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# ***MODEL***

# ***TM-2270***

**Instrument for Concrete Testing**

**Manual**

Version 1.32 April 2023

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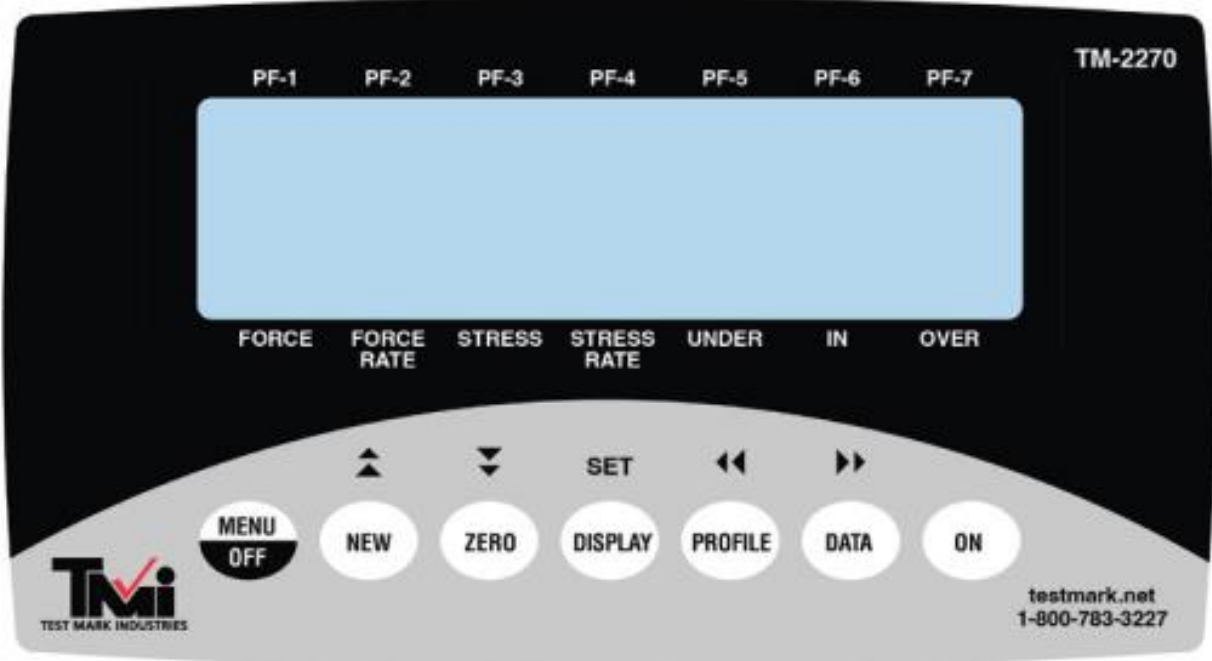
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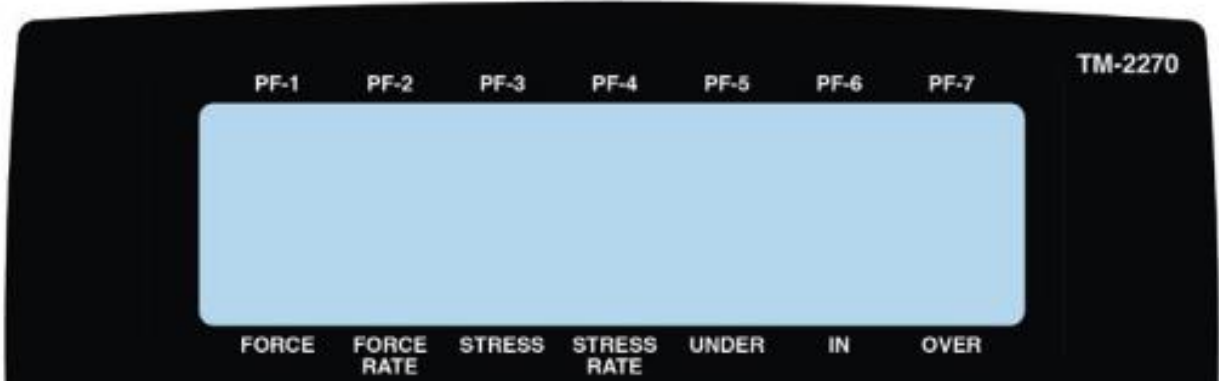
## DISPLAY & KEYPAD DETAILS

This instrument utilizes a 7-digit LCD (Liquid Crystal Display) with adjustable LED backlight.

The Table below summarizes the display annunciators:



Annunciator	Display
→0←	Indicates that the instrument is on Zero
P	Indicates that the indicator is in PEAK HOLD mode
▲▼	This light is on whenever the instrument is at rest (i.e., a stable reading)
Force	Indicates that the indicator is displaying Force information
Force Rate	Indicates that the indicator is displaying Force Rate information
Stress	Indicates that the indicator is displaying Stress information
Stress Rate	Indicates that the indicator is displaying Stress Rate information
Under	Indicates that the indicator is loading at a rate slower than the programmed target rate
In	Indicates that the indicator is loading at a correct programmed target rate
Over	Indicates that the indicator is loading at a rate faster than the programmed target rate
lb	Indicates that the unit of the displayed force is in pounds
N	Indicates that the meter is in SI units. This would include Newtons (force), N/s (force rate), MPa (stress=N/mm <sup>2</sup> ), MPa/s (stress rate)
kg	Indicates that the unit of the displayed force is in kilograms



Across the top of the screen will identify Profiles 1 through 7 (PF-1 to PF-7). These are programable fields for different sample types and sizes. A light will appear below the field that is being used.

### **DISPLAY COLORS**

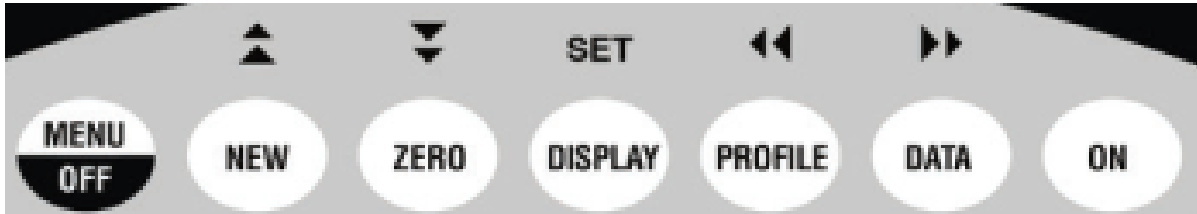
The display will change color based on its current status.

