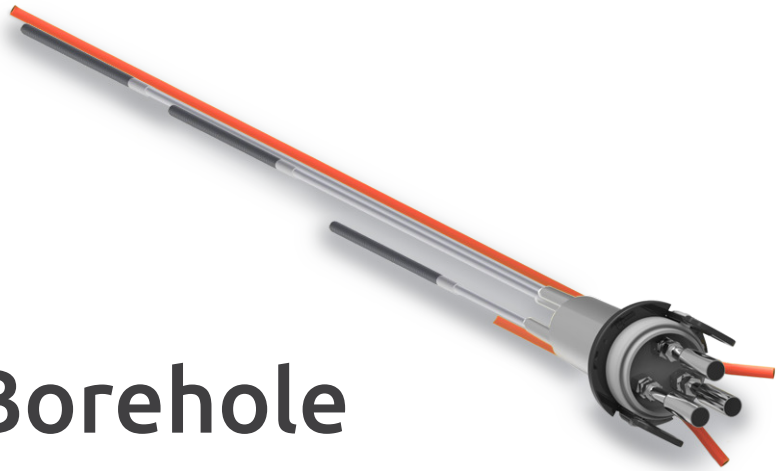


Instrument Datasheet

# Multipoint Borehole Extensometer



## DESCRIPTION

The MPBX, also known as multi-point rod extensometer, is designed to monitor changes in the distance between downhole anchors, each set at a specified depth in the borehole, and a measurement head at the surface. Rods extend upward from the anchors to the head, where measurements are made with a depth micrometer or displacement transducers.

MPBX heads are sized to accommodate measurement ranges up to 100 mm (3.9") or 200 mm (7.9"), the number of anchors (points) to be monitored, and the type of rod to be used.

Groutable anchors are included with the heads while packer anchors are available as option.

MPBX rods are available in fiberglass or stainless steel. Both types include a nylon sleeve that breaks friction between the rods and the surrounding soil or grout.

MPBX measurements can be taken manually with a depth micrometer or remotely with vibrating wire or 4-20mA displacement transducers and a readout or data logger.

## APPLICATIONS

- ✓ Tunnelling
- ✓ Deep excavations
- ✓ Dams
- ✓ Foundations
- ✓ Settlement monitoring
- ✓ Rock displacements

## FEATURES

- ✓ Invar rods available on request
- ✓ 4-20mA sensors and vibrating wire sensors available
- ✓ Automated, remote readings possible

## MPBX 100 MM (3.9") RANGE

VERSION	MPBX WITH FIBERGLASS RODS	MPBX WITH STAINLESS STEEL RODS
PRODUCT CODES <sup>(1)</sup>	0D222FG01A0 (single point) 0D222FG02A0 (2 points) 0D222FG03A0 (3 points) 0D222FG04A0 (4 points)	0D222FG05A0 (5 points) 0D222FG06A0 (6 points) 0D222FG07A0 (7 points)
		0D222AC01A0 (single point) 0D222AC02A0 (2 points) 0D222AC03A0 (3 points) 0D222AC04A0 (4 points)
		0D222AC05A0 (5 points) 0D222AC06A0 (6 points) 0D222AC07A0 (7 points)
HEAD		
Materials	stainless steel, galvanised steel and ABS	stainless steel, galvanised steel and ABS
Displacement	0DTE1A02500 (4-20 mA, 25 mm)	0DTE1A02500 (4-20 mA, 25 mm)
transducer compatibility	0DTE1A05000 (4-20 mA, 50 mm)	0DTE1A05000 (4-20 mA, 50 mm)
(see specifications at page 5)	0DTE1A10000 (4-20 mA, 100 mm) 0DTE010VW00 (VW+T, 10 mm) 0DTE025VW00 (VW+T, 25 mm) 0DTE050VW00 (VW+T, 50 mm) 0DTE100VW00 (VW+T, 100 mm)	0DTE1A10000 (4-20 mA, 100 mm) 0DTE010VW00 (VW+T, 10 mm) 0DTE025VW00 (VW+T, 25 mm) 0DTE050VW00 (VW+T, 50 mm) 0DTE100VW00 (VW+T, 100 mm)
ANCHORS <sup>(2)</sup>		
Galvanised rebars (included)	Ø 16 mm / length 400 mm (Ø 0.625" / 16")	Ø 22 mm / length 400 mm (Ø 0.9" / 16")
Packers (option)	see page 5, max 4 packers for each extensometer	see page 5, max 4 packers for each extensometer
RODS AND SLEEVES		
Product code	0D221BMFG00 <sup>(3)</sup>	0D221BMAC00 <sup>(4)</sup>

