

Noise Reference Guide

307375A

This instruction manual describes the problems of noise and icing of pneumatic equipment, and their relationship to government standards. Installation recommendations are given to lower noise levels and to minimize problems of icing.

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Sound

Sound waves are created whenever an object moves, causing the air surrounding the object to vibrate. This vibration travels from one particle of air to another, causing alternate layers of positive and negative pressures to move away from the vibration object. When the pressure changes reach the ear, the sensation of sound is produced.

Decibels

The difference between loud and soft sounds depends on the magnitude of the sounds, which are measured in decibels (dB).

Noise

Sound is tolerable up to about 75 dB. Beyond 75 dB sound rapidly turns into noise, interfering with the ability to hear clearly. Various government and industry standards have been established, limiting noise levels in various work locations. For example, in the United States OSHA requires noise levels to be under 90dB for an 8 hour time period, according to the Walsh-Healy Act of 1969.

Noise Measurement

The sound equipment used to measure noise should be designed to ANSI 5.1.4-1971 standards. The measurement methods and data reporting technique must be in accordance with CAGI-PNEUROP (CAGI – Compressed Air and Gas Institute in the United States; PNEUROP – European Committee of Manufacturers of Compressed Air Equipment). This code establishes test environment, measurement technique, and microphone locations for pneumatic equipment, and is a recognized international code. These readings, along with recording equipment identification, background noise levels, test room size, and noise decay rate, are some of the data required per the test code. The Graco noise test room is built to ANSI recommendations.

In field measurements, there is usually more error because less accurate, portable instruments are used. Sound meter accuracy on portable units is ± 1 dB when calibrated to ANSI specifications. This error, in addition to an operator reading error of ± 1 dB, results in a permissible total error of ± 2 dB. Background noise will also affect finding the actual noise level.

Background Noise

To find the total noise level of two or more machines, the decibels must be converted to intensity ratios before they can be added and subtracted. This total can then be reconverted to decibels. For example, to find the total noise level of one machine at 85 dB in an environment of 89 dB, Table 1 gives the factors. Using Table 1, a difference of 4 dB translates into the addition of 1.5 dB to the highest noise level; the total noise level to 90.5 dB.

When combining more than two noise levels, the two highest should be combined first. This total should then be combined with the next highest level. This procedure should be followed until all noise levels are combined.

To separate one machine noise level from background noise, use Table 2. First measure the total noise level, then turn the machine off and measure just the background noise. Subtract the lower reading from the higher one and refer to Table 2. For example, if the total noise level is 90 dB, and with the machine turned off it is 85 dB, the difference is 5 dB. Using Table 2, a difference of 5 dB corresponds to 1.6 dB.

The corresponding noise level of 1.6 dB should then be subtracted from the total noise level of 90 dB, resulting in machine noise of 88.4 dB.

Table 1	
Difference between levels in dB	No. of dB to be added to higher level
0	3.0
1	2.6
2	2.1
3	1.8
4	1.5
5	1.2
6	1.0
7	0.8
8	0.6
10	0.4
12	0.3
14	0.2
16	0.1

Table 2	
Difference between Total Noise Level and Background Level in dB	No. of dB to be subtracted from Total Noise Level to Find Noise Level Due to Source
10	0.5
9	0.6
8	0.7
7	1.0
6	1.2
5	1.6
4	2.2
3	3.0
2	4.3
1	6.9