Light Green: When the display is ready to test.

Dark Green: When the display is conducting a test and has passed the Load Threshold.

Purple: When the display Sample Break has been activated and the test completed. It will remain purple until New is pushed or it is turned off.

The capacitive touch keypad is composed of a total of seven (7) function keys.



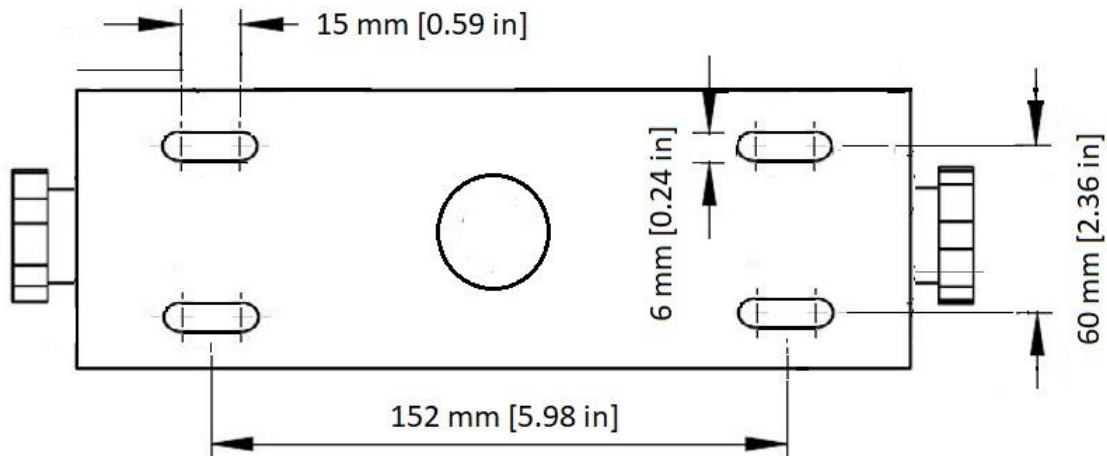
	Keypad Functions
<b>Menu/Off</b>	This key provides access to the various configuration menus (see <b>System Configuration</b> )  <b><u>To turn the instrument OFF:</u></b> 1. Press MENU/OFF key. 2. Press the DISPLAY button while “OFF?” is displayed.
<b>New Test</b>	Action performed is configured in menu; when pressed, could automatically clear Peak Force value, zeros force, rearms Load Rate trigger, and/or Send data
<b>Zero</b>	The Zero key functions as a Tare
<b>Display Mode</b>	Toggles the instrument among the display modes of Force, Stress, Force Rate and Stress Rate
<b>Profile</b>	Allows users to cycle between saved test profiles
<b>Data</b>	Exports data to both PC via USB and/or printer via RS232; prints / exports summary of test results; may include Sample ID, Timestamp, test Duration, Peak Force/Stress, Load Rate, sample Area
<b>On</b>	Press and hold for 2-3 seconds to turn the unit ON
<b>SET &amp; arrows</b>	Utilized in the various configuration menus (see <b>System Configuration</b> )

## INSTALLATION & OVERVIEW

Remember that the installer is ultimately responsible for ensuring that an installation will be and remain safe and operable under the specific conditions encountered.

### Installation of TM-2270

Find a suitable location for the instrument and use the included bracket to mount the unit to a wall or table. Use this handy guide for mounting the bracket to a wall or table:



### CONNECTIONS

The rear cover must be removed to make the appropriate connections to the weigh platform, etc. To remove the rear cover, simply remove the screws that secure it to the enclosure and set aside.

**Caution!** Disconnect power source from instrument prior to removing rear cover.

**Caution!** Disconnect leads from rechargeable battery (if installed) to avoid shorts!



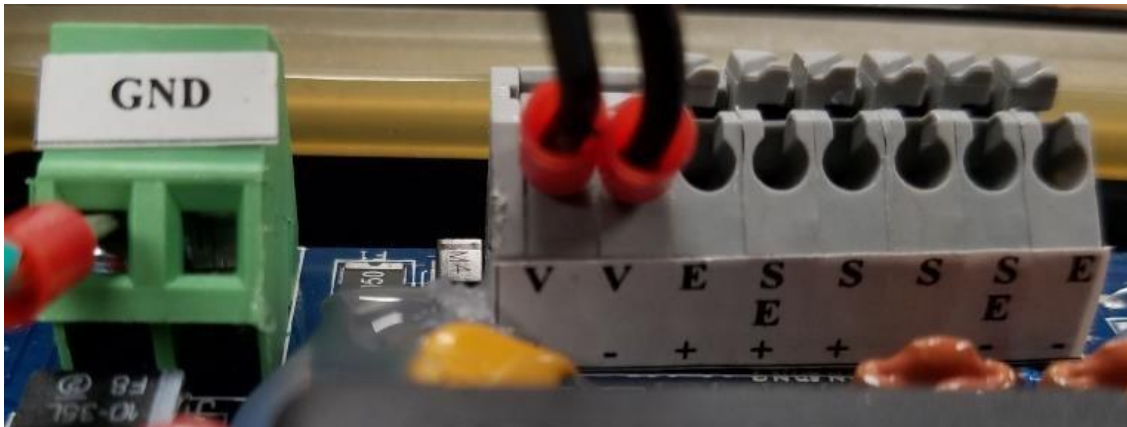
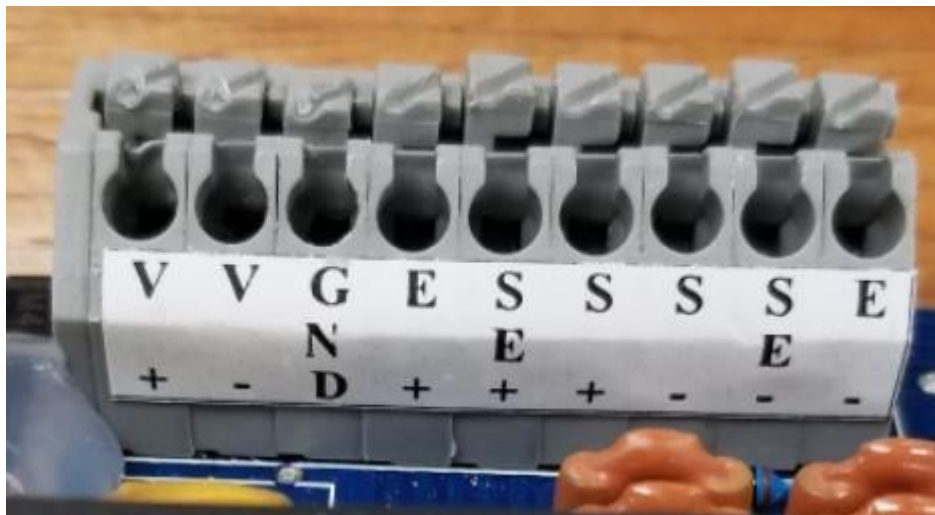
**Force sensor Connections**

