

PRODUCT PROFILE



144 x 144 x 50mm

SPECIFICATIONS

| | | | | | |
|-------------------------|---|-------------|----------|--------------|--------|
| Display | : 4 Digit, 7 Segment LED display, height : 0.56" | | | | |
| Auxiliary Supply | : 90-550V AC, 50-60Hz | | | | |
| Rated input voltage | : 40-300V(L-N), 50-530V(L-L), 45-65Hz | | | | |
| Rated input current | : Nominal 5A AC (MIN 50mA, MAX 6A), Single CT Sensing | | | | |
| Burden | : 20 mOhms | | | | |
| CT Primary | : 1-9999A(For CT.S=1); 5-9999A(For CT.S=5) | | | | |
| CT Secondary | : 1 or 5A | | | | |
| No. of relay stages | : For APFC147-108 : 8 Relay For APFC147-112 : 12 Relay | | | | |
| Trip indication | : Alarm relay turns ON & ALM (Alarm) LED blinks (Refer LED indication chart) | | | | |
| Controlling Range | : Target PF : 0.8lag to 0.8lead Control sensitivity : 55 to 100% Step time : 1 to 999Sec Discharge time : 1 to 999 Sec Switching program : Automatic/Linear/Rotational Control Mode : Automatic/Manual Auto initialization : Yes / No | | | | |
| Output | : Relay output Alarm mode : Under voltage, Over voltage, CT polarity error Under compensate, Over compensate | | | | |
| Programmable Hysteresis | : Voltage : 1 to 10% Power Factor : 1 to 5% | | | | |
| Power Consumption | : 15 VA max. | | | | |
| Environmental Condition | : Operating : 0°C to 60°C Storage : -20°C to 60°C | | | | |
| Humidity | : 0% to 95% without moisture consideration | | | | |
| Accuracy | : <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td>Measurement</td> <td>Accuracy</td> </tr> <tr> <td>Power factor</td> <td>±0.01</td> </tr> </table> | Measurement | Accuracy | Power factor | ±0.01 |
| Measurement | Accuracy | | | | |
| Power factor | ±0.01 | | | | |
| Mounting | : Panel Mounting | | | | |
| Weight | : <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td>APFC147-112</td> <td>420gms</td> </tr> <tr> <td>APFC147-108</td> <td>400gms</td> </tr> </table> | APFC147-112 | 420gms | APFC147-108 | 400gms |
| APFC147-112 | 420gms | | | | |
| APFC147-108 | 400gms | | | | |

SAFETY PRECAUTIONS

All safety related codification, symbols and instructions that appear in this operating manual or on the equipment must be strictly followed to ensure the safety of the operating personnel as well as the instrument.

If the equipment is not handled in a manner specified by the manufacturer, it might impair the protection provided by the equipment.

CAUTION : Read Complete instruction prior to installation and operation of the unit.

WARNING : Risk of electric shock.

WIRING GUIDELINES

- To prevent the risk of electric shock, power supply to the equipment must be kept OFF while doing the wiring arrangement. Do not touch the terminals while power is being supplied.
- Wiring shall be done strictly according to the terminal layout. Confirm that all connections are correct.
- Use pin type lugged terminals.
- To eliminate electromagnetic interference, use wires with adequate ratings and twists of the same in equal size shall be made.
- Cables used for connection to power source, must have a cross section of 1.5mm². These wires shall have current carrying capacity of 5A.

MAINTENANCE

- The equipment should be cleaned regularly to avoid blockage of ventilating parts.
- Clean the equipment with a clean soft cloth. Do not use Isopropyl alcohol or any other cleaning agent.

