



Kaye HTR-420

Dry Block

User Manual



M5450
Rev. A
October 2020



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www.kayeinstruments.com

Amphenol
Advanced Sensors

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Contents

Chapter 1.	Product Overview	6
1.1	Key Components of the HTR-420	7
1.2	Dry-Block Function	8
1.3	Calibration Modes	9
1.4	Contact Kaye Customer Service	10
1.5	Calibration and Repair Information	10
Chapter 2.	Safety Information	11
Chapter 3.	Specifications	14
Chapter 4.	Getting Started	15
4.1	Unpack and Inspect	15
4.2	Placement	16
4.3	Connect to Main Power	16
4.4	HTR-420 Startup	17
4.5	Calibrator Setup	18
4.5.1.	Set Screen Brightness	18
4.5.2.	Set Language Selection	18
4.5.3.	Set Date and Time	19
4.5.4.	Set Temperature Units	19
4.5.5.	Set Decimal Resolution	19
4.5.6.	Switching Modes (Remote Control / Standalone)	19
4.6	Powering Off	19
4.7	Thermocouple Fixture	20
4.7.1.	Installation:	20
4.7.2.	Usage:	20
4.7.3.	Removal of Thermocouples Holder:	21
Chapter 5.	Automatic Calibration Mode	22
5.1	Starting Automatic Calibration	23
Chapter 6.	Standalone Manual Mode	25
6.1	Standalone Main Screen	26
6.2	Toolbars and Icons	27
6.3	Configuration Range Settings	28
6.4	Test Tasks	29
Chapter 7.	Starting Standalone Manual Calibration	33
Chapter 8.	Maintenance and Troubleshooting	36
8.1	Introduction	36
8.2	Maintenance	36
8.2.1.	Dry Block	36
8.2.2.	Main Unit	36
8.2.3.	Dry Block Insert	36

8.3	Troubleshooting	37
Chapter 9.	Appendix	38
9.1	Warranty	38
9.2	Return Policy	39
Customer Support Centers.....		40

Chapter 1. Product Overview

The Kaye HTR-420 is the most advanced high temperature calibrator specifically designed to address the capacity and flexibility needs for thermal validation. The HTR-420 offers a broad temperature range from 30°C to 420°C with temperature stability of $\pm 0.010^{\circ}\text{C}$ and uniformity of $\pm 0.1^{\circ}\text{C}$. Performance of calibration and calibration verification can either be performed automatically via Remote mode or manual through Standard mode.

The Kaye HTR-420 has been designed to interface directly with all Kaye products (Validator AVS, Validator 2000, IRTD, ValProbe, and RF ValProbe). The firmware is backward compatible with all version of Kaye software without need for software upgrades. This functionality allows the unit to be utilized for fully automatic calibrations/verifications of thermocouples, ValProbes or RF ValProbes utilizing your existing IRTD and applicable Kaye software.

The Kaye HTR-420 also has the flexibility to calibrate other process or validation sensors in Standalone mode through the intuitive 7" touchscreen, and a variety of optional inserts.

To maximum accuracy of the control and measurement during calibration, the HTR-420 includes an external Control Reference Probe. This probe is used for feedback to the calibrator controller.

The calibrator is portable, rugged and can be used in a variety of environments from 0°C to 50°C and humidity $\leq 80\%$ (non-condensing).



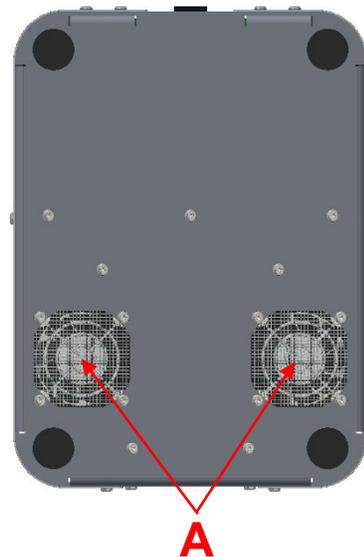
1.1 Key Components of the HTR-420

1. Dry block
2. Carrying handle
3. Steel housing
4. Touch screen for display and operation
5. Calibrator exhaust ventilation
6. Connection for external reference probe
7. USB port for connection to Kaye hardware
8. Main switch with fuse and main plug socket



Calibrator, bottom view:

A: Calibrator ventilation Inlet air for housing cooling.



1.2 Dry-Block Function

The HTR-420 comes standard with a dry block insert containing sixteen (16) wells for thermocouples as well as two (2) wells for IRTD, and one (1) well for the Control Reference Probe. Each of the sixteen (16) thermocouple wells is included with a sleeve which can accommodate upwards of three (3) thermocouples. The sleeves are optimized to handle 22AWG thermocouples, which are similar others currently utilized in existing Kaye dry block models.

Kaye also offers additional dry block inserts for calibrating specialty processes or validation probes. These inserts are easily interchangeable utilizing the supplied insert tool.

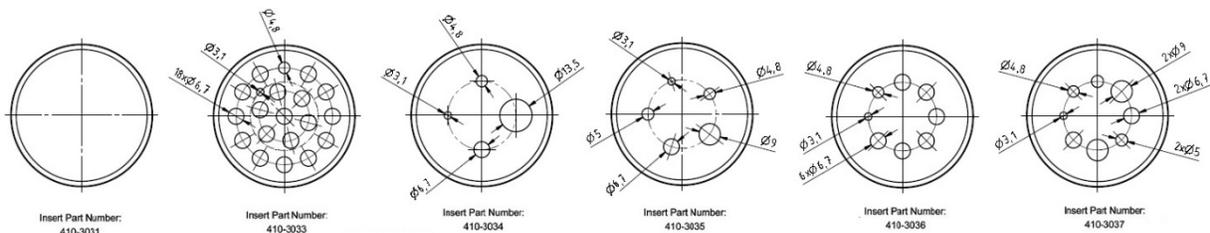


Control Reference Probe well.

IRTD insert wells.

Thermocouple insert wells.

Kaye HTR-420 Additional Inserts (units mm)

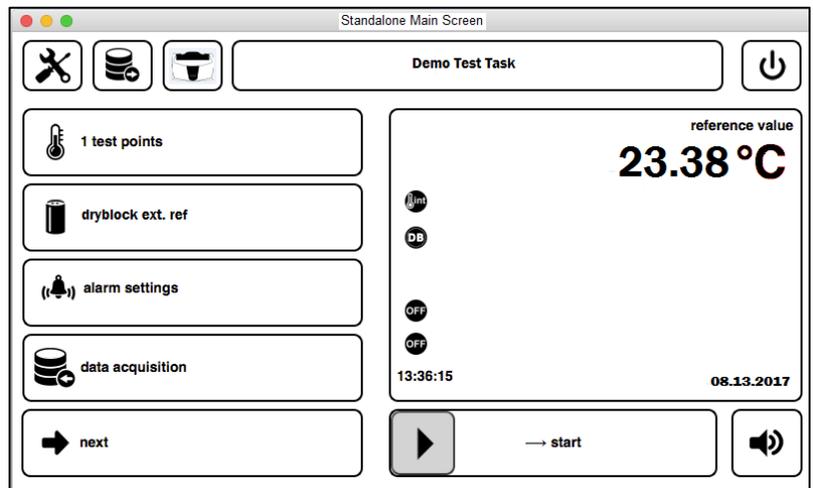
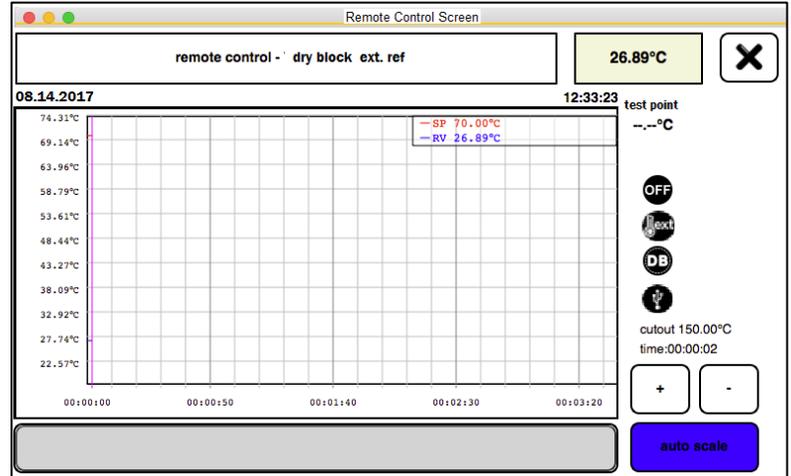


1.3 Calibration Modes

The HTR-420 was designed to offer flexibility and ease of use. To accommodate these needs Kaye implemented two main modes or menu's *Remote Control mode* and *Standalone mode*.

