Information, Air operated Oil Pumps

Pumps
The Orion range includes pumps with a variety of pressure ratios. 1:1 ratio pumps (see below) should only be used for transfer of oil from one container to another and are not generally recommended for connection to installed pipe-work. 3:1 and 5:1 ratio pumps are suitable for connection to pipe work systems. Two pump tube lengths are offered - the longer one being suitable for direct installation in drums and the shorter (stub) version suitable for wall or floor mounting for connection to tanks etc. The choice between drums and tanks for bulk storage of the oil depends upon local consumption conditions. It is generally considered to be cheaper to buy oil in bulk but investment costs and consumption time must be taken into account.

Oil Types
Orion pumps are suitable for use with most types of oil, but further advice is available from our technical centre should you require it. It is important though to avoid long suction lines using high viscosity oils.

Important Pump Data
Pressure ratio
An air-operated, reciprocating pump consists essentially of two major parts: Air motor and pump mechanism. Each has a piston of a certain diameter and the ratio is determined by dividing the effective area of the air-motor piston by that of the pump mechanism piston. If the pressure ratio is 3:1 for example and the applied air pressure 700 kPa, the material pressure at the pump outlet will be 3x700 kPa = 2,1 Mpa (21 bars).

Pump capacity and back pressure
Each type of pump has a specific performance curve. In other words a pump is capable of delivering a certain volume at a given back pressure. If the flow volume increases the back pressure decreases and vice versa.

Pressure drop and pump selection
When oil is pumped through pipes or hoses a pressure drop is created due to friction. The extent of the pressure drop depends on velocity, pipe length and presence of i.e. shut-off valves, pipe elbows, oil meters etc. There are various formulae for calculating pressure drop and the easiest way of compensating for the pressure drop is to increase the internal pipe diameter. When a pump is selected the desired flow volume is known and the pump chosen must be capable of delivering this volume at sufficient back pressure. The total pressure drop through pipe work, hose reel, valves, meters etc. must not exceed the pump pressure.

Pump Room
For environmental and stock control reasons all lubricants should be stored in a separate room. High consumption oils should preferably be stocked in tanks with the pump being either wall or floor mounted. A filter should, if possible, be installed at the pump outlet to prevent contaminants reaching the device being lubricated and to protect vital system components. Compressed air should pass through an air-line filter which separates both condensate and foreign matter. Also an air-line regulator should be installed in the air supply to each pump so that each one can be regulated individually. Orion oil pumps are pre-lubricated at the factory and do not normally require an air line lubricator. Only in special circumstances, i.e. when the air is heavily polluted or contains excessive water should an air lubricator be used. Once installed a lubricator must continue to be used as the ”permanent” lubricant is washed away. Pumps are connected to the pipe work by means of hoses. Shut-off valves should be installed in both air- and lubricant lines for all pumps. This facilitates disconnection of the pump for maintenance purposes.

Connecting Hoses
Normal PVC or rubber hoses may be used. For oil, high pressure hoses corresponding to the pump working pressure must be used. These are made of steel reinforced rubber.

Pipe work
As stated under ”Pressure drop and pump selection” it is important that pipelines do not create excessive back pressure. Some general recommendations for oil follow. These apply to systems with 3:1 ratio oil pumps and hose reels with hose end meter and assume an oil flow of 10 l/min. for engine oil or 2 l/min. for gear oil with indoor pipe work and an ambient temperature of +20ºC.
Hydraulic, seamless tubes (DIN2391/C, St 37.4) are used with cutting ring couplings.

Pipe length (meter)	0-50	51-100	101-300
Pipe dimension (mm)	ø22x1,5	ø28x2	ø35x3

Hose Reels
The use of hose reels is highly recommended in order to create a safe and efficient work place. Hose reels may be positioned above or beside the work area and may be fixed to the ceiling, wall or floor, as appropriate. An adjustable hose stop enables the hose free length to be set to suit the working application. Hose reels are available for grease, water, detergents, air etc. as well as oil.

