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Thies CLIMA

Instruction for Use

021326/03/07

Precipitation Transmitter

5.4033.35.xxx / 5.4033.36.xxx

ADOLF THIES GmbH & Co. KG

Hauptstraße 76 37083 Göttingen Germany
Box 3536 + 3541 37025 Göttingen
Phone ++551 79001-0 Fax ++551 79001-65
www.thiesclima.com info@thiesclima.com

Contents

Figures

Tables

1 Models available

Order-No.	Heating	Supply	Output/Analogue	Measuring range
5.4033.35.040	yes	24 V AC/DC	0 ... 20 mA (max. 500 ohm)	0 ... 10 mm * 0 ... 20 mm 0 ... 25 mm 0 ... 50 mm selsctable via DIP-switch
5.4033.35.041	yes	24 V AC/DC	4 ... 20 mA (max. 500 ohm)	
5.4033.35.061	yes	24 V AC/DC	0 ... 10V	
5.4033.35.073	yes	24 V AC/DC	0 … 5V	
5.4033.36.040	no	10 .. 24 V DC	0 ... 20 mA (load 150 .. 500 ohm)	
5.4033.36.041	no	10 .. 24 V DC	4 ... 20 mA (load 150 .. 500 ohm)	
5.4033.36.061	no	13 .. 24 V DC	0 ... 10V	
5.4033.35.073	no	13 .. 24 V DC	0 ... 5V	

*** Factory adjustment**

Table 1: Models available

2 Application

The instrument is designed to measure the height, quantity and the intensity of the precipitation striking the surface of the earth. The measuring principle, tipping bucket, is basing on the description „Guide to Meteorological Instruments No 8“ of the WMO (World Meteorological Organization).

3 Mode of Operation

The precipitation, collected by the collecting surface and the collecting funnel, is conducted into a tipping-bucket. The tipping bucket consists of two bucket-compartments. Is one of these compartments filled with water it tips over, and the water drains off. Meanwhile subsequent rain falls into the newly positioned upper compartment. The tipping movement is detected by Reed-contactors, and a connected electronics, and produces a respective output signal.

There are two outputs available:

Output 1: Analogue output for the output of the precipitation sum as voltage- or current value.
Output 2 :Pulse output for the output of single precipitation meter pulse .

The electronics of the precipitation transmitter is equipped with a linearising system. The linearising procedure is basing on a intensity-dependent pulse number correction for the range from approx. 0,5... 11 mm/min.

Each instrument is calibrated with a water quantity of 200cm³ (= 10 mm precipitation height).

- Precipitation transmitters with built-in heating (5.4033.35.xxx) liquefy snow and hail and consequently, are suitable for winter use.
- All parts are corrosion-resistant. The casing consists of stainless steel (V2A).

For information

A precipitation height of 1 mm corresponds to a water volume of 1 litre on 1 m² ground area.

4 Description Electrical Output

4.1 Output 2: Analogue Output

The measured precipitation value is available at the analogue output in the form of electrical output signals (see chapter 1). In case of a DC-supply, the analogue output refers to supply ground (-).

4.1.1 Signal Processing

For the signal processing please select as follows:

1. Accumulating Precipitation Sum *(= the sum of all precipitation events up to a maximum measuring range)*

With this procedure the precipitation events are added up to a maximum value (see measuring range), and are output as analogue value. With every precipitation event the analogue value is updated. In case of exceeding the maximum value the analogue value is automatically reset. In parallel to this, an external signal (RESET) can reset the analogue value at any time (see fig. 1).

Application example for accumulating precipitation sum:
- for recording the precipitation on recording instruments.

2. Gliding Precipitation Sum *(= the sum of precipitation events over a past period)*

With this procedure (see fig. 2) the precipitation events are added in a circular buffer over a selectable *gliding time period*. The updating (see fig. 3) of the analogue value is carried out continuously within the scope of the selected past period. After starting the precipitation transmitter the analogue value is in the set-up for the selected period. After the set-up delay the analogue value represents the gliding sum value of the precipitation (see fig. 2) The measuring range to be selected has to come up to the expected precipitation quantities, as an internal measuring range overflow leads to erroneous gliding sum values.

