

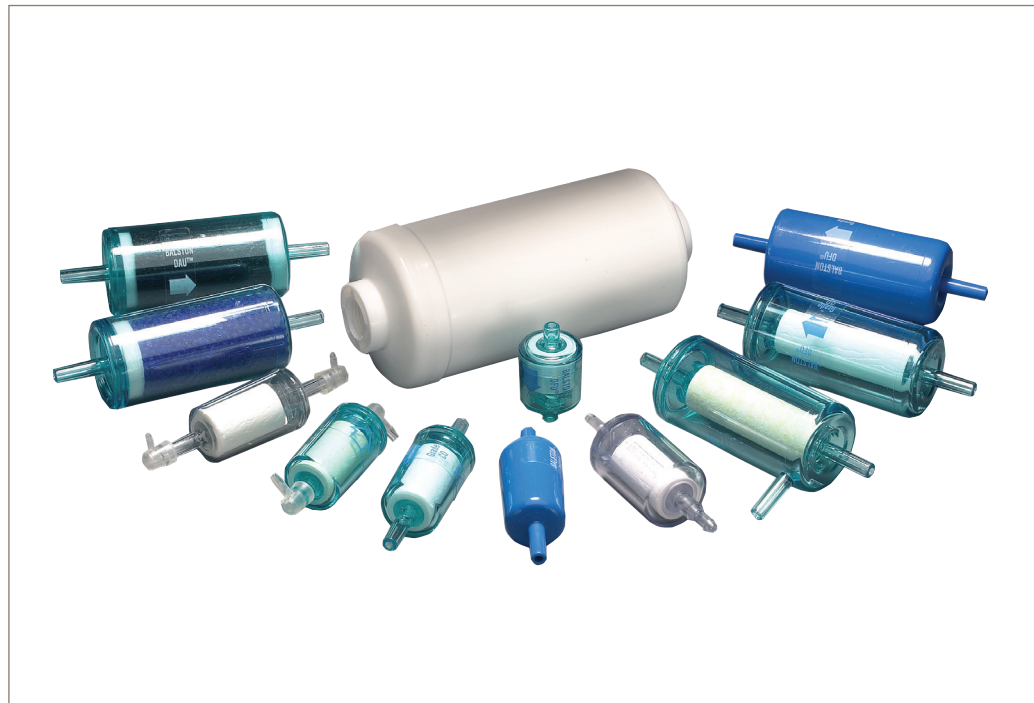
# Disposable Filter Units for Critical Medical Devices

Market Application Publication



## Background:

Original equipment manufacturers are very concerned with ensuring efficient removal of undesirable contaminants and producing consistent trouble free operation of their equipment. In addition, there is a growing trend towards developing and producing smaller, more portable devices that perform similarly to larger predecessor designs.



## Contact Information: Features and benefits:

**Parker Hannifin Corporation**  
**Industrial Gas Filtration and**  
**Generation Division**  
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Lancaster, NY 14086

phone 716 646 6400 or 800 343 4048  
fax 877 857 3800

[www.parker.com/igfg](http://www.parker.com/igfg)

- Prevent cross-contamination of samples
- Pressure ratings up to 125 psig
- Temperature to 275°F (135°C)
- Completely disposable, constructed of recyclable plastics



ENGINEERING YOUR SUCCESS.

## Application:

One very popular application for miniature filtration is in oxygen concentrators used to produce high purity oxygen for respiratory patients. These devices can be large units with castors however the growing trend in this industry is to provide more mobility for the patient and therefore smaller more portable designs are being developed. All of these devices require a pump mechanism (small compressor or diaphragm pump) to pull ambient air into the oxygen separation modules. High efficiency filtration is required to protect the pump from damaging contamination and in some systems filtration is required to protect the patient from contaminants.

Requirements for filtration range so widely that specifying a filter is best done on a case by case basis.

