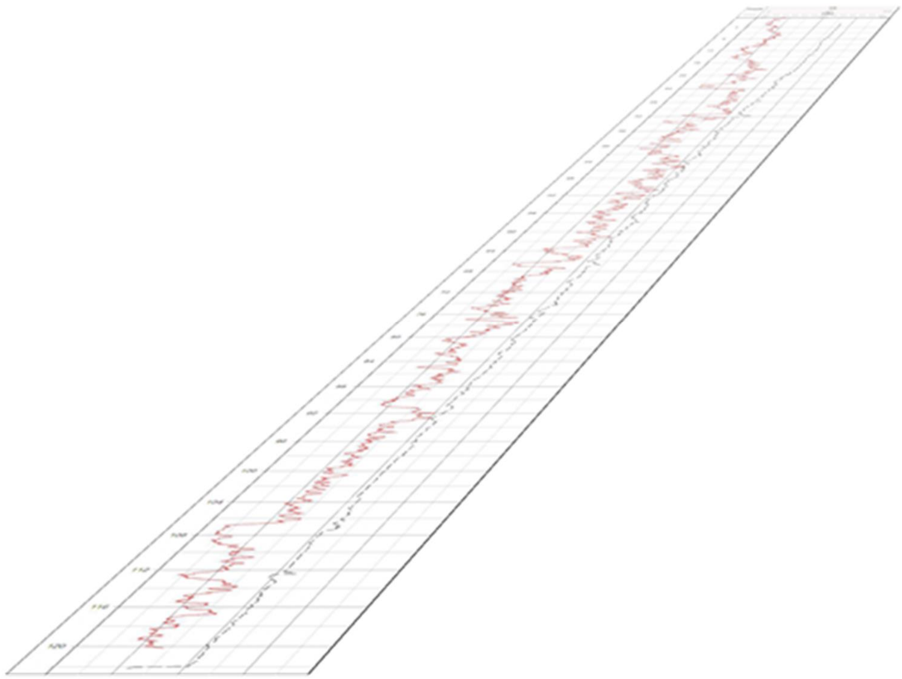

User Guide

HFP-2293 – Heat Pulse Flowmeter Probe

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Table of Contents

1 General Information

The Heat Pulse Flowmeter Model HFP-2293 is a probe designed to measure low vertical flow rates in the borehole environment. In addition to measuring the flow rate, the Heat Pulse Flowmeter will also record direction of fluid flow, up or down in the borehole.

The Heat Pulse Flowmeter is supplied with Microsoft Windows™ based MatrixHeat software, centralizers, and a range of diverters for 10 cm (4 inch) through 20 cm (8 inch) boreholes. Diverters are devices that divert flow in the borehole through a central column of the probe where the measurement is taken.

This document describes the hardware of the HFP-2293 Heat Pulse Flowmeter, installation procedures, probe maintenance and logging procedures. There is a separate document for the operation of the MatrixHeat Software, and there will be references made in this document that will relate to the software document regarding certain logging procedures.

The HFP-2293 is supplied as a standalone probe and cannot be combined with other QuickLink 40 series subs to form a tool string. It operates on the Matrix logging system and can be run on any standard wireline (mono, 4 or 7-conductor, coax).

1.1 Dimensions

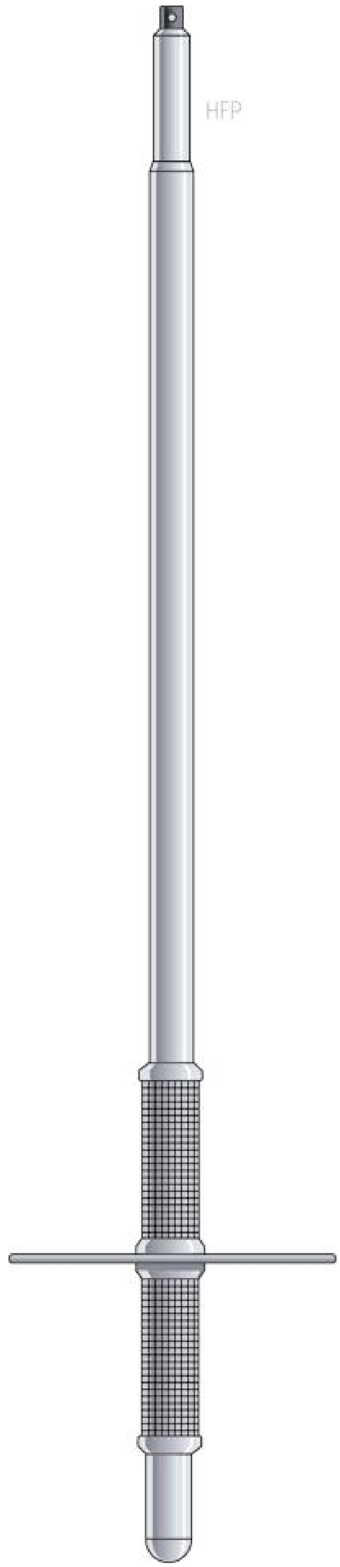


Figure 1-1 HFP-2293 Dimensions

Technical Specifications

Tool

Diameter:	41 mm (1.63”)
Cage Diameter:	53 mm (2.1”)
Length:	1.22 m (47.5”)
Measurement point:	0.24 m (9.45”) from bottom connector
Weight:	5.5 kg (12 lbs)
Min. Temp.:	0 °C (32 °F)
Max. Temp.:	50 °C (122 °F)
Max.Pressure:	200 bar (2900 psi)

Cable:

Cable type:	Mono, Coaxial, 4 or 7-conductor
Compatibility:	Matrix data logger

Tool Output:

Pulse type:	Positive going 1.25µS wide from 4.5 KHz to 37,000 KHz

Measuring Range:

Estimated by Volume Min:	0.113 lpm (0.03 gpm)
Estimated by Volume Max:	3.785 lpm (1.0 gpm)
Velocity Min:	0.046 m/min (0.15 ft/min)
Velocity Max:	3.962 m/min (13 ft/min)
Accuracy at Nominal:	5%
Accuracy at Max:	15%

Power:

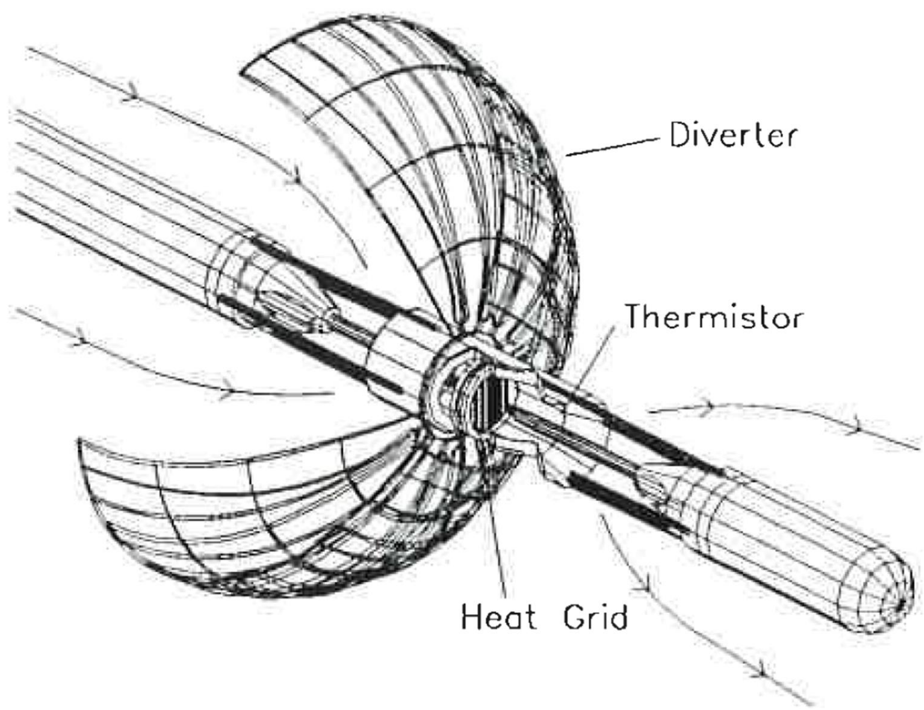
DC voltage at probe top:	Min 30 VDC Max 68 VDC
Current:	Max 200 mA while charging

