InstroTek® Inc.

innovators in instrumentation technology

MiST™

Asphalt Moisture Sensitivity Testing

OPERATING MANUAL

www.InstroTek.com

MIST ™

Operation Manual Version 17

Software Version 3.23 and later

Important

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PRECAUTIONS WHEN USING THE MIST

1. **There is a water immersion heater inside the MIST Sample Chamber to maintain temperature during test. THE SAMPLE TANK AND LID MAY BE VERY HOT DURING PRE-CONDITIONING AND AFTER TEST IS COMPLETED.**
2. **Do NOT start a test without water in the Sample Tank. The bladder could burst due to over-inflation.**
3. **Contents in Sample Test chamber are under pressure. The Auto Drain feature will keep the system closed until the end of the test. The drain valve needs to remain open with a 5 gallon bucket placed beneath it to catch the test water at the end of the test. Failure to keep the drain valve open may have a negative impact on the test samples because the MIST cannot drain the water at the end of the test.**
4. **When machine is not in use, drain all water to extend life of bladder.**
5. **Voltage of 120V is present inside the MIST cabinet. DO NOT PROBE INTO THE MAIN CABINET WITH CONDUCTIVE MATERIALS, TOOLS, OR HANDS. IF THE COVER MUST BE REMOVED, CONTACT INSTROTEK FIRST.**
6. **Do not attempt to repair this unit with unit plugged into AC power. Maintenance on this unit must be done by trained technicians.**

Call InstroTek if you have any questions.

1. Table of Contents

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1. Introduction

The MIST is designed as an accelerated conditioning device to determine the resistance of the asphalt mixture to adhesion and cohesion problems generally known as stripping.

The mechanisms involved in stripping and moisture damage of asphalt mixtures include displacement, detachment, spontaneous emulsification, pore pressure, osmosis, and microbial activity. Mechanical scouring, occurring as a result of increased pore pressures brought on by traffic loading, is also a major contributor to stripping. Displacement, as a mechanism of stripping, is defined as water penetrating the aggregate surface through a break in the asphalt film. Detachment is the peeling off of asphalt film without a break in the asphalt surface. Spontaneous emulsification occurs when water and asphalt combine to form an inverted emulsion. Water trapped within the air voids of asphalt concrete can cause high pore pressure when the asphalt is exposed to traffic loading. The consequence of these mechanisms is adhesion and cohesive failure within the asphalt mixture.

Pore pressure introduced by vehicle tires on wet asphalt pavements has been identified as one of the main causes of moisture damage on roadways. To effectively determine moisture susceptibility during design and quality control it is necessary to simulate the damage caused by travelling vehicles on pavements. This involves extended exposure of asphalt mixtures to water to determine chemical effects (adhesion failure) and creation of pore pressure to induce mechanical effects (cohesion failure).

The MIST is a dynamic instrument which produces stresses and pore pressure in an asphalt sample at elevated temperatures to accelerate the mechanisms, adhesion and cohesion. The conditioning operates at higher than normal temperatures and creates pore pressure within a compacted asphalt mixture to accelerate the effects that a mixture would experience from traffic at normal temperatures and

conditions. The elements that are necessary for stripping to occur are high air void content, presence of water, high stress, and high temperature. The MIST is capable of producing three of those factors: water, stress, and high temperature. The presence of air voids is, of course, a property of the mix.

The MIST provides the capability to automatically determine adhesion and cohesion failure potential of an asphalt mixture. The order of the test (an adhesion phase followed by a cycle phase) simulates the order that events occur in the field (i.e., pavement is naturally saturated over time, and then passing vehicle tires cause pumping and pore pressure). When samples are placed inside the MIST, the temperature is ramped up to 60C. The samples are allowed to remain at this temperature for 20 hours for chemical or adhesion effects to become apparent. After the initial 20 hours, the MIST automatically starts 3500 pressure cycles at 40 psi, pumping and creating pore pressure in the samples. This action simulates the pore pressure experienced on a wet pavement by a passing vehicle tire and subjects the mix to potential cohesive failure that can occur on the pavement.

