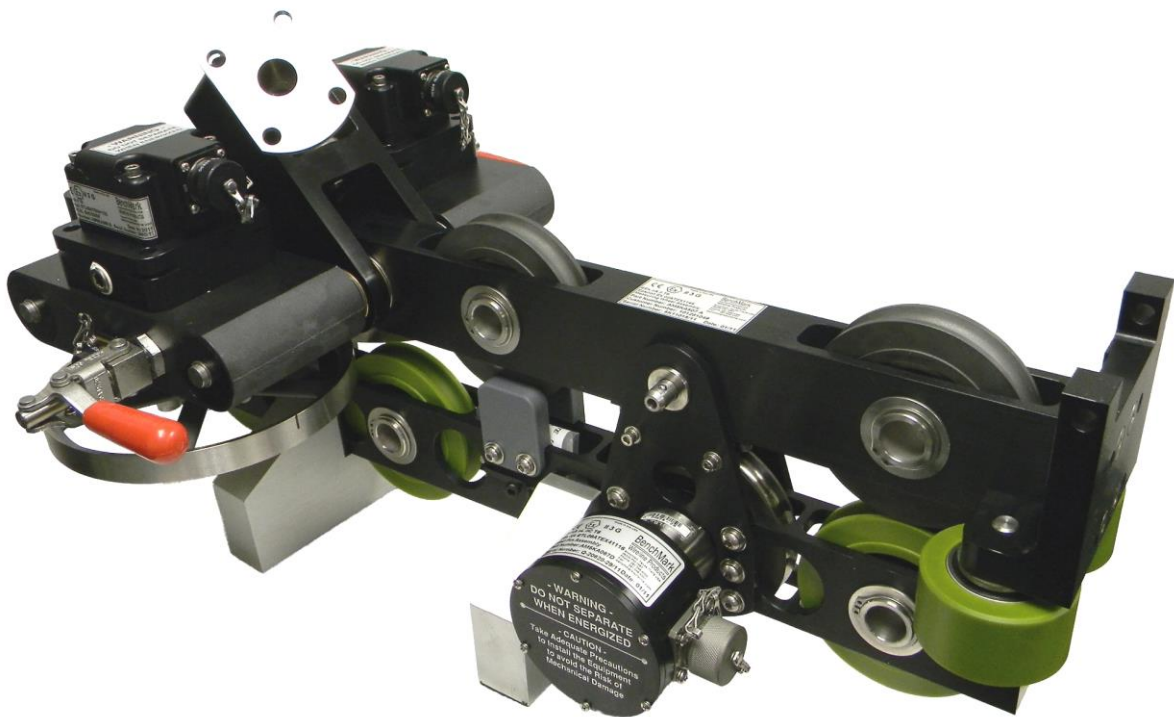


AM5K COMBINED DEPTH/TENSION MEASUREMENT DEVICE

Zone 2 - Class 1 Div 2

**For Open & Cased Hole or
Cased Hole E-Line Logging**

STANDARD CONFIGURATIONS



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SAFETY WARNINGS

This apparatus is suitable for use in ATEX Zone 2 Locations.

This apparatus is suitable for use in Class I, Division 2, Groups A, B, C, & D Hazardous (Classified) or Unclassified Locations.

WARNING – EXPLOSION HAZARD – SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR ATEX Zone 2 LOCATIONS.

AVERTISSEMENT – RISQUE D’EXPLOSION – LA SUBSTITUTION DE COMPOSANT PEUT RENDRE CE MATERIEL INACCEPTABLE POUR LES ATEX Zone 2 LOCALES.

WARNING - EXPLOSION HAZARD – SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2;

AVERTISSEMENT - RISQUE D'EXPLOSION – LA SUBSTITUTION DE COMPOSANTS PEUT RENDRE CE MATERIEL INACCEPTABLE POUR LES EMPLACEMENTS DE CLASSE I, DIVISION 2

WARNING – EXPLOSION HAZARD – DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZAROUS;

AVERTISSEMENT – RISQUE D’EXPLOSION – AVANT DE DECONNECTER L’EQUIPMENT, COUPER LE COURANT OU S’ASSURER QUE L’EMPLACEMENT EST DESIGNÉ NON DANGEREUX.

WARNING - PROTECTION MAY BE IMPAIRED IF THIS DEVICE IS USED IN AN APPLICATION OR MANNER NOT SPECIFIED IN THE MANUAL

NOTE – The safe ambient temperature operating range for this equipment is -20 to 40C or -4 to 104F.

BenchMark measuring equipment will frequently be operated in hazardous environments. Appropriate safety precautions need to be taken.

Training - Operators shall be trained in the proper and safe use of the device.

Do not exceed the tension limit specified for this device in this manual.

SAFETY WARNINGS continued

Flammable Substances - Flammable and explosive substances are often found in the proximity of the equipment operations. Proper venting should take place where practicable. Avoid open flames, sparks and other ignition sources.

Electric Shock – Depending on the equipment being used, both AC and DC current may be present. Frequently in wellsite operations conductive fluids and chemicals are used. Use extra caution when working with BenchMark equipment and follow manufacturer warnings to avoid electric shock.

Do not separate any electrical connector, while powered, in a hazardous area. Separate only when power is removed, and/or in a safe area.

Safe Operating Temperatures – BenchMark Wireline equipment is designed to operate safely within these temperature ranges. Do not try to operate this equipment in conditions that outside these temperature limits.

The safe ambient temperature operating range for this equipment is -20 to 40C or -4 to 104F.

Hazardous Equipment Marking - See General Assembly drawings for hazardous equipment marking.

ALL WARNING LABELS ON THE EQUIPMENT MUST BE OBSERVED AND FOLLOWED.

Installation Instructions - Install measuring device onto the spooling mechanism per the unit manufacturer instructions. Take care to avoid pinching or cutting of electrical cables when the measuring device moves during the spooling operation.

Take care to thread the wire through the device properly to prevent the wire from rubbing the frame during operation. The Table of Contents of this manual will list where the threading procedure is located.

Rotating Equipment – BenchMark Wireline measuring equipment is often attached to rotating industrial machinery. This may include winches, pulleys, rigging, rotating drums plus moving cable and wire. Though BenchMark's measuring equipment does not normally present a safety hazard when in operation provided it is used within the design parameters of the equipment, the heavy equipment used in this type of work in proximity to BenchMark's equipment may. Never attempt to use BenchMark equipment in any way or for any other purpose than for which it was designed.

Use every precaution to keep a safe distance from dangerous equipment when it is in operation. Never approach the measuring device while the cable drum is turning.

QUICK START PROCEDURES

- 1.1 Install the measuring head on to the spooling arm.
- 1.2 Open the measuring head.
- 1.3 Position the measuring head below the wire.
- 1.4 Clamp the head over the wire, close it and insert the locking pin.
- 1.5 Connect encoder and load pin cables to measuring head and panel.
- 1.6 Begin operations

RECOMMENDED SPARE PARTS

It is recommended that the following parts be kept on hand in the indicated quantities QTY.

ITEM	P/N	DESCRIPTION	QTY
RECOMMENDED SPARE PARTS FOR ALL LOCATIONS			
14	AM5KA058	ASSY BACKUP MAGNETIC EEx Na	1
22	AM5KM001	WHEEL MEASURING 2FT 5 SPOKE	2
31	AM5KA247	ASSY WHEEL GUIDE PLAS 35MM BRG	4
33	AM5KA063	ASSY WHEEL TENSN SHALLOW GROOVE	1
33	AM5KA073	ASSY WHEEL TENSN DEEP GROOVE	1
34	AM5KA364	ASSY WHEEL TENSN FIXD 35MM BRG	2
36	AM5KM073	COUPLING MOD ENCDR 0.250/0.375	2
51	AMS1P009	RETAINING PIN (T HANDLE)	1

ITEM	P/N	DESCRIPTION	QTY
ADDITIONAL RECOMMENDED SPARE PARTS FOR REMOTE LOCATIONS			
10		ASSY LOAD AXLE / PIN	1
12	AM5KA066	ASSY MAG MARK DETECTOR EEx nA	1
13		ENCODER	1
35	AM5KA065	ASSY ROLLER SPOOLNG 2.75" PLAS	4
54	AM5KM157	BEARING BALL 35MM ID MOD	6
55	AM5KP088	BEARING LINEAR 30MMID X 40MMOD	8
56	AM3KP204	BEARING BALL 20MM FAFNIR 204PP	4
58	AM5KM134	BEARING BALL 40MM ID MOD	1
59	AM5KP229	CLAMP TOGGLE PUSH/PULL SST	1
101	AM5KP130	NOZZLE GREASE FITTING FLUSH	1

NOTE - ONLY STOCK THE LOAD AXLE AND ENCODER USED IN YOUR MEASURING HEAD. A COMPLETE LIST IS FOUND IN THE BILL OF MATERIALS

NOTE 1:

Heads manufactured before Sep 2013 did not have bearing seal retainers. We have since installed retainers on the bearings installed in the AM5KA137 and AM5KA164. The part numbers for these wheels have been changed to AM5KA247 and AM5KA364. Visit 7.3 to see pictures of the new wheels.

OBTAINING TECHNICAL ASSISTANCE

Call BenchMark Wireline Products Inc. at +1 281 346 4300

Or contact by email mail@benchmarkwireline.com

Or fax in request at +1 281 346 4301

Information in the form of user manuals and instructional videos are also available on our website www.benchmarkwireline.com

Parts can be ordered by email, phone, or fax

Equipment can be returned for repair and maintenance. Please notify us by Phone, email, or fax before sending any equipment.

To return equipment to BenchMark, ship it to:

BenchMark Wireline Products

36220 FM 1093

Simonton, Texas 77476

U.S.A.

Manual Revision Log

Revision R - Jun 2010

Page 12	Added contact information for customer support
Pages 24-27	Added Options and Accessories section
Pages 43-48	Added new ATEX Zone 2 Certificates Updated parts lists and numbers

Revision S - Jan 2016

Quick Start	Revised parts list
3.7	K Factors
5.0	Additional options
7.0	Revised parts list

1.0 GENERAL

The AM5K Wireline Measuring Device is a compact and lightweight device for measuring both wireline depth and tension. The device is designed to be mounted to the spooling arm of a wireline unit. It is unique to other measuring devices in that it measures both depth and tension on wireline cables from .190" to .494". This device will work on both open and cased hole wireline units which allows standardization on a measuring head for all types of operations.

FEATURES AND BENEFITS:

- **Straight-line measurement** - (cable sizes can be changed without affecting depth measurement)
- **Dual Tangential Measuring Wheels** - made from specially hardened steel
- **Accepts cable sizes** - from .190" to .875" diameter (4.8 mm to 22 mm)
- **Optional guide wheels** - available for wirelines up to .650" diameter
- **Lightweight design with integral tension** - makes for easier high angle rigup
- **Device opens up** - to provide easy cable installation and removal, by removing a single pin
- **Includes both horizontal and vertical guide rollers** - to minimize measuring wheel loading
- **Rollers are oversized** - to increase reliability and reduce maintenance
- **Guide rollers are made from composite material** - to reduce weight and cable wear
- **Rear or Center spooling arm mount** - to minimize head "jerking"
- **Tension Load Axle and amplifier** - can be configured for different outputs.
- **Digital Magnetic Mark Detector**
- **Accepts single or dual encoders**
- **Supports fully independent backup depth measuring system** - using a magnetic pickup
- **Backup depth system** - reduces drag on measuring wheel by eliminating mechanical drive cable
- **Encoder, Mark Detector, and Tension amplifier** - certified for Zone II area use
- **Anodized aluminum frame** - All steel parts are plated or SST
- **All bearings are SST**

2.0 SYSTEM DESCRIPTION

DEPTH MEASUREMENT:

The AM5K Measuring Head uses dual spring-loaded measuring wheels to measure the amount of wireline moving to and from the borehole. The measuring wheels are coupled to one or two optical encoders that transmit electrical signals via a cable to the hoistman's panel and/or logging computer. An independently powered magnetic encoder is used for back up depth indication.

The hardened measuring wheels are 2.0000 ft. (.609600 m) in circumference. Springs are used to hold the measuring wheels in contact with the wireline. The springs are sized to provide the appropriate friction between the wheels and wireline. The frame members are anodized 6061-T6 aluminum.

Under ideal conditions, without magnetic marks, the measuring heads have an accuracy of +/- 3 m in 3000 m (10 ft in 10,000 ft.). With magnetic marks and accurate line stretch calculations, an accuracy of .3 m in 3000 m (1 ft in 10,000 ft) can be achieved. The Hoistman's panel is required to fully utilize the mark detection and stretch correction algorithms.

TENSION MEASUREMENT:

The AM5K uses an electronic load axle to measure line tension. Three wheels are used to create a force on the load axle. 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. A calibrate resistor is included in the load pin to send out a signal to calibrate the computer system.

GENERAL SPECIFICATIONS:

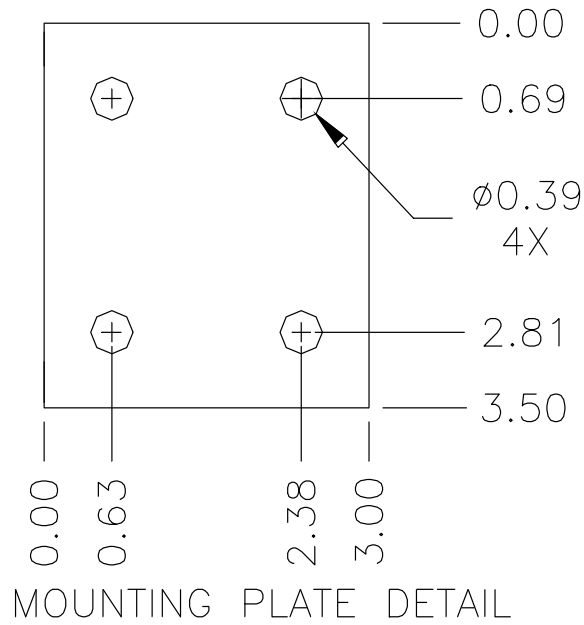
WEIGHT:	58 lbs	26.3 kg
LENGTH:	26.5"	673 mm
HEIGHT:	10.8"	274 mm
WIDTH:	15.3"	389 mm
MAXIMUM TENSION:	20,000 lbs	9072 kg
MEASURING WHEEL SIZE:	24.000"	609.60 mm
CABLE SIZES:	.190" to .875" diameter (4.8 mm to 22 mm)	
CABLE BEND OVER TENSION WHEEL:	2.5 – 7.5 degrees (depends on cable) Minimal or no affects on magnetic marks	

3.0 OPERATION

3.1 SPOOLING ARM INSTALLATION – OVERHEAD SPOOLING ARM

Take Adequate Precautions when installing the Measuring Head to Avoid the Risk of Mechanical Damage

Install the measuring head on to the spooling arm by using the top adapter mount assembly to mount to an overhead spooling arm. The mount is designed to mount with a standard U-joint yoke.



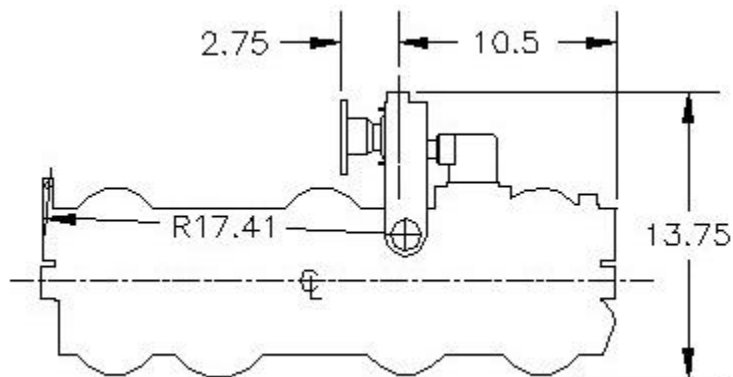
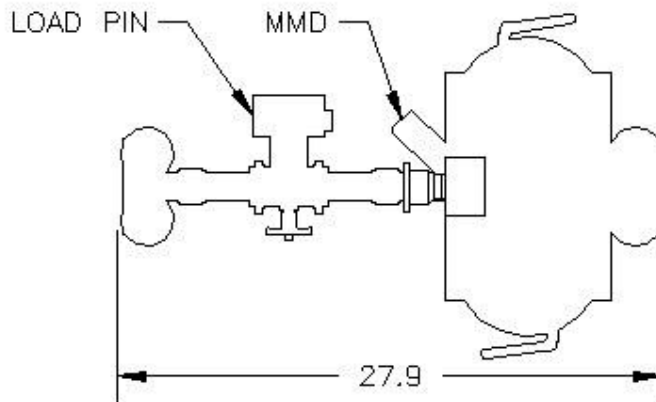
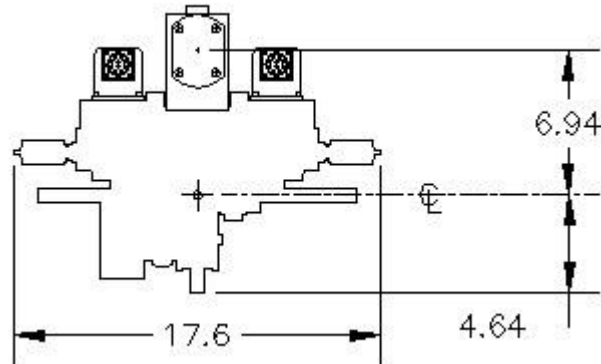
3.1 SPOOLING ARM INSTALLATION continued



MOUNTING YOKE

3.2 HEAD-ON CABLE INSTALL

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 an 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 CABLE INSTALLATION

To install cable, first open the wheels by shifting the red release handles.

Next, remove the push pin, and hinge the head open.

Lifting up on the wireline cable makes it easier to remove the push pin.



The cable can now be inserted or removed.

Close the red release handles to tighten the wheels against the wireline.

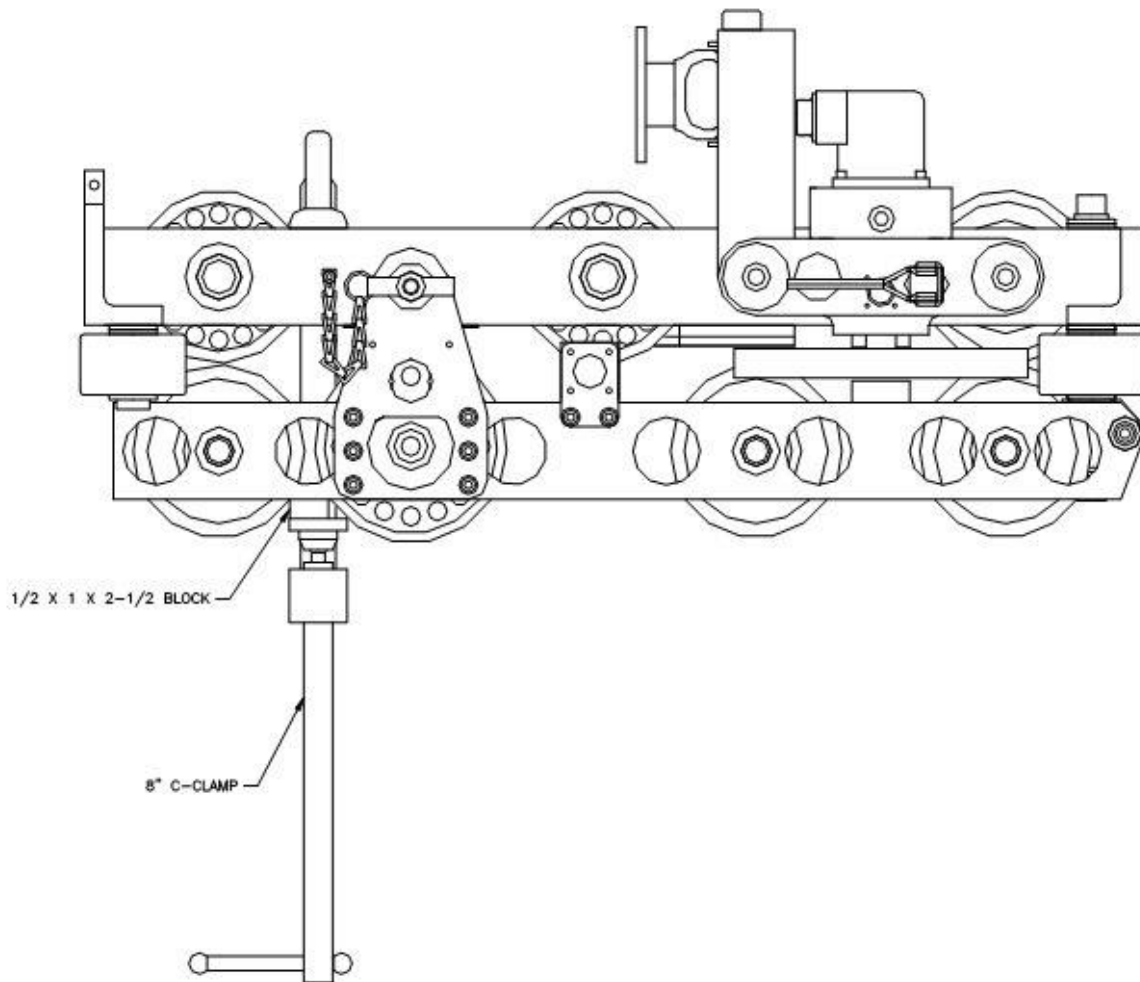
Swing the head closed and reinsert the pin.

3.4 CABLE REMOVAL UNDER LOAD

3.4.1 If under load, the load will need to be removed from the device prior to removing the retaining pin. A "C-clamp" or a nylon "ratchet strap" can be used to remove the load.

3.4.2 Install a C-Clamp across the top and bottom frames as shown in the drawing below. The ratchet strap can be installed in a similar way.

3.4.3 Tighten the C Clamp until the load is removed from the retaining pin. Remove the retaining pin then loosen and remove the C Clamp.



3.5 CHANGING BENCHMARK LOAD PIN WHILE DOWNHOLE

- 1.** Stop Cable drum and Set Brake
- 2.** Hold Safety Meeting with crew, ensure all persons are aware of roles and responsibilities
- 3.** Place cable clamp on cable approximately 1ft away from the front of the lower sheave (side facing winch drum) and tighten onto cable, ensuring bolts are made up crosswise
- 4.** Spray a mark on the cable at the front of the clamp using spray paint
- 5.** Attach chain and binder to cable clamp shackles and bind to a secure point removing the slack from the chain to ensure when the cable is slacked, the clamp does not move forward too far and jam onto the lower sheave wheel.
- 6.** Slack cable on the drum 5ft and monitor mark at the cable clamp for 1 minute to ensure no slippage of cable through the clamp
- 7.** Perform load pin change-out as per below procedure:
 - a. Electronic load pin is held in place by one retaining ring on the outer end of its shaft. Remove the retaining ring by using a small screw driver to lift one end of the ring out of the groove then “walk” the ring off of the pin.
 - b. The load pin can then be removed from the mounting frame.
 - c. Install the new load pin, replacing the retaining ring
 - d. Reattach data cable and ensure stable and correct readings are being seen on the benchmark system
- 8.** Pick up 5ft of cable slack, set drum brake.
- 9.** Slacken and remove chain and binder
- 10.** Slacken and remove cable clamp
- 11.** Ensure tension values on benchmark system are reading correctly
- 12.** Continue operation.

3.6 CHANGING CONFIGURATION BETWEEN OPEN HOLE AND CASED HOLE

A measuring head configured for open hole will typically contain a magnetic mark detector and a 2nd encoder. Cased hole operations rarely require a magnetic mark detector and typically use only one encoder.

If the head is configured for open hole, no changes are required to run it on a cased hole unit. You may elect to remove the magnetic mark detector if you have no plans to use the head on an open hole unit any time in the near future.

The cased hole head can be configured with a different wear plate. The cased hole wear plate is thicker and stepped on one end to keep the line from riding near the top of the wheels. This can occur when going in the hole with a small cable (7/32") with a very light load. The open hole wear plate is flat. Both plates are made from hardened tool steel. The wear plate is mounted on the upper frame above the measure wheels.

Part number for the open hole wear plate is: AM5KM034

Part number for the cased hole wear plate is: AM5KM074

3.6.1 To remove the magnetic mark detector, refer to item 12 on the parts list. Remove the four screws holding the detector in place then remove the detector. To install a magnetic mark detector, reverse this procedure.

3.6.2 To remove an encoder, remove the four screws securing the encoder adapter to the head. Remove the encoder and adapter. Remove the coupling from the measuring wheel shaft.

3.7 INSTALLING THE DEEP GROOVED TENSION WHEEL

3.7.1 A deep grooved "High Tension" wheel is available for use when line tension greater than 10,000 lbs is commonly encountered. This wheel is grooved to better support the wireline at high tensions. The groove also reduces the radius of the wheel which lowers the bend angle of the wireline. This wheel is only for use with 15/32" or larger cables and cannot be used with smaller cable sizes. We recommend using this wheel for lines 7/16" or larger.

The normal shallow grooved wheel can be used at high loads for short pull durations but should not be used when loads exceed 10,000 lbs for an extended period of time.

3.7.2 To install the deep grooved tension wheel, replace the standard shallow grooved tension wheel with the deep grooved tension wheel. The load pin does not need to be changed. To account for the decreased bend angle of the cable, the Load Cell Angle value will need to be changed when using this wheel.

Ensure that the slot in the bushing of the tension wheel is aligned with the roll pin on the side of the frame. The roll pin is only installed on one side of the frame and it needs to be inserted in the slot.

Also ensure that the grease hole in the tension wheel is installed on the opposite side as the load pin amplifier.

3.7.3 The deep grooved wheel assembly can be ordered by part number AM5KA073. The shallow grooved tension wheel assembly can be order by part number AM5KA063.

3.7.4 INSTALLING THE DEEP GROOVED TENSION WHEEL
continued



STANDARD SHALLOW GROOVED TENSION WHEEL



DEEP GROOVED TENSION WHEEL

3.8 SYSTEM OPERATION

3.8.1 Determine cable size to be used – .490" to .190". Since the wireline cable actually bends over the tension wheel, the bend radius of the wireline cable will affect the tension measurement.

3.8.2 Enter tension calibrate factor. These corrections are automatically made in the Benchmark Hoistman's panel by selecting the proper cable size from the menu. If a different panel is used, enter the tension factor at this time.

Value for **shallow grooved** tension wheel with standard load pin

<u>VALUES</u>	<u>CABLE SIZE</u>
.9	.484
1	.472
1.1	7/16"
1.2	3/8"
1.4	5/16"
1.5	9/32"
1.8	7/32"

Value for **deep grooved** tension wheel with standard load pin

<u>VALUES</u>	<u>CABLE SIZE</u>
2.15	.490
2.30	.484
2.40	.472

Note – A special set of wheels is required for line sizes greater than .490".

550 WHEEL SET

<u>VALUES</u>	<u>CABLE SIZE</u>
2.33	.500
2.16	.520 High Strength
2.05	17/32

650 WHEEL SET

<u>VALUES</u>	<u>CABLE SIZE</u>
2.10	9/16

3.8 SYSTEM OPERATION continued

3.8.3 Install line in measuring head (refer to section 3.2).

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

3.8.5 Press the Ten Cal button and tension should read the value indicated in paragraph 3.6.2.

3.8.6 At this point, the system is ready to log. Watch for visual indications of problems such as excessive vibration, wheel or roller slippage or lockups that signify bearing or shaft failures, or cable tracking problems.

3.9 BEARING SEAL RETAINERS



Views

**Metal Wheel
Lubrication Side**



**Composite Wheel
Non-lube Side**



**Wheel with
bearing prior
to seal
retainer install**

**Seal
retainer**

**Clip to
secure
retainer**

**Finished
wheel**

3.9 BEARING SEAL RETAINERS continued

NOTE 1:

Heads manufactured before Sep 2013 did not have bearing seal retainers. We have since installed retainers on the bearings installed in the AM5KA137 and AM5KA164. The part numbers for these wheels have been changed to AM5KA247 and AM5KA364.

4.0 MAINTENANCE AND REPAIR

4.1 OBTAINING TECHNICAL ASSISTANCE

Call BenchMark Wireline Products Inc. at +1 281 346 4300
Or contact by email mail@benchmarkwireline.com
Or fax in request at +1 281 346 4301

Information in the form of user manuals and instructional videos are also available on our website www.benchmarkwireline.com

Parts can be ordered by email, phone, or fax

Equipment can be returned for repair and maintenance. Please notify us by Phone, email, or fax before sending any equipment.

To return equipment to BenchMark, ship it to:
BenchMark Wireline Products
36220 FM 1093
Simonton, Texas 77476
U.S.A.

4.2 PRE-JOB CHECK

Each time the system is used perform the following steps:

Verify that the AM5K 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 wheels are clean and that no groove has been worn into the measuring wheel surface. 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. Ensure that the wheel bearings inner race is not spinning on the shaft and that the shaft is not spinning in the bushings.

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 depth system is working by turning the wheel and observing the hoistman's panel and backup display unit to indicate cable movement. The hoistman's panel and backup display should measure 2' for each rotation of the wheel. If more than one encoder is installed check both encoders by turning each wheel and verifying that the hoistman's panel will read 2' for each rotation of either wheel.

4.3 POST-JOB MAINTENANCE

At the completion of each job, thoroughly clean and dry the device as soon as possible. This avoids problems caused from borehole residues transferred from the wireline onto the measuring device. Borehole residues should be washed from the device with a cleaning solvent such as Varsol or an equivalent type. Rinse the device with water, dry, and wipe down with an oily rag.

Do not pressure wash

4.4 MONTHLY MAINTENANCE

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. Install dust caps on the connectors if the cables are removed.

Manually rotate each wheel by hand to verify its condition. Inspect the depth measuring wheels for signs of abnormal wear, diameter changes, or shaft/bearing play that can affect measurement accuracy. The wheel should be replaced if it is grooved more than .005". The wheel should be 7.639 / 7.640" (194 mm) in diameter with a 24" circumference (609.6 mm).

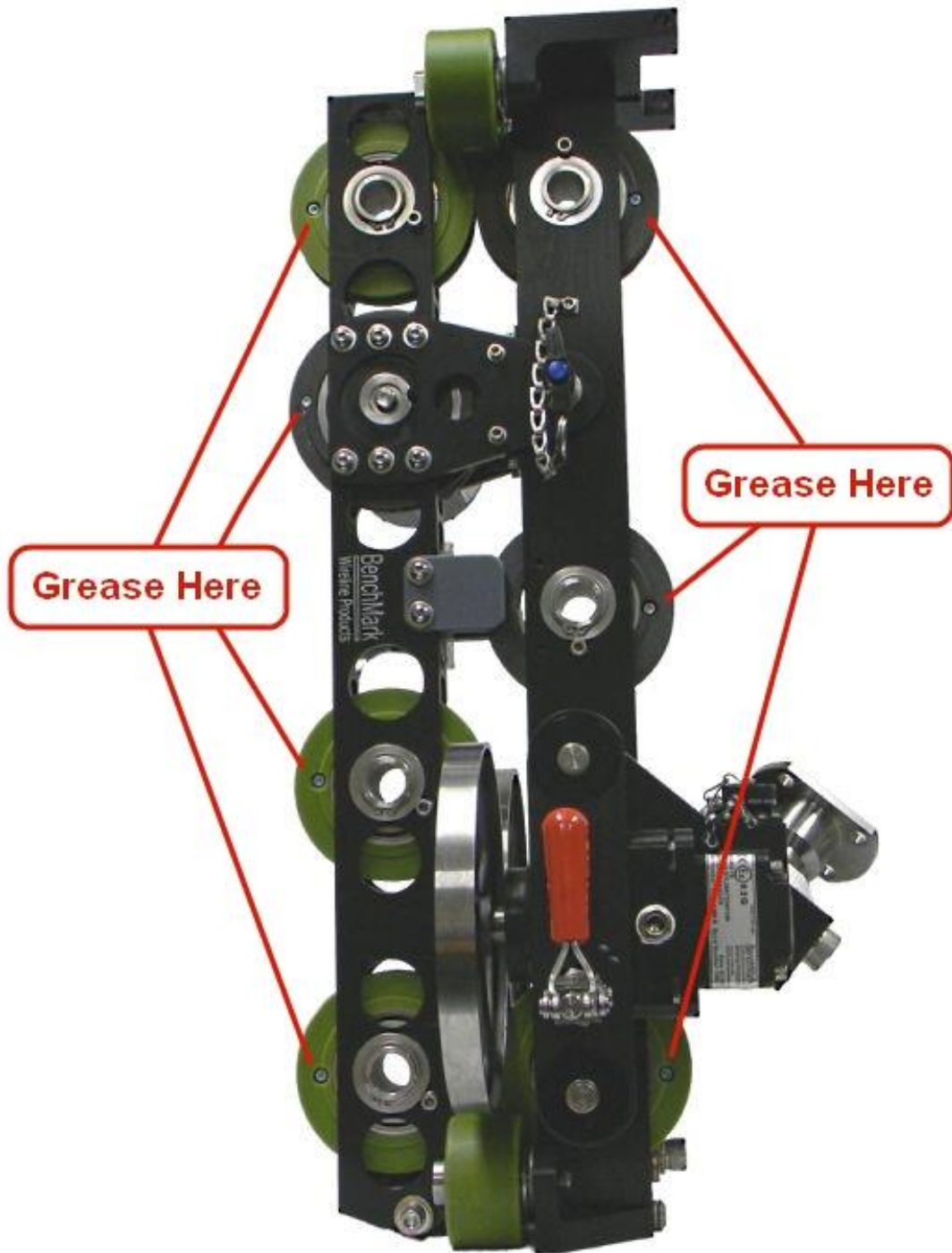
Inspect the tension wheel for signs of abnormal wear, diameter changes, or shaft and bearing play that could affect tension measurement accuracy. The shallow groove tension wheel (item 33 in section 7.0 of this manual) should be 5" in diameter at the bottom of the groove. It should be replaced if it is worn more than .010".

