Mounting Recommendations

for

gO Measurement-System®
Measurement Nodes and Sensors

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1 Introduction

This document describes how greenTEG sensors are optimally mounted and un-mounted, depending on different wall conditions. The proposed methods are developed based on systematic tests and empirical measurements.

Attention

- Each wall is unique. These methods have been tested on walls that are typically representative of the wall types in question, but optimum adhesion and non-destructive (un)mounting results are not guaranteed. Please test the recommended mounting methods on an inconspicuous area of the wall and check for residue, discoloration, and damage. greenTEG will not accept liability for any damage to the wall or sensor.

- If the standard U-value measurement setup on a desired wall is not possible (e.g. due to the presence of frescoes or murals on the exterior side of the wall), it is possible to move the outside node to an alternative location (ideally on the north side of the building), while the location of the inside node remains at the desired measurement spot→ Attention: Due to metrological reasons, the exterior Surface Temperature Sensor at its alternative location must be mounted in a way that does not contact the wall, such that it measures the air temperature instead.

  Note: A U-value can also be determined without a surface temperature measurement – however, the R-value cannot be calculated. In this case, the ISO conformity test is based on the air temperature measurement instead of the wall surface temperature, which is a good approximation but not strictly in accordance with the ISO standard.

- Any adhesive residue left on walls and equipment should only be removed according to the recommended methods described here.

- The sensors and their housings must not be physically exposed to non-approved solvents. Please clean the sensors and their housings exclusively with the cleaning agents recommended or supplied by greenTEG.

- Sensor accuracy will only perform as per specifications if greenTEG mounting solutions are used. Any other non-greenTEG approved mounting solutions will result in measurement errors and potentially even safety hazards.

2 Four Golden gOMS Mounting Rules

To understand where each mounting solution should be used, please carefully read and understand the four condensed rules below:

1. Always use Roll Tape indoors as the first choice for mounting all items
2. Always use Putty outdoors as the first choice for mounting all items
3. If Putty stains are undesirable or Putty is not adhering outdoors
    a) Use water-repellent double-sided adhesive strips (A-018902) for Nodes and Ambient Temperature Sensor Holders (A-018975) only
    b) Use Roll Tape for Surface Temperature/Heat Flux Sensors
4. If Roll Tape is not adhering for sensors outdoors, then use water-repellent adhesive strips to mount the sensors.

3 Description of Mounting Methods

The following section describes the mounting and unmounting techniques in detail. This is critical to performing a valid measurement.

3.1 Thermally Conductive Putty

In general, it is advantageous to use the putty on the surface of very rough and uneven (roughness > 2mm) outdoor walls. By filling in any bumps or indentations, the putty provides a flat surface and good grip for adhesion.

Attention

- The putty can be re-used several times. However, it inevitably absorbs particles with each use, thus losing its elasticity and adhesivity. Due of safety concerns, it is not recommended to re-use the putty more than 2-3 times.
- If left for several days, silicone oils within the putty can diffuse into the wall surface and leave visible stains, depending on the wall type in question.

3.1.1 Mounting with Putty

1) Clean and remove all grease and dust residues from the wall mounting site such that it is clean and dry.
2) Attach two lumps of cherry-sized putty to the back of the node (see Fig. 1, left) . If the wall is extremely rough, the amount of putty attached may need to be increased.
3) Apply a homogenuous, 2-3mm thick layer of putty to the back of the Surface Temperature or Heat Flux Sensor (Fig. 1, center). While applying the putty, please do not bend or kink the sensor cable as this may damage its attachment point to the sensor.
4) Attach the ambient temperature sensor into its designated holder and apply a roughly peanut-sized amount of putty to the mounting side of the holder (Fig. 1, right).
5) Press the node firmly against the wall with a slight rocking motion, such that the putty adheres well to the wall and extrudes slightly out of the bottom of the node (see Fig. 2, left).
6) Gently press the Surface Temperature or Heat Flux Sensor against the wall with a slight twisting motion until some putty extrudes out around the edges of the sensor (Fig. 2, center). Remove any excess putty.
7) Press the temperature sensor holder lightly against the wall with a slight rocking motion until some of the putty extrudes out its sides (Fig. 2, right).

Figure 1: Correct application of putty for mounting. Left: On the back of the node; Center: On the back of the Ambient Temperature/Heat Flux Sensor; Right: On the mounting surface of the Ambient Temperature Sensor holder.

