

WIP-PROBES/MASTER

Technical specifications



WIP-Probes	
Length, diameter	130 mm, aØ 12 mm
Measuring method	Direct Vapor Equilibrium method — Dilution Diffusion Sampling (DVE — DDS)
MICROPOROUS HEAD	
Length, diameter	56 mm, aØ 10 mm
Material	porous HDPE membrane head
Pore size	10 µm
CONNECTING SLEEVES	
Material	anodized aluminium
3 X CAPILLARIES	
Diameter	aØ 1.6 mm; iØ 0.75 mm
Material	Teflon (FEP)
Usage	for sample collection, rinsing and dilution
PROTECTIVE TUBE	
Diameter	aØ 8 mm
Material	PA
COLOR CODED TERMINAL NUTS	
Size	1/16, 1/4"-28 UNF
Usage	for direct connection to a WIP master 7+3 or WIP hub 10

WIP-Master	
Dimensions	50 x 21.1 x 54 cm
Weight	20 kg
Protection class	IP54 (splash-proof on all sides)
Power supply	230 V
Ports	10 Ports, standard for 6 WIPs/hubs, 3 isotope standards, 1 purge line
Standards	Regularly included in delivery: 3 WIPs for standard measurements (40 cm tube length), holder for max. 3 standards, 3 Duran glass bottles (250 ml) with adapter connection
Software	IsWISaS. Python-Script, for installation on Windows computers of the Picarro analyzer. User-friendly GUI shows the current measured values and flow rates

Order information

WIP-Probe

Item no.: 1289095 (WIP, 5 m connection length)
Item no.: 1289094 (WIP, 10 m connection length)
Item no.: 1289093 (WIP, 15 m connection length)

WIP-Master

Item no.: 1289096 (WIP-Master)

WIP-Hub

Item no.: 1289097 (WIP-Hub)

WIP-Setup for EcoLabs

Item no.: 1880130 (WIP-Setup for EcoLabs)

Picarro L2130-i Analyzer

Item no.: 5070107



Water Isotope Probe WIP-SYSTEM

Investigation of the whole soil-plant-water cycle

Direct, non-destructive in-situ measurement

Continuous, temporally high-resolution Isotope measurements



Even more info at:
www.ugt-online.de

WATER ISOTOPE PROBE-SYSTEM

Diffusion Dillution Sampling

Water Isotope Probes (WIPs) are used for the direct, non-destructive in-situ measurement of the stable water isotopes $d^{18}O$ and d^2H . They work according to the „Diffusion Dillution Sampling“ method (DDS, Volkmann and Weiler 2014) based on the equilibrium between gas and liquid phases (Direct Vapor Equilibrium Methode DVE).

In the DVE-DDS method, no absolute pressure gradient is established, but the equilibrium is set by diffusion, using the different water vapor partial pressure in the gas mixture in the filter cartridge and the surrounding medium (soil / snow / xylem / air). This has the advantage that the WIPs can also be used under saturated

conditions. However, the water inlet pressure of the filter cartridge used must not be exceeded, for example, by a water overflow.

UGT with exclusive license

The probes were developed at the University of Freiburg and are based on the scientific findings of Volkmann and Weiler (2014) (patent no. (patent no. DE102013013969B3). Since 2022, UGT has been continuously optimizing them, producing them under exclusive license and distribute them. To date, the WIPs are the only in situ probes proven to work in soil and tree xylem (Volkmann et al. 2016 in Seeger and Weiler 2021).

Design and function of the WIPs

The WIPs consist of three parts:

- 1) Microporous head
- 2) Shaft with mixing chamber
- 3) Protective tubing, which guides three gas transport capillaries in a defined geometry into the insertion shaft and into the filter cartridge.

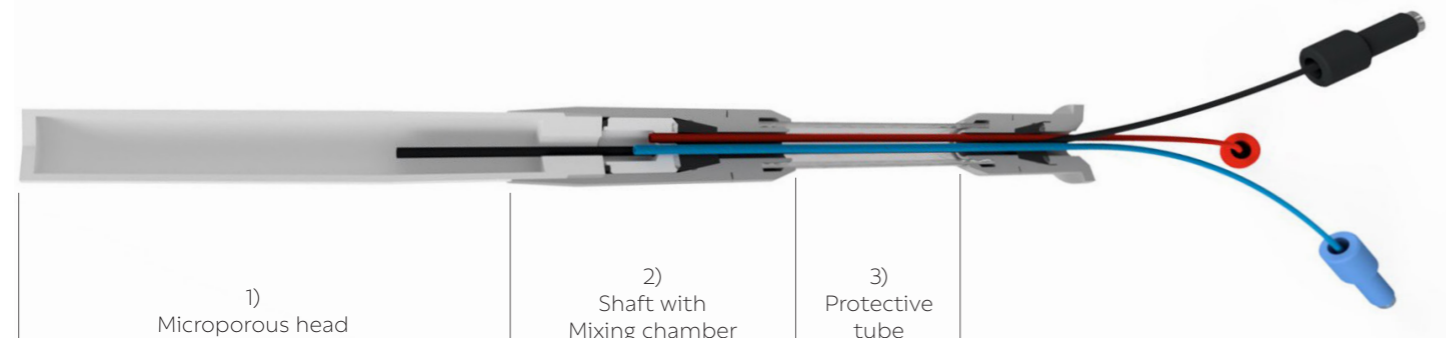
Water vapor diffuses from the surrounding medium into the mixing chamber via the microporous head.

The sampling capillary guides the gas flow from the probe to the isotope laser spectrometer. A second

capillary supplies controlled nitrogen for dilution of the the sample gas into the mixing chamber. In this way, a relatively stable water vapor concentration of the sample gas can be ensured. The third capillary extends into the microporous head. It supplies just enough nitrogen during measurement to ensure pressure equalization and provides purging between measurement cycles.

The advantages of the dilution principle of WIPs vs. comparable probes are the relatively stable concentration and the very small line diameters. Condensation and thus fractionation is largely prevented, which also protects the cavity of the isotope analyzer.

Installation is easy and the same probes can be used for all media (soil / tree / air).



Cross section WIP © UGT GmbH

WIP SYSTEM

Optimum measuring success

To set up our WIP system perfectly, you need, in addition to the WIP probes:

- ✓ WIP-Master with special software
- ✓ Picarro water isotope analyzer with monitor and external pump
- ✓ Dry gas source
- ✓ If necessary, a distribution box (WIP-Hub) with connection string

For laboratory setups, combine the WIP system with our EcoLab flex.

For field measurements, the WIPs can be conveniently integrated with our Sap flow sensors, Soilmoisture probes, Tensiometers, Rainout shelters and Weather stations.

