User Manual

63PFC POWER FACTOR CONTROL RELAY

CELEC Enterprises

Other Product Range

- Power Factor Control Panels (1phase & 3phase)
- Static Power Factor Control Panel. (2phase & 3phase)
- Multifunction Power & Energy Analyzer. (1ø & 3ø) (with computer software) & Remote Display
- Maximum Demand Controller.
- Peak Load Controller.
- Digital Time Switches.
- Digital Panel Meters.
  Complete Range (144mm x 144mm)
  (96mm x 96mm)
  (96mm x 48mm)

Welcome to the world of Powerfactor correction systems from CELEC™ & thanks for purchasing CELEC™ product.

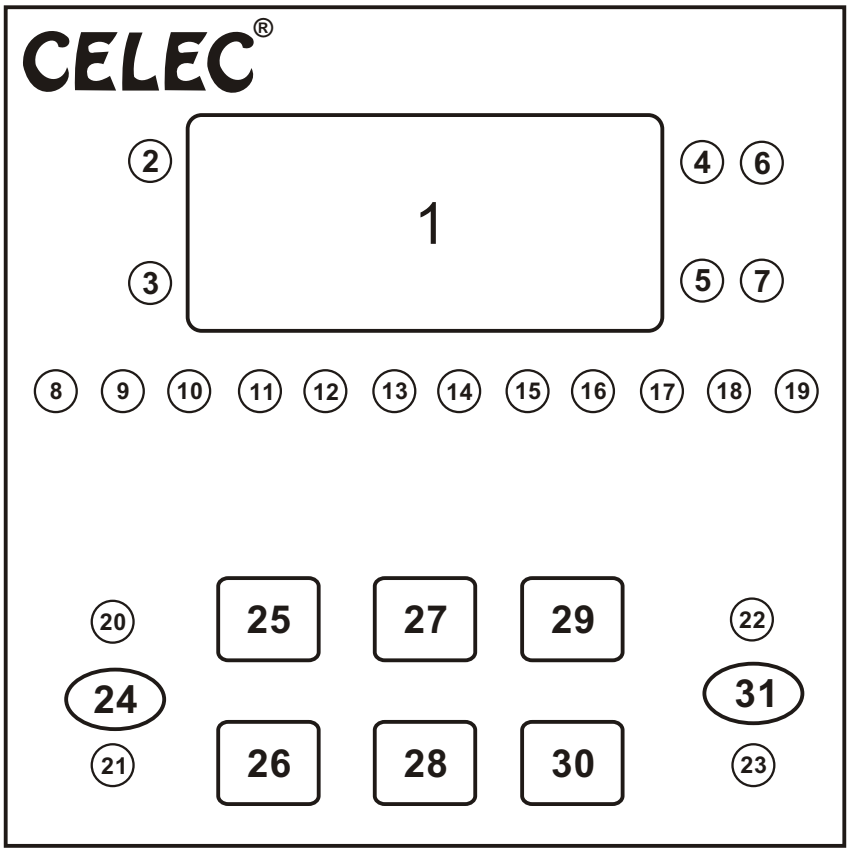
Contents :

1. Specifications

1. Voltage Input	350 to 460VAC (110V, 220V against Order)
2. Current Path	10mA to 5.00 Amp (Isolated) (1.00 Amp Against Order)
3. Frequency	45 to 65 Hz
4. Operating Temperature	-10 to 70°C
5. Display Size	1.00"
6. Stages	8,12
7. Target Power Factor Setting	0.90 lag to 0.90 lead
8. Switching Time Delay a) On delay b) Off delay	 1 to 60 seconds 1 to 60 seconds
9. Dead band	0.01 to 0.20
10. Ampere Sensitivity	1 to 20 Amp
11. Control Type	Binary / Intelligent
12. CT Ratio Programming	Available
13. Programming Lock	Available
14. Auto Scroll	Available
15. Manual Operation	Available
16. Display Parameters	PF, KW, Volt, Amp.
17. Relay Contacts	7 Amp 230VAC
18. Dimensions	144mm (W)x144mm(H)x 115mm(D)
19. Bezel/Panel Cut Out	140mmx140mm ± 1mm

Note : Specification may change due to continuous development.

