Struttura per CTD

MEDA 2 Marina di Portofino

STRUMENTAZIONE VARIA (AIS; ECC.)

PARTE SUPERIORE SEGNALAMENTO

COMPONENTI AGGIUNTIVI ALLA FORNITURA DA REALIZZARE IN OFFICINA (TUBI CON FLANGE)

GALLEGGIANTE IMMERSO (4 t NB)

BASE BOA SEGNALAMENTO STANDARD

10/15,00

JUMPER (0,6 t NB)

CAVO E GRILLI

CORPO MORTO IN CALCESTRUZZO   11 t

eventuali pannelli flessibili disposti a semicerchio (escluso accesso scaletta al terrazzino). Il telaio di sostegno sara' ancorato ai montanti angolati.

NEXOS
alimentazione
sistema archiviazione dati
sistema trasmissione dati

2,45

1,10

0,00

2,50

6,00

MEDA 2

SCHEMA STATO ATTUALE E POSIZIONE FUTURE STRUTTURE PER ULTERIORE STRUMENTAZIONE.

sensore acustico NEXOS
opzioni installazione
2,50 - 6,00 – 10/15,00 m

GUARD1
Video/photo recorder
CNR ISMAR
opzioni 2,50 o 6,00 m
10/15,00 m
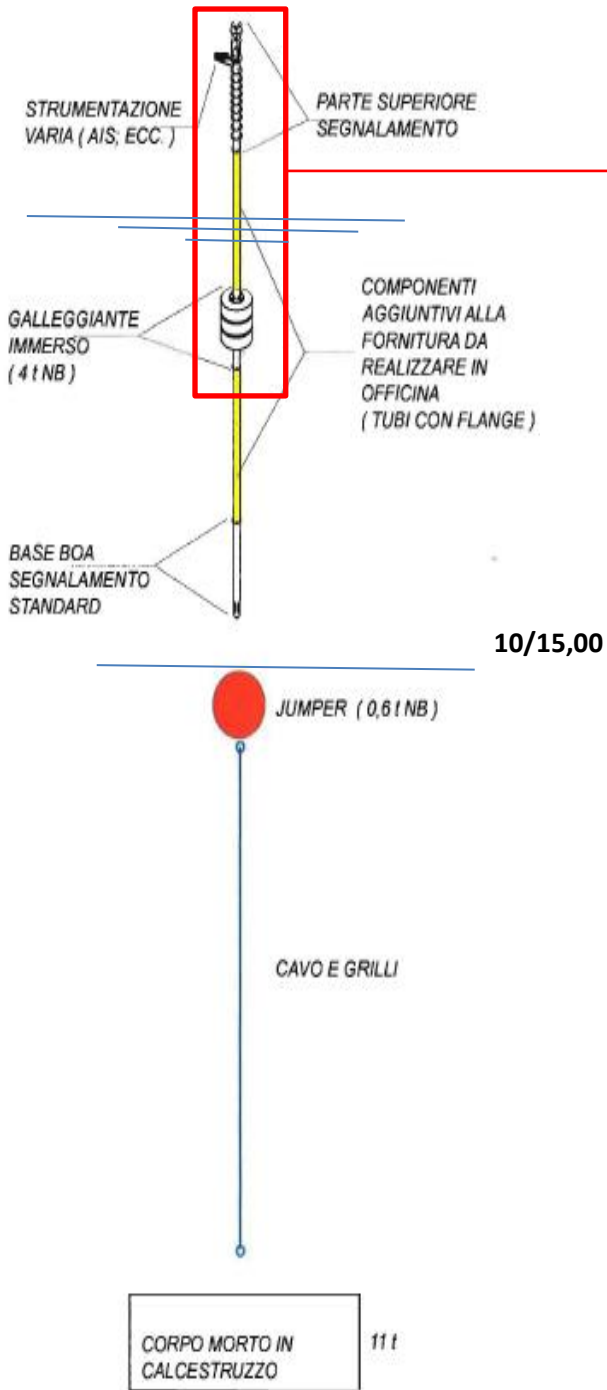
IDRONAUT OCEAN SEVEN 316Plus CTD for Oceanography

PROFILER AND RECORDER EQUIPMENT - SMALL SIZE - FAST SAMPLING RATE: 20Hz
O2, pH, ORP - ARCTICA, ANTARCTICA - FERRYBOX - BRINE - CCS - ROVs, AUVs

The OCEAN SEVEN 316Plus CTD multiparameter probe is the evolution of the well-known OCEAN SEVEN 316 probe, more than 1000 units sold all over the world. The Ocean Seven 316Plus is equipped with the well-known IDRONAUT full ocean depth, pump-free and long-term stability sensors. _Central to which, is the high accuracy seven-platinum-ring quartz conductivity cell (patented), which can be cleaned in the field without the need for re-calibration._ This unique quartz cell employs a large diameter (8 mm) and a short length (46 mm) to guarantee self-flushing and no clogging after long-term deployment even in biologically active waters. Competitors' sensors, which present few mm only of cell orifice and very long cell length, are prone to clog even if protected by dangerous and poisonous antifouling devices. The OCEAN SEVEN 316Plus CTD multiparameter probe _does not require pumps_ or any other external device to flush the sensors, which minimizes its power consumption and allows the use in **Arctica** and **Antarctica** boreholes. For added flexibility, the OCEAN SEVEN 316Plus CTD multiparameter probe can be operated in either verbose or non-verbose mode, the latter being especially convenient for system integrations on buoys, ROVs, USVs and AUVs, thus making this probe an ideal choice for both on-line profiling and self-recording moored applications. Optional data telemetry is available for on-line full ocean depth, real-time data transmission (**20Hz sampling rate with REDAS-5 software**). The OCEAN SEVEN 316Plus CTD multiparameter probe can also optionally accommodate up to a maximum of 16 sensor analogue inputs, including 2 digital inputs, which can, if required, be added later.

