

Operating Instructions

021581/11/08

TW Measuring Transducer

4.3348.20.0xx



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Operating Instructions

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- 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 should not be passed on without the/these operating instructions.

Safety Instructions

- Read through the operating instructions before using the device for the first time.
- The device may only be fitted and connected by a qualified technician who is familiar with and observes the engineering regulations, provisions and standards applicable in each case.
- The device may only be fitted and connected when de-energised.
- **Adolf Thies GmbH & Co KG** guarantees proper functioning of the device 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 troublefree operation and a safe condition of the measuring system.
- The device is only designed for a specific application as described in these operating instructions.
- The device should only be operated with the accessories and consumables supplied and/or recommended by **Adolf Thies GmbH & Co KG**.
- Repairs 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.
- Opening the device may expose live parts possibly posing a lethal hazard if touched. It should only be opened for the purpose of repair by trained staff.
- When using the device, it must be ensured that it is not subjected to a service condition which might bring about damage to objects or present a risk to persons.
- All users must be constantly instructed about handling and safety of the device.
- Adjustment and maintenance performed while the opened device is energised may only be carried out by qualified technicians who are aware of the associated risk.
- The device may only be operated by trained technicians whose qualifications enable them to comply with the safety measures necessary during use of the device.
- In the event of any malfunction the device should no longer be used.
- The measuring results do not only depend on correct usage, installation and functioning of the device, but are also influenced by other factors. It is therefore necessary to check the results supplied by the measuring system for plausibility before taking action on the basis of such measuring results.

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, arrange for recycling as the packaging materials are designed to be recycled.



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1 Device Versions

Order - No.	Electr. output	Operating voltage	Design
4.3348.20.040	0...20 mA + RS 485/422	230 V / 50 Hz	Wall-mounted cabinet
4.3348.20.041	4...20 mA + RS 485/422	230 V / 50 Hz	Wall-mounted cabinet
4.3348.20.060	0... 1 V + RS 485/422	230 V / 50 Hz	Wall-mounted cabinet
4.3348.20.061	0...10 V + RS 485/422	230 V / 50 Hz	Wall-mounted cabinet

2 Application

The **TW Measuring Transducer** converts the output frequency of the **wind transmitter**, Order No.: 4.3308.10.000, into directional analog signals.

The following outputs are available:

2 x analog outputs

- 1 x air flow speed with identification of direction, via offset of electric output
- 1 x air flow speed without identification of direction

