Oil-injected screw compressors

CPM 10, CPM 15, CPM 20

Instruction book

CP Chicago Pneumatic

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Instruction book

Original instructions

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This instruction book is valid for CE, non-CE as well as UKCA labelled machines. It meets the requirements for instructions specified by the applicable European directives or UK statutory instruments as identified in the Declaration of Conformity.

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1 Safety precautions

1.1 Safety icons

Danger: Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

Warning: Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

Notice: Indicates a potential situation which, if not avoided, might result in property damage or in an undesirable result or state.

Note: Indicates important information.

1.2 General safety precautions

- The operator must employ safe working practices and observe all related work safety requirements and regulations.
- If any of the following statements does not comply with the applicable legislation, the stricter of the two shall apply.
- Installation, operation, maintenance and repair work must only be performed by authorized, trained, specialized personnel. The personnel should apply safe working practices by use of personal protection equipment, appropriate tools and defined procedures.
- The compressor is not considered capable of producing air of breathing quality. For air of breathing quality, the compressed air must be adequately purified according to the applicable legislation and standards.
- Before any maintenance, repair work, adjustment or any other non-routine checks, switch the controller in service mode (see section *Service mode*), stop the compressor, press the emergency stop button, switch off the voltage and depressurize the compressor. In addition, the power isolating switch must be opened and locked. The process of locking, tagging and trying to turn on the equipment to confirm it cannot operate is called Lock Out, Tag Out (LOTO).

  Danger: If the machine is equipped with an automatic restart after voltage failure function and if this function is active, be aware that the machine will restart automatically when the power is restored if it was running when the power was interrupted!
- Never play with compressed air. Do not apply the air to your skin or direct an air stream at people. Never use the air to clean dirt from your clothes. When using the air to clean equipment, do so with extreme caution and wear eye protection.
- The owner is responsible for maintaining the unit in safe operating condition. Parts and accessories shall be replaced if unsuitable for safe operation.
- It is not allowed to walk or stand on the unit or on its components.
- If compressed air is used in the food industry and more specifically for direct food contact, it is recommended, for optimal safety, to use certified Class 0 compressors in combination with appropriate filtration depending on the application. Please contact your customer center for advice on specific filtration.
- The service switch should only be operated by a trained service specialist from the manufacturer.

Safety precautions for the connectivity module

It is important to follow all regulations regarding the use of radio equipment, in particular regarding the possibility of radio frequency (RF) interference. Please follow the safety advice given below carefully.

- Respect restrictions on the use of radio equipment in fuel depots, chemical plants or other explosive environments.
- Avoid operation close to inadequately protected personal medical devices such as hearing aids and pacemakers. Consult the manufacturers of the medical device to determine if it is adequately protected.
- Avoid operation close to other electronic equipment which may also cause interference if the equipment is inadequately protected. Observe any warning signs and manufacturer recommendations.
- Respect a distance from the human body of at least 20 cm (8 inch) during operation.

1.3 Safety precautions during installation

Warning: All responsibility for any damage or injury resulting from neglecting these precautions, or non-observance of the normal caution and care required for installation, operation, maintenance and repair, even if not expressly stated, will be disclaimed by the manufacturer.

- The machine must only be lifted using suitable equipment in accordance with the applicable safety regulations. Loose or pivoting parts must be securely fastened before lifting. It is strictly forbidden to dwell or stay in the risk zone under a lifted load. Lifting acceleration and deceleration must be kept within safe limits. Wear a safety helmet when working in the area of overhead or lifting equipment.
- The unit is designed for indoor use. If the unit is installed outdoors, special precautions must be taken. Consult your supplier.
- Place the machine where the ambient air is as cool and clean as possible. If necessary, install a suction duct. Never obstruct the air inlet. Care must be taken to minimize the entry of moisture at the inlet air.
- Any blanking flanges, plugs, caps and desiccant bags must be removed before connecting the pipes.
- Air hoses must be of correct size and suitable for the working pressure. Never use frayed, damaged or worn hoses. Distribution pipes and connections must be of the correct size and suitable for the working pressure.
- The aspirated air must be free of flammable fumes, vapors and particles, e.g. paint solvents, that can lead to internal fire or explosion.
- Arrange the air intake so that loose clothing worn by people cannot be drawn in.
- Ensure that the discharge pipe from the compressor to the after-cooler or air net is free to expand under heat and that it is not in contact with or close to flammable materials.
- No external force may be exerted on the air outlet valve; the connected pipe must be free of strain.
- If remote control is installed, the machine must bear a clear sign stating: DANGER: This machine is remotely controlled and may start without warning.

  The operator has to make sure that the machine is stopped and depressurized and that the electrical isolating switch is open, locked and labelled with a temporary warning before any maintenance or repair. As a further safeguard, persons switching on or off remotely controlled

machines shall take adequate precautions to ensure that there is no one checking or working on the machine. To this end, a suitable notice shall be affixed to the start equipment.

- Air-cooled machines must be installed in such a way that an adequate flow of cooling air is available and that the exhausted air does not recirculate to the compressor air inlet or cooling air inlet.
- The electrical connections must correspond to the applicable codes. The machines must be earthed and protected against short circuits by fuses in all phases. A lockable power isolating switch must be installed near the compressor.
- On machines with automatic start/stop system or if the automatic restart function after voltage failure is activated, a sign stating "This machine may start without warning" must be affixed near the instrument panel.
- In multiple compressor systems, manual valves must be installed to isolate each compressor. Non-return valves (check valves) must not be relied upon for isolating pressure systems.
- Never remove or tamper with the safety devices, guards or insulation fitted on the machine. Every pressure vessel or auxiliary installed outside the machine to contain air above atmospheric pressure must be protected by a pressure relieving device or devices as required.
- Piping or other parts with a temperature in excess of 70˚C (158˚F) and which may be accidentally touched by personnel in normal operation must be guarded or insulated. Other high temperature piping must be clearly marked.
- If the ground is not level or can be subject to variable inclination, consult the manufacturer.
- In an installation with multiple compressors, the outlet piping must be installed in such a way that condensate cannot flow back into the compressor. See section *Installation proposal*.

Note: Also consult the following safety precautions: *Safety precautions during operation* and *Safety precautions during maintenance or repair*.

These precautions apply to machinery processing or consuming air or inert gas. Processing of any other gas requires additional safety precautions typical to the application which are not included herein.

Some precautions are general and cover several machine types and equipment; hence some statements may not apply to your machine.

1.4 Safety precautions during operation

Warning: All responsibility for any damage or injury resulting from neglecting these precautions, or non-observance of the normal caution and care required for installation, operation, maintenance and repair, even if not expressly stated, will be disclaimed by the manufacturer.

- Never touch any piping or components of the machine during operation.
- Use only the correct type and size of hose end fittings and connections. When blowing through a hose or air line, ensure that the open end is held securely. A free end will whip and may cause injury. Make sure that a hose is fully depressurized before disconnecting it.
- Persons switching on remotely controlled machines shall take adequate precautions to ensure that there is no one checking or working on the machine. To this end, a suitable notice shall be affixed to the remote start equipment.
- Never operate the machine when there is a possibility of taking in flammable or toxic fumes, vapors or particles.
- Never operate the machine below or in excess of its limit ratings.
- Keep all bodywork doors shut during operation. The doors may be opened for short periods only, e.g. to carry out routine checks. Wear ear and eye protection when opening a door.

On machines without bodywork, wear ear protection in the vicinity of the machine.

- People staying in environments or rooms where the sound pressure level reaches or exceeds 80 dB(A) shall wear ear protectors.
- Periodically check that:
  - All guards are in place and securely fastened
  - All hoses and/or pipes inside the machine are in good condition, secure and not rubbing
  - No leaks occur
  - All fasteners are tight
  - All electrical leads are secure and in good order
  - Safety valves and other pressure relief devices are not obstructed by dirt or paint
  - Air outlet valve and air net, i.e. pipes, couplings, manifolds, valves, hoses, etc. are in good repair, free of wear or abuse
  - All pre-filters are not clogged
- If warm cooling air from compressors is used in air heating systems, e.g. to warm up a workroom, take precautions against air pollution and possible contamination of the breathing air.
- Do not remove any of, or tamper with, the sound-damping material.
- Never remove or tamper with the safety devices, guards or insulations fitted on the machine. Every pressure vessel or auxiliary installed outside the machine to contain air above atmospheric pressure shall be protected by a pressure relieving device or devices as required.
- Yearly inspect the air receiver. Minimum wall thickness as specified in the instruction book must be respected. Local regulations remain applicable if they are more strict.

Note: Also consult the following safety precautions: *Safety precautions during operation* and *Safety precautions during maintenance or repair*.

These precautions apply to machinery processing or consuming air or inert gas. Processing of any other gas requires additional safety precautions typical to the application which are not included herein.

Some precautions are general and cover several machine types and equipment; hence some statements may not apply to your machine.

1.5 Safety precautions during maintenance or repair

Warning: All responsibility for any damage or injury resulting from neglecting these precautions, or non-observance of the normal caution and care required for installation, operation, maintenance and repair, even if not expressly stated, will be disclaimed by the manufacturer.

- Always use the correct safety equipment (such as safety glasses, gloves, safety shoes, etc.).
- Use only the correct tools for maintenance and repair work.
- Use only genuine spare parts for maintenance or repair. The manufacturer will disclaim all damage or injuries caused by the use of non-genuine spare parts.
- All maintenance work shall only be undertaken when the machine has cooled down.
- A warning sign bearing a legend such as "Work in progress; do not start" shall be attached to the starting equipment.
- Persons switching on remotely controlled machines shall take adequate precautions to ensure that there is no one checking or working on the machine. To this end, a suitable notice shall be affixed to the remote start equipment.

- Close the compressor air outlet valve and depressurize the compressor before connecting or disconnecting a pipe.
- Before removing any pressurized component, effectively isolate the machine from all sources of pressure and relieve the entire system of pressure. See section *Maintenance*.
- Never use flammable solvents or carbon tetrachloride for cleaning parts. Take safety precautions against toxic vapors of cleaning liquids.
- Scrupulously observe cleanliness during maintenance and repair. Keep dirt away by covering the parts and exposed openings with a clean cloth, paper or tape.
- Never weld or perform any operation involving heat near the oil system. Oil tanks must be completely purged, e.g. by steam cleaning, before carrying out such operations. Never weld on, or in any way modify, pressure vessels.
- Whenever there is an indication or any suspicion that an internal part of a machine is overheated, the machine shall be stopped but no inspection covers shall be opened before sufficient cooling time has elapsed; this to avoid the risk of spontaneous ignition of the oil vapor when air is admitted.
- Never use a light source with open flame for inspecting the interior of a machine, pressure vessel, etc.
- Make sure that no tools, loose parts or rags are left in or on the machine.
- When replacing the air filter, make sure no dirt, dust, rags, tools or loose parts can fall in the air inlet.
- All regulating and safety devices shall be maintained with due care to ensure that they function properly. They may not be put out of action.
- Before clearing the machine for use after maintenance or overhaul, check that operating pressures, temperatures and time settings are correct. Check that all control and shut-down devices are fitted and that they function correctly. If removed, check that the coupling guard of the compressor drive shaft has been reinstalled.
- Every time the separator element is renewed, examine the discharge pipe and the inside of the oil separator vessel for carbon deposits; if excessive, the deposits should be removed.
- Protect the motor, air filter, electrical and regulating components, etc. to prevent moisture from entering them, e.g. when steam cleaning.
- Make sure that all sound-damping material and vibration dampers, e.g. damping material on the bodywork and in the air inlet and outlet systems of the compressor, is in good condition. If damaged, replace it by genuine material from the manufacturer to prevent the sound pressure level from increasing.
- Never use caustic solvents which can damage materials of the air net, e.g. polycarbonate bowls.
- **Only if applicable, the following safety precautions are stressed when handling refrigerant:**
    - Never inhale refrigerant vapors. Check that the working area is adequately ventilated; if required, use breathing protection.
    - Always wear special gloves. In case of refrigerant contact with the skin, rinse the skin with water. If liquid refrigerant contacts the skin through clothing, never tear off or remove the latter; flush abundantly with fresh water over the clothing until all refrigerant is flushed away; then seek medical first aid.
- Protect hands to avoid injury from hot machine parts, e.g. during draining of oil.
- Be aware of eventual sharp edges on certain parts of the machine.

Note: Also consult the following safety precautions: *Safety precautions during operation* and *Safety precautions during maintenance or repair*.

These precautions apply to machinery processing or consuming air or inert gas. Processing of any other gas requires additional safety precautions typical to the application which are not included herein.

Some precautions are general and cover several machine types and equipment; hence some statements may not apply to your machine.

1.6 Dismantling and disposal

The device must be disposed according to local regulations. The product is not designed for refurbishing after finished lifecycle.

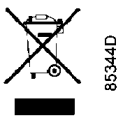
Dismantling

Once the end of life of the machine is reached, please follow next steps:

1. Stop the machine.
2. Check all safety precautions mentioned in the previous chapters to secure safe handling (e.g. LOTO, cool-down, depressurize, discharge, etc.).
3. Have trained personnel dismantle the installation.
4. Separate the harmful from the safe components (e.g. drain oil from parts containing oil).
5. Refer to the disposal topic below.

Disposal of electrical and electronic appliances (WEEE)

This equipment falls under the provisions of the European Directive 2012/19/EU on waste electrical and electronic appliances (WEEE) as well as under the UKCA Waste Electrical and Electronic Equipment regulations 2013 and may not be disposed as unsorted waste.



The equipment is labelled in accordance with the European Directive 2012/19/EU and the UKCA Waste Electrical and Electronic Equipment regulations 2013 with the crossed-out wheelie bin symbol.

At the end of life-time of the electric and electronic equipment (EEE) it must be taken to separate collection.

For more information check with your local waste authority, customer center or distributor.

Disposal of other used material

Used filters or any other used material (e.g. filter bags, filter media, desiccant, lubricants, cleaning rags, machine parts, etc.) must be disposed of in an environmentally friendly and safe manner, and in line with the local recommendations and environmental legislation.

2 General description

2.1 Introduction

Introduction

CPM 10, CPM 15, CPM 20 are air-cooled, single-stage, oil-injected screw compressors, driven by an electric motor.

The compressors are enclosed in sound-insulating bodywork.

An easy-to-operate control panel is provided, including the start/stop switch and the emergency stop button. A cabinet housing the controller, pressure sensor and motor starter is integrated into the bodywork.

Floor-mounted model

The compressor is installed directly on the floor.

Floor-mounted units are available without dryer only.

Figure 1: Front view, floor-mounted

Reference	Description
1	Electric cabinet

Tank-mounted model

CPM 10, CPM 15, CPM 20 tank-mounted units are supplied with an air receiver of 270 l (71.28 US gal / 59.40 Imp gal / 9.45 cu.ft) or 500 l (132 US gal / 110 Imp gal / 17.50 cu.ft).

Tank-mounted units are available with or without dryer.

