

HFG-SERIES

HFG-11 HFG-45 HFG-110

HAND-HELD FORCE GAUGE

OPERATORS MANUAL



Transducer
Techniques®

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The Handheld Force Gauge (HFG)

Introduction

Thank you for choosing the Handheld Force Gauge. With correct use and regular re-calibration it will give many years of accurate and reliable service.

Before Use

Upon receiving the unit please check that no physical damage has occurred to the packaging material or the instrument itself. If any damage is evident please notify Transducer Techniques immediately.

Operation

The most commonly used features such as displaying force, peak hold, zero and changing of displayed units of measurement can all be done by pressing a single dedicated key on the front panel - see page 6, Basic Functions.

Powering the Gauge

The HFG is supplied with a set of 4x1.5V AA batteries. To install the batteries you must first remove the battery cover on the upper part of the rear of the gauge. To release the battery cover press the battery cover as indicated by the arrow and slide the cover upwards. Install the batteries in the battery holder ensuring that you observe polarity. Incorrect insertion of batteries can cause damage to the gauge. To replace the battery cover slide it from the top edge of the gauge until it clicks into place.

If the gauge is not going to be used for 3 months or more, the batteries should be removed and stored separately. (Settings and calibration data will not be lost if the batteries are removed).

Replacing batteries

Low battery symbol

If the low battery symbol appears on the display, the gauge will power-off unconditionally at intervals of one minute. The gauge may be repowered but will power-off every one minute as long as the low battery symbol remains on the display.

This feature has been designed into the gauge to protect the integrity of displayed readings because when the low battery symbol appears the accuracy of the load cell reading may be compromised.

When the low battery symbol appears on the display, install four new 1.5V AA batteries in the gauge. **Rechargeable batteries should not be used in the HFG.**

AC operation

The HFG can also be powered using an AC Power Adapter plugged into the right hand side of the gauge (available as P/N APD-HFG). Using an incorrect power adapter can damage the gauge.

Battery safety information

NEVER:

Short circuit

Disassemble or deform cells

Heat or incinerate

Immerse in water

Solder anything to the battery terminals

Reverse individual cell polarity

Use alternative chargers other than that supplied by Transducer Techniques (Available as P/N APD-HFG)

Never dispose of batteries with 'normal' refuse. Contact your local Environmental Authority to determine the location of your appropriate disposal facility.

Using the Gauge

Installing accessories

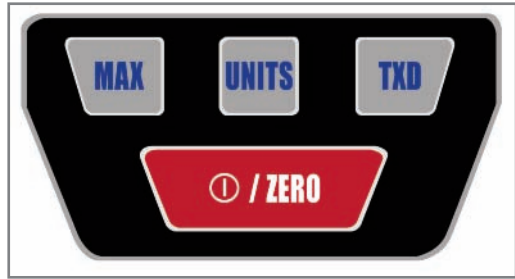
All HFG instruments are supplied with a short extension rod (30 mm long). This fits directly onto the load cell mounted in the bottom of the HFG.


Note: When installing the extension rod always ensure that it is screwed finger-tight only. Excessive torque or overtightening can damage the load cell.

Note: When attaching accessories to the gauge always use the extension rod.

Powering up

Fig. 1




As shown in Fig. 1, the control panel has 4 keys. To power up the gauge press the red and white  key. A short self test will run during which the software version number, the currently selected baud rate and the load cell capacity in newtons are shown. The gauge will then enter the main display mode.

After the self test, providing no load has been applied to the instrument, the display will show a zero reading. This is because the gauge zeros itself during the self test routine.

If a compression or tension force is applied via the extension rod to the load cell, the reading on the display will register the applied force if not in **MAX** Mode.

