

## Ultrasonic Anemometer 2D Compact

### Short - Instruction for Use

4.387x.xx.xxx

from software version V3.14 Status: 07/2020



Dok. No. 021946/11/22

THE WORLD OF WEATHER DATA

### Safety Instructions

- Before operating with or at the device/product, read through the operating instructions. This manual contains instructions which should be followed on mounting, start-up, and operation. A non-observance might cause:
  - failure of important functions
  - endangerment of persons by electrical or mechanical effect
  - damage to objects
- Mounting, electrical connection and wiring of the device/product must be carried out only by a qualified technician who is familiar with and observes the engineering regulations, provisions and standards applicable in each case.
- Repairs and maintenance may only be carried out by trained staff or **Adolf Thies GmbH & Co. KG**. Only components and spare parts supplied and/or recommended by **Adolf Thies GmbH & Co. KG** should be used for repairs.
- Electrical devices/products must be mounted and wired only in a voltage-free state.
- **Adolf Thies GmbH & Co KG** guarantees proper functioning of the device/products provided that no modifications have been made to the mechanics, electronics or software, and that the following points are observed:
  - All information, warnings and instructions for use included in these operating instructions must be taken into account and observed as this is essential to ensure trouble-free operation and a safe condition of the measuring system / device / product.
  - The device / product is designed for a specific application as described in these operating instructions.
  - The device / product should be operated with the accessories and consumables supplied and/or recommended by **Adolf Thies GmbH & Co KG** .
  - Recommendation: As it is possible that each measuring system / device / product may, under certain conditions, and in rare cases, may also output erroneous measuring values, it is recommended using redundant systems with plausibility checks for **security-relevant applications**.

### Environment

- As a longstanding manufacturer of sensors Adolf Thies GmbH & Co KG is committed to the objectives of environmental protection and is therefore willing to take back all supplied products governed by the provisions of "*ElektroG*" (German Electrical and Electronic Equipment Act) and to perform environmentally compatible disposal and recycling. We are prepared to take back all Thies products concerned free of charge if returned to Thies by our customers carriage-paid.
- Make sure you retain packaging for storage or transport of products. Should packaging however no longer be required, please arrange for recycling as the packaging materials are designed to be recycled.



### Documentation

- © Copyright **Adolf Thies GmbH & Co KG**, Göttingen / Germany
- Although these operating instructions have been drawn up with due care, **Adolf Thies GmbH & Co KG** can accept no liability whatsoever for any technical and typographical errors or omissions in this document that might remain.
- We can accept no liability whatsoever for any losses arising from the information contained in this document.
- Subject to modification in terms of content.
- The device / product should not be passed on without the/these operating instructions.

## **Short instructions for use**

These operating instructions describe the installation of the instrument. **The *Ultrasonic Anemometer 2D compact* is factory-set.**

Identification for the factory setting derives from the order No. and the respective "Factory Setting"

## **Order number and Setting see supplementary sheet "Factory Setting"**

With the detailed operating instructions and via the serial interface of the Ultrasonic Anemometer 2D compact it is possible for the user to adapt the factory-settings to his own requirements.

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## **Patent**

This instrument is patent-protected

Patent No.: EP 1 448 966 B1

Patent No.: US 7,149,151 B2

## **Shipment**

1 x Ultrasonic Anemometer Compact

1 x Short Instructions for use (the complete instructions for use is available for download)

1 x Supplementary Sheet: Factory Setting

1 x Factory certification

The instructions for use are available for download under the following link:

[https://www.thiesclima.com/db/dnl/4.387x.xx.xxx\\_US-Anemometer-2D-compact\\_eng.pdf](https://www.thiesclima.com/db/dnl/4.387x.xx.xxx_US-Anemometer-2D-compact_eng.pdf)

## 1 Device versions

Bezeichnung	Artikel- Nr. *	Messgröße	Ausgang / Schnittstellen / Ausstattung
US-Anemometer 2D compact	4.387x.xx.xxx	Depending on article no.	Configuration concerning - outputs - data telegrams - scaling - heating - etc.

