FINERO *The Quality Control Company*

Quanti™

TEST & MEASUREMENT EQUIPMENT PRODUCT SERIES

Reliable, Rugged, Fast, Accurate, Intrinsically Safe & Easily Programmable Measurements

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TABLE OF CONTENTS

"THIS PRODUCT SERIES OFFERS AN EXTREMELY FLEXIBLE SYSTEM FOR INTEGRATED FUNCTIONAL TESTING"

FOREWORD

DEAR CUSTOMER,

Finero feels obliged to provide you with the best on the market available test and measurement devices. *Quanti* product series is the latest evidence of Finero's 30 years' innovative experience in most demanding test and measurement applications.

***Quanti* offers an extremely flexible system for integrated functional testing and I am confident that *Quanti* equipment will support your endeavors to keep up the good quality of your production as well as fulfill your test and measurement needs in R&D or type tests.**

Please do not hesitate to contact Finero if you have any comments or questions. Your feedback is our driving force.

Yours truly,

Risto Vuolle

Chief Executive Officer

Finero Oy

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COMPANY OVERVIEW

- FOUNDED: 1980
- HEADQUARTERS: KAUSALA, FINLAND
- NORTH AMERICAN HEAD OFFICE: CAPE CORAL, FL, USA
- AN RW INVESTTECH COMPANY
- MAIN PRODUCT LINES:
  - DIGITAL MULTIMETERS AND LCR METERS
  - ELECTRICAL SAFETY TESTERS
  - POWER SUPPLIES AND ELECTRONIC LOADS
  - FUNCTIONAL AND COMPONENT TESTING
  - SOFTWARE FOR QUALITY CONTROL AND TRACEABILITY
  - FIXTURES

ISO 9001
DNV
CERTIFIED ORGANISATION

FINERO, THE QUALITY CONTROL COMPANY - an RW InvestTech Company

For over thirty years Finero Corporation has provided the electrical and electronics industries with a broad range of advanced and reliable test and measurement equipment. We also provide high volume manufacturing industry with highly automated test systems when speed and high yield is crucial for outstanding business performance.

Finero substantially invests into R&D and co-operates with leading technological institutes. Our engineers continually seek better ways to test products and to enhance electrical safety through improved testing methods. Finero delivers worldwide and through its certified partners. Service and support is available locally to our international customers.

FINERO'S SALES AND SERVICE IS AVAILABLE WORLDWIDE

Europe: Finland (HQ), Austria, Belgium, Czech Republic, Estonia, France, Germany, Hungary, Italy, Ireland, Latvia, Lithuania, Moldova, Netherlands, Poland, Portugal, Romania, Serbia and Ex-YU, Slovakia, Spain, Sweden, Turkey, United Kingdom

North America: Mexico, United States (Finero USA LLC)

South America: Brazil

Asia: China, India, Israel, Malaysia, Singapore

To see the contact details for your local sales representative, please visit Finero's webpage (Sales & Service)

OUR CUSTOMERS ARE WORLD LEADERS IN THE FOLLOWING AREAS:

Industrial & building automation and electronics
Motor control manufacturing
Household equipment manufacturing
Medical equipment manufacturing
Electronics Manufacturing Services (EMS) business
Component manufacturing

The Finnish Air Force

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INTRODUCTION

A single test and measurement device that is available with any combination of functions, such as digital multimeter (DMM) or LCR (inductance, capacitance and resistance) meter!

ORDERING INFORMATION CAN BE FOUND ON THE PAGES 30-31

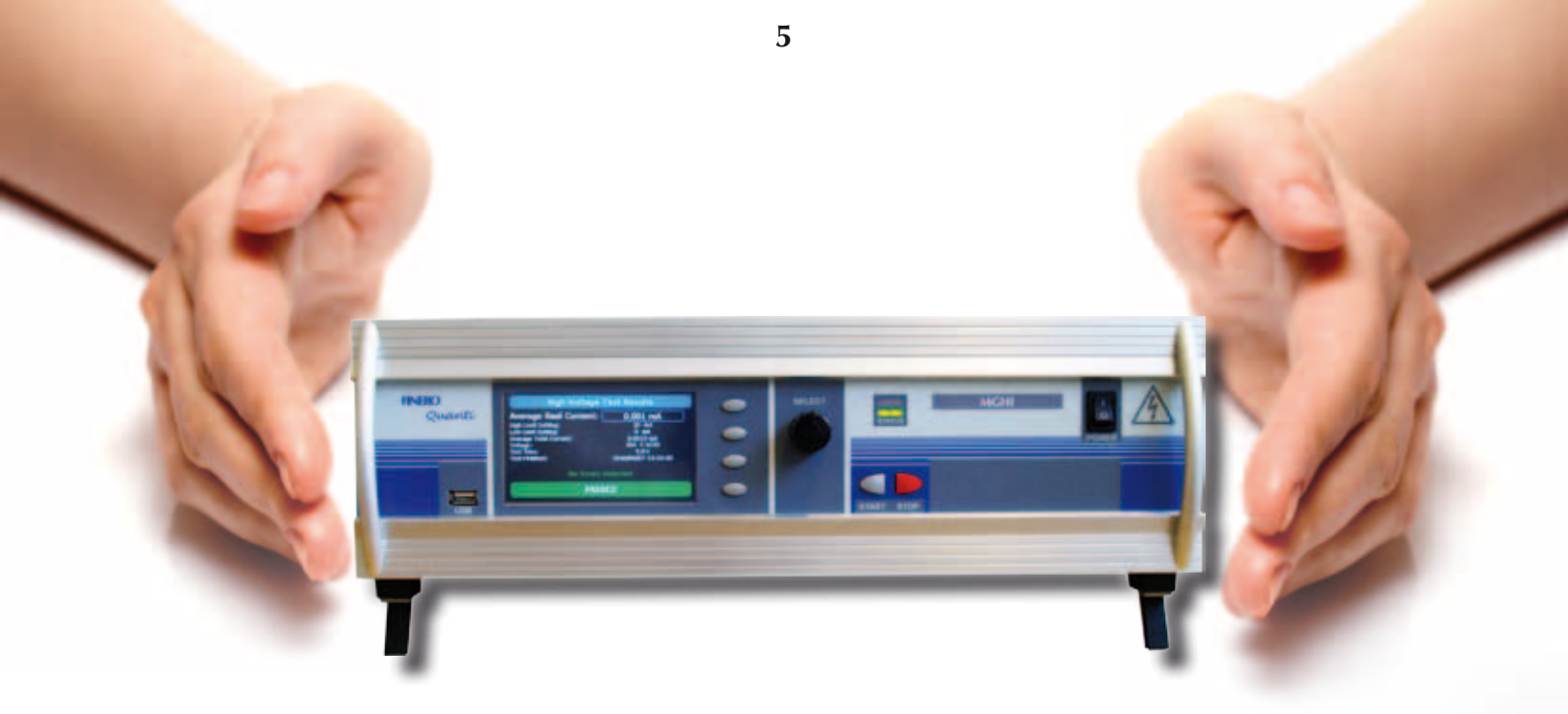
Quanti SELECTION GUIDE

TEST / MODEL	ELECTRICAL SAFETY TEST				FUNCTIONAL TEST			
	ISO	GROUND BOND	HIGH VOLTAGE	LEAKAGE CURRENT	LCR	DMM	CONTINUITY TEST	AVAILABLE OPTIONS
G	-	X	-	-	-	-	-	
H	-	-	X	-	-	-	-	40/100mA
I	X	-	-	-	-	-	-	
GI	X	X	-	-	-	-	-	
HD	-	-	2pcs [1]	-	-	-	-	40/100mA
HQ	-	-	4pcs [1]	-	-	-	-	40/100mA
HI	X	-	X	-	-	-	-	40/100mA
HM	-	-	X	-	-	X	-	40/100mA
LC	-	-	-	X	-	-	-	
MHI	X	-	X	-	-	X	-	40/100mA
2MHI	X	-	X	-	-	2pcs	-	40/100mA
GHI	X	X	X	-	-	-	-	40/100mA
HILS	X	-	X	-	X	-	X	40/100mA
ML	-	-	-	-	X	X	-	
GHILC	X	X	X	X	-	-	-	40/100mA
HIS	X	-	X	-	-	-	X	40/100mA
MGHI	X	X	X	-	-	X	-	40/100mA

1) simultaneous

X = INCLUDED - = NOT INCLUDED OTHER MODELS ON REQUEST

All information and specifications in this catalogue are subject to change without notice



“Simplicity is the ultimate sophistication”

LEONARDO DA VINCI

QUANTI

Quanti lifts test and measurement and electrical safety testing to a completely new level. Quanti offers reliable, rugged, fast, accurate, intrinsically safe and easily programmable testing no matter what your need is.

Uniquely this product series has various options for combining and integrating electrical safety and functional test. Quanti offers testing equipment for a wide range of applications, such as production, type test and R&D.

Advantages of Quanti are unrivalled. Quanti offers fast testing times and reduces testing costs because you need only one device for LCR, DMM, electrical safety and functional testing. Power factor correction in the input ensures that the network harmonic problems are mitigated. Despite the great variety of available test functions, devices remain very compact.

Needless to say, Quanti continues Finero’s philosophy in building test and measurement systems. Quanti products can be equipped with optional interfaces. Quanti equipment use proprietary RS-485 interface for Quanti to Quanti communication, which enables linking of several devices to each other. This means less cabling and less space requirements.

There is a program storage for 20 test sequences with 25 steps. The available Windows software allows the creation and loading of test programs on your PC. Like all Finero’s testers, Quanti products are LabVIEW compatible.

Information and data provided can be seen on the multiple line, crystal clear colour LCD - display and the clear commands make the software easy and intuitive to use. Comfortable menus make sure that the operator can adjust all test parameters very easily.

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Quanti FEATURES

COMBINED ELECTRICAL SAFETY AND FUNCTIONAL TEST & MEASUREMENT

Quanti comes with a wide variety of functions in a single test device. Quanti enables most accurate, most efficient, and safest testing. Tests such as AC Hipot, DC Hipot, insulation resistance, ground bond, leakage current, and functional run tests can be performed in any order, and some can be executed simultaneously without the need for multiple connections to the Device Under Test (DUT).

