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## **Shipment**

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

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

[https://www.thiesclima.com/db/dnl/3.1157.10.xxx\\_Bar\\_Transmitter\\_eng.pdf](https://www.thiesclima.com/db/dnl/3.1157.10.xxx_Bar_Transmitter_eng.pdf)

## 1 Models available

Description	Order-No.	Electrical Output	Meas. Range	Operating voltage
Baro Transmitter	3.1157.10.000	Digital: 1 x RS485 1 x 260...1260Hz	260...1260hPa	5...24V DC
		Analogue: 1 x 0...5V set: 800...1060hPa	scalable: 300...1100hPa	8...24V DC
Baro Transmitter	3.1157.10.040	Digital: 1 x RS485 1 x 260...1260Hz	260...1260hPa	5...24V DC
		Analogue: 1 x 0...20mA set: 600...1060hPa	scalable: 300...1100hPa	12...24V DC
Baro Transmitter	3.1157.10.041	Digital: 1 x RS485 1 x 260...1260Hz	260...1260hPa	5...24V DC
		Analogue: 1 x 4... 20mA set: 600...1060hPa	scalable: 300...1100hPa	12...24V DC
Baro Transmitter	3.1157.10.061	Digital: 1 x RS485 1 x 260...1260Hz	260...1260hPa	5...24V DC
		Analogue: 1 x 0...10V set: 600...1060hPa	scalable: 300...1100hPa	12...24V DC
Baro Transmitter	3.1157.10.140	Digital: 1 x RS485 1 x 260...1260Hz	260...1260hPa	5...24V DC
		Analogue: 1 x 0...20mA set: 800...1060hPa	scalable: 300...1100hPa	12...24V DC
Baro Transmitter	3.1157.10.141	Digital: 1 x RS485 1 x 260...1260Hz	260...1260hPa	5...24V DC
		Analogue: 1 x 4... 20mA set: 800...1060hPa	scalable: 300...1100hPa	12...24V DC
Baro Transmitter	3.1157.10.161	Digital: 1 x RS485 1 x 260...1260Hz	260...1260hPa	5...24V DC
		Analogue: 1 x 0...10V set: 800...1060hPa	scalable: 300...1100hPa	12...24V DC

## 2 Application

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Application:

The intended use of the baro transmitter is the measurement of „barometric air pressure“. The instrument is designed for application in the field of meteorology and environmental protection, where high accuracy, quick responding behaviour, long-term sturdiness and reliability are required.

The baro transmitter measures the „ABSOLUTE AIR PRESSURE“ \* or calculates the „REDUCED AIR PRESSURE“.

The measuring results are available to the user via an analogue or digital interface.

The instrument is suited for indoor- and outdoor application.

- For outdoor application we recommend to use an additional weather shield or protective housing with pressure balance function.
- With the use in buildings, rooms, housings, etc. a pressure balance to the ambient pressure that has to be measured, must be given.

Definition:

- *Absolute air pressure: air pressure measured in altitude of barometer.*

*Other description of the „absolute air pressure“:*

*“QFE“, used by ICAO (International Civil Aviation Organization).*

- *Reduced air pressure: calculated air pressure, referring to sea level.*

*Other description of the „reduced air pressure“:*

*“QNH“ used by ICAO.*

*“QFF“ for synoptic presentation.*

Construction:

The applied sensor is a tempered, piezo-ceramic absolute-pressure sensor, which shows excellent thermal and mechanical stability.

The baro transmitter housing is equipped with a 1/8“-hose connection. By means of this connection the integrated absolute-pressure sensor acquires the prevailing air pressure of the atmosphere.

In rooms, housings, etc. where no pressure balance is prevailing, a hose can be plugged on the hose connection. The other end of the hose is then to be installed in free atmosphere or in rooms, where a pressure balance is given.

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\* Factory setting

The following outputs are available:

**Analogue:**

1 x voltage-/ current output,  
for the „absolute air pressure“ **or** for the „reduced air pressure“.

**Digital:**

1 x frequency output,  
for the „absolute air pressure“ or for the „ reduced air pressure“.

1 x serial interface,  
for communication and data output; output parameter see chapter 7.1).

**Info:**

In order to compare air pressure values, which have been measured at different sites, reasonably with each other, they have to be converted to a mutual reference height (**air pressure at sea level**).