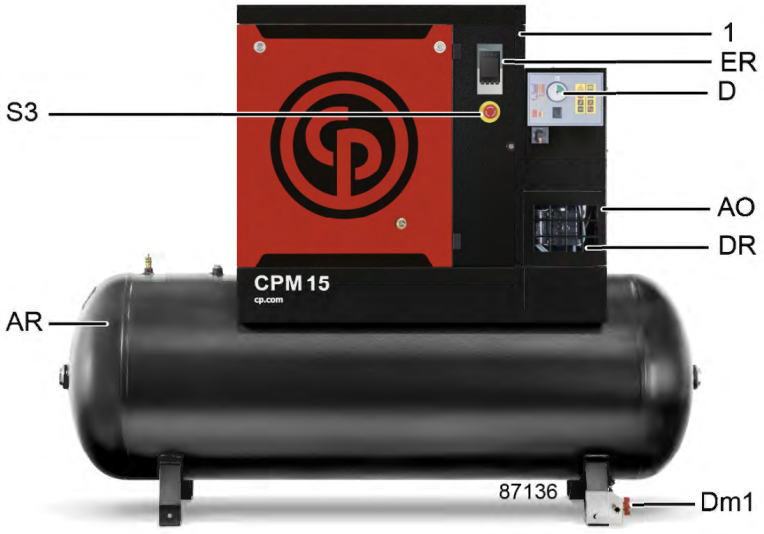


Figure 2: Front view, tank-mounted with dryer

Reference	Description
1	Electric cabinet
ER	Controller
S3	Emergency stop button
AO	Air outlet
AR	Air receiver
Dm1	Manual condensate drain
DR	Dryer
D	Dew point indicator (only on units with dryer)

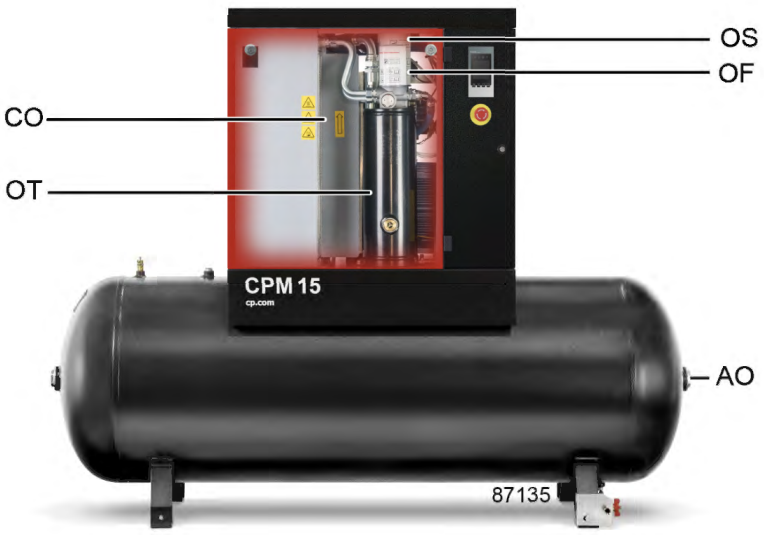


Figure 3: Front open view, tank-mounted

Reference	Description
Co	Oil cooler
OF	Oil filter
OS	Oil separator
OT	Oil separator tank

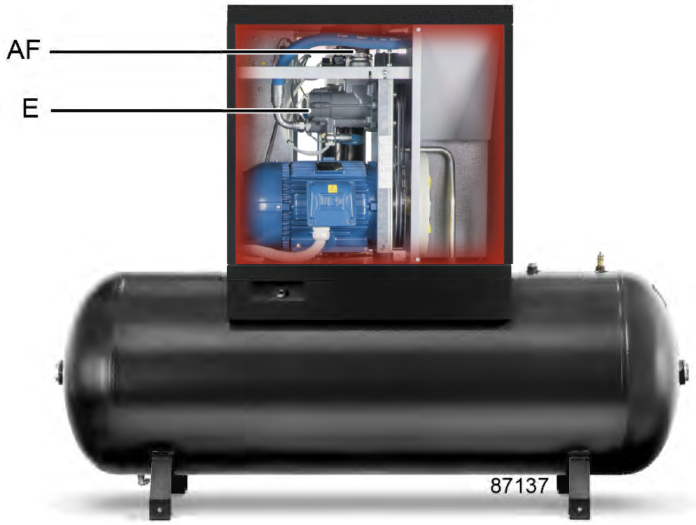


Figure 4: Rear open view, tank-mounted

Reference	Description
E	Compressor element
AF	Air filter

2.2 Air flow

Without dryer

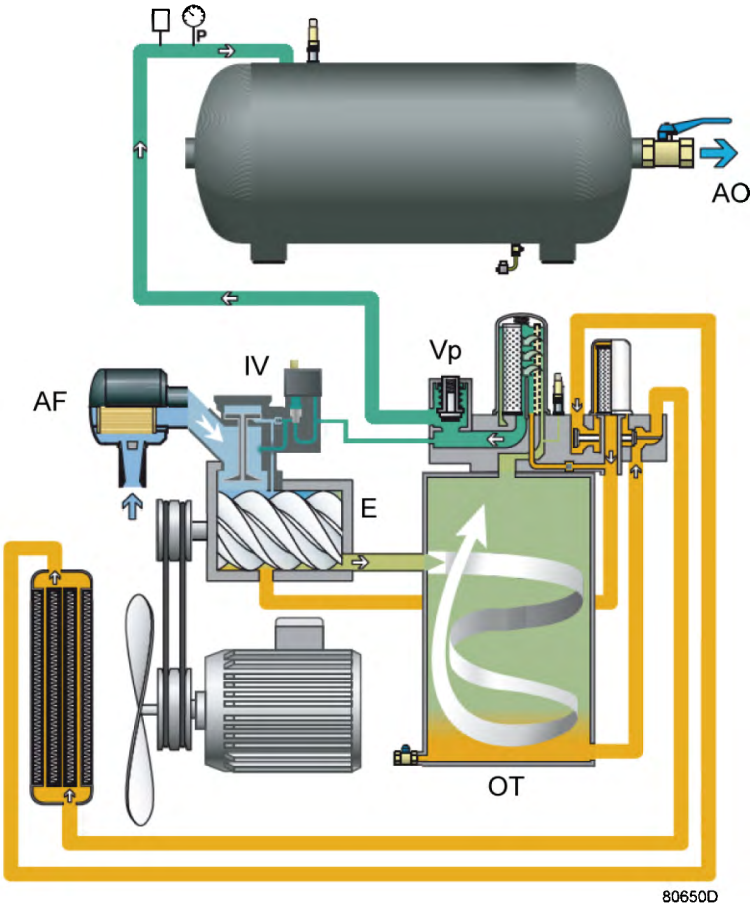


Figure 5: Tank-mounted

Air drawn through filter (AF) and open inlet valve (IV) into compressor element (E) is compressed. Compressed air and oil flow into oil separator/tank (OT). The air is discharged via minimum pressure valve (Vp) towards the air outlet (AO).

With dryer

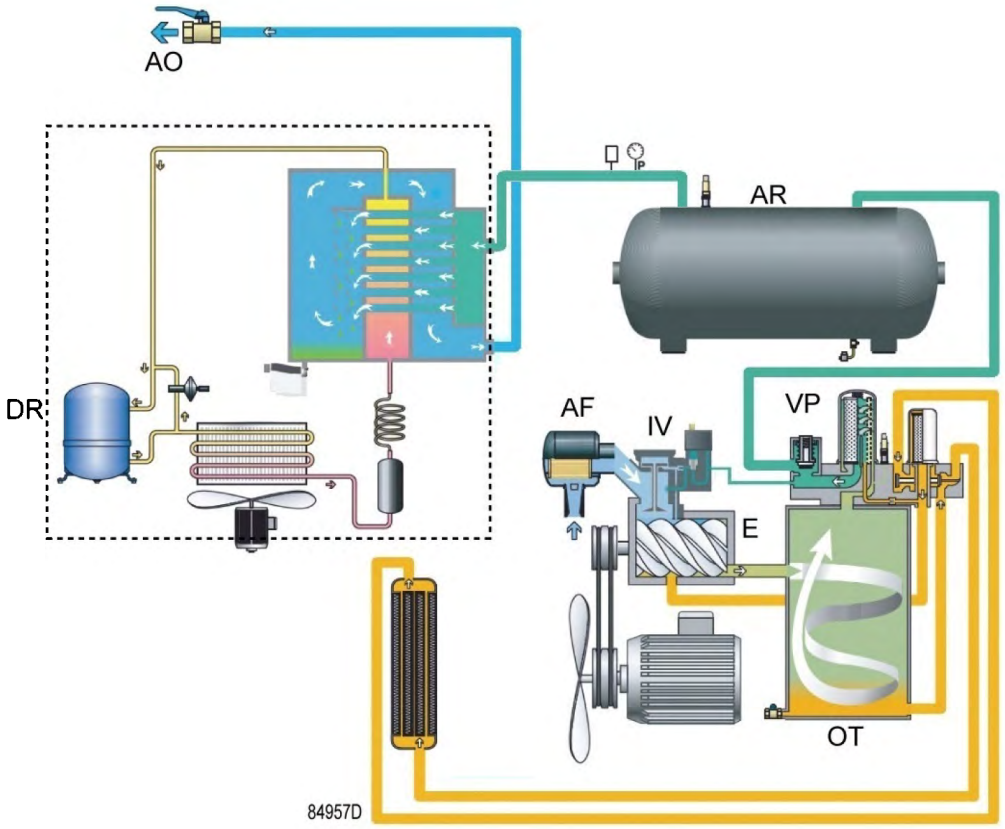


Figure 6: Tank-mounted

Air drawn through filter (AF) and open inlet valve (IV) into compressor element (E) is compressed. Compressed air and oil flow into oil separator/tank (OT). The air is discharged via minimum pressure valve (Vp), air receiver (AR) and air dryer (DR) towards the air outlet (AO).

The unit has 2 filters (FT). The G filter (coarse) is located upstream the dryer, the C filter (fine) is located downstream the dryer.

2.3 Oil system

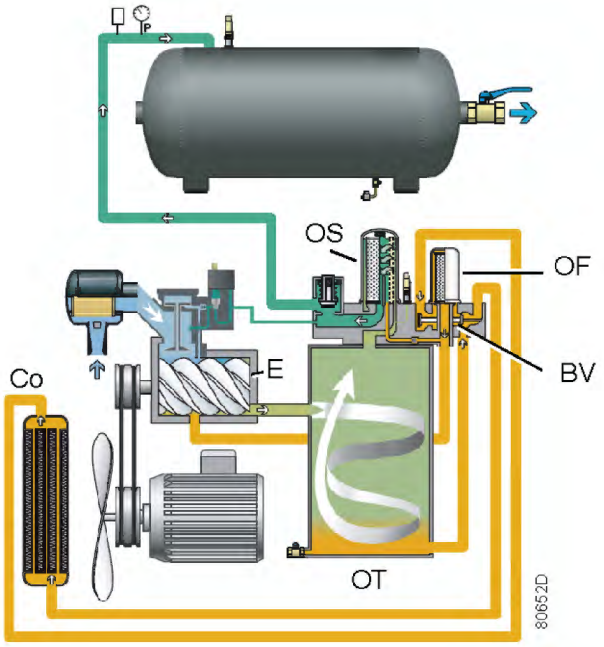


Figure 7: Without dryer

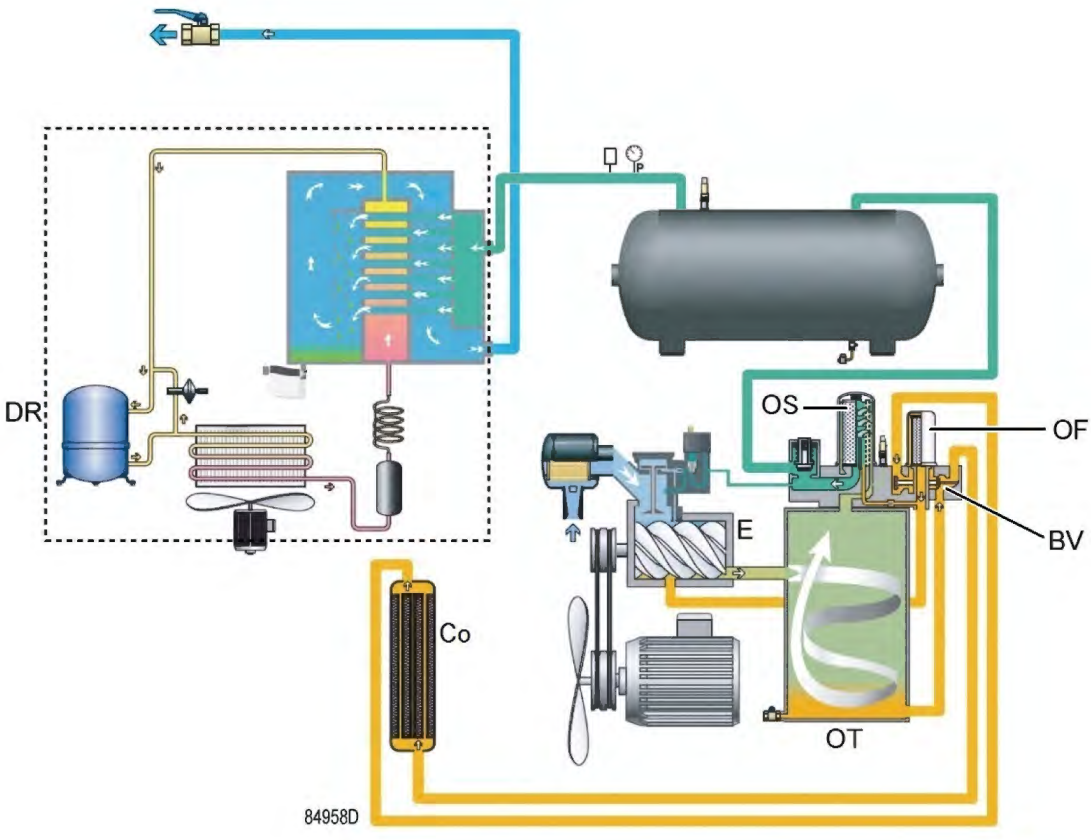


Figure 8: With dryer

Air pressure in the oil separator tank (OT) forces the oil from the tank to compressor element (E) via oil cooler (Co) and oil filter (OF). Compressed air and oil flow into oil separator/tank (OT) where most of the oil is separated from the air by centrifugal action. The remaining oil is removed by oil separator (OS) and returns to the oil circuit via a separate line. The minimum pressure valve (Vp - see section *Air flow*) ensures a minimal pressure in the tank, required for oil circulation under all circumstances.

The oil system is fitted with a by-pass valve (BV). When the oil temperature is below the set-point of the valve, the by-pass valve shuts off the oil supply from oil cooler. The by-pass valve starts opening the supply from cooler (Co) when the oil temperature exceeds the setting of the valve. The setting of the by-pass valve depends on the model, see section *Compressor data*.

2.4 Cooling system

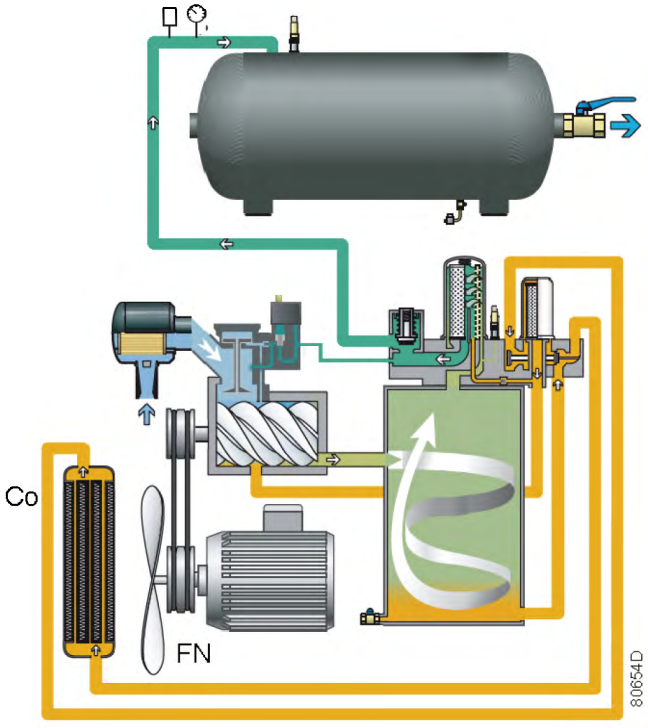


Figure 9: Without dryer

The cooling system comprises oil cooler (Co) and fan (FN). The fan, mounted directly onto the motor shaft, generates the cooling air in order to cool the oil and the internal parts of the compressor.

