



GTX-Plus Series User's Manual

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Introduction

Thank you for choosing the Dillon GTX series instrument. With correct use and regular re-calibration it will give many years of accurate and reliable service.

The GTX can measure tensile and compressive forces accurately, while being simple to use by the operator.

Dillon offers software and accessories to make your force gauge even more versatile. Ask your Dillon distributor for additional information or visit our website at www.forcetorque.com

Before Use

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

Operation Overview






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

You can press a menu key to access the gauge configuration- see the *Main Menu* section.

Powering the GTX Plus for the first time

The GTX Plus is supplied with a set of 4 Nickel Metal Hydride AAA rechargeable batteries pack. For safety reasons during transportation the batteries are shipped discharged. To obtain maximum battery life we recommend that you charge them with the charger/adaptor supplied for at least 14-16 hours when you first receive the instrument. Only use the adaptor/charger supplied.

Battery Indicator

	Battery level > 5.0 V
	5.0 V > Battery level > 4.9 V
	4.9 V > Battery level > 4.8 V
	4.8 V > Battery level > 4.7 V
	Battery level < 4.7 V

If battery level less than 4.6 V , The “battery empty” message will be displayed and the gauge will be powered down automatically.

Important: Only use the adaptor/charger supplied.

Using the GTX Plus

Fitting Accessories

Couple fittings directly to the load cell stem or use an extension rod. The threads are 10-32 in capacities up to 1000 N, and 5/16-18 in the 2500 N capacity.

Ensure that fixturing does not contact the force gauge case.

Ensure that anything coupled to the gauge is screwed finger-tight only. Excessive torque can damage the load cell and is not covered by warranty.

Mounting to Test Stand

The two 10-32 threaded holes on the rear of the gauge can be used for mounting the gauge. The distance between the holes is 2.25 inch. A versatile stand mounting plate is available to couple the force gauge to many brands of test stands.

Powering up

As show in Figure 1 the control panel has eight keys.



Figure 1 GTX Plus control panel

To power up the gauge press the ON/OFF key. A short self-test runs during which the display will show the capacity in Newtons.

After the self test, providing no load has been applied to the instrument, the display will show all zeroes. This is because the gauge zeroes itself during the self-test routine.

If a force is applied via the load cell probe (hole at bottom of GTX Plus), the reading on display will register the applied force.



Forces may not show zero if it is moved during the self test routine. Once it is properly mounted and zeroed the reading will be stable.

***Do not overload** the load sensor. This will cause irreparable damage. Forces greater than 120% of full-scale will produce an audible beep and OL symbol will blink on the display until load is release and RESET key is pressed.

To power down the gauge press the ON/OFF key.

All the current settings are saved when the gauge is turned off and the gauge will function in the same mode when powered up again.

Basic Functions

Tensile forces are displayed on the GTX Plus and recognized by the symbol  Compressive forces are displayed on the GTX Plus and recognized by the symbol 

Display of Tension/Compression

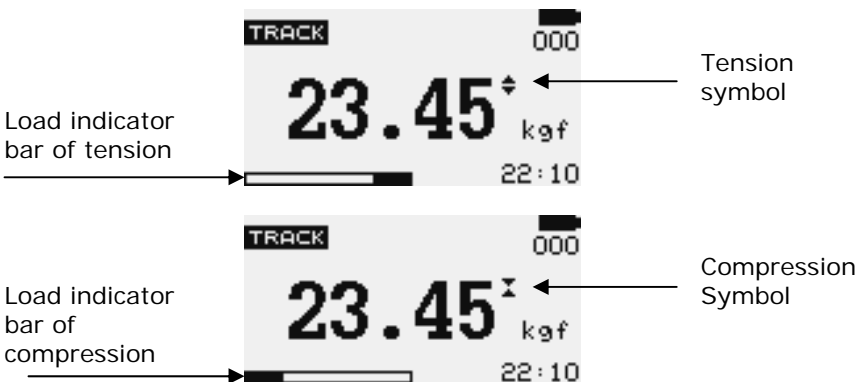


Figure 2 Tension and compression displays

A load indicator bar alerts the operator to how much load has been applied to the load sensor.

For tensile force the indicator bar move from right to left. For compressive forces the indicator bar move from left to right.

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 a grip, so it does not become part of the measured reading. Press and release the ZERO key.