2 x relays

- 1 x for forward flow
- 1 x for return flow

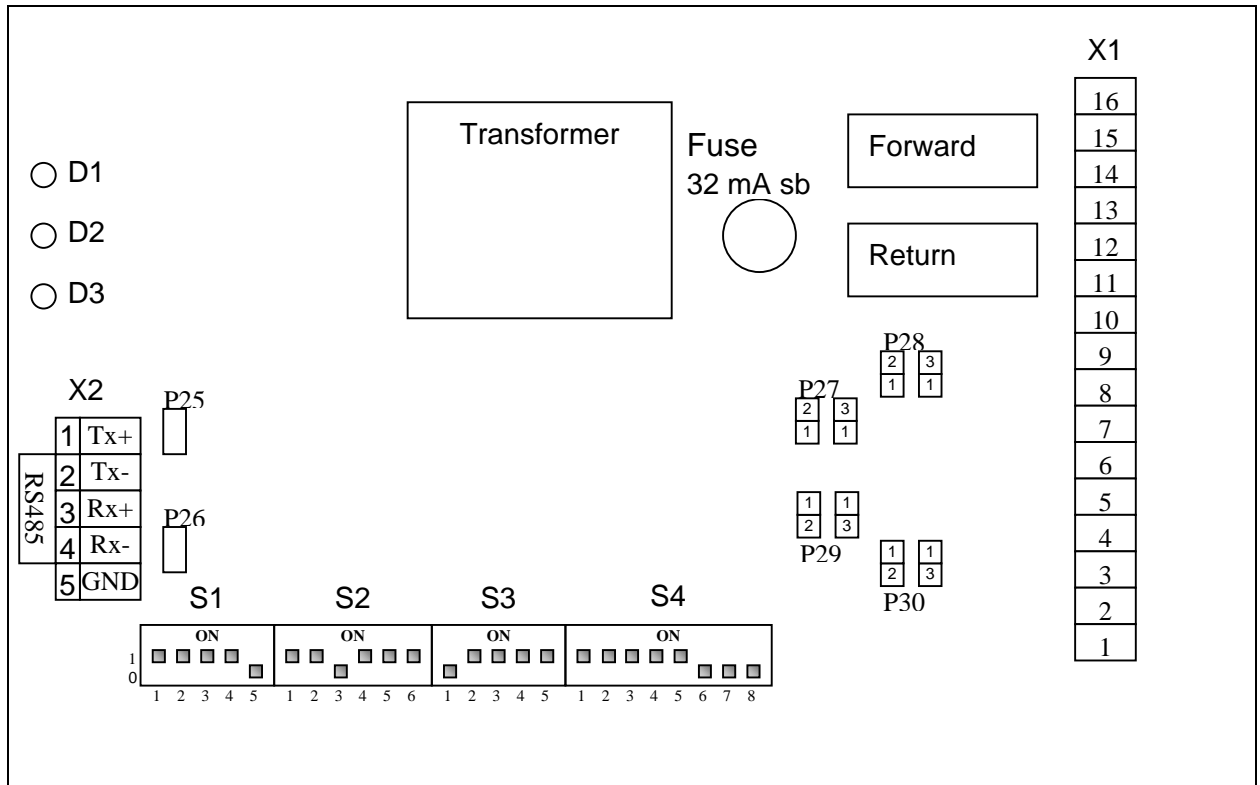
1 x serial interface

RS485 / RS422 interface

For optimised system adjustment the following selections can be made using the coding switches on the TW Measuring Transducer:

1. adjustment of measuring range, referred to analog outputs
2. averaging for measured values
3. ON delay for relays to suppress switching with brief episodes of turbulence

3 Overview



4 Installation

Caution:
The device should only be installed and connected by a qualified technician who is familiar with and observes the general engineering regulations and applicable provisions and standards.

Caution:
When selecting the installation site, please take note of the operating temperature range and the type of protection necessary.

Caution:
Prior to installation it may be necessary to adjust the settings of the TW Measuring Transducer, see chapter 6.

4.1 Mechanical installation

The TW Measuring Transducer is designed for wall mounting and can be fixed in place using screws and wall plugs. The scope of supply does not include screws or wall plugs.

4.2 Electric installation

(see also chapter 11)

4.2.1 Pin assignment

Terminal strip X1	
Terminal	Function
1	Wind transmitter: earth
2	Wind transmitter: +15V
3	Wind transmitter: frequency input 1
4	Wind transmitter: frequency input 2
5	Analog output A: earth (directional)
6	Analog output A: signal (directional)
7	Analog output B: earth (non-directional)
8	Analog output B: signal (non-directional)
9	Return relay: NC contact
10	Return relay: common terminal
11	Return relay: NO contact
12	Forward relay: NC contact
13	Forward relay: common terminal
14	Forward relay: NO contact
15	L1 (230 V AC)
16	N

Terminal strip X2	
Terminal	Function
1	Tx+ / Data+
2	Tx- / Data-
3	Rx+
4	Rx-
5	Earth

Note:

In half duplex mode only Data+ and Data- are required.

5 Device Status

Three diodes on the PCB indicate the state of the TW measuring transducer:

Diodes	
Diode	Description
D1	Return relay status
D2	Forward relay status
D3	Device status LED

Return relay status D1:

The LED lights up when the return relay is energised.

Forward relay status D2:

The LED lights up when the forward relay is energised.

Device status LED D3:

The device status LED indicates possible faults with the measuring transducer. If it is functioning properly, the LED flashes briefly once approx. every 3 seconds. If a fault is present, the LED will flash repeatedly (s. following table). The error code will only be cleared when the measuring transducer has been de-energised, the command 'CS' has been transmitted to the measuring transducer, or the option button 6 (CLEAR_STATUS_AUTOMATIC) has been activated.

Light pulses every 3 sec	Description
1	No fault
2	Failure / incorrect value of 5V reference voltage
3	Failure / incorrect value of wind transmitter supply voltage (15 V)
4	Incorrect value of 5V processor voltage
5	Reset via watchdog
6	Reset via undervoltage (brown-out)

6 Settings

Four switch groups (S1- S4) can be found on the PCB for setting various scales.

S1: Mean value for analog output

S2: Measuring range for analog output

S3: ON delay for relays

S4: - Behaviour of analog outputs
- Behaviour of relays
- Optional settings

Setting coding switches

Switch ON = 1

Switch OFF = 0

* = Factory setting

6.1 Mean value time for analog outputs

Switch group S1:

This is used to set the mean value times. Sliding calculation is performed over the previous time interval selected and is updated every second.

