FINERO *The Quality Control Company*

# FINERO'S FST PRODUCT SERIES

FINERO *The Quality Control Company*

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ISO 9001

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CERTIFIED ORGANISATION

CE

*www.qacontrol.com*

# COMPANY INFORMATION


For over thirty years Finero Corporation has provided the electrical and electronics industries with a broad range of advanced and reli-able test and measuring 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 research institutes in numerous industries.

Our engineers continually seek better ways to test products to enhance electrical safety through improved testing methods.

Finero delivers world wide and through its certified partners. Service and support is available locally to our international customers.

- FOUNDED: 1980
- HEADQUARTERs: KAUSALA, FINLAND, NORTH AMERICAN HEAD OFFICE FINERO USA LLC
- 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

## 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, Malaysia, Singapore

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

FINERO *The Quality Control Company*


# *FST-110 High Voltage Tester*

**FST-110** is a microprocessor controlled fully programmable High Voltage Test device for dielectric strength testing using 0 to 5kV AC or DC with full floating output with a rated 500VA (100mA). It incorporates all necessary functions for dielectric strength testing and additional features for more automated testing.

- Very quick calibration with exchangable measuring module
- A very sensitive and adjustable partial discharge detector
- Single flywheel knob in manual or auto-matic mode
- Alphanumeric display for easy programming
- Last measured value shown on the display and saved
- Time controlled adjustable ramp and dwell
- Reliable mA level measurements
- Interfaces USB, Ethernet, RS232, GPIB

# *FST-110 High Voltage Tester*

| Technical Specification | |
|---|---|
| Input | 230V or optionally 115V AC; 50Hz / 60Hz; 650VA |
| Output | Range: 0 - 2500V AC or 0 - 5000V AC |
| Optional | DC output |
| Maximum test current | 100mA |
| Maximum test apparent power | 500VA |
| Measurements | True RMS for I and U |
| Accuracy | ± 0.5% from the range plus 5 digits |
| Analog Display | ± 2% from the range |
| Measuring Ranges | |
| Standard | 10mA / 100mA |
| Optional | 2mA / 10mA |
| Timer function | |
| Timer ON | 1 - 60s, 0.1s steps |
| Timer OFF | To be defined by the user or software program, t >60s |
| Ramp function | Ramp up and/or down |
| selectable range | 5 - 30s, No ramp = 60ms |
| Partial discharge detector | OFF or relative sensitivity adjustable 1 - 100 |
| External connections | |
| Input 24V DC | Start, Stop, External safety loop, 2 programmable inputs |
| Output, closing relay | Test On, Test Failed |
| Output, change over relay | Discharge |
| Output NPN 24V DC / 100mA | 2 programmable |
| Auxiliary power | 24V DC, max. 100mA |
| Interfaces | GPIB, Ethernet, RS-232, USB |
| Dimensions | 483mm x 410mm x 148mm (w x d x h) |
| | Rack19", 3U, 133mm without feet |
| Weight | 23kg |

## ORDERING INFORMATION

| Product Name | Art. No. |
|---|---|
| FST-110 AC output, 2mA/10mA range | 5408 |
| FST-110 AC output, 10mA/100mA range | 2746 |
| FST-110 AC/DC output, 2mA/10mA range | 5681 |
| FST-110 AC/DC output, 10mA/100mA range | 5680 |
| Measuring module 2mA/10mA range | 3362 |
| Measuring module 10mA/100mA range | 3938 |

*All specifications are subject to change without notice*

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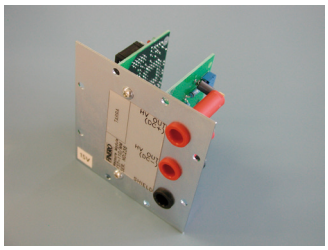
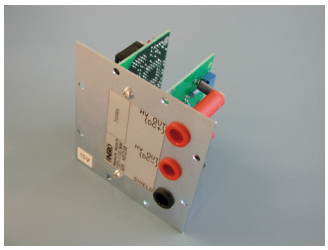
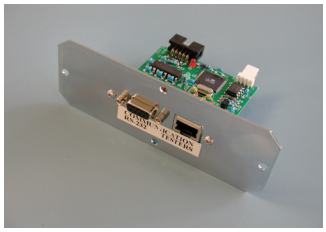
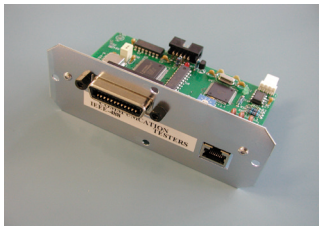
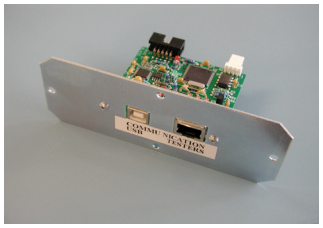
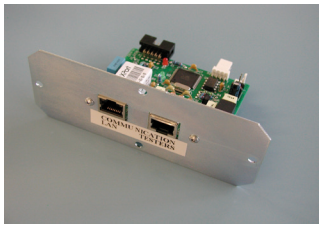
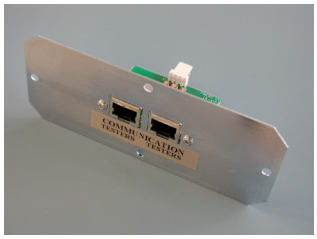
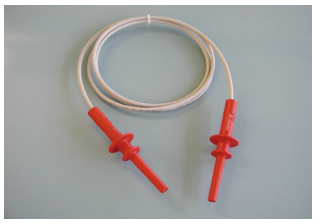
# *FST-110 High Voltage Tester - Optional equipment*

| Picture | Description and Type | Article No. |
|---|---|---|
|  | FST-110-MM<br><br>Measuring module for FST-110<br>Measurement current range 10/100mA<br>Both for DC and AC measurements<br>Needed with the FST-110 High Voltage Tester | 3938 |
|  | FST-110-MM 2/10mA<br><br>Measuring module for FST-110-MM 2/10mA<br>Measurement current range 2/10mA<br>Both for DC and AC measurements<br>Needed with the FST-110 High Voltage Tester | 3362 |
|  | FST RS-232<br>Interface RS-232 for FST Series<br><br>- Baud rate 19200, 8, N, 1<br>- RS-232 connector: D-9 female<br>- RS-485 connector CAT 5 female | 2752 |
|  | FST GPIB<br>Interface IEEE-488 for FST Series<br><br>- IEEE-488.1-1987 and HS488 compatible<br>- self adapting<br>- 24 pole female connector<br>- RS-485 connector CAT5 female | 2753 |
|  | USB Interface for FST Series<br><br>- USB 1.1 and 2.0 compatible<br>- USB connecor type B female<br>- RS-485 connector CAT5 female | 2159 |
|  | Interface Ethernet for FST Series<br><br>- 10 / 100 Mbit Ethernet compatible<br>- Ethernet connector CAT5 female<br>- RS-485 connector CAT5 female | 5458 |

# FST-110 High Voltage Tester - Optional equipment

| Picture | Description and Type | Article No. |
|---|---|---|
|  | Interface Tester to Tester to FST Series<br><br>2 pcs CAT5 female connectors for other FST-series testers | 5397 |
|  | High Voltage pistol with connector SP-02<br>2m cable<br>High Voltage pistol with connector SP-02<br>5m cable<br>High Voltage pistol with connector SP-03<br>2m cable<br>High Voltage pistol with connector SP-03<br>5m cable<br><br>- Conforms to CE, according to EN 50 191<br>- Operating voltage 10 kVDC / 8 kVAC max<br>- Test voltage 21 kVDC<br>- Connection via highly flexible safety cable<br>- Wear-proof tungsten test prod<br>- Teflon - guard ring<br>- Integrated start key only in SP-03 | 1431<br><br>2757<br><br>3887<br><br>2758 |
|  | High Voltage Test Lead 1,5m, red<br>High Voltage Test Lead 1,5m, black<br><br>- Max voltage 5000V CAT I<br>(Transient overvoltage 2000V)<br>1000V CAT III<br>- Max current 10A<br>- Conformity IEC 61010-031, A type probe.<br>LVD 93/68/EEC.<br>Reinforced insulation | 2913<br>2912 |

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# *FST-112D Dual High VoltageTester*
# *FST-114Q Quad High Voltage Tester*

## Fast and Efficient!

### Fast, Faster, Finero HiPot!

Finero's **FST-112D Dual HiPot** and **FST-114Q Quad HiPot** lift testing speed and production output to a completely new level. **FST-112D Dual HiPot** and **FST-114Q Quad HiPot** perform Dielectric Withstand (HiPot) tests for 2 or 4 channels simultaneously thus enabling a double or quadruple performance with much lower costs than with traditional HiPot systems.

**FST-112D Dual HiPot** and **FST-114Q Quad HiPot**, when used in connection with Finero's simple to use and effective Safetest 100B quality control software makes building high performing functional test systems cost efficient and fast.

Dual HiPot and Quad HiPot main features are:

- Simultaneous dual or quad channel high speed measurement
- Very quick calibration with exchangeable measuring module
- A very sensitive and adjustable partial discharge detector
- Reliable mA level measurements
- Interfaces USB, Ethernet, RS232, GPIB
- LabVIEW drivers available

# *FST-112D Dual High VoltageTester*
# *FST-114Q Quad High Voltage Tester*

## Applications

**FST-112D Dual HiPot** is used mainly in medium and high volume production where output performance is critical. Due to its dual channel simultaneous measurement capability production output can be doubled with much lower cost than using two single HiPot testers. **FST-112D Dual HiPot** also simplifies substantially building test systems in cases when simultaneous synchronized testing is required.

