

DEX-A

**— DEX AND DEX-S**  
**ANALOG EXTENSOMETERS**

EXTENSOMETERS



## DEX AND DEX-S ANALOG EXTENSOMETERS

DEX in-place extensometers are installed in ABS inclinometer casings with magnet rings to monitor settlement or heave. The DEX system, designed to be left in-situ, permits automatic, remote, and continuous monitoring.

DEX extensometers are linked together with stainless steel wire or rods.

DEX-S extenso-inclinometers add biaxial tiltmeters to the DEX system, providing 3D monitoring of the borehole.

### APPLICATIONS

- Monitoring settlement in dam foundations
- Monitoring 3D deformation in tunneling and diaphragm walls
- Monitoring lateral displacements in dams and rockfall areas

### FEATURES

- Automated monitoring
- 3-D borehole profile
- Removable, reusable sensors
- Cost savings by use of single borehole



Meet the essential requirements of the EMC Directive 2014/30/UE

## DEX-S 3D EXTENSO-INCLINOMETERS

PRODUCT CODES	0DEX35S102B	0DEX35S202B
<b>SETTLEMENT SENSOR</b>		
Sensor type	high performance contactless displacement transducer	
FS and Measuring range	100 mm ( $\pm 50$ mm)	
Sensor resolution	0.005 mm	
Sensor repeatability	0.05 mm	
Sensor stability @ 60 days	$< \pm 0.1$ mm	
Sensitivity <sup>(1)</sup>	See Calibration Report	
Sensor accuracy: Lin. MPE <sup>(2)</sup> Pol. MPE <sup>(2)</sup>	$< \pm 0.30\%$ FS ( $< \pm 0.30$ mm) $< \pm 0.25\%$ FS ( $< \pm 0.25$ mm)	
<b>TILT SENSOR</b>		
Sensor type	biaxial MEMS inclinometer	biaxial MEMS inclinometer
Measuring range	$\pm 10^\circ$	$\pm 20^\circ$
Sensor resolution	0.00056° (reading frequency 2 Hz)	0.00056° (reading frequency 2 Hz)
Sensor mechanical bandwidth	18 Hz	18 Hz
Sensor repeatability	$< 0.0013^\circ$ (reading frequency 2 Hz)	$< 0.0013^\circ$ (reading frequency 2 Hz)
Sensitivity <sup>(1)</sup>	See Calibration Report	See Calibration Report
Sensor accuracy: Lin. MPE <sup>(2)</sup> Pol. MPE <sup>(2)</sup>	$< \pm 0.20\%$ FS $< \pm 0.07\%$ FS	$< \pm 0.20\%$ FS $< \pm 0.07\%$ FS
Offset temperature dependency	$\pm 0.003^\circ / ^\circ\text{C}$	$\pm 0.003^\circ / ^\circ\text{C}$
<b>TEMPERATURE SENSOR</b>		
Sensor type and measuring range	Thermistor, $-50^\circ\text{C}$ to $+80^\circ\text{C}$	
Accuracy	$\pm 0.5^\circ\text{C}$	
Resolution	0.1 $^\circ\text{C}$	
<b>ELECTRICAL INFORMATION</b>		
Signal output	0-10V DC (settlement sensor), 4-20mA (tilt sensors), Ohm (temperaure)	
Power supply	24 V DC	
Average consumption	70 mA @ 24 V DC	
Max cable length to logger	200 m (for more information see F.A.Q.#077 on Sisgeo web site)	

(1) Sensitivity is a specific parameter different for every gauge. The sensitivity is calculated during gauge calibration test and inserted into the Calibration Report.

(2) MPE is the Maximum Permitted Error on the measuring range (FSR). In the Calibration Report, the accuracies of the gauge are expressed using both linear regression ( $\leq$  Lin. MPE) and polynomial correction ( $\leq$  Pol. MPE).