2. Unpacking the MIST

When the MIST arrives it will be crated and attached to a wooden pallet. The unit will come with two eyebolts in the top for hoisting. The eyebolts allow the MIST to be lifted off the wooden pallet using a hoist. Care must be exercised as the MIST weighs approximately 300 lbs. Once the pallet is removed, the MIST may be carefully lowered to the floor, the hoist straps removed, and the MIST rolled to its permanent location. The eyebolts may be removed and inserts placed in the bolt holes, the inserts will be taped to the top of the MIST unit.

3. MIST Components

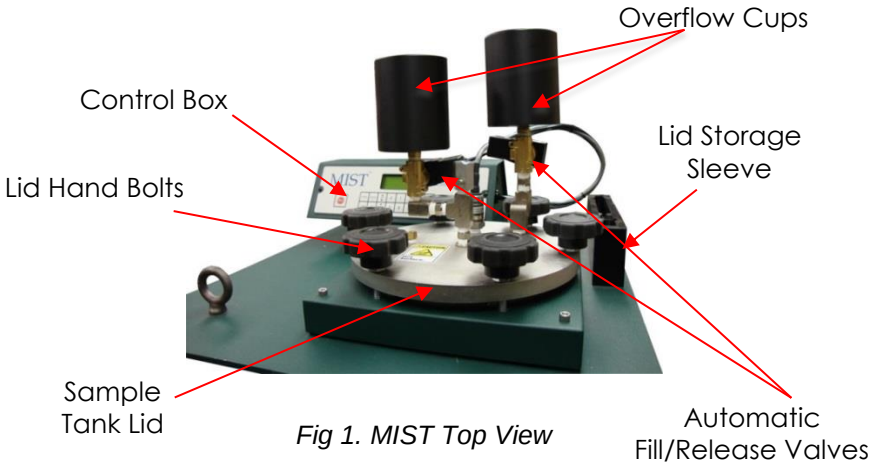


Fig 1. MIST Top View

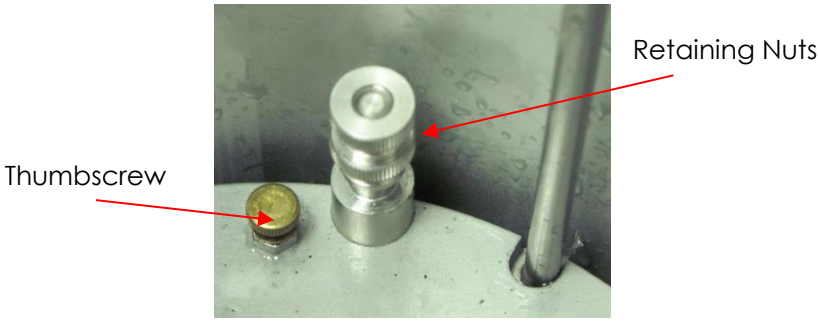


Fig 2. MIST Bottom Plate Retaining Nuts

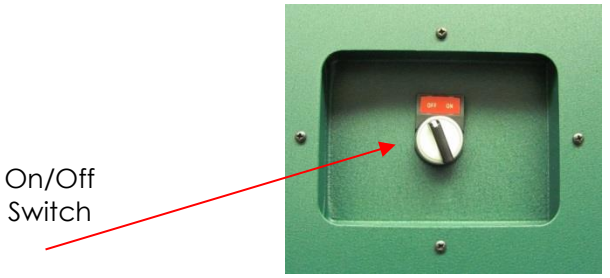


Fig 3. MIST Front Panel

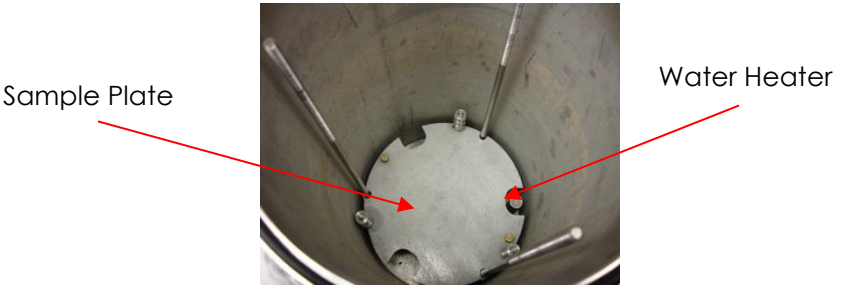


Fig 4. Bottom Plate inside Sample Tank

Fig 5. Sample Spacers

The MIST is comprised of four major assemblies: (1) sample containment assembly, (2) hydraulic linkage assembly, (3) pneumatic linkage assembly, and (4) electronic/electrical assembly. The sample containment assembly consists of the sample tank, two restraining plates and the lid. Figure 1 shows the lid of the sample and the fill valves. Figure 4 shows the inside of the tank along with the restraining plates that support the sample. The hydraulic linkage assembly consists of the hydraulic fluid reservoir, hydraulic pump, direction valve, pump motor, hydraulic fluid lines, and the hydraulic piston. The hydraulic linkage assembly is the system that drives the pneumatic linkage. The pneumatic linkage assembly consists of an air piston coupled to the hydraulic piston, bladder in the bottom of the sample tank, airline connecting the piston to the bladder, check valve, vacuum indicator as part of a failure detections system, input pressure gauge, and pressure relief valve. Pressure is transferred to the sample in the tank by forcing air into the bladder. The electronic/electrical assembly consists of the control electronics, the on/off switch, the pump motor relay, and the associated control wiring.

4. Test Setup

a. **Remove from Shipping Container: (Refer to Unpacking the MIST: Chapter 2)** Position the MIST close to a 120 or 230V outlet. Check the serial plate for the correct voltage. Plug the MIST into a dedicated wall outlet. Do not plug other machines or systems into the same circuit as the MIST.

b. **Accessories:** Unpack extra bladders, manual, and USB flash drive. Store bladders in cool dry place for future replacement.

c. **Sample Tray (optional):** The MIST has an optional sample tray, which may be used by affixing it to the supplied screws. Loosen the two screws on the top of the MIST, place the screws through the tray key holes, slide the tray out to lock the tray in place, and finally tighten the screws to anchor the tray.

d. **Turn on the MIST:** Plug unit into a wall outlet and turn the on/off switch to the **ON** position.