QUANTI EQUIPMENT FACILITATES VERY COST EFFICIENT TEST SYSTEM BUILDING

- CONTINUITY
- DMM
- GROUND BOND
- HIPOT
- INSULATION RESISTANCE
- LCR
- LEAKAGE CURRENT

QUANTI PRODUCTS ARE LABVIEW COMPATIBLE

4.3″ GRAPHICAL DISPLAY WITH 16 MILLION COLORS

Quanti has excellent colors and graphics, which supports an already very interactive human to machine interface.

COMFORTABLE TO ADJUST TEST PARAMETERS

Easy programming of the units is achieved through the use of only four buttons and a flywheel knob. The four buttons are 'soft buttons', with their current meaning always clearly shown on the display, while the flywheel knob is used to select parameters.

REDUCED RISK OF HUMAN ERRORS

Quanti's interactivity and easy-to-use user interface enables easier programming and learning as the user only needs to be familiar with one product family. Also the extensive help functions guide the user while testing and reduce human errors.

QUANTI DEVICES COMPLY WITH APPLICABLE ROHS REGULATIONS

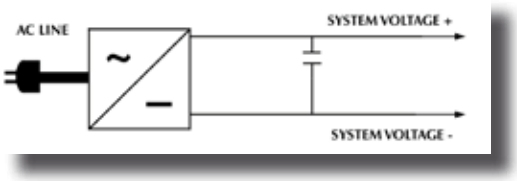
PANEL PROGRAMMABLE - 20 PROGRAM SEQUENCES WITH 25 CONFIGURABLE TESTS - NO PC REQUIRED

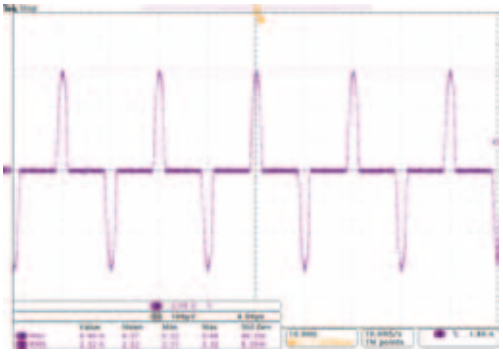
The operator can store and recall test setups, thus eliminating the need to re-enter setup information.

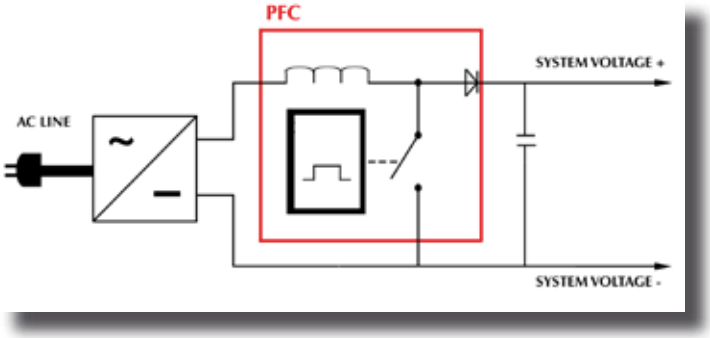
REDUCE THE HARMONIC NOISE IN YOUR FACTORY SUPPLY NETWORK - PFC INTEGRATED IN THE INPUT

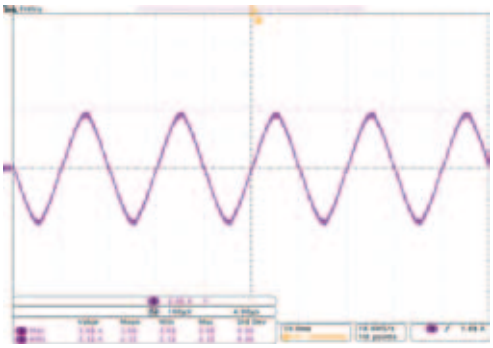
EN 61000-3-2 specification requires electronic equipment consuming more than 75W to meet certain standards for harmonic content, which basically requires the use of PFC (Power Factor Correction). The PFC forces the input current to follow the waveform of input AC voltage. Power Factor Correction substantially reduces total harmonics.

Below are block diagrams and network current waveforms without and with a PFC converter:









3U SIZE, TABLE OR RACK MOUNTED

Quanti devices can be used as a standard desktop tester or as 19 inch built-in apparatus (optional).

RUGGED TESTING

Quanti devices continue Finero's way of building rock solid testers and Quanti also comes with a rugged metal case.

CAN BE USED IN A WIDE RANGE OF APPLICATIONS, SUCH AS:

- Cable testing
- Power supply testing
- Home appliances testing
- Information equipment testing
- Industrial automation testing
- Medical equipment testing
- YOU NAME IT!

ONLY ONE DEVICE NEEDED - LESS CABLING IN TEST SYSTEMS

Having functional tests combined with electrical safety tests in one unit saves cabling costs and space and enables easier programming.

EXTERNAL RELAY MATRIX, OPTION, PLEASE SEE PAGES 26-27

MAINS SUPPLY 110 TO 240V AC AND 50 OR 60HZ WITHIN THE SAME UNIT

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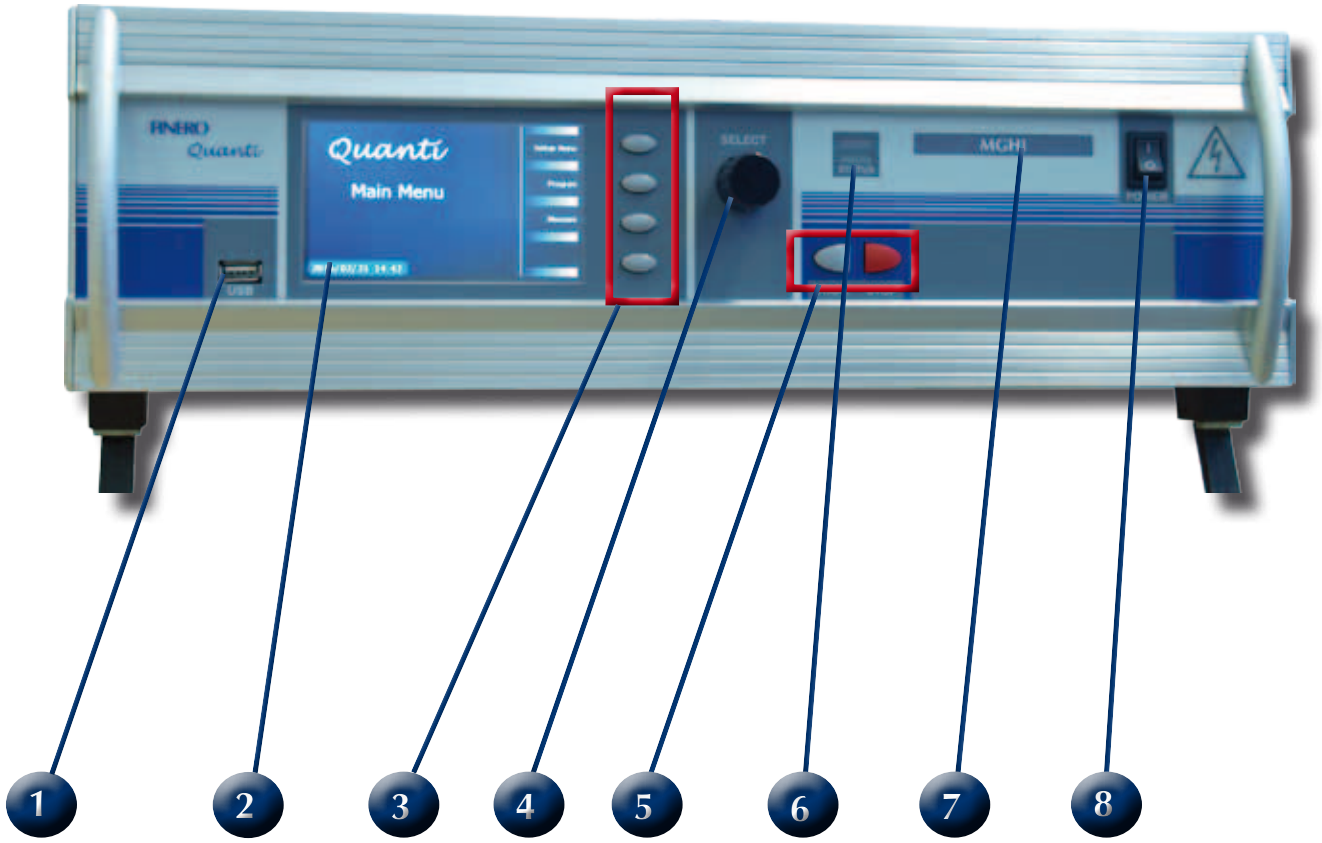
PANEL INFORMATION



1. = USB SLOT - USB slot available in the front panel for storing and transferring test results without a connection to a PC

2. = DISPLAY - 4.3″ Graphical display with 16 million colors

3. = SOFT BUTTONS - For easy navigation through different display menus.

4. = FLY WHEEL KNOB - For choosing different tests, measurement ranges and setting up parameters.

