
Mechanical Wind Recorder

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ADOLF THIES GmbH & Co. KG

Hauptstraße 76

Box 3536 + 3541

Phone ++551 79001-0

www.thiesclima.com

37083 Göttingen Germany

37025 Göttingen

Fax ++551 79001-65

info@thiesclima.com

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1 Range of application

The mechanical wind recorder is used to register wind conditions over a relatively long period of time. Since the instrument does not require any sort of auxiliary energy supply to record the measured values, it can be set up anywhere.

The instrument can be used in wind velocities ranging from 0 to 60 m/s. The sensitivity of response of the cup anemometer and the wind vane is 0,5 m/s. Average wind velocity can be determined from the wind run recorded over a certain period of time. Determination of instantaneous wind velocity is not possible.

2 Construction of the complete instrument

The complete instrument is shipped in several parts in order to avoid shipping damage or resp. to keep the carton small.

The instrument consists of the following parts:

- 1 case
- 1 cup anemometer
- 1 wind vane
- 3 rolls of recording paper
- 2 rulers for evaluation of data
- 1 key (clockwork)
- 1 instruction for use
- 1 hexagon box wrench SW 3

3 Technical data

Recorded values	: wind run, wind direction (velocity with the aid of the evaluation ruler)
Form of recording	: on waxpaper
Recording length	: 31 days
Recording speed	: 10 mm/h
Graduation of recorder	: 1 km or resp. 30°
Width of writing	: wind run 50 mm = 10 km, wind direction 36 mm = 360°
Admissible	: max. 60 m/s
Responsiveness	
Anemometer	< 0.5 m/s
Wind vane	< 1.3 m/s (bei 90° Auslenkung)
Accuracy	
5... 15 m/s	< ± 2% of meas. value
Paper transport	Band Recorder, handwinding Accuracy: < ± 60 s /d bei 20° C (nach DIN 1620)
Admissible temperature range	: -35° ... + 45°C
Recomm. Mast dimensions	: threaded pipe 1 ½" acc. to DIN 2440 (Ø50)
Weight	: 10,5 kg

4 Construction and mode of operation

Wind direction is recorded by means of a wind vane, wind run with the aid of the rotating cup anemometer mounted above the wind vane. The movements are transferred by means of gears onto the recording drums in the case. The recording drums have spiral ridges whose slopes correspond to a certain point on the recording strips. By means of appropriate gears, the wind run drum turns once every 1000 meter wind run. The wind direction drum is synchronised with the wind vane. A band recorder transport mechanism for handwinding turns the recording strips at the rate of 10 mm per hour. The case door has a bolt lever lock which can be secured with a padlock. In this manner, the wind recorder is protected from tampering by unauthorised persons and from theft.

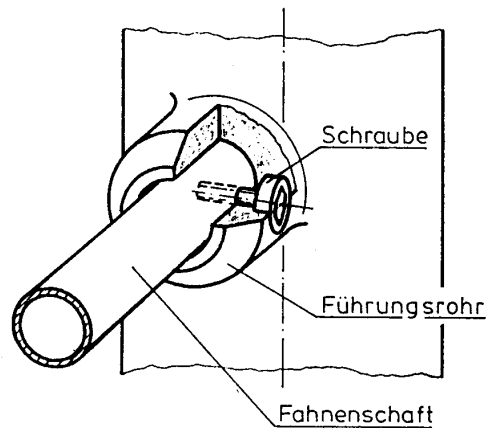
5 Preparation for use

5.1 Selecting the site of operation

In general, anemometers must record wind conditions over a large area. Therefore, the site of operations must be chosen with care so as to ensure that the anemometer isn't placed in the lee of buildings, trees etc. Since the wind recorder must be aligned in a north-south direction make sure that the instrument is accessible from the south (the case door faces south).

