

Tank-Type Variable Frequency AC Resonant Test Systems up to 100 kV

Testing Applications

Variable Frequency Resonant Test Systems are generally used where a lightweight, transportable unit is a requirement. Primary application is cable and rotating machine testing. Other test objects which are capacitive in nature such as cables, generators, and motors may also be tested. Non-mobile systems for factory or laboratory use are also available.

- **Lightweight**, transportable, **easy to set-up**
- **Pure sinusoidal** output voltage
- Complies with **IEC 60517**, **IEC 62271-203**, and **IEC's frequency range** of **20 to 300 Hz**
- Virtually **maintenance free**, no movable internal parts



Theory of Operation

A Variable Frequency Resonant Test System takes advantage of resonance theory. To achieve resonance, the capacitive reactance (test object) has to equal the inductive reactance (high voltage reactor). In a Variable Frequency Resonance System, the reactor is non-variable; therefore, the frequency of the circuit is adjusted until resonance is achieved. This adjustment of the resonant circuit is

commonly referred to as "tuning". Once resonance has been achieved only the resistive (real) losses in the circuit have to be supplied. The output voltage and the incoming power drawn from the mains is a function of the "Q" or quality factor of the circuit. The higher the system Q, the lower the incoming power requirement.



Tank-Type Reactors

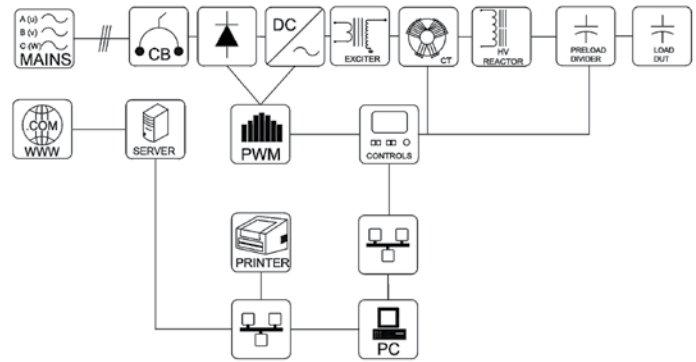
Phenix Technologies' reactors are constructed in a grounded, painted steel tank encapsulating the oil insulated reactor coils. One of the main features of tank-type reactors is the capability to offer multiple output taps via a tap switch or multiple output bushings. When multiple reactors are connected in parallel, very high currents can be achieved. The unique reactor coil design is manufactured of radially laminated magnetic cores enclosed by copper windings. The use of high quality materials results in a low loss, high Q reactor. This design provides a lightweight and transportable test system. Tank-type reactors operate in series resonance mode.



Electronic Power Regulator

At the heart of the system is a specially designed electronic regulator that converts the mains service into a variable voltage, variable frequency power source that is ideally suited for use with a Variable Frequency Resonant Test System. The excellent resolution and frequency stability maintain a reliable, controllable resonant test circuit.

System Diagram VRTS Tank Type



Precision Measurement System

A high precision measuring system is designed to enable accurate measurements of voltages and currents. The metered information is displayed on the Human Machine Interface (HMI). The values displayed on the HMI are performed as a function of the Programmable Logic Controller (PLC).

Our systems function in compliance with IEC 60060, IEEE 4, and other recognized national and international industry testing standards.

Calibration Certificate traceable to NIST (National Institute of Standards and Technology, USA) is issued with every system. ISO17025 traceable voltmeter calibration is available as an option upon request.

High Voltage Protection

High voltage protection or dampening impedances are supplied to provide protection to the system when a test object breakdown or flashover occurs. Fast transients are blocked and shunted to ground without causing damage to the high voltage components.

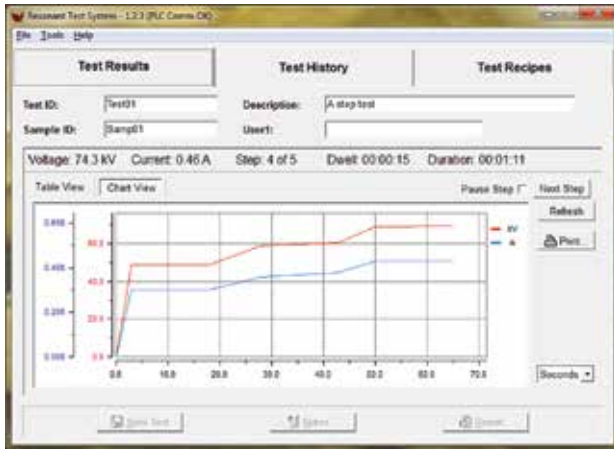


Designed for Transportation and On-Site Testing

Testing of rotating machinery requires a system that is easily transported and packaged for frequent movement. Transport containers, sturdy shipping boxes and accessories such as shielded high voltage cables for the Variable Frequency Resonant Test System can be supplied by Phenix Technologies.