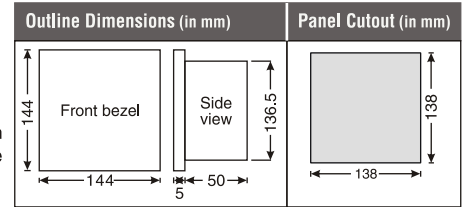
INSTALLATION GUIDELINES

CAUTION

- This equipment, being built-in type, normally becomes a part of main control panel and in such case the terminals do not remain accessible to the user end after installation and internal wiring.
- Conductors must not come in contact with the internal circuitry of the equipment or else it may lead to a safety hazard that may in turn endanger life or cause electrical shock to the operator.
- Before disconnecting the secondary of the external current transformer from the equipment, make sure that the current transformer is short circuited to avoid risk of electrical shock and injury.
- The equipment shall not be installed in environmental condition other than those mentioned in this manual.
- Thermal dissipation of equipment is met through ventilation holes provided on chassis of equipment. Such ventilation holes shall not be obstructed else it can lead to a safety hazard.
- Connector screw must be tightened after installation.

MECHANICAL INSTALLATION / DIMENSIONS

- Prepare panel cut out with proper dimensions as shown in the figure.
- Push the unit into the panel cutout. Secure the meter in its place by pushing the clamp on the rear side. The screw of the panel clamp must be in the farthest forward slot.
- For proper sealing tighten the screw evenly with required torque.



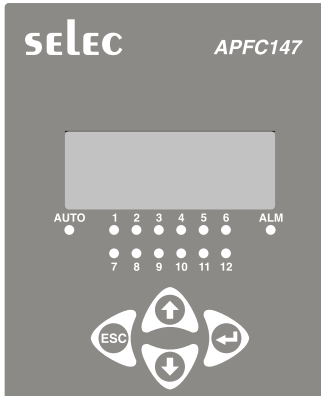
CAUTION

The equipment in its installed state must not come in close proximity to any heating sources, caustic vapors, oils, steam or other unwanted process byproduct.

EMC GUIDELINES

- Use proper input power cables with shortest connections and twisted type.
- Layout of connecting cables shall be away from any internal EMI source.

FRONT PANEL DESCRIPTION



CONFIGURATION

There are 4 dedicated keys (ESC, ↑, ↓, ←). Use these 4 keys to enter into configuration menu / change setting.

KEY DESCRIPTION

| | |
|-------------------|---|
| Press (ESC) & (↑) | For 3 sec to enter or exit from the configuration menu. |
| Press (↑) | For increment |
| Press (↓) | For decrement |
| Press (←) | To save the setting and move on to next page |
| Press (ESC) | To go back |

Note : The setting should be done by a professional after going through this operating manual.

LED INDICATIONS

| LED | DESCRIPTION |
|--------------------------|--|
| 1 to "X" [X = 8 or 12] | Capacitor Banks that are ON. |
| AUTO | Indicates controller is in AUTO mode. |
| AUTO | Indicates controller is in MANUAL mode. |
| ALM | No fault condition present. |
| ALM [Blinking] | Fault condition occurred [Press ENTER key to display trip parameter.] |
| ALM | This will take place when user will press ENTER key in fault condition. Trip parameters will be displayed for 3sec each. |

NOTE : On occurrence of any new fault condition ALM LED starts blinking again & on pressing ENTER key all trip parameters will be displayed for 3sec each.

SERIAL NUMBER DESCRIPTION

Press ESC (ESC) key for 10sec. to display 8 digit serial number.

| | |
|-----------------------------------|---------------------------------------|
| Example : Sr. No. 12345678 | |
| Press ESC (ESC) key for 10sec. | Displays 1234 for 3 sec. |
| | After 3 sec. displays 5678 for 3 sec. |

USER GUIDE

a) Manual switching (MANL)

When this switching program is selected, the capacitor steps are controlled manually by the user.

b) Rotational switching (ROTN)

This switching program is based on rotational first-in-first-out sequence. This option will automatically switch in and out the capacitors according to the targeted power factor, sensitivity setting and the re-connection time setting.

c) Automatic switching (AUTO)

This automatic switching program uses intelligent switching sequence. The step switching sequence is not fixed and the program automatically selects the most appropriate steps to switch in or out in order to achieve shortest reaction time with minimum number of steps.

d) Linear switching (LINR)

In this switching sequence it works in last in first out mode. This option will automatically switch in and out the capacitors according to the targeted power factor, sensitivity setting and the re-connection time setting.

