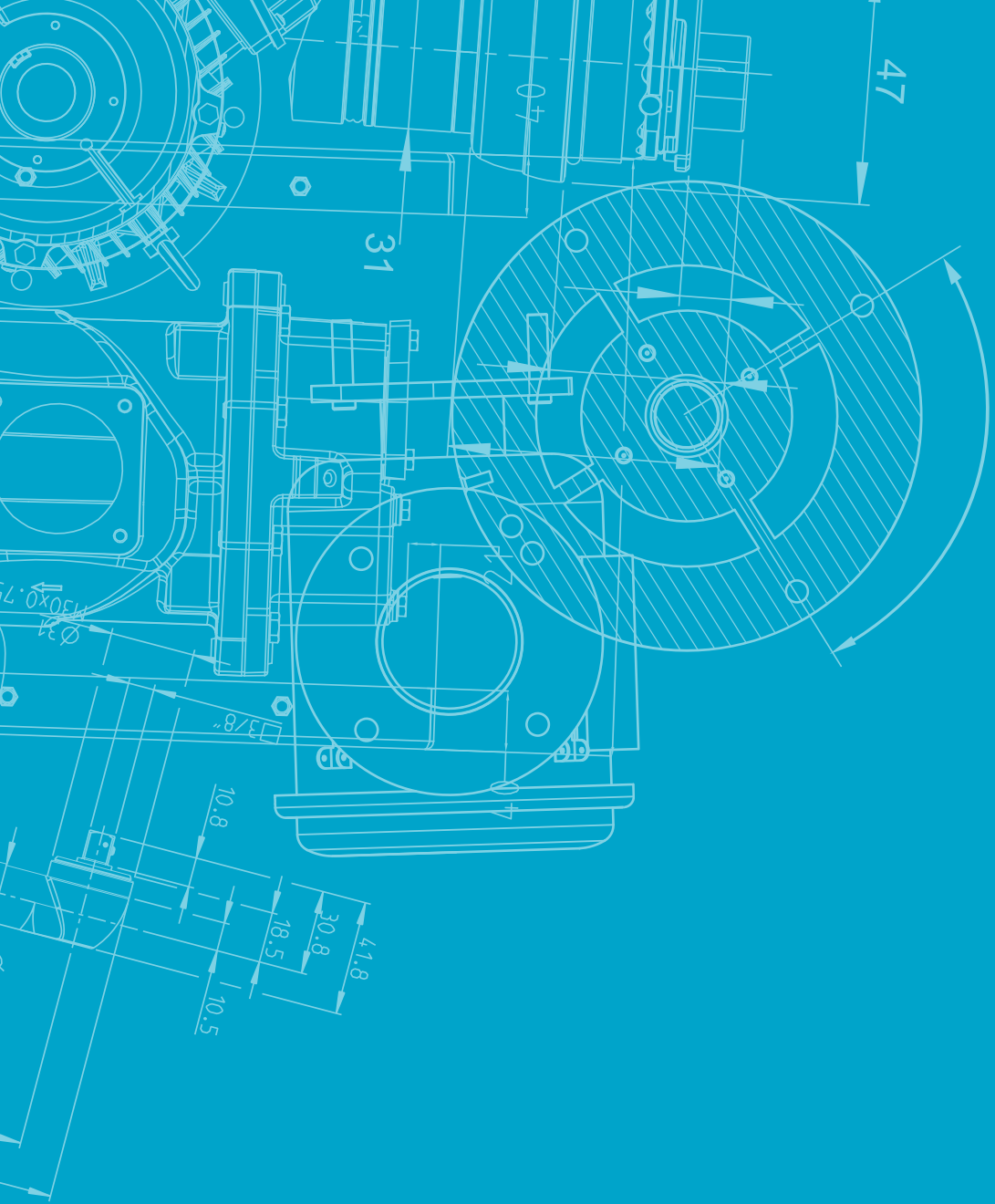

Instruction book

Oil-free scroll compressors

SF 8+, SF 11+
> WUX 200 911

Atlas Copco

Oil-free scroll compressors

SF 8+, SF 11+

Instruction book

Original instructions

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

November 2022

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Table of contents

1 Safety precautions

1.1 Safety icons

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

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

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

Note: Indicates important information.

1.2 General safety precautions

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

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

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

appropriate filtration depending on the application. Please contact your customer center for advice on specific filtration.

- The service switch should only be operated by a trained service specialist from the manufacturer.

1.3 Safety precautions during installation

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

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

  The operator has to make sure that the machine is stopped and depressurized and that the electrical isolating switch is open, locked and labelled with a temporary warning before any maintenance or repair. As a further safeguard, persons switching on or off remotely controlled machines shall take adequate precautions to ensure that there is no one checking or working on the machine. To this end, a suitable notice shall be affixed to the start equipment.
- Air-cooled machines must be installed in such a way that an adequate flow of cooling air is available and that the exhausted air does not recirculate to the compressor air inlet or cooling air inlet.
- The electrical connections must correspond to the applicable codes. The machines must be earthed and protected against short circuits by fuses in all phases. A lockable power isolating switch must be installed near the compressor.
- On machines with automatic start/stop system or if the automatic restart function after voltage failure is activated, a sign stating "This machine may start without warning" must be affixed near the instrument panel.

- In multiple compressor systems, manual valves must be installed to isolate each compressor. Non-return valves (check valves) must not be relied upon for isolating pressure systems.
- Never remove or tamper with the safety devices, guards or insulation fitted on the machine. Every pressure vessel or auxiliary installed outside the machine to contain air above atmospheric pressure must be protected by a pressure relieving device or devices as required.
- Piping or other parts with a temperature in excess of 70˚C (158˚F) and which may be accidentally touched by personnel in normal operation must be guarded or insulated. Other high temperature piping must be clearly marked.
- If the ground is not level or can be subject to variable inclination, consult the manufacturer.
- In an installation with multiple compressors, the outlet piping must be installed in such a way that condensate cannot flow back into the compressor. See section **Installation proposal**.

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

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

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

1.4 Safety precautions during operation

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

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

  On machines without bodywork, wear ear protection in the vicinity of the machine.
- People staying in environments or rooms where the sound pressure level reaches or exceeds 80 dB(A) shall wear ear protectors.
- Periodically check that:
  - All guards are in place and securely fastened
  - All hoses and/or pipes inside the machine are in good condition, secure and not rubbing
  - No leaks occur
  - All fasteners are tight
  - All electrical leads are secure and in good order

  - Safety valves and other pressure relief devices are not obstructed by dirt or paint
  - Air outlet valve and air net, i.e. pipes, couplings, manifolds, valves, hoses, etc. are in good repair, free of wear or abuse
  - All pre-filters are not clogged
- If warm cooling air from compressors is used in air heating systems, e.g. to warm up a workroom, take precautions against air pollution and possible contamination of the breathing air.
- Do not remove any of, or tamper with, the sound-damping material.
- Never remove or tamper with the safety devices, guards or insulations fitted on the machine. Every pressure vessel or auxiliary installed outside the machine to contain air above atmospheric pressure shall be protected by a pressure relieving device or devices as required.
- Yearly inspect the air receiver. Minimum wall thickness as specified in the instruction book must be respected. Local regulations remain applicable if they are more strict.

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

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

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

1.5 Safety precautions during maintenance or repair

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

- Always use the correct safety equipment (such as safety glasses, gloves, safety shoes, etc.).
- Use only the correct tools for maintenance and repair work.
- Use only genuine spare parts for maintenance or repair. The manufacturer will disclaim all damage or injuries caused by the use of non-genuine spare parts.
- All maintenance work shall only be undertaken when the machine has cooled down.
- A warning sign bearing a legend such as "Work in progress; do not start" shall be attached to the starting equipment.
- Persons switching on remotely controlled machines shall take adequate precautions to ensure that there is no one checking or working on the machine. To this end, a suitable notice shall be affixed to the remote start equipment.
- Close the compressor air outlet valve and depressurize the compressor before connecting or disconnecting a pipe.
- Before removing any pressurized component, effectively isolate the machine from all sources of pressure and relieve the entire system of pressure. See section **Maintenance**.
- Never use flammable solvents or carbon tetrachloride for cleaning parts. Take safety precautions against toxic vapors of cleaning liquids.
- Scrupulously observe cleanliness during maintenance and repair. Keep dirt away by covering the parts and exposed openings with a clean cloth, paper or tape.

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

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

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

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

1.6 Dismantling and disposal

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

Dismantling

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

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

Disposal of electrical and electronic appliances (WEEE)

This equipment falls under the provisions of the European Directive 2012/19/EU on waste electrical and electronic appliances (WEEE) and may not be disposed as unsorted waste.

The equipment is labelled in accordance with the European Directive 2012/19/EU with the crossed-out wheelie bin symbol.

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

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

Disposal of other used material

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

2 General description

2.1 General description

Introduction

SF 8+ and SF 11+ are stationary, oil free compressors.

The sound insulating canopy contains 2 electric motor driven compressor modules. The front door panel houses the Elektronikon™ Graphic controller and the emergency stop button. An electric cabinet with the electric components is located behind the front panel.

The compressors are available in 2 canopy versions and can be supplied with or without integrated refrigerant air dryer. The *low canopy version* is the most compact one, while the *high canopy version* has space for up to 2 extra compressor modules (upgrade kits are available).

SF

SF is the type designation of the compressor variant without integrated dryer. On SF, the compressed air of each compressor module flows via an individual check valve to a common air cooler and leaves the compressor via the air outlet valve.

SF Full Feature (SF FF) compressors are SF compressors provided with a refrigerant air dryer, integrated in the bodywork. The dryer removes moisture from the compressed air by cooling the air to near freezing point and automatically draining the condensate.

Figure 1: SF 11+ FF, low canopy version, front view

1	Elektronikon™ Graphic controller
2	Electric cabinet
S3	Emergency stop button

Figure 2: SF 11+ FF, high canopy version, front view

1	Elektronikon™ Graphic controller
2	Electric cabinet
S3	Emergency stop button

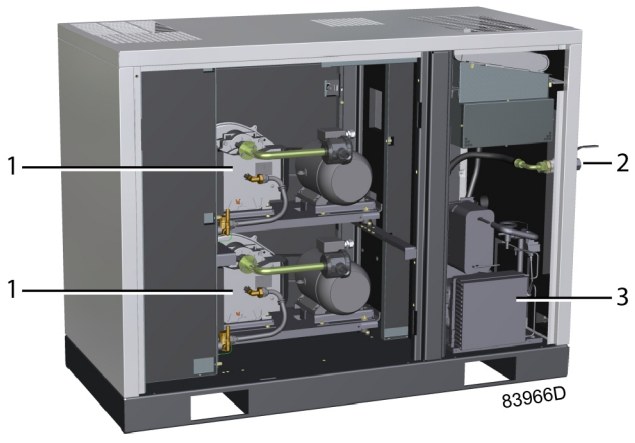


Figure 3: SF 8+ FF, low canopy version, rear view

1	Compressor module
2	Compressed air outlet valve
3	Refrigerant dryer

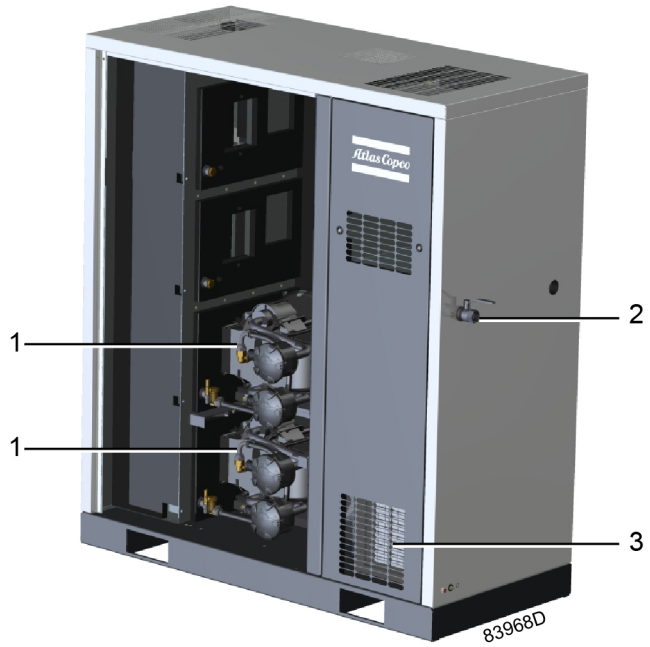


Figure 4: SF 11+ FF, high canopy version, rear view

1	Compressor module
2	Compressed air outlet valve
3	Refrigerant dryer

Compressor element operating principle

Each compressor element consists of a fixed scroll shaped housing and a scroll shaped rotor. Air enters the compressor element through inlet opening (1). Once the air is drawn in, the orbiting scroll (4) seals the inlet opening and forces the air into a continuously decreasing space. As scroll (4) keeps orbiting, this process of compression is constantly repeated, resulting in discharging of oil free compressed air through outlet opening (3).

