Wind Transmitter “First Class” Advanced

Instruction for Use

4.3351.x0.140 / 141 / 161 / 173 / 541

Classified according to IEC 61400-12-1 (2005-12)

Dok. No. 021549/08/22

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 instruction has 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.

Contents

Patent

This device is protected by patent.

Patent Nr.: EP 1 398 637
Patent Nr.: DE 103 27 632
Patent Nr.: EP 1 489 427

1 Models Available

Order - No.	Meas. range	Output Frequency	Output Analogue	Power supply	Heating
4.3351.00.140	0.3...75m/s	1082Hz @ 50m/s	0...20mA	15...24V DC	Yes (24V AC/DC, 24W)
4.3351.00.141	0.3...75m/s	1082Hz @ 50m/s	4...20mA	15...24V DC	Yes (24V AC/DC, 24W)
4.3351.00.161	0.3...75m/s	1082Hz @ 50m/s	0...10V	15...24V DC	Yes (24V AC/DC, 24W)
4.3351.00.173	0.3...75m/s	1082Hz @ 50m/s	0.... 5V	12...24V DC	Yes (24V AC/DC, 24W)
4.3351.00.541	0,3...75m/s	1082 Hz @ 50m/s	4...20mA	15...24V DC	Yes (24V AC/DC, 24W)
4.3351.10.140	0.3...75m/s	1082Hz @ 50m/s	0...20mA	15...24V DC	No
4.3351.10.141	0.3...75m/s	1082Hz @ 50m/s	4...20mA	15...24V DC	No
4.3351.10.161	0.3...75m/s	1082Hz @ 50m/s	0...10V	15...24V DC	No
4.3351.10.173	0.3...75m/s	1082Hz @ 50m/s	0.... 5V	12...24V DC	No

The following parts are included in delivery:
1 Instrument
1 Terminal plug
1 Instruction for Use

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

https://www.thiesclima.com/db/dnl/4.3351.x0.140-173_Wind_Transmitter_First_Class_Advanced_analogue_eng.pdf

2 Application

The wind transmitter is designed for the acquisition of the horizontal component of the wind speed in the field of meteorology and environmental measuring technology, evaluation of location, and measurement of capacity characteristics of wind power systems.

- The measuring value is available at the outputs, at the same time, in digital form as frequency as well as also in analogue form as current or voltage.

The measuring data available are ideally adapted to the supply in display instruments, recording instruments, datalogger, as well as process control systems.

For winter operation the instrument is optionally equipped with an electronically regulated heating, which guarantees a smooth running of the ball bearings, and prevents the shaft and slot from icing-up.

3 Mode of Operation

A low-inertia cup star (in ball bearings) with 3 cups, made of carbon-fibre-reinforced plastic, is set into rotation by the wind. The rotation is scanned opto-electronically, and is converted into a square wave signal. The frequency of this signal is proportional to the number or rotations. A down-stream frequency/voltage-converter of high precision generates an output voltage which is strictly linear-dependent from the frequency. This analogue measuring data can be output alternatively as voltage- or current measuring value. At the same time, the wind transmitter delivers also the rectangular digital signal as output data. The supply of the electronics can be effected by dc-voltages from 15V to 24V The supply of the optional heating is provided separately by an ac/dc. The heating prevents the Wind Transmitter First Class from blocking up even under extreme meteorological icing conditions.

The outer parts of the instrument are made of corrosion-resistant anodised aluminium. Highly effective labyrinth gaskets and O-rings protect the sensitive parts inside the instrument against humidity and dust. The instrument is mounted onto a mast tube; the electrical plug-connection is located in the transmitter shaft.

4 Recommendation Side Selection / Standard Installation

In general, wind-measuring instruments are supposed to record wind conditions over a large area. According to international regulations, the surface wind should be measured at a height of 10 m above even open terrain, in order to achieve comparable values. An open terrain is defined as terrain where the distance between the wind-measuring instrument and the next obstacle is at least ten times the height of this obstacle (acc. to VDI 3786 sheet 2 as well as Guide to Meteorological Instruments and Methods of Observation, Sixth Edition, WMO-No. 8). If this regulation cannot be fulfilled, the measuring instrument should be installed at a height at where the measurement values are not influenced by any local obstacles. In any case, the measuring instruments should be installed at a height of 6 to 10 m above the mean height of the buildings or trees in the vicinity. If it is necessary to install the instrument on a roof, it should be installed in the centre of the roof in order to avoid any preferential directions.

