DETROITAIR

COMPRESSED AIR INNOVATION THROUGH TECHNOLOGY

SR-5.5VSD and SR-7.5VSD

MAINTENANCE MANUAL

220 Volt Series

We do our utmost to ensure the integrity and correctness of the manual, however, we reserve the right to continuous research and improvement of our products .The design and specification of product(s) are subject to change without prior notice.

PREFACE

This operation manual describes the safety precautions, structure and functions of all systems and components, as well as the operation and maintenance methods for the SR Series Screw Air Compressors designed by Detroit Air.

The user must read the operating manual carefully. Only after a thorough understanding of the structure and functions of all systems and components, as well as the safety precautions, can the operator start operating and maintaining the unit. In addition to the descriptions in the manual, if the user fails to follow the operation and maintenance instructions, dismantles and/or modifies the machine, or uses parts not specified by the manufacturer, the user shall lose any warranty.

There is no catalogue for the illustrations of parts and components given in the manual. If you want to order the parts from our company, please consult the parts manual for related units. It is noted that SR is continuously researching and improving its products and the contents of the parts manual may vary from the actual products after a certain period. Before you order the parts, please confirm with the service (parts) department of our company.

This operation manual gives a general description of the motor, electrical system and maintenance. However, if you have any questions before operating and maintaining the unit, please contact the local dealer or our service department.

Standard Warranty Clause

Detroit Air provides the following warranties on the manufacturing process and material defects for the screw air compressor manufactured by itself in the conditions of normal operation, maintenance, repair and service.

SR-5VSD / SR-6VSD / SR-7.5VSD Series Screw Compressor unit: Within 12 months after commissioning. This is taken as the purchase

date. Proof of purchase required.

Compressor air-end returned for repair: Within 24 months after date of purchase.

Spare parts (except for three filters and oil): Within 12 months after commissioning.

For products not manufactured by us, the warranty clause of the original manufacturer shall be directly applied in feasible situations. Within the warranty period, your Specialist Rotary (SR) or Detroit Air (DA) agent must be informed in writing within 7 days after the defects are discovered, and details must be attached for identification, including the ex-factory serial number, model, proof of purchase, etc.

The single responsibility assumed by DA in the warranty clause is to repair or replace the products or parts which are proven defective according to the evidence provided. If necessary, DA can ask the user to return the defective products or parts to the factory for inspection.

DA holds the warranty period of 3 months or the remaining warranty period for the repaired products, parts or replaced parts in the conditions of normal operation, maintenance, repair and service.

The warranty clause is not applicable to the following responsibilities and DA assumes no responsibility or obligation:

A. Indirectly caused, incidental or special losses or damages.

B. Damages caused due to the normal wear, abnormal operating conditions, neglect or incorrect operation of equipment, poor storage conditions or transport related damages..

C. Failure to follow the stipulations in operation instructions, regulations or other special sales conditions.

D. Labour costs, losses or damages caused due to wrong operation (running), maintenance and the repair performed by the maintenance personnel authorised or not authorised by the Buyer.

E. Improper use of products.

Please request a copy of the full warranty policy from your local DA agent should you require further details.

NOTICE

The warranty policy document is available for download from the detroitcompressors.com website.

Safety Warning Signs

In this manual, the operations and items related to safety are identified for their risks, and they are classified based on the severity of machine damages and the level of injuries caused due to the operations.

They are represented and described in boldface with the following signs respectively.

WARNING *Regards the unsafe factors which may cause property loss or injuries.*

CAUTION *Regards the unsafe factors which has the hot surface to cause property loss or injuries.*
OR
Regards the important installation, operation and maintenance information.

Safety Tips

Please read the following information carefully before operating and using the compressors

⚠ WARNING

There are risks present in the compressed air and compressed air system!
If you fail to follow the operating procedures and safety precautions in the operation manual, there may be accidents and injuries to yourself or others.
Before operating and maintaining the compressors, you must carefully read and understand the operating manual.

Detailed instructions are given for the safety precautions which must be followed to operate the machine safely. Clear warning labels have been attached to the places with associated risk and the places requiring careful operation.

1. Before any operations and maintenances on the unit, you **must** read and understand the operation manual.
2. Never operate the unit above the rated air discharge pressure, otherwise an overload will occur and the motor may be damaged
3. Before the unit is delivered, individual protection controls shall be set in a good condition. It is **never allowed** to modify or remove the control components of the unit. Otherwise, severe equipment damages and injuries will be caused.
4. When the unit is in operation, do not remove or loosen any pipeline elements, joints or connectors and/or the safety valve. The unit is pressurised which can cause severe injuries.
5. Prior to any maintenances on the unit, it **must** confirm that:
    - The unit is stopped;
    - The internal pressure in the unit has been discharged;
    - The power supply is shut off.
6. A damp cloth and/or high-pressure air can be used to clean the unit. Do not use water directly.
7. Failed parts/service parts must be replaced immediately when due, otherwise unexpected loss may occur.

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Chapter 1. Safety Rules

1. General rules

The following safety measures and precautions are not an exhaustive list; they are only a part of the items which have to be followed when operating the compressors and compressed air system.

⚠ WARNING

If you fail to follow these safety measures, injuries, property loss or compressor damages will be caused.

Only trained and authorised persons are allowed to operate the compressor. Prior to any operations, the operation manual shall be carefully read and its contents shall be comprehensively understood. If you fail to follow the operation and maintenance procedures and safety rules in the operation manual, accidents and injuries are possible.

It is never allowed to start the unit in an unsafe condition; if problems occur to the unit, don't attempt to start the unit. The power supply shall be shut off and the significant sign shall be given to prevent the person not knowing the condition from wrongly operating.

The compressed air is hazardous. Only when the compressed air is totally discharged from the entire compressor system, can maintenance and service be performed on the unit.

Don't change the internal structure and control mode of the unit, unless written permission from DL is given.

The daily service and maintenance shall be performed well. The unit shall be carefully inspected every day to check if the conditions, such as leakage, loose, damaged and poorly adjusted parts, or missed parts and components are present. If a problem is discovered, it shall be handled in time.

2. Common precautions

1) Before repairing the machine, all power supplies and any possible long-distance control devices shall be shut off, locked and demarcated.

2) If the unit is stopped, don't assume that it is safe. As the unit has the automatic starting and stopping devices, the starting is possible at any time.

3) The compressor is designed to compress the general air. Other gases or steams are not allowed to approach the inlet of the compressor or to flow through the compressor.

4) The safety relief valves with proper size shall be installed in the system and shall be located before the suction valve, heat exchanger, restriction orifice or any potential blockage points. If no safety relief valve is installed, damages to the compressor or compressor parts or an explosion may be caused.

2. Common precautions (cont.)

5) Don't change the pressure setting of the safety relief valve, limit its function, or replace it with the plug. Otherwise over-pressure will be caused to the compressor parts or system, resulting in injuries and property loss.

6) Don't use a plastic or rubber pipe, or the brazed connecting pieces in the compressed air system. Incorrect piping will lead to leaks and possible system damage.

7) Don't use the combustible or toxic solvent to clean the air filter or any components.

8) When the compressor is operating, don't remove any protection covers or outer panels. Don't repair any parts in the unit when the machine is operating.

9) When the compressor is operating, it is important to observe operating status and fault reports, ensuring the normal operation of the compressor.

10) Follow the stipulations in the maintenance and repair procedures and periodically inspect all safety devices, ensuring that they are in good condition.

11) Never remove or disable a temperature probe or a catastrophic failure may result.

12) Do not inhale or play with compressed air, it is toxic and can cause injury.

13) Follow the maintenance and repair procedures and use the proper lubricating oil.

14) When the unit is operating, don't open the cover in order to avoid noise or scalding caused by the hot surface of the unit.

3. Pressure releasing

1) Open the safety valve at least once a week and inspect whether blockage or other damages are present. It is not allowed to pull the handle of the safety valve when the unit is pressurized.

2) Confirm that the installed pneumatic equipment, air hose, pipe fittings, valves, filters and other accessories are in good condition and the operating pressure during operation is not above the rated pressure.

3) Before opening the oil filling cap of the oil-gas separator tank, the machine shall be stopped and one must ensure that no pressure is present in the tank.

4) When removing any pipe fittings, valves, and oil drain plugs, as well as the parts and components, such as oil filters and the oil-gas separator, one must ensure that no pressure is present inside the system.

5) Don't operate against any air vents, regardless of the outlets of air supply pipes or the air vents of compressors or pneumatic equipment.

6) Only the compressed air with a pressure below 30 psi (2.1 bars) can be used for dust removal. During the actual operation, the protection equipment, such as the body panels, must remin in place. Compressed air with pressure above 3 bars can be used for maintaining the air filter element.

4. Operating components

- The hands, arms and other body parts, as well as clothes shall not touch the operating components, such as coupling, fans, etc.
- After the protection covers at the fan, coupling or other components are removed, don't operate the compressor.
- During operation, especially in a place near a high-temperature surface or operating components, no open clothing shall be worn and long hair must be tied up.
- The door on the unit shall be closed unless it is for maintenance.
- One must ensure that no one is inside the unit when starting it.
- The lubricating oil shall be filled only after the machine is stopped.
- It is possible that the capacity regulating valve or pressure switch requires adjustment during operation. During this adjustment, don't touch other operating components and pressurised bodies. Other adjustments shall be made only after the machine is stopped.
- Ensure the machine is clean and any external surface of and around the machine is oil and dust free.

