

OPERATING MANUAL TD219 COASTAL MONITORING BUOY CMB 4280

A moored data buoy for measuring meteorological and oceanographical conditions.

Optional Sensors:

Wind Speed and Gust, Wind Direction

Air temperature, Air Pressure

Relative Humidity, Visibility

Wave Height/Period

Current Speed/Direction

Salinity, Conductivity

Water Temperature, Turbidity

Oxygen, pH, ORP

Features:

- *Compact, lightweight and easy to install*
- *Solar cell powered*
- *High reliability and low cost*
- *Customer specified sensor configuration*
- *Up to 30 parameters can be measured*
- *Several ways to transmit data*
- *Real-time data from distances up to 20km by using UHF radio Modem*
- *Remote data downloading and programming by using GSM modem*

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Abbreviations

CBM	Central Buoy Module
Ch	Channel
CMB	Coastal Monitoring Buoy
CT	Conductivity/Temperature
DCS	Doppler Current Sensor
GSM	Global System for Mobile Communication
PDC-4	Pulse Duration Code of 4 seconds
RS-232C	Recommended Standard 232C
ST	Salinity/Temperature
VHF	Very High Frequency
UHF	Ultra High Frequency

INTRODUCTION

This operating manual describes the Coastal Monitoring Buoy CMB 4280, how it is used, maintained and serviced.

The CMB 4280 is an important member of the family of Aanderaa instruments family of data collecting instruments for land, sea and air.

It shares a number of common features with these instruments, such as rugged construction, modular design, potted waterproof units, low power consumption and minimal maintenance.

Great effort has been taken to make this buoy easy to deploy and use.

Knowledge of met/ocean information is of great importance for safe navigation, as well as for many surveys and research activities. This Buoy is a moored data buoy designed to provide such

information in ports, harbours and coastal waters.

The buoy can measure wave height and period, sea current speed and direction, sea temperature as well as the most important meteorological parameters.

Two examples are shown on page 8, but the buoy can accommodate a selection of sensors depending on customer's request.

Data can be transmitted ashore in real-time if VHF or UHF transmitter is connected. If a GSM modem 3865 is connected the buoy can be dialled-up and historical data can be downloaded.

Some illustrations in this operating manual include 4 and 6 digit stock numbers. These are available spares and the numbers must always be quoted when ordering

SYSTEM DESCRIPTION



Payload:

- **Communication equipment:**
 - VHF Radio Transmitter 3149
 - UHF Radio Transmitter 3694
 - Argos Transmitter 2965
 - Radio Modem
 - GSM Modem 3865
- Sensor Ring 3886 with meteorological sensors.
- Mast Section with Flashing Light 3861 and optional Radar Reflector 3885.
- Control Unit 3850 with optional:
 - Wind Vane 3273
 - Data Storage Unit 2990
 - GPS Unit 3890 (prospective option)
- Central Buoy Module 3867 with:
 - Datalogger 3860
 - Rechargeable Batteries
 - Optional:
 - Wave Height Sensor 3595
 - Buoy Orientation Sensor 2864



Buoy Hardware 3870:

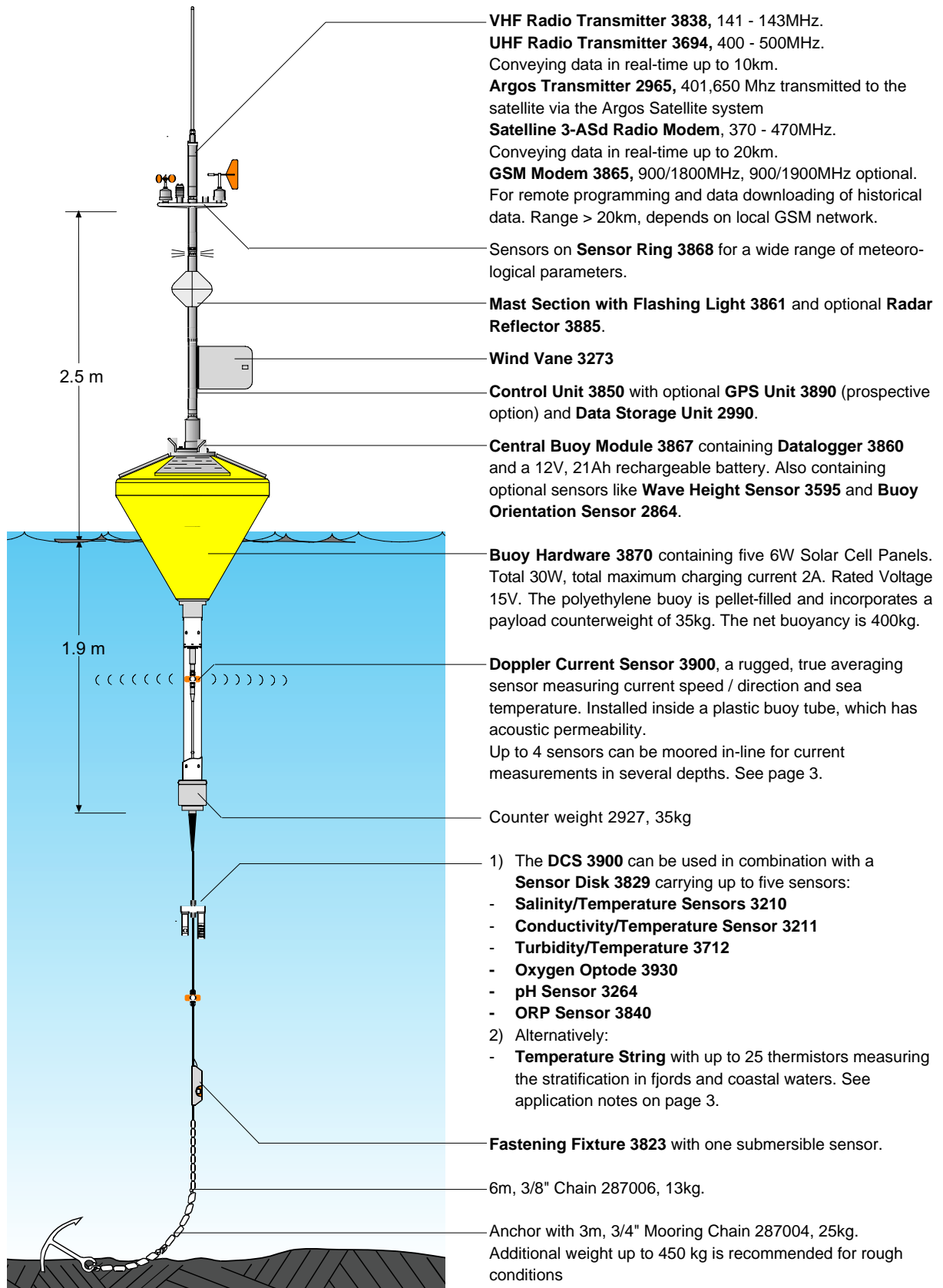
- Pellet-filled polyethylene buoy
- Solar Cell Panels
- Encompassing Heavy Plastic Tube
- Counter Weight



Substructure:

- Link 3962 between DCS 3900 and buoy
- Sensor string with submersible sensors
- 3m, 3/4" mooring chain
- Nylon mooring rope
- 6m, 3/8" chain
- 3m, 3/4" mooring chain
- Anchor

Specifications



Examples of Applications

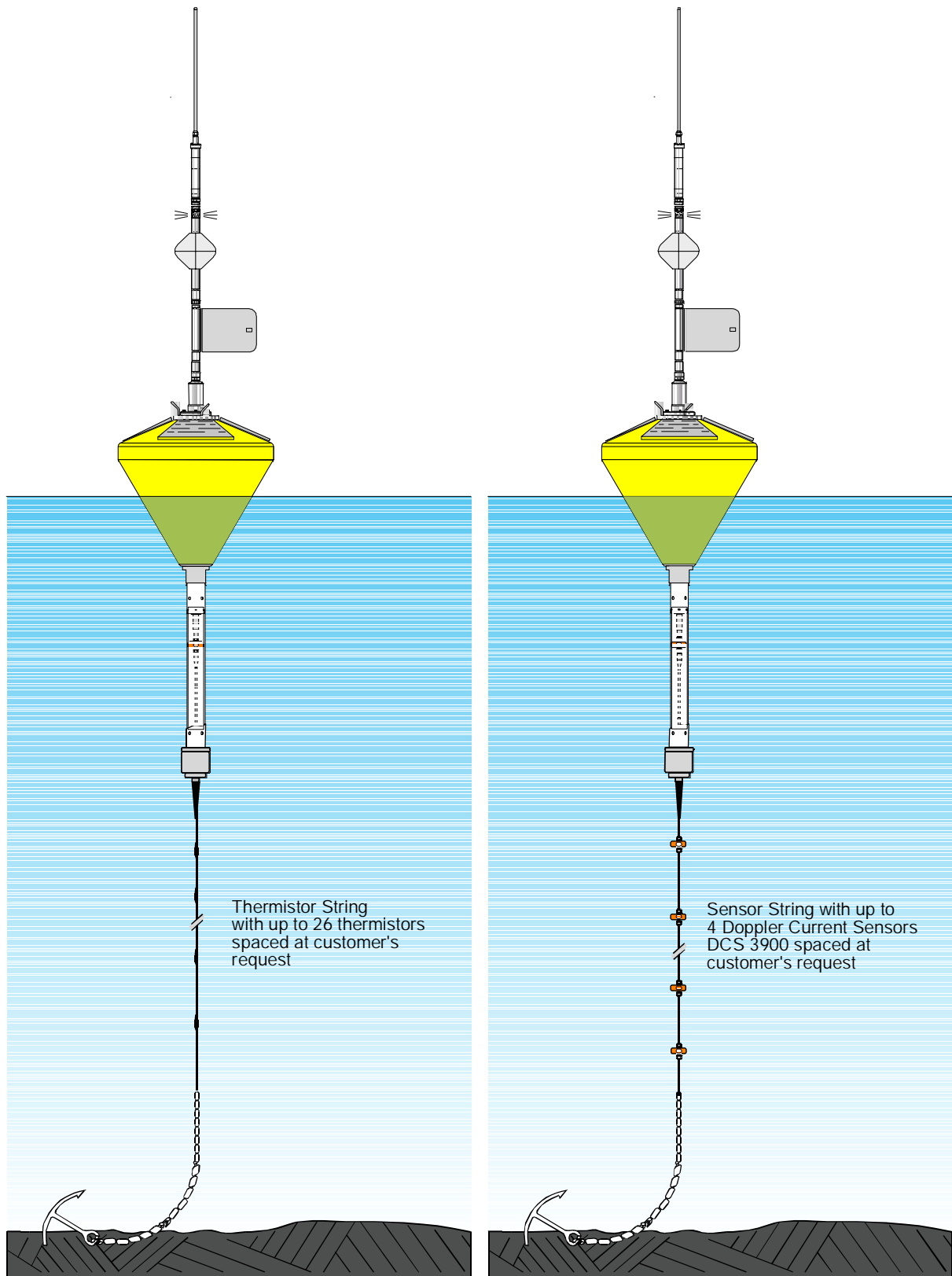


Fig. 1 Telemetry Temperature Profile application Fig. 2 Doppler Current Sensor application

CHAPTER 1 Receiving the Coastal Monitoring Buoy CMB 4280

The buoy is packed in a wooden framework, containing:

the polyform buoy hardware with the central buoy module, a crate with the rest of the payload, mooring rope, anchor and chains and a encasement for the Sensor Ring with sensors.

Buoy without sensor string:

The wooden frame measures 1.28m x 1.22m x 3.07m (4' 2.5" x 4' x 10' 1") and the gross weight is approximately 200kg (441lb).

Buoy with sensor string

The wooden frame measures 1.28m x 1.22m x 3.31m (4' 2.5" x 4' x 10' 10") and the gross weight is approximately 200kg (441lb).

Fig. 3 CMB 4280 in Packing Case

CHAPTER 2 Theory of operation, Description of components and parts.

The measuring system

The buoy is triggered at preset time intervals by a clock in the Datalogger 3860.

The sensors are scanned in sequence and the readings, converted into engineering units, are stored in the Datalogger.

When the measuring cycle is completed, the Datalogger 3860 enters a quiescent state awaiting a new trigger pulse from the clock after which another measurement cycle is carried out.

When the GSM Modem is interrogated, the stored data are conveyed over the telephone network.

The Payload with Sensors

The payload is built up using separate modules. All the modules are joined together by watertight joints with internal electrical connectors.

Installation and removal for maintenance and service can therefore be done very easily.

Mast Section with Flashing Light 3861

A built in flashing amber light is activated by a photo diode after dark. The optional Radar Reflector 3885 is fitted below the flashing light.

Central Buoy Module (CBM)

This Module is equipped with a flange. The Module and its payload is secured to the buoy hardware with 4 bolts.

The Datalogger 3860 is located at the top of the Central Buoy Module.

It can read up to 30 sensors at a preset recording interval and has the following output formats:

1. Serial data in PDC-4 format to an Aanderaa Radio Transmitter or Deck Unit 3127.
2. RS-232C serial data, one-way communication port to a Radio Modem, enabling long distance real-time data.
3. RS-232C serial data, two-way communication port to a GSM Modem, enabling remote data downloading and programming.

The Wave Height Sensor and the Buoy Orientation Sensor are fitted on standard sensor outlets inside the module making them easily replaceable.

The module also incorporates a 21 Ah rechargeable battery.

Doppler Current Sensor (DCS)

The sensor is installed inside the plastic tube in the center of the buoy . This provides a symmetrical position at 1 meter depth with minimal current interference from the buoy structure.

Since the acoustic pulses penetrate the plastic PVC tube, the sensor is also protected from fouling

and wave forces. A short stud connects the DCS sensor to the CMB.

A thermistor string for measuring temperature profiles in the sea can be installed instead of or below the DCS.

On top of the payload there is a sensor section which carries the UHF/VHF Transmitter or GSM modem and the atmospheric sensors.