5 Installation

Attention:
Storing, mounting, and operation under weather conditions is permissible only in vertical position, as otherwise water can get into the instrument.

Remark:

When using fastening adapters (angle, traverses, etc) please take a possible effect to the measuring values by shading into consideration.

Caution:

The device may only be supplied with a power supply of the ,,Class 2, limited power".

5.1 Mechanical Mounting

Note:

The wiring must be prepared so far, that plug and cable have been pushed through instrument carrier, mast, traverse etc., and can be connected to the wind transmitter at the moment of the "Mechanical Mounting", described in the following (please refer also to chapter 5.2).

The wind transmitter must be mounted on an instrument carrier, which is suited for the measurement. For dimensions of wind transmitter please refer to 8. dimension diagram.

Suitable instrument carriers are masts, tubes, traverses, arms, adapters, adapters of POM for isolated mounting, which correspond to the mounting dimensions of the wind transmitter, and to the static requirements.

The inner diameter of the instrument carrier should be ≥ 20mm based on plug- and cable feed-through.

The wind transmitter must be mounted on an instrument carrier, which is suited for the measurement. For dimensions of wind transmitter please refer to chapter 8.	
Tools: Hexagon socket wrench SW3 (Allen key). **Procedure:** 1. Lead a prepared cable with assembled plug through the bore hole of mast, tube, arm etc., and connect it to the wind transmitter. 2. Put wind transmitter on mast, tube, arm etc. 3. Safeguard the wind transmitter by two M6-Allen head screws.	

5.2 Electrical Mounting

5.2.1 Cable

Solder a shielded cable with diameter 7-8mm and a core cross-section of 0.5...0.75mm² to the enclosed coupling socket.

- The number of necessary wires is given in the connection diagram (chapter 5.3).

5.2.1.1 Cable Recommendation

No. of wires/ diameter / type / cable diameter
CABLE 4 x 0,5mm² LI9YC11Y BLACK, UV- resistant, Ø 6mm
CABLE 8 x 0,5mm² LIYCY BLACK, UV- resistant, Ø 7.6mm

5.2.2 Cable Shield

The connection of the cable shield between sensor and data acquisition device should be selected in way, that in case of over-voltages no equalizing currents will flow that might destroy the electronic components.

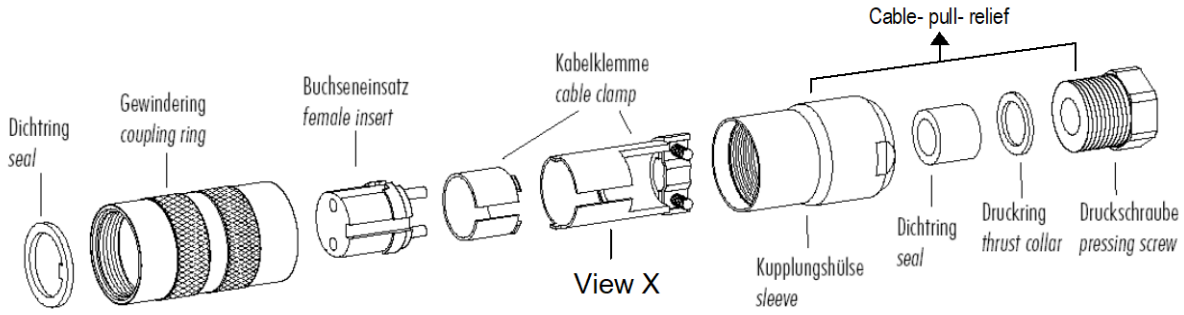
The connection of the cable shield should depend on the selected isolated, or respectively, non-isolated mounting of the sensors.

