GTX Series User's Manual

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Introduction

Thank you for choosing the Quantrol 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.

Quantrol offers software and accessories to make your force gauge even more versatile. Ask your Quantrol distributor for additional information or visit our website at www.quantrol.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 Quantrol 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 font panel-see the *Basic Functions* section.

The display can be inverted for convenient reading when holding the instrument away from you – see the *Optional Setting* section.

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

Powering the GTX for the first time

The GTX is supplied with a set of 6 Nickel Metal Hydride AAA rechargeable batteries. 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.

Inserting and Changing the Batteries

To insert the battery pack, remove the back cover by undoing the 2 retaining screws. Fit the six AAA batteries pack ensuring that you observe polarity.

Refit the back cover and tighten the 2 retaining screws. Connect the AC charger to the GTX charger socket located at the top side of the gauge next to the display and charge the batteries for 14 – 16 hours. Only use the adaptor/charger supplied.

Battery Indicator


Battery level > 7.2 V


7.2 V > Battery level > 7.0 V


7.0 V > Battery level > 6.55 V


6.55 V > Battery level > 6.1 V


Battery level < 6.1 V

If battery level less than 6.0 V , The "battery empty" massage will be displayed and the gauge will be powered down automatically.

Important: Only use the adaptor/charger supplied.

Using the GTX

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 nor 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 Stan

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 2.5 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.

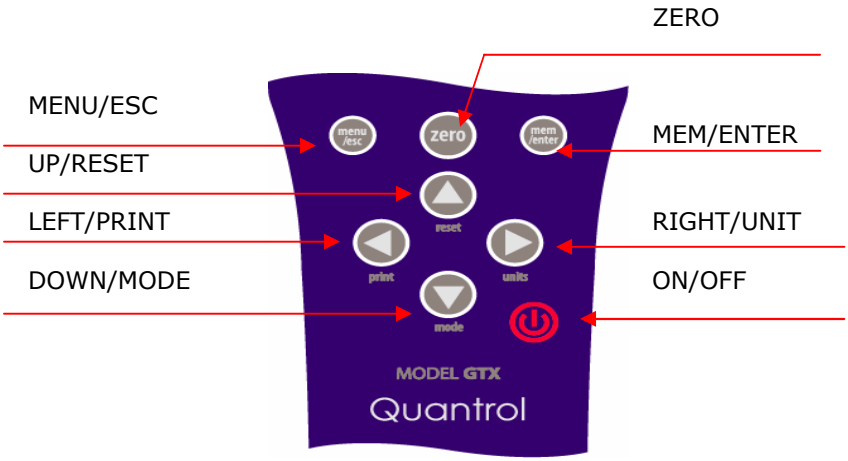


Figure 1 GTX control panel

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 rezeroes itself during the self-test routine.

If a force is applied via the load cell probe (hole at bottom of GTX), 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 and recognized by the symbol ▲ Compressive forces are displayed on the GTX and recognized by the symbol ▼

Display of Tension/Compression

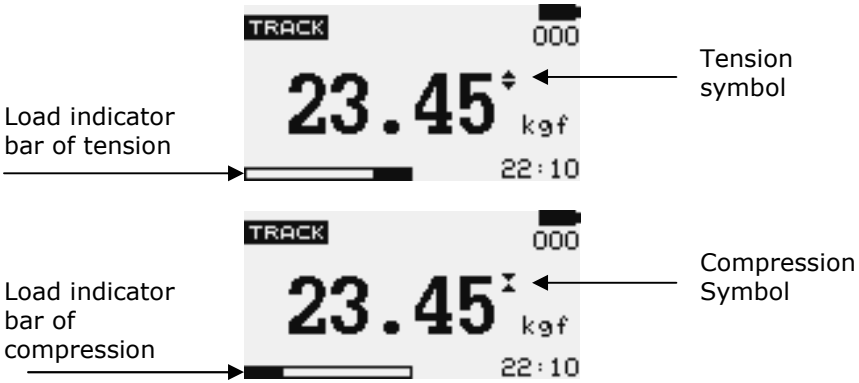


Figure 2 Tension and compression displays

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

For tensile force the indicator bar is move from right to left. For compressive forces the indicator bar is 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 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 ▲▼ appeared on the display. The display will show the maximum tensile force. See Figure 3b