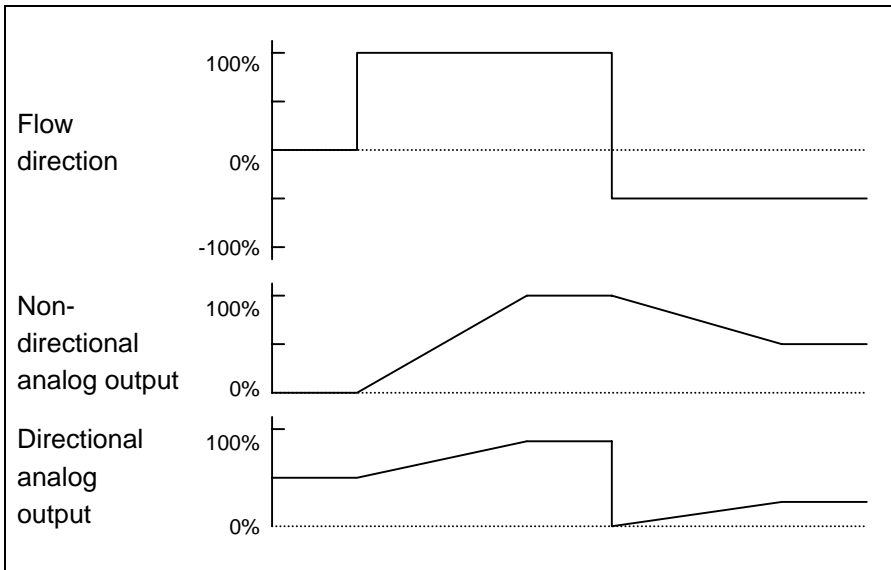
Switch group S1					
Time	Switch				
	1	2	3	4	5
*0 s	1	1	1	1	0
24 s	1	1	1	0	1
48 s	1	1	0	1	1
120 s	1	0	1	1	1
240 s	0	1	1	1	1

The mean value time = 0 s for all other switch settings.

Switch group S4:

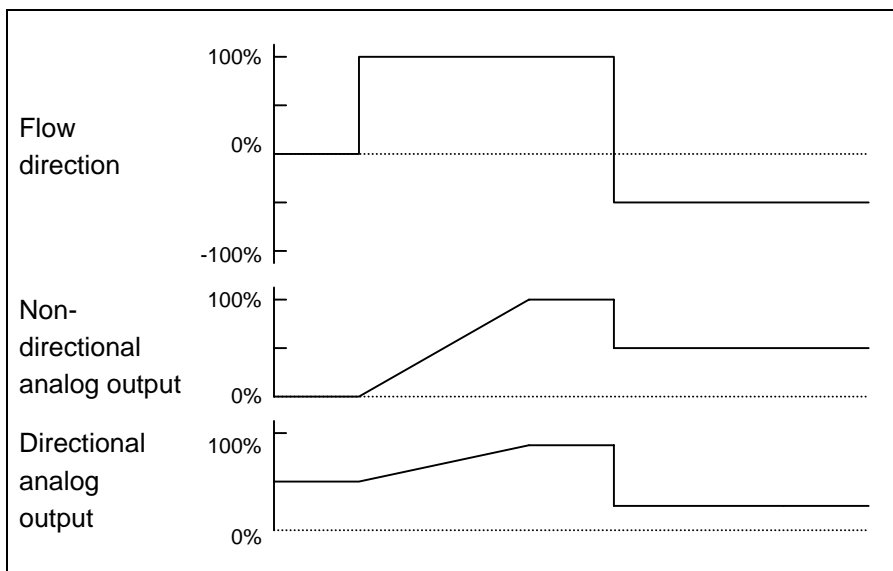
Switch 7 of switch group 4 can be used to adjust the behaviour of the analog outputs.

1. Discrete variant: Switch 4-7 = 0



With a change in wind direction the leading sign is immediately reversed at the output. The value for the wind speed however changes slowly depending on the mean value time selected.

2. Digital variant: Switch 4-7 = 1



With a change in wind direction the leading sign is immediately reversed at the output. Calculation of the mean value only includes measured values with the new leading sign.

6.2 Measuring range

Switch group S2:

This is used to set the measuring range. We recommend selecting the range so that it corresponds to the maximum flow speed that will occur.

Switch group S2						
Measuring range	Switch					
	1	2	3	4	5	6
5 m/s	0	1	1	1	1	1
10 m/s	1	0	1	1	1	1
*20 m/s	1	1	0	1	1	1
30 m/s	1	1	1	0	1	1
40 m/s	1	1	1	1	0	1
50 m/s	1	1	1	1	1	0

The measuring range is 50 m/s for all other switch settings.

