



Instruction book

Oil-injected screw compressors

GA 37, GA 45

**PORTLAND
COMPRESSOR**
Experience You Can Depend On
800-542-8300

Atlas Copco

Oil-injected screw compressors

GA 37, GA 45

Instruction book

Original instructions

WARNING



Read all safety warnings, instructions, illustrations and specifications provided with this product. Failure to follow all instructions listed in this instruction book may result in personal injury, death and/or property damage.

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1 Safety precautions

1.1 Safety icons

Explanation

	Danger to life
	Warning
	Important note

1.2 General safety precautions

1. The operator must employ safe working practices and observe all related work safety requirements and regulations.
2. If any of the following statements does not comply with the applicable legislation, the stricter of the two shall apply.
3. 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.
4. 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.
5. Before any maintenance, repair work, adjustment or any other non-routine checks:
 - Stop the machine
 - Press the emergency stop button
 - Switch off the voltage
 - Depressurize the machine
 - Lock Out - Tag Out (LOTO):
 - Open the power isolating switch and lock it with a personal lock
 - Tag the power isolating switch with the name of the service technician.
 - On units powered by a frequency converter, wait 10 minutes before starting any electrical repair.
 - Never rely on indicator lamps or electrical door locks before maintenance work, always disconnect and check with measuring device.

	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!
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6. 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.
7. The owner is responsible for maintaining the unit in safe operating condition. Parts and accessories shall be replaced if unsuitable for safe operation.
8. It is prohibited to walk or stand on the unit or on its components.
9. 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.
10. The service switch should only be operated by a trained service specialist from the manufacturer.

1.3 Safety precautions during installation



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.

Precautions during installation

1. 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.
2. The unit is designed for indoor use. If the unit is installed outdoors, special precautions must be taken. Consult your supplier.
3. In case the device is a compressor, 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.
4. Any blanking flanges, plugs, caps and desiccant bags must be removed before connecting the pipes.
5. 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.
6. In case the device is a compressor, the aspirated air must be free of flammable fumes, vapors and particles, e.g. paint solvents, that can lead to internal fire or explosion.
7. In case the device is a compressor, arrange the air intake so that loose clothing worn by people cannot be drawn in.
8. Ensure that the discharge pipe from the compressor to the aftercooler or air net is free to expand under heat and that it is not in contact with or close to flammable materials.
9. No external force may be exerted on the air outlet valve; the connected pipe must be free of strain.
10. 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.

11. 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.
12. 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.
13. 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.
14. 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.
15. 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.
16. 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.
17. 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.
18. If the ground is not level or can be subject to variable inclination, consult the manufacturer.
19. If the device is a dryer and no free extinguishing system is present in the air net close to the dryer, safety valves must be installed in the vessels of the dryer.



Also consult the following safety precautions: [Safety precautions during operation](#) and [Safety precautions during maintenance](#).

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



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.

Precautions during operation

1. Never touch any piping or components of the machine during operation.

2. 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.
3. 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.
4. Never operate the machine when there is a possibility of taking in flammable or toxic fumes, vapors or particles.
5. Never operate the machine below or in excess of its limit ratings.
6. 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 protectors when opening a door.

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

7. People staying in environments or rooms where the sound pressure level reaches or exceeds 80 dB(A) shall wear ear protectors.
8. 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
 - Air cooling filters of the electrical cabinet are not clogged
9. 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.
10. 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.
11. Do not remove any of, or tamper with, the sound-damping material.
12. 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.
13. 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.
14. It is not allowed to directly use the hot water from the compressor cooling water circuit as process water in pollution-sensitive applications such as the food and pharmaceutical industry.



Also consult following safety precautions: [Safety precautions during installation](#) and [Safety precautions during maintenance](#).

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



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.

Precautions during maintenance or repair

1. Always use the correct safety equipment (such as safety glasses, gloves, safety shoes, etc.).
2. Use only the correct tools for maintenance and repair work.
3. 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.
4. All maintenance work shall only be undertaken when the machine has cooled down.
5. A warning sign bearing a legend such as "Work in progress; do not start" shall be attached to the starting equipment.
6. 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.
7. Close the compressor air outlet valve and depressurize the compressor before connecting or disconnecting a pipe.
8. Before removing any pressurized component, effectively isolate the machine from all sources of pressure and relieve the entire system of pressure.
9. Never use flammable solvents or carbon tetrachloride for cleaning parts. Take safety precautions against toxic vapors of cleaning liquids.
10. Scrupulously observe cleanliness during maintenance and repair. Keep dirt away by covering the parts and exposed openings with a clean cloth, paper or tape.
11. 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.
12. 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.
13. Never use a light source with open flame for inspecting the interior of a machine, pressure vessel, etc.
14. Make sure that no tools, loose parts or rags are left in or on the machine.
15. 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.
16. 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.
17. 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.
18. Protect the motor, air filter, electrical and regulating components, etc. to prevent moisture from entering them, e.g. when steam cleaning.

19. 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.
20. Never use caustic solvents which can damage materials of the air net, e.g. polycarbonate bowls.
21. **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.



Also consult following safety precautions: [Safety precautions during installation](#) and [Safety precautions during operation](#).

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1.6 Dismantling and disposal

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 (for example, LOTO, cool-down, depressurize and discharge).
3. Separate the harmful from the safe components (for example, drain oil from oil containing parts).
4. Refer to the disposal topic mentioned 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 wheeled 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 (for example, filter bags, filter media, desiccant, lubricants, cleaning rags and machine parts) must be disposed of in an environmentally friendly and safe manner, and in line with the local recommendations and environmental legislation.

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2 General description

2.1 Introduction

GA 37 and GA 45 are single-stage, oil-injected screw compressors, driven by an electric motor. The compressors are air cooled or water cooled.

The compressors are controlled by an Elektronikon™ Touch controller.

The controller is fitted to the right hand door panel on the front side. An electric cabinet comprising the motor starter is located behind this panel.

The compressors are enclosed in a sound-insulated bodywork.

There are 2 versions of the compressor: Workplace Pack (without integrated dryer) and Workplace Full-Feature (with integrated dryer).

The dryer removes water from the compressed air by cooling the air to near freezing point.



Figure 1: Front view

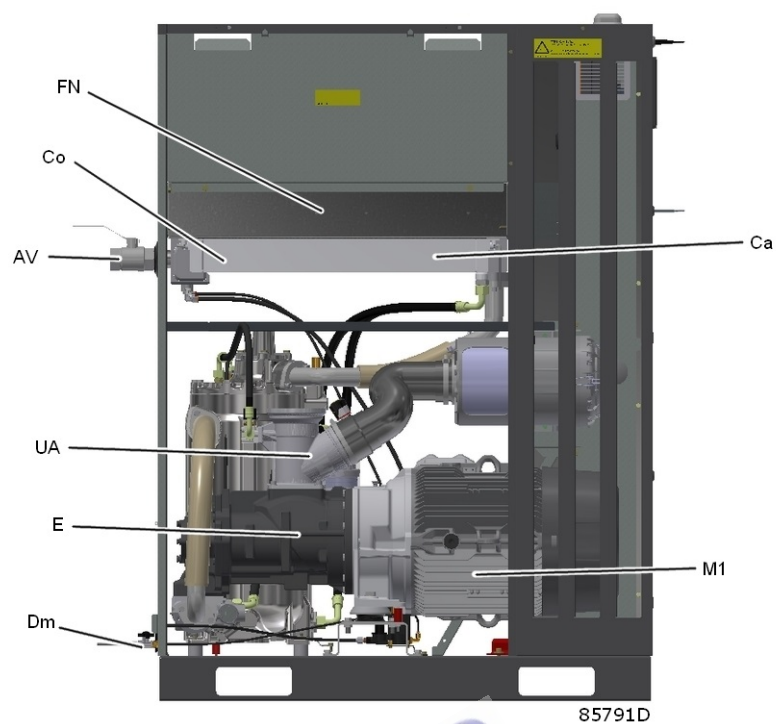


Figure 2: Motor side view, Pack

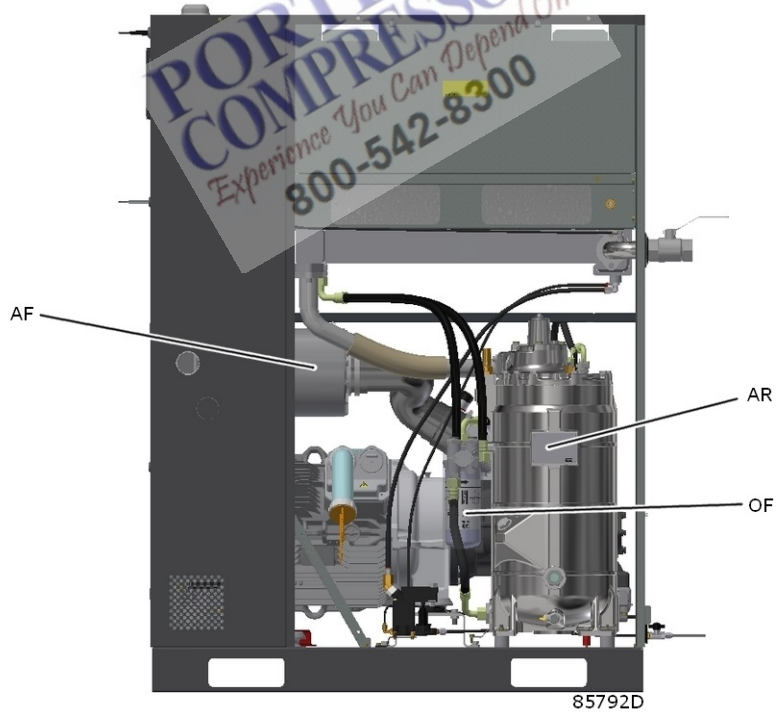


Figure 3: Service side view, Pack

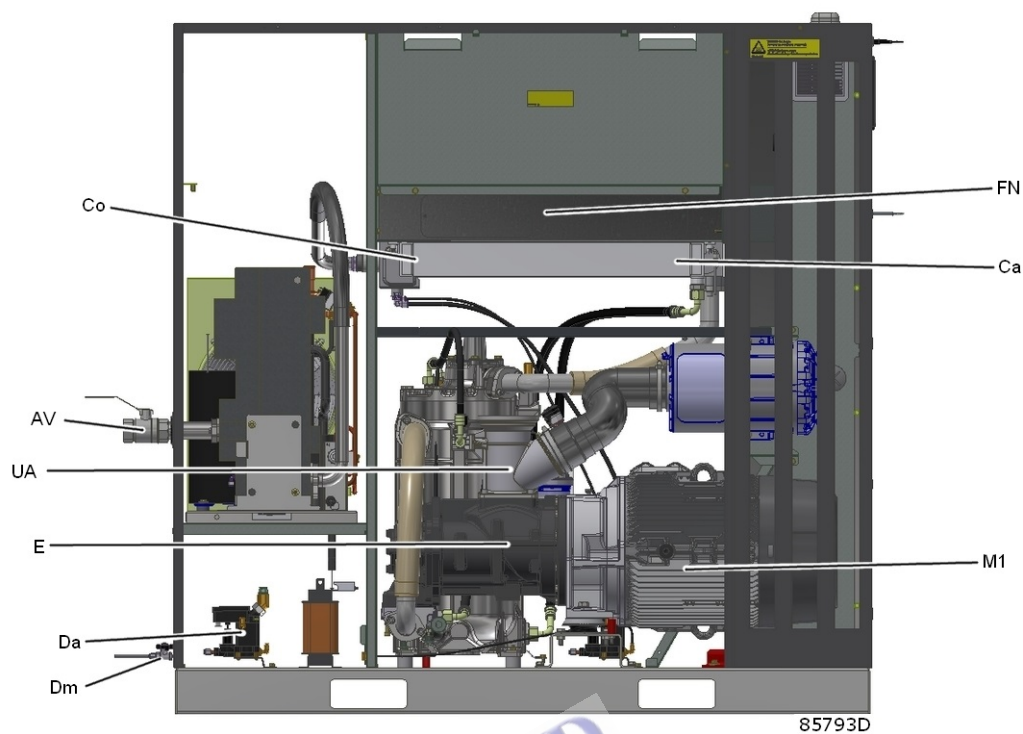


Figure 4: Motor side view, Full-Feature

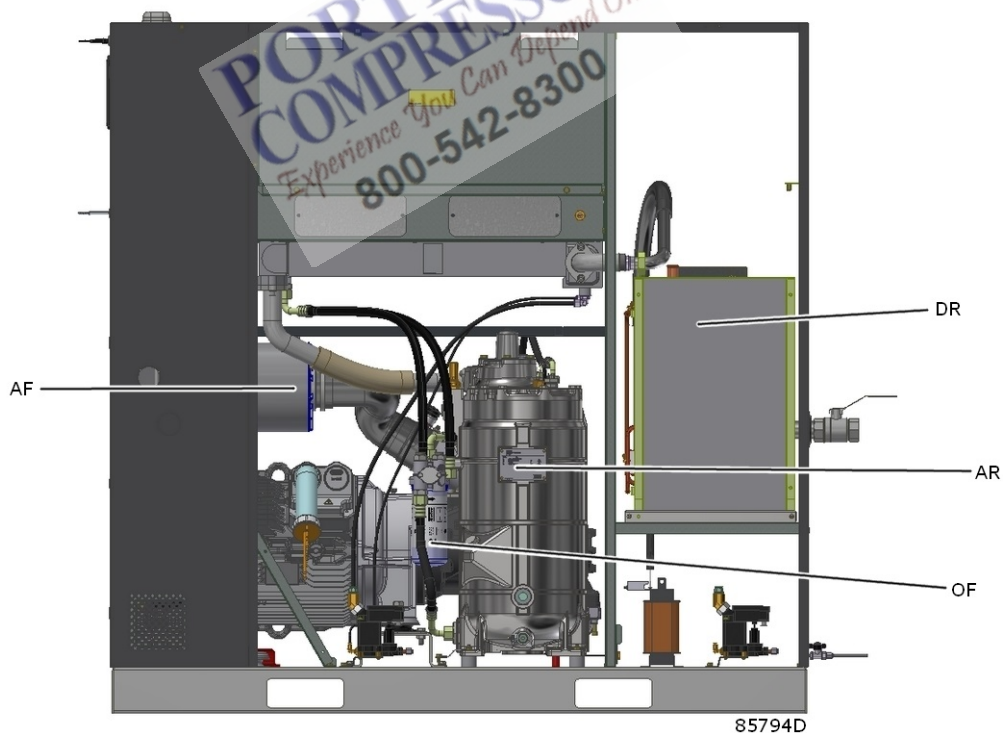


Figure 5: Service side view, Full-Feature

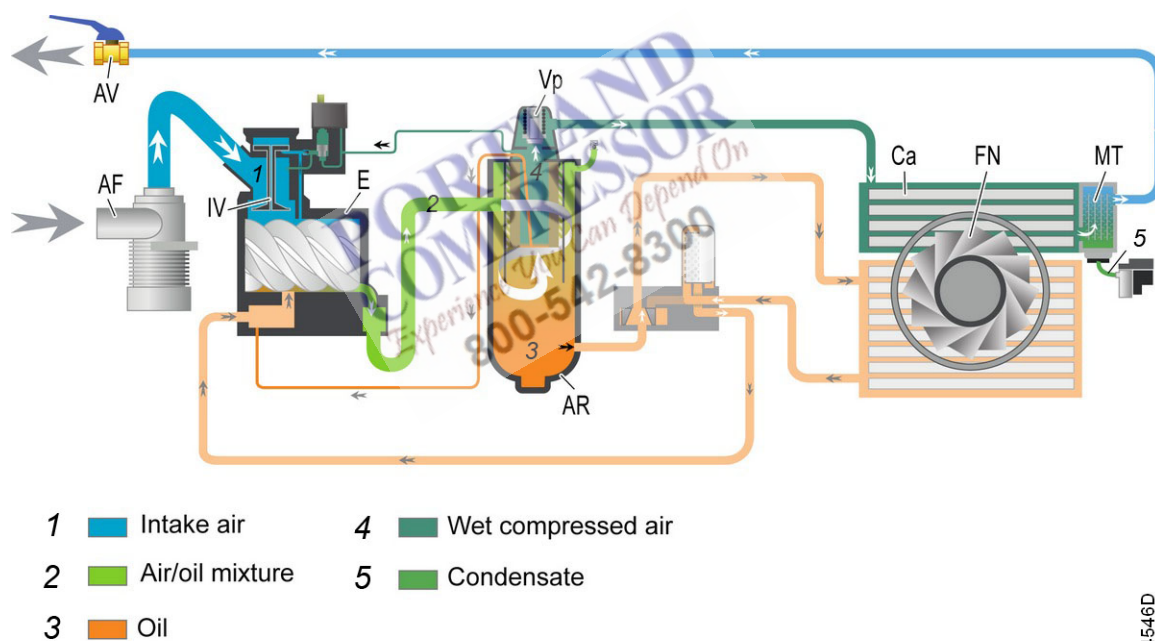
1	Electric cabinet
AV	Outlet valve
Ca	Air cooler

Co	Oil cooler
E	Compressor element
ER	Controller
FN	Cooling fan
M1	Motor of the compressor
S3	Emergency stop button
UA	Unloader
Da (Dm)	Condensate outlets
AF	Air filter
AR	Air receiver (oil separator tank)
OF	Oil filter
DR	Dryer (only on units with integrated dryer)

