

Repair and Maintenance

PCB guarantees Total Customer Satisfaction through its “Lifetime Warranty Plus” on all Platinum Stock Products sold by PCB and through its limited warranties on all other PCB Stock, Standard and Special products. Due to the sophisticated nature of our sensors and associated instrumentation, **field servicing and repair is not recommended and, if attempted, will void the factory warranty.**

Beyond routine calibration and battery replacements where applicable, our products require no user maintenance. Clean electrical connectors, housings, and mounting surfaces with solutions and techniques that will not harm the material of construction. Observe caution when using liquids near devices that are not hermetically sealed. Such devices should only be wiped with a dampened cloth—never saturated or submerged.

In the event that equipment becomes damaged or ceases to operate, our Application Engineers are here to support your troubleshooting efforts 24 hours a day, 7 days a week. Call or email with model and serial number as well as a brief description of the problem.

Calibration

Routine calibration of sensors and associated instrumentation is necessary to maintain measurement accuracy. We recommend calibrating on an annual basis, after exposure to any extreme environmental influence, or prior to any critical test.

PCB Piezotronics is an ISO-9001 certified company whose calibration services are accredited by A2LA to ISO/IEC 17025, with full traceability to SI through N.I.S.T. In addition to our standard calibration services, we also offer specialized tests, including: sensitivity at elevated or cryogenic temperatures, phase response, extended high or low frequency response, extended range, leak testing, hydrostatic pressure testing, and others. For more information, contact your local PCB Piezotronics distributor, sales representative, or factory customer service representative.

Returning Equipment

If factory repair is required, our representatives will provide you with a Return Material Authorization (RMA) number, which we use to reference any information you have already provided and expedite the repair process. This number should be clearly marked on the outside of all returned package(s) and on any packing list(s) accompanying the shipment.

Contact Information

PCB Piezotronics, Inc.
3425 Walden Ave.
Depew, NY14043 USA
Toll-free: (800) 828-8840
24-hour SensorLine: (716) 684-0001
General inquiries: info@pcb.com
Repair inquiries: rma@pcb.com

For a complete list of distributors, global offices and sales representatives, visit our website, www.pcb.com.

Safety Considerations

This product is intended for use by qualified personnel who recognize shock hazards and are familiar with the precautions required to avoid injury. While our equipment is designed with user safety in mind, the protection provided by the equipment may be impaired if equipment is used in a manner not specified by this manual.

Discontinue use and contact our 24-Hour Sensorline if:

- Assistance is needed to safely operate equipment
- Damage is visible or suspected
- Equipment fails or malfunctions

For complete equipment ratings, refer to the enclosed specification sheet for your product.

Definition of Terms and Symbols

The following symbols may be used in this manual:



DANGER

Indicates an immediate hazardous situation, which, if not avoided, may result in death or serious injury.

**CAUTION**

Refers to hazards that could damage the instrument.

**NOTE**

Indicates tips, recommendations and important information. The notes simplify processes and contain additional information on particular operating steps.

The following symbols may be found on the equipment described in this manual:



This symbol on the unit indicates that high voltage may be present. Use standard safety precautions to avoid personal contact with this voltage.



This symbol on the unit indicates that the user should refer to the operating instructions located in the manual.



This symbol indicates safety, earth ground.



PCB工业监视和测量设备 - 中国RoHS2公布表

PCB Industrial Monitoring and Measuring Equipment - China RoHS 2 Disclosure Table

部件名称	有害物质					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
住房	0	0	0	0	0	0
PCB板	X	0	0	0	0	0
电气连接器	0	0	0	0	0	0
压电晶体	X	0	0	0	0	0
环氧	0	0	0	0	0	0
铁氟龙	0	0	0	0	0	0
电子	0	0	0	0	0	0
厚膜基板	0	0	X	0	0	0
电线	0	0	0	0	0	0
电缆	X	0	0	0	0	0
塑料	0	0	0	0	0	0
焊接	X	0	0	0	0	0
铜合金/黄铜	X	0	0	0	0	0
本表格依据 SJ/T 11364 的规定编制。						
0：表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572 规定的限量要求以下。						
X：表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 规定的限量要求。						
铅是欧洲RoHS指令2011/65/ EU附件三和附件四目前由于允许的豁免。						

CHINA RoHS COMPLIANCE

Component Name	Hazardous Substances					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Chromium VI Compounds (Cr(VI))	Polybrominated Biphenyls (PBB)	Polybrominated Diphenyl Ethers (PBDE)
Housing	O	O	O	O	O	O
PCB Board	X	O	O	O	O	O
Electrical Connectors	O	O	O	O	O	O
Piezoelectric Crystals	X	O	O	O	O	O
Epoxy	O	O	O	O	O	O
Teflon	O	O	O	O	O	O
Electronics	O	O	O	O	O	O
Thick Film Substrate	O	O	X	O	O	O
Wires	O	O	O	O	O	O
Cables	X	O	O	O	O	O
Plastic	O	O	O	O	O	O
Solder	X	O	O	O	O	O
Copper Alloy/Brass	X	O	O	O	O	O

This table is prepared in accordance with the provisions of SJ/T 11364.

O: Indicates that said hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement of GB/T 26572.

X: Indicates that said hazardous substance contained in at least one of the homogeneous materials for this part is above the limit requirement of GB/T 26572.

Lead is present due to allowed exemption in Annex III or Annex IV of the European RoHS Directive 2011/65/EU.

Model Number
080962-010000

MODEL 922 DIGITAL PEAK METER

Revision: NR
ECN #: 52690

	ENGLISH	SI	
Performance			
Resolution	21 bit	21 bit	
Non-Linearity	0.25 % FS	0.25 % FS	[1]
Frequency Response	10 kHz	10 kHz	
Environmental			
Temperature Range(operating)	32 to 158 °F	0 to 70 °C	
Electrical			
Torque & Force Input Range	±2.5 mV/V, ±4.5 mV/V, ±5 VDC	±2.5 mV/V, ±4.5 mV/V, ±5 VDC	
Sensor Excitation(120 Ma)(max)	5 VDC	5 VDC	
Peak Trap Circuit(positive voltage)	7 µs reset time	7 µs reset time	
Peak Threshold	software programmable	software programmable	
Peak Reset	Automatic Reset	Automatic Reset	
Angle Input Type	quadrature A/B track	quadrature A/B track	
Angle Input(excitation)	5 VDC	5 VDC	
Angle Input(frequency)(max)	1 MHz	1 MHz	
Battery Indication	low	low	
Battery Life(maximum,continuous use)	8 hours	8 hours	
Battery Charge Time(max)	3.5 hours	3.5 hours	
Shunt Calibration	Rear Binding Posts	Rear Binding Posts	
Physical			
Housing Material	Molded ABS Plastic	Molded ABS Plastic	
Size (Height x Width x Depth)	5.40 in x 9.0 in x 3.18 in	137.2 mm x 228.6 mm x 80.8 mm	[2]
Weight	1.75 lb	0.8 kg	
Display Resolution	4 LINE X 20 CHAR.	4 LINE X 20 CHAR.	
Transducer Mating Conn.	15 pin D	15 pin D	
Auxillary Connectors	USB Type B	USB Type B	

OPTIONAL VERSIONS

Optional versions have identical specifications and accessories as listed for the standard model except where noted below. More than one option may be used.

NOTES:

[1]FS - Full Scale.

[2]See Outline Drawing 72890 for Complete Dimensions

SUPPLIED ACCESSORIES:

Model 100-17092-80 AC CHARGER (24V)

Model 100-17444-50 CUSTOMER DOCUMENT PACKAGE (FLASH DRIVE)

Model 7122R-04352A PRECISION CAL RESISTOR 43.575 kOhm

Entered: ND	Engineer: PE	Sales: DM	Approved: JM	Spec Number:
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Date: 08/18/2022	Date: 08/18/2022	Date: 08/18/2022	Date: 08/18/2022	72891
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All specifications are at room temperature unless otherwise specified.
In the interest of constant product improvement, we reserve the right to change specifications without notice.

