

Raytech plays a starring
role in precision testing
worldwide



Raytech products face the high demands of everyday life

Everyday Raytech's hardworking transformer test equipment is in use world-wide in the most demanding conditions. It is our goal to produce robust quality measuring systems for the international power industry and innovation is the driving force behind our design concepts. Raytech's leading position in this field allows us the ability to create unique and custom solutions for any application. Leading manufacturers in this field rely on our transformer test equipment, which is still custom-built and rigorously tested prior to shipping. The quality control center in Switzerland ensures a precision-built product with laboratory accuracy and multiple product control inspections. Our consistent high quality is guaranteed in every instrument. Customer feedback and satisfaction are high priorities at Raytech. The philosophy of working together and then providing high quality products at a fair price is what makes our customer relations more like a partnership. Look at our products and you will see why Raytech's name has become the standard for accurate, precision-made instruments. Welcome to the world of Raytech.



Measurement made easy

Since 1995 Raytech GmbH, an independent and efficient company located in Switzerland, produces quality instrumentation and test systems for the power industry, which are designed for use internationally. One year later Raytech USA was founded. This was an important step to support the sales and services throughout North and South America. All devices that have been produced, are still in daily use – worldwide. This is also the result of the people at Raytech, who have a creative potential, which reflects in the products

that are offered. Our goal is to provide our customers with robust test and measurement equipment that are reliable and easy to use. The product line covers a wide range of devices for testing various electrical parameters. This includes single and multi-phase transformer winding resistance and turns ratio instruments, high current resistance test sets, automated transformer test systems and control software. The design, development, production and final inspection is performed at the Switzerland facility which

guarantees a consistency of high quality products. Raytech attaches great importance to extensive customer support.



www.raytech.ch



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Micro Junior 2

For very low resistance measurements

The Raytech digital micro ohm meter, Micro Junior 2, was designed for maintaining a high degree of accuracy for the measurement of very low resistance. It is battery operated with a lithium-ion battery that allows over 2000 test measurements at 10 A output without recharging. The Micro Junior 2 is one of the most lightweight systems available that comes complete with its own rugged waterproof fieldcase.

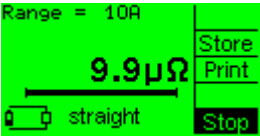
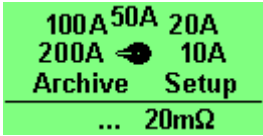


Micro Junior 2

Measurement Parameters

Current Range	Measuring Range	Accuracy	Resolution
10 A F/R*	0.00 μΩ ... 40 mΩ	± 0.1% Rdg ± 0.1 μΩ	5 Digits or 0.01 μΩ
10 A	0.0 μΩ ... 40 mΩ	± 0.1% Rdg ± 1 μΩ	5 Digits or 0.1 μΩ
1 A F/R*	0.0 mΩ ... 1 Ω	± 0.1% Rdg ± 1 μΩ	5 Digits or 0.1 μΩ
1 A	0.000 mΩ ... 1 Ω	± 0.1% Rdg ± 10 μΩ	5 Digits or 0.001 mΩ
0.1 A	0.00 mΩ ... 10 Ω	± 0.1% Rdg ± 0.1 mΩ	5 Digits or 0.01 mΩ
10 mA	0.00 mΩ ... 400 Ω	± 0.1% Rdg ± 1 mΩ	5 Digits or 0.1 mΩ
1 mA	0.0 Ω ... 40 kΩ	± 0.1% Rdg ± 0.1 Ω	5 Digits or 0.1 Ω
1 mA	40 kΩ ... 400 kΩ	± 0.1% Rdg	5 Digits

F/R* = automatic Forward / Reverse current measurements



Specifications

Model

Micro Junior 2

Size (field case)

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

Weight

5.9 kg (13 lbs.)

Interfaces

Interface 9 Pin RS232 serial

Memory Storage

Internally stores up to 2000 test results

Panel Display

LCD graphic with back light

Front Panel

Sealed, Anodized



Resistance range	0.00 $\mu\Omega$... 400 k Ω
Accuracy	$\pm 0.1\%$ Rdg
Resolution	5 Digits or 0.01 $\mu\Omega$
Current range	1mA ... 10 A DC
Operating range	-10°C to 60°C
Weight	5.9 kg (13 lbs.)
Power	lithium-ion battery 16.4 V / 6 Ah

A large assortment of accessories is included with this instrument, there is nothing extra to purchase to start testing immediately. Many additional and helpful options are also available.

Accessories



Cable bag



Current Cables
2 x 10m



Potential Cables CH 1
2 x 10m



Power Cord Charger
100 to 265 V AC



Toolbox software for
Data Exchange



2 Paper Rolls



Instruction Manual

Options



TP X1: External
temperature probe



MJO 201
Kelvin probe set

Micro Centurion II

For very low resistance measurements

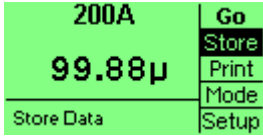
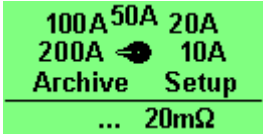
Micro Centurion II is a high precision, fully automatic, microprocessor based micro ohm meter for measuring very low resistance. This system is designed for highly accurate readings on-site with laboratory precision. Extensive filtering and high precision standards are used within the test system. The Micro Centurion II applies a preset pure DC current, selected by the user up to 200 A.



Micro Centurion II

Measurement Parameters

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



Specifications

Model

Micro Centurion II

Size (field case)

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

Weight

14.4 kg (31.5 lbs.)

Interfaces

Interface 9 Pin RS232 serial
25 Pin centronics parallel

Memory Storage

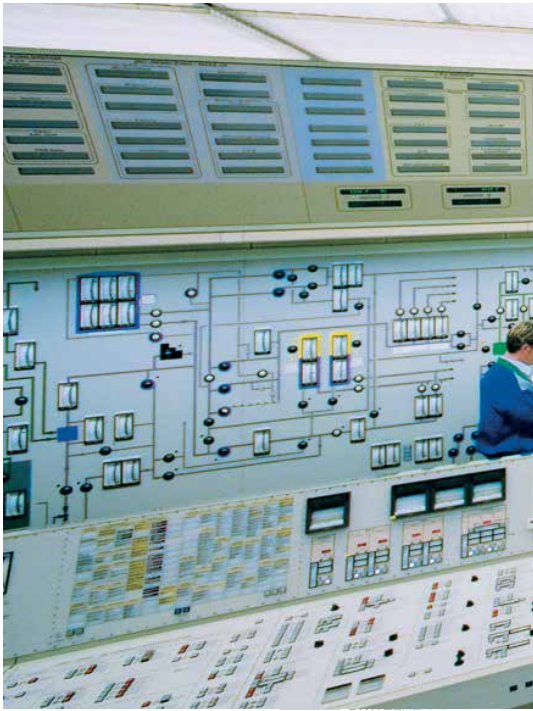
Internally stores up to 2000 test results

Panel Display

LCD graphic with back light

Front Panel

Sealed, Anodized



Resistance range	0.00 $\mu\Omega$... 5 Ω
Accuracy	$\pm 0.1\%$ Rdg
Resolution	5 Digits or 0.01 $\mu\Omega$
Current range	10 A ... 200 A DC at 5 V
Operating range	-10°C to 60°C
Weight	14.4 kg (31.5 lbs.)
Input Power	100 to 250 VAC 50/60 Hz

A large assortment of accessories is included with this instrument, there is nothing extra to purchase to start testing immediately. Many additional and helpful options are also available.