Application example for gliding precipitation sum:
- for visualising the precipitation on display- or recording instruments.
- for controlling certain processes, for example with sewage treatment plants.

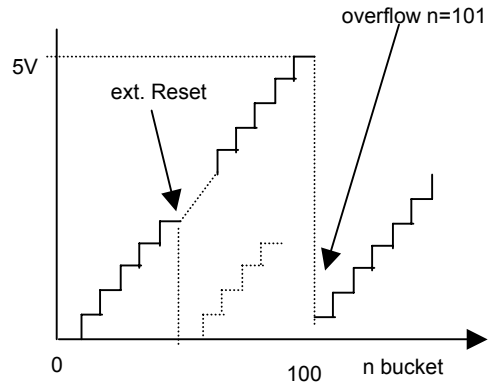


Figure 1: accumulating precipitation sum

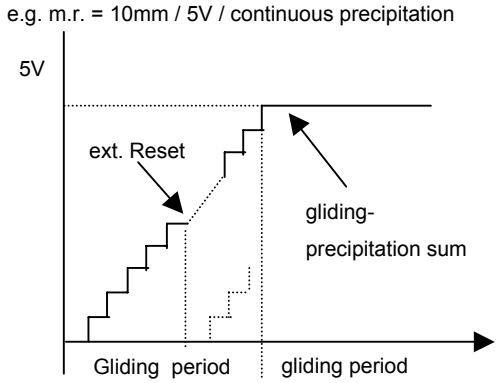


Figure 2: gliding precipitation sum

Updating Time	With gliding Period
every 25 sec.	10 Min.
every 150 sec.	60 Min.
every 15 min.	6 h.
every hour	24 h.

Table 2: Updating

4.2 Output 1: Pulse Output

In parallel to the analogue signal output the precipitation pulse (1 pulse = 0,1 mm precipitation) is available via an opto-coupler.

5 Recommendation Site Selection / Standard Installation

Depending on the wind velocity, a certain amount of the precipitation particles are blown away over the deposit area. Therefore, an installation in a completely open area as well as at the direct lee-side of an object is to be avoided. Gardens e.g., where hedgerows or similar objects offer protection against the wind, are more suitable.

The World Meteorological Organization recommends that precipitation gauges be installed at a distance which is at least four times as high as the next higher object. If this is not possible, it is to be observed that an elevation angle of ≤45° towards the surrounding plants, buildings etc. is adhered to.

The precipitation gauge is to be installed in such a way that the collection area is horizontal and is situated 1 m above ground. If snowfall is to be expected regularly within the area of the measuring instrument this distance should be increased respectively.

Attention

Precipitation gauges are to be installed in a way that ensures a vibrationless operation.

6 Installation

Please Note:

The electrical connection is to be carried out by experts only.
Please open the instrument only with dry ambient conditions.
Do not damage the exposed electronics!

6.1 Mechanical Mounting:

Installation is carried out as follows:

(see also **Fig. 4: instrument construction**)

- Unpack the instrument.
- Remove the tipping bucket **(9)** from the collecting funnel of the casing **(7)** (in a separate small carton) and unpack it, as well.
- Put the precipitation transmitter onto an applicative stand and fix it by means of the screws **(12).**
- Unscrew 2 screws **(1)** at the casing **(7)** and remove the casing carefully.
- Check, if the level on the base plate **(11)** indicates vertical mounting, possibly correct it by means of the screws **(12)** in the stand.
- For inserting the tipping bucket **(9)** the collector **(4)** must be moved upwards by unscrewing the knurled screws.
- Then insert the tipping bucket carefully into the bearing seat.

