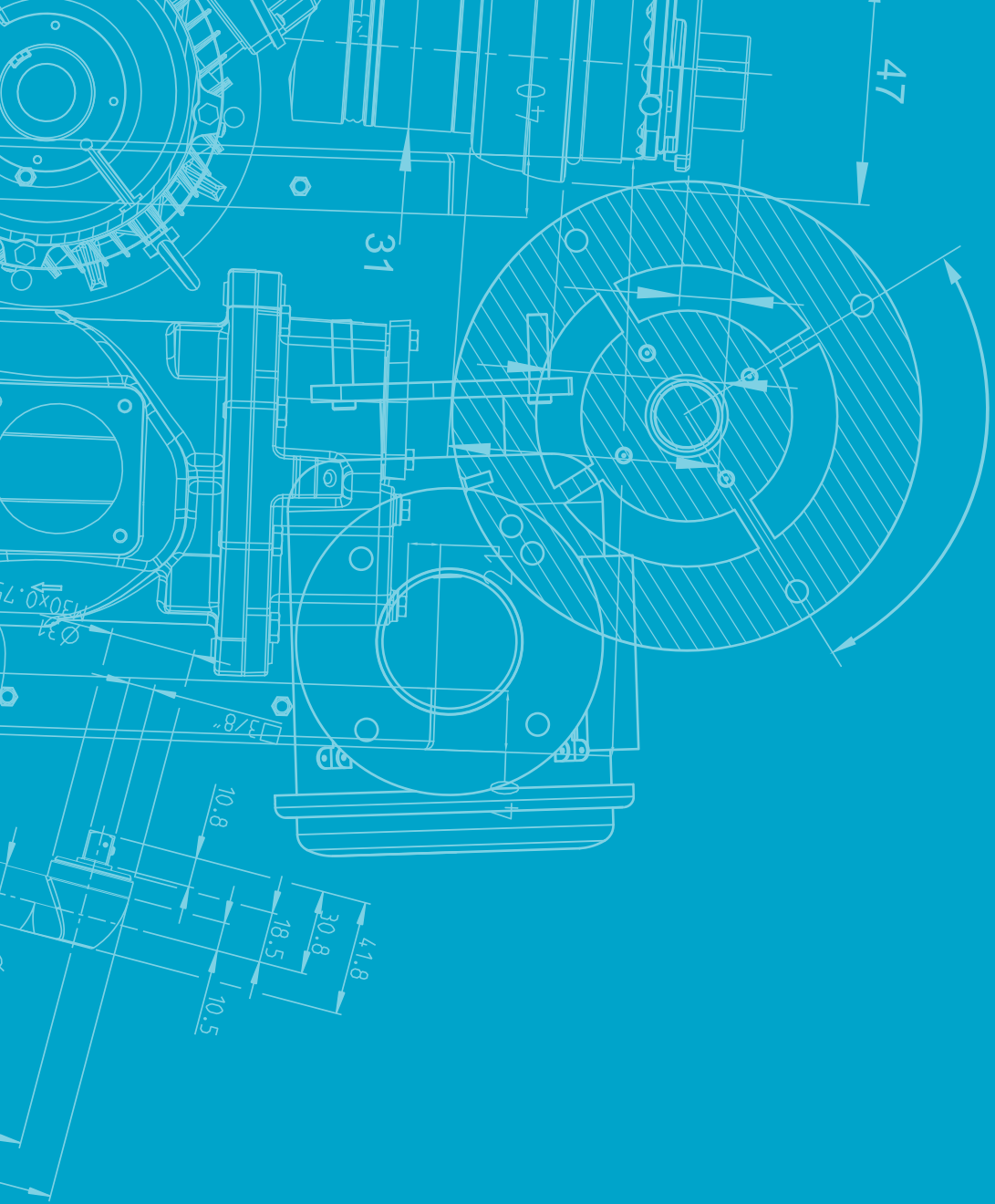


Instruction book

Oil-free scroll compressors

SF 2+, SF 4+, SF 6+

Atlas Copco

Oil-free scroll compressors

SF 2+, SF 4+, SF 6+

Instruction book

Original instructions

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.

This product is intended for marketing in the United States and Canada.

September 2023

No. 2920 7219 10

www.atlascopco.com

Table of contents

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).

  On units powered by a frequency converter, wait 10 minutes after switching off the voltage, before starting any electrical repair.

  Warning: In a domestic environment, this product may cause radio interference, in which case supplementary mitigation measures are required.

  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.

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.
- For water-cooled machines, the cooling water system installed outside the machine has to be protected by a safety device with set pressure according to the maximum cooling water inlet pressure.
- 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.
- On water-cooled compressors using open circuit cooling towers, protective measures must be taken to avoid the growth of harmful bacteria such as Legionella pneumophila bacteria.
- It is not allowed to directly use the hot water of the cooling water circuit of the compressor as process water in pollution sensitive applications such as the food -and pharmaceutical industry.
- 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

General

SF 2^+, SF 4^+ and SF 6^+ are stationary, single-stage, oil-free compressors, driven by an electric motor.

The compressors are controlled by a Touch controller. See section *Controller* for details.

The compressors are enclosed in a sound dampening enclosure and are air-cooled.

Available versions:

- The Pack version (P) comprises the motor, the compressor element, the air cooler, and the regulation and protection components.
- The Full-Feature (FF) version is a Pack version, completed with an integrated refrigerant dryer (ID).

The basic version, referred to as the floor-mounted version (FM), does not include an air receiver.

Available options:

- Air receiver of 30 l (7.93 US gal), 270 l (71.3 US gal) or 500 l (132 US gal). The 30 l receiver consists of a module with three 10 l (2.64 US gal) receivers. The 30 l receiver option includes an electronic drain.
- Electronic drain on the air receiver in the tank-mounted version (270 l and 500 l).
- Water separator on the outlet in floor-mounted Pack units.
- Pre-filter mats on the air inlet.
- Phase sequence relay on 3–phase units.
- Remote air intake.
- Full-Feature version: desiccant dryer (CD): for a dew point down to - 40 °C.
- Touch controller with a touch display. This option is useful if more than one compressor is connected to the same air net. See section *Controller*.

Pack

A Touch controller module, fitted in the front panel, controls the compressor.

The electric components are located in the cubicle behind the front panel door.

A check valve (CV) prevents loss of compressed air when the compressor is stopped.

A temperature sensor and a safety valve (SV) protect the compressor element against overheating and too high pressure respectively.

The compressed air is cooled by an air cooler (Ca).

Single-phase units are equipped with a vent valve for easy starting.

Figure 1: SF 4+ Pack, floor-mounted

Reference	Description
AV	Air outlet valve
ER	Touch controller
S3	Emergency stop button

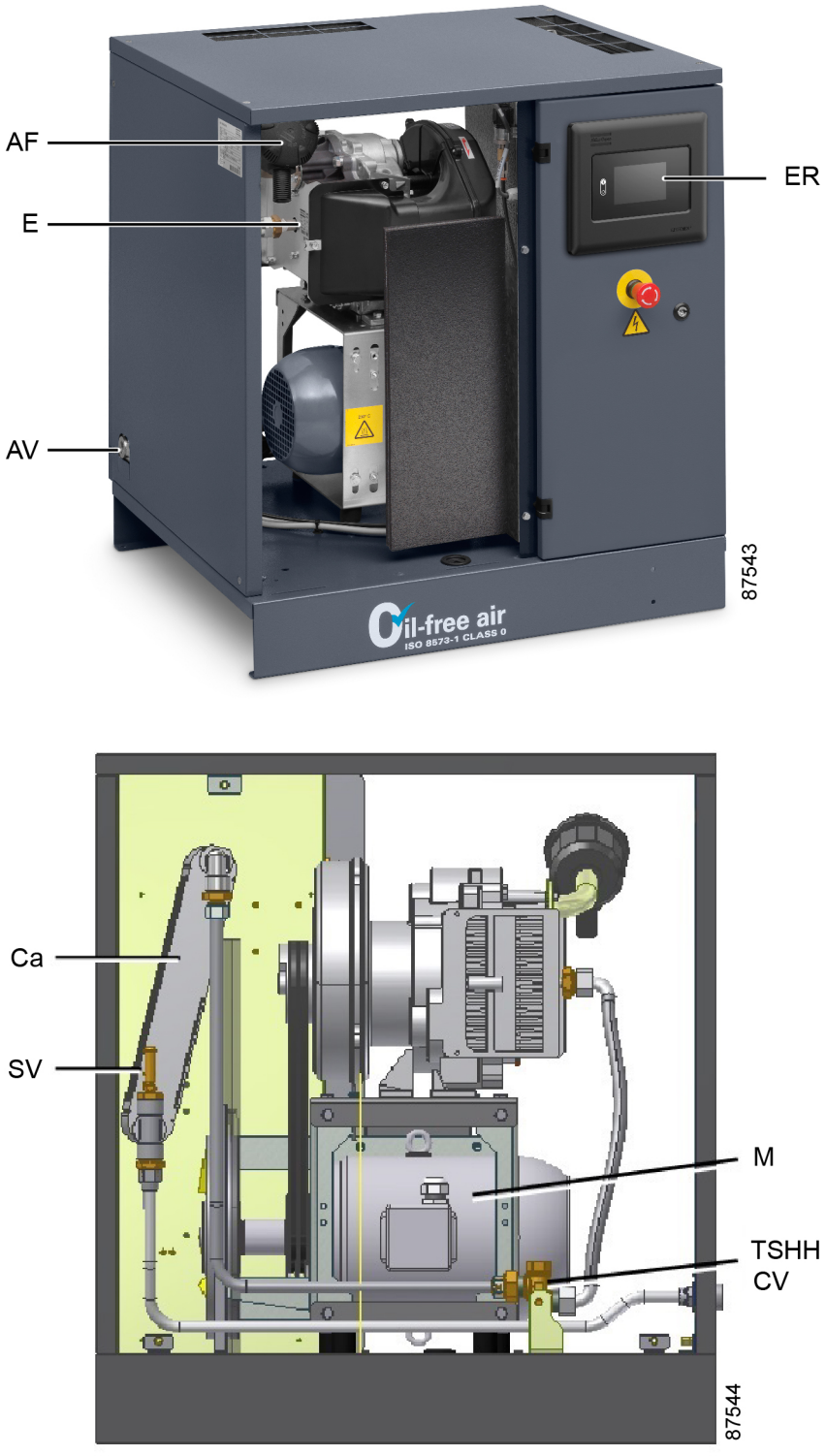


Figure 2: SF 4+ Pack, details

Reference	Description
AF	Inlet air filter
AV	Air outlet valve

Reference	Description
Ca	Air cooler
CV	Check valve
E	Compressor element
ER	Touch controller
M	Motor
SV	Safety valve
TSHH	Temperature sensor

Full-Feature

A Touch controller module, fitted in the front panel, controls the compressor and the dryer.

The electric components are located in the cubicle behind the front panel door.

A check valve (CV) prevents loss of compressed air when the compressor is stopped.

A temperature sensor and a safety valve (SV) protect the compressor element against overheating and too high pressure respectively.

The compressed air is cooled by an air cooler (Ca) before it enters the dryer.

Single-phase units are equipped with a vent valve for easy starting.

Figure 3: SF 4+ Full-Feature, floor-mounted

Reference	Description
AV	Air outlet valve
Da	Automatic drain outlet

Reference	Description
Dm	Manual drain valve
ER	Touch controller
Gd	Dew point gauge
ID	Refrigerant dryer
S3	Emergency stop button

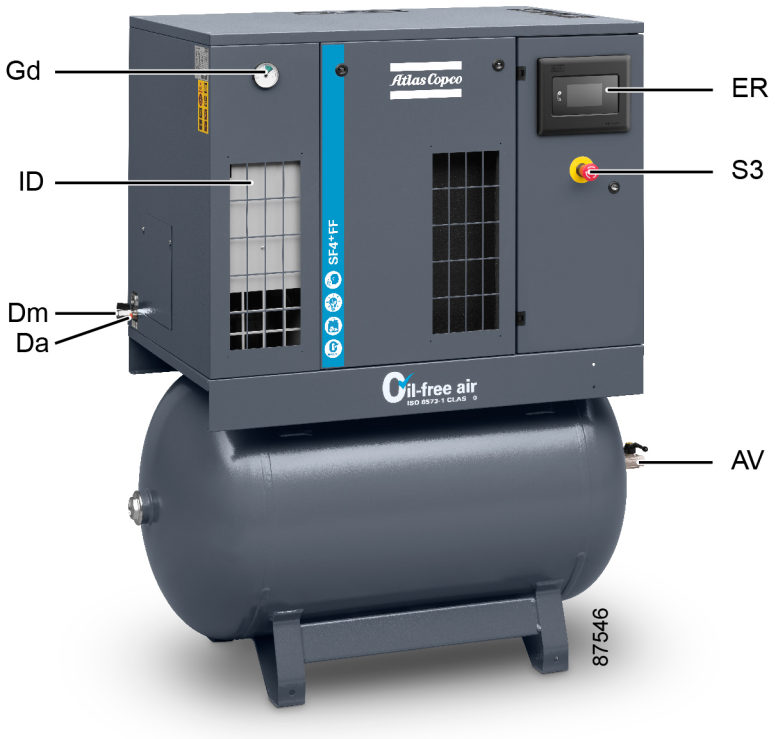


Figure 4: SF 4⁺ Full-Feature, tank-mounted

Reference	Description
AV	Air outlet valve
Da	Automatic drain outlet
Dm	Manual drain valve
ER	Touch controller
Gd	Dew point gauge
ID	Refrigerant dryer
S3	Emergency stop button

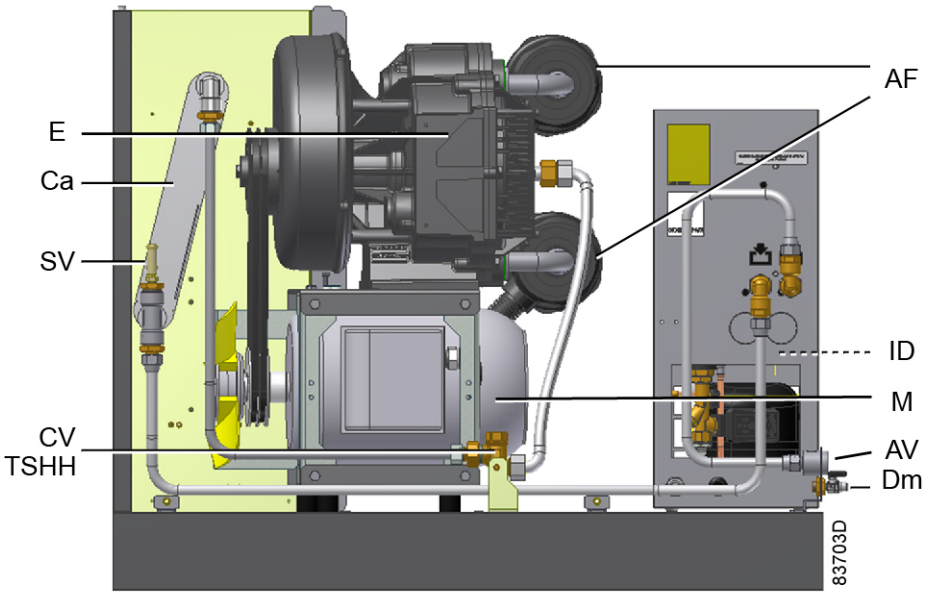


Figure 5: SF 4+ Full-Feature, details

Reference	Description
AF	Inlet air filter
AV	Air outlet valve
Ca	Air cooler
CV	Check valve
Dm	Manual drain valve
E	Compressor element
ID	Refrigerant dryer
M	Motor
SV	Safety valve
TSHH	Temperature sensor

