# TRYCOMP DRYER AR

## SANAYİ TİCARET LİMİTED ŞİRKETİ


Refrige Air Dryer AR Series User Manual

## INTRODUCTION

Thank you for purchasing TRYCOMP compressor and wish you to enjoy using it.

The product you bought is completely smooth and safe if all product maintenance instructions are followed. Therefore, please read this manual carefully and follow all instructions.

You will find instructions related to mounting, operation, periodical control and maintenance in this manual. It is developed to ensure your effective and long usage of the machine.

The first point to be taken into consideration while installing, during operation or service/maintenance should be safety. So, occupational safety is always the most important point in any case. Please take necessary safety measures provided in this manual carefully.

**Whenever you apply to our services, please specify the type and production number of your compressor.**

## GENERAL SAFETY MEASURES

### GENERAL SAFETY MEASURES

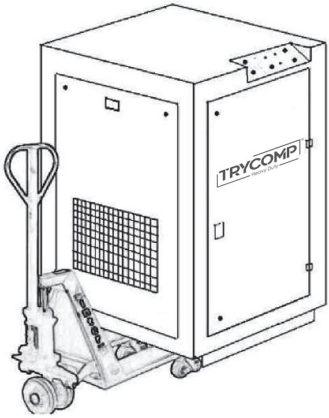
- ✓ Ensure that properties of the compressor will meet your needs. If necessary, get support from our authorized service and sales personnel.
- ✓ Have your compressor installed and operated by the authorized service.
- ✓ Ensure that operation environment of the compressor is clean and adequately conditioned.
- ✓ Ensure that there is no leakage in your air installation. Otherwise, your compressor will over-operate to meet your needs. This will both shorten the life your compressor, and increase maintenance and power costs.
- ✓ Operator using the compressor should now occupational safety applications and act in accordance with all occupational safety instructions and regulations.
- ✓ Any modification and amendment to the compressor should be made within information and confirmation of Filo Compressor. Otherwise, Filo Compressor will not be responsible for all faults arising from amendments.
- ✓ Do not use compressed air of the compressor on living creatures for cleaning or any other purposes.
- ✓ Do not use or inhale air of the compressor as direct ventilation. Special filters are required for this application. (Please see related regulations.)
- ✓ Do not change settings of your compressor. If you need to change, please contact with Filo Compressor or its authorized service.
- ✓ Use spare parts confirmed by the manufacturer.
- ✓ Do not keep any flammable substance around your compressor.
- ✓ Ensure that cables connected to electricity are not left outside.
- ✓ Use safety fuses and cables which are suitable for machine power.
- ✓ Do not operate the compressor without closing covers. Ensure that main switch of the machine does not provide electricity during maintenance, service and failure.
- ✓ In case of any extraordinary situation such as oil leakage, vapor, excessive vibration and noise etc. in your compressor, switch off your compressor immediately, cut off the electricity and notify authorized service. Do not intervene yourself.
- ✓ Ensure that there is no spare part, tools, cleaning products etc. inside or outside the compressor after service, failure, repair or maintenance processes.
- ✓ Ensure that moving parts in the compressor do not touch anywhere, and necessary protection parts are mounted.
- ✓ Always keep B&C or A,B&C class fire extinguisher around the compressor.
- ✓ Do not use air tanks for any other purposes than air storage.
- ✓ Do not do welding or any other works on the air tank with cutting or sharp objects. If necessary, these works should be performed within confirmation of the factory.
- ✓ Examination and pressure test of air tanks should periodically be done each year by considering regional rules. If it

is not specified in the rules, test pressure should be 1,5 times more than operating pressure of the air tank.

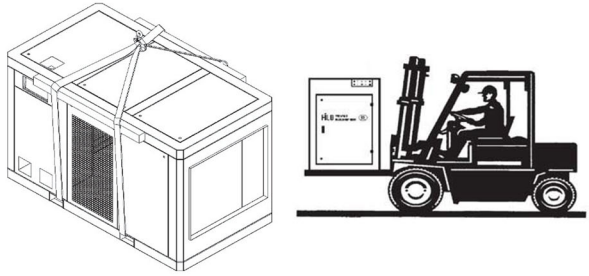
- ✓ Send the compressor air used for cooling to related special waste collection companies. Do not pour into environment and sewerage system.
- ✓ In case oil used in the compressor contacts with skin, wash with plenty of water. In case of eye contact, wash your eyes with warm water, and see your doctor.
- ✓ People who are in the environments or rooms which have more than 80 Db(A) volume level should wear protective earphone.
- ✓ If statements and especially safety instructions in this manual differ from legal applications in the region where the compressor is used, both instructions in the manual and legal applications should be followed.

## SAFETY IN CARRYING AND LIFTING

- ❖ Use vehicles like pallet truck, forklift, workshop hoist, crane while transporting and replacing the compressor.




- ❖ On no account carry or replace the compressor by using manpower. Consider the risk of injury and mutilation risk.
- ❖ Ensure that the compressor is in well-balanced position during lifting or carrying. If necessary, rope and take safety measures to prevent slipping.
- ❖ If your compressor is over tank, take necessary measures to ensure that the tank does not rotate due to its cylindrical shape.
- ❖ Ensure that the rope or vehicle you are going to use to lift the compressor is capable for lifting the compressor before starting lifting process.
- ❖ During lifting and carrying, ensure that there is nobody under or near the compressor against tumble-down risk.
- ❖ Do not lift the forklift excessively, and move it slowly.
- ❖ If you are going to lift the compressor on or with a pallet, ensure that pallet is properly mounted under the compressor.
- ❖ If weight of the compressor excesses capacity of forklift, please use caraskal or workshop hoist.
- ❖ The Operator who will do the lifting work should be authorized in the vehicle that he uses.
- ❖ Considering that connection points may be loosened during transportation, connection points (nuts, bolts etc.) of the compressor should be re-controlled, and tightened if necessary.