Accessories

Options



Cable bag



Current Cables
2 x 5m



Potential Cables
2 x 5m



Power Cord depending
on country of distri-



TP 01: External
temperature probe



MCO 101
200 A Kelvin clip set



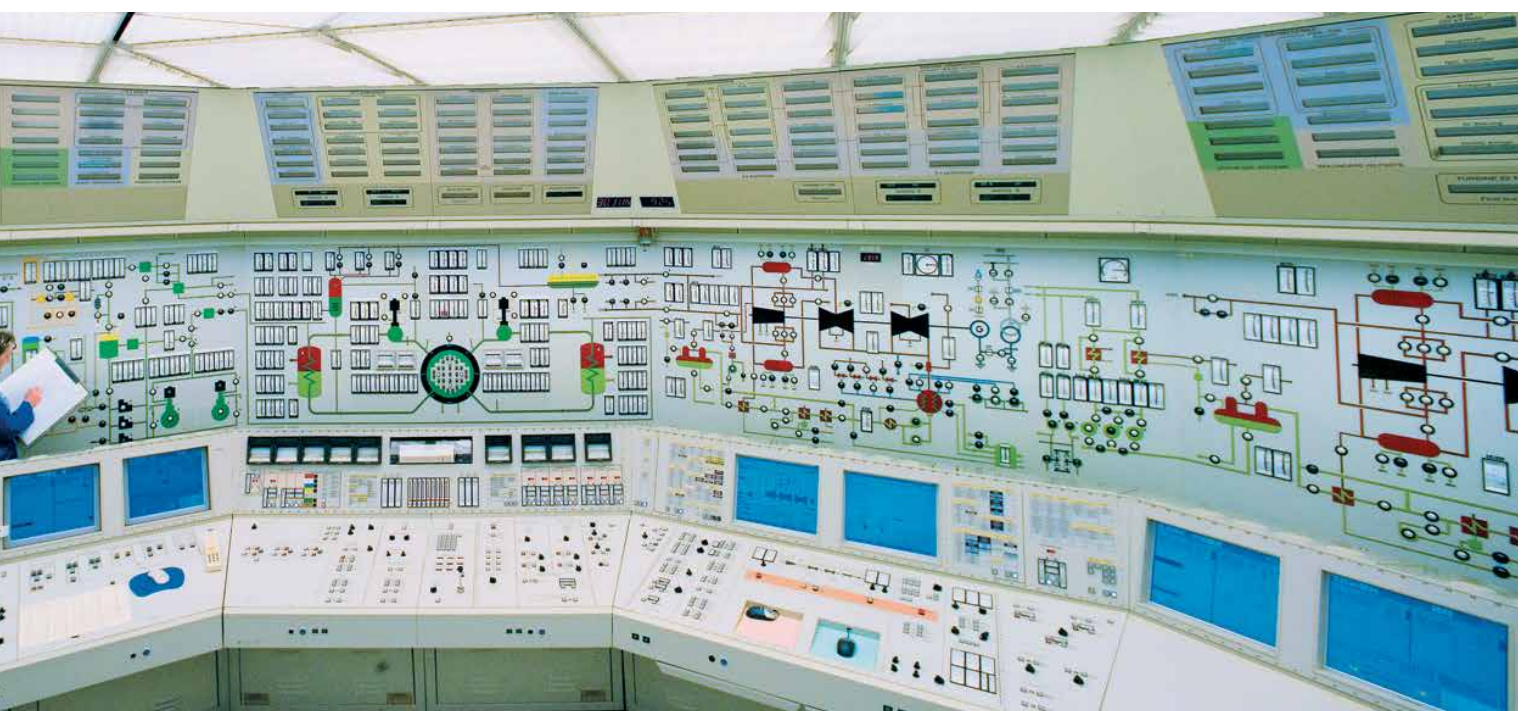
2 Paper Rolls



Toolbox Software for
Data Exchange



Instruction Manual



CT-T1

For knee point detection

The CT-T1 is a microprocessor-based Current Transformer Tester that measures CT excitation current, turns ratio, and winding polarity tests, all without having to switch the leads during testing. This CT Tester is precision-made, just like all of the Raytech products. Built to stand up to the harsh environments of field testing, the CT-T1 comes with a 2 year warranty to guarantee years of accurate and reliable usage.



CT-T1

Measurement Parameters			Features	
Ratio Range	Accuracy	Resolution	<ul style="list-style-type: none">Fully automatic knee point detection (ASA 10/50, IEEE 30°, IEEE 45°)Ratio range of 0.9 to 15 0005 low side taps, 1 high side tapPerforms CT excitation, turns ratio, and polarity tests on current transformersManual or automatic degauss and measurementsEasy, one-time hook up for up to 5 CT taps	<ul style="list-style-type: none">Automatic test voltage range with changeable limitsEasy to use tap selector interfaceData storage of more than 10 000 measurements3" graphic-capable printerTwo USB interfaces and one RS-232 serial port
0.9 ... 5000	± 0.05%	5 Digits		
5001 ... 10 000	± 0.5%	5 Digits		
10 001 ... 15 000	± 1%	5 Digits		
Voltage Range	Accuracy	Resolution		
0 ... 2000 V	1% Rdg ± 0.1 V	0.01 V		
Current	Accuracy	Resolution		
0 ... 10 A	1% Rdg ± 0.001 A	0.1 mA		

Specifications		Options
Model CT-T1 Current Transformer Tester	Interfaces 2 USB interfaces (host and device) and one RS-232	Annual Warranty Extension
Size (field case) L: 521 mm (20.5") W: 432 mm (17") H: 216 mm (8.5")	Memory Storage More than 10 000 measurements	
Weight 20 kg (44 lbs.)	Panel Display Color 5.7" LCD with back light and touch screen display for easy operation, additional digipot	
	Front Panel Sealed, Anodized	



Voltage range	0 ... 2000 V
Current range	0 ... 10 A
Ratio range	0.9 ... 15000
Operating range	-10°C to 60°C
Storage range	-20°C to 70°C
Weight	20 kg (44 lbs)
Input power	115 / 230 V AC
	50/60 Hz
	auto ranging

Accessories



Cable bag



Safety Ground Cable
1 x 10m



Cable surveillance



Power Cord depending on
country of distribution



Measuring Cables X1 – X5 5 x 5m,
5 X-Plug Clamps



2 Paper Rolls and
2 Fuses (16 A)



USB Memory Stick
with documentation



Measuring Cables, details
see right discription

Content:

- Measuring Cable H Clamp
1 x 5m
- Measuring Cable Lug Type
1 x 0.3m
- Measuring Cable Extension H
1 x 5m



Instruction Manual



CAPO 2.5

Capacitance and Dissipation Factor measurement

The CAPO 2.5 is specially designed for fast and easy field measurement, with the well known high precision and quality of Raytech. It is a world unique, line- or **battery-operated** instrument, built into a portable rugged case, making it perfect for field use.



CAPO 2.5

Measurement Parameters

	Range	Accuracy	Resolution
Dissipation Factor $\tan \delta$	0 ... 0.1 0.1 ... 1 >1	$\pm 0.5\% \text{ Rdg} \pm 1 \times 10^{-4}$ $\pm 0.5\% \text{ Rdg} \pm 1 \times 10^{-4}$ $\pm 0.5\% \text{ Rdg}$	1×10^{-5} 1×10^{-4} 3 Digits
Power Factor $\cos \varphi$	0 ... 0.1 0.1 ... 1	$\pm 0.5\% \text{ Rdg} \pm 1 \times 10^{-4}$ $\pm 0.5\% \text{ Rdg} \pm 1 \times 10^{-4}$	1×10^{-5} 1×10^{-4}
Capacitance @ 50 Hz	0.00pF ... 1.3μF @ 500 V 0.00pF ... 254nF @ 2.5 kV	$\pm 0.3\% \text{ Rdg} \pm 0.3\text{pF}$	0.01pF or 5 Digits
@ 60 Hz	0.00pF ... 1.1μF @ 500 V 0.00pF ... 212nF @ 2.5 kV		
Test Voltage	up to 2500 V _{rms} (45 ... 400Hz)	$\pm 0.5\% \text{ Rdg} \pm 1\text{V}$	1V
Test Current	up to 200 mA _{rms}	$\pm 0.3\% \text{ Rdg} \pm 1\mu\text{A}$	0.1μA or 4 Digits
Output Power	0 ... 500 VA		
Output Frequency	10Hz - 400 Hz (Step 0.5Hz)	$\pm 0.01\%$	0.1Hz

Features

- Battery operated, world unique
- Built-in Standard Capacitor
- Test Frequency 10 Hz - 400 Hz
- Easy export of results by USB key
- External switch for safe operation
- Internal thermal printer

Specifications

Model

CAPO 2.5

Size

L: 521mm (20.5")

W: 432mm (17")

H: 216mm (8.5")

Weight

22.2 kg (48.9 lbs.)

