



FORCE ONE™ FDIX

OPERATION MANUAL

FORCE ONE™

**FORCE ONE™ FDIX
PATENTED
“PLUG and PLAY”
FORCE GAGE**



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fdixman_141022_mp

MOST IMPORTANT - READ BEFORE USING THE FDIX FORCE GAGE

- OVERLOADS:**
- ▶ FDIX provides overload protection of its load cells. However, **EXCESSIVE OVERLOADS** or **IMPACT LOADING** will cause permanent damage.
 - ▶ Prior to reaching an overload condition, the FDIX displays “STOP”. Continuing to apply force to the FDIX will damage the Force Cell Module. For overload protection by model, see **SPECIFICATIONS**.
 - ▶ When **HELP** is displayed, it indicates:
 - Force Cell Module is not securely connected, or,
 - Force Cell Module is overloaded and damaged.
- CORRECT LOADING:** FDIX is intended for axial loads only. Application of force to the load shaft at an angle or twisting the load shaft will cause erroneous readings. If these forces are excessive, damage will occur.
- ATTACHING IMPLEMENTS:** Attach implements “finger-tight” only. Use of tools to attach implements to the load shaft will cause damage to the Force Cell Module.
- AC ADAPTER/CHARGER:** Use only the AC adapter/charger supplied with FDIX. Using other adapter/charger units may damage the gage.
- CABLE CONNECTION:** Turn FDIX off before connecting or disconnecting a cable.



FORCE ONE™ DIGITAL FORCE GAGE

FDIX

OPERATION MANUAL

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**CONSTRUCTION**

- Patented “Plug and Play” Design.
- Force Display Module (FDMIX) adapts to 7 Force Cell Modules (FCMI).
- Tension and Compression with lbf, kgf, gf, N and ozf units.
- Large 1.2” x 1.8” Graphic LCD with full 5 digit readout.
- Displays: Battery status, **T**, **C**, and **Peak**.
- Automatic display reversal for use with load shaft up or down.
- Compact firm grip aluminum housing.
- Made in the USA - Patented Design.
- Standard American threads.

OPERATION

- Change Force Cell Module (FCMI) to change gage capacity.
- Peaks captured at selectable 100 or 1000 samples/sec.
- Filtering of non-peak and peak readings.
- USB Interface for battery charging and communication.
- Five selectable baud rates: 9600, 19200, 38400, 57600, or 115200
- Single data point or continuous data output.
- Control of data output from FDIX or computer.
- Remote firmware updates by web site download.

POWER REQUIREMENTS

- Continuous AC operation with 110 or 220 VAC adapter/charger.
- Continuous operation with USB connection.
- Re-chargeable NIMH battery for up to 4 hours of full backlight operation.
- Backlight can be dimmed or turned off for up to 20 hours of operation.
- Auto-Off power conservation.

ACCESSORIES

- Re-chargeable NIMH battery, AC adapter/charger, two implements, case, NIST Calibration Certificate, and Measure Lite Data Logging Software.
- Optional accessories: 7 Force Cell Modules, implements, grips, test stand mounting kits, and Measure Gage Force Testing Software.

ACCURACY

- Dedicated Force Cell Module: $\pm 0.2\%$ of full scale ± 1 L.S.D.
- Interchangeable Force Cell Modules: $\pm 0.3\%$ of full scale ± 1 L.S.D.

WEIGHT & DIMENSIONS

- 0.8 lb (.4 kg), shipping weight: 3 lb (1.4 kg).
- 2 3/4” (70mm) w x 4” (100 mm) h x 1 1/4” (30mm) d.



FORCE ONE™ FORCE GAGE

FEATURES

FORCE DISPLAY MODULE – FDMIX

Front Half
Electronics & Digital Display

FORCE CELL MODULE – FCMI

Rear Half – Interchangeable
Load Cell and Battery

USB 2.0 Communication

Auto Calibration
lbf, or kgf

Interchangeable
Force Cells

Firm Grip Design

Overload Protection

Aluminum Housing



High Resolution
White Backlight
Graphic Display

2000 Count
5 Digit Display

Selectable
lbf/ozf/kgf/gf/N

AC Charger or
USB Port Charging
20 Hour NiMH Battery

Selectable 100 or 1000
Peak Sampling Rate

Patent Number 5,471,885

The **FDIX Digital Force Gauge** provides the unique **patented ability to interchange various capacity Force Cell Modules** with a single force gage providing **± 0.3% accuracy**. If used with one Force Cell Module - one capacity - the **accuracy is ± 0.2%**.

The **FDIX** is a **general purpose force gage** intended for **hand-held or test stand use**. It can be used on motorized test stands, but is not intended for test stand control.

Several features add to **FDIX** usefulness and data quality. It provides **bi-directional USB output** for logging data or plotting curves and **Auto-Calibration** feature permits calibration with only one test weight.

Expanded firmware includes **single data point** or **continuous data flow** to a computer and **remote firmware updates** via email.

Auto-reversal of display provides upright display for load shaft up or down.



TABLE 1 FDIX DIGITAL FORCE GAGE & FORCE CELL MODULES

FDIX MODEL	FCMI MODULE*	CAPACITY ** / GRADUATION								LOADSHAFT MOVEMENT AT CAPACITY
FDIX 2	FCMI 2	2 x 0.001 lbf	32 x 0.02 ozf	1 x 0.0005 kgf	1000 x 0.5 gf	10 x 0.005 N	0.015"			
FDIX 5	FCMI 5	5 x 0.002 lbf	80 x 0.05 ozf	2.5 x 0.001 kgf	2500 x 1 gf	25 x 0.01 N	0.011"			
FDIX10	FCMI 10	10 x 0.005 lbf	160 x 0.1 ozf	5 x 0.002 kgf	5000 x 2 gf	50 x 0.02 N	0.007"			
FDIX 25	FCMI 25	25 x 0.01 lbf	400 x 0.2 ozf	10 x 0.005 kgf	10000 x 5 gf	100 x 0.05 N	0.007"			
FDIX 50	FCMI 50	50 x 0.02 lbf	800 x 0.5 ozf	25 x 0.01 kgf	25000 x 10 gf	250 x 0.1 N	0.007"			
FDIX100	FCMI 100	100 x 0.05 lbf	1600 x 1 ozf	50 x 0.02 kgf	50000 x 20 gf	500 x 0.2 N	0.007"			
FDIX200	FCMI 200	200 x 0.1 lbf	3200 x 2 ozf	100 x 0.05 kgf	100000 x 50 gf	1000 x 0.5 N	0.005"			

* The optional FCMI Force Cell Modules can be purchased separately and interchanged with all FDIX Series Force Gages.
 ** Overload protection to 250 lbf for all capacities except 200 lbf overload protection to 400 lbf.

TABLE 2 FDIX - OPTIONAL ACCESSORIES

MODEL	DESCRIPTION	MODEL	DESCRIPTION
FD/S-1 *	Steel Hook - Large (100 lbf)	FDIX/CA210 *	Cable, USB, FDIX to PC, Male A
FD/B-1 *	Steel Hook - XL (200 lbf)	FDIX/CA120 **	Cable, RS232, FDIX to PC, 9 pin/DB
FD/S-2 *	Flat Head (5/8" diameter)	15-1004 ***	MESURgauge Force Testing Software
FD/S-3	Cone Point	FD/NMH	NiMH Battery - 9V Size
FD/S-4	Chisel Head	FDIX/AC-USB	AC Adapter with USB Cable – 110/220 Vac
FD/S-5	Vee Tip		
FD/S-6	Extension Rod		
FD/A-7	Hinged Hook - Small (20 lbf)		
FD/S-7	Hinged Hook - Large (100 lbf)		
FD/RT	1 cm2 Flat Rubber Tip		
FD/CP2	2" Compression Plate		
FD/HDL	Aluminum Handles		

* Flat head and appropriate steel hook included with FDIX.

* Replacement USB cable, driver and MESURLite software on a CD.
 ** Requires USB port on the computer.
 *** Feature rich force testing software – force vs. distance.