- ### HIGHLY ACCURATE/PRECISE (0.01%FS) PRESSURE TRANSDUCER
  The high-precision 0.01%FS pressure transducer is based on a piezoresisitive bridge, floating on oil, with drift-free sensor interface. Temperature dependency and nonlinearity are mathematically compensated by the interfacing electronics. Standard pressure transducers immediately available: 100, 1000, 2000, 4000, 6000, 10000 dbar.

- ### TEMPERATURE SENSOR
  Features a very fast platinum resistance thermometer (response time: 50 ms). Negligible self-heating effect.

- ### CONDUCTIVITY CELL
  The high accuracy seven-platinum-ring quartz conductivity cell (patented) can be cleaned in the field without the need for re-calibration. This unique quartz cell employs a large diameter (8mm) and a short length (46mm) to guarantee self-flushing and no clogging after long-term deployment even in biologically active waters. Furthermore, an optional UV LED (280 nm), integrated into the conductivity cell, sterilizes the sample under measurement, thus avoiding the early growth of biofouling inside the quartz measuring cell.

- ### OXYGEN SENSOR (7000 m operation)
  Features a pressure-compensated polarographic sensor with a replaceable cap or/and advanced optical dissolved oxygen sensor. Both sensor can be installed at the same time.

- ### pH GLASS SENSOR and SOLID GEL REFERENCE ELECTRODE (7000 m operation)
  High-pressure low impedance glass membrane pH electrode in conjunction with a unique KCl or NaCl gel double junction reference electrode and a differential pH preamplifier, $10^{13} \div 10^{14}$ ohm input impedance.

- ### DATA TRANSMISSION
  Via RS232C interface. Optional interfaces are: long distance (10000 m) data telemetry, RS422 and Wireless Bluetooth.

- ### DATA MEMORY
  Allows storage of up to 16M dataset, for each of the 7 standard acquired parameters together with date & time, using the 4 GByte non volatile memory.

- ### OPTIONAL PROBES, SENSORS
  o GENERAL OCEANICS - Rosette Water Samplers 1018 and 1015.
  o IDRONAUT – High Precision 0.01 % Pressure Transducer.
  o IDRONAUT - String and Weight Bottom Sensor.
  o IDRONAUT – Optical dissolved oxygen sensor
  o IDRONAUT – MISS Sampling system
  o PSA916D Sonar Altimeter, 6000 m.
  o LI-COR - LI-192SA and LI-193SA Underwater Quantum sensors.
  o CHELSEA - Unilux and Trilux Fluorometers.
  o WET Labs - C-Star Transmissometer and ECO Fluorometers.
  o SEAPOINT - Fluorometers and Turbidity Meter.
  o TURNER DESIGNS – Cyclops, CFluor Fluorometers.
  o D & A INSTRUMENT COMPANY - OBS-3 Sensor.
  o BIOSPHERICAL INSTRUMENTS - QSP-2200 - QSP-2300 PAR Sensors.
  o VALEPORT - MiniSVS Sound Velocity Sensors.

TECHNOLOGY IN SEARCH OF NEW DEPTHS

BATTERY-OPERATED SELF RECORDING MODES

The internal and the optional external submersible battery packs permit continuous probe operation for about 12 and 120 hours respectively. Rechargeable or lithium batteries can also be used. Twelve batteries: 1.2V, 2.85 Ah, NiMH cells are installed in the internal battery pack. The OCEAN SEVEN 316Plus CTD can measure, store and transmit sensor data by these modes of operation:

- **Pressure:** Data is sampled at regular pressure intervals. Multiple profiles can be obtained by switching the CTD ON and OFF.
- **Timed:** OS316Plus collects a series of samples and then sleeps for the configured time interval before waking up again and repeating the acquisitions. Time interval can be configured from 0.1s up to 1 day. Battery power is conserved while the probe is in sleep mode.
- **Conditioned:** Data is sampled at configurable sampling rates starting when the selected parameter overcomes the configured boundary. Sampling continues until the selected parameter falls below the configured boundary. Whenever the acquisition cycle starts, a configurable sampling rate 0.1..12 Hz is used. Monitoring of the selected parameter occurs at the configurable interval between 0.1s up to 1 day.
- **Continuous:** Data is sampled at configurable sampling rates starting when the operator switches on the probe. Sampling continues until the probe is switched off. Multiple cycles can be obtained by switching the CTD ON and OFF.
- **Real-time:** Data is sent to the control system at sampling rates of: **12 and 20 Hz using REDAS-5 software**.
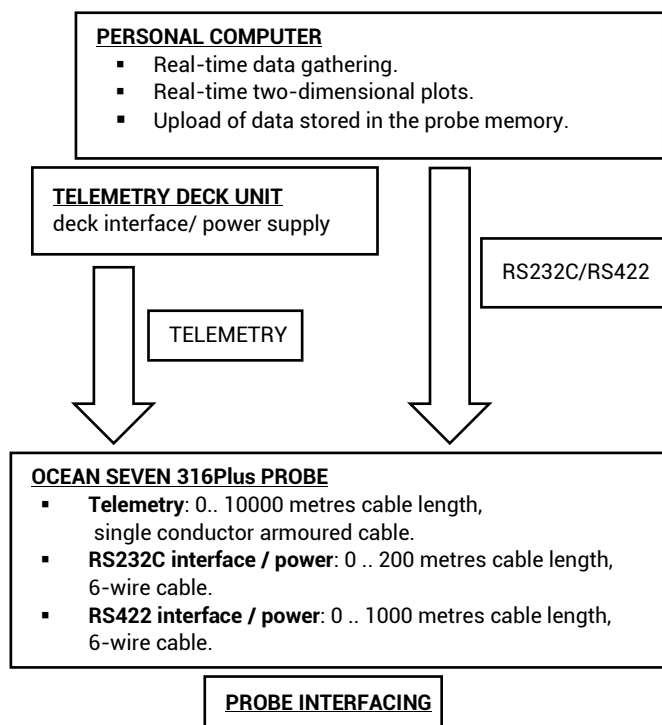
The unattended acquisition can be activated by means of a magnetic switch present on the probe top cover. Extension of the internal battery life is automatically obtained through a power management procedure that switches the probe OFF between data acquisitions. The probe is equipped with an internal non-volatile memory which can store up to a 16M dataset, each data set being composed of date, time and measurement of the standard sensors. Stored data is uploaded at the end of the measuring cycles.