2 Measurement Principle

The heat pulse flowmeter sensor is comprised of a wire mesh (or heat grid) exposed to the borehole environment with two thermistors positioned above and below this heat grid. To collect a measurement, the flowmeter is lowered into the borehole to a stationary position above or below the area of interest.

When the probe is in position to take a flow measurement, the instrument is fired from within the Matrix Heat software. This releases a high-energy pulse across the heat grid and signals the surface monitoring equipment and software to begin a flow measurement cycle. The grid heats a sheet of water that moves with the flow of the borehole to the upper or lower sensor. An amplifier detects the difference in temperature between the sensors. The output of this amplifier is then converted to a frequency. This frequency is then driven up the cable line and monitored by the surface equipment.

When the tool is fired from the surface, as described above, the tool immediately begins to charge the capacitors that produce the voltage for the heat grid in preparation for the next measurement cycle. A complete flow measurement is made when the time has been accurately measured from when the heat grid was fired to when either the sensor located above or below the heat grid detected a peak temperature change, carried by the flow.



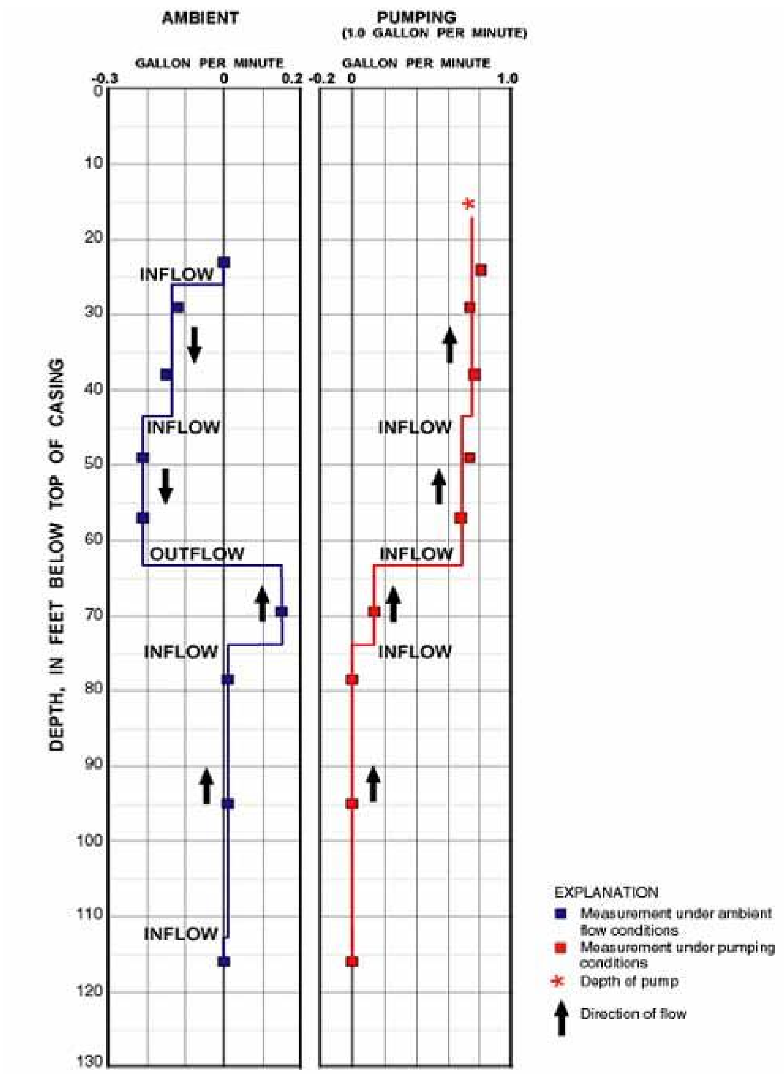


***Figure 2-1** Measurement principle (top, Colog Technical note,1994) and typical Heat Pulse Flowmeter responses (bottom, USGS Vertical Flowmeter Responses, https://water.usgs.gov/ogw/bgas/flowmeter/)*

3 Operating Procedure

Note: Parts of the topics discussed in the sections below assume that the user is familiar with the Matrix Heat data acquisition software. Refer to the corresponding **Matrix Heat manual** for more details.

3.1 Quick Start

1. Connect the tool to your wireline and start the data acquisition software, **Matrix Heat**.

2. To connect the Heat Pulse Flowmeter (HFP) to the Matrix logger, select **File → Acquire…** (Figure 3-1).

3. You will be asked to provide a .tol file; you should see the HFP2293_mtx.tol listed. Select the correct tool file and click **Open** (Figure 3-2). If you do not see a HFP2293_mtx.tol file, you will need to navigate to **C:\MatrixHeat\Tol\Current**, and paste the .tol file here.

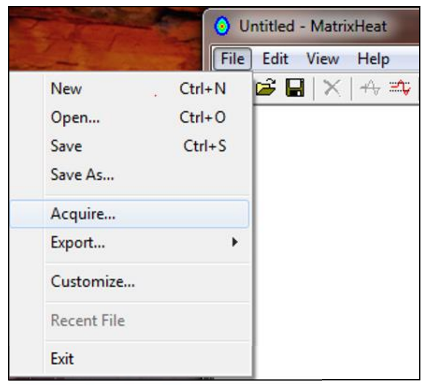


Figure 3-1 *Acquire*

__NOTE:__ Do not install .tol files for any other tool in this directory. It is possible to have more than one Heat Pulse .tol file in the directory, if you have more than one probe, with more than one calibration. If the Matrix logger is detected by the USB routine on the PC, the .tol file will be loaded, and the current depth value in the Matrix logger will be loaded.

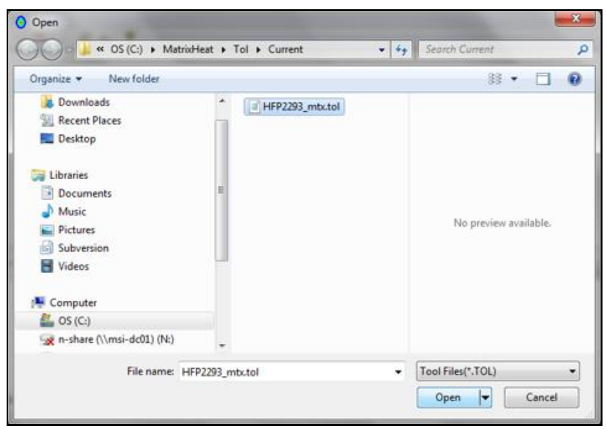


Figure 3-2 *HFP Tool File*

__NOTE:__ If the logger has been used with a different winch model, it may be necessary to exit the program and verify (with LoggerSettings.exe) that the proper depth encoder settings are programmed into the logger. Refer to the Logger Operating software manual for more details.

