H40-50
40 & 50HP OIL LUBRICATED SCREW COMPRESSOR

Operating & Service Manual

H40-50

13-28-610
Version 00
July 17, 2020

Models
H40-50B
H40-50VSDB

General Information

These compressors are designed for compressing atmospheric air and are not suitable for compressing any other gas. They are designed and manufactured to give optimum performance with long life and reliability.

This manual gives the user all the information required to install, commission, operate the compressors, and carry out the regular schedules for servicing and maintenance which will ensure a maximum satisfactory service life.

Servicing facilities and the supply of genuine replacement parts are provided through a worldwide network of DV Systems distributors. For individual replacement parts, please contact your local DV Systems dealer.

The information in this manual was valid at the time of publication. However, because modifications to parts and procedures may be made at any time which could affect the servicing requirements of the compressors, always make sure that the very newest information is at hand before the compressors are serviced. New and edited publications can be obtained from your local DV Systems distributor or service centre.

In any communication concerning the compressor, it is essential to quote the MODEL and SERIAL NUMBER.

In this manual, all pressures quoted are gauge pressures unless otherwise stated.

Maintenance

To ensure the continued trouble-free operation of the compressor, it is important that periodic maintenance and servicing are carried out in accordance with the information given in the “Maintenance” section of this manual. If you require assistance, please contact DV Systems or your local DV Systems service centre. Your service centre can work with you to develop a maintenance program suited to your requirements. These agreements provide you with expert knowledge from trained technicians and the guarantee that only genuine DV Systems parts will be used.

Warranty

The conditions of the DV Systems Warranty are set out in the company's Standard Limited Warranty statement, provided with the machine documentation package.

Register the Unit to activate the warranty by completing the online warranty registration at:

www.gdg.gardnerdenver.com/DV-Rotary-Warranty

USE ONLY DV SYSTEMS GENUINE PARTS. USING NON-GENUINE PARTS FOR SERVICING OR REPAIRS WHILE THE COMPRESSOR IS WITHIN THE WARRANTY PERIOD WILL INVALIDATE YOUR WARRANTY.

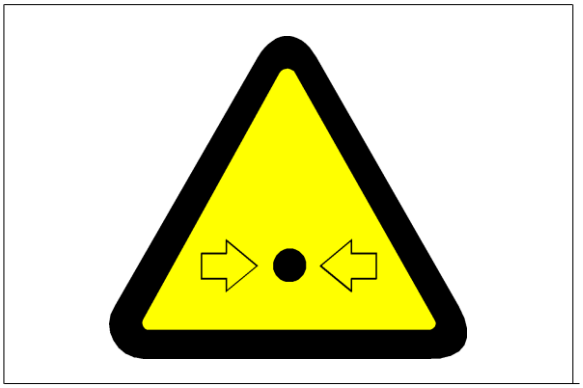
DV Systems Rotary Screw compressors are the result of advanced engineering and skilled manufacturing.
To be assured of receiving maximum service from this machine, the owner must exercise care in its operation and maintenance. This book is written to give the operator and maintenance department essential information for day-to-day operation, maintenance and adjustment. Careful adherence to these instructions will result in economical operation and minimum downtime.

Boxed text formats are used within this manual to alert users of the following conditions:

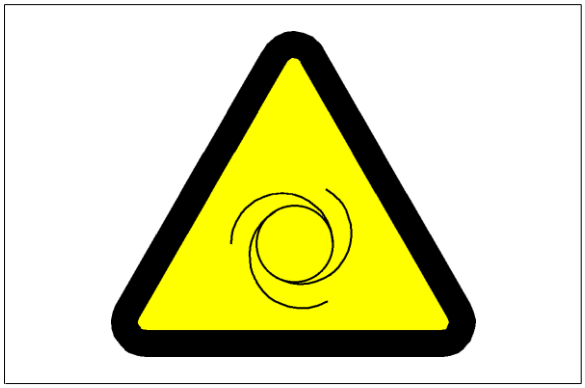
Safety Labels are used within this manual and affixed to the appropriate areas of the compressor package to alert users of the following conditions:

DANGER

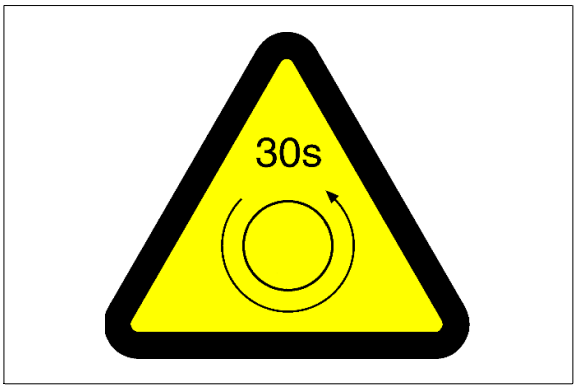
Indicates a hazard with a high level of risk, which if not avoided, WILL result in death or serious injury.



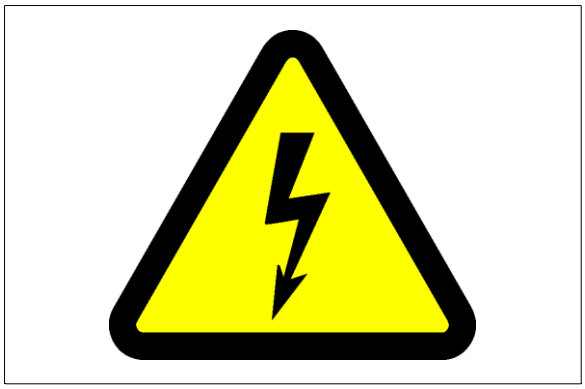
Pressurized part or system



This system can start up by means of a remote control or automatically after a power failure.



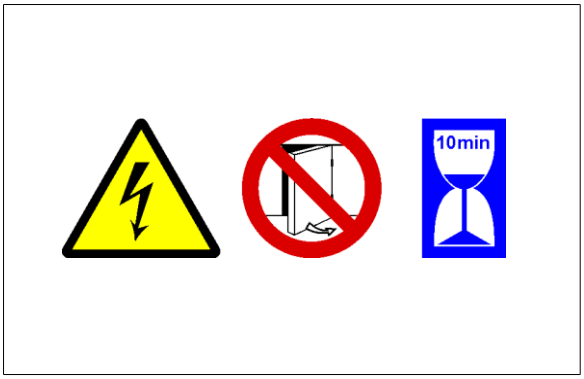
The system continues to run for 30 seconds after pressing the O-key



Danger of electric shock

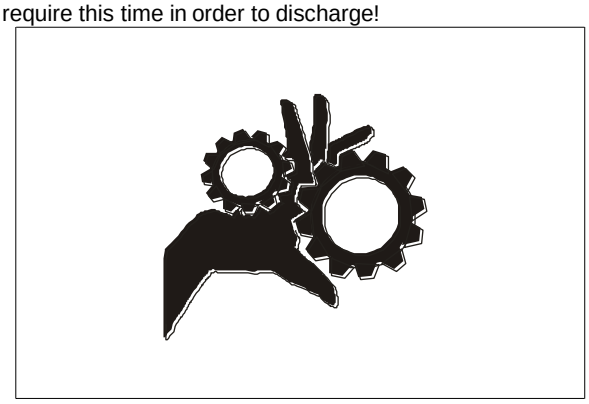
Check and, if required, re-tighten connection terminals. For further details, see the operating instructions.

Danger of electric shock from loaded condensers! Please always first disconnect the system from the power supply and wait another 10 minutes before touching the electrical components. The power condensers require this time in order to discharge!



Check the DC bus voltage at the system terminal strip of the frequency converter by measuring this between the +DC and -DC terminals (the exact position can be found in the supplied operating manual of the frequency converter), between the +DC terminal and the chassis as well as between the -DC terminal and the chassis.

The voltage must read zero in the case of all three measurements.



As the unit starts and stops automatically, do not come into contact with moving parts. Shut off all power to the unit before attempting any repair or maintenance work.

WARNING

Indicates a hazard with a medium level of risk which, if not avoided, COULD result in death or serious injury.

CAUTION

Indicates a hazard with a low level of risk which, if not avoided, MAY result in a minor or moderate injury.

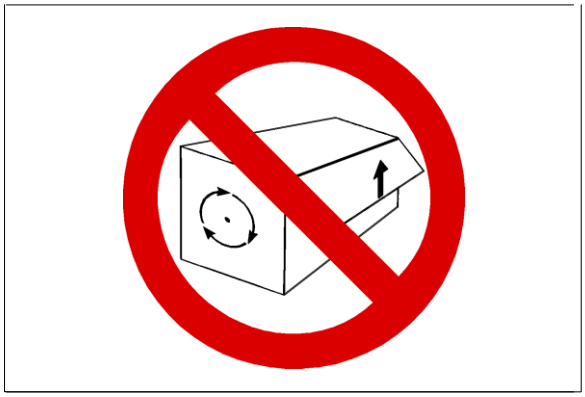
Burn Hazard – Hot surface

NOTICE

Indicates a property damage message.

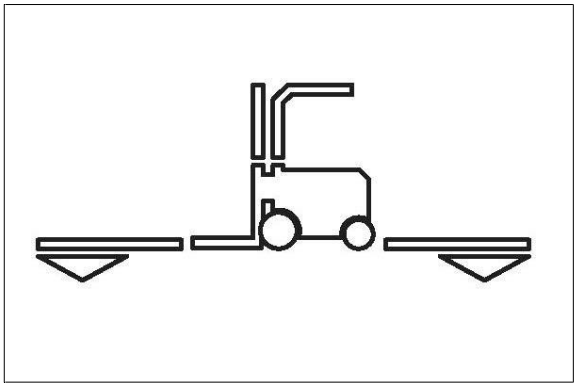
PROHIBITION/MANDATORY ACTION REQUIREMENTS

Asphyxiation Hazard – Never breathe in compressed air from this system.



Never operate the unit with open doors or loose access panels.

Read the operator's manual before proceeding with this task



Handle package at forklift points only

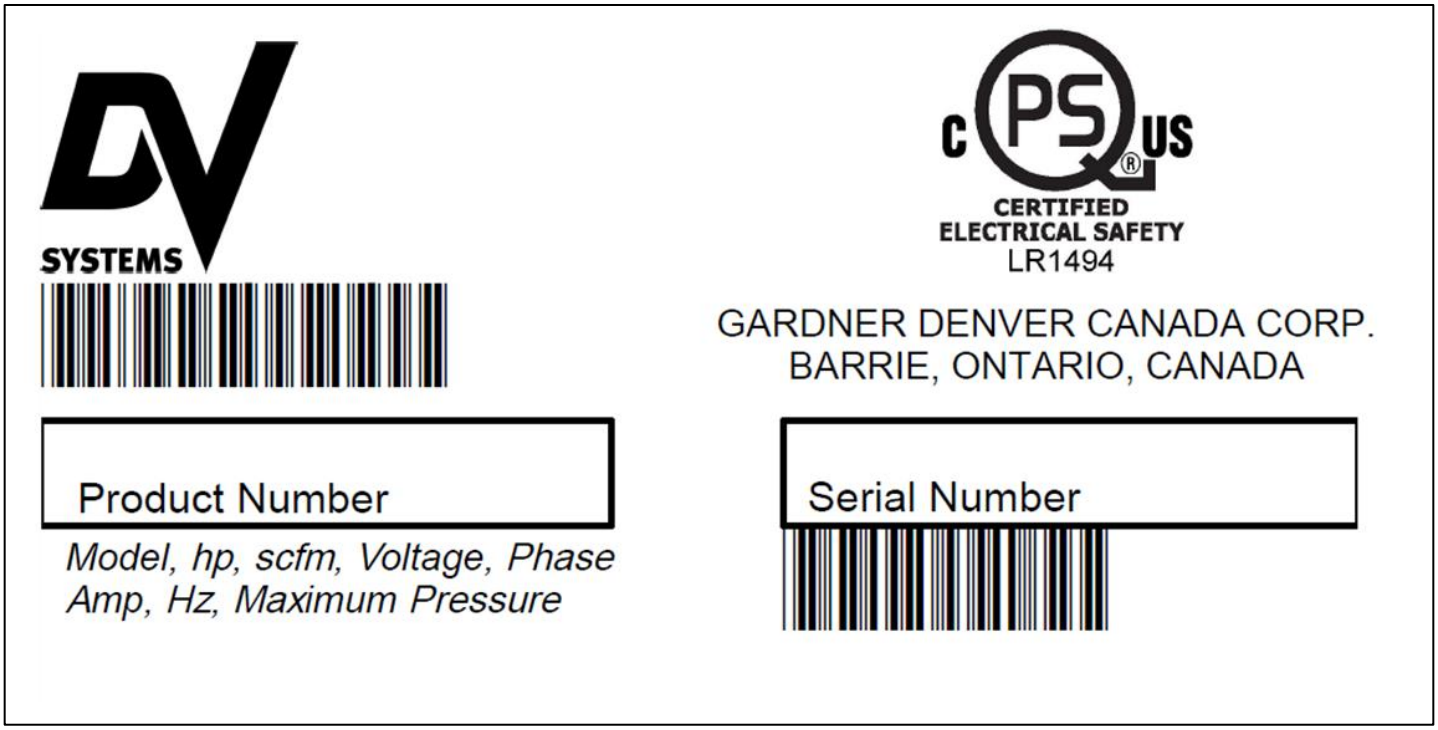


Fig. 1

Product Number	
Serial Number	
Model	
HP	
SCFM	
Voltage	
Phase	
Amp	
Hz	
Maximum Pressure	

Your DV Systems Distributor

Name:	
Address: _____	
_____	
_____	
Telephone:	Fax:
Contact:	Spare Parts:
	Service:

2.1 Compressor Information

DV Systems screw compressors are the result of many years of research and development. This background and a high-quality standard ensure that the screw compressors we manufacture have long service lives with higher reliability and economic operation.
We also ensure that strict environmental protection requirements are met.

2.2 Intended Use

The machine/equipment is built with state of the art technology and following recognized safety regulations. However, the use of the machine can result in serious injury or death to the user or third parties, or cause damage to the machine or other valuables if:

- it is not used as intended
- it is operated by untrained personnel
- it is improperly changed or modified
- the safety instructions aren't observed.

Therefore, everyone who is involved in operating, servicing or repairing the machine must read and follow the safety rules. If necessary, this must be confirmed with a signature.

