PD200

EN

OPERATING MANUAL
PULSE CURRENT
MEASURING SYSTEM

TROTEC
AT WORK.

TRT-BA-PD200-HS-003-EN

Table of contents

The measuring device at hand was built according to current state-of-the-art technology and fulfils valid European and national directives. This conformity has been tested and the corresponding declarations and documents are kept on file by the manufacturer.

To keep this condition and ensure safe operation, as a user, you must observe the following safety instructions:

01. Safety

We accept no liability for damages caused by non-observance of this manual or unprofessional handling. Any warranty claims are voided in such cases!

⚠ ***Before starting the measuring device for the first time, read this manual from cover to cover!***

For reasons of safety and conformity (CE), any unauthorised change made to the device construction or components which are to be used with the measuring device are prohibited!

Before using the device, observe the following:

- Never measure live parts.
- The only party responsible for determining measured results to be valid, drawing conclusions and deriving actions is the user! The correctness of the results presented is excluded from any liability or guarantee. Liability for damages which have been caused by utilising the presented measured results is strictly excluded.

02. Intended use

The PD200 system is a professional measuring device based on the pulse current method for the pinpoint location of grounded leaks in non-conducting plastic foils.

Fields of application i.a.:

- warm roofs, cold roofs and greened flat roofs
- roof-top terraces
- balconies
- lined ponds, swimming pools
- plastic covered landfills, dumps

The power supply has to comply with the device type and the mains connection must be provided with a proper protective earth conductor. The device may only be used for the given intended use while complying with the specified technical data.

Any other use is considered misuse and contrary to the intended use.

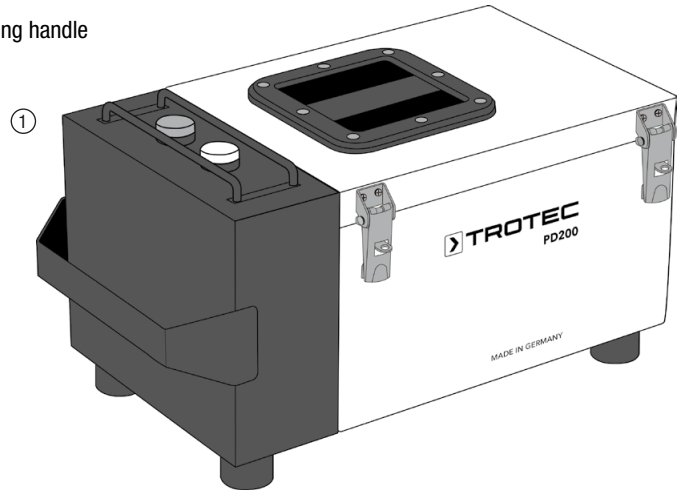
In the European Union, electronic equipment must not be treated as domestic waste, but must be disposed of professionally in accordance with Directive 2002/96/EC of the European Parliament and Council of 27th January 2003 concerning old electrical and electronic equipment.

At the end of its life, please dispose of this instrument in a manner appropriate to the relevant legal requirements.

