

Model 3062 Diffusion Dryer

Instruction Manual

*P/N 1933062, Revision G
September 2003*



Manual History

The following is a manual history of the Model 3062 Diffusion Dryer Instruction Manual, P/N 1933062.

Revision	Date
Final	November 1987
A	September 1989
B	January 1992
C	August 1994
D	May 1996
	July 1998
E	July 2000
F	January 2003
G	September 2003

Slight revisions were made throughout the manual for revision B and general layout of the manual was redone.

In revision C, the manual was rewritten.

In revision D, TSI's "Limitation of Warranty and Liability" on page iii was updated.

In July 1998, TSI's area code was changed from 612 to 651.

In Revision E, TSI's Limitation of Warranty and Liability was updated.

In Revision F, TSI's address and phone numbers were updated.

In Revision G, Table 1, Packing List, was updated to include gasket.

Part Number

1933062 / Revision G/ September 2003

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**Limitation of Warranty
and Liability**

(effective July 2000)

Seller warrants the goods sold hereunder, under normal use and service as described in the operator's manual, shall be free from defects in workmanship and material for (12) months, or the length of time specified in the operator's manual, from the date of shipment to the customer. This warranty period is inclusive of any statutory warranty. This limited warranty is subject to the following exclusions:

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- b. Parts repaired or replaced as a result of repair services are warranted to be free from defects in workmanship and material, under normal use, for 90 days from the date of shipment.
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Service Policy

Knowing that inoperative or defective instruments are as detrimental to TSI as they are to our customers, our service policy is designed to give prompt attention to any problems. If any malfunction is discovered, please contact your nearest sales office or representative, or call TSI at 1-800-874-2811 (USA) or (651) 490-2811.

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About This Manual

This manual contains instructions for using and maintaining the Model 3062 Diffusion Dryer. The manual is organized into the following sections:

- ❑ Introduction
- ❑ Unpacking
- ❑ Using the Diffusion Dryer
- ❑ Maintaining the Diffusion Dryer
- ❑ Contacting TSI for Service
- ❑ Specifications

Model 3062 Diffusion Dryer

Introduction

The Model 3062 Diffusion Dryer is designed as a general-purpose aerosol dryer that has minimal aerosol loss. The aerosol inlet incorporates a water trap that collects coarse water droplets. Two concentric cylinders formed by an inner wire screen cylinder and an acrylic outer cylinder contain an annular volume of silica gel. As wet aerosol flows through the inner cylinder, water vapor diffuses through the wire screen and into the silica gel. Particle loss is minimized because the particles do not come into contact with the silica gel. The silica gel is easily regenerated in an oven at 120°C. In addition, the silica gel may be replaced by other materials such as activated charcoal or sodium aluminosilicate.

