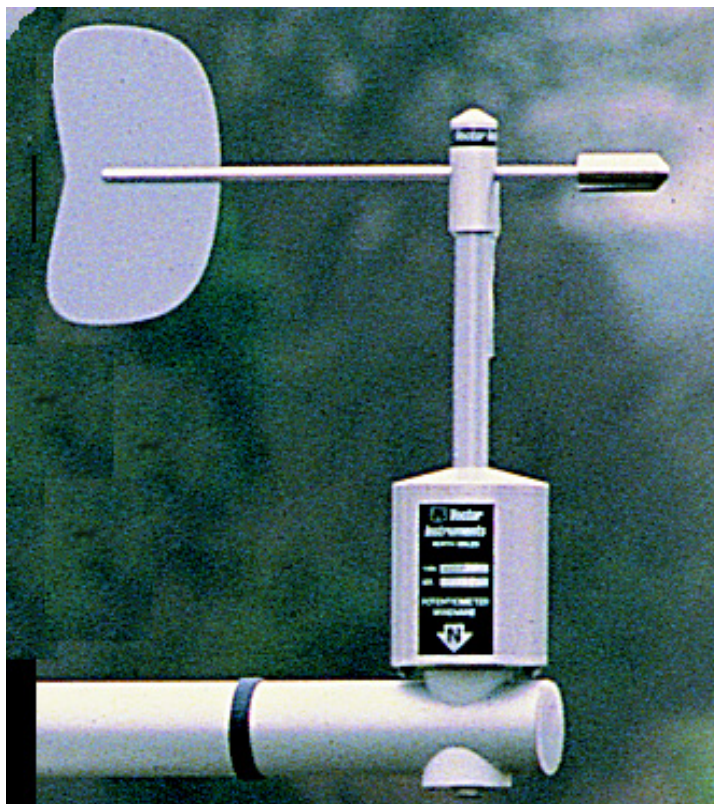

User Manual for the

Windvane

type WD1



WD1-UM-3

AT

DELTA-T DEVICES

ABOUT THIS MANUAL

Use this manual to help you install and use the type WD1 wind-vane.

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Revised: Jan 1996

In this Manual, all references to loggers and weather stations relate to the Delta-T Logger DL2, its software LS2, the WS01 Weather Station, and the sensor codes used with them. The references also apply to the DL2E and its derivatives.

For use with the DL3000 logger, you must refer to the DL3000 documentation. It contains the specific connection details and sensor type codes used by the DL3000. General information concerning the performance and installation of the sensor and contained in this manual remains relevant.

Windvane

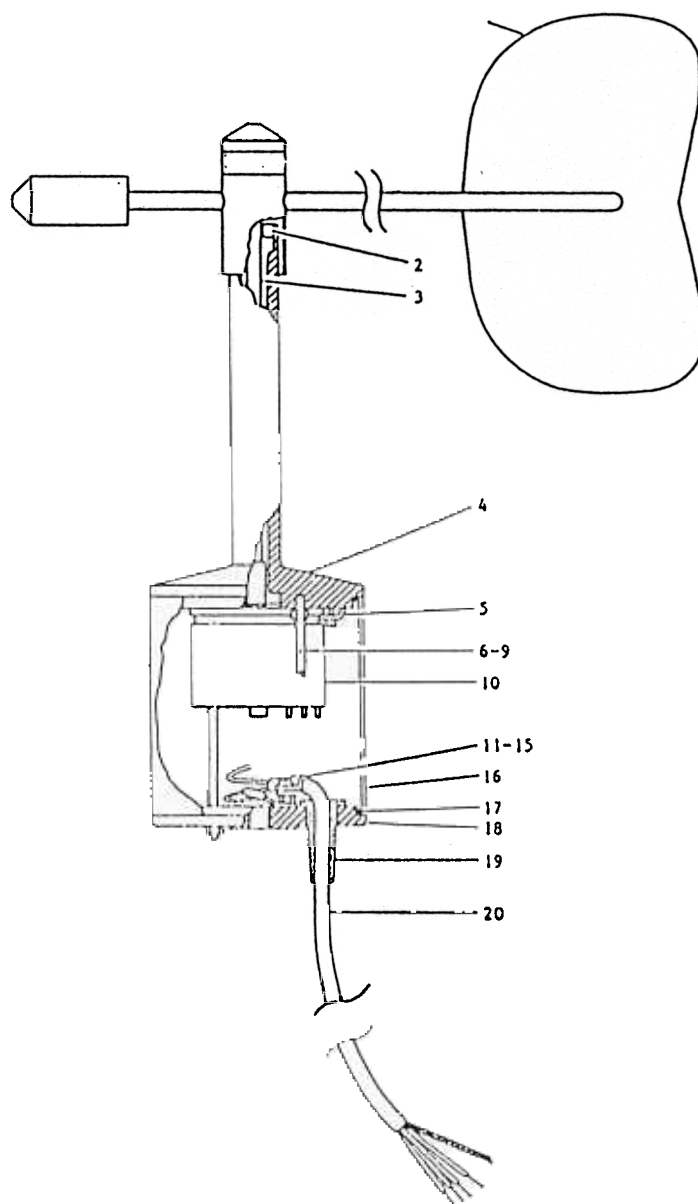
Delta-T serial number : WD1. _____
Unit serial number: Fin _____
 Body _____
Resistance full scale : _____ Ohms
Calibration factor : _____ Ohms/degree

