

# GLÖTZL Baumeßtechnik

## CELLS for POREWATER PRESSURE

Type E: P4 . . .  
Art. No.: 22. . .

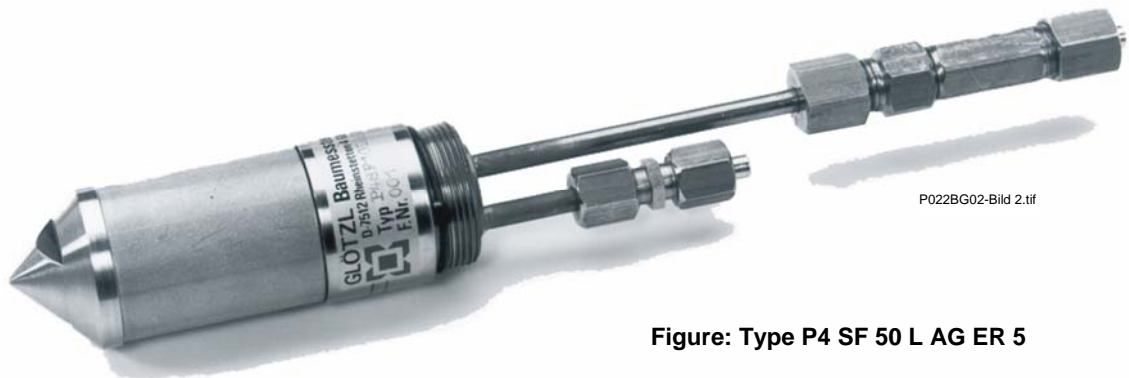
### Function

These cells are used for measurement of porewater pressures with air or oil operation up to 20 bars, water pressures up to 50 bars.



P022BG02-Bild 1.tif

Figure.: Type P4 KF 10L



P022BG02-Bild 2.tif

Figure: Type P4 SF 50 L AG ER 5

### Configuration

The porewater pressure cell is constructed of rust- and acid-proof steel with a diameter of 40 mm. Model for air operation, standard, model for oil operation can be delivered on special request. Load limit in bar = (X)

The following models are available:

KF = Ceramic filter, air entry value 10 m water column for installation in binding soils

SF = Sintered metal filter for installation in sand fillings

### Cell types

	Type	Filter	Surface
22.XX.01.01	P4 KF(X)L	Ceramic filter	4,5 cm <sup>2</sup>
.02	P4 SF(X)L	Sintered metal filter	12 cm <sup>2</sup>
22.XX.02.01	P4 KF(X)L AG	Ceramic filter and connection thread	4,5 cm <sup>2</sup>
.02	P4 SF(X)L AG	Sintered metal filter and connection thread	12 cm <sup>2</sup>
22.XX.04.01	P4 SF(X)L AG ER5	Sintered metal ring filter Ø 40 mm, l = 50 mm with injection tip and connection thread M 36 x 1	60 cm <sup>2</sup>
.02	P4 KF(X)L AG ER5	Ceramic filter Ø 40 mm, l = 50 mm with injection tip and connection thread M 36 x 1	60 cm <sup>2</sup>
22.XX.06	P4 W(X))L AG ER	Water pressure transducer with fleece special filter for water level measurement in sand or gravel soils	55 cm <sup>2</sup>
22.XX.07	P4 F(X)L	Water pressure transducer with tube connection EO 6 S	

## Measuring ranges

- 22.01** (X) = -0.6/3 load range -0.6/3 bars, control accuracy ± 0.005 bar
- .02** (X) = -1/5 load range -1/5 bars, control accuracy ± 0.01 bar
- .03** (X) = 10 load range 0/10 bars, control accuracy ± 0.01 bar
- .04** (X) = 20 load range 0/20 bars, control accuracy ± 0.02 bar
- .05** (X) = 50 load range 0/50 bars, control accuracy ± 0.05 bar

## Type code

e. g. P4 KF 10L AG E R5

- P4 = P4 Porewater pressure cell  
40 mm diameter
- KF = Ceramic filter
- 10L = Load range (10 bars air operation))
- AG = Connection thread
- E = Injection tip
- R5 = Ring filter

## Filter

- SF = Sintered metal filter, filter height 50 mm, diameter 40 mm
- KF = Stone filter, filter height 50 mm, diameter 40 mm