5. = START / STOP BUTTONS

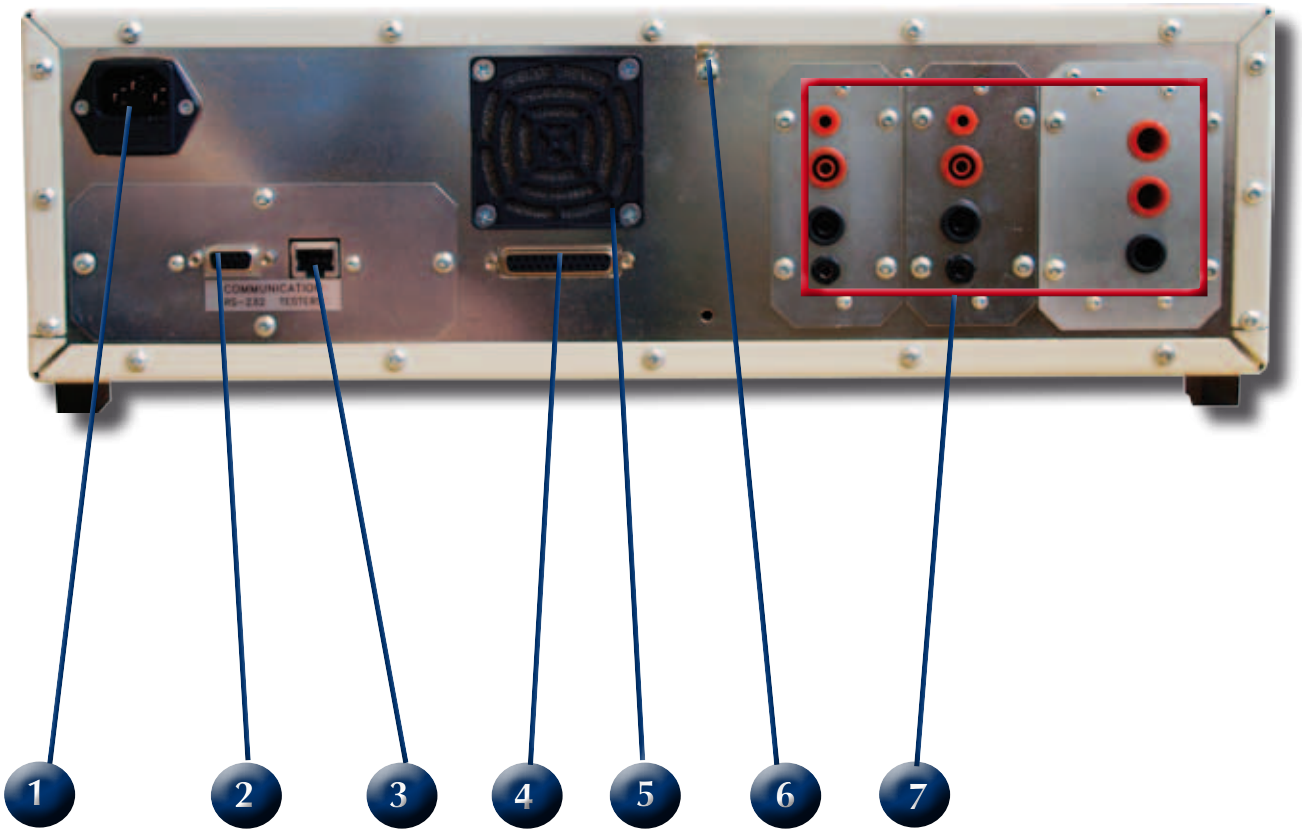
6. = TEST STATUS LIGHTS

7. = QUANTI MODEL - Indicates the type of your Quanti device.

8. = POWER SWITCH

NOTE!

THIS IS AN EXAMPLE OF A QUANTI BACK PANEL. THE BACK PANEL VARIES, DEPENDING ON THE MODEL AND THE OPTIONAL INTERFACES ORDERED.



1. = POWER CORD RECEPTACLE

2. = PC INTERFACE - Optional, please see pages 28-29

3. = QUANTI LINK INTERFACE - Connector for Finero's proprietary Quanti link interface (please see pages 28-29)

4. = PLC REMOTE CONNECTOR - Limited external control of Quanti device with PLC

5. = COOLING FAN

6. = CHASSIS GROUND TERMINAL

7. = REAR PANEL OUTPUT CONNECTORS - These output connectors vary, depending upon the Quanti model

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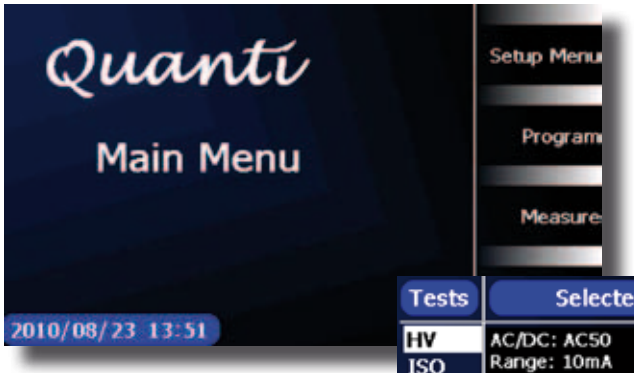
DISPLAY INFORMATION

4.3" LCD GRAPHICAL COLOR DISPLAY WITH 16 MILLION COLORS

FOUR SELECTABLE USER LANGUAGES, EXTENSIVE HELP FUNCTIONS

Clear commands make the software easy and intuitive to use. Comfortable menus make sure that the operator can adjust all test parameters correctly. User can choose between the following menu languages: English, German, French or Spanish.

MAIN MENU WINDOW



In the main menu view the user can start using Quanti.

The user may continue from this view by pressing either:

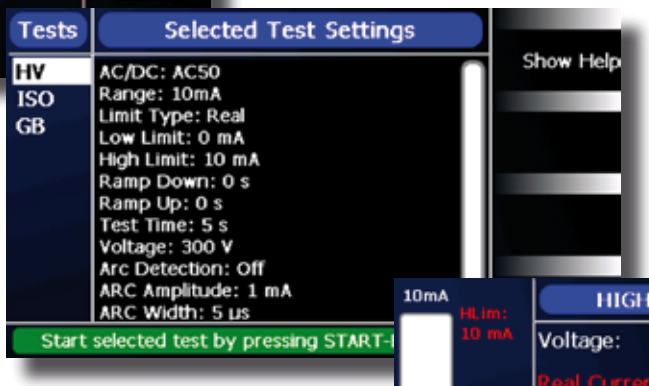
- **SETUP MENU**
- **PROGRAM**
- **MEASURE**

Behind the **SETUP MENU** tab you will find all the device settings.

Behind the **PROGRAM** button you can make your own test sequences.

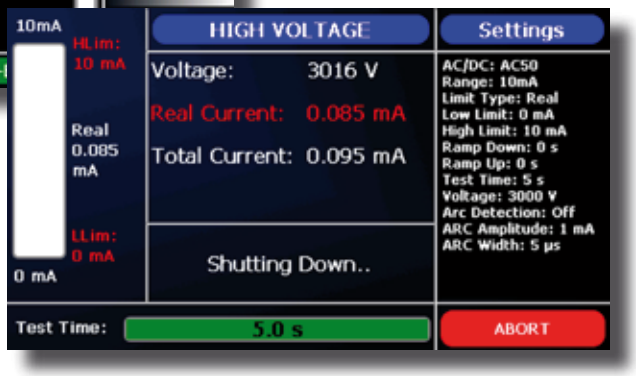
In the **MEASURE MENU** you can select the test parameters.

TEST SETTINGS WINDOW



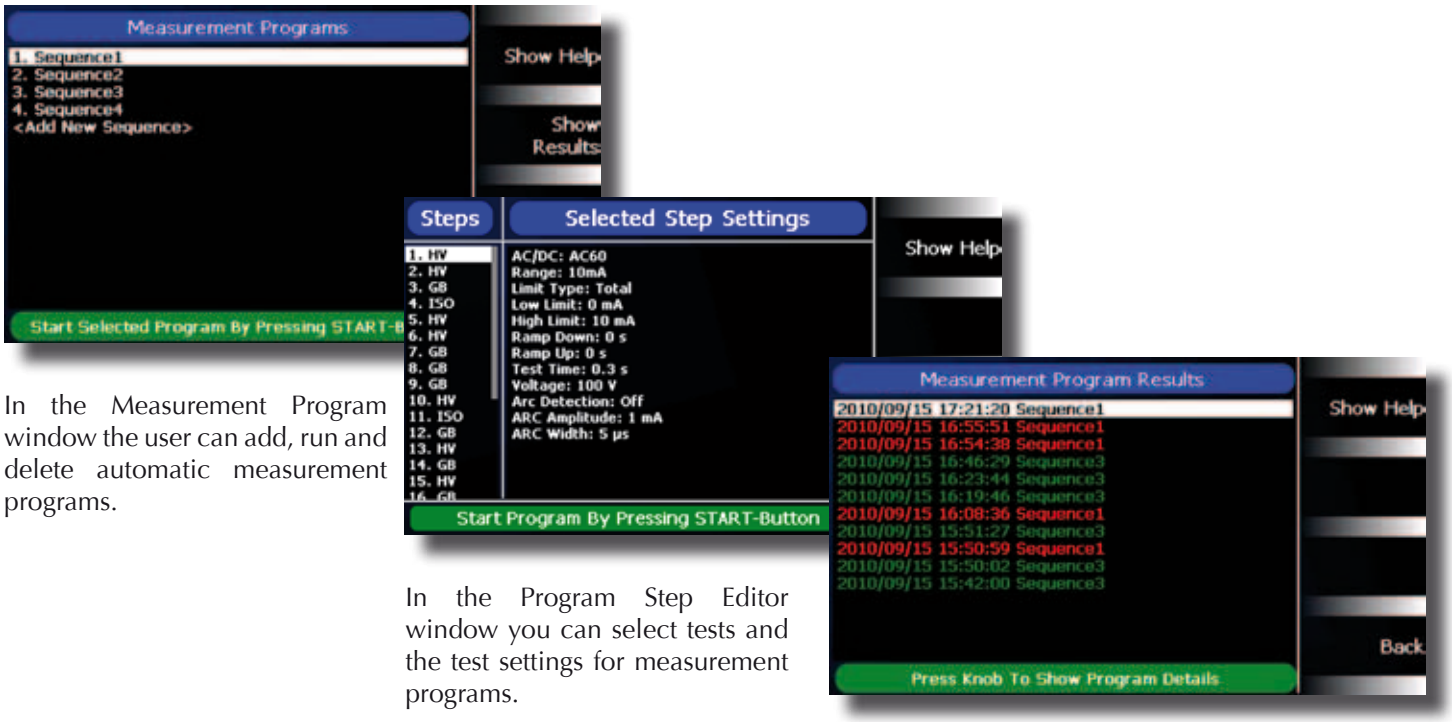
Setting up different tests has never been this easy - just select the test to be done, adjust the test settings and then press the START - button.

TEST DISPLAY



Behind every measurement option you can see a user-friendly test display. The display shows the current test settings and the approval limits. The horizontal bar shows the phase of the test.