## DEX EXTENSOMETERS

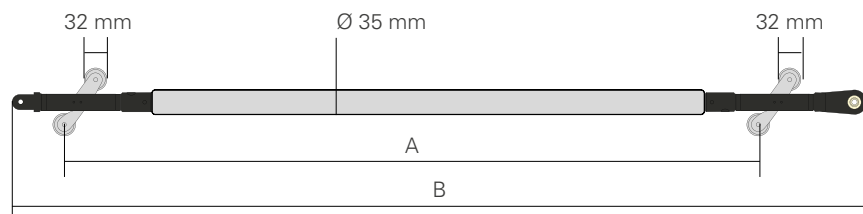
PRODUCT CODES	0DEX3501000	0DEX3505000	0DEX3510000
<b>SETTLEMENT SENSOR</b>			
Sensor type	high performance contactless displacement transducer		
FS and Measuring range	100 mm ( $\pm 50$ mm)	500 mm ( $\pm 250$ mm)	1000 mm ( $\pm 500$ mm)
Sensor repeatability	$\pm 0.05$ mm	N/A	N/A
Sensor stability @ 60 days	$< \pm 0.1$ mm	N/A	N/A
Sensitivity <sup>(1)</sup>	See Calibration Report	See Calibration Report	See Calibration Report
Sensor accuracy: Lin. MPE <sup>(2)</sup>	$< \pm 0.30\%$ FS ( $< \pm 0.30$ mm)	$< \pm 0.10\%$ FS ( $< \pm 0.5$ mm)	$< \pm 0.10\%$ FS ( $< \pm 1.0$ mm)
Pol. MPE <sup>(2)</sup>	$< \pm 0.25\%$ FS ( $< \pm 0.25$ mm)	$< \pm 0.08\%$ FS ( $< \pm 0.4$ mm)	$< \pm 0.08\%$ FS ( $< \pm 0.8$ mm)
<b>ELECTRICAL INFORMATION</b>			
Signal output	0-10V DC (settlement sensor)		
Power supply	24 V DC		
Average consumption	70 mA @ 24 V DC		
Max cable length to logger	200 m (for more information see F.A.Q.#077 on Sisgeo web site)		

(1) Sensitivity is a specific parameter different for every gauge. The sensitivity is calculated during gauge calibration test and inserted into the Calibration Report.

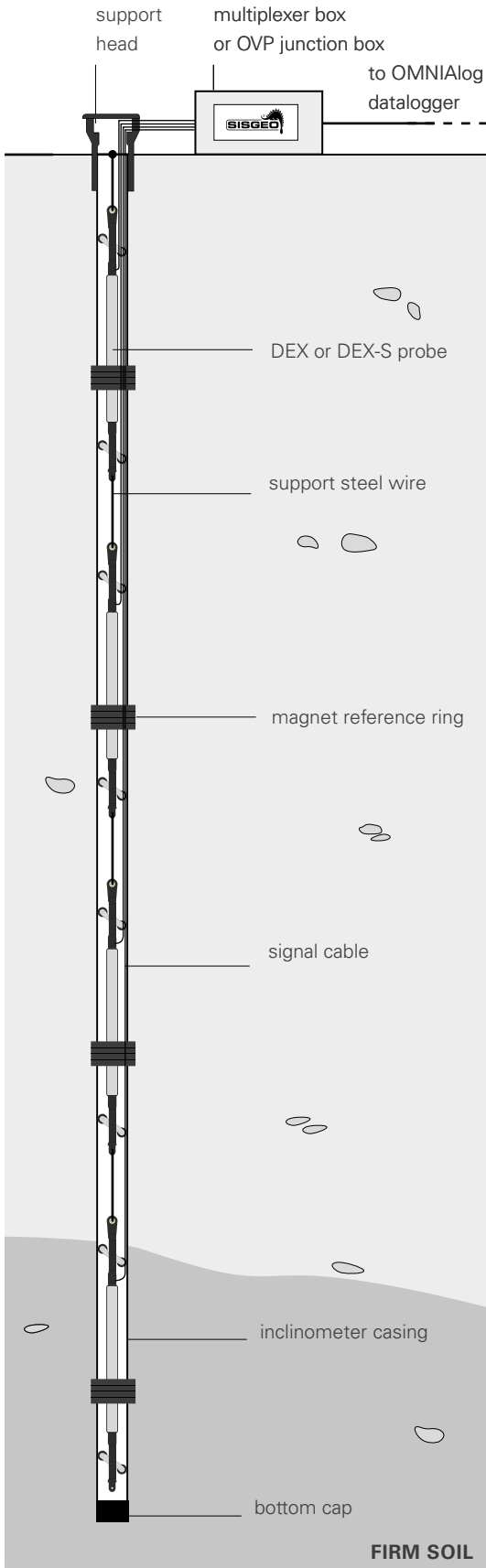
(2) MPE is the Maximum Permitted Error on the measuring range (FSR). In the Calibration Report, the accuracies of the gauge are expressed using both linear regression ( $\leq$  Lin. MPE) and polynomial correction ( $\leq$  Pol. MPE).

