Medical Grade
Breathing and Surgical Air
Application
A medical air supply is regarded as a vital part of every hospital infrastructure and is one of the few medicines that are manufactured on-site. Compressed medical grade air can be used for a wide variety of applications such as anaesthetics, lung ventilation, intensive therapy, pneumatic surgery tools, nebulizers and many more where the quality of the air is vitally important.

If you believe that your patients deserve the highest quality medical air - then Parker domnick hunter will have a product for you.
Meeting health care needs

Anaesthesia Machines

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Medical / breathing air installation

Ventilators

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The problem

In compressed air fed systems, ambient air is drawn into the compressor, therefore any contaminants present in the ambient air plus those introduced by the compressor itself will be present unless removed by a purification system. Contaminants present can include:

- Carbon monoxide
- Carbon dioxide
- Water vapor
- Micro-organisms
- Atmospheric dirt
- Oil vapor
- Water aerosols
- Condensed liquid water
- Liquid oil
- Oil aerosols
- Rust
- Pipescale

Atmospheric dirt

Atmospheric air in industrial and urban environments will typically contain 140 - 150 million dirt particles in every cubic meter. As 80% of these particles are less than 2 microns in size, they are too small to be captured by the compressor air intake filter and will therefore travel unrestricted into the compressed air system.

Micro-organisms

Atmospheric air can contain up to 100 million micro-organisms per cubic meter. Bacteria, viruses, fungi and spores are drawn into the compressor air intake and due to their size; will pass directly through the compressor intake filters and into the compressed air system. The warm, moist compressed air provides an ideal environment for their growth.

Rust and pipescale

Rust and pipescale is usually found in air receivers and distribution piping and can be directly attributed to the presence of water in the compressed air system. Over time, the rust and pipescale breaks away to cause damage or blockage in production equipment which can also contaminate final product and processes. Even after the installation of dryers into older piping systems which were previously operated with inadequate or no purification equipment, rust and pipescale problems often increase for a period of time.
Water vapor
Water enters the compressed air system through the compressor intake as a vapor (or gas). The ability of air to hold water vapor is dependent upon its pressure and temperature. The higher the temperature, the more water vapor that can be held by the air. The higher the pressure, a greater amount of water vapor is squeezed out. As large volumes of air are drawn into the compressor and compressed, the temperature of the air increases significantly. This allows the heated air to easily retain the water vapor present in the atmospheric air.

Condensed liquid water and water aerosols
After compression, compressed air is normally cooled to a usable temperature by an after-cooler. This cooling reduces the air’s ability to retain water vapor, resulting in a proportion of the water vapor being condensed into liquid water. The liquid water is then removed by a condensate drain fitted to the after-cooler water separator.

The air leaving the after-cooler and entering the compressed air system is now 100% saturated with water vapor. Any further cooling of the compressed air will result in more water vapor condensing into liquid water. Condensation occurs at various stages throughout the system as the air is cooled further by the air receiver, the distribution piping and the expansion of air in valves, cylinders, tools and machinery.

Oil vapor
Atmospheric air also contains oil in a gaseous form (oil vapor) which comes from inefficient industrial processes and vehicle exhausts. As with other contaminants, oil vapor is drawn into the compressor intake and passes through the intake filter. Typically, concentrations can vary between 0.05 and 0.5 mg per cubic meter, but these can increase significantly should the compressor be sited near highways and heavy traffic. Additionally, lubricants used in the compression stage of a compressor can also be vaporized and carried into the compressed air system. This oil vapor will then cool and condense into a liquid. Oil vapor can also taint products and packaging with an oily smell and/or make workers feel unwell.

Liquid oil and oil aerosols
The majority of air compressors in use today still use oil in their compression stage for sealing, lubrication and cooling. The oil is in direct contact with the air as it is compressed, however due to the efficiency of modern air/oil separators built into the compressor, only a small proportion of this lubricating oil is carried over into the compressed air system as a liquid, an aerosol (typically no more than 5 ppm for a well-maintained screw compressor) or as oil vapor. Liquid and aerosols mix with water in the system to form a thick, acidic condensate. Compressor condensate causes damage to the compressed air storage and distribution system, production equipment, products and packaging.

Carbon dioxide
Carbon dioxide is a colorless, odorless gas occurring naturally in the atmosphere and is formed by respiration. In large concentrations, it is an asphyxiant.