5. High-temperature surface, sharp corner and sharp edge

1) Don't touch the hot oil, lubricating fluid and high-temperature surface, as well as the sharp edges and corners.
2) Any part of the body shall not face the air vents of compressors and cooling fans.
3) Appropriate protective equipment, such as gloves or glasses, must be worn when operating or maintaining the machine.

6. Toxic and irritant substances

1) If the compressed air produced by the compressor is directly used for respiration or food processing, then severe injuries or death may be caused. The compressed air used for the above purposes must meet the stipulations in the local government pressure equipment regulations or ISO-Class air quality standards.

6. Toxic and irritant substances (cont.)

2) Avoid skin contact and swallowing of the lubricating oil (fluid). If skin contact is made inadvertently, then it shall be cleaned out with soap water. If lubricating oil is accidentally swallowed, the person must be taken to the doctor or hospital immediately.

7. Hoisting

- Prior to hoisting, one must carefully inspect individual connectors to check if cracks occur at the base welds; if cracks, deformation or corrosion occur to the parts and components, and if the fasteners are loose.
- One must ensure that the selected hoisting equipment, hangers and riggings have a good performance and are able to withstand the weight of the unit. If the weight of the unit is not clear, it can weigh the unit or consult the local agent before hoisting.
- The hoisting hook shall have the safety detent which can securely catch the lug or hoisting chain.
- The unit shall be pulled with the rope to prevent the hoisted unit from turning or swinging.
- Don't hoist the unit when a strong wind is present.
- After the compressor unit is hoisted, no one can stand under it.
- After it is hoisted, the hoisting operator can't leave the site.
- The unit should be hoisted to a sufficient height instead of an excessive height.
- When the unit is lowered, the supporting face shall have the proper hardness and strength.
- Before transportation, the base shall be fixed with iron nails or bolts.

Chapter 2. Introduction To System Functions

1. Introduction

The SR 220V Series Screw Compressor unit is a positive displacement type, single-stage oil-injected double-screw compressor. The motor is connected to the male rotor of the compressor air-end via the coupling to drive the compressor rotor. The compressor air-end has been excellently engineered to provide economical efficiency and reliability.

The unit consists of the compressor air-end, air inlet system, air discharge system of the compressor, cooling and lubricating system, airflow adjustment and control system of compressor, instrument control panel. All instruments, indicators and control devices are centralized on the control panel for convenient operation; all components are installed on a high-strength steel frame for a long-term stable and reliable operation.

An illustration of a model is quoted in the manual for the description of the system. For the structure of other models, please refer to the quoted illustrations in the manual, as the structures and functions of individual systems are similar. To maintain the best operating status of your purchased or applied screw compressor unit, please read the details in Chapter 5 Maintenance and Service Procedures of the operation manual. If you have problems which are not mentioned in the operation manual, please contact the local agent or the After-Sales Service Department of DA.

Fig. 2-1 Introduction to the unit system

2. Compressor air-end and compression cycle

The compressor air-end (main machine) is a very important component in the screw compressor unit. The carefully designed single-stage oil-injected cooling and lubricating screw compressor can provide the stable compressed air without airflow ripple.

In the casing of the compressor air-end, there is a pair of parallel rotors (male rotor and female rotor) with spiral slots, which are finely processed. The air inlet and outlet are provided in the diagonal positions of the outside box at both ends of the rotors. The threaded slot of the female rotor engages with the threaded teeth of the male rotor, and it is driven by the male rotor. During operation, the air flows into the casing via the air inlet at the power input end. When the rotor turns through the edge of the suction hole in the casing, part of the suctioned air is trapped in the enclosed volume which is formed by the female and male rotors and the casing. The closed volume of threaded slots change with the engaging movement of the female and male rotors, and consequently the continuous operation cycle for suction, closing, compression and discharge will be realised. The compressed air will be discharged via the air discharge port and then enter into the oil-gas separator.

3. Air inlet system

The function of the air inlet system in the compressor unit is to provide clean air to the compressor. It includes **an air filter and suction valve.**

4. Air discharge system of compressor

The air discharge system of the compressor unit mostly consists of an **air discharge pipe, oil-gas separator, minimum pressure valve, safety valve, after-cooler**, etc.

When the compressor is operating, the air inside the closed volume of the threaded slot is continuously compressed and the heat generated in the air during the compression is absorbed at the same time by the lubricating oil which is continuously injected into the closed volume of the threaded slot. When the closed volume of the threaded slot is reduced to a certain value (designed value), the closed volume of the threaded slot is connected to the specially designed air vent, and the mixture of oil and air is discharged from the air vent. As the pair of rotors in the screw compressor have several threaded slots and the rotating speed of rotors is very high, the air discharge of the unit is continuous.

The mixture of oil and air discharged from the compressor air-end enters the oil-gas separator. Most oil is separated from the air by the catching, collision and direction change in the separator. The formed oil drops accumulate to the relative large particles which will fall into the lower part of the tank through gravity. Only some very fine oil mist is left. When the air flows through the filter core of the oilgas separator, the oil mist will congeal to the fine oil drops on the fibers of filter core by collision, dispersion and catching. The oil drops congealing on the outer fibers of the filter core will fall to the oil level in the lower part of the cylinder through gravity, while the oil drops congealing on the inner fibers will finally be collected at the bottom of the filter core. A secondary oil return pipe is led from the bottom of the filter core and connected to the suction chamber of the compressor. The oil accumulating at the bottom of the filter core will flow back to the suction chamber of the compressor under the action of pressure differential. The throttle orifice is installed in the oil return pipe. The throttle orifice is confirmed by testing and will ensure both stable oil return and minimum air loss. Therefore, modification is not allowed unless permitted by Detroit Air.

4. Air discharge system of compressor (cont.)

A minimum pressure valve is installed in the downstream of the outlet of the oil-gas separator tank and its function is to ensure that a minimum tank pressure will be established in the tank when the compressor is normally operating, ensuring the normal operation of the lubricating oil circuit. When the unit is stopped or unloaded, the minimum pressure valve acts as a check valve to prevent the return flow of compressed air. The unsealing pressure of the minimum pressure valve is 4.0±0.34bars (60±5psi), which has been pre-set before leaving the factory. The compressed air after oil-gas separating only contains several PPM (usually below 3PPM) lubricating oil. After the separated compressed air flows through the minimum pressure valve, it will enter the after-cooler for cooling down and can then be used by the users.

A safety valve is installed on the cylinder of the oil-gas separator tank. When the pressure inside the tank exceeds the setting pressure of the safety valve, the safety valve will automatically open. The unsealing pressure safety valve is set before delivery. Please do not change it by yourself. A temperature sensor is additionally installed in the air discharge pipe. When the discharge temperature of the compressor exceeds 130ºC (248°F), the unit will automatically stop.

The screw-plug of the oil filling port in the oil-gas separator is specially designed and can release any remaining pressure from the tank when it is removed. The oil sight glass installed on the cylinder is applied to inspect the level of lubricating oil in the tank. When the machine is not operating, the normal oil level shall be located between the center of oil sight glass and its top position.

⚠ WARNING

- *When the compressor is operating or pressurised, do not remove the nuts, oil filling cap and other parts. Before maintenance, the machine should be stopped and all internal pressure should be released.*
- *Do not replace the safety valve with different pressures or models.*

5. Cooling and lubricating system of compressor

The lubricating oil in the system has the following three main functions:

A) It acts as the coolant. The injected lubricating oil can absorb a large amount of the heat generated during compression, and consequently control the temperature rise of compressed air.

B) It fills the leakage clearances between the rotor and outside box and between rotors, reducing the internal leakage of compressed air and increasing the efficiency of the compressor.

C) The lubricating oil film is formed between rotors. It allows the male rotor to directly drive the female rotor and can absorb some mechanical noises at the same time.

Generally, the cooling and lubricating system of the compressor consists of an **oil-gas separator, oil cooler, oil filter, oil pipes etc.** For the air cooling model, the assemblies, such as the thermostatic valve, cooling fan, etc., will be added.

5. Cooling and lubricating system of compressor (cont.)

The **thermostatic valve** is a direction valve with a temperature sensing device. The lubricating oil leaving the oil-gas separator will flow through the thermostatic valve before it enters the cooler. The valve will sense the temperature of the lubricating oil discharged by the oil-gas separator and automatically control the flow of the lubricating oil through the oil cooler, to keep the compressor operating normally between the temperatures of 80º~115ºC (176º~239ºF).

The **oil filter** consists of a filter base and replaceable spin-on filter core (depending on the model size, there may be two or three filter cores) with a built-in by-pass valve which will ensure the unblocked oil circuit and normal operation of the compressor in case the filter core is dirty or the viscosity of oil is too high.

The **oil cooler** is an important part of the cooling and lubricating system.

Air cooling type oil cooler: the cooler has the aluminum plate-fin type structure. The cooling fan forces the air to flow through the fins of the cooler and cool down the lubricating oil in the pipes of the cooler. To maintain the normal operation of the compressor, the radiating fins of the cooler shall be kept clean and the maximum operating ambient temperature of the compressor shall not exceed 43ºC. During the daily maintenance, the surface of the cooler shall be periodically cleaned. If necessary, high-temperature pressurised water (not above 3.5 bars) can be applied to wash it.

