

Model- KM-PFR-S-9-04 / KM-PFR-S-9-08 / KM-PFR-S-9-12

FEATURES :

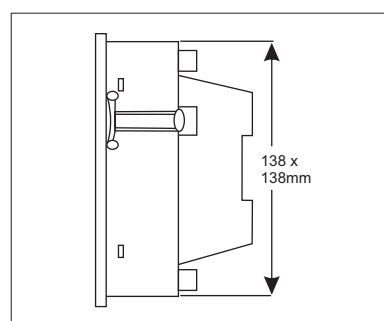
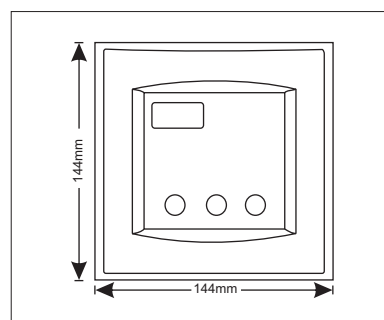
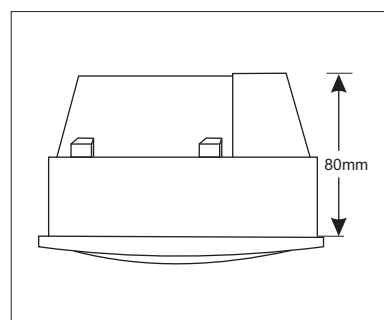
- **Display :** Power Factor
Line Voltage Input
Load Current
- Precise compensation of Reactive Power with automatic calculation of C / K..
- KVAR based Power Factor Controller
- User friendly menu for simple setting of various Parameters.
- High sensitivity, operates even at 50 mA current signal.
- Over Voltage & Low Voltage protection.
- Automatic & Manual operation
- Stores setting Data even if there is a power failure.
- Standard DIN Size 144 mm x 144 mm for easy installation in control panels.



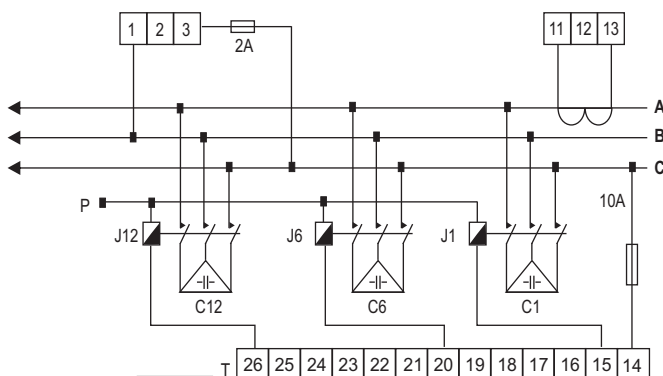
TECHNICAL DATA :

- **Rated Volatage :** AC 440 V 50Hz / 60Hz (L-L).
- **Rated Current :** AC 50 mA ~ 5A 50Hz / 60Hz
- **Output Relay Rating :** AC 220 V ; 8 A ; 50 Hz
- **Display Power Factor :** Lag 0.001 ~ Lead 0.001
- **Measure Power :** 0 - 9999 KVAR
- **Low-Voltage Protection :** 300 V (L - L)
- **Ambient Temperature :** 20°C ~ 50° C
- **Protection Class :** Ip40
- **Model :** KM-PFR-S-04 : 4 step
KM-PFR-S-08 : 8 steps
KM-PFR-S-12 : 12 steps

DIMENSION



CONNECTION DIAGRAM :



Note: All Specification are Subject to change without prior notice.



An ISO 9001:2008 Company

**REACTIVE POWER
AUTOCOMPENSATION CONTROLLER**

KM-PFR-S-9-04

KM-PFR-S-9-08

KM-PFR-S-9-012

USER MANUAL

1.GENERAL

KM-PFR-S-9 series Reactive Power Autocompensation Controller is used for the automatic regulation for capacitor compensation devices of low voltage distribution system (hereinafter referred to as controller). It makes the power factor reach user's preset state, to enhance the utilization efficiency of power transformer, reduce line loss and improve the voltage value of power supply, thereby to increase the economic benefit and social benefit.

2.FUNCTION CHARACTERISTICS

1. To calculate input-cut capacity of capacitor by reactive power, with high compensation precision.
2. High measuring precision for power factor, with wide display range.
3. Initial phase preset (software regulation synonymous end or current signal polarity).
4. With two types of control modes: power factor and reactive power.
5. Various control parameter can be adjusted through full digital display. visual and easy to use.
6. With two kinds of working modes: auto running and manual running.
7. With over voltage and under voltage protection functions.
8. With power down protection functions, data will not lose.