Interfaces

USB 2.0 full speed (1 host, 1 device)
and 9 Pin RS232 serial

Memory Storage

Internally stores more than
10 000 test results

Panel Display

5.7" Color LCD with LED back lighting

Front Panel

Sealed, Anodized



Operating range -10°C to 60°C
Input power 88 to 264 V AC
47 ... 63 Hz

Measured values:

Dissipation Factor $\tan \delta$
Power Factor $\cos \varphi$
Capacitance
Inductance
Quality Factor
Power (Watts)
Power@10kV

Accessories



Cable bag



HV-cable
1 x 10m



Safety switch
1 x 2m



Power Cord depending on
country of distribution



2 Paper Rolls



Earth cables
2 x 10m



2 Measurement cables
(length 10 m)



USB Memory Stick
with documentation



Instruction Manual

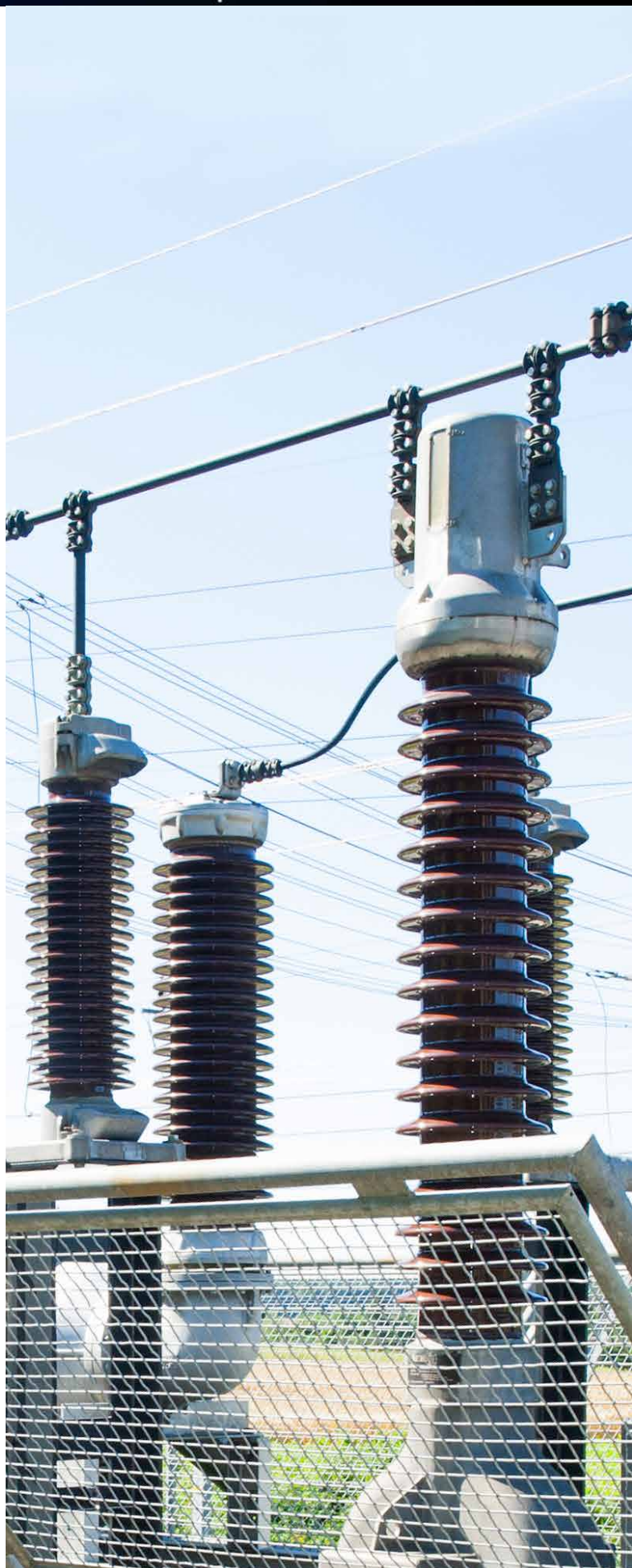
Options



TP 01: External
temperature probe



Safety switch
1 x 10m



TR-1 and TR-1P

For 1 phase Turns Ratio measurements

Fully automatic. Battery operated. Reverse polarity test. Continuity test. Pass/fail function. Extremely rugged. Built in printer in the TR-1P model. Can be charged by DC car adapter.



TR-1

Measurement Parameters

Range	Accuracy in PT Mode (40 V)	Accuracy in CT Mode (1...5 V)	Resolution
0.8 ... 100	± Rdg ± 1 LSD	± 0.08% Rdg ± 1 LSD	5 Digits
... 4000	± Rdg ± 1 LSD		5 Digits

Current	Accuracy	Resolution
PT-Mode A	± 1 mA	0.1 mA
CT-Mode 0... A	± 1 mA	0.1 mA

Specifications

Model

TR-1 and
TR-1P (with printer)

Size (field case)

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

Weight

3.2 kg (7 lbs.)

Interfaces

Interface RS232 serial (with optional
interface adapter)

Memory Storage

Internally stores 50 test results

Panel Display

LCD graphic with back light

Front Panel

Sealed, Anodized

Turns Ratio range	0.8 ... 4000
Accuracy	$\pm 0.08\%$ Rdg
Resolution	5 Digits
Current range	0 A ... 1 A
Operating range	-10°C to 60°C
Weight	3.2 kg (7.0 lbs.)
Input power	85 to 264 VAC
	47... 63 Hz
	12 VDC charging



TR-1P

A large assortment of accessories is included with this instrument, there is nothing extra to purchase to start testing immediately. Many additional and helpful options are also available.

Accessories



Carry Case



H and X Leads 3m



2 Paper Rolls
(only for TR-1P)



Power Cord depending
on country of distri-



TRO 107:
Toolbox software for
Data Exchange requires
Cable



Instruction Manual

Options



TRO 106:



TRO 107:
Serial Interface with cable



TRO 101:
10m Extension cable



TR-Mark III 250 V

For 3 phase Turns Ratio measurements

Fully automatic 3 phase measurements. Automatic Vector Group Detection. Rugged and Reliable. A color LCD with back lighting and touch screen increases user comfort. USB interfaces make it easy to store measurements on external storage devices and transfer easily to a personal computer.



TR-Mark III 250V

Measurement Parameters	Ratio	Phase	
Accuracy at 250 V	0.06% Rdg \pm 1LSD	0.05°	• Turns Ratio range: 0.8 to 45 000
Accuracy at 100 V	0.06% Rdg \pm 1LSD	0.05°	• Current: 0...1 A
Accuracy at 40 V	0.06% Rdg \pm 1LSD	0.1°	• Accuracy \pm 0.06% Rdg
Accuracy at 10 V	0.1% Rdg \pm 1LSD	0.15°	• Resolution 0.1 mA
Accuracy at 1 V	0.1% Rdg \pm 1LSD	0.15°	• Operating temperature -10°C to 60°C
			• Storage temperature -20°C to 70°C

Features

- Automatic measurements of Voltage, Turns Ratio, Current and Phase displacement
- Easy one time hook up to the transformer
- Automatic test voltage range
- Displays deviation from a nominal ratio
- Graphical tap changer display
- Tap changer interface (Input and Output)
- Load on test object < 0.05 VA
- Measures Power transformers PT's and CT's
- Displays % error vs. name plate value
- Enhanced heavy-duty protection circuitry
- Internal Printer

Specifications

Model

TR-MARK III 250V
TR-MARK III R 250V
(19" Rackmount version)

Size

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

Weight

8.4 kg (18.5 lbs.)

Interface

USB 2.0 full speed (1 host/1 device)
and 9 Pin RS232 serial

Memory Storage

Internally stores more than 10 000 test results

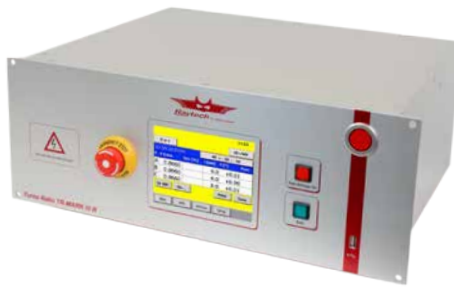
Panel Display

5.7" Color LCD with back lighting
and touch screen

Front Panel

Sealed, Anodized

Turns Ratio range 0.8...45000
 Accuracy $\pm 0.06\%$ Rdg
 Resolution 5 Digits
 Current range 0...1A
 Test voltage 1/10/40/100/250V
 Phase angle ± 90 Degree
 Operating range -10°C to 60°C
 Input power 100 to 250 VAC



TR-Mark III R 250 V
 19" Rackmount version



TR-Mark III R 250V: Rear View

A large assortment of accessories is included with this instrument, there is nothing extra to purchase to start testing immediately. Many additional and helpful options are also available.