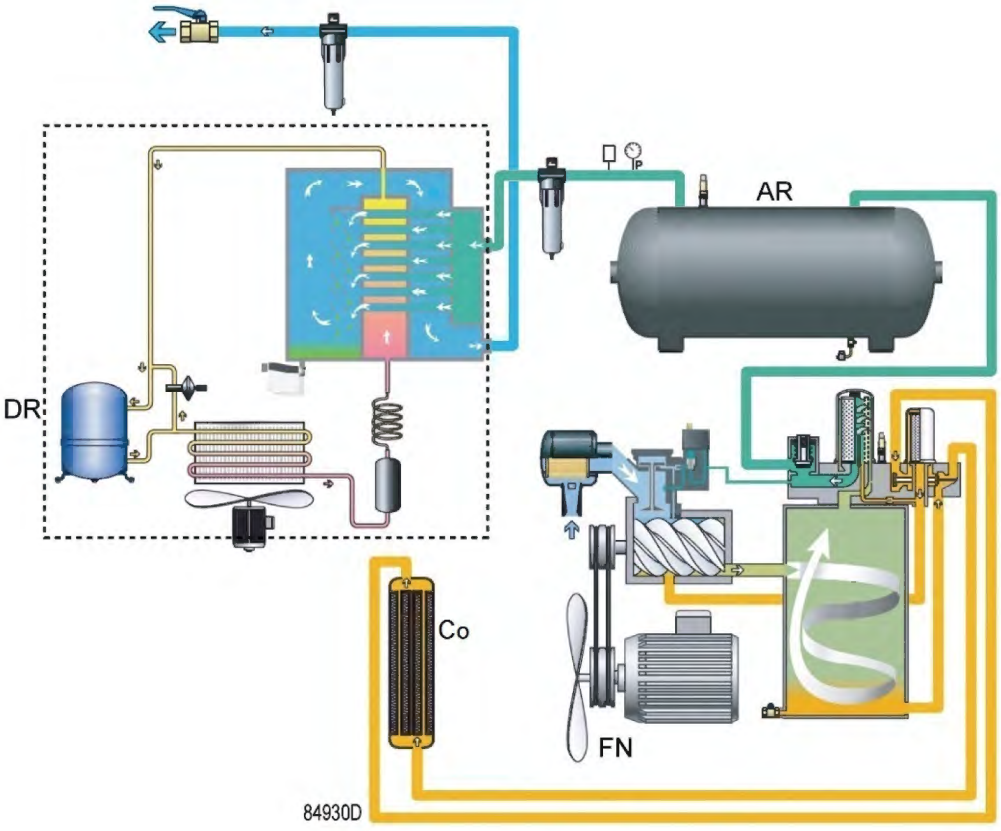


Figure 10: With dryer

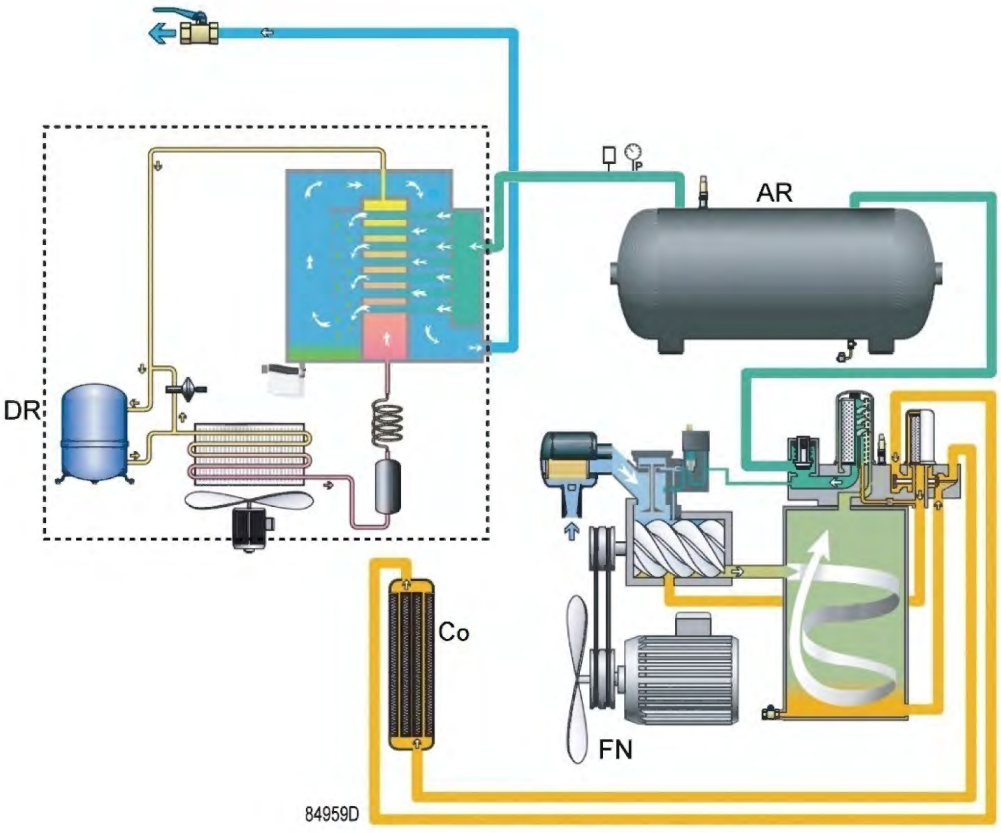


Figure 11: With dryer

The cooling system of the version with dryer comprises oil cooler (Co), air receiver (AR) and fan (FN).

The dryer (DR) has a separate cooling fan and an automatic condensate drain (see also section *Air dryer*).

2.5 Regulating system

Main components

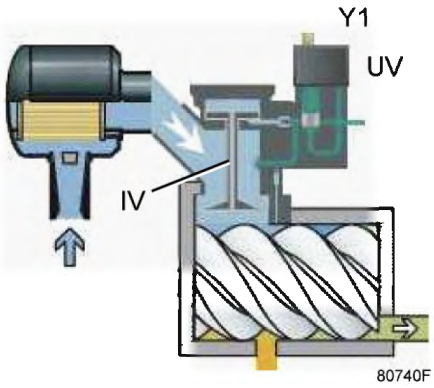


Figure 12: Detail view of unloader assembly (UA)

The main components of the regulating system are:

- Unloader (UA), including inlet valve (IV) and unloading valve (UV).
- Loading solenoid valve (Y1).
- The controller that regulates the compressor based on the pressure settings and readings of the pressure sensor.

Loading

As long as the working pressure is below the preset maximum value, the solenoid valve is energized, allowing control air to the unloader: the inlet valve is completely open and the compressor will run fully loaded (100% output).

Unloading

When the working pressure reaches the maximum limit, the solenoid valve is de-energized, venting the control air: the inlet valve closes completely and the unloading valve opens completely. The compressor will run unloaded (0% output).

The units are equipped with an intelligent controller that uses Delayed Second Stop (DSS) algorithm to determine when to stop or restart the motor.

The compressor will automatically restart when the net pressure drops to the minimum limit.

2.6 Control panel

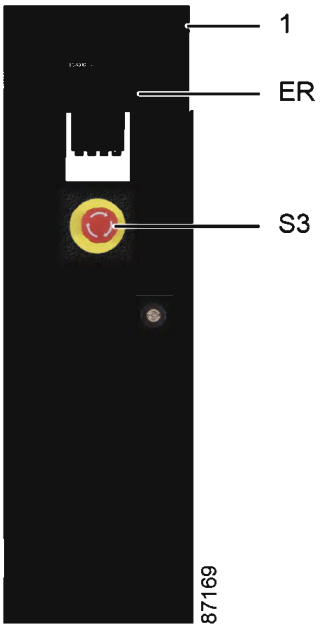


Figure 13: Electric cabinet - Control panel

Reference	Description
1	Electric cabinet
ER	Controller
S3	Emergency stop button

2.7 Electrical system

The electrical system comprises the following components:

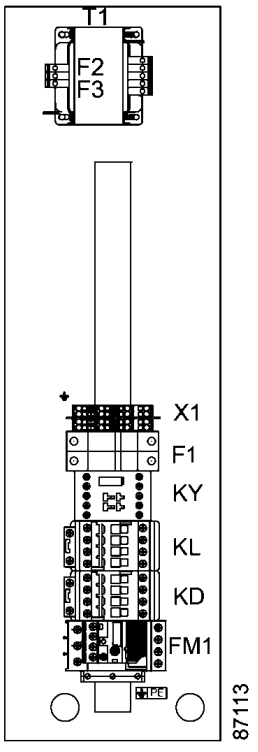


Figure 14: Electric cubicle IEC

Reference	Description
F1	Primary fuse, transformer of the control circuit
F2-3	Fuses
FM1	Motor overload relay
KD	Delta contactor
KL	Line contactor
KY	Star contactor
T1	Transformer
X1	Terminal block of the control circuit

Electrical diagram

Diagram number	Model description
2205 0189 00	IEC
2205 0367 00	cULus/ cCSAus (DOL) for 10 and 15 hp

The complete electrical diagram can be found in the electric cubicle.

The complete electrical diagram can be found on the USB supplied with the machine.

2.8 Protection of the compressor

Figure 15: Safety valve on the air receiver

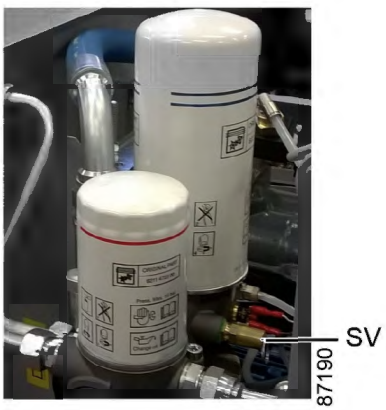


Figure 16: Safety valve on the compressor

Reference	Description	Function
SV	Safety valve	To protect the air outlet system if the outlet pressure exceeds the operning pressure of the valve.

2.9 Air dryer

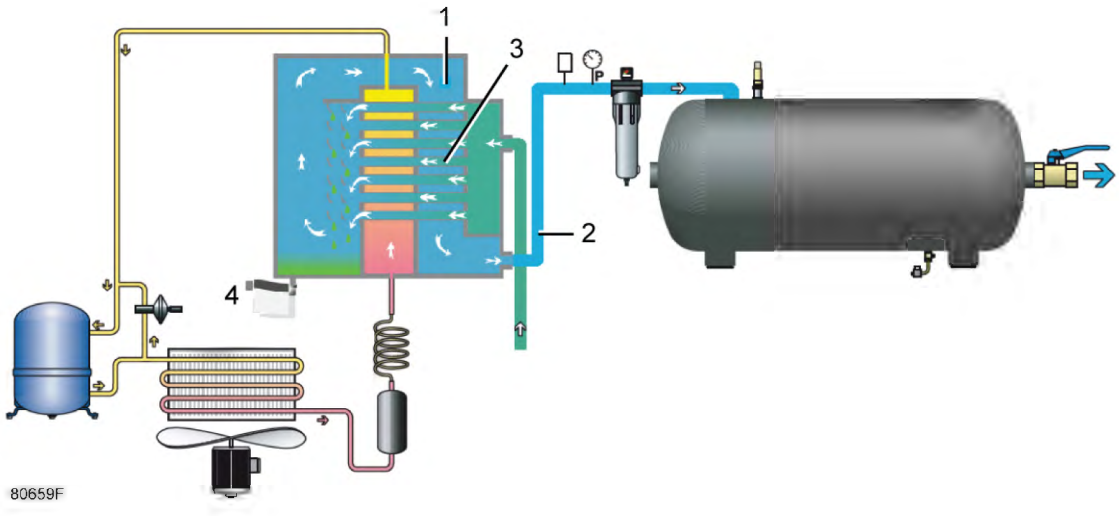


Figure 17: Air dryer

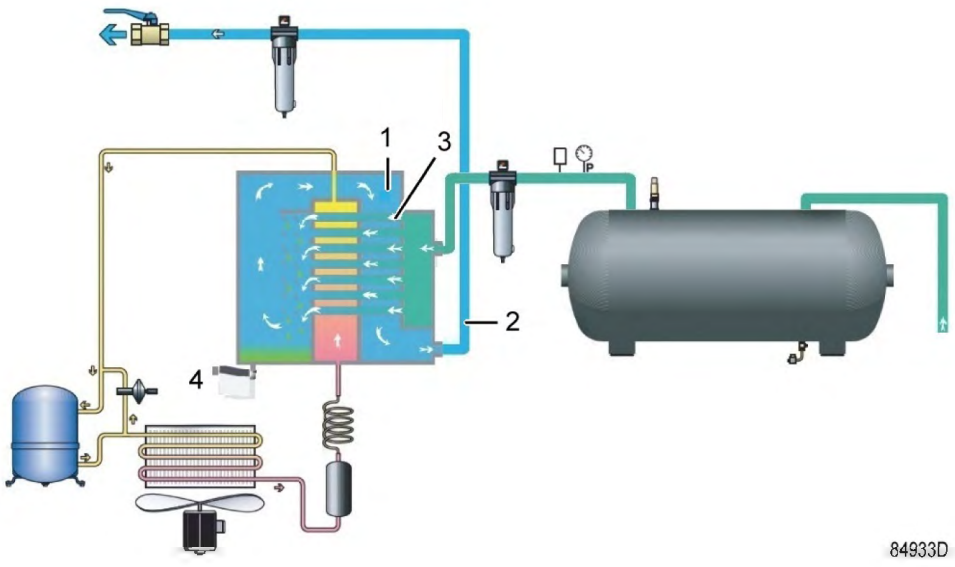


Figure 18: Air dryer

Wet compressed air enters the dryer and is further cooled by the outgoing, dried air (2). Moisture in the incoming air condenses. The air then flows through heat exchanger (1) where refrigerant evaporates, withdrawing heat from the air. The cold air then flows through condensate trap (4) which separates condensate from the air. The condensate is automatically drained. The cold, dried air then flows through heat exchanger (3), where it is warmed up by the incoming air.

3 Controller

3.1 Controller functions

Figure 19: ES4000 Controller

Introduction

The controller has the following functions:

- Controlling the unit
- Protecting the unit
- Monitoring components subject to service
- Automatic restart after voltage failure (ARAVF)
- Integrated connectivity (Bluetooth 4.2, Wi-Fi 802.11 b/g/n or Ethernet RJ45)

Automatic control of the unit

The controller maintains the net pressure between programmable limits by automatically loading and unloading the unit.

A number of programmable settings, e.g. the unloading and loading pressures, the minimum stop time and the maximum number of motor starts are taken into account.

The controller stops the unit whenever possible to reduce the power consumption and restarts it automatically when the net pressure decreases. If the expected unloading period is too short, the unit is kept running to prevent too short standstill periods.

Warning: A number of time-based automatic start/stop commands may be programmed. Take into account that a start command will be executed (if programmed and activated), even after manually stopping the unit.

Protecting the unit

Shutdown

If the outlet element temperature exceeds the programmed shutdown level, the unit will be stopped. This will be indicated on the display of the controller.

The unit will also be stopped in case of overload of the drive motor.

Air-cooled units will also be stopped in the event of overload of the fan motor

Warning:

Before remedying, consult the safety precautions.

Before resetting a warning or shutdown message, an authorized technician should solve the problem. If a warning or alarm persists to occur, consult your supplier. Frequently resetting these messages without remedying may damage the unit.

Warning

A warning level is a level below the shutdown level.

If one of the measurements exceeds the programmed warning level, a message will appear on the display and the general alarm LED will light up to warn the operator before the shutdown level is reached.

The message disappears as soon as the warning condition disappears.

Service warning

If the service timer exceeds a programmed value, this will be indicated on the display to warn the operator to carry out the service actions.

Warning: Ignoring this service warning could severely damage your machine in the long term. The supplier is not liable for failures caused by neglecting service interval timings.

Automatic restart after voltage failure (ARAVF)

The machine is designed to not lead to hazardous situations after a power voltage failure (according to safety standards). However, if required, the ARAVF function can be activated in the Smartphone App (see section *Connectivity-Smartphone App*).

This function, when enabled, will automatically restart the unit when the voltage is restored after voltage failure. This function is deactivated in the unit before leaving the factory.

The activation of ARAF function at customer side, will automatically release your supplier from any legal responsibility related to damages or injuries related to things and persons related to its activation and use. For this reason due to the safety implications of this function it will be required that, before activating it, every responsible of the machine signs a declaration, which exempts your supplier from every liability. The danger is due to the fact that the machine is remote controlled and could start running without any notice. This could lead to eventual damage of the electrical plant and personal damage.

Please make sure to train adequately, the personnel in charge of the unit start up, in order to be sure that before starting the unit, nobody is working close to the machine. And if maintenance is necessary that the proper Lock out, tag out (LOTO) procedure is followed (see section *General safety precautions*).

Warning:

If the function is activated and provided the regulator was in the automatic operation mode, the unit will automatically restart if the supply voltage to the module is restored. The ARAVF label shall be attached near to the controller.

Figure 20: ARAVF label

The ARAVF label is attached on the side panel, next to the controller, with the goal of warning users of the risks linked to the function.

Integrated connectivity

Integrated connectivity allows you to monitor and control the unit by using just your smartphone. Use the application to check the real-time performance indicator like pressure, temperature, running hours and operation mode. Receive real time notification of warnings and shutdown.