Table 1: References

2.2 Air and oil circuit

Air circuit

**Figure 6: Flow diagram, air circuit (compressors without integrated dryer)**

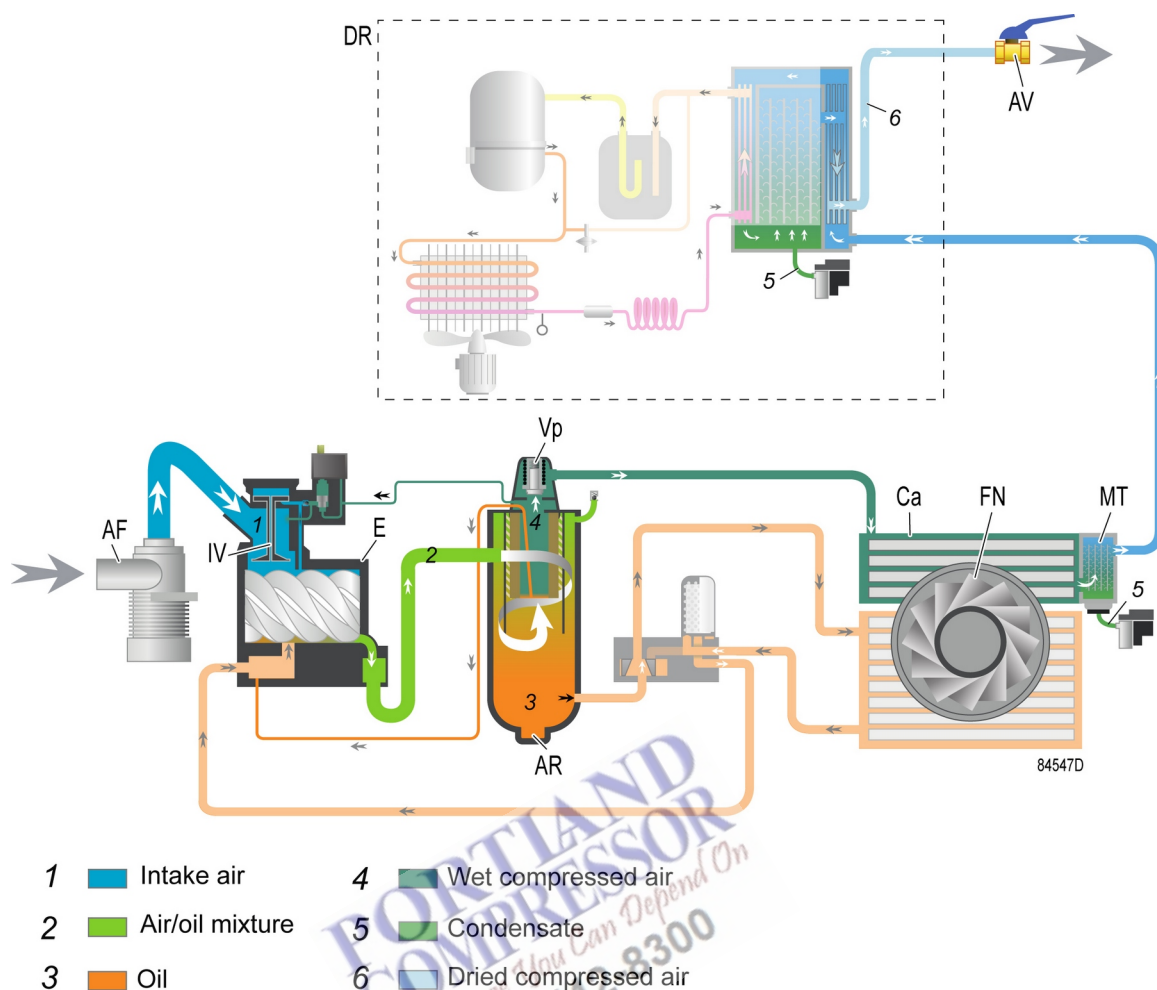


Figure 7: Flow diagram, air circuit (compressors with integrated dryer)

Reference	Description
1	Intake air
2	Air/oil mixture
3	Oil
4	Wet compressed air
5	Condensate
6	Dried compressed air

Description

Air drawn through inlet filter (AF) and open inlet valve (IV) of the unloader is compressed in compressor element (E). A mixture of compressed air and oil flows into the air receiver/oil separator tank (AR). The air is discharged through outlet valve (AV) via minimum pressure valve (Vp) and air cooler (Ca).

The air cooler is provided with a moisture trap (MT).

On compressors with integrated dryer, the air flows through air dryer (DR) before it is discharged through outlet valve (AV). Also see section [Air dryer](#).

Under all circumstances, the minimum pressure valve (Vp) keeps the pressure in the separator tank (AR) above the minimum value that is required for lubrication of the compressor element. An

integrated check valve prevents the compressed air downstream the minimum pressure valve from being vented to atmosphere during unloaded operation. When the compressor is stopped, inlet valve (IV) closes, preventing compressed air (and oil) to be vented into the air filter.

Oil circuit

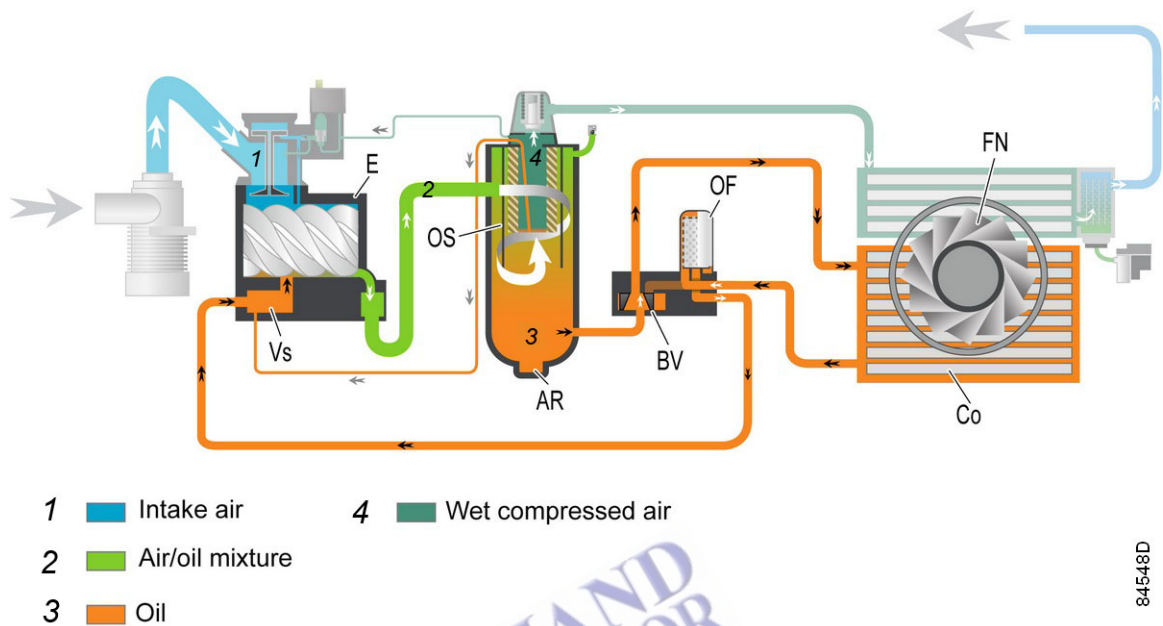


Figure 8: Flow diagram, oil circuit

Reference	Description
1	Intake air
2	Air/oil mixture
3	Oil
4	Wet compressed air

Description

Air pressure in the separator tank forces the oil via oil filter (OF) to compressor element (E), where it acts as sealant, coolant, lubricant and corrosion inhibitive (during stand still periods).

In air receiver/oil separator tank (AR), most of the oil is separated from the air/oil mixture by gravity and inertia. The remaining oil is separated by oil separator (OS). The oil collects in the lower part of air receiver/oil separator (AR).

The oil circuit is provided with a thermostatic bypass valve (BV). When the oil temperature is below its setpoint, the oil cooler is bypassed. Bypass valve (BV) starts opening the supply to cooler (Co) when the oil temperature has increased to the setpoint temperature. At approx. 15 °C (27 °F) above the setpoint temperature, all the oil flows through the oil cooler.

A tropical thermostatic valve (available as an option) offers a higher opening temperature, it helps avoiding condensate accumulation in the oil. This option is advised when the compressor operates in high humidity conditions.

2.3 Cooling system

Air-cooled

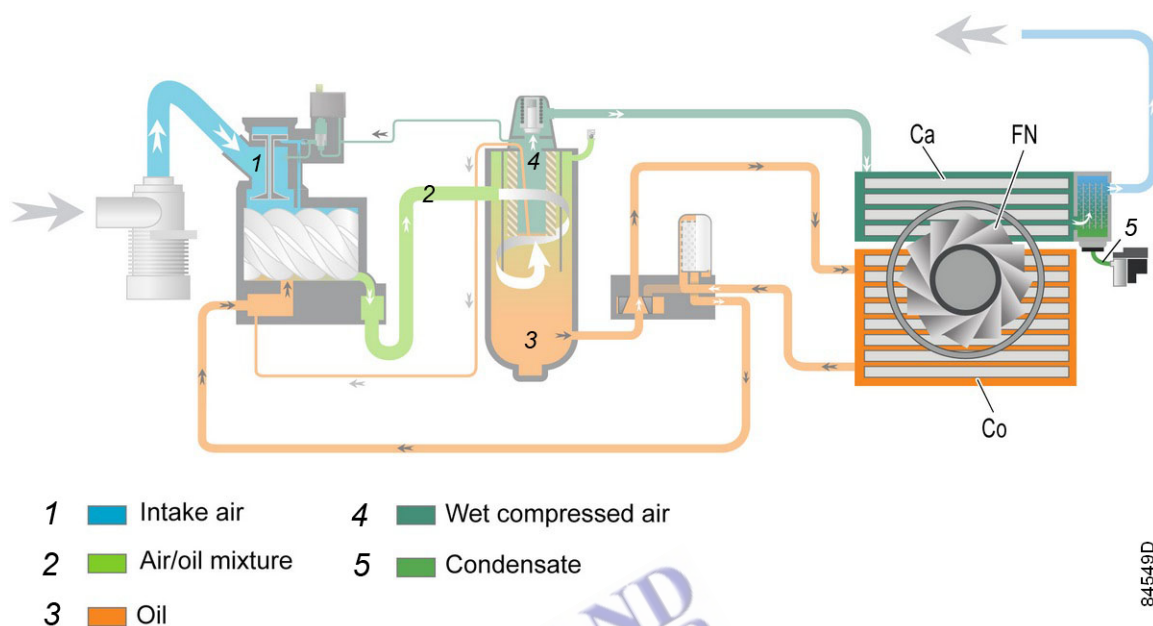


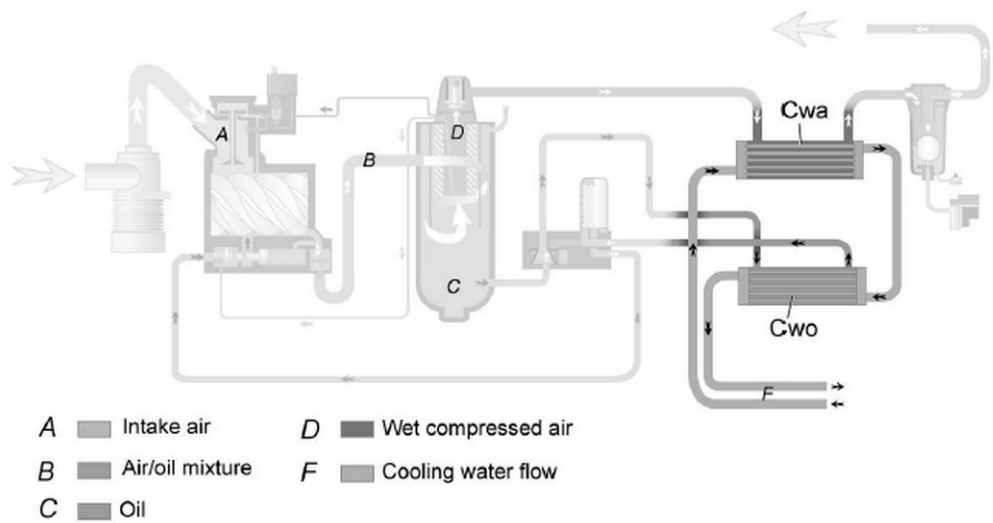
Figure 9: Cooling system, air-cooled compressors

Reference	Description
1	Intake air
2	Air/oil mixture
3	Oil
4	Wet compressed air
5	Condensate

Description

The cooling system on air-cooled compressors comprises air cooler (Ca) and oil cooler (Co). The cooling air flow is generated by fan (FN).

Water-cooled



86164D

Figure 10: Cooling system, water-cooled compressors

Reference	Description
A	Intake air
B	Air/oil mixture
C	Oil
D	Wet compressed air
F	Cooling water flow

Description

The cooling system on water-cooled compressors comprises air cooler (Cwa) and oil cooler (Cwo). They are connected to a cooling water circuit. The water flows through the inlet pipe, the coolers and the outlet pipe.

2.4 Condensate system

The condensate, collected in the moisture trap of the air cooler, is evacuated via an automatic drain. A compressor with integrated dryer has an additional drain on the moisture trap of the dryer. Each drain is connected to its outlet connection (Da) and a manual drain valve (Dm).

Electronic drains

The GA 37 and GA 45 Pack have an electronic water drain (LD drain). On Full-Feature compressors, an additional electronic water drain is provided. The condensate accumulates in the collector of the drain. When the condensate reaches a certain level, it is discharged through the automatic drain outlet (Da). The Test button on top of the drain can be used in three different ways, according the situation:

- When pressed during normal operation, it starts the manual drain test.

- When pressed during an alarm, it resets the control logic
- By pressing the Test button for at least 5 seconds, the self diagnosis routine will start.

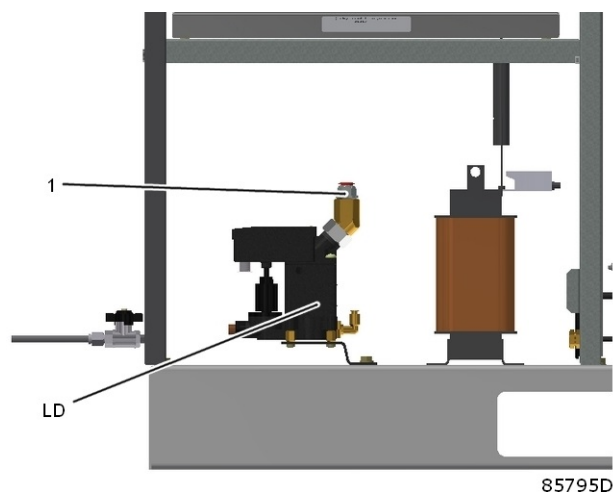


Figure 11: Electronic condensate drains

	Green LED on Normal operation, drain is in standby and awaiting condensate.
	Green LED blinking Normal operation, drain valve is open to drain water.
	Green LED fading on/off Water is not flowing in to the drain's tank. If the floater does not reach the upper level for 3 hours, the solenoid is energized for 2 seconds. This cycle is repeated for 5 times (so up to 15 hours). Afterwards, the green light starts fading on/off. Causes: • No condensate entering the tank. • Float mounted incorrectly (upside down). Checks: • Is any condensate reaching the drain? Does the water separation take place in the heat exchanger? • Is the floater mounted in its correct position, for instance after maintenance? Solution: • Although this LED sign does not indicate any kind of failure, the drain can be reset by pushing the test button (T) for 5 seconds.

 847330	Red LED blinking slowly: cleaning routine 1 The drain's tank is filled and the water cannot be drained or can only be drained very slowly. In normal operation, the drain gets 20 seconds time to drain all water. If the drain is not emptied within this time frame, a (first) cleaning routine is activated, alternatively opening and closing the valve for 2 seconds, during maximum 30 cycles. This routine is started in an attempt to unblock the drain. If this first unlock routine is unsuccessful, a second routine will be started. Causes: • Filter mesh clogged. • Not enough pressure on drain. • Internal problem with the drain. Checks: • Is the filter clean and in good condition? • Is there a minimum pressure of 0.2 bar (2.8 psi) in the drain? Press the test button (T) for at least 5 seconds to reset the drain.
 847340	Red LED blinking fast If cleaning routine 1 is completed (after 30 cycles) but still unsuccessful, cleaning routine 2 is activated. This routine will open (3 sec) and close (60 sec) the drain's valve until a floater is in lower position, so the water is completely drained. Meanwhile, the external alarm signal is activated. Causes: • Filter mesh clogged. • Not enough pressure on drain. • Internal problem with the drain. Checks: • Is the filter clean and in good condition? • Is there a minimum pressure of 0.2 bar (2.8 psi) in the drain? From this point onwards, the drain will remain in this routine, even after restart. Press the test button (T) for at least 5 seconds to reset the drain.
 847350	Red LED on An irreversible error occurred. Replace the drain and keep the failed one for further analysis.