## MPBX 200 MM (7.9") RANGE

VERSION	MPBX WITH FIBERGLASS RODS	MPBX WITH STAINLESS STEEL RODS
PRODUCT CODES <sup>(1)</sup>	0D222FG01B0 (single point) 0D222FG02B0 (2 points) 0D222FG03B0 (3 points) 0D222FG04B0 (4 points)	0D222FG05B0 (5 points) 0D222FG06B0 (6 points) 0D222FG07B0 (7 points)
		0D222AC01B0 (single point) 0D222AC02B0 (2 points) 0D222AC03B0 (3 points) 0D222AC04B0 (4 points)
		0D222AC05B0 (5 points) 0D222AC06B0 (6 points) 0D222AC07B0 (7 points)
HEAD		
Materials	stainless steel, galvanised steel, and ABS	stainless steel, galvanised steel, and ABS
Displacement	0DTE1A15000 (4-20 mA, 150 mm)	0DTE1A15000 (4-20 mA, 150 mm)
transducer compatibility	0DTE1A20000 (4-20 mA, 200 mm)	0DTE1A20000 (4-20 mA, 200 mm)
(see specifications at page 5)	0DTE150VW00 (VW+T, 150 mm)	0DTE150VW00 (VW+T, 150 mm)
ANCHORS		
Galvanised rebars (included)	Ø 16 mm / length 400 mm (Ø 0.625" / 16")	Ø 22 mm / length 400 mm (Ø 0.9" / 16")
Packers (option)	see page 5, max 4 packers for each extensometer	see page 5, max 4 packers for each extensometer
RODS AND SLEEVES		
Product codes	0D221BMFG00 <sup>(3)</sup>	0D221BMAC00 <sup>(4)</sup>

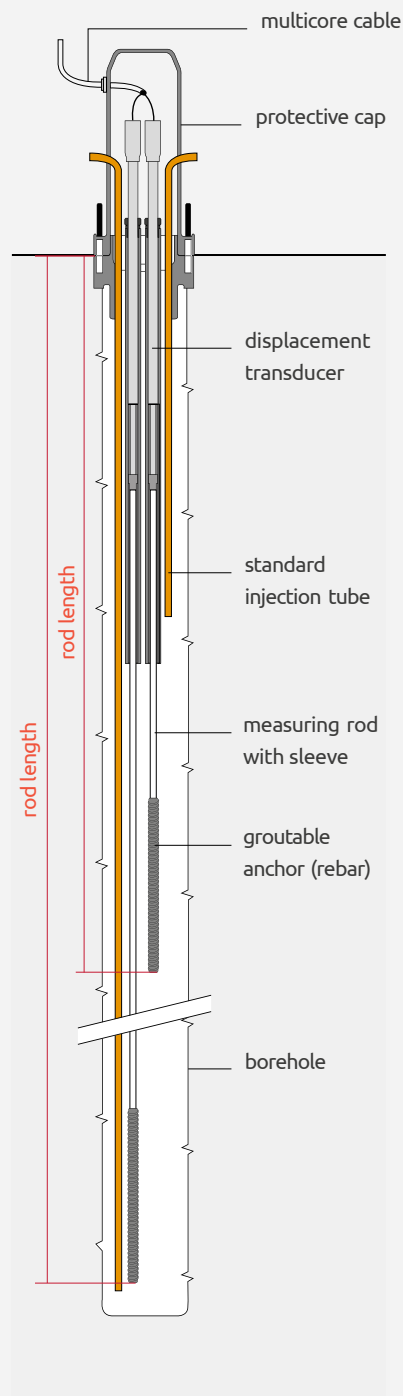
(1) MPBX product codes include an instrument head, a short top cap (0D222TOP100), and anchors. Rods, transducers, and protective caps for transducers are not included. Codes for these items are on page 4 and 5.