5.2.2.1 A Connecting Recommendation for the Cable Shield

	Sensor Carrier	Sensor	Shielding / Ground	Lightning Protection
1.	Metallic measurement mast, grounded	**Isolated** mounting at the measuring mast (e.g. by non-metallic brackets, holder etc. or by metallic brackets, holder etc. with isolated plastic adaptors)	Apply the cable shield between sensor and data acquisition device (e.g. datalogger) both-sided. Ground data acquisition device.	Mount metallic lightning protection rod on the mast. Alternatively: Install separate lightning protection rod beside the measurement mast.
2.	Metallic measurement mast, grounded	**Non-isolated** mounting at the measurement mast (e.g. by metallic brackets, holders etc.)	Apply cable shield between sensor and data acquisition device (e.g. datalogger) only one-sided at the acquisition device. Ground data acquisition device.	Mount metallic lightning protection rod on the mast in **isolated condition**, and ground lightning protection rod. Alternatively: Install separate lightning protection rod beside the measurement mast.
3.	Metallic measurement mast, not grounded (mounted in isolated condition, e.g. on the attic)	**Non-isolated** mounting at the measurement mast (e.g. by metallic brackets, holders etc.)	Apply the cable shield between sensor and data acquisition device (e.g. datalogger) both-sided. Ground data acquisition device.	Mount metallic lightning protection rod on the mast in **isolated condition**, and ground lightning protection rod. Alternatively: Install separate lightning protection rod beside the measurement mast.
4.	Non-metallic measuring mast (=isolated)	Mounting at the measurement mast (e.g. by metallic brackets, holders etc.)	Apply the cable shield between sensor and data acquisition device (e.g. datalogger) both-sided. Ground data acquisition device.	Mount metallic lightning protection rod on the mast, and ground lightning protection rod. Alternatively: Install separate lightning protection rod beside the measurement mast.

5.2.3 Plug and Cable Mounting

Coupling socket, Type: Binder, Serial 423, EMC with cable clamp



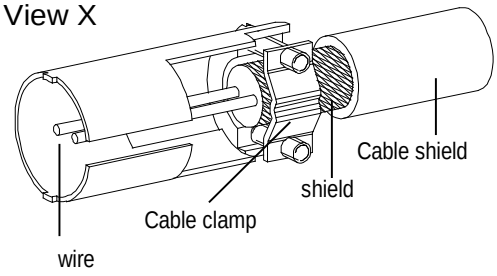
Cable connection: **with** cable shield

1. Stringing parts on cable acc. to plan given above.
2. Stripping cable sheath 20mm
   Cutting uncovered shield 15mm
   Stripping wire 5mm.

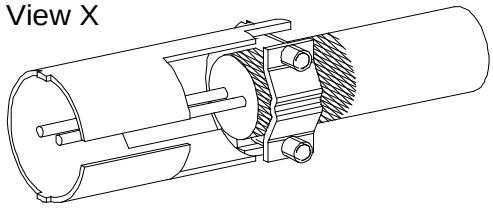
   Cable mounting 1
   Putting shrink hose or insolating tape between wire and shield.

   Cable mounting 2
   If cable diameter permits, put the shield backward on the cable sheath.
3. Soldering wire to the insert, positioning shield in cable clamp.
4. Screwing-on cable clamp.
5. Assembling remaining parts acc. to upper plan.
6. Tightening pull-relief of cable by screw-wrench (SW16 und 17).

