

# ***Instruction Manual***

Wind vane model WS-MM-660-I(H)

Anemometer model WS-MM-067-I(H)



June 2004

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## **1. SUMMARY**

This manual describes sensors which are developed for measuring wind speed and wind direction under extreme circumstances (e.g. for wind turbines). The output is 4 - 20 mA, they are shockproof and are optionally equipped with a heater which keeps the rotating parts free of ice down to -40°C

## **2. WIND VANE MODEL WS-MM-660-I(H)**

### 2.1 PRINCIPLE OF OPERATION

The angle of the vane is determined optically in 64 steps (0 - 359 ) by means of the 6-bit Gray Code disc. The Gray Code is subsequently converted into a binary code. This binary code is transmitted to a D/A-converter with an analog voltage output. This voltage is finally translated into a 4 - 20 mA signal.

The electronics also stabilize the supply voltage, and they contain a transient protection circuit.

### 2.2 WEATHER RESISTANCE

The cap and the bearing housing of wind vane WS-MM-660-I have been designed to withstand temperatures of –20 to +60 C easily.

If a wind vane is equipped with optional heater, it has a better resistance against extreme climate conditions, such as heavy glaze, severe snow storms, and prolonged rimeing. The solid state heating has a maximum power of 100W, can be adjusted continuously and is built into the sensor. The temperature range for a sensor with built-in heating is –40 to +60 Celsius. The model number for a wind vane with heating is WS-MM-660-I(H).

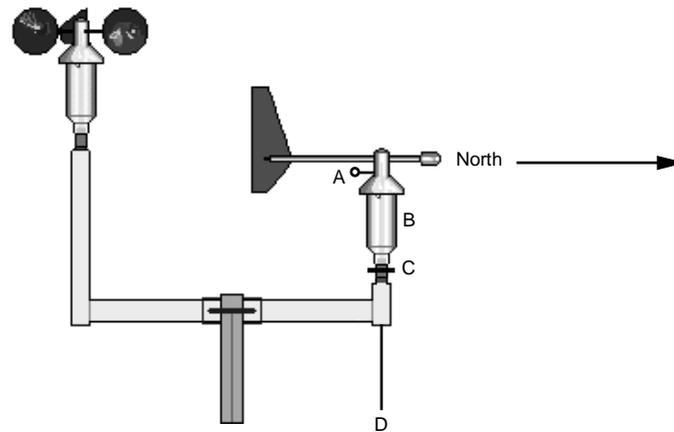
The instrument has a weather resistance rating of IP-65.

### 2.3 INSTALLATION

The wind vane should be mounted on a pipe with  $\frac{3}{4}$  " gas thread (male).

The wind vane must be positioned correctly during installation. The code disc has been mounted in the wind vane in such a way that the electronics output is 4 mA when the vane is at an angle of 0 (north). The vane is aligned with the stop that is provided with the instrument.

### 2.3.1 Aligning the wind vane (to the north)



Mount the bracket to the mast, ensuring that the highest point of the bracket is pointing in the dominant wind direction.

Screw the anemometer to the highest point of the bracket and tighten the lock nut with a 36mm open-end wrench. Do not connect the wires yet, to avoid twisting them.

Screw the wind vane to the lowest point of the bracket, and do not tighten the lock nut yet. Do not connect the wires (D) yet, to avoid twisting them.

Use a compass to determine the north.

Insert the stop (A) into the wind vane to lock it.

Now turn the wind vane (B) until the counterbalancing weight points north.

Tighten the lock nut (C) with a 36mm open-end wrench.

Ensure that the counterbalancing weight is still pointing north.

Remove the stop (A) from the wind vane.

Connect the wires (D) according to the table.

## 2.4 CONNECTION WIND VANE MODEL WS-MM-660-I

Colour	Signal
White	+24 V
Brown	GND
Green	I out

I out : 4 - 20 mA @ 0 - 359

## 2.5 CONNECTION WIND VANE MODEL WS-MM-660-I(H)

Colour	Signal
White	+24 V
Brown	GND
Green	I out
Yellow	+24 V Heater
Gray	GND Heater

## 2.6 SPECIFICATIONS WIND VANE MODEL WS-MM-660-I(H)

### Performance:

Operating range	:	0...359°
Resolution	:	5,6°
Inaccuracy	:	< 3,8°
Output signal	:	Analogue 4...20mA @ 0...359°

### Physical:

Dimensions	:	265 x 370 mm, ø 53 mm
Weight	:	1 kg
Material	:	aluminium 51ST (anodized, 20µm)
Operating temperature	:	-20...+60°C (without heater)
	:	-40...+60°C (with heater)
Protection	:	Sealed to IP-65