## 2 Preparation for operation

### **Attention:**

*The working position of the anemometer is vertical (North arrow on the top). During installation, de-installation, transport or maintenance of the anemometer it must be ensured that no water gets into the connector or cable gland of the anemometer. (IP68 is only fulfilled if the cable socket with connection cable is screwed on). When using a lightning rod take care that it be installed in a angle of 45 ° to a measuring transducer; otherwise there will be deviations in the measured values.*

### 2.1 Installation of Anemometer

#### Mechanical installation

Proper installation of the ULTRASONIC ANEMOMETER 2D compact is carried out using a tube socket Ø 50mm and at least 40mm in length. The inside diameter of the tube socket must be at least 25mm as the electrical connection of the ULTRASONIC is carried out at the bottom of the device.

**Tool:**

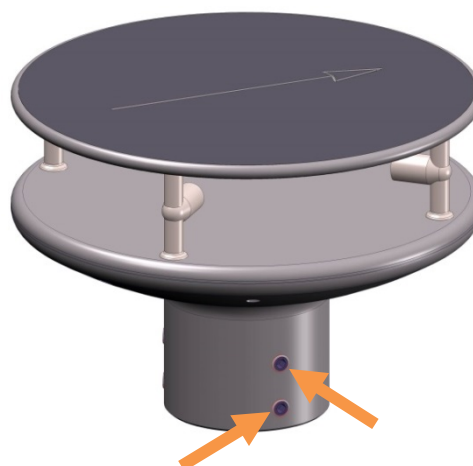
Hexagon socket wrench Gr.4

**Procedure:**

1. Conduct and connect the cable/ plug connection of the ultrasonic anemometer through the boring of the mast, tube, bracket etc.
2. Put the ultrasonic anemometer onto the mast, tube etc.
3. The ultrasonic anemometer "Positioning". See chapter 2.2.
4. Lock the ultrasonic anemometer afterwards at the mast by the four M8 hexagon socket screws.

**Caution:**

The allen screws must be tightened to max. 7Nm.



## 2.2 Alignment to North / Positioning

### North Alignment (Positioning) of the Anemometer at a Weather Station

For the accurate determination of the wind direction, the anemometer must be positioned to the north.

#### Procedure:

1. „Position“ the ultrasonic anemometer by rotating on the mast tube until the **Orientation arrow ①** indicates to northern direction (geographical north). For this, please choose, in advance, a prominent point of the land scape in northern or southern direction by using a compass, und and rotate the mast or the anemometer until the Orientation arrow indicates to northern direction (geographical north).
2. Lock the ultrasonic anemometer afterwards at the mast by the four M8 hexagon socket screws.

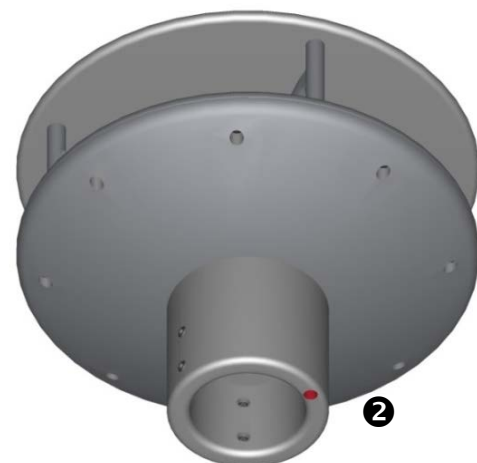
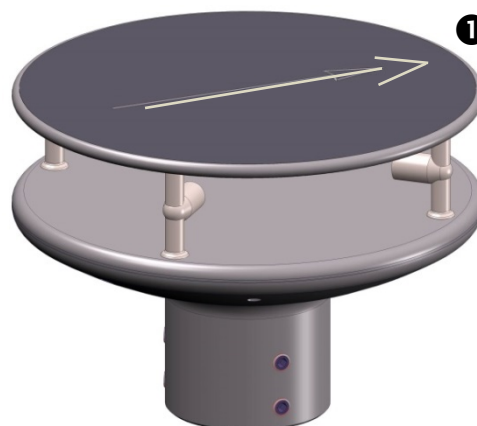
#### Caution:

The allen screws must be tightened to max. **7Nm**

#### Note:

When aligning the instrument to north using a compass, the magnetic variation (= deviation in direction of compass needle from true north) and local interfering magnetic fields (e.g. iron parts, electric cables).

As additional positioning aid, or for a simple change without re-alignment you may use also the **position drilling ②** in the base. Precondition, however, is a preparation by user at the mast.



## Positioning of an Anemometer on a Wind Power Plant

For the exact determination of the wind direction the anemometer must be mounted in alignment with the generator hub.