## Connection sleeves and accessories



## Connection sleeves

- 22.50.01.01** Connection sleeve for porewater pressure cell for injection Ø 40 mm, total length L = 240 mm, for model AG with female thread and connection pivot Ø 35 mm, l = 40 mm
- .02** Connection sleeve for porewater pressure cell for injection Ø 40 mm, total length L = 1 m, for standard model to attach and connection pivot Ø 35 mm, l = 40 mm

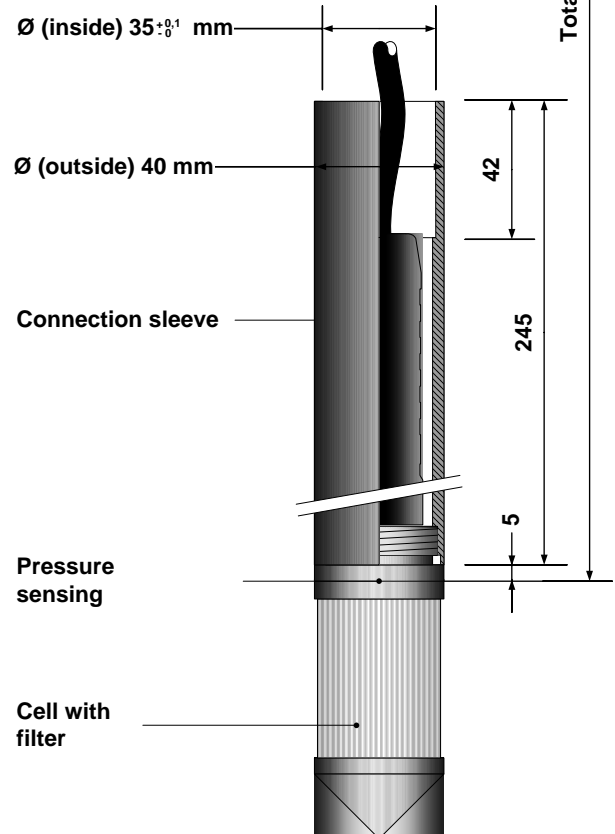
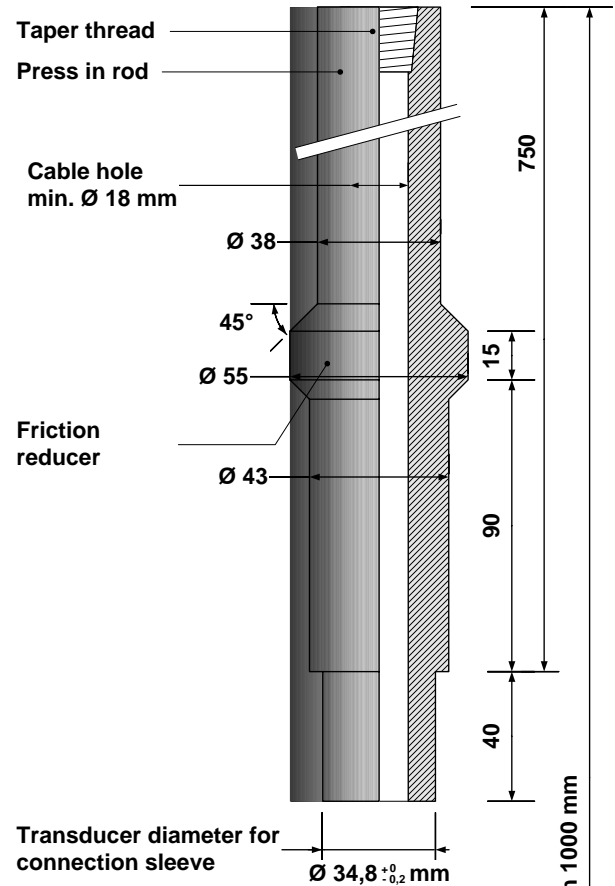
Injection rods see group 16.10

## Accessories

- 22.60.01.01** Sintered metal filter complete for replacement, area 60 cm<sup>2</sup>
- .02** Ceramic filter complete for replacement, area 60 cm<sup>2</sup>
- .03** Fleece filter complete with filter body for replacement, area 55 cm<sup>2</sup>

