

Item number 215520:

## Soil Adapter Kit for Vertical Positioning of GMP343

The soil adapter kit consists of a soil adapter made of POM (polyoxymethylene) and a moulded hydrophobic filter made of PTFE (polytetrafluoroethylene). The kit is intended to be used with a diffusion model of the Vaisala CARBOCAP® Carbon Dioxide Probe GMP343 in in-soil CO<sub>2</sub> measurement applications.

### Structure and Operating Principle of the Adapter Kit

The two parts of the soil adapter kit are illustrated in Figure 1. The soil adapter can be used with or without the PTFE filter. The intention of the PTFE filter is to give extra protection to the GMP343 from water in the soil. The PTFE filter is a breathable material that is made porous by sintering with a pore size of 5-10 µm.

When using the soil adapter kit for vertical positioning, please first remove the standard filter cover of the GMP343, both the outer plastic grid filter and the paper filter.

The PTFE filter should then be pushed tightly against the O-ring on the diffusion model of the GMP343. After this, the actual soil adapter can be screwed on the probe. When the probe with the adapter is vertically installed into the soil, a "diving bell" type of air pocket is formed around the NDIR sensor.

The open end at the bottom of the adapter provides a distinct surface for gas diffusion.

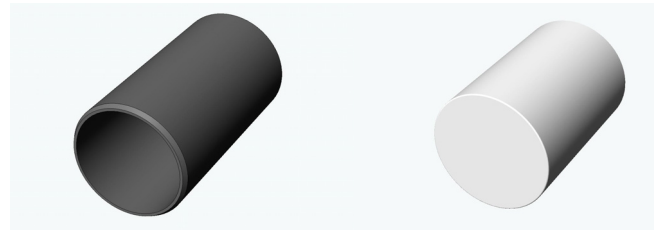


Figure 1. The soil adapter kit for vertical installation of the GMP343 consists of an in-soil adapter (left) and a hydrophobic PTFE filter (right).

### The Probe and the Adapter Kit

The soil adapter kit for the vertical positioning of the GMP343 for in-soil CO<sub>2</sub> measurements is mounted on the GMP343 probe in Figure 2. The thread on the soil adapter should be tightened with a sealant such as the Loctite® Product 5331 threadsealant for plastic fittings (an acetoxo silicone paste) for extra protection.

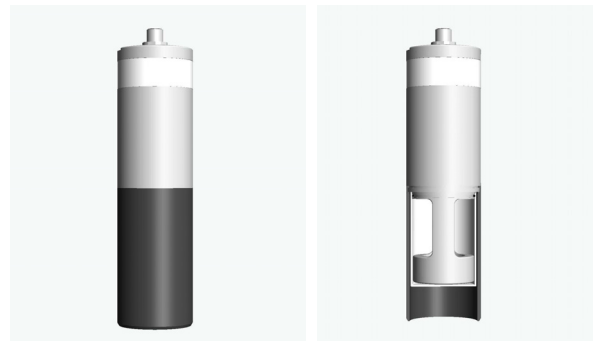


Figure 2. The GMP343 with the soil adapter kit for vertical positioning (left a view from outside, right a cut-away view on the adapter).

### Installing the Probe with Adapter in Soil

When installing the CO<sub>2</sub> probe and the in-soil adapter into soil it is important to minimize their effects on the soil texture. Depending on the type of soil, a drill could be used to make a hole that is as distinct as possible. Special care should be taken to avoid soil penetrating into the air pocket where the probe is located, otherwise water might



reach the probe through the soil. Ensure also that the nut on the probe cable is well tightened.

Note that the vertical probe installation might have an impact on the microclimate below ground due to heat conduction and water penetration along the probe and the In-soil adapter. This and possible air leakage impact the CO<sub>2</sub> concentration. When installing the probe and adapter into soil, the hole should therefore be as small as possible, to avoid making unintentionally large conduits for water. In some cases a brick or collar could be used in order to avoid the water penetration into the hole.

Figure 3 illustrates a vertical installation of three GMP343's below ground. In case there is a risk that also the connectors could be submerged some vacuum grease could also be applied on the connector threads.

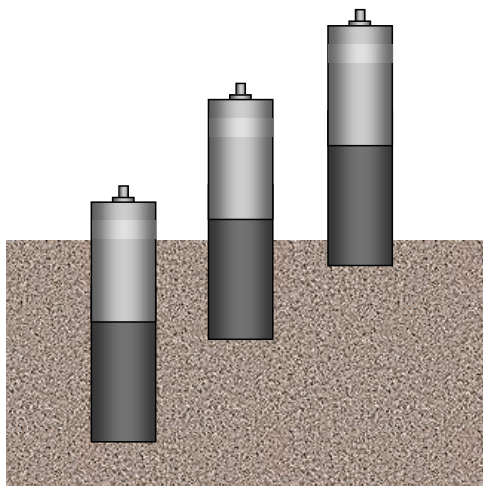


Figure 3. Three GMP222's in soil CO<sub>2</sub> profile measurements

## Environmental compensations

As NDIR based CO<sub>2</sub> measurements are dependent on the ambient temperature and pressure (mainly in accordance with the ideal gas law), compensations must be made in cases when best possible accuracy is required from the CO<sub>2</sub> measurement. The GMP343 has an internal temperature sensor in its gas sampling space. The temperature compensation can be enabled to continuously compensate for temperature. Also, by disabling the temperature compensation, uncompensated data can be

obtained. If using a digital output (RS-232/485) both the uncompensated data and temperature data can be obtained from the GMP343. Although the GMP343 has internal algorithms also to calculate the pressure, relative humidity and oxygen compensations, these must be disabled unless there is an external system or PC providing pressure and humidity data to the CO<sub>2</sub> probe on regular basis. Please refer to the GMP343 User's Guide for more information. In case all or some of the compensations will be made externally appropriate formulas needs to be used. Please contact Vaisala for further info.

## Operating Conditions

The GMP343 Carbon Dioxide Probe is specified for an operating temperature range of -40...+60°C and operating humidity range according to figure 4. To avoid condensation on the optical components of the sensor, optics heating can be applied. Please refer to the GMP343 User's Guide for more details.

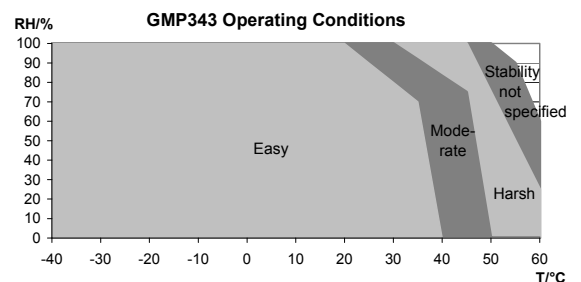


Figure 4. The GMP343 operating conditions.

### Warning

If the probes are used outside the specifications the warranty will be void. Also any modifications or changes of the product as well as any adding to it without Vaisala's prior authorization will void the warranty.