

SOLUTIONS FOR OXYGEN CONCENTRATORS

Sensors and Switches

Application Note

Oxygen concentrators reduce the level of nitrogen in the air, and increase the oxygen level.

BACKGROUND

Oxygen concentrators are used to assist patients with respiratory illnesses or lung disease, who have difficulties in absorbing oxygen into the bloodstream.

An oxygen concentrator receives air, purifies it and then distributes the newly formed air. Typically, air is composed of 80 percent nitrogen and 20 percent oxygen. An oxygen concentrator increases the oxygen content to over 90 percent. Sieve bed filters contain Zeolite, which removes the nitrogen from the air. Oxygen concentrators can be used in hospitals, home and some devices are portable.

SOLUTIONS

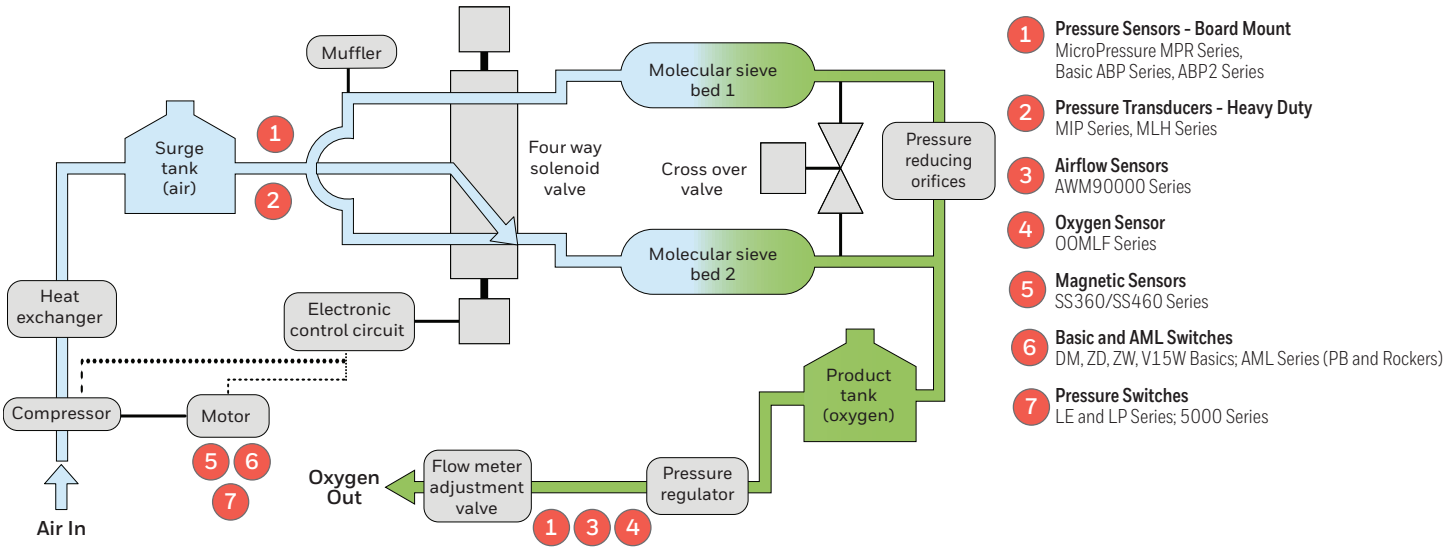
Honeywell manufactures many sensors and switches that may be used in oxygen concentrators. Our solutions are designed to help control pressure and airflow, detect failures, enhance equipment performance and efficiency and act as a high pressure warning within the oxygen concentrator. (See Figure 1.)