Low input impedance of current signal $\leq 0.01\Omega$.

3.OPERATING CONDITIONS

1. Altitude should not exceed 2500m.
2. Ambient temperature: $-25^{\circ}\text{C} \sim +50^{\circ}\text{C}$.
3. Air humidity should not exceed 50% at 40°C , and not exceed 90% at 20°C .
4. No corrosive gas, conductive dust and flammable medium around.
5. No fierce vibration in installation place.

4.technical data

- **Rated working voltage** : AC 440V /380V 50Hz / 60Hz (L-L)
- **Rated working current** : AC 60mA ~ 5A
- **Capacity of output contact** : AC 220V 7A 50Hz
- **Display power factor** : lag 0.001 - lead 0.001
- **Measure reactive power** : 0 ~ 9999Kvar
- **Under voltage protection value**: 340V
- **Control mode**: optimize automatically/ input disconnect circularly
- **Sensitivity**: 60mA
- **Protection grade**: shell IP40

5.CHARACTERISTICS OF WORKING MODES

At any moment control just can work under one working mode.

Characteristics of power factor control mode : The controller has been adjusted to power factor control mode before leaving factory. All parameters have been preset according to the reasonable mode. User just performs correct connection and it will work normally, no other operation is required.

Characteristics of reactive power control mode : can accurately control the input-cut and zero input-e vibration of capacitor groups. It is applied to all working environment especially the occasions with light load and large capacity.

6.Selection of power factor control mode and reactive power control mode

Selection of the working mode of controller is separated by the different taken value of PA - 4 parameter. If user adjusts the parameter within (1-12), it shows that controller works under power factor mode, the value of data means the number of output loop of controller. If user adjusts the parameter with (50-5000), it shows that under reactive power control mode, the value of data means the transformation ratio of total current transformer of user system.

Note: Under reactive power control mode. before using the controller, user must input the transformation ratio of actual current and all parameters such as capacity of capacitor for the controller.

7. Display contents of each menu under different working mode

Working mode	Power factor	Reactive power	Manual running
Reactive power control mode	Display power factor	Display reactive power	Display power factor
Power factor control mode	Display power factor	Display "A u to"	Display power factor

8.DEBUGGING

Warning: During the process of debugging, user must comply with the following steps to debug, in which the items with ☆ marked are the operation steps for controller working under reactive power control mode.

1. Assemble the compensation device according to the requirements of connecting diagram and check carefully for one time to eliminate the mistakes that may bring serious potential safety hazard.
 2. Switch on the compensation device, the controller will enter into auto running state.
 - ☆3. Input the transformation ratio of current transformer of on site signal. Please see menu operation.
 - ☆4. Input the capacity of capacitor groups of each branch circuit. Please see menu operation.
 5. Operate Menu key and the indicator light of manual running shines, as one method for debugging compensation device, manual running can check whether the connection is correct or not. Operating increasing key will input one capacitor group and operating decreasing key will cut one capacitor group.
- Note:** The output terminal, the corresponding capacitor value of which is zero, can't be performed with input-cut action. The above operation can be performed without current signal.
6. To make the controller automatically input-cut capacitor groups, besides the user should set the menu to "power factor" or "reactive power", there also should be with the current signal lagging the voltage signal and the system voltage should not exceed the over voltage protection value and not lower than the under voltage protection value,.

9.PRESS KEY FUNCTIONS

Name	Symbol	Contents
Menu key		To choose main menu and submenu. Note: Press menu key for 3s to enter into parameter preset menu.
Increasing key		To increase data when presetting parameter, to input capacitor groups when for manual running
Decreasing key		To decrease data when presetting parameter, to cut capacitor groups when for manual running. Under "Power factor" menu: Power factor control mode displays secondary current I _a Ma Reactive power control mode displays primary current I _a Under "Reactive power" menu: Display voltage signal value V

10. MENU OPERATION

1. Steps for adjusting parameters under power factor control mode.

Choose the preset parameter	Parameter code	Code meaning	Parameter range	Parameter adjustment
Press "Menu" key for 3s to make indicator light of "Parameter preset" shine	P A - 1	Input threshold	0.70 ind-0.70cap	Press" △ "key parameters will increase.
Repress "Menu" key	P A - 2	P A - 6	1-250 S	
Repress" Menu" key	P A - 3	Over voltage preset	230-160V/380-500 V	Press"▽"key parameters will decrease.
Repress"Menu" key	P A - 4	Loop preset	1- 12Loops	
Repress"Menu" key	P A - 5	Cutting threshold	0.70 ind-0.70cap Note ④	
Press" △▽" key for 3s at the same time	P A - 6	Signal initial phase	0° OR 180° Note③	
Repress"Menu" key for 3s	Save the preset parameters and enter into auto running state.			