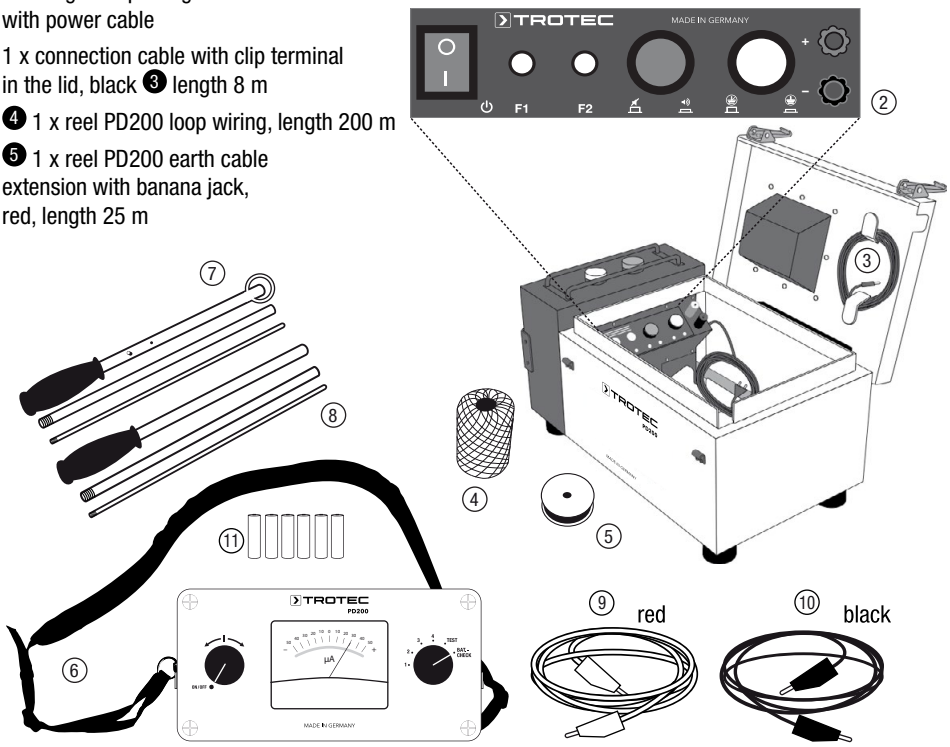
03. Scope of delivery

3.1 Standard scope of delivery

- ❶ transport case with carrying handle and 2 safety locks

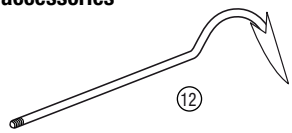


- ❷ integrated pulse generator PD200 G with power cable
- 1 x connection cable with clip terminal in the lid, black ❸ length 8 m
- ❹ 1 x reel PD200 loop wiring, length 200 m
- ❺ 1 x reel PD200 earth cable extension with banana jack, red, length 25 m



- ❻ compact, battery-powered pulse receiver PD200 E with carrying strap
- ❼ ❽ 2 x take-apart measuring rods with rubber grip (3-part, length: 1.00 m) incl. 1 x clamping spring and 1 x integrated uncoiling aid for loop wiring
- 1 x connecting cable each for the measuring rods, red ❾ and black ❿
- ⓫ 6 x batteries of type LR06 / AM-3 | AA | Mignon

3.2 Optional accessories



- ⓬ gravel claw for a simplified laying of loop wiring under the gravel fill (art. no. 3.510.010.003)

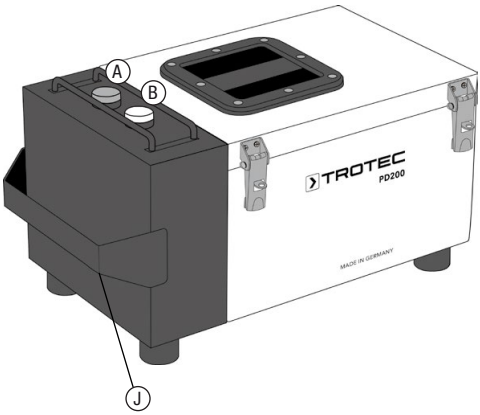
3.3 Supplies

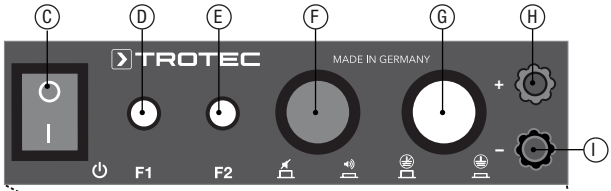
- ❹ 1 x spare reel of PD200 loop wiring, length 200 m (art. no. 3.510.010.005)
- ❺ 1 x spare reel of PD200 earth cable extension, red, length 25 m (art. no. 3.510.010.004)

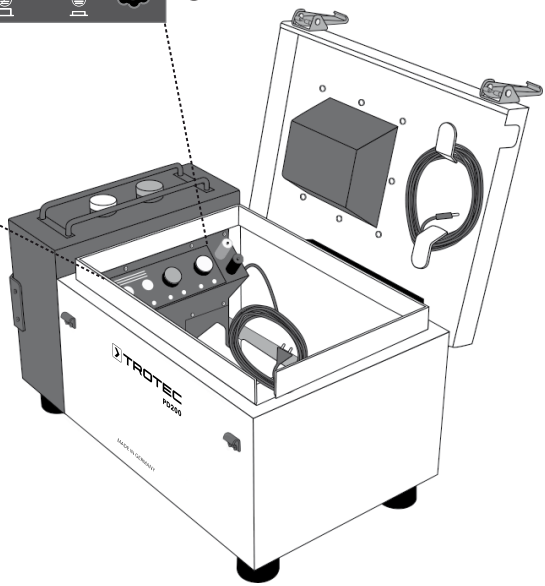
04. Operating elements, displays and connections

