



IDRONAUT OCEAN SEVEN 302 PROBE

ADVANCED SENSORS AND DEVICES FOR BOREHOLE PROFILING AND MONITORING

The OCEAN SEVEN 302 Multi-Parameter Probe is the result of fifteen years of experience in designing high-technology probes for scientific, research and borehole monitoring applications. The Ocean Seven 302 Multi-Parameter Probe has been specifically designed for borehole application and uses very reliable, accurate and drift free high quality sensors, associated with advanced and miniaturised electronics. The 302 Probe has an outside diameter of only 50 mm. Integration of geographical position information, through GPS, and acquired data can be performed by means of the IDRONAUT probe management software.

HIGH PERFORMANCE COMBINED TEMPERATURE AND CONDUCTIVITY SENSOR

TEMPERATURE SENSOR

Features a very fast platinum resistance thermometer (time constant: 50 ms).
Negligible self-heating effect.

FLOW CONDUCTIVITY SENSOR

Features a very large diameter, seven-ring quartz cell which does not require platinum black deposition and which can be cleaned without re-calibrating.

OXYGEN SENSOR

Features an innovative pressure-compensated polarographic sensor, with a replaceable cap for membrane support. Stirring effects are negligible.

pH GLASS SENSOR (7000 m)

Cylindrical, high-pressure glass membrane pH electrode in conjunction with a special differential amplifier system.

OXIDATION-REDUCTION POTENTIAL (ORP) SENSOR

Special cross section platinum electrode.

SOLID GEL REFERENCE ELECTRODE

A reference electrode for pH and oxidation-reduction potential measurements. It uses a special ceramic junction-less design. Operation to 7000 m. Long life.

DATA TRANSMISSION

Via ASK (4800 bps) telemetry up to 1500 m.

INTERNAL MEMORY

Provides up to 1,500 data acquisitions each of 8 channels.

DIMENSIONS AND WEIGHT

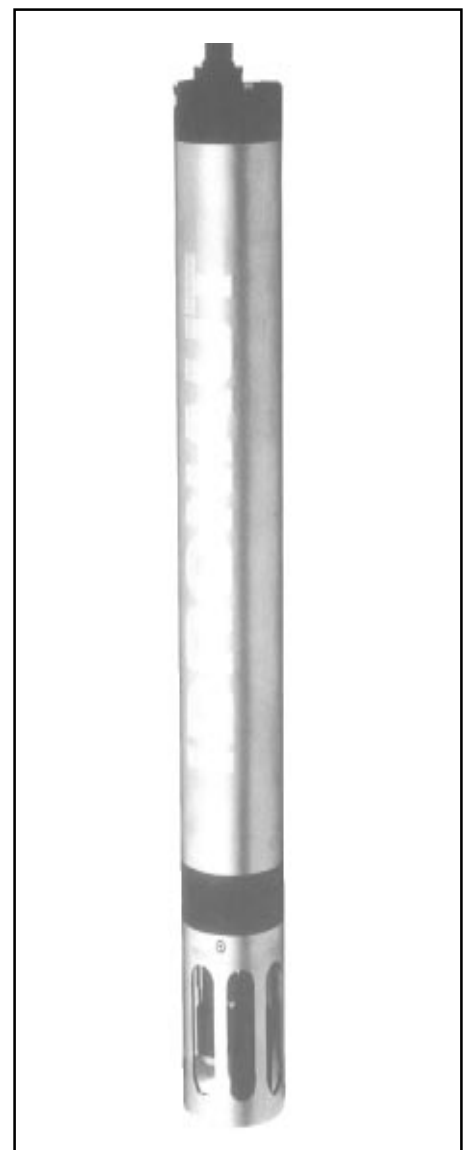
50 mm diameter x 600 mm length; 2,2 kg in air.

OPTIONAL SENSORS

- Calcium
- Copper
- CO₂

BATTERY OPERATION

The internal rechargeable battery of the 301 PORTABLE DECK UNIT allows full operation of the 302 Probe for more than 50 hours.



