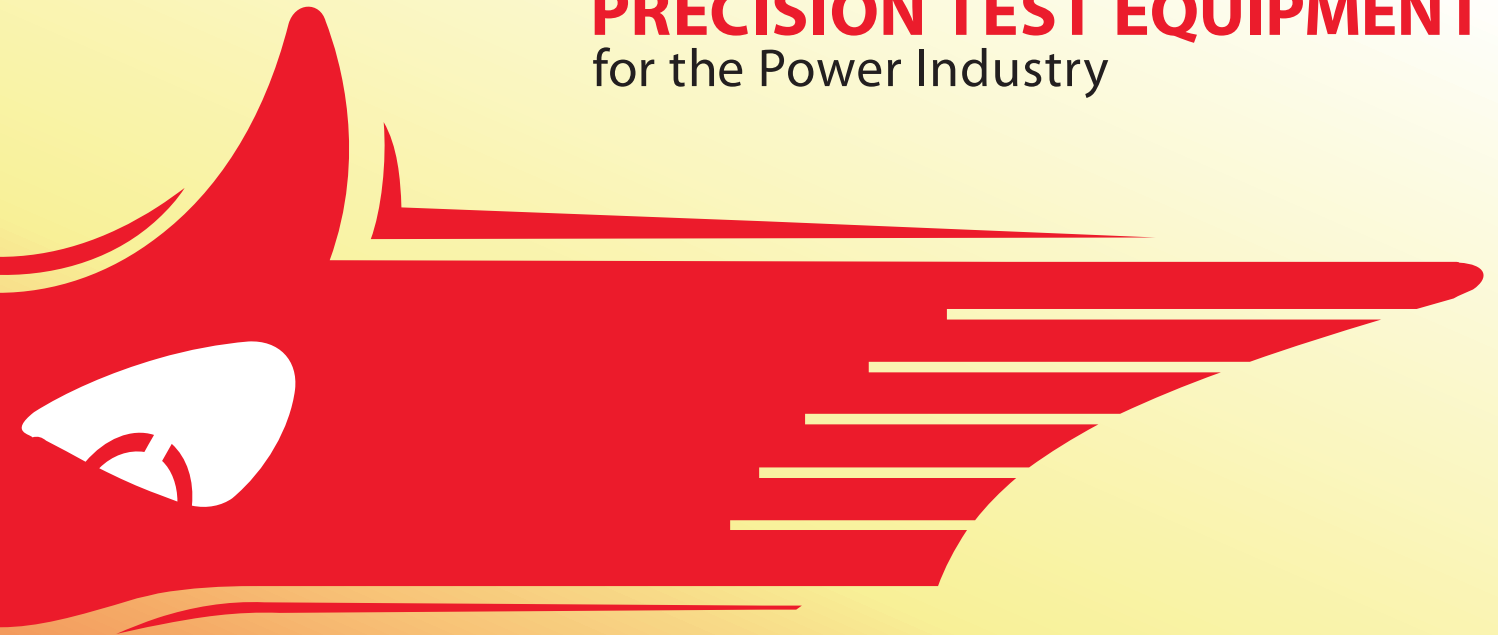


# *Raytech*

**PRECISION TEST EQUIPMENT**  
for the Power Industry



# MEASURING UP TO YOUR **HIGH STANDARDS** for **PRECISION** and **ACCURACY**

## About Raytech

Since 1997, Raytech has been a world leader in the design and production of precision measuring instruments and systems. Our products are used in the manufacturing, maintenance, and acceptance testing of electrical apparatus. Raytech USA fully supports sales and service throughout North, South and Central America, Australia, Taiwan, Thailand, and Egypt. Raytech AG supports sales and service throughout Europe, Asia, and Africa.

## Our Instruments

Raytech develops and produces measuring instruments with laboratory precision for the electrical testing industry. The unique design approach of our engineering team has resulted in the development of the highest quality measuring instruments, which have set new standards in the electrical testing industry. Our rugged test equipment is designed for easy operation and fast, accurate results.

Our portable products are housed in durable field cases designed to withstand impact, vibration, and the harsh conditions associated with field testing. We also offer durable rack-mountable equipment which can be integrated into systems for factories, laboratories, and development facilities.

Raytech products are designed for many years of trouble-free use, which is why we can offer a standard five-year warranty, guaranteeing the highest quality instrumentation available.

## Our Precision Engineering

We always focus on our customers' needs and have produced innovative engineering solutions which meet, and often exceed, our customers' expectations and the industry standards. The products designed at Raytech undergo long-term development of three (3) years or more to ensure that the products have all of the features desired by our customers, along with the highest accuracy available.

## Our Service and Support

### **Trouble-Free and Guaranteed with our 5-Year Standard Warranty.**

Raytech offers superior service, support, and traceable certifications for all Raytech test instruments. Once received in our service department, your product will be documented, serviced, calibrated, cleaned and then carefully packed and shipped back to you quickly and efficiently.

### **Our Service and Support Group provides our customers with:**

- Professional, expert service and advice
- **No-charge service evaluations**
- Hardware, firmware, and software updates
- Full and continued support on all retired products
- Certification services available
- Shortest repair turnaround times

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## **ALL RAYTECH EQUIPMENT INCLUDES OUR 5-YEAR STANDARD WARRANTY.**

For more information, please refer to your equipment instruction manual.

*Specifications subject to improvement/change at any time.*

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**To contact our Service and Support Group,  
call toll free **888 484 3779**  
or email **service@RaytechUSA.com****



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# CAPO 2.5

## Capacitance and $\tan \delta$ Power Factor Meter 2.5kV

This easy-to-use, battery-operated test set is designed for fast and easy measurements. The CAPO 2.5 measures Dissipation Factor ( $\tan \delta$ ), Power Factor ( $\cos \varphi$ ), Capacitance, Inductance Quality Factor, and Power Loss (watts) which can be converted to 10kV. Built to stand up to the harsh conditions of field testing, this instrument provides reliable test results in any situation.

Advanced Protection: Upon powering on, the system initializes itself with a self-calibrating and circuit checking sequence. If any problem is detected during this initialization period, or during operation, the operator will be notified immediately.

### FEATURES

- Battery operated
- Built-in Standard Capacitor
- Power Factor ( $\cos \varphi$ ) / Dissipation Factor ( $\tan \delta$ ) reading
- Test Frequency 10Hz to 400Hz
- Internal thermal printer
- Microprocessor based with internal storage for over 10,000 test results
- Data exchange via USB-Key or USB / RS232 Connection
- Storage and Printing of test results
- Complete automatic calibration system and system diagnostics
- Temperature channel with automatic correction (user selectable)
- Standard USB 2.0 & RS232 (serial) Interface
- Color LCD display with backlighting and touch screen
- Panel mounted Emergency Stop Switch / Safety Ground Detect
- Mounted in a rugged and lightweight case
- 5-Year Standard Warranty



For sales, service, a quote or demonstration, call 24/7 ☎ 888-484-3779 ☎ 267-404-2676

# Power Factor

## ACCURACY

	Range	Accuracy	Resolution
Dissipation Factor $\tan \delta$	0 ... 0.1	$\pm 0.5\% \text{ Rdg} \pm 1 \times 10^{-4}$	$1 \times 10^{-5}$
	0.1 ... 1	$\pm 0.5\% \text{ Rdg} \pm 1 \times 10^{-4}$	$1 \times 10^{-4}$
	>1	$\pm 0.5\% \text{ Rdg}$	3 Digits
Power Factor $\cos \varphi$	0 ... 0.1	$\pm 0.5\% \text{ Rdg} \pm 1 \times 10^{-4}$	$1 \times 10^{-5}$
	0.1 ... 1	$\pm 0.5\% \text{ Rdg} \pm 1 \times 10^{-4}$	$1 \times 10^{-4}$
Capacitance @ 60 Hz	0.00pF to 1.1 $\mu$ F @500V	$\pm 0.3\% \text{ Rdg} \pm 0.3\text{pF}$	0.01pF or 5 Digits
	0.00pF to 212nF @2.5kV	$\pm 0.3\% \text{ Rdg} \pm 0.3\text{pF}$	0.01pF or 5 Digits
Capacitance @ 50 Hz	0.00pF to 1.3 $\mu$ F @500V	$\pm 0.3\% \text{ Rdg} \pm 0.3\text{pF}$	0.01pF or 5 Digits
	0.00pF to 254nF @2.5kV	$\pm 0.3\% \text{ Rdg} \pm 0.3\text{pF}$	0.01pF or 5 Digits
Test Voltage	Up to 2500Vrms	$\pm 0.5\% \text{ Rdg} \pm 1\text{V}$	1V
Test Current	Up to 200mA rms	$\pm 0.3\% \text{ Rdg} \pm 1\mu\text{A}$	0.1 $\mu$ A or 4 Digits
Output Power	0 ... 500VA		
Output Frequency	10 Hz ... 400 Hz (Step 0.5 Hz)	$\pm 0.01\%$	0.1 Hz

## SPECIFICATIONS

**Model:** CAPO 2.5

**Size:** L: 521 mm (20.5") W: 432 mm (17") H: 216 mm (8.5")

**Weight:** 22.2 kg (48.9 lbs.)

**Input power:** 85 - 264 VAC, 47.... 63Hz

**Output voltage:** 0 to 2,500 V, 10 to 400 Hz

**Test Current:** Up to 200mA rms

**Front panel:** sealed, anodized

**Interfaces:** USB A/B and RS-232 port

**Operating temperature:** -10°C to +60°C (14°F to 140°F)

**Storage temperature:** -20°C to +70°C (-4°F to 158°F)

## STANDARD ACCESSORIES INCLUDED

HV Cable – 10m (32 ft.)

HV Ground Cable – 10m (32 ft.)

Test Lead A – Red, 10m (32 ft.)

Test Lead B – Blue, 10m (32 ft.)

Safety Ground Lead – 10m (32 ft.)

Safety Switch – 2m (6.5 ft.)

Power Cord – 7.6m (25 ft.)

Braided Jumpers

HV Hook

RS-232 Cable – 3m (10 ft.)

A-B USB Cable – 3m (10 ft.)

Cable Bag with Shoulder Strap

External USB Drive and Touch Screen Stylus

Paper Refill for Printer – 5 rolls

Instruction Manual

Certification Report

## OPTIONAL ITEMS AVAILABLE

Temperature Probe – 10m (32 ft.): 2021N-26001

Safety Switch – 10m (32 ft.): 3071N-31000

2 Hot Collar Straps

Bushing Tap Adapters

# CAPO 12

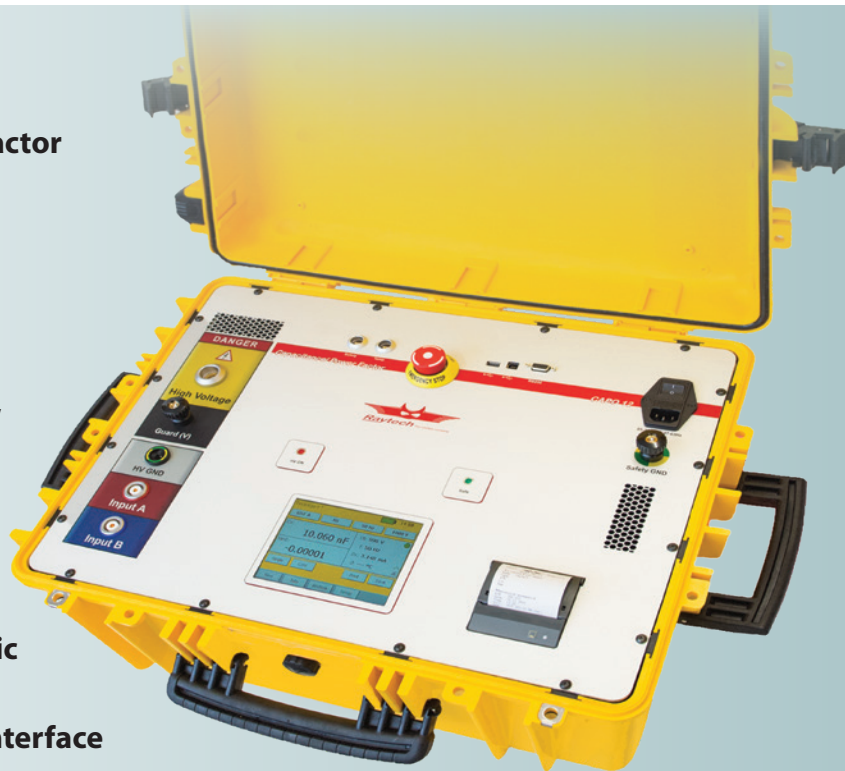
## Capacitance and $\tan \delta$ Power Factor Meter 12kV

This self-contained, fully automatic instrument performs measurements of Insulation Power Factor ( $\cos \varphi$ ), Dissipation Factor ( $\tan \delta$ ), Capacitance, Inductance, Excitation, Quality Factor and Power Loss (watts). Measurements can be made up to 12kVAC at variable frequency (from 10Hz to 400Hz).

