Precipitation recorder according to Hellmann (1507)

Model 1507	**Recording Period 7 days**
Model 1507 a	**Recording Period 24 hours**
Model 1507 H42	**Recording Period 7 days, with heating**
Model 1507 a H42	**Recording Period 24 hours, with heating**

Function

The recording rain gauge according to Hellmann uses a standard funnel (200 cm²) to collect the precipitation which is conducted into a measuring vessel equipped with a float and a siphoning device.

Whenever a precipitation quantity of 10 mm has been reached, the self-actuated siphoning device flushes the collected precipitation from the measuring vessel into a collecting can.

A drum chart recorder continuously registrates the precipitation quantity. Additionally, the precipitation quantity can be gauged with the collecting can.

Precipitation measurement

The precipitation quantity falling on a surface is indicated by the height of the liquid precipitation that would cover the ground if it had not seeped into the ground, run off or evaporated. The height is indicated in mm which is equivalent to the precipitation quantity in litres per m².

To determine the precipitation quantity, the precipitation falling on a small portion of the concerned surface is either collected and measured at given times, or continuously recorded with a recording device. The measuring result is judged to be the average value for the entire observation area.

Since there may be considerable local differences in the precipitation quantity, the measuring accuracy depends both on the ratio between collecting surface and observation surface, and on the choice of an appropriate measuring site. For economic reasons the ratio between collecting surface and observation surface can only be extremely small. Therefore, special attention should be paid to choosing the right measuring site for precipitation gauges or recorders.

Choosing the installation site

The device should be installed on a free space to ensure the rain will unimpededly reach the collecting funnel. Houses, trees and other objects must be as far from the rain gauge as they are tall. The future growth of trees and bushes should be considered when the device is installed, otherwise an occasional change of the measuring site cannot be avoided. In this case the comparability of the measuring results is no longer guaranteed.

Installing the device on roofs or in completely open terrain, especially on unprotected ground elevations, is inappropriate, because the wind may adversely affect the measurements, making it nearly impossible to obtain representative measuring results for a larger observation area.

The collecting surface must be 1.2 m above the ground.

If the rain gauge is fixed to a foundation using the eyes at the foot ring, this height is automatically reached.

Note: Owing to tolerances caused by manufacturing the bore holes must be transferred individually to the specific foundation.

Additionally, the rain gauge can be braced with wires in three directions. For this purpose, use the eyes at the upper part of the casing beneath the rain cover. The device must be anchored such that it stands vertically.

Putting into operation

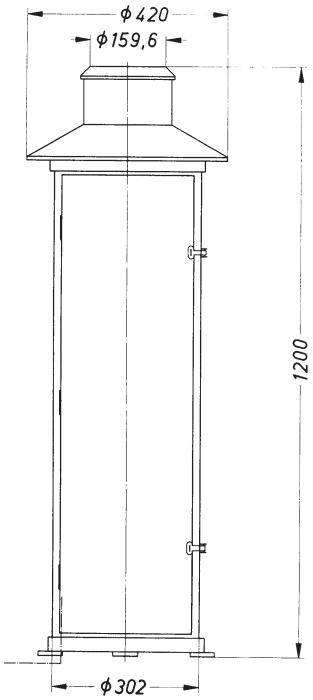
After installing the device, open the door to the precipitation recorder, to remove the transport lock from the recording arm. Move the recording arm to the front until it is locked by the appropriate leaf spring. Then the separately packed clockwork and the collecting can are unpacked. The collecting can is set onto the bottom of the casing. The clockwork is introduced into the device, if necessary after changing the chart and winding up the clockwork's driving mechanism.

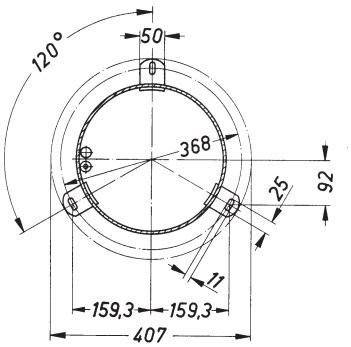
Inserting the siphon pipe: Now one of the supplied siphon pipes is inserted into the nozzle at the side of the float vessel. Cautiously introduce the siphon pipe into the nozzle up to the metal stopper.

