

UNIK5000 Series

Pressure Sensing Platform
Instruction Manual



Safety



WARNING Do not use with media that has an oxygen concentration > 21 % or other strong oxidizing agents.

This product contains materials or fluids that may degrade or combust in the presence of strong oxidizing agents.

Do not apply pressure greater than the maximum safe working pressure to the sensor.

The manufacturer has designed this sensor to be safe when operated using the procedures detailed in this manual. Do not use this sensor for any other purpose than that stated.

This publication contains operating and safety instructions that must be followed for safe operation and to maintain the sensor in a safe condition. The safety instructions are either warnings or cautions issued to protect the user and the equipment from injury or damage.

Use qualified¹ personnel and good engineering practice for all procedures in this publication.

Maintenance

The sensor must be maintained using the manufacturer's procedures and these should be carried out by authorized service agents or the manufacturer's service departments.

<https://druck.com/service>

For technical advice contact the manufacturer.

1. A qualified technician must have the necessary technical knowledge, documentation, special test equipment and tools to carry out the required work on this equipment.

Symbols

Symbol	Description
	This equipment meets the requirements of all relevant European safety directives. The equipment carries the CE mark.
	This equipment meets the requirements of all relevant UK Statutory Instruments. The equipment carries the UKCA mark.
	This symbol, on the equipment, indicates a warning and that the user should refer to the user manual.
	<p>Druck is an active participant in the UK and EU Waste Electrical and Electronic Equipment (WEEE) take-back initiative (UK SI 2013/3113, EU directive 2012/19/EU).</p> <p>The equipment that you bought has required the extraction and use of natural resources for its production. It may contain hazardous substances that could impact health and the environment.</p> <p>In order to avoid the dissemination of those substances in our environment and to diminish the pressure on the natural resources, we encourage you to use the appropriate take-back systems. Those systems will reuse or recycle most of the materials of your end life equipment in a sound way. The crossed-out wheeled bin symbol invites you to use those systems.</p> <p>If you need more information on the collection, reuse, and recycling systems, please contact your local or regional waste administration.</p> <p>Please visit the link below for take-back instructions and more information about this initiative.</p>
	
https://druck.com/weee	

Abbreviations

The following abbreviations are used in this manual.

Note: Abbreviations are the same in the singular and plural.

Abbreviation	Description
°C	Degrees Celsius
COSHH	Control of Substances Hazardous to Health
FS	Full-scale
mA	Milli Ampere
mbar	Millibar
psi	Pound per square inch

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1. Introduction

This manual is applicable to UNIK family pressure sensors consisting of the following product series:

- UNIK5000, UNIK5600, UNIK5700, UNIK5800 and UNIK5900

The original language of this manual is English.

1.1 Manufacturer

The identified manufacturer of this equipment is:

“Druck Limited”

Fir Tree Lane, Groby, Leicester, LE6 0FH, United Kingdom.

Telephone: +44 116 231 7100; Fax: +44 116 231 7103

Internet: <https://druck.com>

Under the instruction of Druck Limited, the pressure sensors may also be manufactured in China by:

Baker Hughes Sensing & Inspection (Changzhou) Co., Ltd.

Building 9A, Jintong International Industrial Park, No. 8 Xihu Road, Wujin High-Tech Industrial Zone, Changzhou, Jiangsu 213164, China.

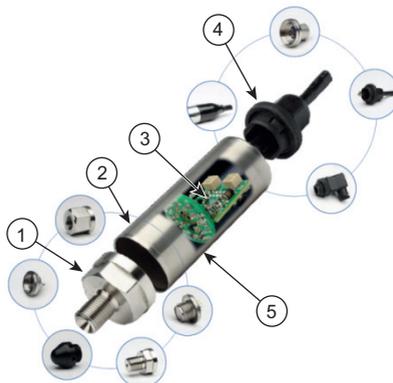
Each sensor is marked to indicate the country of manufacture.

2. Description

2.1 Purpose

UNIK pressure sensors (hereinafter referred to as sensors) are designed for continuous measurement and conversion of gauge, atmospheric, absolute and differential pressure into an analogue output signal of direct current or voltage.

UNIK is a family of modern pressure sensors of modular design, the parameters of which are chosen by the customer at the time of order, see Figure 1.



