



# AANDERAA INSTRUMENTS

DATA COLLECTING INSTRUMENTS FOR LAND SEA AND AIR

## AUTOMATIC WEATHER STATION AWS 2700

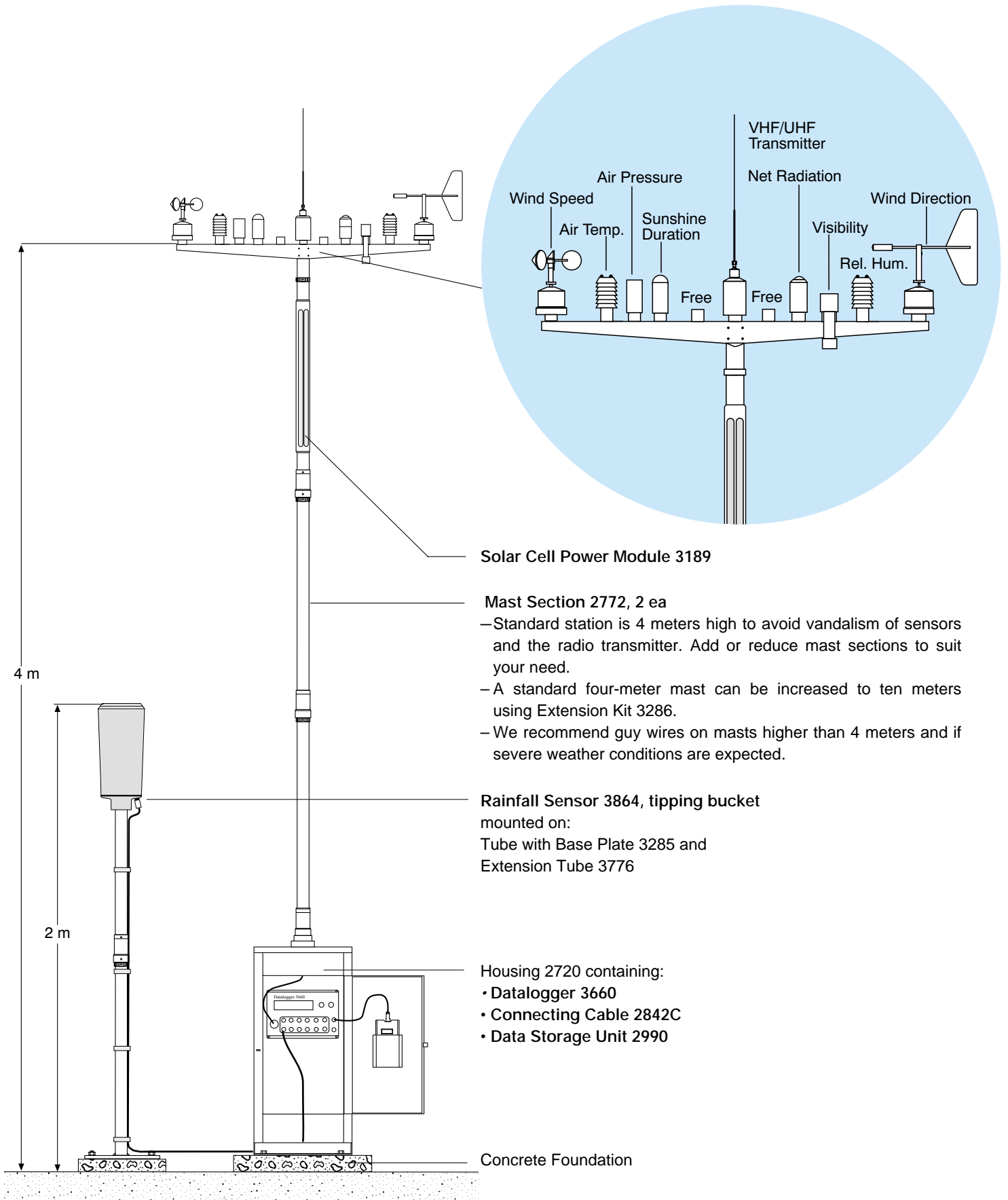
*A rugged self-contained station suited for use in remote places without electricity supply. Data can be recorded on site or be transmitted in real-time.*