Changing the unit of measure You can choose from the following units of measure depending on the capacity of your gauge: MilliNewton, KiloNewton, Newton, gram-force, kilogram force, ounce-force or pound-force.

To change the display units press the UNITS key. Each successive key press will select the next available units until the gauge returns to its original setting. The GTX Plus automatically converts readings as new unit of measure are selected.

**Note: All units may not be displayed depending on gauge capacity.*

Changing the mode of measure You can choose from the following modes of measure: Track, Peak-Tension, Peak-Compression, Dual-Peak.

To change the display modes press MODES key. Each successive key press will select the next available modes until the gauge returns to its original setting.

Track mode Press MODES key until the **TRACK** appeared on the display. The display will now indicate forces applied in both directions as they are applied to the load sensor and maintain the live display. See Figure 3a



Figure 3a Track

Peak-Tension mode Press MODES key until the **PEAK** with a plus sign appeared on the display. The display will show the maximum tensile force. See Figure 3b

Peak Tension symbol →

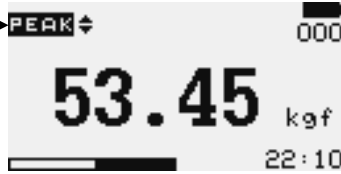


Figure 3b Peak Tension

Peak-Compression mode Press MODES key until **PEAK** with a vertical bar symbol appeared on the display. The display will show the maximum compressive force. See Figure 3c

Peak Compression symbol →

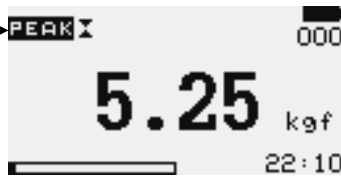


Figure 3c Peak Compression

Dual-Peak mode Press MODES key until **PEAK** with a double-headed arrow symbol appeared on the display. The display will show the highest tensile force and the highest compressive force. The current load being applied to the load sensor is also displayed. See Figure 3d

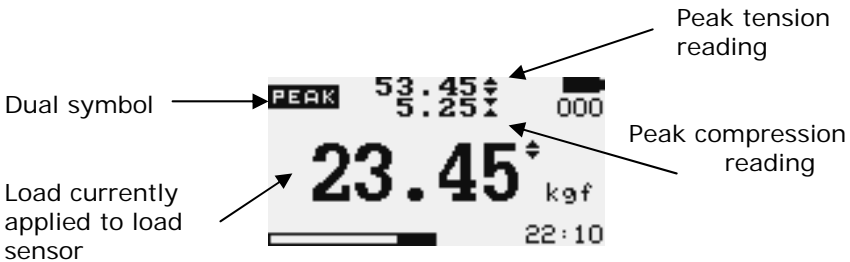


Figure 3d Dual Peak

Resetting the gauge Press RESET key to clear both maximum registers and prepare for detecting the next maximum readings.

Backlit Display When you press any key or applied forces to load sensor greater then 0.5 % of full scale the backlight will go on for 6 seconds.

Invert Display The display may be inverted or “reversed”, so that the operator can read it more comfortably. Press and hold the MENU key while powering up the GTX Plus to invert the display. This feature is remembered after power down. Perform the same steps again to restore the display to the opposite direction

Saved reading to database Any reading can be saved anytime by press MEM/ENTER key. A total of 500 readings can be stored in the database include the reading unit, date and time of reading.

Display Date and Time the lower right corner of the display will alternate between date (1sec) and time (3sec). Time is show in 24 hour format.

Digital Output GTX Plus have 2 open collector digital output (Overload and Sample Brake),It use to control the test stand SMD Model Stop or reverse when overload and sample brake occur.

USB output signal The displayed reading may be transmitted to PC by pressing the PRINT key or sending request command from PC to the gauge.

USB command	Action
“l”	Send live reading value with unit.
“p”	Send peak tension value with unit.
“c”	Send peak compression value with unit.
“x” or pressing PRINT key	Send live reading value with unit, if current mode is track mode. Send peak tension value with unit, If current mode is peak tension mode. Send peak compression value with unit. If current mode is peak compression mode. Send live, peak tension and peak compression value with unit, If current mode is dual peak mode.
“s”	Send Statistics of database (Max, Min, Mean, Std Dev, Cov).
“d”	Send database.
“t”	Send current date and time.
“!”	Send information of gauge (model, capacity, serial number, firmware revision, last calibration, original offset, current offset, overload count).

Computer Control of Force Gauge A computer can control the force gauge by sending USB commands.

