

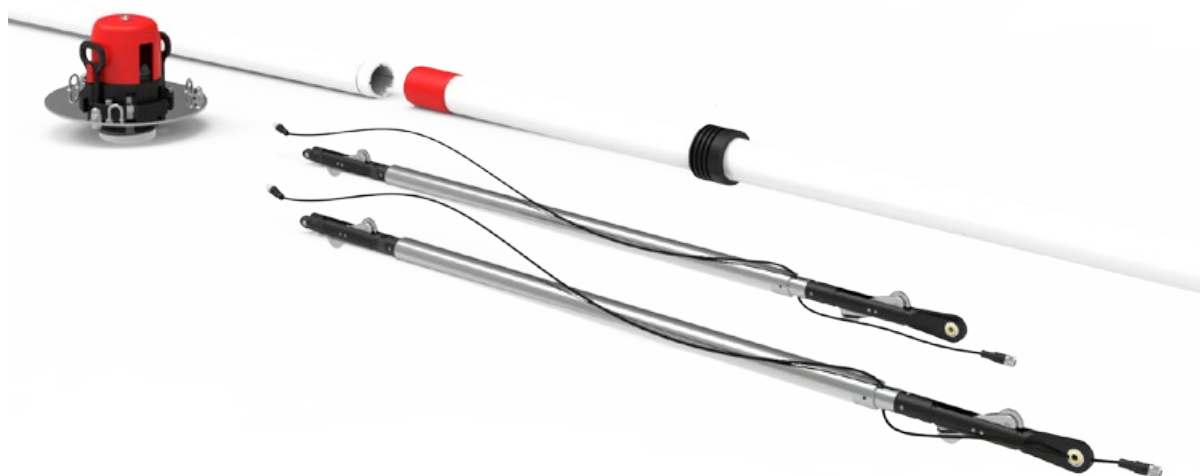


DEX-D

## — DEX AND DEX-S DIGITAL EXTENSOMETERS

EXTENSOMETERS





## DEX AND DEX-S DIGITAL EXTENSOMETERS

The DEX-S extenso-inclinometer is a 3D probe with an exclusive merge of two sensors: a high accuracy biaxial MEMS inclinometer to read displacements on horizontal axis, and a contactless magnetic sensor to monitor the vertical displacements.

A chain of probes installed in a borehole allows the unique advantage to return a 3D profile of both the casing and surrounding ground where the chain is installed.

The DEX extensometer is equivalent to DEX-S but without inclinometer sensor, so that a chain of DEX probes is suitable to read vertical displacements only.

DEX and DEX-S are installed into ABS inclinometer casings with special magnet rings.

### APPLICATIONS

- Monitoring 3D deformation in tunneling and diaphragm walls
- Monitoring settlement in dam foundations
- Monitoring lateral displacements in dams and rockfall areas
- Monitoring settlements at depths up to 200 m

### FEATURES

- 3-D borehole profile
- Removable, reusable sensors
- Cost savings by use of single borehole
- mixed chains of DEX-S and DEX extensometer probes are allowed
- DEX-S and DEX chains can be removed and installed in other projects