Communication equipment

- Aanderaa UHF/VHF transmitters
- Argos transmitter
- GSM modem
- UHF Radio modem

The three first communication devices can be interchanged without any reconfiguration or programming of the buoy. The Radio modem will require a minor modification to the internal wiring.

A typical sensor configuration is:

Ch1 Reference

Ch2 Wind Speed Sensor

Ch3 Wind Direction (Buoy Orientation inside Central Buoy Module)

Ch4 Air Temperature

Ch5 Air Pressure (optional Mira Visibility Sensor)

Ch6 Relative Humidity Sensor

Ch7 Wave Height Sensor (inside the Central Buoy Module)

Ch8 Wave Period (inside the Central Buoy Module)

Ch9 Current Speed

Ch10 Current Direction

Ch11 Water Temperature

Ch13 through 30 are free for optional sensors such as DCS 3500, CT or ST sensors or Oxygen and Turbidity sensors.

The buoy can be fitted with alternative sensor configurations. A 25-channel Thermistor String can be mounted under the Buoy.

The Reference

This reading is used both as a verification of the system performance and as an identification of the buoy.

The Wind Speed Sensor

has a three cup rotor. The rotor shaft is equipped with a magnet that activates an internal reed switch. The rotation frequency is thus transferred to the internal electronics without the need for any sealing on the rotor shaft.



The Buoy Orientation Sensor



used for wind direction, incorporates a hall effect compass sensing the earth's magnetic field. This field is sampled once every second and vector averaged. Both wind speed and direction are presented as the average during the past measuring interval.



The Air Temperature Sensor

measurement are made using a half bridge with one platinum resistor is used. The sensor is furnished with a radiation screen to prevent it from being heated by solar radiation.



The Relative Humidity Sensor

uses a capacitive film for measuring the humidity of the air. This sensor is also equipped with a radiation screen.



The Air Pressure Sensor

contains a silicium chip with one side exposed to the air and the other side in vacuum. By sampling a resistive bridge integrated on this chip, a measurement of the absolute barometric pressure is obtained.



The Wave Height Sensor

is based on a silicium accelerometer. To keep it horizontal, this accelerometer is mounted on a small pendulum. A little micro-processor samples the acceleration 5 times a second and double integrates this to get an expression for the sensor's movement. At the end of the measuring interval, significant wave height and average wave period are calculated. The significant wave height is the mean of the highest third of all the waves during the interval.

The outputs from the sensor are: 1) Significant Wave Height 2) Wave Period

Current Speed, Current Direction and Water Temperature

are provided by the Doppler Current Sensor 3900. This sensor transmits a short acoustic pulse into the water every second. Small particles and bubbles in the water flow will reflect a little of this sound. Due to the doppler effect the reflected sound change frequency slightly. By sensing this change in four direction, and referring them to an internal hall effect compass, vector averaged current speed and direction are found. The water temperature is measured by a Pt 2000 platinum element. The DCS 3900 can be used in combination with optional sensors as mentioned earlier



Polyform Buoy, Anchoring Equipment.

Buoy Hardware 3870 containing 5 Solar Cell Panels each 6 Wmax, max. current 0.39A and rated voltage 15V. The buoy incorporates superstructure/ counterweight (25kg), is foam filled with a net buoyancy of 420kg, OD 940mm.

Mooring rope as specified below can be delivered upon request:

- 1) Ballast Chain 3/4", part number 287004, which is 3m long and weights 25kg,
- 2) Mooring Rope, part number 287008, which is 14mm thick and made of Karat Estalon. Breaking Load:1400kg. Length must be specified.
- 3) Anchor with a 3m long anchor chain, part no. 287004 and a 6m long 3/8" chain, total weight 55kg. However, the recommended anchoring weight is up to 300kg. To be supplied by the customer.
- 4) Subsurface Viny float for mooring line, 972209, buoyancy:20kg
- 5) Elastic Rubber Band for chord anchorage in the open sea.



CHAPTER 3 Preparing the buoy for use.

Assembly

Each component and sensor in the system has been thoroughly tested in accordance with our quality assurance system, ref enclosed Test & Specifications Sheets and Calibration Sheets.

The Buoy with hardware, the Central Buoy Module with all its components, the DCS and CT sensors are shipped partly assembled in a wooden frame.

The GSM Modem, the Mast Section 3861 are packed together with the Control Unit in a plywood box and placed inside the frame. The circular cross-arm, with the Meteorological Sensors installed, is packed in a cardboard box and placed inside the wooden frame.

Assembling the Buoy

- 1) Remove the buoy from the frame.
- 2) Assemble the Control Unit and the Mast Section. Place the assembled unit on top of the Central Buoy Module and tighten up the muff nut. Each unit is furnished with a male and a female cone and quick connect/ disconnect electrical plugs.
- 3) Mount the Circular Cross-arm on top of the Mast section and tighten up the muff nut.
- 4) Install the Communication Device on top of the Sensor Ring.
- 5) Connect the Power Cable (2-pins) from the Buoy to the Solar Cell Receptacle in the Control Unit.
- 6) The five Solar Cell Panels and the batteries in the Central Buoy Module now power the buoy. The buoy operates as long as it is assembled.

Functional test

To perform a functional test, interconnect the equipment.

Insert the ON/OFF Plug into the ON/OFF Receptacle on the Control Unit.

The Datalogger will trigger the buoy and perform one measurement cycle after which it enters a quiescent state awaiting for a new triggering pulse to arrive.

Let the Datalogger perform 3-4 cycles or until the readings are stable.

Check that the different channels read sensible values.

1. Channel 1 is the **reference** channel. The reading is a fixed reading identifying this particular buoy. The reference number is written in the Test & Specification sheet for the Datalogger 3860. Allowable difference is ± 1 digit.
2. **Wind Speed** reading. If possible, use a fan to turn the sensor rotor and check for sensible readings.
3. **Wind Gust** reading. Use the same procedure as for channel 2. The reading should be the same as channel 2 or higher.
4. **Wind Direction** reading. Turn the Wind vane and see that the reading follows the Vane.
5. **Wave Height** reading. Test after deployment.

6. **Wave Period** reading. Test after deployment.
7. **Buoy Orientation** reading. This reading indicates the bearing of the Wind Vane on the Buoy. This bearing is the reference for the True Wind Direction measurements.
8. **Current Speed** reading. Use the Test Unit (see Data Sheet D320).
9. **Current Direction** reading. Use the Test Unit (see Data Sheet D320).
10. **Water Temperature** reading. Check against ambient temperature.

If all readings appear logical the buoy is ready for operation.

The buoy is now ready for deployment.

Deploying the Buoy

Prepare the anchoring equipment and the length of the mooring line according to the deployment depth.

Total Length of Anchoring Line = Depth + Max.Tide + Max.Wave Height + From 25 to 50% extra length (see drawing S6262B).

- 1) After the Rope, the Anchor Chain and Anchor are assembled, lower the anchor and chains gently until the anchor rests on the seabed.
- 2) Connect the mooring rope to the ballast chain at the bottom of the buoy.
- 3) Hoist the buoy overboard and hold the buoy alongside the vessel. Take care not to harm the superstructure in this operation.
Note!
Only use the handle on the buoy for lowering the buoy not the anchoring equipment, maximum weight 300kg (660lb).
- 4) If a Data Storage Unit DSU 2990 is used connect it the to the Control Unit and close the Wind Vane.

The equipment is now waiting for the buoy to be triggered.

When the buoy is triggered the data are either stored in the Datalogger 3860 ready to be conveyed to the recipient over the GSM network when called upon or are transferred in real-time via radio or satellite.

How to collect data from the buoy, see chapter 4.

CHAPTER 4 Collecting Data From The Buoy

Data Transmission.

The Transmitter, which is mounted on top of the Buoy, transmits the measured raw data instantaneously as they are measured. Data format is the Aanderaa PDC-4 code.

At the receiving point the radio receiver is connected to the Deck Unit 3127

If a GSM modem 3865 is connected the buoy can be dialed up and data can be downloaded. The buoy is of modular design which enables a variety of application

- Radio Modem, Frequency: 370-470MHz. Range: 20km
- GSM Modem, Frequency: 900/1800MHz. 900/1900 optional
- VHF Radio Transmitter 3838, Frequency: 142.025MHz
- UHF Radio Transmitter 3694, Frequency: 400 - 500MHz
- Argos Transmitter 2965, Frequency 401,650 Mhz

GSM Modem Setup

The GSM modem needs a SIM card prepared for data communication to operate. The SIM card is NOT delivered together with the GSM modem. Contact your network supplier to obtain a SIM card for your modem and install it as instructed.

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, a real time display program with data storage capability

When using radio transmission, the program can handle data from up to 20 buoys providing data multiplexing is employed or the receiving station is equipped with several radio receivers, Deck units and Com-ports. When using GSM communication, the rate of data download will limit the number of buoys that can be connected. The user can set up the visual display as wanted.

Five different basic windows are available:

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

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

can be saved in a log-file for each station either as raw Data or as Engineering Data.

Log File System

It is also possible to obtain an extra software (Autolog Program 3875 for the 3710 Display Program) which among other things can save data for each day in separate files.

If the buoy is equipped with GSM modem the M version of program 3710 is required. The program has a dial-up function which can automatically dial up the buoy and download the last records

The C version of Program 3710 has 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 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 NTTM, 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>

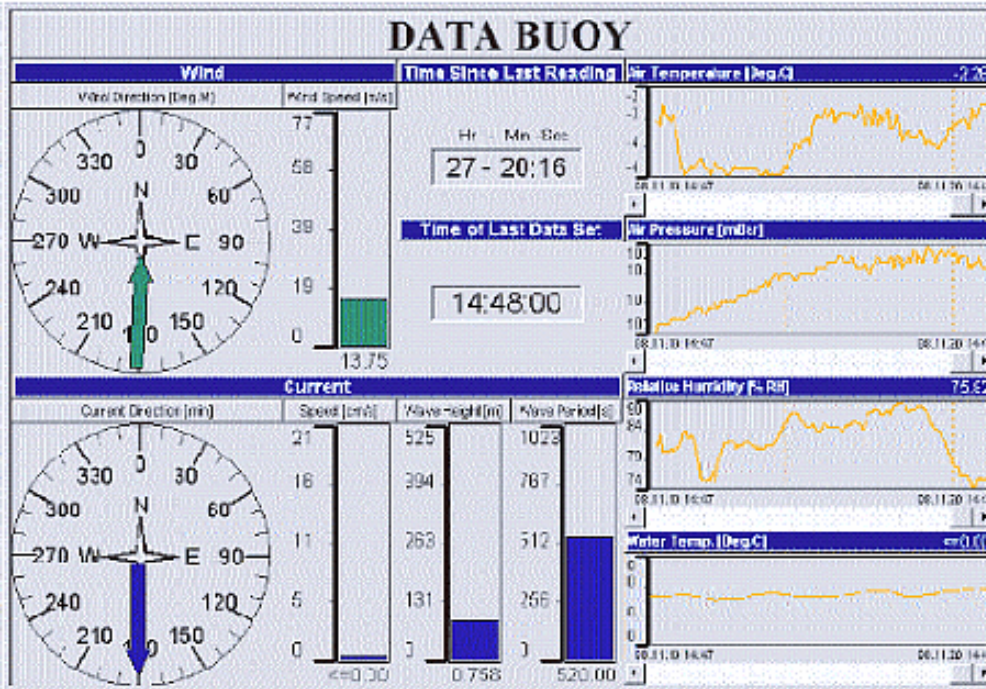


Fig. 4 An example of a display set-up

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

Downloading Data and Programming the Buoy using Hyper Terminal & Modem

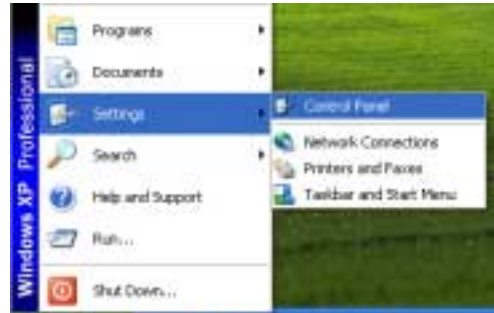
To download data from the buoy a computer with either an analog modem supporting 9600 baud or a GSM modem is required.

If a modem is already installed on the computer, skip the “Installing Modem” chapter and go directly to the “Setup of Hyper Terminal” chapter.

To install a modem, follow the “**Installing Modem:**” chapter below.

Installing Modem:

1. Open the “**Control Panel**” from the Start Menu.



2. For Windows XP, select “**Printers and Other Hardware**”.



For Windows 95, 98, NT, and 2000, select “**Modems**” and jump to section 4.

3. Select “**Phone and Modem Options.**”



4. Click on the “**Modem**” tab, and then click “**Add**”.



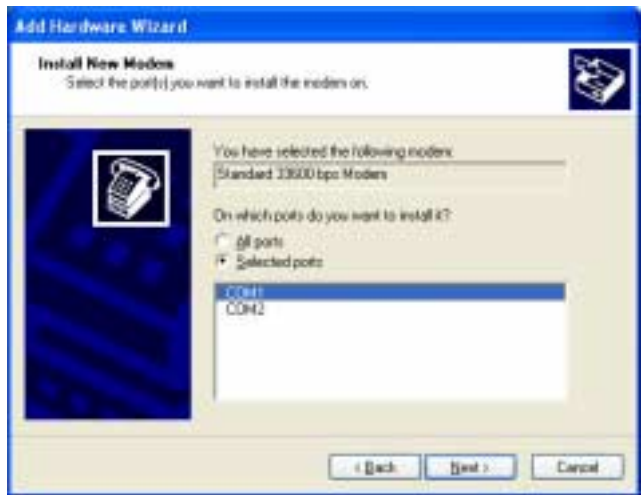
- 5. Click in the “**Don’t detect my modem; I will select from a list.**” box, and then click “**Next**”.



- 6. Select a “**Standard Modem**” that corresponds with the maximum speed of the modem. If the maximum speed of the modem is not known, select “**Standard 9600 bps Modem**”. Click “**Next**”.



