Low Voltage / Medium Voltage

Real Time

Automatic Power Factor Correction Panel

AKANKSHA

REAL TIME AUTOMATIC POWER FACTOR CORRECTION PANEL RT-APFC

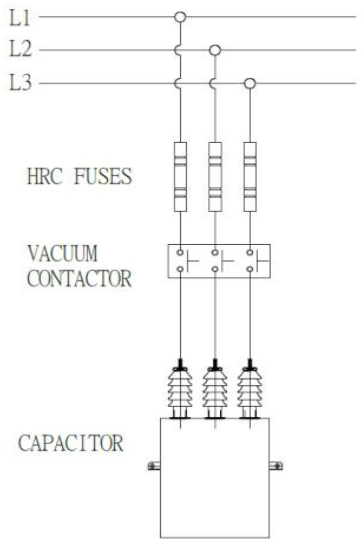
Construction:

1. **Enclosure:**

Customised Indoor / Outdoor: Pad Mounted Enclosure type / Structure Mounded, CRCA (Cold Rolled Close Annealed) / steel sheet. Duly Powder Coated / Painted / Galvanized for corrosion resistance.

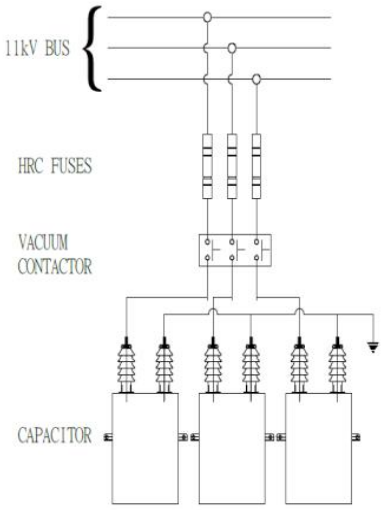
Protection: depending on installation (indoor/outdoor) and customer requirement, up to IP55 protection, with natural / forced cooling.

Typical connection of Capacitor connection in RT-APFC panel



In case of MSD Capacitors, protection devices, RVT, NDR Relay etc are not required

Largely used technology in India, externally star capacitor systems with APP technology



Three phase APP type capacitor

Single Phase APP type capacitor

2. **Capacitors with tuned / de-tuned, panels / banks**

a) **Incoming Circuit Breaker:** Connected across two phases.

- **Type: MCCB** (Moulded Case Circuit Breaker) or ACB (Air Circuit Breaker).
- **Purpose:** Main protection and isolation of the panel.

b) **Current Transformers (CTs)**

- **Installed on:** Load lines (typically R, Y, B phase).
- **Purpose:** To measure the current for power factor monitoring.

c) **Power Factor Controller**

- **Function:** Automatic detection and correction of power factor.
- **Operation:** Controls the switching ON/OFF of capacitor banks based on real-time power factor.

d) **Contactor & Capacitor Banks**

- **Contactors:** Electromagnetic switches for connecting/disconnecting capacitor banks.
- **Capacitors:** Power capacitors (usually heavy-duty, low-loss, oil- or gas-filled).
- **Step Arrangement:** Capacitors arranged in steps (e.g., 5kVAR, 2500 kVAR, etc.) for flexible correction.

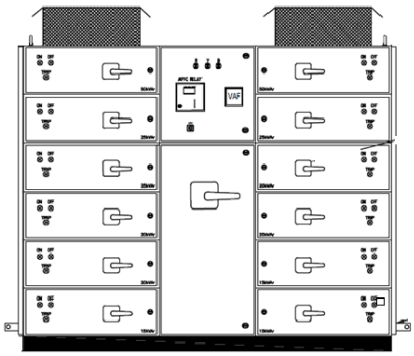
e) **Detuning Reactors (Optional – for Harmonic Filtering)**

- **Purpose**: To avoid resonance and protect capacitors from harmonics.

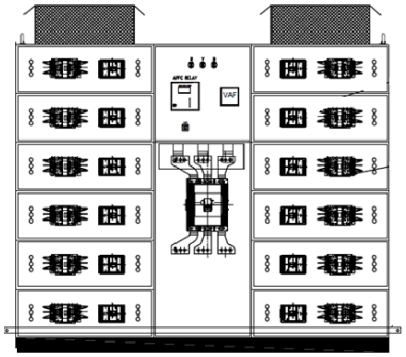
3. **Auxiliary Components**

- **MCBs/MCCBs:** For protection of individual capacitor steps.
- **Busbars:** Made of electrolytic grade copper or aluminium, sized according to load.
- **Indicators:** Phase indicators, ON/OFF lamps, capacitor bank status indicators.
- **Meters:** Digital VAF (Voltage, Ampere, Frequency) meter or Multifunction meter.
- **Wiring:** Flame retardant cables; neatly arranged with ferrules and cable ducts.

