

# 9000 Mk2 transmitter

## Pressure & hydrostatic level transmitter

### Description

The 9000 pressure transmitter is designed to perform in the arduous conditions of today's industrial measurement applications.

Using temperature compensated, surface mount electronics and a ceramic capacitive sensor, the 9000 provides an accuracy of better than  $\pm 0.1\%$  of calibrated span and excellent long term stability. One field replaceable PCB covers the entire product range and provides simple calibration over the 10:1 rangeability limits.

Available with a wide variety of process connection materials and configurations, the series 9000 offers wider application versatility than many of its higher priced rivals.

### 9000 transmitter

- Absolute and gauge pressure transmitters
- Good long-term stability
- Hygienic style fittings

### Features

- 2 wire 24V dc loop powered
- 4 to 20mA output
- Accuracy  $\pm 0.1\%$  of calibrated span
- Spans from 0.02 to 300 Bar
- 10:1 rangeability
- Ceramic capacitive sensor
- High overrange capability
- Temperature compensated
- Reverse polarity protection
- Wide range of process connections
- Intrinsically safe option

### Operation

At the heart of the 9000 is the Ceramic Capacitive Sensor (CCS). This ensures extremely low hysteresis, high repeatability and high overrange capabilities.

The CCS replaces the traditional metallic diaphragm and sensor assembly and provides outstanding resistance to chemical attack.

The CCS eliminates the need for oil filled isolation, ensuring better temperature stability and allowing process temperatures between  $-30^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$ .

### Advantages of ceramic capacitive sensor technology

- High overrange capability
- Better long term stability and overall performance.
- Low hysteresis and high repeatability.
- Highly corrosion resistant and no oil filling giving better temperature stability and eliminating process contamination.
- The CCS used in the 9000 series can directly withstand most process media with temperatures between  $-30^{\circ}\text{C}$  and  $125^{\circ}\text{C}$ .



## Product overview

The 9000 transmitter gives high performance with accuracy better than 0.1%, temperature compensation and excellent long term stability, the 9000 ensures precise and reliable measurement and is virtually maintenance free.

### Compact, low mass

Weighing less than one kilogram, the 9000 is designed for “direct to process” mounting hence reducing installation costs. The sensor housing contains the ceramic capacitance sensor and the electronics circuit board, all the components needed to produce an accurate and reliable measurement of the process.

### Protected from aggressive environments and processes

The transmitter is designed to withstand the harshest of environments. The housing is environmentally protected to the requirements of IEC IP67. Its rugged ceramic sensor is inherently capable of withstanding attack from most chemicals. Normal process temperature limits are -30 and +125°C, ambient temperature limits are -20 to +90°C (80°C EEx ia) Overrange limit is up to 5 times upper range limit, depending upon the sensor selected.

### Optional process connections

Where necessary, flanged or sanitary process connections of various materials are available suitable for use in food and beverage applications. Alternative process connections are available on request.

### The Sensor

All members of the 9000 family use a Capacitive Ceramic Sensor (CCS), manufactured using an aluminium oxide ceramic. The sensor measuring range is determined by the thickness of the ceramic, this is precisely controlled during the manufacturing process. The CCS works like a capacitor with electrode surfaces on the inside comprising one measuring and one reference capacitor.

The surfaces of the capacitor are gold plated and linked to ASIC electronics. These electronics generate a signal proportional to the applied pressure, which is sent to the 4-20mA signal conditioner.

The ceramic sensor is a “dry cell” meaning no isolating diaphragm and fill fluid is needed. The process fluid acts directly onto the rugged, corrosion resistant sensor.

### Other members of the 9000 family

- 9710 - Cable suspended, submersible level.
- 9720 - Clamped, submersible level.
- 9780 - Pole mounted, submersible level.
- 9790 - Flange mounted submersible level