Connect your shielded force sensor cable to terminal block J1 using the table below. All terminals are labeled for function.

**TIP:** You should have the color codes handy for your force sensor before doing so. For Dynisco transducers, the wiring patten in Red to Signal +, Black to Signal -, White to Excitation +, and Green to Excitation -.

**Force Sensor Terminal Block J1**

Marking	Function	Marking	Function
GND	Shield	S-	- Signal
E+	+ Excitation	SE-	- Sense
SE+	+ Sense	E-	- Excitation
S+	+ Signal		



- NOTE1:** Use F11 to configure for 4-wire or 6-wire force sensors
- NOTE2:** Pins 1 and 2 are for DC power input (V+ and V- respectively)
- NOTE3:** There are two configurations for J1, as shown above, and differing only in the location of the force sensor shield wire connection (GND)

## RS-232 Connections (COM1)

The instrument ships with a “piggyback” RS-232 communication board plugged into socket U9 (COM1). This port is configured via the User/COM1 (“A1”) menu.

Connect your RS-232 serial communications cable to said “piggyback” board using the table below. Pin 1 is on the left.



**COM1 RS-232 Terminal Block (J6)**

Pin No.	Function
1	Receive Data
2	Transmit Data
3	Signal Ground

## Power Connections (AC version)

The TM-2270 instrument ships with a pre-installed AC line cord. It has been pre-wired to Terminal Block J1 at the factory. Simply plug the unit into a standard wall outlet.

## USB Port

The external USB port is used for communication and updating of the firmware. Consult factory for use.

## Getting Started

1. Press and hold the ON key on the force instrument for two seconds.  
After a brief initialization period, the instrument will revert to a zero (“0”) force display.

Your instrument is now ready for configuration and system calibration.

## SYSTEM CONFIGURATION

### Configuration Menus

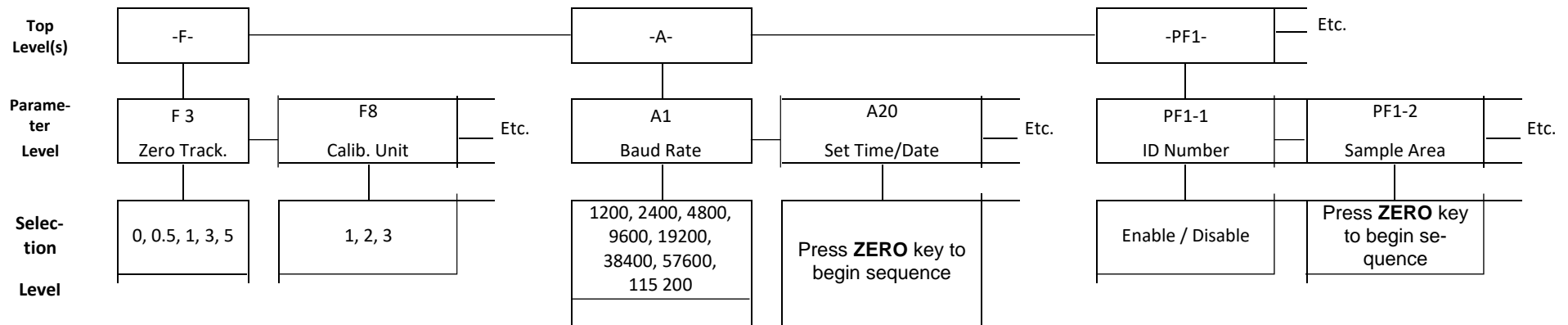
The TM-2270 instrument contains five menus to configure the calibration system:

1. Setup (“F”) Menu – Configures all scaling parameters, including calibration procedures. All Profiles [PF1-PF5]
2. User (“A”) Menu – Configures USB communication parameters and other misc. parameters, e.g., automatic turn off and hold mode.
3. Profile Setup (“PFx”) Menu – Configures all Profiles [PF1-PF7] for sample types and sizes.

The configuration menus are laid out in the following vertical arrangement:

- Top [Menu selection] level [Note: some menus may have a secondary top level, e.g., -F- \ F-PF 1]
- Parameter level
- Selection level (or function level, e.g., span calibration)

Please review the following chart to get a feel for how to navigate among the various menus and parameters.



**Entering the Setup (“F”) Configuration Menu**

1. Switch off the instrument by pressing the MENU/OFF key followed by the DISPLAY key.
2. Press the DISPLAY button while “Set?” is displayed. The instrument displays “-F-“.
3. Scroll down using the ZERO (down) key to reach the parameter level. The instrument shows “F 1”.
4. Move from one menu parameter to the next by using the PROFILE (left) or DATA (right) keys. For example, to go from F3 to F8, press the DATA key. To go from F8 back to F3, press the PROFILE key.
5. Once you have arrived at the proper “-F-” menu parameter, e.g., “F3”, press the ZERO (down) key once to arrive at the selection level. The instrument displays the current parameter setting.
6. If there is a selection list, scroll through the available parameter settings, use the PROFILE (left) or DATA (right) keys. Otherwise, use the arrow keys to adjust the displayed value to the new value.
7. Once the setting you want is displayed on the screen, press the DISPLAY (set) key to save this value and revert up to the parameter level, e.g., “F 1”.