6.3 ON delay of relays

Switch group S3:

This is used to specify the relay response times when the air flow starts. The aim here is to prevent constant relay switching with brief changes (e.g. turbulence). It is only ever the relevant direction identification relay that is switched.

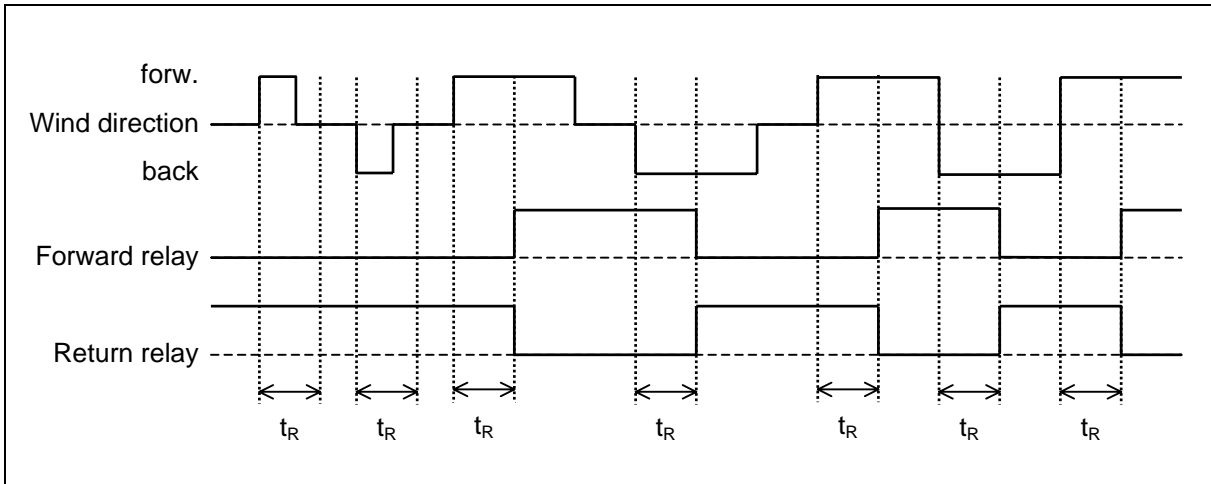
Switch group S3					
Delay time t_R	Switch				
	1	2	3	4	5
*1.5 s	0	1	1	1	1
3 s	1	0	1	1	1
6 s	1	1	0	1	1
9 s	1	0	0	1	1
12 s	1	1	1	0	1
15 s	1	0	1	0	1
18 s	1	1	0	0	1
21 s	1	0	0	0	1
24 s	1	1	1	1	0
27 s	1	0	1	1	0
30 s	1	1	0	1	0
33 s	1	0	0	1	0
36 s	1	1	1	0	0
39 s	1	0	1	0	0
42 s	1	1	0	0	0
45 s	1	0	0	0	0

Switch group S4:

Switch 7 of switch group 4 can be used to adjust the behaviour of the relay outputs.