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



## DEX-S 3D DIGITAL EXTENSO-INCLINOMETERS

PRODUCT CODES	0DEX35S115D		0DEX35S130D	
SETTLEMENT SENSOR				
Sensor type	high performance contactless displacement transducer			
FS and Measuring range	100 mm (±50 mm)			
Sensor resolution (with OMNIAlog datalogger)	0.0001mm (with OMNIAlog datalogger)			
Sensor repeatability	0.007 mm			
Sensor 24 hours stability <sup>(1)</sup>	±0.06 mm			
Sensitivity <sup>(2)</sup>	See Calibration Report			
Sensor accuracy: Lin. MPE <sup>(3)</sup> Pol. MPE <sup>(3)</sup>	< ±0.30% FS (< ±0.30mm) < ±0.25% FS (< ±0.25mm)			
TILT SENSOR				
Sensor type	biaxial MEMS inclinometer		biaxial MEMS inclinometer	
Measuring range	±10°, ±15°		±20°, ±30°	
Sensor resolution	0.00056° (reading frequency 2 Hz)		0.00056° (reading frequency 2 Hz)	
Sensor mechanical bandwidth	18 Hz		18 Hz	
Sensor repeatability	0.002°		0.002°	
Sensitivity <sup>(2)</sup>	See Calibration Report		See Calibration Report	
Sensor accuracy: Lin. MPE <sup>(3)</sup> Pol. MPE <sup>(3)</sup>	< ±0.030% FS < ±0.015% FS		< ±0.100% FS < ±0.020% FS	
Sensor 24 hours stability <sup>(1)</sup>	< ±0.07 mm / m (A-axis)		< ±0.07 mm / m (A-axis)	
Offset temperature dependency	±0.002° / °C		±0.002° / °C	
TEMPERATURE SENSOR <sup>(4)</sup>				
	Embedded on electronic board			
Measuring range	- 40°C to +125°C			
Accuracy	±1°C with temperature range -10°C to +85°C			
HUMIDITY SENSOR <sup>(4)</sup>				
	Embedded on electronic board			
Measuring range	0 to 100% RH			
Accuracy	±5% RH with humidity range 0 to 95% RH			
SUPPLY VOLTAGE MONITOR <sup>(4)</sup>				
	Embedded on electronic board			
Measuring range	0 to 36 V			
Accuracy	±5% FS			
ELECTRICAL INFORMATION				
Signal output	RS-485 with Modbus RTU protocol <sup>(5)</sup>			
Power supply	from 12 to 24 V dc - default powering set up is TIMED <sup>(6)</sup>			
Average consumption	70 mA @ 24 Vdc, 145 mA @ 12 Vdc			
Max cable length to logger	1000 m (for more information see F.A.Q.#077 on Sisgeo web site)			

(1) Stability calculated as difference after a 24 h period under repeatability conditions. (2) Sensitivity is a specific parameter different for every gauge. The sensitivity is calculated during gauge calibration test and inserted into the Calibration Report. (3) 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). (4) These sensors are installed on the internal electronic board for sensor diagnostics. (5) RS485 not-optoisolated Modbus communication with RTU Protocol. Default output is [mm] for settlement sensor and [sin  $\alpha$ ], for tilt sensor. Other units are available and to be requested at order. Sisgeo Modbus protocol manual is available for download at [this page](#). (6) For more information regarding powering mode, please visit F.A.Q.#094 on [www.sisgeo.com](#).

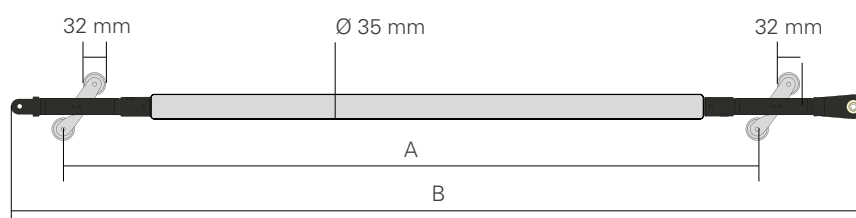
## DEX DIGITAL EXTENSOMETERS

PRODUCT CODES	0DEX350100D	0DEX350500D	0DEX351000D
<b>SETTLEMENT SENSOR</b>	high performance contactless displacement transducer		
Sensor type			
FS and Measuring range	100 mm (±50 mm)	500 mm (±250 mm)	1000 mm (±500 mm)
Sensor resolution (with OMNIAlog datalogger)	0.0001 mm	0.0001 mm	0.0001 mm
Sensor repeatability	0.007 mm	N/A	N/A
Sensor 24 hours stability <sup>(1)</sup>	±0.06 mm	N/A	N/A
Sensitivity <sup>(2)</sup>	See Calibration Report	See Calibration Report	See Calibration Report
Sensor accuracy: Lin. MPE <sup>(3)</sup> Pol. MPE <sup>(3)</sup>	< ±0.30% FS (< ±0.30 mm) < ±0.25% FS (< ±0.25 mm)	< ±0.10% FS (< ±0.5mm) < ±0.08% FS(< ±0.4 mm)	< ±0.10% FS (< ±1.0 mm) < ±0.08% FS(< ±0.8 mm)
<b>TEMPERATURE SENSOR <sup>(4)</sup></b>	Embedded on electronic board		
Measuring range	- 40°C to +125°C		
Accuracy	±1°C with temperature range -10°C to +85°C		
<b>HUMIDITY SENSOR <sup>(4)</sup></b>	Embedded on electronic board		
Measuring range and accuracy	0 to 100% RH / ±5% RH (within 0 to 95% RH)		
<b>SUPPLY VOLTAGE MONITOR <sup>(4)</sup></b>	Embedded on electronic board		
Measuring range and accuracy	0 to 36 V / ±5% FS		
<b>ELECTRICAL INFORMATION</b>			
Signal output	RS-485 with Modbus RTU protocol <sup>(5)</sup>		
Power supply	from 12 to 24 V dc - default powering set up is TIMED <sup>(6)</sup>		
Average consumption	68 mA @ 24 Vdc, 140 mA @ 12 Vdc		
Max cable length to logger	1000 m (for more information see F.A.Q.#077 on Sisgeo web site)		