The OCEAN SEVEN 316Plus CTD can be configured to be directly interfaced to a personal computer by means of the RS232C serial port or by telemetry. The telemetry and RS422 interfaces remedy the limitations of the RS232C serial interface (cable length and number of conductors). When using the telemetry interface, the Telemetry Deck Unit is required to convert serial, RS232C type signals from a PC communication port, into telemetry signals (and vice versa) which must flow superimposed on the probe power supply along the armoured single conductor coaxial cable.

Probe communication is achieved through one of the two male connectors installed on the top end cap of the probe. A six-pole connector is used for the RS232C and RS422 interfaces and for the power input, while, a two-pole connector is used for the telemetry interface.

IDRONAUT REDAS-5 Windows Software

REDAS-5 software, through a simplified and friendly operator interface, allows taking full control of the OCEAN SEVEN 316Plus CTD and facilitates real-time data acquisitions, configuration of unattended acquisition cycles and uploading of data stored in the probe memory. REDAS-5 program is a true 32-bit Windows application, which flawlessly runs on Windows. REDAS-5 shows the acquired data graphically and numerically thus allowing the operator to dynamically change the graphical and numerical set-up during data acquisition. Post-processing functions and data extraction procedures, in function of time, pressure or numerical intervals can be applied to acquire data in real time or on data retrieved from the probe memory. Among the operations that REDAS-5 can perform, it is worth mentioning: automatic start and stop of data acquisition; management of the bottle sampling (Rosette); processing and filtering of acquired data in real time (time lag compensation, smoothing etc.); acquisition of geographical coordinates from a GPS device; acquired data conversion into text files; automatic scaling of the graphical window X and Y axis. **REDAS-5 software allows 12 and 20 Hz sampling rate.**

PERSONAL COMPUTER
- Real-time data gathering.
- Real-time two-dimensional plots.
- Upload of data stored in the probe memory.

TELEMETRY DECK UNIT
deck interface/ power supply

RS232C/RS422

TELEMETRY

OCEAN SEVEN 316Plus PROBE
- **Telemetry**: 0.. 10000 metres cable length, single conductor armoured cable.
- **RS232C interface / power**: 0 .. 200 metres cable length, 6-wire cable.
- **RS422 interface / power**: 0 .. 1000 metres cable length, 6-wire cable.

PROBE INTERFACING

OCEAN SEVEN 316Plus Telemetry System Performance Chart

Telemetry Type	Max cable length	Max transfer rate
RS232C	200 metres	38400 bps
RS422	1000 metres	38400 bps
Telemetry (*)	10000 metres	9600 bps

(*) The above performance is obtained using the 6.4 mm diameter (1/4inch) Rochester cable 1-H-255 which has an electrical resistance of 23 Ω/km and a capacity of 138 pF/m. The Ocean Seven 316Plus CTD operates with the standard Rochester coaxial armored cables (1/10, 1/8, 1/4, 1/2 inch) present in oceanographic vessels having a total resistance up to 250 ohms.

SENSOR SPECIFICATIONS

All the sensors installed in the OS316Plus CTD are manufactured by IDRONAUT and are exported all over the world. They are used by several other multiparameter probe manufacturers. All sensors have extremely low response time: 50 milliseconds for physical parameters (CTD) at 1m/s profiling speed and 3 seconds for chemical parameters.

	Range	Initial Accuracy	Resolution	Response Time
Pressure	0.. 1000 dbar (1)	0.05 % full scale	0.002 % full scale	50 ms
Temperature	-3.. +50 °C	0.002 °C	0.0002 °C	50 ms
Conductivity	0.. 70 mS/cm	0.003mS/cm	0.0003 mS/cm	50 ms (3)
Oxygen Polarographic	0.. 50 ppm	0.1 ppm	0.01 ppm	3 s (4)
	0.. 500 % sat.	1 % sat.	0.1 % sat.	3 s (4)
Oxygen Optical	0..45 mg/l	0.1 mg/l	0.025 mg/l	5 s (5)
	0..250 %sat.	±0.2 %sat.	0.05 %sat.	5 s (5)
pH	0.. 14 pH	0.01 pH	0.001 pH	3 s
Redox	-1000.. +1000 mV	1 mV	0.1 mV	3 s
Auxiliary inputs (2)	0.. 5000 mV	1 mV	0.1 mV	50 ms

(1) Other standard pressure transducers, immediately available, have 10, 40, 100, 200, 500, 2000, 4000, 6000, 10000 dbar ranges. **Optionally, the IDRONAUT Highly Accurate Precise (0.01%FS) Pressure Transducer can be installed instead of the standard pressure transducer**.
(2) Through the auxiliary inputs, optional sensors like: Fluorometer, Turbidity Meter, Transmissometer, Altimeter, Par, can be interfaced. Six auxiliary analogue inputs are available inside the probe.
(3) At 1 m/second flow rate.
(4) From nitrogen to air.
(5) A **special FAST membrane, with response time 3s,** is available upon request.
The fundamental properties of seawater, like: **Salinity, Sound Speed, Water Density, Oxygen ppm** are obtained using the algorithms described in the UNESCO technical papers in marine science no. 44 "Algorithms for computation of fundamental properties of sea water".
The freshwater properties like: **TDS (Total Dissolved Solids), Fresh Water Conductivity** corrected at 20°C and 25°C are automatically calculated.