4.1 Pulse generator PD200 G

- Ⓐ red warning light for earthing control
- Ⓑ green lamp for visual control of current pulses (flashes green)
- Ⓒ rocker switch with indicator light, green
- Ⓓ primary fuse (PTC) F1
- Ⓔ secondary fuse (PTC) F2
- Ⓕ pressure switch, red, for activation of an additional acoustic signal for acoustic control of current pulses
- Ⓖ pressure switch, green, for switching on the external earthing
- Ⓗ positive connector, red
- Ⓘ negative connector, black
- Ⓙ transport handle

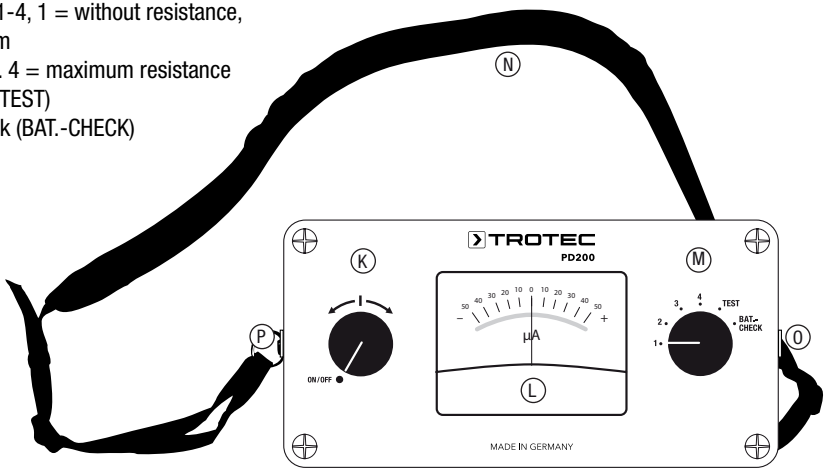






4.2 Pulse receiver PD200 E

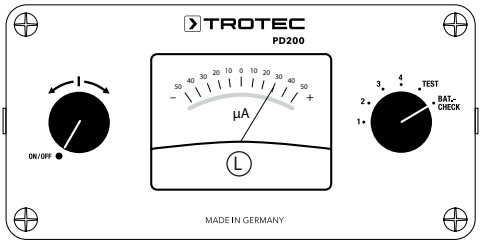
- Ⓚ rotary switch "ON/OFF", adjustment for "0" position
- Ⓛ analogue indicating instrument [µA]
- Ⓜ rotary switch with 6 settings:
  attenuation 1-4, 1 = without resistance, 2 = minimum
  resistance ... 4 = maximum resistance
  test setting (TEST)
  battery check (BAT.-CHECK)
- Ⓝ carrying strap
- red Ⓞ and black Ⓟ connectors for connection of connection cables with measuring rods



05. Functional check

5.1 Battery testing pulse receiver PD200 E

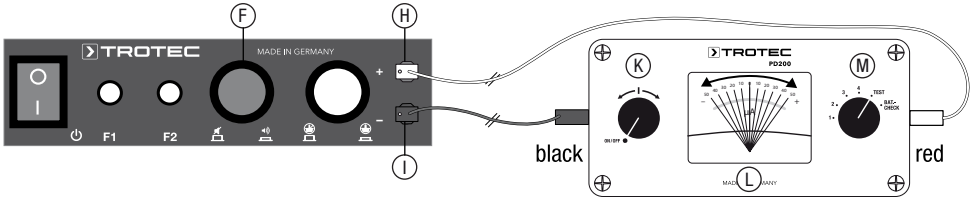
Do not switch on the receiver. Set the right rotary switch to "BAT.-CHECK". If the needle on the indicating instrument [µA] Ⓛ deflects to the right to at least 30 µA, the battery capacity is sufficient and the device ready for use. Then turn the right rotary switch to position "4".



5.2 Voltage testing pulse generator PD200 G

Plug the power cable into an earthed safety socket. Flip the rocker switch Ⓒ to position "I" and the green indicator light indicates the mains connection.

5.3 Checking the functional interaction of both devices



⚠ ***Before checking, switch off both devices. Set the rotary switch of pulse receiver PD200 E M to "TEST". If the switch is in a different position, the receiver might be damaged when switching on pulse generator PD200 G.***

Use the red 9 and black 10 connection cables to connect the pulse receiver to the receptacles of the pulse generator H I. Ensure the correct colour assignment black/red.

