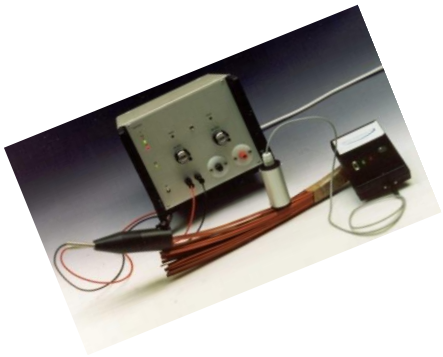
RIGON INSTRUMENTS
Torino - Italy

A WORLD OF INSTRUMENTS



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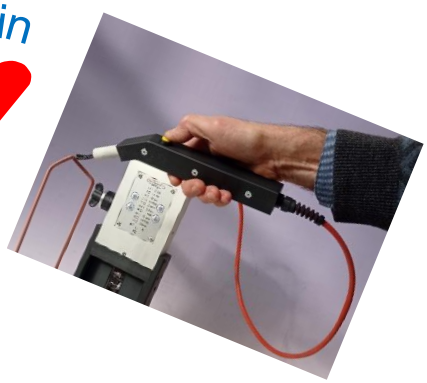

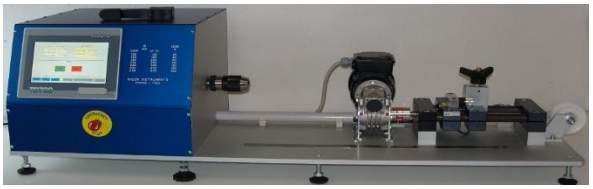

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ASSOCIAZIONE COSTRUTTORI ITALIANI MACCHINE PER FILO
ITALIAN WIRE MACHINERY MANUFACTURERS ASSOCIATION

Table of contents

RIGON INSTRUMENTS policy is to pursue a continuous research and development of its products to offer to its estimated customers the most upgraded technologies, for this reason the contents of this catalogue could be changed at any moment without notice.
We have paid our best care to print this catalogue, we apologize for mistakes.

MECHANICAL TEST

BIDIRECTIONAL SCRAPE TESTER mod. BST

STANDARD: NEMA MW 1000- 3.51

TEST PROCEDURE: After the specimen has been removed from the solvent following the procedure described in the single data sheet, it must be inserted on a device which scrapes the surface of the film coating at right angle to the length of the wire with the prescribed weight and lowered gently to the surface of the film coating and scrapes at 50 mm/1" along the portion that was immersed in the solvent. Exposure of the bare conductor shall be indicated by an electrical circuit having a potential of 7.5 +/- 1.5Vdc between the needle and the conductor. This procedure also indicates any eccentricity of the insulation on the wire as well.

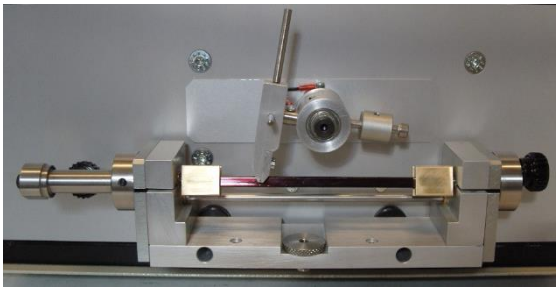
- Suitable for wire diameter from 0.2 up to 2.5 mm (32 – 10 AWG).
- Rotation of specimen device by 120° and 240°.
- Human Machine interface
- Adjustable stroke speed up to 55 mm/1".
- Test length 50 mm (about 2").
- Precision linear bearing unit.
- Stretching device 1%.
- Adjustable piano wire device.
- Complete set of weights: 2x 50, 100, 2x200, 500, 1000 g.
- Test voltage and current according to the standard.
- 4 digits counter with pre-selection and automatic stopping.

TECHNICAL SPECIFICATIONS

Power supply	Dimensions	Weight
100 - 230Vac 50/60Hz 1phase 80VA	l 500 x d 390 x h 450 mm	24 kg 52.8 lb

OPTIONS

- FIX Fixture to test flat wires



Fixture to test flat wires

Data changes reserved

BIDIRECTIONAL SCRAPE TESTER mod. BST1

STANDARD: GOST 14340.10-69

TEST PROCEDURE: After the specimen has been removed from the solvent following the procedure described in the single data sheet, it must be inserted on a device which scrapes the surface of the film coating at right angle to the length of the wire with the prescribed weight and lowered gently to the surface of the film coating and scrapes at 60 mm/1" along the portion that was immersed in the solvent. Exposure of the bare conductor shall be indicated by an electrical circuit having a potential of 12 +/- 1.5Vdc between the needle and the conductor. This procedure also indicates any eccentricity of the insulation on the wire as well.

- Suitable for wire diameter from 0.85 up to 7.2 mm.
- Human Machine interface
- Adjustable stroke speed up to 60 mm/1".
- Test length 10 mm.
- Precision linear bearing unit.
- Adjustable piano wire device.
- Complete set of weights: 600 - 746 - 816 - 950 - 1020 - 1154 - 1224 g.
- Test voltage and current according to the standard.
- 4 digits counter with pre-selection and automatic stopping.
- Device to rotate the sample wire by 90° - 180° - 270° - 360°

TECHNICAL SPECIFICATIONS

Power supply	Dimensions	Weight
100 - 230Vac 50/60Hz 1phase 80VA	l 500 x d 390 x h 450 mm	24 kg 52.8 lb

Data changes reserved

AUTOMATIC ELONGATION TESTER mod. ET

STANDARDS: IEC 60851 - 3.3, NEMA MW 1000, JIS C 3216-3, ASTM D 1676

TEST PROCEDURE: The elongation shall be measured with an elongation tester or tensile machine. The free measuring length shall be between 200 and 250 mm (7.9 to 10 inches). The wire shall be stretched at a rate of 5 mm/1" +/- 20%. The elongation shall be expressed as a percentage of the free measuring length. Three measurements shall be made and the mean value taken as "elongation".

- Suitable for wire diameter from 0.064 up to 2.75 mm (42 – 9 ½ AWG).

-Test length 250 mm (10") and maximum percentage of elongation 53%.

- 4 digits counter with pre-selection of percentage of elongation, resolution 0,1%, accuracy > 0.3%.

- Adjustable translation speed from 1,5 to 8 mm/1".

- Brushless motor with worm gearbox and inverter driver.

- Automatic stopping at break point and fast return.

TECHNICAL SPECIFICATIONS

Power supply	Dimensions	Weight
230Vac 50/60Hz 1phase 250VA	w 500 x h 1200 x d 600 mm	48 kg 105.6 lb

OPTION:

- D Load cell to measure the rupture force.

- PC Computer for test management with graphic representation of elongation force and printout of measurement results. Complete of software for low elongation test.

Mod. ET

mod. ET-D

Data changes reserved

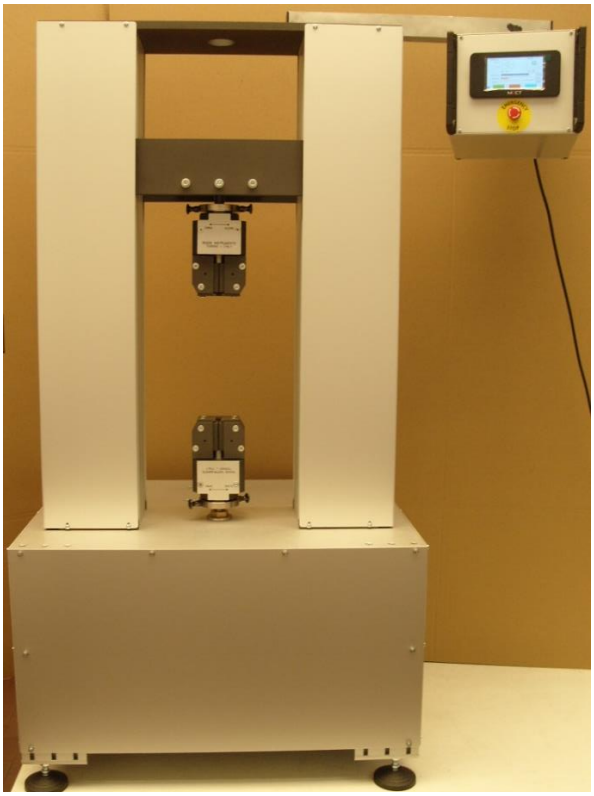
AUTOMATIC ELONGATION TESTER mod. ET3, ET4

STANDARDS: IEC 60851 - 3.3, NEMA MW 1000, JIS C 3216-3, ASTM D 1676

TEST PROCEDURE: The elongation shall be measured with an elongation tester or tensile machine. The free measuring length shall be between 200 and 250 mm (7.9 to 10 inches). The wire shall be stretched at a rate of 5 mm/1" +/- 20%. The elongation shall be expressed as a percentage of the free measuring length. Three measurements shall be made and the mean value taken as "elongation".

TECHNICAL SPECIFICATIONS

model	Power supply	Dimensions	Weight
ET3	230Vac 50/60Hz 1phase 370VA	h 1300 x w 500 x d 610 mm	86 kg 189.2 lb
ET4	230Vac 50/60Hz 1 phase 370VA	h 1400 x w 550 x d 700 mm	95 kg 209.0 lb

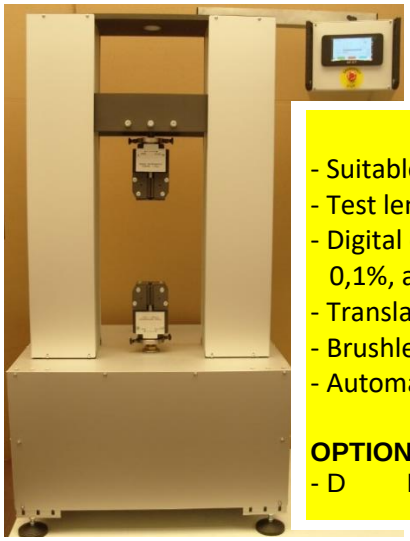


Model ET3

- Suitable for wire diameter from 0.60 up to 5.00 mm (24 – 3 AWG) and strip up to 60 mm^2.
- Test length 250 mm (10") and maximum percentage of elongation 52%.
- Pre-selectable elongation counter, 0.1% resolution, accuracy > 0.3%.
- Translation speed adjustable from 1.5 up to 8.0 mm/1".
- Brushless motor with planetary gearbox electronically controlled.
- Automatic stopping at break point and fast return.

OPTION:

- D Load cell to measure the breaking force
- PC Computerised test management complete of load cell with graphical representation of elongation force and printout of test results.

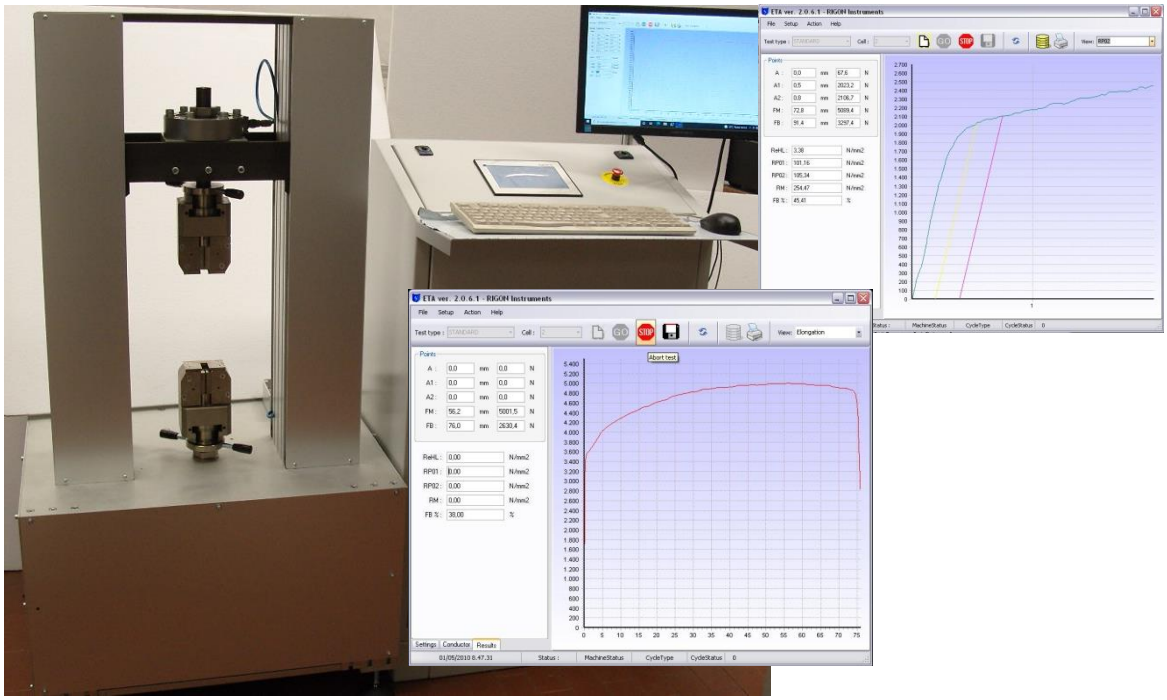


Model ET4

- Suitable for wire diameter from 0.70 up to 6.00 mm and strip up to 100 mm^2
- Test length 250 mm (10”) and maximum percentage of elongation 53%.
- Digital counter with pre-selection of percentage of elongation, resolution 0,1%, accuracy > 0.3%.
- Translation speed adjustable from 1.5 up to 8.0 mm/1”.
- Brushless motor with planetary gearbox electronically controlled.
- Automatic stopping at break point and fast return.

OPTION:

- D Load cell to measure the breaking force



Model ET4-PC

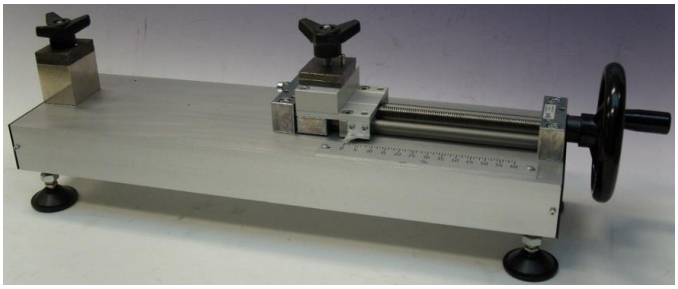
- Suitable for wire diameter from 0.70 up to 6.00 mm and strip up to 100 mm^2
- Test length 250 mm (10”) and maximum percentage of elongation 53%.
- Computerised test management complete of load cell with graphical representation of elongation force and printout of test results, calculation Rp 0.1 – Rp 0.2
- Translation speed adjustable from 0.1mm up to 8.0 mm/1”.
- Brushless motor with planetary gearbox electronically controlled.
- Automatic stopping at break point and fast return.

Data changes reserved

ELONGATION TESTER mod. ETM, ETM1, ETM2, ETM3

STANDARDS: IEC 60851-3.3, NEMA MW 1000, JIS C 3216-3, ASTM D 1676

TEST PROCEDURE: The elongation shall be measured with an elongation tester or tensile machine. The free measuring length shall be between 200 and 250 mm (7.9 and 10 inches). The wire shall be stretched at a rate of 5 mm/1" +/- 20%. The elongation shall be expressed as a percentage of the free measuring length. Three measurements shall be made and the mean value taken as "elongation".



Model ETM

Manual driven
Suitable for wire diameter from 0.05 up to 1.15 mm (42 - 17 AWG)
Test length 250 mm (10")
Maximum elongation percentage 52%
Resolution 1%
Dimensions. w 500 x d 150 x h 140 mm 8 kg (17.6 lb)

Model ETM1

Suitable for wire diameter from 0.05 up to 1.15 mm (42 - 17 AWG)
Test length 200 mm
Maximum elongation percentage 52%
Resolution 0.1%
Translation speed adjustable from 1,5 up to 6 mm/1"
Safety limit switches
HMI to set test parameters such: Speed, maximum percentage of elongation
Power supply 230V 50/60 Hz single phase 100VA
Dimensions: w 480 x d 430 x h 450 mm 27 kg (59.4 lb)

Model ETM2

Suitable for wire diameter from 0.10 up to 2.0 mm (38 - 13 AWG)
Test length 200 mm
Maximum elongation percentage 52%
Resolution 0.1%
Translation speed adjustable from 1,5 up to 6 mm/1"
Safety limit switches
HMI to set test parameters such: Speed, maximum percentage of elongation

Power supply 230V 50/60 Hz single phase 200VA
Dimensions: w 480 x d 430 x h 450 mm 30 kg (66 lb)

Model ETM3

Suitable for wire diameter from 0.72 up to 3.5 mm (20 – 7 ½ AWG)
Test length 200 mm
Maximum elongation percentage 52%
Resolution 0.1%
Translation speed adjustable from 1,5 up to 6 mm/1”
Safety limit switches
HMI to set test parameters such: Speed, maximum percentage of elongation
Power supply 230V 50/60 Hz single phase 200VA
Dimensions: w 920 x d 360 x h 450 mm 42 kg (92.4 lb)

OPTIONS:

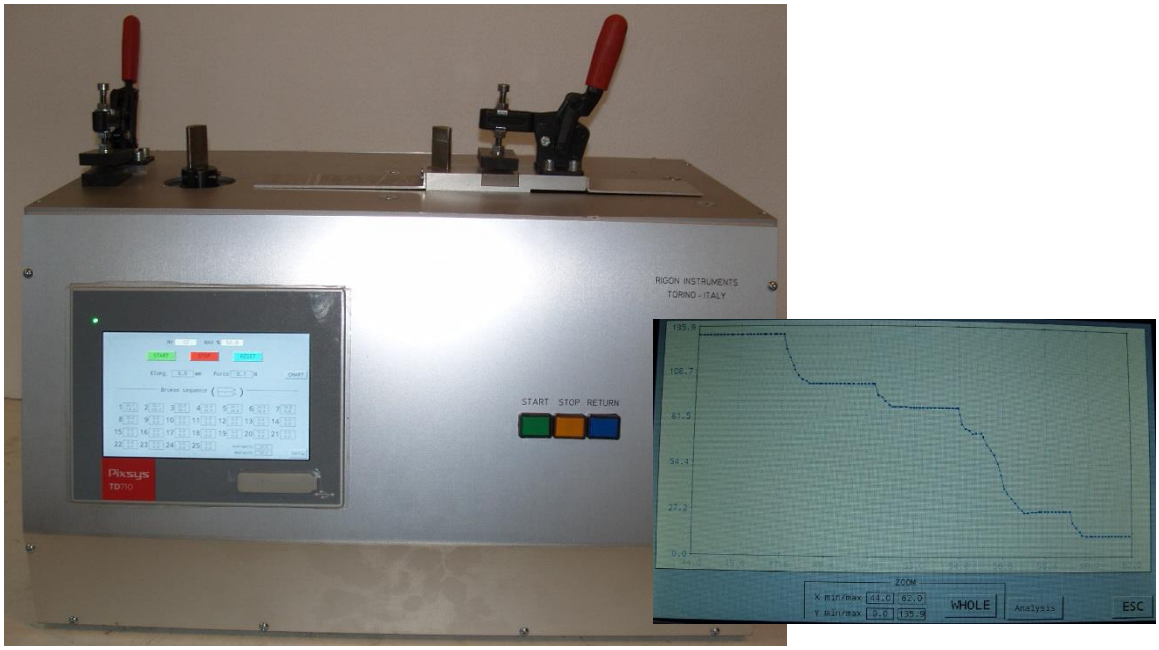
250 Test length 250 mm
D Load cell to measure the breaking force, complete of digital indicator
JAW Fast jaws tread up (suitable for bare wire).

Data changes reserved

STRANDED WIRE ELONGATION TESTER mod. ETM4

Automatic elongation tester able to detect the breaking force of every single wire on a stranded wire.

- Test length 200 mm, maximum elongation percentage 52%.
- Adjustable translation speed from 1 up to 6. 5 mm/1".
- Load cell rated force 500 N, resolution 0,1 N to measure the strength force and detect the breaking point of each single wire (up to 25).
- Stranded wire composition up to 25 x 0,25 mm
- Touch screen 7" HMI to set the test parameters, visualization and automatic storage of test results, on usb pen drive in Excel format.
- Easy calibration of load cell.
- User friendly.



TECHNICAL SPECIFICATIONS

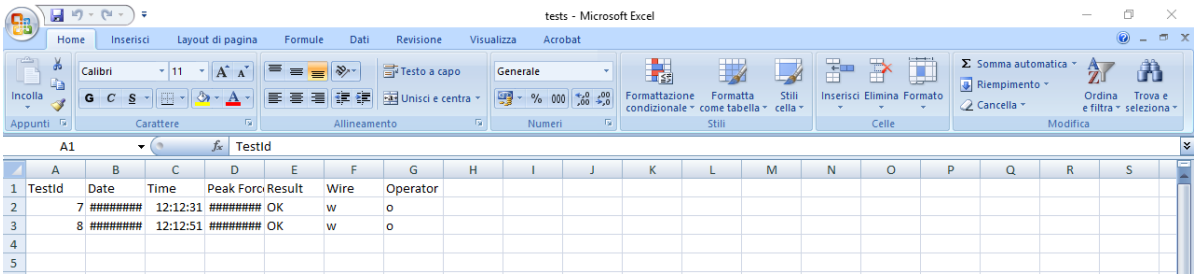
Model	Power supply	Dimensions	Weight
ETM4	230V 50/60 Hz monofase 200 VA	w 600 x d 380 x h 400 mm	24 kg 52,8 lb

Data changes reserved

DYNAMOMETER mod. ETM-XD

Automatic dynamometer, for the measurement and graphic representation of the fraying force of the cables from the sheath.

Suitable for cables with external diameter up to 20 mm.
- Adjustable translation speed from 50 to 300 mm / 1 '.
- Load cell for measuring the extraction force, capacity 150 N, resolution 0.01 N.
- Provided with gauges for the insertion of cables with external diameters from 3 to 20 mm in steps of 0.5 mm.
- Maximum length of fraying 125 mm
- HMI for the execution of the test with graphic display and automatic storage on a USB key of the individual results in Excel format.
- Easy calibration of the load cell.
- Stop limit switch.



TECHNICAL SPECIFICATIONS

Model	Power supply	Dimensions	Weight
ETM-XD	100 - 240V 50/60 Hz single phase 100 VA	w 600 x d 380 x h 400 mm	24 kg 52,8 lb

Data changes reserved

LOW STRESS ELONGATION TESTER mod. LSE, LSE-PC

STANDARD: ASTM D1676-99

TEST PROCEDURE: To determine the wire softness.
Take three samples of enamelled wire 40 cm (1.5”) in length, paying attention to handle them with care avoiding deformation which will false the final test result. The sample shall then be placed between two jaws at a distance of 10”, a pre-load of 51,75 N/mm^2. The comparator used to measure the softness must be zeroed, double the test weight (103,5 N/mm ^{2}) for a time of 30”, take out then the doubled weight, read on comparator the Δall value, then calculate the low stress elongation value with the following formula:

$$L.S.E = \frac{\Delta all}{10”} \times 100$$

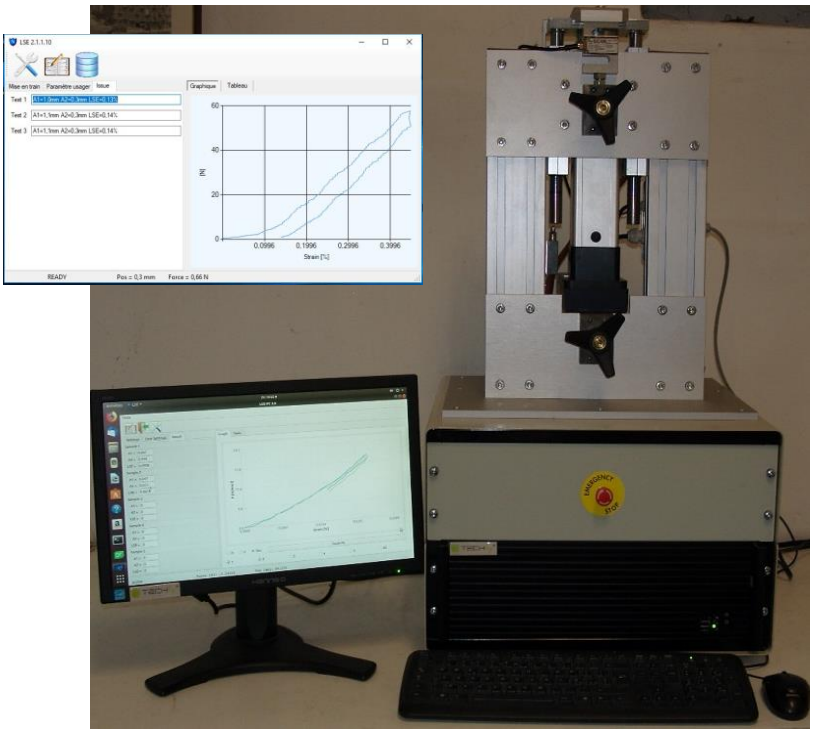
Calculate then the average of three measurements.

A high LSE value indicates that the wire has greater formability and is better able to absorb bends and twists during motor and coil winding operation. Low LSE value (with reference to the same wire diameter) indicates harder wire with more springiness.

Model	Power supply	Dimensions	Weight
LSE	230 V 50/60Hz 1 phase 100VA	w 500 x d 550 x h 620 mm	25kg 55 lb
LSE-PC	230 V 50/60Hz 1 phase 150VA	w 500 x d 550 x h 620 mm	27kg 59.4 lb

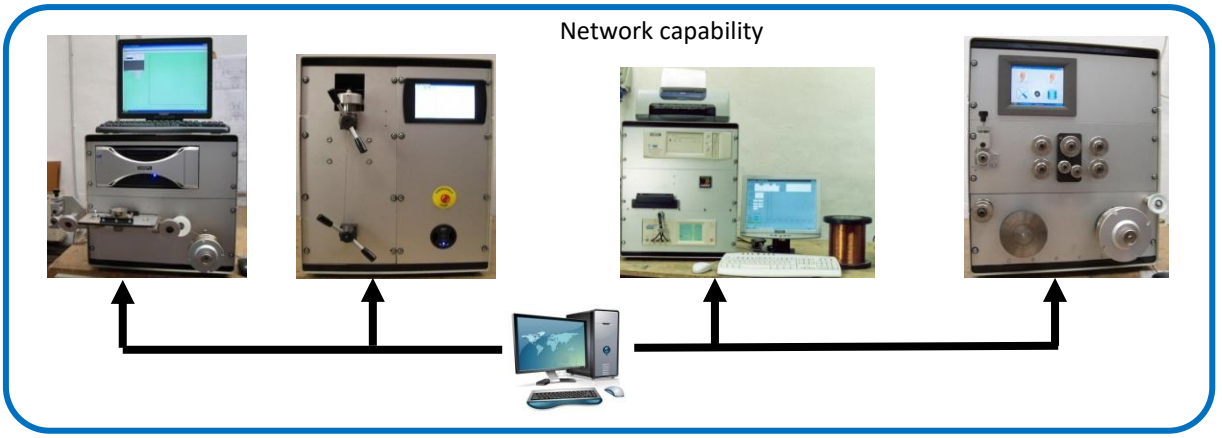
Model LSE

- Suitable for wire diameter range from 0,10 up to 2,50 mm (38–10 AWG). (Other range upon request).
- Meets ASTM D-1676 requirements.
- High accuracy load cell and measurement repeatability.
- Very slow translation speed with high precision ball bearing screw.
- User friendly also for unskilled personnel, doesn’t need pre-load and load weights, so complicated calculations for their value are avoid.
- Keypad input and LCD display.



Model LSE-PC

- Suitable for wire diameter range from 0,10 up to 2,50 mm (38–10 AWG). (Other range upon request).
- Meets ASTM D-1676 requirements.
- High accuracy load cell and measurement repeatability.
- Very slow translation speed with high precision ball bearing screw.
- Computerised version, which shows the graphical representation of low stress elongation.
- Network capability.
- User friendly also for unskilled personnel, doesn't need pre-load and load weights, so complicated calculations for their value are avoid.
- Print-out of each single result with calculation of minimum, maximum, average and standard deviation values.
- Easy calibration procedure



Data changes reserved

HEAT OR SOLVENT BONDING TESTER mod. HBT

STANDARD: IEC 60851-3.7.1

TEST PROCEDURE : The turns of a helical coil of the wire wound on a mandrel are pressed together by applying a load and bonded by means of heat or solvent. After bonding, the specimen is removed from the mandrel and suspended in a vertical position with a load applied at the lower end to determine whether the specimen withstands a specified load or not. This procedure is repeated at an elevated temperature.

- Motorised 100N load cell with adjustable speed to measure the bonding strength.
- Digital indicator of bonding force 4 ½ digit, resolution 0.01 N, storage of maximum bonding value.
- Automatic forward and reverse.
- Limit switches for adjustable test length and automatic stopping for maximum stroke length.
- Complete set of loading weights and winding mandrels.
- Supplied with weights standing.