The calculation is referring to sea level (QNH) acc. to the international altitude formula (DIN ISO2533).

$$p(h) = p_b \left(1 + \frac{\beta}{T_b} \cdot h\right)^{-\frac{g_n}{\beta \cdot R}}$$

$p_h$  = Air pressure on local height

$p_b$  = Air pressure on sea level

$\beta$  = -0065K/m

$g_n$  = 9,80665m/s<sup>2</sup>

$R$  = 287,05287m<sup>2</sup>/K/s<sup>2</sup>

$T_b$  = 288,15K

**The formula is implemented in the firmware of the baro transmitter. The input of the station height is done via the serial interface by command "SH".**

## 3 Installation

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**Attention:**

*The electrical connection is to be carried out by experts only.  
The electronics is situated in the cover of the baro transmitter.  
The instrument has to be opened only in dry ambience.  
The exposed electronics must not be damaged.*

**Attention:**

*At the location of the baro transmitter as well as on application in a housing a pressure compensation to the atmospheric air pressure must be possible.*

### 3.1 Mechanical Mounting

The housing of the baro transmitter is suited for wall mounting or installation on other plane surfaces. For mounting, please remove the cover. The housing lower part can be mounted by appropriate screws through the now visible and accessible fixing borings ( $\varnothing$  4mm).

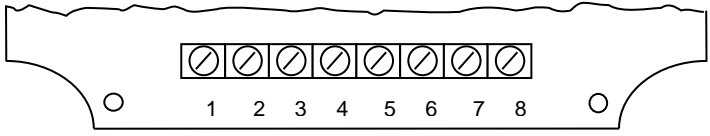
**Note**

*Position: The cable gland and the hose connection must point downwards.*

In case there is no sufficient pressure balance for the baro transmitter at an installation site, a hose can be plugged on via the 1/8"-hose connection. The open side of the hose is to be place in an area where a pressure balance is prevailing.

## 3.2 Electrical Mounting

8-pole terminal strip		
No.	Description	Function
1	SHUTDOWN	Shutdown of baro transmitter
2	SUPPLY	5 - 24VDC supply (+)
3	GND*	Supply, ground (-)
4	FREQUENCY	Frequency output
5	AGND*	Analogue signal, ground (-)
6	V <sub>OUT</sub> / I <sub>OUT</sub>	Analogue output
7	B	RS485 (Data+)
8	A	RS485 (Data-)



**Table 1: Pin Assignment of Terminal Strip**

\* The pins AGND and GND are connected to the same electrical potential

The different outputs are usable at the same time. With the analogue output the analogue ground (AGND) has to be applied. For the frequency output AGND or GND is allowable. The baro transmitter is protected against polarity reversal.

## 4 Operating Mode

The baro transmitter can be used alternatively in two operating modes:

**Active mode** or **Shutdown mode**.

In the **active mode** the baro transmitter outputs continuously measuring values after connection of power supply.

In the **shutdown mode** the baro transmitter can be turned on and off via an external trigger signal.

0V = Baro transmitter off.

5 ... 24V = Baro transmitter on.

### **Remark:**

*The baro transmitter is delivered with factory-setting „active mode“.*

The respective operating mode is selected by means of the jumper P1 (see **chapter 5**).



## 5 Settings (Operation Mode / termination)

- Operation Mode „Active mode“ or „Shutdown Modus“
- Termination resistor „Off“ or „On“

The baro transmitter can be configured by means of jumpers. The following figures show the position of the bridges and the coding table:

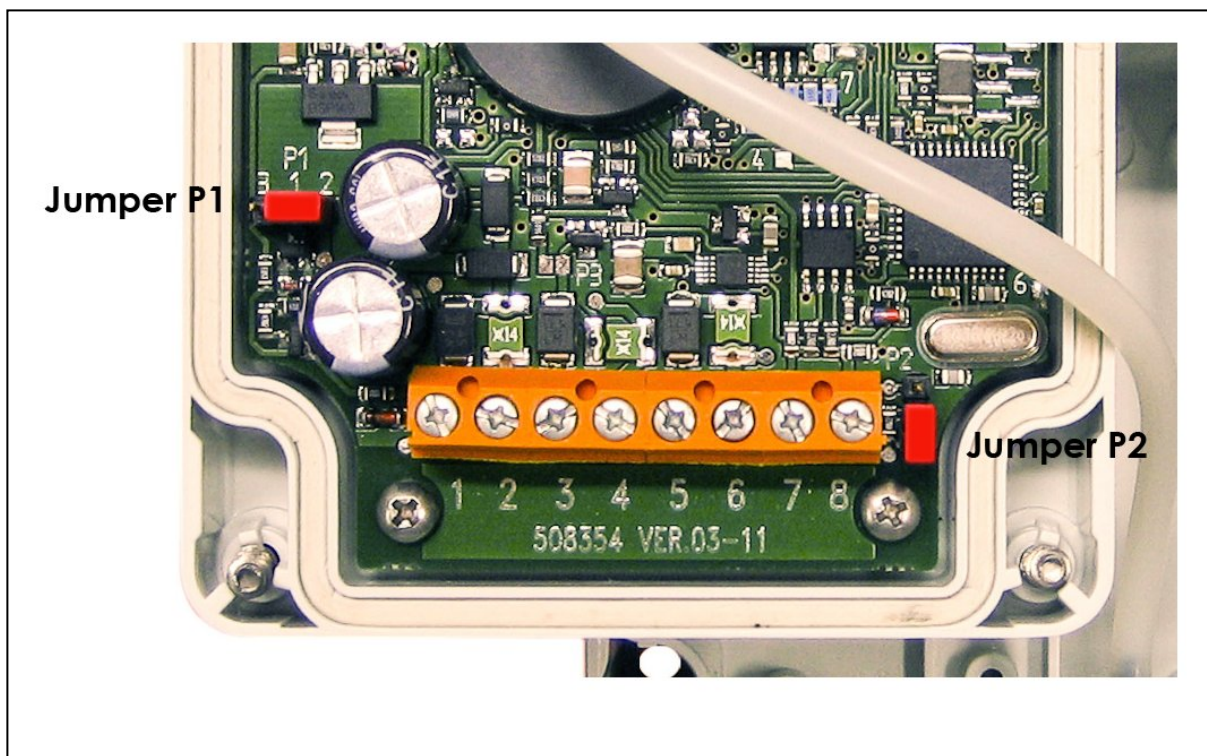


Figure 1: Position Jumper

Function	Jumper		Soldered bridge
	P1	P2	P3
SHUTDOWN Off *	1-2		
SHUTDOWN On	1-3		
RS485 termination off *		1-2	
RS485 termination on (120Ohm)		1-3	
Pull-up- resistance inactive *			O
Pull-up- resistance active (5,6kOhm)**			X

Table 2: Coding jumper

O: open

X: closed

\*: factory-setting

\*\* : resistance at the frequency output (open collector output)

## 6 Analysis

Mathematical correlation between output variable and air pressure:

Output	Formula
Voltage output: 0...5V @ 800...1060hPa	$p = 800hPa + \frac{260hPa}{5V} \cdot U[V]$
Voltage output: 0...10V @ 800...1060hPa	$p = 800hPa + \frac{260hPa}{10V} \cdot U[V]$
Current output: 0...20mA @ 800...1060hPa	$p = 800hPa + \frac{260hPa}{20mA} \cdot I[mA]$
Current output: 4...20mA @ 800...1060hPa	$p = 800hPa + \frac{260hPa}{16mA} \cdot (I[mA] - 4mA)$
Voltage output: 0...10V @ 600...1060hPa	$p = 600hPa + \frac{460hPa}{10V} \cdot U[V]$
Voltage output: 0...20mA @ 600...1060hPa	$p = 600hPa + \frac{460hPa}{20mA} \cdot I[mA]$
Voltage output: 4...20mA @ 600...1060hPa	$p = 600hPa + \frac{460hPa}{16mA} \cdot (I[mA] - 4mA)$
Frequency output: 300...1100Hz @ 300...1100hPa	$p = 1 \frac{hPa}{Hz} \cdot f[Hz]$

## 7 Serial Communication

An RS485 interface is available for serial communication. It can be operated in half duplex mode at different baud rates.

A terminating resistor (120Ω) can be hardware-connected by the jumper P2 (see **chapter 5**).

Software version number and bus-ID are output on starting the baro transmitter. Output with the selected baud rate.

Example:  
THIES Baro comp.  
V0.04-04  
ID02

Factory-setting: ID = 0, baud rate = 9600, frame = 8N1

### Bus operation

Thanks to the concept of the ID-based communication an operation in bus assembly is possible. Prerequisites are as follows:

- Different IDs of the individual bus parties.
- Master- Slave structure, i.e. there is one instrument in the bus that queries cyclically the data of the individual instruments.