The deep grooved tension wheel (item 33 in section 7.0 of this manual) should be 4.375" in diameter at the bottom of groove. It should be replaced if it is worn more than .010".

Inspect the two grooved guide wheels on either side of the tension wheel (items 34 in section 7.0 of this manual). They should be 4" (101.6 mm) in diameter (bottom of groove). They should be replaced if they are worn more than .010".

NOTE: If the tension wheels or guide wheels mentioned above are worn more than .010" then the tension reading will be less than the actual line tension. The amount of error is relative to the amount of wear.

Grease all the wheels and bearings that are fitted with a flush mount grease fitting (see following diagram). Use a water-proof, marine grade grease. An inverted grease nozzle (p/n AM5KP130) is supplied with each head. This nozzle will fit any standard grease gun.



4.5 ASSEMBLY / DISASSEMBLY PROCEDURES

WARNING – DO NOT SEPARATE CONNECTORS WHEN ENERGIZED

4.5.1 MEASURING WHEEL, SHAFT, AND BEARING REMOVAL

Either measuring wheel can be removed from the measuring head. First shift the red release handle to move the wheel away from the frame. Next remove the encoder with its adapter.

On the later model heads, the wheels are keyed onto the shaft and can be removed simply by removing the screw holding the wheel to the shaft.

On earlier model heads, the wheels are pressed on to the shaft. The lower snap ring between the wheel and the bearing must first be removed. Pull the wheel and shaft from the mount. Reassemble in the opposite order. The bearing should also be replaced at this time.

4.5.2 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 by using a small screw driver to lift one end of the ring out of the groove then “walk” the ring off of the pin. The load pin can then be removed from the mounting frame.

4.5.3 BACKUP DEPTH MAGNETIC PICKUP REMOVAL AND INSTALLATION

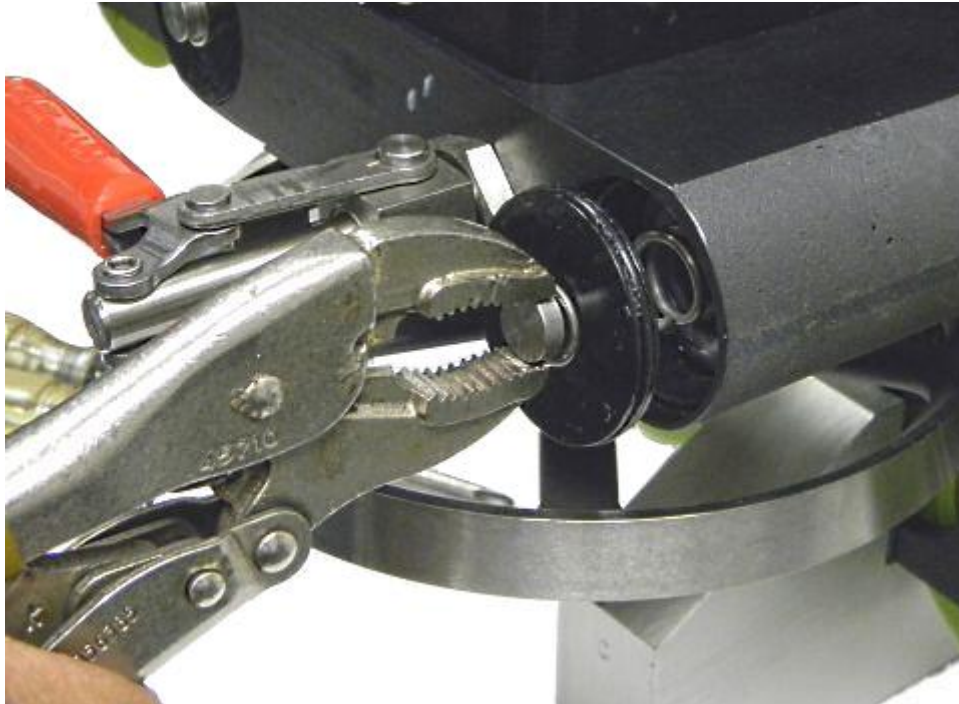
The backup depth magnetic pickup is mounted to the encoder adapter. It is held in place by four screws. Remove the screws and the pickup can then be removed. The pickup must be properly oriented to work correctly. The slot should be oriented to the top. The top side is the encoder side. Ensure that an o-ring is inserted between the plastic housing and the mount. An additional o-ring is used between the connector and the housing to keep moisture out.

If the backup display is counting backward (i.e. counting negative when going down hole), simply rotate the pickup 180 degrees to change the direction.

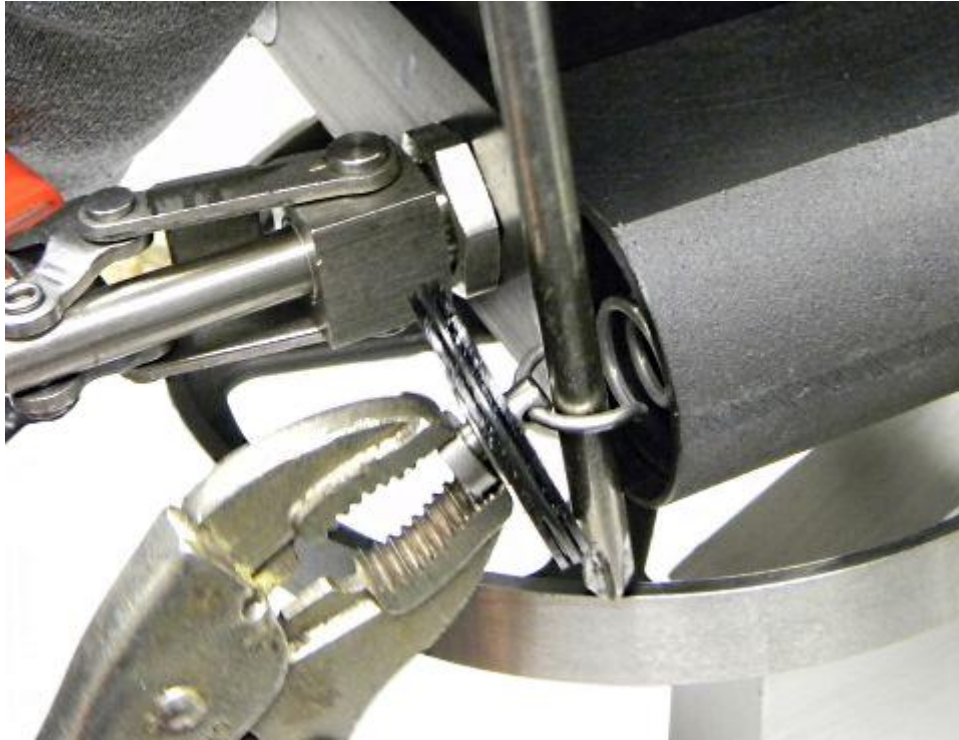
4.5.5 ENCODER MOUNT AND TOP GUIDE WHEEL REMOVAL

Follow these steps to remove the encoder mounts.

1. Using a pair of vice grips, grab the end of the pin and pull on it.



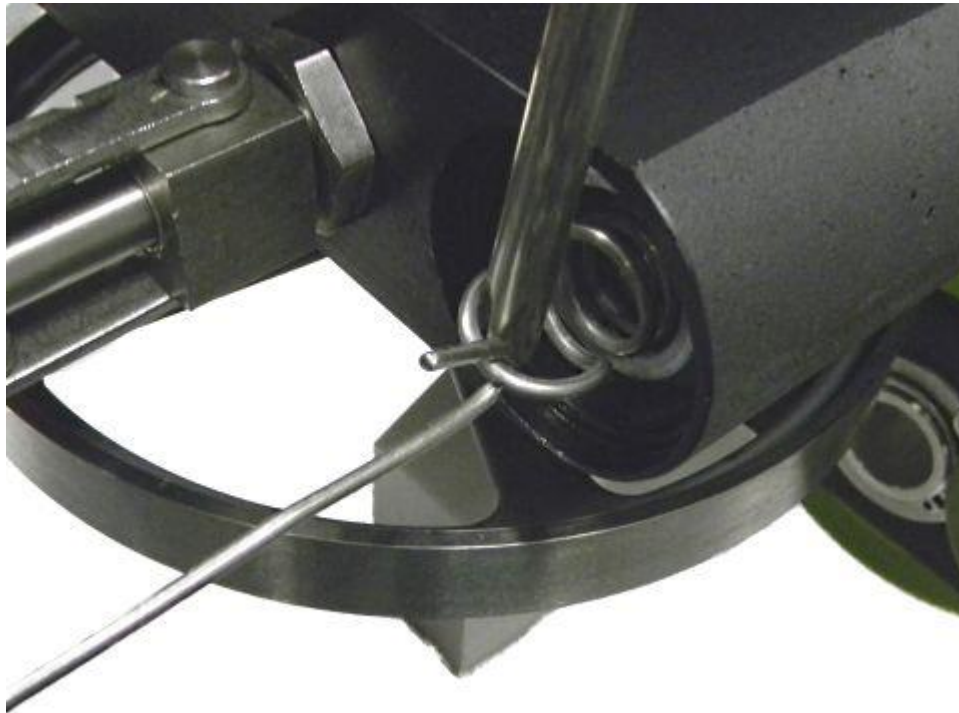
2. Use a screw driver to capture the end of the spring.



3. The end cap and the pin can now be removed.



- 4 Use a hook to pull the spring out far enough to remove the screwdriver (Careful not to bend the spring).

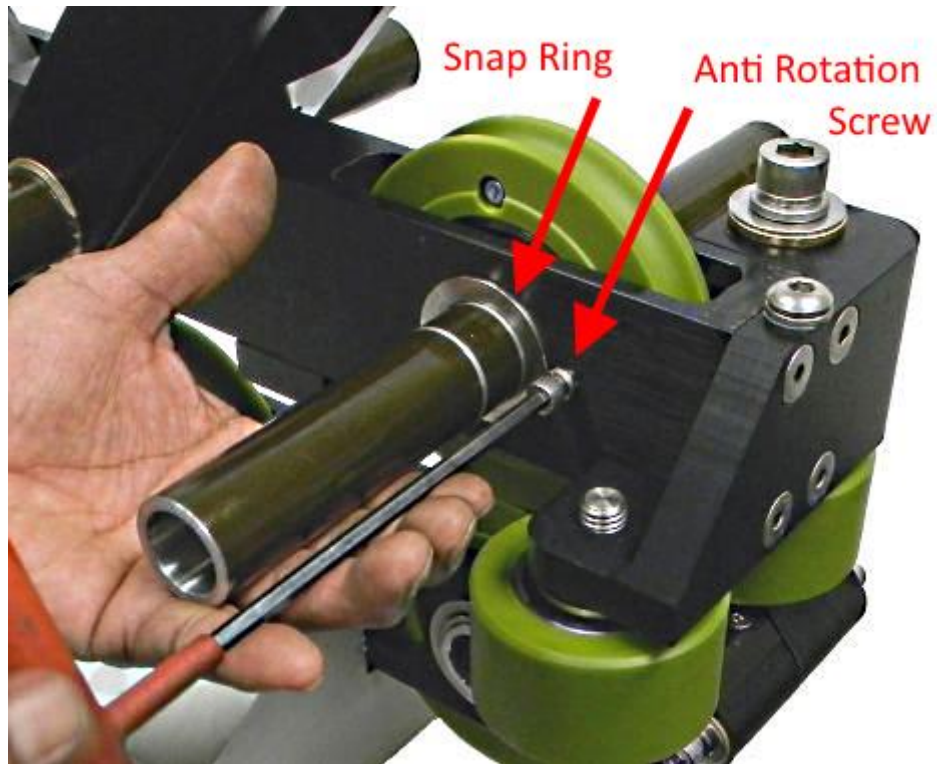


5. Simply slide the floating encoder assembly off the 2 shafts.



6. Repeat for the other side.

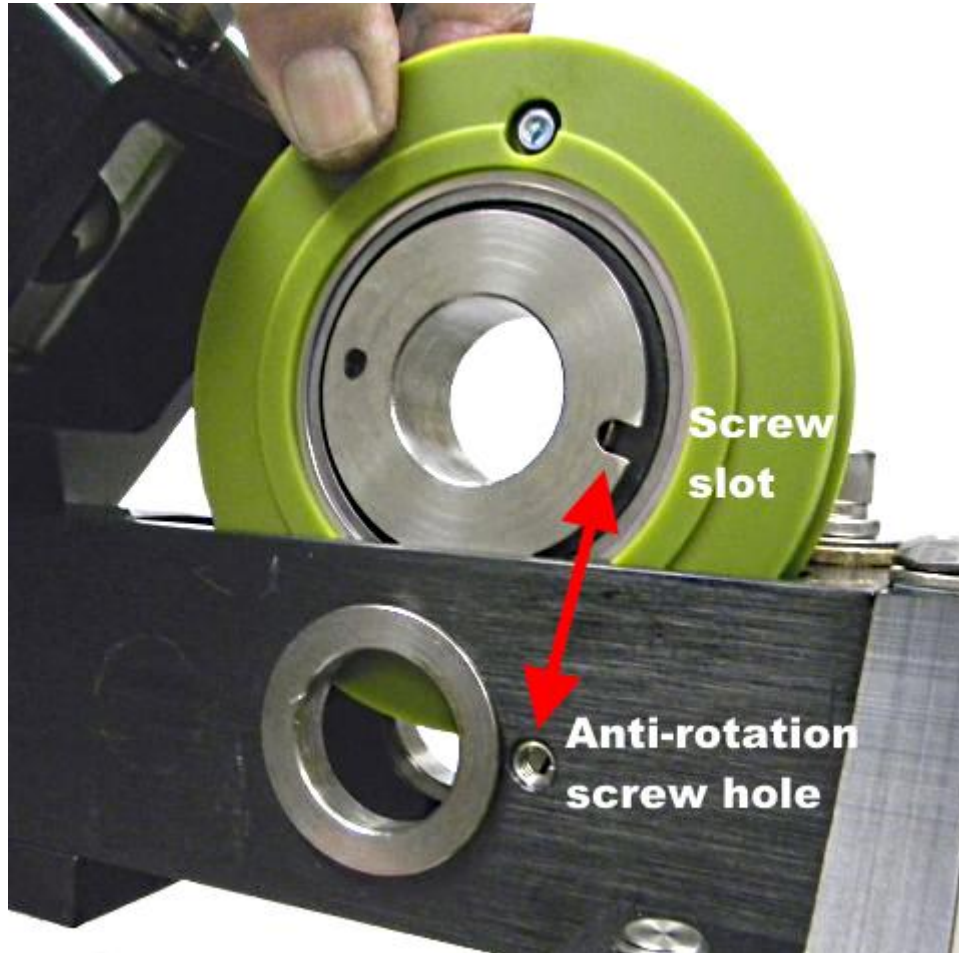
7. Remove anti-rotation screw (if equipped) and snap ring.



8. Slide the shaft out of the frame.



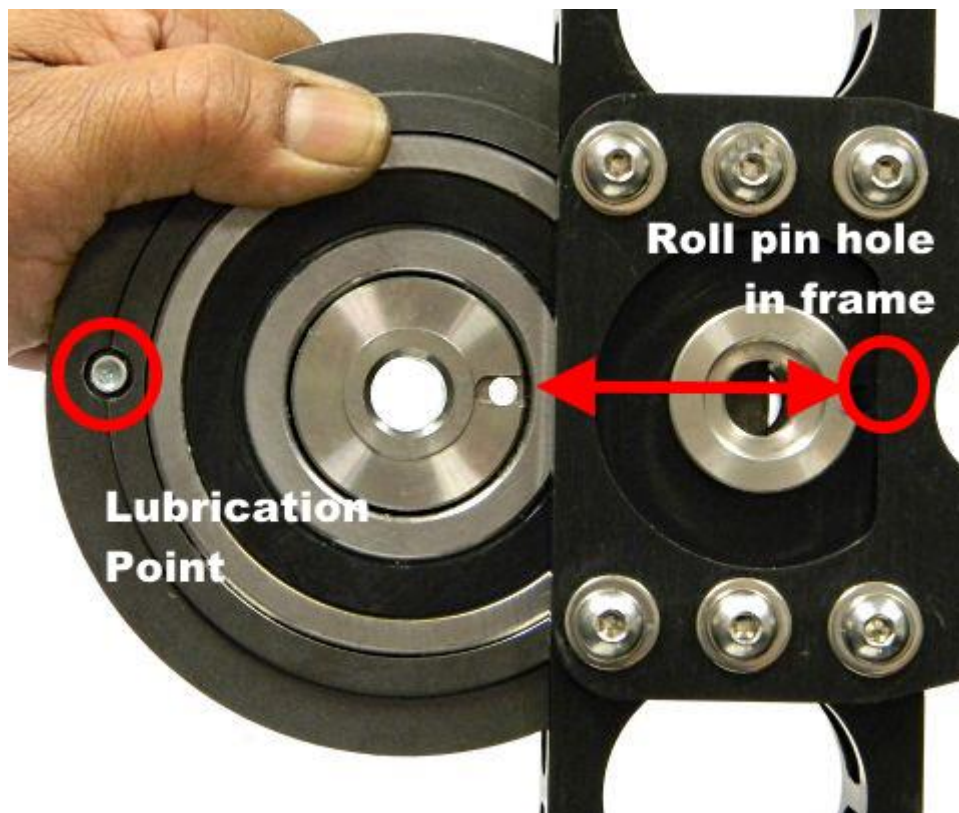
9. Remove the wheel assembly.



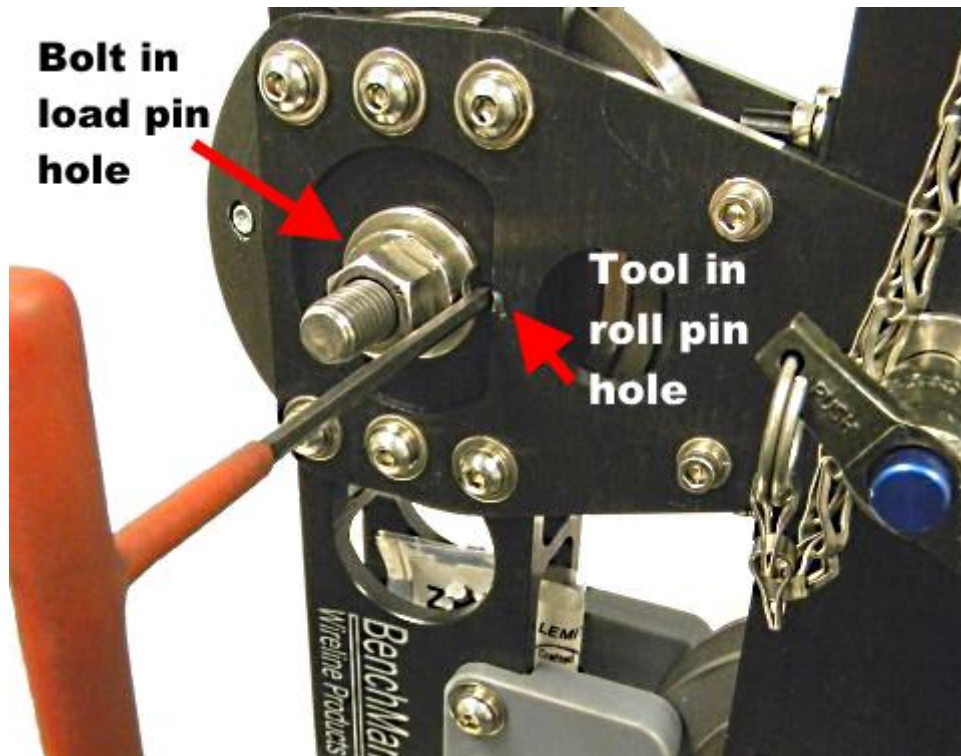
10. Re-assemble in reverse order making sure that slot in the bearing lines up with the anti-rotation screw hole (if equipped). Note – wheels come in a variety of colors and materials.

4.5.6 INSTALLING THE LOAD AXLE WHEEL

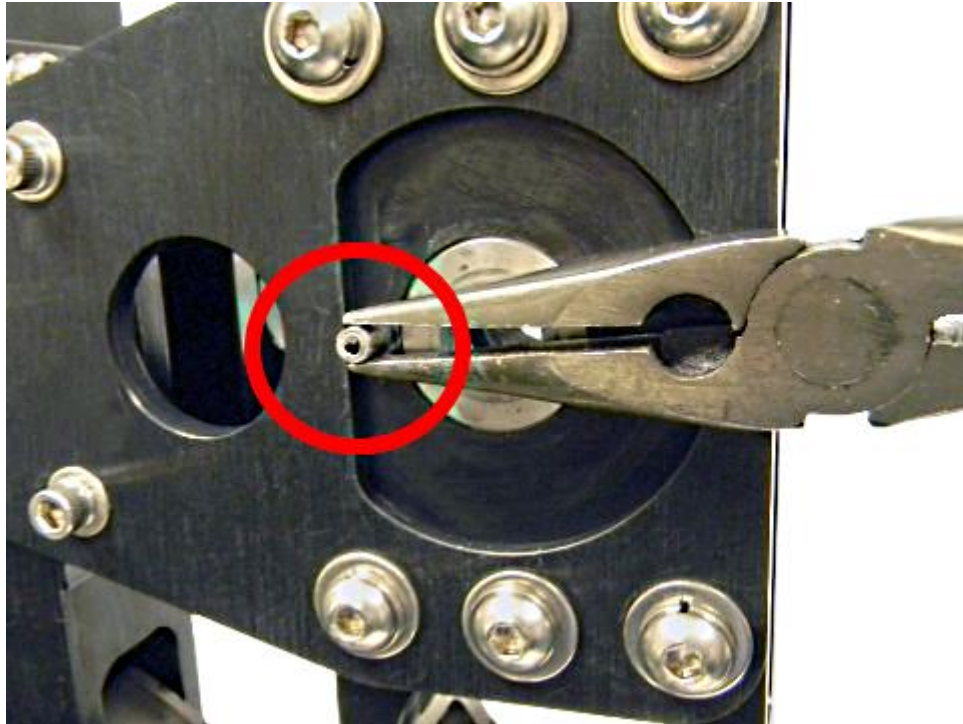
1. Insert the tension wheel into the frame. Make sure the slotted hole in the tension wheel bushing is on the same side as the roll pin hole in the frame and the grease hole is on the opposite side.



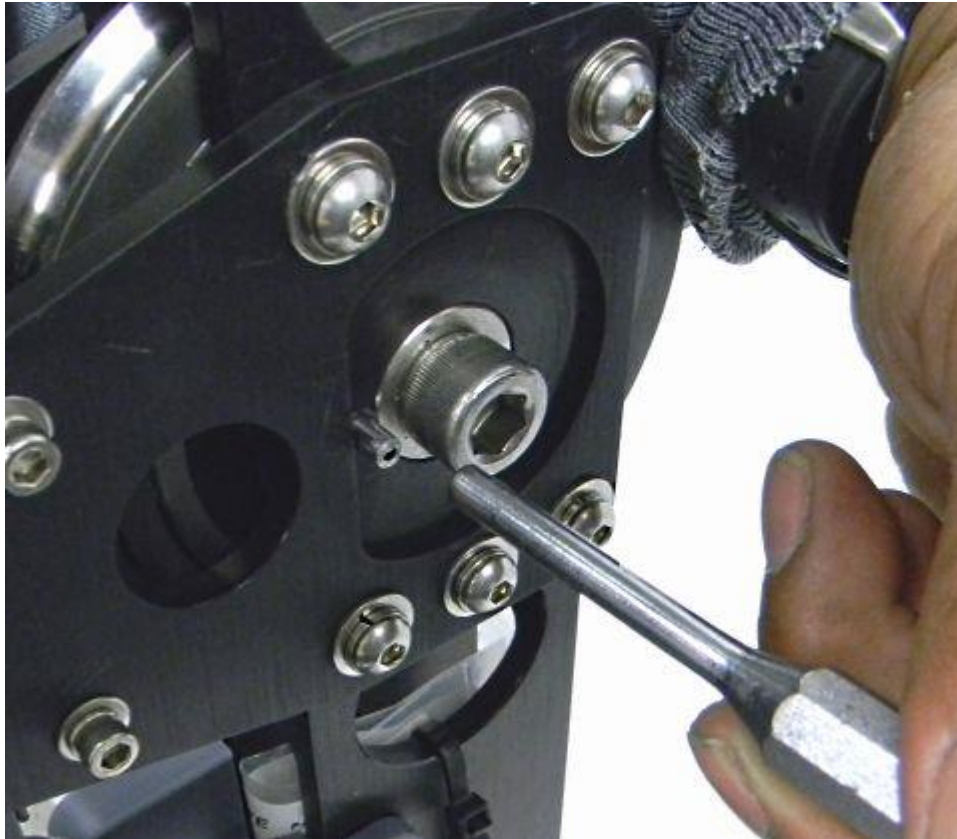
2. Use a bolt in place of the load pin to hold the wheel in place. Install an Allen wrench or other long tool to align the hole in the bearing with the slotted hole in the frame.



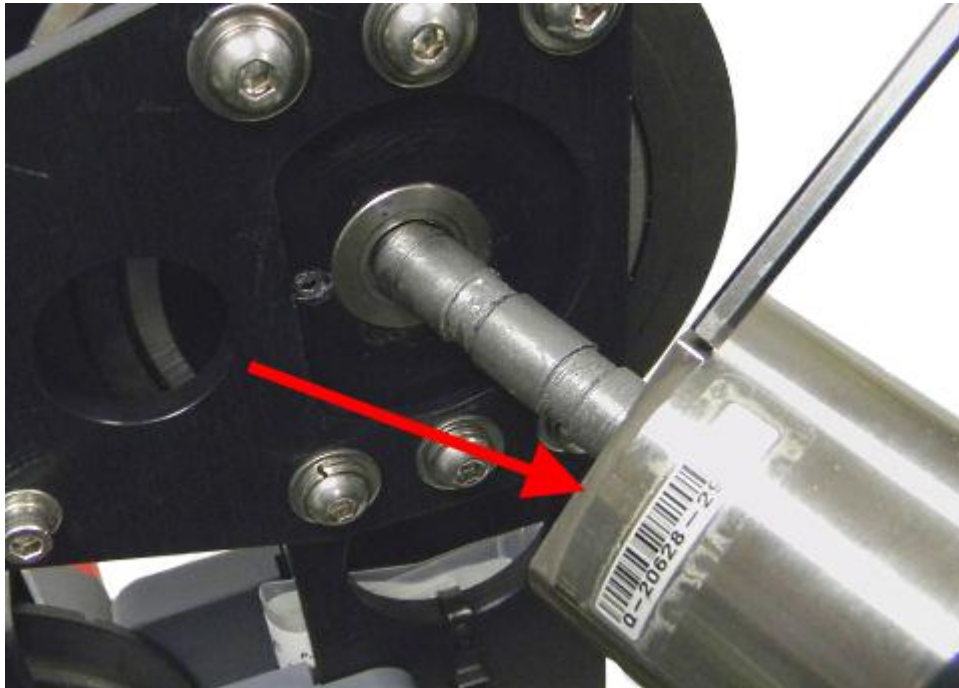
3. Insert a 3/16" x 1/2" long roll pin into the hole. Do not use a longer roll pin as it will bind the wheel.



4. Drive in the roll pin flush with the frame. Make sure that the wheel can freely slide up and down in the frame.



5. Remove the bolt and install the load pin. Align the notch in the load pin with the flat side on the frame.



**AFTER ASSEMBLY IS COMPLETE THE LOAD PIN SHOULD BE
CONFIGURED AS SHOWN BELOW**



5.0 OPTIONS AND ACCESSORIES

5.1 SHIPPING CASE AM5KM198

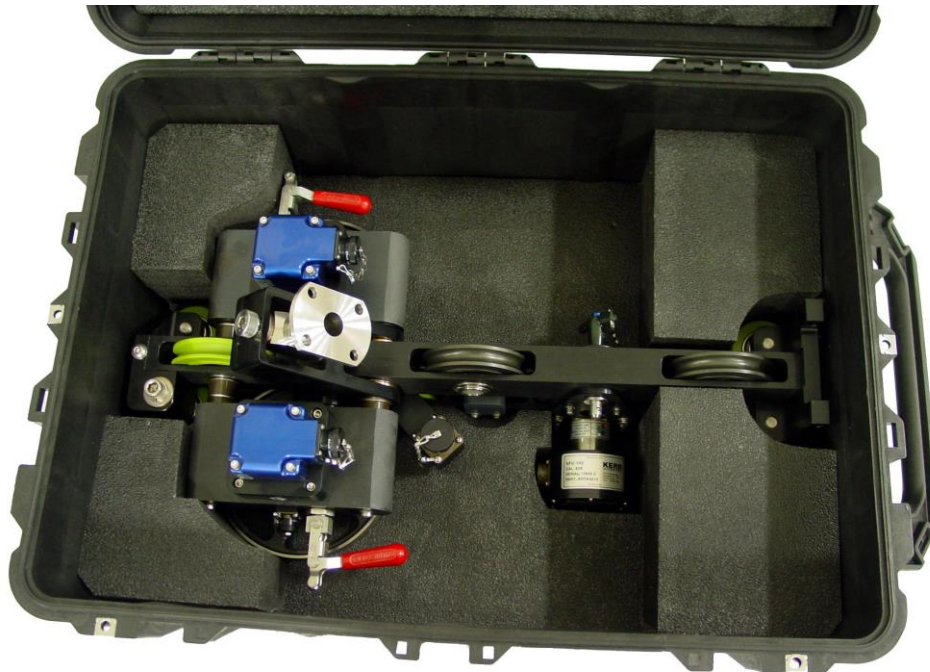
This case is designed to help easily transport the measuring head.

CUSTOM FOAM LINED FOR AM5K

RETRACTABLE HANDLE

ROLLER WHEELS

OUTSIDE DIMENSIONS: 31.5L X 22.88W X 18.88



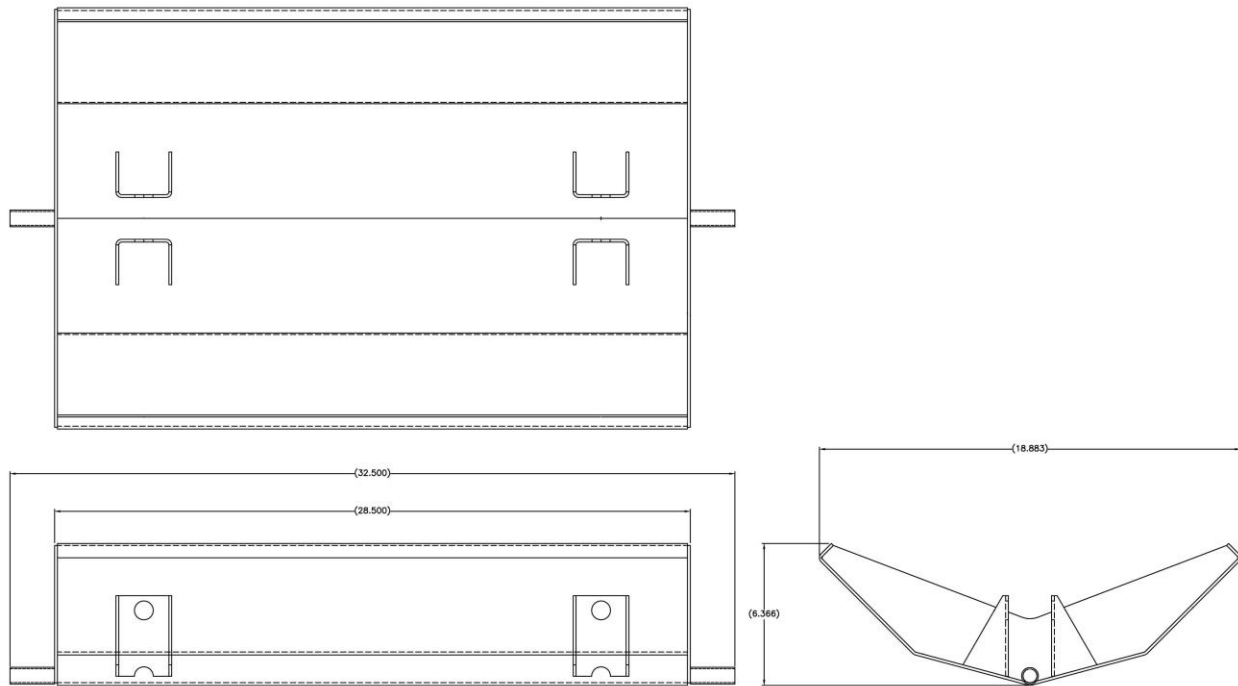
5.1 SHIPPING CASE continued - AM5KM198



AM5K SHIPPING CASE

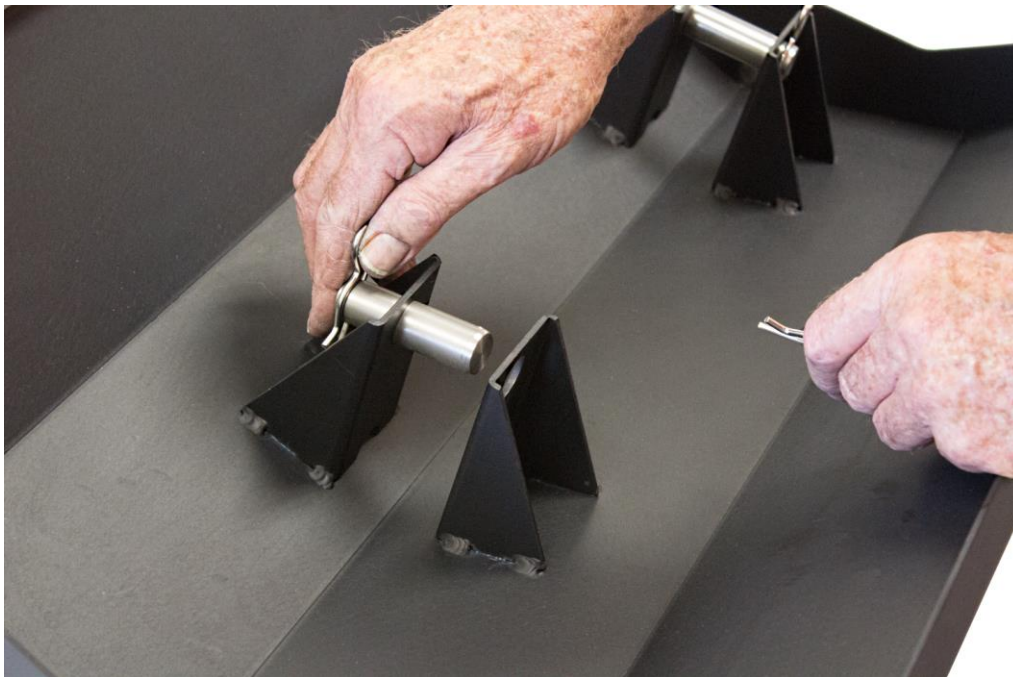
5.2 AM5KA090 DRIP PAN KIT

This drip pan will mount to the bottom of the AM5K measuring head. It is designed to capture fluids and debris that drip or fall from the measuring head. A hose is provided as a means to drain the pan into an external container.

