

Railway Pressure Transmitter



Product description

Trafag's ECR 8478 excels in railway applications involving corrosive media. With its ceramic membrane and EN 50155 railway compliance, it offers accurate relative or absolute pressure measurement across a wide range in harsh railway environments.

Applications

- Railways

Features

- Measuring ranges from 100 mbar
- Relative or absolute pressure measurement
- Frontal membrane optional
- Dielectrical strength: 500 VAC / 750 VDC, meets EN 50155 (Railways)

 EMC: 2014/30/EU

 S.I. 2016 No. 1091

 RoHS/Reach compliant

 Conformity EN 50155

Technical Data

Measuring principle	Thick-film-on-ceramic
Measuring range	0 ... 0.1 to 0 ... 60 bar 0 ... 1.5 to 0 ... 1000 psi
Output signal	4 ... 20 mA
Media temperature	-25°C ... +125°C
Ambient temperature	-25°C ... +125°C

Additional information

Data sheet www.trafag.com/H72337
 Instructions www.trafag.com/H73324
 Accessories www.trafag.com/H72258
 Video <https://youtu.be/5EX4JkhUMxl>

Ordering information/Type code

				8478	XX	XX	XX	XX	XX	XX
Measuring range ¹⁾	Pressure measurement range [bar]	Over pressure [bar]	Burst pressure [bar]	Pressure-measurement-range [psi]	Over pressure [psi]	Burst pressure [psi]				
	0 ... 0.1	1.2	2	66	0 ... 1.5	15	30	F6		
	0 ... 0.16	1.2	2	67	0 ... 2	15	30	F7		
	0 ... 0.2	1.2	2	68	0 ... 2.5	15	30	F8		
	0 ... 0.4	1.2	2	69	0 ... 5	15	30	F9		
	0 ... 0.6	1.2	2	70	0 ... 10	20	30	G0		
	0 ... 1.0	2	3	71	0 ... 15	30	45	G1		
	0 ... 1.6	3.2	4.8	73	0 ... 20	40	70	G3		
	0 ... 2.5	5	7.5	75	0 ... 30	60	90	G5		
	0 ... 4	8	12	76	0 ... 50	100	150	G6		
	0 ... 6	12	15	77	0 ... 100	200	250	G7		
	0 ... 10	20	25	78	0 ... 150	300	375	G8		
	0 ... 16	32	40	79	0 ... 200	400	600	GA		
	0 ... 25	50	75	80	0 ... 250	500	625	G9		
	0 ... 40	80	100	81	0 ... 400	800	1200	H0		
	0 ... 60	120	180	82	0 ... 500	1000	1250	H1		
	Option 5P: Fivefold overpressure				0 ... 1000	2000	3000	H2		
	0 ... 2.5	12.5	18	55						
	0 ... 4	20	30	56						
	0 ... 6	30	48	57						
	0 ... 10	50	75	58						
	0 ... 16	80	120	59						
	0 ... 25 ²⁾	125	180	60						
	0 ... 40 ²⁾	200	300	61						
	0 ... 60 ²⁾	300	480	62						
Sensor	With temperature compensation									
	Relative pressure, Material pressure connection and housing: 1.4305 (AISI 303) ^{3) 4)}							54		
	Relative pressure, Material pressure connection and housing: 1.4404/1.4435 (AISI 316L) ³⁾							56		
	Absolute pressure, Material pressure connection and housing: 1.4305 (AISI 303) ^{3) 4)}							84		
	Absolute pressure, Material pressure connection and housing: 1.4404/1.4435 (AISI 316L) ³⁾							86		
	Without temperature compensation									
	Relative pressure, Material pressure connection and housing: 1.4305 (AISI 303) ^{4) 5)}							57		
	Relative pressure, Material pressure connection and housing: 1.4404/1.4435 (AISI 316L) ⁵⁾							59		
Pressure connection	Absolute pressure, Material pressure connection and housing: 1.4305 (AISI 303) ^{4) 5)}							87		
	Absolute pressure, Material pressure connection and housing: 1.4404/1.4435 (AISI 316L) ⁵⁾							89		
Electrical connection	G1/4" male								17	
	G1/2" male DIN3852-E, with inner cone ^{2) 6) 7)}								59	
	G3/4" frontal membrane ^{6) 8)}								52	
Electrical connection	Male electrical connector EN 175301-803-A (DIN 43650-A), Material PA									
	Male electrical connector M12x1, 5-pole, Material PBT								35	
	3 Way male Delphi MetriPack 1.5 sealed connector, Material PA66								51	