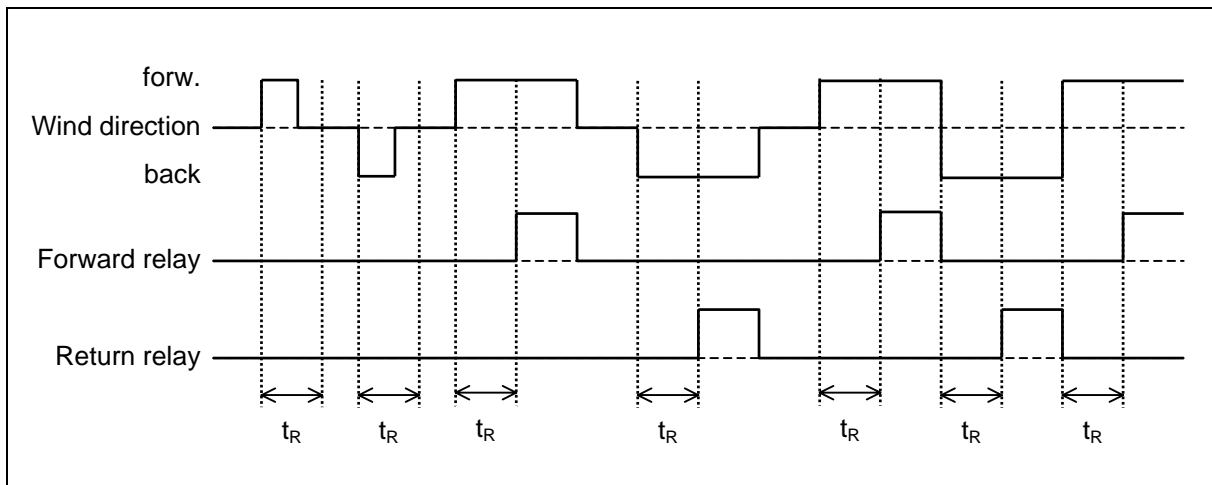
1. Discrete variant: Switch 4-7 = 0

If the air flow is zero, it is always the last active relay that remains energised.



2. Digital variant: Switch 4-7 = 1

If the air flow is zero, no relay will be energised.



6.4 Options

Switch group S4:

Switch group S4		
Switch	Designation	Description
1	UI_SELECTION_A1*	0 = Output A is the voltage output 1 = Output A is the current output
2	UI_SELECTION_A2*	If output A is the voltage output 0 = 0-1 V 1 = 0-10 V If output A is the current output: 0 = 0-20 mA 1 = 4-20 mA
3	UI_SELECTION_B1*	0 = Output B is the voltage output 1 = Output B is the current output
4	UI_SELECTION_B2*	If output B is the voltage output 0 = 0-1 V 1 = 0-10 V If output B is the current output 0 = 0-20 mA 1 = 4-20 mA
5	HALF_FULL_DUPLEX	Duplex mode: 0 = half duplex 1 = full duplex
6	CLEAR_STATUS_AUTOMATIC	0 = Status can only be reset by the software command 'CS'. 1 = Status is reset automatically when the fault is cleared. Resets via the watchdog or undervoltage (brown-out) are no longer displayed.
7	DISCRET_DIGITAL_VARIANT	Switching between discrete and digital variant. 0 = discrete variant 1 = digital variant
8	TEST MODE	0 = Standard operation 1 = Test mode. Here the processor assumes a frequency of 400 Hz at the input. All calculations and output signals then refer to this value.

* Bridges P27 to P30 also have to be set in addition to the switch settings.

Bridge	Designation	Voltage	Current
P29, P30	Analog output A, directional	1-2	1-3
P27, P28	Analog output B, non-directional	1-2	1-3

7 Serial Communication

An RS485/422 interface is available for serial communication. Full or half duplex mode with different baud rates are possible as required.

Terminating resistors (120 Ω) can be connected on the hardware side via solder bridges P25 and P26 (s. section 4).

When the TW Measuring Transducer is started, the ID and baud rate are output. Output takes place at the baud rate selected.

Example: !00BR00005 baud

Factory setting: ID = 0, baud rate = 9600 8N1, measured values output every second

7.1 Telegram structure

For serial communication the TW Measuring Transducer has a fixed telegram format, which also permits communication in bus mode. It has the following form:

<STX><id>;<Measured value>;<Status>* <Check sum><CR><LF><ETX>

Example:

<STX>00;+19.5;01*39<CR><LF><ETX>

id = 00; wind speed = 19.5 m/s; Status bit = 01 (no error); Check sum = 0x39

Control characters:

CR – Carriage return (13_{dec}; 0x0D)

LF – Line feed (10_{dec}; 0x0A)

STX – Start of text (2_{dec}; 0x02)

ETX – End of text (3_{dec}; 0x03)

Separators:

The individual measured values appearing in the string are separated by a semicolon ';'.
'

The multiplication sign '*' is used as the check sum separator.

Check sum:

The check sum is the XOR link of all characters from <id> to the status. The asterisk serves as a separator from the check sum and is not included in the sum.

Status:

Device status	Description
1	No fault
3	Failure / incorrect value of 5V reference voltage
7	Failure / incorrect value of wind transmitter supply voltage (15 V)
15	Incorrect value of 5V processor voltage
31	Reset via watchdog
63	Reset via undervoltage (brown-out)

7.2 General structure with transmission of a command

The TW Measuring Transducer is equipped with a command interpreter which can be used to change the behaviour of the device, e.g. change in baud rate, device ID. Commands basically have the following structure:

<id><Command><CR> or

<id><Command><Parameter><CR>

id: Wind transmitter ID. It always consists of two digits ranging between 00... 99

Command: See list of commands

Parameter: A five-position value to set a new parameter value.