Turning off

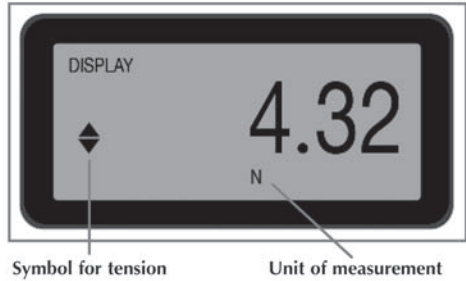
To turn off the gauge press the  key for at least 2 seconds.

Basic Functions

Display of Tension/Compression

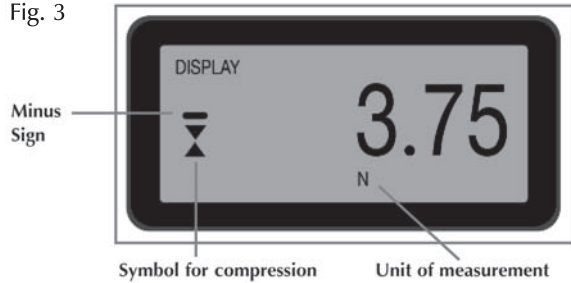
Tension forces \blacklozenge are displayed on the HFG and recognized by the symbol (See Fig. 2).

Fig. 2



Compression forces \blacktriangledown are displayed on the HFG and recognized by the symbol (See Fig. 3).

Fig. 3



Zeroing the gauge

During the operation of the gauge it is often necessary to zero the display (e.g. when you wish to tare out the weight of an accessory that you do not want to become part of the measured reading). Press and release the **ZERO** key. When the gauge is in the process of zeroing itself, a row of segments on the top and bottom of the display will be seen to alternately blink once. When this is completed the display will read zero. This function will not be performed if the gauge is in an overloaded state.

Changing the unit of measurement

Max (peak) readings

Peak capture rate is 500Hz

Max Tension

Max Compression

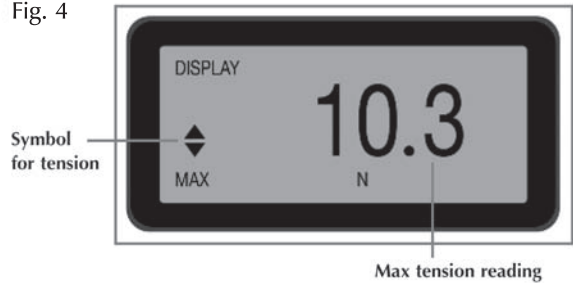
You can choose from the following units of measurement depending on the capacity of the gauge: newtons (N), kilogram-force (kg), millinewtons (mN), gram-force (g), ounce-force (oz), pound-force (lb) or kilonewtons (kN).

To change the display units press and release the **UNITS** key. Each successive key press will select the next available units until the gauge returns to its original setting. The HFG automatically converts readings as new units of measurement are selected.

The gauge detects and stores maximum (peak) force in both compression and tension directions.

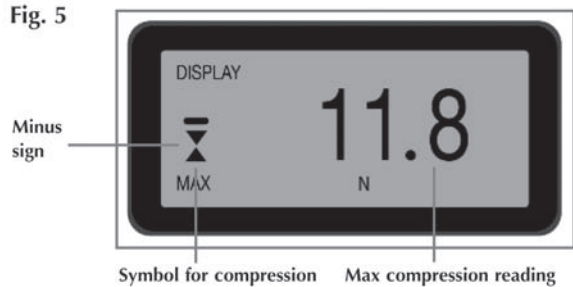
Press the **MAX** key. The display will show the word **MAX** together with the highest tension \blacklozenge force (See Fig. 4).

Fig. 4



Press the **MAX** key. The display will show the word MAX together with the highest compression \blacktriangledown force (See Fig. 5).

Fig. 5



Data Output

HFG uses

9600 or 115200 Baud

8 data bits

1 start bit

1 stop bit

no parity

A data cable is available to connect your gauge to peripheral devices

The continuous data stream rate is 100Hz at 9600 Baud and 250Hz at 115200 Baud

Remote key press from PC

The HFG has a RS232 output. It is possible to transmit the displayed reading to peripheral devices (e.g. PC, printer) by pressing and releasing the **TXD** key.