*Compressor Carrying*

❖ Ensure that the ground of the area where the compressor will be placed is load-bearing enough to hold the compressor

**MEASURES TO BE TAKEN DURING INSTALLATION**

- The compressor should certainly be lifted and grounded according to the occupational safety rules. Loose or moving parts should certainly be tightened or stables before lifting process. Before it is moved, ensure that it is in off position and connections to the power source are completely cut off.
- While connecting the compressor to air or electricity, clean unnecessary out-of-gear connection elements or similar parts, if any.
- Ensure that cables and hoses are used at right measurements for electricity and air connections.
- Ensure that you provide the cleanest and coolest possible for the compressor. Ensure that air to the compressor is not less than +2 °C.
- Ensure that heated air disposed from the compressor is disposed from the operation environment through an air duct. Direct this duct to the outside of the compressor room through the as shortest route as possible.
- Make the connection between the compressor and installation through a flexible hose. Shrinks and tensions which may occur in the external installation should not be reflected to the compressor.
- Compressor runs and stops automatically according to air need of the system. Necessary warning and

- alarms should be kept in the area where the compressor is placed to prevent this risk, and compressor operator should be adequately informed.
- If more than one compressor are used for air need of the system, manual valves should be used between the compressors for insulation of each compressor from the system. Non-return valves are not suitable for this process.
- The surface where the compressor will be installed should have less than 5° slope. If the compressor should be installed on a surface with more than 5° slope, you should prepare a smooth surface under the compressor to carry it.
- Ensure that grounding is made properly and adequately for the compressor, and a fuse is put between the main power supply and compressor to protect the compressor against short circuits.
- If deemed necessary, you may put a rubber pad between the compressor and surface. This application will help the compressor operate more silently.
- Place the compressor in order not to be affected from hot outlet of any other machine.
- For periodical maintenances of the compressor, ensure that there is adequate working area around the compressor.
- Environment temperature of the area where the compressor will be installed should be maximum 40°C.

**MEASURES TO BE TAKEN BEFORE OPERATION**

- All air hoses to be used should be at appropriate sizes and in necessary pressure resistance. Before you replace any air hose or change the air line, ensure that there is no pressure in the system.
- Do not operate the compressor in an environment where there are flammable and combustible substances.
- Do not operate the compressor at lower or higher pressures other than limits determined by the manufacturer.
- Always keep the cabin covers closed. Before you perform any work inside the cabin, ensure that compressor is in the off position and pressure inside the compressor tapped and main electric switchgear is off.
- Do not remove or replace the noise insulation materials.
- Do not leave any conductive materials on our around the compressor.
- Check whether there is any leakage.

## MEASURES TO BE TAKEN DURING MAINTENANCE

- ✓ Maintenance and repair works should only be performed by authorized person or people.
- ✓ Only use original spare parts.
- ✓ Do not perform any maintenance work (except visual control) unless you shut down the compressor and main electric switchgear. Before you start working on the compressor, ensure that the compressor is completely cooled and internal pressure is zero.
- ✓ Before you remove any part in which there is pressure, ensure that connection of air system and compressor of the factory (or facility) is completely cut off and compressed air remaining in the compressor is completely tapped.
- ✓ In any case do not use flammable substances to clean the compressor. Avoid using cleaning solutions containing substances which are hazardous and poisonous to inhale.
- ✓ During maintenance, prevent any foreign objects from falling or entering into the open parts of the compressor components. It is highly recommended to keep intakes of outward parts of the components covered during maintenance to prevent this.
- ✓ Do not do heavy works causing to high temperature such as welding around the oil system of the compressor. If necessary, ensure that whole of the oil tank is cleared of oil. Remember that if any work is performed on the compressor out of factory's information, the compressor will not be covered by warranty.
- ✓ DO NOT PERFORM ANY WORK ON THE OIL TANK.
- ✓ Before you engage maintained compressor, control operating pressure, heat and time settings. Also ensure that control and automatic/manual shut-down equipment of the compressor operate properly.
- ✓ During maintenance, ensure that necessary gloves, protective glasses and similar equipments are worn to protect eyes, hands and necessary parts of the body in accordance with occupational safety regulations.
- ✓ During oil change, protect the environment against spark and similar flammable elements. During process, clean oil poured or splashed to the environment immediately.
- ✓ Ensure that electric cables are constantly in proper conditions. Replace cables which are cracked, cut or damaged to ruin insulation. Replace worn, colored or rusted connection component.