Cable mounting 1
View X

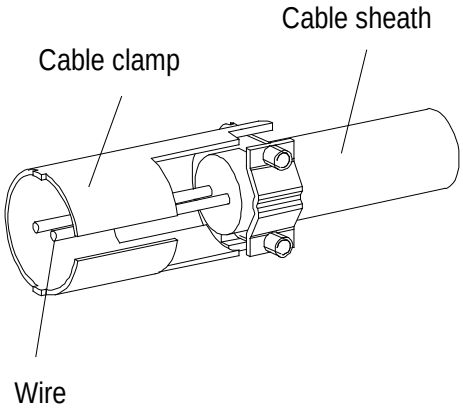


Cable mounting 2
View X



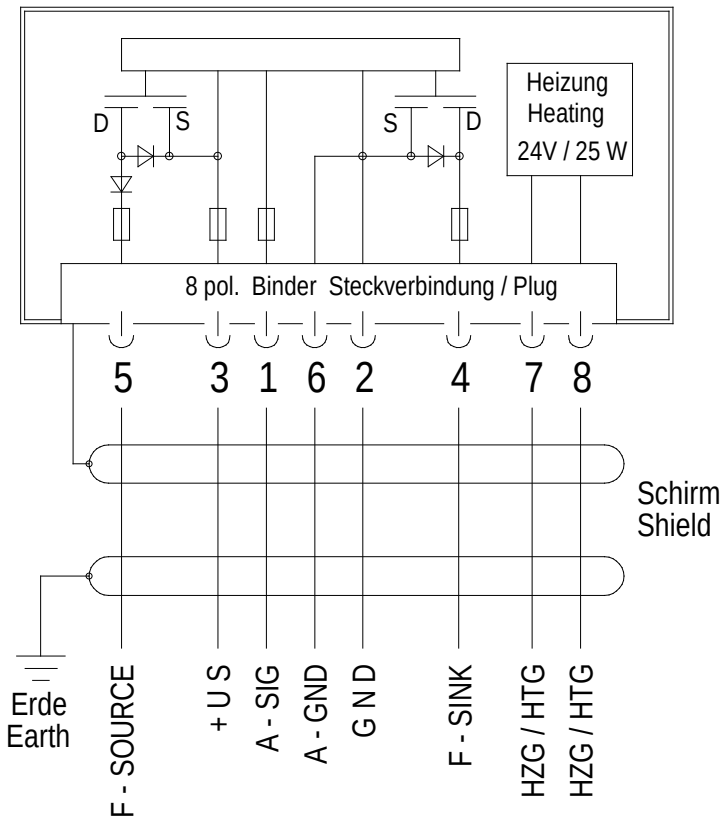
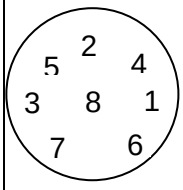
Cable connection: **without** cable shield

1. Stringing parts on cable acc. to plan given above.
2. Stripping cable sheath 20mm.
3. Cutting uncovered shield 20mm.
4. Stripping wire 5mm.
5. Soldering wire to the insert.
6. Positioning shield in cable clamp.
7. Screwing-on cable clamp.
8. Assembling remaining parts acc. to upper plan.
9. Tightening pull-relief of cable by screw-wrench (SW16 und 17).



5.3 Connecting Diagram

Connection diagram acc. to chapter 5.2.2.1 no.1, 3 and 4:

Order – No.		View on the soldered joint of the counter plug
4.3351.00.140 4.3351.00.141 4.3351.00.161 4.3351.00.173 4.3351.00.541 4.3351.10.140* 4.3351.10.141* 4.3351.10.161* 4.3351.10.173*		
*Order-No.. 4.3351.**10**.1xx (without heating) PIN 7 u. 8 are not connected		

Pin	Name	Function
1	A - SIG	Analogue output
6	A - GND	Analogue ground
2	GND	Ground supply
3	+Us	Supply 15V...24V DC
4	F - SINK	Frequency output (rectangle), open Drain
5	F - SOURCE	Frequency output (rectangle), source (open Drain)
7	HTG	Heating supply: voltage: 24V AC/DC Power : 25W
8	HTG	
*Order-No.. 4.3351.**10**.1xx (without heating) PIN 7 u. 8 are not connected		

6 Maintenance

If properly installed, the instrument requires no maintenance.

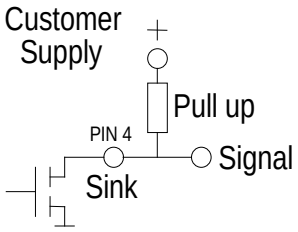
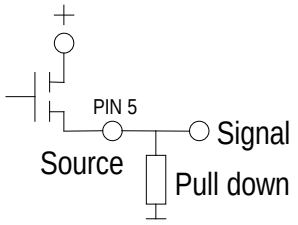
The ball bearings of the wind transmitter are prone to wear, and with a prolonged use they might change the dynamic behavior of the cup star. Therefore, we recommend checking the instrument in regular intervals.