- 7. Select the port to which the modem is connected. If the modem is connected to an unknown port, select “**All ports**”. Click “**Next**”.



- 8. Click “**Finish**”.



Setup of Hyper Terminal :

- 1). Start Hyper Terminal, usually located as shown below.
 If Hyper Terminal is not visible there it is probably not installed on your computer.
 In this case contact your network administrator to install Hyper Terminal.



2. Enter a name for the connection and select an icon. Click "OK".



3. Enter the buoy's phone number and select the modem using the "Connect using:" drop down menu.



4. Click "Modify".



5. Click **“Configure”**.



6. Set Port speed to **“9600”** and Flow control to **“None”**. Click **“OK”**.



7. Click **“OK”**.



8. Click **“Dial”**.



9. If a success the following data will be received.

```

                                DATA LOGGER 3860
                                Owner's Name

Location                               Recording Int: 10.0 min.Date: 24/6-2002
-----
Parameter                               Unit      Reading
                                13:49
-----
01 Reference                               228
02 Wind speed                             m/s       3.2
03 Wind gust                             m/s       4.7
04 Wind direction                         Deg.M     35.4
05 Air temperature                         Deg.C     14.8
06 Relative humidity                       % RH     56.7
07 Visibility                             m        1023.0
08 Air pressure (QNH)                     hPa      1015.8
09 Wave Height                             m         1.6
10 Wave Period                             sec.      2.0
11 Buoy Orientation                       Deg.M    350.2
12 Current speed                           cm/s      5.0
13 Current direction                       Deg.M    227.5
14 Water temperature                       Deg.C    15.6
-----
                                A system from Aanderaa Instruments ----

For help - write help at command prompt!

Command >
    
```

Enter the Setup menu by modem:

1. If a successful connection is established, the following data will be received.
2. At the command prompt enter “**setup**”. Enter your password.
When delivered from factory the default password is: 3860.

```

                                DATA LOGGER 3860
                                Owner's Name

Location                               Recording Int: 10.0 min.Date: 24/6-2002
-----
Parameter                               Unit      Reading
                                13:49
-----
01 Reference                               228
02 Wind speed                             m/s       3.2
03 Wind gust                             m/s       4.7
04 Wind direction                         Deg.M     35.4
05 Air temperature                         Deg.C     14.8
06 Relative humidity                       % RH     56.7
07 Visibility                             m        1023.0
08 Air pressure (QNH)                     hPa      1015.8
09 Wave Height                             m         1.6
10 Wave Period                             sec.      2.0
11 Buoy Orientation                       Deg.M    350.2
12 Current speed                           cm/s      5.0
13 Current direction                       Deg.M    227.5
14 Water temperature                       Deg.C    15.6
-----
                                A system from Aanderaa Instruments ----

For help - write help at command prompt!

Command >
    
```

```
Command >setup
```

- The "Setup" menu will now be received.
See the operating manual for Datalogger 3860 for detailed description on each menu choice.

```

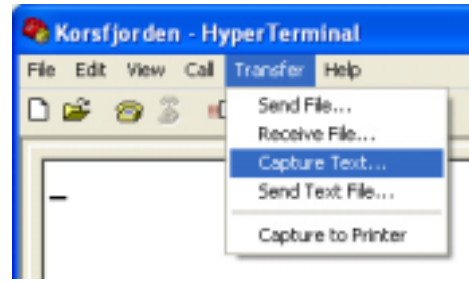
Setup                                     13 March-2001
-----
Channel reading                          Serial Settings
-----
| 11 Last Data                            | 31 Modem Init String          |
| 12 Channel Settings                     | 32 Set Baud Rate              |
| 13 Channel List                         | 33 RS232 Port Setting         |
| 14 Display Raw Data                     | 34 Serial Setting             |
| 15 Number of Channels                   |                               |
| 16 Recording Interval                   |                               |
| 17 Show Elapsed Sequence (Current Program) |                               |
| 18 Remote Start Trigger                 |                               |
-----
Misc                                      Memory Settings
-----
| 21 Set Location and Owners Name         | 41 Memory Setting            |
| 22 Set Date and Time                   | 42 Sent to Voice              |
| 23 Set New Password                    | 43 Clear All Data             |
| 24 Call Statistics                      | 44 Clear All Parameters       |
| 25 Command mode                        |                               |
| 99 Quit/Hang-up                        |                               |
-----
                                           Alarms
                                           -----
                                           | 51 Set Alarm Number          |
                                           | 52 Set Alarm Interval        |
                                           -----
<Enter> or ? to show this menu. To stop listing of menu, press 's'.
Enter menu choice >
Download historical data by modem
    
```

- Enter the "Setup" menu and select menu choice "25. Command mode".
- At the command prompt different commands can be given to list historical data. The commands are listed below

Commands	Description
1. list	Lists all historical data. The most recent data will be received first.
2. listbackwards	As for list.
3. lb	As for list.
4. listforward	Lists all historical data. older readings first then newer readings.
5. lf	As for listforward.
<u>Optional:</u> A time period may be added to all commands. Syntax: <list command> <from time> - <to time> Time syntax: YYYYMMDDHHmmSS YYYY-year, MM-month, DD-day HH-hour, mm-min, SS-seconds. „Seconds may be skipped. Example: 11 200206251400 - 200206251500	

3. Go to the "Transfer" menu and select "Capture Text..."

- Click **"Browse"**. Enter a filename and select a location on the PC's hard drive where you want the log file to be stored, then click **"Start"**.



- Enter one of the list commands shown under section 2. If the list commands are given with a start and end time



```

Command >lf 200206250949 - 200206250959

-----
Conditional listing : 25 June-2002 9:49:00 - 25 June-2002 9:59:00
To stop listing press 's' or Ctrl-x
-----

0-----12-----25-----37-----50-----62-----75-----87-----100
.....

                                DATA LOGGER 3860
                                Owner's Name

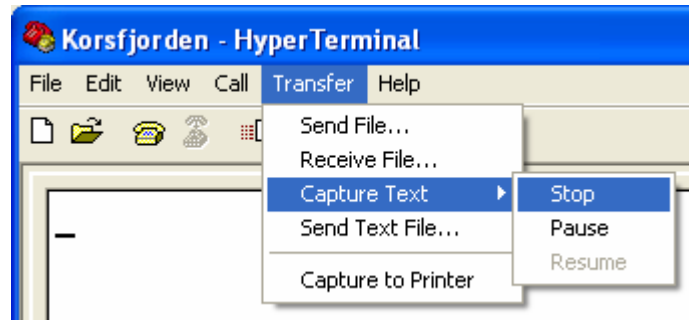
1.                                                                    Date: 25/6-2002

-----
Parameter          Unit          Reading
          9:59
-----
01 Reference                228
02 Wind speed                m/s          6.0
03 Wind gust                 m/s          8.7
04 Wind direction           Deg.M        35.7
05 Air temperature           Deg.C        12.9
06 Relative humidity        % RH         82.3
07 Visibility                m            1023.0
08 Air pressure (QNH)        hPa          1015.0
09 Wave Height               m            5.3
10 Wave Period               sec.         2.4
11 Buoy Orientation         Deg.M        238.5
12 Current speed             cm/s         0.6
13 Current direction         Deg.M        50.3
14 Water temperature         Deg.C        15.6
15 Battery Voltage          R V          794.0

----- A system from Aanderaa Instruments -----

Time/Date : 25 June-2002 9:59:00
Time      Ref.  Ch002  Ch003  Ch004  Ch005  Ch006  Ch007  Ch008
          Ch009  Ch010  Ch011  Ch012  Ch013  Ch014  Ch015
9:59     228    6.0    8.7    35.7   12.9   82.3   1023.0  1015.0
          5.3    2.4    238.5  0.6    50.3   15.6   794.0
9:49     228    4.4    8.7    35.7   12.8   84.7   1023.0  1015.2
          4.5    2.2    229.7  1.5    7.0    15.6   788.0
    
```

- When the data has been down loaded click the **"Stop"** command.



Format description of the received data.

```

Time/Date : DD m-YYYY HH:MM:SS
Time      Ref.   Ch002   Ch003   Ch004   Ch005   Ch006   Ch007   Ch008
           Ch009   Ch010   Ch011   Ch012   Ch013   Ch014   Ch015
HH:MM    rrrrr   rrrrr.dd rrrrr.dd rrrrr.dd rrrrr.dd rrrrr.dd rrrrr.dd rrrrr.dd
           rrrrr.dd rrrrr.dd rrrrr.dd rrrrr.dd rrrrr.dd rrrrr.dd rrrrr.dd

D = date           m =           January      July
Y = year           February     August
H = hour           March        September
M = minutes        April        October
S = seconds        May          November
r = reading        June         December
d = decimals (can be set to none, 1 or 2)

If the Datalogger is set to show no decimals or to list raw-data, the decimal sign and
the decimal numbers will not be included in the data string.

The heading will increase together with the number of channels activated. If more than 16
channels are listed a third line will appear in the heading presenting the channel num-
ber. A LF and CR separates every line. If the Battery Voltage measurement is set to be
stored, it will be added as the first channel and the heading will change. See below.

Time  BattVolt  Ref.   Ch002   Ch003   Ch004   Ch005   Ch006   Ch007

```

To insert the data into a spreadsheet use the "3660 List converter", a free utility program that can be downloaded from our website at:

<http://www.aanderaa.no/Datalog3660.htm>

Reading of Recorded Data.

To read the Data Storage Unit 2990 or 2990E, the following equipment is needed.

- 1) A Personal Computer
- 2) DSU Reader 2995
- 3) Data Reading Program 5059

The DSU reader 2995 will shift the level of the ASCII characters from the DSU to the standard levels of the RS-232C data format needed for further handling of the data.

When a DSU is connected to a suitably programmed computer, and when the right

commands are given by the computer, the data will be transferred to the computer at a rate of 9600 baud. As this process goes on, the display of the DSU will show a steadily decreasing number until all data has been transferred. Data is not removed from the DSU during this process. If the DSU is disconnected from the DSU reader, the DSU will again show its initial number, after which the data transfer process can start over again if wanted.

To remove the data stored in the DSU, two special commands must be given. After the data have been removed, the DSU display will show five zeros.

Data Reading Program 5059

The Data Reading Program DRP 5059 is a totally new Win32 based program, designed using the most modern software technology

presently available. Emphasized has been put on ease of use together with versatile, graphical user interface and system flexibility.

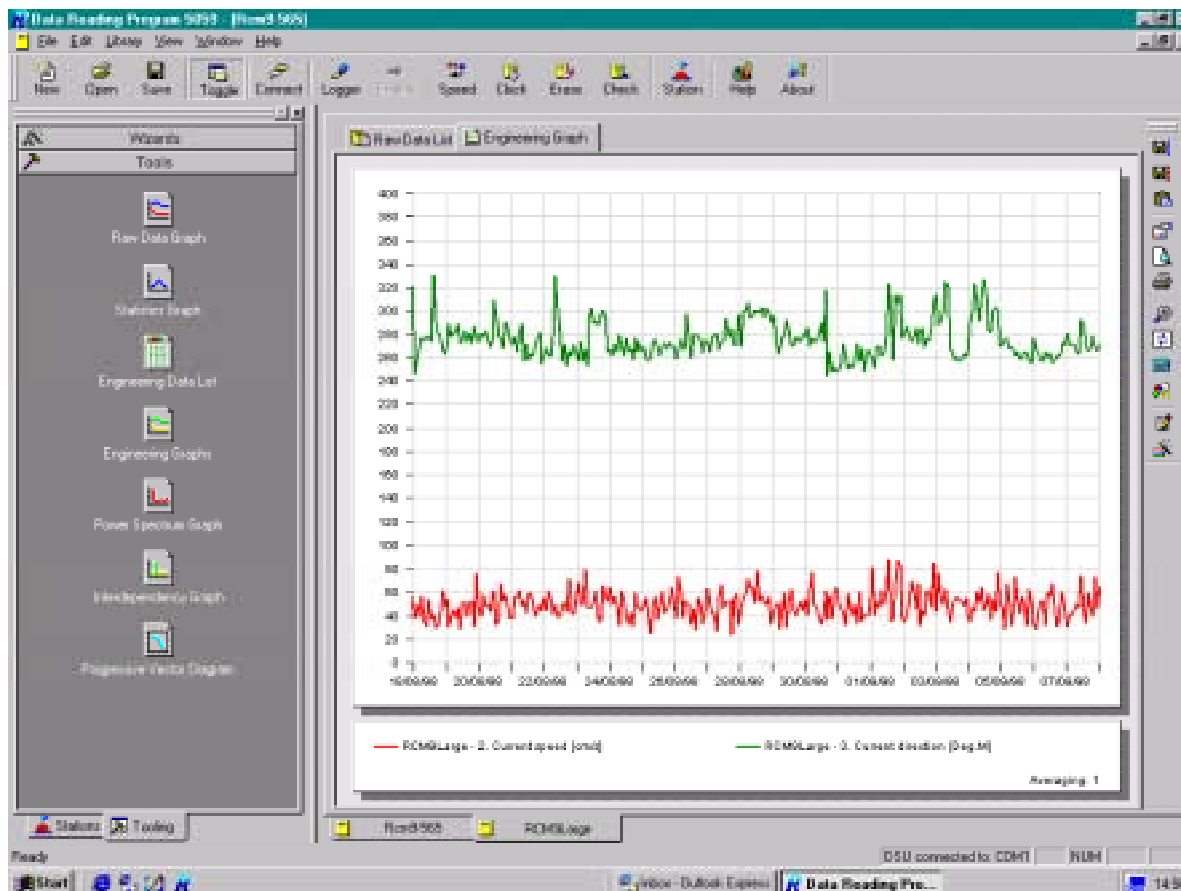


Fig. 5 An example of Data Reading Program 5059 screen view

Minimum requirements are:

Pentium 166 Processor (recommended),
16MB RAM for Windows 95 and 98, 32MB RAM for Windows NT, 10MB Hard Disk. It can be used with Windows ©95, build 1111, Windows ©98 and Windows NT™ Sp3.

