

FDG series Digital Force Gauge

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# User's Manual



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STAR<sup>☆</sup>RR<sup>☆</sup> INSTRUMENTS

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**Warning**  
MELNIB

### Please Carefully Read This First

- Operators should wear protection such as a mask and gloves in case pieces or components break away from the unit under test.
- Whether the unit is ON or OFF, DO NOT exceed the capacity of the gauge. NEVER exceed 150% of the rated capacity, or the load cell will be damaged. At 110% of the rated capacity, the display will flash a warning.
- When mounting the Digital Force Gauges, use M6 mounting screws with a maximum insertion depth of 7 mm into the gauge.
- Hand tightens adapters, DO NOT use tools. Do not use damaged clamp.
- Measure in line tension and compression forces only. DO NOT attempt to measure forces at an angle to the measuring shaft – damage to load cell and/or shaft may result.
- Do not attempt to repair or alter this instrument. Warranty will be voided and damage to the unit may result.
- Use and store within the stated temperature and humidity ranges, or damage and failure may result.
- If not using for extended periods of time, recharge it for every 2 to 3 months, or remove the batteries to prevent potential battery leakage from causing product damage.

# 1. Introduction

## 1.1 Overview

Fig.1-1.

## 1.2 LCD Screen

See Fig.1-2.

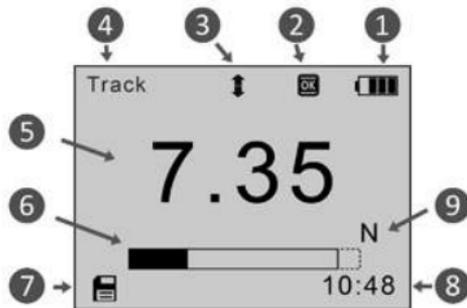


Fig. 1-2

1. **Battery icon:** Battery level or charging status. Flashes when needs to be recharged.

2. **Tolerance alarm Indicator:** “”:  
under lower limit; “”:  
between lower limit

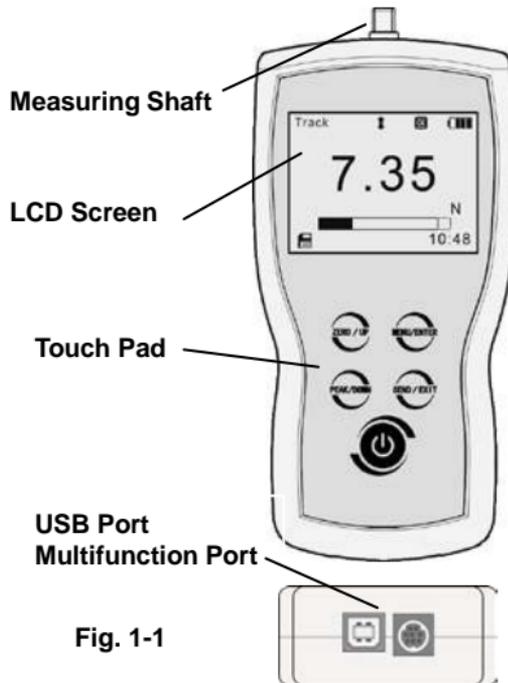


Fig. 1-1

and upper limit; “”: over upper limit

3. **Direction Icon:** “” tension, “” compression.

4. **Test Mode Icon:** Three measurement modes. Track, Peak and Auto Peak.

5. **Current measured value**

6. **Analog bar:** Indicates current position in whole capacity. When the bar enters the area enclosed by dotted line, means overload.

7. **Saving icon:** Indicates data is being saved.    8. **System time.**    9. **Units.**

### 1.3 Touch Pad



**Power:** Push for 2 seconds to power On or Off.



During Measurement: Print the current force value or store data, depending on the key setting. (See 3.5.7 Key Setting)

In Menu: Back or Exit.



During Measurement: Enter the menus.

In Menu: Select or Enter.



During Measurement: Track mode-Zeroing. Peak & Auto Peak modes-Resets the peak value.

In Menu: Moves selection up or increases the value.