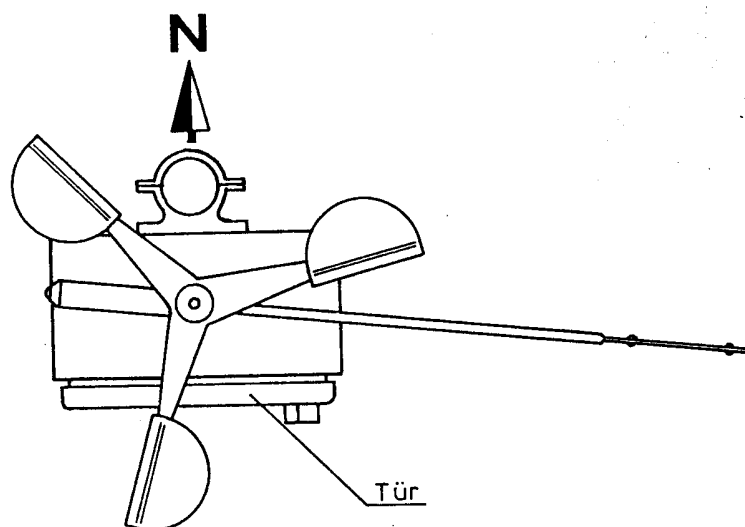
5.2 Installing the wind vane

Unscrew the inner hexagon cap screw found on the shaft of the mast. Insert the shaft of the mast into the guide tube and rescrew the hexagon screw. The hexagon box wrench is part of the accessories.



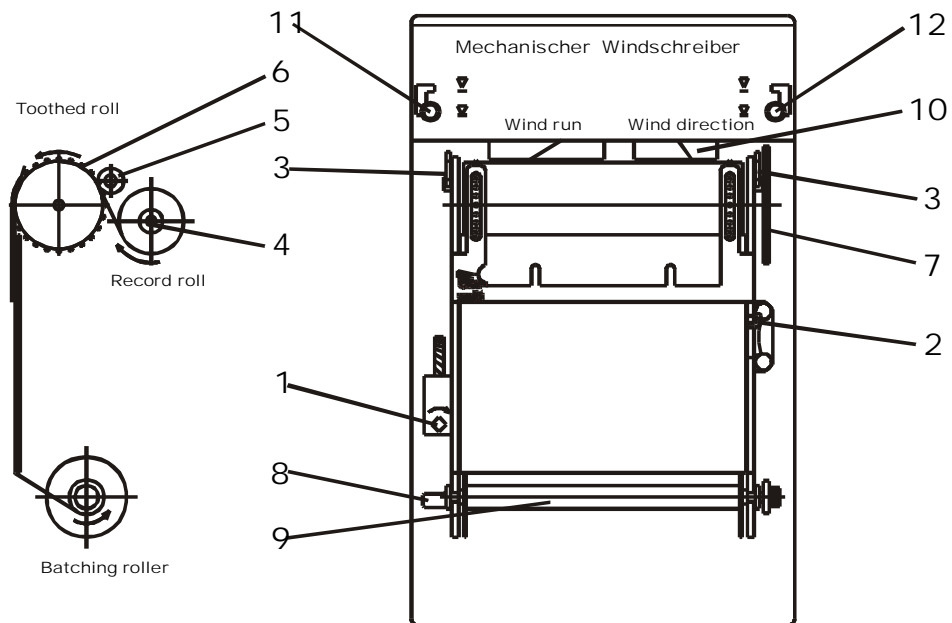
5.3 Attaching to the mast

Set the wind recorder onto the receiving mast and, using a compass, align it in such a way that the back of the case faces north. Then tighten the wind recorder into position with the aid of the 2 hexagon cap screws on the receiving flange.