Table 2: LED explanation

Drain connections

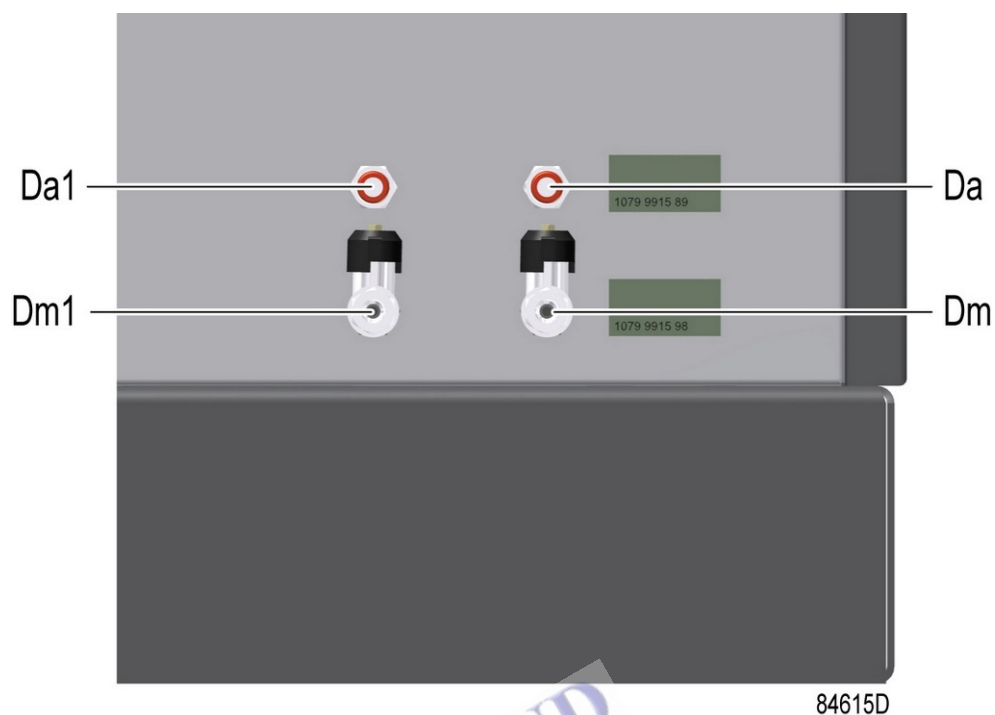


Figure 12: Condensate drain connections

Reference	Designation
Da	Automatic drain connection
Dm	Manual drain valve
Da1	Automatic drain connection of the dryer (only on units with integrated dryer)
Dm1	Manual drain valve of the dryer (only on units with integrated dryer)

2.5 Regulating system

Load/unload regulating system

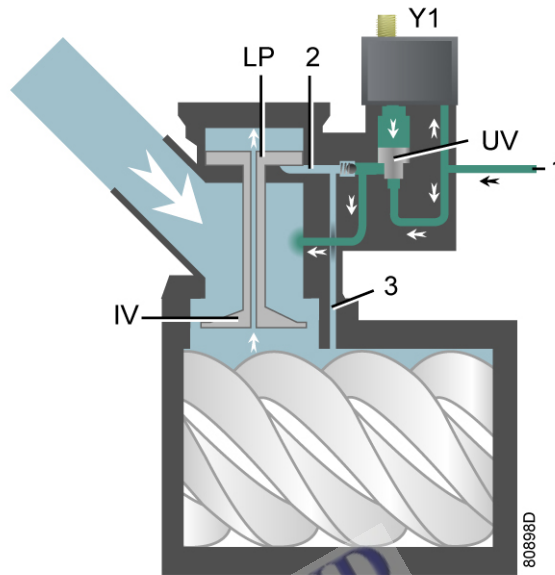


Figure 13: Regulating system (loaded condition)

Loading

When the net pressure is below the loading pressure, solenoid valve (Y1) is energised. Results:

- The space above unloading valve/blow-off valve (UV) is connected with the oil separator tank pressure (1) via the solenoid valve.
- Unloading valve/blow-off valve (UV) moves downwards, closing off the connection to channels (2) and (3).
- Underpressure from the compressor element causes loading plunger (LP) to move downwards and inlet valve (IV) to open fully.

Air delivery is 100%, the compressor runs loaded.

Unloading

If the air consumption is less than the air output of the compressor, the net pressure increases.

When the net pressure reaches the unloading pressure, solenoid valve (Y1) is de-energised.

Results:

- The pressure above unloading valve/blow-off valve (UV) is released to atmosphere and the space above valve (UV) is no longer in connection with the oil separator tank pressure (1).
- Unloading valve/blow-off valve (UV) moves upwards, connecting the oil separator tank pressure (1) with channels (2) and (3).
- The pressure in channel (2) causes the loading plunger (LP) to move upwards, causing inlet valve (IV) to close, while the pressure is gradually released to atmosphere.
- The pressure in the separator tank stabilises at low value. A small amount of air is kept drawn in to guarantee a minimal pressure, required for lubrication during unloaded operation.

Air output is stopped, the compressor runs unloaded.

2.6 Electrical system

Electrical components

The electrical system is comprised of the following components:

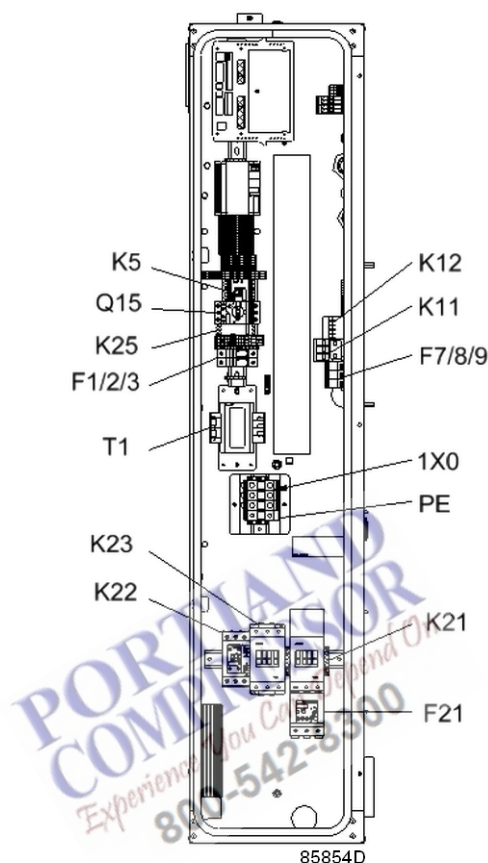


Figure 14: Typical example of electric cubicle

Reference	Designation
F1	Fuse
F2	Fuse
F3	Fuse
F7/8/9	Fuses (only on units with integrated dryer)
F21	Overload relay, compressor motor
Q15	Circuit breaker, fan motor (on air-cooled compressors)
K5	Auxiliary relay
K11	Auxiliary contactor (only on units with integrated dryer)
K12	Auxiliary contactor (only on units with integrated dryer)
K25	Phase sequence relay
K21	Line contactor
K22	Star contactor
K23	Delta contactor
T1	Transformer
PE	Earth terminal
1X0	Customer supply connection

Electrical diagram

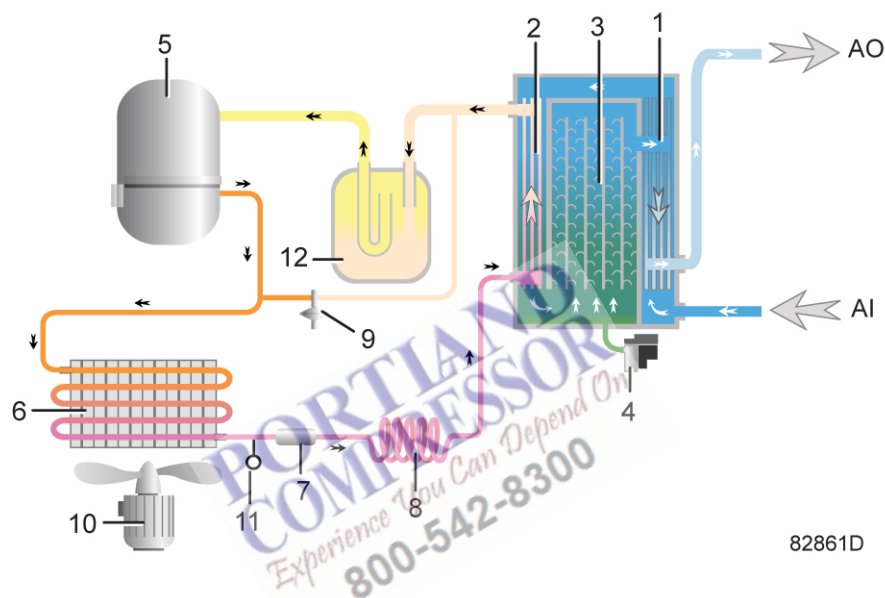
9820 3003 16	Service diagram
--------------	-----------------

The complete electrical diagram can be found in the electric cubicle and in the technical documentation, supplied with the machine.

2.7 Air dryer

(On compressors with integrated dryer only)

Flow diagram



82861D

Figure 15: Air dryer

Reference	Name
AI	Air inlet
AO	Air outlet
1	Air/air heat exchanger
2	Air/refrigerant heat exchanger/evaporator
3	Condensate separator
4	Automatic drain / condensate outlet
5	Refrigerant compressor
6	Refrigerant condenser
7	Liquid refrigerant dryer/filter
8	Capillary
9	Bypass valve
10	Condenser cooling fan
11	Pressure switch, fan control
12	Liquid separator

Compressed air circuit

Compressed air enters 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 heat exchanger/evaporator (2), where the refrigerant evaporates, causing the 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 separator (3) where all the condensate is separated from the air. The condensate is automatically drained through condensate drain (4).

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

Refrigerant circuit

Compressor (5) delivers hot, high-pressure refrigerant gas which flows through condenser (6) where most of the refrigerant condenses.

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

The refrigerant enters evaporator (2) where it withdraws heat from the compressed air by further evaporation at about constant pressure. The heated refrigerant leaves the evaporator and is sucked in by the compressor (5) through a liquid separator (12).

Bypass valve (9) regulates the refrigerant flow. Fan (10) is switched on or off by switch (11) depending on the pressure degree of the condensate.

**PORTLAND
COMPRESSOR**
Experience You Can Depend On
800-542-8300

3 Elektronikon™ Touch controller

3.1 Controller



Figure 16: The 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)

Automatic control of the unit

The controller maintains the net pressure between programmable limits by automatically loading and unloading the unit (fixed speed units) or by adapting the motor speed (units with frequency converter).

A number of programmable settings, e.g. the unloading and loading pressures (for fixed speed units), the setpoint (for units with frequency converter), the minimum stop time, the maximum number of motor starts and several other parameters are taken into account.

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

	It is possible to program a number of time-based commands for automatic start/stop. Take into account that a start command will be executed (if programmed and activated), even after manually stopping the unit.
---	--

Protecting the unit

Shutdown

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

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

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

	Before remedying, consult the <i>Safety precautions</i>. Before resetting a warning or shutdown message, always solve the problem. Frequently resetting these messages without remedying may damage the unit.
---	--

Shutdown warning

A shutdown warning level is a programmable level below the shutdown level.

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

The message disappears as soon as the warning condition disappears.

A warning will also appear if the dew point temperature is too high (on units with integrated dryer).

When the shutdown warning is shown, press stop button to stop the unit and wait until the unit has stopped. Switch off the voltage, inspect the unit and remedy if necessary. The warning message will disappear as soon as the warning condition disappears.

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 contact your supplier to schedule the necessary maintenance actions. See section **Preventive maintenance schedule**.

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.

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

3.2 Control panel



Figure 17: Control panel

Parts and functions

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 and 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 power is switched on.
6	Stop button	Stops the unit.
7	Start button	Starts the unit. The operation sign (4) lights up. The controller is operative.

3.3 Icons used

Menu icons

Menu	Icon	Menu	Icon	Menu	Icon
Data	 85233D	Status	 85239D		
		Inputs	 85240D		

Menu	Icon	Menu	Icon	Menu	Icon
		Outputs	 85241D		
		Counters	 85242D		
		Aux. Equipment Parameters	 85243D		
Service	 85234D	Service		Converters	 85251D
				Overview	 85252D
				Service Plan	 85253D
		Service History			 85254D
		Service functions	 85244D		
		Clean Screen	 85302D		
Week Timer	 85235D			Week	 85303D
				Remaining Running Time	 85304D
Event History	 85236D	Saved Data	 85245D		
Machine Settings	 85237D	Alarms	 85239D		
		Regulation	 85346D		
		Control Parameters	 85347D		
		Aux. Equipment Parameters	 85243D	Converter(s)	 85251D
				Fan	 85255D
				Internal SmartBox	 85256D
Controller Settings	 85238D	Network Settings	 85246D	Ethernet Settings	 85257D
				CAN Settings	 85258D

Menu	Icon	Menu	Icon	Menu	Icon
		Localisation	 85247D	Language	 85259D
				Date/Time	 85260D
				Units	 85261D
		User Password	 85248D		
		Help	 85249D		
		Information	 85250D		

Status icons

Icon	Description
 85262D	Motor Stopped
 85263D	Motor Stopped Wait
 85264D	Running Unloaded
 85265D	Manual Unload
 85266D	Running Unloaded Wait
 85267D	Running Loaded
 85268D	Failed to Load
 85269D	Running Loaded Wait
 85270D	Manual Stop
 85271D	Machine Control Mode, Local
 85272D	Machine Control Mode, Remote
 85273D	Machine Control Mode, LAN

 85274D	Automatic Restart After Voltage Failure
 85275D	Week Timer Active

System icons

Icon	Description
 85276D	Basic User
 85277D	Advanced User
 85278D	Service User
 85279D	Antenna 25%
 85280D	Antenna 50%
 85281D	Antenna 75%
 85282D	Antenna 100%
 85283D	Change between screens (indication)
 85284D	Energy recovery
 85285D	Dryer
 85286D	Element
 85287D	Drain(s)
 4-20mA 85288D	Analogue Output
 85289D	Menu
 85290D	Reset
 85291D	Auto Restart

 85292D	Filter(s)
 85293D	Cooler
 85294D	Valve(s)
 85295D	Power Meter

Input icons

Icon	Description
 85296D	Pressure
 85297D	Temperature
 85298D	Special Protection
 85299D	Open
 85300D	Closed



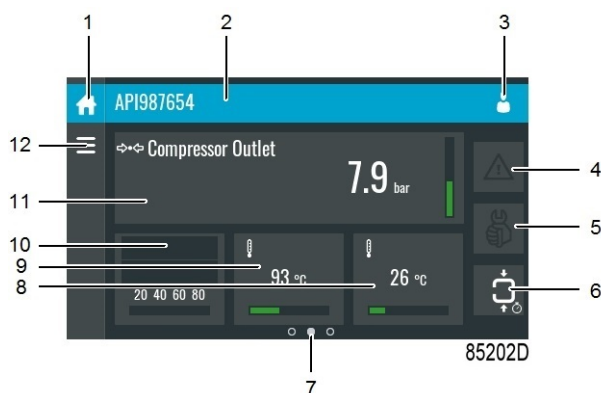
This chapter gives a general survey of available icons. Not all icons mentioned in this chapter are applicable to every machine.

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 history chart, an input or a counter value, depending on the type of the machine.	Tap the field to view the type of measurement. This will be shown in the screen information bar. Examples of inputs: - Ambient temp - Outlet - Dryer dewpoint Examples of counters: - Running hours - Load relay - Loaded hours
12	Menu button	The menu button is always shown and can be tapped to go to the menu.

3.5 Quick access screen

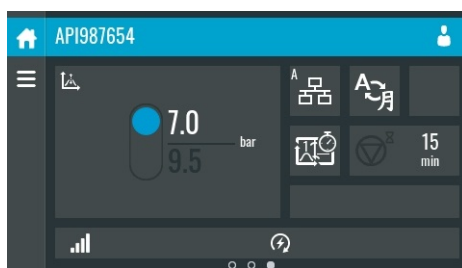
Function

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



85201D

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

Function	Description
Setpoints	Several setpoints can be modified by tapping this icon.
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.
Display language	The display language of the controller can be changed by tapping this icon.
Manual unload (only on fixed speed units)	When tapped, the machine will go in Manual unload mode until the icon is tapped again.
Week timer	Week timers can be set by tapping this icon.
Remaining running time	The Remaining running time can be set and modified by tapping this icon.
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%.
Auto restart	Auto restart can be activated by tapping this icon.

3.6 Menu screen

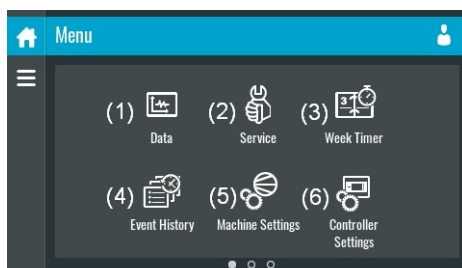
Function

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

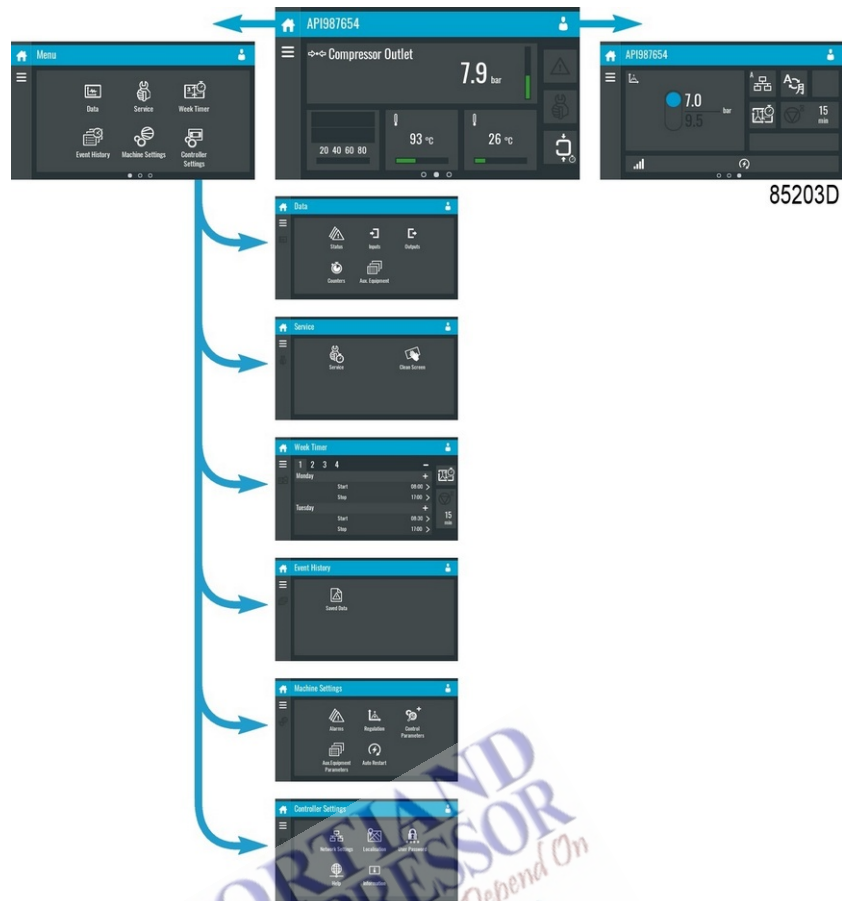


85204D

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 Auto 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.