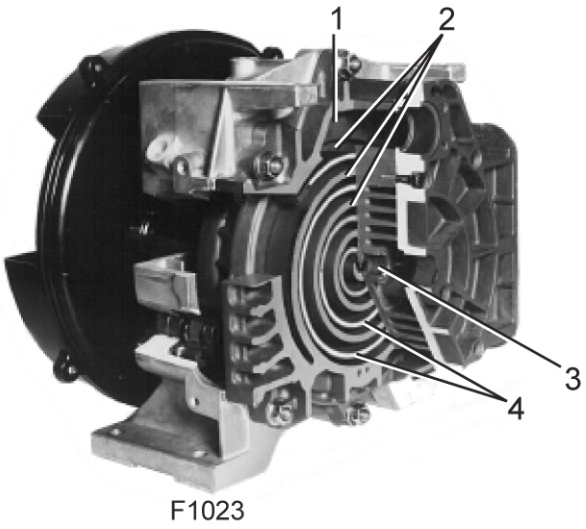


Figure 5: Compressor element, typical

1	Air inlet
2	Fixed scroll
3	Air outlet
4	Orbiting scroll

Compressor module

The SF 8^+ has two 3.7 kW modules, while the SF 11^+ has two 5.5 kW modules.

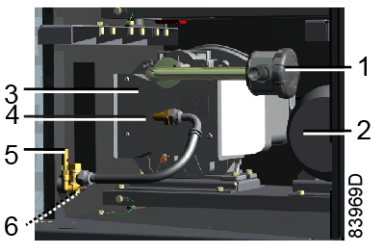


Figure 6: 3.7 kW compressor module

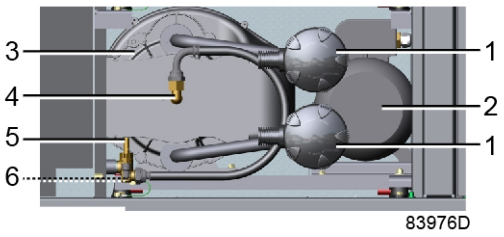
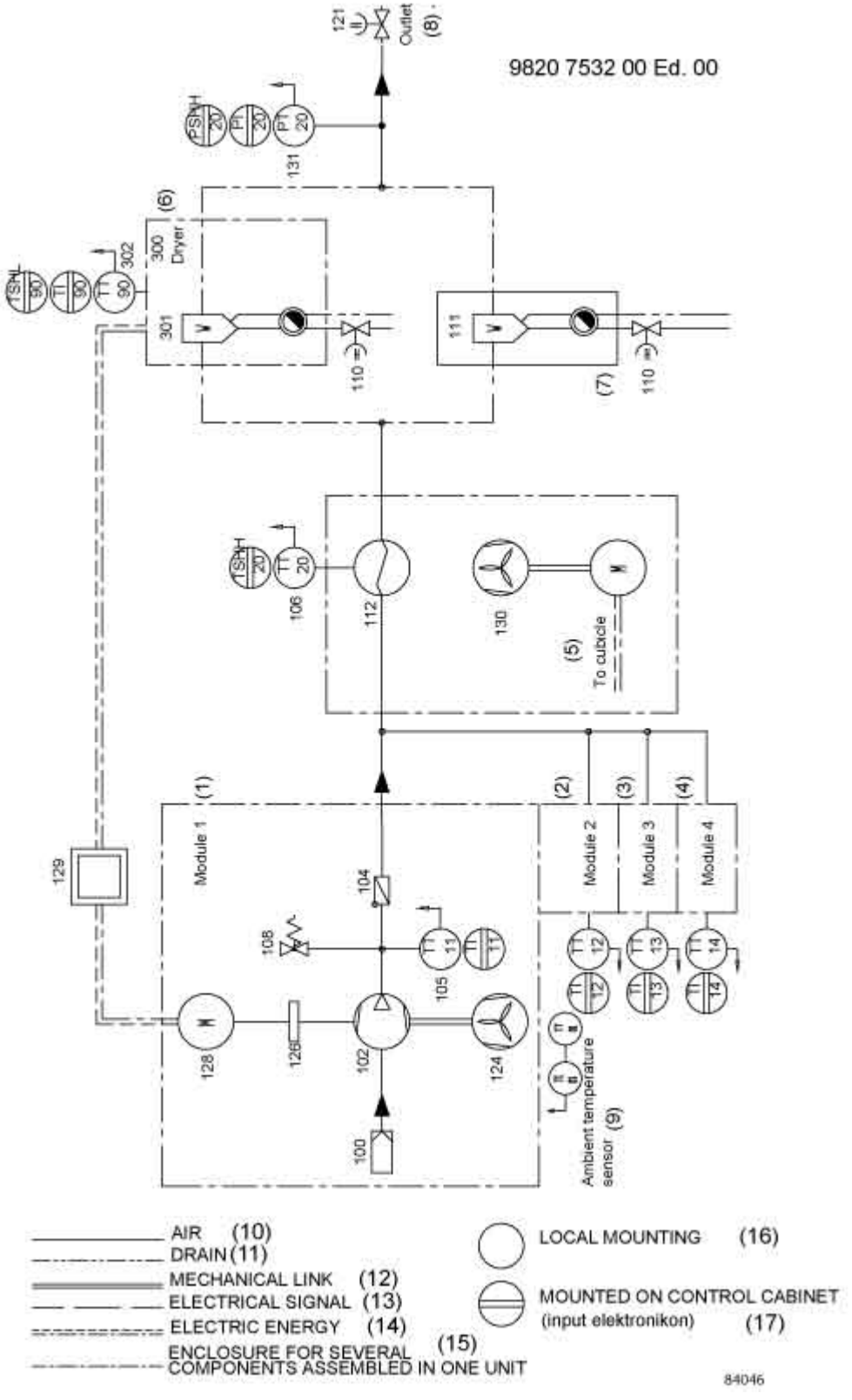


Figure 7: 5.5 kW compressor module

1	Air filter
2	Motor

3	Compressor element
4	Compressor element air outlet
5	Safety valve
6	Temperature sensor

2.2 Flow diagram



(1)	Compressor module 1

(2)	Compressor module 2
(3)	Compressor module 3
(4)	Compressor module 4
(5)	To cubicle
(6)	Refrigerant dryer (units with dryer)
(7)	Water separator (units without dryer)
(8)	Outlet
(9)	Ambient temperature sensor
(10)	Air
(11)	Drain
(12)	Mechanical link
(13)	Electrical signal
(14)	Electric energy
(15)	Enclosure
(16)	Local mounting
(17)	On control cabinet

Table 1: Text on image

Air flow

Air is drawn through air filter (100) and is compressed by the compressor element (102) of each compressor module. The compressed air is discharged via the check valve (104) and a common air cooler (112).

On compressors without integrated dryer, the compressed air passes a water separator (111) and flows to the outlet valve (121).

On standard compressors with an integrated air dryer, the compressed air flows through a common refrigerant dryer (300) before reaching the outlet valve (121). For details on the operation of the dryer, see section *Refrigerant dryer*.

Cooling

Each compressor element (102) is cooled by a radial fan (124), mounted on the drive shaft of the compressor element. The cooling air is blown over the compressor element via a duct.

A separate electric fan (130) provides cooling air for the common air cooler (112).

On compressors with integrated refrigerant dryer, a separate fan delivers cooling air for the dryer.

Condensate management

The water separator (111) on compressors without integrated dryer has an automatic condensate outlet and a manual drain valve.

On compressors with integrated dryer, the dryer is equipped with a water trap with an automatic condensate outlet and a manual drain valve.

Figure 8: Condensate drain connections (typical)

1	Automatic condensate drain outlet
2	Manual condensate drain valve
3	Ambient temperature sensor

2.3 Regulating system

The controller performs following functions:

- Monitoring the pressure
- Protecting the compressor
- Monitoring components subject to service
- Automatic restart after voltage failure

For more details, please consult the sections on the controller further in this book.

2.4 Electrical system

Cubicle layout

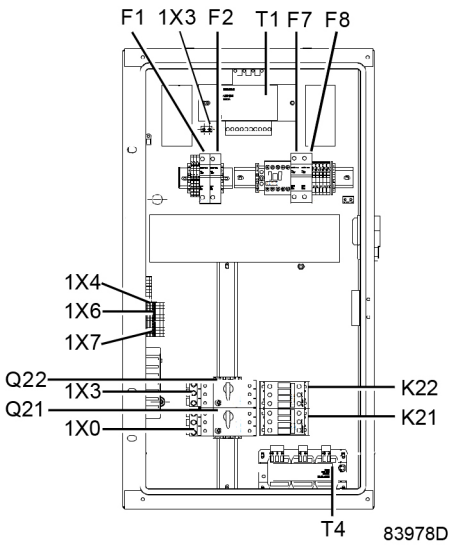


Figure 9: Electrical cabinet SF 8+ and SF 11+, typical

K21, K22,...	Contactor
Q21,Q22,...	Circuit breaker
F1,F2,...	Fuses
1X0, 4X3,...	Terminals
T1, T4,...	Transformer

2.5 Electric diagram

Note: The electrical installation must correspond to the applicable codes.

Warning: The mains supply and earthing lines must be of suitable size. See section *Electric cable size and fuses*.

Warning: The installation must be earthed and protected by fuses in each phase.

Warning: An isolating switch must be installed near the compressor. Make sure that this switch is open to isolate the compressor from the mains before carrying out any connection.

The complete electrical diagram is available in the electric cubicle of the compressor. For connection of the supply wires, please see section *Electrical connections*.

2.6 Temperature protection

The compressor is equipped with an ambient temperature sensor. The sensor creates a warning message on the controller if the ambient temperature rises above 40 °C (104 °F). If the ambient temperature reaches 45 °C (113 °F), the compressor is stopped.

Figure 10: Condensate drain connections

1	Automatic condensate drain outlet
2	Manual condensate drain valve
3	Ambient temperature sensor

Each compressor element is protected by a PT 1000 sensor (6) in the outlet pipe. The sensor is connected to the electronic regulator.

When the maximum temperature is exceeded, the compressor element is stopped during 2 minutes before it can restart. If this happens 2 times within a time span of 2 hours, the element will be

stopped during 10 minutes. If the compressor element stops a third time within the 2 hours time span, the element will be shut down and must be reset manually.