2.2 Flow diagram

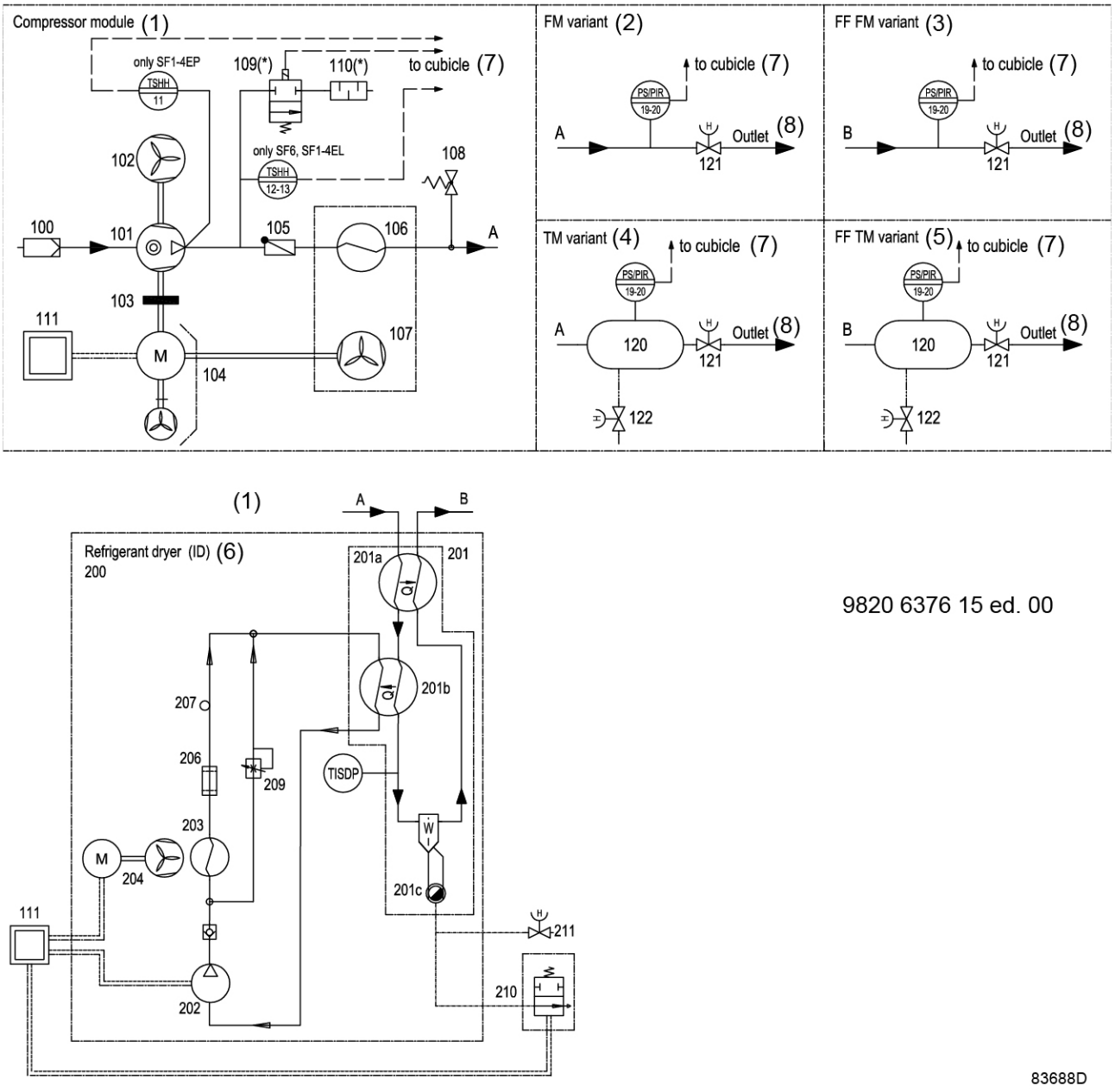


Figure 6: Flow diagram

Reference	Description
(1)	Compressor module
(2)	Floor-mounted, Pack units
(3)	Floor-mounted, Full-Feature units
(4)	Tank-mounted, Pack units
(5)	Tank-mounted, Full-Feature units
(6)	Refrigerant dryer (ID, 200)
(7)	To cubicle

Reference	Description
(8)	Compressed air outlet

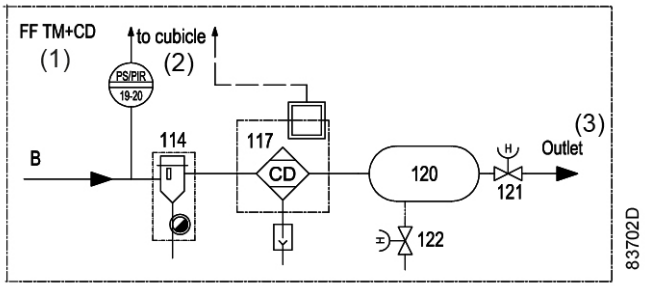


Figure 7: Full-Feature, tank-mounted units with optional desiccant dryer (CD, 117)

Reference	Description
(1)	Full-Feature, tank-mounted units with optional desiccant dryer (CD, 117)
(2)	To cubicle
(3)	Compressed air outlet

Full-Feature units are fitted with an integrated refrigerant dryer (ID, 200), a desiccant dryer (CD, 117) is optionally available.

Air flow

Air drawn through the air filter (100) is compressed by the compressor element (101). Next, the compressed air flows through the check valve (105) and the air cooler (106).

Single phase units are equipped with a solenoid valve (109) and a silencer (110) for easy starting at low voltage.

On floor-mounted, Pack units the air then flows directly to the outlet valve (121). On tank-mounted units, the compressed air flows into the air receiver (120), onto which the outlet valve (121) is fitted.

On Full-Feature units, the compressed air flows to the refrigerant dryer (ID, 200), where the water vapor condensates by cooling down. The water is removed via the integrated water separator (201c) and the electronic drain (210).

The compressed air flows to the refrigerant dryer (ID, 200), where the water vapor condensates by cooling down. The water is removed via the integrated water separator (201c) and the electronic drain (210).

For details on the operation of the refrigerant dryer (ID, 200), see section *Refrigerant dryer*.

On Full-Feature compressors equipped with a desiccant dryer (CD, 117), the air from the refrigerant dryer (ID, 200) passes a PD 20^{+} filter (114) and flows into the desiccant dryer (CD, 117). Next, the dry air flows into the receiver (120).

For details on the operation of the desiccant dryer (CD, 117), see section *Desiccant dryer*.

Cooling

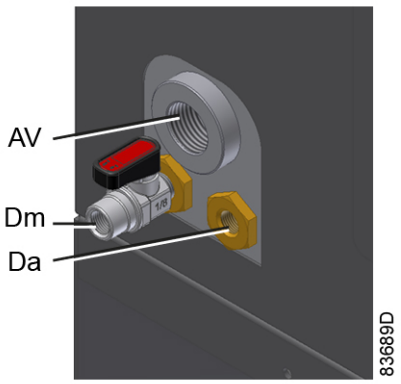
The compressor element (101) is cooled by an integrated radial fan (102). An axial fan (107) fitted on the motor shaft provides cooling air for the air cooler (106).

On Full-Feature units, a separate fan (204) delivers cooling air for the dryer.

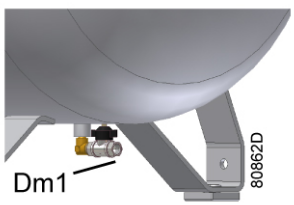
Condensate management

Floor-mounted Pack units have no drain. A water separator is available as an option.

The dryer on Full-Feature units has an integrated water separator (201c) and a timer drain (210). The water separator has a manual drain valve (211) and a connection for the automatic drain. For more details, consult section *Refrigerant dryer*.



The air receiver of tank-mounted compressors has a manual drain valve (122) at the bottom. A timer drain is available as an option.



On Full-Feature compressors equipped with an optional desiccant dryer (CD, 117), a PD 20^{+} filter (114) equipped with an automatic drain ensures that no water droplets enter the dryer.

Regulating system and protection

The compressor is controlled by a Touch controller. See the dedicated sections for more details. A pressure transducer (PIR) and a temperature sensor (TSHH) respectively monitor the air pressure and the compressor element outlet temperature.

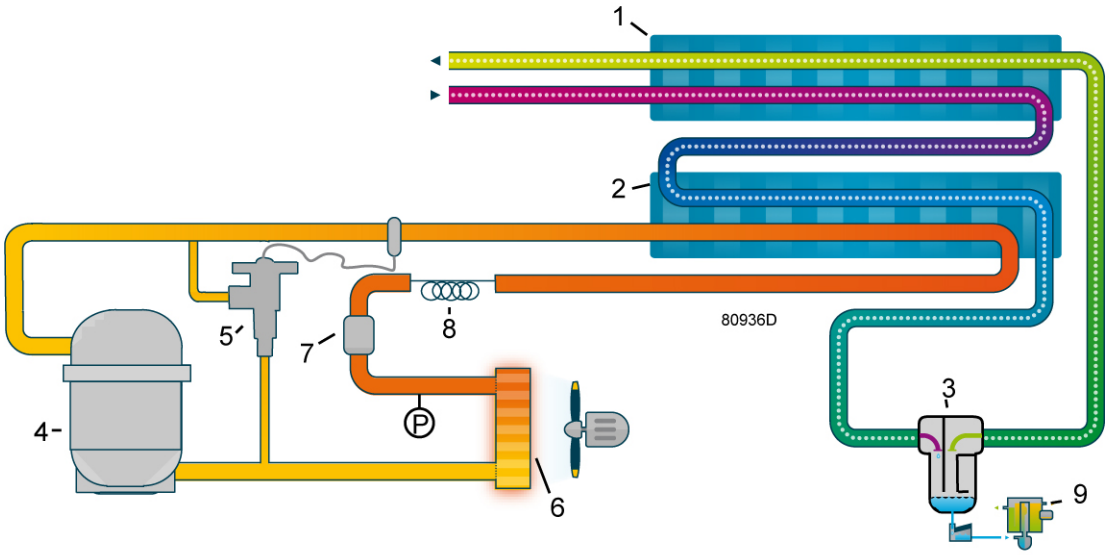
A safety valve (108) protects the compressor element against too high pressure.

2.3 Refrigerant dryer

Operation

The refrigerant dryer (ID) removes moisture from the compressed air by cooling it to near freezing temperature. The water is removed via an automatic drain.

Compressed air circuit



Compressed air enters the heat exchanger (1) and is cooled by the outgoing, cold, dried air. Water in the incoming air starts to condense. The air then flows through the evaporator/heat exchanger (2) where the refrigerant evaporates, causing the compressed air to be cooled further to close to the evaporating temperature of the refrigerant. More water in the air condenses. The cold air then flows through the water separator (3), where the condensate is separated from the air. The condensate is automatically drained by the timer drain (9).

The cold, dried air flows through the heat exchanger (1) where it is warmed up by the incoming air.

Refrigerant circuit

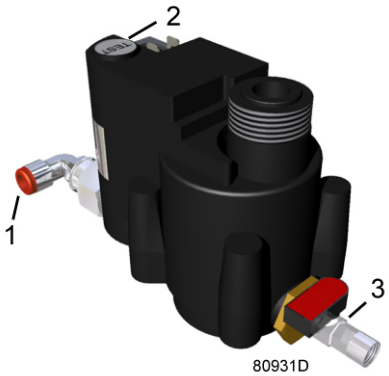
The compressor (4) delivers hot, high-pressure refrigerant gas which flows through the condenser (6) where most of the refrigerant condenses.

Next, the liquid refrigerant flows through the dryer/filter (7) to the capillary tube (8). The refrigerant leaves the capillary tube at evaporating pressure.

The refrigerant enters the evaporator (2) where it withdraws heat from the compressed air by further evaporation at constant pressure. The heated refrigerant leaves the evaporator and is sucked in again by the compressor.

The condenser (6) pressure must be kept as constant as possible to obtain stable operation. The fan control switch (P) therefore stops and starts the condenser cooling fan. If, under partial or no load, the evaporator (2) pressure drops to approximately 2.25 bar(e) (32.63 psig), the hot gas bypass valve (5) opens and hot, high-pressure gas is fed to the evaporator circuit to prevent the evaporator pressure from dropping any further.

Electronic condensate drain



The dryer is equipped with an electronic condensate drain. The condensate, separated by the condensate trap, accumulates inside the drain. Once the condensate reaches a certain level, it is discharged through the drain outlet (1).

The condensate can also be drained by pressing the test button (2).

The drain filter can be cleaned by opening the manual drain valve (3), see section *Preventive maintenance schedule*.

2.4 Desiccant dryer

The optional desiccant dryer (CD) is used in combination with the refrigerant dryer (ID) on Full-Feature units in order to achieve a lower dew point.

Description

A desiccant dryer (CD) is a heatless adsorption dryer. The dryer basically consists of two cylinders (towers), containing adsorption material (desiccant). The desiccant is a very porous grain material, able to adsorb large amounts of water vapor. The air is dried when it passes the desiccant material.

Figure 8: CD 3+

Operation

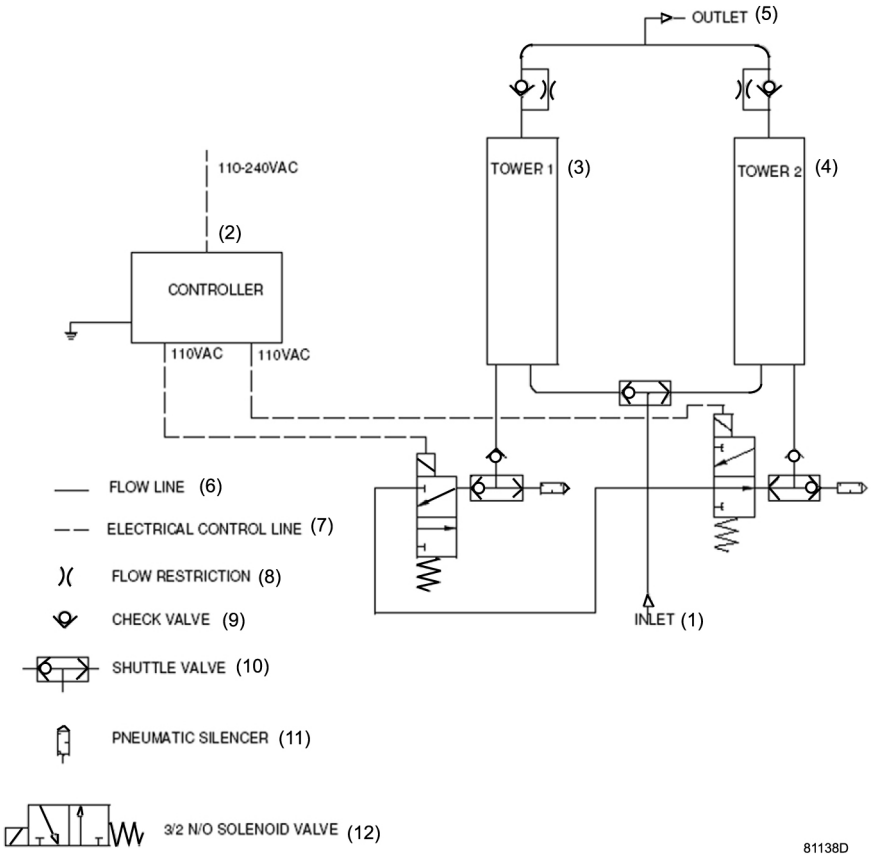


Figure 9: Flow diagram CD 3+

Reference	Description
1	Compressed air inlet
2	Dryer controller
3	Left desiccant tower
4	Right desiccant tower
5	Compressed air outlet
6	Flow line
7	Electrical control line
8	Flow restriction
9	Check valve
10	Selector valve
11	Pneumatic silencer
12	Solenoid valve

The operation cycle of the dryer is repetitive and is controlled by a factory set timer. While the desiccant in one tower dries the compressed air, the desiccant in the second tower is being regenerated. Regeneration of the desiccant is achieved by means of purge air from the drying tower.

