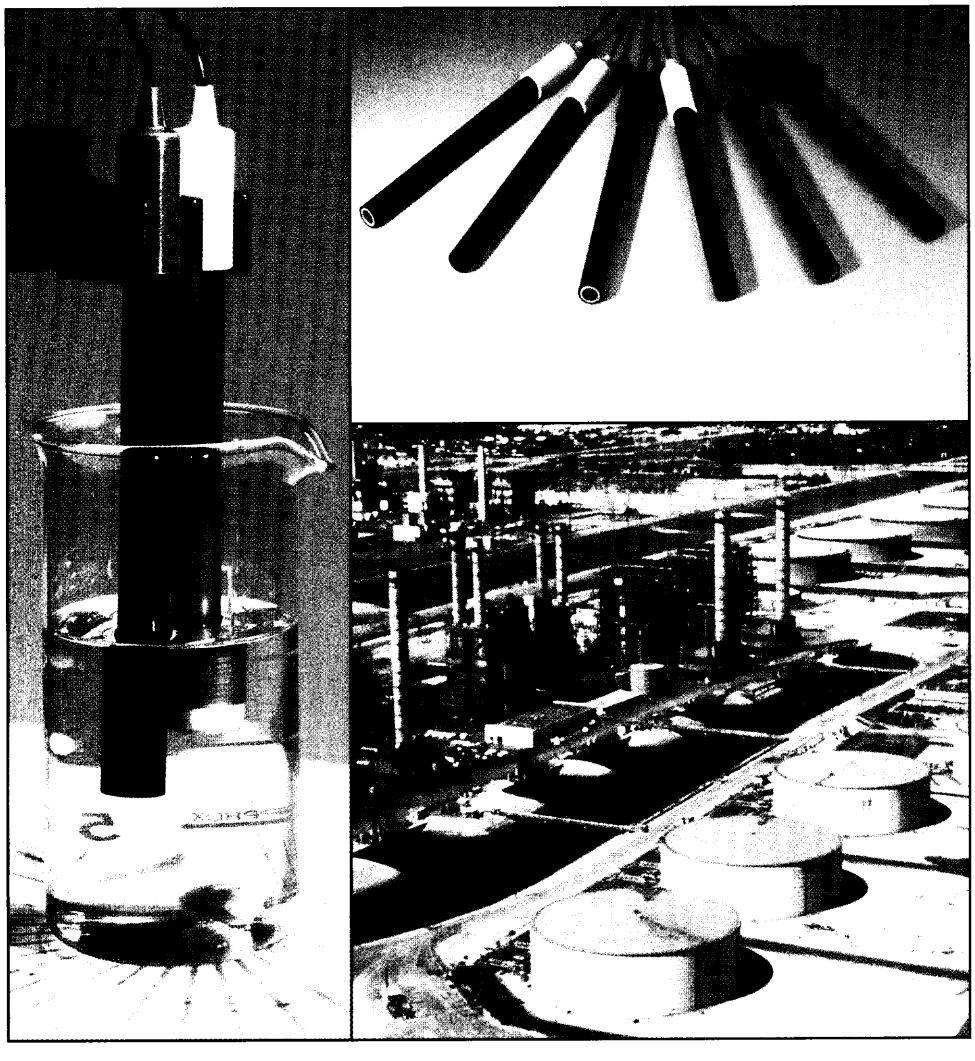
Innovative Sensors, Inc.

