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SMARTTRACKER™

HAMBURG WHEEL TRACKER



OPERATING MANUAL

www.InstronTek.com

'This page may be removed from the manual to prevent the unauthorized access to the restricted menu functions of the InstroTek SmarTracker.'

Restricted Menu Function Access

Codes:

System Configuration

Device Configuration (2222)

Channel Configuration (3333)

Profile Configuration (Golden Tags)

(1111)

Control Panel → Software (5555)

This page may be removed from the manual to prevent the unauthorized access to the restricted menu functions of the InstroTek SmarTracker.

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SmarTracker™
Wheel Tracker Device for Measuring
Rutting in Asphalt Mixtures
Based on AASHTO T324

Operation Manual Revision 10

IMPORTANT

WARNINGS WHEN USING THE SmarTracker™

1. DO NOT attempt any repairs on the unit with the power switch on.
2. DISCONNECT the unit from wall power before attempting any repairs.
3. Wipe off any water from the surface of the unit and from the surfaces surrounding the device to prevent shock.
4. Follow all your other related facility safety instructions while operating this device.
5. DO NOT operate this device without prior training.
6. Maintenance on this device must be done by trained technicians.
7. Call InstroTek, Inc. (919- 875-8371) if you have any questions.

IMPORTANT

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1. Introduction

InstroTek SmarTracker is designed for measuring the rut depth of asphalt mixtures in either water or air by following the procedures detailed in the AASHTO T324 standard. The rut depth profile from the SmarTracker can be used to predict the rutting performance and sensitivity to moisture damage of asphalt mixtures. The SmarTracker measures the rut depth over the length of the specimen for each pass using a measurement system that includes a high accuracy LVDT system for the rut depth and an encoder for the displacement across the specimen.

The System is fully automated with a microprocessor controlling the temperature, movement of the loading arms, and measurement acquisition. All the functions of the SmarTracker system are automatically controlled and the results are displayed on the touch screen.

2. System Location

When setting up this unit, please select a location that meets the minimum requirements below.

1. Provide adequate space for the user to open the lid and insert/remove specimen trays. Also, provide adequate space for the unit to be rolled forward for service
2. Set the unit on a level and stable surface. It is recommended that the unit be leveled using the attached metal feet.
3. Use a dedicated AC circuit for powering the unit.
4. Location to drain water from the unit.

NOTE: The unit has an unplumbed overflow pipe in addition to the tank drains. If the water level gets too full due to water that is displaced when putting the specimen trays in a full water bath or the water inlet valve sticks open, water may come down this pipe and spill onto the floor.

3. System Specifications

Temperature* – Room temperature to 70°C

Dimensions – 54" W x 48" L x 50" H

Weight – 1450 lbs.

Wheel Speed* – 30-55 passes per minute

Electrical Supply – Single Phase 208-230V – 30 Amps

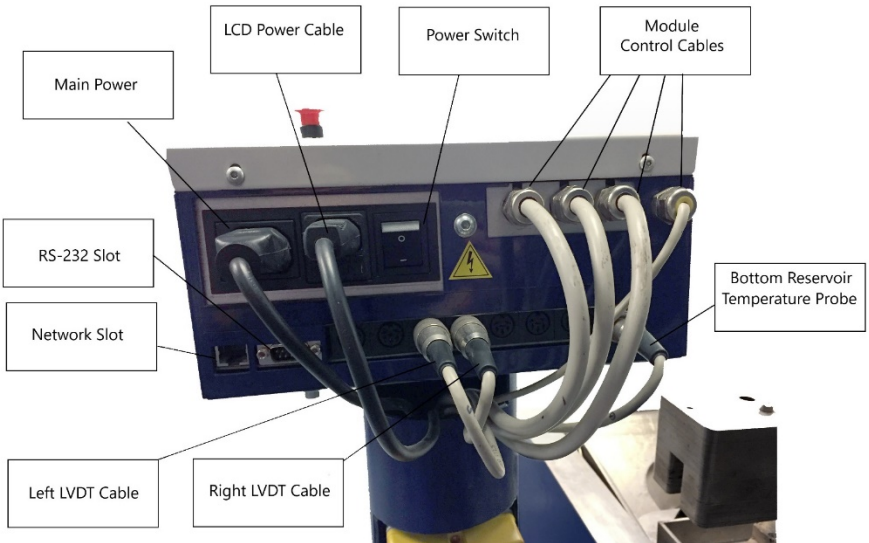
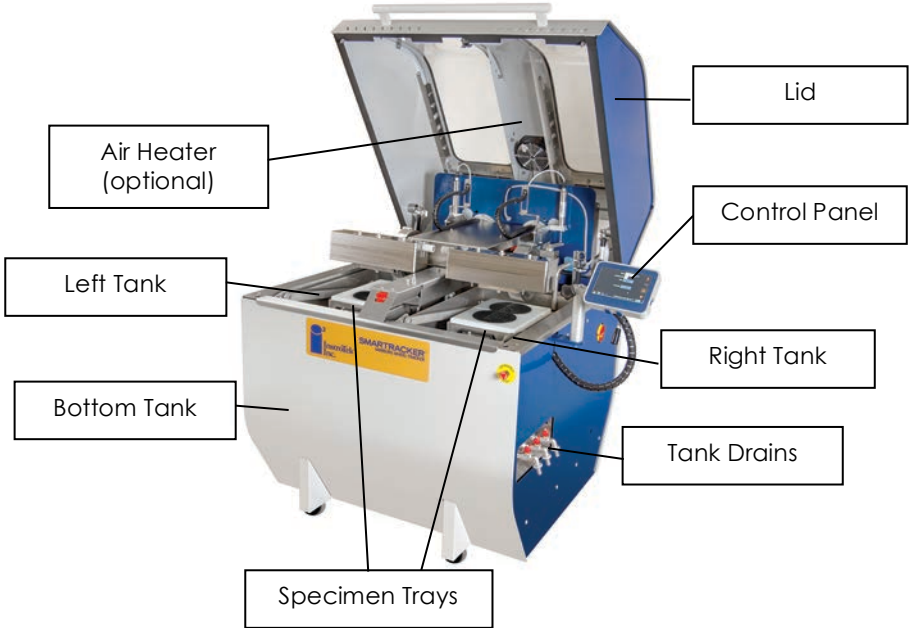
Wheel Load* – 703 +/- 4.5 N (158 +/- 1.0 lbf)

Displacement measurements* – 0-25 mm +/- 0.1 mm

Water Capacity – 110 liters (30 US Gallons)



*Meets or exceeds AASHTO T324 requirements

4. Machine Components



5. System Setup

The following steps will guide you through the required connections for powering up the unit:





1. Plug the power cord in the appropriately rated outlet (30A-230VAC).
2. Connect the unit to a clean water supply (minimal mineral content).
3. Turn ON the main power switch and the switch on the back of the touch screen.
4. The unit will perform a self-test and will show  when ready. If an alarm, , is shown, please refer the *Alarms* section.