The compressed air entering the dryer is led to one of the towers by means of the bottom selector valve. The position of the selector valve depends on the position (activated or not) of the solenoid valves. As the air flows upwards through the tower, the desiccant adsorbs the water vapor and the compressed air is dried.

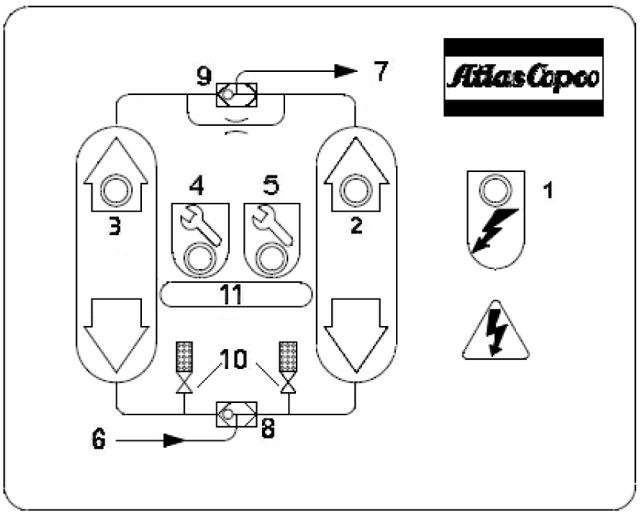
When it reaches the top of the tower, the dried air leaves the dryer via the check valve.

A small portion of the dried air passes a nozzle, expands to atmospheric pressure and flows downwards through the other tower, regenerating (drying) the desiccant. The size of the nozzle depends on the operating pressure. Alternative nozzles for use at other operating pressures are available. Please consult the spare parts list for ordering information. The regeneration air is released via the corresponding solenoid valve and a silencer. The solenoid valves are controlled by the timer.

After a preset time interval, the function of the towers is reversed. The fully regenerated tower will now dry the air, while the desiccant in the other tower will be regenerated.

When the compressor stops, the drying cycle stops as well: purge air flow stops, both solenoid valves are closed. When the compressor restarts, the drying cycle will resume where it was stopped.

Control panel



Reference	Description
1	LED <Power On>
2	LED <Right tower drying>
3	LED <Left tower drying>
4	LED <Service warning>
5	LED <Service alarm>
6	Air inlet
7	Air outlet
8	Inlet selector valve
9	Outlet selector valve
10	Solenoid valves
11	Service reset

3 Controller

3.1 Controller functions

85199D

Figure 10: Elektronikon™ Touch 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).

  This function can only be activated by a service technician.

Automatic control of the unit

The controller maintains the net pressure between programmable limits by automatically starting and stopping one or more compressor modules. A number of programmable settings, e.g. the starting and stopping pressures and the maximum allowed motor starting frequency and several other parameters, are hereby taken into account.

The controller stops the unit whenever possible to reduce the power consumption and restarts it automatically when the net pressure decreases.

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 compressor

Shutdown

Several sensors are provided on the unit. If one of the measured signals exceeds the programmed shutdown level, the unit will be stopped.

This will be indicated on display and the general alarm LED will blink.

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.

Shutdown warning/shutdown

If the compressor element temperature exceeds the factory set warning level, the compressor element will be stopped for a short time and a warning will appear on the controller display and the general alarm LED will light up.

In case of repetitive stops due to a too high temperature, a manual reset will be necessary before restarting the compressor.

The compressor will also be stopped when the motor is overloaded.

A warning message will also appear if, on compressors with integrated dryer, the dew point temperature is too high in relation to the ambient temperature.

Service warning

A number of service operations are grouped as a Service Plan. Each Service Plan has a programmed time interval. 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 belonging to that Service Plan.

When the service warning is shown, stop the unit, switch off the voltage and carry out the required service actions.

The running hours will be recalculated with respect to the ambient temperature. This algorithm is activated when the compressor is operated above 30 °C (86 °F) ambient.

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 controller has a built-in function to automatically restart the unit when the voltage is restored after voltage failure.

For units leaving the factory, this function is made inactive. If desired, the function can be activated. Consult your supplier.

Warning:

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

3.2 Control panel

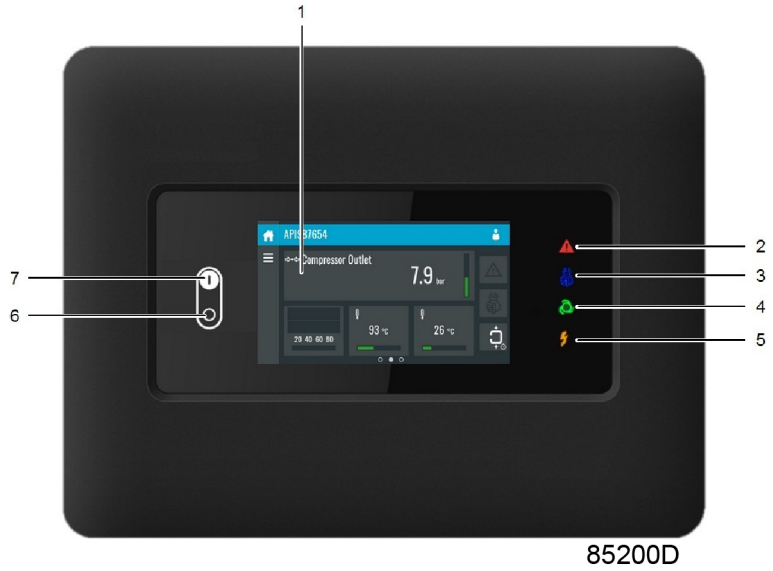


Figure 11: Control panel

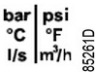
Reference	Designation	Function
1	Touch screen	Shows the unit operating condition and several icons to navigate through the menu. The screen can be operated by touch.
2	Warning sign	Flashes in case of a shut-down, is lit in case of a warning condition.
3	Service sign	Lit when service is needed.
4	Operation sign	Lit when the unit is running in automatic operation.
5	Voltage sign	Indicates that the voltage is switched on.
6	Stop button	Stops the unit.
7	Start button	This button starts the unit. The operation sign lights up. The controller is operative.

3.3 Icons used

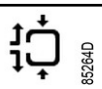
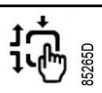
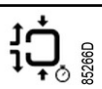
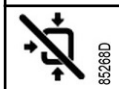
Menu icons

Menu	Icon	Menu	Icon	Menu	Icon
Data	 85233D	Status	 85239D		

Menu	Icon	Menu	Icon	Menu	Icon
		Inputs			
		Outputs			
		Counters			
		Auxiliary Equipment Parameters		Converters	
Service		Service		Overview	
				Service Plan	
				Service History	
		Service Functions			
		Clean Screen			
Week Timer				Week	
				Remaining Running Time	
Event History		Saved Data			
Machine Settings		Alarms			
		Regulation			
		Control Parameters			
		Auxiliary Equipment Parameters		Converters	
				Fan	
				Internal SmartBox	

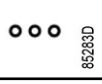
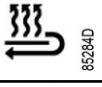
Menu	Icon	Menu	Icon	Menu	Icon
				STC valve	
		Auto Restart			
Controller Settings		Network Settings		Ethernet Settings	
				CAN Settings	
		Localisation		Language	
				Date/Time	
				Units	
		User Password			
		Help			
		Information			

Status icons

Icon	Description
	Motor Stopped
	Motor Stopped Wait
	Running Unloaded
	Manual Unload
	Running Unloaded Wait
	Running Loaded
	Failed to Load

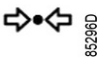
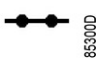
Icon	Description
	Running Loaded Wait
	Manual Stop
	Machine Control Mode, Local
	Machine Control Mode, Remote
	Machine Control Mode, LAN
	Automatic Restart After Voltage Failure
	Week Timer Active

System icons

Icon	Description
	Basic User
	Advanced User
	Service User
	Antenna 25%
	Antenna 50%
	Antenna 75%
	Antenna 100%
	Change between screens (indication)
	Energy recovery
	Dryer

Icon	Description
	Element
	Drain(s)
	Analogue Output
	Menu
	Reset
	Auto Restart
	Filter(s)
	Cooler
	Valve(s)
	Power Meter

Input icons

Icon	Description
	Pressure
	Temperature
	Special Protection
	Open
	Closed

Note:

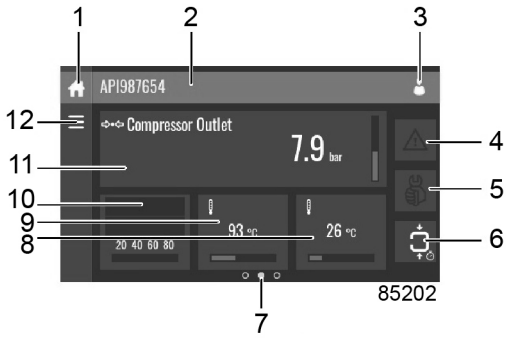
This chapter gives a general survey of available icons. Not all icons mentioned in this chapter are applicable to every machine.

3.4 Main screen

Function

The main screen is the screen that is shown automatically when the voltage is switched on. It is switched off automatically after a few minutes when there is no touch input.

Description



Reference	Designation	Function
1	Home button	The home button is always shown and can be tapped to return to the main screen.
2	Screen information	On the main screen, the screen information bar shows the serial number of the machine. When scrolling through menus, the name of the current menu is shown.
3	Access level button	The access level button is always shown and can be tapped to change the current user access level.
4	Alarm button	The alarm button can be tapped to show the current alarms. If an alarm occurs, the icon on the button will be red.
5	Service button	The service button can be tapped to show the service information.
6	Status	This icon shows the current status of the unit.
7	Page indicator	Indicates which page you currently see. The middle indication is the main screen, left is the menu screen and at the right the quick access screen. Swipe left or right to go to another screen.
8, 9, 10, 11	These fields can contain a certain value, depending on the type of the unit.	Tap the field to view the type of measurement. This will be shown in the screen information bar. Examples of values shown: • Temperature • Pressure • Purity level
12	Menu button	The menu button is always shown and can be tapped to go to the menu.

3.5 Quick access screen

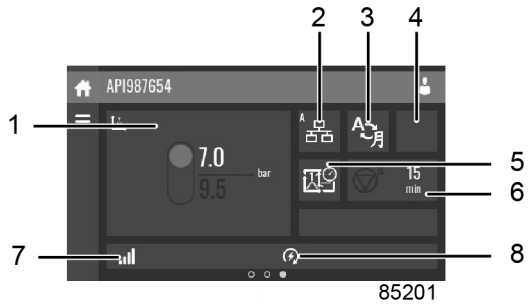
Function

The screen is used to directly access some frequently used functions.

Procedure

The quick access screen can be viewed by swiping left, starting from the main screen.

Description



Through this screen, several important settings can be viewed and modified.

Reference	Function	Description
1	Setpoints	Several setpoints can be modified by tapping this icon.
2	Control mode	The control mode can be changed by tapping this icon. • Local control via start/stop buttons • Remote control via digital input(s) • LAN control via the network. When in remote or LAN control, the start/stop buttons on the controller will not work.
3	Display language	The display language of the controller can be changed by tapping this icon.
4	Operation mode	When tapped, the operation mode can be chosen between manual and automatic. When manual mode is selected, the controller will switch to automatic mode automatically after 24 hours.
5	Week timer	Week timers can be set by tapping this icon.
6	Remaining running time	The remaining running time can be set and modified by tapping this icon.
7	Internal SmartBox	The reception quality of the internal antenna can be monitored. Each bar represents 25% reception strength. If the four bars are filled, the reception strength is 100%. If only one bar is filled, the reception strength is just 25%.

Reference	Function	Description
8	Auto Restart	Auto restart can be activated by tapping this icon.

3.6 Menu screen

Function

This screen is used to display the different menus where settings can be viewed or changed.

Procedure

The menu screen can be viewed by tapping the menu button or by swiping right, starting from the main screen.

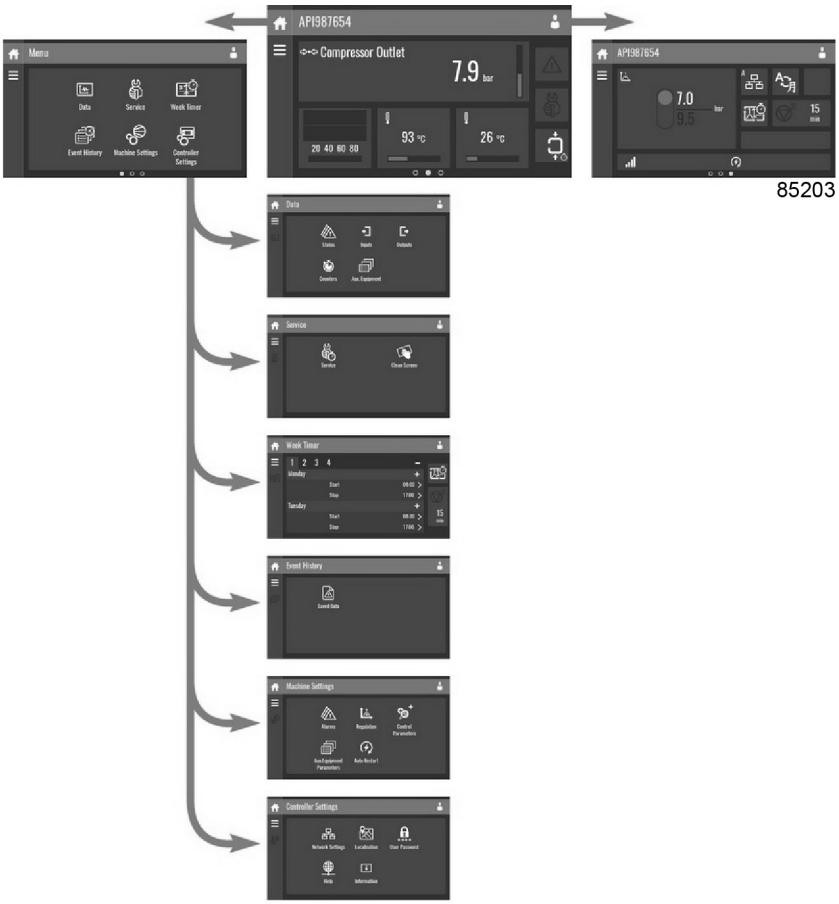
Description

85204

Reference	Designation	Function
(1)	Data	The data menu contains the status of the unit, information about the inputs, outputs and counters. The auxiliary equipment can also be viewed through this menu.
(2)	Service	The service menu contains the service information. The "clean screen" function can be used to clean the touchscreen.
(3)	Week timer	Multiple week timers and a remaining running time can be set through this menu.
(4)	Event history	In case of an alarm, the status information of the unit is saved and can be viewed through this menu.
(5)	Machine settings	Alarms settings, regulation settings and control parameters can be changed through this menu. Auxiliary equipment parameters can also be changed. The automatic restart function can be set through this menu. This function is password-protected.
(6)	Controller settings	Network settings, localisation settings and a user password can be set through this menu. There is also a help page available and the controller information can be shown.