## DEX AND DEX-S PHYSICAL FEATURES

PROBE FEATURES	ALL DEX-S MODELS DEX WITH $\pm 50$ mm and $\pm 250$ mm FS	DEX WITH $\pm 500$ mm FS
Measuring base (A)	1000 mm (39.4")	1800 mm (59")
Total length (B)	1230 mm (48.4")	2030 mm (68.1")
Body diameter	35 mm (1.4")	
Wheel diameter	32 mm (1.25")	
Temperature operating range	$-30^{\circ}\text{C}$ to $+70^{\circ}\text{C}$	
Pressure rating	IP68 up to 1.0 MPa (higher pressure rating available on request)	
Material	stainless steel and thermoplastic resin	
Casing compatibility	S143 Easy Lock or S151 Quick-Joint casings, equipped with magnet rings	



## DEX/DEX-S VERTICAL LAYOUT



After the position of the magnetic rings is verified, the DEX/DEX-S sensors are suspended from the support head at the proper elevations. Optically surveying the position of the support head provides an absolute reference for vertical displacements.

### DEX SIGNAL CABLE OWE104SGOZH

22 AWG, 4-wire cable for DEX in-place extensometer with LSZH flame-retardant external jacket. External diameter 4.7 mm.

### DEX-S SIGNAL CABLE OWE110DXOZH

24 AWG, 10-wire cable for DEX-S in-place extenso-inclinometer with LSZH flame-retardant external jacket. External diameter 6.5 mm.

### SUPPORT HEAD OS4TS101000

The support head can be installed at the top of inclinometer casings for hanging the DEX / DEX-S string.

### SUPPORT STEEL WIRE OWRAC250000

The steel wire is used to install DEX and DEX-S probes at the correct depth within the inclinometer casing. Diameter 2.5 mm.

### MULTIPLEXER BOX, 24/48 CH O0MNO0MUXB0

Relay multiplexer board(s) with surge arrestors, mounted in IP65 plastic box for the connection of up to 12/24 DEX extensometers or 6/12 DEX-S extenso-inclinometers (without thermistors). It allows local reading with New Leonardo readout or remote connection to OMNIAlog datalogger.

### MUX BOX - OMNIALOG CABLE OWE610MUXZH

Cable with LSZH flame retardant jacket for the connection of external multiplexer boxes to OMNIAlog datalogger.

### OVP JUNCTION BOX OEPDP000W00

IP67 plastic box with 3-level OVP Over Voltage Protection boards (model OEXKV306W00) for the connection of up to 7 DEX extensometers or 3 DEX-S extenso-inclinometers.

### MULTICORE CABLE OWE1320LSZH

Multicore cable for the connection of OVP junction box to OMNIAlog. Composed by 16 twisted pair conductors and LSZH flame retardant jacket. External diameter 12.2 mm

### MAGNETIC DETECTOR PROBE OC121000000

Simple, portable device to verify position of magnet rings. Flat cable with millimeter graduations, mounted on reel. Available in different lengths.

## DEX HORIZONTAL LAYOUT

After the control of the position of the magnetic rings is verified (i.e. using the C121 BRS magnet detector probe), the DEX horizontal probes are inserted and pushed into the casing using the steel rods. Optically surveying the position of the support head provides an absolute reference for displacements.

### DEX SIGNAL CABLE OWE104SGOZH

22 AWG, 4-wire cable for DEX in-place extensometer with LSZH flame-retardant external jacket.  
External diameter 4.7 mm.

