

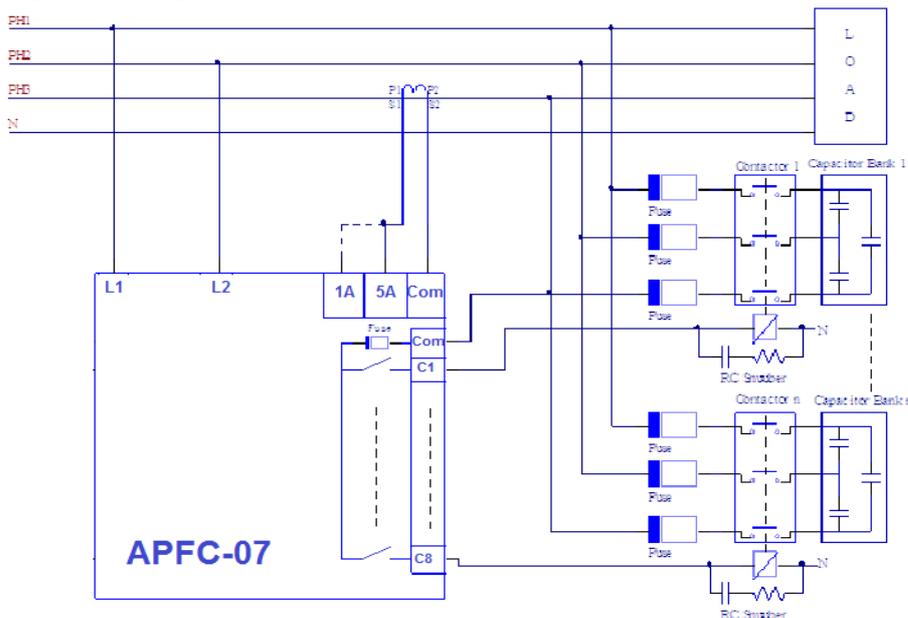


APFC-07/ (4/6/8)
Low-Cost , Single-CT,
Automatic Power Factor Controller
for Balanced Three-Phase
Reactive Power Compensation
User Operations Guidelines
 Revision Dated: 27th June 2017.

Features:

- Advanced, State-of-the-Art, 32-Bit Micro-Controller based Digital Signal processing logic for measurements and control, for Automatic Power Factor Control Operation.
- Voltage, Current 1% Accuracy and Reactive Power Measurement Accuracy is 2%.
- Advanced Power Factor Correction Algorithm.
- Single CT for Supply (Load) Current Feedback.
- Relay N.O. Contacts (potential-free) Outputs for Controlling External Capacitor-Duty Contactors, for control for 4, 6 or 8 Capacitor Banks, as per the ordered Model.
- Externally Replaceable Fuse Protection for the Relay Contacts.
- Designed for basically Balanced Three-Phase AC Loads and Balanced Three-Phase Capacitive Reactive Power Compensation.
- Large 7 Segments Digits, Custom LCD Display for easy & accurate PF Value indication, Alarm Conditions , Status Indications.
- LED Back-Light for the Custom LCD Display for improved readability in low light.
- Automatic, Timer Controlled, Shut-Off for LED Back-Light, for Power Saving.
- Flashing “OK” Indication on the LCD Display for Controller Active Status.
- 7-Keys Tactile Keypad for Manual Interactions for user operation & settings, etc.
- Rear Terminals Connections with Plastic Covers, suitable for Fork / “U” Type Lugs.
- DIN Standard 96 x 96 mm Plastic Cabinet for Panel-door flush-mounting.
- Splash Water-proof Front Panel of the Unit.

Typical Wiring Scheme:



Mechanical Dimensions: Standard 96mm X 96mm DIN standard.

Front Height: 96 mm

Front Width: 96 mm

Rear Depth behind the Panel Door: 65 mm

Recommended Panel Cut-out for instrument mounting: 92 mm x 92 mm

Maximum weight: (with clamps and terminals): Not exceeding 1 Kg. max.

