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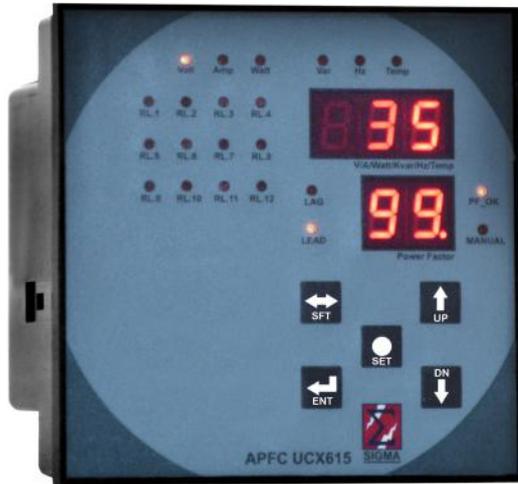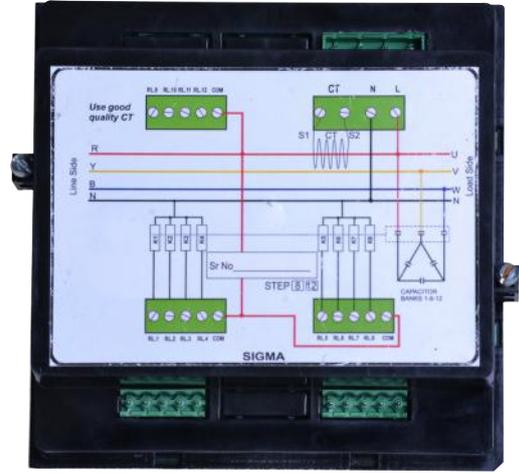**SIGMA** **SIGMA INDUSTRIAL CONTROL**

Automatic Power Factor Controller
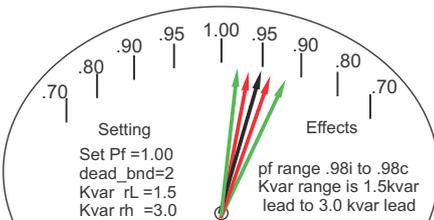

FRONT VIEW

SIDE VIEW
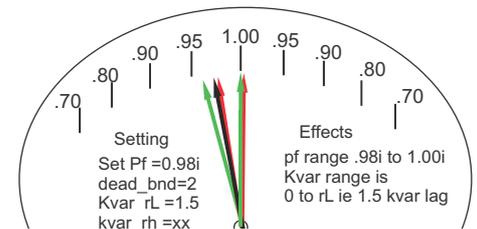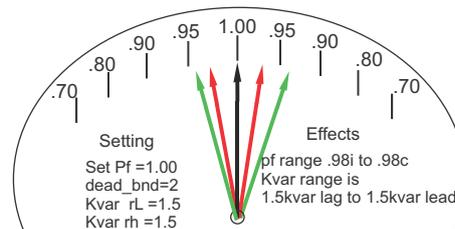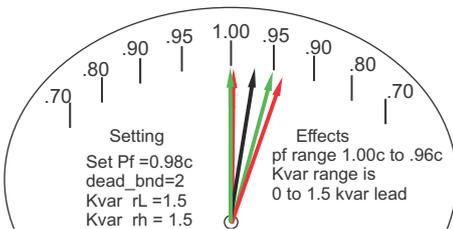