USB Command	Action
"m"	Changing measure mode.
"u"	Changing measure unit.
"z"	Zero the gauge.
"r"	Reset the gauge.

Main Menu

Press MENU/ESC key to access the main menu. To move between the option listed on the main menu page, press UP and DOWN arrow keys to move the cursor. Press ENTER to select the sub-menus, activate feature and enter values. Within sub-menus UP, DOWN LEFT and RIGHT arrow keys will also change numerical values. Press ESC to return to the main menu page.

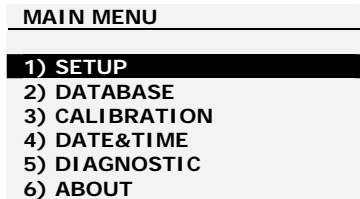


Figure 4 Main Menu

1) SETUP Press the MENU key, the display will show main menu page and use UP and DOWN to move the cursor point to *SETUP*. Press the ENTER key. The display will show the setup menu page. Press ESC key to return to the main menu page.

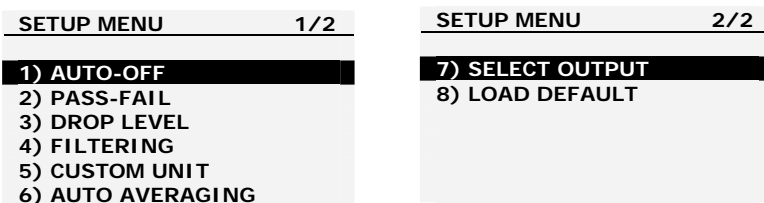


Figure 5 Setup Menu

1.1) AUTO-OFF An Auto-off feature can be enabled to conserve battery power where the gauge powers down after 5,10 and 15 minutes (depend on Auto-off time) since the last key press. The *AO* will appear in the main display if you activate this feature.

To access *AUTO-OFF* menu, Press UP and DOWN to move the cursor point to *AUTO-OFF* and press the ENTER key the display will show the auto-off menu page. Press ESC key to return the setup menu page.

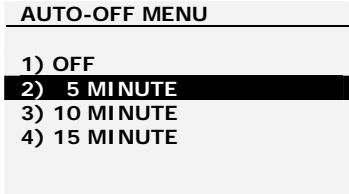


Figure 6 Auto-Off Menu

Use UP and DOWN key to move the cursor. Press the ENTER key to select auto-off option and return to setup menu page.

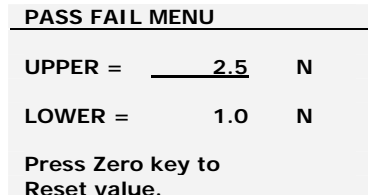
1.2) PASS-FAIL the Pass-Fail feature used to set a defined acceptable maximum and minimum forces gap for measuring. It activate by setting the lower level and upper level forces limit If the forces value is within the gap level, the display will show message *PASS*. Any reading values outside this gap (higher or lower), the display will show message *FAIL*. If you activate this feature the *PF* symbol will display on main display.

To access *PASS-FAIL* menu, Press UP and DOWN to move the cursor point to *PASS-FAIL* and press the ENTER key the display will show the Pass-Fail menu page. Press ESC key to return the setup menu page.

Use LEFT ARROW keys to move cursor point to *the desired value*. Use UP and DOWN keys to change the value, press and hold to scroll values. Use RIGHT ARROW key to change the unit. Press ENTER to save setting and return to Setup menu page.

