

Membrane Dryers

Removes water vapor from compressed air providing dewpoint suppression.

W07 Series Membrane Dryer	
1/4" Port Sizes	ALE-4-2
W72 Series Membrane Dryer	
1/4" Port Sizes	ALE-4-4
W74 Series Membrane Dryer	
1/2" Port Sizes	ALE-4-6

Membrane Dryer



**W07M Series Membrane Dryer
1/4" Port Size**

- Removes water vapor from compressed air providing condensate-free air at the point of application.
- Provides dewpoint suppression up to 80°F (44°C) depending on air flow through the membrane
- Dewpoint suppression of 20°F (11°C) below the inlet temperature is suitable for most industrial applications.
- Utilizes the latest membrane technology to achieve optimal water vapor removal rates.
- W07 available for in-line installation only
- Easy installation, no power required
- Maintenance free with proper prefiltration
- Extremely low pressure drops



Ordering Information. Models listed include NPT threads.

Port Size	Model	Nominal Flow* scfm (dm ³ /s)		Differential Pressure ** psid (bar)	Weight lb (kg)
		Outlet	Inlet		
1/4	W07M-2AN-NNA	2 (1.00)	2.2 (1.06)	0.40 (0.028)	0.88 (0.39)

* Maximum flow with 20°F (11°C) dewpoint suppression.

** Differential pressure at 100 psig (7 bar) inlet pressure at stated flows.

Alternative Models

W ★ ★ M - ★ ★ N - N ★ ★

Threads	Substitute
NPT	A
ISO G parallel	G

How to Size a Membrane Dryer

1. Enter the application requirements below:

- Maximum air flow required: _____
- Inlet pressure: _____
- Dewpoint suppression required:* _____

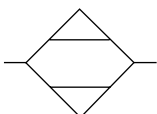
2. Select a chart by matching the maximum air flow required to the flow range in the chart title.

3. Follow the appropriate inlet pressure curve downward until it crosses the maximum air flow required. Trace a horizontal line to the *DEWPOINT SUPPRESSION* axis and note the degrees of suppression.
Degrees Of Suppression: _____

4. If the degrees of suppression is less than the application requirement, check the membrane dryer with the next higher flow range. The inlet pressure of the smaller membrane dryer may also be increased to provide greater suppression.

5. If the degrees of suppression is greater than the application requirement, check the membrane dryer with next smaller maximum flow.

* Typically, a dewpoint suppression of 20°F (11°C) below the inlet temperature provides dry air suitable for most industrial applications.

ISO Symbol


W07M Membrane Dryers

All Dimensions in Inches (mm)



Technical Data

Fluid: Compressed air, prefiltered to 0.01 micron and oil free (ISO 8573-1, 1.7.2) with noncycling supply.

Maximum pressure: 150 psig (10 bar)

Operating temperature: 0° to 175°F (-20° to 80°C)*

* Air supply must be dry enough to avoid ice formation at temperatures below 35°F (2°C).

Nominal flow at 100 psig (7 bar) inlet pressure, 100°F (38°C) inlet temperature, and a dew point suppression of 20°F (11°C). Flow demand affects dew point suppression.

Model W07M-2AN-NNA: 2 scfm (1.00 dm³/s)

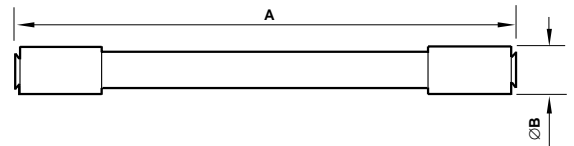
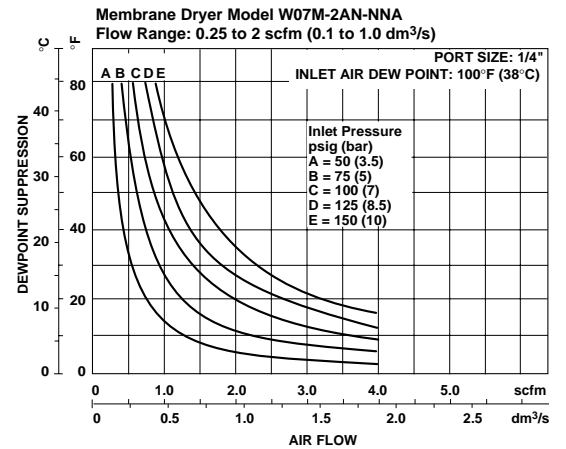
Materials