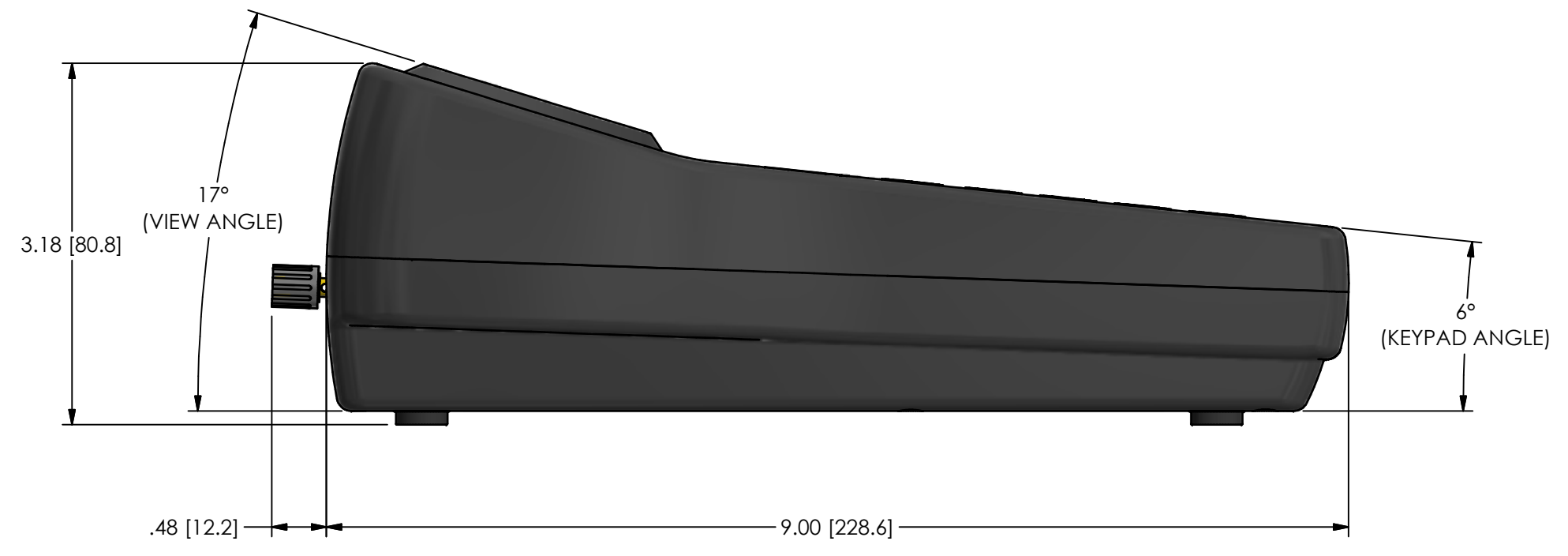
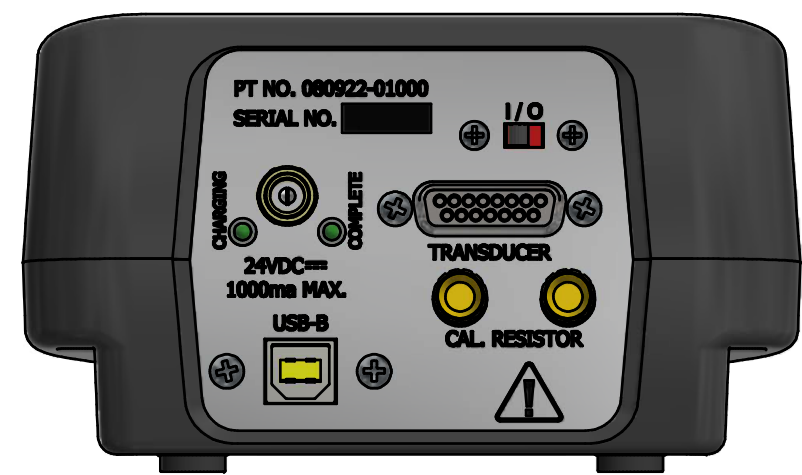
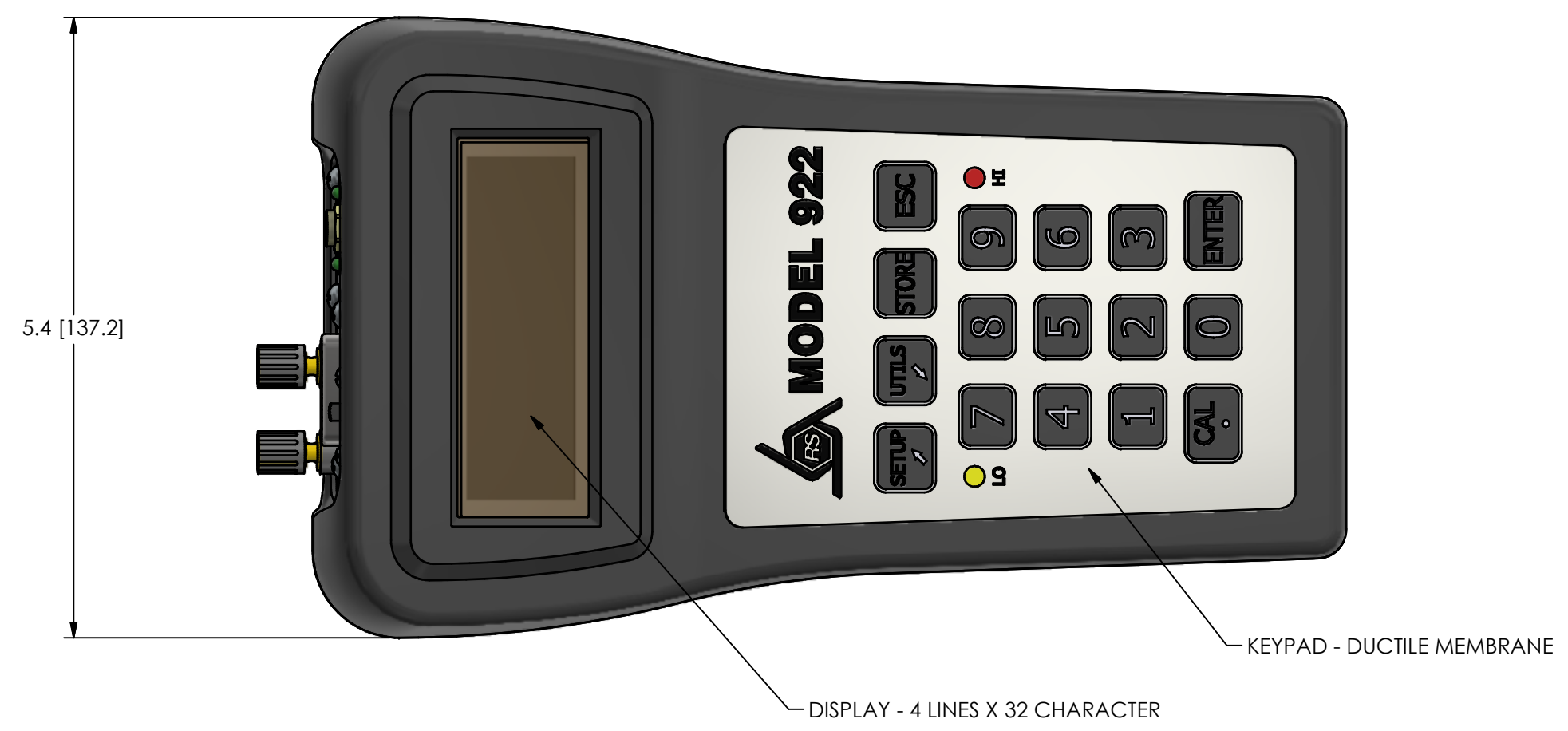


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REVISIONS		
REV	DESCRIPTION	ECO
NR	RELEASED FOR PRODUCTION - 08.16.22, PTE	52690

72890



UNLESS OTHERWISE SPECIFIED TOLERANCES ARE:		DRAWN	CHECKED	ENGINEER	PCB LOAD & TORQUE A PCB GROUP COMPANY
DIMENSIONS IN INCHES	DIMENSIONS IN MILLIMETERS [IN BRACKETS]	PTE	DM	PTE	
DECIMALS .XX ±.01 XXX ±.005	DECIMALS X ± 0.3 XX ± 0.13	TITLE			DWG. NO.
ANGLES ± .5 DEGREES	ANGLES ± .5 DEGREES	OUTLINE DRAWING MODEL 922 DIGITAL PEAK METER (PT NO. 080922-01000)			72890
FILLETS AND RADII .015 MAX	FILLETS AND RADII 0.38 MAX	SCALE: 3 / 4			SHEET 1 OF 1

Model 922

Digital Transducer Instrument

Instruction Manual



Instrument Part No. 080922-01000
Firmware Version 1.04

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1. Important Features

The Model 922 has some important features that may be helpful to understand prior to use.

