Atlas Copco

Oil-injected rotary screw compressors

GA 37 VSD+, GA 45 VSD+, GA 55 VSD+, GA 75 VSD+

Instruction book

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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!

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 centre for advice on specific filtration

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 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.

	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. 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.

2 General description

2.1 Introduction

Introduction

GA 37 VSD+ up to GA 75 VSD+ are single-stage, oil-injected screw compressors driven by an interior permanent magnet (English: Interior Permanent Magnet (IPM)) motor.

The compressors are controlled by the Atlas Copco Elektronikon^{TM} Graphic controller (ER).

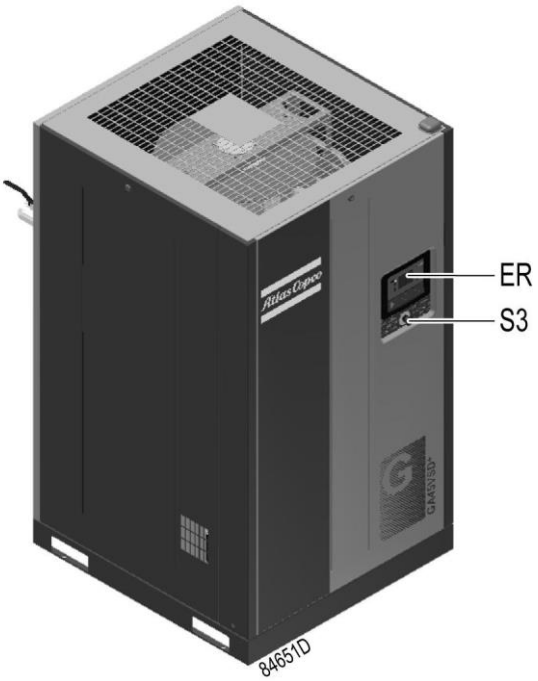
The controller is fitted to the front panel. An electric cabinet (1) comprising fuses, transformers, relays, etc. is located behind this panel.

The compressors use VSD (English: Variable Speed Drive) technology. This means: automatic adjustment of the motor speed, depending on the compressed air demand.

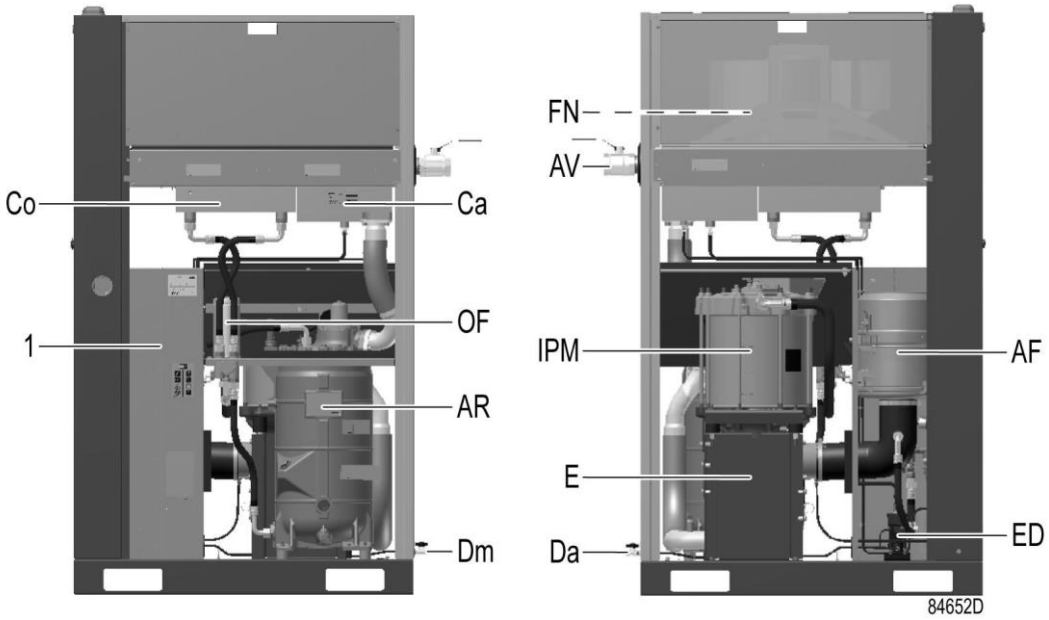
The compressors are air-cooled and are enclosed in a sound-insulated bodywork.

There are 2 versions of the compressor: Workplace (also referred to as Pack), i.e. without integrated dryer) and Workplace Full-Feature (also referred to as Full-Feature, i.e. with integrated dryer).

GA Workplace



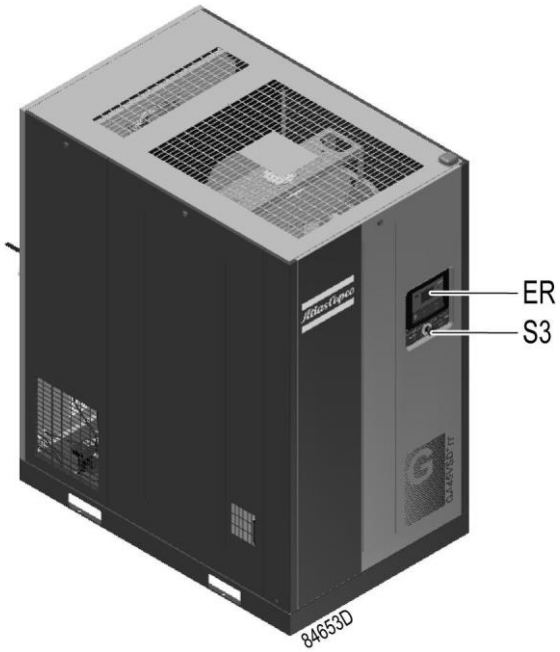
Front view, GA VSD+ Workplace



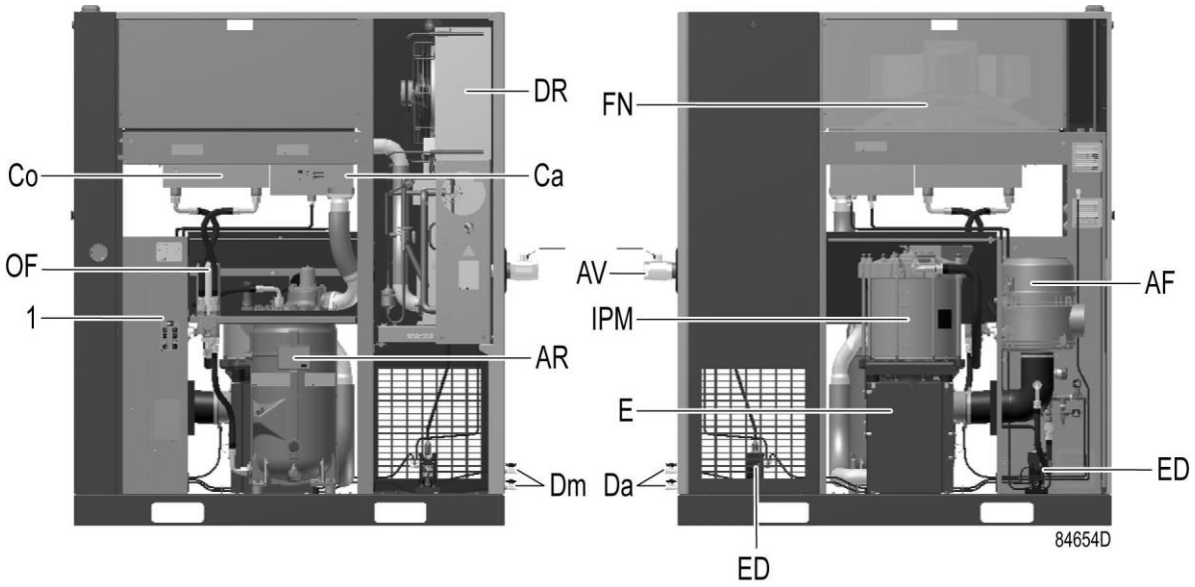
Open side view, GA VSD+ Workplace

GA Workplace Full-Feature

The Workplace Full Feature compressors have an air dryer which is integrated in the sound-insulated bodywork. The dryer removes condensate from the compressed air by cooling the air to near freezing point.



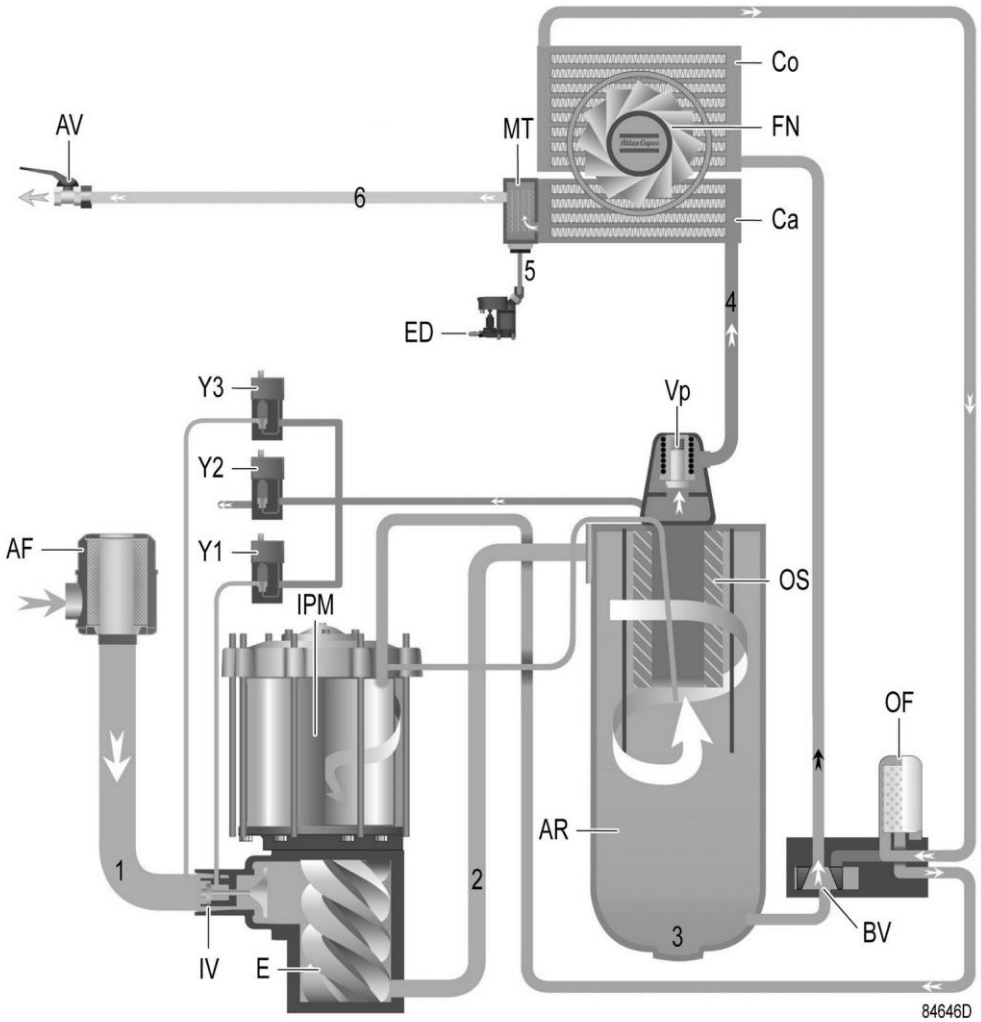
Front view, GA VSD+ Workplace Full-Feature



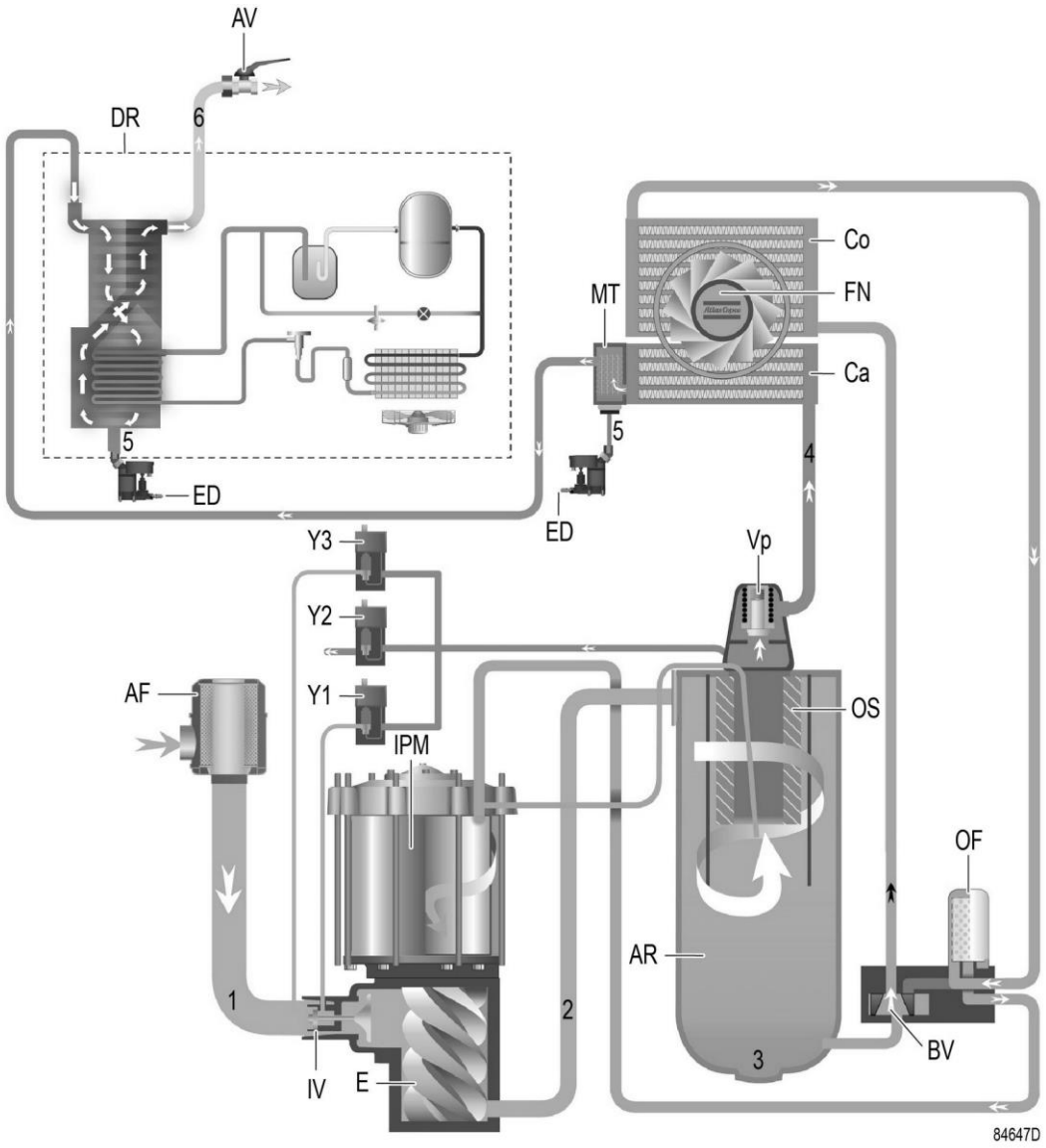
Open side view, GA VSD+ Workplace Full-Feature

Reference	Name
AF	Air filter
AR	Air receiver
AV	Air outlet
Ca	Air cooler
Co	Oil cooler
Da	Automatic condensate outlet
Dm	Manual condensate outlet
DR	Refrigerant dryer
E	Compressor element
ED	Electronic water drain
ER	Elektronikon® Graphic controller
FN	Cooling fan
IPM	Drive motor
OF	Oil filter
S3	Emergency stop button
1	Electric cabinet

2.2 Flow diagram



GA 37 VSD+ up to GA 75 VSD+ Workplace



GA 37 VSD+ up to GA 75 VSD+ Workplace Full-Feature

Reference	Description
1	Air inlet
2	Air/oil mixture
3	Oil
4	Wet compressed air
5	Condensate
6	Dry compressed air (Workplace Full-Feature)

Air flow

Air comes in through filter (AF) and inlet valve (IV) and is compressed in the compressor element (E).

A mixture of compressed air and oil flows into the air receiver/oil separator (AR), where oil and air are separated.

The air flows through the minimum pressure valve (Vp), the air cooler (Ca) and the condensate trap (MT) to the outlet valve (AV).

Minimum pressure valve (Vp) prevents the receiver pressure from dropping below a minimum pressure and includes a check valve which prevents blow-back of compressed air from the net.

Workplace Full-Feature compressors have a dryer (DR) after the air cooler.

Oil circuit

The air receiver (AR) removes most of the oil from the air/oil mixture by centrifugal action. The oil collects in the lower part of the air receiver (AR) which serves as oil tank.

The oil separator (OS) removes the remaining oil.

The oil circuit has a thermostatic bypass valve (BV) that prevents that the oil flows through the oil cooler (Co) when the oil temperature is low.

Air pressure forces the oil from air receiver (AR) through the oil filter (OF).

The filtered oil flows through the cooling channels of the interior permanent magnet (IPM) motor to the compressor element (E).

Cooling

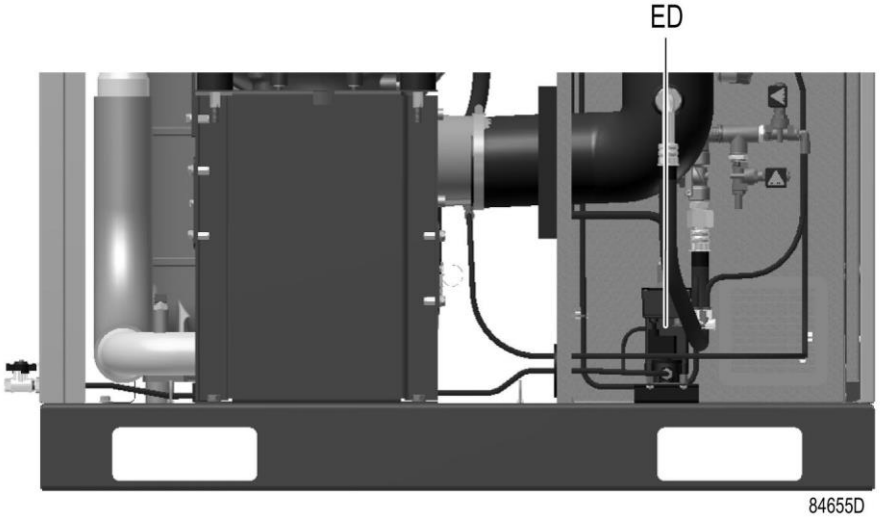
The cooling system has an air cooler (Ca) and an oil cooler (Co).

The fan (FN) blows air over the coolers. This fan is set on and off, depending on the operating conditions, according to a specific algorithm.

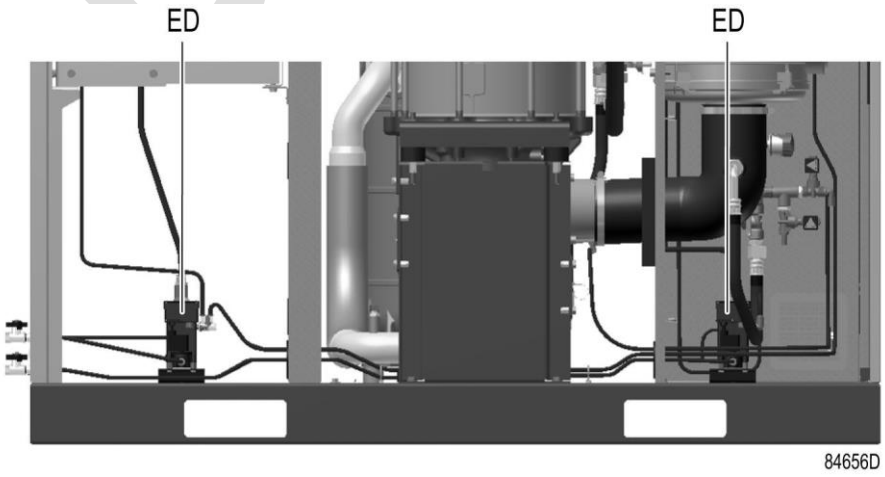
2.3 Condensate system

Drain connections

The compressors have an electronic water drain (ED).



Location of the electronic water drain (Workplace)



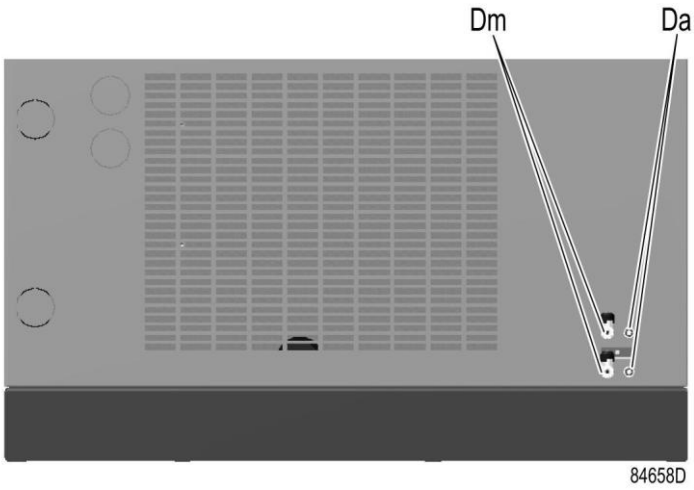
Location of the electronic water drains (Workplace Full-Feature)

The condensate collects in the condensate trap (MT) of the air cooler.

On Workplace Full-Feature units, the condensate formed in the dryer collects in the lower part of the heat exchanger/evaporator.

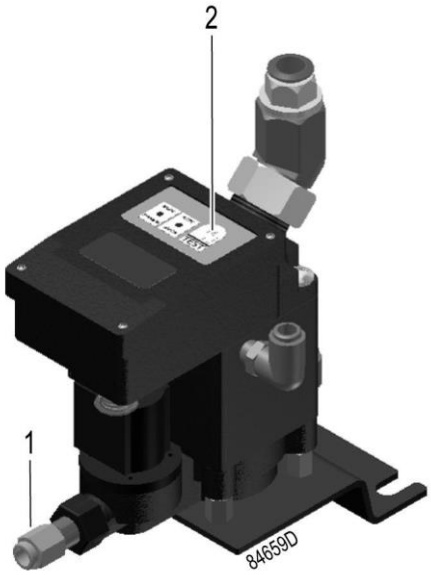
When the condensate in the electronic drain (ED) reaches a certain level, it is drained via the automatic drain outlet (Da).

Condensate drain connections, Workplace



Condensate drain connections, Workplace Full-Feature

Reference	Designation
Da	Automatic drain connection
Dm	Manual drain connection



Electronic water drain (ED), typical example

To test the electronic water drain, press the Test button (2) on top of the device.

LED meanings

	**Green LED on** Normal operation, drain is in stand-by 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.
	**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 timeframe, 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 (2.8psi) in the drain? Press the test button (T) for at least 5 seconds to reset the drain.
	**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 (2.8psi) 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.
	**Red LED on** An irreversible error occurred: replace the drain and keep the failed one for further analysis.

2.4 Regulating system

Description

When the compressor is started and the net pressure is below the setpoint, the motor speed increases until the net pressure reaches the setpoint or until the maximum motor speed is reached.

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

When the net pressure reaches the setpoint (desired net pressure) and continues to rise, the regulator decreases the motor speed.

When the pressure continues to increase although the motor already operates at minimum speed, the regulator stops the motor as soon the net pressure reaches a value, equal to the setpoint plus the indirect stop level (typically 0.3 bar above the setpoint, see section Programmable settings).

Should the net pressure rise very quickly to a value equal to the setpoint plus the direct stop level (typically 1 bar above the setpoint, see section Programmable settings), the compressor is stopped immediately (without first decreasing the motor speed).

No compressed air is lost when the compressor is stopped in automatic operation, thus saving valuable energy.

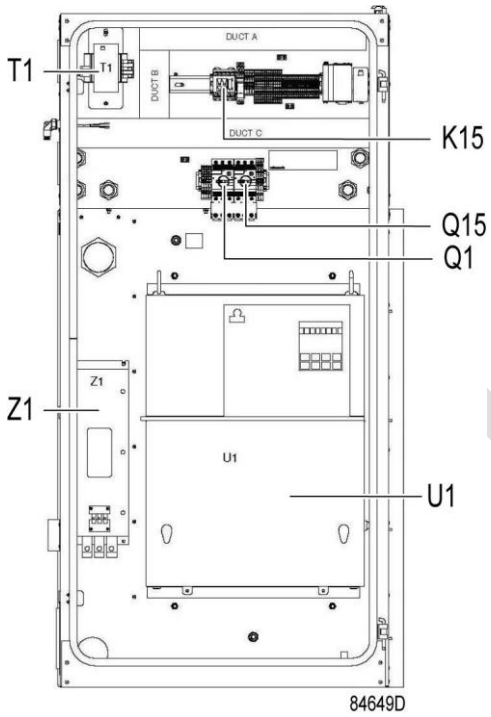
If the compressor was stopped in automatic operation and the net pressure approaches the setpoint, the regulator starts the motor again. The quicker the net pressure drops, the quicker the compressor will restart.

	The pressure in the oil separator vessel is only released to atmosphere when the compressor is stopped manually or in case of an emergency stop (see chapter Stopping in section Operating Instructions).