ELECTRONIC SPECIFICATIONS

Sampling rate: User selectable: 12 and 20 Hz raw data CTD using REDAS-5 software.
Communication protocol: Proprietary byte-oriented, binary and plain message protocol.
Operator interface: Friendly menu-driven user interface.
Data memory: 4 GByte SD card non-volatile memory.
Battery power supply: 9 .. 18 V, 150 mA @ 12 V.

PHYSICAL SPECIFICATIONS

Housing	1500 dbar	2000 dbar	7000 dbar
Diameter	100 mm	105 mm	89 mm
Length	710 mm	710 mm	720 mm
Weight in air	4,2 kg	4,2 kg	8,0 kg
Weight in water	0,2 kg	0,2 kg	4,3 kg
Materials	White POM	White POM	Titanium

ACCESSORIES

- **TELEMETRY PORTABLE DECK UNIT:**
  The Telemetry Portable Deck Unit powers and interfaces, by coaxial oceanographic cables, the OS316Plus CTD with a PC. The portable deck unit is equipped with a transceiver (modem) which allows half-duplex communication with the CTD. The portable deck unit is housed in a waterproof plastic case and is provided with an internal mains rechargeable lead battery (12V DC, 7 A/h) which permits probe operation even in the absence of the mains supply. The internal battery guarantees up to 15 hours of continuous probe and deck unit operation. The portable deck unit comes complete with an international battery charger: 115/220VAC +/-10%, 50-60 Hz +/-5% Telemetry power supply: 30V DC (max 0.3A@12 V). Dimensions: 340 x 300 x 160 mm. Weight: 6.5 kg.

- **TELEMETRY ON-BOARD MKPlus DECK UNIT**:
  The MKPlus Deck Unit powers and interfaces the OS316Plus CTD with an auto-adaptive V32/V32bis modem to optimize the full-duplex communication in real time, depending on the connection conditions. The communication speed of 14.400 bps over the oceanographic cable allows obtaining a higher transfer rate from the interfaced CTDs. Visual feedback is provided to the operator during communication to indicate the line quality and speed automatically selected by the MKPlus modem. The MKPlus Deck Unit provides high voltage telemetry power supply (220 VDC) to allow the CTDs to interface and power several additional probes. The MKPlus Deck Unit is housed in a 19" rack-mountable metallic box and is designed for on-board operations. The MKPlus Deck Unit operates with: 115/220 VAC +/-10%, 50-60 Hz +/- 5%. Telemetry power supply: 220 VDC (max 1A@12V). Dimensions: 80x160x90. Weight: 3 Kg.

- **PORTABLE READER**:
  Portable lightweight and extremely rugged reader based on the Windows Mobile™ software, which overcomes the limitations that the use of a PC in the field and in hostile environments normally implies, like: battery endurance, display reading under sunlight, water and dust tightness, weight, etc. The Portable Reader interfaces the probe through a built-in RS232-C interface and a dedicated programme.

- **MANUAL PORTABLE WINCH**:
  Includes 2-way or 5-way slip ring and it can hold up to 350 m of 5 mm polyurethane jacketed armoured cable or 100 m of 8.3 mm polyurethane multi-conductor shielded cable.

- **COAXIAL ARMOURED CABLE - Ø 5 mm - POLYURETHANE**:
  A strain relieved 5 mm polyurethane jacketed armoured cable type Idronaut - breaking strength: 200 kg - weight per km: 40 kg.

- **RS232C/RS422 CABLE - Ø 8.3 mm - POLYURETHANE**:
  Multi-conductor shielded cable - Kevlar amoured - type Idronaut Ø 8.3 mm - specifically designed for RS422 or RS232C interface. Composed of 2 pairs: one 2x24 AWG twisted together and one 2x19 AWG - breaking strength: >250 kg. RS232C data transmission limits this cable length to 200 metres. RS422 data transmission enables this cable length to 1000 metres. Weight: 3,6 kg/100 m in water; 9.6 kg/100 m in air.

- **SENSOR PROTECTION ANTIFOULING KIT**:
  The electrochemical antifouling kit is installed near the OS316Plus probe measuring sensors. It greatly extends the sensor operations by protecting them from the bio fouling. The antifouling kit has been specifically developed for moored applications and does not release any poison.

- **TITANIUM PROTECTIVE CAGES:**
  For sensor and/or upper connector protection: Ø 260 mm. Mooring frame to house the CTD and two additional probes: on custom request.

- **EXTERNAL SUBMERSIBLE RECHARGEABLE BATTERY PACKS**:
  The following battery packs, 14.4VDC (no. 12 NiMH cells), 4.5Ah are available:
  - Ø 75 x 315 mm, 1500/7000 m max depth operation;
  The external battery pack is held by the probe by means of one or two POM flanges.

- **TRANSPARENT FLOW CELL**:
  Easily connectable to a pumped source of seawater (water volume 200÷300 ml), this option converts the Ocean Seven 316Plus CTD from a profiling CTD to a very accurate FerryBox thermosalinograph.

OPTIONS

- **BLUETOOTH® WIRELESS ADAPTER**:
  The IDRONAUT Wireless Adapter allows full duplex communications between the OCEAN SEVEN 316Plus probe and a personal computer or PDA devices equipped with a Bluetooth® device. The Wireless Adapter provides an interface conforming to the Bluetooth® class 1 (100 m) connectivity SPP protocol.