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INTRODUCTION

The WD1 windvane has a good reputation as a rugged, reliable wind direction sensor. It incorporates a micro-torque wire-wound potentiometer with a filled gap to provide smooth operation and a long life. The spindle is supported by two corrosion resistant steel precision ball races which are protected against the entry of moisture droplets and dust. The fin is attached by a unique and patented gravity sensitive fastener.

**DIAGRAM OF THE WINDVANE**

ASSEMBLY INSTRUCTIONS

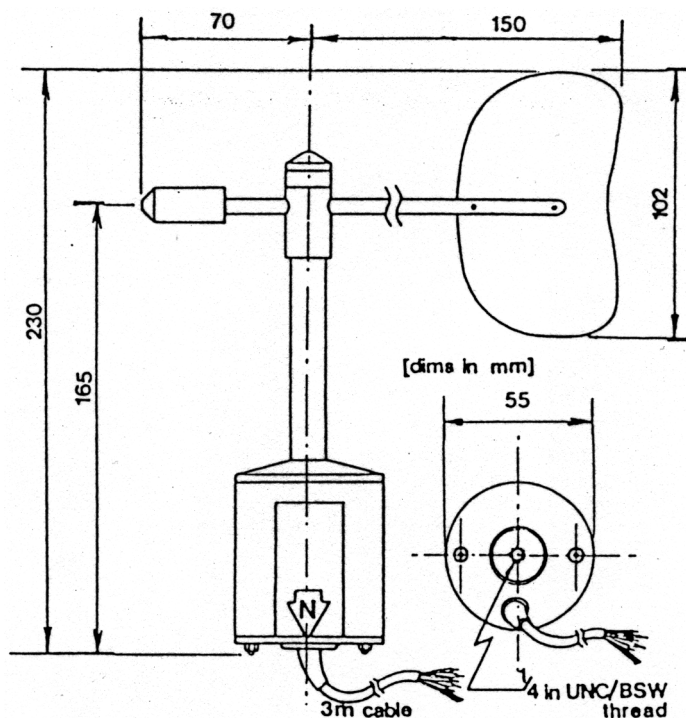
1) Remove the white spindle protection tube and turn the spindle so that the locator indent is in-line with the right hand side of the fin as viewed from above. Lightly push on the fin, with a force of about 1 to 2 Kg, until positive location is obtained.

To remove the fin, first invert the instrument, press hub of fin to release the gravity-sensitive catch within the hub, and allow it to slide off. The required force is no more than 1 to 2 Kg. **DO NOT USE EXCESSIVE FORCE.**

2) The windvane is now ready for attaching to the horizontal cross-spar of the weather station, using a 0.25 inch BSW/UNC stainless steel bolt and two white nylon saddle washers. Further instructions are given in Chapter 2 of the *Delta-T Weather Station User Manual*.

If you are not using a Delta-T Weather Station to mount this sensor then you will have to provide your own mounting fixtures.

Make sure the North marker arrow on the body of the windvane faces north.