TEST SEQUENCE WINDOWS

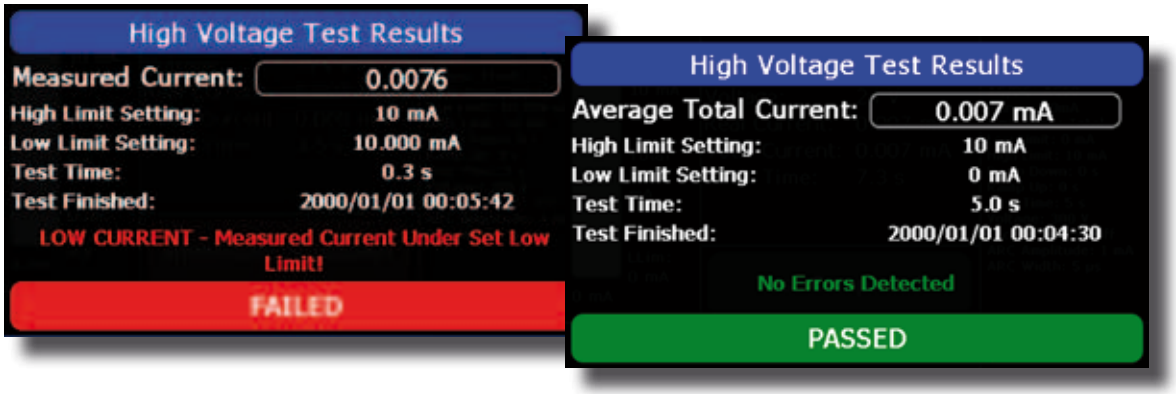


In the Measurement Program window the user can add, run and delete automatic measurement programs.

In the Program Step Editor window you can select tests and the test settings for measurement programs.

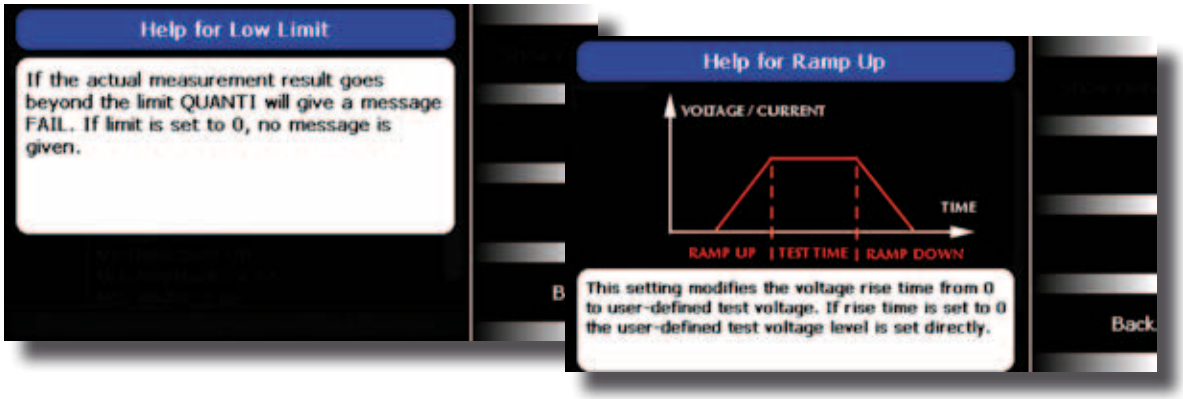
Measurement Program Result window displays the result log for conducted measurement programs.

PASSED / FAILED INFO SCREENS



Clear and simple passed / failed screens inform the user what the test result is in qualitative and quantitative terms. The user also sees the necessary information about the conducted test. Results are saved into Quanti's memory for further analysis.

EXTENSIVE HELP WINDOWS



Pressing the help button shows a help window on the screen, which provides the user additional information about the particular function.

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GENERAL SPECIFICATIONS

GENERAL SPECIFICATIONS	
POWER REQUIREMENTS	Rated input voltage: 110 - 240 VAC, 50 / 60 Hz Input voltage range: 100 - 250 VAC, 45 - 65 Hz
MECHANICAL	Table with tilt up feet (optional 19” rack)
WEIGHT	Depending on the model, approximately 15 - 25kg
CERTIFICATION	EN61010, EN60950 and EN61558 Safety, EN55024 and EN61000 EMC, CE, ETL (coming)
WARRANTY	12 months limited, extended warranty available on request
USB SLOT	1 USB, Type A connection in the front panel for the memory stick

PROTECTION FUNCTIONS

Fast output cut-off after fail
Panel operation lock, present password (four digits)
Arc detection (please see the details on page 19)

PASS / FAIL JUDGEMENT FUNCTION

Visual and audible indication

MEMORY

25 steps per sequence
Test database: 20 Test sequences, single step possibility
Data hold: Last 100 test results saved

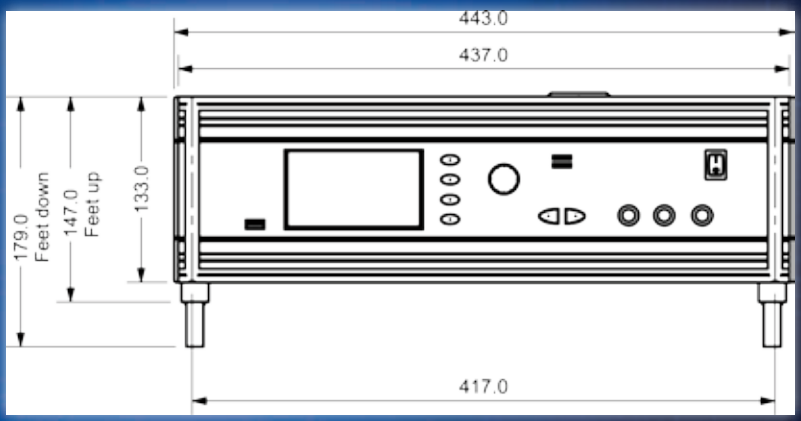
DISPLAY

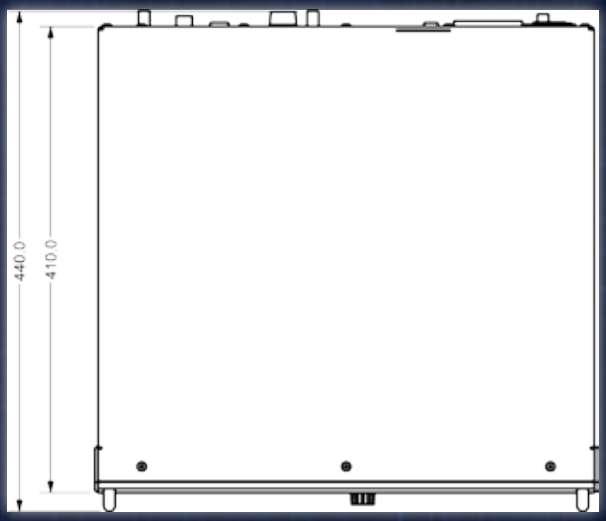
TFT-LCD 4.3” (480 x 272) with back light, 16 million colours

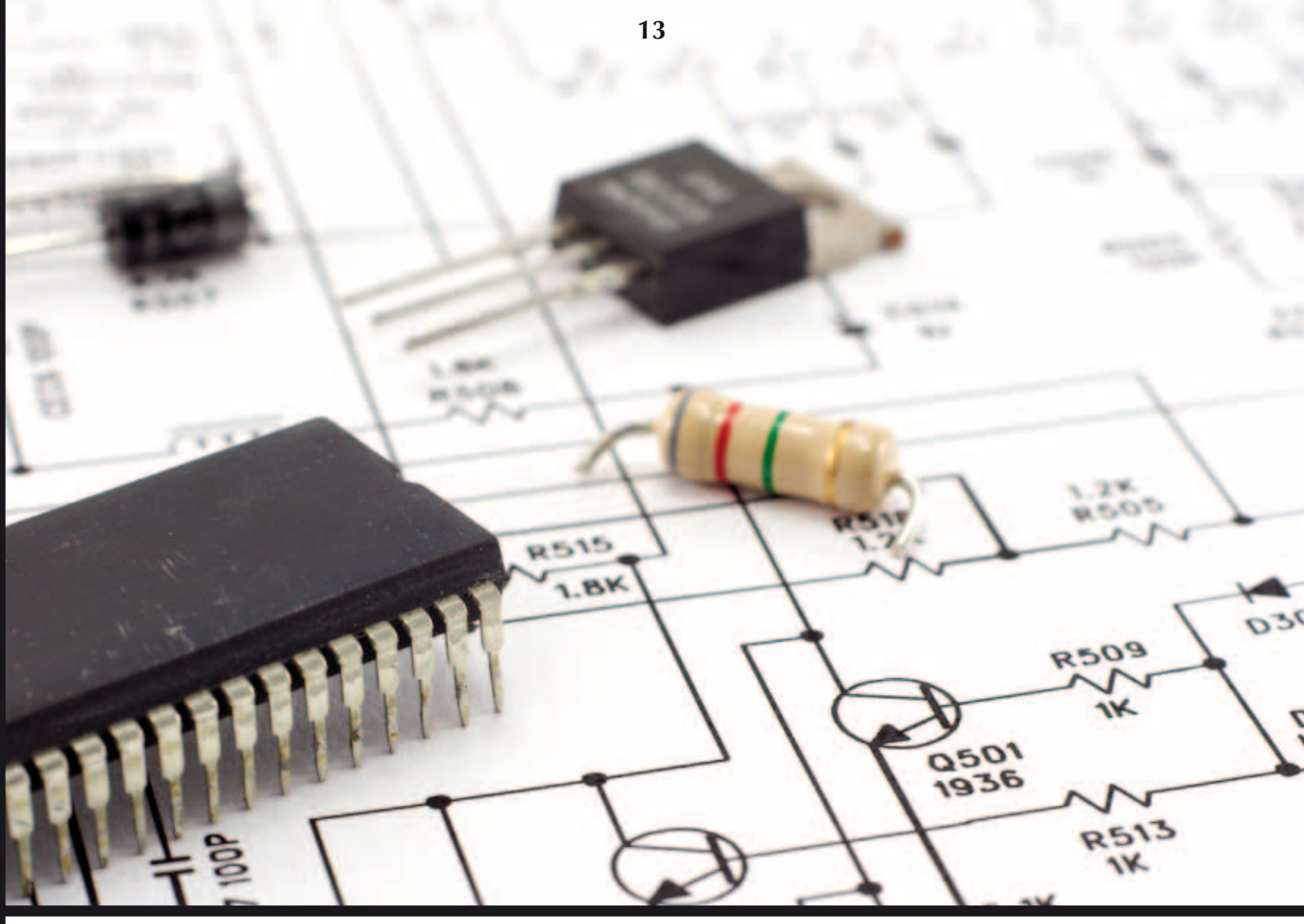
OTHER FEATURES

Calibration notification: The device notifies when the next calibration has to be done
Simple to download test data to USB stick

DIMENSIONS

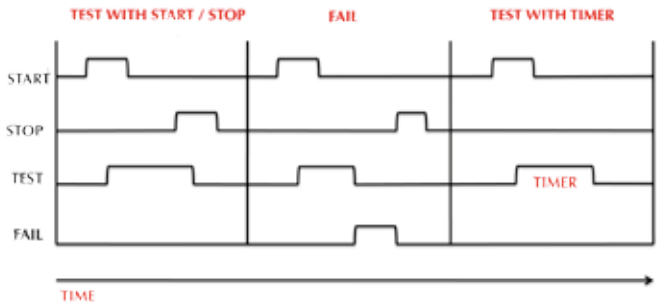




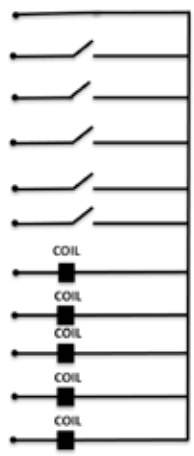


SAFETY CIRCUIT CONNECTOR D25

Quanti provides an external safety circuit; which prevents connection of the test voltage, when external safety circuits are open. The safety circuit connector is a part of the external D25 connector.