<CR>: Carriage return (13_{dec}; 0x0D)

The TW Measuring Transducer checks the command syntax. If a correct command is received, this is acknowledged with an "echo telegram".

Example: 00BR00005<CR> Transmission command
 !00BR00005<CR> Echo telegram

If a command is transmitted to the device without the parameter value, the value currently selected will be transmitted.

Example: 00BR<CR> Transmission command
 !00BR00005<CR> Echo telegram

7.3 List of commands

Command	Description
Command BR	Baud rate
Command CS	Reset status byte (Clear Status)
Command ID	Identification
Command OR	Telegram output interval (Output Rate)
Command SV	Software version
Command TR	Telegram request (Transmit Request)
Command TT	Independent telegram output (Transmit Telegram)

7.4 Commands and description

Command BR

<id>BR<parameter><CR> Set baud rate

<id>BR<CR> Interrogation of current BR parameter

Command echo !xxBRxxxx<CR>

Access: Read / write

Description: The BR command and the parameter 0000x are used to select the required baud rate.

Parameter description: 3: 2400 baud 8,N,1
4: 4800 baud 8,N,1
5: 9600 baud 8,N,1
6: 19200 baud 8,N,1
7: 38400 baud 8,N,1

Range of values: 3 to 7

Initial value: 5

Command CS

<id>CS<CR> Reset device status (Clear Status)

Command echo !xCsxxxx<CR>

Access: Write

Description: This command is used to reset the device status and then pass it back as the read parameter. The status byte can be read via the commands 'TT' or 'TR'.

Command ID

<id>ID<parameter><CR>	Set identification number
<id>ID<CR>	Interrogation of current ID parameter
Command echo	!xxIDxxxxx<CR>
Access:	Read / write
Description:	<p>This command is used to set the identification number of the measuring transducer. The 'id' is used in every telegram of the transducer. Once the 'id' has been changed, the device will immediately respond with the new 'id'.</p> <p>'id' 99 is a generic identification number which always produces a response. 'id' 99 must not be used in bus mode.</p>
Range of values:	0 to 99
Initial value:	0

Command OR

<id>OR<parameter><CR>	Set telegram output interval
<id>OR<CR>	Interrogation of current OR parameter
Command echo	!xxORxxxxx<CR>
Access:	Read / write
Description:	<p>This command is used to set the output interval in seconds for automatic telegram output.</p> <p>With value = 0 no telegram will be output.</p>
Range of values:	0 to 255
Initial value:	1

Command SV

<id>SV<CR>	Read out software version.
Command echo	!xxSVxxxxx<CR>
Access:	Read
Description:	This command is used to read out the software version.
Range of values:	0 to 99

Command TR

<id>TR<00001><CR>	Measured value request
Access:	Read / write
Description:	This command initiates one-off transmission of the current measured value.
Response telegram:	<STX><id>;<Measured values>*<Check sum><CR><LF><ETX>
Range of values:	1

Command TT

<id>TT<parameter><CR>	Automatic telegram output
<id>TT<CR>	Interrogation of current TT parameter
Access:	Read / write
Description:	This command is used to enable / disable automatic telegram output. Output takes place using the interval specified by the command OR.
Response telegram:	<STX><id>;<Measured values>*<Check sum><CR><LF><ETX>
Parameter description:	0: no telegram output 1: continuous data transmission
Range of values:	0 / 1
Initial value:	1

8 Maintenance

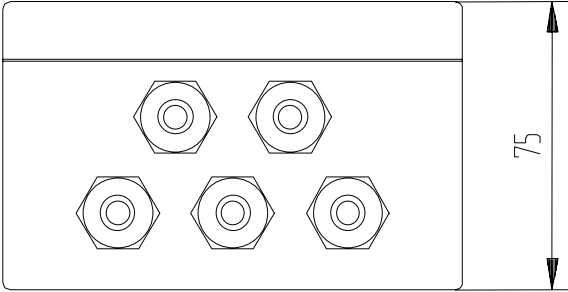
The TW Measuring Transducer is maintenance-free.

The TW Measuring Transducer must be stored in a dry room free of dust at temperatures between -30.. +70°C. We recommend storing the device in a cardboard box.

