

# PBMR

Fully welded pressure transmitter for railway applications

PBMR-2#####221100#

## Overview

- Excellent accuracy and long-term stability up to  $\leq 0.1\%$  FS
- Active temperature compensation throughout the entire operating temperature range
- Sensor element fully welded to stainless steel housing
- Tested for railway applications according to EN 50155:2007
- Vibration and shock resistant according to EN 61373:1999, 2010 (category 2)



## EN 50155

### Technical data

#### Performance characteristics

Pressure type	Absolute Relative (gauged)
Compensated temperature range	-40 ... 85 °C
Long term stability	$\leq 0.1\%$ FSR/a, measuring range > 1 bar $\leq 1$ mbar, measuring range $\leq 1$ bar
Max. measuring error	$\pm 0.1\%$ FSR $\pm 0.25\%$ FSR Including zero-point and span error, non-linearity (by terminal base line), hysteresis and non-repeatability (EN 61298-2) For turndown, multiply this value by the applied turndown ratio
Max. measuring span	40 bar
Measuring range	-1 ... 40 bar
Standard error of measurement (BFSL)	$\pm 0.04\%$ FSR $\pm 0.1\%$ FSR Including non-linearity, hysteresis and non-repeatability according BFSL For turndown, multiply this value by the applied turndown ratio
Min. measuring span	0.1 bar
Rise time (10 ... 90 %)	$\leq 5$ ms
Temperature coefficient	$\leq 0.03\%$ FSR/10 K, measuring span $\leq 0.03\%$ FSR/10 K, zero point

#### Process conditions

Process temperature	-40 ... 120 °C
Process pressure	Refer to section "Operating conditions"

#### Process connection

Connection variants	Refer to section "Dimensional drawings"
Wetted parts material	AISI 316L (1.4404)
Wetted parts material, membrane	AISI 316L (1.4435)

#### Process connection

Wetted parts material, gasket	FKM, optional, gaskets require a minimum ambient temperature of -20 °C and a minimum medium temperature of -25 °C NBR, optional
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#### Ambient conditions

Operating temperature range	-40 ... 85 °C
Storage temperature range	-40 ... 85 °C
Degree of protection (EN 60529)	IP 65, with connector DIN EN 175301-803 A (DIN 43650 A), 4-pin IP 67, with connector M12-A, 4-pin
Insulation resistance	> 100 M $\Omega$ , 500 V DC
Insulation voltage	500 V AC, 1 min.
Leakage current	< 2.8 mA
Bump (EN 60068-2-27)	100 g / 2 ms, 5000 impulses per axis and direction
Cold (EN 60068-2-1)	Ab: -40 °C, 2 h (not in operation) Ae: -40 °C, 1 h (in operation)
Damp heat, cyclic (EN 60068-2-30)	Db: 55°C, Variant 1, 2 cycles (2 · 24 h)
Dry heat (EN 60068-2-2)	Be: 85 °C, 6 h (in operation)
Free fall (EN 60068-2-32)	5 g / 30 ms, 3 impulses per axis and direction
Shock (EN 60068-2-27)	50 g / 11 ms, 100 g / 6 ms, 10 impulses per axis and direction
Shock and vibration tests (EN 61373:1999, 2010)	The respective most demanding severity levels of the issues 1999 and 2010 are applied in each Category 2 Vibration: Category 2, Shock: Category 1, 2, 3
Vibration (sinusoidal) (EN 60068-2-6)	1.5 mm p-p (10 ... 58 Hz), 10 g (58 Hz ... 2 kHz), 10 cycles (2.5 h) per axis

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## Technical data

### Ambient conditions

Vibration, broad-band random (EN 60068-2-64) Functional test: 0.00193 g<sup>2</sup> / Hz, 0.54 gRMS (7 ... 250 Hz), 10 min. per axis  
Life-time: 0.1188 g<sup>2</sup> / Hz, 4.25 gRMS (7 ... 250 Hz), 5 h per axis

