



**Model 070M90**

**12-channel summation ICP® sensor signal cond. module, (12) BNC jack**

**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](mailto:info@pcb.com)  
Web: [www.pcb.com](http://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

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Repair inquiries: [rma@pcb.com](mailto:rma@pcb.com)

For a complete list of distributors, global offices and sales representatives, visit our website, [www.pcb.com](http://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.

**Twelve-Channel ICP<sup>®</sup>  
Summing Signal  
Conditioner Module**

**Model 070M90**

**Operating Guide**



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## 1.0 DESCRIPTION

The 070M90 is 4-slot ICP amplifier module, intended for use with the PCB "440" series of modular enclosures. Features of the 070M90 include:

- 12 Channels (individual input and output)
- Summed output
- Selectable gain for summed output (.1, 1, 10)
- Adjustable current (2-20mA)
- Fault, overload detection per channel
- Overload detection for summed output
- AC coupled output

## 2.0 OPERATION

The 070M90 can be turned on using the main power switch on the enclosure it is installed in. (most enclosures feature a rear-panel mounted rocker switch for power) When turned on without sensors connected to the "INPUT" jacks, the "Input Fault" LEDs will illuminate.

Connect each sensor to a "SENSOR" jack using the appropriate cable. Connect readout devices to the "OUTPUT" jacks using a BNC-to-BNC cable. Wait for 1-3 minutes to allow the system to settle out before taking data.

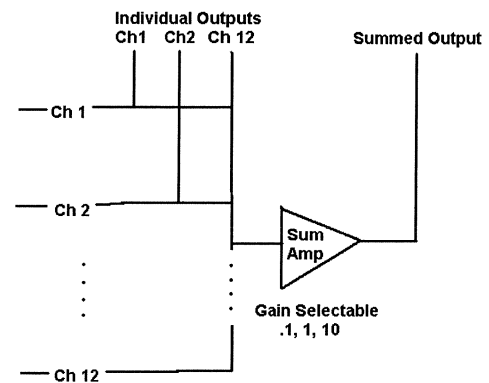
Note: Many types of connector adaptors are available from PCB to simplify difficult installation situations. Consult the factory for details.

Input faults are indicated by individual channel LEDs. With an ICP sensor connected to the input jack, a sensor or cable open is indicated by a solid red LED. If the cable or sensor is shorted, the LED blinks. Finally, if a signal exceeds  $\pm 10$  volts, the LED enlightens until the overload is removed.

If you wish to learn more about sensors with built-in microelectronic circuitry, known as ICP sensors, consult PCB's "General Operating Guide for use with Piezoelectric ICP Accelerometers" a brochure outlining the technical specifics associated with piezoelectric sensors. Topics covered include charge versus voltage mode systems, sensor time constants, effect of discharge time constant on low-frequency response, and power requirements.

## 3.0 SETTING THE GAIN

A three position switch controls the gain for the summed output.



## 4.0 SETTING THE CONSTANT CURRENT

To set the constant current adjustment locate the constant current adjust hole on the front panel of the Model 070M90. Hook a 0-30mA meter to the sensor input of any channel. Put a small screwdriver through the hole, and carefully turn the pot clockwise to increase current or counterclockwise to decrease current. The current level may be read on the meter. Note that this sets the current on all twelve channels simultaneously to the same value.



The 070M90 is preset to a constant current of 4mA during production. This is adequate for most laboratory and field applications. Special situations, such as driving extra long (beyond 1000 ft) cables, high frequency or fast rise-time pulses, may require increasing the sensor drive current above 4 mA.

Optionally available, PCB Model 401A04 ICP Sensor Simulator consists of a unity gain, non-inverting, impedance-converting voltage amplifier similar to those found in many ICP sensors. When used in conjunction with a signal generator, the electrical characteristics of long cables can be easily determined.

#### **CAUTION**

To avoid permanent damage to the sensor,  
DO NOT EXCEED 20 mA.