Advanced Controls

Phenix Technologies uses the latest development in computer-assisted controls. Our configuration creates ease in set-up and simplicity in testing. The test system features a full-color, liquid crystal display and Ethernet port to select automation modes through a remote personal computer interface. The controls allow the operator to easily perform repeatable testing. All test data is collected by the data acquisition software and stored for later recall or test report generation.



Assessment Test System - 1.2.3 (PLC Control OK)

Test Results Test History Test Recipes

Test ID: Test01 Description: A step test
 Sample ID: Sample1 User:

Voltage: 89.0 kV Current: 0.55 A Step: 5 of 5 Dwell: 00:00:15 Duration: 00:01:36

Table View Chart View Pause Step Next Step

Step	Voltage	Current	PD	Gap %	Dwell	Duration
1	5 kV	0 A			00:00:00	00:00:00
2	49 kV	0.3 A			27.8 00:00:15	00:00:03
3	59 kV	0.36 A			00:00:18	00:00:18
4	69 kV	0.43 A			27.7 00:00:15	00:00:28
5	89 kV	0.55 A			00:00:43	00:00:43
6	89 kV	0.55 A			27.7 00:00:15	00:00:60
7	89 kV	0.55 A			00:01:05	00:01:05
8	89 kV	0.55 A			27.7 00:00:15	00:01:11
9	89 kV	0.55 A			00:01:26	00:01:26
10	89 kV	0.55 A			27.4 00:00:15	00:01:36

High Voltage Output: Result:
 Failure Voltage:
 Data Acquisition:
 Internal (local):
 Start Mode: Automatic
 Collect Data:

Recipes

Recipe ID: Step Description: A step test

Step Test

Parameter	Value	Dwell	Last Dwell
Start Voltage (kV)	50	Hr: <input type="text"/>	Hr: <input type="text"/>
Step Voltage (kV)	10	Min: <input type="text"/>	Min: <input type="text"/>
Last Step	5	Sec: 15	Sec: 10
Ramp Rate	20 %		

Save Cancel

Model Number	Tap 1 kV [μ F]	Tap 2 kV [μ F]	Tap 3 kV [μ F]	Frequency Range [Hz]	Length [mm]	Width [mm]	Height [mm]	Weight [kgs]
VRTS8TC60-300	60 [0.44]	24 [2.76]	12 [11.0]	[20] -30..300	1200	1200	1350	1800
<i>20 Hz Operation</i>	40 [0.99]	16 [6.21]	8 [24.9]	Duty Cycle	1 Hour On / 1 Hour Off, 6 Cycles per 24 hours			
VRTS8TC50-1000	50 [2.12]	25 [10.6]	TBD	[20] -30..300	2200	1270	1620	4200
<i>20 Hz Operation</i>	33 [0.99]	16 [19.8]	TBD	Duty Cycle	1 Hour On / 1 Hour Off, 6 Cycles per 24 hours			
VRTS8TC100-1000	100 [2.12]	50 [10.6]	TBD	[20] -30..300	2300	1270	1620	4800
<i>20 Hz Operation</i>	66 [2.41]	32 [9.95]	TBD	Duty Cycle	1 Hour On / 1 Hour Off, 6 Cycles per 24 hours			

DIMENSIONS AND WEIGHT	Length inches (mm)	Width inches (mm)	Height inches (mm)	Weight lbs (kgs)
Power Supply	85 (2159)	38 (965)	80 (2032)	3200 (1451)
Control Box	22 (559)	22 (559)	20 (508)	50 (23)

*Other designs and duty cycles upon request. Dimensions and weight are approximate.

Operator Training/Worldwide Service and Support

Commissioning and training are available to provide your operator with the information and resources they need for efficient and safe use of the test system. Long-term customer support is provided from our fully experienced and knowledgeable staff. Future periodic calibration of the metering is easily accomplished by one of our PHENIX service technicians keeping your system at top performance for many years.



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