Keyboard in Front:

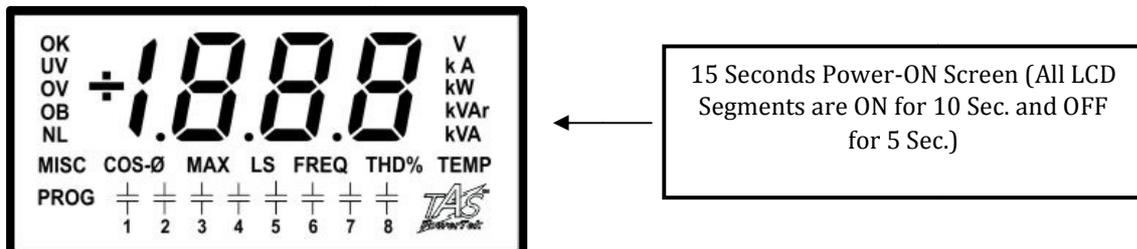


DISPLAY:

- Large 7 Segments Digits, Custom LCD Display for easy & accurate PF Value indication, Alarm Conditions, Status Indications.
- LED Back-Light for the Custom LCD Display for improved readability in low light.
- Automatic, Timer Controlled, Shut-Off for LED Back-Light for Power Saving.

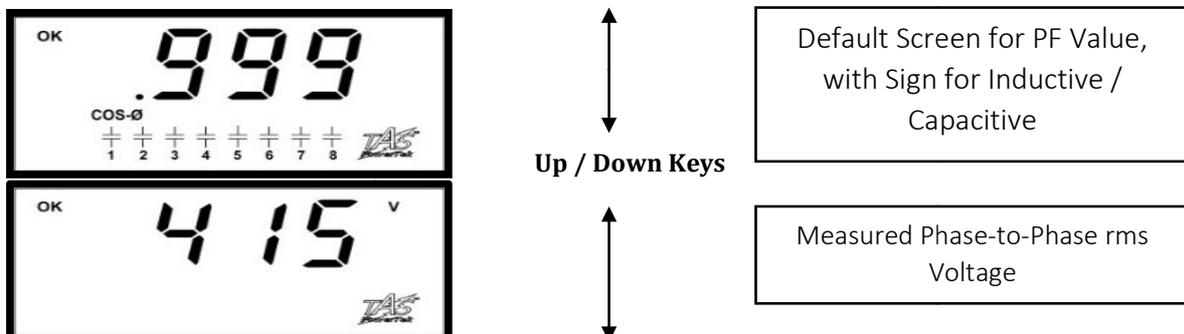
Contrast of LCD: Adjust the LCD Contrast 'Darker' by Left Shift Key & 'Lighter' by Right Shift Key. Press Memory / Save Key to save the contrast setting in to the Non-Volatile Memory.

Power-on LCD Display:



Display Parameters list:

Values of various parameters can be viewed by using UP/ DOWN keys in Auto & Misc mode .





Up / Down Keys

- Measured Phase Current in Amps (A) or kilo-Amps (kA)
- Power Factor in Measured-Phase, with Sign for Inductive / Capacitive
- kW (Three-Phase)
- kVAr (Three-Phase)
- KVA (Three-Phase)
- LINE FREQUENCY
- % VTHD Measured Phase
- % ITHD Measured Phase
- PF Controller Internal Temperature,
- This APFC Unit Firmware Version. This number can change according to product updates from time-to-time.

MODE Selection:

AUTO OPERATION is a factory default mode of operation.

Press Mode Key on default screen. Two Modes will get displayed on screen.

There are two modes of operation for selection,

- **MISC** – Here the Capacitor banks can be turned ON/OFF manually, Faulty Capacitor Banks can be reset & also the Capacitor banks can be declared faulty so that they are not utilized in Auto Mode of operation.
- **PROGRAM PARAMETERS** – In this mode System parameters can be edited & set.

By pressing “UP / DOWN” arrow keys, user can choose the MODE of operation. Press “ENTER” to enter the specific mode.

Auto Mode:

This is the automatic PF correction mode. In this mode, the Capacitor Bank Status indications are: ON, OFF, Discharging or Faulty. The ON state is indicated by keeping Capacitor Symbol and the associated Bank Number, both ON. The OFF state is indicated by keeping the Capacitor Symbol OFF, but the Bank Number ON, to indicate that the Bank is available for operation. Discharging Capacitor status is indicated by blinking of the capacitor bank symbol. A faulty Capacitor Bank is indicated as a Flashing Bank Number and the Capacitor Symbol in OFF state.

MISC Mode:

In MISC mode, there are two display screens: **i) Test (tSt) ii) Fault (FLt)**

i) Select MISC Mode on Mode screen by pressing ENTER key to display Test (tSt) screen.

