

Power Factor Controller
RISH PFC 08L

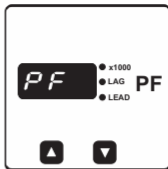
Operation Manual

Installation & Operating Instructions

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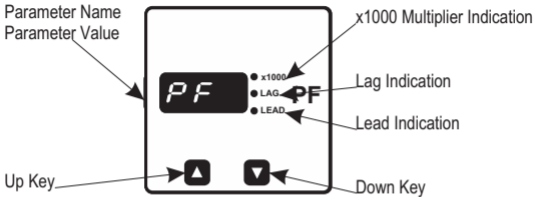
1. Introduction

The Power Factor Controller is a modern control device of innovative design with auto bank detection function. It is designed for a measuring voltage of 80 to 300 Vac. Display of Power Factor with Auto Detection Function makes ease of operation.



Main Features:

- 4/6/8 switching outputs.
- Autoinitialisation function for Minimum settings
CT ratio is optional
Bank kVAr detection
Phase correction angle detection
Number of bank detection
- Various bank kVAr input method
Programmable individual bank kVAr value,
Auto detection of bank value,
1- 9 standard control series.
- Fault detection for Under Voltage, Over Voltage and Under Current.
- Capacitor bank protection by switching off capacitor bank for faults.
- Manual relay test mode
- Ultra bright LED Display.
- Compact size of 96 x 96 with low back depth.
- Adaptable to 144 x 144 panel cutout by use of adapter plate.
- Onsite Programmable PFC parameters



Display is ultra bright 3 Digit LED display with power factor value with lead and Lag indication.

2 . Measurement Reading Screen

"PF" on the screen indicates Power Factor parameter.

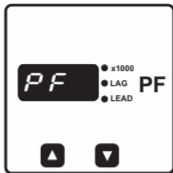
"0.98" inductive on the screen indicates Power Factor value.

Lag LED glows when power factor is inductive.

Lead LED glows when power factor is capacitive.

Lead / Lag LED is also used for target power factor programming
x1000 LED glow when CT primary multiplier is 1000 in setup screen

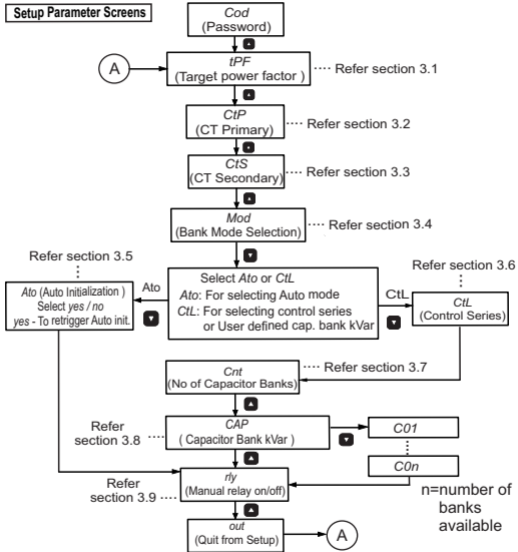
Keys are used for navigation through menu and for changing parameter values.



Fault Messages displayed on screen:

1. "uU" - Under Voltage.
2. "oU" - Over Voltage.
3. "uC" - Under Current.
4. "uCC" - Under Compensation Capacitor.
5. "oCC" - Over Compensation Capacitor.







Setup Parameter Screens



3. Setup Screen

Upon pressing both Up and Down keys simultaneously for 3 sec "Cod" screen is displayed. Entering of correct code scrolls all programmable parameters. Key function which common to all parameters are explained below


Editing of digits (Setting value)

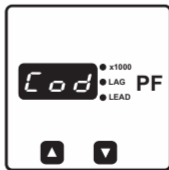
Upon display of setup parameter label pressing  key enter into setup and present value is shown. Pressing  key the Most significant digit (first digit from left) starts blinking, pressing  key increases in digit value pressing  key confirms digit and move to next digit editing till 3rd digit. After all three digits programmed as desired pressing  key results in confirmation of value and display shows "SET", Pressing  key scroll to next parameter.

