



Umwelt-Geräte-Technik GmbH

# Modern research in Lysimeters and Ecotrons in a changing world

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location  
Müncheberg/Berlin



approx. 50 employees with an interdisciplinary team of:

- scientists,
- engineers and
- technicians,

the company develops and manufactures instruments with a high degree of innovation, functionality and quality.

Location  
Munich



UGT Neubau TK

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# Installation and automation of environmental measurement points in the field of...



Forestry



Mining

Agriculture



Landfills

Water-  
Management



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### Water balance

$$\Delta W(t) = P(t) - ET(t) - S(t) - R(t)$$



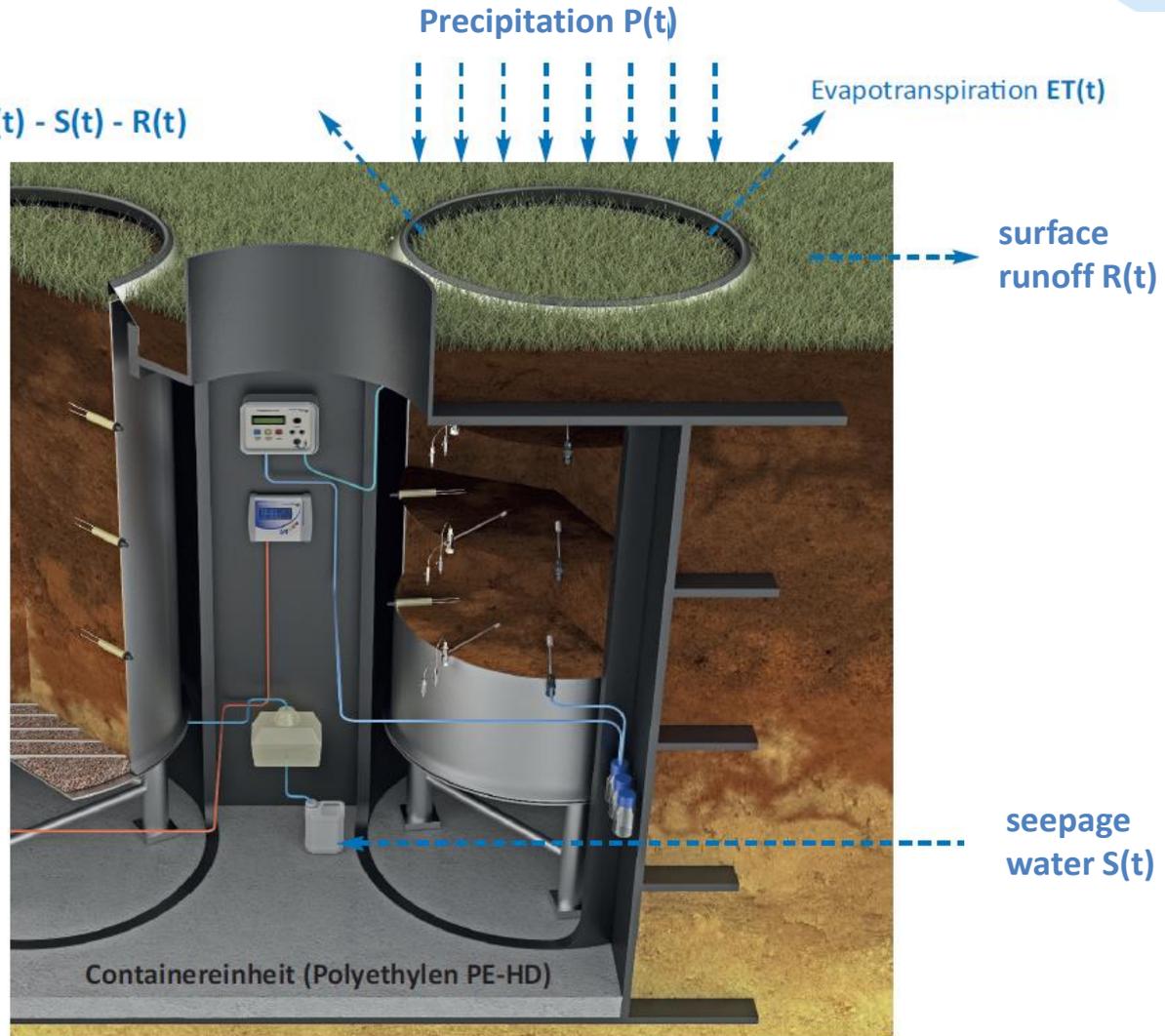
Lysimeterkragen



Datenlogger



Wägemonitor



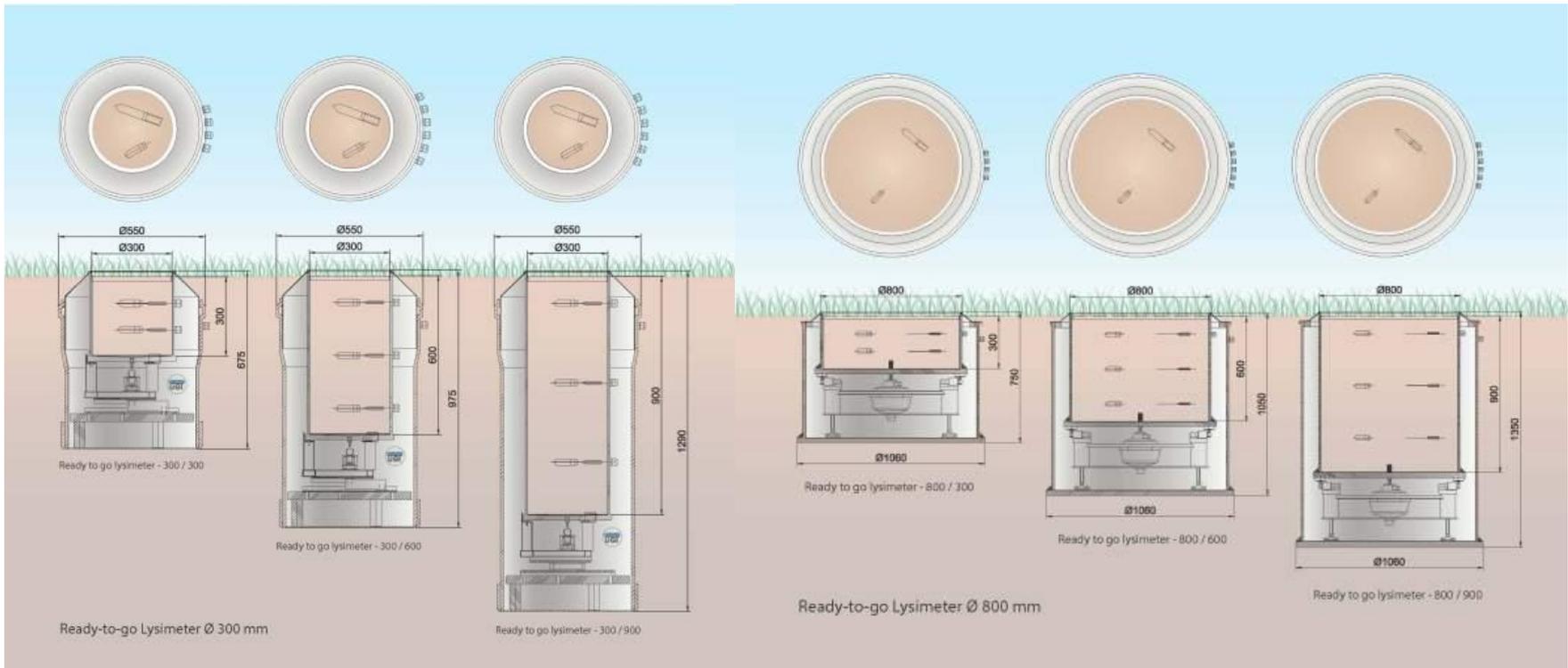
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# Ready-To-Go-Lysimeter