During Measurement: Changes Test Mode from Track, Peak or Auto Peak

In Menu: Moves selection down or decreases the value.

## 1.4 Specifications

Accuracy	± 0.2% F.S.		
Selectable Units	mN, N, gf, kgf, ozf, and lbf.(Selectable)		
Display	160*128 dot matrix LCD with LED Backlight		
Overload	150% of F.S. (LCD flashes beyond 110% of F.S.)		
Temperature Effects	<0.03% FS per °C		
Measurement Mode	Peak, Autopeak or Track Mode		
Set Point	Tolerance Alarm		
Sampling Rate	1000 Hz	Display Update	10 times/sec.
Memory	1000 data		
Power	3.6VDC Ni-MH rechargeable batteries		
Battery Life	Approximately 16 hours continuous use per full charge		
Charger / Adaptor	Universal USB/BM charger, Input:110~240VAC		
Outputs	USB, RS232, Set points output		
Environment	Operating: -10 to 40°C, 20 to 80% RH Storage : -20 to +50°C , 5 to 95%RH		
Dimensions	145*73*35.5		
Weight:	0.7 kg (1.5 lb)		
Accessories	AC adapter/charger,6 attachments: hook, flat tip, conical tip, chisel tip, notched tip, extension shaft		

**The capacity and resolution is in table on back cover.**

## 2. Operations

This series force gauge is widely used in the production practice, please do the security measures before use, according to the following steps operate the force gauge.

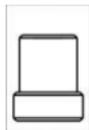
### 2.1 Choose model

This series force gauge has a variety of models can be selected, different models corresponding to different range and resolution, as shown in table on back cover of this manual.

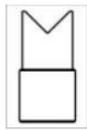
Select the appropriate model based on practical need before use. **DO NOT** exceed the capacity of the gauge, or it may damage the force gauge forever.

### 2.2 Choose measuring heads

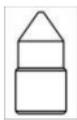
In order to complete the test work convenient, the force gauge equipped with a variety of measuring heads (adapters). Select the appropriate measuring heads according to the actual need.



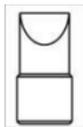
Flat tip



Notched tip



Conical tip



chisel tip



Hook



Extension shaft

Fig. 2-1

## 2.3 Power on/off



Touch  for 2 seconds to power On or Off.

After switching the instrument on, you should check the model wheith it is you want.

Check Battery Icon. If the power is low, should be recharged.

## 2.4 Testing

After completion of the test preparation, testing can be done.

### 2.4.1 Measuring heads

Select the appropriate measuring head, install it in the gauge's measurement axis. Tighten it by hand, without the use of tools. Do not use a deformed or damaged measuring head.

**NOTE: Do not use tools to vigorously tighten the measuring head, otherwise it will damage the force gauge.**

### 2.4.2 Units

The force gauge has a variety of measurement units, select the appropriate unit of force. Under the measure interface, press the Menu key to enter the menu interface (See **3.2.1 Unit** )

### 2.4.3 Test Mode

This series force gauge has 3 kinds of measurement test mode can choose.

You can select a Measure Mode by touching  under the measure interface, Or can change it in menus (See **3.2.4 Test Mode** ).

**Track:** *The real time measuring mode, under this mode, press the zero key the force gauge will be cleared (remove tare).*

**Peak:** *Peak readings will not change until a higher value is measured. Under this mode, touch the zero key  the force gauge will update the display immediately.*

**Auto-Peak:** *In this mode, the gauge display a peak value of force in a fixed duration.*

*The duration time can be set in menus.*

### 2.4.4 Tolerance Limit

The tolerance limits can be set for GO/NG measurement also. See  for detail.

If you set the alarm on and a valid limit, The icon    will be displayed for within limit, lower than lower limit or exceed upper limit.

### 2.4.5 Zeroing

Touch  to clear the force gauge in track mode for removing the tare.

## 2.5 Hand-held or Mounting

The force gauge is a portable Instrument, you can do the testing hand-held, or you also can install the force gauge on the test stand so as to obtain accurate measurement results. There are 6 M4.0 mounting screw holes on the back , can be fixed on the test stand, show as **Fig. 2-2**.