Naturally it is also necessary to follow:

- relevant accident prevention rules
- generally accepted safety rules
- country-specific regulations

The machine/equipment may only be used if it is in good working order. Always be aware of safety and potential dangers and only use the machine/equipment as directed in the user manual. In particular, faults which could affect safety must be dealt with promptly.

The machine/equipment is intended only for creating pressurized air to drive pressure equipment. Any other or extended use is not considered to be an intended use and the manufacturer/supplier shall not be held liable for any resulting damages. The user shall bear such risks alone.

Following the user manual as well as inspection and maintenance requirements are also considered to be part of proper use.

2.3 Maintenance and Care

Proper maintenance and care are necessary to ensure that the screw compressor fulfills the requirements made of it. Therefore, it is essential that the prescribed maintenance intervals are adhered to and that maintenance and upkeep are done thoroughly, especially under difficult operating conditions.

Service

If you encounter a fault or require spare parts, please contact your DV Systems representative. Trained expert staff will quickly and properly make repairs with genuine DV Systems replacement parts. Genuine DV Systems replacement parts are manufactured with state-of-the-art technology and guarantee reliable operation.

For important questions

Please enter the important information from the nameplate of your unit into the table shown (see fig.1 on p. 5). With inquiries or when ordering replacement parts, please list the compressor type and the ID number as listed on the nameplate. Providing this information helps to ensure that you will receive the right information or the necessary replacement part.

2.4 Notes

General Notes

This user manual should help you to get to know the machine/equipment and to make use of its possible approved applications. It contains important notes on how to operate the compressor in a safe, proper and economic way. Following these instructions helps to avoid dangers, minimize repair costs and downtime and increase the reliability and service life of the machine/equipment.

The user manual should be supplemented with instructions based on existing national regulations on accident prevention and environmental protection. It must always be available at the location where the machine/equipment is used. The user manual must be read and used by everyone who works on/with the machine/equipment. For example when: servicing, including setup, troubleshooting during operation, eliminating production waste, care, disposing of lubricants and additives, performing maintenance and repairs (servicing, inspection, repairs), transporting.

Aside from the user manual and respective national and local regulations for accident prevention, recognized rules for safety and proper working methods must be followed.

Warranty

You should only use the compressor after first fully learning its operation and in accordance with this manual.

DV Systems will not guarantee the safe operation of the machine/equipment if it is not handled in a way which corresponds to accepted use or if it is used for other applications which are not named in the manual.

You have no right to warrantee claims in case of:

- user errors
- inadequate upkeep

- the use of improper fuel
- failing to use genuine DV Systems replacement parts
- alterations to the equipment.

The warranty or liability terms of DV Systems' Standard Limited Warranty statement are not expanded by the foregoing.

Any independent alterations to the compressor equipment/station or installing components which have not been approved by the manufacturer (e.g., separator) will result in the loss of the CE mark, or other factory certifications. As a consequence, all liability and warranty claims against the manufacturer will be terminated.

Safety Regulations

DANGER

Always observe the safety regulations in Section 4 of the user manual.

Technical Changes

We reserve the right to make changes in the course of technical development without prior notice.

4.1 General safety regulations

Danger	Safety measure required
Working with compressors involves dangers that are not immediately apparent.	Everyone working with the machine must have first read and understood the operating manual. Don't leave this until you start work – it's too late. Please keep this operating manual handy at all times on the site of the machine/installation, in the bag provided. Pay attention to all safety and danger warnings on the machine/installation! Deploy trained staff only. The responsibility of the personnel for operating, setting up and maintaining the machine/installation must be clearly defined. Make sure that only authorized personnel use the machine. Define who is responsible for operating the machine, and authorize him/her to ignore instructions from third parties if these instructions could compromise safety.
Symbols on the machine indicating dangers may become dirty or disappear.	Ensure that all safety and danger notices on the machine/system stay fully legible.
Faults and modifications to the machine may jeopardize safety.	In the event of malfunctions, shut down the machine/system immediately and secure it from being switched on again! Have malfunctions corrected immediately. Check the machine/installation for external damage and faults at least once per shift. Any changes noticed (including changes in operating performance) must be reported immediately to the authority or person in charge. If necessary, shut down and secure it from being switched on again.

4.2 Particular dangers associated with compressed air

Danger	Safety measure required
Compressed air is very powerful. It can be used, for example, to break open concrete but can also put lives at risk.	Never play with compressed air.
Small parts propelled at high speed by compressed air can penetrate the skin or destroy an eye.	When using compressed air to clean equipment, work with extreme caution and always wear suitable eye protection. Never direct compressed air onto the skin or toward another person. Never use compressed air for cleaning clothing.
Compressed-air connections may split and put people at risk.	Only connect the compressor to the existing compressed-air system when the service temperatures and service pressures are correct and the connecting flange and connecting thread are in full working order. All connected components must be of the correct size and be suitable for the specified operating pressure and temperature (i.e. distributing pipes and pipe connections). A hose connected to an air valve must be fitted with a safety wire for operating pressures above 100 PSI; it is in fact recommended that this safety device should be used for pressures above 60 PSI. The steel wire has a diameter of 0.315" and is firmly clamped to the hose at least every 20". Both ends should be fitted with cable lugs. Do not use chafed, damaged or poor-quality hoses. Only use the correct type and size of hose coupling and connection. The compressed air line connected at the air exit of the unit must not be under strain. No force should be applied to the outlet thread or the outlet flange by, for example, pulling on the lines or by mounting additional equipment (e.g., a water separator or a pneumatic oiler, etc.)
Compressed-air lines may be breached by accident.	Compressed-air lines have to be marked distinctly according to local regulations.
Compressed-air lines get hot and expand.	Make sure that the compressed-air line from the compressor to the air network can expand as a result of heat and cannot come into contact with flammable materials. Pipes and other parts with a surface temperature of more than 70°C must be suitably secured against contact and suitably marked.
Loose hose ends may flog and result in injury.	Fix the hose in such a way that it does not lash if the connection is broken. Before blowing through a hose or air line, it is essential to hold the open end firmly. Before disconnecting a hose, always make sure that it is not under pressure.

Danger	Safety measure required
Compression results in high temperatures. Risk of explosion from drawn-in materials.	The system should be set up such that hazardous mixtures (flammable solvent vapors etc., but also dusts and other dangerous or toxic materials) cannot be drawn in. The same applies to flying sparks. Never use the machine in environments where the possibility cannot be ruled out that flammable or toxic vapors may be taken in. The installation is to be set up in such a way that it is adequately accessible and that the necessary cooling is ensured. Never block the admission of air. Compressor units must never be operated in areas subject to explosion hazards! (Exception: Special units with the corresponding technical modifications)
There is strong suction at the air inlet.	The air intake is to be designed in such a way that no loose clothing can be drawn in.
There is a risk of injury, e.g., from getting stuck or being drawn in.	Personnel must not have long, loose hair, or wear loose clothing or jewelry, including rings, due to risk of injury through catching. Personal protective equipment should be worn if necessary.
Connected compressed air tools may start up unexpectedly when switching on.	Before switching on the machine/installation, or starting it up, make sure that nobody can be injured by the machine/installation as it starts up.
Compressed air may contain substances that may damage your health if inhaled.	The compressed air produced by these compressors must not be used as breathable air, unless it has been processed specially for such an application in accordance with the “Safety requirements for breathable air.” When a breathing apparatus with cartridges is used, make sure that the correct cartridge has been inserted and that its service life has not expired.
The pressure relief valves in the system only guarantee the pressure relief for the compressor unit.	The pressure devices/systems connected to the compressor must be secured, allowing for the weakest pressurized component (pressure relief valve or similar).
As a rule:	If several compressors are arranged in a system, manually operated valves have to be installed so that each machine may be shut off individually. For the purpose of shutting off pressurized systems, you should never rely on the effectiveness of return valves alone. All pressure tanks located outside the unit with an approved operating pressure higher than atmospheric pressure and fitted with two or more pressure feed lines must be equipped with an additional safety device to automatically prevent the approved operating pressure from being exceeded by more than 10%. Never operate the system at temperatures and/or pressures below or above the values indicated in the technical data sheet.

4.3 Particular dangers associated with machines

Danger	Safety measure required
Risk of electric shock.	Electrical connections must meet local regulations. Power units must be connected to earth and protected from short-circuits by means of fuses.
Insufficient power quality could have a strong effect on health & safety and may constitute a risk to life and limb of the user or third parties.	Always check a correct power supply to the compressor before commissioning. The voltage supply has to fulfill the requirements of NFPA70-NEC for this type of industrial equipment.
Remote-controlled units may start up unexpectedly.	If a remote control is used, the system must carry a clearly visible sign with the following note: Attention! This installation is operated by remote control and can start up without prior warning! As an additional safety measure, persons who start remotely-controlled systems have to take sufficient safety precautions in order to ensure that nobody is checking the system or working on it. For this, a label with a corresponding warning notice has to be attached to the remote control equipment.
Noise, even when it is not very loud, can make us nervous and irritated, and after a longer period of time our nervous system can suffer serious damage.	We recommend a separate machine room in order to keep the noise of the machine away from the workshop. Where necessary, wear the personal hearing protection. Shielding and doors must be closed during operation so that the efficiency of the sound insulating is not reduced.

4.4 Dangers present when loading/moving machines

Danger	Safety measure required
Loose parts may fall off when lifting.	All loose parts must first be removed or secured; parts fitted so that they can turn like doors etc. must be secured and made immobile. Parts to be removed for transport purposes must be carefully refitted and fixed again before putting the machine/installation back into operation.
The compressor may fall if mistakes are made when lifting.	Only use lifting tackle approved for the weight in question. Observe the operating manual for the lifting tackle. When heavy loads are being conveyed by means of hoisting gear, it is imperative to keep well clear of the load in order to avoid accidents. The person giving the instructions must be within sight or voice contact with the operator.
Safety components may be damaged if lifted incorrectly.	Machines may only be hoisted correctly using hoisting gear in accordance with the information in the operating manual (lifting spots for heavy-lift facilities etc.) To avoid damage to the system or external installations, the compressed-air connection, condensation drain and electrical connection should be isolated from external lines and hoses. The system must be set up on a level surface with full contact between its base frame and the supporting surface.

4.5 General workplace dangers

Danger	Safety measure required
This manual only describes how to work safely with the compressor itself. But other dangers will arise during work.	Please note and pass on general statutory and other binding regulations that may supplement the operating manual for the prevention of accidents and the protection of the environment. Such obligations may be, for example, the handling of hazardous materials, or the provision and/or wearing of personal protective equipment, or traffic regulations. Instructions, including supervisory responsibility and duty of notification for taking account of special in-plant factors, for example, regarding work organization, sequences of operations, personnel assigned to certain tasks, are to be added to the operating manual. Before starting work, make yourself familiar with the working environment at the installation site. The location and operation of fire extinguishers must be made known. Observe the instructions concerning fire alarm and firefighting. Set up the machine in such a way that no inlets, outlets or gates are blocked. When handling chemical substances, observe the safety regulations applicable for the product. Use caution when handling process materials (risk of burning/scalding).

4.6 Dangers resulting from neglecting to perform maintenance

Danger	Safety measure required
Components important to safety wear over time.	Observe the setting, maintenance, and inspection work and intervals stipulated in the operating manual, including information about the replacement of parts/partial sections. This work may only be carried out by trained specialists. Observe the intervals stipulated or those given in the operating manual for routine checks and inspections. Verify on a regular basis that pressure relief valves and other pressure relief devices are in perfect condition and are not blocked, for example, by dirt or paint. Check on a regular basis that all safety mechanisms are fully functional. Correct any malfunctions immediately.
Air and Oil lines deteriorate	Check regularly that all hoses and/or pipes within the system are in good condition, firmly fixed and do not chafe. Replace hydraulic hose lines at the stated intervals even if no defects of relevance to safety are apparent!
Spurting oil can result in injuries.	Check all lines, hoses, and bolted connections on a regular basis for leaks and visible damage. Repair damage immediately and always arrange for damaged parts to be replaced!
Risk of electric shock.	Have the electrical equipment on a machine/system checked regularly. Have Defects, like loose connections or charred cables, corrected immediately. Use only original fuses with the specified current rating. In the event of faults with the electrical power supply, switch the machine/system off immediately, and secure it from being switched on again!

Danger	Safety measure required
In the event of faulty sensors, the system can be led into a dangerous state of operation.	Check the accuracy of pressure and temperature indicators at regular intervals. If the admissible tolerance limits have been exceeded, these devices must be replaced immediately.

4.7 Dangers during maintenance and repairs

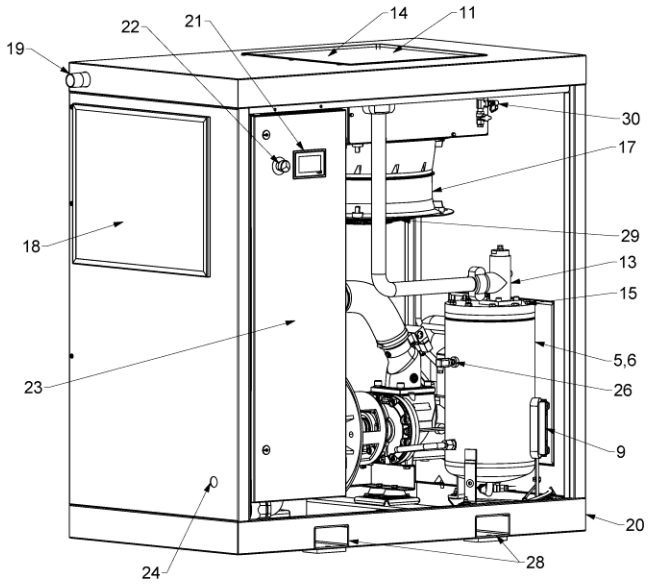
Danger	Safety measure required
During maintenance and repairs, parts that may be pressurized must be removed. If you maintain the compressor and have not been trained by DV Systems, you will put yourself and others at risk.	The compressor can only be maintained by specially-trained technicians. Contact your DV Systems agent.
Incorrectly installed spare parts may jeopardize safety, e.g., tear when loaded.	Spare parts must meet the technical requirements laid out by the manufacturer. This is always guaranteed when original spare parts are used.
Risk of electric shock.	Work on the electrical systems of the machine/installation may only be carried out by a trained electrician in accordance with electrical regulations. The system must be secured from being switched on. Seal off the main switch and remove the key and/or attach a warning sign to the main switch. Variable speed only: Danger of electric shock from loaded condensers! Always first disconnect the system from the power supply and wait another 10 minutes before touching the electrical components. The power condensers require this time in order to discharge! Check the DC bus voltage at the system terminal strip of the frequency converter by measuring this between the +DC and -DC terminals (the exact position can be found in the supplied frequency converter operating manual), between the +DC terminal and the chassis as well as between the -DC terminal and the chassis. The voltage must read zero in all three measurements.
The machine may start up unexpectedly.	Only carry out maintenance and repair work when the system is not in operation and the power supply disconnected. Ensure that the power unit cannot be switched on inadvertently. The system must be secured from being switched on. Seal off the main switch and remove the key and/or attach a warning sign to the main switch.
Risk of injury from pressurized or moving parts.	Only carry out inspection, maintenance, and repair work when the screw compressor system is at a standstill and is not under pressure. The system must be secured from being switched on. Before removing or opening pressurized components, positively isolate any source of pressure and depressurize the entire system.