4. In the **Tool** panel switch on the tool (click **On** button) and verify that the power indicator shows a valid (green) level. The system goes through a short initialization sequence and begins charging the capacitors that will pulse the heat grid thermistor. You must wait for the Charging bar to finish loading before moving on (Figure 3-3).

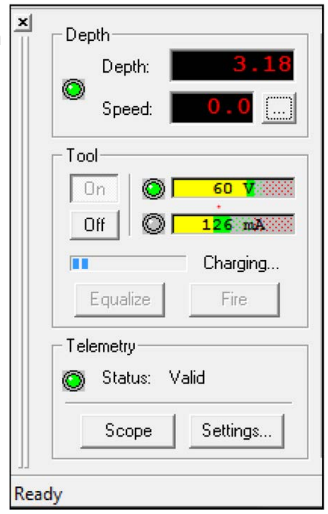


Figure 3-3 *Tool panel*

5. After the probe is powered up, it will take several minutes for the probe measuring array to stabilize and for the firing capacitors to charge up. This is a good time to confirm that the proper calibrations for the probe have been entered in the .tol file and saved. (For information on HFP calibrations see **Section 4: Performance Check & Calibration**)

6. It is recommended that the user check the probe data to confirm that it is operating properly, and is ready to begin a logging operation. (For information on HFP performance check see **Section 4: Performance Check & Calibration**)

7. Now you will need to confirm that you have the correct telemetry set up. If a normal (18-20 kHz while submerged in water) value is not indicated on the heat-pulse real time acquisition screen, modem adjustment may be required. To access the modem controls, click on the **Settings** button on the **Telemetry** panel and then on **Advanced** to show the modem settings: The advanced modem settings are embedded in the .tol file, depending on the wireline type and length. (For information on HFP tool communications see **Section 3.3: Tool Communication with MATRIX**).

8. Lower the HFP to the correct zero point (For more information on setting up the tool see **Section 3.2: Tool Setup and Installation**). The probes are zeroed at the joint between the cable head and the tool top. Once you have positioned your probe at the correct position, go to the **Depth Panel**, select the icon, and click **Zero Tool**. The value that is entered into the **Depth** box is the depth to the Heating Grid (this is where the heat pulse if fired from) (Figure 3-4).

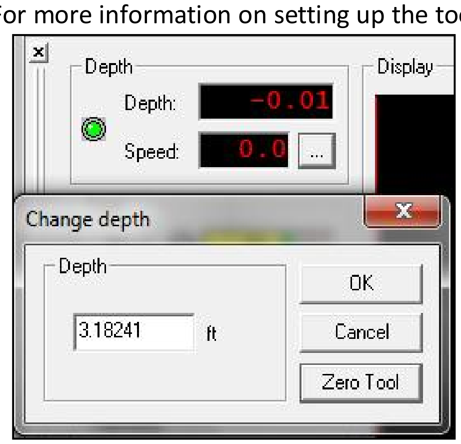


Figure 3-4 *Depth panel*

9. Once the probe is zeroed you can proceed to your desired sample point. Once you have reached the sample point you can fire the probe. Make sure you have the correct picking windows set. (For more information on setting your picking windows and firing the probe see **Section 3.4: Firing the Probe**).

10. If the shot record appears to indicate a successful flow event, the operator should press the **Add** button at the lower right-hand corner of the shot window. If the record is questionable, it can be deleted from the display with the **Clear** button.

3.2 Tool Setup and Installation

3.2.1 Diverter Selection

Operation of the Heat-Pulse Flowmeter begins by determining the borehole diameter. This will indicate the proper diverter size to be assembled on the probe to provide maximum sealing while in the borehole. Several different diverter sizes are supplied with the HFP-2293 for different borehole diameters.

The following diverter sizes are provided with the Heat Pulse tool:

- 13 cm (5 in.) used in 8 to 10 cm (3 to 4 in.) diameter boreholes
- 18 cm (7 in.) used in 13 to 15 cm (5 to 6 in.) diameter boreholes
- 23 cm (9 in.) used in 18 to 20 cm (7 to 8 in.) diameter boreholes

To log boreholes larger than 20 cm (7 to 8 in.), please contact Mount Sopris Instruments at sales@mountsopris.com.

Technical Note: The probe can be run in a 5.08 cm (2 inch) undeviated borehole without a diverter assembly to detect the direction of flow in the borehole. Although running the probe in a 5.08 cm (2 inch) hole without a diverter will give you a flow rate, it is an uncalibrated reading and cannot be held to the specifications mentioned in this document. Any attempt to use this tool without a diverter or a diverter of improper size with respect to the borehole will likely result in erroneous data.

3.2.2 Installation of Diverters

1.) To install a set of diverters, first remove the rings that capture the bottom centralizer using an Allen wrench set. Then, remove the bottom screen by loosening the setscrews and sliding the screen off.

2.) Choose the desired size of diverter petals to be used. Slide the stack of diverter petals over the bottom of the probe all the way to the top screen, and then reinstall the bottom screen, centralizer and centralizer rings. Tighten all setscrews.

3.) Install the top centralizer by loosening the setscrews on the centralizer ring to slide it off the probe. Slide the centralizer over the top of the probe, reinstall the centralizer ring and tighten setscrews in the ring.

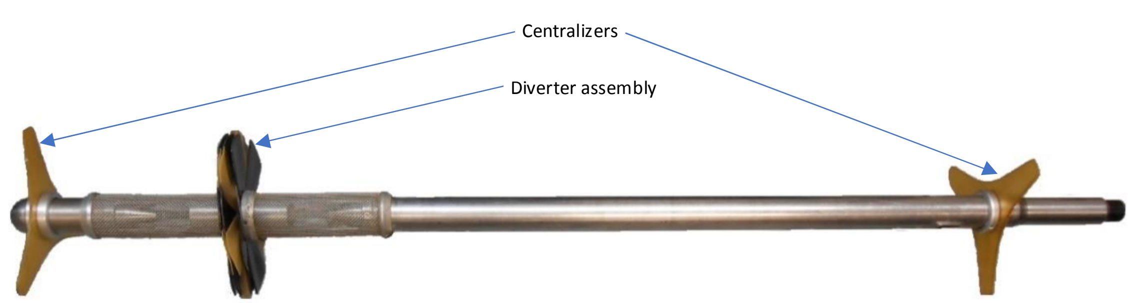


Figure 3-5. *Heat-Pulse Flowmeter showing correct installation of diverter and centralizers.*

Sealing the probe in the borehole is necessary to achieve an accurate flow determination. This is achieved by positioning the diverter petals to bend into the flow. If the flow is down the borehole, then the correct positioning of the pedals would be up, and this would be achieved by moving the probe down the hole. If the flow is up the borehole, the correct positioning of the petals would be down and this would be achieved by bringing the tool up the hole.