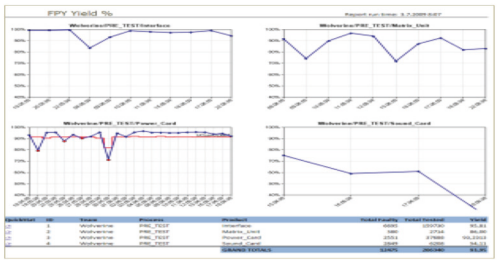
**FST-112D Dual HiPot** is very fast, when needed, in testing and saving the test data, which makes it an optimum safety tester for very high volume production.

Optionally available **FST-114Q**, four channel HiPot tester, simultaneously tests and retrieves and saves test and measurement data of all 4 channels.

The outputs are floating against the ground in both **FST-112D** and **FST-114Q**.

## FST-112D Dual HiPot ideal applications are for instance in high volume production quality control of:

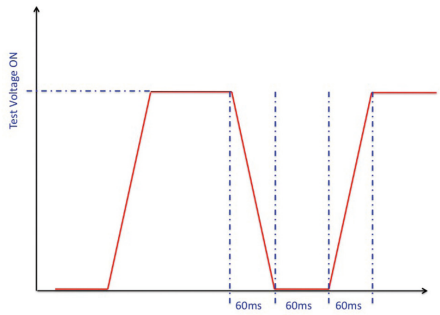
- Power supply testing
- Filter testing
- Cable harnesses testing
- Any production that has high requirements for production output




## FST-112D Dual HiPot as an Ultra High Speed Test System

Dual HiPot's and Quad HiPot's 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 both channels.




The **FST-112D Dual HiPot** and **FST-114Q Quad HiPot** can be combined with other FST-safety tester line products, like leakage current tester FST-140 and the Relay Matrix FST -150. By using the available LabVIEW driver for FST-line equipment, it can be used for building test systems by utilizing for instance other LabVIEW compatible measurement modules either from Finero or from a wide variety of suppliers.

# *FST-112D Dual High VoltageTester*
# *FST-114Q Quad High Voltage Tester*

## Reliability in Quality Control

In production quality control the reliability of test equipment plays a crucial role. A failure in test equipment can potentially cause a major production bottleneck. In terms of measurement accuracy and reliability the quality control test equipment must deliver superior performance. Finero has provided the world wide electronics and electrical industry with reliable and accurate safety testers and functional test systems for over several decades.

The **FST-112D Dual HiPot** and **FST-114Q Quad HiPot** make no compromise to this commitment of reliability and accuracy.

| Technical Specification | |
|---|---|
| Input | 230V AC or optionally 115V AC; 50Hz / 60Hz; 650VA |
| Output | Range: 0 - 2500V AC or 0 - 5000V AC |
| Optional | DC output |
| Maximum test current | 20mA |
| Optional | 100mA on request |
| Measurements | True RMS for I and U |
| Accuracy | ± 0.5% from the range plus 5 digits |
| Analog Display | ± 2% from the range |
| Measuring Ranges | |
| Standard | 2mA / 20mA per channel |
| Optional | 10mA / 100mA per channel on request |
| Timer function | OFF or 1 - 60s, 0.1s steps |
| Ramp function | Ramp up and/or down |
| selectable range | 5 - 30s, No ramp = 60ms |
| Partial discharge detector | OFF or relative sensitivity adjustable 1...100 |
| External connections | |
| Input 24V DC | Start, Stop, External safety loop, 2 programmable inputs |
| Output, closing relay | Test On, Test Failed |
| Output, change over relay | Discharge |
| Output NPN 24V DC / 100mA | 2 programmable |
| Auxiliary power | 24VDC, max. 100mA |
| Interfaces | GPIB, Ethernet, RS-232, USB |
| Dimensions | 483mm x 410mm x 148mm (w x d x h) |
| | Rack19", 3U, 133mm without feet |
| Weight | 23kg |

# *FST-112D Dual High Voltage Tester*
# *FST-114Q Quad High Voltage Tester*

**Other features are:**

- Low and High limits for each acceptance parameter
- 19″ rack mounting kit included
- Automatic DUT discharge output to control external discharging circuit
- Safety loop input to prevent dangerous testing if loop open

✓ **Ultra High Speed**
✓ **Superior Performance**
✓ **High Accuracy**
✓ **Increased Throughput**
✓ **Cost Saving**

## ORDERING INFORMATION

| Product Name | Art. No. |
|---|---|
| FST-112D Dual HiPot | 5787 |
| FST-114Q Quad HiPot | 5791 |
| Additional Measuring module for FST-112D | 5788 |

*All specifications are subject to change without notice*

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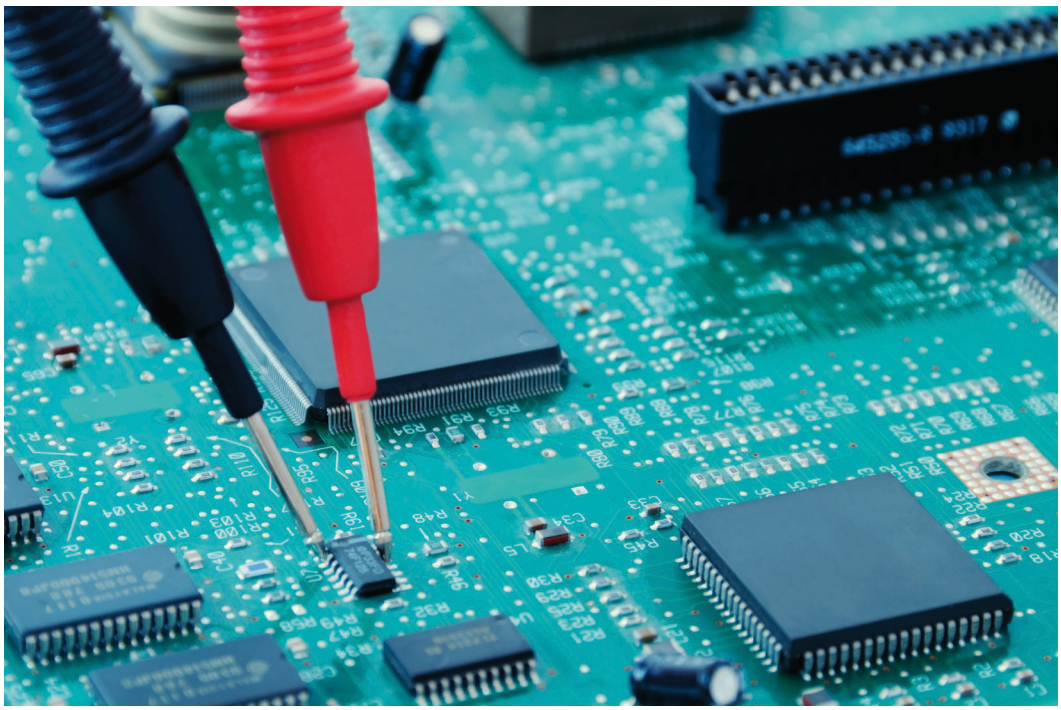
# *FST-120 Insulation Resistance Tester*

**FST-120** is a multirange insulation resistance meter having a programmable measuring voltage making it to fit almost every measuring task. It's easy to use and single fly wheel programming allows you to preprogram full test sequences also in manual or PLC-controlled automatic testing.

- In-line calibrated measuring module
- GPIB, RS-232, Ethernet or USB interface
- Communication interface between testers
- Timer and ramp function programmable
- Alphanumeric display for easy reading
- One computer interface can control all FST- series testers and accessories
- Programmable output voltage 100 - 1000V DC
- Measuring range up to 10GΩ
- Automatic DUT capacitance charging - no delay



# *FST-120 Insulation Resistance Tester*

| Technical Specification | |
|---|---|
| Input | 230V AC or optionally 115V AC; 50Hz / 60Hz; 30 VA |
| Output | 100 - 1000V DC, freely programmable, fully floating |
| Maximum test current | 3,0mA, current limited, short circuit proof |
| Accuracy | Better than ± 1% from the range (if resistance < 10% of the range) |
| Analog Display | ± 2% of the range to the middle point of the scale, rest ± 5% |
| Measuring Ranges | Autorange, 0,5 - 10 MΩ; 5 - 100 MΩ; 50 - 1000 MΩ; 0,5 - 10GΩ |
| Timer function | OFF or 0,3 - 60s with 0,1s steps |
| Ramp function | Time controlled 0 - 10s, in front of the test cycle |
| Internal safety circuit | NC circuit 24V DC |
| External connections | |
| Input 24V DC | Start, Stop, External safety loop, 2 programmable inputs |
| Output, closing relay | Test On, Test Failed |
| Output, change over relay | Discharge |
| Output NPN 24V DC/100mA | 2 programmable |
| Auxiliary power | 24V DC, max. 100mA |
| Interfaces | GPIB, Ethernet, RS-232, USB |
| Dimensions | 483mm x 410mm x 148mm (w x d x h) |
| | Rack 19", height 3U, 133mm without feet |
| Weight | 10kg |

## ORDERING INFORMATION

| Product Name | Art. No. |
|---|---|
| Insulation Resistance Tester FST-120 | 2747 |
| Measuring module for FST-120 | 3939 |