For further information, ask for data sheet number IP0078



## Ordering Information : Industrial Version

9000	Gauge & absolute pressure transmitters - Industrial versions							
Code	Enclosure							
S	Stainless steel (316)	A	Aluminium bronze					
Code	O ring	Process temperature limits (Note 3)						
1	Fluorocarbon (FPM/FKM)	-20 to + 125°C						
2	Buna N	-30 to + 110°C						
3	Chemraz®	-30 to + 110°C(non-wetted 'O' rings in (FPM/FKM) (Note 5)						
4	EPDM	-30 to + 125°C						
Code	Nominal range	Overrange limit (Note 1)						
GB	0 to 0.1 Bar g (0 to 1m H <sub>2</sub> O)	0.5 Bar g						
GC	0 to 0.2 Bar g (0 to 2m H <sub>2</sub> O)	1 Bar g						
GD	0 to 0.5 Bar g (0 to 5m H <sub>2</sub> O)	2.5 Bar g						
GE	0 to 1.0 Bar g (0 to 10m H <sub>2</sub> O)	5 Bar g						
GF	0 to 2.0 Bar g (0 to 20m H <sub>2</sub> O)	10 Bar g						
GG	0 to 5.0 Bar g (0 to 50m H <sub>2</sub> O)	25 Bar g						
GH	0 to 10 Bar g (0 to 100m H <sub>2</sub> O)	30 Bar g						
GJ	0 to 20 Bar g (0 to 200m H <sub>2</sub> O)	60 Bar g						
GK	0 to 70 Bar g 105 Bar g	GL	0 to 300 Bar g 400 Bar g					
AA	0 to 0.1 Bar a 1 Bar a	AD	0 to 1.0 Bar a 5 Bar a					
AE	0 to 2.0 Bar a 10 Bar a	AF	0 to 5.0 Bar a 25 Bar a					
AG	0 to 10 Bar a 30 Bar a	AH	0 to 20 Bar a 60 Bar a					
AJ	0 to 70 Bar a 105 Bar a	AK	0 to 300 Bar a 400 Bar a					
Code	Approval							
0	Non certified - Safe area use only							
1	ATEX II 1 G EEx ia IIB T4 ATEX II 1 D (90°C)							
Code	Process connection (Note 2)	Max. pressure						
AB	½" NPT male & ¼" NPT female	400 bar						
BC	½" BSPT male & ¼" BSPT female	400 bar						
AC	¼" NPT male	400 bar						
AD	G 1/2"- A (½" BSPP male)	400 bar						
AE	G 1½" A (1½" BSPP male)	400 bar						
AF	Hygienic 1½" Tri-Clamp	40 bar						
AG	Hygienic 2" Tri-Clamp	40 bar						
AH	Hygienic 1½" IDF	16 bar						
AJ	Hygienic 2" IDF	16 bar						
AK	Hygienic 1½" RJT	10 bar						
AL	Hygienic 2" RJT	10 bar						
BD	Hygienic 1½"(38mm) SMS	16 bar						
BE	Hygienic 2"(51mm) SMS	16 bar						
BM	Hygienic 2"(51mm) SMS	16 bar						
AM	Slip on flange DN25 PN40 (DIN2635)	40 bar						
AN	Fixed flange DN50 PN40 (DIN2635)	40 bar						
AP	Fixed flange DN80 PN40 (DIN2635)	40 bar						
AQ	Slip on flange 1" #150 (ANSI B16.5 RF)	18.4 bar	See note 4					
AR	Fixed flange 2" #150 (ANSI B16.5 RF)	18.4 bar						
AS	Fixed flange 3" #150 (ANSI B16.5 RF)	18.4 bar						
Code	Process connection material							
1	Stainless Steel 316 S31							
3	Aluminium bronze							
4	Titanium (fittings in 316SS)(Codes AB to BE - Note 6)							
5	Titanium (flanges in 316SS)(Codes AM to AS - Note 6)							
Code	Temp barrier (Note 3)							
X	No							
A	Yes							
9000	S	2	GB	1	AB	1	X	Typical ordering code

- Notes:**
1. Overage limit of sensor shown. Process connection may reduce permitted overrange.
  2. Temperature barrier recommended for hygienic application. Max. pressure stated is for connection, not sensor.
  3. Used to reduce risk of condensation forming in electronics housing when combination of low process and high ambient temperature is possible. Also required when process temperature may exceed 90°C
  4. Check relevant flange tables if temperature is greater than 50°C.
  5. Not available on fixed flange versions
  6. Fixed flange on Aluminium Bronze option
  7. Chemraz® is a registered trademark of Green Tweed