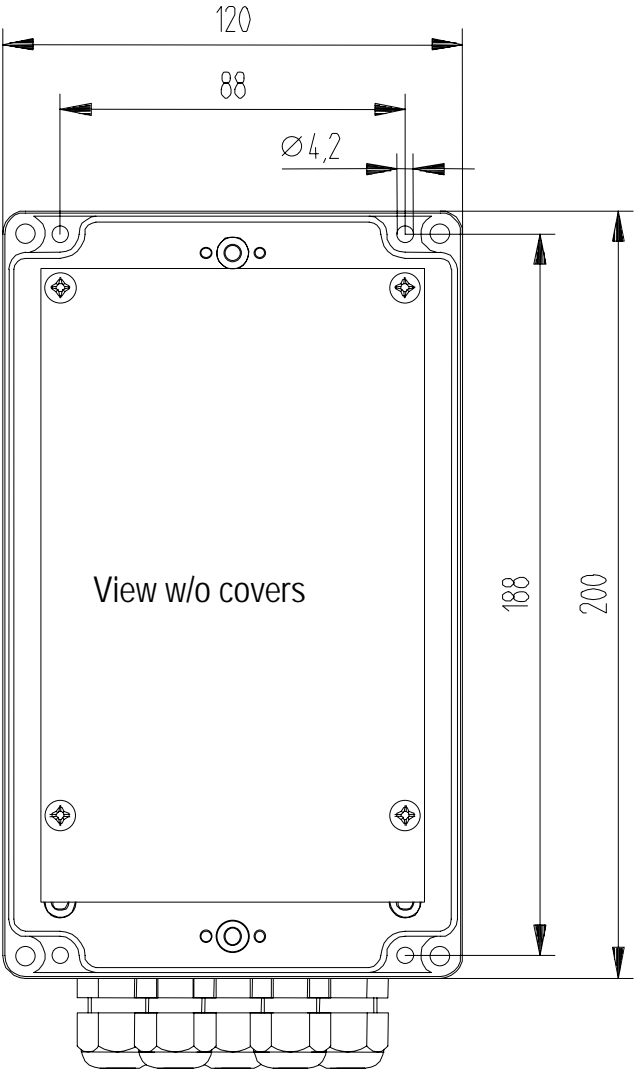
9 Technical Data

Input		
Input variable	Wind speed	max. 50 m/s
	Signal	2 x frequency, by 90° out of phase, amplitude 12 ... 15 V
	Wind transmitter type	4.3308.10.000
Analog outputs		
	Scaling, adjustable	5 ; 10 ; 20 ; 30 ; 40 ; 50 m/s
Output	Depending on version	0- 20 mA / 4- 20 mA / 0- 1V / 0- 10V
Output A	Directional	(e.g. 0 ... 10 ... 20 mA = -20 ... 0 ... 20 m/s)
Output B	Non-directional	(e.g. 0 ... 20 mA = 0 ... 20 m/s)
Burden	With current output	max. 600 Ω
	With voltage output	min. 1000 Ω
Accuracy		< ± 0.5% of measuring range
Delay	Adjustable	0 ... 240s
Relay outputs		
Relay 1	Return	
Relay 2	Forward	
Load		250 VAC / 2A
ON delay	Adjustable	1.5 ... 45s
Serial interface		
Type		RS485 / RS422
Data format	Output	8N1
	Baud rate	2400, 4800, 9600 , 19200, 38400 Bd
Operating voltage		
Mains		230 VAC
Supply output	For wind transmitter	15 VDC
General		
	Temperature range	-20 ...+50 °C
	Humidity range	Non-condensing
Design	Wall-mounted cabinet	120 x 200 x 75 mm
Housing material	Plastic	Polycarbonate
Connection type		Terminal strip, cable gland
Weight		Approx. 0.65 kg
Type of protection		IP 65

