

QSR4

ELECTRONIC POWER FACTOR REGULATOR (4 controlled bank)

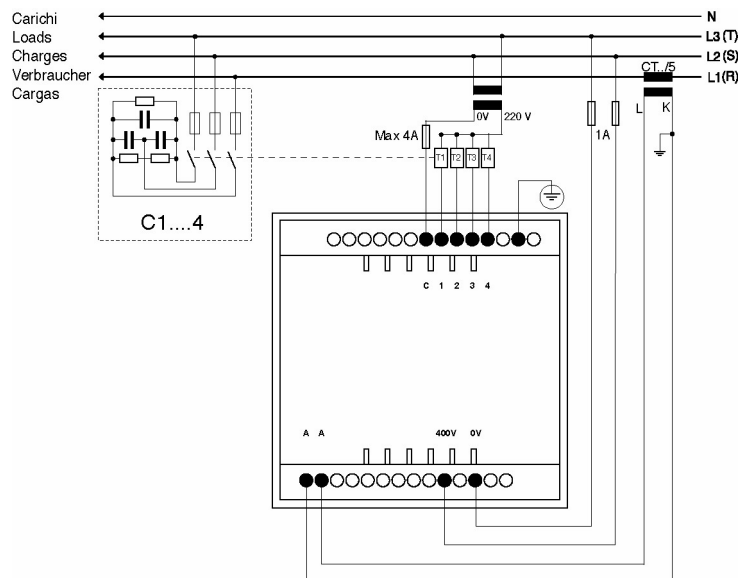
User Manual MU 03.15.mmm rev.1
Cod. COMAR 381021

Products are selected to correspond to the mains power supply (options available listed in technical specifications later in this manual)

General characteristics:

- *Large three digit display offers comfortable viewing and ease of operation.*
- *Specialist measuring system works even when the current is distorted by the presence Harmonics.*
- *Microprocessor controlled switching of up to four banks of capacitors to reach the target P.F.*
- *Auto-diagnosis system process's the information about the condition of the network and protects the capacitors from peak voltages and extending their life.*
- *The regulator is able to detect automatically the correct phasing of the C.T., it is not necessary to ensure correct polarity connection as with many other Power factor regulators.*

Pinout diagram



Warning

To ensure correct operation of this electronic P.F. regulator and correct functioning of its internal self test routine, the regulator must be earthed. The guarantee does not cover problems arising from an incorrect earth connection.

Powering on

When power is switched on, an internal self test routine is performed. The display shows the type of regulator and then displays the installed s/w version.

Digital display

It is possible to read the value of P.F. and the working banks on the digital display. Normally the regulator indicates the value of P.F., to read the working banks it is necessary to press simultaneously the "+" and "-" buttons; the working banks are indicated with vertical lines adjacent to the ON and OFF legends.

If a power loss occurs, the digital display returns to read the value of P.F.

To return to the P.F. on the display press simultaneously the "+" and "-" buttons.

AUTOMATIC working

This is the standard condition when switching on the regulator. When the network is inductive (motors, transformers, fluorescent lamps, etc), the led "Ind" is on and the regulator begins to connect capacitor banks. If too many capacitor banks are connected, the led "Cap" will be on and the regulator will begin to switch off banks. The preset PF value will be achieved when both led's "Ind" and "Cap" are off.

MANUAL working

Press the button "SETUP".

When the regulator is in the manual mode the red Led on the button will be on. In manual mode, the regulator will not operate without a manual input (both inductive and capacitive Led's are off). By pressing either the "+" or "-" buttons all banks will be connected or disconnected one step at a time. Each button must be pressed for at least 25 secs. When a power loss occurs, all capacitor banks will be switched off automatically. When the power returns, the regulator will again insert all required banks step by step.

SETTINGS ON REGULATOR

After making the required connections to the regulator, the following adjustments should be made.

Note: In the presence of alarms, the setting mode is disabled.

- **C/K setting**

By pressing the "SETUP" button for 4 secs in AUTOMATIC mode, the "SETTING MODE" will be entered. The red led "Ind" and "Cap" will illuminate and, at the same time, a number will appear in the digital display. Release the "SETUP" button and use the "+" or "-" buttons to change the selection. The suggested value to set is given on the table "C/K VALUES" (see table on the next page).

C/K		C = First bank power expressed in kvar (400V)									
		2,5	5	6	10	12,5	20	25	40	50	
T.A.	K										
50/5	10	0,25	0,50	0,50	1,00		-	-	-	-	
60/5	12	0,25	0,50	0,50	1,00	1,00	-	-	-	-	
80/5	16	0,15	0,33	0,33	0,50	1,00	-	-	-	-	
100/5	20	0,15	0,25	0,33	0,50	0,50	1,00	-	-	-	
150/5	30	0,08	0,15	0,25	0,33	0,50	0,50	1,00	-	-	
200/5	40	0,06	0,15	0,15	0,25	0,33	0,50	0,50	1,00	-	
250/5	50	0,05	0,10	0,15	0,25	0,25	0,50	0,50	1,00	1,00	
300/5	60	0,05	0,08	0,10	0,15	0,25	0,33	0,50	0,50	1,00	
400/5	80	0,05	0,06	0,08	0,15	0,15	0,25	0,33	0,50	0,50	
500/5	100	0,05	0,05	0,06	0,10	0,15	0,25	0,25	0,50	0,50	
600/5	120	0,05	0,05	0,05	0,08	0,10	0,15	0,25	0,33	0,50	
800/5	160	0,05	0,05	0,05	0,06	0,08	0,15	0,15	0,25	0,33	
1000/5	200	0,05	0,05	0,05	0,05	0,06	0,10	0,15	0,25	0,25	
1200/5	240	0,05	0,05	0,05	0,05	0,05	0,08	0,10	0,15	0,25	
1500/5	300	0,05	0,05	0,05	0,05	0,05	0,06	0,08	0,15	0,15	
2000/5	400	0,05	0,05	0,05	0,05	0,05	0,05	0,06	0,10	0,10	

- When using the regulator on 220/240 Vac networks the C/K values should be doubled.
- "-" means installation of C.T. with primary value too small.