Remote Control mode is intended for Automatic Calibration utilizing Kaye Validator equipment (Validator 2000, Validator AVS, ValProbe and RF ValProbe). In this mode, control of the HTR-420 and the touchscreen interface is automatically driven by the appropriate Kaye software. In the Kaye software, the user configures the set points, the stability criteria, and deviation criteria. The user simply starts the calibration from the Kaye software and the control of the calibration is automated. No additional interaction with the touchscreen is required. The HTR-420 when powered on automatically boots into the **Remote Control** screen.

The *Standalone* mode is intended again to offer flexibility by allowing fully manual configuration of the HTR-420 to define all different kinds of parameters from different types of sensors, ramp and soaks setups /profiles to address other calibration needs. For *Standalone* mode, refer to *Chapter 6 Standalone Manual Mode* and *Chapter 7 Starting Standalone Manual Calibration* for details the options and screen flows to manually configure the HTR-420.



1.4 Contact Kaye Customer Service

You may contact our North American customer service team at (814) 834-9140 (FAX: (814) 781-7969). You may also call our European headquarters in Germany at +49 (0) 7231-14335 0.

1.5 Calibration and Repair Information

To schedule and send the HTR-420 to Kaye for calibration or repair:

1. Contact the Kaye Service Center in your area to schedule the calibration or repair.
2. Utilize original packing box and carefully pack and secure the HTR-420.
3. Send the HTR-420 to the Service Center.

Chapter 2. Safety Information

- WARNING!** A Warning identifies conditions and procedures that are dangerous to the user.
- CAUTION!** A Caution identifies conditions and procedures that can cause damage to the product or equipment under test.

See *Table 1: Hazard Signs and Symbols* below for list of symbols used in this manual and on the HTR-420.

Hazard signs and other symbols used:	
	CAUTION! Electric current! This sign indicates dangers which could arise from handling of electric current.
	WARNING! / CAUTION! Risk of injury! This sign indicates dangers that cause personal injuries that can lead to health defects or cause considerable damage to property.
	CAUTION! High temperature! This sign indicates dangers resulting from high temperature that can lead to health defects or considerable damage to property.
	CAUTION! Material damage! This sign indicates actions which could lead to possible damage to material or environmental damage.
	ADHERE TO OPERATING MANUAL!
	NOTICE! This symbol indicates important notices, tips or information.
	NO DOMESTIC WASTE! The device must not be disposed of together with domestic waste.
	Pay attention to and comply with information that is marked with this symbol.
	Follow the specified instructions and steps. Adhere to the given order.
	Check the specified points or notices.
	Reference to another section, document or source.
	Item.

Table 1: Hazard Signs and Symbols



Before you install the HTR-420, read through this user manual carefully. If the instructions contained within are not followed, including the safety guidelines, it could result in danger for people, the environment, and the device and system it is connected to.

To guarantee that the device operates safely, the operator must act competently and be conscious of safety issues.

General safety instructions:

-  In all work, the existing national regulations for accident prevention and safety in the workplace must be complied with. Any internal regulations of the operator must also be complied with, even if these are not mentioned in this manual.
-  Ensure that the complete operating instructions are always available in excellent condition at the calibrator installation site.
-  Degree of protection per EN 60529: Ensure that the ambient conditions at the site of use does not exceed the requirements for the stated protection rating.
-  Structural safety in accordance with EN 61010-1: The calibrator must be installed in such a way that the requirements for structural safety are met.
-  Only use the HTR-420 if it is in perfect condition. Damaged or faulty devices must be checked without delay and, if necessary, replaced. If problems cannot be cleared, immediately shut down the calibrator and ensure that it cannot be started up accidentally.
-  Never leave the calibrator unattended when it is in operation or in the cooling phase.
-  Do not remove or obliterate type plates or other markings on the device, as otherwise the warranty is rendered null and void.

Special Safety Instructions:

CAUTION! Risk of Burns!

The calibrator can become very hot when in operation. Touching hot parts can result in serious burn injuries.



-  Never touch the metal block, the dry block insert, the external reference control probe or the test specimen at temperatures above 35 °C.
-  Allow the calibrator to cool before you remove the test specimen / the external reference control probe, change the dry block insert or switch off the calibrator.

-
-  **Thermal fuse!** The calibrator is equipped with a temperature fuse that works independently. If there is an over-temperature in the inside of the housing, the power supply to the heating system is cut off. The calibrator cannot then be started any more.
 -  After it has cooled, send the calibrator for inspection to Kaye.
 -  The calibrator may not be used in an explosion-endangered atmosphere (ignitable or explosive atmosphere).
 -  Remove all the easily flammable media from the vicinity of the calibrator.
 -  Ensure that the calibrator cannot encounter easily flammable or explosive media.
 -  Operate the calibrator only in the temperature range permissible for the test sample.
 -  Ensure that the test sample is securely fixed in the calibrator.
 -  Use only suitable adapter sleeves or calibration inserts. When doing so, also ensure that the structural safety of the calibrator is retained.



IMPORTANT NOTE!



The thermocouple holder may be hot after use. Wait for the HTR-420 to cool to a safe temperature before touching or removing the holder.



IMPORTANT NOTE!

Keep in mind after transport or storage!

After transport, storage or long periods of non-use, moisture can seep into the heating elements (magnesium oxide). For drying, the calibrator must be slowly heated up. During this process, the calibrator has not yet reached the required insulation voltage for protection class I.

↳ For drying the heating elements, heat the calibrator for at least 15 min to 120 °C.

Further warnings that are specifically relevant to individual operating procedures or activities can be found at the beginning of the relevant sections of this user manual.

Chapter 3. Specifications

Dry Block		
Temperature Range*	30°C to 420°C	86°F to 780°F
Stability	±0.010°C	±0.018°F
Uniformity	0.1°C	0.18°F
Accuracy	±0.1°C	±0.18°F
Heating / Cooling time	30°C to 100°C	7 min
	30°C to 350°C	20 min
	350°C to 125°C	20 min
	350°C to 50°C	40 min
Block Dimensions		
Diameter	60 millimeters	2.36 inches
Depth	170 millimeters	6.69 inches
Display Unit		
Display Unit	Brilliant Color (7") Touchscreen Viewing angle range 120° to 140° Brightness 400 cd/m ² Unit °C/ °F/ °K	
Resolution	0.1/ 0.01/ 0.001 °C/ °F/ °K	
General Data		
Interface	Serial to Validator Ethernet 3 x USB	
Dimensions		
Width	215 millimeters	8.46 inches
Height	290 millimeters	11.417 inches
Depth	345 millimeters	13. inches
Weight (approximate)	11 kilograms	24 pounds
Power Supply	110–115 VAC ±10%, 60 Hz 230 VAC ±10%, 50 Hz	
Power Consumption	Approximately 1000 watts	
Safety	OVERVOLTAGE (Installation) CATEGORY II, Pollution Degree 2 according to IEC-61010-1:2001	

* at an ambient temperature of 20°C (68°F)

Chapter 4. Getting Started

4.1 Unpack and Inspect

All units have been carefully checked for their operational reliability before shipment.

- ✉ Immediately after receipt, please check the outer packaging for damages or any signs of improper handling.
- ✉ Report any possible damages to the forwarder and your responsible sales representative. In such a case, state a description of the defect, the type and the serial number of the device.

