

Quick Reference Guide

WAV252 Heated Wind Vane

Description and Technical Data



0002-030

- **Non-freezing all-weather sensor**
- **Lightweight vane assembly with integral heaters**
- **Non-contact heating power transmission**
 - **Low starting threshold**
- **Fast response; delay distance below 0.5 m**
 - **Used with the WAA252 Heated Anemometer**



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DESCRIPTION

The WAV252 Heated Wind Vane is a non-freezing gauge of novel design. Its lightweight vane offers excellent sensitivity and fast response. The foil heaters integrated in the vane & tail assembly protect the gauge's rotating parts against freezing in all wintry weathers, even in extreme climates.

The transmission of heating power to the WAV252's rotor is contactless, with no slip rings or brushes. This feature completely eliminates sparks and excessive friction or wear. Power to the heaters is supplied via a rotary transformer, with 26kHz low-EMI sine wave. For easy maintenance the vane & tail assembly is removable, with a 2-pin connector for heating electricity.

An intelligent heating control circuitry is included, with integral sensors for both ambient and internal temperature. Therefore, there is no need for a separate temperature sensor in the system.

Power consumption, typically 50 watts, is very low considering the heating efficiency and the protection against freezing provided. Approximately 30 watts of the power is consumed on the vane and tail assembly, 12 watts on the shaft and bearings, and 8 watts on the body. Hence also the sensor body is kept free of ice, which is important for maintaining the gauge's aerodynamic performance.

The WAV252 is normally used with the WAA252 Heated Anemometer. A single 24 VDC (5.5 A) power supply such as the Vaisala WHP25 is able to feed both devices simultaneously. The WAV252 can be mounted on Vaisala's regular WAC151 crossarm and its output interface is compatible with that of the regular WAV151 vane. Therefore, updating to a heated-vane system is easy - just a minimal wiring alteration is needed in the crossarm's junction box.

The operational voltage for the gauge's transducer part is taken from the 24 V heating power with a galvanically isolated voltage converter integral in the WAV252. Thus no separate transducer power supply is needed. Optionally it is possible to take this power from an external device such as the WT521 or WAT12 wind transmitter. This guarantees an uninterrupted transducer supply, independent of the heating power. The opto-electronic type transducer consumes less than 20 mA from a 5... 15 V excitation.

Wind tunnel tests per ASTM method D5366-93 have been conducted on the WAV252 in order to define its aerodynamical behavior.

The WAV252's power inputs and signal outputs are well protected against line transients and interference. The device itself emits no unacceptable electro-magnetic noise to the signal cables or the atmosphere.

TECHNICAL DATA

Sensor/ Transducer type	Mechanical vane / Optical code disc
Measuring range	0 ... 360°
Starting threshold	< 0.4 m/s
Damping ratio	0.3
Overshoot ratio	0.4
Delay distance	< 0.5 m
Resolution	± 2.8°
Accuracy	Better than ± 3°
Signal output	6-bit parallel GRAY code
Input power	24 VDC ± 10 %, max. 2.1 A
Typical power consumption (U _{in} = 24 VDC)	50 W below +2 °C (heating on) 1 W above +6 °C (heating off)
Optional xducer i/p power (U _{xdr})	4.8 - 15.3VDC, 19mA typ.
Transducer output high level (with I _{out} < +3 mA)	> 11V (or > U _{xdr} - 1.5V)
Transducer output low level (with I _{out} > -3 mA)	< 1.5 V
Electrical connections	MIL-C-26482 type 10-pin plug
Operating temperature	-55 ... +55 °C
Storage temperature	-60 ... +70 °C
Housing material	AlMgSi, Grey & black anodized
Vane material	Carbonfibre and glass fiber; black
Dimensions	355 (h) × 90 (Ø) mm; swept radius of vane: 218 mm
Weight	850 g

Mounting and Locating

In mounting the WAV252 Heated Wind Vane keep in mind the recommendations for locating the wind sensors. Following three cases are most typical:

- 1 Preferred location is on the top of a mast, at a site with open terrain. The recommendation is to have at least 150 m open area in all directions. Minimum distance to visible obstacles is 10 times the height of the obstacle.
- 2 When the gauge is mounted beside the mast, the distance from the mast to the crossarm should be at least 3 times the diameter of the mast.
- 3 If mounted on the top of the building, the gauge should be installed on top of a mast at least 1.5 times as high as is the height or the largest width of the building, whichever is smaller.

NOTE Following the recommendations for locating the wind sensors is essential for receiving reliable wind data.

Electrical

The WAV252 operates from a single 25 VDC +10% power supply, at 2.1-ampere maximum current (@ 25 V). Most of the current is consumed by the heating, typically enabled only at ambient temperature below +5 °C. With heating off, only some 45 mA is consumed.

