User Manual

Applicable Devices: RTS200, FTS 200 and FTS400

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www.smartmelter.com

Contents

BEFORE YOU BEGIN

Thank you for your interest in PaneraTech's SmartMelter Wall Imaging Solution. Please read this operation manual before attempting to use the SmartMelter system.

SmartMelter products, including this manual, are under continuous development. The information contained within is accurate at time of publication; however the SmartMelter, this manual and all its contents are subject to change.

PaneraTech, Inc. reserves the right to modify the product without notice and some product changes may have taken place after this user manual was published.

Visit www.smartmelter.com for the latest information about SmartMelter.

IMPORTANT NOTICES

General

This instrument, or family of instruments, will not be permanently damaged by reasonable electrostatic discharge and has been tested in accordance with EN 301 489-33. However, in extreme cases temporary malfunction may occur. If this happens, the SmartMelter units RTS200, FTS200, FTS400 will indicate equipment failure error. In such case, please move to a separate location, wait for 1 min and reconnect the radar units to the controller.

Training

PaneraTech, Inc. provides training services for entire SmartMelter solution. Our qualified instructors will train operators at the plants or other personnel at your preferred location. Only trained and authorized personnel is qualified to use SmartMelter sensors.

Copyright

Copyright Notice

Compliance

FCC Compliance Statement

CAUTION: Changes or modifications not expressly approved could void your authority to use this equipment

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This In-wall Radar Imaging Device shall be operated where the device is directed at the wall and in contact with or within 20 cm of the wall surface.

This In-wall Radar Imaging Device shall be operated only by law enforcement agencies, scientific research institutes, commercial mining companies, construction companies, and emergency rescue or firefighting organizations.

FCC Coordination Notice

NAME:

ADDRESS:

CONTACT INFORMATION [CONTACT NAME AND PHONE NUMBER]:

AREA OF OPERATION [COUNTIES, STATES OR LARGER AREAS]:

FCC ID: [E.G. QJQ-PE-PRO-TLF-A)]

EQUIPMENT NOMENCLATURE: [E.G. PULSEEKKO PRO TLF-A]

Send the information to:

Frequency Coordination Branch., OET
Federal Communications Commission
445 12th Street, SW
Washington, D.C. 20554
ATTN: UWB Coordination
Fax: 202-418-1944

INFORMATION PROVIDED IS DEEMED CONFIDENTIAL

Industry Canada Statement

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

This In-wall Radar Imaging Device shall be operated where the device is directed at the wall and in contact with or within 20 cm of the wall surface.

This In-wall Radar Imaging Device shall be operated only by law enforcement agencies, scientific research institutes, commercial mining companies, construction companies, and emergency rescue or firefighting organizations.

Ce dispositif d'imagerie radar intramur doit être utilisé lorsqu'il est orienté vers le mur et en contact avec la surface du mur ou à au plus 20 cm de cette surface.

Ce dispositif d'imagerie radar intramur ne doit être utilisé que par des organismes d'application de la loi, des établissements de recherche scientifique, des sociétés minières commerciales, des entreprises de construction, et des organismes d'intervention d'urgence ou de lutte contre les incendies.

ETSI Regulations for the EC

In the European Community (EC), UWB wall imaging radar instruments must conform to ETSI (European Technical Standards Institute) standard EN302066. Details on individual country requirements for licensing are coordinated with this standard. This product is tested to ETSI standards and found to comply with EN302 066 and EN 301 489 .

Safety

This equipment should be used by fully qualified and trained personnel only. Please refer to the Safety section in the manual for detailed instructions on safe operation of SmartMelter sensors.

IMPORTANT SAFETY INSTRUCTIONS WARNING READ ALL SAFETY WARNINGS AND INSTRUCTIONS.

Failure to follow the warnings and instructions may result in electric shock, fire and/or serious injury.

Operation around Furnace Environment

The operator shall strictly follow the safety guidelines provided by the local plant. Proper Personal Protection Equipment (PPE) is worn. These include ear protection, eye protection, gloves, safety vest, and hard hat per the plant requirements. It is required that the user wears gloves during use of SmartMelter sensors.

Measuring Around Electrodes

It is strictly required that the electrodes are turned off when performing measurements on the electrode blocks. Unintended contact with the electrodes may cause serious injuries when electrodes are active and on.

Taking Breaks

The operator shall strictly follow the safety guidelines provided by the local plant to avoid excessive heat exposure during the inspection. We strongly recommend taking breaks every 15 minutes or less whenever the operator feels the impact of the excessive heat. It is very critical that the operator stays hydrated and takes breaks as often as needed.

During inspection process, the internal temperature of the sensors will rise. The user is required to take a break when the sensor internal temperature reaches overheated level. The handheld computer will provide warning to the user when the sensor is overheated.

Proper Use

This equipment shall be used by fully qualified and trained personnel only. Although equipment has been made rugged to survive harsh factory environments, it has sensitive components which may be damaged by improper treatment.

Tampering

Do not tamper with any SmartMelter sensors, they contain no user serviceable parts. There are strict financial penalties if sensors are tampered.

Care and Maintenance

All components in the SmartMelter Kit are thoroughly checked and carefully packed prior to customer delivery. Inspect your SmartMelter Kit upon receipt to ensure it is complete and undamaged.

The operator must inspect equipment before and after use, and wipe away any debris or contamination with a dry, soft cloth. Do not use cleaning agents or solvents, do not immerse the measuring tool in water or other fluids.

In case of visible damage or loose components inside the equipment, safe function can no longer be ensured. Notify us immediately of any issues so that we may assist you in completing your inspection as scheduled. Any repairs must be carried out by PaneraTech.

Licensed Use

SmartMelter products may only be used in accordance with an established licensing agreement with PaneraTech Inc. If you have received a SmartMelter product and are not a licensed user, contact us immediately.

SmartMelter XSight Software

SmartMelter is accompanied by a powerful XSight Software. With XSight, you can visualize furnace health and store all maintenance and furnace records in an electronic environment. Our radar sensors capture proprietary radar waveforms on a handheld device that transfers the data to XSight for processing and visualization.

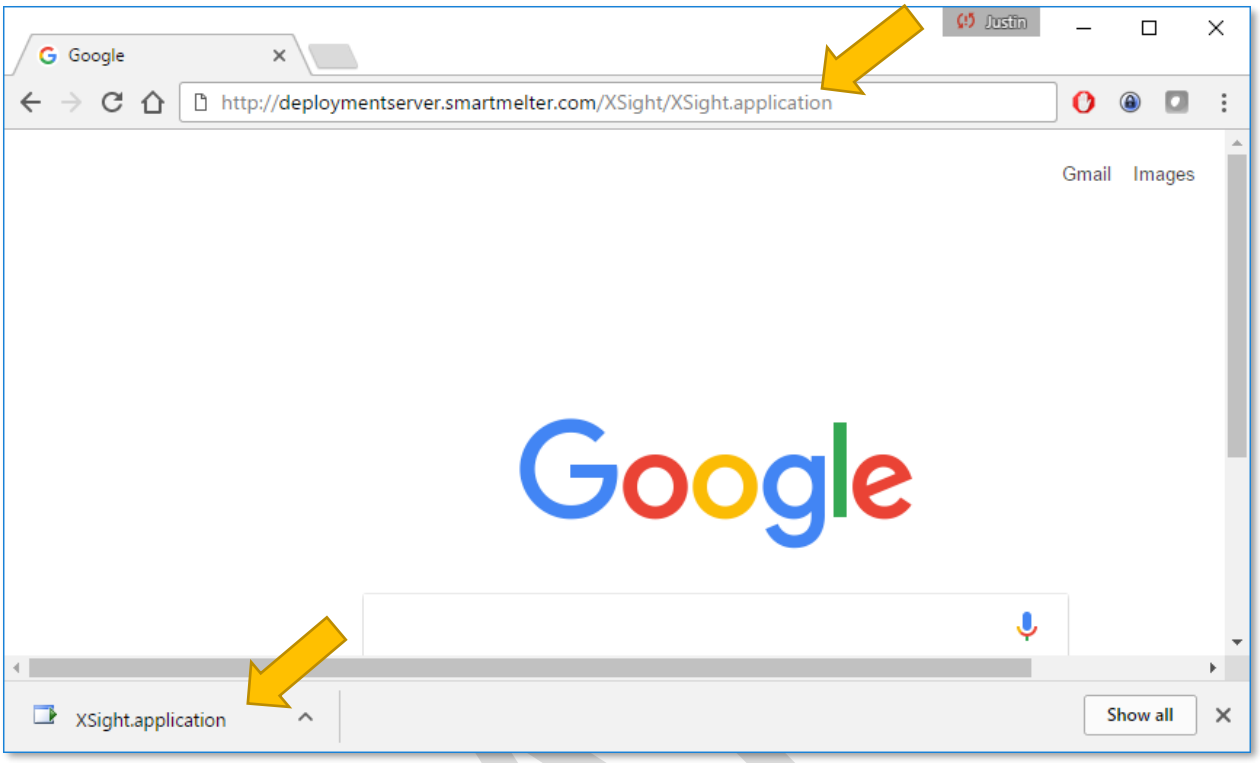
SmartMelter data is stored in PaneraTech's secure server. View your furnace records anywhere with an internet connection through XSight software.