## 7.4 Command Description

### Command AM

<id>AY<parameter><CR> Is setting the mode for the analogue output.  
Echo of command !xxAMxxxxx<CR>  
Access: read / write.  
Description: The mode for the analogue output is stated by the command AM.  
Parameter description:

Parameter	Description
1	0...20mA
2	4...20mA
3	0...5V
4	0...10V

Value range: 1...4  
Initial value: depending on model (1...4)

### Command AY

<id>AY<parameter><CR> Scales the minimum value of the analogue output.  
Echo of command !xxAYxxxxx<CR>  
Access: read / write.  
Description: By the command AY the pressure value for the lower analogue output value is stated.  
Value range: 300...1000  
Initial value: 600 with 3.1157.10.040/041/061  
800 with 3.1157.10.000

### Command AZ

<id>AZ<parameter><CR> Scales the maximum value of the analogue output.  
Echo of command !xxAZxxxxx<CR>  
Access: read / write.  
Description: By command AZ the pressure value is given for the upper analogue. output value.  
Value range: 400...1100  
Initial value: 1060

## Command BR

<id>BR<parameter><CR> Setting the baud rate.  
 <id>BR<CR> Query of the current BR-parameter.  
 Echo of command !xxBRxxxx<CR>  
 Access: read / write.  
 Description: The required baud rate is set by the BR-command and the parameter 0000x.

Parameter description:

Parameter	Description
00002	1200 baud (8n1)
00003	2400 baud (8n1)
00004	4800 baud (8n1)
00005	9600 baud (8n1)
00006	19200 baud (8n1)
00007	38400 baud (8n1)
00008	57600 baud (8n1)

Value range: 2 to 8  
 Initial value: 5

## Command DP

<id>DP<parameter><CR> mean value time.  
 <id>DP<CR> Query of the current DP-Parameter.  
 Echo of command !xxDPxxxx<CR>  
 Access: read / write.  
 Description: By command „DP“ is set the time for the gliding mean value calculation of the pressure value.

Parameter description: 0: 1 second  
 1: 2 seconds  
 2: 4 seconds  
 3: 8 seconds  
 4: 16 seconds

Value range: 0...4  
 Initial value: 4



### Command HT

<id>HT<parameter><CR>	Mode of the heating control.
<id>HT<CR>	Query of the current HT-parameter.
Echo of command	!xxHTxxxxx<CR>
Access:	read / write.
Description:	The command „HT“ is setting the mode of the heating control. Adjusting of sensor temperature to 17°C.
Parameter description:	0: heating off 1: heating on
Value range:	0...1
Initial value:	1

### Command ID

<id>ID<parameter><CR>	Setting the identification number.
<id>ID<CR>	Query of current ID-parameter.
Echo of command	!xxIDxxxxx<CR>
Access:	read / write.
Description:	This command is setting the identification number. The ‚id‘ is used in every telegram of the instrument. After the ‚id‘ has been changed the instrument replies immediately with the new ‚id‘.
Value range:	0 to 99
Initial value:	0

### Command KY

<id>KY<parameter><CR>	Key
Echo of command	!xxKYxxxxx<CR>
Access:	read / write.
Description:	The value for the key (password) is set by the command „KY“. A change of parameters is possible only when this value is set to „234“.
Value range:	0 / 234
Initial value:	0

### Command OR

<id>OR<parameter><CR> Output rate telegram.  
 <id>ID<CR> Query of the current OR parameter.  
 Command echo !xxORxxxxx<CR>  
 Access: read / write.  
 Description: This command is used to set the output rate for the automatic telegram output (command TT). The statement of the parameter is carried out in seconds.  
 Value range: 1 to 60  
 Initial value: 10

### Command PP

<id>PP<CR> Query of the current calibration parameters.  
 Echo of command --  
 Access: read  
 Description: The calibration parameters of the pressure sensor are output by the command „PP“.  
 Response telegram:  
 < AC1=10459; // Parameter AC1  
 < AC2=64447;// Parameter AC2  
 < AC3=51002;// Parameter AC3  
 < AC4=32770;// Parameter AC4  
 < AC5=26335;// Parameter AC5  
 < AC6=23458;// Parameter AC6  
 < B1= 06348; // Parameter B1  
 < B2= 00059; // Parameter B2  
 < MB= 32768; // Parameter MB  
 < MC= 54561; // Parameter MC  
 < MD= 02400; // Parameter MD  
 Value range: --  
 Initial value: --

## Command PS

<id>PS<parameter><CR> Power Save.