1 Pressure connector.

2 Partially encapsulated electronics module.

5 Cylindrical metal housing.

4 Pressure measuring module.

3 Electrical connection.

Figure 1: Modular Design of UNIK Pressure Sensors

The sensors are designed for measurement of pressure in systems.

UNIK pressure sensors are optionally available with certification permitting their use in explosive atmospheres.

2.2 Technical Specifications

Refer to the appropriate UNIK5#00 data sheet for technical specifications and explanation of the product model number.

Model numbers appended with a four or eight-digit alphanumeric string denote the use of a customer-specific specification drawing indicating the use of additions or deviations to the data sheet specification. Refer to the specification drawing if applicable.

2.3 Design and Principle of Operation

The sensor consists of a pressure connector, pressure measuring module, a partially encapsulated electronics module, and electrical connection facilities, structurally combined in a cylindrical metal housing.

The pressure connector allows the sensor to be mounted to a pressurized vessel or pipework.

The pressure measuring module consists of a welded metal body featuring a metal diaphragm (providing a flexible barrier to the process media), a glass-to-metal seal (for electrical connections) and a fluid filled cavity containing a silicon diaphragm with diffusion implanted resistors arranged in the form of a Wheatstone bridge.

The operating principle of the pressure sensor is based on the piezo resistive effect: a change in resistance when applying pressure. When pressure is applied, the silicon diaphragm flexes, changing the resistance of the implanted resistors and the output voltage of the bridge circuit.

For sensors designed to measure 'gauge' or 'atmospheric' pressure, the rear of the silicon diaphragm is vented to the external atmosphere via a PTFE filtered port in the body of the enclosure, or via a tube in the supplied electrical cable.

The electronic circuit, available in three main variants ("PMP", "PDCR" and "PTX") provides a range of electrical connection and electrical output signal options.

Depending on the type of electrical connection facility provided, the 'zero' and 'span' settings of the sensor can be adjusted.

Depending on the type of electrical output and electrical connection of the sensor, it is possible, by connecting certain electrical contacts together, to receive an output signal simulating an external pressure equal to 80% of the full scale. This is the 'Shunt Calibration' feature of the sensor.

2.4 Markings

For typical markings applied to the non-hazardous area version of pressure sensors, see Figure 2:

[1]		UNIK 5000				[3]
[2]		PRESSURE SENSOR				
[4]		#### 5###[#]-T#-A#-C#-##-##[-#####]				
[5]		##### ACCURACY				
[6]		S/N #####				
[7]		## TO ## #				
[8]		Supply: ## TO ## V== ## mA				
[9]		Output: ## TO ## # #####				
[10]		Temp. Range: ## TO ## °C				
[11]						
[12]		DRUCK LTD. LEICESTER, LE6 0FH, UK				
[13]		MADE IN #####				

Figure 2: Identification, Electrical and Pressure Markings

1. Product name: 'UNIK5000'
2. Product description: 'Pressure Sensor'
3. CAUTION: To install and use this equipment, read, understand and comply with this document.
4. Model number
5. Accuracy description: Industrial/Improved/Premium
6. Serial number
7. Pressure range limits and unit of measurement
8. Input supply voltage range and current limits
Note: The symbol == indicates the use of direct current
9. Output voltage or current range
10. Ambient temperature range
11. Reserved for applicable certification markings. Position on sensor may vary
12. Manufacturer's name and address
13. Country of manufacture

3. Installation & Operation



CAUTION Until installation, keep the unit in the original container with all the covers in position. The container and covers prevent contamination and damage. When not in use, keep the connections covered.



WARNING High pressures, temperatures and potentially poisonous pressure media are dangerous, and can cause injury to personnel and damage to property and the environment. Ensure correct installation, sealing of pressure interfaces and connection of the equipment. Ensure correct operation of the equipment in accordance with the specification. Use the applicable protection and obey all safety precautions.



WARNING For sensors intended for use in Explosive Atmospheres refer to additional instructions on Hazardous Area Installation.

3.1 General Requirements

When the sensor is received, check the completeness.

To identify the electrical and pressure connections, refer to the product datasheet or, if applicable, the specification drawing.

Do not use force when installing the sensor. Use only a wrench on the sensor's hexagonal flats to tighten the sensor.

The ambient temperature and the process media to be measured must not exceed the ranges specified in the sensor specification.

Do not use the sensor where the pressure medium may freeze. This may cause damage to the sensor and connected pressure equipment.