1.1. Main Screen

In the Upper Left Corner of the Main Screen, see Figure 1 below, the Model 922 displays the number of the Limit Set in use. This line also contains the Track value (TRK) which is the current load being applied to the transducer input. On the second line, it displays the Peak value for torque or load. On the third line, it displays the peak angle of turn (deg), if so configured. The angle data is flagged with a F when set up to display the Final Angle of the previous test, or with a P to display the Angle at Peak Torque. The angle view selection is made in the test setup, see Section 4.2.8

NOTE: the 922 does not update the Track value as quickly as the Peak value. In the lower left corner of the fourth line is the Status indicator. In the lower right corner is the current number of readings stored for the current limit set.

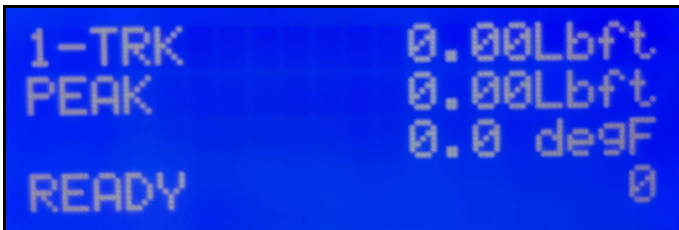


Figure 1. Main Screen, Ready State

1.2. Input Channel

There is one transducer input channel for the Model 922. It can be used to connect a RS torque or torque-angle transducer, a load cell such as a load washer or clamp load cell, or it can be set up to use any industry standard strain gage transducer.

1.3. Operating Modes

There are two operating modes in the Model 922. The Peak Operating Mode picks out and displays and records the Peak value achieved during the test. The Click Operating Mode picks up the initial peak seen when testing a mechanical “click” type wrench and records that value.

1.4. Data Display and Printing

After testing, the Model 922 generates two kinds of data reports, Peak Data and Statistical Data. The 922 displays the Peak Data as time-date stamped peak values with indications as to whether the data is higher, lower, or within programmed limits. The 922 also can display the Statistical Data showing the High, Low, Mean, Range, Standard Deviation, and other calculated values for the programmed sample size.

The Peak Data and Statistics recorded by the Model 922 can be uploaded to a PC using the FastPK software that comes with the instrument. FastPK then lets you print the data or export the data in spreadsheet or text formats.

1.5. USB Port

There is one USB port provided on the Model 922. The USB-B port lets you to exchange information between the 922 and a desktop or laptop PC using the FastPK software.

1.6. Instrument Operating Status

The lower left corner of the Main Screen indicates the operating status of the Model 922. It will read one of the following:

“Ready” indicates that the instrument is armed and ready to begin a new test once the threshold/cycle start value is reached. The Model 922 is automatically put in the Ready state once the test is completed and the data is recorded.

“Incy” means the Model 922 is in a recording cycle.

“Calc” indicates that the measurement has completed and the 922 is determining either the Peak or Click values

“Done” indicates that recording has been completed. Under normal conditions, the Model 922 will then advance to the Ready state.

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2. Controls & Connections

The top panel, Figure 2 below, contains all possible controls and connections other than the keypad.

- POWER I/O switch turns power on and off.
- Battery Charger input with Charging and Complete Charge LEDs, See 2.1 below.
- TRANSDUCER receptacle connects torque sensor or load cell, see 2.2 below.
- USB-B connection for communications with a PC using FastPK software. See 2.3 below.
- CAL RESISTOR binding posts for the shunt calibration resistor.



Figure 2. Top Panel

The tactile feel keypad, see Figure 3, is mounted on the face of the instrument. It contains numeric keys in the center and special function keys for selecting menus such as Setup, Calibration, Utilities, and Storage. There is also a set of LEDs to indicate when the recorded data of the display reading are HI (above limit) or LO (below limit).

2.1. Battery Charging

The Model 922 is provided with a 24 VDC battery charger. The Charging LED is lit when the charger is plugged in and the battery is charging, while the Complete LED is lit when the charge is full. Battery Charging takes approx. 2 hours to full charge. A full charge is recommended before use.



Figure 3. Keypad

2.2. Transducer Connection

The Model 922 has a DB15 receptacle for torque-angle and torque-only transducers, and for fastener and general purpose load cells. The pinouts are listed in the Specifications, Section 11.0.

2.3. USB-B Connection

The Model 922 accepts the B port connector from a standard 10-foot USB A-B cable. Recommended is a Belkin USB F3U133-10 A-B Plug.

Instruction Manual

3. Starting up the Model 922

Starting up the Model 922 is described below.

3.1. Basic Startup

1. Turn on the power using the slider switch on the top panel of the instrument. The HI and LO LEDs will flash alternately and the Model 922 briefly displays the firmware version.
2. The Model 922 then begins a search for a Smartducer, which is a RS transducer with an Auto-ID chip.
NOTE: If the 922 will be used with a sensor without an Auto-ID chip, the search for the Smartducer can be disabled as described in Section 3.2. If the connected transducer does not have an Auto-ID chip, it can be defined as described in Section 3.3.
3. When the Model 922 finds a Smartducer, it briefly displays OK and then displays information about the transducer detected, such as serial number, full-scale capacity, and cal value.
4. The Model 922 will then ask you to make sure there is no load on the transducer and press ENTER to perform an automatic shunt calibration.
5. The Model 922 should briefly display “Zero”, “Cal Successful”, and display the Main Screen.

3.2. Smartducer Feature

It may be useful when first using the Model 922, to determine whether or not you will be using the Auto-ID Smartducer feature. Most RS rotary torque transducers, torque-angle transducers, and hand torque-angle wrenches manufactured by PCB Load & Torque are equipped with an Auto-ID feature that allows the Model 922 to read the information on an ID chip to simplify setup and calibration of the instrument.

Guideline: If the Model 922 will be used with several or most transducers that do not have the RS Auto-ID chip, the Auto-ID feature can be disabled; if the Model 922 will be used with one or more transducers that all have Auto-ID, enabling this feature will simplify set-up and calibration.

1. To enable or disable the Auto-ID feature, from the Main Screen, press the CAL key to display the Cal Menu. See Figure 4 below.

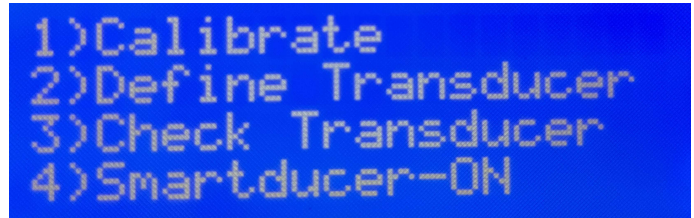


Figure 4 Cal Menu

2. In the Cal Menu the fourth selection shows you whether the Auto-ID feature is turned on or off. Pressing the 4 key will then ask you to enter a password to change the feature and press ENTER. **NOTE:** The default password is “157”.
3. When the desired Smartducer selection is displayed, press ESC to return to the Main Screen.

3.3. Define Transducers

The Model 922 has a library of 20 transducers or load cells that can be accessed using the Cal Menu.

Guideline: It may be helpful to first select the engineering units per Section 4.4.

NOTE: To be able to select User Defined sensors for use, the search for Smartducer option should be disabled as described in Section 3.2 above.

1. To define a transducer or load cell press CAL.
2. From the Cal Menu press, 2 to define the transducer or load cell. The 922 will display the Define Transducer screen as shown in Figure 5 below.

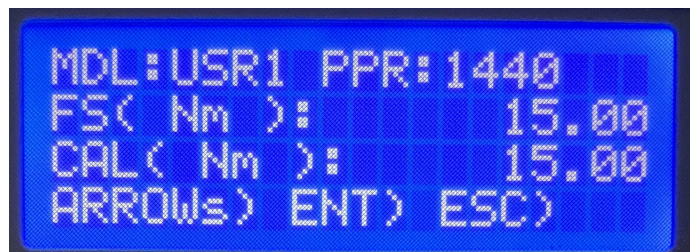


Figure 5. Define Transducers

3. Use the Up Arrow (SETUP) or Down Arrow (UTILS) keys to scroll through the user definable transducers, USR1 through USR20.

Model 922 Digital Instrument

- When you have displayed the one you want to define, press ENTER. The 922 will display the first parameter to set. You can scroll through the setup selections by pressing the Up Arrow or Down Arrow keys.
- The first parameter is the rated capacity or Full Scale (FS). Enter this value and press the Down Arrow.
- Second is the Calibration Value. Refer to the calibration certificate for the transducer to locate the cal value, sometimes labeled as the Auto-Cal value, enter it into the Model 922, and press the Down Arrow.

Guideline: Before calibrating the transducer, note that you will need to confirm the resistance value listed on the certificate and verify that the resistor attached to the Cal Resistor binding posts on the connector panel of the 922 matches the resistance called out by the cal certificate.

