

Pressure measurement for research & industry

#### **Druck Limited**

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LP 1000 Series Pressure Sensor

**User Manual** 

K0267

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Amendment Record											
Iss No	Date	C/N No	Originator Typed Workflow Amendments								
1	16/02/06	-	Robert Lee	Robert Lee	New specification						
2	14/07/05	16834	Robert Lee	Robert Lee	Re-format to GE standards –ATEX requirements.						
3	27/04/06	18700 18701	Robert Lee	Robert Lee	-	Clarification of accuracy statements and materials spec.					
4	08/08/06	19030	Robert Lee	Robert Lee	-	Red/green on page 1 change to green/red					
5	20/06/11	26584	Robert Lee	Robert Lee	166044	IS version obsolete					

### Approvals

Engineering S REES	Engineering C GUTTRIDGE	
Marketing I ABBOTT	Technical Communications R LEE	

### **Print Instructions**

Print colour on white, double sided as supplied on disk.

Print on paper to 110 gsm, Silverblade matt art, saddle-stitch in 270 gsm covers.

Size 120 x 160 mm.

Translate into French, German, Italian, Spanish, Portuguese Brazilian, Simplified Chinese and Japanese.

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GE Measurement & Control Solutions

## **Druck LP 1000 Series Pressure Sensor**

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### Safety

To use this equipment safely, use the data and procedures in this publication:

- This user manual contains instructions to operate the equipment and maintain it in a safe condition. To prevent damage or injury:
- Obey all warnings and cautions.
- Use the equipment only for the specified applications.
- Operate the equipment only in the specified limits.

To install and use the equipment, use only approved engineers who have the necessary skills and qualifications.

CE This product complies with the requirements of the relevant European directives. For data on the applied standards, refer to the "Declaration of Conformity".

#### Trademarks

All product names are trademarks of their respective companies.

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#### Introduction

The Druck LP 1000 series of sensors accurately measures pressures to produce a voltage or current output. Some versions of this sensor contain a front panel LCD showing the current pressure value. The pressure measurement ranges can be between 0 to 0.25 mbar up to 0 to 70 mbar (0 to 0.10 inH<sub>2</sub>O up to 0 to 1 psi) [vented gauge, one pressure connection or differential two pressure connections].

The measurement cell and electronic circuits are contained in a compact alochromed aluminium enclosure. The LP 1000 series can be mounted using options including a wall mounting bracket, aluminium panel mounting bezel and stainless steel panel mounting bezel.

The DC and NC sensors (see Specification) provide in-situ calibration/test facilities, using two non-protruding calibration valves and calibration pressure ports located on the front panel. A calibration key actuates each calibration valve to allow pressure to the calibration pressure ports.

On code -L models two LED status indicators locate on the front panel. These indicators can be set to show a high/low pressure state (green/red). The high/ low pressure can be set by a potentiometer. The inverted state for these indicators can be set internally by the manufacturer.

#### Installation CAUTION:

- 1. INCORRECT ELECTRICAL CONNECTIONS CAN, IN CERTAIN CIRCUMSTANCES, DESTROY THE ELECTRONIC OUTPUT CIRCUIT.
- 2. BEFORE APPLYING ELECTRICAL POWER, MAKE SURE THE SUPPLY VOLTAGE IS TO THE CORRECT RATING.
- 3. This is a very sensitive sensor, only apply pressures within the pressure range.
- **Note:** After switching on, the sensor requires one hour to achieve full accuracy stated in the specification.

#### Positioning

The installed position of the sensor should be away from sudden temperature variations, shocks and vibrations and should not be close to strong electromagnetic fields (transformers, motors etc.).

The sensor can be mounted in any position with no affect on span, but mounting at an angle may require zero adjustment.

**Note:** At the factory, the sensor is adjusted with the diaphragm in the vertical plane. Possible positioning zero shift can happen, up to a maximum of 0.4 mbar/90° (0.16 inH<sub>2</sub>O/90°), when changing orientation.



#### Wall Mounting

Four, 6 mm (0.24") diameter holes in the mounting plate of the sensor provide securing points.





#### Internal detail

- 1 electrical connector DIN 43650A 2 zero adjustment
- 3 span adjustment

- damping adjustment 4

#### Panel mounting

The sensor requires a hole to locate in a panel. Four clamps, in the mounting plate of the sensor, provide securing points to the mounting panel.



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#### Internal detail

- 1 Electrical connector DIN 43650A
- 2 Zero adjustment
- 3 Span adjustment
- 4 Damping adjustment

### -NC and -DC models

- 1 LED indicators (option L)
- 2 Lo Cal valve

2

- 3 Lo Cal connection
- 4 Hi Cal connection
- 5 Hi Cal valve

#### **Electrical connections**



Current output (two-wire)

Voltage output (three-wire)

**Note:** GND connects to frame of sensor. Optionally, the frame of the sensor can be connected to earth/ground through the GND terminal.