IMPORTANT NOTE: Report any in-transit damage immediately. Damage reported later shall not be recognized.

- ✉ Carefully unpack the unit to prevent any damage.
- ✉ Check the completeness of the delivery based on the packing slip and/or purchase order.
- ✉ The X0385 HTR-420 comes with the following components.

Item	Description	Quantity
1	HTR-420	1
2	6 ft. (2 meter) Mains Power Cord (US / EU)	2
3	Dry Block Insert (for up to 48 thermocouples, 2 IRTD, & 2 Reference Probes)	1
4	Insert Exchange Tool	1
5	Extruded Sleeves for thermocouples (16)	16
6	External Reference Control Probe	1
7	USB to Serial Communications cable (connection to Kaye hardware)	1
8	Thermocouple Holder	1
9	Calibration Certificate	1
10	User Manual	1



Save the packaging!

The HTR-420 is delivered in special protective packaging.

- Save the packaging for returning the instrument safely to the manufacturer for recalibration or repair.
- Use the type plate to check if the delivered unit corresponds to your order request.

4.2 Placement

Ensure that the HTR-420 storage and operation conditions described below are met:

- Only suitable for indoor use, do not use outdoors.
- Not suitable for applications with high vibration or possible contamination
- Operate only in the vertical position on an even surface. The surface must be stable, clean, and dry.



IMPORTANT NOTE: If the operation conditions do not conform to what is described above then the structural safety and the specified properties of the HTR-420 is not guaranteed.

- Sufficient clearance around the machine; greater than 3 feet (1 meter) in the front and 1.5 feet (0.5 meters) on the sides and back. Sufficient head clearance and free space above the machine.
- Sufficient ventilation must be ensured.
- Do not operate near flammable materials.
- The ventilation openings must not be blocked or covered.
- The machine must be installed in a manner so that it can be easily switched off at any time.

4.3 Connect to Main Power

Ensure the following before powering up the HTR-420:



IMPORTANT NOTE: Only connect the HTR-420 to a properly installed and grounded, three-pronged outlet. If no ground is applied to the HTR-420 it will not heat nor cool.

- Ensure supply voltage is either 115VAC 60Hz or 230 VAC 50Hz.
- Do not use any extension cables or adapter plugs.
- Use only the original power cables supplied by Kaye or approved, like power cable.



IMPORTANT! "KILL" switch!

The plug of the mains connecting cable serves as a "KILL" switch.

- ✎ Ensure that the plug is always easily accessible and easy to reach.
- ✎ In an emergency, pull the plug, so that the machine is isolated from the mains.

4.4 HTR-420 Startup

Prior to powering up the HTR-420 perform the following task;

Push the dry block insert down to the stop. Connect the External Reference Probe to the connector marked “ext Ref” on the front panel and insert into the dry block using the 4.8mm hole sized specifically for the 4.5mm Reference Control Probe.

Power On the HTR-420 by utilizing the Power Switch on the front panel.

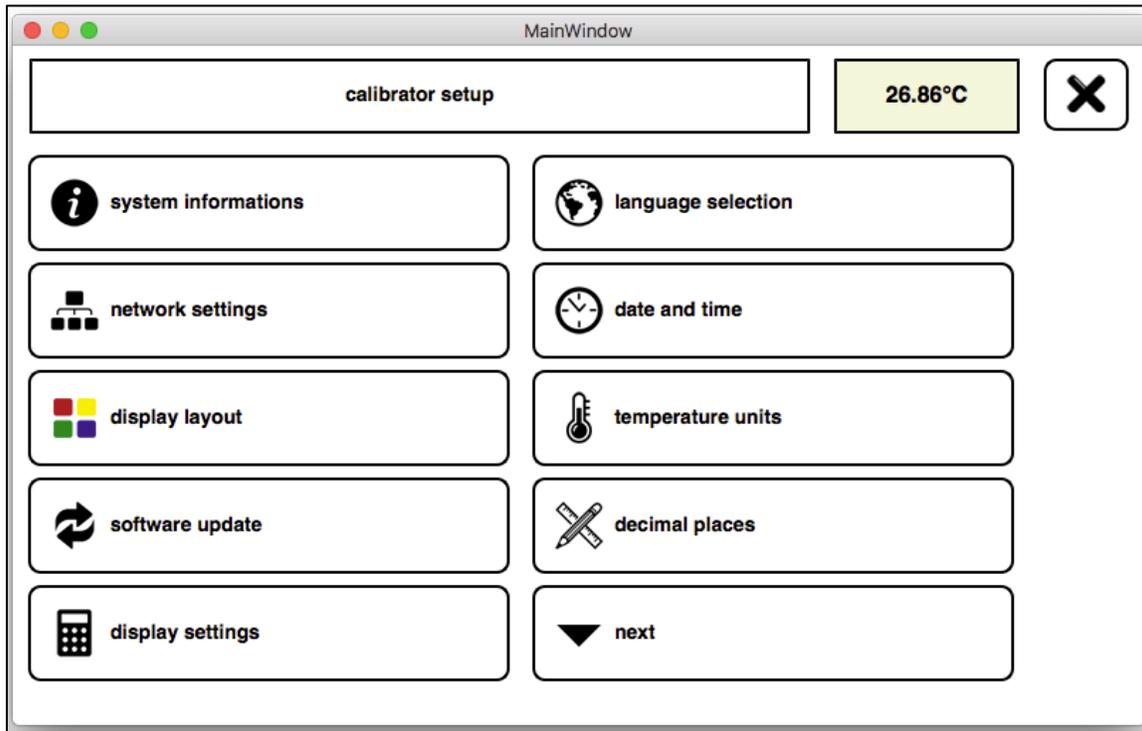
Once powered on, the Kaye HTR-420 splash screen appears for approximately thirty seconds, followed briefly by the model and firmware version, before presenting the *Remote Control* home screen.

Since the HTR-420 is predominately used for automatic calibration with Kaye validation equipment, the unit automatically boots into the *Remote Control* screen with the following default settings:

• Mode		Remote Control mode
• Function:		Dry Block
• Control Temp:		External Reference Probe
• Temp Controller		OFF
• Language Selection:		English
• Date and Time:		MM.DD.YYYY and 24h
• Temperature Units:		Celsius
• Decimal Places:		0.00

4.5 Calibrator Setup

Refer to the below sections to change the default settings. To access these parameters, click on the cancel icon  in the upper right-hand corner, this brings up a new screen with the following three options: **End Remote Control**, **Switch Off**, and **Cancel**. Tap on **End Remote Control**, which takes you to the Standalone home screen. Next, tap on the tools icon  in the upper left-hand corner to bring up the **Calibrator Setup** home screen.



4.5.1. Set Screen Brightness



- You can modify the screen brightness (100% default) by tapping on the **Display Settings** calculator icon then choose **Brightness** on the **Set Display** window.
- Enter the desired value (1 through 100) for screen brightness on the numeric keyboard.
- Confirm selection by touching the check mark icon to save the change and then the to return to the  **Calibrator Set Up** window.

4.5.2. Set Language Selection



- Select Language selection from the **Calibrator Set Up** window by touching the world icon. The current language is indicated in the information box on the left while all installed languages can be seen in the selection list on the right.
- Select the desired language by tapping the desired language.
- Confirm selection by tapping on the check mark icon in the lower right of the screen, which returns you to the **Calibrator Set Up** window.

4.5.3. Set Date and Time



- Select Date and Time from the **Calibrator Set Up** window. Options are available to change the date and time format.
- ↳ By tapping the respective field, a window is opened for the input/change.
- ↳ Make the necessary adjustment then touch the check mark icon to save the change and then the to return to the  **Calibrator Set Up** window.



4.5.4. Set Temperature Units

- By tapping on the thermometer icon, a temperature unit selection list appears providing you with the option to choose between Celsius, Fahrenheit, and Kelvin.
- ↳ Touch the desired temperature unit, which is identified by a checkmark.
- ↳ Confirm selection by touching the check mark icon to save the change and return you to the **Calibrator Set Up** window.