Body and end caps: Anodized aluminum

Membrane: Polymeric materials

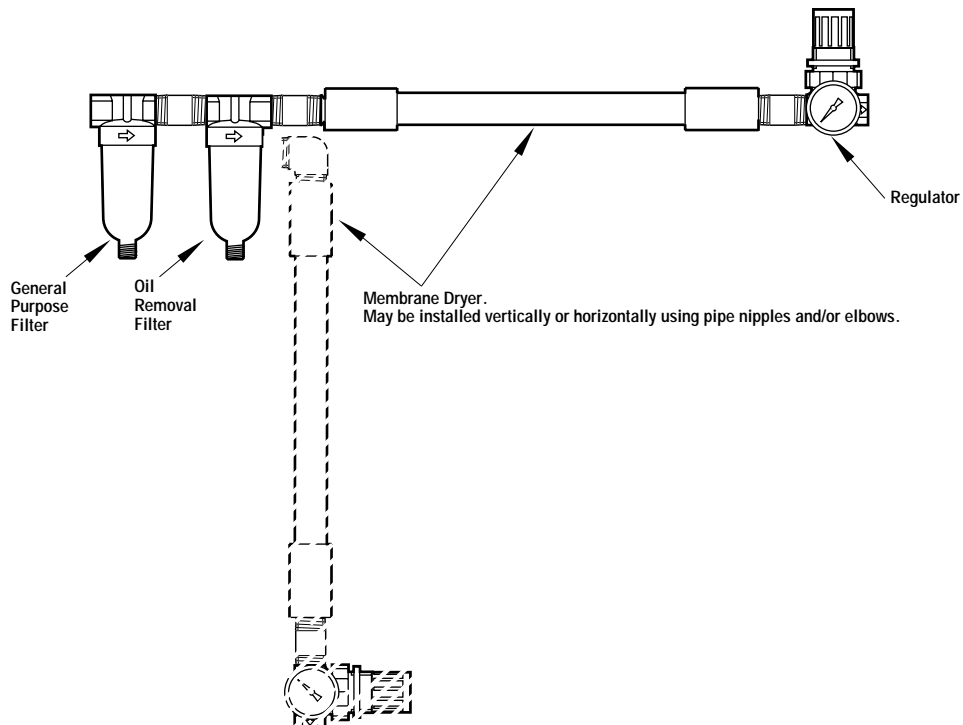
NOTE - Required prefiltration: General purpose filter (5 micron element) and an oil removal filter (0.01 micron particle removal) with equivalent pipe size and flow capacity equal to or greater than the membrane air dryer, (automatic drains advised).

Typical Dew Point Suppression Characteristics



Model	Dimension A	Diameter B
W07M-2AN-NNA	16.0 (406)	1.18 (30)

Typical Installation. W07 installation uses pipe fittings in conjunction with Miniature 07 Series products



- Removes water vapor from compressed air providing condensate-free air at the point of application.
- Provides dewpoint suppression up to 80°F (44°C) depending on air flow through the membrane
- Dewpoint suppression of 20°F (11°C) or below the inlet temperature is suitable for most industrial applications.
- Utilizes the latest membrane technology to achieve optimal water vapor removal rates.
- W72 utilizes the Excelon Quikclamp™ design to provide in-line or modular installation with 72, 73 and 74 Series products.
- Easy installation, no power required
- Maintenance free with proper prefiltration
- Extremely low pressure drops



Ordering Information. Models listed include ISO G parallel threads.

Port Size	Model	Nominal Flow* scfm (dm ³ /s)		Differential Pressure ** psid (bar)	Weight lb (kg)
		Outlet	Inlet		
1/4	W72M-2AN-NNB	5 (2.40)	5.6 (2.65)	0.32 (0.023)	1.80 (0.82)
1/4	W72M-2AN-NNC	10 (4.75)	11.2 (5.27)	0.90 (0.062)	1.86 (0.84)

* Maximum flow with 20°F (11°C) dewpoint suppression.

** Differential pressure at 100 psig (7 bar) inlet pressure at stated flows.

Alternative Models

W ★ ★ M - ★ ★ N - N ★ ★

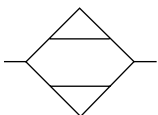
Threads	Substitute
NPT	A
ISO G parallel	G

How to Size a Membrane Dryer

1. Enter the application requirements below:
 - Maximum air flow required: _____
 - Inlet pressure: _____
 - Dewpoint suppression required:* _____
2. Select a chart by matching the maximum air flow required to the flow range in the chart title.
3. Follow the appropriate inlet pressure curve downward until it crosses the maximum air flow required. Trace a horizontal line to the *DEWPOINT SUPPRESSION* axis and note the degrees of suppression. Degrees Of Suppression: _____
4. If the degrees of suppression is less than the application requirement, check the membrane dryer with the next higher flow range. The inlet pressure of the smaller membrane dryer may also be increased to provide greater suppression.
5. If the degrees of suppression is greater than the application requirement, check the membrane dryer with next smaller maximum flow.

* Typically, a dewpoint suppression of 20°F (11°C) below the inlet temperature provides dry air suitable for most industrial applications.

ISO Symbol



W72M Membrane Dryers

All Dimensions in Inches (mm)



Technical Data

Fluid: Compressed air, prefiltered to 0.01 micron and oil free (ISO 8573-1, 1.7.2) with noncycling supply.

Maximum pressure: 150 psig (10 bar)

Operating temperature: 0 to 175°F (-20 to 80°C)*

* Air supply must be dry enough to avoid ice formation at temperatures below 35°F (2°C).