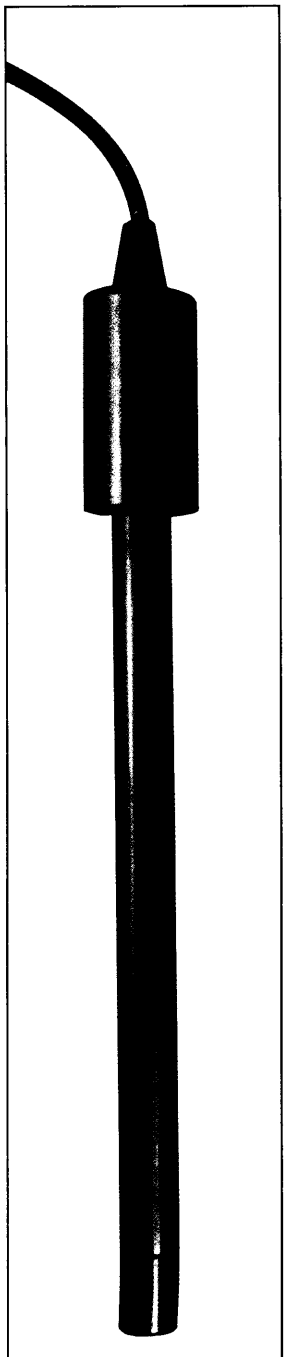
"ISI SOLUTIONS" - Specialty Sensors for Difficult Applications

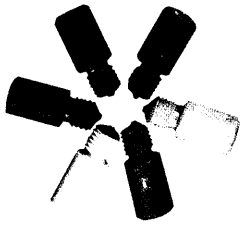


The **SOLUTION** to Ion Measurement

- ISO 9002 Certified Manufacturing
- Direct Ion/Concentration Measurement
- Wide Linear Measuring Range
- Fast and Accurate
- Easy to Use
- Laboratory and Process Configurations Available

Innovative Sensors Inc. is an established manufacturer of robust, high performance sensors for use in process industry and laboratory situations. As part of a continuing research and development program, ISI has coupled recent advances in ion measurement technologies with innovative sealing and mounting techniques to produce the ***Platinum Label***™ range. These superior ion measuring devices (IMD's) have eliminated the difficulties normally associated with ion analysis, and transformed traditionally temperamental products into user friendly and practical analytical sensors. Through the development of the ***Platinum Label***™ range ISI offers the user cost effective and convenient measuring capabilities.





Platinum Label™ IMD's join the ISI family of proven high performance sensors and offer the **SOLUTION** to Ion Measurement.

Construction

Innovative Sensors IMD's are robust mono measuring or combination electrodes constructed from an inert polymer material and available in laboratory or industrial configurations.

Response times

Ion Measuring Devices show a very rapid response to a change of ionic concentration when the electrode remains immersed in solution. If they are moved from one solution to another their response time is increased, however, even the slowest will usually achieve 99% of steady-state reading within 5-10 seconds. Very dilute solutions can extend this period by up to 30 seconds, but poor stirring, membrane surface damage, and the presence of some interfering ions may contribute towards excessively sluggish behaviour.

Temperature Effects

Although Ion Measuring Devices are usable over a wide range of temperatures, this should be held constant during measurements. The chief effect of temperature variation is to change the slope response of the electrode, but other effects arising from the reference electrode and heat transfer across the membrane, will also result in an apparent drift of potential.

Interferences

No Ion Measuring Device, with the possible exception of the fluoride sensor, is wholly specific to one ion. All others are more or less selective towards the ion for which they are designed, subject to certain other ions being present at or below some acceptable level. The measurement of electrode selectivity is known as the "Selectivity Ratio". This is specified for each electrode with respect to major interfering ions. The smaller this number, the more selective the electrode is to its primary ion.

Calibration and Measurement

In order to make quantitative measurements with an Ion Measuring Device, it is first necessary to construct a calibration curve by measuring a series of standard solutions. These standards are usually made by serial dilution from a known guaranteed stock solution.

All ISI products are manufactured in the USA to the highest standards in an ISO 9002 environment and are supported by extensive technical and customer service to ensure the highest quality, performance and satisfaction.
Note: Most product and packaging materials are recyclable. ISI has started a recycling program so that used IMD's can be returned in their original box to help improve our environment by reducing waste.

Platinum Label™ IMD's are suitable for use with any ISO 9000 approved instrumentation or accessories.

In keeping with ISI's continuing commitment to quality and product development, product appearance and specifications are subject to change without notice.