TABLE 3 FORCE ONE™ - TECHNICAL SPECIFICATIONS	
Item	Specification
Accuracy	Dedicated FCMI: ± 0.2 % F.S. ± 1 L.S.D.* Interchangeable FCMI: ± 0.3 % F.S. ± 1 L.S.D.**
Display	160 x 100 Graphic Liquid Crystal Display (LCD) Reversible White Backlight Selectable Brightness and Contrast
Display Update	8 per second or 2 per second
Resolution	2000 graduations (2500 for 5 & 25 lbf capacity)
Tare	$\pm 10\%$ of Full Scale (FS)
Load Shaft Deflection	Varies by capacity - see page 5
Load Cell	Overload protected "Smart Load Cell"
Load Cell Interchangeability	"Plug and Play" with Smart Load Cell
Overload Protection	250 lbf
Power	<ul style="list-style-type: none"> • 110 or 220 VAC Adapter/Charger • USB connection • Rechargeable 9V NIMH battery (9V form)
Battery Endurance	Up to 4 hours with backlight on high Up to 20 hours with backlight off
Battery Charge	12 hours for typical charge (21 hours for full charge)
Peak Force Sampling Rate	Selectable: 100 Samples per second 1000 Samples per second
Menu Selection	Menu selection of: <ul style="list-style-type: none"> • Display Options – orientation, brightness, contrast, time • Settings Options – units, sample rate, more • Data Options – output mode, baud rate, format

* Dedicated and NIST certified for use with one FCMI.

** Fully interchangeable and NIST certified with multiple FCMI.

A. KEYPAD AND DISPLAY

A.1 Keypad Description

FDIX is operated with a five button keypad that controls all functions. Practice using the keypad to gain familiarity with gage operation prior to actual use.



FUNCTION

- Context sensitive function buttons.
- Intuitive text defines button function.

ESCAPE

- Menu control - cancel and return to previous menu.
- Exit set-up menu.

ZERO

- Returns display to zero in non-peak and peak mode.
- Returns display to zero with tare force or weight applied to the load shaft.

ON/OFF

- Turns FDIX on and off.
- Display self-test – press & hold during power on.
- Capacity and software version displayed at power on.

If there is no display or if low battery is indicated, the battery may be low or not securely connected. Connecting the AC Power Adapter or USB Cable will confirm this.

A.2 Main Display Controls

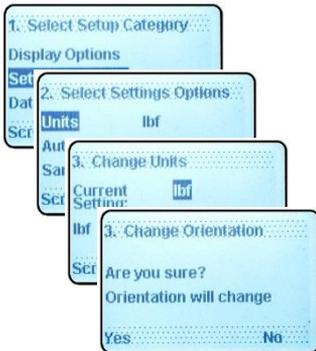
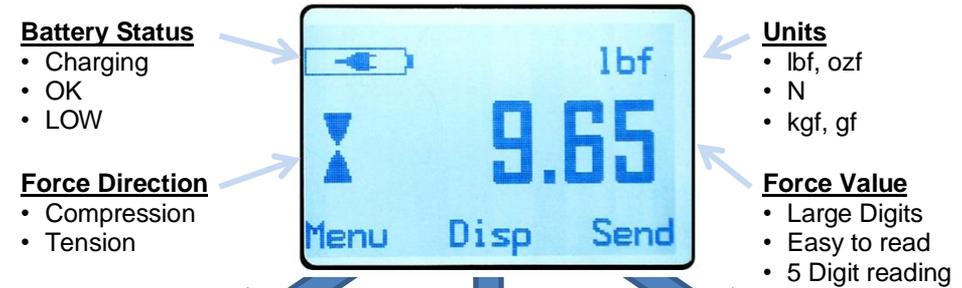
The intuitive, text based, on screen function menu makes the gage easy to operate.

- | | |
|-------------|---|
| Menu | <ul style="list-style-type: none">• Provides access to all display, setup, and data options. |
| Disp | <ul style="list-style-type: none">• Controls display mode – Real time, compression or tension peak, or simultaneous display of all three. |
| Send | <ul style="list-style-type: none">• Transmits current display values via the USB port. |

A.3 Main Display Use

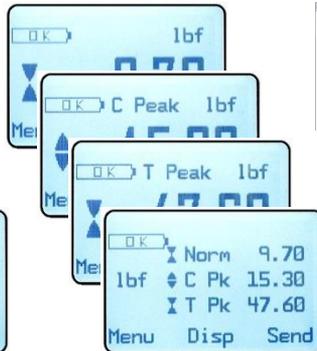
The large (1.2" x 1.8"), high resolution (160 x 100 pixel) graphic LCD display makes the FDX easy to read and easy to operate. Three context sensitive Function buttons automatically change the command options when you enter different operating modes.

The Function buttons on the main display provide the most common commands needed for normal testing. Pressing the **Menu** Function button (described in Section B) where all gage display and operating parameters can be viewed and changed to optimize performance to match your testing needs. Pressing the **Disp** Function button (described in Section C) changes how data is shown on the screen so the force value display matches how you record data. Pressing the **Send** Function button (described in Section D) transmits digital data to your computer or printer via the USB port to record your data.



B. Setup Your Gage

- Select a Category
- Choose a Parameter
- Change the Value
- Confirm the Change



C. Display Your Force

- Real Time Non-Peak
- Compression Peak
- Tension Peak
- Display All



D. Send Your Data

- Single value
- Continuous stream
- Bi-directional Computer Control

B. MENU SET-UP

Force Cell Capacity - There is no menu option for capacity selection - simply “Plug and Play”. The “Smart Load Cell” capacity is immediately recognized by FDIX and displayed when the power is turned on.

B.1 Menu Description

FDIX features are configured using the set-up menu. First you select the Category of features you want to review or change, then you select the feature you want review or change, then you select the new configuration value you want to use.

TABLE 4 MENU OPTIONS AND SELECTIONS		
Category	Features - Level One	Values / Settings - Level Two
Display	Orientation	Auto, Inverted, Standard *
	Backlite To	Always On, Always Off, 1 Min, 5 Min *, 10 Min, 20 Min, 30 Min
	Contrast	1 to 20 (15 *)
	Brightness	Medium *, High
Settings	Units	lbf *, N, kgf, gf, ozf
	Auto Off	Always On *, 30, 15, 5
	Sample Rate	1000 *, 100
	Filter	Fast, Normal *, Slow
Data	Data Mode	Send key off, Send Only *, Continuous
	Baud Rate	9600 *, 19200, 38400, 57600, 115200
	Cont Rate	100, 50, 20, 10, 5, 2, 1 *, 0.5
	Protocol	Wagner *, Chatillon™ **
	Data Format	-lbf *, “-“, lbf, -
		See Section D. For Data Interface Details

* Factory default settings.

** Chatillon is a registered trademark of Ametek.

B.2 Menu Operations

B.2.1 Menu Access

- Turn FDIX on.
- Starting on Display Screen, press and hold “Menu”.
- Menu selections are displayed when released.
- Press the **ESCAPE** button to exit the Menu.



B.2.2 Menu Navigation

Menu Title - Each menu screen has three types of information to help setup your gage. The title describes what you are configuring, scrollable parameter list lets you choose the feature you want to configure, and the Function Bar lets you control the setup.

Where you are

What you can do

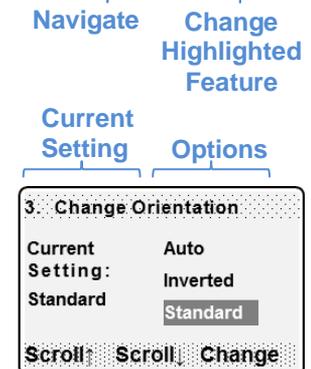
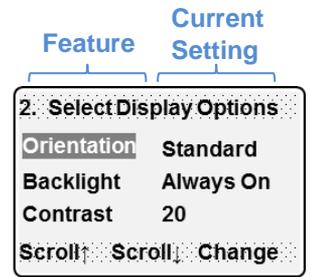
How to do it



Menu Items – Each menu item shows the feature and the current setting. The highlight box shows the feature or parameter to be configured. The highlight box moves as you scroll, except when the highlight box is on the first or last item of the list. You are at the top or bottom of the menu list when the highlight box is at the top or bottom of the screen. The example to the right shows that the menu is at the top of the list and the **Display Orientation** is currently set to **Standard**.