### OVP JUNCTION BOX OEPDP000W00

IP67 plastic box with 3-level OVP Over Voltage Protection boards (model OEXKV306W00) for the connection of up to 7 DEX extensometers or

### MULTICORE CABLE OWE1320LSZH

Multicore cable for the connection of OVP junction box to OMNIAlog. Composed by 16 twisted pair conductors and LSZH flame retardant jacket. External diameter 12.2 mm

### MULTIPLEXER BOX, 24/48 CH 00MNO0MUXB0

Relay multiplexer board(s) with surge arrestors, mounted in IP65 plastic box for the connection of up to 12/24 DEX extensometers. It allows local reading with New Leonardo readout or remote connection to OMNIAlog datalogger.

### MUX BOX - OMNIALOG CABLE OWE610MUXZH

Cable with LSZH flame retardant jacket for the connection of external multiplexer boxes to OMNIAlog datalogger.

### MAGNETIC DETECTOR PROBE OC121000000

Simple, portable device to verify position of magnet rings. Flat cable with millimeter graduations, mounted on reel. Available in different lengths.

### HORIZ. DEX TOP CAP ODEXOTS2350

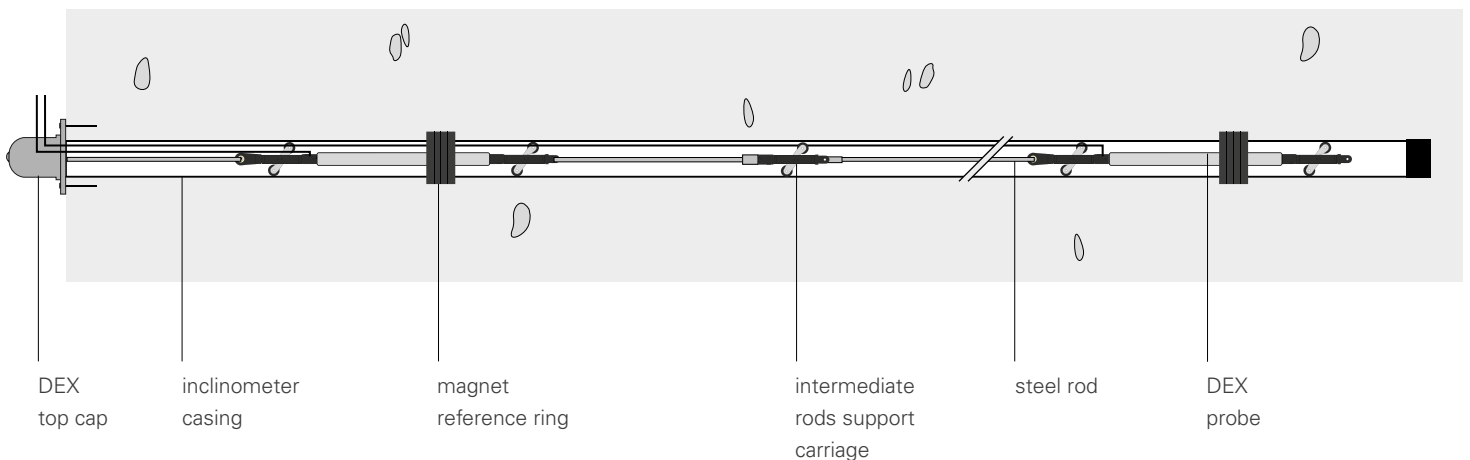
Special cap with No.3 anchor that permits to fasten the horizontal DEX string and fix it into the casing.

### PUSH/FASTEN RODS OS4R0DOAC00

Threaded steel bar with special ends for pushing IPI chain into the tube and fasten it to the top cap. Available in 1.0, 2.0 and 3.0 m lengths.

