

User Manual

**AUTOMATIC
POWER FACTOR
CONTROLLER
APFC 440**

www.elmeasure.com



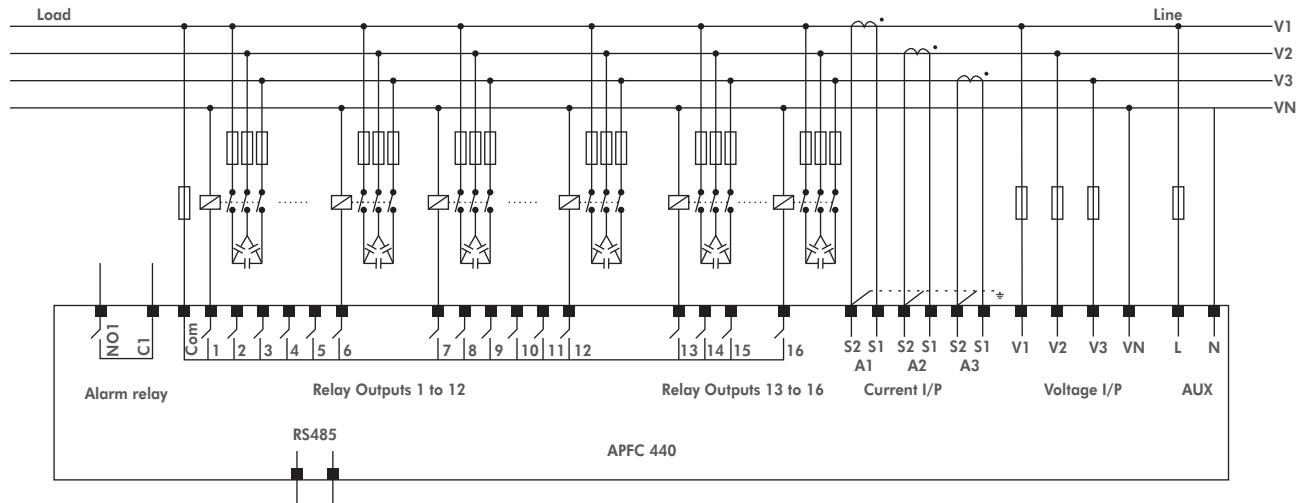
1. FEATURES

- True RMS Measurements.
- Simultaneous sampling of Voltage and Current.
- Accuracy class: class1 as per standard IEC 62053-21.
- Programmable CT/PT ratio.
- User programmable password protection.
- Star/Delta/1Phase programmable.
- 3Phase measurement.
- Programmable 3 phases or 1 CT option in the field.
- 8 or 12 or 16 Switching Relay Outputs
- Auto recognition of the CT phase. Auto Phase detection.
- Two Quadrant Operation
- Displays Basic, Power and Energy parameter.
- Capacitance based Power Factor correction to take care of variation in Voltage and Frequency.
- Programmable CT ratio makes it to suitable for any load.
- Intelligent Power Factor Controlling based on the capacitor bank switching history (No of Operations, ON Time) which