Installation Recommendation

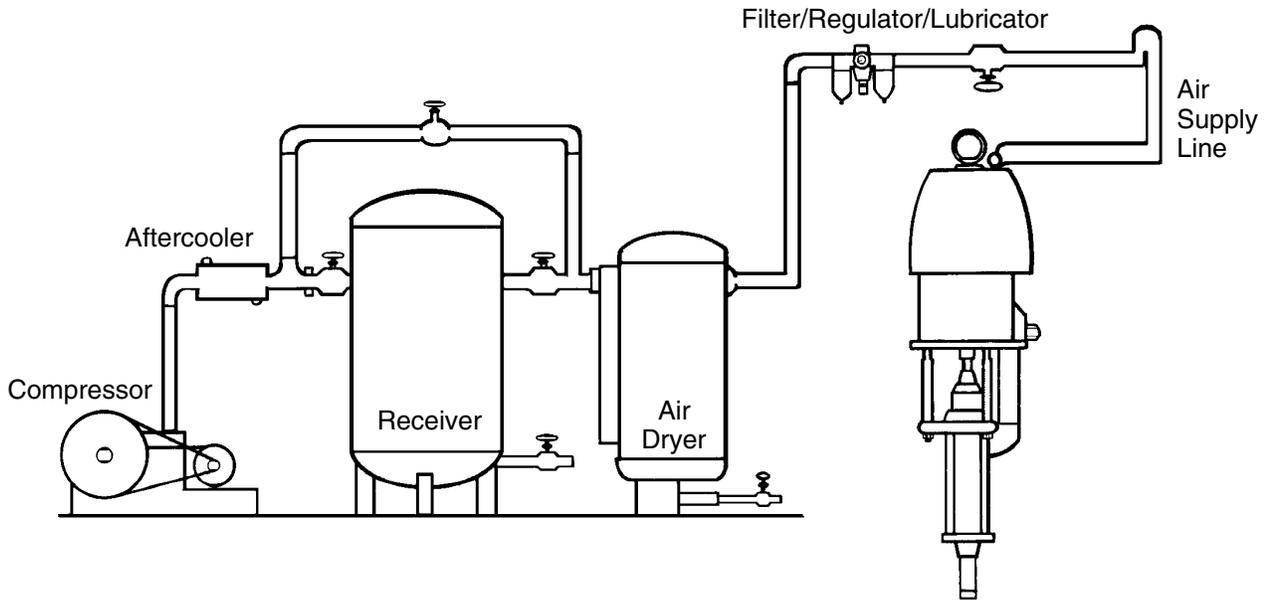


Fig 1

Compressed air has water in it (usually in vapor form). The amount of water in the compressed air will have to be reduced before the air reaches any pneumatic equipment to prevent icing and undue wear to the equipment. The amount of water in compressed air is reduced by installing a compressor with components (Aftercooler, Air Dryer, Filter/Regulator/Lubricator) that dry the air. See Fig. 1.

Items to consider when sizing an air dryer:

- Desired dew point
- Volume of air the unit must dry

The three basic types of air dryers are Refrigeration, Desiccant, and Chemical or deliquescent. To minimize icing, the recommended moisture level at the air motor inlet is 11° F (55° F) dew point at 21° C (70° F) air temperature.

A Filter/Regulator/Lubricator can also help prevent icing.

Icing

Compressed air cools as it approaches the end of the line. In cooling, the air loses its ability to carry water in vapor form, resulting in condensation. Sudden expansion of compressed air at the point of discharge from the air motor results in icing.

A muffling device of air exhaust used to lower the noise level of a particular piece of equipment will add to the problem of icing. To reduce the icing problem, we recommend a compressor installation as shown in Fig. 1.

Displacement Pump Configurations

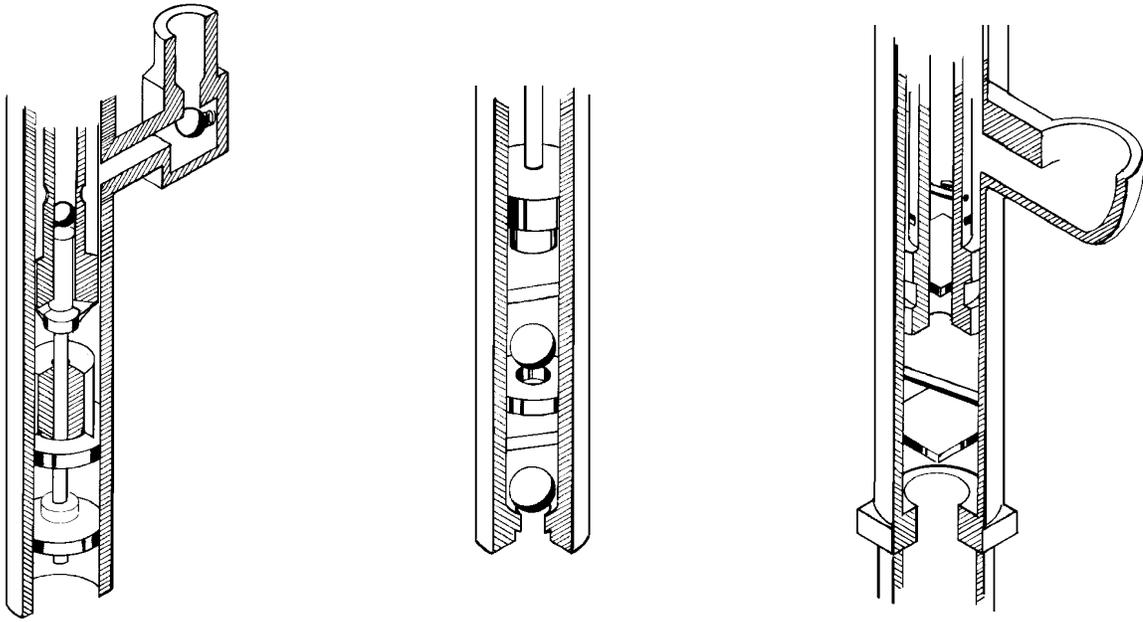


Fig. 2 **Shovel Valve**

Ball Valve

Flapper Valve

These are the three basic designs of Graco pumps. The material being pumped will affect the noise level. The lower the viscosity of material being pumped, the noisier the pump will be. For noise level, the worst combination is a flapper valve type pumping water. The noise level will decrease depending on both pump configuration and viscosity of the material being pumped. In contrast, the best combination is a shovel valve pump pumping a high viscosity material such as grease or mastics.

Items to consider when installing a piece of pneumatic equipment to meet noise requirements:

NOTE: Local standards do apply.

- Viscosity of material being pumped
- Design of displacement pump
- Location chosen for pump to be mounted
- Rubber mountings to minimize vibration
- Lack of hard plumbing to minimize vibration sound amplification

Additional Information

Further information is available on sound and noise. For a background of industrial information on noise we recommend "Think Quiet" by Compressed Air Magazine, and "Sound Advice" by Vickers, Division of Sperry Rand.

Graco Information

TO PLACE AN ORDER, contact your Graco distributor, or call one of the following numbers to identify the distributor closest to you:

1-800-367-4023 Toll Free

612-623-6921

612-378-3505 Fax

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