(1) Stability calculated as difference after a 24 h period under repeatability conditions. (2) Sensitivity is a specific parameter different for every gauge. The sensitivity is calculated during gauge calibration test and inserted into the Calibration Report. (3) 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). (4) These sensors are installed on the internal electronic board for sensor diagnostics. (5) RS485 not-optoisolated Modbus communication with RTU Protocol. Default output is [mm], other units available and to be requested at order. Sisgeo Modbus protocol manual is available for download at [this page](#). (6) For more information regarding powering mode, please visit F.A.Q.#094 on [www.sisgeo.com](#).

## DEX AND DEX-S PHYSICAL FEATURES

PROBE FEATURES	ALL DEX-S MODELS DEX WITH ±50 mm and ±250 mm range	DEX WITH ±500 mm range
Measuring base (A)	1000 mm (39.4")	1500 mm (59")
Total length (B)	1230 mm (48.4")	1730 mm (68.1")
Temperature operating range	-30°C to +70°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	



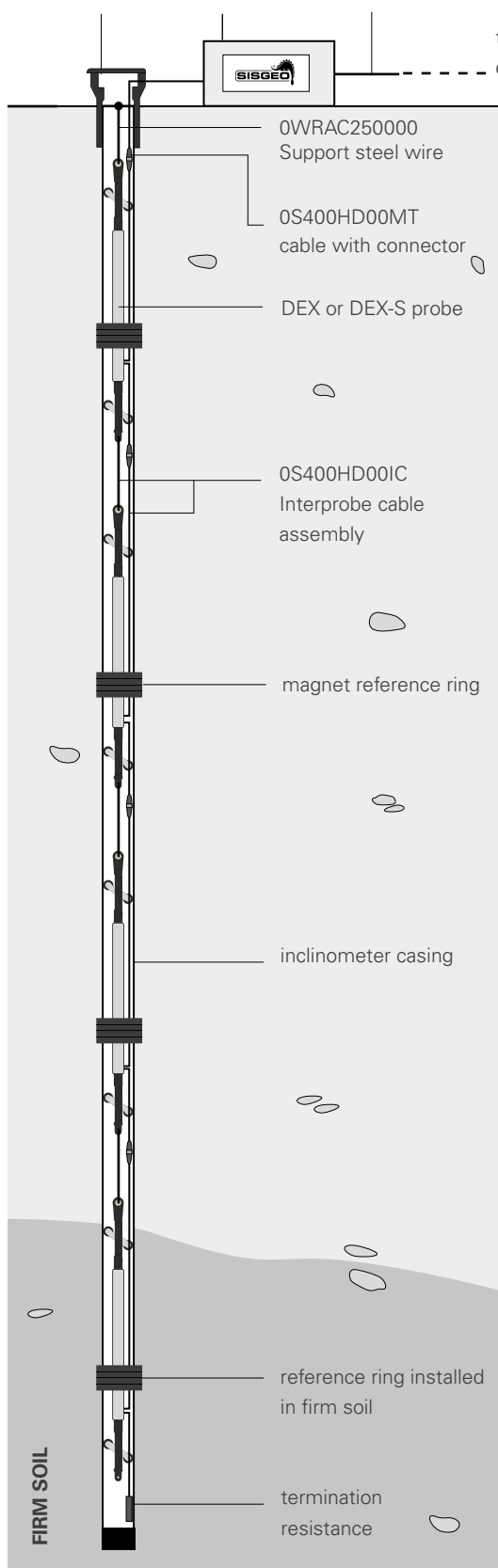
## DEX/DEX-S VERTICAL LAYOUT

support head  
OS4TS101000

Junction box  
0EPD023IPID

Digital cable  
0WE606IPDZH

to OMNIAlog  
datalogger



### INTERPROBE CABLE ASSEMBLY OS400HD00IC

Available in different lengths (2m, 5m, 10m, 15m), it is composed by digital signal cable with female/male connectors and stainless steel support wire for the connection of a lower probe to the upper one.