X2-5 – X2-9	+ 25V
X2-22	INPUT 1
X2-10	START
X2-23	INPUT2
X2-11	STOP
X2-1	SAFETY CIRCUIT
X2-3	DISCHARGE
X2-2	TEST ON
X2-4	FAULT
X2-24	OUTPUT1
X2-25	OUTPUT2
X2-17 – X2-27	0V



Environmental specifications:

- INDOOR USE
- ALTITUDE: UP TO 2000M
- OPERATING TEMPERATURE: +5°C TO +50°C
- STORAGE TEMPERATURE: -40°C TO +60°C
- MAXIMUM RELATIVE HUMIDITY: 80% FOR TEMPERATURE UP TO 31°C, DECREASING LINEARLY TO 50% RELATIVE HUMIDITY AT +40°C; NO CONDENSATION ALLOWED
- POLLUTION DEGREE IS 1

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INSULATION RESISTANCE - I

WHY?

Insulation resistance test is one of the tests that are required by the electrical safety testing standards. The test measures insulation resistance of a Device Under Test, while phase and neutral are short circuited together.

INSULATION RESISTANCE FUNCTION SPECIFICATIONS				
OUTPUT VOLTAGE	Range: 50 - 1000V DC Resolution: 1V Accuracy: ± 0.5% of range			
RESISTANCE MEASUREMENT	Range: 0.5MΩ - 50 000MΩ (5 digit, Auto range) Resolution: MΩ / MΩ 0.001 / 0.500 - 9.999 0.01 / 1.00 - 99.99 0.1 / 10.0 - 999.9 1 / 100 - 50 000 Accuracy: ± 5% to ± 15% depending upon the voltage and the selected range 50 - 499V DC: 0.5MΩ - 999.9MΩ, ± (5% of reading +2 counts) 1000MΩ - 9999MΩ, ± (8% of reading +2 counts) 10000MΩ - 50000MΩ, ± (17% of reading +2 counts) 500 - 1000V DC: 0.5MΩ - 999.9MΩ, ± (3% of reading +2 counts) 1000MΩ - 9999MΩ, ± (6% of reading +2 counts) 10000MΩ - 50000MΩ, ± (15% of reading +2 counts)			
RAMP TIME	Ramp up: 0.1 - 99.9sec; No Ramp Ramp down: 0.1 - 99.9sec; No Ramp			
TEST TIME	0; 0.3 - 999.9sec (0 = continuous)			
HI AND LO LIMIT (MΩ)	Range: 0.500 - 0.999 Resolution: 0.001	Range: 1.00 - 9.99 Resolution: 0.01	Range: 10.0 - 99.9 Resolution: 0.1	Range: 100 - 50 000 Resolution: 1
	Hi Limit: 0 = OFF			

ENSURING CONNECTIVITY

For optimum quality process control the connectivity to the DUT has to be ensured. Quanti gives the user several options to check this. The user can select either automatic or manual mode connectivity check. The parameters can be adjusted in order to meet high quality control standards and optimum yield.

OUTPUT VOLTAGE 50 - 1000V DC

Quanti measures insulation resistance in electrical systems and equipment such as: electrical machines, household appliances, transformers, cables, power supplies and so on. Measuring range is from 0.5MΩ to 50GΩ.

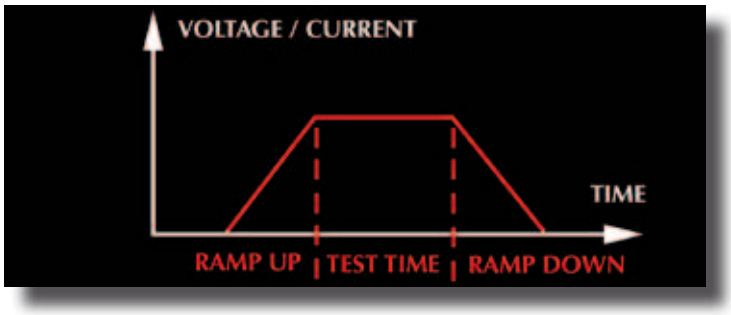
VOLTAGE RESOLUTION 1V

VOLTAGE ACCURACY ±0.5% OF RANGE

RESISTANCE MEASUREMENT ACCURACY ± 5% TO ± 15%

RAMP TIMER

The voltage is ramped up from zero to the final value. Once the voltage reaches the selected value, it is kept at that value for a brief period (typically up to 5 seconds) before the resistance value is measured.



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GROUND BOND - G

WHY?

Ground bond test (also referred to as PE resistance test, ground continuity test) determines whether the safety ground circuit of the Device Under Test (DUT) can adequately handle fault current if the product should ever become defective. The measured resistance has to be lower than the indicated limit from the applicable international standards. Usual values are << 500mΩ.

GROUND BOND FUNCTION SPECIFICATIONS	
OUTPUT CURRENT	Range: 3.00 - 30.00A AC Resolution: 0.01A Accuracy: ± 1% (of setting + 0.15A)
OUTPUT FREQUENCY	50 / 60Hz, User selectable
RESISTANCE MEASUREMENT	Range: 0.5mΩ - 500.0mΩ Resolution: 0.1mΩ Accuracy: 0.5% of range
TEST METHOD	4 wire measurement
TEST TIME	0; 0.3 - 999.9sec (0 = continuous)
HI AND LO LIMIT	Range: 0.5mΩ - 500.0mΩ Resolution: 0.1mΩ
MAXIMUM LOADING	20A 500mΩ 25A 380mΩ 30A 300mΩ
CURRENT DISPLAY	Range: 3.00A - 30.00A Resolution: 0.01A Accuracy: ± (1% of reading + 0.15A)
WAVEFORM	True Sine wave

Quanti's ground bond is a high current continuity test. Ground continuity is important for instance in manufacturing to ensure that the products leaving to the customers are safely grounded.

OUTPUT CURRENT RANGE 3 - 30A AC

With Quanti's ground bond test you will test with the currents that most common standards require. User programmable output current from 3A to 30A AC provides extensive coverage for testing according to UL, IEC, EN and other requirements.

OUTPUT CURRENT RESOLUTION 0.01A

Adjustable output current and milliohm trip ranges to meet all safety specifications for ground bond test requirements.

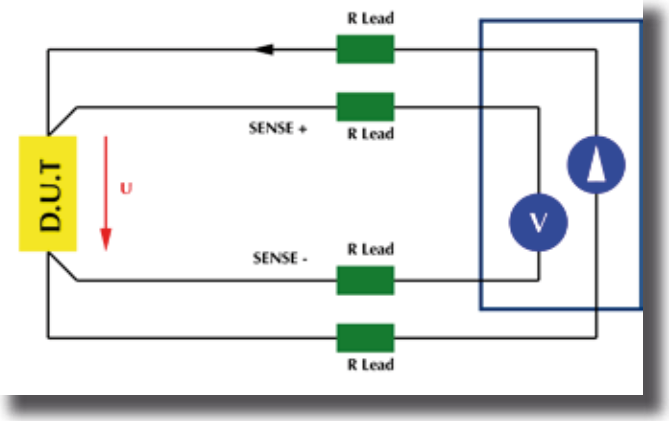
PROGRAMMABLE HIGH AND LOW RESISTANCE LIMITS

A resistance measurement range from 0.5mΩ to 500mΩ, in conjunction with user-programmable high and low resistance limits with Pass/Fail indication, makes this tester ideal for production testing.

4 WIRE MEASUREMENT, CONSTANTLY ACCURATE RESULTS

4 wire measurement ensures accurate and repeatable measurements. When measuring low values resistances, an important error source can be found in the contact resistance. In many applications, the contact resistance value can go beyond the value which has to be measured. To cancel this error source a 4 wire measurement is used.

For instance during the day the factory ambient temperature can change, which would mean wrong resistance values with 2 wire measurements if the error is not manually and constantly offset.



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DIELECTRIC WITHSTAND - H

WHY?

Hipot test or also called a Dielectric Withstand test verifies that the insulation of a product or component is sufficient to protect the operator from electrical shock. In a typical Hipot test high voltage is applied between a product's current carrying conductors and for instance its metallic chassis. Hipot equipment measure extremely low currents like from microamps to milliamps.

