



Model 699A05
4-20 mA Loop Calibrator
Installation and Operating Manual

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

Toll-free: 800-959-4464
24-hour SensorLine: 716-684-0001
Fax: 716-684-3823
E-mail: imi@pcb.com
Web: www.imi-sensors.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.

Basic Keypad Operations

① EZ-Check™ Switch

SOURCE mode: Slide the switch to select from Hi and low range pre-set values and the mid ranger (Dial) is selectable. Dial the mid range value and it will store the value with-in 5 seconds automatically.

READ mode: Slide the switch to recall minimum and maximum readings. Press the **EZ-Dial™ Knob** to clear the stored values.

② SOURCE/OFF/READ Switch

Slide the **SOURCE/OFF/READ Switch** to **SOURCE** to output a mA signal and to do 2 - wire transmitter simulation. Use the **READ** position to read mA signal and power & measure 2 - wire transmitter.

③ EZ-Dial™ Knob

Turn the knob to change display in 0.01mA increments. Push and turn for faster dialing. Push without turning to clear EZ-Check™ switch HI/LO points in READ mode.

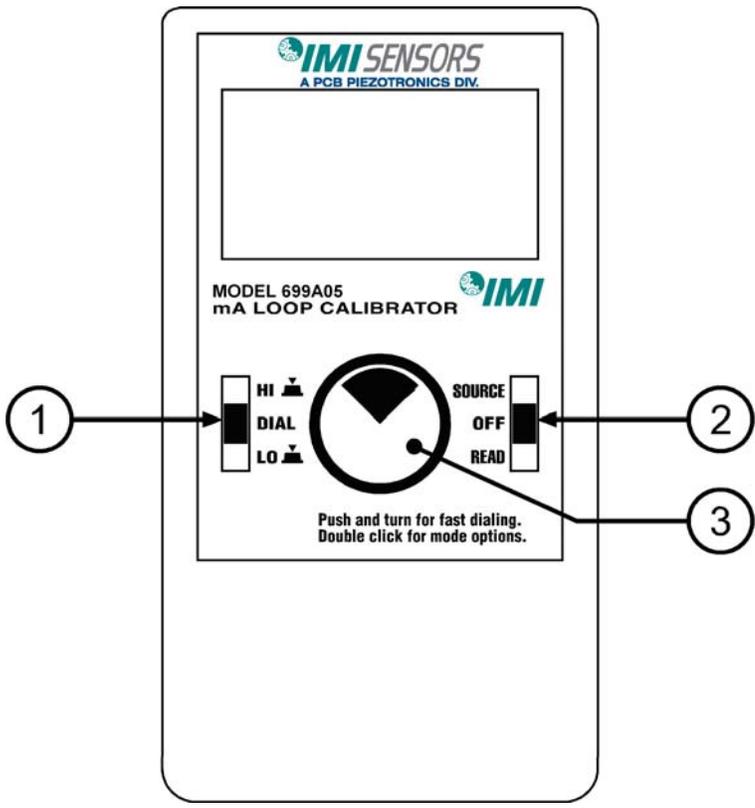
Press twice to select options:

- In **Source** mode select -
 - % or mA
 - 2-Wire Transmitter Simulate
 - % or mA
 - low power (15V) or High power (24V)

- In **Read** mode select -
 - % or mA
 - Power and Measure 2-Wire Transmitter
 - % or mA
 - low power (15V) or High power (24V)

HART® Protocol

An internal jumper enables the Power & Measure 2 - wire transmitter mode to be compatible with HART® communicators and transmitters.



EZ-Dial™ Knob

Adjust the output up and down with the EZ-Dial™ knob. The increment is 0.01 mA (or 0.1 % if display units are % of 4-20 mA.) Press while turning to adjust 10X faster - 0.10 mA (or 1.00 %.)

Quick Reference Bar Graph

The Quick Reference Bar Graph indicates the input and output level to the Model 699A05 in % of 4-20 mA with 1.0% resolution. If the input or output signal is outside the normal operating range of the Model 699A05 the Quick Reference Bar Graph in source mode will flash, in Read mode display over range when above 24.5mA.

Error Conditions

Bar Graph will flash when any error conditions exist.

HART® Protocol

Remove the back of the case and remove the jumper that is located in position J6 on the PC board. By doing so it places a 250Ω resistor in series with the output of the model 699A05. This internal resistor eliminates the need to add an external load resistor when communicating with a HART® transmitter. This reduces the typical drive capability to 950Ω.

