12.0 Warranty

ELECTROMATIC Equip’t Co., Inc. expressly warrants to its buyer for three (3) years from the date of delivery that the goods sold are free from defects in workmanship and materials. ELECTROMATIC Equip’t Co., Inc. will, at its option, repair or replace or refund the purchase price of goods found to be defective. This remedy shall be the buyer’s sole and exclusive remedy. Any modification, abuse, exposure to corrosive environment or use other than intended will void this warranty. This warranty is in lieu of all other warranties, including implied warranties of merchantability and fitness for an intended purpose. In no event shall ELECTROMATIC Equip’t Co., Inc. be liable for any incidental and consequential damages in connection with goods sold or any part thereof.

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1.0 INTRODUCTION

Thank you for purchasing a Check-Line CAP-T Torque Tester. We are confident that you will get many years of service from this product.

The CAP-T can be used to test a number of different closure shapes and sizes, along with other types of samples. To maintain normal functioning of the tester, avoid repetitive overloads and shock loads.

Two models are available. The CAP-T-XX basic model and the CAP-T-XXRS which includes an RS-232 and Digimatic output for connection to a PC or printer.

Before continuing, carefully unpack the CAP-T and check for any damage. Inspect the contents to ensure that you have received a tester complete with all accessories.

1.1 Included items

- CAP-T Torque Tester
- User’s guide (this booklet)
- 4 Sample gripping posts
- AC Adapter

1.2 Optional Items

- Sample Gripping Jaws: See photo page 3. These jaws are for use with square or other shaped containers, in addition to round samples. The jaws are reversible; one side has a V-groove, while the other side is flat. These jaws can be mounted to the inside or outside of the sliders. Part # CAP-T-JAWS

- CAP-T-XX RS Version: This model allows torque data to be transferred to a PC, printer, or other device for data analysis. The package consists of a serial connector and data button to manually output data. For more automated data collection, common software programs such as WinWedge (available from Electromatic) can be configured to automatically request data from the CAP-T.

11.0 OUTPUTS

Outputs are available as part of the CTRS communication option. If installed, it offers RS-232 and Mitutoyo BCD outputs on the 9-pin male connector. Please refer to the pin diagram below for proper connection.

RS-232

The data transmission can be initiated by pressing the DATA button or by an external device by sending ASCII “?” to the gauge. The gauge will respond by sending the current reading in either full or numeric format, depending on the configuration setting (see Section 3). Polarity sign indicates CW (+) or CCW (-) torque. The transmitted string has the following format:

[POLARITY (SPACE OR -)][DATA][SPACE][UNITS (IF ENABLED)][CRLF]

Mitutoyo BCD

This output is useful for connection to data collectors, printers, multiplexers or any other device capable of accepting Mitutoyo BCD data. The transmission is initiated by the DATA button (see Section 3 about settings) or by the receiving device.

RS-232 receive Input
RS-232 transmit Output
Mitutoyo request Input
Mitutoyo clock Output
Signal ground
No connection
Mitutoyo ready Output
Mitutoyo data Output
2.0 SET-UP

Carefully unpack the CAP-T and check for any damage. Inspect the contents to ensure that you have received a tester complete with all accessories – see page 2.

Place the tester on a firm, flat and level working surface free from vibration. If preferred, the CAP-T can be secured to a work bench with screws through the four tapped holes in the underside of the base. Then insert the posts or sample gripping jaws into the desired holes on the sliders.

3.0 CONTROLS

CAP-T Torque Testers have three keys for controlling all functions:

POWER: Turns power on and off. Also used in Calibration mode.

PEAK: Used to select Clockwise Peak, Counterclockwise Peak or Normal (real time) display mode. The actual peak readings are always captured and can be recalled at any time.

ZERO: Zeros any tare value (up to the full capacity of the gauge) and clears the peak readings stored in memory.

DATA: (optional) Used to manually output the torque data point currently displayed.
4.0 **DISPLAY**

The display consists of a 4-1/2 digit section and several indicators. Their functions are listed below.