6. Air flow adjustment and control system of compressor

This series of compressor unit is equipped with a standard automatic control system: after pressing the start button, when the pressure of the air tank is lower than 6.5bar (94psi), the compressor starts to run to 8bar (116psi) and stops running; when the pressure of the air tank is lower than 6.5bar (94psi), it starts running again.

For models with simple configuration, the operation of the machine has three main states: A. working conditions of starting; B. working conditions of loading operation; C. working conditions of unloading and stop. See the following descriptions for the detailed meanings.

Generally, the air flow adjustment and control system of the compressor unit has been set before leaving the factory, so the user does not have to adjust it. If an adjustment is necessary, refer to the contents of the **Section 7 Setting Procedure in Rated Working Conditions, Chapter 4 in the operation manual.**

WARNING

Do not think that if the compressor is not operating, then the maintenance operation on it will be safe, as the compressor may be in the "waiting" status and can start at any time. Please strictly follow all related stipulations in "Maintenance and Service Procedures".

CAUTION

The related documents are attached when the unit leaves the factory. To avoid mis-operation, please refer to the electrical schematic diagrams attached to the machine for the maintenance and service of the electrical system.

6. Air flow adjustment and control system of compressor (cont.)

The standard drive motor is the IEC closed type with the protection level of IP54/IP55, and the maximum ambient temperature for operation is 43oC (110oF). The standard motor is not to be used in locations where conditions can be described as saline, corrosive, dirty, moist/wet, or flammable.

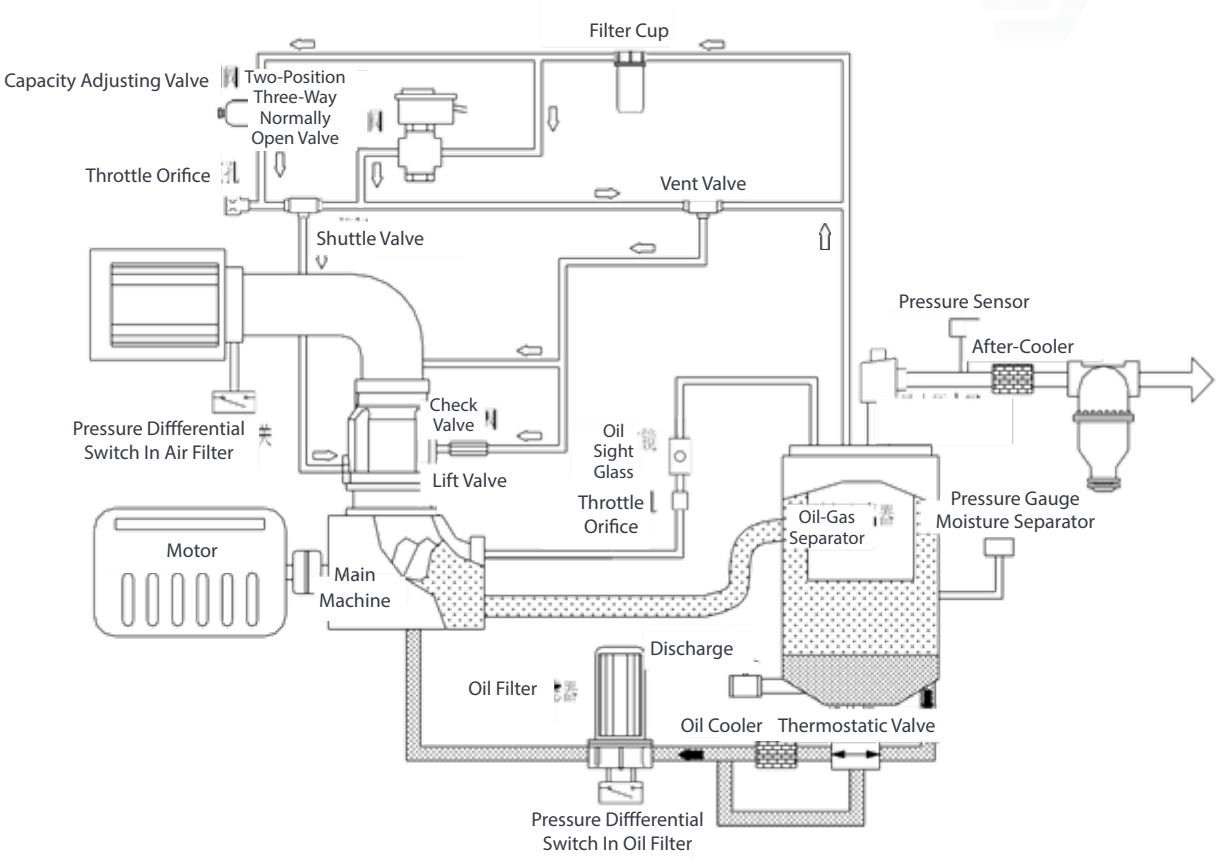


Fig. 2-5

This series of standard compressor unit adopts a 220V / 60Hz frequency converter. A transformer in the control box reduces the supply voltage to 24 volts for the secondary control loop to operate. The controller mainly includes a switch, temperature sensor, pressure sensor, emergency stop switch, etc.

The temperature switch of the cooler fan (AC220V) is connected in series to control the start and stop of the fan according to the programme settings.

6. Air flow adjustment and control system of compressor (cont.)

The controller can ensure that the unit cannot be started or automatically stopped under abnormal conditions, so as to protect the safety of the compressor host and motor. Its functions mainly include: compressor exhaust temperature shutdown protection, current overload protection, voltage relay, safety valve, etc. In addition to the safety valve, other automatic protection devices can shut down the unit when the unit is running. Each control device is described in detail below.

- Protection against discharge temperature of compressor – if the discharge temperature of the main machine reaches 130'C (266'F), the controller will send out the command to cut off the motor's power supply to stop it.
- Current overload protection – If the compressor unit operates at overload due to some reason and the operating current of the motor exceeds the setting, the controller will send out the command to cut off the motor's power supply to stop it.
- Phase sequence protector – The machines of this series are equipped with a phase sequence protector. When the machine leaves the factory, the wiring of the motor has been configured in good condition. If the wrong phase sequence, phase loss and over-/ under-voltage occur in the wiring for power supply by user, then the unit can't be started to ensure the safety of compressor unit.
- Safety valve - **See Section 5 of Chapter 3.**

⚠ WARNING

High voltage will cause severe injury and death. Please cut down the power supply before maintaining the electrical apparatus or opening the electrical control box.

⚠ WARNING

Do not remove, bridge, or damage the high-temperature safety switch. If the safety function is not provided, severe injuries, death and property loss may be caused. If the machine is shut off due to over-high temperature, please contact the qualified service persons immediately.

Chapter 3. Installation and Acceptance

1. Installation, acceptance and keeping

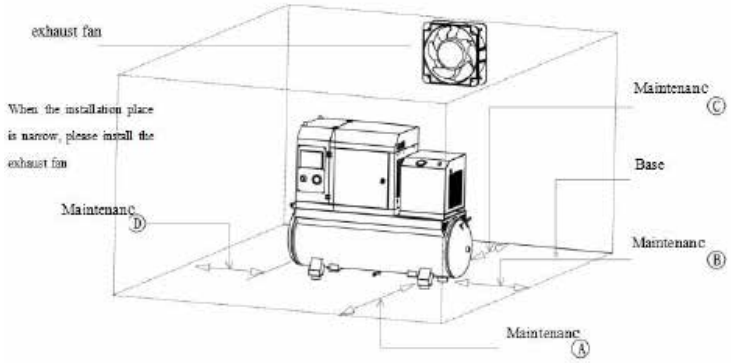
In the process from the delivery of the machine to the installation in position on-site, the correct shutdown maintenance and service process contribute to the stable and normal operation of the machine. Therefore, the machine shall be inspected immediately for damages caused during transportation when it is received. If any damages are found, the carrier can be required to sign on the shipping document and give a damage report.

Check the nameplate of the compressor to ensure that it has the model number and specifications you ordered and check whether optional parts are included. In addition, inspect the oil-gas separator and safety valve to confirm whether the design or pressure setting is correct. The protection and maintenance solutions shall be prepared for the unit which will not be installed temporarily or operated for a long time, ensuring the normal operation of the unit, especially the air-end of the main machine.

The handling and installation of the unit shall strictly follow the precautions related to handling after the packaging box is opened. Two holes for a forklift are set under the base of the unit. When it is lifted, a supporting block shall be placed to prevent the forklift from crushing the door plate of the unit. If the lifting rope is used, the cross bar has to be used to counteract the lateral pressure against the box caused by the lifting rope. Note: It is not acceptable to place protection materials between the lifting rope and the outside box of the unit. It will crush the door plates at both sides on the top of the unit.

2. Installing and locating

This series of compressor units are applicable to the indoor environment. Place the compressor in a clean environment with good lighting and ventilation, and the foundation must be solid and flat. The whole base should tightly fit the horizontal level of foundation. If necessary, the hard rubber cushion can be shimmed. However, it is noted that no wood wedge should be used. For safety and simple maintenance, as well as the daily inspection, sufficient space must be provided around the machine (at least 1.2m space should be left around and above the compressor).