EZ-Check™ Switch

The EZ-Check™ switch has three positions -- high, dial, and low. Its position is shown at the left edge of the display with "HI" and "LO" indicators. Neither indicator indicates the middle position. Use of the EZ-Check™ switch depends on mode.

Source Modes:

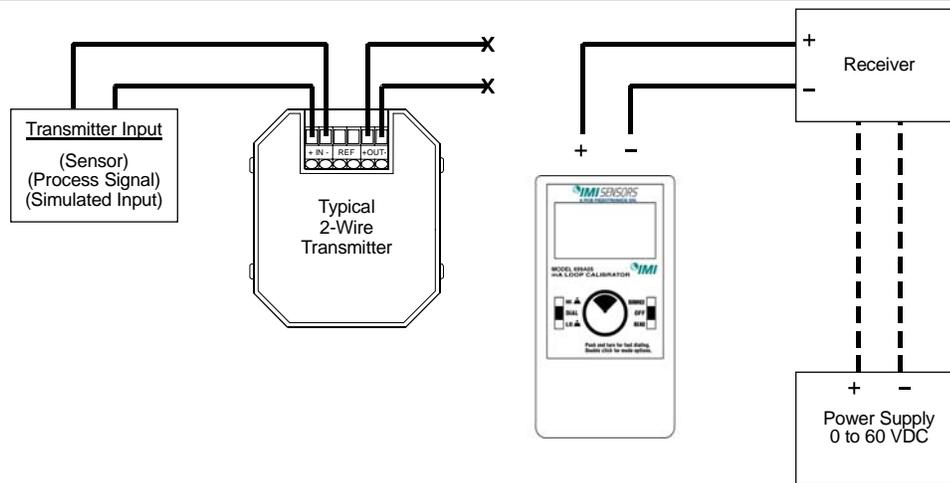
Slide the EZ-Check™ switch to the HI and LO positions to recall the preset settings (Hi=20.00mA & Lo=4.00mA).

Hint: For faster calibrations, the position of the switch can be felt. This feature allows continuous monitoring of the device being calibrated without looking back at the Model 699A05 display. This is also useful in poor lighting or under difficult operating conditions.

Read Modes:

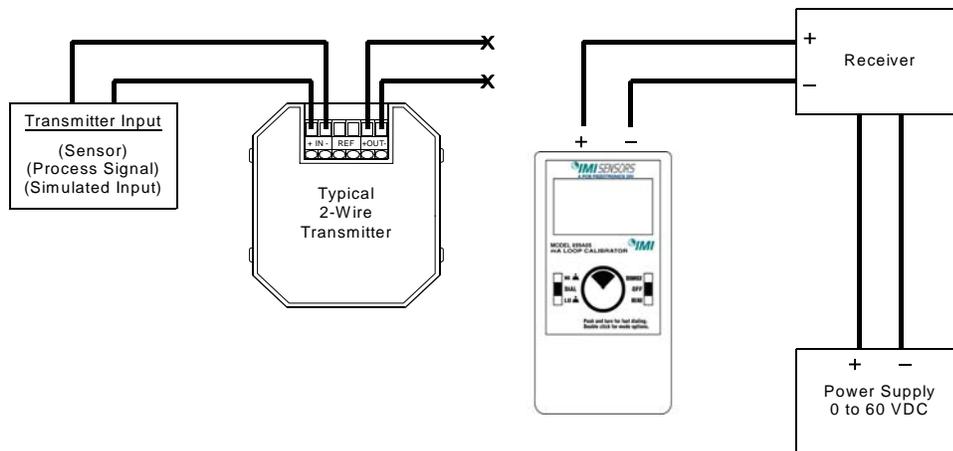
In read mode, the Model 699A05 calibrator records the maximum and minimum readings observed in each mode. Slide the EZ-Check™ switch to the Dial position to read the loop. Then Slide the EZ-Check™ switch to the HI and LO positions to display the max and min readings. Press the EZ-Dial™ knob to clear the readings. The display will flash "CLEARED" to confirm.