2. Display & Indications



1. Bright Red, 1", 7 Segment 3digit Display.
2. Lead PF Indication.
3. LAG PF Indication.
4. PF Indication.
5. KW Indication.
6. Volt Indication.
7. Ampere Indication.

8 to 19. These Led's Indicate On Status of Contactors/Capacitors.

20. Auto Mode Indication.
21. Manual Mode Indication.
22. Auto Scroll Indication.
23. Program Blinking Indication.
24. Auto/Manual Select Key.
25. On/Off Delay Time key.
26. Set Function Keys (For Optimum Programming).
27. Target PF Program Key.
28. Dead Band Program Key.
29. Navigation Key Upward/Increase.
30. Navigation Key Downward/Decrease.
31. Program/Enter key.

3. Important Instructions (Must Read)

(i) Always Install CT On Phase With Maximum Load Current & Connect Rest of 2 Phase to 415VAC of Relay Through MCB (Max 6Amp.)

(ii) Install CT Before APFC Panel & Factory Load (As Shown in Wiring Diagram (at page no. 7)

(iii) Choose CT 2 to 3 times of Load Current & Program CT to Display Exact KW (Secondary CT 5Amp.)

(iv) Always Set Ampere Sensitivity to Avoid Hunting At Low Current.

(v) Pay Special Attention For The Size of CT Wire (2.5mm Copper Conductor Wire is Recommended).

(vi) Always Install Capacitors in Increasing Order Capacitor Ratio 1-2-4-6-10.....
Or ratio Should Not Increase 2-4-8-15.....

(vii) Install Branded Capacitors (Preferably Epcos, Square cap.)

(viii) Do Not Use Coil Voltage Of Contactors Above 240V.

(ix) Fix Capacitors On LT Side of Transformer For Transformer PF Compensation (If Energy Meter Installed On HT Line).

4. System Installation

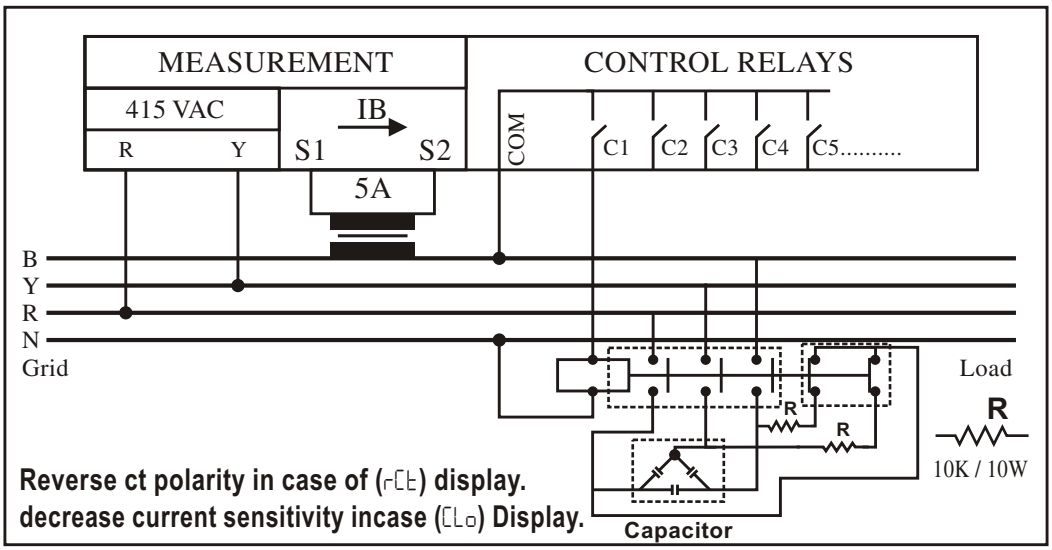
Appropriate Specifications must be followed while electrical installation, taking care following specifications.

a) Input voltage range 350V to 460V (250mA fuse).

b) Current transformer of 5 Amp. secondary (10A fuse)

c) Control circuit for 230V AC 5A. (use 5Amp. fuse / MCB externally).