6. Main Menu

The main menu allows the user to select the main functions of the machine.





The main functions are:

-  Wheel Tracker Test
-  Active alarms
-  Manually position loading arm (<<< left wheel; right wheel >>>)
-  Washing tanks with supply water

-  Test archive
-  System configuration
-  Control panel

Select an item with the touch-screen: Scroll through the menu

( or ) until the desired menu item is highlighted and select the item by touching the screen.

Status Bar

The bottom of the main screen contains the status bar. The left side of the status bar provides the current software version installed on the machine. The center of the bar provides the current status of the machine. The right side provides the current date and time.





: Machine is ready to test



: Heating the air and water



: Running the test (automatic)



: Warning

7. Running the Test

This section will provide a general guide to set up, run, and record the data for a test on the SmarTracker.

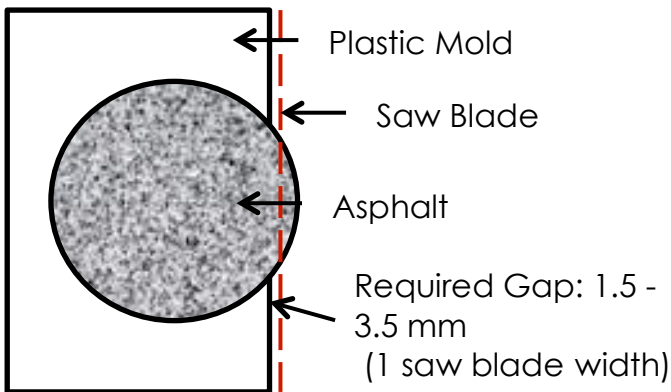
Specimen Preparation

1. Prepare specimens according to the instructions in the standard (AASHTO 324 or local state agency requirements).

NOTE: Specimens can be prepared using the gyratory compactor, kneading compactor, cores cut from the field, or slabs from a segmented laboratory roller compactor.

2. Cut the samples with a wet saw using a specimen mold as a cutting guide. See the figure below for details.

NOTE: An extra specimen mold is provided with the machine for a cutting guide.

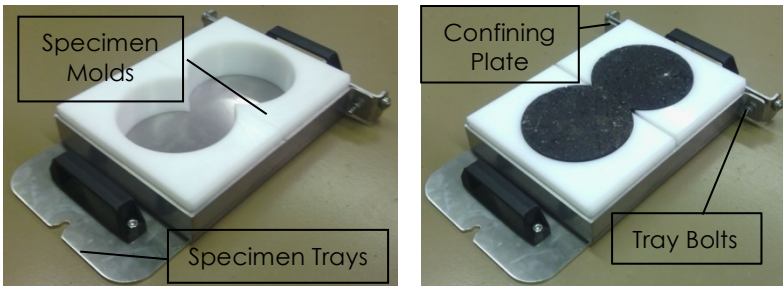


3. Tighten the specimens in the molds in the tray.
 - a) Insert the specimens in the molds.

NOTE: The molds need to fit tightly around the specimens. If the molds do not fit tightly, they will not provide the adequate confinement and the specimens could rut excessively. The mold should have less than a 0.25 mm (0.01 inch) gap between the mold and the specimen. This gap can be checked using a feeler gauge or piano wire. If the gap is too large, replace the mold or use Plaster-of-Paris to fill the gap. If using Plaster-of-Paris, allow the plaster to harden for at least 1 hour before testing.

- b) Tighten the nut for each bolt 2-3 turns to apply even pressure to the confining plate; alternate between the left and right bolts until the confining plate is hand tight.
- c) Tighten the *bolts* a quarter turn with a 13 mm wrench while holding the nut with your fingers; alternate sides until the bolts are tight.

NOTE: The confining plate and specimen molds should not bend or bow during tightening. If this occurs, the tray has been overtightened. Loosen the bolts and repeat Step 3.





NOTE: The molds included with the SmarTracker are designed for 150 mm (nominally 6") gyratory specimens. Optional molds

are available for field cores with a 145 mm diameter (from 6" outside diameter drill bits).

Preheating Water

The AASHTO T 324 standard requires that the specimens be in the water at least 45 minutes to ensure the specimens are at the test temperature but not longer than 60 minutes to prevent unnecessary aging of the specimens. It is recommended to use a hot water source to fill the water bath. If this is not feasible, a procedure has been developed to preheat the water before inserting the specimens.

1. Press  on the main menu to enter the test
2. Press  to enter the filling/preheating option.
3. Allow the machine to fill and heat the water.

NOTE: The lid must be shut for the machine to start filling and heating the water.

Delayed Preheating

If the water preheating should be performed when no one is present, such as overnight, a different set of procedures is necessary. The testing parameters in the main test function




must be adjusted to preheat the water bath for this case.

1. Set the testing parameters to Preheat the water
 - a) Select the Start Mode
 - i. Immediate – Water filling and heating will start now
 - ii. Delayed – Water filling and heating will start after a certain number of minutes


- iii. Timed – Water filling and heating will start at a certain time (24 hour clock (00:00 -23:59 hours)).
- b) Set the preconditioning time to 1440 minutes (24 hours) to prevent the machine from moving the arms before inserting the specimen trays.



2. Press  to enter the filling/preheating option

3. Allow the machine to fill the tanks with water. Then press





 to stop the preheating mode and return to the test setup screen.