*All specifications are subject to change without notice*

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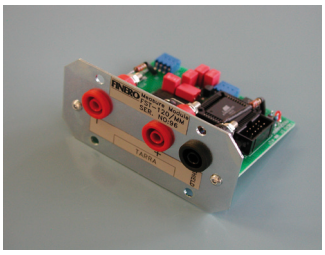
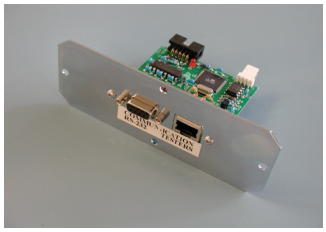
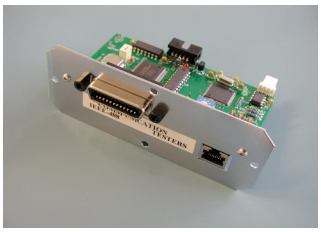
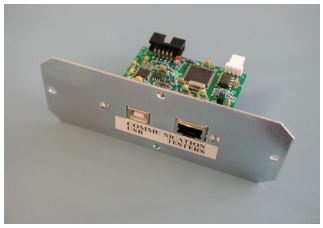
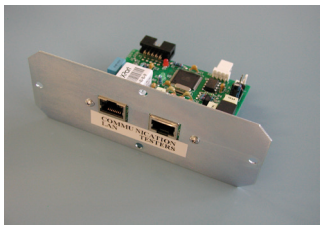
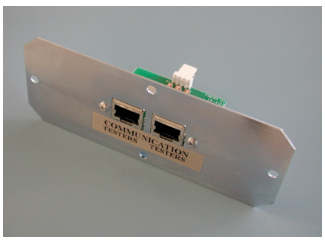
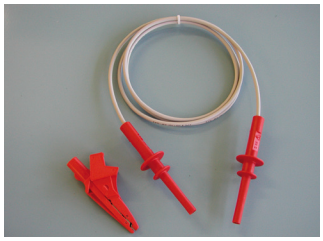
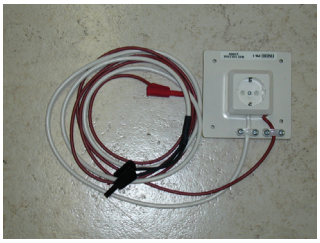
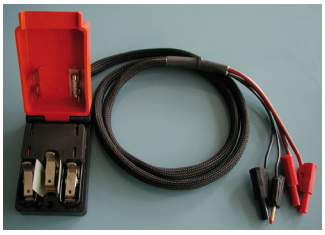
# FST-120 Insulation Resistance Tester - Optional Equipment

| Picture | Description and Type | Article Number |
|---|---|---|
|  | FST-120-MM<br><br>Measuring module for FST-120<br>Measurement voltage 100 - 1000V<br><br>Needed with FST-120 Insulation Resistance Tester | 3939 |
|  | FST RS-232<br>Interface RS-232 for FST Series<br><br>- Baud rate 19200, 8, N, 1<br>- RS-232 connector: D-9 female<br>- RS-485 connector CAT 5 female | 2752 |
|  | FST GBIP<br>Interface GB-IP for FST Series<br><br>- IEEE-488.1-1987 and HS488 compatible<br>- self adapting<br>- 24 pole female connector<br>- RS-485 connector CAT5 female | 2753 |
|  | USB Interface for FST Series<br><br>- USB 1.1 and 2.0 compatible<br>- USB connecor type B female<br>- RS-485 connector CAT5 female | 2159 |
|  | Interface Ethernet for FST Series<br><br>- 10 / 100 Mbit Ethernet compatible<br>- Ethernet connector CAT5 female<br>- RS-485 connector CAT5 female | 5458 |
|  | Interface Tester to Tester to FST Series<br><br>2 pcs CAT5 female connectors for other FST-series testers | 5397 |

# FST-120 Insulation Resistance Tester - Optional Equipment

| Picture | Description and Type | Article Number |
|---|---|---|
|  | High Voltage Test Lead 1,5m, red<br>High Voltage Test Lead 1,5m, black<br>with crocodile clip 1,5m, red<br>with crocodile clip 1,5m, black<br><br>- Max voltage 5000V CAT I<br>(Transient overvoltage 2000V)<br>1000V CAT III<br>- Max current 10A<br>- Conformity IEC 61010-031, A type probe.<br>LVD 93/68/EEC.<br>Reinforced insulation.<br>- Crocodile clip max voltage 1000V | 2913<br>2912<br>2947<br>5542 |
|  | PR1 / HV, ISO, PE, FU Schuko-Socket, 2m cable<br><br>- PE-wire has separate sense line for 4-wire measurement<br>- Separate HV-leads for functional testing<br>- Max voltage 2500V<br>- Instead of schuko socket other types can be used | 1296 |
|  | Safety block / HV, ISO, 2m cable<br><br>- L and N lines have a knife type isolation switches<br>- L-line has 13 Amps fuse<br>- L and N are connected together | 2519 |
| | FST-150 Relay Matrix Controller<br>Fully automatic safety and functional testing<br><br>Connection: 230V or optionally 115V AC; 50Hz / 60VA<br>Output: 32 NPN type outputs 24V DC / 100mA<br>Inputs (digital): 8 PNP type inputs 24V DC<br>Inputs (analog): 8 voltage inputs 0...10V<br>Dimensions: 483mm x 410mm x 148mm<br>Weight: 10-15kg depending assembled relays<br><br>Relay Card RK-3797, 8 pcs relays<br>Relay Card RK-4069, 8 pcs HV-relays<br>Relay Card RK-4314, 4 pcs HV-relays | 2750<br><br><br><br><br><br><br><br><br><br>3395<br>2975<br>4614 |

*All specifications are subject to change without notice*

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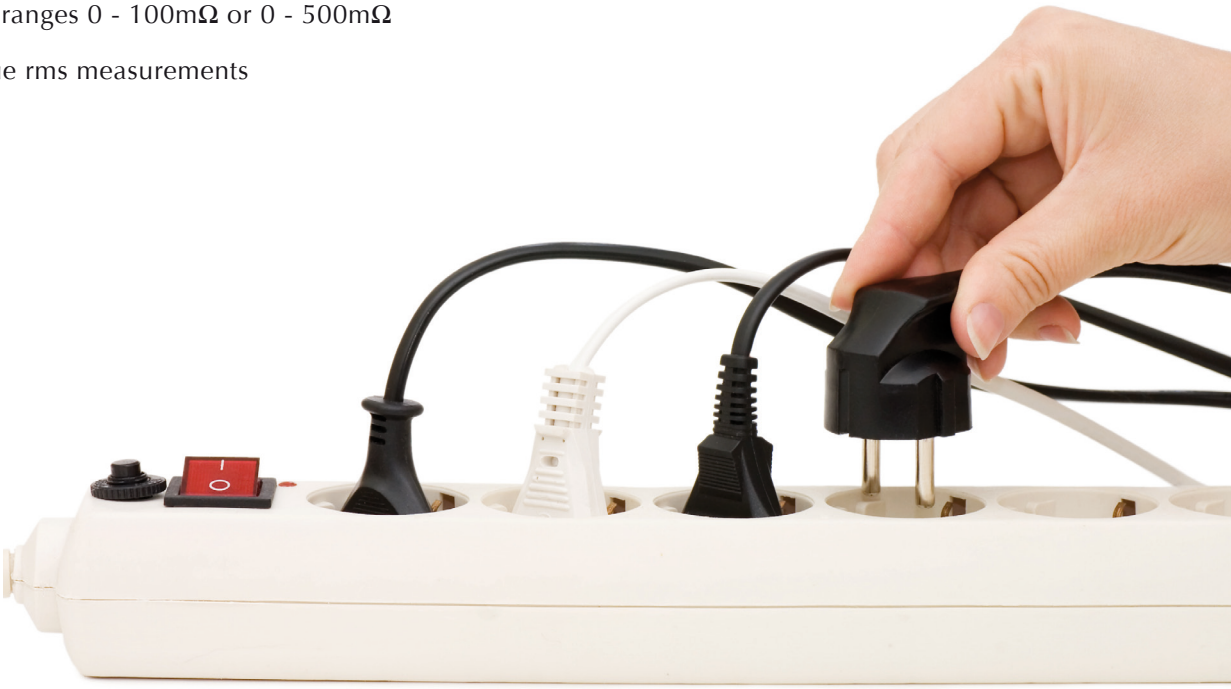
# FST-130 PE-Continuity Tester

**FST-130** is a high power continuity tester for PE-grounding (Ground Bond) testing. It's easy to use and single fly wheel programming allows you to preprogram full test sequences also in manual or PLC-controlled automatic testing.

- In-line calibrated measuring module
- GPIB, RS-232, Ethernet or USB interface
- Communication interface between testers
- Timer functions also available in manual mode
- Alphanumeric display for easy programming
- Measuring ranges 0 - 100mΩ or 0 - 500mΩ
- 4-wire / true rms measurements



# *FST-130 PE-Continuity Tester*

| Technical Specification | |
|---|---|
| Input | 230V AC or optionally 115V AC; 50Hz / 60Hz; 330VA |
| Output | 2 ranges, 6 and 12V AC |
| Maximum test current | 2 ranges, 10A and 25A, setting accuracy -0+20% |
| Accuracy | |
| Resistance | ± 0.5% from the range plus 5 digits |
| Current | ± 0.5% from the range plus 5 digits |
| Analog display | ± 2% from the range |
| Measuring Ranges | |
| Standard | 0 - 500mΩ |
| Optional | 0 - 100mΩ |
| Timer function | OFF or 0,3 - 60s with 0,1s steps |
| Internal safety circuit | NC circuit 24V DC |
| External connections | |
| Input 24V DC | Start, Stop, External safety loop, 2 programmable inputs |
| Output, closing relay | Test On, Test Failed |
| Output, change over relay | Discharge |
| Output NPN 24V DC / 100mA | 2 programmable |
| Auxiliary power | 24V DC, max. 100mA |
| Interfaces | GPIB, Ethernet, RS-232, USB |
| Dimensions | 483mm x 410mm x 148mm (w x d x h) |
| | Rack19", 3U, 133mm without feet |
| Weight | 23kg |

## ORDERING INFORMATION

| Product Name | Art. No. |
|---|---|
| PE-Continuity Tester FST-130 | 2748 |
| Measuring module for FST-130 | 3940 |