The program replaces the Data Reading Program 4059. The program will not work with Windows 3.1 or 3.11, and customers working in these environments should still use the 4059 program.

It is a component based program, built using a large set of independent binary components that become a part of your operating system instead of building the application into one huge executable file. As such, each component becomes available to any application that can make use of it.

The advantage of using this technique is that only one copy of the component resides on your disk although several applications may use it. This yields less chance for bugs or errors and it improves productivity through reuse of programming effort.

An example of such a component is the AAIComServer used to set up the serial (COM) ports and download the DSU. Used in the Display Program 3710, it has proven its reliability.

Perhaps the most important feature is the possibility to design your own custom analysis tool components. The DRP 5059 incorporates a special hook-in mechanism for ActiveX components. The hook-in interface provides your ActiveX component with access to the database and to a window in which you can show the analysis result.

In most cases, you will probably be satisfied with the tools shipped with the program from the factory. These tools comprise graphing features, statistical analysis and signal analysis. Analyze the exported ASCII files from the database in other products such as Microsoft Excel.

The Data Reading Program 5059 is a multi-document application. A document always links to a measurement session. A measurement session usually consists of the data that is stored in a single Data Storage Unit (DSU).

A DSU connects to a document via a COM port. Several documents can open at the same time. Each document uses a separate COM port, so to work with two DSUs at the same time, two COM ports must be available. The COM port is, however only needed during the actual DSU download (reading) session and not while working with a previously downloaded DSU file or an imported ASCII file.

The Data Reading Program 5059 is a new, multifunction handling and data processing program.

It contains:

- a Template Library of standard instruments, stations and sensors from Aanderaa Instruments
- a Custom Library to store customers' own product specifications and
- a Tooling section for different data handling functions as well as a faster data transfer mode.
-

Two sample *.dsu files, located in the samples directory, allows for experimenting with the program without having to download a DSU item.

To download a complete version of the Data Reading Program 5059, see our web pages on the internet. The program grants a 30 day trial period during which time all functionality is available.

After the trial period the program reverts into a non- licensed, limited capability version. By purchasing a license key from the manufacturer, or one of our representatives, the full functionality will be retained. The size of this file is 3253KB

CHAPTER FIVE MAINTENANCE

General

The Coastal Monitoring Buoy CMB 4280 requires a minimum of maintenance. The maintenance and cleaning intervals depends on the local environmental conditions, under which the buoy is deployed.

The buoy should be checked regularly for any damage. The outside should be kept clean, es-

pecially the Solar Cell Panels.

Before launching the buoy again, it is recommended to apply suitable anti-fouling paint to the parts of the buoy that will stay under water bearing in mind that the sensing area of the sensors must not be covered.

Maintenance procedure

Once a year the buoy should be overhauled according to the following procedure.

1. Turn the buoy OFF by removing the ON/OFF plug. Protect open plugs with cover caps.
2. When lifted out of the sea and on deck, clean the buoy hardware for marine fouling such as seashells, barnacles, seaweed, crustacea etc. Pay special attention to the cone joints which must be separated for further inspection.
3. Disconnect the solar cell panels from the buoy hardware by detaching the cable between the buoy hardware and the Control Unit. Protect plugs with cover caps.
4. Detach meteorological and submersible sensors and protect open plugs with cover caps. Follow the maintenance instructions for each sensor.
5. Remove the four bolts fastening the Central Buoy Module to the buoy hardware and pull the superstructure with the sensor string out of the buoy hardware. Handle with extra care to avoid damage to the Doppler Current Sensor and Wave Height Sensor if installed.
6. Detach the Doppler Current Sensor if installed. Protect plugs with cover caps.
7. Remove the sensor string before cleaning the inside of the buoy hardware.
8. After maintenance is performed on all sensors, reinstall sensors and perform a function test on the buoy. See next page.

Function Test

Buoy Hardware

1. Cover up all five solar cell panels.
2. Remove the cover from one of the panels and measure the voltage on the 2-pin plug with a voltmeter. The voltage reading should be between 12-15V. Cover the panel again and remove cover from the next panel and check voltage reading. Repeat procedure until all panels has been tested.

Sensors

1. Connect Connecting Cable 2842 between the PDC-4 input receptacle on Deck Unit 3127 and the PDC-4 Output receptacle on the Control Unit.
2. Connect RS-232C Cable 3016C between the RS-232C Output on Deck Unit 3127 and a computer's serial port.
3. Start Display Program 3710 and open the *.aip file for the specific buoy.
4. Insert the ON/OFF plug into the ON/OFF receptacle on the Control Unit. The Datalogger will now start scanning the sensors. After the last channel has been scanned the data will be presented in the 3710 display.
5. Wind Speed/Gust, check for sensible readings.
6. Wind Direction, turn the wind vane and see that the readings change in correlation with the position of the wind vane.
7. Air Temperature, check for sensible reading.
8. Relative Humidity, check for sensible reading.
9. Visibility, cover the sensor legs with a dark cloth to get max. reading and hold a reflective surface approx. 5 cm below sensor to get min. reading
10. Current Speed/Direction, to test these parameters the buoy should be deployed into the water.
11. Water Temperature, check for sensible readings.
12. Conductivity, use resistor loop to check the sensor.
13. Water Temperature, check for sensible readings.

GSM Modem

Dial the GSM modem from another modem and check that data are accessible.

Charging procedures

1. Disconnect the power cable from the buoy hardware from the Control Unit, and connect the charging cable (Connecting Cable 3483, 2 pins and free end) to the Solar Panel receptacle on the Control Unit.
2. Adjust the Battery Charger to 16Volt.
3. Connect the charging cable to the power supply (with voltage adjuster and current limiter) and adjust the current limiter to 2.1A. Charge for 14 hours.
4. The batteries in the Central Buoy Module will withstand 100% overcharge, but **precaution should be taken to avoid temperature over 50°C.**
5. After the charging period, disconnect the charger and cable.

We do not recommend opening any of the sections of the buoy if all the readings look fine. If a problem should occur the different sections can be opened and inspected/serviced as described below.

Central Buoy Module

1. Check the outside of the Central Buoy Module for wear and corrosion.
2. Remove the six flange screws at the lower end of the module.
3. Pull the inner structure out of the tube.
4. Remove the link from the lower end of the Central Buoy Module by removing the four screws.
5. Check the link and the Central Buoy Module for leakage and corrosion.
6. Detach the battery connector and measure the voltage on the three battery modules. If voltage is less than 12V the batteries need to be recharged.
See instruction on how to recharge the batteries.
7. Remove the Buoy Orientation Sensor and the Wave Height Sensor. See instructions on how to maintain these sensors and reinstall.
8. Make sure the battery modules are fastened to the frame. If not replace the tape.
9. Replace silica gel bags.
10. Apply silicon grease to new o-rings and reassemble the module.
11. Apply anti-seize lubricant "Un-lock" on the upper cone.

Control Unit 3850

1. Check the upper and lower end connectors for damage and corrosion. Also check that the guiding pin on the lower end is fastened. If it is loose, remove it and clean the mounting hole with acetone and use Loctite 648 to fasten the pin again.
2. Open the unit by removing the screw on the upper end cone, and press the lower end receptacle in.
3. Pull the frame up by pulling the upper end receptacle housing until the printed circuit card is out of the tube. The whole frame cannot be completely removed from the tube. Check for leakage and corrosion.
4. Replace silica gel bags.
5. Apply silicon grease to new o-rings and replace old o-rings.
6. Apply "Un-lock" to:
 - a. Upper connector housing and put the frame back into the
 - b. Upper and lower cones.
 - c. Locking screw on the upper cone.
 - d. Threads on the muff nut.

Mast Section with Flashing Light

1. Check the upper and lower end connectors for damage and corrosion. Also check that the guiding pin on the lower end is fastened. If it is loose, remove it and clean the mounting hole with acetone and use Loctite 648 to fasten the pin again.
2. Open the unit by removing the screw on the upper end cone and press the lower end receptacle in.
3. Pull the frame up by pulling the upper end receptacle housing until the printed circuit card is out of the tube. Check for leakage and corrosion.

4. Replace silica gel bags.
5. Apply silicon grease to new o-rings and replace the old o-rings.
6. Apply "Un-lock" to:
 - a. Upper connector housing and put the frame back into the
 - b. Upper and lower cones.
 - c. Locking screw on the upper cone.
 - d. Threads on the muff nut.

Sensor Ring

1. Remove all sensors, radio/GSM Modem and cover caps.
2. Visually inspect sensor outlets and Radio/GSM outlet for signs of corrosion and leakage. Pay special attention to o-ring grooves concerning corrosion and scratches. If any leakage or corrosion is detected in any of the sensor outlets, clean with an appropriate cleaner (alcohol based). Dry out the outlet by elevating the temperature above dew point, but not above 60°C. If water has entered through a sensor or the Radio/GSM Modem, we recommend that the sensor/radio/GSM Modem be sent back to the factory for repair, test and calibration.
3. Ohm all connections between sensor outlets and the lower 18-pin connection. Use an ohmmeter set to low resistance (max 2k). Our Test Plug 3419 with 6-pin receptacle can be used. In addition measure for short circuits between the different pins (signals/data channels). When measuring for short circuits, set your ohmmeter to >1M.
4. Check that the guiding pin on the lower end is fastened. If it is loose, remove it and clean the mounting hole with acetone and use Loctite 648 to fasten the pin again.
5. Apply silicon grease to new o-rings and replace the old o-rings.
6. Apply "Un-lock" to:
 - a. Upper connector housing and put the frame back into the
 - b. Upper and lower cones.
 - c. Lock screw on the upper cone.
 - d. Threads on the muff nut.

Recommended Spares and Accessories 3889

Consisting of:

1202003	1	Ø 0,70 millimeter acid proof locking wire AISI 316
1642401	4	M 8x8 millimeter Set Screw, DIN 16 AA4
1680054	2	D-Shackle No. 730 with long pin and split pin 316
1862012	8	O-ring Angus RM 0096-24
1862017	8	O-ring 10x1, Simrit material
1863002	8	O-ring silicone 24,6 x 2,4 millimeter
1863003	2	O-ring, SOR 13 (26,5x3)
1863004	2	O-ring, RMO 186-24 (18,6x2,4)
1863008	2	O-ring, SOR 131 (18,1x1,6)
1863014	4	O-ring, 22 x 2 (DCS 3900)
1864006	5	O-ring, R-147 for Mast Section
1864019	5	O-ring, 46,0 x 3,0
0964078	2	Wide Retaining Ring
2228A	1	Three Cup Rotor for Wind Speed Sensors
2620B	1	Bearing Assembly. WSS 2740
3142	1	Cover Cap, Sensor Outlet
2769	1	Mast Cap for 2" tube
3738	1	O-ring grease, 50 ml.
3739	1	Un-lock Release Agent, 50 ml.

Tool Kit, Data Buoy

Part no.	Amount	Description	Formål.
10 1017	1	Wrench, NV 7 mm	Radiation Screen
10 1027	2	Wrench, NV 10 mm	CBM 3867
	1	Wrench, NV 11 mm	Nut, Antenna
10 1020	1	Wrench, NV 13 mm	Adjustable Anchoring point
10 1021	1	Wrench, NV 14 mm	Wind Speed Rotor, old type
10 1049	1	Wrench, NV 19 mm	Wind Speed Rotor / CBM 3867
91 3021	2	Wrench, NV 30 mm	DCS 3500
	2	Wrench, NV 36 mm	DCS 3900
91 3019	1	Hex Key, NV 4 mm	Sensor fot
91 3002	1	Hex Key, NV 4 mm	Sensor fot
91 3008	1	Hex Key, 2,5 mm	Wind Direction Sensor
91 3013	1	Hex Key, 5 mm	Subm. Sensor / Buoy hardware
91 3014	1	Hex Key, 6 mm	Buoy hardware
	1	Pipe Wrench	Mast Mufle, old / Sensor house
91 3025	2	C Wrench, 58/62 mm	Mast Joints
91 3008	1	C Wrench, 52/55 mm	Sensor Disk
	1	C Wrench, 20/22 mm	Air Temp. / Rel. Humidity Sensor
10 0013	1	Screw Driver, flat 5,0 mm	Wind Dir. Sensor / Opne 3189 etc.
10 0018	1	Screw Driver, flat 2,5 mm	Wind Speed Rotor Boss
	1	Nippers	Split Rivet, Thimble Bolt
	1	Pliers	Split Rivet, Thimble Bolt
Electronic Work			
10 2008	1	Tweezers , flat	
10 2007	1	Tweezers , Angled	
	1	Diagonal Cutting Nippers	
	1	Electronic Pliers	
	1	Wire Stripper, Small	
	1	Soldering Iron, Gas	
	1	Solder, Dispenser	
	1	Desolder Wick Dispenser	
Test Equipment			
97 3419	1	Test Sensor, 6-pin	
97 3418	1	Test Sensor, 10-pin	
97 3443	1	Test Adapter for Field Station	