4. Turn OFF the water supply.

NOTE: For Delayed and Timed settings, the water supply is turned OFF before leaving the machine to prevent the water from overflowing while unattended. The machine will still heat the water at the scheduled time.



5. Start the delayed preheating by pressing . Verify that the trays for the LEFT and/or RIGHT sides are in place.

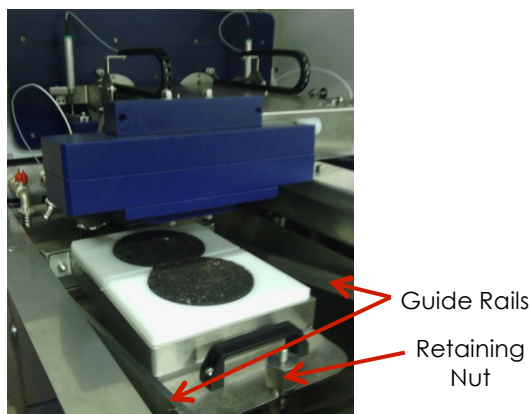
Confirm by pressing .

6. Once the water is heated, stop the preheating mode and set the appropriate test parameters. Reset the preconditioning time to 30 minutes.

8. Inserting Specimen Trays into the Waterbath

1. Slide the specimen tray down the guide rails and into the water bath as seen below.

CAUTION: Water can be hot enough when preheated to cause burns on bare skin in less than 30 seconds. Use elbow length rubber gloves, safety glasses, and other appropriate PPE to prevent burns.




2. Tighten the retaining nut by hand to hold the specimen tray in place.

NOTE: The retaining nut should be tightened flush to the specimen tray. If the nut is tightened at an angle, loosen the nut, reinsert the tray firmly, and retighten the nut.

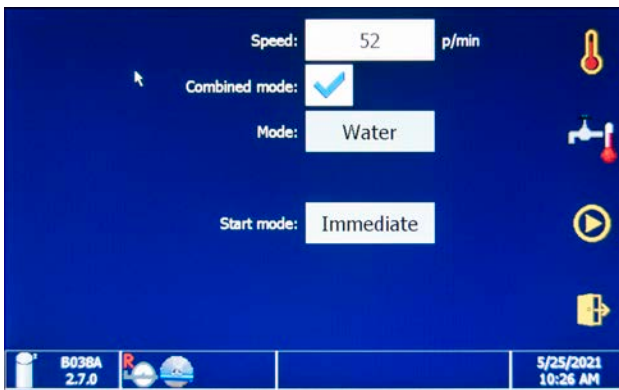
3. Close the lid.
4. Proceed to the TEST SETUP section to run the test.

9. Test Setup

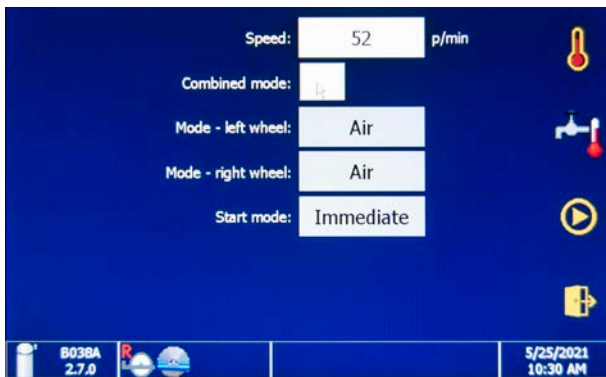


1. Press  on the main menu to enter the test.
2. The main parameters screen will be displayed (as seen below). [Default – Combined]

Combined Mode



Individual Mode



Default Test Parameters

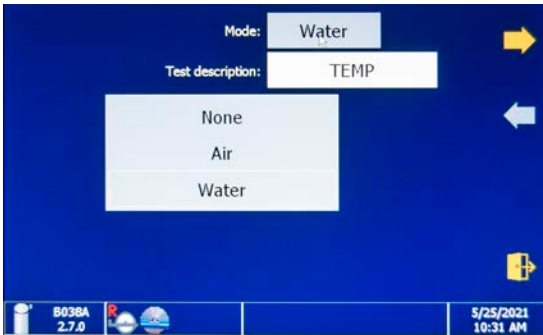
The machine is capable of running the test in different modes, such as air or water testing, and at different temperatures and speeds. The software will be set up according to the standard used by the customer during installation. The table with the default parameters below can be used as a reference if these parameters are changed.

Parameter	Factory Default	Local Standard
Mode	Water (Combined)	
Pre-conditioning (minutes)	30	
Zero Passes	2	
Pause (minutes)	0	
Passes	20,000	
Rut Depth (mm)	20 (Enabled)	
Temperature Probe	Disabled	
Water Temperature	50°C	

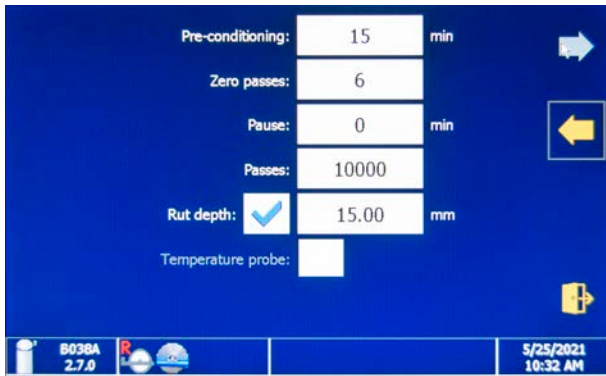
- Choose whether to test using the **Combined Mode** by selecting the Combined mode box or **Left / Right Mode** by deselecting the box. Combined mode runs both sides simultaneously using the same settings such as description (name), water/air mode, temperature, cycles to failure, etc. Left / Right mode is designed for setting the test parameters individually for the left and right trays. For example, the machine can run a dry sample in the left tank and a wet sample in the right tank. The Left / Right mode also allows the user to *name the mixtures individually*. (Left / Right is based on facing the touch screen.)

NOTE: To run a dry test in the left tank and wet test in the right tank, the valve on the left water supply hose must be closed.