### SUPPORT STEEL WIRE 0WRAC250000

Steel wire for hanging the DEX string from the upper probe to the support head. Diameter 2.5 mm.

### DIGITAL CABLE 0WE606IPDZH

LSZH cable for connecting digital gauge' chain to OMNIAlog datalogger.

### RESISTANCES KIT (SPARE) 0ERESIKIT00

Kit composed by one 120 Ohm, two 240 Ohm, three 360 Ohm and four 480 Ohm resistance ending devices. Each one has an M12 5-pin connector for linking to SISGEO digital gauges. Check compatibility with old digital gauges with your Sales Representative.

### MAGNETIC DETECTOR PROBE 0C121000000

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

### UPPER CABLE WITH CONNECTOR OS400HD00MT

Available in different lengths (2m, 5m, 10m, 15m), it is composed by digital signal cable with a connector for linking the upper probe to the junction box or logger.

### SUPPORT HEAD OS4TS101000

It is installed at the top of inclinometer casings for hanging the DEX/DEX-S string.

### DIGITAL JUNCTION BOX 0EPD023IPID

Junction box for chains of digital instruments, composed by IP67 plastic box, internal electronic board for wiring and three cable glands.

### RESISTANCE ENDING DEVICE 0ETERMRESIO

Termination resistance with connector, needed to close every digital instrument' chain. The value of resistor depends on the layout of each DEX system. For more detail see the [FAQ#076](#).

### INSTALLATION KIT OS4IPIT00LO

Kit composed by one plier for copper sleeves and 20 copper sleeves

## 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.

### UPPER CABLE WITH CONNECTOR OS400HD00MT

Available in different lengths (2m, 5m, 10m, 15m), it is composed by digital signal cable with a connector for linking the upper probe to the junction box or logger.

### DIGITAL JUNCTION BOX OEPD023IPID

Junction box for chains of digital instruments, composed by IP67 plastic box, internal electronic board for wiring and three cable glands.

### DIGITAL CABLE OWE606IPDZH

LSZH cable for connecting digital gauge' chain to OMNIAlog datalogger.

### INTERPROBE CABLE ASSEMBLY OS400HD00IC

Available in different lengths (2m, 5m, 10m, 15m), it is composed by digital signal cable with female/male connectors and stainless steel support wire (not used in horizontal installation) for the connection of a lower probe to the upper one.

### RESISTANCE ENDING DEVICE OETERMRESIO

Termination resistance with connector, needed to close every digital instrument' chain. The value of resistor depends on the layout of each DEX system.  
For more detail see the [FAQ#076](#).

### 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

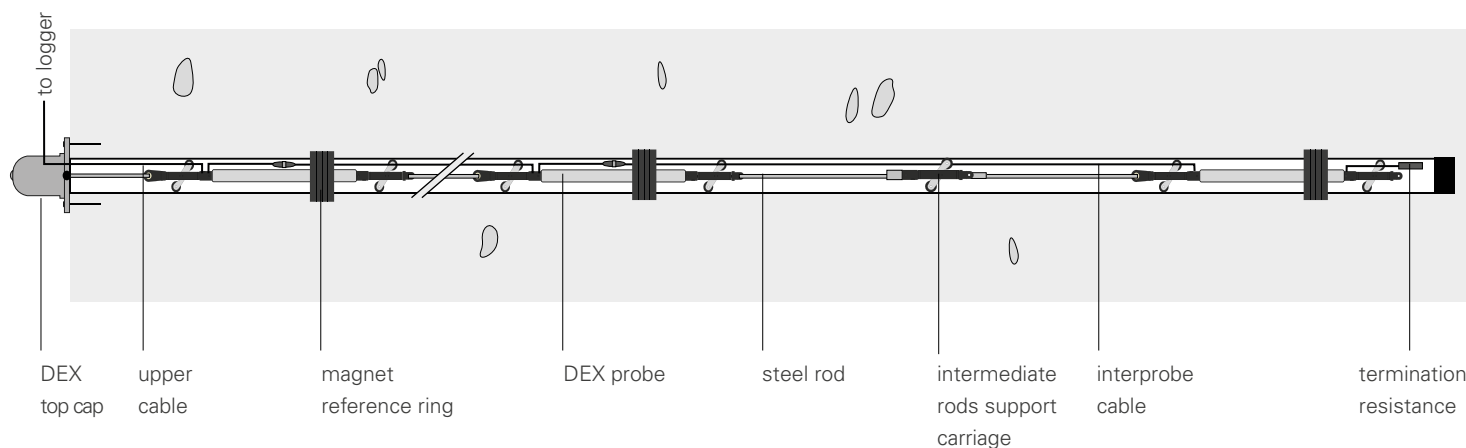
Special cap with No.3 anchor that permits to fasten the horizontal DEX string and fix it into the casing.