Portable and rugged, the CAPO 12 is perfect for field, facility, or manufacturing plant use, and is specially designed for fast and easy measurements with well-known high precision and quality. Advanced intelligence of design initializes itself with a self-calibrating and circuit check sequence. The operator is immediately notified if any problem is detected.

### FEATURES

- Test Voltage up to 12kV
- Built-in Standard Capacitor
- Power Factor ( $\cos \varphi$ ) / Dissipation Factor ( $\tan \delta$ ) reading
- Test Frequency 10Hz to 400Hz
- Internal thermal printer
- Microprocessor based with internal storage for over 10,000 test results
- Data exchange via USB-Key or USB / RS232 Connection
- Storage and Printing of test results
- Complete automatic calibration system and system diagnostics
- Temperature channel with automatic correction (user selectable)
- Standard USB 2.0 & RS232 (serial) Interface
- Color LCD display with backlighting and touch screen
- Panel mounted Emergency Stop Switch / Ground safety detect
- Mounted in rugged and lightweight case
- 5-Year Standard Warranty



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# Power Factor

## ACCURACY

	Range	Accuracy	Resolution	
Dissipation Factor	0 ... 0.1	$\pm 0.5\% \text{ Rdg} \pm 1 \times 10^{-4}$	$1 \times 10^{-5}$	
tan $\delta$	0.1 ... 1	$\pm 0.5\% \text{ Rdg} \pm 1 \times 10^{-4}$	$1 \times 10^{-4}$	
	>1	$\pm 0.5\% \text{ Rdg}$	3 Digits	
Power Factor	0 ... 0.1	$\pm 0.5\% \text{ Rdg} \pm 1 \times 10^{-4}$	$1 \times 10^{-5}$	
cos $\varphi$	0.1 ... 1	$\pm 0.5\% \text{ Rdg} \pm 1 \times 10^{-4}$	$1 \times 10^{-4}$	
Capacitance @ 50 Hz	0.00pF ... 1.3 $\mu$ F @ 500 V	$\pm 0.3\% \text{ Rdg} \pm 0.3\text{pF}$	0.01pF or 5 Digits	
	0.00pF ... 254nF @ 2.5 kV	$\pm 0.3\% \text{ Rdg} \pm 0.3\text{pF}$	0.01pF or 5 Digits	
	0.00pF ... 53nF @ 12 kV	$\pm 0.3\% \text{ Rdg} \pm 0.3\text{pF}$	0.01pF or 5 Digits	
	@ 60	0.00pF ... 1.1 $\mu$ F @ 500 V	$\pm 0.3\% \text{ Rdg} \pm 0.3\text{pF}$	0.01pF or 5 Digits
	0.00pF ... 212nF @ 2.5 kV	$\pm 0.3\% \text{ Rdg} \pm 0.3\text{pF}$	0.01pF or 5 Digits	
	0.00pF ... 44nF @ 12 kV	$\pm 0.3\% \text{ Rdg} \pm 0.3\text{pF}$	0.01pF or 5 Digits	
Test Voltage	up to 12 000 Vrms	$\pm 0.5\% \text{ Rdg} \pm 1\text{V}$	1V	
Test Current	up to 200 mA rms	$\pm 0.3\% \text{ Rdg} \pm 1\mu\text{A}$	0.1 $\mu$ A or 4 Digits	
Output Power	0 ... 2400 VA			
Output Frequency	10 Hz - 400 Hz (Step 0.5 Hz)	$\pm 0.01\%$	0.1Hz	

## SPECIFICATIONS

**Model:** CAPO 12

**Size:** L: 627 mm (24.7") W: 475 mm (18.7") H: 292 mm (11.5")

**Weight:** 36 kg (79 lbs.)

**Input power:** 85 - 264 VAC, 47...63 Hz

**Output voltage:** 0 to 12,000V, 10 to 400 Hz

**Front panel:** sealed, anodized

**Interfaces:** USB A/B and RS-232 port

**Operating temperature:** -10°C to +60°C (14°F to 140°F)

**Storage temperature:** -20°C to +70°C (-4°F to 158°F)

## STANDARD ACCESSORIES INCLUDED

**HV Cable** – 10m (32 ft.)

**HV Ground Cable** – 10m (32 ft.)

**Test Lead A** – Red, 10m (32 ft.)

**Test Lead B** – Blue, 10m (32 ft.)

**Safety Ground Lead** – 10m (32 ft.)

**Safety Switch** – 2m (6.5 ft.)

**Power Cord** – 7.6m (25 ft.)

**Braided Jumpers**

**HV Hook**

**RS-232 Cable** – 3m (10 ft.)

**A-B USB Cable** – 3m (10 ft.)

**Cable Bag** with Shoulder Strap

**External USB Drive** and **Touch Screen Stylus**

**Paper Refill for Printer** – 5 rolls

**Instruction Manual**

**Certification Report**

## OPTIONAL ITEMS AVAILABLE

**Temperature Probe** – 10m (32 ft.): 2021N-26001

**Safety Switch** – 10m (32 ft.): 3071N-31000

**2 Hot Collar Straps**

**Bushing Tap Adapters**

# TR-Mark III 250V

## Turns Ratio Meter Three Phase

The TR-MARK III 250V is the successor of the famous TR-MARK III. Besides an extended test voltage up to 250V, it offers new features and increased accuracy to make it a perfect system. A color LCD with backlighting and touch screen increases handling and user comfort. Two USB interfaces make it easy to store measurements on external storage devices and transfer easily to a personal computer or download nameplate data of transformer to test.

### FEATURES

- **Automatic measurements of Voltage / Turns Ratio, Current and Phase displacement**
- **Internal storage for more than 10,000 test results**
- **Easy one time hook up to the transformer**
- **Tap changer interface with graphic display**
- **Load on test object <0.05 VA**
- **Measures Power transformers, PTs and CTs**
- **Automatic phase vector detection**
- **Enhanced heavy-duty protection circuitry**
- **Data exchange via USB-Key**
- **Internal Printer**
- **Displays deviation from a nominal ratio**
- **Automatic test voltage range**
- **Color LCD display with backlighting and touch screen**
- **Panel mounted Emergency Stop Switch**
- **Mounted in a rugged and lightweight case**
- **5-Year Standard Warranty**



For sales, service, a quote or demonstration, call 24/7 ☎ 888-484-3779 ☎ 267-404-2676



# Turns Ratio

## ACCURACY

Range	Accuracy at 100V or 40V	Accuracy at 10V	Resolution
0.8 ... 2,000	$\pm 0.06\%$ Rdg $\pm 1$ LSD	$\pm 0.15\%$ Rdg $\pm 1$ LSD	5 Digits
2,001 ... 4,000	$\pm 0.1\%$ Rdg $\pm 1$ LSD	$\pm 0.3\%$ Rdg $\pm 1$ LSD	5 Digits
4,001 ... 13,000	$\pm 0.3\%$ Rdg $\pm 1$ LSD	not specified	5 Digits
13,001 ... 16,000	$\pm 0.4\%$ Rdg $\pm 1$ LSD		5 Digits
Range	Accuracy at 250V	Resolution	
00.8 ... 5,000	$\pm 0.06\%$ Rdg $\pm 1$ LSD	5 Digits	
5,001 ... 10,000	$\pm 0.1\%$ Rdg $\pm 1$ LSD	5 Digits	
10,001 ... 32,500	$\pm 0.3\%$ Rdg $\pm 1$ LSD	5 Digits	
32,501 ... 40,000	$\pm 0.4\%$ Rdg $\pm 1$ LSD	5 Digits	
Current	Accuracy	Resolution	
0 ... 1A	$\pm 0.001$ A	0.1mA	
Phase Angle	Accuracy	Resolution	
$\pm 90$ Degree	$\pm 0.05$ Degree	0.01 Degree	

## SPECIFICATIONS

**Model:** TR-MARK III 250V

**Size:** L: 470 mm (18.5") W: 371 mm (14.6") H: 190 mm (7.5")

**Weight:** 10.2 kg (22.4 lbs.)

**Input power:** 100 - 240 VAC 50/60 Hz auto-ranging, Fuse 2 A

**Test voltage user selectable:** 250, 100, 40, 10, and 1 VAC

**Max test current:** 1A

**Front panel:** sealed, anodized

**Interfaces:** USB A/B and RS-232 port

**Operating temperature:**  $-10^{\circ}\text{C}$  to  $+60^{\circ}\text{C}$  ( $14^{\circ}\text{F}$  to  $140^{\circ}\text{F}$ )

**Storage temperature:**  $-20^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$  ( $-4^{\circ}\text{F}$  to  $158^{\circ}\text{F}$ )

## STANDARD ACCESSORIES INCLUDED

**H and X Lead Set** – 5m (16 ft.)

**Red Extension Lead Set (2)** – 10m (32 ft.) each

**Power Cord** – 7.6m (25 ft.)

**Safety Ground Lead** – 5m (16 ft.)

**A-B USB Cable** – 3m (10 ft.)

**External USB Drive and Touch Screen Stylus**

**Cable Bag** with Shoulder Strap

**Paper Refill for Printer** – 5 rolls

**Spare Fuse Set**

**Instruction Manual**

**Certification Report**

## OPTIONAL ITEMS AVAILABLE

**External Trigger Switch for Tap Changer Testing** –  
10m (32 ft.): 1003N-31001

**TR-Mark III R 250V:** Rackmount Version

**Red Extension Lead** – 10m (32 ft.): 1002A-05002

**T-Rex:** Three Phase Test Voltage Option for TR-Mark III 250V

# T-Rex

## Phase Voltage Extension for Turns Ratio Meter

Designed to give Engineers and Test Technicians the ability to test the phase relationships and actual voltage ratios of transformer windings while applying three phase voltage.

The system (in connection with a three phase Raytech Turns Ratio Meter) precisely measures the ratio and angular relationship of transformer phases with voltage applied to all three phases simultaneously. This is a “real condition” measurement, which allows greater understanding of how the transformer will operate connected to a three phase system.

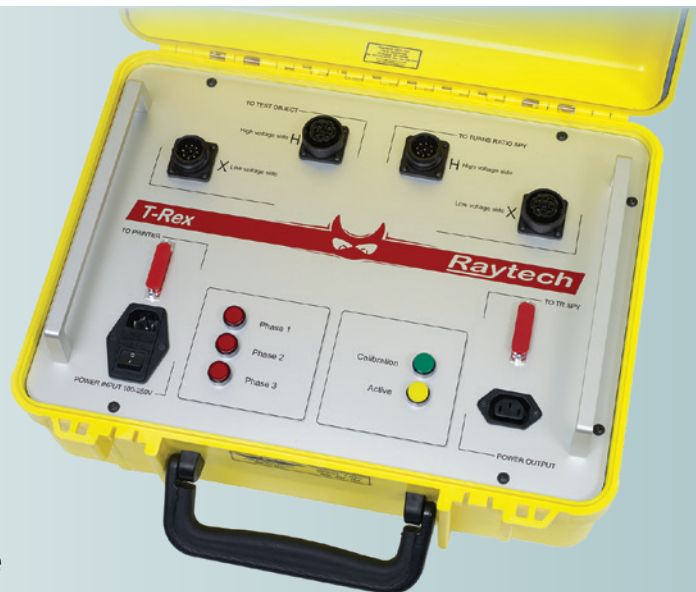
**The T-Rex is especially useful for transformers with:**

- Phase relationships other than multiples of 30°
- Zig Zag windings
- Uncentered neutral points
- Suspected broken, damaged, or missing core laminations

The T-Rex is contained within a separate yellow case and comes complete to connect to the Raytech Models; TR-Spy, TR-MARK II, TR-MARK III, or TR Mark III 250V three phase transformer ratiometers.

