

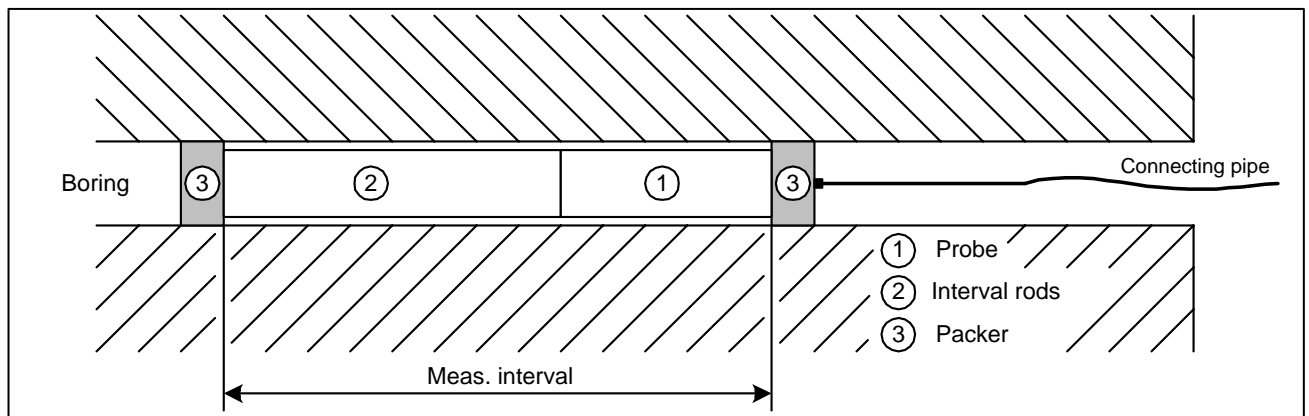
GLÖTZL Baumeßtechnik

PERMEABILITY MEASURING DEVICE

Type: PEA . . .
Art. No: 98. . .

- Application in explosion-endangered areas (EEx I/II, T2)
- Resoluble double packer system
- Pressure- and temperature measurements in probe
- Registration of surrounding parameters (temperature, compressed air and humidity outside of boring)
- Measuring course control, data collecting and indication of meas. values with PC

Principle of permeability measurement:



The complete probe body is installed in a boring by means of settlement rods.

Then the two packers are pressed on at the beginning and end of probe body by compressed air. The packers are sealing the measuring interval airtight with the surrounding rock resp. salinar. Water resp. alkaline solution is injected into the closed measuring interval with defined flow quantity.

The injection procedure is terminated after a predefined time resp. after pressure exceed in the measuring interval.

Till test termination (predefined time), the pressure, temperature and flow rate existing in the measuring interval are measured and permanently stored.

Conclusions to the permeability of rock resp. salinar can be drawn by the gained measured values (pressure increase during injection resp. pressure decrease after injection compared with time).

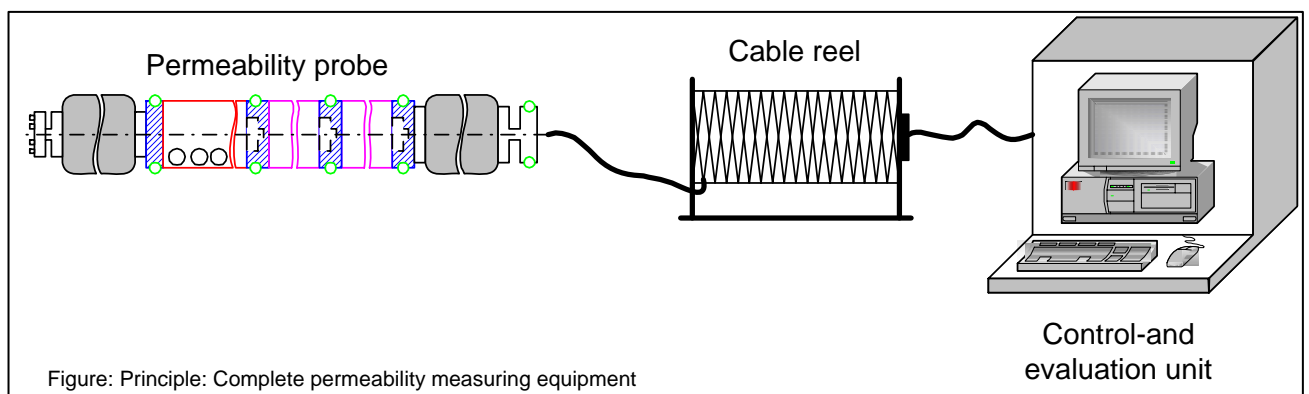


Figure: Principle: Complete permeability measuring equipment

The following figure schematically shows the complete structure of permeability measuring equipment in ex-version.

