100 Kg x 0.05 Kg, Kg/LB/Newton, RS232

FORCE GAUGE

Model : FG-5100
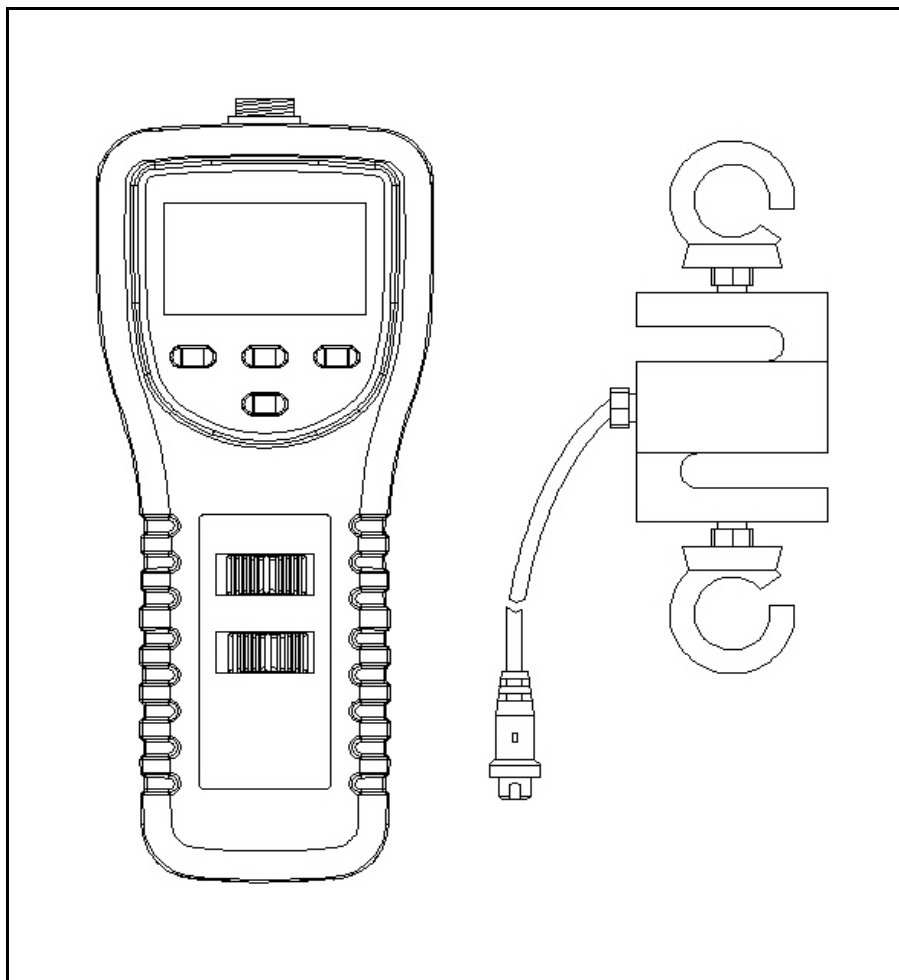
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1. FEATURES

* Large LCD display with back light.
* Tension & compression capability .
* 100 Kg, wide capacity, high resolution, high accuracy, high repeatability.
* 3 kind display unit, Kg/LB/Newton.
* Seperate sensor.
* Peak hold (Max. load) can be held in display during make tension or compression measurement.
* Zero button can operate both for normal measuring & the " peak hold " operation.
* Full capacity zero (tare) control capability.
* Fast/Slow response time push button.
* Positive or reverse display direction select.
* Over load protection.
* Hand held & stand mounting available.
* Low power consumption gives long battery life.
* Build in low battery indicator.
* Microprocessor circuit & exclusive load cell transducer.
* RS-232 computer interface .
* Power supply built-in DC 9V adapter input socket.

2. SPECIFICATIONS

Display	LCD (Liquid crystal display). 5 digits, 16 mm (0.63") digit size. Back light.