*All specifications are subject to change without notice*

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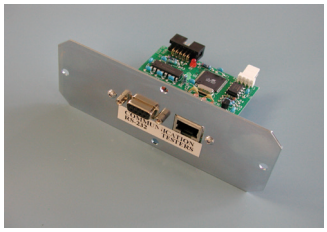
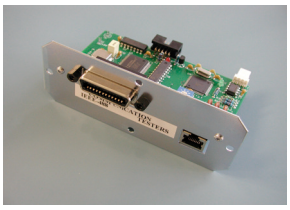
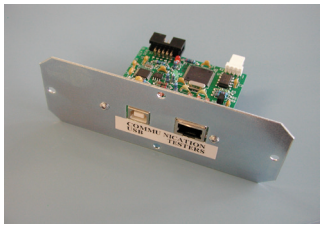
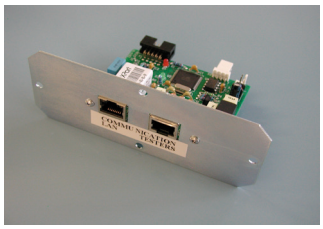
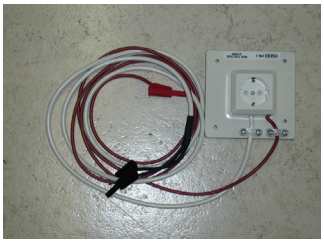
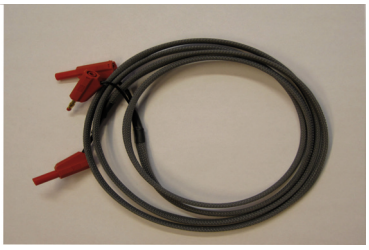
# FST-130 PE-Continuity Tester - Optional Equipment

| Picture | Description and Type | Article Number |
|---|---|---|
|  | FST RS-232<br>Interface RS-232 for FST Series<br><br>- Baud rate 19200, 8, N, 1<br>- RS-232 connector: D-9 female<br>- RS-485 connector CAT 5 female | 2752 |
|  | FST GPIB<br>Interface IEEE-488 for FST Series<br><br>- IEEE-488.1-1987 and HS488 compatible<br>- self adapting<br>- 24 pole female connector<br>- RS-485 connector CAT5 female | 2753 |
|  | USB Interface for FST Series<br><br>- USB 1.1 and 2.0 compatible<br>- USB connecor type B female<br>- RS-485 connector CAT5 female | 2159 |
|  | Interface Ethernet for FST Series<br><br>- 10 / 100 Mbit Ethernet compatible<br>- Ethernet connector CAT5 female<br>- RS-485 connector CAT5 female | 5458 |
|  | PR1 / HV, ISO, PE, FU Schuko-Socket, 2m cable<br><br>- PE-wire has separate sense line for 4-wire measurement<br>- Separate HV-leads for functional testing<br>- Max voltage 2500V<br>- Instead of schuko socket other types can be used | 1296 |
|  | Pe Probe, remote controlled | 0121 |

# FST-130 PE-Continuity Tester - Optional Equipment

| Picture | Description and Type | Article Number |
|---|---|---|
|  | PE-cable 2m, red with crocodile clip | 5950 |
|  | Pe-cable 2m, black with crocodile clip | 1731 |
|  | Crocodile clip | |

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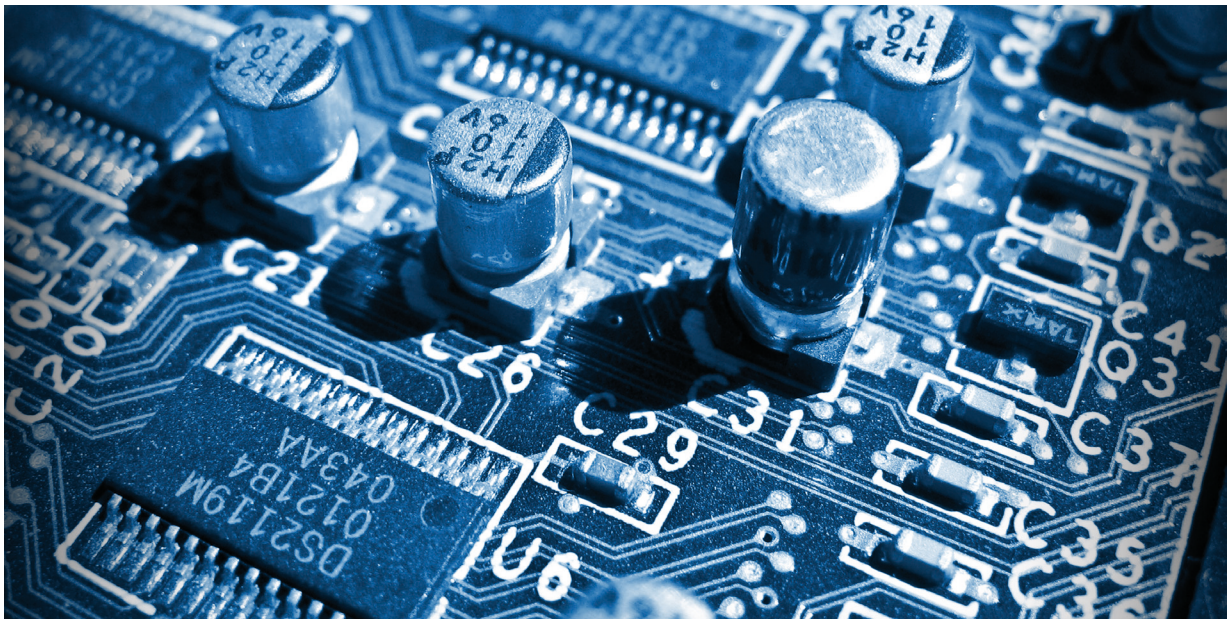
# *FST-140 Leakage Current Tester*

**FST-140** is a multifunction leakage current tester with internal power supply up to 260V/3A. It's also possible to use external power supply up to 300V/16A. Standard tests include L-PE- and N-PE-leakage current tests, but optionally also N cut-off-PE tests and a case leakage test are available.

It's easy to use and single fly wheel programming allows you to preprogram full test sequences also in manual or PLC-controlled automatic testing.

- In-line calibrated measuring module
- GPIB, RS-232, Ethernet or USB interface
- Internal power supply 0 - 260V / 3A / 50Hz
- Possibility to use external power up to 300V / 16A
- Measuring ranges 0 - 1mA or 0 - 10mA
- Easy to use fly wheel programming



# *FST-140 Leakage Current Tester*

| Technical Specification | |
|---|---|
| Input | 230V AC or optionally 115V AC; 50Hz / 60Hz; 800VA |
| Output | |
| With internal power | 0-260V / 3A AC |
| Without internal power | 230V AC or optionally 115V AC |
| External power | 300V AC / 16A max |
| Voltage measurement | 0 - 300V AC, Digital |
| Internal current measurement | 20A AC true RMS, Digital |
| Measuring Ranges | 0 - 1,0mA and 0 - 10mA ranges, Digital + Analog |
| Accuracy | ± 0.5% from the range plus 5 digits |
| Analog Display | ± 2% from the range |
| Timer function | OFF or 1 - 60s with 0,1s steps |
| Test mode | 3 different test modes available A1, A2 and B, each mode automatically includes polarity reversal. All combination of the test modes (A1, A2, A1+A2, B, A1+B, A2+B, A1+A2+B) can be selected |
| External connections | |
| Input 24V DC | Start, Stop, External safety loop, 2 programmable inputs |
| Output, closing relay | Test On, Test Failed |
| Output, change over relay | Discharge |
| Output NPN 24V DC / 100mA | 2 programmable |
| Auxiliary power | 24V DC, max. 100mA |
| Interfaces | GPIB, Ethernet, RS-232, USB |
| Dimensions | 483mm x 410mm x 148mm (w x d x h) |
| | Rack19", 3U, 133mm without feet |
| Weight | 23kg |

## ORDERING INFORMATION

| Product Name | Art. No. |
|---|---|
| Leakage Current Tester FST-140 with internal power | 2749 |
| Leakage Current Tester FST-140 without internal power | 2474 |
| Measuring module for FST-140 | 3941 |

*All specifications are subject to change without notice*

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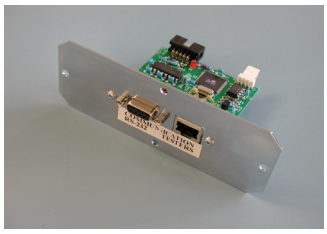
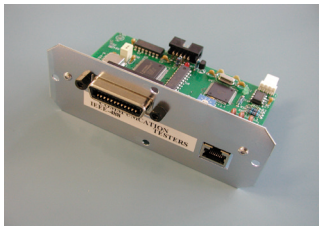
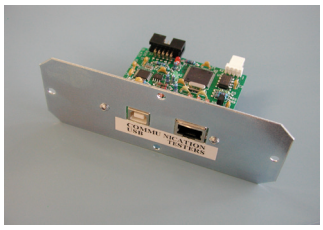
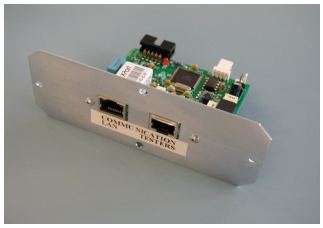
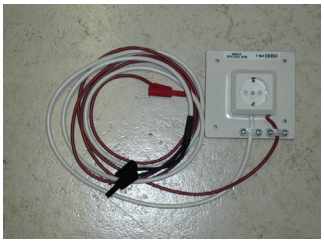
# *FST-140 Leakage Current Tester - Optional Equipment*

| Picture | Description and Type | Article Number |
|---|---|---|
|  | FST RS-232<br>Interface RS-232 for FST Series<br><br>- Baud rate 19200, 8, N, 1<br>- RS-232 connector: D-9 female<br>- RS-485 connector CAT 5 female | 2752 |
|  | FST GPIB<br>Interface IEEE-488 for FST Series<br><br>- IEEE-488.1-1987 and HS488 compatible<br>- self adapting<br>- 24 pole female connector<br>- RS-485 connector CAT5 female | 2753 |
|  | USB Interface for FST Series<br><br>- USB 1.1 and 2.0 compatible<br>- USB connecor type B female<br>- RS-485 connector CAT5 female | 2159 |
|  | Interface Ethernet for FST Series<br><br>- 10 / 100 Mbit Ethernet compatible<br>- Ethernet connector CAT5 female<br>- RS-485 connector CAT5 female | 5458 |
|  | PR1 / HV, ISO, PE, FU Schuko-Socket, 2m cable<br><br>- PE-wire has separate sense line for 4-wire measurement<br>- Separate HV-leads for functional testing<br>- Max voltage 2500V<br>- Instead of schuko socket other tes can be used | 1296 |

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# *FST-150 Relay Matrix*

**FST-150** is a very flexible relay matrix to build easily complete functional test systems. It can be controlled directly by Finero GP-IB, RS-232, Ethernet or USB interfaces already installed into the test instruments. 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.