## MEASURES TO BE TAKEN FOR AIR TANKS

- There are values on the labels located on the air tank such as maximum pressure value of the tank. Compare these values with your system needs. Or you may contact with the authorized service regarding this issue.
- Air tanks are used to store the atmospheric air. Do not use for any other purposes, or fill with any other gas.
- Do not excess the operating pressure specified on the tank.
- Do not any welding work on the tanks. If necessary, welding should be made under surveillance of the authorized service or factory.
- Do not keep any sharp tools on the tank, or do processes to thin the wall thickness of tank plate. Otherwise, it will not be covered by warranty and you will jeopardize occupational safety. Therefore, it is absolutely dangerous and prohibited to do any work on the tank.
- The surface on which the tank will be placed should be capable of carrying the full tank.
- Air tanks are then subjected to a test pressure at 1,5 times more than maximum production pressure after they are manufactured. And air tanks should periodically be controlled every year by considering local rules. You may contact with your authorized service to get information about periodical examination.
- Water accumulates under the tank due to moist air accumulated in the air tanks. This water should be daily disposed by opening the valve under the tank. If water is not disposed, you may cause excessive moist air to come into your system. Even if you have dryer, it may not completely dry due to excessive moist air. Therefore, it may cause to quick corrosion of your sensitive machinery in your enterprise. So, it is highly important to dispose the water accumulated in the tank daily.
- Corrosion ration is minimum 0,5 mm according to operating pressure of the tank.
- Weld points on the air tank should be regularly checked. In case of thinning, contact with your authorized service.

**In the event that warnings specified in this manual are not followed, warnings made are not fulfilled, necessary care is not given while installing, operating, maintaining and repairing products, it may cause to damage to the products, operator may get injured or even die. Filo Compressor is not responsible for these damages**

## SYMBOLS AND LABELS

**Warning Label**

**DANGER OF FAILURE**

Machine may break down. When necessary, notify authorized service.

**DANGER OF ELECTRICITY**

Shut down all installation before operating the machine due to electrical installation.

**HEAT DANGER**

Serious burns may occur during touch due to surface temperature. Do not work without protective clothes.

**DANGER OF INJURY**

Arms and legs may get injured or shear off due to rotating parts.

**WATCH OUT**

Do not intervene the machine without taking protective measures.

**USE EAR PROTECTOR**

Due to the possibility of loud noise in the machine, do not approach the machine without ear protector.

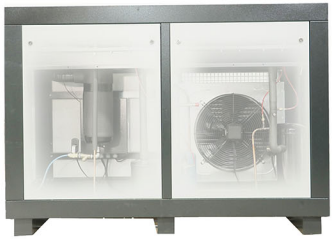
**READ THE USER MANUAL**

For any intervention that you will make on the machine, read the user manual.

**NO UNAUTHORIZED INTERVENTION**

It is prohibited to intervene the machine except authorized people.

INFORMATION ABOUT THE PRODUCT




| Model | Air Quantity ($M^3$/Min.) | Connection Diameter | Max. Working Pressure | V | Hz | Cooling Gas |
|---|---|---|---|---|---|---|
| AR 12 | 1,2 | ½ " | 13 BAR | 220 V | 50 Hz | R 134 A |
| AR 16 | 1,6 | ¾ " | 13 BAR | 220 V | 50 Hz | R 134 A |
| AR 22 | 2,2 | ¾ " | 13 BAR | 220 V | 50 Hz | R 134 A |
| AR 30 | 3 | 1 " | 13 BAR | 220 V | 50 Hz | R 134 A |
| AR 45 | 4,5 | 1 ½ " | 13 BAR | 220 V | 50 Hz | R 134 A |
| AR 60 | 6 | 1 ½ " | 13 BAR | 220 V | 50 Hz | R 134 A |
| AR 85 | 8,5 | 2 " | 13 BAR | 220 V | 50 Hz | R 134 A |
| AR 120 | 12 | 2 " | 13 BAR | 380 V | 50 Hz | R 134 A |
| AR 160 | 16 | 2 " | 13 BAR | 380 V | 50 Hz | R 134 A |
| AR 200 | 20 | 2 " | 13 BAR | 380 V | 50 Hz | R 134 A |
| AR 300 | 30 | DN 100 | 13 BAR | 380 V | 50 Hz | R 407 C |
| AR 400 | 40 | DN 100 | 13 BAR | 380 V | 50 Hz | R 407 C |
| AR 500 | 50 | DN 100 | 13 BAR | 380 V | 50 Hz | R 407 C |

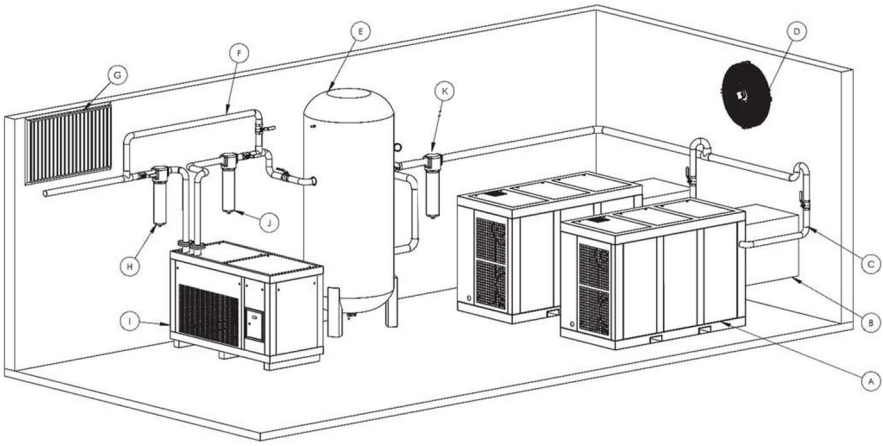
| Model | Diamensions (mm.) | | | Total Weight (Kg) |
|---|---|---|---|---|
| | Width | Length | Height | |
| AR 12 | 380 | 520 | 520 | 38 |
| AR 16 | 380 | 520 | 520 | 40 |
| AR 22 | 380 | 520 | 520 | 42 |
| AR 30 | 440 | 700 | 710 | 64 |
| AR 45 | 480 | 810 | 810 | 80 |
| AR 60 | 480 | 810 | 810 | 90 |
| AR 85 | 700 | 1000 | 920 | 150 |
| AR 120 | 700 | 1050 | 1250 | 200 |
| AR 165 | 800 | 1300 | 1240 | 300 |
| AR 200 | 800 | 1950 | 1250 | 350 |
| AR 300 | 900 | 1950 | 1250 | 500 |
| AR 400 | 950 | 2000 | 1360 | 550 |
| AR 500 | 1000 | 2100 | 1250 | 600 |