DIELECTRIC WITHSTAND (HIPOT) FUNCTION SPECIFICATIONS			
OUTPUT VOLTAGE	0.05 - 6kV AC/DC, Fully floating		
OUTPUT REGULATION	Max ± (2% of output + 5V) from no load to full load over input voltage range		
VOLTAGE SETTING	Range: AC: 0.05 - 6000V, DC: 0.05 - 6000V Resolution: 5V Accuracy: ± (1% of reading + 5V)		
VOLTAGE MEASUREMENT	Range: 0.05 - 6000V Resolution: 1V Accuracy: ± (1% of reading + 5V)		
MAXIMUM OUTPUT CURRENT	100mA AC/DC		
MAX TEST APPARENT POWER	600VA		
MEASUREMENTS	AC Total, AC Real, DC		
CURRENT MEASUREMENT RESOLUTION	1mA : 0.1µA AC/DC 10mA: 1µA AC/DC 100mA: 10µA AC/DC		
CURRENT ACCURACY	AC Total: ± (0.5% of range + 5 counts) AC Real: ± (1% of range + 5 counts) DC: ± (0.5% of range, + 5 counts)		
OUTPUT FREQUENCY	50 or 60 Hz, User selectable		
TEST TIME	AC: 0; 0.3 - 999.9sec (0 = continuous) DC: 0; 0.3 - 999.9sec (0 = continuous)		
RAMP TIME	AC: 0.1 - 99.9sec; No Ramp DC: 0.1 - 99.9sec; No Ramp, τ << Ramp time		
OUTPUT WAVEFORM	True Sine wave, THD < 1 %		
HI AND LO LIMIT	AC TOTAL Range: 100mA Resolution: 10µA Range: 10mA Resolution: 1µA	AC REAL Range:100mA Resolution: 10µA Range: 10ma Resolution: 1µA	DC Range: 10mA Resolution: 1µA Range: 1mA Resolution: 0.1µA
	Lo Limit: 0 = OFF		
MEASUREMENT CIRCUIT DISCHARGE TIME	< 0.2sec, see max. capacitive loads		
MAXIMUM CAPACITIVE LOAD IN DC MODE	0.03µF ≤ 6kV 0.5µF ≤ 3kV 1µF ≤ 1kV		
MEASUREMENT SAFETY	Fully floating output[1]		
ARC DETECTION	Setting mode: Programmable setting Minimum pulse width: < 5µ sec or > 5 - 100µ sec Detection current: Programmable 1 - 20mA		

1) Except with some combination with other functions

ENSURING CONNECTIVITY

For optimum quality process control the connectivity to the DUT has to be ensured. Quanti gives the user several options to check this. The user can select either automatic or manual mode connectivity check. The parameters can be adjusted in order to meet high quality control standards and optimum yield.

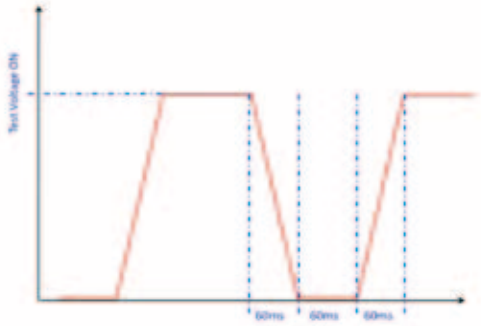
1, 2 AND 4 CHANNEL SIMULTANEOUS MEASUREMENT POSSIBLE

ARC DETECTION

Arc is electrical spark occurred by voltage or current quickly changing. There should be no “sparking” in a Hipot test. Arc detection can help you to solve product quality issues.

MINIMUM TEST CYCLE 1,2 SEC

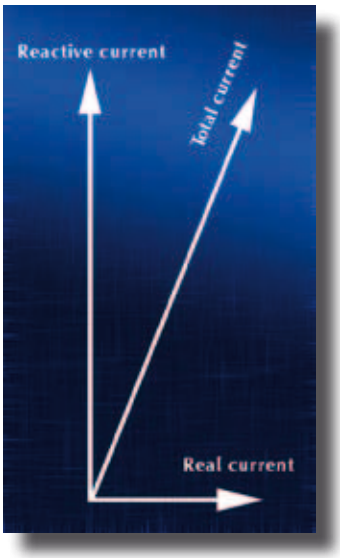
Exceptional high speed (see the diagram) allows to build ultra high speed high volume production test lines. This diagram shows how fast the test cycle can be. With minimum test time of 1sec the overall test cycle time is 1.18sec only. And this for all channels.



TOTAL AND REAL CURRENT MEASUREMENTS

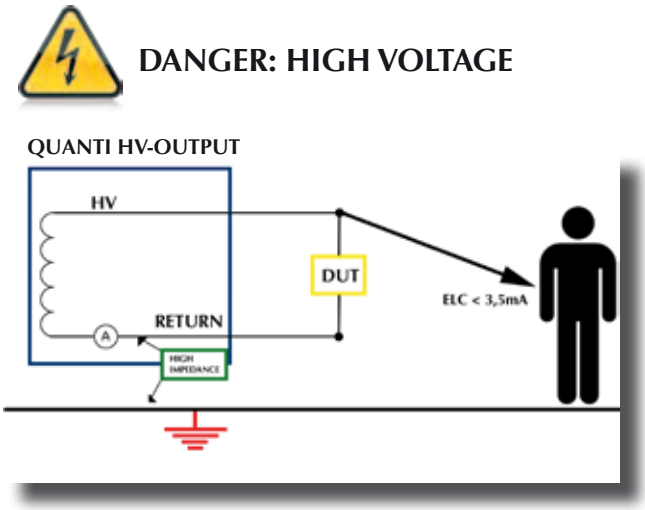
Real Current measurement allows operators to monitor total and real current on a single screen. When testing highly capacitive devices, it is often desirable to make a distinction between real and total current.

Total current is the vector sum of resistive and capacitive leakage current (see picture on the right). If the tester monitors only the total current, a substantial change in real current can often go undetected. The ability to separate the real and capacitive currents is an important requirement for AC Hipot testing. Nowadays some test requirements clearly specify the measurement of real rather than total current.



INTRINSICALLY SAFE - FLOATING OUTPUT

A floating electrical circuit is created by separating grounds; one for the operator, one for the equipment. This method creates an intrinsically safe operator environment. (please see the picture on the right).



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LEAKAGE CURRENT - LC

WHY?

There are mainly two types of LC measuring methods: Touch Current **(TC)** and Protective Conductor Current **(PCC)**. Touch Current is the current that flows when a human body touches the equipment. Protective Conductor Current is the current that flows from the unit through the grounding conductor into a household ground.

LC is capable of performing tests that comply with standards for a wide range of equipment.

LEAKAGE CURRENT FUNCTION SPECIFICATIONS	
DUT INPUT POWER CAPACITY	AC: 300V / 16A max., separate input connection
SHORT PROTECTION	External
CURRENT RANGE AC/DC	50.0µA - 25mA (75mA peak)
LINE VOLTAGE MEASUREMENT	0 - 300 VAC
LINE CURRENT MEASUREMENT	0 - 16A
TIMER FUNCTION	0; 0.3 - 999.9sec (0 = continuous)
LINE CONDITIONS	Reverse power switch: Reverse polarity switch for normal condition Neutral switch: Neutral switch on/off selection for single fault Ground switch: Ground switch on/off selection for class I single fault
HI AND LO LIMIT	Adjustable within the full measuring range

DUT INPUT POWER CAPACITY 300 VAC / 16A MAX.

SUPPORTS ALL TOUCH CURRENT AND PROTECTIVE CONDUCTOR CURRENT (EARTH LEAKAGE CURRENT) TESTS.

Quanti Leakage Current test is designed to perform leakage current (touch current and protective conductor current) tests on general electric equipment (medical option on request). It enables you to conduct tests that conform the requirements of the applicable IEC, UL, EN and other standards.

POWER SUPPLY SEPARATION

The power supply for the Quanti Leakage Current is separate from the line power supply of the equipment that is being tested, preventing this way any damage to equipment due to wrong supply voltage being in the input.

CONFORMS TO FOLLOWING STANDARDS AMONG OTHERS:

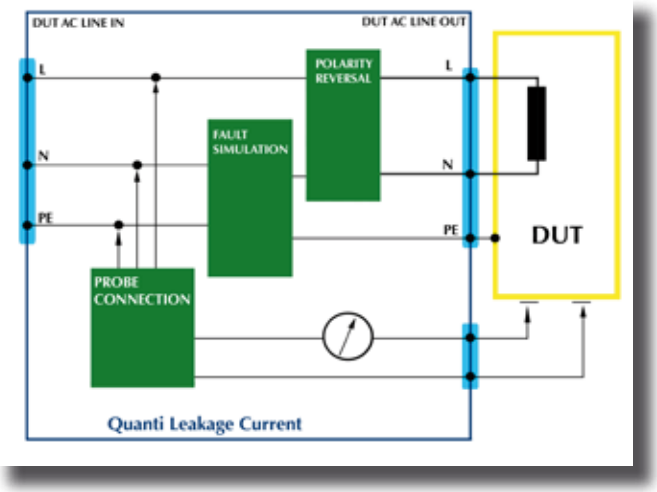
- UL 1563 - Standard for electric spas, equipment assemblies and associated equipment
- UL/IEC/EN 61010-1 - Electrical equipment for measurement, control and laboratory use
- UL/IEC/EN 60950-1 - Information technology equipment
- UL/IEC/EN 60335-1 - Safety of household and similar electrical appliances
- IEC/EN 60990 - Methods of measurement of touch current and protective conductor current

MEASUREMENT MODES

- LEAKAGE CURRENT BETWEEN ENCLOSURE AND LINE
- LEAKAGE CURRENT BETWEEN ENCLOSURE AND EARTH
- LEAKAGE CURRENT BEWEEN ENCLOSURE AND ENCLOSURE
- EARTH LEAKAGE CURRENT

TOUCH CURRENT (TC) AND PROTECTIVE CONDUCTOR CURRENT (PCC) TEST

Eight measurement circuit networks conforming to the applicable standards are provided as standard. The switching of the polarities of the power line to the DUT, as well as single-fault conditions, are automatically set with relays inside the tester.



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LCR METER - L

WHY?

LCR Meters are multifrequency impedance measuring instruments, capable of measuring resistance, capacitance or inductance over a wide range. An LCR meter is used to test the electrical impedance of various equipment or components. LCR meters deliver also additional valuable information like Q, D, ESR etc.