Parker Balston has a wide range of standard catalog products that have been developed over time to accommodate most typical applications. In the event standard catalog product is not adaptable to the specific instrument, Parker Balston has the ability to develop product that meets exactly the requirements for

fit, form and function. With over 3000 product models and a team of highly experienced design engineers, Parker Balston can provide a solution to the most demanding concentrator applications.

## Case Study:

A major medical device manufacturer offers a wide array of oxygen concentrators. This particular concentrator is designed specifically for offering respiratory patients daily mobility. This concentrator is designed to offer a complete self-contained system that produces a consistent supply of high purity oxygen to patient. It contains a small pump, oxygen scrubber module and battery power pack. In addition, two miniature, high efficiency filters are included in the design to protect the pump from damaging contamination. This filtration ensures long term, trouble free operation. This enables the manufacturer to market this device as a high end, top quality concentrator offering reliable and consistent output of critical oxygen supply.

Parker Balston worked closely with this manufacturer in developing a specialized

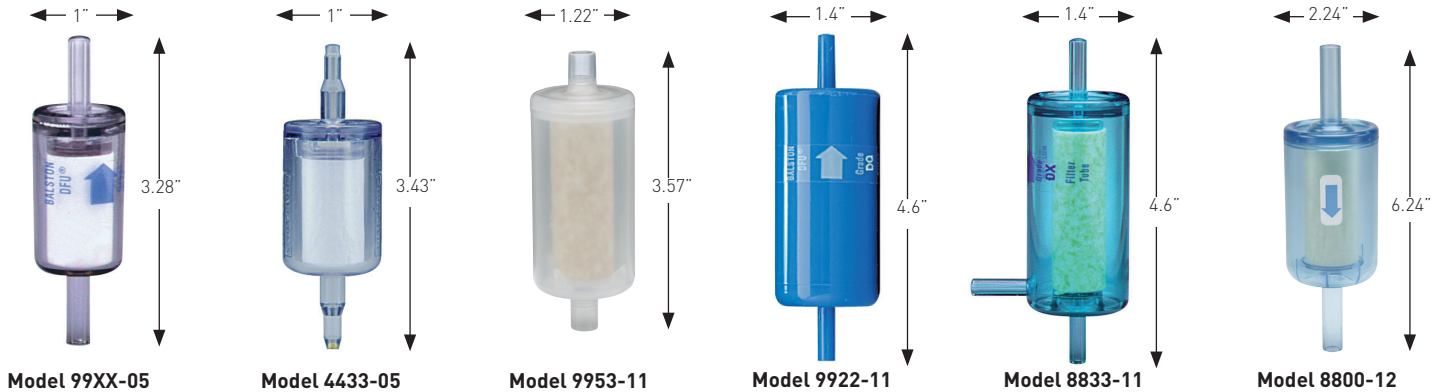
disposable filter unit to protect the internal pump from ambient contamination. Critical design features included quick disconnections, specific length and diameter parameters and high filtration efficiency coupled with long filter life.

In a very short period of time prototypes were produced, samples from production runs were tested and approved and now every monitor is shipped with two of these custom disposable filter units.

The manufacturer has not only realized trouble free operation (reduced service calls and warranty claims) but also enjoys significant aftermarket revenue and profits on the resale of the filter units.



Invacare O2  
Portable Device



### Models 9922-05, 9933-05, 4433-05 and 9900-05

The 99XX-05 models are the smallest Disposable Filter Units with 11.7 ml internal volume. These models are used in low flow gas or liquid sampling applications, such as liquids to specific-ion analyzers or gases to personal samplers. The model 9900-05-BK has a color indicating feature, which turns the cartridge red when saturated with oil. The model 4433-05 has 1/4" and 3/8" Barb Connections molded into the inlet/outlet ports.

### Models 9922-11, 9933-11, and 8800-12

Models 9922-11, 9933-11, and 8800-12 are used for applications similar to the smaller DFUs (Models 9922-05 and 9933-05) which require greater solids holding capacity and can tolerate the increased retention time.