The operating ambient temperature of the compressor can't exceed 43oC (110oF). Otherwise, the compressor will shut down due to overheating. The spatial dimensions and shape of the compressor room must be carefully considered, to prevent the hot air discharge from circulating in the room and consequently causing the rise of the operating ambient temperature. In principle, all stationary type screw compressors from Detroit Air are provided for indoor installation and application. The machine cover must be waterproof and ventilated, protecting the unit from rainwater, snow and freezing.

WARNING

The compressor can't operate in an environment with a temperature below 0 celcius or above the maximum operating temperature limit.

Do not place the compressor in an environment where it may take in high-temperature waste gas discharged from other compressors or thermally loaded equipment. Do not block the cooling air discharge of the compressor; it must be vented outdoors, avoiding the excessive ambient temperature in the compressor room. If the ventilation in the compressor room is poor, the high-temperature shutdown of the machine may be caused. Moreover, do not place the compressor in the basement or areas with poor ventilation. Consider the possibility of oil pollution caused by water purging. Always monitor the operating temperature of the compressor and the lubricating oil level of the compressor.

CAUTION

The normal operation of the compressor requires sufficient clean air.

CAUTION

Removing or modifying the outside cabinet panels will cause high noise and could lead to injury or property loss or damage.

Screw compressors have stable operation and basically no vibration. It can be placed without an anchor connection. However, if it is necessary for the user, the compressor can be fixed with bolts to prevent the pipes from breaking or the electrical connection from being damaged due to the displacement of the machine caused by a collision. At this point, it should be noted that the bolts shall not be tightened excessively to prevent the oil cooler, pipes and air tank from cracking and being damaged due to the distortion and deformation of the machine base caused by the excessively tightened bolts.

WARNING

Do not install or expose the compressor to areas with toxic, volatile or corrosive gases. It is also not allowed to store substances with similar properties around it. Otherwise, severe injuries and property losses may be caused.

3. Storage and maintenance of the unit

The screw compressor unit is specially designed for the air-end of the main machine, which is precisely machined and formed. The operating procedure and requirements from the manufacturer must be strictly followed for maintenance and service. Otherwise, property losses and injuries may occur. If the unit will be stored for a long time or will be out of service for a long period, then it must be placed in a clean and dry environment. The accumulated water at the bottom of the parts and components, such as the oil-gas tank, cooler (especially the water cooler), steam-water separator, and pipeline water filter shall be drained out. Individual major parts and components of the unit and joints shall be inspected periodically and cleaned to ensure no leakage and rust occurs. The unit must be started and operated for at least 60 minutes every month to ensure the safe lubrication in the air-end of the main machine. A careful inspection is required before the machine is started. If necessary, the lubricating oil shall be replaced in the unit. In addition, a 2-hour operation test shall be performed at full load on the unit and the data shall be recorded. A qualified specialised service engineer shall be present for instruction.

4. Pipe connection

No lead/tin solder is allowed in the connection of pipes or connecting pieces. The lead/tin solder materials have the characteristics of low strength and can't resist the high temperature. Their melting point is only 182°C (360°F). Therefore, please do not mistake them for braze welding, such as the silver solder and copper solder. In addition, please note that no plastics, PVC, ABS pipes or rubber hoses are allowed in the piping system for compressed air.

It has to be noted that no rusty pipes will be installed on the compressor. The pipes shall be connected to the proper position without bending and distortion. To avoid the effect of heat expansion of the pipes on the system, some flexible expansion joints or hoses can be installed in the system, if necessary. The pipes shall be independently supported and fixed to reduce the vibration and prevent expansion and deformation. In any cases, the size of the pipes shall be no less than the connection size of the discharge pipes in the compressor.

For the compressor, the cleaning air is critical. The air filter is indispensable. The air supply which can supply the cleaning air shall be selected. If the outdoor air supply is used, then all pipes must be short and straight. The pipes shall be properly laid out and vibration shall be avoided. The diameter of pipes shall be no less than the dimensions of the suction valve. For the excessively long pipes, the diameter of pipes shall be increased. In addition, the pipes shall prevent leakage and must be absolutely clean after they are installed.

Flow rate-piping pressure drop Kg/cm^2 -(100m)

Flow m^3/min	Diameter (mm)					
	DN15	DN20	DN25	DN32	DN40	DN50
0.8	5.87	1.23	0.339	0.0858	0.038	
1.0	9.18	1.92	0.53	0.134	0.059	0.0157

5 Installation of safety facilities

1) Safety valve (relief valve)

The safety valve is a pressure relief device of proper size, which is applied to protect the system. It is set before delivery. It is not allowed to change its pressure setting at random or block the valve. Only the manufacturer of the safety valve or a qualified agent can perform such an operation.

The safety valve shall be located before the potential blockage points, including (but not limited to) the check valve, heat exchanger and discharge silencer. In theory, the safety valve shall be directly connected to the pipes or vessels which bear the pressure, instead of being connected via the pipes. The discharged gas from the safety valve shall be led to the safety place faraway from people.

⚠ WARNING

Do not modify, weld, repair or reprocess the pressure vessel with GB (or ASME) specifications. No operation exceeding the ratings on the nameplate is allowed. Otherwise, the warranty clause will be influenced and severe injuries and property losses may be caused.

2) Protection cover

All mechanical movements have risks in different levels. Therefore, the protection covers shall be installed. The series of units completely follow the national and industrial standards to have the necessary protection facilities. The user shall periodically inspect and maintain them and no random modification or removal is allowed.

3) Manual vent valve and shutoff valve

It is recommended that a manual vent valve is installed in the air system. The purpose of installing the manual vent valve is to discharge the air in the compressor and its air discharge capacity pipes to the atmosphere. If the air tank in the system is used with a single compressor only, then the vent valve can be installed on the air tank. If the shut-off valve is installed in the system, the manual vent valve shall be installed in the upstream side of the shut-off valve. However, the safety valve shall be installed in the upstream side of the manual shut-off valve. Such a configuration can ensure that the persons and equipment are in a safe status during maintenance and service.

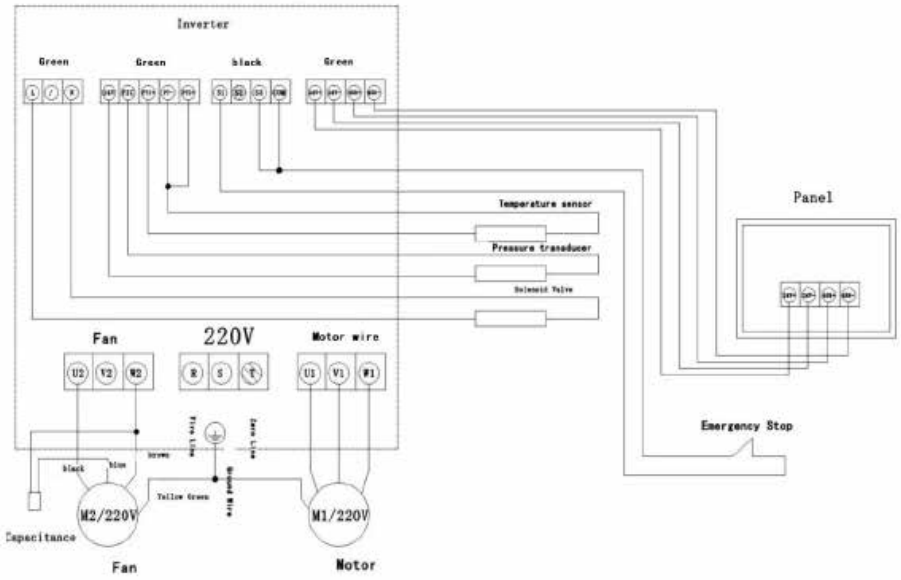
If the compressor is isolated from the system only for maintenance, please note not to replace the shut-off valve with the check valve.

⚠ WARNING

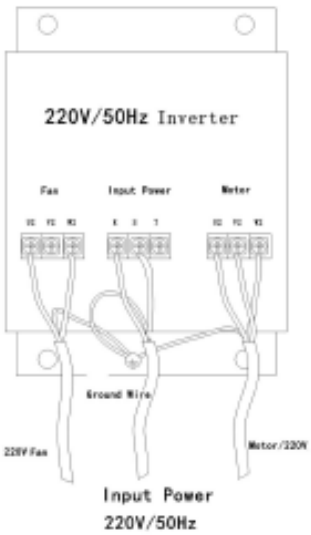
Before maintaining the machine, the manual vent valve has to be opened to release the pressure in the compressor and system. The neglect in the pressure reduction of the system may cause severe injuries, death and property losses.

6. Electrical installation

Before installation, it must be inspected whether the capacities of power supply, power supply wires and the transformer are consistent. The proper fuse or breaker shall be configured in the installation. The unbalance between the voltage phases shall be limited to be within 5%, to prevent the over-current caused due to low voltage. For installing the motor and connecting the electric wires, cables and all electrical elements, the related national electrical standards and local regulations must be followed. Only qualified electricians can perform the above-mentioned operations. The grounding of the compressor must be in a good condition. See the electrical wiring diagrams.