**TECHNOLOGY
IN SEARCH OF
NEW DEPTHS**

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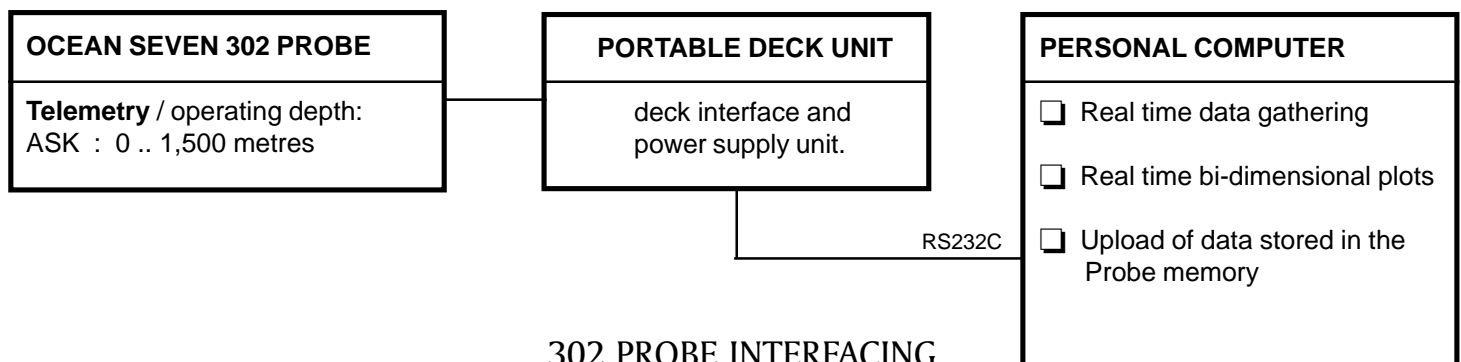
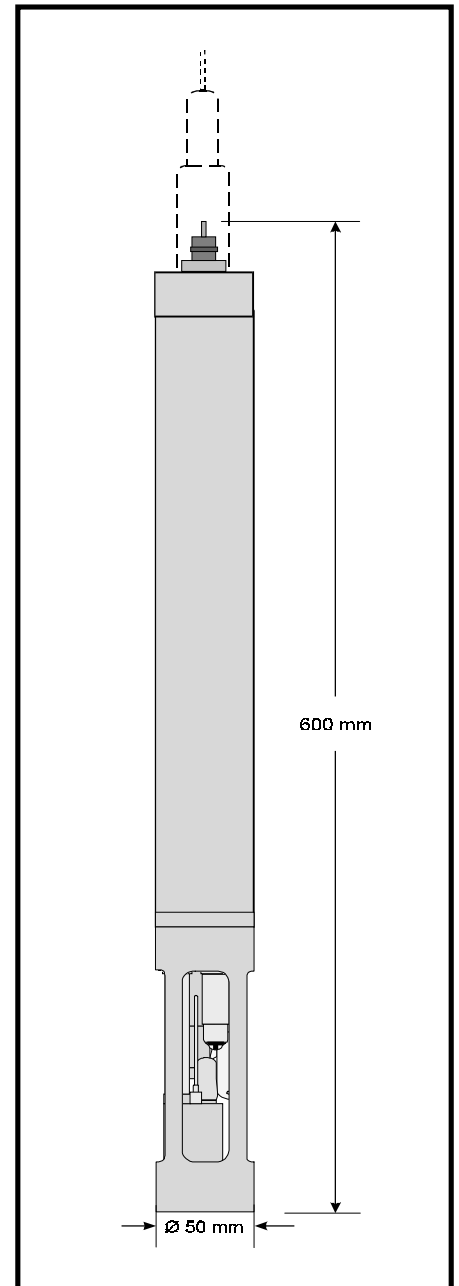
The six standard measurement sensors (see table of sensor specifications) installed in the OCEAN SEVEN 302 Probe are manufactured by IDRONAUT and are exported all over the world. They are used by several other multi-parameter probe manufacturers. All sensors have extremely low time constants (50 milliseconds for physical parameters [CTD] and 3 seconds for chemical parameters). The slim line of the Probe and the pressure-compensation of sensors permit operation in fast water profiling or in fixed depth monitoring down to 1500 metres depth. Scanning of the sensors takes place at a rate of 25 milliseconds. The user can decide to perform spot measurements or to acquire data which are the average of a certain number of sensor scans; said number is selectable through the Probe software.