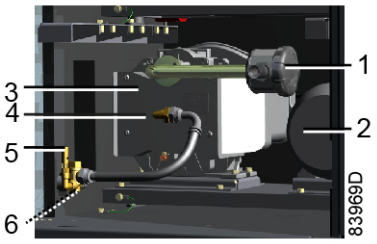


Figure 11: 3.7 kW compressor module

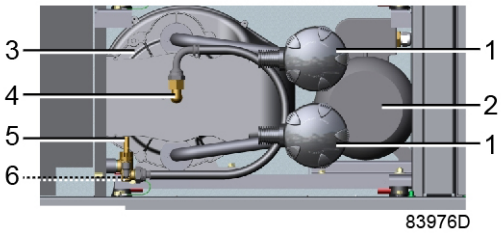
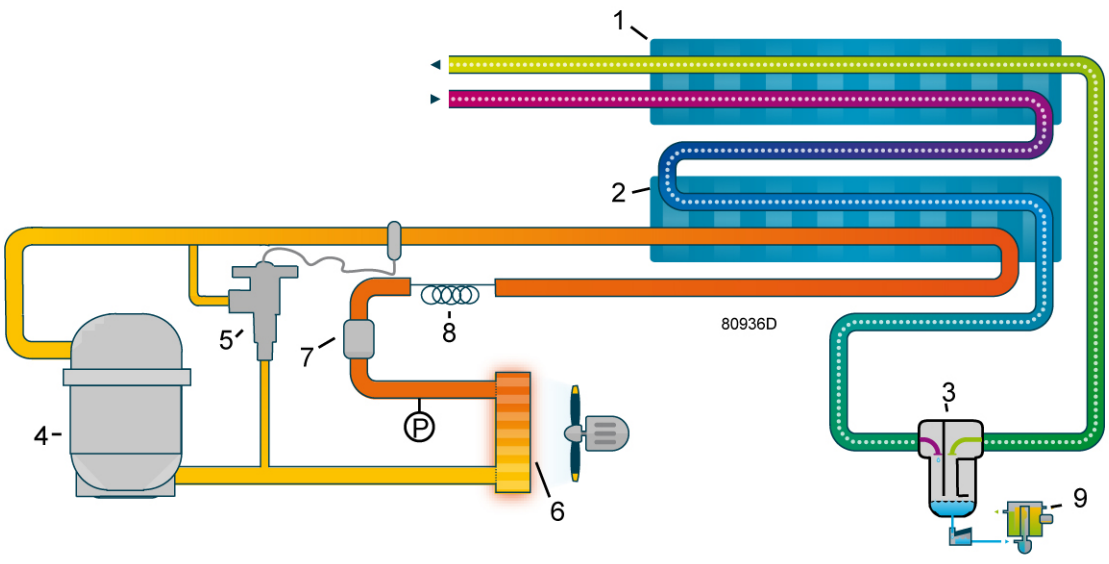


Figure 12: 5.5 kW compressor module

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

2.7 Air dryer

Flow diagram



Compressed air circuit

Compressed air enters heat exchanger (1) and is cooled by the outgoing, cold, dried air. Water in the incoming air starts to condense. The air then flows through heat exchanger/evaporator (2)

where the refrigerant evaporates, causing the air to be cooled further to close to the evaporating temperature of the refrigerant. More water in the air condenses. The cold air then flows through separator (3) where all the condensate is separated from the air.

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

The condensate is automatically drained by the electronic condensate drain (9).

Refrigerant circuit

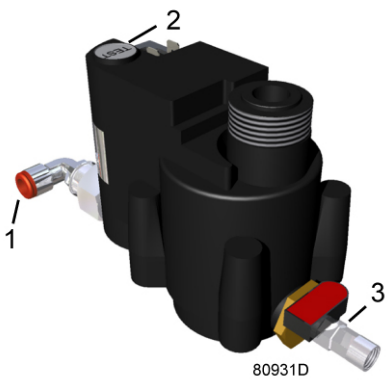
Compressor (4) delivers hot, high-pressure refrigerant gas which flows through condenser (6) where most of the refrigerant condenses.

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

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

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

Automatic drain



The dryers are equipped with an electronic condensate drain (EWD). The condensate from the condensate trap accumulates in a collector. When the condensate reaches a certain level, it is discharged through the drain outlet (1).

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

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

3 Controller

3.1 General

Controller

General description

The Elektronikon™ controller automatically controls and protects the unit, i.e.:

- Monitoring pressures, temperatures and digital switches to ensure safe operation, and stopping the unit whenever necessary.
- Restarting the unit when required.

In order to control the unit and to read and modify programmable parameters, the controller has a control panel provided with:

- LEDs, indicating the status of the unit
- A display indicating the operating conditions or a fault
- Keys to control the unit and to access the data collected by the controller
- Buttons to manually start and stop the unit

3.2 Controller panel

Electronic controller

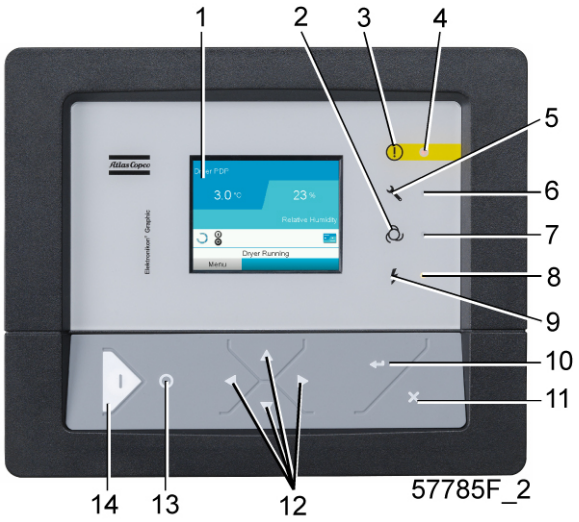


Figure 13: Controller panel

Parts and functions

Reference	Designation	Function
1	Display	Shows the unit operating condition and a number of icons to navigate through the menu.
2	Pictograph	Automatic operation
3	Pictograph	General alarm
4	General alarm LED	Flashes in the event of a shutdown warning.
5	Pictograph	Service
6	Service LED	Lights up if a service is needed
7	Automatic operation LED	Indicates that the regulator is automatically controlling the unit.
8	Voltage on LED	Indicates that the voltage is switched on.
9	Pictograph	Voltage on
10	Enter key	Key to select the parameter indicated by the horizontal arrow. Only the parameters followed by an arrow pointing to the right can be modified.
11	Cancel/Escape key	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 unit. LED (7) turns off.
14	Start button	Button to start the unit. LED (7) lights up indicating that the electronic regulator is operative.

Warning:

The Voltage On LED should not be used as a voltage indicator during maintenance.

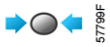
3.3 Icons used

Status icons

Name	Icon	Description
Stopped/Running	 57786F	When the compressor is stopped, the icon stands still. When the compressor is running, the icon rotates.
Compressor status	 57787F	Motor stopped
	 57788F	Running unloaded
	 57789F	Running loaded
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
	 57796F	Shutdown
	 57797F	Warning
Service	 57798F	Service required
Main screen display	 59162F	Value lines display icon
General icons	 81105D	No communication / network problem
	 82418D	Not valid

Input icons

Icon	Description
 57799F	Pressure
 57800F	Temperature
 57801F	Digital input
 57802F	Special protection

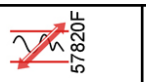
System icons

Icon	Description
 57803F	Compressor element (LP, HP, etc.)
 57804F	Dryer

 57805F	Fan
 57806F	Frequency converter
 57807F	Drain
 57808F	Filter
 57809F	Motor
 57810F	Failure expansion module
 811105D	Network problem
 57812F	General alarm

Menu icons

Icon	Description
 57813F	Inputs
 57814F	Outputs
 57812F	Alarms (Warnings, shutdowns)
 57815F	Counters
 57816F	Test
 57817F	Settings
 57798F	Service
 57818F	Event history (saved data)
 57819F	Access key/User password
 57792F	Network

 57820F	Setpoint
 57867F	Info

Navigation arrows

Icon	Description
 57821F	Up
 57822F	Down

3.4 Main screen

Control panel

Reference	Description
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 switches off automatically after a few minutes when no keys are pushed.

Typically, 2 different Main screen views can be chosen:

1. Two value lines
2. Four value lines

Two- and four-value-line screens

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

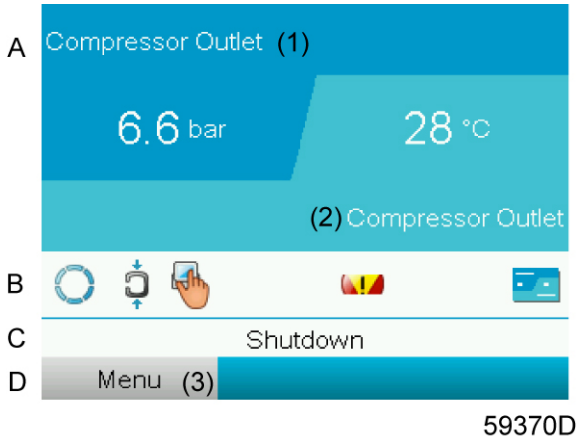


Figure 14: Typical Main screen (2 value lines)

Reference	Description
1	Compressor Outlet
2	Compressor Outlet
3	Menu

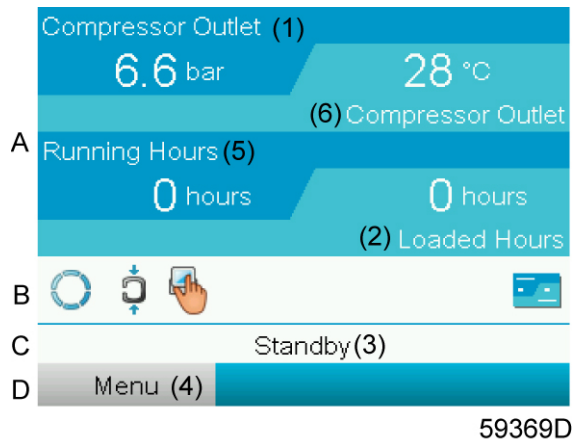


Figure 15: Typical Main screen (4 value lines)

Reference	Description
1	Compressor Outlet
2	Loaded Hours
3	Standby, etc. (text varies upon the compressor's actual condition)
4	Menu
5	Running Hours
6	Compressor Outlet

- **Section A** shows information regarding the compressor operation (e.g. the outlet pressure or the temperature at the compressor outlet).
- **Section B** shows status icons. The 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, etc.)

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 gain 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, select the button by using the Scroll keys and press the Enter key.

To go back to the previous menu, press the Escape key.

Selecting a Main screen view

To change between the screen layouts, select the far-right icon from the line of control icons (see the value lines display icon in the "Icons used" section) and press the Enter key.

Select the layout required and press the Enter key.

3.5 Calling up menus

Control panel

Reference	Description
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):

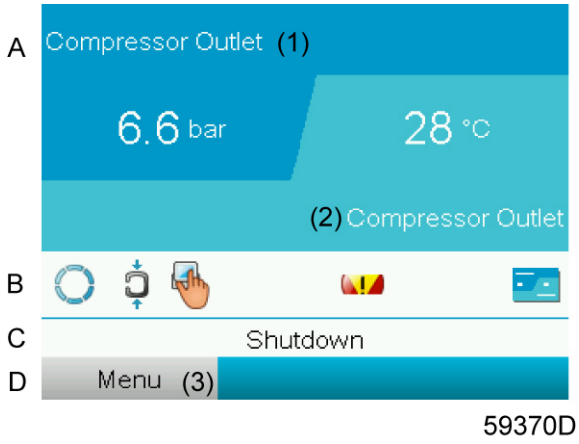
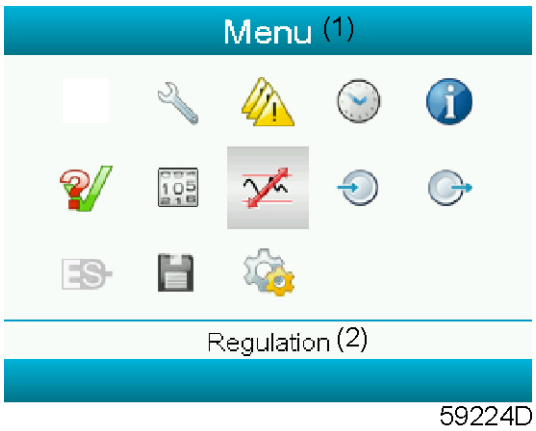


Figure 16: Typical Main screen (2 value lines)

- To go to the Menu screen, highlight the Menu button (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 2)) 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

Control panel

Reference	Description
1	Scroll keys
2	Enter key
3	Escape key

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

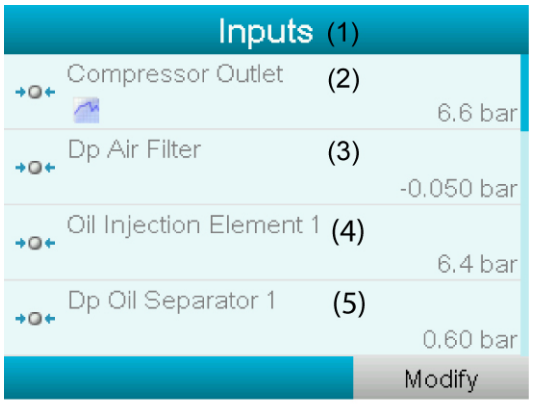
Starting from the Main screen (see the "Main screen" section),

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

59224D

Reference	Description
1	Menu
2	Regulation

- Using the Scroll keys, move the cursor to the Inputs icon.
- Press the Enter key. A screen similar to the one below appears:



59372D

Reference	Description
1	Inputs
2	Compressor Outlet
3	Dp Air Filter
4	Oil Injection Element
5	Dp Oil Separator

- 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 (i.e. the Stop icon and the Warning icon in the screen shown above).