Type Number	Measurement Type	Membrane Type	Recommended Applications
Z8081 (M) Z8083 (C)	Ammonia NH_3	Gas permeable	Biological samples, boiler feed water, fertilizer, environmental samples, plating baths, sea water and waste water.
Z8085 (M) Z8087 (C)	Ammonium NH_4^+	PVC	
Z8091 (M) Z8093 (C)	Calcium Ca^{2+}	PVC	Boiler feed water, blood and serum, milk, water softening.
Z8065 (M) Z8067 (C)	Chloride Cl^-	Solid State	Boiler feed water, food processing, plating baths.
Z8077 (M) Z8079 (C)	Cyanide CN^-	Solid State	Metal plating and extraction processes, pollution monitoring.
Z8069 (M) Z8071 (C)	Fluoride F^-	Solid State	Drinking water supplies, dental products, Aluminium and Phosphates ore processing.
Z8113 (M) Z8115 (C)	Nitrate NO_3^-	PVC	Drinking water supplies, sewage treatment, food industry.
Z8117 (M) Z8119 (C)	Potassium K^+	PVC	Blood and serum, fertilizer and soils.
Z8061 (M) Z8063 (C)	Sodium Na^+	Glass sensing	Food industry, paper and pulp, Ion exchange units.
Z8073 (M) Z8075 (C)	Sulfide S^{2-}	Solid State	Paper and pulp, petrochemical, waste water treatment.

Type	Measurement Range M (Lower Limit - ppm)	pH Limits	Temperature Range °C	Interferences and Selectivity Ratios
NH_3	1M - 10^{-6}M (0.02)	11 to 13	0 to 50	Hydrazine = 5×10^{-2} Aliphatic amines 0.1 - 0.5
NH_4^+	10^{-1} - 10^{-6}M (0.02)	5 to 8	0 to 50	$K^+ = 1.2 \times 10^{-1}$ $Na^+ = 2.0 \times 10^{-3}$ $Mg^{2+} = 2.0 \times 10^{-4}$
Ca^{2+}	1M - 5×10^{-7}M (0.02)	4 to 9	0 to 50	$Mg^{2+} = 2.5 \times 10^{-4}$ $Ba^{2+} = 3 \times 10^{-3}$ $Pb^{2+} = 0.1$ $Zn^{2+} = 1.0$ $Na^+ = 1.5 \times 10^{-4}$
Cl^-	1M - 5×10^{-5}M (1.8)	2 to 11	0 to 80	Br^-, I^- and CN^- must be absent S^{2-} must be less than 10^{-7}M
CN^-	10^{-2} - 10^{-6}M (0.03)	10 to 14	0 to 80	S^{2-} must be less than 10^{-7}M $I^- = 1.0$ High levels CN^- rapidly attack membrane *
F^-	1M - 5×10^{-7}M (0.01)	5 to 8	0 to 80	$OH^- = 10^{-1}$
NO_3^-	1M - 5×10^{-6}M (0.08)	3 to 10	0 to 50	$Cl^- = 10^{-2}$ $NO_2^- = 3 \times 10^{-2}$ $Br^- = 5 \times 10^{-2}$ $F^- = 10^{-6}$ $SO_4^{2-} = 3.5 \times 10^{-3}$ $ClO_4^- = 16.2$ $ClO_3^- = 20$
K^+	1M - 10^{-6}M (0.04)	4 to 9	0 to 50	$Na^+ = 2.6 \times 10^{-3}$ $Ca^{2+} = 2.5 \times 10^{-3}$ $Rb^+ = 1.9$ $Mg^{2+} = 1.9 \times 10^{-3}$ $Cs^+ = 0.38$ $NH_4^+ = 0.30$
Na^+	Sat - 10^{-6}M (0.02)	9 to 12	-5 to +70	$Li^+ = 2 \times 10^{-2}$ $K^+ = 1 \times 10^{-3}$ $NH_4^+ + 3 \times 10^{-3}$ Ag should be absent
S^{2-}	1M - 10^{-7}M (0.003)	12 to 14	0 to 80	Hg^{2+} and Ag^+ must be absent **

* Measurements should be made at pH >12. ** All measurements must be at pH > 12

M = Mono
C = Combination

Other Ions are available, please consult the factory for additional information.