Pressing ‘Enter’ key on the Test (tSt) screen will start blinking of the Digit Number (Bank No.) . Use ◀ ▶ keys to select the specific bank for turning it ON/OFF. By pressing “UP” or “DOWN” key, user can turn ON or OFF the Bank. After these operations, press ENTER key to stop digit blinking.

ii) In MISC Mode Test (Tst) screen, if no digit No. (Bank Number) is blinking & “DOWN” key is pressed then Fault (FLt) screen is displayed. In Fault (FLt) screen, the Faulty Banks can be reset or specific bank can be declared Faulty.

Resetting of Faulty Banks:

a) In Fault (FLt) screen, press ENTER key. The digit No.(Bank No.) will start blinking.

b) The OKAY Banks shall be indicated with ‘Capacitor Symbol’ & Faulty Bank status shall be indicated by ‘Blank’ location . Use ◀ ▶ keys to select the specific faulty bank indicated by ‘Blank’ location.

c) By Pressing ‘UP’ key, the ‘Capacitor Symbol’ meaning OKAY status will appear at the specific blank location indicated by blinking digit number.

d) By using ◀ ▶ keys & UP key, make the entire required faulty bank with Okay status, by display of capacitor symbol.

e) Stop the Digit Number (Bank No.) blinking by pressing enter key & Press ‘Memory’ key to save the Okay status of capacitor banks to confirm resetting of faulty banks.

Declaring Specific Bank as faulty:

a) In Fault (FLt) screen, press ENTER key. The digit No.(Bank No.) will start blinking.

b) The OKAY Banks shall be indicated with ‘Capacitor Symbol’ & Faulty Bank status shall be indicated by ‘Blank’ location . Use ◀ ▶ keys to select the specific capacitor bank to be declared faulty.

c) By Pressing ‘Down’ key, a ‘Blank Location’ (Capacitor symbol will disappear) meaning capacitor bank faulty status will appear at the location indicated by blinking digit number.

d) By using ◀ ▶ keys & DOWN key make all the required Capacitor bank with Okay status to faulty status by display of ‘Blank Location’ (Capacitor symbol will disappear).

e) Stop the Digit Number (Bank No.) blinking by pressing enter key & Press ‘Memory’ key to save the Faulty status of capacitor banks to confirm masking of specific capacitor banks in the auto mode.

Programmable Parameters: Min., Max. Ranges and factory default settings:

Programmable Parameters	Min.	Factory Default	Max.
Nominal Supply voltage value across Line to Line terminals.	110 V	415 V	480 V
Primary CT Current in Amps up to 1999 & in kilo-Amp after 1999.	1	1000	5.00 KA
Target Power Factor.	0.800	0.995	1.000
Target Power Factor Sign +Ve or -Ve. (-Ve value means leading target PF setting and +Ve value means lagging PF)	+Ve	+Ve	-Ve
PF Correction time in Seconds	10	60	600
Capacitor Bank Discharge Time in Seconds	60	60	600
Check Bank health	Disable	Disable	Enable
%Harmonic fault	Disable	Disable	Enable
%Harmonic fault Auto Reset Time in Second	180	180	1800
No. of steps connected, as per the Model Number (Factory Set)	1	Factory Settings	Factory Settings
Capacitor Bank kVAr values at supply nominal rated voltage and nominal rated frequency values.	1 kVAr	25 kVAr	255 kVAr

Fault Indications:

OK: Healthy Condition (No Fault). **UV:** Under Voltage. **OV:** Over Voltage. **OB:** Out of Banks.
NL: Low (Zero) Load Current.

Other Faults: These faults are displayed on seven segment digits as Er0 to Er9.
 The Errors **Er0**, **Er1** & **Er2** are the internal hardware related errors. (Try Unit re-setting to Factory Default)

Er3 to Er9 Errors are:

- Er3:** Voltage %THD of supply system exceeding limit.
- Er4:** Current %THD of supply system exceeding limit.
- Er5:** Under Load condition on supply system (in terms of kW) so that unit cannot compensate for PF.
- Er6:** Supply system over current loading sensed.
- Er7:** Supply system over frequency.
- Er8:** Supply system under frequency.
- Er9:** P.F. Controller Internal Temperature exceeding limit.