**NOTE:** The depth of the mounting hole is 8.0mm, please choose the appropriate screws, screw into the depth of the force gauge shall not be greater than 7mm.

## 2.6 Storage

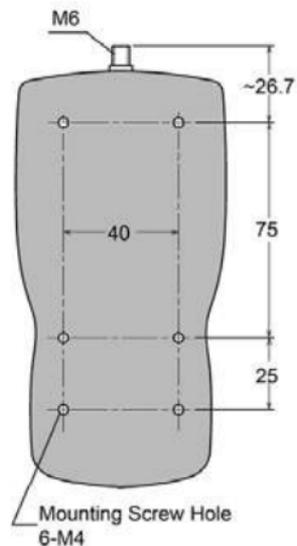
Measured results can be stored in the force gauge, so that you can review or print them later.

Under the measure interface, touch  to save value measured, and the save icon  will be displayed.

## 2.7 Browse and Printing

The values saved in memory can be reviewed in Browse function.

The data in memory can be printed to a report.



**Fig. 2-2**

## 3. Menu

### 3.1 Structure

The Force Gauge has multi-level menu interface(Table 3-1).

From the home screen, touch “” to enter the Menu.  
(Fig. 3-1、 Fig. 3-2)

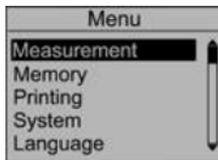


Fig. 3-1

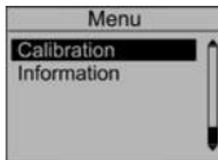


Fig. 3-2

Touch  or  can move selection. Then touch  can enter the next layer of menu.

Touch  can cancel the setting or exit.

In number input, touch  can increase the number, and touch  can change to another digit or item.

Table 3-1

Menu	Measurement	Unit
		Group
		Tolerance
		Test Mode
		Peak Time
		Alarm
	Memory	Storage Mode
		Browse All
		Browse Selected
		Delete Selected
	Printing	Delete All
		Print Recent
		Print Selected
	System	Print All
		Display Mode
		Power Off
		Backlight
		Key Tone
		Date/Time
		Password
	Key Setting	
	Default Setting	
	Language	
	Calibration	
	Information	

## 3.2 Measurement

The Measurement contains six selectable items: Unit, Group, Tolerance, Test mode, Peak Time and Alarm. (Fig. 3-3)

### 3.2.1 Unit

The measuring unit can be selected under this menu. Different range models may have different unit selection capabilities. See Fig.3-4.

### 3.2.2 Group

When several test samples need to be measured, the samples can be coded into groups. The range is 01-99. See Fig.3-5.

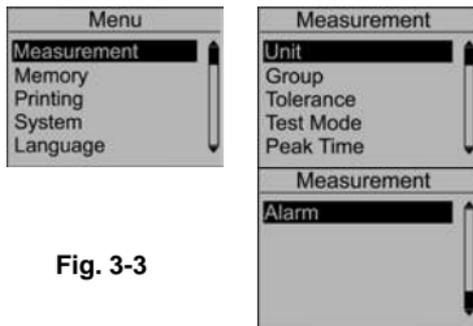


Fig. 3-3

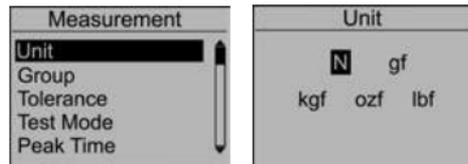


Fig. 3-4

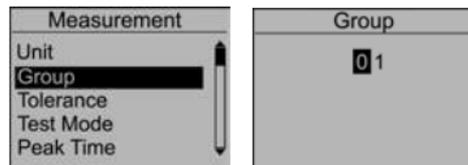
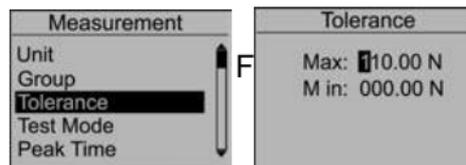


Fig. 3-5

### 3.2.3 Tolerance

In the Tolerance menu, program upper and lower limit for GO/NG Measurement.