### Installation:

Mounting	:	¾" female gas thread
Connection	:	5 - wire (0,34mm <sup>2</sup> ) shielded cable, ø 6 mm. Sensor supplied with 5-meter cable

### Electrical:

Supply voltage	:	24 VDC. 75 mA (without heater)
Static discharge	:	The instrument is protected against outside inductive interference up to a discharge power of 1500 Watt
Heating	:	If required the sensor can be provided with a heater inside
Warranty	:	1 year

### Specifications optional heater (model WS-MM-660-IH)

Control	:	A solid state circuit controls the internal sensor heater
Power	:	0 < P < 100W, internally analogue regulated
Operating temperature	:	-40...+60°C
Supply voltage	:	24VDC unregulated, separate supply for heater
Connection	:	wires included in the sensor cable
Power consumption	:	Approx. 4A

### **3. ANEMOMETER MODEL WS-MM-067-I(H)**

#### **3.1 PRINCIPLE OF OPERATION**

A cage with 32 evenly distributed slots is mounted to the anemometer axis. This cage revolves between the LED and the transistor of a photo interrupter. The revolving motion of the axis generates a pulse train which is proportional to the wind speed. An integrator converts these pulses into a voltage, which is subsequently translated into a 4 - 20 mA signal.

The electronics also stabilize the supply voltage, and they contain a transient protection circuit.

#### **3.2 WEATHER RESISTANCE**

The cap and the bearing housing of anemometer WS-MM-067-I have been designed to withstand temperatures of -20 to +60 C easily.

If a wind vane is equipped with optional heater, it has a better resistance against extreme climate conditions, such as heavy glaze, severe snow storms, and prolonged rimeing. The solid state heating has a maximum power of 100W, can be adjusted continuously and is built into the sensor. The temperature range for a sensor with built-in heating is -40 to +60 Celsius. The model number for a anemometer with heating is WS-MM-067-I(H).

The instrument has a weather resistance rating of IP-65.

#### **3.3 INSTALLATION**

The anemometer should be mounted on a pipe with 3/4 " gas thread (male). It is important to ensure that there are as few obstacles as possible in the immediate vicinity that could affect the readings. The anemometer does not need positioning.

Note that the cable should be connected after the sensor has been installed on the pipe, to avoid twisting the cable.

### 3.4 CONNECTION ANEMOMETER MODEL WS-MM-067-I

Colour	Signal
White	+24 V
Brown	GND
Green	I out

I out : 4 - 20 mA @ 0 - 40 m/s

### 3.5 CONNECTION ANEMOMETER MODEL WS-MM-067-I(H)

Colour	Signal
White	+24 V
Brown	GND
Green	I out
Yellow	+24 V Heater
Gray	GND Heater

### 3.6 SPECIFICATIONS ANEMOMETER MODEL WS-MM-067-I(H)

#### **Performance:**

Operating range	:	0,75...40m/s,
Maximum wind load	:	Cup assembly tested until 75 m/s
Inaccuracy	:	< 0,8 m/s by a range of 0...30 m/s
	:	< 0,5 m/s by a range of 3...30 m/s
Output signal	:	Analogue 4...20mA @ 0...40 m/s

#### **Physical:**

Dimensions	:	265 x 300, ø 53 mm
Weight	:	0,7 kg
Material	:	aluminium 51ST(anodized, 20µm)
Material cups	:	glass-fiber reinforced Polycarbonate
Operating temperature	:	-20...+60°C (without heater)
	:	-40...+60°C (with heater)
Protection	:	Sealed to IP-65

#### **Installation:**

Mounting	:	¾" female gas thread
Connection	:	5 - wire (0,34mm <sup>2</sup> ) shielded cable, ø 6 mm. Sensor supplied with 5-meter cable

#### **Electrical:**

Supply voltage	:	24 VDC, 50 mA (without heater)
Static discharge	:	The instrument is protected against outside inductive interference up to a discharge power of 1500 Watt
Heating	:	If required the sensor can be provided with a heater inside
Warranty	:	1 year

#### **Specifications optional heater (model WS-MM-067-I(H))**

Control	:	A solid state circuit controls the internal sensor heater
Power	:	0 < P < 100W, internally analogue regulated
Operating temperature	:	-40...+60°C
Supply voltage	:	24VDC unregulated, separate supply for heater
Connection	:	wires included in the sensor cable
Power consumption	:	Approx. 4A

#### **4. GROUNDING**

The sensors are electronically protected against outside inductive interference in accordance with international standards. However, the effectiveness of the transient protection largely depends on proper grounding.