## INSTRUCTIONS FOR INSTALLATION AND MOUNTING

For measures to be taken during installation, mounting and carrying processes, read the title of safety measures specified on the top of this manual carefully.

Before you mount or operate the compressor, fulfill leakages in your system certainly. Otherwise, you not only cannot receive a complete effectiveness from your compressor, and consume lots of electricity.

Connection systematic of the compressor, tank and dryer system are indicated below.




*General Layout Plan*

**A -** COMPRESSOR

**B** – COMPRESSOR VENTILATION OUTLET

**C** - FLEXIBLE HOSE

**D** – ROOM HOT AIR OUTLET

**E** – AIR TANK

**F** – BY-PASS LINE

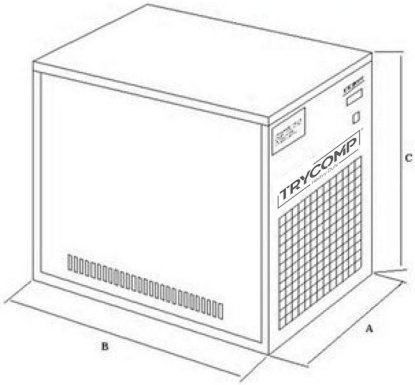
**G** – FRESH AIR INLET

**H** – OUTLET FILTER

**I** – DRYER

**J** – INLET FILTER

**K- WATER TRAP**




| MODEL | BOYUTLAR (mm) | | |
|---|---|---|---|
| | A | B | C |
| AR 12 | 380 | 520 | 520 |
| AR 16 | 380 | 520 | 520 |
| AR 22 | 380 | 520 | 520 |
| AR 30 | 440 | 700 | 710 |
| AR 45 | 480 | 810 | 810 |
| AR 60 | 480 | 810 | 810 |
| AR 85 | 700 | 1000 | 920 |
| AR 120 | 700 | 1050 | 1250 |
| AR 160 | 800 | 1300 | 1240 |
| AR 200 | 800 | 1950 | 1250 |
| AR 300 | 900 | 1950 | 1250 |
| AR 400 | 950 | 2000 | 1360 |
| AR 500 | 1000 | 2100 | 1250 |

SELECTION OF PLACE

Trycomp Air Dryer must be protected to directly sun heat, extreme temperature, rain and humidity. It must assemble to a well-ventilated, cool and free of dust environment.

The environment temperature ,at which air dryer operating, must be max. 35ºC. The radiator full with dust easily by operating in a dusty and near to painting systems and these cause efficiency loss and failure of air dryer. The failures which can be for these reasons are out of warranty range.

SAFETY

It must be dragged the plug when making an operation at air dryer( service, failure etc.). Please make the upkeeping according to informations in the manual. You can use the 'ERRORS AND MEASURES' section at failure states, please contact with your service when you cant measure the errors.

ASSEMBLING

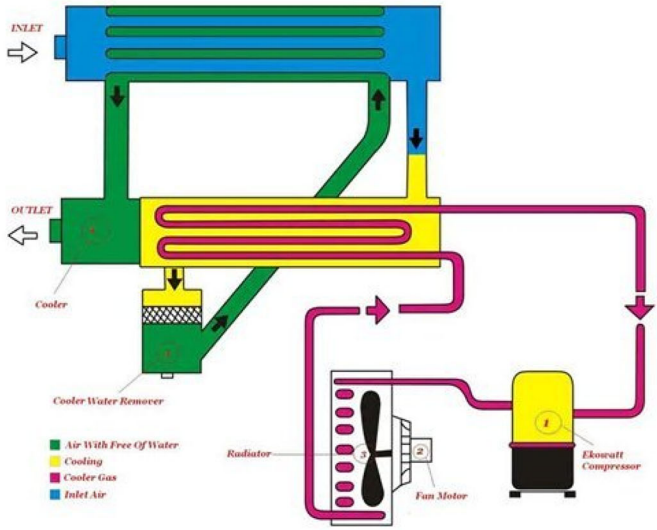
Trycomp air dryer must be assembled on smooth floor and high from floor( for floods).

The ventilation holes at front and back of the dryer must not come closer to the wall etc.

Electric connection must be grounded. Otherwise the failures that occurs are out of warranty range.

İt must be careful to the directions of inlet and outlet. Must be by-pass connection and for this must be used spherical valve.

SYSTEM DIAGRAM




PERIODIC UPKEEPING

Trycomp air dryers decrease the time and Money loss to minimum level with its structure which needs less upkeeping.

This upkeeping must made once a week. If the environment which the air dryer operate is dusty and dirty then this upkeeping must be decreased once at2-3 day. The cleanness must made by compressed air and when the dryer doesnt operate.

