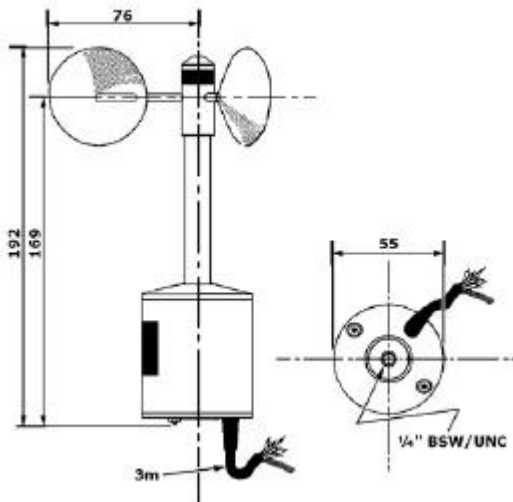


Anemometer „vector“

Order No: P6171

- Lightweight anemometer for highest demands
- Optoelectronic wind speed transmitter
- Low power, high frequency output signal
- Range 0.2 .. 75 m/s, Resolution 0.05 m/s



Dimensions: mm

In response to demand for a low power, pulse output only type, a new version of the well-known "Vector"-anemometer has been produced suitable for use with Ammonit data loggers. This sensor consumes 1 mA while operating from the logger's battery supply.

Measurement principle

The low-inertia 3-cup rotor is set into rotation by the wind. The wheel is scanned optoelectronically and the measuring value is available at the output as a digital signal.

Mounting

The anemometer should ideally be mounted at the top of a mast to be open to the wind from all directions. Only a lightning protection rod mounted below may overtop the sensor. If an anemometer has to be mounted on a traverse the length must be at least 7 times the mast diameter.

Screw securely to mast top using a 1/4" inch BSW screw directly into the base of the anemometer. The screw should not enter more than 0.38 inches; use of an excessively long screw may result in internal damage. After installation remove protection cup and lightly push rotor onto the spindle.

To remove rotor first unscrew the sensor from mast and invert instrument. Pressing the rotor hub releases the gravity sensitive catch and allows the rotor to slide off.

To avoid damage due to lightning, a protection rod and proper grounding of all metal parts is to be recommended.

Maintenance

When mounted properly, the anemometer operates almost maintenance-free. Dust or dirt may clog the space between the rotating parts and the shaft. Therefore you should check for plausibility of measurement results at regular terms and clean the device if necessary. In true long-term operation (years) the bearings may be subject to wear and tear showing delayed start-up behaviour or even stand-still of the anemometer. Should such a defect occur we would recommend that you return the instrument for repairs.

Technical Data

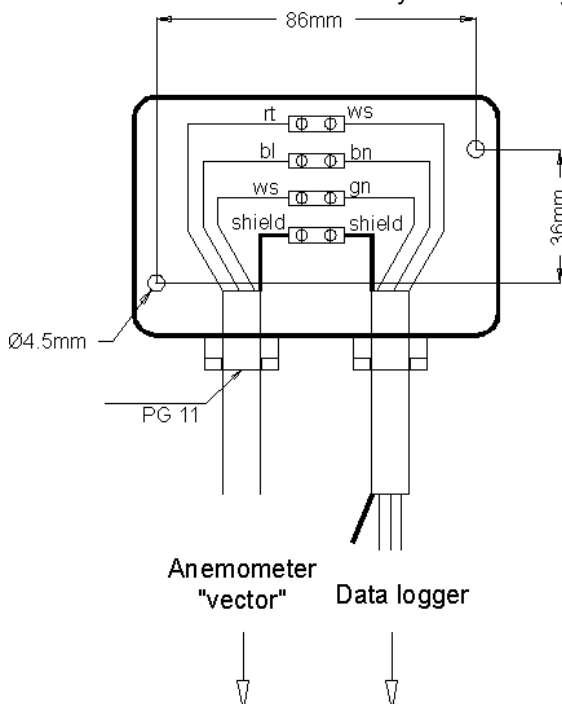
Type	P 6171 – Anemometer “vector”
Measurement range	0.2 ... 75 m/s
Accuracy	±0.2 m/s (< 10 m/s); ±2 % of reading (> 10 m/s)
Resolution	0.05 m/s
Start-up wind speed	0.2 m/s
Survival wind speed	max. 75 m/s
Distance constant	2.3 m ± 10%
Materials	anodised aluminium, weather-resisting plastics
Ambient temperature	-30 °C ... +70 °C
Heating	Optional
Transducer	Interruption of optical beam
Operating supply	5 VDC (4.75 .. 28 VDC), 1 mA
Electrical output	0 ... 1500 Hz
Termination	cable length 3 m
Mass anemometer	0.5 kg
Gross weight for shipping	1 kg
Recalibration	recommended interval every 24 months
Manufacturer	Vector Instruments / UK