e. **MIST Preparation:**

1. Turn the unit on and Press **START**. The current conditioning settings will be displayed on the LCD. Default settings programmed into the MIST are 20 hours of adhesion time at 60°C (140°F) followed by 3500 Cycles at 60°C (140°F) and 40 PSI. Dwell Time will be disabled. If conditioning settings need to be changed, press **MENU** and refer to Chapter 5 for menu functions.
2. Remove the six hand bolts and place the lid in the storage sleeve. Be careful not to drop the lid. Instrumentation on the lid may be damaged if proper care is not taken.
3. If there is any water in the tank from a previous conditioning test, drain the tank completely into a bucket by opening the drain valve.
    a) Open the manual valve on the right side of the machine when facing the control box.

b) Open the automatic valve using Option 1 in the Menu.

4. Close the manual drain valve.
5. If the sample plates are in the sample tank, remove them and place them in lid storage sleeve along with the lid.
6. MIST is now ready to condition samples. Continue to Chapter 6 for the Sample Testing Procedure.

5. Menu Functions

Pressing the **MENU** Button will bring up the Menu Screen with the following options. Select and configure desired settings by using the number and arrow keys on the Control Panel.

Note: *Once changed, settings are saved for future tests.*

1. **Auto Drain Setting:** This allows the user to manually open and close the Auto Drain on the MIST. The manual Drain Valve should always be in the open position during a conditioning test with a 5 gallon bucket placed beneath it to catch the test water after the test. The Auto Drain will close when the test starts and when the machine is turned off.
2. **Pressure Setting:** Set pressure set point. Default = 40 psi (max = 75 psi). This is the maximum pressure that the unit will try to achieve. However, the apparent pressure will depend on the mixture type and void structure of the sample. Depending on the Mix type (open graded mixtures), achieving higher pressures than 40 psi may not be possible and may result in puncture of the bladder.
3. **Temperature/Time Set Point:** Set the temperature and time for conducting the conditioning test. The temperature range is from 25°C to 68°C (77°F to 155°F). Default setting is 60°C for PG grades higher than PG58. For PG58 asphalt binder use 50°C. The menu cycles through the set points in the order they occur in the conditioning test.
    a) **Adhesion Time:** The length of time *before* the cycle phase on the specimens begins, when samples sit in water heated to the adhesion temperature. If time is 0 hours, the adhesion option is disabled. Default is 20.0 hours. The maximum time is 168 hours.
    NOTE: Press **DOWN** key to enter a decimal point for time.
    b) **Adhesion Temperature:** The temperature during the adhesion time. If adhesion time is disabled (0 hrs), this screen will not appear. Default is 60°C.