Source Mode



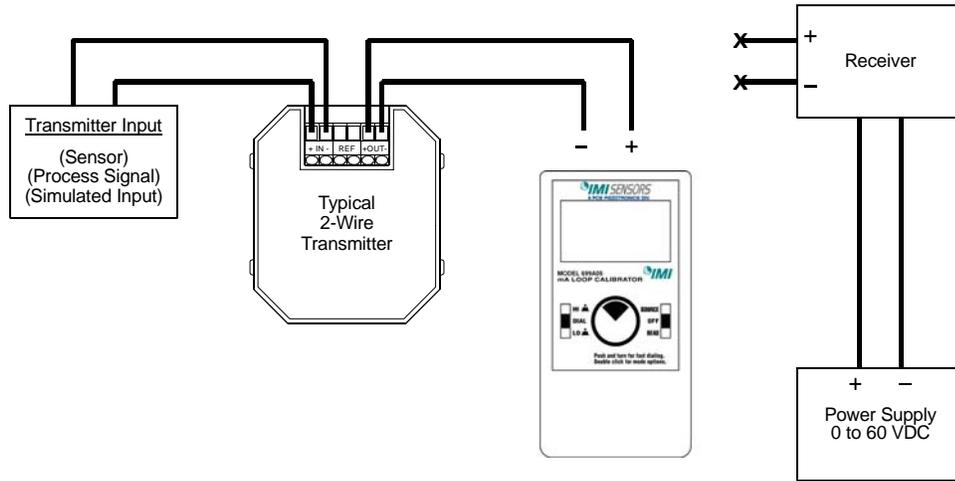
Source mode uses internal power to supply current from 0.00-24.00 mA into as much as 1200Ω until the end of battery life. The calibrator Graph will flash if connected improperly. The three-position EZ-Check™ switch provides instant preset 4mA at zero, 12mA at mid range and 20mA at full scale outputs. The output is adjusted in 0.01 or 0.10 mA increments (0.1 or 1.0) % display units with the EZ-Dial™ knob.

2-Wire Transmitter Simulation Mode



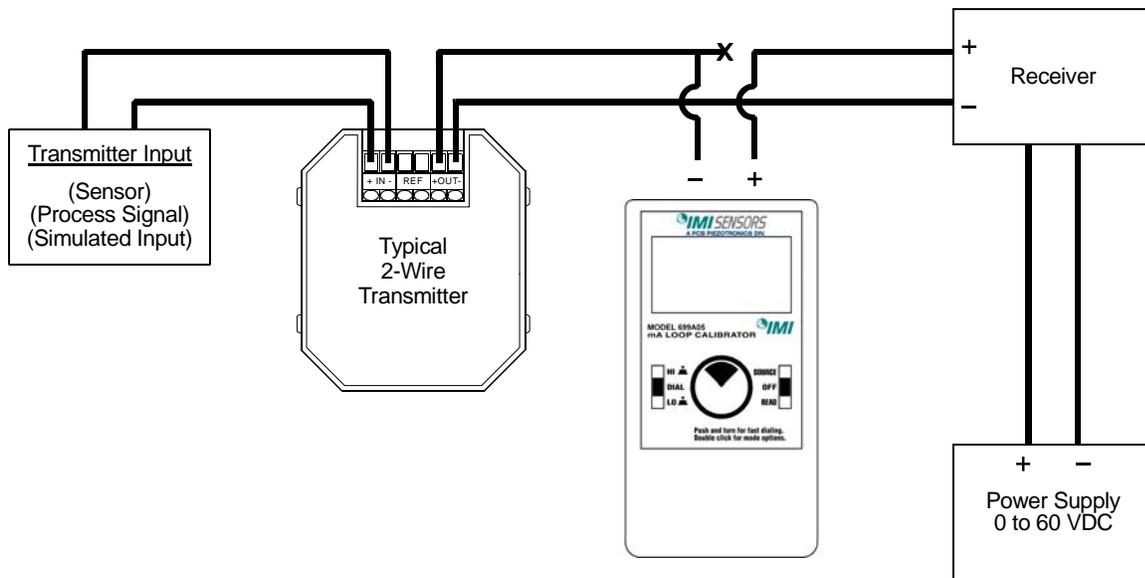
The Model 699A05 can simulate a 2-wire transmitter in the 4-20 mA or % process loop. In source mode press the EZ-Dial™ knob twice to get into the feature options. Then press the EZ-Dial™ knob to select mA 2 - wire. The EZ-Check™ switch and EZ-Dial™ knob allow rapid and fine control of loop current.

Power and Measure Transmitter Mode



The Model 699A05 supplies 15Volts or 24 Volts to the transmitter and displays the output in mA or % on the Model 699A05 display. In read mode press the EZ-Dial™ knob twice to get into the feature options. Then press the EZ-Dial™ knob to select mA PWR - M. Then turn EZ-Dial™ knob to select power range (15V or 24V). The EZ-Check™ switch and EZ-Dial™ knob allow rapid and fine control of loop current.

Read Mode



The Model 699A05 can read loop currents from 0-24 mA. It limits current in read mode to 25mA to protect the devices in the loop from over voltage or over current conditions.