Electrical Wiring Diagram



Power cord specification vs voltage

Model (HP)	Rated power (KW)	Line Current (A)	Calculation of current- carrying capacity of customer power cord diameter at 40'C	Uses air switch specifications are not less than the following current (A)
SR-5VSD 380v	3.7	7	3*2.5mm²	17.7
SR-5VSD 220V	3.7	12.5	3*2.5mm²	20.4
SR-6VSD 380V	4	7.6	3*2.5mm²	25
SR-6VSD 220V	4	13	3*2.5mm²	40
SR7.5VSD 380V	5.5	10.4	3*2.5mm²	35
SR-7.5VSD 220V	5.5	18.5	3*4mm²	60
SR-10VSD 380V	7.5	13.5	3*4mm²	50
SR-10VSD 220V	7.5	24.5	3*10mm²	100

⚠ WARNING

Before maintaining the machine, the manual vent valve has to be opened to release the pressure in the compressor and system. The neglect in the pressure reduction of system may cause severe injuries, death and property losses.

⚠ WARNING

Removing or covering the safety signs is hazardous. Machine status without proper indicating information may result in injuries, or property losses. The warning signs shall be outstanding and placed in a significant position with good lighting. In addition, the text shall be clear and it is not allowed to move the warning signs and other attached indications.

Chapter 4. Operating Procedures

1. Overview

The screw compressor units of this series are equipped with a series of control elements and display/indicating elements. To ensure the normal operation of the unit, it requires the operators to properly operate the machine. In addition, it requires that the operators have a proper judgment against the operating status or failure conditions of the unit according to the displayed/indicated values or states. Before the unit is started, the operators must be familiar with the positions, functions and usages of the control/operating elements and display/indicating elements.

2. Preparation for starting

1) Remove foreign materials and tools around the compressor.

2) Inspect the oil level to ensure that it is in the normal position (see the sections for lubricating oil).

3) Inspect the fan to ensure that it is mounted firmly.

4) Inspect whether all joints for pressure pipes are secure.

5) Inspect and ensure that the safety valve is installed correctly.

6) Inspect whether all covers and protection devices are safe and secure.

7) For the water cooling unit, inspect the water inlet and discharge pipes and ensure that their connections are correct and secure and that the cooling water is turned on.

8) Inspect whether the air filter is securely installed.

9) Close the power supply switch. The power supply indicator light will then light up.

3. Routine starting steps

1) Open the shut-off valve going to the air supply system.

2) Pre-set the control parameters and then push the start button.

3) Observe whether the started compressor has any abnormal vibration, noise and air/oil leakage. If a problem is found, immediately shut down the machine and correct it.

4) Close all external cover doors to control the noises of the unit and ensure the normal flow of cooling air.

5) Inspect whether the indicating values of status parameters are normal.

6) During the first hour of the compressor's operation, carefully observe the operating conditions. In the following seven hours, observe it at any time. If any abnormality occurs, please shut down the machine for repairing.

7) After the primary operation, shut down the machine as per the shutdown procedures. Inspect whether it is necessary to add the lubricating oil into the oil tank; inspect whether the joints are loose.

CAUTION

- *It is necessary to discharge the condensate water in the gas tank. The operation for discharging the condensate water must be performed before starting the unit.*
- *It is necessary to discharge the condensate water from the bottom of the filter in the control pipes periodically (every week). The operation for discharging the condensate water must be performed before starting the unit.*

4. Shutdown procedure

1) Push the stop button.

2) Close the shut-off valve connecting to the air supply system.

3) Disconnect the power supply switch.

CAUTION

Closing the shut-off valve for shutdown can prevent the compressed air of the air supply system from returning to the compressor due to the damages of the check valve; leakage and damages of machine parts may then occur.

5. Emergency shutdown

In an abnormal case, push the emergency stop switch to shut down the machine and disconnect the power supply switch.

2. User parameters and functions

Press the PRG key to enter the parameter modification mode; press the up arrow and down arrow to select the corresponding function code, and press confirm to select the corresponding function, press the up or down arrow key to select the parameter, press the confirm key and press the PRG key to exit the parameter modification mode.

When leaving the factory, the unit has its parameters preset for the optimal operating state of the air compressor. If you have any questions, please contact the manufacturer. Users can adjust the following parameters according to the actual situation to meet the needs of use:

User parameter table and functions

A menu	Secondary menu	Set initial value	function
Pressure and temperature preset	Preset pressure	00.70MPa	The target force set during inverter control.
	Loading pressure	00.60MPa	1,Automatic loading mode, the controller automatically loads when the pressure is lower than this value. In standby mode, the pressure is lower than this value, and the operating conditions are met, the controller automatically starts
	Unloading pressure	00.80MPa	1. If the pressure is higher than this value, the controller will automatically unload 2. This value should be less than or equal to “unloading high limit”
	Fan start temperature	0080 ‘C	When the exhaust temperature is higher than the value set here, the fan runs.
	Fan stop temptureera	0070 ‘C	When the exhaust temperature is lower than the value set here, the fan stops.
Start-stop delay preset	Start delay	0010 s	Motor delay time
	Loading delay	0002 s	After corner operation, delay loading time (applicable to power frequency control)
	Unloading delay	0600 s	The longest continuous no-load operation time allowed by the air compressor exceeds.Stop automatically after this time.
	Stop delay	0010 s	After the air compressor receives the stop command, it turns to no-load operation. After the load operation exceeds the time set here, it will automatically stop
	Restart delay	0100 s	After a normal shutdown, an empty vehicle shutdown for a long time, or a fault shutdown, the air compressor can be restarted after delaying the time set here.
	Oil filter used	0000 hours	The accumulated used time of the oil filter. After replacing the new oil filter, manually clear.

Maintenance parameter reset	Oil separator used	0000 hours	The accumulated used time of the oil separator. After replacing the new oil separator,Manually clear.
	Air filter used	0000 hours	The air filter has accumulated used time. After replacing the new air ilter, manually clear
	Lubricant used	0000 hours	The accumulated used time of lubricating oil, after replacing lubricating oil, Manually clear.
	Grease used	0000 hours	The accumulated used time of the grease. After the grease is replaced, Manually clear.
Maximum use time preset	Oil filter preset	500 hours	1. When the accumulative use time of the oil filter exceeds the value set here, the controller will warn; 2. When set to "0000", the oil filter warning function is prohibited
	Oil separator preset	500 hours	1. When the accumulative use time of the oil separator exceeds the value set here, the controller will warn; 2. When set to "0000", the oil separator warning function is prohibited
	Air filter preset	500 hours	1. When the cumulative use time of the air filter exceeds the value set here, the controller will warn; 2. When set to "0000", the air filter warning function is prohibited
	Lubricant preset	500 hours	1.When the cumulative use time of lubricating oil exceeds the value set here, the controller will warn; 2. When set to "0000", the lubricating oil warning function is prohibited
	Grease preset	500 hours	1.When the accumulative use time of grease exceeds the value set here, the controller will warn; 2. When set to "0000", the lubricating oil warning function is prohibited
	****	****	Modifiable user password; can use old user password or factory Home password reset

Adjustment parameters

The adjustment parameters are used to set the relevant data of the controller and are not allowed to be viewed or modified by users who are not authorized by the manufacturer. The user needs to verify the adjustment password before viewing the adjustment parameters.

Chapter 5. Parameter Setting and Adjustment of Working conditions

1. Functions and technical parameters

1) System over-temperature protection

If the temperature of the system is above the limit of the set temperature, the controller will send out an alarm to shut down the machine and the field failure is indicated as "system over-temperature".

2) Anti-reverse protection of air compressor

If the phase sequence of the 3-phase power supply connected to the air compressor has a setting different from that of the controller, the field failure is indicated to be "wrong phase sequence" and the controller cannot start the motor. In this point, it is only needed to exchange the power supply wires of any two phases and look over the rotational direction of motor.

3) System over-pressure protection

If the system pressure is above the limit of the set pressure, the controller will send out an alarm to shut down the machine and the field failure is indicated as "system over-pressure".

4) Sensor failure protection

If the pressure sensor or temperature sensor is disconnected, the controller will send out an alarm to shut down the machine. The field failure is indicated as "** sensor failure".

2. Control principle (refer to the attached for the electric schematic circuit)

Individual Control

1) Local automatic control (ON/OFF Mode: Beside Machine; Loading Method: Automatic)

1.1. Press 'run' to start:

When the controller is powered on, it will perform a 3S self-check. Pressing the 'run' button cannot start the machine until the self-check is completed.

1.2. Automatic Running Control:

When the motor starts and a certain time delay has passed, air pressure will be applied to the air compressor to increase the pressure in the air tank. When the air pressure reaches a value that exceeds the set unloading pressure (unloading pressure value), the air compressor stops working. When the pressure drops to the load pressure limit, the motor can be restarted according to the normal starting process, and repeated operation will follow.

1.3. Normal Stopping:

Press the button 'STOP'

1.4 Frequency starting prevent control

The motor cannot be started immediately; once stopped (after pressing the 'O' button or due to failure), the motor can only be restarted after a time delay. Whatever the situation is, this controller will display the remaining countdown of the time delay (such as 90s). The motor can only be started when the time display is 0.

2) Failure stop and emergency stop

When any electronic failure or high air temperature failure occurs during the running process, the controller will stop the motor immediately. The motor can only be restarted after the failures are cleared. If any emergency situation occurs, please press down the emergency stop button to cut off the power supply of the controller and contactor power.