Automatic emptying valve( selenoid valve) and dirty remover must be cleaned once a month. When this operation made electricity and airflow must be cut off.

ERRRORS AND MEASURES

1- AIR DRYER DOESN'T OPERATE
Drag the electric plug and check the fuse at back of the machine. Change the fuse.

2- AUTOMATIC EMPTYING DOESN'T OPERATE
Cut off the air , check the dirty remover and selenoid valve if necesary clean them.

3- AIR DRYER IS OPERATING BUT NOT FUNCTIONING
Check the indicator.The situation must be +3°C. Please call your service in excessive different situations.

WARRANTY,SERVICE AND SPARE PARTS

All of the parts are in two years warranty of Trycomp Air Dryer according to assembling and production errors. Our company cant be responsibled about the breakdowns and damages which can be when you dont match the informations in this manual, your product will be out of warranty range.

* We have all the spare parts in our stocks for you not mistreated.

WARRANTY CONDITIONS

1- Warranty time starts from the date of delivery and be valid one years.

2- The warranty contains all of the parts of the products

3- When the product breaks down in warranty time then the repair time adds to warranty time. The repairing time of the product is maximum 30 days. This time starts from the announcement date for failure of product to authorized service, if not seller of product, dealer agent or importer of the product.

4- If the product breaks down with material failures, workmanship failures or assembly failures in warranty time then we repairs without any payment called workman payment, the payment of the parts which be changed or in any other called name.

5- Our company cant be responsibled about the breakdowns and damages which can be when you dont match the informations in this manual, your product will be out of warranty range.

6- The product's

a) Passing over the max. time limit for repairing
b) The establishing of uselessness of the product by occuring same failure more than twice or different failures more than four times in warranty time.
c) The establishing of repairing of product is impossible with arranging a report by one of the seller, dealer, agent, or importer of the product.

In these situations the product is changed without any payment.

7- Can be applied to the general directorship of be protected consumer rivalry of Ministry of industry and trade for any problems which can occur about this document.

## PLACING OF THE COMPRESSOR

The surface on which the compressor will be placed should be capable of carrying the machine. The surface should have minimum 500 kg/m$^2$ area in average and surface slop should be maximum 5°.

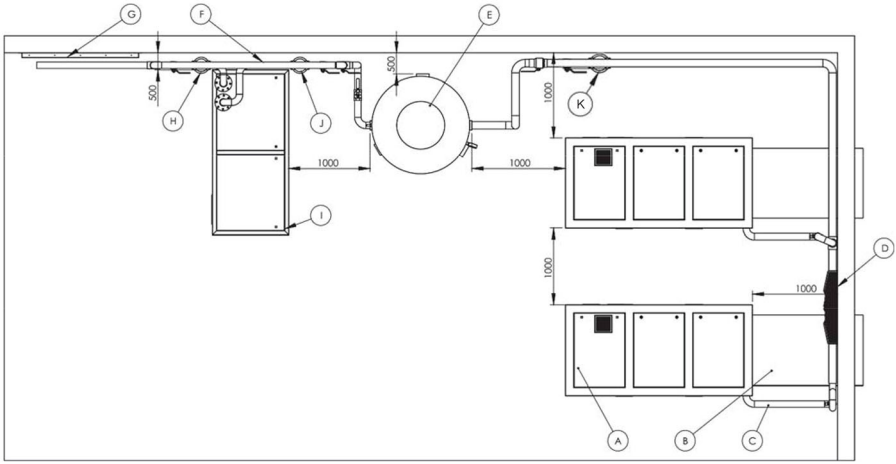
The compressor should be placed near to the center of air distribution network in order to minimize air and pressure losses.

Elbow, valve and any connections should be used at minimum level in order to decrease pressure drop.

The environment should be cleared of moisture and corrosion and measures should be taken against any fire danger.

Air outlet line of the compressor should not be regulated as connection. Flexible hoses which are resistant against desired pressure or compensator should be used.

The compressor should be placed minimum 1m away from the wall and any other machinery or installation. This ensures that your compressor can cool itself easily, and it can effortlessly be intervened during maintenance and service.




*Compressor room minimum placement dimensions*

Sis Choose the diameter of the pipe in your system installation according to the capacity of your compressor and dryer. If necessary, you may contact with our authorized service and factory.

The compressor is manufactured according to room conditions. If you use the compressor in outer environment, please consult authorized service of Filo Compressor.

## VENTILATION OF THE COMPRESSOR ROOM

The room where the compressor is operating in should be constantly ventilated in order to ensure that the compressor can operate properly. The gap required for this air flow corresponds to two times more than the panel filter located on the compressor. You may ensure this by using variable fans such as axial fan. To ensure this, a fan with the same capacity of the fan used on the compressor is suitable.

Placing the compressor around walls and/or installations at least 1 m distance will make air flow easier. In addition, ceiling should be 1,5 m higher than the length of the compressor.

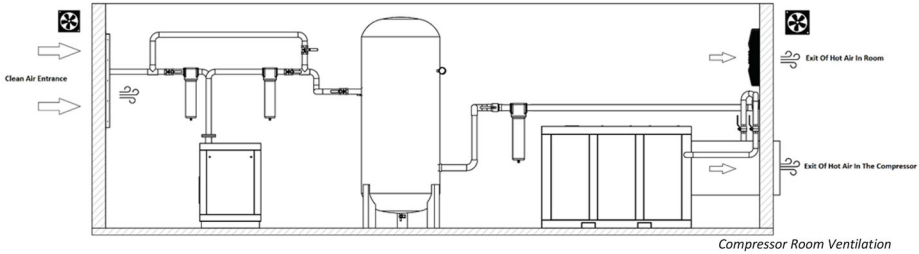
In case room temperature decreases below 2°C, do not operate the compressor. If necessary, heat the room.