<id>PS<CR> Query of the current PS parameter.

Echo of command !xxPSxxxxx<CR>

Access: read / write.

Description: Energy saving mode is set by the command „PS“.

In case a mode is set without active RS 485 interface the following output is given when starting the baro transmitter:

THIES Baro komp.  
v0.03-30  
ID02  
ESC  
RS485off

After the output of „ESC“ the user has to reactivate the interface within approx. 0,5 s by sending the ESCAPE character. The activation of the interface is signaled by the output of „RS485on“.

Parameter description:

- 0: all outputs active.
- 1: only RS485 active.
- 2: only analogue output active.
- 3: only frequency output active.
- 4: only analogue- and frequency output active.
- 5: only RS485 and analogue output active.
- 6: only RS485 and frequency output active.
- 7: only RS485 Receiver active (start-up via receipt of a sign).
- 8: all deactivated (start-up only via power-on-reset).

PS - mode	Power consumption @ 5V (in mA)	Power consumption @ 12V (in mA)	Power consumption @ 24V (in mA)
0	4.0	4.1	4.7
1	2.1	2.3	2.8
2	3.0	3.1	3.9
3	2.1	2.2	2.7
4	3.4	3.6	4.2
5	3.1	3.2	3.8
6	2.5	2.6	3.2
7	0.5	0.6	1.1
8	0.2	0.2	0.7
Shutdown=0	1µA	1µA	1µA

Value range: 0...8

Initial value: 0

---

**Remark:**

*If the selected mode is without RS485 interface, the user cannot communicate with the baro transmitter.*

*In order to change the interface in this status, the ESCAPE character must be transmitted during the start process (see description command PS).*

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**Command SH**

<id>SH<Hoehe><CR>      Station height.

Command echo                      --

Access:                              read / write.

Description:                        The command is used to set the station height at the site of the baro transmitter.

Parameter description:          Height above sea level (NHN) in meters.

Value range:                        0...3000

Initial value:                        0

- When set station height **equals 0**, the „ABSOLUTE AIR PRESSURE“ is transmitted at the **analogue output**.
- When the set station height **does not equal 0**, the „REDUCED AIR PRESSURE“ is delivered at the **analogue output**.

**Command TR**

<id>TR<00001><CR>      Query of measuring value.

Echo of command      --

Access:                              read.

Description:                        The command triggers a single transmission of the current measuring value.

Response telegram:                <(STX)><pressure>;<temperature>;<station height>;<QNH><status>\*<check sum><CR><LF><ETX>

Value range:                        1

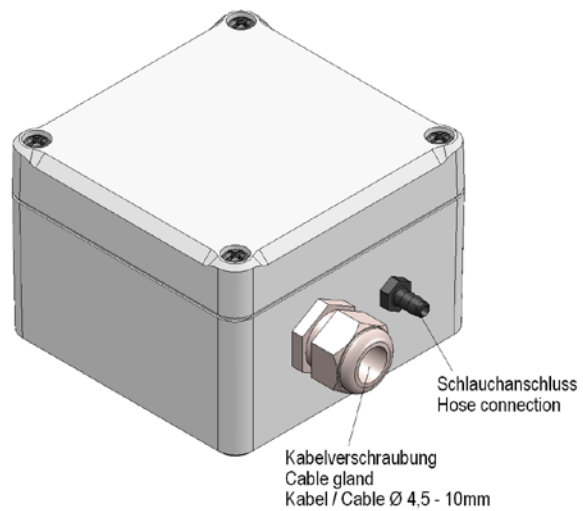
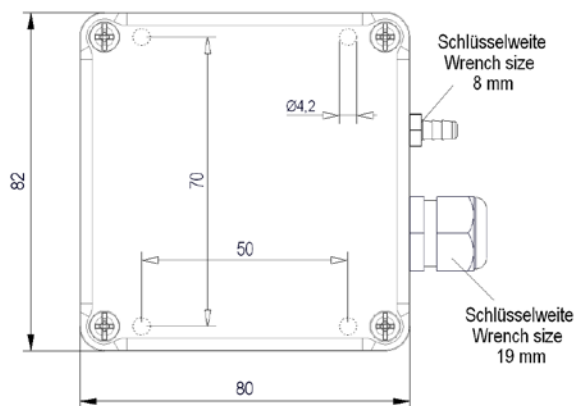
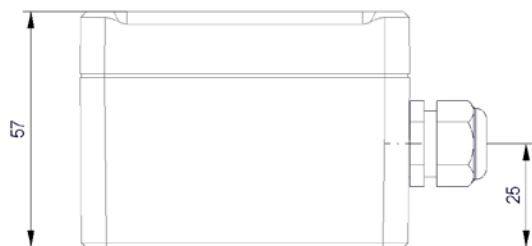
Initial value:                        --