TECHNICAL SPECIFICATIONS

Power supply	Dimensions	Weight
100 - 230Vac 50/60Hz 1phase 50VA	w 450 x d 480 x h 650 mm	32 kg 70 lb

OPTION

- STV Air draught oven, with digital temperature controller, max temperature 250°C and timer.

Data changes reserved

JOULE EFFECT SELF BONDING TESTER mod. JOU

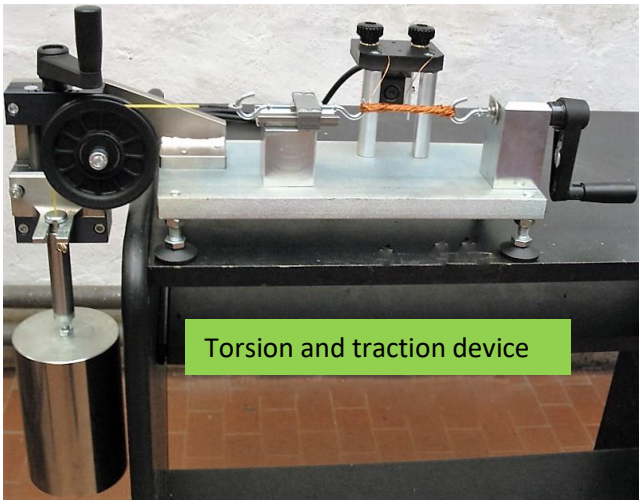
STANDARD: IEC 60851-3.7.2

TEST PROCEDURE: The sample is formed by a twisted winding having a number of turns given from the relevant specifications. The sample so realised is loaded with a weight of 100 N, at the ends of the coil a constant continuous current for a time between 30" to 60 "is applied, this specimen will be tested in a tensile testing equipment in a horizontal position to obtain the maximum deflection force to break it. The test shall be repeated at elevated temperature.

- Motorised winding device with automatic calculation of number of turns as a function of the wire diameter.
- Sample twisting device supplied with weight of 100N and device to lift up/down the weight.
- High power constant current supply (Voltage adjustable from 0 up to 50 Vdc and current from 0 up to 24 A).
- Motorised load cell device to measure the sample deflection force, maximum force 500 N resolution 0.1 N.
- Infrared contactless thermometer for bonding temperature determination, resolution 1°C max. temp. 500°C.
- Industrial PC with LCD screen for the management of the test and self-guide menu for every step of test, automatic calculation of minimum, maximum, average and standard deviation with printout of measured values.
- Air draught oven for high temperature test up to 220°C, complete of digital temperature controller with serial line for PC communication.

TECHNICAL SPECIFICATIONS

Power supply	Dimensions	Weight
230Vac 50/60Hz 1phase 3KVA	w 900 x d 480 x h 600 mm	69kg 151.8 lb



Data changes reserved

JERK TESTER mod. JT, JT2, JTM

STANDARDS: IEC 60851-3.5.3, NEMA MW 1000, JIS C 3216-3

TEST PROCEDURE: A sample of wire of 250 mm (10 inches) length shall be suddenly stretched to the breaking point or to an elongation given in the relevant specification sheet. The specimen shall be examined for cracks or loss of adhesion under a magnification of:

- 10 to 15 times for nominal conductor diameters up to and including 0.04 mm.
- 6 to10 times for nominal conductor diameters > 0.04 up to and including 0.5 mm.
- Normal vision or up to six times for nominal conductor diameters over 0.5 mm.

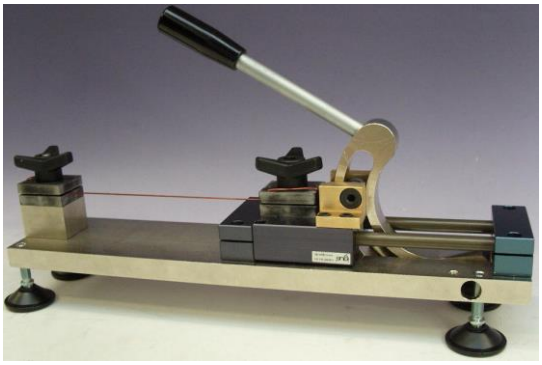
The distance of 2 mm from the broken ends shall be disregarded. Three tests shall be made.

- Suitable for wire diameter range from: 0,09 up to 1,00 mm (39-18 AWG) mod. JTM
  0.09 mm up to 1.60 mm (39 – 14 AWG) mod. JT
  3,00 mm up to 8,00 mm (1/2 – 9 AWG) mod. JT2
- Clamping length 250 mm (10 inches mod. JT, JT2), (200mm (7,9inches) mod. JTM)
- Compressed air, maximum force of 650N (mod. JT), 16KN (mod. JT2), (Manual mod. JTM).
- Pre-selectable elongation value device (mod. JT).
- Graduate percentage scale (mod. JT).

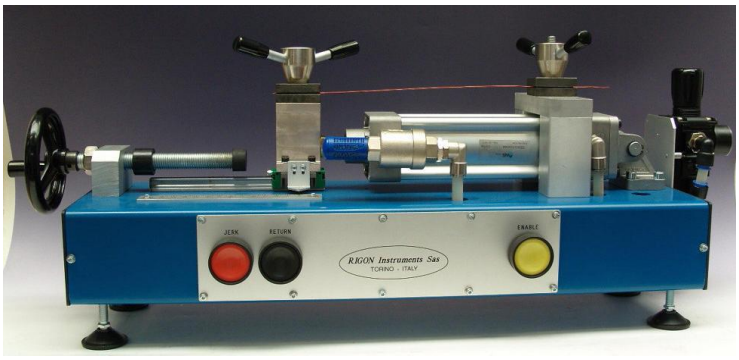
TECHNICAL SPECIFICATIONS

Model	Power supply	Dimensions (w x d x h) mm	Weight
JT	Compressed air 0.5 – 1.0 MPa	750 x 250 x 350	29 kg 63.8 lb.
JT2	Compressed air 0.8 – 1.0 MPa	1200 x 630 x 800	185 kg 407lb.
JTM	Manual	500 x 250 x 500	16 kg 35.2lb.

OPTIONS - Microscope with adjustable magnification from 6 up to 40 times.
- Digital output to measure jerk speed (mod. JT)



mod. JTM



mod. JT

Mod. JT2

Data changes reserved

MANDREL WINDING TESTER mod. MW, MW1

STANDARDS: IEC 60851-3.5, JIS C 3216-3, NEMA MW 1000

TEST PROCEDURE: A specimen of wire shall be wound for ten contiguous turns round a polished mandrel of the diameter given in the relevant specification sheet. The mandrel shall be rotated between 60 and 180 RPM, the tension of the wire being just sufficient to keep it in contact with the mandrel. Elongation or twisting of the wire shall be avoided. After winding, the specimen shall be examined for cracks under a magnification of:

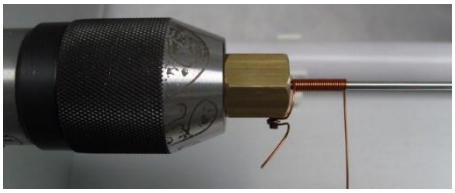
- 10 to 15 times for nominal conductor diameters up to and including 0.04 mm.
- 6 to 10 times for nominal conductor diameters over 0.04 up to and including 0.5 mm.
- Normal vision or up to six times for nominal conductor diameters over 0.5 mm.

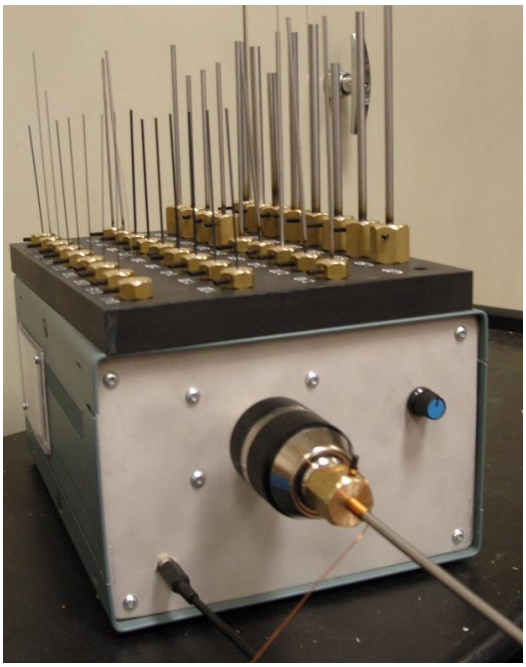
Three tests shall be made.

- Suitable for wire diameter from 0.04 up to 1.60 mm (46 – 14 AWG).
- Dc motor with gearbox adjustable rotation speed 10 - 100 rpm.
  (100 up to 2000 rpm with digital tachometer model MW1).
- Digital revolution counter up to 9999 with pre-selectable number of turns (mod. MW1).
- Supplied with a complete set of 36 mandrels: 0.40 – 0.45 – 0.50 – 0.60 - 0.70 – 0.80 – 0.90 – 1.00 – 1.10 - 1.20 1.30 – 1.40. – 1.50 – 1.60 – 1.70 – 1.80 – 1.90 – 2.00 - 2.10 – 2.20 2.40 – 2.60 – 2.80 – 3.00 – 3.20 – 3.40 – 3.60 –4.00 - 4.50 – 5.00 5.50 – 6.00 – 6.50 – 7.00 – 7.50 – 8.0 mm

TECHNICAL SPECIFICATIONS

Model	Power supply	Dimensions	Weight
MW	100 - 230V 40/60Hz 1 phase 50VA	w 350 x h 280 x d 330 mm	18 kg 39.6 lb
MW1	100 - 230V 50/60 Hz 1 phase 70VA	w 350 x h 290 x d 360 mm	27 kg 59.4 lb





Mod. MW

Mod. MW1

OPTION

- WEI Loading and test weight for thermal/solvent self-bonding test.
- MAN Mandrels

data changes reserved

FLAT WIRE MANDREL WINDING TESTER model MW2

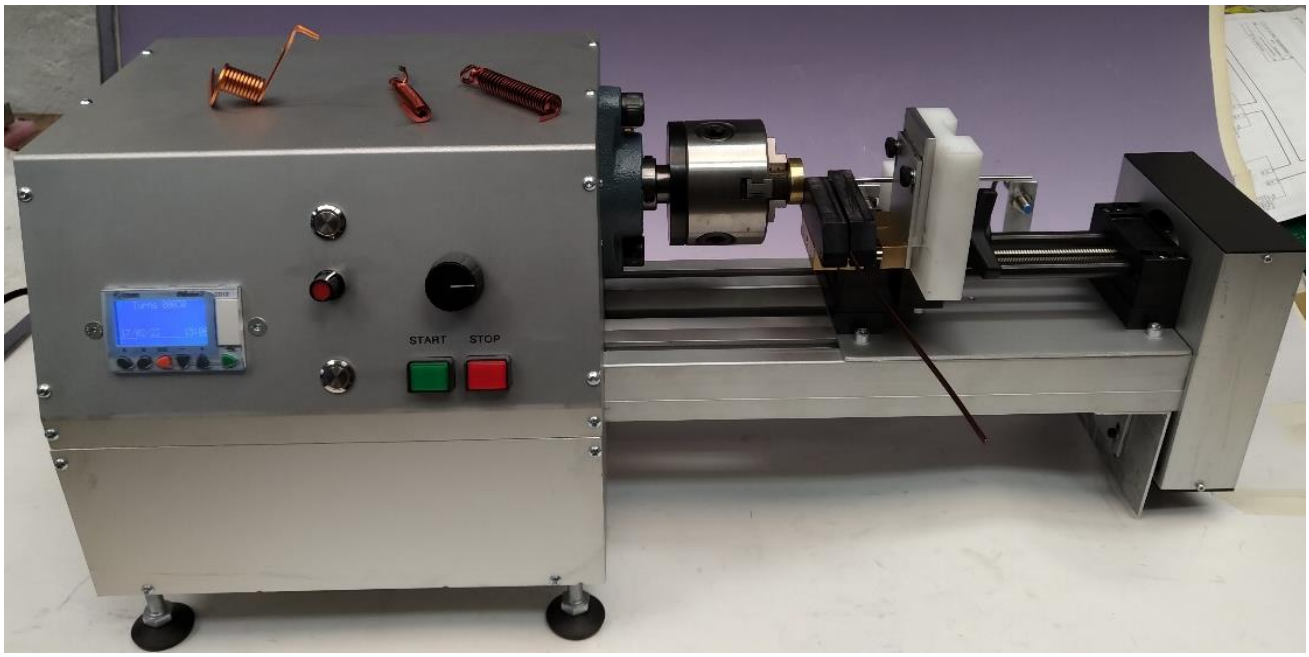
STANDARDS: Not foreseen

TEST PROCEDURE: A specimen of flat wire shall be wound, flat or edge wise for contiguous turns round a polished mandrel of the diameter given in the relevant specification sheet.
After winding, the specimen shall be examined for cracks, or can be used to test its breakdown voltage.

- Suitable for flat wire, dimensions in different ranges
- Dc motor with gearbox rotation speed 10 - 20 rpm depends on dimensions ranges.
- Adjustable pitch electronic controlled.
- Digital revolution counter up to 999 with pre-selectable number of turns.
- Limit proximity switches.

TECHNICAL SPECIFICATIONS

Model	Power supply	Dimensions	Weight
MW2	100 - 230V 40/60Hz 1 phase 100VA	w 650 x h 280 x d 330 mm	18 kg 39.6 lb



OPTION
- MAN Mandrels dimensions at choice

data changes reserved

PEEL TESTER mod. PT, PT0
STANDARDS: IEC 60851-3.5.4

TEST PROCEDURE: A sample of round wire shall be inserted between two mandrels, one of these is able to rotate, the other one cannot rotate but can be displaced axially, the latter is loaded according to the table to apply tension to the rotating wire.

Nominal conductor diameter mm		Load N
Over	Up to and including	
1,000	1,400	25
1,400	1,800	40
1,800	2,240	60
2,240	2,800	100
2,800	3,550	160
3,550	4,500	250
4,500	5,000	400

By means a scraper the enamel is removed on opposite sides of the wire down to the bare conductor. The rotating fixing device shall be driven at a speed from 60 to 100 rpm until the number of revolutions required has been reached. The specimen shall then be examined for enamel flexibility and for adhesion of the enamel.

Model PT

- Suitable for diameter from 0.9 mm up to 5.00 mm (19 - 4 AWG).
- Load cell with linear servo-actuator for test load up to 500 N, that eliminate the needed of test weights and operator fatigue.
- Supplied with easy to use scraper.
- Human Machine Interface, to set and display test load, mandrel speed revolution, pre-selection of number of torsions of sample wire with automatic stopping.
- Brushless motor with planetary gear box, electronic driver, adjustable speed from 30 up to 220 rpm.
- Suitable for mandrel winding test.

TECHNICAL SPECIFICATIONS

Power supply	Outline dimensions	Weight
230Vac 50/60 Hz single phase 200VA	w 1200 x d 400 x h 350 mm	65kg 143 lb

OPTION

- PT1 Extended range up to 12.5 mm
- MAN Complete set of 36 mandrels for winding test.

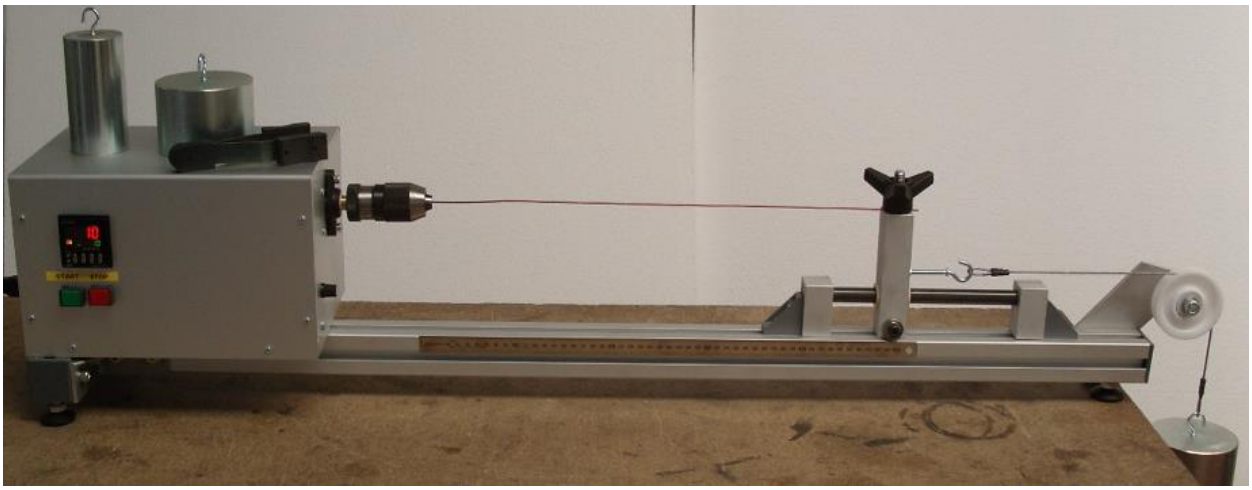
Mod. PT

Model PT0

- Suitable for diameter from 0.9 mm up to 2.00 mm (19 - 12 AWG).
- Gear-motor with planetary gear box, electronic driver, adjustable speed from 30 up to 100 rpm.
- Adjustable test length from 400 up to 550 mm.
- Supplied with easy-to-use scraper.
- Pre-selection of number of torsions of sample wire with automatic stopping.
- Suitable for mandrel winding test.

TECHNICAL SPECIFICATIONS

Power supply	Outline dimensions	Weight
100 - 240Vac 50/60 Hz single phase 100VA	w 1200 x d 300 x h 260 mm	24kg 52.8 lb



Mod. PT0

Data changes reserved

STRIP BENDING DEVICE mod. SBD1 – SBD2

STANDARDS: IEC 60851-3.5.1.2

TEST PROCEDURE: A straight piece of wire approximately 400 mm (15”) in length shall be bent through 180° round a polished mandrel of the diameter given in the relevant standard in two directions to form an elongated S-shape. The straight part between the U-shape bends shall be at least 150 mm. Care should be taken to ensure that the specimen does not buckle or depart from a uniform bend.

After bending, the insulation shall be examined for cracks in case of enamelled wire, for exposure of the bare conductor or under lying coating in case of fibre covered wire and for exposure of the bare conductor and de-lamination in case of tape wrapped wire under magnification of six to ten times.

Six specimens shall be bent, three flat wise (on the thickness) and three edgewise (on the width). It shall be reported, if the wire shows cracks or de-lamination, exposure of the bare conductor or underlying coating, whichever is applicable.

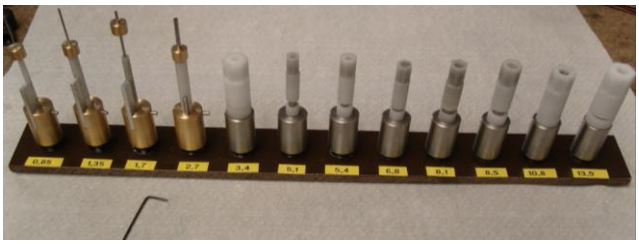
- Suitable for strip up to 180 mm^2 (mod. SBD1) flat wise and edgewise bent.
- Suitable for mandrel dia. < 5 mm (mod. SBD2).
- Harsh galvanised steel construction.
- Fast sample locking.
- Manual device for strip bending.
- High precision roller bearings.
- Supplied complete of 5 fast interchangeable stainless steel mandrels at choice.

TECHNICAL SPECIFICATIONS

Power supply	Dimensions (w x d x h) mm	Weight
Manual driven	480 x 350 x 570	22 kg 48.4 lb.

Mod. SBD1

Mod. SBD2



OPTION: - MAN Mandrel at choice from 0.75 mm up to 100.0 mm

Data changes reserved

FLAT WIRE TORSION METER mod. TOR

TEST PROCEDURE: A copper or aluminum flat wire should be inserted between one rotating mandrel and another one that could be displaced axially with a specified tensioning weight applied. The rotating mandrel shall rotate at a speed between 2 and 6 RPM, till to reach the prescribed number of torsions. The sample wire shall then be examined for enamel flexibility and for adhesion of the enamel.

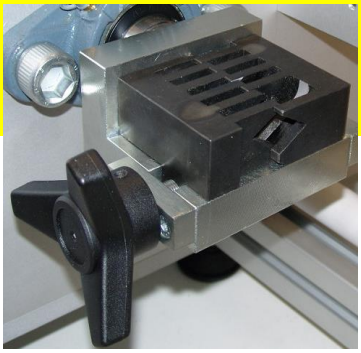
- Suitable for copper and aluminum flat wire having dimensions from 3,0 x 5,0 mm up to 20 x 6,0 mm.

- Load cell with linear servo-actuator for sample tensioning up to 2,5KN, resolution 1N, which eliminate to apply heavy load weights.

- HMI controller to set and visualize the loading weight applied to the specimen, test speed and number of torsions.

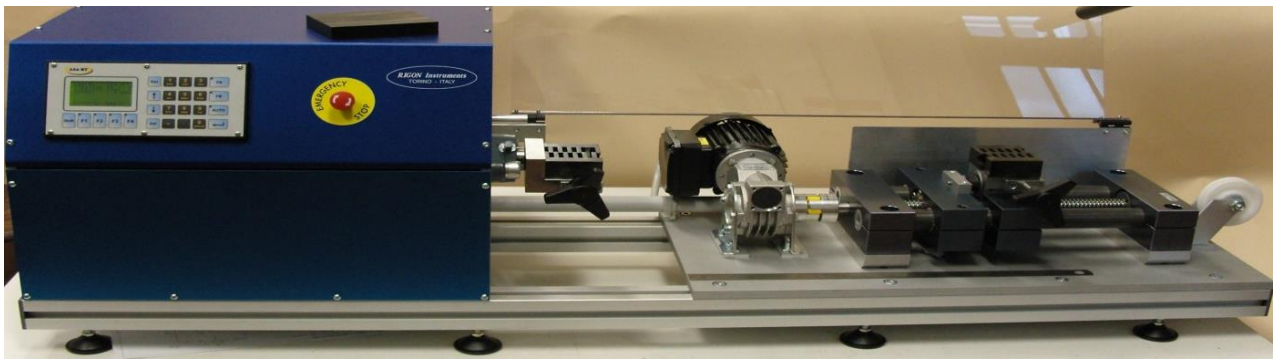
- Rotating mandrel drive by worm gear-motor with digital inverter, speed from 2 up to 10 RPM.
- Number of torsions CW/CCW independently pre-selected up to 99.

- Sample length adjustable between 400 up to 500 mm.



TECHNICAL SPECIFICATIONS

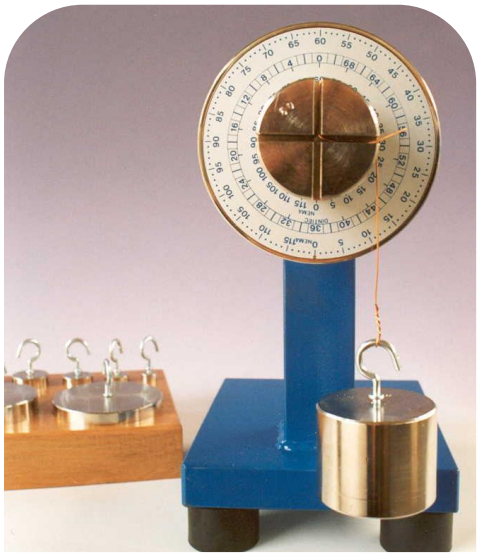
Power supply	Dimensions	weight
230Vac 50/60 Hz single phase 650VA	w 1350 x d 610 x h 400 mm	45 kg 99,0 lb



Data changes reserved

SPRING-BACK TESTER mod. SB0, SB1, SB2
STANDARDS: IEC 60851-3.4, NEMA MW 1000, JIS C 3216-3

TEST PROCEDURE: a sample of wire should be wound (5 times IEC, DIN) (3 times NEMA, JIS) on a mandrel of diameter according to the standards and at its end a weight will be applied, the winding speed must be constant. The spring-back value can be read on a graduate disc.



Model SB0

- Suitable for dia. from 0.07 mm up to 1.60 mm (41–14 AWG).
- Complete set of weights and fast plug-in grooved mandrels.
- Disc division every degree for all standards.
- Manual driven.
- Mandrels and weights according to IEC 60851-3.4 / NEMA MW 1000

Model SB1

- Suitable for dia. from 0.07 mm up to 1.60 mm (41–14 AWG).
- Complete set of weights and fast plug-in grooved mandrels.
- Disc division every degree for all standards.
- Electric driven brushless gear motor for winding /unwinding at constant speed
- Speed and winding turns automatically selected according to the standards.

OPTION: - D Digital indicator of spring back angle, resolution 1°.

Model SB2

- Suitable for dia. from 0.07 mm up to 1.60 mm (41–14 AWG).
- Complete set of weights and fast plug-in grooved mandrels.
- Disc division every degree for all standards.
- Electronic driven brushless gear motor for winding /unwinding at constant speed
- Speed and winding turns automatically selected according to the standards.
- Fully automatic, winding/unwinding according to IEC, NEMA standard
- Digital spring-back counter resolution 1°.

TECHNICAL SPECIFICATIONS

Model	Power supply	Dimensions (W x d x h)	Weight
SB0	Manual	180 x 190 x 250 mm	18 kg (39,6 lb).
SB1	100 – 230V 40/60 Hz single phase 100VA	500 x 440 x 250 mm	29 kg (63,8lb).
SB2	230V 50/60 Hz single phase 150VA	500 x 440 x 480 mm	37 kg (81,4lb).

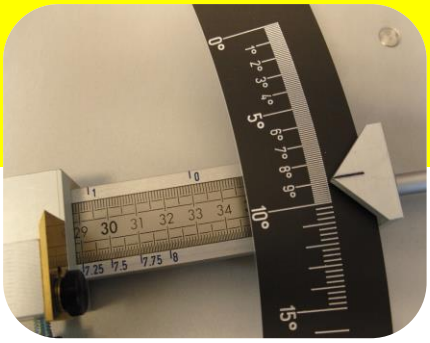
Data changes reserved

SPRING-BACK TESTER dia. > 1,60 mm and strip mod. SB3, SB4

STANDARDS: IEC 60851-3.4, NEMA MW 1000, JIS C 3216-3

TEST PROCEDURE: the test consists of bending a specimen of 400 mm (16") long over a given angle, then removing the load and measuring the spring-back angle in degrees. The specimen shall be removed from the spool with as little bending as possible.

- Suitable for the whole production sizes, aluminium and copper.
- Fully automatic, with motorised lever arm with constant speed (mod. SB4).
- Digital spring-back angle readout with 0.1° resolution, optical fibre photocell to detect the sample position (mod. SB4).
- Integral precision scale, resolution to 0.10° of one degree up to 10° and 0.25° of one degree up to 15°.
- Lever arm length 330 mm resolution 1 mm, direct indication of slider position according to wire size in millimetres and AWG.
- Manual activated (mod. SB3).
- Adjustable device to compensate the sample wire bend



TECHNICAL SPECIFICATIONS

model	Power supply	Dimensions	Weight
SB3	Manual driven	w 500 x d 330 x h 110 mm	8 kg 17.6 lb
SB4	230V 50/60Hz 1 phase 75VA	w 500 x d 400 x h 390 mm	28 kg 61.6 lb

mod. SB3

mod. SB4

Data changes reserved

SPRING-BACK TESTER dia. 0.070 up to 8.0 mm and strip mod. SB5, SB6

STANDARDS: IEC 60851-3.4, NEMA MW 1000, JIS C 3216-3

TEST PROCEDURE (wire dia. 0.070 mm to 1.60 mm): a sample of wire should be wound (5 times IEC, DIN) (3 times NEMA, JIS) on a mandrel of diameter according to the standards and at its end a weight will be applied, the winding speed must be constant. The spring-back value can be read on a graduate disc.

TEST PROCEDURE (range >1.60 mm and strip): the test consists of bending a specimen of 400 mm (16") long over a given angle, then removing the load and measuring the spring-back angle in degrees. The specimen shall be removed from the spool with as little bending as possible.

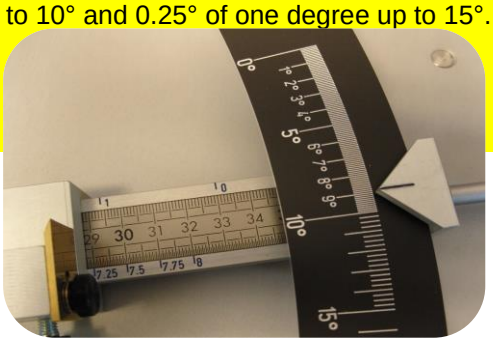
TECHNICAL SPECIFICATIONS

Wire diameter up to 1.60 mm

- Complete set of weights and fast plug-in grooved mandrels.
- Electronic drive brushless gear motor for winding /unwinding at constant speed.
- Disc division every degree for all standards.
- Fully automatic (mod. SB6), automatic winding according to IEC, NEMA standard (mod. SB5).
- Digital spring-back counter resolution 1° (mod. SB6).
- Speed and winding turns automatically selected according to the standards.