Display Direction	Positive or Reverse direction, select by the push button on the front panel.
Function	Tension & Compression (Push & Pull). Normal force, Peak hold (Max. load).
Peak hold	Will freeze the display value of the Peak load (Max. load).
Zero	Zero button can be operated both for "normal force" or "peak hold" operation
Unit select	Kg/LB/Newton
Measure Capacity	100 Kg/220 LB/980 Newton.
Resolution	0.05 Kg/0.05 LB/0.2 Newton.
Min. Display	0.15 Kg/0.35 LB/1.4 Newton.
Accuracy	$\pm$ (0.5 % + 2 digits), within $23\pm 5℃$. *Under the test weight on 100 Kg & 10 Kg.*
Update time	Fast Approx. 0.2 second. Slow Approx. 0.6 second.
Over range Indicator	Display show " - - - - " when in over range status.
Data output	RS-232 serial computer interface.
Overload Capacity	Max. 150 kg.
Full Scale Deflection	Less than 1 mm.
Zero/tare Control	Max. full capacity.
Circuit	Exclusive microprocessor LSI-circuit.
Sensor type	S type load cell.
Power Supply	6 x 1.5 V AA (UM-3) size battery or DC 9V adapter (not included).

Power Consumption	Approx. DC 28 mA
Operating Temperature	0℃ to 50℃ (32℉ to 122℉).
Operating Humidity	Less than 80% RH.
Dimension	*Main instrument :* 215 x 90 x 45 mm (8.5 x 3.5 x 1.8 inch).
	Sensors with two hooks : 130 x 51 x 18 mm (4.7 x 2.0 x 0.7 inch).
	Cable length : 2 meters.
Weight	*Main instrument :* 450 g (0.99 LB).
	Sensors : 380 g (0.84 LB).
Mounting Holes	Main instrument with mounting holes are provided on the back case, easy stand mounting.
Accessories Included	Operating manual ....1 PC. 100 Kg sensor with 2 hooks and 2 meter cable.........................1 PC. Hard carrying case .... 1 PC.

Optional Accessories	* RS232 cable, Model : UPCB-02.
	 * Software for data logging & data
	    recorder.
	    Model : SW-U801-WIN.

3. FRONT PANEL DESCRIPTION

Fig. 1

3-1 Sensor socket
3-2 LCD Display
3-3 Fast Indicator
3-4 FAST/SLOW Button
3-5 LCD Reverse Display
      Button
3-6 Zero Button
3-7 Kg/LB/Newton Unit
      Switch
3-8 Power Off/On/Peak Hold
      0 = Off, 1 = On
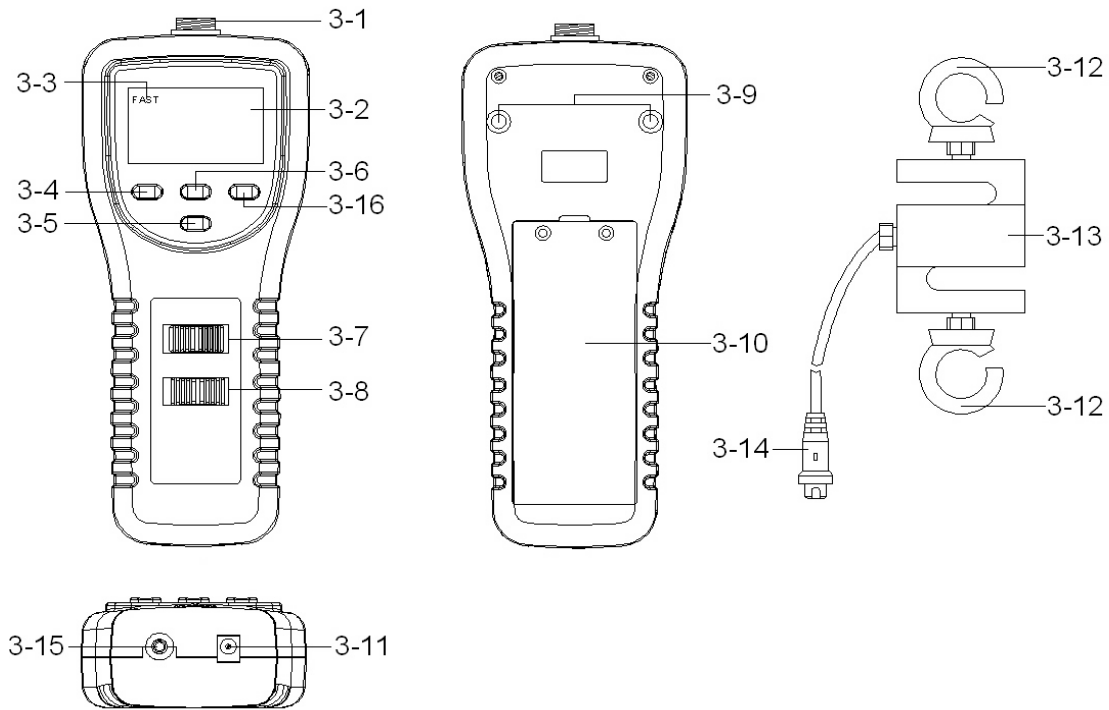
3-9 Mounting Holes/fixing
      Screws
3-10 Battery Cover/
      Compartment
3-11 DC 9V power adapter
      input socket
3-12 Sensor Hook
3-13 Sensor (force sensor)
3-14 Sensor plug
3-15 RS-232 output terminal
3-16 LCD Back Light Button