2.5 Electrical system

Electric components

The electrical system has following components:



Electric cabinet, typical example

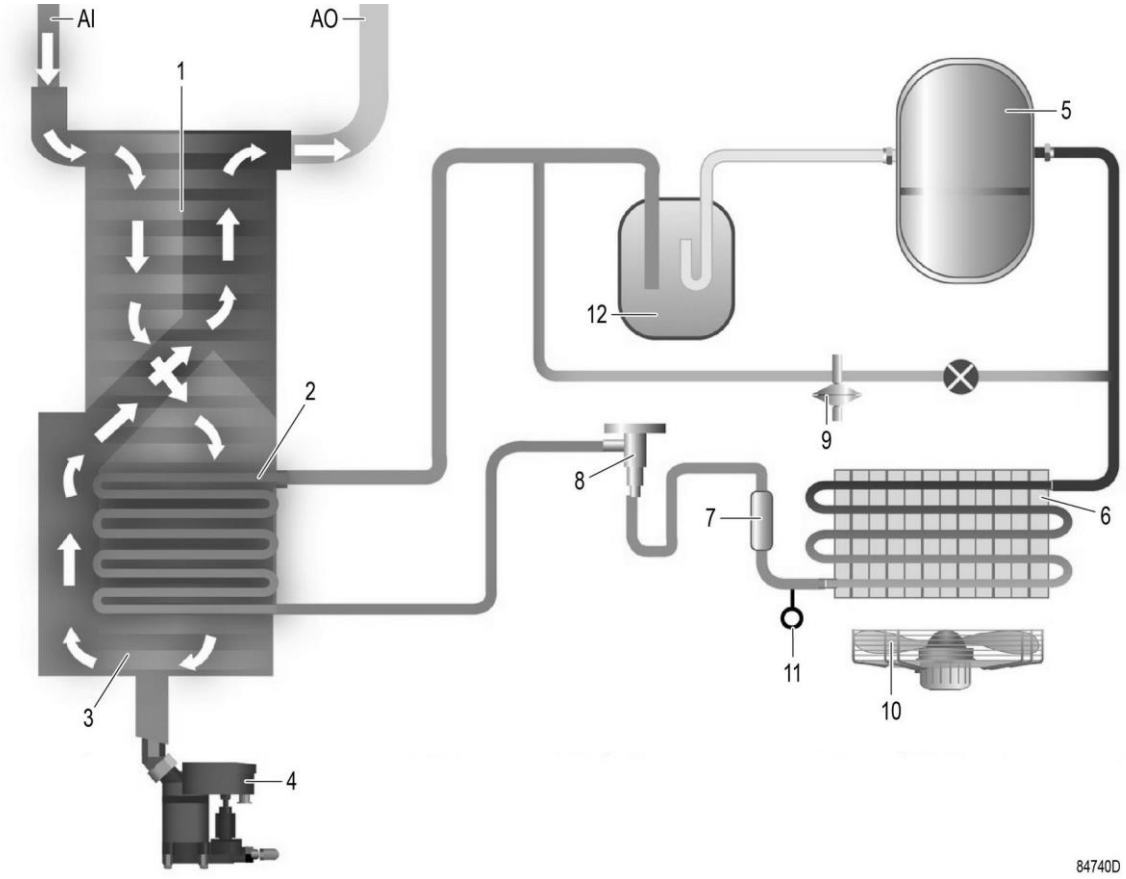
Reference	Designation
T1	Transformer
Q15	Circuit breaker
Q1	Circuit breaker
K15	Contactor
Z1	EMC filter
U1	Frequency converter

Electrical diagrams

The complete electric diagram can be found in the electrical cabinet and on the CD-ROM, DVD or USB, supplied with the unit.

2.6 Air dryer

Flow diagram



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	Thermostatic expansion valve
9	Bypass valve
10	Condenser cooling fan
11	Pressure switch, fan control
12	Liquid separator

Compressed air circuit

Compressed air enters the heat exchanger (1) and is cooled by the outgoing, cold, dried air.

Water in air starts to condense. Then, the air flows through the heat exchanger/evaporator (2), where the refrigerant evaporates.

This causes the air to cool further close to the evaporating temperature of the refrigerant. More water in the air condenses.

The cold air flows through the separator (3) where all the condensate gets out of the air.

The condensate is automatically drained through the outlet (4).

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

Refrigerant circuit

The refrigerant compressor (5) delivers hot, high-pressure refrigerant gas which flows through the refrigerant condenser (6).

Most of the refrigerant condenses.

The liquid refrigerant flows through the liquid refrigerant dryer/filter (7) to the TEV (8). The refrigerant leaves the thermostatic expansion valve at about evaporating pressure.

The refrigerant enters the evaporator (2) where it gets heat from the compressed air by further evaporation at about constant pressure.

The heated refrigerant leaves the evaporator and gets into the compressor (5) through a liquid separator (12).

A bypass valve (9) regulates the refrigerant flow.

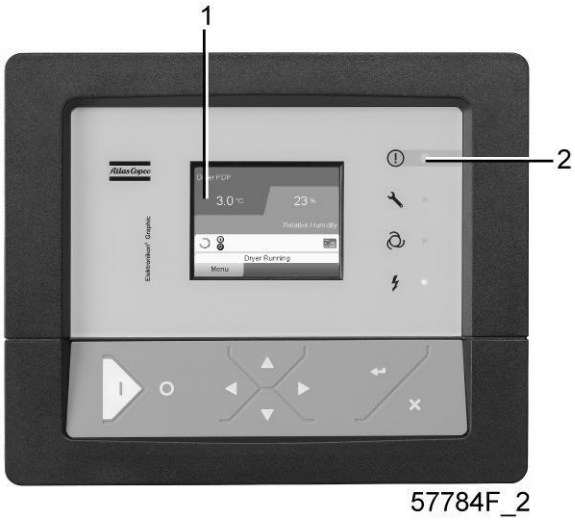
The fan (10) blows cool air over the refrigerant condenser (6)

Pressure switch (11) controls fan (10), depending on the operating conditions.

3 Elektronikon® Graphic controller

3.1 Elektronikon™ Graphic controller

Control panel



Display of the Elektronikon™ Graphic controller

Introduction

The Elektronikon™ controller has following functions:

- Controlling the compressor
- Protecting the compressor
- Monitoring components subject to service
- Automatic restart after voltage failure (made inactive)

Automatic control of the compressor operation

The controller maintains the net pressure within programmable limits by automatically adapting the motor speed. A number of programmable settings, e.g. the setpoint, the minimum stop time and the maximum number of motor starts and several other parameters are hereby taken into account.

The controller stops the compressor whenever possible to reduce the power consumption and restarts it automatically when the net pressure decreases. In case of risk for condensate forming in the oil, the compressor activates the condensate prevention cycle and keeps running for a specified time.

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

Protecting the compressor

Shut-down

Several sensors are provided on the compressor. If one of the measured signals exceeds the programmed shut-down level, the compressor will be stopped. This will be indicated on display (1) and general alarm LED (2) will blink.

Remedy the trouble and reset the message.

	Before remedying, consult the applicable safety precautions

Shut-down warning

A shut-down warning level is a programmable level below the shut-down level.

If one of the measured signals exceeds the programmed shut-down warning level, a message will appear on display (1) and general alarm LED (2) will light up to warn the operator that the shut-down warning level

is exceeded.

The message disappears as soon as the warning condition disappears.

Warning

A warning message will appear if, on Full-Feature compressors, the dew point temperature is too high in relation to the ambient temperature.

Service warning

A number of service operations are grouped (called Service Plans). Each Service Plan has a programmed time interval. If a time interval is exceeded, a message will appear on display (1) to warn the operator to carry out the service actions belonging to that Service Plan.

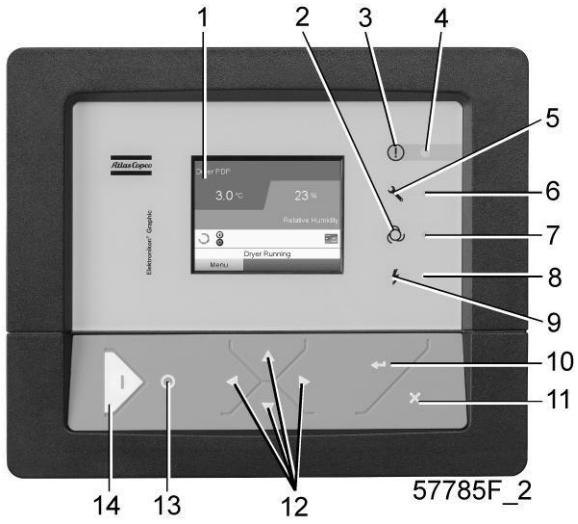
Automatic restart after voltage failure

The controller has a built-in function to automatically restart the compressor when the voltage is restored after voltage failure. For compressors leaving the factory, this function is made inactive. If desired, the function can be activated. The ARAVF label 1079 9932 74 (see section Pictographs) shall be glued near to the controller. Consult the Atlas Copco Customer Centre.

	If the function is activated and provided the regulator was in the automatic operation mode, the compressor will automatically restart if the supply voltage to the module is restored.

3.2 Control panel

Elektronikon regulator



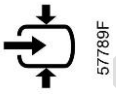
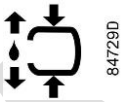
Control panel

Parts and functions

Reference	Designation	Function
1	Display	Shows the compressor operating condition and a number of icons to navigate through the menu.
2	Pictograph	Automatic operation
3	Pictograph	General alarm
4	Alarm LED	Flashes in case of a shut-down, is lit in case of a warning condition.
5	Pictograph	Service
6	Service LED	Lights up if service is needed
7	Automatic operation LED	Indicates that the regulator is automatically controlling the compressor.
8	Voltage on LED	Indicates that the voltage is switched on.
9	Pictograph	Voltage
10	Enter key	Use this button to confirm the last action.
11	Escape key	Use this button to go to previous screen or to end the current action.
12	Scroll keys	Keys to scroll through the menu.
13	Stop button	Button to stop the compressor. LED (7) goes out.
14	Start button	Button to start the compressor. LED (7) lights up indicating that the Elektronikon regulator is operative.

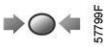
3.3 Icons used

Status icons

Name	Icon	Description
Stopped / Running	 57786F	When the compressor is stopped, the icon stands still. When the compressor is running, the icon is rotating.
Compressor status	 57787F	Motor stopped
	 57788F	Running unloaded
	 57789F	Running loaded
	 84729D	Condensate prevention cycle
Machine control mode	 57790F or  59161F	Local start / stop
	 57791F	Remote start / stop
	 57792F	Network control
Automatic restart after voltage failure	 57793F	Automatic restart after voltage failure is active
Week timer	 57794F	Week timer is active
Active protection functions	 57795F	Emergency stop

Name	Icon	Description
		Shutdown
		Warning
Service		Service required
Main screen display		Value lines display icon
		Chart display icon
General icons		No communication / network problem
		Not valid
		General alarm

Input icons

Icon	Description
	Pressure
	Temperature
	Digital input
	Special protection

System icons

Icon	Description
	Compressor element
	Dryer
	Fan
	Frequency converter
	Drain
	Filter
	Motor
	Failure expansion module

Menu icons

Icon	Description
	Inputs
	Outputs
	Alarms (Warnings, shutdowns)
	Counters
	Test
	Settings
	Service
	Event history (saved data)
	Access key / User password

Icon	Description
	Network
	Setpoint
	Info

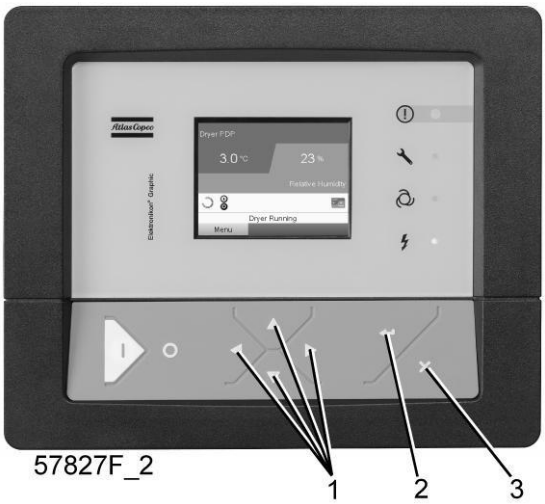
Navigation arrows

Icon	Description
	Up
	Down

	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

Control panel



(1)	Scroll keys
(2)	Enter key
(3)	Escape key

Function

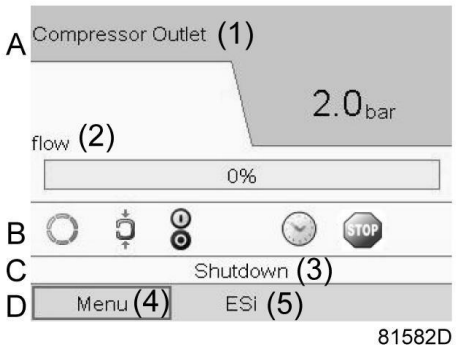
The Main screen is the screen that is shown automatically when the voltage is switched on and one of the keys is pushed. It is switched off automatically after a few minutes when no keys are pushed.

Typically, 5 different main screen views can be chosen:

1. Two value lines
2. Four value lines
3. Chart (High resolution)
4. Chart (Medium resolution)
5. Chart (Low resolution)

Two and four value lines screens

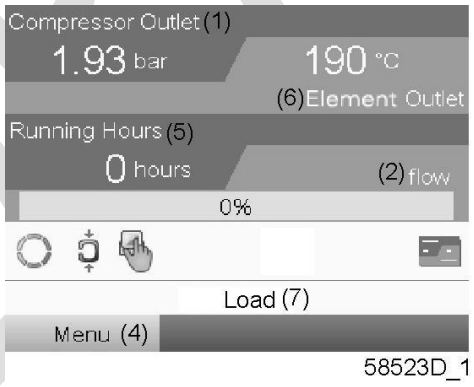
This type of Main screen shows the value of 2 or 4 parameters (see section Inputs menu).



Typical Main screen (2 value lines)

Text on figures

(1)	Compressor Outlet
(2)	Flow
(3)	Load, shutdown, ... (text varies upon the compressors actual condition)
(4)	Menu
(5)	Unload, ES,...(text varies upon the compressors actual condition)



Typical Main screen (4 value lines)

Text on figures

(1)	Compressor Outlet
(2)	Flow
(3)	Off, Shutdown,... (text varies upon the compressors actual condition)
(4)	Menu
(5)	Running hours
(6)	Element outlet
(7)	Load, Unload, ... (text varies upon the compressors actual condition)

- **Section A** shows information regarding the compressor operation (e.g. the outlet pressure or the temperature at the compressor outlet). On compressors with a frequency converter, the load degree (flow) is given in % of the maximum flow.
- **Section B** shows Status icons. Following icon types are shown in this field:
  - Fixed icons

    These icons are always shown in the main screen and cannot be selected by the cursor (e.g. Compressor stopped or running, Compressor status (running, running unloaded or motor stopped).
  - Optional icons

    These icons are only shown if their corresponding function is activated (e.g. week timer, automatic restart after voltage failure , etc.)
  - Pop up icons

    These icons pop up if an abnormal condition occurs (warnings, shutdowns, service,...)

To call up more information about the icons shown, select the icon concerned using the scroll keys and press the enter key.

- **Section C** is called the Status bar

  This bar shows the text that corresponds to the selected icon.
- **Section D** shows the Action buttons. These buttons are used:
  - To call up or program settings
  - To reset a motor overload, service message or emergency stop
  - To have access to all data collected by the regulator

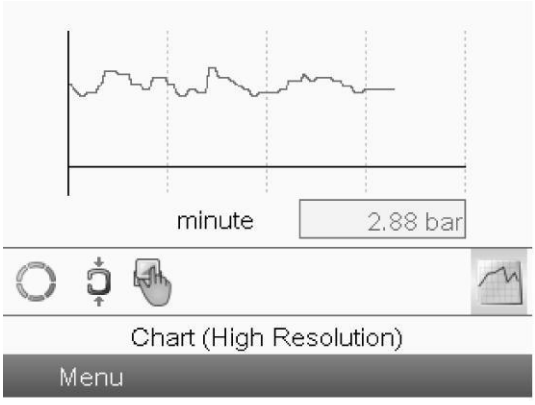
The function of the buttons depends on the displayed menu. The most common functions are:

Designation	Function
Menu	To go to the menu
Modify	To modify programmable settings
Reset	To reset a timer or message

To activate an action button, highlight the button by using the Scroll keys and press the Enter key.
To go back to the previous menu, press the Escape key.

Chart views

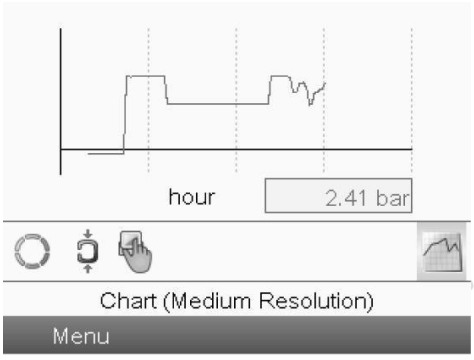
Instead of viewing values, it is also possible to view a graph of one of the input signals (see section Inputs menu) in function of the time.



59166D

When Chart (High Resolution) is selected, the chart shows the variation of the selected input (in this case the pressure) per minute. Also the instantaneous value is displayed. The screen shows the last 4 minutes.

The switch button (icon) for selecting other screens is changed into a small Chart and is highlighted (active).



59167D

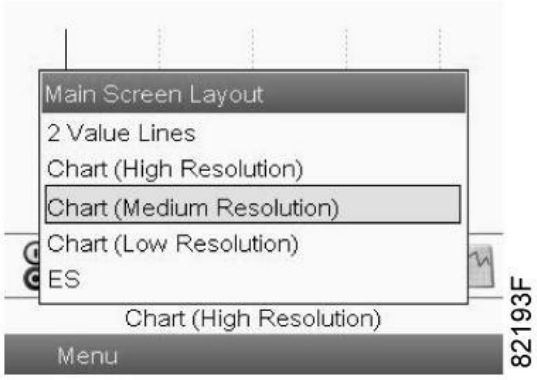
When the Chart (Medium Resolution) is selected, the chart shows the variation of the selected input per hour. The screen shows the last 4 hours.

59168D

When the Chart (Low Resolution) is selected, the chart shows the variation of the selected input per day. The screen shows the evolution over the last 10 days.

Selection of a main screen view

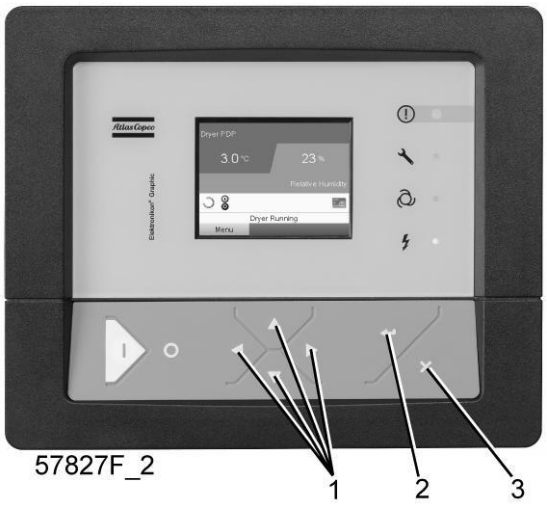
To change between the different screen layouts, select the far right icon in the control icons line (see value lines display icon or chart display icon in section Icons used) and press the Enter key. A screen similar to the one below opens:



82193F

Select the layout required and press the Enter key. See also section Inputs menu.

3.5 Calling up menus

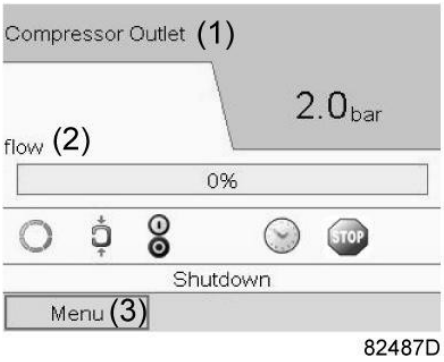


Control panel

(1)	Scroll keys
(2)	Enter key
(3)	Escape key

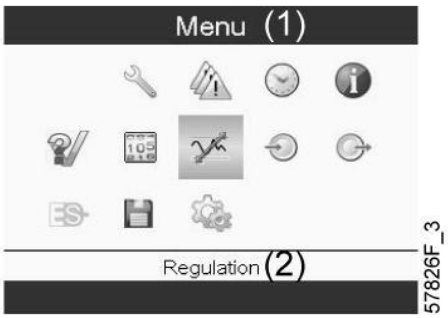
Description

When the voltage is switched on, the main screen is shown automatically (see section Main screen):



Typical Main screen (2 value lines)

- To go to the Menu screen, select <Menu> (3), using the Scroll keys.
- Press the Enter key to select the menu. Following screen appears:



The screen shows a number of icons. Each icon indicates a menu item. By default, the

- Pressure Settings (Regulation) icon is selected. The status bar shows the name of the menu that corresponds with the selected icon.
- Use the Scroll keys to select an icon.
- Press the Escape key to return to the Main screen.

3.6 Inputs menu

Menu icon, Inputs

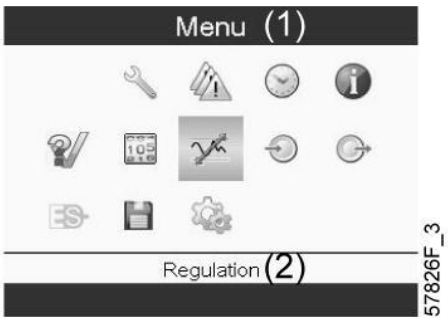
Function

- To display the actual value of the measured data (analog inputs) and the status of the digital inputs (e.g. emergency stop contact, motor overload relay, etc.).
- To select the digital input to be shown on the chart in the main screen.

Procedure

Starting from the main screen,

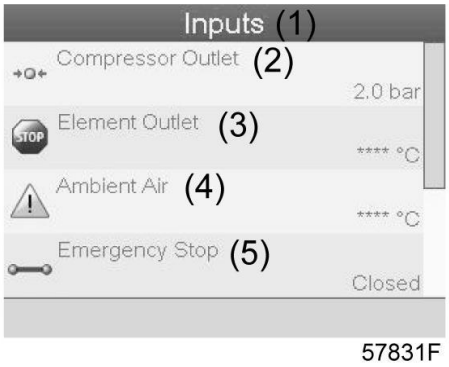
- Move the cursor to the action button Menu and press the Enter key. Following screen appears:



Text on image

(1)	Menu
(2)	Regulation

- Using the Scroll keys, move the cursor to the Inputs icon (see above, section Menu icon).
- Press the Enter key. A screen similar to the one below appears:



Text on image

(1)	Inputs
(2)	Compressor Outlet
(3)	Element Outlet
(4)	Ambient Air
(5)	Emergency Stop

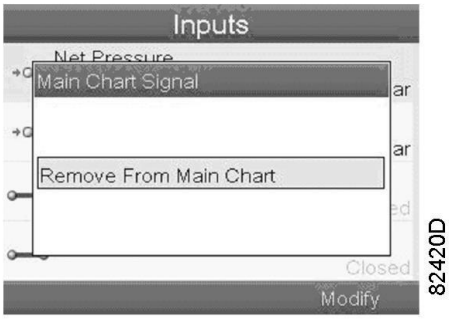
- The screen shows a list of all inputs with their corresponding icons and readings.
- If an input is in warning or shutdown, the original icon is replaced by the warning or shutdown icon respectively (in this case the Stop icon and the Warning icon in the screen shown above).

A small chart icon, shown below an item in the list means this input signal is shown on the chart at the main screen. Any analog input can be selected.

Selecting another input signal as main chart signal

Select the Modify button and press the Enter button on the controller. A screen similar to the one below appears:

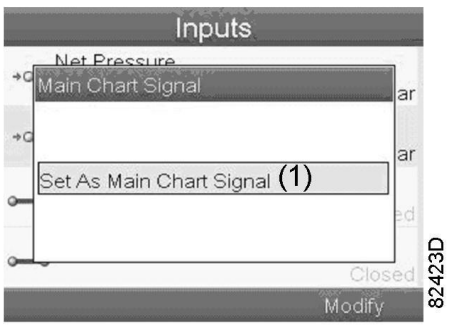
The first item in the list is highlighted. In this example, the Net Pressure is selected (chart icon). To change, press the Enter button again. A popup window opens:



Press Enter again to remove this input from the chart. Another confirmation popup opens:

Select Yes to remove or No to quit the current action.

In a similar way, another input signal can be highlighted and selected as Main Chart Signal:



(1): Set as Main Chart Signal

3.7 Outputs menu

Menu icon, Outputs

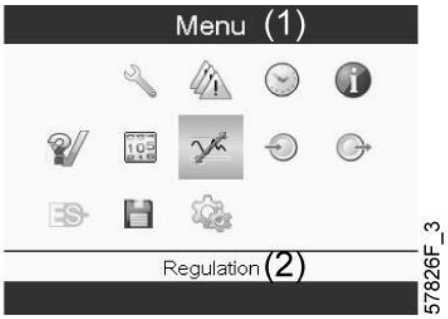
Function

To call up information regarding the actual status of some outputs such as the condition of the fan overload contact (on air cooled compressors), the Emergency stop contact, etc.

Procedure

Starting from the Main screen,

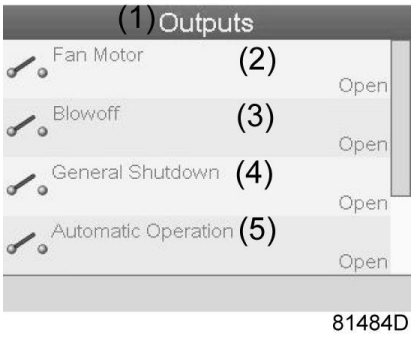
- Move the cursor to the action button Menu and press the Enter key. Following screen appears



Text on image

(1)	Menu
(2)	Regulation

- Move the cursor to the Outputs icon (see above, section Menu icon, using the Scroll keys.
- Press the Enter key. A screen similar to the one below appears:



Outputs screen (typical)

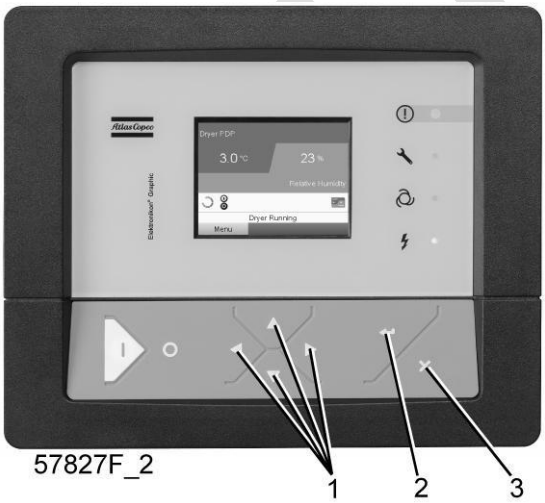
Text on image

(1)	Outputs
(2)	Fan motor contact
(3)	Blow-off contact
(4)	General shutdown
(5)	Automatic operation

- The screen shows a list of all outputs with their corresponding icons and readings.
  If an output is in warning or shutdown, the original icon is replaced by the warning or shutdown icon respectively.