<b>Frequency output</b>		
	Measuring range	260 ...1260hPa
	Frequency	260... 1260Hz
Definition	Open collector, sink	$U_{max} \leq 30 \text{ V}$ , $I_{max} \leq 20\text{mA}$
	Pull-up-resistance active	$U_{low} = 0\text{V}$ , $U_{high} = 3\text{V}$
<b>Analogue output</b>		
	Measuring range scalable	300...1100hPa, factory setting please see <b><u>models available page 4.</u></b>
	Accuracy plus. to digital output	$\pm 0.10\text{hPa}$
Voltage	Output (3.1157.10.000)	0...5V @ $U_B \geq 8\text{V DC}$
	Output (3.1157.10.061/161)	0...10V @ $U_B \geq 12\text{V DC}$
	R (load)	>50k $\Omega$ (output 0.. 10V), >10k $\Omega$ (output 0... 5V)
Current	Output (3.1157.10.040/140)	0...20mA
	Output (3.1157.10.041/141)	4...20mA
	R <sub>L</sub> (load)	$\leq 350\Omega$ @ $U_B \geq 12\text{V DC}$ $\leq 500\Omega$ @ $U_B \geq 15\text{V DC}$
<b>General</b>		
<b>Operating voltage</b>	On using digital outputs	(8)12...24VDC 5...24VDC
	Power consumption at @ 12V DC	4.1mA (max. 115mA with heating) 2.3mA (only RS485 active) 3.1mA (only analogue output active) 2.2mA (only frequency output active) 3.6mA (only analogue- and frequency- output active) 3.2mA (only RS485 and analogue-output active) 2.6mA (only RS485 and frequency output active) 0.6mA (only RS485 Receiver active) 1 $\mu\text{A}$ (in shutdown mode)
<b>External Control</b>	Shutdown mode	0V = Baro transmitter off 5... 24V = Baro transmitter on
<b>Gliding mean value</b>		1, 2, 4, 8, 16sec
<b>Settling time</b>	without Heating with Heating	20s 200s
<b>Ambient conditions</b>	Temperature range	-40... +65 °C
	Humidity range	Non-condensing
	Storage temperature	-30...+70°C

<b>Housing</b>	Material	Polycarbonat
	Dimensions	See dimensional drawing
	Weight	Ca. 0.15Kg
	Protection	IP54 (in-use position)
	Connection - for the electrical supply	Screwed cable gland M 16 x 1.5 and 8-pole terminal strip
	Connection - for the air pressure balance	Hose connection nozzle 1/8" (Ø 4,76mm)

## 10 Dimension drawing (in mm)



# 11 EC-Declaration of Conformity

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

**Product:** Precipitation Transmitter

Doc. Nr. 113-44544\_CE

**Article Overview:**

3.1157.10.000    3.1157.10.040    3.1157.10.041    3.1157.10.061    3.1157.10.140    3.1157.10.141    3.1157.10.161

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.
2014/35/EU	26.02.2014	DIRECTIVE 2014/35/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 the making available on the market of electrical equipment designed for use within certain voltage limits.
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	2012-11	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.

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 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.



# 12 UK-CA-Declaration of Conformity

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

**Product:** Precipitation Transmitter

Doc. Nr. 113-44544\_CA

**Article Overview:**

3.1157.10.000    3.1157.10.040    3.1157.10.041    3.1157.10.061    3.1157.10.140    3.1157.10.141    3.1157.10.161

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

1091	08.12.2016	The Electromagnetic Compatibility Regulations 2016
1101	08.12.2016	The Electrical Equipment (Safety) Regulations 2016
RoHS Regulations 2	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 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.

## 13 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 instruction for use are available for download under the following links.

Short instruction for use

[https://www.thiesclima.com/db/dnl/3.1157.10.xxx\\_Baro\\_Transmitter\\_eng\\_short.pdf](https://www.thiesclima.com/db/dnl/3.1157.10.xxx_Baro_Transmitter_eng_short.pdf)

Instruction for use

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

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