

3-Phase Precision Power Meter

Accurate measurements at low PF

Basic Accuracy $\pm 0.1\%$, 30 to 800Hz Band Width



FEATURES

- 600V True RMS
- 80A True RMS
- Four 10V DC channel
- RPM interface
- 125 Data memory
- RS-232 interface
- Two display
- Tamper proof calibration
- Portable size
- User friendly operation
- Low Cost

Various range available

PA-600-8A (600V / 8A)
PA-140-5A (140V / 5A) with CT PT

PA-600 (here in after called PA) is a state of art technology developed by **Gopal Electronics**, as a result of continuous & steady research and development of our qualified engineering staff.

PA is powerful Instrument for testing Single Phase and Three Phase AC Machines due to it's high sampling rate, simultaneous measurements for all channels, and capability to perform accurate measurements of Active Power, Trms Value, Mean value and Peak value of Voltage and Current. PA is Micro-Controller based Instrument and hence, performs accurate calculations of PF, CF, FF, S, Q, with any load and signals of frequencies from 30 Hz to 800 Hz. Isolated inputs have a high immunity against electrical disturbances, high dynamic common-mode rejection and feature of measuring range: For Current directly from 80mA to 80A and for voltage directly from 6V to 600V.

PA is designed for user-friendly operation with features like two display: one LCD and second LED (LED for long distance view) and 16 push buttons, to perform easy operations. Input terminals have been designed to withstand in momentary over load condition up to 200A. PA has no adjustable component inside, therefore it's accuracy remains for long time without tampering.

PA is enhanced by RS-232 port to interface with computer. A free demo software viz. "**DATA TRANSFER TOOL**" is provided for communication. The software is capable to collect basic data in real time (or from internal memory) and transfers it to specified cells of MS-Excel sheet for further calculation hence, a user can generate his desired test report of device under test. (e.g transformer / motor etc.) We understand our clients better and have tried to fulfil their maximum need of measurement in Transformer and Motor, as a result we have provided four 10 Volt DC channel for interfacing of various types of Transducer for measurement of Temperature, Torque, RPM, Pressure, Flow etc.

Application of PA is to test and measure single phase/three phase AC Machines like Transformer, Motor, Food processor, Air conditioner, Fan, Heater, Lighting Ballast, Energy meter, calibration of AC meters etc.

Internal Non-Volatile Memory is provided to save up to 125 test results and all test results can be transferred to computer one by one using **Data transfer tool** so there is no need to note down test results by hand.

SPECIFICATION OF MODEL PA-600 AT (25°C ± 5°C) AFTER 30 MINUTES WARM-UP

GENERAL SPECIFICATIONS

Warm up time	30 minutes
Operating temperature	20°C to 45°C
Operating humidity	20% to 75% RH (non condensation)
Storage temperature	25°C to 50°C
Insulation resistance	40M Ω or higher at 600V all of the following area Voltage input terminal to case Current input terminal to case Voltage input terminal to Current input terminal Case to power supply
Insulation withstand voltage	2000V for 1minute at 50 Hz across all of the following area Voltage input terminal to case Current input terminal to case Voltage input terminal to Current input terminal
Power supply	210V - 250V / 50Hz
Power consumption	15VA maximum
Size	280 x 260 x 130 mm (l x b x h) including projection
Panel mounting cut out size	280 x 115 mm
Weight	3.5 kg approximate.

CALCULATION FUNCTIONS

Parameter	3 Wire	V * 1.73205 mode	4 Wire
Volt V	$V = (V1 + V2) / 2$	$V1 = \sqrt{3} \cdot V1$ $V2 = \sqrt{3} \cdot V2$ $V3 = \sqrt{3} \cdot V3$ $V = (V1 + V2 + V3) / 3$	$V = (V1 + V2 + V3) / 3$
Current I	$I = (I1 + I2) / 2$	$I = (I1 + I2 + I3) / 3$	
Active Power P	$P = P1 + P2$	$P = P1 + P2 + P3$	
Power Factor PF	$PF = (PF1 + PF2) / 2$	$PF = (PF1 + PF2 + PF3) / 3$	
Apparent Power S	$S1 = V1 \times I1$ $S2 = V2 \times I2$ $S = S1 + S2$	$S1 = V1 \times I1$ $S2 = V2 \times I2$ $S3 = V3 \times I3$ $S = S1 + S2 + S3$	
Reactive Power Q	$Q = \sqrt{S^2 - P^2}$		
Mean Volt	$V_{mean} = 1.11072 \times \text{Voltage rectified}$		
Crest Factor cf	$cf = \text{Peak Value} / \text{RMS Value}$		
Form Factor ff	$ff = \text{RMS Value} / \text{Average Value}$		