***Figure 3-6**. Heat-Pulse Flowmeter showing diverter petals in up positon for downward flow (left) and down position for upward flow (right).*

To flip the petals from the up direction to the down direction, tug sharply up on the tool and lower it slightly to expand the petals against the borehole then secure the wireline, without lessening the tension on the probe, with the winch controls.

This can also be done entirely with the winch controls for deeper wells. For example, if positioning the Heat Pulse with diverters up for downflow, winch the probe up to a few feet above the measurement location. Then move the probe down a few feet with the winch until it is positioned at the correct measurement depth. This is the best way to assure the diverters are positioned up at the right depth.

A caliper log run prior to the HFP-2293 may help indicate areas that contain washouts or fractures that will affect the sealing of the diverters.

3.3 Tool Communication with MATRIX

In general, the gain of the modem should be left in **Manual** mode, and the positive discriminator should also be left in **Manual** mode. This means the Automatic boxes within the Telemetry [Configur Pulse Counters] window will be unchecked.

Figure 3-5 shows proper position and settings for the Heat-pulse Flowmeter operating on a 1000-meter winch with 1/8" single conductor cable.

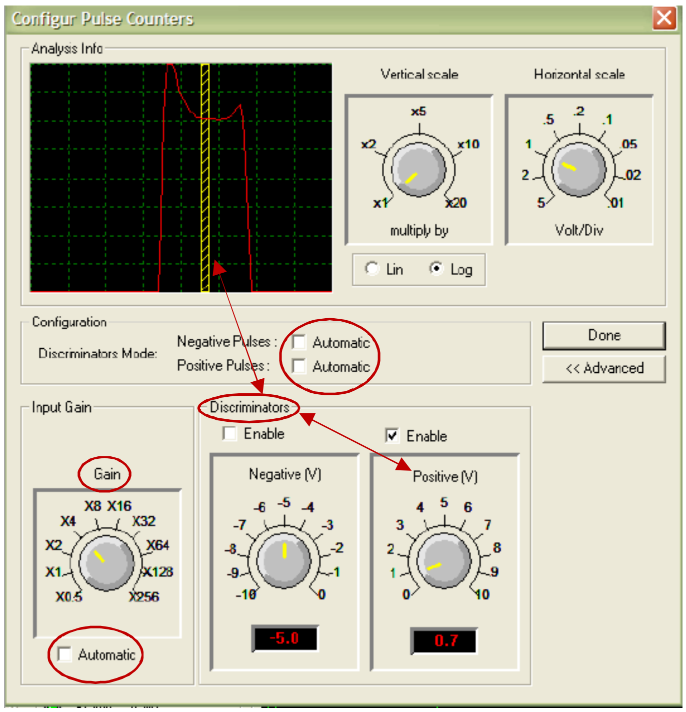


Figure 3-5 *Telemetry panel*

NOTE: Moving the discriminator slightly closer to the left-center peak and away from the signal trough may reduce spikey noise on the data trace, particularly on coaxial wireline. This is also to avoid the signal hump at the beginning when firing the tool that can be a problematic when you are monitoring higher flow rates.

Cable Length	Gain Setting
200 meters	X1
500 meters	X2
1000 meters	X4

Chart 3-1*. Recommended Gain settings for 1/8" single conductor wireline.*

3.4 Firing the Probe

When the probe is fired, a sheet of water is heated and its direction and travel time is detected by the thermistors.

3.4.1 Picking Options

Before firing the probe, the operator should set picking options to match estimated heat pulse arrival time. In a new well, with no information, it is best to set the parameters so that a long-time interval is available. Two Time Sample settings are required. One is in the **Flow Pick** window, and the other is in the **Shot Window** display. Time Sampling for the Shot Window controls record length. The Time Setting in the Flow Pick Window only controls the display of the saved flow trace.

As logging proceeds, the operator can "fine tune" these parameters to make the best use of time available. For faster flow rates, the time window can be decreased to save time. However, even for faster flows, the probe must recharge between shots, and this time is fixed.

To set picking options, click on the **Pick Options** icon on the top selection bar (Figure 3-6).

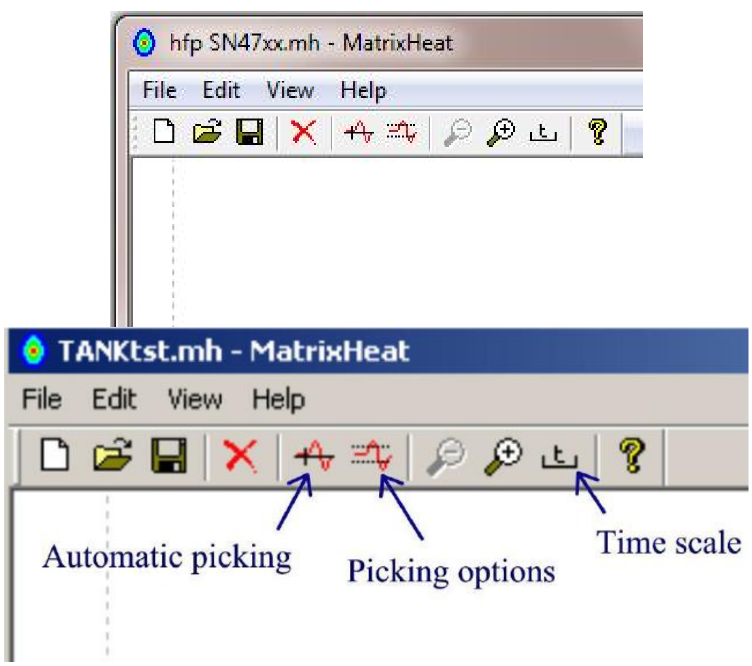


Figure 3-6 *Picking Options*

Picking options can also be accessed by clicking on **Edit → Picking Options** (Figure 3-7).

Figure 3-7 *Edit Picking Options*

- The **Window Time Min** value should be kept low, in general. It is the minimum time after which a pick will be allowed. Normally, there is no measurable flow before 0.6 seconds, as the flow is so fast that the sensors cannot see the heat pulse.
- The **Window Time Max** value is the maximum time in which a pick can be allowed. Once this value is reached, the program will stop recording, and automatically make a pick on the maximum or minimum peak produced by the heater grid within these times.
- The **Threshold ratio** is the “detection level” above which the software can make a pick. For low heat pulse peaks, the level may need to be decreased, and for very high peaks, the level can be raised.

These three parameters are represented on the plot record by dashed lines. The Time windows are vertical, and the Threshold ratio is indicated by a pair of dashed horizontal lines equidistant from the zero baseline (Figure 3-8).

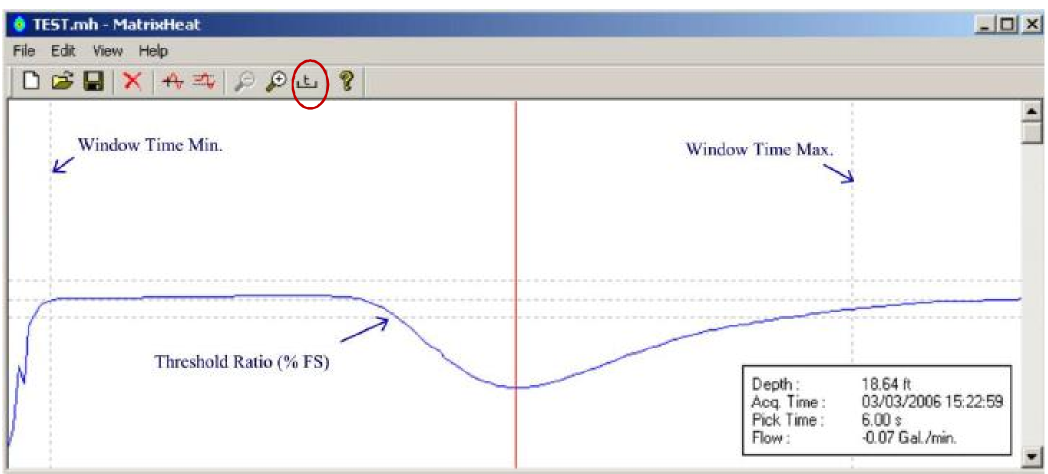


Figure 3-8 *Window Parameters*

The Time Scale parameter is set by clicking on the time scale icon  on the menu bar. It brings up a window similar to Figure 3-9.