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## 1-, 2- u. 4-fouled - PE-HD Lysimeter container stations



Dimensions :

- Heighth: 1,5 m ... 4,0 m
- Length: 2,5 m ... 3,5 m
- Width: 2,5 m ... 3,5 m
  
- Materials: PE-HD 80 / 100

Weighth of the station: 500... 1500 kg



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# Precision weighing system

- Total weight: up to 5,5t
- Resolution: 100 g
- Accuracy: 10 g
  
- All kinds of precipitation can be seen in the weighing data
  - For a lysimeter with a surface area of 1 m<sup>2</sup> 1 mm rainfall accords to 1 L and means a weight increase of 1 Kg
  - Dew as a weight increase in the early morning hours and also rime in winter

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# Sensor grommet



- Pressure water proof
- Available in different sizes and shapes for different sensors
- Easy to install / uninstall

# Sensor grommet and isolation



- Isolation layers or PE-vessels prevent heat exchange between surrounding air and soil in the lysimeter
- ↳ **Prevent horizontal temperature gradients**
- Aim is an undisturbed natural temperature profile in the soil

# Controlled lower boundary condition



- Tension at the lower boundary can be controlled according to present tension values outside the lysimeter station or according to scenarios
- Ceramic cups with a bubble point of 1 bar

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# Controlled lower boundary condition



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# Advantages of UGT excavation technologies

- Well visible soil profile
  - the excavation pit is not damaged
- Possibility of soil mapping after lifting the monolith out of the pit
  - visible soil horizons or soil layers
- Minimal damage of the surrounding area by using the excavation tools
  - no need to dig out the area around the vessel