### Output signal

Current output 4 ... 20 mA, 2-wire  
20 ... 4 mA, 2-wire

Voltage output 0 ... 10 V, 3-wire  
0 ... 5 V, 3-wire  
0.5 ... 4.5 V, 3-wire  
1 ... 5 V, 3-wire  
10 ... 0 V, 3-wire

Load resistance ≥ 10 kΩ

Short circuit protection Yes

Shunt resistance  $R_s \leq (V_s - 8 \text{ V})/0.0205 \text{ A}$   
 $R_s \leq 270 \Omega$ ,  $V_s = 0.6 \cdot U_n$

### Housing

Style Compact transmitter

Overall size Refer to section "Dimensional drawings"

Material AISI 316L (1.4404)

### Electrical connection

Connector DIN EN 175301-803 A (DIN 43650 A), 4-pin  
M12-A, 4-pin

### Power supply

Voltage supply range 13 ... 30 V DC, with voltage output  
8 ... 30 V DC, with current output

Rated voltage 24 V

Power input ( $V_s = U_n$ ) ≤ 150 mW, with voltage output (without load)  
≤ 500 mW, with current output

Compliant to EN 50155:2007, 5.1 Power Supply

Switching between two power supplies Class C1

Interruption of power supply Class S1

Reverse polarity protection Yes

### Compliance and approvals

EMC EN 50121-3-2:2006, with power supply unit acc. EN 61000-6-2:2005  
EN 61000-6-2  
EN 61000-6-3  
EN 61326-2-3

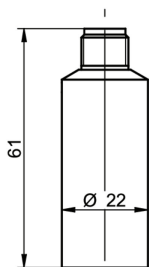
Railway applications EN 50155  
EN 50155:2007, 5 electrical conditions, 12 tests

## Operating conditions

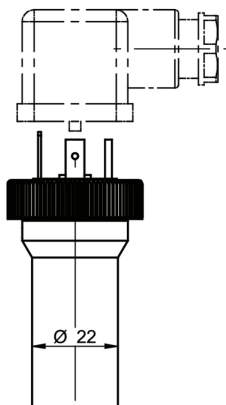
Measuring range (bar)							Proof pressure (bar)	Burst Pressure (bar)
0 ... 0,1 0 ... 0,16 0 ... 0,25							1	2
-0,1 ... 0,1	-0,2 ... 0,2	-1 ... 0	-1 ... 0,6	0 ... 0,4	0 ... 0,6	0 ... 1	3	6
	-1 ... 1,5	-1 ... 3	-1 ... 5	0 ... 1,6	0 ... 2	0 ... 2,5	15	30
		-1 ... 9	-1 ... 15	0 ... 6	0 ... 10	0 ... 16	60	120
			-1 ... 24	0 ... 25			70	140
			-1 ... 39	0 ... 40			135	270

## Dimensional drawings (mm)

### Housing



Housing with connector M12-A, 4-pin



Housing with connector DIN EN 175301-803 A (DIN 43650 A), 4-pin

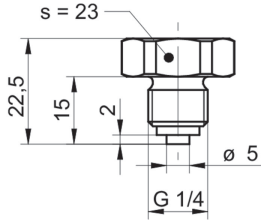
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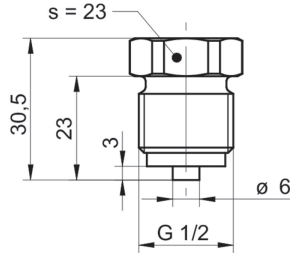
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## Dimensional drawings (mm)

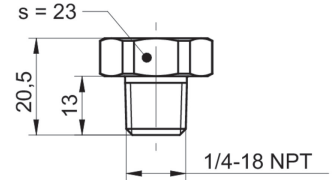
### Process connection



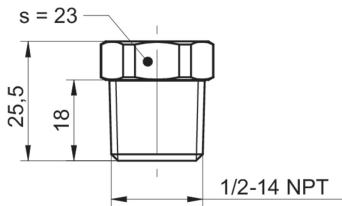
G30-02  
G 1/4 B EN 837-1 (BCID: G30)