Wire diameter > 1.60 mm and strip

- Fully automatic, with motorised lever arm with constant speed (mod. SB6).
- Manual activated (mod. SB5)
- Digital spring-back angle readout with 0.1° resolution, optical fibre photocell to detect the sample position (mod. SB6).
- Integral precision scale, resolution to 0.10° of one degree up to 10° and 0.25° of one degree up to 15°.
- Lever arm length 330 mm resolution 1 mm
- Direct indication of sample size in mm and AWG
- Adjustable device to compensate the sample wire bend



Model	Power supply	Dimensions	Weight
SB5	230V 50/60Hz 1 phase 75VA	w 500 x d 330 x h 280 mm	15 kg 33lb
SB6	230V 50/60Hz 1 phase 150VA	w 500 x d 400 x h 390 mm	28 kg 61.6 lb

Mod. SB5

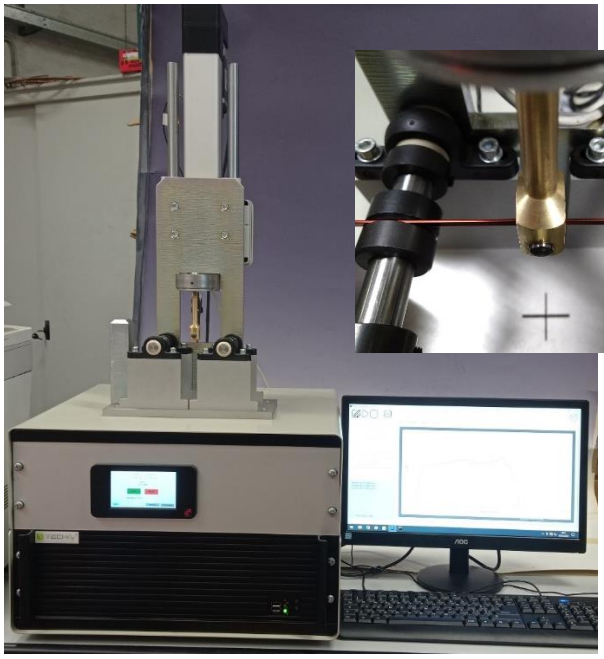
Mod. SB6

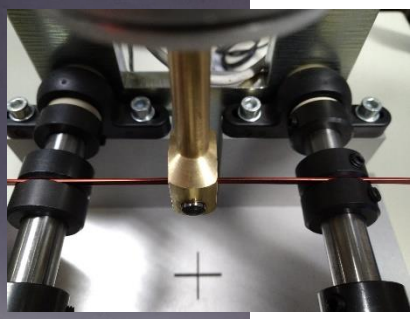
Data changes reserved

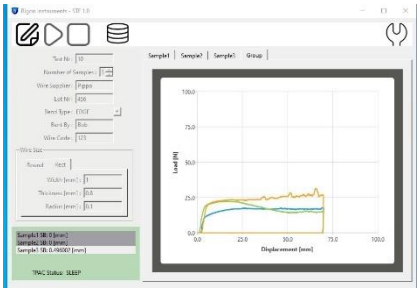
FLAT WIRE SPRING BACK TESTER mod. SB7

STANDARD: Ford

Magnet wire spring-back is the geometric change made to the wire after the end of the forming process i.e. when all the external forces acting on the wire have been removed. Consistent and appropriate levels of this geometric change are desired to aid in stator hairpin winding assembly (lower spring back levels make the wire too soft and prone to plastic deformation during in-process part handling, and higher spring back levels tend to increase forming die forces). This test procedure will describe a test that can be performed on virgin wires fresh off the bobbin or wires post wire straightening process (prior to hairpin forming process) to check for magnet wire spring-back and its consistency.







- Suitable for strips from 0.5 x 0.5 mm to 3 x 5 mm
- Graphical representation of spring-back.
- Load cell 100N, resolution 0.01N.
- Adjustable traverse speed from 15 mm/1' up to 150 mm/1'
- Automatic calculation of the return angle value.
- HMI for device diagnosis.
- Ease of calibration of the load cell.
- SQL database.

TECHNICAL SPECIFICATIONS

Power supply	Dimensions	Weight
230Vac 50/60Hz single phase 300VA	l 500 x p 390 x h 750 mm	35 kg 77 lb

Data changes reserved

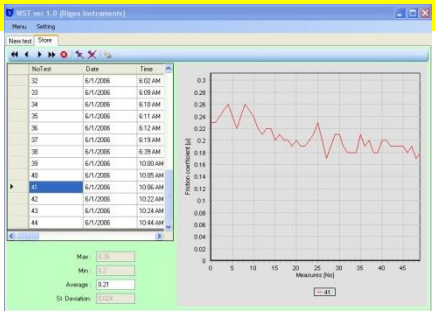
DYNAMIC SURFACE SMOOTHNESS TESTER mod. SST, SST1, SST2

STANDARD: IEC 60851-3.B3/B4, NEMA MW 750, EMERSON TP-131

TEST PROCEDURE: As coefficient of friction, which is defined as u=Fr/Fn, where Fr is the friction power and Fn the load applied on the wire. The test wire is moved at a speed of 15m/1' between a basic plate and a moveable loading plate, both have a defined surface roughness. The test load is mechanically connected to a dynamometer, which due to the roughness of the wire surface, detect the power friction, the values detected shall be displayed and recorded at desired time intervals. The statistical evaluation is taken from 50 single values.

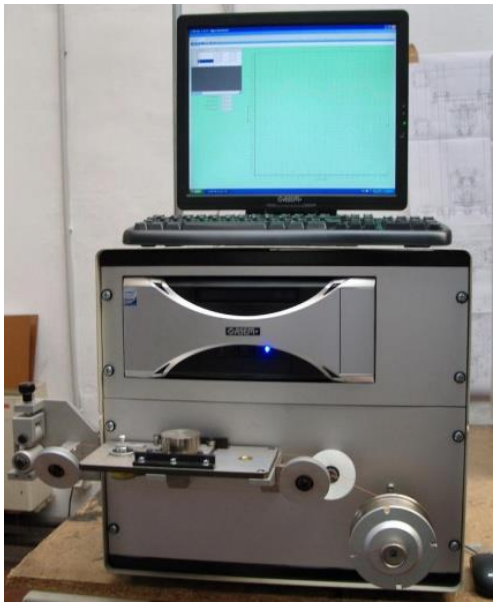
The coefficient of friction value is an indication of the magnet wire insulation lubricity. The lubricity of the insulation affects the spooling and windability of magnet wire into coils and its subsequent assembly into the finished products.

- Suitable for wire diameter range from 0.05 mm up to 2.0 mm
- Load cell to measure the coefficient of friction, resolution 0.01N.
- Test speed adjustable from 1 up to 30 m/1'.
- Test management with pc, selection of up to 1000 measurements per test, calculation and print out of each single value, minimum, maximum, average and standard deviation, with graphical representation, powerful data base, customisable print out report.
- Multi languages.
- Network capability and remote technical assistance.
- Winding wheel for ease removal of tested wire.
- Complete of weights according to IEC and NEMA standard.
- Two test methods in one equipment (mod. SST2).

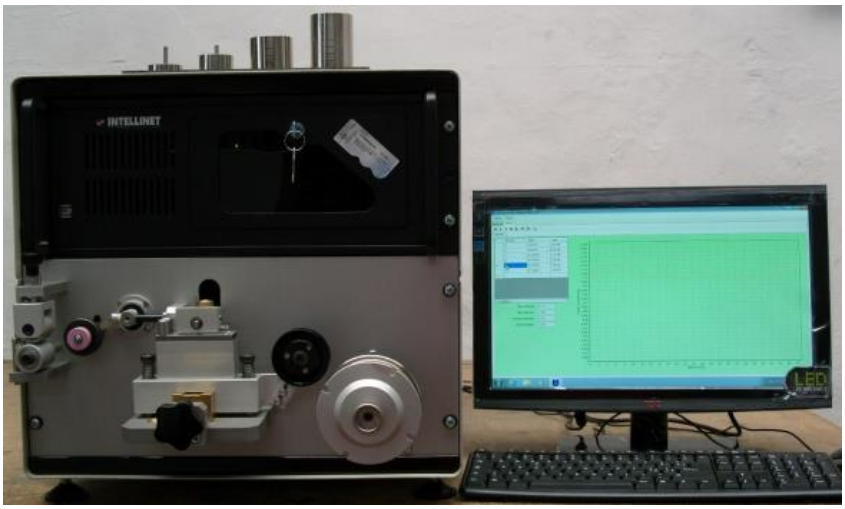


TECHNICAL SPECIFICATIONS

Model	Power supply	Dimensions	Weight
SST	230Vac 50/60Hz 1 phase 450VA	w 550 x h 560 x d 630 mm	32 kg 70.4 lb
SST1	230Vac 50/60Hz 1 phase 450VA	w 550 x h 560 x d 630 mm	35 kg 77.0 lb
SST2	230Vac 50/60Hz 1 phase 500VA	w 550 x h 660 x d 630 mm	44 kg 96,8 lb



model SST (DIN 46453, IEC60851-3.B3)

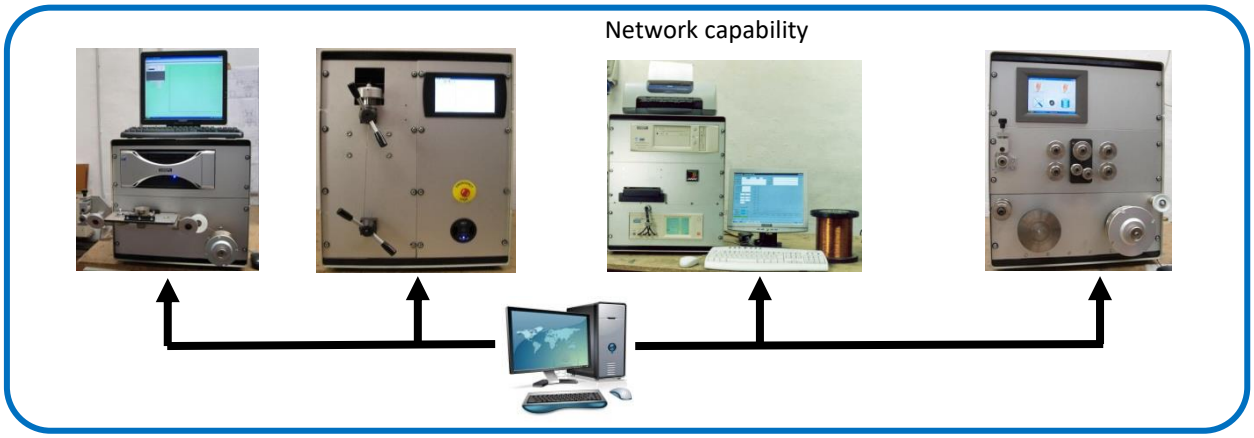


mod. SST1 (IEC 60851-3.B4, NEMA MW 750)

mod. SST2 (IEC 60851-3.B3/B4, NEMA MW 750)

OPTIONS:

- BAR Barcode reader
- EME Test weight according to Emerson standard (only on mod. SST1, SST2)



Data changes reserved

STATIC COEFFICIENT OF FRICTION TESTER mod. SST3

STANDARD: IEC 60851-3.B5

TEST PROCEDURE: A specimen approximately of 400 mm (16”) in length shall be twisted back on itself for a distance of 125 mm (5”). The force applied to the wire pair while begin twisted and the number of twists is given in the relevant table. At the twisted end, the loop is cut in two separate places to obtain a maximum separation between these cut ends. Any bending of the wires, at the cut end or at the other untwisted end, to ensure adequate separation between the wires, shall avoid sharp bends or damage to the insulation.
One end of one wire shall be attached firmly to a jaw, while at the opposite end of the other wire a force (dynamometer) is applied to let that wire slide without any rotation.
Three specimens shall be tested.

- Suitable for wire diameter range from 0.05 up to 1.60 mm (44 – 14 AWG).

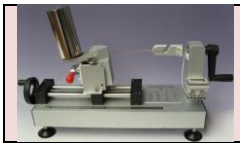
- Motorised load cell 100N, to detect the friction power, resolution 0.01 N

- Digital indicator 4 ½ digit with hold of maximum friction force.

TECHNICAL SPECIFICATIONS

Model	Power supply	Dimensions	Weight
SST3	100 - 230V 50/60Hz 1 phase 80VA	w 230 x d 360 x h 540 mm	15 kg 33.0 lb

Option:



- TWM Twist specimen fabricator, complete of loading weights and digital revolution counter

Data changes reserved

STATIC COEFFICIENT OF FRICTION TESTER mod. SST4

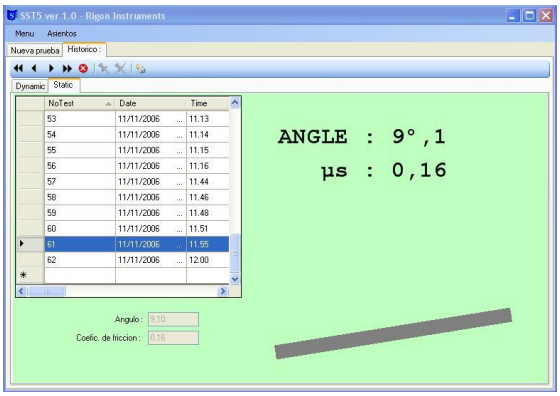
STANDARD: IEC 60851-3.B2

TEST PROCEDURE: The static coefficient of friction (μs) is determined by measuring the inclining angle α of a plane at the moment when a block begins to slip on the track made from the wire specimen. The wire test specimen shall be removed from the delivery spools by de-reeling over the end flange. The top layers of the spool shall be removed before testing when the wire surface is contaminated by dust or dirt. One part of the wire specimen is straightened and then fixed on the inclining plane by means of the two posts and the two clamps constituting the sliding track. The other part of the wire specimen is mounted in a similar way on the sliding block. The sliding block with the wire specimen is then placed on the track of the plane to be inclined in such a way that the wire on the block and the wire on the plane are crossed at right angles at the point of contact. The plane is then slowly inclined (approximately 1°/1") until the block starts to slide down the track. At that moment, the angle of inclination α is read from the scale. The static coefficient of friction is calculated as follow: $\mu_s = \tan \alpha$.

- Suitable for wire diameter from 0.05 up to 1.60 mm (44 – 14 AWG).
- Motorised inclined plane, with test speed 1°/1" electronically controlled.
- Photocell to detect the slid movement.
- Test management pc controlled, with parameters setting, automatic calculation of test weight to be applied according to wire diameter, tan α automatically calculated, with printout of test results.
- Incremental encoder to measure the inkling angle with resolution of 0,1°, tan α resolution 0.01.
- Complete of two test slides 50 g and 500g.

TECHNICAL SPECIFICATIONS

model	Power supply	Dimensions	Weight
SST4	230V 50/60Hz 1 phase 120VA	w 500 x d 640 x h 230 mm	26 kg 57.2 lb



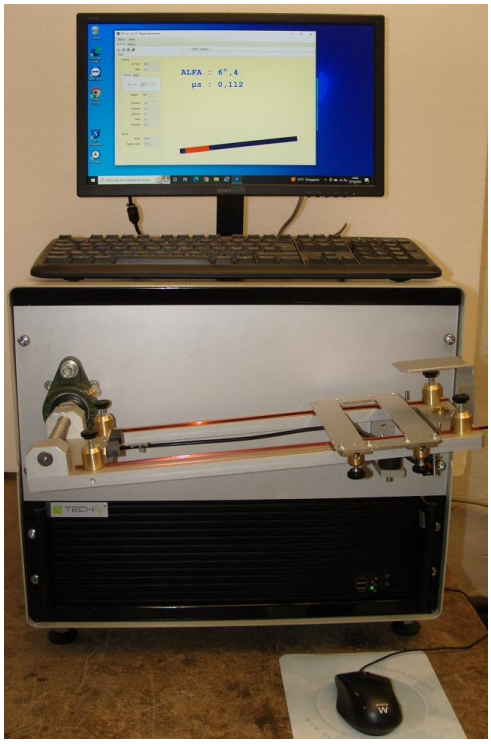
Graphical representation of result

Data changes reserved

FLAT WIRE STATIC FRICTION TESTER model SST4-F

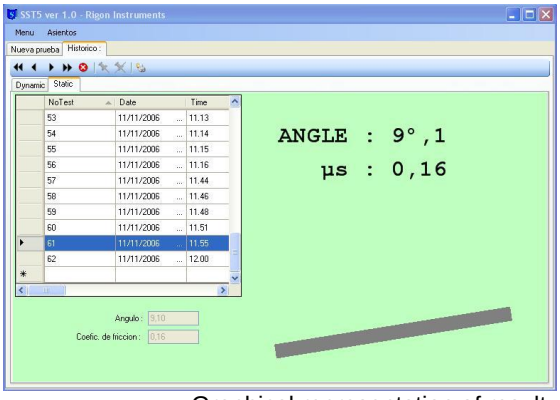
STANDARDS: IEC 60851-3 Annex B2, NEMA

- Suitable for flat wire dimensions from 0,5 x 1,0, up to 3 x 12 mm and round wire
- Motorised inclined plane, with test speed 1°/1" electronically controlled.
- Laser photocell to detect the slid movement.
- Test management pc controlled, with parameters setting, automatic calculation of test weight to be applied according to wire diameter, tan α automatically calculated, with printout of test results.
- Incremental encoder to measure the inkling angle with resolution of 0,1°, tan α resolution 0.01.
- Complete of three test slides 200 g, 300 g and 500 g. (other test slides on request)
- Power supply 230Vac 50/60 Hz single phase 400VA
- Outline dimension w 500 x d 640 x h 600 mm, weight 26 kg (57.2 lb)



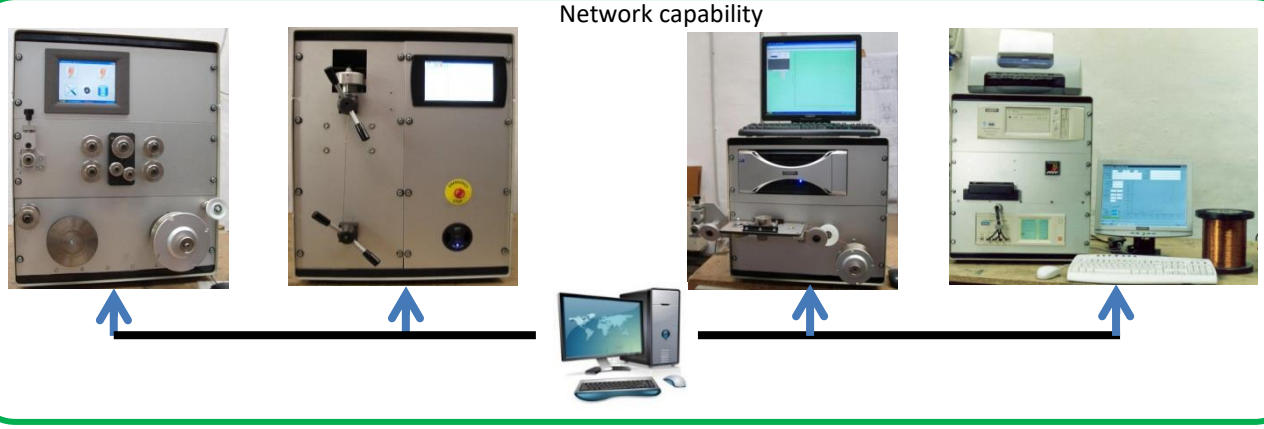
Data management

A powerful data base associated with the advanced SQL, allows to store and retrieve all measures, in a very short time applying a filter to get a measure



Graphical representation of result

Network capability



Data changes reserved

STATIC/DYNAMIC COEFFICIENT OF FRICTION TESTER mod. SST5

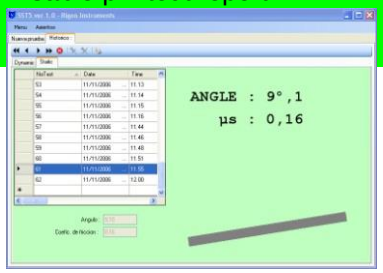
STANDARD: IEC 60851-3.B2/B4 NEMA MW 750, EMERSON TP-131

STATIC TEST PROCEDURE: The static coefficient of friction μ_s is determined by measuring the inclining angle α of a plane at the moment when a block begins to slip on the track made from the wire specimen. The wire test specimen shall be removed from the delivery spools by de-reeling over the end flange. The top layers of the spool shall be removed before testing when the wire surface is contaminated by dust or dirt. One part of the wire specimen is straightened and then fixed on the inclining plane by means of the two posts and the two clamps constituting the sliding track. The other part of the wire specimen is mounted in a similar way on the sliding block. The wire block with the wire specimen is then placed in the track of the plane to be inclined in such a way that the wire on the block and the wire on the plane are crossed at right angles at the point of contact.

The plane is then slowly inclined (approximately 1°/1") until the block starts to slide down the track. At that moment the angle of inclination α is read from the scale. The static coefficient of friction is calculated as follow: $\mu_s = \tan \alpha$.

STATIC TEST FEATURES (IEC 60851.3.B2)

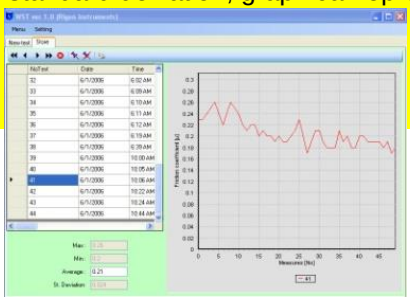
- Suitable for wire diameter range 0.05 mm up to 2.00 mm.
- Motorised inclined piano, inclining speed electronically regulated 1°/1", angle α resolution 0.1°.
- Test management with industrial PC, parameters setting, automatic calculation of weight to be applied on sample wire, powerful data base.
- Automatic stopping at test block slippage.
- Direct indication of tan α value, with printout of test result with customisable printout report.
- Complete of two test blocks 50 g and 500 g.

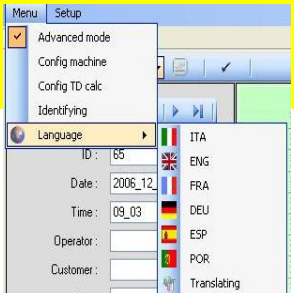


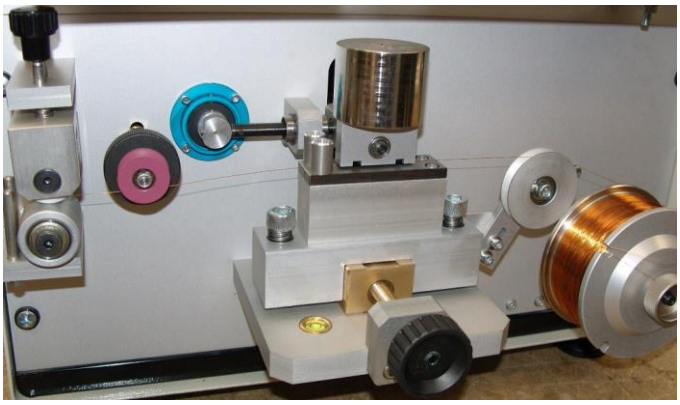
DYNAMIC TEST PROCEDURE: As coefficient of friction, which is defined as μ=Fr/Fn, where Fr is the friction power and Fn the load applied on the wire. The test wire is moved at a speed of 15m/1' between a basic plate and pre-loaded sapphires. The sapphires are mechanically connected to a load cell to detect the force of friction, the values detected shall be displayed and recorded at desired intervals.

DYNAMIC TEST FEATURES (IEC 60851-3.B4, NEMA MW 750, EMERSON TP-131)

- Load cell to detect the friction force, resolution 0.01 N accuracy 0.25%.
- Test speed adjustable from 1 up to 30 m/1', asynchronous motor with worm gearbox
- Complete set of weights 100g, 200g, 600g, 1000g.
- Pc test management, setting of up to 1000 measurements per test, calculation and printout of measured values, minimum, maximum, average and standard deviation, graphical representation of coefficient of friction.
- Powerful data base.
- Easy calibration procedure.
- Winding wheel for easy wire removal.

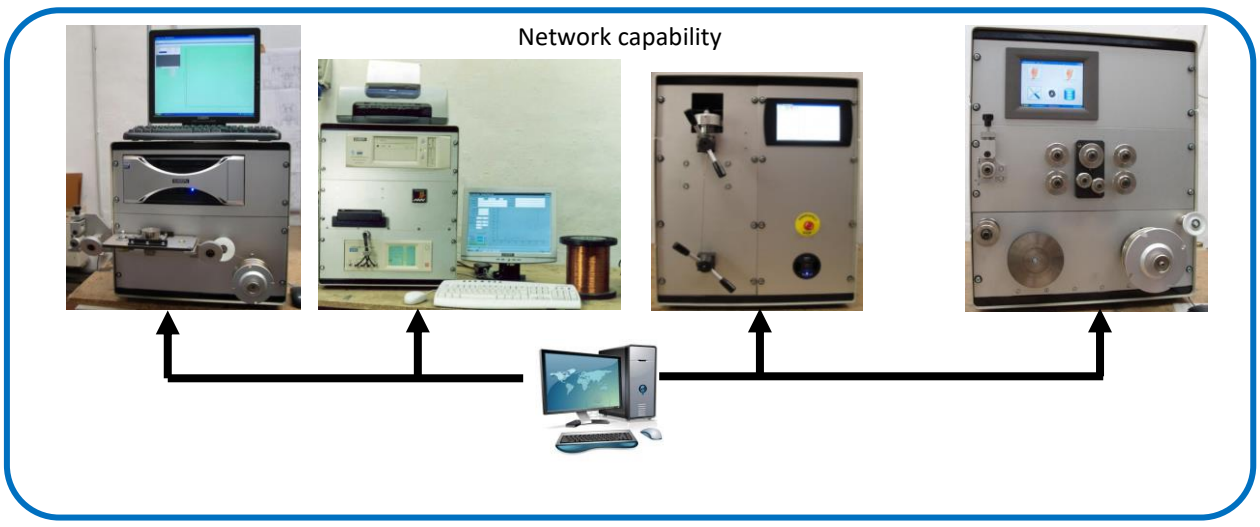






TECHNICAL SPECIFICATIONS

Power supply	Dimensions	Weight
230Vac 50/60Hz 1phase 380VA	w 550 x h 560 x d 670 mm	41Kg 90.2 lb

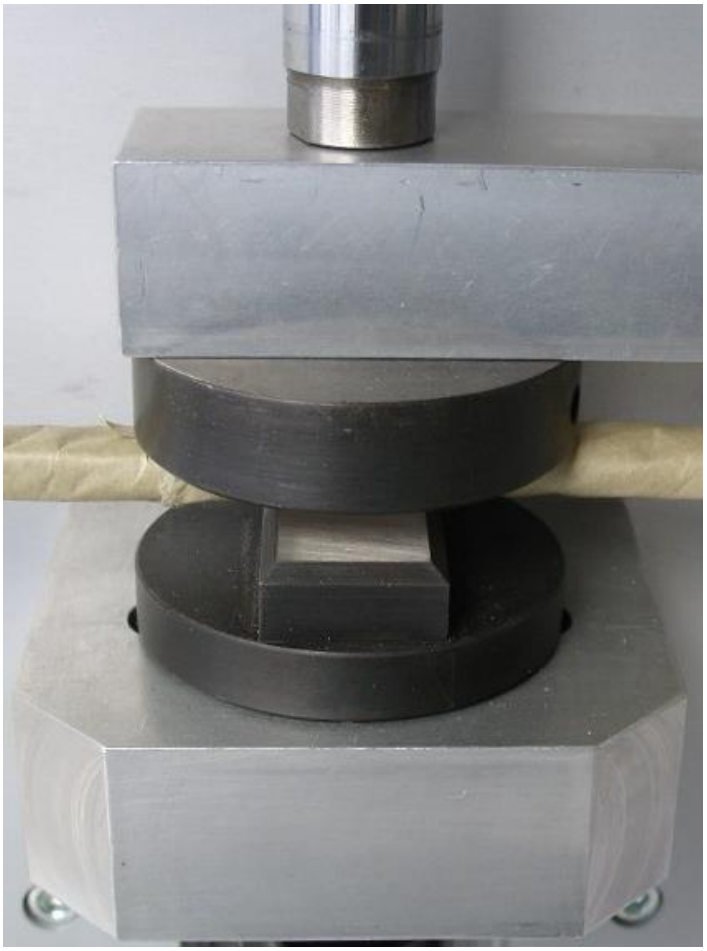


Data changes reserved

THICKNESS MEASURING GAUGE mod. TMG

The thickness measuring gauge has been developed for the purpose of determining the dimensions of CTC cables and soft or elastic materials. The system is powered by a pneumatic servo-cylinder electronically controlled, which provides a constant force by input the sample dimensions through a touch screen computer, a powerful data base allows to find any measure for further analysis, printed out capability, with the Ethernet port the tester could be linked to a network.