CHAPTER 6 Drawings

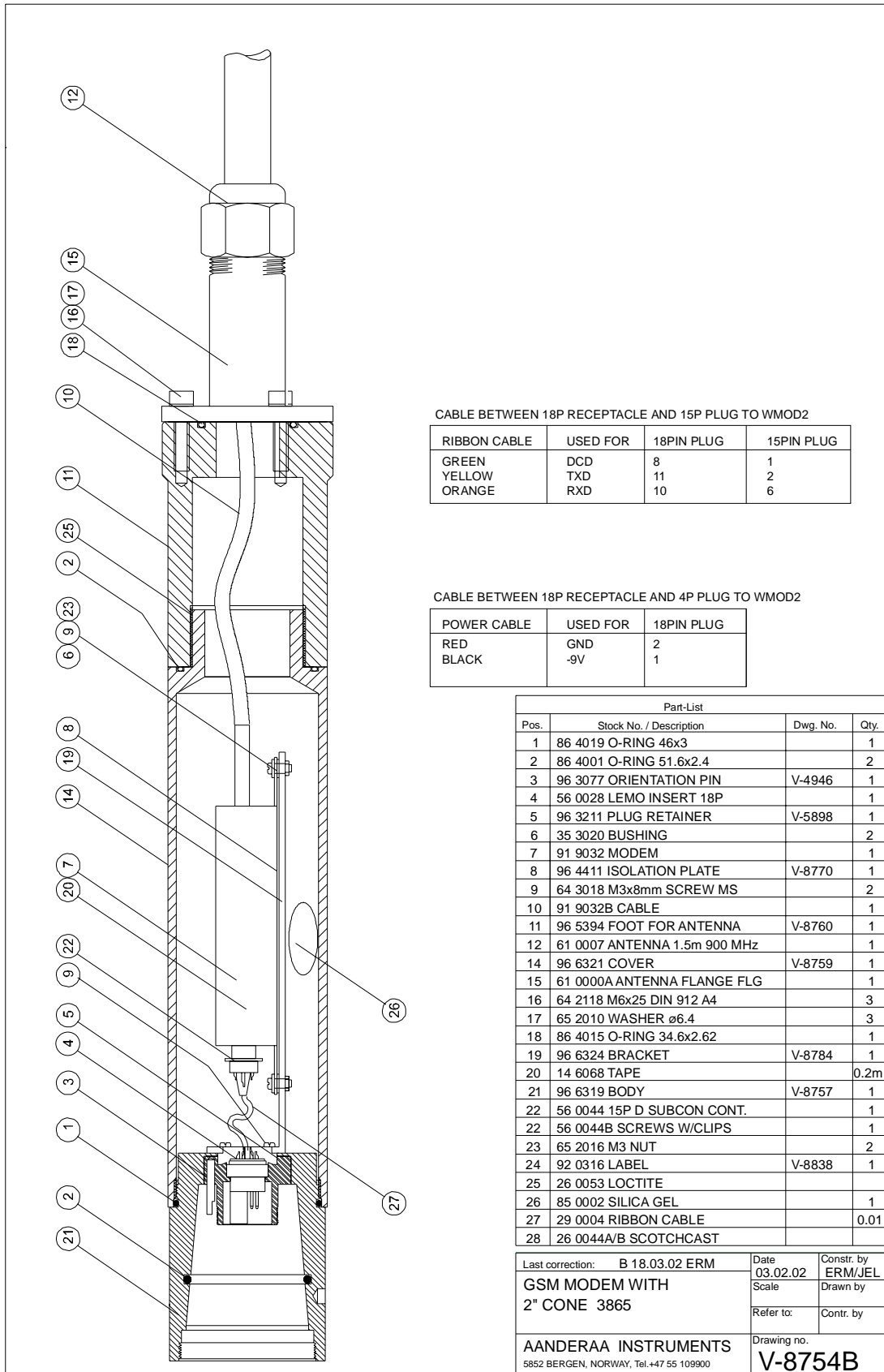


Fig. 6 GSM Modem with 2" Cone 3865

S-6262

TOTAL LENGTH OF ANCHORING LINE:
 DEPTH + MAX TIDE + MAX WAVE HEIGHT
 +FROM 25 TO 50% EXTRA LENGTH FOR TOTAL

Last correction: B 17.12.01 ERM		Date	Constr. by
MOORING SYSTEM FOR		17.08.00	ERM
COASTAL MONITORING BUOY		Scale	Drawn by
		Refer to:	ERM
			Contr. by
		Drawing no.	S-6262B
AANDERAA INSTRUMENTS		BERGEN, NORWAY, Tel. +47 55 132500	