This is the main menu structure. The structure can be different 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
- Aux. Equipment

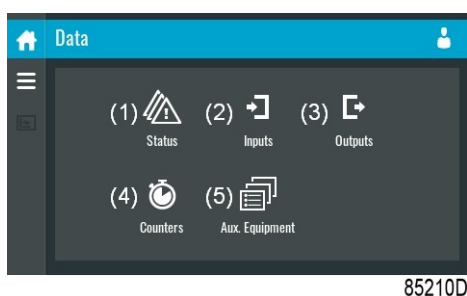
These submenus can be entered by tapping the icons.

Procedure

To enter the Data menu screen:

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

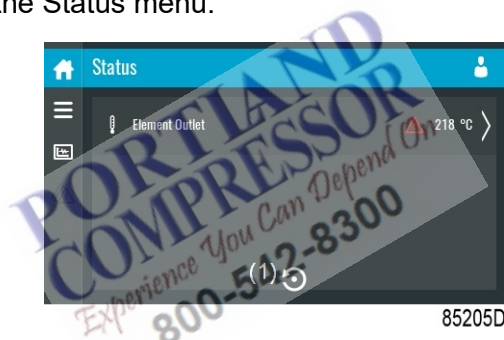
Description



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

Status menu

Tap the Status icon to enter the Status menu.



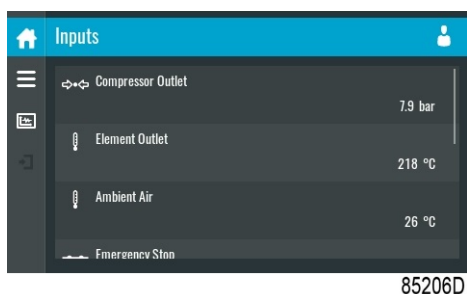
This menu shows the current status of the unit.

If an alarm is active, it can be viewed by tapping the alarm message. To reset an alarm, tap the reset button (1).

	Before remedying, consult the <i>Safety precautions</i>. Before resetting a warning or shutdown message, always solve the problem. Frequently resetting these messages without remedying may damage the unit.
--	---

Inputs menu

Tap the Inputs icon to enter the Inputs menu.



This menu shows information about all the inputs.

Outputs menu

Tap the Outputs icon to enter the Outputs menu.



85207D

This menu shows information about all the outputs.

	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.
	Stop the unit and switch off the supply before connecting external equipment. Check the <i>Safety precautions</i> .

Counters menu

Tap the Counters icon to enter the Counters menu.

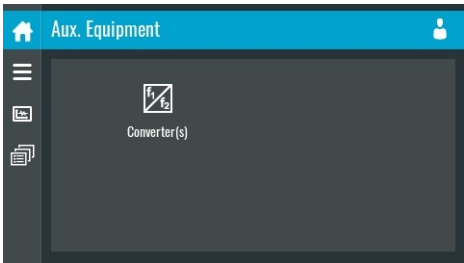


85208D

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

Auxiliary equipment menu

Tap the Aux. Equipment icon to enter the Aux. equipment menu.



85209D

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 (Only visible as advanced user)
- Clean screen

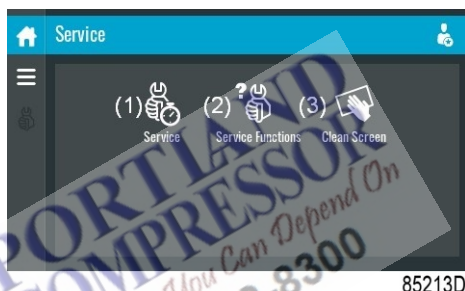
These submenus can be entered by tapping the icons.

Procedure

To enter the Service menu screen:

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

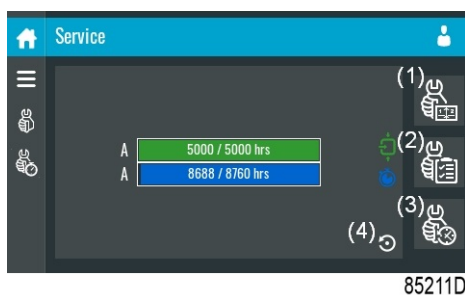
Description



Reference	Designation
(1)	Service
(2)	Service functions (Only visible as advanced user)
(3)	Clean screen

Service menu

Tap the Service icon to enter the Service menu.



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)

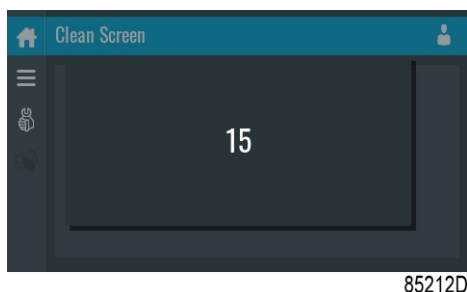
A service overview can be viewed by tapping icon (1).

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

When a service plan interval is reached, a message will appear on the screen.

Clean screen

Tap the Clean Screen icon to start the 15 seconds countdown to perform cleaning of the touchscreen.



The touchscreen 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 week timers with each up to 8 settings per day.

The week timers can be activated through this screen.

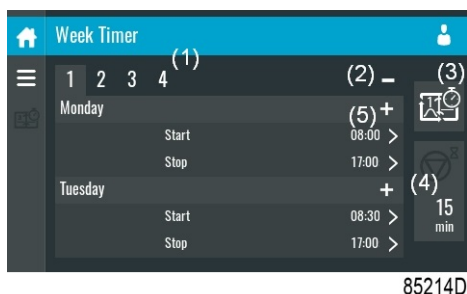
A Remaining Running Time can be set from 5 up to 240 minutes.

Procedure

To enter the Week Timer menu screen:

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

Description



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.

Reference	Designation	Function
(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.

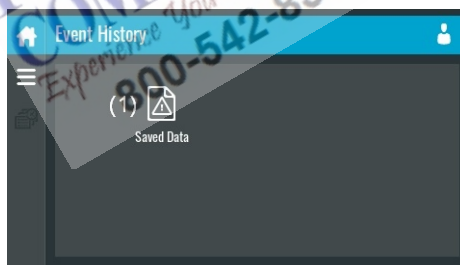
These submenus can be entered by tapping the icons.

Procedure

To enter the Event history menu screen:

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

Description

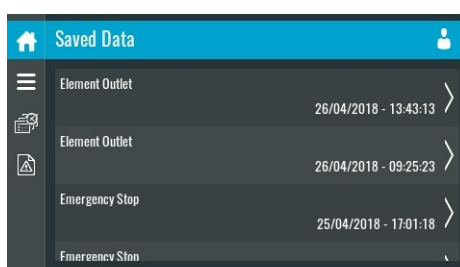


85216D

Reference	Designation
(1)	Saved Data

Saved data

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



85215D

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

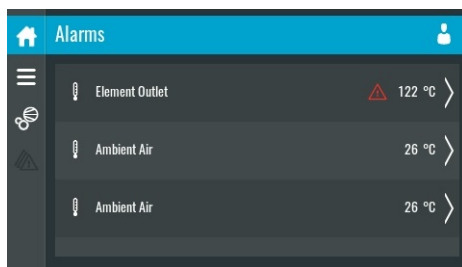


85222D

Reference	Designation
(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.



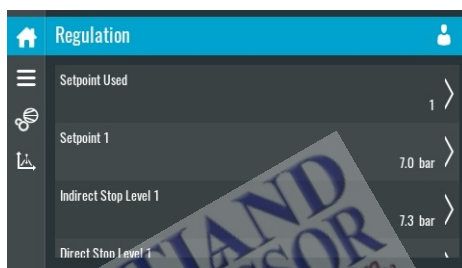
85217D

A list of all alarms is shown.

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

Regulation menu

Tap the Regulation icon to enter the Regulation menu.



85218D

Setpoints or pressure bands can be modified through this menu.

Modify a setting

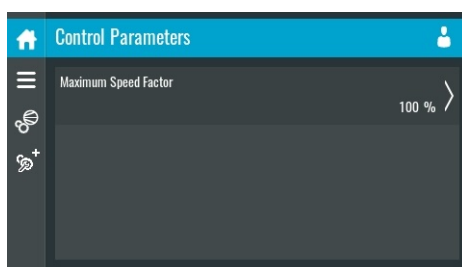
When tapping a list item, a selection screen pops up. The user can modify the setting by tapping '–' or '+' and can confirm by tapping 'V' or decline by tapping 'X'.

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'.

Control parameters menu

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



85219D

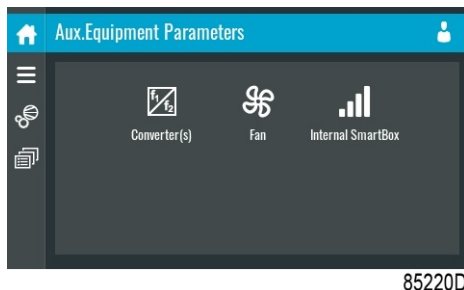
This menu shows information about the Control Parameters.

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 auxiliary equipment parameters menu.



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

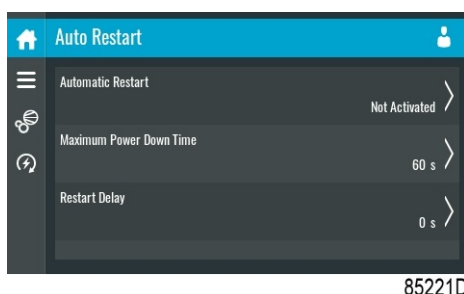
When tapping a list item, a selection screen pops up. The user can modify the setting by tapping '–' or '+' and can confirm by tapping 'V' or decline by tapping 'X'.

Auto restart menu

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

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

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.



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 clicking 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

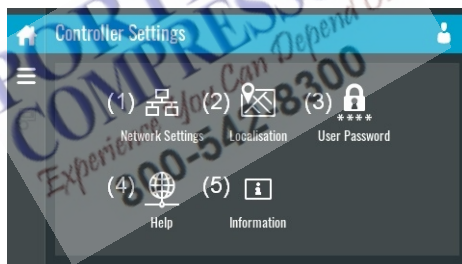
These submenus can be entered by tapping the icons.

Procedure

To enter the Controller Settings menu screen:

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

Description

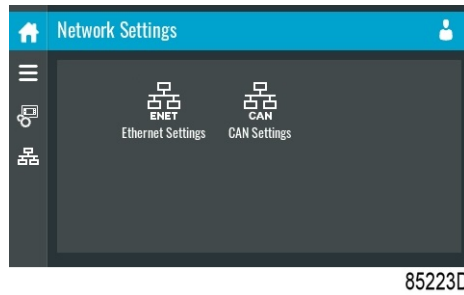


85228D

Reference	Designation
(1)	Network Settings menu
(2)	Localisation menu
(3)	User Password menu
(4)	Help menu
(5)	Information menu

Network settings menu

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



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

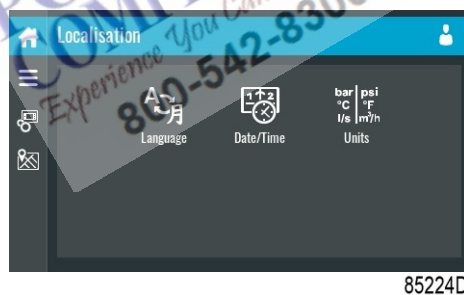
When tapping a list item, a selection screen pops up. The user can modify the setting by tapping '–' or '+' and can confirm by tapping 'V' or decline by tapping 'X'.

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.



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

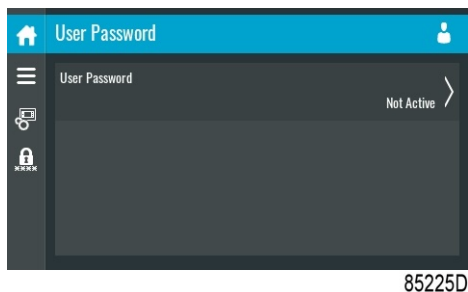
When tapping a list item, a selection screen pops up. The user can modify the setting by tapping '–' or '+' and can confirm by tapping 'V' or decline by tapping 'X'.

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.



85225D

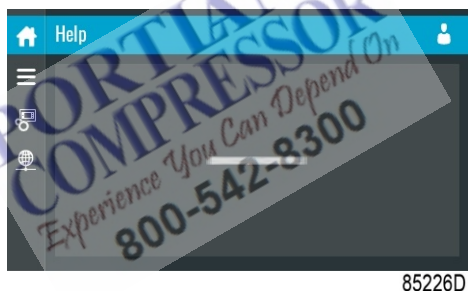
The user password can be activated or deactivated through this menu. Enter and confirm a user password to activate, repeat to deactivate.

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.

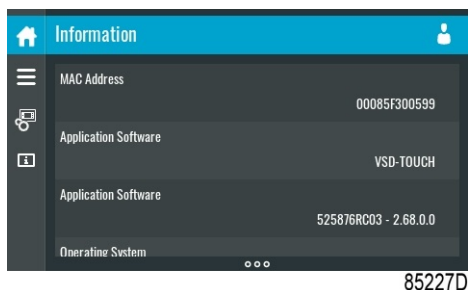


85226D

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.



85227D

This menu shows information about the controller.

3.13 Access level

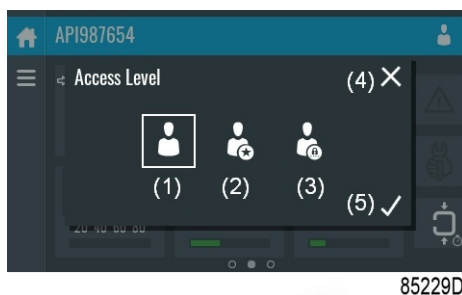
Function

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



Reference	Designation	Function
(1)	User	A basic set of parameters is visualized, no password required.
(2)	Service	This access level is only to be used by certified technicians.
(3)	Full	This access level is only to be used by certified technicians.
(4)	Decline	Tap to decline the selected user level.
(5)	Confirm	Tap to confirm the selected user level.