## FEATURES

- Outputs a pure three phase sine wave
- Fully remote controlled by TR-SPY, TR-MARK II, TR-MARK III, TR- Mark III 250V
- Single hook up to the transformer
- Automatic selection of test voltage frequency
- Phase accuracy 0.08 degree
- Measures phase relationships other than multiples of 30°
- Measures phase shifting transformer
- Measures power rectifier transformer
- Mounted in a rugged and lightweight case
- 5-Year Standard Warranty



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# Turns Ratio

## ACCURACY

Voltage	Voltage Accuracy*	Phase Accuracy*	Current
3 x 24 Vac	± 0.08%	0.08 Degree	0 ... 200mA

*\*between phases*

## SPECIFICATIONS

**Model:** T-Rex

**Size:** L: 470 mm (18.5") W: 371 mm (14.6") H: 190 mm (7.5")

**Weight:** 8.4 kg (18.5 lbs.)

**Input power:** 100 - 250 VAC, 50/60 Hz, auto-ranging

**Test voltage:** Three phase 24 VAC 50/60 Hz auto-selecting

**Front panel:** sealed, anodized

**Operating temperature:** -10°C to +60°C (14°F to 140°F)

**Storage temperature:** -20°C to +70°C (-4°F to 158°F)

## STANDARD ACCESSORIES INCLUDED

**Power Cord** – 3m (10 ft.)

**Interconnect Power Cord** – 1.8m (6 ft.)

**Interface Cable** (TR-Spy and TR-Mark II)

**Interface Cable** (TR-Mark III)

**Red Interconnect Cables** (2) – 1m (3.3 ft.) each

**Cable Bag** with Shoulder Strap

**Spare Fuse Set**

**Instruction Manual**

**Certification Report**

## OPTIONAL ITEMS AVAILABLE

**T-Rex R:** Rackmount Version

# TR-1 / TR-1P

## Turns Ratio Meter Single Phase

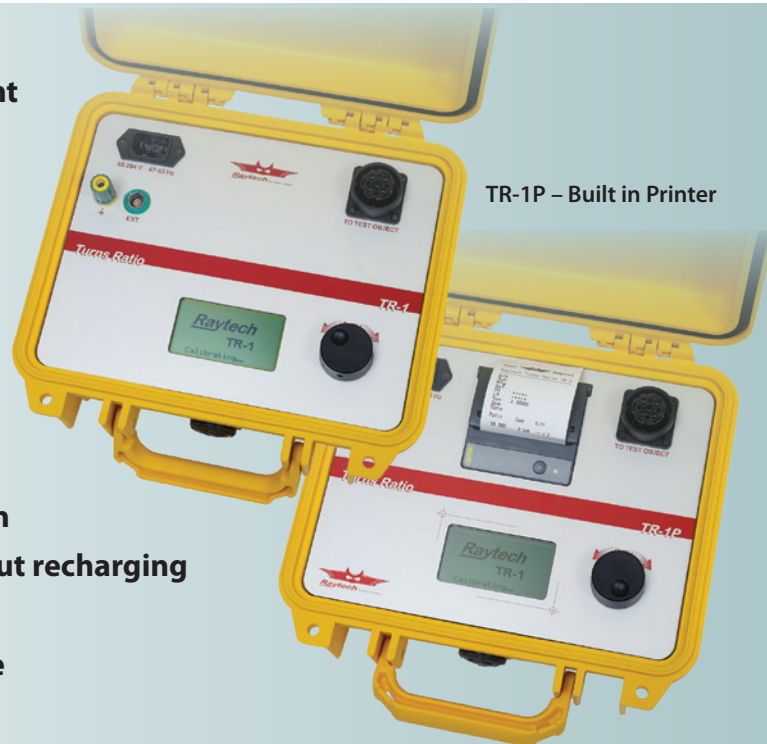
Designed to be a rugged and reliable automatic transformer ratiometer, this system has a high degree of accuracy and will test ratios to 4000:1. The design of this test system is based upon the popular Raytech Automatic Three Phase test set: TR-Mark III.

The TR-1/ TR-1P is a high precision, fully automatic, microprocessor based, Single Phase Transformer Turns Ratio Test system, designed for highly accurate readings on-site with laboratory precision. There is no maintenance required. Due to the utilization of high precision components in the design, there are no calibration procedures and no potentiometers to turn.

**Advanced Protection:** Upon powering on, the system initializes itself with a self-calibrating and circuit checking sequence. If any problems are detected during this initialization period or during operation, the operator is immediately notified. The system constantly monitors the condition of the transformer under test. The TR-1/ TR-1P can recognize shorted leads and will terminate the test without any damage to the test equipment. This works especially well if the test leads accidentally fall off the transformer while under full voltage measurement.

## FEATURES

- Single or continuous operation
- Rechargeable battery-operated instrument
- Recharged with line voltage, or optional DC Car adapter
- Reverse Polarity Test
- Continuity Test
- Test current up to 1 A for CT testing
- Internal storage of the last 50 test results
- PC interface with optional RS-232 cable adapter
- Save up to 16 Transformers for comparison
- Performs over 1,000 measurements without recharging
- Color LCD display with backlighting
- Mounted in a rugged and lightweight case
- 5-Year Standard Warranty



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# Turns Ratio

## ACCURACY

Range	Accuracy in PT Mode (40V)	Accuracy in CT Mode (1...5V)	Resolution
0.8 ... 100	$\pm 0.08\% \text{ Rdg} \pm 1 \text{ LSD}$	$\pm 0.08\% \text{ Rdg} \pm 1 \text{ LSD}$	5 Digits
101 ... 4,000	$\pm 0.08\% \text{ Rdg} \pm 1 \text{ LSD}$		5 Digits
Current	Accuracy in CT Mode (1...5V)		Resolution
PT-Mode: 0 ... 0.1A	$\pm 1\text{mA}$		0.1mA
CT-Mode: 0 ... 1A	$\pm 1\text{mA}$		0.1mA

## SPECIFICATIONS

**Model:** TR-1 / TR-1P

**Size:** L: 270 mm (10.62") W: 245 mm (9.68") H: 125 mm (4.87")

**Weight:** 3.2 kg (7.1 lbs.)

**Input power:** 85 - 264 VAC, 47 ... 63 Hz, 12 VDC (optional)

**Output voltage:** PT Mode: 40 VAC, 10 VAC, 5 VAC, 1 VAC

**Output voltage:** CT Mode: 1 ... 5 VAC auto-ranging

**Display:** LCD Graphic with backlight

**Front panel:** sealed, anodized with a multi-actuation rotary knob

**Operating temperature:** -10°C to +60°C (14°F to 140°F)

**Storage temperature:** -20°C to +70°C (-4°F to 158°F)

## STANDARD ACCESSORIES INCLUDED

**H and X Lead Set** – 5m (16 ft.)

**Safety Ground Lead** – 5m (16 ft.)

**Power Cord** – 3m (10 ft.)

**Cable Bag** with Shoulder Strap

**Paper Refill for Printer** – 5 rolls (with the TR-1P)

**Instruction Manual**

## OPTIONAL ITEMS AVAILABLE

**Red Extension Lead** – 5m (16 ft.): 1011N-05001

**RS-232 Interface Cable Adapter:** 1011N-23001

**12VDC Automotive Adapter:** 1011N-24002

# WR14

## Winding Resistance Meter 15 Amps, 2 Channel

This battery powered winding resistance system contains the most advanced demagnetizing circuit. It is designed for a high degree of accuracy for the measurement of very low resistance of any inductive loads.

Unique, Newly Designed Measuring Technique: incorporates a high precision measurement circuit, a unique power source and the fastest charge and discharge unit on the market. This system is for measuring primary and secondary in series on the same core leg.

Operation: The WR14 applies a preset current level, selected by the user from 0.025A to 15A. Results are reported on the easy-to-read color LCD display and can be stored or printed.

Advanced Protection: Upon powering on, the system initializes itself with a self-calibrating and circuit checking sequence. If any problem is detected during this initialization period, or during operation, the operator will be notified immediately.

### FEATURES

- High power DC supply (15A / 30V)
- Charge inductive loads up to 1500 Henry
- 2 independent measuring channels
- Battery Powered – Up to 200 Measurements at 15A
- Automatic measurements of Low Resistance from  $0.00\mu\Omega$  ...  $100k\Omega$
- Demagnetizing Circuit (Advanced design)
- Data exchange via USB-Key or USB / RS232 Connection
- Complete automatic calibration system and system diagnostics
- Temperature channels with automatic resistance correction
- Pure filtered DC Power source for the highest accuracy readings
- Discharge indicator – visible and audible indicator for discharge status
- Color LCD display with backlighting and touch screen
- Panel mounted Emergency Stop Switch
- Mounted in a rugged and lightweight case
- 5-Year Standard Warranty



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# Winding Resistance

## ACCURACY

Current Range	Measuring Range	Accuracy	Resolution
10 – 15A	0.00 $\mu\Omega$ ... 1 $\Omega$	$\pm 0.1\%$ Rdg $\pm 0.1 \mu\Omega$	5 Digits or 0.05 $\mu\Omega$
5 – 10A	0.0 $\mu\Omega$ ... 3 $\Omega$	$\pm 0.1\%$ Rdg $\pm 0.2 \mu\Omega$	5 Digits or 0.1 $\mu\Omega$
1 – 5A	0.0000m $\Omega$ ... 15 $\Omega$	$\pm 0.1\%$ Rdg $\pm 0.5 \mu\Omega$	5 Digits or 0.5 $\mu\Omega$
0.5 – 1A	0.000 m $\Omega$ ... 30 $\Omega$	$\pm 0.1\%$ Rdg $\pm 2 \mu\Omega$	5 Digits or 1 $\mu\Omega$
0.1 – 0.5A	0.000 m $\Omega$ ... 300 $\Omega$	$\pm 0.1\%$ Rdg $\pm 5 \mu\Omega$	5 Digits or 2 $\mu\Omega$
25m – 0.1A	0.00 m $\Omega$ ... 1200 $\Omega$	$\pm 0.1\%$ Rdg $\pm 20 \mu\Omega$	5 Digits or 10 $\mu\Omega$
< 25 mA	1.2 k $\Omega$ ... 10 k $\Omega$	$\pm 0.1\%$ Rdg $\pm 100$ m $\Omega$	5 Digits or 200 m $\Omega$
< 25 mA	10 k $\Omega$ ... 100 k $\Omega$	$\pm 0.5\%$ Rdg $\pm 10 \Omega$	4 Digits or 20 $\Omega$

## SPECIFICATIONS

**Model:** WR14

**Size:** L: 470 mm (18.5") W: 357 mm (14.1") H: 176 mm (6.9")

**Weight:** 9.4 kg (20.7 lbs.)

**Input power:** 88 to 264 VAC, 47...63 Hz, auto-ranging

**Output voltage:** 0 to 30 V DC

**Test current user selectable:** 25mA ... 15A

**Front panel:** sealed, anodized

**Interfaces:** USB A/B and RS-232 port

**Memory storage:** Internally stores more than 10,000 test results

**Operating temperature:** -10°C to +60°C (14°F to 140°F)

**Storage temperature:** -20°C to +70°C (-4°F to 158°F)

## STANDARD ACCESSORIES INCLUDED

**Current and Potential Lead Set** – 10m (32 ft.)

**Jumper Cable** – 10m (32 ft.)

**Power Cord** – 7.6m (25 ft.)

**Safety Ground Lead** – 10m (32 ft.)

**A-B USB Cable** – 3m (10 ft.)

**External USB Drive and Touch Screen Stylus**

**Cable Bag** with Shoulder Strap

**Paper Refill for Printer** – 5 rolls

**Instruction Manual**

**Certification Report**

## OPTIONAL ITEMS AVAILABLE

**Current and Potential Leads** – 20m (65 ft.): 2043N-0501

**Temperature Probe** – 10m (32 ft.): 2021N-26001

**Heat-Run Curve Analysis Software (AHRT-01):** 2042N-11001

**WR14 R:** Rackmount Version

# WR50-12

## Winding Resistance Meter 50 Amps, 2 Channel

Raytech Digital Winding Resistance meter WR50-12 is an enhanced winding resistance system with the most advanced demagnetizing circuit. It is designed for a high degree of accuracy for the measurement of very low resistance of any inductive loads.