- Finally, locate the Counts Per Revolution value on the cal certificate and enter it into the PPR field. If your transducer does not have an angle encoder, a torque-only sensor or a load cell, simply enter 0.
- Once all values are entered, press ENTER to save the settings and then press ESC to return to the Cal Menu. Press ESC again to return to the Main Screen.

3.4. Selecting User Defined Transducers for Use

Once your User Defined transducers are entered you will want to select them for use and perform a calibration to match them to the Model 922.

- From the Main Screen press CAL to display the Cal Menu.
- From the Cal Menu press 1 to select Calibrate. The 922 will briefly display “checking for Smartducer ... NONE” and then display the basic info about the most recently used of the transducers stored on-board as shown in Figure 6 below.

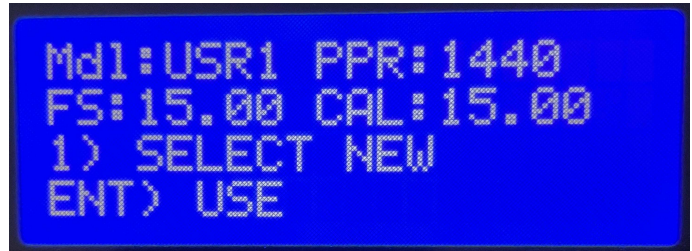


Figure 6. Select User Defined Transducer

- You have two options:
 - You can press ENTER to select the sensor that is displayed and then go to Step 5 below.
 - You can press 1 to select a different transducer from the library. When you press 1, the 922 will briefly display how many tools are in memory, and then display the first of transducers in the library, as previously shown in Figure 5.
- Press the Up Arrow or Down Arrow key to scroll through the available user defined transducers. When the desired transducer is displayed, press ENTER.
- When the 922 prompts you to Unload the Transducer, make sure there is no load on the sensor and press ENTER.
- The Model 922 will step through the calibration process. When it displays Cal Successful, calibration is complete and the Cal Menu is again displayed.
- Press ESC to return to the Main Screen.

4. Setting Up a Test: Setup Menu

Press the SETUP key to display the Setup Menu. The Model 922 will display the number of test setups that it found in memory. There are four selections in the Setup Menu as shown in Figure 7 below.

- **TestSetup:** Press 1 to enter the number of the test setup you want to program. See Section 4.1 below.
- **Define Limits:** Press 2 to program the Limits Setup Menu as described in Section 4.2.
- **Direction:** Press 3 to toggle between CW and CCW. Refer to Section 4.3 for more.
- **Units:** Press 4 to toggle through the available torque and load units of measure. Refer to Section 4.4 for more.

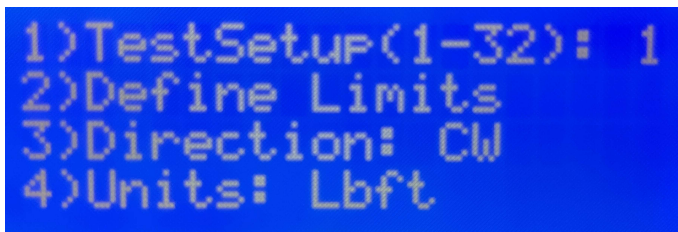


Figure 7. Setup Menu

4.1. Test Setups

The Model 922 comes with the ability to program up to 32 different limit sets or test setups for torque, torque-angle, or load measurement. Once in the Setup Menu, press 1 to be able to enter the number of the test setup you wish to work on. Then enter the number of the setup and press ENTER.

Guideline: For basic use with a single transducer on some simple tests, it is only necessary to have one test setup. For more extensive testing where you may have multiple tools, transducers, and/or applications to test, you will find having multiple test setup useful to store different torque or load setting and keep the test data in separate stores.

4.2. Define Limits

Press the 2 key in the Setup Menu to display the Define Limits Menu and program your test setup on the Model 922. There are nine test limits to be

programmed, which are described in Sections 4.2.1 through 4.2.9 below.

Guideline: You have options when navigating to the Limits selections. You can press the number associated with the limit, or you can also use the Up Arrow and Down Arrow keys to page through the selections. Figure 8 shows limit selections 1-4.

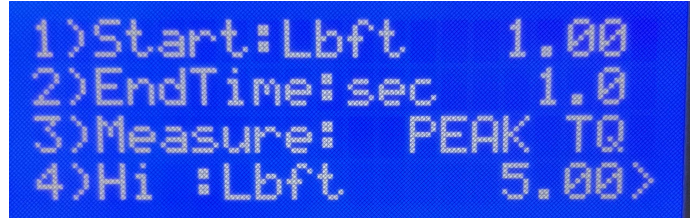


Figure 8. Define Limits 1-4

4.2.1. Start

In the Define Limits Menu, press 1 to set the cycle start or threshold of the test. After setting the Start value, press ENTER to save your selection.

When the input signal reaches the Start level set here, the search for the peak value begins. This is typically set at approx. 10-20% of the target value.

If you will be using the Click Operating mode, the Start value should be set to 50-60% of the target value.

The Start value also serves as the starting point for measurement angle of turn when doing torque-angle tests. For applications where you are testing a torque plus angle tightening strategy, you will want to set the Start value at the seating torque or “snug” torque point.

Finally, Start also serves as the trigger to end the test and works with Selection 2 below to stop the recording process. Press ENTER to save your selection and continue.

Guideline: When setting recording limits, the following should be observed. The lowest torque limit value must be Start. Low torque should be higher than Start, and High torque should be higher than Low.

4.2.2. EndTime

To set the EndTime, Press 2 from the Define Limits Menu and then enter the amount of time you want to

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delay the end of the test cycle. After setting the EndTime parameter, press ENTER to save.

Guideline: EndTime lets you set a time value in seconds that is used to trigger the end of the test. When a measurement cycle has started and the input drops below the value entered for Start, the Model 922 will wait for the time set here to end the test. This feature can be used to allow for continuing a test when there may be a momentary drop in the input value that is part of the test cycle, such as a downshift in the tooling speed as shown in Figure 6 below. If that is the case, program this value to something greater than the length of time of the momentary drop.

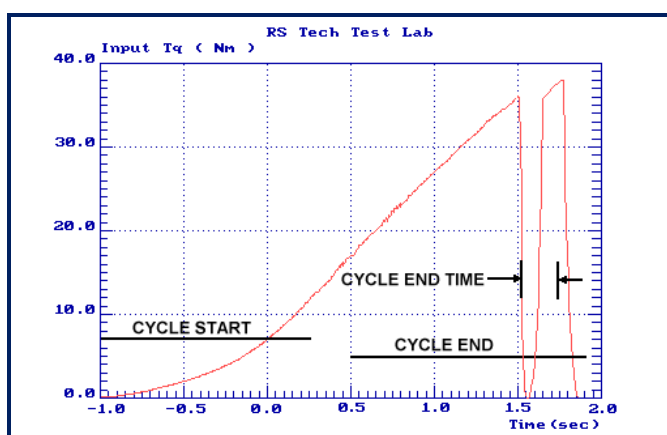


Figure 6. Cycle End Time

4.2.3. Measure

To select the Measurement Mode, press 3 from the Define Limits Menu to toggle between the Peak Torque measurement mode and the Click Torque measurement mode. When the desired mode is displayed, press ENTER to save the selection.

Guideline: Peak Torque mode will pick off and store the highest value measured during each test cycle. Click Torque mode will look for the initial peak that occurs when a mechanical torque wrench reaches its set value. Click Torque can be used for other applications where it is desired to capture an initial peak and not the overall highest value.

4.2.4. Hi Torque

The enter the upper engineering limit for torque (or load), press 4 from the Define Limits Menu, as shown in Figure 8 above or Figure 9 below, and set the engineering High Limit for the measured Peak or

Click value. Enter the desired value and press ENTER to save your selection and continue.

Guideline: the High value must be the highest of all the limits. See paragraph 3.5 for guidelines about setting limits.

4.2.5. Low Torque

To set the lower engineering limit for torque, press the 5 key from the Define Limits Menu. After entering the desired value, press ENTER to save your selection and continue.

Guideline: The Low value must be set to a level less than the Hi value, and a level greater than the Start value. See paragraph 3.5 for guidelines about setting limits.

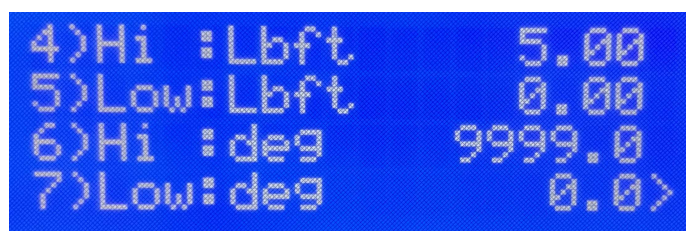


Figure 9. Define Limits 4-7

4.2.6. Hi Angle

Selection 6 lets you set the engineering High Limit for angle of turn when doing torque-angle tests. Press 6 to enter the desired value and then press ENTER to save your selection and continue.