In some of cases instead of digits label option need to be set



Code (Password)

The Screen shown is used for authentication purpose. Pressing of  key allows user to enter password here. correct password results in setup parameter editing else PFC will show "Err" message and exit to the measurement screen. default code is 000. and cannot be changed.







3.1 Target power factor Setting

The Screen followed by label tPF is target power factor setting. once required PF value to set then LAG or LEAD PF can be set on LEDs' Range for power factor is 0.8 Lead to 0.8 Lag. Default value is 0.99 Inductive




3.2 CT Primary Setting

The Screen shown further is used to set CT Primary. Pressing the  Key will enter into CT Primary Setup. Pressing the  key select for x1000 Multiplier selection. Pressing the  will change the decimal position. Annunciation of "x1000" indicates the value in Kilo. Pressing the  will select the decimal point position and multiplier now CT Primary Value can be edited The range of CT Primary is 1A to 9.99 kA. Default is 5.00 A.




Undercurrent fault value are set with respect to CT primary.

The value of 1 kA is as shown in the screen

if valid value set then, pressing  to move forward for CT Secondary Setting.



3.3 CT Secondary Setting

The Screen shown further is used to set CT secondary. pressing  Key enter into CT secondary Setup.


For editing the value press  key.

pressing  will scroll between 1A

or 5A and Set value using  Key.

The possible values are 1A or 5A.


The default value is 5 A.


use  key for moving to next parameter



3.4 Capacitor Bank Selection Mode:


The Screen displays "Mod" followed by its mode "Ato" or "Ctl" .

Pressing the  will enter to edit capacitor bank selection mode.

Pressing  will scroll between "Ato" and "Ctl" mode.

to set value press  key.

After pressing the  will display "Set" Message.

Now press  to move forward for next setting depending upon the mode selected.

Control Mode(CtL) : User can select capacitor bank from control series option.If "Ctl" selected Auto Initialization menu (Section 3.5) is skipped .


Auto Mode(Ato) : If Auto Selection mode is selected the values detected in Auto Initialization are used for PF Correction .If "Ato" selected Control series menu ,Number of banks Menu, Capacitor bank value Menu is skipped.

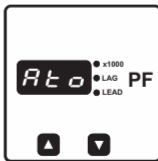


3.5 Auto Initialization Setting:

The Screen displays "Ato" followed by Yes or No. Default is Yes.

Pressing the  will enter to edit value.

Pressing  will change to No if previously it was set as Yes or vice-versa. After Setting Yes Auto Initialization will be performed.



At start of Auto Initialization display shows "Ato"

1. Auto Init enables detection of phase correction angle between voltage and current , number of capacitor bank and capacitor bank kVAr connected. Auto option will become "No" automatically once auto initialization is completed successfully.
2. For successful auto init voltage should be healthy, otherwise Auto Init will be terminated and display shows "InP" and test is aborted.
3. For detection of phase correction angle the power factor should be in range of 0.6 Lag to 0.99 Lag. if detected successfully then display shows angle on screen.
4. Load conditions are stable and No error detected then average of three attempts of capacitor bank kVAr values is calculated by switching capacitor bank one after other. and three attempts are made to get capacitor bank kVAr values.

during capacitor switching the attempt number with bank position is shown followed by capacitor kVAr value measured."A-P" indicates Auto Init Pass and "A-F" indicates Auto Init Fail

5. During Auto init Screen displays "Ato" followed by "diS" at power on Auto Init will be started after Discharge time delay. if auto int fails due to some reason then after predefined time or at each Power On it will be re attempted. here shown various screens during auto init. depending on state



*Auto init
function started*



*Auto fail
attempt1*



*Auto angle
detection failed*



*Attempt1
of capacitor1
for kVAr*



*Auto Init
Successful*



*Phase corr.
Angle detected*



*Blinking Ato
Phase Corre.
angle detection
in process*




*Auto Init
Failed*

3.6 Control Series Setting:

This Setting is for selecting capacitor bank values in control series mode

The Screen displays "Ctl" followed by previously set Control Series Value.