Danger	Safety measure required
During the course of maintenance and repairs, parts can be damaged which are important for safety.	Never weld any pressure reservoir or modify it in any way. If work which produces heat, flames, or sparks has to be carried out on a machine, the adjacent components must be protected by means of inflammable material. Motor, air filter, electrical components, and regulating equipment must protected from the ingress of humidity, e.g., when cleaning the system by means of a steam jet. Under no circumstances should the sound-proofing material be removed or modified. Never use etching solvents which could attack the materials used. Before cleaning the machine with water or steam jet (high-pressure cleaner) or other cleaning agents, cover/mask all openings which must be protected from the ingress of water, steam or detergents for safety and/or functional reasons; in particular electric motors and switch cabinets. After cleaning, remove the covers/masking completely.
Modifications to the machine impair safety.	After completing repair work, always check to see whether any tools, loose parts or cloths have been left in or on the machine, driving engine or driving equipment. After the work has been completed, replace any protective devices that have been removed. Operation without protective devices is not permissible. Always re-tighten screwed connections which were loosened for maintenance and repair work. Machines performing rotating movements must be cycled several times in order to ensure that there are no mechanical faults in the machine or the drive member. Before releasing the power unit for operation after maintenance or overhaul, check that the operating pressures, temperatures and time settings are correct and that the regulating and shutdown equipment function properly.

4.8 Dangers resulting from conversion work/modifications on the machine

Danger	Safety measure required
Genuine parts are designed especially for the machine. Modifications may interfere with safety equipment or give rise to new dangers for which protection is not provided.	No alterations, additions, or modifications to the machine may be carried out without the approval of the manufacturer. Unauthorized modifications to the machine are prohibited for reasons of safety. Original parts are specially-designed for our machines. We must explicitly point out that parts and special accessories not supplied by the manufacturer are not approved by DV Systems. Installing or using such products will adversely affect active and/or passive safety. The manufacturer accepts no liability whatsoever for damage resulting from the use of non-original parts or special accessories. This also applies to the installation and adjustment of safety devices and valves as well as to welding on bearing and pressurized parts.
If protective equipment is not functioning, operating the system may put lives at risk.	Only operate the machine when all protective devices, shutdown devices, sound-insulating equipment and extraction equipment are in place and working. Safety devices, protective covers, or insulations mounted on the system must not be removed or modified in any way.

5.1 Design of the unit



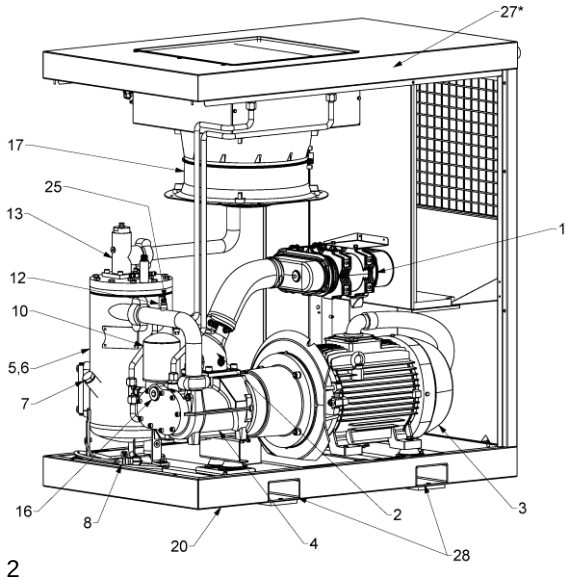


Fig. 2

1. Intake Filter
2. Intake Valve
3. Electric Motor
4. Screw Compressor
5. Pressure Reservoir
6. Fine Oil Separator
7. Oil Fill
8. Oil Drain
9. Oil Level Indicator
10. Oil Filter
11. Oil Cooler
12. Pressure Relief Valve
13. Minimum Pressure Valve & Non-Return Valve
14. Air Cooler
15. Fine Oil Separator Access
16. Oil Temperature Regulator
17. Cooling Fan
18. Cool Air Inlet Filter
19. Compressed Air Outlet
20. Base Frame
21. Compressor Controller
22. Emergency Stop Button
23. Control Cabinet
24. Feed Cable Entry
25. Final Compression Temperature Sensor
26. System Pressure Sensor
27. Final Compression Pressure Sensor (*Not Shown)
28. Opening For Lifting Equipment
29. Fan Guard
30. Oil Sampling Valve

5.2 System Schematic

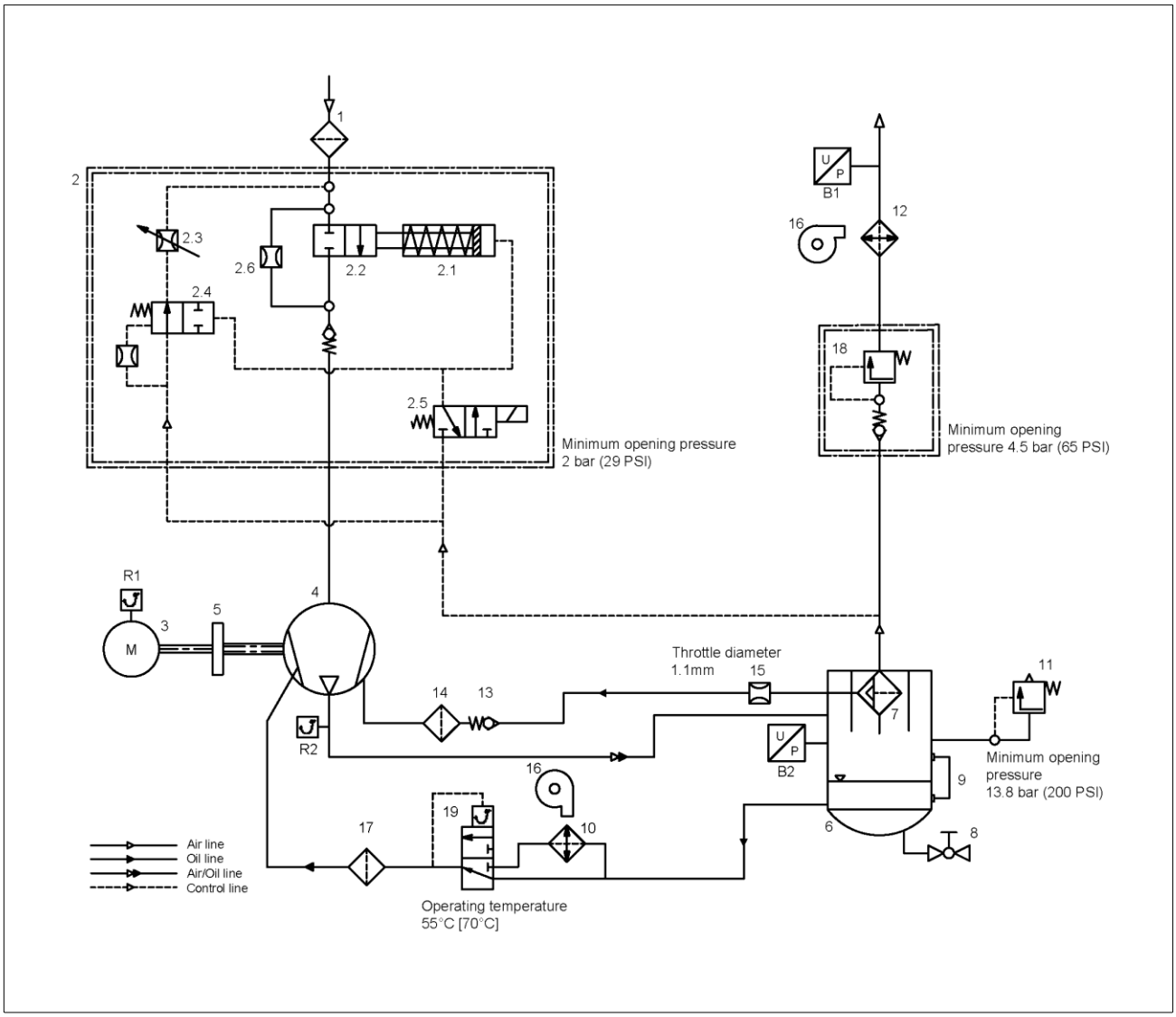


Fig. 3

1 Intake filter
2 Intake Valve
  2.1 Actuating Cylinder
  2.2 Pressure control valve - NC
  2.3 Discharge control screw
  2.4 2/2 Discharge valve – NO
  2.5 3/2 Solenoid valve – NC
  2.6 Bypass orifice
3 Electric motor
4 Compressor
5 Direct coupled drive
6 Air/Oil receiver
7 Air/Oil separator
8 Oil drain valve
9 Oil level sight gauge
10 Oil cooler
11 Pressure relief valve
12 Air cooler
13 Scavenge check valve
14 Scavenge inline filter
15 Scavenge orifice
16 Cooling air fan
17 Oil filter
18 Minimum pressure valve
19 Thermostatic valve and
  non- return valve

R1 Motor temperature
R2 Oil temperature
B1 Plant pressure
B2 Reservoir pressure

5.3 Oil circuit

The oil flows from the air/oil receiver (-6-) into the oil temperature regulator (-19-). With oil temperatures < 55°C the oil flows via the by-pass of the oil cooler directly into the oil filter (-17-) and is then injected into the screw compressor (-4-).

With oil temperatures of between 55°C and 70°C the oil flow is divided and fed into the oil cooler (-10-) and the by-pass.

With oil temperatures above 70°C the entire oil flow is directed via the oil cooler through the oil filter into the screw compressor.

The oil separated by the oil separator element (-7-) is fed through an oil scavenge line to the screw compressor.

The entire oil circulation is based on a differential pressure in the system. Considering the pressure difference of approx. 29 PSI within the oil circuit, the oil is then injected into the screw compressor with approx. 116 PSI at a reservoir pressure of e.g. 145 PSI.

When the screw compressor is in the off-load mode, a sufficiently high pressure differential and thus the required oil injection quantity is achieved owing to the fact that when the intake valve (-2-) is closed, a vacuum pressure occurs in the intake connection and at the place of injection.

Excess pressure of approx. 22 PSI (off-load pressure) is produced in the pressure reservoir at the same time.

5.4 Air circuit

The intake air passes through the intake filter (-1-) and the intake valve (-2-) into the screw compressor (-4-). During the compression process, the intake air is cooled via the injected oil. The developed air/oil mixture flows tangentially into the pressure reservoir (oil reservoir) (-6-). After pre-separation and subsequent fine separation by the separator element (-7-), the compressed air with a low oil content is fed via the minimum pressure valve (-18-) and the air cooler (-12-) into the consumer network.

5.5 System control

(See also operating instructions for the compressor controller)

Standstill of the system

- If the plant is shut down, the suction controller (-2-) is closed by a pressure spring at the actuating cylinder (-2.1-).
- The solenoid valve (-2.5- (Y1)) is de-energized.
- The oil separator vessel is released via valve (-2.4-) to atmospheric pressure.

Starting the system

- The motor starts up in the Y-mode.
- The intake valve is closed and the solenoid valve (-2.5 (Y1)) is de-energized.
- The compressor aspires a certain amount of air through a bypass orifice in the intake valve butterfly plate (-2.6-). Pressure begins to build up in the air/oil receiver (-6-).
- The oil supply of the screw compressor takes place through a pressure differential between the pressure vessel and the injection spot in the screw compressor.
- As the drive motor is switched over to Δ operation, the solenoid is energized and opens (-2.5- (Y1)).
- The air circulated in the system passes through the solenoid valve (-2.5- (Y1)) into the upper control area of the operating cylinder (-2.1-). The blow off valve (-2.4-) is closed. The lower control space of the actuating cylinder is ventilated.
- The actuating cylinder (-2.1) opens the pressure control valve (-2.2-) and the intake valve (-2-) opens. Pressure continues to build up in the air/oil receiver.
- At a reservoir pressure of approx. 65 PSI the pressure holding and check valve (-18-) opens.
- Compressed air is now delivered into the consumer network.
- The system is now in load running mode.

Stopping the system

- Solenoid valve (-2.5- (Y1)) is de-energized when the STOP button on the operating panel of the compressor controller is pressed.
- The upper control space of the adjusting cylinder (2.1) is ventilated by the solenoid valve (-2.5- (Y1)), the pressure spring in the adjusting cylinder causes the choke valve (-2.2-) in the intake valve to close.
- The air/oil receiver is relieved to blow down pressure (residual pressure) via the discharge valve (-2.4-).
- After a set timeout, the drive motor (-3-) and the cooling air ventilator motor (-16-) are shut down.

Automatic operation (open-close operation)

- When the pressure reaches the unload set point at the plant pressure sensor (B1), solenoid valve (-2.5- (Y1)) is de-energized.
- The upper control space of the adjusting cylinder (2.1) is ventilated by the solenoid valve (-2.5- (Y1)), the pressure spring in the adjusting cylinder causes the choke valve (-2.2-) in the intake valve to close.
- The air/oil receiver is relieved to blow down pressure (residual pressure) via the discharge valve (-2.4-).
- The screw compressor is now running in the offload mode.
- When the pressure at the network pressure sensor (B1) does not fall to the load set point within the set motor run-on time (e.g. 120 seconds), the drive motor (-3-) and the cooling air ventilator motor (-16-) are shut down and the system is depressurized to atmospheric pressure.
- The system is now in the “stand-by” mode and can restart at any time when the network pressure falls to the load set point (see section “Starting of the system”).
- When the pressure falls to the load set point before the set motor run-on time has elapsed, solenoid valve (-2.5- (Y1)) is energized again.
- The unit now changes over to on-load operation.