Connect to the Internet

Before moving forward, make sure that your computer has an internet connection. SmartMelter XSight requires an internet connection to download updates, authenticate the user and synchronize with PaneraTech's cloud processing servers.

Installation Steps

1. Go to http://deploymentserver.smartmelter.com/XSight/XSight.application to download the XSight software installer. When the download is complete double-click to start the installation process.


Google
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http://deploymentserver.smartmelter.com/XSight/XSight.application
Gmail
Images
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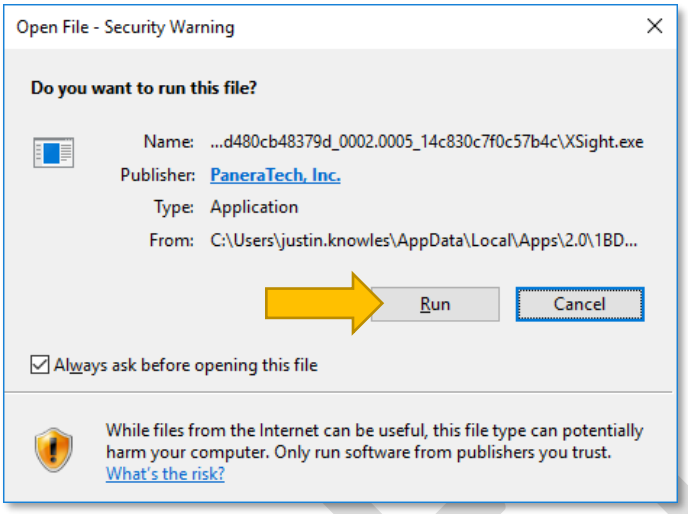
XSight.application
Show all

2. Click “Run” to allow local installation of XSight software. The XSight application will automatically open when installation is complete. The installer will place a shortcut on the Windows Desktop, in the future XSight can be launched using this shortcut, and will always update to the latest version automatically.

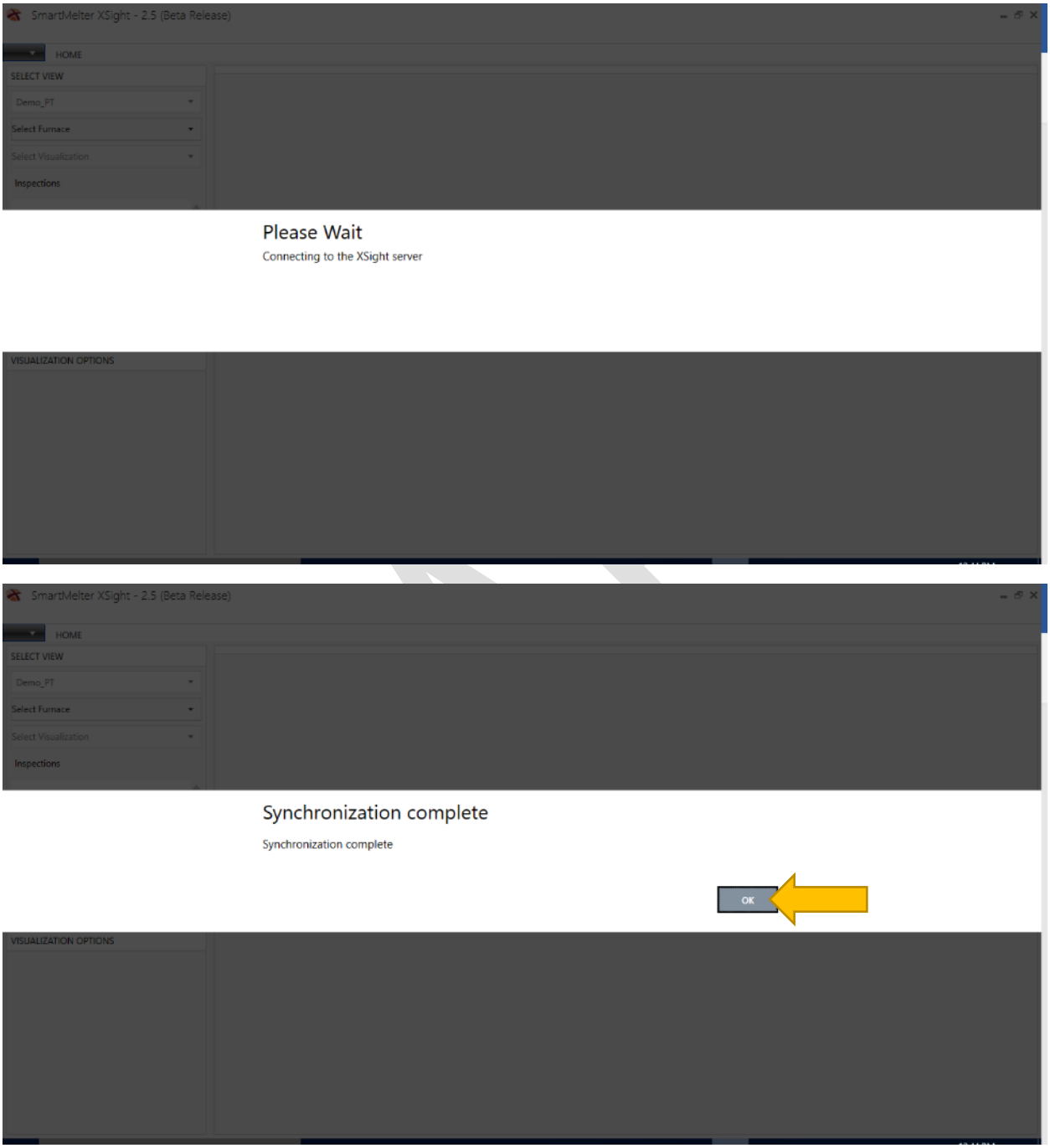


Logging In

3. Enter the Username and Password provided by your Technical Account Manager and click LOG IN. If you are trying to log in and you do not know your Username and Password please contact us.

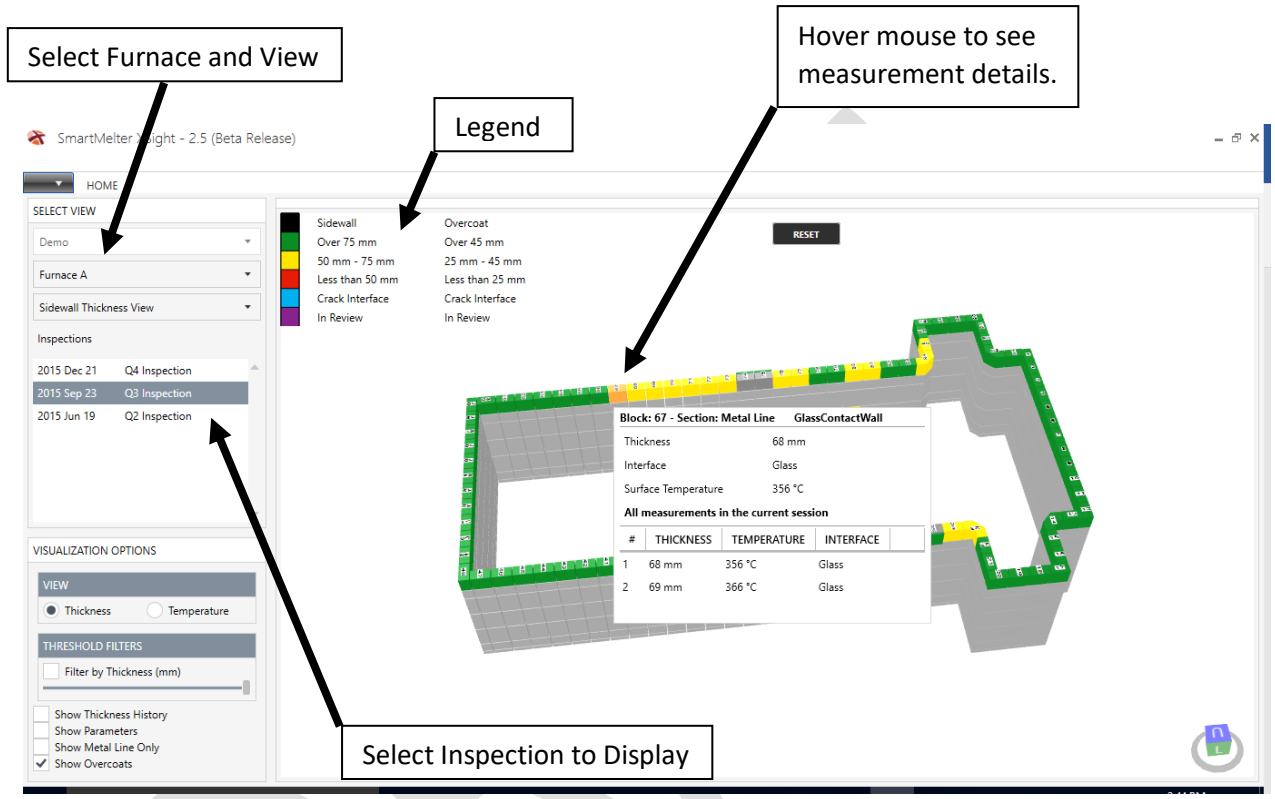
4. Using the Drop-down menus, select your company and factory. Click CONTINUE.