**Leaving the Setup (“F”) Configuration Menu**

1. While on any level except the selection level, press the MENU/OFF key.

**Setup (“F”) Menu Descriptions**

This section provides more detailed descriptions of the selections found in the Setup Menu Chart. Detailed instructions can be found in the next section [Instrument Calibration]. Factory-set defaults are shown in **bold** with a checkmark; (✓).

CODE/NAME	DESCRIPTION	SELECTION LIST	
<b>F3</b> Zero Band	Selects the range within which the instrument will automatically zero. Selections are in display divisions (d).	0 1 5	0.5 <b>3</b> ✓ 
<b>F8</b> Calibration Unit	Sets the force unit of measure to be used in the calibration process and the default unit for normal operation. "1" = pounds (lbf)    "2" = kilograms (kgf)    "3" = Newtons (N) "4" = kilonewton (kN)	<b>1</b> ✓ 3	2 4

CODE/NAME	DESCRIPTION	SELECTION LIST
<b>F10</b> Decimal Point	Sets the decimal point value.	0 <b>00</b> √
<b>F16</b> Zero Calibration Only	Places instrument into live zero-calibration mode. Scrolling down with the ZERO key one level begins the procedure.	Press <b>ZERO</b> key to begin sequence
<b>F17</b> Zero & Span Calibration	Places instrument into live zero and span calibration mode. Scrolling down with the ZERO key one level begins the procedure. This is password protected, the password is 336699.	Press <b>ZERO</b> key to begin sequence. Press <b>DISPLAY</b> to enter the values.
<b>F18</b> Calibration Data	F18-1 Output calibration data via USB Port, see setup on page 21 F18-2 Display Calibration data, load counts and A/D counts F18-3 Key-in calibration data, password need. 336699	
<b>F20</b> Edit calibration	This menu is used to edit calibration. After the calibration weight points have been edited in F32, this applies them to the calibration.	Press <b>DISPLAY</b> key to cycle through
<b>F21</b> Factory Reset	This sub-menu will reset all setup parameters to the default settings. It will not overwrite any previously saved calibration data. USE WITH CAUTION!	Press the <b>ZERO</b> key twice to execute
<b>F31</b> Quick Calibration	Selects the Quick calibration mode. "no" = Disabled (normal cal) "yE5" = Enabled (Quick cal)	no <b>yE5</b> √
<b>F32</b> Preset Span Calibration	Allows operator to preset the span calibration force values (Cx) used in F17.	Key-in 10 000 – 100 000
<b>F33</b> Trigger Delay	Sets the trigger delay in seconds. The trigger delay disarms the force drop detection at the very beginning of the test.	1 <b>2</b> √ 5      10

### **Entering the User (“A”) Menu**

1. Switch off the instrument by pressing the MENU/OFF key followed by the DISPLAY key.
2. Press the DISPLAY button while “Set?” is displayed. The instrument displays “-F-“.
3. Press the DATA (right) key once. The screen displays “-A-“.
4. Scroll down using the ZERO (down) key to reach the parameter level. The force instrument shows “A-1”.
5. Move from one “A” parameter to the next by using the PROFILE (left) or DATA (right) keys. For example, to go from A1 to A2, press the DATA key. To go from A2 back to A1, press the PROFILE key.
6. Once you have arrived at the proper “A” menu parameter, e.g., “A1”, press the ZERO (down) key once to arrive at the selection level. The instrument displays the current parameter setting.
7. If there is a selection list, scroll through the available parameter settings, use the PROFILE (left) or DATA (right) keys. Otherwise, use the arrow keys to adjust the displayed value to the

new value.

- Once the setting you want is displayed on the screen, press the DISPLAY (set) key to save this value and revert up to the parameter level, e.g., "A1".

### **Leaving the User ("A") Configuration Menu**

- While on any level except the selection level, press the MENU/OFF key.

### **User ("A") Menu Descriptions**

This section provides more detailed descriptions of the selections found in the User Menu Chart. Factory-set defaults are shown in **bold** with a checkmark; (√).

CODE/NAME	DESCRIPTION	SELECTION LIST
<b>A1</b> Baud Rate	Selects the baud rate for data transmission through the serial port.	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, <b>9600</b> √
<b>A12</b> Display Color	Selects the color of the LCD (liquid crystal display) in various operating modes. "A12-1" = Normal Mode, "A12-2" = Pretest Mode, "A12-3" = Test Mode, "A12-5" = Post-test Mode "1" = Dark Green, "2" = Dark Blue, "3" = Light Blue, "4" = Light Green, "5" = Purple, "6" = Bluish Green	<b>1</b> √      2 3            4 5            6
<b>A13</b> Auto Print	Selects the Auto Print function. "0" = Disabled "1" = Enabled	<b>0</b> √ 1
<b>A20</b> Set System Time & Date	Allows you to set the system time and date. Pressing the ZERO key to scroll down one level begins the sequence.	Press ZERO key to begin sequence
<b>A24</b> Diagnostics	Used to access the listed test functions (one at a time). Pressing the <b>ZERO</b> key begins the sequence. "A1-24-1" = Display segment test, "A1-24-2" = A/D converter test, "A1-24-5" = Serial Port test (both), "A1-24-6" = Keyboard test	Press <b>ZERO</b> key to begin sequence
<b>A25</b> Report	A25-1 Send all test report via USB to PC A25-2 Clear all test reports, password needed 336699.	

### **Setting system time and date (A20)**

- While in the Setup mode, scroll to "A20".
- Once you have arrived at A20, press the ZERO (down) key once. The screen displays "ho\_xx" where 'xx' is the current hour, e.g., "15". One digit will be flashing.
- Use the four directional keys to adjust the displayed value to the actual hour value. Increase

the flashing digit by pressing the NEW key. Decrease the flashing digit by pressing the ZERO key. Pressing the PROFILE key or the DATA key will change the position of the flashing digit.