Menu structure

Operating the controller can be done by swiping through screens and tapping icons or menu items.



85203

This is the main structure. It can differ depending on the configuration of the unit.

3.7 Data menu

Function

This screen is used to display the following submenus:

- **Status**
- **Inputs**
- **Outputs**
- **Counters**
- **Auxiliary Equipment**

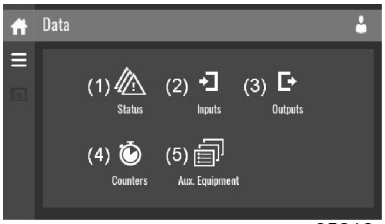
These submenus can be entered by tapping the icons.

Procedure

To enter the **Data** menu screen:

1. Tap the Menu button.
2. Tap the **Data** icon.

Description

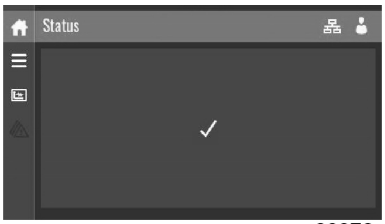


85210

Reference	Description
(1)	**Status** menu
(2)	**Inputs** menu
(3)	**Outputs** menu
(4)	**Counters**
(5)	**Auxiliary equipment** menu

Status menu

Tap the **Status** icon to enter the **Status** menu.



86370

This menu shows the current status of the unit.

If an alarm is active, it can be viewed by tapping the alarm message. To reset an alarm, tap the reset button.

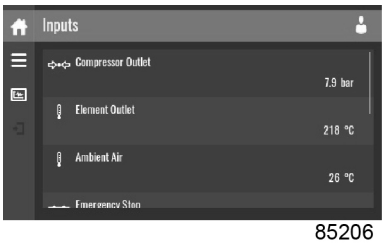
Warning:

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.

Inputs menu

Tap the **Inputs** icon to enter the **Inputs** menu.

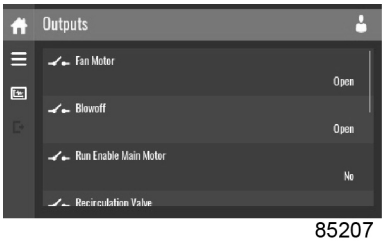


85206

This menu shows information about all the inputs.

Outputs menu

Tap the **Outputs** icon to enter the **Outputs** menu.



85207

This menu shows information about all the outputs.

Danger:

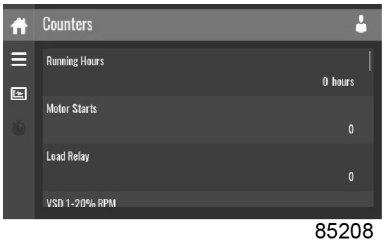
Voltage-free outputs may only be used to control or monitor functional systems. They should **NOT** be used to control, switch or interrupt safety related circuits. Check the maximum allowed load on the label.

Warning:

Stop the unit and switch off the supply before connecting external equipment. Consult the safety precautions.

Counters menu

Tap the **Counters** icon to enter the **Counters** menu.

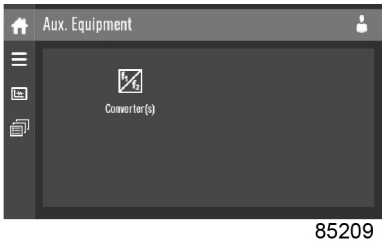


85208

This menu shows an overview of all actual hours and counters of the unit and controller.

Auxiliary Equipment menu

Tap the **Auxiliary Equipment** icon to enter the **Auxiliary Equipment** menu.



85209

This menu shows an overview of all auxiliary equipment fitted.

3.8 Service menu

Function

This screen is used to display the following submenus:

- **Service**
- **Service Functions** (visible as advanced user)
- **Clean Screen**

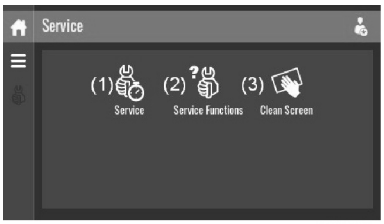
These submenus can be entered by tapping the icons.

Procedure

To enter the **Service** menu screen:

1. Tap the Menu button.
2. Tap the **Service** icon.

Description

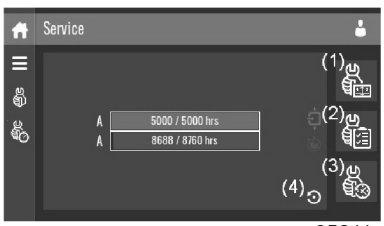


85213

Reference	Description
(1)	**Service**
(2)	**Service Functions** (only visible as advanced user)
(3)	**Clean Screen**

Service menu

Tap the **Service** icon to enter the **Service** menu.



85211

This menu shows the remaining **Running Hours** and the remaining **Real Time Hours** until the next service. The first row (A) shows the **Running Hours** when the first service is needed (green), the second row shows the **Real Time Hours** (blue)

A service overview can be viewed by tapping icon (1).

The service plan can be viewed by tapping icon (2). Through this menu, the service plan can be modified:

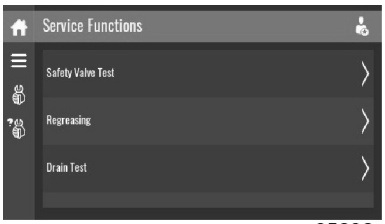
1. Tap the desired service plan. A selection screen will pop up.
2. Change the Running Hours by tapping '–' or '+'.
3. Confirm by tapping 'V' or decline by tapping 'X'.

The service history can be viewed by tapping icon (3).

When a service plan interval is reached, a message will appear on the screen. When service has been performed, the service timer can be reset by tapping the reset button (4).

Service functions (visible for advanced user)

Tap the **Service Functions** icon to enter the **Service Functions** menu.

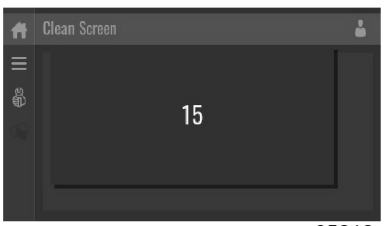


85232

Depending on the machine, this menu can have a different set of functions. Many of them are password protected, as they are only accessible for authorized personnel.

Clean screen

Tap the **Clean Screen** icon to start the 15 seconds countdown to perform cleaning of the touch screen.



85212

The touch screen and the start and stop button become inactive for 15 seconds.

3.9 Week timer menu

Function

This screen is used to set up to 4 different timers with each up to 8 settings per day.

The week timers can be activated through this screen.

A **Remaining Running Time** can be set from 5 up to 240 minutes.

Procedure

To enter the **Week Timer** menu screen:

1. Tap the Menu button.
2. Tap the **Week Timer** icon.

Description

85214

Reference	Designation	Function
(1)	Add or select week	If less than 4 weeks are programmed, tap the '+' button to add a week.
(2)	Remove week	Tap to remove a programmed week timer.
(3)	Activate week timer	A selection screen pops up. The user can choose the correct week by tapping '–' or '+' and can confirm by tapping 'V' or decline by tapping 'X'.
(4)	Remaining running time	A selection screen pops up. The user can change the remaining time by tapping '–' or '+' and can confirm by tapping 'V' or decline by tapping 'X'.
(5)	Add setting	A selection screen pops up. The user can change the setting by swiping up or down and confirm by tapping 'V' or decline by tapping 'X'.

3.10 Event history menu

Function

This screen is used to display the saved data in case of an alarm.

These submenus can be entered by tapping the icons.

Procedure

To enter the **Event History** menu screen:

1. Tap the Menu button.
2. Tap the **Event History** icon.

Description

85216

Reference	Description
(1)	**Saved Data**

Saved data

Tap the **Saved Data** icon to enter the **Saved Data** menu.

Scroll through the items swiping up and down in this list. The event date and time is shown at the right side of the screen.

Press on one of the items in the list for more information reflecting the status of the unit when the shutdown occurred.

3.11 Machine settings menu

Function

This screen is used to display the following submenus:

- **Alarms**
- **Regulation**
- **Control Parameters**

  Only visible if the machine has adaptable parameters.
- **Aux. Equipment Parameters**
- **Auto Restart**

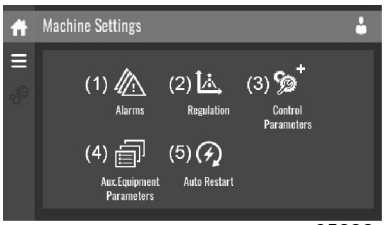
These submenus can be entered by tapping the icons.

Procedure

To enter the **Machine Settings** menu screen:

1. Tap the Menu button.
2. Tap the **Machine Settings** icon.

Description

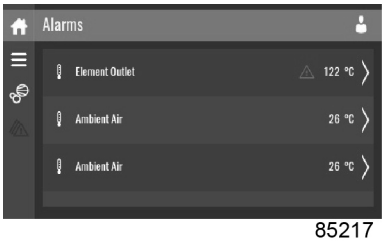


85222

Reference	Description
(1)	**Alarms** menu
(2)	**Regulation** menu
(3)	**Control Parameters** menu
(4)	**Aux. Equipment Parameters** menu
(5)	**Auto Restart** menu

Alarms menu

Tap the **Alarms** icon to enter the **Alarms** menu.



85217

A list of all alarms is shown.

When pressing on one of the items in the underlying list, the warning and/or shutdown levels are shown for this alarm.

Regulation menu

Tap the **Regulation** icon to enter the **Regulation** menu.

85218

Setpoints can be modified and capacity control can be consulted through this menu.

Modify a setting

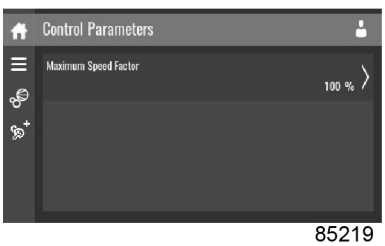
When tapping a list item, a selection screen pops up. The user can modify the setting by tapping ‘–’ or ‘+’ and can confirm by tapping ‘V’ or decline by tapping ‘X’.

Change a selection

When tapping a list item, a selection screen pops up. The user can change the selection by swiping up or down and confirm by tapping ‘V’ or decline by tapping ‘X’.

Control parameters menu

Tap the **Control Parameters** icon to enter the **Control Parameters** menu.



85219

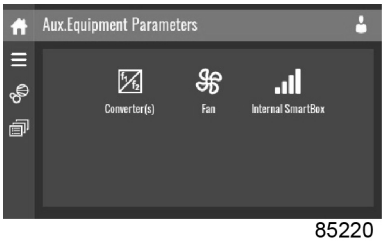
This menu shows information about the **Control Parameters**.

Modify a setting

When tapping a list item, a selection screen pops up. The user can modify the setting by tapping ‘–’ or ‘+’ and can confirm by tapping ‘V’ or decline by tapping ‘X’.

Auxiliary equipment parameters menu

Tap the **Aux. Equipment Parameters** icon to enter the **Aux. Equipment Parameters** menu.



85220

This menu shows an overview of all the auxiliary equipment fitted.

Through this menu, the parameters of the auxiliary equipment can be changed.

Modify a setting

When tapping a list item, a selection screen pops up. The user can modify the setting by tapping '–' or '+' and can confirm by tapping 'V' or decline by tapping 'X'.

Auto restart menu

Tap the **Auto Restart** icon to enter the **Auto Restart** menu.

85221

Through this menu, the automatic restart can be activated. The activation is password protected.

The automatic restart settings can also be changed.

Enter a password

When tapping a password protected item, a selection screen pops up. The user can enter the password by swiping up or down to select the desired number. Once the 4 digits are entered, the user can confirm by tapping 'V' or decline by tapping 'X'.

Modify a setting

When tapping a list item, a selection screen pops up. The user can modify the setting by tapping '–' or '+' and can confirm by tapping 'V' or decline by tapping 'X'.

3.12 Controller settings menu

Function

This screen is used to display the following submenus:

- **Network Settings**
- **Localisation**
- **User Password**
- **Help**

- **Information**
- **Main Chart**

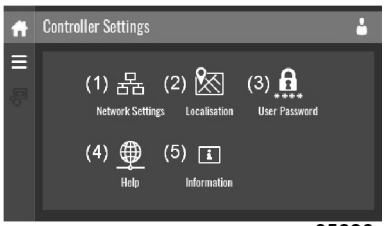
These submenus can be entered by tapping the icons.

Procedure

To enter the **Controller Settings** menu screen:

1. Tap the Menu button.
2. Tap the **Controller Settings** icon.

Description

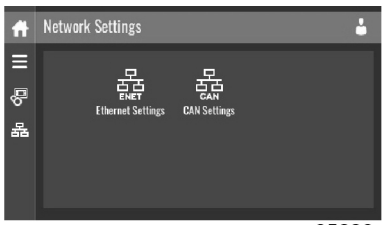


85228

Reference	Description
(1)	**Network Settings** menu
(2)	**Localisation** menu
(3)	**User Password** menu
(4)	**Help** menu
(5)	**Information** menu
(6)	**Main Chart**

Network settings menu

Tap the **Network Settings** icon to enter the **Network Settings** menu.



85223

Ethernet Settings

The list of **Ethernet Settings** is shown. When ethernet is turned off, the settings can be modified.

CAN Settings

The list of **CAN Settings** is shown. When CAN is turned off, the settings can be modified.

Modify a setting

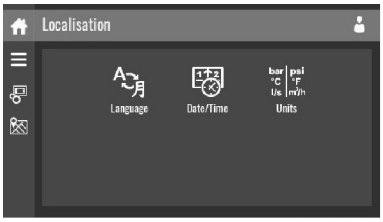
When tapping a list item, a selection screen pops up. The user can modify the setting by tapping '–' or '+' and can confirm by tapping 'V' or decline by tapping 'X'.

Change a selection

When tapping a list item, a selection screen pops up. The user can change the selection by swiping up or down and confirm by tapping ‘V’ or decline by tapping ‘X’.

Localisation menu

Tap the **Localisation** icon to enter the **Localisation** menu.



85224

Language

The language setting of the controller can be modified through this menu.

Date/Time

The date and time settings of the controller can be modified through this menu.

Units

The units displayed can be modified through this menu.

Modify a setting

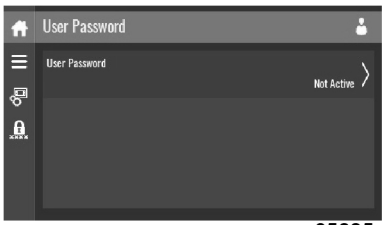
When tapping a list item, a selection screen pops up. The user can modify the setting by tapping ‘–’ or ‘+’ and can confirm by tapping ‘V’ or decline by tapping ‘X’.

Change a selection

When tapping a list item, a selection screen pops up. The user can change the selection by swiping up or down and confirm by tapping ‘V’ or decline by tapping ‘X’.