Switch on the generator. Then switch on the receiver and use the rotary switch K to adjust the indicator to "0".

The needle of the analogue indicating instrument [µA] L must deflect to the right in the pulse frequency. Also check the pulses by means of the white lamp B in the transport case. Switch on the acoustic signal of the pulse generator F.

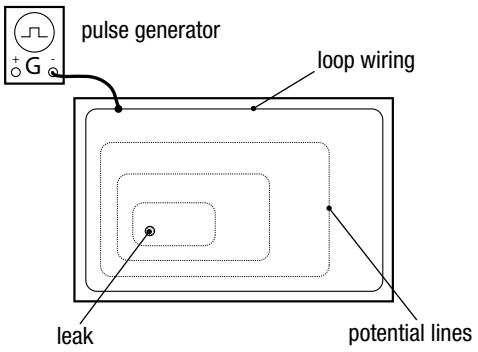
Interchange the two measuring lines at the pulse receiver – black cable to red connector and red cable to black connector – and repeat the procedure. The needle should now deflect to the left.

06. Leak detection

6.1 General functioning

The method is based on the fact that there is water both on top of and also underneath the sealing sheet. This water or moisture serves as conductor. Therefore, leak detection always requires a damp and hence electrically conducting sealing sheet, regardless of whether the surface is wet to various degrees, gravelled or greened.

The PD200 pulse generator gives of current pulses with a voltage of 40 V. The current finds its path to the point of leakage via the moisture. The PD200 receiver is used to measure the potential difference. The needle of the indicating instrument deflects to the direction with the higher potential, indicating the direction for the locator. This way you are led to the leak, to the position where moisture enters.



6.2 Preparing the measurement

The basic distinction of flat roofs is made between warm, cold and greened roof. Their different composition necessitates a different preparation.

Figure: schematic cross-section warm roof

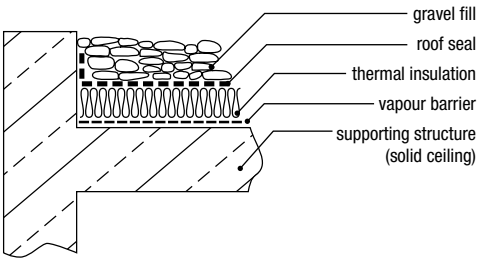


Figure: schematic cross-section greened roof

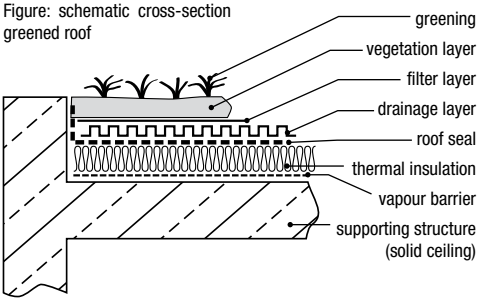
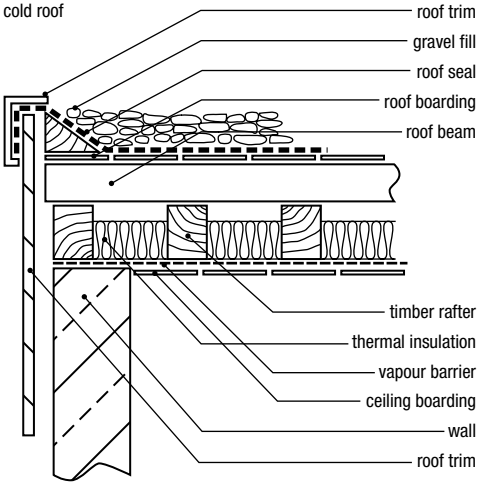


Figure: schematic cross-section cold roof



6.3 Preparation warm/green roof

6.3.1 Installation of loop wiring

Figure: sectional drawings warm roof

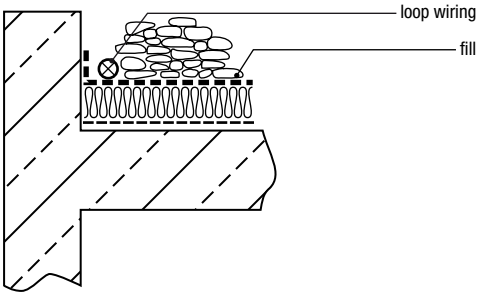
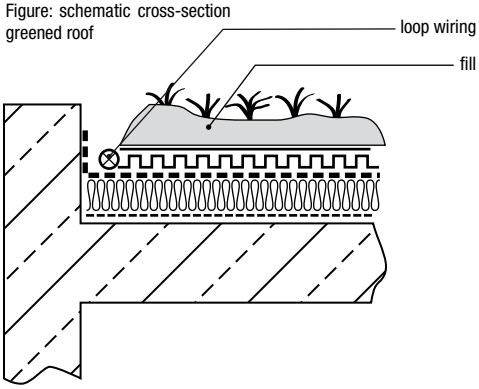


