



AANDERAA INSTRUMENTS

DATA COLLECTING INSTRUMENTS FOR LAND SEA AND AIR

COASTAL MONITORING BUOY CMB 3280

A moored data buoy for measuring

- meteorological conditions*
- wave height and wave period*
- current speed, current direction*
- temperature, salinity, turbidity or*
- conductivity of the water*

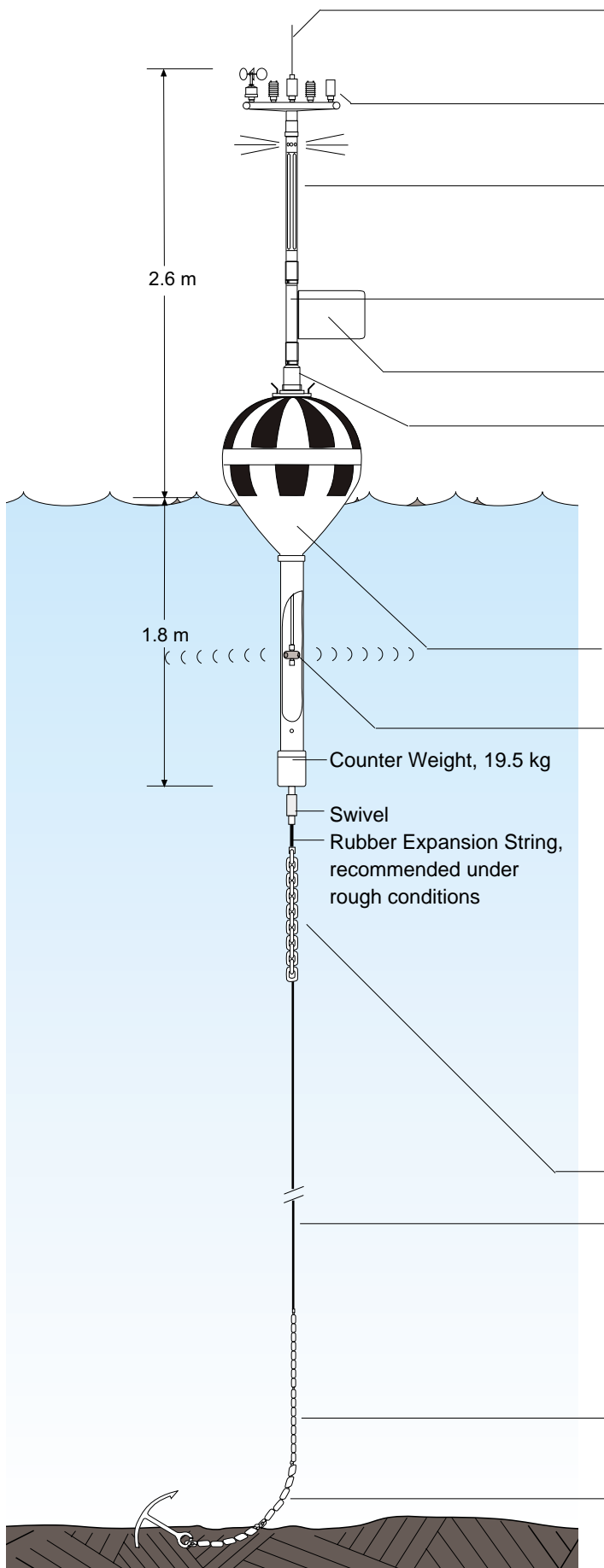
in a specific coastal area and to convey this information to the user in real-time.

Features:

- *Compact, lightweight and easy to install.*
- *Solar cell powered.*
- *High reliability and low cost.*
- *Standard or customer specified sensor configuration.*



General Description



VHF Radio Transmitter 3149, Frequency: 142.025MHz or UHF Radio Transmitter 3694, Frequency: 400 - 500MHz Conveying data in real-time. Range: 8–10 km

Atmospheric Sensors on Sensor Section 3868 for Wind Speed, Air Temperature, Relative Humidity and Air Pressure.

Solar Cell Power Module 3469 contains rechargeable NiCd. batteries and Flashing Light. Supplies power to the buoy together with rechargeable batteries in Central Buoy Module.