2. Steps for adjusting parameters under reactive power control mode

Choose the preset parameter	Parameter code	code meaning	Parameter range	Parameter adjustment
Press "Menu" key for 3s to make indicator light of "Parameter preset" shine	P A - 1	Target power factor	0.70ind-0.70cap	Press"△" key parameters will increase. Press"▽"key parameters will decrease.
Repress"Menu" key	P A - 2	Delay preset	1-250 S	
Repress"Menu" key	P A - 3	Over voltage.preset	230-260V/380-500V	
Repress"Menu" key	P A - 4	CT transformation ratio preset	50-5000 Note①	
Repress"Menu" key	C - 0 1	Capacitor capacity of number 1 loop	0-150.0Kvar Note②	
Repress"Menu" key	C - 0 2	Capacitor capacity of No. 2 loop	0-150.0Kvar Note②	
.....				
Repress"Menu" key	C - 12	Capacitor capacity of No. 12 loop	0-150.0Kva Note②	
Press"△▽" key for 3s at the same time	P A - 6	Signal initial phase	0° or 180° Note③	
Repress"Menu" key for 3s	Save the preset parameters and enter into auto running state.			

User should carefully read the following annotation contents, especially the black letter.

- Note:** 1. Under reactive power control mode, CT transformation ratio preset value is the numerator of transformation ratio of signal current transformer. If the transformation ratio of signal current transformer is 500/5A, the CT transformation ratio preset value is 500 other than 100.
2. Under reactive power control mode, the capacity parameter of the output loop that not connected to capacitor groups should be preset to "0", To the output loop with "0" preset capacity, the controller will not output signal control signal.
3. When the input voltage signal of controller and current signal are in the synonymous end state, user should adjust the parameter to "0". When they are not in the synonymous end state, user should adjust to "180". When the voltage signal and current signal sampling are correct and at the same time the controller hasn't input one set of capacitor group, the displayed power factor value is negative value. It can be judged that the voltage signal and current signal input to the controller are not in the synonymous end state. If the initial phase is "180", user should adjust it to "0". If it is "0", user should adjust it to "180". If one set of compensation device is finished installing, user should confirm whether the parameters are correct, otherwise it may cause the abnormal running for controller.
4. Under power factor control mode, cutting threshold parameter should exceed 0.02 of input threshold parameter. If user amends the cutting threshold parameter to the value less than +0.02, the input threshold value by mistake, parameter amendment procedure will automatically set the cutting threshold parameter to +0.05, the current input threshold parameter.

11.DISPLAY INSTRUCTION

Over voltage state : ☆ If the indicator light of current menu shines frequently, which means the controller is working under over voltage cutting state. System voltage value is displayed.

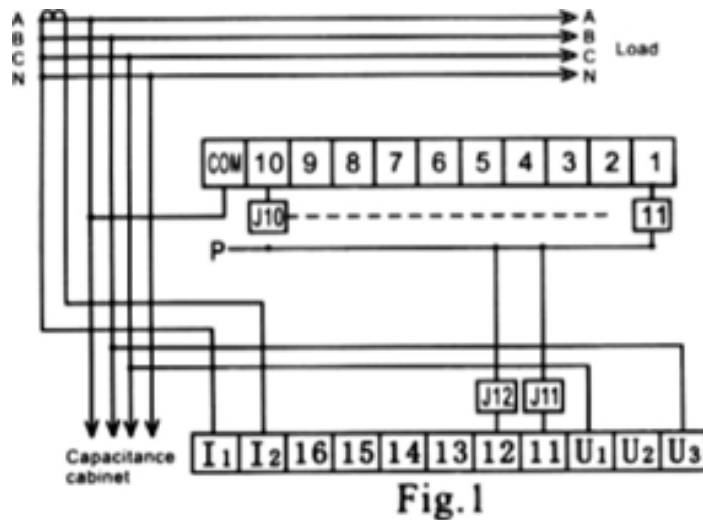
Cos φ value : ☆ If 0.985 displays, it means the current power factor is lagging 0.985. If -.985 displays, it means the current power factor leads 0.985.

Undercurrent state : ☆ C - - 0 display means undercurrent, the signal current is less than 60mA.