LCR METER FUNCTION SPECIFICATIONS

PARAMETER	MEASUREMENT RANGE
Lp, Ls	0.01µH to 9.999kH
Cp, Cs	0.01pF to 99.999mF
Rs, Rp	0.1mΩ to 99.99MΩ
|Z|	0.1mΩ to 99.99MΩ
Q	0.0001 to 9999
D	0.0001 to 9999
Phase Angle	-180.00 to 180.00 degrees
Xs	0.1mΩ to 99.99MΩ
Rs, Rp	0.1mΩ to 99.99MΩ

MEASUREMENT ACCURACY	Basic LCR: 0.2% (1kHz/1V rms), Basic DQ: ±0.002
TEST SIGNAL	0.25V or 1.0V RMS
MEASUREMENT MODE	Continuous or trigger
TEST FREQUENCY	100Hz, 120Hz, 1kHz, and 10kHz (9.6kHz)
SOURCE IMPEDANCE	25Ω, 100Ω, 1kΩ, 10kΩ, 100kΩ
DC BIAS VOLTAGE	Internal: 0 - 2V in 1mV steps

COMBINE LCR WITH DMM OR HIPOT

For instance in cable manufacturing Quanti equipment can be used to measure resistance (R) and inductance (L) as well as Hipot testing. This all can be done with one Quanti unit. This makes the end product testing very easy and the quality data is coming from one measurement device to ensure the highest traceability. Testing is performed at considerably lower cost.

ACCURATE AND REPEATABLE MEASUREMENTS

The dominant component value can be measured with a basic accuracy of 0.2%

SELECTABLE TEST SIGNAL 0.25V OR 1.0V RMS

COMPREHENSIVE MEASUREMENT FUNCTIONS TO SUIT ALL REQUIREMENTS

Quanti's LCR meter offers a comprehensive range of measurement functions: series and parallel inductance (Lp/Ls) and resistance (Rp/RS), series and parallel capacitance (Cp/Cs), impedance (Z), phase angle and quality factor (Q) can all be selected.

Measure and display two of 10 impedance parameters simultaneously.

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DMM AND CONTINUITY - M / S

WHY?

DMM usually combines several measurement functions in one unit. A typical multimeter may include features such as the ability to measure voltage, current and resistance. DMM is used in R&D, type tests and production test.

DMM FUNCTION SPECIFICATIONS

MEASUREMENT FUNCTION	RANGE		ACCURACY % OF RANGE
VOLTAGE DC	100mV 1V 10V 100V 1000V		0.025
RESISTANCE 2 WIRE	100Ω		0.05
	1kΩ		0.05
	10kΩ		0.05
	100kΩ		0.05
	1MΩ		0.1
	10MΩ		0.25
	100MΩ		2.5
CURRENT DC	10mA 100mA 1A 10A		0.1
10Hz - 120kHz VOLTAGE AC TRMS	100mV 1V 10V 100V 750V	10Hz - 50Hz	1
		50Hz - 100Hz	0.5
		100Hz - 25kHz	0.25
		25kHz - 120kHz	1
20Hz - 5kHz CURRENT AC TRMS	10mA 100mA 1A 10A		0.5
FREQUENCY	**PERIOD RANGE**		**% OF RANGE**
3Hz - 500kHz (For 0.1V - 750V AC RMS)	333msec - 2µsec		0.01%

VOLTAGE DC RANGE 100mV - 1000V

RESISTANCE 2 WIRE RANGE 100Ω - 100MΩ

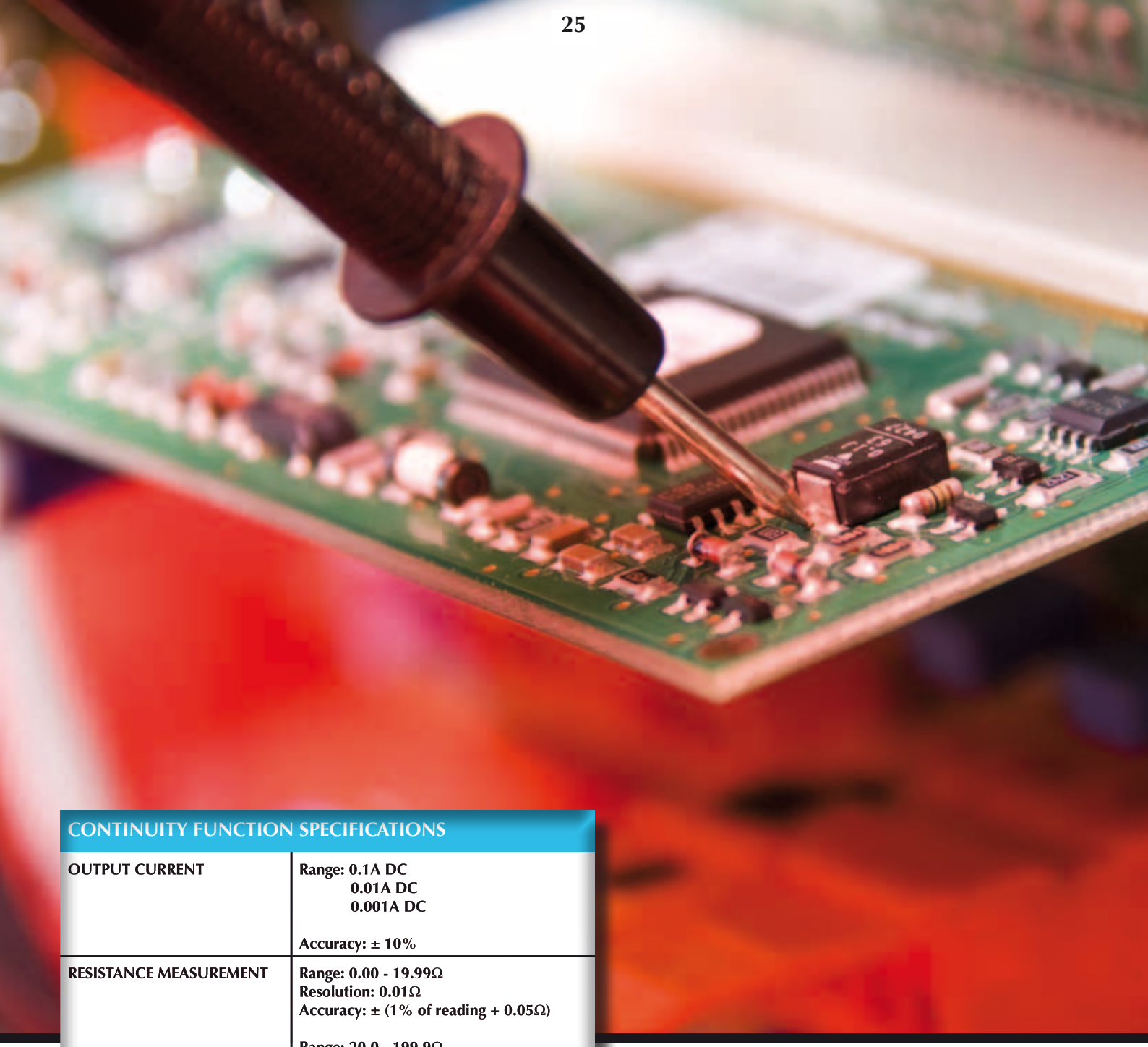
CURRENT DC TRMS 10mA - 10A

VOLTAGE AC TRMS 100mV - 750V

CURRENT AC TRMS FREQUENCY 3Hz - 500kHz

4½ DIGITS

With Quanti's digital multimeter, you will get all the tools you need at an affordable price without compromising the quality. It provides a broad range of features and measurement functions such as DC voltage, DC current, true-RMS AC voltage and AC current, resistance, frequency, which are designed to meet general industrial needs.



CONTINUITY FUNCTION SPECIFICATIONS	
OUTPUT CURRENT	Range: 0.1A DC 0.01A DC 0.001A DC Accuracy: ± 10%
RESISTANCE MEASUREMENT	Range: 0.00 - 19.99Ω Resolution: 0.01Ω Accuracy: ± (1% of reading + 0.05Ω) Range: 20.0 - 199.9Ω Resolution: 0.1Ω Accuracy: ± (1% of reading + 0.2Ω) Range: 200 - 2000Ω Resolution: 1Ω Accuracy: ± (1% of reading + 2Ω)
TEST METHOD	2 wire measurement
HI AND LO LIMIT	Range: 0.00 - 19.99Ω Resolution: 0.01Ω Accuracy: ± (1% of reading + 0.05Ω) Range: 20.0 - 199.9Ω Resolution: 0.1Ω Accuracy: ± (1% of reading + 0.2Ω) Range: 200 - 2000Ω Resolution: 1Ω Accuracy: ± (1% of reading + 2Ω)
TEST TIME	Range: 0; 0.3 - 999.9sec (0 = continuous)
MILLIOHM OFFSET	Range: 0.00 - 10.00Ω

WHY?

Whether an electric circuit is open or closed, can be tested easily by using continuity test.

OUTPUT CURRENT 0.001A, 0.01A, 0.1A

CURRENT ACCURACY ±10%

RESISTANCE RANGE 0.00Ω - 2000Ω

RESISTANCE RESOLUTION 0.01Ω - 1Ω

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RELAY MATRIX

FINERO PROPRIETARY QUANTI LINK INTERFACE ALLOWS EASY SYSTEM BUILDING

UP TO 32 HV-RELAYS IN A SINGLE COMPACT 3U CASE

EASY PROGRAMMING USING SAFETEST 100 SOFTWARE

FULL PC CONTROL USING GPIB, RS-232, ETHERNET OR USB INTERFACE

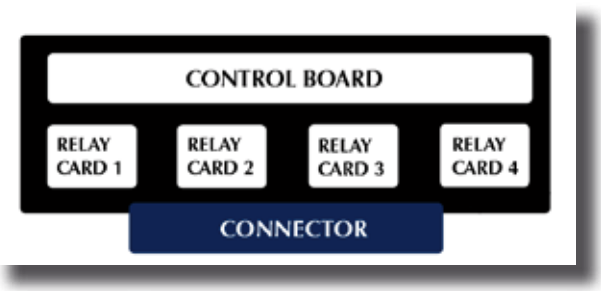
EASILY EXPANDABLE CONFIGURATION

LED DISPLAY FOR 32 OUTPUTS AND 8 INPUTS

Quanti relay matrix allows to easily build complete functional test systems. PC control of the test system is made simple by already installed interfaces, which you can choose from GPIB, RS-232, Ethernet or USB, according to your needs. Programming can be done by SAFETEST 100 software.

The basic model of the matrix has 32 digital outputs, 8 inputs and 8 analog inputs. The number of inputs and outputs can be expanded several ways up to hundreds if needed.