Nominal flow at 7 bar (100 psig) inlet pressure, 100°F (38°C) inlet temperature, and a dew point suppression of 20°F (11°C). Flow demand affects dew point suppression.

Model W72M-2AN-NNB: 5 scfm (2.40 dm³/s)

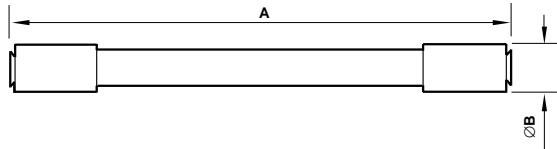
Model W72M-2AN-NNC: 10 scfm (4.75 dm³/s)

Materials

Body and end caps: Anodized aluminum

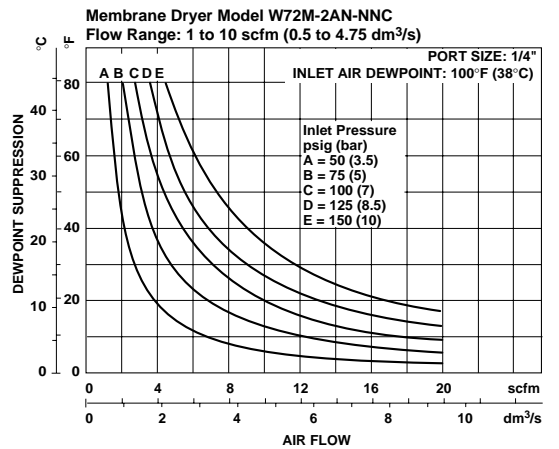
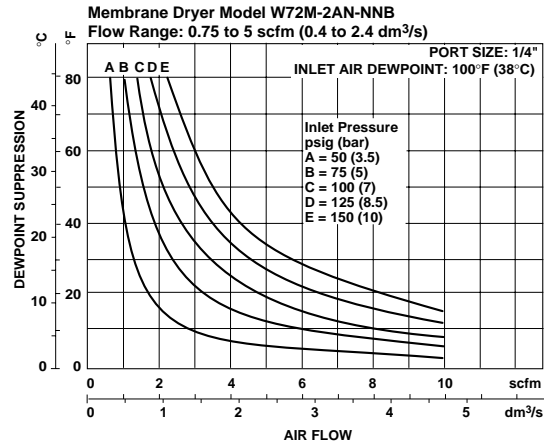
Membrane: Polymeric materials

NOTE - Required prefiltration: General purpose filter (5 micron element) and an oil removal filter (0.01 micron particle removal) with equivalent pipe size and flow capacity equal to or greater than the membrane air dryer, (automatic drains advised).

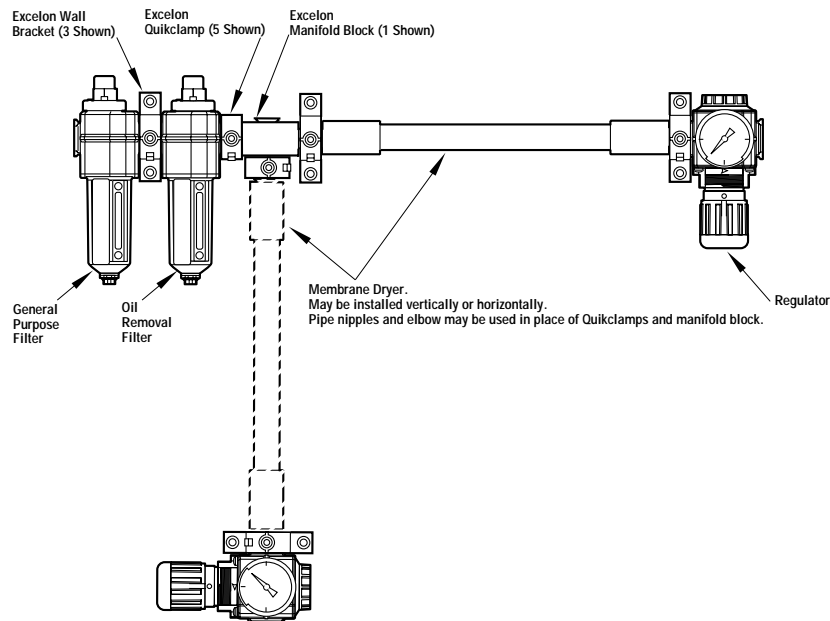


Model	Dimension A	Diameter B
W72M-2AN-NNB	18.0 (457)	1.74 (44)
W72M-2AN-NNC	19.0 (483)	1.74 (44)

Typical Dew Point Suppression Characteristics



Typical Installation. W72 membrane dryer shown with Excelon products, Quikclamps and manifold block.



- Removes water vapor from compressed air providing condensate-free air at the point of application.
- Provides dewpoint suppression up to 80°F (44°C) depending on air flow through the membrane
- Dewpoint suppression of 20°F (11°C) below the inlet temperature is suitable for most industrial applications.
- Utilizes the latest membrane technology to achieve optimal water vapor removal rates.
- W74 utilizes the Excelon Quikclamp™ design to provide in-line or modular installation with 72, 73 and 74 Series products.
- Easy installation, no power required
- Maintenance free with proper prefiltration
- Extremely low pressure drops



Ordering Information. Models listed include ISO G parallel threads.