User password menu

Tap the **User Password** icon to enter the **User Password** menu.



85225

The user password can be activated or deactivated through this menu. Enter and confirm a user password to activate, repeat to deactivate.

Enter a password

When tapping a password protected item, a selection screen pops up. The user can enter the password by swiping up or down to select the desired number. Once the 4 digits are entered, the user can confirm by tapping ‘V’ or decline by tapping ‘X’.

Help menu

Tap the **Help** icon to enter the **Help** menu.

85226

This menu can show a link to the web page of your supplier, a helpdesk phone number or other helpful information.

Information menu

Tap the **Information** icon to enter the **Information** menu.

85227

This menu shows information about the controller.

3.13 Access level

Function

Through this pop-up screen, the access level settings can be viewed or changed.

Procedure

The **Access Level** screen can be viewed or changed by tapping the **Access Level** button at the upper right corner of the screen.

Description

85229

Reference	Designation	Function
(1)	User	A basic set of parameters is visualized, no password required.
(2)	Service	A basic set of parameters can be modified, no password required.
(3)	Full	This access level is not accessible to end users.
(4)	Decline	Tap to decline the selected user level.

Reference	Designation	Function
(5)	Confirm	Tap to confirm the selected user level.

Service access level

85230

Tap the **Service** access level icon (1) and confirm (2).

85231

The screen information bar (1) now shows the current status of the unit instead of the machine serial number.

The Received Signal Strength Indicator (RSSI) value is now shown in the Internal SmartBox menu. See section *Quick access screen*.

In the service menu, an extra menu item is now available. See section *Service menu*.

3.14 Web server

All controllers have a built-in web server that allows direct connection to the company network or to a dedicated PC via a local area network (LAN). This allows to consult certain data and settings via a PC instead of the display of the controller.

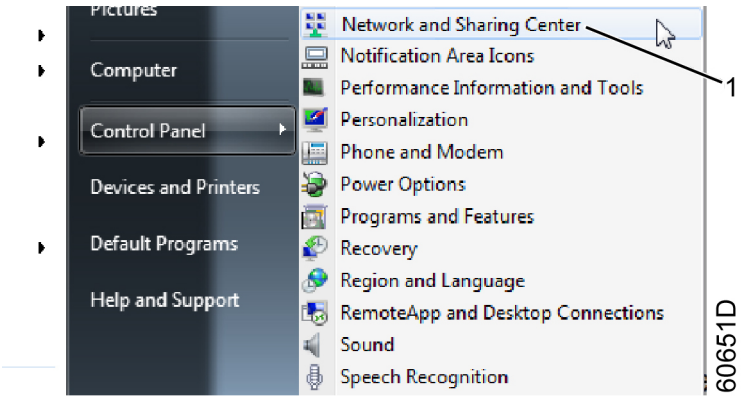
Getting started

Make sure you are logged in as administrator.

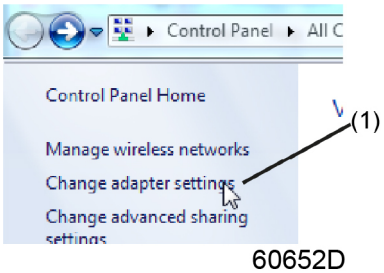
- Use the internal network card from your computer or a USB to LAN adapter.
- Use a UTP cable (CAT 5e) to connect to the controller (see picture below).

Configuration of the network card

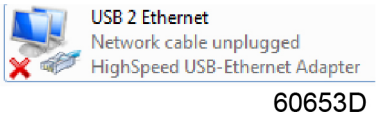
- Go to Network and Sharing Center (1).



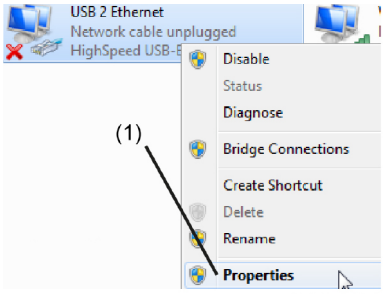
- Click on Change adapter settings (1).



- Select the Local Area Connection, which is connected to the controller.

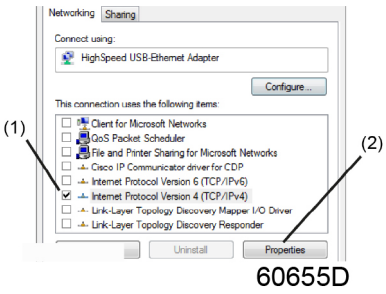


- Click with the right button and select Properties (1).



60654D

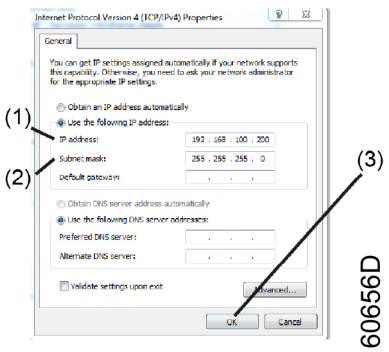
- Use the check box Internet Protocol version +4 (TCP/IPv4) (1) (see picture). To avoid conflicts, uncheck other properties if they are checked. After selecting TCP/IPv4, click on the Properties button (2) to change the settings.



60655D

- Use the following settings
  - IP Address 192.168.100.200(1)
  - Subnetmask 255.255.255.0(2)

  Click OK (3) and close network connections.

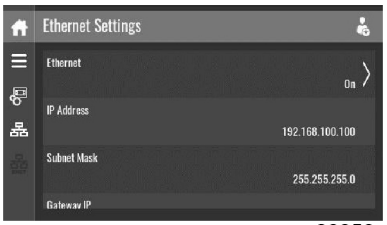


60656D

Configure a company network (LAN) connection

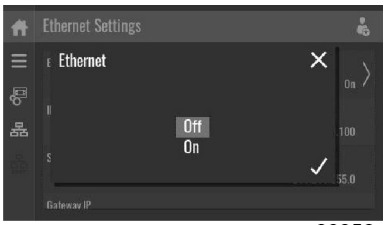
- Ask your IT department to generate a fixed IP address in your company's network. That IP address will be excluded from the DNS server, so it will be reserved for the controller. Also get the correct Gateway and Subnet mask settings. For example:
  - IP = 10.25.43.200
  - Gateway = 10.25.42.250
  - Subnet mask = 255.255.254.0
- Connect the controller to the company's network (LAN) by using a UTP cable (min. CAT 5e).

- Adapt the network settings in the controller.
  - Put the controller in advanced mode by navigating to **Menu** > **Controller settings** > **Network settings** > **Ethernet settings**.



86359

  - Switch off the ethernet communication to allow the editing of the settings.



86358

  - Adapt IP adress
  - Adapt Gateway IP
  - Adapt Subnetmask
  - Switch on the Ethernet communication
  - Wait a few minutes so the controller can be connected to the LAN network.

Configuration of the web server

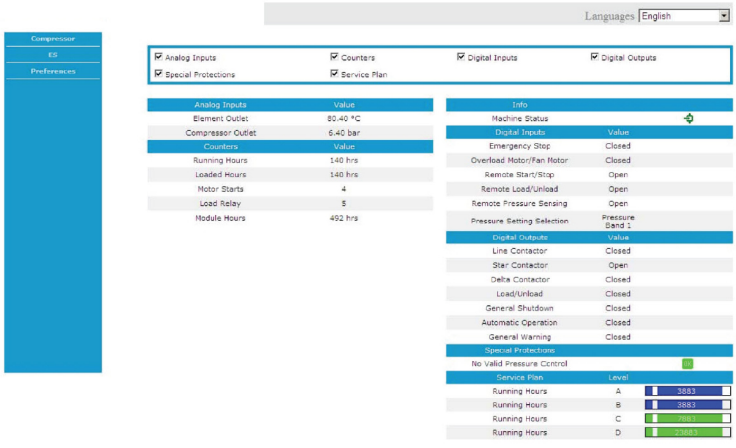
The internal web server is designed and tested for Microsoft® Internet Explorer. Opera, Mozilla Firefox, Safari and Chrome should work as well.

Viewing the controller data

Note:

All screen shots are indicative. The number of displayed fields depends on the selected options.

- Open your browser and type the IP address of the controller you want to view in your browser (in this example http://192.168.100.100). The interface opens.



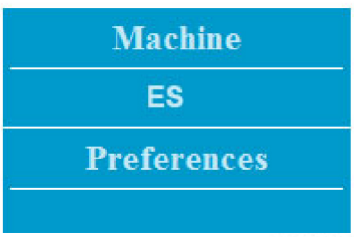
81520D

Navigation and options

- • The banner shows the unit type and the language selector. In this example, three languages are available on the controller.

81521D

- • On the left side of the interface, you can find the navigation menu. If a license for ESi is foreseen, the menu contains 3 buttons:



83810D

  - Machine: shows all generator settings.
  - ES: shows the ESi status (if a license is provided).
  - Preferences: allows to change temperature and pressure unit.

4 Installation

4.1 Dimension drawings

The dimension drawings can be found in the technical documentation supplied with the compressor.

Model	Dimension drawing number
SF 2-6 P FM EL metric	9820 6376 02-02
SF 2-6 P FM EL imperial	9820 6376 02-05
SF 2-6 FF FM EL metric	9820 6376 03-02
SF 2-6 FF FM EL imperial	9820 6376 03-05
SF 2-6 P TM EL metric	9820 6376 04-02
SF 2-6 P TM EL imperial	9820 6376 04-05
SF 2-6 FF TM EL metric	9820 6376 05-02
SF 2-6 FF TM EL imperial	9820 6376 05-05
SF 2-6 P-FF 30 l EL metric	9820 6376 06-02
SF 2-6 P-FF 30 l EL imperial	9820 6376 06-05
SF1-6 FF TM EL CD metric	9820 6376 09-01
SF1-6 FF TM EL CD imperial	9820 6376 09-02

Reference	Description
P	Pack
FM	Floor-mounted
30 l	With integrated 30 l air receiver
CD	With desiccant dryer
FF	Full-Feature
TM	Tank-mounted
EP	Electro-pneumatic control
EL	With Touch controller

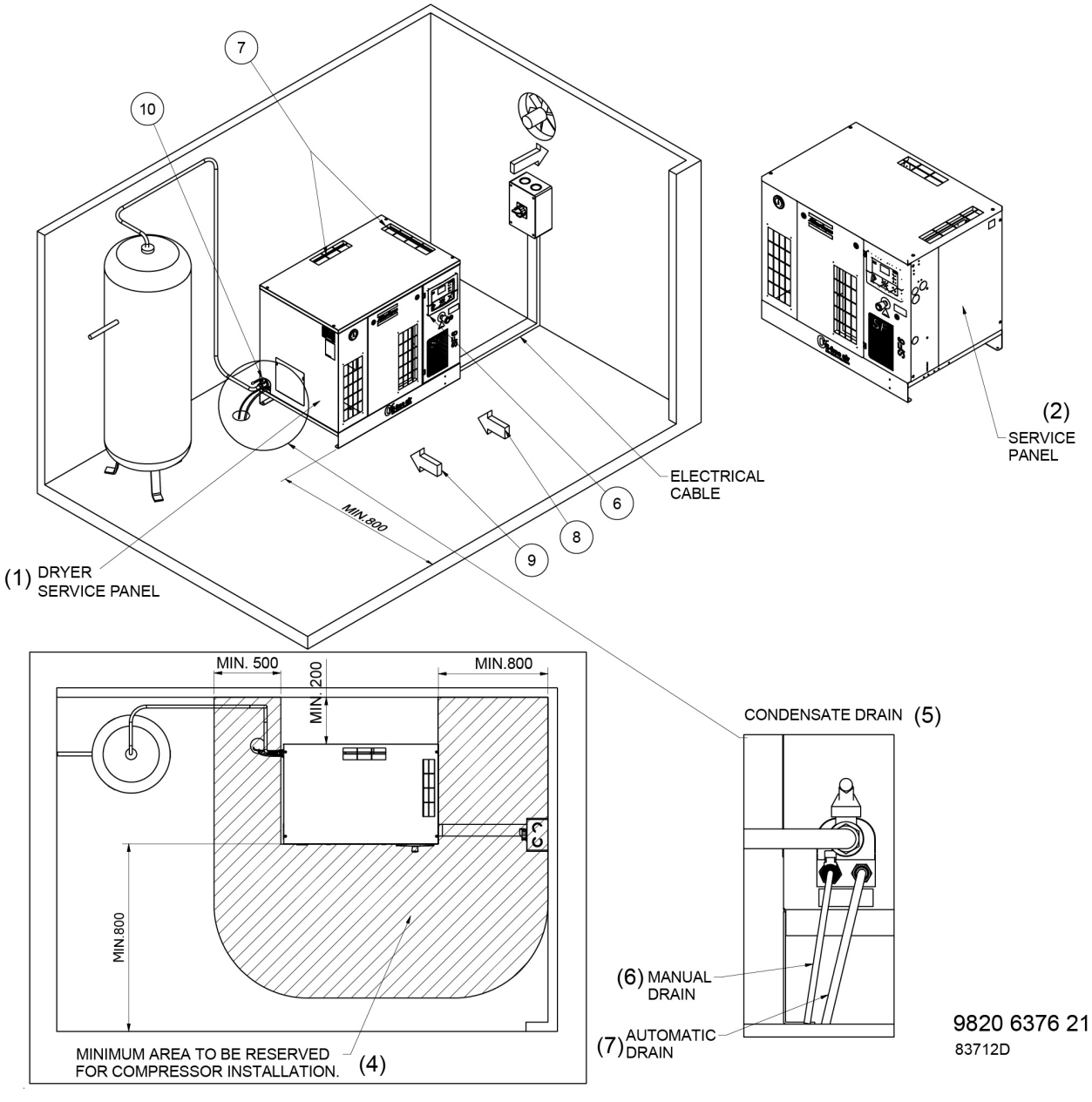
Table 1: Legend

Hereby a list of commonly used terms with their translation:

Text on drawings	Translation or Explanation
COOLING AIR OUTLET	Cooling air outlet
COMPRESSED AIR OUTLET	Compressed air outlet
COOLING AIR INLET	Cooling air inlet
POWER SUPPLY CABLE	Power supply cable
DRYER MANUAL DRAIN	Manual drain valve of the dryer
AUTOMATIC DRAIN	Automatic drain outlet
CENTER OF GRAVITY	Location of center of gravity
DRYER SERVICE PANEL	Service panel for the dryer

Text on drawings	Translation or Explanation
DOOR FULLY OPEN	Dimensions with fully open door
COOLING AIR INLET OF DRYER	Cooling air inlet for the dryer
ANCHOR POINTS	Location of anchoring points
AIR RECEIVER MANUAL DRAIN	Manual drain of the air receiver
THE DIMENSIONS FOR 500 L VESSEL...	Dimensions of the 500 l vessel are indicated between ( ) where they are different from the dimensions of the 270 l vessel.
THE DIMENSIONS FOR FULL-FEATURE UNIT...	Dimensions of the Full-Feature units are indicated between ( )

4.2 Installation proposal



Reference	Description
1	Dryer service panel
2	Service panel
3	Supply cable
4	Minimum area to be reserved for servicing purposes
5	Condensate drain
6	Manual drain
7	Automatic drain

Recommendations

1. Install the compressor on a level, horizontal, industrial floor, suitable for taking the weight of the compressor.

   It is mandatory to remove the shipment pallet to install the compressor correctly.