4 Installation

4.1 Dimension drawings

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

Dimension drawing	Model
9828 5102 95	GA 37, GA 45 Pack, air-cooled
9828 5102 96	GA 37, GA 45 Full-Feature, air-cooled
9828 5103 19	GA 37, GA 45 Pack, water-cooled
9828 5103 20	GA 37, GA 45 Full-Feature, water-cooled

Text on drawings	Translation or Explanation
Cooling air outlet of compressor	Cooling air outlet of compressor and motor
Air inlet of compressor	Cooling air inlet of compressor and motor
Compressed air outlet	Compressed air outlet connection
Electrical cable passage	Electrical cable passage
Cooling air outlet of cubicle	Cubicle cooling air outlet
Doors fully open	Dimensions with doors fully open
Cooling air inlet of dryer	Dryer cooling air inlet
Cooling air outlet of dryer	Dryer cooling air outlet
Centre of gravity	Centre of gravity
Approx. mass	Approximate mass of the machine
Manual drain of after cooler	Manual drain, aftercooler
Automatic drain of after cooler	Connection of the automatic drain of the aftercooler
Manual drain of dryer	Manual drain of the dryer
Mounting holes of compressor	Mounting holes to fixate the compressor

4.2 Installation proposal

Safety

	The operator must apply all relevant safety precautions, including those mentioned in this book.
---	--

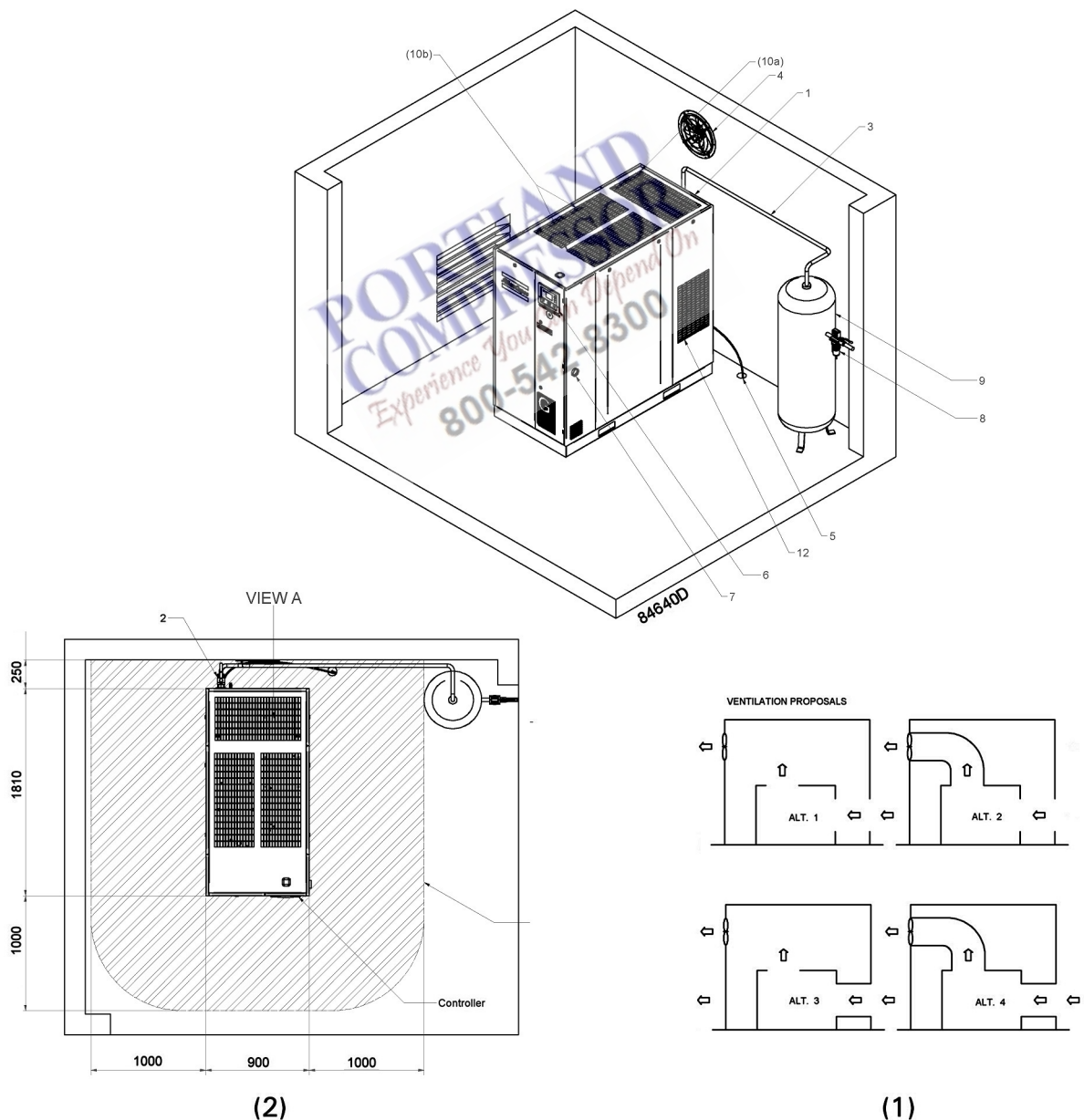
Outdoor/altitude operation

	The compressor is not designed for outdoor installation. The compressors can be sold with option <u>rain protection</u>. With this option, this compressor can be installed outside under a shelter, in frost free conditions. If frost might occur, the appropriate measures must be taken to avoid damage to the machine and its ancillary equipment. Consult Atlas Copco.
---	--

Moving/lifting

	The compressor can be moved by a lift truck using the slots in the frame. Take care not to damage the bodywork during lifting or transport. Make sure that the forks protrude from the other side of the frame. The compressor can also be lifted after inserting beams in the slots. Make sure that the beams cannot slide and that they protrude from the frame equally. The chains must be held parallel to the bodywork by chain spreaders in order not to damage the compressor. The lifting equipment must be placed in such a way that the compressor is lifted perpendicularly. Lift gently and avoid twisting.
	In case of units equipped with the Lifting Device Option, it is not allowed to lift the compressor if the canopy parts or lifting supports are not completely installed. When the compressor is being lifted, it is also forbidden to come under the load or to perform maintenance activities to it.

Compressor room example



Reference	Designation
(1)	Ventilation proposals
(2)	Minimum free area to be reserved for the compressor installation

Table 3: Text on drawing

	All piping to be connected stress-free to the compressor.
---	---

Installation guidelines

1. Install the compressor unit on a solid, level floor suitable for taking its weight.
2. Position of the compressed air outlet valve.
3. The pressure drop over the air delivery pipe can be calculated from:

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

- Δp = pressure drop in bar (recommended maximum: 0.1 bar (1.5 psi))
- L = length of the pipe in m
- Q_c = Free air delivery of the compressor in l/s
- d = inner diameter of the pipe in mm
- P = absolute pressure at the compressor outlet in bar(a)

It is recommended that the connection of the compressor air outlet pipe is made on top of the main air net pipe in order to minimise carry-over of possible condensate residue.

4. Ventilation: the inlet grids and ventilation fan should be installed in such a way that any re-circulation of cooling air is avoided.

The maximum air velocity through the grids is 5 m/s (16.5 ft/s).

The maximum allowed pressure drop in ventilation ducts before or after the compressor is 30 Pa.

The maximum air temperature at the compressor intake is 46 °C (115 °F), the minimum air temperature is 0 °C (32 °F).



NOTE

If the unit is equipped with the option “High Ambient Version”, it is allowed to operate the unit up to 55 °C (131 °F).

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

$$Q_v = 1.06 N / \Delta T \text{ for versions without dryer}$$

$$Q_v = (1.06 N + 1.3) / \Delta T \text{ for versions with dryer}$$

- Q_v = Required ventilation capacity in m³/s
- N = Shaft input of compressor in kW
- ΔT = Temperature increase in the compressor room in °C

5. The drain pipes to the drain collector must not dip into the water of the drain collector. Any flow back must be avoided. Oil/water separators to separate the major part of the oil from the condensate to ensure that the condensate meets the requirements of the environmental codes are available.
6. Control module with monitoring panel.
7. Position of the main cable entry. Power supply cable to be sized and installed by a qualified electrician.



To preserve the protection degree of the electric cubicle and to protect its components from dust from the environment, it is mandatory to use a proper cable gland when connecting the supply cable to the compressor.

8. Provision for inlet and outlet of the energy recovery system (system is optional).
9. The air receiver (optional) should be installed in a frost-free room on a solid, level floor for normal air consumption, the volume of the air net (receiver and piping) can be calculated as follows:

$$V = (0.25 \times Q_c \times P_1 \times T_o) / (f_{max} \times \Delta P \times T_1)$$

- V= Volume of the air net in l.
 - Q_c= Free air delivery of the compressor in l/s
 - P₁= Compressor air inlet pressure in bar absolute
 - f_{max}= Cycle frequency =1 cycle/30s
 - ΔP= P unload - P load in bar
 - T₁= Compressor air inlet temperature in K
 - T_o= Air receiver temperature K
10. To prevent feedback of exhaust air to the cooling inlet, sufficient space should be foreseen above the unit to evacuate the exhaust air.

4.3 Electrical connections

Important remark



To preserve the protection degree of the electric cubicle and to protect its components from dust from the environment, it is mandatory to use a proper cable gland when connecting the supply cable to the compressor.

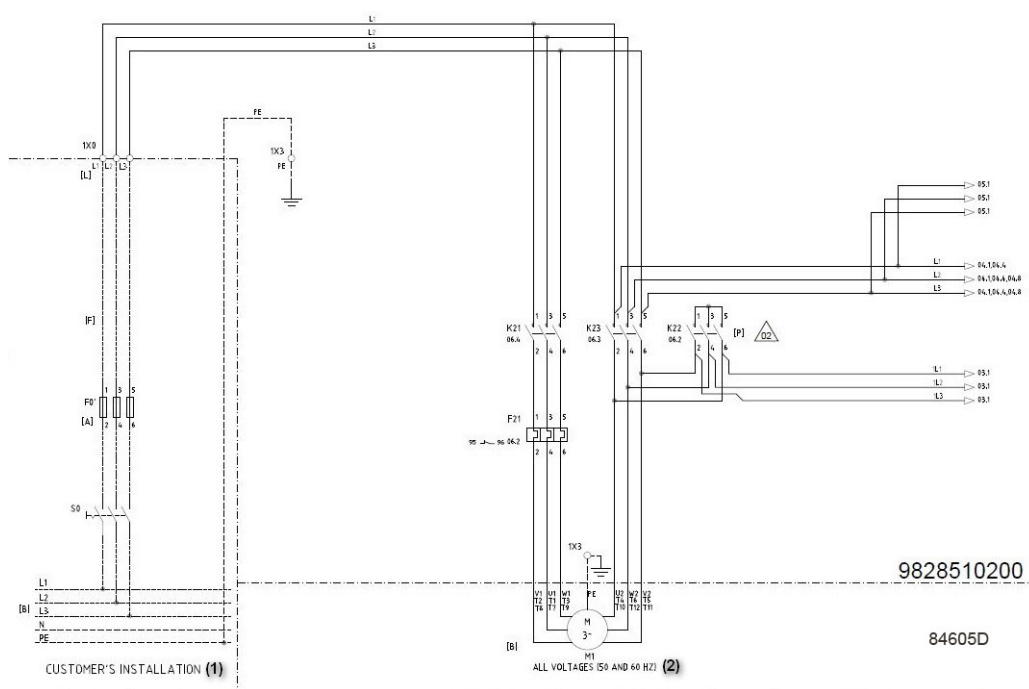


Figure 18: Electrical connections

Reference	Designation
(1)	Customer's installation
(2)	All voltages (50 and 60 Hz)

Instructions

1. Provide an isolating switch.
2. Check that the motor cables and wires inside the electric cabinet are clamped tight to their terminals.
3. Check the fuses and the setting of the overload relay. See section [Electrical cable size](#).
4. Connect earth conductor bolt (PE).
5. Connect the power supply cables to their terminals L1, L2, L3.

Compressor status indication

On compressors equipped with an Elektronikon™ Touch controller, the controller is provided with potential free auxiliary NO contacts (NO = normally open) (K05, K07 and K08) for remote indication of:

- Manual load/unload or automatic operation (K07)
- Warning condition (K08)
- Shut-down condition (K05)

Example: K05 is a NO (NO = normally open) contact. It will be closed if all conditions are normal and will open in case of power failure or shutdown.

Maximum contact load: 10 A / 250 V AC.

Stop the compressor and switch off the voltage before connecting external equipment. Consult your supplier.

Compressor control mode

On compressors equipped with a Touch controller, consult section [Quick access screen](#) if it is desired to switch to another control mode.

The following control modes can be selected:

- **Local control:** The compressor will react to commands entered by means of the buttons on the control panel. Compressor start/stop commands via Clock function are active, if programmed.
- **Remote control:** The compressor will react to commands from external switches. Emergency stop remains active. Compressor start/stop commands via Clock function are still possible.

Options:

- Remote starting and stopping (switch S1')
- Remote loading/unloading (switch S4')
- Remote pressure sensing (switch S' combined with pressure switch S4')



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

- **LAN control:** The compressor is controlled via a local network. Consult your supplier.

4.4 Cooling water requirements

General



Cooling water needs to fulfill certain requirements in order to avoid problems of scaling, fouling, corrosion or bacterial growth.
In open circuit cooling towers, protective measures must be taken to avoid the growth of harmful bacteria such as legionella pneumophila when there is a risk of inhalation of the water droplets.

No general recommendation can encompass the effects of all combinations of the various compounds, solids and gases typically found in cooling water in interaction with different materials. Therefore the recommendations formulated in our Cooling Water Specifications are a general guide line for acceptable coolant quality. However, where strict limits apply, a statement is made in the specification.

The water requirements refer to untreated water. When water is treated, some parameters will change. Water treatments should be carried out by a specialized water treatment company, taking the responsibility for the performance of the treated cooling water and the compatibility with the materials in the cooling circuit. This includes not only the selection of the appropriate additives, but also the correct application, monitoring of concentrations and properties, prevention of sludge formation and maintenance of the system. This applies also to treatment with antifreeze products. They must be provided with suitable stabilizers and inhibitors. Specifications are also depending on the type of cooling circuit (open, once through / recirculating with tower / closed) and on the application (Standard – max 65 °C cooling water temperature at the outlet) or Energy Recovery (water temperature up to 95 °C).

In case water is not in line with recommended values or if any doubt, consult the manufacturer.

Cooling water parameters

1. pH

The effect of pH is already included in the Ryznar Stability Index (RSI - see item 4 below), but also the pH itself is subject to limitations:

Type of cooling system	Materials	pH	
		Standard	Energy recovery
Single pass	Containing copper	6.8 - 9.3	6.8 - 9.3
	Stainless steel with carbon steel and / or cast iron	6.8 - 9.3	6.8 - 9.3
	Stainless steel only	6 - 9.3	6 - 9.3
Recirculating (with tower)	Containing copper	6.8 - 9.3	not applicable
	Stainless steel with carbon steel and / or cast iron	6.8 - 9.3	
	Stainless steel only	6 - 9.3	
Closed loop	Containing copper	7.5 - 9.3	7.5 - 9.3
	Stainless steel with carbon steel and / or cast iron	7.5 - 9.3	7.5 - 9.3
	Stainless steel only	6 - 9.3	6 - 9.3

The values in **bold** are rejection limits.

When the system contains Zn or Al, the pH must be < 8.5.

2. Total dissolved solids (TDS) and conductivity

The conductivity is expressed in $\mu\text{S}/\text{cm}$, the TDS in ppm.

Both parameters are related with each other. The conductivity is convenient for quick monitoring of general water quality, but the TDS is required for calculating the RSI. If only one of both parameters is measured, an estimation can be obtained by using a theoretical conversion factor (0.67):

$$\text{TDS} = \text{conductivity} \times 0.67$$

3. Hardness

Different types of hardness are in relation with each other and together with the pH and the alkalinity of the water they determine the equilibrium situation of the water, determined and specified by the RSI.

In addition, the calcium hardness must be limited to:

Type of cooling system	Ca (ppm Ca CO ₃)	
	Standard	Energy recovery
Single pass	< 500	< 2
Recirculating (with tower)	< 500	not applicable
Closed loop	< 1000	< 50

4. The Ryznar Stability Index (RSI)

The Ryznar Stability Index is a parameter for predicting whether water will tend to dissolve or precipitate calcium carbonate. The adhesion of scaling depositions and their effect are different on different materials, but the equilibrium of the water (scaling or corrosive) is only determined

by its actual pH value and by the saturation pH value (pH_s). The saturation pH value is determined by the relationship between the calcium hardness, the total alkalinity, the total solids concentration and the temperature.

The Ryznar Stability Index is calculated as follows:

$$RSI = 2 \cdot pH_s - pH,$$

in which

- pH = measured pH (at room temp) of the water sample
- pH_s = pH at saturation

pH_s is calculated from:

$$pH_s = (9.3 + A + B) - (C + D),$$

in which

- A : depends on the total solids concentration
- B : depends on the water temperature at the outlet of the heat exchanger
- C : depends on the calcium hardness ($CaCO_3$)
- D : depends on the HCO_3^- concentration or M-alkalinity

The values of A, B, C and D can be found in below table:

Total dissolved solids (mg/l)	A	Temperature (°C)	B	Ca hardness (ppm $CaCO_3$)	C	M-Alkalinity (ppm $CaCO_3$)	D
< 30	0.1	0 - 1	2.3	9 - 11	0.6	10 - 11	1.0
30 - 320	0.2	2 - 6	2.2	12 - 14	0.7	12 - 14	1.1
> 320	0.3	7 - 11	2.1	15 - 17	0.8	15 - 17	1.2
		12 - 16	2.0	18 - 22	0.9	18 - 22	1.3
		17 - 22	1.9	23 - 28	1.0	23 - 28	1.4
		23 - 27	1.8	29 - 35	1.1	29 - 35	1.5
		28 - 32	1.7	36 - 44	1.2	36 - 44	1.6
		33 - 38	1.6	45 - 56	1.3	45 - 56	1.7
		39 - 43	1.5	57 - 70	1.4	57 - 70	1.8
		44 - 49	1.4	71 - 89	1.5	71 - 89	1.9
		50 - 55	1.3	90 - 112	1.6	90 - 112	2.0
		56 - 61	1.2	113 - 141	1.7	113 - 141	2.1
		62 - 67	1.1	142 - 177	1.8	142 - 177	2.2
		68 - 73	1.0	178 - 223	1.9	178 - 223	2.3
		74 - 79	0.9	224 - 281	2.0	224 - 281	2.4
		80 - 85	0.8	282 - 355	2.1	282 - 355	2.5
		86 - 91	0.7	356 - 446	2.2	356 - 446	2.6
		92 - 95	0.6	447 - 563	2.3	447 - 563	2.7
				564 - 707	2.4	564 - 707	2.8
				708 - 892	2.5	708 - 892	2.9
				893 - 1000	2.6	893 - 1000	3.0

Interpretation of the values obtained:

- $RSI < 6$: boiler scale formation
- $6 < RSI < 7$: neutral water
- $RSI > 7$: corrosive water



As a general rule, the RSI index should be between 5.6 and 7.5. If that is not the case, contact a specialist.

5. Free chlorine (Cl₂)

Disinfecting with chlorine is **not done in closed systems, neither in energy recovery systems.**

A continuous level of 0.5 ppm should not be exceeded. For shock treatments, a maximum limit of 2 ppm for maximum 30 minutes/day applies.

6. Chlorides (Cl⁻)

Chloride ions will create pitting corrosion on stainless steel. Their concentration should be limited, depending from the RSI value.

	RSI < 5.5	5.6 < RSI < 6.2	6.3 < RSI < 6.8	6.9 < RSI < 7.5	7.6 < RSI
Cl ⁻ (ppm)	200	350	500	350	200

For energy recovery systems, the limit is 100 ppm.