### Procedure (at generator hub north):

1. „Position“ the ultrasonic anemometer by rotating on the mast tube, until the **orientation arrow** (in parallel to the generator axis) indicates towards the generator-hub.
2. Lock the ultrasonic anemometer afterwards through the four M6 hexagon socket screw at the mast.

### **Caution:**

The allen screws must be tightened to max. **7Nm**

### Remark:

In order to avoid the discontinuity of the wind direction at the north leap (360 ... 1°) the ultrasonic anemometer should be aligned oppositely to the generator hub by means of the reference arrow.

## Positioning of an Anemometer on a Ship

For the exact determination of the wind direction the anemometer must be mounted in alignment with the roll-axis, where the **bow** is related to „0 °“ (**north**).

### Procedure:

1. „Position“ the ultrasonic anemometer by rotating on the mast tube, until the **orientation arrow** (in parallel to the generator axis) indicates towards the generator-hub.  
Remark:  
If the anemometer is far away from the roll-axis (center line bow-rear), a parallel line (bow-rear) should be assumed.
2. Lock the ultrasonic anemometer afterwards through the four M6 hexagon socket screw at the mast.

### **Caution:**

The allen screws must be tightened to max. **7Nm**

## 2.3 Electrical Installation for Ultrasonic Anemometer

The ultrasonic anemometer is equipped with a plug for electrical connection. A coupling socket (mating) is included in delivery. It is located in the lower part of the transport packing.

### 2.3.1 Cables, Cable preparation, Connector Installation

For pin assignment please refer to supplement „factory settings“. Examples see chapter 2.2.2.

The cable must have the following properties:

8 cores; 0.5 ... 0.75mm<sup>2</sup> core cross-section for supply ; min. 0.14mm<sup>2</sup> core cross-section for data communications ; 7 ... 8mm cable diameter, resistant to ultraviolet rays, overall shielding.

**Caution:**

*The cable to be connected must be at least the operating voltage class 01 correspond HAR (100 V).*

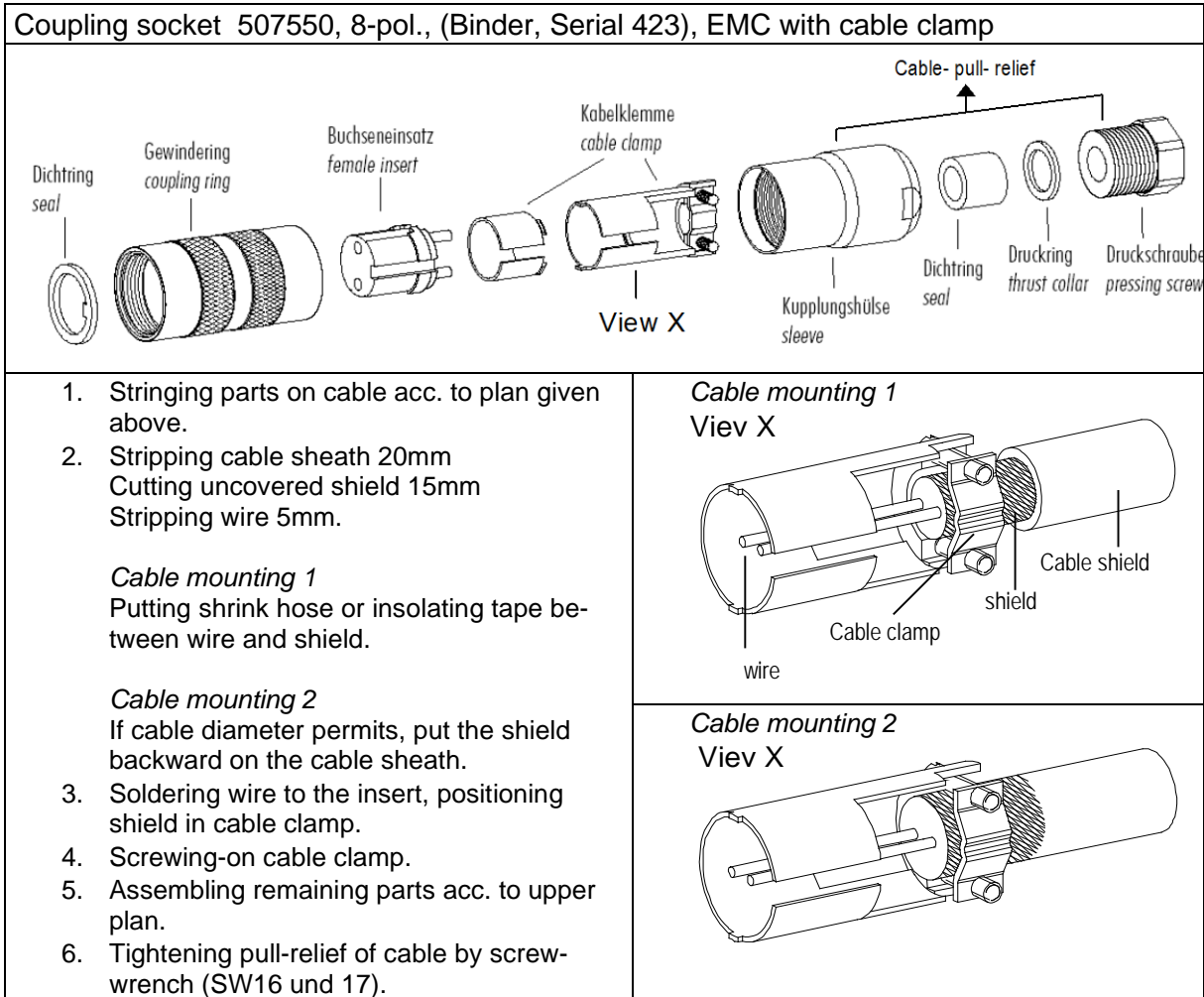
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**Remark:**