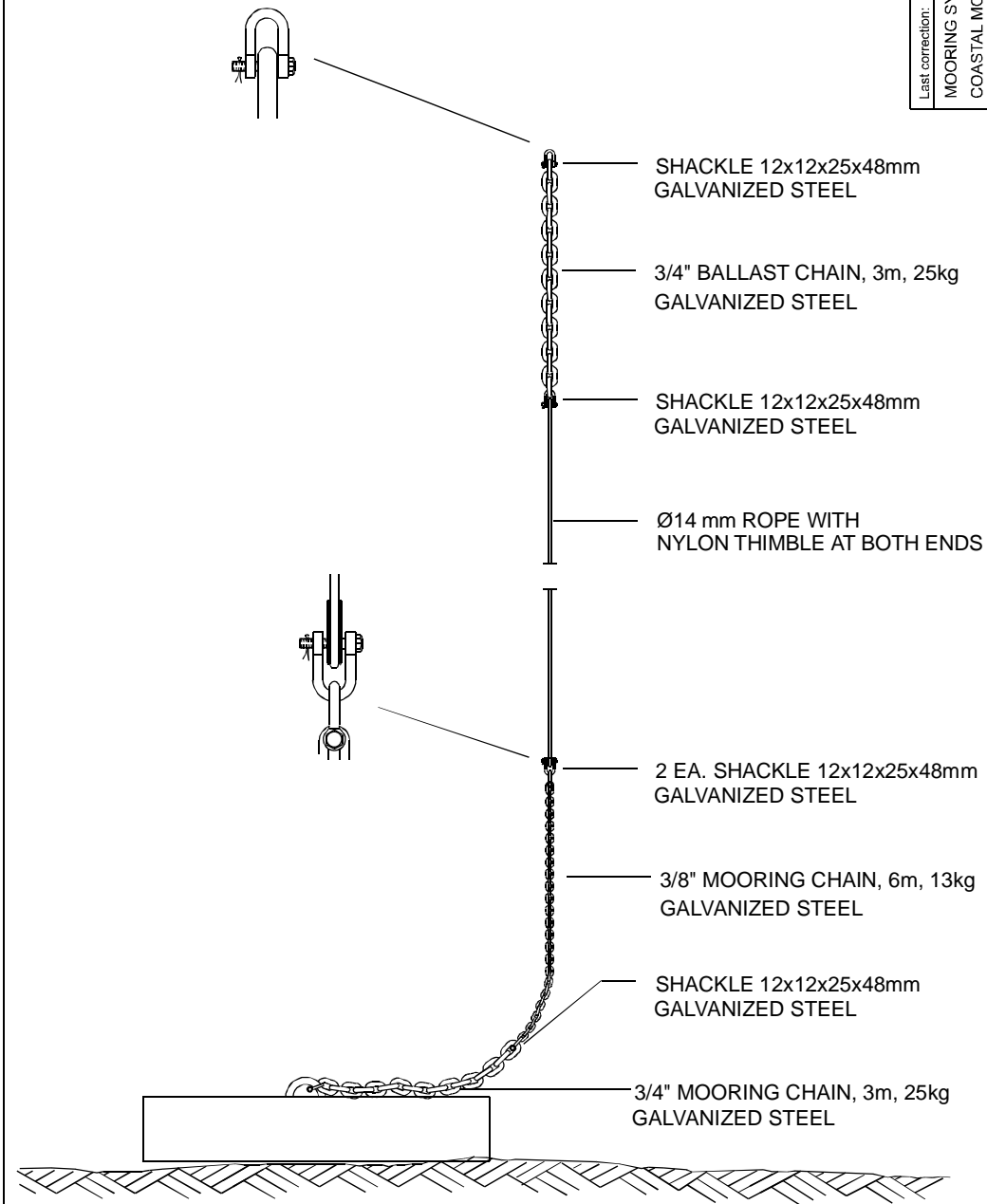


Fig. 7 Mooring System for Buoy S6262B

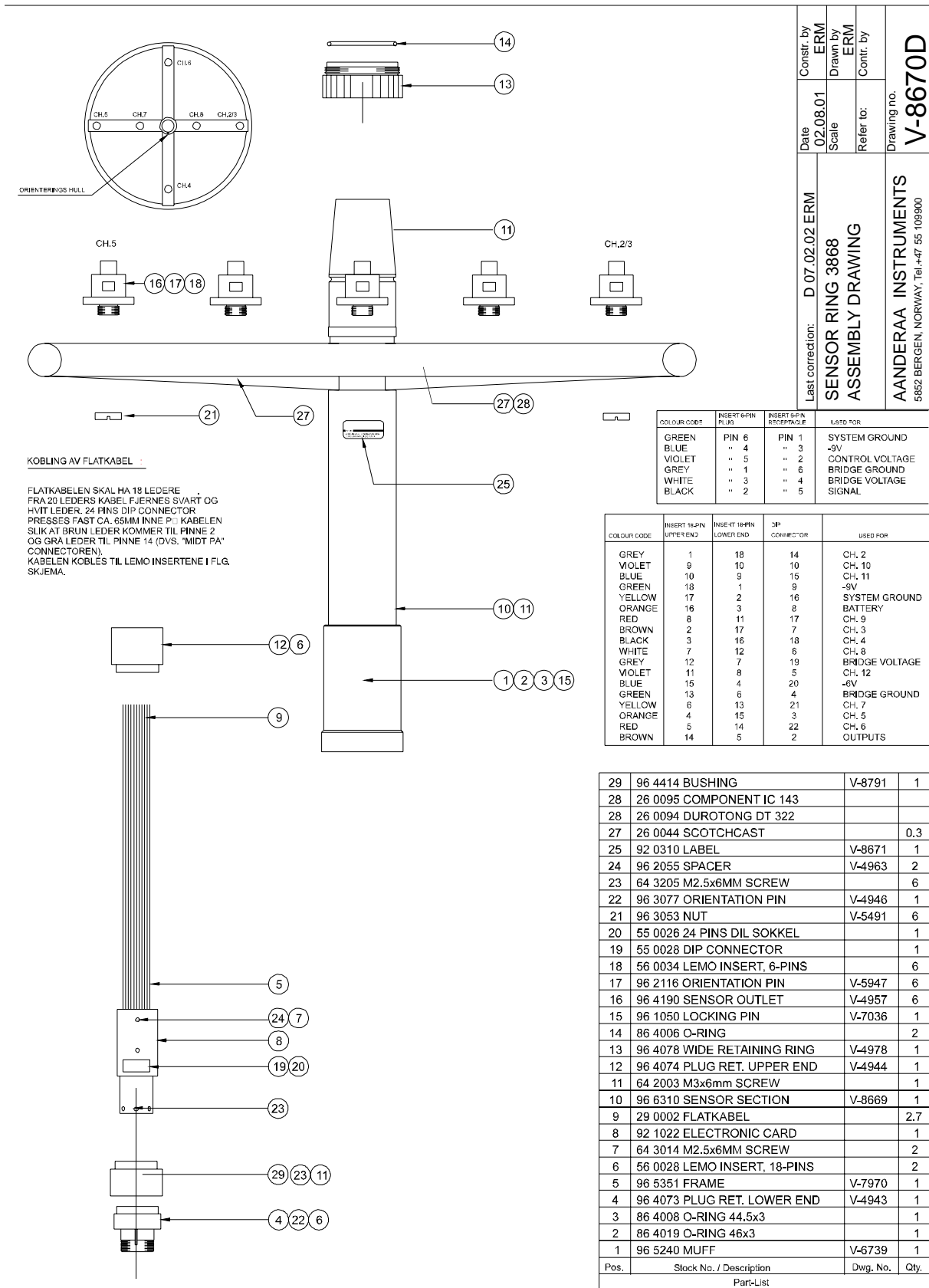


Fig. 8 Sensor Ring 3868

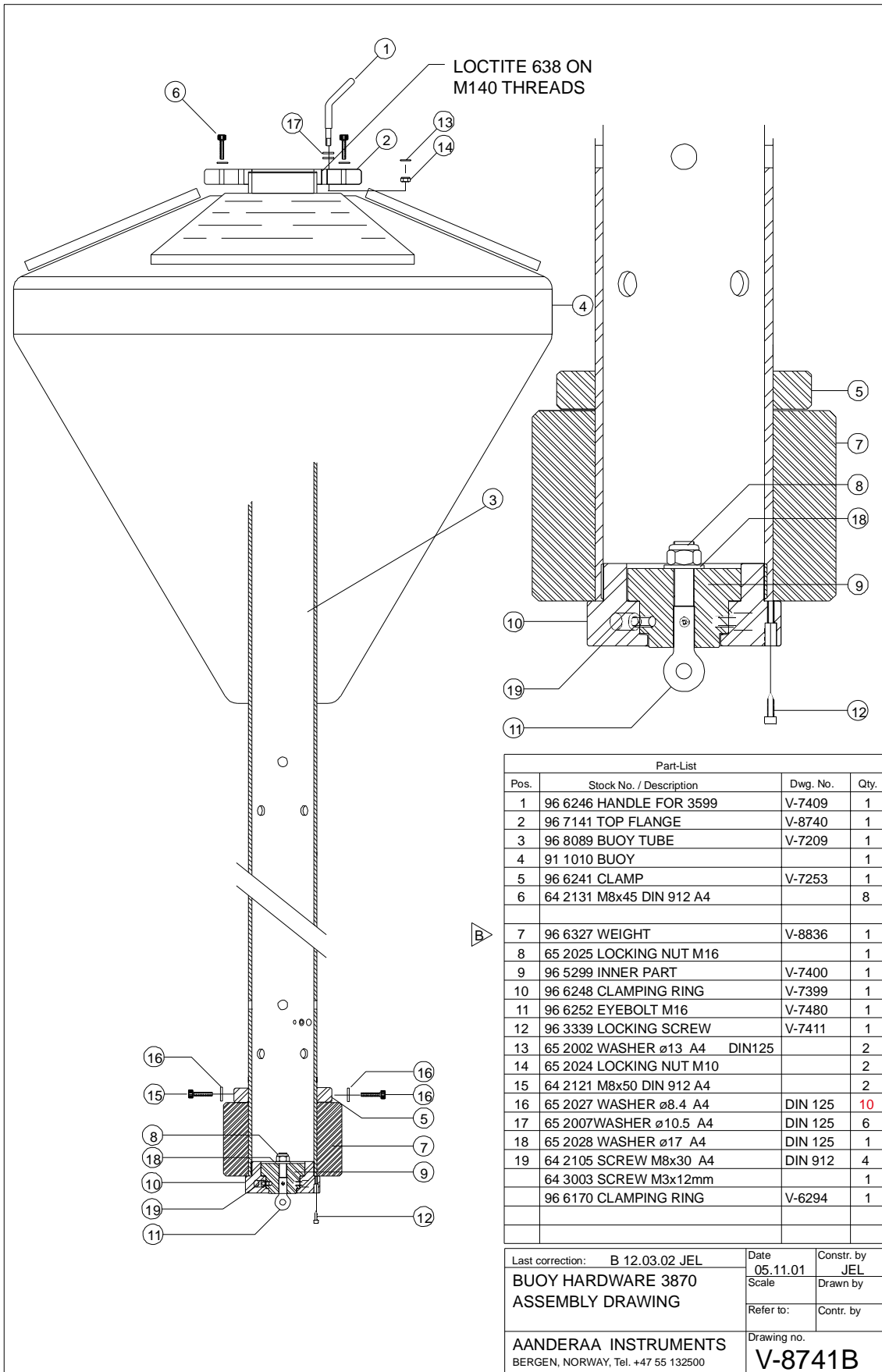
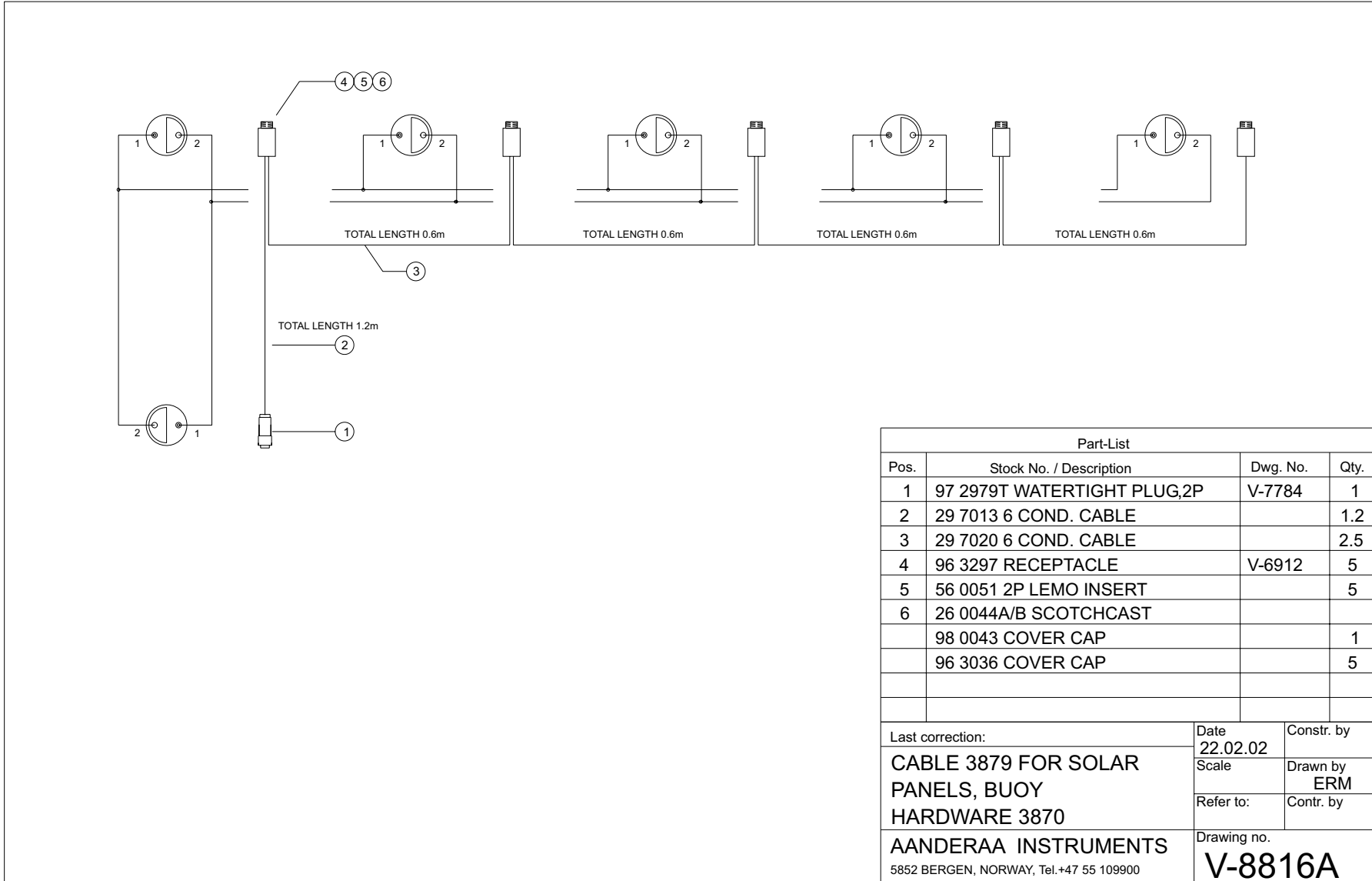


Fig. 9 Buoy Hardware 3870

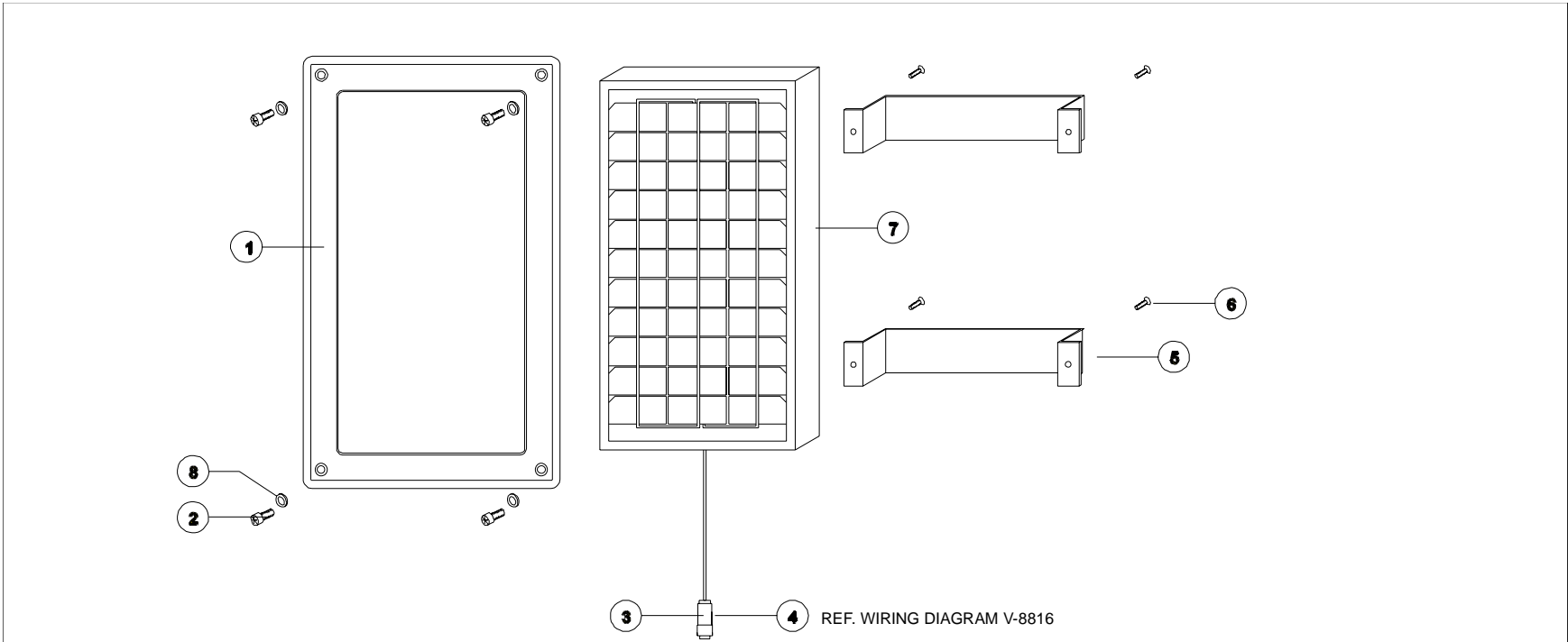
Fig. 10 Cable 3879 for Solar panels

V-8816



Part-List			
Pos.	Stock No. / Description	Dwg. No.	Qty.
1	97 2979T WATERTIGHT PLUG,2P	V-7784	1
2	29 7013 6 COND. CABLE		1.2
3	29 7020 6 COND. CABLE		2.5
4	96 3297 RECEPTACLE	V-6912	5
5	56 0051 2P LEMO INSERT		5
6	26 0044A/B SCOTCHCAST		
	98 0043 COVER CAP		1
	96 3036 COVER CAP		5
Last correction:		Date	Constr. by
CABLE 3879 FOR SOLAR PANELS, BUOY HARDWARE 3870		22.02.02	
		Scale	Drawn by
			ERM
		Refer to:	Contr. by
AANDERAA INSTRUMENTS		Drawing no.	
5852 BERGEN, NORWAY, Tel.+47 55 109900		V-8816A	

Fig. 11 Solar Panels 3878

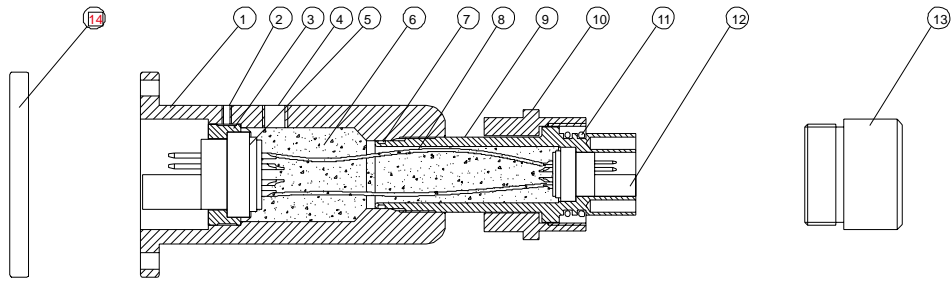


Part-List			
Pos.	Stock No. / Description	Dwg. No.	Qty.
1	96 7151 FRAME	V-8825	1
2	64 2503 SCREW M5x16 TORX A4		4
3	2979T 2P. TITAN PLUG		1
4	35 0033 BYS 26		1
5	96 6328 BRACKET	V-8837	2
6	64 2221 M4x8 POZ. A4		4
7	91 5001 SOLAR MODULE		1
8	65 2014 ø5.2 WASHER		4

Part no:		Last correction:		Date	Constr. by
Stock No./Description		Qty.	SOLAR PANEL 3878	19.03.02	JEL
				Scale	
				Refer to:	Contr. by
			AANDERAA INSTRUMENTS	Drawing no.	
			5050 NESTTUN, NORWAY, Tel.+47 55 132500	V-8839	

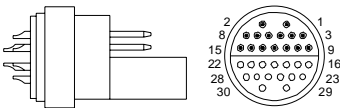
Finish:

Fig. 12 Link 3962 between Doppler Current Sensor (DCS) and CMB 4280

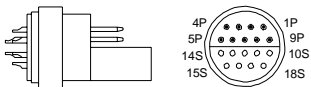


30-PINS INSERT	COLOUR CODE	18-PINS INSERT	USED FOR
27	GREY	1P	CH. 2
26	BROWN	2P	CH. 3
25	BLACK	3P	CH. 4
24	ORANGE	4P	CH. 5
23	RED	5P	CH. 6
16	YELLOW	6P	CH. 7
9	WHITE	7P	CH. 8
3	RED	8P	CH. 9
4	VIOLET	9P	CH. 10
1	BLUE	10S	CH. 11
5	VIOLET	11S	CH. 12
28	GREY	12S	BRIDGE VOLTAGE
22	GREEN	13S	BRIDGE GROUND
6	BROWN	14S	CH. 13
21	BLUE	15S	CONTROL VOLTAGE
2	ORANGE	16S	CH. 14
29	YELLOW	17S	SYSTEM GROUND
30	GREEN	18S	-9V

30 PIN INSERT, SOLDERING SIDE



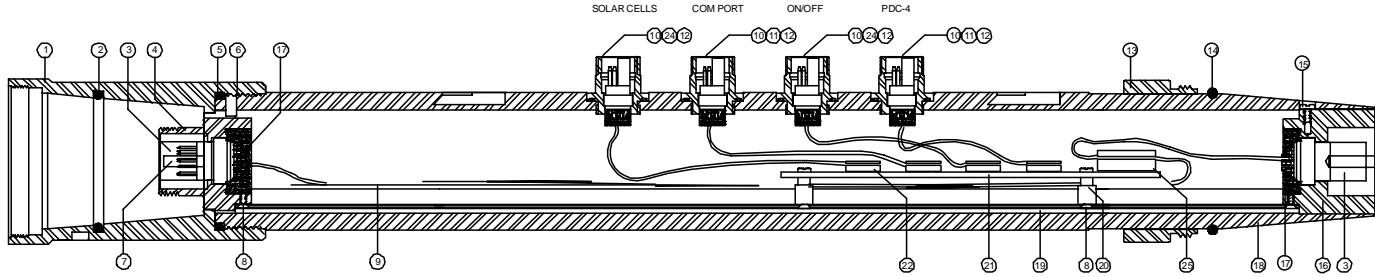
18 PIN INSERT, SOLDERING SIDE



Part-List			
Pos.	Stock No. / Description	Dwg. No.	Qty.
1	96 5396 MOUTH PIECE	V-8786	1
2	64 2403 M3x3 SET SCREW		1
3	96 4407 BUSHING	V-8660	1
4	64 2401 M8x8 SET SCREW		1
5	56 0069 30p. LEMO INSERT		1
6	26 0043 SCOTCHCAST		
7	86 3010 O-RING 19.1x1.6		1
8	29 0004 RIBBON CABLE		
9	96 5395 REAR PIECE	V-8785	1
10	96 4394 NUT M32x1.5	V-8466	1
11	86 3014 O-RING 22x2		2
12	56 0028 18p. LEMO INSERT		1
13	96 4405 CAP M32x1.5	V-8592	1
14	96 5399 COVER CAP	V-8795	1