Pressing the  will enter to edit value of control Series.

The range of control series setting is "1 to 9"

and "u". selecting value from 1 to 9 select

control series which represents ratio of capacitor banks with respect to first bank. selecting "u" select user defined capacitor bank values which represents actual kVAR value (not ratio)

select value using  key and for setting the value press the  Key.

The Control Series are as given below:

1. Control Series 1: {1,1,1,1,1,1,1,1}

2. Control Series 2: {1,2,2,2,2,2,2,2}

3. Control Series 3: {1,2,3,3,3,3,3,3}

4. Control Series 4: {1,2,3,4,4,4,4,4}

5. Control Series 5: {1,2,4,4,4,4,4,4}

6. Control Series 6: {1,2,3,6,6,6,6,6}

7. Control Series 7: {1,2,4,4,4,4,4,4}

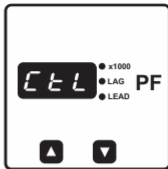
8. Control Series 8: {1,2,4,8,8,8,8,8}

9. Control Series 9: {1,1,2,4,8,8,8,8}

Default control series Number is 1.

and default C1 value is 25 kVAR.

Default capacitor bank value for 'U' is 25 kVAR for all capacitor banks



Selecting 1 will show as above.




Selecting u will show as above.




Note: If control series 1 to 9 is selected then device will accept only C01 value. if "u" is selected then all capacitor bank values need to be entered

The Control Series Selection will act as an Multiplier for the Capacitor Banks. Selecting the Control Series 1 will select multiplier {1,1,1,1,1,1,1,1} for Capacitor Bank 1 to 8 depending on number of outputs.


After Setting the Series Press  key to move to Number of Banks Selection.

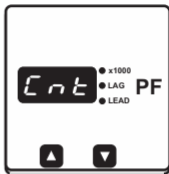
3.7 Number of Banks Setting:

The Screen displays "Cnt" followed by previously set Number of Banks count. Pressing the  will enter to edit number of capacitor banks count. The range of setting is depending on orderd instrument or previously detected in auto init function. Maximum value is 8.

Select value using  key and for Setting the same press the  key. This screen is not shown if auto mode is selected. After Setting the Number of banks count ,Press  key to move to capacitor bank kvar Value Setting.

3.8 Capacitor Bank kvar Value Selection:


The Screen displays "CAP". Pressing the  key will enter to edit kvar value of capacitor bank. The Screen will display "C01" followed by its kvar value. the range of value is 1 to 250. if control series is 1 to 9 then only C01 screen shown and next capacitor bank screens not shown. For control series U all bank screen C01...C0n are shown and value can be set as per bank count set previously. Sideby is screen for bank 1 with 25 kvar value.



if CtL as bank mode (1 - 9), the value entered in C01 will be set as the multiplicand for Capacitor Banks.




Example: The value set in Control Series is 3 - {1,2,3,3,3,3,3,3} and C01 is 2 kVAR then the Bank values will become C01(Bank1) = 2kVAR x 1 = 2 kVAR, C02(Bank2) = 2kVAR x 2 = 4 kVAR, C03(Bank3) = 2kVAR x 3 = 6 kVAR and so on.


if CtL as "u" the value entered in C01 will be the Capacitor Bank value. The value entered in CXX will be the value for respective Capacitor Bank.

After setting the values for number of selected banks pressing the  will move forward to manual relay on-off function.