### HORIZ. RODS SUPPORT CARRIAGE OS4R0DOOSUP

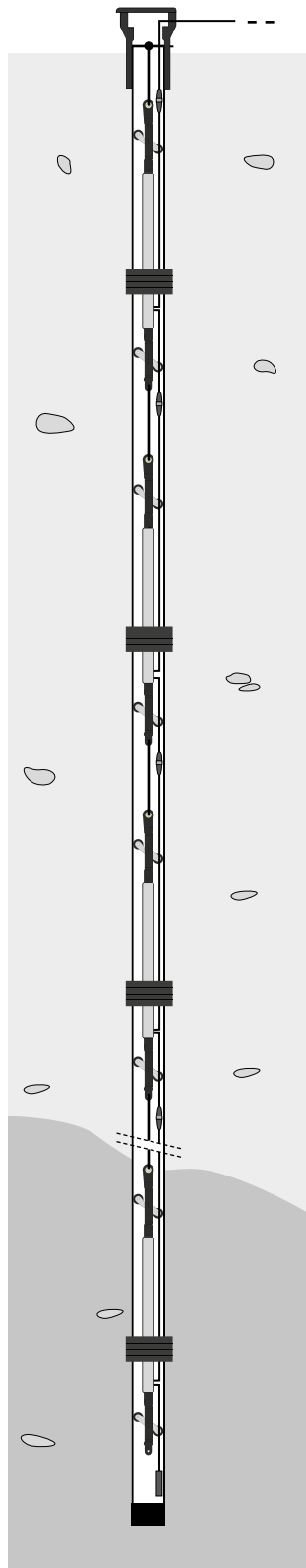
Additional carriage to be inserted every 2m length of steel pushing rods in order to support the steel rod chain and to do not have any bending.



## DIGITAL Vs. ANALOGUE VERSION

### DIGITAL OUTPUT

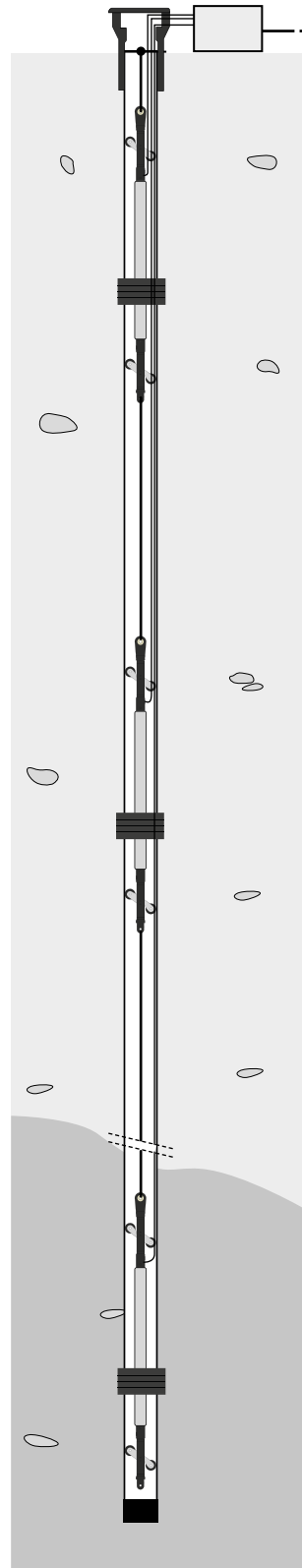
(Suitable for complex monitoring systems)



- Higher performances in terms of accuracy and resolution
- Faster installation: only one cable for the whole chain
- Maximum number of probe per chain: 30 (timed mode)
- Maximum cable length: 1000m
- One-click logger set up with OMNIAlog and miniOMNIAlog
- Higher data acquisition frequency up to 1 second per instrument
- Each gauge gives internal data of temperature, humidity and voltage supply

### ANALOG OUTPUT

(Suitable for simple monitoring systems)



- Good performances
- Each gauge has its own cable
- Maximum number of probe per chain: 9
- Maximum cable length: 200m
- Data acquisition frequency about 10 seconds per instrument
- Each gauge has an internal temperature sensor

## CASINGS AND ACCESSORIES

For most installations, S143 ABS inclinometer casing with external rings works well. However, for deep installations (140-150m), S151 quick-joint casing is recommended. Inform the sales engineer if you will use quick-joint casing so that rings can be installed during manufacturing. For further information, refer to the S143 and S151 inclinometer casing datasheet.

### S143 ABS INCLIN. CASING OS143107000

Easy lock ABS inclinometer casing model S143, 3 m length, OD 70 mm, ID 58 mm.

### S143 BOTTOM CAP OS143TF7000

Top/bottom cap for S143 casings, made of ABS. Suitable for inclinometer column or extenso-inclinometer column.