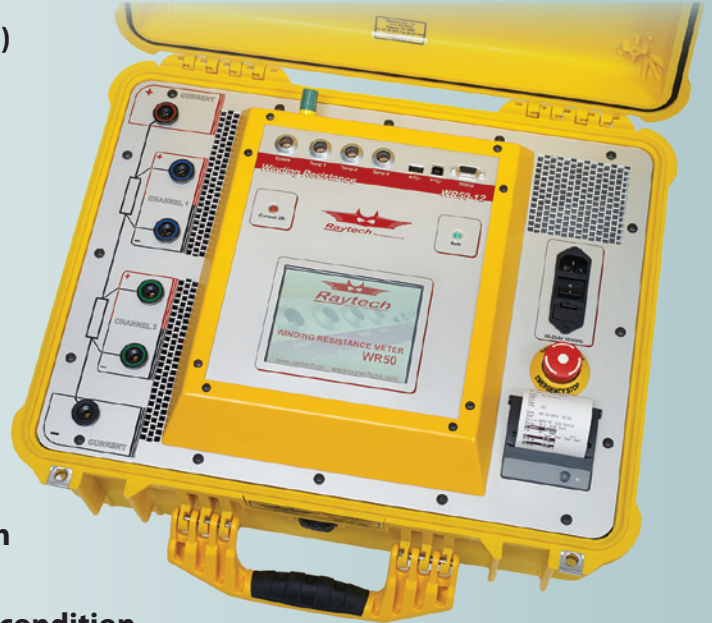
Unique, Newly Designed Measuring Technique: incorporates a high precision measurement circuit, a unique power source and the fastest charge and discharge unit on the market. This system is for measuring primary and secondary in series on the same core leg.

Operation: The WR series applies a preset current level, selected by the user, from 0.025A to 50A. Results are reported on the easy-to-read color LCD display and can be stored or printed.

Advanced Protection: Upon powering on, the system initializes itself with a self-calibrating and circuit checking sequence. The system constantly monitors the conditions when turned on, detecting any problems during initialization or operation, and immediately notifies the operator. The WR series have extensive protection built into the circuitry.

### FEATURES

- Demagnetizing Circuit (Advanced design)
- Data exchange via USB-Key or USB / RS Connection
- Storage and Printing of test results while the test system is measuring
- Complete automatic calibration system and system diagnostics
- Temperature channels with automatic resistance correction
- Pure filtered DC Power source for the highest accuracy readings
- Automatic, high efficiency cooling system to dissipate internal heat
- Automatic shut off for over-temperature condition
- Color LCD display with backlighting and touch screen
- Panel mounted Emergency Stop Switch
- Mounted in a rugged and lightweight case
- 5-Year Standard Warranty



For sales, service, a quote or demonstration, call 24/7 ☎ 888-484-3779 ☎ 267-404-2676



# Winding Resistance

## ACCURACY

Current Range	Measuring Range	Accuracy	Resolution
30 – 50A	0.00 $\mu\Omega$ ... 1.3 $\Omega$	$\pm 0.1\%$ Rdg $\pm 0.05 \mu\Omega$	5 Digits or 0.05 $\mu\Omega$
15 – 30A	0.0 $\mu\Omega$ ... 3.3 $\Omega$	$\pm 0.1\%$ Rdg $\pm 0.1 \mu\Omega$	5 Digits or 0.1 $\mu\Omega$
8 – 15A	0.0000 m $\Omega$ ... 6.3 $\Omega$	$\pm 0.1\%$ Rdg $\pm 0.2 \mu\Omega$	5 Digits or 0.2 $\mu\Omega$
3 – 8A	0.0000 m $\Omega$ ... 16.7 $\Omega$	$\pm 0.1\%$ Rdg $\pm 0.5 \mu\Omega$	5 Digits or 0.5 $\mu\Omega$
1 – 3A	0.000 m $\Omega$ ... 47.2 $\Omega$	$\pm 0.1\%$ Rdg $\pm 1 \mu\Omega$	5 Digits or 1 $\mu\Omega$
0.7 – 1A	0.000 m $\Omega$ ... 71.4 $\Omega$	$\pm 0.1\%$ Rdg $\pm 2 \mu\Omega$	5 Digits or 2 $\mu\Omega$
0.3 – 0.7A	0.000 m $\Omega$ ... 167 $\Omega$	$\pm 0.1\%$ Rdg $\pm 5 \mu\Omega$	5 Digits or 5 $\mu\Omega$
0.1 – 0.3A	0.00 m $\Omega$ ... 500 $\Omega$	$\pm 0.1\%$ Rdg $\pm 10 \mu\Omega$	5 Digits or 10 $\mu\Omega$
25 – 100 mA	0.00 m $\Omega$ ... 2 k $\Omega$	$\pm 0.1\%$ Rdg $\pm 20 \mu\Omega$	5 Digits or 20 $\mu\Omega$
< 25 mA	2 k $\Omega$ ... 10 k $\Omega$	$\pm 0.2\%$ Rdg $\pm 200 \text{ m}\Omega$	5 Digits or 200 m $\Omega$
< 25 mA	10 k $\Omega$ ... 100 k $\Omega$	$\pm 0.8\%$ Rdg $\pm 20 \Omega$	4 Digits or 20 $\Omega$

## SPECIFICATIONS

**Model:** WR50-12

**Size:** L: 521 mm (20.5") W: 432 mm (17") H: 216 mm (8.5")

**Weight:** 16.6 kg (36.6 lbs.)

**Input power:** 90–264 VAC (1.5 kW max.), 47...63 Hz, auto-ranging

**Output voltage:** 0 to 50 V DC

**Test current user selectable:** 25 mA ... 50 A

**Front panel:** sealed, anodized

**Interfaces:** USB A/B and RS-232 port

**Resistance Range:** 0.00 $\mu\Omega$  ... 100k $\Omega$

**Memory storage:** Internally stores more than 10,000 test results

**Operating temperature:** -10°C to +60°C (14°F to 140°F)

**Storage temperature:** -20°C to +70°C (-4°F to 158°F)

## STANDARD ACCESSORIES INCLUDED

**Current and Potential Lead Set** – 10m (32 ft.)

**Safety Ground Lead** – 10m (32 ft.)

**Jumper Cable** – 10m (32 ft.)

**Power Cord** – 7.6m (25 ft.)

**External USB Drive and Touch Screen Stylus**

**A-B USB Cable** – 3m (10 ft.)

**Cable Bag with Shoulder Strap**

**Spare Fuse Set (10A), Qty. 5**

**Paper Refill for Printer** – 5 rolls

**Instruction Manual**

**Certification Report**

## OPTIONAL ITEMS AVAILABLE

**Cable Extension Set** – 10m (32 ft.): 2040N-05003

**Temperature Probe** – 10m (32 ft.): 2021N-26001

**Heat-Run Curve Analysis Software (AHRT-01):** 2042N-11001

**WR50-12R:** Rackmount Version

# WR50-13

## Winding Resistance Meter 50 Amps, 3 Channel

Raytech Digital Winding Resistance meter WR50-13 is an enhanced winding resistance system with the most advanced demagnetizing circuit. It is designed for a high degree of accuracy for the measurement of very low resistance of any inductive loads.

Unique, Newly Designed Measuring Technique: incorporates a high precision measurement circuit, a unique power source and the fastest charge and discharge unit on the market. This system is for measuring primary, secondary and tertiary in series on the same core leg.

Operation: The WR series applies a preset current level, selected by the user, from 0.025A to 50A. Results are reported on the easy-to-read color LCD display and can be stored or printed.

Advanced Protection: Upon powering on, the system initializes itself with a self-calibrating and circuit checking sequence. The system constantly monitors the conditions when turned on, detecting any problems during initialization or operation, and immediately notifies the operator. The WR series have extensive protection built into the circuitry.

### FEATURES

- Demagnetizing Circuit (Advanced design)
- Data exchange via USB-Key or USB / RS Connection
- Storage and Printing of test results while the test system is measuring
- Complete automatic calibration system and system diagnostics
- Temperature channels with automatic resistance correction
- Pure filtered DC Power source for the highest accuracy readings
- Automatic, high efficiency cooling system to dissipate internal heat
- Automatic shut off for over-temperature condition
- Color LCD display with backlighting and touch screen
- Panel mounted Emergency Stop Switch
- Mounted in a rugged and lightweight case
- 5-Year Standard Warranty



For sales, service, a quote or demonstration, call 24/7 ☎ 888-484-3779 ☎ 267-404-2676

# Winding Resistance

## ACCURACY

Current Range	Measuring Range	Accuracy	Resolution
30 – 50A	0.00 $\mu\Omega$ ... 1.3 $\Omega$	$\pm 0.1\%$ Rdg $\pm 0.05 \mu\Omega$	5 Digits or 0.05 $\mu\Omega$
15 – 30A	0.0 $\mu\Omega$ ... 3.3 $\Omega$	$\pm 0.1\%$ Rdg $\pm 0.1 \mu\Omega$	5 Digits or 0.1 $\mu\Omega$
8 – 15A	0.0000 m $\Omega$ ... 6.3 $\Omega$	$\pm 0.1\%$ Rdg $\pm 0.2 \mu\Omega$	5 Digits or 0.2 $\mu\Omega$
3 – 8A	0.0000 m $\Omega$ ... 16.7 $\Omega$	$\pm 0.1\%$ Rdg $\pm 0.5 \mu\Omega$	5 Digits or 0.5 $\mu\Omega$
1 – 3A	0.000 m $\Omega$ ... 47.2 $\Omega$	$\pm 0.1\%$ Rdg $\pm 1 \mu\Omega$	5 Digits or 1 $\mu\Omega$
0.7 – 1A	0.000 m $\Omega$ ... 71.4 $\Omega$	$\pm 0.1\%$ Rdg $\pm 2 \mu\Omega$	5 Digits or 2 $\mu\Omega$
0.3 – 0.7A	0.000 m $\Omega$ ... 167 $\Omega$	$\pm 0.1\%$ Rdg $\pm 5 \mu\Omega$	5 Digits or 5 $\mu\Omega$
0.1 – 0.3A	0.00 m $\Omega$ ... 500 $\Omega$	$\pm 0.1\%$ Rdg $\pm 10 \mu\Omega$	5 Digits or 10 $\mu\Omega$
25 – 100 mA	0.00 m $\Omega$ ... 2 k $\Omega$	$\pm 0.1\%$ Rdg $\pm 20 \mu\Omega$	5 Digits or 20 $\mu\Omega$
< 25 mA	2 k $\Omega$ ... 10 k $\Omega$	$\pm 0.2\%$ Rdg $\pm 200 \text{ m}\Omega$	5 Digits or 200 m $\Omega$
< 25 mA	10 k $\Omega$ ... 100 k $\Omega$	$\pm 0.8\%$ Rdg $\pm 20 \Omega$	4 Digits or 20 $\Omega$