The materials used for the primary enclosure and pressure bearing surfaces are identified in the product datasheet or, if applicable, the specification drawing. Make sure that the materials are applicable for the installation.

Before using the equipment, remove the plastic/rubber protection cap from the pressure connector.

Some models feature a white PTFE vent filter in the wall of the enclosure. Make sure the vent filter is correctly installed and is flush with the enclosure body.

3.2 Safety Measures

The operation of sensors in systems whose pressure may exceed the overload values specified in the data sheet or customer-specific specification drawing is not allowed.

Connection and detachment of sensors from the mains supplying the pressure of the medium to be measured must be done after the shutoff valve is closed from the process and the pressure in the working chamber is made equal to atmospheric.

The connecting pipes must have a one-way slope (not less than 1:10) from the pressure collection point up to the sensor, if the medium to be measured is gas, and down to the sensor if the medium is liquid. If this is not possible, when measuring gas pressure at the lower points of the connecting lines, it is necessary to install sludge vessels, and when measuring the liquid pressure at the highest points, install gas collectors.

Selected devices for mounting sensors should be mounted on straight sections, at the maximum possible distance from pumps, locking devices, elbows, expansion joints and other hydraulic devices. It is especially not recommended to install sensors in front of the shut-off device if the

medium to be measured is liquid. If there are water hammers in the system, it is recommended to use a sensor complete with a hydraulic shock dampener.

To reduce the temperature acting on the isolation diaphragm when measuring vapor pressure, it is recommended to use impulse tubes. The impulse tube must first be filled with water.

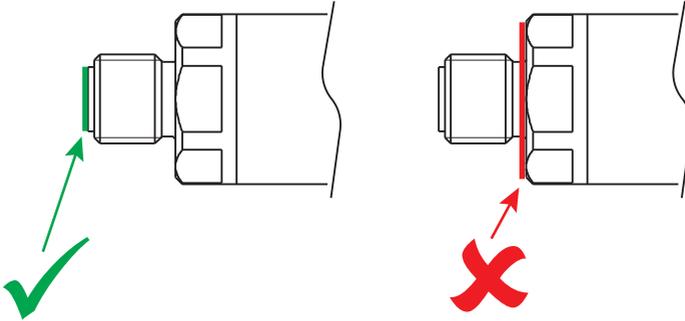
Attach the equipment in a safe configuration that prevents unwanted stress (vibration, physical impact, shock, mechanical and thermal stresses). Do not install the equipment where it can be damaged by a material that causes corrosion. Provide additional protection for the equipment if it may be damaged in service.

When installing power supply and signal wiring, the possibility of condensate entering the sensor cable entry should be avoided.

3.3 Connecting to a Pressure Source

When mounting the sensor, seal the mating surfaces. Failure to properly seal may affect performance or calibration accuracy.

Male threaded pressure connectors must not be sealed or constrained against the face at the base of the thread. The forward cone or flat face should always be used as indicated below.



3.3.1 Media Compatibility

The media compatibility of the product is shown in Table 1.

Table 1: Media Compatibility

Product	Pressure Range	Media Compatibility
5000	0 – 200 bar (0 – 2900 psi)	Fluids compatible with stainless steel 316L and Hastelloy C276.
	201 – 500 bar (2915 – 7250 psi)	Liquids and group II gases compatible with stainless steel 316L (and stainless steel 17-4PH for pressure connector P58 only).
	501 – 700 bar (7265 – 10150 psi)	Group II liquids and group II gases compatible with stainless steel 316L (and stainless steel 17-4PH for pressure connector P58 only).
		<p>Notes:</p> <p>For the wet/dry differential version, negative pressure port: Fluids compatible with stainless steel 316L, stainless steel 304, Pyrex, silicon and structural adhesive.</p> <p>For pressure connector option PW: immersion fluid must be compatible with Kynar.</p> <p>For electrical connector option 3: immersion fluid must be compatible with polyurethane.</p> <p>For electrical connector option 4: immersion fluid must be compatible with Hytrel.</p> <p>For electrical connector option N: immersion fluid must be compatible with Kynar.</p>
5600	0 – 200 bar (0 – 2900 psi)	Fluids compatible with stainless steel 316L (and Hastelloy C276 for differential versions only).
	201 – 500 bar (2915 – 7250 psi)	Liquids and group II gases compatible with stainless steel 316L.
	501 – 700 bar (7265 – 10150 psi)	Group II liquids and group II gases compatible with stainless steel 316L.
		<p>Notes:</p> <p>For the wet/dry differential version, negative pressure port: Fluids compatible with stainless steel 316L, stainless steel 304, Pyrex, silicon and structural adhesive.</p> <p>For pressure connector option PW: immersion fluid must be compatible with Kynar.</p> <p>For electrical connector options N and P: immersion fluid must be compatible with Kynar.</p> <p>For electrical connector options U and V: immersion fluid must be compatible with TPE-U.</p> <p>For electrical connector options P and V: immersion fluid must be compatible with nitrile butadiene rubber.</p>