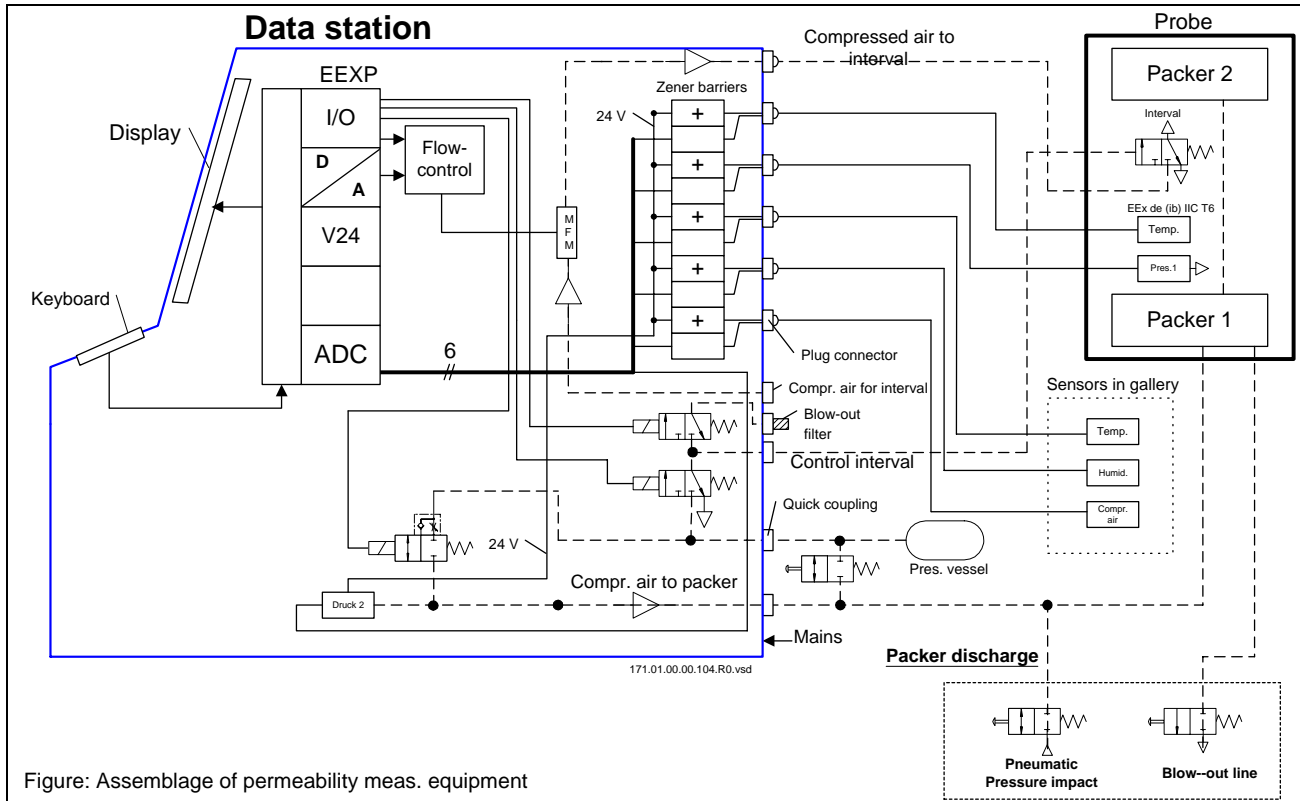


Figure: Assemblage of permeability meas. equipment

Permeability probe:

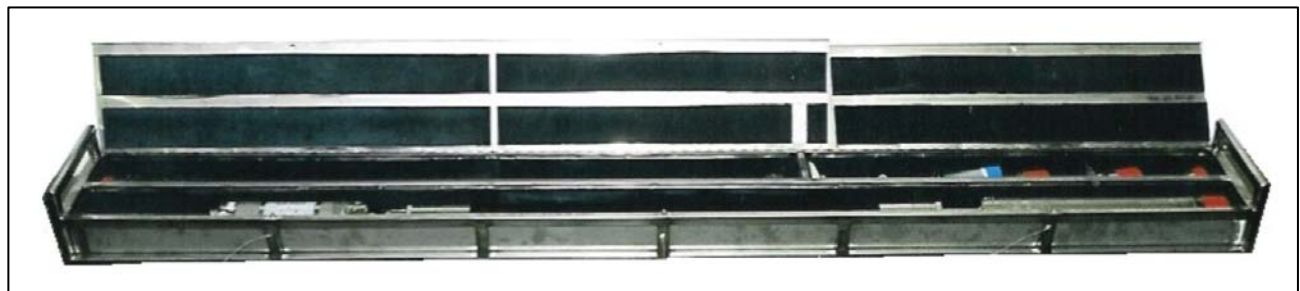


Figure: Permeability probe in three-part transport case

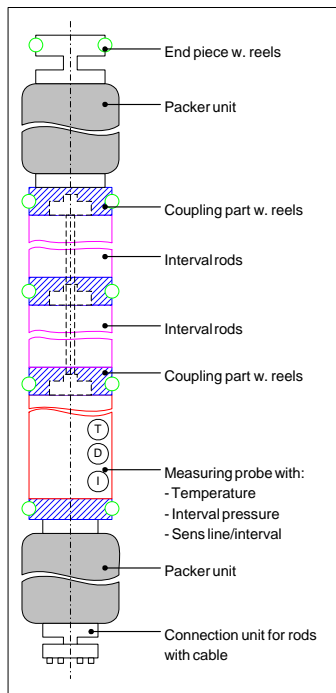


Figure : Assemblage permeability probe

The complete probe unit can be elongated to any length by assembly of several interval rods (basic length 2 m) via coupling parts. The probe as well as the interval rods are manufactured of rust- and acid-resistant stainless steel. Pressure- and temperature sensor are placed in the probe. Operation of sensors is done intrinsically safe according to EXi with 4–20 mA signals.

The figure at right-hand side shows the electrical and pneumatic connections at the permeability probe.



Figure: Probe connections

Cable reel of permeability measuring device:



Figure: Cable reel of permeability measuring device

- | | |
|--------------------------------|------------------------|
| 1. High-pressure flexible line | 4. PETP – Inner casing |
| 2. Polyamide flexible line | 5. PUR – Outer casing |
| 3. Electric line | |

The figure shows the rotary current-operated motor cable reel with 600 m special line for the permeability measuring device.

The line is marked by the meter in order to have a control about installation depth during installation of probe.

All required electric and pneumatic lines as well as the high-pressure lines are integrated in the special line.

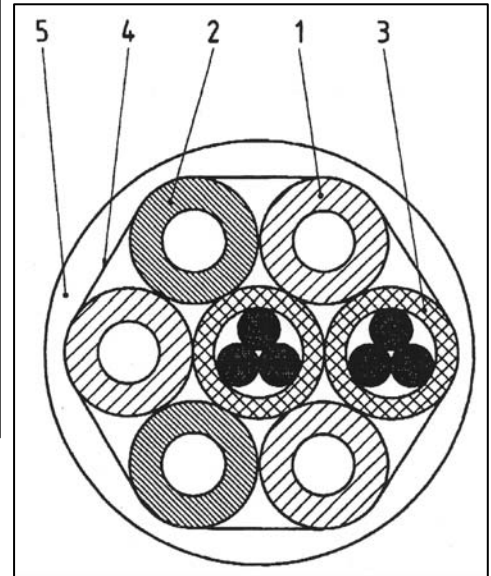


Figure: Assemblage of high-pressure flexible line

Data station of permeability measuring device:



Figure: Data station

The data station is placed in the EEX-p-casing for application in the Ex-zones 1 and 2, group IIC T4.