c) **Cycle Temperature:** The temperature during the cycle phase. Default is 60°C.

d) **Dwell Time:** The length of time *after* the completion of the cycle phase that the specimens sit in water heated to the dwell temperature. If time is 0 hours, the adhesion option is disabled. Default is 0 hours (disabled).

e) **Dwell Temperature:** The temperature during the dwell time. If dwell time is disabled (0 hrs), this screen will not appear. Default is 60°C.
NOTE: The MIST only has the ability to heat water. If the water in the sample chamber is above the dwell temperature, the dwell temperature may not be achieved during the test. Therefore, any temperature below the cycle temperature may not be achievable during the dwell time.

4. **Test Cycles:** Set the number of pressure cycles to be completed during the test. Number of cycles ranges from 1 to 50,000. Default is 3,500 cycles.
5. **Set Date/Time:** Enter the date and time for reports and for use with Automatic Start Time option. Set date and time in 12 hour format using the number pad to enter the current time. When prompted choose option '1' for AM or '2' for PM. Enter date in MM/DD/20XX format using the number pad and press **YES** to save.
6. **Data Storage:** Enable or disable data storage. If data storage is enabled, insert a USB memory device into the USB port. The MIST will create a new file for each test and log test data into the file. Periodically, transfer files from the USB memory device to long-term storage to avoid loss of data.
7. **Purge Water:** Password protected feature runs an automatic procedure to evacuate water trapped in the air cylinder in the event of a bladder failure. ***CAUTION: This procedure should only be run in the event of a bladder failure and should be conducted by trained personnel ONLY.***
8. **Reset Cycles:** The bladder should be replaced after 70,000 cycles. This number is based on factory testing over a range of temperatures; the actual number of cycles the bladder will endure varies depending on the temperature used during testing and the type of mix being tested. The unit

prompts the user at power up with the number of cycles remaining before the replacement of the bladder is required. Once the bladder is replaced, please select option 8 in the menu and reset the cycle reminder.

9. **Diagnostics (password 6478):** Password protected feature allows user to calibrate and view temperature and pressure measurement sensors and system parameters on the MIST. Contact InstroTek for detailed calibration procedures—if required.

6. Sample Testing

a. Determine pre-test Bulk Specific Gravity:

1. Use AASHTO T166, ASTM D2726 or ASTM D6752 to determine the bulk specific gravity of the sample, BSG_0.

b. If testing only two samples, for example 150 mm diameter by 95 mm thick samples, place the samples in the MIST following steps b1 and b2:

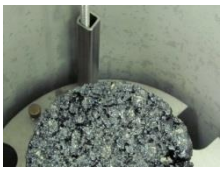
1. Ensure the bottom sample plate is secured with the retaining nuts. Place two sets of spacers over the threaded posts and the first sample on the bottom plate.

2. Place a sample plate on top of the spacers. Place the second sample on the sample plate. Secure the top sample plate with the remaining set of spacers and retaining nuts.

c. If testing more than two samples, for example field cores or 100 mm diameter by 64 mm thick samples, place the samples in the MIST following steps c1 thru c3:

1. Ensure the bottom sample plate is secured with the retaining nuts. Place the first set of spacers over the threaded posts and the first sample on the bottom plate.

2. Place the first sample plate on top of the first set of spacers. Add another set of spacers onto the threaded post. Place the second sample on the sample plate.