Interchangeable jaws automatically detected, allow adjustment within a large pressure and force margin. Thanks to the stable parallel guides of the moving jaws, high precision values are achieved even when the test piece is clamped not aligned. The pneumatic cylinder presses against the jaw holder via a compensation coupling. The fixed jaw is placed in a ball cup which has its center exactly at the surface of the jaw. With this, it is ensured that both jaws are always in a parallel position.



Jaw width (mm)	3	5	10	20
Jaw length (mm)	40			
Minimum surface pressure (N/cm$^{2)}$	32	20	10	15
Maximum surface pressure (N/cm^{2})	380	230	115	58
Measuring unit	Metric or inches			
Maximum specimen pressure range	330N @ 0.45MPa – 455N @ 0.6 MPa			
Minimum specimen pressure	60N			
Compressed air input pressure range (MPa)	0.67 - 1.0			
Measuring pressure range (MPa)	0.1 - 0.6			
Power supply	100 – 240 V 40/60 Hz single phase 50VA			
Measuring range (mm)	0 – 100			
Accuracy (mm)	0.005			
Dimensions and weight	W 500 x d 500 x h 675 mm 16 kg			
Cylinder bore	32 mm			

OPTIONS:

- Jaw Ø 6 mm
- Jaw Ø 8 mm
- Jaw Ø 10 mm

Data changes reserved

UNIDIRECTIONAL SCRAPE TESTER mod. UST, UST1

STANDARDS: IEC 60851-3.6, NEMA MW 1000 3.59

TEST PROCEDURE: A specimen of film coated wire shall be wiped with a clean cloth or tissue, placed in the machine and straightened by elongating it not more than 1%. The specimen shall then be secured in the clamping jaws and the supporting anvil adjusted to contact the underside of the specimen. An initial load of approximately 90% of the minimum "grams to fail" value specified in the data sheets shall be applied to the loading arm. The load shall be lowered gently onto surface of the film coating and the scraping action started until the conductor is exposed and the machine stops. Take note of the weight. The test procedure shall be repeated twice, indexing the clamps holding the wire to expose the wire surface 120° and 240° from the original position. The three "grams to fail" values shall then be averaged.

- Suitable for wire diameter from 0.2 up to 2.5 mm (32 – 9 ½ AWG).
- Automatic device for specimen rotation of by 120° and 240°.
- Stretching device 1%.
- Adjustable piano wire device.
- Complete set of weights: 2 x 50 – 100 – 2 x 200 – 500 – 1000 g
- Test voltage and current according to the standard.
- Digital multiplication factor (mod. UST1).
- Precision load cell for measuring the "grams to fail" (mod. UST).
- Automatic loading/unloading of test weight.
- Measuring of single values and automatic average calculation (mod. UST).

TECHNICAL SPECIFICATIONS

Model	Power supply	Dimensions	Weight
UST	230Vac 50/60Hz 1phase 100 VA	w 500 x h 390 x d 450 mm	24 kg 52.8 lb
UST1	100 - 230Vac 50/60 Hz 1 phase 75 VA	w 500 x h 390 x d 450 mm	20 kg 44.6 lb.

mod. UST

Mod. UST1

Data changes reserved

HIGH VOLTAGE WINDABILITY TESTER mod. WT

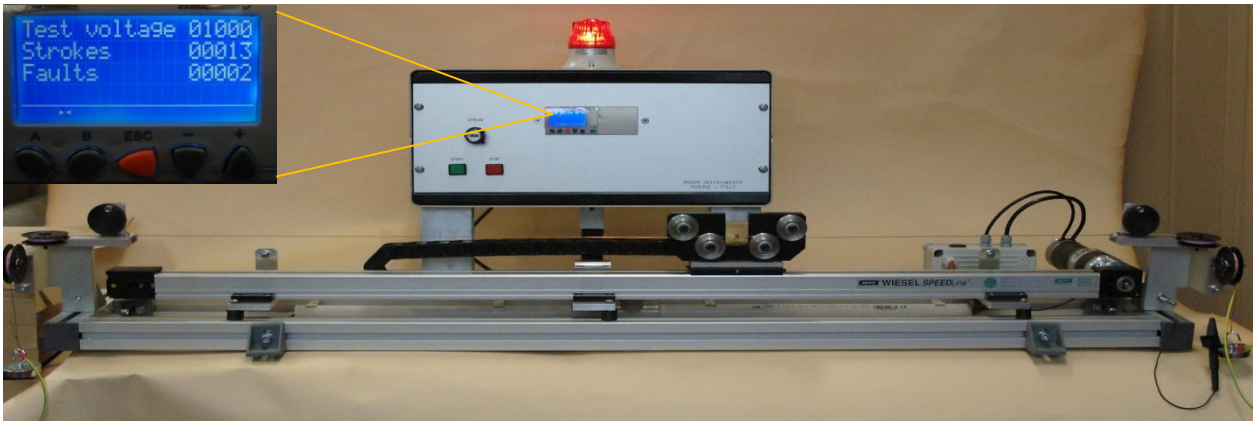
This test is designed to show the windability for film coated magnet wire in round sizes.
The wire, in a taut horizontal position, is looped once around a prescribed mandrel, this mandrel is rapidly moved along the wire, alternating from right to left and vice versa. The wire is monitored by D.C. high voltage continuity equipment during the test, searching for breaks in the insulation.

TEST PROCEDURE: A two meters long specimen of wire is placed horizontally in the apparatus, with a single loop around the prescribed mandrel. The mandrel should be installed so that the bottom of it is centred between the upper and lower sheaves. A prescribed weight is attached to each end of the sample to keep it taut during the test. The prescribed high voltage should be applied between the conductor and the mandrel. At the start the mandrel moves from right to left position at a stroke speed of about 60cm/sec., then after a slight pause of 1,5 seconds, it moves again at the same speed in the reverse side and so on. A stroke counter will display the number of strokes, while a second one, which will be reset at the beginning of each stroke, will display the number of faults detected on a single stroke, when the number of faults reaches the maximum faults admitted, the test will last.

- Suitable wire diameter from 0,078 up to 2 mm (40 – 12 AWG).
- Fully automatic.
- Stroke speed adjustable from 0.1 m/1" up to 1m/1".
- Test voltage in 8 steps: 350V, 500V, 750V, 1000V, 1500V, 2000V, 2500V, 3000V.
- Asynchronous motor and stroke counter with pre-selection and adjustable speed stroke
- Fault counter with pre-selection of admitted maximum number of faults per stroke.
- Supplied with a complete set of 18 weights and 9 mandrels.
- HMI to set all test parameters.

TECHNICAL SPECIFICATIONS

Power supply	Dimensions	Weight
230V 50/60Hz single phase 350VA	w 1500 x d 400 x h 500 mm	76 kg 167.2 lb



Data changes reserved

CHEMICAL TEST

WATER BATH mod. BAM, BAM1

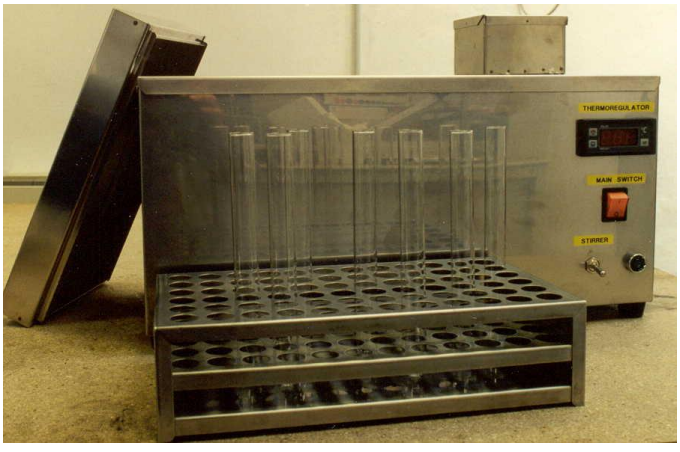
Apparatus useful for thermal condition at constant temperature of sample wires inserted in vessel, such bombs, extraction vessels, test tubes etc.
Wholly made of stainless steel, with an armoured heating element and a thermo resistance type Pt100 to detect the vessel temperature. A digital temperature controller assures the thermal stability.

- Digital temperature controller 3 digits, resolution 1°C, accuracy > 0.2%.
- Water stirrer excludible (mod. BAM).
- Sample holder suitable for 20 test tubes (mod. BAM).
- Supplied complete of cover (mod. BAM).
- Maximum working temperature 95°C.
- Good thermal insulation.

TECHNICAL SPECIFICATIONS

Power supply 230 V 50/60 Hz single phase 500 VA

Model	Water bath dimensions	Vessel dimensions	Weight
BAM	w 300 x d 150 x h 200 mm	w 450 x d 290 x h 300 mm	10 kg 22.0 lb
BAM1	diameter 120 x h 160 mm	w 240 x d 350 x h 180 mm	9 kg 19.8 lb



mod. BAM

mod. BAM1

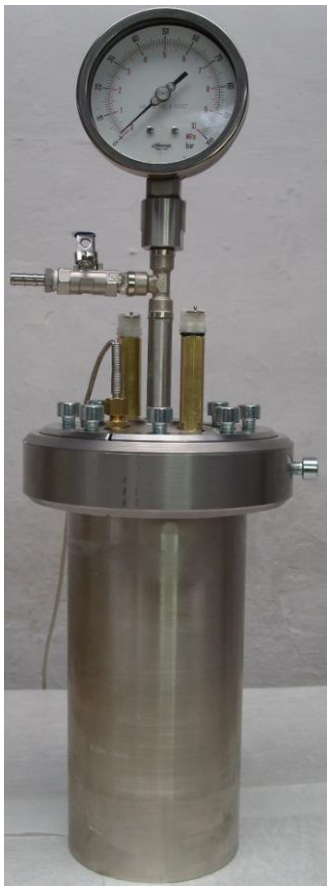
Data changes reserved

REFRIGERANT EXTRACTION TESTER mod. EXT

STANDARDS: IEC 60851-4.2, NEMA MW 1000, BS 6811-2.4

TEST PROCEDURE: Eight enamelled wire specimens, shall be made into coils of 70 turns. The prepared specimens shall be annealed in an oven with forced air recirculation at 150°C for 15'. After cooling for 30' the eight specimens shall be weighed together to the nearest 0,1mg. The eight specimens shall be placed in a 450 ml siphon cup and suspended from the condenser coil in the top portion of pressure vessel below the condenser. The pressure vessel shall be assembled and charged with monochlorodifluoromethane (R22). The pressure vessel shall be placed over a controlled heating system, and the condenser water supply and drain line properly connected. The temperature of the controlled heating system and the water flow running through the condenser shall be adjusted to maintain a reflux rate from 20 to 25 discharges per hour for 6 hours. After completion of the extraction, the pressure vessel shall be removed from its heating source and cooled with solid carbon dioxide to liquefy the refrigerant. The pressure vessel shall be discharged carefully and opened. The coils and the siphon cup shall be rinsed with R113 and the rinse shall be poured into the pressure vessel. The refrigerant shall be evaporated slowly to within 5 mm of the bottom of the vessel. The liquid sample shall then be transferred to a pre-dried tared aluminium weighing dish, with a 15 ml methylene chloride rinse evaporated to dryness at150°C for 1h and then cooled to room temperature in a dessicator. The aluminium dish, with the residue, shall be weighed to the nearest 0,1mg. The original tared weight of the aluminium dish shall be subtracted.

- Unwelded AISI 316 stainless steel construction.
- Pressure gauge for internal pressure measurement with double scale in Mpascal and bar.
- Over pressure safety valve adjustable from 75 up to 350 PSI (option).
- Maximum working temperature 100°C.
- Glass siphon cup



Mod. EXT

Siphon cup

OPTIONS

	Refrigerant extraction tester with inspection glass Model EXT1
	Closed circuit cooling device Model COOL - Heating/cooling temperature from -10°C up to +99.9°C PID controlled. - Good thermal insulation. - Stainless steel tank, volume 8 litres. - Safety thermal switch. - Power supply 230v 50/60 Hz single phase 1500 W. - Weight 20 kg. - Dimensions: w 335 x d 440 x h 625 mm.
	Air draught oven model STV - Maximum working temperature 250°C, PID controlled. - Chamber dimensions w x h x d (mm) Power supply - STV1 310 x 260 x 250 230V 50 Hz 500 VA single phase - STV2 430 x 310 x 300 230V 50 Hz 600 VA single phase - STV3 460 x 360 x 350 230V 50 Hz 750 VA single phase -STV4 400 x 600 x 400 230V 50 Hz 1000 VA single phase - Safety thermal switch
	Vacuum pump model VP - Pumping speed 4.6 m^3/h - Stages 1 -Ultimate pressure 0.1hPa (mbar) -Motor power 0.18 KW @ 230V 50/60Hz single phase - Noise 58 dB - Weight 8.5 kg
	Analytical balance Model BAL - Capacity 110 g, safe overload capacity 150% of capacity - Readability 0.1 mg - Weighing modes: g, mg, oz, oz t, ct, dwt, N - Power supply 100 – 240V 50/60 Hz single phase 50 W
	Heating system Model HT - Maximum working temperature 90°C, PID controlled. - Power supply 230V 50/60 Hz single phase 750 VA. - Good thermal insulation.
	Touch screen pc Model PC Test management and supervisor of vessel temperature and pressure, coolant flow meter, data base. Power supply 24Vdc 50 W

Data changes reserved

FREEZER mod. FRI
STANDARDS: IEC 60851-4, DIN 46453, NEMA MW 1000

This laboratory equipment find use in those cases is necessary subject a sample of enamelled wire to a low temperature treatment before to carry out determined tests as for example the solvent test in monochlorodifluoromethane.

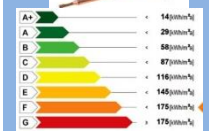
Working temperature up to -60°C.

Digital temperature controller, resolution 0,1°C.

Double motor-compressor.

Test chamber dimensions 300 x 300 x 500 mm.
Stainless steel test chamber and cooper pipes.

Safety thermostat.



Excellent thermal insulation.

TECHNICAL SPECIFICATIONS

Power supply	Dimensions	Weight
230Vac 50/60Hz 1phase 300VA	w 800 x d 850 x h 125 mm	84 kg 184.8 lb

Data changes reserved

RESISTANCE TO HYDROLYSIS and TO TRANSFORMER OIL mod. HYD

STANDARD. IEC 60851-4.6

Resistance to hydrolysis is expressed by appearance and adherence after exposure of the specimens to transformer oil in the presence of water under pressure.

Resistance to transformer oil is expressed by breakdown voltage and flexibility after exposure of the specimens to transformer oil under pressure and at elevated temperature.

Volume capacity: model BOM 500 ml
model BOM 1 2000 ml

Maximum working temperature 150°C.

Safety thermal switch

Pressure vessel	Dimensions	Weight	Pressure
BOM (500ml)	Dia. 75 x h 380 mm	7.5 kg (16.5 lb)	8 MPa
BOM1 (2000 ml)	Dia. 160 x h 310 mm	14 kg (30.8 lb)	8 MPa

OPTIONS:

- HT Heating system, suitable for BOM, complete of digital temperature controller 230V 50/60Hz 1000VA
  Dimensions: 510 x 380 x h 360 mm 12 kg

- HT1 Heating system, suitable for BOM1, complete of digital temperature controller 230V 50/60Hz 1500VA
  Dimensions : 510 x 380 x h 360 mm 12 kg

Heating system suitable for BOM

Heating system suitable for mod. BOM1

Data changes reserved

SOLVENT RESISTANCE TESTER mod. SOL

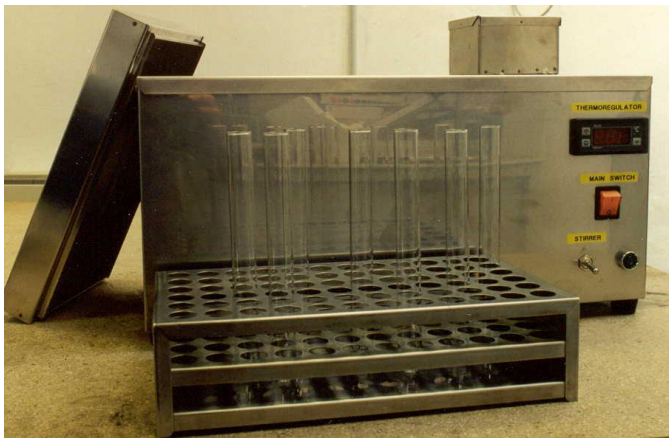
STANDARDS: IEC 60851-4.2, DIN 46453

TEST PROCEDURE: A straight piece of wire, 150mm in length, shall be heated for 10' at 130°C. A glass cylinder containing sufficient solvent to immerse a substantial portion of the test specimen is used. The temperature of the solvent shall be 60 +/- 3°C. The specimen shall be immersed for 30' in the solvent, the temperature must be maintained within limits prescribed during testing. After treatment, the specimen shall be removed from the solvent and the hardness of the insulation shall be determined as pencil hardness. The test must be carried out within 30" from the removal of the sample from the solvent, otherwise erroneous results may be obtained. Before each test, the point of the pencil shall be sharpened with a smooth-cut file to form an angle of 60° symmetrical about the axis of the lead. The specimen to be tested shall be firmly laid on a glass plate. The lead pencil, with the hardness called in the relevant specification sheet, shall be placed on the surface at an angle of 60°. The sharpened edge of the pencil shall be pressed slowly along the surface with a force of approximately 5N. Three tests shall be made.

- Pencil sliding device 60° inclined. - Set of graphite leads. - Steam cooker stainless steel AISI304, complete of cover. Inner dimensions 300 x 150 x h160 mm capacity 7 litres
 Electronic temperature controller P.I.D., resolution 0.1° Safety thermal switch.
 Maximum working temperature 95°C

TECHNICAL SPECIFICATIONS

Power supply	Dimensions	Weight
230Vac 50/60Hz 1phase 500VA	w 600 x h 480 x d 350 mm	25 kg 55.0 lb



OPTIONS

- Stirrer.
- Glass tubes
- Glass tubes holder

Data changes reserved

SOLDERABILITY TESTER mod. ST

STANDARDS: IEC 60851-4.5, DIN 46453, NEMA MW 1000

TEST PROCEDURE: (diameters up to 0.05 mm) 8 wires shall be twisted together, a suitable carrier shall be used, then immersed in a tin bath with its vertical axis. (Diameters from 0.05 to 0.1 mm) a single wire is required and shall be immersed in the tin bath with its vertical axis. (Diameter over 0.1 mm) a single specimen 200 mm in length is required. The specimen shall be lowered at least 200mm depth and its temperature shall be measured approximately 10 mm from the sample. After immersion the sample shall be moved sideways before it's withdrawn from the tin bath. The surface of the wire shall then be examined with a magnification of 6 to 10 times. Three tests shall be carried out.

- Digital temperature controller up to 530°C accuracy > 0.3%.
- Digital timer with pre-selectable immersion time from 0.2" up to 999h (mod. ST and ST2).
- Automatic or manual test with possibility to disconnect sideways movement of the sample (mod. ST and ST2).
- Three test simultaneous device (diameters over 0.1 mm mod. ST and ST2).
- Specimen immersion depth 30 mm.
- Heater wounded on ceramic support to allow long life and good thermal insulation.
- Double independent pits (model ST2).

TECHNICAL SPECIFICATIONS

Model	Power supply	Dimensions (mm)	Weight
ST	230V 50/60Hz 1 phase 850VA comp. air 0.6MPa	w 390 x d 500 x h 500	23kg 50.6 lb
ST1	230V 50/60Hz 1 phase 800VA	w 210 x d 380 x h 375	12kg 26.4 lb
ST2	230V 50/60 Hz 1 phase 1600VA comp. air 0.6MPa	w 610 x d 500 x h 500	38kg 83,6 lb

OPTIONS

- PP 3 samples holder according to NEMA MW1000.

Mod. ST1

Mod. ST

Data changes reserved

ELECTRICAL TEST

HIGH VOLTAGE CONTINUITY OF COVERING TESTER mod. HVT

STANDARDS: IEC 60851-5.5.2, NEMA MW 1000-2015

TEST PROCEDURE: A voltage generator must provide the electrode with a continuous filtered voltage without transients. The test voltages using an open circuit must be adjustable from 350 to 3000Vdc +/- 5%. The permanent short circuit current must be 25 +/- 5µA at any voltage. A 50 MΩ resistance applied to the high voltage electrode should not cause a voltage drop more than 75% irrespective of the voltage used; the length of specimen shall be 30 meters. An appropriate circuit must evaluate whether the wire carries a current which is greater than that specified in the tables; a counter will display the number of faults.

- Suitable for diameters range 0.05 up to 1.6 mm (44 - 14 AWG).

- Test voltages adjustable in 8 steps: 350V, 500V, 750V, 1KV, 1.5KV, 2KV, 2.5KV, 3KV

- Test current according to standard specifications.

- Four digits meter counter with pre-selectable test length, resolution 0.1 meter.

- Four digits fault counter with signalling maximum admissible faults.

- Winding wheel for easy wire removal, asynchronous motor with worm gearbox, adjustable speed from 3 up to 30 m/1' with inverter driver.

- Supplied with electrodes according to IEC 60851-5.5 or carbon fibre electrode according to NEMA.

TECHNICAL SPECIFICATIONS

Model	Power supply	Dimensions	Weight
HVT	230Vac 50/60Hz 1 phase 150VA	w 500 x d 480 x h 450 mm	38 kg 83.6 lb
HVT-GS	230Vac 50/60Hz 1 phase 200VA	w 500 x d 650 x h 620 mm	47 kg 103,6 lb

OPTIONS

- GS Stretching unit: 2 - 4 - 6 - 8 - 10 - 12 - 14 - 16 - 18 - 20%.
- E Electrodes according IEC or NEMA.
- V Different test voltages

mod. HVT (NEMA standard)

mod. HVT-GS (IEC standard)

Data changes reserved

HIGH VOLTAGE CONTINUITY OF COVERING TESTER mod. HVT-PC

STANDARDS: IEC 60851-5.5.2, NEMA MW 1000-2015, SIEMENS SN54212

TEST PROCEDURE: A voltage generator must provide the electrode with a continuous filtered voltage without transients. The test voltages using an open circuit must be adjustable from 350 to 3000 Vdc +/- 5%. The permanent short circuit current must be 25 +/- 5 µA at any voltage. A 50 MΩ resistance applied to the high voltage electrode should not cause a voltage drop more than 75% irrespective of the voltage used; the length of specimen shall be 30 meters. An appropriate circuit must evaluate whether the wire carries a current which is greater than that specified in the tables; a counter will display the number of faults.

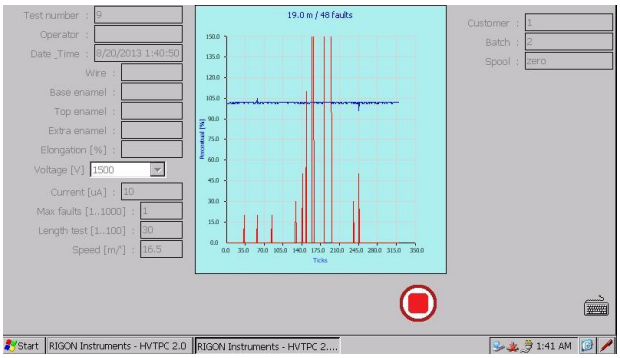
- Suitable for diameters range 0.05 up to 1.6 mm (44 - 14 AWG).
- Test voltage adjustable from 300V up to 4000Vdc.
- PC test management, graphical representation of test sample, with print out of all data.
- RS 485 interface suitable for multi-drop connection with other testers.
- Conical winding wheel for easy wire removal, adjustable test speed from 3 m/1' up to 30 m/1'.
- Supplied with 2 electrodes according to IEC60851 or carbon fibre electrode according to NEMA MW1000

TECHNICAL SPECIFICATIONS

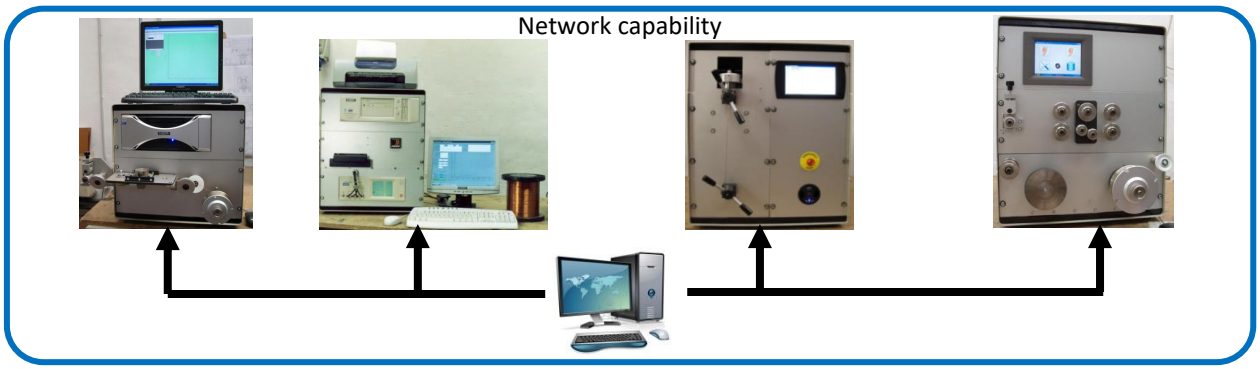
Power supply	Dimensions	Weight
230Vac 50/60Hz 1 phase 250VA	w 500 x d 600 x h 620mm	38 kg 83.6 lb

OPTIONS

- GS Stretching unit: 2 - 4 - 6 - 8 - 10 - 12 - 14 -16 - 18 - 20%.
- E Electrodes according NEMA or SIEMENS.
- V Higher test voltage upon request.



HVT-PC-GS



Data changes reserved

ALTERNATE HIGH VOLTAGE CONTINUITY OF COVERING TESTER mod. HVT-AC

STANDARD: Not foreseen

TEST PROCEDURE: A voltage generator must provide the electrode with an alternate voltage at network frequency. The open circuit test voltage shall be adjustable up to 2kv, the detection current shall be 5 mA, the test length of sample 30 meters, a continuous fault detection device shall be provided

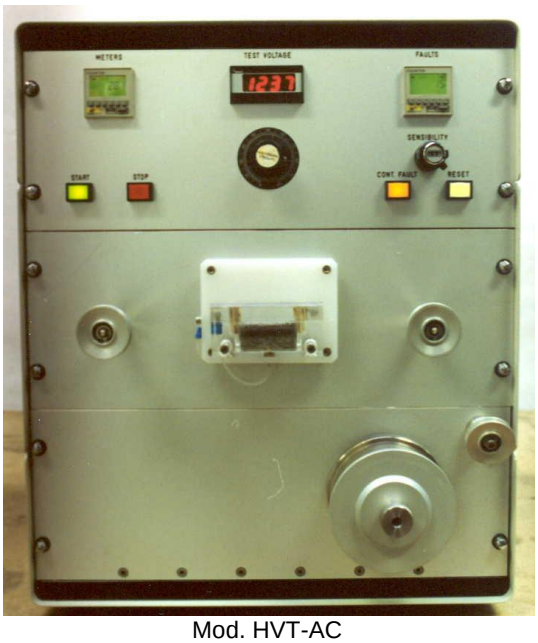
- Suitable for diameters range 0.05 up to 1.6 mm (44 - 14 AWG).
- Test voltages continuously adjustable from 0 up to 2000Vac line frequency with digital voltmeter 3 ½ digit, resolution 1 Volt accuracy 1%.
- Threshold detection current adjustable from 2 mA up to 8mA.
- Four digits meter counter with pre-selectable test length, resolution 0.1 meter.
- Four digits fault counter with signalling maximum admissible faults and continuous fault.
- Test speed adjustable from 2 up to 30 m/1'.
- Winding wheel for easy wire removal, asynchronous motor with worm gearbox, inverter driver.
- Supplied with balls bath electrode and safety cover.

TECHNICAL SPECIFICATIONS

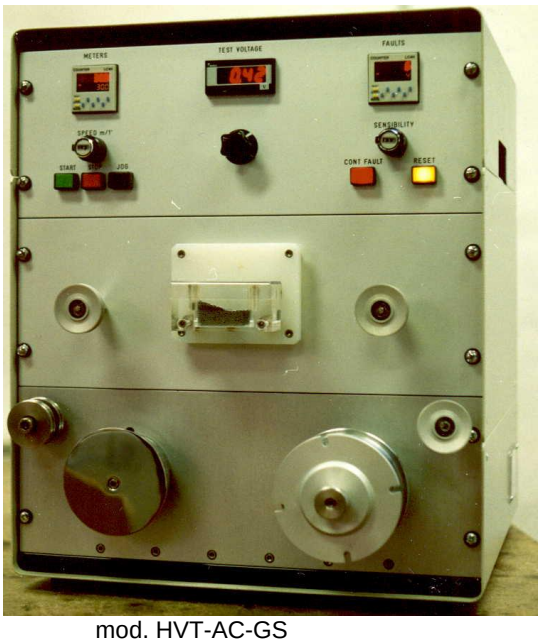
Power supply	Dimensions	Weight
230Vac 50/60Hz 1 phase 250VA	w 500 x d 600 x h 620 mm	38 kg 83.6 lb

OPTIONS

- GS Stretching unit: 2 - 4 - 6 - 8 - 10 - 12 - 14 - 16 - 18 - 20%.