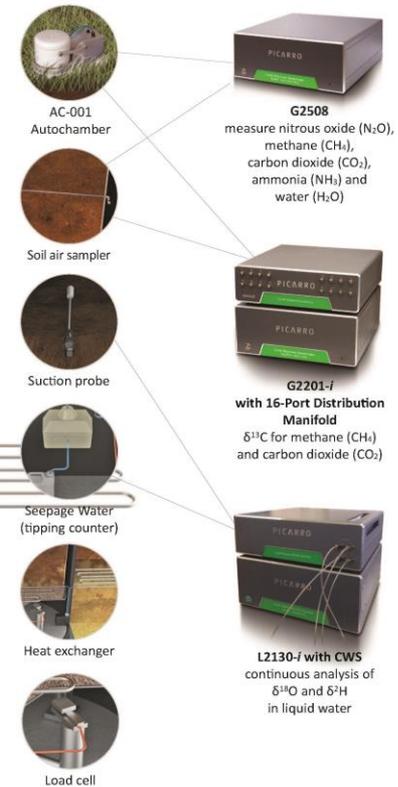
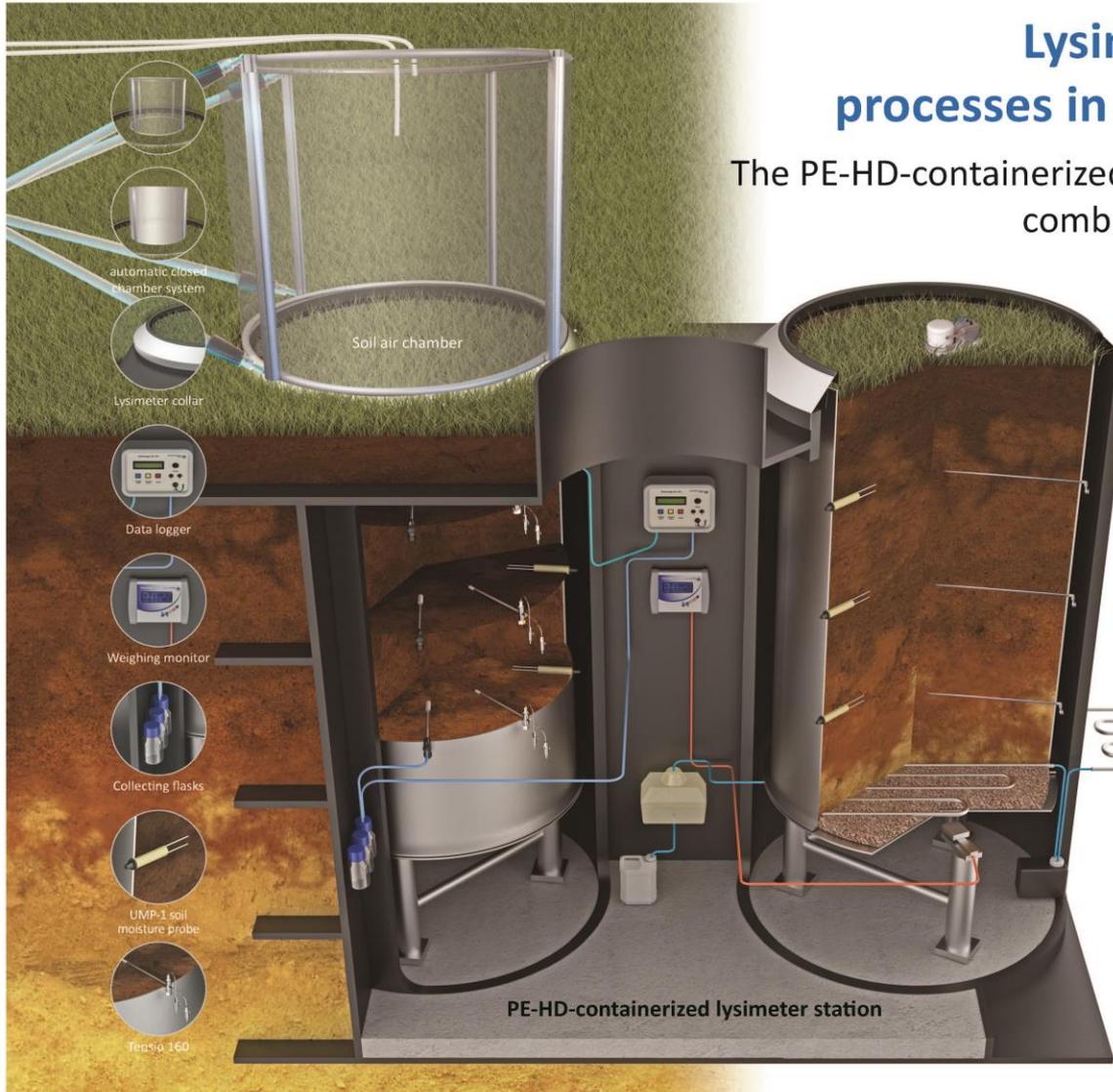


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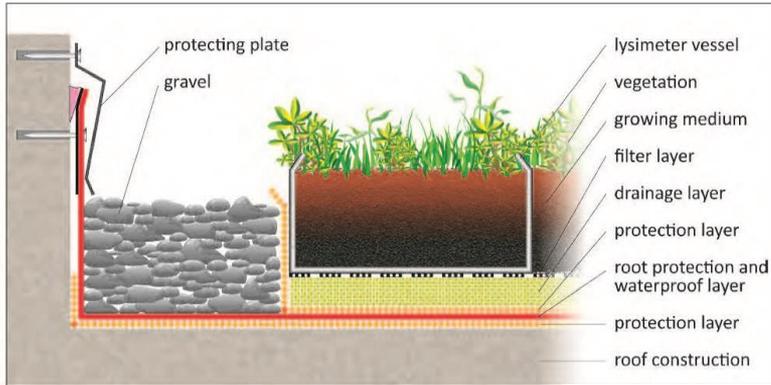
## Lysimeters - separating processes in flux measurement