Figure: schematic cross-section greened roof



Before measuring, the bare cord ❹ (loop wiring) is to be laid as closed circuit around the roof area to be examined observing a minimum distance of 0.5 m to the roof edge. Current can only flow when the wire is placed directly on the roof seal. If the fill consists of gravel or other granulated material, we recommend the gravel claw (art. no. 3.510.010.003) as optional accessory. In case of thicker coatings, e.g. soil or greening, the roof seal has to be exposed to enable direct contact of loop wiring and roof seal.

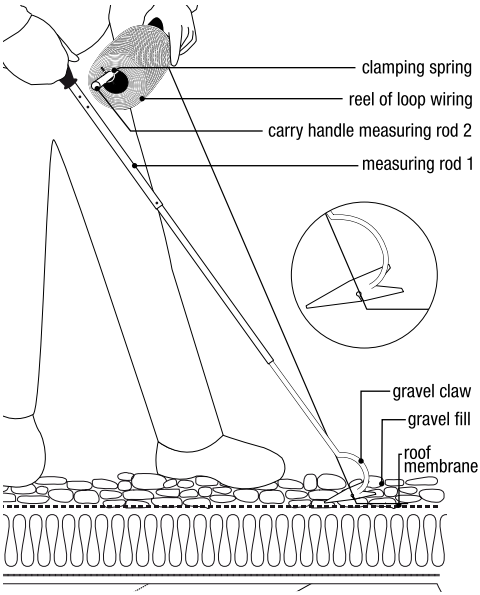
At any rate, the roof seal to be checked must be sufficiently damp to conduct the current pulses. The roof seal may have to be watered additionally.

6.3.2 Using the gravel claw (optional accessories)

The gravel claw serves the purpose of simplified laying of loop wiring under the gravel fill.

Screw the gravel claw (art. no. 3.510.010.003) to the bottom part of the measuring rod, which is not intended for uncoiling the loop wiring (measuring rod 1). Now push the loop spindle onto the handle part of the other measuring rod (measuring rod 2), which serves as uncoiling aid, and secure the spindle by means of the corresponding clamping spring.
Uncoil some of the loop wiring (approx. 1 m) and attach it to a fixed position on the roof in a way that it cannot shift, e.g. by weighting it down with an object. Now tighten the wire and thread it into the eye of the gravel claw. Hold spindle and gravel claw as illustrated below. Carefully insert the claw in the gravel by pulling and move backwards one step at a time, so that the loop wiring disappears underneath the gravel fill. On a sample basis check that the loop is placed directly on the roof membrane.

⚠ ***Always ensure sufficient protection for all works on the (flat) roof! Particularly in close proximity to the roof edge there is the ever-present risk of falling!***



6.3.3 Connecting the pulse generator

Connect the pulse generator to the mains. For this, the device must be switched off. Make sure that the earthing is switched on at the pressure switch Ⓖ:

The red positive connector and the red connection cable are not being used here. Earthing is effected via the earthing contact of the mains plug. The black connection cable ❸ is connected to the loop wiring by use of the clip terminal.

6.3.4 Connecting the pulse receiver

Both measuring rods are screwed together and connected to the pulse receiver by use of the red and black connecting cables.