Control the unit remotely with following functions:

- Start and stop the unit
- Set unload and load pressure
- Select your required pressure bands to enhance performance and save energy
- Set up your week timer

Warning: As a further safeguard, persons switching on or off remotely controlled machines shall take adequate precautions to ensure that there is no one checking or working on the machine. To this end, a suitable notice shall be affixed to the start equipment. See section *Service mode*.

3.2 Control panel

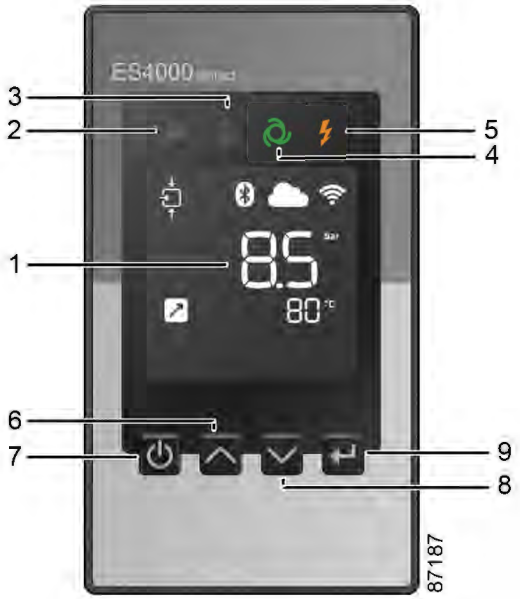
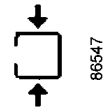
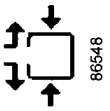
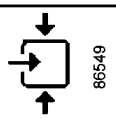


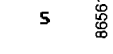
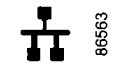
Figure 21: Control panel

Reference	Designation	Function
1	Display	Shows the unit operating condition and a number of icons to navigate through the menu.
2	Warning sign	Flashes in case of a shutdown, is lit in case of a warning condition.
3	Service sign	Is lit when service is needed and flashing when the unit is in service mode.
4	Operation sign	Is lit when the unit is running in automatic operation.
5	Voltage sign	Indicates that the voltage is switched on.
6	Up button	Use these buttons to scroll through the menu.
7	Start/stop button	This button starts the unit. The operation sign (4) lights up. The controller is operative. This button also stops the unit at next pressing.
8	Down button	Use these buttons to scroll through the menu.
9	Enter button	Use this button to confirm the last action or reset the alarm.

3.3 Icons used

Status icons

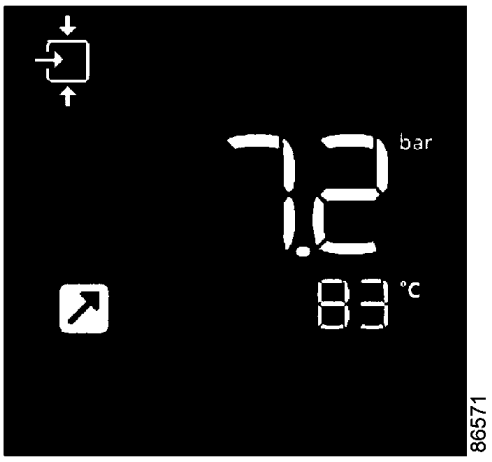
Icon	Description
	Motor stopped
	Running unloaded
	Running loaded
	On: Remote Machine Control Mode, active: compressor can start from Bluetooth or via external switch if wired.
	Automatic Restart After Voltage Failure, active
	Emergency stop
	Main motor
	Element outlet temperature
	Units of pressure, outlet
	Units of temperature, outlet
	Dryer
	Units of dryer LAT temperature (Low ambient temperature)

Icon	Description
	Multiply value x1000
	Value in hours
	Value in seconds
	Fixed: Week timer, active Blinking: Waiting
	Fixed: LAN cable connected Blinking: LAN cable not connected
	Bluetooth connection: appears only when controller is paired to the app through Bluetooth.
	Wi-Fi signal 100%
	Wi-Fi signal 75%
	Wi-Fi signal 50%
	Wi-Fi signal 25%
	Cloud connected
	Fixed: Over-the-air (OTA) update available Blinking: Over-the-air (OTA) update in progress

Note: This chapter gives a general survey of available icons. Not all icons mentioned in this chapter are applicable to every machine.

3.4 Main screen

When the voltage is switched on, the first screen is a test screen. The next screen is the Main screen, shown automatically:



The Main screen shows:

- The unit status by means of pictographs
- The air outlet pressure
- The element outlet temperature

The screen backlight stays on for 2 minutes (default setting), to turn on the backlight again, press any key on the controller.

The screen reactivates when you approach the unit with a connected smartphone.

In case of warning or shutdown the backlight will light up automatically.

3.5 Warning

Description

A Warning will appear in the event of:

- Too high temperature at the outlet of the compressor’s element (TT90)
- Too low temperature at the outlet of the compressor’s element (TT90)
- Warning from dryer unit (units with integrated dryer)

If the unit is connected to the Cloud (internet connection), you will receive a realtime warning notification.

Compressor element outlet temperature (TT90)

If the outlet temperature of the compressor's element exceeds the warning level warning (factory setting 110°C / 230°F) LED (2) will light up red:

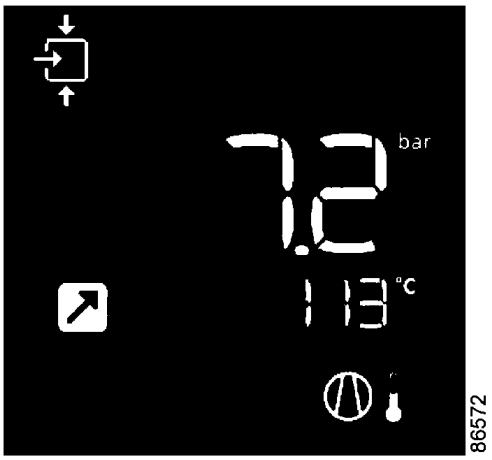


Figure 22: Main screen with temperature outlet warning

The related pictograph

will appear flashing with temperature unit °C / °F icon. It remains possible to scroll through other screens, using the Scroll buttons up and down (6 and 8) to check the actual status of other parameters. Press button (7) to stop the compressor and wait until the compressor has stopped. Switch off the voltage, inspect the compressor and troubleshoot. Before solving the issue, consult the *Safety precautions*. The warning message will disappear as soon as the warning condition disappears.

3.6 Shutdown

Description

The unit will be shutdown in case of:

- Outlet temperature exceeds the shutdown level, detected by temperature sensor (TT90) or temperature switches (TSHH11- TSHH21)
- Error of the outlet pressure (PT20) /temperature sensor (TT90)
- Outlet pressure too high
- Overload of the main motor/fan motor

If the unit is connect to the Cloud, you will receive a realtime shutdown notification.

Compressor element outlet temperature (TT90)

If the outlet temperature of the compressor element exceeds the shutdown level (factory setting 115 ˚C / 239 ˚F) the compressor will be shutdown, alarm LED (2) will flash, automatic operation LED (4) will go out and the following screen will appear:

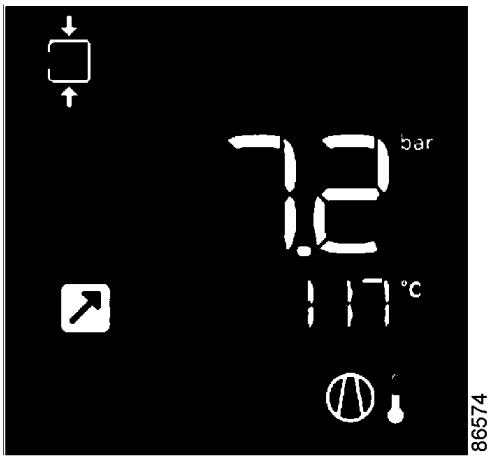


Figure 23: Main screen with temperature outlet shutdown

The related pictograph

will appear flashing with temperature unit °C / °F icon.

Press Scroll buttons (6-8) until the actual compressor element temperature appears.

The screen shows that the temperature at the outlet of the compressor element is 117 ˚C.

- Switch off the voltage and troubleshoot. Before solving the issue, consult the section *Safety precautions*.
- When the issue is solved and the shutdown condition has disappeared, switch on the voltage and restart the unit.

Compressor element outlet temperature by temperature switch (TSHH11 / TSHH21)

If the outlet temperature of the compressor element triggers for temperature switch the compressor will be shutdown, alarm LED (2) will flash, automatic operation LED (4) will go out and the following screen will appear:

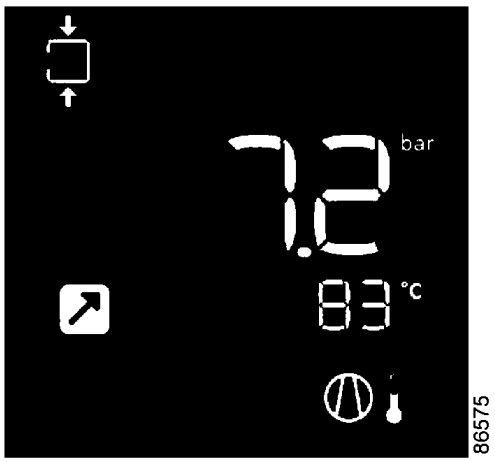


Figure 24: Main screen with temperature switch shutdown

The related pictograph

will appear flashing.

Error pressure/temperature sensor

In case of error of the outlet pressure sensor (PT20) or temperature sensor (TT90), compressor will be shutdown. The following screen will appear:

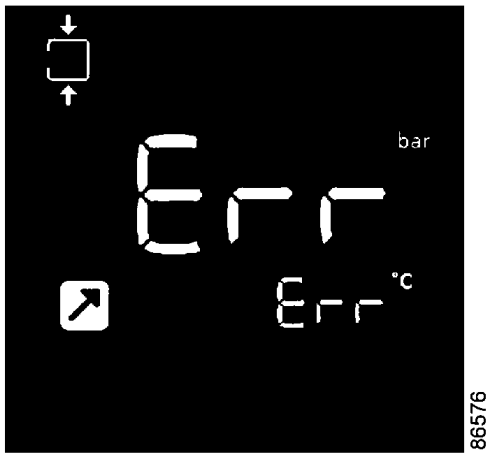


Figure 25: Error on pressure and temperature sensor

Compressor outlet pressure too high

If the outlet pressure of the compressor exceeds the shutdown level (factory setting 1.5bar / 22psi over the maximum pressure of compressor) the compressor will be shutdown, alarm LED (2) will flash, automatic operation LED (4) will go out and the following screen will appear:

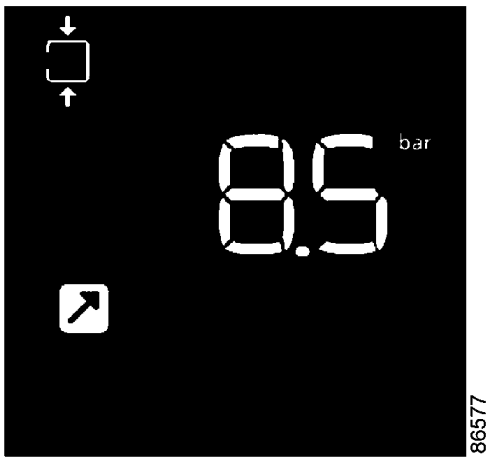


Figure 26: High outlet pressure

The unit of pressure bar/psi/MPa will appear flashing.

- Switch off the voltage and remedy the trouble. Before remedying, consult the section *Safety precautions*.
- After remedying and when the shutdown condition has disappeared, switch on the voltage and restart the unit.

Motor overload

In the event of motor overload, the compressor will be shutdown, alarm LED (2) will flash, automatic operation LED (4) will go out and the following screen will appear:

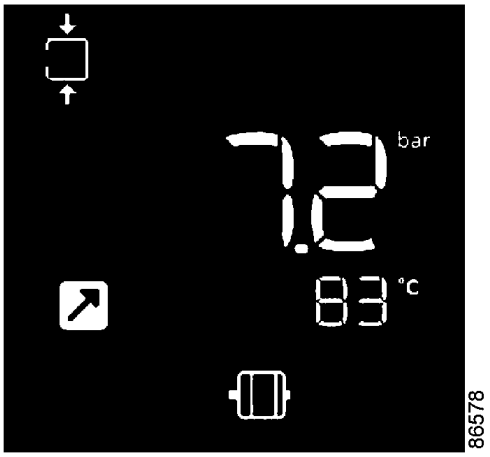


Figure 27: Main screen with shutdown indication, motor overload

- Switch off the voltage and troubleshoot. Before solving the issue, consult section *Safety precautions*.
- When the issue is solved and the shutdown condition has disappeared, switch on the voltage and restart the unit.

3.7 Service warning

A service warning will appear when the service timer has reached the programmed time interval. If the service timer exceeds the programmed time interval, alarm LED (3) will light up.

- Stop the unit, switch off the voltage and carry out the required service actions (see section *Preventive Maintenance*). Before proceeding with service, activate Service mode (see section *Service mode*).
- **Warning:** The longer interval service actions must also include the shorter interval actions. In the example above, carry out all service operations belonging to the 8000 running hours interval as well as those belonging to the 4000 running hours interval. The setting of the service timer can be changed in function of the operating conditions. See section *Preventive maintenance schedule*.
- After servicing, reset the service timer. See section *Calling up/resetting the service timer*.

3.8 Remote control

The unit can be commanded via external switches, this function is always activated. The unit can be commanded to start/stop via digital inputs.

Note: Have the modifications checked by your supplier. Stop the unit and switch off the voltage before connecting external equipment. Only potential-free contacts are allowed.

Warning: Persons switching on remotely controlled machines shall take adequate precautions to ensure that there is no one checking or working on the machine. To this end, a suitable notice shall be affixed to the remote start equipment.

3.9 Scrolling through screens

Scroll buttons (6-8) can be used to scroll through all screens. For most screens, the unit of measurement and the related pictograph are shown together with the screen number.

Example:

The screen shows the screen number **P.SEt**, the unit used **bar** and the related symbol for pressure unit.

Press Enter key (9) to call up the actual running hours.

Controller screens	Designation	Function
Main screen	Main with element outlet temperature	
P.SEt	Pressure settings	See section *Calling up/ modifying pressure band settings*
HoUr	Running hours	See section *Calling-up running hours*
SoFt	Software relase version	See section *Calling Software release*
PAIr	Bluetooth pairing	See section *Calling-up Bluetooth pairing/ Discovery mode*

3.10 Calling up/ modifying pressure band settings

Starting from the Main screen:

- Press Scroll button (6-8) until **P.SEt** is shown on the display.

Figure 28: Pressure setting screen

- Press Enter button (9) to modify.

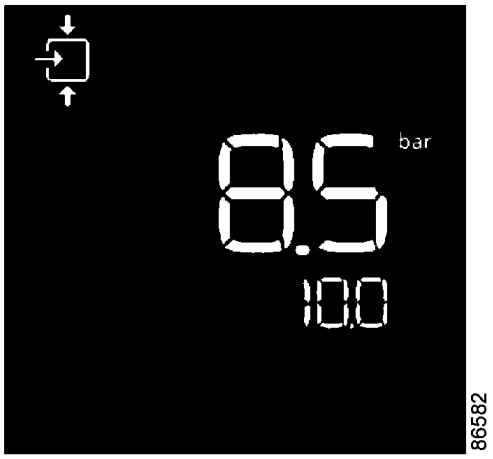


Figure 29: Starting/loading pressure changing

- The pictograph

  shows starting/loading pressure and the value starts blinking.
- Press Scroll button (6-8) to modify the starting/loading pressure and press enter button (9) to confirm.

  The unloading pressure on secondary row will update accordingly to have optimal pressure range.

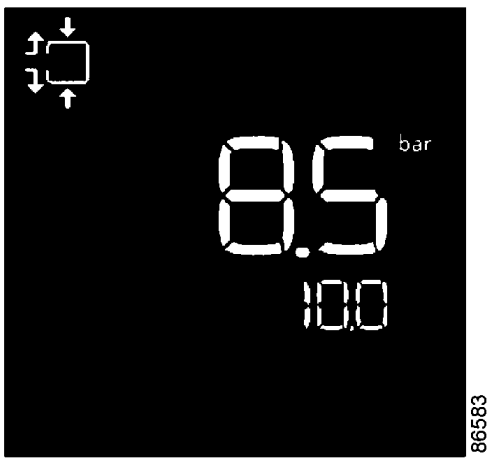


Figure 30: Stopping/unloading pressure changing

- The pictograph

  shows stopping/unloading pressure and the value starts blinking.
- Press Scroll button (6-8) to modify the stopping/unloading pressure and press enter button (9) to confirm.