General Information

Information, Air operated Oil Pumps

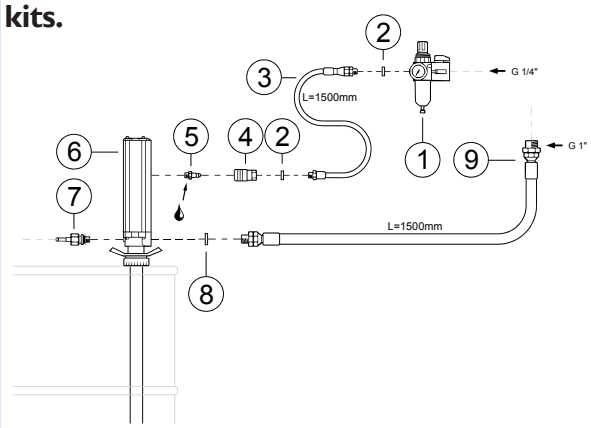
Installation Kits

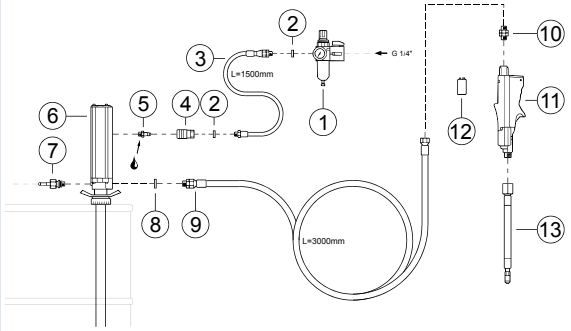
In order to assist our customers we have established kits for complete installation. This enables all the components required for a specific reel or pump installation to be ordered under a single part number. Some typical kits are illustrated below.

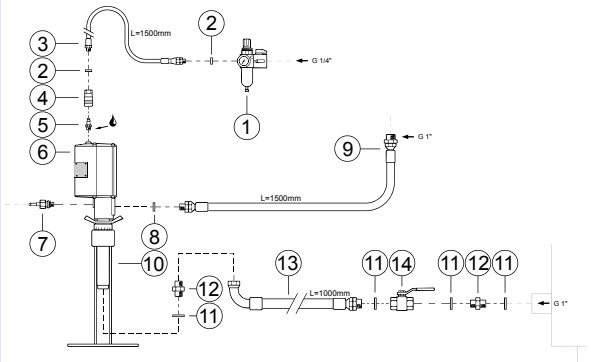
Oil Meters

Static oil dispensing systems may be equipped with in-line meters or hose-end meters.The latter incorporate a control valve. In-line meters can be equipped with impulse generators for connection to remote reading and control systems.
See the Monitoring section.

Examples of Pumps with installation kits.







Dosage Equipment

We supply dosage equipment for repetitive, and automatic, filling of e.g. engines, gear boxes, small oil containers, crankcases etc. This is connected to a pump via a meter and delivers pre-set volumes of lubricants (see the Monitoring section).