3.7 Outputs menu

Control panel

Reference	Description
1	Scroll keys
2	Enter key
3	Escape key

Menu icon, Outputs

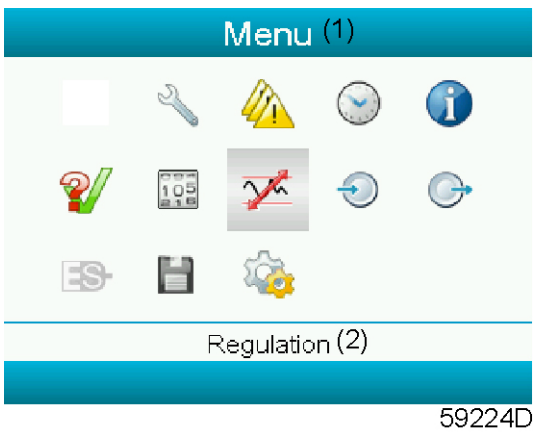
Function

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

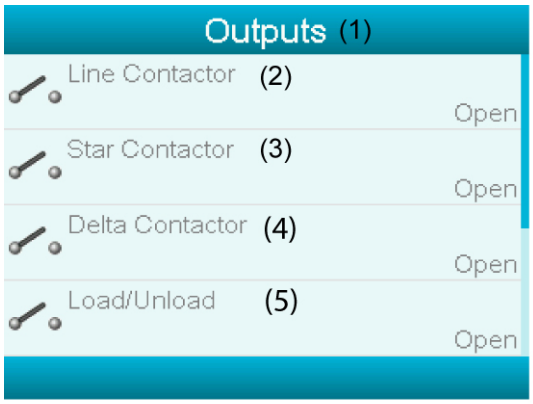
Starting from the Main screen (see the "Main screen" section),

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



Reference	Description
1	Menu
2	Regulation

- Using the Scroll keys, move the cursor to the Outputs icon.
- Press the Enter key. A screen similar to the one below appears:



59371D

Figure 17: Outputs screen (typical)

Reference	Description
1	Outputs
2	Line Contactor
3	Star Contactor
4	Delta Contactor
5	Load/Unload

- 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

59769F

Reference	Description
1	Scroll keys
2	Enter key
3	Escape key

Menu icon, Counters

Function

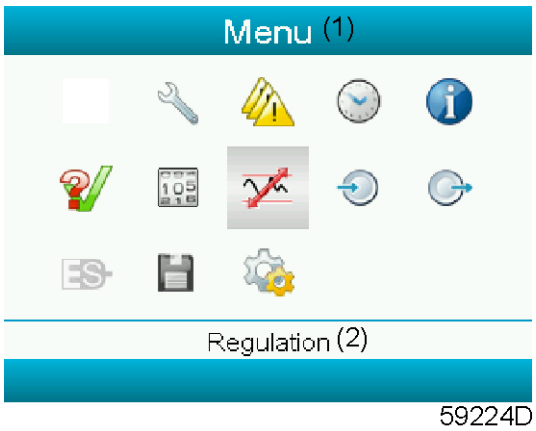
To call up:

- 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

Procedure

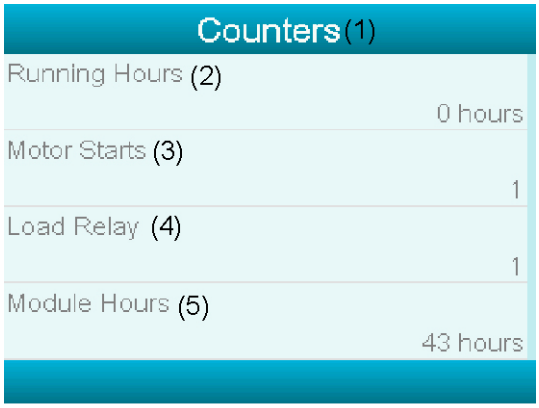
Starting from the Main screen (see the "Main screen" section),

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



Reference	Description
1	Menu
2	Regulation

- Using the Scroll keys, move the cursor to the Counters icon.
- Press the Enter key. The following screen appears:



59226D

Reference	Description
1	Counters
2	Running Hours
3	Motor Starts
4	Load Relay
5	Module Hours

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

Note: The example above is for a frequency-converter-driven compressor. For a fixed-speed compressor, the actual screen will be somewhat different.

3.9 Control mode selection

Control panel

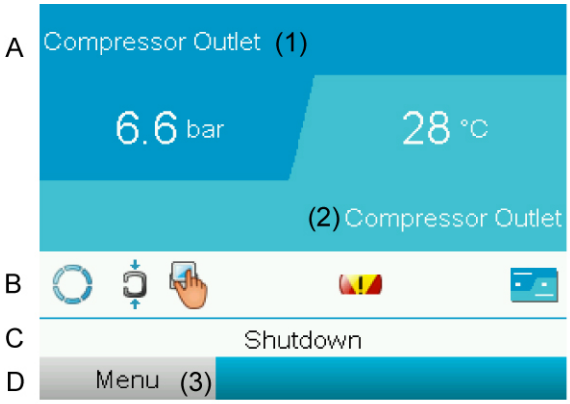
59769F

Reference	Description
1	Scroll keys
2	Enter key
3	Escape key

Function

To select the Control mode, i.e. whether the compressor is in local control or remote control.

Procedure

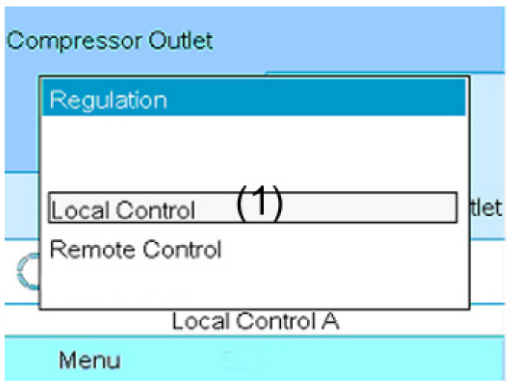


59370D

Starting from the Main screen, use the Scroll keys to go to the machine control mode icon (see the "Icons used" section) and press the Enter key:

There are 2 possibilities:

- Local Control
- Remote Control



59408D

After selecting the required regulation mode, press the Enter key on the controller to confirm your selection. The new setting is now visible on the Main screen. See the "Icons used" section to find out what the icons mean.

3.10 Service menu

Control panel

Reference	Description
1	Scroll keys
2	Enter key
3	Escape key

Menu icon, Service

Function

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

Procedure

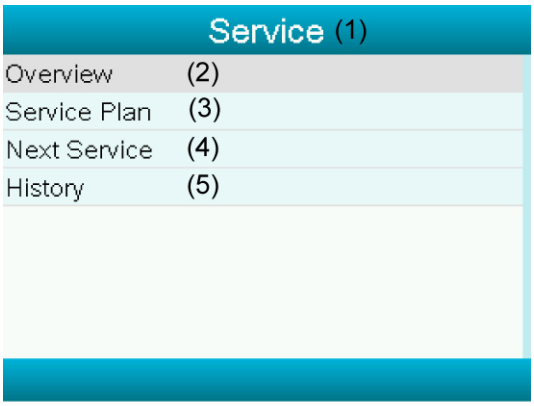
Starting from the Main screen (see the "Main screen" section),

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

59224D

Reference	Description
1	Menu
2	Regulation

- Using the Scroll keys, move the cursor to the Service icon.
- Press the Enter key. The following screen appears:

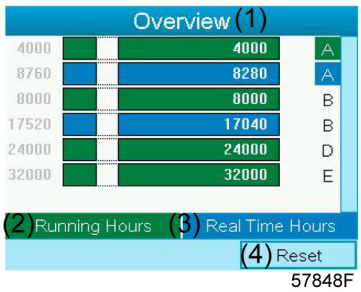


57847F_1

Reference	Description
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

Reference	Description
1	Overview
2	Running Hours (green)
3	Real Time Hours (blue)
4	Reset

Example for service level (A):

The figures on the left are the programmed service intervals. For service interval A, the programmed number of Running Hours is 4000 hours (top row, green) and the programmed number of Real Time Hours is 8760 hours, which corresponds to one year (second row, blue). This means that the controller will launch a service warning when either 4000 Running Hours or 8760 Real Time Hours are reached, whichever comes first. Note that the Real Time Hours counter keeps counting, even when the controller is not powered.

The figures within the bars are the number of hours to go until 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.

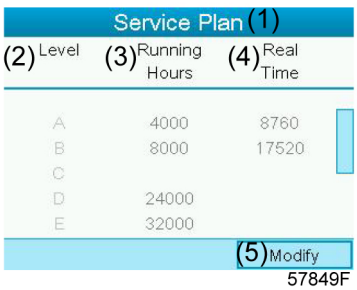
Service plans

A number of service operations are grouped together (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 electronic 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. The following screen appears:



Reference	Description
1	Service Plan
2	Level
3	Running Hours
4	Real Time
5	Modify

Modifying a Service Plan

Depending on the operating conditions, the service intervals may need to be modified. 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. The following screen appears:

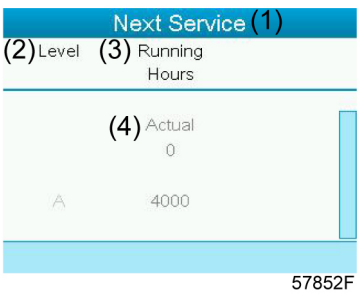
Reference	Description
1	Service Plan
2	Modify

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

Note:

Running Hours can be modified in increments of 100 hours, Real Time Hours can be modified in increments of 1 hour.

Next Service



Reference	Description
1	Next Service
2	Level
3	Running Hours
4	Actual

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

History

The History screen shows a list of all service actions performed 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 Setpoint menu

Control panel

Reference	Description
1	Scroll keys
2	Enter key
3	Escape key

Menu icon, Setpoint

Function

On fixed-speed compressors, the operator can program two different pressure bands. This menu is also used to select the active pressure band.

Procedure

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

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

59224D

Reference	Description
1	Menu
2	Regulation

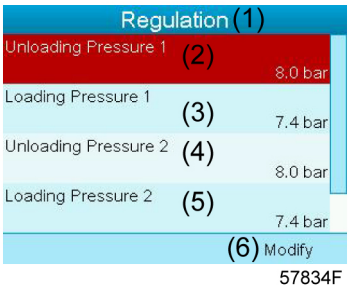
- Move the cursor to the Setpoint icon using the Scroll keys.
- Press the Enter key. The following screen appears:

57833F

Reference	Description
1	Regulation
2	Unloading Pressure 1
3	Loading Pressure 1
4	Unloading Pressure 2
5	Loading Pressure 2
6	Modify

- The screen shows the actual unloading and loading pressure settings for both pressure bands.