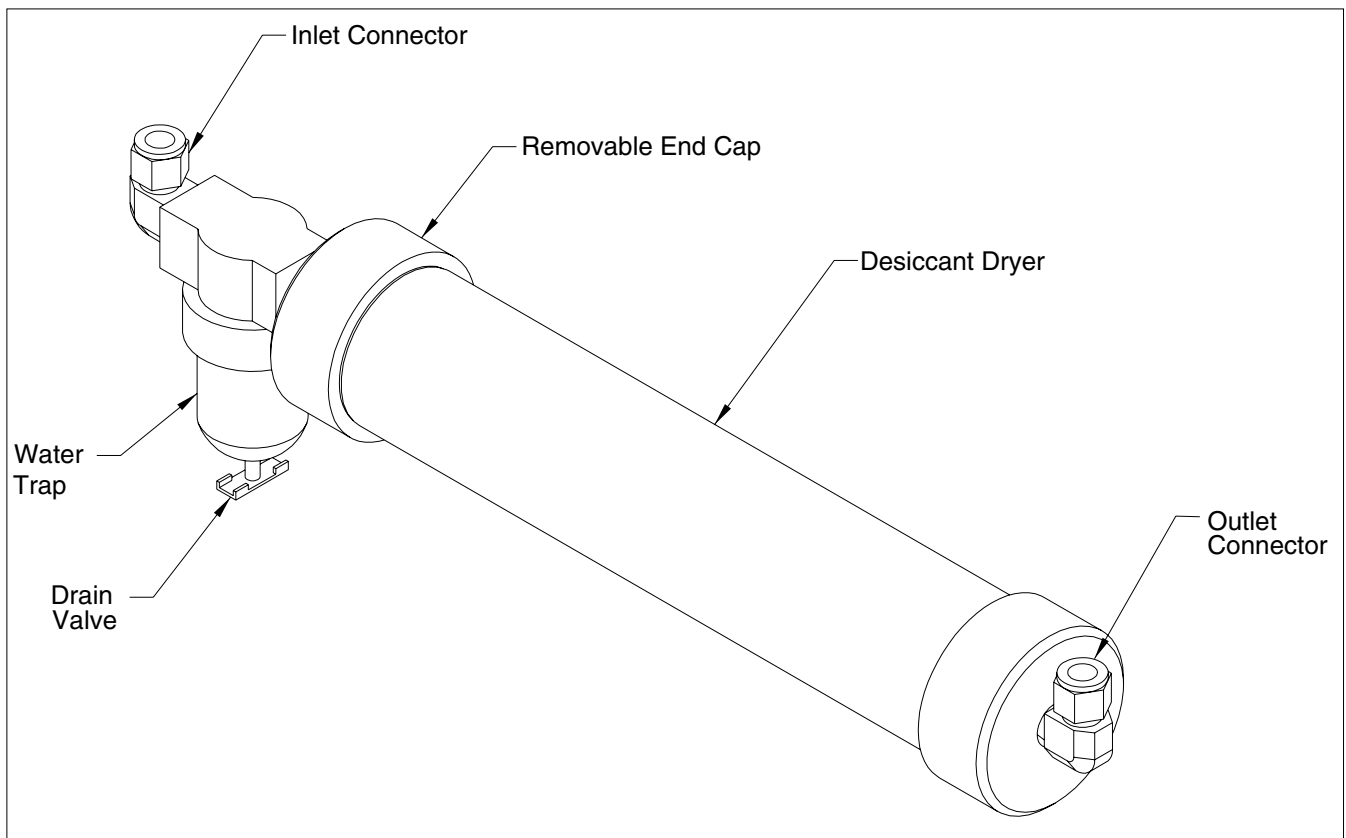


Figure 1
Model 3062 Diffusion Dryer

Unpacking

The Diffusion Dryer consists of a diffusion dryer tube with water trap and fittings attached and accessories, including the following:

Table 1
Packing List for the Model 3062 Diffusion Dryer

Qty.	Item	TSI Part No.
1	Diffusion Dryer	3062
2	Bracket special dryer	1206089
1	Cap, filling	1304017
3	Bags of silica gel desiccant	1403002
2	Latch Rubber Band 3½ × ¼	2205003
2	Gasket Rubber, 2.938" x 1.938" diameter	1704083
10 ft	Tubing polyethylene ½ OD	3929439
4	Panhead Screws 10-32 × ¾ SS	5113090
4	Nut 10-32 Lock "Kep"	5310001
1	Instruction manual	1933062

If anything is missing or appears to be damaged, contact your TSI representative or contact TSI Customer Service (Particle Instruments) at 1-800-874-2811 (USA) or (651) 490-2811.

Installation

Two cradles with mounting screws and nuts are included with the dryer. They are used to mount the dryer horizontally in a convenient location. Two large rubber bands are provided to secure the dryer to the cradles.

To fill the dryer with silica gel, see "Installing the Silica Gel" later in this manual.

Using the Diffusion Dryer

This section gives a description of the major components of the Diffusion Dryer.

Inlet and Outlet Connectors

The inlet and outlet connectors are ½ in. female Swagelok® fittings that connect to ½ in. OD tubing.

Water Trap and Drain Valve

The inlet of the Diffusion Dryer contains a trap to collect large water droplets before they enter the desiccant. The trap is equipped with a drain valve to allow easy removal of trapped water.

Desiccant Dryer

The Model 3062 Diffusion Dryer is a general-purpose aerosol dryer consisting of two concentric cylinders (see Figure 2). The inner cylinder is made of wire screen and the outer cylinder is made of Plexiglas. The annular space between the two cylinders is filled with silica gel. The aerosol enters the dryer at the end equipped with the water trap and exits at the opposite end.