4.5.5. Set Decimal Resolution



- You can define the format of the temperature values in the windows by tapping on the pencil and ruler icon.
- ↳ Touch the desired temperature precision, which is identified by a check mark.
- ↳ Confirm selection by touching the check mark icon to save the change and return you to the **Calibrator Set Up** window.

4.5.6. Switching Modes (Remote Control / Standalone)



- To switch to **Remote Control** mode from the **Standalone Main** mode simply tap the Validator icon.



- To switch to **Standalone** mode from **Remote Control** mode, click on the cancel **X** icon in the upper right-hand corner. A new window displays with the following three options: **End Remote Control**, **Switch Off**, and **Cancel**. Tap on **End Remote Control**, to take you to the **Standalone home** screen.

4.6 Powering Off



- To power off the unit from **Remote Control** screen, tap on the cancel **X** icon in the upper right-hand corner then **Switch Off**. A **Switch Off Calibrator** screen appears with a temporary message stating, “*system data are saved – please wait*” eventually followed by another message “*you can now turn off the calibrator*” at which point you can flip the switch in the front of the unit.

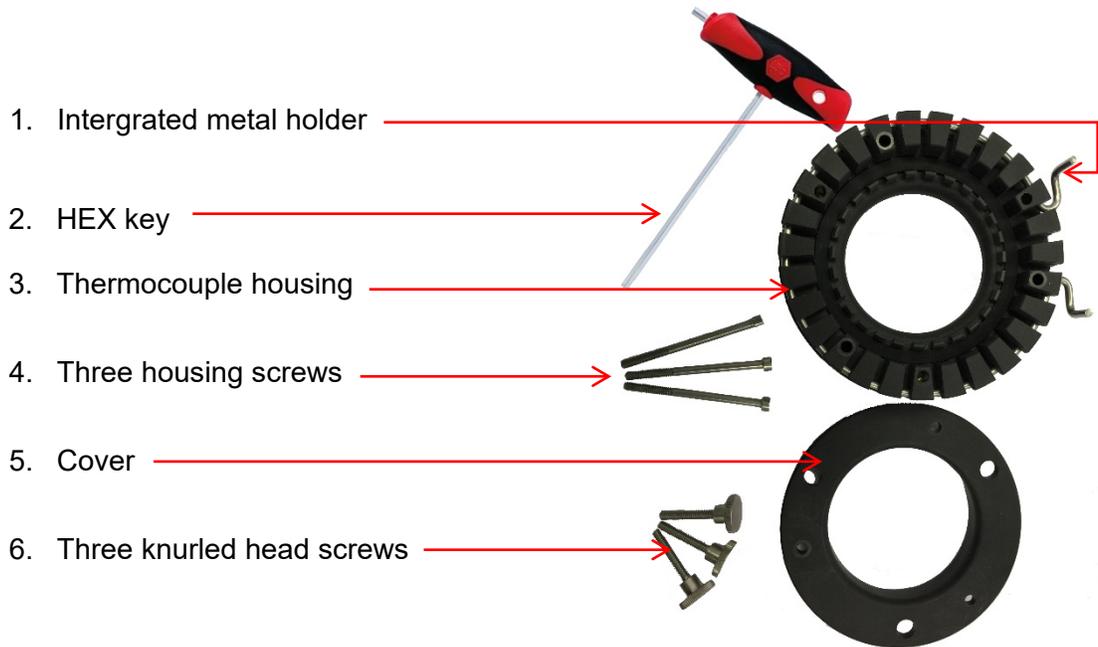


- To power off from **Standalone** screen, tap on the power icon in the upper right-hand corner and follow prompts as listed above.

Note: If the temperature value is greater than 40°C then a message appears stating, “calibrator is reaching safe temperature – please wait.” Once the value drops below 40°C, a new message appears informing that “you can now turn off the calibrator.”

4.7 Thermocouple Fixture

The HTR-420 comes standard with a Thermocouple (TC) Fixture. The Thermocouple Fixture is used with the dry block to ensure that all thermocouples are securely held at the full immersion depth of the dry block inserts to ensure accurate calibrations. The Thermocouple Fixture set contains thermocouple housing with an integrated metal holder, a cover, a HEX key, three housing screws, and three knurled head screws to hold the cover in place.

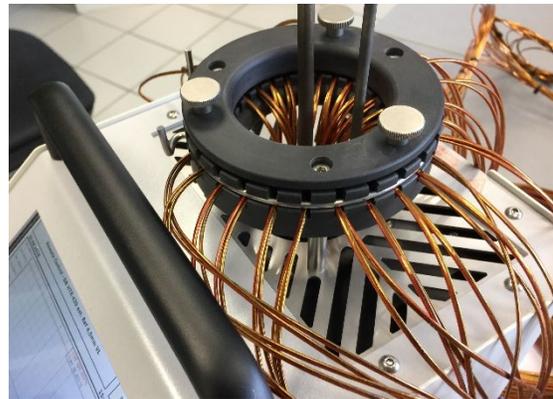


4.7.1. Installation:

- ☞ Let the calibrator cool before installing the TC fixture.
- ☞ Screw the TC housing onto the dry block thread using the three housing screws. Please do not overtighten!

4.7.2. Usage:

- ☞ Place the thermocouple into the dry block, route it through the accessible notch and rotate the metal holder to fix the position.
- ☞ Move to the next accessible notch until all thermocouples are fixed.
- ☞ Place the cover on the fixture and secure it with the three knurled knob screws.
- ☞ Place the External Reference sensor and Kaye IRTD in the dry block.



4.7.3. Removal of Thermocouples Holder:



The thermocouple holder may be hot after use. Wait for the HTR-420 to cool to a safe temperature before touching or removing the holder.

- ✎ Remove the IRTD and sensors and the three knurled knob screws.
- ✎ Remove the cover.
- ✎ Remove the thermocouples from the housing notches by rotate the metal holder until all thermocouples have been successfully dislodged.
- ✎ Using the HEX key, remove the three housing screws.
- ✎ Remove the thermocouple housing from the HTR-420.



Chapter 5. Automatic Calibration Mode

The HTR-420 was designed to interface with all Kaye Validation products (IRTD, Validator AVS, Validator 2000, ValProbe, and RF ValProbe) to support automatic calibration of validation sensors and loggers. The unit is backward compatible with all versions of Kaye validation software which means that no software upgrades are required to use the HTR-420.

During the automatic calibration process the appropriate Kaye software automatically steps the HTR-420 thru the programmed set points defined in the Kaye software. The Kaye software automatically determines stability and deviation of the sensors and loads the calculated offsets to the Kaye hardware. Calibration/ Verification reports are generated by the applicable Kaye software.



See the appropriate Kaye Software manual for detailed instructions on how to setup the automatic calibration software.

An IRTD Temperature standard is required for automatic calibration of all Kaye software.

Prior to performing calibration and/or calibration verification, Kaye recommends the following best practices to maximize accuracy and system performance:

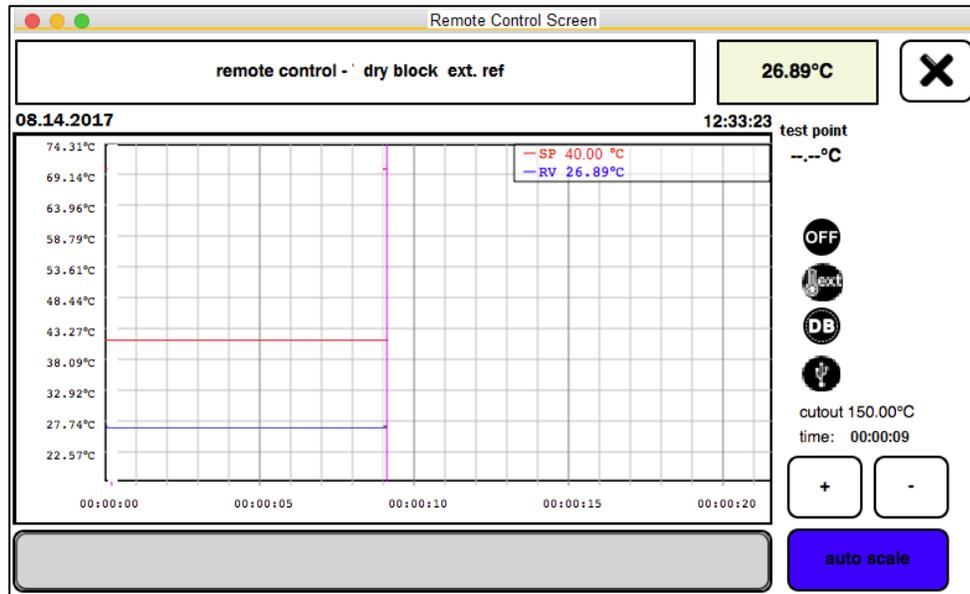
- Place the thermal validation system along with the HTR-420 in a location with stable ambient conditions and away from any local heat or cold sources, such as close proximity to a sterilizer, supply air duct, or door opening to a cold storage unit.
- Power on the Kaye validation system and allow it to acclimate in its testing environment for approximately 20 minutes prior to initiating calibration or calibration verification process.