CONFIGURATION MENU

PRESS + KEYS for 3 sec. to enter or exit from configuration menu.

| MAIN MENU | LEVEL | SUB MENU |
|---|-------|---|
| Installation Password (PW1) | LE-1 | <div style="display: flex; justify-content: space-between; font-size: small;"> Change Password Yes / No New Password CT Primary CT Secondary Network Selection Phase Compensation Nominal Voltage Threshold Voltage </div> <div style="display: flex; justify-content: space-between; border: 1px solid black; padding: 2px;"> CPYd NPYd CTP CTS NETY PCAR UOLT UTH </div> |
| | LE-1 | <div style="display: flex; justify-content: space-between; font-size: small;"> Auto Initialization Max Relay No. Mode Switching Program Target P.F Step Time Discharge Time Control Sensitivity Setting Low Current Setting </div> <div style="display: flex; justify-content: space-between; border: 1px solid black; padding: 2px;"> RAINT PLY MODE SYPC EPF STEPt d15t CSNS LCUR </div> |
| <ul style="list-style-type: none"> • After entering into PW1, sub menu of LE-1 will be selected. • To scroll through sub menu press increment or decrement key. | | |
| Technical Password (PW2) | LE-1 | <div style="display: flex; justify-content: space-between; font-size: small;"> Change Password Yes / No New Password CT Primary CT Secondary Network Selection Phase Compensation Nominal Voltage Threshold Voltage </div> <div style="display: flex; justify-content: space-between; border: 1px solid black; padding: 2px;"> CPYd NPYd CTP CTS NETY PCAR UOLT UTH </div> |
| | LE-2 | <div style="display: flex; justify-content: space-between; font-size: small;"> Over Voltage Setting Over Voltage Under Voltage Setting Under Voltage Over Compensation Under Compensation CT Polarity Error Hysteresis Voltage </div> <div style="display: flex; justify-content: space-between; border: 1px solid black; padding: 2px;"> OULT OUS UULT UUS OCAR UCAR CTEP HULT </div> |
| | LE-3 | <div style="display: flex; justify-content: space-between; font-size: small;"> Hysteresis Power Factor Factory Default </div> <div style="display: flex; justify-content: space-between; border: 1px solid black; padding: 2px;"> HPF dFLt </div> |
| | LE-3 | <div style="display: flex; justify-content: space-between; font-size: small;"> Bank 1 Bank 2 Bank 3 Bank 4 Bank 5 Bank 6 Bank 7 Bank 8 </div> <div style="display: flex; justify-content: space-between; border: 1px solid black; padding: 2px;"> PL01 PL02 PL03 PL04 PL05 PL06 PL07 PL08 </div> <div style="display: flex; justify-content: space-between; font-size: x-small; margin-top: 5px;"> Bank 9 Bank 10 Bank 11 Bank 12 </div> <div style="display: flex; justify-content: space-between; border: 1px dashed black; padding: 2px; margin-top: 2px;"> PL09 PL10 PL11 PL12 </div> |
| <ul style="list-style-type: none"> • After entering into PW2, all levels can be accessed. • Press ESC Key to change the level. Different level can be selected by pressing increment & decrement Key. | | |

Note : Appearance of shaded menus dependent on selection of other parameters.