**Pass-Fail feature will automatically disabled if you set LOWER and UPPER = 0 N.*

**LOWER must be less than the UPPER.*



example LOWER LEVEL = 0 N, UPPER LEVEL = 20 N

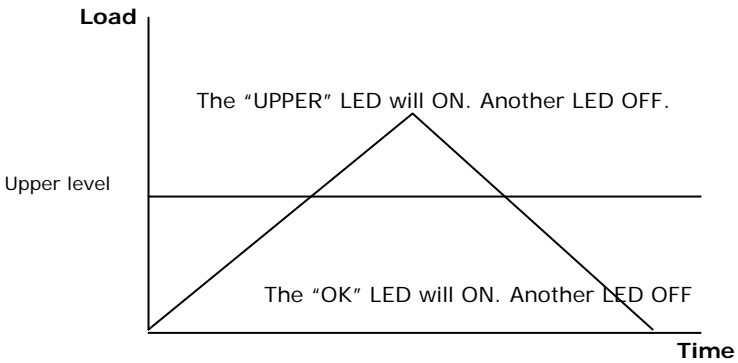


Figure 7a

example LOWER LEVEL = 20 N, UPPER LEVEL = 0 N

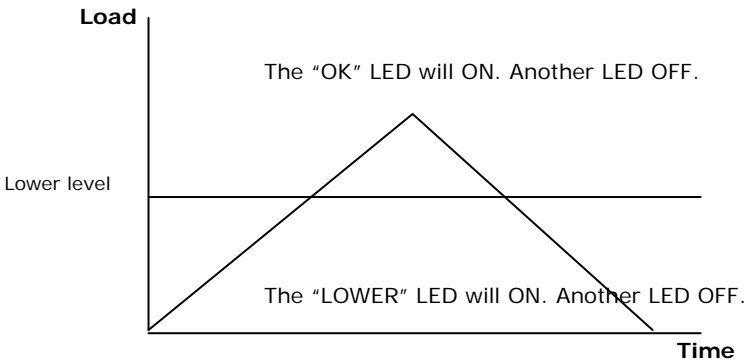


Figure 7b

example LOWER LEVEL = 10 N, UPPER LEVEL = 20 N

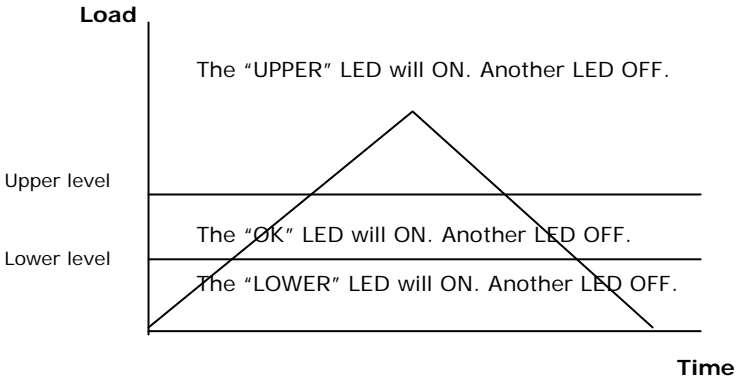


Figure 7c

1.3) DROP LEVEL 1st Peak facility- this is used to detect the force at which a sample breaks but is not necessarily the maximum force (e.g. detecting the force at which a tablet first begins to crack) or in capturing yield point of a material. *NOTE: This setting will control, stand stop or stand reverse.*

When this feature is set *ON*, three addition Measure mode can be selected using the MODE key from the main display.

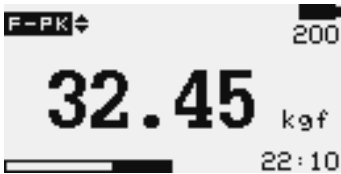


Figure 8a 1st Peak Tension

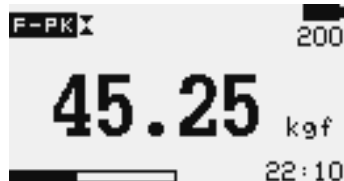


Figure 8b 1st Peak Compression



Figure 8c 1st Peak Tension and Compression

To set *DROP LEVEL*, Press UP and DOWN to move the cursor point to *DROP LEVEL* and press ENTER key The display will show the Set Drop level menu page. Press ESC key to return the setup menu page.

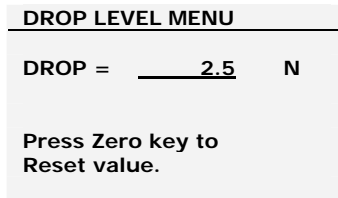


Figure 9 Set Percent Drop Menu

Use UP and DOWN keys to change the value, press and hold to scroll values. Use RIGHT ARROW key to change unit. When the correct value is reached press ENTER to save setting and return to setup menu page.

**1st Peak feature will automatically disabled if you set DROP = 0 N.*

example GTX Plus 100N has drop level =20N. If the peak load before sample break is 50 the load must drop to 30N in order for the GTX Plus to detect a 1st peak of 50N. If load continues to be applied above 50N (e.g. to 75N), the GTX will return 75N as PEAK and 50N as 1st peak.