4. After entering the exact value, press the DISPLAY key to save the value. The screen displays "n\_x" where 'xx' is the current minute, e.g., "55". One digit will be flashing.
5. Use the four directional keys to adjust the displayed value to the actual minute value. Increase the flashing digit by pressing the NEW key. Decrease the flashing digit by pressing the ZERO key. Pressing the PROFILE key or the DATA key will change the position of the flashing digit.
6. After entering the exact value, press the DISPLAY key to save the value. The screen displays "dA\_x" where 'xx' is the current day of the month, e.g., "14". One digit will be flashing.
7. Use the four directional keys to adjust the displayed value to the actual day value. Increase the flashing digit by pressing the NEW key. Decrease the flashing digit by pressing the ZERO key. Pressing the PROFILE key or the DATA key will change the position of the flashing digit.
8. After entering the exact value, press the DISPLAY key to save the value. The screen displays "n\_x" where 'xx' is the current month of the year, e.g., "02". One digit will be flashing.
9. Use the four directional keys to adjust the displayed value to the actual month value. Increase the flashing digit by pressing the NEW key. Decrease the flashing digit by pressing the ZERO key. Pressing the PROFILE key or the DATA key will change the position of the flashing digit.
10. After entering the exact value, press the DISPLAY key to save the value. The screen displays "yE\_x" where 'xx' is the current month of the year, e.g., "11". One digit will be flashing.
11. Use the four directional keys to adjust the displayed value to the actual year value. Increase the flashing digit by pressing the NEW key. Decrease the flashing digit by pressing the ZERO key. Pressing the PROFILE key or the DATA key will change the position of the flashing digit.
12. After entering the exact value, press the DISPLAY key to save the value and revert up to the parameter level, e.g., "A20".

#### Diagnostics (A24)

Here is a brief description of each test mode:

**A24-1 Display Test** – Lights up all display segments. End test manually by pressing the DISPLAY (Set) key.

**A24-2 ADC Test** – Shows internal A/D converter counts – useful for troubleshooting weighing issues. End test manually by pressing the DISPLAY (Set) key. The Zero key works in this mode.

**A24-5 Serial Test** – Transmits a data string continuously out both serial ports ("TEST1" on COM1 and "TEST2" on COM2). End test manually by pressing the DISPLAY (Set) key.

**A24-6 Keyboard Test** – Displays a keycode for each key pressed on the keypad. See Table below. End test manually by pressing the DISPLAY (Set) key.

Key	Keycode
Menu/Off	12
Units	1
Zero	2
Peak	EXIT
Profile	4
Data	5

### **Entering the Profile (“PFx”) Configuration Menu**

Note: This configuration menu has seven (7) top levels - PF 1 to PF 7 - corresponding to the seven (7) profiles (PF-1 to PF-7). Instructions are identical for each profile.

1. Switch off the instrument by pressing the MENU/OFF key followed by the DISPLAY key.
2. Press the DISPLAY button while “Set?” is displayed. The instrument displays “-F-“.
3. Press the DATA (right) key twice. The screen displays “-PF1-“.
4. Move from one profile [PF 1 to PF 7] to the next by using the PROFILE (left) or DATA (right) keys. For example, to go from PF 1 to PF 2, press the DATA key. To go from PF 2 back to PF 1, press the PROFILE key.
5. Scroll down using the ZERO (down) key to reach the parameter level. The instrument shows “PF1-1”.
6. Move from one “PF1-” menu parameter to the next by using the PROFILE (left) or DATA (right) keys. For example, to go from PF1-1 to PF1-2, press the DATA key. To go from PF1-2 back to PF1-1, press the PROFILE key.
7. Once you have arrived at the proper “PF1-” menu parameter, e.g., “PF1-1”, press the ZERO (down) key once to arrive at the selection level. The instrument displays the current parameter setting.
8. If there is a selection list, scroll through the available parameter settings, use the PROFILE (left) or DATA (right) keys. Otherwise, use the arrow keys to adjust the displayed value to the new value.
9. Once the setting you want is displayed on the screen, press the DISPLAY (set) key to save this value and revert up to the parameter level, e.g., “PF1-1”.

### **Leaving the Profile Setup (“P”) Configuration Menu**

1. While on any level except the selection level, press the MENU/OFF key.



## **Profile Setup (“P”) Menu Descriptions**

This section provides more detailed descriptions of the selections found in the Profile Menu Chart. The menus are identical for each profile (PF-1 to PF-7). Factory-set defaults are shown in **bold** with a checkmark; (√).

<b>CODE/NAME</b>	<b>DESCRIPTION</b>	<b>SELECTION LIST</b>
<b>PF1-1</b> ID Number	Selects the ID number prompt mode for a new Test. "0" = Disabled (do not prompt for ID No.) "1" = Enabled (prompt for ID No.)	0 <b>1</b> √
<b>PF1-2</b> Key-in Sample Area	Allows operator to key-in the sample area used in area for stress calculation. If Force Units is lbf, then Area Units is in <sup>2</sup> ; if Force unit is N or kgf, then Area Units is mm <sup>2</sup> . Pressing the <b>ZERO</b> key to scroll down one level begins the sequence.	Key-in XXXX.XXX <b>001.010</b> √
<b>PF1-3</b> Set Rate Time Unit	Selects the unit for rate time. "1" = Seconds "2" = Minutes	<b>1</b> √ 2
<b>PF1-11</b> Force Threshold Value	Sets the force threshold value. Exceeding this value arms the Percent Drop detection.	Key-in 100 – 10 000 <b>500</b> √
<b>PF1-12</b> Percent Drop Value	Sets the percent drop value. The test is known to be complete after the force has a certain Percent Drop below the Peak Force.	Key-in 1 – 99 <b>50%</b> √
<b>PF1-13</b> Average Rate	Displays the Average Rate of Load at the completion of test.	<b>'0'=Disable,</b> <b>'1'= Enable,</b> <b>Default='1'</b>
<b>PF1-14</b> Under Force Rate	Sets the minimum speed in force units per second. When the sample is being loaded slower than the entered rate a light will appear above the UNDER annunciator.	<b>Default=0</b> Key in rate
<b>PF1-15</b> Over Force Rate	Sets the maximum speed in force units per second. When the sample is being loaded faster than the entered rate, a light will appear above the OVER annunciator.	<b>Default=0</b> Key in rate

## Common Sample Types and Sizes

Below is a table with the common ASTM sample types and speeds.  
Use this information to program PF1 through PF7.