Specifications

General Specifications:

(Unless otherwise indicated all specifications are rated from a nominal 23 °C, 70 % RH for 1 year from calibration)

Operating Temperature Range	-20 to 60 °C (-5 to 140 °F)
Storage Temperature Range	-30 to 60 °C (-22 to 140 °F)
Relative Humidity Range	10 % ≤RH ≤90 % (0 to 35 °C), Non-condensing 10 % ≤RH≤ 70 % (35 to 60 °C), Non-condensing
Battery	2 AA Alkaline
Miscellaneous	Low battery indication with nominal 1 hour of operation left Over-voltage protection to 120 Vrms (rated for 30 seconds) or 240 Vrms (rated for 15 seconds) Bar graph display with 1% resolution of 4-20 mA signal scale High contrast graphic liquid crystal display with 0.45" (11.4 mm) high digits

Common Specifications for all current modes

Ranges	0.00 to 24.00 mA, 25.0 to 125.0% of 4-20 mA
Accuracy	≤ ± (0.05 % of Reading + 0.01 mA)
Temperature effect	≤ ± 50 ppm/°C of Range
Resolution(s)	0.01 mA and 0.1 %

Source/Power and Measure 2-Wire Transmitter Specifications:

Loop compliance voltage	≥ 15 Volts or ≥ 24 Volts
Loop drive capability	1200 Ω at 20 mA for entire battery life @ 24 Volts 600 Ω at 20 mA for entire battery life @ 15 Volts

Read mA Specifications:

Voltage burden	≤ 1V at 20 mA
Overload/Current limit protection	nominal ≤24 mA
Battery life	Typical ≥ 40 Hours

2-Wire Transmitter Simulation Specifications:

Voltage burden	≤ 2V at 20 mA
Overload/Current limit protection	nominal ≤ 24 mA
Loop voltage limits	2-42 VDC
Miscellaneous	or out of compliance conditions are indicated by appropriate error display Battery life ≥ 40 hour typical

Manual Number: 32925

Manual Revision: A

ECR Number: 24875

Model Number
699A05

HAND-HELD 4-20MA CALIBRATOR

Revision: NR
ECN #:

General

	ENGLISH	SI
Operating Temperature Range	-5 to 140 °F	-20 to 60 °C
Storage Temperature Range	-22 to 140 °F	-30 to 60 °C
Relative Humidity (Non-Condensing)	10% to 90%	10% to 90%
Size (LxWxD)	4.75x2.5x0.75 inches	120.65x63.5x19.05 mm
Weight	7.5 oz	212.6 grams
Battery	2-AA Alkaline	2-AA Alkaline
Overvoltage Protection (30 seconds)	120 Vrms	120 Vrms
Display	0.45" LCD	11.4mm LCD

Common Specifications

Range	0.00 to 24.00 mA	0.00 to 24.00 mA
Accuracy	±0.05%	±0.05%
Resolution	00.01 mA	00.01 mA

Source/Power/Measure Specifications

Loop Voltage (Selectable)	15 or 24 Vdc	15 or 24 Vdc
Loop Drive Capability (15Vdc)	600 Ω	600 Ω
Loop Drive Capability (24Vdc)	1200 Ω	1200 Ω
Battery Life (24Vdc)	≥ 10 hours	≥ 10 hours
Battery Life (15Vdc)	≥ 18 hours	≥ 18hours

Read Specifications

Voltage Burden	≤ 1V at 20mA	≤ 1V at 20mA
Overload/Current Limit Protection	25mA Nominal	25mA Nominal
Battery Life	≥ 40 hours	≥ 40 hours

Transmitter Simulation Specifications

Voltage Burden	≤ 1V at 20mA	≤ 1V at 20mA
Overload/Current Limit Protection	25mA Nominal	25mA Nominal
Loop Voltage Limit	2-42 Vdc	2-42 Vdc
Battery Life	≥ 40 hours	≥ 40 hours

All specifications are at room temperature unless otherwise specified.

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.

N/A

NOTES:

N/A

SUPPLIED ACCESSORIES:

N/A

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In the interest of constant product improvement, we reserve the right to change specifications without notice.