5.1 Starting Automatic Calibration

- ✎ Connect the IRTD to the appropriate Kaye validation hardware and place into the insert utilizing the IRTD slots. Verify with Kaye validation software that on the calibration Hardware screen that the IRTD is displayed as being connected
- ✎ Connect the supplied External Reference Probe to the front panel of the HTR-420 and place in the insert using the appropriate slot.
- ✎ Place the Kapton thermocouples into the wells utilizing the well sleeves. Ensure that each thermocouple tip is touching the bottom of the well by gently pushing down until the sensor can go no further without bending.

Note: Due to the high heat capabilities of the HTR-420, Kaye recommends using Kapton wires over Teflon as Teflon can melt at temperatures over 220°C.

- ✎ Connect the USB end of the supplied USB to Serial cable to one of the three (3) USB slots in the front panel of the HTR-420. Connect the serial end of the supplied cable to the existing bath cable supplied with your Kaye Validation system, and then to the Kaye Validation system.
- ✎ Power up the HTR-420. The HTR-420 boots up into Remote Control mode.



- ✎ Verify the following are displayed:



Controller is OFF (heat). Test Point is left blank



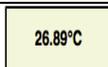
External Reference (error message displays if not connected)



Appropriate *Function* is configured (dry block, tub insert, surface)



USB to Serial cable connected to HTR-420

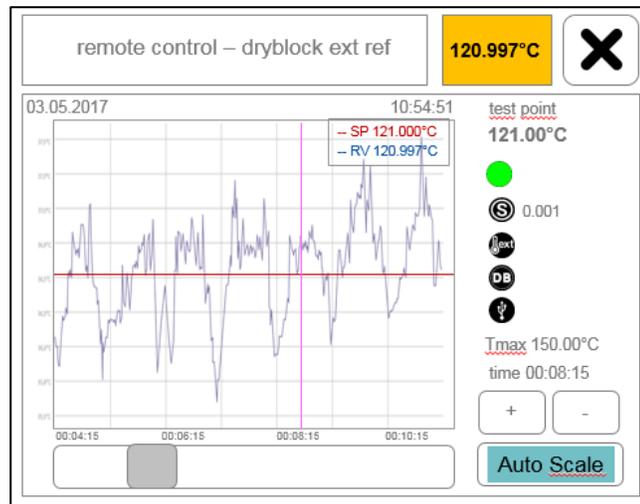


External Reference Control Probe Temperature is displayed.

- ↪ Using the Kaye validation software verify on the calibration hardware screen that the HTR-420 is displayed as being connected.
- ↪ Start the Kaye calibration or calibration verification process from the Kaye validation software. The HTR-420 is now controlled by the Kaye validation software. The HTR-420 is automatically programmed via the Kaye validation software with all appropriate set points.
 - During the automatic calibration process the HTR-420 *Remote Control* screen provides the following status information:

●	●	Status (Start/ At Setpoint)	
OFF	❄	🔥	Control (Off / Cool / Heat)
Ⓢ	0.010	Regulation (Displays when Stable with Standard Deviation)	
🔊	Audible Alarm when RV Stable		

- During the automatic calibration process the HTR-420 Remote Control screen also displays and graphs the set point (red) and the External Reference Probe value (blue), in digital and graphical format.



- The graph displays the reference value (RV in blue) and target test point (SP in red).
- User can zoom in or out the graph by tapping on the plus or minus icons.
- User can also scroll back to the start of test to view the historical trend by tapping down and sliding the grey box immediately to the left of the Auto Scale box. To return to current time and temperature, simply release hold of the grey box.
- Following completion of testing, allow the HTR-420 to return to ambient conditions before carefully removing the thermocouples and IRTD before powering off the unit. Never attempt to remove sensors immediately following testing at elevated temperatures ($\geq 45^{\circ}\text{C}$) as it could cause personal injury.

Note: The HTR-420 is left programmed at the low set point as defined in the Kaye validation software.

Chapter 6. Standalone Manual Mode

While the Kaye HTR-420 was primarily intended for automatic calibration with the Kaye Validation products it can also be utilized as a Standalone dry block for a wide range of sensors and applications. This makes it ideal for general use in the metrology lab.

In *Remote* mode, the HTR-420 relies solely on the associated Kaye software to define and control the set points, dwell times, ramp and soak profiles, perform datalogging, and report generation.

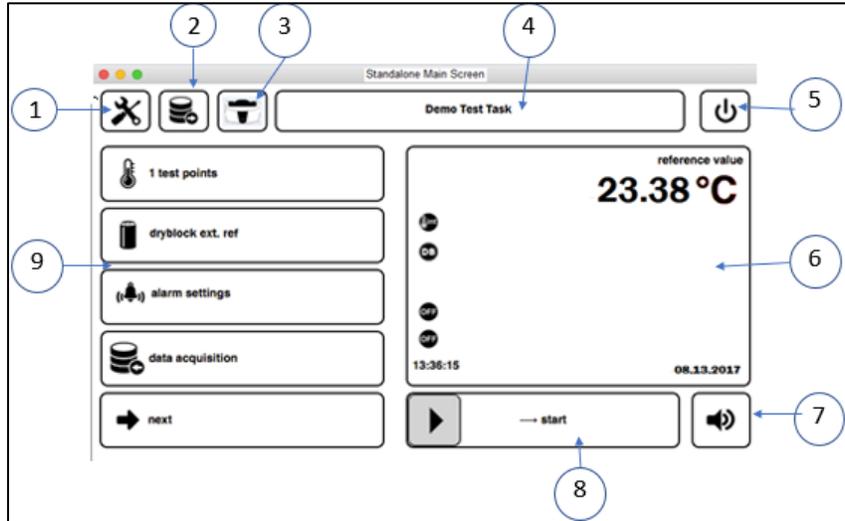
In *Standalone* mode, utilizing the easy to use touchscreen, the user has the flexibility of configuring these parameters under *Test Tasks*. Test tasks are containers for defined test conditions. They are helpful for recurring testing processes and standardizing test sequences.

All the required settings and configurations for the calibration of test sensors are compiled in a test task. The parameters of the testing task can be saved, and easily selected later for specific testing.

The operational concept of the HTR-420 in *Standalone* mode is based on self-defined test tasks, which are described below.

6.1 Standalone Main Screen

The individual icons and key features of the main screen are presented in brief in the following.



-  ① **Calibrator Set Up:** By using the tools icon, you can reach the "Calibrator Set Up" screen. There, you can change the settings of the calibrator.

-  ② **Measurement Reports:** By using the reports icon, you can reach the "Select measurement report" screen. There, you can select saved measurement logs and view them.

-  ③ **Remote Control:** By using the validator icon, you can switch back to remote control screen for automatic calibration with Kaye products.

- ④ **Test Task Selection:** Using this parameter field, you can reach the "Select Test Task" screen. There, you can select the saved test tasks and create or configure your own test tasks.

-  ⑤ **Power Off:** By using the power icon, you can switch the calibrator off.