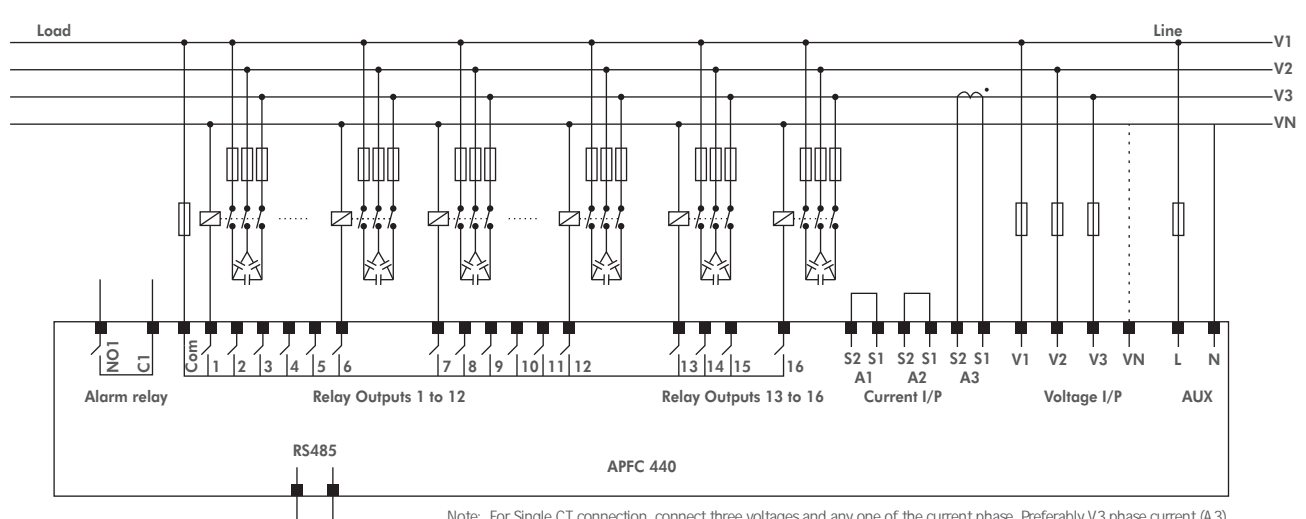
- improves the capacitor life time
- Minimum Sensing Current for Controlling Operation 250mA
- RS485 communication (optional).
- Programmable Alarm display Enable / Disable.
- Programmable Alarm levels based on the comfort level of the user.
- Storage of No. of switching and Life time of each capacitor.
- Monitoring of the individual capacitor power values
- Alarm/Fault Detection (Over Compensation, Under Compensation, Over Voltage, Over Current, Under Voltage, over harmonics Voltage and Current).
- Auto learning of capacitor value.
- Aux supply: 180V to 300VAC/DC

2. WIRING DIAGRAM

Star (3Phase 4 Wire):

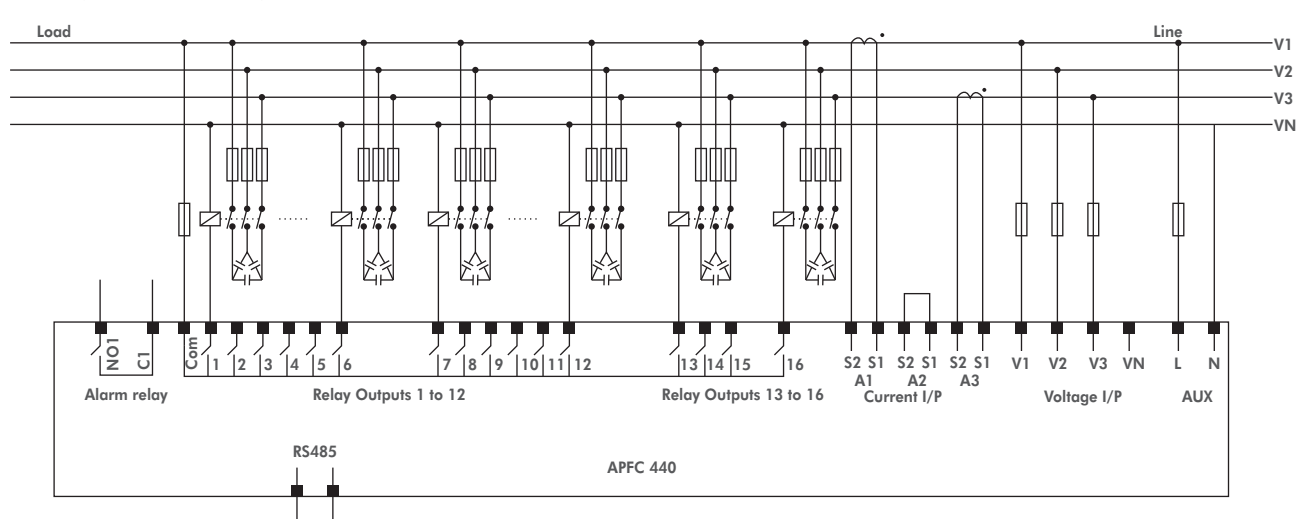


1CT Connection:



Note: For Single CT connection, connect three voltages and any one of the current phase. Preferably V3 phase current (A3).