4. Set the **Speed** by touching the screen and entering the desired value (passes per minute). [Default-52 passes/minute]
5. Set the **Start Mode**. (See descriptions on page 11)
6. Press the Mode button (Water or Air) to enter the parameters to set up a test for a specimen. The following screen will appear.




7. Select the **Mode**. Select **None** to disable to test, **Air** to run a “dry” test, and **Water** to run a “wet” test. [Default – Water]. Only one side can be set to None.
8. Change the Test Description by touching the description box; enter a name to identify the test with the virtual keyboard. The results will be automatically saved to a file with this name.



9. Set the **Pre-conditioning** time (in minutes). The preconditioning time is the wait time after the air and water are heated to the desired temperatures. The AASHTO T324 default time is [45 minutes].
10. Select the **Zero passes**. The zero passes help seat the specimen before measuring the rut depth. During the last zero pass, the machine will acquire the reference measurement for the zero value of the rut depth. [Default – 2 passes, must be an even number]
11. Set the **Pause** time (in minutes). Pause time is the rest time between the zero passes and the passes. [Default – 0 minutes]
12. Set the number of **Passes**. [Default – 20,000 passes]
13. Set the **Rut depth** limit. This value is used to scale the graph during the test. In addition, it will be used to stop the test if the **Rut depth** is enabled.
14. Check/uncheck the **Rut depth**. If checked (enabled), the test will stop when the rut depth is equal to or greater than the input value. [Default – Enabled at 20 mm]

15. Check/uncheck the **Temperature Probe**. The temperature can be controlled by the individual temperature probes in the specimen water baths or by the probe in the bottom tank. To select the probes in individual water baths, select this option. [Default – Disabled].




16. Press  twice (x2) to return to the main test setup screen (step 2) with the first parameter of "Test Description".

17. If in the left/right mode, press the **Mode (right)** button to enter the parameters for the specimen on the right side of the machine. Change the parameters by following steps 6-16.


18. Set the **Water Temperature** and/or **Air Temperature**. Press







 to enter the temperature control (as seen on the next page).

NOTE: To regulate the air temperature, an optional air heater must be installed.


Air temperature:	<input type="text"/>	60.0	°C
Water temperature:	<input checked="" type="checkbox"/>	50.0	°C
Air temperature offset 1:	<input type="text"/>	0.0	°C
Air temperature offset 2:	<input type="text"/>	0.0	°C
Water temperature offset:	<input type="text"/>	0.0	°C





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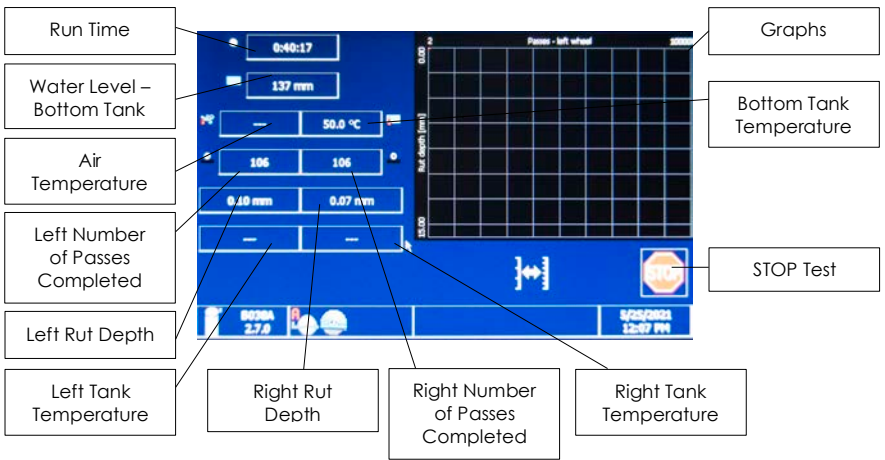
19. Check/uncheck the **Air Temperature** and **Water Temperature**. If checked (enabled), the machine will heat the air and/or water to the setpoint before beginning the preconditioning.
20. Set the **Water Temperature** and/or **Air Temperature**. [Default – Water enabled at 50°C]
21. Press  to close the screen.

10. Performing the Test

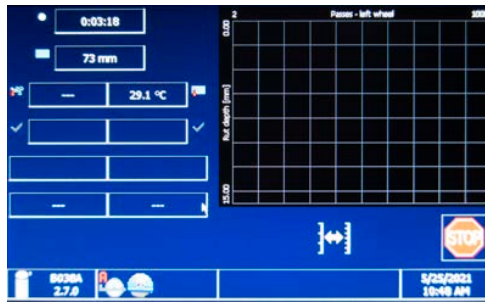
1. Make sure that the machine is ready ( in the status bar). If not, check *Alarms*.
2. Check that a USB thumb drive has been inserted into the slot on the right side of the control panel so the data can be automatically saved.

NOTE: If the USB thumb drive is NOT inserted, a warning will be displayed. Press the red X to cancel the test and insert a USB thumb drive. If the green checkmark is selected, the machine will record only the averaged or maximum rut depth, but not the rut depth for the 11 points along each pass.

3. Press  to start the test.
4. Verify that the trays for the LEFT and/or RIGHT SIDES are in place. Confirm by pressing .
5. The test status will be displayed on the screen below. The figure is labeled to describe what each value represents. It will change as the test progresses.

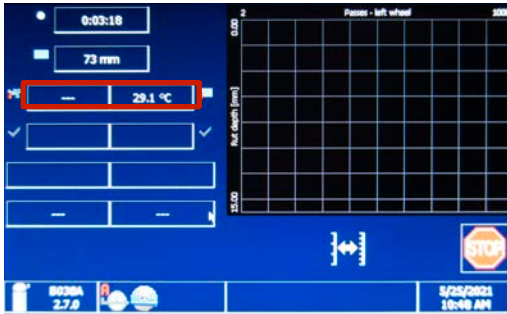


Stage 1: Filling the tanks; heating the air and water



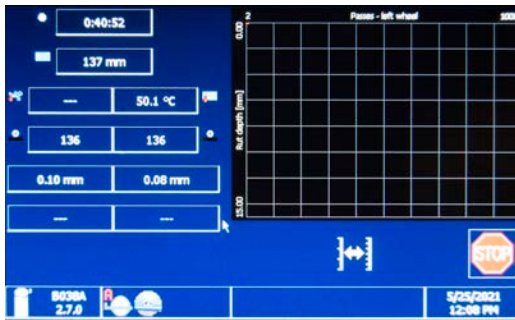
Water will fill the bottom tank, and then fill the top tanks. The bottom tank level will change as it fills. The machine starts heating the water at the default level of 70 mm. Temperatures of the air and water will increase until reaching the setpoints.