Accessories



Cable bag



H and X Lead Cable
 2 x 5m



Extension Cables
 2 x 10m



Power Cord depending
 on country of distri-



2 Paper Rolls and
 2 Fuses



USB Memory Stick
 with documentation



T-Base Pro Software for
 Data Exchange and



Instruction Manual

Options



TRO 203: External test
 switch for tap changer



Remote: Extension for
 T-BasePro Remote Control



Sequence: Extension for
 T-BasePro fully automatic test



TRO 205: Additional
 extension cables 2 x 10m



ST 105: Standard Box
 for calibration



T-Rex: 3-phase supply to
 energize all 3 phases at



T-Rex

For 3-phase extension to Turns Ratio meter

The Raytech three phase voltage system T-Rex is an optional system accessory for 3-phase transformer ratio meter test sets. Fully automatic. Measuring phase relationships other than multiples of 30°. The T-Rex R is the same instrument as the T-Rex but built in a 19" rackmount version.



T-Rex

Features

- Outputs a pure three phase sine wave
- Fully remote controlled by TR-MARK II or TR-MARK III
- Single hook up to the transformer
- Automatic selection of test voltage frequency
- To measure phase relationships other than multiples of 30°
- To measure phase shifting transformer
- To measure power rectifier transformer
- Unique system on the market
- Extremely rugged (can withstand a drop test of 1 meter)
- 2 year standard warranty

Specifications

Model

T-Rex
T-Rex R (19" Rackmount version)

Front Panel

Sealed, Anodized

Size (field case)

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

Weight

7.8 kg (17.2 lbs.)



Turns Ratio range 0.8 ... 4000
 Accuracy $\pm 0.08\%$
 Test voltage 3 phase 24 VAC 50/60 Hz
 Operating range -10°C to 60°C
 Input power 100 to 250 VAC
 50/60 Hz



T-Rex R (Rackmount version)



T-Rex R: Rear View

A large assortment of accessories is included with this instrument, there is nothing extra to purchase to start testing immediately. Many additional and helpful options are also available.

Accessories



Power Jumper Cable



H and X Leads
2 x 1m



Interface cable connection to
TR-MARK III



Interface cable
connection to TR-



Instruction Manual



WR14 15A

For Winding Resistance measurements

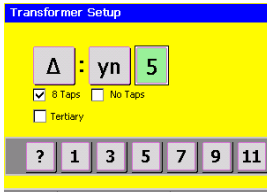
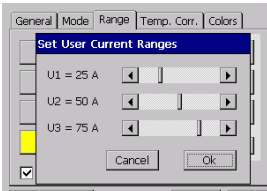
Battery and mains operated. Heavy duty protection circuitry. Color touch screen. 2 independent measuring and temperature channels. Internal printer. Fast discharge unit. Internal «Heat run test» software available. USB interfaces. Mounted in a rugged case. Fully automatic demagnetizing circuit.



WR14

Measurement Parameters

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



Specifications

Model with 2 channels WR14 and WR14R (rackmount version)	Interface USB 2.0 full speed (1 host, 1 device) and 9 Pin RS232 serial
Size (field case) L: 470 mm (18.5") W: 357 mm (14.1") H: 176 mm (6.9")	Memory Storage Stores up to 10 000 complete test results
Weight 9.4 kg (20.6 lbs.)	Panel Display 5.7" Color LCD with LED back lighting and touch screen
	Front Panel Sealed, Anodized



Resistance range 0.00 $\mu\Omega$ to 100 k Ω
 Accuracy $\pm 0.1\%$ Rdg
 Resolution 5 Digits or 0.05 $\mu\Omega$
 Current range 25 mA ... 15 A
 Inductance range up to 1500 Henry
 Operating range -10°C to 60°C
 Input power 88 to 264 VAC,
 47... 63 Hz
 12 V DC charging



WR14R (rackmount version)



WR14R: Rear View

A large assortment of accessories is included with this instrument, there is nothing extra to purchase to start testing immediately. Many additional and helpful options are also available.

Accessories



Cables bag



Current Cables
2 x 5m



Potential Cables CH 1
2 x 5m



Potential Cables CH 2
2 x 5m



Jumper Cable
1 x 5m



2 Paper Rolls



Power Cord depending on country of distri-



USB Memory Stick with documentation



T-Base Pro Software for Data Exchange and Analysis. .



Instruction Manual

Options



TP 01: External temperature probe



TP 02: Set of 2 external temperature probes

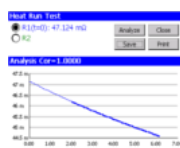


WRO 202: DC car adapter



WRO 402: 10m cable set

Content:
2 x 10m current cables
4 x 10m pot. cables
1 x 10m jumper cable



AHRT 01: Automatic Heat-Run Test software



Remote: Extension for T-BasePro Remote Control



Sequence: Extension for T-BasePro fully automatic test

WR50 50 A

For Winding Resistance measurements

2 or 3 measuring channels. Heavy duty protection circuitry. Fastest discharge unit on the market. 3 temperature channels. Built in panel printer. Internal «Heat run test» software available. USB interfaces. Simple color touch screen operation. High power DC supply 50A/50V. Fully automatic demagnetizing circuit.



WR50-12

Measurement Parameters

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

Specifications

Model with 2 channels

WR50-12 and
WR50-12R (rackmount version)

Interfaces

USB 2.0 full speed (1 host, 1 device)
and 9 Pin RS232 serial

Model with 3 channels

WR50-13 and
WR50-13R (rackmount version)

Memory Storage

Internally stores more than
10 000 test results

Size (field case)

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

Panel Display

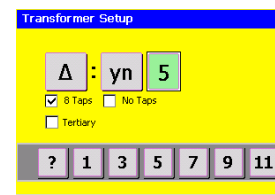
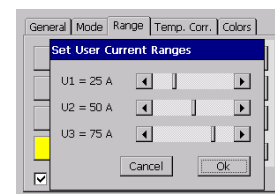
5.7" Color LCD with LED back lighting
and touch screen

Weight

16.6 kg (36.6 lbs.)

Front Panel

Sealed, Anodized



Resistance range	0.00 $\mu\Omega$ to 100 k Ω
Accuracy	$\pm 0.1\%$ Rdg
Resolution	0.05 $\mu\Omega$
Current range	25 mA...50 A/50 V DC
Inductance range	0 ... 1500 Henry
Operating range	-10°C to 60°C
Input power	90 to 264 VAC
	47...63 Hz



WR50-12R (rackmount version)



WR50-13R: Rear View

A large assortment of accessories is included with this instrument, there is nothing extra to purchase to start testing immediately. Many additional and helpful options are also available.

Accessories



Cables bag



Current Cables
2 x 5m



Potential Cables CH 1
2 x 5m



Potential Cables CH 2
2 x 5m



Jumper Cable
1 x 5m



T-Base Pro Software for
Data Exchange and
Analysis.



2 Paper Rolls
and 2 Fuses



Power Cord depending
on country of distri-



USB Memory Stick
with documentation



Instruction Manual

Options



TP 01: External
temperature probe



TP 03: Set of 3 external
temperature probes



WRO 505:
Screw pole connectors



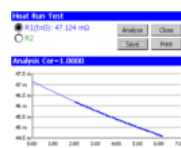
Remote: Extension for
T-BasePro Remote Control



Sequence: Extension for
T-BasePro fully automatic test



WRO 102:
10m cable extension set.
You can add/connect
multiple 10m extension



AHRT 01: Automatic
Heat Run Test software



WR50-13
3 measurement channel
version

WR100 100A

For Winding Resistance measurements

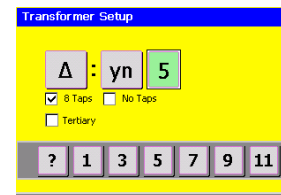
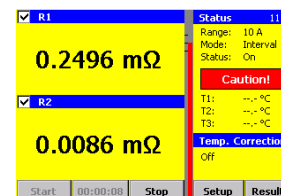
2 or 3 measuring channels. Fastest discharge unit on the market. 3 temperature channels. Heavy duty protection circuitry. Demagnetization circuit. Internal «Heat run test» software available. USB interfaces. Color touch screen.