The upper limit value must be greater than the lower limit, and both limit value can not be greater than 110% of the rated capacity. See **Fig.3-6**.

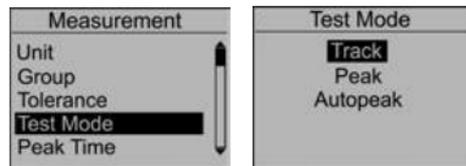


**Fig. 3-6**

### 3.2.4 Test Mode

Test mode can be selected. There are three kinds of mode: Track, Peak and Auto Peak. (**Fig. 3-7**) See

**2.4.3 Select Test Mode** also.

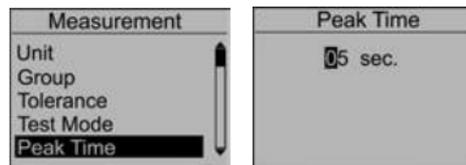


**Fig. 3-7**

### 3.2.5 Peak Time

If AutoPeak mode is used, you can set the peak value capturing time interval- Peak Time. Default

10 setting of Peak Time is 5 sec.



**Fig. 3-8**

The range is 1~99 seconds. (Fig. 3-8)

### 3.2.6 Alarm

You can turn on/off the sound of tolerance alarm( Fig.3-9). The sound for overload alarm cannot be turned off.

## 3.3 Memory

In this menu, you can set the memory mode, browse the data in memory or delete it/them.

### 3.3.1 Storage Mode

There are two storage mode can be selected, Single and Series.

**Single:** The current value displayed can be saved when touch . This mode can be use in all 3 test mode.

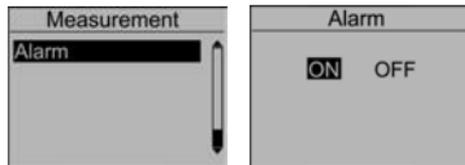


Fig. 3-9



Fig. 3-10

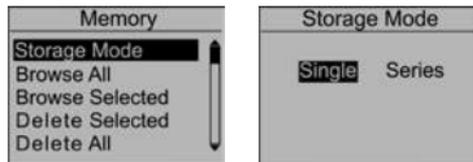


Fig. 3-11



**Series:** Continuous storage mode, only in Auto Peak mode is effective. When a peak capture time interval is reached, the peak value is saved, no need touch any key (Fig. 3-11).

### 3.3.2 Browse Data

You can browse the data in memory with two method, Browse All or Browse Selected. (Fig.3-12, Fig3-13)

The greatest number is the most recent data.

For Browse Selected selecting the range of data number is needed.

Touch  or  can turn the page.

### 3.3.3 Delete Data

There are 2 methods to delete the data for restoring the memory.

Memory		
Storage Mode		
Browse All		
Browse Selected		
Delete Selected		
Delete All		

No.	Force	Dir
013	15.298 lbf	↔
014	1.650 kgf	↔
015	1.730 kgf	↔
016	6.020 lbf	←

Fig. 3-12

Memory	
Storage Mode	
Browse All	
Browse Selected	
Delete Selected	
Delete All	

Browse Select	
Range:	000 ~ 016
Select:	000 ~ 000

Fig. 3-13

Delete selected: Delete data in number range selected.

Delete All: Delete all data saved.

Before delete data, a warning window will pop up for further confirmation.

### 3.4 Printing

The force gauge can be connected to a printer for printing the report. In Printing menu, you can Print Recent, Print Selected and Print All.

#### 3.4.1 Connect Printer

Connect the printer to the force gauge with a printing cable. Then turn on the power of printer.