REAR VIEW

FEATURES

- Latest Micro Controller based Technology
- Two digit continuously display of PF i.e. Power Factor (70 pf as 70 , 99 pf as 99 and one pf as 1.0).
- Separate three digit window for 6 parameters, displayed one after other with LED indication as (**Volt, Amp, Kw, Kvar, Hz** and **Temp** i.e. inner temp of the controller). The inner temperature of the controller is limited to 50.0 degree celsius, if the temp inside the relay crosses this set limit, the **Temp** LED starts blinking and the relay comes into action and switches on the exhaust fan fitted in panel (optional).
- Other parameters are monitored to diagnose system under control i.e. how much load is running in the Phase on which the Controller is installed. Kvar gives us the exact rating of capacitor required for the system.
- To operate at Unity Power Factor, we aim to keep the Kvar reading near zero as much as possible so as to keep the Power Factor of the system near unity for less Kvah consumption.
- We can adjust the Kvar, below which the controller action is blocked and is best way to control the haunting phenomenon in controlling systems.
- We can also set the minimum value of Kw at which the APFC will switch off all the Banks one by one and remains in this condition until load remains below the set Kw to avoid haunting in power factor relays.
- For each relay out_put LED indicator is provided i.e. for **rly_1** to **rly_8** for 8 stages APFC and **rly_1** to **rly_12** for 12 stage APFC.
- **Lag** indicator is on when the overall load is inductive and **Lead** indicator is on when overall load is Capacitive.
- **PF_OK** LED is off only when present power factor is less than the set value and controller has to adjust the capacitor Banks.
- When **PF_OK** led is off along with **Lag**_Led on, the APFC has to switch on more capacitor banks in system.
- When **PF_OK** led is off along with **Lead**_Led_on, the the APFC has to switch off some banks from the system
- **Manual**_Led is for operating the APFC manually to check the working of Capacitor Panel in Factory after fabrication which is explained in programming procedure.
- Any parameter as **Amp, Volt, Kw, Kvar, Hz** and **Temp** can be displayed by using the **up** and **dn keys** and it can be shifted to right or left.
- Normally the Parameters are scrolling one after the other from left to right after every 6 seconds but when we use **up/dn** key , then displayed parameter remains on window for 60 seconds and after that scrolling gets back to the normal cycle i.e. 6 second.
- If knowingly or unknowingly we leave the relay in manual mode the relay will exit manual mode after 2 minutes of no action and during this time **PF_OK** LED will remain blinking.
- CT can be set in field by programming its ratio as explained in programming procedure i.e. 100/5 as=20 and 500/5 =100 and hence in this way we can set CT max. up to 1250/5 = 250.
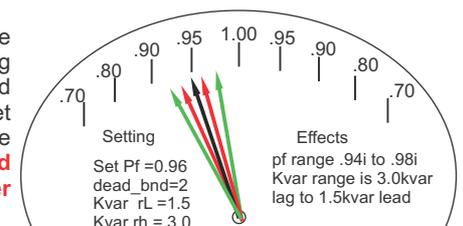
Programming:

For programming press the **SET** key until you get ' **Ct** ' in lower two digit with ' **t** ' blinking meaning that it is CT ratio Parameter which is to be set in upper three digit window. The value of parameter can be increased with the **UP_key** and can be decreased with **Dn_key** to the desired value. The programming parameters will appear on display with first digit blinking in lower 2 digit window.
The parameter will be displayed in sequence as shown in table below

Parameters	As displayed	Explanation
CT Ratio ↓	(Ct)	(ct) (10 for 50/5, 20 for 100/5, 40 for 200/5,and 100 for 500/5 and 200 for 1000/5 Current
Set power Factor ↓	(PF)	0.70(lag) - 1.00 - 0.70 (lead) lag to lead or lead to lag with set key
Set dead_band ↓	(db)	value may be 1-9
switch_on_time ↓	(tU)	00.1 Second to 250 Second Optional - 00.1 minute to 25.0 minute
switch_off_time ↓	(td)	00.1 Second to 250 Second Optional - 00.1 minute to 25.0 minute
Min Kw load for blocking ↓	(Ⴞ)	00.1 Kw to 25.0 Kw
Lower_limit_kvar for blocking ↓	(rL)	00.1 Kvar to 25.0 Kvar
Higher_limit_Kvar for blocking ↓	(rh)	00.1 Kvar to 25.0 Kvar

Setting
Set Pf =0.98c
dead_bnd=2
Kvar rL =1.5
Kvar rh = 1.5

Effects
pf range 1.00c to .96c
Kvar range is
0 to 1.5 kvar lead

Setting
Set Pf =1.00
dead_bnd=2
Kvar rL =1.5
Kvar rh =1.5

Effects
pf range .98i to .98c
Kvar range is
1.5kvar lag to 1.5kvar lead

Setting
Set Pf =0.98c
dead_bnd=2
Kvar rL =1.5
kvar rh =xx

Effects
pf range .98i to 1.00i
Kvar range is
0 to rL ie 1.5 kvar lag

Setting
Set Pf =1.00
dead_bnd=2
Kvar rL =1.5
Kvar rh =3.0

Effects
pf range .98i to .98c
Kvar range is 1.5kvar
lead to 3.0 kvar lead

Attention

Black needle shows actual Pf reading where as **green is** power factor **setting** after considering dead band which is = **set_PF + dead_band** and **set_PF - dead_band** . So green needle shows set lower value of **SET_PF** and other green needle show the upper set value of **SET_PF**. The **red two needles** show the **Set_lower** and **Set_higher** value of **Kvar.**

Setting
Set Pf =0.96
dead_bnd=2
Kvar rL =1.5
Kvar rh = 3.0

Effects
pf range .94i to .98i
Kvar range is 3.0kvar
lag to 1.5kvar lead

The above figures shows the possible setting of parameter to observe the APFC behavior

Any suggestion for better performance will be highly appreciated