5.4 Inserting the recording strip

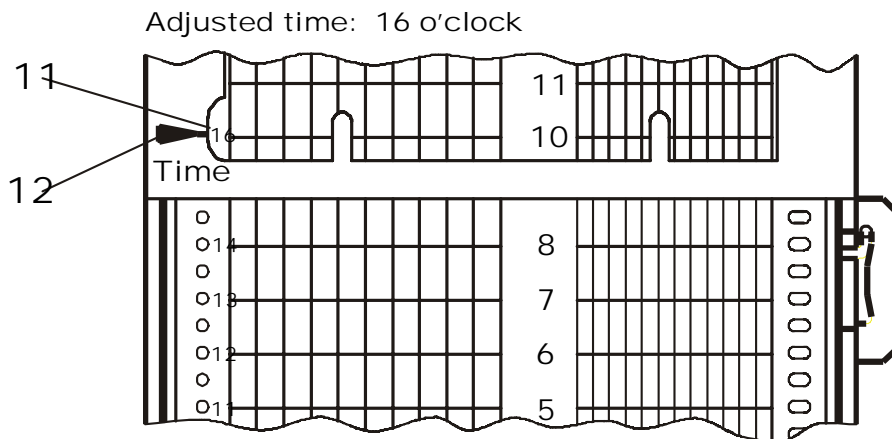
Wind up the clockwork with the crank on the square (1), and block it with the adjustable lever (place lever on the red point). Push the locking lever (3) upwards, and tip out the clockwork mechanism towards the front. Remove the recording roll (4), and put on the new roll from the right side (big flange on the left). Roll off approx. 10 cm of paper, thread it under the shaft (5), and replace the recording roll into the holder. Thread the recording strip carefully over the toothed roll (6), and push it under the chard feeding.



Tip the clockwork mechanism back until it catches. Thread the paper downwards by turning the toothed gear (7). Press down the lower locking lever (8), and remove the batching roller (9). Clamp the paper under the retaining spring of the batching roller (toothed gear to the right), and roll it in a bit. Press down the locking lever (8) and replace the batching roller.

5.5 Adjusting the paper to time

On the left hand side of the recording strip there are small numbers indicating hours (13). The large numbers indicating hours in the centre of the recording strip are part of the recording itself. With the aid of the regulator wheel (7) turn the recording strips forward until the time mark (14) on the left recording strip holder points to the time at the moment of setting. In order to compensate the play of the toothed gear (last motion) in the clockwork mechanism, it is advisable to turn the recording strip a bit beyond time desired and then to set the correct time by turning back (turning against the rotation). Raise the adjustable lever (2) to the green point to start the transport mechanism.



6 Operation

In order to avoid damages to the spiral ridges on the recording drums (10), the recording drums are raised from the toothed cylinder during transport.

In order start recording, lower the recording drums onto the recording strip with the aid of the respective switch lever (11) i.e. for wind run (12) and for wind direction. Gently push against the switch levers and move it into the desired position. In the final position both levers snap into place. A time mark can be placed on the recording strip at the beginning of the measurement by rotating the wind vane full around by hand. A pencil or some other sharp object can be used to note the date on the recording. In order to avoid premature wear of the recording spiral ridge, it is recommendable to raise the recording drums when the wind recorder is not in use, when changing the recording strip as well as when installing the instrument.