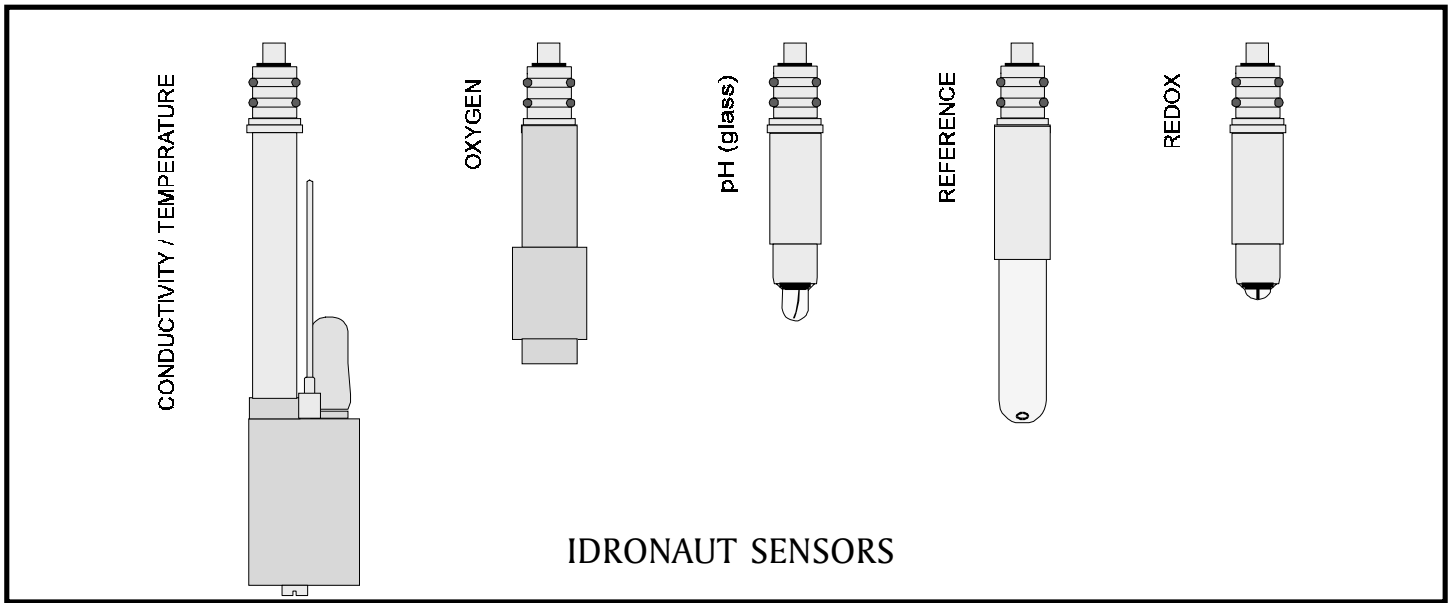
The electronic boards are fitted in an AISI 316 stainless steel sealed housing; one oceanographic connector, located on the top cover, provides the probe power supply and data exchange with a suitable external device. On the opposite end, the sensor area is protected against accidental bumps with an AISI 316 stainless steel protective cage.

The OCEAN SEVEN 302 PROBE is microprocessor-controlled, and measures and transmits sensor data through the shielded coaxial cable via ASK telemetry (real-time monitoring mode), or stores measurements in the internal memory for transmission later. A special mode of operation allows fast data acquisition, at a rate of 40 measurements per second, so that micro-profiles can be easily obtained. Moreover, Timed Data Acquisition allows acquisition and transmission at programmable time intervals.

The internal non-volatile memory can store up to 1,500 measurements, each composed of 8 parameters. A friendly menu-driven MMI (Man Machine Interface) allows the operator to interact with the internal firmware to personalize the operating functions and to perform the sensor calibration. Commands are selected from a list, or a menu, of possible choices. Parallel to the menu interface, a computer-oriented interface has been implemented, allowing execution of the data acquisition and transmission to be performed in a quick and efficient (from a Computer's point of view) way.

The OCEAN SEVEN 302 Probe is equipped with an ASK (Amplitude Shift Key) telemetry system (4,800 bps) that allows the connection of the Probe to the Portable Deck Unit by means of a coaxial armoured cable (2 wires). The cable also provides the mechanical support of the Probe and its power supply.