5. Wait for XSight to synchronize data. Click OK to continue.

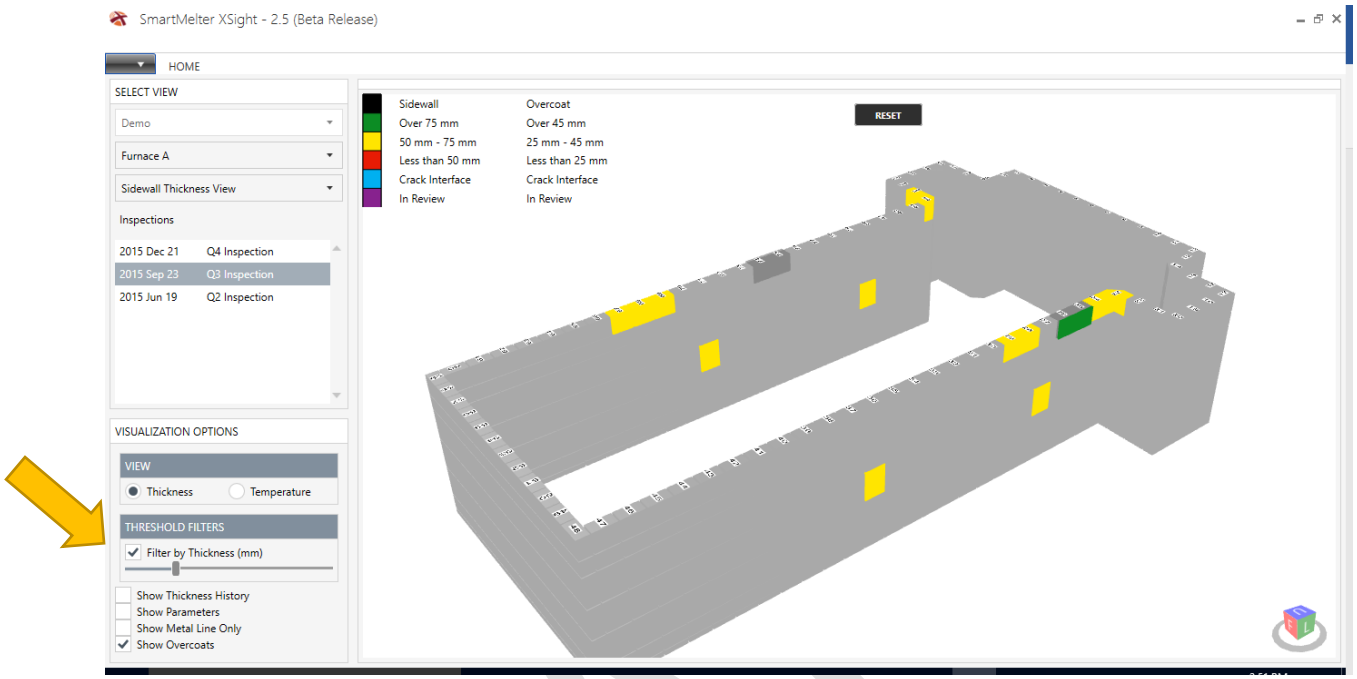


Viewing Inspection Data

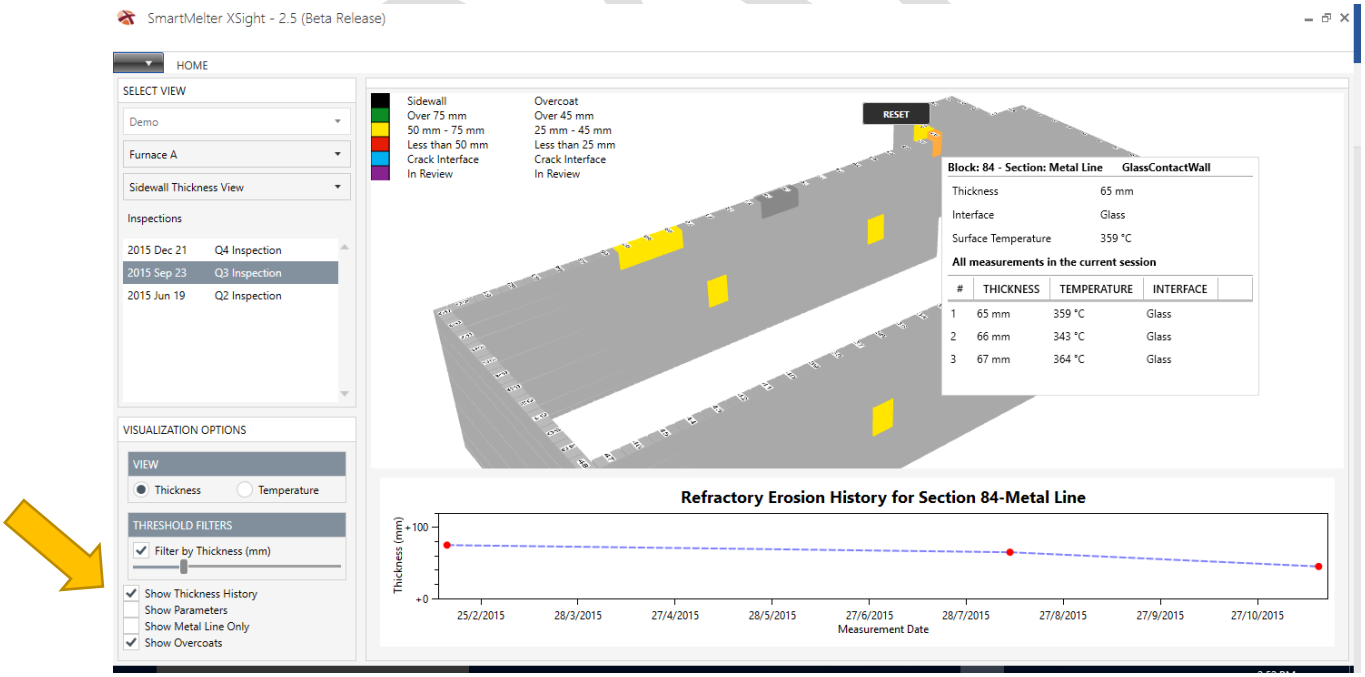
With an active license you will have access to view historical and current inspections. Select the furnace of interest and the view, here we've chosen the Sidewall Thickness View, then click an inspection. Browse measurements by clicking or hovering your mouse over the block and section of interest. A legend shows how colors correlate to thickness ranges.



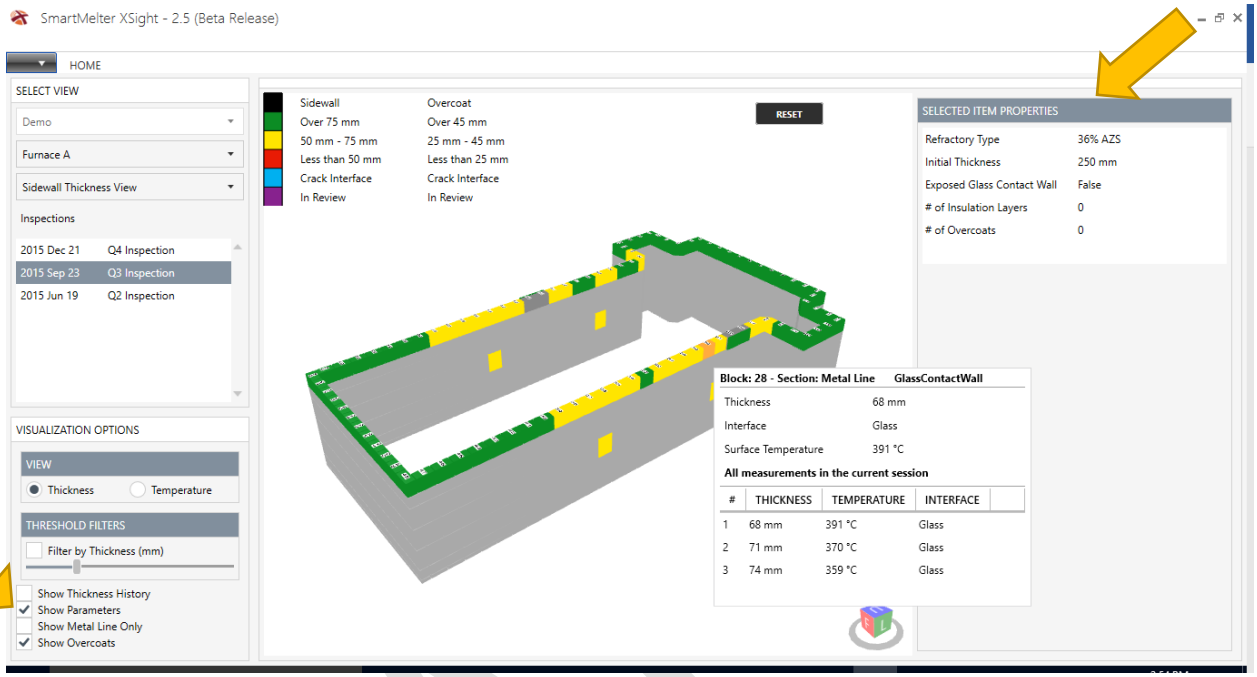
6. Filter by Thickness to show areas below a configurable threshold to highlight areas of increased wear.