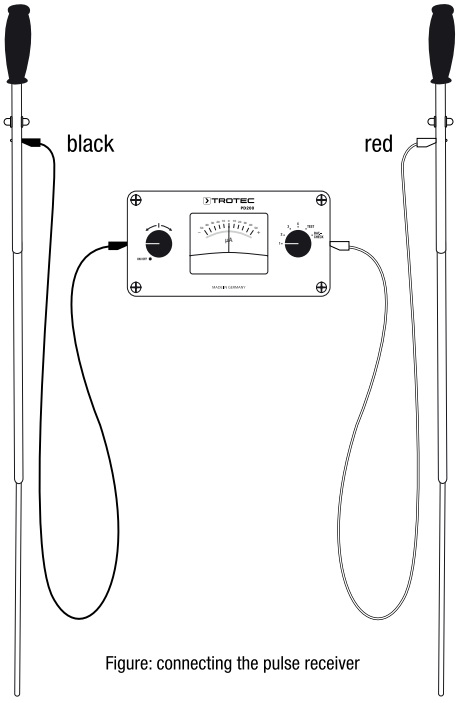


Figure: connecting the pulse receiver

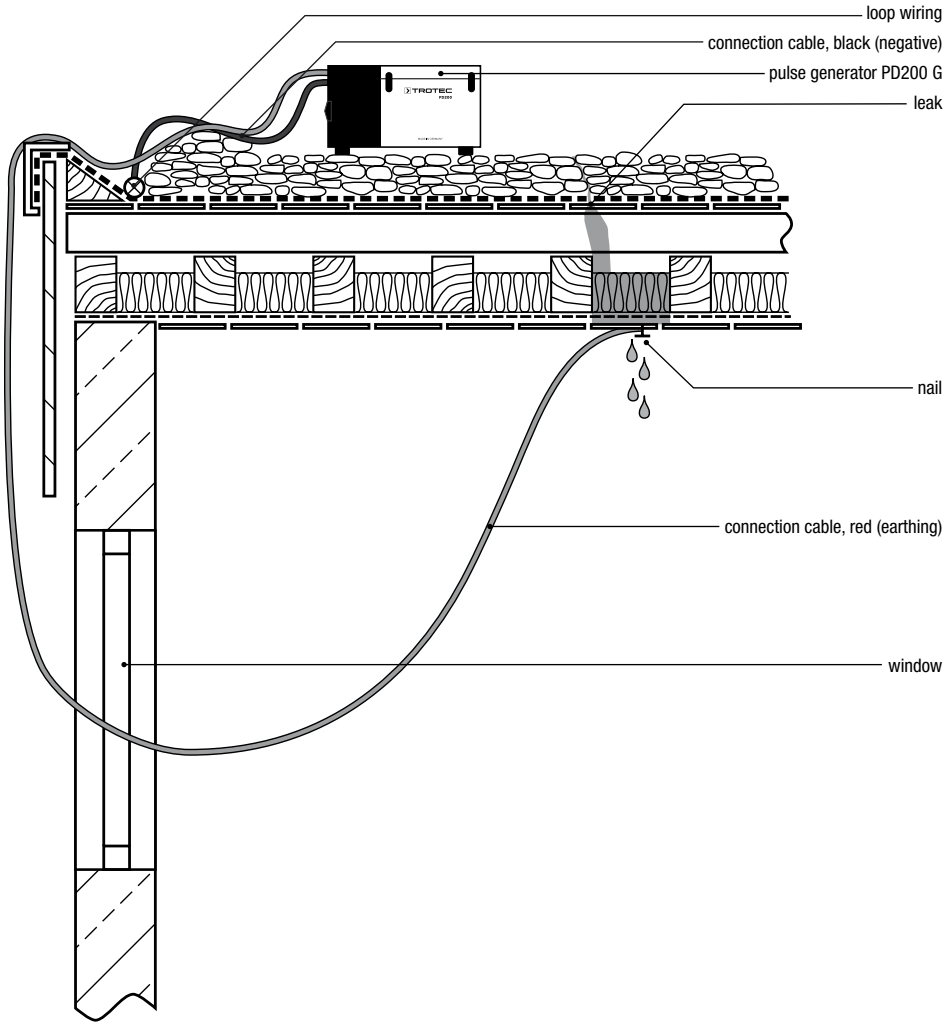
6.4 Preparation cold roof

Timber structures are electrically non-conducting. Therefore, the preparations differ.

6.4.1 Installation of loop wiring

Please proceed as described in point 6.3.1.

6.4.2 Connecting the pulse generator



Connect the pulse generator to the mains. For this, the device must be switched off. Make sure that the earthing is switched off at the pressure switch ⓖ.

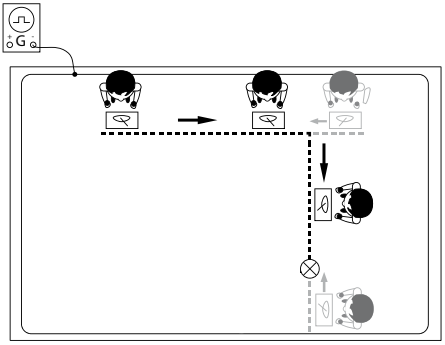
Plug the end of the red connection cable ❺ into the red positive connector Ⓗ. Now attach the bare end of the wire to the wet ceiling area underneath the flat roof.