## Possible options for press-in rods

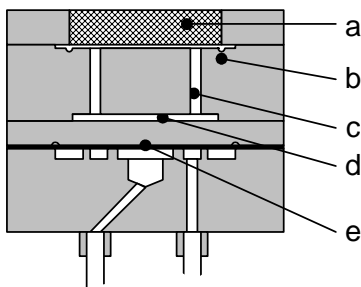
Cell type EPKE...AG ER5 and P4...AG ER5



## Measurement with cells for porewater pressure

General remarks: The following items are important for measurement of porewater pressures:

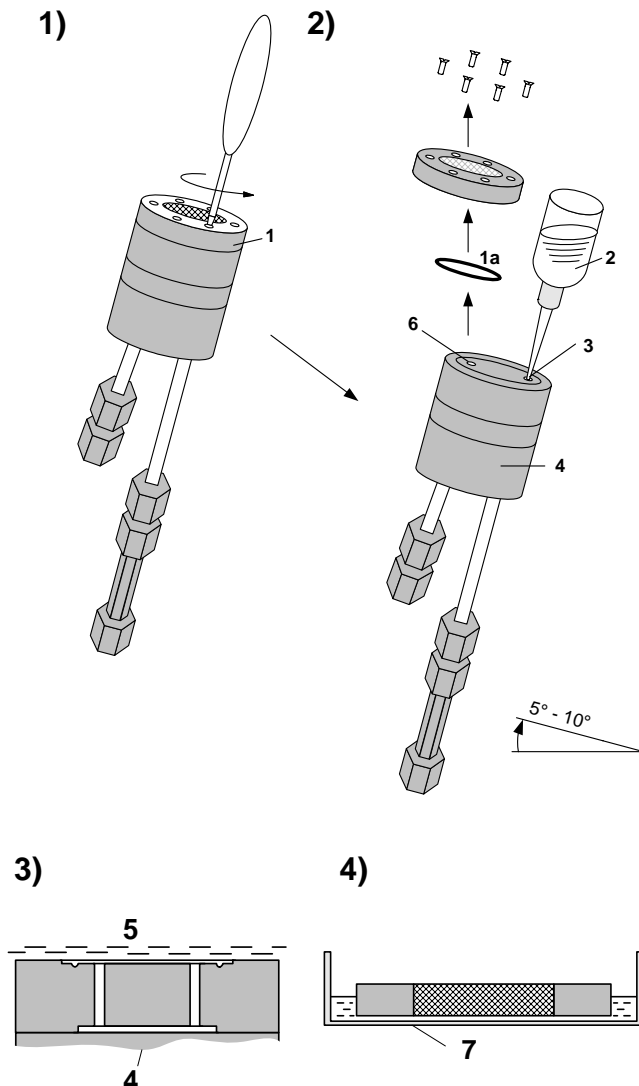
- I. The measuring unit should not effect too high volume changes by measurement at the measuring location.
  - II. After installation of the measuring cell, the environment of the measuring location should be restored to the initial condition of compaction with the same material, if possible.
- To I. The area between outer filter boundary layer and the measuring diaphragm must be filled – possibly without air – with a hydraulic pressure medium, if possible directly before installation of the cell. Another possibility is to store the thus prepared cell, completely embedded in this hydraulic pressure medium, till time of installation



- a = Filter stone  
 b = Collecting grooves  
 c = Connection boring  
 d = Pressure area over  
 e = Measuring diaphragm

As pressure medium, stress-relieved water is normally used

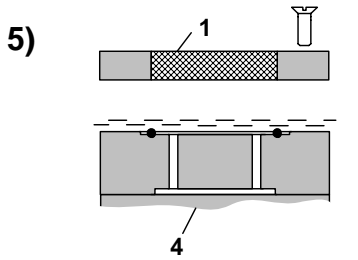
Filling procedure of the pressure connection area can be done as follows:



- 1) Unscrew filter (in case of ceramic filter with filter ring) by means of screwdriver, width approx. 3.5 mm, and remove sealing ring (1a).
- 2) Fill stress-relieved water (= dipol.), free of air bubbles, by means of small plastic can (2) into somewhat deeper positioned connection boring (3), the other cell part (4) at slight sloping position, approx. 5 – 10° inclined, till no air bubbles are escaping from the higher located connection boring (6). The air must really flush through the pressure room (d).
- 3) After that, keep now cell housing (4) horizontally, fill in more stress-relieved water till it is completely covered (5) and insert sealing ring (1a) again.
- 4) In the meantime, fill stress-relieved water into a flat bowl (7) till a height of 2 – 4 mm which is lower than the filter ring resp. the filter plate and insert filter (1).
- 5) Screw on filter (1) again at constantly horizontal position of the other cell part (4).
- 6) In such filled condition, the cell can be stored – in case that installation should not be done immediately – in a container (8) which is also filled with stress-relieved water till time of installation in the foundation soil and can thus be transported to the place of installation.