3. Alarm and notices

Text Display Tips

1. Air filter alarm tips

a. Check the alarm using the switch signal.

The controller can display a message on the text display to remind the operator that 'the air filter is blocked' by checking the pressure difference switch operating state.

b. Set the running time alarm of the air filter.

The text will display "Air filter life terminated' when the using time of the air filter terminates.

2. Oil filter alarm tips

a. Check the alarm using the switch signal.

The controller can display the message on the text display to remind the operator that 'the oil filter is blocked' by checking the pressure difference switch operating state.

b. Set the running time alarm of the oil filter.

The Text displays 'Oil filter life terminated' when the using time of the oil filter terminates.

3. Oil separator alarm tips

a. Check the alarm using the switch signal.

The controller can display the message on the text display to remind the operator that 'the oil separator is blocked' by checking the pressure difference switch operating state.

b. Set the running time alarm of the oil separator.

The Text displays 'Oil separator life terminated' when the using time of the oil separator terminates.

4. Lubricating Oil alarm tips

The Text displays 'Lubricate Oil life terminated' when the using time of the lubricate oil terminates.

4. Handling of common failures

Failure causes can be located by reviewing the field failures or history failures for the failure shutdown caused by the external devices of the controller, then the peripheral failures can be eliminated. See the "Reviewing operating parameters" for detailed methods.

Fault	Causes	Measurement To Take
Air Exhaust Temperature too high	Bad vent condition, Oil lacking, etc.	Check the vent condition and lubricant amount, etc.
Temperature Sensor Failure	Cable off or PT1OO damaged	Check the wiring and PT100
Over Pressure	The pressure is too high or the pressure sensor has failed	Check the pressure and the pressure sensor
Pressure Sensor Failure	Cable off, Sensor damaged or the cable connected reversed	Check the wiring and sensor transformer
Phase Lacking	Power phase lacking or the Contactor terminal damaged	Check the power and contactors
Fan Unrotate	Fan damaged, Contactor damaged, no control output	Check the wiring and control output
Main Contactor activate time to time	The emergency button loose	Check the wiring

Chapter 6. Maintenance and Service

1. Preparations before maintenance and service

To ensure the normal operation and long service life of the unit, good maintenance and service is critical. Therefore, the maintenance and service procedures for the screw compressor unit must be carefully performed. Before proceeding with the maintenance, please carefully read the **Chapter 1. Safety Rules** in the manual. **The following preparations are, at least, required:**

1. Shut off the power supply of main machine and hang the sign at the power supply switch.
2. Close the shut-off valve going to the air supply system to prevent the compressed air from returning to the maintained parts.
3. Open the manual vent valve to release the pressure in the system. Keep the vent valve open.
4. Ensure that the compressor unit has been cooled down to prevent scalding and burning.
5. Wipe off the oil and water from the ground to prevent slippage.

WARNING

- *Do not think that the maintenance and service operations can be performed when only the machine is shut down. The automatic control system of the machine will start the compressor at any time.*
- *Poor maintenance and service will influence, not only the normal operation of the unit, but the safety of operators, too.*
- *When the compressor is operating or pressurized, don't remove the nut, oil filling plug or other parts.*
- *It is not allowed to use combustible solvents, such as gasoline or kerosene oil, to wash the air filter or other parts and components. The safe solvents shall be applied as per the instructions.*

2. Maintenance and service of screw compressor

CAUTION

Closing the shut-off valve for shutdown can prevent the compressed air of the air supply system from returning to the compressor due to the damages of the valve and leakage and damages of machine parts may occur.

2.1 Lubricating oil of compressor

The screw air compressor, designed and manufactured by DL, can use the synthetic lubricating oils listed in the below table. Every delivered compressor unit has a lubricating oil tag to indicate the type of lubricating oil filled in the unit. The different types of lubricating oils are adaptive to the different ambient temperatures and load conditions and the oil-changed interval is also different. Only when the specialized synthetic lubricating oil is used, then the corresponding warranty service can be obtained.

Type of lubricating oil	Oil-changed interval (hour)	Ambient temperature
CN SLT	2000	≤43

2. Maintenance and service of screw compressor (cont.)

The lubricating oil is specialised oil for screw compressors which is provided specially by the manufacturer. It can provide reliable operation and a long service intervals.

Do not mix the oils with different types or trademarks for application. Otherwise, operation failures such as the lubricating oil foaming, filter blockage, orifice or pipe blockage, etc., will be caused, reducing the designed service life of the compressor and lubricating oil.

During operation, please check the oil level regularly. The oil sight glass is installed on the oil and gas barrel, and the normal oil level is higher than the middle position. After shutting down the machine, if the oil level of the oil and gas separator drops to the center line of the oil glass, you need to add this oil. However, oil can only be added when the machine is switched off and the machine is completely drained of air.

2.1.1 Factors influencing the service life of lubricating oil

1) Abnormally high operating temperature
2) Contamination:
   a) Other types or brands of lubricating oils
   b) Strong oxidizing substances, such as
      - Acid
      - Sulphur
      - Chloride
      - Nitrogen oxide
      - Welding waste-gas
      - Ozone
   c) Ammonia water
   d) Solution type fume
   e) Airborne dust

Place the compressor in a ventilated and cool place, as far as possible, ensuring that it can operate within the normal temperature range. Otherwise, the oil consumption of the compressor and oil content in the air will be increased. In addition, if the operating temperature exceeds 95°C (203°F), the service life of the lubricating oil will be halved every time the discharge temperature increases by 10°C (18°F). Therefore, it is better that the operating temperature of the above lubricating oil doesn't exceed 95°C (203°F).

2.1.2. Water discharge and replacement of lubricating oil

The condensate at the bottom of the oil-gas separator tank should be removed periodically. If the water content in the lubricating oil exceeds 200PPM, the lubricating oil will be severely emulsified and damages to the air-end and bearing will be caused. Therefore, it is necessary to replace the lubricating oil. It is prohibited to mix the lubricating oils with different types or brands for replacement as the warranty of the compressor unit will be voided. If it is necessary to use other types of lubricating oils due to special conditions, please contact a Detroit Air Screw agent.

2. Maintenance and service of screw compressor (cont.)

For Detroit brand C46 S3R lubricating oil, under normal maintenance and operating conditions, the first maintenance is 200 hours, and each subsequent 2000 hours or half a year (whichever comes first) the oil should be replaced; for other lubricating oils, please refer to the oil change interval table in this section.

CAUTION

On cold morning, the pressure differential switch of the filter may send out an alarm after the air compressor starts, due to the high-pressure differential caused by the low fluidity of the lubricating oil. Please monitor the pressure differential switch after the operating temperature of the compressor has normalized.

2.2. Oil filter

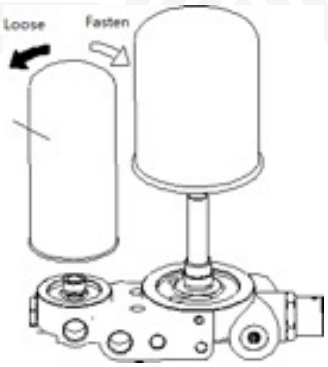
After the new machine operates for 200 hours, the element of the oil filter should be replaced. Afterwards, it is required to replace the oil filter when the following conditions occur. For replacing the filter core the machine must be shut down. Wipe off the dirt and oil from the outside carefully to prevent foreign matters from entering into the lubricating system as far as possible.

- In the normal operating temperature, the filter (pressure differential) has an alarm. At this point, the pressure differential of the filter exceeds 1.7 bars (25 psi).
- Every time it operates for 1000 hours.
- When the lubricating oil is replaced.
- When an oil sample is used to determine the condition of the oil.

CAUTION

On cold mornings, the pressure differential switch of the filter may send out an alarm after the air compressor starts, due to the high-pressure differential caused by the low fluidity of the lubricating oil. Please monitor the indicator after the operating temperature of the compressor has normalised.

2. Maintenance and service of screw compressor (cont.)



The replacement and adjustment steps for the element of the oil filter are as follows:

1. Use the band type wrench to remove the old filter core and shim.
2. Clean the mounting surface of shim.
3. Apply a thin layer of lubricating oil on the surface of new shim.
4. Tighten the filter core by hand for 1/2 - 3/4 turn.
5. Start the machine again and inspect whether any leakage occurs.

⚠ WARNING

To reduce the possibility of damages to the filter core to a minimum, only the products provided by DL can be used, as other substitutes may not match the pressure in the unit.

2.3. Safety valve

If dirt blockage occurs in the safety valve, it will cause the safety valve to malfunction after it is opened. If the safety valve fails to open, then its function to protect the pressure system will be lost and there will be no safety assurance of the unit. If the safety valve fails to close, then the lubricating oil in the oil-gas separator will accidentally be ejected in large amounts, resulting in possible property losses. The machine must be shut down every week for inspecting of the status of safety valve.

2.4. Secondary oil return pipe

The function of the secondary oil return pipe is to guide the oil accumulating inside the filter core of the oil-gas separator to return to the low-pressure chamber of the compressor. Its orifice is applied to ensure the stable oil return. If severe blockage occurs in the secondary oil return pipe (mostly in the orifice and filter), then the oil content in the discharged air will be excessive. The secondary oil return pipe shall be inspected in the specified time. Clean the orifice and filter (if equipped).