Stage 2: Preconditioning



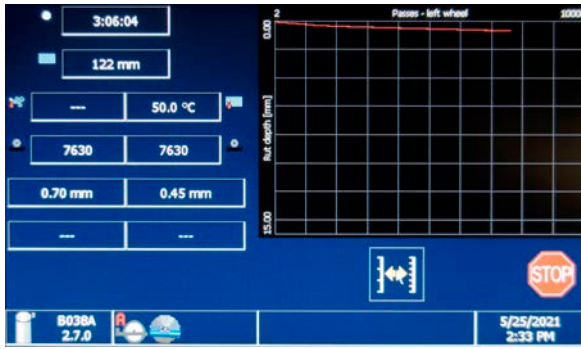
Temperatures are maintained at the setpoints (within +/- 1.0°C) while the machine counts down the remaining preconditioning time.


Stage 3: Test



No rut depth values are reported for the zero cycles. These cycles are designed to stabilize and seat the specimens.

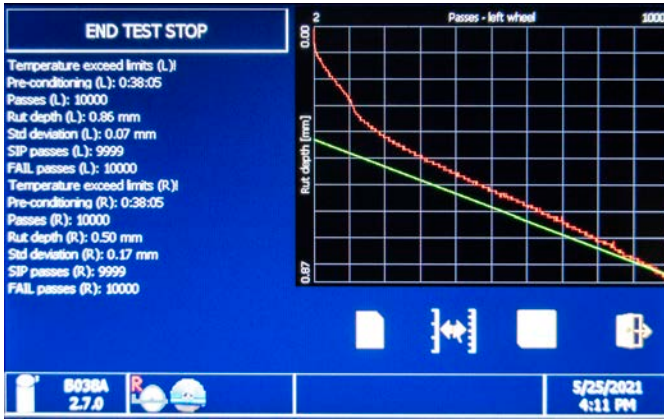
During the test, real-time rut depth values are displayed on the screen with the current number of cycles and temperatures for both water baths. The data will be automatically recorded to the USB thumb drive.




6. Press  at any time to stop the test.
7. The test for each side will finish independently when the number of passes is completed or the rut depth limit is reached (if enabled).

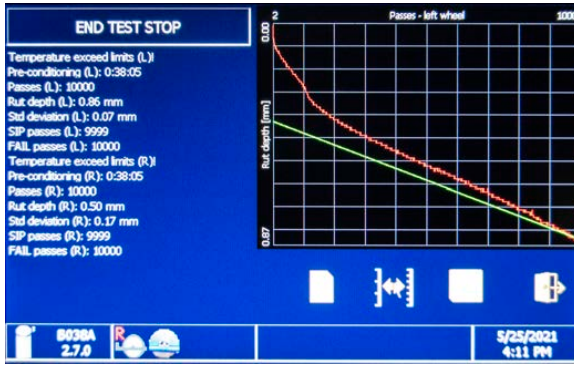
11. Results

1. A summary of the test results will be displayed automatically at the end of the test.



NOTE: If the screen shows ??? in each box, no testing was performed. Check the Active Alarms  in the main menu to determine a possible cause.

- The stripping inflection point and passes to failure (12.5 mm or 0.5 inches) will be calculated automatically. The results will be plotted as points on the graphs.



- Rut depth: Final rut depth measured at the end of the test.
- Std deviation: This value is the statistical standard deviation of the middle 5 points. It is used to prevent damaging the machine if the rutting is excessive.

NOTE: If one arm stops earlier than expected, check if this value is ≥ 3.50 mm. If so, the arm stopped at the default value to protect the machine.
- SIP Passes: The stripping inflection point (SIP) represents the point that moisture-induced damage starts to dominate the rutting. The SIP is calculated by fitting two lines to the rut curve. The data is smoothed by fitting a 4th order polynomial to the curve. The first line is tangent to the point on the curve with the shallowest slope. The second line is tangent to the point on the curve with the steepest slope. The intersection of these points is the SIP passes.
- FAIL passes: The passes to failure are the number of passes when the *measured* rut depth is greater than the rut depth set in the parameters.




12. Saving Data

The default settings of the machine are set to automatically save the test results. The machine will save two different files (.txt and .log). Both files are used in the HWT-Report software to display details about the test.

.txt – records the displacement of every other pass based on the settings in the Device Configuration section. The choices are the average of a given number of points on either side of the center point or the maximum rut depth.

.log – records the displacement along a pass at given intervals that are shown in the Device Configuration section.

If a machine warning states that the data has not been saved, follow the instructions below to save the .txt file. If a USB device was *not* inserted before starting the test, the .log file *cannot* be saved.

1. Press  to save average or maximum rut depth history.
2. Check that a USB thumb drive has been inserted into the right side of the control panel and press  again to save the test data. Test results will be saved on the thumb drive. The file will be named with the “test description” name (set in TEST SETUP – Step 8), and will include the test date and time.
3. Exit the data saving page by pressing .

13. Clean Up


Perform these steps to clean the machine after *each* test. This helps ensure repeatable, quality results and a long machine life.

1. Drain the water using the valves on the right-hand side of the machine.
2. Clean the wheels by scrapping off any residual asphalt with a putty knife or similar dull blade. Heat or mild solvent such as WD-40 or orange cleaner can be used to remove the final residual asphalt layer.


NOTE: The use of harsh solvents, such as acetone or paint thinner, is not recommended because it can damage the bearing seals of the wheels.