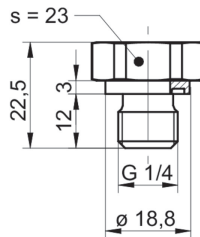
G31-03  
G 1/2 B EN 837-1 (BCID: G31)



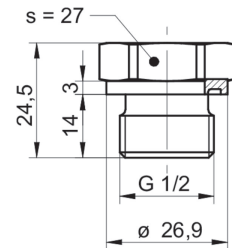
N01-04  
1/4-18 NPT (BCID: N01)



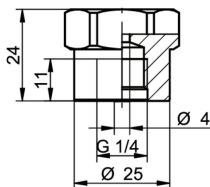
N02-05  
1/2-14 NPT (BCID: N02)



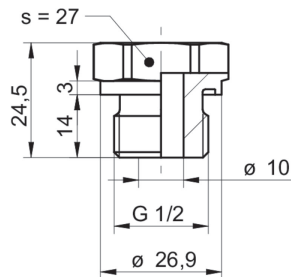
G50-06  
G 1/4 A DIN 3852-E (BCID: G50)



G51-09  
G 1/2 A DIN 3852-E (BCID: G51)



G21-12  
G 1/4 A ISO 228-1 female thread (BCID: G21)



G51-19  
G 1/2 A DIN 3852-E, hole  $\varnothing$  10 mm (BCID: G51)

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## Electrical connection

Output signal	Equivalent circuit	Electrical connection	Function	Pin assignment
4 ... 20 mA (2-wire)			+Vs	1
			Iout	3
0 ... 10 V (3-wire)			+Vs	1
			Uout	2, 4
			GND (0 V)	3
			Frame Ground	Plug thread
			n.c.	2, 4
			+Vs	1
			Iout	2
			Frame Ground	Grounding lug
			n.c.	3
			+Vs	1
			Uout	2, 4
			GND (0 V)	3
			Frame Ground	Plug thread
			+Vs	1
			Uout	3
			GND (0 V)	2
			Frame Ground	Grounding lug

## Ordering information

Ordering key - Configuration possibilities see website

	PBMR	-	2	#	###	#	##	##	##	2	#	1	0	0	#
<b>Product</b>	PBMR														
<b>Housing material</b>															
Stainless steel 1.4404 AISI 316L				2											
<b>Accuracy</b>															
±0.25 % FS					4										
±0.10 % FS					5										
<b>Measuring range</b>															
0...0,1 bar (EN)															B08
0...0,16 bar (EN)															B09
0 ... 0.25 bar (EN)															B10
0 ... 0.4 bar (EN)															B11
0...0,6 bar (EN)															B12
0...1 bar (EN)															B15
0...1,6 bar (EN)															B16
0...2 bar (EN)															B17
0 ... 2.5 bar (EN)															B18
0 ... 4 bar (EN)															B19
0...12 bar (EN)															B1K
-1...39 bar (EN)															B1L
0 ... 6 bar (EN)															B20
0 ... 10 bar (EN)															B22
0 ... 16 bar (EN)															B24
0...20 bar (EN)															B25
0...25 bar (EN)															B26
0 ... 40 bar (EN)															B27
-0,1...0,1 bar (EN)															B2H
-0,2...0,2 bar (EN)															B4G
-0,6...0 bar (EN)															B58