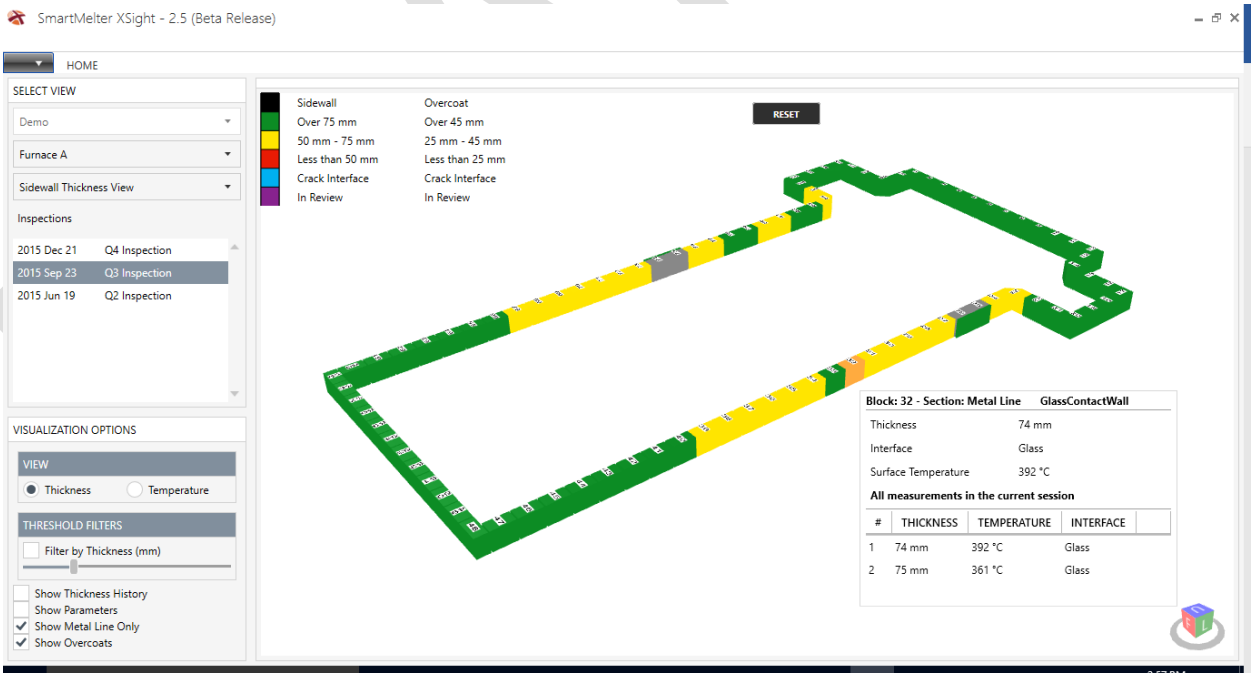
7. Show Thickness History to show Refractory Erosion History of the selected block and section.



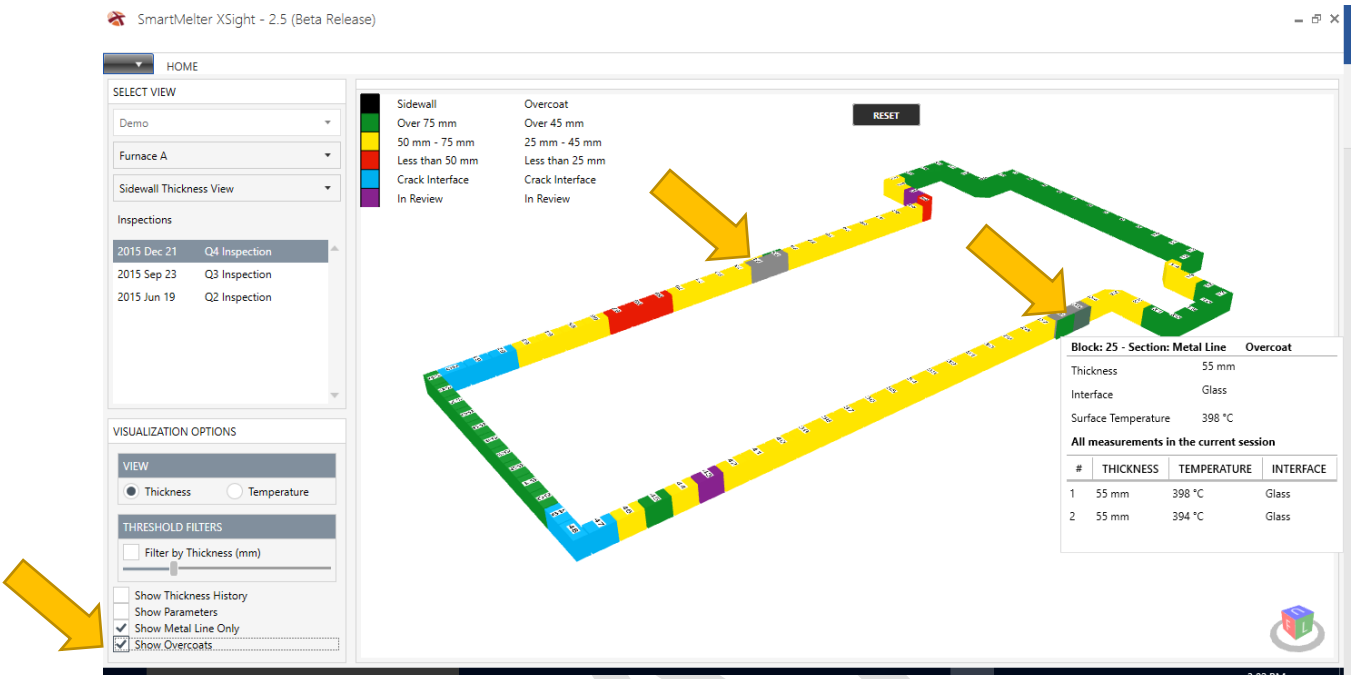
8. Select Show Parameters to view the Selected Item Properties including Refractory Type and Initial Thickness of the selected block and section.



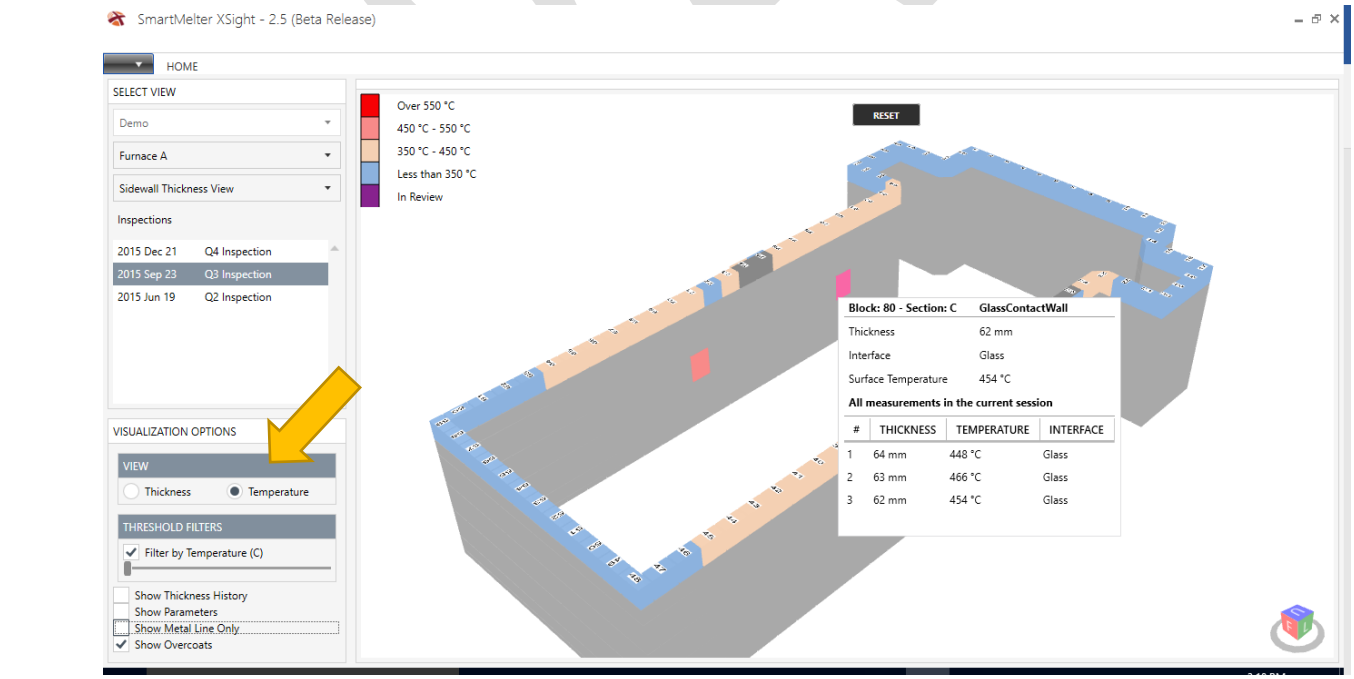
9. Select Show Metal Line Only to simplify the view and hide Sidewalls.