3.8 Counters

Control panel



(1)	Scroll keys
(2)	Enter key
(3)	Escape key

Menu icon, Counters

Function

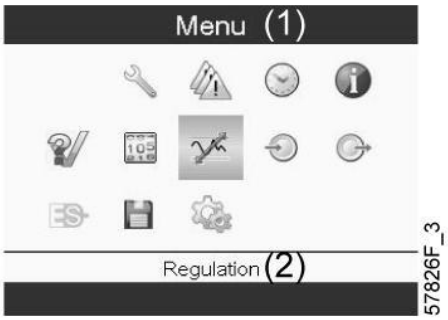
To call up:

- The running hours
- The loaded hours
- The number of motor starts
- The number of hours that the regulator has been powered
- The number of load cycles
- The number of recirculation cycles
- The number of recirculation cycle failures

Procedure

Starting from the Main screen (see Main screen),

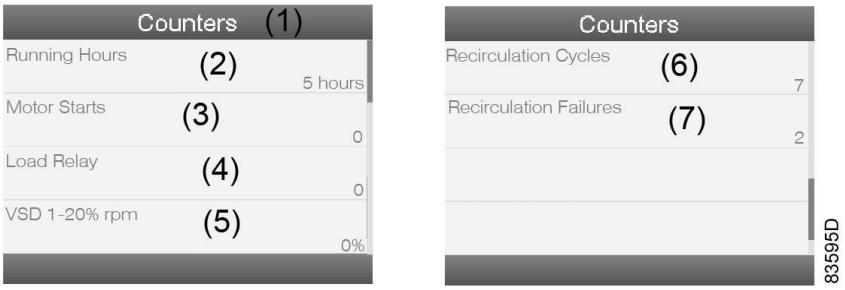
- Move the cursor to the action button Menu and press the Enter key. Following screen appears:



Text on figure

(1)	Menu
(2)	Regulation

- Using the Scroll keys, move the cursor to the Counters icon (see above, section Menu icon)
- Press the Enter key. Following screen appears:



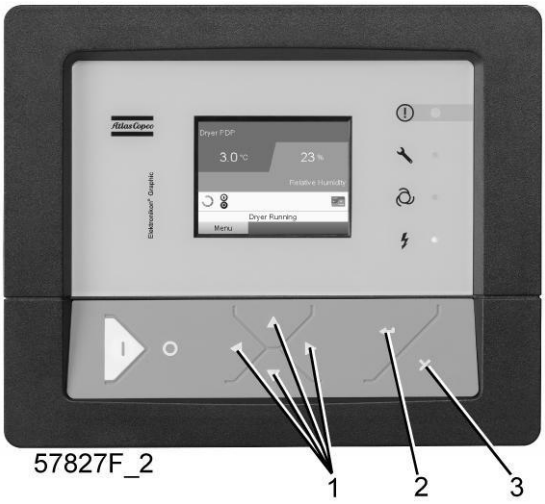
Text on figure

(1)	Counters
(2)	Running Hours
(3)	Motor Starts
(4)	Load Relay
(5)	VSD 1-20 % rpm in % (the percentage of the time during which the motor speed was between 1 and 20 %)
(6)	Recirculation Cycles
(7)	Recirculation Failures

The screen shows a list of all counters with their actual readings.

3.9 Control mode selection

Control panel



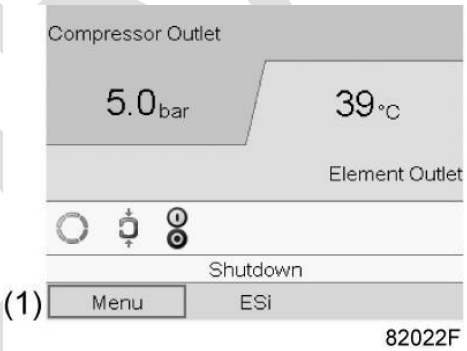
(1)	Scroll keys
(2)	Enter key
(3)	Escape key

Function

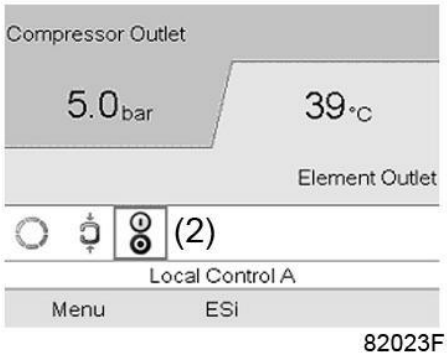
To select the control mode, i.e. whether the compressor is in local control, remote control or controlled via a local area network (LAN).

Procedure

Starting from the main screen, make sure the button Menu (1) is selected:

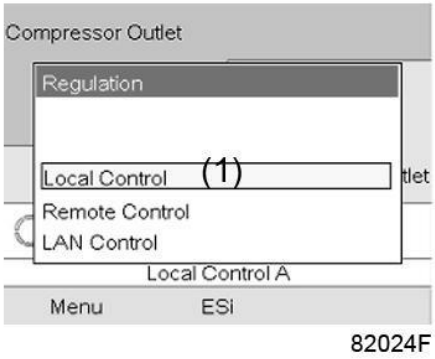


Next, use the scroll buttons to go to the regulation icon (2) and press the enter button:



There are 3 possibilities:

- Local control
- Remote control
- LAN (network) control



After selecting the required regulation mode, press the enter button on the controller to confirm your selection. The new setting is now visible on the main screen. See section Icons used for the meaning of the icons.

3.10 Service menu

Menu icon, Service

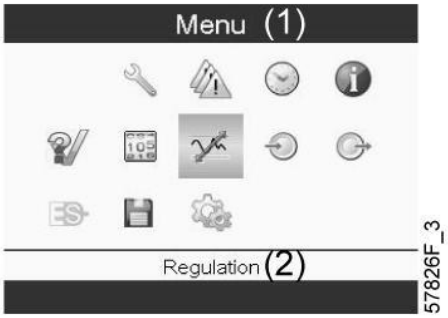
Function

- To reset the service plans which are carried out.
- To check when the next service plans are to be carried out.
- To find out which service plans were carried out in the past.
- To modify the programmed service intervals.

Procedure

Starting from the Main screen,

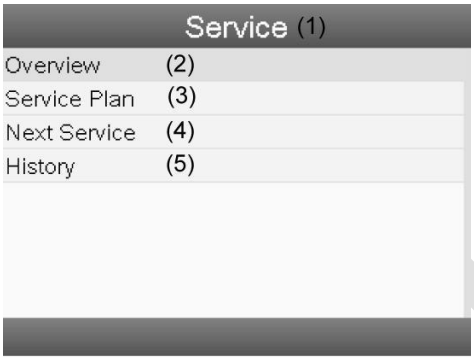
- Move the cursor to the action button Menu and press the Enter key. Following screen appears:



Text on image

(1)	Menu
(2)	Regulation

- Using the Scroll keys, move the cursor to the Service icon (see above, section Menu icon).
- Press the Enter key. Following screen appears:



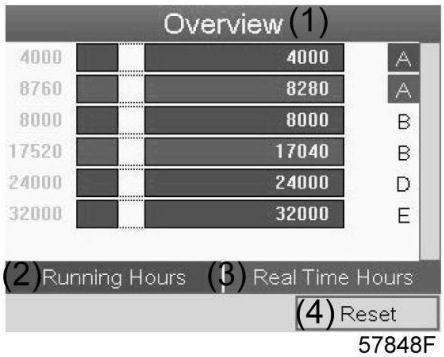
57847F_1

Text on image

(1)	Service
(2)	Overview
(3)	Service Plan
(4)	Next Service
(5)	History

- Scroll through the items to select the desired item and press the Enter key to see the details as explained below.

Overview



57848F

Text on image

(1)	Overview
(2)	Running Hours
(3)	Real Time Hours
(4)	Reset

Example for service level (A):

The figures at the left are the programmed service intervals. For Service interval A, the programmed number of running hours is 4000 hours (upper row) and the programmed number of real time hours is 8760 hours, which corresponds to one year (second row). This means that the controller will launch a service

warning when either 4000 running hours or 8760 real hours are reached, whichever comes first. Note that the real time hours counter keeps counting, also when the controller is not powered.

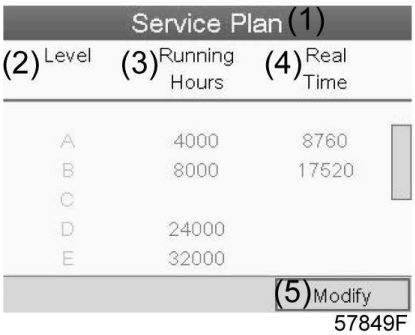
The figures within the bars are the number of hours to go till the next service intervention. In the example above, the compressor was just started up, which means it still has 4000 running hours or 8280 hours to go before the next Service intervention.

Service plans

A number of service operations are grouped (called Level A, Level B, etc...). Each level stands for a number of service actions to be carried out at the time intervals programmed in the Elektronikon® controller.

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

After carrying out the service actions related to the indicated levels, the timers must be reset. From the Service menu above, select Service plan (3) and press Enter. Following screen appears:

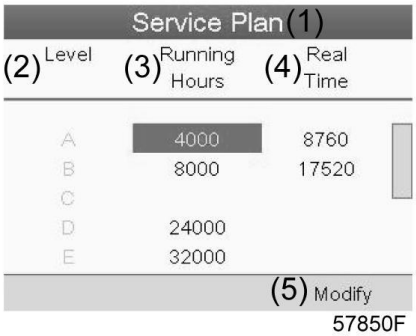


Text on image

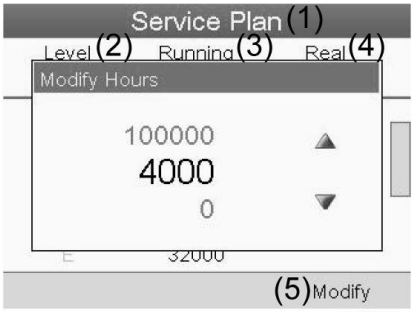
(1)	Service Plan
(2)	Level
(3)	Running hours
(4)	Real Time (hours)
(5)	Modify

Modifying a service plan

Dependant on the operating conditions, it can be necessary to modify the service intervals. To do so, use the Scroll keys to select the value to be modified. A screen similar to the one below appears:



Press the Enter key. Following screen appears:

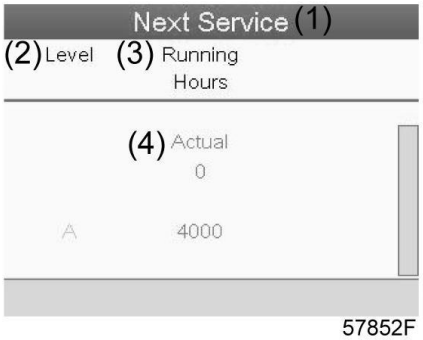


57851F

Modify the value as required using the ↑ or ↓ scroll key and press the Enter key to confirm.

Note: Running hours and real time hours can be modified in steps of 100 hours.

Next Service



57852F

Text on image

(1)	Next service
(2)	Level
(3)	Running Hours
(4)	Actual

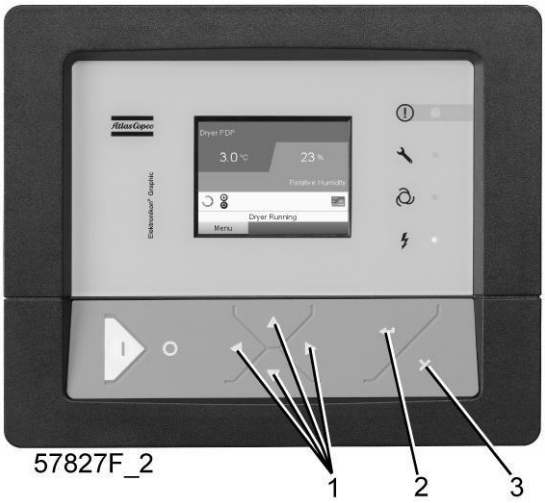
In the example above, the A Service level is programmed at 4000 running hours, of which 0 hours have passed.

History

The History screen shows a list of all service actions done in the past, sorted by date. The date at the top is the most recent service action. To see the details of a completed service action (e.g. Service level, Running hours or Real time hours), use the Scroll keys to select the desired action and press the Enter key.

3.11 Modifying the setpoint

Control panel



(1)	Scroll keys
(2)	Enter key
(3)	Escape key

Menu icon, Setpoint

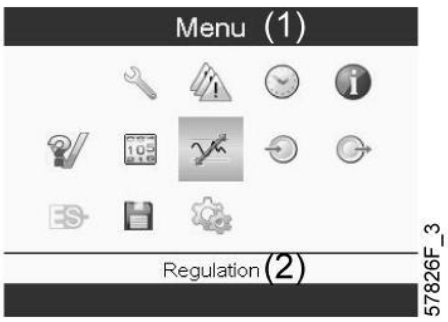
Fnction

On compressors with a frequency converter driven main motor, it is possible to program two different setpoints. This menu is also used to select the active setpoint.

Procedure

Starting from the Main screen,

- Highlight the action key Menu using the Scroll keys and press the Enter key. Following screen appears:



Text on image

(1)	Menu
(2)	Regulation

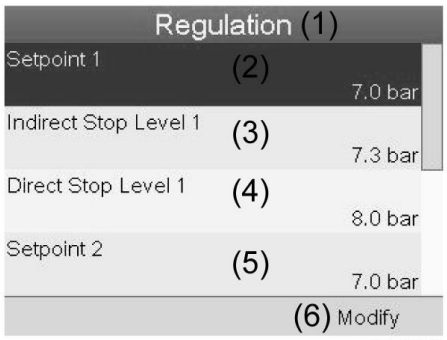
- Activate the menu by pressing the enter key. A screen similar to the one below appears:

57828F

Text on image

(1)	Regulation
(2)	Setpoint 1
(3)	Indirect stop level 1
(4)	Direct stop level 1
(5)	Setpoint 2
(6)	Modify

- The screen shows the actual settings.
- To modify the settings, move the cursor to the action button Modify and press the Enter key. Following screen appears:



57829F

- The first line of the screen is highlighted. Use the Scroll keys (1) to highlight the setting to be modified and press the Enter key (2). Following screen appears:

The upper and lower limit of the setting is shown in grey, the actual setting is shown in black. Use the ↑ or ↓ key of the Scroll keys to modify the settings as required and press the Enter key to accept.

If necessary, change the other settings as required in the same way as described above.

Indirect stop: occurs when the pressure rises to the pre-set Indirect stop setpoint (= setpoint plus Indirect stop level). The motor will decelerate to minimum speed and the compressor will switch to unloaded condition.

Direct stop: occurs when the compressor runs at a speed between minimum and maximum and the net pressure rises above the direct stop setpoint (= setpoint plus Direct stop level).

Both settings (Indirect stop level and Direct stop level) are programmable, see section Programmable settings.

3.12 Event history menu

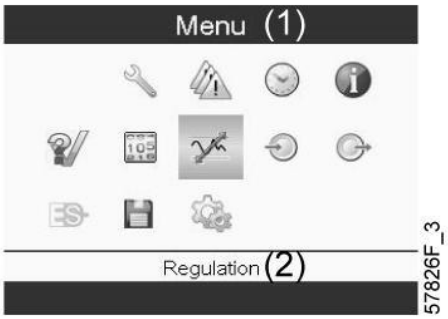
Menu icon, Event History

Function

To call up the last shutdown and last emergency stop data.

Procedure

- Starting from the Main screen, move the cursor to the action button Menu and press the Enter key. Following screen appears:



Text on image

(1)	Menu
(2)	Regulation

- Using the Scroll keys, move the cursor to the Event History icon (see above, section Menu icon)
- The list of last shutdown and emergency stop cases is shown.

Example of Event History screen

- Scroll through the items to select the desired shutdown or emergency stop event.
- Press the Enter key to find the date, time and other data reflecting the status of the compressor when that shutdown or emergency stop occurred.

3.13 Modifying general settings

Menu icon, Settings

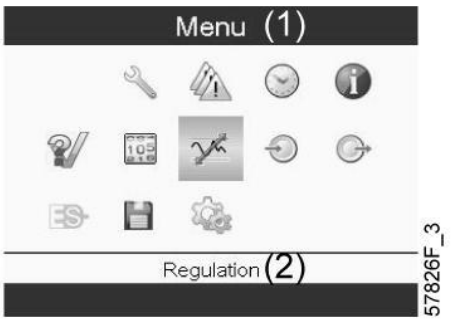
Function

To display and modify a number of settings.

Procedure

Starting from the Main screen,

- Move the cursor to the action button Menu and press the Enter key. Following screen appears:

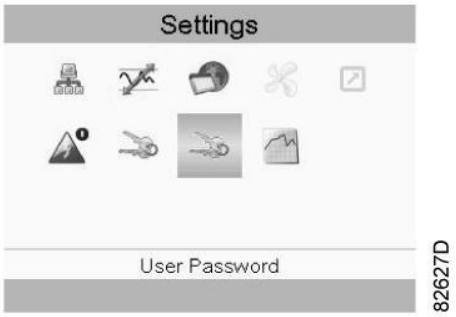


Text on image

(1)	Menu
(2)	Regulation

- Next, move the cursor to the Settings icon (see above, section Menu icon), using the Scroll keys.

- Press the Enter key. Following screen appears:

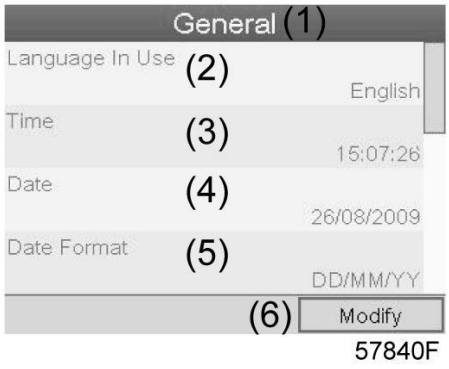


This screen shows again a number of icons. By default, the User Password icon is selected. The status bar shows the description that corresponds with the selected icon. Each icon covers one or more items , such as

- Access key
- User password
- Main chart
- General
- Automatic restart after voltage failure (ARAVF)
- Network
- Regulation

For adapting certain parameters, a password may be necessary.

Example: Selecting the General Settings icon gives the possibility to change e.g. the language, the date, the date format, etc.:



Text on image

(1)	General
(2)	Language in Use
(3)	Time
(4)	Date
(5)	Date Format
(6)	Modify

- To modify, select the Modify button using the Scroll keys and press the Enter key.
- A screen similar to the one above is shown, the first item (Language) is highlighted. Use the ↓ key of the Scroll keys to select the setting to be modified and press the Enter key.
- A pop-up screen appears. Use the ↑ or ↓ key to select the required value and press the Enter key to confirm.

3.14 Info menu

Menu icon, Info

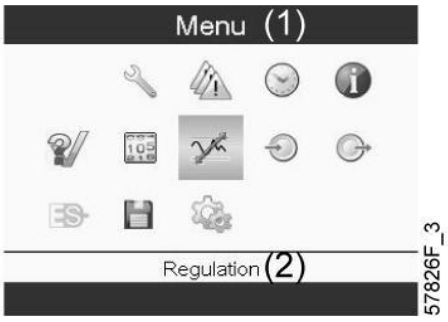
Function

To show the Atlas Copco internet address.

Procedure

Starting from the Main screen,

- Move the cursor to the action button Menu and press the Enter key. Following screen appears:



Text on image

(1)	Menu
(2)	Regulation

- Using the Scroll keys, move the cursor to the Info icon (see above, section Menu icon).
- Press the Enter key. The Atlas Copco internet address appears on the screen.

3.15 Week timer menu

Menu icon, Week timer

Function

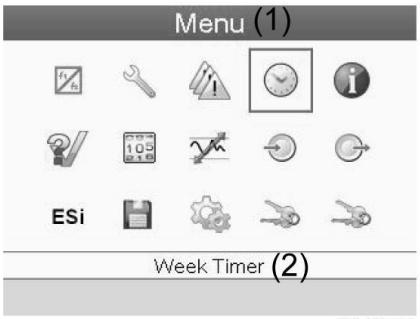
- To program time based start/stop commands for the compressor
- To program time based changeover commands for the net pressure band
- Four different week schemes can be programmed.
- A week cycle can be programmed, a week cycle is a sequence of 10 weeks. For each week in the cycle, one of the four programmed week schemes can be chosen.

	Important remark: In the Elektronikon you can select different timers on one day (up to 8 actions). It is however not possible to program 2 actions at the same time. The solution: leave at least 1 minute in between 2 actions. Example: Start Compressor: 5.00 AM, Pressure Setpoint 2: 5.01 AM (or later).

Procedure

Starting from the Main screen (see section Main screen),

- Move the cursor to the action button Menu and press the Enter key. Use the Scroll buttons to select the Timer icon.

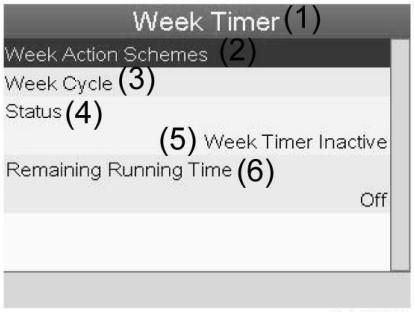


81485D

Text on image

(1)	Menu
(2)	Week Timer

- Press the Enter key on the controller. Following screen appears:



81486D

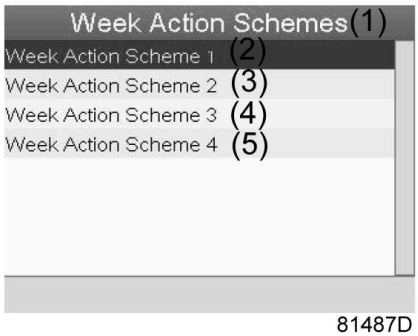
Text on image

(1)	Week Timer
(2)	Week Action Schemes
(3)	Week Cycle
(4)	Status
(5)	Week Timer Inactive
(6)	Remaining Running Time

The first item in this list is highlighted. Select the item requested and press the Enter key on the controller to modify.

Programming week schemes

- Select Week action schemes and press Enter. A new window opens. The first item in the list is highlighted. Press the Enter key on the controller to modify Week Action Scheme 1.

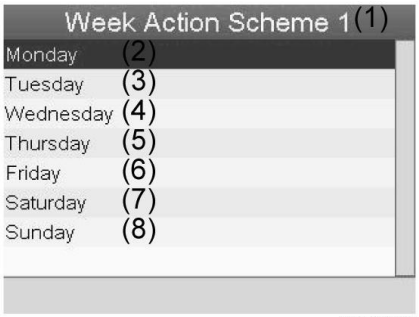


81487D

Text on image

(1)	Week Action Schemes
(2)	Week Action Scheme 1
(3)	Week Action Scheme 2
(4)	Week Action Scheme 3
(5)	Week Action Scheme 4

- A weekly list is shown. Monday is automatically selected and highlighted. Press the Enter key on the controller to set an action for this day.

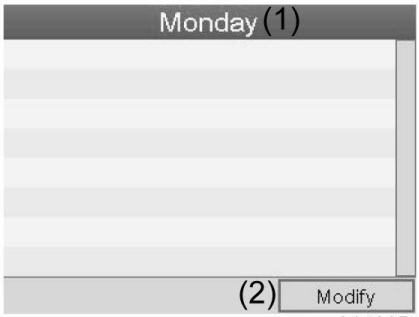


81488D

Text on image

(1)	Week Action Scheme 1
(2)	Monday
(3)	Tuesday
(4)	Wednesday
(5)	Thursday
(6)	Friday
(7)	Saturday
(8)	Sunday

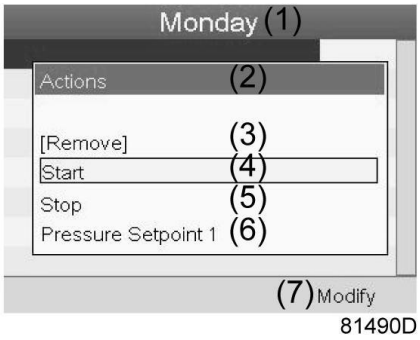
A new window opens. The Modify action button is selected. Press the enter button on the controller to create an action.



Text on image

(1)	Monday
(2)	Modify

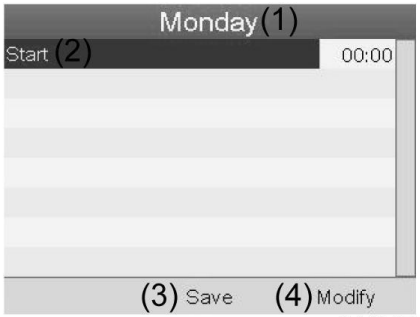
- A new pop-up window opens. Select an action from this list by using the Scroll keys on the controller. When ready press the Enter key to confirm.



Text on image

(1)	Monday
(2)	Actions
(3)	Remove
(4)	Start
(5)	Stop
(6)	Pressure Setpoint 1
(7)	Modify

- A new window opens. The action is now visible in the first day of the week.

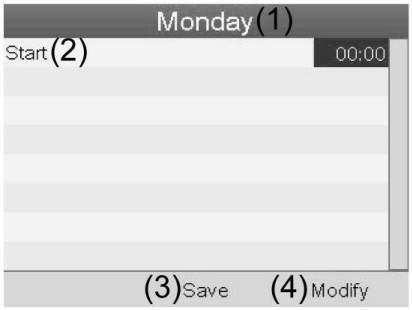


81491D

Text on image

(1)	Monday
(2)	Start
(3)	Save
(4)	Modify

- To adjust the time, use the Scroll keys on the controller to select the time and press the Enter key to confirm.