  Important: The magnet of the tipping-bucket must indicate towards the pc-board.
- Afterwards, check the tipping bucket if the tips go accurately.
- Then put the collector back into the lower position and fix it there.
- Replace carefully the case over the instrument from above and tighten the 2 housing screws.

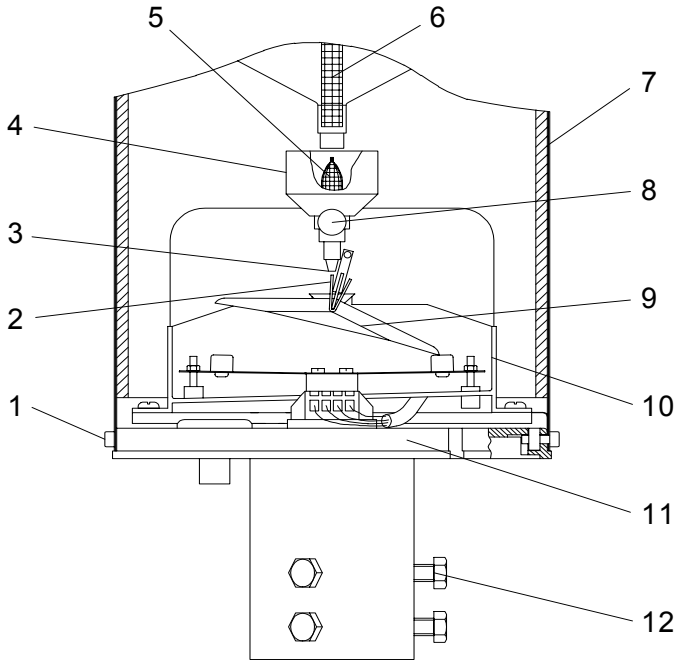


Figure 3: Instrument construction

Attention

Do not touch the inner surfaces of the tipping bucket, and do not deform the draining pins (2).

Remark

Please remove the inflow sieve (6) in the collecting funnel during the winter period when it is snowing!

6.2 Electrical Mounting:

- Please solder a cable (for ex.. LiYCY 0,5 mm²) to the attached connecting plug acc. to the respective connecting diagram (see also chapter 9).
- Plug-mounting see chapter 6

Remark

Connections 6 and 7 are not used by the connecting plug at the model without heating.

6.3 Setting the Signal Processing, Measuring Range, and gliding Period

(only necessary in case the factory adjustment is to be changed)

On the pc-board there is a 6-pole DIP-switch for setting the requested signal processing, measuring range, and period. For this, please put the single switches into the right position, acc. to the table. In the factory, the instrument is pre-set for the function „accumulating precipitation sum“ and the measuring range 0...10 mm.

Remark:

After the DIP-switch has been set, disconnect briefly the supply voltage, so that the precipitation sensor can accept the new information.

Offset-Funktion	DIP-Switch 6
0-20 mA / 0-10V / 0-5V	ON
4-20 mA / 2-10V / 1-5V	OPEN

Signal Processing	DIP-Switch 5
Accumulating precipitation sum *	ON
Gliding precipitation sum	OPEN

Measuring Range	DIP-Switch 1	DIP-Switch 2
10 mm *	ON	ON
20 mm	OPEN	ON
25mm	ON	OPEN
50mm	OPEN	OPEN

Gliding Period	DIP-Switch 3	DIP-Switch 4
10min	ON	ON
60min	OPEN	ON
6h	ON	OPEN
24h	OPEN	OPEN