In the daily maintenance, if the following conditions occur, then the orifice shall be cleaned:

- Fail to see the lubricating oil flow through the oil sight glass.
- It is found that the oil content in the discharged air is too high.
- Every time the lubricating oil is replaced.
- Once every half a year.

2.5. Oil cooler

When oil, grease, dust and dirt accumulate onto the surface of the cooler, the heat transfer effect of the cooler will be reduced and will lead to an excessive discharge temperature. For the air-cooled cooler, the external surface of the cooler should be cleaned every two months with a dust cleaner, cleaning fluid or low-pressure (usually not above 3.5 bars) compressed air. For the water-cooled cooler, the discharge temperature should be monitored in real-time. In general operating conditions, the interior of the cooler should be cleaned every 3000 hours or 1 year, whichever comes first.

2. Maintenance and service of screw compressor (cont.)

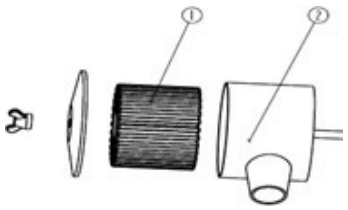
2.6. Air filter

When it operates every 500 hours or 3 months, the air filter should be inspected for damages and the air inlet system should be inspected for sealing; under normal operating conditions, the element of the air filter should be replaced every 2000 hours or six months. If the environment condition is poor and dusty (such as, ceramic, cement, etc.), the maintenance and replacement intervals must be properly shortened.

Every time the air filter is maintained, it should be inspected whether the downstream side of the filter core is dirty. If so, the causes must be found and eliminated. It is necessary to ensure the airtightness of sealing elements, thread connection, flange connection and leather hose connection between the air filter and the air inlet of the compressor are absolutely secure.

Replacement of air filter element:

1. Remove the air filter cover plate and take down the air filter element
2. Clean the inside of the housing with a clean, wet cloth and pay attention to no use of compressed air
3. Install the new filter element and lock the air filter cover plate.



CAUTION

When the compressor is operating, it is not allowed to remove and replace the element of the air filter.
It is prohibited to use the oil, water or the compressed air containing water to clean the filter core.
The filter core with damaged filter paper or sealing ring must be replaced immediately.

2.7. Oil-gas separator

The element has an overall structure and can congeal the oil mist on its surface to become oil drops which will fall into the bottom of the separator and then be recovered by the oil return pipe to return to the compression chamber. The separator has to be carefully handled to avoid damages. Once the separator element is hit and deformed, even an indentation will influence the separating efficiency, resulting in excessive oil content in the discharged air of the compressor. Even a tiny hole on the component will lead to very high oil content.

Under normal circumstances, if the air filter and oil filter are maintained in good condition, then the periodic replacement of the filter core in the oil-gas separator will not be required.

2. Maintenance and service of screw compressor (cont.)

If the following conditions occur, then the replacement of the oil-gas separator element will be required:

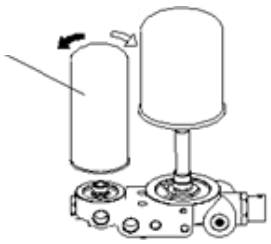
- In the case that the oil level, loading and unloading, and the oil return system are identified to be normal, the oil content in the compressed air is still too high.
- Every other 2000 hours

The detailed replacement and adjustment steps are as follows:

If the supplied air contains the oil fine separator and oil significantly and the filter, check valve, orifice and the diaphragm of vent valve in the oil return pipe is inspected in a normal condition, then it is necessary to replace the oil-gas separator filter core.

Replacement of oil filter:

1. Remove the old filter element with a belt wrench.
2. Clean the mounting surface of the gasket.
3. Apply a thin layer of lubricating oil to the new seal ring surface.
4. Tighten the filter element with hand.



2.8. Air inlet adjusting valve

The maintenance of the suction valve usually requires the replacement of the piston spring, piston O-ring, sealing ring and check valve spring. During the maintenance, the following steps shall be followed:

WARNING

- *Do not remove the screws, screw-plug and other components when the compressor is in operation or pressurised.*
- *Before the removal, shut down the machine and release the internal pressure completely.*

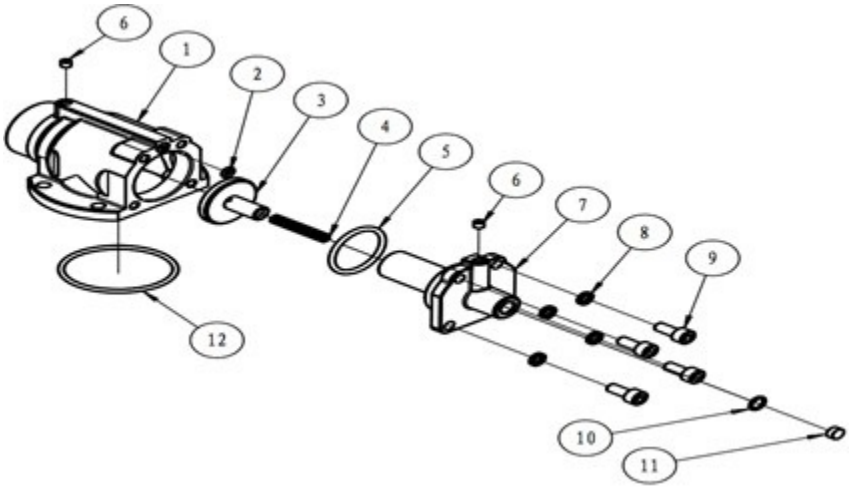
1. Remove all pipes connected to the suction valve
2. Remove 4 bolts and spring washers connecting the suction valve body and the compressor. Move the suction valve away from the compressor
3. Remove the retaining ring and O-ring in the suction valve body
4. Remove the check valve assembly and spring in the valve body
5. Remove the piston spring and piston assembly
6. Clean the valve body. Ensure that the internal path is clean. Clear the old sealing ring on the flange of the suction valve
7. Replace the old parts with the new parts provided in the spare parts and install them in the suction valve

2. Maintenance and service of screw compressor (cont.)

CAUTION

To ensure sealing, apply a little oil on the parts.

8. Install the new piston spring;
9. Place the new check valve spring into the piston. Then install the check valve assembly;
10. Place the new Teflon O-ring into the valve body and lock the nut in this point, removal of the bolt is required. Tap it on the air-end. Please note the sequence of individual components for removal;
11. Before installing the new flange sealing pad, clean the inlet flange face of the compressor;
12. Tighten the 4 bolts and lock the locking washer.



Periodically inspect the suction valve (usually 600 hours or two months), vent valve and loading solenoid valve and ensure that they are sealed without any leakage and perform normally.

2. Maintenance and service of screw compressor (cont.)

2.9 Hose

After every 600 hours or half a year of operation, it is necessary to inspect the air supply hose, lubricating oil pipeline and the flexible hose in the control pipeline. If necessary, replace them.

3. Maintenance and service of the motor

3.1. The operating conditions of Screw compressor from Screw Compressor:

Ambient temperature	≤45°C	
Frequency	50Hz	
Voltage	380V (VS5)	220V (C5)
Operating mode	S1	
Protection level/Insulation level	IP54/IP55/F	

3.2. Operation of the specialized motor in Screw compressor

3.2.1. The motor must be securely grounded to the earth. The grounding wire of the specialized compressor motor is usually led to the inside of the electrical cabinet and connected to the cabinet body. It is only required to securely connect the grounding wire of user to that point.

3. Maintenance and service of the motor (cont.)

3.2.2. The specialized motor in the Screw compressor must be connected as per the wiring and connecting signs on the nameplate or instruction. Its lead-out line has the specified signs.

3.2.3. The specialized motor in the compressor can continuously operate at the rated power multiplying the application coefficient, when the voltage and frequency are kept to the values specified on the nameplate. When the frequency deviation of the power supply exceeds the value on the nameplate by 1% or the voltage deviation exceeds its value by 5%, the motor can't ensure that it continuously outputs power at the correct levels.

3.2.4. When the motor operates at no load or at load, no intermittent or abnormal noise or vibration should occur.

3.3. Maintenance, service and repair of the specialized Screw compressor motor

3.3.1. The operating environment should be kept dry.The surface of the motor should be kept clean. The air inlet should not be obstructed by dust, fibres, etc.

3.3.2. If the operating environment is moist or the machine is out of service for a long term, then it should be heated before restarting to eliminate the moisture.

3.3.3. When the controller or thermal relay acts, the failure source must be inspected. After the failure is eliminated, then it can be put into operation.