8478				XX	XX	XX	XX	XX	XX
Output signal	Output signal	Load resistance	U (supply)						
	4 ... 20 mA	(U _{supply} -9 V) / 20 mA	9 ... 30 VDC						
									19
Accessories	Seal FKM (-20°C ... +125°C), inner and outer								
	Seal CR (-25°C ... +100°C), inner								
	Seal EPDM (-25°C ... +125°C), inner and outer								
	Pressure peak damping element Ø 1.0 mm, material 1.4305								
	Pressure peak damping element Ø 0.4 mm, material 1.4305 (sensors 54, 57, 84, 87) resp. 1.4404 (sensors 56, 59, 86, 89) ⁹⁾								
	Female electrical plug EN 175301-803-A (DIN 43650-A)/NBR, -40°C ... +90°C For cable diameter 4 ... 9 mm, flammability standard UL94-V0								
	Female electrical plug EN 175301-803-A (DIN 43650-A)/silicone, -40°C ... +125°C For cable diameter 4 ... 9 mm, flammability standard UL94-V0								
	Female electrical plug EN 175301-803-A (DIN 43650-A)/NBR, -40°C ... +90°C For cable diameter 4 ... 9.5 mm, flammability standard UL94-V2								
	Female electrical plug M12x1, 5-pole								
	Housing nut for electrical connection EN 175301-803-A (DIN 43650-A) secured with Loctite (max. 85°C)								
	Multiple packaging ¹⁰⁾								
	Pin configuration, see table: Electrical connection								

⁰¹⁾ Extended overpressure as well as customized pressure ranges upon request, see table „Customised measuring ranges“

⁰²⁾ Only for sensors without temperature compensation

⁰³⁾ max. 40 bar or 500 psi

⁰⁴⁾ Only with pressure connection 17 (1.4305)

⁰⁵⁾ ≥ 1 bar

⁰⁶⁾ Upon request, whereas minimum order quantities may apply

⁰⁷⁾ max. 16 bar / overpressure 32 bar

⁰⁸⁾ Only with sensors 56, 86 (with temperature compensation) and for pressure ranges ≤ 25 bar or 400 psi

⁰⁹⁾ Not for pressure connection 52

¹⁰⁾ The order quantity must be a multiple of 50, only for electrical connections 05 and 35

i Vacuum measuring ranges: Measuring ranges below 0 bar (e.g. -1 bar ... 0 bar) are available as special pressure ranges.

i Reversed calibration: A reversed calibration is also possible for measuring ranges below 0 bar, with the signals 4 ... 20 mA (code 19), 1 ... 6 VDC (code 16) and 0 ... 10 VDC (code 17). The signal zero point is at 0 bar, the signal end point at -1 bar. Additional configurations on request.