English	4x8 Cylinder C39	6x12 Cylinder C39	2x2 Cube C109/C109M	6x6x18 Beam C78 (2 point)	4x4x12 Beam C78 (2 point)	6x6x18 Beam C293 (1 Point)	4x4x12 Beam C293 (1 point)	6x12 Cylinder C496	4x8 Cylinder C496	3x6 Prism C1019
1. ID Number (1=Enable/ 0=Disable Default: Disable)										
2. Key in Sample Area	12.566 in <sup>2</sup>	28.274 in <sup>2</sup>	4 in <sup>2</sup>	12 in <sup>2</sup>	5.333 in <sup>2</sup>	8 in <sup>2</sup>	3.555 in <sup>2</sup>	113.097 in <sup>2</sup>	50.265 in <sup>2</sup>	10.562 in <sup>2</sup>
3. Rate Time Unit (1=Second, 2=Minute, Default=1)	1	1	1	2	2	2	2	2	2	1
11. Force Threshold Value(100 to 10000, Default: 500)	500 lbs	500 lbs	500 lbs	500 lbs	500 lbs	500 lbs	500 lbs	500 lbs	500 lbs	500 lbs
12. Percent Drop Value (1% to 99%, Default 50%)	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
13. Average Rate of load (0=Disable, 1=Enable, Default=1)	1	1	1	1	1	1	1	1	1	1
14. Under Force Rate (Default=0) In pounds per second	352 lbs	792 lbs	200 lbs	25 lbs	11 lbs	17 lbs	7 lbs	188 lbs	84 lbs	252 lbs
15. Over Force Rate (Default=0) In pounds per second	528 lbs	1188 lbs	400 lbs	35 lbs	16 lbs	23 lbs	10 lbs	377 lbs	168 lbs	378 lbs
Metric	4x8 Cylinder C39	6x12 Cylinder C39	2x2 Cube C109/C109M	6x6x18 Beam C78 (2 point)	4x4x12 Beam C78 (2 point)	6x6x18 Beam C293 (1 Point)	4x4x12 Beam C293 (1 point)	6x12 Cylinder C496	4x8 Cylinder C496	3x6 Prism C1019
1. ID Number (1=Enable/ 0=Disable Default: Disable)										
2. Key in Sample Area	8107 mm <sup>2</sup>	18241 mm <sup>2</sup>	2580 mm <sup>2</sup>	7741 mm <sup>2</sup>	3440 mm <sup>2</sup>	5161 mm <sup>2</sup>	2293 mm <sup>2</sup>	72965 mm <sup>2</sup>	32428 mm <sup>2</sup>	6814 mm <sup>2</sup>
3. Rate Time Unit (1=Second, 2=Minute, Default=1)	1	1	1	2	2	2	2	2	2	1
11. Force Threshold Value(100 to 10000, Default: 500)	2.22 kN	2.22 kN	2.22 kN	2.22 kN	2.22 kN	2.22 kN	2.22 kN	2.22 kN	2.22 kN	2.22 kN
12. Percent Drop Value (1% to 99%, Default 50%)	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
13. Average Rate of load (0=Disable, 1=Enable, Default=1)	1	1	1	1	1	1	1	1	1	1
14. Under Force Rate (Default=0) In pounds per second	1.566 kN	3.523 kN	0.889 kN	0.111 kN	0.049 kN	0.075 kN	0.031 kN	0.836 kN	0.374 kN	1.121 kN
15. Over Force Rate (Default=0) In pounds per second	2.348 kN	5.284 kN	1.779 kN	0.156 kN	0.071 kN	0.102 kN	0.044 kN	1.676 kN	0.747 kN	1.681 kN

## Calibration Overview

You will be calibrating an actual load sensor to the instrument using live test loads. You can have up to seven span calibration points. These calibration points are denoted as C1 through C7. The value of each subsequent calibration point should be higher than the last, e.g., the C2 value should be greater than the C1 value, etc.

You can preload these calibration points by utilizing the F32 menu.

Use the F17 procedure to do both **zero** calibration and **span** calibration. Use the F16 procedure in case you wish to re-establish a zero point with the instrument.

### Preset Span Calibration Points Instructions (F32)

1. While in the Setup mode, scroll to " **F32** ", and then scroll down once using the ZERO (down) key. The instrument will briefly display '**C1**' and then prompt you to enter the data for the first calibration point (C1). The previously saved force value will be displayed with one digit blinking.
2. Use the four directional keys to enter in the actual positive force value, e.g., 1000.0 lbf. Increase the flashing digit by pressing the NEW TEST key. Decrease the flashing digit by pressing the ZERO key. Pressing the PROFILE key or the DATA key will change the position of the flashing digit.
3. Press the DISPLAY (set) key to save the value. The indicator briefly displays '**SET**' and then moves to the next calibration point (C2).
4. Repeat steps 2 through 4 to enter data for the remainder of the calibration points. **You need not enter data for all seven calibration points. To cease entering additional calibration points, simply enter zero for the new value, e.g., 0.0 lbf.**
5. At the conclusion of C7 (or the last calibration point), the instrument will show "SET" and then revert up to F17.
6. Note, do not use 0 lbf for C1, when capturing the weight values 0 lbf will be the first point automatically.

### Zero and Span Calibration Instructions (F17)

1. While in the Setup mode, scroll to " **F17** ", and then scroll down once using the ZERO (down) key. It will ask for the password, 336699. The display will momentarily show "**C 0**" followed by a value. This value is the internal A/D count and can prove useful when trying to troubleshoot setup problems.
2. Ensure a no-load condition, float the piston, and then press the DISPLAY (set) key to save the zero-point value. The display will show "**SET**" and "**EndC0**" momentarily, and then the instrument will briefly display '**C 1**' and prompt you to enter the data for the first calibration point (C1). The previously saved force value will be displayed with one digit blinking.
3. Advance the piston until the calibration load cell is read the same load as is being displayed on the indicator and press DISPLAY.

4. After pressing the DISPLAY (set) key to save the value, the indicator briefly displays 'End C1' and then moves to the next calibration point (C2).
5. Repeat steps 2 through 4 to enter data for the remainder of the calibration points. **You need not enter data for all ten calibration points. To cease entering additional calibration points, simply enter zero for the new value, e.g., 0.0 lbf.**
6. At the conclusion of C7 (or the last calibration point), the instrument will show "-donE" and then revert up to F17.