Guideline: See paragraph 3.5 for guidelines about setting limits.

4.2.7. Low Angle

Selection 7 lets you set the engineering Low limit for angle of turn when doing torque-angle tests. Press 7 to enter the desired value and then press ENTER to save your selection and continue.

Guideline: See paragraph 3.5 for guidelines about setting limits.

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4.2.8. View Angle

Press 8 to display the View Angle selection. The Model 922 can measure, record and display the angle of turn in two ways as follows.

- From the value set at Start to the measured peak torque value (ANG@PK).
- From the value set at Start to the angle of turn at the end of the test (FINAL ANG), which may be near the peak or beyond.

Pressing 8 will toggle between ANG@PK and FINAL ANG. Press ENTER to save your selection and continue.

NOTE: The angle data on the Main Screen is flagged with a F when Final Angle is selected, or with a P when Angle at Peak is selected.

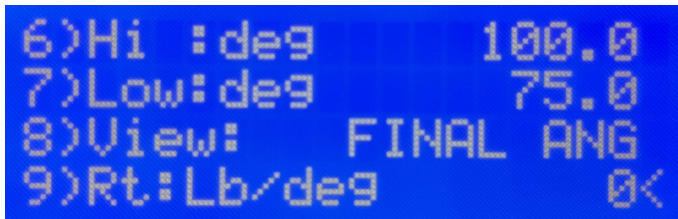


Figure 10. Define Limits 6-9

4.2.9. Rt

Press 9 in the Define Limits Menu to set up the M-Alpha feature. If not doing a torque-turn-clamp load study, set this value to 0 and press ENTER to save. If doing a torque-turn-tension study see guideline below.

Guideline: If you are doing a torque-angle audit and have researched your bolted joint well enough to know your Tension-Angle Coefficient, that is, how many pounds of force or Newtons are achieved per degree of turn in elastic tightening, you can set this selection to that value and the instrument will calculate as estimated value for the resulting clamp load. For example, if you have determined that you achieve 85 pounds per degree of turn from Start to Peak, you can enter that value here and the Model 922 will record the resulting estimated clamp load accordingly in the test data.

4.2.10. Return to Setup Menu

Press ESC to return to the Setup Menu.

4.3. Direction of Rotation

Press the 3 key from the Setup Menu to toggle between the measurement direction as CW or CCW. For almost all threaded fasteners, CW is tightening and CCW is loosening.

For clamp load or tension/compression testing select CW for compression or clamp load, or select CCW for tension load measurements. **NOTE:** Some load cells may be wired differently with CW tension and CCW compression.

4.4. Units of Measurement

Pressing the 4 key repeatedly in the Setup Menu will toggle you through the available units of measure. They are in order of appearance: Lbft, Lbin, Nm, Kgcm, Kgm, ozin, Lb, N, and kN. When your desired units of measure are displayed, press ENTER to save your selection and press ESC to return to the Main Screen.

Guideline: When defining a non-Auto-ID transducer, it is always a good idea to select the native units of measure for that transducer before entering the full scale and cal value. That saves having to calculate a unit conversion as the Model 922 will do the conversion for you when you select the units of measure for you test setup.

4.5. Guidelines for Hi and Low Limits

Hi and Lo limits for torque (or load) and angle (if used) are based on engineering limits required for the application. For example, if torque should be 50 ±5 Nm, Hi torque would be 55 Nm and Lo Torque would be 45. Data recorded above or below these limits would be flagged and the corresponding front panel LED is lit. The same is true for Hi and Lo Angle.

If engineering limits are not required for the test, set Hi Torque to the rated capacity of the transducer or load cell and set the Lo Torque to something just above the cycle Start value. If angle limits are not required, set Hi Angle to 9999 and Lo Angle to 0.

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5. Taking Data with Model 922

Once your transducer is calibrated and the test is set up, you are ready to take data. The display of the Model 922 should resemble the Main Screen in Figure 11 showing the status as READY.

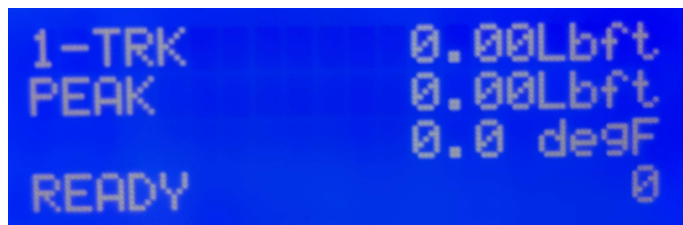


Figure 11. Ready Status

Apply a load (either torque or load) to the connected transducer. The Status in the lower left corner of the display will change from READY to IN CYC as shown in Figure 12 below. You will also notice that the Track display will increment as the load increases.



Figure 12. In Cycle Status

When the cycle Start value is exceeded, the Peak display will increase accordingly.

When the application or torque or load is removed, the status will show "CALC ..." to indicate that the meter is picking out the Peak or Click value and adding it to memory.

Figure 13. Calc Status

When the data is recorded, the number of cycles in the lower right corner is incremented and the status will briefly display as DONE and then switch to READY to indicate when it's ready take another reading.

6. Utilities Menu

There are several utilities that are available in the Utilities Menu, including clearing data, setting the sample size, setting the filter, etc. Press the UTILS key when the Main Screen is displayed to access the Utilities Menu, as shown in Figure 14 below. Note that it may be necessary to use the Down Arrow key to display menu items 5-8.

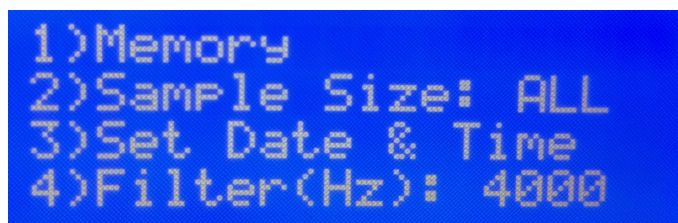


Figure 14. Utilities Menu 1-4

6.1. Clear Memory

Press the 1 key to clear the memory of recorded readings. You are given two options.

- **1) Clear Last.** This option lets you clear out the last reading recorded in memory. Press the 1 key to delete the last reading. Press ESC to return to the Utilities Menu and ESC again to return to the Main Screen.
- **2) Clear ALL Results.** This option lets you clear all readings in memory. Press the 2 key to delete all readings from memory. Press ESC once to return to the Utilities Menu or press it twice to return to the Main Screen.

6.2. Statistics Sample Size

From the Utilities Menu press the 2 key to set the number of consecutive readings to use for calculating statistics. 5 Samples is the default which is typical for most statistical standards. Setting this value to 0 uses all readings in memory for statistical calculations. After setting the desired sample size, press Enter to save the selection.

Included in the statistics are Number of Results, Low, Mean, High, Range, Standard Deviation, +3Sigma, -3Sigma, CpK, and Cp.

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6.3. Set Date and Time

From the Utilities Menu press the 3 key to reset the Date and Time kept by the Model 922. Enter the desired values as needed and press Enter to continue. When the last value has been entered you are returned to the Utilities Menu.

6.4. Set Filter

From the Utilities Menu press the 4 key to toggle through the Low Pass Filter settings used by the Model 922. Available filter settings are 4000, 2000, 1000, 500, 250, 125, 63, and 31. When the desired setting is displayed, press the ENTER key and the Model 922 returns to the Main Screen.

6.5. Install Defaults

From the Utilities Menu press the down arrow key to access the next set of utility options as shown in Figure 15 below.

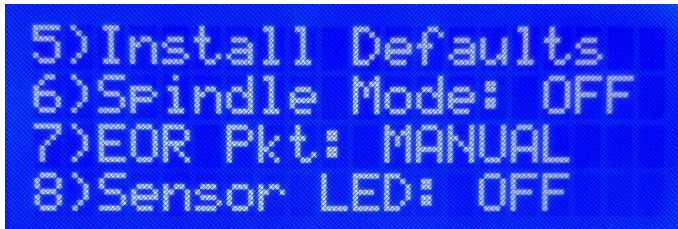


Figure 15. Utilities 5-8

Press 5 to reinstall the default settings of the Model 922. This may be advisable when the meter displays garbled characters or when trouble-shooting problems. Press 1 to reinstall the default limit sets or press 2 to reinstall the default set of tool definitions, called calibrations. Reinstall password is “268”.