Calibration

Frequency output is determined by a linear function of the wind speed:

$$\text{wind run [m]} = \text{pulses} \cdot 0.050 + 0.2 \text{ [m]}$$

For measurement campaigns with extremely crucial requirements an individual calibration of each anemometer in a wind tunnel test may be necessary to achieve the required accuracy.



Function	Colours sensor	Colours extension*	Connector Data Logger	
			3-pin <Plug>	12-pin
Supply	rt (red)	ws (white)	2	H
Ground	bl (blue)	bn (brown)	1	J, K, M
Pulses	ws (white)	gn (green)	3	A, B or C
Shielding	shield	shield	1**	J, K, M**

* colours if cable supplied by Ammonit. For extension of cable a small junction box with weather shield is to be recommended. Cable type: LiYCY 3 x 0.25 mm².

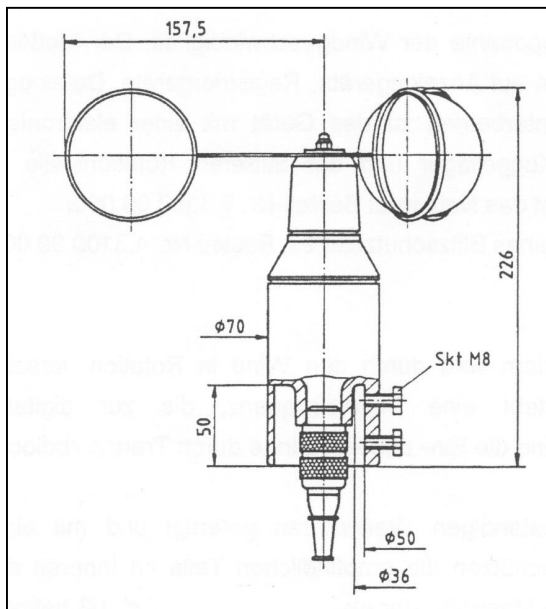
** or connect to proper earthing if steel cabinet is used.

rt = rot / red
 bl = blau / blue
 ws = weiß / white
 bn = braun / brown
 gn = grün / green

Anemometer „classic“

Order No: P6121 – heatable

- Robust anemometer for highest demands
- Optoelectronic wind speed transmitter
- Low power, frequency output signal
- Range 0.3 .. 50 m/s, Resolution < 0.05 m/s



Measurement principle

The low-inertia light metallic cupstar is set into rotation by the wind. The wheel is scanned optoelectronically and the measuring value will be placed at the output as digital signal.

The anemometer is equipped with an electronically regulated heating system in order to prevent ice from the bearings. To use this heating the connection cable must have additional cores and you should provide a sufficient power supply (mains connection).

Mounting

Mount the transmitter on a piece of pipe with an outer diameter of 48 mm and a length of > 50 mm. The pipe must have an internal diameter of at least 36 mm as the anemometer has to be connected with a plug from below. Set the transmitter onto the pipe and fastened it with the two hexagonal screws.

To mount the cupstar unscrew the cap nut (SW 8) and remove the disk. Set the star into position in such a way that the dowel pin catches in the nut. Replace the disk and rescrew the cap nut.

To avoid damage due to lightning, a protection rod and proper grounding of all metal parts is to be recommended.

The anemometer should be mounted principally at the top of a mast to be free in all directions. Only a lightning protection rod mounted below must overtop the sensor. If an anemometer has to be mounted on a traverse the length must be at least 7 times the length of the mast diameter.