Displayed readings can also be requested individually from a PC via the RS232 interface by sending a “?” (ascii D63 [3fh]) character.

For sending a continuous data stream to a PC, press and hold the **TXD** key for 2 seconds and release. A ‘1’ will now appear in the display to indicate that data can now be sent (See Fig. 6). To stop sending data, simply press and release the **TXD** key, at which point a ‘1’ will disappear from the display.

Fig. 6



Symbol indicates data can be sent

Please note that the continuous data stream only starts when approximately 2% of the rated capacity of the gauge is reached.

Hold down the Ctrl key on the keyboard and press:

- a** to simulate pressing the **TXD** key*
- b** to simulate pressing the **UNITS** key
- c** to simulate pressing the **MAX** key
- e** to simulate pressing the **ZERO** key

* **Note** that the continuous transmission mode cannot be entered via this method.

See page 11 for full table.

Optional Settings through Dual Function keys

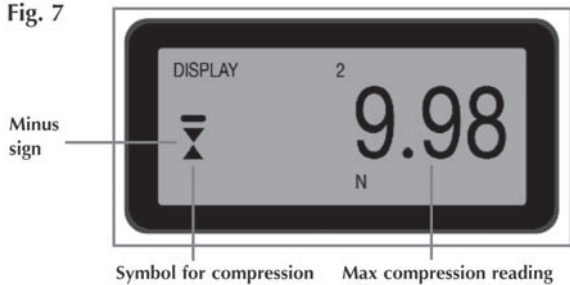
Baud Rate

Holding down the **TXD** key while turning the gauge on will toggle between baud rates of 9600 and 115200. If the baud rate is being toggled when powered up, the gauge will display either 9600 or 115.2 between displaying the software version number and the load cell capacity. The baud rate setting will be stored in memory and remembered when the gauge is turned off.

Removing the minus sign during data transmission

Holding down the **MAX** key while turning the gauge on will enable or disable sending a minus sign with RS232 transmission. If the 'transmit sign' function is enabled then '2' is displayed in the top row of the display (See Fig. 7). This setting is stored in the memory and is remembered when the gauge is powered down.

Fig. 7



Auto-off

To conserve battery power the gauge constantly keeps a record of time elapsed since the last key press. If this function is not disabled and the low battery symbol is not showing, the gauge will power down after approximately five minutes has elapsed since the last key press, the last load change greater than 2% or the last recurrence of RS-232 communication.

If the gauge is being used for a long test the user may wish to disable the auto-off function. The auto-off function can be disabled when powering up the gauge by holding down the **⊕ / ZERO** until the display shows 'No Ao'.

Overload

An instrument showing an overload condition cannot be relied upon to provide accurate, repeatable measurement—consult Transducer Techniques.

Overload counters

Display messages

Do not overload the load cell, as this can cause irreparable damage.

Forces greater than 120% of full-scale will show an ‘-OL-’ symbol and the corresponding tension or compression symbols on the display. If the display shows ‘OL’ (without dashes) in either of the two max modes, the load cell is not currently in overloaded state but has been overloaded at least once since the last **ZERO** operation.

If you suspect that the gauge has been subjected to overloading, this can be verified by pressing the **UNITS** key while turning on the gauge. This will first display the number of overloads in tension, press **UNITS** key again to see the number of overloads in compression. Press **UNITS** key once more to allow the gauge to resume powering up.

Removing recorded overloads can only be performed by Transducer Techniques.

Should the instrument have sustained a catastrophic overload the symbol ‘OL’ will be permanently displayed and the instrument must be returned to Transducer Techniques for evaluation.

