Using the AirWatch For Monitoring Breathing Air Compressors

Application Note: 501-6

INTRODUCTION

In many applications compressors are used to produce pressurized synthetic air. Depending on the purity of the synthetic air it can be used as technical gas or as breathing air. Since 2001 breathing air counts as medicine and the purity of it needs to be ensured. This means that compressed air needs to be treated before it can be used as breathing air. The treatment removes the unwanted contaminations, which can vary depending on the application, where the breathing air is going to be used.

As a result, breathing air for industrial use needs to be monitored according to EN 12021 and breathing air for medical use needs to be monitored according to the European Pharmacopoeia. This Application note will mainly focus on the demands for the medical breathing air, where the hospital pharmacist is obliged to ensure that the thresholds for the specific gases are not exceeded.

Gas	Threshold Value
CO_2 Carbon Dioxide	≤500 ppm
CO Carbon Monoxide	≤5 ppm
NO Nitric Oxide	≤2 ppm
NO_2 Nitrogen Dioxide	≤2 ppm
SO_2 Sulfur Dioxide	≤1 ppm
O_2 Oxygen	20,4 %vol - 21,4 %vol
Oil mist	≤0.1 mg/m^3
H_2O Water Vapor	≤67 ppm / ≤870 ppm*

Figure 1: Threshold Values for medical breathing air.
**with specific exception*

The treatment stages consist out of several filters to decrease the amount of contaminations. The most important filters are the active carbon filter, which removes the oil while the adsorption dryer reduces NO_2 SO_2, CO_2 and the moisture to a minimum for the catalyst, which changes CO to CO_2, because it doesn't tolerate moisture.

Up to 2017 those threshold values were regularly checked with gas detector tubes for high pressure applications. Every filter has a limited lifetime and it could cause in major damage, if the filters end of life is not noticed immediately. To address this concern the MDR (Medical Device Regulation) became effective in May 2017 with a transitional regulation of 3 years. The MDR demands a continuous monitoring of Oil mist, H_2O and CO to ensure that the active carbon filter, the adsorption dryer and the catalyst (hopcalite filter) is working properly. As a result, the mainly spreaded detection methods for this application were not sufficient anymore.

Most common CO sensors work only with at least 5% relative humidity, are not precise in the lower measurement range to allow a threshold of 5ppm and would be blind for any concentration at 10 bars pressure. The location, where those parameters needs to be monitored has already the lowered humidity and the high pressure, why it is a tough challenge to monitor especially for CO.

OUR SOLUTION

The Breathing AirWatch is designed to meet the criteria of constant monitoring of pressurised air. It comes with a Swagelok connector for 6 mm pipes and can be powered up with a normal power socket, even though we strongly recommend using a hard-wired cable for powering up the unit during operation. That way it is as easy as possible to implement it in already existing systems.

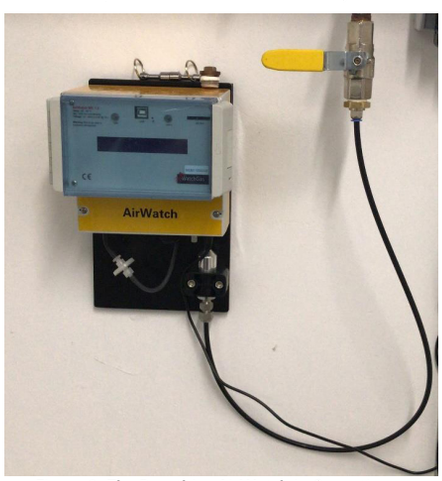

Figure 2: The BreathingAirWatch in Operation

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To ensure that the electrochemical sensors work in the pressurised dry air, the sample is lead through a pressure regulator and a PermaPure tube to bring up the humidityto a nearly ambient level. That way it is not only possible to monitor continuously the CO & CO_2 concentration, but also the O_2, SO_2, NO & NO_2 concentration if needed. It is even possible to upgrade existing BreathingAirWatches with more sensors up to a maximum of 4, so that you can always match the demands of regulations.

The Standard Breathing AirWatch comes preprogrammed to use the first relay as a fault relay, if the power gets interrupted or the internal flow sensor gives alarm. The other relays can be used to shut a valve or inform the pharmacist of a too high gas contamination.

All you need for installing the Breathing AirWatch into an existing System is a bypass after the treatment stages and a power supply, which can even be a normal power socket.

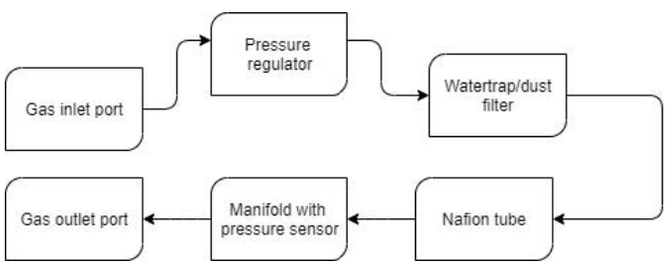

Figure 3: Schematic structure of the gas flow

It is optional to mount a WatchGas Beacon Sounder on top of the AirWatch. You don't need a relay for this due to the serial communication. The WatchGas Beacon Sounder can also light up in every color you want, including a green signalling for "all ok".

KEY ADVANTAGES OF THE BREATHING AIR WATCH

- Continuous CO & CO_2 monitoring in pressurised air
- Resolution of 20 ppb for CO and 10ppm for CO_2
- Basic datalog available & programmable
- 3 programmable Relays
- Plug & Play
- Reliable in the lower measurement ranges
- Integrated flow fault detection
- Hard-fixed powering or through power socket
- Optional Beacon Sounder available

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