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## Ordering information

Ordering key - Configuration possibilities see website

	PBMR	-	2	#	###	#	##	##	##	2	#	1	0	0	#
-1...0 bar (EN)					B59										
-1...0,6 bar (EN)					B72										
-1...1 bar (EN)					B73										
-1 ... 1,5 bar (EN)					B74										
-1...2 bar (EN)					B75										
-1...3 bar (EN)					B76										
-1...5 bar (EN)					B77										
-1...9 bar (EN)					B79										
-1...15 bar (EN)					B81										
-1...24 bar (EN)					B82										
0...5 bar (EN)					B98										
0...1.5 psi (ANSI)					H08										
0...4 psi (ANSI)					H10										
0...6 psi (ANSI)					H11										
0...10 psi (ANSI)					H13										
0...15 psi (ANSI)					H15										
0...25 psi (ANSI)					H16										
0...30 psi (ANSI)					H17										
0...60 psi (ANSI)					H19										
0...20 psi (ANSI)					H1C										
0...500 psi (ANSI)					H1E										
-30Hg...600 psi (ANSI)					H1L										
0...100 psi (ANSI)					H21										
0...160 psi (ANSI)					H22										
0...200 psi (ANSI)					H23										
0...250 psi (ANSI)					H24										
0...300 psi (ANSI)					H25										
0...400 psi (ANSI)					H26										
0...600 psi (ANSI)					H27										
-30HG...60 psi (ANSI)					H2C										
0...5 psi (ANSI)					H2N										
0...2 psi (ANSI)					H2Y										
-30HG...0 (ANSI)					H59										
-30HG...15 psi (ANSI)					H73										
-30HG...30 psi (ANSI)					H75										
-30HG...100 psi (ANSI)					H78										
-30HG...150 psi (ANSI)					H79										
-30HG...220 psi (ANSI)					H81										
-30HG...300 psi (ANSI)					H82										
0...3 psi (ANSI)					H93										
0...1 mH2O (EN)					J08										
0...1,6 mH2O (EN)					J09										
0...2,5 mH2O (EN)					J10										
0...4 mH2O (EN)					J11										
0...6 mH2O (EN)					J12										
0...10 mH2O (EN)					J15										
0...16 mH2O (EN)					J16										
0...20 mH2O (EN)					J17										
0...25 mH2O (EN)					J18										
0...40 mH2O (EN)					J19										
0...60 mH2O (EN)					J20										

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## Ordering information

Ordering key - Configuration possibilities see website

	PBMR	-	2	#	###	#	##	##	##	2	#	1	0	0	#
0...100 mH <sub>2</sub> O (EN)					J22										
0...160 mH <sub>2</sub> O (EN)					J24										
0...200 mH <sub>2</sub> O (EN)					J25										
0...250 mH <sub>2</sub> O (EN)					J26										
<b>Kind of pressure</b>															
Relative (gauged)															R
Absolute															A
<b>Output signal</b>															
20...4 mA															A0
4...20 mA															A1
0...10 V															A2
1...5 V															A3
0...5 V															A4
0.5...4.5 V															A5
10...0 V															A7
<b>Output Connection</b>															
M12-A, 4-pin															14
DIN EN 175301-803 A (DIN 43650 A), 4-pin															44
<b>Process connection</b>															
G 1/4 B EN 837-1 (G30)															02
G 1/2 B EN 837-1 (G31)															03
1/4-18 NPT (N01)															04
1/2-14 NPT (N02)															05
G 1/4 A DIN 3852-E (G50)															06
M20 × 1.5 ISO 261 / ISO 965 (M08)															07
G 1/2 A DIN 3852-E (G51)															09
G 1/4 A ISO 228-1 female thread (G21)															12
G 1/2 A DIN 3852-E, hole Ø 10 mm (G52)															19
G 1/4 B EN 837-1 with integrated damping element (P ≤ 600 bar) (G30)															22
G 1/2 B EN 837-1 with integrated damping element (P ≤ 600 bar) (G31)															23
1/4-18 NPT with integrated damping element (P ≤ 1000 bar) (N01)															24
1/2-14 NPT with integrated damping element (P ≤ 1000 bar) (N02)															25
G 1/4 A DIN 3852-E, pressure channel 0.6 mm (G50)															26
G 1/2 A DIN 3852-E with integrated damping element (P ≤ 600 bar) (G51)															29
<b>Process connection material</b>															
Stainless steel 1.4404 AISI 316L															2
<b>Seal</b>															
None															0
NBR standard															1
FKM															3
<b>Oil filling</b>															
Standard oil															1
<b>Display</b>															
Without display															0
<b>ATEX</b>															
Standard safety															0

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## Ordering information

Ordering key - Configuration possibilities see website

PBMR - 2 # ### # ## ## ## 2 # 1 0 0 #

## Approvals

Railway (EN 50155)

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EAC

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