Mod. HVT-AC



mod. HVT-AC-GS

Data changes reserved

AC/DC HIGH VOLTAGE CONTINUITY OF COVERING TESTER mod. HVT-AC/DC

STANDARDS: IEC 60851-5.5.2, NEMA MW 1000-2015

TEST PROCEDURE (AC): A voltage generator must provide the electrode with an alternate voltage at network frequency. The open circuit test voltage shall be adjustable up to 2kv, the detection current shall be 5 mA, the test length of sample 30 meters, a continuous fault detection device shall be provided

TEST PROCEDURE (DC): A voltage generator must provide the electrode with a continuous filtered voltage without transients. The test voltages using an open circuit must be adjustable from 350 to 3000 Vdc +/- 5%. The permanent short circuit current must be 25 +/- 5 µA at any voltage. A 50 MΩ resistance applied to the high voltage electrode should not cause a voltage drop more than 75% irrespective of the voltage used; the length of specimen shall be 30 meters. An appropriate circuit must evaluate whether the wire carries a current which is greater than that specified in the tables; a counter will display the number of faults.

- Suitable for diameters range 0.05 up to 1.6 mm (44 - 14 AWG).

- Alternate test voltages continuously adjustable from 0 up to 2000Vac line frequency with digital voltmeter 3 ½ digit, resolution 1 Volt accuracy 1%.

- Dc test voltages adjustable in 8 steps: 350V, 500V, 750V, 1KV, 1.5KV, 2KV, 2.5KV, 3KV

- Four digits meter counter with pre-selectable test length, resolution 0.1 meter.

- Four digits fault counter with signalling maximum admissible faults and continuous fault.

-Test speed adjustable from 2 up to 30 m/1'.

- Winding wheel for easy wire removal, asynchronous motor with worm gearbox, inverter driver.

- Supplied with balls bath electrode and safety door.

TECHNICAL SPECIFICATIONS

Power supply	Dimensions	Weight
230Vac 50/60Hz 1 phase 300VA	w 500 x d 600 x h 750 mm	44 kg 96.8 lb

OPTIONS

- GS Stretching unit: 2 - 4 - 6 - 8 - 10 - 12 - 14 - 16 - 18 - 20%.

Mod. HVT-AC/DC-GS

Data changes reserved

HIGH/LOW VOLTAGE CONTINUITY OF COVERING TESTER mod. HLVT

STANDARDS: IEC 60851-5.5.1/2, NEMA MW 1000

TEST PROCEDURE: (high voltage) a voltage generator must provide the electrode with a continuous filtered voltage without transients. The test voltages using an open circuit must be adjustable from 350 to 3000Vdc+-5%. The permanent short circuit current must be 25+-5µA at any voltage. A 50Mohm resistance applied to the high voltage electrode should not cause a voltage drop more than 75% irrespective of the voltage used; the specimen length shall be 30 meters. An appropriate circuit must evaluate whether the wire carries a current which is greater than that specified in the tables; a counter will display the number of faults. (low voltage) A sample of wire 30 meters length shall be passed through two felts in a water salt solution (30 g/l). The test voltage shall be 50 Vdc and the circuit shall be capable to detect an insulation resistance less than 10 KΩ.

- Suitable for diameter range from 0.012 up to 1.6 mm (56 - 14 AWG).
- High test voltages adjustable in 8 steps: 350V, 500V, 750V, 1KV, 1.5KV, 2KV, 2.5KV, 3KV test current according to the standard specifications
- Low test voltage adjustable from 10 to 110 Vdc.
- Test speed electronically adjustable from 5 up to 30 m/1'.
- Four digits meter counter with pre-selectable test length, resolution 0,1 meter.
- Continuous fault signalling device.
- Expanding winding wheel for easy wire removal.
- Four digits fault counter with signalling maximum admissible fault.
- Supplied with 2 high and 1 low voltage electrodes (IEC or NEMA standard at choice).

TECHNICAL SPECIFICATIONS

Power supply	Dimensions	Weight
230V 50/60Hz 1phase 300VA	w 500 x d 730 x h 620 mm	45 kg 99.0 lb

OPTIONS

- GS Stretching unit: 2 - 4 - 6 - 8 - 10 - 12 - 14 - 16 - 18 - 20%.
- E Electrodes according NEMA MW 1000 or IEC 60851-5.5.2
- Ex Customised low voltage electrode.

mod. HLVT-GS

mod. HLVT

Data changes reserved

LOW VOLTAGE CONTINUITY OF COVERING TESTER mod. LVT

STANDARDS: IEC 60851-5.5.1, DIN 46453 NEMA MW 1000

TEST PROCEDURE: A sample of wire 30 meters length shall be passed through two felts in a water salt solution (30 g/l) at the prescribed speed. The test voltage shall be 50Vdc and the circuit shall be capable to detect an insulation resistance less than 10 KΩ.

- Suitable for diameter range from 0.012 up to 1.6 mm (56 - 14 AWG).
- Test voltage adjustable from 10 to 110Vdc, with digital indicator 3 ½ digit, resolution 1 Volt.
- 4 digits meter counter with pre-selectable test length, resolution 0.1 meter.
- Test speed electronically adjustable from 2 up to 30 m/1'.
- Winding wheel for easy wire removal, asynchronous motor and worm gearbox inverter driven.
- Continuous fault signalling device.
- 4 digits fault counter with alarm maximum admissible faults.
- Supplied with electrode IEC or NEMA standard at choice.

TECHNICAL SPECIFICATIONS

Power supply	Dimensions	Weight
230Vac 50/60Hz 1 phase 200VA	w 500 x d 560x h 620 mm	45 kg 99. 0 lb

OPTIONS

- GS Stretching unit: 2-4-6-8-10-12-14-16-18-20%.
- E Electrode according NEMA MW 1000 or IEC 60851-5.5.1.
- Ex Customised electrode.
- SR Sensibility upon request.

Model LVT


Model LVT-GS

Data changes reserved

ELECTRICAL RESISTANCE TESTER mod. OHM

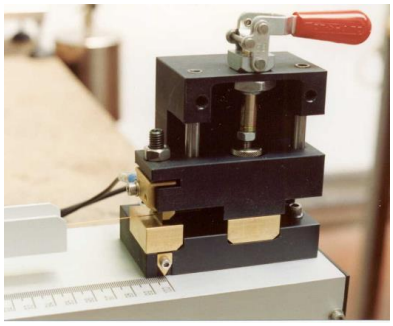
STANDARDS: IEC 60851-5.3, NEMA MW 1000, DIN 46453

TEST PROCEDURE: The resistance of the wire shall be expressed as the directional current resistance at 20°C The method used shall provide an accuracy of 0.5%. If the resistance is measured at a temperature other than 20°C a correction factor has to be applied.

- Suitable for wire diameter up to 3.15 mm (8 AWG).
- Digital milliohmmeter with 8 test range, resolution 1 µohms, accuracy 0.05%.
- Four terminal measurement method.
- Range selection: Manually, automatically via built-in auto-range function or via RS232 serial interface
- LCD 4 ½ digit display, sampling rate 5 reading per second.
- Automatic temperature compensation for Cu, MS63, MS80 and thermal e.m.f. compensation from 0 up to 40°C.
- Dry-circuit measurement (20mV limit).
- Go-No go circuit
- 1 meter sample holder with automatic clamping device.
- Power supply 230Vac 50/60Hz 1 phase 50VA

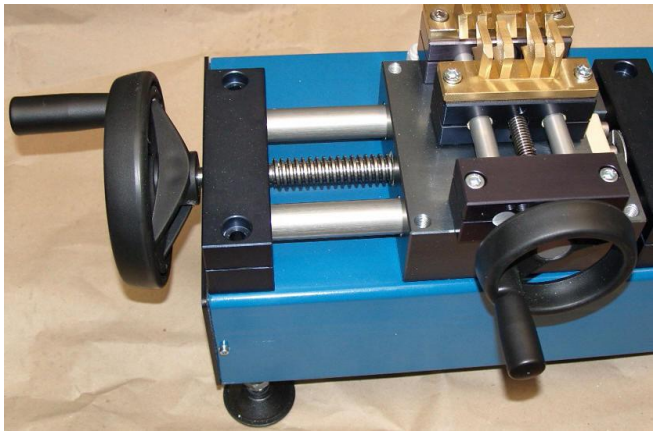
OHM 2		
Meas. range	Resolution	Meas. current
20.000 mΩ	1 µΩ	900 mA
200.00 mΩ	10 µΩ	90 mA
2.0000 Ω	100 µΩ	9 mA
20.000 Ω	1 mΩ	900 µA
200.00 Ω	10 mΩ	900 µA
2.0000 kΩ	100 mΩ	90 µA
20.000 kΩ	1 Ω	90 µA
200.00 kΩ	10 Ω	90 µA

CAL1 One meter sample holder suitable for wire diameter 0,025 mm up to 2,00 mm

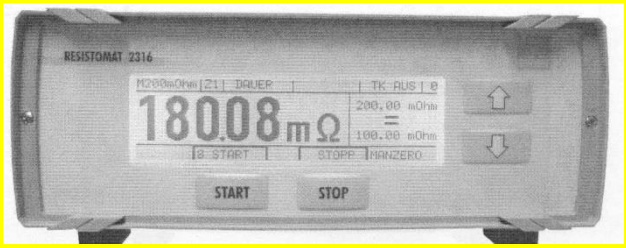


CAL2 One meter sample holder suitable for wire diameter > 1,50 mm and strip wire up to 27,5 x 7,5 mm

CAL3 One meter sample holder suitable for wire diameter > 4,50 mm and strip wire up to 300mm^2



OHM 3		
Meas. range	**Resolution**	**Measuring current**
2.0000 mΩ	0.1 μΩ	1A
20.0000 mΩ	0.1 μΩ	1A, 0.1A
200.000 mΩ	1 μΩ	1A, 0.1A, 10 mA
2.00000 Ω	10 μΩ	1A, 0.1A, 10 mA, 1 mA
20.0000 Ω	0.1 mΩ	0.1A, 10 mA, 1 mA, 0.1μA
200.000 Ω	1 mΩ	10 mA, 1mA, 100μA
2.00000 kΩ	10 mΩ	1 mA, 100μA
20.0000 kΩ	0.1 Ω	100μA

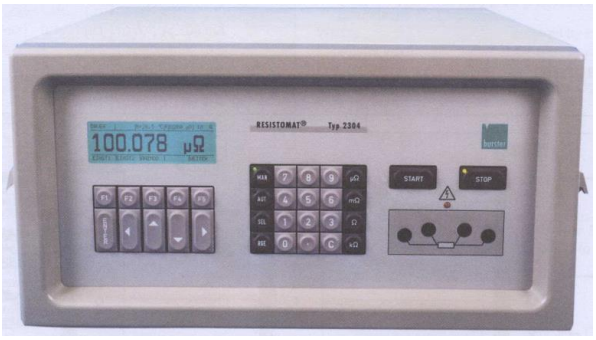


OHM 3A		
Meas. range	**Resolution**	**Measuring current**
200 μΩ	0.01 μΩ	7A
2 mΩ	0.1 μΩ	7A
20 mΩ	0.1 μΩ	1A
200 mΩ	1 μΩ	100 mA
2 Ω	10 μΩ	10 mA
20 Ω	0.1 mΩ	0.1A, 10 mA
200 Ω	1 mΩ	10 mA, 1mA
2 kΩ	10 mΩ	1 mA
20 kΩ	0.1 Ω	100μA

The device is designed in a modular system and built in a stable housing of steel sheet. Therefore, every structural component is easily accessible and thus an optimal service is secured. All operational knobs, the LCD graphic display and the connector box are situated clearly and easy to survey on the front panel. ON the rear panel the in/out interfaces are placed as well as the comparators, the Pt100 sensor for temperature compensation and for controlling the instrument.

- Suitable for wire diameter > 3,0 mm and strip wire
- Auto-range selection.
- Interfaces in series IEEE 488, RS 232, RS 485.
- Checking of tolerances, classification with statistics.
- Measuring error < 0,05% (OHM3) < 0.01% (OHM4) with thermal e.m.f. compensation.
- Measuring time with pure ohmic sample: 3 ½ digit < 300mS. 4 ½ digit < 500mS, 5 ½ digit < 5 seconds.
- Measuring method: continuous, single, unipolar or bipolar
- Zero balance: microprocessor controlled.
- Automatic temperature compensation
- Power supply 230V 50/60Hz single phase 60VA (mod. OHM3) 260VA (mod. OHM4)
- Supplied complete of software

OHM 4		
Meas. range	**Resolution**	**Measuring current**
200.000 μΩ	1 nΩ	10A
2.00000 mΩ	10 nΩ	10A, 1A
20.0000 mΩ	100 nΩ	10A, 1A, 0.1A
200.000 mΩ	1 μΩ	1A, 0.1A, 10mA
2.00000 Ω	10 μΩ	1A, 0.1A, 1A, 1mA
20.0000 Ω	0.1 mΩ	0.1A, 10mA, 1mA, 100μA
200.000 Ω	1 mΩ	10mA, 1mA, 100μA
2.00000 kΩ	10 mΩ	1mA, 100μA
20.0000 kΩ	0. Ω	100μA



Data changes reserved

PULSE DIELECTRIC TESTER mod. PDT

STANDARD: IEC 62068-1

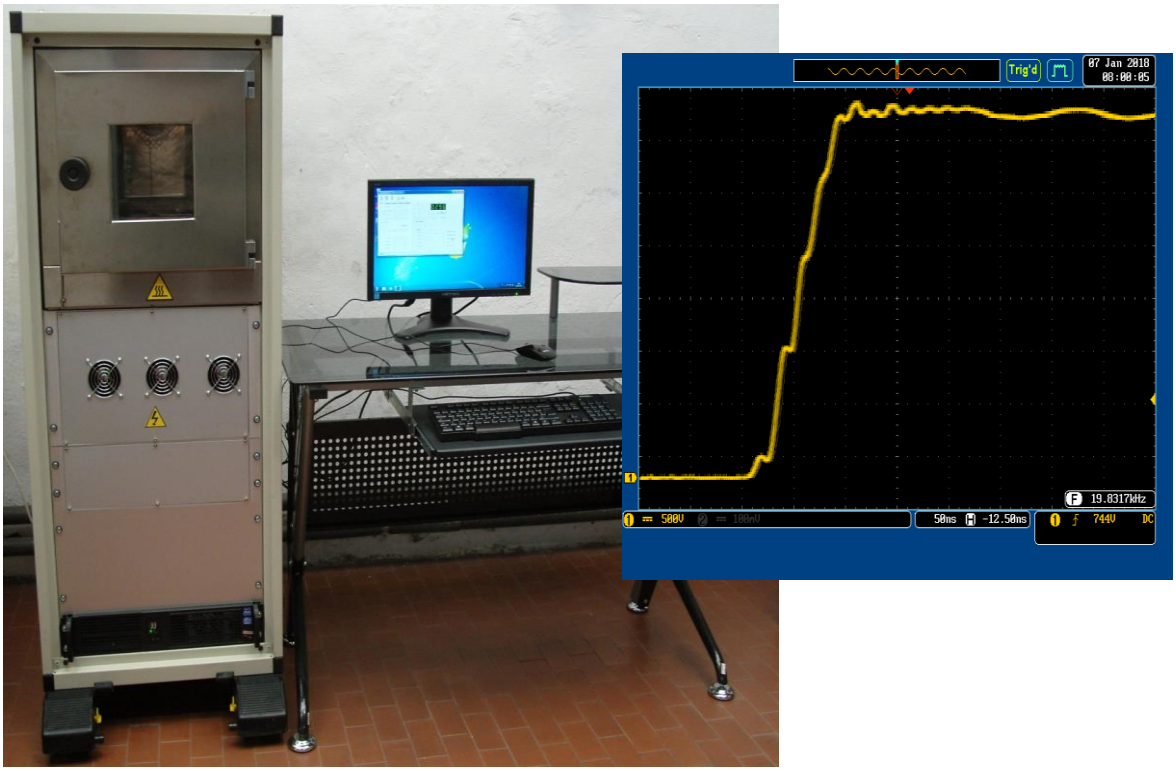
The enamelled wire used in asynchronous motors driven by inverter suffer of relevant electrical and thermal stress, due to the resulting sine waveform applied, derived from a modulated square waveform having steep rise and fall edges tenths of nano seconds, obviously the routine tests as for example the dielectric strength test, doesn't fully comply the requested performances, for this reason has been necessary develop a new test to simulate such conditions.

TEST PROCEDURE: Five enamelled wire samples are twisted back on themselves and the ends opened, placed in an air draught oven at the prescribed temperature, a high voltage having risen and fall edges according to the specifications is applied to each twisted pair. When the current threshold is exceeded for a given station, that station is disabled, the failure information is logged to a text file.

- Bidirectional test voltage independently adjustable from 100V_{pp} up to 3000V_{pp}
- Duty cycle 50%.
- Pre-selectable test time up to 99 days.
- Pulse frequency from 200 Hz up to 20KHz, up to 30KHz with de-rate voltage up to 1750V_{pp}.
- Rising edges < 100nS.
- Air draught oven temperature adjustable from 40°C up to 250°C
- Current threshold adjustable in each station, with individual disable
- Suitable for wire diameter range from 0,05 mm up to 2 mm (44AWG – 12AWG) and strip wire
- Five test fixtures, suitable for twisted pair
- Windows operative system, included application for remote connection

TECHNICAL SPECIFICATION

Power supply	Dimensions	Weight
230V 50/60Hz 1 phase 2500VA	w 600 x d 650 x h 1700 mm	148 kg 325.6 lb



OPTIONS

- ELEC Sample holder suitable for strip wire

Data changes reserved

PULSE DIELECTRIC TESTER mod. PDT1

STANDARD: IEC 62068-1

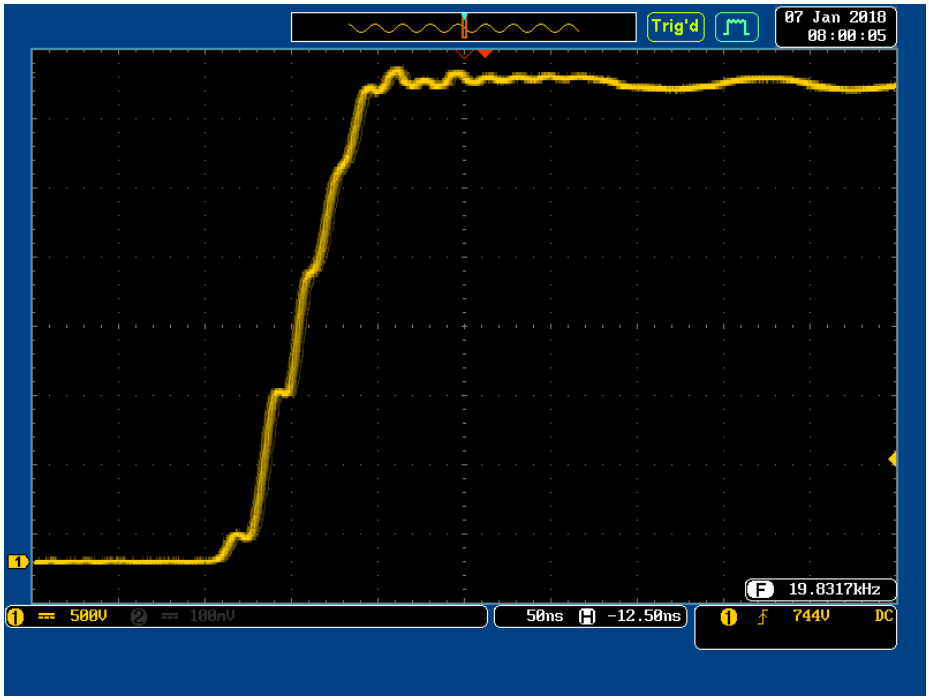
The enamelled wire used in asynchronous motors driven by inverter suffer of relevant electrical and thermal stress, due to the resulting sine waveform applied, derived from a modulated square waveform having steep rise and fall edges tenths of nano seconds, obviously the routine tests as for example the dielectric strength test, doesn't fully comply the requested performances, for this reason has been necessary develop a new test to simulate such conditions.

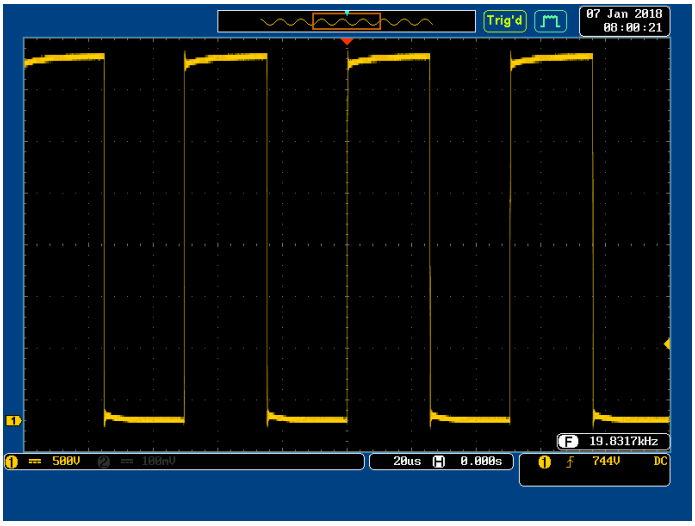
TEST PROCEDURE: Five enamelled wire samples are twisted back on themselves and the ends opened, placed in an air draught oven at the prescribed temperature, a high voltage having risen and fall edges according to the specifications is applied to each twisted pair. When the current threshold is exceeded for a given station, that station is disabled, the failure information is logged to a text file.

- Unidirectional square wave high voltage independently adjustable from 100V_p up to 3600V_p
- Duty cycle 50%.
- Pre-selectable test time up to 99 days.
- Pulse frequency from 1KHz up to 20KHz, up to 30KHz with de-rate voltage up to 1750V_{pp}.
- Rising edges <100nS.
- Air draught oven, complete of five sample holders, temperature adjustable from 40°C up to 250°C
- Current threshold adjustable in each station, with individual disable
- Suitable for wire diameter range from 0,05 mm up to 2.5 mm (44AWG – 10AWG) and strip wire
- Test fixtures for each channel, suitable for twisted pair
- Windows operative system
- Teleassistance

TECHNICAL SPECIFICATION

Power supply	Dimensions	Weight
230V 50/60Hz 1 phase 2500VA	w 600 x d 650 x h 1700 mm	148 kg 325.6 lb





OPTION:
- ELEC Sample holder suitable for strip wire

Data changes reserved

PIN HOLE TESTER mod. PH

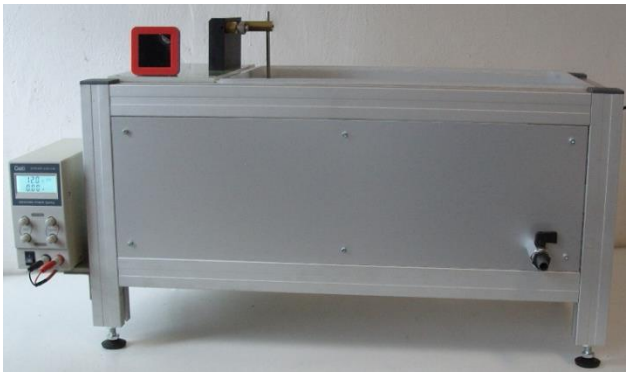
STANDARDS: IEC 60851 (proposal), JIS C 3216-5

TEST PROCEDURE: For diameters less than 0.06 mm (42 ½ AWG) a piece of wire 1.5 meters long and 6 meters for wire diameter bigger, carry out heat treatment for about 10' in a thermostatic oven at 125° +/- 3°C. After heat treatment, without bending nor stretching, dip the test piece in 0.2% sodium chloride aqueous solution added with proper quantity of alcohol solution of 3% phenolphthalein, about 1meters in length for wire dia.< 0.06 mm and about 5 meters for big one. Apply 12Vdc by making the solution as positive and then examine the numbers of pin holed generated.

TECHNICAL SPECIFICATIONS

Model	Power supply	Dimensions (w x d x h)	Tank (w x d x h) litres	Weight
PH	230V 50/60Hz 1phase 25VA	600 x 290 x 195 mm	245 x 145 x 150 mm 8	9kg 19.8 lb
PH1		790 x 480 x 435 mm	490 x 290 x195 mm 20	16kg 35.2 lb
PH2	230V 50/60Hz 1phase 100VA	1300 x 750 x 950 mm	940 x 640 x 500 mm 270	32kg 70,4 lb

Model PH
- Polycarbonate tank and cover.
- Adjustable test voltage from 2 up to 30 Vdc.
- Digital readout of test voltage and current.
-Digital timer 1" up to 59' 59"



Model PH1
- Suitable to test motor rotors/stator to control small leakages current.
- Polycarbonate tank and cover.
- Adjustable test voltage from 1 up to 30 Vdc, with possibility to change voltage polarity
- Digital readout of test voltage resolution 0.1V.
- Digital current readout resolution 0.1 A
-Digital timer 1" up to 59' 59"

Model PH2
- Suitable to test motor rotors/stator to control small leakages current.
- Polycarbonate tank and cover.
- Adjustable test voltage from 1 up to 30 Vdc, with possibility to change voltage polarity
- Adjustable current limit from 0 up to 3 A
- Digital readout of test voltage resolution 0.1V.
- Digital current readout resolution 10 mA
-Digital timer 1" up to 59' 59"

Data changes reserved

BREAKDOWN VOLTAGE TESTER mod. RDT

STANDARDS: IEC 60851-5.4, IEC172, DIN 46453, NEMA MW 1000, JIS C 3216-5

TEST PROCEDURE: (with wire diameter up to 0.10 mm):

A straight piece of wire with the insulation removed at one end shall be connected to the upper terminal and wound once around a 25 mm cylinder. A load as specified in tab.1 shall be applied to the lower end of the wire to keep the specimen in close contact with the cylinder.

The test voltage shall be applied between the conductor of the wire and the cylinder at a rate of 20V/1" for breakdown voltage up to 500V, 100V/1" between 500 to 2500V or 500V/1" for higher breakdown voltage. The test shall be carried out at room temperature.

Five specimens shall be tested. The five single values shall be reported.

(With wire diameter from 0.10 mm up to 2.50 mm):

A straight piece of wire, approximately 400 mm in length, with the insulation removed at both ends, shall be twisted back on itself for a distance of 125 +/- 5 mm on a twisting machine with a load applied to the wire pair and with the number of twists given in tab.2. The loop at the end of the twisted section shall be cut at two places to provide a maximum spacing between the cut ends. Any bending to ensure adequate separation between the two wire ends shall avoid sharp bends or damage to the coating.

The test voltage shall be applied between the two conductors of the wires at a rate of 100V/1" for breakdown voltage from 500 V up to 2500V, or 500V/1" for higher breakdown voltage.

Five specimens shall be tested. The five single values shall be reported.

(With wire diameter over 2.50 mm and strip wire):

A sample of wire of approximately 350 mm in length with the insulation removed at one end shall be bent (on the flat for strip) around a mandrel to form a U, the mandrel diameter shall be:

25 mm for nominal thickness up to and including 2,500 mm.

50 mm for nominal thickness and diameter over 2,500 mm.

The specimen shall be placed in a container and shall be surrounded by at least 5 mm of shot. The ends of the specimen shall be sufficiently long to avoid flashover.

The test voltage shall be applied between the conductor of the wire and the shot at a rate of 100V/1" for breakdown voltage between 500 up to 2500V, or 500V/1" for higher breakdown voltage.

Five specimens shall be tested. The five single values shall be reported.

mod. RDT-C2

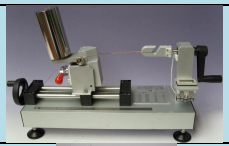
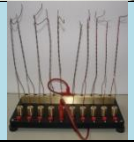
mod. RDT-C2-PC

- Suitable for wire diameter from 0.012 to 8 mm (56 – ½ AWG) and strip up to 50 x 8 mm.
- High voltage transformer rated power 600 VA.
- Digital voltmeter 4 ½ digit, resolution 1 Volt, with 2 pre-selectable voltage for timed test.
- Suitable to determination of temperature index test
- Digital timer with pre-selection from 0.2" up to 9999 h.
- Automatic rise time voltage according to the standards.
- Double safety device applied on the cell door.
- Equipped with pivot wheels and break, easy to move.
- 2 testing voltage ranges: V10 0-2Kv 0-10Kv
- Test chamber suitable for test at environment temperature dimensions 400 x 420 x 450 mm.
- Control unit with automatic voltage rising according to the standards, 4 test methods (automatic, with one or two timed test, temperature index test).
- Supplied with electrode suitable for diameters from 0.10 up to 8,0 mm and strip wire.