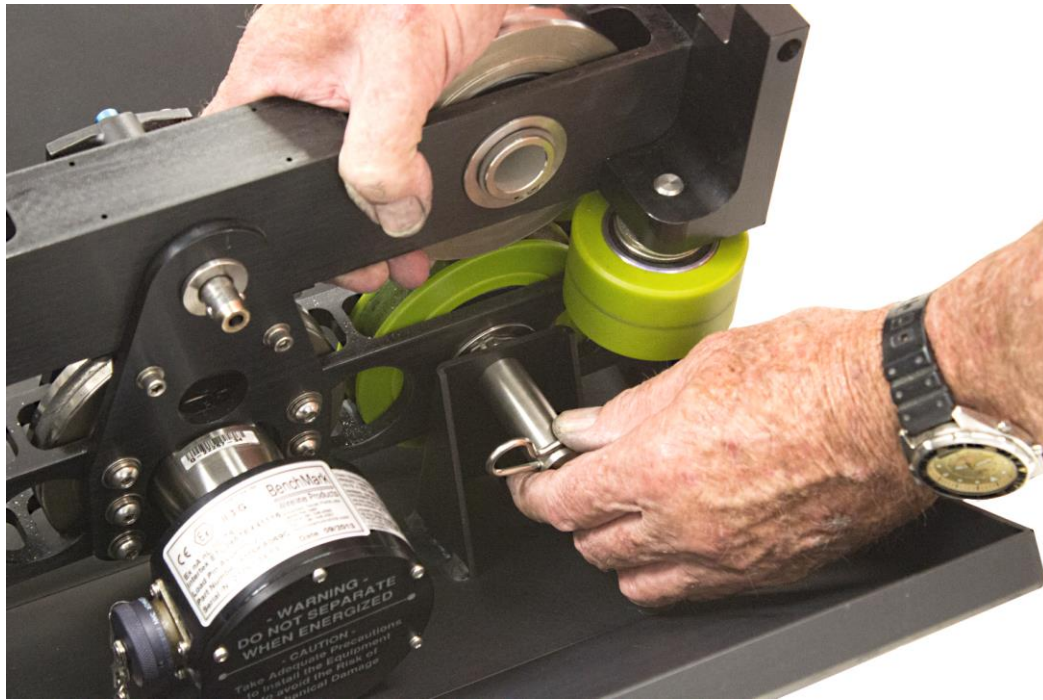


P/N	DESCRIPTION	QTY	UNIT
AM5KM090	PAN DRIP ALUMINUM AM5K	1	EA
AM5KM092	PIN CLEVIS 13/16 X 2-3/4 SST	2	EA
AM5KP205	PIN HAIR 0.125 X 5/8-7/8 SST	4	EA
AM5KP209	TEE 3/4 MALE PUSH-ON NYLON	1	EA
AM5KP208	CLAMP HOSE 0.56-1.06 SST	5	EA
AM5KP207	TBG PVC .75ID X 1.00OD CLEAR	12	EA

5.2 AM5KA090 DRIP PAN KIT continued



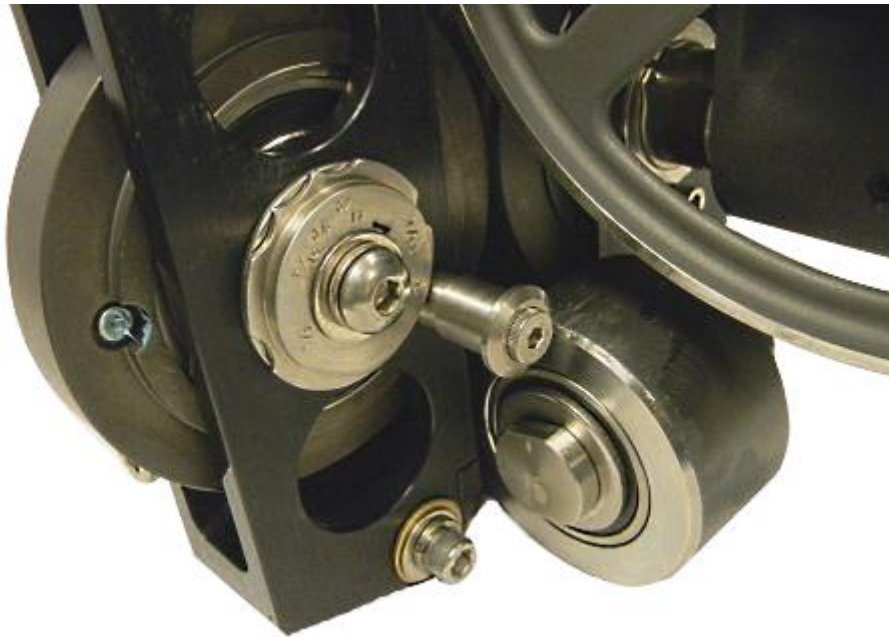
5.2 AM5KA090 DRIP PAN KIT continued



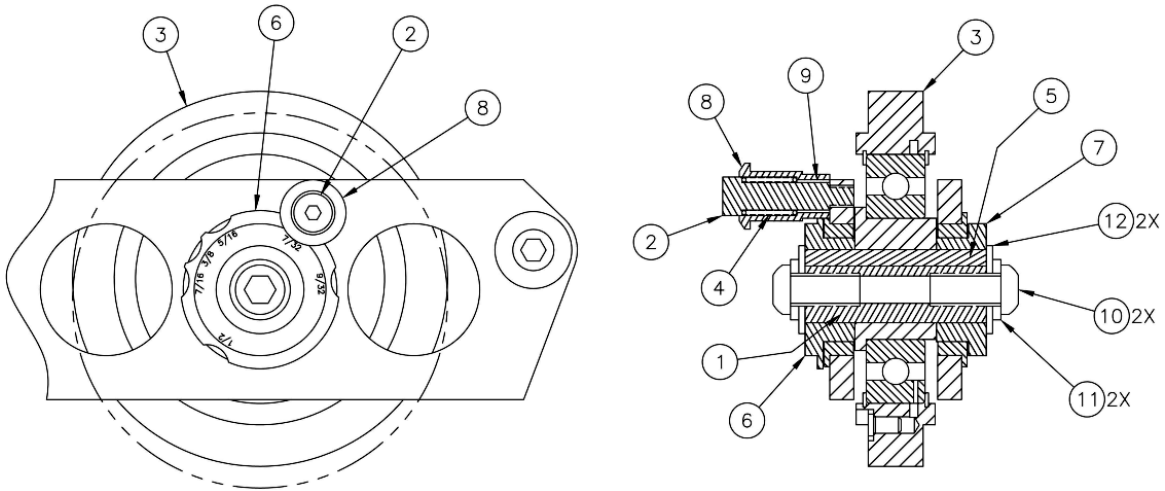
5.3 AM5KA239 ADJUSTABLE GUIDE ROLLER KIT

This kit is designed to force smaller sizes of wireline to run straight across the measuring wheels. Large wirelines (7/16" or larger) are stiff enough so they will run straight but smaller lines such as 7/32" can walk up/down the measuring wheel if they are not under much tension. This can occur when running into the well with pressure through grease tubes. This will cause a depth error (less depth measured than actual) because any vertical movement of the wireline will not turn the measuring wheel as far as it should.

This roller is mounted on an adjustable cam shaft. The shaft can be turned to raise or lower the roller to press the wireline against the bottom of the groove in the upper guide roller. This assures that the wireline will run straight across the measuring wheels.



5.3 AM5KA239 ADJUSTABLE GUIDE ROLLER KIT continued



AM5KA239 ADJUSTABLE GUIDE WHEEL PARTS LIST

ITEM	P/N	DESCRIPTION	QTY	UNIT
1	AM5KM231	SHAFT KEYED 3/4 ADJ RLR SST	1	EA
2	AM5KM232	BOLT MOD SHOULDER 5/16 X 1 SST	1	EA
3	AM5KA144	ASSY WHEEL GUIDE 4.266 SST	1	EA
4	AM5KP234	SPRING COMP 7/8 OAL 0.42 OD	1	EA
5	AM5KP235	KEY 3/16 SQUARE SST	2	EA
6	AM5KM146	BUSHING INDEXED KEYED 30MM	1	EA
7	AM5KM147	BUSHING 30MM KEYED 3/4 SHAFT	1	EA
8	AM5KM148	COLLAR LATCH ADJ ROLLER SST	1	EA
9	AM5KP236	BEARING BRZ .314 ID X .378 OD	1	EA
10	AM5KP181	SCREW 3/8-16 X 3/4 BUTTON HD	2	EA
11	AMS1P058	WASHER 3/8 LOCK SS	2	EA
12	C276P513	WASHER 3/8 FLAT SST	2	EA

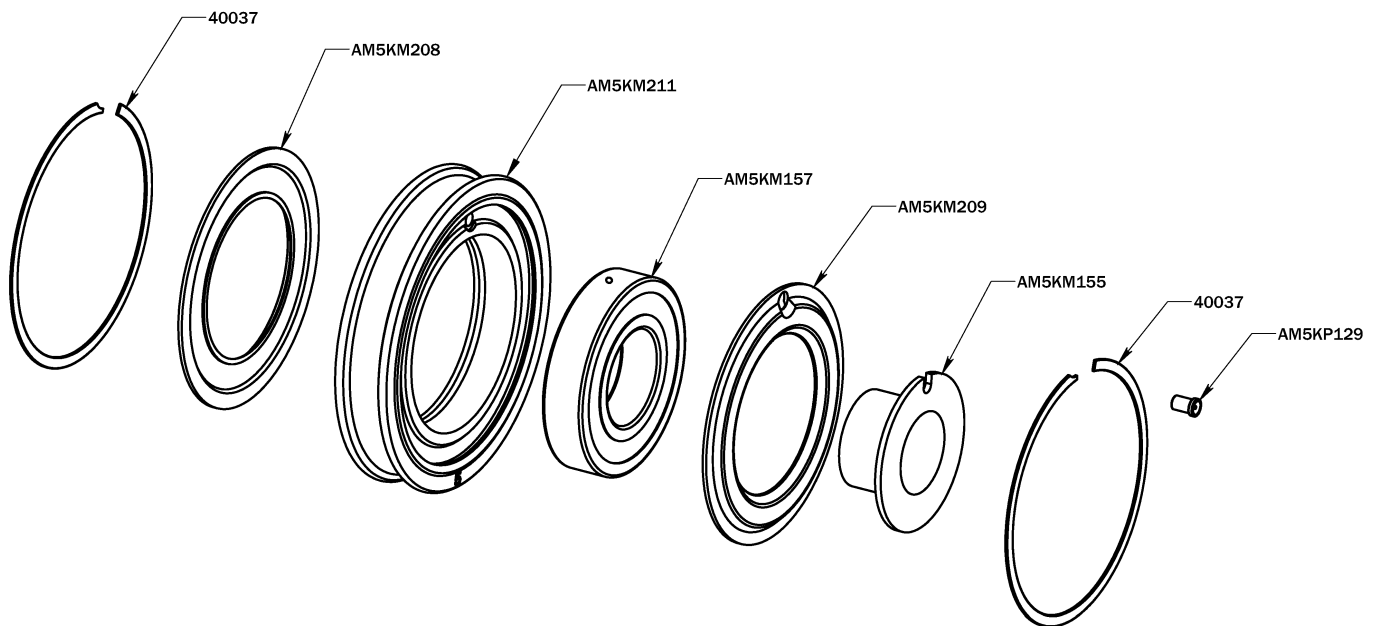
5.4 550 WHEELS AM5KK550

This kit includes guide wheels and tension wheel that are grooved to fit wirelines from .500" up to .550" diameter.

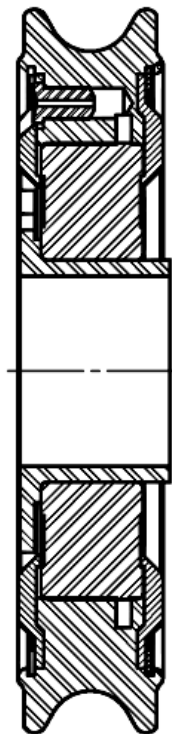
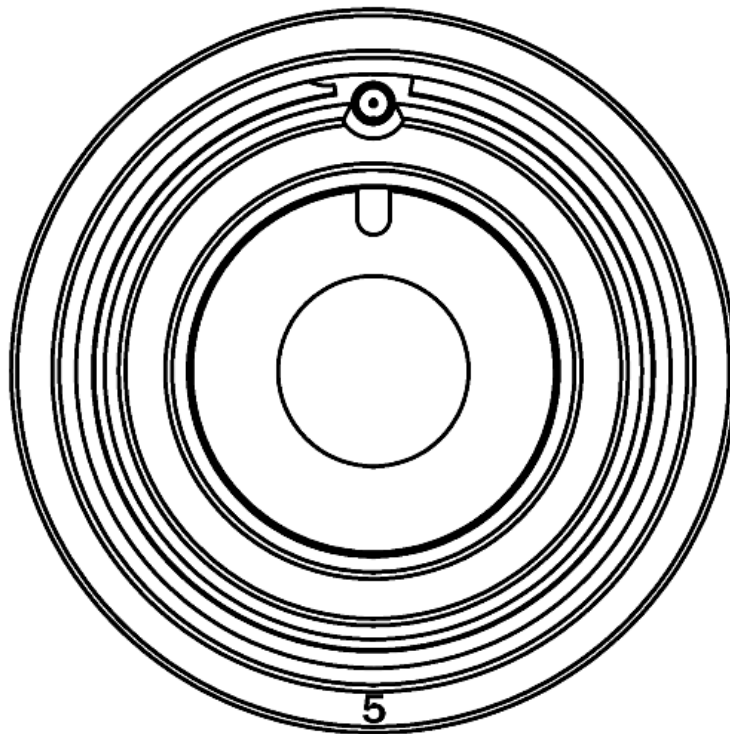
The kit includes 6 steel guide wheels. It replaces the two steel guide wheels and four plastic guide wheels on the standard head. A new tension wheel is also included.

The tension "K" factor is different with this wheel.

P/N	DESCRIPTION	QTY	UNIT
AM5KA391	ASSY WHEEL TENSN FIXD 35MM BRG	6	EA
AM5KA095	ASSY WHEEL TENS 0.550 LOAD AXL	1	EA



5.4 550 WHEELS AM5KK550 continued



Wheels with the "5" stamp are 550's

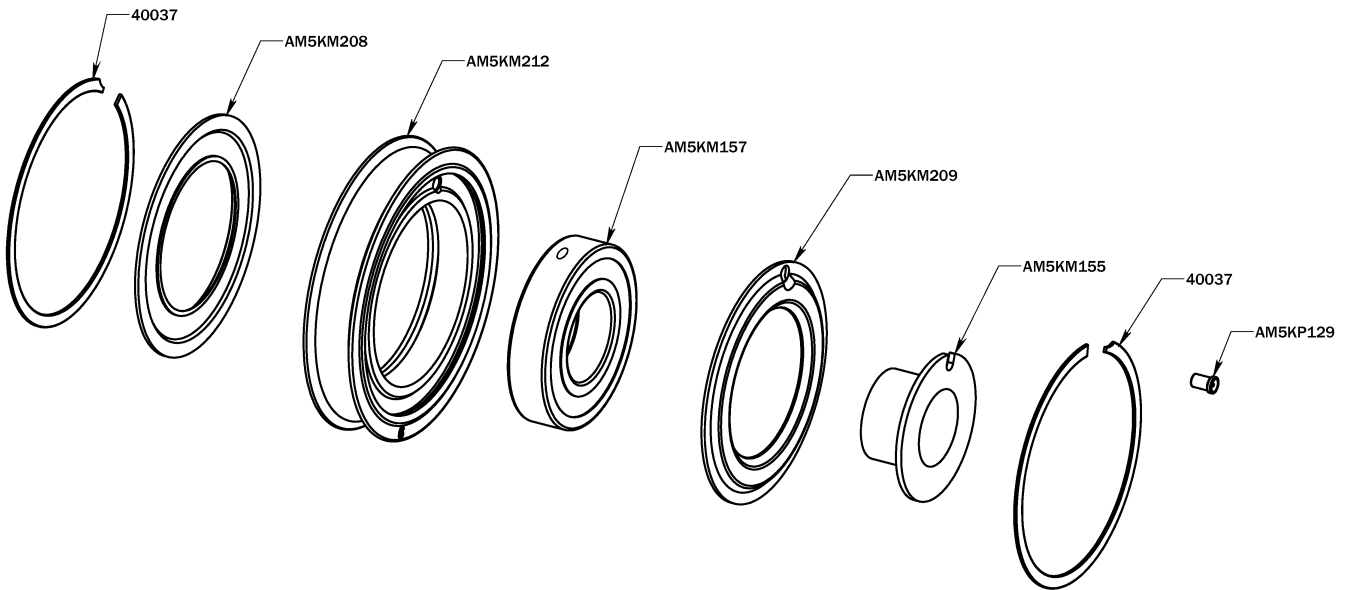
5.5 650 WHEELS AM5KK650

This kit includes guide wheels and tension wheel that are grooved to fit wirelines from .550" up to .650" diameter.

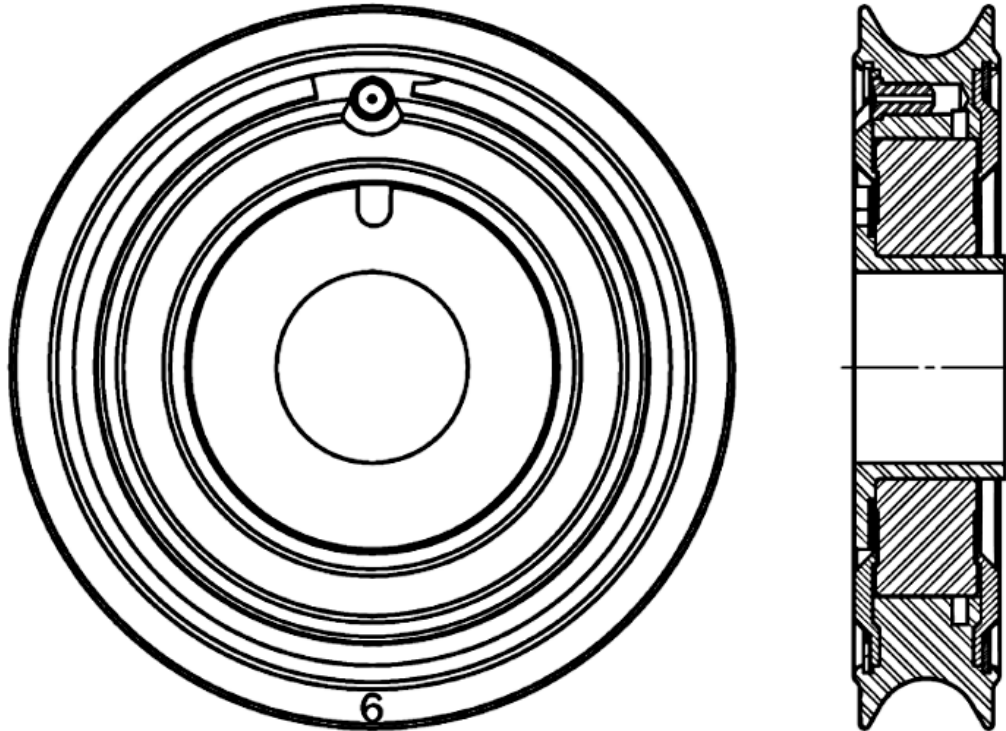
The kit includes 6 steel guide wheels. It replaces the two steel guide wheels and four plastic guide wheels on the standard head. A new tension wheel is also included.

The tension "K" factor is different with this wheel.

P/N	DESCRIPTION	QTY	UNIT
AM5KA392	ASSY WHEEL TENSN FIXD 35MM BRG	6	EA
AM5KA096	ASSY WHEEL TENS 0.650 LOAD AXL	1	EA

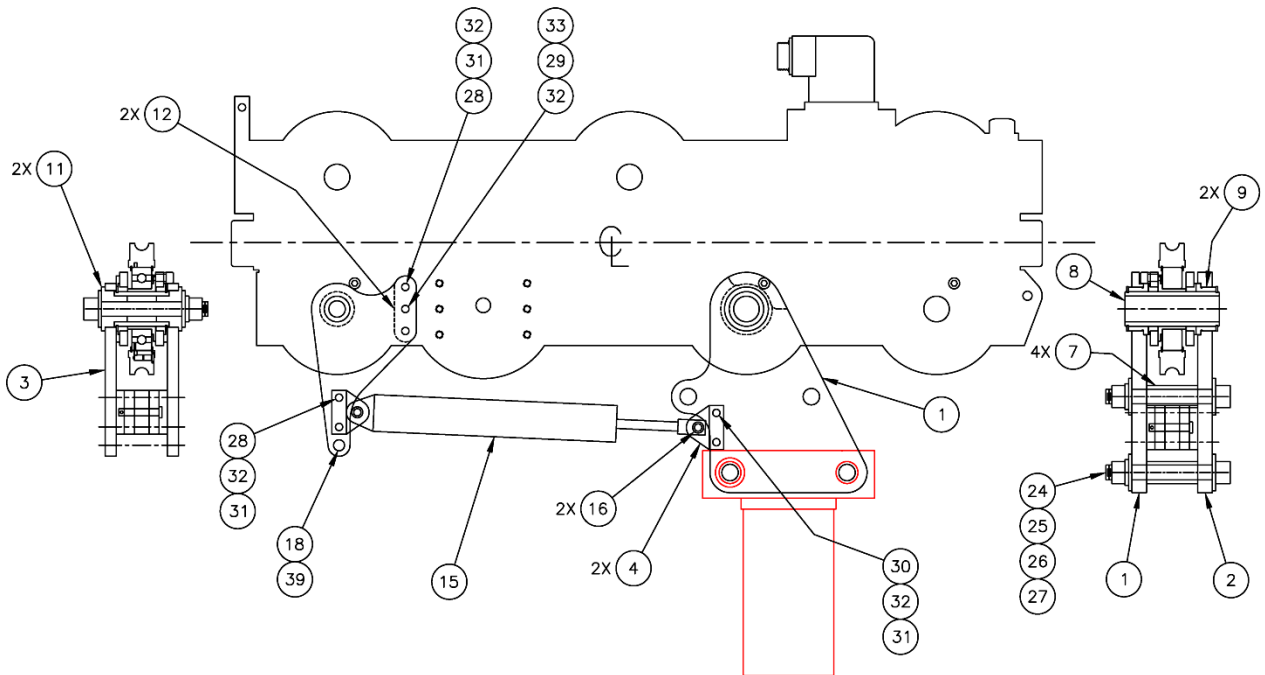
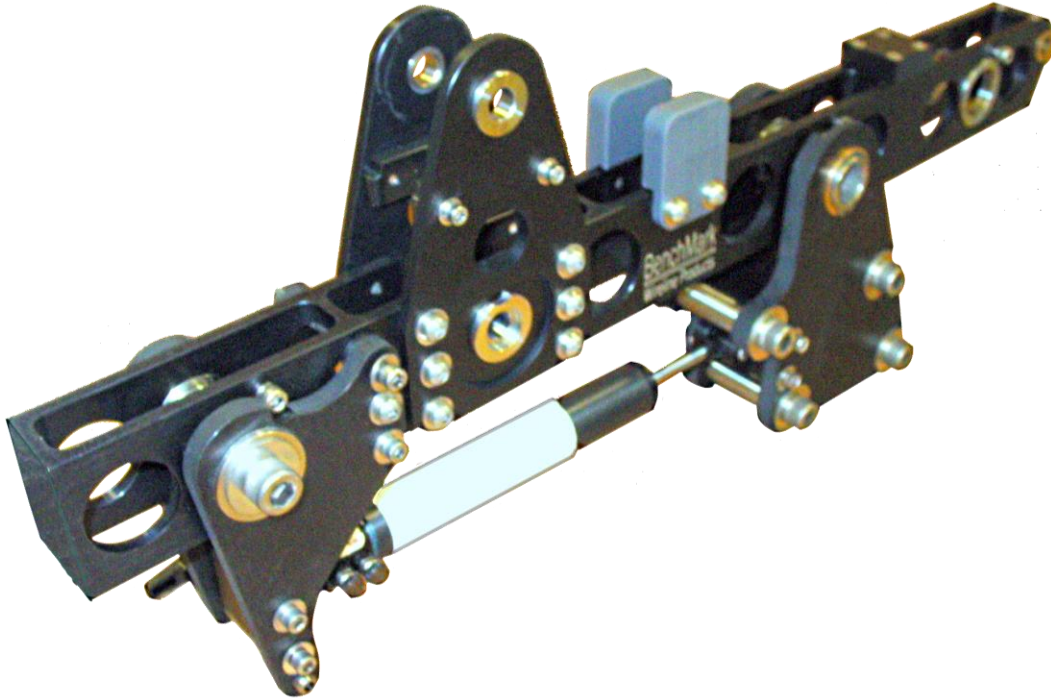


5.5 650 WHEELS AM5KK650 continued



Wheels with the "6" stamp are 650's

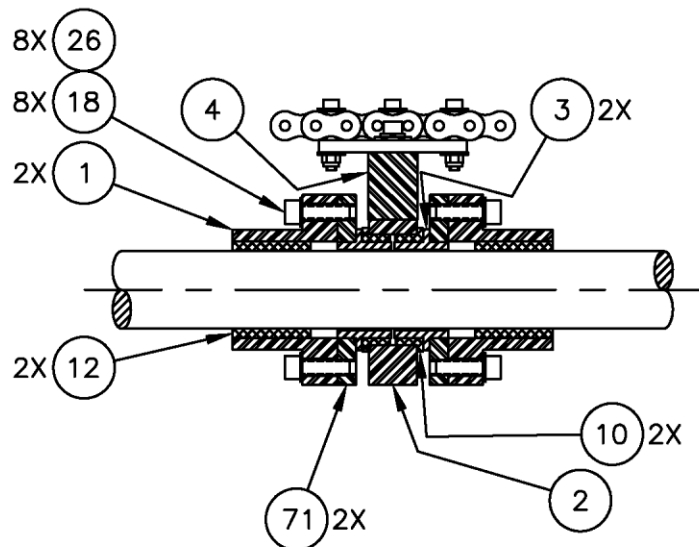
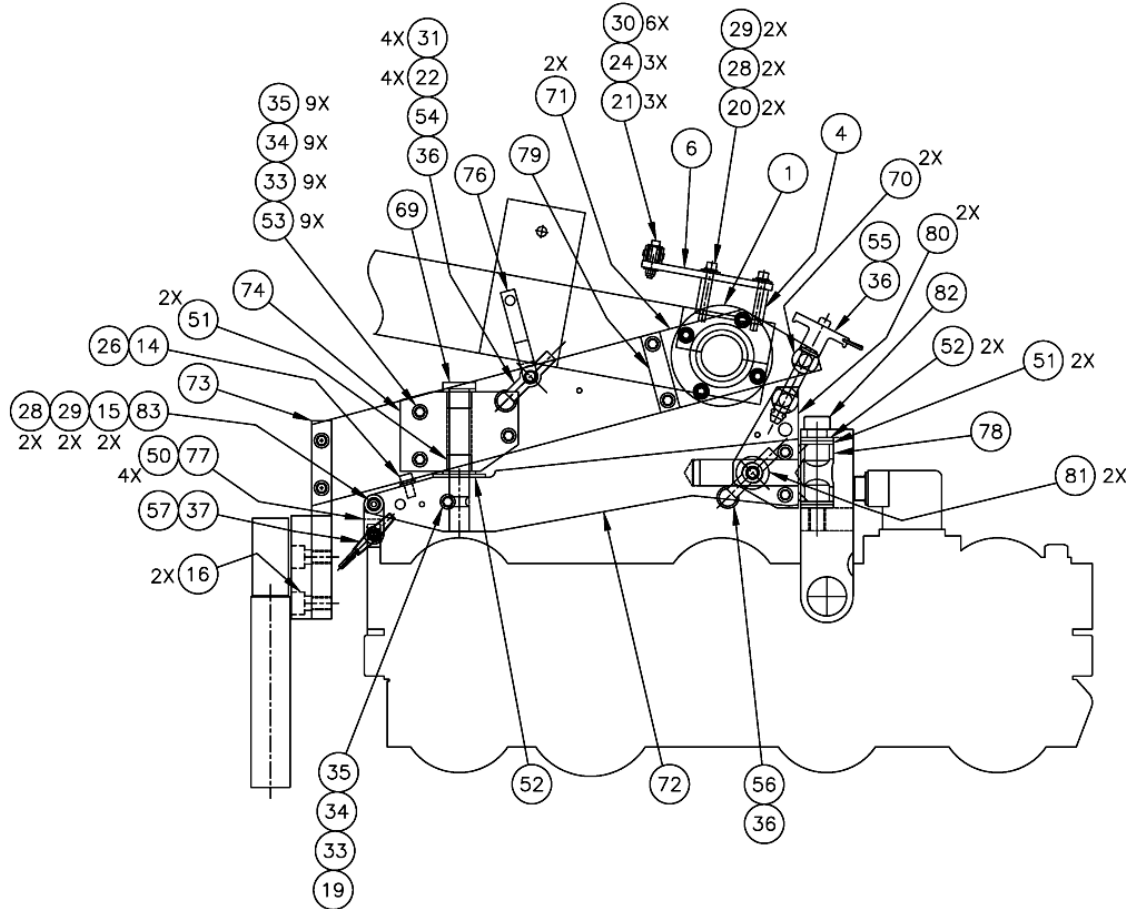
5.6 AM5KA140 - LOWER ARM MOUNT



5.6 AM5KA140 - LOWER ARM MOUNT

ITEM	P/N	DESCRIPTION	QTY
1	AM5KM131-1	PLATE SIDE PIVOT BTM 30MM 5K 1.0000 EA Nor	1
2	AM5KM131-2	PLATE SIDE PIVOT BTM 30MM 5K	1
3	AM5KM133	PLATE SIDE DAMPER BTM PIVOT 5K	2
4	AM5KM139	CLEVIS DAMPER BOTTOM MT AM5K	2
7	AM3KM041	SPACER SST 3/4 OH ARM 3 WHEEL	4
8	AM5KM052	SHAFT TENSION ROLLER 30MM OH	1
9	AM5KM008	BEARING BRZ FLANGE 30MM ID MOD	2
11	AM5KM142	BUSHING SIDE PLT BOTTOM PIVOT	2
12	AM5KM143	SPACER PLT DAMPER BTM PIVOT	2
15	AM5KP171	DAMPER HYD 4IN DBL ACTING ADJ	1
16	AM5KP172	2 PIN CLEVIS 1/4 X 1-3/8 SST	2
17	230949000	PIN COTTER SST .093 X .750 IN	2
18	AM3KP076	PIN QUICK REL 3/8 OD X 2-1/2	1
24	AM5KP140	SCREW 1/2-13 X 3.50 SOC HD SST	5
25	C276P037	WASHER 1/2 FLAT SST	10
26	AMS1P066	WASHER 1/2 LOCK SS	5
27	AMS1P065	NUT 1/2-13 HEX SST	5
28	AM5KP173	SCREW 1/4-20 X 3 SOC HD SS	3
29	C276P036	WASHER 1/4 LOCK SS	2
30	AM5KP174	SCREW 1/4-20 X 3-1/4 SOC HD SS	3
31	AM5KP048	NUT 1/4-20 ELASTIC STOP SST	6
32	ACMU2P31	WASHER 1/4 FLAT 5/8OD SST	14
33	AM5KP117	SCREW 1/4-20 X 5/8 BTN HD SST	2
39	AM5KP075	CHAIN SASH #35 SST	6 INCH

5.7 AM5KA243B - OVERHEAD ARM MOUNT ASEP AUTOSPOOLER



5.7 AM5KA243B - OVERHEAD ARM MOUNT ASEP AUTOSPOOLER


ITEM	P/N	DESCRIPTION	QTY
1	AM3KM124	HOUSING BRG FLANGE 40MM ASEP	2
2	AM3KM138	HUB GUIDE ASEP OH ARM	1
3	AM3KM139	HUB GUIDE INNER ASEP OH ARM	2
4	AM3KM140	SPACER GUIDE ASEP OH ARM	1
6	AM3KM141	PLATE CHAIN GUIDE ASEP OH ARM	1
10	AM3KM144	BEARING FLANGE 2 IN ID MOD	2
12	AMSLP088	BEARING LINEAR 40MMID X 50MMOD	2
14	AMS1P045	SCREW 5/16-18 X 3/4 SHCS SST	1
15	AM5KP117	SCREW 1/4-20 X 5/8 BTN HD SST	2
16	AM5KP042	SCREW 1/2-13 X 3/4 SOC HD SST	2
18	AM3KP057	SCREW 5/16-18 X 1-1/4 SOC HD	8
19	AM5KP183	SCREW 3/8-16 X 2 SOC HD SST	1
20	AMS1P049	SCREW 1/4-20 X 2-1/4 SOC HD SS	2
21	AM3KP058	SCREW 10-24 X 1-1/4 SHCS SST	3
22	AM5KP040	SCREW 10-24 X 3/8 SOC HD SST	4
23	AMS1P065	NUT 1/2-13 HEX SST	2
24	AM3KP059	NUT 10-24 ELASTIC STOP SST	3
26	AMS1P047	WASHER 5/16 LOCK SS	9
28	C276P036	WASHER 1/4 LOCK SS	4
29	ACMU2P31	WASHER 1/4 FLAT 5/8OD SST	4
30	AMS1P054	WASHER #10 FLAT SS	6
31	C276P035	WASHER #10 LOCK SS	4
33	C276P513	WASHER 3/8 FLAT SST	0
34	AMS1P058	WASHER 3/8 LOCK SS	0
35	AMS1P059	NUT 3/8-16 SST	0
36	AMS1P009	PIN QUICK REL 1/2 OD X 2-1/2	3
37	AM3KP073	PIN QUICK REL 3/8 OD X 5 GRIP	1
50	C276P003	BEARING BRZ .375 ID X .500 OD	4
51	AM5KP022	BEARING BRZ FLANGED 3/4" ID	4
52	AM5KP011	WASHER M20 FLAT SST	3
53	AMSLP060	SCREW 3/8-16 X 2-3/4 SOC HD SS	9
54	AM5KP075	CHAIN SASH #35 SST	6 INCH
55	AM5KP075	CHAIN SASH #35 SST	8 INCH
56	AM5KP075	CHAIN SASH #35 SST	6 INCH
57	AM5KP075	CHAIN SASH #35 SST	8 INCH

5.7 AM5KA243B - OVERHEAD ARM MOUNT ASEP AUTOSPOOLER

ITEM	P/N	DESCRIPTION	QTY
69	AM5KM069	SHAFT PIVOT HORIZ ASEP AUTOSPL	1
70	AM3KM070	PIVOT TIE-DN HORZ ASEP AUTOSPL	2
71	AM5KM076	PLATE PIVOT MOUNT ASEP AUTOSPL	2
72	AM5KM068	BEAM SUPPORT ASEP AUTOSPL AM5K	1
73	AM3KM073	ADAPTER HORZ PIVT ASEP AUTOSPL	1
74	AM3KM074	MOUNT SHAFT HORZ PIVT ASEP AS	1
76	AM3KM076	BRACKET TIE-DN QUIK PIN HORIZ	1
77	AM5KM077	KNUCKLE REAR ASEP AUTOSPL 5K	1
78	AM5KM078	YOKE STUB CENTER MT SST	1
79	AM5KM079	SPACER PLATE ASEP AUTOSPL	1
80	AM5KM080	PLATE TIE-DN MT ASEP AUTOSPL	2
81	AM5KM081	BUSHING FLANGE QUIK PIN SS	2
82	AM5KP023	BOLT SHOULDER 3/4 X 3 SST	0
83	AM5KM082	PIN HINGE 3/8 SST ASEP ASPOOL	1

6.0 CERTIFICATION DOCUMENTATION

6.1 MEASURING HEAD ATEX Conformity Certificate



ATEX Conformity Variation Certificate

Epsilon Certificate Number:
Epsilon 02ATEX1144/1

This certificate is issued for the following equipment:
5 Wheel Cable Measurement Device.
Inline Tension Device.