(2) Anchors will be assembled at site screwing them to the end of the rods

(3) Fiberglass rods and sleeves are assembled to the head at factory. Specify depth for each anchor at order. See technical specifications, page 4.

(4) Stainless steel rods are supplied in 2m lengths and assembled on site. Specify depth for each anchor so that factory can supply the proper number of rods and sleeves length. See technical specifications, page 4.

## PHYSICAL FEATURES



### RODS AND SLEEVES

PRODUCT CODES	0D221BMFG00	0D221BMAC00
Rod material	fiberglass	stainless steel
Coefficient of linear expansion	$5.0 \times 10^{-6} / ^\circ\text{C}$	$12.0 \times 10^{-6} / ^\circ\text{C}$
Rod type	pre-assembled	2m (6.5') section (assembled on site)
Rod junctions	continuous	threaded couplings (M/F)
Diameter	7 mm (0.28")	8 mm (0.31")
Weight	0.20 kg/m	0.40 kg/m
Protective anti-friction sleeve	nylon 11 (rilsan), OD 12 mm	nylon 11 (rilsan), OD 12 mm
Rod-anchor connection	fitted at factory	quick joint

### PROTECTIVE CAPS

PRODUCT CODES	0D222TOP100 <sup>(1)</sup>	0D222TOP200
Length	100 mm (3.9")	200 mm (7.9")
Diameter	120 mm (4.7")	120 mm (4.7")
Material	ABS	ABS
Transducer compatibility	No transducer allowed (only for manual measurements with dial gauge)	0DTE010VW00 (VW+T, 10mm) 0DTE025VW00 (VW+T, 25mm) 0DTE1A02500 (4-20 mA, 25mm)

PRODUCT CODES	0D222TOP320	0D222TOP520
Length	320 mm (12.6")	520 mm (20.5")
Diameter	120 mm (4.7")	126 mm (5.0")
Material	ABS	ABS
Transducer compatibility	0DTE050VW00 (VW+T, 50mm) 0DTE100VW00 (VW+T, 100mm) 0DTE1A05000 (4-20 mA, 50mm) 0DTE1A10000 (4-20 mA, 100mm)	0DTE150VW00 (VW+T, 150mm) 0DTE1A15000 (4-20 mA, 150mm) 0DTE1A20000 (4-20 mA, 200mm)

(1) Short top cap is supplied as default with all the MPBX if a longer top cap to cover displacement transducer is not required.