- **RS422 INTERFACE**:
  Instead of the RS232C interface, allows real-time communication with the probe using cables long up to 1000 m.

- **GENERAL OCEANICS ROSETTE INTERFACE**:
  General Oceanics Rosettes mod. 1018 and 1015 are interfaced to perform attended and unattended bottle firing in function of time and/or depth variations. The latter is obtained through user's configurable depth profiles or depth steps. Furthermore, bottle firing can be accomplished in real time whenever the probe operates with the telemetry system.

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PRECISIONE COMPENSATI DIGITALMENTE / CAMPO VARIABILE /
USCITA DIGITALE E ANALOGICA

Questi trasmettitori di pressione sono progettati per le misurazioni dei livelli nelle quali è richiesta la massima accuratezza.

Uscita Digitale del Trasmettitore

Questa Serie si basa sul trasduttore piezoresisitivo e stabile, e su un circuito elettronico a microprocessore con convertitore integrato A/D a 16 bit. Le dipendenze dalla temperatura e le non-linearità del sensore sono compensate matematicamente. Con il software READ30 e con il cavo KELLER K-107 è possibile visualizzare la pressione calcolata su un computer palmare, su un portatile o su un PC. Il software READ30 consente inoltre di registrare i segnali di pressione e di visualizzarli sul PC sotto forma di grafico. E' possibile collegare insieme in un sistema Bus fino a 128 trasmettitori.

Trasmettitore con Uscita Analogica

Nel processore è integrato un convertitore D/A a 16 bit per le uscite di segnale analogico da 4…..20 mA oppure da 0….10 V. La frequenza di uscita è di 100 Hz (regolabile). L'uscita digitale è disponibile su tutti i trasmettitori con uscita analogica.

Programmazione

Con i software KELLER READ30 e PROG30, un convertitore RS485 (cioè K102, K-104 o K107 della KELLER) e un PC (Laptop), è possibile visualizzare la pressione, cambiare le unità di misura, impostare un nuovo incremento o un nuovo punto zero. L'uscita analogica può essere impostata su un qualsiasi campo compreso all'interno del campo compensato.

I trasmettitori di livello sono disponibili in due versioni differenti:

• PAA-36 X W   Pressione Assoluta, Punto Zero in corrispondenza del vuoto
La sonda è applicata quando la pressione atmosferica è misurata da un barometro separato e quando il livello dell'acqua è calcolato come differenza tra il valore assoluto e la pressione ambientale.

• PR-36 X W   Pressione Relativa, Punto Zero in corrispondenza della pressione ambientale
La sonda è munita di un cavo PUR a lunga durata e di un tubo integrante per lo sfogo verso l'atmosfera. Questi trasmettitori di livello possono essere soggetti a condensazione interna provocata dalle installazioni in acqua fredda in giornate calde e umide. Se il tubo di riferimento non termina in un alloggiamento caldo e secco, la KELLER raccomanda l'uso di una cartuccia realizzata appositamente e riempita di un gel di silice, la quale va installata alla parte terminale del tubo di riferimento.

Collegamenti Elettrici

Uscita	Funzione	Colore del filo
4…20 mA	OUT/GND	Bianco
2 fili	+Vcc	Nero
0…10 V	GND	Bianco
3 fili	OUT	Rosso
	+Vcc	Nero
A program-	RS485A	Blu
mazione	RS485B	Giallo

⊕146 mm
⊕121 mm
Segno della posizione della membrana
ø 22

CE

KELLER

Specifiche

	Campi di Pressione Standard (FS) e Sovrapressione in Bar			
PR-36 X W	1	3	10	30
PAA-36 X W	1	3	10	30
Sovrapressione	3	5	20	60

	(digitale)	(analogica)	(analogica)
Uscita	**RS 485**	**4…20 mA** (2 fili)	**0…10 V** (3 fili)
Alimentazione (U)	8…28 Vcc	8…28 Vcc	13…28 Vcc
Accuratezza, Fascia di Errore[1] (0…50 °C)	0,1 %FS	0,15 %FS	0,15 %FS

[1] Linearità + Isteresi + Ripetibilità + Coefficienti di Temperatura + Punto Zero + Tolleranza dello Span

Linearità (retta migliore)	0,025 %FS	
Frequenza effettiva di uscita	100 Hz	
Risoluzione	0,002 %FS	
Stabilità di lungo termine standard	Campo ≤ 1 bar: 1 mbar	
	Campo > 1 bar: 0,1 %FS	
Resistenza di Carico (Ω)	<(U-7V) / 0,02A (2 fili)	> 5'000 (3 fili)
Connessione Elettrica	Cavo: Polietilene (PE), aperto	
Isolamento	> 100 MΩ / 50 V	
Temperatura di manutenzione/di esercizio	-20…80 °C	
Resistenza alla pressione	10 milioni di cicli di pressione 0…100 %FS a 25 °C	
Resistenza alle vibrazioni a norma		
IEC 68-2-6	20 g (5...2000 Hz ampiezza max ± 3 mm)	
Resistenza agli urti	20 g (11 ms)	
Protezione	IP 68, resistente al ghiaccio	
Conformità CE	EN 61000-6-1 a -6-4	
Materiale a contatto con gli elementi ambientali	Acciaio inossidabile 316L (DIN 1.4435) / Viton® / PE	
Peso	≈ 200 g	
Alterazione del volume morto	< 0,1 mm^3	

Osservazione: – Le spine RS 485 (per l'uscita digitale e per la programmazione) sono disponibili su tutti i modelli.

Optionen: – Commutatore di uscita, programmabile tramite interfaccia
– Elaborazioni particolari della pressione e della temperatura
– Differente materiale per l'alloggiamento, il riempimento d'olio o la filettatura di attacco della pressione

Nota: tutti i campi da 100, 200 o 500 mbar sono realizzati con il trasmettitore da 1 bar. Per questi campi l'accuratezza è di ±1 mbar (0…50 °C)

Tutti i campi intermedi per l'uscita analogica sono realizzabili senza sovrapprezzo scaglionando i campi standard.