Manufactured and submitted by:
Kerr Measurement Systems, Inc.
6415 Reading Road
Rosenberg
Texas 77471
USA



The equipment shall be designed and constructed in accordance with the specification set out in the schedule herein and documents referred to therein.


This Certificate is issued subject to the conditions of Epsilon Compliance and any additional conditions as may be prescribed.


This Certificate does not imply that the equipment meets all statutory requirements in any particular industry or circumstance.

Directive/s:
ATEX Directive, 94/9/EC


Standard/s:
EN50021: 1999

Coding:

 EEx nA II T6

<p>Project Number: ETS0412</p> <p>Issue Date: 01 November 2004</p>	<p>Report Number: ETS(A)0412/B/1</p> <p>On Behalf of Epsilon Compliance</p> <div style="text-align: center;">  S L D'Henin Certification Manager </div>
--	--




This certificate may only be used in its entirety and without change



Epsilon Compliance (UK),
 Drury Lane, Drury, Buckley, CH7 3DU, UK.
 Telephone: +44(0)1244 541551
 Fax: +44(0)1244 543888

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6.2 MEASURING HEAD ATEX Conformity Certificate – Sheet 1



ATEX Variation Conformity Certificate Schedule

Epsilon Certificate Number:
Epsilon 04ATEX1144/1

Variation 1 Description:
The 5 wheel measuring device range is extended to include the following versions:

- 512/780PPR 0-1.5V
- 2X1200PPR MS16 0-1.5V DIFF
- 2X1200PPR MS16 2.0mV/V

An inline tension device of the following types is included in the scope of the certificate:


- 0-1.5V DIFF
- 2.0mV/V

Drawings:


Number	Rev	Date	Title
AMTKA105	A	4/03	DEVICE ASSY INLINE TENSION 0-1.5V DIFF EEx nA
AMTKA106	A	4/03	DEVICE ASSY INLINE TENSION 2.0 mV/V EEx nA
AM5KA107	B	4/03	DEVICE ASSY 5 WHEEL 2 X 1200PPR MS16 2.0mV/V EEx nA
AM5KA110	B	4/03	DEVICE ASSY 5 WHEEL 2 X 1200PPR MS16 0-1.5V DIFF EEx nA
AM5KA117	A	4/03	DEVICE ASSY 5 WHEEL 512/780PPR 0-1.5V EEx nA
AM5KA121	A	4/03	DEVICE ASSY 5 WHEEL BASE MODEL EEx nA
AM5KA507	A	8/04	DEVICE ASSY 5 WHEEL 2 X 1200PPR MS16 2.0mV/V EEx nA GEN II
AM5KA510	A	8/04	DEVICE ASSY 5 WHEEL 2 X 1200PPR MS16 0-1.5V DIFF EEx nA GEN II
AM5KA517	A	8/04	DEVICE ASSY 5 WHEEL 512/780PPR 0-1.5V EEx nA GEN II
AM5KA521	A	8/04	DEVICE ASSY 5 WHEEL BASE MODEL EEx nA GEN II

Conditions of Certification:
None

Special Conditions of Certification:
None



This certificate may only be used in its entirety and without change



Epsilon Compliance (UK),
 Drury Lane, Drury, Buckley, CH7 3DU, UK.
 Telephone: +44(0)1244 541551
 Fax: +44(0)1244 543888

2/2

MEASURING HEAD ATEX Conformity Certificate – Sheet 2

ATEX Certificate Schedule



Epsilon Certificate Number:

Epsilon Ex 02ATEX1144

Equipment Description:

The Type 2MV EX 5 Wheel Cable Measurement Device consist of the following certified parts:
 Optical Encoder 1200 Pulse/Rev Ex, Magnetic Mark Detector EX and Load Axle 2MV/V EX.
 The device is designed to measure various cable parameters using the listed sensors.

Drawings:

Number	Rev	Date	Title
AM5KA110 2 Shts.	A	May 02	DEVICE ASSY 5 Wheel Zone 2
AM5KM620	A	May 02	LABEL 5 Wheel 2MV EX
AM5KA527	A	April 06	DEVICE ASSY 5 WHL
AM5KA529	A	April 06	DEVICE ASSY 5 WHL
AM5KA521	A1	April 06	DEVICE ASSY 5 WHL

Conditions of Certification:

None

Special Conditions of Certification:

None

Note:

Certificate re issued in June 2006 to include additional drawings in the schedule list. These drawings have no affect on the original certification of the equipment.



Epsilon Certification Service Limited
 Drury Lane, Buckley, Chester CH7 3DU, UK
 Tel: +44 (0) 1244 541551 Fax: +44(0) 1244 543888
 E-mail: certification@epsilon-td.com



6.3 ENCODER ATEX Conformity Certificates

		
<p>1. TYPE EXAMINATION CERTIFICATE</p>		
<p>2. Equipment or Protective System Intended for use in Potentially Explosive Atmospheres</p>		
<p>3. Type Examination Certificate Number: ETL09ATEX41116</p>		
<p>4. Equipment or Protective System: 2.0 mV/V Load Pin Assembly, model numbers AM5KA067, AM5KA072, AM5KA087, AM5KA313</p>		
<p>5. Manufacturer: BenchMark Wireline Products</p>		
<p>6. Address: 36220 FM 1093 P.O. Box 850 Fulshear, Texas, TX 77441 USA</p>		
<p>7. This equipment or protective system and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.</p>		
<p>8. Intertek declares that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive 94/9/EC of 23 March 1994</p>		
<p>The examination and test results are recorded in confidential Report: 3183344DAL-001 dated December 03, 2009. The investigation was begun on 07/21/09 and concluded on 11/30/09. A type sample was made available and tested at the Intertek, Dallas, TX location.</p>		
<p>9. Compliance with the Essential Health and Safety Requirements has been assured by compliance with standards EN 60079-0:2006, and EN 60079-15:2005 except in respect of those requirements referred to at item 16 of the Schedule.</p>		
<p>10. If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.</p>		
<p>11. This Type examination certificate relates only to the design, examination and tests of the specified equipment or protective system in accordance to the directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by this certificate.</p>		
<p>12. The marking of the equipment or protective system shall include the following:-</p>		
 II 3 G Ex nA nL IIC T6		
<p>Intertek 1809 10th Street, Suite 400 Plano, TX 75074, USA Tel: (972) 202-8800 Fax: (972) 202-8801 http://www.Intertek.com</p>		 <hr/> <p>Ryan Parks Hazardous Locations Team Leader Date: 2009/12/03</p>
<p><small>This certificate may only be reproduced in its entirety and without any change, schedule included, and is subject to Intertek Testing Services NA, Inc. Testing and Evaluation Terms and Conditions.</small></p>		
<p>Sheet 1 of 3</p>		
<p><small>Benchmark ATEX Cert ETL09ATEX41116</small></p>		
<p><small>12/03/09</small></p>		

Intertek



SCHEDULE
TYPE EXAMINATION CERTIFICATE NUMBER: ETL09ATEX41116

13. Description of Equipment or Protective System

The 2.0 mV/V Load Pin Assembly is a device to translate force or weight into an electrical signal (mV). The internal strain gauges change their electrical resistance in proportion to the strain placed on them. The resulting small signal is amplified and output as a voltage. This unit is constructed from high strength alloys and is powered from a suitable DC power supply -15V & +15V via an 8 or 10 pin military style circular connector.

Connector Pin	Description	
G	CAL	Calibration
F	SIG-	SIG OUT- Amplifier o/p
E	SIG+	SIG OUT+ amplifier o/p
C	-15V	-15V Power rail
D	GND	Power supply 0V.
B	+15V	+15V Power rail

Each 2.0 mV/V Load Pin Assembly has a 1/2-inch load pin, high strength alloy housing containing a 350 Ohm bridge, and a military style twist-lock connector.

14. Report NUMBER

Intertek Report 3183344DAL-001, dated 03 December 2009.

15. Conditions for use:

a. Special Conditions for safe use

There are no special conditions for safe use

b. Conditions for use (Routine Tests)

There are no routine tests

16. Essential Health and Safety Requirements (EHSR's)

The relevant EHSR's that have not been addressed by the standards listed in this certificate have been identified and assessed in Intertek Report 3183344DAL-001, dated 03 December 2009.

17. DRAWINGS

Intertek
 1809 10th Street, Suite 400, Plano, TX 75074, USA
 Tel: (972) 202-8800 Fax: (972) 202-8801
<http://www.intertek.com>

Sheet 2 of 3

Benchmark ATEX Cert ETL09ATEX41116

12/03/09



SCHEDULE
TYPE EXAMINATION CERTIFICATE NUMBER: ETL09ATEX41116

Number	Issue	Date	Description
C276A032	B	08/01	Shaft. Load Pin (W/Sleeve)
AMS7M010	F	08/17/00	Load Pin E-1 Converter PCB Housing
AM5KM062	A	02/05	Lid Load Pin Housing
AMTKA013	B	12/18/01	Low Voltage Load Cell Amp Kerr Measurement Systems
AM5KM464	A	07/29/09	Label Load Pin 09ATEX41116 Ex nA
AM5KA067	D	08/19/09	Assy Load Pin 2mV/V 1/2 Dia CWL18 10 Pin EX 09ATEX41116
Bill of Material	A	08/19/09	Bill of Material AM5KA067D
AM5KA072	B	08/19/09	Assy Load Pin 2mV/V 1/2 Dia CWL18 10P HT EX 09ATEX41116
Bill of Material	A	08/19/09	Bill of Material AM5KA072D
AM5KA087	B	08/19/09	Assy Load Pin 2mV/V 1/2 Dia CWL18 10PIN EX 09ATEX41116
Bill of Material	A	08/19/09	Bill of Material AM5KA087D
AM5KA313	B	08/19/09	Assy Load Pin 2mV/V 1/2 Dia KP 16 8PIN EX 09ATEX41116
Bill of Material	A	08/19/09	Bill of Material AM5KA313D

On the basis of the referenced test report(s), the type sample(s) of the product has(have) been found to comply with the relevant harmonized standard(s) listed on this certificate at the time the tests were carried out.

This Certificate is for the exclusive use of Intertek's client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this Certificate. Only the Client is authorized to permit copying or distribution of this Certificate and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test/inspection results referenced in this Certificate are relevant only to the type sample tested/inspected. This Certificate by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.

Intertek
 1809 10th Street, Suite 400, Plano, TX 75074, USA
 Tel: (972) 202-8800 Fax: (972) 202-8801
<http://www.intertek.com>

Sheet 3 of 3

Benchmark ATEX Cert ETL09ATEX41116

12/03/09

6.4 LOAD PIN ATEX Conformity Certificates

	
<p>1. TYPE EXAMINATION CERTIFICATE</p>	
<p>2. Equipment or Protective System Intended for use in Potentially Explosive Atmospheres</p>	
<p>3. Type Examination Certificate Number: ETL09ATEX41116</p>	
<p>4. Equipment or Protective System: 2.0 mV/V Load Pin Assembly, model numbers AM5KA067, AM5KA072, AM5KA087, AM5KA313</p>	
<p>5. Manufacturer: BenchMark Wireline Products</p>	
<p>6. Address: 36220 FM 1093 P.O. Box 850 Fulshear, Texas, TX 77441 USA</p>	
<p>7. This equipment or protective system and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.</p>	
<p>8. Intertek declares that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive 94/9/EC of 23 March 1994</p>	
<p>The examination and test results are recorded in confidential Report: 3183344DAL-001 dated December 03, 2009. The investigation was begun on 07/21/09 and concluded on 11/30/09. A type sample was made available and tested at the Intertek, Dallas, TX location.</p>	
<p>9. Compliance with the Essential Health and Safety Requirements has been assured by compliance with standards EN 60079-0:2006, and EN 60079-15:2005 except in respect of those requirements referred to at item 16 of the Schedule.</p>	
<p>10. If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.</p>	
<p>11. This Type examination certificate relates only to the design, examination and tests of the specified equipment or protective system in accordance to the directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by this certificate.</p>	
<p>12. The marking of the equipment or protective system shall include the following:-</p>	
<p></p>	
<p>Intertek 1809 10th Street, Suite 400 Plano, TX 75074, USA Tel: (972) 202-8800 Fax: (972) 202-8801 http://www.Intertek.com</p>	<p> Ryan Parks Hazardous Locations Team Leader Date: 2009/12/03</p>
<p>This certificate may only be reproduced in its entirety and without any change, schedule included, and is subject to Intertek Testing Services NA, Inc. Testing and Evaluation Terms and Conditions.</p>	
<p>Sheet 1 of 3</p>	
<p>Benchmark ATEX Cert ETL09ATEX41116</p>	<p>12/03/09</p>

Intertek



SCHEDULE
TYPE EXAMINATION CERTIFICATE NUMBER: ETL09ATEX41116

13. Description of Equipment or Protective System

The 2.0 mV/V Load Pin Assembly is a device to translate force or weight into an electrical signal (mV). The internal strain gauges change their electrical resistance in proportion to the strain placed on them. The resulting small signal is amplified and output as a voltage. This unit is constructed from high strength alloys and is powered from a suitable DC power supply -15V & +15V via an 8 or 10 pin military style circular connector.

Connector Pin	Description	
G	CAL	Calibration
F	SIG-	SIG_OUT- Amplifier o/p
E	SIG+	SIG_OUT+ amplifier o/p
C	-15V	-15V Power rail
D	GND	Power supply 0V.
B	+15V	+15V Power rail

Each 2.0 mV/V Load Pin Assembly has a 1/2-inch load pin, high strength alloy housing containing a 350 Ohm bridge, and a military style twist-lock connector.

14. Report NUMBER

Intertek Report 3183344DAL-001, dated 03 December 2009.

15. Conditions for use:

a. Special Conditions for safe use

There are no special conditions for safe use

b. Conditions for use (Routine Tests)

There are no routine tests

16. Essential Health and Safety Requirements (EHSR's)

The relevant EHSR's that have not been addressed by the standards listed in this certificate have been identified and assessed in Intertek Report 3183344DAL-001, dated 03 December 2009.

17. DRAWINGS

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Benchmark ATEX Cert ETL09ATEX41116

12/03/09

Intertek



SCHEDULE
TYPE EXAMINATION CERTIFICATE NUMBER: ETL09ATEX41116

Number	Issue	Date	Description
C276A032	B	08/01	Shaft. Load Pin (W/Sleeve)
AMS7M010	F	08/17/00	Load Pin E-1 Converter PCB Housing
AM5KM062	A	02/05	Lid Load Pin Housing
AMTKA013	B	12/18/01	Low Voltage Load Cell Amp Kerr Measurement Systems
AM5KM464	A	07/29/09	Label Load Pin 09ATEX41116 Ex nA
AM5KA067	D	08/19/09	Assy Load Pin 2mV/V 1/2 Dia CWL18 10 Pin EX 09ATEX41116
Bill of Material	A	08/19/09	Bill of Material AM5KA067D
AM5KA072	B	08/19/09	Assy Load Pin 2mV/V 1/2 Dia CWL18 10P HT EX 09ATEX41116
Bill of Material	A	08/19/09	Bill of Material AM5KA072D
AM5KA087	B	08/19/09	Assy Load Pin 2mV/V 1/2 Dia CWL18 10PIN EX 09ATEX41116
Bill of Material	A	08/19/09	Bill of Material AM5KA087D
AM5KA313	B	08/19/09	Assy Load Pin 2mV/V 1/2 Dia KP 16 8PIN EX 09ATEX41116
Bill of Material	A	08/19/09	Bill of Material AM5KA313D

On the basis of the referenced test report(s), the type sample(s) of the product has(have) been found to comply with the relevant harmonized standard(s) listed on this certificate at the time the tests were carried out.

This Certificate is for the exclusive use of Intertek's client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this Certificate. Only the Client is authorized to permit copying or distribution of this Certificate and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test/inspection results referenced in this Certificate are relevant only to the type sample tested/inspected. This Certificate by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program

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Sheet 3 of 3

Benchmark ATEX Cert ETL09ATEX41116

12/03/09

6.5 MARK DETECTOR ATEX Conformity Certificates



ATEX Conformity Certificate

Epsilon Certificate Number:
Epsilon Ex 02ATEX1143

This certificate is issued for the electrical equipment:
Magnetic Mark Detector EX

Manufactured and submitted by:
Kerr Measurement Systems, Inc.
6415 Reading Road
Rosenberg
Texas 77471
USA

The equipment shall be designed and constructed in accordance with the specification set out in the schedule herein and documents referred to therein.

This Certificate is issued subject to the conditions of Epsilon Certification Service and any additional conditions as may be prescribed.

This Certificate does not imply that the equipment meets all statutory requirements in any particular industry or circumstance.

Directive/s:
ATEX Directive - EU 94/9/EC

Standard/s
EN 50021:1999

Coding:
II 3 G EEx nA II T6

Epsilon Project Number:
ETS0412

Issue Date: 22 May 2002



Epsilon Report Number:
ETS(A)0412/C/1

On Behalf of Epsilon Certification Service



S L D'Henin
Certification Manager

This certificate may only be used in its entirety and without change

Epsilon Technical Services Limited is certified against the requirements of ISO 9002 for assessment of products against EU Standards and Directives and is accredited for test and inspection by N.A.P.I.T. Epsilon is accredited as a Certification Body by the ASCB(E) (Accreditation Service for Certifying Bodies (Europe)).





Sheet 1 of 2





Epsilon

ATEX Certificate Schedule



Epsilon Certificate Number:

Epsilon Ex 02ATEX1143

Equipment Description:

The magnetic mark detector is a device which makes use of the Hall effect, for the purpose of generating a direct current voltage in the presence of a magnetic field, in this case a 5VDC electrical pulse. This unit operates between 9-30 volts DC with differential signals via a plug and socket arrangement.

Drawings:

Number	Rev	Date	Title
98600001	F	April 01	Mark Detector
AM5KM635	A	April 02	Cover Magnetic Mark Detector EX

Conditions of Certification:

None

Special Conditions of Certification:

None



Epsilon Certification Service Limited
 Drury Lane, Buckley, Chester CH7 3DU, UK
 Tel: +44 (0) 1244 541551 Fax: +44(0) 1244 543888
 E-mail: certification@epsilon-ltd.com



6.6 CLASS 1 DIVISION 2 CERTIFICATES

Intertek

AUTHORIZATION TO MARK

This authorizes the application of the Certification Mark(s) shown below to the models described in the Product(s) Covered section when made in accordance with the conditions set forth in the Certification Agreement and Listing Report. This authorization also applies to multiple listee model(s) identified on the correlation page of the Listing Report.

This document is the property of Intertek Testing Services and is not transferable. The certification mark(s) may be applied only at the location of the Party Authorized To Apply Mark.

Applicant: Benchmark Wireline Products Inc.
Address: 36220 FM 1093, PO Box 850
 Simonton, TX 77476
Country: USA
Contact: Joey Mayhugh
Phone: (218) 346-4300
FAX: (281) 346-4301
Email: jmayhugh@benchmarkwireline.com

Manufacturer: Benchmark Wireline Products Inc.
Address: 36220 FM 1093, PO Box 850
 Simonton, TX 77476
Country: USA
Contact: Joey Mayhugh
Phone: (218) 346-4300
FAX: (281) 346-4301
Email: jmayhugh@benchmarkwireline.com

Party Authorized To Apply Mark: Same as Manufacturer
Report Issuing Office: Dallas, TX

Control Number: 4005218

Authorized by: _____


 William T. Starr, Certification Manager



This document supersedes all previous Authorizations to Mark for the noted Report Number.

This Authorization to Mark is for the exclusive use of Intertek's Client and is provided pursuant to the Certification agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this Authorization to Mark. Only the Client is authorized to permit copying or distribution of this Authorization to Mark and then only in its entirety. Use of Intertek's Certification mark is restricted to the conditions laid out in the agreement and in this Authorization to Mark. Any further use of the Intertek name for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. Initial Factory Assessments and Follow up Services are for the purpose of assuring appropriate usage of the Certification mark in accordance with the agreement, they are not for the purposes of production quality control and do not relieve the Client of their obligations in this respect.

Intertek Testing Services NA Inc.
 165 Main Street, Cortland, NY 13045
 Telephone 800-345-3851 or 607-753-6711 Fax 607-756-6699

Standard(s): Standard for Safety Electrical Equipment For Measurement, Control, and Laboratory Use; Part 1: General Requirements (ANSI/UL 61010-1-2008, Second Edition, Dated July 12, 2004 Revisions through and including October 28, 2008)

 Standard for Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 1: General Requirements (CAN/CSA-C22.2 No. 61010-1-04, 2nd Edition dated July 12, 2004, with revisions through and including October 28, 2008)

 Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Division 1 and 2 Hazardous (Classified) Locations (ANSI/ISA-12.12.01-2011)



 Standard for Non-incendive Electrical Equipment for Use in Class I, Division 2 Hazardous locations (CSA C22.2 No. 213-M1987, R2008)





AUTHORIZATION TO MARK


Product:	Combined Depth/Tension Measurement Device For use in: Class I, Division 2, Groups A, B, C, and D Temperature Code: T6 Ambient Temperature: -20°C to +40°C
Models:	AM5KA / AMSLA; may be followed by additional letters and numbers


6.7 SAFETY LABELS


CONFORMS TO ANSI/UL STD 61010-1-2008 CERTIFIED TO CAN/CSA STD C22.2 61010-1-04	 Intertek XXXXXX
T6, Tamb = -20°C TO +40°C CLASS I DIV 2, GROUPS A B C D	
MEASURING DEVICE ASSY Part Number: XXXXXXXX Serial Number: YRXXX	


Class 1 Division 2, Groups A, B, C, D PRODUCT: Load Pin VOLTS: 12DC AMPS: 0.050	
WARNING - EXPLOSION HAZARD - DO NOT DISCONNECT WHILE CIRCUIT IS LIVE UNLESS AREA IS KNOWN TO BE NON-HAZARDOUS	
ADVERTISSEMENT - RISQUE D'EXPLOSION. NE PAS DEBRANCHER TANT QUE LE CIRCUIT EST SOUS TENSION, A MOINS QU'IL NE S'AGISSE D'UN EMPLACEMENT NON DANGEREUX.	

Class 1 Division 2, Groups A, B, C, D PRODUCT: Load Pin VOLTS: +/-15DC AMPS: 0.050	
WARNING - EXPLOSION HAZARD - DO NOT DISCONNECT WHILE CIRCUIT IS LIVE UNLESS AREA IS KNOWN TO BE NON-HAZARDOUS	
ADVERTISSEMENT - RISQUE D'EXPLOSION. NE PAS DEBRANCHER TANT QUE LE CIRCUIT EST SOUS TENSION, A MOINS QU'IL NE S'AGISSE D'UN EMPLACEMENT NON DANGEREUX.	

Class 1 Division 2, Groups A, B, C, D PRODUCT: Load Pin VOLTS: 24DC AMPS: 0.050	
WARNING - EXPLOSION HAZARD - DO NOT DISCONNECT WHILE CIRCUIT IS LIVE UNLESS AREA IS KNOWN TO BE NON-HAZARDOUS	
ADVERTISSEMENT - RISQUE D'EXPLOSION. NE PAS DEBRANCHER TANT QUE LE CIRCUIT EST SOUS TENSION, A MOINS QU'IL NE S'AGISSE D'UN EMPLACEMENT NON DANGEREUX.	

Class 1 Division 2, Groups A, B, C, D PRODUCT: Magnetic Mark Detector VOLTS: 15DC AMPS: 0.050	
WARNING - EXPLOSION HAZARD - DO NOT DISCONNECT WHILE CIRCUIT IS LIVE UNLESS AREA IS KNOWN TO BE NON-HAZARDOUS	
ADVERTISSEMENT - RISQUE D'EXPLOSION. NE PAS DEBRANCHER TANT QUE LE CIRCUIT EST SOUS TENSION, A MOINS QU'IL NE S'AGISSE D'UN EMPLACEMENT NON DANGEREUX.	

Class 1 Division 2, Groups A, B, C, D PRODUCT: Optical Encoder VOLTS: 5-15DC AMPS: 0.100	
WARNING - EXPLOSION HAZARD - DO NOT DISCONNECT WHILE CIRCUIT IS LIVE UNLESS AREA IS KNOWN TO BE NON-HAZARDOUS	
ADVERTISSEMENT - RISQUE D'EXPLOSION. NE PAS DEBRANCHER TANT QUE LE CIRCUIT EST SOUS TENSION, A MOINS QU'IL NE S'AGISSE D'UN EMPLACEMENT NON DANGEREUX.	

Class 1 Division 2, Groups A, B, C, D PRODUCT: Magnetic Backup Encoder VOLTS: 5DC AMPS: 0.050	
WARNING - EXPLOSION HAZARD - DO NOT DISCONNECT WHILE CIRCUIT IS LIVE UNLESS AREA IS KNOWN TO BE NON-HAZARDOUS	
ADVERTISSEMENT - RISQUE D'EXPLOSION. NE PAS DEBRANCHER TANT QUE LE CIRCUIT EST SOUS TENSION, A MOINS QU'IL NE S'AGISSE D'UN EMPLACEMENT NON DANGEREUX.	

7.0 SPARE PARTS LISTS

7.1 RECOMMENDED SPARE PARTS

It is recommended that the following parts be kept on hand in the indicated quantities **QTY**.

ITEM	P/N	DESCRIPTION	QTY
RECOMMENDED SPARE PARTS FOR ALL LOCATIONS			
14	AM5KA058	ASSY BACKUP MAGNETIC EEx Na	1
22	AM5KM001	WHEEL MEASURING 2FT 5 SPOKE	2
31	AM5KA247	ASSY WHEEL GUIDE PLAS 35MM BRG	4
33	AM5KA063	ASSY WHEEL TENSN SHALLOW GROOVE	1
33	AM5KA073	ASSY WHEEL TENSN DEEP GROOVE	1
34	AM5KA364	ASSY WHEEL TENSN FIXD 35MM BRG	2
36	AM5KM073	COUPLING MOD ENCDR 0.250/0.375	2
51	AMS1P009	RETAINING PIN (T HANDLE)	1

ITEM	P/N	DESCRIPTION	QTY
ADDITIONAL RECOMMENDED SPARE PARTS FOR REMOTE LOCATIONS			
10		ASSY LOAD AXLE / PIN	1
12	AM5KA066	ASSY MAG MARK DETECTOR EEx nA	1
13		ENCODER	1
35	AM5KA065	ASSY ROLLER SPOOLNG 2.75" PLAS	4
54	AM5KM157	BEARING BALL 35MM ID MOD	6
55	AM5KP088	BEARING LINEAR 30MMID X 40MMOD	8
56	AM3KP204	BEARING BALL 20MM FAFNIR 204PP	4
58	AM5KM134	BEARING BALL 40MM ID MOD	1
59	AM5KP229	CLAMP TOGGLE PUSH/PULL SST	1
101	AM5KP130	NOZZLE GREASE FITTNG FLUSH	1

NOTE - ONLY STOCK THE LOAD AXLE AND ENCODER USED IN YOUR MEASURING HEAD. A COMPLETE LIST IS FOUND IN THE BILL OF MATERIALS

NOTE 1:

Heads manufactured before Sep 2013 did not have bearing seal retainers. We have since installed retainers on the bearings installed in the AM5KA137 and AM5KA164. The part numbers for these wheels have been changed to AM5KA247 and AM5KA364. Visit 7.3 to see pictures of the new wheels.