10. Select Show Overcoats, to view/hide overcoats. Toggling this filter allows you to easily identify which areas of the furnace are overcoated.



11. Select the Temperature View radio button to show temperature measurements. Each SmartMelter probe collects surface temperature with each measurement. In Temperature View, Filter by Temperature sets a minimum temperature threshold to view.

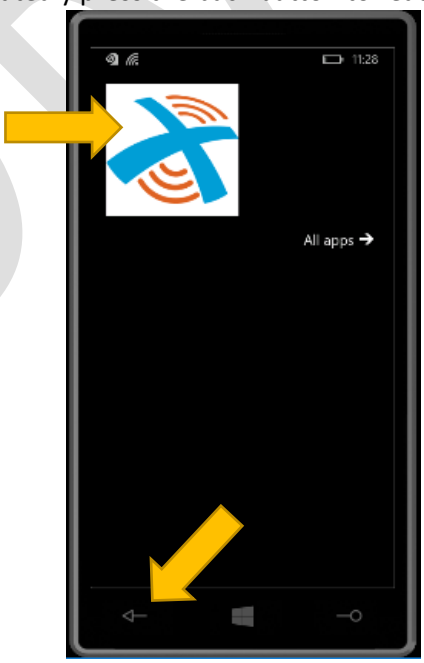


SmartMelter XSense

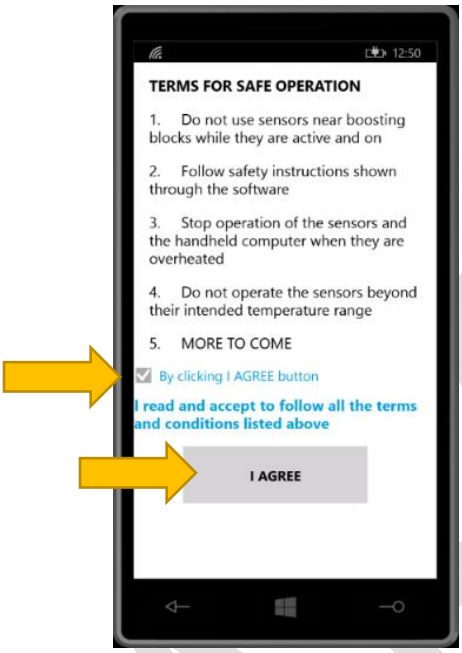
SmartMelter XSense is the tool used to collect probe measurements and map the physical location of these measurement to the furnace model in XSight. It also provides guidance to the User throughout the inspection. XSense runs on a rugged Panasonic FZ-E1 handheld computer, which is MIL-STD-810 rugged and water resistant to ensure it will survive the harsh furnace environment.

Starting an Inspection Session

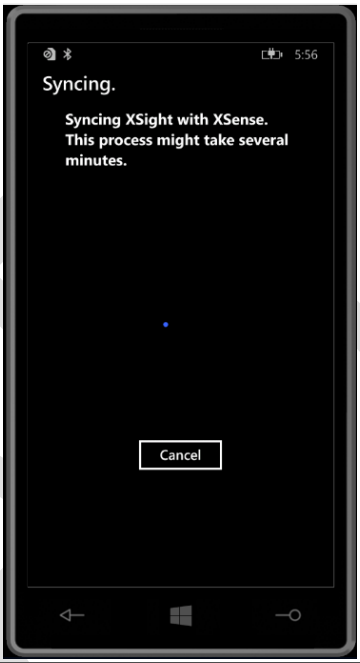
1. Turn on the Handheld and tap XSense icon on the home screen to open XSense. If the Handheld is on any other screen, repeatedly press the back button to reach the home screen.

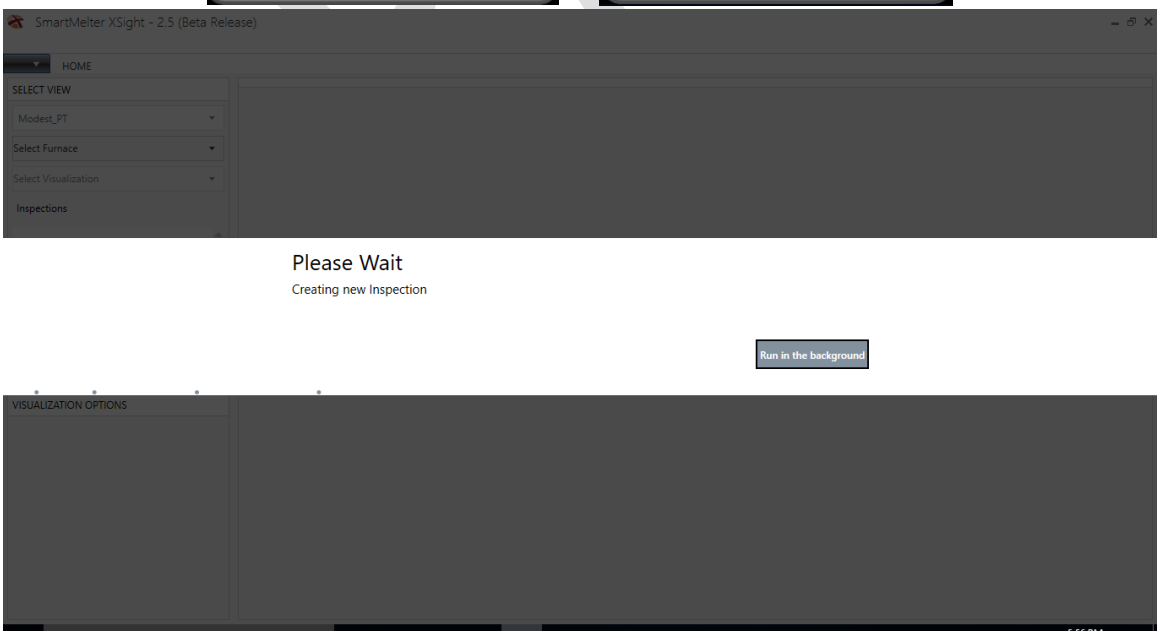


2. Read the TERMS FOR SAFE OPERATION and accept by selecting the checkbox and tapping I AGREE.

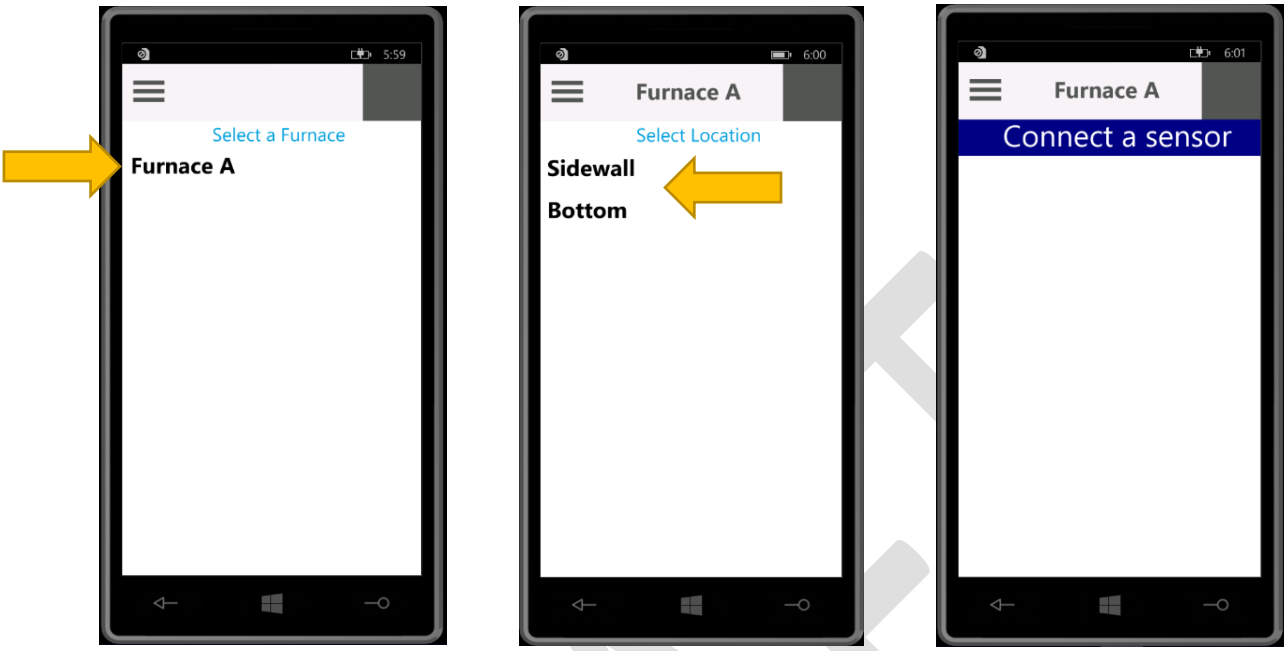


1. To start an XSense Inspection Session, you must first login to XSight on a computer with Bluetooth. Refer to the SmartMelter XSight section of this document if your computer is not fully configured. If you are using a computer that does not have Bluetooth hardware, install the USB Bluetooth adapter included in each SmartMelter Kit.
2. Select your XSight PC from the list and tap Create Inspection. Your XSight PC name can be found by right-clicking the Windows Start Menu icon and selecting System. Your XSight PC name will match the Computer name. Wait for the Syncing process to complete, it may take a few minutes.