- ⑥ **Selected Test Task Details:** The reference temperature, the set temperature as well as additional information related to the selected test task.

-  ⑦ **Alarm Signal:** By tapping the alarm annunciator icon, you can switch the alarm signal on or off. 

Note: To define when alarm signal is to be activated, tap on the alarm setting icon. 

- ⑧ **Start / Stop Slider:** The start / stop slider is used to start  or end  the testing process.

- ⑨ **Configuration Range:** You can use the parameter fields of the configuration range to get to the parameter screens of the calibrator.

6.2 Toolbars and Icons

The individual icons and key features of the main screen are presented in brief in the following.



Cancel / Back: Return to the previous window. Changes are discarded without saving.



Input confirmation / Save: The selected value or setting is confirmed and saved.



Manage / Configure: The selected entry is processed, and the relevant screen is displayed.



Copy: The selected entry is copied, and the relevant screen is displayed.



Create New: A new entry is generated for the selection list and the relevant screen is displayed.



Delete: The selected entry in the selection list is deleted.



Search: The selection list is searched, and the result is displayed in the selection list.



Sorting A-Z: The selection list is sorted alphabetically in ascending order.



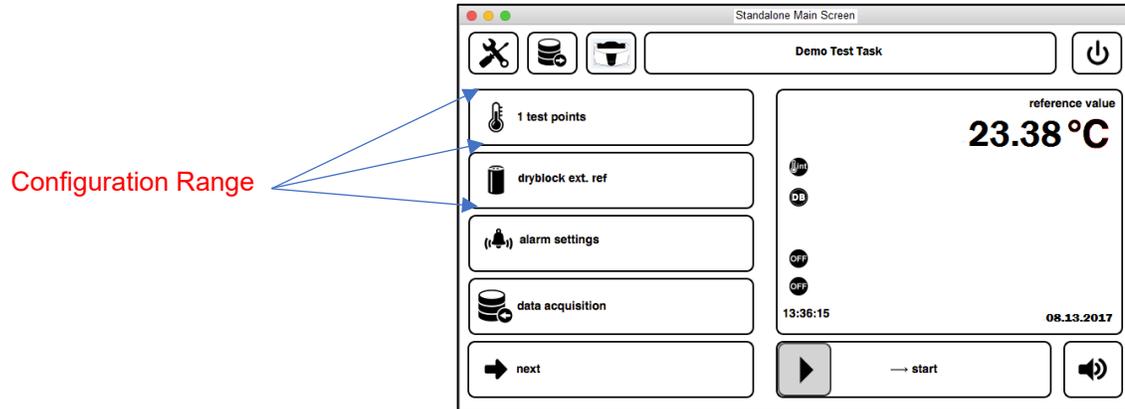
Sorting Z-A: The selection list is sorted alphabetically in descending order.



Export: The selected entry is copied, and the relevant screen is displayed.

6.3 Configuration Range Settings

The calibrator settings can be easily and quickly changed directly from the configuration range. Selecting any of the options opens the appropriate screens for changing set points, function, or alarm settings.



The operation of the calibrator via the configuration range is particularly well suited for one-off testing processes. You can directly set the required test conditions and then start the testing process by swiping right the start icon. 

You can save the new test conditions under the current test task or a new test task. Without saving, the test conditions are discarded.

6.4 Test Tasks

Test tasks are containers for defined test conditions. They are helpful for recurring testing processes, standardizing test sequences, and generating measurement logs.

All the required settings and configurations for the calibration of a test specimen are compiled in a test task. The parameters of the testing task are saved and linked to the selected functions

The operational concept of the calibrator is based on pre-installed and self-defined test tasks. They are a central component of the function and operation of the HTR-420 in *Standalone* mode.

The calibrator is shipped with functions and basic testing tasks defined in the factory internally stored. These protected test tasks cannot be deleted nor edited. They serve as templates for your own self-defined test tasks. You can define your own test tasks for different test sequences. These test tasks are directly saved in the calibrator for ready access and activation.

From the *Standalone* main screen, the current test is displayed.



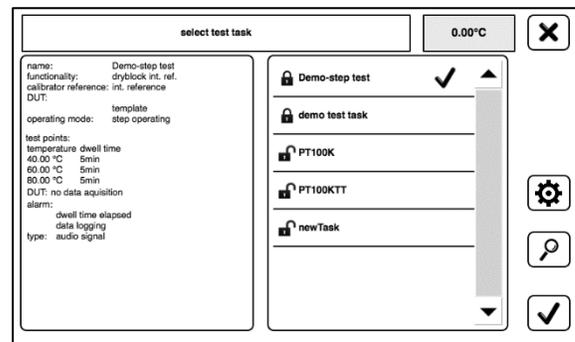
Tap the *Current Test Task* window to go to “Select Test Task” screen.

Select Test Task:

Information on the selected test task is displayed in the information box.

All the test tasks of the calibrator are displayed in the selection list.

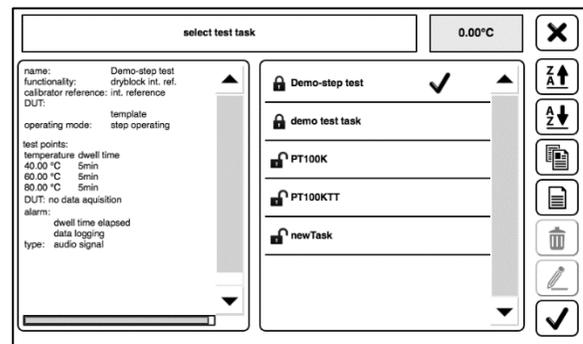
From the toolbar, you can accept the selected test task, search for test tasks, or switch to *Manage Test Task*  for *managing and configuring the test tasks*.



Manage Test Task:

This window differs slightly from the *Select Test Task* screen only by the functional elements appearing in the toolbar.

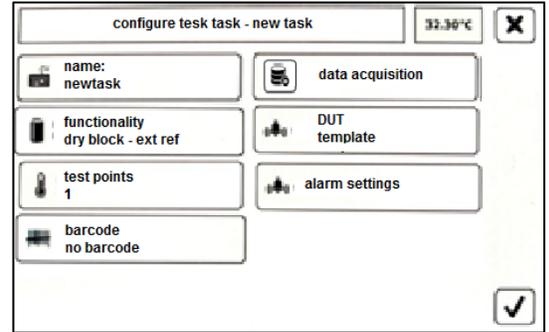
The test tasks can be sorted, copied, deleted, configured, or new ones created.



Configure Test Task:

From the *Manage Test Task* screen, you can use the  icon to go to *Configure Test Task*.

Here, you can change the parameters of the selected test task.



- Tap on the desired parameter field you wish to change. The window of that parameter is opened, which you can then edit. Below is a listing of the available fields and brief function description.



Name: Here, you can change the name of the test task through the virtual keyboard when the input line is displayed.

- Input the new name of the test task and confirm the input.
- When the new name is adopted, you are then returned to the previous window.

Functionality: Here, you can link the desired function of the calibrator with the test task.



IMPORTANT!

The selected function must be suitable for the calibrator type and the measuring insert used.

- Select the desired function by tapping on  in the selection list.
- Confirm the selection by using the  icon.
- The new function is adopted, you are then returned to the previous window.

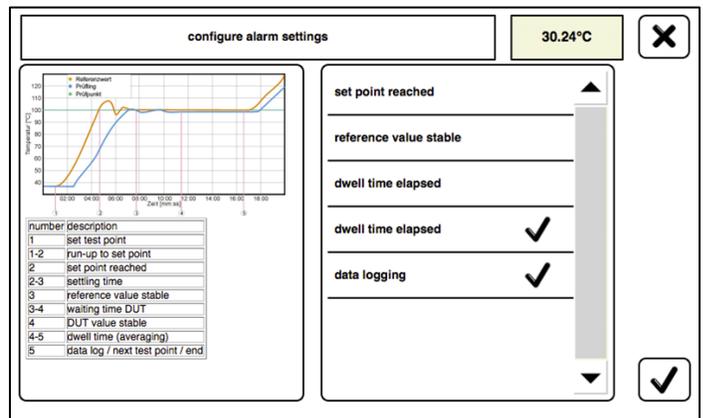


Data Acquisition: Here, you can enable data acquisition and give the file a name or it can be disabled.