Figure 2: gOMS System mounted with putty. Left: Node (shown without antenna for clearer visualization); Center: Surface sensor; Right: Ambient Temperature Sensor.

3.1.2 Unmounting

1) Unclip the Ambient Temperature Sensor from its holder. Remove the holder with a turning and pulling motion. Do not remove the adhesive residues yet.
2) Carefully loosen the surface sensor with gentle turning motions. As soon as the sensor is moderately loose from the wall, it can be gently removed with a slight pull. **The sensor and cable must not be kinked or bent!** If the sensor is stuck on particularly stubbornly, a spatula can be used to aid the removal. **Do not pry it off, but instead carefully slide it behind the sensor!**
3) Pull strongly on the node and twist slightly to remove it.

3.1.3 Removing Adhesive Residue

Various methods are presented, which can be applied individually or in combination to remove adhesive residue on walls, housings or sensors:

a) With clean hands (free of dust and grease), form a ball of fresh thermal putty approx. 3 cm in diameter. Roll the ball over the area to be cleaned with the palm of your open hand (see Fig. 3, left)
b) With clean hands (free of dust and grease), form a ball of fresh thermal putty approx. 3 cm in diameter and dab off the residues (Fig. 3, centre).
c) If your hands are dirty: press a small amount of thermal putty onto a plastic spatula. The putty must adhere well to the spatula.The adhesive residue can be removed by dabbing them with the putty on the spatula.

Figure 3: Dismounting and removal of the thermal putty. Left: Rolling with palm of hand; Center: Dabbing; Right: Removal with a spatula.

3.2 Adhesive Mounting Solutions

Mounting with double-sided adhesive solutions is generally recommended for smooth and slightly rough walls. The double-sided adhesive roll tape (Fig. 4, left) is for indoor installation, while the water repellent double-sided adhesive strip (with drop symbol, Fig. 4, right) is intended for outdoor installation.

Figure 4: Indoor adhesive tapes (left) and water repellent adhesive strips (right).

3.2.1 Mounting with Double-sided Adhesive Roll Tape

1) Clean and remove all grease and dust residues from the wall mounting site such that it is clean and dry.
2) Mount the sensor on the exposed side of the tape. Ensure the sensor cable is perpendicular to the direction of unfurling the tape roll (Fig. 5 left). This is to create a removal tab towards the side of the sensor.
3) Cut an additional 2cm length of tape extending beyond the edge of the sensor (Fig. 5, right).
4) Fold back the additional length of tape onto itself to create a removal tab (Fig. 6, left).
5) Peel off the yellow protective film and mount the sensor onto desired surface (Fig. 6, right). Firmly and evenly apply pressure on the sensor using your fingers for 4-5 seconds to ensure good adhesion. Do not apply uneven pressure on the sensor with any hard objects.
6) Repeat the same adhesive tape cutting procedure for the node and ambient temperature sensor holder as shown in Figure 2.
7) After peeling off the yellow protective film, apply a force of approximately 5kg to the node to the mounting position with your palm and hold for 4 to 5 seconds.
8) Proceed similarly for the Ambient Temperature Sensor holder.

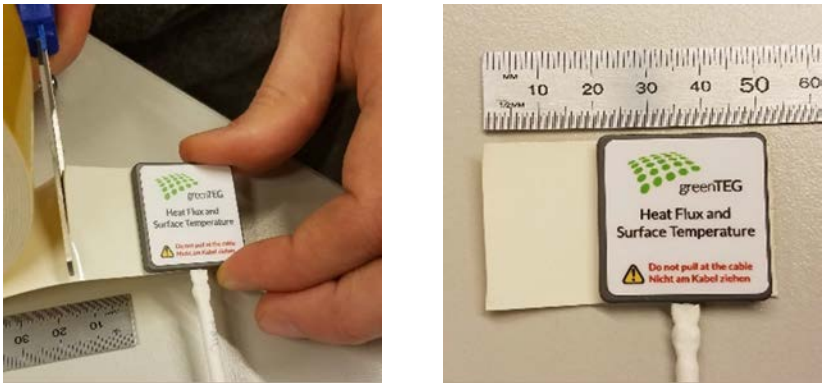

Figure 5: Mount sensor with cable perpendicular to unfurling of tape (left), leave an additional 2cm of tape on the side of the sensor (right)