3.11 Calling up running hours

Starting from the Main screen:

- Press Scroll button (6-8) until **HoUr** is shown on the display.

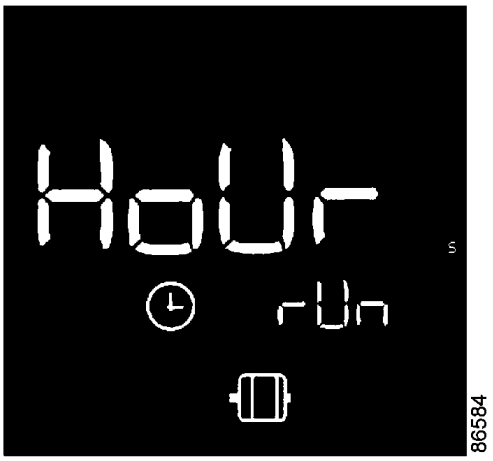


Figure 31: Running hours screen

- Press Enter button (9).

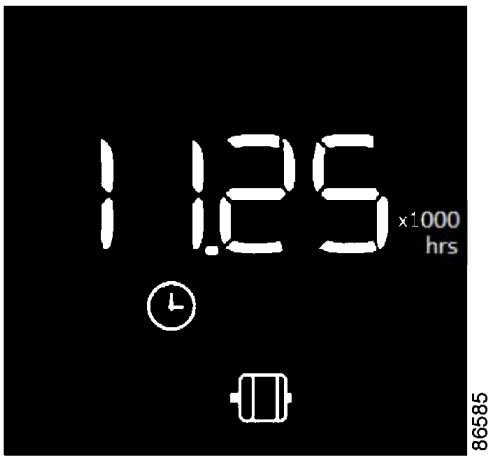


Figure 32: Running hours value

The screen shows the unit used (x1000 hrs) and the value (11.25): the running hours of the unit are 11250 hours.

3.12 Calling up Software release

Starting from the Main screen:

- Press Scroll button (6-8) until **SoFt** is shown on the display.

Figure 33: Software release screen

- Press Enter button (9) to show the software release version.

3.13 Calling up Bluetooth pairing/ discovery mode

For Bluetooth connectivity a paring with the device is necessary, see section *Connectivity*. This function is also a way to select the pair to the correct unit when multiple units are in the proximity. During the Bluetooth pairing, the controller generates and stores a random code.

This code is displayed on the controller screen and the app user must enter this code in the ICONS app.

The user enters this code to connect for the first time, after this the application allow automatic Bluetooth connection when the unit is in the range.

A short video instruction will guide you through the Smartphone App while proceeding with pairing.

Starting from the Main screen:

- Press Scroll button (6-8) until **PAIr** is shown on the display.

Figure 34: Bluetooth pairing screen/ discovery mode

- Press Enter button (9) to show Bluetooth PIN code. Attention, PIN code is composed by 6 sliding numbers.
- To exit from pairing, press Enter button (9) again.

3.14 Advanced menu

To enter inside the advanced menu Press buttons (6) and (8) together.

Advanced menu consists by following functions:

Controller screens	Designation	Function
SEru	Service mode	See section *Calling-up Service mode*
tESt	Screen Test	See section *Calling-up Screen Test*
FACt	Factory reset	See section *Calling-up Factory reset*

3.15 Service mode

Service mode can be only enabled/disabled physically on the controller, this function will allow to notify "in real time" the customer on the App that the service has been started on the machine and when it will be finished. It will also prevent remote start/stop when a service technician is working on a machine.

Once Service mode is active, it will not be possible to use any of the remote control functionalities like:

- Remote control with digital input
- Start/stop from Smartphone App
- Timer Schedule
- Controller firmware over-the-air (OTA) updates

When service mode is active, the service icon (3) is blinking. The only available command during Service Mode is from start/stop button (7) to start the unit.

Starting from the Main screen:

- Press buttons (6) and (8) together to enter inside advanced menu
- **SEru** is shown on the display.
- Press enter button (9) to change status.
- Use scroll button (6-8) to set “on” or “off”.
- Use enter button (9) to confirm the status.

3.16 Screen test

Starting from the Main screen:

- Press buttons (6) and (8) together to enter inside advanced menu.
- Press Scroll button (6-8) until **tESt** is shown on the display.
- Use enter button (9) to confirm the screen test.

The display now shows all icons that can be displayed:

Figure 35: Test screen

3.17 Calling up factory reset

This function restores the controller to original machine settings for pressure settings/units/starting. This parameter can only be modified after entering a password. Consult your supplier to use this function.

Starting from the Main screen:

- Press buttons (6) and (8) together to enter inside advanced menu
- Press Scroll button (6-8) until **FACt** is shown on the display.
- Press Scroll button (6-8) to enter a password.

3.18 Connectivity-Smartphone App

The controller has been designed as a standalone Internet of Things (IoT) solution. As such it includes integrated connectivity, which allows you to monitor and control your unit by using just your smartphone.

To enable this you just need the ICONS application and an internet connection for your unit.

Download the ICONS application from the Play Store and App Store to get the full functionality of the unit.

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In order to have an overview of all the features available in the App we refer to the APP guidelines document which can be found in the media section of the App.

Unit configuration and control are made possible by Bluetooth communication with digital signature. To connect the unit to the cloud for monitoring purposes, a Wi-Fi connection or alternatively an Ethernet network with access to Internet is required.

The network settings can also be changed after the Wizard, the change is only available with a Bluetooth connection. Wi-Fi 802.11 b/g/n 2.4Ghz connection supported. For the Ethernet, use a UTP cable (CAT 5e) to connect the controller, the position of RJ45 connector is in the bottom side of the controller inside the electrical cubicle.

Note: Have the modifications checked by your supplier. Stop the unit and switch off the voltage before connecting external equipment. Only potential-free contacts are allowed.

In the App you will be able to change the settings of “**Wi-Fi**” or “**Ethernet**”, see App guidelines document.

When the unit is connected to the Wi-Fi network, the following icon

lights up on the controller. Otherwise for Ethernet, when the cable is plugged the following icon

lights up. If the internet is active and the unit is connected to the cloud, then the following icon

is on.

Machine events and notification

The smartphone application sends real time push notifications in case of alarms or shutdown. This allows you to always be up to date on the status of the machine. In case you want more information, you can always press on the pop-up message in your Smartphone and you will redirected to the App.

Please look at the App guidelines document for a detailed explanation of this feature

OTA firmware update

Over-the-air (OTA) firmware updates are remote updates that do not require a direct connection to the unit. These are only possible if the controller of the machine is connected to the internet, so make sure to connect your machine to be able to use this feature. The benefits of this feature are to keep a product updated with the latest software to ensure optimal functionality, add the ability to receive new firmware to support additional features. Reduces time response to errors, bugs and security update without the need to physically service the unit.

When a firmware update is available, the following icon

appears on the unit's screen and a message is shown in your App

- Before starting the update, press the emergency stop button on the controller.
- Open your App tot start the update procedure.
- Follow the instructions in the application.
- At the start of the update the following icon on the controller screen starts blinking

  .

Warning: Do not turn off the power of the unit during the firmware update or interrupt this procedure. During the update the machine will be stopped; THE SCREEN AND LEDS WILL BE OFF.

- The firmware update loads the new firmware on your Compressor. This process can take a few minutes. Once the firmware update is complete, the controller will reboot.
- Reset the emergency stop alarm and manual start is required after the update.

Pressure settings

Changing pressure settings is one of the useful features only available in the App, when the smartphone is connected via Bluetooth to the unit.

Please look at the App guidelines document for a detailed explanation of this feature.

Warning: If the unit is in standby and the loading pressure is set above the current pressure shown on the controller, the unit will start.

Timer schedule

With a timer schedule, you will not need to go every day to your unit to start and stop it. You will just need to specify a start and stop hour in the App. To active the function and set the timers, you will need Bluetooth pairing with the unit and an internet connection. This is needed to send the information from the phone to the controller. Then the information will be stored in the controller itself.

Please look at the App guidelines document for a detailed explanation of this feature.

When the Timer schedule is active, the related pictograph

will be shown on the controller display.

Figure 36: Main screen with timer schedule active

4 Installation

4.1 Installation proposal

Outdoor/altitude operation

If the compressor is installed outdoors or if the ambient temperature can be below 0˚C (32˚F), precautions must be taken. In this case, and also if operating at high altitude, consult your supplier.

Moving/lifting

Figure 37: Transport by a pallet truck

Danger: For transport with a fork truck, use the openings in the frame. Move the compressor gently.

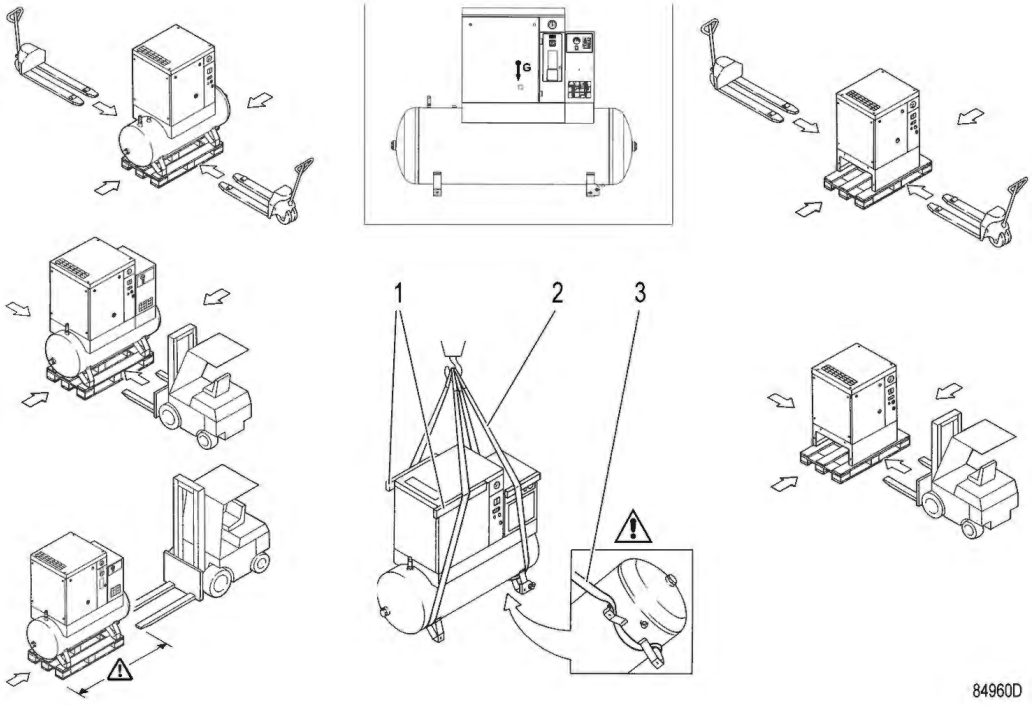


Figure 38: Lifting instructions

Reference	Description
1	Spacer bars to protect the body
2	Lifting straps: • Minimum length: 6 meter • ISO 4878
3	It is recommended to position the lifting straps this way.

Installation proposal

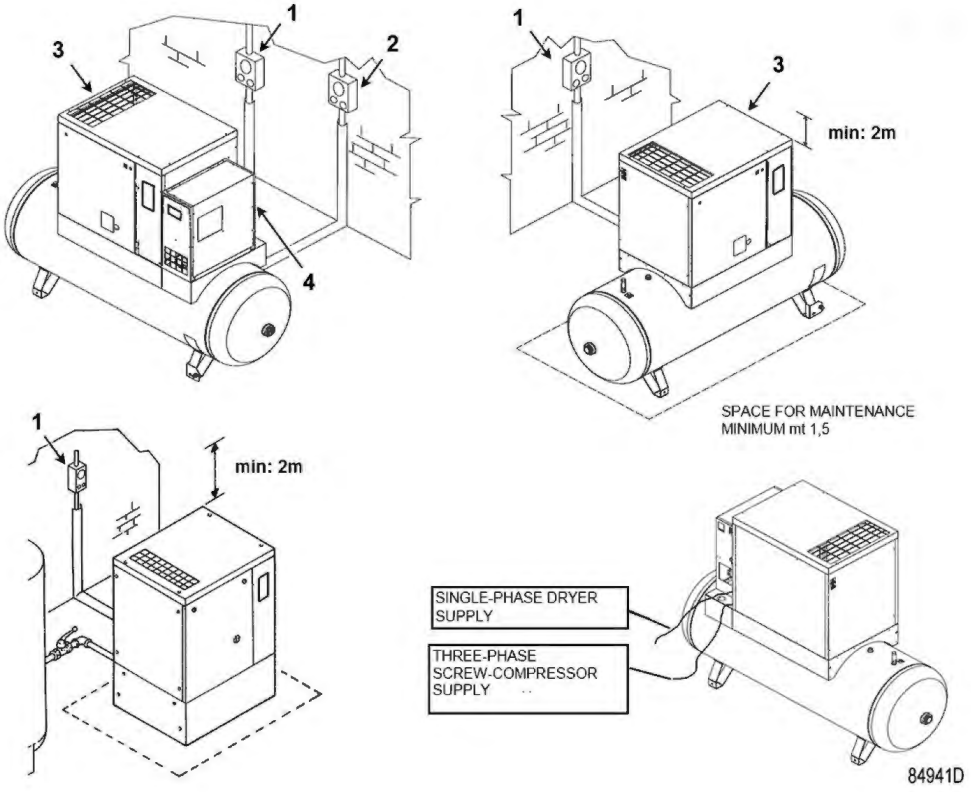


Figure 39: Installation proposal

Reference	Description
1	Main power switch for the compressor (three-phase). Power supply cables need to be protected by suitable conduit.
2	Main power switch for the dryer (single-phase). Power supply cables need to be protected by suitable conduit.
3	Compressor
4	Dryer

1. Install the compressor on a solid, level floor suitable for taking its weight.

   The recommended minimum distance between the top of the unit and the ceiling is 2 m (78.7 in).

   The air receiver should not be bolted to the floor.

   For tank-mounted units, the minimum distance between the wall and the back of the compressor is 1.5 m (59 in).
2. Calculate the pressure drop over the air delivery pipe as follows:

   $\Delta p = (L \times 450 \times Q_c^{1.85}) / (d^5 \times P)$, with

   d = Inner diameter of the pipe in mm

   Δp = Pressure drop in bar (recommended maximum: 0.1 bar (1.5 psi))

   L = Length of the pipe in m

   P = Absolute pressure at the compressor outlet in bar

Q_c = Free air delivery of the compressor in l/s

3. Install the inlet grids and ventilation fan in such a way that any recirculation of cooling air to the compressor or dryer is avoided.

   The air velocity to the grids must be limited to 5 m/s (200 in/s).

   The required ventilation capacity to limit the temperature of the compressor room can be calculated from the following formula:

   $Q_v = 0.92\ N / \Delta T$

   Q_v = Required ventilation capacity in m^3/s

   N = Shaft input of compressor in kW

   ΔT = Temperature increase in the compressor room in °C

4.2 Dimension drawings

The dimension drawing can be found in the technical documentation supplied with the unit.