- ‘-OL-’ Overload – More than 120% of full scale load is currently being applied to the transducer
- ‘OL’ Overload – The peak force reading was applied to the load cell in excess of 120% of full-scale
- ‘t-ERR’ Tare Error – The zero function was performed while the transducer was in an overloaded state
- ‘No Ao’ No Auto off – Automatic power-off is disabled
- ‘C-dEF’ Calibration default – Invalid calibration data; please notify Transducer Techniques for calibration.

RS232 Commands Table: Configuration

It is possible to remotely read/configure the settings of your HFG by sending the following RS232 command characters:

Character in ASCII	Decimal	Hexadecima	Function
M	77	0x4D	Current mode
U	85	0x55	Current units
C	67	0x43	Load cell capacity in newtons
?	63	0x3F	Transmit the current reading
@	64	0x40	Configuration Status Request
*	42	0x2A	Toggle Continuous Transmit Mode
r	114	0x72	Normal Screen (Non max)
t	116	0x74	Max Tension Screen
u	117	0x75	Max Compression Screen
a	97	0x61	Change Units to mN
b	98	0x62	Change Units to N
c	99	0x63	Change Units to kN
d	100	0x64	Change Units to gf
e	101	0x65	Change Units to kgf
f	102	0x66	Change Units to ozf
g	103	0x67	Change Units to lbf
CTRL a	1	0x01	Simulates the TXD key
CTRL b	2	0x02	Simulates the UNITS key
CTRL c	3	0x03	Simulates the MAX key
CTRL e	5	0x05	Simulates the ZERO key (to ZERO a load reading, not turn the gauge off)
CTRL o	15	0x0F	Turns the gauge off

RS232 Command Responses: Information

It is possible to verify the settings of the HFG by sending the following RS232 commands. This will inform you which settings are currently configured.

Command: M

Response	HFG Display Mode
Normal	Normal Mode
MaxC	Max Compression
MaxT	Max Tension

Command: U

Response
mN
kN
N
gf
kgf
ozf
lbf

RS232 Command Responses: Information

Command: C

The load cell size in N

Note: 'xxxx' will be transmitted if the load cell is not calibrated, or has a serious fault. Contact Transducer Techniques.

Command: @

You will receive the following information listing:

Response	Explanation of Response
Compact +	Gauge Type
50, 100, 200, 500 or 'xxxx' if the gauge is uncalibrated	Load cell size in N
V01	Version number
Normal, MaxT or MaxC	Mode of operation
mN, kN, N, gf, kgf, ozf or lbf	Units of operation

Specifications

Range & Resolution

Model no:	N	kgf	lbf
HFG-11	50 x 0.05	5 x 0.005	11 x 0.01
HFG-45	200 x 0.2	20 x 0.02	45 x 0.05
HFG-110	500 x 0.5	50 x 0.05	110 x 0.1

Accuracy

±0.5% of full-scale

Calibration temperature: 20°C ±2°C

Operating temperature: 10°C - 35°C

Temperature shift at zero load: ±0.09% of full-scale/°C

Output

RS232-C 9600 or 115200 Baud
8 data bits, 1 start bit, 1 stop bit, no parity

Optional Accessories

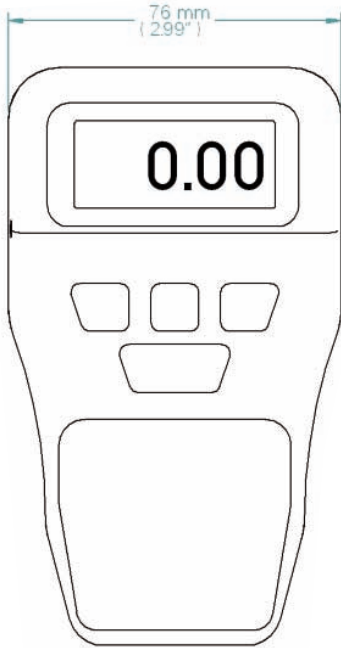
AC Power Adapter A 6V - 9V AC/DC power adapter (fitted with a 1.3mm DC power plug with +6V +9V DC on the center conductor), can be plugged into the right hand side of the gauge. (Available as P/N APD-HFG)
Note: Using an incorrect power adapter can damage the gauge.