4(a) Wiring Diagram



While using contactor always prefer to use contactor with 2 NC Auxiliary contacts, use 10K / 10W resistance for capacitor discharge circuit as shown in the diagram or use capacitor duty contactors.

Must read important instructions (at page no. 7)

4(b) Manual Test

AUTO MANUAL SWITCHING

This switch is used to select the mode of operation

(i) Auto mode : The capacitor switch ON/OFF is automatically related to power factor in order to control the power factor with in the specified range.

(ii) Manual mode : Controller is by passed and the user can select the capacitor by pressing navigation keys ▲ / ▼

4(c) System Protection

i) Always Install 6 Amp. MCB On Common.

ii) Always use proper fuse (15mm glass fuse)
- **Common - 5 Amp.**
- **415 VAC - 250 mA**
- **S1-S2/CT - 10Amp.**

iii) Do Not Use Coil Volt of Contactor Above 240Volt.

iv) Choose CT 2 to 3 times of Load Current (Secondary CT 5Amp.)

v) Always install indoor.

5 System Programming

5a) SYSTEM LOCK :

TO UNLOCK RELAY press DEADS BAND key, Display shows stored value of set Dead Band. Set Dead Band at 004 by pressing ▼ or ▲ key & Press ↵ Key. At 004 Dead Band relay is in unlock mode.

TO LOCK RELAY press DEADS BAND key, display shows stored value of set Dead Band. Set any Value of Dead Band Except 004 by pressing ▼ or ▲ key, Press ↵ Key. Now Relay in lock mode.

During lock mode the set values of PF, dead band, delay on, delay off, CT Ratio, Current sensitivity & Auto Scroll cannot be changed.

5b) SYSTEM RESET

Switch off the relay keep pressing ▲ key and switch on the relay, All default/factory parameters get stored auto-matcally.

5 System Programming

5c) DEFAULT/FACTORY SET PARAMETERS :

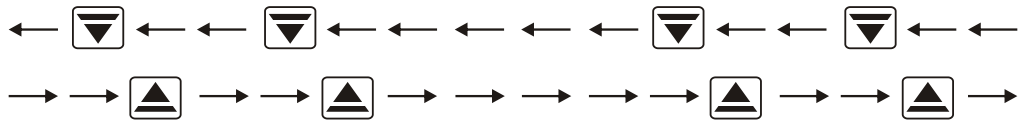
Target PF --	1.00 ((unity PF)
Dead band	005
On Time Delay	∩05
Off Time Delay	F05
sensitivity	005 amp.
CT Ratio -	500 / 5

5d) TO CHANGE TARGET POWER FACTOR :

Press SET PF key display show present value of target power factor to change value of PF press ▲ / ▼ key, To store press ↵ key.

.90.91.92.93.94.95.96.97.98.99 **100** .99.98.97.96.95.94.93.92.91.90

Lag. PF — UNITY PF — Lead PF



5e) TO CHANGE ON DELAY TIME :

Press ON/OFF DELAY Key display show default '∩' +stored value of On Delay Time to change press ▲ / ▼ key to store press ↵ key.

5f) TO CHANGE OFF DELAY TIME :

Press ON/OFF DELAY key two times display shows 'F' +stored value of OFF Delay Time to change press ▲ / ▼ key to store press ↵ key.

5g) TO CHANGE CT RATIO

Press ON/OFF DELAY & SET PF keys both a time. Display shows stored value of CT Ratio To change Press ▲ / ▼ key. To store press ↵ key.

5h) TO SET AMPERE (I) SENSITIVITY :

Press SET FUNC. & DEAD BAND keys both at a time Display shows stored ampere sensitivity to change press ▲ / ▼ key to store press ↵ key.