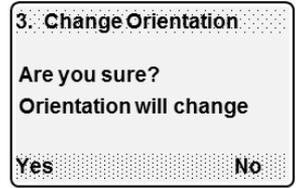
Menu Control – All feature and parameter selection menu screens are controlled the same way. Press the **Scroll↑** function button to move the highlight box up and press the **Scroll↓** function button to move down. Press **Change** to modify the selected feature.

Parameter Change – All parameter change screens show the feature being changed in the title, the current setting is displayed on the left side, and the list of available options is displayed on the right. The highlight box shows the selected new value. The highlight box moves as you scroll, and starts at the current setting. Press **Change** to accept the new value.



ESCAPE – Pressing the **ESCAPE** button moves you to the previous menu screen.

Confirm Your Change – You will always be asked **Are You Sure?** before a new value is saved. Once saved, gage configuration is changed and will operate using the new value until changed again. Press **Yes** to save the new value or **No** to escape back to the previous menu screen. The **Are You Sure?** screen always reminds you of what parameter will be saved.

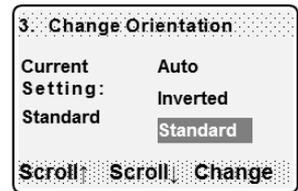


B.2.3 Display Options Menu

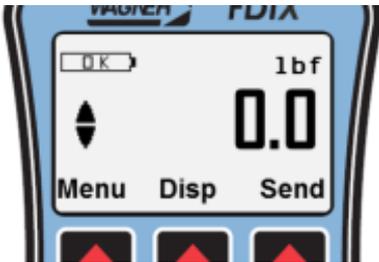
To access the Display Options Menu, refer to B.2.1 and scroll to **Display Options**. The various display features of the FDIX are grouped for convenience. Table 4 above lists the features and setup values you are able to review and change.

1) **Orientation** – is the Display feature that sets the direction that display text is viewed.

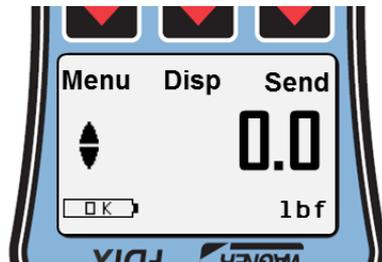
- ▶ **Auto** - uses an internal tilt sensor to automatically sense gage orientation. When the gage is inverted, the text will flip to be readable.
- ▶ **Inverted** - sets the text to always be inverted.
- ▶ **Standard** * - sets the text to always be vertical.



Standard

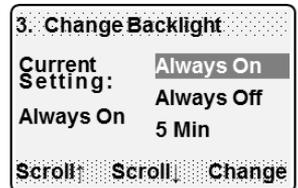


Inverted



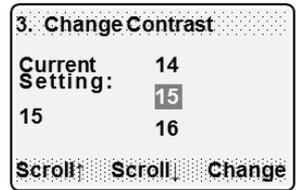
2) **Backlight** – is the power saving Display feature that controls the automatic backlight off delay.

- ▶ **Always on** - keeps that backlight on all the time reducing battery duration with best visibility.
- ▶ **Always off** - keeps the backlight off all the time maximizing battery duration with reduced visibility.
- ▶ **5 Min** * - keeps the backlight on for five minutes then turns off if no activity is detected. Provides best visibility with good battery duration when not in use.
- ▶ **10 Min, 20 Min, 30 Min** – optional automatic turn off times.



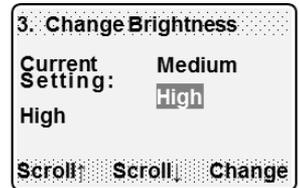
* Factory default setting

- 3) **Contrast** – is the Display feature that sets the text darkness compared to the background. The exact setting is determined by operator preference and may be affected by operating temperature. The contrast is set by selecting a value between **1** and **20**. If you set contrast too low the text will appear “washed out” and difficult to read, if you set contrast too high the background will darken. The best setting provides good readability on a light gray background.



- ▶ **1** is the lightest text and **20** is the darkest text.

- 4) **Brightness** – is the Display feature that sets the brightness of the display backlight.

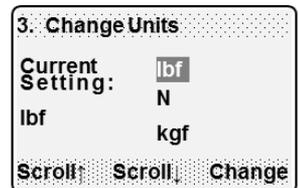


- ▶ **Medium** * - provides acceptable brightness with better battery duration.
- ▶ **High** - provides best brightness with reduced battery duration.

B.2.4 Settings Options Menu

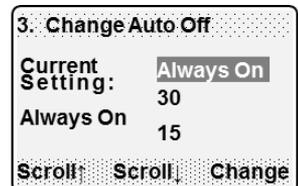
To access the Settings Menu, refer to B.2.1 and scroll to **Settings Options**. The various general operating features of the FDIX are grouped for convenience. Table 4 above lists the features and setup values you are able to review and change.

- 1) **Units** – is the Settings feature that selects the units of measurement. The current setting is always shown on the main display screen.



- ▶ **lbf** * displays all values in pounds force.
- ▶ **N** displays all values in Newtons.
- ▶ **kgf** displays all values in kilograms force.
- ▶ **gf** displays all values in grams force.
- ▶ **ozf** displays all values in ounces force.

- 2) **Auto Off** – is the Settings feature that conserves battery power by automatically shutting off the gage after a period if no buttons are pressed. Press the Power button to restart the gage.

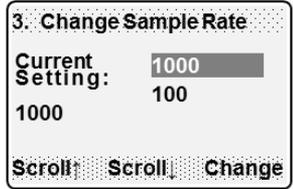


NOTE: The gage automatically zeros at power on.

- ▶ **Always on** * - keeps the gage on all the time reducing battery duration, but the gage is always ready for use.
- ▶ **30 Min, 15 Min, 5 Min** - optional automatic turn off times.

* Factory default setting

3) **Sample Rate** – is the Settings feature that provides selectable peak sampling rates and corresponding filtering. The sample rate sets the number of electronic force measurements processed per second. The sample rate and filter setting work together to control the overall response time of the force reading.



- ▶ **1000 *** – provides 1,000 measurements per second.
- ▶ **100** – provides 100 measurements per second.

- **Routine Testing**

Peak sampling rate of 100/sec is preferable for slowly occurring events and reduces battery power consumption.

- **Rapid Event Testing**

Peak sampling rate of 1000/sec is required to capture peaks of rapidly occurring events and break tests. The FDIX takes 1000 “looks” per second to accurately capture a break point and display it.

- **Digital Filtering**

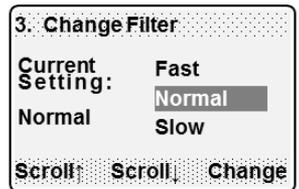
Filtering of displayed data provides accurate force readings by eliminating vibrations and electro-magnetic inference.

- **Filter Settings**

Filtering can be selected to provide faster or slower response time (see B.2.4 4).

Input bandwidth: The band of frequencies that filtering passes thru from the load cell to the display. All other background noise or interference frequencies are excluded.

4) **Filter** – is the Settings feature that modifies the standard filter to provide slightly more or less filtering for the selected sample rate. The filter works together with the sample rate to control the overall response time of the force reading.



- ▶ **Fast** – provides slightly faster response because there is less filtering.
- ▶ **Normal *** – provides a good balance between response time and noise.
- ▶ **Slow** – provides slightly slower response because there is more filtering

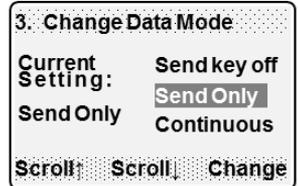
* Factory default setting

B.2.5 Data Options Menu

To access the Data Menu, refer to B.2.1 and scroll to **Data Options**. The various communication parameters of the FDIX are grouped for convenience. Table 4 above lists the features and setup values you are able to review and change. The FDIX is a bi-direction USB controlled force gage. This menu category permits configuration used for digital communication.

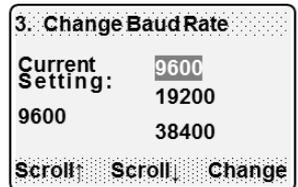
- 1) **Data Mode** – is the Data feature that controls how the Send button (Function button 3 shown in A.1) is used to transmit digital data to the USB port. Pressing Send transmits the displayed data value to the USB port.