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



57834F

- The first line of the screen is selected. Use the Scroll keys to select the setting to be modified and press the Enter key. The following screen appears:

1	Regulation
2	Unloading Pressure 1

- 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.

3.12 Event history menu

Control panel

Reference	Description
1	Scroll keys
2	Enter key
3	Escape key

Menu icon, Event History

Function

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

Procedure

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

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

59224D

Reference	Description
1	Menu
2	Regulation

- Using the Scroll keys, move the cursor to the Event History icon.
- The list of last shutdown and emergency stop instances is shown.
- 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

Control panel

59769F

Reference	Description
1	Scroll keys
2	Enter key
3	Escape key

Menu icon, Settings

Function

To display and modify a number of general settings (e.g. Time, Date, Date Format, Language In Use etc.)

Procedure

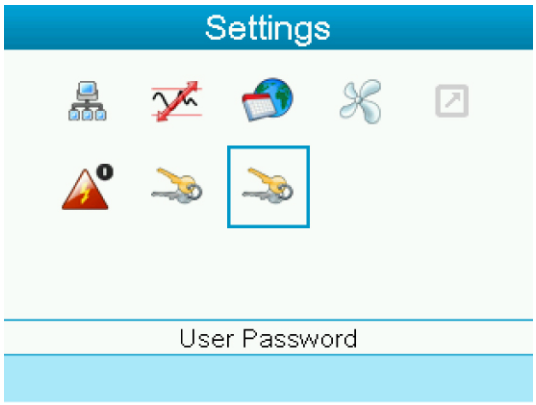
Starting from the Main screen (see the "Main screen" section),

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

59224D

Reference	Description
1	Menu
2	Regulation

- Using the Scroll keys, move the cursor to the Settings icon.
- Press the Enter key. The following screen appears:



59409D

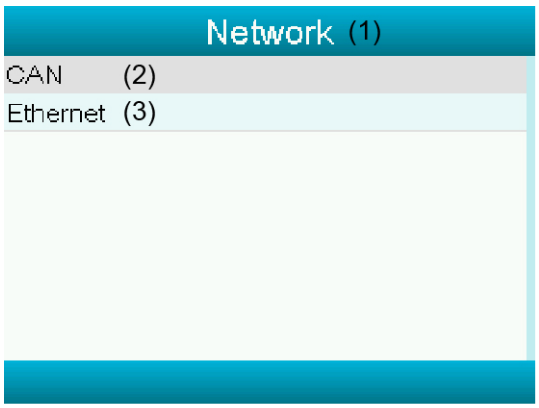
- The screen shows a number of icons:

Icon	Function
	Network settings
	Regulation settings
	General settings
	Fan settings
	Automatic restart after voltage failure settings
	Access key
	User password

- Move the cursor to the icon of the function to be modified and press the Enter key.

Modifying Network settings

- Select the Network settings icon as described above and press the Enter key. The following screen appears:



58466D_1

Reference	Description
1	Network
2	CAN
3	Ethernet

- Use the ↓ key of the Scroll keys to select the setting to be modified and press the Enter key. The following screen appears:

Figure 18: Screen for CAN settings

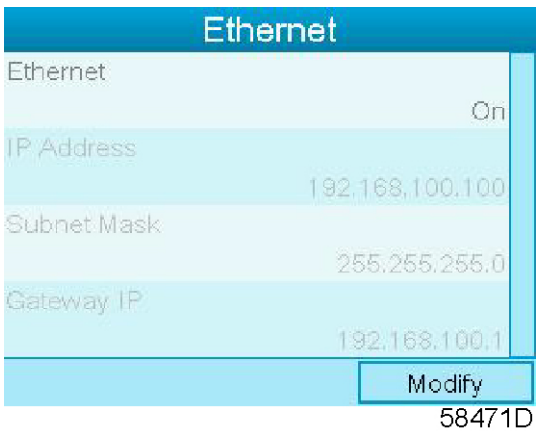


Figure 19: Screen for Ethernet settings

.

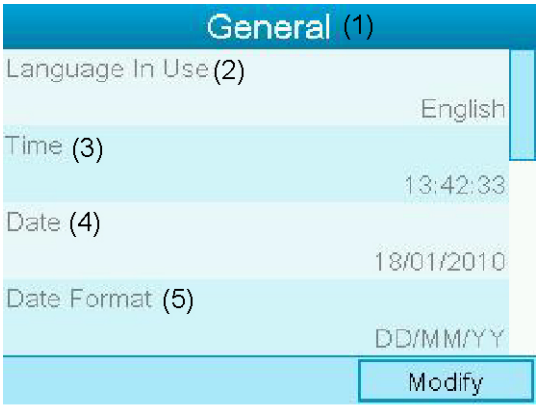
- Press the Enter key; a red selection bar highlights the first item.
- Using the Scroll keys, move the cursor to the setting to be modified and press the Enter key.
- A pop-up screen appears. Use the ↑ or ↓ key to select the required parameter and press the Enter key to confirm.

Regulation settings

This menu allows you to view and modify the Regulation settings.

General settings

- Select the General settings icon as described above and press the Enter key. The following screen appears:



58467D

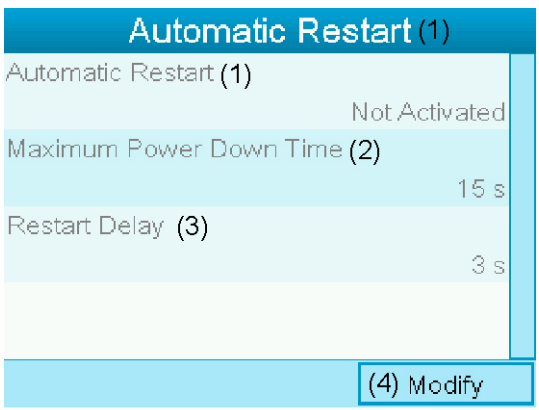
Reference	Description
1	General
2	Language In Use
3	Time
4	Date
5	Data Format

- The screen shows the first items of a list of all settings. Use the Scroll keys to see the other items in the list.
- Press the Enter key; a red selection bar highlights the first item (Language In Use).

  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 parameter and press the Enter key to confirm.

Automatic Restart

- Select the Automatic Restart settings icon as described above and press the Enter key. The following screen appears:



58508D

Reference	Description
1	Automatic Restart
2	Maximum Power Down Time
3	Restart Delay
4	Modify

- The screen shows the list of all settings.
- Press the Enter key; a red selection bar highlights the first item (Automatic Restart).

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 parameter and press the Enter key to confirm.

Access key

Different security levels are programmed in the regulator (e.g. user, service technician, etc.). This menu item is used to change the security level. Scroll to the correct icon using the Scroll key. Press the Enter key. Press the Enter key again to modify the security level. Press the Enter key again; a pop-up menu appears. Use the Scroll keys to enter the password of the new security level. Press the Enter key to confirm the change.

User password

If the password option is activated, it is impossible for unauthorized persons to modify any setting.

- Using the Scroll keys, move the cursor to the password icon.
- Press the Enter key.
- Select the Modify button using the Scroll keys and press the Enter key. Next, modify the password as required.

3.14 Info menu

Control panel

Reference	Description
1	Scroll keys
2	Enter key
3	Escape key

Menu icon, Info

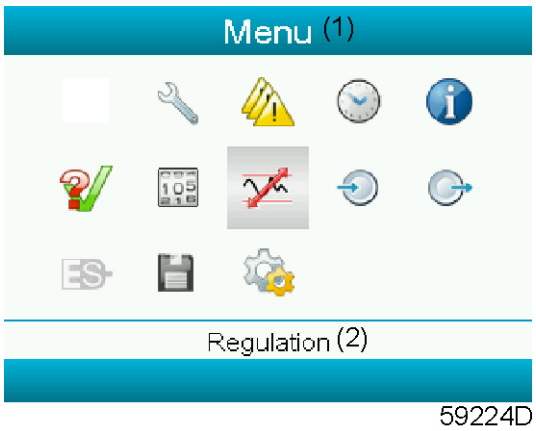
Function

To show the manufacturer's internet address.

Procedure

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

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



Reference	Description
1	Menu
2	Regulation

- Using the Scroll keys, move the cursor to the Info icon.
- Press the Enter key. The internet address appears on the screen.

3.15 Week Timer menu

Control panel

Reference	Description
1	Scroll keys
2	Enter key
3	Escape key

Menu icon, Week Timer

Function

- To program time-based start/stop commands for the compressor.
- To program time-based change-over 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.

Procedure

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

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

Reference	Description
1	Menu
2	Regulation

- Use the Scroll keys to select the Week Timer icon. Press the Enter key on the controller. The following screen appears:

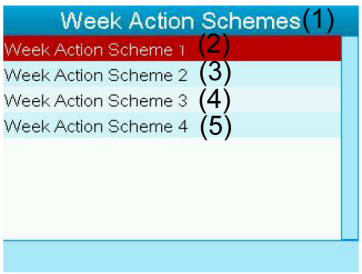
Reference	Description
1	Week Timer
2	Week Action Schemes
3	Week Cycle

Reference	Description
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 the Enter key. A new window opens.

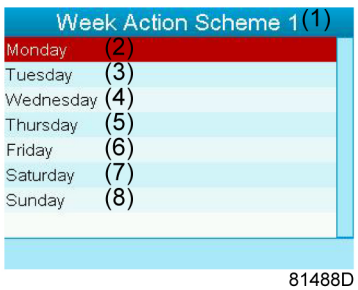


81487D

Reference	Description
1	Week Action Schemes
2	Week Action Scheme 1
3	Week Action Scheme 2
4	Week Action Scheme 3
5	Week Action Scheme 4

- The first item in the list is highlighted. Press the Enter key on the controller to modify Week Action Scheme 1.

  A weekly list is shown. Monday is automatically selected and highlighted.

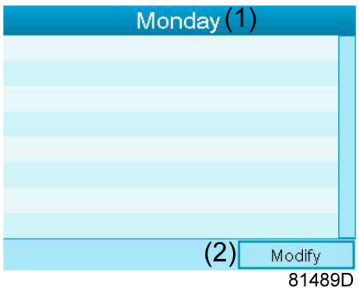


81488D

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

- Press the Enter key on the controller to set an action for this day.

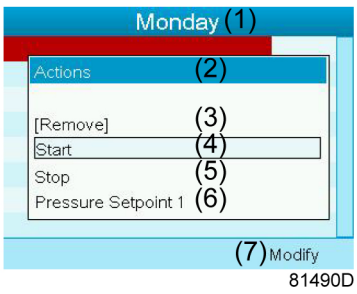
A new window opens.



Reference	Description
1	Monday
2	Modify

- The Modify action button is selected. Press the Enter key on the controller to create an action.

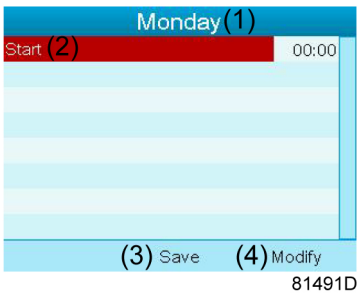
  A new pop-up window opens. Select an action from this list by using the Scroll keys on the controller. When ready, press the Enter key to confirm.



Reference	Description
1	Monday
2	Actions
3	Remove
4	Start
5	Stop
6	Pressure Setpoint 1
7	Modify

- When ready, press the Enter key to confirm.

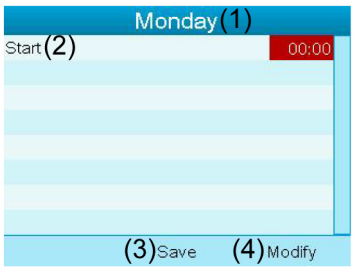
  A new window opens. The action is now visible in the first day of the week.