TECHNICAL SPECIFICATIONS

Power supply	Dimensions	Weight
230 Vac 50/60 Hz 1phase 800VA	h 1800 x w 610 x d 700 mm	120 kg 264 lb

OPTIONS:

	TEST VOLTAGES: - V15 0 – 3Kv 0 - 15Kv - V20 0 - 4Kv 0 - 20Kv - V30 0 - 6Kv 0 - 30Kv	
	E1	Electrode suitable for wire diameter < 0.10 mm (38AWG), complete set of weights
	CAL	Digital calibrator
	PC	PC control unit for data acquisition and data management with print out of single values, minimum, maximum, average and standard deviation.
	C2	Test chamber suitable for high temperature tests up to 250°C, higher on request
	P5	Test chamber suitable for 5 specimens.
	CUR	Adjustable threshold current detection
	RAT	Adjustable test voltage rising ratio
	TWM	Twist specimen fabricator, complete of loading weights and digital twist counter.
	IND	Ten samples electrode, suitable for temperature index test

Data changes reserved

BREAKDOWN VOLTAGE TESTER mod. RDT1, RDT2

STANDARDS: IEC 60851-5.4, IEC 172, DIN 46453, NEMA MW1000, JIS C 3216-5

TEST PROCEDURE: (with wire diameter up to 0.10 mm):

A straight piece of wire with the insulation removed at one end shall be connected to the upper terminal and wound once around a 25 mm cylinder. A load as specified in tab.1 shall be applied to the lower end of the wire to keep the specimen in close contact with the cylinder.

The test voltage shall be applied between the conductor of the wire and the cylinder at a rate of 20V/1" for breakdown voltage up to 500V, 100V/1" between 500 to 2500V or 500V/1" for higher breakdown voltage. The test shall be carried out at room temperature.

Five specimens shall be tested. The five single values shall be reported.

(With wire diameter from 0.10 mm up to 2.50 mm):

A straight piece of wire, approximately 400 mm in length, with the insulation removed at both ends, shall be twisted back on itself for a distance of 125 +/- 5 mm on a twisting machine with a load applied to the wire pair and with the number of twists given in tab.2. The loop at the end of the twisted section shall be cut at two places to provide a maximum spacing between the cut ends. Any bending to ensure adequate separation between the two wire ends shall avoid sharp bends or damage to the coating.

The test voltage shall be applied between the two conductors of the wires at a rate of 100V/1" for breakdown voltage from 500 V up to 2500V, or 500V/1" for higher breakdown voltage.

Five specimens shall be tested. The five single values shall be reported.

(With wire diameter over 2.50 mm and strip wire):

A sample of wire of approximately 350 mm in length with the insulation removed at one end shall be bent (on the flat for strip) around a mandrel to form a U, the mandrel diameter shall be:

25 mm for nominal thickness up to and including 2,500 mm.

50 mm for nominal thickness and diameter over 2,500 mm.

The specimen shall be placed in a container and shall be surrounded by at least 5 mm of shot. The ends of the specimen shall be sufficiently long to avoid flashover.

The test voltage shall be applied between the conductor of the wire and the shot at a rate of 100V/1" for breakdown voltage between 500 up to 2500V, or 500V/1" for higher breakdown voltage.

Five specimens shall be tested. The five single values shall be reported.

Model RDT1

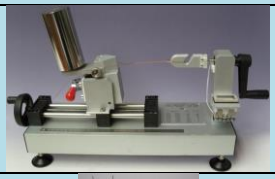
Model RDT2

- Suitable for wire diameters from 0.012 to 8 mm (56 – ½ AWG) and strip.
- High voltage transformer rated power 600 VA.
- Digital voltmeter 4 ½ digits, resolution 1 V (mod. RDT2).
  3 ½ digits resolution 10V (mod. RDT1).
- Suitable for determination of temperature index test and timed test (mod. RDT2).
- Automatic rise time voltage according to the standards.
- Digital timer for timed test from 0,2" up to 9999 h (mod. RDT2)
- Double safety device applied on the cell door.
- Two testing voltage ranges: V10 0-2Kv 0-10Kv (mod. RDT2). One range 0-10Kv model RDT1.
- Environmental temperature test chamber, complete of light and fan for air circulation (mod.RDT2).
- Control unit with breakdown voltage held on panel meter.
- Supplied with electrode suitable for diameter from 0.1mm up to 8.0 mm and strip wire
- Fully automatic

TECHNICAL SPECIFICATIONS

Model	Power supply	Dimensions	Weight
RDT1	230Vac 50/60Hz 1 phase 700VA	w 500 x h 700 x d 600 mm	68 kg 149.6 lb
RDT2	230Vac 50/60Hz 1 phase 730VA	w 500 x h 850 x d 600 mm	72 kg 158.4 lb

OPTIONS:

<table>
<tr><td colspan="3">TEST VOLTAGES:</td></tr>
<tr><td></td><td>RDT1
- V15 0 – 15Kv</td><td>RDT2
- V15 0 - 3 Kv 0 - 15 Kv
- V20 0 - 4 Kv 0 - 20 Kv
- V30 0 - 6 Kv 0 - 30Kv</td></tr>
<tr><td>  </td><td colspan="2">E1 Electrode suitable for wire diameter < 0.10 mm (38AWG), complete set of weights</td></tr>
<tr><td>  </td><td colspan="2">CAL Digital calibrator</td></tr>
<tr><td></td><td colspan="2">CUR Adjustable threshold current detection</td></tr>
<tr><td></td><td colspan="2">RAT Adjustable test voltage rising ratio</td></tr>
<tr><td>  </td><td colspan="2">TWM Twist specimen fabricator, complete of loading weights and digital twist counter.</td></tr>
<tr><td>  </td><td colspan="2">IND Ten samples electrode, suitable for temperature index test</td></tr>
</table>

Data changes reserved

BREAKDOWN VOLTAGE TESTER mod. RDT3

STANDARDS: IEC 60851-5.4, IEC172, NEMA MW 1000, JIS C 3216-5 IEC 60243.1

- Suitable for enamelled wire diameters from 0.012 to 8 mm (56 – ½ AWG) and strip.
- Suitable for insulating materials like tapes, films, narrow strip, flexible and rigid tubing, sleeving etc.
- High voltage transformer rated power 1000 VA.
- Digital voltmeter 5 digits, resolution 1V, with two pre-selectable voltages for timed and double-timed test.
- Suitable to determination of temperature index test
- Digital timer with pre-selection from 0.2" up to 9.999 h.
- Double safety device applied on the cell door.
- Two testing voltage ranges: 0-4Kv 0-20Kv
- Test chamber suitable for test at environment temperature dimensions: d 470 x h 340 x w 800 mm.
- Three test methods: - Automatic.
  - Timed.
  - Temperature index.
- Supplied with electrode suitable for diameters from 0.10 up to 8.0 mm and strip wire.

TECHNICAL SPECIFICATIONS

Power supply	Dimensions	Weight
230 Vac 50/60 Hz 1phase 1000VA	h 1450 x w 1160 x d 760 mm	175 kg 385 lb

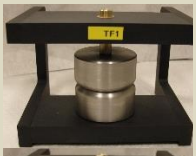
RDT3

RDT3-C2

Test voltages:

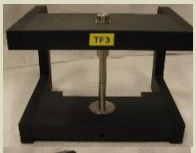
V30 0 – 6 kv and 0 – 30 kv
V50 0 – 10 kv and 0 – 50 kv

ELECTRODES for insulating materials



TF1 Opposing cylinders 2” (51 mm) in diameter, 1” (25 mm) thick with edges rounded to 0.25” (6.44 mm) radius.

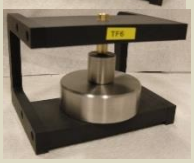
TF2 Opposing cylinders 1” (25 mm) in diameter, 1” (25 mm) thick with edges rounded to 0.125” (3.2 mm) radius.



TF3 Opposing cylinder rods 0.25” (6.4 mm) in diameter, with edges rounded to 0.0313” (0.8 mm) radius.

TF4 Flat plates 0.25” (6.4 mm) thick and 4.25” (108 mm) wide with edges square and ends rounded to 0.125” (3.2 mm) radius.

TF5 Hemispherical electrodes 0.5” (12.7 mm) in diameter.



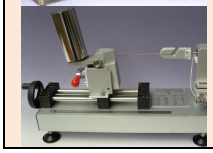
TF6 Opposing cylinders: the lower one 3” (75 mm) in diameter, 0.6” (15 mm) thick; the upper one 1” (25 mm) in diameter, 1” (25 mm) thick; with edges of both rounded to 0.12” (3 mm) radius.

CAL Digital calibrator

PC Pc control unit for data acquisition and data management with print out of single values, minimum, maximum, average and standard deviation.

Enameled wires

E1 Electrode suitable for wire diameter < 0.10 mm (38AWG), complete set of weights



TWM Twist specimen fabricator, complete of loading weights and digital twist counter.

Data changes reserved

TANGENT DELTA TESTER mod. TD1

STANDARDS: IEC 60851-5.6, NEMA MW 1000, DANFOSS.

TEST PROCEDURE: A sample of enamelled wire shall be wiped with a soft cloth, then spread with a water graphite solution on 100 mm length and dried in an oven. The specimen shall be inserted in a thermostatic oven to measure the tan delta value versus temperature variation, any value shall be recorded.

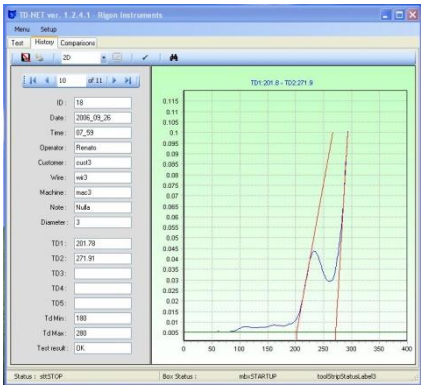
- Suitable for all kind of enamelled conductors: copper, aluminium, superconductor and any conductor alloy.

Range 0.05 mm up to 6.00 mm (45 – 3 AWG)

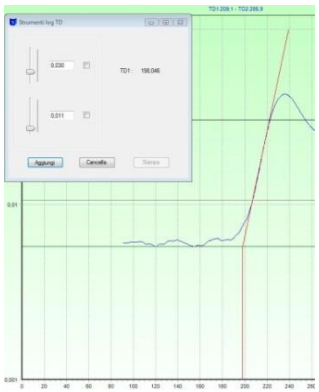
and up to 25 x 6,0 mm.

Samples holder

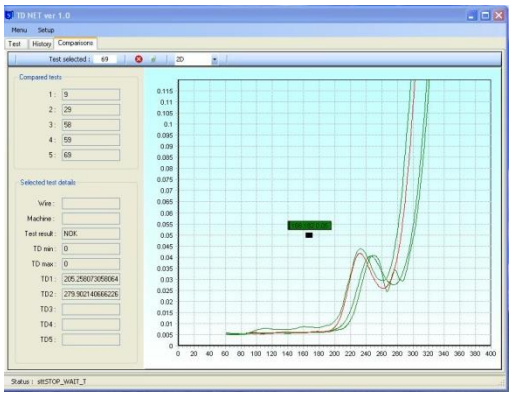
- Maximum working temperature 400°C.
- Fast test time from 2' up to 6', depending on temperature rising ratio choose.
- Constant rising temperature selectable from 1°C/1'up to 60°C/1' for all sizes.
- Test frequency 1 KHz accuracy 0.01%, amplitude 1.5 V RMS
- Dissipation factor value resolution 0.0001.
- Three test modes:
  - Linear scale (According to IEC 60851-5.6, DIN 46453).
  - Logarithmic scale (According to DANFOSS standard).
  - Single point.



- Automatic calculation up to 5 tangents



- Semi-logarithmic scale



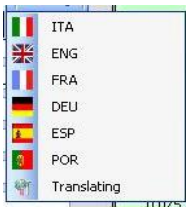
- Comparison up to 5 measurements

- Easy to use also for unskilled personnel.
- Powerful advanced SQL data base, curves searching with filter application.
- Multi-languages capability.
- Customised printout layout.
- Tele-assistance, for a fast technical intervention and software upgrading.
- Network capabilities.

TECHNICAL SPECIFICATIONS

Installed power supply	Power consumption	Dimensions and weight
230 Vac 50/60 Hz 1400VA	550W/h	w 500 x d 620 x h 750 mm 58 kg (128 lb)

Supplied with:
- Two sample holders
- Stand for sample holders
- ½ kg of colloidal graphite complete of brush.
- Calibration bar.
- Technical documentation.

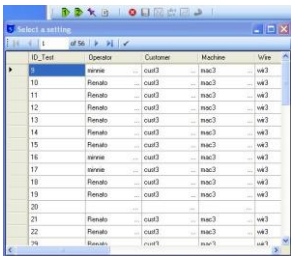


Multi-languages

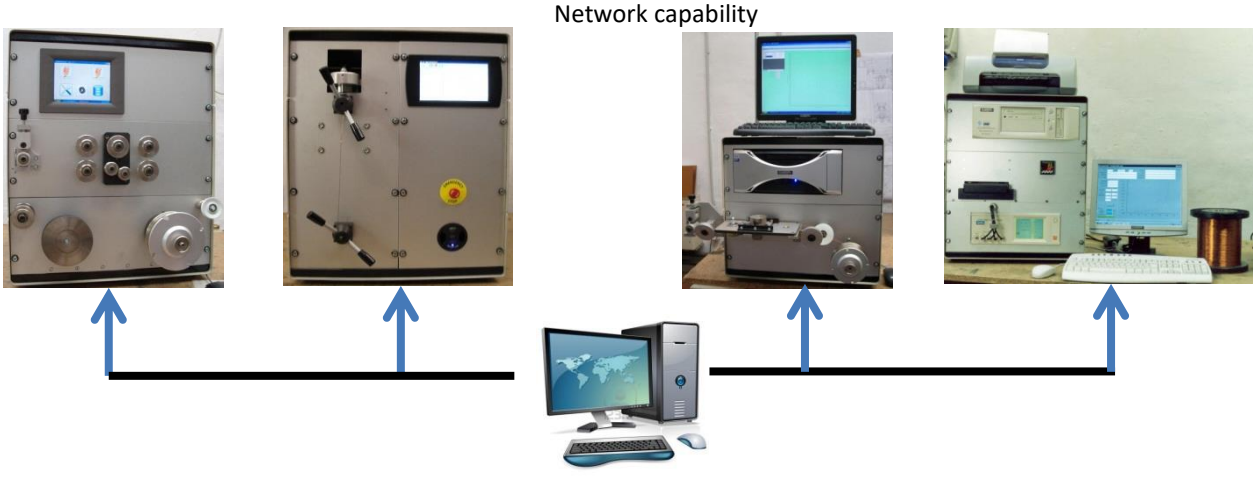
A set of several languages are included in the software, furthermore is included the possibility to customize a language or dialect.

Data management

A powerful data base associated with the advanced SQL, allows to store and retrieve all measures, in a very short time applying a filter to get a measure



Network capability



Data changes reserved

TANGENT DELTA TESTER mod. TD2

STANDARDS: DIN 46453, IEC 60851-5.6

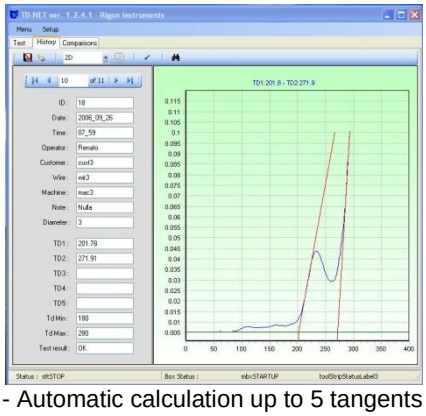
TEST PROCEDURE:(With graphite) A sample of enamelled wire shall be wiped with a soft cloth, then spread with a water graphite solution on 100mm length and dried in an oven.
The specimen shall be inserted in a thermostatic oven to measure the tan delta value versus temperature variation, any value shall be recorded.
(With alloy) A sample of wire shall be bent into a U-shape to be lowered into the metal bath.

- Suitable for all kind of enamelled conductors: copper, aluminium, superconductor and any conductor alloy.

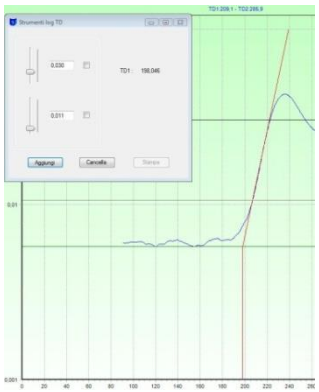
Range 0.05 mm up to 5.00 mm (45 – 3 AWG)

and up to 25 x 5,0 mm.

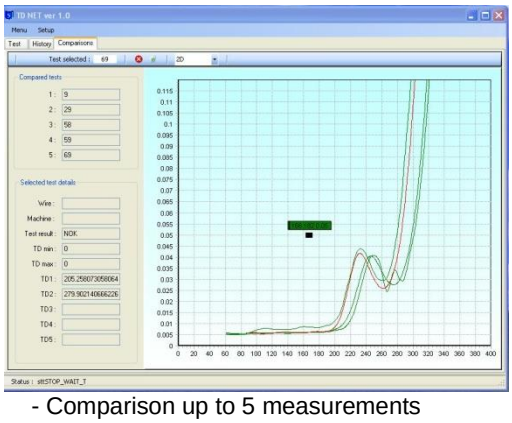
- Maximum working temperature 400°C (with graphite).
- Fast test time from 2' up to 6' (with graphite).
- Constant rising temperature selectable from 1°C/1'up to 60°C/1' for all sizes (graphite).
- Test frequency 1 KHz accuracy 0.01%, amplitude 1 V RMS
- Dissipation factor value resolution 0.0001.
- Four test modes: - Linear scale (According to IEC 60851-5.6, DIN 46453 with graphite).
  - Linear scale (According to IEC 60851-5.6, DIN 46453 with alloy and decrement temperature).
  - Logarithmic scale (According to DANFOSS standard).
  - Single point.



- Automatic calculation up to 5 tangents



- Semi-logarithmic scale



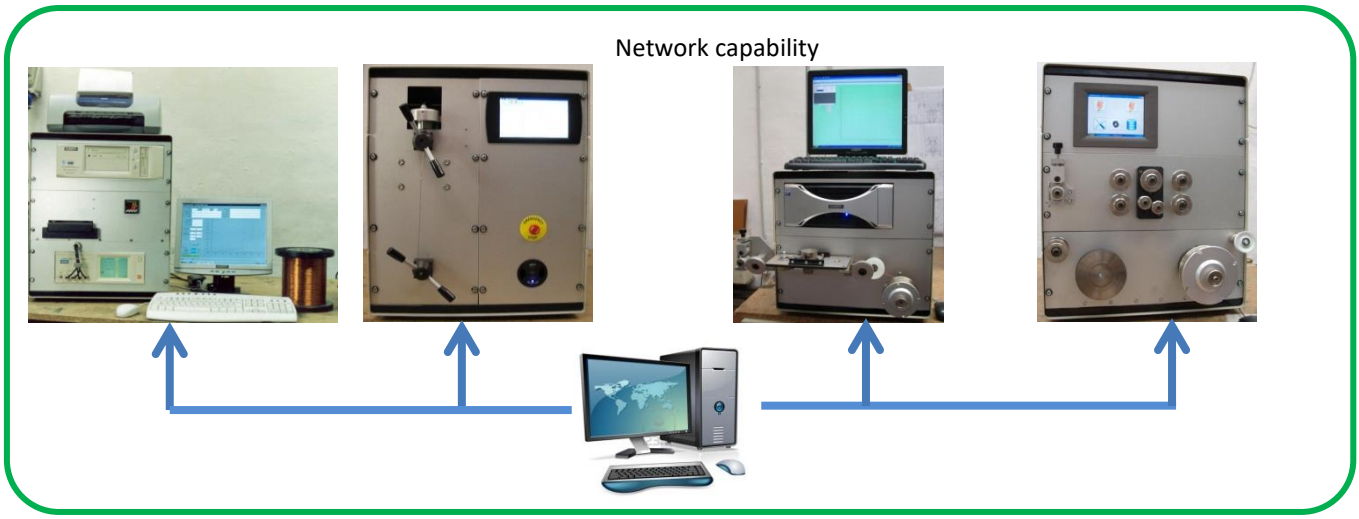
- Comparison up to 5 measurements

- Easy to use also for unskilled personnel.
- Powerful advanced SQL data base, curves searching with filter application.
- Multi-languages capability.
- Customised printout layout.
- Tele-assistance, for a fast technical intervention and software upgrading.
- Network capabilities.

TECHNICAL SPECIFICATIONS

Power supply	Dimensions	Weight
230Vac single phase 50/60Hz 1500VA	h 850 x w 500 x d 650 mm	64 kg 141 lb

Supplied with:
- Two sample holders for graphite and one sample holder for low melting alloy.
- Holder for sample holders.
- ½ kg of colloidal graphite complete of brush.
- Calibration bars.
- Technical documentation.



Data changes reserved

TANGENT DELTA TESTER mod. TD8

STANDARDS: DIN 46453, IEC 60851-5.6

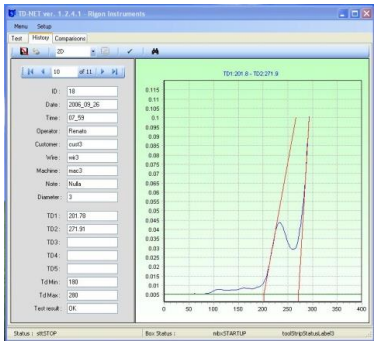
TEST PROCEDURE: A sample of enamelled wire shall be wiped with a soft cloth, then spread with a water graphite solution on 100mm length and dried in an oven.
The specimen shall be inserted in a thermostatic oven to measure the tan delta value versus temperature variation, any value shall be recorded.

- Suitable for all kind of enamelled conductors: copper, aluminium, superconductor and any conductor alloy.

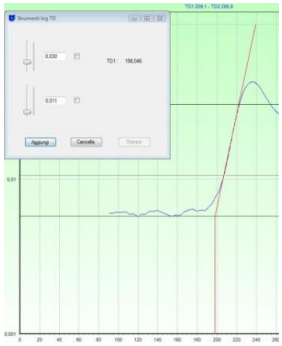
Range 0.05 mm up to 6.00 mm (45 – 3 AWG)

and up to 25 x 6,0 mm in different ranges.

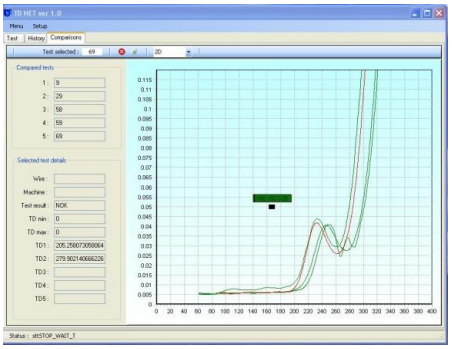
- Maximum working temperature 400°C.
- Up to eight sample wires at time, in different sizes as well.
- Constant rising temperature selectable from 1°C/1'up to 6°C/1' for all sizes.
- Test frequency 1 KHz accuracy 0.01%, amplitude 1 V RMS
- Dissipation factor value resolution 0.0001.
- Two test modes: - Linear scale (According to IEC 60851-5.6, DIN 46453).
  - Logarithmic scale (According to DANFOSS standard).



- Automatic calculation up to 5 tangents



- Semi-logarithmic scale



- Comparison up to 5 measurements

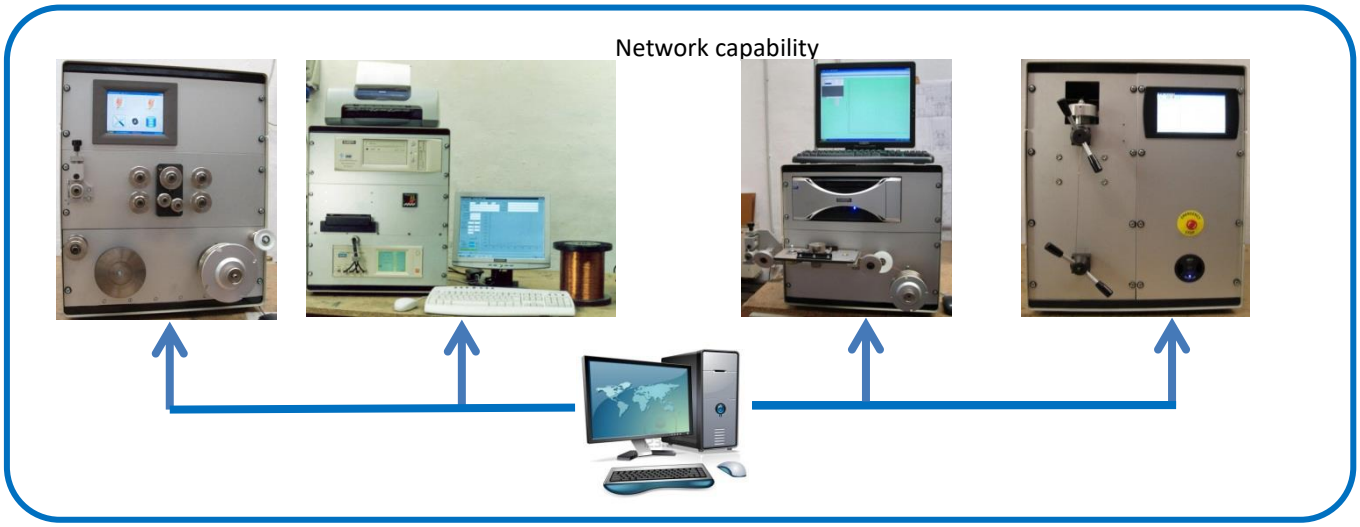
- Easy to use also for unskilled personnel.
- Powerful advanced SQL data base, curves searching with filter application.
- Multi-languages capability.
- Customised printout layout.
- Tele-assistance, for a fast technical intervention and software upgrading.
- Network capabilities.

TECHNICAL SPECIFICATIONS

Power supply	Dimensions	Weight
230V 50/60Hz 1 phase 850VA	w 900 x h 600 x p 750 mm	75 kg 165 lb

Option:

- BAR Bar code reader



Data changes reserved

TWIST SPECIMEN FABRICATOR mod. TWM, TWM1

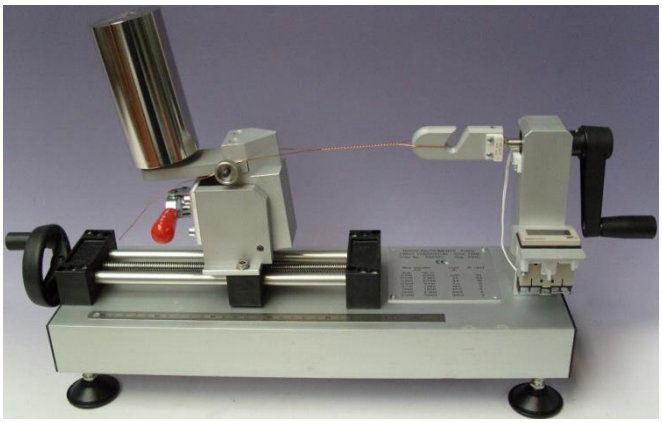
STANDARDS: IEC 60851-5.5, NEMA MW 1000, JIS C 3216-5, ASTM D 1676

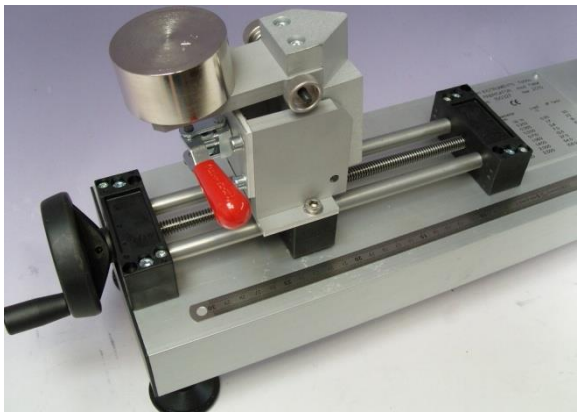
TEST PROCEDURE: a piece of wire approximately 400 mm in length shall be twisted back on itself for a distance of 125 mm on an apparatus having a hook which can rotate, the force applied to the wire pair while being twisted and the number of twists, are given from the relevant standards specifications. The loop at the end of the twisted section shall be cut at two places to provide the maximum distance between the cut ends.