Sensor Scanning Unit 2800, 12 channels. Selectable sampling interval, normally set to 10 minutes.

Wind Vane 3273 w/ space for optional Data Storage Unit 2990

Central Buoy Module 3591 with optional sensors for Wave height and period, part no. 3595 and Buoy orientation 2864 (Wind Direction). Also containing a 7 Ah rechargeable battery.

All items above including the DCS 3900 can be removed from the buoy without pulling the buoy out of the water (Removable Payload)

Polyform Buoy 3599 with superstructure/counterweight. Foam filled. Net buoyancy: 345kg, OD 94 cm.

Doppler Current Sensor 3900, a rugged, true averaging sensor measuring current speed / direction and sea temperature. Installed inside a plastic buoy tube which has acoustic permeability. Up to 3 sensors can be moored in-line for current measurements in several depths.

- 1) The DCS 3900 can be used in combination with
 - Salinity / Temperature Sensors 3210
 - Conductivity / Temperature Sensor 3211 or
 - Oxygen/ Temperature Sensor 3713

- 2) Alternatively:
 - Eleven point Temperature String 2903 for measuring the stratification in fjords and coastal waters.

See application notes on page 3

3m, 3/4" Ballast Chain 287004, 25kg

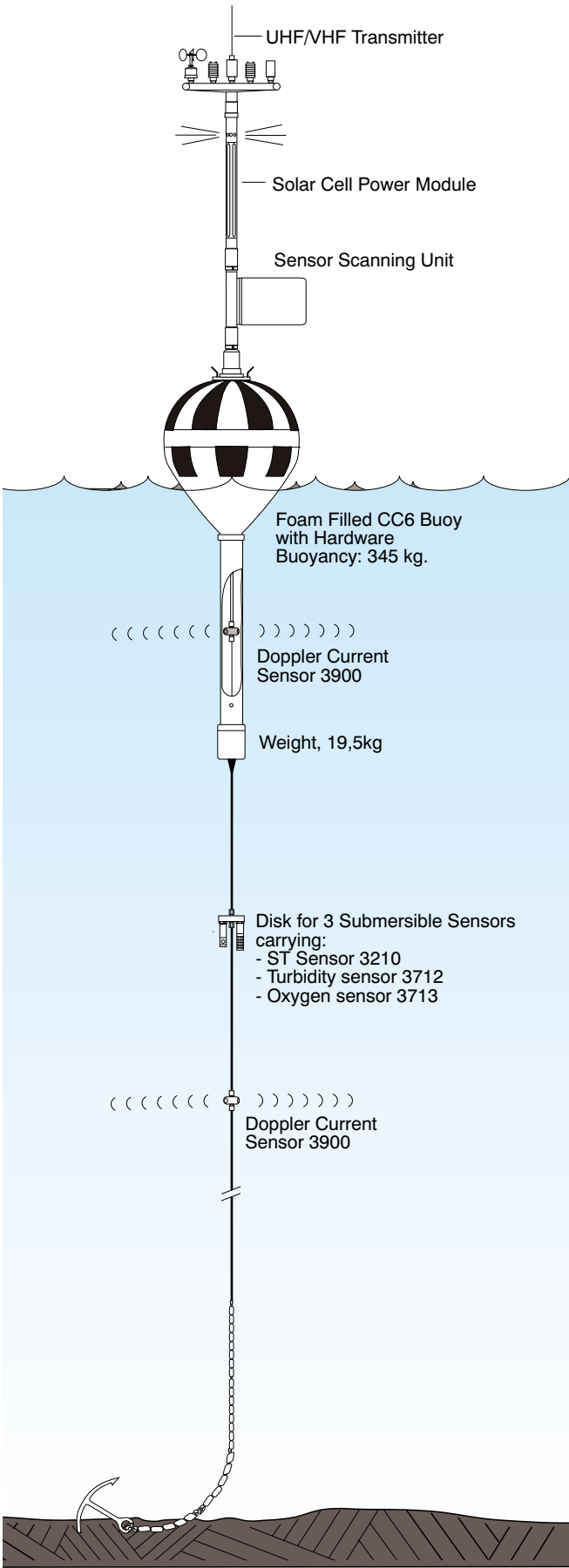
Mooring Rope 287008, 14mm, Karat. Breaking Load: 1400 kg.