7.2 AM5K MEASURING HEAD STANDARD CONFIG – BILL OF MATERIALS

ITEM	P/N	DESCRIPTION	QTY	REF
1	AM5KA131	ASSY FRAME BACKBONE UPPER W/BUSHINGS	1	
2	AM5KA332	ASSY LOWER FRAME W/BUSHINGS AND WEAR BLOCKS	1	
3	AM5KA052-1	ASSY MOUNT FLTNG ENCDR WHL W/	1	OPTION
4	AM5KA052-2	ASSY MOUNT FLTNG ENCDR WHL W/0	1	
5	AM5KA053	ASSY BLOCK PIVOT HORIZ/VERT	1	
6	AM5KM057	ADAPTER ENCODER H37C/H25D	2	OPTION
6	AM5KM058	COVER ENCODER ADAPTER	1	OPTION
7	AM5KM020	ENDCAP FLOATING ENCODER MOUNT	4	
8	AM5KA057	ASSY MOUNT SPOOLNG ROLLR FRNT	1	
9	AM5KM026	MOUNT SPOOLING ROLLER REAR	1	
10	MANY	ASSY LOAD AXLE / PIN	1	SEE CHART 8.3
11	AM5KA040	ASSY MOUNT CENTER YOKE 5 WHEEL	1	OPTION
12	AM5KA066	ASSY MAG MARK DETECTOR EEx Na	1	
13	MANY	ENCODER	1	SEE CHART 8.3
14	AM5KA058	ASSY BACKUP MAGNETIC EEx Na	1	
15	AM5KM024	SHAFT PIVOT VERTICAL 20MM SST	1	
16	AM5KM011	SHAFT TENSION ROLLER 30MM SST	5	
17	AM5KA059	ASSY SHAFT ENCODER SLIDE 30MM	2	
18	AM5KM023	SHAFT PIVOT HORIZONTAL 1/2 SST	1	
19	AM5KM013	SHAFT SPOOLING ROLLER 20MM	3	
20	AM5KP023	BOLT SHOULDER 3/4 X 3 SST	1	
21	AM5KP002	SPRING EXT 4" OAL 47/64 DIA SST	4	
22	AM5KM001	WHEEL MEASURING 2FT 5 SPOKE	2	
23	AM5KM141	ANCHOR SPRING 1/2" FLOATING	4	
24	AM5KM034	PLATE WEAR 1/16 X 1.5 X 3.5	1	
25	AM5KM049	BLOCK WEAR 1.50 X 1.50 X 0.56 STL	2	LARGE LINES
25	AM5KM074	BLOCK WEAR UPPER TOOL STL CH	1	SMALL LINES ONLY
26	AM3KM134	BLOCK WEAR 0.75 X 2.50 TOOLSTL	2	
27	AM5KM159	BLOCK GUIDE TENSION WHEEL PLAS	2	
28	AM5KM084	SCREW ANTI-ROTATION TENS WHEEL	6	
29	AM5KM010	SHAFT WHEEL CANTILEVERED 5 WHL	1	
30	AM5KM060	SHAFT WHEEL CANTLVRD MAG 5 WHL	1	OPTION
31	AM5KA247	ASSY WHEEL GUIDE PLAS 35MM BRG	4	
33	AM5KA073	ASSY WHEEL TENSN DEEP GROOVE	1	OPTION (HI TENSION) USE with line tensions > 10,000 pounds or cables > 7/16"

7.2 AM5K MEASURING HEAD STANDARD CONFIG – BILL OF MATERIALS continued

ITEM	P/N	DESCRIPTION	QTY	REF
34	AM5KA164	ASSY WHEEL TENSN FIXD 35MM BRG OBSOLETE REPLACED WITH AM5KA364	0	
35	AM5KA065	ASSY ROLLER SPOOLNG 2.75" PLAS	4	
36	AM5KM073	COUPLING MOD ENCDR 0.250/0.375	2	OPTION
37	AM5KP124	PIN COILED SPRING 1/4 X 1-1/8	2	ENCODER SLIDE
38	AM5KP125	PIN COILED SPRING 3/16 X 1/2	1	TENSION WHEEL PIN
42	AM5KM138	YOKE PIVOT CENTER MOUNT SST	1	
43	AM5KM040	PUSHROD TOGGLE CLAMP PLASTIC	2	
51	AMS1P009	RETAINING PIN (T HANDLE)	1	
52	AMS1P072	PLUG 3/8 NPT SS	2	
53	AM5KP075	CHAIN SASH #35 SST	6	
54	AM5KM157	BEARING BALL 35MM ID MOD	6	
55	AM5KP088	BEARING LINEAR 30MMID X 40MMOD	8	
56	AM3KP204	BEARING BALL 20MM FAFNIR 204PP	4	
58	AM5KM134	BEARING BALL 40MM ID MOD	1	
59	AM5KP229	CLAMP TOGGLE PUSH/PULL SST	2	
60	AM5KM055	KEY 1/8 X 1/8 X 0.625L SST	2	
61	AM5KP144	WASHER 1/4 LOCK SS HIGH COLLAR	4	
62	ACMU2P31	WASHER 1/4 FLAT SS	8	
63	AMS1P058	WASHER 3/8 LOCK SS	3	
64	C276P513	WASHER 3/8 FLAT SST	2	
65	C276P036	WASHER 1/4 LOCK SS	4	
66	AM5KP011	WASHER 20MM FLAT SST	12	
67	C276P039	WASHER 5/16 FLAT SST	2	
68	AMS1P066	WASHER 1/2 LOCK SS	2	
69	AMS1P047	WASHER 5/16 LOCK SS	4	
70	C276P037	WASHER 1/2 FLAT SST	2	
71	C276P046	WASHER #6 LOCK SS	4	
72	C276P035	WASHER #10 LOCK SS	7	
73	AMS1P052	SCREW 10-24 X 5/8 SOC HD SST	4	
74	C276P331	SCREW 6-32 X 1/2 PHIL PAN SST	4	
75	AM5KP117	SCREW 1/4-20 X 5/8 BTN HD SST	4	
76	AM5KP038	SCREW 5/16-18 X 7/8 FH SOC SS	8	
77	AM5KP039	SCREW 10-24 X 7/8 FH SOC SST	2	

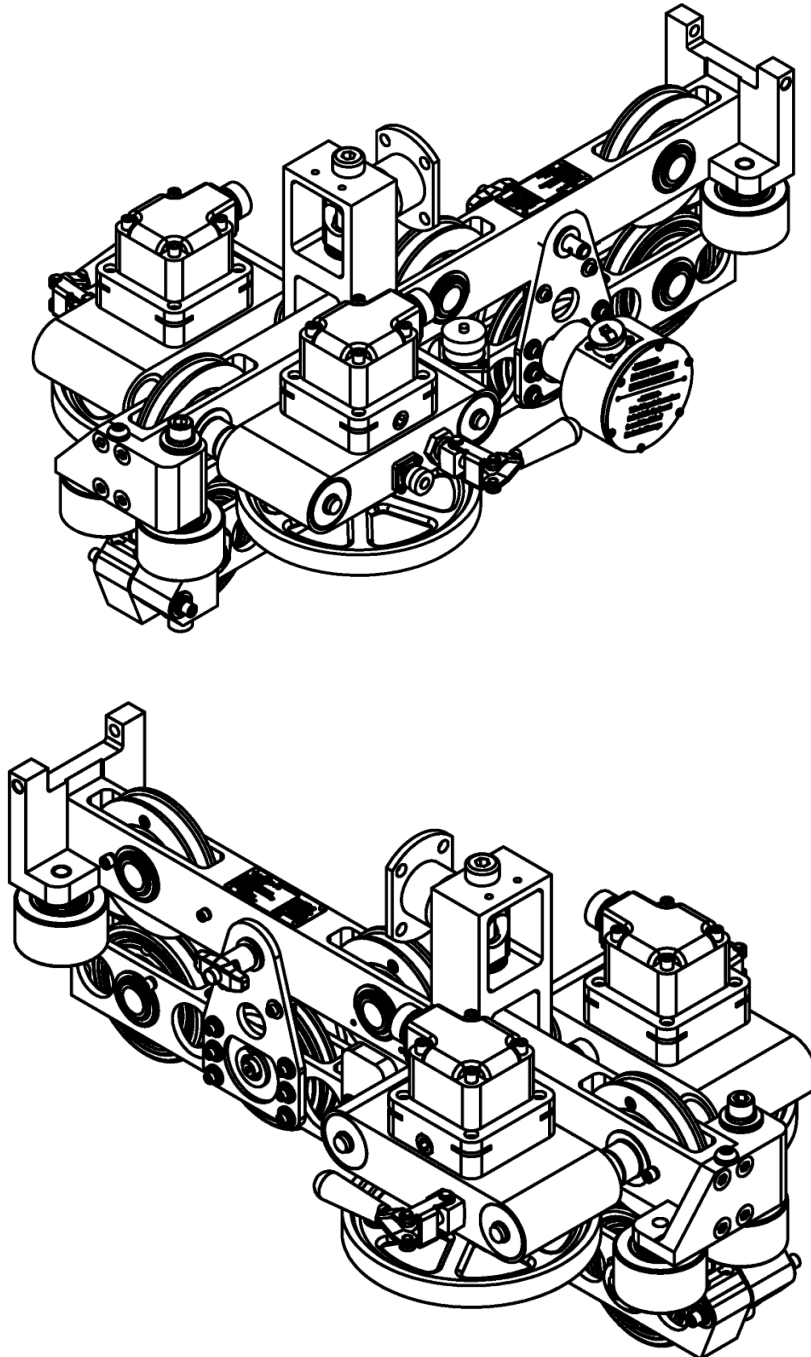
7.2 AM5K MEASURING HEAD STANDARD CONFIG – BILL OF MATERIALS continued

ITEM	P/N	DESCRIPTION	QTY	REF
78	AM5KP040	SCREW 10-24 X 3/8 SOC HD SST	5	
79	AM5KP042	SCREW 1/2-13 X 3/4 SOC HD SST	2	
80	AMS1P048	SCREW 1/4-20 X 3/4 SOC HD SST	4	OPTION W/COVER
80	C276P031	SCREW 1/4-20 X 1-1/4 SOC HD SS	8	
82	AM5KP037	SCREW 5/16-18 X 4-1/2 SOC HD	2	
83	AM3KP028	SCREW 5/16-18 X 1/2 SHCS SST	2	
84	AMS1P052	SCREW 10-24 X 5/8 SOC HD SST	8	OPTION
84	AMS1P053	SCREW 10-24 X 2 SHCS SST	8	OPTION W/HD ENCDR
85	AM5KP043	SCREW 3/8-16 X 1/2 BUTTON HD	3	
86	AMS1P006	RING RETNG INT UR187S	4	
87	AM5KP033	RING RETNG EXT 0.500 SHAFT SST	1	
89	AM3KP018	RING RETNG EXT 1.188 SHAFT SST	14	
90	AM5KP168	RING RETNG INT 2.875 LT DUTY	12	
91	C276P041	O-RING 2-017 BUNA N	1	BACKUP HSG
92	AM5KP072	O-RING 2-046 BUNA N MMD COVER	1	
93	C276P040	O-RING 2-235 BUNA N L/P LID	1	
94	AMS8P066	O-RING 2-136 BUNA N L/P HSG	1	
95	AM5KP118	O-RING 2-023 BUNA N L/P CONN	1	
96	AM5KP020	O-RING 2-030 BUNA N ENDCAP	4	
97	AMS1P014	O-RING 2-152 BUNA N ENC ADPTR	2	
98	AM5KP071	O-RING 2-141 BUNA N H25 ENCDR	2	
99	AM5KP119	O-RING 2-026 BUNA N MMD CONN	1	
100	C276P042	O-RING 2-016 BUNA N	1	BACKUP CONN
101	AM5KP130	NOZZLE GREASE FITTING FLUSH	1	NOT SHOWN

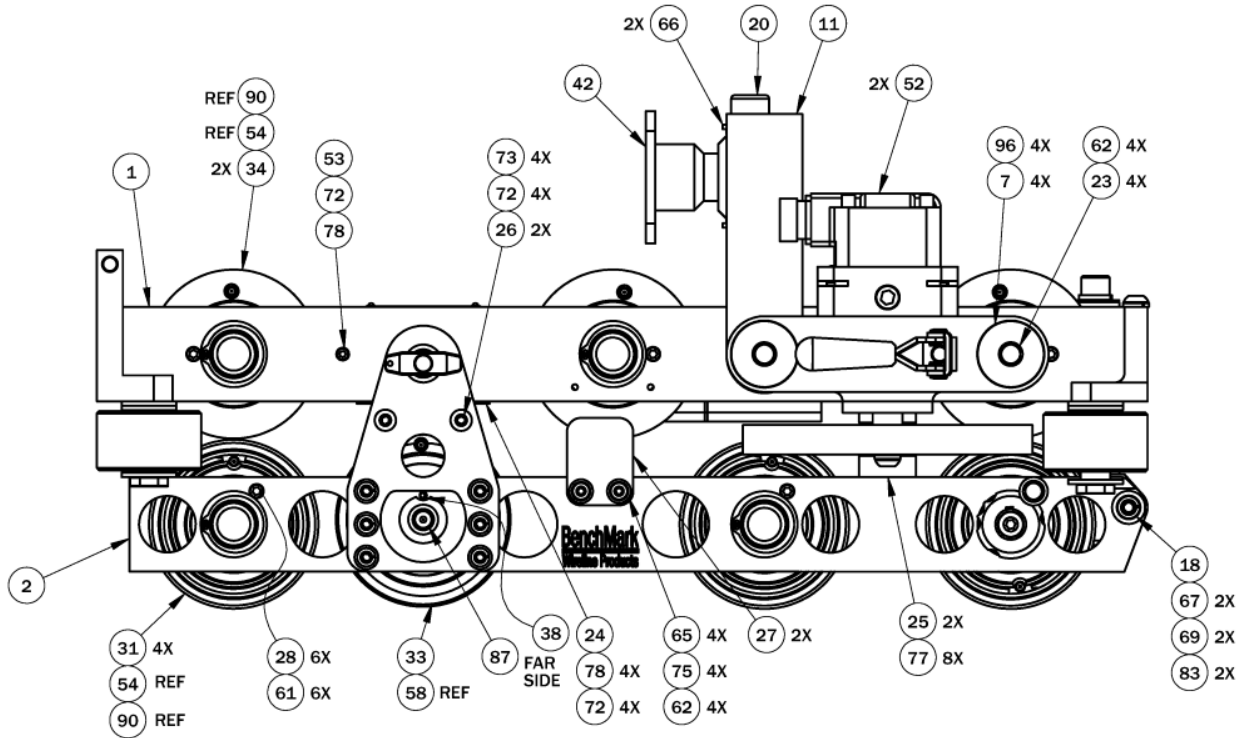
8.0 DRAWINGS & SPECIFICATIONS

8.1 MEASURE HEAD ASSEMBLY

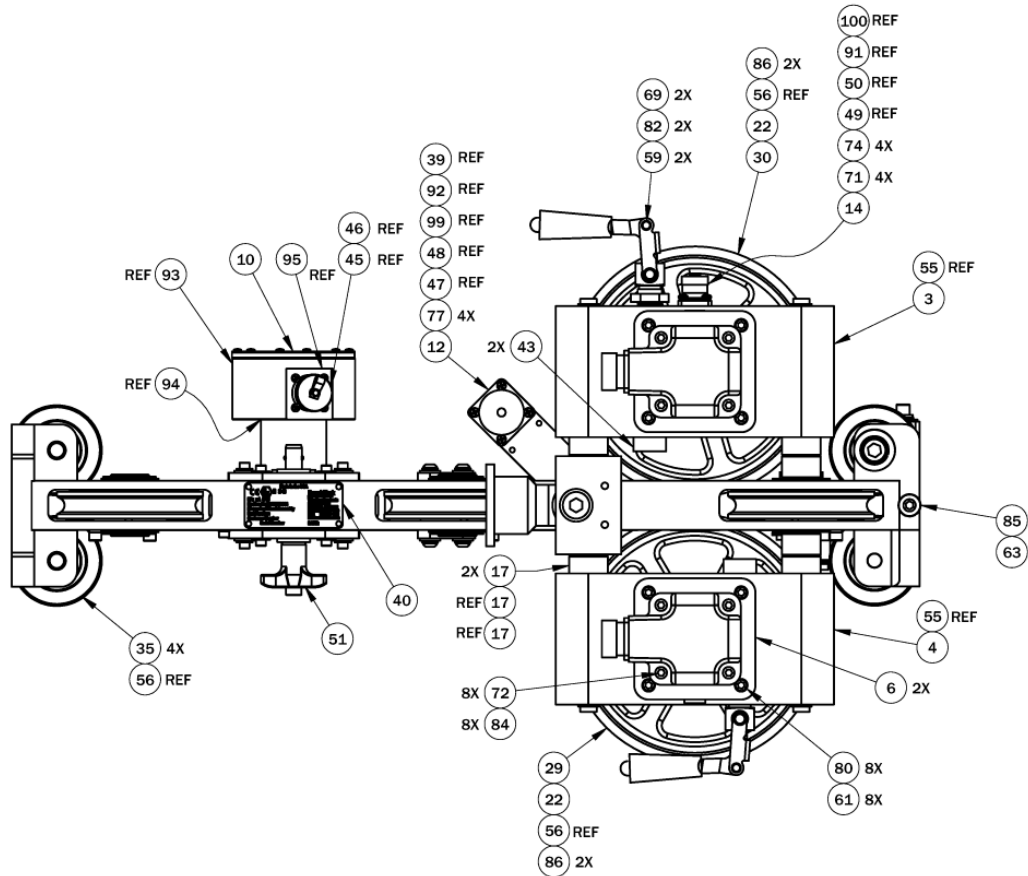
AM5K - SIDE VIEW



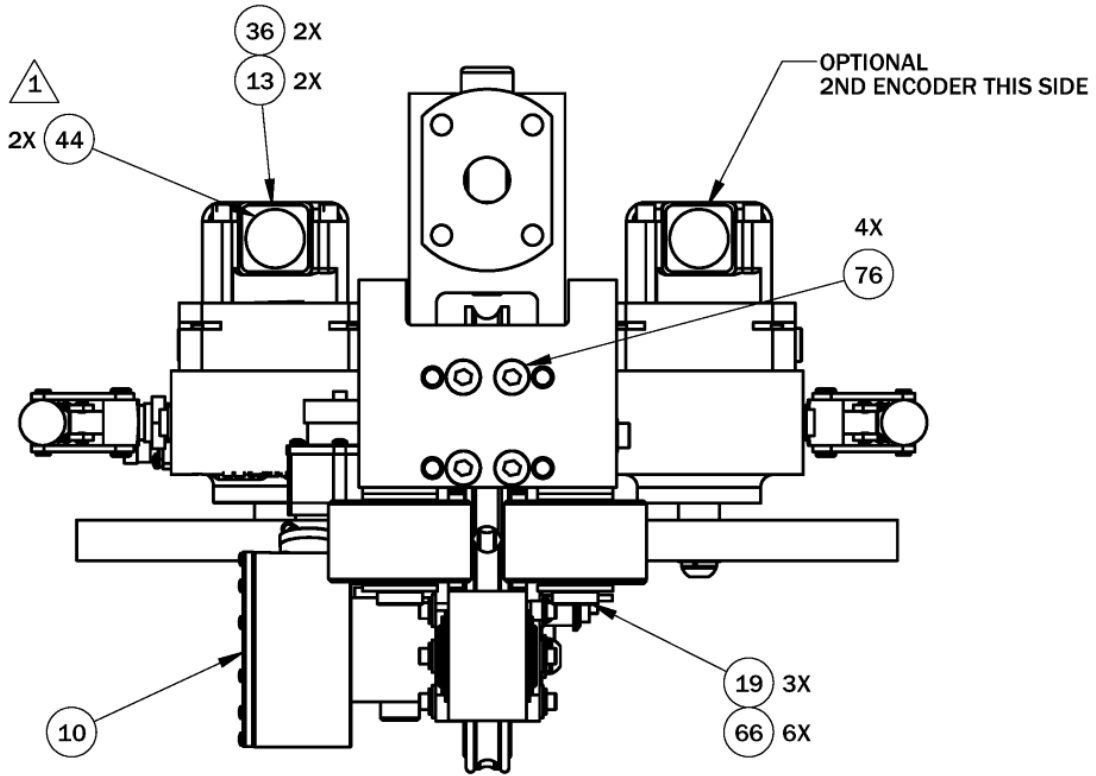
AM5K - SIDE VIEW



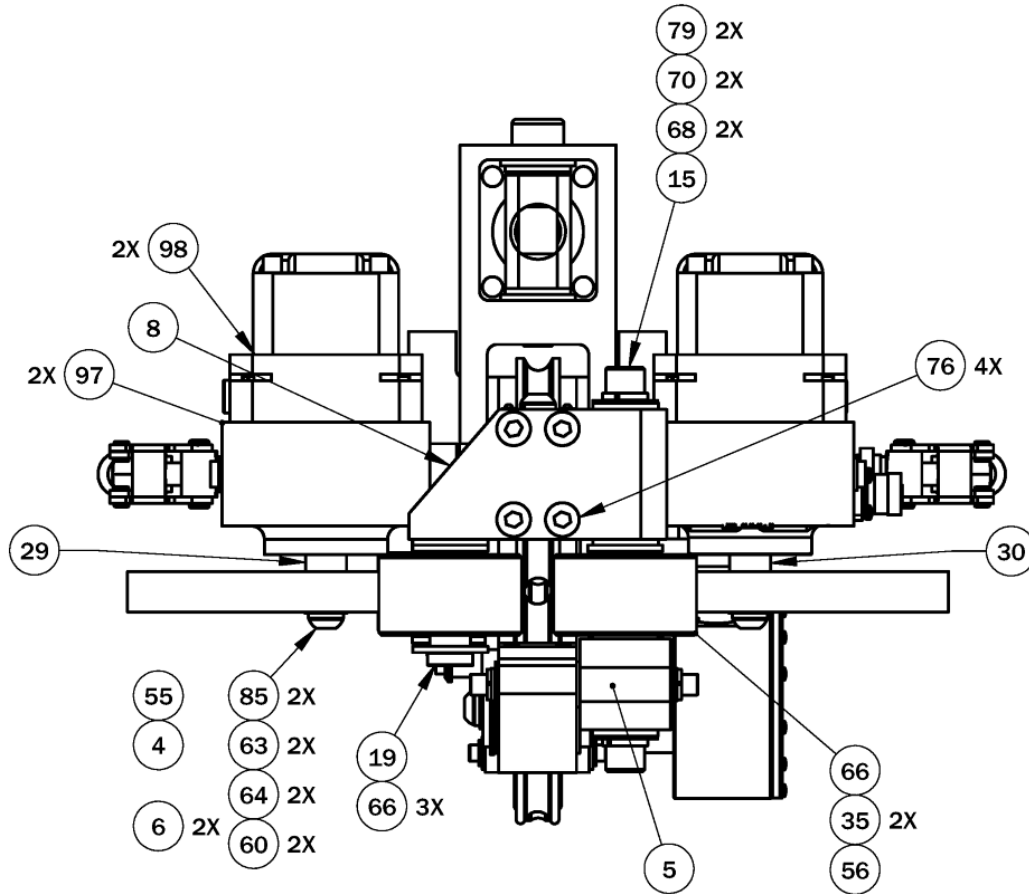
AM5K - TOP VIEW



AM5K - FRONT VIEW



AM5K - REAR VIEW



8.2 MMD - MAGNETIC MARK DETECTOR SPECIFICATION

1. General

This specification describes the latest magnetic mark detector. It replaces the original AMS100 detector, p/n AMS1A003. The performance characteristics emulate the original unit.

2. Mechanical

The mark detector will work in both the original housing p/n AMS1M022 and the AM5K versions using p/n AM5KM029. The pc board is potted to prevent damage from shock, vibration, or humidity.

3. Power

Input power is 9 - 30vdc at 100ma max.

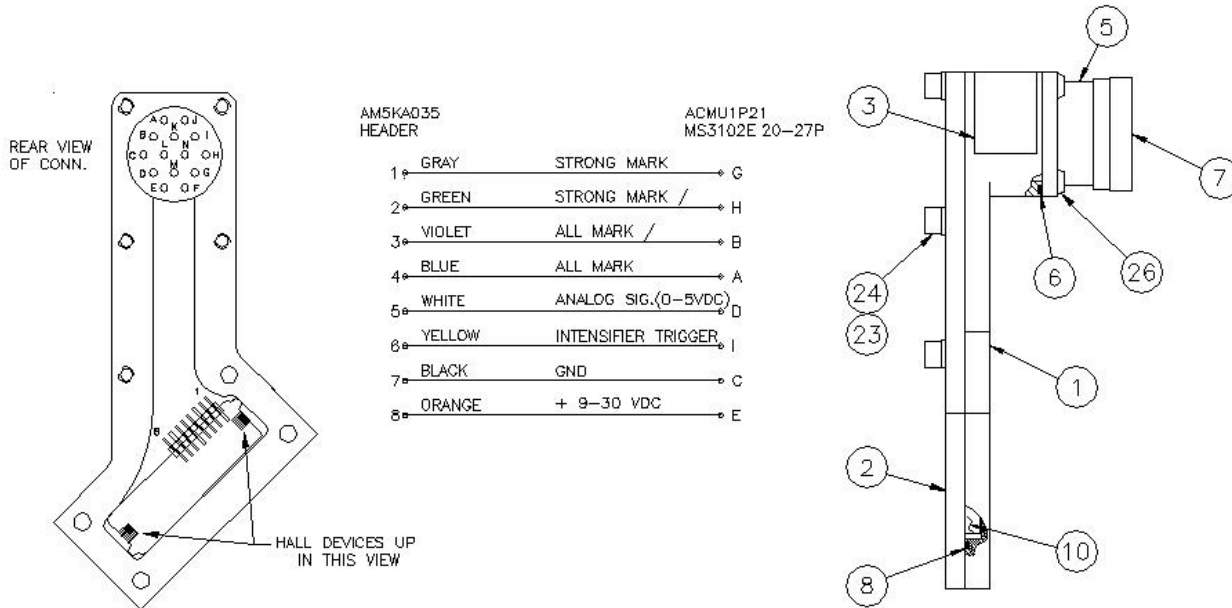
4. Outputs

Digital line driver out for strong & strong\ and also weak & weak\ where a weak mark is 4 gauss or less and a strong mark is greater than 4.1 gauss measured 0.10 inch from cable surface. The signals are a +5vdc digital pulse. A digitized 0-5vdc representation of the analog signal is provided.

5. Performance

- a) Operating temperature -40 to +120 f. compensated and stable. Storage temperature -60 to +180 f.
- b) Magnetic mark detection at cable line speeds of 1 to 1000 feet per minute.
- c) Auto cal feature removes offset of the electronics and any constant magnetic field less than 1 gauss every 100ms. If in a greater field, it will auto calibrate every 11 seconds.
- d) Detection of apparent zero gauss (at high/low crossing) is within 0.1 inch and repeatable so as any error is not accumulative.
- e) Will survive a gauss level exposure of 60 gauss.

8.2 MMD continued



AM5KA066 ASSY MMD EEx nA

ITEM	P/N	DESCRIPTION	QTY	UNIT
1	AM5KM029	ENCLSR MAGNETIC MARK DETECTOR	1	EA
2	AM5KM035	COVER MAGNETIC MARK DETECTOR	1	EA
5	ACMU1P21	CONN MS3102E-20-27P 14 PIN RECEPT	1	EA
6	AM5KP119	O-RING 2-026 BUNA N MMD CONN 1-1/4 X 1-3/8 X 1/16	1	EA
7	ACMU1P22	DUST CAP MS25D43-20DA	1	EA
8	AM5KP072	O-RING 2-046 BUNA N MMD COVER 4.239ID X 4.3790D X 0.070	1	EA
10	AM5KA035	PCB MMD POTTED, AM5K OR AMS100	1	EA
23	C276P035	WASHER #10 LOCK SS	5	EA
24	AMS8P029	SCREW 10-24 X 1/2 SOC HD SST	5	EA
26	AMS1P040	SCREW 6-32 X 3/8 PAN HD SST	4	EA

8.3 MEASURING HEAD PART NUMBERS, LOAD PINS AND ENCODERS

The Selection Matrix shows AM5K measuring heads sorted in three different ways.

- **Measuring head part number**
- **Load pin part number**
- **Encoder part number**

Using the matrix you can either identify your measuring head part number or by the proper encoder/load pin combination for your measuring head.

Also, with the correct measuring head part number, you can see the load pin and encoder options available to you.

Benchmark Wireline Measuring Head Matrix - Sorted by Head Part Number - Page 1

HEAD	TENSION	LOAD PIN	MIMD	PPR	ENC 1	ENC 2	BACKUP	MAX LINE SZ	T-WHEEL	CERT	OTHER
AM5KA501	0-1.5V	AM5KA069C	AM5KA066	512/780	AM5KP163		AM5KA055	0.499	AM5KA063		
AM5KA502			AM5KA066	1200	AM5KP161	AM5KP161	AM5KA055	0.499	AM5KA063		
AM5KA502-3	2mV/V	AM5KA013-3	AM5KA066	1200	AM5KP161	AM5KP161	AM5KA055	0.499	AM5KA063		
AM5KA506	0-1.5V	AM5KA069C	AM5KA066	1200	AM5LP061	AM5LP061	AM5KA055	0.499	AM5KA063		
AM5KA507	2mV/V	AM5KA067D	AM5KA066	1200	AM5KA068B	AM5KA068B	AM5KA055	0.499	AM5KA073	ZZ/C1D2	
AM5KA507-22	2mV/V	AM5KA067D	AM5KA066	1200	AM5KA068B	AM5KA068B	AM5KA055	0.874	AM5KA094	ZZ/C1D2	22MM WHEELS
AM5KA507A											
AM5KA508											
AM5KA509	0-1.5V	AM5KA069C		512/780	AM5KP163		AM5KA055	0.499	AM5KA063		
AM5KA510	0-1.5V	AM5KA069C	AM5KA066	1200	AM5KA074B	AM5KA074B	AM5KA055	0.499	AM5KA063	ZZ/C1D2	
AM5KA510A	0-1.5V	AM5KA069C		1200	AM5KA068B	AM5KA068B	AM5KA055	0.499	AM5KA063	ZZ/C1D2	
AM5KA510A-1	0-1.5V	AM5KA069C	AM5KA066	1200	AM5KA068B	AM5KA068B	AM5KA055	0.499	AM5KA063	ZZ/C1D2	
AM5KA510B	0-1.5V	AM5KA069C		1200	AM5KA074B	AM5KA074B	AM5KA055	0.499	AM5KA063	ZZ/C1D2	
AM5KA511	2mV/V	AM5KA013-7.5		600	AM57P131	AM57P131	AM5KA055	0.499	AM5KA063		7.5V LV TENS
AM5KA512	2mV/V	AM5KA067D		1200	AM5KA068B		AM5KA055	0.499	AM5KA063		
AM5KA513	2mV/V	AM5KA313B		1200	AM5LP061		AM5KA055	0.499	AM5KA063		
AM5KA514	0-1.5V	AM5KA069C		1200	AM5LP061		AM5KA055	0.499	AM5KA063		NO MOUNT
AM5KA515	0-1.5V	AM5KA069C		1200	AM5LP061	AM5LP061	AM5KA055	0.499	AM5KA063		
AM5KA515-550	0-1.5V	AM5KA069C		1200	AM5LP061	AM5LP061	AM5KA055	0.549	AM5KA095		0.550 WHEELS
AM5KA515-650	0-1.5V	AM5KA069C		1200	AM5LP061	AM5LP061	AM5KA055	0.649	AM5KA096		0.650 WHEELS
AM5KA516	0-1.5V	AM5KA069C		1200	AM5LP061		AM5KA055	0.499	AM5KA063		
AM5KA517	0-1.5V	AM5KA069C	AM5KA066	512/780	AM5KA070B	AM5KA070B	AM5KA055	0.499	AM5KA063	ZZ/C1D2	
AM5KA517-2											
AM5KA517A-2	0-1.5V	AM5KA078B	AM5KA066	512/780	AM5KA070B	AM5KA070B	AM5KA055	0.499	AM5KA073	ZZ/C1D2	RED LID
AM5KA518	0-1.5V	AM5KA069C	AM5KA066	512/780	AM5KP163	AM5KP163	AM5KA055	0.499	AM5KA063		
AM5KA518-550	0-1.5V	AM5KA069C	AM5KA066	512/780	AM5KP163	AM5KP163	AM5KA055	0.549	AM5KA095		0.550 WHEELS
AM5KA519	PASSIVE	AM5KA071						0.499	AM5KA063		NO ELECTRONICS
AM5KA520	4-20mA	AM5KA420		1200	AM5LP061		AM5KA055	0.499	AM5KA063		4-20mA
AM5KA520-650	4-20mA	AM5KA420		1200	AM5LP061		AM5KA055	0.649	AM5KA096		4-20mA, 0.650 WHEELS
AM5KA521											
AM5KA521A											
AM5KA521A-1	PASSIVE	AM5KA573A		1200	AM5KA079B	AM5KA079B	AM5KA055	0.499	AM5KA063	ZZ/C1D2	
AM5KA521A-2	PASSIVE	AM5KA573A		600	AM57P191	AM57P191	AM5KA055	0.499	AM5KA063	ZZ/C1D2	BRAIDED LINE
AM5KA521A-3	PASSIVE	AM5KA578A	AM5KA066	600	AM57P191	AM57P191	AM5KA055	0.499	AM5KA073	ZZ/C1D2	IS ENCODERS
AM5KA521A-6	PASSIVE	AM5KA573A		1200	AM5KA074B	AM5KA074B		0.499	AM5KA063	ZZ/C1D2	BRUP TENSION
AM5KA522											
AM5KA522B-2	PASSIVE	AM5KA078D	AM5KA166	1200	AM5KP164	AM5KP164		0.499	AM5KA063	ZI	ALL SST WHEELS
AM5KA522B-3	PASSIVE	AM5KA673A		1200	AM5KP164	AM5KP164		0.499	AM5KA063	ZI	ALL SST WHEELS
AM5KA522B-4	PASSIVE	AM5KA078D		1200	AM5KP164	AM5KP164		0.499	AM5KA063	ZI	ALL SST WHEELS
AM5KA522B-5	PASSIVE	AM5KA673A	AM5KA166	1200	AM5KP164	AM5KP164		0.499	AM5KA063	ZI	ALL SST WHEELS