Maximum room temperature should be 40°C. If necessary, take measures to decrease the temperature.

Do not direct the hot air from the compressor radiator directly to the room. Direct to external environment from the closest section through equipment such as fume hood, air duct. If you have to direct to the room, ensure that the compressor is well ventilated to prevent temperature increase. Temperature increase should not exceed 7-10°C.

Clean air inlet and hot air outlet should not be on the same wall.

While ventilating the compressor room, ensure that dust and harmful gases will not enter into the room. If necessary, filter should be mounted on the intake headwalls.




*Compressor Room Ventilation*

Compressor hot air outlet should be done over the compressor. In such cases, compressor should be designed to emit over the fume hood to be mounted.

## PRESSURE AIR LINE

### Pressure Decreases and Pipe Diameters

In pressure air distribution systems, minimizing pressure and air leakages, a highest condensation system which is possible with air distribution system if there is no dryer are very important in terms of reliability and economization of the system.

A good installation investment at the beginning of the enterprise will amortize itself in time and move into profit. Big pipe and connection elements of the air installation that you have done for your enterprise should be designed in consideration that your compressor capacity will not be suitable for your system in time. In case air delivery is not sufficient, the capacity of pipe line may not be sufficient when you desire to enlarge the compressor that you will buy or current compressor. When air line established according to the first compressor is to be replaced and you may desire to enlarge your compressor, cost will be higher. Therefore, it will be more economic that installation is made according to the capacity increase that you will apply in the future, at the stage of installation.

Other matter to be cared is the absolute pressure that pneumatic devices used in your system desire. Pipe line and diameter of the installation should be determined by calculating longest pipe line length permitted for a certain pressure decrease between the place where the compressor will be installed and devices to be used.

While air installation is made, it should be avoided from using downcome elbow and/or connection elements. Wide-angle connection elements should be used as much as possible. While using connection elements which will create resistance such as valve, full flow valves should be used.

Air flow and pressure changes due to air temperature according to the place where there is main air installation. Temperature will vary in pipes from one building to another. Since temperature will decrease, condensation amount will increase. In such cases, condensation at the entrance of other building should be separated.

Pipe line should be isolated to prevent water arising from condensation in outdoor main air installation from freezing.

Pipes to be used for installations should be black or galvanized. It is recommended that pipes with low corrosion resistance should not be used. In pipes with more than 65mm internal diameter, welded connections should be made instead of gear connections.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | 8 Bar | | | | | | | | | |
| **Debi ($m^3$/dk)** | 0,8 | 1,1 | 1,6 | 2,6 | 3,1 | 3,6 | 5,1 | 6,2 | 7,2 | 8,1 | 9,6 | 12,4 | 13,8 | 16,5 | 19,5 | 23,2 | 27,4 |
| **3/4"** | 194 | 115 | 52,0 | 24,0 | 17 | 13 | | | | | | | | | | | |
| **1"** | 615 | 365 | 163 | 75,0 | 54,0 | 41,0 | 22,0 | 15 | 12,0 | | | | | | | | |
| **1 1/4"** | | | | 298 | 215 | 164,0 | 86,0 | 60,0 | 46,0 | 37,0 | 27,0 | 17,0 | | | | | |
| **1 1/2"** | | | | | | 350,0 | 184,0 | 128,0 | 97 | 88,0 | 57 | 36,0 | 29 | 21 | 16,0 | | |
| **2"** | | | | | | | | 419,0 | 318,0 | 256,0 | 187,0 | 116 | 96,0 | 67,0 | 51,0 | 37,0 | 27,0 |
| **2 1/2"** | | | | | | | | | | | 688,0 | 428 | 352,0 | 253,0 | 186,0 | 135,0 | 99,0 |
| **3"** | | | | | | | | | | | | | | | 414 | 300 | 221,0 |
| | | | | | | | | | **10 Bar** | | | | | | | | |
| **Debi ($m^3$/dk)** | 0,65 | 0,85 | 1,35 | 2 | 2,5 | 3 | 4,3 | 5,1 | 6 | 6,7 | 8,1 | 10,8 | 11,2 | 13,5 | 17 | 20,5 | 24 |
| **3/4"** | 420 | 256,0 | 109,0 | 53,0 | 36,0 | 25,0 | | | | | | | | | | | |
| **1"** | | | 344 | 167,0 | 110 | 79,0 | 41,0 | 30,0 | 22,0 | 18,0 | 13,0 | | | | | | |
| **1 1/4"** | | | | | 440 | 315,0 | 167,0 | 118,0 | 88,0 | 71 | 50 | 30,0 | 28,0 | 20,0 | | | |
| **1 1/2"** | | | | | | | 346,0 | 253,0 | 188,0 | 152 | 107 | 63,0 | 59,0 | 52,0 | 27 | 20,0 | 14 |
| **2"** | | | | | | | | | | 499 | 351 | 207,0 | 193,0 | 137,0 | 89 | 63 | 47 |
| **2 1/2"** | | | | | | | | | | | | | | 503 | 329,0 | 232 | 174,0 |
| **3"** | | | | | | | | | | | | | | | | | |
| | | | | | | | | | **13 Bar** | | | | | | | | |
| **Debi ($m^3$/dk)** | 0,7 | 1,1 | 1,7 | 2,1 | 2,6 | 3,5 | 4,3 | 5,3 | 5,6 | 7 | 9 | 9,4 | 11 | 14 | 16,5 | 20 | 24 |
| **3/4"** | 466 | 202 | 90,3 | 61 | 41 | 24,0 | 16 | | | | | | | | | | |
| **1"** | | | 286,0 | 194,0 | 130 | 76,0 | 52,0 | 35,0 | 32,0 | 21,0 | | | | | | | |
| **1 1/4"** | | | | | 522,0 | 301 | 206,0 | 140,0 | 126 | 84,0 | 53,0 | 49,0 | 36 | 24,0 | 17 | 12 | |
| **1 1/2"** | | | | | | | | 299 | 270 | 179,0 | 112 | 104,0 | 78,0 | 50,0 | 37,0 | 26,0 | 19,0 |
| **2"** | | | | | | | | | | | | 368,0 | 340,0 | 254,0 | 163,0 | 120,0 | 84 |
| **2 1/2"** | | | | | | | | | | | | | | 599,0 | 442,0 | 310,0 | 221,0 |
| **3"** | | | | | | | | | | | | | | | | | |