| LEVEL 1 | | | | |
|---------|------------------------------------|--------------------------|------------------------------------|--|
| Display | Description | Default Value | Range | Condition |
| PSWD | Password | 10(PW1); 11(PW2) | 0000 - 9999 | |
| C.PWD | Change Password | No | NO / YES | |
| N.PWD | New Password | 0 | 0000 to 9999 | This option will be prompted only when C.PWD set to YES. |
| CT.P | CT Primary | 5A | 5 to 9999A | 1 to 9999 (CT.S=1) 5 to 9999 (CT.S=5) |
| CT.S | CT Secondary | 5A | 1A / 5A | |
| NETW | Network Selection | L-L | LN / LL | |
| PCMA | Phase compensation | 90° | 0°, 90°, 120°, 210°, 240°, 330° | |
| VOLT | Nominal Voltage | 240V (L-N) 415V (L-L) | 50V-550V | |
| V.TH | Voltage Threshold | 0% | 0% to 100% | |
| A.INT | Auto Initialization | Yes | NO / YES | |
| * RLY | Max Relay Numbers | 8/12 | 3 to 8/12 | |
| MODE | MODE | AUTO | AUTO / MANL | |
| SWPG | Switching Program | AUTO | Automatic (AUTO) | |
| | | | Linear (LINR) | |
| | | | Rotational (ROTN) | |
| T. PF | Targeted P. F | 1.000 | -0.800 to 0.800 | |
| STP.T | STEP TIME | 5 | 1s to 999s | |
| DIS.T | Discharge time (Reconnection time) | 180 | 1s to 999s | |
| C.SNS | C/K Setting | 60 | 55% to 100% | |
| L.CUR | Low Current Setting | 0 | 0-50% | |

* 8 Relay : Applicable only for APFC147-108
12 Relay : Applicable only for APFC147-112

NOTE :

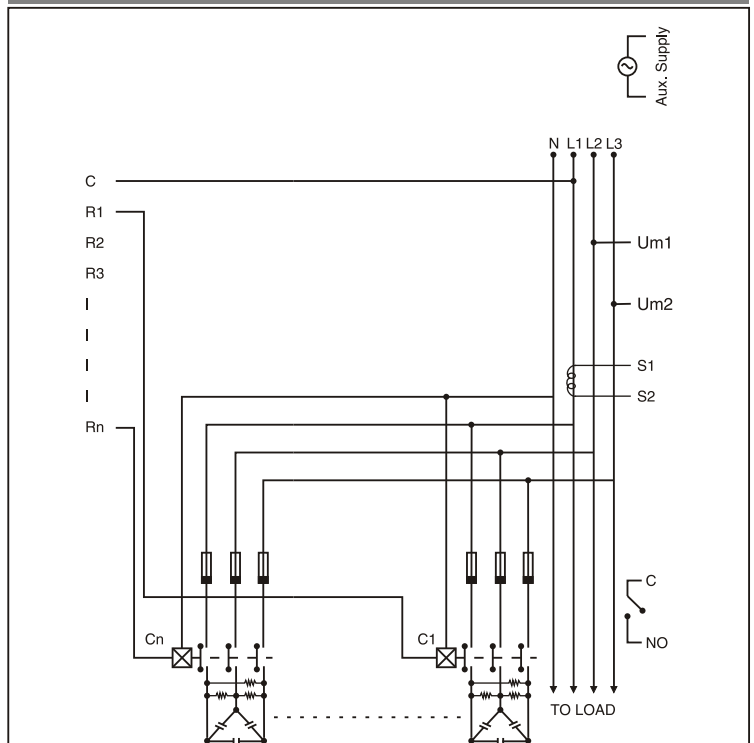
- Auto - Initialization (A.INT) is working at best, under stable load conditions.
- Auto - Initialization (A.INT) works only with capacitor banks and not with reactors.
- A.INT will be update to 'NO' automatically in configue after auto initialization.
- Reauto - Initialization will be done by only changing A.INT - Yes in configue manually.
- If V.TH value is set to zero, A.IN will be done only at power ON.
- Recommended that number of relays not to be changed during normal operation. If done so, restart the unit.
- Recommended to restart the unit if Switching program(SWPG) is changed during normal operation for proper functionality in accordance with the chosen control mode.
- When condition of low current occurs, the display of controller will show the 'CURR'.