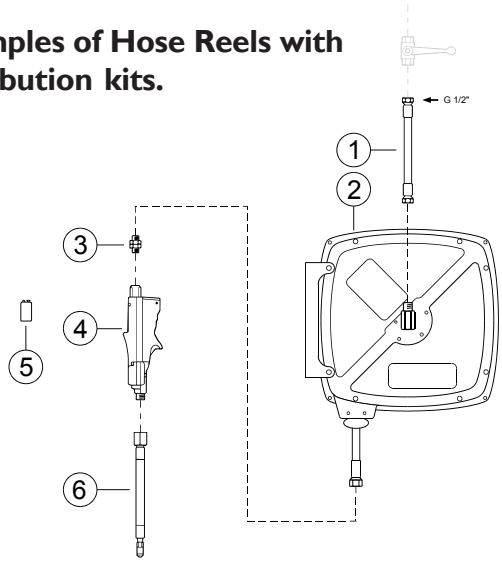
Remote Control

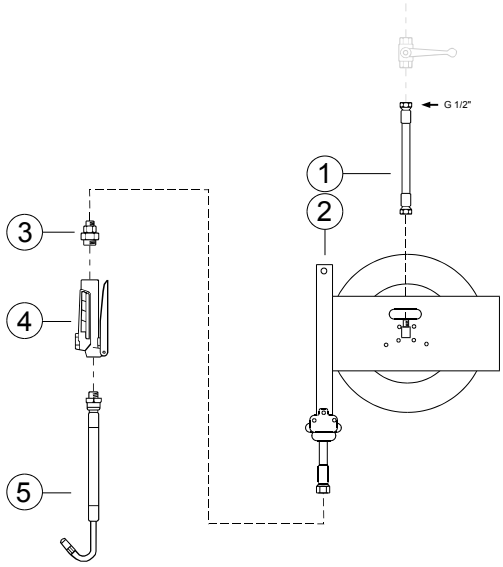
Loss of oil can depend on forgetfulness to report oil volumes used, difficult to read or smeared working orders. The problem can be eliminated by the installation of a Monitoring System.

Installation Components

For a full range of components and accessories required to install a complete oil system, refer to the Oil section and the Installation Equipment section.

Examples of Hose Reels with distribution kits.





Information, Hand operated and Mobile Oil Pumps

Oil Filling

Unlike grease which is injected in small quantities at high pressure, oil is generally transferred to gear boxes, containers etc. at low pressure and usually without the use of lubrication fittings.

Transfer Pumps

Hand operated transfer pumps, generally called drum pumps, are used for filling small, mobile containers. For the transportation of oil and subsequent dispensing at fixed installations, portable or mobile pumps or dispensers can be used. These may be manually or pneumatically operated.

Fitting Systems

Generally fittings are not used in oil dispensing. However for certain bearings they may be required and in such cases the button head type of fitting is preferred in order to minimise back pressure.

Hoses and Valves

Most pumps are supplied with a delivery hose and manual valve to control the flow of oil. Usually the control valves are fitted with an outlet pipe with check-valve (non-drip nozzle) to prevent dripping after closing. If fittings are to be used then the appropriate grease nozzle should be fitted to the manual control valve.

Mobile Air Operated Pumps

When larger quantities of oil need to be dispensed at various points around a site, then mobile dispensers equipped with air-operated pumps are an efficient solution. It is of course, essential that compressed air is available at the different dispensing points. The larger dispensers enable the original refinery drums to be used to minimise the risk of contamination and to avoid the need for transfer of the oil.

General Information

OriPac, Portable oil distribution system

OriPac

OriPac incorporates 75 or 150 litres container, an air-operated oil pump (pressure ratio 3:1), built-in filter (20 µm) and hose reel with 10 m x 1/2”-hose, complete with oil control valve.
OriPac 150L also includes an air supply hose reel, with 15 m 3/8”-hose.
For filling of the OriPac container from barrel or tank a vacuum pump and hose kit can be supplied, (see accessories on next page).

- Easily adaptable to a wide variety of applications due to the modular construction using standard “add-on” components.
- Complete and ready to use. No additional equipment needed.
- The containers are designed to fit Euro pallets, 800 x 1200 mm.
- Reinforced containers make it possible to use vacuum pumps for filling.
- Closed system gives an improved working environment and as a consequence reduces machine wear.
- Built-in 20 µm oil filter to eliminate contamination.

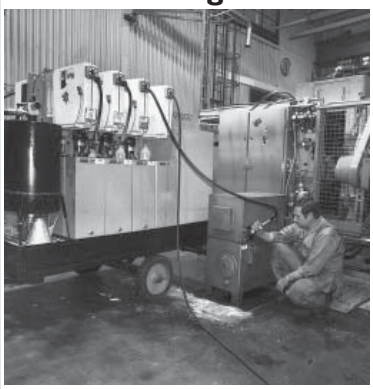
OriPac units can be combined, temporarily or permanently, and may also be mounted on Euro pallets. Mounting on pallets makes them easy to transport to the machines needing service. It is possible to use the container as a waste oil tank thus minimising the risks associated with contaminated oil causing increased wear and breakdown of machinery.