Maintenance

When mounted properly, the anemometer operates almost maintenance-free. Dust or dirt may clog the space between the rotating parts and the shaft. Therefore you should check for plausibility of measurement results at regular terms and clean the device if necessary. In true long-term operation (years) the bearings may be subject to wear and tear showing delayed start-up behaviour or even stand-still of the anemometer. Should such a defect occur we would recommend that you return the instrument for repairs.

Technical Data

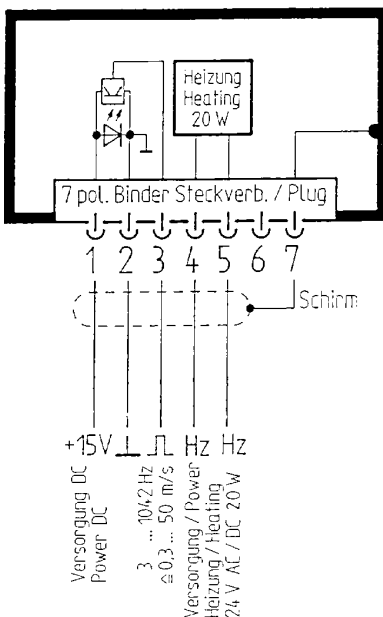
type	P 6121
measurement range	0.3 ... 50 m/s
accuracy	± 2 % of meas. value, however ≥ 0.3 m/s
resolution	< 0.05 m/s
start-up wind speed	0.3 m/s
survival wind speed	max. 60 m/s
delay distance	5 m
housing made of	cast aluminium, anodised and varnished
ambient temperature	-35 °C ... +80 °C
heating	24 V AC/DC; 20 W; electronically controlled
transducer	optochopper
operating supply	5 V DC (4 .. 18), 0.3 mA
electrical output	0 ... 1042 Hz
wind load at 35 m/s	~ ca. 9 N
connector	male plug 7 pins type BINDER series 691
mass anemometer	1 kg
gross weight	4 kg
recalibration	recommended interval every 24 months
manufacturer / type	Thies 4.3303.22.007

Calibration

Frequency output is determined by a linear function of the wind speed:

$$\text{wind path} = \text{pulses} \cdot 0.047 + 0.6 \text{ [m]}$$

For measurement campaigns with extremely crucial requirements an individual calibration of each anemometer in a wind tunnel test may be worthwhile to achieve optimum accuracy and precision.



Connection	color of cores	Connector Data Logger 3-pin <Plug> 12-pin	
1 – Supply	white	2	H
2 – Ground	brown	1	J, K, M
3 – Pulses	green	3	A, B or C
4 – Heating 1	grey, pink, blue		
5 – Heating 2	red, black, violet		
6 - n.c.			
7 - Shielding	Shielding		

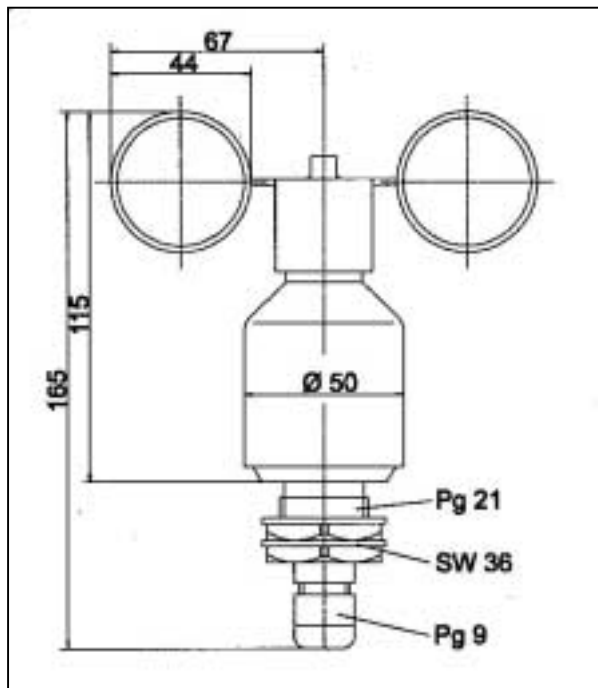
Cable type without heating cores: LiY(C)Y 3 x 0.5 mm²

Cable type with heating cores: LiY(C)Y 10 x 0.25 mm²

Anemometer „compact“

Order No: P6140 - heatable

- Optoelectrical wind speed transmitter
- Low power, frequency output signal
- Range 0.5 .. 50 m/s, Resolution < 0.1 m/s



Measurement principle

The low-inertia plastic cupstar is set into rotation by the wind. The wheel is scanned optoelectronically and the measuring value will be placed at the output as digital signal.