3. Place the second sample plate on top of the second set of spacers. Place the third sample on the sample plate. Secure the top sample plate with the remaining set of spacers and retaining nuts.

d. Fill Sample Tank with Water and Secure Sample Lid:

1. Fill sample tank with clean water. Note: You may use hot tap water to shorten the water heating stage of the test.

2. Replace sample tank lid and secure with six hand bolts.

3. Pour water into one of the overflow cups. Wait for water to flow up into the other cup to purge air from the test sample tank. Then, fill both cups until they are both 2/3 full of water.

e. Self-Test and Pre-Conditioning:

1. Verify that the desired settings are selected by referring to the menu items. If desired settings are not saved, change to desired settings as described in Chapter 5 and continue to step 2.

2. From the system ready screen press **START**. Current settings will be displayed. If the settings are correct, press **START**. The MIST will run a self-test to check the Lower Limit Sensor, Upper Limit Sensor, and Pressure Sensor and will display the pressure that can be achieved for the sample during the test. NOTE: If there are any problems during the self-test ensure the lid hand bolts are tight and the tank is full of water; then, restart test. If problems continue, refer to the full Troubleshooting section or contact InstroTek.

3. The MIST will then enter the heating stage. During this stage, the water in the tank will be heated until its temperature reaches within 10°C of the set point. At this point the MIST will, if enabled, enter the adhesion phase. During the adhesion phase, the MIST will regulate the temperature at the adhesion temperature for the duration of the adhesion time.

CAUTION: DURING PRE-CONDITIONING, HEATER IS TURNED ON AND SAMPLE TANK AND LID MAY BE VERY HOT.
CAUTION: DURING PRE-CONDITIONING, SINCE WATER IS HEATED, SOME MAY ESCAPE THROUGH FILL/RELEASE VALVE AND MAY BE VERY HOT.

f. Test Operation: During the conditioning test, the display will indicate the **phase** of the test, the **temperature**, **time** or **cycles** and **maximum pressure** obtained during each cycle.

CAUTION: DO NOT OPEN THE LID DURING TESTING. TANK IS UNDER PRESSURE.

g. Test Completion: Have ready: (1) a bucket with enough **room temperature water** to fill the sample tank and cool the samples and **(2)** an **empty 5-gallon bucket**, which is large enough to hold the amount of water currently in the sample tank**.**

IMPORTANT: Never stack the samples on top of each other. The weight of the top samples can deform the samples on the bottom, especially when the samples are warm.

1. Once the conditioning test has finished, the Auto Drain feature will slowly open the drain valve in the MIST which will allow the test water to drain into the bucket placed beneath the manual drain valve. ***CAUTION: Take extreme care as the water draining from the tank is hot and can cause injury.***

2. Once all the water has drained from the fill cups on top of the lid, remove the six hand bolts securing the sample tank lid and carefully place lid in the storage sleeve. ***CAUTION: Sample tank lid is hot. Use temperature resistant gloves to remove the lid.***

3. With sample still in the tank, close the manual drain valve and then pour room temperature water into the tank. Allow the sample to sit in room temperature water for at least 2 minutes. This will give the samples enough time to cool down and ensures sample integrity during removal. Drain the water out of sample tank.

4. Use both hands to lift the samples from the tank. ***CAUTION: Please use care when handling the sample as it will be hot. Use temperature resistant gloves to remove the sample from the tank.***

5. Condition the samples in 25°C +/ 1.5°C (77°F +/- 3°F) temperature water for a minimum of 2 hours.

6. Measure and record the post-test bulk specific gravity, BSG_f, of the sample by AASHTO T166, ASTM D2726 or ASTM D6752. You may use the original dry mass of the sample used to calculate BSG_0.

7. The sample is now ready for tensile strength or other desired mechanical tests. The pre and post bulk specific gravity results can be used as an additional parameter to judge the sensitivity of mixture to moisture damage. For a particular mix, a large difference (~1.5%) between the pre and post bulk specific gravity may indicate a weak mixture.

CAUTION: AFTER TEST IS COMPLETED, SAMPLE TANK, LID, AND TEST SAMPLE MAY BE VERY HOT. USE CAUTION WHEN REMOVING OR HANDLING SAMPLE TANK AND LID.

7. InstroTek MIST Mixture Acceptance Criteria

If two or more of the conditions below are met, the mixture is considered good; otherwise the mixture is considered moisture sensitive.

1. Percent density change, or swell, is 1.5% or less. This is the change in density from before MIST conditioning to after conditioning. Density of samples should be measured at 25°C +/ 1.5°C (77°F +/- 3°F).