Reference	Description
1	Monday

Reference	Description
2	Start
3	Save
4	Modify

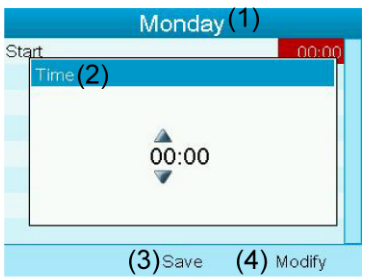
- To adjust the time, use the Scroll keys on the controller and press the Enter key to confirm.



81492D

Reference	Description
1	Monday
2	Start
3	Save
4	Modify

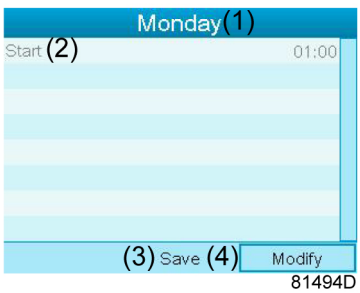
- A pop-up window opens. Use the ↑ or ↓ Scroll keys to modify the hour values. Use the ← or → Scroll keys to go to the minutes.



81493D

Reference	Description
1	Monday
2	Time
3	Save
4	Modify

- Press the Escape key on the controller. The action button Modify is selected.

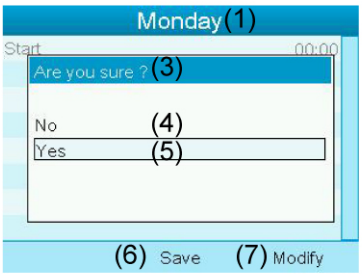


81494D

Reference	Description
1	Monday
2	Start
3	Save
4	Modify

- Use the Scroll keys to select the action Save.

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



81495D

Reference	Description
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 on which the action is scheduled.

81497D

Reference	Description
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.

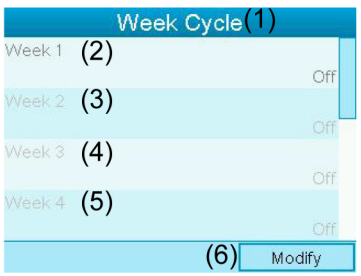
81486D

•

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

Select Week Cycle from the main Week Timer menu list.

- A list of 10 weeks is shown.

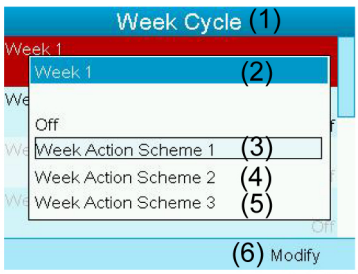


81498D

Reference	Description
1	Week Cycle
2	Week 1
3	Week 2
4	Week 3
5	Week 4
6	Modify

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

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



81500D

Reference	Description
1	Week Cycle
2	Week 1
3	Week Action Scheme 1
4	Week Action Scheme 2
5	Week Action Scheme 3
6	Modify

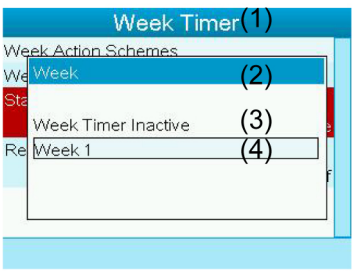
- Check the status of the Week Timer

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

81501D

Reference	Description
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 as active.



81502D

Reference	Description
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

Reference	Description
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

Reference	Description
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 the compressor must continue working for 1 hour, for example, for any given reason. The timer can be set on this screen. This timer is prior to the Week Timer action.

81505D

Reference	Description
1	Week Timer
2	Week Action Schemes
3	Remaining Running Time

Important:

In the regulator, different timers can be selected on one day (up to 8 actions). However, it is not possible to program 2 actions at the same time. The solution: keep 1 minute in between 2 actions. For example, start compressor: 5:00 AM, pressure setpoint 2: 5:01 AM.

3.16 Test menu

Control panel

Reference	Description
1	Scroll keys
2	Enter key
3	Escape key

Menu icon, Test

Function

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

Procedure

Starting from the Main screen (see Main screen):

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

Reference	Description
1	Menu
2	Regulation

- Using the Scroll keys, move the cursor to the Test icon and press the Enter key.
- The safety valve test can only be performed by authorized personnel and is protected by a security code.

3.17 Web server

All Elektronikon™ 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 via 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 (see picture below).

Figure 20: USB to LAN adapter (for Windows XP)

Figure 21: USB to LAN adapter (for Windows 7)

- Use a UTP cable (CAT 5e) to connect to the controller.

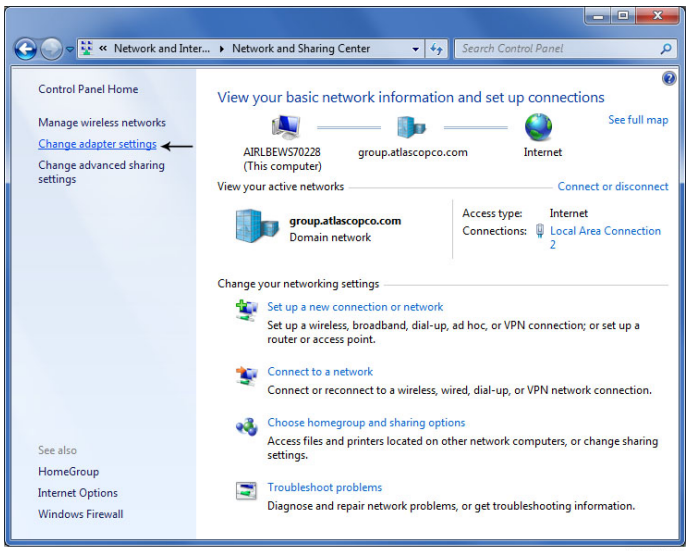
Configuration of the network card

To configure the network card:

- Open Network and Sharing Center, via Control Panel, by clicking View network status and tasks.

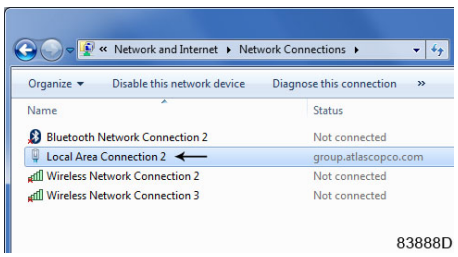
83886D

- Click on Change adapter settings.



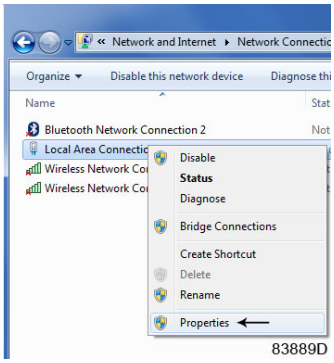
83887D

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

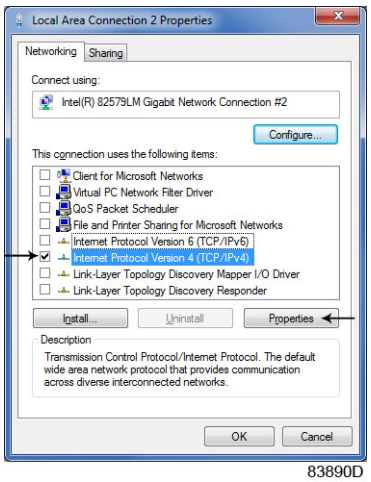


83888D

- Click with the right button and select Properties.



- Use the checkbox Internet Protocol (TCP/IP). To avoid conflicts, de-select other properties if they are selected. After selecting TCP/IP, click on the Properties button to change the settings.



- Use the following settings:
  - IP Address 192.168.100.200
  - Subnetmask 255.255.255.0
- Click OK and close Network and Sharing Center.

Configuration of the web server

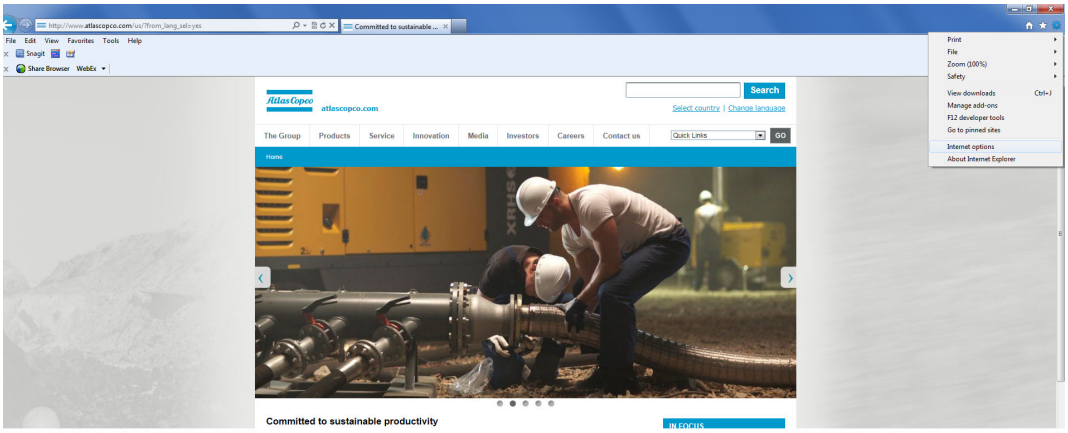
Configure the web interface

Note:

The internal web server is designed and tested for Microsoft® Internet Explorer 6, 7 and 8. Other web browsers like Opera and Firefox do not support this internal web server. When using Opera or Firefox, a redirect page opens. Click on the hyperlink to connect to the download server from Microsoft® to download the latest version of Internet Explorer, and install this software.

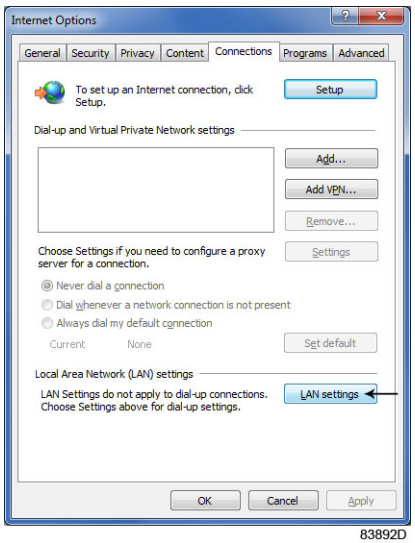
- When using Internet Explorer:

  Open Internet Explorer and click on Tools - Internet options (2).



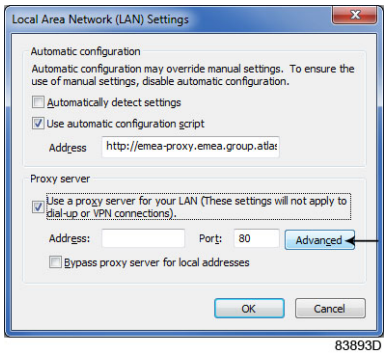
83891D

- Click on the Connections tab and then click on the LAN settings button.



83892D

- In the Proxy server Group box, click on the Advanced button.

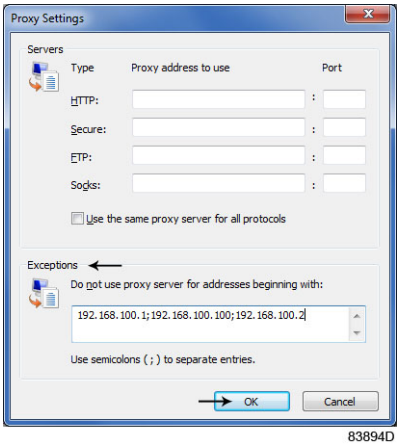


83893D

- In the Exceptions Group box, enter the IP address of your controller. Multiple IP addresses can be entered but they must be separated with semicolons (;).

  Example: Suppose that you already added two IP addresses (192.168.100.1 and 192.168.100.2). Now you add 192.168.100.100 and separate the 3 IP addresses by putting semicolons.