3.3.4. After ffailure occurs, please contact the Detroit Air service department

4. Service plan

Period (number of hours)	Recommended actions	Spare parts set
100 (Or weekly)	Check the oil level Clean the air filter Clean the radiator (exterior) Gas storage tank blowdown Cleaning and dust removal inside the screw machine	maintainance
500 First guarantee	Replace the special lubricating oil for screw machine Replace the oil filter Replace the oil fine separator Replace the air filter element Check the control switch cable screw Check the seal (each joint, air pipe) Clean the radiator (exterior) Gas storage tank blowdown Cleaning and dust removal inside the screw machine	Consult the manufacturer for spare parts
Every 2000	Replace the special lubricating oil for screw machine Replace the oil filter Replace the oil fine separator Replace the air filter element Check the control switch cable screw Check the seal (each joint, air pipe) Clean the radiator (exterior) Gas storage tank blowdown Cleaning and dust removal inside the screw machine	Consult the manufacturer for spare parts
8000	In addition to maintenance items every 2000 hours Replace the main engine shaft sealClean oil and gas separator oil Clean the oil return check valve Replace if necessary Clean the intake valve Replace if necessary Clean the intake valve Replace if necessary control Finally changed Motor bearing Clean the radiator Inside and outside	Consult the manufacturer for spare parts
2000	(In addition to maintenance items every 8000 hours) Replace the main engine bearing	Consult the manufacturer for spare parts

The operating hours shown in the table refer to the best use of the machine, and may vary depending on the workplace and the number of cycles.

6. Preparations for long-term shutdown

If the interval between shutdown and restart is relatively long, please turn on the manual switch of the (electronic) water (waste-water) discharge valve before shutdown and set the draining period not less than 5 minutes ensuring that the water in the system is completely drained out. The accumulated water in the components such as the cooler, air tank, etc., will be discharged after the shutdown.

a. Shutdown period less than 1 month

- It is necessary to start the machine once every week and allow the machine to operate at unload for 10 minutes.
- Manually turn the coupling once every week .

4. Service plan (cont.)

b. Shutdown period more than 1 month

(A) Shutdown preparation

- Continuously load it for 10 minutes to discharge the air in the pipe.

Remember: Drain out the water inside the two gas-water separators

- Discharge the water in the components such as the cooler, air tank, etc.

(B) During the shutdown

- Repeat (A) once every three months

(C) Before restarting

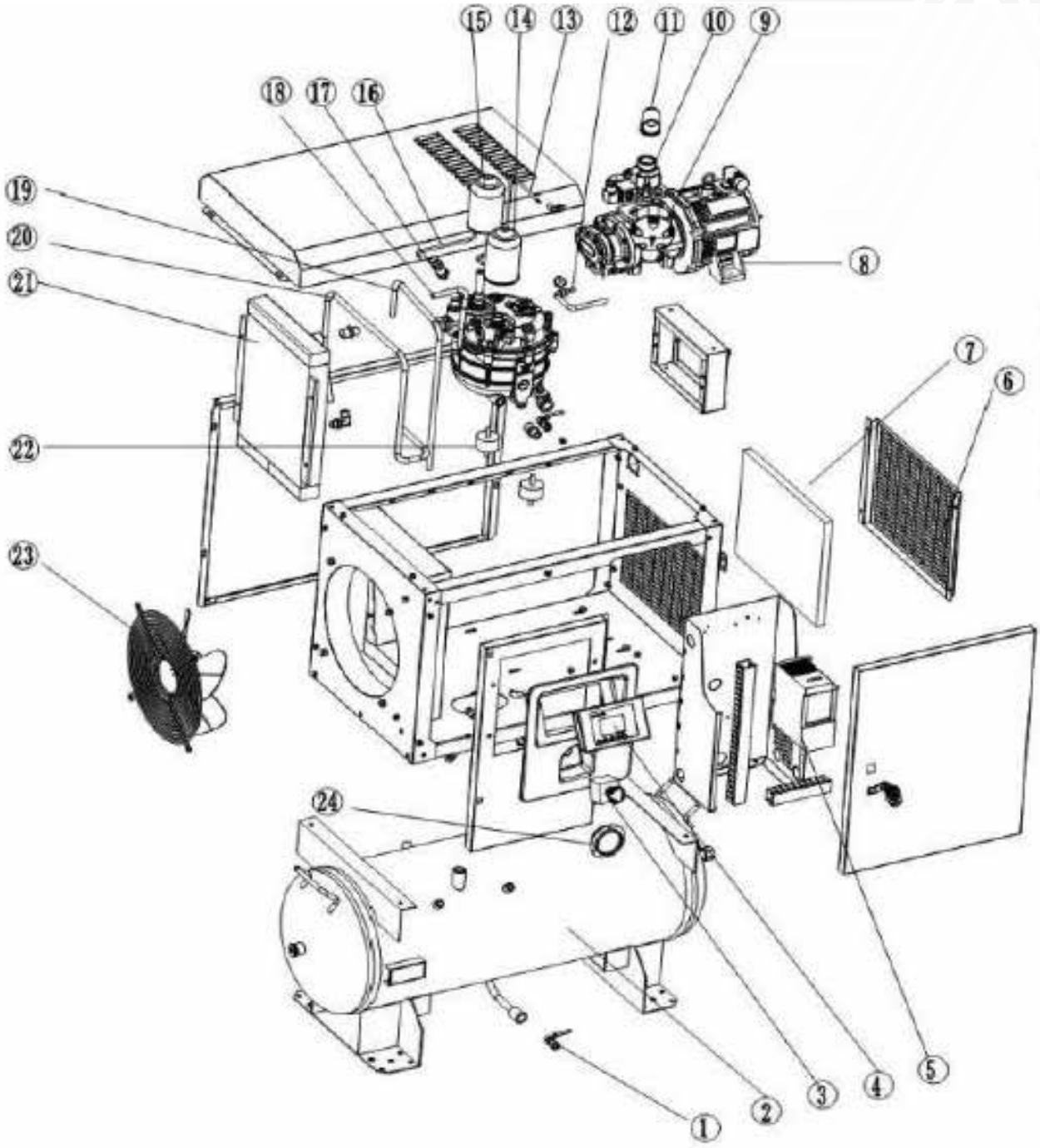
- Prime the air-end with oil and turn by hand before starting
- Open the water discharge valve in the gas-water separator

Chapter 7. Troubleshooting

problem	reason	solution
Too high oil temperature causes shutdown	The exhaust temperature of the body is too high (maximum 105'C)	- Check the oil level - Check the cleanliness of the cooler - Check if the fan is working properly - Check whether the temperature sensor is working properly The reset button must be present before restarting the machine. If high temperature occurs repeatedly, please contact the service centre
Motor overheated causing shutdown	- The voltage is too low. - Motor temperature is too high - Power consumption is too high	- If the machine is turned when a fault occurs, check whether the phase sequence is stable; - If the fault occurs, the machine is running, confirm the internal pressure and replace the oil separator - If the current of the motor is higher than the rated current, please contact the technical staff of the service center. - Don't force start, so as not to cause more damage to the compressor control board. - Check whether the voltage and fequency match
Safety valve open	- Pressure sensor failure - The set pressure exceeds the set value - Oil fine separator blocked	- Check whether the pressure sensor and barometer parameters are normal - Check whether the setting value of the control panel matches the safety valve parameter - Replace the safety valve - Remove and replace the oil fine separator
The compressor is running but the pressure is too low	- The intake valve is not open - Pressure cannot be increased due to leakage - Transmission element blocking	- When the air compressor is stopped and the internal pressure is safe, remove the air filter and check whether the valve can move - Check the pipeline for leaks - Check carefully whether the motor is running but the body is not running. - Contact the service center
Air filter injection	- Oil level is too high - The oil-returning sight glass is dirty - Oil fine seperator failure - The intake valve bleeds too fast	- Drain the excess oil during shutdown and check the oil level. - Remove the oil return sight glass and clean it, and replace it if neccessary. - Replace the oil fine seperator and clean the core tube
Main motor overload	- Load voltage - Power phase loss - High pressure in oil and gas barrels	- Confirm input power - Check whether the three-phase input of the power supply is close to the value and whether it is reliably connected to the terminal - Check the cable for damage - Checke whether the ventilation of the mainmotor is unobstructed. - If the motor has only two-phase input, it should be checked by a qualified technician. (If necessary,replace or repair the motor) - If the pressure difference of the oil and gas barrel is greater than 1 bar, it will cause high energy consumption of the system by a qualified technician. - The ambient temperature is too high: ventilation - Restart the machine and press the reset switch on the control panel
Excessive fuel consumption	- The faulty oil of the oil fine separator is not suitable for the compressor. - Worn or defective air/oil separator element - oil level is too high	- Change the oil and fill the mcahine with the oil specified by the manufacturer. - Replace the oil fine separator - Clean or replace the oil return sight glass. - Replenish oil until the oil level reaches the correct positiion specified in the manual

Chapter 8. Parts List

Serial Number	Accessory name	Material No.	Quantity
1	Drain valve	40791040000	1
2	gas tank	30980005100	1
3	Emergency stop switch	39067002544	1
4	Operation panel	37300157094	1
5	Frequency converter	39056240220	1
6	Net cover	/	1
7	sponge	67202000000	1
8	host computer/Motor assembly	07032750045/07610004030	1
9	Air filter assembly	33150005040	1
10	Intake valve	40780025304	1
11	Air filter elbow	33150300593	1
12	Temperature Sensor	40720100020	1
13	Unloading pipe	/	1
14	Oil filter	3335L962202	1
15	Oil and gas separator	3335L719200	1
16	Oil return pipe	/	1
17	Safety valve	40800004370	1
18	Oil return pipe 1	/	1
19	trachea	/	1
20	Oil return pipe 2	/	1
21	Cooler	31030001001	1
22	Cushion	21165009010	1
23	cooling fan	20116300380	1
24	Pressure gauge	40728001004	1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