   % Density Change = ($BSG_0 - BSG_f$) / BSG_0 x 100

2. If TSR on MIST conditioned samples is 80% or higher. After you obtain the after conditioning MIST density, determine the tensile strength of the MIST conditioned sample. This value is a ratio of average wet to dry tensile strengths with a minimum of 3 samples for each condition.
3. If visual inspection of the MIST displays minor stripping. After conducting tensile tests, do a visual inspection of the mix and note minor, moderate, or severe stripping of aggregates.

Also consider calculating the saturation of the samples with the MIST device, as additional information. Mixes with a high percent saturation can also be problematic mixes, especially in regards to mixture permeability.

Calculate Percent Saturation:

$$\%Saturation = \left(\frac{SSD - W}{V * \left(\frac{VTM}{100}\right)}\right) \times 100$$

Where:
SSD = SSD after MIST
W = Dry Weight
V = Sample Volume before MIST
VTM = Voids in the Total Mix

Please note all the data needed to calculate %Saturation will be obtained during determination of bulk specific gravities.

8. Maintenance

Bladder Replacement: ***Replace the bladder every 70,000 cycles or 20 tests, with 3500 cycles per test***. Remove lid hand bolts and place tank lid in the storage sleeve. Remove the sample plate (bottom plate). Locate the bladder at the bottom of the sample tank. Remove the bladder from the tank by opening the plastic hose clamp and pulling the bladder off of the barbed hose fitting. The bladder may tear during removal. Inspect the new bladder for tears, holes and other irregularities. Cut the bladder hose such that it has a 1/2" (12.5 mm) stub. Next, install the new bladder by fitting the bladder's hose onto the barbed hose fitting. Use a small amount of a soap and water solution to slide the bladder onto the barbed hose fitting. Ensure the bladder covers the *whole* length of the barb. Tighten the plastic hose clamp around the bladder hose to secure it in place. Reinstall the sample plate (bottom plate). Reset the cycle count (option 8 in Menu). At this point, the MIST should be ready for normal operation.

Important: If you are changing the bladder because of bladder failure (rupture), please make sure you purge the chamber by selecting "Purge Water" option from the Menu. This function should be performed by technicians familiar with the MiST. The pass code to access this option is 7726. Purge water option ensures all water is removed from the piston before replacing the bladder with a new one. Please perform the "Purge Water" option from the Menu immediately after you detect "Bladder Failure". Follow the above instructions to replace the failed bladder with a new bladder. After the MIST detects a bladder failure, you may have to power down the unit, and hold the 9 key on the display while powering the unit on.

9. Trouble Shooting

MIST does not turn on –

- Make sure unit is plugged into a power source.
- Test outlet by plugging another device into the same outlet such as a lamp or fan.
- Check the Reset/Test buttons on the GFCI plug that is fitted to the MIST.

Unit stops operation after a few cycles –

- Make sure that tank is completely filled with water. Water should be poured into the side overflow cup until water can be seen beginning to fill in the center cup.
- Check bladder.
- Check possible solutions to error codes in Error Message section.

MIST cannot maintain pressure –

- Make sure that tank lid is tight and O-ring is in place. Verify no water leaks.
- Replace the bladder.
- Check that the Fill/Release valves do not leak. If during testing, water is forced up into the overflow cups, the valve may need to be replaced.
- Check for air leaks from air piston and tubing (Contact Instrotek before performing this step).

Stroke Time: The Stroke Time function allows the user to move the piston up and down and measure the pressure to diagnose issues.
Fill tank and install lid. Then, go to Diagnostics (Option 9 in Menu). Enter password (see cover sheet). Go to Stroke Time (Option 3). Press Start to begin the test and turn on the hydraulic pump. Press the UP button to move the piston up and then press the DOWN button to move the piston down. The current pressure and voltage of the pressure sensor will be displayed on the screen. Press STOP to exit test.

10. Error Messages

If a problem occurs with the unit during operation, an error message is displayed on the LCD screen. Consult the following list for a detailed description of each message.