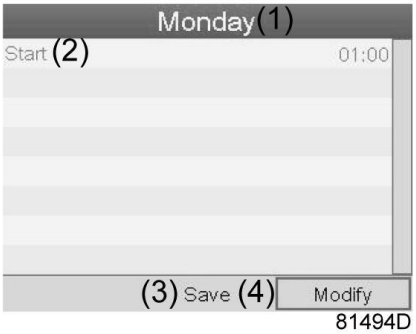


81492D

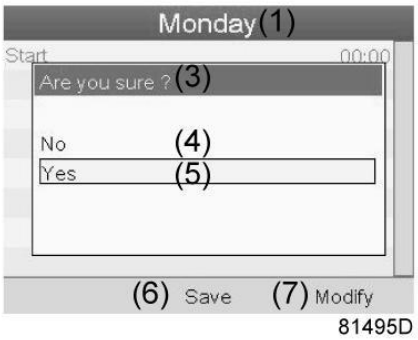
- A pop-up window opens. Use the ↑ or ↓ key of Scroll keys to modify the values of the hours. Use the ← or → Scroll keys to go to the minutes.

81493D

- Press the Escape key on the controller. The action button Modify is selected. Use the Scroll keys to select the actionSave.



- A new pop-up window opens. Use the Scroll keys on the controller to select the required action. Press the Enter key to confirm.

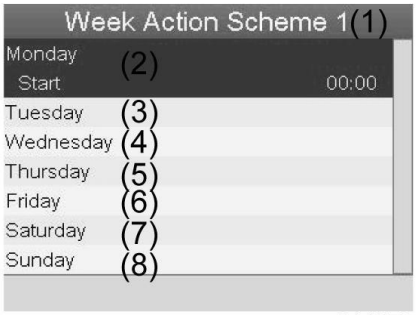


Text on image

(1)	Monday
(3)	Are you sure?
(4)	No
(5)	Yes
(6)	Save
(7)	Modify

Press the Escape key to leave this window.

- The action is shown below the day the action is planned.



81497D

Text on image

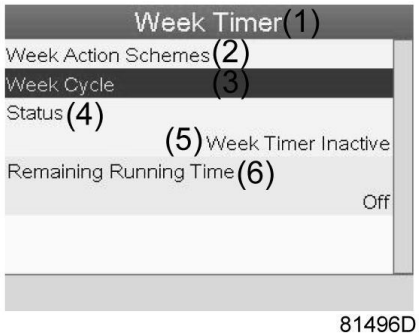
(1)	Week Action Scheme 1
(2)	Monday
(3)	Tuesday
(4)	Wednesday
(5)	Thursday
(6)	Friday
(7)	Saturday
(8)	Sunday

Press the Escape key on the controller to leave this screen.

Programming the week cycle

A week cycle is a sequence of 10 weeks. For each week in the cycle, one of the four programmed week schemes can be chosen.

- Select Week Cycle from the main Week Timer menu list.

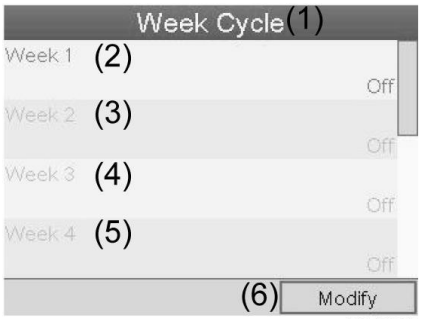


81496D

Text on image

(1)	Week Timer
(2)	Week Action Schemes
(3)	Week Cycle
(4)	Status
(5)	Week Timer Inactive
(6)	Remaining Running Time

- A list of 10 weeks is shown.

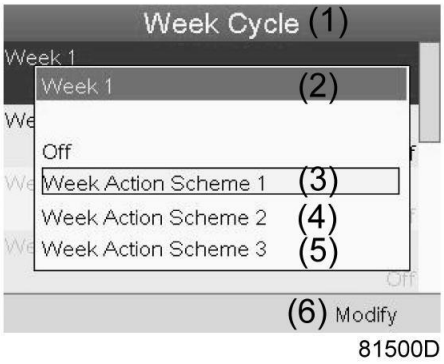


Text on image

(1)	Week Cycle
(2)	Week 1
(3)	Week 2
(4)	Week 3
(5)	Week 4
(6)	Modify

Press twice the Enter key on the controller to modify the first week.

- A new window opens. Select the action, example: Week Action Scheme 1



Text on image

(1)	Week Cycle
(2)	Week 1
(3)	Week Action Scheme 1
(4)	Week Action Scheme 2
(5)	Week Action Scheme 3
(6)	Modify

- Check the status of the Week Timer

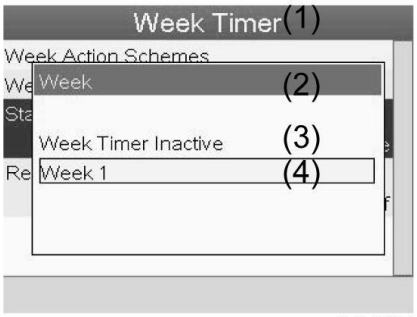
  Use the Escape key on the controller to go back to the main Week Timer menu. Select the status of the Week Timer.

81501D

Text on image

(1)	Week Timer
(2)	Week Action Schemes
(3)	Week Cycle
(4)	Status
(5)	Week Timer Inactive
(6)	Remaining Running Time

- A new window opens. Select Week 1 to set the Week Timer active.



81502D

Text on image

(1)	Week Timer
(2)	Week
(3)	Week Timer Inactive
(4)	Week 1

- Press the Escape key on the controller to leave this window. The status shows that week 1 is active.

81503D

Text on image

(1)	Week Timer
(2)	Week Action Schemes
(3)	Week Cycle
(4)	Status
(5)	Remaining Running Time

- Press the Escape key on the controller to go to the main Week Timer menu. Select Remaining Running Time from the list and press the Enter key on the controller to Modify.

81504D

Text on image

(1)	Week Timer
(2)	Week Action Schemes
(3)	Week Cycle
(4)	Status
(5)	Remaining Running Time

- This timer is used when the week timer is set and for certain reasons the compressor must continue working, for example, 1 hour, it can be set in this screen. This timer is prior to the Week Timer action.

Text on image

(1)	Week Timer
(2)	Week Action Schemes
(3)	Remaining Running Time

3.16 Test menu

Menu icon, Test

Or

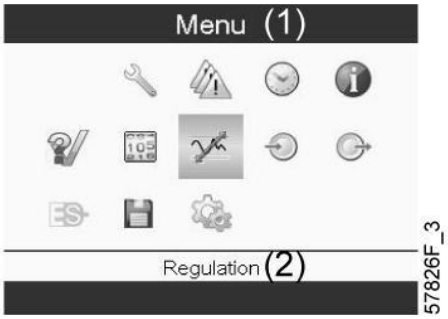
Function

- To carry out a display test, i.e. to check whether the display and LED's are still intact

Procedure

Starting from the Main screen,

- Move the cursor to the action button Menu and press the enter key (2), following screen appears:



Text on image

(1)	Menu
(2)	Regulation

- Using the scroll keys (1), move the cursor to the test icon (see above, section Menu icon)
- Press the enter key (2), following screen appears:

Text on image

(1)	Test
(2)	Safety Valve Test
(3)	Regreasing/Oil Draining

- The safety valve test can only be performed by authorized personnel and is protected by a security code.
- Select the item display test and press the enter key. A screen is shown to inspect the display, at the same time all LED's are lit.

3.17 User password menu

Menu icon, Password

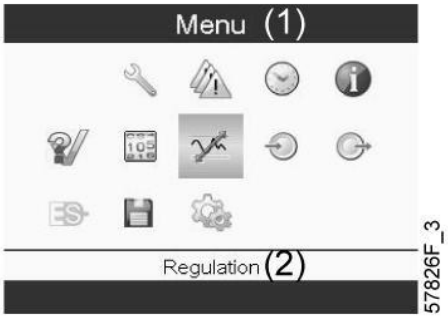
Function

If the password option is activated, it is impossible for not authorized persons to modify any setting.

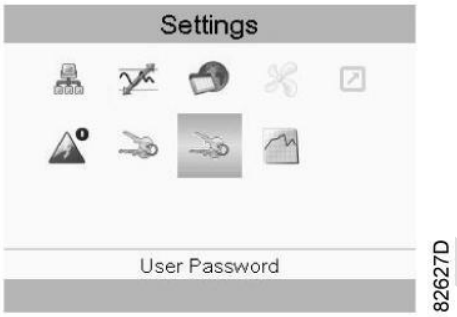
Procedure

Starting from the Main screen (see section Main screen),

- Move the cursor to Menu and press the Enter key (2). Following screen appears:



- Using the Scroll keys, select the Settings icon (see section Modifying general settings)
- Press the Enter key. Following screen appears:



- Move the cursor to the Password icon (see above, section Menu icon)
- Select <Modify> using the Scroll keys and press the Enter key. Next, modify the password as required.

3.18 Web server

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

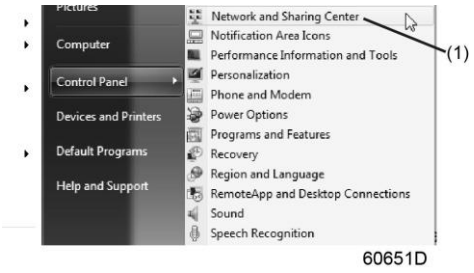
Getting started

Make sure you are logged in as administrator.

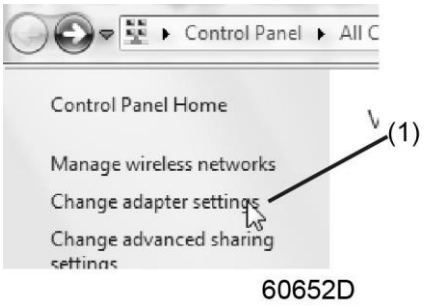
- Use the internal network card from your computer or a USB to LAN adapter.
- Use a UTP cable (CAT 5e) to connect to the controller (see picture below).

Configuration of the network card

- Go to Network and Sharing Center (1).



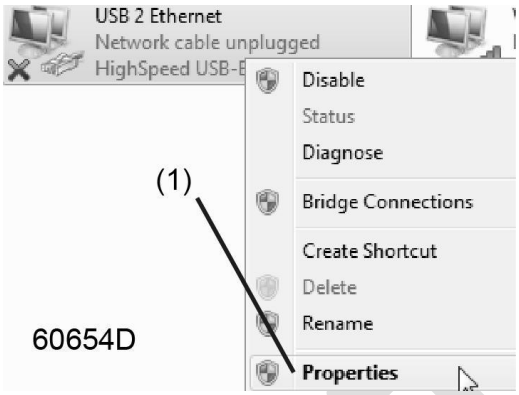
- Click on Change adapter settings (1).



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

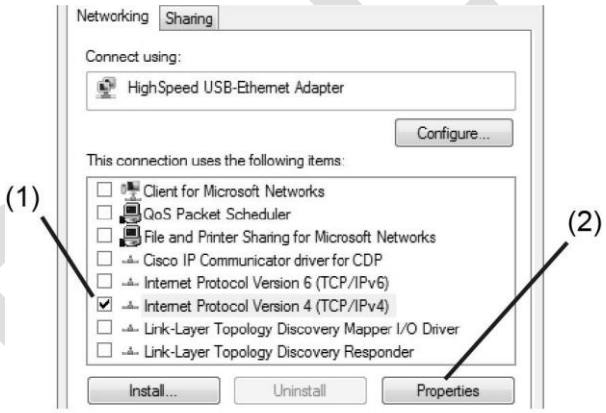
60653D

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



60654D

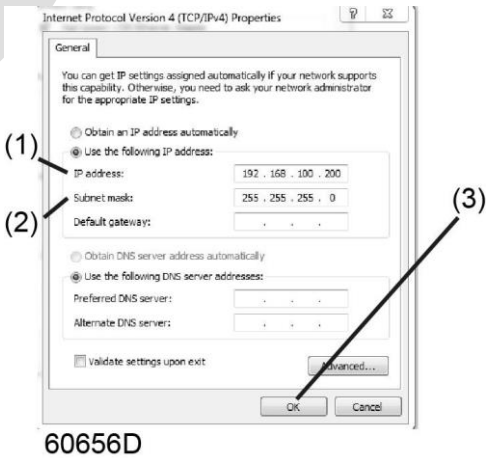
- Use the check box Internet Protocol version +4 (TCP/IPv4) (1) (see picture). To avoid conflicts, uncheck other properties if they are checked. After selecting TCP/IPv4, click on the Properties button (2) to change the settings.



60655D

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

Click OK (3) and close network connections.

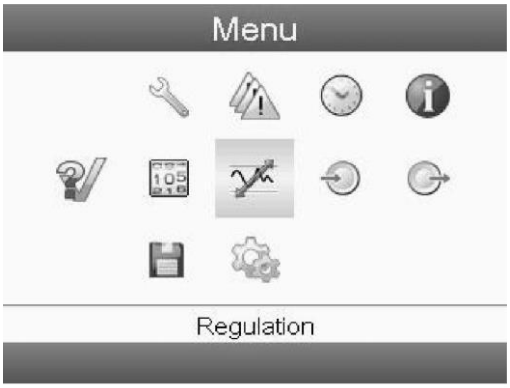


60656D

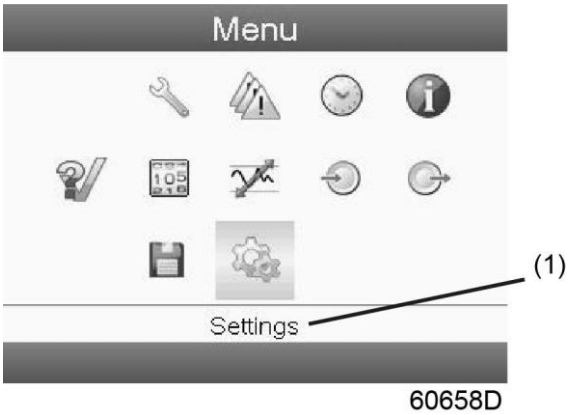
Configure a company network (LAN) connection

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

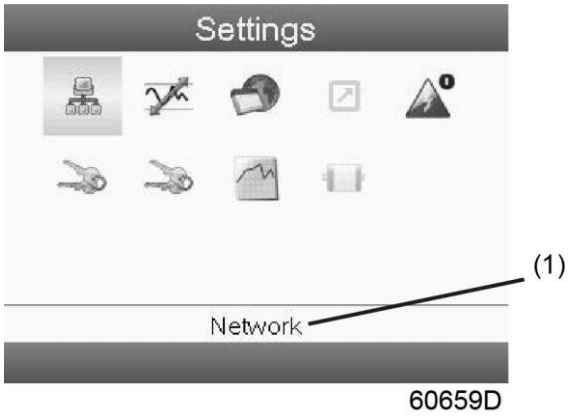
- Adapt the network settings in the controller:
  - Go to Main Menu



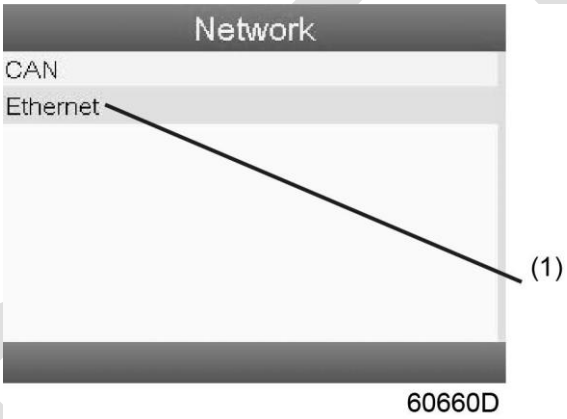
  - Go to Settings (1)



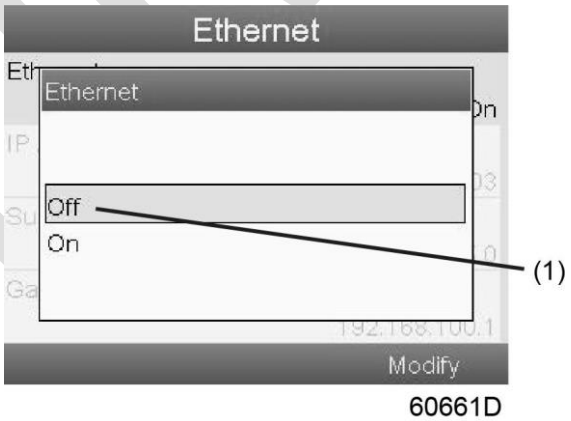
- Go to Network (1)



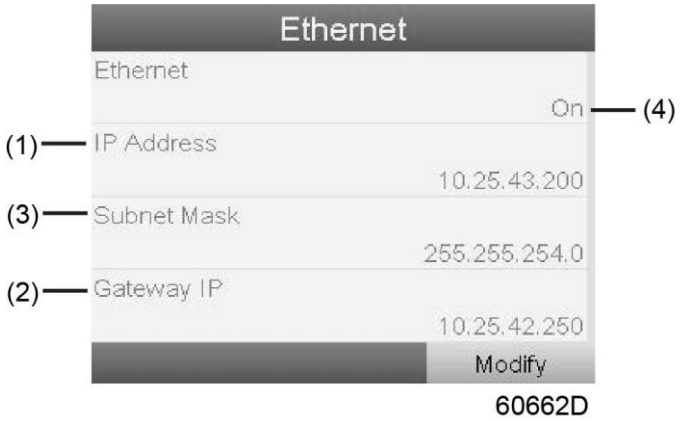
- Go to Ethernet (1)



- Switch Off (1) the Ethernet communication to allow editing the settings



- Adapt IP Address (1)
- Adapt Gateway IP (2)
- Adapt Subnet Mask (3)
- Switch On (4) the Ethernet communication



- Wait a few minutes so the LAN network can connect to the controller

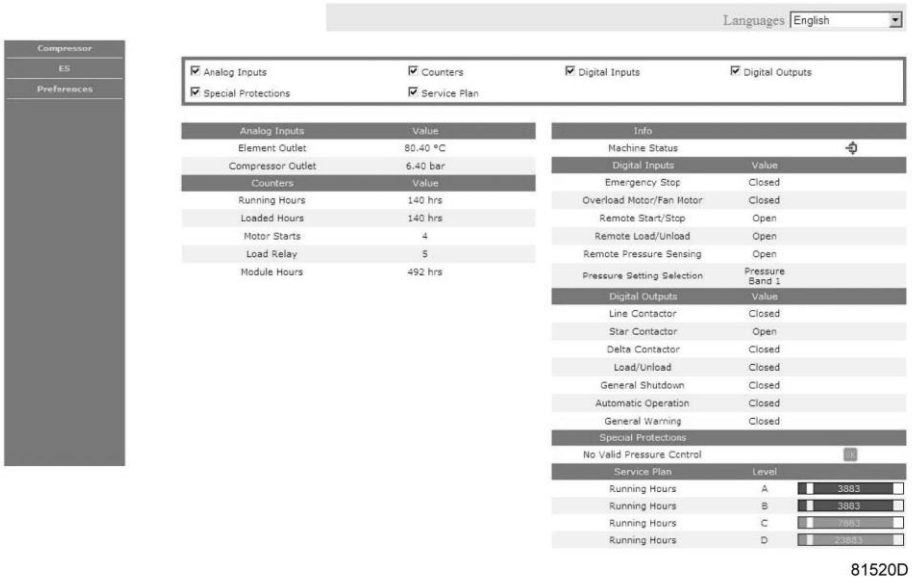
Configuration of the web server

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

Viewing the controller data

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

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



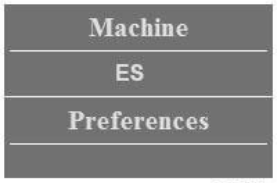
Screen shot (example!)

Navigation and options

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

81521D

- On the left side of the interface, you can find the navigation menu.
  If a license for ESi is foreseen, the menu contains 3 buttons.
  - Machine: shows all generator settings.
  - ES: shows the ESi status (if a license is provided).
  - Preferences: allows to change temperature and pressure unit.



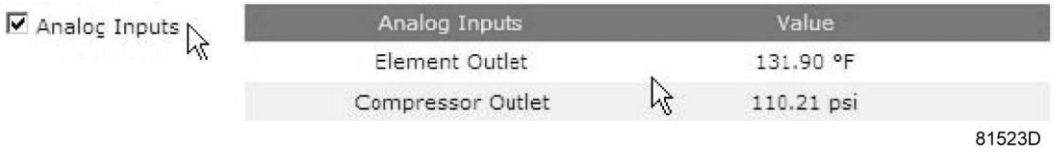
83810D

Unit settings

All unit settings can be displayed or hidden. Put a check mark in front of each point of interest and it will be displayed. Only the machine status is fixed and can not be removed from the main screen.

Analog inputs

Lists all current analog input values. The measurement units can be changed in the preference button from the navigation menu.



81523D

Counters

Lists all current counter values from controller and unit.

81524D

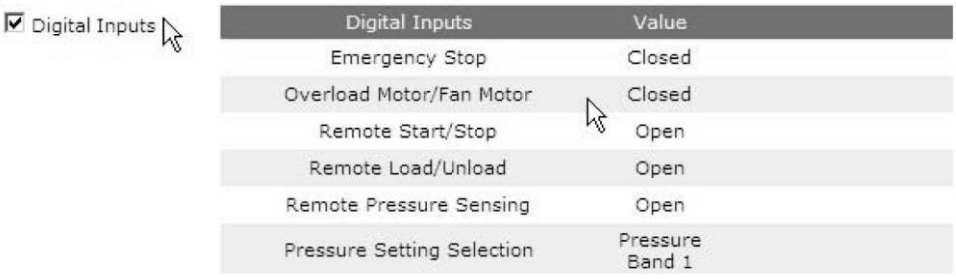
Info status

Machine status is always shown on the web interface.

81525D

Digital inputs

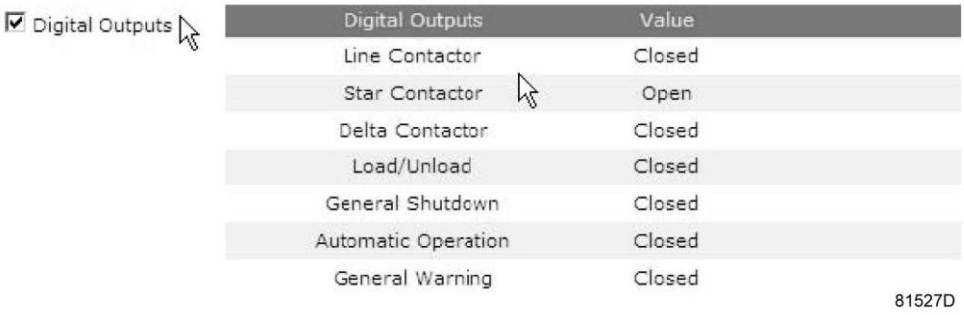
Lists all digital inputs and their status.



81526D

Digital outputs

Lists all digital outputs and their status.



81527D

Special protections

Lists all special protections of the unit.

81528D

Service plan

Displays all levels of the service plan and their status. This screen shot underneath only shows the running hours. It is also possible to show the current status of the service interval.

3.19 Programmable settings

Compressor/motor

		Minimum setting	Factory setting	Maximum setting
Set-point 1 and 2, Workplace compressors	bar(e)	4	7	13
Set-point 1 and 2, Workplace compressors	psig	58	100	188
Set-point 1 and 2, Workplace Full-Feature compressors	bar(e)	4	6.8	12.8
Set-point 1 and 2, Workplace Full-Feature compressors	psig	58	99	186
Indirect stop level	bar	0.1	0.3	1
Indirect stop level	psi	1.45	4.35	14.5
Direct stop level	bar	0.3	1	1.5
Direct stop level	psi	4.35	14.5	21.8
Proportional band	%	6	10	15
Integration time	sec	5	6	10

Parameters

		Minimum setting	Factory setting	Maximum setting
Minimum stop time	sec	18	18	30
Power recovery time	sec	60	60	3600
Restart delay	sec	0	0	1200
Communication time-out	sec	10	30	60
Fan motor starts per day		1	720	720

Protections

		Minimum setting	Factory setting	Maximum setting
Compressor element outlet temperature (shut-down warning level)	˚C	50	110	119

Compressor element outlet temperature (shut-down warning level)	˚F	122	230	246
Compressor element outlet temperature (shut-down level)	˚C	111	120	120
Compressor element outlet temperature (shut-down level)	˚F	232	248	248

Specific protections for Full-Feature compressors:

		Minimum setting	**Factory setting**	**Maximum setting**
Dewpoint warning temperature	ºC	10	25	99
Dewpoint warning temperature	ºF	10	77	210

Service plan

The built-in service timers will give a Service warning message after their respective preprogrammed time interval has elapsed.

For specific data, see section Preventive Maintenance.

Consult Atlas Copco if a timer setting needs to be changed. The intervals must not exceed the nominal intervals and must coincide logically. See section Modifying general settings.

Terminology

Term	**Explanation**
ARAVF	Automatic Restart After Voltage Failure. See section Elektronikon Graphic controller.
Power recovery time	Is the period within which the voltage must be restored to have an automatic restart. Is accessible if the automatic restart is activated. To activate the automatic restart function, consult Atlas Copco.
Restart delay	This parameter allows to programme that not all compressors are restarted at the same time after a power failure (ARAVF active).
Compressor element outlet	The recommended minimum setting is 70 ˚C (158 ˚F). For testing the temperature sensor the setting can be decreased to 50 ˚C (122 ˚F). Reset the value after testing. The regulator does not accept inconsistent settings, e.g. if the warning level is programmed at 95 ˚C (203 ˚F), the minimum limit for the shut-down level changes to 96 ˚C (204 ˚F). The recommended difference between the warning level and shut-down level is 10 ˚C (18 ˚F).
Delay at signal	Is the time period during which the warning signal must exist before the warning message appears.
Delay at start	Is the time period after starting which must expire before generating a warning. The setting should be less than the setting for the delay at signal.
Minimum stop time	Once the compressor has automatically stopped, it will remain stopped for the minimum stop time, whatever happens with the net air pressure.
Proportional band and integration time	The settings for the Proportional band and integration time are determined by experiment. Altering these settings may damage the compressor. Consult Atlas Copco.

4 Installation

4.1 Dimension drawings

The dimension drawing can be found on the CD-ROM, DVD or USB, supplied with the unit.