Drawing number	Model description
9828 0832 60	Floor-mounted
9828 0832 61	Tank-mounted
9828 0832 62	Tank-mounted with dryer

Text on drawings	Translation or explanation
Emergency stop switch	Emergency stop switch
Power supply	Power supply
Cooling air and compressor inlet	Cooling air and compressor inlet
Cooling air outlet of compressor and motor	Cooling air outlet of compressor and motor
Service panel	Service panel
Compressor controller	Compressor controller
Oil level indicator	Oil level indicator
Compressed air outlet (G1/2” Female)	Compressed air outlet
Forklift openings	Forklift openings
Valve rotation	Valve rotation
Center of gravity	Center of gravity
Cubicle door fully open	Cubicle door fully open
Anchorpoints in base	Anchorpoints in base
Air receiver safety valve	Air receiver safety valve
Vessel anchor points	Vessel anchor points
Air receiver manual drain (G3/8” Female)	Air receiver manual drain
Dryer dewpoint indicator	Dryer dewpoint indicator
Condensate drain integrated dryer	Condensate drain integrated dryer
Dryer inlet cooling air	Dryer inlet cooling air
Dryer outlet cooling air	Dryer outlet cooling air

4.3 Electrical connections

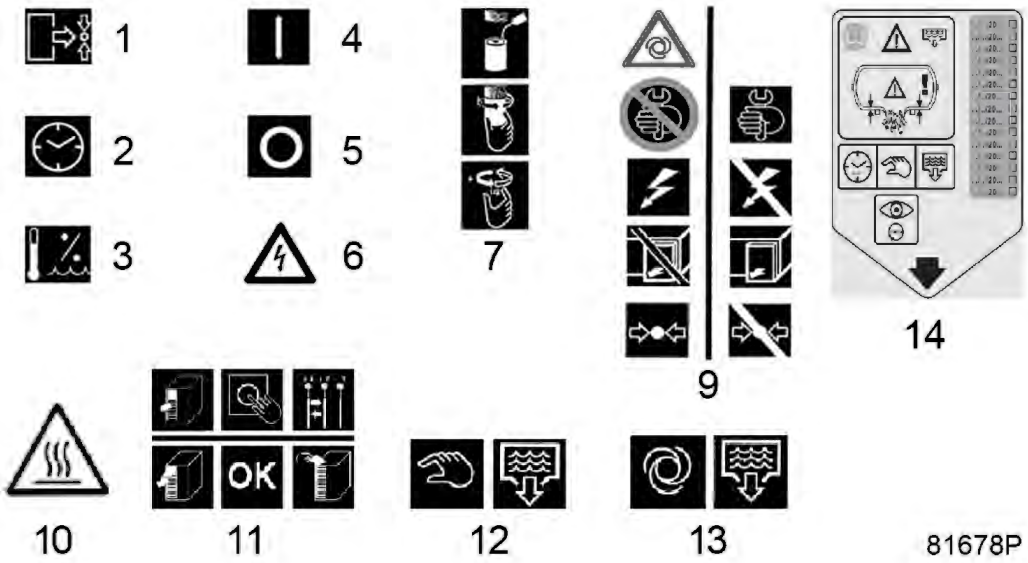
Danger: Always disconnect the power supply before working on the electrical circuit!

General instructions

1. Install an isolating switch near the compressor.
2. Check the fuses and the setting of overload relay, see section *Settings for overload relay and fuses*.
3. Check transformers for correct connection, if fitted.
4. Connect the power supply cables to terminals L1, L2 and L3 (1X0) and the neutral conductor (if applicable) to terminal (N). Connect the earth conductor.

   The power supply cable delivered with the compressor must be protected by raceway or by a suitable conduit system.

4.4 Pictographs



Reference	Description
1	Working pressure
2	Hour meter
3	Dew point temperature
4	Start
5	Stop
6	Warning: voltage
7	Lightly oil gasket of oil filter, screw filter on and tighten by hand
8	Minimum load factor to avoid condensate is 10%
9	Warning: switch off voltage and depressurise compressor before carrying out maintenance work
10	Warning: hot parts

Reference	Description

11	With all bodywork panels in place, push the start button.
	• If the sheet is pulled downwards:
	  • Stop the compressor immediately and switch off the voltage.
	  • Reverse two incoming electric lines and repeat the previous step.
	• If the sheet is blown away, the motor rotation direction is correct.

12	Manual condensate drain
13	Automatic condensate drain
14	Drain the condensate daily and inspect the vessel yearly. Note down the inspection dates.

Figure 40: ARAVF label

Reference	Description
ARAVF	Automatic restart after voltage failure

5 Operating instructions

5.1 Initial start-up

Safety

Warning: The operator must apply all relevant safety precautions.

General preparation

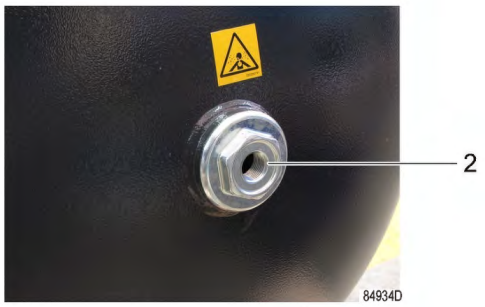


Figure 41: Air receiver port

Figure 42: Condensate drain

Figure 43: Condensate drain valve on air receiver

1. Consult the installation instructions (see *Installation proposal*).
2. Check that the electrical connections correspond to the local codes. The installation must be earthed and protected against short circuits by fuses in all phases. An isolating switch must be installed near the compressor.
3. Connect condensate drain valve (Dm) and automatic drain outlet (Da) to a drain collector. Close the valve.

   Connect condensate drain valve (4) of the air receiver to a drain collector. Close the valve.

   To drain the condensate, an NPT3/8 connection is available.

   Connect an NPT3/4 valve to the air receiver port (2).

Oil system

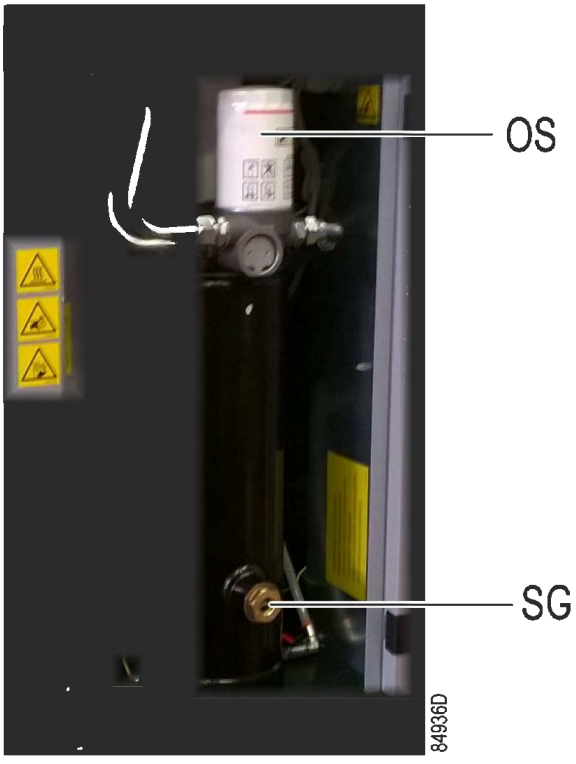


Figure 44: Oil level sight-glass

Check the oil level.

The oil level sight-glass (SG) should be between ¼ and ¾ full.

Start-up

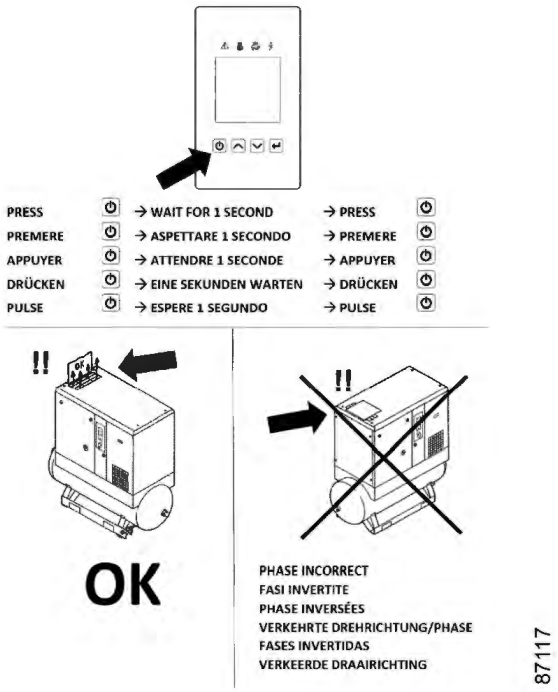


Figure 45: Start-up sheet (5)

1. Affix sheet (5) (explaining the procedure for checking the motor rotation direction) to the cooling air outlet of the compressor. Consult section *Dimension drawings*.
2. Switch on the voltage. Press the start button.
3. Check the rotation direction of the motor using sheet (5). If the motor rotation direction is correct, the sheet on the top grating will be blown upwards. If the sheet remains in place, the rotation direction is incorrect (see the pictographs on the label). If the rotation direction is incorrect, switch off the voltage, open the isolation switch and reverse two incoming electric lines.
4. Start and run the compressor for a few minutes. Check that the compressor is operating normally.

5.2 Starting

Starting the compressor

Figure 46: Automatic drain

Figure 47: Condensate drain valve on air receiver

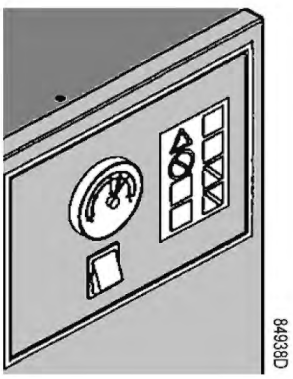


Figure 48: Dew point temperature gauge

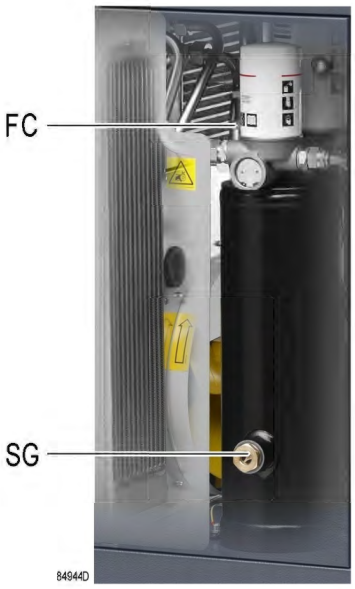


Figure 49: Position of oil sight glass and filler plug

Figure 50: Control panel

1. Before starting, check the oil level in accordance with step 5.
2. Switch on the voltage.
3. Open air outlet valve.
4. Push the start button (7).

   On compressors with a star-delta starter, the drive motor switches over from star to delta 4 seconds after starting.

Warning: The maximum number of starts is limited at 10 per hour. It is strongly recommended to operate the compressor with a load factor of more than 10% to avoid condensate in the oil.

5. Regularly check the oil level. 10 to 15 minutes after stopping, the sight glass (SG) should be between 1/4 and 3/4 full.

   If the oil level is too low, stop the compressor, depressurise the oil system by unscrewing oil filler plug (FC) one turn and wait a few minutes. Remove the plug and top up the oil, until the sight glass is 3/4 full. Do not overfill. Fit and tighten plug (FC).

   In automatic operation, the regulator is automatically controlling the compressor, i.e. loading, unloading, stopiing of the motors and restarting.
6. Regularly check the working pressure and the dew point (units with dryer).
7. Regularly check that condensate is drained (Da) during operation.

5.3 Stopping

Figure 51: Condensate drain valve on air receiver

Figure 52: Control panel

1. Push the start/stop button (7) on the controller. The compressor will unload. When the unload time has elapsed, the compressor is stopped and the controller goes back to the main screen.

   To stop the compressor immediately in the event of an emergency, press button (S3), see section *Control panel*. After remedying the fault, unlock the button by rotating it.

Note: Only use the emergency stop button in the event of an emergency Avoid using the button for normal stopping of the compressor.

2. Close air outlet valve and switch off the voltage to the compressor.
3. Open condensate drain valve (4) of the air receiver for a few seconds to drain any condensate and then close the valve.

Danger: The air dryer and air receiver remain under pressure.

Danger: The integrated filter (if installed) remains pressurised.

Danger: If maintenance or repair work is necessary, consult the section *Problem solving* for all relevant safety precautions.

5.4 Taking out of operation

Figure 53: Condensate drain valve on air receiver

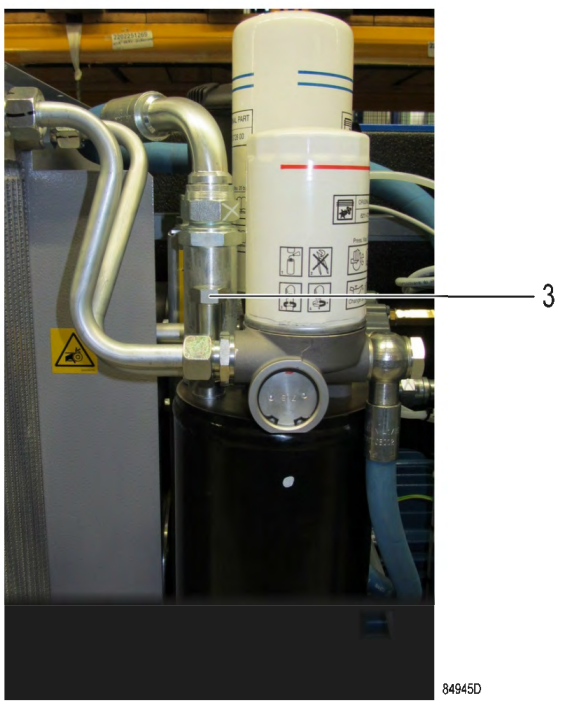


Figure 54: Oil filler plug

Procedure

This procedure should be carried out at the end of the compressor's service life.

1. On Full-Feature units: move switch (3) of the dryer to position 0.

   Stop the compressor and close the air outlet valve (2).
2. Switch off the voltage and disconnect the compressor from the mains.
3. Depressurize the compressor by opening plug (3) one turn.

   Push condensate manual drain (Dm) for a few seconds to release any condensate from the dryer.

   Open condensate drain valve (4) of the air receiver.
4. Shut off and depressurize the part of the air net which is connected to the outlet valve. Disconnect the compressor from the air net.
5. Drain the oil and condensate circuits.
6. Disconnect the compressor condensate outlet and valve from the condensate net.

6 Maintenance

6.1 Preventive maintenance schedule

Warning

Warning: Before carrying out any maintenance, repair work or adjustments, proceed as follows:

- Stop the compressor.
- Switch off the voltage and open the isolating switch.
- Close the air outlet valve and open the manual condensate drain valves.
- Depressurize the compressor.

For detailed instructions, see the next sections.

The operator must apply all relevant *Safety precautions during maintenance or repair*.

Warranty-Product Liability

Use only authorized parts. Any damage or malfunction caused by the use of unauthorized parts is not covered by Warranty or Product Liability.

General

When servicing, replace all removed gaskets, O-rings and washers.

Intervals

Carry out maintenance at the interval which comes first. The local Customer Center may overrule the maintenance schedule, especially the service intervals, depending on the environmental and working conditions of the compressor.

The "longer interval" checks must also include the "shorter interval" checks.

Preventive maintenance schedule

Period (1)	Running hours (1)	Action
Daily	--	Check the oil level. After stopping, drain the condensate from the air receiver by means of the manual drain valve (4), see section *Stopping*.
3–monthly	500 (2)	Inspect the air filter. Clean if necessary.
“	2000	Check the tension and the condition of the belts. Adjust if necessary.
“	1000 (2)	Inspect the oil cooler. Clean if necessary.
“	“	For versions with dryer: inspect the condenser of the dryer. Clean if necessary.
Yearly	2000	Replace the oil filter.
“	“	Replace the oil.
“	“	Replace the air filter.
“	4000 (2)	Replace the oil separator element.

Period (1)	Running hours (1)	Action
“	4000	Replace the belts.
“	“	Install the drain wear kit.
“	“	Have the safety valve tested.
“	“	Have the operation of sensors, electrical interlockings and components checked.
“	“	Have the temperature shutdown switch tested.
“	“	Inspect the air receiver. The air receiver must no longer be used and must be replaced if the wall thickness is less than the minimum value, specified in the technical documentation of the air receiver.
“	8000 (3)	If Roto Synthetic Fluid Xtend Duty is used, change the oil.
“	8000	Replace the thermostatic valve and overhaul the minimum pressure valve.
“	“	Check and clean the inlet valve. Use the unloader kit.
“	“	Replace the electronic drain.

(1): whichever comes first

(2): more frequently in a dusty environment

(3): The indicated oil exchange intervals are valid for standard operating conditions (see section *Reference conditions and limiations*) and nominal operating pressure (see section *Compressor data*). Exposure of the compressor to external pollutants or operation at high humidity combined with low duty cycles may require a shorter oil exchange interval. Contact your supplier if in doubt.

Important

Danger: Always consult your supplier if a timer setting has to be changed.

Danger: For the change interval of oil and oil filter in extreme conditions of temperature, humidity or cooling air, consult your supplier.