Figure 3b Peak Tension

Peak-Compression mode Press MODES key until PEAK ⧗ appeared on the display. The display will show the maximum compressive force. See Figure 3c

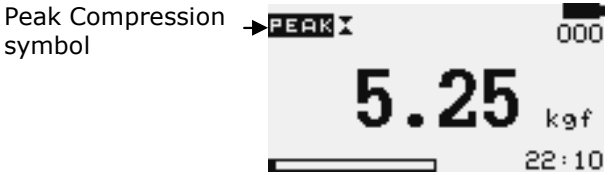


Figure 3c Peak Compression

Dual-Peak mode Press MODES key until PEAK 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

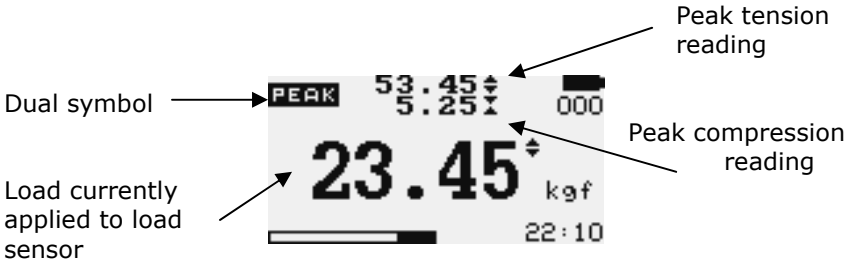


Figure 3d Dual Peak

Reseting 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.

Saved reading to database Any reading can be saved anytime by press MEM/ENTER key. A total of 200 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

RS232 output signal The displayed reading may be transmitted to PC by pressing the PRINT key or sending request command from PC to the gauge

RS232 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 RS-232 commands.

RS-232 Command	Action
"m"	Changing measure mode.
"u"	Changing measure unit.
"z"	Zero the gauge.
"r"	Reset the gauge.

Optional Setting

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 to invert the display. This feature is remembered after power down. Perform the same steps again to restore the display to the opposite direction

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.

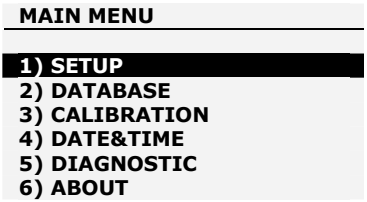


Figure 4 Main Menu

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.

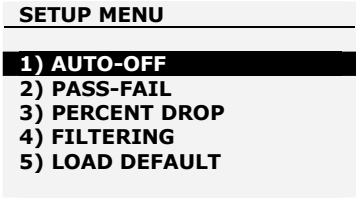


Figure 5 Setup Menu

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.

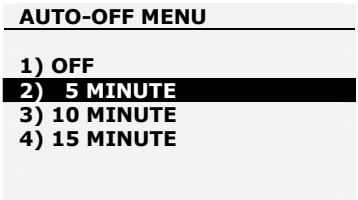


Figure 6 Auto-Off Menu

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.

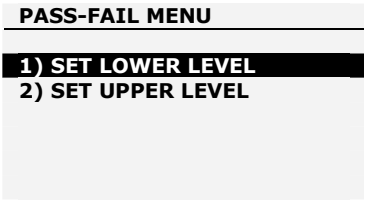


Figure 7 Pass-Fail Menu

1.2.1) SET LOWER LEVEL Use UP and DOWN key to move cursor point to *SET LOWER LEVEL*. Press the ENTER key. The display will show the Set Lower Level menu page. Press ESC key to return the Pass-Fail menu page.