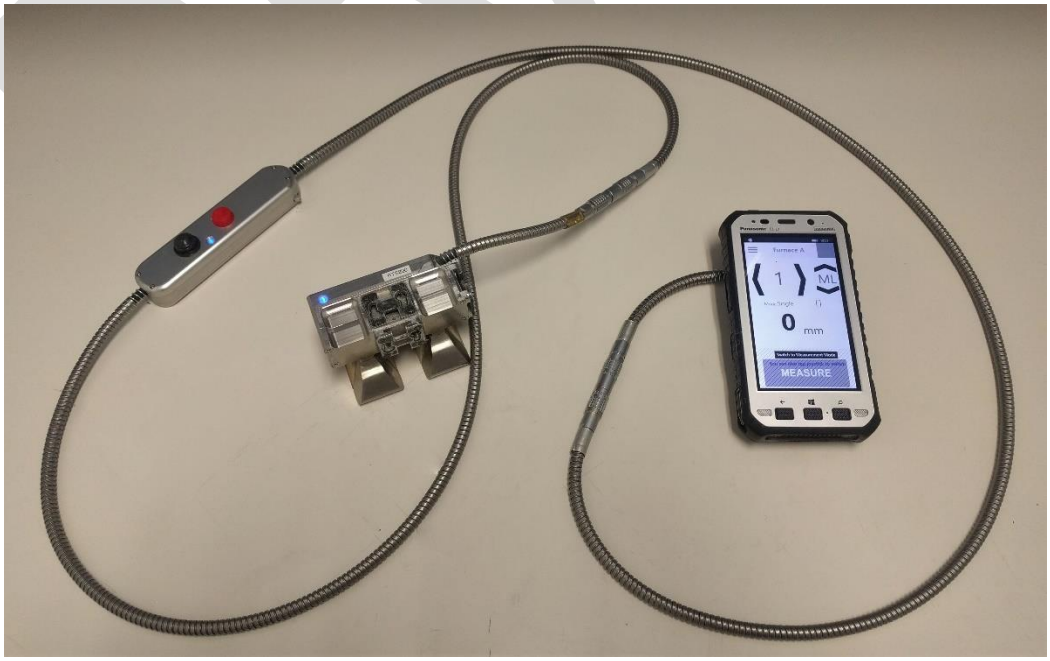


3. With an Inspection Session successfully started, you will be able to select a location and begin taking measurements. Tap the furnace to inspect, and the location: Sidewall or Bottom.



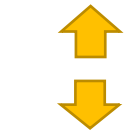
Conducting an Inspection

1. With and inspection started, plug one end of the controller cable into the handheld computer and the other into the probe. Each connector has a red dot, align the red dots and push the connectors together until they click, they should easily slide together.



2. During setup and installation PaneraTech divides your furnace into blocks and sections in software and marked accordingly.

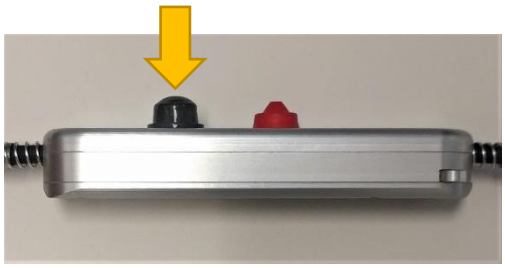
3. Using the controller or handheld touch screen, navigate to the location where you will be taking a measurement.

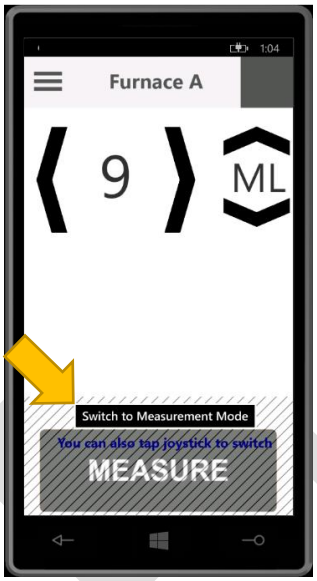


Change section

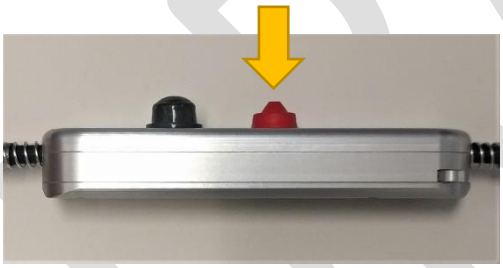
Change block

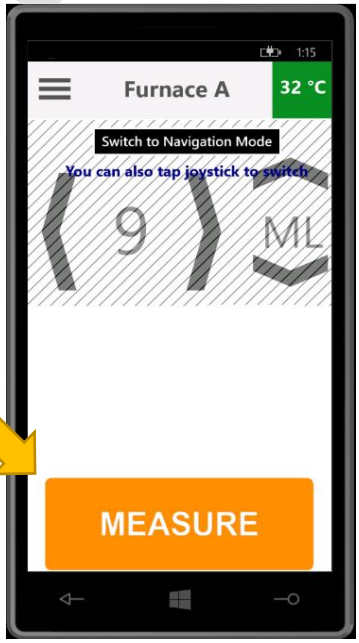
4. To take a measurement, first you must leave Navigation Mode and enter Measurement Mode. To do so tap the “Switch to Measurement Mode” button or push in on the joystick.



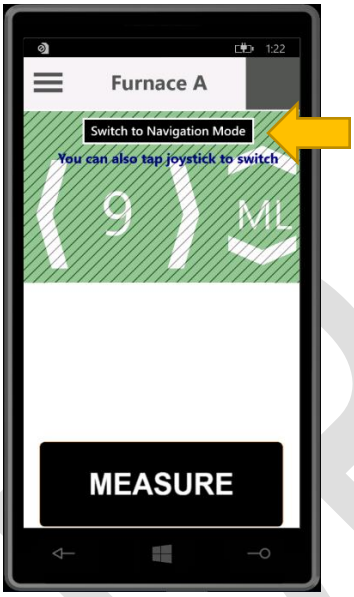


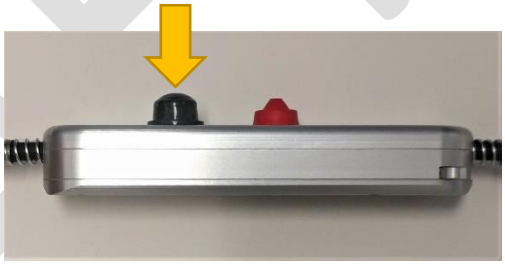
5. With measurement mode activated, the joystick directions are inoperable reducing errors due to inadvertent button presses. Press the red trigger button or tap the MEASURE key to acquire a single measurement.



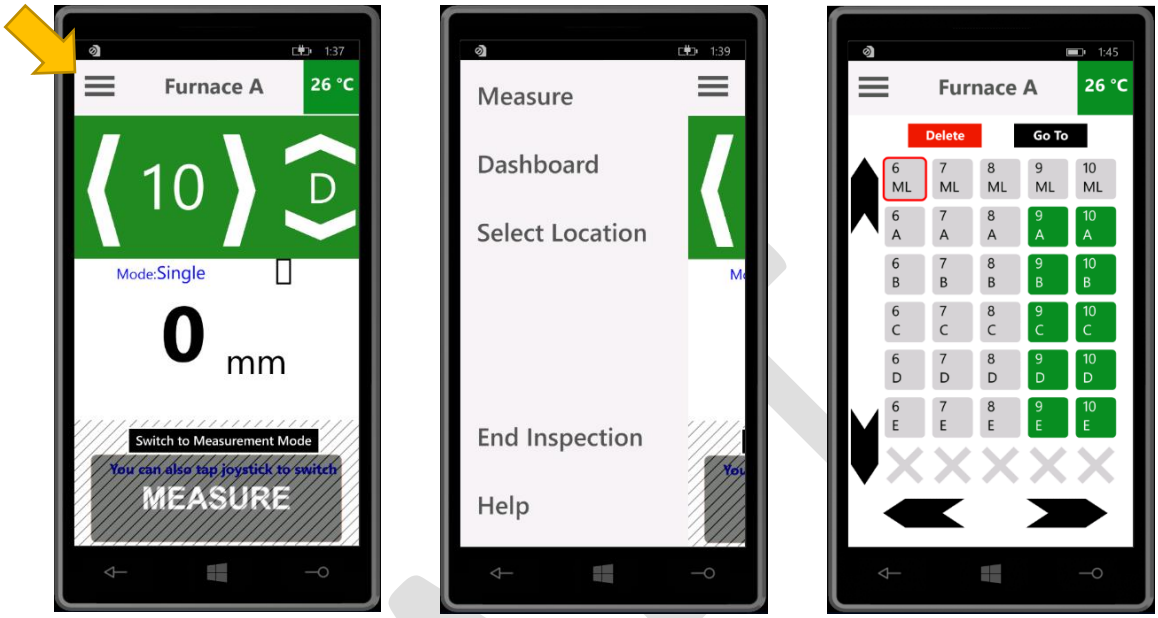


6. Depending on the type of probe used, a measurement will take 1 – 2 seconds. The LED indicators on both the probe and controller will blink bright blue while acquiring a measurement.
7. When the measurement is complete, XSense determines the measurement quality and the LED color indicates the result:
    - Green. Good measurement acquired, do not take another measurement in this location, move on to the next measurement location. The Handheld screen will also have a green background at this location the measurement taken at this location is complete.
    - Red. Bad measurement, this is usually because of poor surface contact or buildup beneath the probe. Adjust probe positioning or scrape away build up and try again.
    - Blinking red. Block is too hot, the probe has an integrated IR temperature probe to determine surface temperature for each measurement.
8. To return to Navigation mode, press in on the joystick or tap the “Switch to Navigation Mode” button on the Handheld.



