

Introduction

The TTC610 Indicator is a laboratory grade instrument that provides TORQUE, FORCE and ANGLE of rotation measurements and set-able alert functions. Although designed as an integral component of the TTC2000 Torque Calibrator, it can also be used independently in many laboratory and industrial applications. The TTC610 features versatile data acquisition capabilities including measurement storage, retrieval, statistical analysis and automatic downloading to the built-in printer or external printer/computer. A remote computer COM port is available for PC interfacing.

Used with precision torque/force transducers, the TTC610 provides high speed monitoring of static or dynamic torque, force or angle inputs. Torque/force transducers, purchased separately, are available in ranges from 15-200 in oz, to 200-2000 ft lb, and provide system readings with an accuracy of 0.25%, or better. A special memory chip is built into each torque/force transducer that identifies its range and maintains its calibration between any other TTC610 Indicator with an accuracy of 0.5%. The indicator and its transducers may be calibrated by using accessory precision bars and certified weights.

The indicator features a bright red alpha-numeric LED display for readout of torque in ft lb, in lb, in oz, Nm, dNm, cNm, mkg and cmkg, or force in ounces, pounds, Newtons, decaNewtons, kiloponds (kilograms) or grams, depending upon the transducer in use.

Angle measurement, calibration, statistical analysis and set-up functions are reported on a 2-line by 16-character 5x8 dot matrix, backlighted LCD, display. A Torque-Angle mode can be set up for precision fastener installation monitoring. The TTC610 uses X4 quadrature logic that takes advantage of maximum resolution from industry standard bidirectional rotary encoders.

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Set-up and calibration programming is entered on front panel membrane keys. HIGH and LOW torque limits are adjustable to give an audible alert. The user selects TRACK mode to display torque values as they are applied, PEAK HOLD or POWER TOOL modes to display the highest torque value applied, or FIRST PEAK mode which captures the torque output at the "click" of a set-able wrench or driver. CLEAR, STORE and PRINT functions can be set up for automatic or manual operation.

The indicator stores and recalls up to 3000 torque/force readings and does statistical analysis on them for downloading to printer or computer. The statistical report (print out) includes a simple histogram for process monitoring. True RS-232 serial printer and separate RS-232 computer COM ports are at the back of the unit.

The TTC610 Indicator operates from the AC power line and is switch selectable for either 120VAC or 220 VAC, 50–60 Hz. Its integral switching power supply is UL listed. A hard-wired lithium battery keeps the internal memory and date-time clock operating for up to 10 years.

The information in this manual is general. Operational features, procedures and specifications may change without notice. **Snap-on** Tools makes no claims as to the suitability of this information for diverse user applications.

Specifications

TTC2000 System

System Accuracy

$\pm 0.25\%$ of reading @ 25°C
(Indicator and transducer calibrated together)

- ✓ TTC Transducers used with, but not calibrated to, another TTC Indicator provide a system accuracy of $\pm 0.5\%$ of reading @ 25°C.

Temperature Drift

$+0.03\%/^{\circ}\text{C}$ ($+0.017\%/^{\circ}\text{F}$)

Angle Precision

Bi-directional rotary encoder pulses/revolution X4

TTC610 Indicator

Display Accuracy

$\pm 0.05\%$ of reading @ 25°C

Temperature

Operating Temperature

10 to 32°C (50 to 90°F)

Storage

-20 to 50°C (-2 to 122°F)

Humidity

Up to 90%, Non-condensing

Temperature Drift

$+0.011\%/^{\circ}\text{C}$, ($+0.006\%/^{\circ}\text{F}$)

Dimensions

Width	16.5"
Height	6.25"
Depth*	14.5"

*Includes handle, feet, printer and connectors

Weight

13.5 lbs

Power Supply

UL approved, 120VAC/220VAC, 50-60 Hz
Amperage, 3.15 amps

Data Storage/Recall w/Date Time Stamp

3,000 measurements

Statistical Analysis

Max, Min, Range, Mean, Sigma N, Sigma, Cp, Cpk

%Error, -NoGo, +NoGo.

Histogram: Lower Set Limit, Upper Set Limit, 10 Divisions

Printer/Computer Serial Output Port

Serial Communications

RS-232 (true)

300—19.2K Baud

8 data bits

1 stop bit

no parity

Computer Serial COM Port

RS-232 (True)

300—19.2K Baud

OPTIONAL

Analog Output

+(CW)/-(CCW) 1.8V at transducer full range linearity
±1% of reading

Loader Control Relays

Two, normally open, Form A, rated 12VDC @ 1/2A close contact
at 110% CW or CCW of torque/force transducer range.



For additional information refer to *Transducer* and
System specifications.

Display Capacity

(16 bit A/D), 8 digits, ±32,000 counts

Units of Measurement

Torque

ft lb, in lb, in oz, Nm, dNm, cNm, mkg and cmkg

Force

lbf, ozf, N, dN, kp, and gf

Angle

degrees

Torque/Force Resolution

Refer to transducer-indicator range and display resolution tables
in *Functional Description* of this chapter.

Angle Resolution

Bi-directional, X4 quadrature logic

Torque/Force Transducers

Accuracy

$\pm 0.2\%$ of reading @ 25°C, within specified range, when used as prescribed with the TTC600 Loader.

Range and Resolution

Refer to transducer-indicator range and display resolution tables in *Functional Description* of this chapter.

Temperature

Operating Temperature

10 to 32°C (50 to 90°F)

Storage

-20 to 50°C (-2 to 122°F)

Humidity

Up to 90% non-condensing

Temperature Drift

$+0.02\%/^{\circ}\text{C}$ ($+0.011\%/^{\circ}\text{F}$)

TTC600 Manual Loader Specifications

Input Torque (Hand Crank)

8 ft lb maximum

Output Torque

2000 ft lb ± 20 degrees rotation maximum

Power Requirements (safety solenoids)

115/230VAC $\pm 10\%$, @ 50-60 Hz

Physical Dimensions

Width

45"

Height

50"

Depth

24"

Weight (including KRL762PY roll cab)

1500 lbs

Optional Calibration Fixturing (load bars and weights)

$\pm 0.05\%$ accuracy