### STEEL RODS OS4ROD0AC00

Threaded steel bar with special ends for pushing DEX 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 OS4ROD00SUP

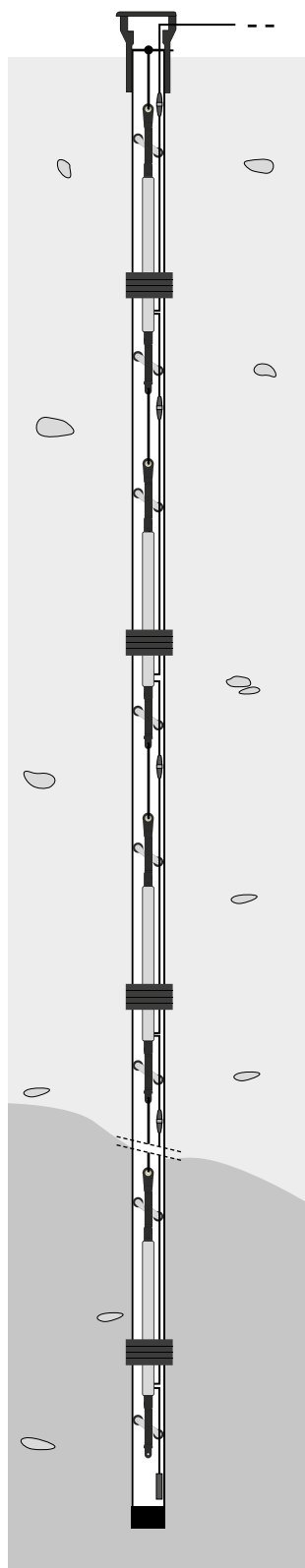
Additional carriage to be inserted every 2m length of steel pushing rods in order to support the steel rod chain and to do not have any bending.



## DIGITAL Vs. ANALOGUE VERSION

### DIGITAL OUTPUT

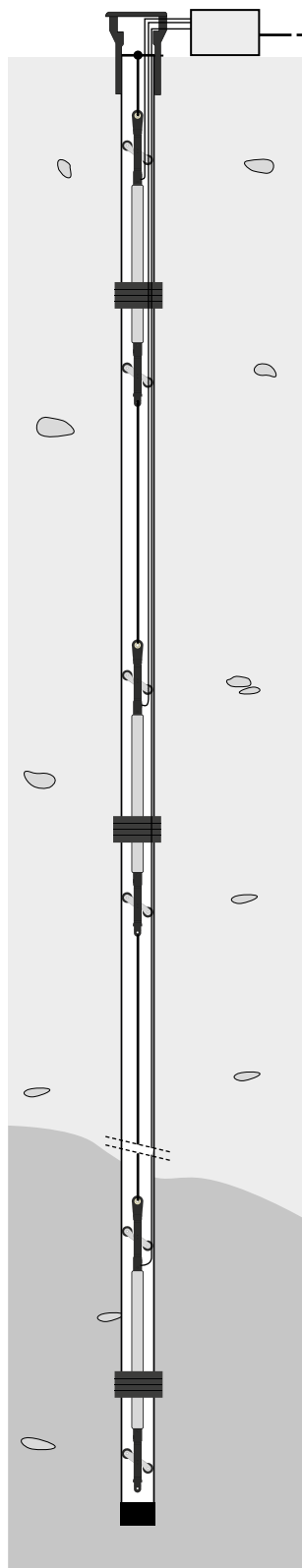
(Suitable for complex monitoring systems)