Figure 6: Fold back the excess tape to create a removal tab (left), peel off the yellow film to mount the sensor (right)

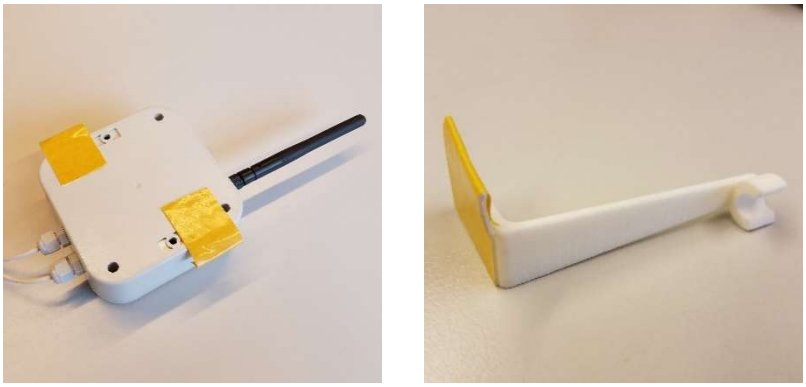

Figure 7: Adhesive tape mounting configuration for node (left) and ambient temperature sensor holder (right)

3.2.2 Mounting with Water Repellent Double-sided Adhesive Strip

1) Clean and remove all grease and dust residues from the wall mounting site such that it is clean and dry.
2) Remove the red-inked protective film from 4 pieces of adhesive strip (Leave the black-inked protective film on as it is). Attach the four adhesive strips to the back of the node as shown in Fig. 8 (left).
3) Remove the red-inked protective film from 2 pieces of adhesive tapes and attach it to the back of the Surface Temperature/Heat Flux Sensor as shown in Fig. 8 (center). Important: Ensure that the removal tabs of the adhesive tapes point towards the sides (left or right) of the sensor.
4) The Ambient Temperature Sensor holder is fitted with an adhesive strip as shown in Fig. 8 (right).
5) Remove the 4 black-inked protective films from the node and press the node housing flat against the wall. Apply a force of approximately 5kg and hold for 4 to 5 seconds.
6) Remove the black-inked protective films from the Surface Temperature/Heat Flux Sensor and stick the sensor at the desired location. Apply some pressure on the sensor with the palm of your hand for 4-5 seconds. For optimum adhesion, a contact pressure of approximately 5 kg is recommended. Do not apply uneven pressure on the sensor with any other hard object.

7) Proceed similarly for the Ambient Temperature Sensor holder.

Figure 8: Water repellent adhesive strip configuration on the node (left), Ambient Temperature/Heat Flux Sensor (center) and Ambient Temperature Sensor holder (right).

3.2.3 Unmounting Double-sided Adhesive Roll Tape

1) With one finger applying a gentle downward pressure on the heat flux/surface temperature sensor, use the other hand to pinch the removal tab and slowly pull it off in a direction parallel along the wall surface (Fig. 9 left).

   Note: If the sensor is not held down while the adhesive is being pulled off, this could result in the sensor being pulled off the wall with sudden force, potentially resulting in damage to the sensor or its connection.

Caution

- DO NOT remove the sensor by pulling at the cable (Fig. 9 center). This could damage the cable connection.
- DO NOT remove the sensor by pulling the removal tab out in a direction out of the wall (Fig. 9 right). This results in uneven forces on the sensor, likely resulting in damage to the sensor.

2) To unmount the node, firmly hold the node with one hand while using the other hand to pull the removal tab (Fig. 10 left and right)
3) Repeat similarly for the ambient temperature sensor holder

Figure 9: Correct (left) and wrong (center & right) method for unmounting a Surface Temperature/Heat Flux sensor.