Cable HFG to RS232 An interface cable for connecting your HFG to peripheral devices.

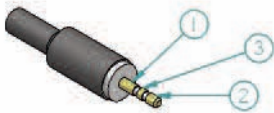
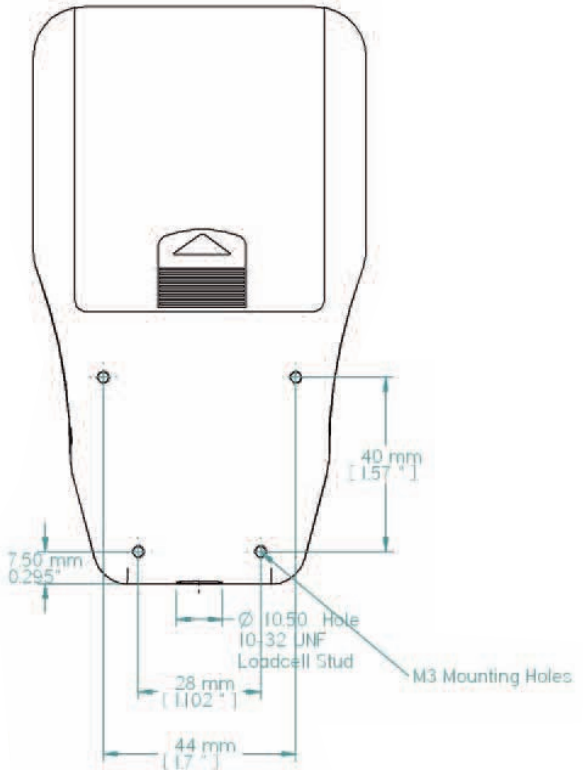
Call for more information.

Dimensions (in Millimeters)