## SPECIFICATIONS

**Model:** WR50-13

**Size:** L: 521 mm (20.5") W: 432 mm (17") H: 216 mm (8.5")

**Weight:** 17.2 kg (37.9 lbs.)

**Input power:** 90 - 264 VAC (1.5 kW max.), 47...63 Hz, auto-ranging

**Output voltage:** 0 to 50 V DC

**Test current user selectable:** 50 A ... 25 mA

**Front panel:** sealed, anodized

**Interfaces:** USB A/B and RS-232 port

**Resistance Range:** 0.00 $\mu\Omega$  ... 100k $\Omega$

**Memory storage:** Internally stores more than 10,000 test

**Operating temperature:** -10°C to +60°C (14°F to 140°F)

**Storage temperature:** -20°C to +70°C (-4°F to 158°F)

## STANDARD ACCESSORIES INCLUDED

**Current and Potential Lead Set** – 10m (32 ft.)

**Safety Ground Lead** – 10m (32 ft.)

**Jumper Cables (2)** – 10m (32 ft.) each

**Power Cord** – 7.6m (25 ft.)

**External USB Drive and Touch Screen Stylus**

**A-B USB Cable** – 3m (10 ft.)

**Cable Bag with Shoulder Strap**

**Spare Fuse Set (10A), Qty. 5**

**Paper Refill for Printer** – 5 rolls

**Instruction Manual**

**Certification Report**

## OPTIONAL ITEMS AVAILABLE

**Cable Extension Set** – 10m (32 ft.): 2041N-05003

**Temperature Probe** – 10m (32 ft.): 2021N-26001

**Heat-Run Curve Analysis Software (AHRT-01):** 2042N-11001

**WR50-13R:** Rackmount Version

# mini-ATOS

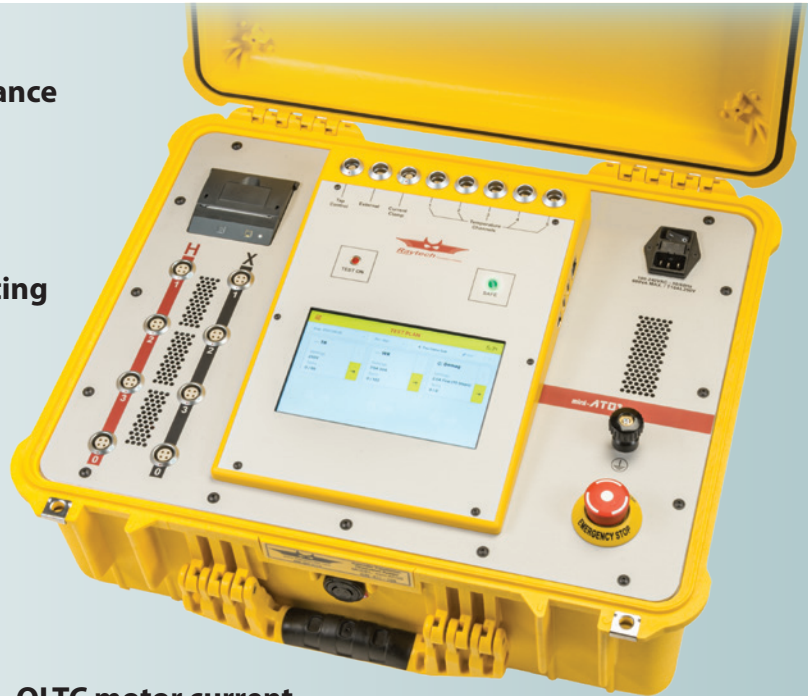
## Automatic Transformer Observation System

This precision instrument is a professional multifunctional power transformer and substation diagnostic system. It is a compact and intelligent instrument that can perform many routine measurements such as Turns Ratio (TR), Winding Resistance with Demagnetization (WR), and advanced optional tests such as Dynamic Resistance Measurement (DRM), Frequency Response of Stray Losses (FRSL) Magnetic Balance and other diagnostic parameters.

Only a one-time connection is required for nearly all functions which saves a considerable amount of time. The portable and rugged case is perfect for use anywhere on-site or in a laboratory. It is specially designed for fast and easy measurement with the well-known high precision and quality of all Raytech instruments.

### FEATURES

- Portable
- Turns Ratio AND Winding Resistance
- Demagnetization
- 5 built-in temperature channels
- Internal printer
- Color LCD display with backlighting and touch screen
- Panel mounted Emergency Stop Switch
- Mounted in a rugged and lightweight case
- 5-Year Standard Warranty



### OPTIONAL FEATURES

- DRM – Dynamic Resistance Measurement
- FRSL – Frequency Response of Stray Losses
- Short circuit impedance
- Magnetic balance
- OLTC motor current measurement
- Excitation current
- Auto vector detection
- Heat-Run

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# TR/WR Combination

## ACCURACY

	Test Current	Charging Voltage	Resistance Range	Accuracy
Resistance Measurement	30A and 7.5A <i>simultaneously</i>	100V	0 ... 100k $\Omega$	up to 0.1% $\pm$ 0.1 $\mu\Omega$
	Test Voltage	Turns Ratio Range		Accuracy
Turns Ratio Measurement	up to 250VAC	1 ... 20 000		up to 0.05%

## SPECIFICATIONS

**Model:** mini-ATOS

**Size:** L: 524 mm (20.6") W: 428 mm (16.8") H: 206 mm (8.1")

**Weight:** 15 kg (33 lbs.)

**Input Power:** 85 - 264VAC 47 ... 63Hz, auto-ranging

**Interface:** 2 x USB-A 1 x USB-B / Ethernet port

**Operating temperature:** -10°C to +60°C (14°F to 140°F)

**Storage temperature:** -20°C to +70°C (-4°F to 158°F)

## STANDARD ACCESSORIES INCLUDED

Cable Bag

Test Leads

Ground Cable

Power Cord

Paper Refill for Printer – 5 rolls

Fuses

Stylus

USB Memory Stick

Instruction Manual

Certification Report

## OPTIONAL ITEMS AVAILABLE

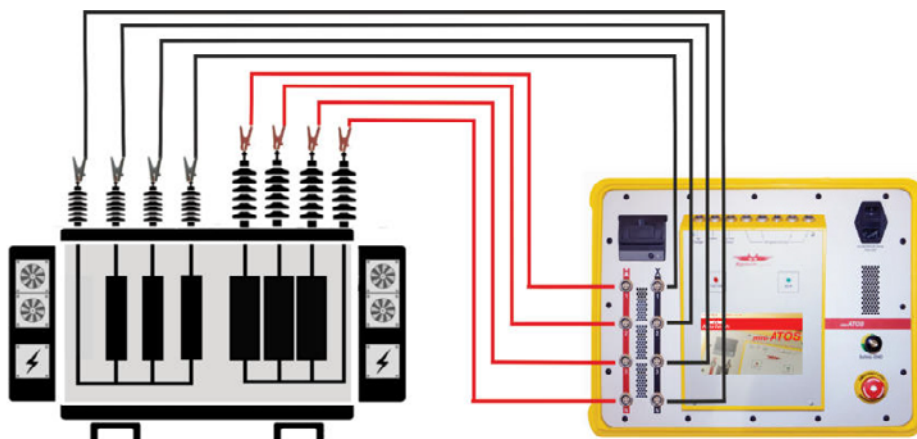
External Temperature Probe

Safety Switch

Tap Control

Current Clamp

Short Circuit Clamps



# Micro Junior 2

## Micro Ohm Meter 10A

This battery-operated system allows over 2,000 test measurements with 10A output without recharging. The unit was designed for a high degree of accuracy to measure very low resistances.

The Micro Junior 2 is a high precision, fully automatic, microprocessor based, 10 Amp Digital Micro-Ohm Meter, designed for highly accurate readings on-site with laboratory precision.

The MJ2 applies a preset current level, selected by the user, from 0.001A to 10A. The results of the test are displayed automatically within a few seconds, and reported on the easy-to-read liquid crystal display, and then can be stored or printed out.

### FEATURES

- Automatic measurements of low resistance from  $0.00\mu\Omega$  ...  $400k\Omega$
- Automatic current reversal mode for highest accuracy
- Lithium Battery power source
- Runs for more than 5 hours continuous at 10 amps
- Single push button operation
- Response time less than 2 seconds
- Single or continuous measurements with automatic data storage
- User can preset a number of tests, at various timed intervals, for automatic data storage
- Complete automatic calibration system and system diagnostics
- Pure filtered DC power source for the highest accuracy readings
- Cable length for cable testing
- Color LCD display with backlighting
- Panel mounted Emergency Stop Switch
- Mounted in a rugged and lightweight case
- 5-Year Standard Warranty



For sales, service, a quote or demonstration, call 24/7 ☎ 888-484-3779 ☎ 267-404-2676

# Contact Resistance

## ACCURACY

Current Range	Measuring Range	Accuracy	Resolution
10 A F/R*	0.00 $\mu\Omega$ ... 40 m $\Omega$	$\pm 0.1\%$ Rdg $\pm 0.01 \mu\Omega$	5 Digits or 0.01 $\mu\Omega$
10 A	0.0 $\mu\Omega$ ... 40 m $\Omega$	$\pm 0.1\%$ Rdg $\pm 1 \mu\Omega$	5 Digits or 0.1 $\mu\Omega$
1 A F/R*	0.0 $\mu\Omega$ ... 1 $\Omega$	$\pm 0.1\%$ Rdg $\pm 1 \mu\Omega$	5 Digits or 0.1 $\mu\Omega$
1 A	0.000 m $\Omega$ ... 1 $\Omega$	$\pm 0.1\%$ Rdg $\pm 10 \mu\Omega$	5 Digits or 0.001 m $\Omega$
0.1 A	0.00 m $\Omega$ ... 10 $\Omega$	$\pm 0.1\%$ Rdg $\pm 0.1 \text{ m}\Omega$	5 Digits or 0.01 m $\Omega$
10 mA	0.0 m $\Omega$ ... 400 $\Omega$	$\pm 0.1\%$ Rdg $\pm 1 \text{ m}\Omega$	5 Digits or 0.1 m $\Omega$
1 mA	0.0 $\Omega$ ... 40 k $\Omega$	$\pm 0.1\%$ Rdg $\pm 0.1 \Omega$	5 Digits or 0.1 $\Omega$
1 mA	40 k $\Omega$ ... 400 k $\Omega$	$\pm 0.1\%$ Rdg	5 Digits

\*F/R = automatic Forward / Reverse current measurements

## SPECIFICATIONS

**Model:** Micro Junior 2

**Size:** L: 410 mm (16.1") W: 337 mm (13.3") H: 178 mm (7")

**Weight:** 5.9 kg (13 lbs.)

**Test current user selectable:** 10, 1, 0.1, 0.01, 0.001 A DC

**Front panel:** sealed, anodized with a multi-actuation rotary knob

**Interface:** RS-232 port

**Memory storage:** Internally stores up to 2,000 test results

**Resistance Range:** 0.00 $\mu\Omega$  ... 400k $\Omega$

**Operating temperature:** -10°C to +60°C (14°F to 140°F)

**Storage temperature:** -20°C to +70°C (-4°F to 158°F)

## STANDARD ACCESSORIES INCLUDED

**Current and Potential Lead Set**, Positive and Negative – 5m (16 ft.)

**Lithium-Ion Battery Charger** with power cord

**Safety Ground Lead** – 5m (16 ft.)

**RS-232 Cable** – 3m (10 ft.)

**Cable Bag** with Shoulder Strap

**Paper Refill for Printer** – 5 rolls

**Instruction Manual**

**Certification Report**

## OPTIONAL ITEMS AVAILABLE

**Temperature Probe** – 10m (32 ft.): 2020N-26002

**Kelvin Spike Probes** – 4m (13 ft.): 2020N-33001

**Kelvin Spike Probes** – 5m (16 ft.): 2020N-33005

# Kelvin Spike Probes

For Digital Low Resistance Ohm Meters  
(Micro Ohm Meters)

## Exclusive Design from Raytech



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# Contact Resistance

- **4" insulated spike probe measuring shaft with spring-loaded potential tip centered in dual current points**
- **4" easy-grip, robust handle**
- **Can be used with any 10 Amp contact resistance meter (Kelvin measuring system)**
- **2 standard lengths available: 4m and 5m, custom lengths are also available**
- **5-Year standard warranty covers defects resulting from manufacturer's workmanship and cannot cover wear from normal use. Raytech will refurbish your worn spike probes and restore them to "like new" condition for about half the cost of a new set.**



# MC2

## Micro Ohm Meter 200A

Packed into a portable test system to be used by apparatus manufacturers, rebuild shops, and electrical maintenance crews, this system was designed for a high degree of accuracy to measure very low resistances.

The MC2 is a high precision, fully automatic, microprocessor based, 200 Amp Digital Micro-Ohm Meter, designed for highly accurate readings on-site with laboratory precision, with an easy-to-use operation screen; allowing a quick selection of the current level and resistance range to be measured. This newly designed technique of measurement incorporates a high precision measurement circuit and modular power source. Extensive filtering and high precision standards are used within the test system.

The MC2 applies a preset current level, selected by the user, from 10A to 200A. The results of the test are displayed automatically within a few seconds, and reported on the easy-to-read liquid crystal display, and then can be stored or printed out.

