

RT 300 PLUS THREE PHASE RELAY TEST KIT

Introduction

RT 300 Plus provides voltage and three current sources 40VA power rating each. It has multiple analog and digital I/Os to pick up the relay trip signals and timers to capture the relay timing properties. Apart from relay testing, it can be used as a standard calibration source for testing/calibrating electrical instruments like energy-meters, power meters, pF controllers etc. It has a built-in DC power supply to power the unit under test. From the front panel selection it can be configured to provide either 6 Voltage sources or 6 current sources or a combination of 3 voltage and 3 current sources. The 6 voltage mode has an option for dual frequency to test synchronization relays.

Principle

The System uses a digitally synthesized sinusoidal wave form with analog amplification to get low total harmonic distortion and high accuracy. The output waveform has a fundamental frequency 60dB above noise floor and stability of 0.1% at full scale. The output parameters are measured and displayed and used for analog and digital close loop control to ensure accuracy.

Features

Three Configuration : **6Voltage/6current/3V,3I**
(Selectable from front panel)

Built in programmable DC supply for RUT

45 Hz - 65Hz variable three phase output

Work from Single phase input power

Angles and amplitudes of all sources variable

Different modes - Relay Test, EM test, 3Ph Source

Bright colour graphic LCD with easy to use interface

Continuous digital POT for parameter setting

Balance Mode, in which R phase setting copied to all

Phaser Diagram

Pulse option for auto calibration in EM test mode

Rs232 for PC interfacing

Dual frequency option



Specifications

Power Input

230V +/-10%, Single phase, maximum 2.5A
50Hz +/- 3Hz

Out/put

Voltage Source

$V_R = 15V\ AC - 300VAC\ @\ 40VA$

$V_Y = 15V\ AC - 300VAC\ @\ 40VA$

$V_B = 15V\ AC - 300VAC\ @\ 40VA$

Resolution 0.1V

Stability & Accuracy (0.2% form 40V - 300V)

Current Source

$I_R = 15\ mA\ AC - 30\ AAC\ @\ 40A$

$I_Y = 15\ mA\ AC - 30\ AAC\ @\ 40VA$

$I_B = 15\ mA\ AC - 30\ AAC\ @\ 40VA$

	V1	V2	V1Ang	V2Ang	Timer
R	100.00	100.00	0.000	0.000	TS 0.000
Y	100.00	100.00	100.00	100.00	TV1 0.000
B	100.00	100.00	240.00	200.00	TV2 0.000
Freq	50.00				TF 0.000
Mode	Manual	MTA			TA1 0.000
T Stop	DRY NO	Step			TA2 0.000
DCv	On	Prev	Next		
Back Set Meas Cfg Start					

STEP CONFIG				MISC CONFIG	
Step	Min	Max			
V1	10.0	10.0	300.0	Auto Dir	INC
V2	10.0	10.0	300.0	Auto Time	20
A1	1.0	1.0	120.0	DC Volts	100.0
A2	1.0	1.0	120.0	Tstart	DRY NO
Frq	1.0	0.000	-42949676.0V4	x V2	x V3
V1 Balance				x V5	x V6
V2 Balance				x A1	x A2
				x A4	x A5
				x A6	
Back Step Blnc Misc StpEn					

Resolution 0.010 A
Stability and Accuracy 0.2%

Power Factor (3Ph Source mode)

$PF_R = 0.1$ to 1 Lead/Lag
 $PF_Y = 0.1$ to 1 Lead/Lag
 $PF_B = 0.1$ to 1 Lead/Lag
Resolution 0.001
Accuracy +/- 0.002

Frequency

Variable from 45 Hz to 65 Hz
Resolution 0.1 Hz, Accuracy 0.05%
Dual Frequency with 0.2% accuracy

Distortion

THD < 1% at full scale

Protection

Built-in Short circuit and Thermal Protection

Mechanical

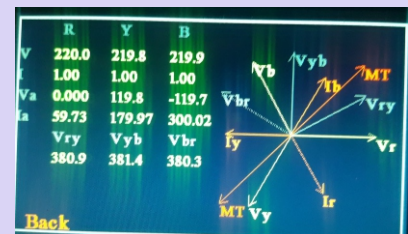
Dimensions 420mm x 425 mm x 170mm
Weight 25 kg (approx.)

Angle Setting(Relay test Mode)

Voltage angle : 0 - 360 Deg (Y & B wrto R)
Current Angle : 0 - 360 deg (wrto V_r)

Relay test Mode interface

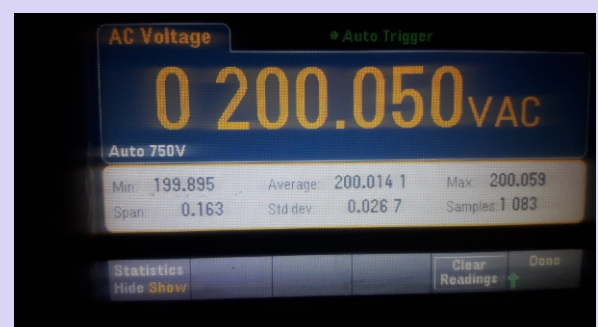
Wet and dry contact sensing
Step size and max value programmable for pick up test
Auto and manual mode
Built in DC source for Aux power to RUT



Accuracy and Stability

For a calibration source, the two parameters of importance are the accuracy and precision (stability) of the set parameter. Accuracy can be defined as the closeness of the average value to the set value and the precision as the closeness of the values to each other. The standard deviation indicates the stability and minimum and maximum values indicate the worst case readings.