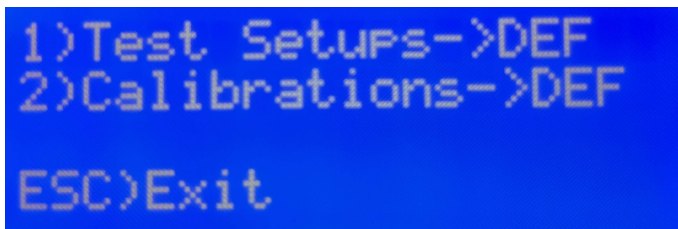


Figure 16. Install Defaults

CAUTION: Resetting the defaults will erase all existing setups for all Limit Sets, and erase all user defined transducer information. It is helpful to backup all of this information on a PC using the FastPK application that comes with the Model 922.

All settings can then be restored from the PC after default restoration.

6.6. Enable/Disable Spindle Mode

From the Utilities Menu press the 6 key to toggle between enabling and disabling the Spindle Mode used by the Model 922 for specialized testing. Unless required by the test being performed, leave Spindle Mode disabled, or turned off.

6.7. Enable/Disable End Of Test Packet

From the Utilities Menu press the 7 key to toggle between enabling and disabling the sending of an ASCII test data packet of the last test cycle to the PC running FastPK software. This data packet includes Date and Time stamped peak information for advanced data acquisition purposes.

6.8. Enable Sensor LEDs

If the connected transducer is a hand torque wrench with tri-color LEDs that can alert the operator to out of limit data, press the 8 key from the Utilities Menu to turn on the sensor's LEDs. Unless this type of sensor is used, leave this feature turned off.

6.9. Debug

This feature is for PCB Load & Torque use only.

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7. Viewing Results

The Data Menu lets you view and print out the stored data in the Model 922. Press the STORE key to access the Data Menu. See Figure 17.

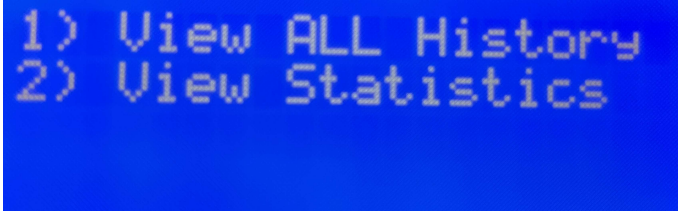


Figure 17. View Data Menu

7.1. View ALL History

From the Data Menu, press the 1 Key to view the peak readings stored in the Model 922. Use the Up Arrow and Down Arrow keys to scroll through the readings. As shown in Figure 18, included in the displayed data is the reading number, the date and time that the reading was recorded, the data itself, and in the upper right corner and indicator of whether the reading was high (TQHI), low (TQLO), or within the programmed limits (OK). Press ESC to return to the View Data menu.

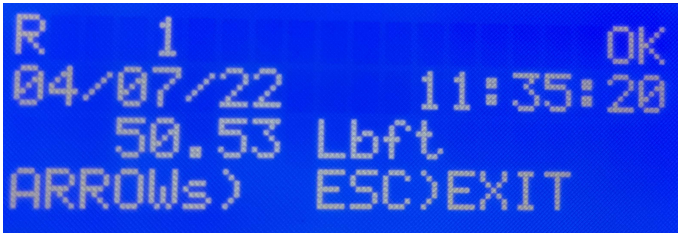


Figure 18. View All Data

7.2. View Statistics

When in the Data Menu, press the 2 key to view the calculated statistics for the recorded data based on the currently programmed sample size. Press the up or down arrow keys to toggle through the available statistics, which include Number of Results, Low, Mean, High, Range, Standard Deviation, +3Sigma, -3Sigma, CpK, and Cp. Figure 19 below shows a sample of data for the Mean.



Figure 19. View Statistics

7.3. Exit Data View

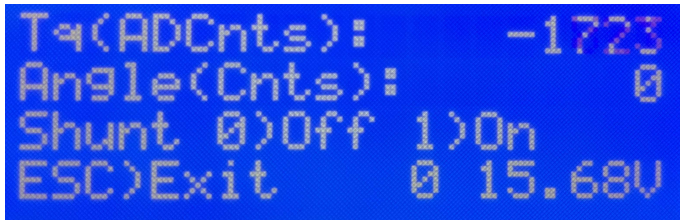
Press ESC to exit back to the Main Screen

8. Additional Features

This section details additional features of the Model 922.

8.1. Check Transducers

This utility in the Cal Menu lets you diagnose possible operational issues with the Model 922. Press 3 from the Cal Menu to view the Check Transducer screen. There are four lines on this display. See Figure 20.



```
Tq(ADCnts):      -1723
Angle(Cnts):      0
Shunt 0)Off 1)On
ESC)Exit         0 15.68V
```

Figure 20. Check Transducer

The top line is Tq(ADCnts) that displays the raw A/D conversion counts produced by the Model 922. A typical transducer at rest will show less than 3000 counts, either positive or negative. It is normal for this value to shift up and down.

The second line shows the raw angle encoder counts if the transducer is equipped with an angle encoder. Rotating the transducer within its housing will increment/decrement this displayed value. A complete rotation of the transducer should produce approximately the same counts as printed on the Calibration Certificate.

The third line displays whether or not the Cal Resistor is shunted on the bridge of the transducer. Pressing 1 will shunt the resistor and the A/D counts on the top line will increase to a large number. Pressing 0 will remove the shunt resistor and return the display to its normal 0 position.

The bottom line displays the current battery voltage on the right side of the line. Normal voltage reading should be more than 10 V.

When finished with the Diagnostics, press ESC to return to the Cal Menu.

8.2. End of Run Packet

When enabled, this feature will send a time-date stamped data packet to the PC running FastPK that contains peak torque, and angle at peak or final angle. This feature is enabled in the test setup, Section 6.7.

8.3. Torque Wrench LEDs

RS provides a series of hand torque wrenches that have LEDs built in that can signal to the operator when the measured torque value falls outside the limits of acceptability. This feature is enabled in the test setup, Section 6.8.

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9. FastPK Software

The Model 922 comes with a PC-side application that lets you create test setups and transducer definitions and then upload them to the 922. You can also download data from the 922 for display, printing, or export. See Section 9.5 for installation.

There are four main tabs on the FastPK window, Test Setups, Calibrations, Results, and Settings. Click on the name of the tab to view the contents.

You will note that for all tabs there is a set of Tools on the lower left side of the screen that are represented by icons. In general by clicking on the icon, you can do the following.

- The + tool is used to add a test setup or tool definition
- The – tool is used to delete the highlighted test setup or tool definition
- The opened folder tool is used to load an existing test setup, tool definition, or data results file on the PC
- The floppy disc tool is used to save the displayed information to the PC
- The down arrow is used to download the displayed information from the Model 922
- The up arrow is used to upload to the Model 922
- A large X is used to delete results
- A right pointing arrow is used to export data

The capabilities of the main tabs in FastPK are described in Sections 9.1 to 9.4.

9.1. Test Setups

In the Test Setups tab, you will see below the Tools a list of the test setups.

- Create a new test by clicking on the + icon
- Delete the highlighted test setup by clicking on the - icon
- Download a test setup from the Model 922 by clicking on the down arrow icon
- Upload the displayed test setup to the 922 by clicking on the up arrow icon

- Load setups from the PC by clicking on the open folder icon
- Save the displayed test setup to the PC by clicking on the floppy disc icon

The test setups are broken down into three parts in FastPK. Click on the General, Logging, or Limits tabs to add, edit or modify the settings.

9.1.1. General Tab

In the General tab you set the sample size for statistics, set Smartducer detection, and select to use the Spindle Mode. You can also enable sending the EOT run packet, or enable the use of LEDs on the torque wrench or tool. See Figure 21 below.

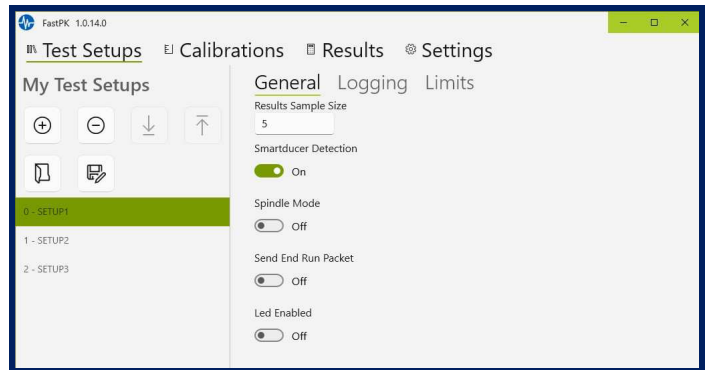


Figure 21. Test Setups, General Tab

9.1.2. Logging Tab

Use the Logging tab to select the engineering units, the rotation direction of the test, and the low pass filter frequency. See Figure 22 below.