WARNING

Do not stop the Unit using the Emergency Stop Button unless there is a danger to the product or of personnel injury.

Using the Emergency Stop Button, disconnect, or breaker to stop the Unit will not all the Unit to go through an unloading sequence, and could result in damage to the Motor, Starter, or other electrical components. Damage caused in this manner is not covered by the manufacturer’s Warranty.

5.5.1 Manner of operation of the intake valve

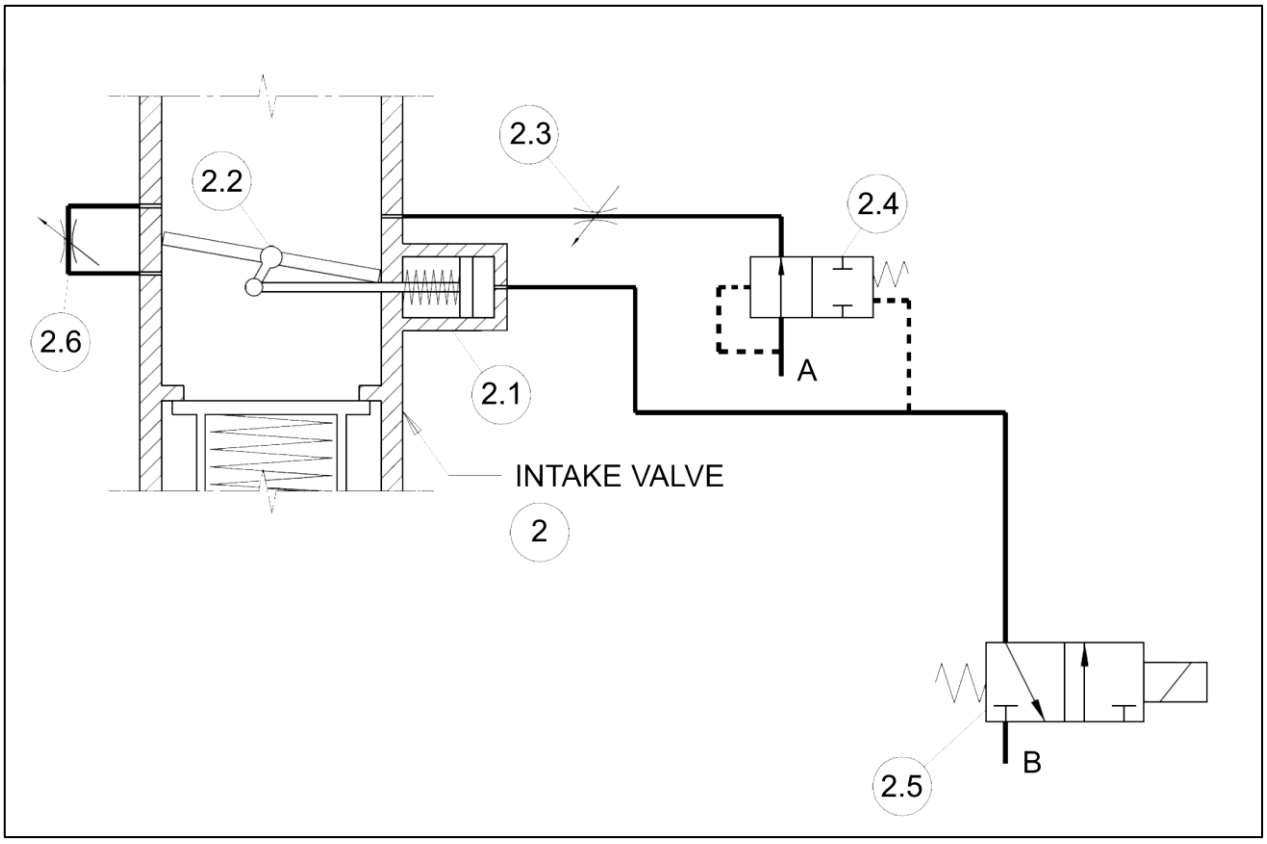


Fig. 4

2. Intake Valve
2.1 Actuating Cylinder
2.2 Pressure Control Valve – NC
2.3 Discharge Control Screw
2.4 2/2 Discharge Valve – NO
2.5 3/2 Solenoid Valve – NC
2.6 Bypass Control Screw (Orifice)

Load running mode
When the unit is running on load the solenoid valve (-2.5-) is energized. The discharge valve (-2.4-) is closed. Compressed air flows through the solenoid into the upper control chamber of the actuating cylinder (-2.1-). The actuating cylinder holds the pressure control valve (-2.2-) open and allows air to enter the air end.

Idling mode
When the unit offloads the solenoid valve (-2.5-) is de-energized. The actuating cylinder (-2.1-) is closed, which holds the pressure control valve (-2.2-) closed and prevents air from entering the air end. The discharge valve (-2.4-) is opened and releases the pressure in the air/oil receiver. A small amount of air is permitted to enter the air end through the bypass screw or orifice (-2.6-). This allows the air/oil receiver to remain at the blow down pressure and ensures that oil continues to circulate into the air end while the unit is running offload.

6.1 Transport

DANGER

The compressor or parts of it may fall if mistakes are made when lifting, and this will put your life at risk. Safety devices may be damaged if lifted incorrectly.

- **Always observe the safety notes in Section 4.5 of the user manual.**
- **Never lift the compressor by or tie onto its enclosure.**
- **A suitable fork lift which complies with local safety regulations must be used when lifting the compressor.**
- **The fork length of the fork lift must correspond to the unit width (see Section 12.2).**
- **Keep the distance between the forks (see Fig. 6) and their length in mind when transporting the compressor.**
- **All loose parts or parts which can swing freely must be safely secured before the unit can be lifted.**
- **It is strictly prohibited to stand in the danger zone of a lifted load.**
- **Ensure that the transport load approach is performed properly (according to the user manual of the lifting device).**

NOTICE

Before transporting, the motor shipping cleat (-1- Fig. 7) must be installed.

Only use the appropriately marked lifting points. Shifting the system after it is lowered is not permitted.

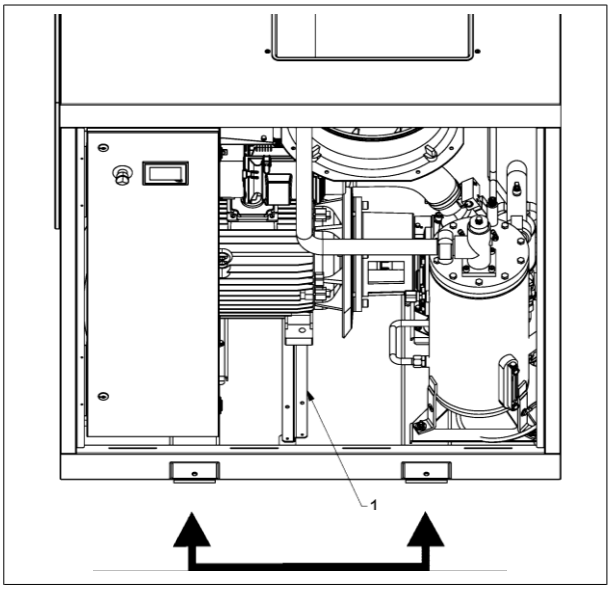


Fig. 6

1 Motor Shipping Cleat

Weights

The values listed below are approximate values, they refer to a screw compressor unit including oil fill:

H40	1900 lbs
H40VSD	1900 lbs
H50	1900 lbs
H50VSD	1900 lbs

6.2 Installation

DANGER

Always observe the safety notes in Section 4 of the user manual.

Pay attention to the weight bearing capacity of the ground.

DANGER

Risk of explosion - The compressor intake should be set up such that hazardous mixtures (solvent vapors etc.) cannot be sucked in. The same applies to flying sparks.

CAUTION

Burn Hazard - Pipework or other parts with a surface temperature of over 70°C must be labeled and appropriately protected from being touched.

NOTICE

The operator must always provide sufficient ventilation and exhaust for the compressor station.

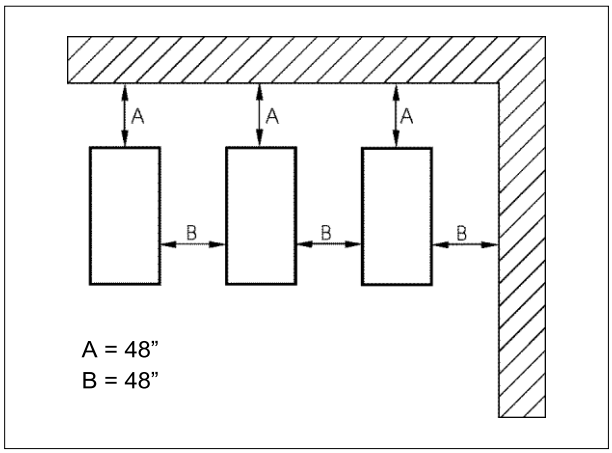


Fig. 8

The screw compressor unit has to be leveled. The system may not be run while on the transport pallet.

A minimum distance from walls, other machines, etc. should be maintained so that there is sufficient clearance for maintenance and repair work (Fig. 8). Allow a minimum of 60” to the nearest obstruction above the unit.

During operation of the screw compressor unit, heat is generated by the electric motor and the compression process. The screw compressor radiates a part of this heat into the surroundings.

Proper ventilation has a considerable effect on the service life and the performance of a compressor.

Once the compressor has been installed, the motor shipping cleat can be removed. The shipping cleat prevents the drive assembly vibration isolators from being damaged during transport. Retain the shipping cleat for future transport.

Vibration isolating rubber mounts for the unit are available as part of the installation kit, PN **IK4050**.

Fill out the nameplate and distributor information tables on Page 5 for future reference.

Register you warranty as described on Page 1.

7.1 Cooling air volume/minimum cross

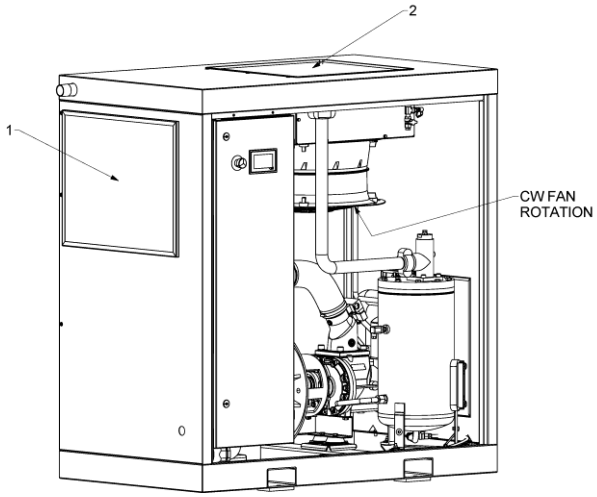


Fig. 9

1 Cool air intake
2 Cool air exhaust (Fan rotation clockwise when viewed from bottom)

The cooling air volume required by these screw compressors is as follows:

H40	2085 cfm
H40 VSD	2085 cfm
H50	3357 cfm
H50 VSD	3357 cfm

NOTICE

The stated minimum cross-section refers to a maximum duct length of 16.4 ft and a maximum of one bend. In the event of differing values (over 16.4 ft, more than one bend, filter cartridges, screens, etc.), please contact your technical adviser.

DV Systems screw compressors are rated for ambient temperatures and cooling temperatures of 10°C to 40°C.

In the case of temperatures other than the above limiting values, please consult your technical adviser.

NOTICE

In order to ensure a good heat dissipation, auxiliary fans should be rated to process approximately 15 to 20% more air volume than the total cooling air quantity required by the compressors installed in the compressed air station.

The figures below show the recommended ventilation sections arrangement:

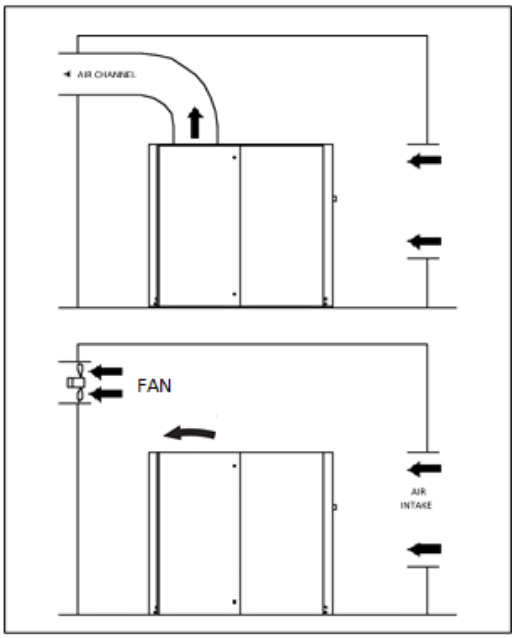


Fig. 10

If conditions are not favorable, we recommend the installation of venting ducts. However, the velocity of the cooling air should not exceed 17ft/sec. We recommend a minimum duct cross-section of approx. 6 ft^2.

7.2 Compressed-air connection

WARNING

A defective connection to the compressed-air system may jeopardize safe operation of the compressed-air system.

When connecting the compressor outlet to the customer's existing compressed-air system, check that the necessary operating temperatures, operating pressures as well as the necessary connecting flange or connecting thread are appropriate and in perfect working order.

For connections with hoses, take steps so that if an end breaks free it will not "whip" around dangerously.

NOTICE

After-coolers, separators, collecting reservoirs and the compressed-air lines must be equipped with drain facilities at their lowest points to drain collected liquids. These facilities have to be fitted to allow the observance of the draining of such liquids.

Hand-operated drain facilities have to be actuated in accordance with the operating instructions.

Automatic drain facilities have to be checked for proper function at regular intervals. When draining condensates into a collecting line, which also collects the condensate from other machines, make sure that the collecting line is free from back pressure at all lines.

When draining condensate, observe the corresponding regulations for waste water disposal.