#### 3.4.2 Printing Setup

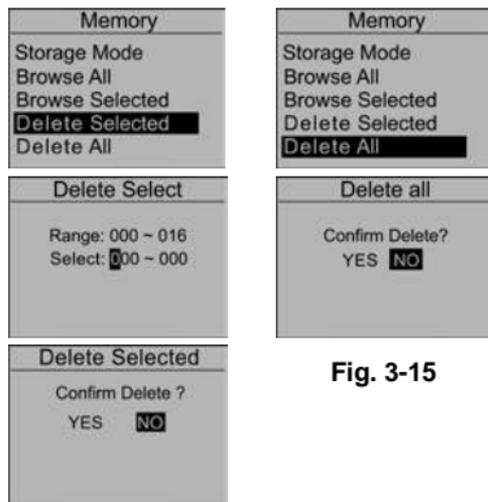


Fig. 3-15

Fig. 3-14

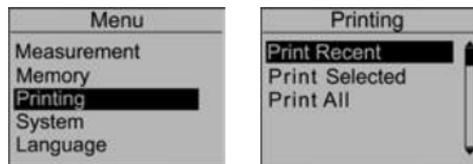


Fig. 3-16

**Print Recent:** Print some data measured recently(**Fig. 3-17**)

**Print Selected:** Print data in a number range(**Fig. 3-18**).



**Fig. 3-17**

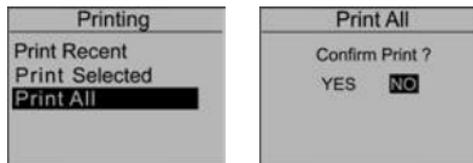


**Fig. 3-18**

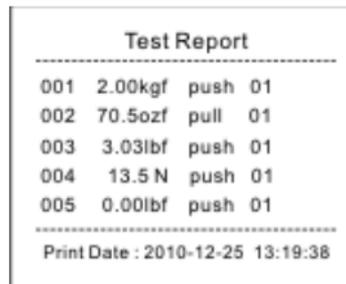
**Print All:** Print all data in memory(**Fig. 3-19**).

It may take a long time to print all the data and need many printing paper, so a prompt window will pop out to ask for confirmation.

The style of test report is shown as **Fig.3-20**.



**Fig. 3-19**



**Fig. 3-20**

## 3.5 System Setting

### 3.5.1 Display Mode

LCD display direction can be transformed according to the position of force gauge



Fig. 3-22

Automatic.

### 3.5.2 Power Off

The force gauge can turn the power off automatically, some time interval after no measuring and no any operation. 5 minutes is default. You can change it for a longer or shorter standby.

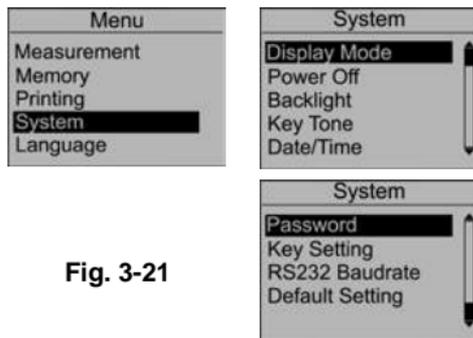


Fig. 3-21

automatically.

You can set it to Obverse or Reverse and not

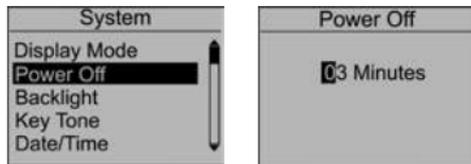


Fig. 3-23

### 3.5.3 Backlight

The force gauge can turn off backlight, some time interval after no measuring and no any operation. You can select this time or turn it on or off always. (Fig. 3-24)

3-24)

### 3.5.4 Key Tone

(Fig. 3-25)

### 3.5.5 Date/Time

(Fig. 3-26)

### 3.5.6 Password

Some operations of force gauge may need to enter a password to prevent mistake or unexpected change.