Port Size	Model	Nominal Flow* scfm (dm ³ /s)		Differential Pressure **		Weight lb (kg)
		Outlet	Inlet	psid (bar)		
1/2	W74M-4AN-NND	20 (9.50)	22.2 (10.47)	0.65 (.045)		3.53 (1.60)
1/2	W74M-4AN-NNE	30 (14.20)	33.4 (15.76)	1.35 (.093)		3.94 (1.79)

* Maximum flow with 20°F (11°C) dewpoint suppression.

** Differential pressure at 100 psig (7 bar) inlet pressure at stated flows.

Alternative Models

W ★ ★ M - ★ ★ N - N ★ ★

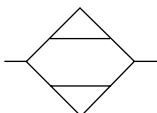
Threads	Substitute
NPT	A
ISO G parallel	G

How to Size a Membrane Dryer

- Enter the application requirements below:
 - Maximum air flow required: _____
 - Inlet pressure: _____
 - Dewpoint suppression required:* _____
- Select a chart by matching the maximum air flow required to the flow range in the chart title.
- Follow the appropriate inlet pressure curve downward until it crosses the maximum air flow required. Trace a horizontal line to the *DEWPOINT SUPPRESSION* axis and note the degrees of suppression. Degrees Of Suppression: _____
- If the degrees of suppression is less than the application requirement, check the membrane dryer with the next higher flow range. The inlet pressure of the smaller membrane dryer may also be increased to provide greater suppression.
- If the degrees of suppression is greater than the application requirement, check the membrane dryer with next smaller maximum flow.

* Typically, a dewpoint suppression of 20°F (11°C) below the inlet temperature provides dry air suitable for most industrial applications.

ISO Symbol



W74M Membrane Dryers

All Dimensions in Inches (mm)



Technical Data

Fluid: Compressed air, prefiltered to 0,01 micron and oil free (ISO 8573-1, 1.7.2) with noncycling supply.

Maximum pressure: 150 psig (10 bar)

Operating temperature: 0 to 175°F (-20 to 80°C)*

* Air supply must be dry enough to avoid ice formation at temperatures below 35°F (2°C).

Nominal flow at 100 psig (7 bar) inlet pressure, 100°F (38°C) inlet temperature, and a dew point suppression of 20°F (11°C). Flow demand affects dew point suppression.

Model W74M-4AN-NND: 20 scfm (9.50 dm³/s)

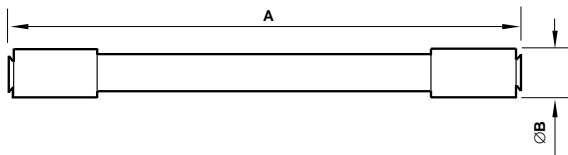
Model W74M-4AN-NNE: 30 scfm (14.20 dm³/s)

Materials

Body and end caps: Anodized aluminum

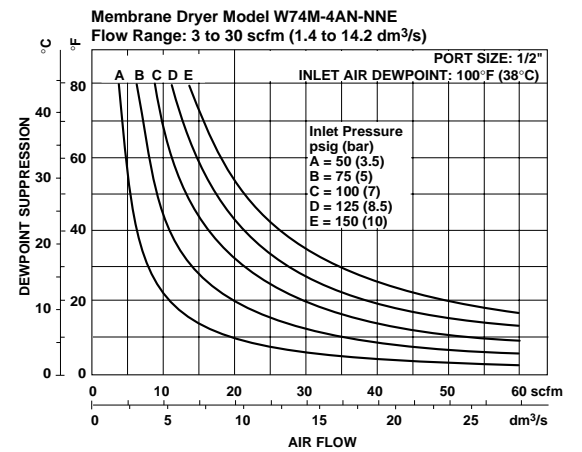
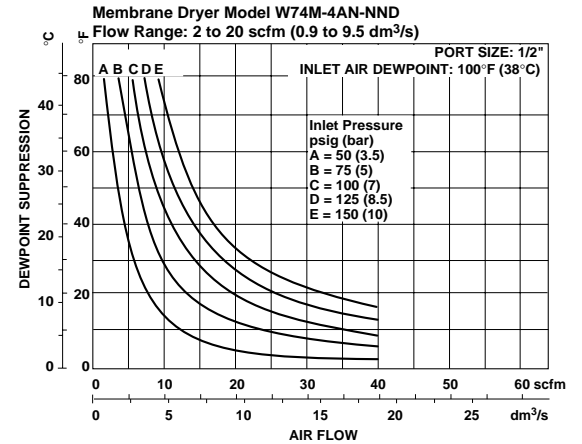
Membrane: Polymeric materials

NOTE - Required prefiltration: General purpose filter (5 micron element) and an oil removal filter (0.01 micron particle removal) with equivalent pipe size and flow capacity equal to or greater than the membrane air dryer, (automatic drains advised).