- 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

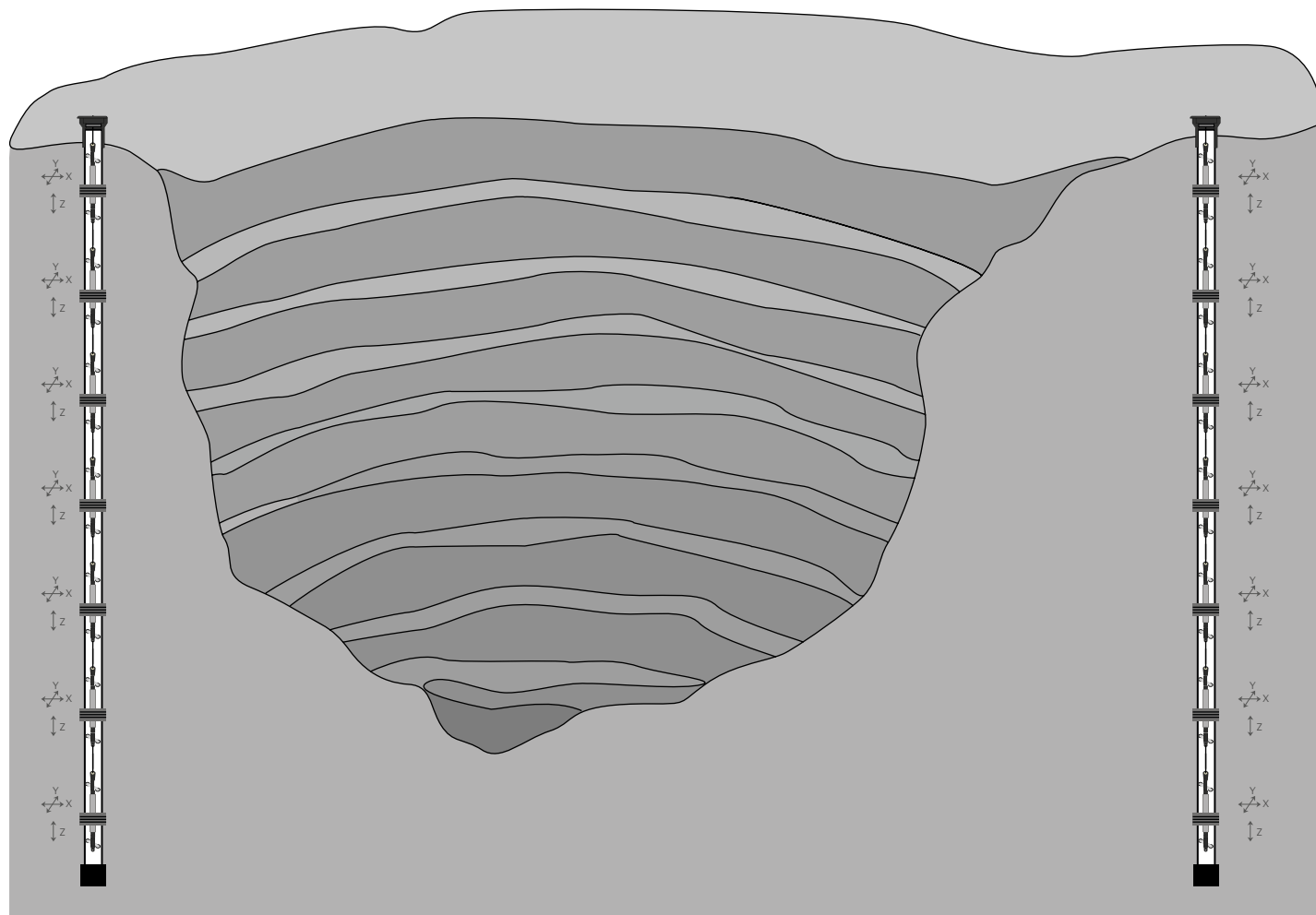
(Suitable for simple monitoring systems)