   The location must be a frost-free and preferably low dust location.
2. **Delivery pipe:**

   The pressure drop in the delivery pipe can be calculated from:

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

   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. **Ventilation:**

   The inlet grids and ventilation fan should be installed in such a way that any recirculation of cooling air to the compressor is avoided. The maximum air velocity through the grids is 5 m/s (16.5 ft/s). The maximum allowable pressure drop over the cooling air ducts is 30 Pa (0.12 in wc). The maximum air temperature at the compressor intake opening is 40 ˚C (104 ˚F).

   Take care that the temperature of the ambient air and the cooling air may never be lower than 0 °C (32 °F) to avoid the freezing of condensate.

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

   - $Q_v = 1.06\ N/\Delta t$ for Pack units.
   - $Q_v = (1.06\ N + 0.2)/\Delta t$ for Full-Feature units.

   Q_v = required ventilation capacity in m^3/s.

   N = shaft input of the compressor in kW.

   Δt = temperature increase in the compressor room in °C.
4. **Air receiver:**

   An optional air receiver can be necessary to limit the cycle frequency. The recommended maximum is 20 starts per hour.
5. Optional filters can be installed in the pressure line downstream the air outlet valve, e.g.:

   - A DD^+ filter for general purpose filtration. The filter traps solid particles down to 1 micron.
   - A PD^+ filter for filtration down to 0.01 micron. A PD filter must always be installed downstream a DD filter.
6. Control cubicle with monitoring panel.
7. Compressor and dryer cooling air outlet
8. Compressor cooling air inlet
9. Refrigerant dryer cooling air inlet
10. Connect the condensate drain outlet to a sewer. It is recommended to provide a funnel to allow visual inspection of the condensate flow. If the condensate piping has been led outside the compressor room where it may be exposed to freezing temperatures, the piping must be

insulated. The condensate drain pipe from the compressor to the sewer must not dip into the water of the sewer.

11. The PD+ filter, installed upstream the membrane dryer or the desiccant dryer, is a high efficiency filter that traps particles down to 0.01 micron and occasionally remaining water droplets.
12. All piping is to be connected free of stress.
13. A remote air inlet is available as an option. For more information on the maximum pipe length, please contact your supplier.

4.3 Electrical connections

Danger: The electrical installation must correspond to the applicable codes. The mains supply and earthing lines must be of a suitable size.

The installation must be earthed and protected by fuses in each phase. Install an isolating switch near the compressor.

Make sure that this switch is open to isolate the compressor from the mains before carrying out any connection.

Supply cable

Consult section *Cable size* for the section of the power supply cable.

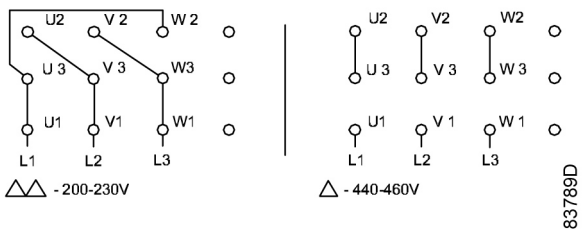
An electric cable is provided on the unit. Fit a suitable plug on the cable.

Plug in the cable.

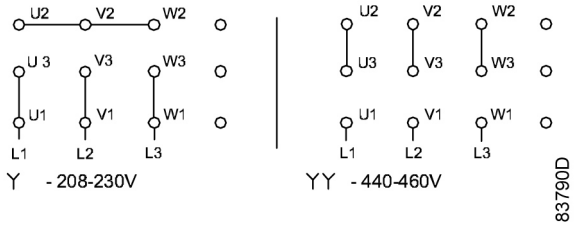
Three voltage units

The compressors leave the factory wired for 230 V. If the compressor is to be used on 460 V, rewire the motor as follows:

1. Take all necessary precautions.
2. Change the connection in the motor terminal box according to the following instructions:
   - For SF 2+ and SF 4+:



   - For SF 6+:

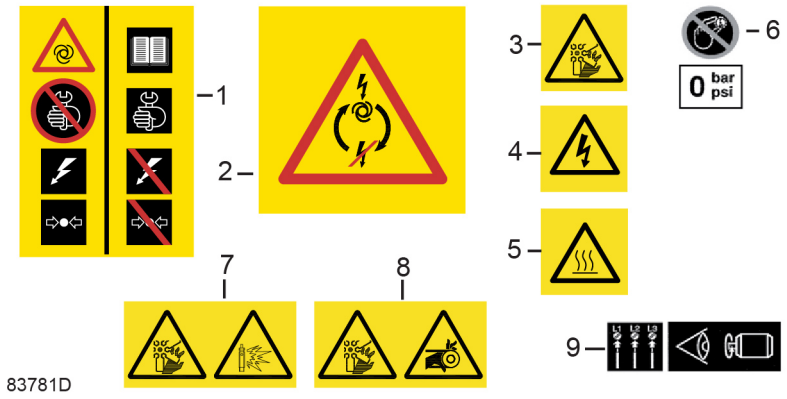


3. Also change the voltage connection on auxiliary transformer T1.

4. Replace the fuses.
5. Adjust the overload relay settings. See section *Settings of overload relay and fuses*.

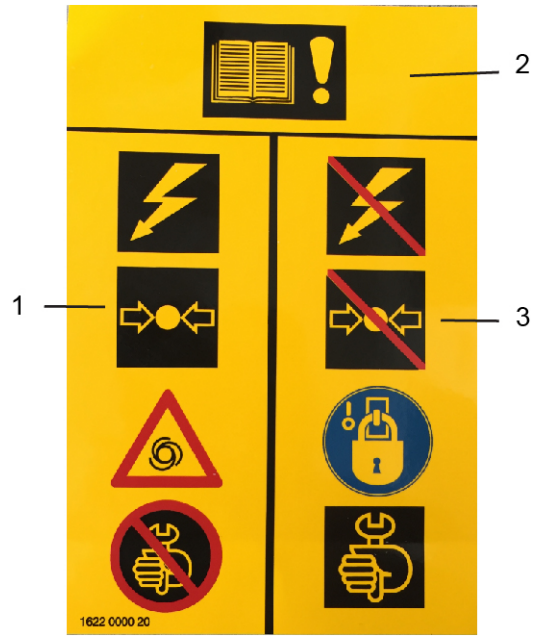
4.4 Pictographs

Pictographs



Reference	Description
1	Warning: the compressor starts and stops automatically. Do not perform service when pressurized and when the voltage is on. Read the instruction book, switch off the power and depressurize the compressor before maintenance or repair.
2	After power failure during automatic operation, the unit restarts automatically.
3	Warning: rotating fan
4	Warning: supply voltage
5	Warning: hot surface
6	Do not adjust the pressure switch while it is depressurized because this can damage the switch (only for compressors controlled by a pressure switch).
7	Warning: rotating fan Warning: safety valve blowing
8	Warning: rotating fan Warning: belts
9	Warning: before connecting the compressor electrically, consult the instruction book for the motor rotation direction.

Alternative for label 1:



Reference	Description
1	Do not work on the compressor when the unit is running, under pressure or in automatic operation.
2	Always read the instruction book first.
3	Switch off the voltage, release the pressure and prevent that the unit is switched on inadvertently (Lock out/Tag out) before working on the equipment.

5 Operation

5.1 Initial start-up

Safety

Warning: The operator must apply all relevant safety precautions.

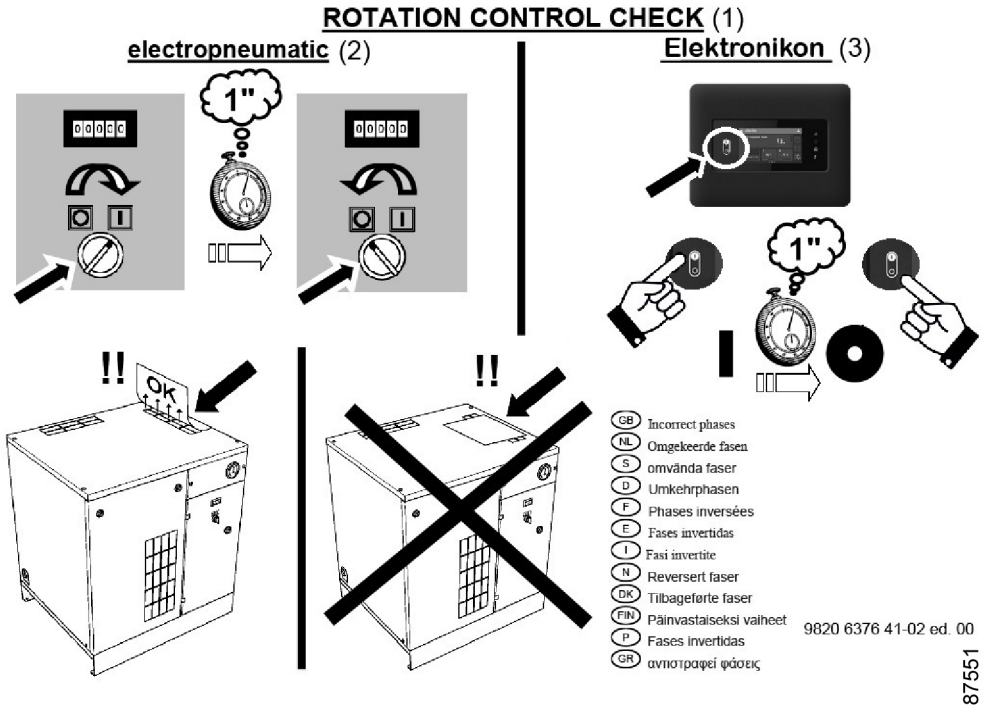
Warning: The maximum recommended motor starting frequency is 20 starts per hour. In order to keep the number of starts at an acceptable level, the compressor must be connected to an air receiver with a suitable size.

Initial start-up

1. Remove the red painted transport bracket.
2. Close the air outlet valve (AV). See section *Introduction* .
3. Check the settings of the overload relay (F21). See section *Settings of overload relay and fuses*.

   Check the drive motor connections. Connect the compressor to the electricity net.
4. Close the condensate drain valve(s). See sections *Introduction* and *Flow diagram* for their location.
5. Switch on the voltage. Press the start button on the controller and immediately press the stop button.

   On 3-phase units, check the rotation direction of the drive motor. For this purpose, a sheet with start-up instructions is fitted to the outlet grating. When the rotation direction is correct, the paper will be blown upwards. If the direction is wrong, stop the compressor immediately and reverse two incoming electric lines.



Reference	Description
(1)	Rotation control check
(2)	Electro-pneumatic controlled compressors
(3)	Compressors with Touch controller

A compressor equipped with a phase sequence relay will not start if the phase sequence is wrong. In that case, reverse two of the incoming electric lines to solve the issue.

A wrong phase sequence will be indicated on the display as a motor overload. See section *Controller functions* for more information.

5.2 Starting

Control panel

Reference	Description
ER	Touch controller
Gd	Dew point gauge
S3	Emergency stop button

Procedure

1. Close the manual condensate drain valve(s) if present.
2. Open the air outlet valve (AV).
3. Switch on the voltage.
4. Press the start button on the Touch controller.
5. The motor starts and stops automatically depending on the air pressure.
6. On Full-Feature units, the dew point of the refrigerant dryer will be reached after a few minutes.
7. On compressors equipped with an additional membrane or desiccant dryer, the latter will start drying the compressed air. Note that at the first start-up, it can take several minutes before its dew point has stabilized to a final value.

5.3 During operation

Procedure

1. Check the display to check pressure setting.
2. On Full-Feature units, check the display or the temperature gauge (Gd) on the control panel to check the dew point.

Check that condensate is discharged regularly by the automatic drain of the dryer. The amount of condensate depends on the operating conditions of the unit and the humidity of the air.

Open the manual drain valve from time to time to remove any impurities. See section *Preventive maintenance schedule*.

3. On compressors equipped with a desiccant dryer (CD), regularly check the pressure difference indicator of the PD 20+ filter in front of the compressor.

   Replace the filter element if the indicator shows red.

   Open the manual drain valve from time to time to remove any impurities. See also section *Preventive maintenance schedule*.

   Check the status of the LEDs on the dryer control panel at regular intervals.

   If the Warning/Alarm LED is alight, consult the section *Problem solving*.
4. On tank-mounted compressors, open the manual drain valve of the air receiver regularly to remove the water (especially in case of Pack units). Also see section *Preventive maintenance schedule*.

Note: The dew point will deviate from nominal when the nominal conditions are exceeded. If the dew point remains too high or unstable, consult section *Problem solving*.

5.4 Stopping

Control panel

Reference	Description
ER	Touch controller
Gd	Dew point gauge
S3	Emergency stop button

Procedure

1. Press the stop button on the Touch controller.
2. Switch off the voltage.
3. Close the air outlet valve (AV). See section *Introduction*.

Warning: The refrigerant air dryer and the air receiver remain under pressure. If it is necessary to depressurize these components, open the manual drain valve(s).

5.5 Taking out of operation

Procedure

1. Stop the compressor and close the air outlet valve.
2. Switch off the voltage and disconnect the compressor from the mains.
3. Depressurize the compressor.
4. On Full-Feature units and on compressors with an air receiver, open the manual drain valve(s) (Dm / Dm1).
5. If provided, shut off and depressurize the part of the air net which is connected to the outlet valve. Disconnect the compressor from the air net.
6. If provided, disconnect the compressor condensate piping from the local condensate drain system.
7. Before moving the unit, reinstall the red transport brackets.

6 Maintenance

6.1 Preventive maintenance schedule

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*.

Warning: The longer interval service actions must also include the shorter interval actions.

Warranty - Product Liability

Use only authorized parts.

Any damage or malfunction caused by bad maintenance is not covered by Warranty or Product Liability.

General

When servicing, replace all removed gaskets, O-rings and washers. Clean parts when reused.

Intervals

The local Customer Center may overrule the specified maintenance schedule, especially the service intervals, depending on the environmental and working conditions of the compressor.

Preventive maintenance schedule

Period(1)	Running hours(1)	Operation
Daily	--	• Check readings on the display. • Compressors with integrated air receiver and/or Full-Feature units: Check if condensate is discharged regularly. • Tank-mounted compressors: Drain the condensate manually at the end of the day. • Full-Feature units: Check the dew point. • Compressors with desiccant dryer: Check the dryer display for any messages. See section *Desiccant dryer*.

Period[1]	Running hours[1]	Operation
Every 3 months[2]	500	Inspect the air inlet filter(s) (AF). Inspect the pre-filter mats on the cooling air intake openings (if fitted). Check for cleanness and damage. Clean if dirty, replace if damaged. Clean the compressor and check the air cooler . If necessary, clean by air jet. After the first 500 running hours or when the belt has been replaced, check the belt tension and adjust if necessary according to the information on the label.
Every 6 months	--	• Manually operate the safety valve. • Check for any damaged wiring or loose connections. • Check for air leaks.

Every 6 months[2]	--	Full-Feature units:
		• If dirty, brush or blow off the finned surface of the dryer's condenser.
		• Inspect and clean the electronic drain:
		  • Functioning of the drain can be checked by pushing the TEST button of the drain.
		  • Cleaning of the drain filter can be done by opening the manual drain valve for a few seconds.