*Optionally, a completely converted connecting cable can be included in delivery for the ultrasonic-anemometer (see accessories).*

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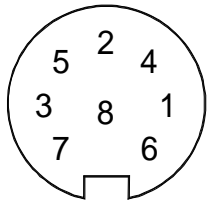



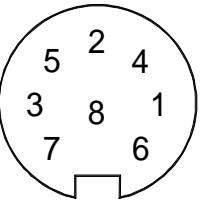

**Figure 1: Connector installation**

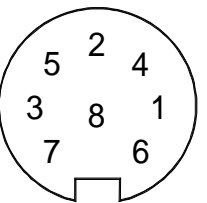

### 2.3.2 Connector Pin Assignment (Examples of Function)

**Remark:**

- For exact allocation of function please refer to supplement “Factory Settings”
- The pins 1 – 6 (incl.) are galvanically isolated from the supply voltage and from housing.

• Serial Interface, Full-duplex			View of solder terminal of coupling socket
Pin	Allocation	Function	
1	RXD-	Serial interface	
2	TXD-	Serial interface	
3	CONTROL	Function programmable	
4	RXD+	Serial interface	
5	TXD+	Serial interface	
6	AGND	Ground for serial interface	
7	24 V AC/DC nominal	(-) Voltage supply*	
8	24 V AC/DC nominal	(+) Voltage supply*	
	Shield		

• Serial Interface, Half-duplex and analogue outputs			View of solder terminal of coupling socket
Pin	allocation	Function	
1	WG	Analogue output wind speed	
2	TXD- / RXD-	Serial interface	
3	CONTROL	Function programmable	
4	WR	Analogue output wind direction	
5	TXD+ / RXD+	Serial interface	
6	AGND	Ground for analogue output and serial interface	
7	24 V AC/DC nominally	(-) Voltage supply*	
8	24 V AC/DC nominally	(+) Voltage supply*	
	Shield		

• Serial Interface, Half-duplex			View of solder terminal of coupling socket
Pin	allocation	Function	
1	WG	-	
2	TXD- / RXD-	Serial interface	
3	CONTROL	Function programmable	
4	WR	-	
5	TXD+ / RXD+	Serial interface	
6	AGND	Ground for analogue output and serial interface	
7	24 V AC/DC nominally	(-) Voltage supply*	
8	24 V AC/DC nominally	(+) Voltage supply*	
	Shield		

\* reverse-polarity protected

### 3 Maintenance

As the instrument does not have moving parts, i.e. is not subject to wear during operation, only minimal servicing is required. The instrument is subject to natural pollution, the level of pollution depends on the location. If necessary the instrument and the sensor surfaces can be cleaned from soil. Cleaning can be carried out as required using non-aggressive cleaning agents in water and a soft cloth during routine checks.