If required, drive a nail into the ceiling at this place. The black connection cable ❸ is connected to the loop wiring by use of the clip terminal.

6.4.3 Pulse receiver

Please proceed as described in point 6.3.3.

6.5 Detection



First switch on the pulse generator and then the pulse receiver.

Position yourself parallel to a roof side, seize the two measuring rods by the rubber grips and with a distance of approx. 1.5 m push them carefully through the fill (gravel, greening) onto the roof seal.

⚠ ***Avoid applying too much force, for otherwise you will inadvertently puncture the roof membrane!***

⚠ ***Measuring will only be possible when there is contact to the roof seal, otherwise no current flows through the receiver.***

Pulses will now be indicated on the pulse receiver's indicating instrument. Should the deflection be hardly discernible, reduce the resistance at the pulse receiver by use of the rotary switch from "4" to "3" or lower.

⚠ ***Relevant for detection is NOT the degree of needle deflection, ONLY the direction.***

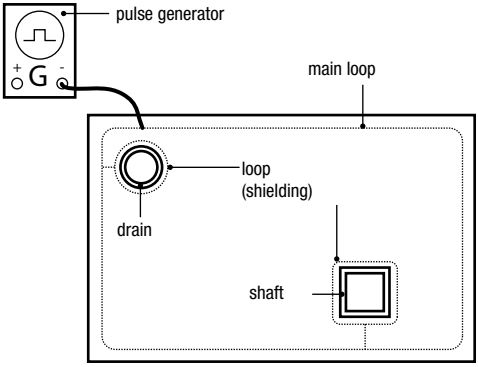
Start locating. If the needle now deflects e.g. to the right, then move another step to the right. Keep going like this until the needle deflects to the left for the first time. At this point turn your body by 90° and again follow the needle deflection. When the needle deflection again changes its direction, reduce the space between the measuring rods and repeat the above procedure until you detect the precise location of the leak. Having removed the fill, the leak should be visible and can be repaired.

07. Avoiding measurement errors

By earthing the positive pole (see 6.3.3) on the roof, everything grounded will be indicated. As a result you are easily led to a lightning arrester, because it contacts the fill. To avoid this you can either prevent the connection of grounded parts to the roof e.g. by placing insulating tape or foil underneath or neutralize the earthing of these parts e.g. by disconnecting the lightning protection. Earthed drains (metal drains) are to be shielded.

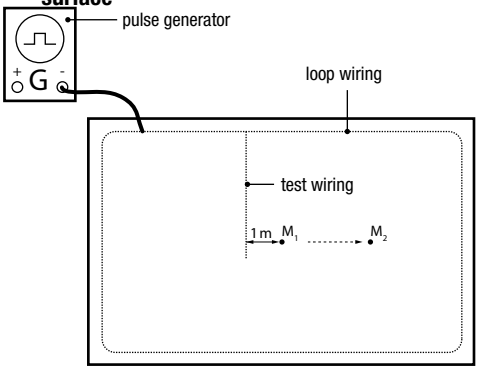
7.1 Shielding

If insulation or the removal of an earthing is not an option, as is the case for e.g. drains or ventilation



shafts, this area is to be shielded. To do so, a closed loop is installed around this area and connected to the outer main loop. This way it is also possible to shield leaks which have already been detected in order to then proceed with another detection process.

7.2 Supposed leak at the centre of the measuring surface



If with a decreasing deflection you are led toward the middle M1 of the indicated field, there probably is no leak. To check this, install some test wiring which is connected to the loop approx. 1 m beside the measured spot M1. If the previously determined point of leakage M1 shifts away from the test wiring toward M2, there is no leak.

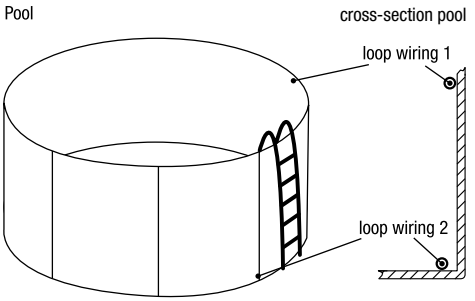
7.3 Prolonged drought

In case of prolonged drought the fill is to be prepared for measurement by means of generous watering. On roofs without fill a moisture film is all it takes, as long as it covers the entire area. Cold roofs might necessitate a certain waiting period.