Opzione: regolazione direttamente sui campi intermedi con sovrapprezzo.

Compensazione polinomiale

Si usa un modello matematico per ricavare il valore esatto della pressione (P) dai segnali misurati dal sensore di pressione (S) e dal sensore di temperatura (T). Il microprocessore all'interno del trasmettitore calcola P utilizzando il seguente polinomio:

$$P(S,T) = A(T) \cdot S^0 + B(T) \cdot S^1 + C(T) \cdot S^2 + D(T) \cdot S^3$$

Con i seguenti coefficienti A(T)….D(T) che dipendono dalla temperatura:

$$A(T) = A_0 \cdot T^0 + A_1 \cdot T^1 + A_2 \cdot T^2 + A_3 \cdot T^3$$
$$B(T) = B_0 \cdot T^0 + B_1 \cdot T^1 + B_2 \cdot T^2 + B_3 \cdot T^3$$
$$C(T) = C_0 \cdot T^0 + C_1 \cdot T^1 + C_2 \cdot T^2 + C_3 \cdot T^3$$
$$D(T) = D_0 \cdot T^0 + D_1 \cdot T^1 + D_2 \cdot T^2 + D_3 \cdot T^3$$

Il trasmettitore è collaudato in fabbrica a vari livelli di pressione e di temperatura. I corrispondenti valori misurati di S, unitamente ai valori esatti della pressione e della temperatura, permettono di calcolare i coefficienti $A_0…D_3$. Questi vengono scritti nella memoria EEPROM del microprocessore.

Quando il trasmettitore di pressione è in funzione, il microprocessore misura i segnali (S) e (T), calcola i coefficienti in base alla temperatura ed ottiene il valore esatto della pressione risolvendo l'equazione P(S,T).

Le elaborazioni e le conversioni sono eseguite almeno 400 volte al secondo.

Accessori per la Serie 30

In ogni trasmettitore della Serie 30 è integrato anche un interfaccia digitale (RS485 semiduplex) di cui potete far uso: collegate il trasmettitore a un PC o a un computer portatile attraverso un convertitore RS232-RS485 (ovvero K-102, K-104 o K-107). Sono offerti due programmi:
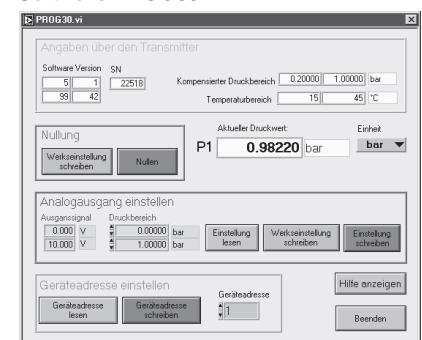
PROG30: Impostazioni dello Strumento
• Richiamo di informazioni (campo di pressione e di temperatura, versione del software, ecc.)
• Indicazione del valore attuale della pressione
• Selezione delle unità di misura
• Impostazione di un nuovo punto zero e incremento per il trasmettitore
• Riprogrammazione dell'uscita analogica (cioè una diversa unità di misura, un altro campo di pressione)
• Impostazione dell'indirizzo dello strumento (per il funzionamento Bus)
• Programmazione dell'uscita di commutazione
• Modifica del tasso di uscita

READ30: Raccolta di dati con grafici
• Lettura rapida e visualizzazione dei segnali di pressione in un grafico
• Documentazione di misurazioni dinamiche
• Fino a 16 trasmettitori su una connessione seriale (funzionamento Bus)

Software PROG30

Potete anche collegare i trasmettitori nel vostro software personale. Inoltre avete a disposizione una documentazione, una DLL e numerosi esempi.

EASY **BEST FIT**
For Your Weather Applications.

precise   tough   low price   customized   made in Germany

Highest Precision

No Moving Parts

Compact Design
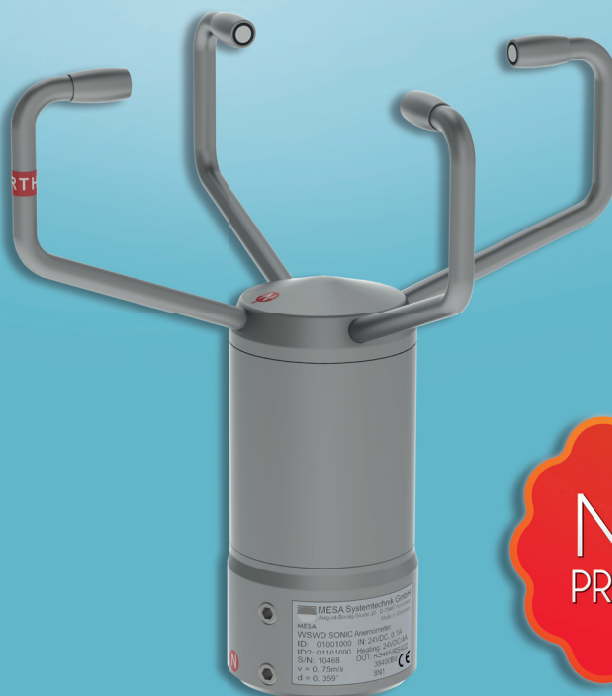
NEW
PRODUCT

▶ THE NEW 2D ULTRASONIC ANEMOMETER TYPE 4310

Theodor Friedrichs & Co. and MESA Systemtechnik are proud to present the new 2D Ultrasonic Anemometer type 4310.
Experts in Airflow Simulation, Transducer Technology, Hardware Design and Software Development have combined their latest knowledge to create an outstanding product.
We developed a high precision 2D Ultrasonic Anemometer which is designed to meet the demands of today's customer applications.