A standard four-meter station is fitted with sensors for:

- wind speed and gust
- wind direction
- air temperature
- relative humidity
- air pressure
- visibility
- sunshine duration
- net radiation
- rainfall

- High accuracy over a wide temperature and humidity range.
- Standard sensor fastening and electrical connection.
- Low power consumption.
- Potted waterproof units.
- 10 step selectable operating intervals.
- Light weight, rugged and modular design
- Installation and raising of a 10m mast can easily be performed by one person in less than 1 hour.
- Standard packing in re-usable, durable, light-weight plywood boxes with carrying handles.
- The system has lightning protection.

# AUTOMATIC WEATHER STATION 2700



Solar Cell Power Module 3189

Mast Section 2772, 2 ea

- Standard station is 4 meters high to avoid vandalism of sensors and the radio transmitter. Add or reduce mast sections to suit your need.
- A standard four-meter mast can be increased to ten meters using Extension Kit 3286.
- We recommend guy wires on masts higher than 4 meters and if severe weather conditions are expected.

Rainfall Sensor 3864, tipping bucket mounted on:  
Tube with Base Plate 3285 and Extension Tube 3776

Housing 2720 containing:  
• Datalogger 3660  
• Connecting Cable 2842C  
• Data Storage Unit 2990

Concrete Foundation

The **Automatic Weather Station 2700** consists of light, compact units in hard anodized aluminum which are quick and easy to install. The sensors and VHF/UHF Transmitter are fitted on a sensor-cross arm placed on top of the mast. The mast is supported by a housing which is bolted to the ground. A hinge at the base of the housing facilitates raising and lowering of the station. An 18-conductor cable inside the mast interconnects the sensors, Radio Transmitter, Solar Cell Power Module and the Datalogger. The station is supplied with a tool kit and manual.

All sensors are normally read and scanned every 10 minutes by the 18-channel Datalogger 3660 in the housing. The first

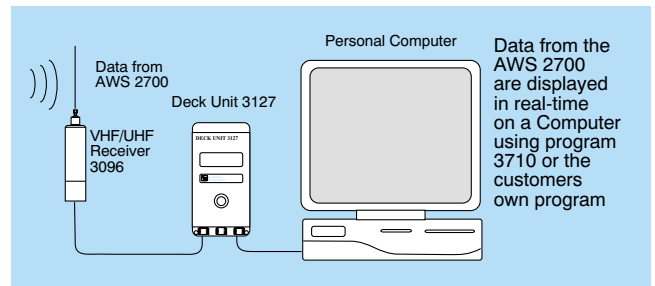
channel is used for a fixed reference reading identifying the station. The remaining channels are for sensors.

The raw data are converted to engineering units and stored in the datalogger. A telephone at the station enables data transfer via modem. The stored data can also be collected at the station using a portable PC.

To extend the operating time, data can in addition be stored on-site in the Data Storage Unit (DSU)2990, a water-proof, reusable and removable unit which allows for easy recovery of data. The entire station is powered by the Solar Cell Power Module which is an integral part of the mast structure.

**Real time data transmission:**

The data can be received in real time by using the equipment shown below. The VHF/UHF Receiver is connected to Deck Unit 3127 which converts the PDC-4 raw data from the AWS 2700 to RS 232 format. These signals are again fed into a computer where data are displayed on the screen.



**Transmission of stored data:**

The stored data can be downloaded via a modem connection or by connecting the PC directly to the Datalogger. It is also possible to connect the modem to a mobile telephone in stead of the telephone line. See Technical Description TD 204 for further information on data transmission.