**Attention:**

***During storage, installation, de-installation, transport or maintenance of the anemometer it must be ensured that no water gets into the instrument stand and plug of the anemometer.***

**Note:**

***We recommend the threads of the plugs with a suitable corrosion inhibitors to protect against corrosion.***

### 4 Warranty

Damage caused by improper handling or external influences, e.g. lightning, do not fall under the warranty provisions. The warranty entitlement expires if the instrument is opened.

**Important:**

***The ultrasonic anemometer must be returned in the original packaging as the warranty entitlement otherwise expires with mechanical damage, e.g. deformation of measuring arms.***

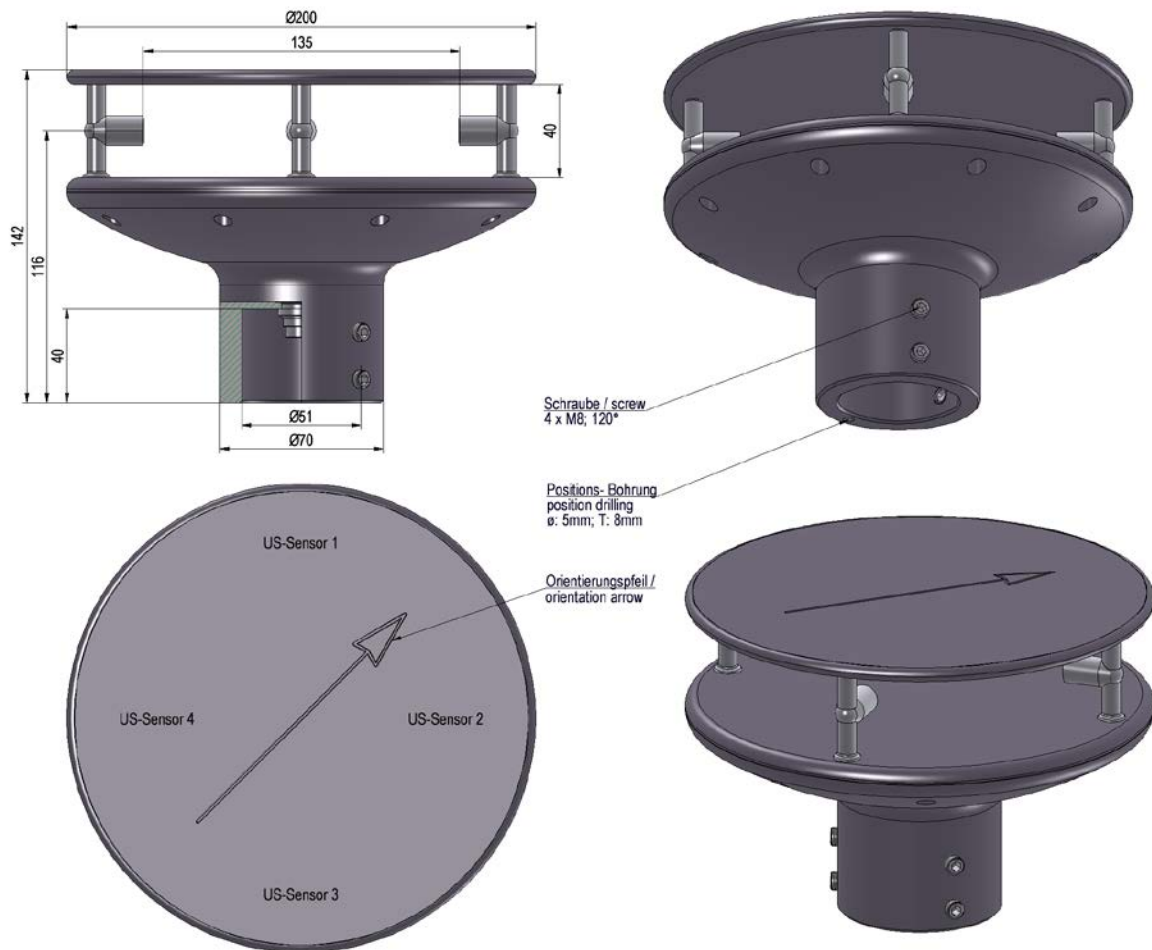
### 5 Technical Data

<b>Wind velocity</b>	Measuring range	0.01 ... 75m/s Scaling of analogue output freely selectable	
	Accuracy	≤5m/s:	±0.2m/s (rms, mean over 360°)
		5 ... 60m/s:	±2% of meas. value (rms- mean over 360 °)
		60 ... 75m/s:	±3% of meas. value (rms- mean over 360 °)
	Resolution	0.1m/s:	In the telegrams: 1, 2, 4, 7
		0.01m/s:	in the telegram 3
<b>Wind direction</b>	Measuring range	0 ... 360°	
	Accuracy	±2.0° at WV >1m/s	
	Resolution	1°:	In the telegrams 1, 2