- Suitable for wire diameter from 0.051 up to 2.6 mm (44 - 10 AWG).
- Complete set of weights.
- Automatic device for loading/unloading of test weight.
- Adjustable wire retractor for the right twist measure, with graduated ruler.
- Electronic digital counter battery powered (mod. TWM).
- Turning crank with ball bearing (mod. TWM).
- Motorised turning with pre-selectable digital counter and automatic stop (mod. TWM1)
- Adjustable rotation speed electronic controlled (mod. TWM1)

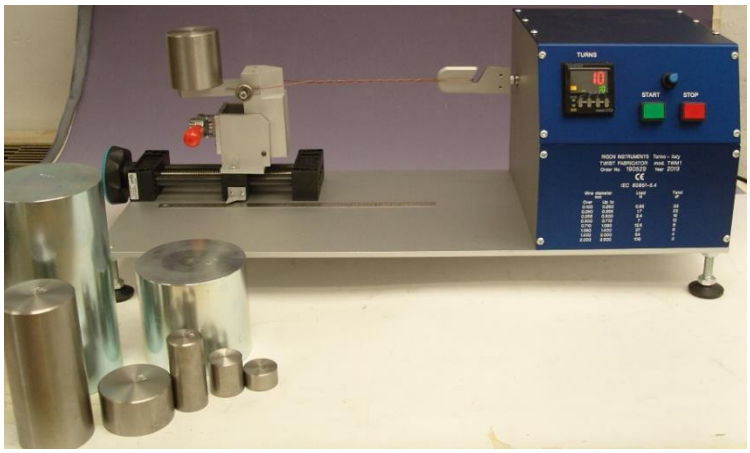
TECHNICAL SPECIFICATIONS

Model	Dimensions	Weight
TWM	w 450 x d 180 x h 210 mm	12 kg 26.4 lb
TWM1	w 750 x d 250 x h 270 mm	16 kg 33.4 lb.





Mod. TWM



Mod. TWM1

Data changes reserved

THERMAL TEST

STOVE mod. STV

STANDARDS: IEC 60851-4, NEMA MW 1000

This laboratory equipment find use in those cases is necessary subject a sample of enamelled wire to a heating treatment before to carry out determined tests as for example solvents resistance, extraction tests, high temperature breakdown voltage test, etc., it could be ordered with some special features according to the customer requirements.

Maximum working temperature up to 250°C. (higher on request).

Digital temperature controller, resolution 1°C.

Digital timer with test time from 1" up to 23 h 59' with sound/visual alarm.

Wide range of models with different sizes and accessory, stainless steel construction.

Safety thermostat.

Excellent thermal insulation.

TECHNICAL SPECIFICATIONS

Model	Test chamber dimensions (w x h x p) mm	Overall dimensions (w x h x d) mm	Power supply	Power VA	Weight kg	Weight lb.
STV1	310 x 260 x 250	560 x 720 x 400	230V 50Hz Single phase	500	18	38.4
STV2	430 x 310 x 300	680 x 770 x 450		600	26	54.8
STV3	460 x 360 x 350	720 x 820 x 500		750	32	68.2
STV4	400 x 600 x 400	660 x 1060 x 600		1000	38	82.2
STV5	600 x 600 x 450	870 x 1060 x 600		1250	45	94.4
STV6	700 x 700 x 500	970 x 1160 x 650		1600	52	110.6

Data changes reserved

THERMAL CUT-THROUGH TESTER mod. TP-F

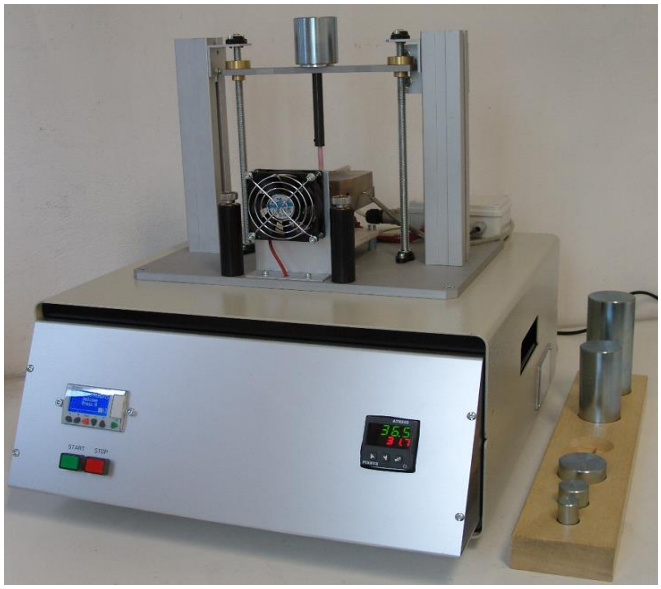
STANDARDS: IEC 60851-6.4 (wire crossing method)

TEST PROCEDURE: Two straight pieces of wire shall be inserted into the metal block crossing each other at right angles, with the metal block pre-heated at the temperature specified in the relevant standard. The temperature shall be measured as close as possible to the crossing point and shall not vary by more than +- 3°C from the specified value. The central point shall lie centrally under the piston. In the case of wire of a nominal conductor diameter of less than 0,200 mm, two straight pieces of wire shall be placed in parallel, side by side and a third one shall be placed at right angle across the first two with the crossing points arranged symmetrically to the axis of the piston. After a heating period, a specified load shall be applied by means of the piston. Immediately thereafter, the test voltage applied between the lower and upper pieces of wire. In the case where two lower pieces are used, they shall be connected. The load and the test voltage shall be applied for 2 minutes.
Three tests shall be made. Any failure shall be reported.

- Complete set of weights (IEC Standard).
- Automatic loading/unloading of test weight.
- Suitable for wire diameter range from 0.10 up to 1.60 mm (38 – 14 AWG).
- Digital temperature controller, resolution 0.1°C, accuracy > 0.2%.
- Preheating and test time independently programmable from 1” up to 9999”.
- Maximum test block temperature 520°C.
- Visible and acoustic signalling to indicate the test results.

TECHNICAL SPECIFICATIONS

Power supply	Dimensions	Weight
230V 50/60Hz 1phase 1600VA	w 500 x h 700 x d 550 mm	35 kg 77.2 lb



Options:

- BLK1 Test block suitable for wire diameter from 1.50 mm up to 5.00 mm
- BLK2 Test block suitable for strip up to 25,0 x 6.0 mm
- V2 Test voltage in two ranges 0 - 100 V and 0 - 230 V.
- HF Adjustable impulse test voltage 100Hz - 1KHz - 10KHz - 20 KHz up to 2000V

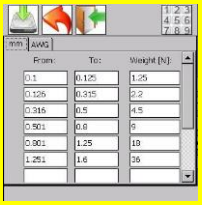
Data changes reserved

THERMAL CUT-THROUGH TESTER mod. TP-PC

STANDARDS: IEC 60851-6.4, NEMA MW 1000 3.50, JIS C 3216-6 (wire crossing method)

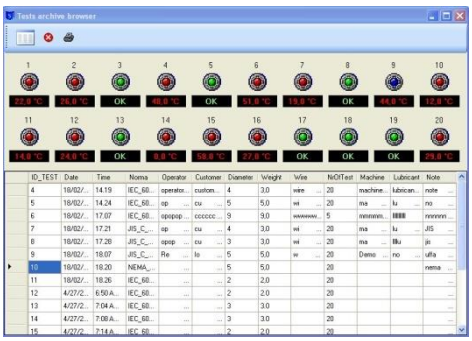
APPARATUS DESCRIPTION: This tester has been designed to absolve to enamelled wire manufactures requests that need to carry out tests in different standards. Thanks to an industrial personal computer has been possible to implement all different functions to carry out tests automatically with print out of every measured value, an easy to use menu allow the operation of this tester to unskilled personnel too, while the tester is performing a test the operator can complete others duty. An automatic function has been implemented to determine the exact point of thermoplastic flow according to IEC regulations

- Complies with the most international regulations such IEC60851-6.4, NEMA MW 1000, JIS C-3003.
- Suitable for wire diameter range from 0.10 mm up to 5.0 mm (38 – 4 AWG).
- Strip up to 25.0 x 6.0 mm with optional test block.
- Complete set of weights for all standard.
- Customizable weight table, according to wire diameter.
- Powerful advanced SQL data base.
- Rising temperature adjustable from 1°C/1' up to 50°C/1'.
- Preheating and test time programmable from 10" up to 999" (according to IEC)
- Automatic loading/unloading of test weight.
- Test voltage 100Vac.
- Up to 20 specimens in sequence (only round wire up to 1.60 mm).
- Fast test block re-cooling system.
- Maximum test block temperature 520°C.
- Automatic calculation of minimum, maximum, median temperature and printout of relevant parameters



TECHNICAL SPECIFICATIONS

Power supply	Compressed Air	Dimensions	Weight
230V 50/60Hz 1phase 1600VA	0.4 – 0.6 MPa	w 800 x h 680 x d 750 mm	36 kg 79.2 lb



Data changes reserved

THERMAL CUT-THROUGH TESTER (Ring method) mod. TP-PC1

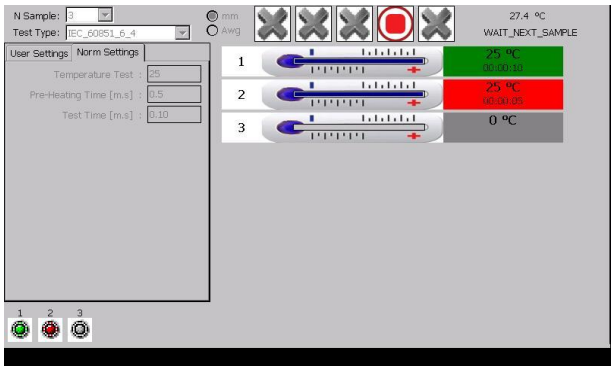
STANDARD: JIS C-3216-6

TEST PROCEDURE: Take 2 pieces of enamelled wire 30 cm in length from the same bobbin, make each of them into a ring-form, cross them, hang up one end of sample and apply the appropriate dead weight to the lower part of sample, put this assembly in a thermostatic oven. An alternated sine wave test voltage of 100V shall be applied to the sample, the temperature shall be raised at a rate of about 2°C/1', till a current of 5 – 20 mA will flow inside the sample.

- Suitable for wire diameter from 0,020 up to 0,19 mm (52 – 32 ½ AWG).
- Thermostatic oven, maximum working temperature up to 400°C, digital temperature controller with temperature ratio adjustable from 1°C/1' up to 10°C/1'.
- Test chamber suitable to test up to three sample wires.
- Supplied complete of test weights.
- Test chamber dimensions: w 310 x d 250 x h 260 mm
- Automatic test cycle.
- Network capability.

TECHNICAL SPECIFICATIONS

Power supply	Dimensions	Weight
230V 50/60 Hz 1 phase 850VA	w 500 x d 650 x h 760 mm	29 kg 63.8 lb



Data changes reserved

MULTIPLE THERMAL CUT-THROUGH TESTER mod. TP-PC5

STANDARDS: IEC 60851-6.4, NEMA MW 1000 3.50, JIS C 3216-6 (wire crossing method)

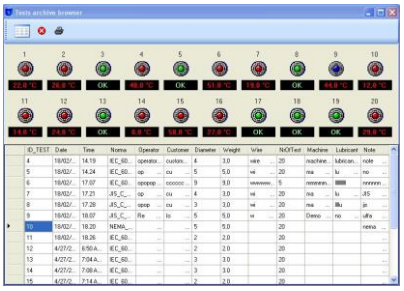
APPARATUS DESCRIPTION: this tester has been designed to absolve to enamelled wire manufactures requests that need to carry out tests in different standards. Thanks to an industrial personal computer has been possible to implement all different functions to carry out tests automatically with print out of every measured value, an easy to use menu allow the operation of this tester to unskilled personnel too, while the tester is performing a test the operator can complete others duty.

- Suitable for wire diameter from 0.10 up to 1.60 mm (38 – 14 AWG).
- Five sample wires tested at same time.
- Digital temperature controller, resolution 1°C, accuracy > 0.2%.
- Complete set of weights.
- Automatic loading/unloading of test weights.
- Rising temperature adjustable from 1 up to 50°C/1'.
- Preheating and test time independently programmable from 1" up to 99'99".
- Fast test block re-cooling system.
- Maximum test block temperature 500°C.
- Automatic calculation of minimum, maximum, average and median temperature and standard deviation.
- Easy to use for unskilled personnel as well.
- Network capability.

TECHNICAL SPECIFICATIONS

Power supply	Compressed air	Dimensions	Weight
230V 50/60Hz 1phase 2500VA	4 – 6 bar	w 700 x h 680 x d 750 mm	48 kg 105.6 lb

Model TP-PC20



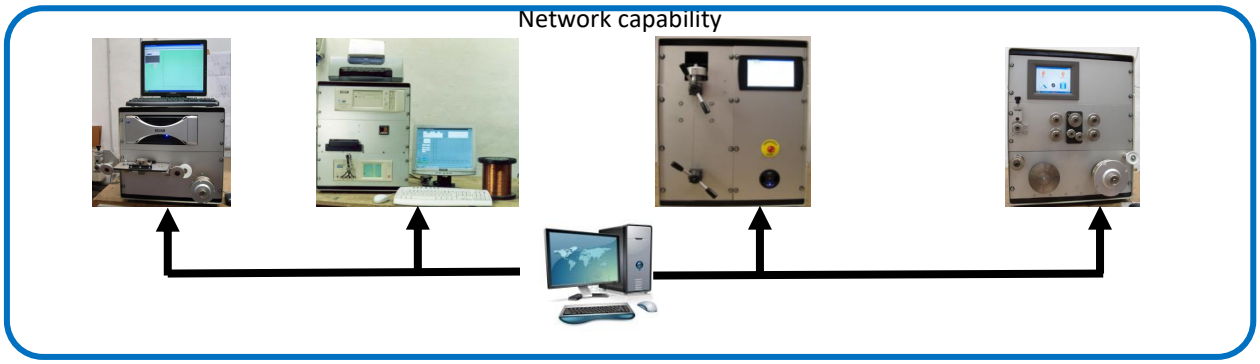
- Powerful advanced SQL data base, measures searching with filter application. Retrieving of measure for analysis.

- Multi-languages capability.

- Customised printout layout.
- Tele-assistance, for a fast technical intervention and software upgrading.

OPTION:

- T10 Test block suitable for simultaneous test of 10 samples, complete with test weights.
- T20 Test block suitable for simultaneous test of 20 samples, complete with test weights.



Data changes reserved

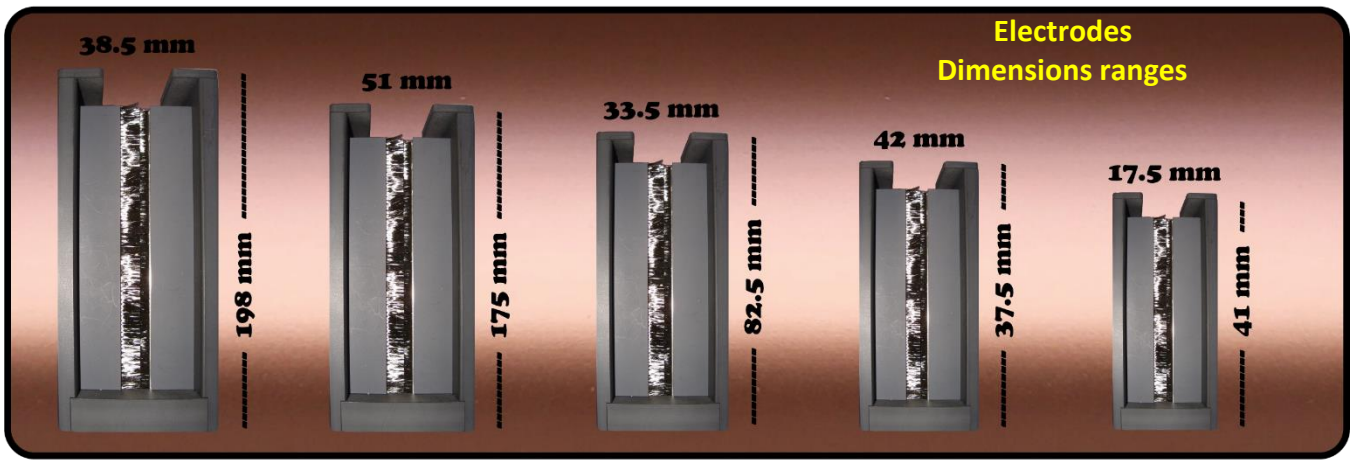
IN-LINE TEST

HAIR PIN TESTER mod. HP

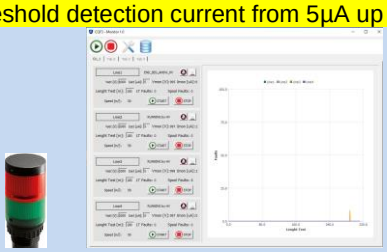
TEST PROCEDURE: The manufacturing process of the hair pins involves several processing steps: cutting the flat wire into the right length, stripping the ends and finally bending into the desired shape, obviously during each processing phase, the flat wire is subjected to mechanical stress that can compromise its characteristics of the insulating enamel, for this reason it is advisable to check the integrity of each single piece, before being inserted into the stator motor slot.

TECHNICAL SPECIFICATIONS

Model	Power supply	Dimensions	Weight
HP-PC	230Vac 50/60Hz 1phase 150VA	w 100 x d 160 x h 60 mm	1.7 kg 3.8 lb
HP-PLC	24Vdc 10W	w 100 x d 180 x h 50 mm	1.5 kg 3.3 lb
HP-MAN	24Vdc 10W	w 100 x d 180 x h 50 mm	1.8 kg 4 lb



Other sizes on request

Stand-alone operation	Pc operation	Manual operation
Test voltage and threshold current set on measuring head. Pass/no pass function.	Complete control and documentation up to 16 lines	Test voltage and threshold current set on measuring head.
Test voltage adjustable from 100V_{dc} up to 4000V_{dc}. Threshold detection current from 5µA up to 25µA.		
		
Customized replaceable electrodes with soft brushes Complete control of the whole hair pin area Wide choice of electrode dimensions Analog interface with plc Output of detected fault Maximum working speed 5 pins/1” Suitable for winding machine Simple installation	Customized replaceable electrodes with soft brushes Complete control of the whole hair pin area Wide choice of electrode dimensions Powerful data base Maximum working speed 5 pins/1” Simple installation	Hand held gun with soft carbon fibre brush and voltage enable switch Output of detected fault

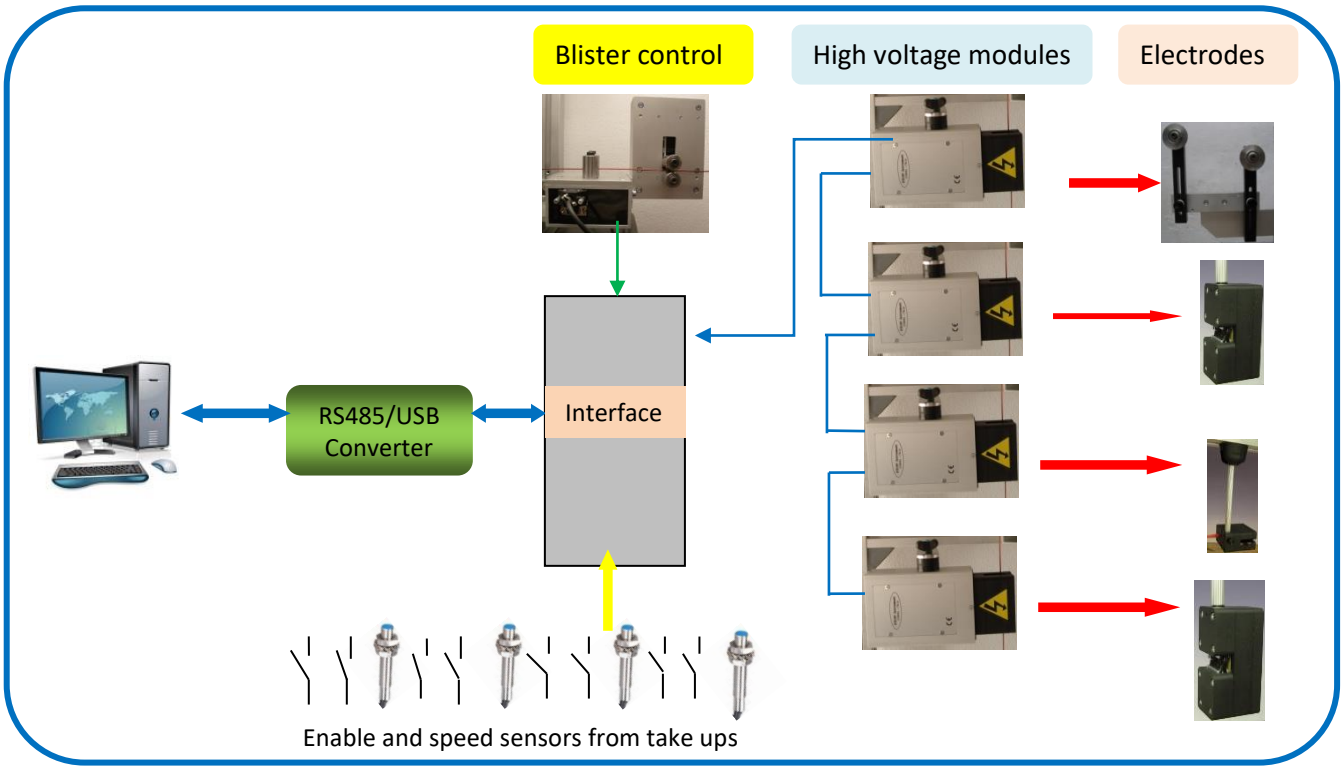
Data changes reserved

IN-LINE HIGH VOLTAGE CONTINUITY OF COVERING TESTER mod. LINCHECK

According to IEC 60851-5 (FIW)

The International specifications such IEC 60851-5.5.3 FIW1/10 and NEMA MW 1000 on enamelled wires applied all over the world, define some basic principles and general test methods that satisfy the requirements of most practical applications. New requirements therefore originated from producers and consumers of enamelled wires, the guarantee that the product satisfy the requirements from the beginning to the end of the reel.

With the in line high voltage continuity of covering tester, moreover to guarantee the enamelled wires be according to the requirements, drastically reduce the scrape and customers complains, because every defect will be detected.

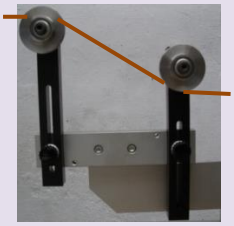


TECHNICAL SPECIFICATIONS	
Power supply	24Vdc 0.3A/each line
Dimensions	w 200 x d 120 x h 80 mm
Weight	1,4 kg 3.1 lb
Environmental temperature	5°C – 50°C
Environmental humidity	0 – 80% no condensation
Test voltage	100Vdc – 4000Vdc
Test current	5µA - 30µA
Response time	< 1mS
Production speed	Up to 1000 m/1’
Serial interface	Multidrop RS485
Data base	Advanced SQL
Standard	IEC60851-5.5.3 FIW1/10
	NEMA MW1000-2008
According to **CE**	EN 61000-6-2:2005
	EN 60204-1:2006
	EN 61000-6-4:2007

Items included

High voltage module with
Electrode at choice: ER (round)
EF (flat)
RS485/USB converter
All connectors, or
Separate electrode: EP (round)
ER (round)
EF (flat)
1.5 m high voltage cable

ELECTRODES: A wide choice of electrodes are available to meet the customer requirements:



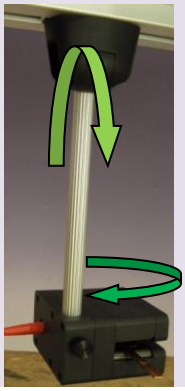
Model EP

Pulleys electrode, suitable for round wire up to 1.00 mm.
Adjustable contact angle.
Stainless pulleys with low friction ball bearings.
Dimensions and weight: w 200 x 80 x h 220 mm 1.2 kg
Pulleys groove diameter 40 mm

Model ER

Carbon fibre electrode, suitable for round wire

range from 0.005 mm up to 6.0 mm.
With its very soft brushes, diameter of each fibre is 7µm, avoid damage or excessive stress to the enamelled wire.
Enamelled wire is completely surrounded.
Supplied with electrode holder which allows a high degree of positioning in every direction.
Easy to maintain
Dimensions and weight: 40 x 50 x h 100 mm 320 g

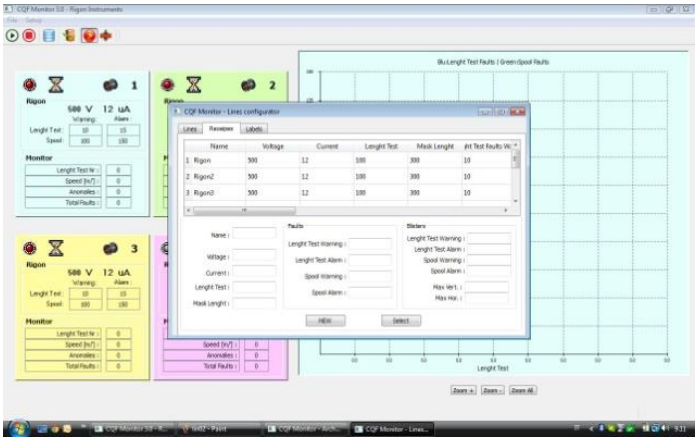


Model EF

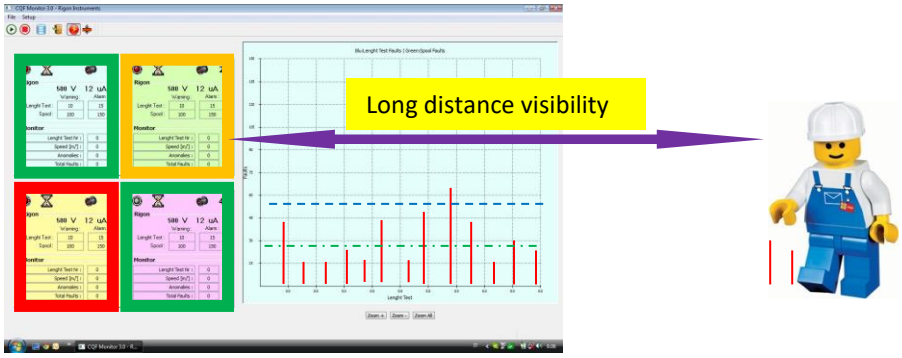
Carbon fibre electrode, suitable for flat  and oval wire 
Thickness from 0.5 mm up to 8 mm, wide from 0.5 mm up to 25 mm.

With its very soft brushes, diameter of each fibre is 7µm, avoid damage or excessive stress to the enamelled wire.
Enamelled wire is completely surrounded.
Supplied with electrode holder which allows a high degree of positioning in every direction.
Easy to maintain
Dimensions and weight: 75 x 80 x h 45 mm 380 g

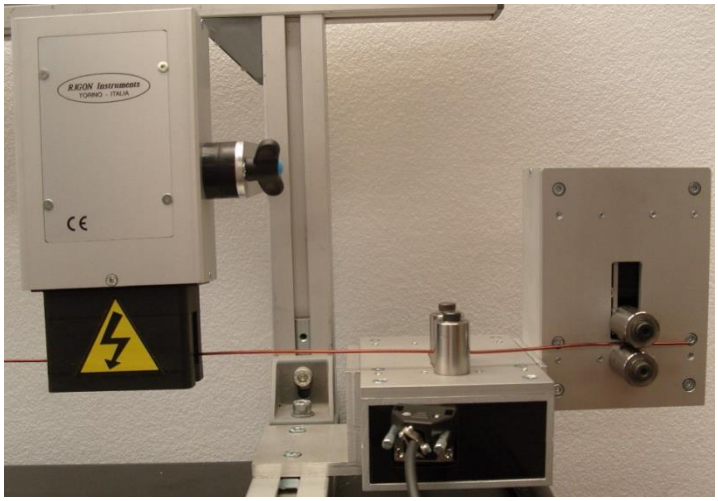
SOFTWARE: The software program runs under Windows10® professional 64-bit application, it allows to set all test parameters such test voltage and current, set the pre-alarm and alarm thresholds, which alert the operator about the anomalies in every test length which can be set from 1 to 1000 m.



Pre-alarm and alarm indications are visible at very long distance, by changing the setting parameter of each line, while the acoustic alarm is activated only for alarm conditions.



All data are stored in a SQL data base for further analysis. A statistical graphic trend is available for each line to determine in which points of reel the faults are. At the end of each reel with a command from the take up a report page or label is printed out with the main test conditions and data acquired. With an optional barcode reader, it's possible input the wire identification avoiding time loss. The room pc could be connected to a host computer used to supervise the whole factory production.