- **PF setting**

After setting the C/K value, press the "SETUP" button again for 4 secs to indicate the selected PF required. At the same the red led's "Ind" and "Cap" will illuminate. Release the "SETUP" button and use the "+" or "-" buttons to change the selection. A P.F. of 0.95 is recommended.

- **SAVING THE SET VALUES**

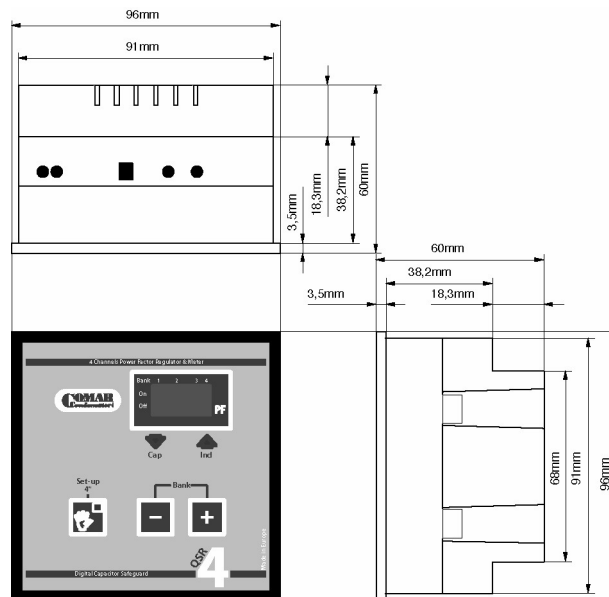
By pressing the "SETUP" button again the C/K, P.F. values which have been selected will be saved and the Regulator works in AUTOMATIC condition.

Note – It is not necessary to set the rated frequency, the Power Factor Regulator auto-set the mains value.

ALARMS

REFERENCE	CONDITION	DISPLAY INDICATIONS	SITUATION
No supply voltage	$V < 200$ volt	Display off	All outputs off
Low P.F. value in the network	All banks connected $PF = IND$ for 15 '.	Ind blinking	All outputs on
Low voltage	$V < 0,9 U_n$ per 10 sec.	LoU blinking	Quick switch off for all outputs
High voltage	$V > 1,1 U_n$ per 10 sec.	HiU blinking	Quick switch off for all outputs
Zero Current	$A < 50$ mA RMS for 10 seconds	A=0 blinking	Quick switch off for all outputs (Automatic working only)
Low Current	$A < 350$ mA RMS for 10 seconds	LOA blinking	Inhibit output switch on
High current	$A > 5.5A$ RMS for 10 seconds	HIA blinking	---
Leading P.F. value	$-0,20 < PF < 0,20$ for 10 seconds	CAP blinking	Quick switch off for all outputs
Power loss	$V < 200$ volt for 200 ms	Writing GA4 or pinpoint blinking	Switch off all outputs and start again
Manual forced banks	Manual working selected by the operator	Manual-button LED illuminated	No auto control of the banks and all banks will be manually connected or disconnected

Mechanical dimensions:



Technical specifications

Rated supply voltage	380-415 Vac $\pm 10\%$ 400 Vac $-10/+5\%$ continuous operation <i>220-240 Vac $\pm 10\%$ (on request)</i> 230 Vac $-10/+5\%$ continuous operation
Rated frequency	50Hz or 60Hz auto selection
Rated consumption	10 VA
Rated supply current	By means of CT secondary side 5A max., 1 st class - 5VA I min. = 500mA
Current circuit consumption	2VA
Current overload	6 A continuous
Controlled banks	4
Output relays	5° at 250Vac resistive load
Max current on relays common circuit	5A at 250Vac resistive load
Bank connection strategy	Automatic optimisation of bank insertion with on line diagnosis for capacitor safety, or manual
Switching steps delay	25" (other on request)
P.F. setting	+0,90 lag / -0,90 lead
Operating range	Power Factor 0,20 ÷ 1,00 lag / lead
Digital display	Three digit display
Measurement – information	Main $\cos\phi$ (0,20 ... 1,00) Phase status IND or CAP Inserted banks Manual mode LED Alarm messages Reference $\cos\phi$ (working point) Reference C/K
Keyboard	Film-protected, tactile feeling keys. Manual with light
Accuracy	On the P.F. regulation range $\pm 2\%$ f.s. at 25 °C and 2,5 A
Connection	With terminal fixing screws, cable of 2,5 mm ² c.s.a.
Mechanical dimensions	96x96 mm FRONT (according to DIN43700) 60 mm. DEPTH
Cut out dimension	92x92 mm. (tolerance +1 / -0 mm.)
Mechanical fixing	With the special accessories supplied
Plastic case	Insulating self-extinguishing material
Weight	~350 gr.
Protection degree	IP54 front panel - IP20 terminal board
Working temperature	0 to +55 °C
Storage temperature	-20 °C to +55 °C
Relative humidity	<90% at 20°C non-condensing
Type of service	Indoor service, no dusty condition. Do not place directly under sun light.

Reference standard	
Safety	IEC 1010 440V CAT III
EMC	EN50082-1, EN50082-2, EN50011, EN50022
Protection degree	CEI-EN 605.29