- Up to 32 HV-relays in single compact 3U case
- Internal power supply 230V / 24V DC
- 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

| Technical Specification | |
|---|---|
| Power Connection | 230V; 50Hz / 60Hz; 60VA |
| Control board | |
| Digital Input | 8 pcs 24V DC, Internal resistance 120Ω, Current rate about 0,2mA |
| Analog Input | 8 pcs 0...10V DC, Internal resistance 110Ω, 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 WIELAND Multipole connectors |

The matrix can include reed-type HV-relays, power contactors and control relays. 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 FST-series instruments plus allows an easy way to integrate additional out of Finero standard line or third party instruments for functional testing.

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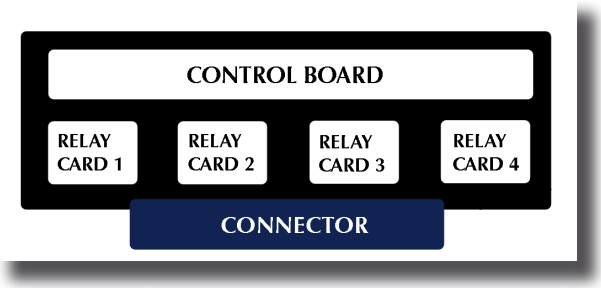
# *FST-150 Relay Matrix*

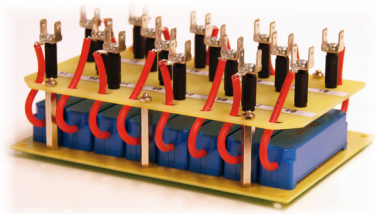
## Example configuration of FST-150




Relay cards 1,2,3 and 4 can be chosen from the table on the next page. 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.

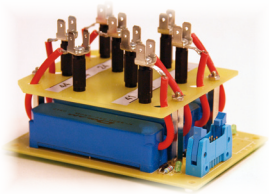
# *FST-150 Relay Matrix - Optional Equipment*

**2975**



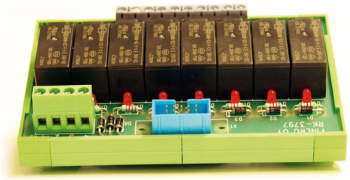
- HV- reed relay, 8 pcs, 1x NO, floating, 7,5kV (DC or AC Peak)
- Coil 24 V DC
- Each relay has a LED indicator and free wheeling diode.
- All contacts connected separately to upper plate HV-terminals. Other types upon request
- Control connector: 10-pin IDC male

**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

## ORDERING INFORMATION

| Product Name | Art. No. |
|---|---|
| FST-150 Relay Matrix, Including controller board | 2750 |
| FST-Interface Ethernet | 5458 |
| FST-Interface GP-IB | 2753 |
| FST-Interface RS-232 | 2752 |
| FST-Interface USB | 2159 |
| FST-Interface for communication between FST-line equipment | 5397 |

*All specifications are subject to change without notice*

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# *FST-200 4 S Analyzer*

## All 4 Safety!

Finero's **FST-200 4 S Analyzer** innovatively combines in one unit all necessary safety tests as well as resistance measurement for ultimate production quality control purposes.

As any other Finero FST safety tester the **FST-200 4 S Analyzer** can be used in connection with Finero's simple to use and effective Safetest 100 quality control software.

**FST-200 4 S Analyzer** consists of following measurements:

- Hipot
- PE continuity (Ground Bond test)
- Insulation resistance
- DUT resistance measurement

**FST-200 4 S Analyzer** is offered either with a standard RS-232 or GP-IB interface and optionally available are Ethernet and USB interfaces. These options facilitate optimum testing performance for volume production.

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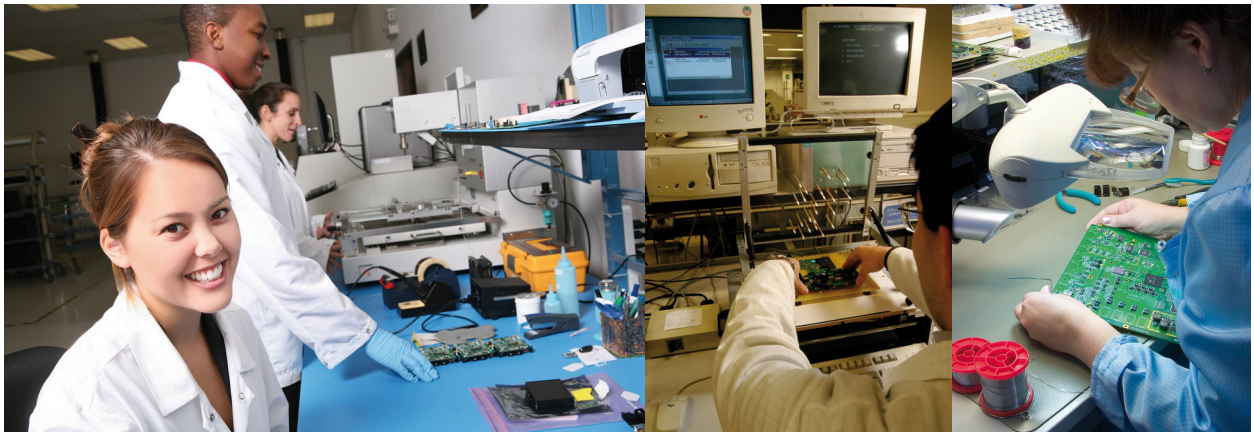
## Applications

**FST-200 4 S Analyzer** is an extension to the renowned Finero FST safety tester line. It is developed for fast and accurate safety testing in high volume full automatic production as well as for manual testing, for instance in low volume high mix production. It is simple to use and provides reliability that a volume production quality control requires.

**FST-200 4 S Analyzer** ideal applications are in production quality control of:

- Heating elements
- Resistance elements
- Filter testing
- Cable harnesses
- Any product testing that requires resistance checking, adjusting or re-checking in the final production quality control



The **FST-200 4 S Analyzer** can also be used for product development validation or sampling inspection test.

## Reliability in Quality Control

In production quality control the reliability of test equipment plays a crucial role. A failure in test equipment can potentially cause a major bottle neck. In terms of measurement accuracy and reliability the quality control test equipment must deliver superior performance. Finero has provided the world wide electronics and electrical industry with reliable and accurate safety testers and functional test systems for over several decades.

The **FST-200 4 S Analyzer** makes no compromise to this commitment to reliability and accuracy.

## FST-200 4 S Analyzer as a Test System

The **FST-200 4 S Analyzer** can be combined with other FST-safety tester line products, like leakage current tester FST-140 and the Relay Matrix FST-150. By using the available LabVIEW driver for FST-200 4 S Analyzer, it can be used for building test systems by utilizing for instance other LabVIEW compatible measurement modules either from Finero or from a wide variety of suppliers.

# *FST-200 4 S Analyzer*

| Technical Specification | |
|---|---|
| Input | 230V AC or optionally 115VAC; 50Hz / 60Hz; 360VA |
| Interfaces | GPIB, Ethernet, RS-232, USB |
| Internal safety circuit | NC circuit 24V DC |
| External connections | |
| Input 24V DC | Start, Stop, External safety loop, 2 programmable inputs |
| Output, closing relay | Test On, Test Failed |
| Output, change over relay | Discharge |
| Output NPN 24V DC / 100mA | 2 programmable |
| Auxiliary power | 24V DC, max. 100mA |
| Dimensions | 483mm x 410mm x 148mm (w x d x h) |
| | Rack19", height 3U, 133mm without feet |
| Weight | 22kg |
| PE-Continuity (Ground Bond) Test | |
| Output | Max. 12V AC |
| Maximum test current | 2 ranges, 10A and 25A, setting accuracy -0+20% |
| Accuracy | |
| Resistance | ± 0.5% from the range plus 5 digits |
| Current | ± 0.5% from the range plus 5 digits |
| Measuring ranges | |
| Standard | 0 - 500mΩ |
| Optional | 0 - 100mΩ |
| Timer function | OFF or 0,3 - 60s with 0,1s steps |
| Insulation Resistance Test | |
| Output | 100 - 500V DC, freely programmable |
| Maximum test current | 3,0mA, current limited, short circuit proof |
| Accuracy | Better than ± 1% from the range (if resistance < 10% of the range) |
| Measuring ranges | Autorange, 0,5 - 10MΩ; 5 - 100MΩ; 50 - 1000MΩ; 0,5 - 10GΩ |
| Timer function | OFF or 0,3 - 60s with 0,1s steps |
| Ramp function | Time controlled 0 - 10s, in front of the test cycle |

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# *FST-200 4 S Analyzer*

Other features are:

- Low and High limits for each acceptance parameter
- 19″ rack mounting kit included
- Automatic DUT discharge output to control external discharging circuit
- Additional 2 outputs and inputs programmable for special use
- Safety loop input to prevent dangerous testing if loop open

| High Voltage Test | |
|---|---|
| Output | Range: 0 - 5000V AC |
| Optional | DC output |
| Maximum test current | 10mA |
| Maximum test apparent power | 50VA |
| Measurements | True RMS for I and U |
| Accuracy | ± 0.5% from the range plus 5 digits |
| Measuring ranges | |
| Standard | 2mA/10mA |
| Timer function | OFF or 0,3 - 60s with 0,1s steps |
| Ramp function | Ramp up and/or down |
| Selectable range | 5 - 30s, No ramp |
| Partial discharge detector | OFF or relative sensitivity adjustable 1 - 100 |
| Resistance Measurement | |
| Output | Max. 50V AC |
| Maximum test current | 200mA |
| Accuracy | ± 0.5% from the range plus 5 digits |
| Measuring ranges | 0 - 2Ω; 0 - 10Ω;<br>0 - 100Ω; 0 - 500Ω |
| Timer function | OFF or 0,3 - 60s with 0,1s steps |

## ORDERING INFORMATION

| Product Name | Art. No. |
|---|---|
| FST-200 4 S Analyzer, with GP-IB Interface | 5770 |
| FST-200 4 S Analyzer with RS-232 Interface | 5772 |
| FST-200 4 S Analyzer AC/DC, with GP-IB Interface | 5948 |
| FST-200 4 S Analyzer AC/DC with RS-232 Interface | 5949 |

*All specifications are subject to change without notice*

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# *FST-210 3 S Analyzer*

Finero's **FST-210 3 S Analyzer** combines in one unit two completely independent Hipot testers and one Ground Bond tester. All this in 3 U and 19″ rack size!