Dimension drawing	Model
9097 5105 80	GA 37 VSD+, GA 45 VSD+, GA 55 VSD+, GA 75 VSD+ Pack, metric units
9097 5105 81	GA 37 VSD+, GA 45 VSD+, GA 55 VSD+, GA 75 VSD+ Full Feature and UD+,

Text on drawings	Translation or explanation
Emergency stop switch	Emergency stop switch
Electrical cable passage	Electrical cable passage
Air inlet of compressor	Air inlet of compressor
Cooling air inlet of compressor	Cooling air inlet of compressor
Cooling air inlet of cubicle and converter	Cooling air inlet of cubicle and converter
Compressed air outlet	Compressed air outlet
Cooling air outlet of compressor, cubicle and converter	Cooling air outlet of compressor, cubicle and converter
Manual drain of compressor	Manual drain of compressor
Automatic drain of compressor	Automatic drain of compressor
Service panel	Service panel
Compressor mounting holes	Compressor mounting holes
Front side	Front side
Bottom view	Bottom view
Cooling air inlet of transformer	Cooling air inlet of transformer
Cooling air inlet of dryer	Cooling air inlet of dryer
Cooling air outlet of dryer	Cooling air outlet of dryer
Dryer service panel	Dryer service panel
Manual drain of dryer	Manual drain of dryer
Automatic drain of dryer	Automatic drain of dryer
Water inlet (Option Energy recovery)	Water inlet (Option Energy recovery)
Water outlet (Option Energy recovery)	Water outlet (Option Energy recovery)

Centre of gravity and weight GA37 VSD+

Frequency (Hz)	Model variant	Voltage (V)	L (mm)	B (mm)	H (mm)	Weight (kg)
50	Pack	400	607	534	890	860
	Full Feature & UD+	400	780	524	935	1043

Centre of gravity and weight GA45 VSD+

Frequency (Hz)	Model variant	Voltage (V)	L (mm)	B (mm)	H (mm)	Weight (kg)
50	Pack	400	607	534	890	860
	Full Feature & UD+	400	780	524	935	1043

Centre of gravity and weight GA55 VSD+

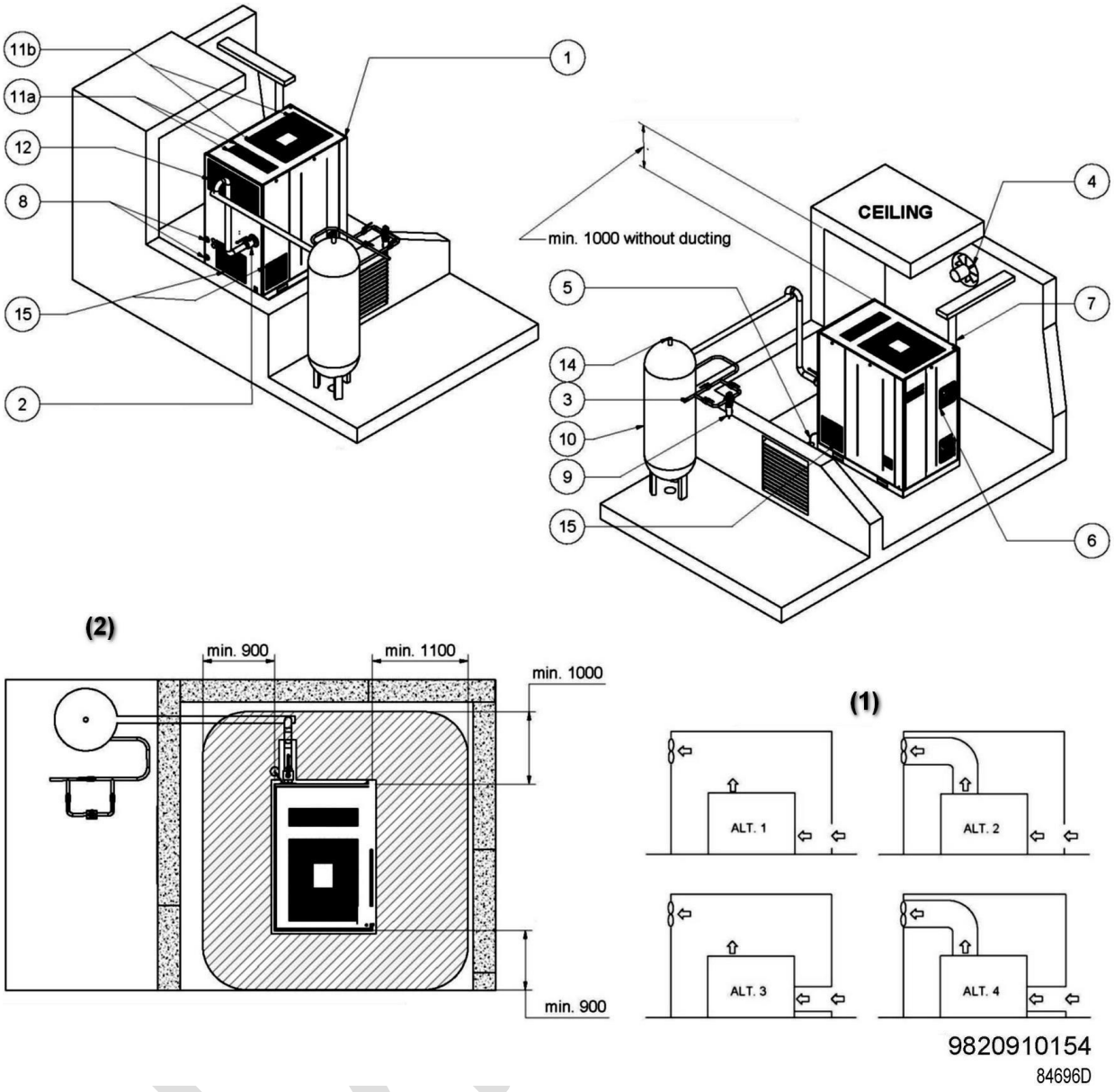
Frequency (Hz)	Model variant	Voltage (V)	L (mm)	B (mm)	H (mm)	Weight (kg)
50	Pack	400	607	543	840	923
	Full Feature & UD+	400	780	530	890	1106

Centre of gravity and weight GA75 VSD+

Frequency (Hz)	Model variant	Voltage (V)	L (mm)	B (mm)	H (mm)	Weight (kg)
50	Pack	400	607	543	840	974
	Full Feature & UD+	400	795	530	890	1157

Dimensions +/- 10 mm
Weights (oil included) +/- 10 kg

4.2 Installation proposal



Compressor room example

Text on image

(1)	The direction of the cooling flows may never be inverted
(2)	Space required for maintenance / air flow / access around the compressor

Description

1	Compressor unit : The unit should be installed on a level floor capable of taking the weight of the compressor.
2	Compressed air outlet valve
3	Delivery pipe : The maximum total pipe length (including interconnecting piping between compressor and receiver) can be calculated as follows : L = (ΔP x d x P)/(450 x Qc) Where, L = length of the pipe (m) ΔP = pressure drop (recommended maximum = 0.1 bar / 1.5 psi) d = inner diameter of the pipe (mm) P = absolute pressure at compressor outlet (bar(a)) Qc = Free air delivery of the compressor (l/s)
4	Ventillation : The inlet grid(s) and ventillation fan should be installed in such a way that any recirculation of cooling air to the inlet grating of the compressor/ dryer is avoided. The air velocity to the grid(s) has to be limited to 5m/s. The maximum air temperature at compressor intake opening is 46 °C (115 °F), (minimum 0 °C / 32 °F) Ventilation alternative 1 and 3 : The required ventilation to limit compressor room temperature can be calculated from : Qv = 1.06 N / ΔT for Pack unit Qv = for Full-Feature unit Where, Qv = Required cooling air flow (m^3/s) N = Nominal motor power of compressor (kW) ΔT = Temperature increase in compressor room. (°C) D = Electric power dryer. Ventilation alternative 2 and 4 : The fan capacity should match the compressor - fan capacity at a pressure head equal to the pressure drop caused by cooling air ducts. The ducting for the air outlet of the dryer (11a) should be separated from the ducting for the cooling air outlet of AIR/OIL coolers and cooling air outlet of the compressor compartement.(11b) Max. allowable pressure drop in ducting before or after the compressor = 30 Pa
5	Drain pipes to drain collector must not dip into the water. For draining of pure condensate water, install an oil / water seperator. Consult Atlas Copco. Drain pipes of different compressors may not be interconnected before the (atmospheric) collector. Interconnecting drain pipes of different compressors can damage the electronic drains of the compressor.
6	Control cubicle with monitoring panel.
7 	Power supply cable to be sized and installed by a qualified electrician. In case of IT network, consult Atlas Copco. To preserve the protection degree of the electric cubicle and to protect its components from dust from the environment, it is absolutely necessary to use a proper cable gland when connecting the supply cable to the compressor.
8	Provision for energy recovery system.

9	High efficiency filter type UD+ for general purpose filtration. In case of FULL FEATURE variants (dryer included), this filter can be integrated in the compressor. Should oil vapours and odeurs be undesirable, a QD active carbon filter should be installed after the UD+ filter. Consult Atlas Copco.
10	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 x Qc x P1 x T0)/(fmax x P xΔT1) V = volume of the air net in l. Qc = free air delivery of the compressor in l/s P1= compressor air inlet pressure in bar absolute fmax = cycle frequency=1 cycle/30s ΔP = Punload - Pload in bar T1 = compressor air inlet temperature in K T0=air receiver temperature KT0 = air receiver temperature K
11	To prevent feadback of exhaust air to the cooling inlet, sufficient space should be foreseen above the unit to evacuate the exhaust air. Otherwise a ducting for the exhaust air should be foreseen. See ALT.1 to ALT.4
12	Cooling air grating dryer.
13	When ducting is foreseen on the inlet air then the ambient temperature sensor need to be repositioned in such a way that the inlet temperature is monitored.
14	Safety valve.
15	Transformer ventilation.

Safety

	Apply all relevant safety precautions, including those mentioned in this book.

Outdoor/altitude operation

The compressors are not designed for outdoor use.

The compressors can only be used in temperatures above 0 °C (+32 °F). If frost might occur, the appropriate measures should be taken to avoid damage to the machine and its ancillary equipment. In this case, consult Atlas Copco.

Also if operating above 1000 m (3300 ft), 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. Before lifting, reinstall the transport securing bolts. 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.

Acclimatization

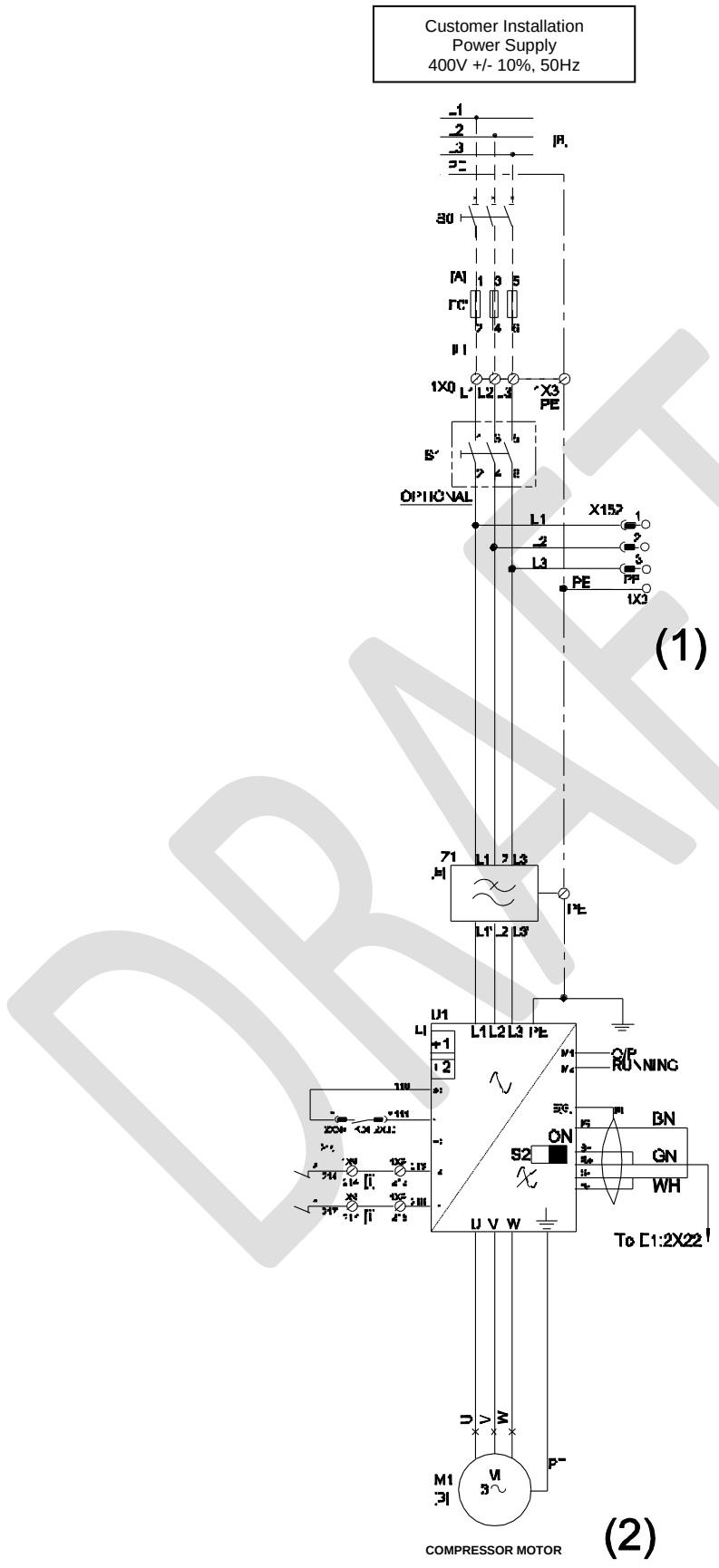
	When moving the compressor into an installation room, forming of condense can occur on some components. To avoid dew harming of electrical components, ensure at least 2 hours of acclimatization before switch on the compressor.

4.3 Electrical connections

	Working with machinery controlled by a frequency converter requires special safety precautions. These safety precautions depend on the kind of network used (TN, TT, IT system). Consult Atlas Copco.

	Most compressors are designed for use in TT/TN networks and are intended for industrial environments where the electrical supply is separated from the residential/ commercial supply network. To use the machine in light industrial, commercial or residential environments with a shared supply network or in an IT network, extra measures can be required: contact Atlas Copco. Important note

Electrical connections for GA VSD+



Typical example of Electrical connections diagram for GA 37 VSD+ to GA 75 VSD+

Reference	Designation
(1)	Power circuit
(2)	Compressor motor

Note

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

Electrical diagram	9097509951

Description

	You find the correct position for the electrical connection on the Dimension drawings

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. See section Electric cable size and fuses.
4. Connect the power supply cables to terminals EMC filter (Z1).
5. Connect the earth conductor to the earth bolt (PE).

	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

Compressor control modes

See also section Control mode selection.

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.

	Have the modifications checked by Atlas Copco. 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 Atlas Copco.

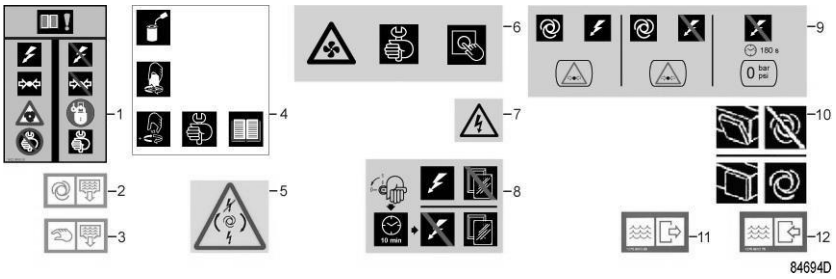
Compressor status indication

The Elektronikon controller is provided with potential free auxiliary NO contacts (NO = normally open) (K07, K08 and K09) for remote indication of:

- Manual or automatic operation (K07)
- Warning condition (K08)
- Shutdown condition (K09) Maximum contact load: 10 A / 250 V AC.

Stop the compressor and switch off the voltage before connecting external equipment. Consult Atlas Copco

4.4 Pictographs



Pictographs

Reference	Designation
1	Lock out/ tag out the compressor before starting maintenance or repairs
2	Automatic condensate drain
3	Manual condensate drain
4	Lightly oil the gasket of the oil filter, screw it on and tighten by hand (approx. half a turn)
5	Automatic restart after voltage failure (ARAVF)
6	Stop the compressor before cleaning the coolers
7	Warning, voltage
8	Switch off the voltage and wait at least 10 minutes before maintenance
9	Compressor remains pressurized for 180 seconds after switching off the voltage
10	Keep doors closed during operation
11	Cooling water inlet
12	Cooling water outlet

5 Energy recovery

5.1 Energy recovery unit

Description

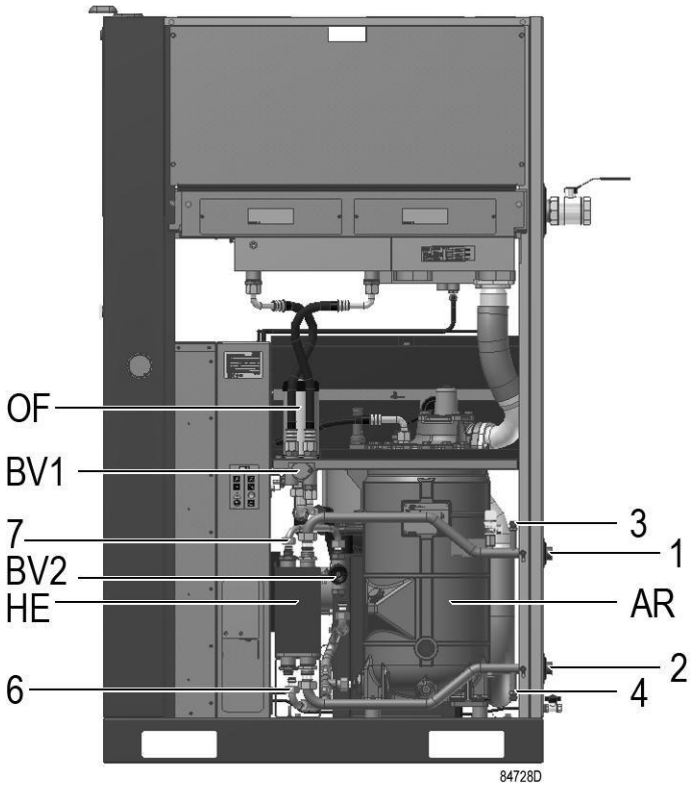
A large part of the energy required for any compression process is transformed into heat. For GA oil-injected screw compressors, the major part of the compression heat is dissipated through the oil system. The Atlas Copco energy recovery (ER) systems are designed to recover most of the above-mentioned heat by transforming it into warm or hot water without any adverse influence on the compressor performance. The water can be used for diverse applications.

Components

The energy recovery system is completely integrated and mainly comprises:

- Stainless steel oil/water heat exchanger
- Thermostatic by-pass valve for energy recovery heat exchanger (BV2)
- Two temperature sensors for water inlet and outlet control (3 and 4)
- The necessary bolts, flexibles, etc.
- Pressure relieve valve with pressure setting of 10 bar
- Oil drain valve.

Energy recovery unit (ER-unit)



Main components of the ER unit (typical installation)

Reference	Designation
1	Water inlet pipe
2	Water outlet pipe
3	Temperature sensor, water inlet pipe
4	Temperature sensor, water outlet pipe
6	Oil line from compressor oil separator vessel to ER unit
7	Oil line from ER unit to oil filter housing
BV2	Location of heat exchanger by-pass valve (BV2)
HE	Heat exchanger
AR	Oil separator vessel
OF	Oil filter housing
BV1	Location of oil cooler bypass valve (BV1)

Field installation

The main components are assembled ex-factory as a compact unit which fits inside the bodywork of the compressor. Consult Atlas Copco for installing and connecting the energy recovery unit.

5.2 Energy recovery systems

General

The energy recovery systems can be applied as low temperature rise/high water flow systems or as high temperature rise/low water flow systems.

Low temperature rise/high water flow systems

For this type of application, the temperature difference between the water in the energy recovery system and the compressor oil is low. As a consequence, a high water flow is needed for maximum energy recovery.

Example: The heated water is used to keep another medium at a moderately high temperature, in a closed circuit, e.g. central heating.

High temperature rise/low water flow systems

For this type of application, a high water temperature rise in the energy recovery system is obtained, which consequently brings on a low flow rate.

Example: An open circuit where cold water from a main supply is heated by the energy recovery system for use in a factory, e.g. pre-heating of boiler feed water.

Recovery water flow

The recovery water enters the unit at inlet connection (1). In heat exchanger (HE) the compression heat is transferred from the compressor oil to the water. The water leaves heat exchanger (HE) via outlet connection (2).**Water requirements for closed water circuits**

The use of a closed water circuit minimises make-up water requirements. Therefore, the use of soft or even demineralised water is economically feasible and eliminates the problem of scale deposits. Although the heat exchanger is made of stainless steel, the water circuit connected to the compressor may require corrosion inhibitors.

Add an anti-freeze product such as ethylene-glycol to the water in proportion to the expected temperature to avoid freezing.

Water requirements for open water circuits

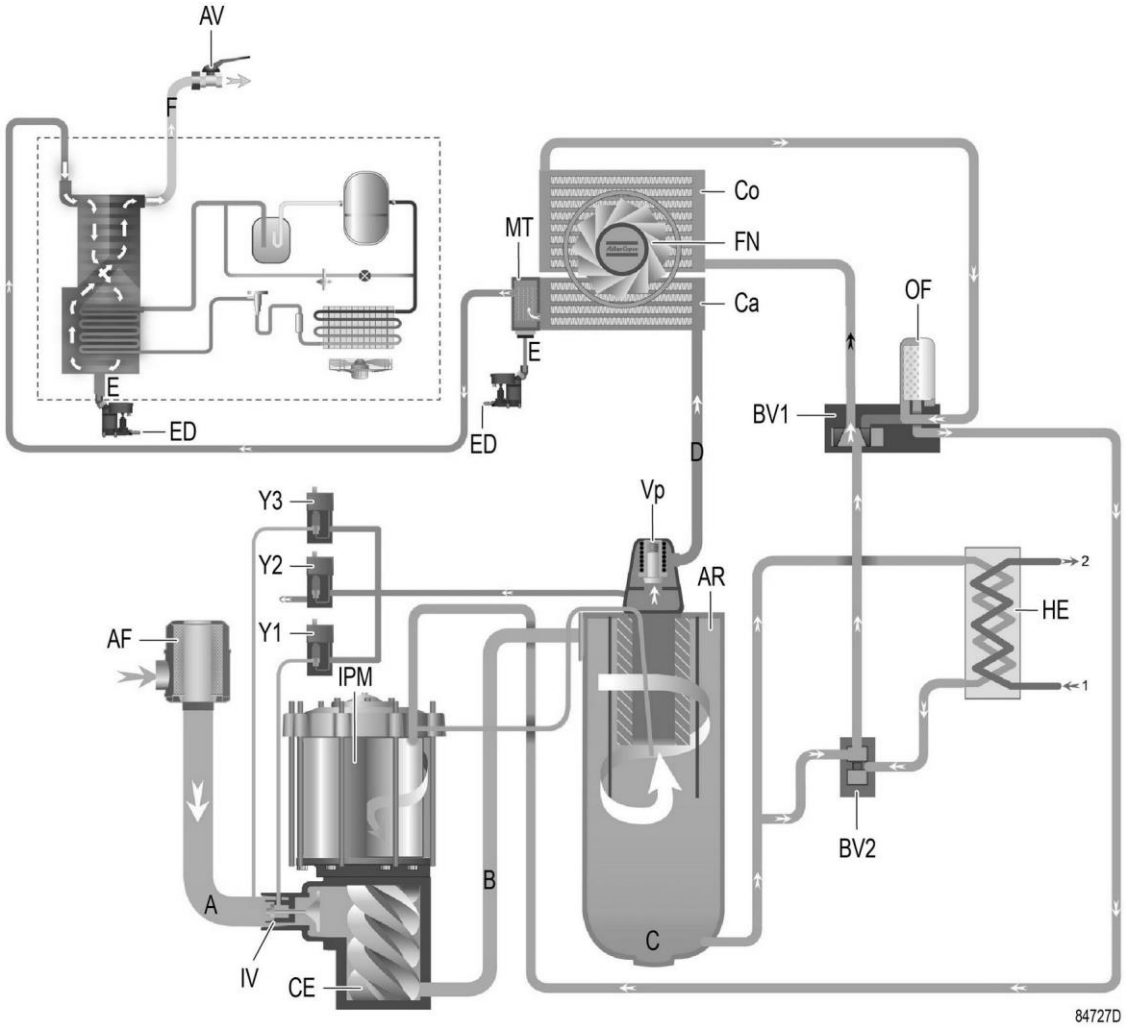
For open, non-recirculation water circuits, the major problems usually encountered are related to deposit control, corrosion control and microbiological growth control. To minimize these problems, the water should meet a number of requirements.

5.3 Operation

Description

The compressor oil flow is controlled by two thermostatic valves (BV1 and BV2), ensuring reliable compressor operation and optimum energy recovery.

Bypass valve (BV1) is integrated in the oil filter housing of the compressor and controls the oil flow through the main oil cooler (Co) of the compressor. Bypass valve (BV2) controls the oil flow through the oil/water heat exchanger (HE) of the ER unit. Both valves consist of an insert (thermostat) mounted in a housing.