RELAY MATRIX SPECIFICATIONS	
POWER CONNECTION	Rated input voltage: 110 - 240 VAC, 45 - 65 Hz Input voltage range: 100 - 250 VAC, 45 - 65 Hz
CONTROL BOARD	Digital input: 8 pcs 24 VDC, Current rate about 0,2mA
	Analog input: 8 pcs 0 - 10 VDC, Current rate about 0,1mA
	Digital output: Totally 32 pcs NPN type outputs, each 8 outputs 24VDC / 100mA supply with max. 500mA
INPUT/OUTPUT CONNECTIONS	Safety 4mm banana plugs or multipole connectors
QUANTI LINK	To be used for device to device communication between Quanti equipment

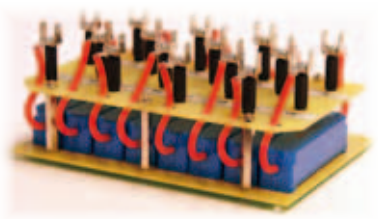


The matrix can include reed-type HV-relays, power contactors and control relays. Also signal relays can be used. It can be fully configured according to each different test case and reprogrammed if needed in later modifications.

Easy to use standard software package supports all Finero's instruments plus allows an easy way to integrate additional out of Finero standard line or third party instruments for functional testing.

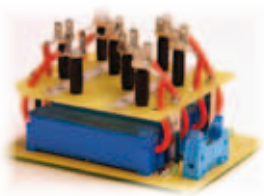
Relay cards 1,2,3 and 4 can be chosen from the models seen below. You can also choose a single contractor or a relay instead of a relay card to any of the four slots, according to your desired configuration.

2975



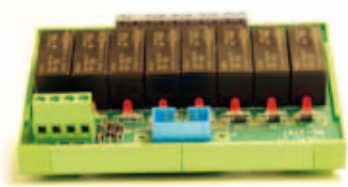
- HV- reed relay, 8 pcs, 1x NO, floating, 7,5kV (DC or AC Peak)
- Coil 24 V DC
- Each relay has a LED indicator and free wheeling diode.
- All contacts connected separately to upper plate HV-terminals. Other types upon request
- Control connector: 10-pin IDC male

4614



- HV- reed relay, 4 pcs, 1x NO , floating, 7,5kV (DC or AC Peak)
- Coil 24 V DC
- Each relay has a LED indicator and free wheeling diode
- All contacts connected separately to upper plate HV-terminals. Other types upon request
- Control connector: 10-pin IDC male

3395



- Relay Type: 230VAC 1xNO, 8 pcs
- Circuit Connects: 1 common input to 8 outputs
- Coil 24 V DC
- Each relay has a LED indicator and free wheeling diode
- Power connectors: 4mm^2 screw connectors
- Control connector: 10-pin IDC male

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OPTIONS

Computer interfaces for Quanti models are optional, and you can choose between four different interfaces to connect the equipment with the computer. Only one interface type is required to enable communication between PC and Quanti.

STANDARD INTERFACE		
USB	1 USB, Type A connection in the front panel for the memory stick	
OPTIONAL (FACTORY INSTALLED) INTERFACES		**CODE**
QUANTI LINK	To be used for device to device communication between Quanti equipment	QL
USB[1]	USB, Type B computer interface in the back panel	U
RS-232[1]	DSUB9 female	R
ETHERNET[1]	10 / 100 Mbit	E
GPIB[12]	IEEE488, Standard	G
BAR CODE READER	Available with computer interface, works ONLY with Safetest software	B
RELAY MATRIX	Please see pages 26-27	RM

1) includes Quanti link interface

2) guaranteed performance only with Labview

COMMUNICATION BETWEEN VARIOUS EQUIPMENT:

As default, Quanti equipment is delivered without interfaces, except the one USB interface in the front panel. Further interfaces can be ordered separately.

The USB slot in the front panel cannot be used as a PC interface.

Quanti computer interfaces include one factory installed Finero proprietary *Quanti link* interface, which can be used for internal communication between numerous Quanti equipment. A factory installed *Quanti link* interface can also be ordered separately.

Quanti can be linked to a PC via USB, Ethernet, RS-232 or GPIB - allowing storaging, displaying and printing of results, as well as remote control of the testing process. This provides a very cost efficient solution for building test systems, less hassle with cables and programming is needed for only one instrument.

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ORDERING INFORMATION

TEST / MODEL	ISO	GROUND BOND	HIGH VOLTAGE	LEAKAGE CURRENT	LCR	DMM	CONTINUITY TEST	AVAILABLE OPTIONS	ORDERING CODE
G	-	X	-	-	-	-	-		6103
H	-	-	X	-	-	-	-	40/100mA	6115 / 6116
I	X	-	-	-	-	-	-		6162
GI	X	X	-	-	-	-	-		6197
HD	-	-	2pcs [1]	-	-	-	-	40/100mA	6163 / 6187
HQ	-	-	4pcs [1]	-	-	-	-	40/100mA	6164 / 6188
HI	X	-	X	-	-	-	-	40/100mA	6111 / 6112
HM	-	-	X	-	-	X	-	40/100mA	6113 / 6114
LC	-	-	-	X	-	-	-		6110
MHI	X	-	X	-	-	X	-	40/100mA	6165 / 6166
2MHI	X	-	X	-	-	2pcs	-	40/100mA	6167 / 6168
GHI	X	X	X	-	-	-	-	40/100mA	6108 / 6109
HILS	X	-	X	-	X	-	X	40/100mA	6169 / 6170
ML	-	-	-	-	X	X	-		6171
GHILC	X	X	X	X	-	-	-	40/100mA	6106 / 6107
HIS	X	-	X	-	-	-	X	40/100mA	6172 / 6173
MGHI	X	X	X	-	-	X	-	40/100mA	6104 / 6105

1) simultaneous

PLEASE USE THE CODE FOR ORDERING. THERE ARE DIFFERENT CODES FOR DIFFERENT OPTIONS.

TO SEE THE CONTACT DETAILS FOR YOUR LOCAL SALES REPRESENTATIVE, PLEASE VISIT FINERO'S WEBPAGE (SALES & SERVICE)

JUST ONE OR A NUMBER OF TESTS –QUANTI™ HAS IT ALL!

STANDARD INTERFACE:

USB 1 USB, Type A connection in the front panel for the memory stick

OPTIONS:

NAME	CODE
Quanti link	QL
USB[1]	U
RS-232[1]	R
ETHERNET[1]	E
GPIB[1,2]	G
BAR CODE READER[3]	B
RELAY MATRIX	RM

1) includes *Quanti link* interface
2) guaranteed performance only with Labview
3) available with computer interface, works only with Safetest software
4) Manual use is standard, ordering code M

XXXX	–	X	–	X
Quanti code		Interface or M[4] for manual use		Electrical outlet type

ORDERING INSTRUCTIONS:

As default, Quanti equipment is delivered without interfaces, except the one USB interface in the front panel. Further interfaces can be ordered separately.

Please also note that you have to define the desired electrical outlet type when ordering (please see the page 32, standard accessories, power cord)

EXAMPLE 1: If you want to order Quanti model G with RS-232 interface and with an electrical outlet type required in the UK (Type D9), you order as follows:

6103-R-D9
(MODEL ORDERING CODE - RS-232 CODE - ELECTRICAL OUTLET TYPE)

EXAMPLE 2: If you want to order Quanti model MGHI (100mA Hipot) with GPIB and Quanti link interfaces and with a electrical outlet type required in China (Type B2 or C8), you order as follows:

6105-G-B2/C8
(MODEL ORDERING CODE - GPIB CODE (includes already Quanti link) - ELECTRICAL OUTLET TYPE)

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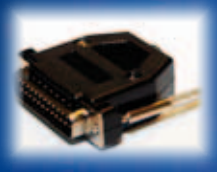
ACCESSORIES

STANDARD ACCESSORIES FOR ALL MODELS:

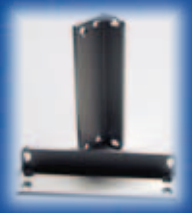
Safety circuit connector D25



Power cord

OPTIONAL ACCESSORIES FOR ALL MODELS:

Rack Installation set



CODE 6183

Different electrical outlet types that Finero provides, please choose the desired one when ordering (please see page 31).

Outlet Type	Country
A1:	Mexico, USA
B2:	Europe, Brazil, China, India, Switzerland
B5:	Italy
B6:	Switzerland
C8:	China
D9:	UK
E10:	India

For information about different plugs and sockets around the world, please visit:
http://www.iec.ch/zone/plugsocket/

ACCESSORIES - SOFTWARE LICENCES:

	3935-5	Safetest 100b multisystem licence, up to 5 test systems
OPTIONAL	3935-1	Safetest 100b licence, single test system
	3935-1+	Safetest 100b licence, additional test system to single licence

ACCESSORIES - MODEL G (GROUND BOND):

STANDARD	5950	GB - Cable 2m with crocodile clip, red
	1731	GB - Cable 2m with crocodile clip, black
OPTIONAL	0121	GB Probe, remote controlled

ACCESSORIES - MODELS H, I, HI (HIGH VOLTAGE, ISO):

STANDARD	6178	3pcs HV-cable, 2m with connector to Quanti back panel
	6155	3pcs of HV-plugs
	6156	HV-pistol SP-02, 2m cable, including connection box
	6157	HV-pistol SP-02, 5m cable, including connection box
	6158	HV-pistol SP-03, 2m cable, including connection box
	6159	HV-pistol SP-03, 2m cable, including connection box
OPTIONAL	6198	HV-cable for Quanti Hipot, ordered by meters
	6179	HV-cable, 2m, with ready installed plug
	6180	HV-cable, 5m, with ready installed plug
	5940	HV-crocodile clip, red, 5kV
	5951	HV-crocodile clip, black, 5kV

ACCESSORIES - MODEL M (DMM):

STANDARD	6160	DMM test leads, red and black with crocodile clips
OPTIONAL	6160	DMM test leads, red and black with crocodile clips

ACCESSORIES - MODEL S (CONTINUITY):

STANDARD	6160	Continuity test leads, red and black with crocodile clips
OPTIONAL	6160	Continuity test leads, red and black, with crocodile clips

ACCESSORIES - MODEL LC (LEAKAGE CURRENT):

STANDARD	6181	Leakage Current test lead set

ACCESSORIES - MODEL L (LCR):

STANDARD	6182	LCR test lead set

FINERO *The Quality Control Company*

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