When driving fast rise-time pulses over long lines, system performance can be optimized by "tuning" the drive current to the line. Find the best current setting for the particular set of physical parameters (line length, line termination, or pulse rise time) established by the sensor. The optimum current setting is best determined by experimentation with your particular test setup. A good rule of thumb is to use the lowest current consistent with satisfactory results to minimize sensor self-heating and noise.

#### **5.0 COUPLING**

A coupling capacitor AC couples the system internally with a >10 second coupling time constant (TC). This gives a low-frequency response as follows:

1% down at .11 Hz  
5% down at .05 Hz  
30% (-3 dB) down at .016 Hz

NOTE: These figures apply to a sensor system where the discharge TC of the sensor is greater than 100 seconds. Shorter TC sensors shorten the overall system TC accordingly.

This coupling is desirable for standard operation since long-term thermal drifting of long TC sensors is nullified by the internal AC coupling. The DC offset at the output of each individual channel is, at the maximum, +/-30 mV.

*MANUAL NUMBER: 30332*  
*MANUAL REVISION: A*  
*ECO #22965*

**ELECTRICAL**

Sensor Excitation Voltage (For ICP® Sensors)	VDC	24 (±1)	
Sensor Excitation Current	mA	2-20	[2]
AC Mode Coupling Time Constant	sec	>10	
Voltage Gain (Per Channel)	V/V	X1 (±3%)	
Voltage Gain (Summed Output)	V/V	X.1, X1, X10 (±3%)	
Frequency Response (-5%):(X.1,X1 Gain)	Hz/KHz	0.05/100	
:(X10 Gain)	Hz/KHz	0.05/50	
Spectral Noise (Summed Output): 1 Hz	µV/√Hz [dB]	30 [-90]	[3]
10 Hz	µV/√Hz [dB]	2 [-114]	[3]
100 Hz	µV/√Hz [dB]	1 [-120]	[3]
1 kHz	µV/√Hz [dB]	.5 [-126]	[3]
10 kHz	µV/√Hz [dB]	.5 [-126]	[3]
Noise Broadband (1 Hz-10 kHz)	µV [dB]	37[-89]	[3]
Output Range	V	>±10	[3]
Output Impedance	ohms	<100	
Sensor Status Display	LED	Overload, Fault	[4]
		Open, Short	[4]
Overload Condition	VpK	>10	[5]
Maximum Power Required(ICP® Mode)	watts	16.7	[6]
Power Required:	VDC/watts	+28 at 240 mA/5.76	[6]
	VDC/watts	+5 at 345 mA/1.73	[6]
	VDC/watts	+15 at 305 mA/4.6	[6]
	VDC/watts	-15 at 305 mA/4.6	[6]

**ENVIRONMENTAL**

Operating Temperature Range	°F [°C]	32 to +120 [0 to +50]
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**PHYSICAL**

Connectors:	Input(12)	type	BNC	
	Output(12)	type	BNC	
	Summed Output(1)	type	BNC	
Size (H x W)		in [mm]	5.05 x 7.2 [128,27 x 182,88]	[7]
Weight		lb [kg]	3.56 [1,61]	

**NOTES:**

- [1] Computation =[A+B+C+...+L] x Summed Gain where A thru L are (12) individual channels.
- [2] Front panel potentiometer adjustable. Potentiometer adjusts all channels. Factory preset to 4mA +/- .5mA.
- [3] Measured at Gain =1.
- [4] Sensor status display contains fault/overload indicators for each channel and 1 overload indicator for the summed output.
- [5] Overload condition is above 10V for any input, or summed output.
- [6] Power consumption when unit is operating with 20 mA ICP current.
- [7] 4x width unit.

*All specifications are at room temperature unless otherwise specified.*

ICP® is a registered trademark of PCB Group, Inc.

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

Drawn: <i>[Signature]</i>	Engineer: <i>[Signature]</i>	Sales: <i>[Signature]</i>	Approved: <i>[Signature]</i>	Spec Number:
Date: 7-7-05	Date: 7-7-05	Date: 7-7-05	Date: 7-7-05	29992



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