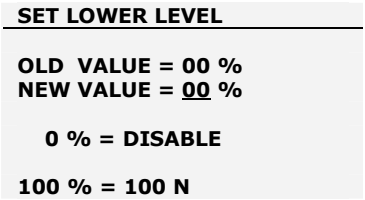


Figure 7a Set Lower Level Menu

Use UP and DOWN keys to change the value, press and hold to scroll values. When the correct value is reached press ENTER to set *NEW VALUE* and return to Pass-Fail menu page.

1.2.2) SET UPPER LEVEL Use UP and DOWN key to move cursor point to *SET UPPER LEVEL*. Press the ENTER key. The display will show the Set Upper Level menu page. Press ESC key to return the Pass-Fail menu page.

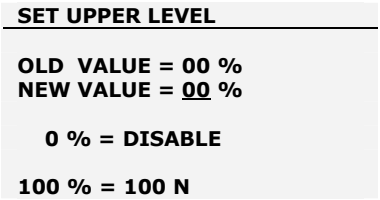


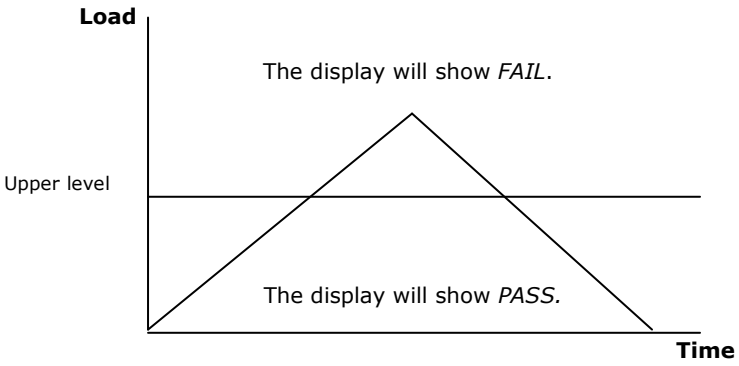
Figure 7b Set Upper Level Menu

Use UP and DOWN keys to change the value, press and hold to scroll values. When the correct value is reached press ENTER to set *NEW VALUE* and return to Pass-Fail menu page.

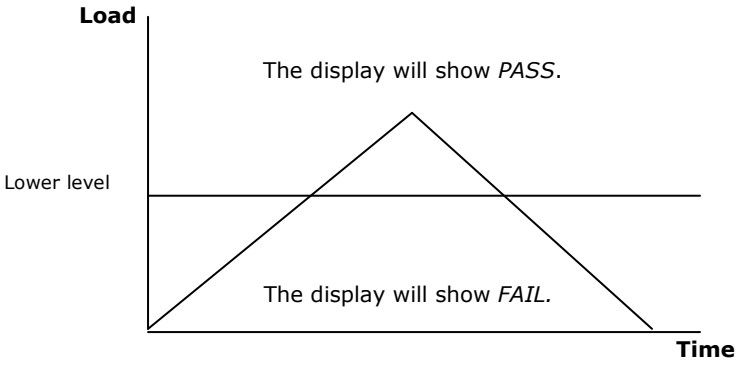
**Pass-Fail feature will automatically disabled if you set LOWER LEVEL and UPPER LEVEL = 00%.*

**LOWER LEVEL must be less than the UPPER LEVEL*

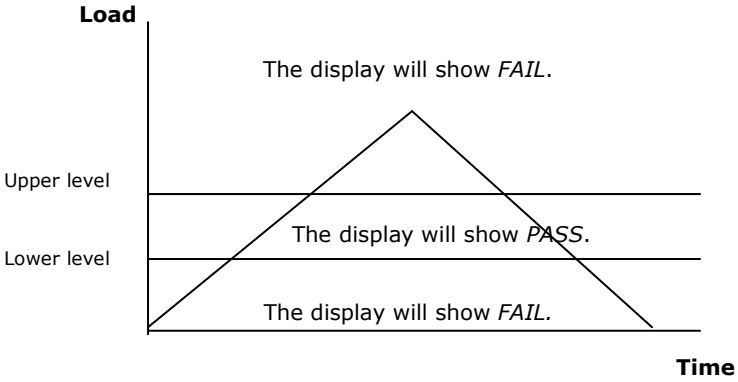
example LOWER LEVEL = 00%, UPPER LEVEL = 20%



example LOWER LEVEL = 20%, UPPER LEVEL = 00%



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



1.3) PERCENT DROP 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.