### ASSEMBLING KIT FOR 100 M OS143KIT000

Assembling set composed by 5 O-rings, locking wire and Sisgeo adhesive tape. (Mandatory)

### S151 QJ ABS INCLIN. CASING OS151107000

Quick joint ABS inclinometer casing model S151, 3 m length, casing OD 70 mm, coupling OD 84 mm, ID 59 mm.

### S151 BOTTOM CAP OS151TF7000

Bottom cap with female quick joint coupling for fast casing assembling.

### SPARE KIT FOR S151 CASING OS151KIT000

This kit includes No.10 "O" rings and No.10 locking rings.

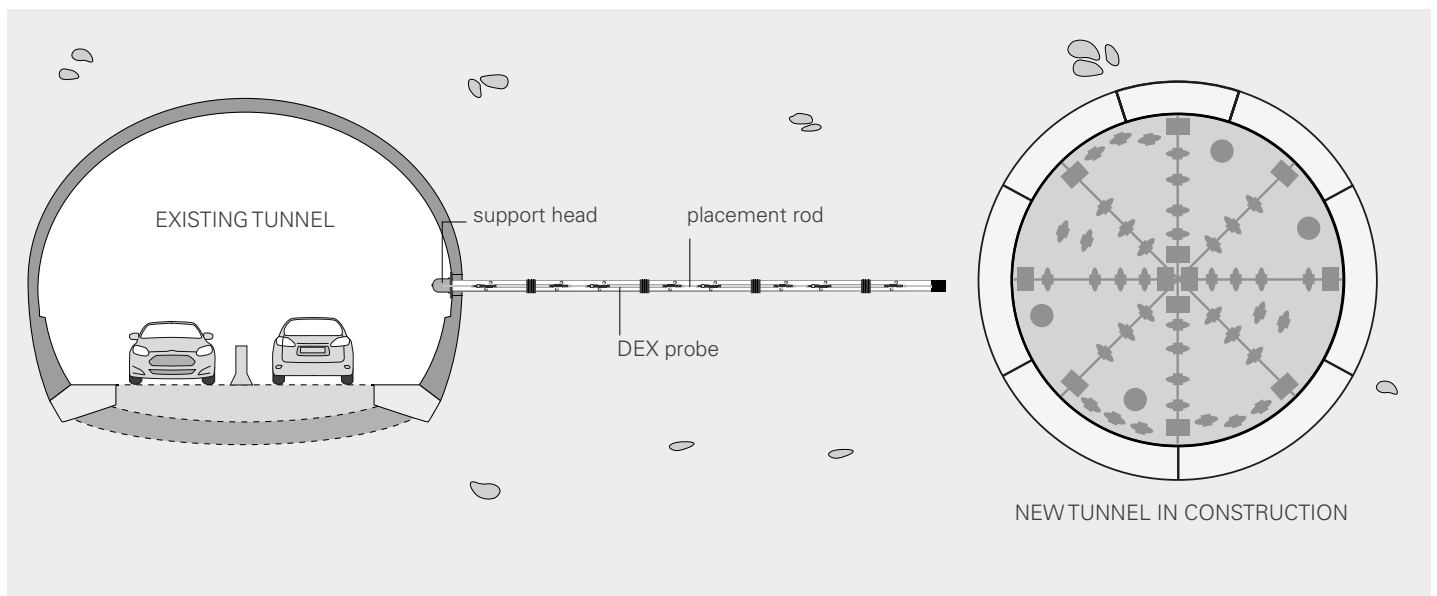
### MAGNET REFERENCE RING OREXORING93

Magnet ring for T-REX, DEX and DEX-S extensometers. OD 93 mm, ID 71 mm. Material: PVC with permanent magnet.