Compatibility matrix pressure connection and accessories

Code	Pressure connection	Damping		Seal		
		Ø 0.4 mm (Code 44)	Ø 1.0 mm (Code 40)	FKM ¹⁾ (Code 61)	CR ²⁾ (Code 62)	EPDM ¹⁾ (Code 63)
17	G1/4" male	✓	✓	✓	n/a	✓
59	G1/2" male DIN3852-E, with inner cone	✓	✓	✓	n/a	✓
52	G3/4" frontal membrane			✓	n/a	✓

¹⁾ Seal: inner and outer

²⁾ Seal: inner

Customised measuring ranges for sensors without temperature compensation

min. pressure [bar] ¹⁾	max. pressure [bar] ²⁾	min. span [bar]	max. span [bar]	Overpressure [bar]	Code
-1	1	≥ 0.5	≤ 1.2	2	21
-1	2	≥ 0.8	< 2	3.2	22
-1	4	≥ 2	≤ 4.5	8	24
-1	6	> 4.5	≤ 7	12	25
-1	10	> 7	≤ 11	20	26
-1	16	> 11	≤ 17	32	27
-1	25	> 17	≤ 26	50	28
-1	40	> 26	≤ 41	80	29
-1	60	> 41	≤ 61	120	30
-1	100	> 61	≤ 101	200	31
-1	160	> 101	≤ 161	320	35
-1	250	> 161	≤ 251	500	32
-1	400	> 251	≤ 401	800	34

¹⁾ Minimum pressure = Lowest zero point, start of measuring range (relative)

²⁾ Maximum pressure = Highest pressure, end of measuring range (relative)

Customised measuring ranges for sensors with temperature compensation

min. pressure [bar] ¹⁾	max. pressure [bar] ²⁾	min. span [bar]	max. span [bar]	Overpressure [bar]	Accuracy	Code
-0.4	0.6	≥ 0.1	< 0.2	1.2	1.0 %	21
-0.4	0.6	≥ 0.2	< 0.5	1.2	0.5 %	21
-1	1	≥ 0.5	≤ 1.2	2	0.3 %	21
-1	2	≥ 1.2	< 2	3.2	0.3 %	22
-1	4	≥ 2	≤ 4.5	8	0.3 %	24
-1	6	> 4.5	≤ 7	12	0.3 %	25
-1	10	> 7	≤ 11	20	0.3 %	26
-1	16	> 11	≤ 17	32	0.3 %	27
-1	25	> 17	≤ 26	50	0.3 %	28
-1	40	> 26	≤ 41	80	0.3 %	29

¹⁾ Minimum pressure = Lowest zero point, start of measuring range (relative)

²⁾ Maximum pressure = Highest pressure, end of measuring range (relative)

i For absolute pressure sensors, the measuring range must include the point 1000 mbar (absolute).

i For relative pressure sensors, measuring range must include the point 0 bar (relative).

Specifications

Electrical data	Output / supply voltage	4 ... 20 mA: 24 (9 ... 30) VDC
	Power-on delay time	100 ms
	Rise time of supply voltage	typ. 1 ms, 10 ... 90 % nominal pressure
	Inverse-polarity protection, short-circuit strength @ 25°C during 5 min.	4 ... 20 mA: to $U_s = 30$ VDC
	Current limiting output signal	4 ... 20 mA: appr. 25 mA max.
Environmental conditions	Media temperature	-25°C ... +125°C
	Ambient temperature	-25°C ... +125°C
	Storage temperature	-20°C ... +40°C
	Protection ¹⁾	IP65, IP67
	Humidity	max. 95 % relative
	Vibration	15 g RMS (20 ... 2000 Hz) (EN60068-2-64) 25 g sin (80 ... 2000 Hz), 1 oct./min, (1x @ 25°C) (EN60068-2-6)
	Shock	50 g/11 ms 100 g/6 ms Male electrical plug M12x1 (EN60068-2-27) ²⁾
EMC protection	Emission	EN 50121-3-2
	Immunity	EN 50121-3-2 ³⁾
Mechanical data	Sensor (wetted parts)	Ceramic, Al ₂ O ₃ (96 %)
	Pressure connection (wetted parts)	1.4404 (AISI316L)
	Housing	1.4404/1.4435 (AISI316L)
	Sealing	FKM 70 Sh, CR, EPDM
	Male electrical connector	See ordering information
	Mounting torque	15 ... 20 Nm