SOLUTIONS FOR OXYGEN CONCENTRATOR APPLICATIONS

- Pressure Sensors – Board Mount
- Pressure Sensors – Heavy Duty
- Airflow Sensors
- Oxygen Sensors
- Magnetic Sensors
- Basic and AML Switches
- Pressure Switches

Honeywell

Figure 1. Solutions for Oxygen Concentrator Applications





MLH Series | MIP Series | MicroPressure, MPR Series | Basic ABP Series

PRESSURE SENSORS

Board Mount: MicroPressure MPR Series, Basic ABP, ABP2 Series
Heavy Duty: MIP, MLH Series

Function/Action

- Monitor sieve bed pressure to maintain the optimal pressure so that enough oxygen can be generated, but still remain at a relatively high oxygen concentration

Honeywell board mount pressure sensors are extensively used within medical equipment due to high levels of accuracy, sensitivity and reliability (see Table 1). Board mount pressure sensors may be used to detect when the patient begins to inhale so that oxygen can then be delivered efficiently and effectively. Not only does this enhance system response time, it also minimizes wasting oxygen when the patient isn't inhaling, allowing the oxygen concentrator to be smaller and to operate more efficiently.

Smaller equipment size also means lower power consumption, as well as greater portability.

Heavy duty pressure sensors are used to monitor and control the flow of air and oxygen delivered to oxygen concentrators, and used to monitor and control pressure within the surge tank, providing feedback to the compressor which allows the compressor to maintain the appropriate pressure level. Heavy duty pressure sensors support a wide variety of media and are offered with a wide choice of ports and outputs (see Table 1).

TABLE 1. PRESSURE SENSORS AND TRANSDUCERS FEATURES

MICROPRESSURE MPR SERIES

- Pressure range 60 mbar to 2.5 bar
- Measures absolute and gage
- Amplified and temperature compensated
- Digital (I^2C/SPI) output (24-bits)

BASIC ABP/ABP2 SERIES

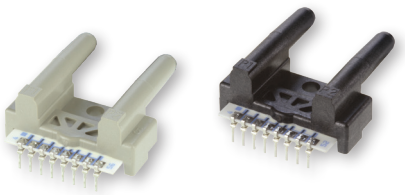
- Pressure range 5 mbar to 25 bar
- Measures absolute, gage and differential
- Amplified and temperature compensated
- Analogue or digital (I^2C/SPI) output
- Supports liquids and dry gases

MIP SERIES

- Rugged, stainless steel construction
- Ratiometric output: 0.5 Vdc to 4.5 Vdc
- Total Error Band up to ±0.75 %FSS
- High accuracy: ±0.15 %FSS BFSL
- CE, UKCA, RoHS, REACH compliant

MLH SERIES

- Pressure range of 6 bar to 550 bar, 50 psi to 8,000 psi
- ±0.25% full scale accuracy (BFSL)
- Total Error Band as low as 2 %FSS
- Less than 2 ms response time
- Fully temperature compensated, calibrated and amplified
- Rated IP65 or better



AIRFLOW SENSORS

AWM90000 Series

Function/Action

- Monitor a patient's breathing to detect when the patient inhales, so that oxygen is only supplied when required and isn't wasted. This helps to minimize the overall system size by supplying oxygen only when required

The AWM90000 Series (see Table 2) is designed to detect ultra-low flow levels at 0,1 cm^3. This enhanced sensitivity may be used to detect when the patient exhales and when the system should reduce airflow, easing exhalation and improving patient comfort.

Honeywell's airflow sensors deliver a low pressure drop (down to 0,2 cm-H_2O at 200 SLPM), leading to lower flow resistance and improved patient comfort.

TABLE 2. AIRFLOW SENSORS FEATURES

AWM90000 SERIES
• Bi-directional sensing capability
• Highly stable null and full-scale
• Low pressure drop
• Compact package design
• Low hysteresis and repeatability errors
• Fast response time (1 ms typical)
• Low power consumption



OXYGEN SENSORS

OOMLF Series

Function/Action

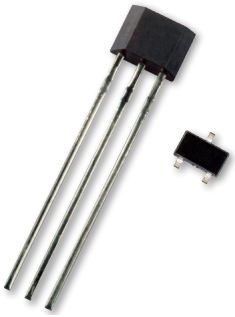
- Measure and control oxygen concentration level of the air delivered to the patient

Oxygen sensors are the oxygen-sensing component of an oxygen analyzer that measures oxygen concentration in breathing gas mixtures. Honeywell's lead-free oxygen sensors are an innovative one-to-one, drop-in replacement for existing lead-based oxygen sensors (see Table 3).