Use only Galvanized shackles, part no 1680022 in the mooring line.

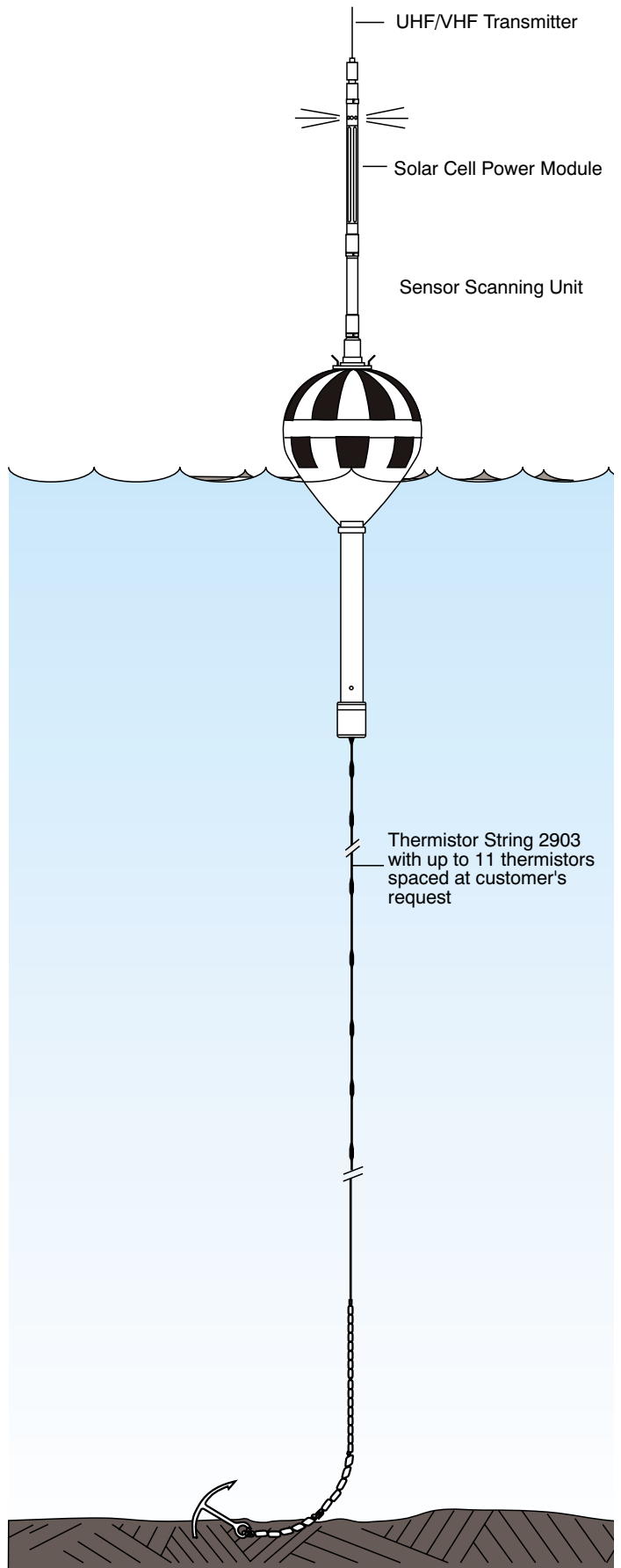
6m, 3/8" Chain 287006, 15kg.

Anchor with 3m, 3/4" Mooring Chain 287004, 40kg. Additional weight up to 300 kg is recommended for rough conditions

Examples of Applications



Multisubmersible sensor application



Telemetering temperature Profile Buoy, TTPB

General Description

The Coastal Monitoring Buoy 3280 is a rugged, lightweight and compact data buoy intended for use along the coast, in ports and harbors and near off-shore platforms. The buoy measures wave height and period, sea current speed and direction, sea temperature as well as the most important meteorological parameters and transmits data ashore in real-time by VHF/UHF radio. The buoy is of modular design which enables a variety of applications. Two examples are shown on page 3, but the buoy can accommodate

