AMS 3K COMBINED DEPTH/TENSION MEASUREMENT DEVICE

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1.0 GENERAL

The Kerr Measurement System AMS-3K measuring device combines in one compact, lightweight unit, both depth measurement and line tension measurement capabilities. A single measuring wheel is used to drive an optical encoder. An electronic load axle is used to measure line tension.
2.0 SYSTEM DESCRIPTION

DEPTH MEASUREMENT

The AMS3K uses a single measuring wheel to measure the amount of wireline moving to and from the borehole. The measuring wheel is coupled to an encoder that transmits electrical signals via a cable to the hoistman’s panel and/or logging computer representing cable travel. An independently powered encoder and display panel is used for back up depth indication.

The hardened measuring wheel is 2.0000 ft. (609.600 mm) in circumference. A spring mounted tension roller is used to hold the measuring wheel in contact with the wireline.

Two guide rollers are used to properly hold the cable in line with the measuring wheel. Wear blocks are also used to guide the cable and prohibit cable contact with the frame members. The frame members are anodized 6061-T6 aluminum.

TENSION MEASUREMENT

The AMS3K uses an electronic load axle on the measuring wheel to measure line tension. Three wheels are used to create a force on the load axle normal to the axis of the wireline. To generate this force the wheel mounted on the load axle is offset from the other two slightly. This offset creates a slight bend in the cable.

As wireline tension increases the small offset creates a corresponding bending force on the strain-gauged load axle. An electronic signal is transmitted via cable to the hoistman’s panel and/or logging computer representing wireline tension.
3.0 OPERATION

3.1 SPOOLING ARM INSTALLATION

Install the measuring head on to the spooling arm by using either the top adapter mount assembly (AM3KA040) to mount to an overhead spooling arm or the lower yoke floor mount assembly (AM3KA140) to mount to a floor mounted pedestal.

3.2 CABLE INSTALLATION

To install cable, simply remove the push pin, and hinge the head open. Next insert the cable, swing the head closed and reinsert the pin. Refer to picture on next page.

If under load, the load will need to be removed from the pin prior to removal. A “C” clamp can be used to remove the load.

Make sure that the head can freely sit on the wireline. If the mounting arrangement will not let the head travel up and down freely and if the cable puts a upward or downward force on the measuring head, this force will cause an offset to the tension measurement which will result in an incorrect tension reading.

3.3 SYSTEM CHECK

Each time the system is used perform the following steps:

Verify that the AMS 3K is properly and securely attached to the spooling arm. Several different mounting kits are available for different types of spooling arms.

Verify that the depth measuring wheel is clean and that no groove has been worn into the measuring wheel surface.

Verify that all fasteners are tight and that the ball lock pushpin is secure.

Verify that the encoder, electronic load pin, and backup counter cable are installed and properly routed. Verify that the encoder depth system is working by turning the wheel and observing the hoistman’s panel to indicate cable movement.
MEASURING HEAD OPENED FOR CABLE INSTALLATION AND REMOVAL
3.4 SYSTEM OPERATION

1. Determine cable size to be used – 5/16” or 7/32”

Since the wireline cable actually bends around the measuring wheel, the circumference of the wheel is affected by the size of the cable. To accurately measure depth, this needs to be taken into account by increasing the size of the wheel. The bend radius of the wireline cable also affects the tension measurement.

These corrections are automatically made in the AMS4A040/42 panel by selecting the proper cable size using the menu.

2. Install line in measuring head.

3. Make sure line is laying slack and head is free to move. Press the Ten Zero Cal button and tension value should read 0.

4. Press the Zero Depth button to set the depth to zero when the tool is hanging at the zero point.

5. At this point, the system is ready to log.
4.0 MAINTENANCE

Between wireline services, check the measuring and guide wheels for looseness, play, out-of-roundness, worn or rough sounding bearings, or other mechanical conditions that could affect measurement accuracy.

Visually inspect the interiors of the electrical connectors for the encoders and electronic load axle for dirt and evidence of insulation breakdown. Clean or replace as necessary.

Manually rotate each wheel by hand to verify their condition. Inspect the depth measuring wheel for signs of abnormal wear diameter changes, or shaft play that can affect measurement accuracy. Inspect the wireline tension wheels for signs of abnormal wear, diameter changes, or shaft and bearing play that could affect measurement accuracy.

At the completion of each job, thoroughly clean and dry the device as soon as possible. This avoids the problems caused by borehole residues transferred from the wireline onto the measuring device.