WIRING CONNECTIONS TO THE DELTA-T LOGGER

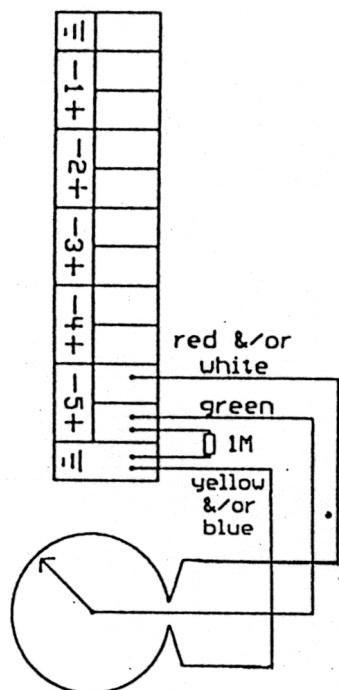
The black wire is not used. It is internally connected to the body of the Windvane.

The cable screen may be connected to DL2 earth (preferably the digital earth of channels 61 or 62) for improved electrical screening. The cable screen is not internally connected to the body of the Windvane.

LAC1 card

3-wire resistance connection

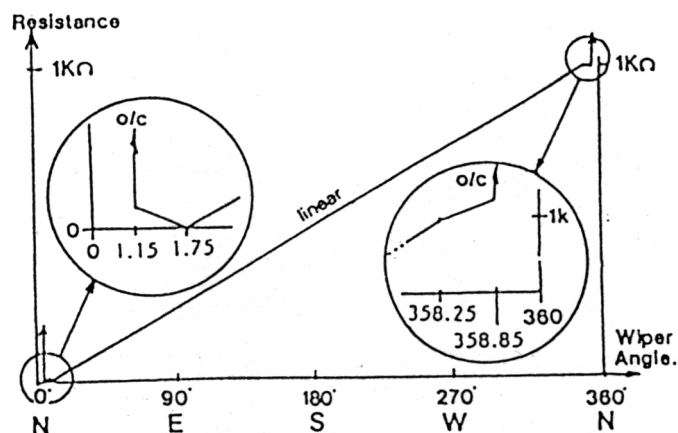
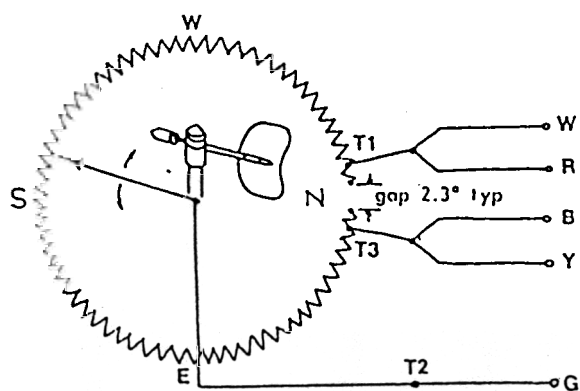
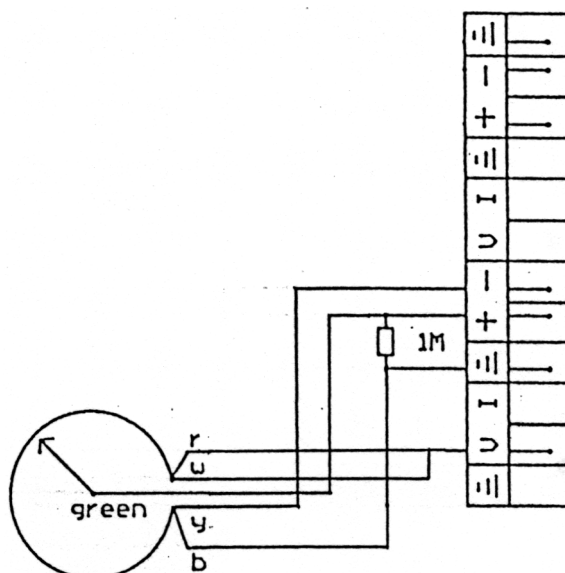
Use DL2 sensor code WV2



LFW1 (4-wire) card

Potentiometer connection

Use DL2 sensor code WD1



GRAPH OF WINDVANE DIRECTION VERSUS RESISTANCE

CONFIGURING THE LOGGER

Instructions on configuring the logger are given in the Delta-T Logger User Manual.

LAC1 card

3-wire resistance connection

Use DL2 sensor code WV2

Modify the potentiometer resistance value as described below for accurate direction readings.