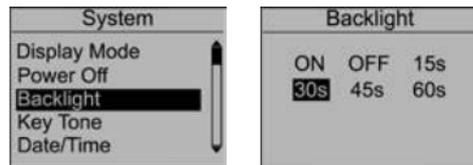


Fig. 3-24

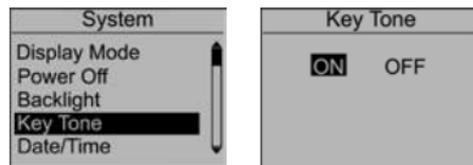


Fig. 3-25

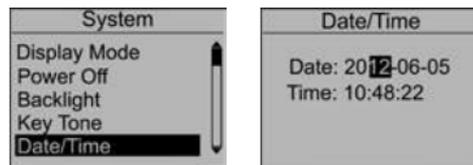


Fig. 3-26

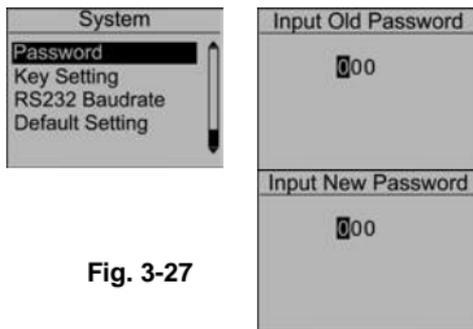


Fig. 3-27

The default System password is "123". You can change it to your favorite. You should enter the old password first, then enter a new one.

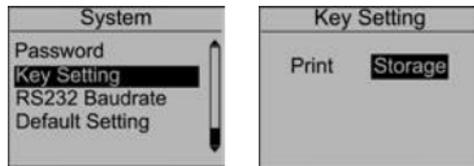


Fig. 3-28

### 3.5.7 Key Setting

The key  is a multifunction key, It can be set as "store the current display value (**Storage**)" or "print the recent data (**Print**)". "**Storage**" is default.

### 3.5.8 Default Setting

When the artificial error, and do not know how to

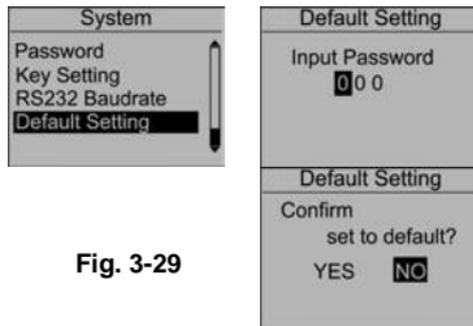


Fig. 3-29

restore, the gauge can be restored to factory settings. it will lose that some information set by customs.Carefully use this function!

Restoring to Default Setting, the password must be enter and a prompt must be confirmed.

### 3.6 Language

Here you can select the language appropriate.

### 3.7 Information

Some information such as the logo, the model, the version of program and the series number are displayed here.



**Fig. 3-30**

## 4 External Interface

The force gauge have 2 external ports, a USB port and an MD8 port.

### 4.1 USB Port

The USB port is used to transmit data to PC and recharge.

Connect the USB cable to a charger for recharging.

Connect to the PC for upload data. The software EDMS need to setup in PC, see manual of EDMS for detail.

### 4.2 Multifunction Port

The MD8 port is a multifunction port, it includes a RS232 interface for connect to the printer or computer, and two alarm outputs.

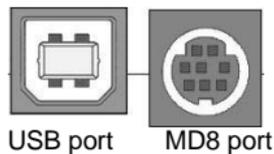


Fig. 4-1

The pins assignment of multifunction port is shown in

**Table 4-1.**

The specification of RS232 is shown in **Table 4-2**

**Table 4-2**

<b>RS232 Specifications</b>	
Data word length	8 bits
Stop bit	1bit
Parity	None
Baud rate	9600,19200,38400
Hardware Flow Control	None

You can change the baud rate in menus. shown in

**Fig.4-2.**

**Table 4-1**

<b>MD8 multifunction port</b>	
Pin	Description
1	RS232- Transmit(TX)
2	RS232- Receive (RX)
3	RS232- Ground
4	Alarm Output A+
5	Reserved
6	Alarm Output Com -
7	Alarm Output B+
8	Reserved

### Alarm output:

There are two alarm outputs, you can connect them to the other equipment (such as test stand, PLC etc.), or connect to some alarm units.