*(* = factory adjustment)*

Table 3: set from DIP- switch

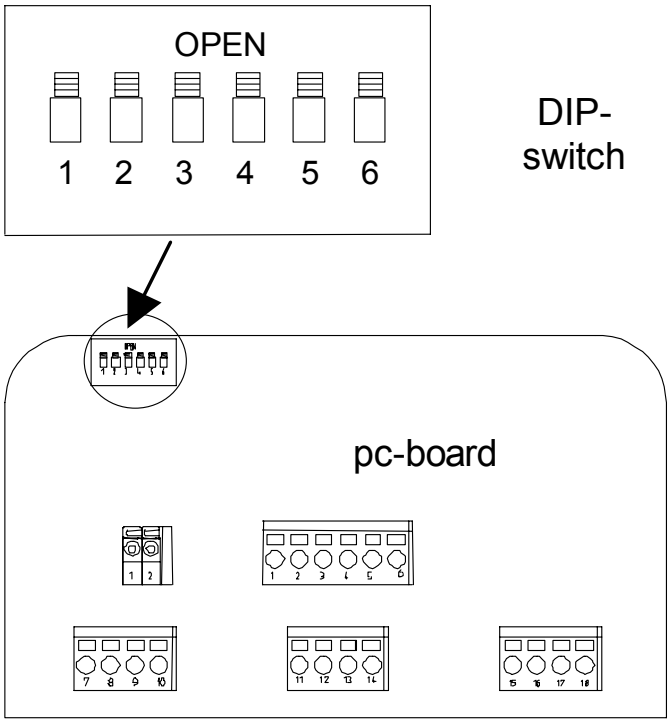
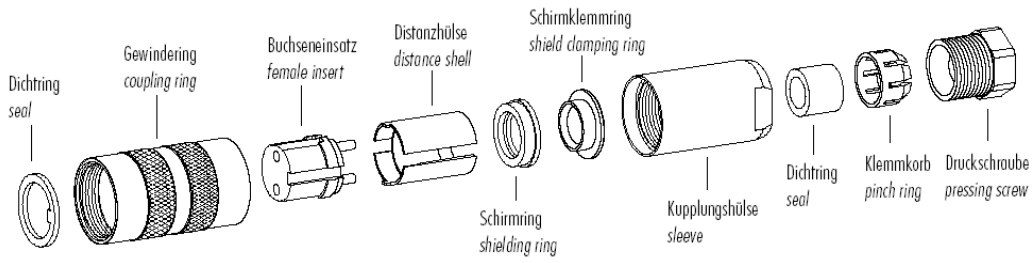
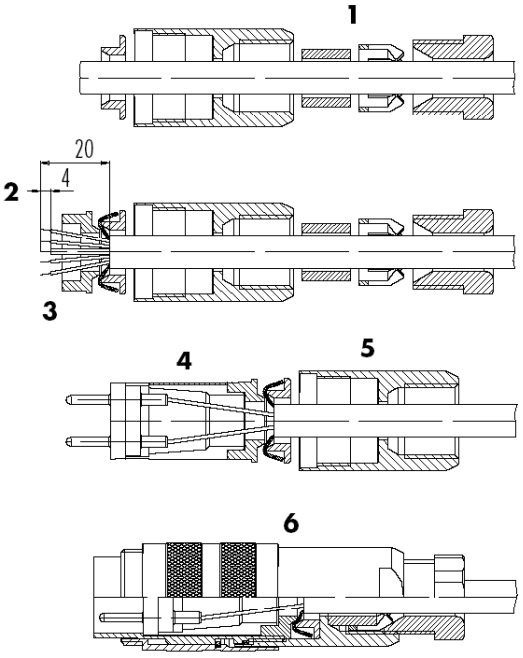


Figure 4: DIP- switch

7 Plug mounting



1. Stringing parts
2. Stripping and widening of shield
3. Assembling shield clamping ring
4. Soldering wire, tripping distance bush
5. Cutting off projecting shield
6. Assembling remaining parts according to plan



8 Maintenance

Please Note:

The electrical connection is to be carried out by experts only.
Please open the instrument only with dry ambient conditions.
Do not damage the exposed electronics!

The instrument is designed in such a way that all of the parts requiring maintenance are easily accessible once the case has been removed.

The most important factors for precise measurements are a free and undisturbed inflow, and clean, grease-free inner surfaces of the tipping bucket.