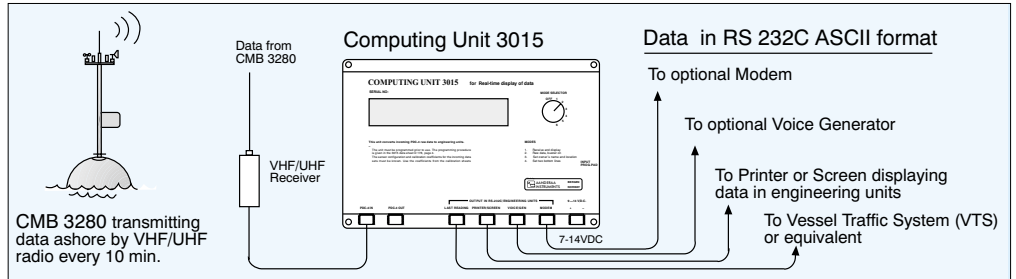
a selection of sensors depending on customers request.

The buoy consists of a foam-filled polyform buoy with a payload carrying the entire measuring system as well as all the sensors and the Radio Transmitter. The buoy, which is moored in a fixed position, operates on solar cells. It is controlled by the Sensor Scanning Unit. An internal clock starts the measuring cycle at the selected interval, reads the sensors and transmits the readings in real-time ashore or to a platform by radio.

Real-time Data Acquisition

At the receiving point several means of data transmission are available.

One alternative is to use **Computing Unit 3015** which converts the incoming raw data signals to engineering units. These data are subsequently displayed on an LCD or screen.



On the screen data are presented as a "Diurnal Picture", which contains the last readings, the 3 hour average and 24 hour maximum, minimum and average readings for all the parameters. Further relaying of data can be done by telephone both digitally and as a voice message. Additional equipment such as Voice Generator 3420 is then needed.

Data display on a PC using 3710 program

Another alternative is to connect the radio receiver to a PC via Deck Unit 3127. The PC runs Display Program 3710 that is a real-time display program with data storage capability. The program can handle data from up to 10 buoys. The user can set up the visual display as wanted.

Five different basic windows are available:

- a bar graph to show for example water level
- a directional compass for wind or current
- a diagram display to show historical development of for example air temperature
- a text display to show static text
- a number display to show exact values

facilities the need to monitor sea /coast or other outdoor environments. The program requires a computer with Windows ©95 (Build 1111 or later versions), Windows ©98 or Windows NT™, version 4, with at least one free serial communications port available, 8 Mbytes of memory, 4 Mbytes of free hard-drive space and a mouse connected.

The program is delivered on 3.5" diskettes or a compact disk with a quick start-up guide, on-line help, a license code and a license agreement sheet. The program is also available on the Internet. A 30-day test program can be downloaded from our Internet site at:

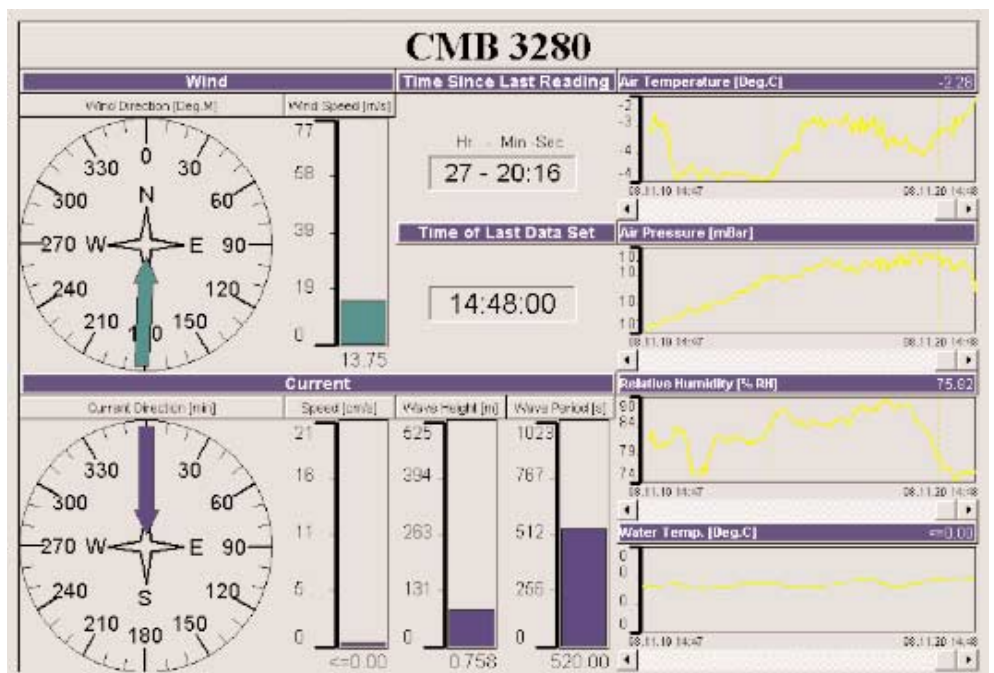
<http://www.aanderaa.com/3710DispProg.htm>