LFW1 (4-wire) card

Potentiometer connection

Use DL2 sensor code WD1

Use sensor code WV2

No modification is needed for potentiometer resistance value.

A 1 megohm resistor is used to prevent “o/s limits” errors when the windvane points north. If the DL2 still occasionally reports o/s limits, change the sensor characteristic from autoranging (A) to fixed range (F), for either sensor code.

USE THE CORRECT CONVERSION FACTOR

To obtain the full $\pm 2^\circ$ accuracy of the windvane, change the conversion factor used in the example/demonstration configuration. If you do not do this, the accuracy will only be $\pm 36^\circ$ degrees. The appropriate conversion factor to use can be found with the serial number at the front of this chapter.

The windvane potentiometer has a resistance of 1 kohm to within 10%. The exact full scale resistance of a particular windvane, R_{max} , is used to calculate the conversion factor, equal to $R_{max}/356.5$ Ohms/degree.

Example: A windvane potentiometer has a maximum resistance of 1028 ohms so the conversion factor is $1028/356.5 = 2.8836$ ohms per degree.

The conversion factor for your sensor is given at the front of this chapter, along with the serial number and R_{max} .

AVERAGING

After asking the user for a sampling interval the programme will ask the user if they want to average the data over longer intervals. This option is available for all sensor types on all input channels but it is not appropriate to use it in the case of the windvane. The reason for this is that the calculation of the average direction is not simply the arithmetic average. For example, the average of 359 degrees and 1 degree is 0 degrees, due North, whereas the arithmetic average of 359 and 1 is $(359+1)/2 = 180$ degrees, due South.

SPECIFICATIONS

Threshold :	0.6 m/s (Fin will commence movement when aligned at 45 degrees to airflow).
Max. speed :	75 m/s.
Distance constant :	2.3 metres
Damping ratio :	0.2
Range :	360 degrees mechanical angle, full circle continuous rotation allowed.
Accuracy :	± 2 degrees obtainable in steady winds over 5 m/s.
Backlash :	± 0.5 degree when fin is removed and replaced. There is no measurable backlash movement during use.
Resolution :	0.2 degrees.
Temperature range :	-50 to +70 deg. C.
Life :	5×10^7 cycles, equivalent to 10 year's typical exposure.

ELECTRICAL SPECIFICATIONS

Potentiometer resistance :	1 Kohm $\pm 10\%$
Electrical continuity angle :	$357.7^\circ \pm 1.5^\circ$ (2.3° gap at north)
Electrical variation angle :	$356.5^\circ \pm 1.5^\circ$ (3.5° deadband)
Temperature coefficient :	± 50 ppm per deg. C.
Dissipation :	0.5 W from -50 to + 20 deg. C., derating linearly to 0.25 W at 70 deg. C.
Insulation resistance :	50M ohms minimum (case to pot circuit).
Wiper current :	20 mA maximum.
Max voltage, case to potentiometer :	125 V.
Supply voltage :	20 V maximum.
Linearity :	0.5 % of full range output.
Repeatability :	$\pm 0.5^\circ$
Terminations :	6-wire attached cable, two connections at each end of potentiometer, one wiper connection, connection to case.

MECHANICAL SPECIFICATIONS

Overall height :	230 mm
Vane clearance :	203 mm
Body diameter :	56 mm
Packed dimensions :	250 x 160 x 160 mm
Cable length :	3 m supplied as standard.
Materials :	Anodised aluminium and stainless steels, for all exposed parts.
Fixing :	0.25 inch BSW/UNC tapped hole in base.
Weight :	310 g (700g when packed)