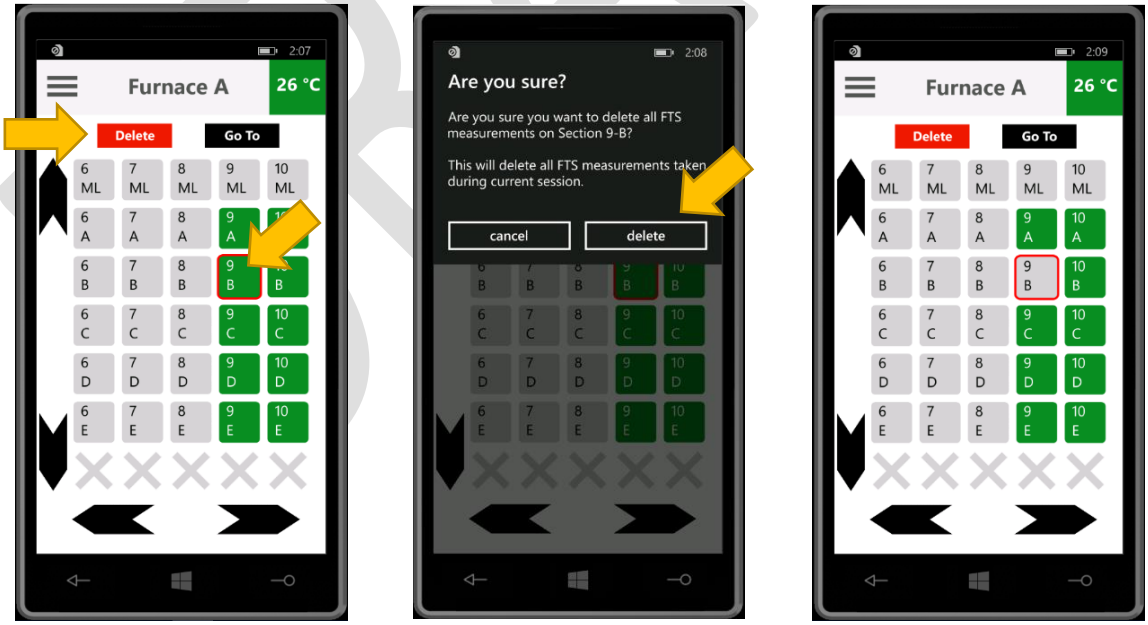


9. Continue in this fashion until you complete your inspection. Tap Menu > Dashboard to track your progress.



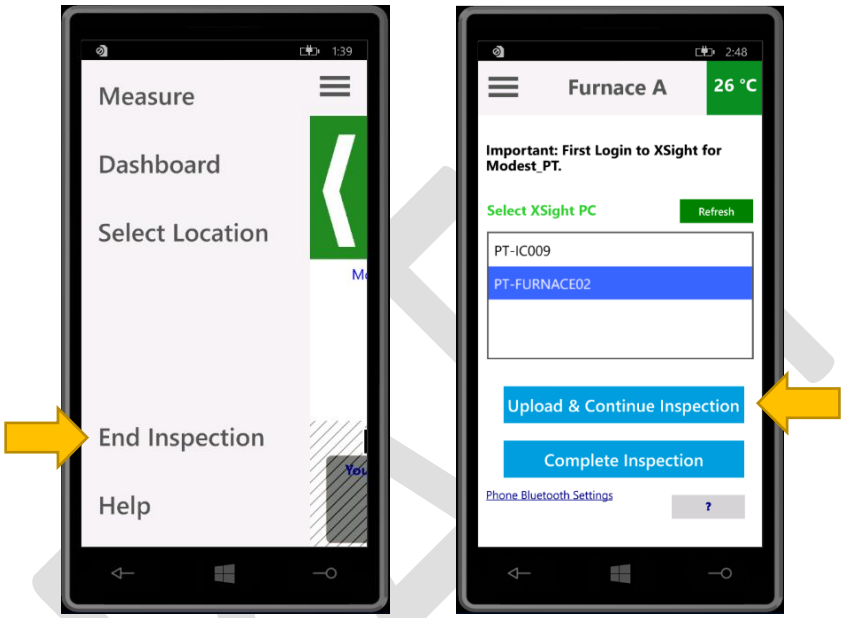
Deleting a Measurement

10. If you've taken a measurement in the wrong location or need to remove it for any other reason, Tap the location in Dashboard and Tap Delete. Warning: this will remove all measurements taken with the attached sensor type at this location! Tap delete in the pop-up to confirm.



Upload and Continue

11. A complete inspection may be a long process, and you may want to upload a partial inspection for preliminary results. To do so, open XSight on an internet connected computer with Bluetooth or the provided Bluetooth dongle installed. Refer to the XSight section of this document for complete installation and login instructions.
12. Bring the Handheld near the XSight computer and tap Menu > End Inspection, select your XSight PC and tap Upload & Continue Inspection. Wait a few minutes until the upload process is complete.



13. Return to taking measurements by tapping Menu > Measure.

Complete Inspection

1. First check the Dashboard and ensure that all measurement locations are green, an inspection may not be continued after it is completed.
2. Bring the Handheld near the XSight computer and tap Menu > End Inspection, select your XSight PC and tap Complete Inspection. Wait a few minutes until the upload process is complete.

SmartMelter Sensors

RTS200

The RTS200 sensor is a Refractory Thickness Sensor that measure refractory thickness on glass contact walls. RTS200 used in locations include sidewall blocks, furnace bottom bubbler blocks, sidewall electrode blocks, throat blocks and any other exposed glass contact refractory. Please contact your Technical Account Manager if you have an interest in measuring refractory thicknesses at any other location in your furnace. Sidewall thickness measurements at the glass level will always be labeled with a number and “ML” for metal line.

Surface Preparation

Be sure that the area being measured is adequately cooled, the surface temperature must not exceed 480°C. If the surface temperature is greater than 480°C, additional air cooling must be added for reliable measurements. The measurement surface must also be clear of any buildup, good contact is required for the RTS200 sensor to work.

Calcium buildup is a common result of water cooling. This buildup must be removed from the measurement location to ensure good contact.

Probe Orientation

Place the RTS200 sensor flat against the refractory surface such that the two antennas are oriented vertically at the expected glass level. Confirm the glass level for each furnace, if you do not know the glass level your Technical Account Manager can do a series of measurements to determine a good measurement location for your furnace.

FTS400 and FTS200

Surface Preparation

The FTS series of sensors is a Furnace Tomography Sensor that can measure glass infiltration into sidewall and furnace bottom insulation. The FTS200 sensor is a more compact version of the FTS400 sensor and must only be used where the FTS400 sensor cannot fit. The FTS400 sensor measurement covers a larger area per measurement and is therefore always better to use if possible. Sidewall insulation measurement locations will be labeled with a block number and letter corresponding to the vertical position along the sidewall. Furnace bottom measurement locations will be indicated by single number.

Figure 1 - FTS200 being used to measure sidewall where the FTS400 cannot fit.

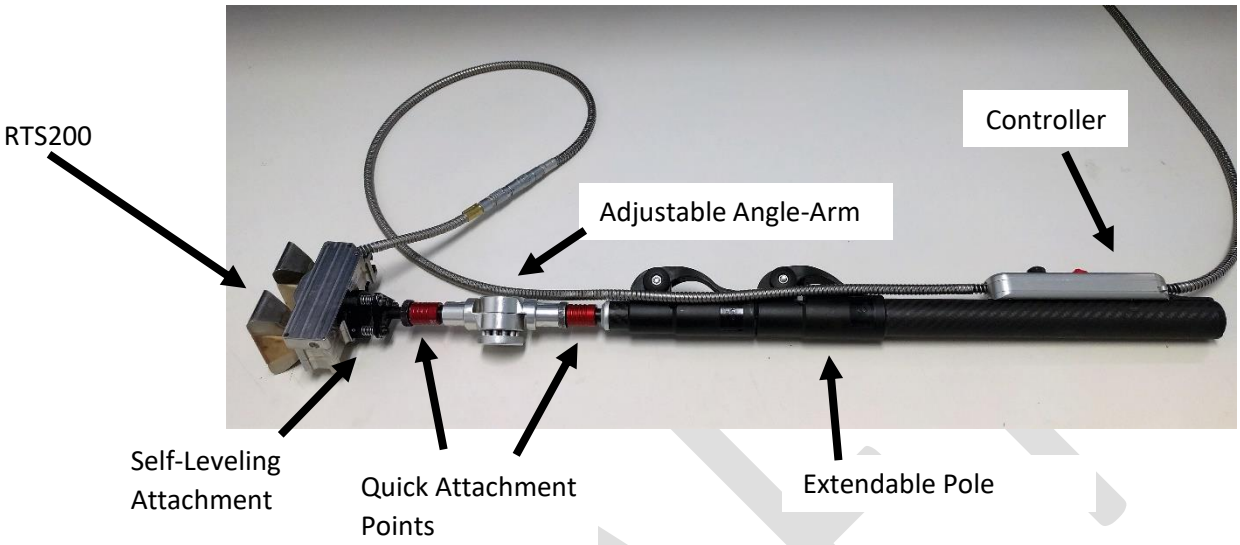
FTS sensors are less sensitive to surface temperature but will overheat more quickly when measuring hot surfaces or in high ambient temperatures. Active cooling can be used to extend operational time and the measurement surface should be cleared of buildup.