That is why we recommend connecting the shielding to an appropriate "ground" at the connection point of the wind sensor cable.

#### **5. MAINTENANCE**

To ensure a life span of 20 years and measuring values that remain correct throughout this period, it is recommended that the wind sensors are serviced once every two years.

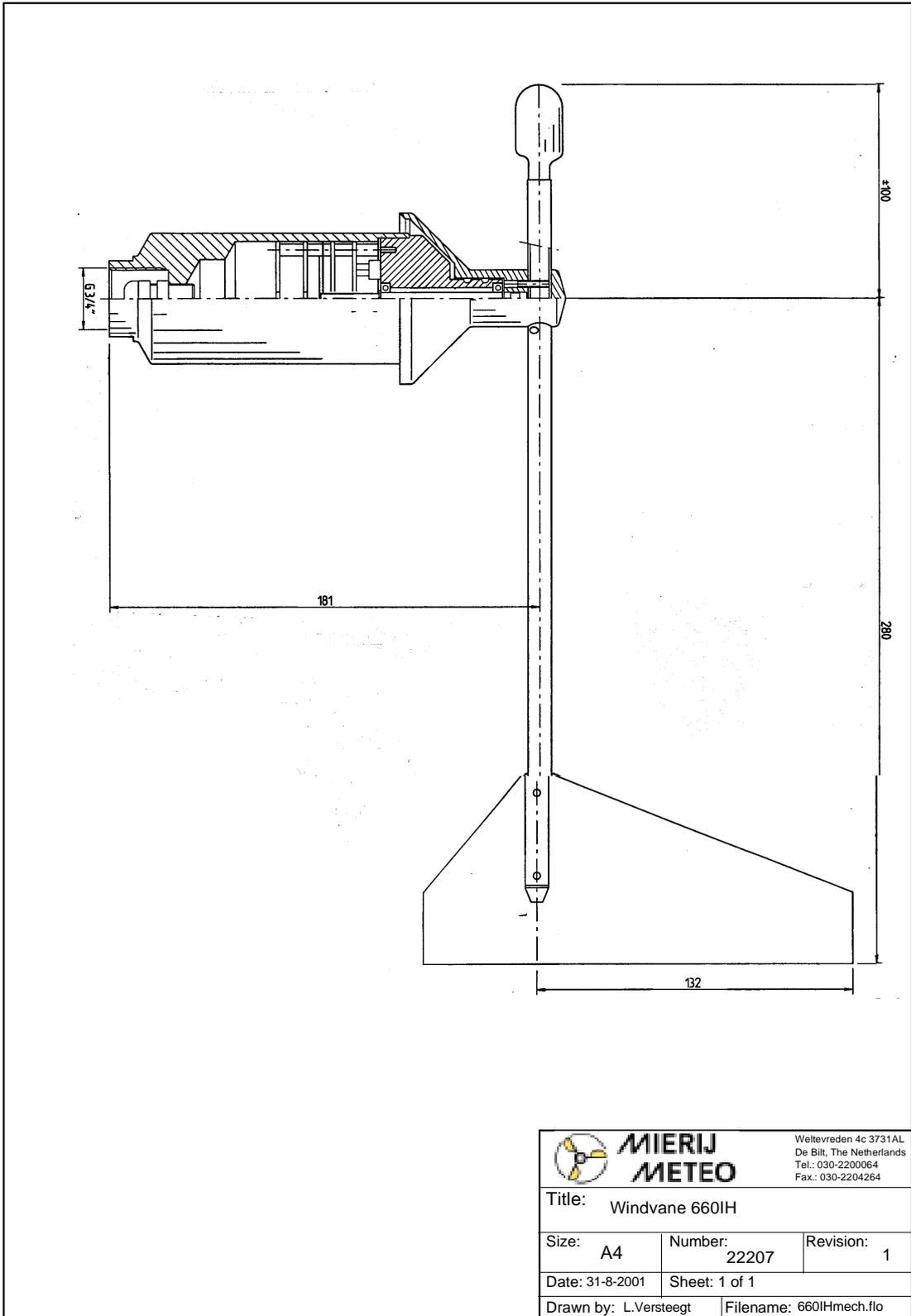
If the sensors are installed near the coast or on locations with severe air pollution, maintenance on an annual basis is recommended.

The maintenance consists of replacing the bearings and O-rings, and removing any dirt that may have accumulated between the bearing housing and the cap. Mechanical parts that show signs of extreme wear should be replaced. Maintenance includes the sensors being disassembled to a large extent, after which they are cleaned and subjected to visual inspection. After replacement of the relevant parts, the sensors should be reassembled and adjusted with the utmost accuracy and care. Therefore it is recommendable to have the supplier perform the maintenance.