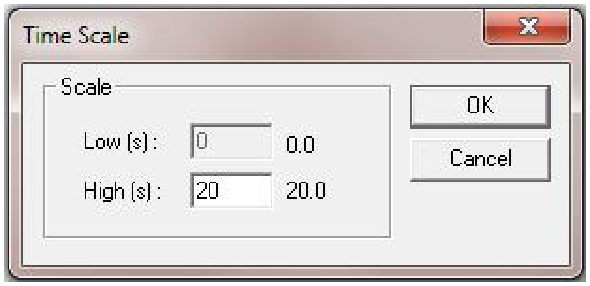


Figure 3-9 *Time Scale*

This Time Scale is the maximum time scale that will be displayed on the **Flow Picking** screen. This Time Scale is not the same time scale that is presented on the Shot Window, which is described in the **Section 3.4.2: Firing**.

A third icon on the main menu is the **AutoPick** selection. It is used to re-pick a heat pulse event in the data records, if the operator does not believe that the first pick was correct. It is used after picking parameters are adjusted, and when pressed, will automatically select a new pick, based on the new parameters.

3.4.2 Firing

Once all parameters are set, the probe can be fired. The fire button should only be pressed if a smooth baseline, with a frequency of around 20 kHz, +/- 2 kHz, is present in the shot window. If the baseline is wavy or changing with time, this is usually caused by probe induced flows, or varying water temperatures that may be entering the measurement area. The operator should wait until this background "noise" is gone before firing (Figure 3-10).

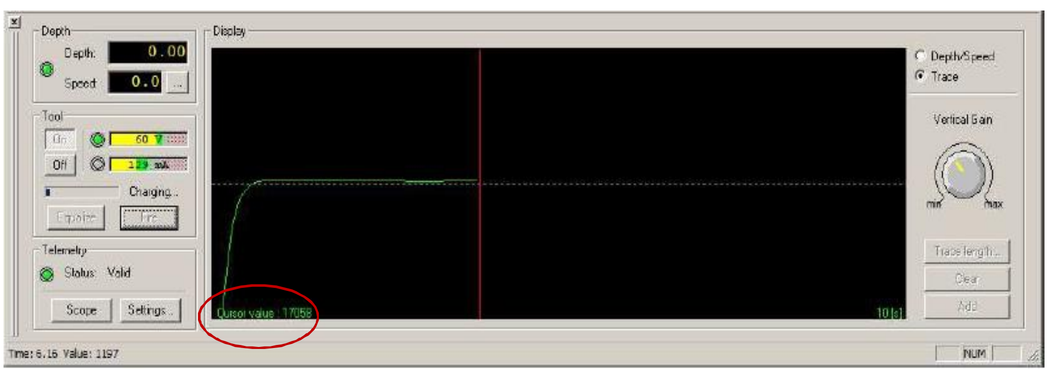


Figure 3-10 *Smooth Baseline*

Note that the Time Scale on the Shot Window is set by clicking **Trace length...** The length of the time scale on the Shot Window must be long enough to capture the heat pulse (Figure 3-11). If it is not, the operator should increase the time to make sure the pulse is detected, if one exists. Normally, there is no usable data past a time of 25 seconds. When the end of the time scale is reached, the system stops, and the probe begins its recharge cycle.

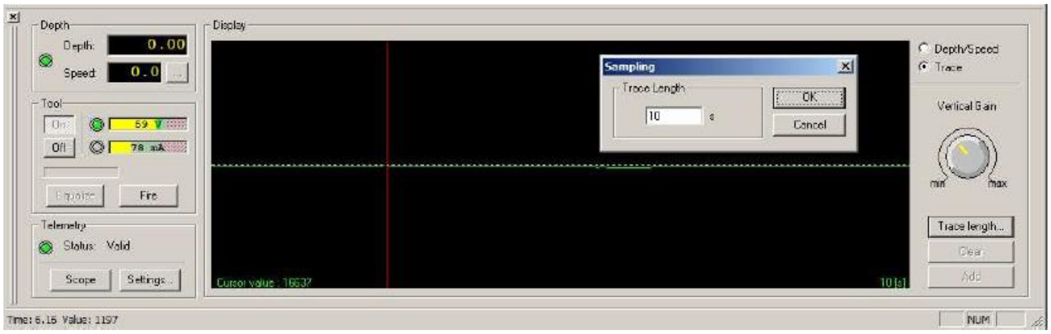


Figure 3-11 *Trace Length*

If the trace goes off the top or bottom edge as it draws across the screen turn the **Vertical Gain** dial counter clockwise towards min to shrink the trace size. To increase the trace size, turn the dial clockwise towards max.

Once the probe fire button is pushed, a real-time plot of frequency vs. elapsed time will appear in the shot window. This green line indicates the differential temperature being sensed between the two thermistors, which are located equidistant from the heater grid in the center of the measurement column. The direction indication of the flow is based on the net frequency response. If the frequency goes up, the flow is up. This is shown graphically on the shot window until the elapsed time passes the Time Scale setting chosen for the shot. After the firing event, the probe begins an automatic “charging cycle”, in preparation for the next shot.

If the shot record appears to indicate a successful flow event, the operator should press the **Add** button at the lower right-hand corner of the shot window (Figure 3-12). If the record is questionable, it can be deleted from the display with the **Clear** button.