Ordering Information

Direct Ordering:

PML Monitoring and Treatment Systems for Industry
Process Technology

pmlprocess.com
Tel: (905) 206-9514 Fax: (905) 282-9903

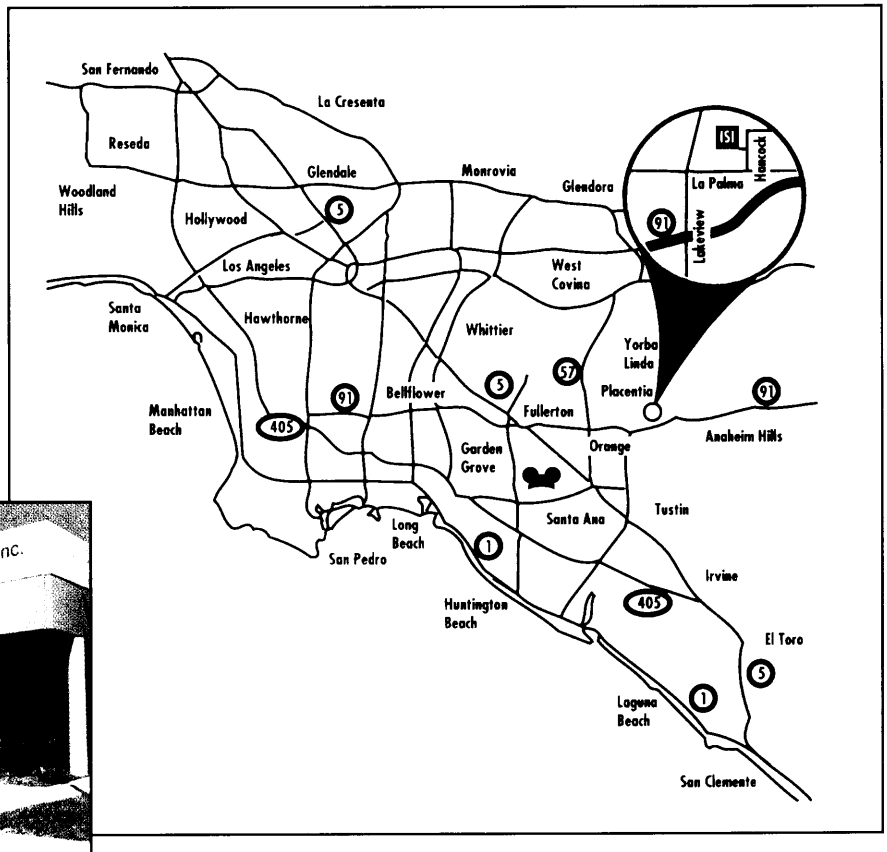
By Visa / Mastercard

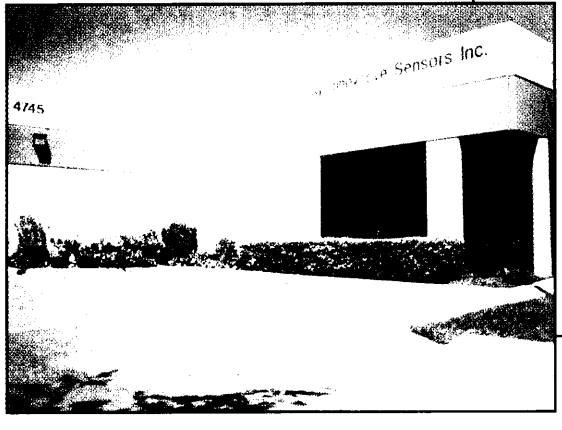
USA Country Code: 010 1

Where is ISI? ...

45 miles South of Los Angeles International Airport and 10 minutes from Disneyland in beautiful Orange County.

You are welcome to stop by and visit our facility.





Other Products:

"LABORATORY SOLUTIONS" and a selection of Schott-Geräte electrodes

"INDUSTRIAL SOLUTIONS" - Specialty Sensors for Difficult Applications

OEM Replacement Electrodes - incorporating 1990's features

Biotech Sensors - specifically designed for the biotech and pharmaceutical industries

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CERTIFICATE NO. A2865

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