Now pour some water into the collecting vessel until the float vessel empties via the siphon pipe. The tip of the recording pen will then be exactly at the zero point of the chart scale graduation.

Funnel spiral: The funnel spiral is inserted into the standard funnel to preserve the water channels of the precipitation recorder from coarse soil particles.

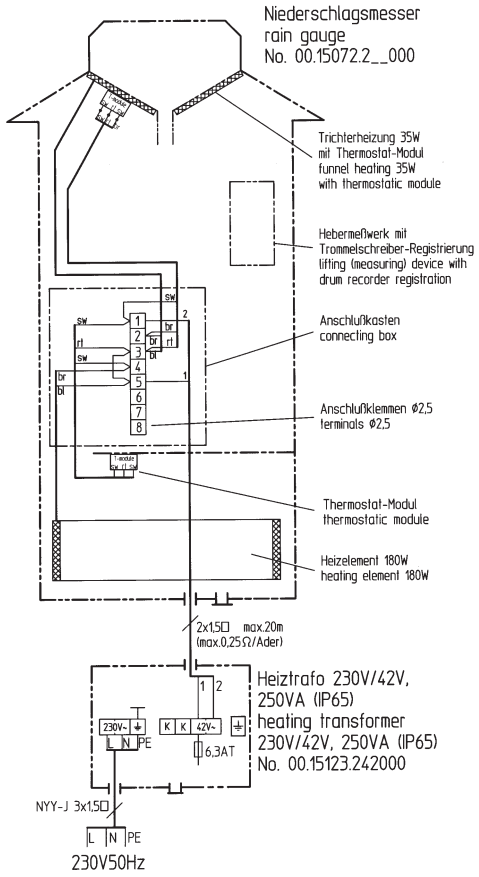
When you have removed the protection from the fiber tip and set the correct time on the drum chart recorder, the device is ready for operation.





Electrical connection 1507 H42

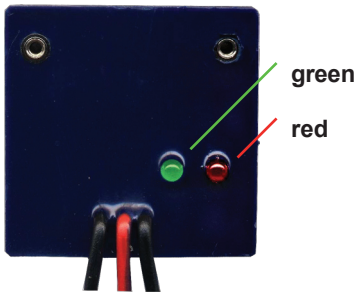
The model 1507 H42 additionally requires its heating device to be connected to the power supply.



Internal circuit model 1507 H42

Thermostatic Module

- **green:** supply voltage
- **red:** heater on



The function of the heating elements can be tested also at ambient temperatures above the control temperature of the solid-state thermostat. For this simple test a regular magnet has to be held close to the blue housing of the switching circuit. When reaching a surface temperature of approximately 50 °C the current will be switched off.

Both blue thermostat modules are fitted internally on the funnel surface as well on the bottom of the housing. The operational conditions will be indicated with coloured luminescence diodes (LED).

Maintenance

Leaves, wood, dirt, bird droppings, flies, spiders etc. may easily get into the collecting vessel of the precipitation recorder and clog the outlet. These impurities must be carefully removed because they may lead to blocking the float.

The lacquered surface - particularly the bright metallic interior of the collecting vessel and the snow cross - must be maintained with commercial means used to reduce the water tension. Deposits and cracks in the lacquer adversely affect the drainage of the collected precipitation. Depending on the degree of contamination, the internal parts of the precipitation recorders should also be cleaned at regular intervals using a soft brush or a damp cloth. Otherwise, sticking dirt may be taken for corrosion.

The gliding parts on the float vessel and the recording arm bearing must in no case be oiled, but should from time to time be cleaned with benzine or soapsuds (for instructions on removing the float vessel see section below).

The drum clockworks in the precipitation recorders are exposed to adverse climatic conditions (varying temperatures, occasionally high air humidity). We therefore recommend to have them cleaned and slightly oiled by a clockmaker or in our repair shop every 2 or 3 years. At fixed observation times, i. e. at the end of the nominal recording time, it is necessary to replace the chart, to wind up the driving mechanism of the recorder, and to measure and remove the collected rain water from the can.

