information

at hand:

• Model number and serialnumber

• Date of the Fault or theProblem

• Symptoms of the failure orproblem

• Customer contact information

For more information, visit our website www.telegroup.it

10. EMERGENCY SITUATIONS

To switch off the equipment quickly, use the circuit breaker located on the distribution board never the main switch-off of the power factor correction equipment.

In the event of a fire in the environment where the appliance is installed, do not use water or any means that could compromise the integrity of the appliance (such as dust extinguishers).

In case of fire of the appliance the use of water is strictly prohibited.