



Model 136A

Tourmaline hydraulic pressure calibration transfer standard, 20k psi, 0.2

Installation and Operating Manual

**For assistance with the operation of this product,
contact PCB Piezotronics, Inc.**

**Toll-free: 800-828-8840
24-hour SensorLine: 716-684-0001
Fax: 716-684-0987
E-mail: info@pcb.com
Web: www.pcb.com**



Repair and Maintenance

PCB guarantees Total Customer Satisfaction through its “Lifetime Warranty Plus” on all Platinum Stock Products sold by PCB and through its limited warranties on all other PCB Stock, Standard and Special products. Due to the sophisticated nature of our sensors and associated instrumentation, **field servicing and repair is not recommended and, if attempted, will void the factory warranty.**

Beyond routine calibration and battery replacements where applicable, our products require no user maintenance. Clean electrical connectors, housings, and mounting surfaces with solutions and techniques that will not harm the material of construction. Observe caution when using liquids near devices that are not hermetically sealed. Such devices should only be wiped with a dampened cloth—never saturated or submerged.

In the event that equipment becomes damaged or ceases to operate, our Application Engineers are here to support your troubleshooting efforts 24 hours a day, 7 days a week. Call or email with model and serial number as well as a brief description of the problem.

Calibration

Routine calibration of sensors and associated instrumentation is necessary to maintain measurement accuracy. We recommend calibrating on an annual basis, after exposure to any extreme environmental influence, or prior to any critical test.

PCB Piezotronics is an ISO-9001 certified company whose calibration services are accredited by A2LA to ISO/IEC 17025, with full traceability to SI through N.I.S.T. In addition to our standard calibration services, we also offer specialized tests, including: sensitivity at elevated or cryogenic temperatures, phase response, extended high or low frequency response, extended range, leak testing, hydrostatic pressure testing, and others. For more information, contact your local PCB Piezotronics distributor, sales representative, or factory customer service representative.

Returning Equipment

If factory repair is required, our representatives will provide you with a Return Material Authorization (RMA) number, which we use to reference any information you have already provided and expedite the repair process. This number should be clearly marked on the outside of all returned package(s) and on any packing list(s) accompanying the shipment.

Contact Information

PCB Piezotronics, Inc.
3425 Walden Ave.
Depew, NY14043 USA
Toll-free: (800) 828-8840
24-hour SensorLine: (716) 684-0001
General inquiries: info@pcb.com
Repair inquiries: rma@pcb.com

For a complete list of distributors, global offices and sales representatives, visit our website, www.pcb.com.

Safety Considerations

This product is intended for use by qualified personnel who recognize shock hazards and are familiar with the precautions required to avoid injury. While our equipment is designed with user safety in mind, the protection provided by the equipment may be impaired if equipment is used in a manner not specified by this manual.

Discontinue use and contact our 24-Hour Sensorline if:

- Assistance is needed to safely operate equipment
- Damage is visible or suspected
- Equipment fails or malfunctions

For complete equipment ratings, refer to the enclosed specification sheet for your product.

Definition of Terms and Symbols

The following symbols may be used in this manual:



DANGER

Indicates an immediate hazardous situation, which, if not avoided, may result in death or serious injury.

**CAUTION**

Refers to hazards that could damage the instrument.

**NOTE**

Indicates tips, recommendations and important information. The notes simplify processes and contain additional information on particular operating steps.

The following symbols may be found on the equipment described in this manual:



This symbol on the unit indicates that high voltage may be present. Use standard safety precautions to avoid personal contact with this voltage.



This symbol on the unit indicates that the user should refer to the operating instructions located in the manual.



This symbol indicates safety, earth ground.



PCB工业监视和测量设备 - 中国RoHS2公布表

PCB Industrial Monitoring and Measuring Equipment - China RoHS 2 Disclosure Table

部件名称	有害物质					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
住房	0	0	0	0	0	0
PCB板	X	0	0	0	0	0
电气连接器	0	0	0	0	0	0
压电晶体	X	0	0	0	0	0
环氧	0	0	0	0	0	0
铁氟龙	0	0	0	0	0	0
电子	0	0	0	0	0	0
厚膜基板	0	0	X	0	0	0
电线	0	0	0	0	0	0
电缆	X	0	0	0	0	0
塑料	0	0	0	0	0	0
焊接	X	0	0	0	0	0
铜合金/黄铜	X	0	0	0	0	0
本表格依据 SJ/T 11364 的规定编制。						
0：表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572 规定的限量要求以下。						
X：表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 规定的限量要求。						
铅是欧洲RoHS指令2011/65/ EU附件三和附件四目前由于允许的豁免。						

CHINA RoHS COMPLIANCE

Component Name	Hazardous Substances					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Chromium VI Compounds (Cr(VI))	Polybrominated Biphenyls (PBB)	Polybrominated Diphenyl Ethers (PBDE)
Housing	O	O	O	O	O	O
PCB Board	X	O	O	O	O	O
Electrical Connectors	O	O	O	O	O	O
Piezoelectric Crystals	X	O	O	O	O	O
Epoxy	O	O	O	O	O	O
Teflon	O	O	O	O	O	O
Electronics	O	O	O	O	O	O
Thick Film Substrate	O	O	X	O	O	O
Wires	O	O	O	O	O	O
Cables	X	O	O	O	O	O
Plastic	O	O	O	O	O	O
Solder	X	O	O	O	O	O
Copper Alloy/Brass	X	O	O	O	O	O

This table is prepared in accordance with the provisions of SJ/T 11364.