It is the perfect tool for production testing of transformers for example in arc welding equipment (EN-60974-1). Nevertheless, it is designed for testing any kind of transformers, equipment or components, which need to be Hipot tested with two independently adjustable voltages and Ground bond tested.

The **FST-210 3 S Analyzer** is offered either with a standard GPIB or RS-232 interface. Optionally available are Ethernet and USB interfaces. It can be easily combined with any Finero FST-line equipment, SafeTest100 computer test software as well as with LabVIEW compatible equipment.

A powerful production test system can be built by combining **FST-210 3 S Analyzer** with **FST-150 Relay Matrix**.

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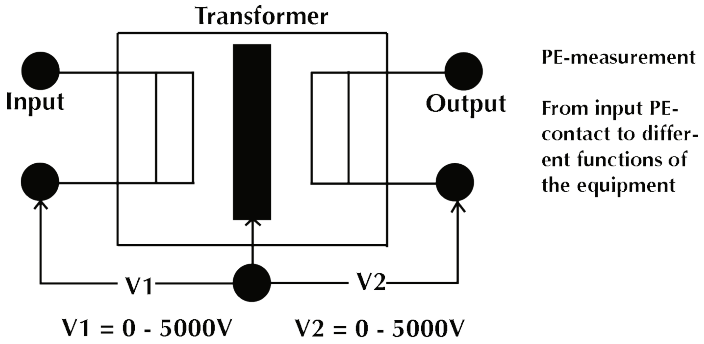
# *FST-210 3 S Analyzer*




EN60947-1 Requirement:

Both HIPOTS simultaneously but 2 different test voltages

| Technical Specification | |
|---|---|
| Input (Ground Bond) | 230V AC; 50HZ; 360VA |
| External connections | |
| Input 24V DC | Start, Stop, External safety loop, 2 programmable inputs |
| Output, closing relay | Test On, Test Failed |
| Output, change over relay | Discharge |
| Output NPN 24V DC / 100mA | 2 programmable |
| Auxiliary power | 24V DC, max 100mA |
| Interfaces | |
| Standard | GPIB or RS-232 |
| Optional | Ethernet or USB |
| Dimensions | 483mm x 410mm x 148mm (w x d x h) |
| | Rack19", 3U, 133mm without feet |
| Weight | 23kg |
| 2 x High Voltage Tester | |
| Output (separate for each Hipot) | 0 - 5000V DC |
| Voltage set up time | max. 1670 V / s |
| Current limits (separate for each Hipot) | Range: 0,010 - 9,990mA |
| Measurements | True RMS for I and U |
| Accuracy | ± 0.5% from the range plus 5 digits |
| Measuring range | 10mA |
| Timer function | |
| Timer ON | 1 - 60s, 0.1s steps |
| Timer OFF | To be defined by the user or software program, t >60s |
| Ramp function | Ramp up and/or down |
| Selectable range | 0,5 - 30s |

# *FST-210 3 S Analyzer*

| 1 x Ground Bond Tester | |
|---|---|
| Input | 230V AC; 50Hz; 500VA |
| Output | 2 ranges, 6 and 12V AC, 50Hz |
| Maximum test current | 2 ranges, 10A and 25A |
| Accuracy | |
| Resistance | ± 0.5% from the range plus 5 digits |
| Current | ± 0.5% from the range plus 5 digits |
| Measuring ranges | |
| Standard | 0 - 500mΩ |
| Optional | 0 - 500mΩ |

## ORDERING INFORMATION

| Product Name | Art. No. |
|---|---|
| FST-210 3 S Analyzer, without interface | 5961 |
| FST-210 3 S Analyzer with GP-IB Interface | 5886 |
| FST-210 3 S Analyzer with RS-232 Interface | 5887 |

*All specifications are subject to change without notice*

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# *FST-160 Power Supply Unit*

**FST-160** is a convenient way to control power feeding of a tester rack. It fits to standard 19″ rack and needs 3U height. It has 2 separate output groups, one for computer and printer, the other group is for tester instruments.

The emergency switch cuts off tester power but leaves computer side alive. Emergency stop circuit can be extended outside the unit via back panel connector.

The unit has plenty of empty space for additional custom features, like 3-phase control, soft starters, small relay units or auxiliary DC power outputs.

- 1-phase power controller with emergency stop
- Separate outputs for instruments and computer
- External safety circuit connections
- Soft starting option available

# *FST-160 Power Supply Unit*

| Technical Specification | |
|---|---|
| Input | 230V 50Hz / 16A or optionally 3x 400 V + N + PE 50Hz / 32 A max |
| Output | Max. 6 Schuko type sockets in 2 groups or mixed 3-phase and 1-phase outputs |
| Emergency stop circuit | 230V 50Hz, NC-loop, external connector |
| Soft starter | Optional, according the load |
| Auxiliary DC output | Optional, typically 24V / 2A |
| Fault current protector | Optional |
| Extra fuses | Optional automatic circuit breakers available |
| Dimensions | 483mm x 410mm x 148mm (w x d x h)<br>Fits to 19" rack, height 3U 133mm without feet |
| Weight | 10kg + optional instruments |

**FST-160 Power Supply Unit** is designed to deliver centralized power to the test instruments and PC. It has 0-1-START type main switch that prevents automatic system starting after power failure and EMERGENCY STOP switch that cuts power off from test instruments but keeps computer powered.

This safety feature is according EN-61010-1 and emergency stop switch line can be extended outside the system via external connector. This unit is also used to interface with external safety loops like test area gate, protective test place hoods or other similar devices that prevent testing if the loop is open.

Standard **FST-160** is single phase but optionally a 3-phase unit is also available.

**FST-160-FU** is an extension of a standard unit. It may contain functional test elements like 1-or 3-phase power analyzer, temperature-, pressure- or humidity meters or DVM to form a multimode safety- and functional test station.

## ORDERING INFORMATION

| Product Name | Art. No. |
|---|---|
| Single Phase Power Supply Unit FST-160 | 2751 |
| Functional Power Supply Unit FST-160 | 2946 |

*All specifications are subject to change without notice*

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# *FST-DCP-1500-05 Power Supply*

Finero's **FST-DCP-1500-05** is a variable voltage DC-power supply exclusively used to reactivate large electrolytic capacitor banks.

Output voltage is automatically ramp controlled with variable speed stepper motor starting from 0-value.

Electronic current limiter controls the output. If the limit value is reached the ramping is stopped until the leakage current level has decreased under limit value.

Normally ramping up is continued automatically to set the voltage level but if the leakage current does not fall under the limit value within 20 seconds the process will be stopped.

The instrument is cased into a 3U high 19" rack mount case.

Output power is available from the rear panel 4mm banana sockets.

| Technical Specification | |
|---|---|
| Input | 230V, 50Hz; 750VA |
| Output | 0 - 1500V DC / 0,5A, full wave rectified<br>Other power levels upon request |
| Internal discharging resistor | Optional |
| Panel meter, voltage | |
| Analog | 0-2000VDC |
| Digital | 0 - 2000VDC / 0-1000mA DC |
| External control | ON / OFF control |
| Computer interface, optional | RS-232, USB or GPIB |
| Dimensions | 483mm x 410mm x 148mm (w x d x h) |
| | Rack19", 3U, 133mm without feet |
| Weight | 25kg |

## ORDERING INFORMATION

| Product Name | Art. No |
|---|---|
| FST-DCP-1500-05 Power Supply | 2283 |

*All specifications are subject to change without notice*

FINERO The Quality Control Company

# FST-500 High Voltage Cable Tester

Finero's cable testers are in use in various types of cable factories. They can be used to test as well cable harnesses.