Menu	RS232 Baudrate	System
Measurement	9600 bps	Password
Memory	19200 bps	Key Setting
Printing	38400 bps	RS232 Baudrate
System		Default Setting
Language		

Fig. 4-2

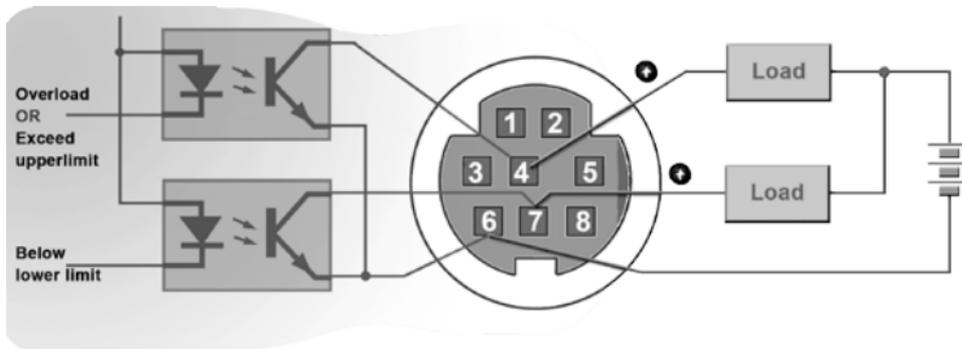


Fig. 4-3

**!** Maximum permissible voltage

pin 7 to pin 6, pin 4 to pin 6: 35V; pin 6 to pin 7, pin 6 to pin 4: 6V.

## 5 Maintain and Calibration

### 5.1 Charging

When the battery are low, the icon “” will be displayed. The batteries should be charged immediately.

Connect the gauge and the charger use the USB

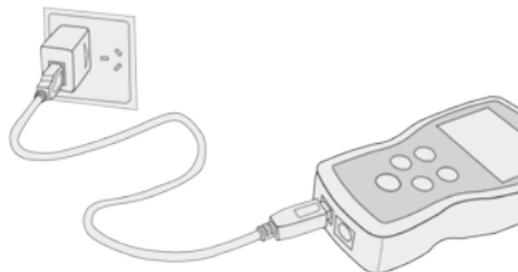
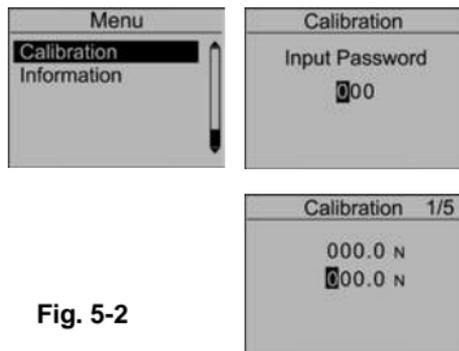


Fig. 5-1

cable, and then connect the charger with AC socket to start charging.

It takes about 3~4 hours for fully charging.

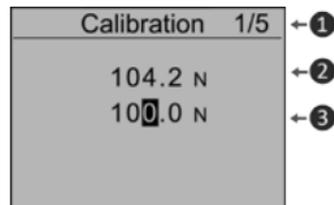
You can also use other USB device (e.g. Laptop PC) to recharge the gauge.

## 5.2 Calibration

Because of the sensor material performance or the influence of external factors, there may be errors in a certain range after a period of time use.

Should send the force gauge to a specialized testing organization for calibration.

If you have some standard force weights or the other standard load and some test stand, you may calibrate it also.



- ① Calibration times
- ② Current measuring value
- ③ Standard value input

Fig. 5-3

① Mount the force gauge.

② Remove the tare by use of the key .

③ Enter Calibration interface, as Fig 5-2.

The calibration interface is shown as Fig 5-3.

④ Load a standard force. Now the value in standard input area is just equal to the current measured value. Wait a moment for the force stability.

⑤ Touch  and  to input the standard force value.

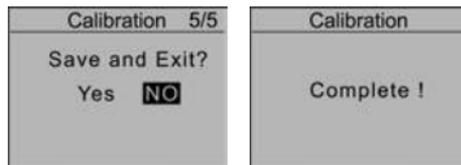


Fig. 5-4

⑥ Touch  to enter the next calibration. Touch  can interrupt the calibration.