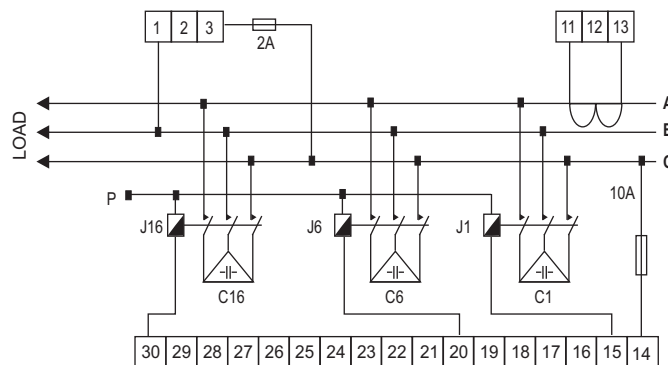
12.CONNECTING DIAGRAM

Connecting diagram (Power Supply 440V)

Tapping size : 113 x 113(mm)



Ub. Uc voltage signal input terminal
la In current signal input terminal
V Common terminal of control output terminal



KM-PFR-S-08 cutout

Dimension : 138x138mm

1,3 voltage signal input terminal

11, 13 In current signal input terminal

14 common terminal of control output terminal

If the contactor is 440V, connect P to B or C. If it is 220V, connect P to phase N.

13. FAILURE AND TROUBLESHOOTING

During installing and using the controller, some easily ignored connection mistakes may cause abnormal running of compensation device. Following are several items of frequent failure phenomenon and its methods of resolution.

1. Control head panel is input to running and the indicator light shines, but the AC contactor doesn't switch on. The phenomenon is caused due to the coils of AC contactor haven't got the power or the power is extremely low. User should check whether the type of AC contactor conforms to the drawing, and the insurance in good condition or not, as well as the power common terminal of AC contactor and the output common terminal of controller are connected to the same line and the connecting line has disconnection or not.
2. Power factor changes abnormally or no change along with the input of capacitor. The former phenomenon was caused as the incorrect sampling of voltage or current signal. User should chiefly check signal sampling. The latter was caused due to the wrong position of signal current transformer, user must cover the current transformer to the place. the output of which can reflect the change of total load current. (Such as the bus bar of general cabinet)
3. General display of controller: C - 0 phenomenon shows that the signal current input into the controller is too small (less than 60mA) or caused by no current. User should calculate whether the transformation ratio of current transformer is reasonable. Current signal loop has disconnection or connected to other meters in serial or parallel or not.
4. One or several groups of capacitors never input (when input, but indicator light doesn't shine), the phenomenon only happens under reactive power control mode. Generally user haven't preset the capacity of capacitor or the preset data is too big when amending parameters, so user just preset the capacity of capacitor will be right.

5. The reactive power value that controller displays has great disparity with the actual value. Generally it is caused by the incorrect preset of the transformation ratio of current transformer. User should check the ratio of signal current transformer conform to the preset value or not.
6. The power factor value that controller displays has great disparity with the actual value. It may caused by the followings:
 - a. Inconrect voltage or current signal sampling.
 - b. Current signal exceeds 5.5A (Unreasonable choice of transformation ratio for current transformer).
7. The power factor value is always negative value when controller not inputting one group of capacitor groups. When user doesn't want to amend the initial phase. just exchange the current signal lines and connect.
8. Any problems that can't be solved personally, user can contact the local distributor or manufactory for technical consultation.

TEST CERTIFICATE

This Test Certificate that warranty the product has been inspected and Tested in accordance with the published specifications. The instrument has been calibrated by using equipment which has already been calibrated to standards traceable to national standards.

MODEL NO. _____

SERIAL NO. _____

DATE: _____

**ISO 9001
REGISTERED**



WARRANTY

Each "KUSAM-MECO" product is warranted to be free from defects in material and workmanship under normal use & service. The warranty period is one year(12 months) and begins from the date of despatch of goods. In case any defect occurs in functioning of the instrument, under proper use, within the warranty period, the same will be rectified by us free of charges, provided the to and fro freight charges are borne by you. This warranty extends only to the original buyer or end-user customer of a "KUSAM-MECO" authorized dealer. This warranty does not apply for damaged Ic's, fuses, disposable batteries, carrying case, test leads, or to any product which in "KUSAM-MECO's" opinion, has been misused, altered, neglected, contaminated or damaged by accident or abnormal conditions of operation or handling. "KUSAM-MECO" authorized dealer shall extend this warranty on new and unused products to end-user customers only but have no authority to extend a greater or different warranty on behalf of "KUSAM-MECO".

"KUSAM-MECO's" warranty obligation is limited, at option, free of charge repair, or replacement of a defective product which is returned to a "KUSAM-MECO" authorized service center within the warranty period.



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