Delta (3Phase 3 Wire):



⚠ Caution: S1 and S2 connection of CT should be proper. Reversal will trigger the alarm

3. KEY FUNCTIONS

Key	In SETUP (Programming) mode	In RUN (Measurement) mode
RIGHT	To select the value and to accept the value	To scroll Energy pages to look at different parameters
UP	To edit the value/system types and scroll through the parameters upwards.	To scroll Power pages to look at different parameters
DOWN	To edit the value/system types and scroll through the parameters downwards	To scroll Basic pages to look at different parameters
OPTIONS	NA	To scroll options

4. DISPLAY OF PARAMETERS

Display	Meaning
VLL with L1, L2, L3	Voltage Line to Line (L1-L2, L2-L3, L3-L1)
VLN with L1, L2, L3	Voltage Line to Neutral (L1-N, L2-N, L3-N)
A with L1, L2, L3	Phase current L1, L2, L3
VLN with THD & L1, L2, L3	Voltage THD phase-wise
A with THD & L1, L2, L3	Current THD phase-wise
W with L1, L2, L3	Active Power Phase wise
VA with L1, L2, L3	Apparent Power Phase wise
VAr with L1, L2, L3	Reactive Power Phase wise
PF with L1, L2, L3	Power Factor Phase wise
PF AU	Average Power factor

Wh	Active Energy
UAh	Apparent Energy
Ur.h.L	Reactive Energy - Inductive
Ur.h.C	Reactive Energy - Capacitive
Ld.Hr	Load Hours
Wh.O	Active Energy Old
UAh.O	Apparent Energy Old
Ur.h.O	Reactive Energy Inductive Old
Ur.h.O with Minus	Reactive Energy Capacitive Old
Ld.H.o	Load Hours Old

5. ENTERING CONFIGURATION | SETUP MODE

To configure the setup parameters through front panel keys, the following steps can be followed.

1	Press the UP & RIGHT keys together to enter the setup, display shows "SETU".
2	Press down key to enter the password, display shows 0000 with first digit "0" blinking
3	Press UP key to increment the first digit "1" If any password is already set, use UP and Down key to set the correct password. (Enter your password or leave it as default '1000' if it wasn't changed)
4	Press Right key to move second digit and or accept the password (If any password is already set, press UP and Down key to change the value then press Right key to accept the value.
5	Continue the same method for 3rd digit and 4th digit to entering in to the configuration mode
6	After entering the four digit password, on pressing RIGHT key, the device enters into Setup/Configure mode.
Note	If the provided password is incorrect display shows ELEM "StAr". But not possible to edit, Then press the Option key to come out. Again follow the same steps with correct password.