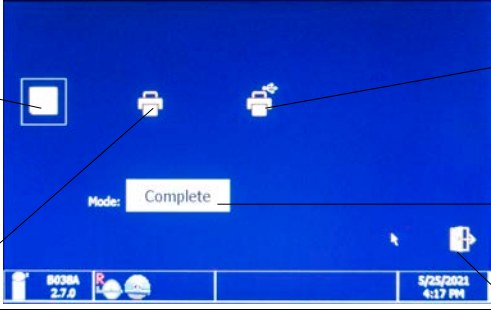
3. Use rags or a *wet-vacuum* to remove the residual water and debris from the water baths.



4. If necessary, press  in the main menu to add more water to the tanks to assist in cleaning. This will fill the bottom tank first, and then add water to the top tanks.

14. Data Storage and Printing

1. Press  to enter the screen below to store and print the rut depth history.



Save the test results to the USB thumb

Print the test results with a USB printer (PCL compatible).


Print the results with a thermal printer (if equipped).


Mode: Complete


Selection of the save/print mode

Return/Close the screen

2. Select the **Print mode** (**Partial**: numeric values only – **Complete**: numeric values and graphs). The print mode is ignored when the results are printed on a USB printer (PC compatible).

3. Press  to print the test results using a thermal printer (if assembled on the machine).

4. Check that a printer (PCL compatible) is connected to the machine and press  to print the test results on the USB printer.




5. Check that a USB thumb drive has been inserted into the right side of the control panel and press  to save the test data. Test results will be saved on the thumb drive. The file will be named with the "test description" name (set in TEST SETUP – Step 4), and will include the test date and time.

6. Close the storage and print screen by pressing .

15. Alarms



How to Confirm and Reset an Alarm

1. Scroll through the list of the active alarms ( or ) until the desired alarm is shown.
2. Confirm and reset the alarm by pressing .
3. If alarm quickly reappears, the cause of the alarm is still active. For example, if the emergency stop switch on top of the controller is pressed, the alarm will not clear until it is released.



16. Manually Position the Loading Arm

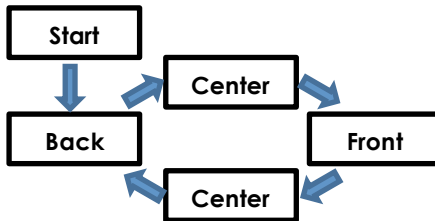
This function allows the user to position the wheel at the back, center, and front of the mold. This function is helpful when verifying the calibration of the device. The directions are based on the user standing in front of the machine and opening the lid.



If this function is activated, the machine will bring the wheel to



the back of the mold. Press  to move to the next position. The arm moves out and back like the machine is performing a pass. The movement follows this pattern:



WARNING: As soon as this function is confirmed, the arm will move forward if door is closed. Check that the loading arm will not damage the equipment. It is recommended to insert something to support the arm as it moves back and forth (i.e., dummy sample, wood block, etc.).



17. Test Archive


This function allows the user to review any tests that are stored on the USB thumb drive currently attached to the machine. The function will show the test parameters, test results, and a plot of the rut depth versus passes.



18. Device Configuration

The section provides information on setting system parameters that are adjusted for optimal performance. The device configuration includes parameters that control the limits of the machine. Usually these parameters do not change. Descriptions of parameters are listed below.

To view and/or change the parameters

1. Touch  on the main menu to enter system

configuration. Then press  to enter the device configuration menu.

2. Enter password (on removable page).

Parameter	Value	Description
Wheel Stroke (mm)	(230) or 280	Length wheel travels
Wheel Offset (mm)	-	Calibration value to set distance of center point
Wheel Timeout (sec)	20	Time for wheel to reach zero point
SIP Calculation	Enabled	Stripping Inflection Point (SIP) automatically calculated at the

		end of a test
Interval between values	23	Spacing between rut depth measurements along wheel stroke
Values number (average)	1-11 (1)	Number of data points along wheel stroke used in averaging for the reported data
Used values	(Average) / Maximum	Value written to .txt file is either average of multiple points or the maximum point along the wheel path
Values number (deviation)	5	Number of points including the center point used in calculation of standard deviation
Std deviation stop	(Yes)	Calculate standard deviation of a given number of points along wheel pass to prevent machine damage
Std deviation threshold	3.5	Standard deviation limit value when machine will stop to prevent damage to machine due to excessive rutting
Values correction	(Yes)	Function to correct for offset when one arm stops or starts while other arm is running
Correction threshold	0.10	Maximum allowable difference between consecutive passes before values correction is activated
Correction Interval	5	Number of data points that the values correction maintains a constant value
Water filling timeout	1800	Time to fill the tank before reporting an error
Water full level (mm)	125	Level when bottom tank is full
Water heating level (mm)	70	Level of bottom tank when heating starts
Water filling level (mm)	105	Level of bottom tank when the water pump starts
Water alarm level (mm)	55	Level of bottom tank when test stops because low water level

Temperature Timeout (sec)	3600	Time allowed for temperature to reach the setpoint
Start temp. tolerance (°C)	0.5	Tolerance of temperature for preconditioning
Alarm temp. tolerance (°C)	1.0	Tolerance of temperature for raising an alarm
Run log file	None / Base/(PC software)	File that records rut depth for all intervals along the wheelpath throughout the test
Auto saving	See Figure Below	Allows data to automatically be saved to a thumb drive or SD card









19. System Calibration

This function allows the verification and calibration of the measurement displacement sensors on the machine. If you need access to these settings, please contact InstroTek, Inc. at (1-919-875-8371).



20. Control Panel

The control panel menu allows the configuration of the software of the machine. The menu includes the following items:

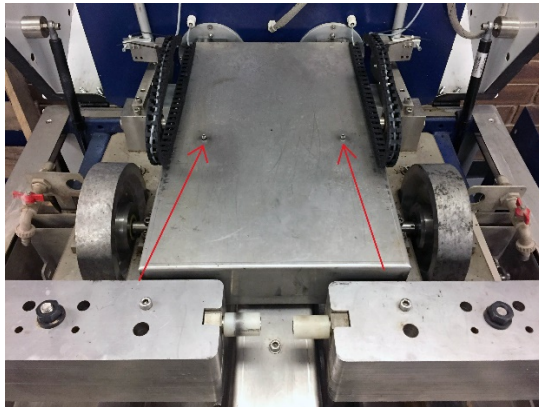
-  Date and time.
-  International settings.
-  Touch screen calibration.
-  Network connection.
-  Password change (protected by PASSWORD – contact manufacturer).
-  Software maintenance (protected by PASSWORD – (default – 5555)).
 - Options include updating software, creating a backup of machine configurations, and restoring the machine configurations from a backup.