- 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



## EXAMPLE OF DIGITAL DEX-S EXTENSO-INCLINOMETERS APPLICATION IN OPEN-PIT MINE

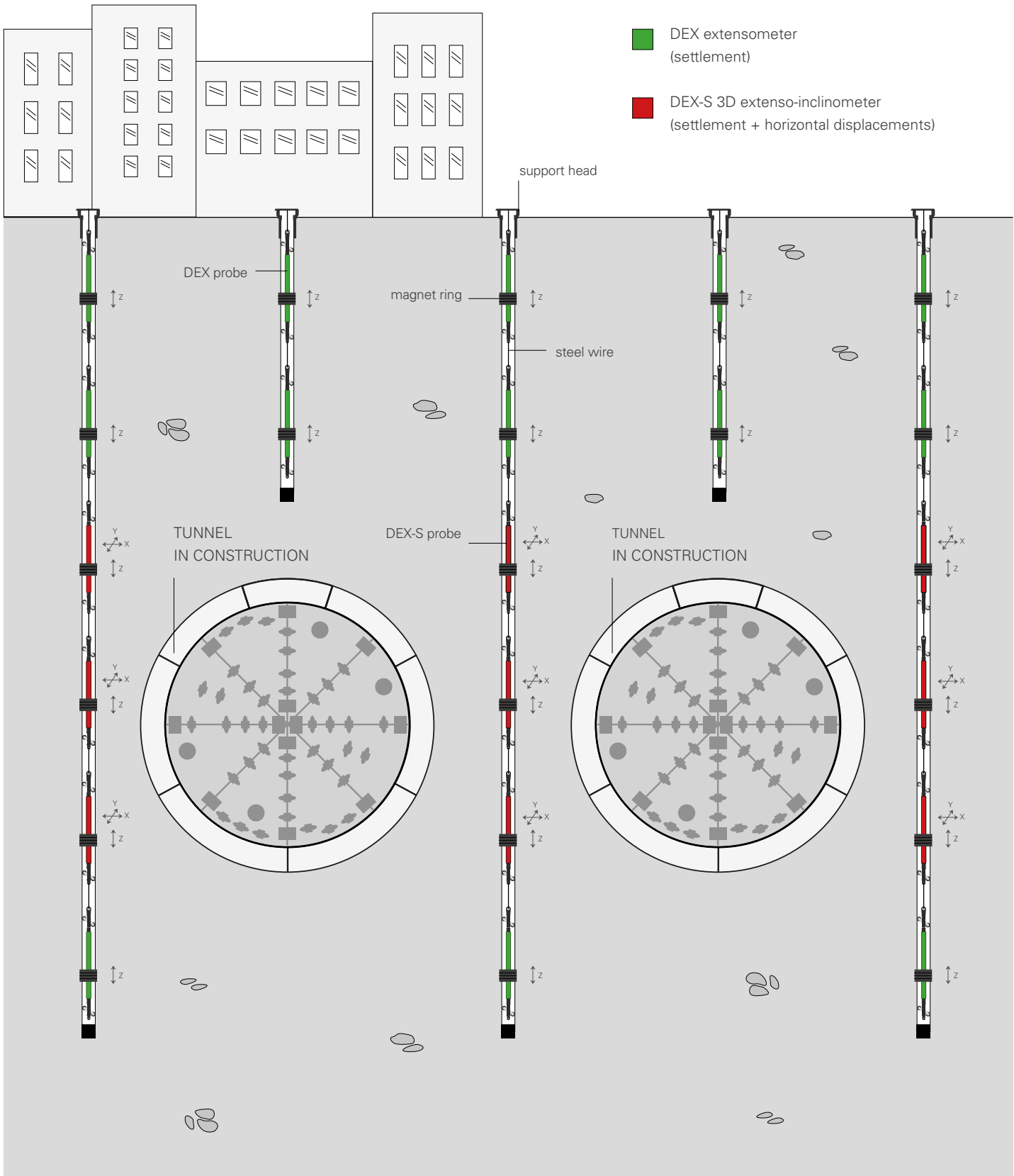


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## DEX / DEX-S MIXED COLUMN APPLICATION



## 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 casing datasheet.

### S143 ABS INCLIN. CASING 0S143107000

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

### S143 BOTTOM CAP 0S143TF7000

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

### ASSEMBLING KIT FOR 100M 0S143KIT000

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

### S151 QJ ABS INCLIN. CASING 0S151107000

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

### S151 BOTTOM CAP 0S151TF7000

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

### SPARE KIT FOR S151 CASING 0S151KIT000

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

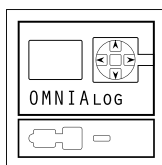
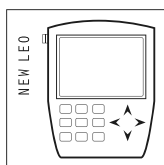
### MAGNET REFERENCE RING 0REXORING93

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

### SPIDER REFERENCE RING 0REX0AF7093

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.

## READABLE BY



Refer to separate datasheets for further information.

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### ADDITIONAL SUPPORT

SISGEO offers customers e-mail and phone assistance to ensure proper use of instruments and readout and to maximize performance of the system.

For more information, please refer to the FAQ pages on our website or email us: [assistance@sisgeo.com](mailto:assistance@sisgeo.com)