The silica gel in the annular space maintains a dry atmosphere within the inner tube. Passing the aerosol through this tube dries the aerosol particles without substantial particle loss.

®Swagelok is a trademark of Crawford Fitting Co.

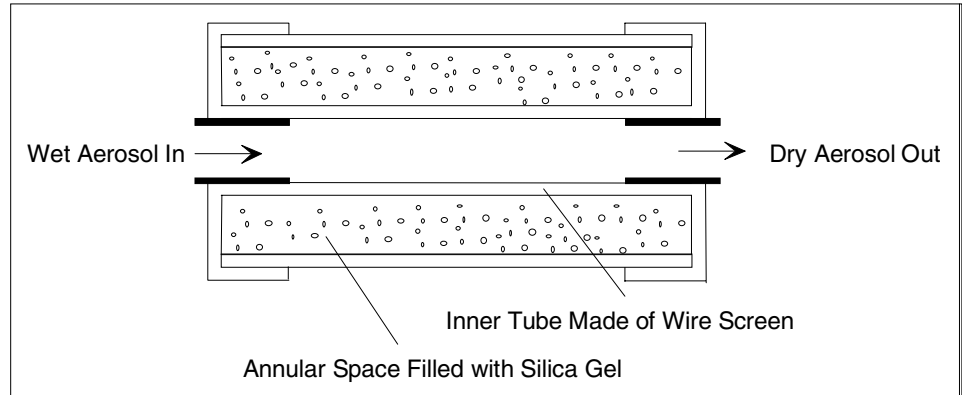


Figure 2
Schematic of Desiccant Dryer Tube

Maintaining the Diffusion Dryer

This section describes routine maintenance required for the Diffusion Dryer. The section includes procedures on draining the water trap, removing, installing and drying the silica gel.

Water Trap and Drain Valve

The water trap provides a place for large water droplets to collect extending the life of the desiccant. This trap should be periodically drained as it collects water. To drain, rotate the valve clockwise until the water has been removed. Retighten the valve until snug.

Drying the Silica Gel

The silica gel contains indicator crystals that are blue when dry and become pink when wet. To dry the gel, remove it from the system (see next section) and bake it in a pan in an oven at 250°F [120°C] until the blue color returns. If the blue color does not return, the silica gel is no longer usable and must be replaced.

The operational time per regeneration of silica gel depends on the aerosol flowrate through the diffusion dryer. The silica gel near the inner tube absorbs the moisture first. Hence, occasional shaking to replace the silica gel crystals near the inner tube with other crystals improves the drying power of the diffusion dryer.

The following data represents the drying capacity of the dryer. It was tested in conjunction with TSI's Model 3076 Constant Output Atomizer, which has an aerosol flowrate of 3.5 liters per minute.

Table 2
Drying Capacity of the Dryer

How Used	Measured Relative Humidity at Exit (%)
No diffusion dryer	60
With one Model 3062	20
With two Model 3062s (in series)	8
With one Model 3062 but after one hour of operation	28
After shaking the Model 3062 to rearrange the silica gel crystals	20

Removing the Silica Gel

To remove the silica gel, do the following:

1. Disconnect the inlet and outlet connections and remove the dryer from its brackets (refer to Figure 1).
2. Holding the dryer vertically with the water trap at the top, remove the end cap on the inlet side.



Important

Do *not* attempt to unscrew the opposite end. It is glued in place and attached to the inner screen. Forcing the outlet end cap will damage the inner screen.

3. Turn the dryer upside-down and the desiccant will flow out into a tray or other container.

4. Dry the silica gel as outlined in the previous section or replace it with new desiccant (if it becomes contaminated or will not regenerate).

Installing the Silica Gel

To install the silica gel, follow these steps:

1. Holding the dryer vertically with the water trap at the top, remove the end cap on the inlet side (if you have not already done so).



Important

Do *not* attempt to unscrew the opposite end. It is glued in place and attached to the inner screen. Forcing the outlet and end cap will damage the inner screen.