## Ordering Information : Marine Version

9000M	Gauge pressure transmitters - Marine versions							
	Code	Enclosure						
	S	Stainless steel (316)						
	A	Aluminium bronze						
		Code	O ring					
		1	Fluorocarbon (FPM/FKM)					
		2	Buna N					
			Code	Nominal range	Overrange limit	(Note 1)		
			GB	0 to 0.1 Bar g (0 to 1m H <sub>2</sub> O)	0.5 Bar g			
			GC	0 to 0.2 Bar g (0 to 2m H <sub>2</sub> O)	1 Bar g			
			GD	0 to 0.5 Bar g (0 to 5m H <sub>2</sub> O)	2.5 Bar g			
			GE	0 to 1.0 Bar g (0 to 10m H <sub>2</sub> O)	5 Bar g			
			GF	0 to 2.0 Bar g (0 to 20m H <sub>2</sub> O)	10 Bar g			
			GG	0 to 5.0 Bar g (0 to 50m H <sub>2</sub> O)	25 Bar g			
			GH	0 to 10 Bar g (0 to 100m H <sub>2</sub> O)	30 Bar g			
			GJ	0 to 20 Bar g (0 to 200m H <sub>2</sub> O)	60 Bar g			
			GK	0 to 70 Bar g	105 Bar g			
			GL	0 to 300 Bar g	400 Bar g			
			AA	0 to 0.1 Bar a	1 Bar a			
			AB	0 to 0.2 Bar a	1 Bar a			
			AC	0 to 0.5 Bar a	2.5 Bar a			
			AD	0 to 1.0 Bar a	5 Bar a			
			AE	0 to 2.0 Bar a	10 Bar a			
			AF	0 to 5.0 Bar a	25 Bar a			
			AG	0 to 10 Bar a	30 Bar a			
			AH	0 to 20 Bar a	60 Bar a			
			AJ	0 to 70 Bar a	105 Bar a			
			AK	0 to 300 Bar a	400 Bar a			
			Code	Electrical approval				
			0	Non certified - Safe area use only				
			1	ATEX II 1 G EEx ia IIB T4				
			Code	Process connection	Max. pressure			
			AB	½" NPT male & ¼" NPT female	400 bar			
			AC	¼" NPT male	400 bar			
			AD	G ½"- A (½" BSPP male)	400 bar			
			AE	G 1½" A (1½" BSPP male)	400 bar			
			AM	Slip on flange DN25 PN40 (DIN2635)*	40 bar			
			AN	Fixed flange DN50 PN40 (DIN2635)	40 bar			
			AP	Fixed flange DN80 PN40 (DIN2635)	40 bar			
			AQ	Slip on flange ANSI B16.5 1" # 150	18.4 bar			
			AR	Fixed flange ANSI B16.5 2" # 150	18.4 bar			
			AS	Fixed flange ANSI B16.5 3" # 150	18.4 bar			
			Code	Process connection material				
			1	Stainless Steel 316 S31				
			3	Aluminium bronze				
			4	Titanium				
			Code	Temp barrier				
			X	No				
			A	Yes				
9000M	S	2	GB	2	AB	1	X	Typical ordering code

### Notes:

1. Overage limit of sensor shown. Process connection may reduce permitted overrange.

\* Fixed flange on Aluminium Bronze option

## Specification

### Functional

Process fluid: Output signal: Power supply: Load resistance: Measuring range: Overrange limit:	Liquid, gas & vapour Two-wire, 4-20mA 10-30 Vdc $R = 50 \times (\text{supply voltage} - 10\text{v})\Omega$ 0.01 to +300 bar See ordering information	Span adjustment: Process temp. limits: Ambient temp. limits:  Humidity limits: Hazardous area certification:	10% to 100% of URL* See ordering information -20°C to +90°C (+80°C EEx ia) 0 to 100% RH  ATEX II 1 G and ATEX II 1 D EEx ia IIB T4 (Ta = -30°C to +80°C)
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\* 20% to 100% on 0.1 bar and 0.2 bar ranges

### Performance

Accuracy: Stability: Temperature effect:	+/- 0.1%* of calibrated span including linearity, hysteresis and repeatability +/- 0.1% URL* per 6 months +/- 0.015% URL* per °C (over ambient temperature range)
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•All nominal ranges except 300 bar, which is +/- 0.5%

\* URL = Upper Range Limit (Maximum span)

### Physical

Electrical connection:  Process connection: Wetted Parts: Sensor Process conn:  Face seal ring:	M20 cable gland for cable O.D. 5 to 9mm See ordering information  Ceramic 316 St Steel, aluminium Bronze or Titanium Fluorocarbon (FPM/FKM), Buna N, EPDM or Chemraz® #	Non-wetted parts: Housing:  Body 'O' rings:  Humidity limits: Ingress protection: Approximate weight:	316 St Steel or Aluminium Bronze Fluorocarbon (FPM/ FKM) or Buna 0 to 100% IP67 1 Kg (threaded version)
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# EPDM and Chemraz® only available on industrial versions.

Chemraz® is a registered trademark of Green Tweed

# Level

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## Approvals

### **Hazardous Area Certification :-**

ATEX II 1 G  
ATEX II 1 D (90°C)  
EExia IIB T4 Intrinsically Safe  
(Ta = -30°C to + 80°C)

### **Marine Approvals :-**

Lloyds Register  
Bureau veritas  
American Bureau of Shipping  
Korean Register

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