Probe Orientation

Place the selected FTS sensor flat against the insulation surface, orientation is not critical unless directed by your Technical Account Manager.

Accessories

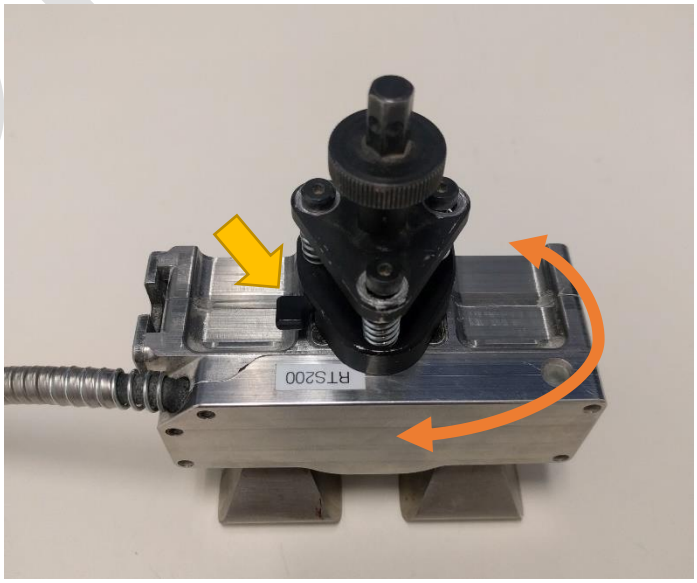
Every SmartMelter Kit contains accessories to speed up the inspection process and allow inspection of difficult to reach locations of the furnace. These include an extendable pole, adjustable-angle arm, and self-leveling attachment.



Self-Leveling Attachment

Each probe has Quick Attachment plates where the Self-Leveling attachment may be connected. The Self-Leveling attachment makes it much easier to keep probes flat against furnace surfaces to capture good measurements. It may be connected to different locations of the probes depending on the accessibility of that measurement.

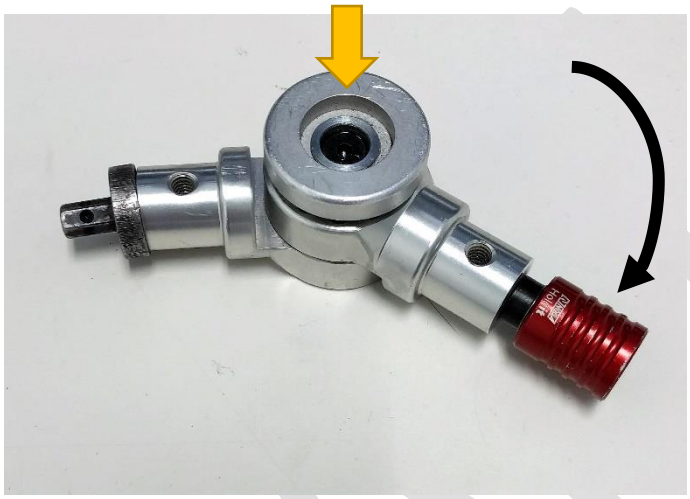
To attach the Self-Leveling attachment to a probe, insert the screws on the attachment into the holes on the probe. Twist the Self-Leveling attachment clock-wise until it clicks, make sure that the Self-Leveling Attachment is locked in place, always test it by firmly pulling and twisting the probe. To remove the attachment from a probe, press the lever and rotate counter-clockwise and pull gently.

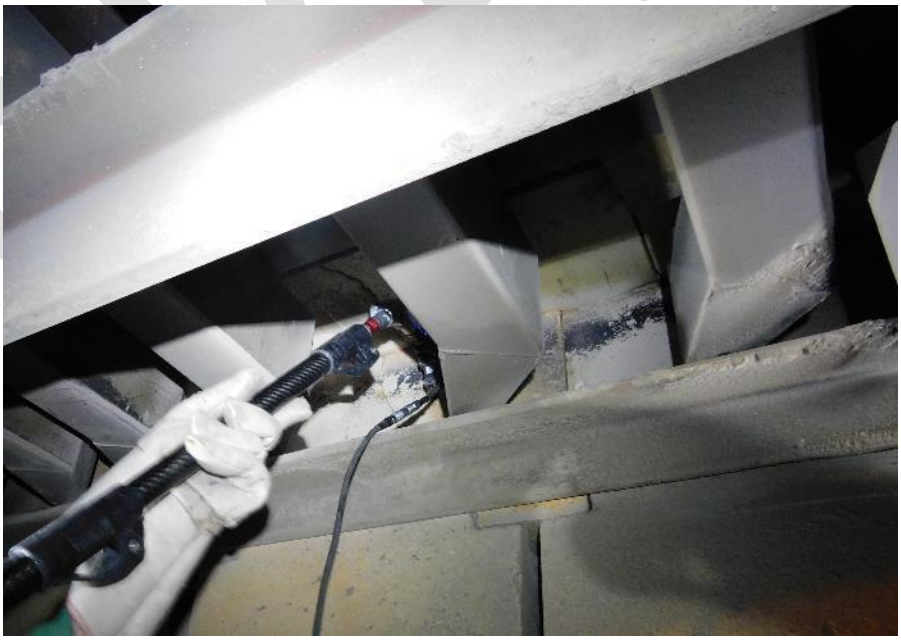


Adjustable-Angle Arm

The Adjustable-Angle Arm allows the user to take measurements behind buckstays, below catwalks, high overhead and at other awkward angles. It attaches to the Self-Leveling Attachment using the red connection point. Pull back on the red sleeve, insert the post and release the red sleeve. Warning: make sure that the Adjustable-Angle Arm is locked in place, test it by firmly pulling and twisting the probe.

Press the large donut shaped button and rotate the arm to the desired angle.





Extendable Pole

The Extendable Pole is used for most measurements doing an inspection. It allows the User to reach across gaps, and behind obstructions to perform measurements in every accessible area.

It also has an attachment point where the Controller can be mounted for ease of use. Insert the metal "finger" into the hole in the base of the controller until it clicks. To remove the controller from the Extendable Pole, press the button on the base of the control and slide it off the mount.

Water Cooling Guidelines

All SmartMelter products are designed to meet IP54 water resistance and dust proof, but all sensors must be used on dry surfaces. Turn off any water cooling for at least 15 minutes prior to measurements. The water resistance of SmartMelter products does allow inspections to be done in wet environments, only turning off water cooling of measurement areas as needed.

Overheating

Automatic Shutdown

Each probe contains active electronics that would be damaged if heated beyond operating temperature limits. We monitor probe temperatures and automatically shut down sensitive electronics to protect

these components, and notify the User with a flashing Magenta colored LED on both the controller and the attached probe. The XSense software also shows a warning that the probe has gone into temperature shutdown mode and must be cooled prior to further use.

Over-temperature Cutoff

To further protect the probe, when it overheats beyond the safe levels for any active electronics, the probe will completely shut off. This prevents a rapidly heating probe from being damaged as it continues to self-heat even after the probe is not in contact with a hot surface. The probe LEDs will be turned off, and the XSense software will not recognize the attached probe.

Cooling an Overheated Probe

Overheating is a normal occurrence during SmartMelter inspections, and in the interest of completing inspections as quickly as possible you may use air cooling to cool a probe within a few minutes. Never use water cooling, or submerge any SmartMelter equipment in water. We recommend that Users leave the overheated probe in an area with cool, moving air and continue the inspection with the backup probe provided. Always allow an overheated probe to cool completely, to maximize the amount of measurements that may be taken without breaks.

Troubleshooting

Symptom	Solution
Probe shows Red LED even though contact is good and surface is clear.	Probe could be damaged, use the provided backup probe or refer to your Technical Account Manager to arrange shipment of a replacement. Do not use the FTS200 as a backup to the FTS400 probe.
XSense recognizes a probe is attached, but controller inputs do not work.	This is a known bug that can occur when the probe is first plugged in or left connected and unused for a time. Press the power button to turn the handheld screen off and on again, this power cycles any attached electronics and the controller should now be responsive. If the problem persists, use the backup controller and contact your Technical Account Manager for further instructions.
Controller LED is continuous yellow, XSense may not recognize attached probe.	The Handheld computer is trying to communicate and initialize the controller. If this state continues for longer than 1 minute and the Handheld is fully powered on, press and hold the power button and restart the Handheld. If after fully loading this state continues, the controller or cable may be damaged. Use the backup controller and contact your Technical Account Manager for further instructions.