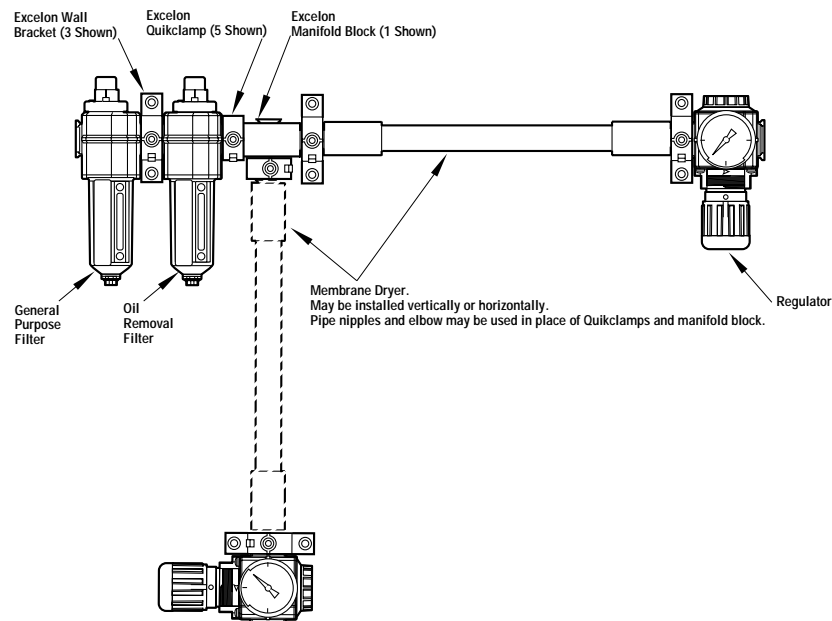


Model	Dimension A	Diameter B
W74M-4AN-NND	21.0 (533)	2.49 (63)
W74M-4AN-NNE	26.0 (660)	2.49 (63)

Typical Dew Point Suppression Characteristics



Typical Installation. W74 membrane dryer shown with Excelon products, Quikclamps and manifold block.



Regulators

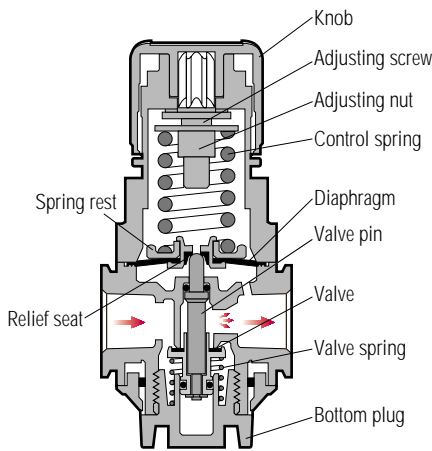
General Purpose Regulators, Specialty Regulators, Manifolding Regulators, Precision and Instrument Regulators, Pilot Regulators, Pilot Operated Regulators, U.L. Listed Industrial, and Beverage Regulators

- Regulator OverviewALE-5-B**
- General Purpose RegulatorsALE-5-1**
- Specialty Regulators (Air or Water, Tube Connection,
Factory Preset Pressure, Large Diaphragm, High
Relief Flow, Field Adjustable Pressure LimitsALE-6-1**
- Manifolding RegulatorsALE-7-1**
- Precision and Instrument RegulatorsALE-8-1**
- Pilot RegulatorsALE-9-1**
- Pilot Operated RegulatorsALE-10-1**
- U.L. Listed Industrial Service RegulatorsALE-11-1**
- U.L. Listed Beverage RegulatorsALE-12-1**



Regulator Overview

GENERAL PURPOSE REGULATOR



General purpose regulators have a control spring which acts on a diaphragm to regulate the air pressure. The rating of this control spring determines the adjustment range of the regulator. The outlet pressure setting is obtained by turning the knob (or T handle) clockwise to increase pressure, counter clockwise to decrease pressure.

1.1.2 Pilot Operated Regulators:

Pilot operated regulators are used in high flow applications and where access to the main regulator is limited or difficult. This type of regulator does not have a control spring to regulate, instead an air pilot signal is used to control the outlet pressure of the main regulator.

This air pilot signal is controlled by a small 'pilot operator' regulator typically of a precision type eg 11-018. The flow through the pilot operator is negligible. The better the pilot, the better the performance from the main regulator.

1.1 GENERAL OVERVIEW

Regulators ideally provide a constant outlet pressure independent of variations in inlet pressure or flow. Regulators are typically used to:

- i. reduce pressure to the level required for downstream equipment.
- ii. limit the force of cylinders.
- iii. minimize pressure variation at the point of use.

The range of different regulators and options within each type are wide and varied, but each can broadly be put into one of 3 categories.