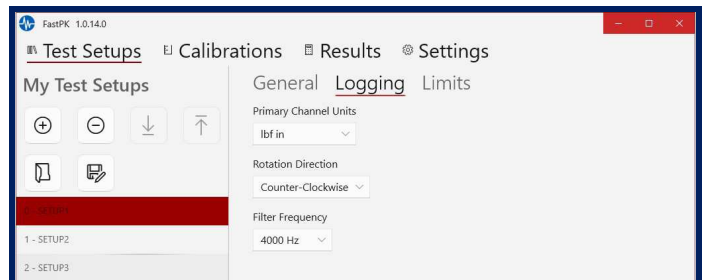


Figure 22. Test Setups, Logging Tab

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9.1.3. Limits Tab

The Limits tab is used to set the parameters for measuring torque or load and angle. See Figure 23 below. You can also enter a name for the selected Test Setup using alphanumeric characters. The specifics of these settings are described in Section 4.2 of this manual.

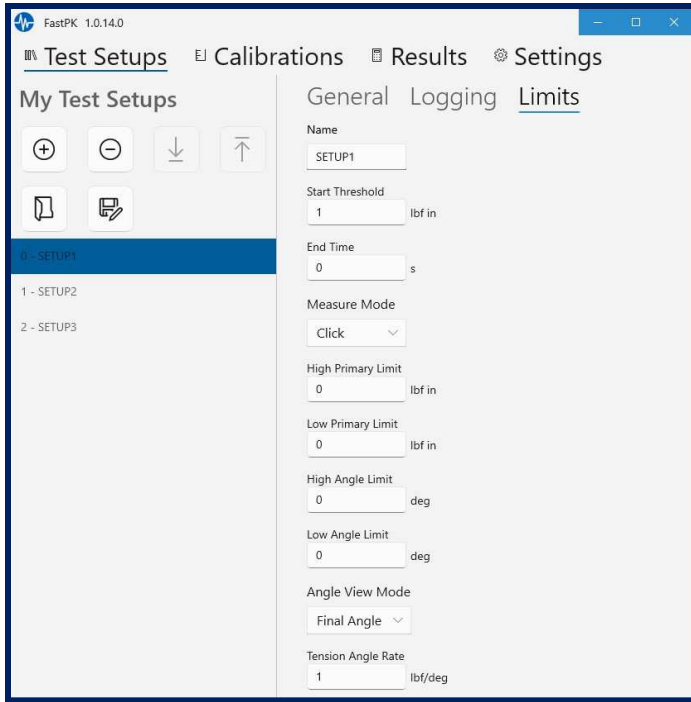


Figure 23. Test Setups, Limits Tab

9.2. Calibrations

The main Calibrations Tab, see Figure 24 below, is used to create a library of user-defined transducers or load cells that can be uploaded to the Model 922 when ready. This is helpful for those who have several transducers or load cells that do not have Auto-ID. Once uploaded, you will be able to select these sensors for use as described in Section 3.4 of this manual. The Calibrations tab of FastPK lets you do the following.

Add a new transducer or load cell by clicking on the + icon.

Highlight an existing tool in the list and modify it as needed.

Delete the highlighted tool definition file by clicking on the – icon.

Download the existing tools definitions from the Model 922 by clicking on the down arrow icon.

Upload the tool definitions to the Model 922 by clicking on the up arrow icon.

Load and display an existing set of tool definitions from the PC by clicking on the open folder icon.

Save the displayed transducer info to the PC by clicking on the floppy disc icon.

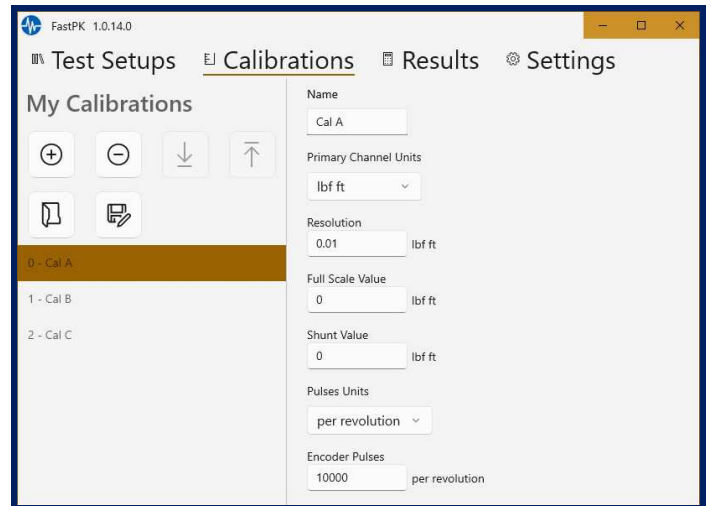


Figure 24. Calibrations Tab

Each tool is set up individually, and the information for all tools can then be saved in a single file on the PC. They can also be uploaded to the Model 922. The following settings define the transducer.

The Name field lets you name the transducer using alphanumeric characters.

Select the units for the transducer using the Primary Channel Units field.

Set the Resolution of the displayed measurement in the Resolution field.

Enter the Full Scale or rated capacity of the transducer in the Full Scale Value field.

Enter the Auto-Cal Value into the Shunt Value field.

Select the units that best describe the angle encoder in the Pulses Units field. For all RS Tech transducers and most other rotary torque angle sensors this will be Pulses Per Revolution (PPR).

Enter the appropriate Pulses Per Revolution in the Encoder Pulses field. This information can be found on the transducer's calibration certificate.

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9.3. Results

The Results Tab is where you can manage the data recorded by the Model 922. See Figure 25 below.

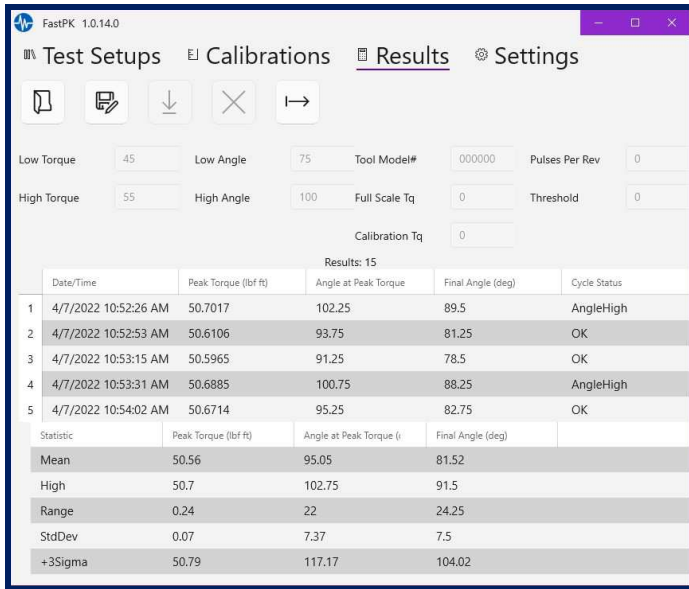


Figure 25. Data Results Tab

Download test results from the Model 922 by clicking on the Download arrow button.

Erase results in the Model 922 clicking on the X button. **NOTE:** choosing to erase the results will take several minutes.

Export the displayed results by clicking on the right pointing arrow button. FastPK displays a dialog box to choose CSV or ASCII text formats for the data and where you want to store it on the PC.

Print the results on a connected printer by clicking on the Printer button.

Load previously saved results from the PC by clicking on the open folder button.

Save the displayed results to the PC by clicking on the floppy disc button.

Export the displayed results in CSV or ASCII Text format.

9.4. Settings

This is where the software and firmware versions are displayed, and from where updates for the Model 922 can be uploaded. See Figure 26 below.



Figure 26. Settings Tab

9.5. Installing FastPK

The FastPK software is provided on a USB Memory Drive that also contains additional information such as the Outline Drawing, Spec Sheet, and Technical Information about torque-angle measurement. To install FastPK use the following procedure.

1. Insert the USB Memory Drive into the PC or access the contents of the drive via network or other storage source.
2. Use Windows Explore to navigate to the folder labeled 1-FastPK Software Install Media.
3. In the Install Media folder double click on the file named **PCB922App_1.0.14.0_x64.msixbundle**.
4. When prompted, select Install and allow the program to complete the installation.

10. Special Applications

The Model can be used for many applications. Two of the most common are the testing the performance of power torque tools, see Section 10.1 below, and the testing hand torque wrenches, refer to Section 10.2.