Yearly	2500	• Replace the air inlet filter(s) (AF) and the pre-filter mats on the cooling air intake openings (if fitted). [2] • Test the safety valve. • Have temperature protection and motor overload tested. • Check tension and condition of the V-belt(s). • Compressors with desiccant dryer: Replace the PD 20+ filter cartridge.
Every 2 years	5000	• Replace the V-belt(s). • Replace check valve.
Every 2 years	5000	8 bar and 116 psi compressors: Have the orbiting scroll bearing greased.[3]
Every 2 years	5000	10 bar and 145 psi compressors: • Replace the element outlet pipe and the plastic insert (only on SF 2+ and SF 4+). See section *Outlet pipe replacement*. **Note: From S/N API 744 000 onwards, a new version of compressor element is used on SF 4+. This new element no longer has a plastic insert in the outlet pipe and preventive replacement is no longer required.** • Clean fan (FN1). See section *Flow diagram*, fan duct and element cooling fins.[2] • Clean the motor fan grid. • Have orbiting scroll bearing and pin crank bearings greased.[3] • Replace tip seals and dust seal.[4]

Period[1]	Running hours[1]	Operation
Every 4 years	10000	8 bar and 116 psi compressors: • Replace the element outlet pipe and the plastic insert (only on SF 2^+ and SF 4^+). See section *Outlet pipe replacement*. **Note: From S/N API 744 000 onwards, a new version of compressor element is used on SF 4^+. This new element no longer has a plastic insert in the outlet pipe and preventive replacement is no longer required.** • Clean fan (FN1). See section *Flow diagram*, fan duct and element cooling fins.[2] • Clean the motor fan grid. • Have orbiting scroll bearing and pin crank bearings greased.[3] • Replace tip seals and dust seal.[4]
Every 2 years	10000	Compressors with desiccant dryer: Replace the desiccant cartridges.
Every 4 years	20000	Compressors with desiccant dryer: • Replace the exhaust valve diaphragm and the solenoid valves. • Replace the shuttle valve and O-rings.
Every 10 years	24000	Replace the element.

[1]Maintenance must be done according to the number of running hours or according to the running period, whichever comes first.

[2]More frequently in a dusty environment.

[3]Greasing of the bearings of the compressor element must be done with special grease, a special grease gun, and according to a specific procedure. In high ambient conditions, the bearings must be greased more frequently: for every 5 °C (9 °F) increase above 30 °C (86 °F), the maintenance interval should be reduced with 30%.

Contact your supplier for details.

[4]In extremely dry conditions (relative humidity below 15%), the tip seals and dust seals need to be replaced more frequently.

6.2 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

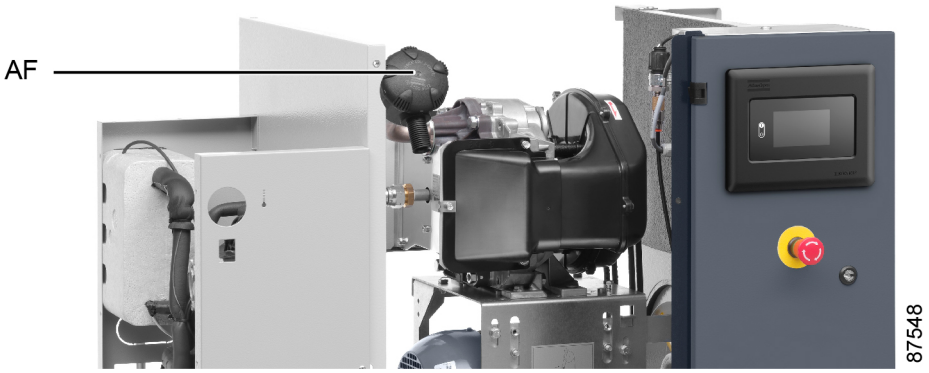


Figure 12: Air filter (AF)

Procedure

1. Stop the compressor, close the air outlet valve and switch off the voltage.
2. Remove the filter cover and the filter element. Discard damaged or clogged elements. Clean the cover.
3. Fit the new element and reinstall the filter cover.

SF 6^+ has 2 air filters.

7.2 Air cooler

Cleaning

1. Keep the cooler clean to maintain cooling efficiency. If necessary, remove any dirt with a fiber brush. Never use a wire brush or metal objects.
2. Next, clean by air jet in the reverse direction of the normal flow.
3. If it is necessary to wash the cooler with a cleansing agent, consult your supplier.

7.3 Drive motor

Instructions

The motor bearings are greased for life and do not require special attention.

Keep the motor free from dust for optimal cooling.

7.4 Safety valve

Testing

Danger: No adjustments are allowed. Never run the compressor without safety valve.

Warning: The safety valve (SV) test can only be performed by authorized personnel and is protected by a security code.

1. Stop the compressor, close the air outlet valve and switch off the voltage.
2. Depressurize the compressor.
3. Remove the safety valve. See section *Introduction* for the location of the safety valve (SV).
4. Test the safety valve on a separate compressed air circuit by gradually increasing the pressure. If the safety valve does not open at the specified pressure, it must be replaced. See section *Temperature protection and safety valve settings* for the opening pressure of the safety valve.

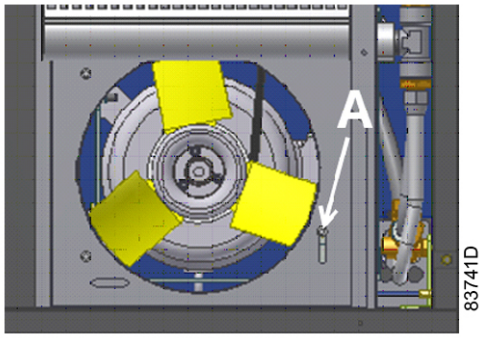
7.5 Belt replacement

Procedure

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

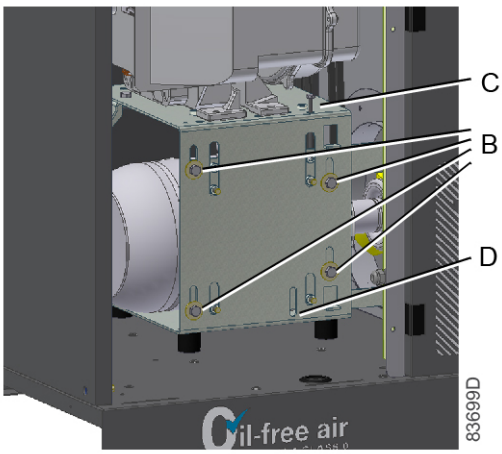
1. Remove the service panel (S).

2. Loosen the screw (A).



3. Remove the front panel.
4. Remove the inlet baffle (I).

5. Loosen the screws (B).



6. Loosen the screw (C).
7. Use slot (D) to lift the motor plate.
8. Install the new belt(s) in the pulley grooves.
9. Set the tension of the belt(s) by adjusting bolt (C) out. Refer to the label on the motor plate for the tensioning data:

10. Tighten the screws (B). Reinstall the inlet baffle.
11. Check the belt tension after the first 500 running hours.

7.6 Temperature protection

Description

The compressor element is protected by a PT 1000 sensor in the element outlet. The sensor is connected to the controller.

When the maximum temperature is exceeded, the compressor is stopped. It will restart automatically if the temperature drops again and if pressure is required. If this happens 4 times within a time span of 1 hour, the element will be shut down and must be reset manually.

Warning: When the compressor is stopped due to overheating, the compressor will not restart until the failure is acknowledged and the compressor is restarted manually.

7.7 Cleaning the compressor element

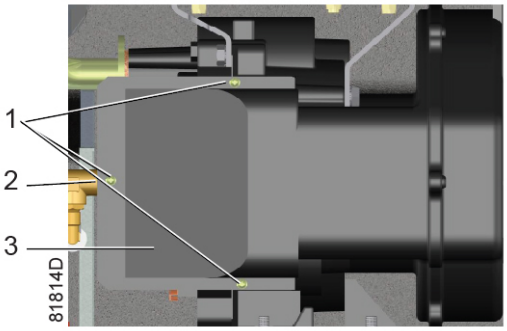
Warning: Compressor element cooling channels can be hot when the compressor has just been turned off.

Warning: Do not clean the cooling channels with organic solvent since this will damage the surface treatment.

The purpose of cleaning the cooling channels of a scroll element is to prevent the cooling channels to silt up and as such reduce the cooling efficiency. A reduced cooling efficiency can lead to a premature compressor element failure.

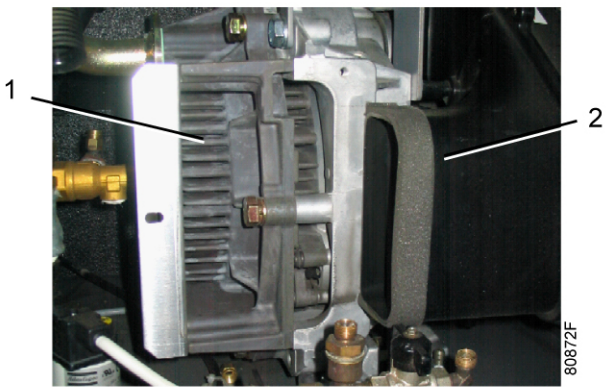
Procedure:

1. Stop the compressor and switch off the power.
2. Close the air outlet valve and depressurize the compressor.
3. Remove the fan duct:
   - Unscrew the 3 bolts (1).
   - Remove the clip (2) (if applicable).



- Remove the fan duct (3).

4. Clean cooling channels:
   - Remove dust from the cooling channels (1) by means of an air jet (see next figure).
   - Clean the fan duct (2).



5. Reassemble the fan duct:
   - Put the fan duct in place.
   - Fit the 3 bolts and the clip.
6. The unit is again ready for use.

7.8 Replacement of the outlet pipe

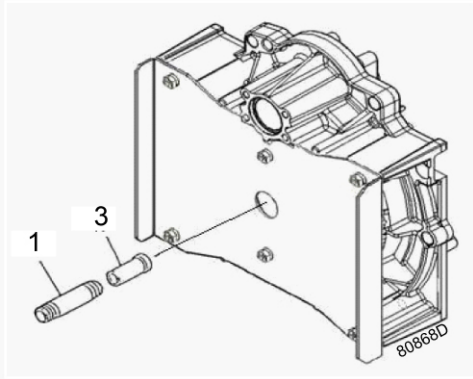
Description

The outlet pipe (1) of the 2.2 kW compressor element (used on SF 2^+) and of the 3.7 kW element (used on SF 4^+ up to S/N API 744 000) contains a plastic insert (3).

Due to the heat of the compressed air, the plastic insert may become brittle after time. It is recommended to replace the outlet pipe together with the insert when that is the case. Both parts are available as a kit (outlet pipe set). Consult the Spare Parts List for part numbers.

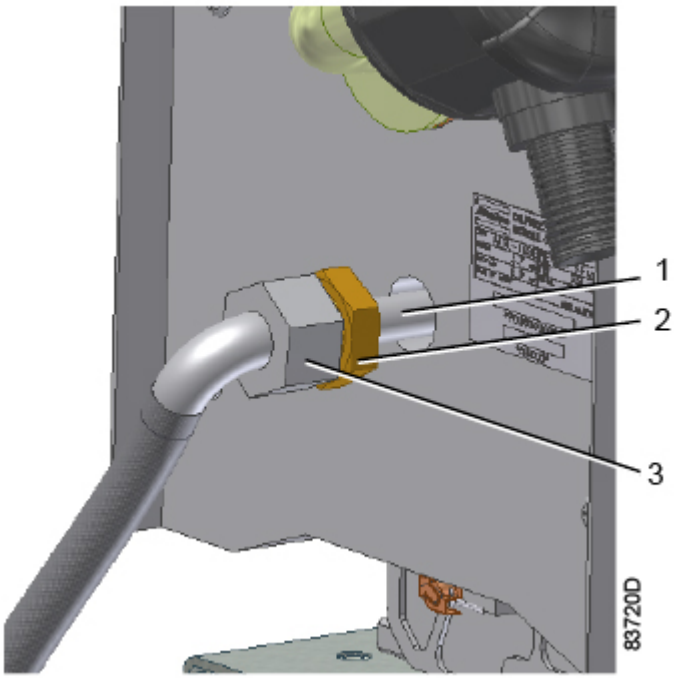
The outlet pipe set contains two parts:

- The plastic insert (3)
- The metal outlet pipe (1)



Replacement procedure

1. Stop the compressor, depressurize and switch off the voltage.
2. Loosen the coupling (3) while immobilizing the nipple (2) with a wrench.



3. Remove the outlet pipe together with the nipple.
4. Fit the nipple to the new outlet pipe and tighten. Use only PTFE tape.
5. Fit the plastic insert in place as indicated on the drawing and assemble the outlet pipe with a maximum torque of 5 Nm (3.7 lbf.ft). No more than one extra turn (360 °) is allowed for positioning of the elbow. Make sure you end up turning clockwise to avoid leaks. Use only PTFE tape.

   Warning: If the outlet pipe is tightened too hard, the thread of the element can get damaged or the insert can break, resulting in overheating of the compressor element! The maximum torque is 40 Nm (29.5 lbf.ft).
6. Fasten the coupling (3) while holding the nipple (2) with a wrench.

Remark:

The outlet pipes of the new version of the 3.7 kW element (used on SF 4^+ from S/N API 744 000 onwards) and of the 5.5 kW element (used on SF 6^+) do not contain an insert. In case of

disassembly, please apply the same assembly procedure as described above. Maximum torque: 15 Nm (11.1 lbf.ft) (hand tight plus maximum 2 revolutions).

7.9 Refrigerant dryer maintenance

Danger: The dryer circuit contains refrigerant. When handling refrigerant, all applicable *Safety precautions during maintenance or repair* must be observed. Specifically be aware of following points:

- Contact of liquid refrigerant with the skin can cause freezing. Wear special gloves. If contacted with the skin, the skin should be rinsed with water. On no account may clothing be removed.
- Fluid refrigerant can also cause freezing of the eyes. Wear safety glasses.
- Avoid inhalation of refrigerant vapors. Check that the working area is adequately ventilated.

Danger: Be aware that internal components of the dryer such as the pipes can reach a temperature of up to 110˚C (230˚F). Therefore, wait until the dryer has cooled down before removing the side panels.

Danger: Before starting any maintenance or repair work, switch off the voltage and close the air outlet valve.

Danger: Local legislation may stipulate that:

1. Work on the refrigerant circuit of the cooling dryer or on any equipment which influences its function must be undertaken by an authorized control body.
2. The installation should be checked once a year by an authorized control body.

General

The following remarks should be kept in mind:

- Keep the dryer clean.
- Brush or blow off the finned surface of condenser regularly.
- Inspect and clean the electronic condensate drain regularly.

1. Functioning of the drain can be checked by pushing the Test button of the drain, consult section *Air dryer*.
2. Cleaning of the drain filter can be done by opening the manual drain valve for a few seconds.

Device settings

The regulating and safety devices are factory adjusted to obtain optimum performance of the dryer. Do not alter the setting of any of the devices.

Warning: Connecting pressure measuring devices in the refrigerant circuit can change the amount of refrigerant in the system. This results in a less optimal working of the dryer.

7.10 Desiccant dryer maintenance

Warning: Under no circumstances should compressed air be allowed to flow through the dryer when the electrical power is switched off. This will result in terminal failure of the desiccant cartridges and regeneration will no longer be possible.

General recommendations and precautions

The desiccant dryer does not need extensive maintenance. Nevertheless, before carrying out any maintenance or corrective activity, read the following recommendations and safety precautions and act accordingly:

- Switch off all electrical power.
- Depressurize the compressor.