- General Purpose Regulators
- Pilot Operated Regulators
- Application Specific Regulators

1.1.1 General Purpose Regulators:

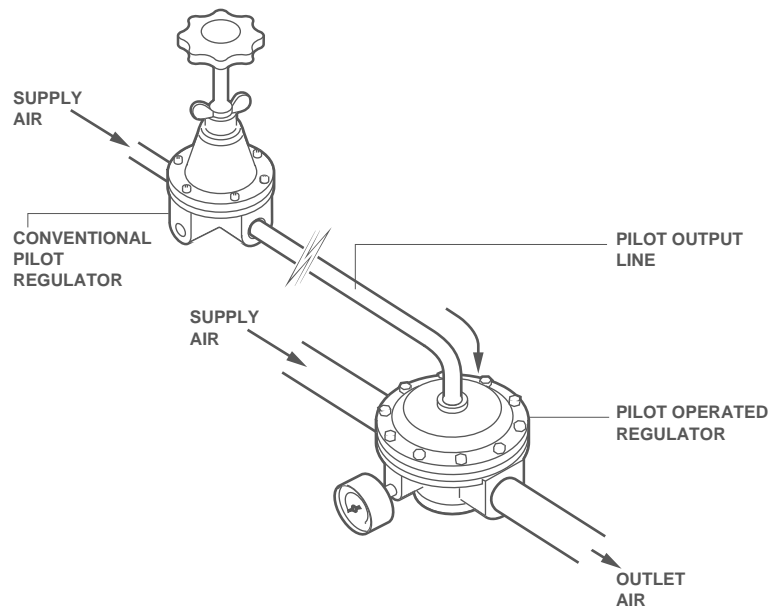
General purpose regulators are designed to give the maximum flow capacity (for their size) while maintaining, to a reasonable accuracy, the outlet pressure to the set level.

They are used to control pressures in compressed air line installations to different parts of machines or to pneumatic tools and motors.

General purpose regulators are available in relieving or non-relieving types. Relieving regulators can be adjusted from a high pressure to a low pressure. Even in a dead end situation relieving regulators will allow the excess downstream pressure to be exhausted. This causes a loud hissing sound which is perfectly normal.

Non relieving regulators when similarly adjusted will not allow the downstream pressure to escape. The trapped air will need to be released in some other way, e.g. by operating a downstream valve.

Typical Pilot Operation



The pilot signal for the main regulator valve is usually onto a large diaphragm area. This results in pilot operated regulators having better regulation characteristics than spring operated general purpose regulators.



1.1.3 Feedback Pilot Regulators:

For even greater control of the outlet pressure a 'feedback' pilot operator can be used. Here the outlet pressure from the pressure critical point in the system can be fed back to the controlling pilot operated regulator.

Feedback systems are very responsive to downstream pressure requirements. If performance does not meet expectations, consult with Application Engineering.

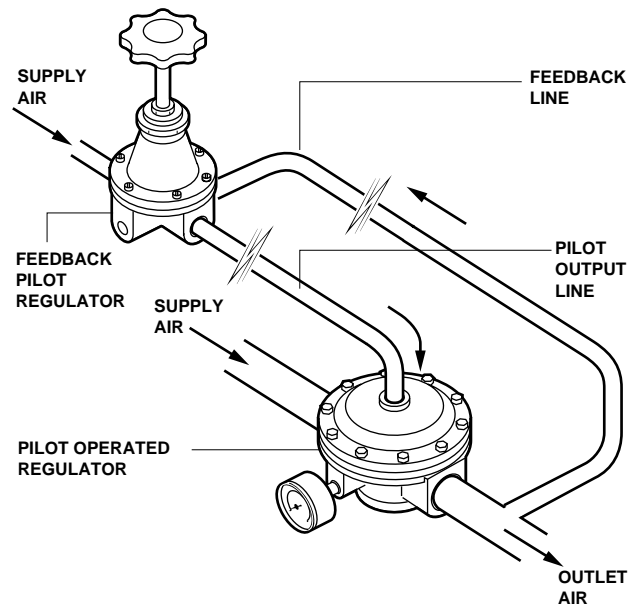
Very few applications require feedback and it is usually better to recommend a standard 11-400 or a general purpose regulator as a pilot operator.

1.1.4 Application Specific Regulators:

Norgren produces a wide range of application specific regulators, each having some enhanced feature over a general purpose regulator. Some of them are listed below.

-
- | | |
|-------------|---|
| 11-018/-118 | - extremely accurate outlet pressure control, with high flow for a precision regulator. Requires oil-free air, pre-filtered to 5µm. |
|-------------|---|
-
- | | |
|-----|--|
| R38 | - Instrument regulator, aluminum body (also available in stainless steel to NACE standard), excellent regulation, no constant bleed to atmosphere. |
|-----|--|
-
- | | |
|-----|--|
| R24 | - Good regulation, extremely high relief capacity. Available in spring or pilot operated versions. |
|-----|--|
-
- | | |
|---------|---|
| R05/R22 | - General purpose regulators with stainless steel bodies to NACE specification. |
|---------|---|
-
- | | |
|---------|--|
| R06/R91 | - Brass or plastic bodied specifically for water. Potable and non potable water options available. |
|---------|--|
-
- | | |
|----------------------|---|
| Miniature Regulators | - Generally based around a modification to a basic R07 including low flow (with improved regulation), plastic bodied (for water), different elastomeric materials (for fluid compatibility) |
|----------------------|---|
-

Feedback Operation



Feedback Pilot Regulator Warning

The feedback line must sense the pilot operated regulator outlet pressure and must be connected before turning on the air supply. If the feedback line is not connected, the pilot operated regulator outlet pressure will rapidly increase to the inlet pressure when the adjusting knob on the pilot regulator is turned clockwise.