Alarm Settings: Here you can select from a variety of choices should you want an audible alarm to sound when conditions are met.

- Select the desired alarm setting by tapping on  in the selection list.
- Confirm the selection by using the  icon.
- Confirm the selection by using the  icon.



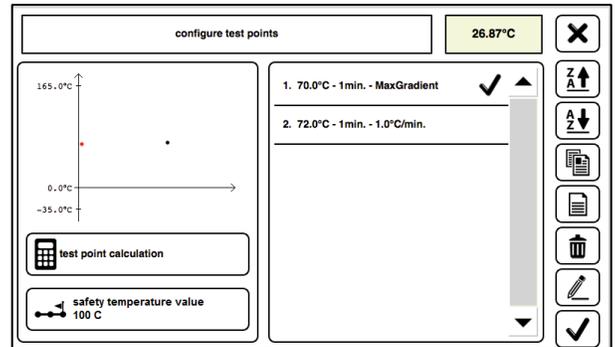
**Test Points:**

The parameters of the test points are set here. You can set the parameters of one or more test point(s).

The information box has several parameter fields for setting the test points.

All the test points are displayed in the selection list.

The test points can be moved, copied, created, deleted or changed from the toolbar.

**Move test point:**

- ↳ Select the desired test point by tapping on ✓ in the selection list.
- ↳ Move the test point down or up by tapping the / icons.

Copy test point:

- ↳ Tap on the icon to copy the selected test point.
- ↳ The test point is copied and appended at the end of the selection list.

**Create new test point:**

- ↳ Tap on the create icon for a new test point.
- ↳ The window for the test point setting is opened.
- ↳ Input the temperature, the dwell time, and gradient then confirm the relevant input.
- ↳ When the input values are adopted you are then returned to the previous window.

**Delete test point:**

- ↳ On tapping the delete icon, the selected test task is immediately deleted.

**Change test point:**

- ↳ Tap on the modify icon to edit the selected test point.
- ↳ The window for the test point setting opens.
- ↳ Change the temperature dwell time and gradient and confirm the new values.
- ↳ When the new values are adopted you are then returned to the previous window.

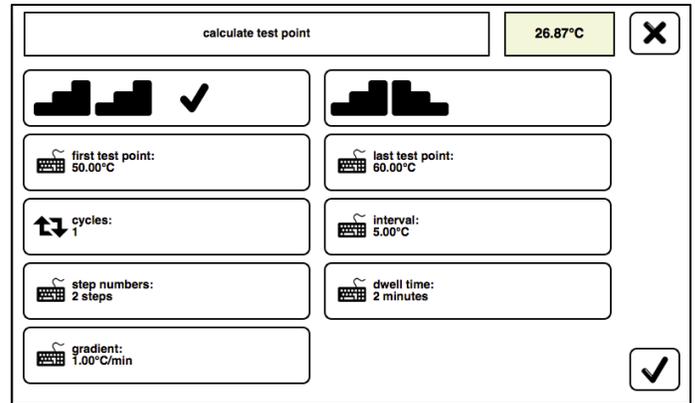
**Calculate test points:**

Here, you can easily have the steps between two temperatures calculated. If a change is made to a parameter, the other parameters dependent on it are calculated afresh automatically.

- ↳ Tap the parameter field to open the window *Calculate test points*.

Define Test Points:

- ✎ To do so, tap on the parameter fields (i.e., *first test point* or *last test point*), input the new values and confirm the input.
- ✎ When the new values are adopted, the interval is calculated afresh, and you are returned to the previous window.



Set Interval:

- ✎ For fixed intervals, tap on the parameter field *Interval*, input the desired step width and confirm the input.
- ✎ When the new interval is adopted, the number of steps is calculated. If necessary, the last test point is also adjusted to match, and you are returned to the previous window.

Set Cycles:

- ✎ You can set the number of cycles here. For every cycle, the test points in the selection list are approached successively.
- ✎ Tap on the parameter field to change the number of cycles.
- ✎ Input the desired number in the input window and confirm the input.
- ✎ When the new values are adopted, you are then returned to the previous window.

Set Steps:

- ✎ Tap on the parameter field *Number of Steps* to change the number of steps. Input the desired number and confirm the input.
- ✎ The number of steps is adopted, the interval is calculated afresh.

Set Dwell Time:

- ✎ Tap on the parameter field *Dwell Time*, input the new values and confirm the input.
- ✎ When the new value is adopted, you are then returned to the previous window.

 **One-Sided Step Selection:**

- ✎ Activate the parameter field by tapping if the test points are to be approached in succession from the first to the last test point.

 **Two-Sided Step Selection:**

- ✎ Activate this parameter field by tapping if the test points are to be approached in succession from the first to the last back to the first test point.

Select Gradient:

- ✎ Tap on the parameter field *Gradient*, input the new values and confirm the input.
- ✎ The new value is adopted, you are then returned to the previous window.
- ✎ At the completion of configuration of the test task, continue to tap the check mark icon thru all screens until you return to the *select test task* screen.
- ✎ To load, select desired test task and tap the check mark icon. The test task loads, and the screen returns to the *Standalone* main screen with the name of the selected test task.

Chapter 7. Starting Standalone Manual Calibration



CAUTION! Risk of burns!

The calibrator can become very hot when in operation. Touching hot parts can result in serious injuries.

- Never touch the metal block, the dry block insert, external reference probe, or the test specimen at temperatures above 35°C.
- Allow the calibrator to cool before you remove the test specimen/external reference probe, change the dry block insert or switch off the calibrator.

Before the testing process

Before the start of the testing process, check whether:

- The instructions regarding the installation site and the operational position have been complied with
- The electrical connections have been made correctly.
- The electrical connection has been grounded – otherwise the HTR-420 will not heat nor cool.
- The correct measuring insert has been selected for the test task.
- The test sensors are securely fixed in the calibrator.
- The calibrator has sufficient structural stability.

Starting the testing process:



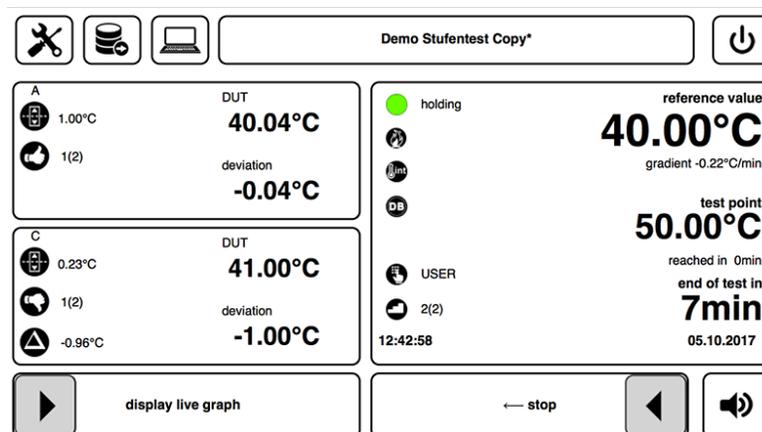
IMPORTANT! Parameter fields disabled!

During the testing process, all the parameter fields, except for the Start / Stop slider and the alarm signal, are disabled.

- Push the button of the start / stop slider completely to the right.



- The testing process is starts. Information on the testing process and the temperature progression displays in the window.