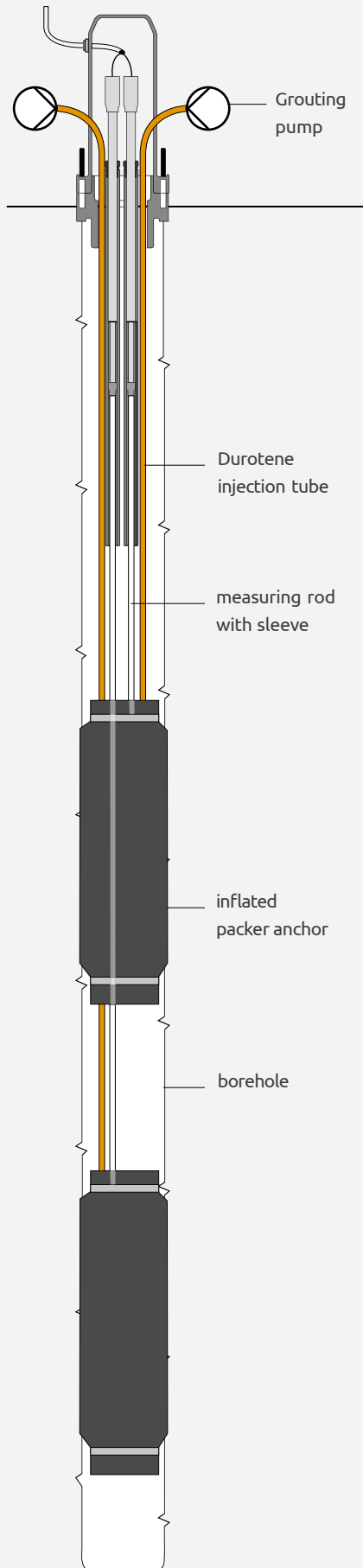
### DIGITAL DEPTH GAUGE

Digital depth gauge is used for manual readings. It includes gauge with LCD display in metric and imperial units, a 1.5V SR44 battery, a 200 mm extension rod, two 100 mm extension rods, a calibration device, and a carrying case.



PRODUCT CODE	0DIGD020000
Range	200 mm (7.9")
Resolution	0.01 mm (0.0004")
Temperature rating	0° C - 40° C
Humidity rating	≤ 80%

## PHYSICAL FEATURES



### PACKER ANCHORS

Usually packer anchors are used in heavily fractured rock to prevent loss of grout and in over head installations like in tunnels.

Packer anchors can be utilised also in very soft soil: the borehole is filled, before the extensometer is installed, with a very soft grout, then the extensometer is installed and the borehole casing is retracted. After retraction of the borehole casing, inflate the groutable anchors so to expand them against the borehole wall.

PAKER ANCHOR 127 MM  
OD222PKR127

Packer anchor for borehole up to 127mm, composed by geotextile packer bag and 400 mm long stainless steel tube to which the measuring rod is fixed.

External diameter with not-inflated packer about 85 mm. One piece is needed for each anchoring point (base). Max 4 packer anchors for each extensometer.

PACKER INJECTION TUBE  
OTUPE101400

Durotene® tube for packer inflation,  
ID 10 mm, OD 14 mm.



## VIBRATING WIRE DISPLACEMENT TRANSDUCERS

PRODUCT CODES	ODTE010VW00	ODTE025VW00	ODTE050VW00	ODTE100VW00	ODTE150VW00
Measurement principle	vibrating wire with built-in thermistor				
Range	10 mm (0.4")	25 mm (1.0")	50 mm (2.0")	100 mm (3.9")	150 mm (5.9")
Accuracy					
Pol. MPE <sup>(1)</sup>	< ±0.50% FS <sup>(2)</sup>	< ±0.50% FS <sup>(2)</sup>	< ±0.30% FS <sup>(2)</sup>	< ±0.30% FS <sup>(2)</sup>	< ±0.30% FS <sup>(2)</sup>
Output signal	frequency (displacement), Ohm (thermistor)				
Resolution (with Sisgeo readout)	<0.0066% FS				
Sensitivity <sup>(3)</sup>	see calibration report				
Typical frequency range <sup>(4)</sup>	1500 - 2800 Hz				
Operating temperature	- 20°C +80°C				
Thermal coefficient of expansion	50 ppm / °C				
Length (compressed)	176 mm (6.9")	183 mm (7.2")	248 mm (9.8")	379 mm (14.9")	510 mm (20.1")
Length with rod extended	186 mm (7.3")	208 mm (8.2")	298 mm (11.8")	479 mm (18.8")	660 mm (26.0")
Material	stainless steel				
Max cable length to logger <sup>(5)</sup>	1000 m				