### Model 8833-11

These Disposable Filter Units are used as continuous coalescing filters with a third port serving as the drain, slip-stream, or by-pass port.

### Model 9953-11

This model snaps together for easy filter cartridge changeouts. It is designed primarily for low pressure or mild vacuum applications. It is ideal for capturing samples and perform analysis or record weights over time. If used with a X-tube, it is a very effective silencer to compress inlets.

Parker Hannifin offers a manual drain valve for removal of coalesced liquids from the Type 8833-11-DX.

Drain Valve: 1/8" NPT (male) x 1/8" ID Tubing.  
(Requires elbow part No. 11972). Part No. 20-125

### Chemical Compatibility Models 9922-05, 9922-11, 8833-11, and 8800-12

**Suitable:** Water or steam to 200°F (135°C); concentrated nitric, sulfuric, and hydrochloric acids; chlorine (gas or liquid); sodium hypochlorite, ethylene oxide (gas or liquid); Freons; ammonia (gas, liquid, or aqueous solutions); hydrogen peroxide (all concentrations); bromine (dry and aqueous solutions); all chlorinated solvents except methylene chloride; all aromatic and aliphatic solvents; all alcohols and glycols; aniline; phenol.

**Limited Use:** Acetone, MEK, dioxane, furfural, methylene chloride.

**Unsuitable:** Water above 200°F (135°C), THF, DMF, ethylene diamine, chlorosulfonic acid, ethanolamine, pyridine, sulfur trioxide

### Chemical Compatibility Model 9933-11

**Suitable:** Water to 158°F (70°C); benzene, toluene, other aromatic hydrocarbons; hydrocarbon solvents and fuels, perchloroethylene; trichloroethylene, nitric acid (to 10%); sulfuric acid (to 40%); hydrochloric acid (to 10%); most salt solutions; sodium and potassium hydroxide (to 50%).

**Limited Use:** Water at 176°F (80°C); acetone; MEK, acetaldehyde; ammonia (to 25%).

**Unsuitable:** Water above 158°F (70°C); alcohols; glycols, phenol; aniline; DMF; concentrated acids; chlorine.

## Flow Rates

### Water Flow Rate, Gallons per Hour

DFU Model	Volume of Housing Gallons	Liters	Initial Pressure Drop	Grade DQ, DX	Grade CQ, CX	Grade BQ, BX	Grade AQ	Grade AAQ
9922-05	0.003	0.01	1 psi	12	10	3	1.5	0.4
4433-05			5 psi	30	25	15	7.3	1.9
9933-05								
9922-11	0.0005	0.02	1 psi	18	15	5	2.5	0.6
9933-11			5 psi	45	37	26	12	3.1
8800-12			1 psi	54	44	13	6	1.4
			5 psi	129	106	56	26	6.5

### Air Flow at 2 psi drop, standard, cu. ft. per min. (SCFM) at indicated line pressure.

Model	2 psig	20 psig	40 psig	60 psig	80 psig	100 psig	125 psig
9953-11-DX, 8833-11-DX (1)	1.8	3.6	5.8	8.0	10.0	12.0	14.6
9953-11-BX, 8833-11-BX (1)	0.9	1.8	2.9	4.0	5.0	6.0	7.3
9900-05-BK, 4433-05-BX	0.4	0.8	1.3	1.8	2.2	2.7	3.3

