User Manual for the

Anemometer

*type **AN4***

Delta-T Devices Ltd

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CE conformity

The sensor described in this document is CE marked by the manufacturer.

Design changes

Delta-T Devices Ltd reserves the right to change the designs and specifications of its products at any time without prior notice.

User Manual Version: 1.0   March 2002

Contents

Introduction

Summary of Features

The AN4 Anemometer is designed for the economical measurement of horizontal wind velocity. The anemometer rotor is mounted on a ball-bearing shaft. A non-contact magnet attached to the shaft activates a reed switch once every revolution.

The AN4 has the following features:

- Zero power switch closure output signal

- Output pulse frequency linearly proportional to wind speed

- Compatible with data logger frequency channels

- Standard output calibration, line replacement item

- Ideal for agro-meteorological uses

Scope of This Manual

This manual contains the specifications and performance of the AN4 Anemometer, and describes its installation with Delta-T data loggers.

You may also need to refer to the appropriate Delta-T logger User Manual or On-line Help.

Installation

Unpacking

Check for any damage that may have occurred to the consignment in transit. Check that the contents of the consignment agree with the Packing List.

If any damage or shortage is apparent, notify the distributors and the carriers immediately.

Make a note of the sensor serial number(s), and check that the cable supplied is the length that was ordered. The serial numbers will be needed in any subsequent warranty claims, repairs or recalibration.
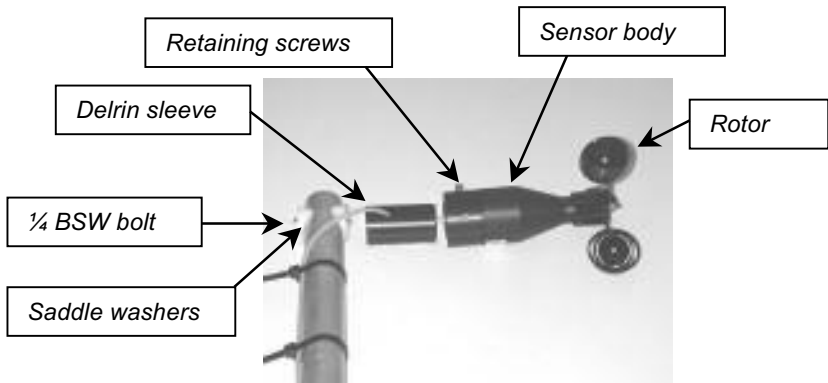
The parts supplied may include:

- AN4 sensor with cable fitted
- Mounting accessories for cross arm mounting

Description of Equipment

Component Diagram:

The components are shown laid on a tabletop for clarity.

Selecting a Site

In general, wind measurement sensors should be positioned to detect the wind conditions of a large area.

For meteorological purposes, measurements are specified ideally at a height of 10 metres on a site with no obstacles.

In practice, it is often not possible to fulfil these conditions, and you must choose a position that as far as possible represents the local wind speed and direction. In particular, avoid roof positions which can often introduce biased wind directions and exaggerated wind speeds.

Mounting Details

Accessories are provided to attach the AN4 Anemometer to the cross arm of the Delta-T M2 mast. This positions the sensor about 2 metres above the ground.

First, slide the Delrin sleeve over the free end of the cable, then insert the sleeve into the sensor body. Tighten the two retaining screws.

Attach the sensor to a mast cross arm, using the ¼ BSW bolt and saddle washers. Any cross arm of about 32 mm diameter, with a 7 mm clearance hole through it would be equally suitable.

When the weather station mast is erected, check that the anemometer axis is vertical by making slight adjustments to the mast and cross arm alignment.
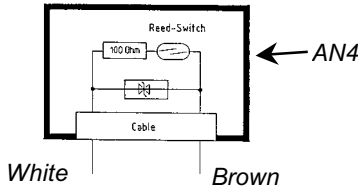
AN4 Sensor Connections

Outline Specs

Parameter	Value
Output	1.25 Hz per m.s^{-1} (switch closure) 50 Hz at 40 m.s^{-1}
Measuring range	0 to 40 m.s^{-1}; threshold 0.5 m.s^{-1}

Sensor Wiring

The sensors are fitted with 5m of 2-core cable, with bare wire ends as standard.

The switch wiring polarity is not important. Switch contact protection components are mounted inside the body of the AN4.

Conductor	Function	Notes
Brown (either)	Switch NO (normally open)	100 ohm resistor in series with switch contacts inside the AN4
White (either)	Switch Common	
Screen		None

Cable

Up to 100m of cable can be fitted at time of ordering. The wiring colours of long cables may not be as shown. Either wire can be used. The AN4 signal output is not sensitive to the cable length within this limit.