Oripac 150L

Disadvantages of uncontrolled oil handling

- Risk of confusion when several oil grades are used.
- Difficulty in using the economic advantage of bulk oil purchase
- Pollution of working environment.
- Increased risk of skin allergies for work force.
- Difficulty of recruiting personnel for maintenance jobs.
- Negative effect on the environment through risk of direct dumping into the sewage system.
- Waste oil must be collected and disposed of.

OriPac is designed for closed oil handling



The hose reels provide a working radius of approx. 10 meter and make it easy to dispense lubrication oil even where space is restricted. OriPac has a built-in oil filter that guarantees absolutely clean lubrication oil.

It’s simple to fill OriPac, because you only need one pump. No external pumps are necessary. OriPac makes it possible to store the lubrication oil in a separate oil store.
The possibility to purchase larger quantities of oil gives better economy.

OriPac can be transported on a small truck, but there are many alternatives. Choice of suitable transportation is of course one part of the customer adapted OriPac-solution!

Information, Air operated Grease Pumps

Pumps

There are two main types of grease pumps in our range; 55:1 and 75:1 pressure ratio (see below). The quantity of grease and pressure required determine which type of pump should be used. Pumps may be mounted directly in the grease drum or connected to a separate container. The size of drum or container to be used would depend upon the total lubricant consumption.

Grease Types

These pumps may be used with most pumpable greases.A follower plate should be used if the grease is of the non self-levelling type.

Some Important Pump Data

Pressure ratio

An air-operated, reciprocating pump consists essentially of two main parts: Air Motor and Pump Mechanism. Each has a piston of a certain diameter and the ratio is determined by dividing the effective area of the air-motor piston by that of pump mechanism piston. If the ratio is for example 55:1 and the applied air pressure 700 kPa the material pressure will be 55x700 kPa = 38,5 Mpa (385 bar).

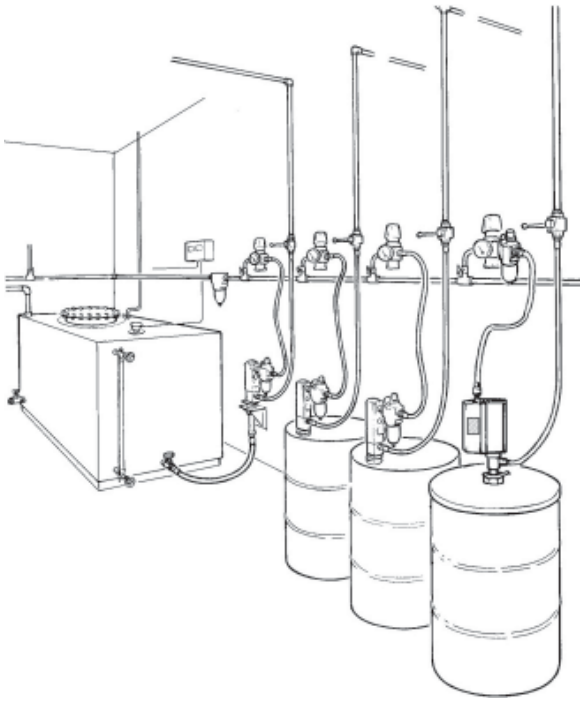
Pump capacity and back pressure

Each type of pump has a specific performance curve. In other words a pump is capable of delivering a certain volume at a given back pressure. If the flow volume increases, back pressure decreases and vice versa. Thus it is important not to use too small a pipe diameter. This is also important as grease is a soap/oil mixture which may separate at excessive pressures. In this catalogue pump performance data is usually shown as free flow capacity, i.e. without any associated back pressure from hoses or pipe work etc.

Pressure drop and pump selection

When grease is pumped through pipes or hoses a pressure drop is created as a result of friction. Pressure drop depends on velocity, shear stress, pipe length and presence of shut-off valves, pipe elbows etc. There are various formulae for calculation of pressure drop and the easiest way of compensating for pressure drop is to increase the internal pipe diameter. When a pump is selected the desired flow volume is known and the pump in question must be capable of delivering this volume at sufficient back pressure. The total pressure drop from pipe work, hose reel, valves etc. must not be greater than the pump pressure.