- ▶ **Send key off** – disables manual data transmission.
- ▶ **Send Only *** – sends one data point when pressed.
- ▶ **Continuous** – send button turns continuous data transmission on and off.



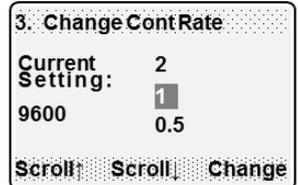
- 2) **Baud Rate** – is the Settings feature that sets the digital communication speed through the USB port.

- ▶ **9600 ***, **19200**, **38400**, **57600**, **115200** – optional baud rates for faster communication.



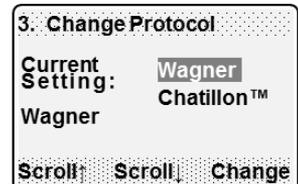
- 3) **Cont Rate** – is the Settings feature that, when selected, sets the rate of continuous data point transmission (**refer to Section D.2** Continuous Data Point Transmission for use and application details).

- ▶ **100**, **50**, **20**, **10**, **5**, **2**, **1 ***, **0.5**



- 4) **Protocol** – is the Settings feature that sets the command language used to remotely control the gage. See section D.3 for details.

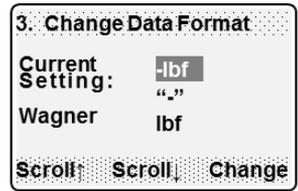
- ▶ **Wagner *** – uses a command language developed by Wagner Instruments for use with other Wagner Instrument and Mark X products.
- ▶ **Chatillon™** – uses a command language developed by Chatillon for use with other Chatillon products.



* Factory default setting

5) **Data Format** – is the Settings feature that formats the output data.

- ▶ **-lbf *** - Minus sign sent as – with force units appended. Example: - 25.00 lbf
- ▶ **“-“** - Minus sign sent as “-“ with force units appended. Example: “-“ 25.00 lbf
- ▶ **lbf** - Minus sign sent as - with force units not appended. Example: - 25.00
- ▶ **- -** - Minus sign sent as “-“ with force units not appended. Example: “-“ 25.00



* Factory default setting

C. GAGE OPERATION

C.1 Force Measuring

The FDIX has four intuitive ways to display force values:

- **Non-Peak Mode** FDIX displays normal (i.e. - instantaneous) force being applied.
- **Peak Mode** FDIX displays highest peak tension or compression force applied since the gage was last cleared by pressing ZERO.
- **Display All Mode** FDIX simultaneously displays the non-peak, compression peak, and tension peak force values.

FDIX continuously measures instantaneous tension and compression forces and continuously captures peak tension and compression forces. Thus, peak values are always available in all modes.

C.1.1 Non-Peak Mode

Displayed force values vary with the instantaneous force applied. Use FDIX in this mode for monitoring the applied force in real time as it varies.

At any time tension or compression peaks are needed, they may be viewed by pressing the **Disp** function button.

- **Enter Non-Peak Mode** Pressing **Disp** repeatedly to cycle through the display modes until the **Peak** icon is not displayed.
- **Run Test** Apply press or pull force, the gage tracks and displays applied force.
- **Recall Peaks** Press **Disp** to cycle through display modes.
- **Clear Peak Memory** Press **ZERO** to tare the gage and clear peak values.
- **Return to Non-Peak** Press **Disp** until the **Peak** icon is not displayed.

It is important to note that the peak value retrieved is not necessarily the peak from the last test excursion; it is the highest peak since peak memory was last cleared.

C.1.2 Peak Mode

Force values displayed by FDIX are the highest peak(s) of tension or compression since peak memory was cleared. If peak memory is cleared, the next peak value displayed will be that of the next test. If additional tests are run after the first test, without clearing the peak memory, the peak value displayed will always be the highest peak from the series of tests.

- **Enter Peak Mode** Press **Disp** repeatedly to cycle through the display modes until the desired **Peak** icon is displayed.
- **Run Compression Test** When the **C Peak** icon is visible, begin compression test by applying push force. Peak force is displayed. When a higher compression force is applied, the new peak is displayed.
- **Run Tension Test** When the **T Peak** icon is visible, begin tension test by applying pull force. Peak force is displayed. When a higher tension force is applied, the new peak is displayed.
- **Recall Peaks** Press **Disp** to cycle through display modes.
- **Return to Non-Peak** Press **Disp** until the **Peak** icon is not displayed.

Prior to actual test use, practice with FDIX “Non-peak” and “Peak” modes to gain familiarity. FDIX in non-peak or peak mode is continuously measuring the instantaneous force applied and continuously capturing peaks.

Peaks can be recalled in non-peak as well as peak modes.

C.1.3 Display All Mode

All three force values are displayed by FDIX. Non-peak, **C Peak**, and **T Peak** values are visible at the same time. The displayed values work the same as described in the above modes, but they are all visible at the same time.

- **Enter Display All Mode** Press **Disp** repeatedly to cycle through the display modes until the display format changes to show three values.
- **Run Test** Apply Press or pull force. The non-peak value tracks and displays the applied force and each peak force is displayed in real time. When a higher compression or tension force is applied, the new peak is displayed.
- **Recall Peaks** Peaks do not have to be recalled, they are already displayed.
- **Return to Non-Peak** Press **Disp** until the desired screen is displayed.

Prior to actual test use, practice with FDIX “Display All” mode to gain familiarity. FDIX in “Display All” mode is continuously measuring the instantaneous force applied and continuously capturing peaks and displaying all three values.

Press ZERO to tare the gage and clear peak values.

C.1.4 Error Messages

The FDIX continuously monitors the applied force and displays error messages when the force is outside the normal operating range. The FDIX displays the following messages when operator error or maintenance issues are detected:

- 1) **DISPLAY NOT CALIBRATED** – verify correct calibration of the Display during factory assembly. Corrective action by factory service is required.
 - ▶ Check electronic calibration.
 - ▶ Stop operation if not calibrated.
- 2) **FCMI NOT FOUND** – verify correct assembly and electrical connections.
 - ▶ Check FCMI connection status.
 - ▶ Stop operation if not connected.
 - ▶ Stop operation if connected, but not working.
- 3) **FCMI NOT CALIBRATED** – verify correct calibration sequence preventing operator error.
 - ▶ Check FCMI calibration status
 - ▶ Stop operation if not calibrated
- 4) **LOAD CELL OFFSET** – detects operator error or load cell damage by measuring load cell offset.
 - ▶ Part of load cell calibration.
 - ▶ Must be measured when gage is horizontal.
 - ▶ The load cell offset has changed.
 - ▶ The gage is disabled until issue is corrected.
 - ▶ Recovery: re-calibrate the load cell using correct no-load horizontal position or repair the load cell.
- 5) **ZERO OUT OF TOLERANCE** detects electronic fault in the value of the Display offset.
 - ▶ Electronic offset exceeds spec. (> 10% deviation).
 - ▶ Recovery: make sure test setup is correct or troubleshoot the Display board. Press **Again** to try again.

DISPLAY NOT CALIBRATED

Call Service 203-698-9681

FCMI NOT FOUND

Connect FCMI or
Call Service 203-698-9681

FCMI NOT CALIBRATED

Calibrate the FCMI or
Call Service 203-698-9681

LOAD CELL OFFSET

Load cell may be damaged.
Call Service 203-698-9681

ZERO OUT OF TOLERANCE

Check setup or repair board.

Again

6) **GAIN OUT OF TOLERANCE** – detects electronic fault in the value of the Display gain.

- ▶ Electronic gain exceeds spec. (> 10% deviation).
- ▶ Recovery: make sure test setup is correct or troubleshoot the Display board. Press **Again** to try again.

GAIN OUT OF TOLLERANCE
Check setup or repair board.
Again

7) **ZERO NOT SET** – detects operator error. Cannot calibrate the Display until ZERO has been pressed.

- ▶ Recovery: press **Again** to try again.

ZERO NOT SET
Must ZERO before CAL
Again

8) **GAIN NOT SET** – detects operator error. Cannot complete Display calibration until CAL has been pressed.