Benchmark Wireline Measuring Head Matrix - Sorted by Head Part Number - Page 2

HEAD	TENSION	LOAD PIN	MMD	PPR	ENC 1	ENC 2	BACKUP	MAX LINE SZ	T-WHEEL	CERT	OTHER
AMSKA523	0-1.5V	AMSKA069C	AMSKA066	1200	AMSLP061	AMSLP061	AMSKA055	0.499	AMSKA063		
AMSKA523-2	0-1.5V	AMSKA069C	AMSKA066	2000			AMSKA055	0.499	AMSKA063		
AMSKA523-600	0-1.5V	AMSKA069C	AMSKA066	600	AM57P131	AM57P131	AMSKA055	0.499	AMSKA063		
AMSKA524	2mV/V	AMSKA087D		1200	AMSKA0808	AMSKA0808	AMSKA055	0.499	AMSKA063		
AMSKA525	4-20mA	AMSKA420	AMSKA066	1200	AMSLP061	AMSLP061	AMSKA055	0.499	AMSKA063		4-20mA
AMSKA526	4-20mA	AMSKA420		600	AM57P131		AMSKA055	0.499	AMSKA063		4-20mA, 600PPR
AMSKA527A	2mV/V	AMSKA087B	AMSKA066	1200	AMSKA0808	AMSKA0808	AMSKA055	0.499	AMSKA063	ZZ/CID2	SMURF
AMSKA527A-1	PASSIVE	AMSKA078D		1200	AM5KP164			0.499	AMSKA063	Z1	OBSOLETE
AMSKA527											
AMSKA527A-1	2mV/V	AMSKA087B	AMSKA066	1200	AMSKA0808	AMSKA0808	AMSKA055	0.499	AMSKA063	ZZ/CID2	SMURF
AMSKA527A-2	2mV/V	AMSKA087B		1200	AMSKA0808	AMSKA0808	AMSKA055	0.499	AMSKA063	ZZ/CID2	SMURF
AMSKA528	0-1.5V	AMSKA069C		512/780	AM5KP163	AM5KP163	AMSKA055	0.499	AMSKA063		
AMSKA529A	2mV/V	AMSKA067D		1200	AMSKA068B	AMSKA068B	AMSKA055	0.499	AMSKA063	ZZ/CID2	HES CH
AMSKA529											
AMSKA530	4-20mA	AMSKA420		120	AM3KP161	AM3KP161	AMSKA055	0.499	AMSKA063		4-20mA, 120PPR
AMSKA530-7	4-20mA	AMSKA420		120	AM3KP161	AM3KP161	AMSKA055	0.499	AMSKA063		4-20mA, 120PPR
AMSKA531	0-1.5V	AMSKA069C		120	AM3KP161		AMSKA055	0.499	AMSKA063		0-1.5V, 120PPR
AMSKA532	0-1.5V	AMSKA069C		300	AM5KP189		AMSKA055	0.499	AMSKA063		0-1.5V, 300PPR
AMSKA534	4-20mA	AMSKA420		300	AM5KP189	AM5KP189	AMSKA055	0.499	AMSKA063		4-20mA, 300PPR
AMSKA535	4-20mA	AMSKA420		1200	AMSKA0808	AMSKA0808	AMSKA055	0.499	AMSKA063		4-20mA, 1200PPR BLUE
AMSKA535-1	4-20mA	AMSKA420		1200	AMSKA0808	AMSKA0808	AMSKA055	0.499	AMSKA063		4-20mA, 1200PPR BLUE
AMSKA536	0-1.5V	AMSKA069C	AMSKA066	300	AM5KP189	AM5KP189	AMSKA055	0.499	AMSKA063		0-1.5V, 300PPR
AMSKA537	0-1.5V	AMSKA069C		300	AM5KP189		AMSKA055	0.499	AMSKA063		0-1.5V, 300PPR
AMSKA538	0-1.5V	AMSKA069C		1200	AMSKA079B	AMSKA079B	AMSKA055	0.499	AMSKA063		BTM MT
AMSKA540	PASSIVE	AMSKF103		1200	AMSKF103		AMSKA055	0.499	AMSKA063		2mV/V, 1200PPR
AMSKA540	2mV/V	AMSKA067D		1200	AMSLP061		AMSKA055	0.499	AMSKA063		2mV/V, 1200PPR, QWL
AMSKA538								0.499			BOTTOM MOUNT, NO ELEC
AMSKA544	0-1.5V	AMSKA069C	AMSKA066	780	40428	40428	AMSKA055	0.499	AMSKA063		CSL, ADJ GUIDE ROLLER
AMSKA545	0-1.5V	AMSKA069C	AMSKA066	780	40428	40428	AMSKA055	0.499	AMSKA095		CSL, 0.550 WHEELS
AMSKA546	PASSIVE	AMSKF103		1200	AM5KP188		AMSKA055	0.499	AMSKA063		2mV/V, 1200PPR
AMSKA547	PASSIVE	AMSKF103	AMSKA066	1200	AM5KP188	AM5KP188	AMSKA055	0.499	AMSKA063		2mV/V, 1200PPR
AMSKA548	PASSIVE	AM5KP226		240	AM57P240	AM57P240	AMSKA055	0.499	AMSKA073		2mV/V, 240PPR, SLB
AMSKA549	PASSIVE	AMSKF103		1200	AM5KP188	AM5KP188	AMSKA055	0.499	AMSKA063		2mV/V, 1200PPR
AMSKA549-1	PASSIVE	AMSKF103		1200	AM5KP188	AM5KP188	AMSKA055	0.499	AMSKA063		2mV/V, 1200PPR
AMSKA549-550	PASSIVE	AMSKF103		1200	AM5KP188		AMSKA055	0.549	AMSKA095		2mV/V, 1200PPR, 0.550 WHEELS
AMSKA549-650	PASSIVE	AMSKF103		1200	AM5KP188		AMSKA055	0.649	AMSKA096		2mV/V, 1200PPR, 0.650 WHEELS
AMSKA567	2mV/V	AMSKA067D		1200	AMSLP061		AMSKA055	0.649	AMSKA096		2mV/V, 1200PPR, QWL, 0.650 WHEELS

BenchMark Wireline Measuring Head Matrix - Sorted by Encoder ENC 1 - Page 1

HEAD	TENSION	LOAD PIN	MMID	PPR	ENC 1	ENC 2	BACKUP	MAX LINE SZ	T-WHEEL	CERT	OTHER
AMSKA544	0-1.5V	AMSKA069C	AMSKA066	780	40428	40428	AMSKA055	0.499	AMSKA063		COSL ADI GUIDE ROLLER
AMSKA545	0-1.5V	AMSKA069C	AMSKA066	780	40428	40428	AMSKA055	0.549	AMSKA095		COSL 0.550 WHEELS
AMSKA530	4-20mA	AMSKA420		120	AM3KP161	AM3KP161	AMSKA055	0.499	AMSKA063		4-20mA, 120PPR
AMSKA530-7	4-20mA	AMSKA420		120	AM3KP161	AM3KP161	AMSKA055	0.499	AMSKA063		4-20mA, 120PPR
AMSKA531	0-1.5V	AMSKA069C		120	AM3KP161		AMSKA055	0.499	AMSKA063		0-1.5V, 120PPR
AMSKA507	2mV/V	AMSKA067D	AMSKA066	1200	AMSKA0688	AMSKA0688	AMSKA055	0.499	AMSKA073	Z2/CI12	22MM WHEELS
AMSKA507-22	2mV/V	AMSKA067D	AMSKA066	1200	AMSKA0688	AMSKA0688	AMSKA055	0.874	AMSKA094	Z2/CI12	
AMSKA510A	0-1.5V	AMSKA069C		1200	AMSKA0688	AMSKA0688	AMSKA055	0.499	AMSKA063	Z2/CI12	
AMSKA510A-1	0-1.5V	AMSKA069C	AMSKA066	1200	AMSKA0688	AMSKA0688	AMSKA055	0.499	AMSKA063	Z2/CI12	
AMSKA512	2mV/V	AMSKA067D		1200	AMSKA0688		AMSKA055	0.499	AMSKA063		
AMSKA529A	2mV/V	AMSKA067D		1200	AMSKA0688	AMSKA0688	AMSKA055	0.499	AMSKA063	Z2/CI12	HES CH
AMSKA517	0-1.5V	AMSKA069C	AMSKA066	512/780	AMSKA0708	AMSKA0708	AMSKA055	0.499	AMSKA063	Z2/CI12	
AMSKA517A-2	0-1.5V	AMSKA076B	AMSKA066	512/780	AMSKA0708	AMSKA0708	AMSKA055	0.499	AMSKA073	Z2/CI12	RED IUD
AMSKA510	0-1.5V	AMSKA069C	AMSKA066	1200	AMSKA0748	AMSKA0748	AMSKA055	0.499	AMSKA063	Z2/CI12	
AMSKA510B	0-1.5V	AMSKA069C		1200	AMSKA0748	AMSKA0748	AMSKA055	0.499	AMSKA063	Z2/CI12	
AMSKA521A-6	PASSIVE	AMSKA573A		1200	AMSKA0748	AMSKA0748	AMSKA055	0.499	AMSKA063	Z2/CI12	BKUP TENSION
AMSKA521A-1	PASSIVE	AMSKA573A	AMSKA066	1200	AMSKA0798	AMSKA0798	AMSKA055	0.499	AMSKA063	Z2/CI12	
AMSKA539	PASSIVE	AMSKA573A		1200	AMSKA0798	AMSKA0798	AMSKA055	0.499	AMSKA063		2mV/V, 1200PPR
AMSKA524	2mV/V	AMSKA087D		1200	AMSKA0808	AMSKA0808	AMSKA055	0.499	AMSKA063		
AMSKA527A	2mV/V	AMSKA087B	AMSKA066	1200	AMSKA0808	AMSKA0808	AMSKA055	0.499	AMSKA063	Z2/CI12	SMURF
AMSKA527A-1	2mV/V	AMSKA087B	AMSKA066	1200	AMSKA0808	AMSKA0808	AMSKA055	0.499	AMSKA063	Z2/CI12	SMURF
AMSKA527A-2	2mV/V	AMSKA087B		1200	AMSKA0808	AMSKA0808	AMSKA055	0.499	AMSKA063	Z2/CI12	SMURF
AMSKA535	4-20mA	AMSKA420		1200	AMSKA0808	AMSKA0808	AMSKA055	0.499	AMSKA063		4-20mA, 1200PPR BLUE
AMSKA535-1	4-20mA	AMSKA420		1200	AMSKA0808	AMSKA0808	AMSKA055	0.499	AMSKA063		4-20mA, 1200PPR BLUE
AMSKA502			AMSKA066	1200	AMSKP161	AMSKP161	AMSKA055	0.499	AMSKA063		
AMSKA502-3	2mV/V	AMSKA013-3	AMSKA066	1200	AMSKP161	AMSKP161	AMSKA055	0.499	AMSKA063		
AMSKA501	0-1.5V	AMSKA069C	AMSKA066	512/780	AMSKP163		AMSKA055	0.499	AMSKA063		
AMSKA509	0-1.5V	AMSKA069C		512/780	AMSKP163		AMSKA055	0.499	AMSKA063		
AMSKA518	0-1.5V	AMSKA069C	AMSKA066	512/780	AMSKP163	AMSKP163	AMSKA055	0.499	AMSKA063		
AMSKA518-550	0-1.5V	AMSKA069C	AMSKA066	512/780	AMSKP163	AMSKP163	AMSKA055	0.549	AMSKA095		0.550 WHEELS
AMSKA528	0-1.5V	AMSKA069C		1200	AMSKP163	AMSKP163	AMSKA055	0.499	AMSKA063		
AMSKA528B-2	PASSIVE	AMSKA078D	AMSKA166	1200	AMSKP164	AMSKP164		0.499	AMSKA063	Z1	ALL SST WHEELS
AMSKA528B-4	PASSIVE	AMSKA078D		1200	AMSKP164	AMSKP164		0.499	AMSKA063	Z1	ALL SST WHEELS
AMSKA528B-5	PASSIVE	AMSKA073A	AMSKA166	1200	AMSKP164	AMSKP164		0.499	AMSKA063	Z1	ALL SST WHEELS
AMSKA522A-1	PASSIVE	AMSKA078D		1200	AMSKP164			0.499	AMSKA063	Z1	OBSOLETE
AMSKA546	PASSIVE	AMSKA573A		1200	AMSKP188		AMSKA055	0.499	AMSKA063		2mV/V, 1200PPR
AMSKA547	PASSIVE	AMSKA573A	AMSKA066	1200	AMSKP188	AMSKP188	AMSKA055	0.499	AMSKA063		2mV/V, 1200PPR
AMSKA549	PASSIVE	AMSKA573A		1200	AMSKP188	AMSKP188	AMSKA055	0.499	AMSKA063		2mV/V, 1200PPR
AMSKA549-1	PASSIVE	AMSKA573A		1200	AMSKP188	AMSKP188	AMSKA055	0.499	AMSKA063		2mV/V, 1200PPR

BenchMark Wireline Measuring Head Matrix - Sorted by Encoder ENC 1 - Page 2

HEAD	TENSION	LOAD PIN	MMD	PPR	ENC 1	ENC 2	BACKUP	MAX LINE SZ	T-WHEEL	CERT	OTHER
AM5KA549-550	PASSIVE	AM5KF103		1200	AM5KP188		AM5KA055	0.549	AM5KA095		2mV/V, 1200PPR, 0.550 WHEELS
AM5KA549-650	PASSIVE	AM5KF103		1200	AM5KP188		AM5KA055	0.649	AM5KA096		2mV/V, 1200PPR, 0.650 WHEELS
AM5KA532	0-1.5V	AM5KA069C		300	AM5KP189		AM5KA055	0.499	AM5KA063		0-1.5V, 300PPR
AM5KA534	4-20mA	AM5KA420		300	AM5KP189	AM5KP189	AM5KA055	0.499	AM5KA063		4-20mA, 300PPR
AM5KA536	0-1.5V	AM5KA069C		300	AM5KP189	AM5KP189		0.499	AM5KA063		0-1.5V, 300PPR
AM5KA537	0-1.5V	AM5KA069C		300	AM5KP189			0.499	AM5KA063		0-1.5V, 300PPR
AM5KA511	2mV/V	AM3KA013-7.5		600	AM57P131	AM57P131	AM5KA055	0.499	AM5KA063		7.5V LV TENS
AM5KA523-600	0-1.5V	AM5KA069C	AM5KA066	600	AM57P131	AM57P131	AM5KA055	0.499	AM5KA063		4-20mA, 600PPR
AM5KA526	4-20mA	AM5KA420		600	AM57P131		AM5KA055	0.499	AM5KA063		BRAIDED LINE
AM5KA521A-2	PASSIVE	AM5KA573A		600	AM57P191	AM57P191	AM5KA055	0.499	AM5KA063	ZZ/CID2	
AM5KA521A-3	PASSIVE	AM5KA578A		600	AM57P191	AM57P191	AM5KA055	0.499	AM5KA073	ZZ/CID2	IS ENCODERS
AM5KA548	PASSIVE	AM5KP226		240	AM57P240	AM57P240	AM5KA055	0.499	AM5KA073		2mV/V, 240PPR, 5LB
AM5KA506	0-1.5V	AM5KA069C	AM5KA066	1200	AM5LP061	AM5LP061	AM5KA055	0.499	AM5KA063		
AM5KA513	2mV/V	AM5KA313B		1200	AM5LP061		AM5KA055	0.499	AM5KA063		
AM5KA514	0-1.5V	AM5KA069C		1200	AM5LP061		AM5KA055	0.499	AM5KA063		NO MOUNT
AM5KA515	0-1.5V	AM5KA069C		1200	AM5LP061	AM5LP061	AM5KA055	0.499	AM5KA063		
AM5KA515-550	0-1.5V	AM5KA069C		1200	AM5LP061	AM5LP061	AM5KA055	0.549	AM5KA095		0.550 WHEELS
AM5KA515-650	0-1.5V	AM5KA069C		1200	AM5LP061	AM5LP061	AM5KA055	0.649	AM5KA096		0.650 WHEELS
AM5KA516	0-1.5V	AM5KA069C		1200	AM5LP061		AM5KA055	0.499	AM5KA063		
AM5KA520	4-20mA	AM5KA420		1200	AM5LP061		AM5KA055	0.649	AM5KA096		4-20mA
AM5KA520-650	4-20mA	AM5KA420		1200	AM5LP061		AM5KA055	0.649	AM5KA096		4-20mA, 0.650 WHEELS
AM5KA523	0-1.5V	AM5KA069C	AM5KA066	1200	AM5LP061	AM5LP061	AM5KA055	0.499	AM5KA063		
AM5KA525	4-20mA	AM5KA420	AM5KA066	1200	AM5LP061	AM5LP061	AM5KA055	0.499	AM5KA063		4-20mA
AM5KA540	2mV/V	AM5KA067D		1200	AM5LP061		AM5KA055	0.499	AM5KA063		2mV/V, 1200PPR, QWL
AM5KA567	2mV/V	AM5KA067D		1200	AM5LP061		AM5KA055	0.649	AM5KA096		2mV/V, 1200PPR, QWL, 0.650 WHEELS
AM5KA507A											
AM5KA508											
AM5KA517-2											
AM5KA519	PASSIVE	AM5KA071						0.499	AM5KA063		NO ELECTRONICS
AM5KA521											
AM5KA521A											
AM5KA522											
AM5KA522B-3	PASSIVE	AM5KA673A						0.499	AM5KA063	Z1	ALL SST WHEELS
AM5KA523-2	0-1.5V	AM5KA069C	AM5KA066	2000			AM5KA055	0.499	AM5KA063		
AM5KA527											
AM5KA529											
AM5KA538	0-1.5V	AM5KA069C		1200				0.499	AM5KA063		BITL MIT
AM5KA538								0.499			BOTTOM MOUNT, NO ELEC

Benchmark Wireline Measuring Head Matrix - Sorted by Load Pin - Page 1

HEAD	TENSION	LOAD PIN	MIMD	PPR	ENC 1	ENC 2	BACKUP	MAX LINE SZ	T-WHEEL	CERT	OTHER
AM5KA511	2m/V	AM5KA013-7.5		600	AM57P131	AM57P131	AM5KA055	0.499	AM5KA063		7.5V LV TENS
AM5KA502-3	2m/V	AM5KA013-3	AM5KA066	1200	AM5KP161	AM5KP161	AM5KA055	0.499	AM5KA063		
AM5KA507	2m/V	AM5KA067D	AM5KA066	1200	AM5KA068B	AM5KA068B	AM5KA055	0.499	AM5KA073	Z2/CID2	
AM5KA507-22	2m/V	AM5KA067D	AM5KA066	1200	AM5KA068B	AM5KA068B	AM5KA055	0.874	AM5KA094	Z2/CID2	22MM WHEELS
AM5KA512	2m/V	AM5KA067D		1200	AM5KA068B	AM5KA068B	AM5KA055	0.499	AM5KA063		
AM5KA529A	2m/V	AM5KA067D		1200	AM5KA068B	AM5KA068B	AM5KA055	0.499	AM5KA063	Z2/CID2	HES CH
AM5KA540	2m/V	AM5KA067D		1200	AM5SLP061		AM5KA055	0.499	AM5KA063		2m/V, 1200PPR, QWL
AM5KA567	2m/V	AM5KA067D		1200	AM5SLP061		AM5KA055	0.649	AM5KA096		WHIS
AM5KA544	0-1.5V	AM5KA069C	AM5KA066	780	40428	40428	AM5KA055	0.499	AM5KA063		CSL, ADI GUIDE ROLLER
AM5KA545	0-1.5V	AM5KA069C	AM5KA066	780	40428	40428	AM5KA055	0.549	AM5KA095		CSL, 0.550 WHEELS
AM5KA531	0-1.5V	AM5KA069C		120	AM5KP161		AM5KA055	0.499	AM5KA063		0-1.5V, 120PPR
AM5KA510A-1	0-1.5V	AM5KA069C		1200	AM5KA068B	AM5KA068B	AM5KA055	0.499	AM5KA063	Z2/CID2	
AM5KA510A-1	0-1.5V	AM5KA069C	AM5KA066	1200	AM5KA068B	AM5KA068B	AM5KA055	0.499	AM5KA063	Z2/CID2	
AM5KA517	0-1.5V	AM5KA069C	AM5KA066	512/780	AM5KA070B	AM5KA070B	AM5KA055	0.499	AM5KA063	Z2/CID2	
AM5KA510	0-1.5V	AM5KA069C	AM5KA066	1200	AM5KA074B	AM5KA074B	AM5KA055	0.499	AM5KA063	Z2/CID2	
AM5KA510B	0-1.5V	AM5KA069C		1200	AM5KA074B	AM5KA074B	AM5KA055	0.499	AM5KA063	Z2/CID2	
AM5KA501	0-1.5V	AM5KA069C	AM5KA066	512/780	AM5KP163		AM5KA055	0.499	AM5KA063		
AM5KA509	0-1.5V	AM5KA069C		512/780	AM5KP163		AM5KA055	0.499	AM5KA063		
AM5KA518	0-1.5V	AM5KA069C	AM5KA066	512/780	AM5KP163	AM5KP163	AM5KA055	0.499	AM5KA063		
AM5KA518-550	0-1.5V	AM5KA069C	AM5KA066	512/780	AM5KP163	AM5KP163	AM5KA055	0.549	AM5KA095		0.550 WHEELS
AM5KA528	0-1.5V	AM5KA069C		300	AM5KP189	AM5KP189	AM5KA055	0.499	AM5KA063		
AM5KA532	0-1.5V	AM5KA069C		300	AM5KP189	AM5KP189	AM5KA055	0.499	AM5KA063		0-1.5V, 300PPR
AM5KA536	0-1.5V	AM5KA069C	AM5KA066	300	AM5KP189	AM5KP189	AM5KA055	0.499	AM5KA063		0-1.5V, 300PPR
AM5KA537	0-1.5V	AM5KA069C		300	AM5KP189		AM5KA055	0.499	AM5KA063		
AM5KA523-600	0-1.5V	AM5KA069C	AM5KA066	600	AM57P131	AM57P131	AM5KA055	0.499	AM5KA063		
AM5KA506	0-1.5V	AM5KA069C	AM5KA066	1200	AM5LP061	AM5LP061	AM5KA055	0.499	AM5KA063		
AM5KA514	0-1.5V	AM5KA069C		1200	AM5LP061		AM5KA055	0.499	AM5KA063		NO MOUNT
AM5KA515	0-1.5V	AM5KA069C		1200	AM5LP061	AM5LP061	AM5KA055	0.499	AM5KA063		
AM5KA515-550	0-1.5V	AM5KA069C	AM5KA066	1200	AM5LP061	AM5LP061	AM5KA055	0.549	AM5KA095		0.550 WHEELS
AM5KA515-650	0-1.5V	AM5KA069C		1200	AM5LP061	AM5LP061	AM5KA055	0.649	AM5KA096		0.650 WHEELS
AM5KA516	0-1.5V	AM5KA069C		1200	AM5LP061		AM5KA055	0.499	AM5KA063		
AM5KA523	0-1.5V	AM5KA069C	AM5KA066	1200	AM5LP061	AM5LP061	AM5KA055	0.499	AM5KA063		
AM5KA523-2	0-1.5V	AM5KA069C	AM5KA066	2000	AM5LP061		AM5KA055	0.499	AM5KA063		
AM5KA538	0-1.5V	AM5KA069C		1200			AM5KA055	0.499	AM5KA063		BTM MT
AM5KA519	PASSIVE	AM5KA071						0.499	AM5KA063		NO ELECTRONICS
AM5KA517A-2	0-1.5V	AM5KA078B	AM5KA066	512/780	AM5KA070B	AM5KA070B	AM5KA055	0.499	AM5KA073	Z2/CID2	RED UID

Benchmark Wireline Measuring Head Matrix - Sorted by Load Pin - Page 2

HEAD	TENSION	LOAD PIN	MND	PPR	ENC 1	ENC 2	BACKUP	MAX LINE SZ	T-WHEEL	CERT	OTHER
AMSKA522B-2	PASSIVE	AMSKA078D	AMSKA166	1200	AMSKP164	AMSKP164		0.499	AMSKA063	Z1	ALL SST WHEELS
AMSKA522B-4	PASSIVE	AMSKA078D		1200	AMSKP164	AMSKP164		0.499	AMSKA063	Z1	ALL SST WHEELS
AMSKA522A-1	PASSIVE	AMSKA078D		1200	AMSKP164			0.499	AMSKA063	Z1	OBSOLETE
AMSKA527A	2mV/V	AMSKA087B	AMSKA066	1200	AMSKA080B	AMSKA080B	AMSKA055	0.499	AMSKA063	Z2/CI02	SMURF
AMSKA527A-1	2mV/V	AMSKA087B	AMSKA066	1200	AMSKA080B	AMSKA080B	AMSKA055	0.499	AMSKA063	Z2/CI02	SMURF
AMSKA527A-2	2mV/V	AMSKA087B		1200	AMSKA080B	AMSKA080B	AMSKA055	0.499	AMSKA063	Z2/CI02	SMURF
AMSKA524	2mV/V	AMSKA087D		1200	AMSKA080B	AMSKA080B	AMSKA055	0.499	AMSKA063		
AMSKA513	2mV/V	AMSKA313B		1200	AMSLP061		AMSKA055	0.499	AMSKA063		
AMSKA530	4-20mA	AMSKA420		120	AMSKP161	AMSKP161	AMSKA055	0.499	AMSKA063		4-20mA, 120PPR
AMSKA530-7	4-20mA	AMSKA420		120	AMSKP161	AMSKP161	AMSKA055	0.499	AMSKA063		4-20mA, 120PPR BLUE
AMSKA535	4-20mA	AMSKA420		1200	AMSKA080B	AMSKA080B	AMSKA055	0.499	AMSKA063		4-20mA, 1200PPR BLUE
AMSKA535-1	4-20mA	AMSKA420		1200	AMSKA080B	AMSKA080B	AMSKA055	0.499	AMSKA063		4-20mA, 1200PPR BLUE
AMSKA534	4-20mA	AMSKA420		300	AMSKP189	AMSKP189	AMSKA055	0.499	AMSKA063		4-20mA, 300PPR
AMSKA526	4-20mA	AMSKA420		600	AMSTP131		AMSKA055	0.499	AMSKA063		4-20mA, 600PPR
AMSKA520	4-20mA	AMSKA420		1200	AMSLP061		AMSKA055	0.499	AMSKA063		4-20mA
AMSKA520-650	4-20mA	AMSKA420		1200	AMSLP061		AMSKA055	0.649	AMSKA096		4-20mA, 0.650 WHEELS
AMSKA525	4-20mA	AMSKA420	AMSKA066	1200	AMSLP061	AMSLP061	AMSKA055	0.499	AMSKA063		
AMSKA521A-6	PASSIVE	AMSKA573A		1200	AMSKA074B	AMSKA074B	AMSKA055	0.499	AMSKA063	Z2/CI02	BKUP TENSION
AMSKA521A-1	PASSIVE	AMSKA573A	AMSKA066	1200	AMSKA079B	AMSKA079B	AMSKA055	0.499	AMSKA063	Z2/CI02	
AMSKA521A-2	PASSIVE	AMSKA573A		600	AMSTP191	AMSTP191	AMSKA055	0.499	AMSKA063	Z2/CI02	BRAIDED LINE
AMSKA521A-3	PASSIVE	AMSKA578A	AMSKA066	600	AMSTP191	AMSTP191	AMSKA055	0.499	AMSKA073	Z2/CI02	15 ENCODEDS
AMSKA522B-5	PASSIVE	AMSKA673A	AMSKA166	1200	AMSKP164	AMSKP164		0.499	AMSKA063	Z1	ALL SST WHEELS
AMSKA522B-3	PASSIVE	AMSKA673A						0.499	AMSKA063	Z1	ALL SST WHEELS
AMSKA539	PASSIVE	AMSK103		1200	AMSKA079B	AMSKA079B	AMSKA055	0.499	AMSKA063		2mV/V, 1200PPR
AMSKA546	PASSIVE	AMSK103		1200	AMSKP188		AMSKA055	0.499	AMSKA063		2mV/V, 1200PPR
AMSKA547	PASSIVE	AMSK103	AMSKA066	1200	AMSKP188	AMSKP188	AMSKA055	0.499	AMSKA063		2mV/V, 1200PPR
AMSKA549	PASSIVE	AMSK103		1200	AMSKP188	AMSKP188	AMSKA055	0.499	AMSKA063		2mV/V, 1200PPR
AMSKA549-1	PASSIVE	AMSK103		1200	AMSKP188		AMSKA055	0.499	AMSKA063		2mV/V, 1200PPR
AMSKA549-550	PASSIVE	AMSK103		1200	AMSKP188		AMSKA055	0.549	AMSKA095		2mV/V, 1200PPR, 0.550 WHEELS
AMSKA548	PASSIVE	AMSK103		1200	AMSKP188		AMSKA055	0.649	AMSKA096		2mV/V, 1200PPR, 0.650 WHEELS
AMSKA502	PASSIVE	AMSKR226		240	AMSTP240	AMSTP240	AMSKA055	0.499	AMSKA073		2mV/V, 240PPR, SLB
AMSKA507A			AMSKA066	1200	AMSKP161	AMSKP161	AMSKA055	0.499	AMSKA063		
AMSKA508											
AMSKA517-2											
AMSKA521A											
AMSKA522											
AMSKA527											
AMSKA529											
AMSKA538								0.499			BOTTOM MOUNT, NO ELEC

8.4.1 LOAD PIN - AM5KA067

TENSION SPECIFICATIONS:

Power Requirements: 12 vdc excitation

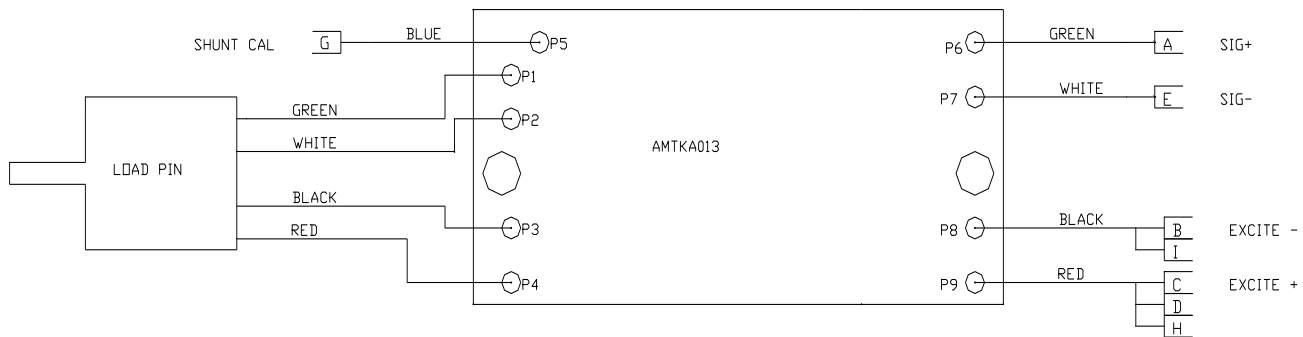
Proprietary circuit board which buffers the load pin signals and provides a 3mv/v output

Temperature stability: \leq .015% full scale / deg F on zero

\leq .02% full scale / deg F on output

Accuracy: Within 150 lbs or 3% of actual, whichever is greater

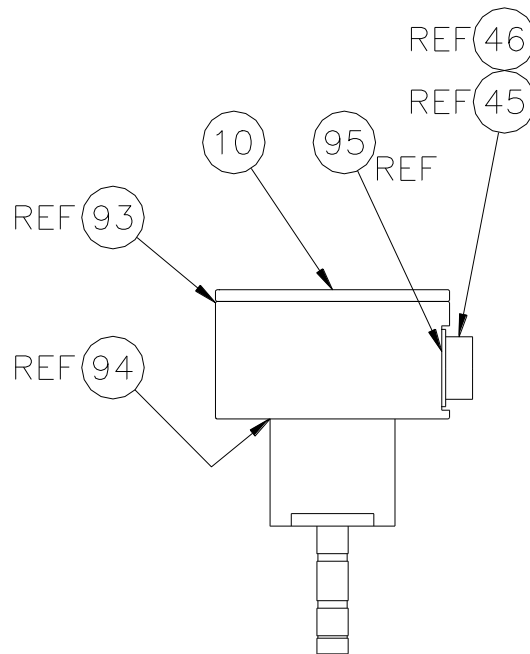
Maximum load (tested): 25,000 lbs 11,340 kg
 (with deep grooved tension wheel)



Take Adequate Precautions when Installing the Load Pin to Avoid the Risk of Mechanical Damage

WARNING – DO NOT SEPARATE CONNECTORS WHEN ENERGIZED

8.4.1 LOAD PIN - AM5KA067 continued



AM5KA067 ASSY LOAD AXLE 3MV/V

ITEM	P/N	DESCRIPTION	QTY	UNIT
45	AM5KP068	CONN 10-107218-1P BENDIX QWL COURSE THD 10 PIN	1	EA
46	AM5KP067	DUST CAP CW49N16C CANNON CWL COURSE THREAD	1	EA
93	C276P040	O-RING 2-235 BUNA N L/P LID 3-1/8 X 3-3/8 X 1/8	1	EA
94	AMS8P066	O-RING 2-136 BUNA N L/P HSG 1.98ID X 2.19OD X 0.103W	1	EA
95	AM5KP118	O-RING 2-023 BUNA N L/P CONN 1-1/16 X 1-3/16 X 1/16	1	EA

8.4.2 LOAD PIN - AM5KA069 OR AM5KA010

TENSION SPECIFICATIONS:

Power Requirements: +/-15 vdc power

Proprietary circuit board which amplifies the load pin signals and provides a 1.5v differential output.

0vdc = 0lbs, 1.5vdc = 20,000 lbs.