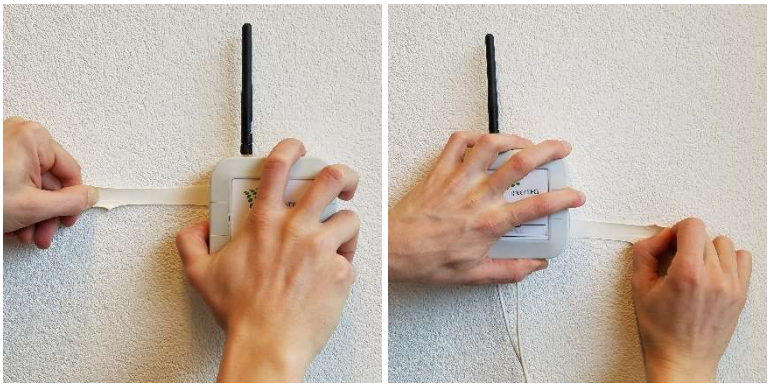

Figure 10: Use one hand to firmly hold the node while using the other hand to pinch the removal tab and pull off the adhesive roll tape.

3.2.4 Unmounting Water Repellent Adhesive Strip

1) Unclip the Ambient Temperature Sensor from its holder. Pinch the adhesive strip by its removal tab and **slowly** pull it off in a direction parallel along the wall surface. If the removal tab is torn off, pull on the holder with appropriate caution or follow the procedure detailed in Section 2.2.5.
2) For the Surface Temperature/Heat Flux Sensor, pinch its adhesive strip by its removal tab and **slowly** pull it off in a direction parallel along the wall surface. If the removal tab is torn off, the procedure detailed in Section 2.2.5 must be applied to unmount the sensor.
   Note: Avoid pulling the removal tab quickly to prevent the removal tab from tearing
3) Loosen the node by carefully removing the 4 adhesive tapes.

Caution

- Extreme care must be taken when unmounting the Surface Temperature/Heat Flux Sensors. **Under no circumstances should its sensor cable be pulled**. The cable connection may be damaged or broken if handled improperly, thus rendering the sensor or entire measurement node un-usable. The adhesive strip may only be removed through usage of the removal tabs, which are explicitly provided for this purpose (see Fig. 11).

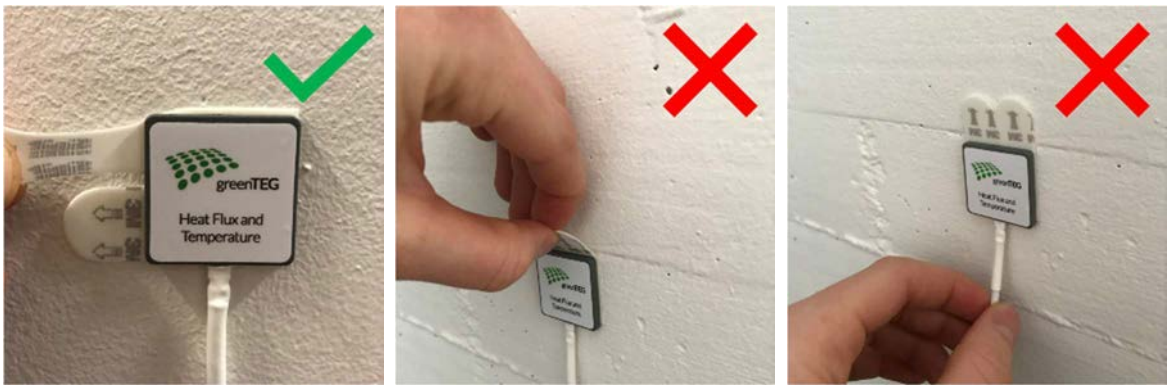

Figure 11: Correct (left) and wrong (center & right) method for unmounting a Surface Temperature/Heat Flux sensor.

3.2.5 Removal of Water Repellent Adhesive Tape with Removal Tab Torn Off

The removal of the adhesive tape can prove difficult under certain circumstances. The adhesive strength of very smooth surfaces (e.g. sliding windows) is very high to begin with and can potentially increase over time under long usage durations and low temperatures.

In the event that the removal tab has torn off, greenTEG has developed a sensor and surface-friendly unmounting method.

1) Moisten the back side of the mounting strip with a few drops of Unmounting Liquid (Fig. 12, left).
2) Allow the liquid to soak in for at least 1-2 minutes. If the area dries up during this time, add a few more drops of Unmounting Liquid.
3) Rotate the sensor gently clockwise and counter-clockwise to loosen it (Fig. 12 center) Patience is required here: **You absolutely must not lift the sensor from its edge or pry it off with a screwdriver**. This would damage both the wall and the sensor.
4) Briefly rinse the the sensor under running water to wash off any unmounting liquid residues. A water-moistened paper towel or cloth may also be used.
5) Dab the sensor dry with a dry cloth or paper towel (Fig. 12, right).