O: Indicates that said hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement of GB/T 26572.

X: Indicates that said hazardous substance contained in at least one of the homogeneous materials for this part is above the limit requirement of GB/T 26572.

Lead is present due to allowed exemption in Annex III or Annex IV of the European RoHS Directive 2011/65/EU.

1.0 DESCRIPTION:

The model 136A Hydraulic Reference Sensor is designed to measure rapidly changing hydraulic pressure up to 20 000 psi in an insulating hydraulic environment. This sensor is an effective transfer standard for calibrating other sensors.

2.0 INSTALLATION:

See the installation drawing at the front of this operating guide for mounting instructions. The model 136A is threaded into a 1/2-20 UNF-2B.

3.0 OPERATION:

Connect the 136A to a laboratory type charge amplifier such as the PCB Model 462A, 463A, or 464A. Use only low noise cable such as the PCB Model 003A or equivalent. Protect the high impedance connection against moisture contamination with shrink tubing. Support sensor cables by tying them to rigid structures to prevent excessive motion which can generate noise. Allow strain relief in the cable.

Select the appropriate sensor sensitivity and range on the charge amplifier in accordance with the instructions supplied with the charge amplifier.

NOTE: Keep the input cable to the charge amplifier as short as practical because noise at the output of the charge amplifier is related to cable length. If necessary, depress the ground button of the charge amplifier and adjust electrical zero.

4.0 POLARITY:

When subjected to pressure, the 136A will have a positive-going charge output. Because PCB charge amplifiers are signal-inverting, the resultant output will be negative.

5.0 CALIBRATION:

The sensor is calibrated dynamically to a maximum pressure of 20 000 psi using a drop weight tester.

NOTE: The oil in the hydraulic system must be non-conductive because the Model 136A has an exposed crystal. Silicon oil is recommended.

Linearity is determined by taking at least five data points across the pressure range specified above and then finding the sensitivities by using linear regression mathematics.

6.0 MAINTENANCE:

The only maintenance possible on the Model 136A is keeping the sensor clean. If using the sensor in a dirty environment, protect the cable connectors with heat shrink tubing. If the cable connections need cleaning, use Isopropyl alcohol on a lint-free cloth. If stored for an extended period or used in a damp environment, the insulation resistance may degrade from the norm of 10^{12} ohms. To restore insulation, bake in a 200°F oven for four hours.

Caution should be taken to prevent bending or breaking wire leads and supports leading to the crystal.

Model Number 136A	CHARGE OUTPUT PRESSURE SENSOR	Revision: G ECN #: 47883
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	<u>ENGLISH</u>	<u>SI</u>	
Performance			
Sensitivity(± 15 %)	0.2 pC/psi	0.029 pC/kPa	
Measurement Range	15 kpsi	103,400 kPa	
Maximum Pressure	15 kpsi	103,400 kPa	
Resolution	500 mpsi	3.45 kPa	[1][2]
Resonant Frequency	≥ 1.0 MHz	≥ 1.0 MHz	
Rise Time(Reflected)	≤ 3.0 μ sec	≤ 3.0 μ sec	
Non-Linearity	≤ 0.5 % FS	≤ 0.5 % FS	[3]
Environmental			
Temperature Range(Operating)	-15 to +100 °F	-26 to +37 °C	
Electrical			
Output Polarity(Positive Pressure)	Positive	Positive	[1]
Capacitance	10 pF	10 pF	
Insulation Resistance(at room temp)	≥ 10 ¹² Ohm	≥ 10 ¹² Ohm	
Physical			
Sensing Element	Tourmaline	Tourmaline	
Housing Material	17-4 Stainless Steel	17-4 Stainless Steel	
Sealing	Epoxy	Epoxy	
Electrical Connector	10-32 Coaxial Jack	10-32 Coaxial Jack	
Weight	0.8 oz	22.0 gm	

OPTIONAL VERSIONS

Optional versions have identical specifications and accessories as listed for the standard model except where noted below. More than one option may be used.

NOTES:
 [1] Typical.
 [2] Resolution dependent on range setting and cable length used in charge system.
 [3] Zero-based, least-squares, straight line method.
 [4] See PCB Declaration of Conformance PS158 for details.