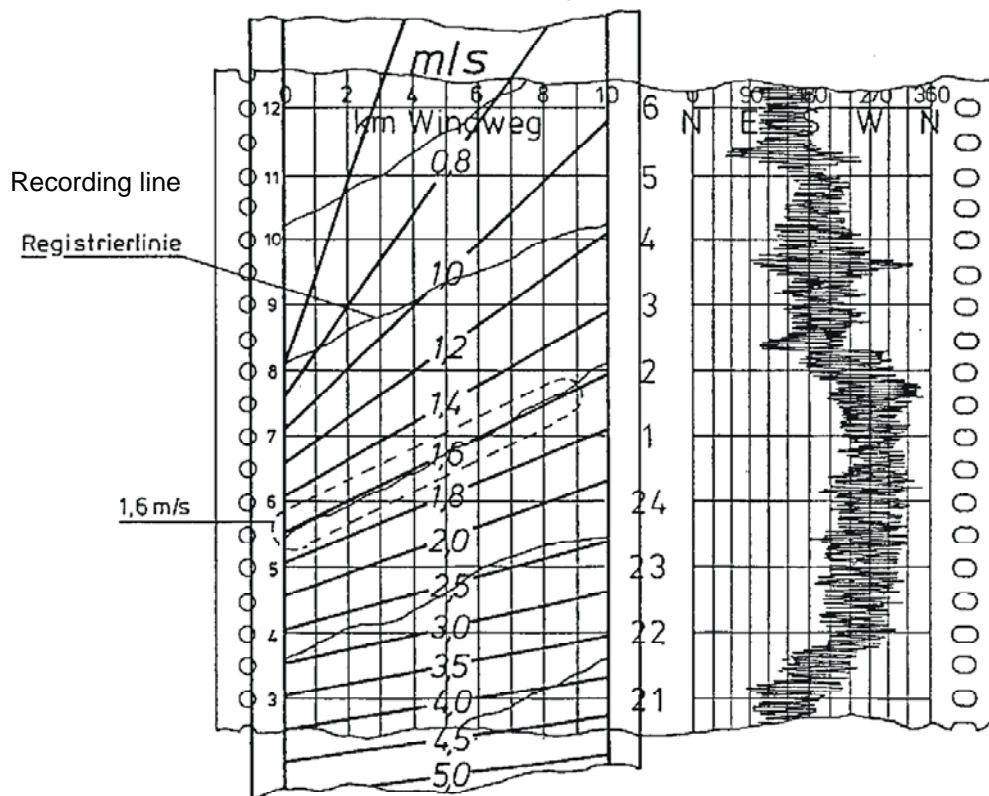
7 Evaluating the recording charts

7.1 Wind velocity

Two different slope rulers to transfer data to control charts have been enclosed with the instrument in order to evaluate the recorded wind runs. The rulers are used to determine the mean wind velocity in m/s.

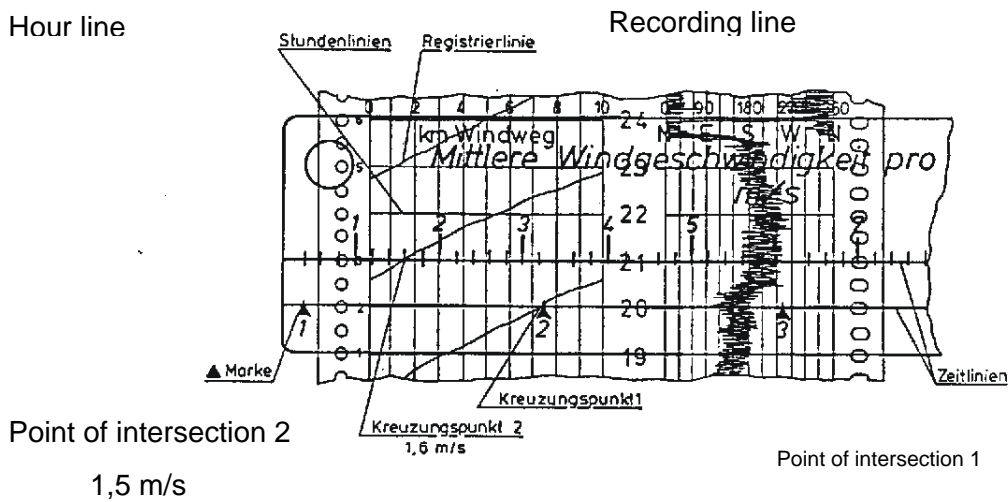
The so-called slope ruler consists of a number of straight lines with varying slopes. Each line corresponds to a certain mean velocity. The slopes of the lines are obtained from the width of the writing, the recording chart speed and the correction values which are the same for each instrument and which are necessary because of the fact that the correlation between cup rotation and wind velocity is not completely linear.

The mean velocity is obtained by placing the slope ruler onto the chart area (see figure below) and, by a parallel shift of the ruler in a vertical direction, searching for the line which coincides with the written line. The indicated value of this gradient indicates the mean wind velocity in m/s.



To determine the mean values of the velocity over a longer period of time, use the evaluation scale according to Höschele (see also „Meteorologische Rundschau“ 17th year, issue 6, pp. 173-174 and, if necessary, a subsequent computation.