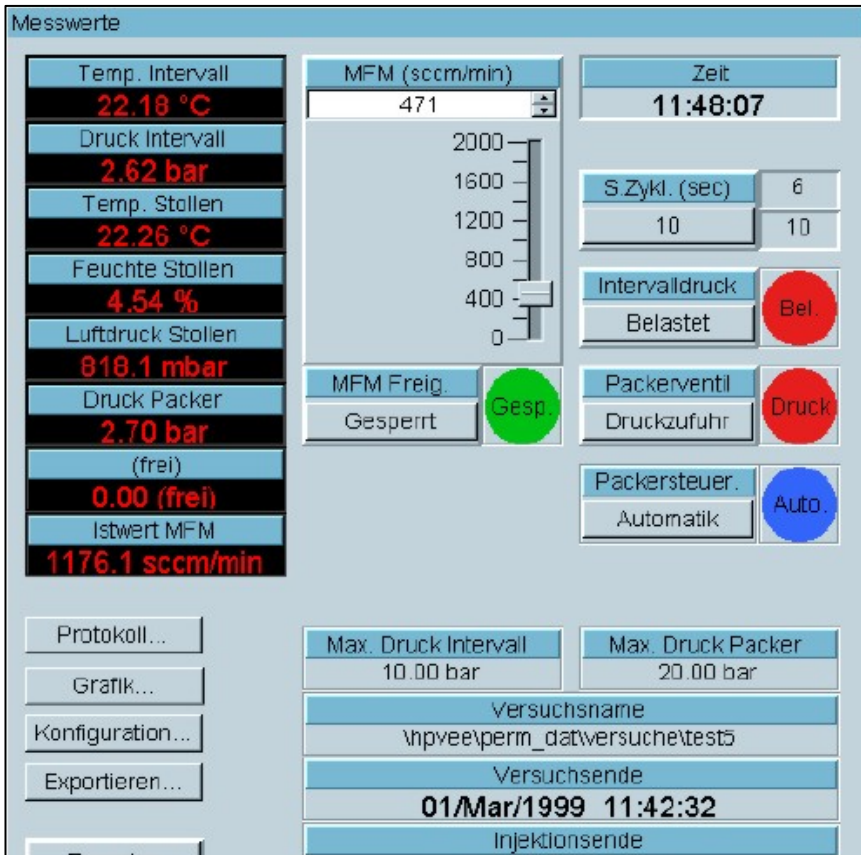
The casing is manufactured of stainless steel and contains the following units:

- PC-computer unit with AD-converter board (16 bit)
- Flow-control for flow rate measurment.
- Galvanically separated RS-232-interface
- RS-485-interface
- Installed multiplexer for sensor inquiry of sensors in the probe and of the environment
- Valve control and valves



Figure: Data station connections

Control- and evaluation software



The control- and evaluation software „Permsond“ is offering all required functions for test performance.

All measured values (meas. values of probe and also meas. values of environment) are displayed online.

Free configuration of units, max. pressures, storage rates and hysteresis adjustments for packer pressures and much more are available for the user.

After a power failure, the computer is automatically starting the software „Permsond“, and the current test is automatically continued.

Figure: Main window „PERMSOND“



Figure: Permeability measuring device in application

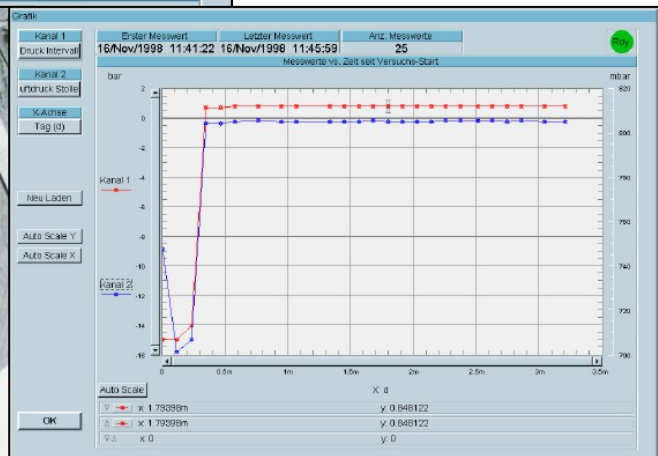


Figure: Evaluation with „PERMSOND“

Technical data - sensorics:

Sensors in environment:

Compressed air sensor:

- Meas. output signal: 4-20 mA
- Meas. range: 800–1200 mbars

Air humidity sensor:

- Meas. output signal: 4-20 mA
- Meas. range: 0–100% RH

Temperature sensor:

- PT 100 : 4-20mA
- Meas. range: 20 up to 70 °C

Permeability probe:

Temperature sensor:

- Meas. output signal: 4-20 mA
- Meas. range: 20 up to 70 °C

Interval pressure:

- Meas. output signal: 4-20 mA
- Meas. range: 0–60 bars