Last correction: B 18.01.02 ERM	Date 08.11.01	Constr. by ERM
LINK 3962, BETWEEN DCS 3900 AND BUOY	Scale 1:2	Drawn by ERM
	Refer to:	Contr. by
AANDERAA INSTRUMENTS BERGEN, NORWAY, Tel. +47 55 132500		Drawing no. V-8774B

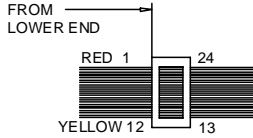
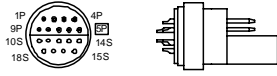
Fig. 13 Control Unit 3850 for Buoy with Datalogger 3860



WIRING DIAGRAM

COLOUR CODE	PIN NO.	PIN NO.	USED FOR	PIN NO.	USED FOR
YELLOW	12	-	-	-	-
ORANGE	13	10	CHARGING	9	CHARGING
RED	11	18	-9V	1	-9V
BROWN	14	1	CH. 2	18	CH. 2
BLACK	10	9	RXD COM PORT	10	RXD COM PORT
WHITE	15	10	CHARGING	9	CHARGING
GREY	9	18	-9V	1	-9V
VIOLET	16	17	SYSTEM GROUND	2	SYSTEM GROUND
BLUE	8	16	BATTERY	3	BATTERY
GREEN	17	8	TXD COM PORT	11	TXD COM PORT
YELLOW	7	2	CH. 3	17	CH. 3
ORANGE	18	3	CH. 4	16	CH. 4
RED	6	7	CH. 8	12	CH. 8
BROWN	19	12	BRIDGE VOLTAGE	7	BRIDGE VOLTAGE
BLACK	5	11	DCD	8	DCD
WHITE	20	15	CONTROL VOLTAGE	4	CONTROL VOLTAGE
GREY	4	13	BRIDGE GROUND	6	BRIDGE GROUND
VIOLET	21	6	CH. 7	13	CH. 7
BLUE	3	4	CH. 5	15	CH. 5
GREEN	22	5	CH. 6	14	CH. 6
YELLOW	2	14	OUTPUT	5	OUTPUT
ORANGE	23	17	SYSTEM GROUND	2	SYSTEM GROUND
RED	1	16	BATTERY	3	BATTERY
BROWN	24	-	-	-	-

18 PIN INSERT, EXTERIOR VIEW



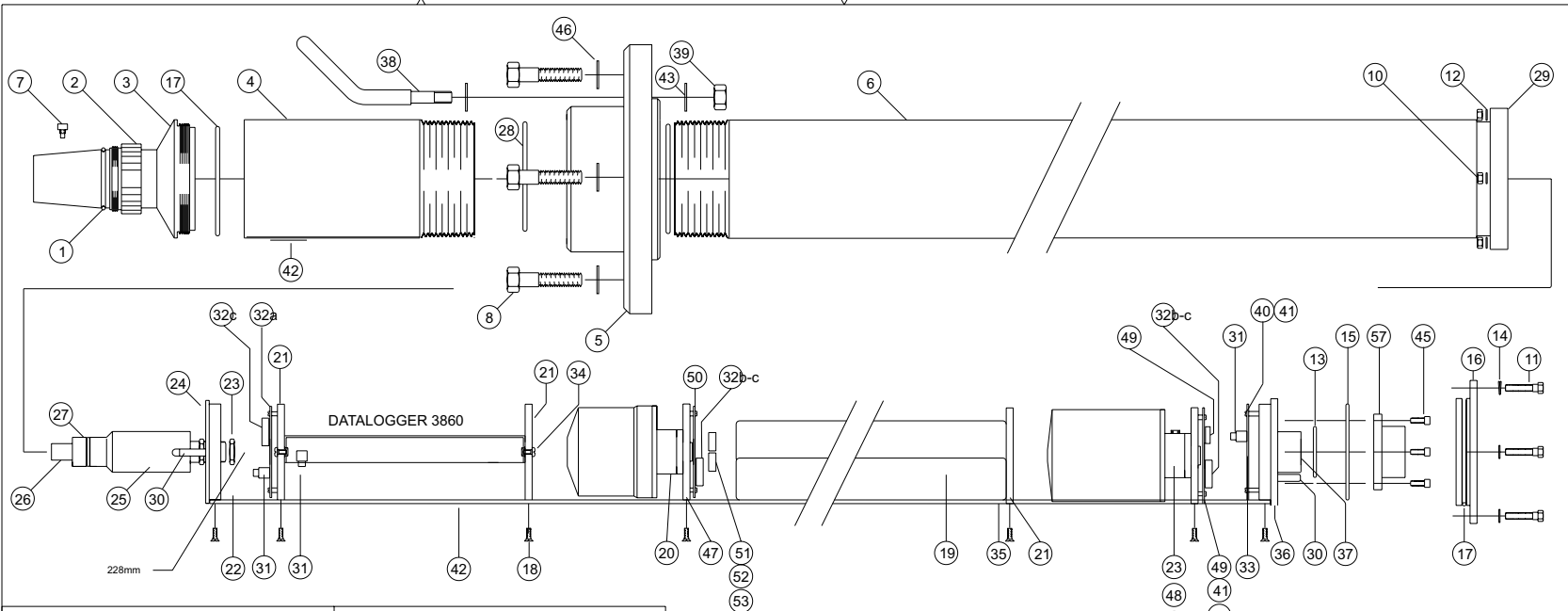
CABLE	24 PIN DIP	14 PIN DIP	PDC-4 OUTPUT	USED FOR
COLOR CODE	PIN NO.	PIN NO.	6P INSERT	USED FOR
BROWN	16	3	1	SYSTEM GROUND
RED	9	11	3	-9V
ORANGE	20	4	2	CONTROL VOLTAGE
YELLOW	2	10	5	OUTPUT
GREEN	-	5	4	-
BLUE	-	9	6	-

CABLE	24 PIN DIP	14 PIN DIP	ON/OFF	USED FOR
COLOR CODE	PIN NO.	PIN NO.	2P INSERT	USED FOR
VIOLET	8	3	1	BATTERY
GREY	9	11	2	-9V
WHITE	8	4	1	BATTERY
BLACK	9	10	2	-9V
BROWN	8	5	1	BATTERY
RED	9	9	2	-9V

CABLE	24 PIN DIP	14 PIN DIP	COM PORT	USED FOR
COLOR CODE	PIN NO.	PIN NO.	6P INSERT	USED FOR
ORANGE	16	3	1	SYSTEM GROUND
BLUE	8	11	3	BATTERY
GREEN	-	4	1	-
BLUE	6	10	5	RXD COM-PORT
VIOLET	5	5	4	DCD
GREY	21	9	6	TXD COM-PORT

CABLE	24 PIN DIP	14 PIN DIP	INPUT SOLAR CELLS	USED FOR
COLOR CODE	PIN NO.	PIN NO.	2P INSERT	USED FOR
WHITE	16	3	1	SYSTEM GROUND
BLACK	15	11	2	CHARGE
BROWN	16	4	1	SYSTEM GROUND
RED	15	10	2	CHARGE
ORANGE	16	5	1	SYSTEM GROUND
YELLOW	15	9	2	CHARGE

Pos.	Stock No. / Description	Dwg. No.	Qty.	25	55 0028 25 PIN DIP	V-8705	1
15	64 2003 M3x6mm SCREW		1	24	56 0050 2P INSERT	V-8688	1
14	86 4006 O-RING R147		1	23	96 3104 COVER CAP	V-5162	4
13	96 4078 WIDE RETAINING RING	V-4978	1	22	55 0017 14 PIN SOCKET		4
12	86 3008 O-RING SOR 131		4	22	55 0020 14 PIN DIP		4
11	56 0034 6 PINS LEMO INSERT		2	21	92 1318 ELECTRONIC BOARD		1
10	96 3372 RECEPTACLE HOUSING	V-7870	4	20	96 2055 SPACER	V-4963	2
9	29 0004 RIBBON CABLE		1.5	19	96 7115 FRAME	V-7820	1
8	64 2219 M2.5x5 DIN85		8	18	96 7137 TUBE	V-3931	1
7	96 3077 ORIENTATION PIN	V-4946	1	17	26 0043 SCOTCHCAST		0.1
6	96 1050 LOCKING PIN	V-7036	1	16	96 4263 PLUG RET. UPPER END	V-6760	1
5	86 4008 O-RING 44.5x3		1	Last correction: C 01.03.02 ERM		Date	Constr. by
4	96 4262 PLUG RETAINER	V-6761	1	CONTROL UNIT 3850		14.08.01	ERM
3	56 0028 18 PIN LEMO INSERT		2	FOR BUOY w/DL 3860		Scale	Drawn by
2	86 4019 O-RING 46x3		1	ASSEMBLY DRAWING		Refer to:	Conr. by
1	96 5240 MAST MUFF	V-6739	1	AANDERAA INSTRUMENTS		Drawing no.	V-8675C
				BERGEN, NORWAY, Tel. +47 55 132500			



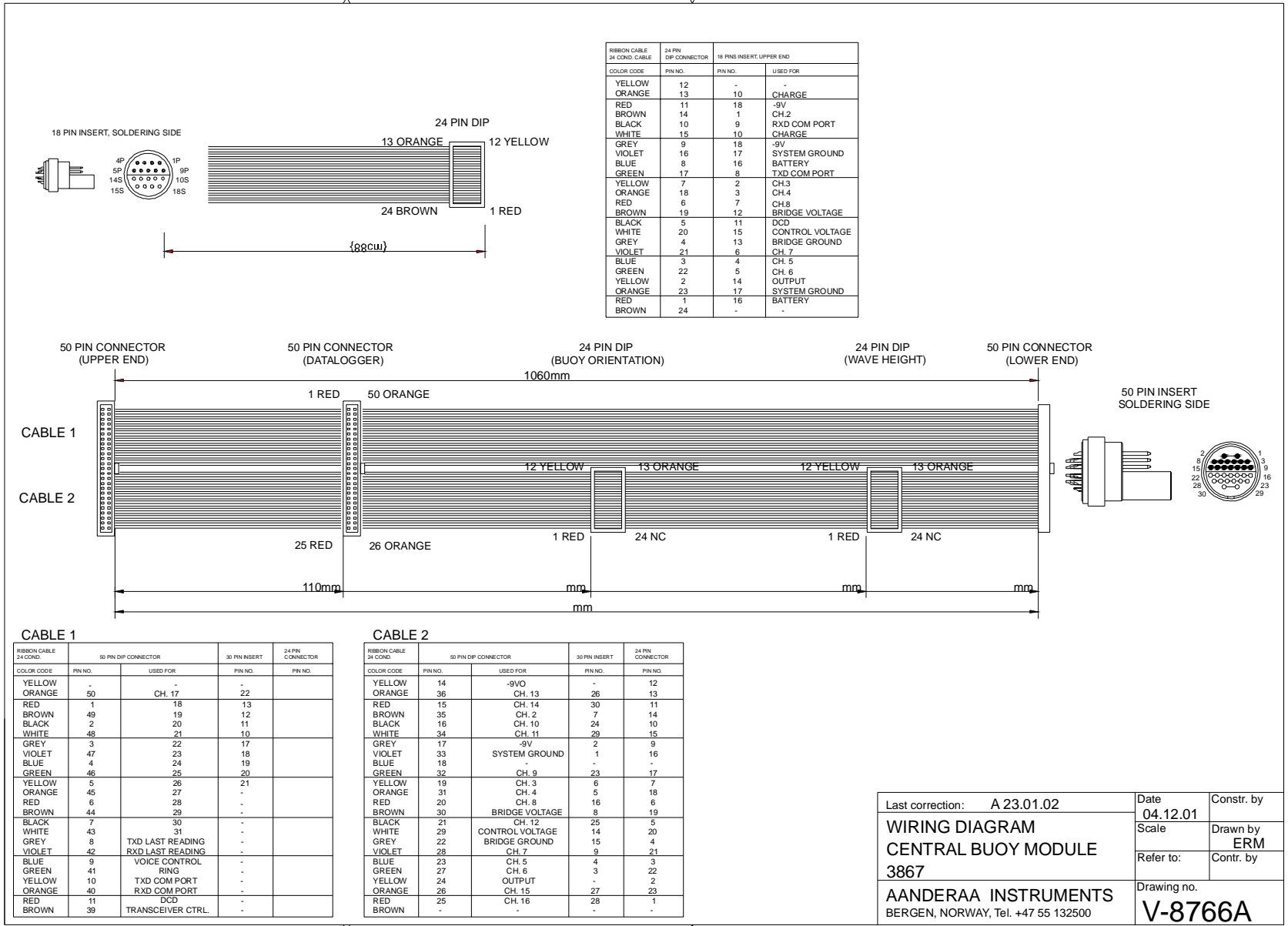
Part-List				Part-List			
Pos.	Stock No. / Description	Dwg. No.	Qty.	Pos.	Stock No. / Description	Dwg. No.	Qty.
1	86 4006 O-RING R147		1	31a	55 0022 PV50G FEMALE		3
2	96 4078 WIDE RETAINER RING	V-4978	1	31b	55 0023 SLU50S212 MALE		1
3	96 6243 UPPER CONE	V-7261	1	32a	92 1319 EL. BOARD		1
4	96 7104 UPPER END	V-7275	1	32b	55 0026 DIL. SOCKET 24 PIN		2
5	96 6244 FLANGE	V-7251	1	32c	55 0028 DIP CONNECTOR 24 PIN		3
6	96 8116 LOWER END	V-8758	1	33	92 1320 EL. BOARD	V-8736	1
7	96 1056 UPPER LOCK. SCREW	V-7412	1	34	64 3034 M5x10 Ms DIN 85		4
8	64 2302 SCREW M12x45 DIN931		4	35	96 8115 FRAME	V-8752	1
9	96 5247 CAP	V-7141	1	36	96 5383 LOWER END	V-8653	1
10	65 2011 M6mm NUT		6	37	56 0069 LEMO INSERT 30 PIN		1
11	64 2304 SCREW M6x30		6	38	96 6245 HANDLE, FOR 3591	V-7408	1
12	65 2010 WASHER ø6.3mm		6	39	65 2024 M10mm LOCKING NUT		2
13	86 4021 O-RING 36.5x3		1	40	64 2017 M3x16mm SCREW		3
14	65 2023 SPRING WASHER		6	41	70 0004 STAND OFF ø6x5xø3.2		15
15	86 5008 O-RING 75x3mm		1	42	92 0195 LABEL	V-8798	1
16	96 5297 LOWER FLANGE	V-7258	1	43	65 2007 WASHER ø10.5		4
17	86 5009 O-RING 85x3		2	45	64 2100 UNBRACO M5x12mm		4
18	64 2216 SCREW M4x10 DIN 963		21	46	65 2002 WASHER ø13mm		4
19	59 0008 NiCd BATTERY STAVE		3	47	965393 BASE PL. FOR SENSOR	V-8756	2
20	56 0052 6p. LEMO		1	48	96 2116 ORIENT. PIN	V-5947	2
21	96 5385 BASE PLATE	V-8662	3	49	92 1321 EL. BOARD	V-8792	1
22	29 0004 RIBBON CABLE		3m	50	92 1253 EL. BOARD	V-7385	1
23	96 3083 HEXAG. NUT M16x1		4	51	57 0020 POWERPOLE RED		6
24	96 5390 BASE, UPPER INS.RET.	V-8689	1	52	57 0019 POWERPOLE BLACK		6
25	96 6320 UPPER INSERT RET.	V-8763	1	53	57 0019B KONTAKTELEMENT		12
26	56 0028 LEMO INSERT 18 PINS		1	54	96 4190 SENSOR OUTLET		2
27	86 3004 O-RING 18.6x2.4		1	55	64 2014 M3x12mm SCREW		9
28	86 5010 O-RING 94.84x3.53		2	56	56 0064 10p. LEMO		1
29	96 5301 LOWER FLANGE	V-7397	1	57	96 5400 CAP	V-8804	1
30	67 0007 ø6x24mm OR. PIN		2		85 0002 SILICA BAG		3

