

APPLIED Because it's not just 
MICROSYSTEMS

Tech Spec Document

SV & P Smart

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1.0 Company Profile & Capabilities

Applied Microsystems is a Canadian owned and operated corporation specializing in the manufacture of in-situ and real-time detection and measurement systems for water. The company offers an extensive line of high performance off-the-shelf instruments and has considerable experience in custom electronics design.

Located in the Ocean Technology cluster in Sidney B.C., on Canada's Pacific coast, Applied Microsystems has an impressive history of innovation. Key facts include:

- Founded in 1974 to manufacture oceanographic instruments;
- Invented the first time-of-flight direct measurement of the speed of sound in water in 1994;
- Current market leader in ocean-going sound velocity instruments; and
- Brought to market the first underwater mass spectrometer in 2001.

We are successful because we understand that our customers buy more than simple sensors; they buy the ability to reliably obtain accurate underwater data. We win business by providing unparalleled in-water measurement capabilities. We keep customers happy by supporting our technologies with knowledge, expertise and excellence in customer service.

Applied Microsystems has four specific areas of expertise. They are: 1) Sound velocity; and 2) Instrument design for harsh environments; 3) Underwater mass spectroscopy; and 4) Integration and customization.

2.0 Overview

The "**SMART SENSOR**" Series is another innovation by Applied Microsystems Ltd consisting of a series of miniature, intelligent, interchangeable sensors. This series of sensors share a standard pressure housing design, connectors and utilizes common power and communication interface protocols. Each "**SMART SENSOR**" incorporates discrete circuitry, firmware and calibration coefficients to allow independent operation. This provides for direct replacement or inter-changeability of one sensor with any other, simply by unplugging one sensor and plugging in the new sensor, without matching or changing calibration coefficients, sensor types or sensor ranges.

The "**SMART SENSOR**" series is designed to operate from any DC supply between 8 and 16 volts. The sensors are auto-bauding from 2400 to 38400 baud via RS-232 (standard), RS-485 or a TTL level serial digital interface.

All "**SMART SENSOR's**" can output sensor readings in raw format or in real engineering units. The sensors can also output single readings when polled or a continuous stream of readings at the maximum scan rate for the sensor.

3.0 Detailed Description

3.1 Electronics

The "*SMART SENSOR*" electronics are contained on one or more multi-layer printed circuit boards depending on the parameter. The sensor is controlled by an 8-bit low power R.I.S.C. micro controller running at 10 MHz. The analog to digital converter provides 40000 counts of resolution.

3.2 Available Sensors

Sound Velocity:

Type:	Piezoelectric time of flight
Range:	1400 - 1550 m/s (optional extended ranges available)
Accuracy:	0.05 m/s (rms)
Resolution:	0.015 m/s
Power:	Power is supplied externally. The unit requires 20 mA at 8 to 16 volts DC (12 volts nominal).

Pressure:

Type:	Wheatstone Bridge strain gauge
Range:	Available ranges: 0-10, 20, 50, 100, 200 dbars (optional ranges of 0-500, 1000, 2000 and 4000 dbars available)
Accuracy:	±0.05% full-scale range
Resolution:	0.01 dbar
Power:	Power is supplied externally. The unit requires 12 mA at 8 to 16 volts DC (12 volts nominal).

3.3 Software

If the units are to be controlled from a computer any terminal emulation communications software program can be used. An example is the shareware program ProComm.

Also supplied is **SmartTalk**, which is a small MS Windows 95™ based program that allows the user to communicate to an AML instrument through the computer's serial port. The user can identify the instrumentation, select and modify the instrument's configuration file, view data from the instrument, perform computation for calculated data values, log data to the computer's hard drive and export (CSV) data files.

3.4 Mechanicals

The standard "*SMART SENSOR*" housings and end caps are made of Delrin and are rated to 500 meters. Most of the sensor housings are 45.7 mm (1.8") in diameter with a nominal overall length of 266 mm (10.5"). The weight in air is 325 g (0.7 lb) and close to 0 g (0 lb) in water. Some sensor housings, like the Current Speed & Direction, are larger.

Optional stainless steel housings with depth ratings of 4500 meters, 6000 meters and 9000 meters are available.

3.5 Output

Auto-bauding ASCII serial data interface up to 38400 baud. The communications standard is configured at the factory to either RS-232, RS-485 ½ duplex, or TTL logic. The maximum scan rate for the "*SMART SENSOR*" series is 10 Hz.

1) RS-232 mode:

In RS-232 mode the sensor communicates directly with a computer or data logger equipped with a serial port. The limitation of RS-232 is that each sensor requires it's own dedicated serial port on the host computer or data logger. I.e., four sensors would require four serial ports.

2) RS-485 mode:

RS-485 ½ duplex mode is ideally suited for multi-sensor systems where up to 128 sensors can be daisy-chained together on one RS-485 serial port. Each sensor has an internal identification number that the host computer or data logger presents to the sensor(s). The sensor with the matching identification number replies with it's data string.

3) TTL logic mode:

TTL logic mode is ideally suited for situations where fixed wiring to an external microprocessor is more desirable.

DISCLAIMER

AML reserves the right to make any changes in design or specifications at any time without incurring any obligation to modify previously delivered instruments. Manuals are produced for information and reference purposes and are subject to change without notice.