### FEATURES

- **Printing and storage of test results while the system is measuring**
- **Complete automatic calibration system and system diagnostics**
- **Automatic, high efficiency cooling system to dissipate internal heat**
- **Automatic shut off for over-temperature condition**
- **Wide input power source range**
- **Single, Continuous, or Timed Interval mode with Automatic data storage**
- **100 Amp Continuous**
- **Pure filtered DC power source for the highest accuracy readings**
- **Cable length correction for Cable Manufacturer**
- **Color LCD display with backlighting**
- **Panel mounted Emergency Stop Switch**
- **Mounted in a rugged and lightweight case**
- **5-Year Standard Warranty**



For sales, service, a quote or demonstration, call 24/7 ☎ 888-484-3779 ☎ 267-404-2676

# Contact Resistance

## ACCURACY

Current Range	Measuring Range	Accuracy	Resolution
200A	0.00 $\mu\Omega$ ... 20 m $\Omega$	$\pm 0.1\%$ Rdg $\pm 0.01$ $\mu\Omega$	5 Digits or 0.01 $\mu\Omega$
100A	0.00 $\mu\Omega$ ... 40 m $\Omega$	$\pm 0.1\%$ Rdg $\pm 0.02$ $\mu\Omega$	5 Digits or 0.02 $\mu\Omega$
50A	0.00 $\mu\Omega$ ... 100 m $\Omega$	$\pm 0.1\%$ Rdg $\pm 0.04$ $\mu\Omega$	5 Digits or 0.05 $\mu\Omega$
20A	0.0 $\mu\Omega$ ... 1.0 $\Omega$	$\pm 0.1\%$ Rdg $\pm 0.1$ $\mu\Omega$	5 Digits or 0.1 $\mu\Omega$
10A	0.0 $\mu\Omega$ ... 5.0 $\Omega$	$\pm 0.1\%$ Rdg $\pm 0.2$ $\mu\Omega$	5 Digits or 0.2 $\mu\Omega$

## SPECIFICATIONS

**Model:** MC2

**Size:** L: 521 mm (20.5") W: 432 mm (17") H: 216 mm (8.5")

**Weight:** 14.4 kg (31.7 lbs.)

**Input Power:** 100 - 250 VAC, 50/60 Hz, auto-ranging

**Output Power:** 1000 Watt

**Test current user selectable:** 200, 100, 50, 20 10A DC

**Front panel:** sealed, anodized with a multi-actuation rotary knob

**Interface:** DB 25 Pin Centronics Parallel / RS-232 port

**Memory storage:** Internally stores up to 2,000 test results

**Resistance Range:** 0.00 $\mu\Omega$  ...5 $\Omega$

**Operating temperature:** -10°C to +60°C (14°F to 140°F)

**Storage temperature:** -20°C to +70°C (-4°F to 158°F)

## STANDARD ACCESSORIES INCLUDED

**Current and Potential Lead Set,** Positive and Negative – 5m (16 ft.)

**Power Cord** – 7.6m (25 ft.)

**Safety Ground Lead** – 5m (16 ft.)

**RS-232 Cable** – 3m (10 ft.)

**Cable Bag** with Shoulder Strap

**Paper Refill for Printer** – 5 rolls

**Spare Fuse Set** (10A), Qty. 5

**Instruction Manual**

**Certification Report**

## OPTIONAL ITEMS AVAILABLE

**Temperature Probe** – 10m (32 ft.): 2021N-26001

## CT-T1

### Current Transformer Tester

A microprocessor-based Current Transformer Tester that measures CT excitation current, turns ratio, and winding polarity tests. Single connection permits all taps on the current transformer to be tested automatically, without operator intervention. The CT-T1 has a fully automatic knee point detection (ASA 10/50, IEEE 30°, IEEE 45°), and includes 5 low side taps and 1 high side tap.

### FEATURES

- Fully automatic knee point detection (ASA 10/50, IEEE 30°, IEEE 45°)
- Ratio range of 0.9 to 15,000
- Easy one time hook up – 5 low side taps connections / 1 high side tap
- Performs CT excitation, turns ratio, and polarity tests on current transformers CT
- Can be used to perform turns ratio test on voltage transformers VT
- Manual or automatic measurements
- Automatic test voltage range with adjustable limits
- Easy to use tap selector interface
- 3" Printable Hysteresis curve
- Color LCD display with backlighting and touchscreen
- Panel mounted Emergency Stop Switch
- Mounted in a rugged and lightweight case
- 5-Year Standard Warranty



# Transformer Test Systems

## ACCURACY

Ratio Range	Accuracy	Resolution
0.9–5,000	±0.05%	5 Digits
5,001–10,000	±0.5%	5 Digits
10,001–15,000	±1%	5 Digits
Voltage Range	Accuracy	Resolution
0–2,000 V	1% Rdg, ±0.1 V	0.01 V
Current	Accuracy	Resolution
0 – 10 A	1% Rdg, ±0.001 A	0.01 mA

## SPECIFICATIONS

**Model:** CT-T1

**Size:** L: 521 mm (20.5") W: 432 mm (17") H: 216 mm (8.5")

**Weight:** 20 kg (44 lbs.)

**Input power:** 115 - 230 VAC, 50/60 Hz auto-ranging

**Front panel:** sealed, anodized

**Interfaces:** USB A/B and RS-232 port

**Memory storage:** Internally stores more than 10,000 test results

**Operating temperature:** -10°C to 60°C (14°F to 140°F)

**Storage temperature:** -20°C to 70°C (-4°F to 158°F)

## STANDARD ACCESSORIES INCLUDED

**H Lead** – 5m (16 ft.), Qty. 1

**X Leads** – 5m (16 ft.), Qty. 5

**Safety Ground Lead** – 10m (32 ft.)

**Safety Switch** – 2m (6.5 ft.)

**H Lead Extension** – 5m (16 ft.), Qty. 1

**X Lead Clip Adapters**

**H Lead Adapter**

**Power Cord** – 7.6m (25 ft.)

**External USB Drive and Touch Screen Stylus**

**A-B USB Cable** – 3m (10 ft.)

**Cable Bag** with Shoulder Strap

**Paper Refill for Printer** – 5 rolls

**Spare Fuse Set** (16A), Qty. 5

**Instruction Manual**

**Certification Report**

## OPTIONAL ITEMS AVAILABLE

**H Lead Extensions** – 5m (16 ft.): 4080N-05001

**Custom Clips:** Customer Spec

# ATOS

## Automatic Transformer Observation System

Raytech – The World Leader in design and manufacturing of high-quality precision measuring instruments and systems, offering flexibility and versatility. Our modular Automatic Transformer Observation System (ATOS) allow you to create a unique and custom solution for any application. ATOS is designed to drastically reduce measuring time and increase test performance, without losing accuracy compared to individual test instruments. With the choice of up to three Multiplexers (primary, secondary, and tertiary), three Winding Resistance Meters, each with three maximum current range options (up to 15A, 50A, or 100A), Turns Ratio, and Integrated power security and safety panel (ISU R), Raytech can create a system with your needs and budget in mind.

### FEATURES

- Minimizes cabling time
- Does all measurements with one cabling per transformer, including Winding Resistance and Turns Ratio
- Uses up to three Multiplexers and measures transformers with three winding systems with one cabling sequence
- No Precision loss compared to single use of devices
- Different currents at same time on Primary and Secondary
- Get your own configuration containing from one to three Multiplexers, from one to three Winding Resistance Meters and one Turns Ratio Meter
- Control your Tap Changer with a powerful tap changer interface
- Operate all instruments on a touch screen or by remote control
- Integrated Safety Unit providing fused electrical power, central interlock system and central warning lamp interface



### SPECIFICATIONS

Turn Ratio Accuracy: Up to 0.06%  
Phase relations: Any angle (not limited to 30° steps)  
Winding resistance accuracy: Up to 0.1%  $\pm 0.05\mu\Omega$   
Winding resistance DC supply: Up to 100A / 50V  
Demagnetizing: fully automatic

Heat run test: Available on Winding Resistance  
Case: Custom 19" Rack Shelf  
Interface: USB  
Remote control: Individual software or by Raytech T-Base Pro  
Input power: 88 - 264 VAC, 47...63 Hz

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# Automation

## MUX R

### Multiplexer for Transformer Testing

Raytech Multiplexer MUX R is designed to drastically reduce cabling time and increase test performance. It is made to be used with Raytech Winding Resistance and Turns Ratio Meters. Any MUX R configuration can be easily controlled by a Winding Resistance Meter touch panel or by remote.

### FEATURES

- Minimizes cabling time
- Does all measurements with one cabling per transformer, including Winding Resistance and Turns Ratio
- Use up to three Multiplexers and measure transformers with three winding systems with one cabling sequence
- Get your own configuration containing from one to three Multiplexers, from one to three Winding Resistance Meters and one Turns Ratio Meter
- Control your Tap Changer with a powerful tap changer interface
- Operate all instruments on a touch screen or by remote control
- Get a customized complete solution containing WR, TR and Multiplexers. Ask Raytech for an ATOS (Automatic Transformer Observing System)
- 5-Year Standard Warranty



### SPECIFICATIONS

Model: MUX R

Measuring: current up to 100 Amps

Size: L: 490 mm (19.3") W: 436 mm (17.2") H: 177 mm (7"), Rack

Unit: 4U

Weight: 10.3 kg (22.7 lbs.)

Input power: 88 - 264 VAC, 47...63 Hz

Front panel: sealed, anodized

### ACCURACY

Using a 4-wire measurement ensures the same high precision as measuring without a Multiplexer.

# ISU-R

## Integrated Safety Unit for ATOS

Raytech Integrated Safety Unit is a useful device when creating rack mounted transformer observation systems. It supplies Raytech devices with fused electrical power, manages external Interlocks and provides a single interface for an external warning lamp. The whole system can be turned on and off with a single mains switch.

### FEATURES

- One main power switch for entire ATOS
- Handles external interlock signal
- Connect one warning lamp for all devices
- Proper and fused AC power distribution
- Additional fused power plug on front panel
- Indications for interlock circuit and warning lamp state
- Open system (not limited for Raytech devices)
- 5-Year Standard Warranty



### SPECIFICATIONS

Model: ISU R

Size: L: 490 mm (19.3") W: 436 mm (17.2") H: 177 mm (7"), Rack

Unit: 4U

Weight: 10.3 kg (22.7 lbs.)

Input power: 88 to 264 VAC, 47...63 Hz

Front panel: sealed, anodized

ISU-R



ATOS  
rear view



MUX R



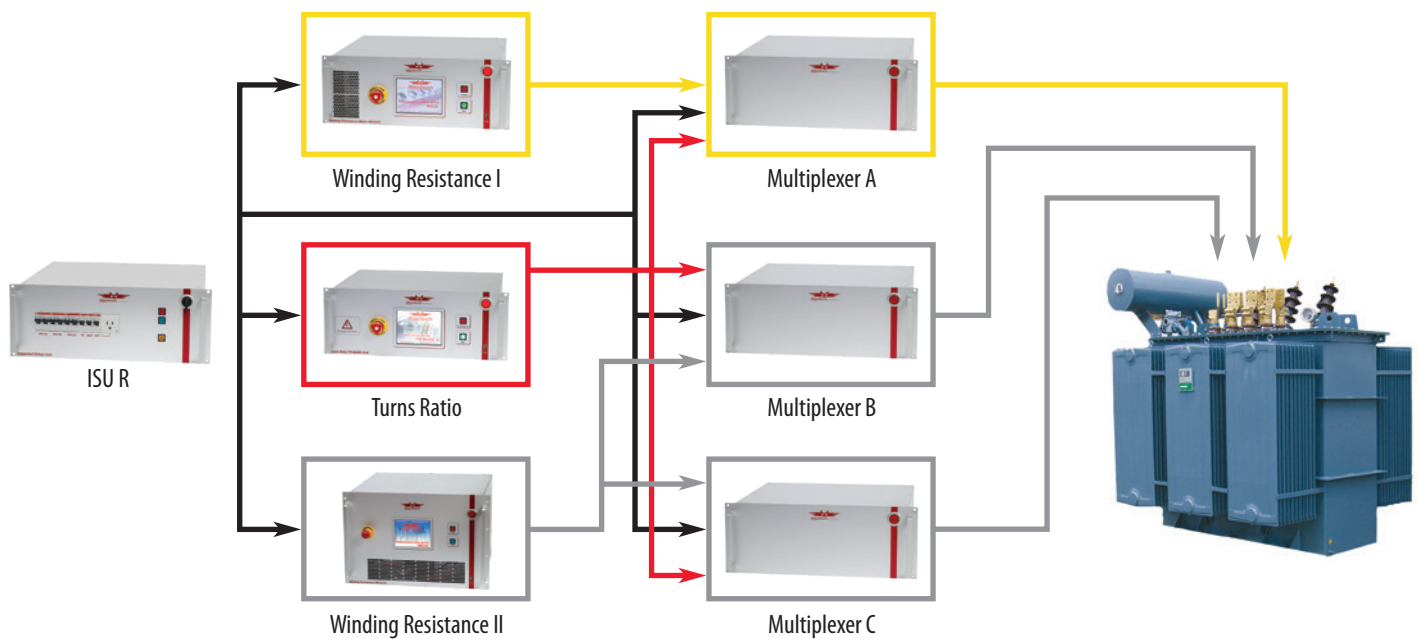
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# Automation