Temperature stability: <= .015% full scale / deg F on zero

<= .02% full scale / deg F on output

Accuracy: Within 150 lbs or 3% of actual, whichever is greater

Maximum load (tested): 25,000 lbs 11,340 kg

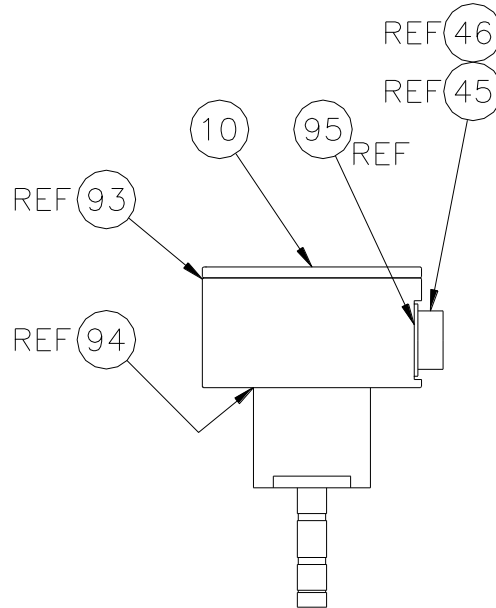
(with deep grooved tension wheel)



Take Adequate Precautions when Installing the Load Pin to Avoid the Risk of Mechanical Damage

WARNING – DO NOT SEPARATE CONNECTORS WHEN ENERGIZED

8.4.2 LOAD PIN - AM5KA069 OR AM5KA010 continued



AM5KA069 ASSY LOAD AXLE 1.5 V DIFFERENTIAL Ex

ITEM	P/N	DESCRIPTION	QTY	REF
45	AMS8P055	CONN KPT 02A16-8P	1	EA
46	AMS8P056	DUST CAP KPT81-16C	1	EA
10	AMTKA014B	PCB ASSY 0-1.5V DIFF LP EX	1	EA
93	C276P040	O-RING 2-235 BUNA N L/P LID 3-1/8 X 3-3/8 X 1/8	1	EA
94	AMS8P066	O-RING 2-136 BUNA N L/P HSG 1.98ID X 2.19OD X 0.103W	1	EA
95	AM5KP118	O-RING 2-023 BUNA N L/P CONN 1-1/16 X 1-3/16 X 1/16	1	EA

8.4.3 LOAD PIN - AM5KA071

TENSION SPECIFICATIONS:

Power Requirements: 12 vdc excitation

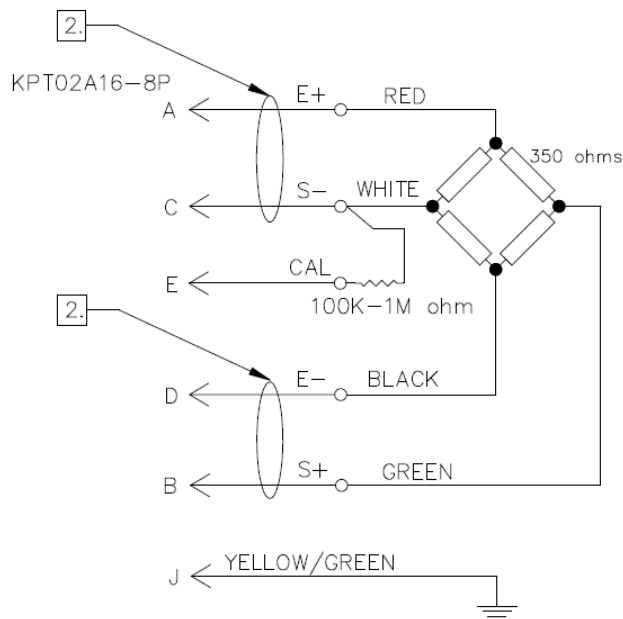
Proprietary circuit board which buffers the load pin signals and provides a 3mv/v output

Temperature stability: \leq .015% full scale / deg F on zero
 \leq .02% full scale / deg F on output

Accuracy: Within 150 lbs or 3% of actual, whichever is greater

Maximum load (tested): 25,000 lbs 11,340 kg

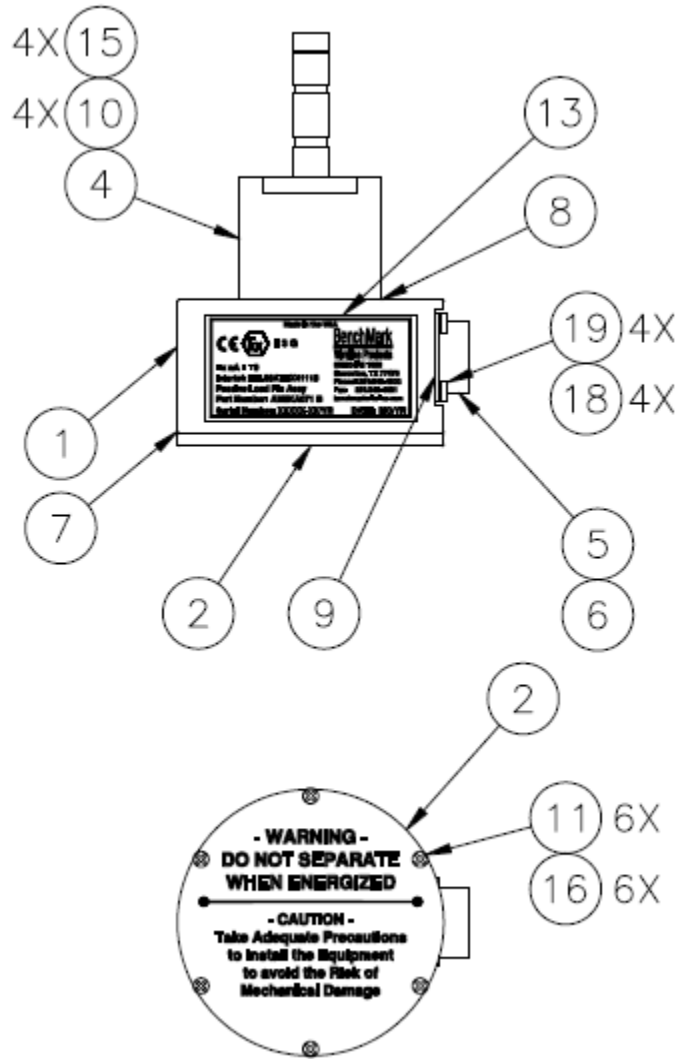
(with deep grooved tension wheel)



Take Adequate Precautions when Installing the Load Pin to Avoid the Risk of Mechanical Damage

WARNING – DO NOT SEPARATE CONNECTORS WHEN ENERGIZED

8.4.3 LOAD PIN - AM5KA071 continued



8.4.3 LOAD PIN - AM5KA071 continued

ITEM	P/N	DESCRIPTION	QTY	UNIT
1	AMS8M010	HOUSING LOAD PIN AMS80	1	EA
2	AMTKA013	ASSY PCB LOW LEVEL TENSION	1	EA
3	AM5KM262	LID LOAD PIN HSG BLACK WARNING	1	EA
4	AM5KP104	PIN LOAD 3000# 1/2 OD 2.0 MV/V	1	EA
5	AMS8P055	CONN KPT02A16-8P	1	EA
6	AMS8P056	DUST CAP KPT8116C RECEPT	1	EA
7	C276P040	O-RING 2-235 BUNA N L/P LID	1	EA
8	AMS8P066	O-RING 2-136 BUNA N L/P HSG	1	EA
9	AM5KP118	O-RING 2-023 BUNA N L/P CONN	1	EA
10	AM5KP041	SCREW 10-24 X 1-1/4 PHIL PAN	4	EA
11	AMS8P034	SCREW 4-40 X 3/8 SOC HD SST	6	EA
12	AM5KP228	STANDOFF 4-40 X 1/2 M/F HEX	2	EA
13	C276P035	WASHER #10 LOCK SS	4	EA
15	C276P035	WASHER #10 LOCK SS	4	EA
16	AMS8P036	WASHER #4 LOCK SST	6	EA
17	AMS8P090	WASHER #4 FLAT SST	6	EA

8.4.4 LOAD PIN - AM5KA078

TENSION SPECIFICATIONS:

Power Requirements: 12 vdc excitation

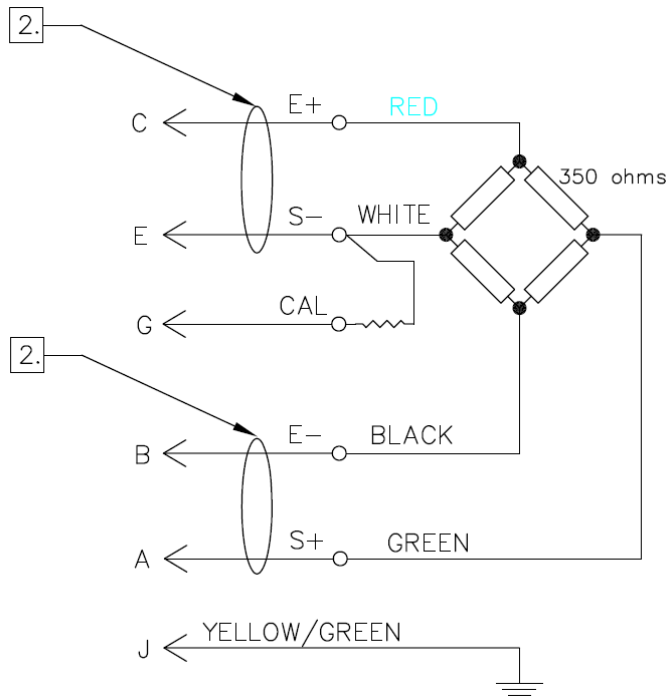
Proprietary circuit board which buffers the load pin signals and provides a 3mv/v output

Temperature stability: \leq .015% full scale / deg F on zero

\leq .02% full scale / deg F on output

Accuracy: Within 150 lbs or 3% of actual, whichever is greater

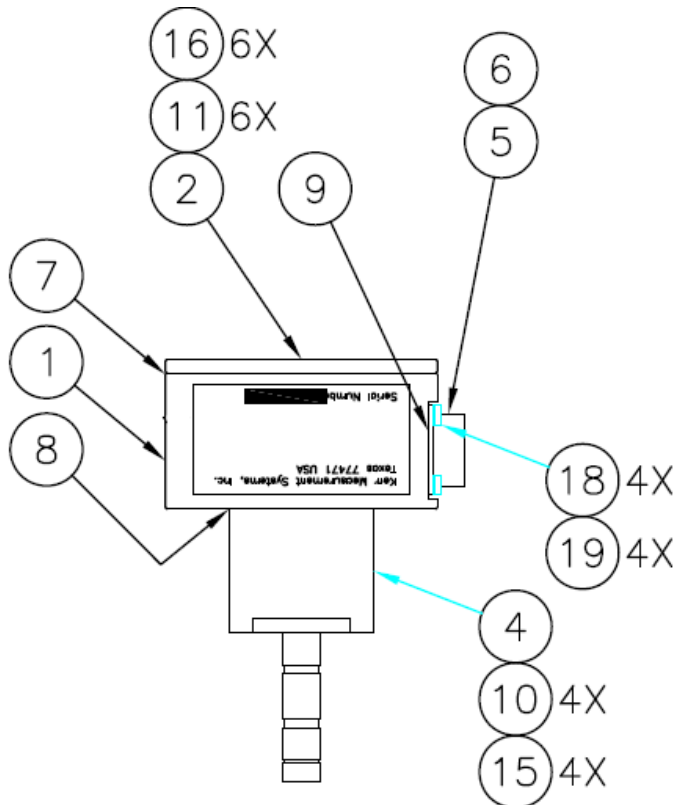
Maximum load (tested): 25,000 lbs 11,340 kg
(with deep grooved tension wheel)



Take Adequate Precautions when Installing the Load Pin to Avoid the Risk of Mechanical Damage

WARNING – DO NOT SEPARATE CONNECTORS WHEN ENERGIZED

8.4.4 LOAD PIN - AM5KA078 continued



AM5KA078 ASSY LOAD AXLE 3MV/V

ITEM	P/N	DESCRIPTION	QTY	UNIT
1	AMS8M010	HOUSING LOAD PIN AMS80	1	EA
2	AMTKA013	ASSY PCB LOW LEVEL TENSION	1	EA
4	AM5KP104	PIN LOAD 3000# 1/2 OD 2.0 MV/V	1	EA
5	AMS8P055	CONN KPT02A16-8P	1	EA
6	AMS8P056	DUST CAP KPT8116C RECEPT	1	EA
7	C276P040	O-RING 2-235 BUNA N L/P LID	1	EA
8	AMS8P066	O-RING 2-136 BUNA N L/P HSG	1	EA
9	AM5KP118	O-RING 2-023 BUNA N L/P CONN	1	EA
10	AM5KP041	SCREW 10-24 X 1-1/4 PHIL PAN	4	EA
11	AMS8P034	SCREW 4-40 X 3/8 SOC HD SST	6	EA
15	C276P035	WASHER #10 LOCK SS	4	EA
16	AMS8P036	WASHER #4 LOCK SST	6	EA

8.4.5 LOAD PIN - AM5KA087

TENSION SPECIFICATIONS:

Power Requirements: 12 vdc excitation

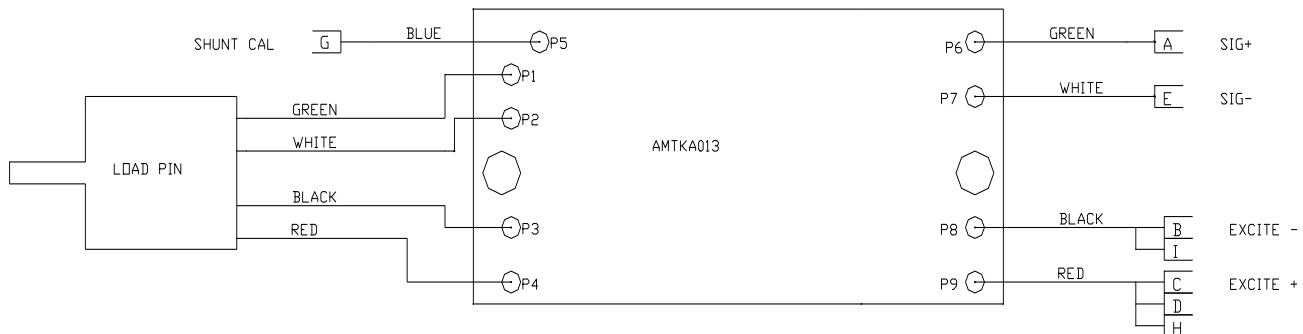
Proprietary circuit board which buffers the load pin signals and provides a 3mv/v output

Temperature stability: \leq .015% full scale / deg F on zero

\leq .02% full scale / deg F on output

Accuracy: Within 150 lbs or 3% of actual, whichever is greater

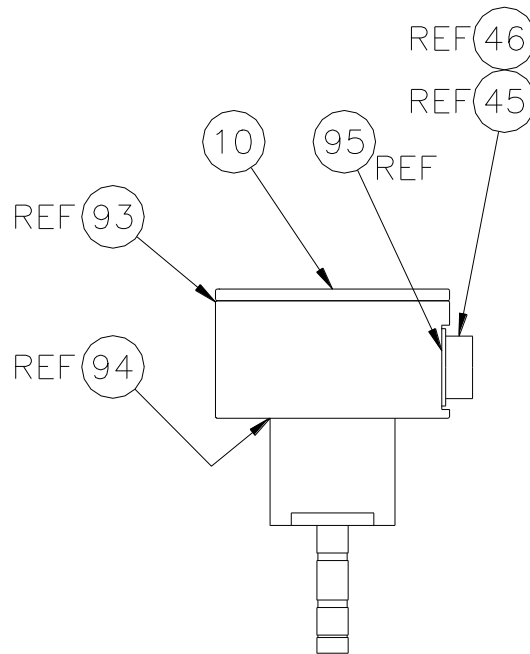
Maximum load (tested): 25,000 lbs 11,340 kg
 (with deep grooved tension wheel)



Take Adequate Precautions when Installing the Load Pin to Avoid the Risk of Mechanical Damage

WARNING – DO NOT SEPARATE CONNECTORS WHEN ENERGIZED

8.4.5 LOAD PIN - AM5KA087 continued



AM5KA087 ASSY LOAD AXLE 3MV/V

ITEM	P/N	DESCRIPTION	QTY	UNIT
45	AM5KP068	CONN 10-107218-1P BENDIX QWL COURSE THD 10 PIN	1	EA
46	AM5KP067	DUST CAP CW49N16C CANNON CWL COURSE THREAD	1	EA
93	C276P040	O-RING 2-235 BUNA N L/P LID 3-1/8 X 3-3/8 X 1/8	1	EA
94	AMS8P066	O-RING 2-136 BUNA N L/P HSG 1.98ID X 2.19OD X 0.103W	1	EA
95	AM5KP118	O-RING 2-023 BUNA N L/P CONN 1-1/16 X 1-3/16 X 1/16	1	EA

8.4.6 LOAD PIN - AM5KA313

TENSION SPECIFICATIONS:

Power Requirements: 12 vdc excitation

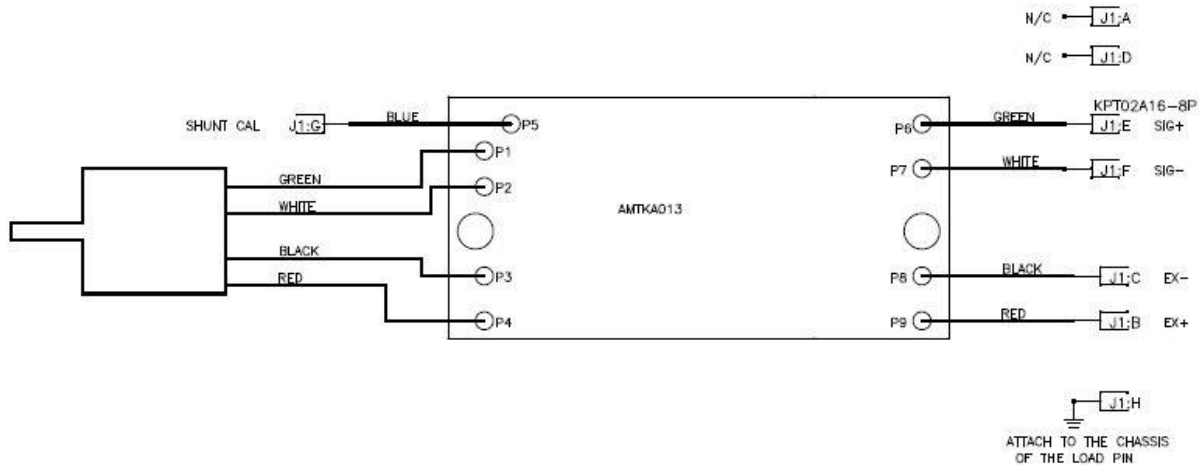
Proprietary circuit board which buffers the load pin signals and provides a 3mv/v output

Temperature stability: \leq .015% full scale / deg F on zero

\leq .02% full scale / deg F on output

Accuracy: Within 150 lbs or 3% of actual, whichever is greater

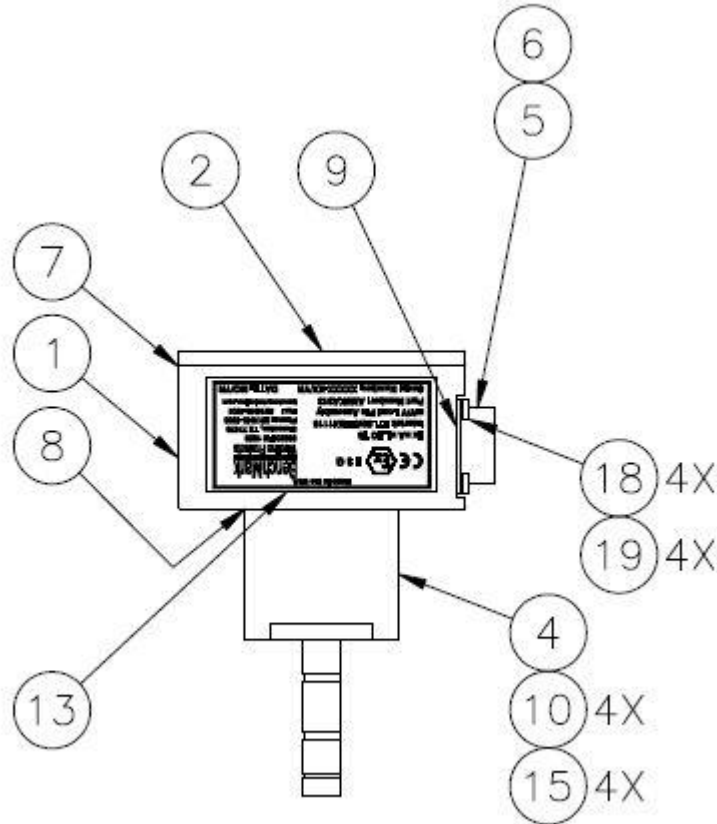
Maximum load (tested): 25,000 lbs 11,340 kg
 (with deep grooved tension wheel)



Take Adequate Precautions when Installing the Load Pin to Avoid the Risk of Mechanical Damage

WARNING – DO NOT SEPARATE CONNECTORS WHEN ENERGIZED

8.4.6 LOAD PIN - AM5KA313 continued



ITEM	P/N	DESCRIPTION	QTY	UNIT
1	AMS8M010	HOUSING LOAD PIN AMS80	1	EA
2	AMTKA013	ASSY PCB LOW LEVEL TENSION	1	EA
3	AM5KM262	LID LOAD PIN HSG BLACK WARNING	1	EA
4	AM5KP104	PIN LOAD 3000# 1/2 OD 2.0 MV/V	1	EA
5	AMS8P055	CONN KPT02A16-8P	1	EA
6	AMS8P056	DUST CAP KPT8116C RECEPT	1	EA
7	C276P040	O-RING 2-235 BUNA N L/P LID	1	EA
8	AMS8P066	O-RING 2-136 BUNA N L/P HSG	1	EA
9	AM5KP118	O-RING 2-023 BUNA N L/P CONN	1	EA
10	AM5KP041	SCREW 10-24 X 1-1/4 PHIL PAN	4	EA
11	AMS8P034	SCREW 4-40 X 3/8 SOC HD SST	6	EA
12	AM5KP228	STANDOFF 4-40 X 1/2 M/F HEX	2	EA
13	C276P035	WASHER #10 LOCK SS	4	EA
16	AMS8P036	WASHER #4 LOCK SST	6	EA
17	AMS8P090	WASHER #4 FLAT SST	6	EA

8.4.7 LOAD PIN - AM5KA420

TENSION SPECIFICATIONS:

Power Requirements: +24 vdc input power

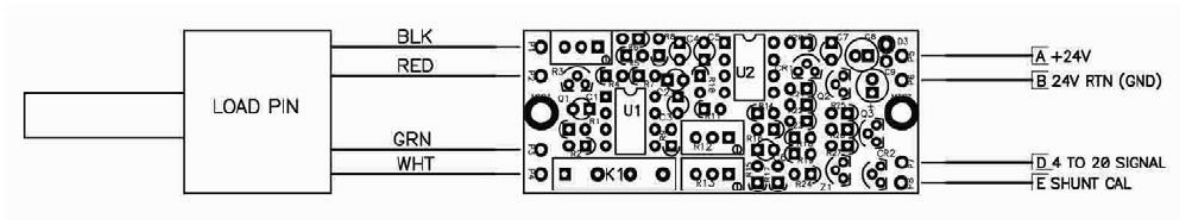
BenchMark proprietary circuit board which amplifies the strain gauge signal and provides a 4-20ma current loop output.

4 ma = 0 lbs (0kg)
 12 ma = 10,000 lbs (4,536 kg) – shunt cal
 20 ma = 20,000 lbs (9,072 kg)

Temperature stability: <= .015% full scale / deg F on zero
 <= .02% full scale / deg F on output

Accuracy: Within 150 lbs or 3% of actual, whichever is greater

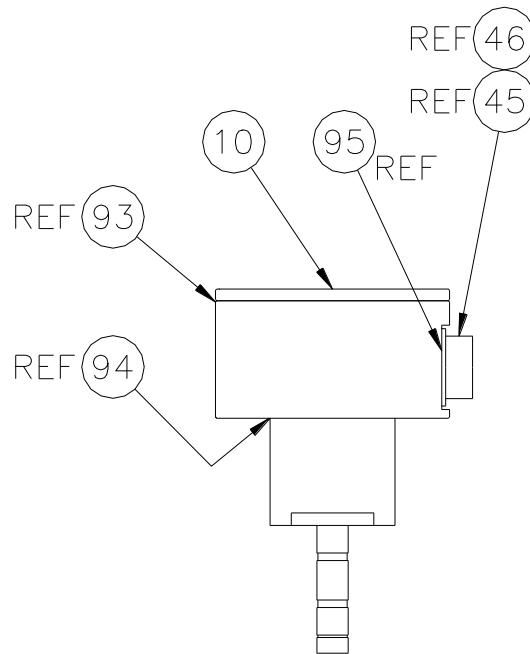
Maximum load (tested): 25,000 lbs 11,340 kg
 (with deep grooved tension wheel)



Take Adequate Precautions when Installing the Load Pin to Avoid the Risk of Mechanical Damage

WARNING – DO NOT SEPARATE CONNECTORS WHEN ENERGIZED

8.4.7 LOAD PIN - AM5KA420 continued



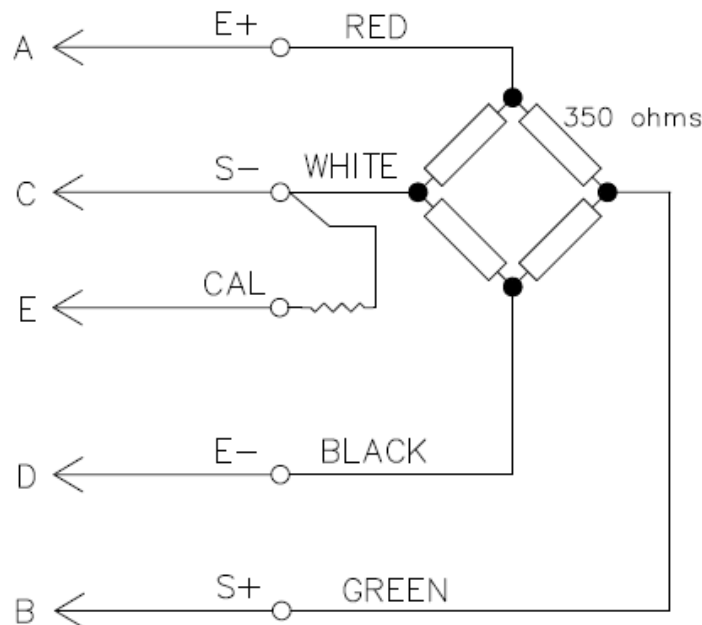
AM5KA420 ASSY LOAD AXLE 3MV/V

ITEM	P/N	DESCRIPTION	QTY	UNIT
45	AM5KP068	CONN MS3102E-18-9P	1	EA
46	AM5KP067	DUST CAP MS25042-18DA	1	EA
93	C276P040	O-RING 2-235 BUNA N L/P LID 3-1/8 X 3-3/8 X 1/8	1	EA
94	AMS8P066	O-RING 2-136 BUNA N L/P HSG 1.98ID X 2.19OD X 0.103W	1	EA
95	AM5KP118	O-RING 2-023 BUNA N L/P CONN 1-1/16 X 1-3/16 X 1/16	1	EA

8.4.8 LOAD PIN - AM5KA573 OR AM5KF103

TENSION SPECIFICATIONS:

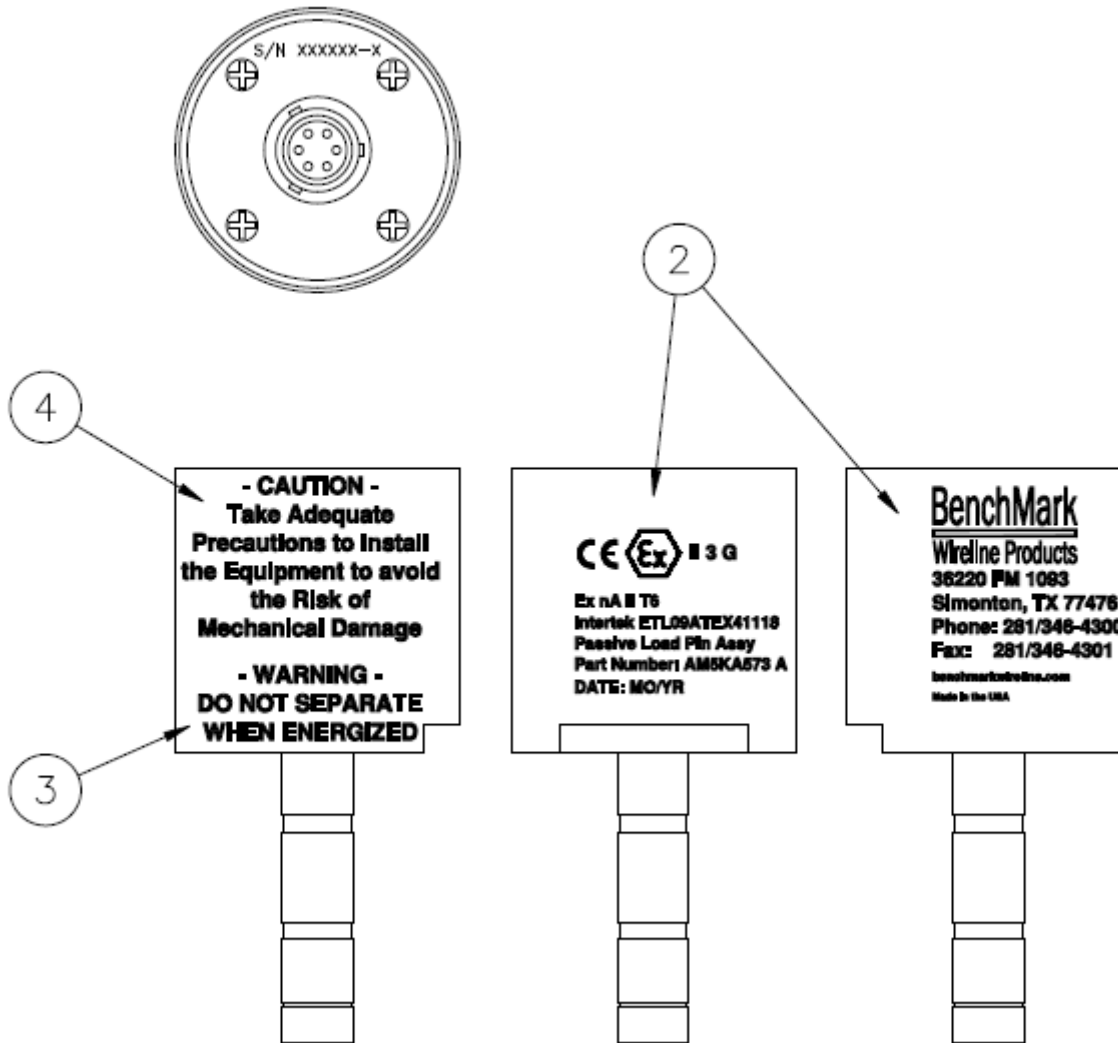
Power Requirements:	12 vdc excitation	
Temperature stability:	<= .015% full scale / deg F on zero	
	<= .02% full scale / deg F on output	
Accuracy:	Within 150 lbs or 3% of actual, whichever is greater	
Maximum load (tested):	25,000 lbs	11,340 kg
(with deep grooved tension wheel)		



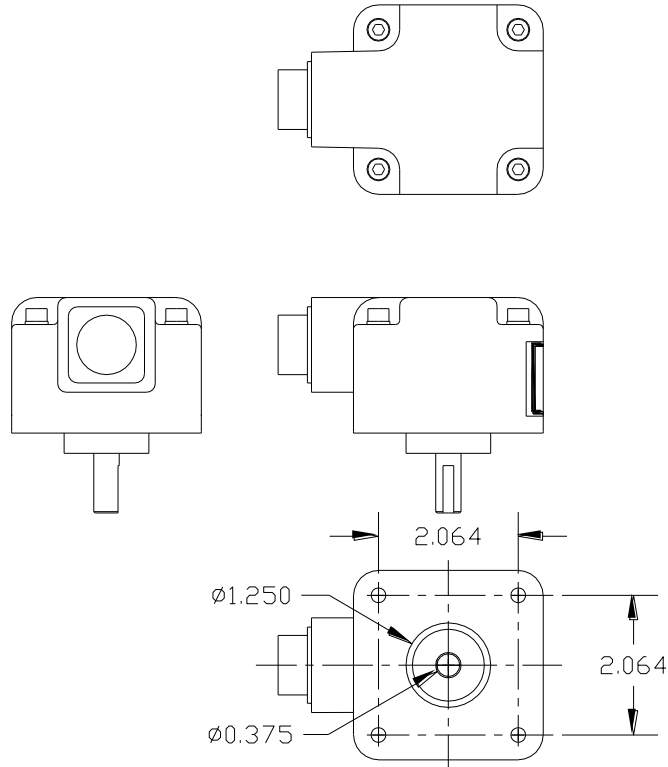
Take Adequate Precautions when Installing the Load Pin to Avoid the Risk of Mechanical Damage

WARNING – DO NOT SEPARATE CONNECTORS WHEN ENERGIZED

8.4.8 LOAD PIN - AM5KA573 OR AM5KP103 continued



8.5.1 ENCODER - AM3KP161



P/N	DESCRIPTION	QTY	UNIT
AM3KP161	ENCODER H25D-SS-1200-ABC-4469	2	EA
AM5KM073	COUPLING MOD ENCDR 0.250/0.375 BORE	2	EA
AMS1P071	DUST CAP MS25043-16DA	2	EA

Specifications

120 Pulses per revolution

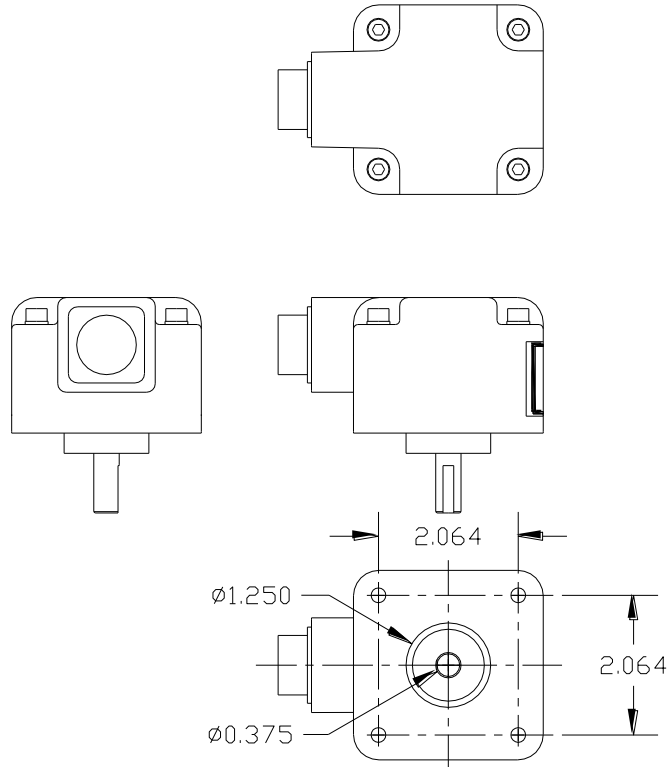
+5 to +15 vdc power

Differential Quadrature output (A – A not, B – B not)

Pin Out

A	-	A
C	-	A\
B	-	B
E	-	B\
D	-	+5 to +15 vdc
F	-	Gnd
G	-	Case

8.5.2 ENCODER - AM5KA068



P/N	DESCRIPTION	QTY	UNIT
AM5KP161	ENCODER H25D-SS-1200-ABC-4469 EEx nA	2	EA
AM5KM073	COUPLING MOD ENCDR 0.250/0.375 BORE	2	EA
AMS1P071	DUST CAP MS25043-16DA	2	EA