**Installation of cell P 4** at the measuring point has to be carried out according to the instructions of II so that the environment of the measuring point must be restored after installation of the cell to the initial condition of compaction with possibly the same material.

For this, first a hole of minimum  $\varnothing$  50 mm (till not higher than  $\varnothing$  80 mm) is bored out (in case of unstable soil by means of a tube) or – if necessary – also flushed out.



7) The cell – in the meantime equipped with its pressure and return lines -is lowered into the open borehole till ground.

After that, it is filled and compacted with possibly the same soil which has been bored or flushed out till a height of not more than 10 cm. During this procedure, an increase of pressure indication can be recognized. That means that the cell has already to be connected to the pump during installation, a measurement should be done and controlled during the complete filling procedure till the borehole is totally filled.

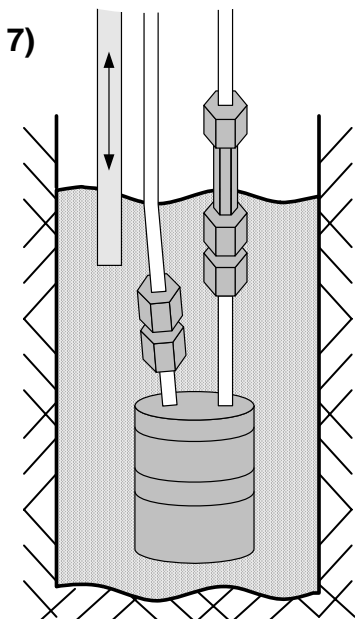
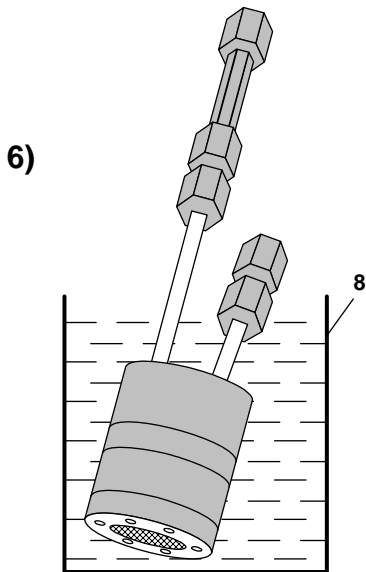
The boring tube should be drawn up immediatly after each partial filling to the same height as the filling has been increased, e.g. after marking at the compaction rod at the level of the tube upper rim when the compaction rod is lowered down to the ground shortly after the end of the boring or flushing.

With layer of the foundation soil, also the filling material may change. However, the filling material should rather be somewhat more impermeable than the natural material of the borehole extraction.

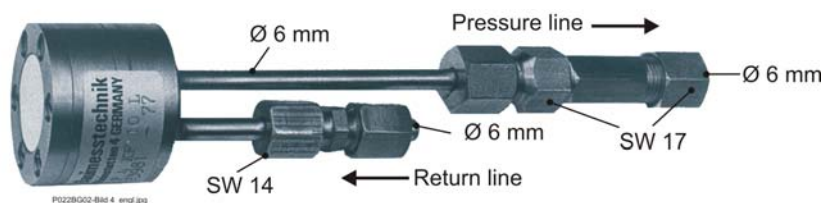
In case of high impermeable soils it may be of advantage to let the boring tube – for this type of application of plastics because of its later plastical deformability – after lifting up to 20 till 40 cm, in the remaining borehole. According to the grade of permeability of the soil, the display which should be measured permanently - during the first time up to each hour - will slowly decrease to a final value if compaction should be somewhat too high. However, it will increase if the compaction was a little bit too small.

If already during filling procedure no display could be recognized, the compaction resp. the filling and eventually also the water content of the filling material is insufficient and no usable measuring result can be expected. Therefore, a reliable control of installation is absolutely necessary which only can be done by immediate measurement at the same time.

The simplest way for control is the application of a manual air quantity regulator. However, the most indicative results can be achieved by recording instruments = electrically controlled air quantity regulator and writer, eventually with a measuring automatic device.



### Survey (with pressure and return line)



Subject to technical alternations