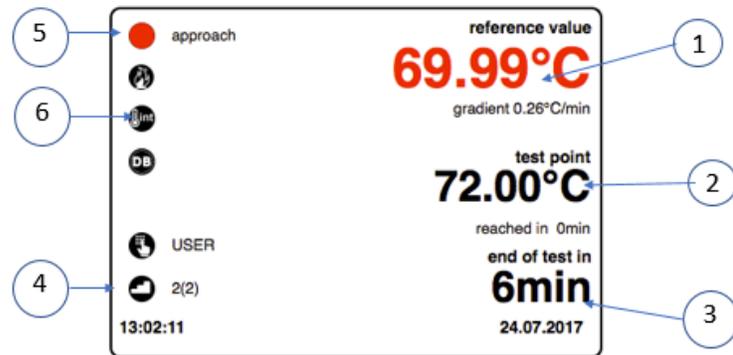


- ↵ To see live display of current reference value against target test point, touch and slide the right arrow icon from its left side location to far right-side location of the *Display Live Graph* field.
- ↵ The *Live Graph* screen appears, displaying current reference value (RV in blue) and target test point (SP in red) along with current elapsed time of test.
- ↵ User can zoom in or out the graph by tapping on the plus or minus icons.
- ↵ User can also scroll back to the start of test to view the historical trend by tapping down and sliding the grey box immediately to the left of the **Auto Scale** box. To return to current time and temperature, simply release hold of the grey box.
- ↵ Tap the **X** icon in the upper right-hand corner to exit live trend.

Display Range:

The following information is shown in the display range:

- ① Current External Control Reference Probe value.
- ② Current test point / set point.
- ③ Probable remaining test duration for the current test point.
- ④ Step counter for stepped operation.
- ⑤ Reference Status.
- ⑥ Reference used (ext).



- ↳ The test continues running until its desired parameters have been achieved then automatically stops and ramps back to its default startup temperature. **Note:** If data logging is enabled, a screen appears prompting the user to enter the test temperature target value. A **Test Task Completed Successfully** window appears.
- ↳ To stop testing manually, touch and slide the left arrow next to **Stop** all the way to the left.
- ↳ To obtain logged data, tap on the data icon to bring up the **Select Log Data** screen. Tap on the desired file then the check mark in the lower right-hand corner.
- ↳ The **View Log Data** window appears providing user with the following four options:
 - Diagram
 - Table
 - Export Log Data
 - Export All Log Data
- ↳ Choose the desired option(s).
- ↳ Following completion of test, power the unit down.

Note: If the temperature value is greater than 40°C then a message appears stating, “calibrator is reaching safe temperature – please wait.” Once the value drops below 40°C then a new message appears informing that “you can now turn off the calibrator.”

After the testing process:

- ↳ Allow the calibrator to cool to room temperature.
- ↳ Note the instructions in the section Test Tasks on page 29.
- ↳ Clean the calibrator.

Chapter 8. Maintenance and Troubleshooting

8.1 Introduction

This section provides instruction on how to care for and troubleshoot the HTR-420 to prolong longevity, maintain precision and accuracy, and functionality.

8.2 Maintenance

Before maintenance and cleaning, ensure that the HTR-420 has sufficiently cooled and that the unit has been powered off and unplugged from the electrical outlet.

8.2.1. Dry Block

- ↪ If recently used, allow the HTR-420 to stabilize at room temperature before attempting to remove the adapter sleeve.
- ↪ Once properly acclimated, use the insert exchange tool to pull the adapter sleeve out of the metal block.
- ↪ Clean the adapter sleeve and the metal block with a dry or slightly damp lint-free cloth. This prevents the adapter sleeve from getting stuck in the metal block.

8.2.2. Main Unit

- ↪ Clean the unit with a dry or slightly damp lint-free cloth. Do not use sharp objects or aggressive agents for cleaning.
- ↪ Ensure that your cleaning agent cannot be a source of danger from a reaction with parts of the machine or the materials inside it. If you have any questions regarding compatibility, please contact our customer service.
- ↪ The grill openings on the base and top of the calibrator must be cleaned at regular intervals. The cleaning intervals depend very closely on the air pollution at the installation site and the daily operation duration. Clean the grill openings by vacuuming or brushing off.
- ↪ During operation, small quantities of metal dust get created in the adapter sleeves and calibration inserts, which can result in the measuring insert getting stuck in the calibration block. To prevent this, pull the measuring insert out of the calibration block with the help of the insert exchange tool and clean the measuring insert and the calibration block at regular intervals.

8.2.3. Dry Block Insert

- ↪ Replace the spring of the dry block insert, if the insert is no longer firmly seated in the block.

8.3 Troubleshooting

The following table details potential problems that you may encounter, which allows you to determine the root cause and corrective action.

Problem	Possible Cause	Corrective Action
HTR-420 and touch screen unresponsive.	Fuse has blown.	Replace both fuses even if only one is defective.
	Unknown.	Power off unit, wait a few minutes, and then power on.
	Fingers too cold or slick to allow recognition on touch screen.	Dry and/or warm up fingers.
Touch screen is dim or dark.	Brightness setting too low.	Increase brightness setting.
Sensor damage.	External reference sensor improperly or not fully connected.	Verify connection and unplug then reconnect, if necessary.
	Sensor cable broken or has a short circuit.	Contact Kaye for service.
Fan not running.	The fan is defective or blocked.	The temperature switch may have been triggered, switching off power supply to the heart cartridge. Contact Kaye for service.
	Fuse has blown.	Replace both fuses even if only one is defective.
End of temperature is not achieved.	Solid state relay is defective, or heating element has short-circuited or aged?	Contact Kaye for service.
	External reference sensor improperly or not fully connected.	Verify connection and unplug then reconnect, if necessary.
No display.	Controller defective.	Contact Kaye for service.
Powered on but not heating.	Not properly grounded.	Ensure that the HTR-420 is grounded.
Cannot communicate with Kaye AVS or Kaye Validator 2000.	Remote control not enabled.	Enable remote control on the HTR-420
	Physical interface cable connection between units absent, improper, or damaged.	Ensure cable is present and properly secured. If verified and problem persists then replace cable.

Chapter 9. Appendix

9.1 Warranty

The Kaye HTR-420, sold by Amphenol Advanced Sensors is warranted to be free from defects in material and workmanship. Liability under this warranty is limited to restoring the unit to normal operation or replacing the unit, at the sole discretion of Amphenol Advanced Sensors. The warranty is effective from the date of delivery to the original purchaser. If Amphenol Advanced Sensors determines that the Kaye HTR-420 was defective, the warranty period is;

- One year for general electronics or mechanical failures.
- If Amphenol Advanced Sensors determines that the HTR-420 was damaged by misuse, improper installation or operation, the use of unauthorized replacement parts, or operating conditions outside the guidelines specified by Amphenol Advanced Sensors, the repairs are not covered under this warranty.
- The warranties set forth herein are exclusive and are in lieu of all other warranties whether statutory, express or implied (including warranties or merchantability and fitness for a particular purpose, and warranties arising from course of dealing or usage or trade).

9.2 Return Policy

If the Kaye HTR-420 malfunctions within the warranty period, the following procedures must be completed.

1. Contact the local Customer Support Center, listed below, and provide the full details of the problem and the serial number of the unit. If the nature of the problem indicates the need for factory service, Amphenol Advanced Sensors will provide you with a "RETURN AUTHORIZATION" number and shipping instructions for the return of the unit to the nearest service center.
2. If Amphenol Advanced Sensors instructs you to send the unit to a service center, it must be shipped prepaid to the authorized repair center indicated in the shipping instructions.
3. Upon receipt, Amphenol Advanced Sensors evaluates the unit to determine the cause of the malfunction.

Then one of the following courses of action will be taken:

- If the malfunction is covered under the terms of the warranty, the unit will be repaired at no cost to the owner and returned.
- If Amphenol Advanced Sensors determines that the malfunction is not covered under the terms of the warranty, or if the warranty has expired, an estimate for the cost of the repairs at standard rates will be provided. Upon receipt of the owner's approval to proceed, the unit will be repaired and returned.

Customer Support Centers

U.S.A.

Sales and Services
Amphenol Thermometrics, Inc.
St. Marys Center
St. Mays, Pennsylvania 15857 U.S.A.
T: 814-834-9140
F: 814-781-7959
E: kaye-us@amphenol-sensors.com

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F: +49(0)7212 391 035
E: kaye@amphenol-sensors.com

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Sales and Services
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13098-396 Campinas
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China

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