**Maximum Pipe Length Table**

**Note: Indicates maximum average meter plain pipe line is needed for Table 0,1 bar pressure decrease**

Excessive pipe elements in your facility will create extra pressure decreases in your installation line for a certain pressure decrease. Therefore, you should take the result obtained from the table below and pressure decreases that connection elements indicated in following table into consideration. For each connection element to be used in the table, pressure decreases to be created are indicated in meter.

| CONNECTION ELEMENTS (STEEL) | EQUIVALENT PIPE LENGTH (M) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | BORU ÇAPI | | | | | | | |
| | ¾'' | 1'' | 1 ½'' | 2'' | 3'' | 4'' | 5'' | 6'' |
| BALL VALVE (F.H.-F.O.) | 0,2 | 0,2 | 0,4 | 0,3 | 0,4 | 0,3 | 0,5 | 0,6 |
| BALL VALVE (S.H.-F.O.) | 4,9 | 2,4 | 2,2 | 5,0 | 2,6 | 4,1 | 3,3 | 12,1 |
| BALL VALVE (S.H.-F.O.) | 1,0 | 1,5 | 2,5 | 3,0 | 4.5 | 6 | 8 | 10 |
| 45° ELBOW | 0,1 | 0,2 | 0,2 | 0,3 | 0,5 | 0,6 | 0,8 | 0,9 |
| 90°(MITER) ELBOW | 1,0 | 1,5 | 2,4 | 3,0 | 4,8 | 6,0 | 7,5 | 9 |
| R=2D ELBOW | 0,2 | 0,3 | 0,5 | 0,6 | 1,0 | 1,2 | 1,5 | 1,8 |
| R=D ELBOW | 0,3 | 0,4 | 0,6 | 0,8 | 1,3 | 1,6 | 2,0 | 2,4 |
| T (PLAIN OUTLET) CONNECTION | 0,3 | 0,5 | 0,8 | 1 | 1,6 | 2,0 | 2,5 | 3,0 |
| T (90° OUTLET) CONNECTION | 1,0 | 1,5 | 2,4 | 3,0 | 4,8 | 6,0 | 7,5 | 9,0 |
| REDUCTION 2D→D | 0,3 | 0.5 | 0.7 | 1 | 2 | 2.5 | 3.5 | 4 |
| RING LINE SUPPLY | 1,2 | 1,5 | 2,4 | 3,0 | 4,8 | 6,0 | 7,5 | 9,0 |
| SUSPENSION BEAM SERVICE LINE | 2,0 | 2,5 | 4,0 | 5,0 | - | - | - | - |

d= internal pipe diameter

R== distance between the pipe center and angle center

F.H.= Full hole

S.H.= Small hole

F.O.= Fully open

**For example:**

If we choose 1" installation for 1,6 m3/min 8 bar air pressure, we see in the table that there is maximum 163 m plain pipe length. Assume that we put 5 full hole fully open ball valves, 6 90° elbow, 2 TE (90°) connection in the installation.

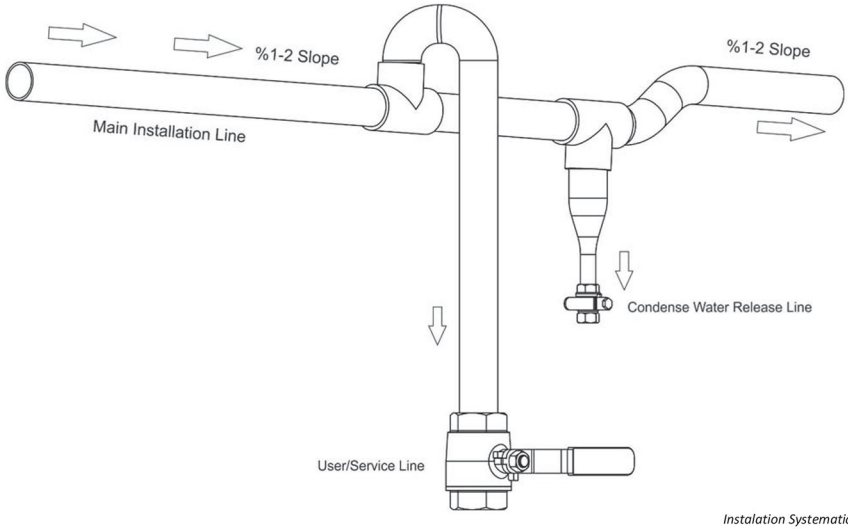
We find that 163 m - (5x0,2 +6x1,5+2x1,5)=150m.