The water inside the float vessel can evaporate to a very small extent only because the vessel is nearly completely closed. However, if after a long drought a considerable loss of water occurs causing the recording tip to fall below the zero point, the operating water required in any case must be refilled. To do so, use the measuring cylinder to slowly pour water into the collecting vessel, until the siphon is actuated. The recording tip must then adjust to the zero point of the chart.

Inserting a spare siphon pipe

The two supplied glass siphon pipes have been adjusted to fit into the device. If, in the course of time, additional siphon pipes must be inserted, the siphoning point and, if necessary, the zero point must be adjusted by the observer himself.

The zero point is adjusted by vertically shifting the recording arm. For this purpose, the hinge of the recording arm is provided with an adjusting screw. By turning this screw the recording arm can be lowered or lifted. The adjustment is correct if the recording pen is exactly on the chart's zero line after the siphoning. The 10 mm siphoning point is adjusted by moving the siphon pipe in the lateral nozzle of the float vessel. If the siphoning point is below the 10 mm line, the siphon pipe must be pulled further out of the nozzle. If it is above the 10 mm line, the siphon pipe must be introduced further into the nozzle. The correct adjustment of the siphoning point can be found when the siphonings and shiftings of the siphon pipe are made alternately.

To pour water into the collecting vessel, you should use the measuring cylinder filled with water up to the 10 mm line. Shortly before the siphoning the water may only be added drop by drop.

Troubleshooting the recording device

Interrupted curve: Replace the fibre tip.

Wrong siphoning: In case of heavy precipitation the precipitation quantity will be frequently discharged from the float vessel through the siphon. The siphoning takes place whenever exactly 10 mm of precipitation have fallen, i. e. when the recording pen is at the 10 mm line of the chart. However, if the first siphoning takes place after a longer drought, the recording pen will usually rise slightly above 10 mm because, due to dust and dryness, the adhesive conditions inside the siphon have changed so that a larger precipitation quantity is required to trigger the siphoning.

If, on the other hand, the device is exposed to vibrations, this procedure usually takes place below 10 mm. In both cases there will be no error in the recording because the recording pen nevertheless registers the actual precipitation quantity. However, if the siphoning takes place during a heavy rainfall, it is important to measure the precipitation later using the measuring cylinder. In this case, the measured value will be greater than the recorded value because the precipitation falling during the siphoning (approximately 10 seconds) is discharged without being recorded.

Completely wrong siphoning is due to a blocked float, to impurities inside the glass pipe or to leaky spots at the lateral nozzle of the float vessel. Contaminated siphon pipes must be cleaned with diluted hydrochloric acid or with strong soapsuds.

Damaged float: If the float movement is obstructed, the float vessel must be removed. To do this, loosen the wing screw that is screwed through the mounting plate into the bottom of the vessel. Remove the cover and clean the float vessel. Then check if the axles of the guide rod and float are still perfectly aligned. Damaged floats must be replaced. When you have installed the new float the guide rod must have sufficient play in vertical direction. If the collecting funnel obstructs the float movement it must be slightly bent aside. If the recording pen is not parallel to the chart lines when you pour water into the collecting vessel, the float vessel can be slightly tilted by turning the appropriate M5 adjusting screw.

Evaluating the charts

If you want to determine the precipitation quantity of a given measuring period when evaluating the chart, you must start from the precipitation heights recorded at the beginning and at the end of this period. The first value results from the intersection of the recorded curve with the vertical line corresponding to the beginning of the measuring period. The precipitation quantity recorded at the end of this period is determined in the same way. The difference between the two values is the precipitation quantity that has fallen during the specified period. If necessary, zero point correction by siphoning may have to be considered. We should like to point out that depending on the tasks to be solved different aspects can be decisive for further evaluation. This is why the meteorological evaluation differs from the evaluation required by water resources authorities. The particular directions of the respective office must be observed.