3.9 Manual relay On - Off

The screen display "rLY".

pressing key  shows relay number corresponding to capacitor. press  key shows relay current state. pressing  key on state screen enables relay to switched ON or OFF depending on current state relay state.

scroll to next capacitor using  key.

Sideby screens shown are possible in relay test mode



Relay
off



Relay
on





Relay is
blocked
in logic and
off



Relay is
blocked
in logic and
on

3.10 Quit

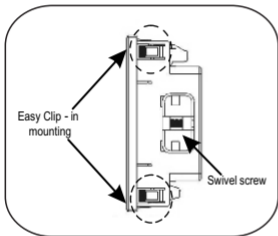
The screen will display "out".
for quitting the programming menu
press  key. else to reprogram the PFC
press  key the meter will scroll back
to first display screen.



4. Installation

Mounting of PFC is featured with easy "Clip-in" mounting. Push the instrument in panel slot (size 92 x92 mm), it will click fit into panel with the four integral retention clips on two sides of instrument.

If required Additional support is provided with swivel screws (optional) as shown in figure.



As the front of the enclosure conforms to IP 50, additional protection to the panel may be obtained by the use of an optional panel gasket. The terminals at the rear of the product should be protected from liquids.

The PFC should be mounted in a reasonably stable ambient temperature and where the operating temperature is within the specification. Vibration should be kept to a minimum and the product should not be mounted where it will be subjected to excessive direct sunlight.

Caution

1. In the interest of safety and functionality this product must be installed by a qualified engineer, abiding by any local regulations.
2. Voltages dangerous to human life are present at some of the terminal connections of this unit. Ensure that all supplies are de-energised before attempting any connection disconnection.
3. These products do not have internal fuses therefore external fuses must be used to ensure safety under fault conditions.

4.1 EMC Installation Requirements

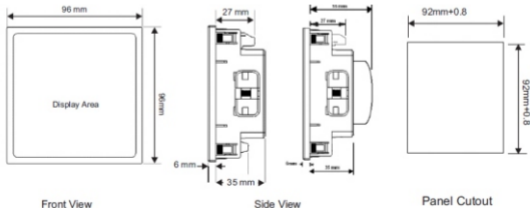
This product has been designed to meet the certification of the EU directives when installed to a good code of practice for EMC in industrial environments, e.g.

1. Screened output and low signal input leads or have provision for fitting RF suppression components, such as ferrite absorbers, line filters etc., in the event that RF fields cause problems.

Note: It is good practice to install sensitive electronic instruments that are performing critical functions, in EMC enclosures that protect against electrical interference which could cause a disturbance in function.

2. Avoid routing leads alongside cables and products that are, or could be, a source of interference.
3. To protect the product against permanent damage, surge transients must be limited to 2kV pk. It is good EMC practice to suppress differential surges to 2kV at the source. The unit has been designed to automatically recover in the event of a high level of transients. In extreme circumstances it may be necessary to temporarily disconnect the auxiliary supply for a period of greater than 5 seconds to restore correct operation.
4. ESD precautions must be taken at all times when handling this product.

4.2 Case Dimensions and Panel Cut Out



Side View

Front View

Panel Cutout

4.3 Wiring

Input connections are made directly to screw-type terminals with indirect wire pressure. Numbering is clearly marked on the connector. Choice of cable should meet local regulations. Terminal for inputs will accept up to 4mm^2 (12 AWG) or 2.5mm^2 (12AWG) Standard

Note : 1) It is recommended to use wire with lug for connection with instrument.

- 2) For disconnecting the device a switch or circuit-breaker shall be included at the site and shall be within easy reach of the operator. The specification are as below.
For aux. = At least 1.2 times of applied Power supply.

For Measuring Input = At least 1.2 times of applied measuring inputs.

4.4 Auxiliary Supply

PFC should ideally be powered from a dedicated supply, however it may be powered from the signal source, provided the source remains within the limits of the chosen auxiliary voltage.