Flow diagram of compressor with energy recovery system

Reference	Designation	Reference	Designation
BV2	Thermostatic bypass valve of ER unit	OF	Oil filter
HE	Oil/water heat exchanger (ER unit)	AR	Oil separator vessel

Reference	Designation	Reference	Designation
CE	Compressor element	BV1	Thermostatic bypass valve in oil filter housing
Co	Oil cooler (compressor)	Ca	Aftercooler (compressor)
1	Water inlet	2	Water outlet
Vp	Minimum pressure valve	FN	Fan
MT	Condensate trap	ED	Electronic drain
AV	Outlet valve	AF	Air filter
IV	Inlet valve	IPM	Motor

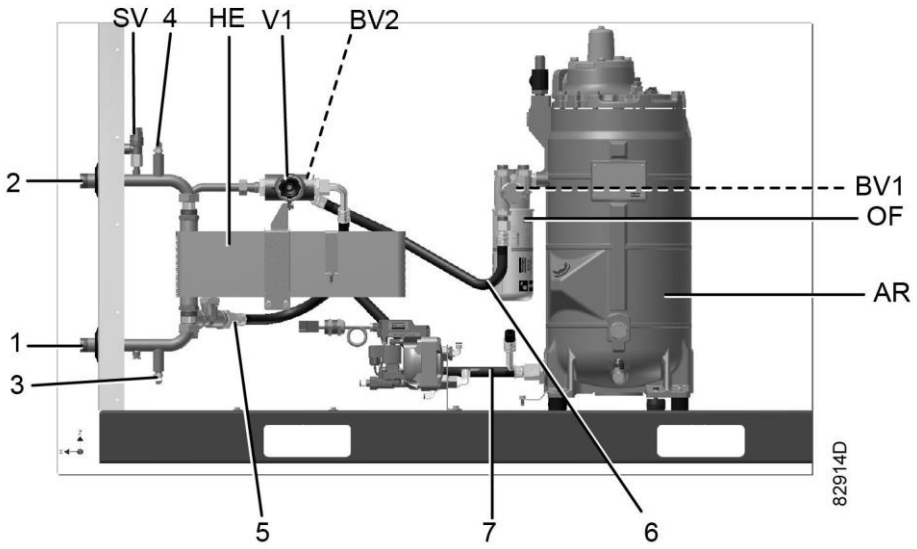
BV2 starts closing the bypass line over the heat exchanger (HE) at the lower limit of its temperature range. At the upper limit of its temperature range, the bypass line is completely closed and all the oil flows through the ER heat exchanger.

Variable speed driven (VSD) air-cooled compressors are equipped with a bypass valve BV2 that starts opening at 38˚C (100 ˚F) and which is completely open at 55 ˚C (131 ˚F).

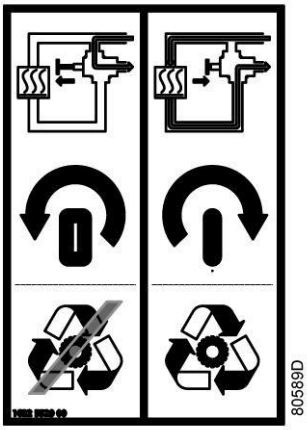
The housing of BV2 is provided with a special wheel (V1), allowing to control the energy recovery system.

As can be seen on the ER label, the ER unit is integrated in the oil circuit and will recover energy when the wheel is completely turned in clockwise.

When the wheel is turned out anticlockwise, the heat exchanger (HE) is bypassed and no energy will be recovered.



Position of valve housing of BV2 with wheel V1



ER label

	Attention: It is only allowed to turn the wheel completely in or out. No in-between position is allowed.

The oil cooler bypass valve (BV1) starts closing the bypass over the oil cooler (Co) at the lower limit of its temperature range. At the upper limit of its temperature range, the bypass is completely closed and all the oil flows through the oil cooler (Co).

BV1 must have a higher opening temperature (set point) than BV2 in order to prevent the heat from being dissipated in the compressor oil cooler (Co) rather than in the oil/water heat exchanger (HE) when using the compression heat as source for energy recovery.

Thermostat BV1 starts to open at 75 ˚C (167 ˚F) and is completely open at 90 ˚C (194 ˚F).

Energy recovery system in use (see drawing)

The wheel (V1) of BV2 (bypass valve of the HE) is totally **turned in clockwise**.

- Compressor start-up

When the compressor is started up from cold, the oil temperature will be low. Bypass valve (BV2) shuts off the oil supply through the heat exchanger (HE) and bypass valve (BV1) shuts off the oil supply through the oil cooler (Co) to prevent the compressor oil from being cooled. The oil flows from the oil separator vessel (AR) through the oil filter(s) (OF) back to compressor element (E).

All energy input is used to rapidly warm up the compressor oil. No energy is recovered.

- Maximum energy recovery

As soon the oil temperature reaches the set point (opening temperature) of bypass valve (BV2), the valve starts closing off the bypass over the heat exchanger (HE) oil line, gradually allowing the oil to flow through the heat exchanger (HE). As the oil temperature rises to approx. 15 ˚C (27 ˚F) above the set point, all the oil passes through the heat exchanger. The exchange of heat between the compressor oil and the heat recovery water is maximum. The oil from the heat exchanger outlet flows via oil filter (OF), oil stop valve (Vs - if present), compressor element (E) and separator (AR) back to the inlet of heat exchanger (HE).

Bypass valve (BV1) bypasses the oil cooler (Co) as long as the oil temperature remains below its set point. Operation principle at different loads:

- Low consumption of recovered energy

The temperature of the oil leaving heat exchanger (HE) rises. When the temperature rises above its set point, oil cooler bypass valve (BV1) will gradually allow the oil to be cooled in the oil cooler (Co).

- Recovery water flow too high/temperature too low

In this case, bypass valve (BV2) will open the bypass line allowing oil from heat exchanger (HE) to be mixed with oil from separator (AR). Energy is transferred from the compressor oil to the water, but at a relatively low temperature level.

Energy recovery system not in use

The wheel (V1) is completely turned out anti-clockwise.

The oil circuit is the same as without installation of the energy recovery system. No energy is recovered.

This situation should be considered as exceptional, e.g. in case of maintenance of the energy recovery system or when no energy is required for a long period.

Stopping the unit for a long period

In case of an open water system and/or if freezing temperatures can be expected, isolate the compressor water system and blow it through with compressed air.

5.4 Maintenance

Compressor oil

For references used consult section Energy recovery unit.

Oil change:

1. Run the unit until warm. Stop the unit, switch off the isolating switch and close the air outlet valve of the compressor.
2. Depressurize the compressor and drain the oil by opening the drain valve. Also drain the oil from the heat exchanger by opening the drain valve on the heat exchanger (HE). Close the valve after draining.
3. Resume oil change as described in section Oil and Filter Change in this book.

Thermostatic bypass valves

Change the thermostat of the ER system at the same interval as the thermostat of the unit.

Heat exchanger (HE)

If the temperature rise over the energy recovery system declines over a period of time with the same basic working conditions, the heat exchanger should be inspected. To clean the oil side, soak the heat exchanger in a degreasing solution. To remove scale formation in the water compartment, a proper descaling process should be applied. Consult Atlas Copco.

5.5 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:

		pH	
Type of cooling system	**Materials**	**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 µS/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):

   TDS = conductivity x 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:

	Ca (ppm Ca CO_3)	
Type of cooling system	**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:

$RSI = 2*pH_s - pH$,

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 (Cl_2)

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 (SO_4^{2-})

	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:

	Suspended solids (ppm)	
Type of cooling system	**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.

	Biology (CFU/ml)	
Type of cooling system	**Standard**	**Energy recovery**
Single pass	< 10^5 / **< 10^7**	< 10^3 / **< 10^5**
Recirculating (with tower)	< 10^5 / **< 10^7**	not applicable
Closed loop	< 10^3 / **< 10^5**	< 10^3 / **< 10^5**

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

5.6 Energy recovery data

Reference conditions

See section Reference conditions and limitations.

Effective working pressure

Consult section Compressor data for the normal working pressure.

Maximum allowed pressure of the heat exchanger

Oil side	15 bar (217 psi)
Water side	10 bar (145 psi)

Reading settings

In addition to other data, the following temperatures can be read on the Elektronikon display:

For air-cooled units:

- The water inlet temperature of the energy recovery system
- The water outlet temperature of the energy recovery system

Modifying settings

If the programmed warning settings for the water temperatures are exceeded, a warning indication is shown on the Elektronikon:

Temperature input		**Minimum setting**	**Nominal setting**	**Maximum setting**
Water inlet temperature of energy recovery	˚C	0	50	99
Water inlet temperature of energy recovery	˚F	32	122	210
Energy recovery water outlet temperature	˚C	0	60	99
Energy recovery water outlet temperature	˚F	32	60	210

To modify a setting, consult the relevant section in the description of the Elektronikon controller.

Recoverable energy

The recoverable energy can be calculated from:

RECOVERED ENERGY (kW) = 4.2 x water flow (l/s) x water temperature rise (˚C)

In the tables below, typical examples are given.

Data for low temperature rise / high water flow systems

Parameter	**Unit**	**GA 37 VSD+**	**GA 45 VSD+**	**GA 55 VSD+**	**GA 75 VSD+**
Recoverable energy	kW	32,5	39,5	41,3	67,5
Recoverable energy	hp	44,2	53,7	55,4	90,5
Water flow	l/min	46.6	59	72.3	94.5
Water flow	cfm	1.6	2.1	2.55	3.34
Temperature at inlet	˚C	50	50	50	50
Temperature at inlet	˚F	122	122	122	122
Temperature at outlet	˚C	60	60	60	60
Temperature at outlet	˚F	140	140	140	140

Data for high temperature rise/low water flow systems

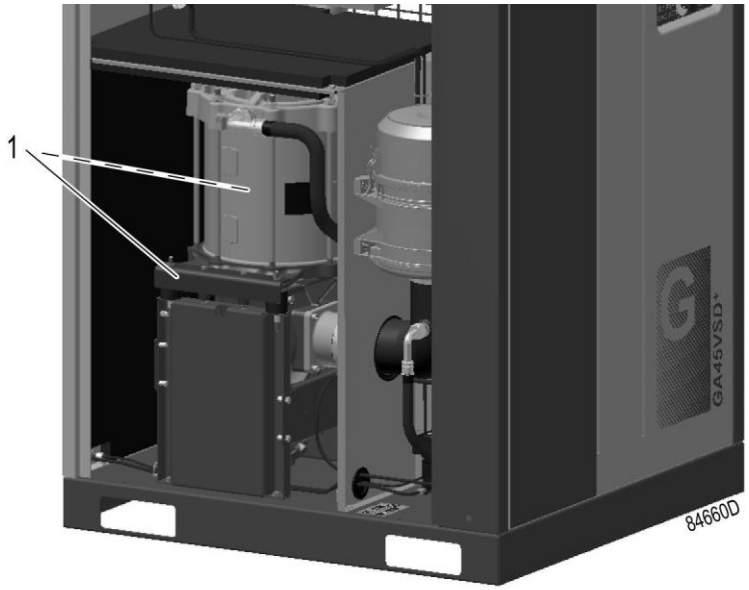
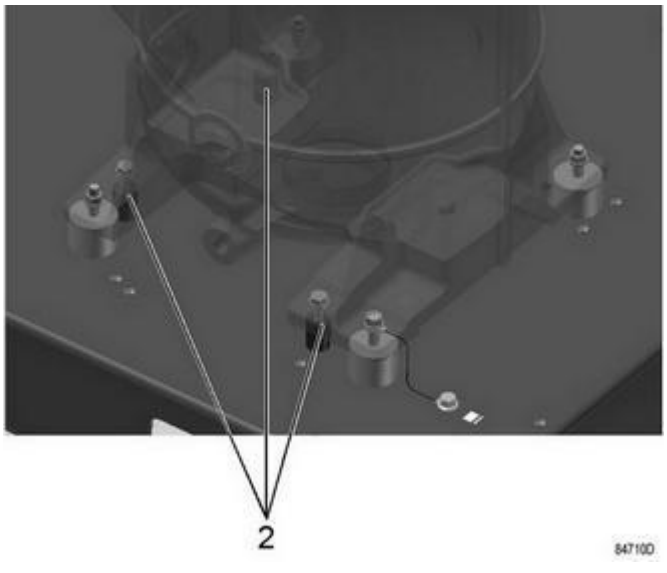
Parameter	Unit	GA 37 VSD+	GA 45 VSD+	GA 55 VSD+	GA 75 VSD+
Recoverable energy	kW	32,5	39,5	41,3	67,5
Recoverable energy	hp	44,2	53,7	55,4	90,5
Water flow	l/min	6.5	8.2	10.2	13.3
Water flow	cfm	0.23	0.29	0.36	0.47
Temperature at inlet	˚C	20	20	20	20
Temperature at inlet	˚F	68	68	68	68
Temperature at outlet	˚C	92	92	92	92
Temperature at outlet	˚F	198	198	198	198

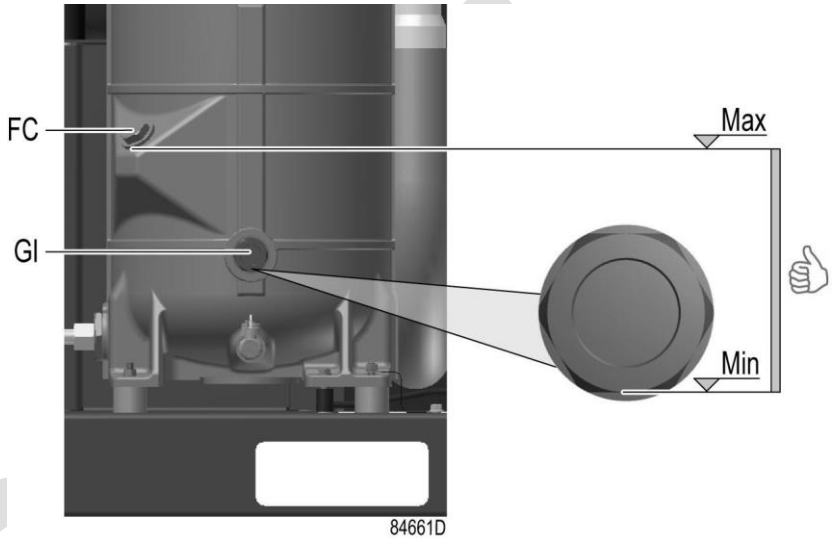
6 Operating instructions

Initial start-up

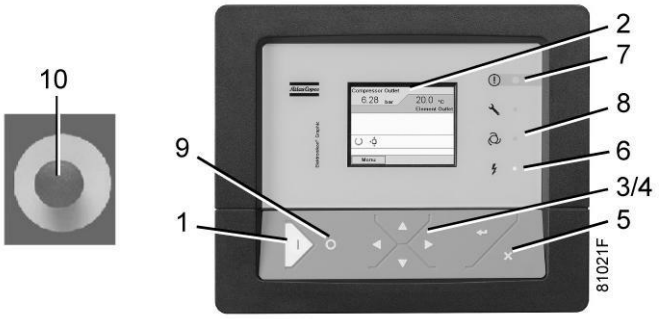
	The operator must apply all relevant Safety precautions. Also consult section Problem solving.

	For the location of the air outlet valve and the drain connections, see sections Introduction and Condensate system

Step	Action
1	Remove the canopy panel(s) in order to get access to the internal components. **Remove the red transport spacers (1) and the related bolts under the motor.**  **Remove the red transport spacers (2) and the related bolts under the air receiver.** 

Step	Action
2	Check that the electrical connections correspond to the local 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.
3	Check the voltage selecting wires at the primary side of transformer T1.
4	Fit air outlet valve (AV); see section Introduction for the position of the valve. Close the valve. Connect the air net to the valve.
5	Fit the manual condensate drain valve (Dm). Close the valve.
6	Check the oil level. The oil level should reach the bottom of the oil filler neck (FC).  Minimum level should reach the oil sight glass (GI) when the compressor is stopped. If needed, top up the oil. Take care that no dirt drops into the oil system. Refit and tighten the filler plug (FC).
7	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. • The compressor may be remotely controlled.
8	Check the rotation direction of the fan motor. 1. Switch on the voltage. 2. On Full-Feature compressors: switch on the voltage and actuate contactor K12 (dryer fan) on the dryer rail for a few seconds (e.g. by means of a screw driver) to check for the rotation direction. The rotation direction of the fan is indicative for the rotation direction of the dryer compressor. If the direction is wrong, interchange two phases of the mains supply. The dryer will become damaged when operating in the wrong direction! 3. On air-cooled compressors, check 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.
9	Check the programmed settings. Consult section Programmable settings.
10	Open the air outlet valve. Start and run the compressor for a few minutes. Check that the compressor operates normally.

Starting



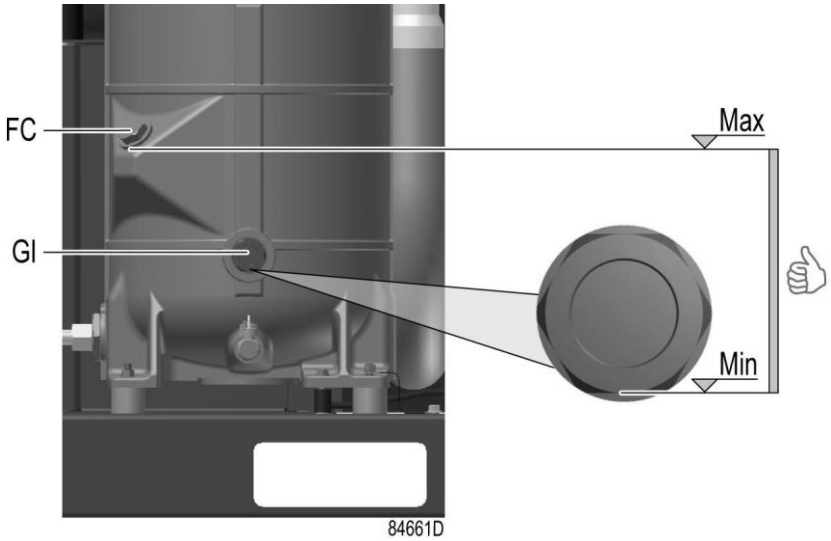
Control panel Elektronikon® Graphic

Step	Action
1	Open the air outlet valve.
2	Switch on the voltage. Check that voltage on LED (6) lights up.
3	Press start button (1) on the control panel. The compressor starts running and the automatic operation LED (8) lights up.

During operation

	Keep the panels closed during operation.
	When the motors are stopped and LED (8) (automatic operation) is alight, the motors may start automatically.
	When the automatic operation LED (8) is lit, the regulator is automatically controlling the compressor, i.e. loading, unloading, stopping of the motors and restarting!

Regularly check the oil level:



A few minutes after stopping, the oil level should reach the bottom of the oil filler neck (FC).

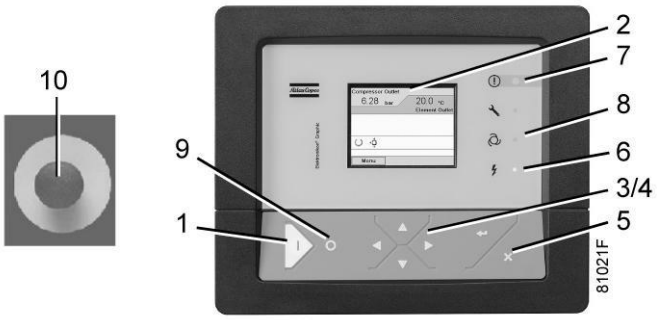
If the oil level is too low, wait until the compressor has depressurized. Push the emergency stop button (10) to avoid the compressor to start unexpectedly. Next, close the air outlet valve and open the manual drain valve (Dm) until the air system between oil separator/air receiver vessel and outlet valve is fully depressurized. See section Condensate system for location of the outlet valve and water drain.

Unscrew oil filler plug (FC) one turn to permit any pressure left in the system to escape. Wait a few minutes. Remove the plug and add oil until the level reaches the filler opening. Fit and tighten the plug (FC).

Unlock the emergency stop button (10), select the STOP icon on the display and press reset before restarting.

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

Regularly check the Elektronikon® display:



Control panel Elektronikon® Graphic

Check the display (2) regularly for readings and messages. The display normally shows the compressor outlet pressure, while the status of the compressor is indicated by means of a number of icons. Remedy the trouble if alarm LED (7) is lit or flashes, see section Icons used. The display (2) will show a service message 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 menu.

Stopping

Step	Action
1	Press stop button (9). Automatic operation LED (8) goes out and the compressor stops.
2	Close the air outlet valve.
3	Press the test button on top of the electronic water drain(s) 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.

	To stop the compressor in the event of an emergency, press emergency stop button (10). Alarm LED flashes (7). • Remedy the problem cause. • Next, unlock the button by pulling it out. • Next, navigate to the Stop icon on the display by means of the navigation keys (3/4) and press the Select key. • Press Reset. **Do not use emergency stop button (10) for normal stopping!**

Taking out of operation

Step	Action
1	Disconnect the compressor from the mains.
2	Unscrew the oil filler plug only one turn to permit any pressure in the system to escape.
3	Shut off and depressurize the part of the air net which is connected to the outlet valve. Disconnect the compressor air outlet pipe from the air net.
4	Drain the oil.
5	Drain the condensate circuit and disconnect the condensate piping from the condensate net.

7 Maintenance

7.1 Preventive maintenance schedule

Control panel

Warning

	**Before carrying out any maintenance, repair work or adjustments, proceed as follows:** • Stop the compressor. • Close the air outlet valve and open the condensate drain valve to depressurize the air system between air receiver and outlet valve. • Press the emergency stop button (10). • Switch off the voltage. • Depressurize the compressor. For detailed instructions, see section Problem solving. The operator must apply all relevant Safety precautions

Warranty - Product Liability

Use only authorised 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 (see section Service kits).

Service contracts

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

General

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

Intervals

The local Atlas Copco 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.

Service plans for compressors with an ElektronikonTM Graphic controller

Besides the daily and 3-monthly checks, preventive service operations are specified in the schedule below.

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, see section Service menu.

Preventive maintenance schedule

Daily and 3-monthly check list

Period	Operation
Daily	Check oil level. If needed, top up the oil (see section Operating Instructions — During operation) Check readings on display. Check that condensate is discharged by waiting for some time during operation. You can use the test button on top of the electronic water drain to check the drain function.
3-monthly (1)	Check coolers, clean if necessary. Remove the air filter element and inspect. Replace damaged or heavily contaminated elements. Check the filter elements of the electric cabinet. Replace if necessary

Check list for compressors with dryer

Period	Operation
Daily	Check that condensate is discharged by the dryer drain by waiting for some time during operation. You can use the test button on top of the electronic water drain to check the drain function.
Monthly (1)	Condenser cleaning: • 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. Keep the compressed air nozzle more than 30 cm away from the condenser to avoid damaging the of condenser fins. • Remove dust from inside the dryer, e.g. with a vacuum cleaner. Do not use water or solvents to clean the condenser.

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

Preventive Maintenance schedule programmed in the Elektronikon

	A-service every 4000 running hours (1)	B-service every 8000 running hours (2)	D-Service every 24000 running hours
Change the air filter	x	x	x
Change the electric cabinet filter mats	x	x	x
Change the drain(s) filter mesh	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 minimum pressure valve		x	x
Overhaul the thermostatic		x	x

	A-service every 4000 running hours (1)	B-service every 8000 running hours (2)	D-Service every 24000 running hours
valve			
Overhaul the condensate drain(s)		x	x
Change the motor top bearing			x (4)
Overhaul compressor element			x (4)

(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): when Roto-Xtend duty fluid is used the oil and oil filter change are part of the B-service.

(4): For compressor elements used on operating pressures below or equal to 10 bar (145 psi), the overhaul can be postponed to 32000 running hours.

Exchange interval for Roto-Inject Fluid Ndurance

Ambient temperature	Element outlet temperature	Exchange interval *	Maximum time interval *
up to 30 °C	up to 95 °C	4000	1 year
between 30 °C and 35 °C	between 95 °C and 100 °C	3000	1 year
between 35°C and 40 °C	between 100 °C and 105 °C	2000	1 year
above 40 °C	above 105 °C	use ROTO-Xtend	use ROTO-Xtend

Exchange interval for Roto-Xtend Duty Fluid

Ambient temperature	Element outlet temperature	Exchange interval *	Maximum time interval *
up to 35 °C	up to 100 °C	8000	2 year
between 35 °C and 40 °C	between 100 °C and 105 °C	6000	2 year
above 40 °C	above 105 °C	5000	2 year

Exchange interval for Roto-Foodgrade Fluid

Ambient temperature	Element outlet temperature	Exchange interval *	Maximum time interval *
up to 35°C	up to 100 °C	4000	1 year
between 35° C and 40 °C	between 100 °C and 105 °C	3000	1 year
between 40 °C and 45 °C	between 105 °C and 110 °C	2000	1 year
above 45 °C	above 110 °C	use not recomended	use not recomended

* Whichever comes first.

Important

	• Always consult Atlas Copco if a timer setting has to be changed. • For the change interval of oil and oil filter in extreme conditions of temperature, humidity or cooling air, consult your Atlas Copco Customer Centre. • Any leakage should be attended to immediately. Damaged hoses or flexible joints must be replaced.

7.2 Oil specifications

It is strongly recommended to use genuine Atlas Copco Lubricants. They are the result of years of field experience and research. See section Preventive maintenance schedule for the advised replacement intervals and consult your 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

Roto-Inject Fluid Ndurance

Atlas Copco's Roto-Inject Fluid Ndurance is a specially developed lubricant for use in single stage oil injected screw compressors. Its specific composition keeps the compressor in excellent condition. Roto-Inject Fluid Ndurance can be used for compressors operating at ambient temperatures between 0 ˚C (32 ˚F) and 46 ˚C (115 ˚F). If the compressor is regularly operating in ambient temperatures above 35 °C (95 °F), oil lifetime is reduced significantly. In such case use Roto-Xtend Duty Fluid for a longer interval for oil exchange.

Roto-Xtend Duty Fluid

Atlas Copco's Roto-Xtend Duty Fluid 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-Xtend Duty Fluid can be used for compressors operating at ambient temperatures between 0

˚C (32 ˚F) and 46 ˚C (115 ˚F).

Roto-Xtend Duty Fluid is the standard oil for compressors equipped with freeze protection.

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

Roto-Foodgrade Fluid

Special oil, delivered as an option.

Atlas Copco's Roto-Foodgrade Fluid is a unique high quality synthetic lubricant, specially created for oil injected screw compressors that provide air for the food industry. This lubricant keeps the compressor in excellent condition. Roto-Foodgrade Fluid can be used for compressors operating at ambient temperatures between 0 ˚C (32 ˚F) and 40 ˚C (104 ˚F).