¹⁾ See electrical connection

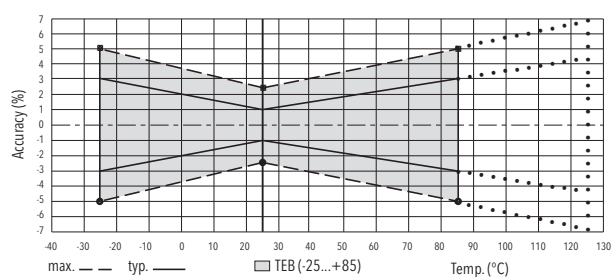
²⁾ For electrical connection 35

³⁾ With power supply according to EN IEC 61326-1:2021 table (2), footnote (e). Surge test conducted on shield, in accordance with EN 61000-4-5:2014, 7.6. Device to be galvanically isolated and to be used in signal area protected against EMC interference (area C in accordance with EN 50155:2021, fig.5)

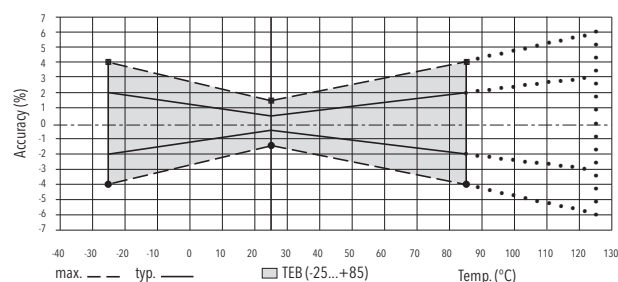
Accuracy

		Sensors 57/87/59/89	Sensors 54/84/56/86		
Pressure measuring range	[bar]	$\geq 0 \dots 1$	$\geq 0 \dots 0.3$	$\geq 0 \dots 0.2$ $< 0 \dots 0.3$	$\geq 0 \dots 0.1$ $< 0 \dots 0.2$
	[psi]	$\geq 0 \dots 15$	$\geq 0 \dots 5$	$\geq 0 \dots 2.5$ $< 0 \dots 5$	$\geq 0 \dots 1.5$ $< 0 \dots 2.5$
				Option 5P	
TEB @ -25 ... +85°C	[% FS typ.]	± 3.0	± 1.0	± 2.0	± 3.0
Accuracy @ +25°C	[% FS typ.]	± 0.5	± 0.3	± 0.5	± 1.0
Measurement deviation during EMC (verified with 100 ms integration time)	[% FS max.]	± 1.0	± 1.0	± 1.0	± 1.0
NLH @ +25°C (BSL)	[% FS typ.]	± 0.2	± 0.2	± 0.3	± 0.3
TC zero point and span	[% FS/K typ.]	± 0.03	± 0.02	± 0.02	± 0.02
Long term stability 1 year @ +25°C	[% FS typ.]	± 0.3	± 0.2	± 0.2	± 0.2

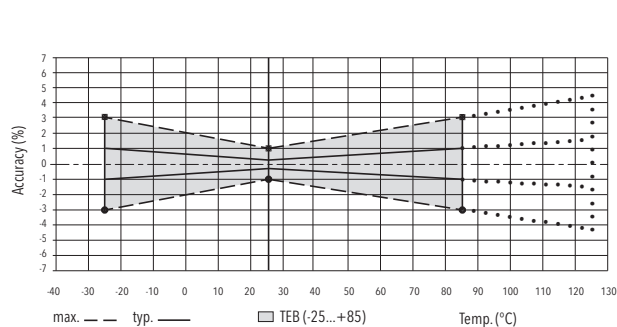
Sensors 54/84/56/86 0 ... 0.1 to 0 ... 0.16 bar