WR100-12R (2 measurement channel)

Measurement Parameters

Current Range	Measuring Range	Accuracy	Resolution
30 – 100 A	0.00 $\mu\Omega$... 1.7 Ω	$\pm 0.1\%$ Rdg $\pm 0.05 \mu\Omega$	5 Digits or 0.05 $\mu\Omega$
15 – 30 A	0.0 $\mu\Omega$... 3.3 Ω	$\pm 0.1\%$ Rdg $\pm 0.1 \mu\Omega$	5 Digits or 0.1 $\mu\Omega$
8 – 15 A	0.0000 m Ω ... 6.3 Ω	$\pm 0.1\%$ Rdg $\pm 0.2 \mu\Omega$	5 Digits or 0.2 $\mu\Omega$
3 – 8 A	0.0000 m Ω ... 16.7 Ω	$\pm 0.1\%$ Rdg $\pm 0.5 \mu\Omega$	5 Digits or 0.5 $\mu\Omega$
1 – 3 A	0.000 m Ω ... 47.2 Ω	$\pm 0.1\%$ Rdg $\pm 1 \mu\Omega$	5 Digits or 1 $\mu\Omega$
0.7 – 1 A	0.000 m Ω ... 71.4 Ω	$\pm 0.1\%$ Rdg $\pm 2 \mu\Omega$	5 Digits or 2 $\mu\Omega$
0.3 – 0.7 A	0.000 m Ω ... 167 Ω	$\pm 0.1\%$ Rdg $\pm 5 \mu\Omega$	5 Digits or 5 $\mu\Omega$
0.1 – 0.3 A	0.00 m Ω ... 500 Ω	$\pm 0.1\%$ Rdg $\pm 10 \mu\Omega$	5 Digits or 10 $\mu\Omega$
25 – 100mA	0.00 m Ω ... 2 k Ω	$\pm 0.1\%$ Rdg $\pm 20 \mu\Omega$	5 Digits or 20 $\mu\Omega$
– 25mA	2 k Ω ... 10 k Ω	$\pm 0.2\%$ Rdg $\pm 200 \text{ m}\Omega$	5 Digits or 200 m Ω
– 25mA	10 k Ω ... 100 k Ω	$\pm 0.8\%$ Rdg $\pm 20 \Omega$	4 Digits or 20 Ω



Specifications

Model with 2 channels
WR100-12R (rackmount unit)

Interface
4 USB 2.0 full speed (3 host, 1 device)
and 9 Pin RS232 serial

Model with 3 channels
WR100-13R (rackmount unit)

Memory Storage
Internally stores up to 10 000 test
results

Size
L: 490 mm (19.3")
W: 436 mm (17.2")
H: 310 mm (12.2")

Panel Display
5.7" Color LCD with LED back lighting
and touch screen

Weight
21.9 kg (48.3 lbs.)

Front Panel
Sealed, Anodized

Resistance range	0.00 $\mu\Omega$ to 100 k Ω
Accuracy	$\pm 0.1\%$ Rdg
Resolution	5 Digits or 0.05 $\mu\Omega$
Current range	25 mA ... 100A/50V DC
Inductance range	up to 1500 Henry
Operating range	-10°C to 60°C
Weight	21.9 kg (48.3 lbs.)
Input power	90 to 264 VAC (3 kW max.) 47... 63 Hz



WR100-12R (2 measurement channel)

A large assortment of accessories is included with this instrument, there is nothing extra to purchase to start testing immediately. Many additional and helpful options are also available.

Accessories



Cable bag



Current Cables
2 x 10m



Potential Cables CH 1
2 x 10m



Potential Cables CH 2
2 x 10m



Jumper Cable
1 x 10m



Set of Accessories
(rack handles, fuses)



USB Memory Stick
with documentation



T-Base Pro Software for Data
Exchange and Analysis.



Instruction Manual



Hardwired Power
Cable

Options



TP 01: External
temperature probe



TP 03: Set of external
temperature probes



WRO 112:
10m cable extension set.
You can add/connect multiple
10m extension cables



Remote: Extension for
T-BasePro Remote Control



Sequence: Extension for
T-BasePro fully automatic test



MUX R Multiplexer



WR100-13R
3 measurement Channel version



AHRT 01: Automatic
Heat-Run Test software

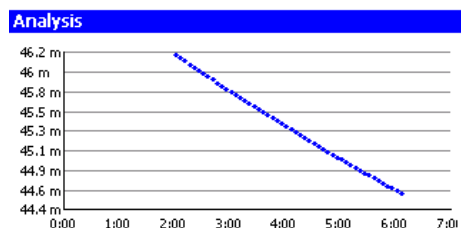
AHRT-01

Heat-Run Test Software

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.

Heat Run Test

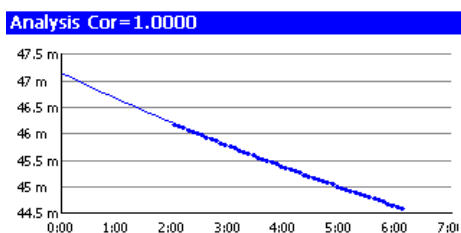
☒ R1(t=0):
☐ R2



The graph of the measured values is shown.

Heat Run Test

☒ R1(t=0): 47.124 mΩ
☐ R2



The instrument extrapolates back to „0“ and displays Resistance at time „0“.

Heat Run Test

☒ Setup HRT

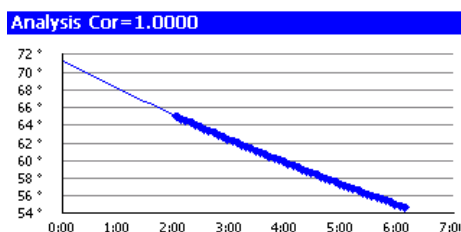
☒ Show Values as °C

	Rcold	Tk	Tref
R1	40.000 m	234.5	25
R2	40.000 m	<input checked="" type="radio"/> Cu (234.5°)	
		<input type="radio"/> Al (225° C)	

By entering a known resistance at a known temperature...

Heat Run Test

☒ T1(t=0): 71.22°
☐ R2



... also temperature of winding at time „0“ can be extrapolated and shown.



WR50-12 with AHRT-Display



ST 105

The ST105 is a calibration box with standard ratios. It is used for calibration of any turn ratios measurement system. Housed in a rugged, waterproof case, it is very lightweight .

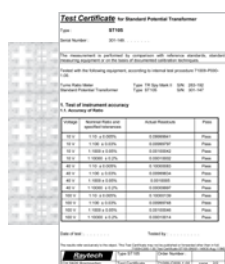


<i>Accuracy</i>	$\pm 0.001\%$ Rdg
<i>Operating range</i>	+10°C to 30°C
<i>Weight</i>	3.8 kg (8.3 lbs.)
<i>Ratio Ranges</i>	1:1 / 10 / 100 / 1000 / 10 000
<i>Input power</i>	none

ST 105

Accessories

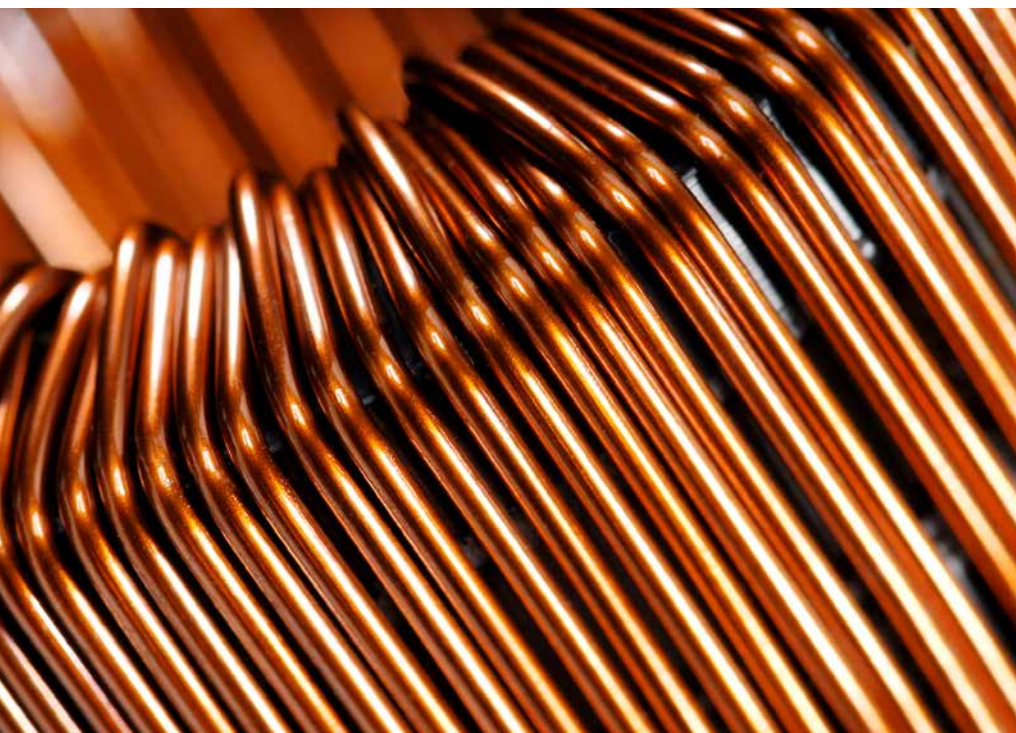
Options



Test Certificate



Certificate from
National Institute



ATOS

Transformer Testing

More options to save time

Raytech Automatic Transformer Observation System (ATOS) is designed to drastically reduce measuring time and increase test performance. A modular design based on Raytech instruments offers the possibility to create a custom solution for any application. The entire system can be easily controlled from a Winding Resistance Meter touchscreen instrument panel or by remote computer.