Cable can be extended with similar cable, up to the 100 metre limit, provided the joint is waterproof.

Data Requirements

Typical common usage:

|	
Average wind speed	Log average wind speed in m.s^{-1} over half or one hour, or longer periods
Wind run	Log accumulated wind run (in m or km) at half, or one hour, or daily intervals

Logger Connections

DL2e Logger

Use with DL2e Counter Channels

This diagram shows the wiring connections for the DL2e onboard counter channels 61 or 62. For the DLC1 Counter Card, follow identical principles, and refer to the DL2e Logger documentation and Ls2Win on-line Help.

AN4 Wiring Schematic for DL2e
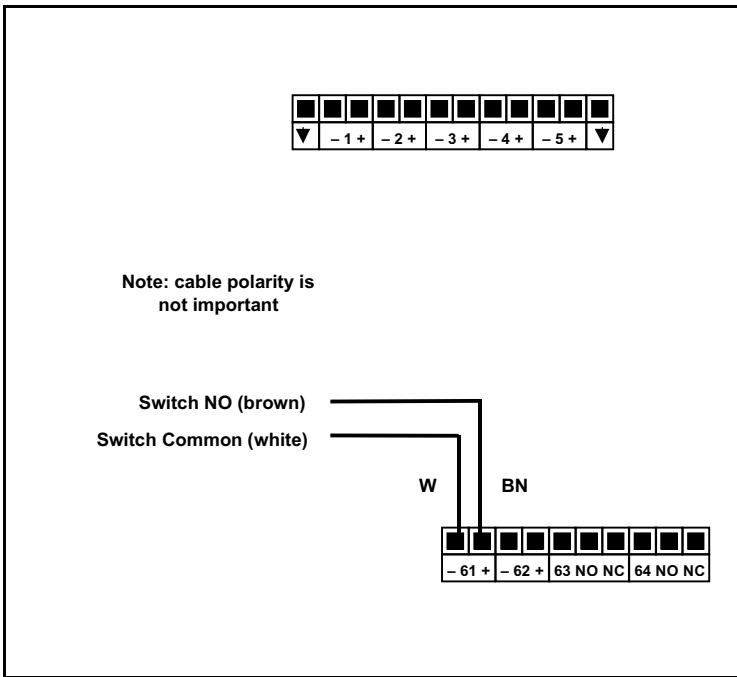
Settings

The example shows the AN4 sensor output connected to counter channel number 61 in the DL2e logger. Either wire can be connected to the channel input terminals. The cable polarity is not important.

DL2e Sensor Code

AN4 Code

When creating your DL2e logger program with the Ls2Win software, check the sensor library for the AN4 code. If the AN4 sensor code is already present, you can use it in your logger program with the two on-board counter channels, or with channels on the DLC1 Counter card.

Then choose suitable sampling and logging intervals (see *data requirements*) in your logging program.

If the AN4 code is not present in your sensor library, you must first import it from a sensor library of additional sensor codes provided by Delta-T. Check with Delta-T for the latest version of the Ls2Win software and sensor libraries.

Other Loggers

Any logger with a frequency input channel capable of sensing switch closures could be used.

Follow the general principles described above.

Specifications

AN4 Specification Table

| Parameter	Notes
Sensitivity	1.25 Hz per m.s^{-1} (50 Hz at 40 m.s^{-1})
Accuracy	0.5 to 10 m.s^{-1}: ± 0.5 m.s^{-1} 10 to 40 m.s^{-1}: ± 5% of the reading
Resolution	0.8 m wind run
Distance constant	Approx 3 m
Measuring range	0 to 40 m.s^{-1}; threshold 0.5 m.s^{-1}
Maximum wind speed	60 m.s^{-1}
Operating range	-25°C to +60°C (free of ice)
Switch type	Reed switch (life approx 5 x 10^{8} operations)
Switch contact rating	10 VA max; 100 V dc max; 0.4 A
Size	Height: 195 mm overall (including sleeve) Body diameter: 50 mm
Rotor	Cup dia: 44 mm 3-cup rotor diameter: 134 mm
Weight	0.5 kg (incl 5 m cable)
Mast mounting (on cross arm)	1¾" x ¼" BSW bolt and saddle washers Delrin sleeve: 60 mm long, 35 mm diameter.
Finish	Black metallic body Weather resistant black thermoplastic rotor
Cable type	2-core
Terminations	Bare wire terminations
Cable length	5 m standard, 100 m maximum