Table 1: Media Compatibility (Continued)

Product	Pressure Range	Media Compatibility
5700		Fluids compatible with titanium grades 2, 4 and 5. Notes: For pressure connector option PW: immersion fluid must be compatible with Kynar. For electrical connector options N and P: immersion fluid must be compatible with Kynar. For electrical connector options U and V: immersion fluid must be compatible with TPE-U. For electrical connector options P and V: immersion fluid must be compatible with nitrile butadiene rubber.
5800/5900	0 – 200 bar (0 – 2900 psi)	Fluids compatible with stainless steel 316L and Hastelloy C276.
	201 – 500 bar (2915 – 7250 psi)	Liquids and group II gases compatible with stainless steel 316L.
	501 – 700 bar (7265 – 10150 psi)	Group II liquids and group II gases compatible with stainless steel 316L.

Note: Fluid classification complies with European Regulation (EC) No 1272/2008 and GB CLP Regulation, UK S.I. 2019/720. Statements comply with European Pressure Equipment Directive 2014/68/EU and UK S.I. 2016/1105; amended by S.I. 2019/696. Refer to document K0581 for product classification and regulatory information.

3.3.2 Pressure Containment

The pressure containment of the sensors is shown in Table 2.

Table 2: Pressure Containment

Product	Pressure Range	Pressure Containment
5000/5600/5700	0 – 150 mbar (2 psi)	10 × FS
	0 – 70 bar (1000 psi) gauge	6 × FS (200 bar (2900 psi) maximum)
	0 – 70 bar (1000 psi) absolute	200 bar (2900 psi) maximum
	>70 bar (1000 psi)	1200 bar (17400 psi) except for pressure connector options PX, RA and RF which are limited to 600 bar (8700 psi) Note: Differential (–ve port) must not exceed positive port by more than 6 × FS (15 bar (200 psi) maximum).
5800/5900	0 – 50 bar (725 psi) gauge	6 × FS (200 bar (2900 psi) maximum)
	0 – 50 bar (725 psi) absolute	200 bar (2900 psi) maximum
	>50 bar (725 psi)	1200 bar (17400 psi) maximum

3.4 Power Requirements

The sensor should be connected to a compliant stable power supply. The power supply must be energy-limited to a maximum of 4.2 A. The power supply requirements for the sensor are shown in Table 3 and Table 4.

Table 3: Supply Voltage

Product	Output Type	Supply Voltage
5000	PMP (Basic)	7 to 32 Vdc (12 to 32 Vdc for 0 to 10 V Output)
	PMP (Ratiometric)	5 ± 0.5 Vdc
	PMP (Basic Configurable)	(Maximum Output + 1 V) (7 V Minimum) to 32 V
	PMP (Configurable 3 & 4 wire)	7 to 36 Vdc
	PTX	7 to 32 Vdc
	PDCR (Passive)	2.5 to 12 Vdc
	PDCR (Linearized)	7 to 12 Vdc
5600/5700	PTX	7 to 32 Vdc
5800/5900	PMP (Basic)	7 to 32 Vdc (12 to 32 Vdc for 0 to 10 V Output)
	PMP (Basic Configurable)	(Maximum Output + 1 V) to 32 Vdc
	PTX	7 to 32 Vdc
	PDCR (Passive)	2.5 to 12 Vdc
	PDCR (Linearized)	7 to 12 Vdc