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4. MEASURING PROCEDURE

4-1 Measuring Consideration

1) The Tension & Compression measuring function is executed automatically.
   When make the compression measurement, the display will show the '" - " mark automatically.
2) When make the measurement, the " Sensor " (3-13, Fig. 1) should be on a line with measuring object.
3) Rotate the sensor's body is prohibited. Some certain angles between " Sensor " (3-13, Fig.1) & measuring object are not allowed.

4-2 Normal Measurement

1) Connect the " Sensor Plug " (3-14) to the " Sensor socket " (3-1, Fig.1).
   Slide the " Power Off/On/Peak Hold Switch " (3-8, Fig. 1) to the " On " position.
2) Determine display unit of Kg, LB or Newton by selecting " Kg/LB/Newton Unit Switch " (3-7, Fig. 1).
3) Connect " Sensor " (3-13, Fig. 1) with the " Measuring Object " via the " Sensor hook " (3-12, Fig. 1) in straight line.
4) " Zero Adjust " by pushing " Zero Button " (3-6, Fig. 1) before every measurement.
5) Start measurement by giving force (push or pull), then the LCD will display the Average reading value.

   Note :
    * During the measurement, if intend to change the display direction, just push the " Reverse Button " (3-5, Fig. 1) once.

* There are two kind sampling time of display, FAST and SLOW. Push the " FAST/SLOW Button " once (3-4, Fig. 1), if the upper left corner of LCD shows " FAST " (Fast Indicator, 3-3, Fig. 1), then the display reading is under the operation of fast sampling time.

* If the upper left corner of LCD not show the " Fast Indicator " (3-3, Fig. 1), the display reading is under the slow sampling time.

* Over range display of tension function, LCD will show " ‾ ‾ ‾ ‾ ‾ "

* Over range display of compression function, LCD will show " _ _ _ _ _ "

4-3 Peak Hold Measurement

The meter can measure the peak value of force both of tension & compression operation. The operation procedures of Peak Hold Measurement are same as above " 4-2 Normal Measurement " but should slide the " Power Off/On/Peak Hold Switch " (3-8, Fig. 1) to the " PEAK H. " position.

Slide the " Power Off/On/Peak Hold Switch " (3-8, Fig. 1) to the " On " position will cancel the peak hold function.

4-4 LCD Back Light On/Off

During the measurement, press the " LCD Back Light Button " (3-16, Fig. 1) momentarily, will turn on the LCD Back Light structure approx. 15 seconds automatically then off.
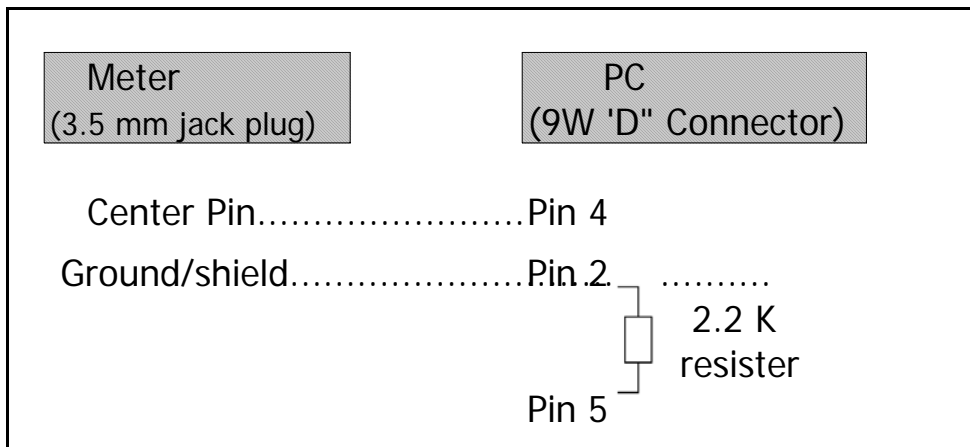
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5. BATTERY REPLACEMENT

1) When the LCD shows " Lo ", it is necessary to replace the batteries. However, in-spec. measurement may still be made for several hours after low battery indicator appears before the instrument become inaccurate.
2) Take out the battery cover (3-10, Fig. 1) away from the instrument and remove the batteries.
3) Install the batteries ((6 x 1.5 V AA, UM-3) correctly into the battery case.

