**Desiccant Air Drying System**

**Model 234401, Series D**  
Maximum Operating Pressure 160 psi (1.1 MPa, 11 bar)  
Maximum Temperature 150° F (65° C)

**Model 24M178, Series B**  
Maximum Operating Pressure 175 psi (1.2 MPa, 12 bar)  
Maximum Temperature 150° F (65° C)

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**Important Safety Instructions**  
Read all warnings and instructions in this manual.  
Save these instructions.

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**Includes:**

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Series</th>
<th>Description</th>
<th>Air Inlet npt(f)</th>
<th>Air Outlet npt(f)</th>
<th>Air Flow Capacity (CFM) at 100 psi (0.7 MPa, 7 bar)</th>
<th>Maximum Operating Pressure, psi (MPa, bar)</th>
</tr>
</thead>
<tbody>
<tr>
<td>234402</td>
<td>B</td>
<td>Stage 1 - Air Filter with automatic drain. Removes water and contaminants down to 3 microns.</td>
<td>1/2 in.</td>
<td>1/2 in.</td>
<td>100</td>
<td>175 (1.2, 12)</td>
</tr>
<tr>
<td>234397</td>
<td>B</td>
<td>Stage 2 - Coalescer with automatic drain. Removes oil and sub-micronic particles down to 1 micron.</td>
<td>1/2 in.</td>
<td>1/2 in.</td>
<td>83</td>
<td>175 (1.2, 12)</td>
</tr>
<tr>
<td>234404</td>
<td>B</td>
<td>Stage 3 - Desiccant Housing Removes uncondensed moisture.</td>
<td>3/4 in., reduced to 1/2 in.</td>
<td>3/4 in., reduced to 3/8 in.</td>
<td>30</td>
<td>175 (1.2, 12)</td>
</tr>
<tr>
<td>288787</td>
<td>A</td>
<td>Self Relieving Air Regulator</td>
<td>3/8 in.</td>
<td>1/4 in.</td>
<td>100</td>
<td>160 (1.1, 11)</td>
</tr>
<tr>
<td>288810</td>
<td>A</td>
<td>Silica Gel Desiccant (5 lb. can)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>288798</td>
<td>A</td>
<td>Shut-off Valve</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
How Desiccant Air Drying System Works

When air is compressed, the temperature of the air increases, as does its capacity to hold moisture. As the hot, moist air travels down through the lines, it cools, allowing the moisture to condense. Filters, drain traps, and driplegs only remove liquid condensation. The Dryaire Desiccant Air Drying System removes liquid condensation, residual water vapor and aerosols.

As the wet compressed air flows through the inlet port and down the bed of desiccant, the desiccant beads absorb the water vapor and aerosols and can reduce the air humidity down to a -40°F (-40°C) pressure dew point.

After the moisture has been removed, the dry air passes through an element, up the center tube, and out the outlet port. As long as the desiccant is replaced at saturation point and your compressed air is not exposed to a temperature below the dew point, your equipment will receive dry, moisture-free air.

As the desiccant becomes saturated with moisture, the dew point begins to rise. This is evident when the desiccant changes color from blue to pink, indicating the need for desiccant replacement. Refer to **Desiccant Change-out**, page 9.
Installation

1. Before installing air line components, blow out the pipe line to remove debris. Be sure air to the regulator is clean. Erratic operation or loss of regulation is usually caused by dirt in the regulator.

2. Install the Air Drying System as close as possible to the equipment it serves. Use template 289185, provided, to position system.

3. Install air shut-off valve 288798 upstream from the air system to isolate it for service.

4. Install system so air flows through filters in the direction noted on top of filter.

5. A minimum 1/2 in. npt piping is recommended. Avoid using too many fittings, couplings, etc., which will restrict air flow.

Shop Air Piping Layout

- Main Air Line stand pipe should not be smaller than compressor outlet size.
- A minimum of 25 ft. (7.62 m) from compressor to first filter outlet is required to cool air [50 ft. (15.24 m) optimum]
## Minimum Pipe Size Recommendations

<table>
<thead>
<tr>
<th>Compressor</th>
<th>Capacity</th>
<th>Main Air Line</th>
<th>Length</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1/2 - 2 HP</td>
<td>6 - 9 CFM</td>
<td>any</td>
<td></td>
<td>3/4 in. (19 mm)</td>
</tr>
<tr>
<td>3 - 5 HP</td>
<td>12 - 20 CFM</td>
<td>Up to 200 ft (61 m)</td>
<td>3/4 in. (19 mm)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Over 200 ft (61 m)</td>
<td>1 in. (25.4 mm)</td>
<td></td>
</tr>
<tr>
<td>5 - 10 HP</td>
<td>20 - 40 CFM</td>
<td>Up to 100 ft (30.5)</td>
<td>3/4 in. (19 mm)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Over 100-200 ft (30.5-61 m)</td>
<td>1 in. (25.4 mm)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Over 200 ft (61 m)</td>
<td>1-1/4 in. (31.8 mm)</td>
<td></td>
</tr>
<tr>
<td>10 - 15 HP</td>
<td>40 - 60 CFM</td>
<td>Up to 100 ft (30.5)</td>
<td>3/4 in. (19 mm)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Over 100-200 ft (30.5-61 m)</td>
<td>1-1/4 in. (31.8 mm)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Over 200 ft (61 m)</td>
<td>1-1/2 in. (38.1 mm)</td>
<td></td>
</tr>
</tbody>
</table>

### Air Pressure Drop Through Hose, by hose length and ID

<table>
<thead>
<tr>
<th>Air Hose Inside Diameter</th>
<th>4 ft. (1.22 m)</th>
<th>10 ft. (3.05 m)</th>
<th>15 ft. (4.6 m)</th>
<th>20 ft. (6.1 m)</th>
<th>25 ft. (7.62 m)</th>
<th>50 ft. (15.24 m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4 in. (6.4 mm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40 psi (276 kPa, 2.8 bar)</td>
<td>6 (41, .4)</td>
<td>8 (55, .6)</td>
<td>9.5 (66, .7)</td>
<td>11 (76, .8)</td>
<td>12.75 (88, 0.9)</td>
<td>24 (165, 1.7)</td>
</tr>
<tr>
<td>50 psi (345 kPa, 3.4 bar)</td>
<td>7.5 (52, .5)</td>
<td>10 (69, .7)</td>
<td>12 (83, .8)</td>
<td>14 (97, 1)</td>
<td>16 (110, 1.1)</td>
<td>28 (193, 1.9)</td>
</tr>
<tr>
<td>60 psi (414 kPa, 4.1 bar)</td>
<td>9 (62, .6)</td>
<td>12.5 (86, .9)</td>
<td>14.5 (100, 1)</td>
<td>17 (117, 1.2)</td>
<td>19 (131, 1.3)</td>
<td>31 (214, 2.1)</td>
</tr>
<tr>
<td>70 psi (483 kPa, 4.8 bar)</td>
<td>10.75 (74, .7)</td>
<td>14.5 (100, 1)</td>
<td>17 (117, 1.2)</td>
<td>22.5 (155, 1.6)</td>
<td>25.5 (176, 1.8)</td>
<td>37 (255, 2.6)</td>
</tr>
<tr>
<td>80 psi (552 kPa, 5.5 bar)</td>
<td>12.25 (84, .8)</td>
<td>16.5 (114, 1.1)</td>
<td>19.5 (134, 1.3)</td>
<td>25.25 (172, 1.7)</td>
<td>29 (200, 2)</td>
<td>39.5 (169, 2.7)</td>
</tr>
<tr>
<td>90 psi (621 kPa, 6.2 bar)</td>
<td>14 (97, 1)</td>
<td>18.75 (129, 1.3)</td>
<td>22 (152, 1.5)</td>
<td>35.75 (241, 1.8)</td>
<td>39 (256, 2.8)</td>
<td>50 (329, 3.1)</td>
</tr>
<tr>
<td>5/16 in. (7.9 mm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50 psi (345 kPa, 3.4 bar)</td>
<td>3 (21, .2)</td>
<td>3.5 (24, .2)</td>
<td>4 (28, .3)</td>
<td>4.5 (31, .3)</td>
<td>4 (28, .3)</td>
<td>8.5 (59, .6)</td>
</tr>
<tr>
<td>60 psi (414 kPa, 4.1 bar)</td>
<td>3.75 (26, .3)</td>
<td>4.5 (31, .3)</td>
<td>5 (34, .3)</td>
<td>5.5 (38, .4)</td>
<td>6 (41, .4)</td>
<td>11.5 (79, .8)</td>
</tr>
<tr>
<td>70 psi (483 kPa, 4.8 bar)</td>
<td>4.5 (31, .3)</td>
<td>5.25 (36, .4)</td>
<td>6 (41, .4)</td>
<td>6.75 (47, .5)</td>
<td>7.25 (50, .5)</td>
<td>13 (90, .9)</td>
</tr>
<tr>
<td>80 psi (552 kPa, 5.5 bar)</td>
<td>5.5 (38, .4)</td>
<td>6.25 (43, .4)</td>
<td>7 (48, .5)</td>
<td>8 (55, .6)</td>
<td>8.75 (60, .6)</td>
<td>14.5 (100, 1)</td>
</tr>
<tr>
<td>90 psi (621 kPa, 6.2 bar)</td>
<td>6.5 (45, .4)</td>
<td>7.5 (52, .5)</td>
<td>8.5 (59, .6)</td>
<td>9.5 (66, .7)</td>
<td>10.5 (72, .7)</td>
<td>16 (110, 1.1)</td>
</tr>
</tbody>
</table>
Operation

Model 234401, Series D
1. Attach air hose(s) to air regulator outlet valve 289165.
2. Attach air hose to main shut-off valve 288798.
3. Open main shut-off valve 288798.
4. Turn the T-hand adjusting screw in or out to adjust regulator to desired setting.
5. Open outlet valve 289165 to supply air to spray guns or tool.
6. With air flowing, readjust air pressure regulator if necessary.
7. Turn off unit when not in use. Follow Pressure Relief Procedure, page 8.

Model 24M178, Series B
1. Attach air hose(s) to outlet elbow fitting 120375.
2. Attach air hose to inlet elbow fitting C19024.
3. Open main shut-off valve 288798.
4. Turn off unit when not in use. Follow Pressure Relief Procedure, page 8.

Automatic Drain
The automatic drain is equipped with a float actuated device which automatically ejects liquid contaminants under pressure.

Coalescer Pressure Drop Indicator
The differential pressure drop indicator provides early detection of a clogged coalescing filter element. As the filter element becomes clogged, the red indicator starts to rise while air is flowing through the unit. When the pressure drop across the element reaches 10-12 psi (69-83 kPa, 0.7-0.8 bar), the red indicator will be in full view, and the element should be replaced. Failure to replace the element when the pressure drop exceeds 10 psi (69 kPa, 0.7 bar) will affect your air quality and tool efficiency.

Do not exceed the Maximum Incoming Air Pressure of the equipment. Over pressurizing can cause component rupture and serious injury.
**Model 234401**

- Part No. 234402: Air Filter with auto drain; see Manual 309919 for parts information
- Part No. 234397: Coalescer with auto drain; see Manual 309919 for parts information
- Part No. 234404: Desiccant Housing
- Part No. 288787: Air Regulator, self relieving
- Part No. 288789: Nipple with screen
- Part No. 288798: Shut-off Valve
- Part No. 289165: Regulator Outlet Valve

**Model 24M178**

- Part No. 234402: Air Filter with auto drain; see Manual 309919 for parts information
- Part No. 234397: Coalescer with auto drain; see Manual 309919 for parts information
- Part No. 234404: Desiccant Housing
- Part No. 288789: Nipple with screen
- Part No. 288798: Shut-off Valve
- Part No. C19024: Elbow Fitting
- Part No. 120375: Elbow Fitting
Pressure Relief Procedure

The following is a basic pressure relief procedure. Be sure to follow the specific pressure relief procedure in your spray gun and/or fluid supply equipment manuals.

1. Close the main air shut-off valve.
2. Trigger the gun or dispense valve and open any drain valves to relieve pressure.

Maintenance and Repair

- Relieve the pressure before cleaning, checking or repairing. Follow Pressure Relief Procedure, above.
- Check system at least once per shift to ensure proper drainage.
- A supply of low flow/low humidity air will provide longer desiccant life.

Air Filter 234402, Series B

To maintain maximum filtering efficiency and avoid excessive pressure drop, the filter must be kept clean. See Manual 309919 for cleaning and parts information.

Coalescer 234397, Series B

NOTE: It is recommended that Air Filter 234402 be installed upstream of the coalescing filter to remove 3 micron and larger size particles and separate large droplets of moisture from the air line.

CAUTION
Never let the liquid level in the bowl reach the base of the coalescing element.

See Manual 309919 for operation, cleaning, and parts information.
Desiccant Housing 234404, Series B

NOTE: Always install a moisture filter, to remove bulk fluids, and a coalescing filter, to remove oil, upstream of the desiccant housing. Desiccant coated with oil will not absorb moisture.

Desiccant Changeout

NOTE: Desiccant beads are non-toxic and non-flammable.

The desiccant gradually changes color from blue to pink, indicating it has absorbed moisture to the saturation point and needs to be regenerated or replaced.

- To regenerate Silica Gel desiccant, heat desiccant for 4 hours at 275°F (135°C).
- To replace desiccant, order desired part no. from the following chart.

<table>
<thead>
<tr>
<th>Desiccant Part No.</th>
<th>Color when fresh</th>
<th>Color when saturated</th>
</tr>
</thead>
<tbody>
<tr>
<td>288810 Silica Gel (5 lb)</td>
<td>Blue</td>
<td>Pink</td>
</tr>
<tr>
<td>288823 Silica Gel (four 5 lb cans)</td>
<td>Blue</td>
<td>Pink</td>
</tr>
</tbody>
</table>

Desiccant Housing Disassembly

1. Follow the Pressure Relief Procedure, page 8.

2. Unscrew the metal collar holding the desiccant bowl to cover. Remove bowl and collar.

3. Dump old desiccant out of bowl.

4. If the pressure drop across the dryer has become unacceptable, the bronze element in the bottom of the bowl may be clogged. To remove clog:
   a. Place a blow gun at the top of the tube and blow air through the flow tube.
   b. If element replacement is needed: disassemble flow tube from the bowl by removing the end cap and nut from the bottom of the bowl.
   c. Turn the flow tube (hand tight) counter clockwise to remove it, then replace elements.
   d. Reassemble in reverse order.

5. Refill bowl with new or regenerated desiccant. See Desiccant Changeout. Desiccant Housing 234404 holds 5 lb. of desiccant.

6. Reassemble bowl to cover, making sure that o-ring 289186 is in place in cover.

## Part No. Description
- 288793 Flow Tube Assy., includes flow tube, nut, o-ring, filter elements and retainers
- 289186 O-Ring
- 288794 Gasket
- 289189 O-Ring
- 289187 Filter Element
- 289188 O-Ring
- 288795 Sight Glass
- 288810 Desiccant, silica gel (5 lb)
- 288823 Desiccant, silica gel (four 5 lb cans)
Self-Relieving Air Regulator
288787

Be sure air to the regulator is clean. Erratic operation or loss of regulation is usually caused by dirt in the regulator.

Cleaning

1. Follow the Pressure Relief Procedure, page 8.
2. Remove bottom plug, spring, and valve.
3. Remove six screws, and separate regulator body.
4. Clean all parts with denatured alcohol. Wipe off seat and blow out body.
5. Inspect parts for damage and replace as needed. To replace the valve and diaphragm, order Repair Kit 288796.
6. Reassemble parts and screw them into the regulator before tightening the bottom plug. Make sure the valve, diaphragm and spring are center aligned.

Air Regulator Assembly
for Desiccant Air Drying System

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>289340</td>
<td>Air Pressure Gauge</td>
</tr>
<tr>
<td>289149</td>
<td>Plug</td>
</tr>
<tr>
<td>288796</td>
<td>Diaphragm/Valve Repair Kit</td>
</tr>
<tr>
<td>289190</td>
<td>T-handle Adjusting Screw</td>
</tr>
<tr>
<td>289191</td>
<td>Spring</td>
</tr>
<tr>
<td>288797</td>
<td>Nipple, 3/8 in. x 3/8 in.</td>
</tr>
<tr>
<td>289165</td>
<td>Shut-off Valve</td>
</tr>
</tbody>
</table>
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For patent information, see www.graco.com/patents.

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