7. Sulphates (SO₄²⁻)

	Sulphate (ppm)	
Type of cooling system	Standard	Energy recovery
Single pass	< 1000	< 200
Recirculating (with tower)	< 1000	not applicable
Closed loop	< 400	< 200

8. Iron and Manganese

	Dissolved iron (ppm)		Dissolved manganese (ppm)	
Type of cooling system	Standard	Energy recovery	Standard	Energy recovery
Single pass	< 1	< 0.2	< 0.2	< 0.05
Recirculating (with tower)	< 1	not applicable	< 0.2	not applicable
Closed loop	< 1	< 0.2	< 0.2	< 0.05

The values in **bold** are rejection limits.

9. Copper

	Copper (ppm)	
Type of cooling system	Standard	Energy recovery
Single pass	< 1	< 0.2
Recirculating (with tower)	< 1	not applicable
Closed loop	< 1	< 0.2

10. Ammonium

The limit of **0.5 ppm** is a rejection limit.

The limitation only applies for copper containing systems.

11. Suspended solids

Large particles (size > 10 µm) should not be present as they can be filtered out.

Small particles (< 0.5 µm) are not taken into account.

For particles between 0.5 µm and 10 µm, the following limits apply:

Type of cooling system	Suspended solids (ppm)	
	Standard	Energy recovery
Single pass	< 10	< 1
Recirculating (with tower)	< 10	not applicable
Closed loop	< 10	< 1

12. Oil or grease

< 1 ppm (rejection value)

13. Biology

If biology is present, it must be aerobic. Anaerobic biology (in closed systems) must be avoided.

Type of cooling system	Biology (CFU/ml)	
	Standard	Energy recovery
Single pass	< 10 ⁵ / < 10⁷	< 10 ³ / < 10⁵
Recirculating (with tower)	< 10 ⁵ / < 10⁷	not applicable
Closed loop	< 10 ³ / < 10⁵	< 10 ³ / < 10⁵

The table shows the recommended values. The values in **bold** are rejection limits.

	If additives are used in the cooling water, take into account that the cooling capacity will change. $\Delta m = ((C_{pw} - C_{pa}) * X) / (C_{pw} * (1-X) + X * C_{pa}) * 100 \%$ with Δm: change of mass flow of the coolant C_{pw}: specific heat capacity of water C_{pa}: specific heat capacity of the additives X: the percentage of additives
--	--

5 Operating instructions

5.1 Initial start-up

	The operator must apply all applicable Safety precautions .
	For the location of the air outlet valve and the drain connections, see sections Introduction and Condensate system .

Preparations

1. Consult the sections [Electrical cable size](#), [Installation proposal](#) and [Dimension drawings](#).
2. **The following transport fixtures, painted red, must be removed:**
 - Bolt and bushes or support under the motor (1)
 - Bolts and bushes under the gear casing (2)
 - Bolts or bolts and bushes under the oil separator vessel (3)



3. Check that the electrical connections correspond to the applicable codes and that all wires are clamped tight to their terminals.

The installation must be earthed and protected against short circuits by fuses of the inert type in all phases. An isolating switch must be installed near the compressor.

4. Check transformer (T1) for correct connection.

Check the settings of drive motor overload relay (F21).

Check that the motor overload relay is set for manual resetting.

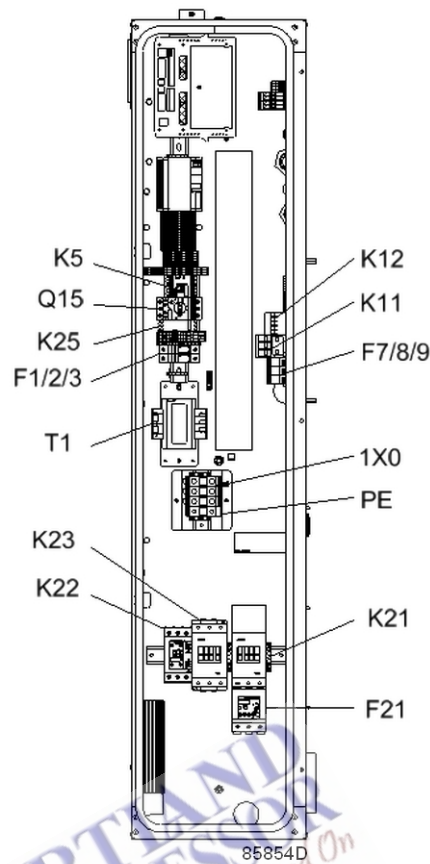


Figure 19: Electric cubicle

5. Check the setting of circuit breaker (Q15). Also check that the switch on the circuit breaker is in position I.
6. Fit air outlet valve (AV). See section [Introduction](#) for the location of the valve.

Close the valve.

Connect the air net to the valve.

7. Connect the condensate drain outlet(s) to a drain collector.

See section [Condensate system](#).

The drain pipes to the drain collector must not dip into the water. If there is a risk for freezing, the pipes must be insulated.

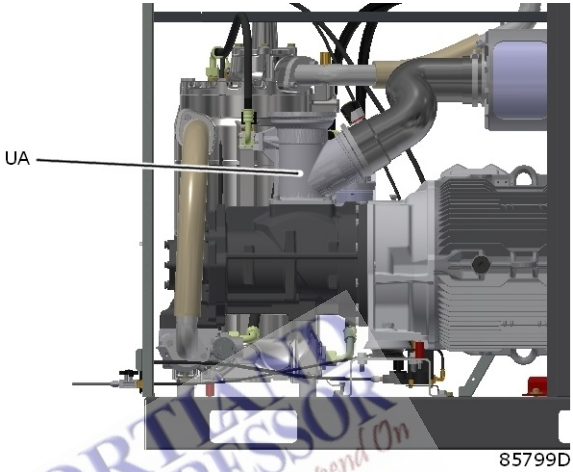
For draining of pure condensate water, install an oil/water separator which is available from Atlas Copco as an option.

8. For compressors with a DD or a UD+ filter: connect the automatic drain of the filters to a suitable drain collector.

9. **Provide labels, warning the operator that:**

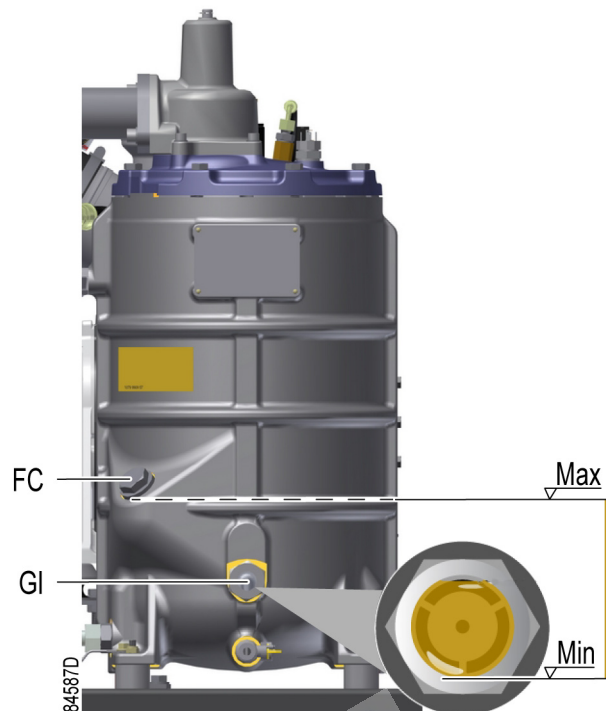
- The compressor may automatically restart after voltage failure (if activated, consult Atlas Copco).
- The compressor is automatically controlled and may be restarted automatically (if activated, consult Atlas Copco).

Initial start procedure

	If the compressor has not run for the past 6 months, it is strongly recommended to improve the lubrication of the compressor element before starting. To do so: 1. Disconnect the inlet hose. 2. Remove the unloader (UA). 3. Pour approximately 0.75 l (0.20 US gal, 0.17 Imp gal) of compressor oil into the compressor element inlet. For oil specifications, see section Oil specifications. 4. Reinstall the unloader and reconnect the inlet hose. Make sure that all connections are tight.  85799D Figure 20: Location of unloader
---	---

1. Check the oil level before starting.

The oil level should be between the oil filler neck (FC) and the bottom of the sight glass (GI).



2. Switch on the voltage. Start the compressor and stop it immediately. Check the rotation direction of drive motor (M1) while the motor is coasting to a stop. The correct rotation direction of the drive motor is indicated by an arrow shown on the motor fan cowl.

If the rotation direction of the drive motor is incorrect, open the isolating switch and reverse two incoming electric lines.

Incorrect rotation direction of the drive motor may cause damage to the compressor.

3. Check also the rotation direction of the fan motor. Rotation arrows, visible through the grating in the roof, are provided on the plate below the fan to indicate the correct rotation direction of the fan motor.

If the rotation direction of the fan motor is incorrect, open the isolating switch and reverse two incoming electric connections at the terminals of circuit breaker (Q15).

4. Check the programmed settings. For compressors equipped with an Elektronikon™ Touch controller, consult section [Menu screen](#).
5. Start and run the compressor for a few minutes. Check that the compressor operates normally.
6. Check that the outlet temperature doesn't rise too much after start-up.

5.2 Before starting

Procedure

1. If the compressor has not run for the past 6 months, it is strongly recommended to improve the lubrication of the compressor element before starting. See section [Initial start](#).
2. Check oil level. Top up if necessary.

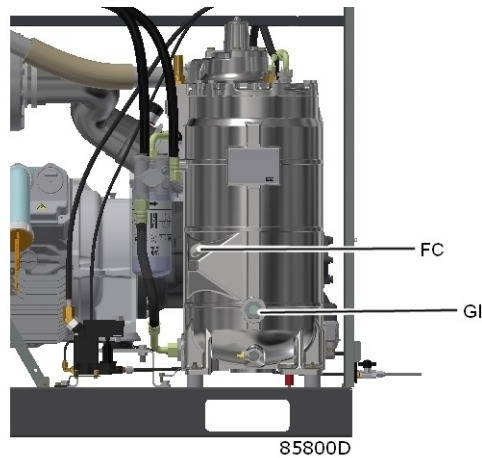


Figure 21: Position of oil level sight glass

3. If necessary, empty the dust trap of the filter, see section [Air filter](#).

If the red part of the air filter service indicator shows full out, replace the air filter element. Reset the service indicator (VI) by pushing the knob in the extremity of the indicator.

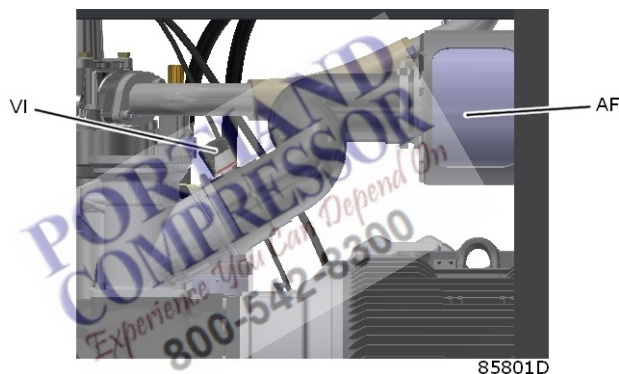


Figure 22: Position of air filter and service indicator

5.3 Starting



For the position of the air outlet valve and the drain connections, see sections [Introduction](#) and [Condensate system](#).

Procedure

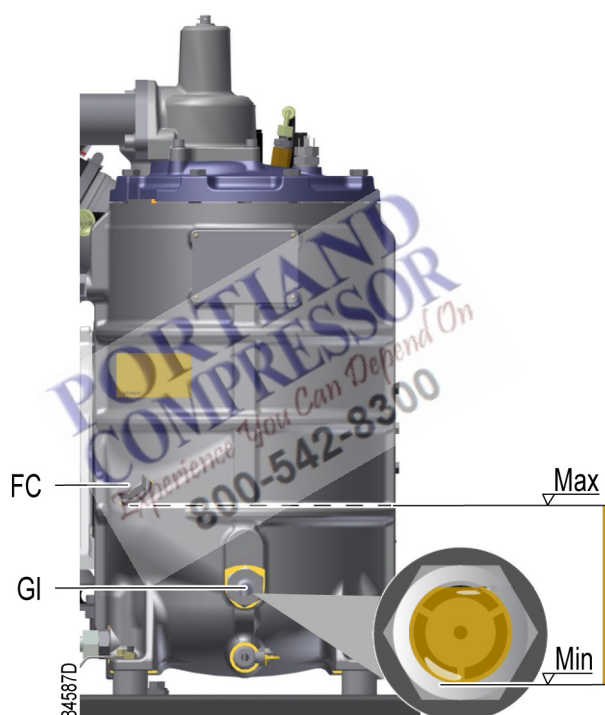
1. Open the air outlet valve.
2. Switch on the voltage. Check that the voltage on LED lights up.
3. Press the start button on the control panel. The compressor starts running and the automatic operation LED lights up. Ten seconds after starting, the drive motor switches over from star to delta and the compressor starts running loaded.

5.4 During operation

Warnings

	The operator must apply all relevant Safety precautions . Also consult section Problem solving .
	Keep the doors closed during operation. They may be opened for short periods only to carry out checks.
	When the motors are stopped and automatic operation LED is alight, the motors may start automatically.

Checking the oil level



Regularly check the oil level. To do so:

1. Press the stop button.
2. Five minutes after stopping, the oil level should not be lower than the bottom of the sight glass (GI).
3. Next, close the air outlet valve and open the manual drain valve (Dm) until the air system between oil separator/air receiver vessel and outlet valve is fully depressurized. See section [Condensate system](#) for location of the outlet valve and water drain.
4. Unscrew oil filler plug (FC) one turn to permit any pressure left in the system to escape. Wait a few minutes.
5. Remove the plug and add oil until the level reaches the filler opening.
6. Fit and tighten the plug (FC).
7. Unlock the emergency stop button.
8. Stop and reset the controller before restarting.

Air filter

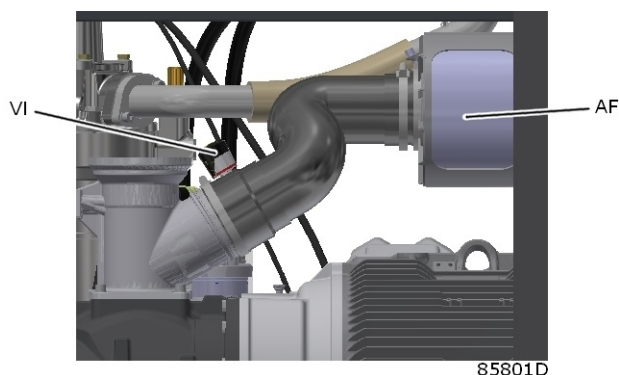


Figure 23: Position of the service indicator

Regularly check the service indicator. If the colored part of service indicator (VI) shows full out, replace the air filter element. Reset the service indicator by pushing the knob in the extremity of the indicator body.

Drains

Regularly check that condensate is discharged during operation. See section [Condensate system](#). The amount of condensate depends on environmental and working conditions.

5.5 Checking the display

Compressors with Elektronikon™ Touch controller:



Figure 24: Control panel Elektronikon™ Touch

Check the main screen (1) regularly for readings and messages. The display normally shows the compressor outlet pressure, while the status of the compressor is indicated by pictographs.

Remedy the trouble if alarm LED (2) is lit or flashes, see section Shutdown warning, Shutdown and Problem solving.

The panel will show a service indication (3) if a service plan interval has been exceeded or if a service level for a monitored component has been exceeded.

Carry out the service actions of the indicated plans or replace the component and reset the relevant timer, see section Service warning.

5.6 Stopping

Procedure

Step	Action
1	Press the stop button. The automatic operation LED goes out and the compressor stops after 30 seconds of unloaded operation.
2	To stop the compressor in the event of an emergency, press the emergency stop button. The alarm LED flashes. On compressors equipped with a Touch controller: 1. Remedy the problem cause. 2. Unlock the emergency stop button by pulling it out. 3. Reset the alarm. Do not use emergency stop button for normal stopping!
3	Close the air outlet valve.
4	Press the test button on top of the electronic water drain(s) (if supplied) to the depressurize the piping between air receiver and outlet valve, next open the manual drain valve (Dm). See section Condensate system . Switch off the voltage.

5.7 Taking out of operation

Warning

	The operator must apply all relevant Safety precautions .
---	---

Procedure

Step	Action
-	Stop the compressor and close the air outlet valve.
-	Press the test button on top of the electronic water drain(s) until the air system between air receiver and outlet valve is fully depressurized. Consult section Condensate system to locate the drain valve.
-	Switch off the voltage and disconnect the compressor from the mains.
-	Open the condensate drain valve(s) (Dm).
-	Unscrew the oil filler plug only one turn to permit any pressure in the system to escape. Consult section Oil and oil filter change to locate the filler plug.
-	Shut off and depressurise the part of the air net which is connected to the outlet valve. Disconnect the compressor air outlet pipe from the air net.
-	Drain the oil.

Step	Action
-	Drain the condensate circuit and disconnect the condensate piping from the condensate net.

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6 Maintenance

6.1 Preventive maintenance schedule

Warning

	Always apply all relevant <i>Safety precautions</i>. Before carrying out any maintenance, repair work or adjustments, proceed as follows: • Stop the compressor. • Close the air outlet valve and open the manual drain valve until the air system between air receiver and outlet valve is fully depressurized. • Press the emergency stop button. • Switch off the voltage. Open and lock the isolating switch. • Depressurize the compressor by opening the oil filler plug one turn.
	Only pressing the emergency stop button is not sufficient to make the compressor voltage free. 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.

Warranty - Product Liability

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

Service kits

For overhauling or carrying out preventive maintenance, service kits are available. Consult the Spare Parts list for part numbers.