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

Cleaning
For the cleaning of the device should use a damp cloth without chemical cleaning agents are used

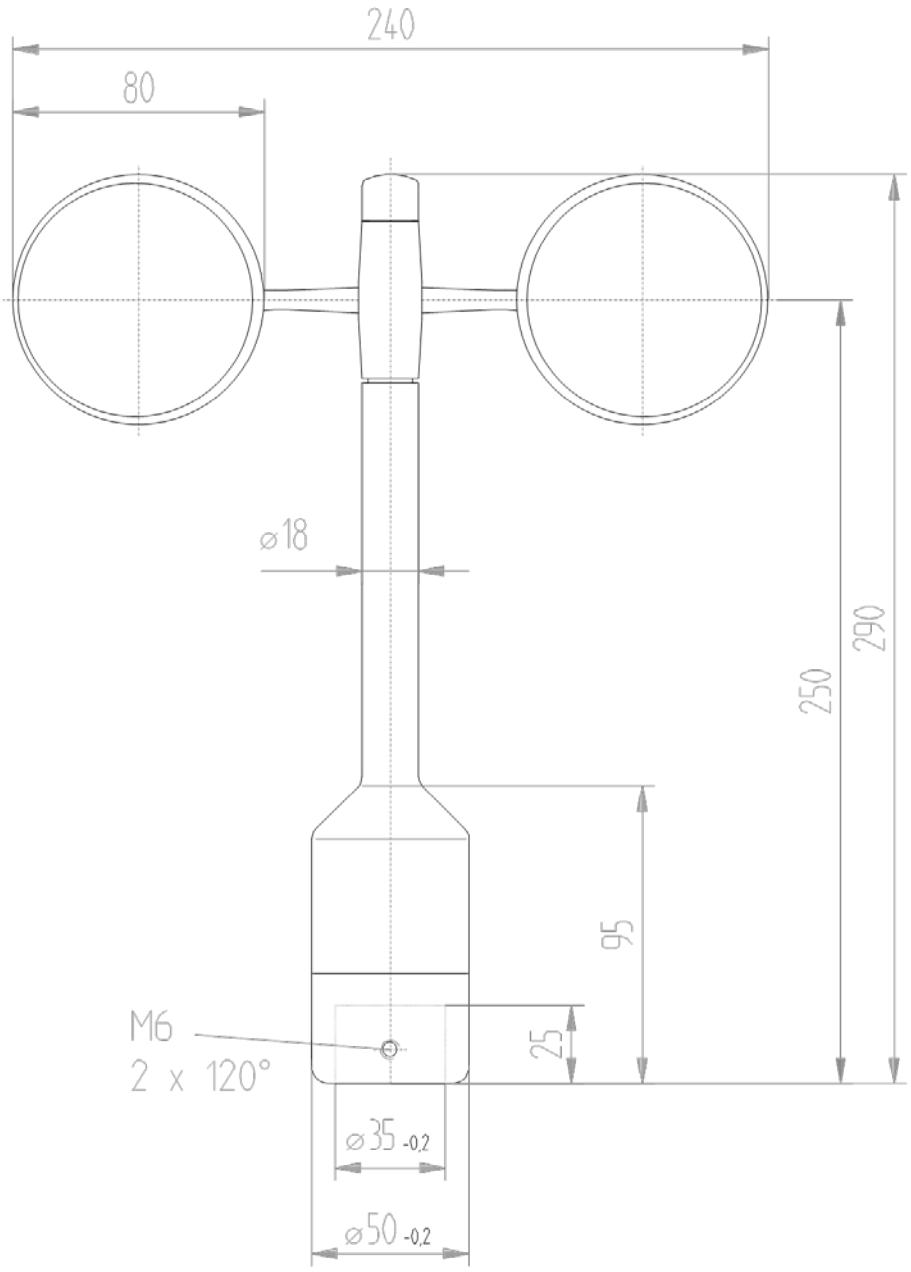
Remark:
For transport of instrument please use original packing.