The PE-HD-containerized lysimeter station by UGT combined with Picarro Analyzer



# Roof Lysimeter

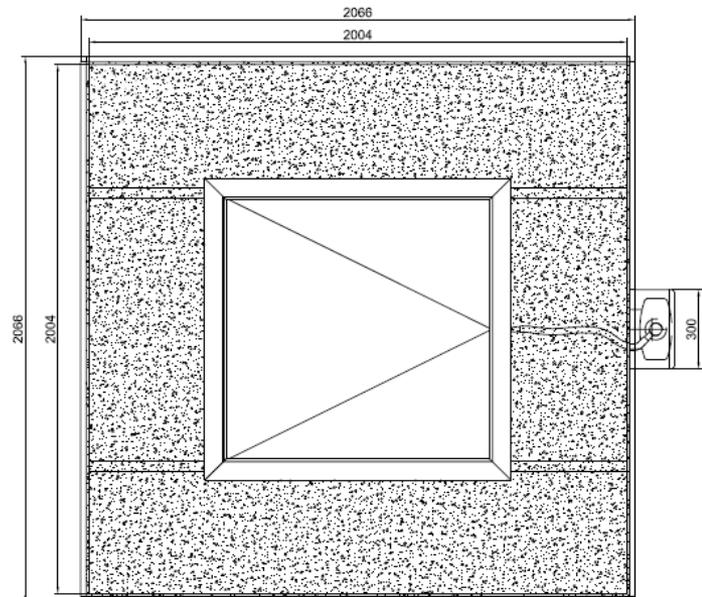
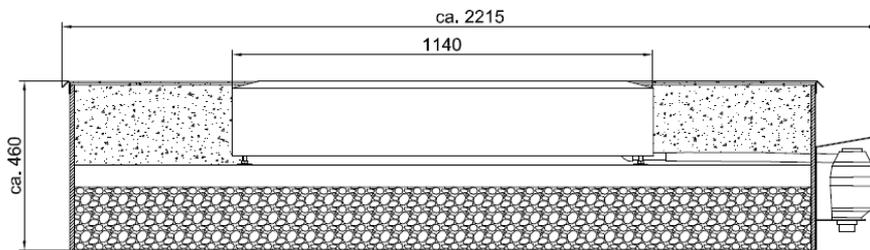
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Scheme of a Green Roof Construction



Green roof lysimeter



# Lysimeter tensiometer TENSIO 160



- Designed for the use in lysimeters
- Installed horizontally
- Can be refilled and maintained in horizontal position



**No deinstallation necessary!**

- ✓ Measurement doesn't need to be interrupted
- ✓ Contact between soil and ceramic is not disturbed
- ✓ Soil bedding is not disturbed
- ✓ Automatic refill is possible

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# Full Range Tensiometer



## Full Range Tensiometer

Measurement of the soil water matric potential ( $\psi_m$ ) is important to characterize and monitor processes in vadose zone hydrology, such as plant growth, crop production, aquifer recharge and leaching below buried waste disposal sites. Tensiometers are widely used instruments for monitoring and have been used for almost 100 years already. Unfortunately, water-filled tensiometers are only able to measure ( $\psi_m$ ) up to approximately  $-90\text{kPa}$ . Soil physical experimental research is hampered by this very limited measurement range.

The Full Range Tensiometer is comparable to water-filled tensiometers, but measures over a larger range. Hereby the Full Range Tensiometer measures the soil water potential directly.

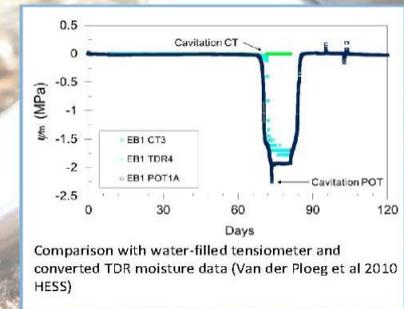
### Advantages

- fast response to changes
- higher measurement range than usual tensiometers
- self refilling
- direct pressure measurement