- ▶ Recovery: press **Again** to try again.

GAIN NOT SET
Must CAL before DONE
Again

9) **TARE TOO HIGH** – verifies that the tare force is within the normal operating range.

- ▶ Too much tare force is applied.
- ▶ Tare is more than 10% of rated load cell capacity.
- ▶ Recovery: reduce tare & press ZERO.

TARE TOO HIGH
Reduce load, then press ZERO

10) **LOAD CELL OUT OF SPEC.** – verifies acceptable load cell offset during first factory calibration.

- ▶ Compares new load cell to vendor spec.
- ▶ Recovery: Trouble shoot load cell and Display electronics and press **Again** try again.

LOAD CELL OUT OF SPEC
Check setup and circuit
Again

11) **INCORRECT CAL WEIGHT** – detects operator error during load cell calibration.

- ▶ Calibration weight does not match selected load cell capacity (> 15% deviation).
- ▶ Recovery: make sure the calibration weight matches the selected load cell capacity.

INCORRECT CAL WEIGHT
Check capacity and weight

- 12) **!!! OVERLOAD !!!** – detects operator error or accidental overload. Senses total force on the load cell (tare + load) and is not affected by tare.
- ▶ Too much force is applied.
 - ▶ More than 125% of rated load cell capacity.
 - ▶ Gage may be damaged.
 - ▶ Recovery: reduce force & check calibration.

!!! OVERLOAD !!!
Reduce applied force and
inspect for damage.
Service 203-698-9691

- 13) **STOP OUT OF RANGE** – detects operator error or accidental use of the gage above the specified full scale. Senses total force on the load cell (tare + load) and is not affected by tare.
- ▶ Too much force is applied.
 - ▶ More than 110% of full scale reading.
 - ▶ Recovery: Reduce the applied total force (tare or load).

**STOP
OUT OF RANGE**
Reduce applied force

D. USB Data Output

USB communication enables operator to change settings, zero the gage and transmit filtered data points from the gage keypad or the computer keyboard. The **FDIX** can be configured to output digital data that can be turned off, send one data point at a time (**described in Section D.1**), send continuous data flow (**described in Section D.2**), or can be remotely controlled from a computer keyboard (**described in Section D.3**).

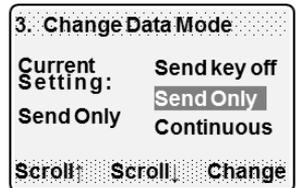
Data Options Menu Instructions (B.2.5 (1), (2), and (3) repeated for Convenience)

- Press and hold the **Menu** button. There are three setup categories listed.
- Press **Scroll** to step thru: **Display Options**, and **Settings Options**.
- Press **Change** when **Data Options** is highlighted.
- Use the menu control functions (**described in B.2.2**) to navigate to Data Mode, Baud Rate, and Cont Rate menu items to setup the desired data stream.

Data Mode Repeated for Convenience from B.2.5 (1)

Data Mode is the Data feature that controls how the **Send** button (Function button 3 shown in A.1) is used to transmit digital data to the USB port. Pressing **Send** transmits the displayed data value to the USB port.

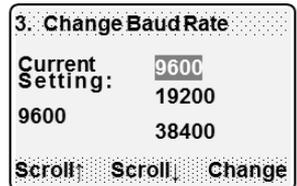
- ▶ **Send key off** – disables manual data transmission.
- ▶ **Send Only** * – sends one data point when pressed.
- ▶ Continuous – turns continuous data transmission on and off.
 - Selecting **Continuous** will send data using the current baud rate.



Baud Rate Repeated for Convenience from B.2.5 (2)

Baud Rate is the Settings feature that sets the digital communication speed through the USB port.

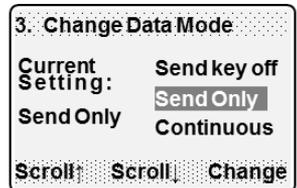
- ▶ 9600 *, 19200, 38400, 57600, 115200 – optional baud rates for faster communication.



Cont Rate Repeated for Convenience from B.2.5 (3)

Data Mode – is the Data feature that controls how the **Send** button (Function button 3 shown in A.1) is used to transmit digital data to the USB port. Pressing **Send** transmits the displayed data value to the USB port.

- ▶ **Send key off** – disables manual data transmission.
- ▶ **Send Only** * – sends one data point when pressed.
- ▶ Continuous – Send button turns continuous data transmission on and off.
 - Press **ESCAPE** to resume normal operation.



* Factory default setting

D.1 Single Data Point Transmission

When the Data Mode is set to **Send Only**, the gage will send only one value at a time to the USB port. When the **Send** button is pressed, the gage sends the current display value to the USB port. Digital data is always transmitted using the setup parameters set in the **Data Option** menu (**described in B.2.5 and E.1 Table 5**)

- Press **Send** to transmit a single value to the USB port.

D.2 Continuous Data Point Transmission

Continuous USB data output is provided with all FDIX Version 5.00 or above and is controlled at the FDIX keypad or at a computer keyboard.

When the Data Mode is set to **Continuous**, the gage sends a continuous stream of data values to the USB port that track the real time display readings. When the **Send** button is pressed, the data stream is turned on or off. The **cont** icon (above the units icon) indicates when data output is active. Digital data is always transmitted using the setup parameters set in the **Data Option** menu (**described in B.2.5 and E.1 Table 5**)

- Press **Send** to initiate continuous USB data stream, **cont** icon above units.
- Press **Send** again to end continuous USB data stream, no **cont** icon.

D.3 Bi-directional Computer Control

Full bi-directional computer control via the USB port is provided with all FDIX Version 5.00 or above.

D.3.1 USB Commands - -- Version 5.00 and above

FDIX USB port is controlled at the gage keypad or computer keyboard.

FDIX is keyboard controlled from a computer using the **FDIX** bi-directional USB port. This feature is useful for those with software programming skills and is not intended for use with commercially available software such as EXCEL.

To access communication protocol setup menus, proceed to **Data Options** in FDIX menu, and choose preferred options as **described in B.2.5, D.1, and E.1 Table 5**.

After USB parameters are set, proceed with the following:

COMMAND - Not Case Sensitive	DESCRIPTION
Single Force Data Point	
FZ	<u>Z</u> ero gage - Set gage to zero (same as ZERO button)
F	Send single force data point (filtered)
I	Send single instantaneous data point (i.e. – unfiltered)
Continuous Force Data Flow	
C.5, C1, C2, C5, C10, C20, C50, C100	Set samples per second
CA	In <u>C</u> lude zeros - Send all, including zeros
CX	Ex <u>C</u> lude zeros - Send all values >2% above zero
CB	<u>B</u> egin continuous data - Start continuous data flow
CE	<u>E</u> nd continuous data - Stop continuous data flow
Units	
UL	Set <u>L</u> B (lbf)
UN	Set <u>N</u> EWTON (N)
UK	Set <u>K</u> G (kgf)
UG	Set grams (gf)
UO	Set <u>O</u> Z (ozf)
Peak Force Data	
PN	Set <u>N</u> on - Peak
PT	Set <u>T</u> ension Peak
PC	Set <u>C</u> ompression Peak
PA	Set Display All
Miscellaneous	
V	Return gage software version
PT	Set <u>T</u> ension Peak
PC	Set <u>C</u> ompression Peak
PA	Set Display All

Notes:

- All commands will return a message:
 - Formatted digital value or
 - “OK” for commands that do not return data
- All commands must be followed by ENTER (Carriage Return / Line Feed)
- Unrecognized commands will be responded with “?”.

E. DATA TRANSMISSION

The FDIX has force data transmission through the USB port only – no analog or other data output is available.

E.1 USB Data Transmission

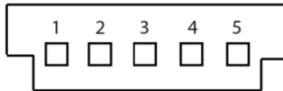
FDIX force values transmitted are those displayed on the FDIX. Serial data is transmitted via the USB Port, either as individual data points, or continuously, up to 100 data points per second with the following parameters:

TABLE 5 DATA TRANSMISSION	
Baud Rate	9600 *, 19200, 38400, 57600, 115200
Word Length	8 (fixed, not user adjustable)
Stop Bits	1 (fixed, not user adjustable)
Parity	None (fixed, not user adjustable)
Continuous	100, 50, 20, 10, 5, 2, 1 *, 0.5 Samples/sec
Data Format	- 25.00 lbf *, “-“ 25.00 lbf, - 25.00, “-“ 25.00

* Factory default settings.