Note! To be able to publish the display on several terminals a client version of the program can also be delivered.

An example of a display set-up is shown underneath.

A complete display can then be built up by using a combination of these five windows. The on-line help will lead you, step by step, through a build-up of the display. The program works almost like a drawing program with the ability to alter the drawing as the physical parameters change. Three display examples are available which can be altered by the user at will.

The program converts raw data in RS-232C format to data in engineering units. The program outputs are a log file for each station, and a serial communications log. Program 3710C is a version with a custom-made display which can be delivered at an extra cost. Program 3710 is intended for use in monitoring harbors, airports, power plants, reservoirs, etc., and



Standard Sensor Specification for CMB 3280



2740



3455



3445



2810



3595



2864



3900

Sensor Scanning Unit 2800/2900

are compact 12 or 16 channel data acquisition devices specially designed for the Aanderaa Data buoys. They are housed in a 2" hard anodized aluminum tube and are integrated modules of the buoy hardware. The units are furnished with a wind vane for orientation of the buoy against the wind and for housing the Data Storage Unit (DSU) 2990 in case on-site storage is required. Ten measuring intervals, Remote start, Non-stop, 1, 2, 5, 10, 20, 30, 60 and 120 minutes, are available and can be set by the operator. The PDC-4 data signals, stored in the DSU 2990, are also routed to the Transmitter on top of the buoy for real-time transmission of data ashore.

On the Sensor Cross Arm:

Wind Speed Sensor 2740

gives average wind speed in the sampling interval. Output: SR10.

Range: 0.5 to 76 m/s. Accuracy: $\pm 2\%$ of reading.

Air Temperature Sensor 3455

Measures air temperature by means of a 2000 Ω platinum resistor protected from radiation by Radiation Screen 2922. Output: VR22.

Range: -44 to $+49^\circ\text{C}$. Accuracy: $\pm 0.1\%$ of range.

Relative Humidity Sensor 3445

Measures percent relative humidity, and is based upon the influence of humidity on a capacitive polymer.

Output: SR10. Accuracy: $\pm 2\%$ RH.

Air Pressure Sensor 2810

Measures air pressure using a miniature monolithic silicon pressure transducer. Output: VR22.

Range: 920 – 1080 mbar. Accuracy: ± 0.2 mbar.

In the Central Buoy Module:

Wave Height Sensor 3595

The buoy's movements in the waves are sensed by an accelerometer in the sensor. The outputs from the sensor are:

- 1) Significant Wave Height, 1/3H. Range: 0–10 meters, Accuracy: $\pm 10\%$ (for wave periods between 3 to 8s).
- 2) Wave Period, range: 1-30s.

Valid for measuring intervals from 10 to 60 minutes.

Buoy Orientation sensor 2864 (Wind Direction)

Works in combination with the Vane plate on the Sensor Scanning Unit. The sensor measures the magnetic heading reference for the buoy and thereby the wind direction.

Accuracy better than $\pm 5^\circ$ Magn.H

and at approximately 1m depth:

Doppler Current Sensor 3900

The DCS 3900 is a unique, new, fully solid-state sensor, which uses the well-known Doppler principle for measuring the sea current. It is a true vector averaging sensor also measuring the sea temperature.