**Connection detail** 

#### Adjustments General

The NC and DC models can be tested and adjusted in-situ. All other models must be disconnected from the system and, if necessary, removed from the installation to be tested and adjusted.



1 Calibration key

#### Preparation

Before starting, carefully vent pressure from the system. Connect the required test equipment to the calibration ports. Using the calibration keys, open the Hi and Lo valves.



### 2 Lo connection

- 1 Lo Cal valve
- 3 zero potentiometer
- 5 span potentiometer
- 4 Hi connection6 damping potentiometer

7 Hi Cal valve

#### Procedure

Three multi-turn potentiometers, located under the cover plate, provide for adjustments of the following:

- Zero
- n Span
- Damping
- The sensor should be positioned in its normal operating position (vertical or horizontal).

#### Zero adjustment

• Carry out zero adjustment with no pressure applied and with the sensor installed in the operating position. Turn the potentiometer clockwise to increase and counter clockwise to decrease.

#### Span adjustment

- The span setting should not normally need adjusting. At manufacture a label, fitted to the unit, indicates the factory span setting. To carry out span adjustment apply the required span pressure and adjust the potentiometer. Turn the potentiometer clockwise to increase span output value and counter clockwise to decrease span output value.
- Release the pressure.

#### Damping adjustment

• Damping adjustment is carried out by turning the potentiometer clockwise to increase damping (slower response) and counter clockwise to decrease damping (faster response).

#### Display (LCD) adjustment

**Note:** On LPX models the potentiometers are on the underside of the display PCB. Take great care when unscrewing the retaining nut, this can loosen the pressure sensing module through the mounting pillar (A). A loose pressure sensing module causes the transmitter to become inaccurate. On LPM models one potentiometer locates on the underside of the display PCB, the other on top.

This setting can be adjusted to change the display value.

**Note:** Before adjusting the display carry out a zero and span adjustment, detailed above.

Apply zero pressure and span pressure and, using the zero and span potentiometers, adjust the display:

- Carry out zero adjustment with no pressure applied and with the sensor installed in the operating position. Turn the potentiometer clockwise to increase and counter clockwise to decrease the display value.
- Carry out span adjustment apply the required span pressure and adjust the potentiometer. Turn the potentiometer clockwise to increase span output value and counter clockwise to decrease the display value.
- Release the pressure.

#### LED indicator adjustment (Option L)

This setting can be adjusted to change the indicator operating value. At manufacture the potentiometer is set to the mid-point of the pressure range.

- Apply the new indicator operating pressure, adjust the potentiometer until both indicators flicker. Turn the potentiometer clockwise to increase the operating value and counter clockwise to decrease operating value.
- Release the pressure.
- Apply a pressure below the operating value and slowly increase the pressure until the indicator operates. Apply a pressure above the operating value and slowly decrease the pressure until the indicator operates.
- Release the pressure. If necessary, re-adjust the potentiometer by repeating the procedure.

#### Completion

Check the output at zero pressure and if necessary, repeat the zero and span adjustments.

- Release the pressure.
- Make sure the o-ring seal correctly locates on the rim.
- Refit the cover.



1 LPX with option L LPM

LPX

2 3 LPM

- Adjusts LED indicator operating value. Adjusts LCD zero display value.
- - Adjusts LCD zero and span display values.
    - Adjusts LCD span display value.
- Pillar mount Α

#### LCD and LED indicator adjustment Models: LP\*1\*\*\*-\*\*\*D\*-1

Specification Pressure ranges (vented gauge or differential)

LP1000	0 to 0.25 mbar up to 0 to 2.5 mbar
	0 to 0.10 inH <sub>2</sub> O up to 0 to 1.0 inH <sub>2</sub> O
LP1500	0 to 5 mbar up to 0 to 15 mbar
LP1800	0 to 20 mbar up to 0 to 70 mbar
	0 to 8.04 inH <sub>2</sub> O up to 0 to 28.15 inH <sub>2</sub> O
Line pressure	
Overpressure	L
LP1000	
LP1500	
LP1800	1200 mbgr (480 inH <sub>2</sub> O)
Pressure media	pases and liquids compatible with alochrome 1000 aluminium allov
(2000 Series) berviliu	m-copper CB101 brass C268-0 Incopel X750 loctite (510 & 518)
Nitrile (Bung-N), PVC.	stainless steel. Delrin, polvurethane.
Accuracy including n	on-linearity, hysteresis and repeatability
normal	±0.5% of calibrated range
option (code A)	±0.25% of calibrated range
Long term stability in	n standard conditions will not change by more than 1% of the
calibrated range, ave	raged over 12 months.
Temperature effects	[over 0°C to +50°C (32°F to +122°F)]
ranges up to 1.25 mb	ar (0.5 inH <sub>2</sub> O)±0.02 mbar (0.01 inH <sub>2</sub> O)
ranges above 2 mbar	$^\circ$ (0.8 inH_2O) up to 2.5 mbar (1.0 inH_2O) \pm 0.04 mbar (0.02 inH_2O)
ranges above 5 mbar	(2.0 inH <sub>2</sub> O) up to 7.5 mbar (3.0 inH <sub>2</sub> O) $\pm$ 0.12 mbar (0.05 inH <sub>2</sub> O)
ranges above 10 mbc	ar (4.0 inH <sub>2</sub> O) up to 15 mbar (6.0 inH <sub>2</sub> O)±0.25 mbar (0.10 inH <sub>2</sub> O)
ranges above 20 mbc	ar (8.0 inH <sub>2</sub> O) up to 35 mbar (14.0 inH <sub>2</sub> O)±0.5 mbar (0.20 inH <sub>2</sub> O)
ranges above 40 mbc	ar (16.0 inH <sub>2</sub> O) up to 70 mbar (28.15 inH <sub>2</sub> O) $\pm$ 1.0 mbar (0.40 inH <sub>2</sub> O)
Operating temperat	0°C to +50°C (32°F to +122°F)
Humidity	
Environmental protec	tion (except models with C2 connections) IP 64 (NEMA 3)
Weight	
Power supply (Vs) (at	the terminals)
LPX sensor without di	splay10 to 30 V d.c.
LPX sensor with disple	ay15 to 30 V d.c.
LPX sensor with disple	ay and LED indicators20 to 30 V d.c.
LPM sensor	
LPM sensor (0 to 10 V	d.c. output)15 to 30 V d.c.