[Purpose of sensitivity is avoid hunting of first capacitor at low current

display shows 001 means 1Amp. 00.1 means 0.1Amp.
005 means 5Amp. 00.5 means 0.5Amp.

If user requires 1st capacitor (say 1KVAr) to be switched on at 3Amp. of current (I) then Set sensitivity at 003 to avoid hunting at low load.

5 System Programming

Recommended sensitivity at motor load.
For first capacitor of 1KVAr - 003 amp.
For first capacitor of 2KVAr - 005 amp.
For first capacitor of 3KVAr - 007 amp.
For first capacitor of 5KVAr - 010 amp.

5i) AUTO SCROLL :

Press ↵ key for 5 sec. to activate or deactivate auto scroll mode in system unlock.
Scroll LED indicates scroll in auto mode.

5j) TO SET DEAD BAND :

Press DEAD BAND key display shows stored dead band. To change dead band press ▲ / ▼ key. To store press ↵ key.

90.91.92.93.94.95.96.97.98.99 1.00 .99.98.97.96.95.94.93.92.91.90

dead band 004 dead band 004

Target PF

6. Trouble Shooting

Before Trouble Shooting, Always Reset System

FAULT	REMEDIES
1. Display shows 'rCt'	Reverse CT polarity, interchange S1 to S2
2. Display shows 'CLo'	a) Check CT 10 amp. fuse b) Check if load current is less than current sensitivity of relay.
3. Display shows lead PF but stages off	Check the wiring, as per wiring diagram. (See page no. 7)
4. Relay switches the capacitor On, but power factor does not improve.	a) Check if current of APFC panel & load current is passing out through CT. b) The capacitors are defective, the best way to find out is to measure the capacitor with capacitor meter. c) Current polarity of APFC panel through CT is reversed.
5. Relay doesn't hold	a) Increase the dead band setting, if problem persists even when the dead band setting is higher, it means that the size of capacitor is too large for load. The remedy is to change with the smaller one. b) check if capacitors are in increasing order.
6. Relay is dead	a) Check fuse 250mA on terminal block. b) Check Voltage at 415VAC terminal using multimeter (Do not check with a neon tester)
7. All capacitors on but relay shows lag PF (or below the desired PF)	At the extreme is the possibility the total installed KVAr is too low. Check if the capacitors are healthy, Remedy is to add capacitors.
8) Relay shows on status of capacitor but no contactor is on.	Check common fuse (5Amp).