The ranges are:

Current Speed: 0-300cm/s,

Accuracy: 0,5cm/s (Standard deviation)

Current Direction: 0-360°Magn.H. Accuracy: $\pm 5^\circ$

Water Temperature: -8 to $+41^\circ\text{C}$. Accuracy: $\pm 0.1^\circ\text{C}$

Up to three DCS 3900 can be moored in-line at several depths. For other available optional sensors, see next page

Optional Sensors and Auxiliaries



OPTIONAL SENSORS:

Salinity/Temperature Sensor 3210.

Salinity range: 0–40 ppt, accuracy: ± 0.2 ppt.

Temperature range: -8 to $+41^\circ\text{C}$, accuracy: $\pm 0.1^\circ\text{C}$.

Salinity/Temperature/Depth Sensor 3230.

Salinity range: 0–40 ppt, accuracy: ± 0.2 ppt.

Temperature range: -8 to $+41^\circ\text{C}$, accuracy: $\pm 0.1^\circ\text{C}$.

Pressure, (Depth): 0-11 bar A (Other ranges on request)
accuracy: 0.2% of range

Conductivity/Temperature Sensor 3211.

Conductivity range: 0–75 mS/cm, accuracy: ± 0.3 mS/cm.

Temperature range: -8 to $+41^\circ\text{C}$, accuracy: $\pm 0.1^\circ\text{C}$.

Conductivity/Temperature/Depth Sensor 3231.

Conductivity range: 0–75 mS/cm, accuracy: ± 0.3 mS/cm.

Temperature range: -8 to $+41^\circ\text{C}$, accuracy: $\pm 0.1^\circ\text{C}$.

Pressure, (Depth): 0-11 bar A (Other ranges on request)
accuracy: 0.2% of range

Temperature String 2903.

Eleven embedded Fenwal thermistors spaced at customers' request.

Maximum length 400 m.

Range: 0 to $+30^\circ\text{C}$, accuracy: $\pm 0.1^\circ\text{C}$

Oxygen Sensor 3713

measures the dissolved oxygen in the water. The sensor consists of two main parts, an Oxyguard cell with a signal converter and an adapter with temperature probe giving dual parameter output.

Oxygen range: 0-20mg/l accuracy ± 0.8 mg/l

Temperature range: -8 to 40°C accuracy $\pm 0.1^\circ\text{C}$

Turbidity Sensor 3712

measures scattered light from particles in the water. An infrared light emitting diode is placed at an angle of 60 degrees against a photodiode. The photodiode is furnished with a daylight filter.

Range: 0.1-100NTU, accuracy: 2% of full scale

AUXILIARIES

Computing Unit 3015

is the real-time data handling unit, receiving data from the buoy via VHF or UHF radio. Raw data is converted into engineering units and displayed on a 40 character LCD. At the same time a Diurnal Picture is edited.

Peripherals such as printer, CRT screen, telephone modem or Voice Generator 3420 will, when connected, give access to the Diurnal Picture. The 3015 unit contains a buffer storing up to 432 data sets. The unit has outputs in RS 232 format for the last data set and the last 432 data sets received.

Representative's Stamp

—Latest version is on the Internet—

PO BOX 160, NESTTUN
5852 BERGEN, NORWAY

FANAVEIEN 13B
5221 NESTTUN, NORWAY

TEL. +47 55 109900
FAX. +47 55 109910

E-MAIL: info@aanderaa.no
WEB: http://www.aanderaa.com

MAIN COMPONENTS

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Pressure,(Depth): 0-11 bar A (Other ranges on request)

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Conductivity/Temperature Sensor 3211.

Conductivity range: 0–75 mS/cm, accuracy: ± 0.3 mS/cm.

Temperature range: -8 to $+41^\circ\text{C}$, accuracy: $\pm 0.1^\circ\text{C}$.

Conductivity/Temperature/Depth Sensor 3231.

Conductivity range: 0–75 mS/cm, accuracy: ± 0.3 mS/cm.

Temperature range: -8 to $+41^\circ\text{C}$, accuracy: $\pm 0.1^\circ\text{C}$.

Pressure,(Depth): 0-11 bar A (Other ranges on request)

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Individual data sheets describing the essential components and sensors are available on request.