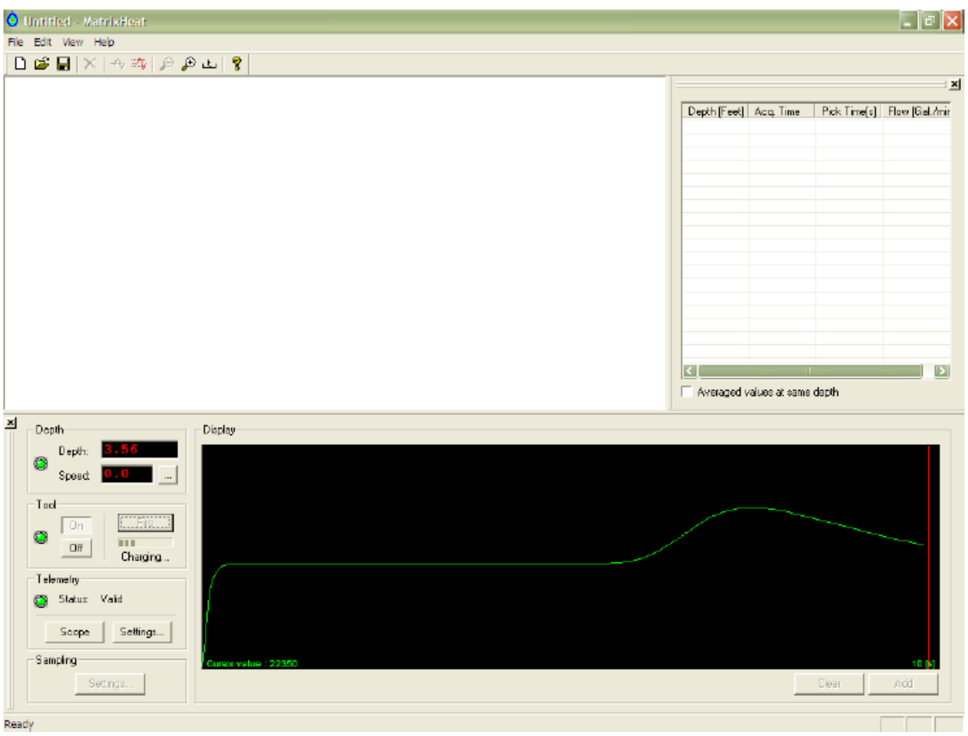


Figure 3-12 *Successful Flow Event*

This sample record appears to be valid, so it is added to the **Pick Window** register by clicking the **Add** button. The record is then moved into the Pick register table, which shows the pick information and calculated flow rate for the current shot (Figure 3-13).

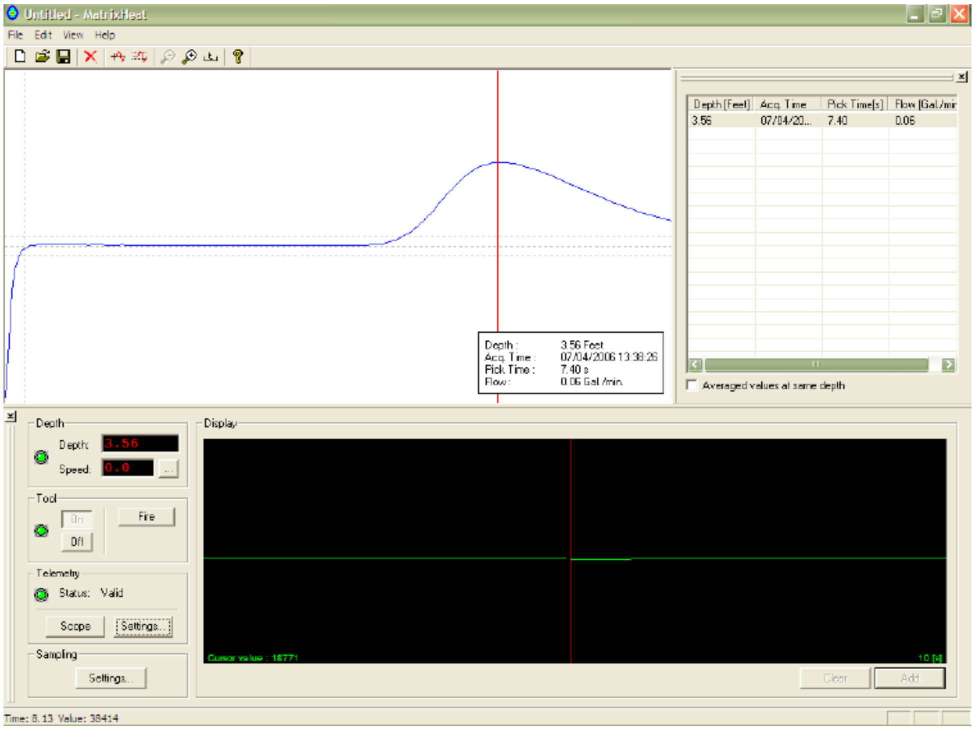


Figure 3-13 *Added to Pick Window*

To fire the probe again, the user must wait until the probe capacitors are fully charged. This process is indicated by the Charging bar located in the window with the bar graph meter, right under the **Fire** button (shown in Figure 3-3). It is a good idea to make at least **two firings per station**, to confirm the accuracy of the measurement.

3.4.3 Re-Picking

In the event that the automatic peak picking did not actually pick on the correct pulse, it is possible to adjust the Min and Max time windows to "bracket" the correct pulse, and/or change the Threshold ratio and then press the autopick button again. It will re-pick a new time within the new parameters. In general, this should only be necessary when a large change in flow magnitude occurs.

Re-picking can be done at any time, simply by highlighting the shot on the list of data in the Pick Flow table. It is even possible to "re-process" picks later, using the program without the logger connected. Simply start the program, open the data file, and proceed as above.

4 Performance Check & Calibration

Calibrations are performed at the factory and require a basic knowledge and understanding of the tool.

Prepare to Calibrate:

1. For the Flow Calibration button to be active **the probe must be fired at least one time and the data added** (click the **Add** button in the lower right side of the **Acquisition** screen).
2. To access the calibrations screen, select **Edit** on the top task bar, and then select **Flow Calibration** (Figure 4-1):

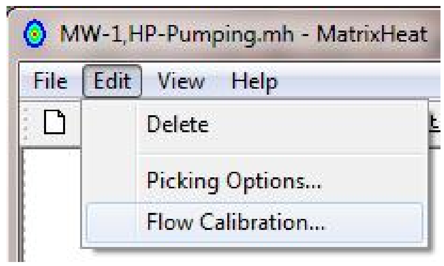


Figure 4-1 *Flow Calibration*

Calibration Settings

1. Check the calibration values on the Tool Certificate provided with the probe (Figure 4-2) against the values on the calibration screen (Figure 4-3).

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CALIBRATION CERTIFICATE

Product type : **HFP-2293**
Date:
Tested by:

Probe	
Serial Number :	
Model :	HFP-2293
Part Number :	0200M-1515

LINE	DELTA TIME	FLOW (GPM)	DELTA TIME	FLOW (GPM)
UP	13.95	0.3	0.85	1.0
DOWN	13.55	-0.3	0.85	-1.0

Figure 4-2 *Tool Calibration Certificate provided with tool at purchase.*

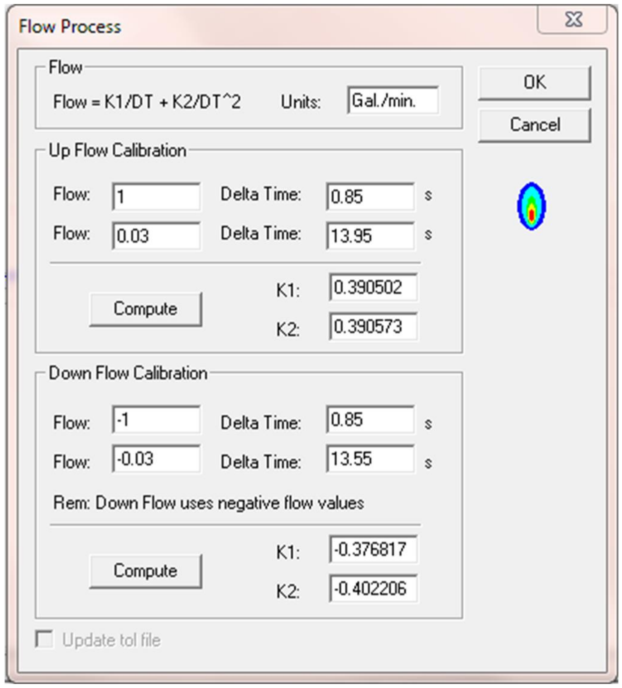

Figure 4-3 *Calibration Settings dialog box*

2. Please note that Down Flow values are negative numbers.

First Performance Check:
After entering the calibration numbers, it is recommended that the user check the probe pulse data to confirm that it is operating properly.