F. PIN ASSIGNMENTS

The FDIX 5 contact USB connector is located on the top side of the FDIX. The contact assignments are:



CONTACT	SYMBOL	DESCRIPTION
1	VBUS+	USB +5V DC Power
2	D-	Data – for USB communication
3	D+	Data + for USB communication
4	No Connection	Reserved for future use
5	GND	USB 5V Return

G. INTERCHANGING FORCE CELL MODULES

The FDIX Force Gage provides the unique patented ability to interchange various capacity Force Cell Modules with a single force gage.

G.1 Module Description

The FDIX consists of two modules:

- **Force Display Module (FDMIX)** contains the display electronics and keypad. All control functions are initiated by keypad entry or by computer keyboard with control information and data displayed on the graphic LCD screen.
- **Force Cell Module (FCMI)** contains the load cell and battery in a load bearing structure. Applied force data is sent from the FCMI to the FDMIX through a center connector that also carries power to the FDMIX. The center connector provides quick removal of the FCMI for replacement.

G.2 Connecting a Force Cell Module (FCMI)

- Back out the two captive screws of the FCMI.
- Detach the FCMI by carefully easing the two halves apart.
- To re-attach the FCMI or replace it with another FCMI, align the center connector by aligning the edges of the two halves and gently squeeze together.
- Drive the screws in, turn the gage on to confirm FDIX functions and proceed.

Since the FDIX uses a “Smart Load Cell” , it is not necessary to make any capacity setting. The FDMIX recognizes the capacity of the FCMI attached to it.

G.3 Overload Protection

- Each FCMI is protected against overload.
- Prior to reaching overload limits of the load cell, the gage will indicate an overload condition by displaying warning messages.
- See Table 3 on page 6 for the safe overload limit of each FDIX Force Gage.

H. CALIBRATION

FDIX features “Smart Load Cell” calibration for verification and adjustment without having to return the gage to the factory.

FDIX should be periodically tested to verify it is within the specified tolerance.

H.1 Procedure Description

- **Verification - Testing Calibration** - Certified lb, kg, or N test weights are applied in tension and compression to determine if the FDIX can be certified and if the calibration procedure is necessary.
- **Calibration** - The FDIX has **Auto-Calibration** enabling the gage to be calibrated by one full capacity lb, kg, or N test weight.

H.2 Verification - Testing Calibration

Warm-up FDIX for 2-3 minutes after power-on to stabilize the electronics.

A five-point tension and compression verification test is recommended with weights equal to 20%, 40%, 60%, 80%, and 100% of FDIX capacity. If the displayed weight differs more than $\pm 0.2\%$ of full scale ± 1 L.S.D. (Dedicated) or $\pm 0.3\%$ of full scale ± 1 L.S.D. (Interchangeable), the FDIX is out of tolerance.

Accuracy verification requires testing fixtures: a test stand capable of supporting weights equal to the FDIX capacity, either lb, or kg test weights, and fixtures for applying test weights in tension and compression. Testing fixtures are available from Wagner Instruments.

FDIX accuracy depends on the Force Cell Module (FCMI) and Force Display Module (FDMIX) meeting the specified tolerance. Therefore, each interchangeable FCMI in use must be tested with the FDMIX to verify accuracy.

If any combination of FDMIX and FCMI units are out-of-tolerance, calibration of the FDIX is necessary. To restore accuracy, proceed to H.3, Auto-Calibration.

H.3 Auto-Calibration (L CAL)

Auto-Calibration is applied if FDIX is used with one or more Force Cell Modules (FCMI). The procedure is used to return the FDIX to its specified accuracy after verification indicates the FDIX is out of tolerance, or if readings are incorrect.

Certified NIST traceable test weights are recommended, resulting in an NIST Calibration Certificate. Test weights are available from Wagner Instruments.

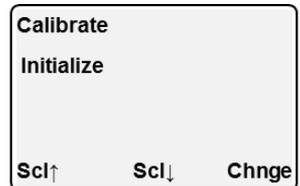
Unless the FDIX is tested with H.2 Verification and a NIST Calibration Certificate issued, FDIX is not certified to NIST standards. If certification is not required, Auto-Calibration is adequate in returning FDIX to specified accuracy.

After Auto-Calibration, FDIX accuracy should be confirmed using H.2 Verification.

H.3.1 Auto-Calibration (Force Module) Procedure

Test weights must match the Force Cell Module capacity to be tested.

- ▶ Set UNITS to lbf, kgf, or N as **described in Section B.2.4 (1)** - calibrations are performed in pounds (lbf), kilograms (kgf), or Newtons (N).
- ▶ Attach FDIX to the calibration test stand, and stop all movement.
- ▶ Enter the calibration menu:
 - Turn FDIX off.
 - Press / Hold the **F1** (left Function button)
 - Press **ON/OFF**.
 - Release **ON/OFF** first
 - Keep holding **F1** until the **Calibrate Initialize** screen is displayed.
 - Release **F1** Function button to display the Calibrate screen
 - Press **Chnge** to Auto-Calibrate the FCMI



H.3.2 Auto-Calibration (LCAL) Procedure

Test weights must match the Force Cell Module capacity to be tested.

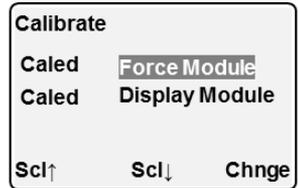
There are two FDIX calibration procedures.

NOTE: The Display Module is calibrated using factory test equipment and should not be adjusted by un-trained personnel.

Verification tests (**described in Section H.2**) should be performed prior to entering Auto-Calibration. If the FCMI is found to be out of tolerance, then use the following procedure to return the FDIX to specified accuracy.

- 1) **Calibrate** – calibration screen 1 selects which part of the FDIX to be calibrated.
 - ▶ Force Module enters FCMI (load cell) calibration.
 - ▶ Display Module enters FDMIX (electronics) calibration.

NOTE: Call service for Display Module calibration.



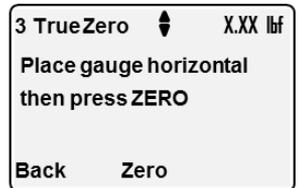
- 2) **2 Capacity** – calibration screen 2 enters the FCMI load cell capacity. The units and available values change based on the previously selected units setting (**described in B.2.4 (1)**).
 - ▶ If **lbf** units: 2, 5, 10, 25, 50, 100, or 200.
 - ▶ If **kgf** units: 1, 2.5, 5, 10, 25, 50, or 100.



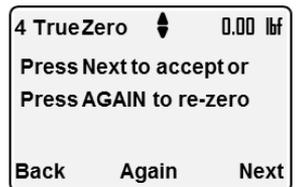
WARNING! – *significant measurement error will occur*

- *If the selected units do not match that of the calibration weight*
- *If the calibration weight does not match that of the attached FCMI*
- *If the selected calibration capacity does not match that of the attached FCMI*

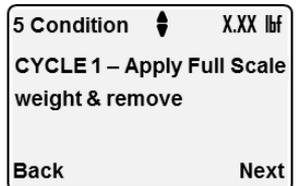
- 3) **3 True Zero** – calibration screen 3 measures the load cell offset for tracking load cell status and over load errors. The uncorrected no-load load cell value is displayed in the upper right corner of the display for your reference.
 - ▶ **Back** returns to the previous screen.
 - ▶ **Zero** measures the no-load offset of the load cell.



- 4) **4 True Zero** – calibration screen 4 displays the corrected force reading and allows the operator to accept the current value or try again.
 - ▶ **Back** returns to the previous screen.
 - ▶ **Again** returns to the previous screen to try again.
 - ▶ **Next** accepts the measured load cell offset and saves the value in memory.

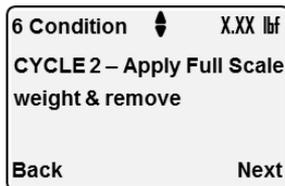


- 5) **5 Condition**– calibration screen 5 displays instruction to apply the first of two “conditioning” cycles to the load cell prior to calibration.
 - ▶ **Back** returns to the previous screen.
 - ▶ **Next** tells the gage that Cycle 1 is complete.