6. RS232 PC SERIAL INTERFACE

The instrument features an RS232 output via 3.5 mm Terminal (3-15, Fig. 1).
The connector output is a 16 digit data stream which can be utilized to the user's specific application.
An RS232 lead with the following connection will be required to link the instrument with the PC serial input.

Meter (3.5 mm jack plug)	PC (9W 'D" Connector)
Center Pin.......................Pin 4	
Ground/shield....................Pin 2	

2.2 K resister

Pin 5

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The 16 digit data stream will be displayed in the following format :

D15 D14 D13 D12 D11 D10 D9 D8 D7 D6 D5 D4 D3 D2 D1 D0

Each digit indicate the following status :

D0	End Word		
D1 & D8	Display reading, D1 = LSD, D8 = MSD *For example :* *If the display reading is 1234, then D8 to D1 is : 1234*		
D9	Decimal Point(DP), position from right to the left 0 = No DP, 1= 1 DP, 2 = 2 DP, 3 = 3 DP		
D10	Polarity 0 = Positive 1 = Negative		
D11 & D12	Anunuciator for Display		
	g = 57	Newton = 59	oz =58
	Kg = 55	LB = 56	
D13	1		
D14	4		
D15	Start Word		

RS232 setting

Baud rate	9600
Parity	No parity
Data bit no.	8 Data bits
Stop bit	1 Stop bit

7. APPLICATIONS

7-1 Electronics
* Test strength of solder points and spot welds on circuit boards.
* Test wire wraps on clip connection.
* Test pull strength of modified wire wrap connection on posts.
* Test spring clip insertion and withdrawal forces.
* Pull test welds in micro-electronic devices.
* Measure torque, timing belt tension, sliding friction, etc., on computer peripheral equipment.
* Test P.C. board insertion force.
* Test insertion and withdrawal forces of various circuit components such as transistors and integrated circuits.
* Test actuating force of snap action switches.

7-2 Business Equipment
* Measure force required to perforate cards.
* Measure load on slitter knives.
* Measure actuating requirements of typewriter.
* Test clutch release force.
* Measure torque, timing belt tension (by deflection), sliding friction, etc., on computer peripheral equipment.
* Test adhesion strength of labels and stickers.
* Test load on paper thickness gages.
* Measure tension of pencils.
* Test actuating requirements on push buttons and flip switches.

7-3 Chemical & Plastics
* Test film bond strengths.
* Tensile test rubber, fibers and filaments.
* Measure firmness of polyurethane foam.
* Test crush strength of pills (medicine)
* Test peel strength of adhesives.
* measure compression of ceramic compounds.
* Test vacuum take-down pressure on process machines.

7-4 Machinery & Manufacturing
* Test load on wire feel
* Test force to open cabinet doors.
* Test sprocket chain tension.
* Test pull-out forced of drive shaft.
* Rate testing of springs in systems.
* Calibrate a cantilever beam-type Apparatus to obtain a force/deflection relationship.

7-5 Automotive
* Measure force of seat belt retractors.
* Measure arm pressure of windshield wipers.
* Measure flip force in mechanical snap action switches.
* Test effort to operate hand tool.
* Test forces required to move linkages and tension cables.
* Measure force of odometer pull.
* Test peel strength of vinyl insert bonded to body side moldings
* Evaluate physical efforts (door, look, hood, glove compartment, brake pedal, etc.).

7-6 Other Industries

* Measure pedal depression force in aircraft.
* Test hardness of gypsum wallboard.
* Test keyboard and pedal contact force of organs and pianos.
* Test force to remove cover tops of aerosol cans.
* Measure trigger pulling forces on firearms, hand tools etc.
* Test firmness of sausages in casings.
* Test integrity of seals on blister packages and plastic bags.
* Test pressure of surgical instruments (forceps, scissors).
* Test fruit removal force and fruit firmness.
* Measure force on spindles of photographic equipment

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