2. Hold the desiccant dryer with the open inlet end pointed up.
3. Install the filling jig on the inlet making sure that the mesh tube is covered by the center of the jig (see Figure 3).
4. Pour desiccant into the jig until the dryer body is almost full (leave about $\frac{1}{4}$ in., 6 mm unfilled). You may want to tap the body of the dryer to compact the desiccant.
5. Make sure the gasket in the end cap is undamaged and slightly greased.
6. Replace the removable end cap being careful to insert the solid tube on the end cap into the screen tube.
7. Make sure that the end cap is completely threaded in place.
8. Replace the dryer into its holding cradles and reattach the fittings to the inlet and outlet.

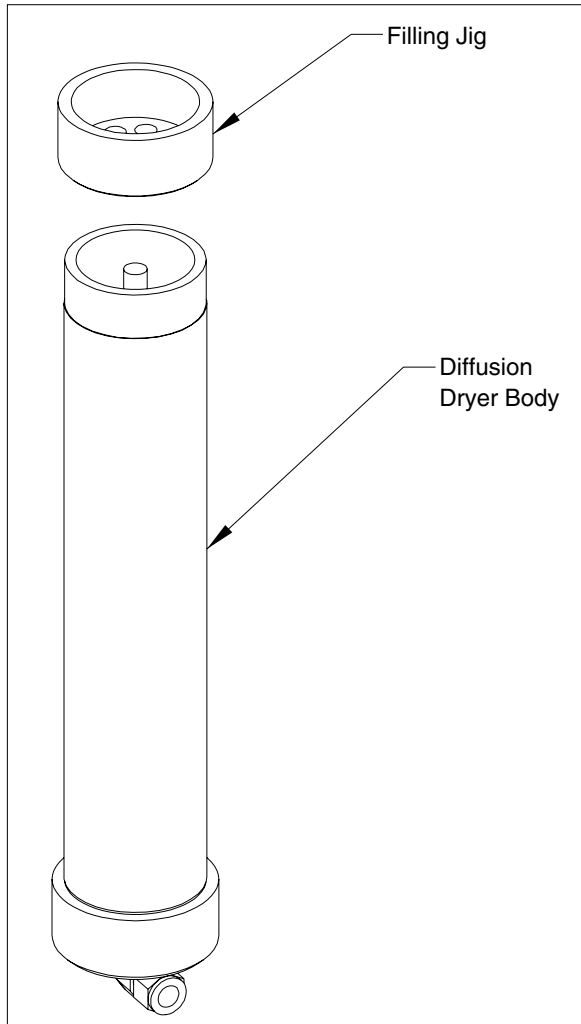


Figure 3
Installing the Filling Jig on the Inlet

Contacting TSI for Service

This section gives instructions for contacting TSI for technical information or for returning the Model 3062 Diffusion Dryer for service.

For Technical or Application Questions

If you have any difficulty setting up the Diffusion Dryer, or if you have technical or application questions about this instrument, contact an applications engineer at TSI Incorporated, 1-800-874-2811 (USA) or (651) 490-2811.

For Customer Service

If the Diffusion Dryer is not operating properly, or if you are returning the instrument for service, contact TSI Customer Service (Particle Instruments) at 1-800-874-2811 (USA) or (651) 490-2811. Customer Service will need this information when you call:

- The instrument model number
- The instrument serial number
- A purchase order number (unless under warranty)
- A billing address
- A shipping address.

Use the original packing material to return the Model 3062 to TSI. If you no longer have the original packing material, use sufficient packing material so the instrument is not damaged during shipping.

Specifications

The following specifications—which are subject to change—describe the most important data of the instrument’s major components.

Table 3
Specifications of the Model 3062 Diffusion Dryer

Flowrate	0 to 4 L/min
Maximum pressure	415 kPa (60 psig)
Relative humidity at exit	20% when incoming R.H. is 60%
Desiccant Type Capacity	Silica gel (blue indicator crystals mixed with clear; all go clear when wet) 1 kg
Fittings	Swagelok 0.5-in. tube connector (inlet and outlet)
Dimensions Length Diameter (cylinder only)	53.5 cm (17 in.) 8.3 cm (3.5 in.)
Weight	3 kg (6.6 lb)

Specifications are subject to change.

Reader's Comments

Please help us improve our manuals by completing and returning this questionnaire to the address listed in the "About This Manual" section. Feel free to attach a separate sheet of comments.

Manual Title Model 3062 Diffusion Dryer

P/N 1933062 **Rev.** G

1. Was the manual easy to understand and use?

Yes No

Please identify any problem area(s) _____

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