1.2 WHAT CAN WE PRODUCE?

1.2.1 Do Norgren Produce Regulators for Inlet Pressure above 400 psig?

The R38, R43 and R18 can accept inlet pressures of up to 450 psig. Norgren has higher pressure regulators for industrial gases up to 3000 psi. Consult Application Engineering for details.

1.2.2 Do we Produce Units for Low/High Temperatures?

Low or high temperature units may be possible in some ranges. Material selection is critical. Consult Air Line for details.

Note: changing to viton elastomers does not in itself make a unit suitable for higher temperatures.

1.2.3 Can we Produce Sub-Base Regulators?

The USA R40/R41 pilot and feedback pilot regulators are available. A sub-base R06 is also available.

1.2.4 Can we Produce Manifolding Regulators?

Manifolding regulators are designed to have a straight through primary pressure with secondary outlets at 90 degrees. Norgren has:

- Excelon 72 R72M - manifold using Quikclamps.
- R30M Plastic R91 style with integral PIF. Manifold using adapters.
- R06 type brass bodied R06, manifold using fittings.

1.2.5 Do we Produce Liquid (water) Regulators?

Norgren has regulators suitable for liquids, primarily water.

These include plastic bodied miniature regulators eg R91G/W and 11-044, as well as brass R06's and R43's.

All are suitable for non potable water some for potable water. Check catalogue sheets for details.

A number of units already have the approval of some water control bodies eg WRC (Water Research Council) UK and NSF USA.

Water regulators can be used with other liquids but it is necessary to check corrosion resistance and material compatibility. Differences in viscosity may effect performance.

Water regulators can be used on air but normally have poorer performance characteristics than air regulators.

1.2.6 Can we do 11-818 Precision Regulators with Gauges?

Yes, we do have some special models, contact Application Engineering for details.

1.2.7 Can we Produce Back Pressure Regulators?

Yes, a back pressure regulator behaves as a very precise relief valve and so controls the rate of relief. With automatic adjustment of its outlet flow to atmosphere the system pressure remains substantially constant. These can be produced as specials.

1.2.8 Can we Produce Reverse Flow Regulators?

Reverse flow regulators allow the outlet pressure to flow back, through the regulator (via an internal check valve) when the inlet pressure is switched off. This is important when the regulator is placed between a valve and cylinder.

This option is available in Excelon 74, 73 and 72 Series and Olympian Plus. The R07, being an unbalanced valve regulator can also be reverse flowed.

1.3 ADJUSTMENT MECHANISMS

1.3.1 What Different Adjustment Mechanisms are Available?

A non-rising knob is the standard adjustment mechanism for most general purpose regulators. A T-handle will provide added leverage and is standard for regulators with 250 psig springs. They are also a common alternative to a knob in applications where the operator is wearing gloves, or has greasy hands.

A slotted adjusting screw enables the customer to adjust using a screwdriver and a hexagon-headed screw is also available. Handwheels can be fitted to most units and are standard on precision regulators.

1.3.2 What is the Difference between Tamper Resistant, Tamper Evident, and Tamperproof?

Tamper Resistant: a device which makes alterations of set pressure difficult.

Units which normally have a T-bar can have the T-bar replaced by a screw driver slotted adjusting screw over which a metal cap is fitted. In this way the set pressure can be protected from accidental adjustment.

Units with adjusting knobs are made tamper resistant by preventing the knob being pulled into its unlocked position for example:-

- R07 insert self tapping screw through the top of the knob.
- R72/73/74/64 use tamper resistant kit and seal with a padlock or seal wire.

Tamper Evident: shows if the set pressure has been altered by the breaking of a seal.

Tamperproof: something which cannot be tampered with at all. It is difficult to describe anything as tamper proof because if someone is intent on making regulator adjustments then they can always find a way. As a result we do not call our regulators tamper proof.

1.3.3 What Presetting Options are Available?

Most regulators can be 'set' in some way, if in doubt contact Air Line Division as this is generally a factory operation.

- Max Set: unit is modified to prevent the regulator being adjusted above a specified maximum.
- Min Set: unit is modified to prevent the regulator being adjusted below a specified minimum.
- Min/Max Set: unit can only be adjusted between two specified upper and lower units.
- Preset (Factory Set): unit outlet pressure is set and locked prior to despatch. These units are not tamper resistant (unless requested).



1.4 REGULATORS IN APPLICATIONS

1.4.1 Can the Regulators be Adjusted Outside the Recommended Range?

The recommended range is that at which the regulator will perform at its optimum. These are not the maximum and minimum values. Regulators can be set outside these limits. For units which cannot be set outside of a specified range see 1.3.3.