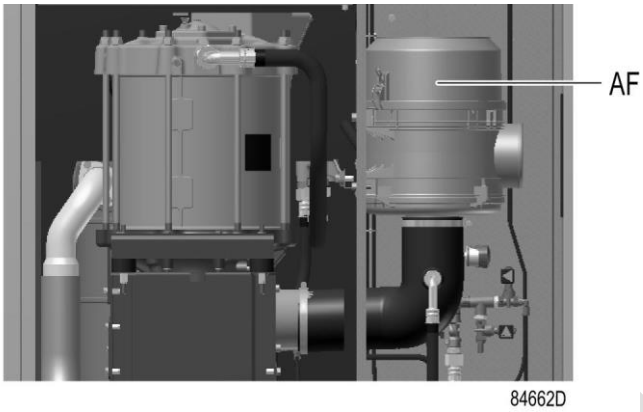
If the compressor is regularly operating in ambient temperatures above 35 °C (95 °F), oil lifetime is reduced (see table oil lifetime Preventive maintenance schedule).

7.3 Drive motor

Bearing maintenance

The motor bearing is lubricated by oil injection. Re-greasing is not necessary.

7.4 Air filter



Location of air filter

Procedure

1. Stop the compressor. Switch off the voltage.
2. Remove the cover of the air filter (AF) by opening the clip system. Remove the filter element.
3. Fit the new element and the cover.
4. Reset the air filter service warning.
   For compressors equipped with an Elektronikon® Graphic regulator, see section Service menu.

7.5 Oil, oil filter and oil separator 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. If the compressor is equipped with an Energy Recovery unit, also consult Maintenance for Energy Recovery Systems

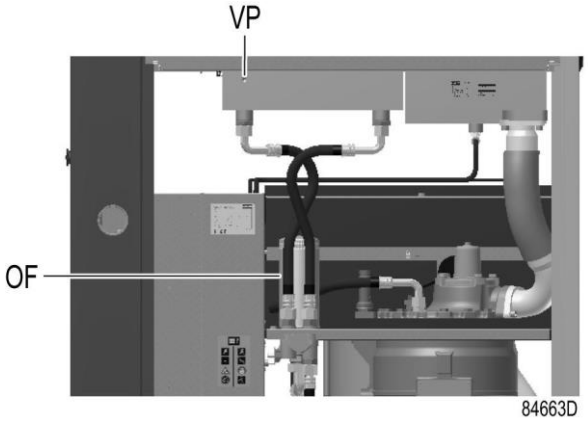
Procedure

1. Run the compressor until warm and stop the compressor.
   - Close the air outlet valve.
   - Wait 10 minutes for the compressor to depressurize the vessel.
   - Open the condensate drain valve to depressurize the cooler (see condensate system) and close again.
   - Start oil drain algorithm:

- Go to the test section in the Elektronikon (section Test menu).
- Activate oil drain algorithm.
- When password needs to be entered, only confirmation is needed.
- The algorithm lets the motor run at 100 rpm during 10 seconds to push the oil through the element into the outlet.

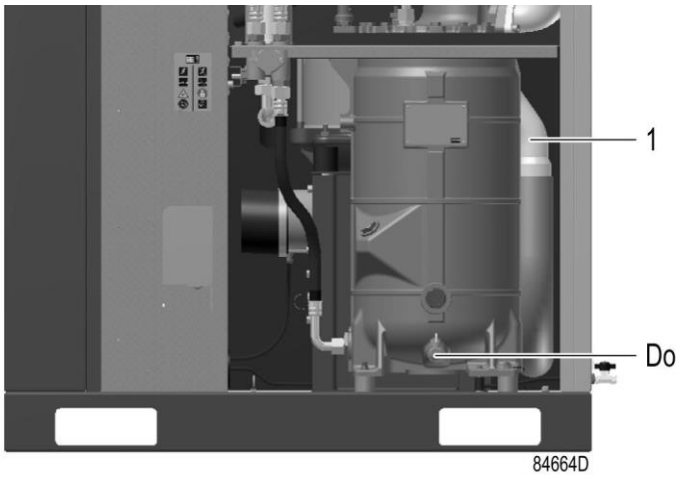
- Switch off the voltage.
- Unscrew the oil filler plug (FC) just one turn to permit any remaining pressure in the system to escape.
- Cover the duct of the heat sink on the electric cabinet.

2. Remove the vent plug (VP) of the oil cooler.

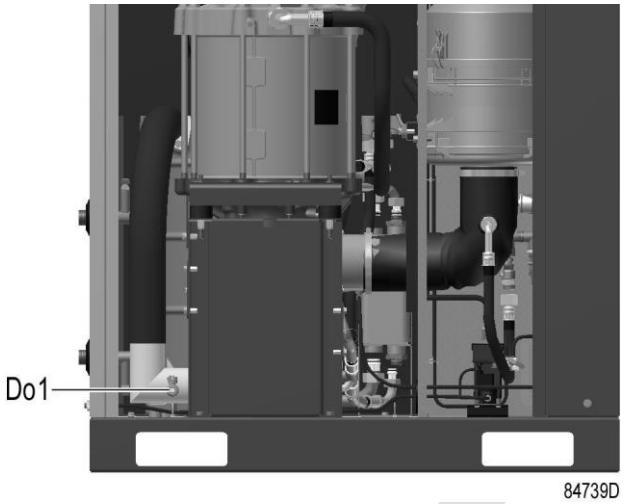


Vent plug, oil cooler

3. Open the oil drain valve (Do).

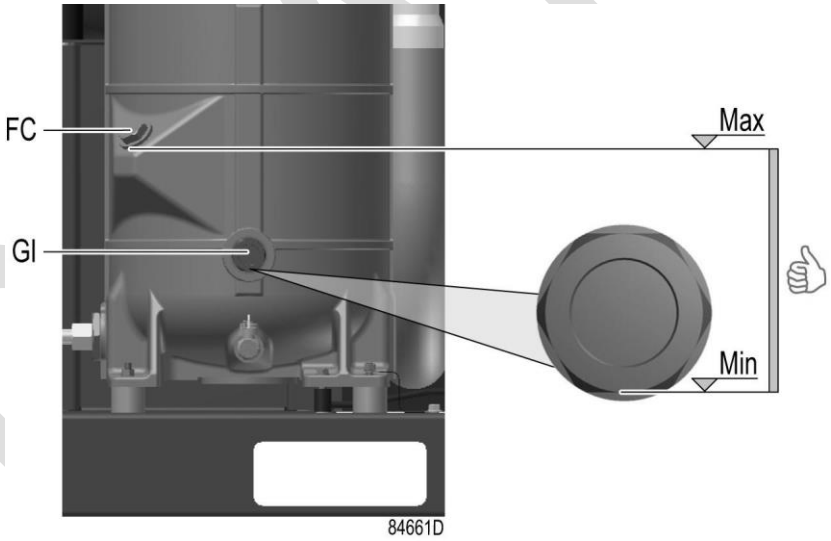


4. Open the oil drain valve on the element outlet hose (DO1).



- Remove the oil filter (OF). **Be aware that this filter has a left thread connection**.
- Collect the oil in a collector and deliver it to the local collection service. Refit the vent plugs after draining.

5. Close the oil drain valves (Do, Do1).
6. Clean the seat on the manifold. Lubricate the gasket of the new oil filter and screw it into place. Tighten firmly by hand.
7. Remove filler plug (FC).
   Fill the air receiver with oil until the level reaches the filler neck.



Take care that no dirt drops into the system. Refit and tighten filler plug (FC).

8. Run the compressor loaded for a few minutes. Stop the compressor.
9. Close the air outlet valve and switch off the voltage.
   - Wait 3 minutes for the compressor to depressurize the vessel.
   - Open the condensate drain valve (Dm) to depressurize the cooler. (see Condensate system) and close again.
   - Unscrew the oil filler plug (FC) just one turn to permit any remaining pressure in the system to escape.
10. Fill the air receiver (AR) with oil until the level reaches the filler neck. (see Operating Instructions / During operation)
    - Refit and tighten filler plug (FC).

    When the oil level is too low, go back to step 7.

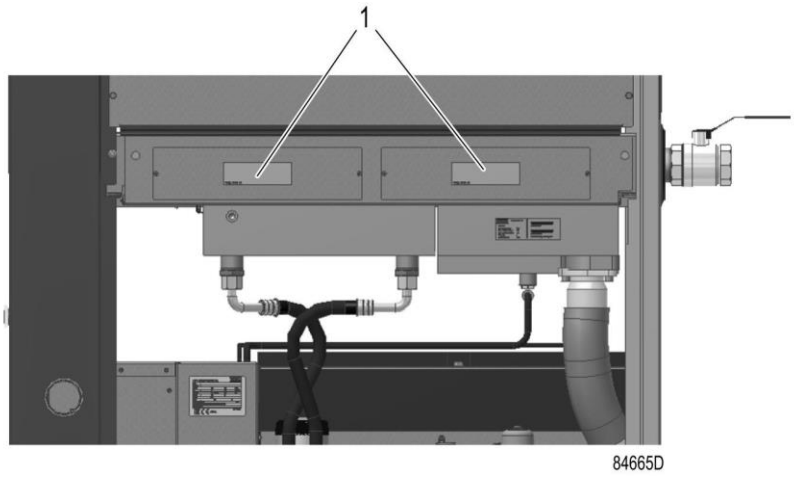
7.6 Coolers

General

Keep the coolers clean to maintain their efficiency.

Procedure

- Stop the compressor, close the air outlet valve and switch off the voltage.
- Cover all parts underneath the cooler.
- Remove the service plate (1) at the fan compartment.

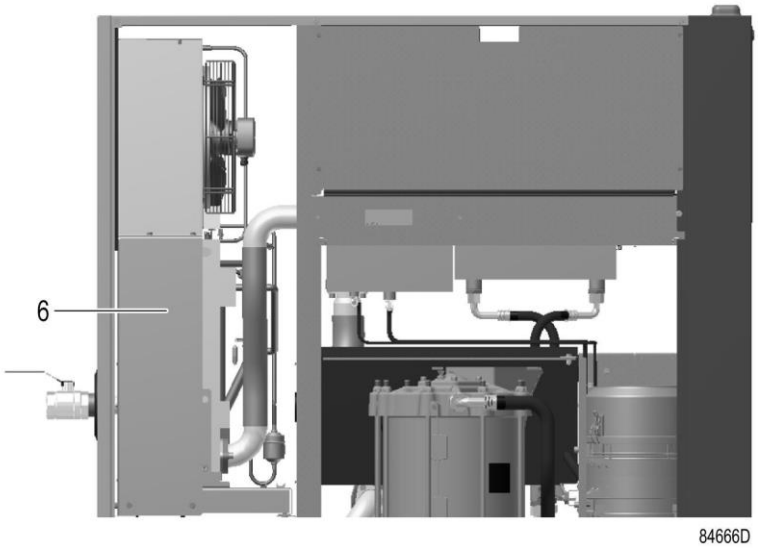


- Remove dirt from the coolers with a fibre brush. Brush in the direction of the cooling fins. Remove dirt from the fan with a fibre brush.
- Clean with an air jet in the reverse direction to normal flow.
- If it is necessary to wash the coolers with a cleaning agent, consult Atlas Copco.

	After maintenance on the fan and on the coolers: Remove the material that was used as cover

- Mount the service plate (1) at the fan compartment.

Procedure for compressors with dryer.



Location of the condenser of the dryer

- Remove dirt on the inlet of the condenser (6) with a fibre brush.
- Clean with an air jet in the reverse direction to normal flow.
- Clean the condenser area with a fibre brush.

7.7 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.

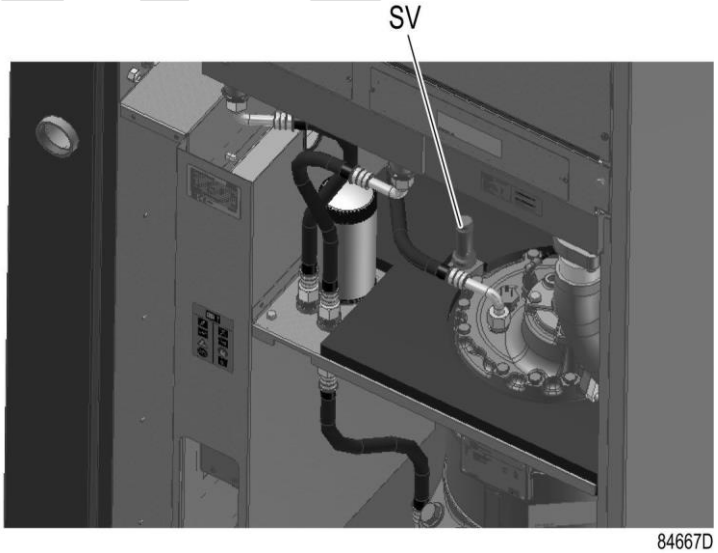
Before starting any maintenance or repair work, switch off the voltage and close the air inlet and outlet valves.

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.

7.8 Safety valves



Location of safety valve

Testing

	The safety valve (SV) test can only be performed by authorized personnel and is protected by a security code. Refer to Elektronikon® Graphic controller, Test menu

If the safety 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.

7.9 Service intervals filters

UD+ filters

The filter elements of oil mist filters (UD+) should be replaced after 4000 hours. The gauge or pop-up is not a measure, as a typical oil mist filter operates in the steady state mode during its life and this mode is 200-250 mbar.

Note that the indicator or gauge will not move into the red area but will stay yellow or orange during operation.

Summarizing, the following service intervals should be observed (whatever comes first):

- 4000 operating hours
- 12 months in use
- Pressure drop: 350 mbar

7.10 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 Atlas Copco parts while keeping the maintenance budget low.

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

Consult the Spare Parts List for part numbers.

7.11 Storage after installation

Procedure

Run the compressor regularly, e.g. twice a week, until warm.

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

7.12 Disposal of used material

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

	Be careful when removing the electric motor. The rotor contains magnetic parts.

Electronic components are subject to the EU Directive 2002/96/EC for Waste Electrical and Electronic Equipment (WEEE). As such, these parts must not be disposed of at a municipal waste collection point. Refer to local regulations for directions on how to dispose of this product in an environmental friendly manner.

8 Problem solving

Warning

	Before carrying out any maintenance, repair work or adjustment, stop compressor, wait 3 minutes and close the air outlet valve. Press the test button on top of the electronic water drain until the air system between the air receiver and outlet valve is fully depressurized. Press the emergency stop button and switch off the voltage. Depressurise the compressor by opening the oil filler plug one turn. **For location of components, see sections:** • Introduction. • Condensate system. • Operation instructions • Maintenance.
	Open and lock the isolating switch.
	Lock the air outlet valve 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.
	The operator must apply all relevant Safety precautions.

Before electrical maintenance

	Wait for at least 10 minutes before starting any electrical repairs as dangerous high voltage remains on the capacitors of the start and speed regulation unit during some minutes after switching off the voltage.

Faults and remedies, compressor

If the alarm LED is lit or flashes, consult sections Event history menu or Service menu.

Condition	Fault	Remedy
Condensate is not discharged from condensate separator during loading	Discharge flexible clogged	Check and correct as necessary

Condition	Fault	Remedy
Compressor air output or pressure below normal	Air consumption exceeds air delivery of compressor	Check equipment connected
	Choked air filter element	Replace filter element
	Solenoid valve malfunctioning	Replace valve
	Oil separator clogged	Have element replaced
	Air leakage	Have leaks repaired
	Safety valve leaking	Have valve replaced
	Compressor element out of order	Consult Atlas Copco

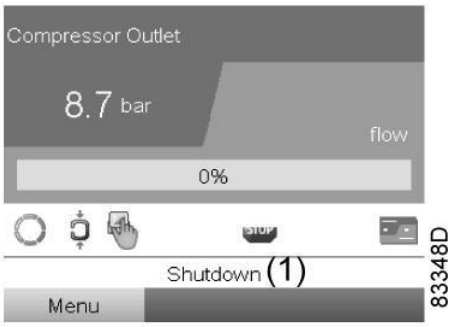
Condition	Fault	Remedy
Safety valve blows	Minimum pressure valve malfunctioning	Check and have defective parts replaced
	Oil separator clogged	Have element replaced
	Safety valve out of order	Have valve checked. Replace if necessary
	On Full-Feature compressors, dryer piping clogged due to formation of ice	Have system checked by Atlas Copco

Condition	Fault	Remedy
Compressor element outlet temperature or delivery air temperature above normal	Oil level too low	Check and correct, see Operation instructions / During operation
	On air-cooled compressors, insufficient cooling air or cooling air temperature or relative humidity is too high	Check for cooling air restriction or improve ventilation of the compressor room. Avoid recirculating of cooling air. If installed, check capacity of compressor room fan
	Oil cooler clogged	Clean cooler
	By-pass valve malfunctioning	Have valve tested
	Air cooler clogged	Clean cooler
	Compressor element out of order	Consult Atlas Copco
	Degraded oil	Check service intervals, see Preventive maintenance schedule

Condition	Fault	Remedy
Low Load Alarm triggered: Compressor running with too low oil temperature over a longer period of time	Solenoid valve malfunctioning	Replace valve
	Extreme low usage of compressor	Increase loading profile (longer and/or more load cycles required) If not possible, consult Atlas Copco

Converter fault codes

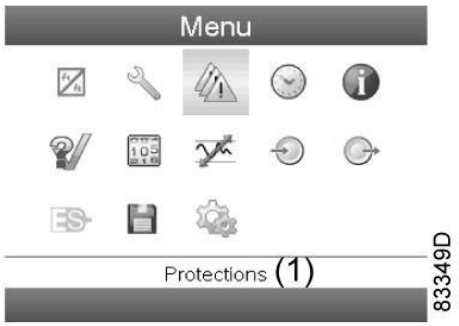
If a problem is detected by the converter, a specific code (Main motor converter alarm) will appear on the Elektronikon display, together with a fault code. Below table lists the most important error codes. If another code appears, please contact Atlas Copco



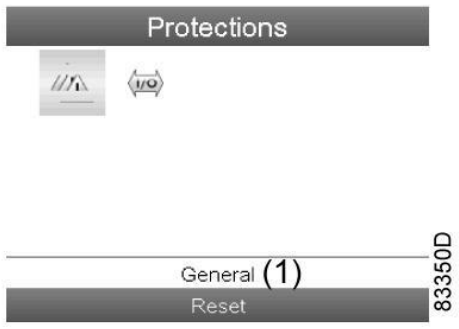
Typical display when the compressor is stopped by a shutdown

(1)	Shutdown

Navigate to the Stop icon or to the Protections icon and press Enter.

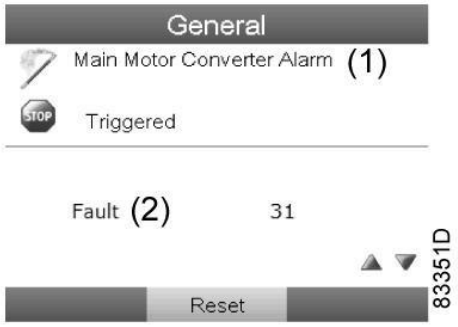


(1)	Protections



(1)	General

The display shows the problem (Main Motor Converter Alarm) and a fault code (31 in this case).



(1)	Main Motor Converter Alarm
(2)	Fault

Fault code	Fault	Remedy
2 (or 60000)	DC Bus Undervoltage (Uv1)	Check supply voltage Check input wiring Check EMC filter
3 (or 60000)	Control Power Supply Voltage Fault (Uv2)	Check supply voltage Check input wiring Check EMC filter
4 (or 60000)	Undervoltage 3 (Uv3)	Check supply voltage Check input wiring Check EMC filter
5	Output Short-Circuit or IGBT Fault (SC)	Check wiring to motor Check for short-circuits Check inlet valve Check back pressure oil separator vessel Check oil injection
6	Ground Fault (GF)	Check wiring to motor Check for short-circuits Check inlet valve Check back pressure oil separator vessel Check oil injection
7 (or 60001)	Overcurrent (oC)	Check wiring to motor Check for short-circuits Check inlet valve Check back pressure oil separator vessel Check oil injection
8 (or 60000)	Drive Overheat Warning (ov)	Check ambient temperatures Check cooling unit/inverter Check heatsink inverter
9	Heatsink Overheat (oH)	Check ambient temperatures Check cooling unit/inverter Check heatsink inverter
10	Overheat 1 (oH1)	Check ambient temperatures Check cooling unit/inverter Check heatsink inverter
11	Motor Overload (oL1)	Check inlet valve Check back pressure oil separator vessel Check drive train Check oil injection
12	Drive Overload (oL2)	Check inlet valve Check back pressure oil separator vessel Check drive train Check oil injection

Fault code	Fault	Remedy
13	Overtorque Detection 1 (oL3)	Check inlet valve Check back pressure oil separator vessel Check drive train Check oil injection
14	Overtorque Detection 2 (oL4)	Check inlet valve Check back pressure oil separator vessel Check drive train Check oil injection
15	Dynamic Braking Transistor (rr)	Contact Atlas Copco
16	Braking Resistor Overheat (rH)	Contact Atlas Copco
17	External Fault at Input Terminal S3 (EF3)	Check control wiring
18	External Fault at Input Terminal S4 (EF4)	Check control wiring
19	External Fault at Input Terminal S5 (EF5)	Check control wiring
20	External Fault at Input Terminal S6 (EF6)	Check control wiring
21	External Fault at Input Terminal S7 (EF7)	Check control wiring
22	External Fault at Input Terminal S8 (EF8)	Check control wiring
23	Internal Fan Fault (FAn)	Check cooling inverter
24	Overspeed (oS)	Contact Atlas Copco
25	Speed Deviation (dEv)	Contact Atlas Copco
26	PG Disconnect (PGo)	Contact Atlas Copco
27	Input Phase Loss (PF)	Check supply voltage Check input wiring Check EMC filter
28	Output Phase Loss (LF)	Check wiring to motor
29	Motor Overheat (PTC input) (oH3)	Check wiring to motor Check ambient temperatures Check cooling unit Check inlet valve Check back pressure oil separator vessel
30	Digital Operator Connection (oPr)	Contact Atlas Copco
31	EEPROM Write Error (Err)	Contact Atlas Copco
32	Motor Overheat (PTC input) (oH4)	Check wiring to motor Check ambient temperatures Check cooling unit Check inlet valve Check back pressure oil separator vessel
33	MEMOBUS/Modbus Communication Error (CE)	Check communication wiring Check inverter, position S2
34	Option Communication Error (bUS)	Contact Atlas Copco
37	Control Fault (CF)	Contact Atlas Copco
38	Zero-Servo Fault (SvE)	Contact Atlas Copco
39	Option External Fault (EF0)	Contact Atlas Copco
40	PID Feedback Loss (FbL)	Contact Atlas Copco
41	Undertorque Detection 1 (UL3)	Contact Atlas Copco
42	Undertorque Detection 2 (UL4)	Contact Atlas Copco
43	High Slip Braking Overload (oL7)	Contact Atlas Copco
48	Hardware Fault (including oFx)	Contact Atlas Copco
50	Z Pulse Fault (dv1)	Contact Atlas Copco

Fault code	Fault	Remedy
51	Z Pulse Noise Fault Detection (dv2)	Contact Atlas Copco
52	Inversion Detection (dv3)	Contact Atlas Copco
53	Inversion Prevention Detection (dv4)	Contact Atlas Copco
54	Output Current Imbalance (LF2)	Check wiring to motor
55 (or 60000)	Pullout Detection (Sto)	Contact Atlas Copco
56	PG Hardware Fault (PGoH)	Contact Atlas Copco
57	MECHATROLINK Watchdog Timer Error (E5)	Contact Atlas Copco
59	Safe Torque Off function activated (STO)	Pressure switch oil separator vessel activated. Check wiring to the switch and emergency stop.
65	PID Feedback Loss (FbH)	Contact Atlas Copco
66	External Fault 1, Input Terminal S1 (EF1)	Contact Atlas Copco
67	External Fault 2, Input Terminal S2 (EF2)	Contact Atlas Copco
68	Mechanical Weakening Detection 1 (oL5)	Contact Atlas Copco
69	Mechanical Weakening Detection 2 (UL5)	Contact Atlas Copco
70	Current Offset Fault (CoF)	Contact Atlas Copco
71	PLC Detection Error 1 (PE1)	Contact Atlas Copco
72	PLC Detection Error 2 (PE2)	Contact Atlas Copco
73	DriveWorksEZ Fault (dWFL)	Contact Atlas Copco
74	EEPROM Memory DriveWorksEZ Data Er (dWF1)	Contact Atlas Copco
77	Output Voltage Detection Fault (voF)	Contact Atlas Copco
78	Braking Resistor Transistor Fault (rF)	Contact Atlas Copco
79	Braking Transistor Overload Fault (boL)	Contact Atlas Copco
80	Motor Overheat (NTC Input) (oH5)	Contact Atlas Copco
81	LSo Fault (LSo)	Contact Atlas Copco
82	Node Setup Fault (nSE)	Contact Atlas Copco
83	Thermistor Disconnect (THo)	Contact Atlas Copco
91	Initial Polarity Estimation Timeout (dv7)	Contact Atlas Copco
95	Power Unit Output Phase Loss 3 (LF3)	Contact Atlas Copco
96	Current Unbalance (UnbC)	Check wiring to motor
97	Power Supply Module Undervoltage (Uv4)	Contact Atlas Copco
131	A/D Conversion Error (CPF02)	Contact Atlas Copco
132	PWM Data Fault (CPF03)	Contact Atlas Copco
135	EEPROM Memory Data Error (CPF06)	Contact Atlas Copco
136	Terminal Board Connection Error (CPF07)	Contact Atlas Copco
137	EEPROM Serial Communication Fault (CPF08)	Contact Atlas Copco
140	RAM Fault (CPF11)	Contact Atlas Copco
141	Flash Memory Circuit Exception (CPF12)	Contact Atlas Copco
142	Watchdog Circuit Exception (CPF13)	Contact Atlas Copco
143	Control Circuit Fault (CPF14)	Contact Atlas Copco
145	Clock Fault (CPF16)	Contact Atlas Copco