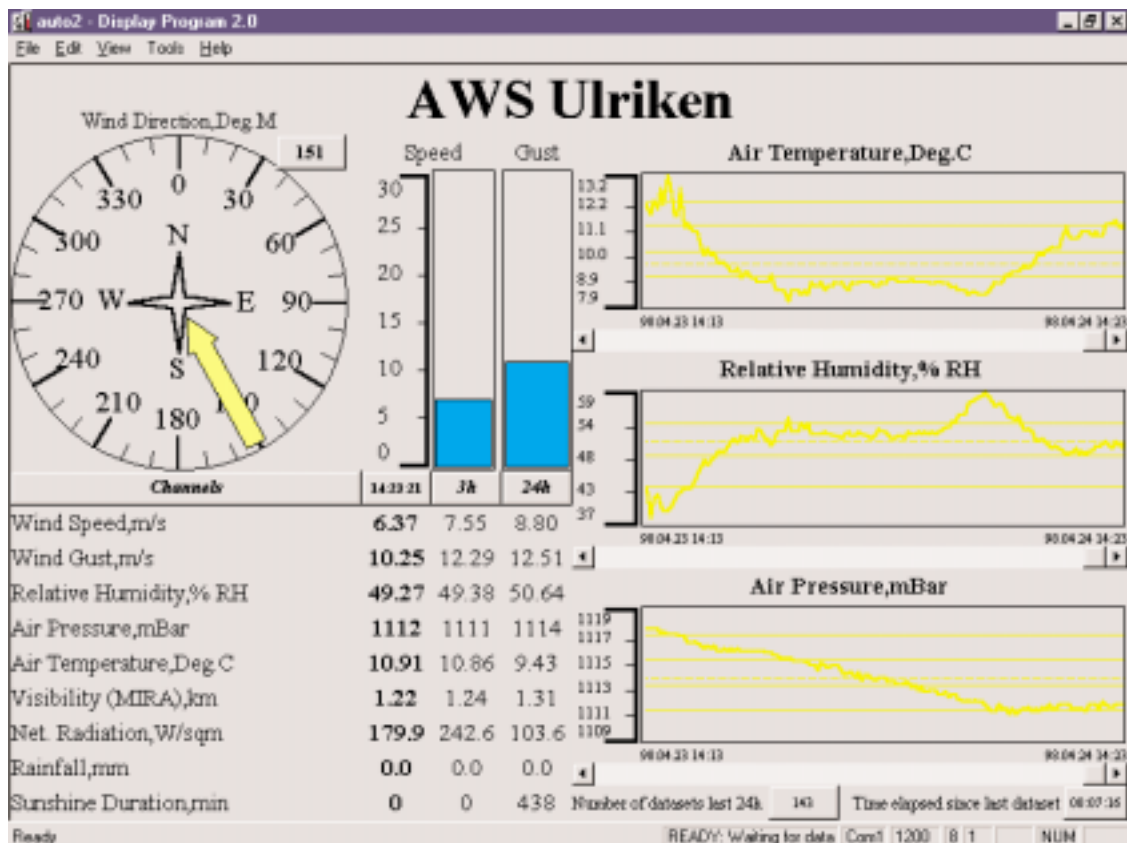
**Data presentation,**

*Visualization of data*

A Real Time Display Program 3710 is available for Data presentation on a PC. This is a Windows 95 based program which makes it possible to display the data as graphs, bar plots, vector plots etc. A DOS based program 3081 is also available which displays the data as engineering values.

*Data as a Voice message*

The data from the station can be converted to a voice message by using the Voice Generator 3420 together with the Computing Unit 3015.



## STANDARD SENSOR CONFIGURATION, (other configurations on request)



Wind Direction Sensor 3590

Wind Speed Sensor 2740

Air Temperature Sensor 3455  
Relative Humidity Sensor 3445

Air Pressure Sensor 2810

MIRA Visibility Sensor 3544

Sunshine Duration  
Sensor 3160

Net Radiation Sensor 2811

Rainfall Sensor 3864

### Wind Speed Sensor 2740

has two output signals, average wind speed and wind gust. The wind gust is the maximum wind speed over a 2-second period at any time during the sampling interval. Output: SR10.

Range: 0 to 79m/s.

Accuracy:  $\pm 2\%$  of reading.