The accompanying figure shows a typical values of average minimum and maximum values and standard deviation over 1000 consecutive readings taken on Keysight DMM 34461A (basic accuracy 0.03%)



Contactors Close Time Testing

Using the Wet input sense and relay close sense, The contactor close time response can be determined using the internal timers associated with the input senses.

Application

Testing of over current , over voltage relays, earth fault relays
Testing of Direction relays, frequency & generator protect relays
Testing and Calibration of Voltmeters, ammeters, wattmeters Energy meters

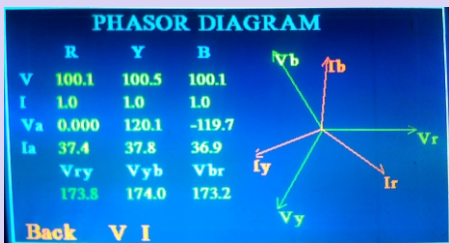
Relay Test Mode

In relay test mode, all parameters like amplitude, phase angles and frequency are programmable and there are software timers associated with each parameter. Whenever a set parameter is changed the corresponding timer resets and if the test is on the timers continue to count. there are input sensing of relay trip either with dry (potential free) or wet (voltage level) mode as selected. A trip sense cause both the timer and test to stop.

The tests can be carried out either manually (by incrementing/decrementing any parameter manually) or automatically with predefined step size and max/min settings.

The DC power supply can be programmed to provide 10V to 200V with 1A load capability. This can be switched on and off from the front panel.

The vector diagram pictorially represents the angles, amplitude and impedance parameters.



Energy Meter Calibration (Optional)

Calsource RT300 has an Energymeter calibration mode in which, an energymeter can be calibrated in three modes.

	V	I	Pf		
R	0.000	0.000	-0.607	Pulse/kwh	1200
Y	0.000	0.000	-0.834	Revln/kwh	600
B	0.000	0.000	0.006	CT X : 1	1
Frq	50.00			PT X : 1	1
Mode	EnergyLmt	Energy	Error		
Pulse	0200	0.000	0.00 %		
Exit	Cfg	Mode	Lmt	Begin	

1. Automatic calibration with pulse sensor - In this mode the pulse rate & amount of energy to be accumulated can be programmed. An optical pulse sensor can be connected to P350 to sense the meter pulses and upon reaching the energy limit set, the error in percentage will be displayed.
2. Semi automatic calibration with revolving disc - In this mode, the maximum number of revolution should be programmed. Then begin the test when the disc reaches the mark and manually count the disc revolution. When it reaches the set value, manually stop the test and the error observed will be displayed,
3. Manual Calibration for meters without pulse/disc - In this mode the energy to be accumulated can be programmed and note down the start energy in the meter, before beginning the test. When the energy in the meter reaches the set value stop the test. The error observed will be displayed on P350.



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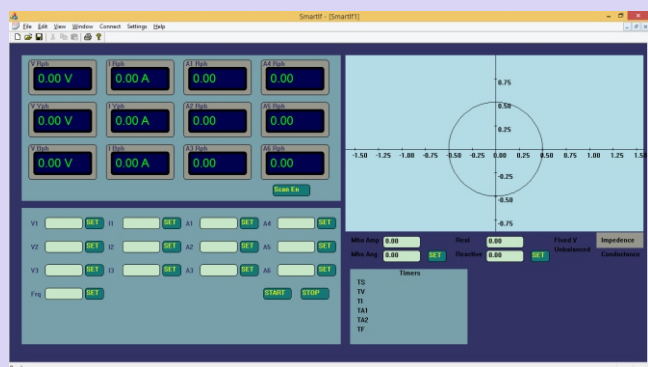
SmartIF - Windows Based Software`

The RT300Plus can be interfaced with a PC/Laptop over serial interface cable with the help of a Microsoft Windows based front end software. All the parameters can be set from the front end and the reading can be displayed. The generation can be started or stoped by single click on the front panel.

The screenshot shows a 'Dialog' box for configuration. It has two main sections: 'Step Configuration' and 'Misc Config'. 'Step Configuration' includes fields for 'Step Size', 'Minimum', and 'Maximum' for parameters V1, V2, A1, A2, and Freq. 'Misc Config' includes checkboxes for 'V1 Balance', 'V2 Balance', 'Dual Freq', 'F1 Step', and 'F2 Step'. There are also checkboxes for 'Step Enable' for each parameter. The dialog has 'OK' and 'Cancel' buttons at the bottom.

Configuration Sheet

The MHO Window for Distance Relay



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