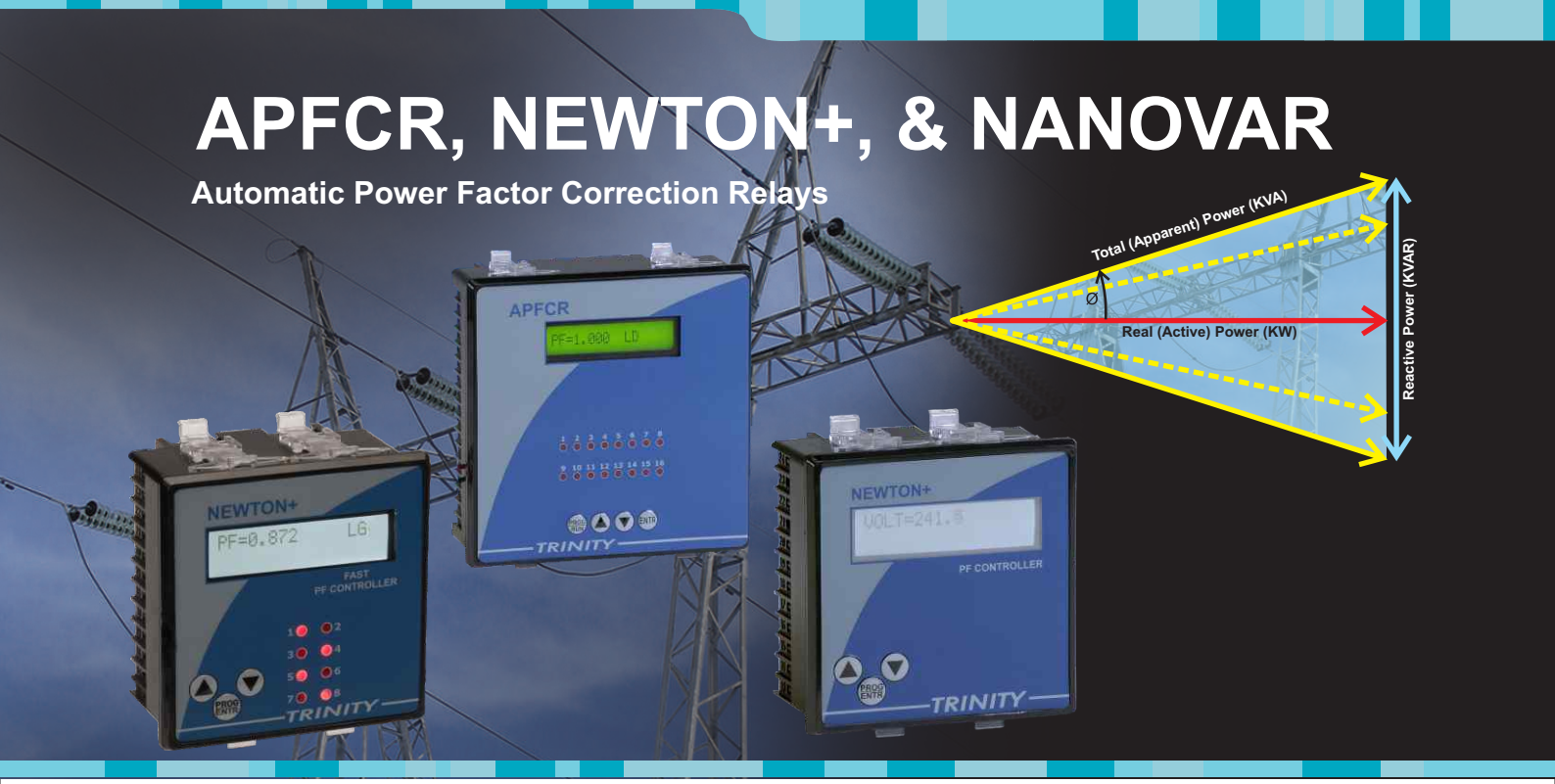
# APFCR, NEWTON+, & NANOVAR

## Automatic Power Factor Correction Relays




**TRINITY** has a versatile range of Power Factor Correction Relays suitable for all applications. These controllers are available in economy version with minimum features, intelligent models with advanced control algorithms and also sub-second switching models with solid state outputs.

The entire series is economical user friendly and extremely reliable. These designs have been field proven for nearly fifteen years with more then 10000 units in service.

### Measurement

All models are single phase measurement. APFCR & NEWTON+ need a CT input from the mains as well as from Capacitor Bank (For VAR mode operation). NANOVAR takes only one current input from the mains, since they have only basic PF control option. Voltage input is taken from phase & neutral.

### Ease of installation

These controllers are user friendly and easy to program. There is no need to program C/K or bank sizes manually.

### Low current operation

In VAR mode operation (Available in APFCR and NEWTON+) these controllers can sense as low as of 1% of the main load and take corrective action. PF control option requires minimum 2.5% of mains current for Newton+(Fast) and 6% of mains current for others.