#### **6. DRAWINGS**

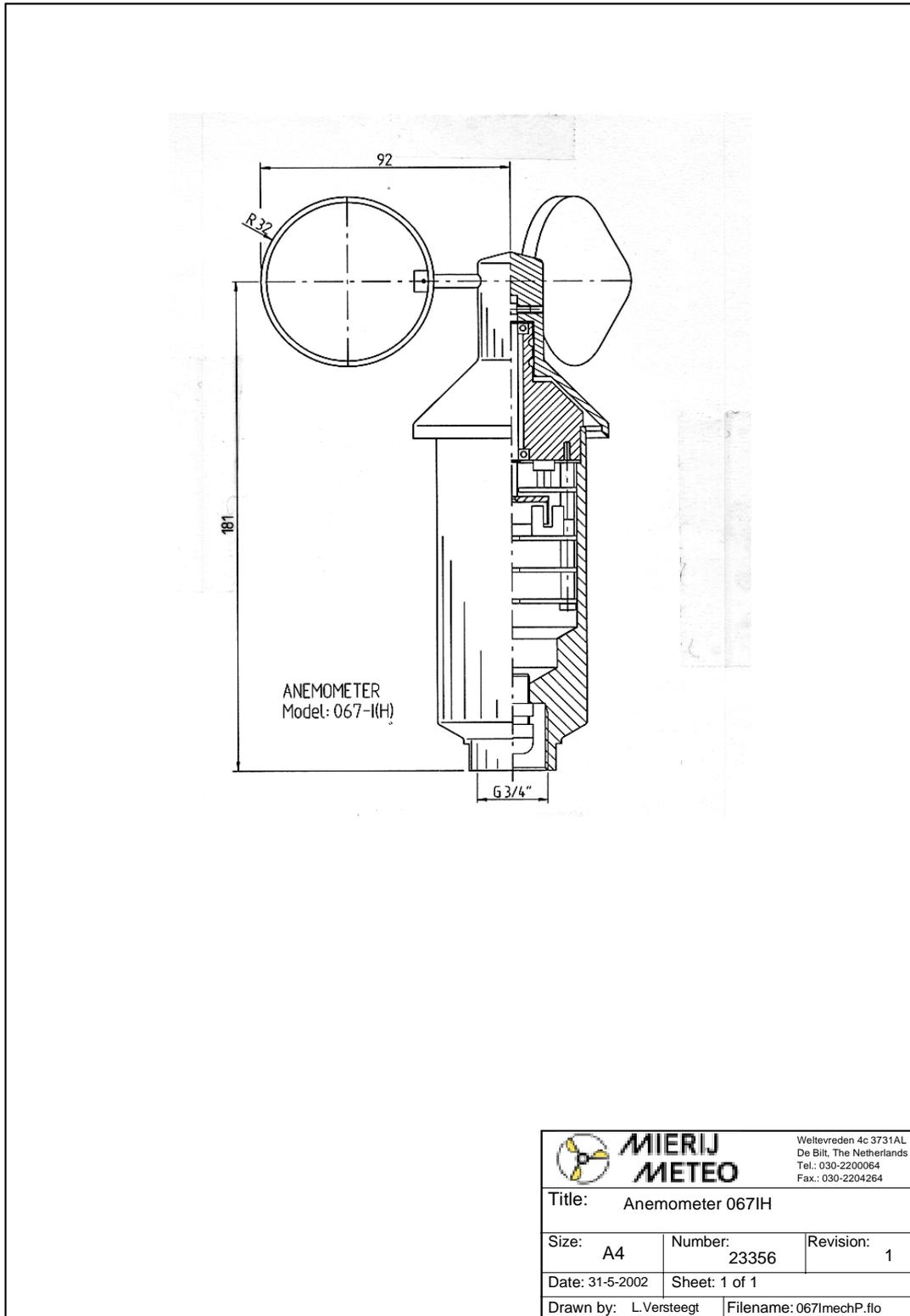
<b>Number</b>	<b>Description</b>
22207	Wind vane model WS-MM-660-I(H) page 12
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6.1 WIND VANE MODEL WS-MM-660-I(H)

