GLÖTZL Baumeßtechnik

TRANSDUCERS FOR PORE WATER PRESSURE, WATER PRESSURE AND PRESSURE. . . .
Vibrating Wire Technique

Type EPVW 3 . .
EPVW 4 . .
Art. No.: 69.03...

The electric pressure transducer with vibrating wire technique is used for measurement of pore water pressures and water- or liquid pressure up to max. 600 bars.

These transducers are suitable for measurements of pore water pressures in dams, embankments, water level in borings and wells – only to mention some of the possible application fields – and for direct measurement of liquid pressures.

The sensor consists of a housing in different models and a sensor element.This transducer is connected to a vibrating wire the pressure-sensitive diaphragm of which is getting a bending at load by the pressure to be measured and thus is discharging the prestressed vibrating wire. The here arising frequency signals of the vibrating wire which have to be measured are proportional to the applied pressure.

The frequency signal is transmitted by a cable to the readout units, either portable model or automatically operating measuring devices.

Figure: Pore water pressure transducer with front diaphragm

Advantages of vibrating wire measuring system

- Long-term measurement under difficult conditions
- Long-term stability with high resolution
- No influence by longer cable lengths
- Insensitive and very robust measuring system
- Proved and successfully applied system
- Closed system

Available models

A series of modified transducers can be supplied. The described standard sensor is a very small-sized one and therefore can also be used without problems in stand-pipes, fillings, embankments and borings. Further models are transducers for pressing into the underground, combined pore water and earth pressure cells as well as cells for direct measurement of pressures with process connections.

Configuration of the transducer

The sensor installed in the cell corresponds to the state-of-art in the field of vibrating wire technique. All component parts are machined of stainless steel with the classification 1.4571. The inner part of the sensor is evacuated and welded together in such a way that a closed chamber is formed for the vibrating wire element. By a drop-forging technique - patented by the manufacturer - the ends of the vibrating wire are connected to the housing. Thus, a very high stability of the wire tensioning is reached.

Electromagnetic coils being placed close to the wire are used for stimulation of the wire and to convert the thus produced wire vibration into an electric output signal. By pressure change, the deflection of the diaphragm and also the vibrating frequency of the wire are influenced and alterated proportionally to the pressure to be measured.

Measuring Cable

Standard cable is a 4-wire shielded cable with PE-coating. Two wires are needed for the vibrating wire sensor and two wires for an optionally available temperature sensor.

For special requirements, measuring cables are available with double coating, reinforced outer casing and high temperature cable.

Here we want to remark that resistance changes in the measuring cable by temperature change, contact resistances at transition points and water entrance in the measuring cable are of no influence to the operating frequency of the sensor.

This fact as well as the excellent zero point stability and long-term behaviour are the reasons why vibrating wire sensors – compared with the conventional electric sensors – are used for long-term measurements also under difficult conditions and furthermore in view of the impossible recovery.

Load ranges:

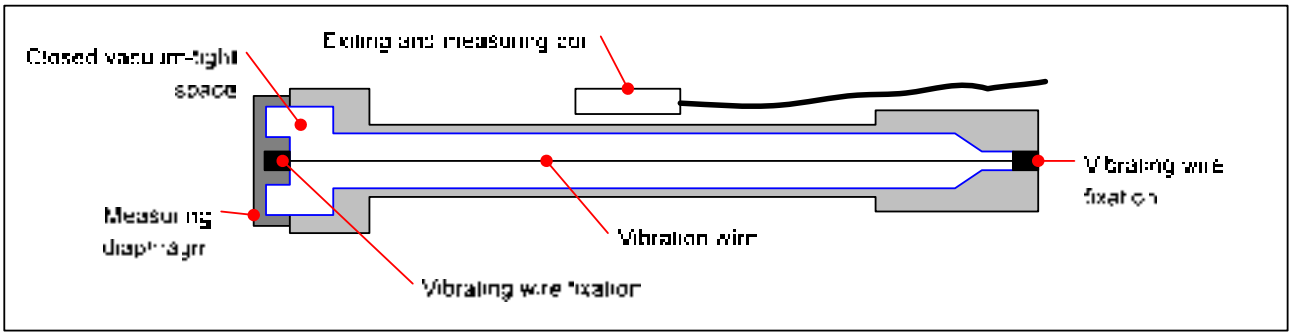
-0.5 up to +0.4, +0.7, +2.0, +3.5, +5.0, +7.0, +10, +20, +35, +70, +100, +200, +350 and +500 bar,

Negative pressures standard up to -0.5 bar

Filter stones and special connections

- Sintered metal filter of stainless steel, standard
- Ceramic filter with high air entry value
- Special connections according to client's specification or standard compression-type fitting, diameter 6 mm