Pump Room



For environmental and stock control reasons all lubricants should be stored in a separate room. The drawing above shows a typical layout.
High consumption oils should preferably be stocked in tanks with the pump being either wall or floor mounted. The prime consideration regarding the storage of grease should be to prevent any risk of contamination from entering the drum since this will ultimately find its way into the components being greased.
Orion grease pumps are pre-lubricated at the factory and therefore do not require an additional air line lubricator. Should the air be particularly contaminated, or contain excessive water, then an air line lubricator may be used. Once installed a lubricator must continue to be used as the ”permanent” lubrication is washed away. Pumps are connected to the pipe work by hoses. Shut-off valves should be installed in both the air and lubricant line for all pumps. This facilitates disconnection of the pump for maintenance purposes.

Connection Hoses

Normal PVC or rubber hoses may be used for connecting the air supply. High pressure hoses corresponding to the pump working pressure must be used for grease. The hoses we supply are made of steel reinforced rubber.

General Information

Information, Air operated Grease Pumps

Pipe work

As stated under ”Pressure drop and pump selection” it is important that the pipelines do not create excessive back pressure. Some general recommendations are given below for use with vehicle grease lubrication systems in the pressure range from 30-50 Mpa. They apply to hydraulic, seamless tubing (DIN1630 St 52.4) used with cutting ring couplings.

Pipe length, (meter)	0-20	20-35	36-60
Pipe dimension (mm)	ø20x2	ø25x2,5	ø38x4

Hose Reels

The use of reels keeps the floor area free from hoses. The hoses hang above or beside the work area when not in use and can easily be pulled down when needed and retracted afterwards. Hose reels can be mounted on wall, ceiling or floor for easy access, without impeding normal work. An adjustable hose stop enables the hose free length to be set to suit the working application. Hose reels are available for oil, water, air, detergents etc. as well as grease.

Installation Kits

In order to assist our customers we have established kits for complete installation. This enables all the components required for a specific reel or pump installation to be ordered under a single part number. Some typical kits are illustrated below.

Safety Equipment

To prevent a pump from running dry a pressure switch can be installed in the grease pipeline. The air supply to the pump is shut-off, the pump stops and an alarm can be activated (see the monitoring section).

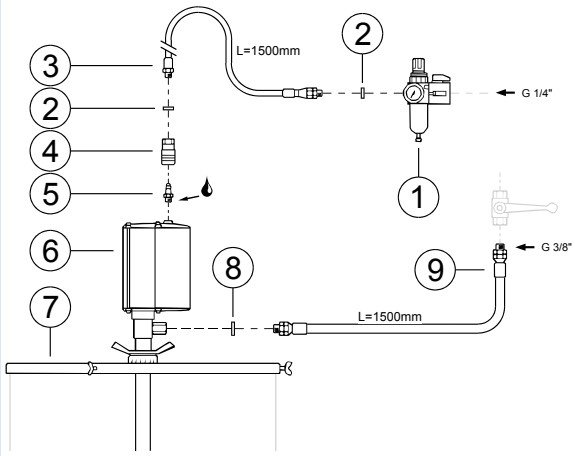
Dosage Equipment

We supply metering equipment for repetitive, and automatic, filling of small containers, bearing cups etc. This is connected to a pump via metering elements and delivers preset quantities of lubricant. (see the monitoring section).

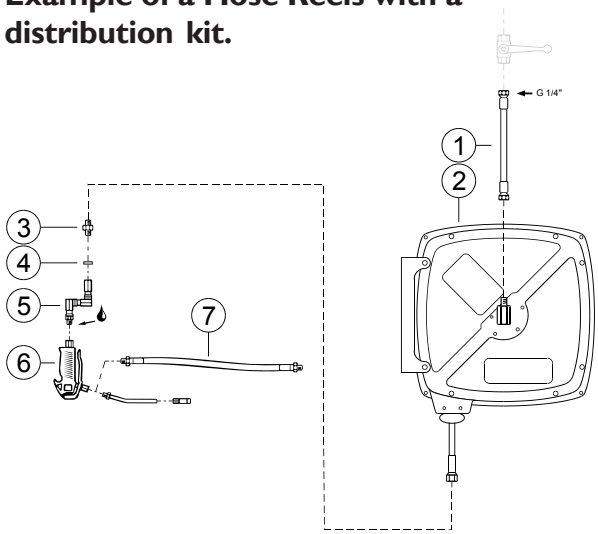
Installation Components

A full range of components and accessories required to install a grease system are shown in the Grease section.