### Available in 3 measurement ranges:

- Full Range 5: **pF 3.7**  
(+50 to -500 kPa)
- Full Range 15: **pF 4.2**  
(+100 to -1500 kPa)

Integrated temperature measurement  
Output signal RS485  
5m cable

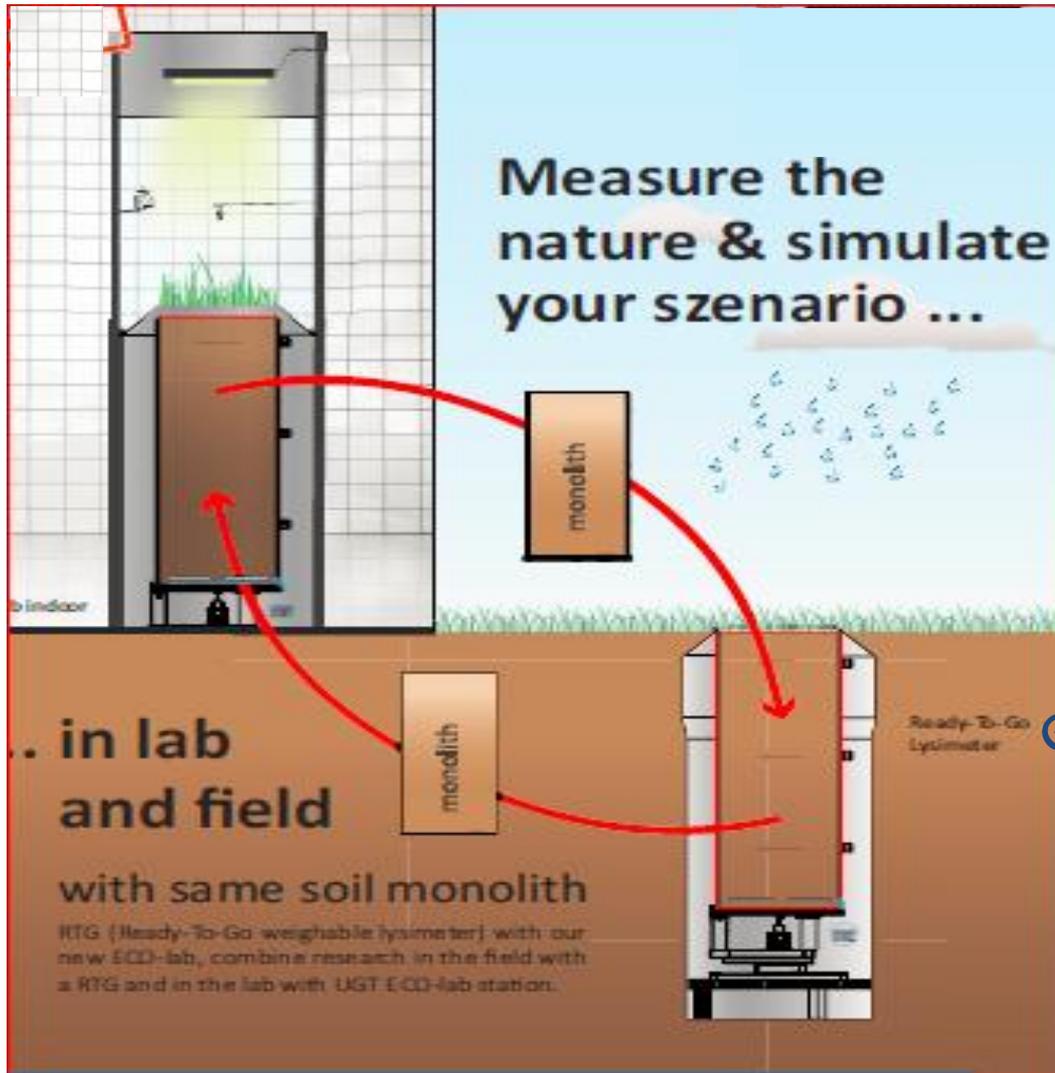


Comparison with water-filled tensiometer and converted TDR moisture data (Van der Ploeg et al 2010 HESS)