  Let the dryer operate for 15 minutes to fully depressurize.
- Use original spare parts only. Consult the Spare Parts List for part numbers. For preventive maintenance, dedicated service kits are available.
- Check for correct operation after maintenance.

See section *Preventive Maintenance schedule* for scheduled activities to be performed.

8 Problem solving

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*.

Compressor

Condition	Fault	Remedy
The compressor does not start.	Pressure too high.	Compressor will start again when the pressure drops to the starting pressure.
	Loose connection.	Check all electrical connections.
Safety valve blows.	Pressure too high.	Check settings and correct.
	Safety valve opens too soon.	Replace valve.
Compressor capacity or pressure below normal.	Air consumption exceeds capacity of compressor.	Check equipment connected.
	Choked air inlet filter.	Remove and check filter. Replace if necessary.
	Safety valve leaking.	Replace valve.
	Compressor element out of order.	Consult your supplier.
Compressor module overheating or compressor shutdown on high air temperature.	Insufficient compressor cooling.	Improve ventilation of compressor room. Clean compressor element fins and fan.
	Cooling fan out of order.	Check and correct.
Condensate trap continuously discharging air and water.	Automatic drain out of order.	Have the drain checked. Replace as necessary.

Refrigerant dryer

For Full-Feature units also:

Condition	Fault	Remedy
Dew point too high.	Air inlet temperature too high.	Check and correct; see section *Reference conditions and limitations*.
	Fuses blown.	Check fuses and remedy the cause.
	Shortage of refrigerant.	Have circuit repaired or recharged.
	Refrigerant compressor does not run.	See below.
	Evaporator pressure is too high.	See below.
	Condenser pressure is too high.	See below.
Condenser pressure too high or too low.	Fan control switch out of order.	Have switch replaced.
	Condenser fan motor out of order.	Have fan motor inspected.
	Ambient temperature too high.	Improve ventilation of compressor room, see section *Installation proposal*.
	Condenser externally clogged.	Clean condenser.
Motor of refrigerant compressor stops or does not start.	The internal thermal protection of the motor has tripped.	Compressor will restart when the motor windings have cooled down.
	Electric power supply to refrigerant compressor interrupted.	Check and correct as necessary.
Evaporator pressure is too high or too low.	Condenser pressure too high or too low.	See above.
	Shortage of refrigerant.	Have circuit repaired or recharged.
	Hot gas bypass valve incorrectly set or out of order.	Have the valve adjusted or replaced.
Condensate trap continuously discharging air and water.	Automatic drain out of order.	Have the drain checked. Replace as necessary.
Timer drain inoperative.	Drain system clogged.	Clean the filter of the automatic drain by opening the manual drain valve.

Desiccant dryer

For compressors with a desiccant dryer:

Condition	Fault	Remedy
High dew point.	The dryer has not had the time to regenerate completely.	Close the valve installed between the dryer and the application (if permitted) and have the desiccant regenerated.
	Liquid water at dryer inlet.	Check PD filter and the drains. Fit an extra water separator if required.
	Excessive flow.	Check actual flow against maximum specified.
	Low inlet pressure.	Check pressure against specification, and use inlet flow correction factors where required.
	High inlet temperature.	Check temperature against specification, and use inlet flow correction factors where required.
	Silencer blocked or damaged.	Replace silencer.
	Air leaks.	Tighten joints or fit new seals.
	Dirty purge plug.	Clean purge plug.
	Wrong size purge plug.	Contact your supplier.
	Shuttle valve stuck in one position.	Check if the exhaust valves closes off: no air must leave the silencer of the tower that is drying. If air escapes from the silencer, check the connections for air leaks. If no solution: check the membranes.
The dryer produces a lot of noise.	Check the silencer and its fixation to the unit.	Replace the silencer or correct its fixation.
Insufficient air leaves the dryer.	Too much purge air escapes.	Check the condition of the solenoid valve and replace if necessary. Check the fitting of the solenoid valve and tube to the bonnet for air leaks. Check if the correct purge nozzle is installed.
Excessive purge air flow.	Shuttle valve stuck in one position.	Check if the exhaust valves closes off: no air must leave the silencer of the tower that is drying. If air escapes from the silencer, check the connections for air leaks.
	Membrane damaged.	Check the membrane of the tower that is having the high purge air flow.
	Shuttle O-ring damaged.	If the shuttle does not seal, there will be a leak path between inlet air and exhaust. Open the valve block and inspect the shuttle O-ring. Replace O-ring if needed.

Condition	Fault	Remedy
Inlet pressure drops every cycle.	Shuttle O-ring damaged.	If the shuttle does not seal, there will be a leak path between inlet air and exhaust. Open the valve block and inspect the shuttle O-ring. Replace O-ring if needed.
Low outlet pressure.	Blocked filter.	Check/replace filter elements.
	Blocked filter desiccant cartridge.	Check/replace desiccant cartridge.
	Excessive purge air flow.	See excessive purge air flow.
Dryer won't pressurize.	Incorrect start-up.	Keep downstream isolation valve closed. Open upstream valve slowly. Power the dryer once pressurized.
Package won't electrically energize.	Faulty wiring to controller.	Check electrical wiring.
	Wrong supply.	Check the voltage supply.
	Power LED does not illuminate.	Replace controller.

9 Technical data

9.1 Readings on control panel

Note: The data is valid under the reference conditions. See section *Reference conditions and limitations*.

Description

Reference	Description
ER	Touch controller
Gd	Dew point gauge
S3	Emergency stop button

Regularly check the display. Important information can be found here, like the working pressure, starting and stopping pressure, dew point, hour meter and service messages.

If the compressor is equipped with a desiccant dryer, also regularly check the service panel of the dryer for messages.

9.2 Electric cable size

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

The voltage drop must not exceed 5 % of the nominal voltage. It may be necessary to use cables of a larger size than those stated to comply with this requirement.

Cable size

		SF 2+	SF 4+	SF 6+
Frequency	**Voltage**	**Cable size**		
IEC				
50 Hz	200 V 3~	-	6 mm^2	6 mm^2
50 Hz	230 V 1~	6 mm^2	-	-
50 Hz	230 V 3~	4 mm^2	6 mm^2	6 mm^2
50 Hz	400 V 3~	1.5 mm^2	1.5 mm^2	2.5 mm^2
50 Hz	400 V 3~ +N	1.5 mm^2	1.5 mm^2	2.5 mm^2

		SF 2+	SF 4+	SF 6+
Frequency	**Voltage**	**Cable size**		
60 Hz	380 V 3~	1.5 mm^2	1.5 mm^2	2.5 mm^2
UL/CUL				
60 Hz	200 V 3~	AWG 12	AWG 10	AWG 8
60 Hz	230 V 1~	-	-	-
60 Hz	230 V 3~	AWG 12	AWG 10	AWG 8
60 Hz	460 V 3~	AWG 12	AWG 10	AWG 8
60 Hz	575 V 3~	AWG 14	AWG 14	AWG 14

Table 2:

9.3 Settings for overload relay and fuses

Danger: The indicated fuse value is the maximum value for the short circuit protection of the starter. The cable size used may specify fuses of a lower value.

Fuse specifications IEC: gL/gG

Fuse specifications CSA: HRC Form II - UL: Class 5

Settings

		SF 2+	SF 2+
Frequency	**Voltage**	**Overload relay**	**Maximum fuse**
IEC			
50 Hz	230 V 1~	16.4 A	20 A
50 Hz	230 V 3~	9.7 A	10/16 A*
50 Hz	400 V 3~	5.6 A	10 A
50 Hz	400 V + N 3~	5.6 A	10 A
60 Hz	380 V 3~	5.6 A	10 A
50/60 Hz	200 V 3~	10.1 A	16 A
UL/CUL			
60 Hz	200 V 3~	10.1 A	15 A
60 Hz	230 V 1~	16.3 A	20 A
60 Hz	230 V 3~	9.1 A	10/15 A**
60 Hz	460 V 3~	4.6 A	6 A
60 Hz	575 V 3~	3.6 A	6 A

Table 3:

*Maximum fuses according to IEC class gL/gG for Pack and Full-Feature units, respectively.

**Maximum fuses according to HRCII-C and according to Class CC for Pack and Full-Feature units, respectively.

		SF 4+	SF 4+	SF 6+	SF 6+
Frequency	**Voltage**	**Overload relay**	**Maximum fuse**	**Overload relay**	**Maximum fuse**
IEC					
50 Hz	200 V 3~	17.3 A	20 A	25.7 A	25 A
50 Hz	230 V 3~	15.7 A	20 A	23.3 A	20 A
50 Hz	400 V 3~	9.1 A	10/16 A*	13.4 A	16 A
50 Hz	400 V + N 3~	9.1 A	10/16 A*	13.4 A	16 A
60 Hz	380 V 3~	9.1 A	10 A	13.3 A	16 A
UL/CUL					
60 Hz	200 V 3~	17.3 A	20 A	25.2 A	30 A
60 Hz	208 V	--	--	25 A	25/30 A**
60 Hz	230 V 3~	15.9 A	20 A	24 A	25/30 A**
60 Hz	460 V 3~	8 A	10 A	12 A	15 A
60 Hz	575 V 3~	6.2 A	10 A	9.6 A	10 A

Table 4:

*Maximum fuses according to IEC class gL/gG for Pack and Full-Feature units, respectively.

**Maximum fuses according to HRCII-C and according to Class CC for Pack and Full-Feature units, respectively.

9.4 Temperature protection and safety valve settings

Temperature sensor settings (TSHH)

Compressor element outlet temperature	Shutdown temperature
SF 2+ (8 bar / 116 psi)	165 °C (329 °F)
SF 2+ (10 bar / 145 psi)	170 °C (338 °F)
SF 4+ (8 bar / 116 psi)	195 °C (383 °F)
SF 4+ (10 bar / 145 psi)	200 °C (392 °F)
SF 6+ (8 bar / 116 psi)	200 °C (392 °F)
SF 6+ (10 bar / 145 psi)	200 °C (392 °F)

Safety valve (SV)

Pressure version	Set pressure	Unit
8 bar compressors	8.8	bar(e)
116 psi compressors	135	psi(g)
10 bar compressors	11	bar(e)
145 psi compressors	160	psi(g)

9.5 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	ºC	20
Air inlet temperature	ºF	68
Relative humidity	%	0
Working pressure		See section *Compressor data*

Limitations

Characteristic	Unit	Data
Maximum working pressure		See section *Compressor data*
Maximum inlet temperature	ºC	40
Maximum inlet temperature	ºF	104
Minimum ambient temperature	ºC	0
Minimum ambient temperature	ºF	32

9.6 Compressor data

Note: The data is valid under the reference conditions. See section *Reference conditions and limitations*.

Compressor type		SF 2+	
Maximum working pressure (Pack)	bar(e)	8	10
Maximum working pressure (Pack)	psi(g)	116	145
Maximum working pressure (Full-Feature)	bar(e)	7.75	9.75
Maximum working pressure (Full-Feature)	psi(g)	112	141
Reference working pressure	bar(e)	7	10
Reference working pressure	psi(g)	100	145
Air temperature at outlet valve (Pack)	°C	25	25
Air temperature at outlet valve (Pack)	°F	77	77
Air temperature at outlet valve (Full-Feature)	°C	20	20
Air temperature at outlet valve (Full-Feature)	°F	68	68
Motor shaft speed (50 Hz)	rpm	2885	2885
Motor shaft speed (60 Hz)	rpm	3520	3520
Nominal motor power	kW	2.2	2.2

Compressor type		SF 2+	
Nominal motor power	hp	3	3
Sound pressure level	dB(A)	56	56
Refrigerant type (Full-Feature)		R513a	R513a
Dew point (Full-Feature)	°C	4	4
Dew point (Full-Feature)	°F	39	39

Compressor type		SF 4+	
Maximum working pressure (Pack)	bar(e)	8	10
Maximum working pressure (Pack)	psi(g)	116	145
Maximum working pressure (Full-Feature)	bar(e)	7.75	9.75
Maximum working pressure (Full-Feature)	psi(g)	112	141
Reference working pressure	bar(e)	7	10
Reference working pressure	psi(g)	100	145
Air temperature at outlet valve (Pack)	°C	32	32
Air temperature at outlet valve (Pack)	°F	90	90
Air temperature at outlet valve (Full-Feature)	°C	21	21
Air temperature at outlet valve (Full-Feature)	°F	70	70
Motor shaft speed (50 Hz)	rpm	2900	2900
Motor shaft speed (60 Hz)	rpm	3510	3510
Nominal motor power	kW	3.7	3.7
Nominal motor power	hp	5	5
Sound pressure level	dB(A)	58	58
Refrigerant type (Full-Feature)		R513a	R513a
Dew point (Full-Feature)	°C	3	3
Dew point (Full-Feature)	°F	37	37

Compressor type		SF 6+	
Maximum working pressure (Pack)	bar(e)	8	10
Maximum working pressure (Pack)	psi(g)	116	145
Maximum working pressure (Full-Feature)	bar(e)	7.75	9.75
Maximum working pressure (Full-Feature)	psi(g)	112	141
Reference working pressure	bar(e)	7	10

Compressor type		**SF 6+**	
Reference working pressure	psi(g)	100	145
Air temperature at outlet valve (Pack)	°C	35	35
Air temperature at outlet valve (Pack)	°F	95	95
Air temperature at outlet valve (Full-Feature)	°C	22	22
Air temperature at outlet valve (Full-Feature)	°F	72	72
Motor shaft speed (50 Hz)	rpm	2905	2905
Motor shaft speed (60 Hz)	rpm	3515	3515
Nominal motor power	kW	5.5	5.5
Nominal motor power	hp	7.5	7.5
Sound pressure level	dB(A)	59	59
Refrigerant type (Full-Feature)		R513a	R513a
Dew point (Full-Feature)	°C	3	3
Dew point (Full-Feature)	°F	37	37

10 Instructions for use

Oil separator vessel

1. The vessel can contain pressurized air. This can be potentially dangerous if the equipment is misused.
2. 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.
3. No alterations must be made to this vessel by welding, drilling or other mechanical methods without the written permission of the manufacturer.
4. The pressure and temperature of this vessel must be clearly indicated.
5. 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.
6. Use only oil as specified by the manufacturer.
7. In case of misuse of the units (frequent operation with an oil temperature that is too low or a long interval of shut down), a certain amount of condensate can gather in the oil separator vessel which must be properly drained. To do so, disconnect the unit from the power line, wait till it is cooled down and depressurized and drain the water by the oil drain valve, positioned at the bottom side of the oil separator vessel.

   Local legislation may require an periodic inspection.

Air receiver (on tank-mounted units)

1. **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.
2. **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).
3. 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.
4. 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.
5. Use the vessel within the pressure and temperature limits stated on the nameplate and the testing report.
6. 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.

12 Pressure equipment directives

Components subject to 2014/68/EU Pressure Equipment Directive

Components subject to 2014/68/EU Pressure Equipment Directive greater than or equal to category II.

Pressure version	Part number	Description	PED Class
8 bar	0830 1008 54	Safety valve	IV
116 psi	0830 1008 49	Safety valve	IV
10 bar	0830 1007 68	Safety valve	IV
145 psi	0830 1008 35	Safety valve	IV

Overall rating

The compressors conform to PED smaller than category I.

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		

8435DD

Figure 13: Typical example of a Declaration of Conformity document

(1) Contact address:
Atlas Copco Airpower n.v.
P.O. Box 100
B-2610 Wilrijk (Antwerp)
Belgium

(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.

Atlas Copco

atlascopco.com