Service contracts

Atlas Copco offers several types of service contracts, relieving you of all preventive maintenance work. Consult your Atlas Copco Customer Center.

General

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

Intervals

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

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

Regular maintenance

Following actions have to be done on a regular basis:

Period	Operation
Daily	Check oil level. Check readings on the controller display. Check the air filter service indicator. Check that condensate is discharged during operation of the compressor. Drain condensate. Check the pressure dew point temperature (on compressors with integrated dryer). Check whether the WSD is drained daily. If it is not drained, please refer to section <i>Instructions for WSD cleaning</i>.
3-monthly (1)	Check coolers. Clean if necessary. Check cooling fins of electric motor(s). Clean if necessary. Remove the air filter element and inspect. If necessary, clean using an air jet. Replace damaged or heavily contaminated elements. Check the filter element of the electric cabinet. Replace if necessary. On compressors with integrated dryer: • Stop the compressor, close the air outlet valve and switch off the voltage. • Remove any dirt from the condenser inlet with a vacuum cleaner. • Next, clean with an air jet in the reverse direction of the normal flow. Use low pressure air. Keep the compressed air nozzle more than 30 cm away from the condenser to avoid damaging the condenser fins. • Remove dust from inside the dryer, e.g. with a vacuum cleaner. Do not use water or solvents to clean the condenser. Clean the WSD every 3 months, please refer to section <i>Instructions for WSD cleaning</i>.
Yearly	Check the condition of all hoses. Replace if necessary.

Table 4: Maintenance checklist

(1): More frequently when operating in a dusty atmosphere

Programmed service interventions

Apart from the above mentioned actions, a number of service interventions (see the table below) are programmed in the controller. Each plan has a programmed time interval at which all service actions belonging to that plan are to be carried out. When reaching the interval, a message will appear on the screen indicating which service plans are to be carried out.

After servicing, the intervals must be reset.

	A-service Every 4000 running hours (1)	B-service Every 8000 running hours (2)	D-Service Every 24000 running hours
Check measured parameters	x	x	x
Record SPM measurements	x	x	x
Change the air filter	x	x	x
Change the electric cabinet filter mats	x	x	x
Change the oil	x (3)	x	x
Change the oil filter	x (3)	x	x
Change the oil separator element		x	x
Overhaul non return valve of the scavenge line		x	x
Overhaul the unloader		x	x
Overhaul the minimum pressure valve		x	x
Change the thermostatic valve		x	x

Overhaul the condensate drain(s)		x	x
Change the non-drive end bearing of the motor			x
Replace the WSD drainer kit	x		

Table 5: Preventive Maintenance schedule programmed in the Elektronikon™

(1): or yearly (indicated by real time counter), whichever comes first.

(2): or every 2 years (indicated by real time counter), whichever comes first.

(3): or as indicated by fluid analysis.

	- Consult your supplier before modifying a timer setting. - For the change interval of oil and oil filter in extreme conditions consult your customer centre. - Any leakage should be attended to immediately. Damaged hoses or flexible joints must be replaced.
---	---

6.2 Oil specifications

It is strongly recommended to use genuine lubricants from your manufacturer. They are the result of years of field experience and research. See section Preventive maintenance schedule for the advised replacement intervals and consult the Spare Parts list for part number information.

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

Roto Synthetic Fluid XTEND DUTY

Atlas Copco's Roto Synthetic Fluid XTEND DUTY is a high quality synthetic lubricant for oil injected screw compressors which keeps the compressor in excellent condition. Because of its excellent oxidation stability, Roto Synthetic Fluid XTEND DUTY can be used for compressors operating at ambient temperatures between 0 °C (32 °F) and 46 °C (115 °F). Roto Synthetic Fluid XTEND DUTY is the standard lubricant for oil injected screw compressors equipped with freeze protection or Energy Recovery.

If the compressor is regularly operating in ambient temperatures above 40 °C (104 °F), oil lifetime is reduced. See section **Preventive maintenance schedule**.

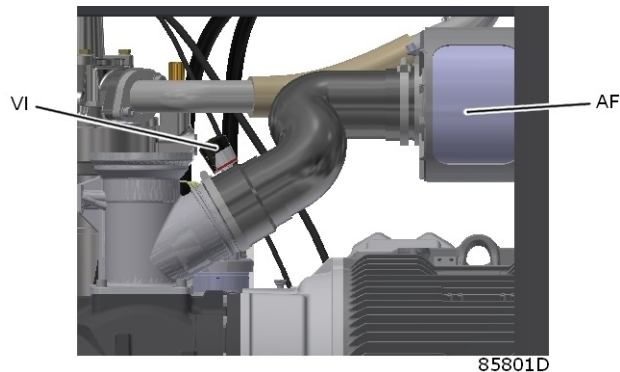
6.3 Drive motor

General

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

6.4 Air filter

Location of air filter



Recommendations

1. Never remove the element while the compressor is running.
2. For minimum downtime, replace the dirty element by a new one.
3. Discard the element when damaged.

Procedure

1. Stop the compressor. Switch off the voltage.
2. Release the snap clips of air filter (AF) and remove the cover and the air filter element. Discard the filter element.
3. Fit the new element and the cover.
4. Reset service indicator (VI) by pushing the knob in the extremity of the body.
5. Reset the air filter service warning.

For compressors equipped with a Touch controller, see section [Service menu](#).

6.5 Oil and oil filter change

Warning



The operator must apply all relevant [Safety precautions](#).

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

Never mix lubricants of different brands or types as they may not be compatible and the oil mix will have inferior properties. A label, indicating the type of oil filled ex-factory, is stuck on the air receiver/oil tank.

Procedure

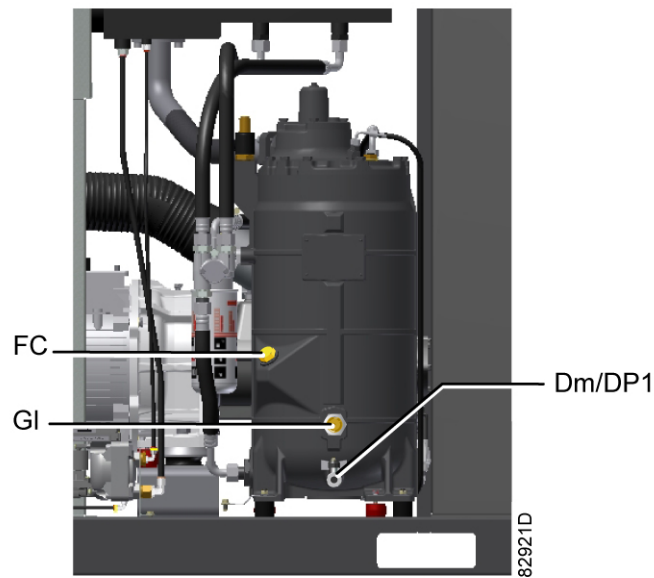


Figure 25: Oil drain and filler plug on the oil separator vessel



Figure 26: Vent plug, oil cooler

Step	Description
1	Run the compressor until warm. Stop the compressor after 3 minutes of unloaded operation. Close the air outlet valve and switch off the voltage. Wait a few minutes and depressurise by unscrewing oil filler plug (FC) just one turn to permit any pressure in the system to escape.
2	Air cooled units: loosen the vent plug (VP) of the oil cooler and wait for 5 minutes.
3	Remove drain plug (DP1) and open drain valve (Dm).
4	Collect the oil in a collector and deliver it to the local collection service. Refit and tighten the drain and vent plugs after draining. Close the drain valve (Dm).
5	Remove the oil filter (OF). Be aware that this filter has a bayonet connection. Rotate the filter across the vertical axis and push slightly upwards. Make sure the connection interface is clean before mounting.
6	Remove filler plug (FC). Fill the air receiver (AR) with oil until the level reaches the filler neck. Take care that no dirt drops into the system. Refit and tighten filler plug (FC).

Step	Description
7	Run the compressor loaded for a few minutes. Stop the compressor and wait a few minutes to allow the oil to settle.
8	Depressurise the system by unscrewing filler plug (FC) just one turn to permit any pressure in the system to escape. Remove the plug. Fill the air receiver with oil until the level reaches the filler neck. Tighten the filler plug.
9	Reset the service warning after carrying out all service actions in the relevant Service Plan: For compressors with a Touch controller, see section Service menu .

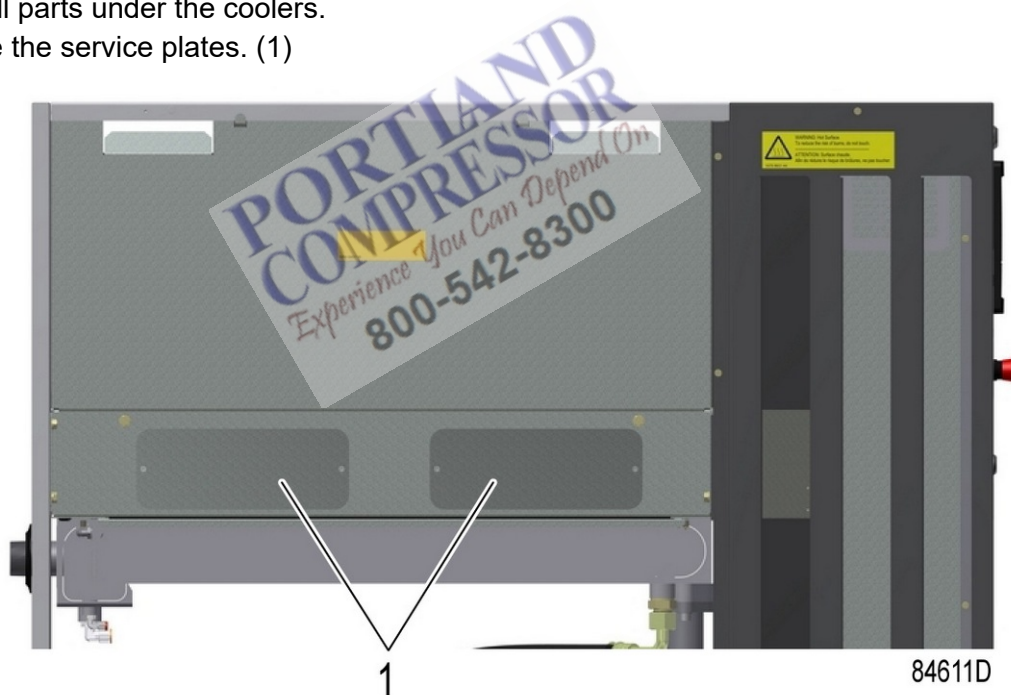
6.6 Coolers

General

Keep the coolers clean to maintain their efficiency.

Instructions for air-cooled compressors

- Stop the compressor, close the air outlet valve and switch off the voltage.
- Cover all parts under the coolers.
- Remove the service plates. (1)



- Remove any dirt from the coolers with a fibre brush. Brush in the direction of the cooling fins.
Also remove any dirt from the fan with a fibre brush.
- Next, clean with an air jet in the reverse direction to normal flow. Use low pressure air. If necessary, the pressure may be increased up to 6 bar(e) (87 psig).
- If it is necessary to wash the coolers with a cleaning agent, consult your supplier.
- Remove the cover used during cleaning.
- Mount the service plates. (1)

6.7 Safety valves

Location of safety valve

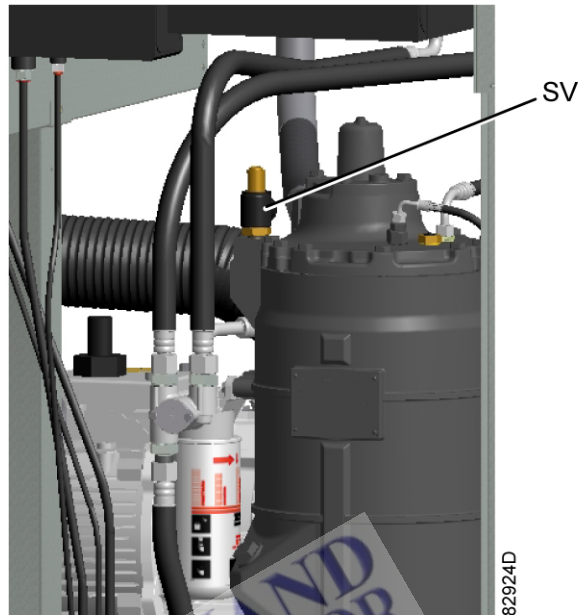


Figure 27: Position of safety valve

Operating

Operate the safety valve from time to time by unscrewing the cap one or two turns. Retighten it afterwards.

Testing

Before removing the valve, depressurize the compressor. See also section Problem solving.

The safety valve (SV) can be tested on a separate air line. If the valve does not open at the set pressure stamped on the valve, it needs to be replaced.

Warning

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

6.8 Dryer maintenance instructions

Safety precautions

Refrigeration dryers of ID type contain refrigerant HFC.

When handling refrigerant, all applicable [safety precautions](#) must be observed. Please be specifically aware of the following points:

- Contact of refrigerant with the skin will cause freezing. Special gloves must be worn. If contacted with the skin, the skin should be rinsed with water. On no account may clothing be removed.

- Fluid refrigerant will also cause freezing of the eyes; always wear safety glasses.
- Refrigerant is harmful. Do not inhale refrigerant vapours. Check that the working area is adequately ventilated.

Be aware that certain components such as the refrigerant compressor and the discharge pipe can become quite hot (up to 110 °C - 230 °F). Therefore, wait until the dryer has cooled down before removing the panels.

Before starting any maintenance or repair work, switch off the voltage and close the air inlet and outlet valves.

Local legislation

Local legislation may stipulate that:

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

General

For all references see section Introduction.

The following remarks should be kept in mind:

- Keep the dryer clean.
- Brush or blow off the finned surface of condenser monthly.
- Stop the compressor, close the air outlet valve and switch off the voltage.
- Remove any dirt on the condenser inlet with a vacuum cleaner.
- Next, clean with an air jet in the reverse direction to normal flow. Use low pressure air. If necessary, the pressure may be increased up to 6 bar(e) (87 psig).
- Clean the condenser area with a vacuum cleaner.
- Inspect and clean the electronic condensate drain monthly.

6.9 Service kits

Service kits

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

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

Consult the Spare Parts List for part numbers.

6.10 Storage after installation

Procedure

Run the compressor regularly, e.g. twice a week, until warm. Load and unload the compressor a few times.



If the compressor is going to be stored without running from time to time, protective measures must be taken. Consult your supplier.

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7 Problem solving

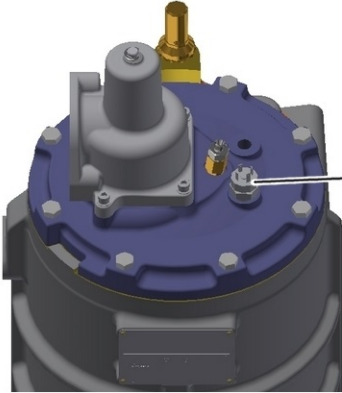
Warning

	Always apply all relevant Safety precautions .
	Before carrying out any maintenance, repair work or adjustment, press the stop button, wait until the compressor has stopped and close the air outlet valve. Open the manual drain valve(s). Press the emergency stop button and switch off the voltage. Open and lock the isolating switch. Depressurise the oil separator vessel by opening the oil filler plug one turn. For location of components: see sections Introduction, Condensate system and Initial start.
	The air outlet valve can be locked during maintenance or repair as follows: • Close the valve. • Remove the screw fixing the handle with the wrench delivered with the compressor. • Lift the handle and turn it until the slot of the handle fits over the blocking edge on the valve body. • Fit the screw.
	• Always switch off the voltage. Only pressing the emergency stop button is not sufficient to make the compressor voltage free. • 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.

Faults and remedies, compressor

For compressors with a Touch controller, see section [Service menu](#).

Condition	Fault	Remedy
Compressor does not start or stops during operation.	Motor overload relay (F21) open	Find cause and remedy. Replace if necessary.
	Circuit breaker (Q15) or fan motor overload (F15) open	Find cause and remedy. Replace if necessary.

Condition	Fault	Remedy
	Too high temperature in oil separator vessel or temperature switch (TSHH1) defective  85802D	Find cause and remedy. Replace if necessary.
	Phase sequence relay (K25) open	Find cause and remedy. Replace if necessary.
	Wiring interrupted	Find cause and remedy. Replace if necessary.
Compressor starts running, but does not load after a delay time	Solenoid valve out of order	Replace valve
	Inlet valve stuck in closed position	Have valve checked
	Leak in control air tubes	Replace leaking tubes
	Minimum pressure valve leaking (when air net is depressurised)	Have valve checked
Compressor does not unload, safety valve blows	Solenoid valve out of order	Replace valve
	Inlet valve does not close	Have valve checked
Condensate is not discharged from condensate separator during loading	Discharge tube clogged	Check and correct as necessary
Compressor air output or pressure below normal	Air consumption exceeds air delivery of compressor	Check the connected equipment.
	Choked air filter element	Replace filter element
	Solenoid valve malfunctioning	Replace valve
	Leak in control air tubes	Replace leaking tubes
	Oil separator element clogged	Have element replaced
	Air leakage	Have leaks repaired.
	Safety valve leaking	Replace valve
	Inlet valve does not fully open	Have valve checked
	Compressor element out of order	Consult your supplier
Excessive oil consumption; oil carry-over through discharge line	Incorrect oil causing foam	Change to correct oil
	Oil level too high	Check for overfilling. Release pressure and drain oil to correct level.
	Oil separator defective	Replace oil separator element
Safety valve blows after loading	Inlet valve malfunctioning	Have valve checked
	Minimum pressure valve malfunctioning	Have valve checked
	Safety valve out of order	Have valve replaced

Condition	Fault	Remedy
	Oil separator element clogged	Have oil separator element replaced
	Compressor element out of order	Consult your supplier
Compressor element outlet temperature or delivery air temperature above normal	Oil level too low	Check and correct
	Insufficient cooling air or cooling air temperature too high	Check for cooling air restriction or improve ventilation of the compressor room. Avoid recirculation of cooling air. If installed, check capacity of compressor room fan
	Oil cooler clogged	Clean cooler
	Bypass valve malfunctioning	Have valve tested
	Air cooler clogged	Clean cooler
	Compressor element out of order	Consult your supplier
Cooling air fan does not deliver enough air.	Unit shuts down due to overtemperature, fan overload, too high oil consumption or less FAD.	Fan rotates in the wrong direction due to wrong electrical connection.