Example of a Pump with an installation kit.



Example of a Hose Reels with a distribution kit.



Information, Grease Fittings and Pumps

How are bearings lubricated?

The simplest form of lubrication is carried out using manually operated pumps. Lubricant is forced through a fitting into a bearing by use of a high pressure pump or gun, e.g. of lever type. The larger the number of lubrication points the greater the risk of overlooking some of them during regular maintenance, especially if they are not easily accessible.
This risk can be partially eliminated with pipes routed from various lube points to a manifold block with the fittings easily accessible.
Pneumatically or electrically powered pumps ease the work of maintenance personnel, especially if the grease container is of the mobile type, being mounted on wheels or installed on a trolley.
Apart from the risk of omission there is the problem of delivering the exact volume of lubricant required and the right interval between lubrications at each point.
To overcome these difficulties centralized lubrication systems are becoming more widely used in industries.

Types of fittings

The three main types of lubrication fittings are shown below. Type 1 is the most common, types 2A and 2B are becoming less popular. Type 3 is normally used where lubricant requirement is higher, for example with construction machinery.

Nozzles and hoses

To connect the pump to the fitting various nozzles, shown below, are used. Types 1 and 3 grip on to the fitting whilst 2A and 2B need to be pressed against the fitting.
A rigid tube or a flexible hose may be used to connect the pump or grease gun with the nozzle. All the hose fittings illustrated employ taper threads in order to give a mechanical seal. Only use fluid sealants as thread tape or similar may enter the hose if incorrectly applied.

Hand pumps

Apart from the simple manual pumps there is also an air-operated grease gun, (see Section 2), and also larger, portable and mobile pumps.

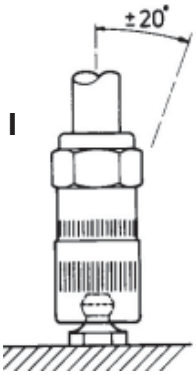
Loader pumps

Loader pumps provide a clean and convenient way of filling manual pumps. They also reduce the risk of contamination of the grease. Loader pumps can be mounted directly onto drums of different sizes and are equipped with filler valves. The lubricant is pumped through a filler adaptor into the manual pump.

Mobile, air-driven grease pumps

When large quantities of lubricant are needed at various locations the use of mobile air operated grease pumps is recommended. Compressed air must be available at each point where the mobile grease pump is to be used. By using a mobile grease pump in conjunction with the original refinery drums, the best possible cleanliness is achieved by avoiding the need for transfer of grease from one container to another.

1



Hydraulic Fitting

Principle

Jaws grip the fitting head and the seal may be mechanical or by rubber. The nozzle is ”twisted” off the fitting when lubrication is completed.

2A

Lub fitting, zerk type

Principle

The pump nozzle is pressed against the dome shaped head of the fitting thus providing a mechanical seal.

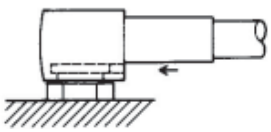
2B

Lub fitting, flush type

Principle

The pump nozzle is pressed into the fitting - mechanical seal.

3



Button Head Fitting

Principle

The nozzle grips the flanged head of the fitting when hooked or thrust into position - metallic or rubber seal.

Information, Compressed Air Equipment

Compressed air as an energy source

Compressed air is especially suitable as a power source for pumps. In our field it is especially suitable for piston pumps for oil and grease.