Constructional View:



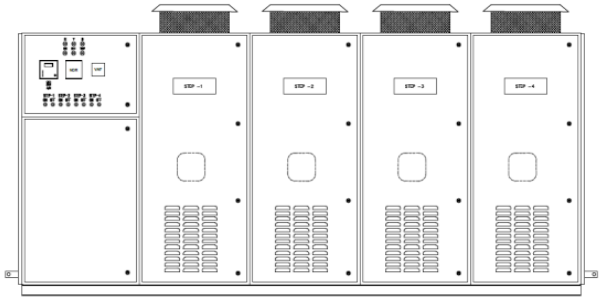
EXTERNAL FRONT VIEW



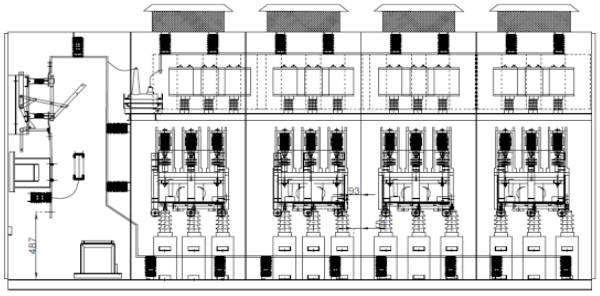
INTERNAL FRONT VIEW

The typical construction of the APFC as shown below, either should be of contactor switched or Thyristor

HT Panel Constructional View:



EXTERNAL FRONT VIEW



INTERNAL FRONT VIEW

AUTOMATIC POWER FACTOR CONTROLLER APFC

Features:

1. **Automatic Power Factor Correction:** Continuously monitors and improves the power factor by switching capacitor banks as per load conditions.
2. **Stepwise Capacitor Switching:** Capacitor banks are arranged in multiple steps (e.g., 5 kVAr, 2500 kVAr) to enable precise correction Open-delta (V-V) tertiary winding configuration.
3. **Microcontroller-Based Relay:** Uses a digital power factor controller to sense power factor in real time and manage switching logic.
4. **Contactor or Thyristor Switching**
    - Contactors: Suitable for steady loads.
    - Thyristors: Used for dynamic or fast-changing loads (contactless, noise-free switching).
5. **Improves Energy Efficiency:** Reduces power losses by minimizing reactive power and maintains a power factor close to unity
6. **Reduces Electricity Bill & Penalties**: Avoids utility penalties for low power factor and helps save on energy charges.
7. **Digital Monitoring and Display**: Equipped with meters to display voltage, current, power factor, frequency, and energy consumption.
8. **Protection Systems** Includes overload, short-circuit, overvoltage, and capacitor protection. Fuses, MCBs/MCCBs, and surge protection devices are used.
9. **Alarm and Indication Features**: Fault indicators, over-temperature alarms, and capacitor failure indications are provided for safety, etc.
10. **Modular Design**: Easy to expand.
11. **Ventilation and Cooling**: Natural or forced air cooling using vents and fans to maintain temperature within safe limits.
12. **Communication Options (Optional)**: Some models offer RS-485, Modbus for remote monitoring.
13. **Standards Compliance** Designed as per IEC – 61439-2:2011standards for electrical safety and performance.

Application:

- To improve power factor for:
- Industries
- Commercial Buildings
- Hospitals
- Data Centres
- Educational Institutions
- Cold Storages & Food Processing
- Steel & Cement Plants
- Water Treatment Plants

Technical data & Specification		
Parameter	**Typical Specification**	
Rated voltage	MV – APFC Panel (Above 1000V)	LV – AKAPFC Panel (Below 1000V)
Reference standard	IEC – 61439-2:2011	
System capacity	5kVAr to 5000kVAr (Customizable)	
Impulse withstand voltage	Up to 75kVp	
One -minute power frequency withstand voltage	Up to 28kV	
Rated operating voltage	110/230V AC/DC (Customizable)	
Power factor range	0.80-1.00 (target PF: 0.98 or above)	
Capacitor voltage rating	**For Low voltage panel** 440V / 480V / 525V	**For Medium voltage panel**: 3.3 kV to 33kV at differential customized voltage level
Capacitor Connection	Star/ Delta	
Switching type	Vacuum Contactor / Cap-Duty contactor / Thyristor module	
Capacitor type	APP / MPP (Customizable)	
Steps configuration	1 to 16 steps (customized)	
Power factor controller	Microprocessor based relay	
Protection device	MCBs, MCCBs, Contactor, HRC- Fuses, Surge capacitor, Relay, Surge arrester, Lightning arrester, Etc.	
Enclosure	CRCA Steel Sheet, Powder coated, IP42 - IP55, Out door structure mounted, As per customer requirement.	
Cooling	Natural or forced air (Fan + Louver)	
Mounting	Wall mounted (Small size) or Floor-standing (Industrial)	
Display / Monitoring	APFC Controller, Digital PF Meter, Voltmeter, Ammeter, MFM	
Ambient temperature	0° to 55°C	

Maximum Rating:
The **maximum rating** of an APFC panel depends on the application, connected load, and system voltage.

Rating Plate

LT APFC

LT APFC PANEL

APPLICATION	AUTOMATIC POWER FACTOR CORRECTION
CUSTOMER	
SYSTEM VOLTAGE	V AC
BANK OUTPUT	kVAr
DESIGN kVAr	kVAr
FREQUENCY	50Hz
P.O. NUMBER	
INSTALLATION	INDOOR
PANEL PAINT SHADE	
SERIAL NUMBER	
DRAWING NUMBER	
YEAR OF MANUFACTURING	

WARNING: DISCHARGE CAPACITORS BEFORE HANDLING

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Works: 87/4, SATPUR M.I.D.C, NASHIK-422 007, MAHARASHTRA.
E-mail id: info@apipl.co.in website:www.apipl.co.in

MV APFC

MV APFC PANEL

APPLICATION	AUTOMATIC POWER FACTOR CORRECTION
CUSTOMER	
SYSTEM VOLTAGE	kV
BANK OUTPUT	kVAr
DESIGN kVAr	kVAr
FREQUENCY	50Hz
P.O. NUMBER	
INSTALLATION	INDOOR
PANEL PAINT SHADE	
SERIAL NUMBER	
DRAWING NUMBER	
YEAR OF MANUFACTURING	

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