Specifications

1200 Pulses per revolution

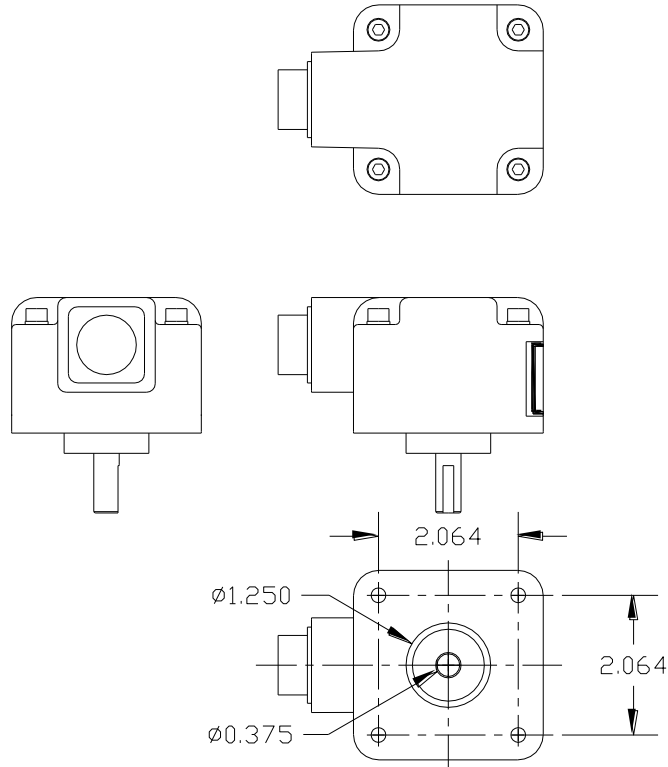
+5 to +15 vdc power

Differential Quadrature output (A – A not, B – B not)

Pin Out

E	-	A
C	-	A\
G	-	B
D	-	B\
A	-	+5 to +15 vdc
B	-	Gnd
F	-	Case

8.5.3 ENCODER - AM5KA070



ITEM	P/N	DESCRIPTION	QTY	UNIT
13	AM5KP163	ENCODER H25D-SS-1200-ABC-4469 EEx nA	2	EA
36	AM5KM073	COUPLING MOD ENCDR 0.250/0.375 BORE	2	EA
44	AMS1P071	DUST CAP MS25043-16DA (HES)	2	EA

Specifications

1200 Pulses per revolution

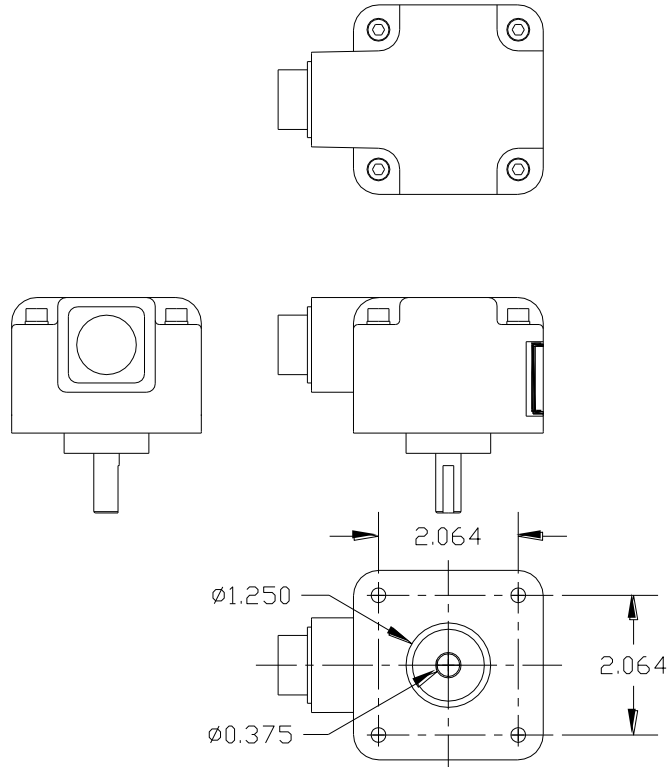
+5 to +15 vdc power

Differential Quadrature output (A – A not, B – B not)

Pin Out

A	-	A
C	-	A\
B	-	B
E	-	B\
D	-	+5 to +15 vdc
F	-	Gnd
G	-	Case

8.5.4 ENCODER - AM5KA074



P/N	DESCRIPTION	QTY	UNIT
AMSLP061	ENCODER H25D-SS-1200-ABC-4469	2	EA
AM5KM073	COUPLING MOD ENCDR 0.250/0.375 BORE	2	EA
AMS1P071	DUST CAP MS25043-16DA	2	EA

Specifications

1200 Pulses per revolution

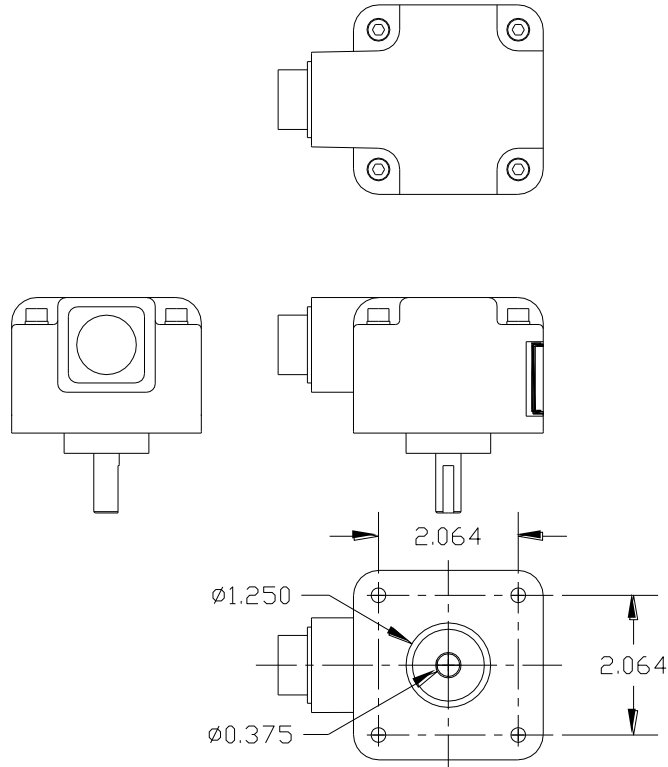
+5 to +15 vdc power

Differential Quadrature output (A – A not, B – B not)

Pin Out

A	-	A
H	-	A\
B	-	B
I	-	B\
D	-	+5 to +15 vdc
F	-	Gnd
G	-	Case

8.5.5 ENCODER - AM5KA079



P/N	DESCRIPTION	QTY	UNIT
AM5KP188	ENCODER H25D-SS-1200-ABC-4469	2	EA
AM5KM073	COUPLING MOD ENCDR 0.250/0.375 BORE	2	EA
AMS1P071	DUST CAP MS25043-16DA	2	EA

Specifications

1200 Pulses per revolution

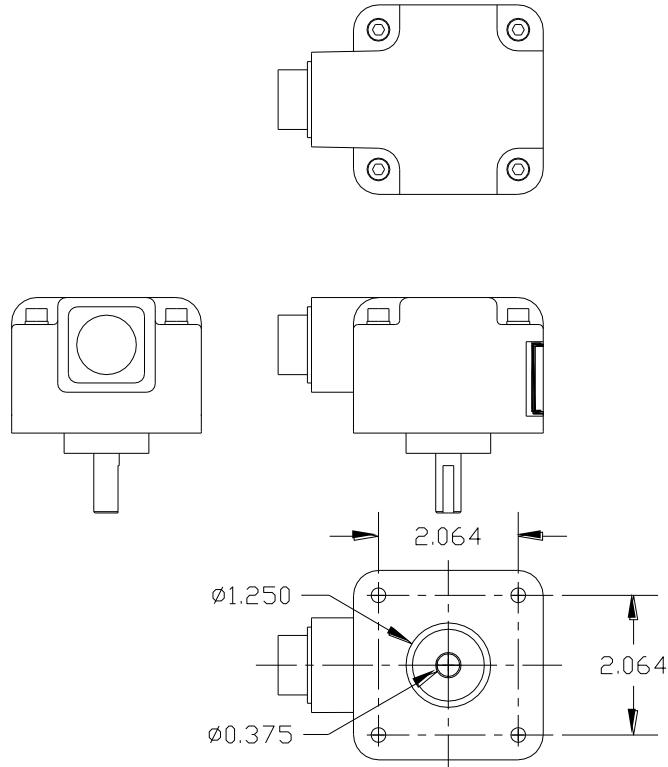
+5 to +15 vdc power

Differential Quadrature output (A – A not, B – B not)

Pin Out

E	-	A
C	-	A\
G	-	B
D	-	B\
A	-	+5 to +15 vdc
B	-	Gnd
F	-	Case

8.5.6 ENCODER - AM5KA080



P/N	DESCRIPTION	QTY	UNIT
AM5KP192	ENCODER H25D-SS-1200-ABC-4469	2	EA
AM5KM073	COUPLING MOD ENCDR 0.250/0.375 BORE	2	EA
AMS1P071	DUST CAP MS25043-16DA	2	EA

Specifications

1200 Pulses per revolution

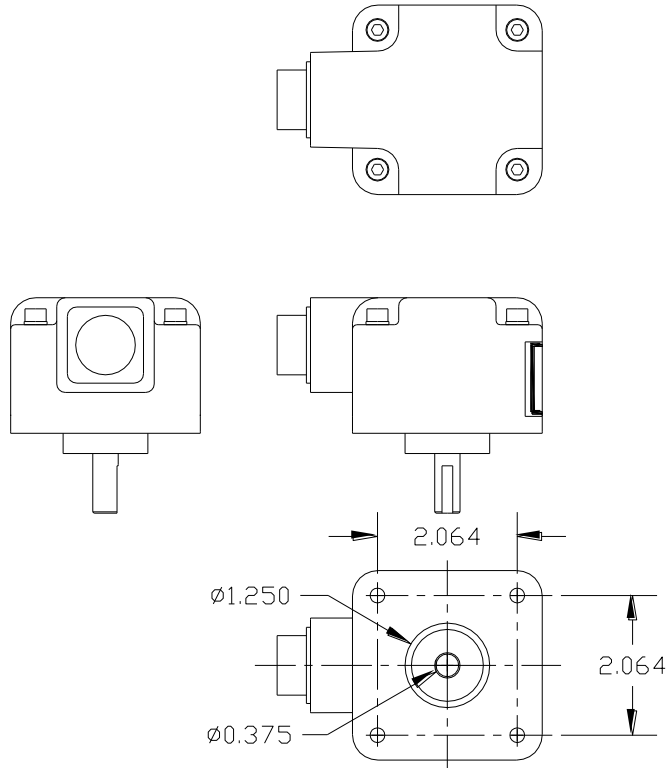
+5 to +15 vdc power

Differential Quadrature output (A – A not, B – B not)

Pin Out

A	-	A
C	-	A\
B	-	B
E	-	B\
D	-	+5 to +15 vdc
F	-	Gnd
G	-	Case

8.5.7 ENCODER - AM5KP161



P/N	DESCRIPTION	QTY	UNIT
AM5KP161	ENCODER H25D-SS-1200-ABC-4469	2	EA
AM5KM073	COUPLING MOD ENCDR 0.250/0.375 BORE	2	EA
AMS1P071	DUST CAP MS25043-16DA	2	EA

Specifications

1200 Pulses per revolution

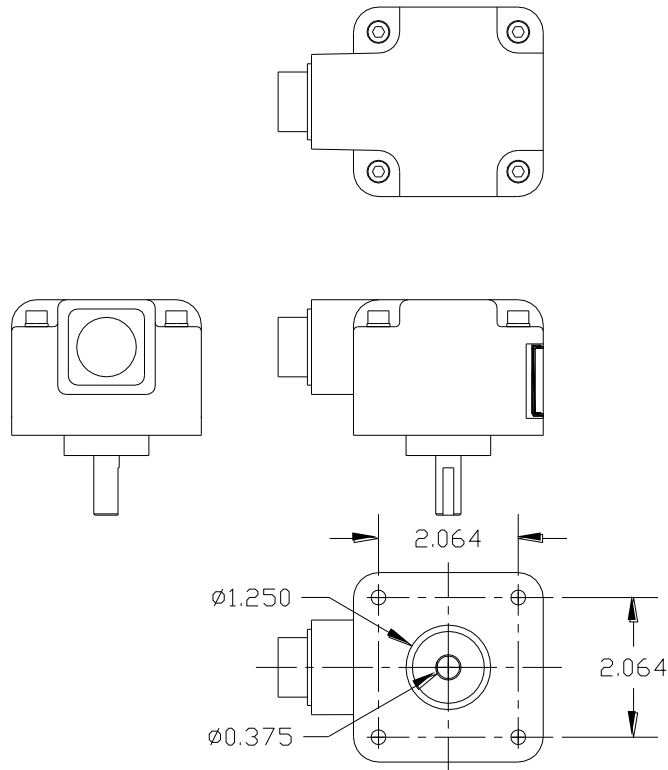
+5 to +15 vdc power

Differential Quadrature output (A – A not, B – B not)

Pin Out

E	-	A
C	-	A\
G	-	B
D	-	B\
A	-	+5 to +15 vdc
B	-	Gnd
F	-	Case

8.5.8 ENCODER - AM5KP163



P/N	DESCRIPTION	QTY	UNIT
AM5KP163	ENCODER H25D-SS-1200-ABC-4469	2	EA
AM5KM073	COUPLING MOD ENCDR 0.250/0.375 BORE	2	EA
ACMU2P09	DUST CAP MS25043-18DA	2	EA
AMS1P053	10-24 X 2" SOCKET HEAD CAP SCREWS SST ENCODER MOUNTING	4	EA

Specifications

512-780 Pulses per revolution – Dual Resolution

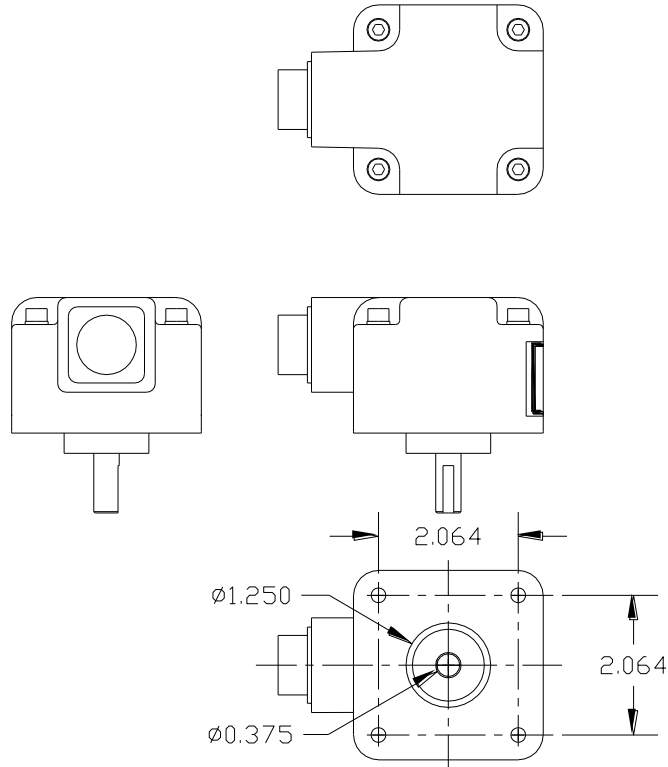
+5 to +15 vdc power

Differential Quadrature output (A – A not, B – B not)

Pin Out

A	-	A
C	-	A\
B	-	B
E	-	B\
D	-	+5 to +15 vdc
F	-	Gnd
G	-	Case

8.5.9 ENCODER - AM5KP164



P/N	DESCRIPTION	QTY	UNIT
AM5KP164	ENCODER IS25-HA-37F-1200-ABC-69-S-16-15 ATEX EEx ia IIB T4	2	EA
AM5KM073	COUPLING MOD ENCDR 0.250/0.375 BORE	2	EA
ACMU2P09	DUST CAP MS25043-18DA	2	EA
AMS1P053	10-24 X 2" SOCKET HEAD CAP SCREWS SST ENCODER MOUNTING	4	EA

Specifications

1200 Pulses per revolution

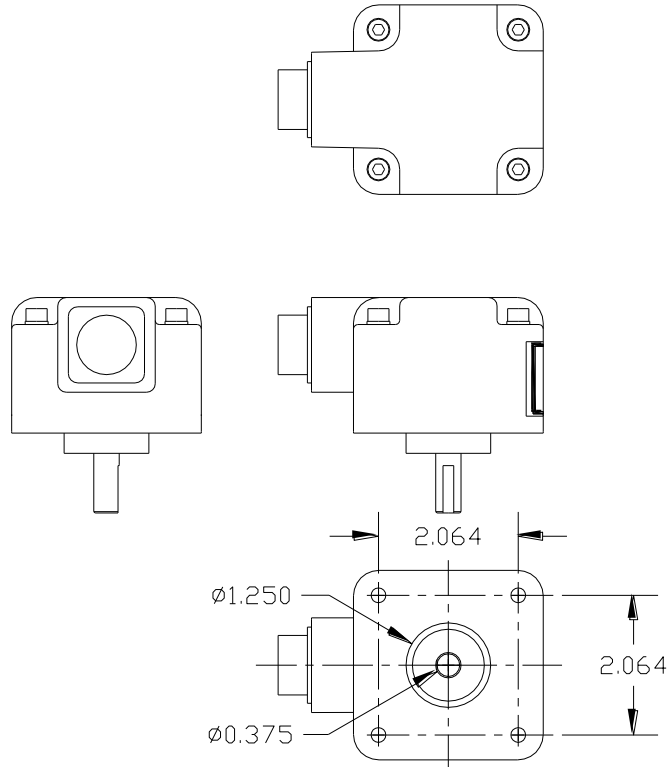
+5 to +15 vdc power

Differential Quadrature output (A – A not, B – B not)

Pin Out

A	-	A
H	-	A\
B	-	B
I	-	B\
D	-	+5 to +15 vdc
F	-	Gnd
G	-	Case

8.5.10 ENCODER - AM5KP188



P/N	DESCRIPTION	QTY	UNIT
AM5KP188	ENCODER H25D-SS-1200-ABC-4469	2	EA
AM5KM073	COUPLING MOD ENCDR 0.250/0.375 BORE	2	EA
AMS1P071	DUST CAP MS25043-16DA	2	EA

Specifications

1200 Pulses per revolution

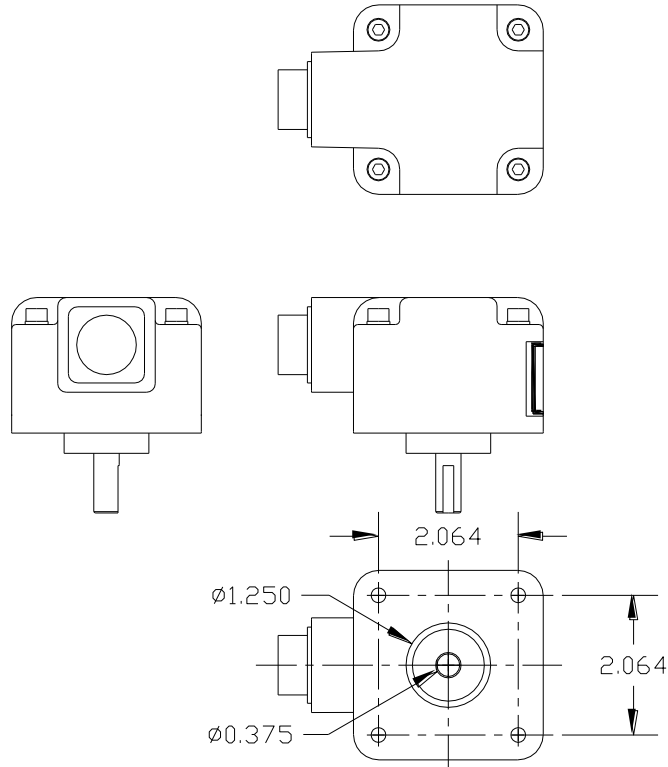
+5 to +15 vdc power

Differential Quadrature output (A – A not, B – B not)

Pin Out

A	-	A
C	-	A\
B	-	B
E	-	B\
D	-	+5 to +15 vdc
F	-	Gnd
G	-	Case

8.5.11 ENCODER - AM5KP189



P/N	DESCRIPTION	QTY	UNIT
AM5IP189	ENCODER H25D-SS-1200-ABC-4469	2	EA
AM5KM073	COUPLING MOD ENCDR 0.250/0.375 BORE	2	EA
AMS1P071	DUST CAP MS25043-16DA	2	EA

Specifications

1200 Pulses per revolution

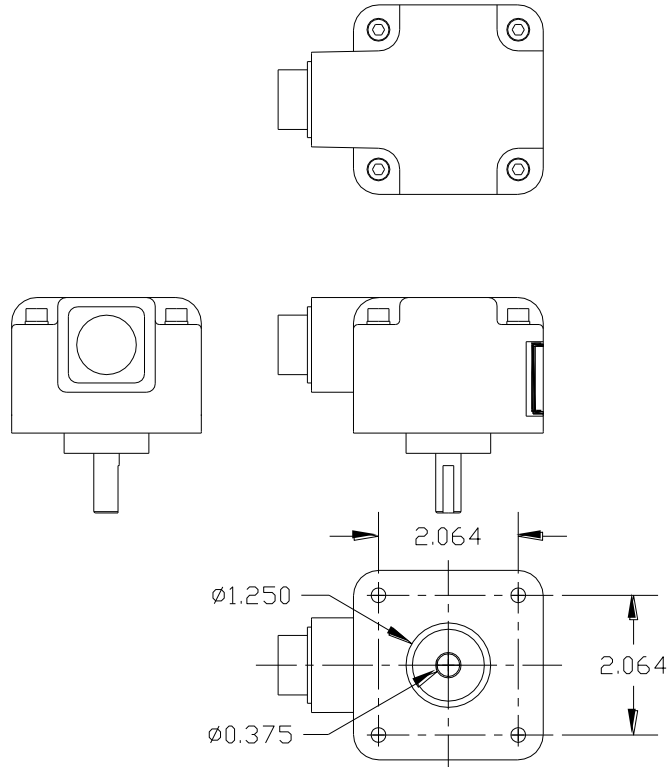
+5 to +15 vdc power

Differential Quadrature output (A – A not, B – B not)

Pin Out

A	-	A
C	-	A\
B	-	B
E	-	B\
D	-	+5 to +15 vdc
F	-	Gnd
G	-	Case

8.5.12 ENCODER - AM5KP192



P/N	DESCRIPTION	QTY	UNIT
AM5KP192	ENCODER H25D-SS-1200-ABC-4469	2	EA
AM5KM073	COUPLING MOD ENCDR 0.250/0.375 BORE	2	EA
AMS1P071	DUST CAP MS25043-16DA	2	EA

Specifications

1200 Pulses per revolution

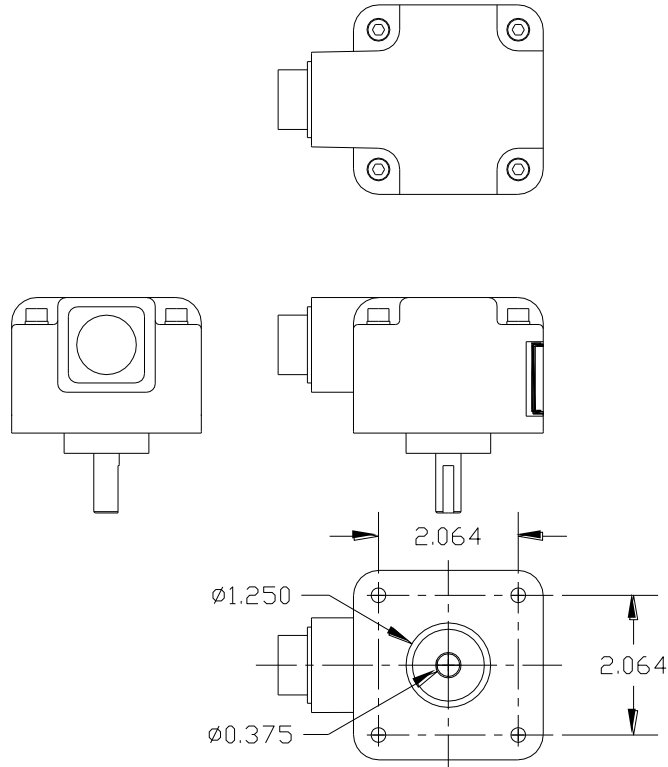
+5 to +15 vdc power

Differential Quadrature output (A – A not, B – B not)

Pin Out

A	-	A
C	-	A\
B	-	B
E	-	B\
D	-	+5 to +15 vdc
F	-	Gnd
G	-	Case

8.5.13 ENCODER – AMS7P131



P/N	DESCRIPTION	QTY	UNIT
AM5KP131	ENCODER H25D-SS-1200-ABC-4469	2	EA
AM5KM073	COUPLING MOD ENCDR 0.250/0.375 BORE	2	EA
ACMU2P09	DUST CAP MS25043-18DA	2	EA

Specifications

1200 Pulses per revolution

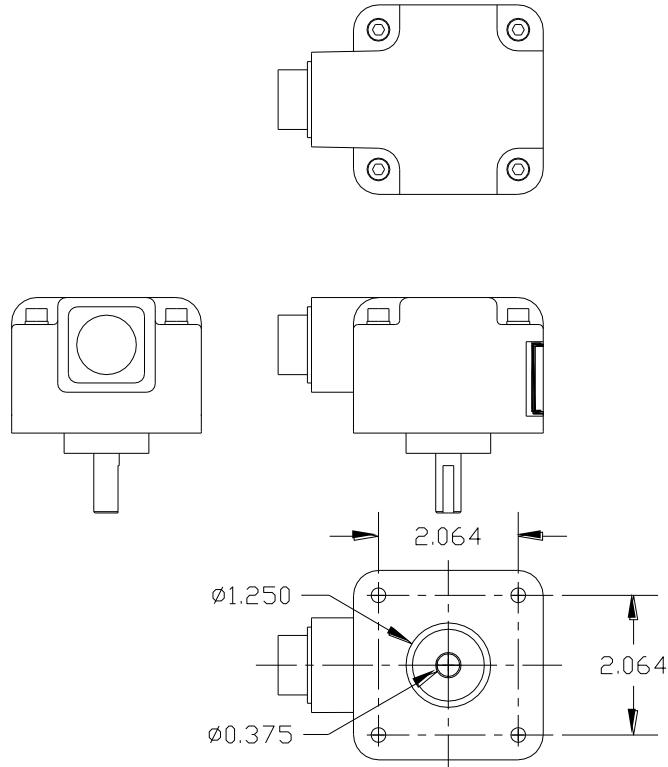
+5 to +15 vdc power

Differential Quadrature output (A – A not, B – B not)

Pin Out

A	-	A
H	-	A\
B	-	B
I	-	B\
D	-	+5 to +15 vdc
F	-	Gnd
G	-	Case

8.5.14 ENCODER – AMS7P191



P/N	DESCRIPTION	QTY	UNIT
AM5KP191	ENCODER H25D-SS-1200-ABC-4469 ATEX EEx ia IIB T4	2	EA
AM5KM073	COUPLING MOD ENCDR 0.250/0.375 BORE	2	EA
AMS1P071	DUST CAP MS25043-16DA	2	EA

Specifications

1200 Pulses per revolution

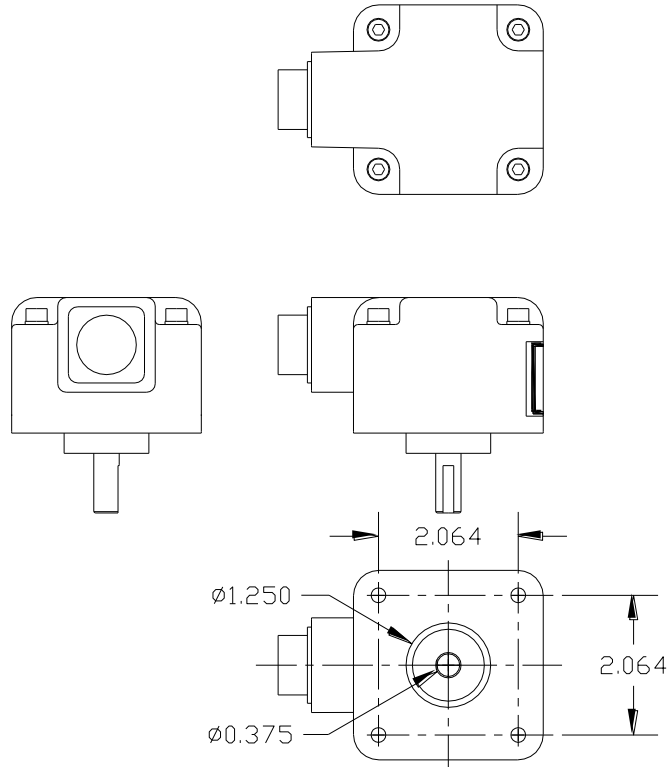
+5 to +15 vdc power

Differential Quadrature output (A – A not, B – B not)

Pin Out

E	-	A
C	-	A\
G	-	B
D	-	B\
A	-	+5 to +15 vdc
B	-	Gnd
F	-	Case

8.5.15 ENCODER – AMSLP061



P/N	DESCRIPTION	QTY	UNIT
AM5KP061	ENCODER H25D-SS-1200-ABC-4469	2	EA
AM5KM073	COUPLING MOD ENCDR 0.250/0.375 BORE	2	EA
ACMU2P09	DUST CAP MS25043-18DA	2	EA

Specifications

1200 Pulses per revolution

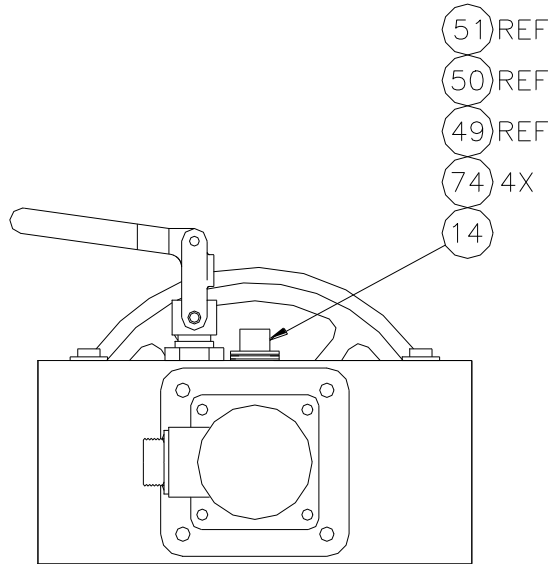
+5 to +15 vdc power

Differential Quadrature output (A – A not, B – B not)

Pin Out

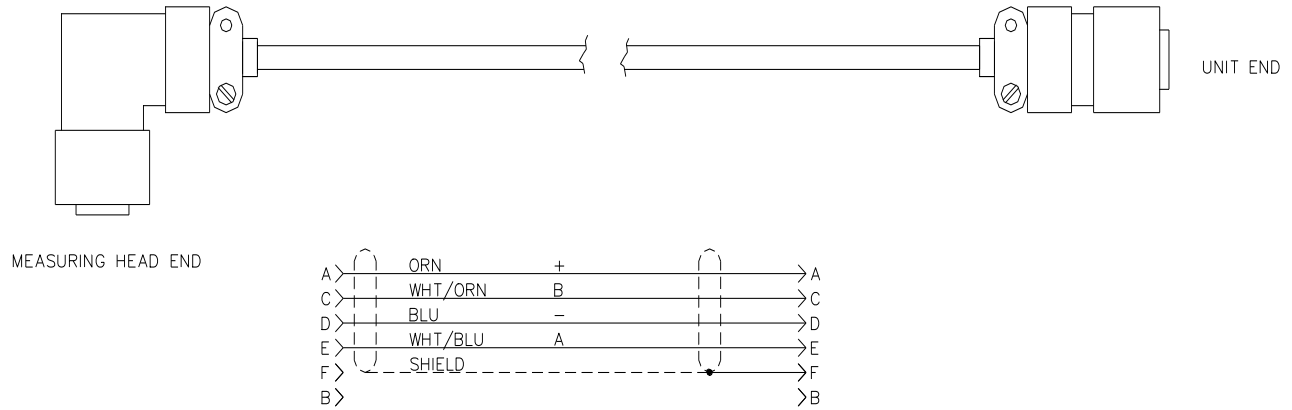
A	-	A
H	-	A\
B	-	B
I	-	B\
D	-	+5 to +15 vdc
F	-	Gnd
G	-	Case

8.6 BACKUP ODOMETER - CABLE AND WIRING



ITEM	P/N	DESCRIPTION	QTY	UNIT
14	AM5KA058	ASSY ENCODER BACKUP MAGNETIC	1	EA
49	AM5KP027	CONN KPT02E10-6P RECEPTACLE MS3112	1	EA
50	AM5KP034	DUST CAP KPT8110C CANNON SHELL SIZE 10	1	EA
51	C276P041	O-RING 2-017	2	EA
74	AMS1P040	SCREW 6-32 X 3/8 PAN HD SST	4	EA

8.6 BACKUP ODOMETER continued
AM5KA024-20 BACKUP ODOMETER CABLE 101343792



ITEM	P/N	DESCRIPTION	QTY	UNIT
1	AMS7P062	CABLE 24/2P STNDED TC PE/PVC AL/MY SHLD W/DW NEC CMUL2919	20	FT
2	AM5KP057	CONN KPT06F10-6P STR PLUG	1	EA
3	AM5KP058	CONN KPT08F10-6S RT ANGLE PLUG	1	EA
4	AM5KP059	DUST CAP KPT8010C CANNON	2	EA
5	AM5KA034	BUSHING #9779-513-4 AMPHENOL	2	EA