Fault code	Fault	Remedy
146	Timing Fault (CPF17)	Contact Atlas Copco
147	Control Circuit Fault (CPF18)	Contact Atlas Copco
148	Control Circuit Fault (CPF19)	Contact Atlas Copco
149	Hardware Fault at Power Up (CPF20)	Contact Atlas Copco
150	Hardware Fault at Communication Start Up (CPF21)	Contact Atlas Copco
151	A/D Conversion Fault (CPF22)	Contact Atlas Copco
152	PWM Feedback Fault (CPF23)	Contact Atlas Copco
153	Drive Unit Signal Fault (CPF24)	Contact Atlas Copco
154	Terminal Board is Not Properly Connected. (CPF25)	Contact Atlas Copco
155	ASIC BB Circuit Error (CPF26)	Contact Atlas Copco
156	ASIC PWM Setting Register Error (CPF27)	Contact Atlas Copco
157	ASIC PWM Pattern Error (CPF28)	Contact Atlas Copco
158	ASIC On-delay Error (CPF29)	Contact Atlas Copco
159	ASIC BBON Error (CPF30)	Contact Atlas Copco
160	ASIC Code Error (CPF31)	Contact Atlas Copco
161	ASIC Start-up Error (CPF32)	Contact Atlas Copco
162	Watch-dog Error (CPF33)	Contact Atlas Copco
163	ASIC Power/Clock Error (CPF34)	Contact Atlas Copco
164	External A/D Converter Error (CPF35)	Contact Atlas Copco
169	Control Circuit Error (CPF40)	Contact Atlas Copco
170	Control Circuit Error (CPF41)	Contact Atlas Copco
171	Control Circuit Error (CPF42)	Contact Atlas Copco
172	Control Circuit Error (CPF43)	Contact Atlas Copco
173	Control Circuit Error (CPF44)	Contact Atlas Copco
174	Control Circuit Error (CPF45)	Contact Atlas Copco
257	Option Compatibility Error (oFA00)	Contact Atlas Copco
258	Option Not Properly Connected (oFA01)	Contact Atlas Copco
259	Same Type of Option Card Already Connected (oFA02)	Contact Atlas Copco
262	A/D Conversion Error (oFA05)	Contact Atlas Copco
263	Option Response Error (oFA06)	Contact Atlas Copco
273	Option RAM Fault (oFA10)	Contact Atlas Copco
274	Option Operation Mode Fault (SLMOD) (oFA11)	Contact Atlas Copco
275	Drive Receive CRC Error (oFA12)	Contact Atlas Copco
276	Drive Receive Frame Error (oFA13)	Contact Atlas Copco
277	Drive Receive Abort Error (oFA14)	Contact Atlas Copco
278	Option Receive CRC Error (oFA15)	Contact Atlas Copco
279	Option Receive Frame Error (oFA16)	Contact Atlas Copco
280	Option Receive Abort Error (oFA17)	Contact Atlas Copco
305	Comm. ID Error (oFA30)	Contact Atlas Copco
306	Model Code Error (oFA31)	Contact Atlas Copco
307	Sumcheck Error (oFA32)	Contact Atlas Copco

Fault code	Fault	Remedy
308	Comm. Option Timeout Waiting for Response (oFA33)	Contact Atlas Copco
309	MEMOBUS Timeout (oFA34)	Contact Atlas Copco
310	Drive Timeout Waiting for Response (oFA35)	Contact Atlas Copco
311	CI Check Error (oFA36)	Contact Atlas Copco
312	Drive Timeout Waiting for Response (oFA37)	Contact Atlas Copco
313	Control Command Selection Error (oFA38)	Contact Atlas Copco
314	Drive Timeout Waiting for Response (oFA39)	Contact Atlas Copco
315	Control Response Selection 1 Error (oFA40)	Contact Atlas Copco
316	Drive Timeout Waiting for Response (oFA41)	Contact Atlas Copco
317	Control Response Selection 2 Error (oFA42)	Contact Atlas Copco
318	Control Response Selection Error (oFA43)	Contact Atlas Copco
513	Option Compatibility Error (oFB00)	Contact Atlas Copco
514	Option Connection Error (oFb01)	Contact Atlas Copco
515	Same Type of Option Card Already _ Connected (oFb02)	Contact Atlas Copco
518	A/D Conversion Error (oFb05)	Contact Atlas Copco
519	Option Response Error (oFb06)	Contact Atlas Copco
529	Option RAM Fault (oFb10)	Contact Atlas Copco
530	Option Operation Mode Fault (SLMOD) (oFb11)	Contact Atlas Copco
531	Drive Receive CRC Error (oFb12)	Contact Atlas Copco
532	Drive Receive Frame Error (oFb13)	Contact Atlas Copco
533	Drive Receive Abort Error (oFb14)	Contact Atlas Copco
534	Option Receive CRC Error (oFb15)	Contact Atlas Copco
535	Option Receive Frame Error (oFb16)	Contact Atlas Copco
536	Option Receive Abort Error (oFb17)	Contact Atlas Copco
561	Comm. ID Error (oFb30)	Contact Atlas Copco
562	Model Code Error (oFb31)	Contact Atlas Copco
563	Sumcheck Error (oFb32)	Contact Atlas Copco
564	Comm. option Timeout Waiting for Response (oFb33)	Contact Atlas Copco
565	MEMOBUS Timeout (oFb34)	Contact Atlas Copco
566	Drive Timeout Waiting for Response (oFb35)	Contact Atlas Copco
567	CI Check Error (oFb36)	Contact Atlas Copco
568	Drive Timeout Waiting for Response (oFb37)	Contact Atlas Copco
569	Control Command Selection Error (oFb38)	Contact Atlas Copco
570	Drive Timeout Waiting for Response (oFb39)	Contact Atlas Copco

Fault code	Fault	Remedy
571	Control Response Selection 1 Error (oFb40)	Contact Atlas Copco
572	Drive Timeout Waiting for Response (oFb41)	Contact Atlas Copco
573	Control Response Selection 2 Error (oFb42)	Contact Atlas Copco
574	Control Response Selection Error (oFb43)	Contact Atlas Copco
769	Option Compatibility Error (oFC00)	Contact Atlas Copco
771	Option Not Properly Connected (oFC01)	Contact Atlas Copco
772	Same Type of Option Card Already _ Connected (oFC02)	Contact Atlas Copco
774	A/D Conversion Error (oFC05)	Contact Atlas Copco
775	Option Response Error (oFC06)	Contact Atlas Copco
785	Option RAM Fault (oFC10)	Contact Atlas Copco
786	Option Operation Mode Fault (SLMOD) (oFC11)	Contact Atlas Copco
787	Drive Receive CRC Error (oFC12)	Contact Atlas Copco
788	Drive Receive Frame Error (oFC13)	Contact Atlas Copco
789	Drive Receive Abort Error (oFC14)	Contact Atlas Copco
790	Option Receive CRC Error (oFC15)	Contact Atlas Copco
791	Option Receive Frame Error (oFC16)	Contact Atlas Copco
792	Option Receive Abort Error (oFC17)	Contact Atlas Copco
849	Encoder Option AD Conversion Error (oFC50)	Contact Atlas Copco
850	Encoder Option Analog Circuit Error (oFC51)	Contact Atlas Copco
851	Encoder Communication Timeout (oFC52)	Contact Atlas Copco
852	Encoder Communication Data Error (oFC53)	Contact Atlas Copco
853	Encoder Error (oFC54)	Contact Atlas Copco
854	Resolver Error (oFC55)	Contact Atlas Copco

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
Electronic condensate drain remains inoperative	Electronic drain system clogged	Have system inspected Clean the filter of the automatic drain by opening the manual drain valve. Check functioning of the drain by pushing the test button
Condensate trap continuously discharges air and water	Automatic drain out of order	Have system checked. If necessary, replace the automatic 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

9 Technical data

9.1 Readings on display

Elektronikon® Graphic controller

Important

	The readings mentioned below are valid under the reference conditions (see section Reference conditions and limtations).

Reference	Reading
Air outlet pressure	Depends on the setpoint (desired net pressure).
Compressor element outlet temperature	Approx. 80 ˚C (176 ˚F) (ambient temperature 20 °C + 60 °C)
Dewpoint temperature (on Full-Feature compressors	Approx. 4 ˚C (39 ˚F).

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

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 IEC60204 table 10.

Leakage breaker (optional)

If the installation requires a leakage breaker, always use an all current sensitive leakage breaker, RCM or RCD Type B (according to IEC/EN 60755) with a sufficient trip level.

Currents and fuses

IEC approval

Type			Imax(1)	Max Fuse (1)	Imax(2)	Max Fuse (2)
				aR		aR
	V	Hz	A	A	A	A
GA37VSD+	400	50	81.3	90	86.5	100
GA45VSD+	400	50	98.2	125	103.4	125
GA55VSD+	400	50	122	175	127	175
GA75VSD+	400	50	153	200	160	200

I_{max} : current in the supply lines at maximum load and nominal voltage

(1): compressors without integrated dryer

(2): compressors with integrated dryer

Setting of circuit breakers

Frequency (Hz)	Voltage(V)	GA37VSD+ Q15 (A)	GA45VSD+ Q15 (A)	GA55VSD+ Q15 (A)	GA75VSD+ Q15 (A)
50	400	3	3	5.3	7.7

Fuse calculations for IEC are done according to 60364-4-43 electrical installations of buildings, part 4: protection for safety- section 43: protection against overcurrent. Fuse sizes are calculated in order to protect the cable against short circuit.

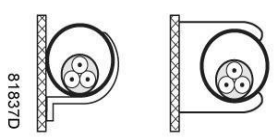
Earthing

The earthing cable connected to the compressor (PE) should be minimum 10 mm^2 (according to EN 60204-1 section 828).

Cable sizing according IEC

The tables below indicate the current carrying capacities of cables for 3 commonly used installation methods, calculated according to standard 60364-5-52 - electrical installations of buildings part 5 - selection and erection equipment and section 52 - current carrying capacities in wiring systems.

The allowed currents are valid for PVC insulated cables with three loaded copper conductors (maximum conductor temperature 70 °C).

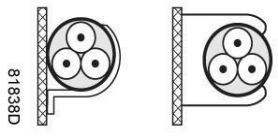
	Installation method B2 according table B.52.1. Multi-core cable in conduit on a wooden wall

Maximum allowed current in function of the ambient temperature for installation method B2

	Ambient temperature				
Cable section	**30 °C**	**40 °C**	**45 °C**	**50 °C**	**55 °C**
4 mm²	< 27 A	< 23 A	< 21 A	< 19 A	< 16 A
6 mm²	< 34 A	< 30 A	< 27 A	< 24 A	< 21 A
10 mm²	< 46 A	< 40 A	< 36 A	< 33 A	< 28 A
16 mm²	< 62 A	< 54 A	< 49 A	< 44 A	< 38 A
25 mm²	< 80 A	< 70 A	< 63 A	< 57 A	< 49 A
35 mm²	< 99 A	< 86 A	< 78 A	< 70 A	< 60 A
50 mm²	< 118 A	< 103 A	< 93 A	< 84 A	< 72 A
70 mm²	< 149 A	< 130 A	< 118 A	< 106 A	< 91 A
95 mm²	< 179 A	< 156 A	< 141 A	< 127 A	< 109 A
120 mm²	< 206 A	< 179 A	< 163 A	< 146 A	< 126 A

PVC Aluminum Cable (Max conductor temperature=70°C) Installation method B2

	Ambient Temperature				
Cable Section	**30°C**	**40°C**	**45°C**	**50°C**	**55°C**
4 mm²	21	18	17	15	13
6 mm²	27	23	21	19	16
10 mm²	36	31	28	26	22
16 mm²	48	42	38	34	29
25 mm²	62	54	49	44	38
35 mm²	77	67	61	55	47
50 mm²	92	80	73	65	56
70 mm²	116	101	92	82	71
95 mm²	139	121	110	99	85
120 mm²	160	139	126	114	98
150 mm²	176	153	139	125	107
185 mm²	199	173	157	141	121



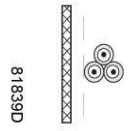
Installation method C according table B.52.1.
Single-core or multi-core cable on a wooden wall

Maximum allowed current in function of the ambient temperature for installation method C

	Ambient temperature				
Cable section	**30 °C**	**40 °C**	**45 °C**	**50 °C**	**55 °C**
4 mm^2	< 32 A	< 28 A	< 25 A	< 23 A	< 20 A
6 mm^2	< 41 A	< 36 A	< 32 A	< 29 A	< 25 A
10 mm^2	< 57 A	< 50 A	< 45 A	< 40 A	< 35 A
16 mm^2	< 76 A	< 66 A	< 60 A	< 54 A	< 46 A
25 mm^2	< 96 A	< 84 A	< 76 A	< 68 A	< 59 A
35 mm^2	< 119 A	< 104 A	< 94 A	< 84 A	< 73 A
50 mm^2	< 144 A	< 125 A	< 114 A	< 102 A	< 88 A
70 mm^2	< 184 A	< 160 A	< 145 A	< 131 A	< 112 A
95 mm^2	< 223 A	< 194 A	< 176 A	< 158 A	< 136 A
120 mm^2	< 259 A	< 225 A	< 205 A	< 184 A	< 158 A

PVC Aluminum Cable (Max conductor temperature=70°C) Installation method C

	Ambient Temperature				
Cable Section	**30°C**	**40°C**	**45°C**	**50°C**	**55°C**
4 mm^2	25	22	20	18	15
6 mm^2	32	28	25	23	20
10 mm^2	44	38	35	31	27
16 mm^2	59	51	47	42	36
25 mm^2	73	64	58	52	45
35 mm^2	90	78	71	64	55
50 mm^2	110	96	87	78	67
70 mm^2	140	122	111	99	85
95 mm^2	170	148	134	121	104
120 mm^2	197	171	156	140	120
150 mm^2	227	197	179	161	138
185 mm^2	259	225	205	184	158



Installation method F according table B.52.1. Single-core cables, touching in free air
Clearance to wall not less than one cable diameter

Maximum allowed current in function of the ambient temperature for installation method F.

	Ambient temperature				
Cable section	**30 °C**	**40 °C**	**45 °C**	**50 °C**	**55 °C**
25 mm²	< 110 A	< 96 A	< 87 A	< 78 A	< 67 A
35 mm²	< 137 A	< 119 A	< 108 A	< 97 A	< 84 A
50 mm²	< 167 A	< 145 A	< 132 A	< 119 A	< 102 A
70 mm²	< 216 A	< 188 A	< 171 A	< 153 A	< 132 A
95 mm²	< 264 A	< 230 A	< 209 A	< 187 A	< 161 A
120 mm²	< 308 A	< 268 A	< 243 A	< 219 A	< 188 A

PVC Aluminum Cable (Max conductor temperature=70°C) Installation method F

	Ambient Temperature				
Cable Section	**30°C**	**40°C**	**45°C**	**50°C**	**55°C**
25 mm²	84	73	66	60	51
35 mm²	105	91	83	75	64
50 mm²	128	111	101	91	78
70 mm²	166	144	131	118	101
95 mm²	203	177	160	144	124
120 mm²	237	206	187	168	145
150 mm²	274	238	216	195	167
185 mm²	315	274	249	224	192

Calculation method for IEC:

- Single supply cables (3 phases + PE - configuration (1)):
  - Add 10 % to the total compressor current (ItotPack or ItotFF from the tables)
  - Install the prescribed fuse on each cable
- Parallel supply cable (2 x 3 phases + PE - configuration (2)):
  - Add 10 % to the total compressor current (I_{tot}Pack or I_{tot}FF from the tables) and divide by 2
  - Multiply the ampacity of the cables with 0.8 (see table A.52.17 (52-E1))
  - Install fuses of half the size of the recommended maximum fuse size on each cable.
- When using 2 x 3 phases + PE as in (3):
  - Add 10 % to the total compressor current (ItotPack or ItotFF from the tables) and divide by √3
  - Multiply the ampacity of the cables with 0.8 (see table A.52.17 (52-E1))
  - Fuse size: the recommended maximum fuse size divided by √3 on each cable.
- Size of the PE cable:
  - For supply cables up to 35 mm²: same size as supply cables
  - For supply cables larger than 35 mm²: half the size of the supply wires

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

Example: I_{tot} = 89 A, maximum ambient temperature is 45 °C, recommended fuse = 100 A

- Single supply cables (3 phases + PE - configuration (1)):
  - I = 89 A + 10 % = 89 x 1.1 = 97.9 A
  - The table for B2 and ambient temperature = 45 ° C allows a maximum current of 93 A for a 50 mm² cable. For a cable of 70 mm², the maximum allowed current is 118 A, which is sufficient. Therefore, use a 3 x 70 mm² + 35 mm² cable.

If method C is used, 50 mm² is suffficient. (35 mm² for method F) => cable 3 x 50 mm² + 25 mm².

- Parallel supply cable (2 x 3 phases + PE - configuration (2)):
  - I = (89 A + 10 %)/2 = (89 x 1.1)/2 = 49 A
  - For a cable of 25 mm², B2 at 45 °C, the maximum current is 63 A x 0.8 = 50.4 A. So 2 parallel cables of 3 x 25 mm² + 25 mm² are sufficient.
  - Install 50 A fuses on each cable instead of 100 A.

XLPE Aluminum Cable (Max conductor temperature=90°C) Installation method B2

	Ambient Temperature				
Cable Section	**30°C**	**40°C**	**45°C**	**50°C**	**55°C**
4 mm²	35	32	30	29	27
6 mm²	44	40	38	36	33
10 mm²	60	55	52	49	46
16 mm²	80	73	70	66	61
25 mm²	105	96	91	86	80
35 mm²	128	116	111	105	97
50 mm²	154	140	134	126	117
70 mm²	194	177	169	159	147
95 mm²	233	212	203	191	177
120 mm²	268	244	233	220	204
150 mm²	300	273	261	246	228
185 mm²	340	309	296	279	258

XLPE Aluminum Cable (Max conductor temperature=90°C) Installation method C

	Ambient Temperature				
Cable Section	**30°C**	**40°C**	**45°C**	**50°C**	**55°C**
4 mm²	40	36	35	33	30
6 mm²	52	47	45	43	40
10 mm²	71	65	62	58	54
16 mm²	96	87	84	79	73
25 mm²	119	108	104	98	90
35 mm²	147	134	128	121	112
50 mm²	179	163	156	147	136
70 mm²	229	208	199	188	174
95 mm²	278	253	242	228	211
120 mm²	322	293	280	264	245
150 mm²	371	338	323	304	282
185 mm²	424	386	369	348	322

XLPE Aluminum Cable (Max conductor temperature=90°C) Installation method F

	Ambient Temperature				
Cable Section	**30°C**	**40°C**	**45°C**	**50°C**	**55°C**
25 mm^2	135	123	117	111	103
35 mm^2	169	154	147	139	128
50 mm^2	207	188	180	170	157
70 mm^2	268	244	233	220	204
95 mm^2	328	298	285	269	249
120 mm^2	383	349	333	314	291
150 mm^2	444	404	386	364	337
185 mm^2	510	464	444	418	388

9.3 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.

Limitations

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

9.4 Compressor data

Reference conditions

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

Common compressor data

	Unit	
Number of compression stages		1
Temperature of the air leaving the outlet valve (approx.), Workplace	˚C	27
Temperature of the air leaving the outlet valve (approx.), Workplace	˚F	81
Temperature of the air leaving the outlet valve (approx.), Workplace Full-Feature	˚C	24
Temperature of the air leaving the outlet valve (approx.), Workplace Full-Feature	˚F	75
Refrigerant type, Workplace Full-Feature		R410a (R134a for CSA variants)

GA 37 VSD+

Normal effective working pressure	bar(e)	4	7	9.5	12.5
Normal effective working pressure	psig	58	102	138	181
Maximum effective working pressure, Workplace	bar(e)	13	13	13	13
Maximum effective working pressure, Workplace	psig	189	189	189	189
Maximum effective working pressure, Workplace Full-Feature	bar(e)	12.75	12.75	12.75	12.75
Maximum effective working pressure, Workplace Full-Feature	psig	185	185	185	185
Maximum motor shaft speed	rpm	3900	3900	3425	2900
Minimum motor shaft speed	rpm	850	850	850	1350

Nominal motor power	kW	37
Nominal motor power	hp	50
Total amount of refrigerant, Workplace Full-Feature	kg	1.25
Total amount of refrigerant, Workplace Full-Feature	lb	2.7
Oil capacity	l	30
Oil capacity	US gal	7
Oil capacity	Imp. gal	6.6
Oil capacity	cu. ft.	1.06
Sound pressure level (according to ISO 2151 (2004))	dB(A)	67

GA 45 VSD+

Normal effective working pressure	bar(e)	4	7	9.5	12.5
Normal effective working pressure	psig	58	102	138	181
Maximum effective working pressure, Workplace	bar(e)	13	13	13	13
Maximum effective working pressure, Workplace	psig	189	189	189	189
Maximum effective working pressure, Workplace Full-Feature	bar(e)	12.75	12.75	12.75	12.75
Maximum effective working pressure,	psig	185	185	185	185

Workplace Full-Feature					
Maximum motor shaft speed	rpm	4500	4500	4000	3300
Minimum motor shaft speed	rpm	850	850	850	1350

Nominal motor power	kW	45
Nominal motor power	hp	60
Total amount of refrigerant, Workplace Full-Feature	kg	1.25
Total amount of refrigerant, Workplace Full-Feature	lb	2.7
Oil capacity	l	30
Oil capacity	US gal	7
Oil capacity	Imp. gal	6.6
Oil capacity	cu. ft.	1.06
Sound pressure level (according to ISO 2151 (2004))	dB(A)	67

GA 55 VSD+

Normal effective working pressure	bar(e)	4	7	9.5	12.5
Normal effective working pressure	psig	58	102	138	181
Maximum effective working pressure, Workplace	bar(e)	13	13	13	13
Maximum effective working pressure, Workplace	psig	189	189	189	189
Maximum effective working pressure, Workplace Full-Feature	bar(e)	12.75	12.75	12.75	12.75
Maximum effective working pressure, Workplace Full-Feature	psig	185	185	185	185
Maximum motor shaft speed	rpm	5400	5400	4820	4000
Minimum motor shaft speed	rpm	850	850	850	1350

Nominal motor power	kW	55
Nominal motor power	hp	75
Total amount of refrigerant, Workplace Full-Feature	kg	1.25
Total amount of refrigerant, Workplace Full-Feature	lb	2.7
Oil capacity	l	32
Oil capacity	US gal	8
Oil capacity	Imp. gal	7
Oil capacity	cu. ft.	1.13
Sound pressure level (according to ISO 2151 (2004))	dB(A)	67

GA 75 VSD+

Normal effective working pressure	bar(e)	4	7	9.5	12.5
Normal effective working pressure	psig	58	102	138	181
Maximum effective working pressure, Workplace	bar(e)	13	13	13	13
Maximum effective working pressure, Workplace	psig	189	189	189	189
Maximum effective working pressure, Workplace Full-Feature	bar(e)	12.75	12.75	12.75	12.75
Maximum effective working pressure, Workplace Full-Feature	psig	185	185	185	185
Maximum motor shaft speed	rpm	6450	6450	5575	4700
Minimum motor shaft speed	rpm	850	850	850	1350

Nominal motor power	kW	75
Nominal motor power	hp	100
Total amount of refrigerant, Workplace Full-Feature	kg	1.45
Total amount of refrigerant, Workplace Full-Feature	lb	3.2
Oil capacity	l	32
Oil capacity	US gal	8
Oil capacity	Imp. gal	7
Oil capacity	cu. ft.	1.13
Sound pressure level (according to ISO 2151 (2004))	dB(A)	70

9.5 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)
Ambient and temperature conditions	IEC60068-2
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
Noise emission	IEC61000-6-3
Noise immunity	IEC61000-6-2
Mounting	Cabinet door

Digital outputs

Number of outputs	9 (Elektronikon™ Graphic controller - p.n. 1900 5200 10 …. 1900 5200 19)
Type	Relay (voltage free contacts)
Rated voltage AC	250 V AC / 10 A max.
Rated voltage DC	30 V DC / 10 A max.

Digital inputs

Number of inputs	10 (Elektronikon™ Graphic controller - p.n. 1900 5200 10 …. 1900 5200 19)
Supply by controller	24 V DC
Supply protection	Short circuit protected to ground
Input protection	Not isolated

Analog inputs

Number of pressure inputs	2 (Elektronikon™ Graphic controller - p.n. 1900 5200 10 …. 1900 5200 19)
Number of temperature inputs	5 (Elektronikon™ Graphic controller - p.n. 1900 5200 10 …. 1900 5200 19)

10 Instructions for use

Air/oil separator vessel

- This vessel can contain pressurised air; this can be potentially dangerous if the equipment is misused.
- This vessel must only be used as a compressed air/oil separator and must be operated within the limits specified on the data plate.
- No alterations must be made to this vessel by welding, drilling or any other mechanical methods without the written permission of the manufacturer.
- 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.
- This vessel has been designed and built to guarantee an operational lifetime in excess of 20 years.
  The vessel needs a yearly visual inspection.
  National legislation may require in service inspection.

11 Guidelines for inspection

Guidelines

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

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

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

12 Pressure equipment directives

Components subject to 97/23/EC 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 97/23/EC and all pressure equipment according to the Simple Pressure Vessel Directive 2009/105/EC.

Compressor type	Component	Description	Number of cycles (1)	Minimum wall thickness	Visual inspection frequency (2)	Hydrostatic inspection frequency (2)
GA 37 VSD+ up to GA 75 VSD+	1625 4815 01	Vessel	2 x 106	2 mm	1 year	10 years
	0830 1010 03	Safety valve	-	-	-	-
	0830 1009 98	Safety valve	-	-	-	-

Compressor type	Component	Description	Volume	Design pressure	Minimum and maximum design temperature	PED Class
GA 37 VSD+ up to GA 75 VSD+	1625 4815 01	Vessel	29 l	15 bar(e)	-8 ˚C/ 120 ˚C	-
	0830 1010 03	Safety valve	-	-	-	IV
	0830 1009 98	Safety valve	-	-	-	IV

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.

Other inspection techniques such as ultrasonic or X-ray are equivalent to hydrostatic testing for this equipment

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Atlas Copco's pursuit of innovation never ceases, driven by our need for reliability and efficiency. Always working with you, we are committed to providing you the customized quality air solution that is the driving force behind your business.

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