Fixed Settings for APFC-07 (cannot be changed):

Fixed Parameter	Default
No. of Banks connected(as per model selection)	4/6/8 Nos.
Over-Voltage limit (%)	115 %
Over-Voltage Resume limit (%)	110 %
Under-Voltage limit (%)	85
Under-Voltage Resume limit (%)	90
Over Current Limit (%) of Nominal Rating.	130
Over Current Resume (%) of Nominal Rating.	125
Under Load Current Limit (%) of Nominal	2
Under Load Current Resume (%) of Nominal	3
VTHD % Limit : for 50% to 100% KW loading	5 %
ITHD % Limit : for 50% to 100% KW loading	50 %
VTHD % Limit : for 25 % to 50% KW loading	7 %
ITHD % Limit : for 25% to 50% KW loading	75 %
VTHD % Limit : for 1 % to 25% KW loading	10 %
ITHD % Limit : for 1% to 25% KW loading	150 %
Under Frequency limit for 50 Hz Supply	47Hz
Over Frequency limit for 50 Hz Supply	53Hz
Under Frequency limit for 60 Hz Supply	57Hz
Over Frequency limit for 60 Hz Supply	63Hz
Over Temperature Limit in Deg. Celsius	+60
Over Temperature Resume in Deg. Celsius	+55



For other Details, Installation, Commissioning and Fault-Finding instructions, refer to the detailed User Manual of this product, which can be availed from **TAS PowerTek**, on request, or down-loaded it from our website : <http://www.taspowertek.com>

Note: The Product Features, Specifications etc. are subject to change, without any prior notice.
Document Revision Dated: **15th June 2017.**

To Learn in-depth on the subject, buy e-Book “Reactive Power Compensation on LV Supply”,
Author: Mr. Tushar P. Mogre, C.E.O., Director, **TAS PowerTek Pvt. Ltd.**,
Web link: <http://www.amazon.com/gp/aw/d/B00o7YLLYY>

TAS PowerTek Products Lines (visit our website for details):

1. APFC-07/xx - Low-Cost, Single-CT, Max. 8 Relay O/P Channels, 96 x 96 mm, LT APFC
2. APFC-03/xx - Low-Cost, Single-CT, Max. 16 Relay O/P Channels, 144 x 144 mm, LT APFC
3. TPFC-03/xx - Low-Cost, Single-CT, Max. 16 Transistor O/P Channels, 144 x 144 mm, LT APFC
4. SPF-56/xx - Three-CTs, Max. 16 Relay O/P Channels, with Data-Logging, 144 x 144 mm, LT APFC
5. TPF-56/xx - Three-CTs, Max. 16 Transistor O/P Channels, with Data-Logging, 144 x 144 mm, LT APFC
6. SPF-57/LTG - Six CTs, Max 8 Relay O/P Channels, with GPRS Connectivity, 144 x 144, LT APFC
7. SPF-57/HTG - Six CTs, Max 8 Relay O/P Channels, with GPRS Connectivity, 144 x 144, HT APFC
8. SPF-35/xx - Six-CTs, Max. 16 Relay O/P Channels, with Data-Logging, 144 x 144 mm, APFC
9. TPF-35/xx - Six-CTs, Max. 16 Transistor O/P Channels, with Data-Logging, 144 x 144 mm, APFC
10. HTPF-03/08 - Six-CTs, 8 Relay O/P Channels, with Data-Logging, 144 x 144 mm, HT APFC
11. HTPF-03/16 - Six-CTs, 16 Relay O/P Channels, with Data-Logging, 144 x 144 mm, HT APFC
12. Hand Held Unit (APFC DATA COMMUNICATOR)
13. Auto-Manual Controller (AMC) for APFC Units, Up to 8 Capacitor Banks
14. Capacitor-Duty Thyristor Switches - Fully Thyristorised (TSCI/TSCC) and Hybrid SCRs + Relays (Thy-Con)
15. Passive Harmonic Filters - De-tuned Inductors, Capacitors, T-Filters
16. Active Harmonic Filters with Reactive Power Compensation & Load Balancing, Custom Projects etc.
17. APFC Panels, Load Manager-cum-Data Logger LM-56, and SCADA Projects based on our LM-56.

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TAS Custom LCD Display at Power-Up, displaying all LCD Pixels / Segments / Symbols etc., with LED Back-Light in ON State:

