

Filter-Regulator-Lubricator

PD16.19
July, 2016

1/2" NPT Inlet/Outlet Ports

Machine Parts & Operating Instructions – Save This Document and Educate All Personnel

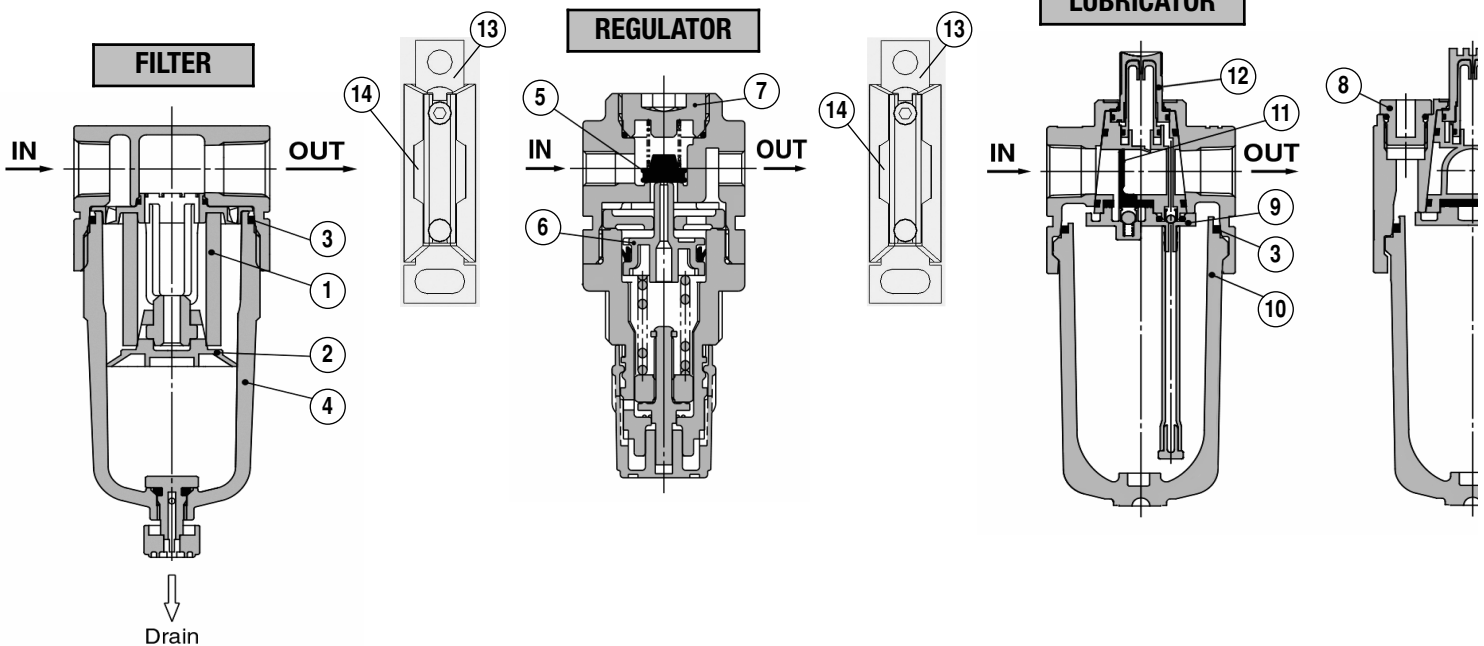
WARNING

Always follow the safety instructions provided in this manual. They are intended to prevent a hazardous situation and / or equipment damage. Refer to Dynabrade's Pneumatic tool safety & operating guidelines. For additional safety, be sure to observe ISO 4414 - General rules and safety requirements for systems and their components.



To reduce risk of injury, everyone using, installing, repairing, maintaining, changing accessories on, a working near this tool **MUST** read and understand these instructions before performing any such task. **DO NOT DISCARD – GIVE TO USER.**

Model No.	Description
10685	Filter
10694	Regulator
10687	Lubricator
10688	Filter-Regulator
10689	Regulator-Lubricator
10690	Filter-Regulator-Lubricator



Index Key		
Item	Part No.	Description
1	10645	Filter Element (5 Micron)
2	10684	Baffle
3	10692	Bowl O-Ring
4	10693	Bowl Assembly
5	10640	Valve Assembly
6	10641	Diaphragm Assembly
7	10642	Valve Guide Assembly
8	10698	Lubrication Plug Assembly
9	10658	Damper Retainer Assembly
10	10668	Bowl Assembly
11	10659	Damper Assembly
12	10656	Slight Dome Assembly
13	10665	Mounting Bracket (2)
14	10667	Seal
—	10697	Dual Pressure Gauge (Not Shown)

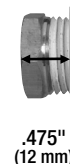
Inlet/Outlet Port	Max. Air Pressure	Max. Air Flow	Max. Air Temperature
1/2" NPT	150 PSIG (10.3 Bars)	106 SCFM (3,000 LPM)	150° F (65° C)



3/8" Reducer Bushings

The enclosed bushings (2) are supplied to reduce the 1/2" NPT openings of the enclosed Filter-Regulator-Lubricator to 3/8" NPT.

(Use only if required)



IMPORTANT

Do Not Overtighten the Bushings!

The bushings will not engage entirely into the 1/2" NPT opening after tightening.

Refer to recommended tightening torque chart on page 6.

Important Installation, Operating, and Maintenance Instructions

Carefully read all instructions before operating or servicing any Dynabrade Accessories.

Installation Instructions:

Notice: Close the air line system by turning off the air pressure in the area where the FRL unit will be installed.

1. Be sure to select a proper site for the FRL unit by locating the area of the air line system that is as close to the actual work area as possible.
Note: This site should be free of direct sunlight, excessively high temperatures, and hazardous chemicals.
2. Mount the FRL unit, or individual units, in the air line system with the arrows on the unit pointed in the direction of the air flow within the air system. Failure to do so can damage components(s).
3. How to reduce from the 1/2" NPT openings to 3/8"- If required, use the two reducer bushings shipped with this item. (See front page for further details).
4. Fill the oil bowl with air tool oil. Please see the section below on lubrication.
5. Open the air line system and check for leaks around the FRL unit.

Standard Operating Instructions:

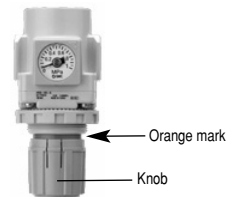
Filter (Filtration)

1. If the water level exceeds the maximum limit on the filter bowl, drain the filter. This is done by rotating the silver nut on the bottom of the filter bowl counterclockwise (left hand thread). Turn nut clockwise by hand to reseal bowl.

Regulator (Regulation)

Warning: Set the regulator while verifying the displayed values of the inlet and outlet pressure gauges. Turning the knob excessively can cause damage to the internal parts. Pressure regulator knob should be adjusted by hand only. Do not use tools.

1. Regulation of air pressure is controlled by the knob found on the regulator portion of the FRL unit. The air pressure is measured by the gauge on the front.
2. To increase the air pressure, be sure to unlock the knob before adjusting. Pull the pressure regulator knob to unlock. (You can visually verify this with the "orange mark" that appears in the gap). To decrease the air pressure, turn the knob counterclockwise. Once the proper air pressure is established push the pressure regulator knob to lock. When the knob is not easily locked, turn it left and right a little and then push it (when the knob is locked, the "orange mark," i.e., the gap will disappear).
3. Maximum operating air pressure is 150 PSIG.



Lubricator (Lubrication)

1. Oil fill port; An internal check valve allows oil to be added to the Lubricator oil reservoir bowl without shutting off the air supply and interruption to work operations.
2. Remove the fill cap plug by turning it counterclockwise.
3. Fill the bowl to the fill line with air tool oil. Use Dynabrade Air Lube **95842** or equivalent air tool oil (10W/NR).
4. Replace the fill plug by turning in clockwise.
5. After filling Lubricator bowl with oil, Oil Flow Adjustment Control, allows for easy, fast and accurate dispensing of oil.
6. Oil feed sight dome; Allows visible adjustment in the amount of dispensed oil (dropped) into the flow of compressed air.
7. Turn the sight dome valve clockwise to decrease oil drop rate and turn counterclockwise to increase oil drop rate. The higher the air flow (SCFM) rate, the more the oil drop rate needs to be. With tool running, adjust to 1 drop per minute for each 20 SCFM of air flow. Flow rates for individual tools are supplied by tool manufacture.



Maintenance Instructions:

Other than when adding oil to the lubricator, always turn off air pressure and discharge all air inside FRL unit before performing any maintenance procedures.

Filter:

1. Remove the filter bowl by sliding the silver lock button downward. Then rotate bowl clockwise or counterclockwise.
2. Remove filter module by visually noting the small locking feature visible through the view portion the top of the filter module. The locking feature is a protrusion on the filter module and a groove in the metal bowl of the filter. Grip the filter module and rotate it clockwise or counterclockwise such that the lock rotates out of the groove, rotate until you can see a wide clearance notch completely fill the viewport then slide the filter module out of the metal bowl.
3. Inspect the filter assembly and check the amount of debris that may be collected on the filter cartridge itself. To remove filter element, rotate bottom of baffle assembly counter clockwise quarter turn. Clean the filter with soap and water. If the filter is damaged or contains heavy debris, it must be replaced. Refer to the parts breakdown for more information. Replace the element every 2 years or when the pressure drop becomes 15 PSIG (1 Bar), whichever comes first, to prevent damage to the element.
4. Clean the filter bowl with soap and water. Replace bowl o-ring if damaged. Re-install bowl by rotating until the lock button locks into place.



Regulator:

1. No maintenance expected.

Lubricator:

1. Fill oil as required to fill line on bowl.

Products offered by Dynabrade should not be converted or otherwise altered from original design.

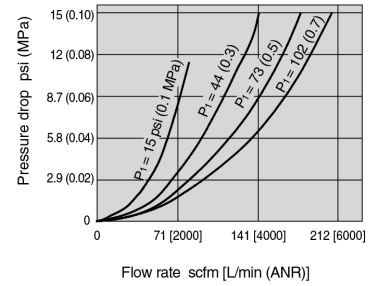
Filter 10685



Standard Specifications

Port Size	1/2"
Fluid	Air
Proof Pressure	218 PSIG (15 Bar)
Max Operating Pressure	150 PSIG (10.3 Bar)
Ambient & Fluid Temperature	23 to 140°F (-5 to 60°C) [with no freezing]
Normal Filtration Rating	5µm
Bowl Material	Zinc
Drain Capacity	1.52 oz. (45 cm³)
Weight	1.2 lb. (0.54 kg)

Flow Characteristics (Representative values)



Regulator 10694

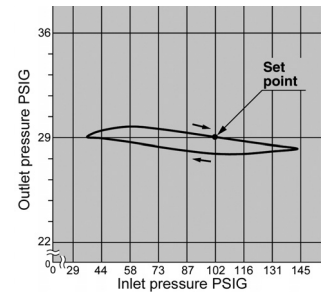


Standard Specifications

Port Size	1/2"
Fluid	Air
Proof Pressure	218 PSIG (15 Bar)
Max Operating Pressure	150 PSIG (10.3 Bar)
Set Pressure Range	7 to 123 PSIG (8.5 bar)
Pressure Gauge Port Size	N/A
Relief Pressure	Set Pressure +7 PSIG (.5 Bar)
Ambient and Fluid Temperature	23 to 140°F (-5 to 60°C) [with no freezing]
Construction	Relieving Type
Weight	1 lb. (0.44 kg)

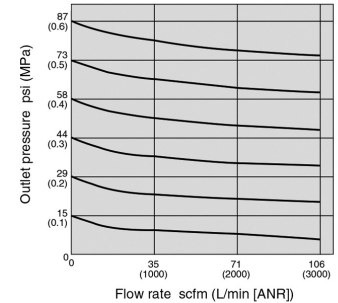
Pressure Characteristics (Representative values)

Condition Inlet Pressure: 102 PSIG
Outlet Pressure: 29 PSIG
Flow Rate: .7 SCFM (20 L/Min.)



Flow Characteristics (Representative values)

Condition Inlet Pressure: 102 PSIG (7 Bar)



Lubricator 10687

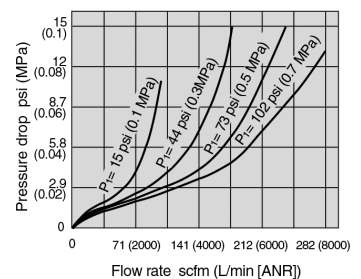


Standard Specifications

Port Size	1/2"
Fluid	Air
Proof Pressure	218 PSIG (15 Bars)
Max Operating Pressure:	150 PSIG (10.3 Bars)
Oil Capacity	4.6 oz. (135 cm³)
Recommended Lubricant	Dynabrade Air Lube (10W/NR)
Ambient and Fluid Temperature	23 to 140°F (-5 to 60°C) [with no freezing]
Bowl Material	Zinc
Weight	1.2 lb. (0.56 kg)


Flow Characteristics (Representative values)


Condition Inlet Pressure: 102 PSIG (7 Bar)




Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of “**Caution**,” “**Warning**” or “**Danger**.” They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)*1), and other safety regulations.

 **Caution:** **Caution** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

 **Warning:** **Warning** indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

 **Danger :** **Danger** indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

*1) ISO 4414: Pneumatic fluid power – General rules relating to systems.
ISO 4413: Hydraulic fluid power – General rules relating to systems.
IEC 60204-1: Safety of machinery – Electrical equipment of machines.
(Part 1: General requirements)
ISO 10218-1: Manipulating industrial robots – Safety.
etc.

Warning

1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. Only personnel with appropriate training should operate machinery and equipment.

The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

3. Do not service or attempt to remove product and machinery/ equipment until safety is confirmed.

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. Contact Dynabrade, Inc. beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.
3. An application which could have negative effects on people, property, or animals requiring special safety analysis.
4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.

Caution

1. The product is provided for use in manufacturing industries.

The product herein described is basically provided for peaceful use in manufacturing industries.

If considering using the product in other industries, consult Dynabrade, Inc. beforehand and exchange specifications or a contract if necessary.

If anything is unclear, contact your nearest sales branch.

Exemption from Liability

1. Dynabrade, Inc. is exempted from liability for any damages caused by operations not contained in the catalogs and/or instruction manuals, and operations outside of the specification range.
2. Dynabrade, Inc. is exempted from liability for any loss or damage whatsoever caused by malfunctions of its products when combined with other devices or software.



F.R.L. Unit Precautions 1

Be sure to read before handling

Design

Warning

1. The sight dome for the lubricator is made of polycarbonate. Do not use in an environment where they are exposed to, or come in contact with organic solvents, chemicals, cutting oil, synthetic oil, alkali, and thread lock solutions.
2. Consult with Dynabrade, Inc. if the intended application calls for absolutely zero leakage due to special atmospheric requirements, or if the use of a fluid other than air is required.
3. **Regulator and Filter-Regulator**
Be sure to install a safety device to prevent damage of malfunction of the outlet side components when the output pressure exceeds the set pressure value.

Selection

Warning

1. The mineral grease used on internal sliding parts and seals may run down to outlet side components.
2. **Regulator and Filter-Regulator**
 - a. Residual pressure release (outlet pressure release) is not complete by releasing the inlet pressure. To release residual pressure, select a model with a back flow mechanism. Using a model without a back flow mechanism makes for inconsistent residual pressure release (i.e. residual pressure may or may not be released) depending on the operating conditions.
 - b. Contact Dynabrade, Inc. if air will not be consumed in the system for a long period of time, or if the outlet side will be used with a sealed circuit and a balanced circuit, as this may cause the set pressure of the outside to fluctuate.
 - c. Set the regulating pressure range for the outlet pressure of the regulator in a range that is 85% or less of the inlet pressure. If set to above 85%, the outlet pressure will be easily affected by fluctuations in the flow rate and inlet pressure and become unstable.
 - d. A safety margin is calculated into the maximum regulating pressure range appearing in the catalog's specification table. However, the outlet pressure may exceed the set pressure due to a delay in the valve's closing.
 - e. Contact Dynabrade, Inc. when a circuit requires the use of a regulator having relief sensitivity with high precision and setting accuracy.
3. **Lubricator**
 - a. Contact Dynabrade, Inc. when the lubricator is used in high frequency operations, such as in a press.
 - b. Lubrication cannot be properly performed if the operating flow rate is too low. Select proper size lubricator by referring to the minimum dripping flow rate provided in this catalog.
 - c. Avoid the use of a lubricator that causes back flow as this may cause damage to internal parts.
 - d. Use a check valve to prevent the lubricant from back flowing when redirecting the piping on the side.



F.R.L. Unit Precautions 2

Be sure to read before handling

Mounting

Caution

1. To avoid reversed connections of the air inlet/outlet, make connections after confirming the "IN/OUT" mark or arrows that indicate the direction of air flow. Reversed connections can cause malfunction.
2. Components with a bowl, e.g., air filter, filter regulator, lubricator, must be installed vertically with the bowl downward so that faulty drain discharge and dripping can be verified.
3. Ensure sufficient top, bottom, and front clearance for maintenance and operation of each component. Refer to the dimensions section for the minimum clearance for each component.
4. **Regulator and Filter-Regulator**
Be sure to unlock the knob before adjusting the pressure and to lock it after the pressure is set.
5. When the bowl is installed on the air filter and/or lubricator, install them so that the lock button lines up to the groove of the front (or the back) of the body to avoid drop or damage of the bowl.



Adjustment

Warning

1. **Regulator and Filter**
 - a. Set the regulator while verifying the displayed values of the inlet and outlet pressure gauges. Turning the knob excessively can cause damage to the internal parts.
 - b. Do not use a tool on the pressure regulator knob as this can cause damage. It must be operated manually.

Caution

1. **Regulator and Filter-Regulator**
 - a. Be sure to check the inlet pressure before setting the outlet pressure.
 - b. To set the pressure using the knob, turn the knob in the direction that increases pressure and lock the knob after the pressure is set. If this is done in the direction that decreases pressure, the pressure may drop from the original set pressure. Turning the knob clockwise increases the outlet pressure, and turning it counterclockwise reduces the pressure.

Piping

Warning

1. To screw piping materials into components, tighten with a recommended tightening torque while holding the female thread side. If the minimum tightening torque is not observed, this can cause a looseness and seal failure. On the other hand, excess tightening torque can cause damage to the threads. Furthermore, tightening without holding the female thread side can cause damage due to the excess force that is applied directly to the piping bracket.

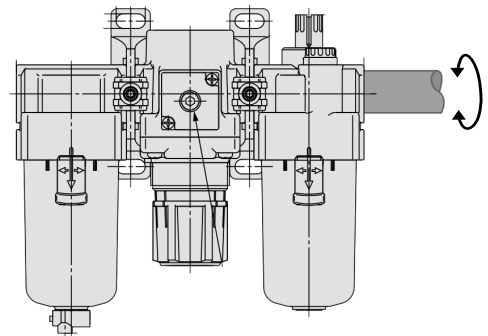
Recommended tightening torque

Unit: lb.-ft.

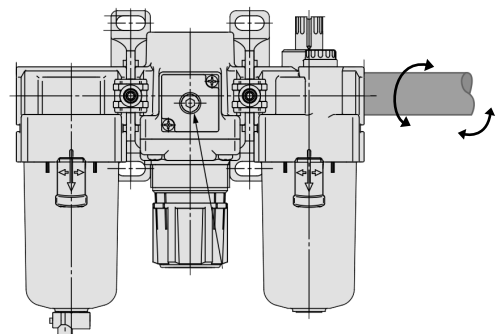
Connection Thread	3/8"	1/2"
Torque	16.2 to 17.7	20.6 to 22.1

* Alternatively tighten by hand, then tighten further approximately 1/6 turn using a tightening tool.

2. Avoid excessive torsional moment or bending moment other than those caused by the equipment's own weight as this can cause damage. Support external piping separately.



3. Piping materials without flexibility such as steel tube piping are prone to be affected by excess moment load and vibration from the piping side. Use flexible tubing in between to avoid such an effect.





F.R.L. Unit Precautions 3

Be sure to read before handling

Piping

Caution

1. Lubricator

Try to avoid riser piping and branch lines as much as possible on the outlet side, otherwise proper lubrication will be compromised.

Air Supply

Caution

1. When there is excessive condensate, install a device that eliminates water such as a dryer or water separator (drain catch) on the inlet side of the air filter.

Maintenance

Warning

1. When disassembly or installation is required during the maintenance, repair, or replacement of a device, be sure to follow the instructions provided in the instruction manual or safety instructions in this catalog.
2. Perform periodical inspections to detect any cracks, scratches, or other deterioration of the transparent sight dome of the lubricator. Replace sight dome when any kind of deterioration is found, otherwise this can cause damage.
3. Perform periodical inspections to detect dirt on the air filter, filter regulator, and lubricator or the sight dome of the lubricator. When you find dirt on any of the above devices, clean with a mild household cleanser. Do not use other cleaning agents, otherwise this can cause damage.
4. **Air Filter**
 - a. Replace the element every 2 years or when the pressure drop becomes 15 PSIG (1 Bar), whichever comes first, to prevent damage to the element.
 - b. Release accumulated condensate periodically before it reaches the maximum capacity. Condensate that flows out to the outlet side can cause malfunctions.

Caution

1. Perform periodical inspections of the filter element and replace it as necessary. Check the element whenever the outlet pressure drops below normal or air does not flow smoothly during operation.
2. **Regulator and Filter-Regulator**

Check the sliding part or seat of the internal valve when a setting malfunction or relief leakage occurs and temporary or emergency repairs need to be made.
3. **Lubricator**

Check the dripping amount once a day. Drip failure can cause damage to the components being lubricated.

Filter-Regulator-Lubricator

Cost-Effective Maintenance for Air Supply Systems



Filter

Five-micron filter element is standard.
Manually rotate drain plug to discharge contaminants.

Part No. 10685



Filter-Regulator

Unit has modular connections with mounting brackets for easy installation.

Part No. 10688



Regulator

Compensation built into unit responds faster to changes in incoming pressure and flow.
Built-in dual PSIG/Bar pressure dial gauge.

Part No. 10694



Regulator-Lubricator

Unit has modular connections with mounting brackets for easy installation.

Part No. 10689



Lubricator

Built-in check valve permits tool to be filled with oil without having to turn off air pressure.
Adjustable oil drop to meter amount of oil into air system.

Part No. 10687



Filter-Regulator-Lubricator

Unit has modular connections with mounting brackets for easy installation.

Part No. 10690

FRL Flow Characteristics (90 PSIG)

Flow		Pressure Drop Across FRL	
SCFM	LPM	PSIG	Bar
15	425	0	—
30	850	2.0	0.14
45	1,274	2.0	0.14
60	1,699	4.0	0.28
75	2,124	5.0	0.34

Each unit includes two bushings for easy conversion to 3/8" NPT.

Additional Specifications: Maximum Operating Pressure
See Standard Specification Tables (Page 3).