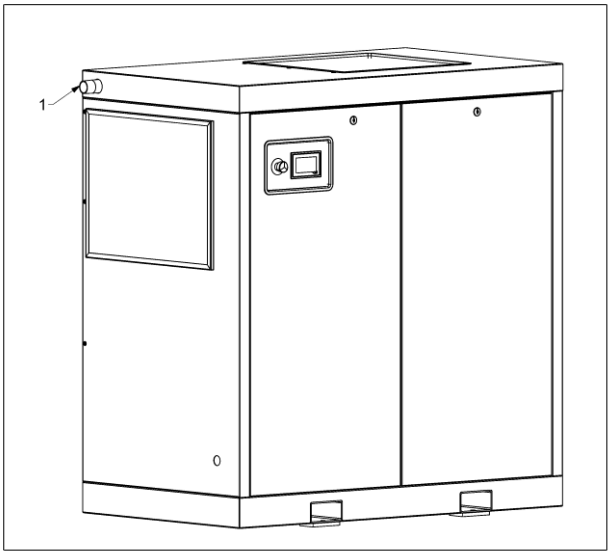


Fig. 11

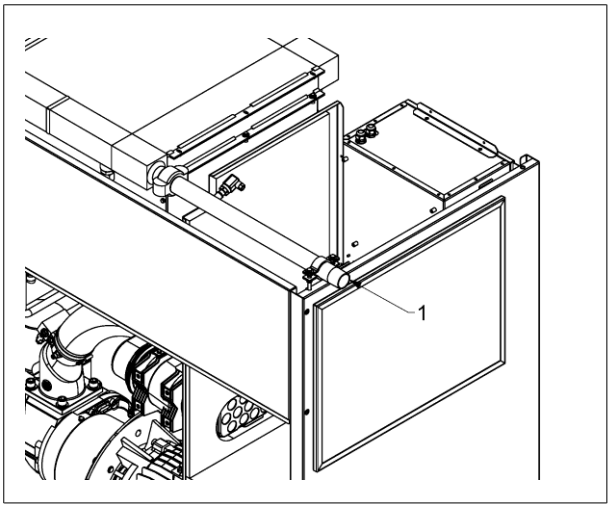


Fig. 12

1 Compressed-air connection

The compressed-air line system is connected at the compressed air supply of the screw compressor (-1- Fig. 11).

For this you should use a flexible connection (e.g., compressed air hose, compensator). A flexible hose is available in the installation kit PN **IK4050**.

Do not twist the outlet pipe when installing the compressed air connection. Doing so can damage the internal components of the compressor.

Connection Type: NPT 1 ½" – 11 ½

7.3 Electrical connection (USA/CANADA Version only)

DANGER

Risk of severe damages and fire on the electric power components.

- **The power supply to the compressor side must be fitted for industrial equipment and fulfil the requirements of all applicable codes and regulations.**
- **The electrical connection should be made by a qualified electrician.**

DANGER

Only for H40-50 VSD: There is a risk of electric shock from charged capacitors!

- **Disconnect the system from the mains and wait 10 minutes before touching electrical components. The power capacitors need this time to discharge.**

WARNING

If local regulations are stricter than the values given below, observe the stricter regulations.

If the electrical connection is made to a non-earthed three-phase system (IT network), please see the corresponding notes in the included frequency converter documentation.

If a residual current device (RCD) is used to monitor the earthing connection in the system for earth faults, to prevent interruptions only Type B devices (adjustable trip setting and delay) may be used.

Apply all covers and panels before applying power to the unit.

Failure to install proper fuse protection may void the unit warranty.

The product must be connected to a grounded, metallic, permanent wiring system, or an equipment-grounding terminal or lead on the product.

To establish an electrical connection, proceed as follows:

Route the supply cable (-1- Fig. 13) through the power inlet on the side of the compressor and into the control box.

Connect the supply line to the connecting terminals as shown in the circuit diagram.

The power inlet holes in the compressor cabinet and the control box are sized for 1" conduit. It is recommended to pass the conduit through the left panel of the cabinet and attach it to the power box with a connection fitting to preserve the sealing of the control box. It may be necessary to punch the openings larger to accommodate larger conduit sizes or wire gauges if required by the electrical code.

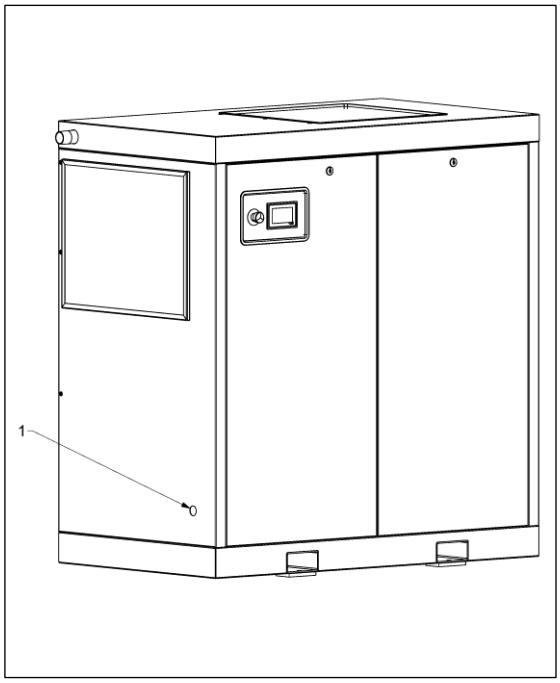


Fig. 13

7.3.1 Check setting of the motor (FS only) and fan protection switches

Check the setting of the motor and fan protection switches in accordance with the table below. Motor protection switch is only present on fixed speed units. Use the value corresponding to the horsepower and mains voltage of the unit (see circuit diagram).

PACKAGE HP	Voltage	Motor Protector Dial Setting (FS Only)	Fan Protector Dial Setting
40	230	58.53	1.65
	460	29.26	0.82
	575	23.6	0.66
50	230	71.17	3.00
	460	35.58	1.45
	575	27.9	1.15

7.4 Checking the Oil Level

DANGER

Air/oil under pressure will cause severe personal injury or death.

- **Shut down the compressor, relieve the system of all pressure, disconnect, lockout and tagout the power supply to the compressor package before removing valves, caps, plugs, fittings, bolts and filters.**

CAUTION

Fire hazard and slip hazard!

- **Do not spill any oil!**
- **Look for leaks! Immediately take care of any spilled oil!**

NOTICE

Do not mix oils with different specifications.

If the compressor system is delivered without oil, oil must first be filled into the pressure reservoir up to the “maximum oil level” mark. (For oil filling also see Sections 10.4 and 10.13)

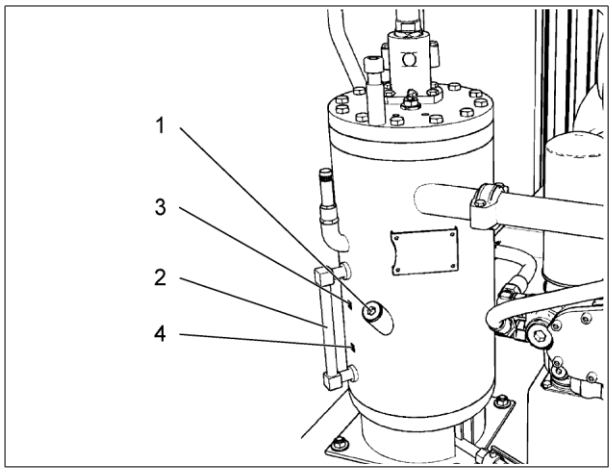


Fig. 14

1 Oil filler cap R1"
2 Oil-level indicator
3 Maximum oil level
4 Minimum oil level

Check the oil level as follows:

- Shut off the compressor with the STOP button.
- Wait at least 5 minutes until the oil has settled, i.e. until the air has bubbled out.
- The oil level should be checked at each pause in operation and at regular intervals using the oil level gauge on the pressure reservoir (-2- Fig. 14).
- The oil level must lie between the “maximum oil level” (-3- Fig. 14) and “minimum oil level” (-4- Fig. 14) marks on the oil gauge.
- If required, top up oil. Use DV Systems oil only.
- Close the oil filler cap (-1- Fig. 14) firmly.

Also see Section 10.13 “Service and Maintenance.”

8.1 First commissioning

DANGER

The rotational direction of the motor can only be checked with the casing open. Rotating parts may lead to injuries, e.g., cutting of finger or hand.

- **Before commissioning make sure that no one is located in the danger zone of the screw compressor!**
- **Be careful of rotating parts!**
- **Keep a sufficient distance from rotating machine parts!**
- **Wear ear protectors.**
- **Always operate system with the casing closed except when performing this test.**

CAUTION

Damages during transport may impair safety!

- **Before commissioning, every screw compressor should be checked again for damage and should be watched during the first hour of operation.**

NOTICE

When the compressor system is connected to a power source for the first time, always check the drive direction of the drive motor. The compressor controller provides a jogging function under the diagnostics menu. See the controller manual for additional instruction. Incorrect rotation of the compressor may cause serious damage, even during short periods of operation.

First commissioning is carried out as follows:

- Remove transport guards, if fitted, and motor shipping cleat.
- Check the oil level in the pressure reservoir (also see Section 7.4 Fig. 14)
- Check settings of the fan motor protection switch (see Section 7.3.1)
- Check and re-tighten all connecting terminals of the electrical control.
- Open isolator valves between the screw compressor, reservoir and pipe.
- Turn on the main power supply switch.
- After the power supply is switched on, the compressor controller will boot to the home screen. The fault shown on the display [power supply fault] must be acknowledged in the alarm screen prior to starting the unit.
- After the acknowledgement, the message [READY TO START] appears on the display, unless another fault is present. Resolve any other faults before starting the unit.
- The factory settings of the Load, Target and Unload set points are saved in the compressor controller and depend on the pressure variant of the compressor (see nameplate fig. 1, pressure variant = maximum operating pressure). These settings can be checked or changed in the Settings -> Control menu (further information can be found in the compressor controller operating manual).
- Temporarily remove the coupling cover plate in order to check the direction of rotation. See (-1- Fig. 15a) for the prescribed direction of rotation of the drive motor of the geared compressor. See (-1- Fig. 15b) for the prescribed direction of rotation of the drive motor of the direct drive comrpessor. For the prescribed direction of rotation of the fan, see direction of rotation arrow sticker near the fan (-3- Fig. 15c).
- Use the jog motor function in the diagnostics menu to jog and check direction of rotation of the main and fan motor.
- With a wrong direction of rotation, de-energize/lock out and correct the direction of rotation.

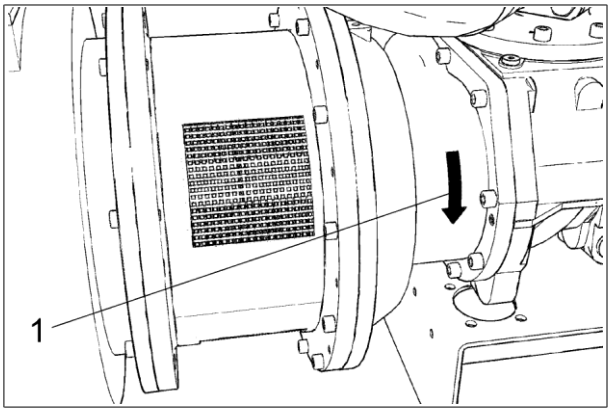


Fig. 15a

1 Drive motor direction of geared compressors

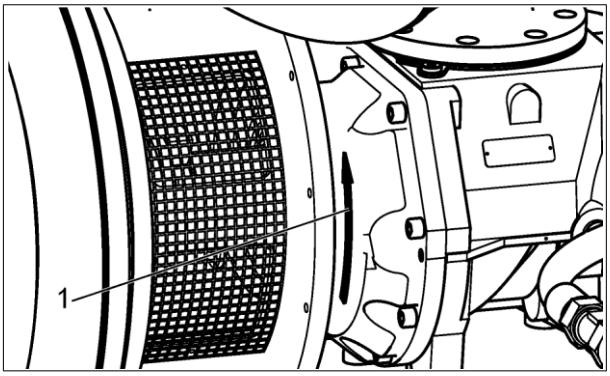


Fig. 15b

1 Drive motor direction of direct drive compressors

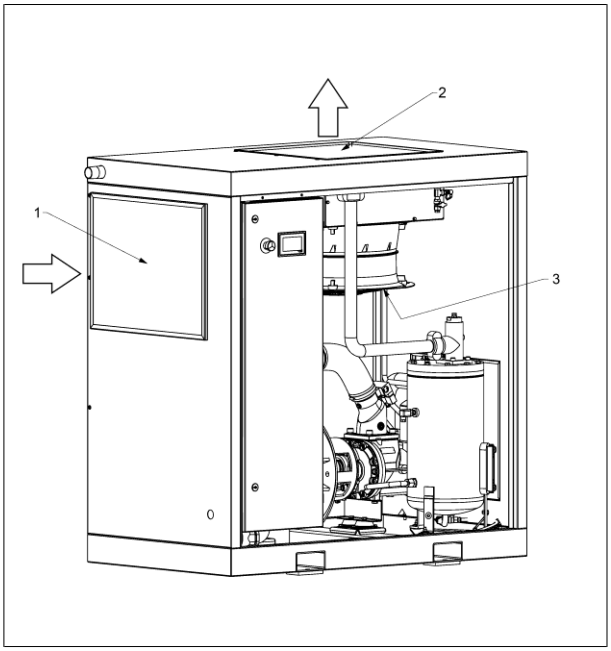


Fig. 15c

1 Cooling air inlet
2 Cooling air outlet
3 Cooling fan

NOTICE

For switching the compressor off “normally”, use only the stop push-button (-3- Fig. 16), but not the EMERGENCY STOP push-button. After having been switched off, the compressor is after-cooled for 30-50 seconds (soft stop).

Temperature start-up protection

The screw compressor unit will not start up if the ambient temperature is lower than 5°C.

8.2 Putting a decommissioned compressor back into operation

Before commissioning the compressor all the electrical and electronic components and units should be checked for the ingress of water or condensation.

If the electronic control system was removed during shut down, it must be re-installed.

Then proceed as described in chapter 8.1 'First commissioning'.

8.3 Display of the compressor controller

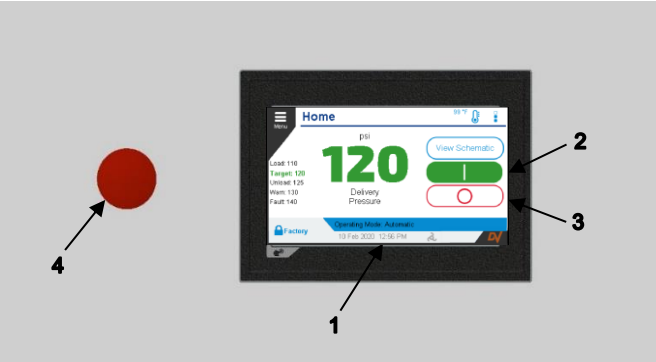


Fig. 16

1. Touchscreen Display
2. Start push-button [I]
3. Stop push-button [O]
4. Emergency Stop

WARNING

The compressor can be automatically started at any time when it is in enabled mode.