▶ TECHNICAL DATA

WIND SPEED

RANGE..0..75 m/s, 0..85 m/s, 0..90 m/s
ACCURACY (for 0..75 m/s)....v ≤ 5 m/s: ± 0.1 m/s
(rms, mean over 360°);
v > 5 m/s: ± 1.5 % of measurement value (rms, mean over 360°)
RESOLUTION..............................0.1 m/s or 0.01 m/s
STARTING THRESHOLD...........0.1 m/s

WIND DIRECTION

RANGE..0..359°
ACCURACY ....±0.6° RMS (at v = 8 m/s), ±1° absolute
RESOLUTION..............................1° or 0.1°

VIRTUAL TEMPERATURE

RANGE..-55..+70 °C
ACCURACY ....±0.5 K (at v > 0.6m/s)
RESOLUTION..............................0.1 K or 0.01 K

DATA OUTPUT

SERIAL INTERFACE................RS422 full duplex / RS485 half duplex
(1200..115200 Baud),
CAN/CANopen (10 kbit/s..1 Mbit/s)
ANALOGUE OUTPUT................0/4..20 mA or 0/2..10 V (16Bit)
PROTOCOLS ....ASCII / MODBUS / NMEA

POWER SUPPLY......................9..36 V DC / 100 mA; 24V DC
(+15%, –50%) with add. body heating

DIMENSIONS

SIZE ....Ø 220x221 mm
HOUSING MATERIAL................Stainless Steel V4A,
WEIGHT ....1.4 kg

ENVIRONMENTAL

HOUSING IP67
OPERATING TEMP...................–55..+70 °C (with add. body heating)

▶ OPTIMIZED DESIGN

The hardware design of the 4310 is made by our experts with the latest Air-Flow-Simulation Software. By reducing the turbulences to a Minimum, the accuracy is increased to a Maximum.
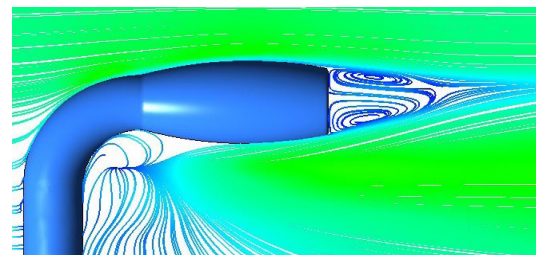
CERTIFICATES

- EMC Test
- Wind Speed Accuracy Tests
- Blowing Sand Test based on AECPT 300, method 313
- Temperature Test
- Altitude Test
- Dust Test IP6X according to DIN EN 60529
- Water Test IPX7 according to DIN EN 60529

- Solar Irradiation according to DIN EN 60068-2-5
- Vibration Tests
- Mechanical Shock according to IEC 60068-2-27
- Bump Test according to IEC 60068-2-29
- Drop Tests
- Icing Tests

▶ PLEASE CONTACT US:

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KTA 1401 CERTIFIED   ISO 9001 CERTIFIED   HMEI MEMBER   MADE IN GERMANY

Digital Hydrophone NEXOS A1

- **Compact Low power, Low Noise Digital Hydrophone with embedded processing.**
- **Consists of one hydrophone and two A/D converters with different sensitivity to detect acoustic source levels from 50 dB to 180 dB re 1µPa in the frequency range from 1Hz to 50kHz.**

Main Innovations:

Web-enabled pre-processed marine acoustic data.
Open source for add-on programming.
Stream / store raw and spectral data.
Smart integration into mobile and fixed platform.
Two Channels with different sensitivity for very wide dynamic range


Acoustic Specification:

Sensitivity ChA:	-138/-158 dB re 1µPa.
Sensitivity ChB:	-178 dB re 1µPa.
Frequency range (±1,5dB):	from 1Hz to 50kHz
Beam pattern:	Omni-directional.
Input equivalent noise:	23dB re 1 uPa/√Hz.
Full BW dynamic range:	130dB.
Dynamic range 1Hz BW:	160dB.

Software interface:

Serial port:	EIA RS232. [*1]
Plug and work:	OGC-Puck enabled.

Sensor Web: Processing data via OGC SWE.
RTC with GPS PPS sync

Settings:

Sampling frequency:	5 to 100 ksps.
CHA sensitivity:	-138 / -158 dB re 1 µPa.
Equalizer (HP filter):	1 Hz / 3200Hz.(one pole)
Channel selection:	A - A&B - A with Equalizer& B.
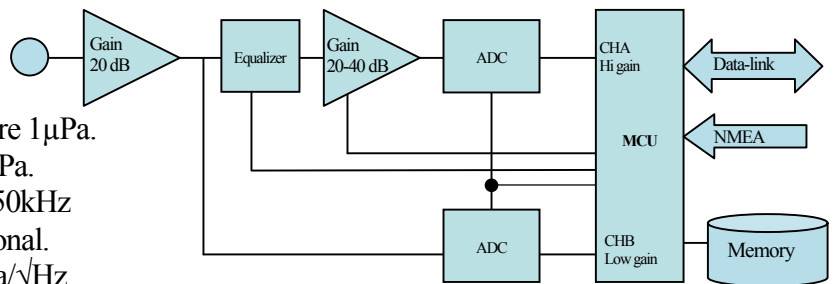
Embedded function:

Spectral analysis
Noise statistics (incl. EU MSFD)
Mammal detection – PAMGUARD
Data storage internal memory 32GB. [*2]

Electrical / Mechanical:

Supply voltage	4.6 to 42Vdc.
Max consumption	900mW
Connector	SubCon MCBH12M.
Working depth	1500m. [*3]
External coat	Polyurethane.
Size	Φ35 x 250mm. [*3]

(*1) Ethernet interface   (*2)   128GB   (*3) Depth 3000m. - Size Φ40 x 250mm.