The OOMLF Series fulfills the lead-free RoHS II regulatory requirements. In addition, these oxygen sensors are also temperature compensated and provide high accuracy of the sensor signal, low signal drift and low cross interferences from common components of breathing gases.

TABLE 3. OXYGEN SENSORS FEATURES

OOMLF SERIES
• Compliant with European MDD (CE/UKCA certification)
• Compliant to EU RoHS Directive 2011/65/EU as amended by Directive 2015/863
• Meets ISO 80601-2-55
• Designed and manufactured according to EN ISO 13485
• Higher accuracy and reliability in response
• Resistant to N_2O



MAGNETIC SENSORS

SS360/SS460

Function/Action

- Control motors and sense motor speed

These magnetic position sensors are designed to provide reliable, highly accurate output for smooth motor control that reduces noise and vibration in the pump's motor assembly and improves its efficiency (see Table 4). Its solid state reliability often reduces repair and maintenance costs.

Their small size allows for design into many compact, automated, lower-cost assemblies. A thermally balanced integrated circuit that is accurate over a full temperature range is designed to provide proper fan functionality.

TABLE 4. MAGNETIC SENSORS FEATURES

SS360/SS460
• Fast response time
• No-chopper-stabilization
• High sensitivity
• Latching magnetics
• Wide operating voltage range of 3 Vdc to 24 Vdc
• Built-in reverse voltage



BASIC AND AML PUSHBUTTON SWITCHES

DM, V15W, ZW Series; ZD Series; AML Series

Function/Action

- Used as on/off operator controls, as well as detection for covers, panels and doors

MICRO SWITCH basic switches can be used as presence/detection for covers, panels and doors acting as a fail-safe to prevent switching the machine when doors/panels are ajar. Several series are sealed to protect against fluids (see Table 5).

MICRO SWITCH AML Series are available as pushbuttons, key switches and rockers/paddles (see Table 5). They are often used in medical equipment as off/on operator controls on the external face of the equipment.

TABLE 5. BASIC SWITCHES AND PUSHBUTTON FEATURES

MICRO SWITCH BASICS
• Watertight, dust tight; leaded versions are sealed to IP67
• High current capacity
• Many different switch characteristics, actuators, and terminations
• Miniature and subminiature size
• Lower power consumption
AML PUSHBUTTONS
• Pushbuttons, paddles, rockers, key-actuated, and indicators within AML Series for coordinated panel appearance
• Less than 1.75 inch panel depth
• Furnished lighted or unlighted



PRESSURE SWITCHES

LP Series; LE Series; 5000 Series

Function/Action

- Act as high pressure warnings in the event of error or over-pressure

Honeywell LP/LE pressure switches are often located on the output of the oxygen concentrator's pressure regulator and can act as high-pressure warnings in the event of an error (see Table 6). The switch could illuminate a warning light/sound, or simply cut power in the event of a dangerous, over-pressure event. In some cases, it may also just shut down the motor.

TABLE 6. PRESSURE SWITCHES FEATURES

LP SERIES, LE SERIES
• Pressure switching set point range: 3.5 psi to 150 psi
• Factory set and field adjustable
• 500 psi proof
• Configurable
• IP67 sealing rating
• Hysteresis option (LP)
• More than 15 pressure port options and over 30 electrical terminations
• Smart diagnostic technology option
5000 SERIES
• Designed to stand up to extended duty applications
• 0 psi to 150 psi
• Factory set
• Gold contacts
• 500 psi proof
• #8-32 screws, 1/4 in blade, Metripack options



⚠WARNING IMPROPER INSTALLATION

- Consult with local safety agencies and their requirements when designing a machine control link, interface and all control elements that affect safety.
- Strictly adhere to all installation instructions.

Failure to comply with these instructions could result in death or serious injury.

WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship during the applicable warranty period. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items that Honeywell, in its sole discretion, finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

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