WIRING DIAGRAM SEE, V-8766

Last correction:	Date	Constr. by
CENTRAL BUOY MODULE 3867 ASSEMBLYDRAWING	16.11.01	JEL
AANDERAA INSTRUMENTS BERGEN, NORWAY, Tel. +47 55 132500	Scale	Drawn by
	Refer to:	Contr. by
	Drawing no.	
	V-8749	

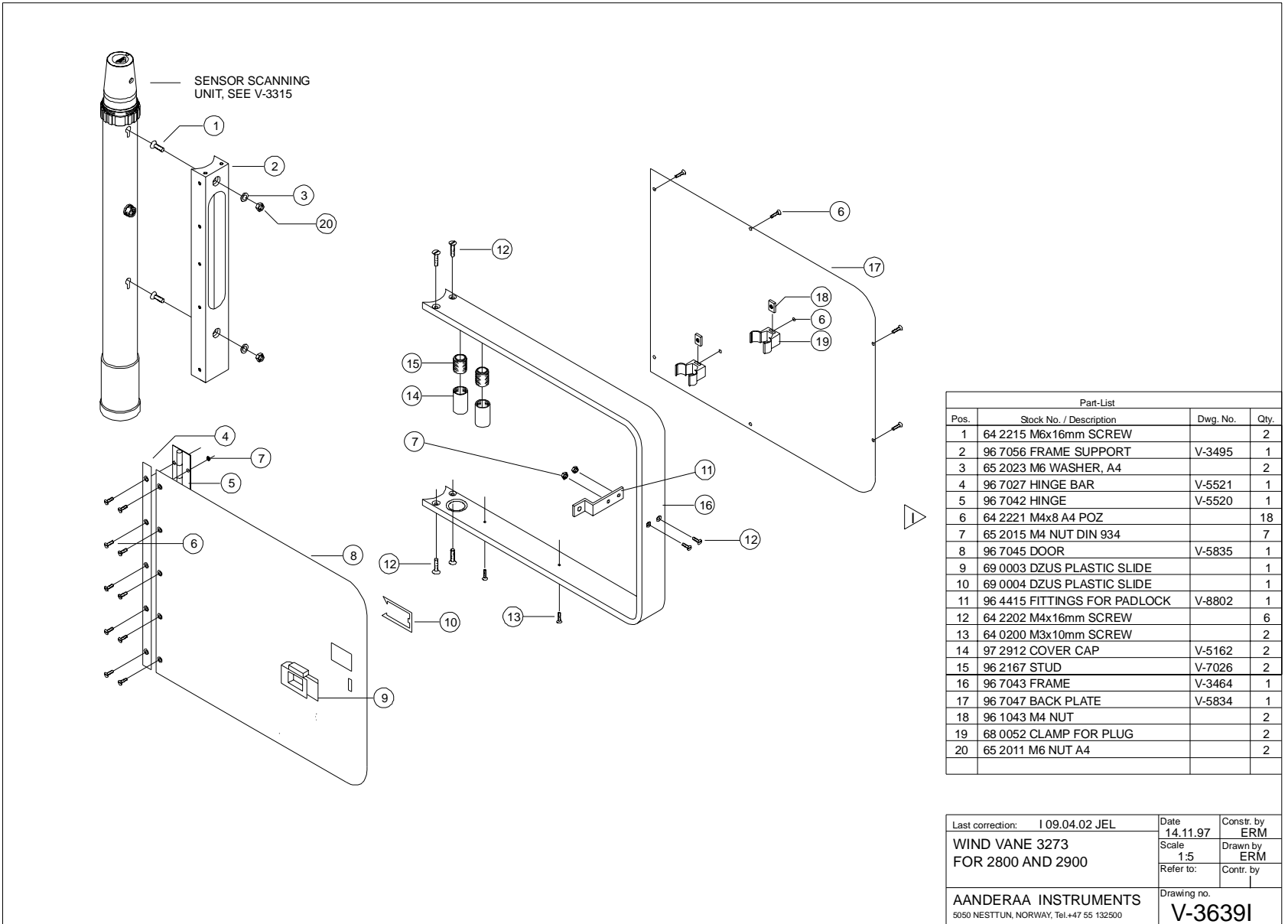
Fig. 14 Central Buoy Module 3867

Fig. 15 Wiring Diagram Central Buoy Module



Last correction: A 23.01.02	Date 04.12.01	Constr. by
WIRING DIAGRAM CENTRAL BUOY MODULE 3867	Scale	Drawn by ERM
	Refer to:	Contr. by
AANDERAA INSTRUMENTS BERGEN, NORWAY, Tel. +47 55 132500	Drawing no. V-8766A	

Fig. 16 Wind Vane 3273



Part-List			
Pos.	Stock No. / Description	Dwg. No.	Qty.
1	64 2215 M6x16mm SCREW		2
2	96 7056 FRAME SUPPORT	V-3495	1
3	65 2023 M6 WASHER, A4		2
4	96 7027 HINGE BAR	V-5521	1
5	96 7042 HINGE	V-5520	1
6	64 2221 M4x8 A4 POZ		18
7	65 2015 M4 NUT DIN 934		7
8	96 7045 DOOR	V-5835	1
9	69 0003 DZUS PLASTIC SLIDE		1
10	69 0004 DZUS PLASTIC SLIDE		1
11	96 4415 FITTINGS FOR PADLOCK	V-8802	1
12	64 2202 M4x16mm SCREW		6
13	64 0200 M3x10mm SCREW		2
14	97 2912 COVER CAP	V-5162	2
15	96 2167 STUD	V-7026	2
16	96 7043 FRAME	V-3464	1
17	96 7047 BACK PLATE	V-5834	1
18	96 1043 M4 NUT		2
19	68 0052 CLAMP FOR PLUG		2
20	65 2011 M6 NUT A4		2

Last correction: 1 09.04.02 JEL	Date 14.11.97	Constr. by ERM
WIND VANE 3273 FOR 2800 AND 2900	Scale 1:5	Drawn by ERM
	Refer to:	Contr. by
AANDERAA INSTRUMENTS 5050 NESTTUN, NORWAY, Tel.+47 55 132500	Drawing no. V-36391	

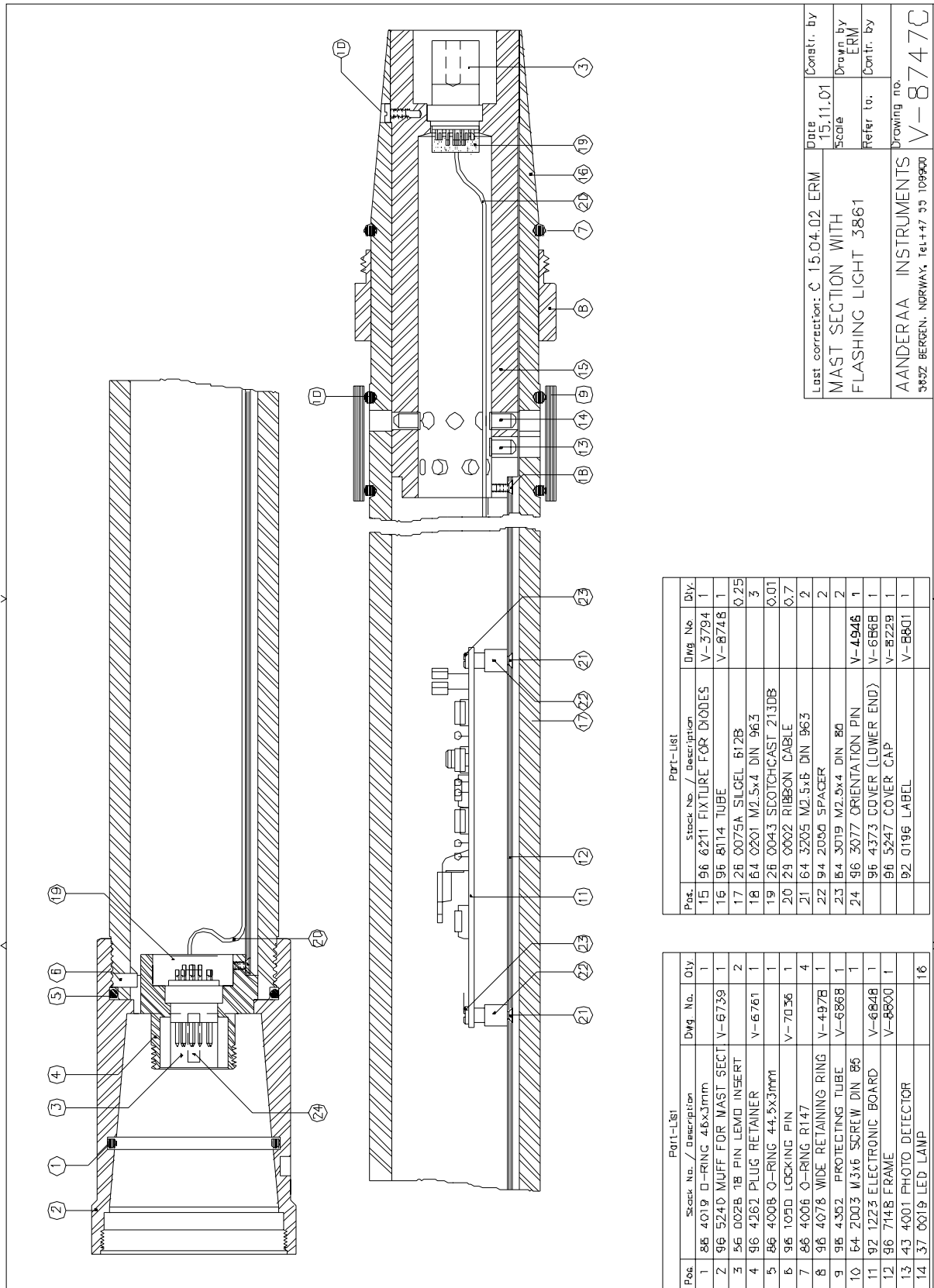


Fig. 17 Mast Section with Flashing Light 3861

Pos.	Stock No. / description	Dwg. No.	Qty.
15	96 6211 FIXTURE FOR DIODES	V-3794	1
16	96 8114 TUBE	V-874B	1
17	26 0075A SILGEL 612B		0.25
18	64 0201 M2.5x4 DIN 963		3
19	26 0043 SCOTCHCAST 213DB		0.01
20	29 0002 RIBBON CABLE		0.7
21	64 3205 M2.5x6 DIN 963		2
22	94 2056 SPACER		2
23	64 3019 M2.5x4 DIN 80		2
24	96 3077 ORIENTATION PIN	V-4948	1
	96 4373 COVER (LOWER END)	V-686B	1
	96 5247 COVER CAP	V-8229	1
	92 0196 LABEL	V-8801	1

Pos.	Stock No. / description	Dwg. No.	Qty.
1	86 4019 O-RING 4.6x3mm		1
2	96 5240 MUFF FOR MAST SECT	V-6739	1
3	56 002B 18 PIN LEMO INSERT		2
4	96 4262 PLUG RETAINER	V-6761	1
5	96 400B O-RING 4.4.8x3mm		1
6	96 1050 LOCKING PIN	V-7036	1
7	86 4006 O-RING R147		4
8	96 4078 WIDE RETAINING RING	V-4978	1
9	96 4362 PROTECTING TUBE	V-686B	1
10	64 2003 M3x6 SCREW DIN 85		1
11	92 1223 ELECTRONIC BOARD	V-6848	1
12	96 7148 FRAME	V-8800	1
13	43 4001 PHOTO DETECTOR		1
14	37 0019 LED LAMP		16

Last correction: C 15.04.02 ERM
 Date 15.11.01
 Scale
 Drawn by ERM
 Refer. to. Contr. by
 Drawing no. V-8747C
 AANDERAA INSTRUMENTS
 3852 BERGEN, NORWAY, Tel:+47 55 109900