GTX capacity

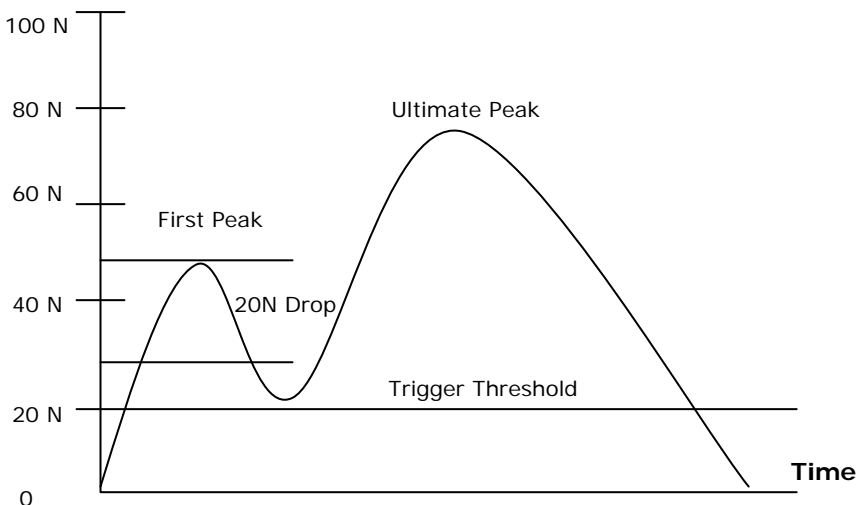


Figure 9a

1.4) FILTERING This function selects the display throughput rate i.e. the amount of averaging performed by the internal electronics before the load reading is displayed. There are two levels HIGH and LOW

- LOW Display update every 100 ms with a little data averaging.
- HIGH Display update every 200 ms with a maximum data averaging.

To set *FILTERING*, Press UP and DOWN to move the cursor point to *FILTERING* and press ENTER key the display will show Filtering menu page. Press ESC key to return the setup menu page.

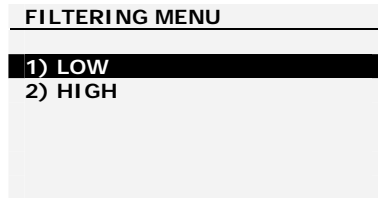


Figure 10 Filtering Menu

Using UP and DOWN keys select the relevant level and press ENTER key to save setting and return to setup menu page.

1.5) CUSTOM UNIT A custom unit can be applied to the load values in the main display. This is useful for applications where you wish to convert the load reading into a non-standard unit of measurement.

To set *CUSTOM UNIT*, Press UP and DOWN to move the cursor point to *CUSTOM UNIT* and press ENTER key the display will show Custom unit menu page. Press ESC key to return the setup menu page.

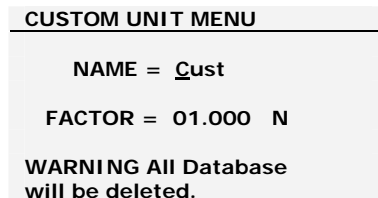


Figure 11 Custom unit Menu

To set the name, Use LEFT ARROW key to move the cursor point to *NAME*. Use UP and DOWN keys to change the character, press and hold to scroll change.

To set the constant factor, Use LEFT ARROW key to move the cursor point to *FACTOR* constant. Use UP and DOWN keys to change the value, press and hold to scroll values.

To set the unit factor, Use RIGHT ARROW key to change the unit, press and hold to scroll change.

Press ENTER to save setting and return to setup menu page.

**All Data in Database will be deleted if you change setting.*

1.6) AUTO AVERAGING This function allows the average load reading to be displayed. The average starts being calculated when the start trigger condition occur and stops when the stop trigger condition occur. When this feature is Enabled, one addition Measure mode can be selected using the MODE key from the main display.



Figure 12 Auto Averaging mode

**In this mode save database by press ENTER key for 0.5 sec*

To access *AUTO AVERAGING* menu, Press UP and DOWN to move the cursor point to *AUTO AVERAGING* and press the ENTER key the display will show the Pass-Fail menu page. Press ESC key to return the setup menu page.

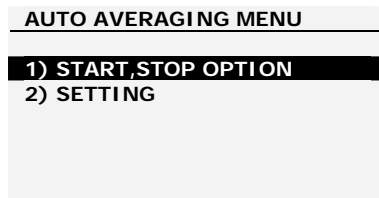


Figure 13 Auto Averaging Menu

1.6.1) START,STOP OPTION This function selects the Auto Averaging start and stop option.