Notes:-

1. If the input contains distorted wave, the calculation based parameters may not match to those of other measuring instruments based on different measuring principles.
2. If either voltage or current falls to 10% of the range rating or less, then the apparent Power (S), power factor (PF) and reactive power (Q) may be displayed with errors.
3. No sign of power factor is displayed when current lags the voltage and negative Sign is displayed when current leads the voltage.

OUR OTHER PRODUCTS

1. Epstein Tester (as per IS:649)
2. Single strip Tester (as per ASTM-804)
3. Holiday Detector (as per IS:1876)

INPUT SPECIFICATIONS

Parameter	Voltage	Current
Input type	Resistance voltage divider	Current to voltage converter
Rated Values	600Vrms for PA-600 & 140Vrms for PA-140	80Arms for PA-600, 8Arms for PA-600 - 8A & 5A for PA-140
Measuring instrument loss (Input resistance)	Approx. 2M Ω	Approx. 1m Ω
Maximum Instantaneous allowed input (1 cycle, 30ms duration)	Peak value - 1.5 kV for PA-600 & 350 V for PA-140 RMS value - 1.1 kV for PA-600 & 250 V for PA-140 (Whichever is less)	Peak value:-200A for PA-600, 20A for PA-600-8A & 12A for PA-140 RMS value:-150A for PA-600, 15A for PA-600-8A & 9A for PA-140 (Whichever is less)
Maximum Instantaneous allowed input (1 Second duration)	Peak value:-1.4 kV for PA-600 & 195V for PA-140 RMS value:-1.0 kV for PA-600 & 230V for PA-140 (Whichever is less)	Peak value:-150A for PA-600, 15A for PA-600-8A & 9A for PA-140 RMS value:-100A for PA-600, 10A for PA-600-8A & 6A for PA-140 (Whichever is less)
Maximum continuous allowed input	Peak value:-850V for PA-600 & 200V for PA-140 RMS value:-600V for PA-600 & 140V for PA-140 (Whichever is less)	Peak value:-120A for PA-600, 12A for PA-600-8A & 7A for PA-140 RMS value:-80A for PA-600, 8A for PA-600-8A & 5A for PA-140 (Whichever is less)
Input terminal type	Banana socket (wire fit type)	Direct input: large binding Post (with 1/4" BSW copper stud with insulated nut)

MEASUREMENT FUNCTIONS

Parameter	Voltage / Current / Active power	
System	Digital sampling, Sum of average method	
Conditions: - Accuracy (within one year after calibration) Temperature: 25 ± 5 °C Humidity: 30 - 75% RH Input waveform: Sine wave power factor: 1.0 Display digits: 5 / 6 digits AVG: 8 sample mode	Frequency range	Accuracy
	30 Hz to 44 Hz 45 Hz to 65 Hz 66 Hz to 800 Hz	± (0.2 % of rdg + 0.2% of rng) ± (0.1% of rdg + 0.1% of rng) ± (0.2% of rdg + 0.2% of rng) Peak/Mean above x 2
	Additional power factor effect on active power measurement	At 50Hz 0.035° or time delay errors 2.5 μS
Effective input range	10-100% of Voltage, 1-100% current range rating	
Display updating value	1/2/3/4/5/6/7/8 seconds selectable by sample Average menu	
Frequency Measurements	Conditions: Input ≥ 30% of V1 from 30 to 800Hz Accuracy ± 0.1% Frequency measured at input of V1 to Neutral	

EXTRA INPUT SPECIFICATIONS -M1,M2,M3,M4,RPM

Input	L type terminal at rear side	Accuracy / Remark
Input type	DC	± 0.25 % FSD
Maximum Input	10V	Withstand up to 20V peak
RPM CARD Input	Compatible with Gopal make rpm and slip card for measurement of motor and pump rpm	
Note	External inputs are useful for any converter connectivity and useful to measure Temperature, Torque, Flow, Pressure etc.	

OPTION AVAILABLE WITH ADDITIONAL COST

Slip rpm card and rpm proximity switch to measure rpm
Terminal Lugs set
Panel mounting type box

Specifications are subject to change without prior notice for further improvement of products.



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