The anemometer is equipped with an electronically regulated heating system in order to prevent ice from the bearings. To use this heating the connection cable must have additional cores and you should provide a sufficient power supply (mains connection).

Mounting

When using fastening adaptors please notice that turbulences could possibly influence the characteristic curve. You should use a tube with a length of 350 mm, an outer diameter of 35 mm and a wall thickness of 5 mm. Cut an inner thread (PG 21) in the upper end of the tube (min. 13 mm). For mounting leave one hexagonal nut (SW36) at the anemometer and pass the cable through the tube. The thread of the anemometer has to be screwed into the tube until there is still enough free space to fix it with the nut.

When mounting the sensor please note that you never turn the sensor at the aluminium tube because this can be opened. To fix and to loosen the lock nut the sensor must be hold with a screw spanner (SW 22) above the thread!

The anemometer should be mounted principally at the top of a mast to be free in all directions. Only a lightning protection rod mounted below must overtop the sensor. If an anemometer has to be mounted on a traverse the length must be at least 7 times the length of the mast diameter.

Maintenance

When mounted properly, the anemometer operates almost maintenance-free. Dust or dirt may clog the space between the rotating parts and the shaft. Therefore you should check for plausibility of measurement results at regular terms and clean the device if necessary. In true long-term operation (years) the bearings may be subject to wear and tear showing delayed start-up behaviour or even stand-still of the anemometer. Should such a defect occur we would recommend that you return the instrument for repairs.

Technical Data

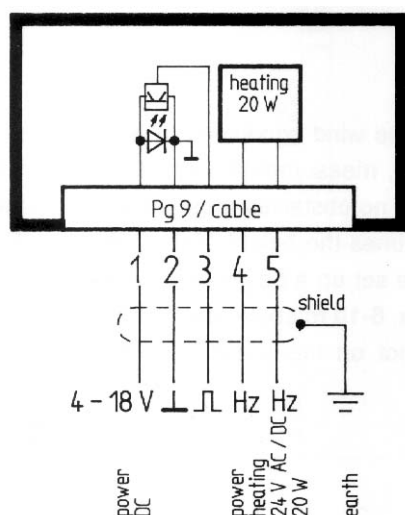
type	P6140
measurement range	0.5 ... 50 m/s
accuracy	± 3 % of meas. value, however ≥ 0,5 m/s
resolution	< 0.1 m/s
start-up wind speed	0.5 m/s
survival wind speed	max. 60 m/s
delay distance	3 m
housing made of	anodized aluminium and plastic
operating voltage	4 - 18 V DC about 0.3 mA
scanning	lightbarrier - cup wheel
heating	24 V AC/DC max. 20 W
ambient temp.	-30 °C ... + 70 °C
weight without cable	0.250 kg
manufacturer / type	Thies, 4.3519.00.000

Calibration

Frequency output is determined by a linear function of the wind speed:
(Recommended calibration using mounting tube)

$$\text{wind path} = \text{pulses} \cdot 0.074 + 0.6 \text{ [m]}$$

For measurement campaigns with extremely crucial requirements an individual calibration of each anemometer in a wind tunnel test may be worthwhile to achieve optimum accuracy and precision.



Connection	color of cores	Connector Data Logger	
		3-pin <Plug>	12-pin
1 – Supply	white	2	H
2 – Ground	brown	1	J, K, M
3 – Pulses	green	3	A, B or C
4 – Heating 1	yellow, grey		
5 – Heating 2	pink, blue		

Cable type without heating cores: LiY(C)Y 3 x 0.25 mm²

Cable type with heating cores: LiYCY 7 x 0.25 mm²

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TYPE 40 MAXIMUM ANEMOMETER



MEASURING THE WIND'S ENERGY



The Maximum #40 has three conical cups molded in one continuous piece. Cup rotation induces a sine wave voltage in a single coil by a four pole magnet. Two sine wave cycles are produced for each revolution of the cups with the frequency directly proportional to windspeed.