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

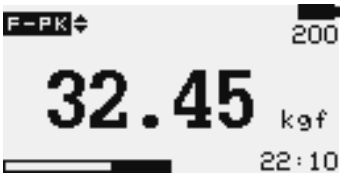


Figure 8a 1st Peak Tension

Figure 8b 1st Peak Compression

Figure 8c 1st Peak Tension and Compression

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

SET PERCENT DROP

OLD VALUE = 00 %
NEW VALUE = 00 %

0 % = DISABLE

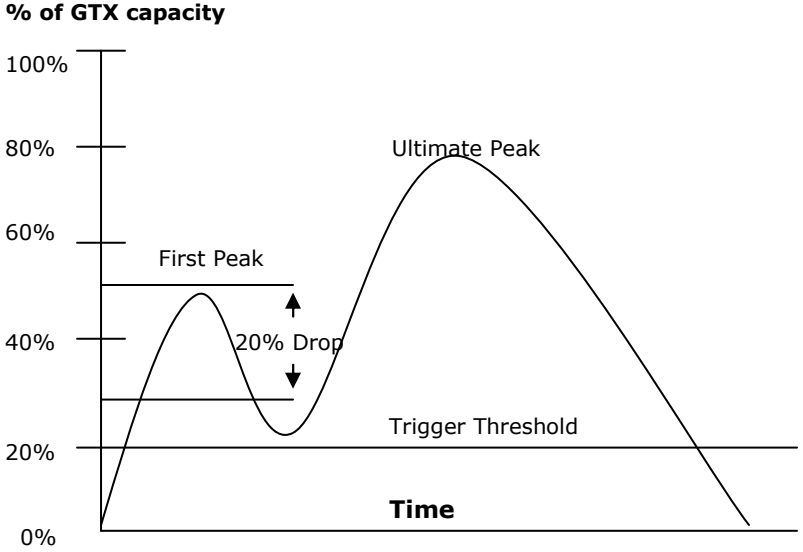
100 % = 100 N

Figure 9 Set Percent Drop Menu

Use UP and DOWN keys to change the value, press and hold to scroll values. When the correct value is reached press ENTER to set *NEW VALUE* and return to setup menu page.

**1st Peak feature will automatically disabled if you set PERCENT DROP = 00%.*

example GTX 100N has % drop of 20 (20N). If the peak load before sample break is 50 the load must drop to 50N in order for the GTX to detect a 1st peak of 50N. If load continues to be applied above 50N (e.g. to 75N), the GTX will return 85N as PEAK and 50N as 1st peak.



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

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

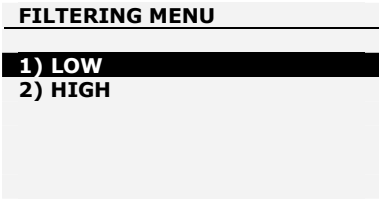


Figure 10 Filtering Menu

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

1.5) LOAD DEFAULT The GTX 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.

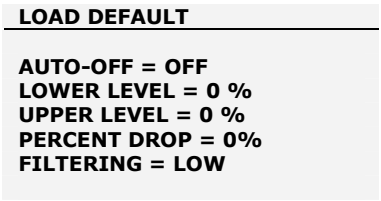


Figure 11 Load default Menu

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

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.

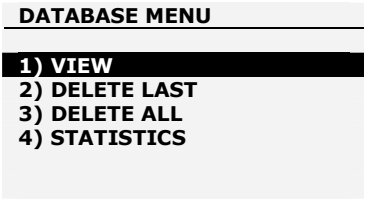


Figure 12 Database Menu

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.

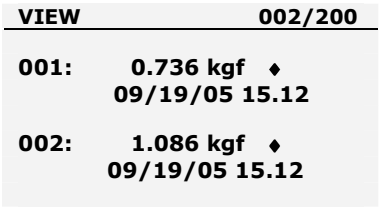


Figure 13a View Menu

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

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.