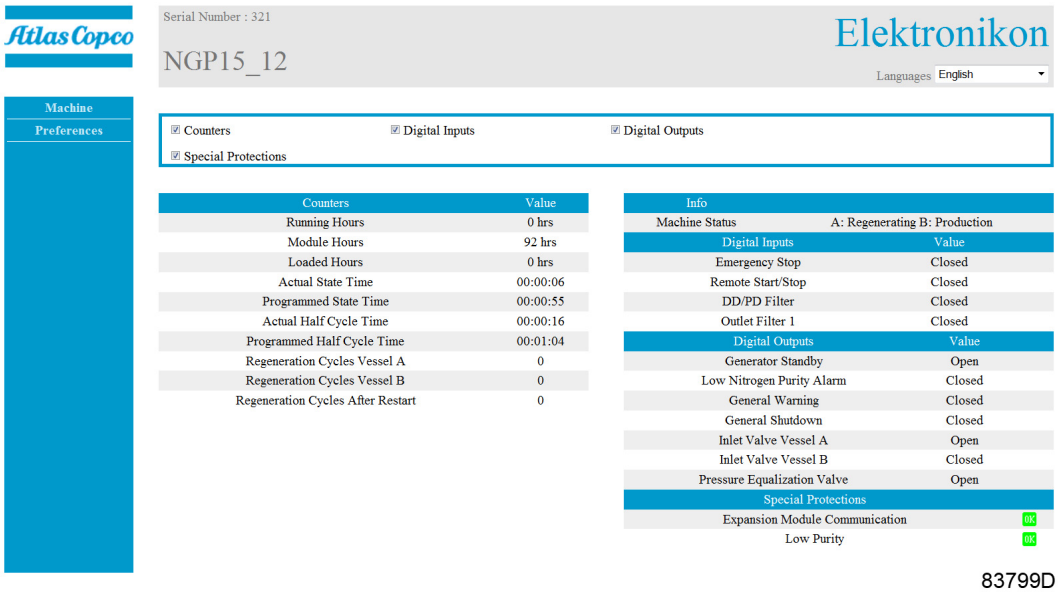
  Click OK to close the window.



83894D

Viewing the controller data

- 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:

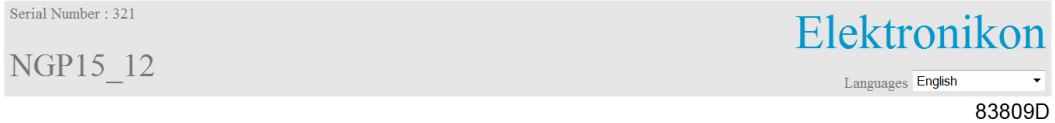


83799D

Controller screen (typical).

Navigation and options

- The banner shows the generator type and the language selector (depending on the languages that are installed on the controller).

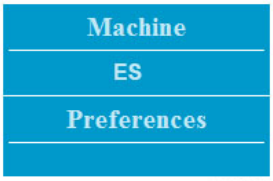


83809D

- 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

Generator settings

All settings can be hidden or shown. Put a mark for each setting. Only the machine status is fixed and can not be removed from the main screen.

Counters

Counters give an overview of all actual counters from the controller and the generator.

☑ Counters

Counters	Value
Running Hours	0 hrs
Module Hours	92 hrs
Loaded Hours	0 hrs
Actual State Time	00:00:06
Programmed State Time	00:00:55
Actual Half Cycle Time	00:00:16
Programmed Half Cycle Time	00:01:04
Regeneration Cycles Vessel A	0
Regeneration Cycles Vessel B	0
Regeneration Cycles After Restart	0

83805D

Info status

Machine status is always shown on the web interface.

Info	
Machine Status	A: Regenerating B: Production

83806D

Digital inputs

Gives an overview of all digital inputs and their status.

☑ Digital Inputs

Digital Inputs	Value
Emergency Stop	Closed
Remote Start/Stop	Closed
DD/PD Filter	Closed
Outlet Filter 1	Closed

83804D

Digital outputs

Shows a list of all digital outputs and their status.

☑ Digital Outputs

Digital Outputs	Value
Generator Standby	Open
Low Nitrogen Purity Alarm	Closed
General Warning	Closed
General Shutdown	Closed
Inlet Valve Vessel A	Open
Inlet Valve Vessel B	Closed
Pressure Equalization Valve	Open

83807D

Special protections

Give an overview of all special protections of the generator.

☑ Special Protections

Special Protections	
Expansion Module Communication	OK
Low Purity	OK

83808D

ES screen controller

If an ESi license is provided, the ES button is shown in the Navigation menu. At the left side, all machines in the ES are shown and at the right side, the ES status are shown.

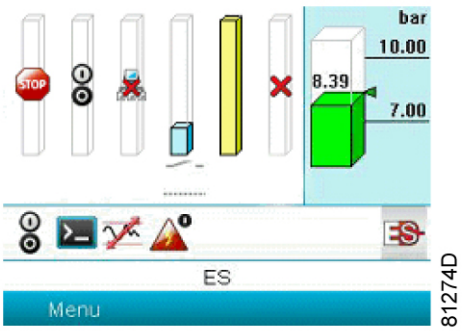


Figure 22: A possible ESi screen

3.18 Programmable settings

Description

The regulation and safety devices are factory-adjusted to obtain optimum performance of the unit. No adjustments are required.

4 Installation

4.1 Dimension drawing

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

Model	Dimension drawing number
SF 8+, SF 11+ Low canopy	9829 3508 26
SF 8+, SF 11+ High canopy	9829 3508 27

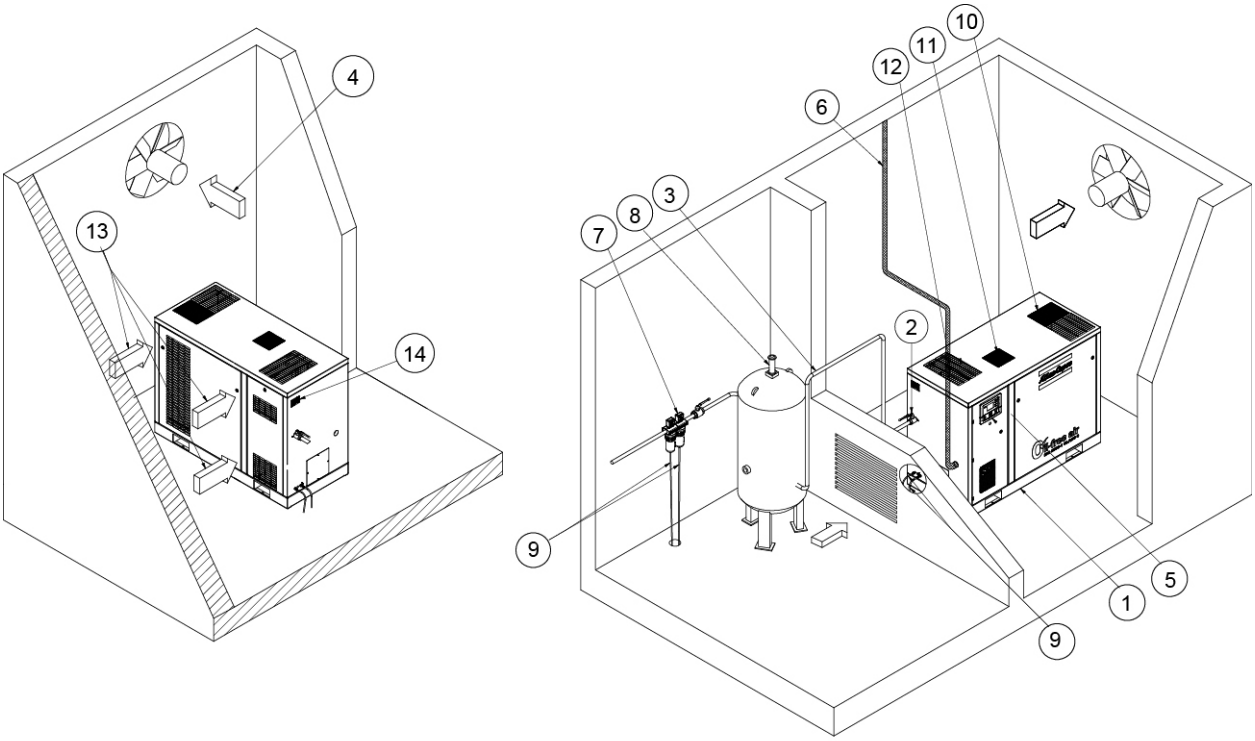
Text on drawings	Translation or Explanation
COOLING AIR OUTLET OF AFTERCOOLER AND DRYER	Cooling air outlet of aftercooler and dryer
COOLING AIR OUTLET OF COMPRESSOR	Cooling air outlet of the compressor
AMBIENT SENSOR	Sensor to measure the ambient temperature
CABINET VENTILATION	Ventilation outlet opening for cabinet
COMPRESSED AIR OUTLET	Compressed air outlet
ELECTRIC CABLE PASSAGE / POWER SUPPLY CABLE	Opening for power supply cable
MANUAL DRAIN	Manual drain valve
AUTOMATIC DRAIN	Automatic drain outlet
CENTER OF GRAVITY	Location of center of gravity
COOLING AIR INLET OF AFTERCOOLER AND DRYER	Cooling air inlet of aftercooler and dryer
COOLING AIR INLET OF COMPRESSOR AND CABINET	Cooling air inlet for compressor and cabinet
COMPRESSOR MOUNTING HOLES	Location of anchoring points to fixate the compressor
CENTER OF GRAVITY DIMENSIONS AND MASS	Location of the center of gravity and mass

4.2 Installation proposal

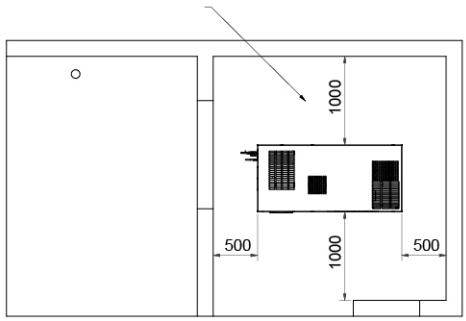
Outdoor/altitude operation

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

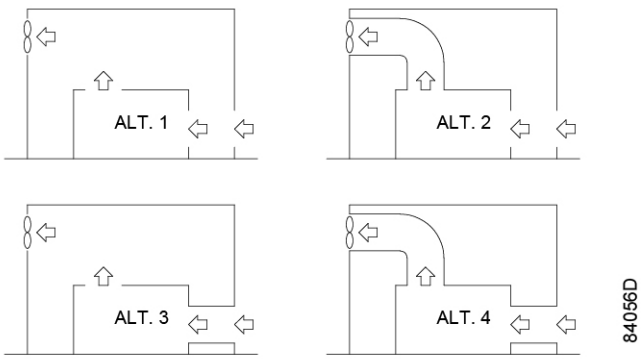
Installation proposal



Minimum free area to be reserved for the compressor installation. (1)



VENTILATION PROPOSALS (2)



9820 7469 00 Ed. 1

Reference	Description
1	Minimum free area to be reserved for the compressor installation
2	Ventilation proposals

Procedure

1. Install the compressor on a level floor, suitable for taking the weight of the compressor in a frost free and preferably low dust location.
2. Compressed air outlet valve.
3. Delivery pipe.

   The pressure drop over the air delivery pipe can be calculated as follows:

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

d = inner diameter of the pipe in mm

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

L = length of the pipe in m

P = absolute pressure at the compressor outlet in bar

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

4. Ventilation: The inlet grid(s) and ventilation fan should be installed in such a way that any recirculation of hot cooling air to the inlet gratings of the compressor/dryer is avoided.

   The air velocity to the grid(s) has to be limited to 5 m/s (16.5 ft/s).

   Maximum allowable pressure drop over cooling air ducts is 50 Pa (0.12 in WC).

   When 50 Pa is exceeded, a ventilation fan is needed at the outlet of the cooling air ducts. The maximum air temperature at the compressor intake opening is 40° C (104 °F), the minimum is 0° C (32 °F).