1.4.2 Will Regulators Shut Off?

Yes, screwing the adjustment 'up' (counterclockwise) closes the valve. It is possible to achieve zero psig with a regulator, however they are not designed to fulfill this function. If shut off is required use a shut off valve.

1.4.3 Will Regulators Work Mounted Upside Down?

Regulators can be mounted in any orientation without affecting their function.

1.4.4 How do you Set a Regulator?

Always set on a rising pressure, i.e. on an increasing spring load.

To adjust a regulator from 100 psig to 70 psig, back the regulator off to below 70 psig and adjust back up to the required pressure.

1.4.5 Can Air Regulators be used on Water?

Generally the answer is no for air regulators with balanced valves. It is possible with the R06 type which does not have a balanced valve and is considered dual service. See 1.2.5.

1.4.6 Can we use Air Regulators on other Gases?

Air regulators are generally suitable for use with CO₂, argon, nitrogen or other inert gases. However units are designed and tested to compressed air standards only (unless specified in the literature) and external leakage rates may vary depending on the gas involved.

Compressed air regulators should never be used with flammable or noxious gases eg LPG, hydrogen etc.

1.4.7 Instability - what is it and how can it be prevented?

Instability (humming or whistling) is the rapid cyclic fluctuation of the outlet pressure from around the set pressure.

Instability is ultimately a problem occurring due to the flow path through the regulator or system. The usual solution is to change the regulator characteristics by replacing the control spring with one of a higher rating to increase the force on the diaphragm or changing the diaphragm material.

There is no magic answer, it is a case of trial and error in those applications where instability occurs.

1.4.8 What is a Constant Bleed Regulator?

Constant bleed in regulators is designed to provide improved response. A hissing noise is normal. R24 and 11-018 are all constant bleed regulators.

1.5 PERFORMANCE

1.5.1 Flow Quoted?

Flow characteristic is the measurement of the flow through the unit for a given deviation from the set outlet pressure.

For example, take a regulator and set the pressure at 90 psig under no flow conditions. As the flow through the unit is increased then the actual outlet pressure falls away from the set pressure. This is called droop (from set). Normally Norgren quotes regulator flow measured under the following conditions: Inlet pressure = 150 psig, set pressure = 90 psig and a 15 psig droop from set.

1.5.2 What are Regulation Characteristics?

Regulation characteristics show how the outlet pressure from the regulator varies when the inlet pressure varies (under constant or no flow conditions).

For example, take a regulator set at 60 psig outlet pressure, with 150 psig at the inlet. If the inlet pressure reduces, ideally the outlet pressure would remain the same.

However, in regulators with an unbalanced valve (eg R07) the outlet pressure actually increases slightly as the inlet pressure decreases. In regulators with balanced valves this variation is reduced.

Standard regulators have an acceptable deviation for most pneumatic application and customers tend to be interested in regulation characteristics in critical applications only. Where this is so, consider using a precision regulator, or consult Application Engineering about ways to improve the performance of standard regulators.

1.5.3 What is the Repeatability of a Regulator?

Repeatability can be defined in terms of changes in flow, inlet pressure or time. It is important to understand which the customer requires.

- a. *Repeatability with Respect to Changes in Flow:* ie the ability of a regulator to hold a set pressure with increasing or decreasing flow.
- b. *Repeatability with Respect to Time Changes:* ie the ability of a regulator to hold a set pressure over a time period.
- c. *Repeatability with Respect to Inlet Pressure Changes:* ie the ability of a regulator to hold a set pressure with changes in supply pressure.

For more information refer to catalogue graphs, or consult Application Engineering.



1.6 SIMPLE REGULATOR TROUBLESHOOTING

Problem	Problem Cause	Remedy
Regulator creep (increase in secondary pressure due to leak from primary).	Dirty or cut valve elastomers. Nick in valve seat.	Replace or clean valve. If body or valve seat is damaged it can be replaced on some models. On others replacement of complete regulator is required.
Won't relieve secondary pressure.	Non-relieving diaphragm assembly.	If this feature is required, replace with relieving type diaphragm assembly.
Won't reach desired pressure.	Regulating spring with low spring rate.	Use regulating spring with spring rate designed to cover desired range.
Excessive leak from relief hole.	Damaged relief seat. Ruptured diaphragm.	Replace diaphragm assembly.
	Leakage past valve causing secondary to increase somewhat and open relief seat.	Replace or clean valve.
Regulator chatter.	A resonant condition is generally only encountered under a certain set of conditions of flow and pressure and then only in some applications in which regulator couples with other system components.	Replace spring with a higher pressure range spring. Replace with a piston type regulator since they have less tendency to chatter.
Regulator difficult to adjust.	Adjusting screw or knob locking device in locked position.	Pull to unlock knob and adjust; push knob to lock Threaded adjusting screws: loosen lock nut, remove adjusting screw, clean thread and lubricate.
	Contaminants in adjusting screw threads.	Place some lubricant on tip of screw.