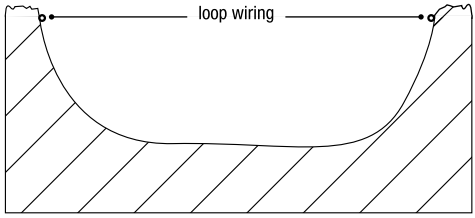
7.4 Earthed metal parts

In order to ascertain whether the metal parts on the roof are grounded, use the black connection cable ❸ and briefly contact the clip terminal to the respective surface of the metal part. Make sure that the earthing is switched on at the pressure switch ❻. If a loud acoustic signal is emitted and the warning light Ⓐ lights up in red, the metal part is grounded.

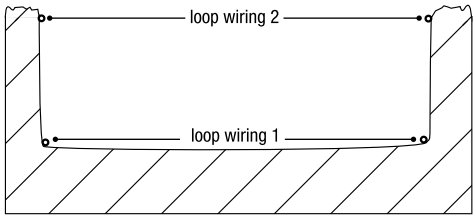
08. Checking of lined ponds and swimming pools with non-conducting sealing



lined pond 1



lined pond 2



First measure the floor area of swimming pools. Following the floor, the walls can be checked for leaks one by one. For this purpose the loop wiring is affixed by use of adhesive tape. Lined ponds, too, can be examined with a loop around the outer rim. However, the foil here has to be visibly exposed. The measurement is effected by applying the same method as on the roof. Here, too, sufficient moisture covering the entire area is required for the measurement.

09. Troubleshooting

Fault description	Potential cause
Green indicator light of pulse generator PD200 G [4.1 C] is not illuminated.	Check mains connection, fuses [4.1 D, E].
Indicating instrument at pulse receiver PD200 E [4.2 L] does not deflect to the right during battery check.	Wrong switch setting, low battery
Indicating instrument at pulse receiver PD200 E [4.2 L] does not deflect during the measurement.	Attenuation set too high; fill too dry, missing protective earth conductor of the mains supply of the pulse generator
Red warning light of pulse generator PD200 G [4.1 A] lights up and an acoustic signal is emitted (current value of more than 1 A).	Loop wiring in contact with grounded metal parts.

10. Maintenance and service

10.1 Battery change

You can check the battery voltage according to point 5.1.

Required for the operation of pulse receiver PD200 E are 6 customary batteries of type LR06 / AM-3 | AA | Mignon.

Detach the 4 screws, lift off the cover, remove the empty batteries and replace them with new ones. Please observe the correct polarity when inserting the batteries.

It is also possible to use rechargeable batteries. If so, make sure that at least 2000 mA NiMH batteries of type 06 or AM-3 | AA | Mignon 1.2 V are used. Do not dispose of used batteries in the household rubbish or throw them in the fire; instead, dispose of them according to the relevant legal requirements.

10.2 Maintenance and service of the device

- If required, clean both devices by means of a slightly damp, lint-free cloth.
- Do not use any aggressive detergents, but only clean water to moisten the cloth.
- When not in use for a longer period of time, it is recommended to remove the batteries from pulse receiver PD200 E.

11. Technical data

11.1 Pulse generator PD200 G

Pulse generator PD200 G	
Article number	3.510.010.010
External dimensions L x W x H	470 x 240 x 250 mm
Weight complete with standard accessories	8.6 kg
Mains connection	220-240 V, 50-60 Hz
As special equipment	(110-125 V, 50-60 Hz)

11.2 Pulse receiver PD200 E

Pulse receiver PD200 E	
Article number	3.510.010.011
External dimensions L x W x H	160 x 80 x 55 mm
Weight (incl. batteries)	550 g
Battery voltage	9 V (6 x 1.5 V)

11.3 Particular equipment features

- compact case to transport the required accessories
- robust, splash-proof design
- easy handling of pulse receiver PD200 E due to less operating elements
- white signal lamp [4.1 Ⓑ] for visual control and selectable acoustic signal [4.1 Ⓕ] for acoustic control of current pulses from the PD200 G
- alarm signal in the event of a short circuit

12. Miscellaneous

12.1 Operational reliability

Without prior express authorization by Trotec the device must not be opened or repaired by unqualified persons. Both the warranty and operating permit expire when removing or changing nameplates or labels.

12.2 Seminars

We offer practical seminars for an optimum application of the PD200. Information ca be obtained by phone via our information line +49 2452 962-333 or else online via www.trotec.de.

Notes

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