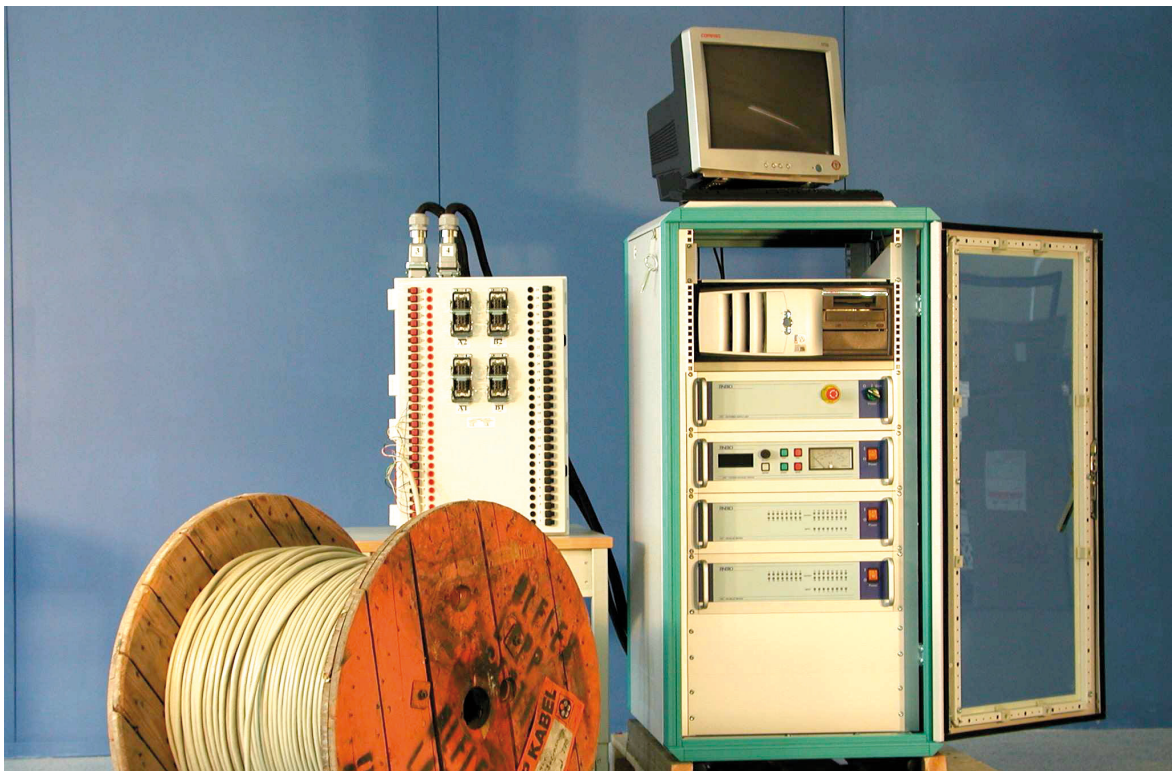
The electronics is based on Finero's rugged industrial grade FST range of standard test equipment. All set and measured values are shown on alphanumeric display, additionally there is an analog panel meter for output voltage. The tester can be ordered with build in PC.

- A very sensitive and adjustable partial discharge detector
- PC controlled easy to use
- Alphanumeric display for easy programming
- Last measured value shown on the display and saved
- Time controlled adjustable ramp and dwell
- Interfaces USB, Ethernet, RS232, GPIB

# *FST-500 High Voltage Cable Tester*

| Technical Specification ( On request customer specific adaptations possible) | |
|---|---|
| Input | 3-phase, 400V, 50 HZ, no connection cable |
| Output voltage | 0 - 5000 V motor controlled, other side grounded, velocity < 1kV/sec |
| Output current | max 2500 mA , ed. 75% |
| Voltage measuring | 0 - 5000 V, +- 2% |
| Current measuring | 0…2500 mA, +- 2% |
| Trip current setting | 0 - 2500 mA |
| Output connection | Terminal blocks inside a separate box, no need to open tester to make a connection |
| Output power for external lights | 230V, 50Hz, 500VA max |
| Test voltage analog output | 0 – 10V (0 – 5kV) |
| Current analog output | 0 – 10V (0 – 2,5A) |
| Fail signal output | potential free contact |
| Safety loop input | potential free contact |
| Dimensions | Rack19″ |
| Weight | 400kg |

*All specifications are subject to change without notice*



FINERO *The Quality Control Company*

# *AKT-Series Battery Testers*

- A wide range of modules with different power rating
- Easily expandable, 1 to 200 test places
- Stand alone, freely progrmmable test modules
- Mix test possibility, each module runs independently
- PC-controlled, possibility to add printer and bar code reader
- Easy to use software
- Clear display view tells immediately the status of each module
- RS-232, USB or IEEE-488 PC-interface

Test modules are designed to fit 19" wide and 3U high rack. One rack includes 1 to 20 test modules depending on power rating. Each test module is an independent tester including charger, load and measurement. All communication with a test module, setting of parameters and reading of test results, is done using a PC-computer.

At the beginning of the test process there are a short circuit and a polarity test of the battery. The test program is based on CHARGER and DISCHARGER software macros. Each macro has its own parameters and they can be loaded several after each others. A test is interrupted if voltage increase is not happening or charging lasts over 2 times more than precalculated value. Optional temperature measurement is available to measure battery temperature during charge and discharge cycles.


An easy to use user interface tells the status of each battery using signal light symbols. Numerical measured values are reached by activating the signal light of the desired battery.

The flexibility of the system allows simultaneous quick incoming test of batteries and a long term durability testing.

| FUNCTION | CHARGER | DISCHARGER |
|---|---|---|
| Select function | Constant current / -voltage | Constant current / -resistance |
| Set parameter | Current/voltage/ mAh-quantity | Current/ resistance |
| Set cut off parameter | Voltage / time / mAh-quantity | Voltage / mAh-quantity |
| Set alarm parameter | Time / temperature (if in software) | Temperature (if in software ) |

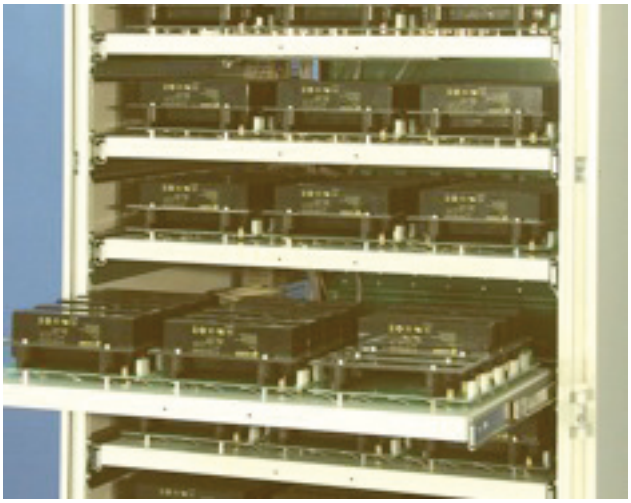
# AKT - Series Battery Testers

During each software module an automatic calculation of charging or discharging Ah-quantity is calculated.

Technical information ( here is shown only 2 different cases, parameters are adjusted according the batteries to be tested )

| TYPE | AKT 1,0 - 100 | AKT 30 - 105 |
|---|---|---|
| Power connection | 230V, 50Hz | 230V,50Hz |
| Quantity of test places | 1 - 5 x 20 | Max 105 |
| Charging voltage | 3 - 5V | 10 - 15V |
| Charging / discharging current | 50 - 200 mA | 0 - 2000mA |
| Cut off value of constant voltage charging | Time 1 - 60 min<br>Current 5...20mA | Time 1 - 120 min<br>Current 5..200mA |
| Cut off value of constant current carching | Voltage 3 - 5V<br>mAh quantity 20 - 500 | Voltage10 - 15V<br>mAh quantity 20 - 2000 |
| Discharge switch | Voltage 2,5 - 4V<br>mAh-quantity 20 - 500 | 10 - 15V<br>mAh-quantity 20 - 2000 |
| Battery temperature (optional) | 20 - 100°C | 20 - 100°C |
| Charged / discharged mAh | 0 - 500mAh | 0 - 5000mAh |
| Final voltage of discharging | 2,5 - 4V | 10 - 15V |
| Efficiency rate | Mathematical 0...100% | Mathematical 0...100% |

AKT 1,0 test module and a rack for 10 modules



AKT-30-105,interface adapter for batteries

AKT 1,0-100, test rack for 100 batteries with adapters

FINERO *The Quality Control Company*

# *SafeTest100B Software*

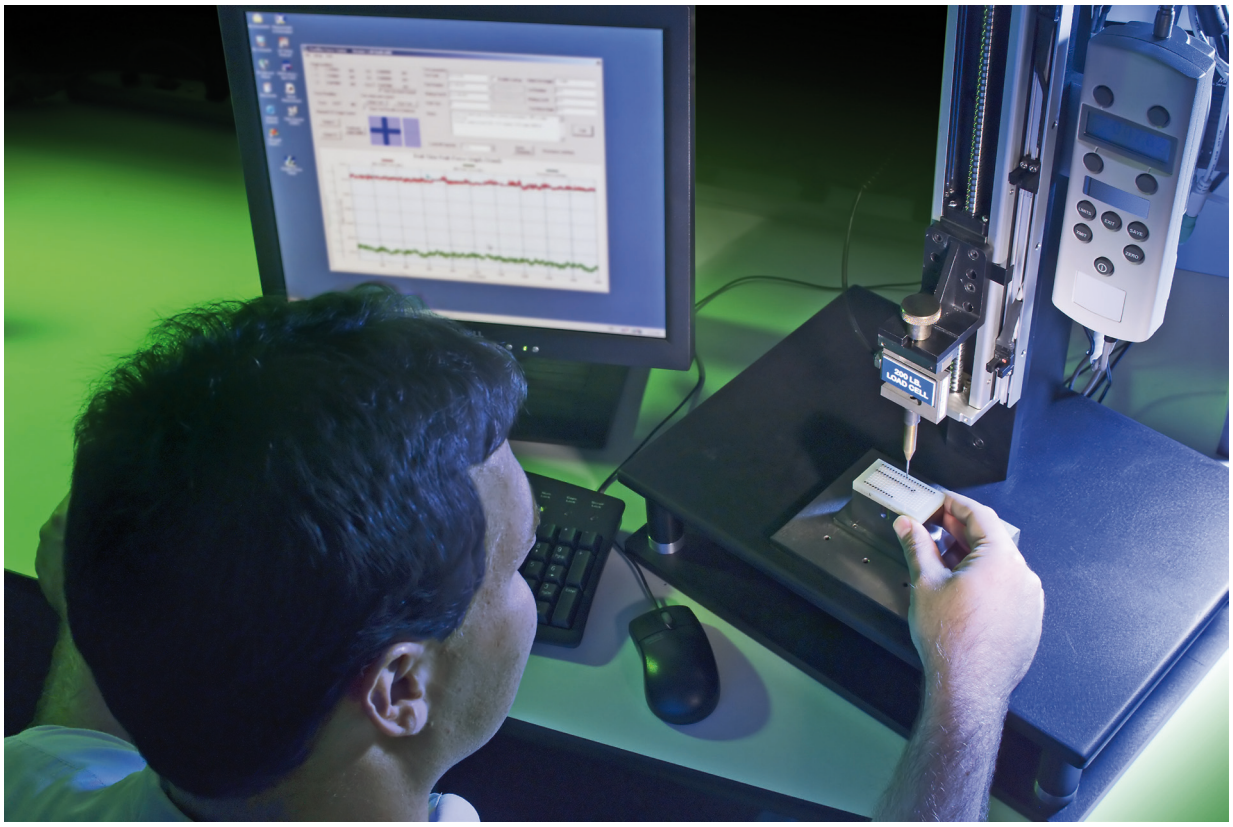
Finero's standard test software **SafeTest** can be applied to build complete test systems with Finero's test equipment as well as optionally with any third party products.