The tipping bucket is made of zinc-plate, the surface of which is specifically oxidised, in order to achieve a hygrophile surface. It guarantees an accurate draining behaviour of the measuring liquid, and must not be removed mechanically.

The maintenance interval should depend on the degree of pollution of the instrument. It is advisable to make a visual inspection at short intervals as particles falling from above, such as foliage, bird dropping etc. can affect the measurement.

8.1 Cleansing Procedure

What you need for cleansing:

- ✓ a clean cloth
- ✓ a small bottle brush
- ✓ a soft brush
- ✓ possibly gentle soap

Cleansing is carried out as follows: (s.a. Fig. 1: Instrument construction):

- Switch off supply voltage of heating.
- Remove **the inflow sieve (6)** from the **case (7)** (collecting funnel) from above and clean it.
- Unscrew the **2 screws (1)** at the cover, remove and clean it.
- Remove **sieve (5)** from the **collector (4)** and clean it.
- The **collector (4)** with the **nozzle (3)** can be removed after unscrewing the **knurled screw (8)**. Clean the nozzle boring by means of small bottle brush.
- Remove the **tipping bucket (9)** carefully from the bearing seat.
- Clean the inner surfaces with clear water, if heavily soiled (grease) also with gentle soap water. For this, please use a soft brush.
- If indicated, clean also the **run-off pan (10)**.
- After cleansing, please re-insert the parts in reversed order.

Attention

- ***Do not use any benzene, alcohol, or other cleansing agents.***
- ***Never treat the inner surfaces of the tipping bucket with emery paper or something similar.***
- ***Do not touch the inner surfaces with hands.***
- ***Please take care that the draining pins are not deformed.***

8.2 Check of the Tipping Bucket

For checking the measuring instrument it is advisable to pour a certain amount of precipitation slowly and steadily into the collecting funnel. Diese muss langsam und gleichmäßig in den Auffangtrichter gegossen werden. That means, that for example a quantity of 200 cm² induces a pulse number of 100.

The quantity of 200 cm² should be filled in constantly over a period of approx. 10 minutes.

Information

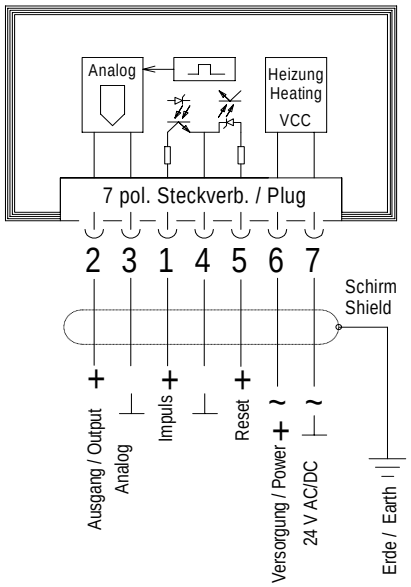
Approx. 98 % of the precipitation in Germany are falling with an intensity of 2mm/min.

Remark

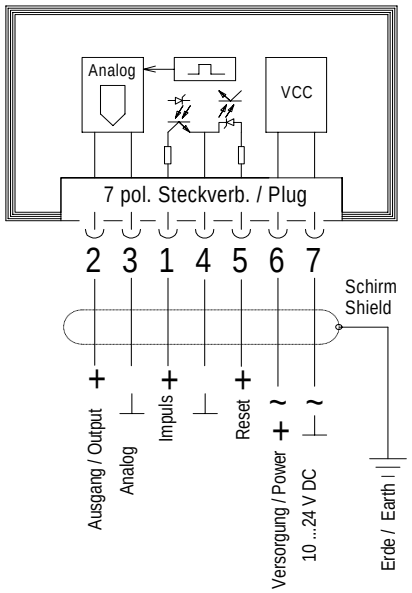
Every precipitation transmitter is checked, adjusted and calibrated at the manufacturers. If, in the course of time, the adjustment of the tipping bucket has changed as a result of external influences, we suggest a check and calibration in our factory.