All specifications are at room temperature unless otherwise specified.
 In the interest of constant product improvement, we reserve the right to change specifications without notice.
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Entered: LK	Engineer: APB	Sales: RWM	Approved: APB	Spec Number:
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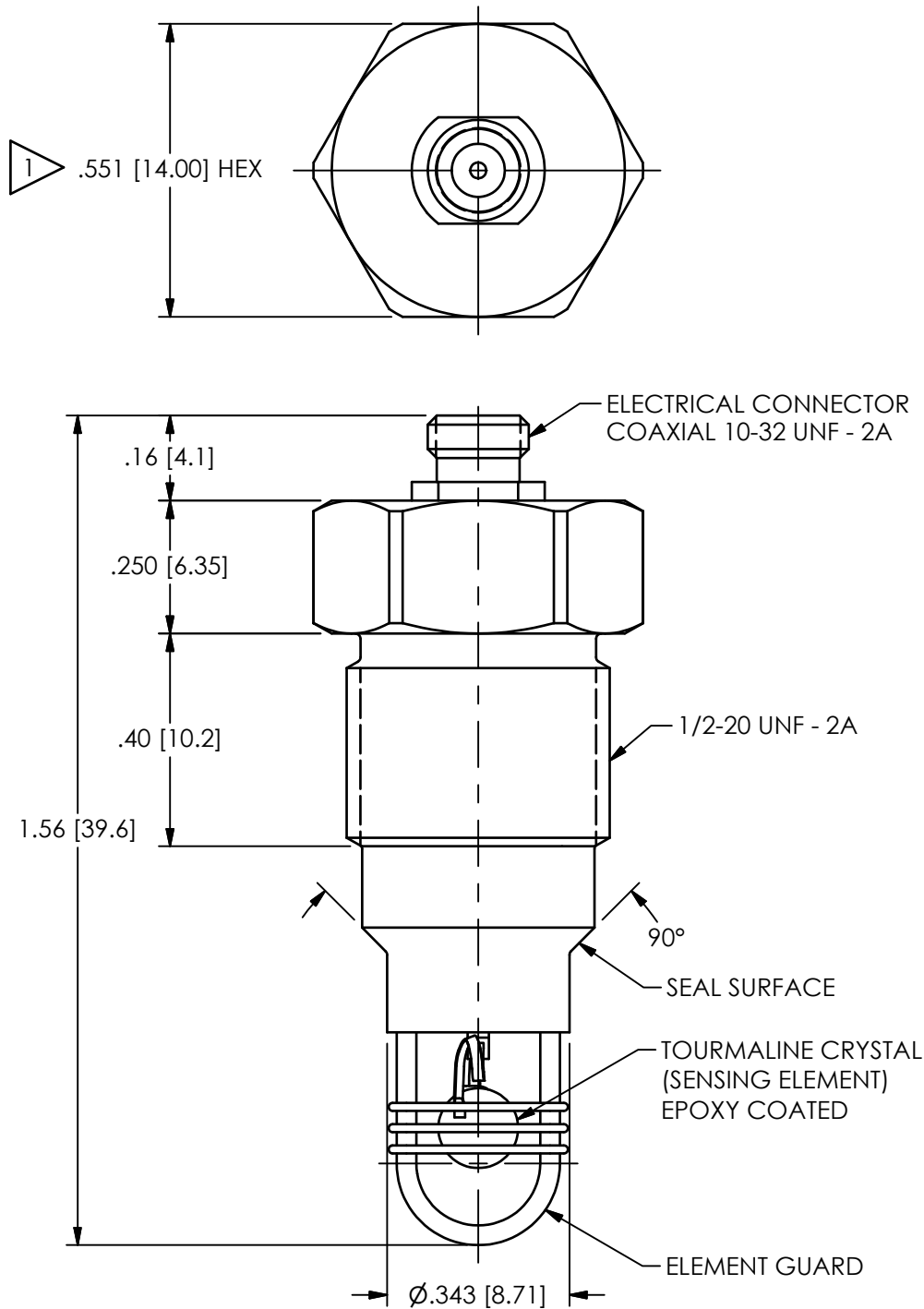
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136-1010-95

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REVISIONS

REV	DESCRIPTION	DIN
B	ADDED NOTE 1	45056



1 MOUNTING TORQUE: 10 FTLB (13.5 Nm) MAXIMUM

UNLESS OTHERWISE SPECIFIED TOLERANCES ARE:		DRAWN		CHECKED		ENGINEER		 3425 WALDEN AVE. DEPEW, NY 14043 (716) 684-0001 E-MAIL: sales@pcb.com	
DIMENSIONS IN INCHES	DIMENSIONS IN MILLIMETERS [IN BRACKETS]	JDM	2/12/16	AF	2/12/16	RF	2/12/16		
DECIMALS XX ±.03 XXX ±.010	DECIMALS X ± 0.8 XX ± 0.25	TITLE OUTLINE DRAWING MODEL 136A CALIBRATION TRANSFER STANDARD							CODE IDENT. NO. 52681
ANGLES ± 2 DEGREES	ANGLES ± 2 DEGREES								DWG. NO. 136-1010-95
FILLETS AND RADII .003 - .005	FILLETS AND RADII 0.07 - 0.13	SCALE: 3X		SHEET 1 OF 1					