## ONE OF MANY POSSIBLE **ATOS** CONFIGURATIONS

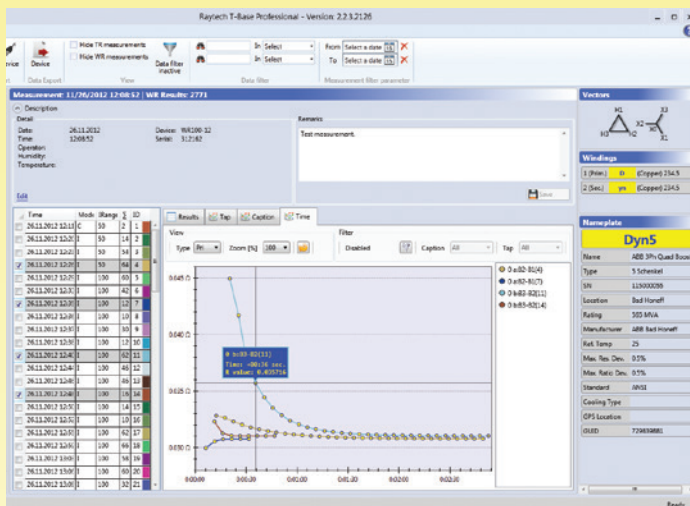
Whatever the application, there are many possibilities for integration. In this example the yellow outline shows the connection of the primary, and the grey outline shows the connection of secondary and tertiary windings.



# SOFTWARE

## T-Base Pro

### Software for Transformer Measuring / Professional



\*\*\*Test Report\*\*\*

Transformer Nameplate: Demo YNyn0  
Name: Demo YNyn0  
S/N: Demo YNyn0  
Type: Demo YNyn0  
Manufacturer: Raytech Switzerland  
Max. Ratio Deviation: IEC  
Standard: IEC  
Cooling Type: Demo Transformer

Configuration: Ynyn0

Measurement

Date: 1/19/2015 6:03:42PM  
Device Name: WR50-12  
S/N Device: 323132  
Remarks: Demo Dataset, created 19.01.2015

Date: 1/19/2015 6:03:43PM Mode: I

+Time	WS	Tap	Phase	Capcion	Rmeas	Rcorr	T1 [C]	T2 [C]	T3 [C]	T Ext [C]	tTest
+00:04:40.0	Pri	+1	d H1-H0	H1-H0	419.02 mΩ	419.02 mΩ	76.17	72.60			15.00
+00:04:45.0	Pri	+1	d H1-H0	H1-H0	418.88 mΩ	418.88 mΩ	76.07	72.51			15.00
+00:04:50.0	Pri	+1	d H1-H0	H1-H0	418.76 mΩ	418.76 mΩ	75.98	72.41			15.00
+00:04:55.0	Pri	+1	d H1-H0	H1-H0	418.62 mΩ	418.62 mΩ	75.88	72.32			15.00
+00:05:00.0	Pri	+1	d H1-H0	H1-H0	418.50 mΩ	418.50 mΩ	75.78	72.23			15.00
+00:05:05.0	Pri	+1	d H1-H0	H1-H0	418.36 mΩ	418.36 mΩ	75.68	72.14			15.00
+00:05:10.0	Pri	+1	d H1-H0	H1-H0	418.22 mΩ	418.22 mΩ	75.59	72.05			15.00
+00:05:15.0	Pri	+1	d H1-H0	H1-H0	418.10 mΩ	418.10 mΩ	75.49	71.96			15.00
+00:05:20.0	Pri	+1	d H1-H0	H1-H0	417.96 mΩ	417.96 mΩ	75.39	71.87			15.00
+00:05:25.0	Pri	+1	d H1-H0	H1-H0	417.84 mΩ	417.84 mΩ	75.30	71.78			15.00
+00:05:30.0	Pri	+1	d H1-H0	H1-H0	417.70 mΩ	417.70 mΩ	75.20	71.69			15.00
+00:05:35.0	Pri	+1	d H1-H0	H1-H0	417.58 mΩ	417.58 mΩ	75.10	71.60			15.00
+00:05:40.0	Pri	+1	d H1-H0	H1-H0	417.44 mΩ	417.44 mΩ	75.01	71.51			15.00
+00:05:45.0	Pri	+1	d H1-H0	H1-H0	417.32 mΩ	417.32 mΩ	74.91	71.43			15.00

**T-Base Pro is a new powerful software for electrical testing, developed by Raytech AG.** Years of experience in building world-class testing equipment flowed into the development, resulting in a state-of-the-art software framework. Its functionality ranges from simple data import and export using a USB stick, to the full control of the sophisticated Raytech testing devices and measurement systems remotely.

On top of all that, the powerful "Sequence" module enables users to fully automate the measurement process. Complex measurement procedures, involving multiple devices and complex setups, can be easily programmed using graphical drag-n-drop tools.

Special attention during development has been put on the intuitive user experience with no restriction in range of functionality. Its modern GUI makes it a pleasure to work with. Basic data manipulation operations can be intuitively done, even by the user with no previous experience using the application. Also, testing experts with upscale requirements working in a laboratory environment and using complex testing setups are well served.

T-Base is full multi-tasking and multi-user capable. Thanks to its modular architecture and progressive add on interface, it can be very easily extended or be integrated into third-party systems. It's also possible to write drivers for third-party devices and control them from T-Base. Nothing is impossible!

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## FEATURES

### Data Management features of the T-Base Professional

- Profile and template creation with simple and easy to use graphical UI wizard
- Create, copy, and delete profiles and templates
- Profile creation from templates
- Template extraction from existing profiles
- Export and import of the profiles and templates in form of files
- Profile export to file with or without measurement results
- Auto detection of the USB stick with Raytech data on it
- Profile and template export to the device using USB or RS232 interface
- Profile and measurement data import from device using USB or RS232 interface
- Full-blown profile and template editor with advanced automatic TAP calculator
- Powerful filter and search engine
- Multiview graphical measurement data presentation, comparison, and inspection.
- All data is stored to the SQL database

### Device Remote Controlling option "REMOTE" of T-Base Pro

- Full remote control of the selected Raytech devices
- Automatic device detection and connection management using native Raytech USB drivers for MS Windows
- Direct data import and export over USB or Serial port
- Realtime result display and data presentation
- Multiple devices can be controlled at once
- Complex ATOS setups can be saved in form of the virtual device and used as any real device
- Clear and modern graphical user interface
- Profile and measurement data import from device using USB or RS232 interface
- Full-blown profile and template editor with advanced automatic TAP calculator
- Powerful filter and search engine
- Multiview graphical measurement data presentation, comparison, and inspection
- All data is stored to the SQL database

### Measurement Automation Option "SEQUENCE" of the T-Base Professional

With the measurement automation module of the T-Base Pro it is possible to fully automate measurement process. With its unique and sophisticated graphical programming tool, it's possible to build and automate every possible measurement scenario for the ATOS systems. Notification about measurement state or confirmation and tasks can be sent to the user with email. Workflows can be saved, loaded, customized, and reused. Programming process is very easy with its graphical drag-and-drop tool.

### Extensibility and Customization Features

In order to meet individual needs of customers, T-Base provides a powerful API for the development of the custom add-ons. It can be extended with new functionality or integrated into the third party environment both as master or as slave. Developer can use existing platform modules such as SQL database abstraction layer, MVVM tools and libraries, device driver layers, sophisticated graphic components and many more. Extension can be configured to start as a background process or as a full-blown GUI application with the ribbon menu, started automatically with the application or with a click on the menu item inside the add-on menu. With the device driver SDK, writing drivers for the 3-party devices and controllable from within T-Base is possible also. Sophisticated project templates for MS Visual Studio are also provided.

*continued*

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# T-Base Pro, *continued*

## Software for Transformer Measuring / Professional

### T-Base Pro Reporting Features

As of version 2.4, powerful SAP Crystal Reports report generator is integrated with T-Base Pro. SAP Crystal Reports is de facto standard in business intelligence reporting. Reports can be exported as Crystal Report, Word, Excel, PDF, XML, CVS, Rtf, HTML, and many more. Integrated report templates can be used as a base for new reports designed according to your company norms.

### T-Base Database

T-Base comes with pre-configured embedded Microsoft SQL Server CE, that can store data up to 4GB of size. Database standard location can be changed and placed anywhere local or on network drive. Database placed on a network drive makes it accessible for different clients and easier to backup. T-Base also works with Microsoft SQL Express and Standard versions, positioning itself as an ideal solution for multiuser and centralized labor environments.

### User Interface

Orientation to modern technologies for user interface design such as Microsoft WPF (Windows Presentation Foundation) allows us to design modern graphic user interface that is simultaneously functional and visually attractive. We at Raytech think that the user interface for industrial application does not have to be austere and boring. Besides the attractive appearance, T-Base graphical user interface is also simple and efficient.

### Development Technology

The heat run test, i.e., temperature rise test, is the type test carried out to verify the guaranteed temperature rise for oil and windings.

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## SYSTEM REQUIREMENTS

### Minimum

Windows Vista  
Pentium 4, 3.2 GHz or higher  
Screen 1024 x 768 pixels

### Recommended

Windows 7/8/8.1/10 with latest service pack  
1 GB Ram Core2 requested  
Microsoft .NET framework 4.5  
Screen 1920 x 1080 pixels or higher

Visit the T-Base Pro website for more information and to download your free copy of the software at <http://TBase.Raytech.ch>



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# T-Base Lite

## Software for Transformer Measuring / Lite

T-Base Lite is intended for users preferring simplicity over complexity of the Pro version. It is limited to the basic functions of USB interface, data import, data export, synchronization, and automatic firmware updates. Data can be exported in many popular data formats such as Excel, Word, text, .csv, .xml, Crystal reports, and .html. Measurements can be saved as archive files and imported into the database of the T-Base Pro version.

The T-Base Lite (as well the T-Base Pro in the basic version) is completely free.