Air-driven pumps

Traditionally, reciprocating piston pumps for grease and oil are air-operated. Air motors have a special feature not available with electric motors. Air operated pumps stall when a certain predetermined back pressure is reached in the system. No further control equipment is needed. When the back pressure decreases pump speed increases and conversely, when back pressure increases speed decreases. This in itself is a benefit, especially in centralized lubrication. Connected pipe work, hoses, meters etc. are not exposed to sudden surges in pressure. Air-driven pumps do no present any explosion hazard. Electric pumps require pressure switches, accumulators and/or by-pass valves which open when the set pressure is reached. Compressed air is available in most service stations and factories and installation of an air pipe work is a straightforward matter.

Pipe work systems

The design of the pipe work system depends on many factors, size of the building, type of work to be carried out and number of outlets for example. Generally pipes are fitted to ceilings or walls. Ring mains are advisable, especially in larger systems.
If an air dryer is not installed condensed water separators, preferably with automatic drain facilities, should be installed at all low points. Branch pipes should always be connected to the top of the main pipe and drainage should of course be from the underside.

Pipe dimensioning

The dimensions of the main air-line are determined by the air volume required and the permissible pressure drop, which is in turn affected by pipe length. Your local compressor dealer will usually assist you with the calculations. As a rule, pumps etc. should not be connected to a feed pipe of lesser diameter than the inlet thread of the unit. The size of the main line in e.g. pump rooms depends on total air consumption and frequency of use.

Shut-off valves

A shut-off valve followed by an air-line filter/regulator should be installed in each branch line. Brass ball valves are recommended.

Air-line filters

Air from the compressor is in principal clean. However, contamination can enter the system from pipe walls, line components etc. Thus equipment connected should be protected against wear and damage by an air-line filter. Different degrees of filtration can be achieved by using filter elements of varying porosity. Particles smaller than the rated porosity can not be separated but will pass through. Compressed air always contains water vapour. If not drained it will settle and may cause corrosion or malfunction of connected components.

Air-line regulators

Equipment connected to ordinary air-line will often work at a variety of pressures. Excessive pressure may lead to malfunction, increased air consumption and abnormal wear. On the other hand insufficient pressure will cause low efficiency and inadequate power. Thus the main supply pressure is set higher than the necessary working pressure and is reduced by means of an air-line regulator/ reducing valve.
A regulator consists essentially of a diaphragm controlling a valve. The diaphragm is balanced by secondary pressure and a spring. As long as the secondary pressure is equal to or greater than the set pressure the valve remains closed.

Air-line Lubricators

Air-operated devices do need some form of lubrication if they are to work efficiently and with the minimum of wear and breakdowns. This can be achieved by adding oil to the compressed air in small drops by means of an air-line lubricator or by prelubrication with certain types of grease during manufacture. An air-line lubricator creates an oil film on wear surfaces, which also helps to prevent corrosion. Today most air-driven equipment is ”permanently” lubricated with grease and requires no further lubrication under normal conditions. Nevertheless it is important to note that once an air-line lubricator is used this must continue as the original grease is washed away.
Tests have shown however that an oil film does increase the efficiency and working life of equipment.
An air-line lubricator operates at full working pressure and high air velocity. It creates relatively large oil droplets which do not travel long distances. Thus air-line lubricators should be installed close to the equipment being lubricated.

Quick-couplings

are very convenient for connecting air hoses to pumps.

Blow guns

A blow gun is used for cleaning with compressed air. Quick-couplings and adapters facilitate quick change of tools and appliances used with air-lines.

Hose reels

The use of hose reels keeps the floor area free from hoses. A hose for example fitted with a blow gun hangs above or beside the working area when not in use and can easily be pulled down when needed, and retracted afterwards. Hose reels can be mounted on ceiling, wall or floor for easy access, without impeding normal work. Hoses are fitted with a hose stop which can be positioned according to the length which should hang outside the reel casing. There are hose reels available for oil, grease, water, detergents etc. as well as for air.

Tyre inflator

Tyre inflators are used to inflate and check tyre pressures. They consist in essence of a valve with a dial connected by hose (or hose reel) to an air line system.