8.4 Routine commissioning

WARNING

Rotating parts inside the unit may lead to injuries, e.g., cutting of finger or hand.

- **Before commissioning make sure that no one is located in the danger zone of the motor/screw compressor!**
- **After doing work: Check that all safety equipment is reinstalled and that all tools have been taken out!**
- **Only operate the screw compressor with the coverings closed!**

For routine commissioning, proceed as follows:

- Check the oil level in the pressure reservoir (also see Section 7.4)
- Open shut-off valves between the screw compressor, reservoir and pipe.
- Turn on the main power supply switch.
- After the power supply was switched on, the compressor controller will boot to the home screen. The fault shown on the display [power supply fault] must be acknowledged in the alarm screen prior to starting the unit.
- After the acknowledgement, the message [READY TO START] appears on the display, unless another fault is present.
- Press START button [I] (-2- Fig. 16).

NOTICE

For switching the compressor off “normally”, use only the stop push-button (-3- Fig. 16), but not the EMERGENCY STOP push-button. After having been switched off, the compressor is after-cooled for 30-50 seconds (soft stop).

Temperature start-up protection

The screw compressor unit will not start up if the ambient temperature is lower than 5°C.

8.5 Commissioning after malfunction

NOTICE

Do not switch the screw compressor on repeatedly without having rectified the malfunction, since this may cause considerable damage to the machine.

Re-start after an automatic shutdown due to a malfunction as follows:

- Faults are shown as text in the compressor controller Alarms menu.

⚠ **Turn master switch off and secure it from being switched on again.**

- Eliminate fault.
- Turn master switch on.
- Acknowledge the fault in the fault memory menu. After the acknowledgement, the message [READY TO START] appears on the display, unless another fault is present.
- Press START button [I] (-2- Fig. 16).

8.6 Shutoff

To switch off the compressor use the [O] key (-3- Fig. 16) and not the EMERGENCY STOP button. After shutdown the compressor has a run on time of 30-50 seconds (soft-stop).

NOTICE

The unit may only be shut down using the emergency stop button in real emergencies. When shutting down normally, please use the [O] (STOP) key.

8.7 Emergency stop

The EMERGENCY STOP button is situated next to the compressor controller. It is used to immediately shut down the unit. Only use the EMERGENCY STOP button (-4- Fig.16) to shut down the unit in emergencies. When shutting down normally, always use the [O] (STOP) key.

⚠ WARNING

Do not stop the unit using the Emergency Stop Button unless there is a danger to the product or of personnel injury.

Using the Emergency Stop Button, disconnect, or breaker to stop the Unit will not allow the Unit to go through an unloading sequence, and could result in damage to the Motor, Stator, or other electrical components. Damage caused in this manner is not covered by the manufacturer's Warranty.

9.1 Decommissioning

All compressors are protected against corrosion at the factory for transport and for brief storage before commissioning.

If the compressors are to be stored for period exceeding six months, additional precautions must be taken.

Compressors which are to be shut down for a lengthy period must also be protected from corrosion.

Since corrosion occurs more quickly in damp atmospheres than in dry conditions, it is not possible to specify a maximum permissible standstill time which will apply in all cases.

NOTICE

The following aspects must be taken into account for storage of storing compressors.

The compressor should be stored in a dry building which should be heated if possible. This is particularly true during the months of winter.

The coolant is to be completely drained where there is a risk of frost (t < 1°C) (compressor stage, coolers, system containers, water filters, storage containers, RO unit, lines, valves).

If there is a risk that the temperature will fall or rise outside the limits of -10°C to 65°C, the electrical controller must be removed and stored in ambient temperatures of 5°C to 30°C.

10.1 Maintenance recommendations

NOTICE

The screw compressor unit can only operate to your complete satisfaction when the maintenance work is carefully carried out at the specified intervals.

In order to facilitate this task, the scope of supply of the screw compressor unit comprises the “Maintenance and inspection manual for DV Systems compressors”, in which you can list your performed maintenance work at the specified intervals.

You can also have this maintenance work performed by our trained technicians. Please ask your DV Systems distributor for a maintenance contract.

10.2 Maintenance Electric Motor

10.2.1 Motor Lubrication

The motors used with this compressor package have sealed bearings which have been greased at the factory and require no re-greasing during their operational life. These motors do not have injection or drain ports for re-greasing.

10.3 Maintenance and inspection schedule

DANGER

High voltage – Hazard of shock, burn, or death

- **Be careful with electricity: only work on screw compressors which are not powered.**
- **Only for H40-50 VSD: There is a risk of electric shock from charged capacitors! Disconnect the system from the mains and wait 10 minutes before touching electrical components. The power capacitors need this time to discharge.**

CAUTION

Burn hazard – Hot surfaces

- **Be careful of the hot surfaces of machine parts when carrying out checks, making settings and doing maintenance.**

WARNING

Some parts of the system will still be pressurized after the system has been switched off. Small parts propelled at high speed by compressed air can penetrate the skin or destroy an eye.

Only perform checks and maintenance after observing the following:

- **Press the STOP button on the compressor controller and wait until the screw compressor comes to a stop and the screw compressor unit is depressurized.**
- **The pressure gauge shows no more than < 4.4 PSI.**
- **Shortly after shutting off the screw compressor unit a small residual pressure may remain.**
- **Therefore, before any maintenance work, the screw compressor unit must be relieved by slowly opening the screw plug (oil filling opening) with integrated air vent slots.**
- **Set the on-site main switch to “0” (OFF) and secure it against being switched on.**

WARNING

Rotating machinery can cause injury or death. Open main disconnect, lockout and tagout power supply to starter before working on the electric motor.

Intervals are valid for normal industrial environments and operating conditions. If there is some uncertainty, set the oil change interval by performing oil analysis.

In the case of a very dirty atmosphere, the cleaning intervals have to be shortened as required.

For order numbers see the spare parts list.

10.3.1 Service Check List

Every 8 hours operation

1. Check air/oil reservoir oil level, add oil if required. See Section 7.5 for information. If oil consumption is high, refer to Section 10.4, Excessive Oil Consumption. DO NOT MIX LUBRICANTS.
2. Check operation of the machine, is it loading and unloading properly.
3. Check discharge pressure and temperature.
4. Check control panel for advisory text messages.

Every 125 hours operation

1. Check for dirt accumulation on oil/aftercooler core faces and the cooling fan. If cleaning is required, clean the exterior fin surfaces of the cores by blowing compressed air carrying a nonflammable safety solvent that will not damage aluminum in a direction opposite that of the cooling air flow. The cleaning operation will keep the exterior cooling surfaces clean and ensure effective heat dissipation.

Every 2000 hours operation or 6 months

1. Replace the oil filter element, air filter element, control box filter (if app.), and clean the cool air inlet filter as indicated by the compressor controller, every 2000 hours or every 6 months, whichever occurs first.
   - See "Change oil filter cartridge", Section 10.5.
   - See "Change Air Filter", Section 10.7.
   - See “Clean cool air inlet filter”, 10.12.
2. An oil sample can be taken and sent to the DV Systems oil lab. See section 5.1 (Fig. 2) for oil sampling valve location. Refer to oil change procedure in section 10.4 for proper oil draining instructions.
3. If operating in dirty environments, filter maintenance may be needed in shorter intervals.

Every 4000 hours operation or 12 months

1. Visually check for leakage on the air end shaft seal, replace as required. See the parts lists for the kit part number. If the oil seal is a lip seal, the wear sleeve must always be replaced.
2. Replace lubricant every 8000 hours **.
   Under adverse conditions, change more frequently (refer to "Oil Change Interval", in Section 10.4).
   Flush system if required.
3. Replace Air/Oil Separator. Operating conditions determine the frequency of service. The air/oil separator will need to be changed as indicated by the compressor controller, every 4000 hours or every year, whichever occurs first. See "Changing the fine oil separator" in Section 10.6 for further details.
4. Inspect the scavenge line, replace the check valve and filter, clean or replace the scavenge line if necessary.
5. Inspect the intake valve, service if necessary, see parts list for repair kit part number.
6. Inspect minimum pressure/check valve operation, repair if necessary. See Fig. 2 "Minimum Discharge Pressure/Check Valve".
7. Check pressure relief valve, see Section 10.8.
8. Inspect the condensate drain, repair if necessary.

** Check Section 10.4 for specific lubricant basic life, based on actual lubricant in the package.

Every 8000 hours operation or 24 months

1. Inspect solenoid valves /vacuum switch operation, replace if necessary.
2. Inspect blow-down valve operation, replace if necessary.
3. Inspect thermistor probes operation, replace if necessary.
4. Inspect pressure transducer, replace if necessary.
5. Inspect control valves and pressure regulator, replace if necessary.
6. Inspect thermal mixing valve operation, replace element if necessary. See Fig. 2 "Thermal Mixing Valve" and "Compressor Oil System Check".
7. Inspect, replace if necessary the drive coupling spider (coupling element). See Section 10.14
8. Inspect hoses, replace if necessary.
9. Replace lubricant.

Maintenance Schedule – H40-50	As indicated by Controller	Every 8 hours of operation	Every 125 hours of operation	Per oil analysis results	6 months / 2000 hours	12 months / 4000 hours	18 months / 6000 hours	24 months / 8000 hours	30 months / 10000 hours	36 months / 12000 hours	42 months / 14000 hours	48 months / 16000 hours
Check air/oil reservoir oil level		☐										
Check operation of the machine, is it loading and unloading properly		☐										
Check discharge pressure and temperature		☐										
Check control panel for advisory text messages		☐										
Inspect, Clean if necessary Cooler / Fan			☐									
Replace oil filter element					☐	☐	☐	☐	☐	☐	☐	☐
Replace air filter element					☐	☐	☐	☐	☐	☐	☐	☐
Oil Sample *					☐	☐	☐	☐	☐	☐	☐	☐
Clean cool air inlet filter					☐	☐	☐	☐	☐	☐	☐	☐
Control Box Filter (if app.)					☐	☐	☐	☐	☐	☐	☐	☐
Visually check for leakage Shaft Seal					☐			☐		☐		☐
Replace Lubricant **	☐			☐				☐				☐
Replace Air/Oil Separator						☐		☐		☐		☐
Inspect and clean or replace if necessary scavenge line, replace check valve and filter						☐		☐		☐		☐
Inspect, service if necessary Intake Valve						☐		☐		☐		☐
Inspect, replace if necessary Hoses								☐				☐
Inspect, replace if necessary Min. Pressure/Check Valve						☐		☐		☐		☐
Check pressure relief valve						☐		☐		☐		☐
Inspect, repair if necessary the Condensate Drains						☐		☐		☐		☐
Inspect, replace if necessary Solenoid Valves / Vacuum Switch						☐		☐		☐		☐
Inspect, replace if necessary Blow-down Valve								☐				☐
Inspect, replace if necessary Thermistor Probes								☐				☐
Inspect, replace if necessary Pressure Transducer								☐				☐
Inspect, replace if necessary Control Valves and Pressure Regulator								☐				☐
Inspect, replace if necessary Thermal Mixing Valve								☐				☐
Inspect, replace if necessary the drive Coupling Spider								☐				☐

* Regular oil samples are recommended to monitor the operation of the compressor and lifespan of the lubricant.

** Drain and change as indicated by oil sample reports, hour life rating of lubricant, or every 24 months, whichever occurs first.

☐ These maintenance intervals must be kept!

☐ It's helpful to check off maintenance work in the maintenance schedule as it is done.

54 months / 18000 hours	60 months / 20000 hours	66 months / 22000 hours	72 months / 24000 hours	78 months / 36000 hours	84 months / 28000 hours	90 months / 30000 hours	96 months / 32000 hours	102 months / 34000 hours	108 months / 36000 hours	114 months / 38000 hours	120 months / 40000 hours
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10.4 Oil change

DANGER

Air/oil under pressure will cause severe personal injury or death.

- **Shut down the compressor, relieve the system of all pressure, disconnect, lockout and tagout the power supply to the compressor package before removing valves, caps, plugs, fittings, bolts and filters.**

CAUTION

Fire hazard and slip hazard!

- **Do not spill any oil!**
- **Oil residue and other deposits must be removed from the compressor coolers which are exposed to hot air in accordance with the user manual.**
- **Look for leaks! Immediately take care of any spilled oil!**

NOTICE

Catch the old oil, do not let it drain onto the floor! Dispose of it properly! Do not spill any oil! Look for leaks!

With these compressors, the frequency of the oil changes is closely related to how dirty the circulating oil is. Pay close attention that no foreign substances which can damage the oil (dust, steam, gases) make it through the air intake filter into the compressor unit's oil circuit. Very humid intake air and condensation inside the machine have an influence on the life span of lubricating oil so that the oil change times must also be reduced in this case. The change time intervals given are based on intake air which is normally available and if foreign substances (dust, steam, gases) are not present in large amounts.

When changing the oil, the old oil must be drained as fully as possible, because the used oil strongly decreases the life span of the new oil.

Different lubricating oils must not be mixed. When changing this type of oil, the old oil must be completely drained from the oil circuit.

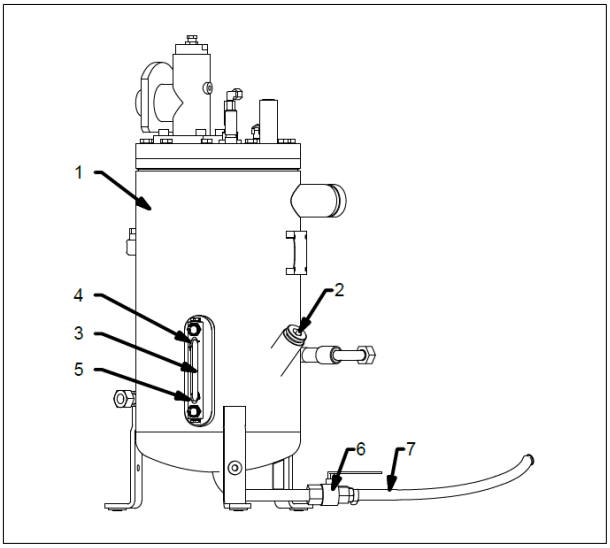

Fig. 18

1 Oil reservoir
2 Oil filler cap R1"
3 Oil-level indicator
4 Upper fill level
5 Lower fill level
6 Bleed ball valve 3/8” NPT
7 Drain hose

The changing intervals can be found in the maintenance schedule.