- **LO BAT** Low battery voltage indicator
- **CW** Clockwise torque indicator
- **CCW** Counterclockwise torque indicator
- **CW PEAK** Peak clockwise indicator
- **CCW PEAK** Peak counterclockwise indicator
- **OZIN, LBIN, NCM, KGMM** Units of measurement (model dependent)
- **---- (dashes)** Overload (>110% of range)

5.0 **POWER**

The CAP-T may be powered by the internal 9V battery, or by the included AC adapter. The need for battery replacement is indicated by a 3-step sequence:

1. A steady **LO BAT** appears on the display indicating the last 10% of battery life
2. **LO BAT** begins to flash indicating the need for an immediate battery replacement
3. The entire display except **LO BAT** flashes for several seconds and then the tester shuts off.

10.0 **SPECIFICATIONS**

- **Accuracy** ±0.5% of full scale ±1 digit
- **Sampling rate** 30/s
- **Display update rate** 2.5/s in normal mode, 30/s in peak mode
- **Safe overload** 150% of gauge capacity. Display shows---- (dashes) above 110%.
- **Power** 9V battery or AC adapter
- **Battery life** 30 hours of continuous operation
- **Weight** 10 lb [4.5 kg]

9.1 **Force Ranges**

<table>
<thead>
<tr>
<th>Model</th>
<th>Capacity</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAP-T-12</td>
<td>12 lb-in</td>
<td>0.01 lb-in</td>
</tr>
<tr>
<td></td>
<td>140 kg-mm</td>
<td>0.1 kg-mm</td>
</tr>
<tr>
<td></td>
<td>135 N-cm</td>
<td>0.1 N-cm</td>
</tr>
<tr>
<td>CAP-T-50</td>
<td>50 lb-in</td>
<td>0.05 lb-in</td>
</tr>
<tr>
<td></td>
<td>580 kg-mm</td>
<td>0.5 kg-mm</td>
</tr>
<tr>
<td></td>
<td>570 N-cm</td>
<td>0.5 N-cm</td>
</tr>
<tr>
<td>CAP-T-100</td>
<td>100 lb-in</td>
<td>0.1 lb-in</td>
</tr>
<tr>
<td></td>
<td>1150 kg-mm</td>
<td>1 kg-mm</td>
</tr>
<tr>
<td></td>
<td>1150 N-cm</td>
<td>1 N-cm</td>
</tr>
</tbody>
</table>
9.0 Operation

Place the sample between the posts or jaws of the tester, and tighten using the knob. Posts can be placed in any of the holes on the sliders.

Ensure that the sample is gripped firmly, however, excessively tightening thin-walled closures may result in sample deformation, possibly affecting test results. When the sample is secured, gradually exert torque by hand.

NOTE: Sudden torque application may produce incorrect readings.

The default mode of operation is the normal (real time) mode.

If the peak readings are to be observed as they occur, then the mode of operation can be changed by pressing PEAK until the desired mode (CW PEAK or CCW PEAK) appears on the display.

This action affects only the display. The peak readings are captured automatically and can be recalled by pressing PEAK. The peak readings may be cleared from the memory by either pressing ZERO or shutting off power.

9.1 Changing Operating Modes and Measuring Units

The displayed units of measurement and the default mode of operation (peak or normal) can be changed by entering the setup mode as described in section 6.0, pressing POWER at the init prompt and selecting the desired settings using the PEAK and the POWER keys.

9.2 Auto Shut-off

The CAP-T is equipped with an automatic shutdown feature and it will shut off after approximately 30 minutes of inactivity (readings do not change by more than ±10 counts and no keys are pressed). The entire display will flash for 5-7 seconds as a warning of the imminent shutdown.

To change the default setting of 30 minutes, hold PEAK while turning on the gauge. Press PEAK repeatedly until 'Aoff' appears. Press POWER to select this function. The current setting will flash on the display. Use PEAK to scroll through the displayed choices and POWER to select.