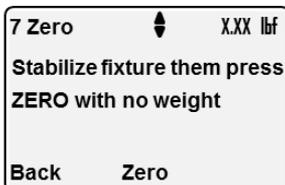
6) **6 Condition**– calibration screen 6 displays instruction to apply the second “conditioning” cycle the load cell prior to calibration.

- ▶ **Back** returns to the previous screen.
- ▶ **Next** tells the gage that Cycle 2 is complete.



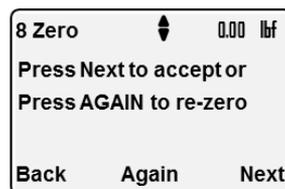
7) **7 Zero** – calibration screen 7 measures the Zero reference used for the calibration measurement. Make sure all test fixture motion is stopped and the test bench is not vibrating.

- ▶ **Back** returns to the previous screen.
- ▶ **Zero** measures the calibration zero.



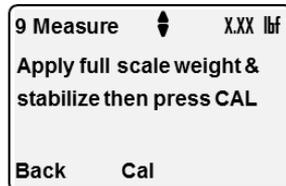
8) **8 Zero** – calibration screen 8 displays the corrected force reading and allows the operator to accept the current value or try again.

- ▶ **Back** returns to the previous screen.
- ▶ **Again** returns to the previous screen to try again.
- ▶ **Next** accepts the measured load cell offset and saves the value in memory.



9) **9 Measure** – calibration screen 9 provides instruction to apply the calibration weight to measure the full scale calibration value. Make sure all test fixture motion is stopped and the test bench is not vibrating.

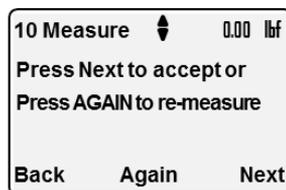
- ▶ **Back** returns to the previous screen.
- ▶ **Cal** measures the calibration value.



FDIX will reject a calibration with weights that are higher or lower than FDIX full-scale capacity. It is possible for FDIX to accept a calibration with weights that are close to, but do not match the full scale capacity of FDIX. This erroneous calibration will give inaccurate readings.

10) **10 Measure** – calibration screen 10 displays the corrected force reading and allows the operator to accept the current value or try again.

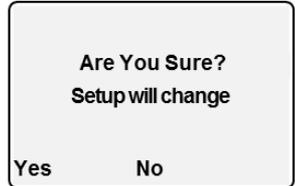
- ▶ **Back** returns to the previous screen.
- ▶ **Again** returns to the previous screen to try again.
- ▶ **Next** accepts the measured load cell calibration value and saves the value in memory.



11) **11 Verify** – calibration screen 11 allows the operator to accept the current calibration value or to verify the calibration linearity prior to accepting the current calibration value. The force value displayed in top right corner shows the corrected reading, but the new calibration information has not been saved yet.



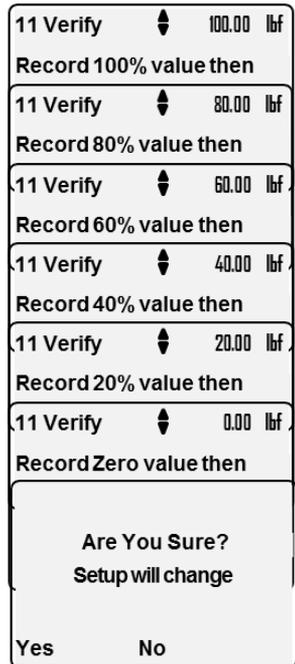
- ▶ **Back** returns to the previous screen.
- ▶ **Done** completes calibration and jumps to the “Are You Sure” screen. If you press **Yes**, then the gage saves the new calibration values to memory, and starts normal gage operation.



Verification is recommended by applying weights to check accuracy at various points of FDIX range.

- ▶ **Verify** displays a series of screens walking the operator through the verification procedure described in Section H.2.

After verification is complete, press **Done** and the gage jumps to the **Are You Sure?** screen. If you press **Yes**, then the gage saves the new calibration values to memory, and starts normal gage operation.



H.3.3 Calibration Error Messages

The FDIX continuously monitors the calibration process, applied force, and displays error messages when the operator error or the force is outside the expected range. The FDIX error messages are **described in Section C.1.4**.

J. MOUNTING INFORMATION

FDIX is mounted on most popular light capacity test stands using the threaded mounting holes on the back side of FDIX - See Dimensions, page 34.

J.1 Mounting on Wagner Test Stands

FDIX is mounted on Wagner test stands using the included mounting kit.

J.2 Mounting on other Test Stands

FDIX is mounted on other test stands, using mounting kits available from Wagner.

K. POWER SUPPLY

The preferred power source is determined by FDIX use, the rechargeable battery for portable use and AC adapter/charger or USB port for stationary use.

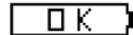
K.1 Battery and AC Adapter

The FDIX is powered by a rechargeable 9 Volt (9V form) Nickel Metal Hydride (NiMH) battery. With a full charge, the NiMH battery will provide power more than 4 hours of continuous use with high backlight and up to 20 hours if used continuously with the backlight off. Battery life can be extended further by using Auto-Off (**described in Section B.2.4 (2)**).

Low battery power is indicated on the display with a battery icon that indicates when the charger is plugged in, when the battery has a strong charge, and when the battery is low. The gage will automatically turn off when the battery is fully discharged and displays "Power Off" message.

With the AC adapter plugged in, FDIX is charging when turned on or off and charges faster when off.

- ▶ Charging – charger plugged in, can use the gage indefinitely.
- ▶ Battery OK – safe to use gage without charger.
- ▶ Battery Low – plug in charger soon, gage will power down soon and data loss may occur.
- ▶ Auto-Off – the gage will automatically turn off when the battery charge is too low.





FDIX DIGITAL FORCE GAGE & FORCE CELL MODULES

FDIX MODEL	FCMI MODULE*	CAPACITY ** / GRADUATION									LOADSHAFT MOVEMENT AT CAPACITY
FDIX 2	FCMI 2	2 x 0.001 lbf	32 x 0.02 ozf	1 x 0.0005 kgf	1000 x 0.5 gf	10 x 0.005 N	0.015"				
FDIX 5	FCMI 5	5 x 0.002 lbf	80 x 0.05 ozf	2.5 x 0.001 kgf	2500 x 1 gf	25 x 0.01 N	0.011"				
FDIX10	FCMI 10	10 x 0.005 lbf	160 x 0.1 ozf	5 x 0.002 kgf	5000 x 2 gf	50 x 0.02 N	0.007"				
FDIX 25	FCMI 25	25 x 0.01 lbf	400 x 0.2 ozf	10 x 0.005 kgf	10000 x 5 gf	100 x 0.05 N	0.007"				
FDIX 50	FCMI 50	50 x 0.02 lbf	800 x 0.5 ozf	25 x 0.01 kgf	25000 x 10 gf	250 x 0.1 N	0.007"				
FDIX100	FCMI 100	100 x 0.05 lbf	1600 x 1 ozf	50 x 0.02 kgf	50000 x 20 gf	500 x 0.2 N	0.007"				
FDIX200	FCMI 200	200 x 0.1 lbf	3200 x 2 ozf	100 x 0.05 kgf	100000 x 50 gf	1000 x 0.5 N	0.005"				

* The optional FCMI Force Cell Modules can be purchased separately and interchanged with all FDIX Series Force Gages.
 ** Overload protection to 250 lbf for all capacities except 200 lbf overload protection to 400 lbf.