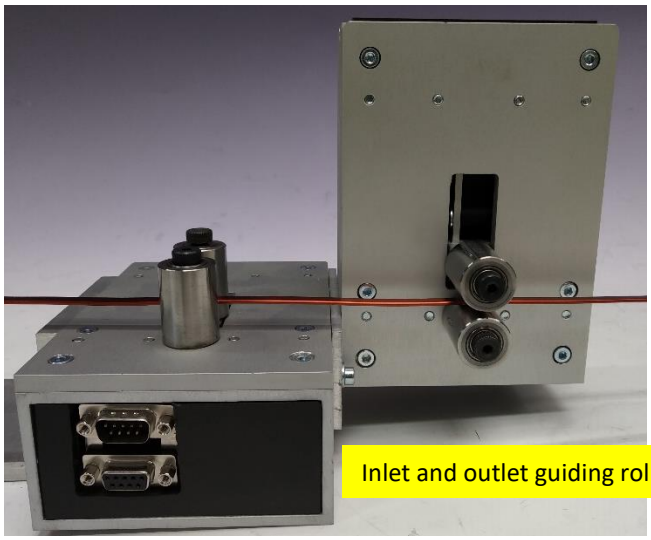
IN-LINE WIRE SURFACE DETECTOR mod. WSD

The surface control on enamelled conductor plays an important role during the production, it allows to detect in real time any anomaly of insulating application, with obviously benefits in terms of productivity scrape return and company image.

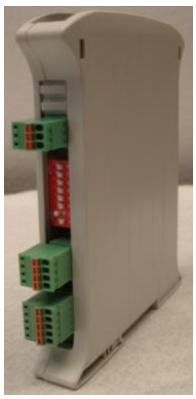
- For rectangular wire with maximum dimensions of 30 x 6 mm.
- Minimum detectable surface variation 0,05 mm.
- Device to monitor speed and meter counting included.
- Possibility to integrate the high voltage continuity of covering device up to 4000 V.
- Two threshold for maximum admissible anomalies with acoustic/visible alarm.
- RS 485 output for multipoint connection to supervise the test parameters.
- Graphical trend representation for each line.
- Individual working recipes.
- Report printout at end of spool.

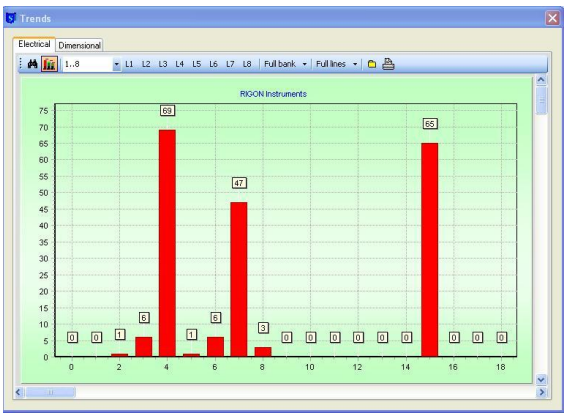
TECHNICAL SPECIFICATIONS

Power supply	Dimensions	Weight
Module 24Vdc 10W	w 310 x d 100 x h 220 mm	4 kg 8.8 lb



Inlet and outlet guiding rollers necessary





Data changes reserved

IN-LINE HIGH VOLTAGE CONTINUITY OF COVERING TESTER mod. LINMON

According to IEC 60851-5 (FIW)

Checking the continuity of covering during the production process guarantees the quality of the enamelled wire from the beginning to the end of the reel, and also allows rapid intervention if a fault is detected, thus drastically reducing waste and the number of returns by end-user.

The equipment is composed from a base unit, in which are inserted the commands to adjust the test voltage and current, the digital fault counter, with alarm of maximum admissible faults.
One pulleys electrode, with built-in the high voltage generator and detection circuit, the electrode is fed by means a multipolar cable complete of connector to link the base unit, The cable with a crocodile to connect the bare wire is supplied as well.

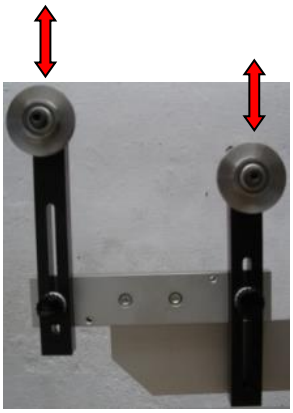
- Test voltage individually adjustable from 350 up to 4000 Vdc.
- Sensitivity individually adjustable from 5 up to 30 μA.
- Wide range of test electrode in conformity to the standards or customer specifications.
- Interfaceable with plc

TECHNICAL SPECIFICATIONS

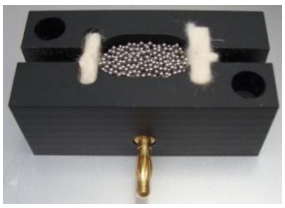
Power supply	Dimensions	Weight
24Vdc 10W	w 260 x h 120 x d 150 mm	1,5 kg 3.3 lb

LINMON

Electrode ER



Electrode EP



Electrode ES

Options:

- EP Pulleys electrode
- ER Carbon fiber electrode
- ES Metal balls electrode.

Data changes reserved

TRANSPOSED CABLE FAULT FINDER mod. PF, PF1, PF-AC

STANDARD: ABB 1ZBA166001-1

During the strip wire transposed cables, short circuit are formed between adjacent strips, generally caused by the action of strip former hammer or by metal particles which pressed by the stranding machine or by caterpuller, punch the strip insulated layer. For this reason, it's necessary detect such defect already during the cable production and then during rewinding. The test is performed applying an alternate voltage between the different wire pairs, in case of anomaly, a special hand-held detection sensor is used to localise the right short circuit position and hence proceed for its reparation.

To control strand to strand fault according to ABB1ZBA16601-1, a second adjustable test voltage from 0 up to 500 Vdc is available, a couple of safety test leads, apply test voltage only at wires completely in, at the end of test, the wire pair under test are short circuited to discharge the residual voltage accumulated avoiding undesirable electrical shock.

- Test methods: - 24Vac 1,2KHz, fault to locate the fault point. (mod. PF, PF1)
  - From 0V up to 500 Vdc, fault current 5mA, suitable to test the continuity of covering according to ABB1ZBA 16600-1 standard. (mod. PF, PF1)
  - Pulse with adjustable test voltage, frequency and duty cycle from 0 up to 500Vdc, 1 up to 20KHz 10 – 90% and single shot. (mod. PF1).
  - Test voltage 300 Vac line frequency, threshold fault current 3 to 10 mA (mod. PF-AC)
- Supplied complete of test cables.
- Digital voltmeter to monitor dc test voltage (mod. PF).
- Touch screen pc (mod. PF1).
- Sound/visual alarm for anomaly signalling.
- Hand held sensor with sensibility adjustment for fault localisation.

TECHNICAL SPECIFICATIONS

Model	Power supply	Dimensions (w x d x h) mm	Weight kg (lb)
PF	100 - 240Vac 50/60 Hz single phase 200VA	240 x 360 x 180	11 (22,2)
PF1	100 – 240 Vac 40/60 Hz single phase 250 VA	420 x 360 x 180	13 (28,6)
PF-AC	230Vac 50/60 Hz single phase 25VA	240 x 360 x 180	8 (17,6)

mod. PF

mod. PF1

mod. PF-AC

OPTION:

- V1K Test voltage 1000V_{dc}

Data changes reserved

IN-LINE TRANSPOSED CABLE TESTER mod. TCT, TCT1

TEST PROCEDURE: During strip wire transposed cables production, short circuit are formed between adjacent strip, generally caused by metal particles which pressed by the stranding machine or by caterpillar, punch the strip insulated layer. For this reason, it's necessary detect such defects already during the cable production. A continuous stabilised test voltage is applied at the end of each group of strip wire, while a suitable detecting circuit will report every anomaly.

- Test voltage during production 24 – 48 – 72 Vdc.
- Voltage adjustable up to 500 Vdc for final continuity of covering test (model TCT1).
- Detecting current 5 mA.
- Self-test of detecting circuit.
- Alarm report on alphanumerical display (model TCT), computer controlled (model TCT1).
- Test report printout (model TCT1).
- Stop stranding machine intervention adjustable via keyboard.
- Supplied with on board connection box and numbered cables up to 81 strips, complete of plugs and jaws.

TECHNICAL SPECIFICATIONS

Model	Power supply	Dimensions	Weight
TCT	230 Vac 50/60Hz 1 phase 80VA	w 500 x d 550 x h 300 mm	14 kg 30,8 lb
TCT1	230 Vac 50/60Hz 1 phase 400VA	w 800 x d 600 x h 900 mm	38 kg 83,6 lb

OPTIONS

- COL Collector complete of brushes holder on reel board

model TCT

model TCT1

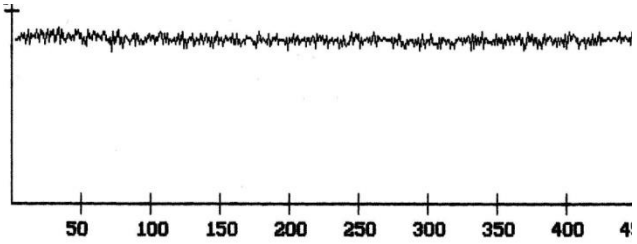
Data changes reserved

FLAT WIRE STRAIGHTENER mod. FWS

The rectangular wire after annealed and before the enamel process must straightened at a right value of CPR, to obtain the physical property and dimension after enamelled, especially for the yield point Rp 0.1 and Rp 0.2.
The systems so far used don't allow to reach reliable and repetitive results.
With the introduction of a load cell, it is possible apply and control to the straightener rollers the right force.

- Manual regulation model FWS.
- Graphical representation of straight force model FWS-PC.

PRELIMINARY



Model	Copper flat wire area mm²	Aluminium flat wire area mm²	Dimensions and weight	Power supply
FWS1	10.0	25.0	200 x 300 x 120 mm 14 kg	24V – 230Vac 40/60Hz 10VA
FWS2	25.0	50.0		
FWS3	50.0	100.0		
FSW4	100.0	200.0	250 x 300 x 150 mm 18 kg	
FSW5	250.0	500.0		

Data changes reserved

ACCESSORIES

- WIRE POINTER	WP	93
- WIRE LUBRICANT	WL	94

WIRE POINTNER mod. WP

The ultimate innovation in the wire drawing department

- Pull the wire by hand.
- Use Jurrasic items such files, heavy transformers.
- Fatigue to the operators.
- Losses of time.

- Now you can thread-up your drawing machine without any stress and faster.
- Just insert your copper or aluminium wire (diameter from 2 up to 8 mm, automatically it will be sharpened
- Aluminium frame trolley.
- Photocell to detect the wire inlet.
- Ten meters extension cable.
- Electronically driven.

Power supply	Outline Dimensions	Weight
230V 50/60 Hz single phase 180VA	w 500 x d 410 x h 1200 mm	23 kg 50,6 lb

Data changes reserved

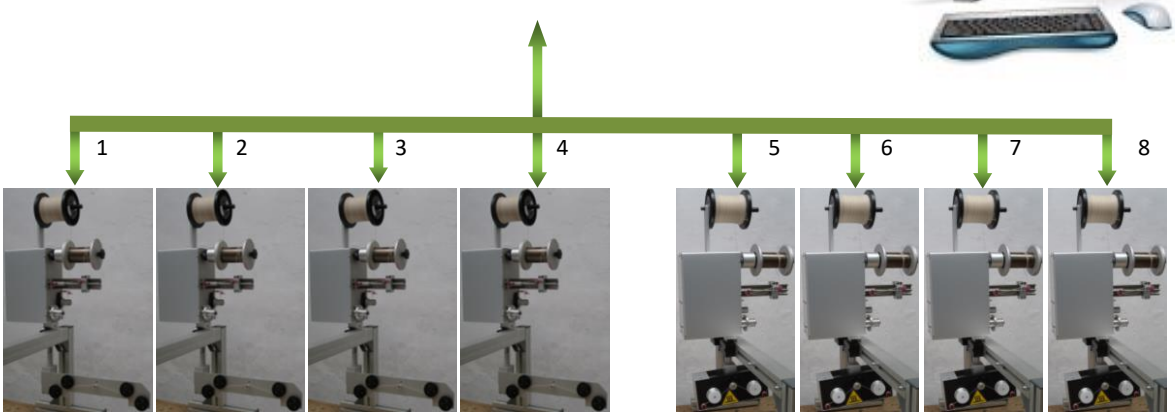
WIRE LUBRICANT mod. WL

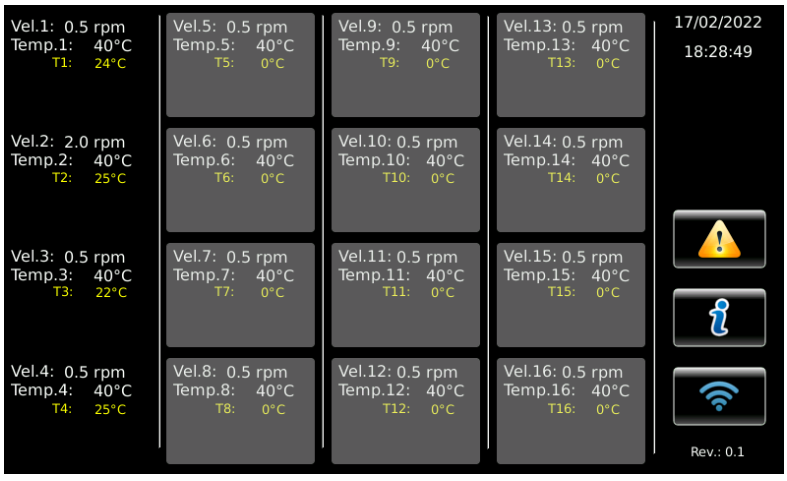
The lubrication of enamelled wire is an essential part for the finished product, a right quantity of lubricant avoids undesirable stress to the wire while it is wound, especially in the high speed winders.
There are many systems to apply wax on surface of enamelled wire, most of them are inaccurate, fire hazard, air pollution, workers health concerns, etc.

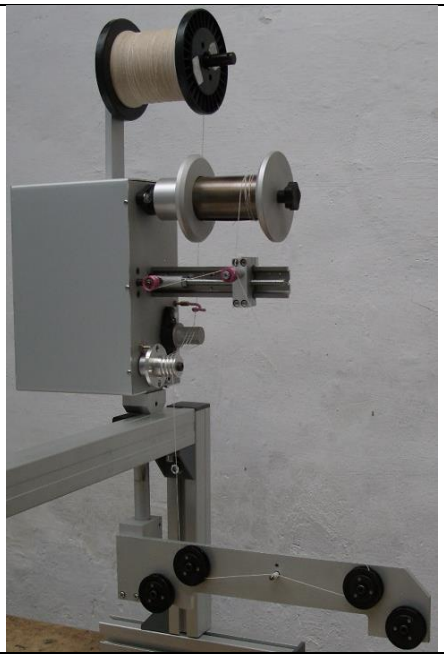
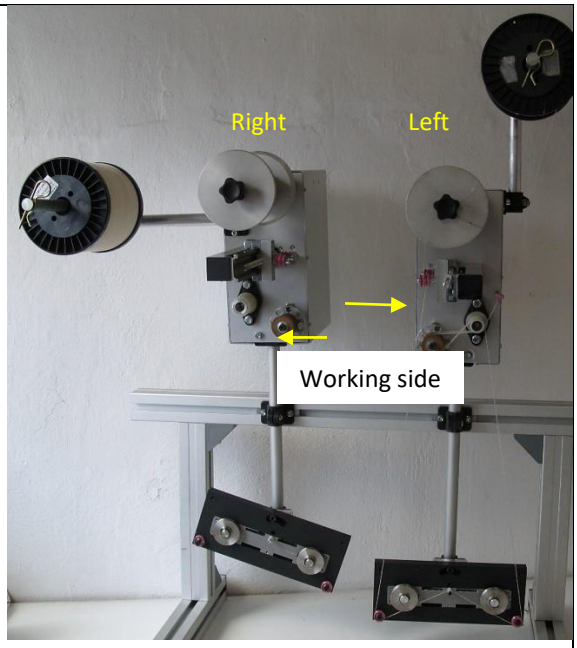
With wire lubricant WL, wax is taken out from a solid lubricated yarn, the right quantity of wax is simply applied by adjusting the yarn speed, without necessity to set error compensation.

Control unit

Suitable for 1 up to 16 independent applicators.
Available interconnections with enameling machine
Plc with HMI with 4 lines text display.
Option:
Serial interface to pc connection





Rigon Instruments Torino - Italy		
Application	Single line enamelling machine (right / left) Multi-lines enamelling machine Hot wires	Single line enamelling machine (right/ left) Multi-lines enamelling machine Cold wires
Mounting position	Oven outlet	Before take up
Wire diameter range	0.12 – 4.0 mm	0.12 – 4.0 mm
V x D range (Wax quantity 9 – 75mg/m^2)	Wheel dia. 17 mm: 15 - 100 Wheel dia. 32 mm: 30 - 200	Wheel dia. 17 mm: 15 - 100 Wheel dia. 32 mm: 30 - 200
Wax heating temperature	Minimum wax melting point	40°C – 105°C
Pulling rotation speed	1 – 7 rpm electronically controlled	
Power supply	100 – 240V single phase 40/60Hz 30VA	100 – 240V single phase 40/60 Hz 60VA
Input	Start/Stop dry contact or 24Vdc 10mA	
Output	Yarn alarm SPST 2A 250Vac	Alarms: Yarn SPST 2A 250Vac Temperature SPST 2A 250Vac
Dimensions and weight:	Unit: w 600 x d 450 x h 380 mm 22 kg Hot wire applicator: w 410 x d 40 x h 80 mm 1.5 kg Cold wire applicator: w 240 x d 90 x 100 mm 1.2 kg	

Data changes reserved

OUR CUSTOMERS

CUSTOMERS	COUNTRY	EQUIPMENT
AB DAHRENTRAD	Sweden	1
ABB FINLAND	Finland	2
ABB POLSKA	Poland	2
ABB USA	U.S.A.	1
AC ARGENTINA	Argentina	5
ACEBSA	Spain	8
ACL-KELANI	Sri-Lanka	4
ACOME	France	7
AL FANAR	Saudi Arabia	2
AL-AHLEIA SWITCHGEAR	Saudi Arabia	4
ALBESIANO SISA VERNICI	Italy	1
AL-FANAR	Saudi Arabia	2
ALLIED MOTION PORTUGAL	Portugal	3
AMETEK	Italy	9
ANHUI TONGDU COPPER WIRE	China	4
ARCELIK	Turkey	4
ARCELIK COMPRESSOR	Turkey	8
ASAP	Germany	3
ASTA	China	2
ASTA CONDUCTORS	India	1
ASTA INC.	U.S.A.	1
ATOP	Italy	3
AUSTECH	Australia	8
AXIS	Italy	1
B&D TRANSFORMER	Indonesia	1
BEICO	India	1
BEMKA	Turkey	11
BITRON	Italy	2
BITRON ELEKTROMEKANIK	Turkey	1
BITRON INDUSTRIE	Spain	2
BONTAZ CENTRE MAROC	Morocco	1
BONTAZ CENTRE PORTUGAL	Portugal	1
BONTAZ CENTRE RD	France	1
BONTAZ SHANGHAI	China	1
BRAMMER	France	1
BSH DRIVE AND PUMPS	Slovakia	2
CABLES de COMUNICACCIONES ZARAGOZA	Spain	1
CAFCA	Zimbabwe	1
CARAIBA METAIS	Brazil	2
CARLO COLOMBO	Italy	2
CEBI	Italy	1
CEBI MICROMOTORS SWITZERLAND	Switzerland	2
CEROS	Italy	11
CHANDRA-PROTECO	India	2
CHANGZHOU WELLYUN ELECTRICAL	China	1
CHAPLIN WIRE	England	1
CHUANG SHEN	Taiwan	2
CN WIRE	U.S.A.	1
COMELIT	Italy	2
COMELIT POLAND	Poland	3
CONDUCEN	Costa Rica	2
CONDUMEX	Mexico	13
CORFIO	Brazil	10
CPT ZWEI	Germany	1
CUPROM	Romania	1
DAIMLER	Germany	2
DE ANGELI PRODOTTI	Italy	12
DENSO	Italy	2
DOMEL	Slovenia	2
DOO-SUNG	Korea	1
DRAKA PHILIPPINES	Philippines	2
DUCATI ENERGIA	Italy	2
EDERFIL	Spain	7
EL SEWEDY CABLES	Syria	11
EL SEWEDY TRANSFORMER	Egypt	1
ELANTAS EUROPE	Italy	20
ELBI INTERNATIONAL	Italy	1
ELE.CON	Italy	2
ELECTRIC COIL MOTOR	Canada	2
ELECTRO CABLE EGYPT	Egypt	2
ELECTRO CABLES	Ecuador	1
ELECTROCONDUCTORES	Venezuela	1
ELECTROLUX	France	3

ELECTROMECANICAS ABIEGA	Spain	1
ELETTRO BRESCIA	Italy	2
ELSAN	Turkey	3
ELTEK	Italy	1
ELTEK POLAND	Poland	2
ELTRON POLAND	Poland	1
EMBRACO SLOVAKIA	Slovakia	1
EMERSON ELECTRIC	Slovakia	1
EMKA	Bulgaria	7
ENERGYA	Egypt	18
ENICAB	Algeria	17
EPCOS Elektrnikal Alkatres	Hungry	1
ER-BAKIR	Turkey	1
ERIC INDUSTRIES	Belarus	4
ERIKOGLU	Turkey	1
ESSEX	England	1
ESSEX FURUKAWA BALKAN	Serbia	13
ESSEX FURUKAWA GERMANY	Germany	3
ESSEX FURUKAWA GROUP	U.S.A	2
ESSEX ITALY	Italy	25
ESSEX MEXICO	Mexico	1
ESSEX PORTUGAL	Portugal	2
ESSEX S.A.S. IVA	France	5
EUROMOTORS	Italy	2
EVERBEST CABLE	Hong Kong	1
FABRYKA LAK ZICE	Serbia	1
FAET	Italy	2
FD SIMS	England	5
FICAP	Brazil	5
FUZHOU DARTONG M & E	China	1
G.C.E. CABLES	Italy	1
GAMAK	Turkey	5
GATE	Italy	1
GEBAUER & GRILLER	Austria	1
GEBAUER & GRILLER	Austria	1
GERARDO BECKER	Spain	7
GIZA CABLE INDUSTRIES	Egypt	1
GLOSER	Italy	2
GRENE WIND INDUSTRY SUPPLIES	Denmark	1
GUANGDONG JINGDA REA	China	1
GUANGDONG RONSEN	China	1
HELFONT-CONDUPLAST	Brazil	2
HELKAMA BICA	Finland	1
HELLENIC CABLE	Greece	6
HERCULES MOTORES ELETRICOS	Brazil	1
HES HACILAR ELEKTRIK	Turkey	1
HES KABLO	Turkey	3
HYESUNG	Korea	1
I.T.E.	Italy	4
IB-MEI	Spain	6
IG IRAPUATO	Mexico	1
IMSA ARGENTINA	Argentina	1
INATRA	Ecuador	3
INECSA	Spain	1
IRAN TRANSFO	Iran	3
IRCE	Italy	29 (+ Isolcable)
IUSA	Mexico	3
JIANGSU QINGJIANG ELECTRIC MOTOR	China	10
KASHAN MAGNET WIRE INDUSTRIES	Iran	18
KC INDUSTRIE	Italy	2
KCEL	Brazil	2
KENTUCKY CABLE	USA	2
K-FIL EMAILLE	Algeria	7
KOOSHKAN TRANSFORMER	Iran	3
KOPOS KABLO KOLIN	Czech Republic	7
KSB PMPA ARMATUR	Turkey	6
KSH INTERNATIONAL	India	1
KUVAG	Austria	1
L.PI.EMME	Italy	4
LAC SIM	Iran	3
LANGER Wicklungsdrähte	Switzerland	2
LEONI	Italy	1
LEROY SOMER	France	2
LES CABLERIES DU MAROC	Morocco	5
LIAKA	Iran	1
LIBAN CABLES	Lebanon	2
LOUSANO COND. ELETR	Brazil	6
MAG	Austria	1

MAGNEKON	Mexico	7
MAGNETI MARELLI	Italy	4
MARELLI MOTORI	Italy	2
MARKAZI ENAMELING WIRE CO	Iran	9
MATCO	Saudi Arabia	15
MECSUD	Italy	2
MEDTRONIC	USA	1
MICROCONTROL	Italy	1
MICROPROVOD	Russia	3
MOTO GEN	Iran	1
MOVINGLOBE	Hungary	2
NEWTECH	Italy	12
NEXANS NORWAY	Norway	1
NEXANS SUISSE	Switzerland	1
NEXANS WIRES	France	3 (+ Safi Conel)
NGO HAN CO. LTD.	Vietnam	8
NKT	Germany	1
NUHAS OMAN	Sultanate of Oman	9
OCREM	Italy	2
OP CABLE	Ceca	1
ORBITEL CABLES	Spain	1
OUTOKUMPU COPPER SUPERCONDUCTORS	Italy	4
PASQUA	Brazil	1
PBMV	Italy	1
PHILIPS LIGHTING	Poland	1
PIERBURG MIKUNI PUMP TECHNOLOGY	China	2
PLASTICABLE	Ivory Coast	1
POLYPIPE	England	1
PPE Fios Esmaltados	Brazil	4
PRECISION WIRE	India	5
PRYSMIAN Mkm HUNGARIAN CABLE WORKS	Hungary	1
RAMA PARSIAN	Iran	5
RATIONAL ENGINEERS	India	1
RENAULT	France	1
RISATTI	Italy	1
ROBERT BOSCH	Germany	4
ROBERT BOSCH SPAIN	Spain	1
RONSEN	China	2
ROSHOW	China	6
SACOM WIRES AND CABLES	Vietnam	8
SAES GETTERS	Italy	4
SAM JIN WIRE	South Korea	1
SAMDONG	Korea	7
SAMDONG EUROPE	Poland	1
SAMDONG INC.	USA	3
SAO MARCO	Brazil	2
SCET MAGNET WIRE	Italy	17
SCHEFFLER TECHNOLOGIES	Germany	3
SCHENECTADY	China	2
SCHWA-MEDICO	Germany	1
SCHWERING & HASSE ELEKTRODRAHT	Germany	9
SCINTILLA	Russia	1
SECOP	Cech republic	8
SEG AUTOMOTIVE SPAIN	Spain	4
SEIKA SANGYO	Japan	4
SETIC	France	1
SETRESA	Spain	4
SHANGHAI DEAN ELECTRICAL	China	13
SHANGHAI HITACHI	China	1
SHREE CABLES & CONDUCTORS	India	1
SICME ITALIA IMPIANTI	Italy	118
SICTRA	Italy	1
SIEMENS ELEKTROMOTORY	Czech Republic	2
SIEMENS EP	Russia	1
SIGI	Italy	2
SIM LACKI KHORASAN	Iran	1
SITEM	Tunisia	1
SLASKA FABRYKA KABLI	Poland	6
SOFFIERIA BERTOLINI	Italy	1
SOLE	Italy	5
SUPER CABLES	Algeria	1
SYNFLEX	Germany	3
SYRIAN MODERN CABLE	Syria	*16*
TA YA	Taiwan	1
TAIHAN COPPER WIRE	Korea	2
TAI-I	China	1
TAU INDUSTRIES	Russia	3
TECUMSEH	Brazil	1

TONGLING JINGGONG	China	3
TONGLING NON FERROUS METALS	China	1
TONGLING TINC0 TINNED WIRES	China	2
TOTAL marketing service	France	1
TRA.SMA	Italy	18
TREFI CUIVRE	Algeria	10
TREMASA	Spain	6
TRIPLE FIVE TRUCKING SOLUTIONS	South Africa	5
TROPICAL CABLE	Ghana	1
TYCAN AUSTRALIA	Australia	3
UNITED CABLE COMPANY	Russia	8
UNITED INDUSTRIES EL SEWEDY	Egypt	26
UNITED TRANSFORMER ELECTRIC	Saudi Arabia	11
UNIVERSITE D'ARTOIS	France	2
UzEraeCables	Uzbekistan	7
VALEO	Brazil	1
VALEO	France	1
VALEO WENLING ZHEJIANG	China	1
VDE PRUF	Germany	5
VENTS	Ukraine	1
VESTAS	Germany	1
VIAKABLE MANUFACTURING	U.S.A.	1
VICENTE TORNS SLOVAKIA	Slovakia	16
VOKSEL	Indonesia	1
VOLT ELEKTRIK MOTOR	Turkey	9
VON ROLL FRANCE	France	3
WEG MOTORES	Brazil	1
WESTRAL INSULATED PRODUCTS	Australia	1
XI'AN YUSHENG	China	7
ZANGAN DISTRIBUTION TRANSFORMER	Iran	3
ZHEJIANG LUXIAO	China	1
ZLT	Hungary	1
ZML INDUSTRIES	Italy	23

Updated to 2020.10.30th

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