8-HOW TO CHOOSE THE SIZE OF CAPACITOR PANEL IN KVAr

Running Power Factor cos Ø	0.80	0.82	0.85	0.88	0.90	0.92	0.94	0.96	0.98	1.00
0.30	2.43	2.48	2.56	2.64	2.70	2.75	2.82	2.89	2.98	3.18
0.32	2.21	2.26	2.34	2.42	2.48	2.53	2.60	2.67	2.76	2.96
0.34	2.02	2.07	2.15	2.23	2.28	2.34	2.41	2.48	2.56	2.77
0.36	1.84	1.89	1.97	2.05	2.10	2.17	2.23	2.30	2.39	2.59
0.38	1.68	1.73	1.81	1.89	1.95	2.01	2.07	2.14	2.23	2.43
0.40	1.54	1.59	1.67	1.75	1.81	1.87	1.93	2.00	2.09	2.29
0.42	1.41	1.49	1.54	1.62	1.68	1.73	1.80	1.87	1.96	2.16
0.44	1.29	1.34	1.42	1.50	1.56	1.61	1.68	1.75	1.84	2.04
0.46	1.18	1.23	1.31	1.39	1.45	1.50	1.57	1.64	1.73	1.93
0.48	1.08	1.13	1.21	1.29	1.34	1.40	1.47	1.54	1.62	1.83
0.50	0.98	1.03	1.11	1.19	1.25	1.31	1.37	1.45	1.63	1.73
0.52	0.89	0.94	1.02	1.10	1.16	1.22	1.28	1.35	1.44	1.64
0.54	0.81	0.86	0.94	1.02	1.07	1.13	1.20	1.27	1.36	1.56
0.56	0.73	0.78	0.86	0.94	1.00	1.05	1.12	1.19	1.28	1.48
0.58	0.65	0.70	0.78	0.86	0.92	0.98	1.04	1.11	1.20	1.40
0.60	0.58	0.63	0.71	0.79	0.85	0.91	0.97	1.04	1.13	1.33
0.61	0.55	0.60	0.68	0.76	0.81	0.87	0.94	1.01	1.10	1.30
0.62	0.52	0.57	0.65	0.73	0.78	0.84	0.91	0.99	1.06	1.27
0.63	0.48	0.53	0.61	0.69	0.75	0.81	0.87	0.94	1.03	1.23
0.64	0.45	0.50	0.58	0.66	0.72	0.77	0.84	0.91	1.00	1.20
0.65	0.42	0.47	0.55	0.63	0.68	0.74	0.81	0.88	0.97	1.17
0.66	0.39	0.44	0.52	0.60	0.65	0.71	0.78	0.85	0.94	1.14
0.67	0.36	0.41	0.49	0.57	0.63	0.98	0.75	0.82	0.90	1.11
0.68	0.33	0.38	0.46	0.54	0.59	0.65	0.72	0.79	0.88	1.08
0.69	0.30	0.35	0.43	0.51	0.56	0.62	0.69	0.76	0.85	1.05
0.70	0.27	0.32	0.40	0.48	0.54	0.59	0.66	0.73	0.82	1.02
0.71	0.24	0.29	0.37	0.45	0.51	0.57	0.63	0.70	0.79	0.99
0.72	0.21	0.26	0.34	0.42	0.48	0.54	0.60	0.67	0.76	0.96
0.73	0.19	0.24	0.32	0.40	0.45	0.51	0.58	0.65	0.73	0.94
0.74	0.16	0.21	0.29	0.37	0.42	0.48	0.55	0.62	0.71	0.91
0.75	0.13	0.18	0.26	0.34	0.40	0.46	0.52	0.59	0.68	0.88
0.76	0.11	0.16	0.24	0.32	0.37	0.43	0.50	0.57	0.65	0.86
0.77	0.08	0.13	0.21	0.29	0.34	0.40	0.47	0.54	0.63	0.83
0.78	0.05	0.10	0.18	0.26	0.32	0.38	0.44	0.51	0.60	0.80
0.79	0.03	0.08	0.16	0.24	0.29	0.35	0.42	0.49	0.57	0.78
0.80		0.05	0.13	0.21	0.27	0.32	0.39	0.46	0.55	0.75
0.81			0.10	0.18	0.24	0.30	0.36	0.43	0.52	0.72
0.82			0.08	0.16	0.21	0.27	0.34	0.41	0.49	0.70
0.83			0.05	0.13	0.19	0.25	0.31	0.38	0.47	0.67
0.84			0.03	0.11	0.16	0.22	0.29	0.36	0.44	0.65
0.85				0.08	0.14	0.19	0.26	0.33	0.42	0.62
0.86				0.05	0.11	0.17	0.23	0.30	0.39	0.59
0.87					0.08	0.14	0.21	0.28	0.36	0.57
0.88					0.06	0.11	0.18	0.25	0.34	0.54
0.89					0.03	0.09	0.15	0.22	0.31	0.51
0.90						0.06	0.12	0.19	0.26	0.48
0.91						0.03	0.10	0.17	0.25	0.46
0.92							0.07	0.14	0.22	0.43
0.93							0.04	0.11	0.19	0.40
0.94								0.07	0.16	0.36
0.95									0.13	0.33

Example :

Running Load (KW) ——— 50.00
Running PF ——— 0.75
Desired PF ——— 0.94
Multiply Factor From Table ——— 0.52
Already connected Capacitor (KVAr) — 5.00
Required Panel KVAr =
Connected Capacitor + (KW x Multiply factor)

Required Panel KVAr = 5+(50 x 0.52) = 31