7 Technical Data

Characteristic	Description
Measuring range	0.3 ... 75m/s
Accuracy	0.3...50m/s 1% of measuring value or < 0.2m/s
Survival speed	80m/s (min. 30min.)
Permissible Ambient conditions	- 50...+ 80°C, all occurring situations of relative humidity (including dew moistening)
Output signals digital Form Frequency	 Rectangle 1082Hz @ 50m/s
Sink-output Permissible drain-current Ext. Pull up resistance	Pull down on ground (Open Drain) max. 250mA R > 100Ω @ maximum voltage of +24V 
Source-output Permissible Source-current Ext. Pull down resistance	Pull up on supply (Open Drain) maximal 100mA R > 270Ω @ maximum voltage of +24V 
Permissible Parallel-capacity	C < 200nF corresponds to typical cable length of 1km
Output signal analogue 4.3351.x0.140 4.3351.x0.141 4.3351.x0.541 4.3351.x0.161 4.3351.x0.173	 Current 0 ... 20.0mA = 0 ... 75m/s @ 500Ω Current 4 ... 20.0mA = 0 ... 75m/s @ 500Ω Current 4 ... 20.0mA = 0 ... 50m/s @ 500Ω Voltage 0 ... 10.0V = 0 ... 75m/s @ 5kΩ Voltage 0 ... 5.0V = 0 ... 75m/s @ 5kΩ
Linearity F/U-converter	Correlation factor r between output voltage and frequency r > 0.999 999 (0.2 … 50m/s)
Linearity Complete instrument	correlation r between output data and wind speed y=0.0462* f +0.21 typical r > 0.999 99 (4 … 20m/s)
Starting velocity	< 0.3m/s
Resolution digital analogue	 0.05m wind run 0.1m/s
Distance constant	< 3m (acc. to ASTM D 5096 – 96), 3m acc. to ISO 17713-1

Turbulent flow	Deviation Δv turbulent compared with stationary horizontal flow -0.5% < Δv < +2% Frequency < 2Hz
Classification	According to IEC 61400-12-1 (2005-12) Class A classification index A 0.9 Class B classification index B 3.0 Class S classification index S 0.5
Heating	Surface temperature of housing neck > 0°C at 20 m/s up to –10°C air temperature, at 10 m/s to –20°C using the Thies icing standard 012002 on the housing neck heating regulated by temperature sensor on constantly +7°C .
Electrical supply for electronics (all types) 4.3351.x0.173:	Voltage: 15...24V DC (galvanic isolation from housing) current: 8mA typical @ voltage output and without external load current: 8mA + output current typical @ current output Ripple immunity: max. 25% rms ≈ $20V_{pp}$ @ 24V Voltage: 12...24V DC (galvanic isolation from housing) current: 8mA typical @ voltage output and without external load current: 8mA + output current typical @ current output Ripple immunity: max. 25% rms ≈ $20V_{pp}$ @ 24V
Electrical supply for heating	current: 24V AC/DC +- 20%, 45…65 Hz (galvanic isolation from housing) Idling voltage: max. 32V AC and max. 48V DC Power: 25W
Connection	8-pole plug-connection for shielded cable in the shaft (see connecting diagram)
Mounting	Mounting on mast Outer diameter ≤ 34mm Inner diameter ≥ 22mm Note: mounting on mast is possible with separate adapter (option).
Wind load at 75 m/s	ca. 100N
Dimensions	See dimension diagram
Weight	ca. 0.5kg
Protection	IP 55 (DIN 40050)

8 Dimensional Drawing



9 Accessories (optional)

Traverse 0.6m For mounting the wind speed and wind direction transmitter jointly onto a mast.	4.3174.00.000	Horizontal sensor distance: 0.6m Vertical sensor distance: 0.2m Mast receptacle: 48 - 50mm Material: Aluminum, anodised Dimensions: tube Ø 34 x 4mm, 668mm long, 756mm high
Hanger –FIRST CLASS- 1m For the lateral mounting of a wind speed and wind direction transmitter onto a mast tube.	4.3184.01.000	Sensor distance to mast: 1m Mast clamp: 40 – 80mm Tube diameter: 34mm Material: Aluminum
Lightning rod For mounting the a/m traverse or hanger.	4.3100.98.000	Dimension: Ø 12mm, 500mm long, 1050mm high Material: Aluminum
Adaptor For isolated mounting of each wind transmitter and wind direction transmitter on the traverse (4.3174.0.000).	509077	Dimension: A:Ø 34mm, outside 25 mm high B:Ø 35mm, inside 45mm high Material: POM

Please contact us for other accessories such as cables, power supply units, masts, as well as for additional mast- or system-constructions.

Example: Wind transmitter with traverse 4.3174.00.000 and lightning rod 4.3100.98.000.

10 More Information / Documents as download

Following documents are available for download via the link.