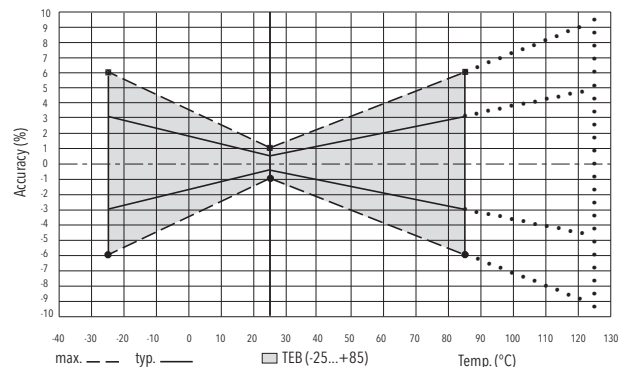
Sensors 54/84/56/86 0 ... 0.2 to 0 ... 0.4 bar



Sensors 54/84/56/86 0 ... 0.4 bar



Sensors 57/87/59/89 0 ... 1 bar



Additional specifications railways

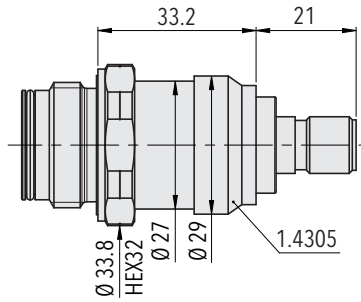
Environmental conditions	Cold	EN 60068-2-1	Ab: -25°C, 2 h (not in operation) Ae: -25°C, 1 h (in operation)
	Dry heat	EN 60068-2-2	Be: 85°C, 6 h (in operation)
	Damp heat, cyclic	EN 60068-2-30	Db: 55°C, variant 1, 2 cycles (2 x 24 h)
	Class of altitude	EN 50125-1	AX (max. 3500 m ASL)
	Class of air temperature	EN 50125-1	Refer to the specified ambient temperature. See table: Specification
	Vibration and shock	EN 61373	Vibration: Category 3 Shock: Category 3 ¹⁾²⁾
	Dielectric strength	EN 50155	750 VDC
	Resistance of insulation	EN 50155	>100 MΩ, 500 VDC
	Behavior in case of fire (Electrical connections 01, 32, 35)	EN 45545-2	Weight: < 10 g Surface: < 0.2 m ²
Supply	Nominal voltage	EN 50155 ³⁾	24 V
	Interruptions of the voltage supply	EN 50155 ³⁾	Class S1
	Switching between two supply voltages	EN 50155 ³⁾	Class C1

¹⁾ In Category 3 the 2010 versions' higher severity levels apply in each case

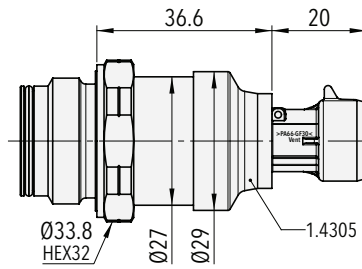
²⁾ Male electrical plug EN 175301-803-A, category 2

³⁾ Chapter 5.1 Voltage supply

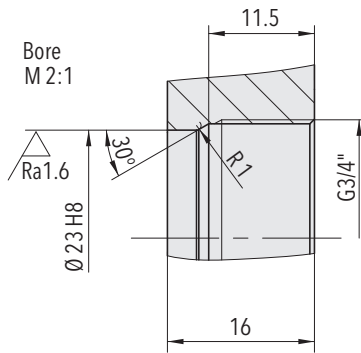
Dimensions



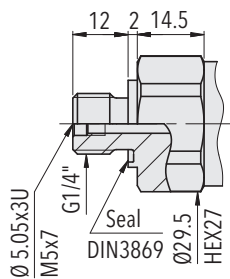
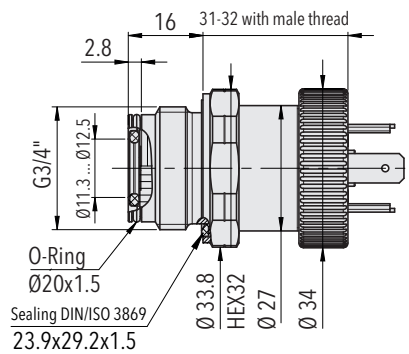
8478.XX.XX52.35.XX.XX