SMIDTechnology

AWAC - 1 MHz

Real-time current profiles and directional waves for shallow water

The AWAC 1 MHz ADCP has become the standard reference technology in submerged wave-measurement applications. Thousands of these ADCPs have been deployed to capture the full wave spectrum in combination with current profiles. With a 35 m maximum range for wave measurements and 4 Hz sampling of the surface elevation, the AWAC 1 MHz is the optimal tool for shallow current and wave measurements.

AWAC - 1 MHz

Highlights

✓ Real-time current profiles to 30 m range; real-time directional waves to 35 m range

✓ Acoustic surface tracking (AST) with vertical beam

✓ Can be used both with fixed frames and subsurface buoys

Applications

✓ Online measurements of currents and waves

✓ Design data for planning of new coastal structures

✓ Site studies for offshore wind platforms

✓ Coastal erosion studies

✓ Measurement campaigns where the full wave spectrum is needed

✓ Monitoring of transient waves for channel wall protection

✓ Studies of tidal currents

AWAC - 1 MHz

NORTEK

Technical specifications

⟶ Water velocity measurements	
Maximum profiling range	30 m
Cell size	0.25-4.0 m
Number of cells	Typical 20-40, max. 128
Velocity range	±10 m/s horizontal, ±5 m/s along beam
Accuracy	±1% of measured value ±0.5 cm/s
Velocity precision	Consult instrument software
Maximum output rate	1 Hz
Internal sampling rate	7 Hz
⟶ Echo intensity (along slanted beams)	
Sampling	Same as velocity
Resolution	0.45 dB
Dynamic range	90 dB
Transducer acoustic frequency	1 MHz
Number of beams	3 beams 120° apart, one vertical beam (90° apart, one at 5° for platform mount)
Beam width	1.7°
Beam width vertical beam	1.7°
⟶ Wave measurement option (AST)	
Maximum depth	35 m
Data types	Pressure, one velocity along each beam, AST
Sampling rate velocity (output)	2 Hz
Sampling rate AST (output)	4 Hz
No. of samples per burst	512, 1024 or 2048
⟶ Wave estimates	
Range	-15 to 15 m
Accuracy/resolution (Hs)	< 1% of measured value / 1 cm
Accuracy/resolution (Dir)	2° / 0.1°

ACOUSTIC WAVE AND CURRENT PROFILER

AWAC - 1 MHz

NORTEK

⟶ Wave estimates	
Period range	0.5-50 s
Cut-off period (Hs)	5 m depth: 0.5 sec, 20 m depth: 0.9 sec, 60 m depth: 1.5 sec
Cut-off period (dir)	5 m depth: 1.5 sec, 20 m depth: 3.1 sec, 60 m depth: 5.5 sec
⟶ Sensors	
Temperature:	Thermistor embedded in housing
Temp. range	-4 to +40 °C
Temp. accuracy/resolution	0.1 °C/0.01°C
Temp. time response	< 5 min
Compass:	Magnetoresistive
Accuracy/resolution	2°/0.1° for tilt <15°
Tilt:	Liquid level
Accuracy/resolution	0.2°/0.1°
Maximum tilt	30°,AST requires <10° instrument tilt
Up or Down	Automatic detect
Pressure:	Piezoresistive
Range	50 m
Accuracy	0.5% of full scale (optional 0.1% of full scale)
Resolution	0.005% of full scale
⟶ Analog inputs	
No. of channels	2
Supply voltage to analog output devices	Three options selectable through firmware commands: Battery voltage/500 mA, +5V/250 mA, +12V/100 mA
Voltage input	0-5 V
Resolution	16-bit A/D
⟶ Data Recording	
Capacity	9 MB standard, 4/16 GB (Prolog)
Profile record	Ncells*9 + 120 bytes
Wave record	Nsamples*24 + 1k bytes
Mode	Stop when full (default and Prolog) or wrap mode

AWAC - 1 MHz

NORTEK

⟶ Real Time Clock	
Accuracy	±1 min/year
Backup in absence of power	1 year
⟶ Data Communications	
I/O	RS-232 or RS-422. Software supports most commercially available USB– RS-232 converters
Communication baud rate	300- 115200 Bd
Recorder download baud rate	600/1200 kBd for both RS-232 and RS-422
User control	Handled via "AWAC AST" software, or ActiveX® controls. "Seastate" for online systems
Output formats	NMEA, Binary. Prolog provides same types also for processed wave and current data.
⟶ Connectors	
Bulkhead	MCBH-2-FS, MCBH-8-FS, optional Souriau M-series metal connector for online use
Cable	PMCIL-8-MP on 10 m polyurethane cable, metal connector optional
⟶ Software	
Functions	Deployment planning, instrument configuration, data retrieval and conversion. (for Windows®)
⟶ Power	
DC input	9- 18V DC
Maximum peak current	3 A
Avg. power consumption	0,65 W
Sleep current	< 100 µA
Transmit power	1-30W, 3 adjustable levels
⟶ Environmental	
Operating temperature	-4 to +40 °C
Storage temperature	-20 to +60 °C
Shock and vibration	IEC 721-3-2
EMC approval	IEC 61000
Depth rating	300m

AWAC - 1 MHz

⟶ Materials	
Standard model	POM and polyurethane plastics with titanium fasteners
⟶ Dimensions	
Maximum diameter	210 mm
Maximum length	175 mm
⟶ Weight	
Weight in air	6.1 kg
Weight in water	2.9 kg
⟶ Online cable	

Polyurethane jacket, Shore D hardness, 13mm in diameter, max 2km. Inquire for longer cables