If the calibration was *not* successful, one of the following error messages will appear.

- "Err0" - The calibration test load or the keyed-in load is larger than the full capacity of the instrument. Change the calibration test load or check the input data.
- "Err1" - The calibration test load or the keyed-in load is smaller than 1% of the full capacity of the instrument. Change the calibration test load or check the input data.
- "Err2" – There is not enough signal from the force sensor to complete the calibration process. Most common causes include incorrect force sensor wiring, a mechanical obstruction or a faulty (damaged) force sensor.

Take the indicated action to correct the problem, and then perform a new calibration.

7. Leave the calibration menu by pressing MENU/OFF key and perform your validation check on the calibration.

### **Edit Calibration**

1. Verify the accuracy of the calibration points by loading the machine twice and noting the values at points C1 through C7, or however many points were used.
2. Once determined that the calibration needs to be adjusted, press MENU/OFF key then DISPLAY to enter back into -F- menu. Press Zero key once for down, then either PROFILE or DATA to move to F32.
3. At F32, press ZERO for down, then move through C1 through C7, adjusting the calibration points. An example of an adjustment would be if C1 was set to 10,000 lbf and when verifying the calibration, it was determined that the indicator was reading 10,500 lbf when the calibration load cell was reading 10,000 lbf. C1 would then be changed to 9,500 lbf using the left, right, up, and down arrows. Once finished, press DISPLAY.
4. Repeat for C2 through C7, or however many calibration points were used. If there is no change to point, just press DISPLAY to cycle past it.
5. Once finished and the indicator is displaying F32, use the left or right arrow to display F20.
6. At F20, press ZERO for down. It will briefly display AUTO and then cycle through C1 to C7.
7. Then press DISPLAY. It will cycle through the adjust weight points. Repeat for all the points, and the indicator will revert to F20.
8. Press Menu/OFF and repeat the calibration verification and edit calibration if necessary.

### **Zero Calibration Instructions (F16)**

1. While in the Setup mode, scroll to " **F16**", and then scroll down once using the ZERO (down) key. The display will momentarily show " **C 0**" followed by a value. This value is the internal A/D count and can prove useful when trying to troubleshoot setup problems.
2. Ensure a no-load condition and then press the DISPLAY (set) key to save the zero-point value. The display will show " **SET**" and " **EndC0**" momentarily, and then revert up to F16.

## ADVANCED OPERATION

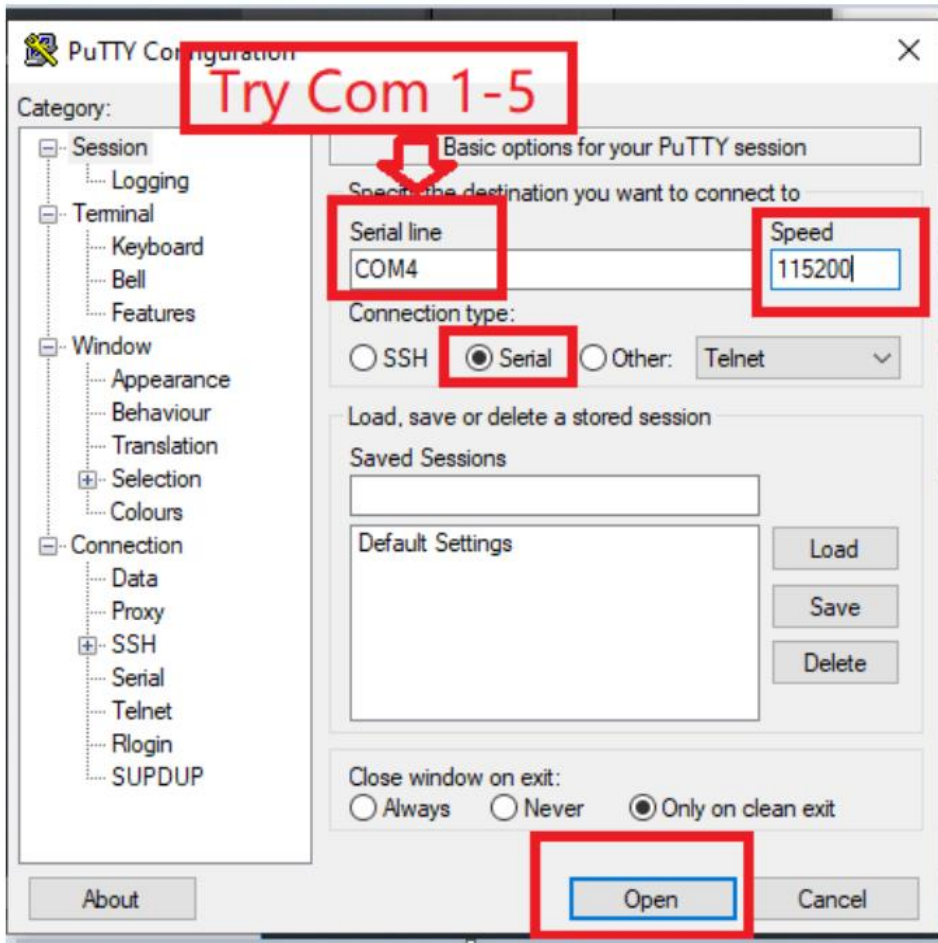
### Concrete Testing Mode

This mode captures and holds peak forces recorded during a specific process. The most common application is evaluating the breaking point of a part or assembly.

1. Ensure Profile is set to the correct type. If it is not, press the PROFILE button until instrument is displaying the PF type.
2. Press the NEW key. If enabled, the instrument will prompt for an ID number. Otherwise, skip to Step #4.
3. Use the four directional keys to enter in the ID number. Increase the flashing digit by pressing the NEW TEST key. Decrease the flashing digit by pressing the ZERO key. Pressing the PROFILE key or the DATA key will change the position of the flashing digit.
4. Press the DISPLAY (set) key to save the value. The "T" annunciator turns on to indicate that the instrument is in "Test" mode.
5. Apply force to the item under test. While loading the machine, the DISPLAY key can be pressed to toggle through FORCE, FORCE RATE, STRESS, and STRESS RATE. When the measured force exceeds the Force Threshold Value (see Profile -11), the display color changes to dark green, and both the "P" and "T" annunciators turn on. The "P" annunciator indicates that the instrument has captured the peak force.
6. The test is known to be complete when force has dropped by a certain percentage (see F12) from the peak force. The display color changes to purple, and the "T" annunciator turns off. If in any field other than FORCE, the digital reverts back to the FORCE field.
7. Press the DATA key to send all the data to a printer or PC.
8. Press the DISPLAY key to toggle the display among the calculated values of FORCE, FORCE RATE, STRESS, and STRESS RATE.
9. To begin another test, press NEW.