Form DD030 Rev.F 2/23/99

Drawn:	Engineer: <i>MDI</i>	Sales: <i>QEM</i>	Approved: <i>NR</i>	Spec Number:
Date: <i>1-27-06</i>	Date: <i>2/8/06</i>	Date: <i>2/8/06</i>	Date: <i>6/1/06</i>	32923



3425 Walden Avenue, Depew, NY 14043

800-828-8840

Fax (716) 684-0987

E-Mail: sales@pcb.com

32924

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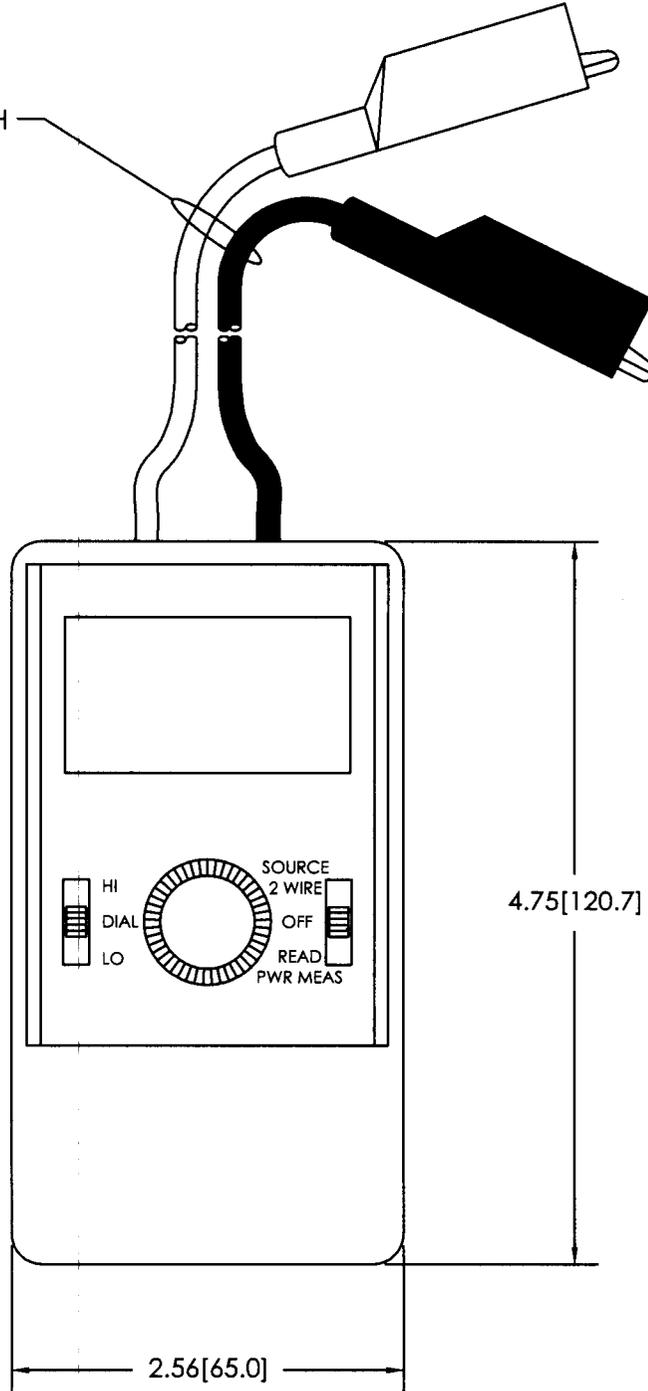
APPLICATION

NEXT ASS'Y	USED ON	VAR

REVISIONS

REV	DESCRIPTION	ECN	DATE	APP'D
NR	RELEASED TO DRAFTING		02/07/06	DM2/bb

CORD LENGTH
32.0 [813]



UNLESS SPECIFIED TOLERANCES

DIMENSIONS IN INCHES	DIMENSIONS IN MILLIMETERS [IN BRACKETS]
DECIMALS XX ±.03 XXX ±.010	DECIMALS X ±0.8 XX ±0.25
ANGLES ±2 DEGREES	ANGLES ±2 DEGREES
FILLETS AND RADII .003 - .005	FILLETS AND RADII [0.07 - 0.13]

DRAWN	RES 2/7/06	MFG	P. J. 2/10/06
CHK'D	DM 2/9/06	ENGR	MI 2/6/06
APP'D	UF 2/11/06	SALES	GRM 2/9/06

PCB PIEZOTRONICS™
 3425 WALDEN AVE. DEPEW, NY 14043
 (716) 684-0001 EMAIL: SALES@PCB.COM

CODE IDENT. NO. 52681	DWG. NO. 32924
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TITLE
**OUTLINE DRAWING
 MODEL 699A05
 4-20 mA LOOP CALIBRATOR**

DD011 REV. C 01/21/03

SCALE: .83X SHEET 1 OF 1