When we use the connection elements that we accept above in a way that maximum pressure decrease will be 0,1 bar, we should make maximum 150 m line length.

**Pressure Air Line Design**

Pressure air lines should be as short and plain as possible, pipe diameters should be at least at a size of compressor outlet. It should be considered that pipe lines which are shorter than compressor outlet may crease a pressure difference. Delivering air obtained from the compressor directly to the tank will reduce pressure decrease. Connection elements used (valve, elbow, etc. ) should be used as little as possible. Establishment of the line in a way to be easily reached later enables to intervene easily in case of any leakage or outflow. Therefore, do not make access difficult by furnishing surfaces with wall, concrete etc.

While designing air lines, slope of pipe lines should be 1-2%. This slope to the condensation points placed on certain locations of the line ensures that water condensed within the line accumulates at condensation points and is discharged easily from the system through these points. Many companies ignores this slope and makes design while installing. Whether you have dryer in your enterprise, creating this slope is both cost efficient and very important to send water away from the system.




*Instalation Systematics*

Wide and/or angled elbows to be used in the air line or main and side lines will reduce turbulence of the air. This will also minimize pressure decrease which will arise.

Creating by-pass line on the dryer part of the pressure air line ensures that system can meet your air need without stopping during failure or maintenance.

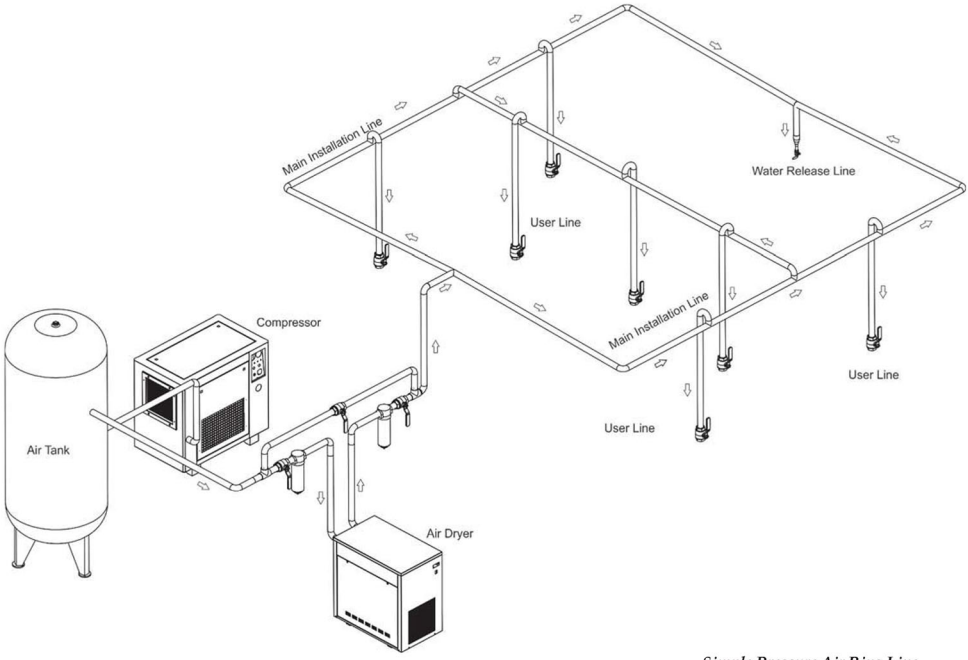
Supporting your line with clips at certain intervals makes the system plain and prevents it from yielding.

Connection of user and service lines over the main lines (in a suspension beam form) will prevent particles such as condensed water, dust in the line from entering into your devices.

Passing main lines from the closes place to the user lines will reduce pressure decrease. and prevent using hoses unnecessarily.

You may choose to establish ring line in order to benefit from the air lines effectively. Since ring lines distribute pressure equally, they will ensure that each point is at equal pressure. If this method is chosen, compressor should be places to be suited to the center of the ring line.

You may see the ring line as following image simply.




*Simple Pressure Air Ring Line*

**Air Leakages in the Facility**

Prevention of leakages and outflows in pressure air installations will both increase your system efficiency and is important in terms of energy efficiency. Even little leakages which can be ignored correspond to very high amount when monthly or annually costs are considered. Small investments which are the first thing to be done for fulfillment of leakages will amortize itself in a very short time.

Leakages usually occur in connection elements such as valve, hose. In addition, neglected installation will mainly cause to air leakages. We strictly recommend annual and regular control and maintenance for efficiency in your installation and decrease in your costs.

Following formula indicates delivery loss arising from leakages in your system roughly.

$$L = \frac{Q \times T}{(T + t)}$$

*T= Time of carrying with load(sec)*

*t= Time of carrying without load(sec)*

*Q= Compressor capacity(l/sec)*

*L= Total leakage amount(l/sec*

To apply the formula, it is expected that all equipment of the system operating with air is closed, compressor is operated and it is propped up after passing to the load. When the compressor is propped up, pressure will decrease due to system leakages. Time until the compressor press to the load again is noted. After it passes to the load, the time until it is propped up is noted. Data obtained by formulas above are recorded.

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