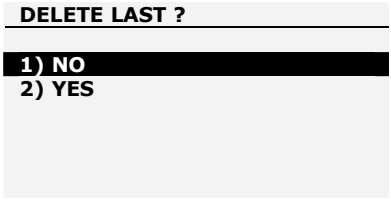


Figure 13b Delete last Menu

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.

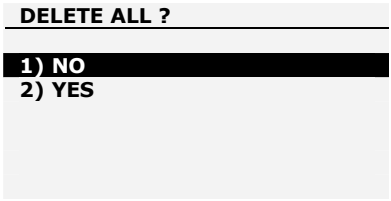


Figure 13c Delete all Menu

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 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 Quantrol'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.

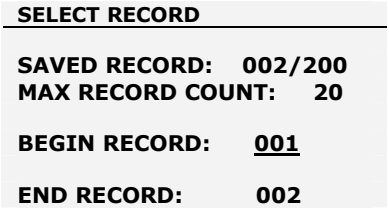


Figure 14 Select record Menu

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.

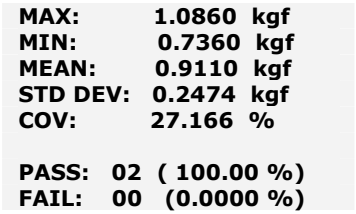


Figure 15 Statistics result Menu

**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. Contract your Quantrol 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 16 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.

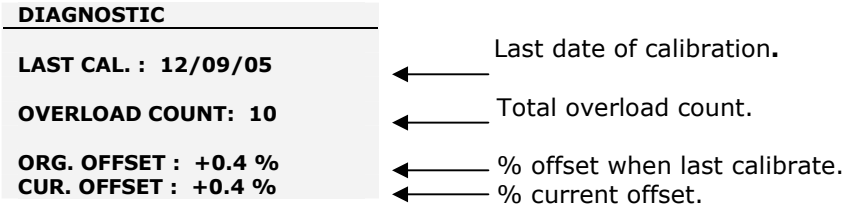


Figure 17 Diagnostic Menu

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.

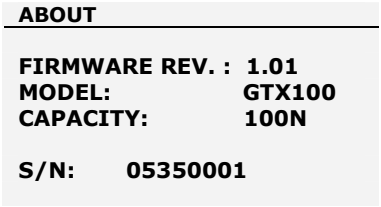


Figure 18 About Menu

GTX Specifications

Capacity and Divisions

Model No:	mN	N	kN	g-f	kg-f	oz-f	lb-f
GTX005	5000 x 1	5 x 0.001	-	500 x 0.1	0.5 x 0.0001	17.5 x 0.005	1.1 x 0.0002
GTX010	10000 x 2	10 x 0.002	-	1000 x 0.2	1 x 0.0002	35 x 0.01	2.2 x 0.0005
GTX025	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
GTX050	50000 x 10	50 x 0.01	-	5000 x 1	5 x 0.001	175 x 0.05	11 x 0.002
GTX100	-	100 x 0.02	-	10000 x 2	10 x 0.002	350 x 0.1	22 x 0.005
GTX250	-	250 x 0.05	-	25000 x 5	25 x 0.005	875 x 0.25	55 x 0.01
GTX500	-	500 x 0.1	-	50000 x 10	50 x 0.01	1750 x 0.5	110 x 0.02
GTX1K0	-	1000 x 0.2	1 x 0.0002	-	100 x 0.02	-	220 x 0.05
GTX2K5	-	2500 x 0.5	2.5 x 0.0005	-	250 x 0.05	-	550 x 0.1

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

Output

RS-232: 8 data bits, 1 Start bit, 1 Stop bit, no parity
Baud rate: 38400
Peak Capture Rate : 0.005 mS
ADC Sampling Rate : 2,000 Hz

Mouting holes : Two 10-32 holes with 2.5 inch center to center spacing.

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