The power supply leads are connected to the terminals J(+) and K(-) of the I/O connector (Table 1). The lead diameter should be such that no excessive power be wasted in the cable. Each 0.5 ohms in the cable will cause a 1-volt extra drop in the input voltage, which in turn will decrease the applicable heating power. For instance, if only 20 V instead of the recommended 24 V is remaining at the wind vane end of the cable, only 70% of the specified heating power will be gained.

No separate power supply is required for the WAV252's transducer section, since this is also fed by the heating supply, through a galvanically isolated voltage converter integral to the sensor electronics.

Optionally however, if an external, no-break power supply should be applied for the transducer section only, this can be connected to the terminals A(+) and B(-), with a voltage range from 5 to 15 VDC. The sensor section, consuming only about 15 mA, will manage even long power break periods with just a tiny battery, whereas the 2-amp heating power would require a big battery pack. An option for saving

power is to use pulsing in power supply. For further information on that contact Vaisala personnel.

Table 1. WAV252 Connector

A	D+	Optional power input for transducer section, 5...15VDC, 10mA typ.
B	SGND	Signal Ground (also GND for optional power i/p at A)
C	G5	Signal Output, MSB of the 6-bit Gray code (HI>11V / LO<1V typ.)
D	G4	Signal Output, 2.MSB
E	G3	Signal Output, 3.MSB
F	G2	Signal Output, 4.MSB
G	G1	Signal Output, 5.MSB
H	G0	Signal Output, LSB of the 6-bit Gray code (HI>11V / LO<1V typ.)
J	HTG+	Power Input, 25 VDC ±10%, 2.1A max.
K	HGND	Power Ground

The sensor output is taken from terminals C to H against terminal B(-). The output signals G5... G0 form a 6-bit binary word, with 64 possible codes each representing certain 5.625 degree direction sector. The magic of the Gray code (vs. natural binary code) is that each time, when moving from a sector to the adjacent one, only one bit state is changed. Typically, o/p high level is 11...13 V and low level 0...1 V. However, with e.g. 5 V external power applied to the transducer section, the o/p high level, during the time the heating supply is unavailable, is only about 4 V.

NOTE SGND at terminal B and HGND at terminal K are galvanically isolated from each other.

WAC151 Wiring

The wiring diagram for the WA252 system to the WAC151 Sensor Crossarm is shown in the Figure 1. Two alterations must be done to the regular sensor cable wiring in this junction box. The altered wire connections are highlighted in the Figure 1.

The alterations are:

- 1 The thermostat switch in the junction box's regular wiring is useless in this application and hence its WHT and LGN colored wires are disconnected. Both of these wires are connected to the screw terminal #2.
- 2 The YEL colored wire is moved from the terminal #2 to the terminal #3.

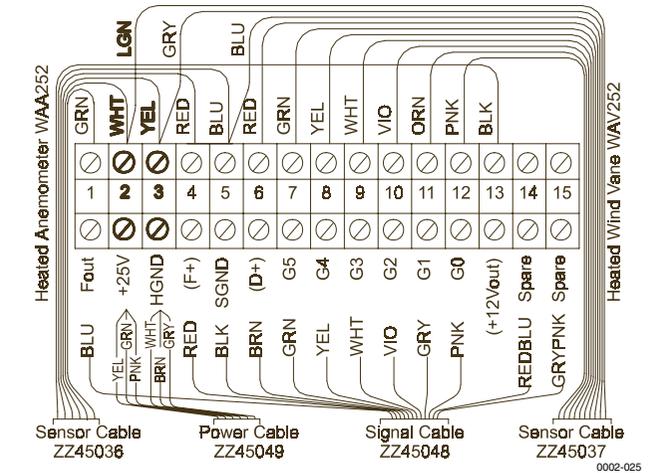


Figure 1. WAC151 Standard Wiring for WAA252 and WAV252

The signal cable wiring (ZZ45048 or equivalent) is the same as with the regular sensors, except for the sensor power inputs F+ and D+ (terminals #4 and #6). Those inputs are not necessarily needed, since the sensor can take its excitation from the integral, isolated 12 V power supply fed from the 25 V heating power line. Optionally, however, as described in the Electrical section, a no-break power supply can be applied to those terminals, for example, when a WT521 or WAT12 Wind Transmitter is being used.

The power cable leads (ZZ45049 or equivalent) are applied to the terminals #2(+) and #3(-). In case the installation includes both the WAA252 and WAV252, the power line current exceeds 5 A. Hence a large wire dimension or several wires in parallel shall be used. Each 0.2 ohms in the power cable will cause a 1-volt extra drop in the input voltage, which in turn will decrease the available heating power.

NOTE The lead diameter should be such that no excessive power is wasted in the cable.