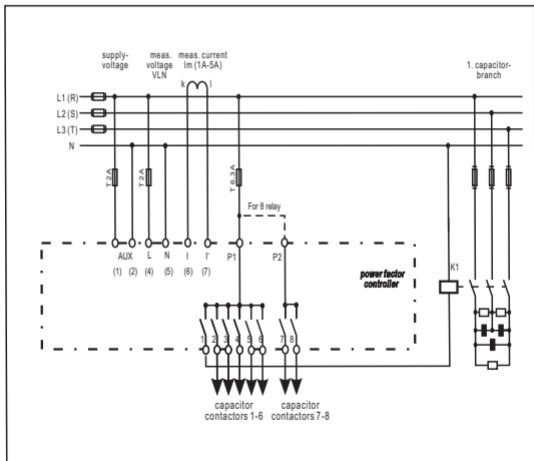
4.5 Fusing

It is recommended that measuring voltage and capacitor contactor voltage to be taken from same phase with proper fusing.

4.6 Earth/Ground Connections

For safety reasons, panels and accessories should be grounded in accordance with relative electrical and safety standards.

5. Connection Diagram



6. Specifications :

Feature:

Display
Parameter Displayed

3 Digit 7 Segment Display(14mm digit height)
Power Factor

Technical Data:

Weight
Case

0.25Kg.
Panel Mounted Instrument
96 x 96 x 35 mm
(Back Depth 55mm with Add on Module)
(Cut Out 92+0.8 x 92+0.8 mm)

Ambient Conditions

Over Voltage Class
Pollution Degree
Operating Temperature
Storage Temperature
Sensitivity to EMC
Safety Guidelines
Mounting Position
Humidity Class
High voltage test

III
2
0..+55 °C
-20...+65 °C
IEC61326-1:2010
IEC61010-1:2010
Flush Mounting
15%...95% Non Condensing
2.5 kV AC , 50 Hz for 1 minute between all
all electrical circuits

Protection Class:

Front Plate
Back Plate

IP50 as per IEC60529
IP20 as per IEC60529

Operation:

Auxiliary Supply Voltage
Auxiliary Supply Frequency
Auxiliary VA burden
Target cos phi

80 Vac - 300 Vac
50 Hz
< 8 VA Approx. (With 8 Relay on)
0.8 Lag...0.8 Lead programmable

Switching ON and OFF	10 secs
Discharge Time	60 secs
Control Modes	Self Optimized Intelligent Control Mode

Measurement:

Voltage Range	80....300 Vac , 240 V Nominal
Fundamental Frequency	50 Hz
Input voltage burden	< 0.15 VA Approx.
Current (CT)	X/1,X/5 onsite programmable
Minimum measuring current	10 mA
Maximum Current	6A (sinusoidal)
Input Current burden	< 0.2 VA Approx.
Power Factor Accuracy	$\pm 2^\circ$

Switching Outputs:

Number of Outputs	4 or 6 steps (without add-on module) 8 steps with add-on module
Switching Voltage Power	Max. 250 Vac / 1000W

Alarm Indication:

Under Voltage	Trip Value	85% of VLn
	Trip Delay	5 Sec
	Hysteresis	3%
	Bank Tripping	Yes
Over Voltage	Trip Value	110% of VLn
	Trip Delay	5 Sec
	Hysteresis	2%
	Bank Tripping	Yes
Under Current	Trip Value	1% of CT Primary
	Trip Delay	5 Sec
	Hysteresis	2%
	Bank Tripping	Yes

The Information contained in these installation instructions is for use only by installers trained to make electrical power installations and is intended to describe the correct method of installation for this product. However, Manufacturer has no control over the field condition which influence product installation.

It is the user's responsibility to determine the suitability of the installation method in the user's field conditions. Manufacturer only obligations are those in Manufacturer standard Conditions of Sale for this product and in no case will Manufacturer be liable for any other Incidental, indirect or consequential damages arising from the use or misuse of the products.
