

RISHI M50 CARBON - BRUSH FORCE METER

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TECHNICAL CHARACTERISTICS

RANGES

0,01 - 5,00 kg
0,1 - 50,0 N

ACCURACY

- +/- 2% of full scale deflection, with force applied in the centre of the probe.
- +/- 1% within a window of 2 kg, previous instrument calibration with sample weight.

DISPLAY

By means of dot matrix lcd display.

RESOLUTION

10 g.
0,1 N.

PROBE

- Miniaturized
- Plug connected
- Interchangeable, previous instrument recalibration
- Neonite envelope, electrically insulating
- Head with "V" and cylindrical recess (standard SM5 probe)
- Flat probe on request (SM5/F : without "V" and cylindrical recess)
- New special strain gauge bridge sensor built-in

POWER SUPPLY

4 x 1,5V battery (LR6 AA 1,5V).

DIMENSION

- instrument : 180 x 100 x 45 mm.
- probe SM5 (supplied standard probe) : 16 x 10 x 8 mm.
- flat probe SM5/F (on request) : 16 x 10 x 7 mm.
- carrying case : 190 x 150 x 55 mm.

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GUARANTEE

12 months guarantee on material and labour.
Guarantee is not applied to SM5 probes and in case of opening or improper use.

RESPONSIBILITY

RISHI responsibility is limited to what is established by the guarantee terms. Other responsibilities for direct or indirect damages caused by use of instruments or their parts are not considered.
The user is responsible of safety.

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RISHI M50

Instruction manual 01/08

RISHIKESH reserves the right to change the specification or design without prior notice.

Fully complies with CE directives



RAEE complies



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REPLACEMENT OF THE PROBE **NEW CALIBRATION PROCEDURE**

Probes are interchangeable previous instrument recalibration.
New recalibration can be made in factory or by the user, using the optional RISHI ST200 Calibration System, that is also used to periodically check the correct calibration and functionality of the probe. ST200 Calibration System is supplied with 2 kg sample weight.

NEW CALIBRATION PROCEDURE

Carry out the New Calibration Procedure only when the probe is replaced.

To carry out a new calibration it is useful the ST200 Calibration System with the 2 kg sample weight.

- 1) Switch off the instrument.
- 2) Plug the new SM5 probe to be calibrated in the connecting socket.
Do not apply any load over the probe.
- 3) While keeping the **ZERO** button pressed, press **ON** button.
- 4) Release the buttons (it does not matter in which order) : display will shows "calibr." and after a few seconds display will shows a number (i.e. "2.88" or "4,21").
- 5) Press **ZERO** buttons: display will shows ".00".
- 6) Put the SM5 probe to be calibrated under the ST200 Calibration System.
- 7) Apply the 2 kg sample weight.
- 8) Press **CAL**: display will shows "2,00 kg".
- 9) Take off the 2 kg sample weight from the probe.
- 10) Switch off the instrument pressing **ON/OFF** button.
- 11) The Calibration Procedure has ended : the new probes is now calibrated.

To start the measurements with new probe press the **ON/OFF** button to switch on the instrument.

In a few seconds display will shows "V 1.04... wait... .00KG".
Whenever the instrument will be switched on (with the plugged in probe), it will automatically carry out the Autozero procedure.
Always switch on the instrument without load over the probe.

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WEIGHT

instrument + SM5 probe + carrying case : 0,500 kg.

ACCESSORIES (supplied)

- SM5 probe, with lead and connecting plug
- instruction manual
- carrying case
- 4 x 1,5V LR6 AA battery

OPTIONAL ACCESSORIES

- ST200 Calibration System with 2 kg sample weight
- SM5 spare probe (standard, with "V" and cylindrical recess).
- SM5/F flat spare probe (on request, without "V" and cylin. recess).

Fully complies with CE directives.

CAUTION IN USE

- Do not exceed the maximum probe load : 5 kg (50,0 N).
- Use the probe very carefully, do not fold or pull the cable.
- In case you do not use the instrument for a long time, take off the battery from the case.

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THEORY and PURPOSE

The carbon - brush force meter **RISHI M50** is a new microprocessed instrument, designed and manufactured by RISHI, suitable for the rapid and precise measurement of the force applied by brush holder springs on the brushes of rotating electrical machines.

In the industrial rotating electrical machines (steel mill motors, railways traction motors, power plant generators and so on), to know the correct spring pressure is of capital importance for the efficiency of the electrical machines themselves, to avoid big and expensive damages to their commutators and/or slip rings.

The correct spring pressure is obtained by dividing the force of the brush holder spring by the area of the brush contact surface. For example, if a pressure of 200 g/cm² should be applied to a brush of a certain grade, having the contact surface with section dimension 25 x 38 mm (9,5 cm²) the correct force that the brush holder spring should give to the brush will be 1,9 kg (9,5 cm² x 200 g/cm² = 1.900 g = 1,9 kg). This is just the value which should be measured before the brush mounting, and which should be periodically checked.

Discordances plus/minus from the correct pressure value, prescribed for a certain brush grade, can cause serious problems, both to brushes and commutators or slip rings : sparking, brush breakage, excessive or uneven brush wear, increased commutator wear.

In fact, insufficient pressure on the brush will favour possible brush jumping on commutator, specially in presence of vibrations, causing harmful sparkings and consequent burnings on commutator. Moreover, the brush will be submitted to an anomalous electric wear, which just occurs in case of sparkings and contact interruptions between brush and commutator, which will cause the brush to wear out very quickly. On the other hand, an excessive pressure on brush will cause higher friction between brush and commutator, with consequent commutator abrasion, brush wear and overheating of both brush and commutator.