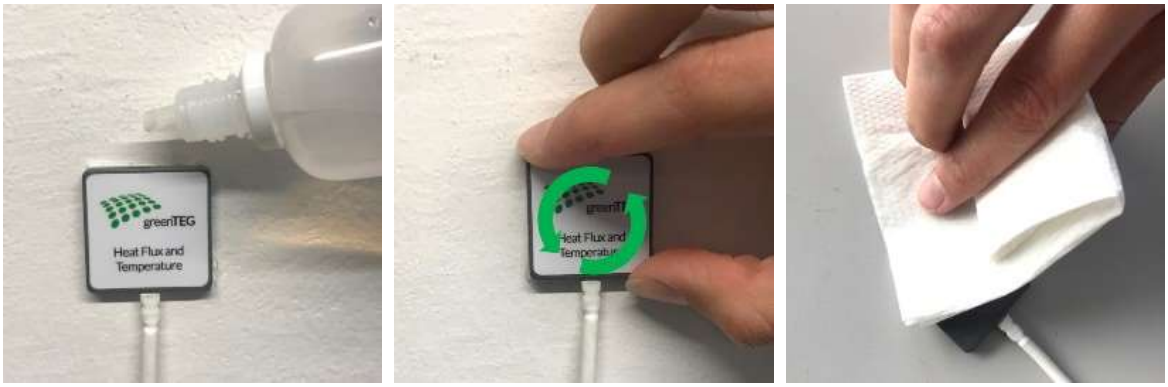

Figure 12: Adhesive tape removal using unmounting liquid. Left: Moisten and allow to take effect; Center: Rotate the sensor gently to loosen and remove it: Right: Wipe the sensor with a damp cloth and allow it to dry

Caution

- Do not allow the unmounting liquid residue to dry on the sensor. These residues would greatly reduce the adhesiveness of the sensor, making it more difficult for the sensor to adhere the next time it is mounted.

- Keep rinsing times short: The sensor is splash proof, but it is not designed for prolonged water contact or water immersion!

4 Summary Table and Release Notes

	Wall Type	Putty	Adhesive Tape: Water Repellent Strips	Adhesive Tape: Roll Tape	Comments
Indoor	Concrete	✖	✖	✔	
	Wood	✖	✖	✔	
	Plaster	✖	✖	✔	
	Wallpaper	✖	✖	✔	
Outdoor (Nodes and ambient temp. holder only)	Concrete	✔	✔	✖	Use putty or adhesive strip depending on surface roughenss.
	Wood	✔	✖	✖	
	Plaster	✔	✔	✖	Use putty or adhesive strip depending on surface roughenss.
	Clinker Brick	✔	✔	✖	Use putty or adhesive strip depending on surface roughenss.
	Rough Plaster	✔	✖	✖	
	Fibre cement	✔	✔	✖	
Outdoor (Sensors only)	Concrete	✔	✖	✔	Use putty or roll tape depending on surface roughenss. Try putty first as it is the preferred option.
	Wood	✔	✖	✔	For smooth, non-weathered wood, roll tape may be more suitable, but try putty first. If the wood is rough or weathered, putty should be used.
	Plaster	✔	✖	✔	Use putty or roll tape depending on surface roughenss. Try putty first as it is the preferred option
	Clinker Brick	✔	✖	✔	Putty is the preferred option
	Rough Plaster	✔	✖	✖	
	Fibre cement	✔	✖	✔	Roll tape may cause paint to peel off during unmounting. Putty is the preferred option

Sales & distribution

All the products described here can be ordered directly from our webshop (https://shop.greenteg.com/), email/telephone or your local distributors. It is expressedly recommended to use only the mounting equipment described here, as they have been extensively tested by greenTEG are ensure good measurement accuracy.

Disclaimer

The restrictions, recommendations, materials, etc. described above do not cover all possible cases, walls and objects. This document is not considered final and exhaustive and may be modified at any time without prior notice. In particular, greenTEG does not accept liability for damage caused to the wall or sensors due to (un)mounting of the system.

Revision History

Date	Revision	Changes
31.07.2018	1.0	Initial Version
03.09.2018	1.1	Comments on Sales
28.01.2019	1.2	Double-sided Adhesive Roll Tape introduction

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