Instruction for use

https://www.thiesclima.com/db/dnl/4.3351.x0.140-173_Wind_Transmitter_First_Class_Advanced_analogue_eng.pdf

11 EC-Declaration of Conformity

Manufacturer: Adolf Thies GmbH & Co. KG
Hauptstraße 76
37083 Göttingen, Germany
http://www.thiesclima.com

Product: WG firstclass

Doc. Nr. 1574-44784_CE

Article Overview:

4.3350.00.000	4.3350.00.140	4.3350.00.141	4.3350.00.161	4.3350.10.000	4.3350.10.140	4.3350.10.141	4.3350.10.161	4.3351.00.000	4.3351.00.140
4.3351.00.141	4.3351.00.161	4.3351.00.541	4.3351.10.000	4.3351.10.140	4.3351.10.141	4.3351.10.161	4.3351.90.141		

The indicated products correspond to the essential requirement of the following European Directives and Regulations:

2014/30/EU	26.02.2014	DIRECTIVE 2014/30/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility.
2017/2102/EU	15.11.2017	DIRECTIVE (EU) 2017/2102 of the European Parliament and of the Council of November 15, 2017 amending Directive 2011/65 / EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment.
2012/19/EU	13.08.2012	DIRECTIVE 2012/19/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 4 July 2012 on waste electrical and electronic equipment (WEEE).
2018/1139/EU	04.07.2018	Regulation (EU) 2018/1139 of the European Parliament and of the Council of 4 July 2018 on common rules in the field of civil aviation and establishing a European Union Aviation Safety Agency.

The indicated products comply with the regulations of the directives. This is proved by the compliance with the following standards:

DIN EN 61000-6-2	2019-11	Electromagnetic compatibility Immunity for industrial environment
DIN EN 61000-6-3:2007 + A1:2011	2011-09	Electromagnetic compatibility (EMC). Generic standards. Emission standard for residential, commercial and light-industrial environments
DIN EN 61010-1	2020-03	Safety requirements for electrical equipment for measurement, control, and laboratory use. General requirements
DIN EN 63000	2019-05	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances.

Legally binding signature:

General Manager - Dr. Christoph Peper

Legally binding signature:

Development Manager - ppa. Jörg Petereit

This declaration certificates the compliance with the mentioned directives, however does not include any warranty of characteristics.
Please pay attention to the security advises of the provided instructions for use.

12 UK-CA-Declaration of Conformity

Manufacturer: Adolf Thies GmbH & Co. KG
Hauptstraße 76
37083 Göttingen, Germany
http://www.thiesclima.com

Product: WG firstclass

Doc. Nr. 1574-44784_CA

Article Overview:

4.3350.00.000	4.3350.00.140	4.3350.00.141	4.3350.00.161	4.3350.10.000	4.3350.10.140	4.3350.10.141	4.3350.10.161	4.3351.00.000	4.3351.00.140
4.3351.00.141	4.3351.00.161	4.3351.00.541	4.3351.10.000	4.3351.10.140	4.3351.10.141	4.3351.10.161	4.3351.90.141		

The indicated products correspond to the essential requirement of the following Directives and Regulations:

1091	08.12.2016	The Electromagnetic Compatibility Regulations 2016
RoHS Regulations 2012	01.01.2021	The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012
3113	01.01.2021	Regulations: waste electrical and electronic equipment (WEEE)
2018/1139/EU	04.07.2018	Regulation (EU) 2018/1139 of the European Parliament and of the Council of 4 July 2018 on common rules in the field of civil aviation and establishing a European Union Aviation Safety Agency.

The indicated products comply with the regulations of the directives. This is proved by the compliance with the following standards:

BS EN IEC 61000-6-2	25.02.2019	Electromagnetic compatibility (EMC). Generic standards. Immunity standard for industrial environments
BS EN IEC 61000-6-3	30.03.2021	Electromagnetic compatibility (EMC). Generic standards. Emission standard for equipment in residential environments
BS EN 61010-1+A1	31.03.2017	Safety requirements for electrical equipment for measurement, control, and laboratory use. General requirements
BS EN IEC 63000	10.12.2018	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

This declaration of conformity is issued under the sole responsibility of the manufacturer.

Legally binding signature:

General Manager - Dr. Christoph Peper

Legally binding signature:

Development Manager - ppa. Jörg Petereit

This declaration certificates the compliance with the mentioned directives, however does not include any warranty of characteristics.
Please pay attention to the security advises of the provided instructions for use.

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

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