1. The best way to see if the probe is sending data is by clicking on the **Scope** button. A screen like the one shown below in **Figure 4-4** will appear.

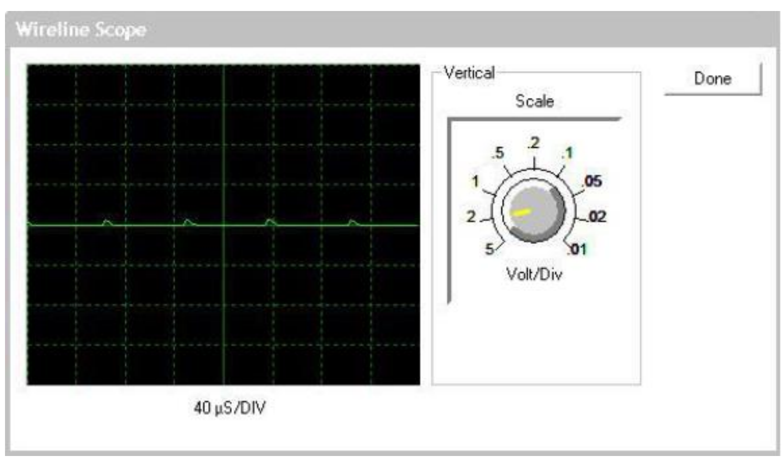

Figure 4-4 *Wireline Scope*

2. Probe data consists of a ~20 kHz positive pulse stream on the wireline, which will vary with the response of the sensor pairs to presence of a heat pulse moving past.

If you don't see this kind of data on the wireline scope screen, the probe is not sending data.

3. After confirming that the probe is sending data, the user should check the main data display screen to verify that the pulse detection modem is in fact detecting the ~20 kHz signals. This is best checked with the probe sensors submerged in water, as airflows around the tool can make it difficult for the baseline to stabilize in air.

4. **Figure 4-5** shows a properly functioning probe, with a baseline frequency of around ~19 kHz. If a zero value is indicated on the lower portion of this screen, the discriminator needs to be adjusted. This might be the case for a long wireline.

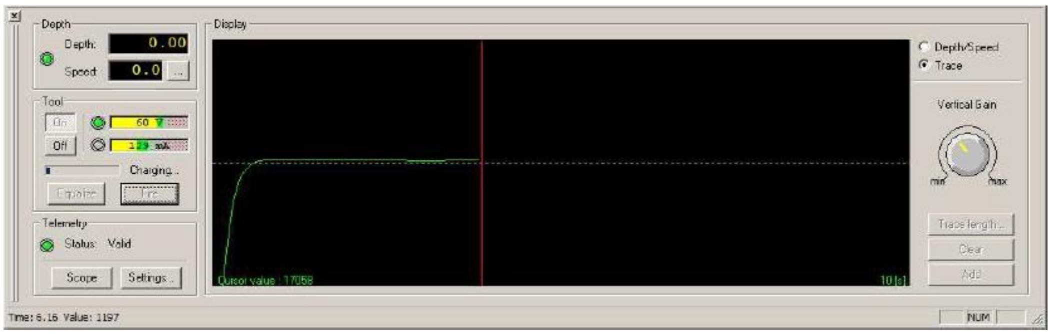

Figure 4-5 *Wireline Scope*

Second Performance Check:
After confirming that the pulse detection modem is correctly positioned when in stasis, the user can also complete a borehole simulation test in the office. Doing this test completely validates not only the firing and operation of the heat grid but the detection of up and downward flow from both sensors.

Note: If needing to test the tool in the field, the test described below could also be done in a borehole at the top just below the well's water level. It is possible to safely assume there is no flow a couple feet below the top of water level in the well. After entering water with the probe and waiting for flow to stabilize, pull on the wireline slowly or lower it after a firing of the heat grid. It should produce the same results as detailed below.

1. To do this, find a receptacle at least 50 cm (20 inches) in height. Fill it with cool water and lower the heat pulse flowmeter into the water. **Figure 4-6** shows an example.

Figure 4-6 *Heat Pulse Field Simulation Receptacle*

2. The signal shown by Matrix Heat will be erratic at first because the water in the receptacle is in flux (**Figure 4-7**). Wait until the water has calmed and the signal is flat (**Figure 4-8**). This may require a few minutes.

Figure 4-7 *Erratic signal shown just after probe enters the water.*

Figure 4-8 *Flat signal shown just after water has calmed.*

3. Fire the probe. As slowly as possible, manually lower the heat pulse probe down to simulate upflow in the receptacle. Look for a positive peak on the discriminator

(**Figure 4-9**). This indicates upwards flow and shows that the heat grid and thermistors and working correctly.

Figure 4-9 *Positive peak indicates upward flow after lowering probe.*

4. Repeat Step 3 by firing the probe and lifting it upwards to simulate downward flow. You should see a negative peak on the discriminator.

5 Maintenance

The HFP-2293 Heat Pulse Flowmeter requires regular maintenance which is very important for the long-term life of the tool. Please follow these simple procedures:

1. Keep the probe and the tool top connector clean with threads free of soil. The probe top connector should be periodically cleaned with oil free contact cleaning solvent.
2. Remove screens (**Figure 5-1** and **5-2**) and lightly rinse the thermistor sensors and mecca connectors with clean water after every use to be sure dirt and grit will not affect the measurement. DO NOT touch the thermistor sensors with your hands.

Figure 5-1 *Remove the Heat Pulse screens with Allen wrench*

Figure 5-2 *Heat pulse with screens removed.*

3. Make sure no soil has collected in the wire grid and that all wires are neatly and evenly space (**Figure 5-3**). DO NOT damage the grid by hand cleaning.

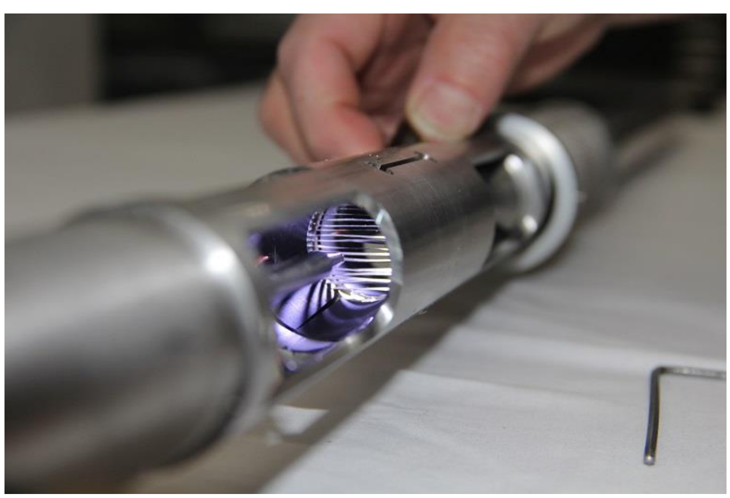

__Figure 5-3__ Heat pulse grid clean and free of dirt.

4. When the probe is transported, it needs to be contained in a vibration damped container to minimize stress on the sensors.
5. Follow the proper methods of cleaning and reapplying grease to protect the feed through areas of the lower portion of the measurement column:
    - After rinsing, allow the probe to thoroughly dry so you are not trapping moisture or debris behind grease.
    - Use the correct materials (**Figure 5-4**).
    - Verify whether you have an old or new version of the bulkhead with mecca connector cut-outs (**Figure 5-5**).
    - Apply grease using syringe and being sure to fill the area around the three mecca feed-throughs on each side of the heat pulse bulkhead (**Figure 5-6**). There are six cut-outs in total. This should be done <u>every time after logging and cleaning the tool</u>.
    - Use finger to be sure all gaps and spaces are filled with grease (**Figure 5-7**). Be careful to not touch the sensor.
    - Visually review the mecca feed-throughs to assure all connections are clean and covered in grease (**Figure 5-8**).