## ELECTRICAL DISPLACEMENT TRANSDUCERS

PRODUCT CODES	ODTE1A02500	ODTE1A05000	ODTE1A10000	ODTE1A15000	DTE1A20000
Technology	Linear potentiometer				
Range	25 mm (1")	50 mm (2")	100 mm (4")	150 mm (5.9")	200 mm (7.9")
Accuracy					
Pol. MPE <sup>(1)</sup>	< ±0.30% FS <sup>(2)</sup>	< ±0.20% FS <sup>(2)</sup>	< ±0.20% FS <sup>(2)</sup>	< ±0.15% FS <sup>(2)</sup>	< ±0.15% FS <sup>(2)</sup>
Output signal	4-20 mA current loop (displacement)				
Resolution (with Sisgeo readout)	<0.0060% FS				
Power supply	12 - 24 V DC				
Sensitivity <sup>(3)</sup>	see calibration report				
Operating temperature	- 20°C +80°C				
Thermal coefficient of expansion	50 ppm / °C				
Length (compressed)	272 mm (10.7")	322 mm (12.7")	422 mm (16.6")	522 mm (20.6")	622 mm (24.5")
Length (with rod extended)	297 mm (11.7")	372 mm (14.7")	522 mm (20.6")	672 mm (26.6")	822 mm (32.4")
Material and IP Class	stainless steel, IP68 up to 100 kPa (tested in a static condition, upper value on request)				
Max cable length to logger <sup>(5)</sup>	1000 m				

(1) Pol. MPE is the polynomial Maximum Permitted Error on the measuring range (FSR).

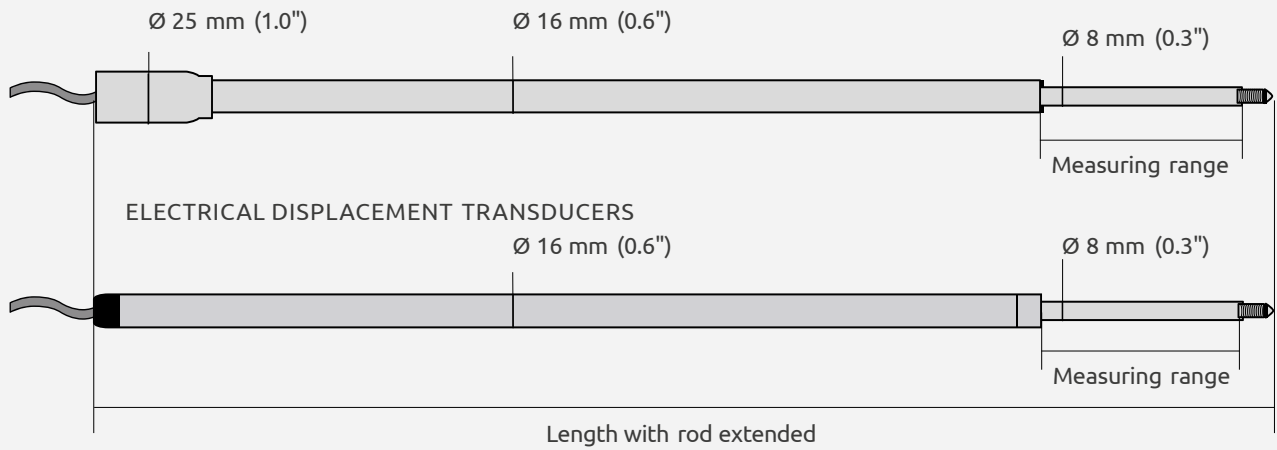
(2) Better results in terms of accuracy are available on request. Please contact your sales representative for more information.