TABLE 2 FDIX - OPTIONAL ACCESSORIES

MODEL	DESCRIPTION	MODEL	DESCRIPTION
FD/S-1 *	Steel Hook - Large (100 lbf)	FDIX/CA210 *	Cable, USB, FDIX to PC, Male A
FD/B-1 *	Steel Hook - XL (200 lbf)	FDIX/CA120 **	Cable, RS232, FDIX to PC, 9 pin/DB
FD/S-2 *	Flat Head (5/8" diameter)	15-1004 ***	MESURgauge Force Testing Software
FD/S-3	Cone Point	FD/NMH	NiMH Battery - 9V Size
FD/S-4	Chisel Head	FDIX/AC-USB	AC Adapter with USB Cable – 110/220 Vac
FD/S-5	Vee Tip		
FD/S-6	Extension Rod		
FD/A-7	Hinged Hook - Small (20 lbf)		
FD/S-7	Hinged Hook - Large (100 lbf)		
FD/RT	1 cm2 Flat Rubber Tip		
FD/CP2	2" Compression Plate		
FD/HDL	Aluminum Handles		

* Flat head and appropriate steel hook included with FDIX.

* Replacement USB cable, driver and MESURlite software on a CD.
 ** Requires USB port on the computer.
 *** Feature rich force testing software – force vs. distance.

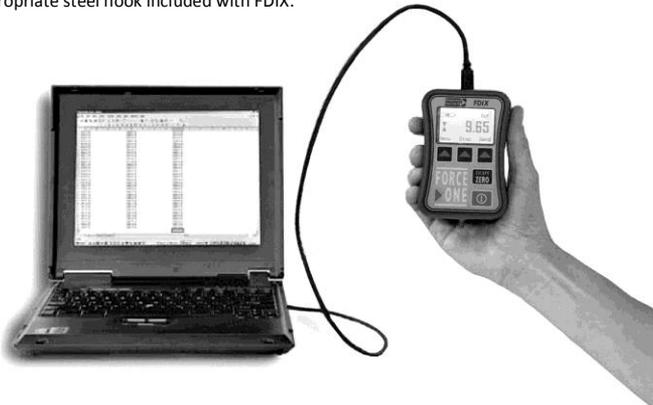




TABLE 3 FORCE ONE™ - TECHNICAL SPECIFICATIONS	
Item	Specification
Accuracy	Dedicated FCMI: ± 0.2 % F.S. ± 1 L.S.D.* Interchangeable FCMI: ± 0.3 % F.S. ± 1 L.S.D.**
Display	160 x 100 Graphic Liquid Crystal Display (LCD) Reversible White Backlight Selectable Brightness and Contrast
Display Update	8 per second or 2 per second
Resolution	2000 graduations (2500 for 5 & 25 lbf capacity)
Tare	$\pm 10\%$ of Full Scale (FS)
Load Shaft Deflection	Varies by capacity - see page 5
Load Cell	Overload protected "Smart Load Cell"
Load Cell Interchangeability	"Plug and Play" with Smart Load Cell
Overload Protection	250 lbf
Power	<ul style="list-style-type: none"> • 110 or 220 VAC Adapter/Charger • USB connection • Rechargeable 9V NIMH battery (9V form)
Battery Endurance	Up to 4 hours with backlight on high Up to 20 hours with backlight off
Battery Charge	12 hours for typical charge (21 hours for full charge)
Peak Force Sampling Rate	Selectable: 100 Samples per second 1000 Samples per second
Menu Selection	Menu selection of: <ul style="list-style-type: none"> • Display Options – orientation, brightness, contrast, time • Settings Options – units, sample rate, more • Data Options – output mode, baud rate, format

* Dedicated and NIST certified for use with one FCMI.

** Fully interchangeable and NIST certified with multiple FCMI.

**CONSTRUCTION**

- Patented “Plug and Play” Design.
- Force Display Module (FDMIX) adapts to 6 Force Cell Modules (FCMI).
- Tension and Compression with lbf, kgf, gf, N and ozf units.
- Large 1.2” x 1.8” Graphic LCD with full 5 digit readout.
- Displays: Battery status, **T**, **C**, and **Peak**.
- Automatic display reversal for use with load shaft up or down.
- Compact firm grip aluminum housing.
- Made in the USA - Patented Design.
- Standard American threads.

OPERATION

- Change Force Cell Module (FCMI) to change gage capacity.
- Peaks captured at selectable 100 or 1000 samples/sec.
- Filtering of non-peak and peak readings.
- USB Interface for battery charging and communication.
- Five selectable baud rates: 9600, 19200, 38400, 57600, or 115200
- Single data point or continuous data output.
- Control of data output from FDIX or computer.
- Remote firmware updates by user via e-mail.

POWER REQUIREMENTS

- Continuous AC operation with 110 or 220 VAC adapter/charger.
- Continuous operation with USB connection.
- Re-chargeable NIMH battery for up to 4 hours of full backlight operation.
- Backlight can be dimmed or turned off for up to 20 hours of operation.
- Auto-Off power conservation.

ACCESSORIES

- Re-chargeable NIMH battery, AC adapter/charger, two implements, case, NIST Calibration Certificate, and Measure Lite Data Logging Software.
- Optional accessories: Seven Force Cell Modules, implements, grips, test stand mounting kits, and Measure Gage Force Testing Software.

ACCURACY

- Dedicated Force Cell Module: $\pm 0.2\%$ of full scale ± 1 L.S.D.
- Interchangeable Force Cell Modules: $\pm 0.3\%$ of full scale ± 1 L.S.D.

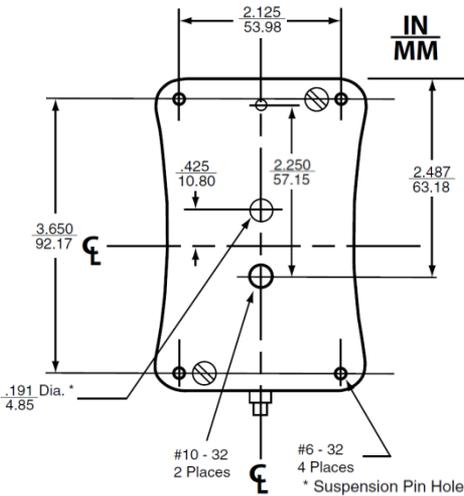
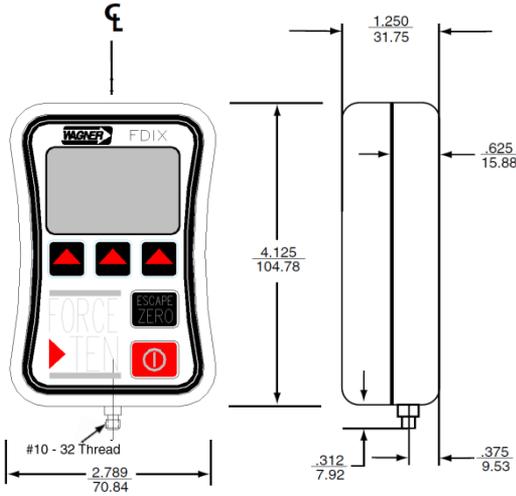
WEIGHT & DIMENSIONS

- 0.8 lb (.4 kg), shipping weight: 3 lb (1.4 kg).
- 2 3/4” (70mm) w x 4” (100 mm) h x 1 1/4” (30mm) d.



FORCE ONE™ FORCE GAGE

DIMENSIONS





FTK 100

FTK 200



Force One™ FDIX shown mounted on Wagner Test Stands



FORCE ONE™ FORCE GAGE

WARRANTY

Wagner Instruments expressly warrants for one year from the date of purchase, that the goods sold shall be free from defects in workmanship and materials under normal conditions. Wagner Instruments will, at its option, replace, repair, or refund, in full, the purchase price of the instrument or any part thereof which, in our opinion, is defective, provided the instrument has not been subjected to tampering, abuse, or exposed to highly corrosive conditions. An instrument that has been improperly used cannot be considered under this warranty. We make no warranties, expressed or implied, including, without limitation, any warranties of fitness or merchantability, except as expressly set forth above. We shall not be liable for any anticipated lost profits, incidental damages, consequential damages, costs, time charges, or other losses in connection with the instrument or any replacement parts thereof. If a manufacturing defect is found, we will replace or repair the instrument, or replace any defective part thereof without charge; however, our obligation hereunder does not include the cost of transportation, which must be borne by the customer. We assume no responsibility for damage in transit, and the purchaser should present any claims for such damage to the carrier. In addition, instead of replacing or repairing the instrument, as aforesaid, we may, at our option, take back the defective instrument and refund, in full settlement, the purchase price thereof.



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