**Notes:**

1 Maximum Pressure 2 psi

## Principal Specifications

Model	9922-05	9900-05	4433-05	9933-05	9922-11	9933-11	8833-11	8800-12	9953-11
Inlet and Outlet Ports	1/4" Tubing	1/4" Tubing	1st Tier/Barb 1/4"Tube 2nd Tier/Barb 3/8"Tube	1/4" Tubing	1/4" Tubing	1/4" Tubing	1/4" Tubing	1/2" Tubing	0.32" OD
Drain	None	None	None	None	None	None	1/4" Tubing	None	None
Material of Construction	PVDF	Nylon	Nylon	Nylon	PVDF	Nylon	Nylon	Nylon	Polypropylene
Filter Cartridge Length	1.25" (3.2 cm)	1.25" (3.2 cm)	1.25" (3.2cm)	1.25" (3.2 cm)	2.25" (5.7 cm)	2.25" (5.7 cm)	2.25" (5.7 cm)	2.25" (5.7 cm)	2.28" (6.35 cm)
Maximum Temperature (2)	275°F (135°C)	230°F (110°C)	230°F (110°C)	230°F (110°C)	275°F (135°C)	230°F (110°C)	230°F (110°C)	150°F (66°C)	125°F (52°C)
Maximum Pressure (3)	125 psig	125 psig	125 psig	125 psig	125 psig	125 psig	125 psig	50 psi (5)	2 psi
Dimensions	1.0"D X 3.25"L (2.5 cm X 8 cm)	1.0"D X 3.25"L (2.5 cm X 8 cm)	1.0"D X 3.43"L (2.5 cm X 8.72 cm)	1.0"D X 3.25"L (2.5 cm X 8 cm)	1.4"D X 4.6"L (3.6 cm X 12 cm)	1.4"D X 4.6"L (3.6 cm X 12 cm)	1.4"D X 4.6"L (3.6 cm X 12 cm)	2.24"D X 6.24"L (5.69 cm X 15.85 cm)	1.22"D X 3.57"L (3.1 cm X 9.07 cm)

**Notes:**

2 At 0 psig

3 At 110°F (43°C)

# Ordering Information

For assistance, call 1-800-343-4048, 8AM to 5PM EST

Model	9922-05	9900-05	4433-05	9933-05	9922-11	9933-11	8833-11	8800-12	9953-11
Box of 10 DFUs Available only in Q-grades	9922-05-□(4)	9900-05-□(4)	4433-05-□(4)	9933-05-□(4)	9922-11-□(5)	9933-11-□(5)	8833-11-□(6)	8800-12-□(5)	9953-11-□(5)
Box 10 DAU'S (3)	9922-05-□	N/A	4433-05-□	9933-05-□	9922-11-□	9933-11-□	N/A	N/A	N/A

## Notes:

- 3** To designate adsorbent in the DAU, insert adsorbent numbers after DAU designation.  
For example, to obtain a miniature clear nylon DAU with carbon adsorbent, order 9933-05-000.
- 4** Available only in Q grades.
- 5** Available in Q or X media.
- 6** Available only in X media.
- 7** 9953-11 is designed for maximum pressure of 2 psig.
- 8** Pressure rating in liquid service is 70 PSIG maximum.

# Installation Information

**To pressure pipe or tubing:** Compression fittings for 1/4" O.D. tubing may be obtained from the following manufacturers. Hoke, Inc. ("Gyrolok"); Crawford Fitting Co. ("Swagelok"); Parker-Hannifin Corp. ("CPI"); Legris, Inc. (push-on fittings); Jaco Mfg. Co. (plastic fittings). The following brass fittings which seal by O-ring compression and which may be completely recovered and reused when changing filters may be purchased from Parker/Balston:

Connector: 1/4" tubing to 1/4" NPT female -  
Part No. 11970 (1 per pkg.)

Connector: 1/4" tubing to 1/4" tubing -  
Part No. 11971 (1 per pkg.)

**To low pressure plastic tubing:** Tubing with 1/4" ID may be slipped over the DFU and fittings and held with tubing clamps. Parker Hannifin supplies plastic barbs to connect the DFU to smaller diameter plastic tubing. The connection is suitable for pressures to 50 psig.

DFU to 1/16" ID tubing: Part No. 14000 (bag of 20 barbs)

DFU to 1/8" ID tubing: Part No. 14001 (bag of 20 barbs)

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