Sensor specifications

	<u>Range</u>		<u>Accuracy</u>	<u>Resolution</u>	<u>Time Constant</u>
Pressure	0.....1500	dbar*	0.25% full scale	0.1 dbar	50 ms
Temperature	-1 ... +49 °	C	0.02 °C	0.004°C	50 ms
Conductivity	0..... 62	mS/cm**	0.02 mS/cm	0.004 mS/cm	50 ms (at 1 m/second flow rate)
Oxygen	0..... 50	ppm	0.1 ppm	0.01 ppm	3 s (in air)
	0... 500%	sat.	1% sat.	0.1% sat.	3 s
pH	0..... 14	pH	0.05 pH	0.01 pH	3 s
Redox	-1000 to + 1000	mV	10 mV	1 mV	3 s

* other standard pressure transducers available have 20, 70 and 300 dbar ranges.

** a probe version with conductivity range for fresh water is also available:

<u>Range</u>	<u>Accuracy</u>	<u>Resolution</u>	<u>Time Constant</u>
0..6200 µS/cm	2 µS/cm	0.4 µS/cm	50 ms +

Electronic specifications

- Sampling frequency: up to 40 Hz.
- Data output rate: up to 2 Hz.
- Communication: ASK telemetry 4800 baud.
- Communication protocol: proprietary byte-oriented message protocol.
- Memory: 32 Kbytes.
- Power supply: 10 .. 30 V, 50 mA @ 12V, 600 mW.
- Dual mode user interface: [MENU] friendly menu-driven user interface
[PACKET] message-driven interface allow operations from a PC.

Onboard electronics

- CPU: Z80180, 8 bit microcontroller unit.
- Program memory: 32 KByte EPROM.
- Memory: 32 KByte nonvolatile SRAM.
- A/D Converter: 14 bit 366,2 µV/bit successive approximation.
- Analog inputs: 8 multiplexed analog input channels.

Mechanical specifications

- Housing: AISI 316 ABLE TO WITHSTAND AT 150 BAR
- Dimensions: cylinder diameter: 50 mm / total length: 600 mm
- Weight: in air: 2.2 Kg / in water: 1.0 kg

ACCESSORIES

- PORTABLE DECK UNIT TO POWER AND INTER-FACE THE 302 PROBE WITH A PC.** This unit enables the 302 Probe to be interfaced with a Personal Computer. Includes: power source, modulation and demodulation circuits (ASK signals) and RS232C output for connection to the PC. Power is by an internal battery (12V - 6.5 A/h) which is recharged when unit is connected to external 100, 110 or 220 V AC, 50/60 Hz source. Allows full operation of Probe for about 50 hours without AC power.
Dimensions: 275 x 250 x 75 mm. Weight: 4.5 kg.
- MINIATURIZED PORTABLE DECK UNIT**
The function of the MINIATURIZED PORTABLE DECK UNIT is to power and interface the 302 Probe with a portable Personal Computer. The unit contains four 1.5V AA alkaline batteries, which allow about 10 hours of continuous operation. The PORTABLE DECK UNIT powers (13V DC) the 302 Probe and the transceiver which transforms commands coming from the PC and data coming from the probe into an RS232C asynchronous transmission format, HALF-DUPLEX mode. Once the probe is connected, the unit powers on by itself. Due to the limited capabilities of its internal power supply, the maximum length of the probe cable is less than 100 metres.
Dimensions: 170 x 95 x 45 mm. Weight: 0,36 kg.
- MANUAL PORTABLE WINCH.** Includes slip-ring and up to 180 meters of 7 mm cable.
- COAXIAL ARMoured CABLE.** A loading 2-conductor 7 mm polyurethane cable.
- CONNECTION KIT FOR CABLES.** Consists of waterproof Probe connector, Portable Deck Unit connector and quick-connection system.

OPTIONS

- IDRONAUT CALCIUM SENSOR** for 1500 dbar
Liquid membrane ISE provided with unique pressure compensation system.
- COPPER SENSOR** based on the Orion mod. 94-29 ISE.
- CO₂ SENSOR**, a gas sensing membrane electrode based on the Severinghaus electrode. The sensor is provided with unique pressure compensation system, the measuring range is: 10 ... 200 mm Hg

SOFTWARE

- SOFTWARE FOR DATA TRANSFER**
The P301 LINK software allows recovering of the memorized data via ASK telemetry and programming of the 302 Probe main operating functions.
- SOFTWARE FOR DATA TRANSFER AND MANAGEMENT** The IDRODAC software allows display, printing and recovering of data received from the Probe. It controls manual, linear and timed profiles. Data can be displayed on the PC and exported in ASCII format.
- REAL-TIME GRAPHIC SOFTWARE.**
This software is an extension of the above package and allows creation of real-time bi-dimensional plots of up to six parameters versus depth or time.



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