Danger: Any leakage should be attended to immediately. Damaged hoses or flexible joints must be replaced.

6.2 Drive motor

General

Keep the outside of the electric motor clean for efficient cooling. If necessary, remove dust with a brush and/or compressed air jet.

Description

The motor bearings are greased for life.

6.3 Oil specifications

Warning: Avoid mixing lubricants of different brands or types as they may not be compatible and the oil mix may have inferior properties. A label, indicating the type of oil filled ex factory, is stuck on the air receiver/oil tank.

It is strongly advised to use the recommended lubricants. See section *Preventive maintenance schedule* for recommended oil change intervals.

For part numbers, consult the Spare Parts List.

Rotair

Rotair is a specially developed lubricant for use in single stage oil-injected screw compressors. Its specific composition keeps the compressor in excellent condition. Rotair can be used for compressors operating at ambient temperatures between 0 ˚C (32 ˚F) and 40 ˚C (104 ˚F). If the compressor is regularly operating in ambient temperatures between 40 °C and 46 °C (115 °F), oil lifetime is reduced significantly.

6.4 Oil, filter and separator change

Important

Note: Never mix oils of different brands or types. A label, indicating the type of oil filled ex factory, is stuck on the air receiver/oil tank.

Always drain the compressor oil at all drain points. Used oil left in the compressor can shorten the lifetime of the new oil.

If the compressor is exposed to external pollutants, is being used at high temperatures (oil temperature above 90˚C / 194˚F) or is being used under severe conditions, it is advisable to change the oil more frequently. Consult your supplier.

Procedure

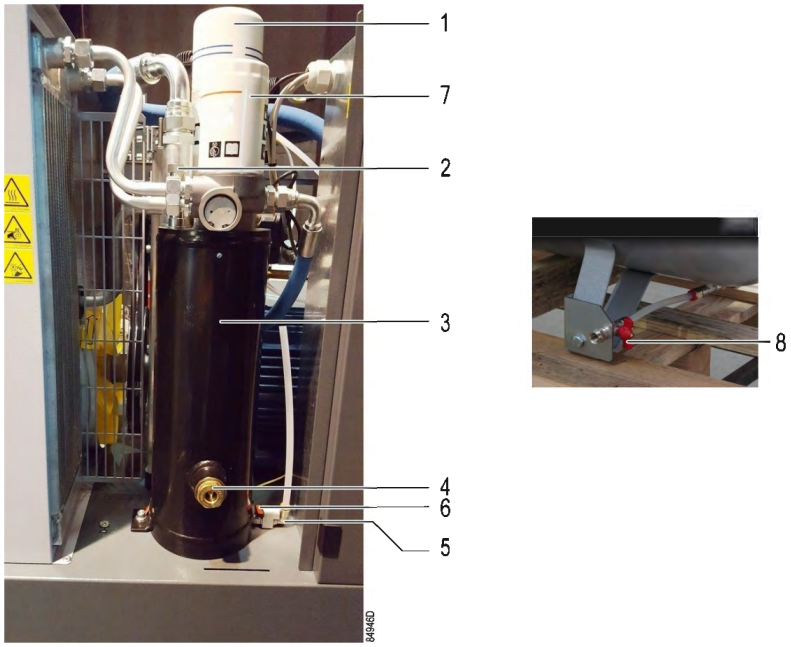


Figure 55: Location of oil filter and separator

1. Run the compressor until warm. Stop the compressor, close the air outlet valve and switch off the voltage. See *Stopping*.
2. Depressurize the air receiver by opening drain valve (8).
3. Depressurize the compressor by unscrewing filler plug (2) one turn to permit any pressure in the system to escape. Remove the plug after the system is depressurized.
4. Remove plug (5), drain the oil by opening drain valve (6). Close the valve and refit the plug after draining. Deliver the drained oil to the local oil collection service.
5. Remove oil filter (7) and, if it needs to be replaced, remove the oil separator (1). Clean the seats on the manifold.
6. Oil the gaskets of the new filter and separator and screw them into place. Tighten firmly by hand.
7. Fill oil separator/tank (3) with oil until the level reaches the middle of sight-glass (4). Ensure no dirt gets into the system.
8. Refit and tighten filler plug (2).
9. Close drain valve (8) of the air receiver.
10. Run the compressor for a few minutes.
11. Stop the compressor and wait a few minutes to allow the oil to settle.
12. If the oil level is too low, depressurize the system by unscrewing filler plug (2) one turn to permit any pressure in the system to escape. Depressurize the air receiver by opening drain valve (8).
13. Add oil as necessary. The sight-glass should be 3/4 full. Retighten plug (2) and close drain valve (8) of the air receiver.

6.5 C/G filter change

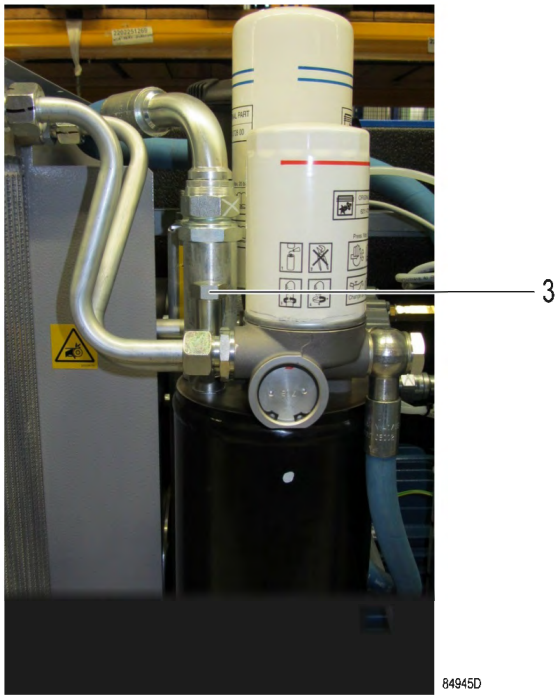


Figure 56: Oil filler plug

Figure 57: Condensate drain valve on air receiver

Reference	Description
3	Oil filler plug
4	Drain valve

Figure 58: Line filters

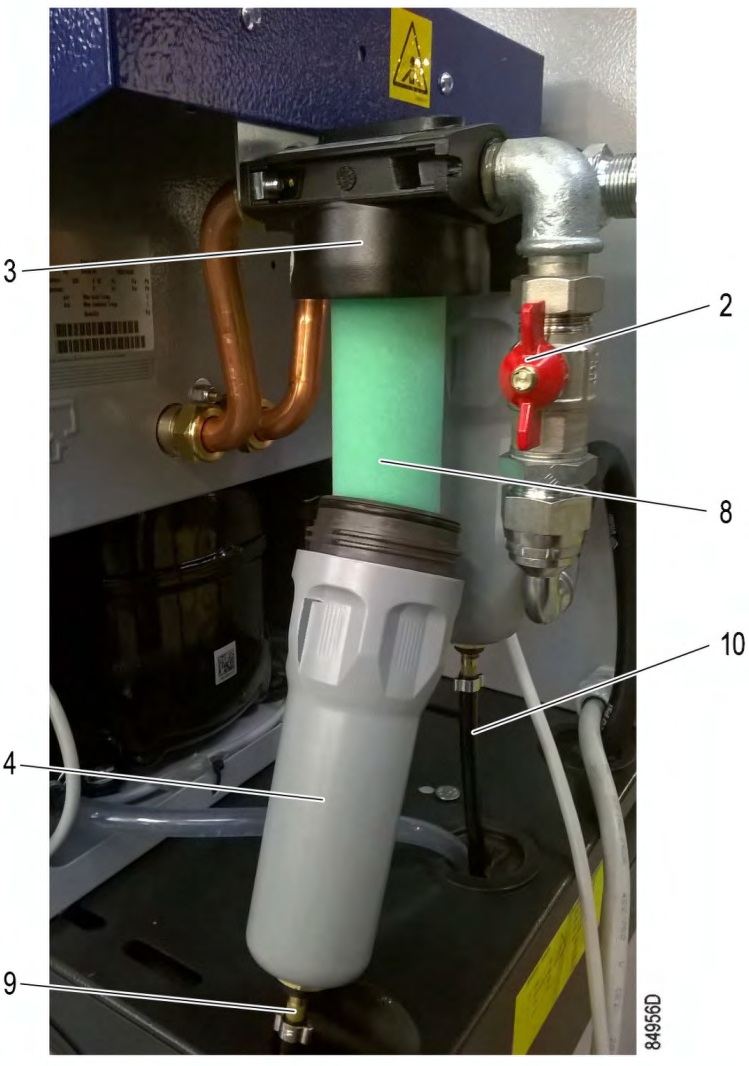


Figure 59: Line filters

Reference	Description
1	Air hose (from air receiver)
2	Ball valve (to isolate the filters and dryer)
3	Pre-filter (G type) head
4	G filter housing. This coarse filter cleans the incoming air to the refrigerant dryer from dust and oil mist.
5	Post filter (C type) head
6	C filter housing. This fine filter is placed downstream the dryer to clean the air from dust and oil mist.
7	Nipple (to connect to the air network)
8	Filter cartridge
9	Filter drain
10	Drain line

Servicing the filters

1. Stop the compressor and isolate it from the air network (Lock Out - Tag Out).
2. Close the ball valve.
3. Depressurize the unit by opening the drain ball valve underneath the air receiver.
4. Unscrew the “G” filter housing.
5. Remove the old “G” cartridge (Green cartridge).
6. Replace the cartridge.
7. Clean and reassemble the filter housing, replace and lubricate the seal. Tighten by hand.
8. Repeat the same operation for the “C” filter (Red cartridge).
9. Check that the filter drains are open and operate properly.
10. Check that the drain lines are clear and not exceeding a length of 2 meter.

Bypass the filters

The dryer and the filters can be bypassed in case of need.

1. Isolate the machine from the main power supply and discharge the pressure from the air receiver.
2. Remove the hose connection (1) from the inlet of the pre-filter and use it to connect directly to the air network.

6.6 Storage after installation

If the compressor is stored without running from time to time, consult your supplier as protective measures may be necessary.

6.7 Service kits

Service kits

For overhauling and for preventive maintenance, a wide range of service kits is available. Service kits comprise all parts required for servicing the component and offer the benefits of genuine parts while keeping the maintenance budget low.

Also a full range of extensively tested lubricants, suitable for your specific needs is available to keep the compressor in excellent condition.

Consult the Spare Parts List for part numbers.

7 Adjustments and servicing procedures

7.1 Air filter

Replacing the air filter

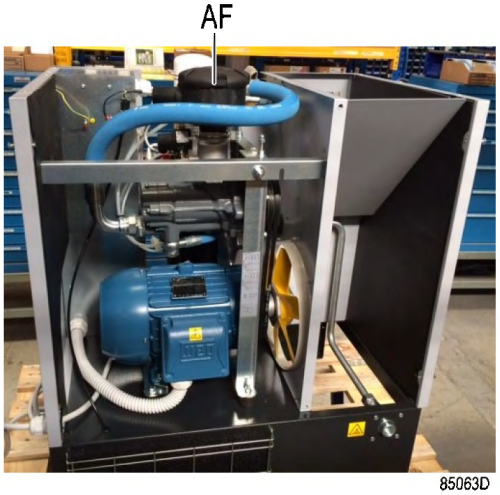
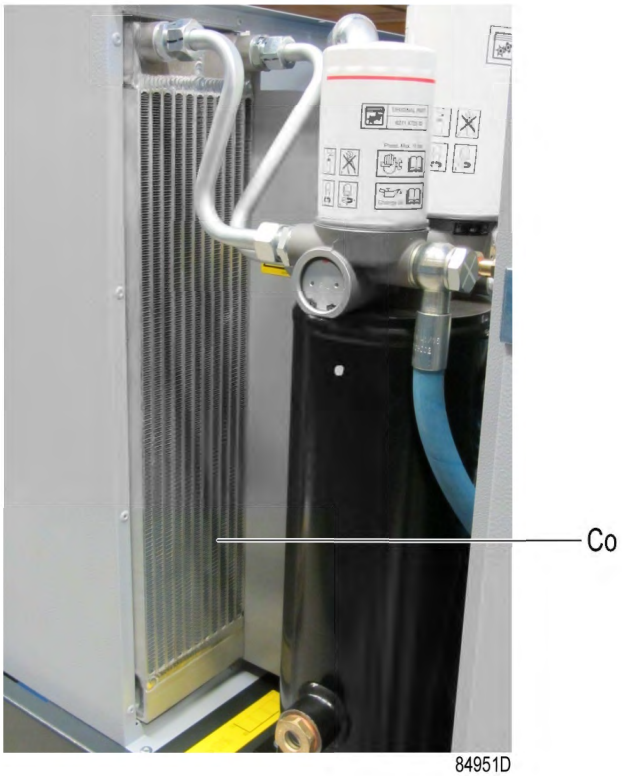


Figure 60: Air filter

1. Stop the compressor, close the air outlet valve and switch off the voltage.
2. Remove the front panel and the top panel of the compressor housing.
3. Unscrew the filter cover (AF) and remove the filter element. Discard the air filter element.
4. Fit the new element and screw on the filter cover.
5. Refit the top and front panels.

7.2 Coolers



1. Keep the oil cooler (Co) clean to maintain the cooling efficiency.
2. Stop the compressor, close the air outlet valve and switch off the voltage. Remove any dirt from the oil cooler (Co) with a fibre brush.

7.3 Safety valve

Location

Figure 61: Condensate drain valve

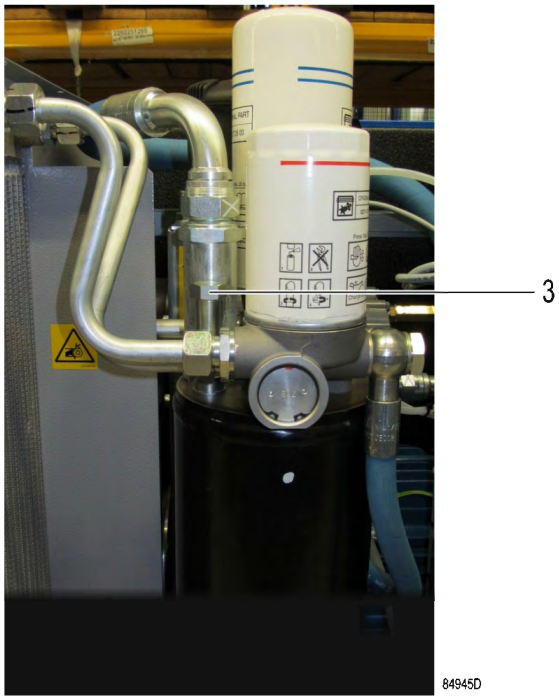


Figure 62: Oil filler plug

Testing

The valve can be tested on a separate compressed air line.

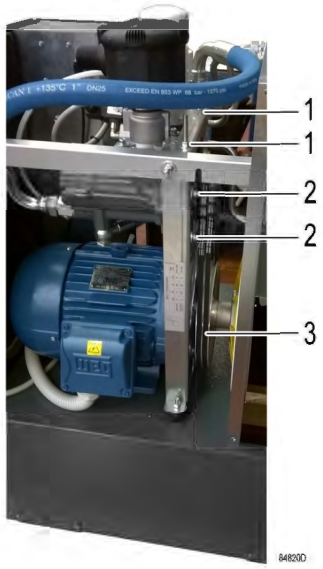
1. Before removing the safety valve, stop the compressor (see section *Stopping*), close the air outlet valve and switch off the voltage.
2. Open drain valves (4) and unscrew filler plug (3) one turn to permit any pressure in the system to escape.

   Open the manual drain valve (5) and unscrew filler plug (3) one turn to permit any pressure in the system to escape.

Danger: If the valve does not open at the set pressure stamped on the valve, replace the valve. No adjustments are allowed. Never run the compressor without a safety valve.

7.4 Belt set exchange and tensioning

Location of parts



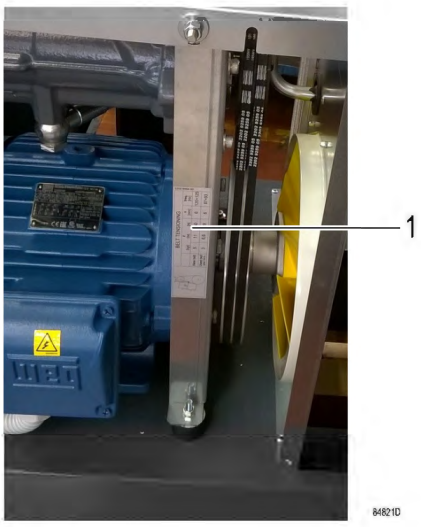
Danger: Read the warning in section *Preventive maintenance*.