# Ecotrons

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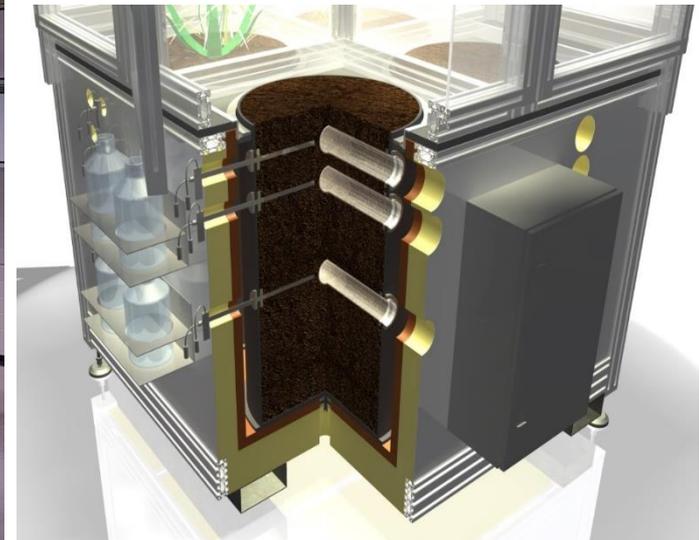
Get the results of the global change, right now!

# Ecotrons/EcoUnit

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“An Ecotron is a set of **replicated experimental units** where **ecosystems are confined in enclosures** allowing simultaneously the **control of environmental conditions** and the **on-line measurement of ecosystem processes.**”



The iDiv Ecotron



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Thanks for your attention

The „Ready-to-go“ Lysimeter is a small lysimeter station for soil columns with a surface area of up to 0.5 m<sup>2</sup> and a length of up to 0.9 m that can be filled by hand or be cut by UGT staff (undisturbed soil monolith).

It comprises a compact PE-HD lysimeter station with integrated weighing system and seepage water reservoir with tipping counter, a PE-HD lysimeter vessel, a data logger and a set of soil hydrological sensors.

You can choose between different extensions for the control station:

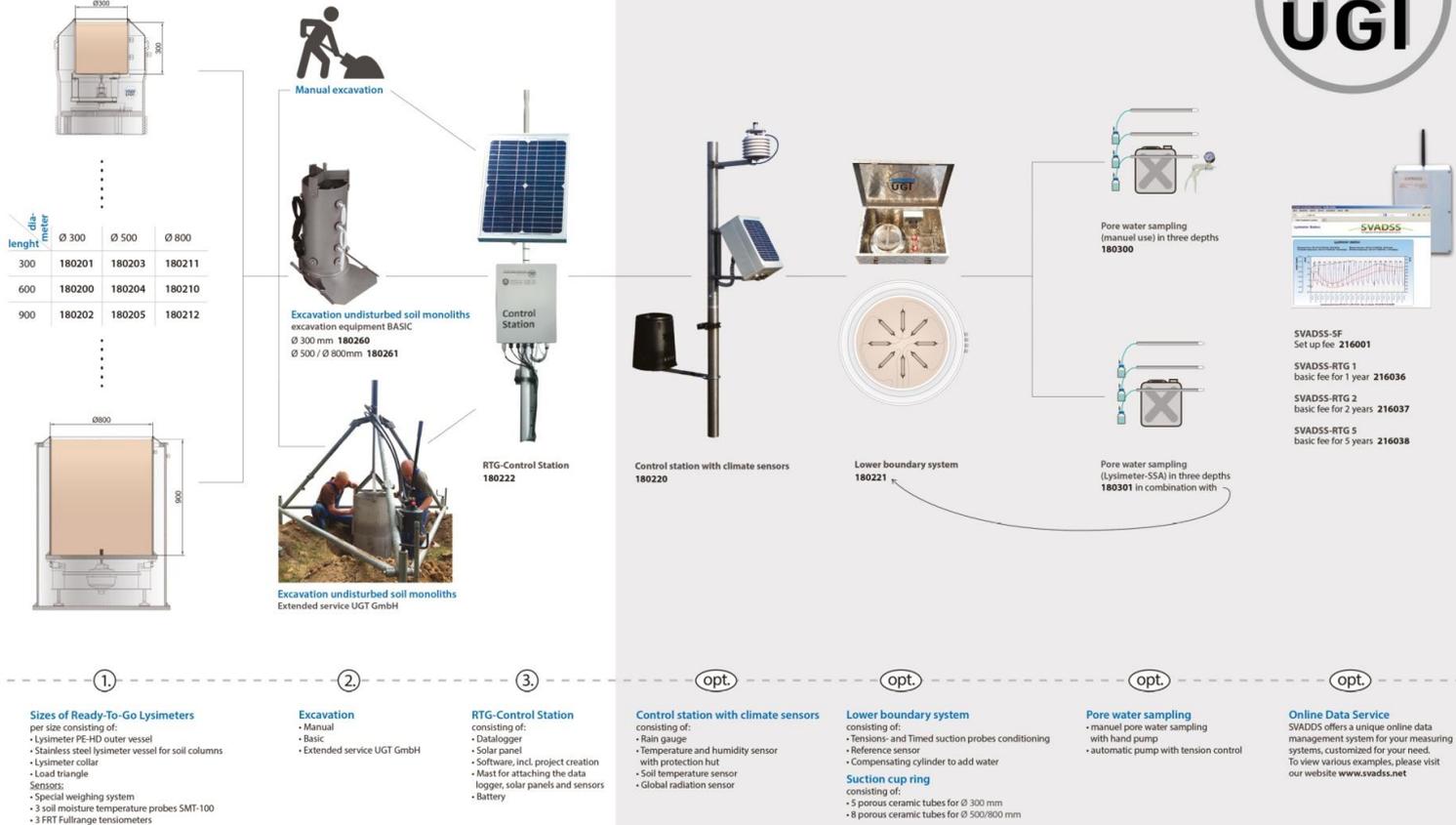
- modul extension with climate sensors
- modul extension for lower boundary system

Everything is prepared to work as plug and play system so that the complete station can be set up and put into operation without any special staff or tools. The data can be displayed and read out on any PC that is connected to the internet using a data bank system and a server.



**NEW**

# Ready-To-Go Lysimeter Components



**1. Sizes of Ready-To-Go Lysimeters**

- per size consisting of:
- Lysimeter PE-HD outer vessel
  - Stainless steel lysimeter vessel for soil columns
  - Lysimeter collar
  - Load triangle
- Sensors:**
- Special weighing system
  - 3 soil moisture temperature probes SMT-100
  - 3 FRT Fullrange tensiometers

**2. Excavation**

- Manual
- Basic
- Extended service UGT GmbH

**3. RTG-Control Station**

- consisting of:
- Datalogger
  - Solar panel
  - Software, incl. project creation
  - Mast for attaching the data logger, solar panels and sensors
  - Battery

**opt. Control station with climate sensors**

- consisting of:
- Rain gauge
  - Temperature and humidity sensor with protection hut
  - Soil temperature sensor
  - Global radiation sensor

**opt. Lower boundary system**

- consisting of:
- Tensioms- and Timed suction probes conditioning
  - Reference sensor
  - Compensating cylinder to add water
- Suction cup ring**
- consisting of:
- 5 porous ceramic tubes for Ø 300 mm
  - 8 porous ceramic tubes for Ø 500/800 mm

**opt. Pore water sampling**

- manuel pore water sampling with hand pump
- automatic pump with tension control

**opt. Online Data Service**

SVADSS offers a unique online data management system for your measuring systems, customized for your needs. To view various examples, please visit our website [www.svadss.net](http://www.svadss.net)

Müncheberg - Freising - Homécourt

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Niederlassung Süd

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