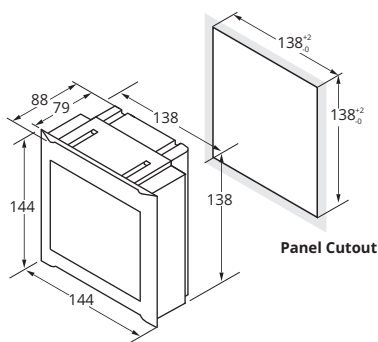
Step	Actions	Display Reads	Range/Options/Comments
1	Press down key	Row 1: ELEM Row 2: StAr	Defines the power system configuration Option : Star, delT,3U.1A
2	Press down key	Row 1: Pt.Pr Row 1: 415.0	PT Primary Range: 100.0 to 999.0K
3	Press down key	Row 1: Pt.SE Row 2: 415.0	PT Secondary Range:50.00 to 550.0
4	Press down key	Row 1: Ct.Pr Row 2:5.000	CT Primary Range:0.500 to 99.00K
5	Press down key	Row 1: Ct.SE Row 2:5.000	CT Secondary Range:0.500 to 6.000
6	Press down key	Row 1: VA.SE Row 2:VEC.H.	VA selection Option: VEC.H,VECt,Arit.
7	Press down key	Row 1: bAUd Row 2:9600	Baud rate Option : 9600, 4800, 19.20K, 38.40K
8	Press down key	Row 1:Par Row 2:EVEn	Parity Option : EVEn,no,Odd
9	Press down key	Row 1: dEU.l Row 2:1.000	Device ID Range:1.000 to 247.0
10	Press down key	Row 1: PASW Row 2: _ _ _ _	Password Range:1000 to 9999K
11	Press down key	Row 1:EnEr Row 2:rES0	Energy resolution Option : rESL, COUn
12	Press down key	Row 1: A.SUP Row 2:0.08	Starting current Range: 0.020 to 10% of Full scale
13	Press down key	Row 1:V.SUP Row 2:10.00	Starting Voltage Range:10 to 80V

14	Press down key	Row 1: UPd.t Row 2:1.00	Display update rate Range:1 to 5 sec
15	Press down key	Row 1: n.rLy Row 2: 16.00	No of relay selection Range:1 to 8/12/16
16	Press down key	Row 1:C.typ Row 2:Auto	Control type Option : Auto, Manual, Series Auto
17	Press down key	Row 1:C.SER Row 2:Auto	Control series Option : C.S.1 to C.S.21
18	Press down key	Row 1: PFLg Row 2:0.980	PF lag Range:0.800 to 0.999
19	Press down key	Row 1: PFLd Row 2:0.980	PF lead Range:0.800 to 0.999
20	Press down key	Row 1:CH.t Row 2:40.00	Capacitor Charging time Range:4 to 999.0 Sec
21	Press down key	Row 1: dSC.t Row 2:40.00	Capacitor Discharging time Range:4 to 999.0 Sec
22	Press down key	Row 1:dLy.t Row 2:60.00	Delay time Range:4 to 999.0 Sec
23	Press down key	Row 1:OU.V Row 2: 498.0	Over Voltage Range:48 to 999.0K
24	Press down key	Row 1: Un.V Row 2:48.00	Under Voltage Range:20 to 999.0K
24	Press down key	Row 1:OU.A Row 2:6.00	Over Amps Range:0.05 to 99.00K
25	Press down key	Row 1:Un.A Row 2:0.20	Under Amps Range:0.05 to 99.00K
26	Press down key	Row 1: O.HAr Row 2:200.00	Over Harmonics Range:1 to 200%
27	Press down key	Row 1: A.dly Row 2:3.00	Alarm on delay time Range:3 to 99sec
28	Press down key	Row 1: Unr.C Row 2:EnAb	Under compensation Option : Enable , disable
29	Press down key	Row 1: OUr.C Row 2:EnAb	Over compensation Option : Enable , disable
30	Press down key	Row 1: Unr.A Row 2:EnAb	Under Amps Option : Enable , disable
31	Press down key	Row 1: OUr.A Row 2:EnAb	Over Amps Option : Enable , disable
32	Press down key	Row 1:O.WAr Row 2:EnAb	Other Warning Option : Enable , disable
33	Press down key	Row 1:FSET Row 2:diSt	Frequency Selection Option : dist, norm
34	Press down key	Row 1: bAr.P Row 2:A	Bar graph Parameter Option : A, VA,Watt
35	Press down key	Row 1: SAUE "Y" Blinking	Use UP/DOWN key to change the option Y / N. Press RIGHT key to confirm