10.1. Testing Power Tools

Ensuring the proper operation of assembly tools in an important part of building quality assemblies. RS Products from PCB Load & Torque can provide the equipment needed to verify the performance characteristics of most electric and pneumatic power torque tools.

These test procedures provide the basic steps necessary to verify the performance characteristics of most hand held electric and pneumatic power tools.

10.1.1. Equipment Required

1. **Model 922 Portable Instrument:** Displays peak torque values for power tools and torque wrenches. Also calculates peak torque values for "click" type wrenches.
2. **Rotary Torque Transducer:** Measures the amount of torque that is supplied by the tool.
3. **Power Tool Joint Simulator:** Provides mounting and positioning for tool, and a series of Belleville-type washers that can be set up in various arrangements to simulate hard, medium, or soft joint rates.
4. **Transducer Cable:** Connects rotary torque sensor to Model 922 instrument.
5. **PC:** Downloads data from the Model 922 for printing, analysis, and archiving.
6. **Power Tool and Controller:** The tool to be tested and its controller.

10.1.2. Power Tool Verification Procedure

The following procedure outlines the steps required to verify power tool performance.

1. Connect the Model 922 instrument to the torque transducer and power it up.
2. Perform a transducer calibration and clear the memory.
3. Make sure that the Measurement Mode of the instrument is set to read Peak torque. Refer to the Section 4.2.3.
4. Set up the joint simulator to emulate the desired joint rate.
5. Position the tool on the joint simulator with the output drive of the power tool inserted into the input end of the rotary torque sensor. Then position the rotary torque sensor on the input drive of the joint simulator. Adjust the tool as needed.
6. Activate the power tool and run it until it shuts off or stalls.
7. Back off the joint simulator and return it to the start position.
8. Repeat steps 6 and 7 until the number of runs required by the test procedure are recorded. Typically, 10 to 25 rundowns are recommended.
9. If the tool does not meet the required torque shutoff specification, make the necessary adjustments to the tool or the tool controller, and repeat Steps 6 and 7.
10. If necessary, repeat Step 9 until the tool is performing within specification.
11. Download the test data via FastPK and print or store as desired.

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10.2. Testing Hand Torque Wrenches

Refer to the following procedure when verifying or calibrating hand torque wrenches.

10.2.1. Equipment Required

To verify the performance of hand torque wrenches you will need the following equipment.

1. Model 922 Digital Instrument, PN 080922-01000
2. Torque transducer, preferably a 7000 Series Stationary Torque Sensor mounted to a table or suitable base. A rotary square drive torque sensor can be substituted if mounted in a suitable fixture where one end is held stationary and the load is applied to the other end.
3. Transducer cable.
4. Printer (optional).

10.2.2. Setting Up the Model 922

After setting up and calibrating the torque transducer that you will use to test the hand torque wrench as described in either Section 3 (for Smartducers with Auto-ID) or Section 8.2 (for user defined transducers), the next step to setting up the Model 922 for use is to set the testing parameters. Use the following procedure to set the torque limits on the Model 922.

1. From the main screen, press the SETUP key to display the Setup menu and select the Test Setup that you would like to use.
2. Press 2 to display the Define Limits menu.
3. In the Start (*units*) field enter the transducer input level that will start the test. This value is where the cycle recording begins. For testing hand torque wrenches and “Click-type” hand wrenches, this should be set to about 60% of the setting of the wrench. For example, if the wrench is set to release or “click” at 100 in-lbs, the Start torque value should be set to 60 in-lbs. Press 1, enter the desired value, then press Enter.
4. In the End Time (*sec*) field, enter the amount of time that data is recorded following the Cycle End and press the down arrow key. This value can be left at the default value of 1.0 sec or less.

5. For the Measure field, press the 3 key to toggle the display between PEAK TQ and CLICK TQ. To record the “click” point of the hand wrench, select CLICK TQ; to record just the peak or maximum applied torque, select PEAK TQ.
6. To enter the high control limit of acceptable torque, press the 4 key and enter the desired high torque value. Press ENTER after your entry. This value is also used for calculating statistics.
7. To enter the lower control limit of acceptable torque, press the 5 key and make your entry. Press ENTER after your entry. This value is used for calculating statistics.
8. Press ESC to return to the setup screen.
9. If needed, press 3 to toggle the direction of the test between CW and CCW.
10. If needed, press 4 repeatedly to cycle through the available engineering units until the desired units are displayed. Those currently available are Lbft, Lbin, Nm, Kgcm, Kgm, ozin, Lb, N, and kN. The conversion of all torque or force values is done automatically.
11. Press ESC to return to the Main Screen.
12. To select the sample size for statistical calculations, press the UTILS key to display the Utilities menu. Press the 2 key and make your Sample Size entry. This can be any number from 3 to 25 depending upon the statistical requirements of the test or process. To use all readings in the population as the sample size enter 0.
13. Press ESC to return to the Main Screen.

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10.2.3. Testing Hand Wrenches

Refer to the following guidelines when attempting to test hand torque wrenches.

1. Clear any unneeded readings from the memory of the Model 922. Refer to Section 6.1 if necessary.
2. Position the drive of the wrench in the correct fitting on the torque transducer. Allow enough room for the operator to pull the wrench to reach the desired torque.
3. If checking the reading of a “dial-type” wrench, simply pull the wrench to the desired reading and release the wrench. Compare that value to the displayed Peak Torque value on the Model 922. Typically, 5-10 tests are required to satisfy the necessary sample size requirement for most tool testing standards. Consult the manufacturer’s specifications and technical information to determine if adjustments to the wrench are necessary to ensure accurate operation and use.
4. If checking a “click-type” wrench, apply torque to the wrench by pulling in a slow, steady manner through the “click” point, then release the handle. The Model 922 will search through the recorded torque to find the point at which the wrench “clicked” and released. Typically 5-10 tests are required to satisfy the necessary sample size requirement for most tool testing standards. Consult the manufacturer’s specifications and technical information to determine if adjustments to the wrench are necessary to ensure accurate operation and use.

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11. Specifications

The following specifications apply to the Model 922. Some special system program configurations may include or delete identified features.

A/D Resolution 21 bit
 Accuracy $\pm 0.25\%$ FS
 Angle Input Quadrature, AB Track
 Angle Frequency (max.) 1 mHz
 Angle Resolution Depends upon counts/rev of transducer
 Bridge Excitation 5 vdc
 Calibration Shunt cal via external binding posts
 Communications Port USB B Type for upload to computer via FastPK software provided
 CW/CCW Operation Software selectable
 Data Memory Automatic storage of 5000 peak torque-angle or force readings, scrolling feature for viewing readings, last reading deletable
 Dimensions 9.0 inches depth x 5.4 inches wide x 3.18 inches high
 Display LCD, 20 alphanumeric characters by 4 lines with 5-digit data readout plus 6 digits for angle
 Enclosure Molded ABS Plastic
 Engineering Units Software selectable (lbft, lbin, ozin, Nm, kg-cm, kgm, lb. and N)
 Frequency Response 10 kHz standard, software programmable filter equiv. to 32 up to 4000 Hz
 Humidity 5 to 95% N.C.
 Input Power Lithium Ion battery, AC Battery Charger 24 vac, low battery charge warning

Input Signal Compatible with conventional strain gage transducers with outputs ranging from 0.8 to 4.5 mV/V and with high level devices up to ± 5.0 VDC
 Keypad 16-key numeric and special function
 Maximum Angle Count 10,000 degrees
 Operating Temperature 32-158 °F
 Multiple Limits Sets Up to 32
 Recorded Data Time and date peak data, angle at peak (if used), and statistics
 Recommended Recalibration Yearly
 Statistics High, low, mean, standard deviation, ± 3 sigma, Cpk, and Cp; calculations based on programmed sample size or entire population
 Supplied with Battery charger, instruction manual
 Warranty One year from date of receipt
 Weight 1.75 lbs.

The Model 922 uses the following pinouts for connecting transducers to the DB-15 Transducer input receptacle.

Pin	Function	Pin	Function
1	-Signal	9	+ Excitation
2	+Signal	10	- Excitation
3	GS1	11	GS3
4	GS2	12	GS4
5	Analog Ground	13	Shunt
6	ID Data	14	Lead CW
7	Encoder 5V	15	Trail CCW
8	Digital Ground		

A jumper must be added when wiring a connector for the Model 922 in order to scale the output of the transducer or input device properly.

Jumper Position	Signal Level
3 & 12	Up to 2.5 mV/V
4 & 12	Up to 4.5 mV/V
None	Up to ± 5 VDC

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