

Kuster Company 2900 E. 29 th Street Long Beach, CA 90806	K8 HT EMR Geothermal Tool	
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Scope: The manual applies only to the Kuster Company K8 HT EMR Geothermal Tool.

Purpose: The purpose of this manual is to describe in sufficient detail all necessary steps to assemble, program, disassemble, download and maintain the tool.

Description: The K8 HT EMR Geothermal Tool is a wireline conveyed, sub-surface, electronic pressure and temperature memory recorder. It is specifically designed to operate in the geothermal environment for up to nine hours at temperatures up to 600°F (315.6°C). The tool consists of three major components: the sub assembly, the gauge assembly and the flask assembly.

Specifications

- A. Length: 60.75" (154.31cm)
- B. Diameter: 1.75" (4.44cm)
- C. Weight: 21 Pounds
- D. Time at temperature: 9.17 Hours at 600°F (315.6°C)
- E. Materials: All materials exposed to well bore media are in compliance with MR0-175.
- F. Collapse Rating: 8,500psi at 662°F (58,607.5kpa at 350°C)

Performance. The K8 HT EMR Geothermal Tool is designed for geothermal bottom hole pressure and temperature work. It has been tested in a variety of time/temperature scenarios, but not all. There exists a complex relationship between external temperature, internal temperature, and downhole time. If there is any doubt as to the suitability of the instrument for a planned survey, please contact Kuster Company.

Definitions. There are three specific definitions, which are used through out this document, which are necessary to understand.

Note: A note indicates a step, procedure, or process, which is necessary to highlight for successful operation.

CAUTION: A caution indicates a step, procedure, or process which if not followed correctly could result in damage to equipment.

WARNING: A warning indicates a step, procedure, or process which if not followed correctly could result in damage to equipment and/or injury to personnel.

Facilities & Equipment.

Assembly

- A. Sub Assembly – Reference Drawing 18500-400, Sheet 1 of 6.

CAUTION

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Exercise caution when handling the Sub Assembly. Two particular areas, which are subject to damage due to mishandling, are the micro 9-pin connector on the gauge bulkhead end of the assembly and the Insulator Tube, Part Number 18500-407.

1. Inspect Sub Assembly, Part Number 18500-423, for damage, cleanliness, and serviceability. In particular, all threads should be looked at closely for signs of debris or damage.
2. Inspect outside diameter of O-ring glands for signs of damage or galling.
3. Inspect lead wires from temperature sensor for cuts, nicks and abrasions.
4. Install Metal C-ring, Part Number 18500-413.
5. Install O-rings, 2 each, Part Number 707-123.
6. Remove Gauge Bulkhead Cover, Part Number 18500-421.
7. Inspect external threads and O-ring glands on gauge bulkhead for damage, cleanliness and serviceability.
8. Install O-rings, 2 each, Part Number 706-015.

Note: Kuster Company Hi-Temp Lubricant, Part Number 915-001, is the factory recommended lubricant to be used for this tool. It has been formulated for high temperature applications and as an anti-galling agent. Other substitutions could be acceptable, but have not been tested.

9. Lubricate the external threads of the gauge bulkhead and the both O-rings with Hi-Temp Lubricant and set aside.

B. Gauge – Sub Assembly: Reference Drawings 18500-400, Sheet 2 of 6 and Sheet 3 of 6.

1. With nose of Gauge Assembly pointed upward, pour into the nose cavity 27cc of Kuster Company Transfer Fluid, Part Number 901-102.
2. With the Gauge Assembly maintained in a nose upward attitude, install the sub assembly until pressure can be felt. This will be approximately x number of turns or x" of travel.
3. Secure the Gauge – Sub Assembly in a vice clamping mid-body on the Gauge Assembly. Using a wrench on the gauge bulkhead only. Slowly rotate sub assembly in a clockwise direction until the sub assembly bottoms out on the nose of the gauge assembly. The additional force felt is the silicone oil being forced up the capillary tube to the sub at the top.
4. Once the gauge has bottomed out on the gauge bulkhead, secure the gauge assembly to the gauge bulkhead using the setscrew.
5. Install 1/8"-27 NPT Plug, Part Number in filter cavity.
6. Connect the 9-Pin, Micro D Plug Connector, Part Number 18500-414, located at the end of the temperature sensor leads to the 9-Pin, Micro D Receptacle Connector, Part Number 18500-415, mounted insided the Gauge Housing Assembly, Part Number 18500-412. Tighten jackscrews on Plug to secure, using no more than 2.5 in/lbs of torque.