Checking the belt tension

1. Stop the compressor, close the air outlet valve and switch off the voltage.
2. Remove the front door and the internal panel.
3. Check the belt tension:

   The force and deflection varies with the power of the unit, and with the total running hours of the belt.

   The values to be measured are indicated with a label (1) on the frame:



4. Refit the bodywork panels.

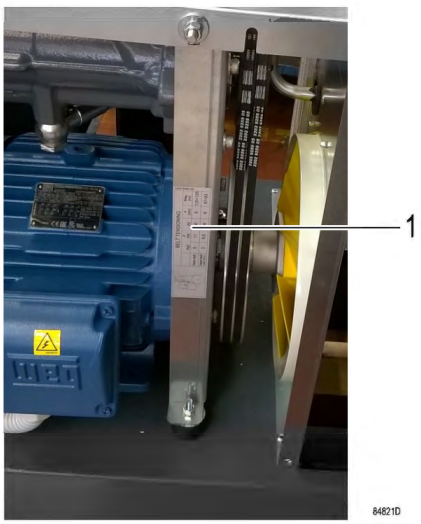
Danger: Tensioning of the belts must be performed with specific dedicated tooling.

Adjusting the tension of the drive belts

1. Stop the compressor, close the air outlet valve and switch off the voltage.
2. Remove the front door, the internal panel, the top cover and the pulley protection.
3. Loosen the 4 bolts (2) by one turn.
4. Adjust the belt tension by turning tensioning nut (1).

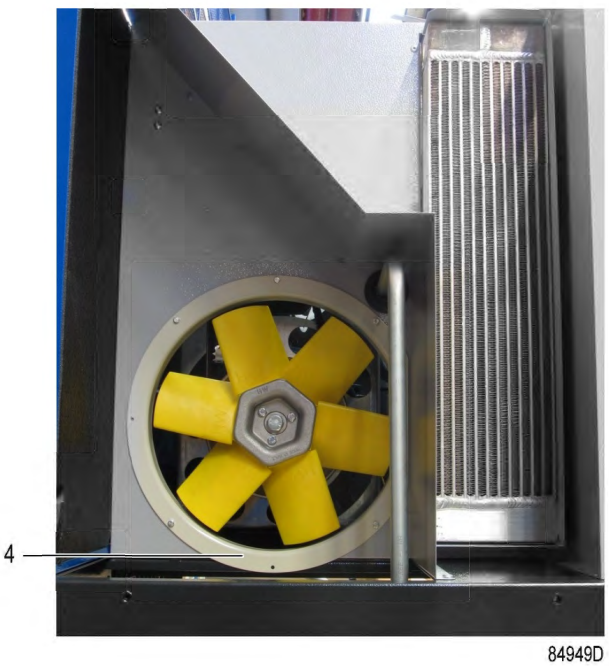
   The force and deflection varies with the power of the unit, and with the total running hours of the belt.

   The values to be measured are indicated with a label (1) on the frame:



5. Retighten bolts (2).
6. Refit the bodywork panels.

Replacing the drive belts



Note: The belts must be replaced as a set, even if only one of the belts is worn. Only use genuine belts.

1. Stop the compressor, close the air outlet valve and switch off the voltage.
2. Remove the front door, the internal panel, the top cover, the pulley protection and the left side panel.
3. Loosen the 4 bolts (2) by one turn.
4. Release the belt tension by loosening tensioning nut (1).
5. Remove the fan duct (4).

   Remove the belts.
6. Install the new belts.
7. Tension belts (3) as described above.
8. Reassemble the fan duct (4), the pulley protection and the internal protection panel.
9. Reassemble left side and top panel cover.
10. Check the belt tension after 50 running hours.

8 Problem solving

For the location of the components, see sections:

- *Introduction*
- *Air dryer*
- *Operating instructions*

Attention

Warning: Use only authorized parts. Any damage or malfunction caused by the use of unauthorized parts is not covered by Warranty or Product Liability.

Apply all relevant *Safety precautions during maintenance or repair*.

Before carrying out any maintenance or repair work on the compressor:

1. Push the stop button (7).

   Wait until the compressor has stopped and switch off the voltage. See the section *Stopping*.
2. Open the isolating switch to prevent an accidental start.
3. Close air outlet valve (2) and depressurize the compressor by opening the oil filler plug (3) one turn.
4. Open manual condensate drain valves (4 and/or 5).

The air outlet valve (2) can be locked during maintenance or repair as follows:

1. Close the valve.
2. Remove the screw fixing the handle.
3. Remove the handle.
4. Fit the screw.

Faults and remedies

For all references given hereafter, see *Air flow diagram*, *Initial start-up*, *Regulating system*.

Condition	Fault	Remedy
Compressor starts running, but does not load after a delay time	Solenoid valve (Y1) out of order	Replace valve
	Inlet valve (IV) stuck in closed position	Have valve checked
	Leak in control air pipes	Replace leaking pipe
	Minimum pressure valve (Vp) leaking (when net is depressurised)	Have valve checked
Compressor air output or pressure below normal	Air consumption exceeds air output of compressor	Check equipment connected
	Choked air inlet filter element (AF)	Replace filter element
	Solenoid valve (Y1) malfunctioning	Replace valve
	Leak in control air pipes	Replace leaking pipe

Condition	Fault	Remedy
	Inlet valve (IV) does not fully open	Have valve checked
	Oil separator (OS) clogged	Replace separator element
	Safety valves leaking	Replace valves
Air outlet temperature above normal	Insufficient cooling air or cooling air temperature too high	Check for cooling air restriction or improve ventilation of compressor room. Avoid recirculation of cooling air. If installed, check capacity of compressor room fan
	Oil level too low	Check and correct as necessary
	Cooler clogged	Clean cooler
	Compressor element (E) out of order	Consult your supplier

9 Technical data

9.1 Electric cable size

Attention

Danger: The voltage on the compressor terminals must not deviate more than 10% from the nominal voltage.

It is however highly recommended to keep the voltage drop over the supply cables at nominal current below 5% of the nominal voltage.

If cables are grouped together with other power cables, it may be necessary to use cables of a larger size than those calculated for the standard operating conditions.

Use the original cable entry. See section *Dimension drawings*.

The compressor is delivered with 3 m (10 ft) cable and a fitting cable gland. This cable is necessary to ensure the protection degree of the electric cubicle and to protect its components from dust from the environment.

Local regulations remain applicable if they are stricter than the values proposed below.

Recommended cable size

Power variant		**5.5 kW 7.5 hp**	**7.5 kW 10 hp**	**11 kW 15 hp**	**15kW 20 hp**
Frequency (Hz)	**Voltage (V)**	**Cable Size**	**Cable Size**	**Cable Size**	**Cable Size**
IEC					
50	230	10 mm^2	10 mm^2	10 mm^2 XLPE or EPR	10 mm^2 XLPE or EPR
50	400	4 mm^2	4 mm^2	6 mm^2	6 mm^2
60	230	10 mm^2	10 mm^2	10 mm^2 XLPE or EPR	10 mm^2 XLPE or EPR
60	380	4 mm^2	4 mm^2	6 mm^2	6 mm^2
60	440	4 mm^2	4 mm^2	6 mm^2	6 mm^2

9.2 Settings for overload relay and fuses

Power variant		**5.5 kW 7.5 hp**		**7.5 kW 10hp**		**11 kW 15hp**		**15 kW 20hp**	
Frequency (Hz)	**Voltage (V) IEC Y-D**	**Setting overload relay FM1 (A)**	**Fuses FU (aM)**	**Setting overload relay FM1 (A)**	**Fuses FU (aM)**	**Setting overload relay FM1 (A)**	**Fuses FU (aM)**	**Setting overload relay FM1 (A)**	**Fuses FU (aM)**
50	230	14.5	32 A	18	40 A	25.5	50 A	30.5	63 A
50	400	8.5	16 A	11	20 A	15	32 A	17.5	32 A

Power variant		5.5 kW 7.5 hp		7.5 kW 10hp		11 kW 15hp		15 kW 20hp	
Frequency (Hz)	Voltage (V) IEC Y-D	Setting overload relay FM1 (A)	Fuses FU (aM)	Setting overload relay FM1 (A)	Fuses FU (aM)	Setting overload relay FM1 (A)	Fuses FU (aM)	Setting overload relay FM1 (A)	Fuses FU (aM)
60	230	14.5	32 A	18	40 A	25.5	50 A	30.5	63 A
60	380	8.5	16 A	12	20 A	15.5	32 A	18.5	32 A

9.3 Reference conditions and limitations

Reference conditions

Characteristic	Unit	Data
Air inlet pressure (absolute)	bar	1
Air inlet pressure (absolute)	psi	14.5
Air inlet temperature	°C	20
Air inlet temperature	°F	68
Relative humidity	%	0
Working pressure	bar(e)	See *Compressor data*
Working pressure	psi	See *Compressor data*

Limitations

Characteristic	Unit	Data
Maximum working pressure	bar(e)	See *Compressor data*
Maximum working pressure	psig	See *Compressor data*
Minimum working pressure	bar(e)	4
Minimum working pressure	psig	58
Maximum air inlet temperature	°C	46
Maximum air inlet temperature	°F	115
Maximum ambient temperature	°C	46
Maximum ambient temperature	°F	115
Minimum ambient temperature	°C	0
Minimum ambient temperature	°F	32

9.4 Compressor data

Compressor type	5.5kW / 7.5HP 7.5kW / 10HP 11kW / 15HP 15kW / 20HP			
Frequency	Hz	50/60		
Maximum (unloading) pressure IEC units	bar (e)	8	10	13

Compressor type	**5.5kW / 7.5HP 7.5kW / 10HP 11kW / 15HP 15kW / 20HP**			
Maximum (unloading) pressure IEC units	psi	116	145	188
Nominal working pressure	bar (e)	7.5	9.5	12.5
Nominal working pressure	psi	109	138	181
Setpoint, thermostatic valve	˚C	71	71	71
Setpoint, thermostatic valve	˚F	160	160	160

		7.5kW / 10HP
Temperature of air leaving outlet valve (ambient +) approx., tank mounted units.	˚C	7
	˚F	45
Temperature of air leaving outlet valve (ambient +) approx., floor mounted units.	˚C	25
	˚F	77
Temperature of air leaving outlet valve (ambient +) approx., units with dryer.	˚C	4
	˚F	39
Frequency	Hz	50 (IEC)
Nominal motor power rating.	kW	7.5
	hp	10
Dryer power consumption at full load, units with dryer.	kW	0.474
	hp	1.32
Oil capacity	l	3.2
	US gal	0.84
Sound pressure level (ISO 2151 - 2004)	db(A)	66

Table 1: 7.5kW / 10HP

		11kW / 15HP
Temperature of air leaving outlet valve (ambient +) approx., tank mounted units.	˚C	9
	˚F	48
Temperature of air leaving outlet valve (ambient +) approx., floor mounted units.	˚C	28
	˚F	82
Temperature of air leaving outlet valve (ambient +) approx., units with dryer.	˚C	5
	˚F	41
Frequency	Hz	50 (IEC)
Nominal motor power rating.	kW	11
	hp	15
Dryer power consumption at full load, units with dryer.	kW	0.385 (IEC)
	hp	1.07 (IEC)
Oil capacity	l	3.2
	US gal	0.84
Sound pressure level (ISO 2151 - 2004)	db(A)	68

Table 2: 11kW / 15HP

		15kW / 20HP
Temperature of air leaving outlet valve (ambient +) approx., tank mounted units.	˚C	11
	˚F	52
Temperature of air leaving outlet valve (ambient +) approx., floor mounted units.	˚C	30
	˚F	86
Temperature of air leaving outlet valve (ambient +) approx., units with dryer.	˚C	6
	˚F	43
Frequency	Hz	50 (IEC)
Nominal motor power rating.	kW	15
	hp	20
Dryer power consumption at full load, units with dryer.	kW	0.385 (IEC)
	hp	1.07 (IEC)
Oil capacity	l	3.2
	US gal	0.84
Sound pressure level (ISO 2151 - 2004)	db(A)	71

Table 3: 15kW / 20HP

10 Instructions for use

Oil separator vessel

The vessel can contain pressurized air. This can be potentially dangerous if the equipment is misused.

This vessel must only be used as a compressed air/oil separator tank and must be operated within the limits specified on the data plate.

No alterations must be made to this vessel by welding, drilling or other mechanical methods without the written permission of the manufacturer.

The pressure and temperature of this vessel must be clearly indicated.

The safety valve must correspond with pressure surges of 1.1 times the maximum allowable operating pressure. It should guarantee that the pressure will not permanently exceed the maximum allowable operating pressure of the vessel.

Use only oil as specified by the manufacturer.

Air receiver (on tank-mounted units)

Corrosion must be prevented: depending on the conditions of use, condensate may accumulate inside the tank and must be drained every day. This may be done manually by opening the drain valve, or by means of the automatic drain, if fitted to the tank. Nevertheless, a weekly check of correct functioning of the automatic valve is needed. This has to be done by opening the manual drain valve and checking for condensate. Verify that no rust obstructions affect the drain system.

Yearly service inspection of the air receiver is needed, as internal corrosion can reduce the steel wall thickness with the consequent risk of bursting. Local rules need to be respected, if applicable. The use of the air receiver is forbidden once the wall thickness reaches the minimum value as indicated in the service manual of the air receiver (part of the documentation delivered with the unit).

Lifetime of the air receiver mainly depends on the working environment. Installing the compressor in a dirty and corrosive environment is not allowed, as this can reduce the vessel lifetime dramatically.

Do not anchor the vessel or attached components directly to the ground or fixed structures. Fit the pressure vessel with vibration dampers to avoid possible fatigue failure caused by vibration of the vessel during use.

Use the vessel within the pressure and temperature limits stated on the nameplate and the testing report.

No alterations must be made to this vessel by welding, drilling or other mechanical methods.

11 Guidelines for inspection

Guidelines

On the Declaration of Conformity / Declaration by the Manufacturer, the harmonised and/or other standards that have been used for the design are shown and/or referred to.

The Declaration of Conformity / Declaration by the Manufacturer is part of the documentation that is supplied with this compressor.

Local legal requirements and/or use outside the limits and/or conditions as specified by the manufacturer may require other inspection periods as mentioned below.

12 Pressure equipment directives

Components subject to Pressure Equipment Directive (PED)

Components subject to 2014/68/EU PED or Pressure Equipment (Safety) Regulations 2016 - S.I. 2016/1105 greater than or equal to category II:

safety valves.

See the spare parts book for part numbers.

Overall rating

The compressors conform to PED smaller than category II.

13 Declaration of conformity

Insert logo here

EU DECLARATION OF CONFORMITY

We, (1) declare under our sole responsibility, that the product
Machine name :
Machine type :
Serial number :

Which falls under the provisions of article 12.2 of the EC Directive 2006/42/EC on the approximation of the laws of the Member States relating to machinery, is in conformity with the relevant Essential Health and Safety Requirements of this directive.

The machinery complies also with the requirements of the following directives and their amendments as indicated.

Directive on the approximation of laws of the Member States relating to		Harmonized and/or Technical Standards used		Att' mnt
(2)		(3)		
				X
				X
				X

The harmonized and the technical standards used are identified in the attachments hereafter

<1> is authorized to compile the technical file.

	Conformity of the specification to the directives	Conformity of the product to the specification and by implication to the directives
Issued by	Engineering	Manufacturing
Name		
Signature		
Date		
Place		

84350D

Figure 63: Typical example of a Declaration of Conformity document

(1) Contact address:
C. Aria C. S.R.L.
Via Selva Maiolo, 5/7
Montecchio, Maggiore, Vicenza
Italy

(2) Applicable directives

(3) Standards used

On the Declaration of Conformity / Declaration by the Manufacturer, the harmonized and/or other standards that have been used for the design are shown and/or referred to.

The Declaration of Conformity / Declaration by the Manufacturer is part of the documentation that is supplied with this device.

People.

Passion.

Performance.

No. 2920 7114 21 / May 2023 C. Aria C. S.R.L.

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