Perform oil changes as follows:

- Turn off the screw compressor unit, secure it against accidental restarts and make sure that the demister vessel is depressurized.
- Slowly open the oil screw plug (-2- Fig. 18) to relieve the screw compressor of any residual pressure in the system
- Remove the oil screw plug
- Open the oil drain (-6- Fig. 18) from the pressure reservoir
- Drain the oil at operating temperature through the drain hose (-7- Fig. 18)
- Close the oil drain
- Fill with oil up to the mark “maximum oil level” (-4- Fig. 18) (approx. 4 US-Gal.)
- Close the oil screw plug
- Run the screw compressor for approximately 2 minutes
- Check for leaks
- Shut off the screw compressor
- Wait at least 5 minutes until the oil has settled, i.e. until the air has bubbled out.
- Check the oil level, (see Section 7.4)
- The oil level must lie between the “maximum oil level” (-4- Fig. 18) and “minimum oil level” (-5- Fig. 18).
- If necessary, top up the oil.

Oil change interval

Operating conditions (e.g., coolant temperatures), the type of operation and the quality of the intake air (e.g., dust content, ratio of gaseous foreign substances such as SO_2 and solvent vapors) have a strong influence on the oil change intervals.

In these cases, the operational life of the oil must be checked by performing an oil analysis (also see Section 10.14).

10.5 Change oil filter cartridge

DANGER

Air/oil under pressure will cause severe personal injury or death.

- **Shut down the compressor, relieve the system of all pressure, disconnect, lockout and tagout the power supply to the compressor package before removing valves, caps, plugs, fittings, bolts and filters.**

CAUTION

Fire hazard and slip hazard!

- **Do not spill any oil!**
- **Look for leaks! Immediately take care of any spilled oil!**

NOTICE

Dispose of the oil filter cartridge properly - it is hazardous waste! Look for leaks!

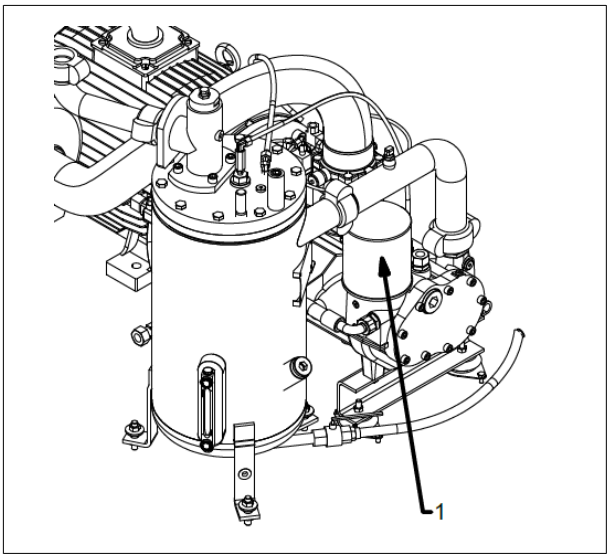

Fig. 19

1 Oil filter cartridge

The changing intervals can be found in the maintenance schedule.

Replace the oil filter cartridge as follows:

- Switch off the screw compressor unit, secure it against an accidental restart and ensure that it is depressurized.
- Wait at least 5 minutes until the oil has settled, i.e. until the air has bubbled out.
- Unscrew the oil filter cartridge (-1- Fig. 19) with a suitable tool
- Dispose of the oil filter cartridge properly
- Lightly oil the seal of the new oil filter cartridge
- Screw on the new oil filter cartridge and tighten by hand (see the notes on the oil filter cartridge)
- Let the screw compressor unit run for approx. 2 minutes
- Check for leaks
- Check the oil level (see Section 7.4)
- If necessary, top up the oil.

Changing times for oil filter cartridges

Operating conditions (e.g., coolant temperatures), the type of operation and the quality of the intake air (e.g., dust content, ratio of gaseous foreign substances such as SO_2 and solvent vapors) have a strong influence on the filter lifespan (air filter, oil filter, fine separator).

In these cases the intervals between changes may be shorter

10.6 Changing the fine oil separator

DANGER

CAUTION

Fire hazard and slip hazard!

- **Do not spill any oil!**
- **Look for leaks! Immediately take care of any spilled oil!**

NOTICE

Dispose of the fine separator properly - it is hazardous waste! Look for leaks!

1 Fine oil separator
2 Plastic oil extraction line
3 Plastic control air line
4 Scavenge tube
5 Victaulic connection to the cooler
6 Victaulic connection to the Minimum Pressure Valve
7 Hexagon screw
8 Set screw to raise the reservoir cover
9 Reservoir cover

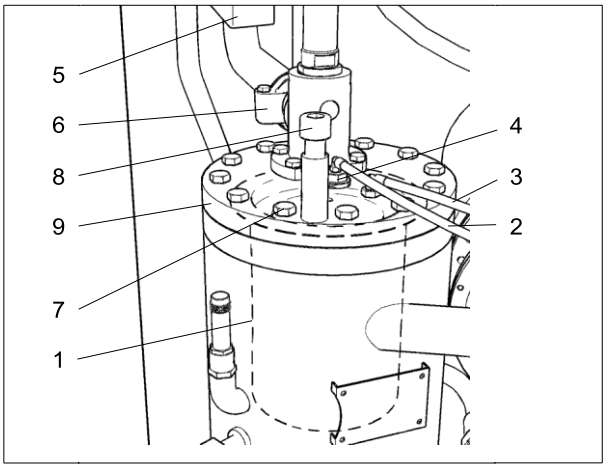

Fig. 21

The changing intervals can be found in the maintenance schedule 10.3.

Replace the fine oil separator as follows:

- Switch off the compressor and ensure that it is depressurized.
- Detach the plastic oil scavenge line (-2- Fig. 21). Loosen and remove the scavenge tube (-4- Fig. 21)
- Detach the plastic pneumatic air lines (-3- Fig. 21).
- Loosen all bolts attaching the Minimum Pressure Valve (MPV) to the reservoir cover.
- Remove all hexagon screws (-7- Fig. 21) on the circumference of the pressure reservoirs cover.
- Swivel the MPV inward. The Victaulic connections to the cooler may have to be loosened.
- The set screw for lifting the reservoir cover (-8- Fig. 21) must be screwed in clockwise until the cover is raised above the top of the reservoir.
- Pivot the reservoir cover 180°.
- Remove the used fine oil separator (-1- Fig. 21).
- Clean all seals and if necessary remove and clean or replace the O-rings.
- Install a new fine oil separator.
- Pivot the reservoir cover back to the starting position.
- Screw the set screw (-8- Fig. 21) counter-clockwise until the reservoir cover is lying on the pressure reservoir flange
- Pivot the MPV back to its starting position and loosely install it with the corresponding screws.
- Screw in and tighten crosswise all hex screws. Tighten the MPV bolts. Tighten all Victaulic connections.
- Tighten the set screw used to raise the reservoir cover (-8- Fig. 21) to prevent it loosening.
- Properly reinstall all lines and the scavenge tube to the pressure reservoir.

Changing times for the fine oil separator

Operating conditions (e.g., coolant temperatures), the type of operation and the quality of the intake air (e.g., dust content, ratio of gaseous foreign substances such as SO_2 and solvent vapors) have a strong influence on the filter lifespan (air filter, oil filter, fine separator).

In these cases the intervals between changes may be shorter.

10.7 Change of air intake filter

DANGER

Only perform checks and carry out work on the screw compressor when the unit is out of operation, depressurized, and secured from being switched on again!

NOTICE

Never operate the screw compressor system without an air filter (even briefly removing it can cause considerable damage to the machine)!

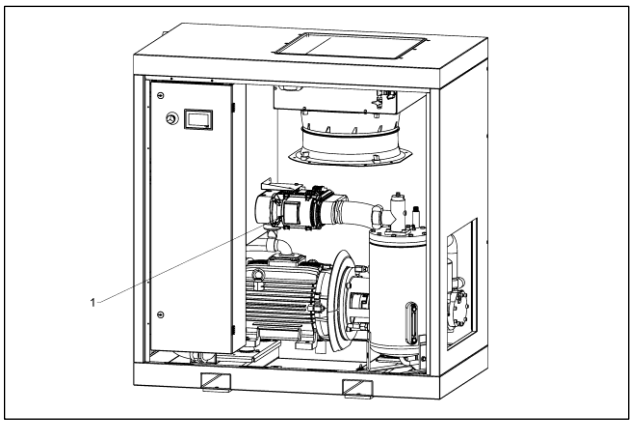

Fig. 22

1 Air intake filter

The air filter cartridge should be replaced at the latest as specified in chapter 7.3. Check air filter at least once a week or, if required, daily for the accumulation of dust. When carrying out maintenance work, make sure that no dirt gets to the clean air side of the air filter.

Changing intervals for air filter cartridge

The operating conditions (e.g., coolant temperatures), the operating modes and the quality of the intake air (e.g., content of dust, content of gaseous foreign substances such as SO_2 and solvent vapors, etc.) have a strong influence on the service life of the filters (air filters, water filters, fine separators).

Where such conditions exist the filter element may require changing more frequently.

Change the air filter as follows:

- Undo snap latches on the filter housing and remove access door.
- Pull air filter element outward. Slide safety element to the left and pull outward.
- Carefully insert new air filter cartridges in the housing.
- Replace access door and close latches.

10.8 Pressure relief valve

⚠ DANGER

When checking pressure relief valve there is an explosive release of pressure.

Failure to perform this operation in a safe manner or without safety equipment may result in personal injury or death.

- **Use the appropriate safety equipment, hearing and eye protection, and use safety precautions when performing this PRV check on an operating machine.**

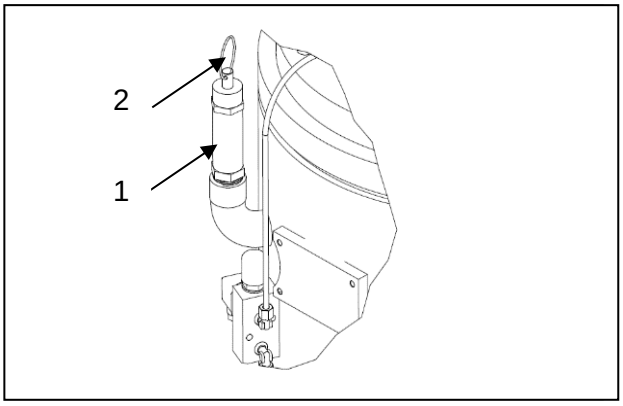

Fig. 23

1 Pressure relief valve
2 Pull Ring

The pressure relief valve has no user serviceable or repairable components.

Testing the pressure relief valve

The valve can be tested:

1 On a separate compressed-air system. or
2 When raising the system operating pressure to its normal level.

Keep local legislation in mind when testing.

Pressure relief valve operation (-1- Fig. 23) depends on the valve type and can be carried out by:

- Operating the lifting lever/pull ring.

If the pressure relief valve doesn't close itself or is leaky, close the doors of the compressor and push the STOP Button. After the pressure in the pressure reservoir is reduced to ambient pressure, replace the pressure relief valve.

DANGER

A defective pressure relief valve may result in pressure that is too high, breaking open parts of the system and causing serious or fatal injury.

Never operate a screw compressor system with a defective pressure relief valve or without pressure relief valve!

10.9 Connecting terminals in the switch cabinet

DANGER

High voltage – Hazard of shock, burns, or death

- **Only qualified electricians may work on the switch cabinet.**
- **Only perform checks and carry out work on the screw compressor when the unit is out of operation, depressurized, and secured from being switched on again!**
- **Push the STOP button on the control panel. After the soft-stop time (30 sec.), set the on-site main switch to “0” (OFF) and secure it against being switched on.**

DANGER

Only for H40-50 VSD: There is a risk of electric shock from charged capacitors!

- **Disconnect the system from the mains and wait 10 minutes before touching electrical components. The power capacitors need this time to discharge.**

10.10 Screw connections

The screw connections of the air, oil, and water circuits have to be checked and, if required, re-tightened according to the maintenance schedule.

Check the hose and piping for unsealed areas.

10.11 General maintenance and cleaning

WARNING

Danger when cleaning system parts with compressed air: Small parts propelled at high speed by compressed air can penetrate the skin or destroy an eye.

- **Do not aim the compressed air at people**

CAUTION

Fire hazard from oil residues

Oil residue and other deposits must be removed from the compressor coolers which are exposed to hot air in accordance with the user manual.

The screw compressor should be blown off with compressed air at the given intervals (do not aim the compressed air at people), especially:

- Controller components
- Fittings
- Air end block
- Cooler
- Electric motor

10.12 Clean / change cool air inlet filter

DANGER

Only perform checks and carry out work on the screw compressor when the unit is out of operation, depressurized, and secured from being switched on again!

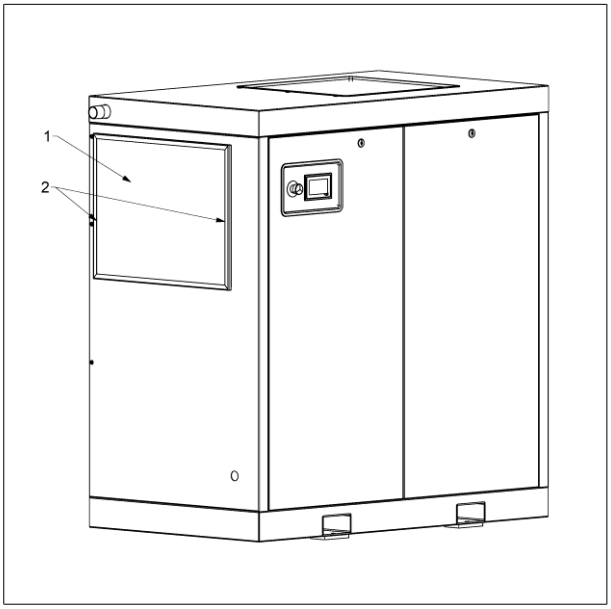

Fig. 24

1 Cool air inlet filter
2 Cool air inlet filter bracket

Perform cool air inlet filter change as follows:

- Take out the filter (-1- Fig. 24) and clean it. Clean the filter by brushing or washing
- If the filter is heavily soiled or damaged, replace the filter.
- Reinstall the filter and tuck edges under the brackets (-2- Fig. 24).

Cleaning:

Clean the filter by brushing, washing, or vacuuming.