21. Maintenance

Maintenance of the machine is necessary for a long life and quality results.

Preventative Maintenance Items **Frequency – Every 20 tests**

1. Remove the protective cover over the drive screws by removing the 2 small screws.



2. Lubricate the rails that guide the loading arms. Apply spray *lithium grease* to the guide rails (rectangles below).



3. Lubricate the grease ports on the screw drive (arrow in picture above). Apply 1-2 pumps of lithium grease using a grease gun to both moving arms.
4. Measure the diameter of the molds with a caliper. The mold diameter at the widest location should be 150.0 ± 0.2 mm. If the diameter is greater than this limit, the mold should be replaced.

Frequency – Monthly

If the SmarTracker seems to be taking a longer time than usual to start, there could be a difference in temperature between the top and bottom tanks. A difference can occur because the water is heated in the bottom tank and then pumped up into the top tanks, where it is exposed to the air. The machine has an offset to adjust the water temperature between the top and bottom tanks.

To adjust the offset:

1. Determine the current difference between the top and bottom tanks by starting with the machine at room temperature. Write down the temperature of the bottom tank and the top tanks.

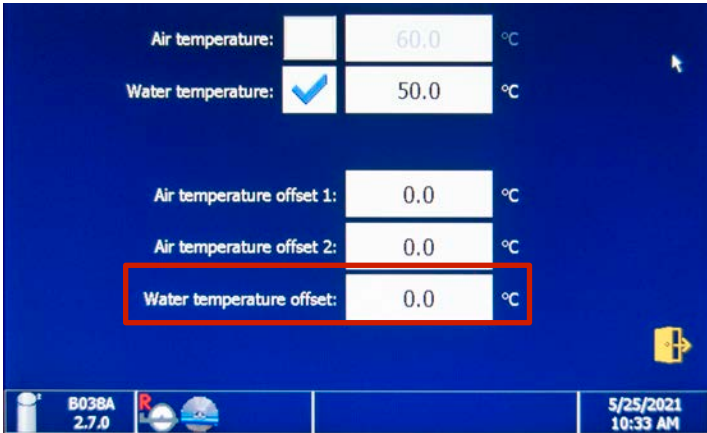
- Calculate the offset.

$$Offset = \frac{Left\ Tank + Right\ Tank}{2} - Bottom\ Tank\ Temperature$$

In the figure above, the offset is $(24.9+25.7)/2 - 25.4 = (-0.1)$.

- Change the offset by entering the test setup menu  and

press .



Air temperature:	<input type="text" value="60.0"/>	°C	
Water temperature:	<input checked="" type="checkbox"/>	<input type="text" value="50.0"/>	°C
Air temperature offset 1:	<input type="text" value="0.0"/>	°C	
Air temperature offset 2:	<input type="text" value="0.0"/>	°C	
Water temperature offset:	<input type="text" value="0.0"/>	°C	

B038A 2.7.0
5/25/2021 10:33 AM

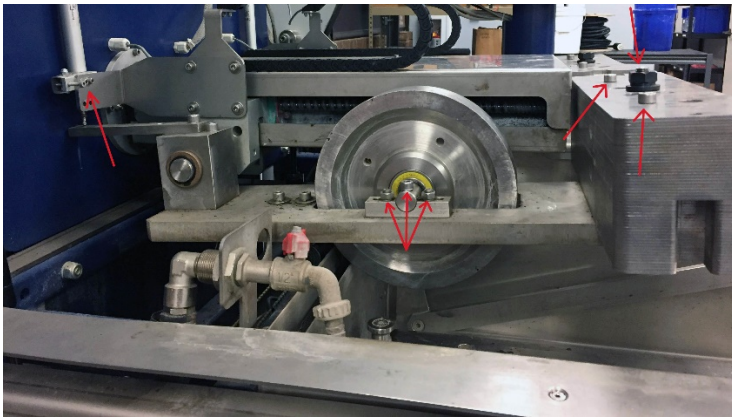
- Add the calculated offset to the offset already in the menu and enter the new offset.
- Verify the offset by running the machine and heating water to the desired temperature. Once the temperature has stabilized at the setpoint for the bottom tank, allow 30 minutes for the top tanks to stabilize. Verify that the difference is less than 0.5C. If not, adjust the offset based on the hot water values.

Tightness of Bolts – Check every 3 months

Inspect for loose bolts on the machine.

1. Check that bolts are tight for weights, wheel, and LVDT (see picture below).

NOTE: The weight may look different than the weights shown in the picture below.

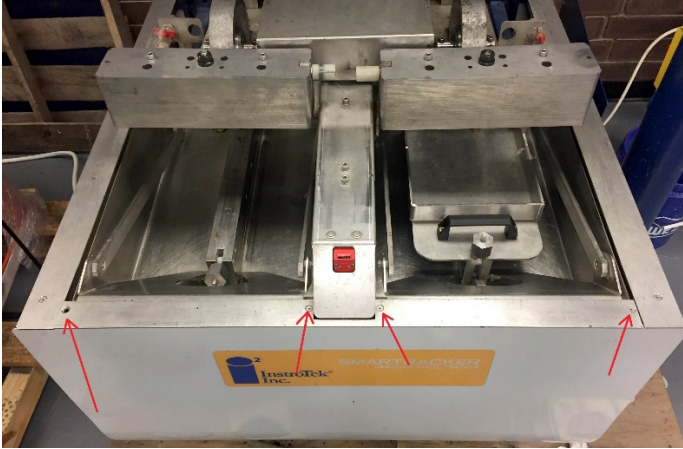


2. Check if the bolts in the picture above are loose. These bolts keep the loading arms level. Also, check that the (3) set screws (red arrows) that hold the arm onto the screw drive are tight.