To access *START,STOP OPTION* menu, Press UP and DOWN to move the cursor point to *START,STOP OPTION* and press ENTER key the

display will show Start, Stop option menu page. Press ESC key to return the auto averaging menu page.

START,STOP OPTION	1/2	START,STOP OPTION	1/2
1) OFF		7) LOAD,TIMER	
2) KEY,KEY			
3) KEY,LOAD			
4) KEY,TIMER			
5) LOAD,KEY			
6) LOAD,LOAD			

Figure 13a Start, Stop option Menu

1.6.1.1) OFF Disable the auto averaging function.

1.6.1.2) KEY,KEY Start Averaging and stop Averaging by press ENTER key.

1.6.1.3) KEY,LOAD Start averaging by press ENTER key and stop averaging by STOP LOAD threshold defined.

1.6.1.4) KEY,TIMER Start averaging by press ENTER key and stop averaging by STOP TIMER defined.

1.6.1.5) LOAD,KEY Start averaging by START LOAD threshold defined and stop averaging by press ENTER key.

1.6.1.6) LOAD,KEY Start averaging by START LOAD threshold defined and stop averaging by STOP LOAD threshold defined.

1.6.1.7) LOAD,TIMER Start averaging by START LOAD threshold defined and stop averaging by STOP TIMER defined.

1.6.2) SETTING This function use to define the threshold value (START LOAD, STOP LOAD, STOP TIMER).

To access *SETTING* menu, Press UP and DOWN to move the cursor point to *SETTING* and press ENTER key the display will show Setting menu page. Press ESC key to return the auto averaging menu page.

START,STOP OPTION	1/2
START LD=	<u>10.0</u> N
STOP LD=	15.0 N
STOP TIMER=	0010 Sec

Figure 13b Setting Menu

Use LEFT ARROW keys to move cursor point to *the desired value*. Use UP and DOWN keys to change the value, press and hold to scroll values. Use RIGHT ARROW key to change the unit. Press ENTER to save setting and return to Setup menu page.

1.7) LOAD DEFAULT The GTX Plus may be returned to its original factory default setting.

To set factory default, Press UP and DOWN to move the cursor point to *LOAD DEFAULT* and press ENTER key the display will show Load Default menu page. Press ESC key to return to the setup menu page.

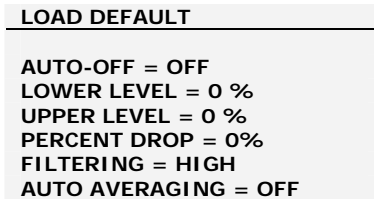


Figure 14 Load default Menu

Press ENTER key to Load default setting and return to setup menu page.

1.8) SELECT OUTPUT Although the GTX Plus' default setting is USB, you can switch the output port to PS2(RS232) and back.

To select output port, Press UP and Down to move the cursor point to *SELECT OUTPUT* and press ENTER key the display will show OUTPUT MENU page, Press Up and Down to move cursor point to your port and press Enter key. Press ESC key to return the setup menu page.

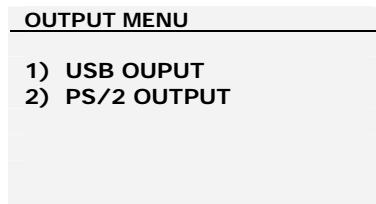


Figure 15 Select Output Menu

2) DATABASE This use to view the saved record, delete last record, delete all record and calculate the statistics value of saved record.

To access *DATABASE* menu, go to the main menu page press UP and DOWN to move the cursor point to *DATABASE* and press ENTER key the display will show the Database menu page. Press ESC key to return to main menu page.

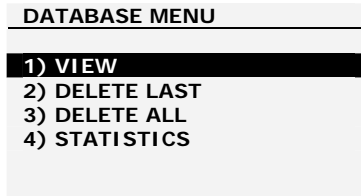


Figure 16 Database Menu

2.1)VIEW This use to view all saved record in database. The detail of each saved record consist of:

- Reading value with unit
- Direction
- Date and time

To access *VIEW* menu, Press UP and DOWN to move the cursor point to *VIEW* and press ENTER key the display will show the view menu page. Press ESC key to return to database menu page.

Press UP and DOWN to change view page, press and hold to scroll change view page.