### Wind Direction Sensor 3590, (Averaging)

consists of a light wind vane pivoted on top of a housing. Damping fluid in the vane opposes rapid changes but permits line-up in light wind. Output: SR10.

Threshold speed less than 0.3m/s. Accuracy:  $\pm 5^\circ$ .

### Air Temperature Sensor 3455

measures air temperature by means of a 2000 $\Omega$  platinum resistor protected from radiation by Radiation Screen.

Output: VR22. Temperature range:  $-43$  to  $+48^\circ\text{C}$ .

Resolution: 0.1 $^\circ\text{C}$ .

Accuracy:  $\pm 0.1^\circ\text{C}$

### Relative Humidity Sensor 3445

measures percent relative humidity, and is based upon the influence of humidity on a capacitive polymer. Output: SR10.

Range : 0-100% RH, Accuracy:  $\pm 2\%$ RH.

### Air Pressure Sensor 2810

measures air pressure by use of a miniature monolithic silicon pressure transducer. Output: VR 22.

Range: 920 – 1080 hPa.

Accuracy:  $\pm 0.2$  hPa.

Resolution: 0.2 hPa.

### MIRA Visibility Sensor 3544

A compact, low power and rugged sensor measuring fog, haze, mist dust and smoke. It will also detect reduced visibility caused by snow. The sensor is based on forward scattering of infra-red light.

Range: 20 - 3000m.

### Sunshine Duration Sensor 3160

records duration of visible sunshine without regard to its intensity. The reading, minutes of sunshine during a sampling interval, is obtained by means of a shadow post surrounded by eight photodiodes. Sunshine is detected as a contrast in radiation between opposite photodiodes. Output: SR10.

Wave Length: 400-1000nm, Resolution: 1 minute.

### Net Radiation Sensor 2811

measures direct and scattered solar radiation as well as thermal radiation from the earth and the atmosphere. A symmetrical high-sensitivity thermistor bridge ensures that the reading is affected only by radiation and not by changes in ambient temperature. No shading screen is needed. Output: VR22.

Wave Length: 0.3 – 60 microns

Range:  $\pm 2000$  W/m<sup>2</sup>.

Accuracy.  $\pm 1\%$  of full scale reading

Resolution: 4 W/m<sup>2</sup>.

### Rainfall Sensor 3864, tipping bucket

Output: SR10,

Range: 200 mm/interval. 12 mm/minute max.

Resolution: 0.2mm.

Accuracy:  $\pm 2\%$

Funnel: 200 cm<sup>2</sup>

Available also with heating, part no. 3864H

N.B. See page 6 for other available sensors.

## ESSENTIAL COMPONENTS



### Datalogger 3660

scans and reads Aanderaa sensors. Input signals from sensors are either routed through an 18-pin mast cable or via individual connecting cables. Sampling intervals are user selectable from 0.5 to 180 minutes. When triggered by the internal clock, the unit scans up to 18 preset input channels in sequence and stores the data internally. The internal storage capacity depends on the number of channels scanned and the sampling interval used, e.g. 12 channels every 10 minutes in 36 days. These data can be collected via telephone or by a portable PC. An LCD shows data in engineering units after each sensor reading. Request data sheet D312 or see our web site.

The output signals are either Aanderaa 10-bit PDC-4 and RS232C ASCII coded raw data or RS232 data in engineering units. The PDC-4 code is used for communication with the Data Storage Unit and for sending data either via VHF/UHF radio or via cable. The RS232C port is for direct connection to a computer or a modem. The unit is powered by 7–14V D.C. either from the Solar Cell Power Module or an AC/DC adapter.

### Data Storage Unit DSU 2990

is the standard data storage device for all Aanderaa data collecting instruments and systems. It is rugged, waterproof and has LCD display that shows the total number of data word stored. The 2990 unit has a storage capacity of 65500 data words. A built-in quartz clock allows time registration for each measurement cycle. For more specifications request Data Sheet D174.