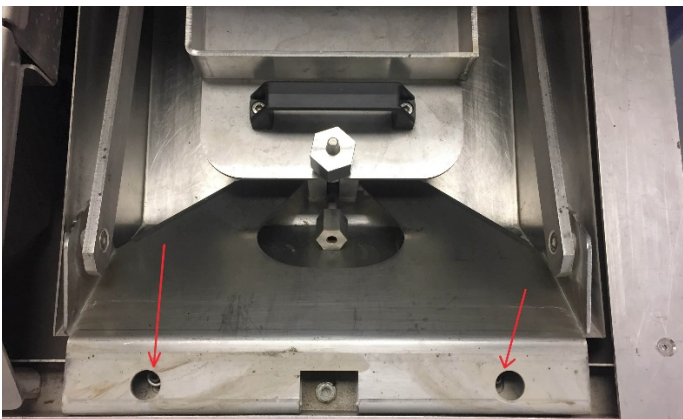
Procedure for Access and Cleaning of Bottom Reservoir

NOTE: For maximum machine life, a cleaning is recommended every 10 tests.

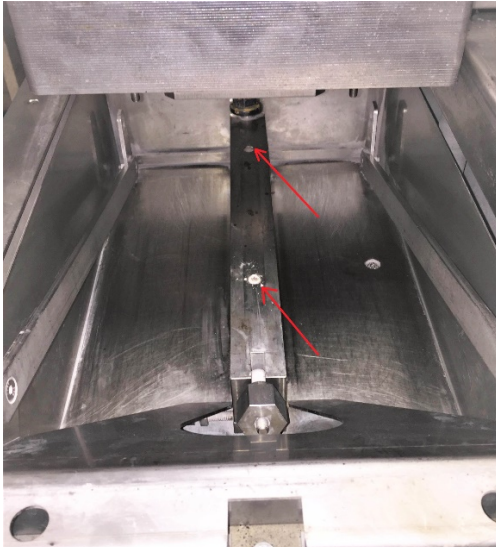
1. Remove the 4 screws securing the top front plate.



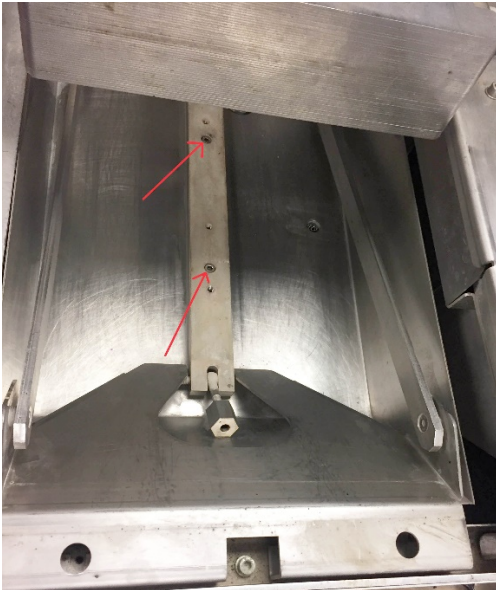
2. Remove the 2 screws securing the tray front.



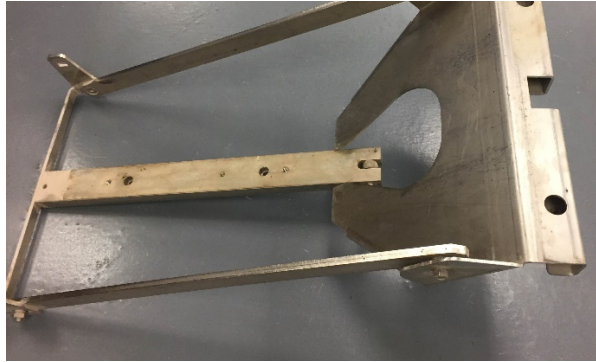
3. Remove the 2 bolts securing the tray bar.



4. Remove the 2 bolts securing the anchor bar.



5. Remove tray slide from the tank (comes out in one piece). Loosen side top plate to make removal of tank and tray slide easier.



6. Remove hose clamps from the bottom of the tray.
7. Remove the tray and repeat steps 1-6 for the second tray.
8. Repeat steps in reverse order for reassembly.

TIPS: Use a putty knife and wet-vac for cleaning bottom reservoir; cleaning is easiest when done after tanks have been drained. If neglected, sediments will corrode the heating element. It can be cleaned from one tank bay, but if very dirty, remove both tray tanks.

FAQ for Minor Problems: USB Compatibility, Water Not Draining, Etc.

1. Q: Can the SmarTracker retrieve test data?
A: The SmarTracker requires a flash drive to save tests for future observation. Any tests run without a storage drive will be irretrievable.

2. Q: Why did my machine stop early?
A: The common reasons for this are alarm triggers during machine operation. These can be caused by breaches in the parameters, such as temperature, rut, or standard deviation values deviating from normal values. Ensure that the parameters are set as desired.

3. Q: Why is one side rutting more than the other?
A: It is common that the confinement or the geometry of the specimens are incorrect. Please refer to section 7 "Running the Test", on page 9, for further explanation on the proper procedure. If the issue persists beyond the specimen, check the tightness of the bolts, level of weights between the arms, and the condition of the wheel bearings.

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23. Warranty

InstroTek, Inc. extends a 1-year warranty on the Smartracker™ to the original purchaser of this equipment. This warranty covers defects in material, workmanship, and operation under the conditions of normal use and proper maintenance.

This WARRANTY DOES NOT cover the replacement of the parts due to improper setup.

InstroTek will replace, free of charge, any part found to be defective within the warranty period.

This warranty is void if inspection shows evidence of abuse, misuse or unauthorized repair.

This warranty covers replacement of defective materials and workmanship only. It does not cover shipping charges, duties or taxes in the transport to and from the factory or authorized service center.

InstroTek's liability is in all cases limited to the replacement price of its products. InstroTek shall not be liable for any other damages, whether consequential, indirect, or incidental arising from use of its product.

If return of the product is necessary, please include return shipping directions, contact name, phone & fax number and a description of the action needed.

Call InstroTek, Inc. for shipping details at (919) 875-8371. If return of the product is necessary, please include return shipping directions, contact name, phone & fax number and a description of the action needed.

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