6.0 Changing Units of Measure

1. Press and hold the PEAK key and at the same time. Press the POWER key. (The Display will show "Aoff"). Then release all keys.
2. Press the PEAK key one (1) or more times until the display shows "init"
3. Press the POWER key one time. (The currently selected unit of measure will flash on/off on the right side of the display)
4. Press the PEAK key to cycle thru the choices of units. Each time the PEAK key is pressed the new units selection will be shown on the right side of the display. (The desired unit of measure should be flashing before you continue to step #5.)
5. Press the POWER key two (2) times to store the new units selections. Display will show "done".
6. Press POWER again to return to the measurement mode with the new unit selection.

7.0 Configuration

CAP-T torque testers have several features with programmable options allowing many user-specified choices. To enter the configuration menu, perform the following:

1. Turn off the tester
2. Press and hold PEAK
3. Turn on the tester
4. Release PEAK

The version number of the internal software will be displayed for a short time followed by either 'Aoff' for a standard CT or '232' if equipped with CTRS communication option. The following secondary functions of keys are used during the configuration process:

| POWER | Used to select a menu choice |
| PEAK  | Used to step through menu choices |

7.1 232 - RS-232 settings sub-menu

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>232d</td>
<td>Output Disabled</td>
</tr>
<tr>
<td>232E</td>
<td>Output Enabled</td>
</tr>
<tr>
<td>300</td>
<td>300 baud</td>
</tr>
<tr>
<td>600</td>
<td>600 baud</td>
</tr>
<tr>
<td>1200</td>
<td>1200 baud</td>
</tr>
<tr>
<td>2400</td>
<td>2400 baud</td>
</tr>
<tr>
<td>4800</td>
<td>4800 baud</td>
</tr>
<tr>
<td>9600</td>
<td>9600 baud</td>
</tr>
</tbody>
</table>
7-1E  7 data bits, 1 stop bit, even parity
7-1o  7 data bits, 1 stop bit, odd parity
7-2E  7 data bits, 2 stop bits, even parity
7-2o  7 data bits, 2 stop bits, odd parity
7-2n  7 data bits, 2 stop bits, no parity
8-1E  8 data bits, 1 stop bit, even parity
8-1o  8 data bits, 1 stop bit, odd parity
8-2n  8 data bits, 2 stop bits, no parity
Ft   Full data (numeric + units)
Ftn  Numeric data only

7.2 bcd - Mitutoyo BCD settings sub-menu
    bcdd  Output disabled
    bcdE  Output enabled
    nPOL  No polarity (absolute value)
    POL   Data with polarity (+ for CW, - for CCW)

7.3 AoFF - Automatic shutoff settings sub-menu
    no   Disabled
    1    1-minute automatic shutoff
    5    5-minute automatic shutoff
    10   10-minute automatic shutoff
    20   20-minute automatic shutoff
    30   30-minute automatic shutoff

7.4 init - Initial (default) settings sub-menu
    LBIN  Pound-inch as default unit
    KGMM  Kilogram-millimeter as default unit
    NCM   Newton-centimeter as default unit
    CCW   Real time display at turn on
    PEAK CW  Peak clockwise display at turn on
    PEAK CCW Peak counterclockwise display at turn on
    CAL   Calibration sub-menu. See CALIBRATION section.

8.0 Calibration
To properly calibrate the CAP-T, application of a precise torque value equal to the full capacity of the tester in lbin (regardless of the displayed units) will be required. The procedure follows:
1. Press and hold the PEAK control while turning on power to the CAP-T tester.
2. When CAL appears on the display, press POWER three times to select the calibration mode.
3. At the null prompt, press ZERO.
4. At the SPAn prompt, apply the calibration torque and press POWER. The display will show uuuu or nnnn if the calibration torque is insufficient or excessive, respectively.
   If this happens, the only way to terminate the calibration mode is by momentarily disconnecting the battery or connecting the AC adapter to the tester without plugging the other end into a wall outlet. This will stop the calibration procedure without making any changes to the previous calibration data.
5. Successful calibration is indicated by done on the display. Press POWER to save the changes and resume normal operation.
CAP-T
Torque Tester

Operating Instructions

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