Carbon monoxide
Carbon monoxide is a colorless, odorless toxic gas formed by the incomplete burning of carbon, e.g. exhaust fumes from power plant and internal combustion engines. Known as the ‘silent killer’, this gas, if inhaled, will be absorbed into the bloodstream very easily.
Breathing Air Purifiers with CO /CO₂ reduction

International breathing air standards

<table>
<thead>
<tr>
<th>Contaminants</th>
<th>OSHA Grade D</th>
<th>CSA Z180.1</th>
<th>European Pharmacopoeia</th>
<th>Parker domnick hunter BA-DME/BAM range*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td></td>
<td>Pressure dewpoint of 41°F (6°C) below lowest system temperature</td>
<td>67 ppm = -49°F (-45°C) atmospheric dewpoint</td>
<td>14 ppm = -72.4°F (-58°C) atmospheric dewpoint</td>
</tr>
<tr>
<td>Oil / Lubricant</td>
<td>5 ppm</td>
<td>&lt; 1 ppm</td>
<td>0.1 ppm</td>
<td>0.003 ppm</td>
</tr>
<tr>
<td>Carbon Dioxide (CO₂)</td>
<td>&lt; 100 ppm</td>
<td>&lt; 500 ppm</td>
<td>&lt; 500 ppm</td>
<td>&lt; 500 ppm</td>
</tr>
<tr>
<td>Carbon Monoxide (CO)</td>
<td>&lt; 10 ppm</td>
<td>&lt; 5 ppm</td>
<td>&lt; 5 ppm</td>
<td>&lt; 5 ppm</td>
</tr>
<tr>
<td>Nitrogen Oxides (NO + NO₂)</td>
<td></td>
<td>&lt; 2 ppm</td>
<td>&lt; 2 ppm</td>
<td>&lt; 2 ppm</td>
</tr>
<tr>
<td>Sulphur Dioxide (SO₂)</td>
<td>&lt; 1 ppm</td>
<td></td>
<td>&lt; 1 ppm</td>
<td></td>
</tr>
</tbody>
</table>

*Independently tested for Parker domnick hunter by Parker domnick hunter BA-DME012

Figures are based on compressed air inlet containing standard ambient levels of CO₂ 300 to 600ppm and CO 10ppm. At higher levels the system will provide incident protection only.
With flow rates from 19 to 674 CFM (9 - 318 l/s) the Parker domnick hunter range of Medical Breathing Air systems can be installed in small medical centers to large scale hospitals.

European Pharmacopeia Medical Air Standard
All Parker domnick hunter medical breathing air systems meet and in many cases exceed the requirements of European Pharmacopeia.

Installation example

This example shows typical installation at a hospital facility. For permanent provision of medical breathing air, the entire plant can be held in a ready state, even during standard maintenance.
CO monitors
All skid mounted BAM units are supplied as standard with a CO monitor. An independent CO monitor is available as an option for all other breathing air systems.

![CO monitor image]

- High intensity 95dB(A) alarm
- Simple calibration
- Remote alarm contacts
- Adjustable alarm settings
- Clear digital read out in ppm

CO₂ monitor
For continuous sampling carbon monoxide monitor utilizes electrochemical cell, for CO detection. This instrument can be wall or panel mounted.

OEM and bespoke system solutions
No matter which country your hospital is located, Parker Domnick Hunter is there. By working with us you have access to an integrated network of global manufacturing plants, as well as sales and service offices in every major country.

Parker Domnick Hunter has the capability to work with OEM's and third party engineering companies to design a system solution for your exact requirements.

Why use a desiccant based purification system
- Independent dewpoint switching - can work efficiently on low loads.
- More efficient and effective than standard filtration and refrigerant dryers. Removes CO, NOx and SOx.
- Lower cost than purchasing and mixing liquid oxygen and liquid nitrogen.
- Suitable for all your hospital air requirements from patients to surgical tools.
- Conforms to the most stringent international regulations.
## Technical Specifications

<table>
<thead>
<tr>
<th>Product code</th>
<th>Connections</th>
<th>Flowrate @ 100 psi (7 bar g)</th>
<th>Dimensions</th>
<th>Weight (approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Inlet (NPT)</td>
<td>Outlet (NPT)</td>
<td>Height (ins)</td>
<td>Width (mm)</td>
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<tr>
<td>BA-DME012</td>
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<td>1/4</td>
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<td>11</td>
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<tr>
<td>BA-DME015</td>
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<td>1/4</td>
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<td>BA-DME040</td>
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<td>BAM108</td>
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<td>640</td>
<td>302</td>
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<tr>
<td>BAM110</td>
<td>2 1/2</td>
<td>2 1/2</td>
<td>800</td>
<td>378</td>
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</tbody>
</table>

### Line Pressure

| Line Pressure | psi g      | 58 | 73 | 87 | 100 | 116 | 131 | 145 | 160 | 174 | 189 | 203 | 218 | 232 |
|---------------|------------|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|               | bar g      | 4  | 5  | 6  | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16  |    |

### Correction Factor

<table>
<thead>
<tr>
<th>Line Pressure</th>
<th>psi g</th>
<th>1.60</th>
<th>1.33</th>
<th>1.14</th>
<th>1.00</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>bar g</td>
<td>1.60</td>
<td>1.33</td>
<td>1.14</td>
<td>1.00</td>
</tr>
</tbody>
</table>

For flow rates at other pressures, apply the factor shown.
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Tubing & plastic flanges

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Agriculture
Alternative energy
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Ferry
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Marine
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Mining
Oil & gas
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Renewable energy
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Sensors

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Pneumatic valves & controls
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Vacuum generators, cups & sensors

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Food & beverage
Marine & shipbuilding
Medical & dental
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