### Intelligent Control

The control parameter is VAR, and not PF. Target PF value is just used to calculate the capacitive VAR required to be added/removed to achieve the desired PF. e.g. If the target PF is unity, means that the target VAR in the system is zero. If system KVAR is 200 lagging, then the controller needs to add 200 KVAR of capacitor banks to reach zero VAR.

The calculation of the reactive power in the system is done by taking instantaneous samples of all voltage and current waveforms, in all four quadrants. These values are then subjected to DSP techniques to add a frequency independent 90° phase shift to current samples. The product of these voltage and current samples then generate signed VAR value.

VAR controller then takes into calculation the prevailing system KVAR, the prevailing bank KVAR and the bank sizes of each stage, and then switches ON/OFF the combination which is closest to the needed VAR. This assumes a balanced loading of the electrical system. For unbalanced load conditions, ACCUVAR model is re-commended.

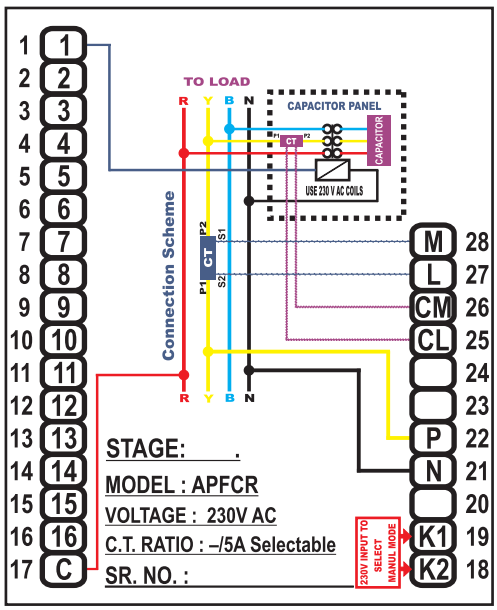
## Comparison Chart

| Feature | APFCR | NEWTON+ (Fast) | NEWTON+ | NANOVAR |
|---|---|---|---|---|
| No. of Stages | 4 to 16 Relays | 6/8 optocouplers | 6/8 Relays | 4 Relays |
| ALARM on PF Value (Optional) | Y | Y | Y | - |
| Fast Switching | - | Y | - | - |
| Stage Indication | LED | LED | LCD | LCD |
| LC Display | 16 X 1 | 16 X 2 | 16 X 2 | 16 X 1 |
| Intelligent Control | Y | Y | Y | - |

# Technical Specifications

| Parameter | | | |
|---|---|---|---|
| Type | | Name | Statistics |
| INPUT | | Supply | One Phase and Neutral of 3P4W system |
| | | Voltage | Direct Voltage Input: Up to 300V L-N<br>Burden: 0.5 VA |
| | | Current | Secondary Current Input : 5A or 1A (To be specified at the time of Ordering)<br>CT Ratio : Site Selectable (In APFCR & NEWTON+ only)<br>Range of Reading : 5-8000A (APFCR), 5-5000A (others)<br>Burden : <1.0VA<br>Overload : 5A CT = 6A RMS Continuous<br>1A CT = 1.2A RMS Continuous |
| | | Auxiliary Power Supply | Wide operating Voltage SMPS :<br>80 VAC – 480 VAC, 50-60 Hz |
| OUTPUT | | Relay | Switching Voltage : Max. 250 VAC<br>Switching Power : Max. 1000W<br>Expected Mechanical Life : >10 X $10^6$ switching operations<br>Expected Electrical Life : > 4 X $10^6$ switching operations @(Load=200VAC, Cosφ=0.5) |
| | | Optocoupler (Fast Newton+) | $V_{CE}$ (max)- 40 VDC; Imax-30 mA. |
| MEASUREMENT | True RMS Basic Parameters | Voltage (Volts L-N: VRN, VYN, VBN) | Accuracy : 0.5% of Reading |
| | | Current (Amps IR, IY, IB) | Accuracy : 0.25% of Reading |
| | | Capacitor Current | CT Ratio : Site Selectable (In APFCR & NEWTON+ of two Models)<br>Accuracy : 1.0% of Reading |
| | | Power Factor | Accuracy : 1.0% of Reading ( IPFI ≥ 0.5 )<br>Range of Reading : 0.05 to 1.00 Lag/ Lead |
| MISCELLANEOUS | Dimensions | Bezel | 144 X 144 mm (APFCR), 96 X 96 mm (All other models) |
| | | Panel Cutout | 138 X 138 mm (APFCR), 92 X 92 mm (All other models) |
| | | Depth of installation | 55 mm |
| | | Operating temp | 10ºC to 60º C |
| | | Weight | 0.730 Kgs (Approx.) for APFCR, 0.376 Kgs (Approx.) for all other three models |
| | | Min. Operating Current | 1% of CT primary in VAR mode, 2.5% in PF mode for Newton+(Fast) and 6% for others |

## Connection Diagram :




TESPL/ CAT/ APFCR, NEWTON+, NANOVAR/ 0809 - Ver-2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