### VHF /UHF Radio Transmitter 3149/3694

plugs directly on to the sensor cross-arm on the top of the station mast. It is designed to transfer real-time data in PDC-4 code. Range under conditions of free sight is 50 kilometers. If free sight between the Transmitter and the Receiver is not possible, a Relay Station is available.

### VHF/UHF Radio Receiver 3096/3696

can be fitted on top of a mast with 2" cone or on Wall Bracket 2806. The output feeds directly into various units accepting PDC-4 code, e.g. Computing Unit 3015. The equipment requires neither tuning nor adjustment after delivery.

### Computing Unit 3015

is the real-time data handling unit, linked to the station either by VHF radio or by cable. Raw data from the Automatic Weather Station are 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 or telephone modem will, when connected, give access to the Diurnal Picture. The 3015 unit contains a buffer storing up to 432 data sets. The unit is powered by 12 volt D.C. Voice Generator 3420 is a unit that converts measured data to synthesized speech. Available in English and Norwegian. Other languages are available on request.

### Field Modem 3431

is a watertight and rugged telephone modem specially designed for field applications with Automatic Weather Station 2700.

## Miscellaneous information

## Remote installations of the AWS 2700

### Reading of data stored in the DSU 2990

The DSU 2990 must be removed from the station and connected to a DSU Reader 2995 and a Personal Computer. The reader provides a full duplex communication between the PC and the DSU and converts the signals to RS232C standard. The reader powers the DSU during this operation.

### Data Reading Program 5059

is a new software program that may be used to download DSU 2990 data to a Personal Computer. The program is based on the latest software technology and is designed to be used with Windows 95, Windows 98 and Windows NT.

In addition to enable for downloading and exporting DSU data, it may also be used for data analysis. The 5059 include extensive charting and analysis facilities, and the resulting analysis graphs may be exported for use with other program such as Microsoft Word and Microsoft Excel.

The modern user interface, including drag & drop facilities combined with an extensive built-in Help system makes the 5059 easy to use.

A sensor, station and instrument library allows you to build up a library holding configuration and calibration sets for all your instruments. For more information see our Web pages.

### Ring for Weather Information

Aanderaa Instruments operates a demonstrational network of stations. Real-time data from the stations listed below can be obtained over the telephone as a voice message and digitally via modem.

Data buoy, Korsfjord	+47 57 131006	modem/voice Norwegian
Data buoy, Marsteinen	+47 57 180569	modem/voice Norwegian
Ulriken, Bergen	820 20220	modem/voice Norwegian

The latter is also available on our internet site.

### The VR22 and SR10 Signal Formats

VR22 is an analog signal from an ohmic halfbridge, that varies over a range that corresponds to 1/22 of the bridge voltage. The signal varies symmetrically around the midpoint of the bridge voltage, which ought to be in the region of 5–6V.

The SR10 signal corresponds to the digital signal that is obtained when the contents of a 10-bit shift register are clocked out in serial format. This signal is used when the parameter to be measured is digital, e.g. a frequency or a number of pulses.

### Mast Extension Kit 3286

is available for converting the 4 meter to a 10 meter station. It is packed in a plywood case 120x48x27 cm, and weighs 38 kilograms.



### Maintenance

The Automatic Weather Station is designed to require a minimum of maintenance. All sensors are factory calibrated.

### Packing

The Automatic Weather Station is shipped in two plywood boxes. The first box contains the Datalogger, Housing and Tools. It is 41x47x112 cm in size and weighs 33 kilograms.

The second box contains Sensors, Sensor Cross Arm, Mast Sections and Solar Cell Power Module. It is 27x48x120 cm in size and weighs 30 kilograms.

### Other Sensor Include:

Solar Radiation Sensor 2770, Temperature Sensor 3444 and Water Level/Temperature Sensors 3791/3791A.

All sensors and units from Aanderaa Instruments are suitable for field use due to their rugged and weather-proof construction. Individual data sheets are available on request or can be downloaded from our web site. The sensors employ either VR22 or SR10 signal standard.

Representative's Stamp

Latest version is on the Internet

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