VIEW	002/200
001:	0.736 kgf ◆ 09/19/05 15.12
002:	1.086 kgf ◆ 09/19/05 15.12

2.2)DELETE LAST This use to delete last saved record. To access *DELETE LAST* menu, Press UP and DOWN to move the cursor point to *DELETE LAST* and press ENTER key the display will show delete last menu page. Press ESC key to return to database menu page.

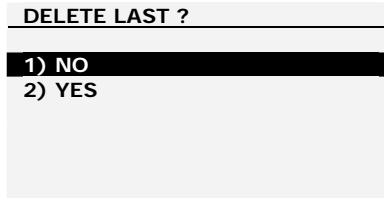


Figure 16a Delete last Menu

Press UP and DOWN to select *NO* and *YES*, If you selected *NO* and press ENTER key the gauge will return to database menu page. If you selected *YES* and press ENTER key the gauge will delete last saved record and return to database menu page.

2.3)DELETE ALL This use to delete all saved record. To access *DELETE ALL* menu, Press UP and DOWN to move the cursor point to *DELETE ALL* and press ENTER key the display will show delete all menu page. Press ESC key to return to database menu page.

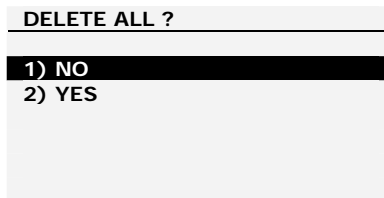


Figure 16b Delete all Menu

Press UP and DOWN to select *NO* and *YES*, If you selected *NO* and press ENTER key the gauge will return to database menu page. If you selected *YES* and press ENTER key the gauge will delete all saved record and return to database menu page.

2.4)STATISTICS The GTX Plus calculate statistics value (max, min, mean, std dev, cov, pass count, fail count, percent pass and percent fail) of up to 20 saved records. For more than 20 records, the data should be processed by computer via Dillon's convenient statistical software.

To access *STATISTICS* menu, Press UP and DOWN key to move the cursor to point to *STATISTICS* and press ENTER key the display will

show Select record menu page. Press ESC key to return to Database menu page.

SELECT RECORD	
SAVED RECORD:	002/200
MAX RECORD COUNT:	20
BEGIN RECORD:	<u>001</u>
END RECORD:	002

Figure 16c Select record Menu

Press UP and DOWN key to select the record, press and hold to scroll select the record. Press LEFT and RIGHT key to change cursor between *BEGIN RECORD* and *END RECORD*, press and hold to scroll change.

**BEGIN RECORD and END RECORD must be not equal 0.*

**BEGIN RECORD must be less than END RECORD.*

**The maximum of record for calculation must be not over 20.*

**Measurement unit and direction of each record for calculation must be same.*

Press ENTER key to calculate the statistic values, The display will show calculation result page. Press ESC key to return to Database menu page.

MAX:	1.0860 kgf
MIN:	0.7360 kgf
MEAN:	0.9110 kgf
STD DEV:	0.2474 kgf
COV:	27.166 %
PASS:	02 (100.00 %)
FAIL:	00 (0.0000 %)

Figure 16d Statistics result Menu

**Pass and Fail count calculation are depend on last setting of UPPER LEVEL and LOWER LEVEL.*

3) CALIBRATION This is used by service technicians when calibrating the gauge. Contact your Dillon distributor for details.

4) DATE&TIME This use to set date and time. To set date and time, Go to main menu page and press UP and DOWN key to move cursor

point to *DATE&TIME* and press ENTER key the display will show Date&Time menu page. Press ESC key to return to main menu page.

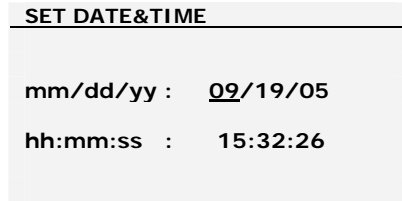


Figure 17 Date&Time Menu

Press UP and DOWN to change the value, press and hold to scroll values. Press LEFT and RIGHT key to move the cursor, press and hold to scroll move the cursor. Press ENTER key to accept the value and return to main menu page.

5) DIAGNOSTIC This use to check status of the load cell. If you suspect that your load cell transducer has sustained an overload it is possible to check the status of the load cell immediately.

Place the gauge horizontally on the flat level surface and go to main menu page. Use UP and DOWN key to move the cursor point to *DIAGNOSTIC* and press ENTER key the display will show Diagnostic menu page. Press ESC to return to main menu page.