Detailed Construction
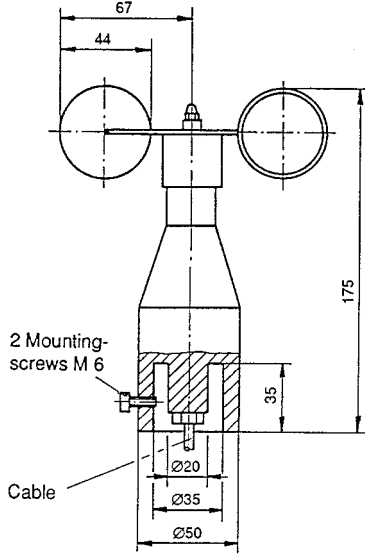
Wind Speed Response

Figure 1
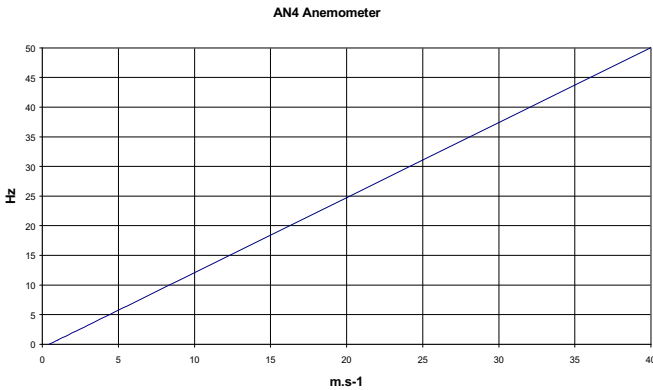
Note that the graph shows a threshold of about 0.4 m.s^{-1} with a linear relationship thereafter. A table of exact values is given below.

The AN4 sensor code for the DL2e approximates this to a linear relationship passing through the origin of the graph.

Hz	m.s^{-1}
0.000	0.4
0.077	0.5
0.710	1
5.771	5
12.097	10
18.423	15
24.750	20
31.076	25
37.402	30
43.728	35
50.054	40

Certification

CE Conformity

The AN4 Anemometer sensor is CE marked by the Manufacturer.

Manufacturer's Certificate of Conformity

The manufacturer confirms that the AN4 Anemometer is manufactured and tested according to DIN EN ISO 9001, under the observation of a certified quality assurance system.

The measuring installations used for testing are regularly calibrated and are based on the national or international standards. Should no national standards exist, the measuring procedure corresponds with the technical regulations and norms valid at the time of the measurement.

Each anemometer is checked in a specific test of the reed switch for the whole range of output frequency.

Maintenance

Routine Maintenance

Clean the anemometer from time to time. Take particular care to make sure that the cup rotor rotates freely on its shaft, and there is no accumulation of dirt or deposits between the rotor and the body of the sensor. Check that the anemometer shaft is still mounted vertically.

After a long period of use, the ball bearings and reed switch contacts may become worn out. This will manifest itself as a higher starting torque. The cup rotor should start to move by blowing on it gently. Reed switch failure will show as inaccurate low or zero readings.

Repairs and Spares

In cases of damage or wear, some items may be available as replacement parts. Check with Delta-T.

Recalibration

Factory reconditioning can be carried out. The bearings and the reed switch will be replaced and a certificate issued.

Warranty and Service

Terms and Conditions of Sale

Our Conditions of Sale (ref: COND: 1/00) set out Delta-T's legal obligations on these matters. Delta-T warrants that the goods will be free from defects arising out of the materials used or poor workmanship for a period of **twelve months** from the date of delivery.

Technical Support

Technical Support is available on Delta-T products and systems. Users in countries that have a Delta-T Distributor or Technical Representative should contact them in the first instance.

Technical Support questions received by Delta-T will be handled by our Tech Support team. Your initial enquiry will be acknowledged immediately with a "T number" and an estimate of time for a detailed reply. Make sure to quote our T number subsequently so that we can easily trace any earlier correspondence.

In your enquiry, always quote instrument serial numbers, software version numbers, and the approximate date and source of purchase where these are relevant.

Contact details:

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Troubleshooting

Problems

Always try to isolate the source of the difficulty. This may fall into one of the following areas:

The Anemometer

- Is the anemometer rotor exposed to wind and free to rotate?
- Is the reed switch producing one switch closure per revolution?

The Cable

- Check for cable damage or connection faults, short circuits or open circuits.
- Verify that switch closures can be detected at the remote end of the cable.

The Data Logger

- Check that the data logger channel in use is correctly configured (counter channel, for switch closure pulses).
- Remove the anemometer connections and connect a manually operated switch instead to check the channel.

Dubious Reading Values

- First check all the above.
- If possible, check the output reading against an independent wind speed measurement alongside the suspect unit.

Symptom	Possible cause or remedy
No output from the AN4	Check the reed switch, and cable
Zero or low windspeed readings	Worn out reed switch, or cable intermittent open circuit, or worn rotor bearings
Wildly variable or high readings	Intermittent short-circuit in cable between sensor and logger.