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7. Using High Temperature Polyimide Tape (Kapton), Part Number 18730-006, tape down all wires in the region shown on drawing.
- C. Programming the tool. All software related issues are covered in the K8 EMR 25 Software Manual.
- D. Flask Assembly
1. Lubricate the external threads on the Gauge Bulkhead with Temperature Lubricant and install Gauge Cover.
 2. Inspect battery to ensure that it:
 - a) Has sufficient Ah remaining for the survey.
 - b) Has sufficient voltage to start the tool.
 - c) Is clean, dry and serviceable.
 3. Install battery.
 4. Verify that the LED on the battery emits four flashes approximately 1 second apart and four flashes approximately 10 seconds apart.
 5. Record the time that the battery was connected.
 6. Lubricate the external threads on the heat sink and install Heat Sink on to Gauge Cover hand tight.
 7. Lubricate remaining threads on Sub Assembly.
 8. Secure flask open end up and install Sub-Gauge Cover-Heat Sink assembly. Slowly screw assembly together until the Metal C-ring bottoms out. Tighten payload to heat shield and torque between 90-100 ft/lbs.
 9. Remove plug from filter cavity and install filter with wrench hand tight.
 10. Lubricate remaining external threads on sub and install Temperature Probe Cover.

Operation

- A. Rigging up.
1. Connect entire pre-assembled unit to wireline. Note that the pin on the flask is a 1.25"-8 UN-2A thread.
 2. Tighten unit to rope socket using the 1.62" wrench flats nearest the pin.
 3. The rigging up of the lubricator and associated equipment remains the same as any other bottom hole pressure work.

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4. Dependent upon wellhead conditions, if there is significant pressure and/or temperature at surface, a 15-minute period of stabilization should be observed within the lubricator with the valve open.

B. Running the tool.

WARNING

Exceeding down hole time and temperature combinations could cause injury to personnel or damage to equipment.

1. The tool is run from this point forward like any other downhole recorder.
2. The tool should be run no faster than 150 feet/minute.
3. The tool should be pulled out of the hole no faster than 150 feet/minute.

C. Rigging Down

CAUTION

Do not submerge the tool in any liquid to advance the normal cooling rate, damage to equipment could occur.

1. Immediately after separating the Heat Shield Assembly from the rope socket, the tool should be placed horizontally on the ground or some other heat sink to allow it to cool as fast as possible.

Disassembly. Refer to Drawing 18500-400, Sheets 1-6 for clarification.

CAUTION

Do not attempt disassembly of tool until the exterior temperature reaches 115°F or you are able to hold it in your bare hands for three minutes without discomfort.

- A. Remove Temperature Probe Cover.
- B. Remove Filter and install plug
- C. Install Temperature Sensor Protector.
- D. Remove Heat Shield and set in case.
- E. Remove Heat Sink.
- F. Remove Gauge Cover

WARNING

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Do not attempt to remove the battery unless it is cool to the touch. Safety glasses should be worn when removing the battery. It is a good practice to let the battery be exposed to ambient air for 10 minutes following removal of the heatsink and prior to removing the battery.

- G. Remove battery by grasping at the base. Do not pull on the battery cell itself.

Downloading Tool. All steps necessary to remove data from the tool are covered in the software manual.

Maintenance.

- A. Temperature Probe Cover.

1. Wash completely with solvent.
2. Inspect for damage and serviceability.
3. Store in case.

- B. Heat Shield.

1. Wash with solvent internal threads and O-ring surfaces.
2. Inspect internal threads and O-ring surfaces for damage, signs of galling, and serviceability.
3. Wash the exterior of the heat shield with solvent to remove any corrosive residue left from the well bore media.
4. Store in case.

- C. Heat Sink.

1. Wash external threads with solvent.
2. Inspect external threads for damage and serviceability.
3. Store in case.

- D. Gauge Cover.

1. Wash completely with solvent.
2. Inspect internal threads for damage and serviceability.
3. Store in case.

- E. Gauge – Sub Assembly.

1. Remove Kapton tape.

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2. Disconnect 9-pin micro connector.
 3. Remove Gauge Assembly from Sub Assembly.
- F. Gauge Assembly. The Gauge Assembly requires no operator maintenance. Store in separate case, Kuster Company Clock Box, Part Number 755-200.
- G. Sub Assembly.
1. Remove all O-rings, the metal C-ring and discard them. These consumable parts are a “one time use” only component.
 2. Wash external threads and O-ring glands with solvent.
 3. Flush capillary tube with solvent.
 4. Inspect all external threads and O-ring glands for damage, signs of galling, and serviceability.
 5. Install Temperature Sensor Protective Cover.
 6. Install Gauge Bulkhead Protective Cover.
 7. Store in case.

Download

Storage. The tool should be stored in the case when not in use.

References.

- A. Performance curves.
- B. Drawings.
- C. Bill of Materials.
- D. Calibration Verification Table.

Technical Support. Technical support can be obtained by contacting:

Kuster Company
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