Features

- Minimizes cable connection time
- All measurements with one cabling per transformer, including winding resistance and turns ratio
- Use up to three multiplexers to measure transformers with three winding systems with one cabling sequence
- No precision loss compared to single usage of devices
- Different currents at same time on primary, secondary and tertiary
- Create your own configuration containing from one to three multiplexers, from one to three winding resistance meters and one turns ratio meter with T-Rex
- Control your tap changer with a powerful tap changer interface
- Operate all instruments on a touchscreen or by remote computer control
- Integrated Safety Unit provides 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 100 A / 50 V
- 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 software
- Input Power: 88 to 264 VAC, 47...63 Hz, auto ranging

Optional items available

The design of the ATOS system is determined by the customer's needs. Equipment to be used in the ATOS system can include combinations of the following equipment:

- TR Mark IIIR: Three Phase Transformer Turns Ratio Meter
- T-Rex R: Three Phase Test Voltage Option
- WR14 R: 15 Amp, 2-Channel Winding Resistance Meter with Core Demagnetization
- WR50-12R: 50 Amp, 2-Channel Winding Resistance Meter with Core Demagnetization
- WR50-13R: 50 Amp, 3-Channel Winding Resistance Meter with Core Demagnetization
- WR100-12R: 100 Amp, 2-Channel Winding Resistance Meter with Core Demagnetization
- WR100-13R: 100 Amp, 3-Channel Winding Resistance Meter with Core Demagnetization
- MUX R: Up to 100 Amp, 3-Channel Multiplexer for Transformer Testing with Core Demagnetization and Discharge.
- ISU R: Integrated Safety Unit



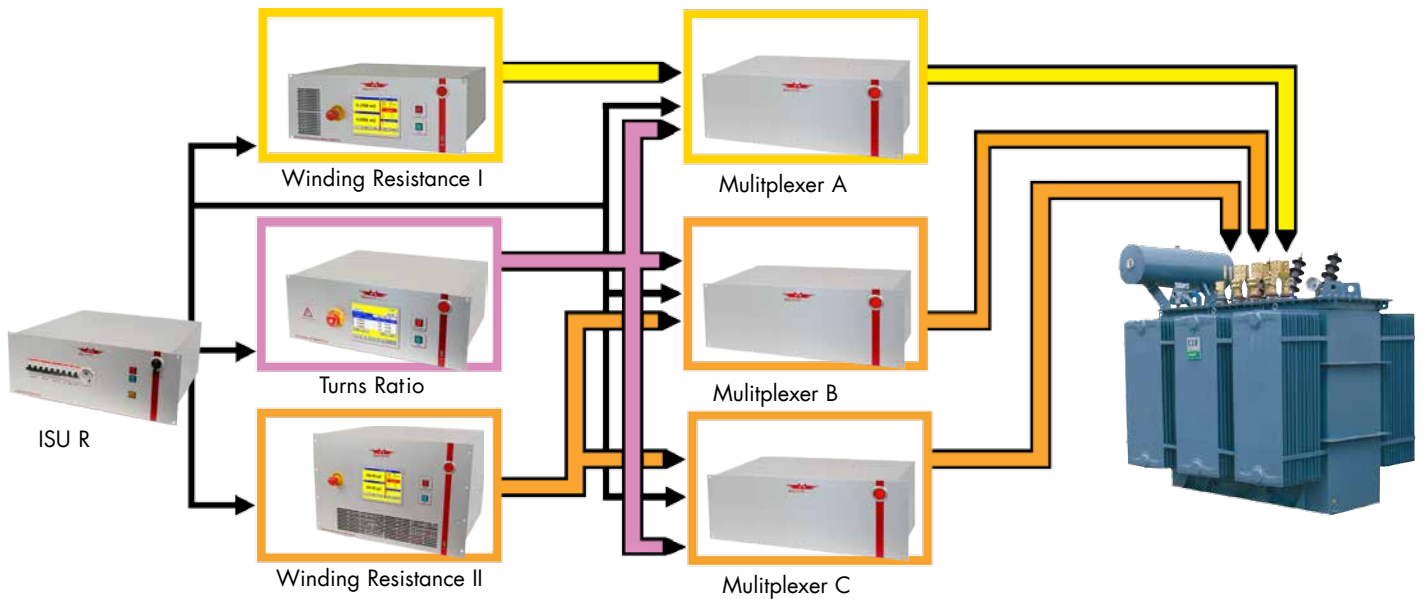
ATOS: Front View



ATOS: Rear View

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 orange outline shows the connection of secondary and tertiary windings.



Accessories

Options



T-Base Professional Base



MUX R
up to 3 Multiplexer



ISU R
Integrated Safety Unit



T-Base Pro

Software:

- T-Base Pro Remote: PC program to remotely control all of your ATOS equipment.
- T-Base Pro Sequence: PC program to both remotely control all of your ATOS equipment and also to schedule and run automatic future tests.
- Program a series of tests with automatic error alerts, which offers the convenience of running unmanned tests – even after hours.



MUX R

for Transformer Testing

Raytech's multiplexer MUX R is designed to drastically reduce cabling time and increase test performance. It is made to be used with Raytech's winding resistance and turns ratio meters. Any MUX R configuration can be easily controlled by a winding resistance meter's touch panel or by remote.



MUX R



MUX R: Rear View

Features

- Minimizes cabling time
- 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 Observation System)
- 2-Year standard warranty

Specifications

- 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.)
- Measuring Current: Up to 100 Amps
- Input Power: 88 to 264 VAC, 47...63 Hz, auto ranging
- Front Panel: Sealed, anodized

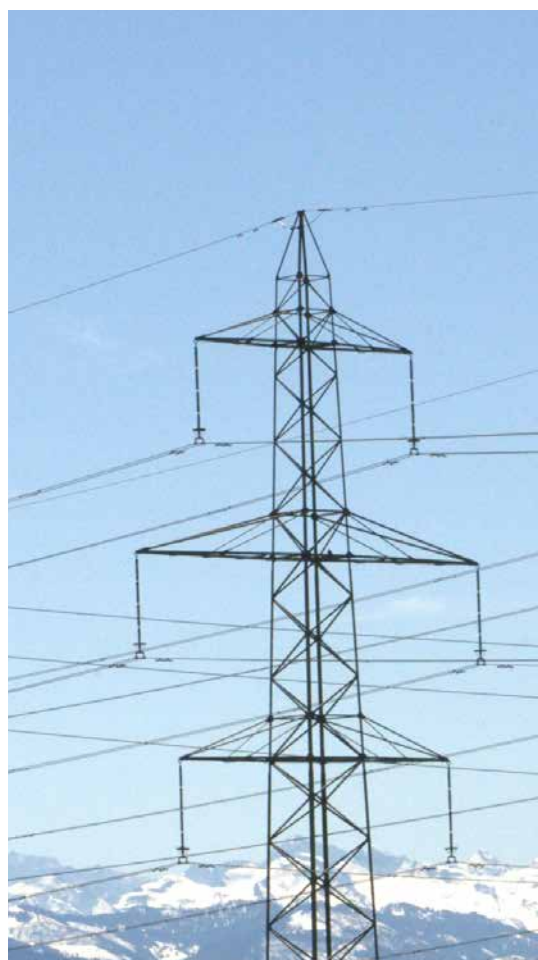
Accessories



4 x 15m measurement kelvin cable set per Mux



Various cable accessories



ISU R

Integrated Safety Unit

With the Raytech ISU R, you get a "smart" optimized power, interlock and warning lamp signal distribution system in a 4U 19" rack with additional fused power circuits for each connected device. The ISU R completes the ATOS system integration.