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

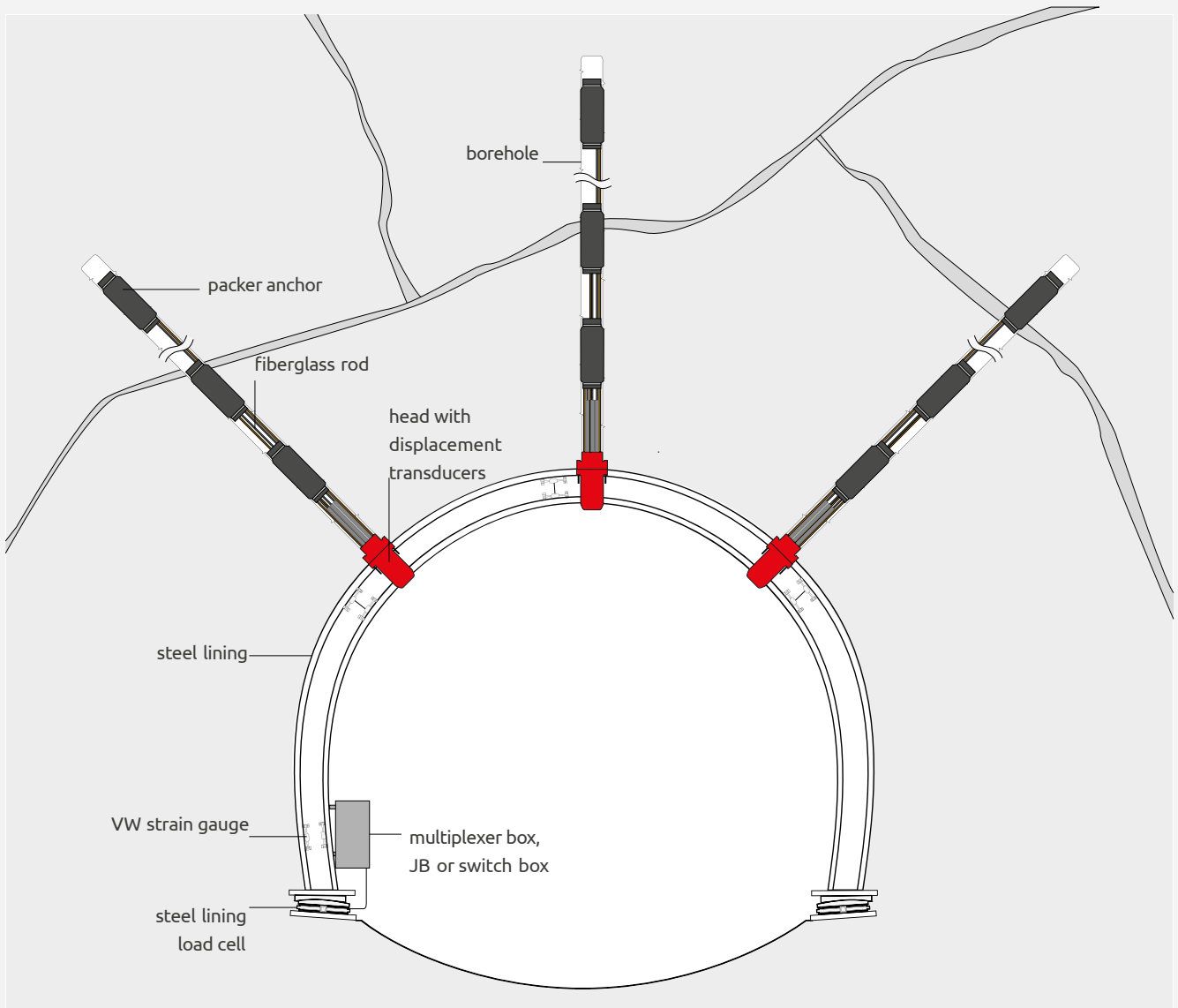
(4) The expressed frequency range could have a ±10% variation