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OPERATING PROCEDURE

- **RISHI M50** is supplied with the SM5 probe already calibrated.
- It is not necessary to carry out a calibration.
- New calibration is to be carried out only when the probes is changed.
- For a new calibration refer to page 10 "Replacement of the probe - New Calibration Procedure".

- 1) Plug the SM5 probe in the connecting socket.
- 2) Press the **ON/OFF** button to switch on the instrument.
In a few seconds display shows "V 1.04... wait... .00KG".
Whenever the instrument will be switched on (with the plugged in probe), it will automatically carry out the Autozero procedure.
Always switch on the instrument without load over the probe.
- 3) Display will indicate ".00 kg".
- 4) Select readout in kg or Newton by pressing the **KG/N** button.
- 5) Do not press the **ZERO** and **CAL** buttons : use this controls only to carry out a new calibration procedure (when the probe is replaced).
Anyway, during the normal use of instrument, the ZERO and CAL button are not working.
- 6) Proceed in the measurement of the force, use the probe very carefully, do not fold or pull the cable, and do not exceed the maximum probe load (5,00 kg - 50,0 N).

Battery recharging

Change the battery when during use appears the "B" indication on display. Use 4x1,5V LR6 AA battery.

Error messages

If a defect of the probe or an error in measurement occurs, the display will shows an error message as follows :

- "over rng" : over range, appears when the probe is not connected, or is defected, or when the probe is loaded over 5 kg.
- "er.sonda" : probe error, appears when the probe is defected.
- "B" : appears when the battery is discharge.

GENERAL DESCRIPTION

New **RISHI M50** is a completely microprocessed instrument, with Autozero function, that permits easy, accurate and reliable measurements.

New **SM5** probes are development to offer better accuracy, reliability and strength.

- Compact, rugged, small, light-weight, handy and simple to use instrument.
- Large dot matrix LCD display, for a perfect readability.
- Double range in kilograms and Newton, switch selectable.
- Accuracy and reliability in measurements.
- Autozero function.
- Low battery indication on display.
- Message errors on display.
- New SM5 probes with new strain gauge bridge sensor built-in , for better accuracy, reliability and strength.
- Battery power supply, which allows the instrument to be used for a long time, also outside premises.
- Instrument case in anti shock plastic material.
- Interchangeable probes, previous instrument recalibration.
- Carrying case as supplied accessory.

RISHI SM5 MEASURING PROBE

The SM5 measuring probe has been made with an envelope of neonite, epoxidic thermosetting glass loaded material, electrically insulating, for which verifications on working machines are possible (although this operations is not advisable, owing to obvious general safety rules). Moreover its smallest sizes allow the probe insertion into brush holder boxes having section dimension from 12x20mm onwards; anyway, it is possible to make measurements, through suitable technical contrivances, on any type of brush holder.

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The measuring probe head, in order to allow the positioning of brush holder springs as precise and possible, is shaped as follows :

- “V” slot, 120° wide, suitable for curled constant force, or clock spiral with normal pressure finger, brush holder springs; the slot vertex has a higher geometrical level in respect to the probe body edge, in order to avoid that particularly wide and convex pressure finger can touch the above mentioned edge, so causing a false measure result (often occurring on brush holders for railways traction motors);
- central cylindric recess, with diameter 5 mm and depth 1,5 mm, for the positioning of cylindric pressure finger of helicoidal spiral brush holder springs;
- on request, a “flat” probe is supplied (SM5/F flat probe, without “V” and cylindrical recess).

Replacement of the SM5 probe

Probes are interchangeable previous instrument recalibration, to be made in factory or by the user, by means of the optional RISHI ST200 Calibration System with 2 kg sample weight.

For more information about replacement of the probes, refer to “Replacement of the probe - New Calibration Procedure” page 10.

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SPECIFICATIONS

- On the panel of the instrument are placed four button controls.
- Socket for the probe is placed on the rear of case.
- Batteries are placed on the back of the case.

ON/OFF button

To switch on the instrument.

Whenever the instrument is switch on, is automatically carry out the Autozero procedure.

KG/N button

To select the digital readout in kg or Newton.

ZERO button

During the normal use of instrument, the ZERO button is not working. Autozero is automatically carried out whenever the instrument is switched on.

To be used only for a "New Calibration Procedure".

For more details refer to page 10.

CAL button

During the normal use of instrument, the CAL button is not working.

To be used only for a "New Calibration Procedure".

For more details refer to page 10.

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It is thus even too obvious that a preventive and periodical check of the mechanical force of brush holder spings is imposing by itself, in order to avoid heavy economical damages (other than the material ones) mainly due to commutator or slip ring turnings, frequent brush changes, periods of stopped machines, repercussion on production.

By means of new **RISHI M50** meter the above verification are reliable, rapid and extremely easy, also for unskilled personnel.

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The advantages of **RISHI M50** meter, in comparison with the mechanical dynamometers used so far, are very evident : typical errors of those measuring methods (wrong inclinations, not timely and not precise readings) are totally avoided, as well as human valutation errors.

Main advantages in using the RISHI M50 are the accurate measurements up to +/- 1%, the easiness, rapidness and reliability of measurements, the advantages of the digital display with double kg and Newton readout, the Autozero automatical function.

RISHI M50 is a high quality product not only useful, but also indispensable to be used by :

- designers, manufacturers, inspectors, maintenance and repair engineers of rotating electrical machines;
- electrical machine brush holder manufacturers;
- brush holder springs manufacturers;
- electrical machine brush manufacturers.

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