ISU R



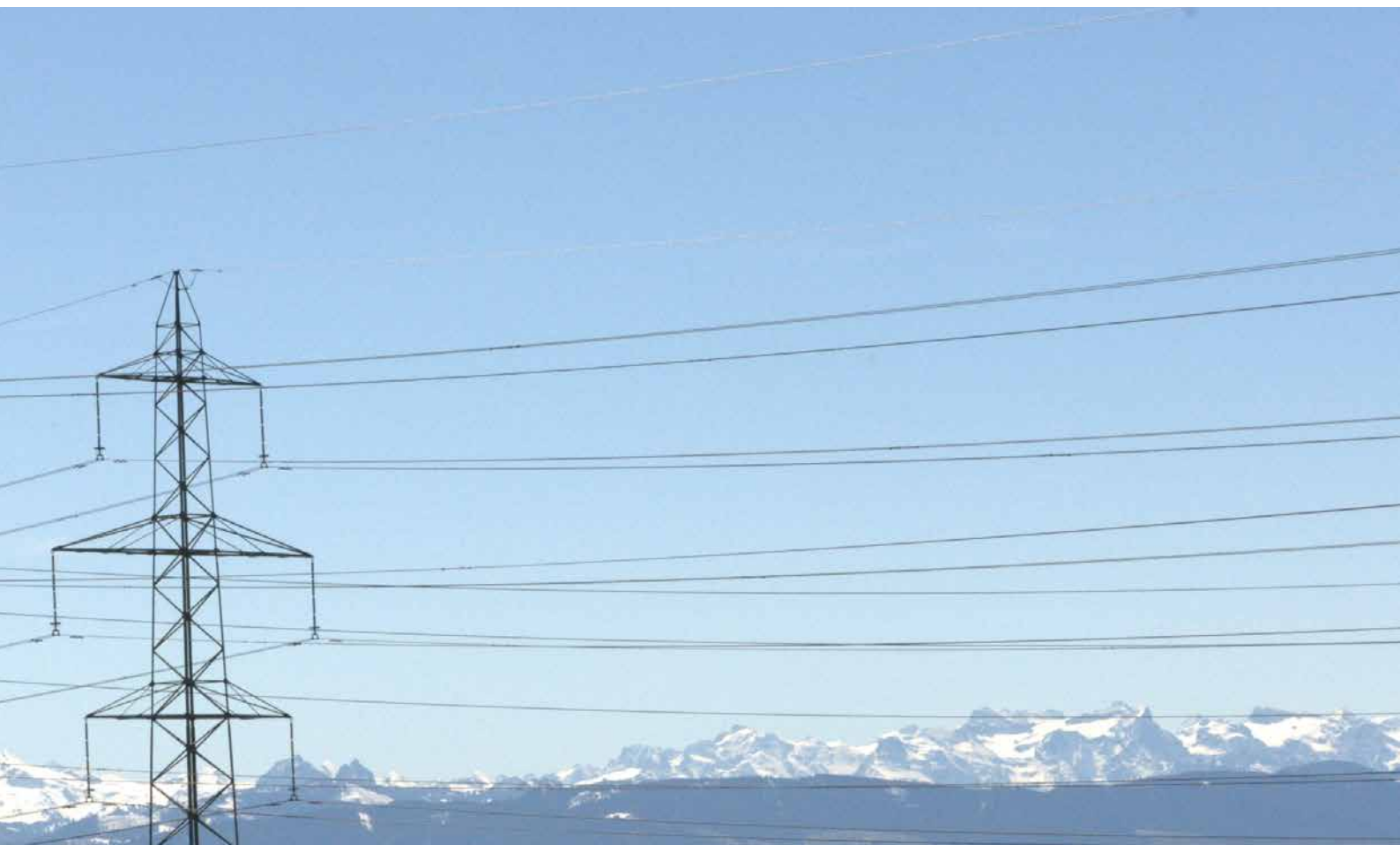
ISU R: Rear View

Features

- One main power switch for the 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)
- 2-Year standard warranty

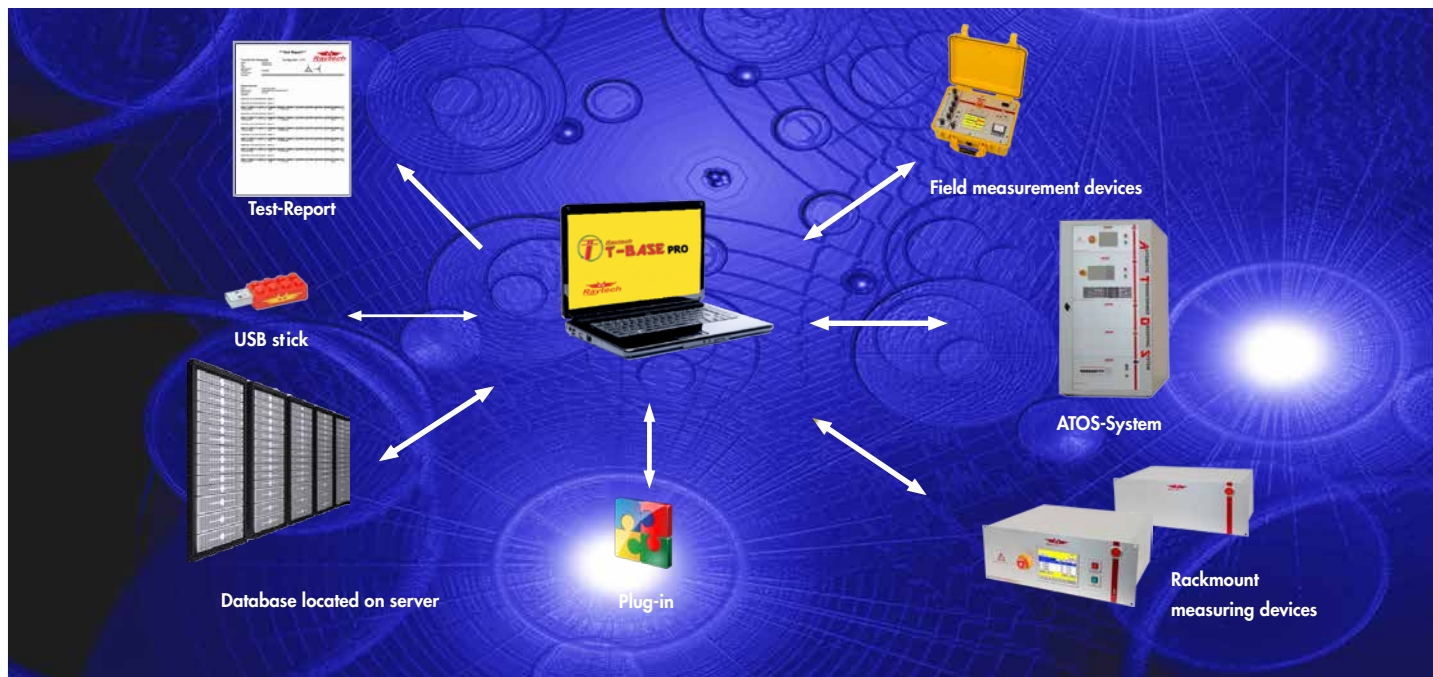
Specifications

- Size: L: 490 mm (19.3") W: 436 mm (17.2") H: 177 mm (7"), Rack Unit: 4U
- Input Power: 88 to 264 VAC, 47...63 Hz, auto ranging
- Front Panel: Sealed, anodized



T-Base for remote control, data exchange and analysis

Raytech T-Base is a powerful set of tools for data exchange, remote control, visual measurement data analysis, test automation and much more. It comes with a fully integrated database management system for storing measurement data as well as with a fully customizable reporting system which can generate test reports in the most widely used document formats. It uses an advanced add-on ecosystem which makes it suitable for integration with external systems.