Message	Description
"Pressure Loss Was Detected. Test Stopped. Cycle # XX"	The unit was unable to obtain a pressure within 20 PSI of the set point for three consecutive cycles.
"Bladder Failure Was Detected. Test Stopped. Cycl #XX"	Conditions indicating a bladder failure were detected. See Maintenance section regarding bladder failure and replacement.
"Lower Position Sensor Defective"	The lower position sensor on the piston was not detected during self-test or calibration.
"Upper Position Sensor Defective"	The upper position sensor on the piston was not detected during self-test or calibration.
"Pressure Low! Call InstroTek"	The pressure measured with the piston in the lowest position is out of range.
"Bladder Lifetime Exceeded! Call InstroTek"	The unit has logged 70,000 cycles without replacement of the bladder.
"Temperature Too High Turn OFF Power to System"	The tank water temperature is too high, indicating a problem with the heater control.

When an error occurs, an error code will be shown on the screen. Use the error codes below to determine the error.

NOTE: Errors are additive. Therefore, ERROR 300 means both Error 100 and 200 are present (100+200 = 300), ERROR 410 means Errors 10 and 400.

Error 001 – LOW_SENSOR_CLOSE_ERROR	Cannot find lower position sensor on air piston.

Adjust the lower sensor on the air piston until the yellow light comes on when the hydraulic pump is off.

Error 002 – LOW_SENSOR_OPEN_ERROR	Lower position sensor did not change output when piston moved up
Error 020 – HIGH_SENSOR_OPEN_ERROR	Upper position sensor did not change output when piston moved down

Check if the hydraulic portion of the air piston is working correctly. To see if the piston will move, go to Stroke Time function (see Troubleshooting section). Press the UP button to move the piston up and then press the DOWN button to move the piston down. If the piston does not move, check the servo-valve for debris prohibiting movement.

Error 010 – HIGH_SENSOR_CLOSE_ERROR	Cannot find upper position sensor on air piston

Adjust the upper sensor. To move the piston up, fill tank and install lid. Then, go to Stroke Time function (see Troubleshooting section). Start the test and press the UP button to move the piston up. Position the sensor approximately 5 mm (0.25 inch) below the position when the yellow light comes on.

Error 100 – LOW_PRESSURE_LIMITS_ERROR	Low pressure outside of limits (-1 to 2 psi).

1) Check if the bladder is broken. If it is broken, follow the instructions in the Maintenance section for bladder replacement.

2) Check if bladder is collapsing on the brass barb. If so, release the blue tube between the pressure chamber and the air piston. Blow air into the tube to inflate the bladder. If the bladder continues to collapse, change the bladder and ensure the bladder covers the *whole* length of the barb.

3) Check the pressure sensor output.
Fill the tank and install lid. Then, go to the Stroke Time function (see Troubleshooting section). Press start and record pressure and voltage at low pressure. The voltage should be between 0.4 and 0.5 V.

Error 200 – HIGH_PRESSURE_LIMITS_ERROR	During the Self-Test, if the pressure is less than 15 psi or greater than 100 psi, this error will display.

1) Check if the bladder is broken. If it is broken, follow the instructions in the Maintenance section for bladder replacement.

2) Check if water (not air) is bubbling up in the overflow cups when starting a test. If so, replace lid valve.

3) Check the pressure sensor output.
Fill the tank and install lid. Then, go to the Stroke Time function (see Troubleshooting section). Press UP. Record pressure and voltage at high pressure (~70 psi). The voltage should be between 2.5 and 4.0 V.

Error 400 – LOW_PRESSURE_TOO_HIGH_ERROR	The low pressure reading did not fall below 10 psi after 1.0 seconds after the peak pressure.

This error suggests either the bladder is collapsing (due to improper installation) or the pressure is not being properly released because of failure of the pressure release valve.

1) Change the bladder and ensure the bladder covers the whole length of the barb.

2) Locate pressure release valve, which is a black box inside frame that is plumbed to the top of the air piston and connected to the tank with a thin blue tube. Place finger over valve while test runs to see if pressure is released from opening #3.

11. Index

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12. Warranty

InstroTek extends a 1-year warranty on the MIST 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 includes all components except for the normal wear components including the bladder and the lid O-ring gasket.

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.

Contact Information

Contact us for top quality, best value and superior service!

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