### Downloading Test Reports

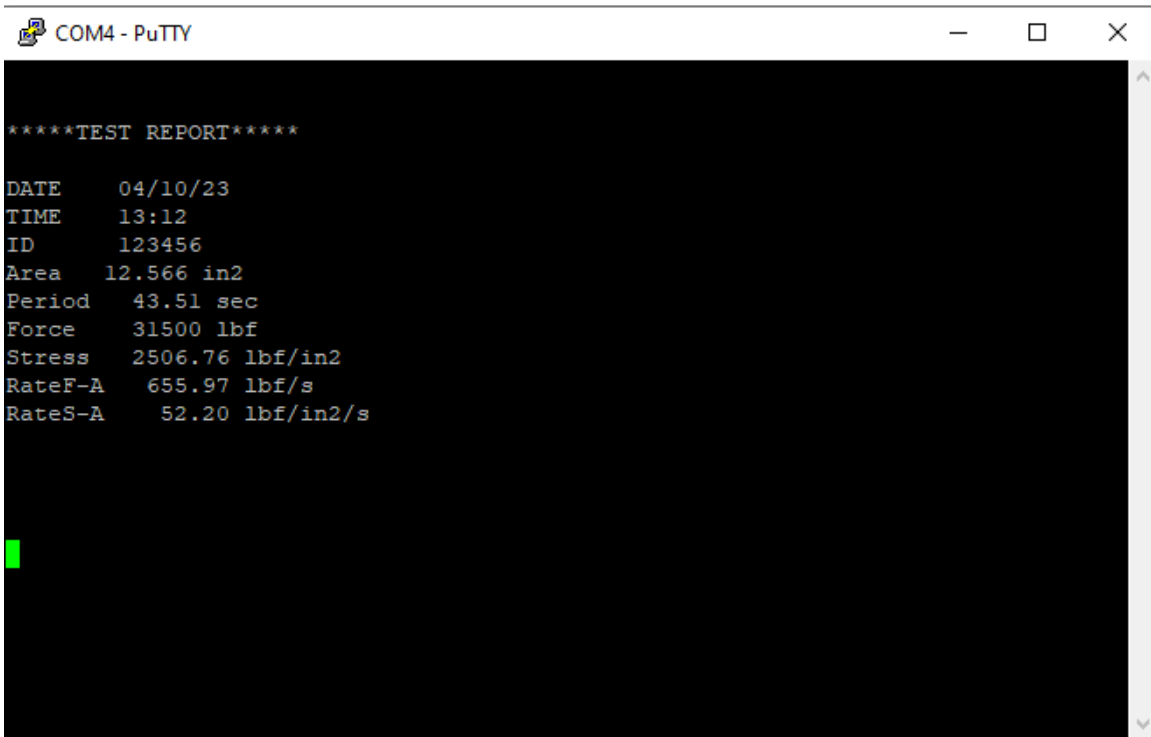
Test report can be download from the TM-2270 to a PC using a USB-B cable. The cable connects to back of the TM-2270 and then to your PC. The PC needs to have PuTTY software download. PuTTY is an open source software that can be downloaded [www.putty.org](http://www.putty.org). Once downloaded the setup page will look like the picture below.



Once opened this screen below will appear.



Once PuTTY is set up there are two methods for downloading test results. The first method is after the test is complete press the DATA button on the TM-2270 and the test report will transfer over. Below is an example.



The image shows a PuTTY terminal window titled "COM4 - PuTTY". The terminal displays a test report with the following text:

```
*****TEST REPORT*****  
DATE    04/10/23  
TIME    13:12  
ID      123456  
Area    12.566 in2  
Period  43.51 sec  
Force   31500 lbf  
Stress  2506.76 lbf/in2  
RateF-A 655.97 lbf/s  
RateS-A  52.20 lbf/in2/s
```

A green cursor is visible on the line following the last line of the report.

The other method is to transfer all stored tests at once. To do this press the MENU/OFF button. When the display reads Set press the SET button. The display will then read -F-, press the right arrow once for -A-, press the down arrow and it will display A 1. Press the left arrow twice and it will display A 25, press down again and it will display A 25-1, press down again and all the test reports will transfer over. The digital can store 90 tests. To clear the data base at A25-1 press the right arrow and it will display A25-2, then press down. It will ask for the passcode to delete them, the code is 336699. Once done to return to the testing screen press MENU/OFF.



## STATEMENT OF WARRANTY

Test Mark Industries warrants all new testing machines, testing apparatus and supplies manufactured by Test Mark Industries against defects in workmanship and materials for a period of 12 months from the original date of shipment, provided the equipment has been properly installed, maintained and operated in accordance with installation and operating instructions. This limited and exclusive remedy does not cover normal wear and tear. The Test Mark Industries manufactured product must be free from accident, damage by fire, water or act of God to be eligible for warranty.

Test Mark Industries will repair, replace or credit at Test Mark Industries' option defective product or component parts. When repair can be accomplished by exchange of a component part, the customer may be required to remove the part of modular component and install the exchanged part.

Warranty does not cover expenses, either direct or indirect, that may arise from the use or the inability to use Test Mark Industries products, or the secondary owner in the event of resale.

Products not manufactured by Test Mark Industries will carry the warranty of the original manufacturer. Under no circumstances shall Test Mark Industries be liable for any injury, loss, or damages, whether direct or indirect, incidental or consequential, arising out of the use of, or inability to use the products described herein.

This exclusion of liability for loss or damages, whether direct or indirect, incidental or consequential, shall apply to all claims whether sounding in contract, warranty, tort including both negligence and strict liability, or any other basis of liability.

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