When the 5 times calibration had been finished or be interrupted, a confirm window will pop up to ask for save or not save the calibration. (Fig. 5-3)

Touch  or  to select, then press .

If "YES" is selected, "**Calibrate complete!**" is displayed.

**NOTE:**

- ① Set the unit of force to the unit used in calibration previously(as shown in **3.2.1 Unit**)
- ② Ensure that the tare weight of attachment has been remove before calibration.
- ③ You can do any point or points calibration from 1 to 5 point., we recommend 5 points calibration.

# Appendix

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## A-1 Packing List

1. Force Gauge



3. User's manual



4. Measuring head



Hook



Flat tip



Conical tip



Notched tip

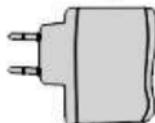


Chisel tip



Extension shaft

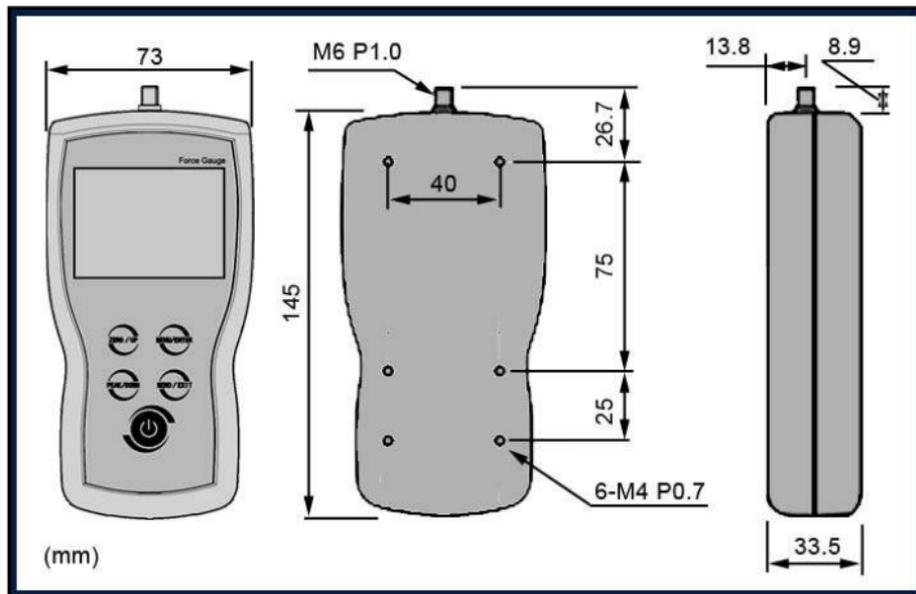
2. Charger



5. USB Cable



## A-2 Dimensions



## Warranty Card

Description: Digital Force Gauge

Model: \_\_\_\_\_

User: \_\_\_\_\_ Tel: \_\_\_\_\_

Add: \_\_\_\_\_

Agent: \_\_\_\_\_ Tel: \_\_\_\_\_

Date: \_\_\_\_\_

### Warranty Description

Please use our product exactly according to our user's manual.

All products sold by our company or authorized dealer are covered by 12 month warranty.

Anthropogenic causes, irresistible natural factors cause the product damage, our company will not warranty.

## Capacity/ Resolution

Model	N	kgf	lbf	ozf	gf	mN
FGD-5	5/0.0005	-	1.1/0.0001	18/0.005	500/0.05	5000/0.5
FGD-10	10/0.001	1/0.0001	2.2/0.0005	35/0.01	1000/0.1	10000/1
FGD-20	20/0.005	2/0.0005	4.4/0.001	70/0.01	2000/0.5	20000/5
FGD-50	50/0.005	5/0.0005	11/0.001	180/0.05	5000/0.5	50000/5
FGD-100	100/0.01	10/0.001	22/0.005	350/0.1	10000/1	-
FGD-200	200/0.05	20/0.005	44/0.01	700/0.1	20000/5	
EFG500	500/0.05	50/0.005	110/0.01	1800/0.5	-	
FGD-1000	1000/0.1	100/0.01	220/0.05	3500/1		