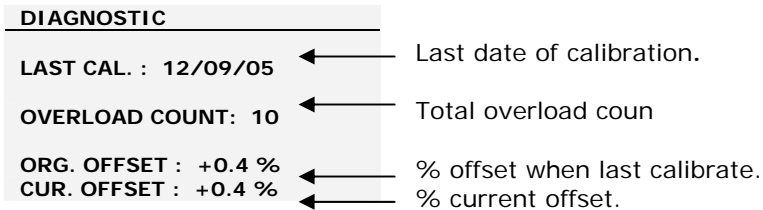


Figure 18 Diagnostic Menu

If the % offset is between 5% - 10 % please contact your supplier to arrange a recalibration of your gauge.

If the % offset is greater than 10% please contact your supplier to arrange for load cell replacement.

These values are given as an indicator only – the need for calibration/repair may vary according to the individual characteristics of the load cell.

6) ABOUT This shows the information of your gauge (Firmware revision, Model, Capacity, Serial number). To access *ABOUT* menu, Go to main menu page and press UP and DOWN to move the cursor point to

ABOUT and press ENTER key the display will show About menu page. Press ESC key to return to main menu page.

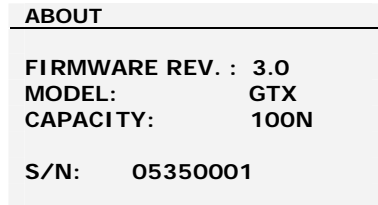


Figure 19 About Menu

Measurement practice

For best measurement accuracy keep the compression/tension forces in line with the force gauge. Alleviate bending loads and torque loads applied to the load cell as these can adversely affect measurement performance.

Always keep the gauge below the capacity limit shown on the front of the gauge. If gauge is used above this capacity in either tension or compression, even for a short time, permanent load cell damage can result. Overload damage is not covered by warranty.

GTX Plus Specifications

Capacity and Divisions

Model No:	mN	N	kN	g-f	kg-f	oz-f	lb-f
GTX Plus 25	25000 x 5	25 x 0.005	-	2500 x 0.5	2.5 x 0.0005	87.5 x 0.025	5.5 x 0.001
GTX Plus 50	-	50 x 0.01	-	5000 x 1	5 x 0.001	175 x 0.05	11 x 0.002
GTX Plus 100	-	100 x 0.02	-	10000 x 2	10 x 0.002	350 x 0.1	22 x 0.005
GTX Plus 250	-	250 x 0.05	-	25000 x 5	25 x 0.005	875 x 0.25	55 x 0.01
GTX Plus 1000	-	1000 x 0.2	1 x 0.0002	-	100 x 0.02	-	220 x 0.05

Accuracy

Accuracy: ± 0.1 % of rate capacity
 Operating temperature: 60 °F – 95 °F (15 °C - 35 °C)
 Temperature shift at zero load: ± 0.04 % of full-scale/°C

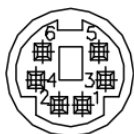
Data Sampling

Peak Capture Rate : 0.005 mS
 ADC Sampling Rate : 2,000 Hz

Output

USB: 8 data bits, 1 Start bit, 1 Stop bit, no parity
 Baud rate: 38400

Digital PS2: 2 Open collector output Overload, Sample Brake



PIN 1: Sample Brake Output
 PIN 2: Tx
 PIN 3: Ground
 PIN 4: Overload Output
 PIN 5: Gauge Connect Output
 PIN 6: Rx

Conversion Factor

Unit	mN	N	kN	g-f	kg-f	oz-f	lb-f
mN	1	0.001	1e-6	101.97e-3	101.97e-6	3.597e-3	224.81e-6
N	1000	1	0.001	101.97	101.97e-3	3.597	224.81e-3
kN	1e6	1000	1	101.97e3	101.97	3597	224.81
g-f	9.807	9.807e-3	9.807e-6	1	0.001	35.28e-3	2.205e-3
Kg-f	9807	9.807	9.807e-3	1000	1	35.28	2.205
oz-f	278.01	0.27801	278.01e-6	28.345	28.345e-3	1	0.0625
lb-f	4448.2	4.4482	4.4482e-3	453.5	0.4535	16	1

DILLON

Dillon, a Weigh-Tronix Brand
1000 Armstrong drive
Fairmont, Minnesota 56031
Sales (507) 238-8796
Service (507) 238-4461
www.dillonforce.com
Made in Thailand