Configuration of Vibrating Wire Sensor



Ordering example for EPVW 3

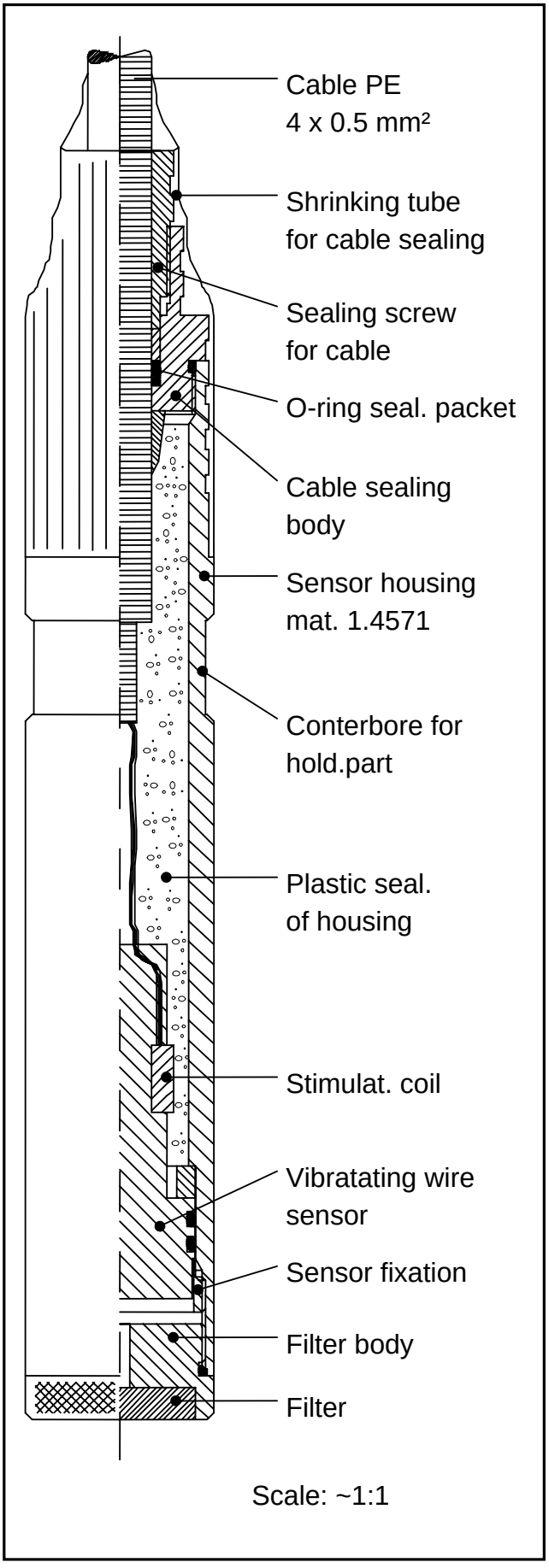
69.03.01.02 = EP VW 3 S 2 F

- F — Surface filter
- 2 — Load range 0.2 bar
- S — Sintered metal filter
- 3 — Sensor type 3, diameter 30 mm
- VW — Vibrating wire sensor
- EP — Pore water and water pressure cell

Measuring devices

- Connection boxes and reversing switches
- Battery-operated readout units
- Automatic measuring and registration units with data carrier, memory and remote control

Sensor Configuration



Technical Data

Technical Data	Standard			High Temperature		
Overload security of meas. range	50 %			50 %		
Linearity incl. hysteresis f.s.	±0.5 %			±0.5 %		
Optional	±0.1 %			±0.1 %		
Resolution f.s.	±0.02 %			±0.025 %		
Thermal zero point displacement	< 0.02 % °C			< 0.05 % °C		
Sensor-specific indications	min.	typical	max.	min.	typical	max.
Coil resistance Ohm/20 °C *	170	180	190	110	120	130
Thermistor resistance Ohm/25 °C *		3000			8200	
Inductivity mH *	10	13	14	8	10	14
Capacity nF *	200	300	400	250	375	600
Line resistance Ohm/5-V feed			3500			4000
Temperature range °C	-20		+80	-20		+180
Current supply mA_{ss}/5V	26	28	30	38	42	46
Supply, Impulse control for coil regulation V_{ss}	2	5	24	2	5	24
Operating frequency	2 kHz – 3.3 kHz			2 kHz – 3.3 kHz		
Option Ex-protection	EEx ib IIB T4			EEx ib IIB BTI		
* For Ex-versions the line lengths must also be considered.						

Connection values for Zener-barriers:	Vibrating wire sensor	Thermistor
R_L min. Ohm	240	1500
U_Z max. Volt	24	17
I_K max. mA	100	11,33
C_A min. nF	620	100
L_A min. mH	15	2

Conn. allocation:	Vibrating wire sensor	Thermistor
Cable 4 x 0.5 mm²	yellow/black	red/blue

Data Collection Devices:

Hand operated change-over manifold for 6 measuring points with installed air pressure sensor Housing of polyester for wall or pole fixing IP 66, type AKVW 6/LS

Portable readout unit without memory, for battery operation, type SMC 2.02

Multimeter with data memory and measuring point allocation, type VMG14.1; see detailed single description

Automatic measuring device, type MFM in standard- or Exx-protection version

Subject to technical alternations

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