Here one proceeds in the following manner:



1. Place the evaluation scale onto the hour field to be evaluated in such a way the time lines coincide with the hour lines (see also Fig. 8).
2. Count the recording lines between the time lines.
3. Place the marker with the number of recording lines counted onto intersection 1 (lower hour line, recording line).
4. Read the mean wind velocity on the upper scale at intersection 2 (recording line, upper hour line).

Example Fig 8

Number of recording lines between the time line = 2 Intersection 2 = 1,6 m/s.

For evaluation over a period of several hours, determine hourly, add the hourly values and divide by the number of hours. For wind velocities over 11.8 m/s for each additionally counted recording line 6,7 etc.) to the wind velocity read at marker 5.

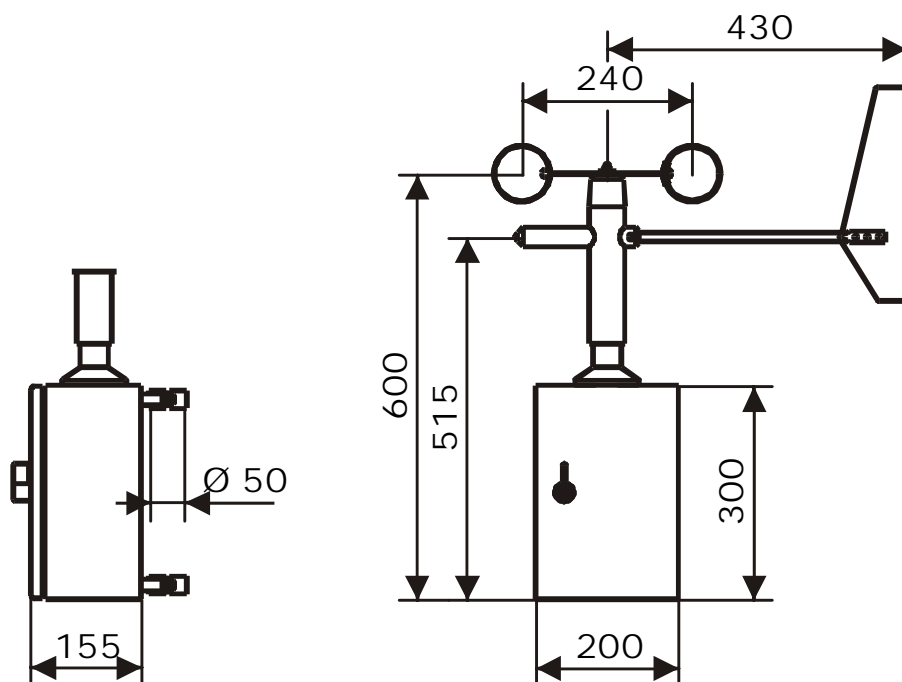
7.2 Wind direction

The wind direction recording, depending on the deviations of the wind vane, consists of a large number of horizontal single lines of varying lengths. The main wind direction can be determined by placing a perpendicular line in the middle of the band there where the horizontal lines join to form a vertical band. Read the direction from recording. If the recording doesn't indicate any deviations, then one can assume that the wind velocity was below the response limit of the wind vane. In that case, one can't draw any conclusions about wind direction from the recording since the position of the wind vane does not allow any kind of correlation with wind direction. A glance at the wind run recording will confirm that there wasn't any perceptible wind velocity and thus no recordable wind direction.

8 Maintenance

Except for occasionally cleaning the parts exposed to the elements (cup, wind, vane, case), no maintenance is required. However, it is recommendable in winter to coat the hinges of the door with a silicon paste or to apply talcum powder to them in order to prevent the case door from freezing shut and to avoid the possible resultant damage to the door hinges and door seal. The functioning of the instrument can be influenced by ice formation at low temperature (frost) between the fixed and movable parts (vane, cup). Use an antifreeze product to de-ice.

9 Dimension diagram





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P.O. Box 3536 + 3541 37025 Göttingen
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