Operating the precipitation recorder at temperatures of about 0 °C

Precipitation recorders without electrical heating device must be put out of operation when frost sets in because solid precipitation cannot get into the float vessel. Moreover, the water in the float vessel would freeze and in most cases destroy the float. At the beginning of the annual frost period you must therefore remove the float vessel and the siphon pipe as well as the clockwork from the casing and store it in a dry space. The float vessel is completely emptied. While put out of operation, float vessel and clockwork should be cleaned and serviced, if necessary. The collecting can must be emptied, too, but it may remain in the recorder casing because the collecting surface can be closed with the supplied cover. The cover should be secured with a heavy object, e.g. a stone, to prevent it from being blown away.

During temporary temperatures below the freezing point the rain recorder can remain in operation in case of the sensor is provided with an incorporated heating device and the corresponding transformer is permanently connected to the 230 VAC power supply.

The electrical connection (230 VAC, 50 Hz; heating capacity: 215 VA) of these devices must be made in due time to the .... heating transformer. The cable is installed in compliance with VDE 0100 „Regulations for the installation of power plants with nominal voltages below 1000 V“.

A Pg 11 cable gland is provided to introduce the cable into the recorder casing. The connecting terminals for the power supply (42 VDC) are located in the terminal box above the collecting can.

A precise working electronic module automatically controls the heating device at an internal housing temperature of 4 °C (±1 K). This function minimises potential evaporation errors caused by higher temperatures.

When snow is falling the snow cross must be put into the collecting vessel. The snow cross very reliably prevents the collected solid precipitation from being blown away by heavy wind. During summer, the snow cross must not remain in the collecting vessel, as the considerably enlarged wetted surface would increase the evaporation of the collected precipitation before it is recorded.

Exchanging the charts on the drum chart recorder

To exchange the strip charts perform the following steps:

1) Prepare a new chart by noting on it the date, site and device number, if any. Store the charts close to the device to enable the formation of a humidity equilibrium between the ambient air and the paper. This way warpings in the paper occurring during the recording period will be avoided as far as possible.
2) Provide the old chart with a time mark by carefully raising or pressing down the recording arm. Determine the respective time.
3) Lift the recording pen off the chart until the recording arm is locked by the leaf spring.
4) Unscrew the winding key clockwise (left-hand thread).
5) Pull the clockwork drum from the axle to the top.
6) Loosen the metal clamp used to fix the chart (push the clamp upward) and remove the recorded chart.
7) Clean the clockwork drum.
8) Insert the new prepared chart. Take the clockwork with your left hand. While fixing the metal clamp with your right hand, use your left hand to press the chart to the drum so that it fits closely and its lower edge touches the protruding rim of the drum over the whole periphery of the drum.
9) Mount the clockwork drum. Do not press down the recording pen. Slowly push the clockwork drum downward and make sure the protruding pinion safely engages with the gear attached to the axle.
10) Secure the clockwork drum with the winding key and wind the clock by turning it clockwise.

    Replace the fibre tip, if necessary. Make sure the fibre tip is pushed onto the recording arm as far as possible, i.e. up to the stopper.
11) Adjust the recording drum to the time that corresponds to the beginning of the recording. To do so, move the recording pen close to the chart, but don’t let it touch the chart. Then slowly turn the clockwork drum counterclockwise (plan view) until the recording pen points exactly to the vertical time line that corresponds to the local time. If you have turned the drum too far, you must reverse it and then again turn it counterclockwise until the recording pen indicates the correct time. This way, the backlash of the clockwork can be avoided.
12) Put the recording pen on the chart. Set a time mark that indicates the start of the recording period. At the same time check the proper function of the recording pen.
13) Close the casing; you may also have to check the heating and measure the precipitation in the collecting can.
14) Complete the notes on the old chart (special events, time marks etc.).

If you have to put the clockwork drum aside when you replace the charts, lay it upside down to avoid damaging the pinion protruding from the base of the drum.