Power supply effects	±0.05% of full-scale/V d.c.
Insulation resistance	100 Mohms (at 50 Vd.c.)
Load impedance	
LPM 1000	5kohms minimum
LPX 1000	
Adjustment range	
Zero	±0.3 mbar (0.012 inH <sub>2</sub> O)
Span	±5% of full-scale
Damping	10 millisecond to 2 seconds
(factory set at minimum)	
Connections	
Pressure 10/32 UNF female (w	ith 1/8" i/d tube), M5 female or 4mm i/d tube
Electrical	DIN43650A, DIN43650C or screw terminal
Output signal (uni-directional)	
LPM (3-wire)	0 - 2.5 V d.c.
	0 - 5 V d.c.
	0 - 10 V d.c.
LPX (2-wire)	
Output signal (bi-directional)	
LPM (3-wire)	
LPX (2-wire)	

For advice and service, go to:

#### www.ge-mcs.com

#### Identification codes

LP	Base	e Mo	odel Number													
	Cod	е	Output type													
	Х	1	mA													
	м	1	V d.c.	<u>}.</u>												
			Code Output													
			0	2.5 mbar (URL)         0.25 mbar to 2.5 mbar (URV)           1.0 inH <sub>2</sub> O (URL)         0.10 inH <sub>2</sub> O (URV)           15 mbar (URL)         5 mbar to 15 mbar (URV)           6.03 inH <sub>2</sub> O (URL)         2.01 inH <sub>2</sub> O (URV)												
			5													
			8	70 r 28.1	70 mbar (URL) 20 mbar to 70 mbar (URV) 28.15 inH <sub>2</sub> O (URL) 8.04 inH <sub>2</sub> O to 28.15 inH <sub>2</sub> O (URV)											
				Code Pressure input												
					0 Gauge											
				1 Differential												
						Со	de	Pres	ssure	e con	necti	ion				
	0 10-32 UNF female to 1/8" barbed fitting															
						1		M5 :	fema	e						
						2	2	M5 :	fema	le to 4	4mm	barbed	fittir	ng		
								Co	ode	Elec	trical	l conne	ectio	on		
								C	21	DIN	4365	0 form /	A			
								C	2	Scre	w ter	minals				
								C	3	DIN	4365	0 form (	С			
										Co	bde	Specia	al fe	ature		
											5	Standa	ara	ototuo in	diantara*	
	L Green/red status indicators*								Mounting kit							
												DA		LCD indi	cator	Aluminium bezel
												DC		LCD indi	cator	FPM <sup>†</sup> & in-situ calibration
												DF		LCD indi	cator	FPM <sup>+</sup>
												DS		LCD indicator		Stainless steel bezel
												DW	/	LCD indi	cator	Wall mount bracket
												(blank)	ık)	None		None
												NC	;	None		FPM <sup>†</sup> & in-situ calibration
												NW	V	None		Wall mount bracket
Code Approvals									als							
	1 None															
* LPX1xxx-CxLDx-1-x and LPX1xxx-CxLDx-2-x only  **Only available with DC & NC models										Options						
+ 1	FPM =	fro	nt panel r	noun	t		2010.								A	Accuracy 0.25% full-scale
B Non-standar									Non-standard range							
															D	5-point calibration certificate
					١.		l					1			E	Calibration key (kit of 2) **
			Ex	am	ple	e id	en	tifi	ica	tio	n c	ode			Ē	
LP	x	1	5		1	2	2	-0	C1	;	S	DC	;	-1	-E	