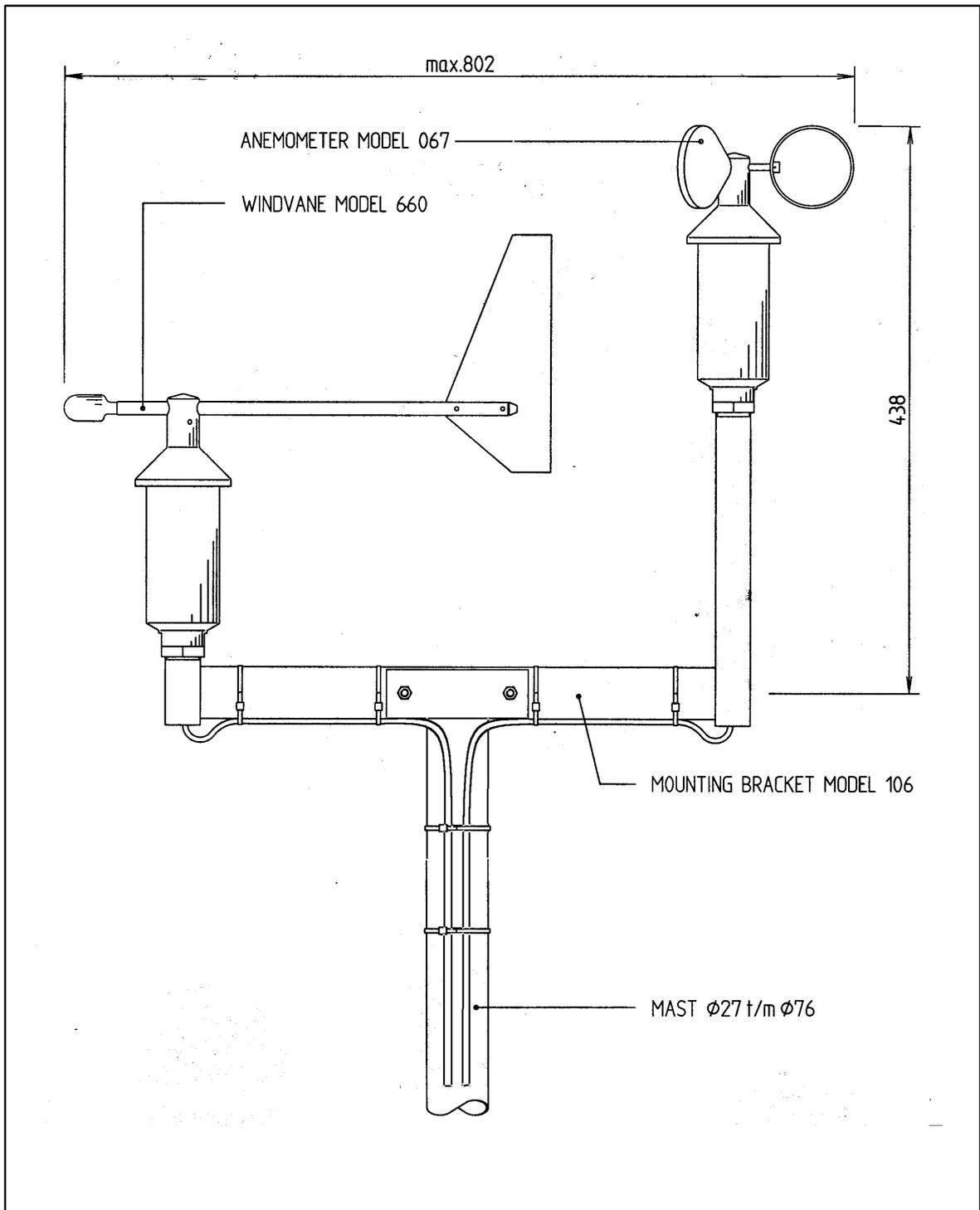


 <b>MIERIJ METEO</b>		Weltevreden 4c 3731AL De Bilt, The Netherlands Tel.: 030-2200064 Fax.: 030-2204264	
		Title: Windvane 660IH	
Size: A4	Number: 22207	Revision: 1	
Date: 31-8-2001	Sheet: 1 of 1		
Drawn by: L.Versteegt		Filename: 660IHmech.flo	

6.2 ANEMOMETER MODEL WS-MM-067-I(H)



6.3 MOUNTING BRACKET MODEL WS-MM-106



 <b>MIERIJ METEO</b>		Weltevreden 4c 3731AL De Bilt, The Netherlands Tel.: 030-2200064 Fax.: 030-2204264	
		Title: Mounting Bracket model 106	
Size:	A4	Number:	24307
Date:	31-8-2001	Revision:	1
Date: 31-8-2001		Sheet: 1 of 1	
Drawn by: L.Versteegt		Filename:067660ENGmech.flo	