Borehole residues should be washed from the device with cleaning solvents. Rinse the device with water, dry, and wipe down with an oily rag.

Operators must remain alert for visual indications of mechanical failures such as excessive vibration, wheel and roller slippage or lockups that signify bearing and shaft failures, and cable tracking problems. If damaged or worn parts are detected or suspected, the unit should be immediately repaired.
4.1 MEASURING WHEEL AND BEARING REMOVAL

Remove any encoders that are attached to the measuring wheel.

Remove the side plates and press the shaft from the wheel.

4.2 ELECTRONIC LOAD PIN REMOVAL

The electronic load pin is held in place by one retaining ring on the outer end of its shaft.

Remove the retaining ring. The load pin can then be removed from the mounting frame.

This is a good time to inspect the tension wheel and its bearing which is held in place by two (2) retaining rings.
## 5.0 SPARE PARTS

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<thead>
<tr>
<th>QTY</th>
<th>KERR P/N</th>
<th>DESCRIPTION</th>
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<tr>
<td>1</td>
<td>AM5KM030</td>
<td>WHEEL GUIDE 4 INCH COMPOSITE</td>
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<tr>
<td>1</td>
<td>AM3KA003</td>
<td>ASST ROLLER PRESSURE 1.95OD SST GREASABLE (INCLUDES BEARING)</td>
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<tr>
<td>1</td>
<td>AM5KM004</td>
<td>WHEEL TENSION FIXED 30MM</td>
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<tr>
<td>1</td>
<td>AM3KA010</td>
<td>WHEEL MEASURING (INCLUDES SHAFT)</td>
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<tr>
<td>1</td>
<td>AM3KM034</td>
<td>BLOCK WEAR 0.75 X 2.50 STEEL</td>
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<td>1</td>
<td>C276P002</td>
<td>BEARING BALL FAFNIR 204PP (GUIDE ROLLERS AND MEASURE WHEEL)</td>
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<tr>
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<td>AM5KP014</td>
<td>BEARING BALL FAFNIR 206PP (TENSION WHEELS)</td>
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<td>AM3KP021</td>
<td>BEARING BALL FAFNIR 200PP (PRESSURE ROLLER)</td>
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<td>AMS1P090</td>
<td>COUPLING OLDHAM ENCODER</td>
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<td>AMTKA011</td>
<td>LOAD PIN ASSY WITH AMPLIFIER 0-1.5VDC</td>
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<td>1</td>
<td>AMS8A023-20</td>
<td>TENSION OUTPUT CABLE</td>
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<td>MAGNETIC PICKUP ASSY</td>
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<td>RETAINING PIN (T HANDLE)</td>
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<td>1</td>
<td>AM5KP130</td>
<td>GREASE NOZZLE</td>
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6.0 DRAWINGS AND PARTS LISTS

SIDE VIEW

- Magnetic Pickup
- Measure Wheel
- Upper Frame Assy
- Guide Roller
- Side Plate
- Lower Frame Assy
- Pressure Wheel Assy
- Tension Wheel Assy
- Tension Link
- Load Pin
- Wireline Cable
FRONT VIEW

- Encoder Adapter
- Measure Wheel
- Measure Wheel Axle
- Side Plate
- Encoder Coupling
- Quick Release Pin
- Load Pin
- Load Pin Amplifier Housing
AMS8A023 CABLE ASSEMBLY
TENSION FROM MEASURING HEAD TO I/O BOX

Kerr p/n    Description                          Qty  Ref
AMS4P222    CABLE 20/8C ALPHA 25468 BLACK 20 FT
AMS8P057    CONN KPT06A16-8S STR PLUG 1 EA LOAD PIN END
AMS8P058    CONN KPT06A16-8P STR PLUG 1 EA PANEL END
AMS8P059    CLAMP CONN MS3057-10A W/BUSH 2 EA
AMS8P060    DUST CAP CANNON SHELL SIZE 16 2 EA
AMS8A028 CABLE ASSEMBLY
ENCODER FROM MEASURING HEAD TO I/O BOX

![Diagram of cable assembly]

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<td>CONN MS3106E-18-1S ENCODER</td>
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<td>AMS1P032</td>
<td>CONN KPT06A14-15P C.O. CABLE</td>
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<td>AMS4P222</td>
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<td>BUSHING #9779-513-10 AMPHENOL</td>
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