9 Connecting Diagram

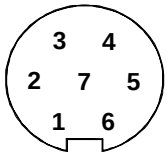
with heating



without heating



View on the soldered joint of the counter plug.



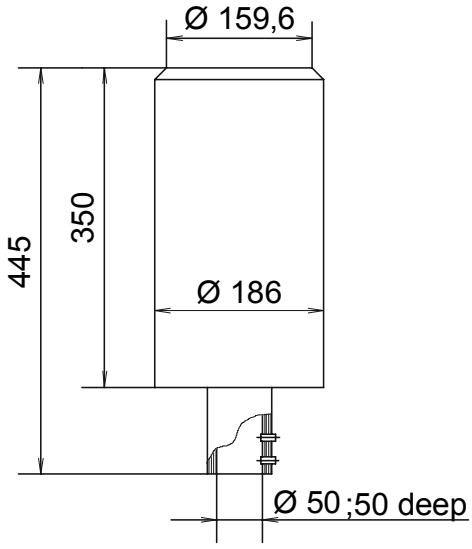
10 Dimensional Drawing

Description	MIN	TYPE	Max	Unit
General				
Collecting surface		200		cm^2
Volume of tipping bucket		2		cm^3
Measuring range	0		11	mm/min
Resolution		0,1		mm NS
Accuracy (within the range of 0.. 11 mm/min)			± 3 *	%
Ambient temperature (w/o heating)	0		60	°C
Ambient temperature (with heating)	- 25		60	°C
Mounting on stand pipe (1 ½“)			50	∅mm
Weight			3,3	kg
Electrical Output				
Output 1: Analogue				
Resolution of analogue value		960		steps
Accuracy of analogue value		± 1		% of m.r
Linearity error			± 0.1	%
Load (Vcc ≥ 17V)			500	ohm
Load (Vcc ≥ 10V)	150			ohm
Imax (voltage output 0..10V) Vcc ≥ 13V	1			mA
Imax (voltage output 0..10V) Vcc ≥ 17V		20		mA
Output 2: Digital (opto-coupler)				
Pulse length		125		ms
Pulse pause	125			ms
Tipping bucket frequency	0		2	Hz
Supply voltage			24	V DC
Pulse current	8	16		mA
Rv (pre-resistance in the precip. transmitter) (fig.)		100		Ω
Reset-input (opto-coupler)				
Pulse length	70			ms
Pulse current	1		40	mA
Rv (pre-resistance in the precip. transmitter) (fig.)		6200		ohm
Supply voltage				
Vcc (with heating)		24	28	V (AC/DC)
Vcc (w/o heating)	10		24	V (DC)
Icc (w/o heating) (at voltage output)			3	mA
Heating				
Heating power (at 24V supply)		48,5		W
heating – switch-on temperature		5		°C
Heating - hysteresis		2		°C

***** The accuracies were determined under laboratory conditions
Test medium: destilled water. **Test volume:** 200cm^3 = 10mm precipitation = 100 tipping bucket pulse
10 mm precipitation per minute corresponds to a quantity of 600 litre per hour.

(General: A precipitation height of 1 mm corresponds to a water volume of 1 litre on 1 m² ground area)

11 Connection Diagram



12 Accessories (deliverable as options)

Stand	9.4031.35.065	Serves for mounting the precipitation transmitter. The distance from the ground to the collecting surface is about 1,0 meter. Stands are available also for other distances.

Bird protection device	5.4010.00.010	Avoids birds sitting on the precipitation transmitter.

Power Supply Unit	9.3388.00.000	Serves for current supply of precipitation transmitter heating. Primary: 230 V / 50 Hz Secondary : 26V / 3,46 A

ADOLF THIES GmbH & Co. KG
Hauptstraße 76 37083 Göttingen Germany
P.O. Box 3536 + 3541 37025 Göttingen
Phone ++551 79001-0 Fax ++551 79001-65
www.thiesclima.com info@thiesclima.com

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