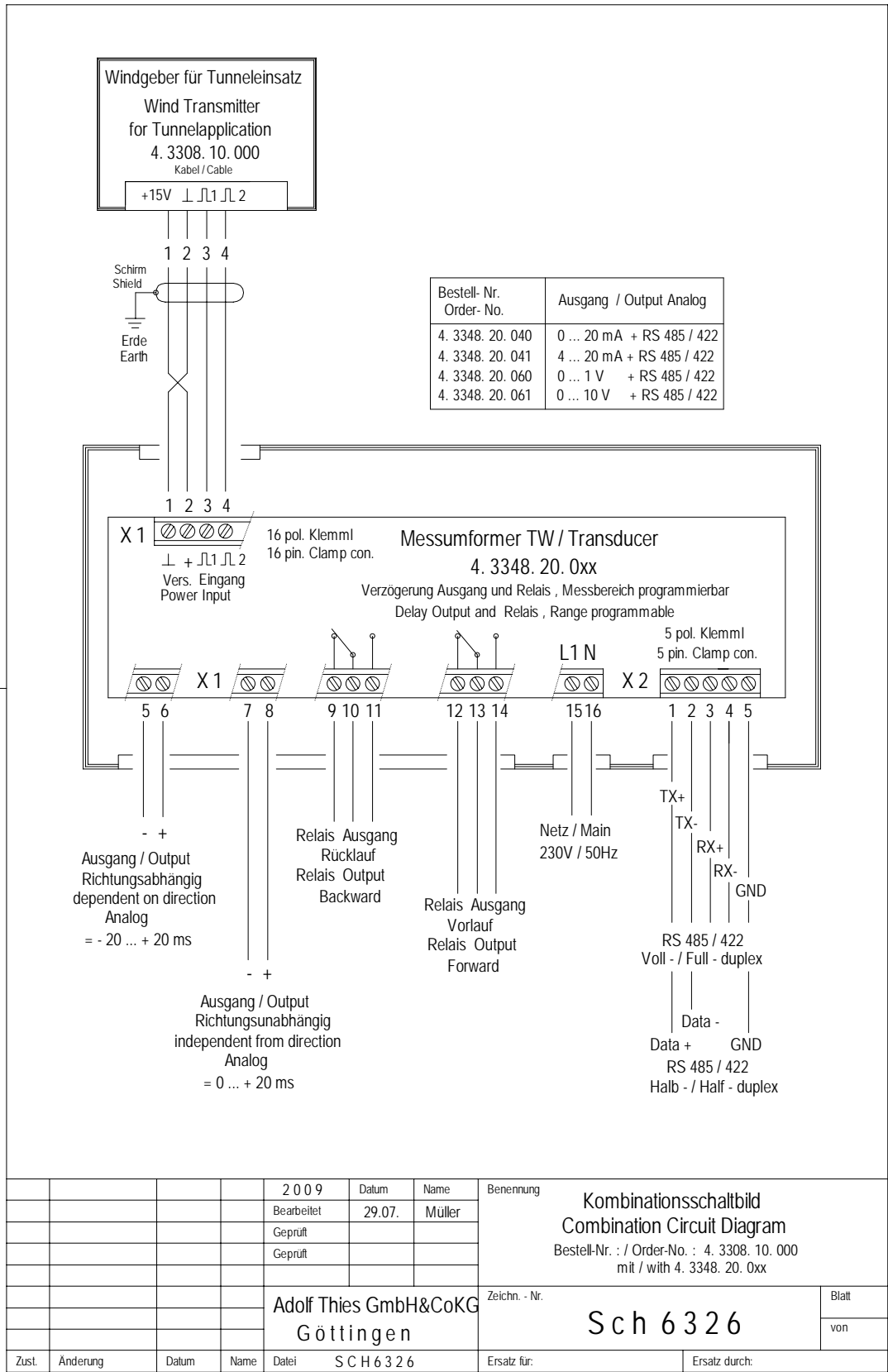
10 Dimension Drawing



Cable gland Pg9



11 Combination Circuit Diagram



12 EC Declaration of Conformity

Document-No.: **000201**

Month: 11 Year: 08

Manufacturer: **A D O L F T H I E S G m b H & C o. K G**

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email: Info@ThiesClima.com

Description of Product: **Measuring Transducer TW**

Article No. **4.3348.20.040** **4.3348.20.041** **4.3348.20.060** **4.3348.20.061**

specified technical data in the document: **021580/11/08**

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

2004/108/EC DIRECTIVE 2004/108/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
of 15 December 2004 on the approximation of the laws of the Member States relating to
electromagnetic compatibility and repealing Directive 89/336/EEC

2006/95/EC DIRECTIVE 2006/95/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
of 12 December 2006 on the harmonisation of the laws of Member States relating to electrical
equipment designed for use within certain voltage limits

552/2004/EC Regulation (EC) No 552/2004 of the European Parliament and the Council of 10 March 2004
on the interoperability of the European Air Traffic Management network
(the interoperability Regulation)

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

Reference number	Specification
IEC 61000-6-2: 2005	Electromagnetic compatibility Immunity for industrial environment
IEC 61000-6-3: 2006	Electromagnetic compatibility Emission standard for residential, commercial and light industrial environments
IEC 61010-1: 2001	Safety requirements for electrical equipment for measurement, control and laboratory use. Part 1: General requirements

Place: Göttingen

Date: 17.11.2008

Legally binding signature:

issuer:

.....
Wolfgang Behrens, General Manager

.....
Joachim Beinhorn, Development Manager

This declaration certifies 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.



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