Front View



Rear View

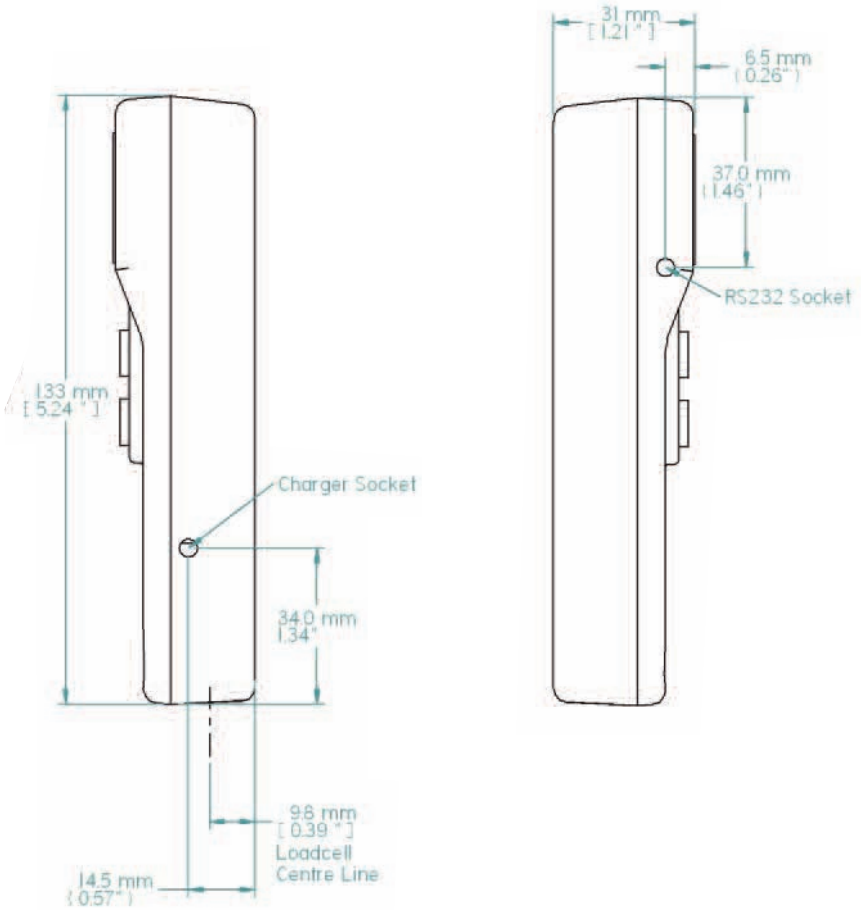


Pin Out:	
1	Ground
2	RS-232 Transmit
3	RS-232 Receive

Allocation for the pins on the 3-pin connector for RS-232 communication.

Dimensions (in Millimeters)

Side Views



WARRANTY & REPAIR POLICY

Limited Warranty on Products

Any of our products which, under normal operating conditions, proves defective in material or in workmanship within one (1) year from the date of shipment by Transducer Techniques, will be repaired or replaced free of charge provided that you obtain a return material authorization from Transducer Techniques and send the defective product, transportation charges prepaid with notice of the defect, and establish that the product has been properly installed, maintained, and operated within the limits of rated and normal usage. Replacement product will be shipped F.O.B. our plant. The terms of this warranty do not extend to any product or part thereof which, under normal usage, has an inherently shorter useful life than one year. The replacement warranty detailed here is the Buyer's exclusive remedy, and will satisfy all obligations of Transducer Techniques, whether based on contract, negligence, or otherwise. Transducer Techniques is not responsible for any incidental or consequential loss or damage which might result from a failure of any Transducer Techniques' product. This express warranty is made in lieu of any and all other warranties, expressed or implied, including implied warranty of merchantability or fitness for particular purpose. Any unauthorized disassembly or attempt to repair voids this warranty.

OBTAINING SERVICE UNDER WARRANTY

Advance authorization is required prior to the return to Transducer Techniques. Before returning the item(s), either write to the Repair Department c/o Transducer Techniques, 42480 Rio Nedo, Temecula, CA 92590, or call (951) 719-3965 with: 1) a part number; 2) a serial number for the defective product; 3) a technical description of the defect; 4) a no-charge purchase order number (so products can be returned to you correctly); and, 5) ship to and bill to addresses. Shipment to Transducer Techniques shall be at Buyer's expense, and repaired or replacement items will be shipped F.O.B. our plant in Temecula CA. Non-verified problems or defects may be subject to a \$75 evaluation charge. Please return the original calibration data with the unit.

OBTAINING NON-WARRANTY SERVICE

Advance authorization is required prior to the return to Transducer Techniques. Before returning the item(s), either write to the Repair Department c/o Transducer Techniques, 42480 Rio Nedo, Temecula, CA 92590, or call (951) 719-3965 with: 1) a model number; 2) a serial number for the defective product; 3) a technical description of the malfunction; 4) a purchase order number to cover Transducer Techniques' repair cost; and 5) ship to and bill to addresses. After the product is evaluated by Transducer Techniques, we will contact you to provide the estimated repair costs before proceeding. The minimum evaluation charge is \$75. Shipment to Transducer Techniques shall be at Buyer's expense, and repaired items will be shipped to you F.O.B. our plant in Temecula, CA. Please return the original calibration data with the unit.

REPAIR WARRANTY

All repairs of Transducer Techniques' products are warranted for a period of 90 days from the date of shipment. This warranty applies only to those items that were found defective and repaired; it does not apply to products in which no defect was found and returned as is, or merely recalibrated. Out-of-warranty products may not be capable of being returned to the exact original specifications or dimensions.

**FOR TECHNICAL SUPPORT, CALL
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