		0.1°:   in telegrams 3, 4
<b>Virtual temperature</b>	Measuring range	-50 ... +70 °C
	Accuracy	±2.0K
	Resolution	0.1K (in the telegrams 2 and 7)
<b>Air pressure</b>	Measuring range	300 ... 1100hPa
	Accuracy	±0.25hPa @ 700 ... 1050hPa and +25 ... +40 °C ±2.0hPa @ 300 ... 1100hPa, -40...+60 °C and activated heating
	Resolution	0.1hPa
	Long-term stability	<±1hPa per year
<b>Data output digital</b>	Interface	RS 485 / RS 422 Galvanically isolated from supply and housing
	Baud rate	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400, 460800, 921600 adjustable
	Output	Instantaneous values,. gliding mean values freely selectable from 100msec to 2min in increments of 100msec
	Output rate	1 per 10msec to 1 per 10 seconds freely selectable in increments of 1msec
	Status identification	Heating, failure of measurement path , ΔT path temperatures
<b>Data output analogue</b>	Electrical outputs	0 ... 20mA / 0 ... 10V or 4 ... 20mA / 2 ... 10V Galvanically isolated from supply and housing
		Burden on current output maximum 300Ω
		Burden on voltage output minimum 2000Ω
	Output	Instantaneous values Gliding mean values from 100msec to 2min freely selectable in increments of 100msec.
	Output rate	Updating rate 10msec
	Resolution	16bit
<b>General</b>	Internal measuring rate	Up to 1000 runtime-measurements per seconds, up to 250 complete measurement sequences/second inclusive calculations
	Bus mode	Bus mode with up to 99 instruments possible
	Firmware update	Firmware update via RS485
	Temperature range	Operating temperature -50 ... +80°C heated -30 ... +80°C unheated Storing -50 ... +80°C Measuring operation possible with heating up to -75°C
Operating voltage	Supply w/o heating	U: 8 ... 60V DC oder 12 ... 42V AC 45 ... 65Hz P: typ. 1.0VA, max. 1.2VA
Operating voltage	Supply with heating 4.3875.XX.XXX	U: 24V AC/DC ±15%, 45 ... 65Hz P: typ. 240VA, max. 250VA @ 24V
Operating voltage	Supply with heating 4.3876.0X.XXX	U: 48V DC ±10 % P: typ. 360 Watt @ 48V

	Protection	IP 68 - applies with proper installation, see section 4. Preparation for operation
Icing resistance	W/o US converter heating	Acc. to THIES STD 012001
Icing resistance	With US converter heating	Acc. to THIES STD 012002
Icing resistance 4.3876.0X.XXX	With US converter heating	Acc. to MIL-STD-810G, METHOD 521.3, 2008/10 Configuration: HP10; HC10; HT1
	EMC	EN 61326, 61000-6-2, 61000-6-3
Housing		Aluminium, seawater-resistant Surface: hard-anodized with basic colouring Coat thickness: 40 ... 60µm
	Installation type	e.g. Mast tube Ø 50mm (see dimension drawing)
	Connection type	8-pole plug connection in shaft
	Weight	approx. 2kg

## 6 Dimensional Drawing



## 7 More Information / Documents as download

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Further information can be found in the short instructions for use. These document and also the short instruction for use are available for download under the following links.

Short instruction for use

[https://www.thiesclima.com/db/dnl/4.387x.xx.xxx\\_US-Anemometer-2D-compact\\_eng\\_short.pdf](https://www.thiesclima.com/db/dnl/4.387x.xx.xxx_US-Anemometer-2D-compact_eng_short.pdf)

Instruction for Use

[https://www.thiesclima.com/db/dnl/4.387x.xx.xxx\\_US-Anemometer-2D-compact\\_eng.pdf](https://www.thiesclima.com/db/dnl/4.387x.xx.xxx_US-Anemometer-2D-compact_eng.pdf)

**Please contact us for your system requirements.  
We advise you gladly.**

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