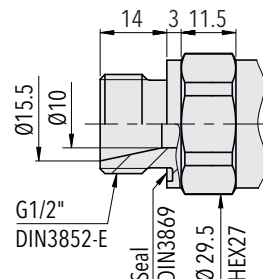
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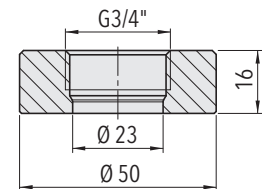
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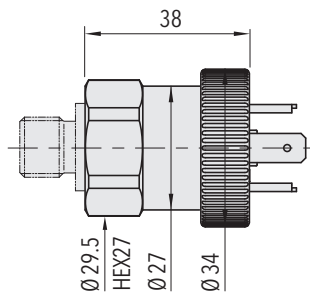
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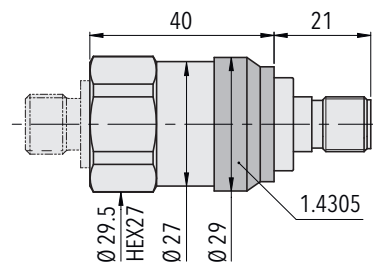
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Welding flange (AISI 316L)
for G3/4" frontal membrane
Ordering No. C27805

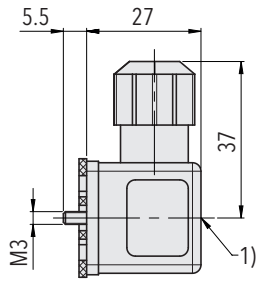


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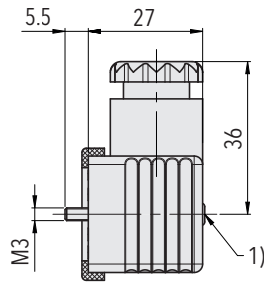


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Dimensions

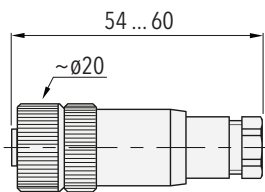


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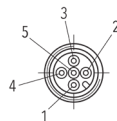
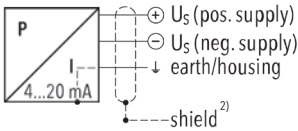
8478.XX.XXXX.XX.XX.58

1) Tightening torque 50 ... 60 Ncm



8478.XX.XXXX.XX.XX.33

Electrical connection

	Industrial standard EN175301-803A		M12x1, 5-pole			
						
Electrical connection type code	05		35			
IP protection	IP65 ¹⁾		IP67 ¹⁾			
Ambient temperature	-25°C ... +125°C		-25°C ... +125°C			
Pin assignment type code		92		94	G9	H1
Output signal 8478.xx.xxxx.xx.19						
	2 1 Earth	1 2 Earth	4 1 5	1 3 5	1 3 4	1 2 5

¹⁾ Provided female electrical plug is mounted according to instructions

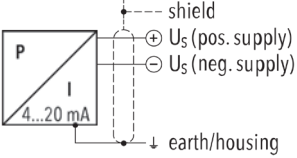
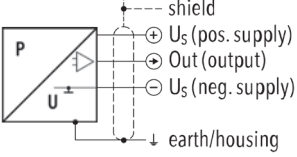
²⁾ Only cable versions or female electrical plug with shield connection