Faults and remedies, dryer

For all references hereafter, consult section [Air dryer](#).

Condition	Fault	Remedy
Pressure dew point too high	Air inlet temperature too high	Check and correct; if necessary, clean the aftercooler of the compressor
	Ambient temperature too high	Check and correct; if necessary, draw cooling air via a duct from a cooler place or relocate the compressor
	Shortage of refrigerant	Have circuit checked for leaks and recharged
	Refrigerant compressor does not run	See below
	Evaporator pressure too high	See below
	Condenser pressure too high	See below
Condenser pressure too high or too low	Fan control switch out of order	Replace
	Fan blades or fan motor out of order	Have checked fan/fan motor, if necessary replace.
	Ambient temperature too high	Check and correct; if necessary, draw cooling air via a duct from a cooler place or relocate the compressor
	Condenser externally clogged	Clean condenser
Compressor stops or does not start	Electric power supply to compressor is interrupted	Check and correct as necessary
	Thermal protection of refrigerant compressor motor has tripped	Motor will restart when motor windings have cooled down

Condition	Fault	Remedy
Condensate drain remains inoperative	Drain system clogged	Have system inspected Clean the filter of the drain by opening the manual drain valve. On units with an electronic drain, check functioning of the drain by pushing the test button.
Condensate trap continuously discharges air and water	Drain out of order	Have system checked. If necessary, replace the drain.
Evaporator pressure is too high or too low at unload	Hot gas bypass valve incorrectly set or out of order	Have hot gas bypass valve adjusted
	Condenser pressure too high or too low	See above
	Shortage of refrigerant	Have circuit checked for leaks and recharged if necessary

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8 Technical data

8.1 Readings on display



Figure 28: Elektronikon™ Touch Controller

Important



The readings mentioned below are valid under the reference conditions (see section [Reference conditions and limitations](#)).

Reference	Reading
Air outlet pressure	Modulates between programmed unloading and loading pressures.
Compressor element outlet temperature	Approx. 60 °C (108 °F) above cooling air inlet temperature.
Dewpoint temperature	See section Compressor data .

8.2 Electric cable size and fuses

Important



- The voltage on the compressor terminals must not deviate more than 10% of the nominal voltage.
It is however highly recommended to keep the voltage drop over the supply cables at nominal current below 5% of the nominal voltage (IEC 60204-1).
- If cables are grouped together with other power cables, it may be necessary to use cables of a larger size than those calculated for the standard operating conditions.
- Use the original cable entry. See section *Dimension drawings*.
To preserve the protection degree of the electric cubicle and to protect its components from dust from the environment, it is mandatory to use a fitting cable gland when connecting the supply cable to the compressor.
Use single core cables in conduit if two multicore cables do not fit in the supply cable entrance.
- Local regulations remain applicable if they are stricter than the values proposed below.
- Currents are calculated with the full service factor but we suggest to add 10% due to over- and under-voltage.
Fuses are maximum allowed values calculated for full service factor and 10% over- and under-voltage.
- Caution:**
 - Always double-check the fuse size versus the calculated cable size. If required, reduce fuse size or enlarge cable size.
 - Cable length should not exceed the maximum length according to IEC 60204 table 10.

Currents and fuses

Compressor type			I tot		Max. fuse (1)	Max. fuse (2)
			I (1)	I (2)	RK5/ HRC form II	RK5/ HRC form II
	V	Hz	A	A	A	A
GA 37	460	60	75	79	80	80
GA 45	460	60	92	96	100	100

Table 6: UL/cUL approval

I: current in the supply lines at maximum load and 10% undervoltage.

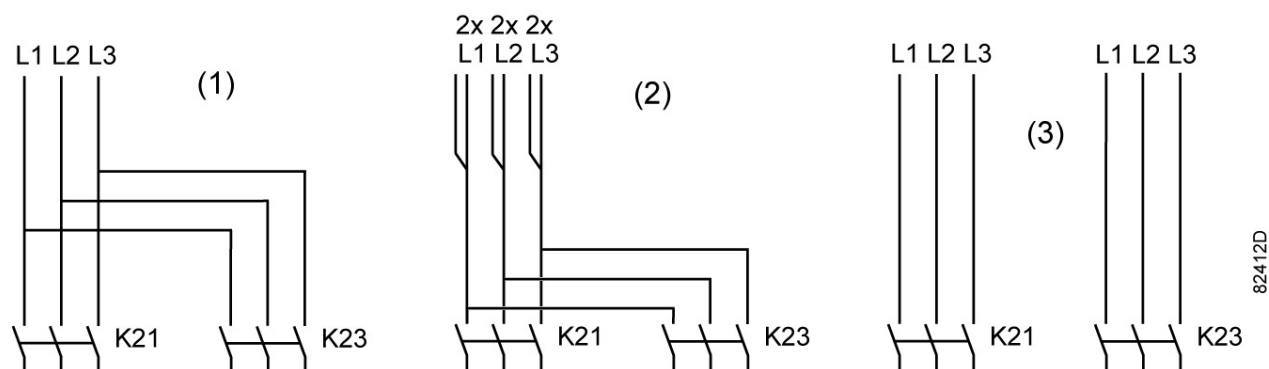
(1): compressors without integrated dryer

(2): compressors with integrated dryer

Fuse calculations for cUL and UL: The indicated fuse size is the maximum fuse size in order to protect the motor against short circuit. For cUL fuse HRC form II, for UL fuse class RK5.

Possible configurations

There are 3 possible cabling layouts:



- (1): Single supply cables.
- (2): Parallel supply cables
- (3) is only valid for Y-D versions

Cable sizing according to UL/cUL

Calculation method according to UL 508A, table 28.1 column 5: allowable ampacities of insulated copper conductors (75 °C (167 °F)).

AWG or kcmil	Maximum current
10	< 30 A
8	< 50 A
6	< 65 A
4	< 85 A
3	< 100 A
2	< 115 A
1	< 130 A
1/0	< 150 A
2/0	< 175 A
3/0	< 200 A

Table 7: Maximum allowed current in function of the wire size

Calculation method for UL:

- Single supply cables (3 phases + 1 PE - configuration (1)):
 - Add 25 % to the total current from the tables (see UL 508A 28.3.2: "Ampacity shall have 125 % of the full load current")
 - Install the prescribed maximum fuse on each cable
- Parallel supply cable (2 x 3 phases + 2 PE - configuration (2)):
 - Add 25 % to the total current from the tables and divide by 2
 - Multiply the ampacity of the cables with 0.8 (see UL 508A table 28.1 continued)
 - Install fuses of half the size of the recommended maximum fuse size on each cable.
- When using 2 x 3 phase + 2 PE as in (3):
 - Add 25 % to the total current from the tables and divide by $\sqrt{3}$
 - Multiply the ampacity of the cables with 0.8 (see UL 508A table 28.1 continued)
 - Fuse size: the recommended maximum fuse size divided by $\sqrt{3}$ on each cable.
- Size PE cable:

- For supply cables up to AWG8: same size as the supply cables
- For supply cables larger than AWG8: use maximum allowed ampacity of the selected supply cables and compare with value in table below (see CEC Part 1 table 17)

< 100 A: use AWG8
< 200 A: use AWG6
< 300 A: use AWG4

Always check the voltage drop over the cable (less than 5 % of the nominal voltage is recommended).

Example of supply cable calculation: $I_{\text{tot}} = 128 \text{ A}$, maximum ambient temperature is 45°C , recommended fuse = 150 A

- Single supply cables (3 phases + 1 PE - configuration (1)):
 - $I = 128 \text{ A} + 25 \% = 128 \times 1.25 = 160 \text{ A}$
 - For AWG2/0, the maximum current is 175 A, which is sufficient => use AWG2/0
 - Install the prescribed maximum fuse (150 A) on each cable
- Parallel supply cable (2 x 3 phases + 2 PE - configuration (2)):
 - $I = (128 \text{ A} + 25\%)/2 = (128 \times 1.25)/2 = 80 \text{ A}$
 - For a AWG4, the maximum current is $85 \text{ A} \times 0.8 = 68 \text{ A}$, which is insufficient. For an AWG3, the maximum current is $100 \times 0.8 = 80 \text{ A}$. So 2 parallel cables of 3 x AWG3 + 2 x AWG8 are sufficient.
 - Install 80 A fuses on each cable.

8.3 Protection settings

Setting motor overload relay (F21)

Frequency (Hz)	Voltage (V)	37kW F21 (A)	45kW F21 (A)
IEC			
60	230	83.8	102.3
60	380	50.4	61.8
50	400	47.6	58.2
60	460	41.9	51.1
UL/cUL			
60	230	84	102
60	460	42	51
60	575	33	41

Settings for fan motor overload protection (Q15)

Frequency (Hz)	Voltage (V)	37kW Q15/F15 (A)	45kW Q15/F15 (A)
IEC			
60	230	4.2	5.8
60	380	2.4	3.5
50	400	2.7	3.3
60	460	2.4	3.2
UL/cUL			
60	230	4.2	5.8

Frequency (Hz)	Voltage (V)	37kW Q15/F15 (A)	45kW Q15/F15 (A)
60	460	2.4	3.2
60	575	1.9	2.6

8.4 Dryer switches

General

The regulating and safety devices are factory-adjusted to give optimum performance of the dryer.

Do not alter the setting of any of the devices.

8.5 Reference conditions and limitations

Reference conditions

Air inlet pressure (absolute)	bar	1
Air inlet pressure (absolute)	psi	14.5
Air inlet temperature	°C	20
Air inlet temperature	°F	68
Relative humidity	%	0
Working pressure		See section Compressor data.

On water-cooled units also:		
Cooling water inlet temperature	°C	20
Cooling water inlet temperature	°F	68

Limits

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

On water-cooled units also:		
Maximum cooling water outlet temperature	°C	50
Maximum cooling water outlet temperature	°F	122
Maximum cooling water inlet pressure	bar(e)	5
Maximum cooling water inlet pressure	psig	72.5

8.6 Compressor data

Reference conditions

	All data specified below apply under reference conditions, see section Reference conditions and limitations .
---	---

		100 psi	125 psi	150 psi	175 psi
Frequency	Hz	60	60	60	60
Reference working pressure	bar(e)	6.9	8.6	10.3	12
Reference working pressure	psig	100	125	150	175
Set point of thermostatic valve	°C	40	40	40	60
Set point of thermostatic valve	°F	104	104	104	140
Motor shaft speed	r/min	3565	3565	3565	3565
Nominal motor power	kW	37	37	37	37
Nominal motor power	hp	49.6	49.6	49.6	49.6
Oil capacity	l	17.7	17.7	17.7	17.7
Oil capacity	US gal	4.12	4.12	4.12	4.12
Sound pressure level (according to ISO 2151:2004)	dB(A)	67	67	67	67

Table 8: GA 37

		100 psi	125 psi	150 psi	175 psi
Frequency	Hz	60	60	60	60
Reference working pressure	bar(e)	6.9	8.6	10.3	12
Reference working pressure	psig	100	125	150	175
Set point of thermostatic valve	°C	40	40	40	60
Set point of thermostatic valve	°F	104	104	104	140
Motor shaft speed	r/min	3565	3565	3565	3565
Nominal motor power	kW	45	45	45	45
Nominal motor power	hp	60.4	60.4	60.4	60.4
Oil capacity	l	19	19	19	19
Oil capacity	US gal	4.39	4.39	4.39	4.39
Sound pressure level (according to ISO 2151:2004)	dB(A)	70	70	70	70

Table 9: GA 45

8.7 Technical data controller

General

Supply voltage	24 V AC /16 VA 50/60Hz (+40%/-30%) 24 V DC/0.7 A
Type of protection	IP54 (front) IP21 (back)
- Operating temperature range - Storage temperature range	-10°C.....+60°C (14 °F 140 °F) -30°C.....+70°C (-22 °F 158 °F)

Permissible humidity	Relative humidity 90% No condensation
Mounting	Cabinet door

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9 Instructions for use

Oil separator vessel

This vessel can contain pressurized air. This can be potentially dangerous if the equipment is misused.
This vessel must only be used as a compressed air/oil separator tank and must be operated within the limits specified on the data plate.
No alterations must be made to this vessel by welding, drilling or other mechanical methods without the written permission of the manufacturer.
The pressure and temperature of this vessel must be clearly indicated.
The safety valve must correspond with pressure surges of 1.1 times the maximum allowable operating pressure. It should guarantee that the pressure will not permanently exceed the maximum allowable operating pressure of the vessel.
Use only oil as specified by the manufacturer.
Original bolts have to be used after opening for inspection. The maximum torque has to be taken into consideration: for M12 bolts 73 Nm (53.8 lbf.ft)), for M16 bolts 185 Nm (136.4 lbf.ft).

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10 Guidelines for inspection

Guidelines

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

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

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

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11 Pressure equipment directives

Components subject to 2014/68/EU Pressure Equipment Directive

The following table contains the necessary information for the inspection of all pressure equipment of category II and higher according to the Pressure Equipment Directive 2014/68/EU and all pressure equipment according to the Simple Pressure Vessel Directive 2014/29/EU.

Compressor type	Component	Description	Volume	Design pressure	Minimum and maximum design temperature	PED Class
GA 37, GA 45	1625 4302 24	Vessel	30l	15 bar(e)	-10 °C/ 120 °C	II
	0830 1010 68	Safety valve	-	-	-	IV
	0830 1010 69	Safety valve	-	-	-	IV

Compressor type	Component	Description	Number of cycles (1)	Minimum wall thickness	Inspection frequency (2)
GA 37, GA 45	1625 5641 99	Vessel	2 x 10 ⁶	8 mm	10 years
	0830 1010 68	Safety valve	-	-	-
	0830 1010 69	Safety valve	-	-	-

The compressors conform to PED smaller than category II.

(1) The number of cycles refers to the number of cycles from 0 bar(e) to maximum pressure.

(2) The minimum wall thickness must be respected at all times. Inspection techniques such as ultrasonic or X-ray are equivalent to hydrostatic testing for this equipment.

12 Declaration of conformity

Insert logo here

EU DECLARATION OF CONFORMITY

1 We, **(1)** declare under our sole responsibility, that the product

2 Machine name :

3 Machine type :

4 Serial number :

5

6 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.

7	Directive on the approximation of laws of the Member States relating to	Harmonized and/or Technical Standards used	Att' mnt
a	(2)	(3)	
b			X
c			
d			X
e			
f			
g			X

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

8 b <1> is authorized to compile the technical file.

9 **Conformity of the specification to the directives**

10

11 Issued by

12 Engineering

13 Name

14 Signature

15 Date

16 Place

11 **Conformity of the product to the specification and by implication to the directives**

12 Manufacturing

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84350D

Figure 29: 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

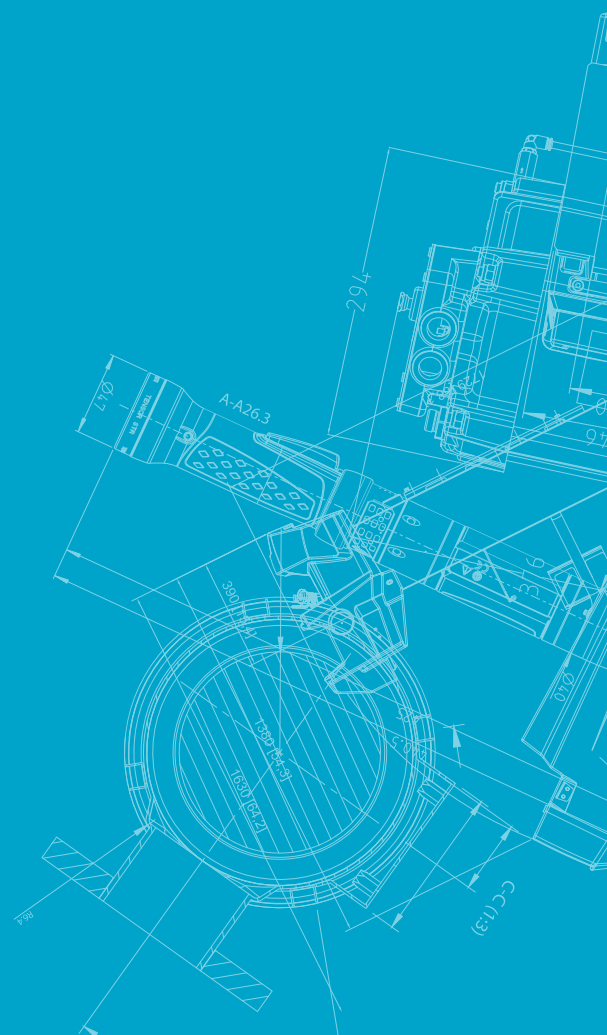
On the Declaration of Conformity / Declaration by the Manufacturer, the harmonized and/or other standards that have been used for the design are shown and/or referred to.

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

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