# PHYSICAL FEATURES DISPLACEMENT TRANSDUCERS

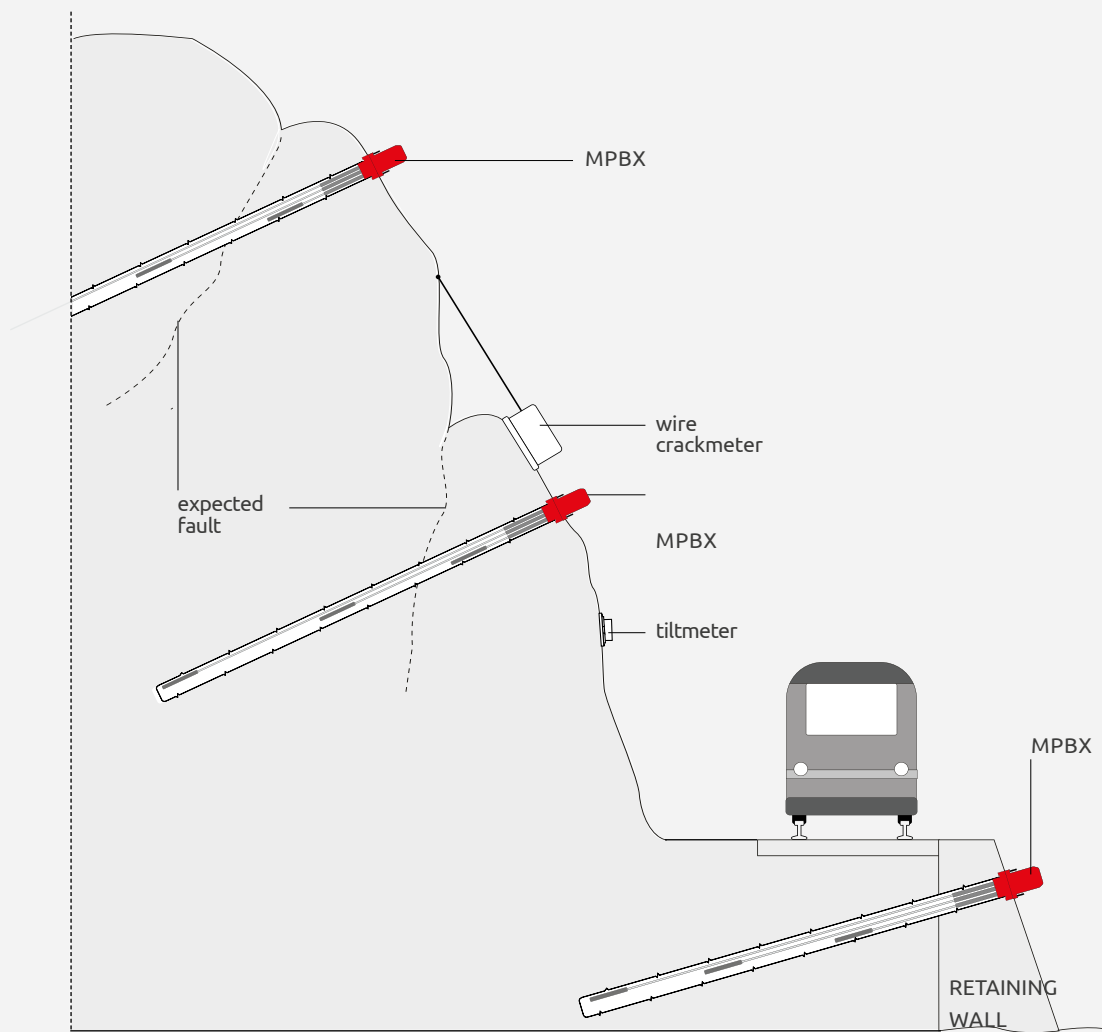
## VIBRATING WIRE DISPLACEMENT TRANSDUCERS



## TUNNEL APPLICATION WITH PACKER ANCHORS IN FRACTURED ROCKS



## ROCKFALL OR TOPPLE LANDSLIDE APPLICATION WITH GROUTABLE ANCHORS



## ACCESSORIES AND SPARE PARTS

### FG INSTALLATION KIT 0D222K6FG00

Kit for fiberglass MPBX. Useful for mounting sensors and for shortening rod length.

### AC INSTALLATION KIT 0D222K7AC00

Kit for stainless steel MPBX. Useful for mounting sensors and for shortening rod length.

### SWITCH BOX 0EPC0000S00

Various sizes to accommodate up to 24 displacement transducers.

### 16-WIRE SIGNAL CABLE 0WE1160LSZH

Multicore cable with 8 pairs of 24 AWG wire, with LSZH jacket. Used to connect instruments to multiplexer, switch box, or data logger.

### 32-WIRE SIGNAL CABLE 0WE1320LSZH

Multicore cable with 16 pairs of 24 AWG wire, with LSZH jacket. Used to connect instruments to multiplexer, switch box, or data logger.

### MULTIPLEXER BOX 0OMN00MUXB0

Multiplexer board with surge protection, housed in IP67 box. Local operation with New Leonardo readout; remote operation with data logger connected by RS484 digital bus.