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### HOW TO USE T-BASE LITE

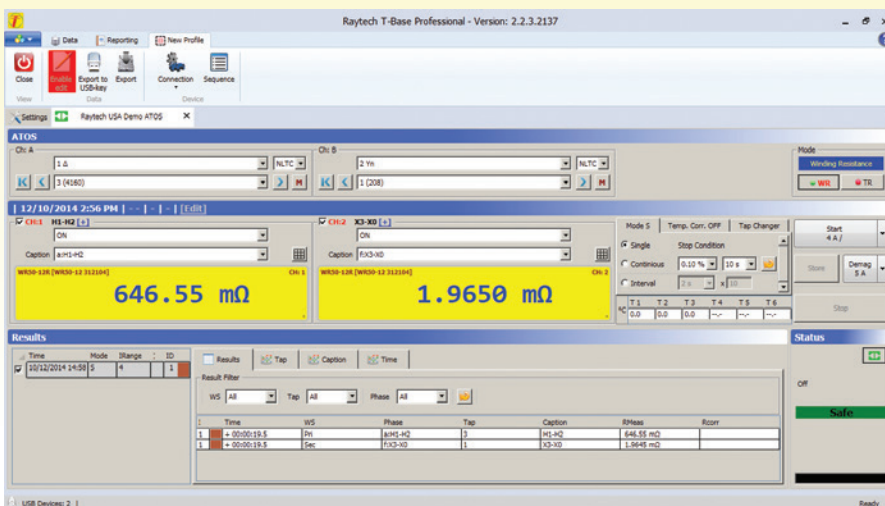
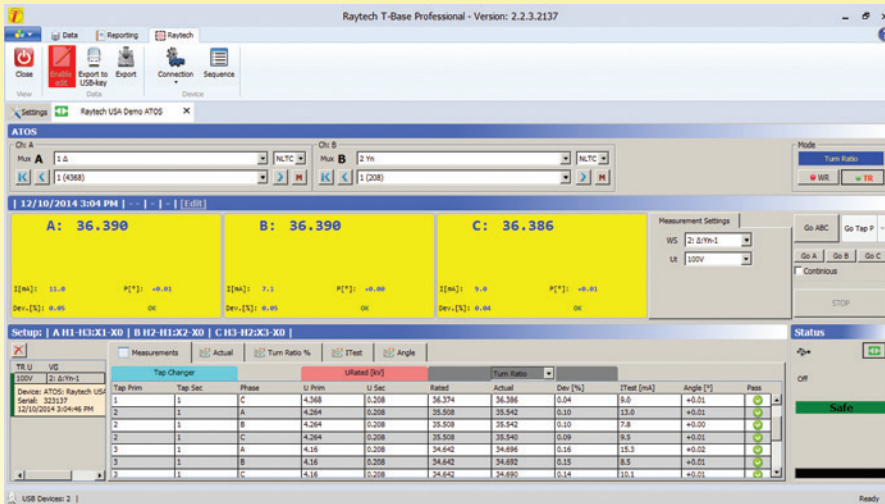
1. Download T-Base installation file
2. Start installation procedure and follow the instructions on the screen
3. Click on the T-Base Lite desktop icon to open the program
4. Connect your Raytech measurement device using USB interface
5. Select the connected USB device from the list and click "connect" button. T-Base will attempt to import existing data from the device after the first connection.
6. T-Base Lite is ready to receive the data from the device. Perform the measurements using connected Raytech device. Saving results to the internal memory



# T-Base Remote

## Control Your Raytech Instruments Remotely

- Full remote control capabilities of selected Raytech instruments
- Automatic device detection and connection management using native Raytech USB drivers for MS Windows
- Direct data import and export over USB or Serial port
- Realtime result displays and data presentation
- Multiple devices, with valid licenses, can be controlled at the same time
- Complex ATOS setups can be saved in the form of a virtual device and used as any real device
- Clear and modern graphical user interface



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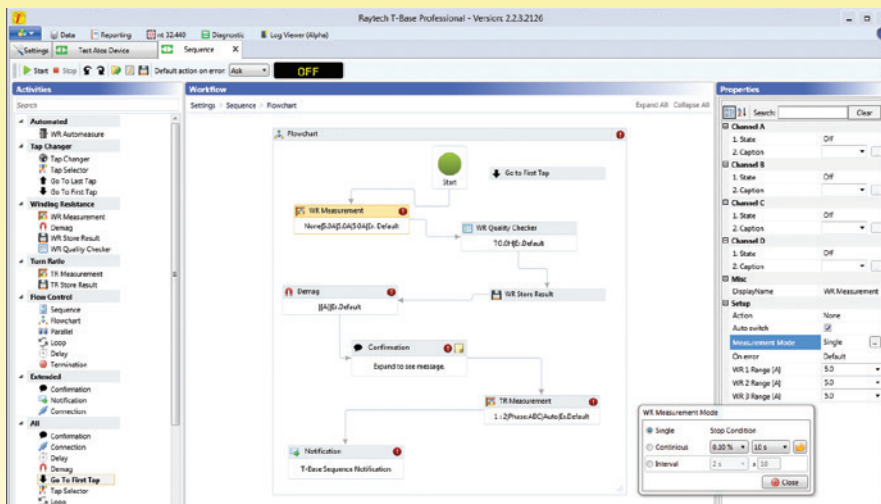
# T-Base Sequence

## Automate Your Measurement Process

Sequence is the measurement automation module of T-Base Pro that makes it possible to fully automate the measurement process. With this unique and sophisticated graphical programming tool, it is possible to build and automate every possible measurement scenario for the ATOS system.

Notifications about the measurements, confirmations, or tasks that were performed can be sent to the user via email. Workflows can be saved, loaded, customized, and reused. Programming is very easy with the graphical drag-n-drop tool.

Remote Options needed for Raytech devices are included in Sequence.



# SDK

## Software Development Kit

The SDK allows software developers to create their own applications. It is a device management software with various possible applications. The kit is essentially a software layer (or driver) that resides between the Operating System (OS) IO system, custom Windows Application and Raytech instruments. The SDK with native Raytech USB Driver for Windows provides the OS with full device functionality, appearing to OS as Raytech USB device. This software can also be used without native Raytech USB drivers to control the device over the standard RS 232 Serial port.

It is a powerful tool to write easy customized Software to control the Raytech Instruments.

### FEATURES

- Write your own application
- Control the Measuring instruments with your own program
- Connection of Raytech Instruments over the USB or the RS232 port
- It's a .NET Library

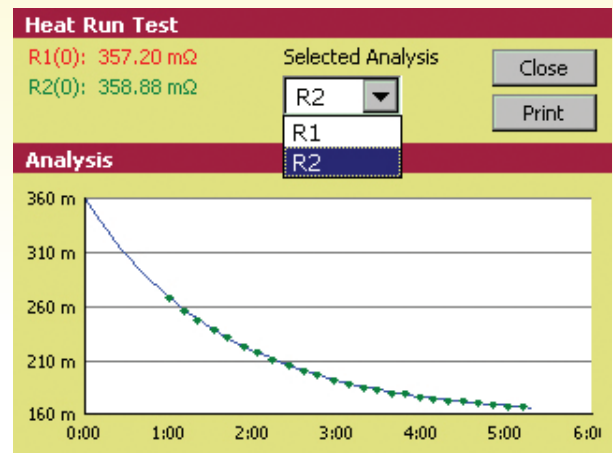
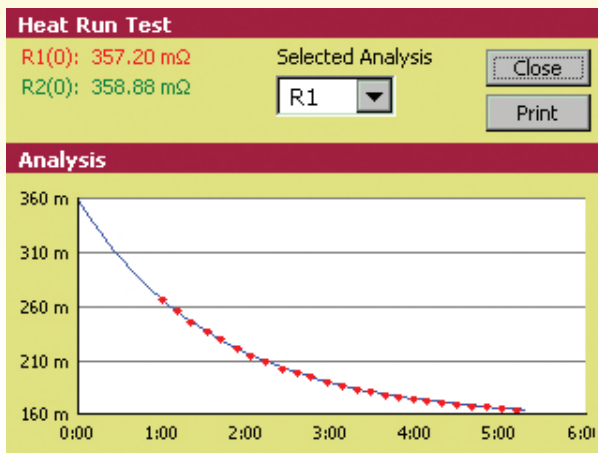
SDK can be used for the following Raytech test equipment:

- TR-MARK III
- TR-MARK III R
- TR-MARK III 250V
- TR-MARK III R 250V
- WR14
- WR14 R
- WR50-12
- WR50-12R
- WR50-13
- WR50-13R
- WR100-12R
- WR100-13R

# Heat-Run Software

## AHRT-01

The optional heat-run software allows you to take advantage of the built-in interval measurement and timer features of our winding resistance meters to generate a cooling curve. This curve is then extrapolated back to "Time = 0" using one of several user-selectable logarithmic equations.



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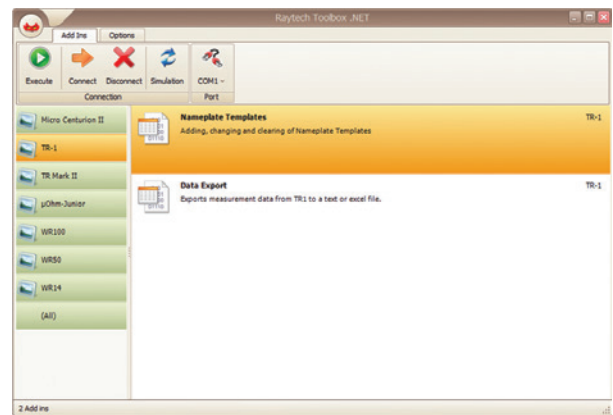
# Raytech Toolbox

The Toolbox PC program is no longer being updated, however, it is still a fully functioning program which can be downloaded and used with certain Raytech test equipment.

Visit our website at [www.RaytechUSA.com](http://www.RaytechUSA.com) to download your free software.

## FEATURES

- Provides firmware upgrade capabilities
- Provides data transfer stored in internal instrument memory to a PC
- Toolbox is based on Microsoft's .NET Framework 3.5
- It's free of charge and can be used unlimited times
- Data exchange over the RS-232 interface
- Download and convert saved test results in text format, or MS Excel format
- Can be used with all retired Raytech TR and WR series of instruments



## SYSTEM REQUIREMENTS

- Operation system:  
Windows XP, Vista or Windows 7
- Installed Microsoft.Net Framework 3.50
- Installed Crystal Reports Runtime
- 20 MB free disk space
- 1 serial port

# OPTIONS

## CAPO 2.5

2021N-26001: Temperature Probe – 10m (32 ft.)

3071N-31000: Safety Switch – 10m (32 ft.)

## CAPO 12

2021N-26001: Temperature Probe – 10m (32 ft.)

3071N-31000: Safety Switch – 10m (32 ft.)

## TR-Mark III 250V / TR-Mark III R 250V

1003N-31001: External Trigger Switch for Tap Changer Testing – 10m (32 ft.)

1002A-05002: Red Extension Lead – 10m (32 ft.)

## T-Rex

**T-Rex:** Three Phase Test Voltage Option for TR-Mark III and TR-Mark III 250V

**T-Rex R:** Three Phase Test Voltage Option for TR-Mark III R and TR-Mark III R 250V

## TR-1 / TR-1P

1011N-05001: Red Extension Lead – 5m (16 ft.)

1011N-23001: RS-232 Interface Cable Adapter

1011N-24002: 12VDC Automotive Adapter

## CT-T1

4080N-05001: H Lead Extensions – 5m (16 ft.)

## WR14 / WR14 R

2043N-05013: Current and Potential Leads for WR14 – 20m (65 ft.)

2043N-05048: Cable Extension Set for WR14 R – 10m (32 ft.)

2021N-26001: Temperature Probe – 10m (32 ft.)

2042N-11001: Heat-Run Curve Analysis Software (AHRT-01)

## WR50-12 / WR50-12R

2040N-05003: Cable Extension Set – 10m (32 ft.)

2021N-26001: Temperature Probe – 10m (32 ft.)

2042N-11001: Heat-Run Curve Analysis Software (AHRT-01)

## WR50-13 / WR50-13R

2041N-05003: Cable Extension Set – 10m (32 ft.)

2021N-26001: Temperature Probe – 10m (32 ft.)

2042N-11001: Heat-Run Curve Analysis Software (AHRT-01)

## WR100-12R / WR100-13R

2061N-05001: Cable Extension Set – 10m (32 ft.) – WR100-12R

2060N-05001: Cable Extension Set – 10m (32 ft.) – WR100-13R

2021N-26001: Temperature Probe – 10m (32 ft.)

2060A-04001: Pelican Transport Shipping Case

2042N-11001: Heat-Run Curve Analysis Software (AHRT-01)

## Micro Junior 2

2020N-26002: Temperature Probe – 10m (32 ft.)

2020N-33001: Kelvin Spike Probes – 4m (13 ft.)

2020N-33005: Kelvin Spike Probes – 5m (16 ft.)

## MC2

2021N-26001: Temperature Probe – 10m (32 ft.)



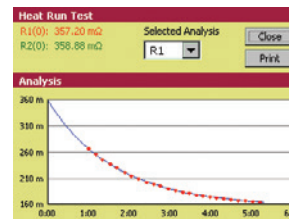
12VDC Automotive Adapter  
1011N-24002



External Trigger Switch  
1003N-31001



Temperature Probe – 10m  
2021N-26001



Heat-Run Curve Analysis Software  
(AHRT-01)  
2042N-11001



Contact your local Raytech Representative:



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