 Empty 'Pin Assignment Type Code' field: Default pinout

Electrical connection

3 Way M MetriPack 1.5 sealed connector



Electrical connection type code	51	
IP protection	IP67 ¹⁾	
Ambient temperature	-40°C ... +125°C	
UL-rated ambient temperature	-20°C ... +80°C	
Pin assignment type code	E4	
Output signal 8478.XX.XXXX.XX.19 	1 2	1 3
Pin assignment type code	99	
Output signal 8478: n/a 	1 3 2	1 2 3

¹⁾ Provided female electrical plug is mounted according to instructions

 Empty 'Pin Assignment Type Code' field: Default pinout

Reliable quality

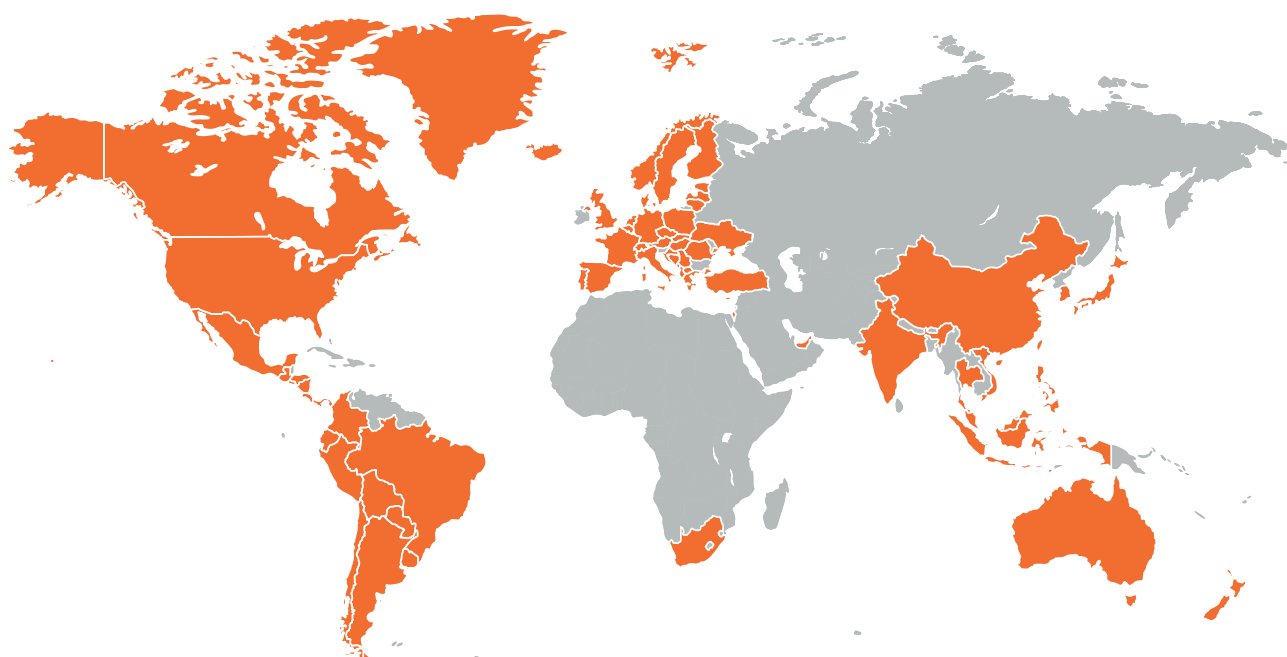
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Trafag develops, produces and distributes robust, reliable and precise instruments for monitoring pressure, temperature and gas density.

The broad portfolio of pressure and temperature measuring instruments is tailored for use in test benches through to applications in harsh environments. The research and development departments in Switzerland and Germany develop all important components from the sensor to the application-specific microchip, which are

then manufactured in the production facilities in Switzerland, Germany, the Czech Republic, and India. Strict quality management according to ISO 9001 and ISO 14001 ensures that Trafag products meet the required quality and sustainability standards.

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Pressure transmitters



Electronic pressure switches



Mechanical pressure switches



Pressure gauge



Thermostats



Temperature transmitters



Gas density