### SPIDER REFERENCE RING OREX0AF7093

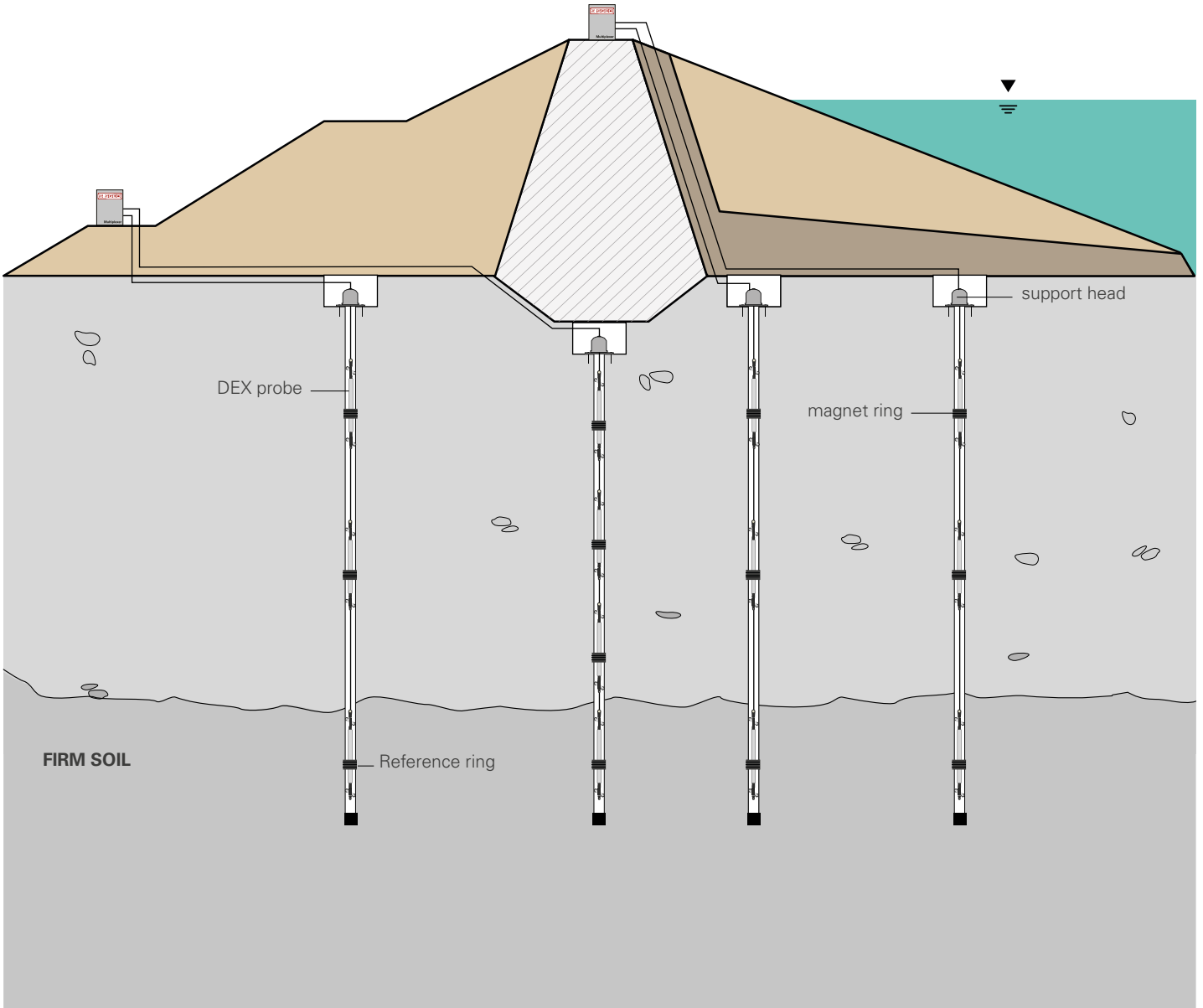
Spider magnet ring for T-REX, DEX and DEX-S extensometers. OD 93 mm, ID 71 mm. Max spring span 300 mm. Material: PVC with permanent magnet.

## EXAMPLE OF HORIZONTAL APPLICATION OF DEX EXTENSOMETER

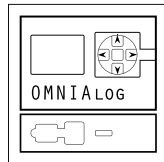
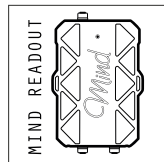




EXAMPLE OF APPLICATION IN EMBANKMENT DAM FOUNDATION



READABLE BY



Refer to separate datasheets for further information.

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