With one computer interface **SafeTest** software controls a complete functional test system.

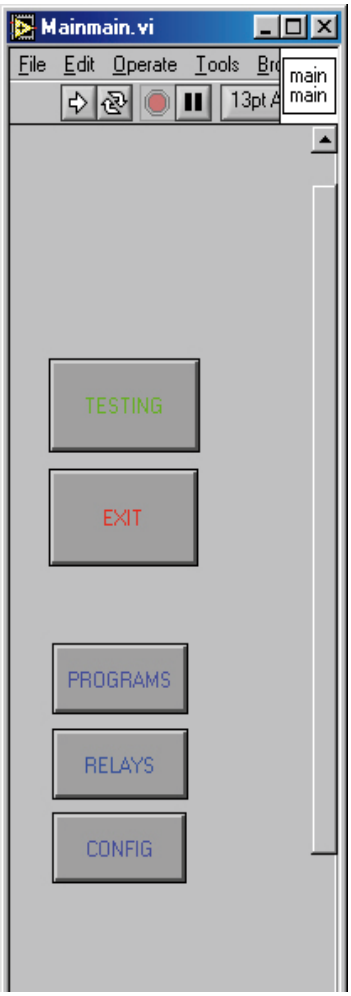
Combined with Finero's **FST-150 Relay Matrix** customers can build very easily and cost efficiently powerful functional test systems.

It can control a barcode reader, 2 printers and also other equipment like multimeters, power supplies and generators to form an automatic functional multimode test station.

The results can be stored in a database that can be easily read into an ERP or MES system.



# Safetest100B Software




## A Short Description of the SafeTest 100B Functions

**MAIN MENU**
The main menu is the starting point for all operations.

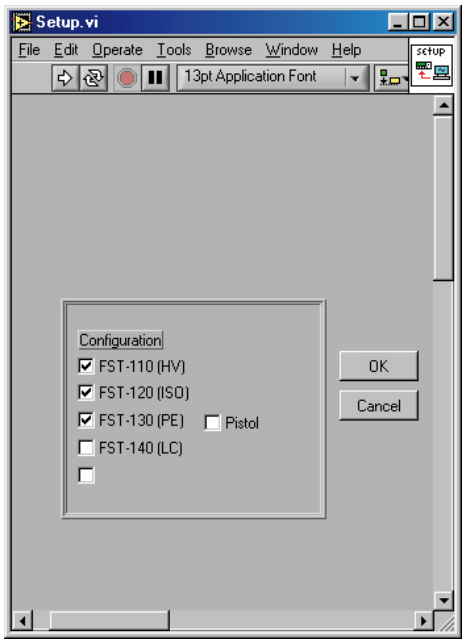
**CONFIG**
is used to configure the system. It means that all those modules that are included in the system are activated. Later if new modules are added only new configuration is needed.

**RELAYS**
This is the place to program relay matrix in order to build a functional test system. Certain relay output is activated by calling out a relay line where each relay has a place. Relays are activated or deactivated by marking / deleting the respective box on the line.

**PROGRAMS**
Under this menu it is possible to write new programs or to edit an already existing program. The test system can handle mixed production, that is the right program is collected according product type.

**TESTING**
Goes to testing mode

**EXIT**
For exiting the software




**CONFIGURATION WINDOW**

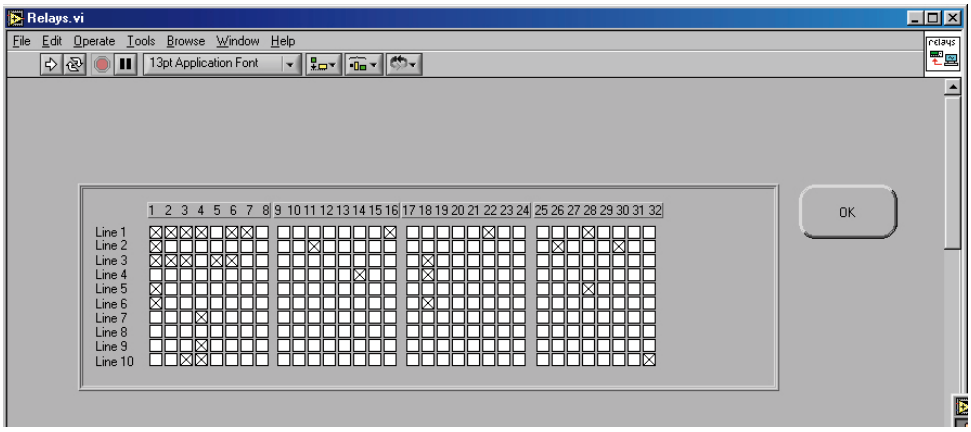
All Finero testers have ready made activation boxes, if additional instruments are included new boxes are created.

Test and measurement equipment can be activated /deactivated individually any time. If a unit is deactivated it is hidden also in all test and programming menus.

Optionally and on request additional test and measurement instruments can be added by plugging in drivers.

FINERO The Quality Control Company

# Safetest100B Software




**RELAYS WINDOW**

The Finero FST-150 relay matrix controller has high voltage 32 outputs, they are activated by marking X and deactivated by unchecking the box. There is also an input matrix of 8 inputs, only activated if the system is using inputs. Programming of inputs is done similar way.

**PROGRAMMING WINDOW**

This window is used to write a new program or to edit an existing program. Each tester unit has its own programming page. That page is ready configured for writing test parameter and to set limit values. One each line on the page is a complete test including relay control. A page has 10 lines, but that is not a limiting factor, the page can be easily expanded.

In the front of each line there is a box, only lines marked X are executed.

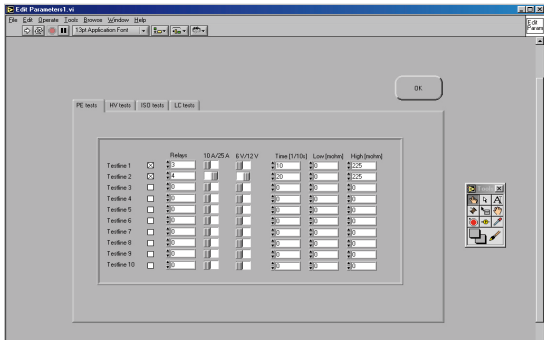
This is a very efficient way to build functional testers and combine the testing with safety testing.

Generally Finero recommends to combine safety testing and functional testing into one single test cycle.

Benefits for customer when functional and safety test is combined:

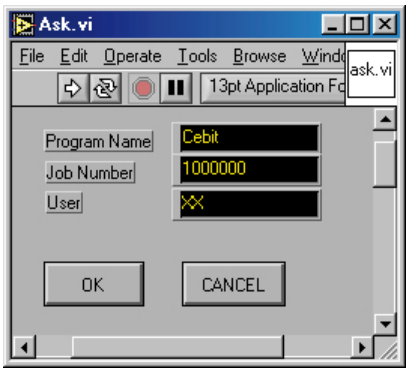
- Reduced fixture downtime
- Reduced fixture life time costs
- Single point of Data collection in the production line
- Software facilitates visibility of the quality measurement in all levels of organization
- Results are put in effective use for continuous improvement
- Reduced human error due to less handling
- Reduced ESD problems
- Reduced test costs
- Reduced test cycle time

# Safetest100B Software



## TESTING WINDOW

Before going to real testing two other auxiliary windows appear:

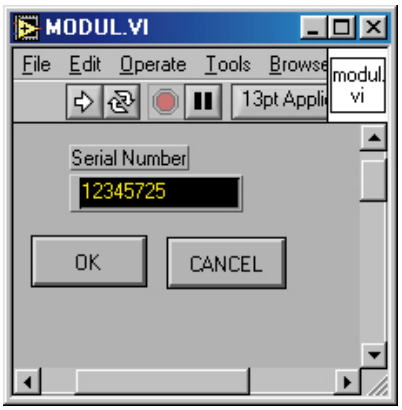



A window for program name, job number and user.

Program name can be selected from the menu, written or read with barcode reader from the DUT.

Job number is sometimes used to collect the measured data in a specified bloc ( at least if no serial numbers are used )

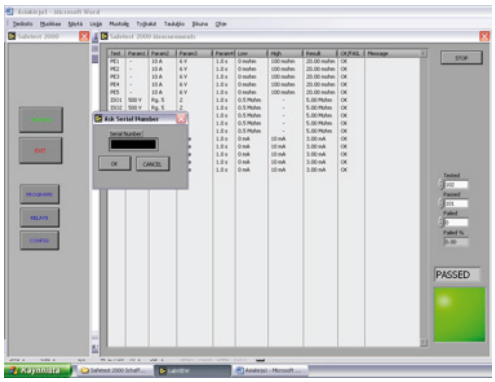
User name is the " finger print" of the person conducting the test.




It is possible to write or read the number by using barcode reader or manually.

Alternatively the system can generate serial numbers by itself.

It is possible to have several sets of serial numbers, which means that every single product can have its own set of numbers.




In the testing window there are ON /OFF switches for printers.

Each executed test is written to the screen with test parameters, limit values and measured values and PASS / FAIL information.

All measured data is stored into an ACCESS compatible data file or optionally the results can be stored in a database that can be easily read into an ERP or MES system.

If 2 printers are used one of them is a label printer and the other one for printing test result or preformulated test certificates.