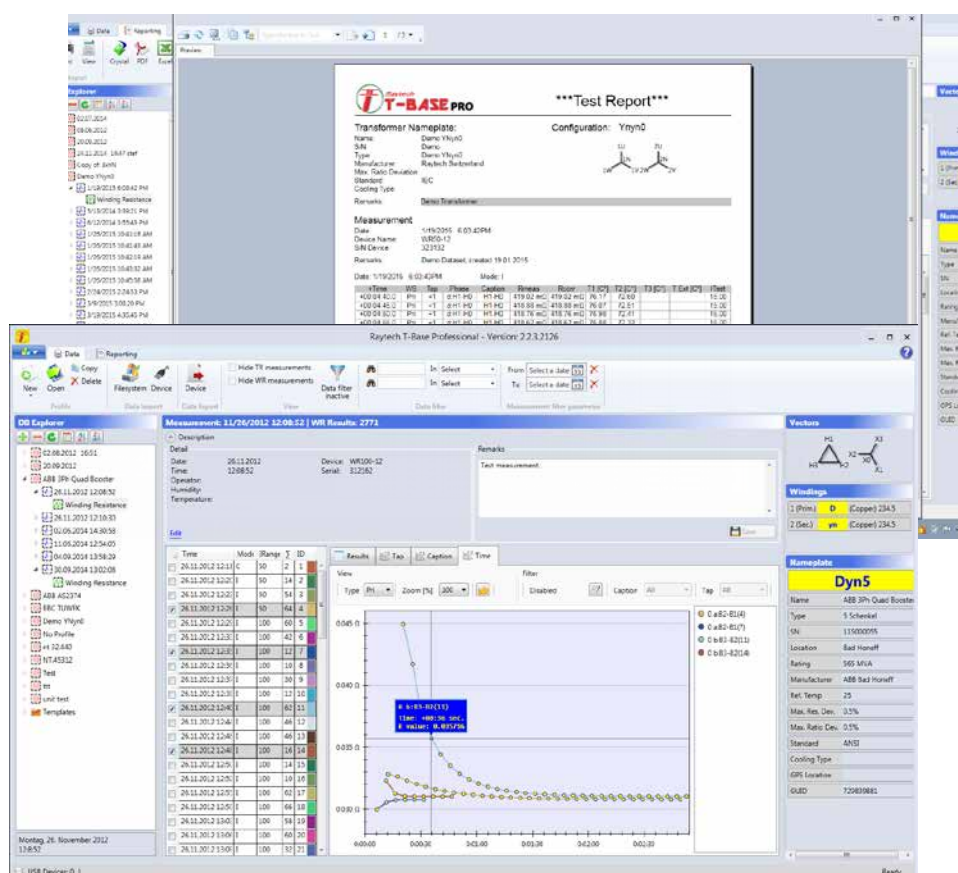


Standard features

- Free download of basic version of T-Base Pro with documentation
- Raytech USB driver

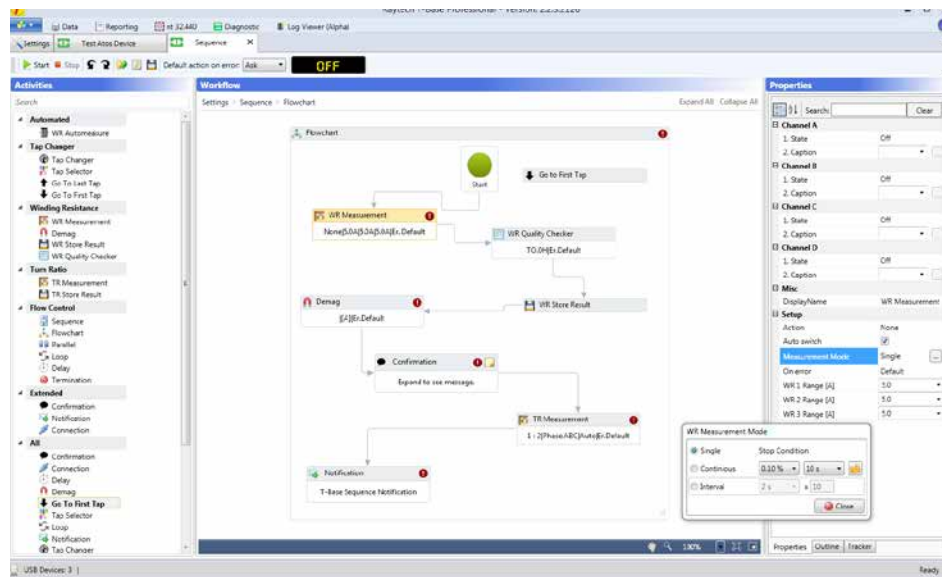
Optional features

- Database located on the server (Synchronization with server)
- Plug-in for NON-Raytech measuring instruments (License code required for each measuring instrument to be used remotely)



T-Base Remote

T-Base has integrated, full-blown remote control capabilities for many Raytech devices. Complex ATOS systems, with multiple devices, can be configured as a single virtual device easily controlled from a single computer. An unlimited number of devices using the same or different measurement profiles can be remotely controlled at one time. Remote control option can be unlocked by entering the license key into the device.



T-Base Sequence

T-Base Pro Sequence is an integrated visual programming tool for utilizing the full test automation capabilities of the ATOS systems. Everything from simple to the most complex testing workflows can be easily created by using the drag and drop graphical editor. Its integrated notification system will inform you about the current status, events and errors. Workflows can be exported, saved and reused. The only limitation is your imagination. T-Base Pro's Sequence module can be unlocked by entering the license key for the ATOS in the device.

Features

Data Management



Create and save measurement profiles and templates. Save and manage your measurement results. Import and export data. Save and print reports. Visualize, inspect and compare measurement results.

Remote Control



Import and export profiles and results using USB and serial interface. Use your PC as full remote controller for single or complex devices and setups. Save complex ATOS setups. Native USB drivers. Multitasking capabilities.

Measurement Automatization



Create and save custom measurement workflows. Let T-Base inform you about measurement progress or errors. Program and edit custom workflows using intuitive graphical interface. Save and exchange workflows.

Extensibility



Extend and customize the application according to your needs using our rich API's interface and MS Visual Studio templates. Make T-Base a part of your environment or write control interface for third-party devices.

Reporting



Export and save your measurement results in many popular formats like SAP Crystal Reports, Excel, Word, PDF, HTML, CSV, XML and many more...

Database



Use preconfigured embedded SQL database or database on network share, Microsoft SQL Express and SQL Professional versions.

User Interface



Modern graphic user interface is not only highly functional, but it is also a pleasure to work with.

Technology



For the development of our software products, we are using the latest technologies provided by Microsoft.

SDK

Software Development Kit

Raytech's SDK is a package of libraries, device drivers, example projects and visual studio templates that allows the creation of the programs for the Raytech instruments. SDK is an application programming interface (API) containing protocols, routines and tools for building software applications. It is the same software layer that is used in programs like T-Base to communicate with devices.

Write your own applications. Control the measuring instruments with your own program. Connection of the Raytech instruments is over the USB or the RS-232 port. It's a .NET Library.

Can be used with 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
- MUX R

Raytech Toolbox

The Toolbox PC program is no longer being updated and supported, however, it is a fully working program which can still be downloaded and used with certain Raytech test equipment. Visit our website at www.raytech.ch to download your free software.

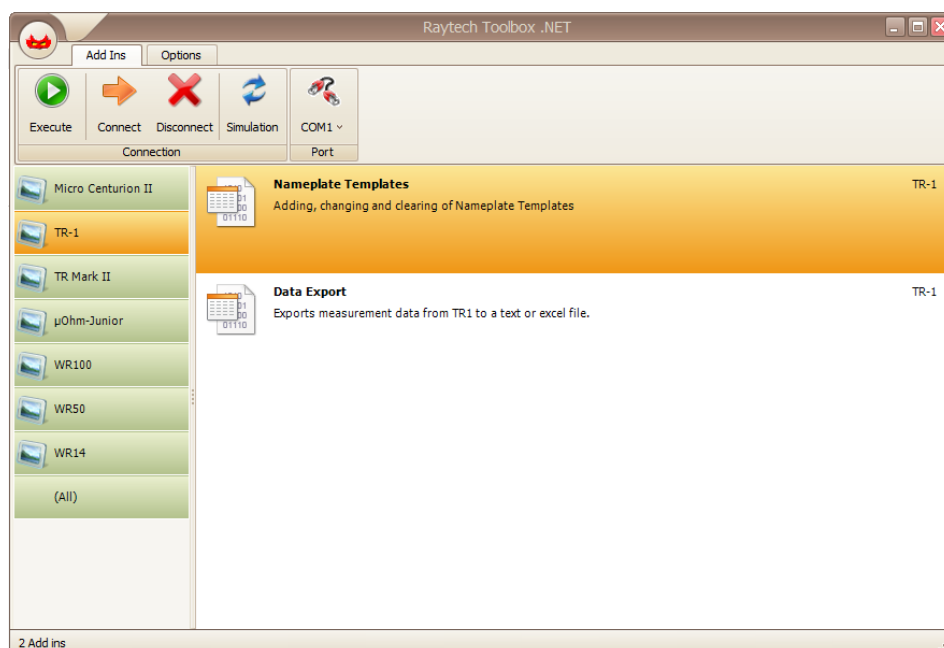
System requirements

- 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

Features

Provides firmware upgrade capabilities

- Provides data transfer stored in the internal instrument memory to a PC
- 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 for the following Raytech products:
 - MC2
 - Micro Junior 1 and 2
 - TR-1 and TR-1P
 - TR-Mark II



Raytech sets new standards – presenting CAPO 2.5 and CT-T1



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Specifications subject to improvement at any time.



90220.CA.1624.mcu