Control Series table

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16
C S1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
C S2	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
C S3	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2
C S4	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
C S5	1	1	1	1	2	2	2	2	3	3	3	3	3	3	3	3
C S6	1	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3
C S7	1	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3
C S8	1	2	3	3	3	3	4	4	4	4	4	4	4	4	4	4
C S9	1	2	3	4	4	4	4	4	4	4	4	4	4	4	4	4
C S10	1	2	4	4	4	4	4	4	4	4	4	4	4	4	4	4
C S11	1	2	3	4	4	8	8	8	8	8	8	8	8	8	8	8
C S12	1	2	4	8	8	8	8	8	8	8	8	8	8	8	8	8
C S13	1	1	1	1	2	2	2	2	4	4	4	4	8	8	8	8
C S14	1	1	1	1	4	4	4	4	4	4	4	4	8	8	8	8
C S15	1	2	4	4	4	4	4	4	4	4	4	4	8	8	8	8
C S16	1	1	2	2	2	2	4	4	4	4	8	8	8	8	8	8
C S17	1	1	1	1	1	1	6	6	6	6	6	6	8	8	8	8
C S18	1	2	4	4	4	4	8	8	8	8	8	8	8	8	8	8
C S19	1	1	2	4	4	4	8	8	8	8	8	8	8	8	8	8
C S20	1	2	3	6	6	6	6	6	6	6	6	6	8	8	8	8
C S21	1	2	3	4	8	8	8	8	8	8	8	8	8	8	8	8

6. MECHANICAL SPECIFICATION



Panel Cutout

Learning Mode:

To enable the Learning mode, Press Up and Down key together. Now display Shows CLEA. Press Down key, display shows Row1 :PASW Row2 : 0000(first digit blinking) Enter the correct password (default 1000), display shows "CLr.P" and press Down key. Display shows "CLr.l". Again Press Down key. Now the Display shows"LEAr". Press Right key. Display shows on Row2: "n". Press UP/Down key for change option n/Y (n- No learning, Y-start learning)

Manual Mode:

1.Press Option and Down Key now display shows Row1 :MANL, 2.Press down key display shows Row1: PASW Row2: 0000(first digit blinking) 3.Now enter correct password (default 1000) and press down key display shows Row1: MANL (Manual) Row2: OFF Row3: rL01 (Relay 01) 4.Now press Right key, Row 2 is blinking now press UP/Down for OFF/ON and press right key for save the option 5.Now press Down key for next relay, now press Right key, display row 2 is blinking. Press UP/Down for OFF/ON and press Right key for save the option 6.After 8/12/16 press down key display shows Row1: donE Row2: n 7.Press Down/Up key, Press Right key. Display shows Row2: "n". Press UP/Down key for change option n/Y (n- not Saved, Y-Save).

Clearing Parameters:

Press the UP & DOWN keys together to enter the Clear mode, display shows "CLEA". Press DOWN key, display shows 0000 with first digit "0" blinking. Enter the Password. Then display shows "CLr.P". (CLr.P = Clear of PF Average). Press Down key "CLr.l". (CLr.l = Clear Integrate of Energy parameter). Press RIGHT key for accept to clear, display shows "n" (n = No), then press UP/DOWN key display shows "Y" (Y = YES). Press Right key.

OLD CLEARED ENERGY PARAMETER:

TO VIEW THE OLD CLEARED ENERGY PARAMETERS: Press the RIGHT key continuously for 5seconds, display will show "OldPArm". Press Right key to scroll and view the cleared parameters one by one Press the RIGHT key continuously for 5seconds, display will show "OldPArm". Press Right key to scroll and view the cleared parameters one by one.

Auto scrolling Enabling and Disabling

TO ENABLE THE AUTO SCROLLING: Press DOWN or UP key continuously for 5 seconds. Display shows "EnAb AUtO" (Enable Auto scrolling).Now display will start to scroll all parameters automatically every 5 seconds.

TO DISABLE THE AUTO SCROLLING: Press any key. Display shows "dSA AUtO" (Disable Auto scrolling). Now device will stop the scrolling of parameters and returns to normal mode.

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