■ The Maximum #40 Anemometer has proven to be rugged, reliable and highly accurate. Over 100,000 units are now in use on wind farms, on mountaintops and in thousands of household, wind energy and institutional installations. ■ Maximum cup anemometers have recorded wind to 96 m/s (214mph). Their low moment of inertia and unique bearings permit very rapid response to gusts and lulls. The black Lexan cups (virtually shatterproof) have thermal properties which resist and shed icing far more effectively than metal assemblies. ■ Because of their output linearity, these sensors are ideal for use with various data retrieval systems and controllers. The unique bearing system ensures that wind-blown dirt and moisture will not destroy the bearings or degrade performance. ■ The unbeatable combination of accuracy, simple yet rugged construction and very low cost have made the #40 the first choice for professionals in all fields. Optional digital outputs and calibration are available. The Maximum #40 from NRG Systems: the wind industry standard anemometer.

NRG SYSTEMS

110 Commerce Street

Hinesburg, VT 05461 USA

(802) 482-2255

FAX (802) 482-2272

Email: sales@nrgsystems.com

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TYPE 40 MAXIMUM ANEMOMETER

APPLICATIONS

- Anemometer for wind resource assessment instrumentation
- Research measurements in environmental studies
- Control anemometer for new or existing wind turbines
- Sensing wind speeds at sporting events (i.e. Olympics)
- Engineering studies on wind effects on bridges, skyscrapers

FEATURES

- Very simple, elegantly engineered construction
- Dirt and wear resistant, modified Teflon bearing system
- All corrosion-resistant materials
- All 3 cups molded in one piece for repeatable performance
- Frequency output for ease of filtering and long cable runs
- Professional qualities at a minimum price
- Never change bearings; stays accurate many years in hostile environments
- Optional signal conditioners for digital and analog outputs available

SPECIFICATIONS

MECHANICAL:

3 cups of conical cross-section, 51mm (2") diameter
190mm (7.5") swept diameter of rotor
51mm (3.2") overall assembly height
Moment of inertia of rotor assembly = 68×10^{-6} S-ft²
Mounting—(Using a cotter pin and set screw) on a 13mm (0.5") diameter mast with a #35 hole, 11mm (.35") from the top.

Materials:

Cups—one piece injection- molded black polycarbonate (Lexan)
Body—housing is black ABS plastic
Shaft—beryllium copper, fully hardened
Bearing—modified Teflon, self-lubricating. Rated PV factor of 20,000 (at 15 mph, PV is approx. 500; at 100 mph PV is approx. 2,000). Upper bearing is centered in the plane of cup thrust for optimal loading.
Permanent magnet—Indox 1, 25mm (1") dia., 13mm (0.5") long, 4 poles

Threshold:

Starting threshold—0.78 m/s (1.75 mph)
Cup distance constant (63% recovery)—3.0m (10')

Environmental:

Operating temperature -55°C to 60°C (-67 to 150 F)
Operating humidity range 0 to 100% RH

Weight: 0.1kg (0.2 lb)

Shipping Weight: 0.5kg (1 lb)

ELECTRICAL:

Single coil, bobbin wound, 4100 turns of #41 wire
Voltage is a sine wave with frequency changing linearly with wind speed—
60 hz = 45.82 m/s (102.5 mph) [1.7 mph/Hz w/0.78 offset, 0.765 m/s/Hz w/0.35 offset]
Voltage is 2.0 VAC at 60 cycles—minimum (typical is 6 VAC P-P)
Hall Effect (#40H): A Hall Effect switch replaces the single coil. The voltage output is a square wave with the same frequency-to-wind speed relationship as the single coil. Requires a 5 to 24 VDC voltage with 5ma of current.

Custom sensors available for wind turbine control, etc.
Please contact us directly.

SPECIFICATIONS MAY CHANGE WITHOUT NOTICE.

ORDERING INFORMATION:

NRG #40 Anemometer	Cat. No. 40
#40 Hall Effect Output Anemometer	Cat. No. 40H
#40 Calibrated Anemometer	Cat. No. 40C



Shown here is the #40 Anemometer with the #200P NRG wind direction vane.



MEASURING THE WIND'S ENERGY

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