Table 4: Supply Consumption

Product	Output Type	Current Consumption
5000	PMP (Basic)	<3 mA
	PMP (Ratiometric)	<3 mA
	PMP (Basic Configurable)	<3 mA
	PMP (Configurable 3 & 4 wire)	<20 mA at 7 Vdc decreasing to <5 mA at 32 Vdc
	PTX	4 to 20 mA (Limited to 30 mA maximum)
	PDCR (Passive)	<2 mA at 10 Vdc
	PDCR (Linearized)	<3 mA
5600/5700	PTX	4 to 20 mA (Limited to 30 mA maximum)
5800/5900	PMP (Basic)	<3 mA
	PMP (Basic Configurable)	<3 mA
	PTX	4 to 20 mA (Limited to 30 mA maximum)
	PDCR (Passive)	<2 mA at 10 Vdc
	PDCR (Linearized)	<3 mA

3.5 Maintenance



WARNING High pressures and temperatures are dangerous and can cause injury (Refer to pressure limits in the sales data sheet). Be careful when working on components connected to lines that have high pressures and heat. Use the applicable protection and obey all safety precautions.

The sensor contains no moving parts and requires a minimum of maintenance.

3.5.1 Visual Inspection

Inspect the sensor for damage and corrosion. Any damage to the sensor must be assessed. If the housing is no longer sealed against water and/or dust, the sensor must be replaced.

3.5.2 Cleaning

Clean the case with a damp lint-free cloth and mild detergent.

If the product has been in contact with hazardous or toxic materials, obey all the applicable Control of Substances Hazardous to Health (COSHH) or Material Safety Data Sheet (MSDS) references and precautions when handling.

3.6 Returned Goods Procedure

To repair or calibrate the sensor, return it to the applicable Druck Service Department.

Please contact our Service Department and get a Return Authorization number.

Please supply these details:

- Product (e.g. UNIK5900 Pressure Sensor)
- Pressure range
- Serial number
- Details of defect / work to be undertaken
- Calibration traceability requirements
- Operating conditions

3.6.1 Safety Precautions

To prevent possible injury when we receive the product, you must also tell us if the product has been in contact with hazardous or toxic materials. Please supply the applicable Control of Substances Hazardous to Health (COSHH) or Material Safety Data Sheet (MSDS) references and precautions.

3.6.2 Important Notice

Service or calibration by unauthorized sources will affect the warranty and may not guarantee further performance. If the equipment has "hazardous area" approval, the approval will also be invalid.

3.7 Electromagnetic Compatibility

The pressure sensor complies with the European Electromagnetic Compatibility Directive 2014/30/EU and UK S.I. 2016/1091; amended by S.I. 2019/696.

3.7.1 Power Supply and Metering

The quality of the power supply and monitoring equipment will directly affect the EMC performance of the entire system. Since Druck Limited has no control over the installation of the sensor it must remain the responsibility of the user to ensure that the EMC performance of the system is adequate.

To maintain good immunity from electromagnetic disturbances present on the system power supply, the power supply should filter any transient interference from the incoming line and

present a clean regulated DC supply to the sensor. The monitoring equipment should likewise be immune from the effects of electromagnetic disturbances and not impart disruptive signals on the connections to the sensor.

3.7.2 Cable Type

Due to the small size of the sensors they are unlikely to be directly affected by radiated RF energy. Any RF energy that gets into the circuits will probably enter via the interconnecting cable. To minimize the effect of nearby circuits and events, it is necessary to use screened cable between the sensors and power supply/monitoring equipment. Failure to do so will invalidate the EMC tests conducted by "Druck".

The choice of cable type should reflect the environment through which it is going to run. Screened cable should always be used where electrical noise is present. Good cabling practice will be reflected in signal quality.

3.7.3 Earthing (Grounding)

For the screening of the cable to be effective, it is essential that the screen or drain conductor is permanently bonded to earth (ground). This should take place at the monitoring end of the cable as close to the power supply as practical. Protection should be afforded to any unscreened section of cable or circuit by means of a screened enclosure. Take care not to create ground loops.

3.8 Faults



WARNING Risk of injury to personnel and damage to property and the environment.

In the event of a fault:

- Establish if the pressure sensor is mounted, sealed, connected and programmed correctly as instructed.
- Contact the manufacturer for further advice on fault elimination.
- For persistent faults, safely remove the equipment from service. Refer to Section 3.6 for returned goods procedure.

Office Locations



<https://druck.com/contact>

Services and Support Locations



<https://druck.com/service>



www.sensycal.com.br

Avenida do Estado 4567
São Paulo, SP, Brasil - 03105-000
+55 (11) 3275 0094
vendas@sensycal.com.br