| LEVEL 2 | | | | |
|---------|-------------------------|----------------------|--|--|
| Display | Description | Default Value | Range | Condition |
| O.VLT | Over voltage | ON | ON / OFF | |
| OV.S | Over voltage setting | 256(L-N) 540(L-L) | 256V to 264V (L-N) 540V to 570V (L-L) | This option will be prompted only when O.VLT option made ON. |
| U.VLT | Under voltage | OFF | ON / OFF | |
| UV.S | Under voltage setting | 195(L-N) 380(L-L) | 195V to 204V (L-N) 380V to 480V (L-L) | This option will be prompted only when U.VLT option made ON. |
| O.CMP | Over compensation | ON | ON / OFF | |
| U.CMP | Under compensation | ON | ON / OFF | |
| CT.ER | CT Polarity error | ON | ON / OFF | |
| H.VLT | Hysteresis voltage | 2 | 1% to 10% | |
| H.PF | Hysteresis power factor | 1 | 1% to 5% | |
| DFLT | Factory Default | No | No / Yes | |

| LEVEL 3 | | | | |
|---------|-------------|---------------|----------|--|
| Display | Description | Default Value | Range | Condition |
| RL.01 | Bank 1 | OFF | ON / OFF | Prompted only if MODE is set to MANUAL |
| RL.02 | Bank 2 | OFF | ON / OFF | |
| RL.03 | Bank 3 | OFF | ON / OFF | |
| RL.04 | Bank 4 | OFF | ON / OFF | |
| RL.05 | Bank 5 | OFF | ON / OFF | |
| RL.06 | Bank 6 | OFF | ON / OFF | |
| RL.07 | Bank 7 | OFF | ON / OFF | |
| RL.08 | Bank 8 | OFF | ON / OFF | |
| * RL.09 | Bank 9 | OFF | ON / OFF | |
| * RL.10 | Bank 10 | OFF | ON / OFF | |
| * RL.11 | Bank 11 | OFF | ON / OFF | |
| * RL.12 | Bank 12 | OFF | ON / OFF | |

* Applicable only for APFC147-112

WIRING DIAGRAM



Where,

- Um1 & Um2 - Input Voltage of Phase or phase to Phase
- S1 & S2 - CT Input
- R1... Rn - Relay to switch capacitor
- C1... Cn - Capacitor banks
- n - 8 for APFC147-108-90/550V
- n - 12 for APFC147-112-90/550V
- C - Relay COM
- NO - Normally Open

PHASE-ANGLE SETTING

| Voltage | L1-N | L2-N | L3-N | L1-N | L2-N | L3-N | L1-N | L2-N | L3-N |
|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| CT | L1 | L2 | L3 | L2 | L3 | L1 | L3 | L1 | L2 |
| Phase-Angle | 0° | 0° | 0° | 240° | 240° | 240° | 120° | 120° | 120° |
| Voltage | L2-L3 | L3-L1 | L1-L2 | L2-L3 | L3-L1 | L1-L2 | L2-L3 | L3-L1 | L1-L2 |
| CT | L1 | L2 | L3 | L2 | L3 | L1 | L3 | L1 | L2 |
| Phase-Angle | 90° | 90° | 90° | 330° | 330° | 330° | 210° | 210° | 210° |

(Specifications are subject to change, since development is a continuous process.)

Selec Controls Pvt. Ltd., India
 Factory Address :
 EL-27/1, Electronic Zone, TTC Industrial Area, MIDC, Mahape, Navi Mumbai - 400 710, INDIA.
 Tel. No. : +91-22-41 418 419/430 | Fax No. : +91-22-28471733
 Toll free : 1800 227 353 (BSNL/MTNL Subscribers only)
 Website : www.selec.com | Email : sales@selec.com