__Figure 5-4__ Molykote Dow Corning grease and syringe.

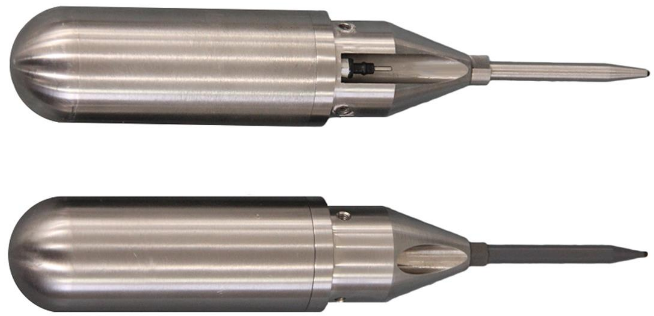

Figure 5-5 *New version of bulkhead with deeper machine cut-outs and stainless sensor stem (upper) and prior version of bulkhead with plastic sensor stem (lower).*

Figure 5-6 *Correct application of grease around mecca boot within the bulkhead cut-outs.*

Figure 5-7 *Use finger to be sure grease fills all crevasses and gaps.*

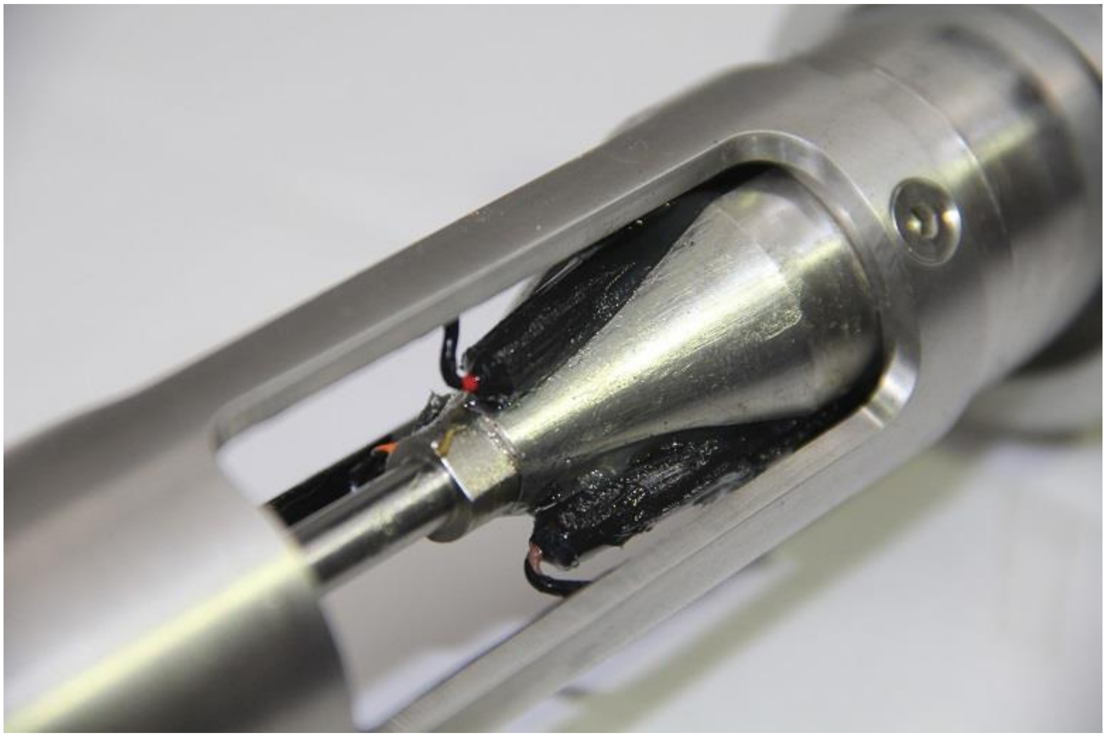

Figure 5-9 *Heat pulse bulkhead with grease correctly applied.*

6. Return the Heat Pulse screens to their protective positions on the probe body. Tighten them to ensure added protection to the probe when not in use.

6 Troubleshooting

Observation	**To Do**
Tool configuration error message when powering on the tool.	- Check all connections. - Adjust the telemetry settings for your wireline configuration (see Chapter 3.3) and store the new settings as default.
Tool panel - No current.	- Verify the wireline and the armor are connected to the logging system. Test your interface cable between winch and data acquisition system. - Verify cable head integrity. Must have 20 Mega Ohm minimum cablehead electrical isolation. - Verify voltage output at the cable head (it should be 58V).
Tool panel - Too much current (red area).	**Immediately switch off the tool!** **-**Possible shortcut (voltage down, current up): Check for water ingress and cable head integrity - wireline continuity. - Verify the interface cable between winch slip ring and data acquisition system is not loose at the connectors. Check for possible source of a short. - If the above shows no issues, use a test cable to verify tool functionality. - If the problem still occurs, please contact Mount Sopris.
Telemetry panel - status shows red.	- Verify the telemetry settings for your wireline configuration (see Chapter 3.3). - If problem cannot be resolved contact tech.support@mountsopris.com .
Telemetry panel - memory buffer shows 100%.	- Indicates that the systems internal memory buffer is full. PC can't receive incoming data streams fast enough. Ensure your PC has enough resources available.
Noisy heat pulse baseline-Inconsistent readings	- Let the borehole calm for at least 5 minutes before taking reading. - Complete Second Performance check (Chapter 4)
Telemetry panel - large number of errors.	- Verify the telemetry settings for your wireline configuration (see Chapter 3.3). - Check bandwidth usage and telemetry error status.
Cannot calibrate probe	-Add one row of data to the screen, then calibrate.

7 Spare Parts

Mount Sopris Instruments and ALT usually have all spare parts in stock and available through phone order (+1.303.279.3211), email Sales@mountsopris.com, or our online store, where you can make purchases quickly and easily with credit card (http://mountsopris.com/store/).

Please contact us if you have any questions about your equipment and maintenance.

Part Number	Description
2DPA-1010	Small diverter- 125 mm (5 inch) diameter
2DPA-1020	Medium diverter - 175 mm (7 inch) diameter
2DPA-1030	Large diverter - 230 mm (9 inch) diameter
2CNA-2010	Small centralizer petals - 100 mm (4 inch) diameter
2CNA-2020	Medium centralizer petals - 150 mm (6 inch) diameter
2CNA-2030	Large centralizer petals - 200 mm (8 inch) diameter