NOTICE

The filter may not be installed while wet or moist!

10.13 Maintenance notes and lubricant recommendations for stationary compressors

Lubricant recommendations

Please note that proper lubrication can significantly increase the lifespan of your compressor system.

In accordance with valid accident prevention regulations, lubricating oils should be used whose characteristics correspond to the expected operating conditions.

Avoid mixing different lubricating oils, i.e. when changing the oil type, first completely drain the old oil from the oil circuit.

If operating temperatures are constantly above 35°C divide the oil change intervals given in Section 10.3 (Maintenance schedule) by half.

The exact oil change schedule according to the actual operating conditions should be set by performing oil tests.

Safety Data Sheets (SDS) are available for all DV Systems lubricants from your authorized DV Systems distributor or by calling DV Systems at 1(705) 728-5657.

The following oil types should be used

a) DEV-3000
b) DEV-3500 (Food Grade)

For further information, please contact your local DV Systems Distributor or DV Systems at 1(705) 728-5657

10.14 Drive Coupling Spider Inspection and Replacement

⚠ WARNING

Rotating machinery can cause injury or death. Open main disconnect, lockout and tagout power supply to starter before working on the drive coupling.

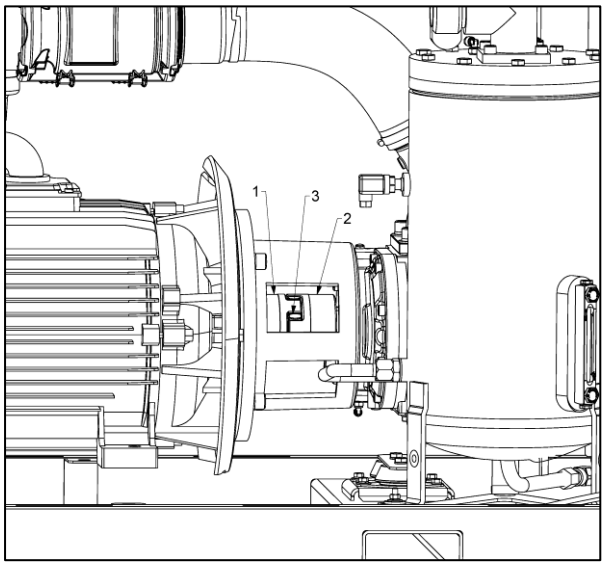

Fig. 25
1 Motor coupling hub
2 Airend coupling hub
3 Coupling spider

Perform drive coupling spider inspection as follows:

- Remove the coupling cover plate
- Loosen the set screws of both hubs of the drive coupling (-1- and -2- Fig. 25)
- Slide the hubs apart. Manoeuvre the drive coupling spider (-3- Fig. 25) out of the connecting housing.
- Inspect the coupling spider for wear or damage. If necessary, replace the coupling spider.
- Reposition the coupling spider between the two hubs and slide the hubs together. Set the appropriate clearance gap between the hubs.
- Tighten the coupling hub set screws.
- Replace the coupling cover plate.

NOTICE

It is critical to have the appropriate clearance gap between the coupling hubs. There must be exactly **3mm** between the coupling hub fingers and the flat of the opposing hub. Failure to follow this will result in airend damage.

11. Trouble-shooting

In the case of faults or warnings that are detected by the compressor controller, please refer to the chapter "Fault/warning table" in the operating instructions of the controller.

Malfunction		Possible cause		Remedy
Unit cannot be started	1.	No operating or control voltage	1.	Check fuses, main switch and supply line
	2.	Malfunction not acknowledged	2.	Acknowledge fault message
	3.	Pressure reservoir not depressurized	3.	Wait until depressurized
	4.	Electric motor defective	4.	Check connections, winding, etc.
	5.	Compressor defective	5.	Turn the compressor manually; if required, replace
	6.	Ambient temperature less than 5°C	6.	Make sure that the ambient temperature is not less than 5°C; install an auxiliary heater, if required
	7.	Remote control/timer has been activated	7.	Deactivate remote control/timer
	8.	Mains pressure exceeds the lower switching point (H40-50) or the prescribed pressure (H40-50 VSD)	8.	Wait until the mains pressure has fallen below the lower switching point
Unit stops during the start-up phase	1.	Intake valve only closes part way, pressure builds up too quickly in the pressure reservoir	1.	Make the intake valve viable, replace if necessary, check the solenoid valve
	2.	System short	2.	Determine cause and remedy, replace defective fuses
	3.	Connection terminal in switch cabinet is loose	3.	Check and tighten
	4.	Oil is too viscous	4.	Choose type of oil which suits the environmental conditions or install an idle heater
	5.	Maximum motor cycles exceeded due to manually switching off and on too often	5.	Avoid frequent manual on and off switching, let the electric motor cool
Unit does not reach the set mains pressure	1.	System pressure sensor set too low	1.	Check, reset
	2.	Intake valve only opens partially	2.	Make the intake valve viable, replace if necessary, check the solenoid valve
	3.	Air bleed too large	3.	Throttle the bleed or attach additional compressors
	4	Fine oil separator is dirty	5.	Replace the fine oil separator cartridge
	5	Air filter is dirty	6.	Replace air filter cartridge
	6	Large leaks in the compressor system	7.	Check the unit

11 Trouble-shooting

Malfunction		Possible cause		Remedy
Unit switches off	1.	Ambient temperature is too high	1.	Ventilate the compressor room
	2.	Electric motor is defective	2.	Check the electric motor and PTC thermistor
	3.	Faulty fan	3.	Check/exchange fan
	4.	Faulty sensor, connection or cable	4.	Check the sensor, connection and cable
	5.	Electrical cable gauge too small	5.	Measure the current draw and exchange the cable if necessary
	6.	Excessive power consumption	6.	Fine oil separator is dirty, replace if necessary
	7.	Oil level too low	7.	Refill the oil in the pressure reservoir
	8.	Oil injection pressure too low	8.	Replace the oil filter cartridge, clean the oil system
	9.	Oil temperature too high	9.	Check the oil cooler and fan/ check the oil temperature controller
Idle pressure too high	1.	Intake valve doesn’t close correctly	1.	Check the intake valve and solenoid valve
	2.	System doesn’t discharge	2.	Check the intake valve and solenoid valve
Oil in the compressed air	1.	Fine oil separator is defective	1.	Replace the fine oil separator cartridge
	2.	Oil foams	2.	Replace the oil
	3.	Oil level is too high	3.	Drain the oil
	4.	Faulty minimum pressure non-return valve	4.	Check the minimum pressure non-return valve
	5.	Oil extractor orifice is plugged (-13- Fig. 3)	5.	Remove and clean the orifice
Oil in the air filter	1.	Faulty intake valve non-return function	1.	Check the intake valve
	2.	Intake valve doesn’t close correctly	2.	Check the intake valve
	3.	Regular use of the emergency stop	3.	Emergency stop may only be used for functional problems relating to safety
Pressure relief valve opens	1.	Faulty pressure relief valve	1.	Replace
	2.	Fine oil separator is dirty and faulty final compression pressure sensor	2.	Replace the fine oil separator cartridge and final compression pressure sensor
	3.	Intake valve closes too slowly	3.	Check the intake valve and solenoid valve
	4.	Faulty system pressure sensor	4.	Replace the system pressure sensor
	5.	Faulty electronics	5.	Replace electronics

12.1 Layout plan

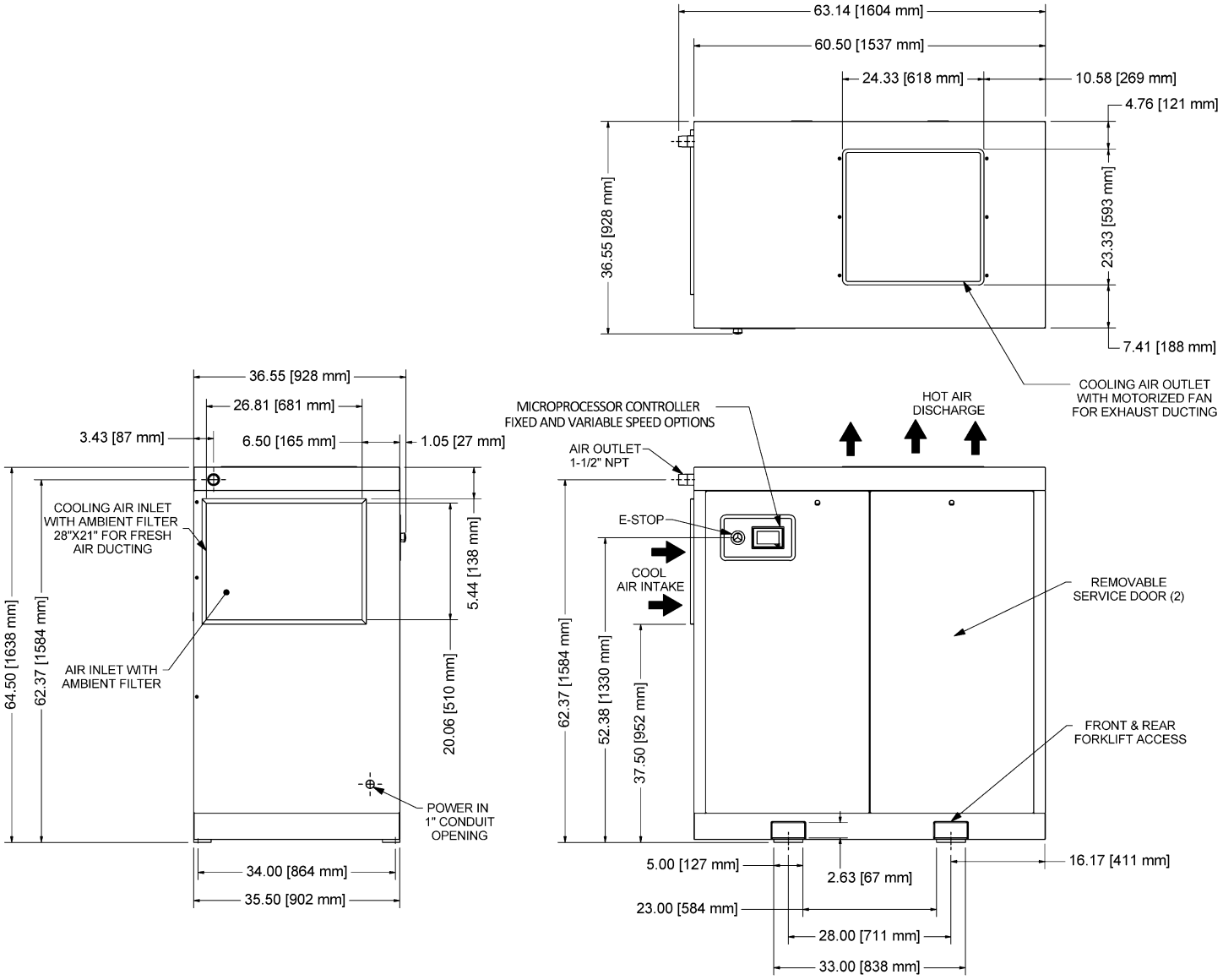

Fig. 27 (all dimensions in in [mm])

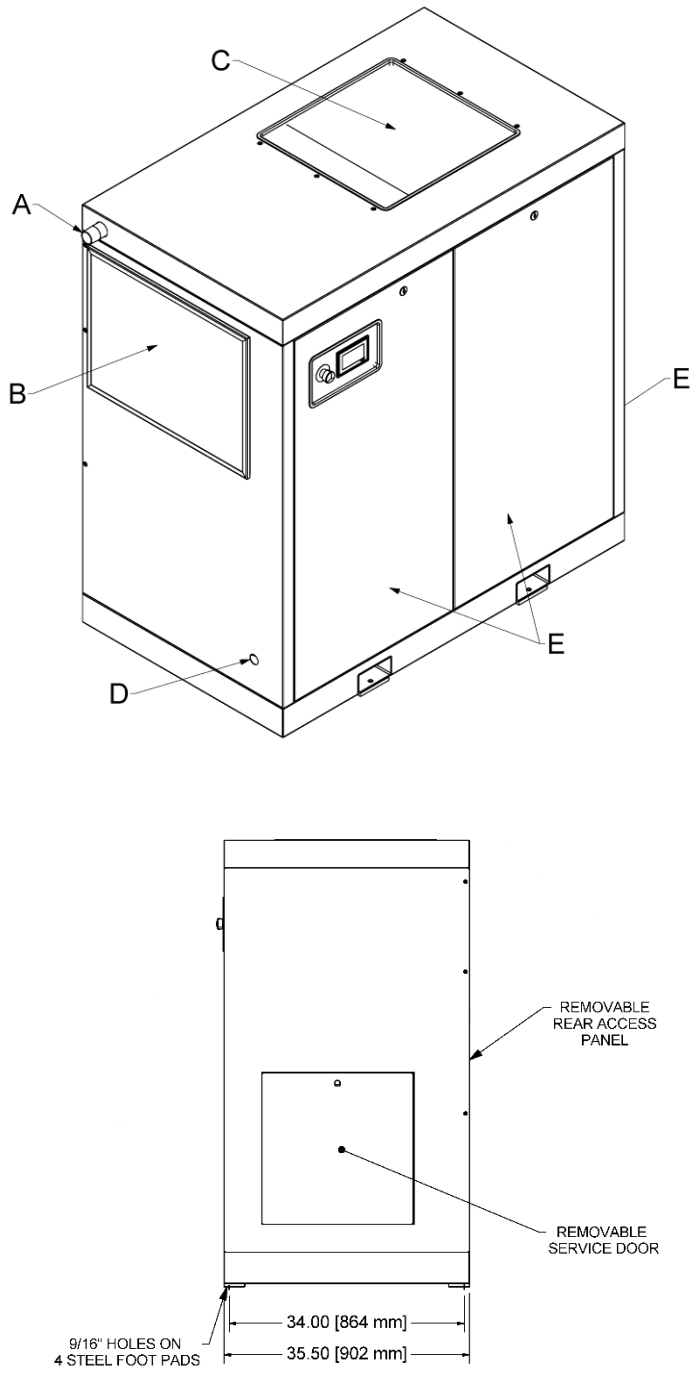

Fig. 28 (all dimensions in in [mm])

A Compressed air connection
- Male pipe thread NPT 1 ½ - 11 ½

B Cool air intake

C Cool air outlet

D Feed cable entry
- Conduit size 1”

E Removable access doors

NOTES:

NOTES:

SYSTEMS

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