Technical Data

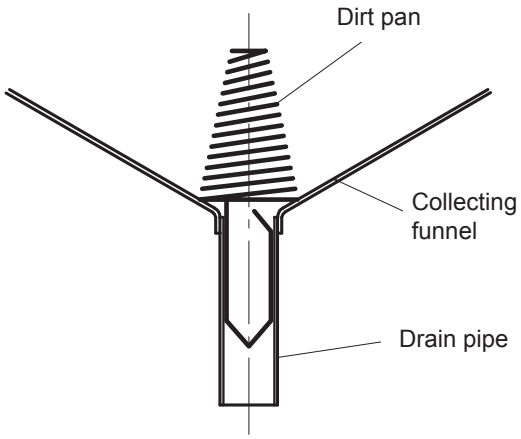
Collection area:	200 cm²
Drum rotation period:	
· 1507:	7 days
· 1507 a:	24 hours
Chart speed:	
· 1507:	2.29 mm/h
· 1507 a:	16 mm/h
Recording reserve:	
· 1507:	10 h
· 1507 a:	2 h
Clockwork accuracy:	±50 s/day
max. recordable precipitation intensity:	approx. 130 mm/h
Capacity:	collecting can 10 l
Dimensions:	height 1200 mm, roof-Ø 420 mm, case-Ø 302 mm
Weight:	approx. 21 kg

Model H42
with heating device:

Supply voltage:	42 V AC, 215 VA
Class of protection:	IP 65

Spare Parts

(1507 U10)	Siphon (glass tube)
Id-No.	**32.15070.010 000**
(1507 U2)	Floater with tube
Id-No.	**32.15070.002 000**
(1507-149)	**D**irt pan
Id-No.	**33.15070.149 000**



Please note the loss of warranty and non-liability by unauthorised manipulation of the system. You need a written permission from LAMBRECHT meteo GmbH for changes of system components. These activities must be operated by a qualified technician.

The warranty does not cover:

1. Mechanical damages caused by external impacts (e. g. icefall, rockfall, vandalism).
2. Impacts or damages caused by over-voltages or electromagnetic fields which are beyond the standards and specifications in the technical data.
3. Damages caused by improper handling, e. g. by wrong tools, incorrect installation, incorrect electrical installation (false polarity) etc.
4. Damages which are caused by using the device beyond the specified operation conditions.

Ordering text	Specification	Id-No.
Recording rain gauge 1507	Rain gauge according to Hellmann. Measuring system consisting of measuring vessel with float and siphon. The precipitation is recorded using a drum chart recorder that is wound up manually. Nominal recording time: 7 days (feed: 2.29 mm/h) Operating temperature range: above 0 °C	00.15072.010 000
Recording rain gauge 1507 a	Same as 00.15070.010 000, but nominal recording time: 24 hours (feed: 16 mm/h) Operating temperature range: above 0 °C	00.15072.020 000
Recording rain gauge 1507 H42	Same as 00.15070.010 000, but with electronically controlled heating Supply voltage: 42 V AC Power consumption: 215 VA Operating temperature range: -10...+60 °C	00.15072.210 000
Recording rain gauge 1507 a H42	Same as 00.15070.010 000, but nominal recording time: 24 hours (feed: 16 mm/h) and with electronically controlled heating Supply voltage: 42 V AC Power consumption: 215 VA Operating temperature range: -10...+60 °C	00.15072.220 000
Heating transformer 1518 T	For the power supply of the heating Operating voltage: 230 V AC Output voltage: 42 V AC; 250 VA Protection type: IP 65 Dimensions: 168 x 220 x 145 mm (W x H x D)	00.15123.242 000
Chart strip	Nominal recording time: 7 days 1 set = 100 pieces	34.15070.002 000
Chart strip	Nominal recording time: 24 hours 1 set = 100 pieces	34.15070.001 000
Fibre recording point	1 set = 6 pieces	33.02520.144 000
Snow cross	Suitable for all recording rain gauges	32.15070.030 000

LAMBRECHT meteo GmbH
Friedländer Weg 65-67
37085 Göttingen
Germany

Tel +49-(0)551-4958-0
Fax +49-(0)551-4958-312
E-Mail info@lambrecht.net
Internet www.lambrecht.net