MAINTENANCE

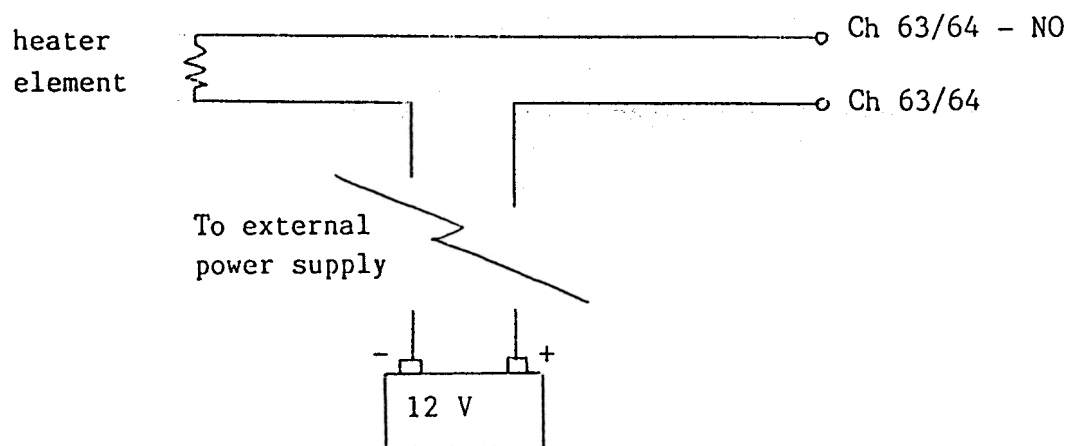
If undamaged by flying projectiles, falling trees or lightning strikes the windvane can be expected to last up to ten years. If a repair is necessary and you find it more convenient to do yourself, then we do supply a repairs kit.

Windvane Spares Kit, type K3, Parts List

1 spare fin
1 replacement potentiometer with spindle
1 spindle protection tube

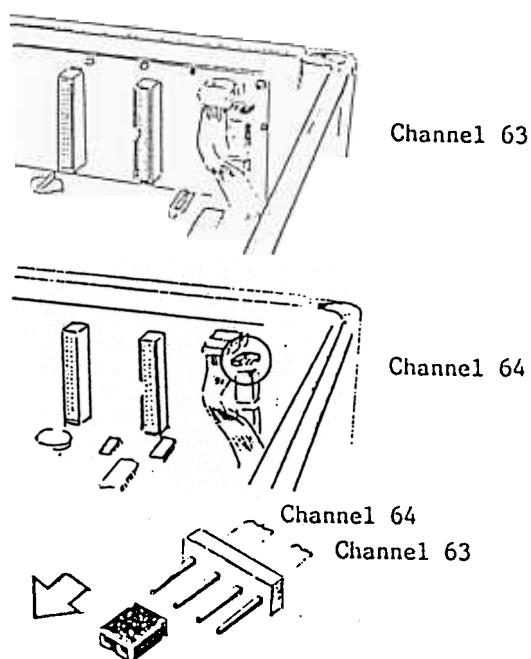
OPTIONAL WIRING CONNECTIONS FOR OPTIONAL HEATER.

**YOU MAY USE THE DELTA-T LOGGER RELAYS,
BUT NOT ITS BATTERIES**



**SHOWING THE LOCATION OF THE INTERNAL JUMPER CONNECTIONS
THESE MUST BE REMOVED.**

WARNING DO NOT USE THESE WITH A HEATER



GUARANTEE, REPAIRS AND SPARES

Our Conditions of Sale ref: COND/91/11 set out Delta-T's legal obligations on these matters. For your information the following paragraphs summarise Delta-T's position but reference should always be made to our Conditions of Sale which prevail over the following explanation.

Instruments manufactured by Delta-T are guaranteed for one year against defects in manufacture or materials used. The guarantee does not cover damage through misuse or inexpert servicing, or other circumstances beyond our control.

For the U.K. this means that no charges are made for labour, materials or return carriage for guarantee repairs.

For other countries, the guarantee covers free exchange of faulty parts during the guarantee period.

Alternatively, if the equipment is returned to us for guarantee repair, we make no charge for labour or materials but we do charge for carriage and U.K. customs clearance.

We strongly prefer to have such repairs discussed with us first, and if we agree that the equipment does need to be returned, we may at our discretion waive these charges.

SERVICE AND SPARES

We recognise that some users of our instruments may not have easy access to technically specialised backup.

Spare parts for our own instruments can be supplied from our works. These can normally be despatched within 1 working day of receiving an order.

Spare parts and accessories for sensors not manufactured by Delta T, but supplied as part of the weather station, may be obtained from the original manufacturer. We will endeavour to obtain parts if requested, but a certain amount of additional delay is inevitable.

Should it prove necessary, instruments may be returned to our works for servicing. We normally expect to complete repairs of our own instruments within 2 days of receiving the equipment. Other manufacturers' sensors supplied by us and returned for servicing will take longer. They will have to be returned to the original manufacturer for servicing, and may be subject to additional delays of two to four weeks.

Users in countries which have a Delta-T Agent or Technical Representative should contact them in the first instance.