   Alternative 1 and 3: The required ventilation to limit the compressor room temperature can be calculated from :

   Q_v = 0,92 N /Δt

   with

   Q_v = required ventilation capacity in m^3/s

   N = nominal motor power of the compressor in kW

   Δt = temperature increase in the compressor room in °C

   Alternative 2 and 4: The fan capacity should match the compressor fan capacity at a pressure head equal to the pressure drop caused by the cooling air ducts.
5. Control cubicle with monitoring panel.
6. Mains cable entry.
7. **Optional filters can be installed in the pressure line downstream the air outlet valve, e.g.:**
   - A DD filter for general purpose filtration. The filter traps solid particles down to 1 micron.
   - A PD filter for filtration down to 0.01 micron. A PD filter must always be installed downstream a DD filter.

   It is recommended to provide bypass pipes and valves across the filters in order to isolate the filters during maintenance without disturbing the compressed air delivery.
8. Safety valve.
9. The drain pipes to the drain must not dip into the water.
10. Compressor cooling air outlet.
11. Ventilation outlet.
12. Aftercooler and dryer cooling air outlet.
13. Data plate.

4.3 Electrical connections

Note: The electrical installation must correspond to the applicable codes.

Warning: The mains supply and earthing lines must be of suitable size. See section *Electric cable size and fuses*.

Warning: The installation must be earthed and protected by fuses in each phase.

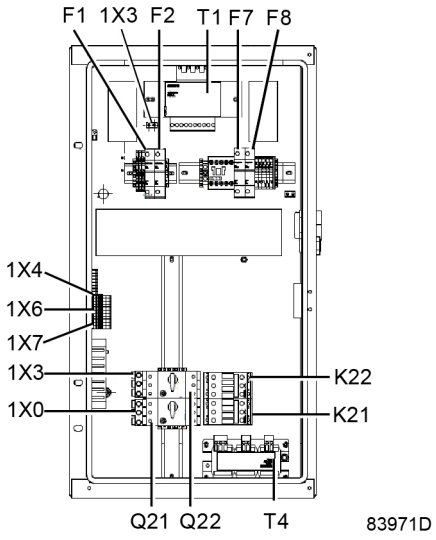
Warning: An isolating switch must be installed near the compressor. Make sure that this switch is open to isolate the compressor from the mains before carrying out any connection.

Warning: 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.

Supply cable

Consult section *Electric cable size and fuses* for the section of the power supply cable.

Connect the supply cable to terminals L1, L2 and L3 of terminal strip (1X0), connect the neutral conductor to terminal (N) (if applicable) and the earthing conductor to the earthing bolt (1X3).



4.4 Pictographs

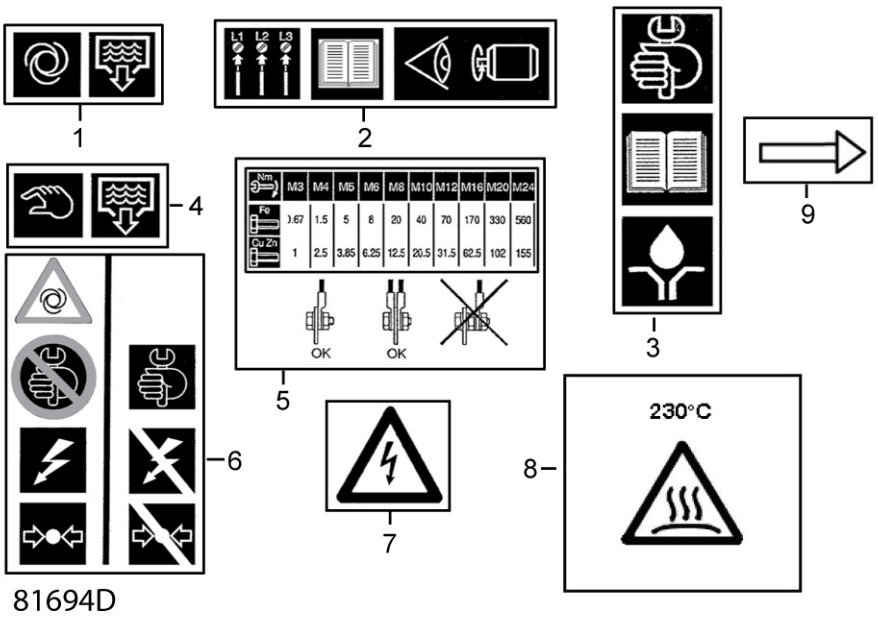


Figure 23: Pictographs

Reference	Designation
1	Automatic condensate drain
2	Warning: before connecting compressor electrically, consult Instruction book for motor rotation direction
3	Consult the specific instructions before greasing
4	Manual condensate drain
5	Torques for steel (Fe) or brass (CuZn) bolts
6	Switch off the voltage and depressurize the compressor before maintenance or repair
7	Warning: voltage
8	Warning: hot surface
9	Rotation direction of fan

5 Operating instructions

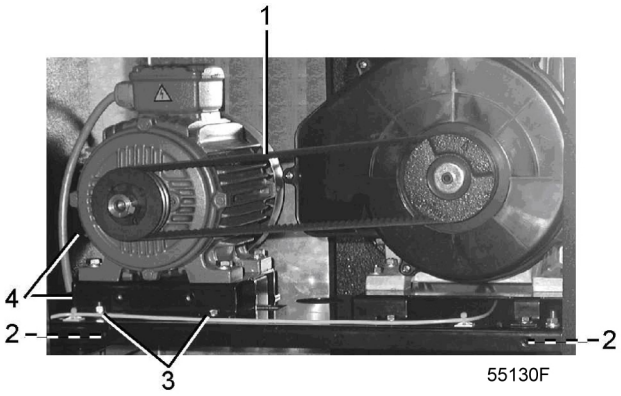
5.1 Initial start-up

Safety

Warning: The operator must apply all relevant safety precautions.

Initial start-up procedure

1. Remove the red painted transport brackets (2).



2. Check the settings of the overload relays. See section *Electric cable size and fuses*.
3. Connect the compressor electrically. See section *Electrical connections*.
4. Close the condensate drain valve. See chapter *Condensate management* in section *Flow diagram*.
5. Switch on the voltage. Start and stop the compressor. On 3-phase compressors, check for correct direction of rotation (direction arrows are provided on the motors). If the rotation direction is wrong, switch off the voltage and reverse two incoming electric lines.

5.2 Starting

Procedure

1. Open the air outlet valve. See section *Introduction* for its location.
2. Switch on the voltage.

3. Close all manual condensate drain valves.
4. Press the start button (1). The compressor starts running and automatic operation LED lights up.
5. The regulator will automatically stop and start the compressor modules in function of the air pressure.
6. On compressors with integrated dryer, the nominal pressure dew point will be reached after a few minutes.

Note: The number of starts is limited to 30 starts per hour. See also section *Programmable settings*.

5.3 During operation

Procedure

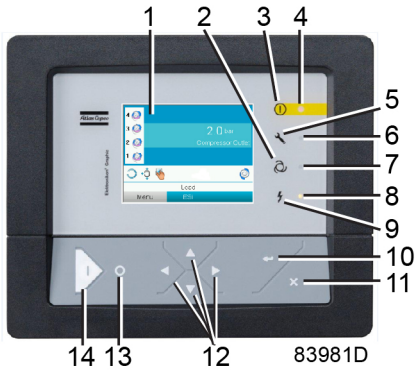


Figure 24: Control panel

1. If the automatic operation LED (3) is alight, the regulator is automatically controlling the compressor modules (starting/stopping).
2. Check the readings on the display (1). In case of a warning or shutdown condition, see section *Problem solving* or *Event history menu*.
3. Check that condensate is discharged automatically from the condensate drain outlet during operation.

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

5.4 Stopping

Procedure

1. Press the stop button (2).
2. Close the air outlet valve. See section *Introduction*.
3. Switch off the voltage.
4. Open the manual condensate drain valve.

5.5 Taking out of operation

Procedure

1. Stop the compressor and close the air outlet valve.
2. Switch off the voltage and disconnect the compressor from the mains.
3. Depressurize the compressor. Open the condensate drain valve.
4. Shut off and depressurize the part of the air net which connected to the outlet valve. Disconnect the compressor from the air net.
5. Disconnect the condensate piping from the local condensate drain system.

6 Maintenance

6.1 Preventive maintenance schedule

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

- Stop the compressor.
- Close the air outlet valve.
- Wait 10 minutes for the vessel to depressurize.
- Press the emergency stop button.
- Open the condensate drain valve to depressurize the air system between air receiver and outlet valve.
- Switch off the voltage. Lock Out and Tag Out.
- Wait 10 minutes for the converter capacitors to discharge before starting any electrical checks, work and/or repair.

For detailed instructions, see section *Problem solving*.

The operator must apply all relevant safety precautions.

Warranty - Product Liability

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

General

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

Intervals

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

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

Preventive maintenance schedule

A number of service operations are grouped in plans called Service plans I, A, B or D. See the table below. A message will appear on the controller display when reaching the interval, indicating which Service plans are to be carried out. After servicing, the regulator is to be reset. For detailed information, consult section *Service menu*.

Interval(1)	Running hours(1)	Service Plan	Operation
Daily	--	--	• Check readings on display. • Check if condensate is discharged during operation. • Drain condensate manually (when applicable). • On compressors with integrated dryer: check the dew point.

Interval[1]	Running hours[1]	Service Plan	Operation
Every 3 months (note 2)	500	--	• Check the pressure drop over the (optional) filters . • Inspect the air inlet filters: check for cleanness and damage. Replace a dirty or damaged filter with a new one. • Check the coolers. Clean by air jet if necessary.

Every 6 months	1000	--	• Operate the safety valve.
			• Clean the compressor.
			• On compressors with integrated dryer:
			  • Brush or blow off the finned surface of the condenser.
			  • Inspect and clean the electronic drain:
			  • Functioning of the drain can be checked by pushing the TEST button of the drain.
			  • Cleaning of the drain filter can be done by opening the manual drain valve during a few seconds.

Yearly	2500	--	• Replace the air inlet filters. • Replace the cubicle filters. • Test the safety valves. • Have temperature protection and motor overload tested. • Check tension and condition of the V-belts.
Every 2 years	5000	A	• Replace V-belt(s). • Replace the check valves.
Every 2 years	5000	B	8 bar and 116 psi compressors: • Clean fan (ref 124 on *Flow diagram*), fan duct and element cooling fins (see note 2). See section *Cleaning cooling fins*. • Have orbiting scroll bearing greased (see note 3).
Every 2 years	5000	B	10 bar and 145 psi compressors: • Clean fan (ref 124 on *Flow diagram*), fan duct and element cooling fins (see note 2). See section *Cleaning cooling fins*. • Have orbiting scroll bearing and pin crank bearings greased (see note 3). • Replace tip seals and dust seal. • Replace inlet seal.

Interval[1]	Running hours[1]	Service Plan	Operation
Every 4 years	10000	B	8 bar and 116 psi compressors: • Clean fan (ref 124 on *Flow diagram*), fan duct and element cooling fins (see note 2). See section *Cleaning cooling fins*. • Have orbiting scroll bearing and pin crank bearings greased (see note 3). • Replace tip seals and dust seal. • Replace inlet seal.

Notes:

1. Maintenance must be done according the number of running hours **or** according the running period, whichever comes first.
2. More frequently in a dusty environment.
3. **Important note:** Regreasing of the bearings of the compressor element must be done with **special grease**, a **special grease gun** and according a **specific procedure**.

   In high ambient conditions, the bearings must be greased more frequently: for every 5 °C (9 °F) increase above 30 °C (86 °F), the maintenance interval should be reduced with 30 %.

   Contact your supplier for details.

   Check more frequently if operating in a dusty atmosphere. Check for cleanness and damage. Replace a dirty or damaged filter by a new one.
4. In extremely dry conditions (relative humidity below 15 %), the tip seals and dust seals need to be replaced more frequently.

6.2 Service kits

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

Consult the Spare Parts List for part numbers.

7 Adjustments and service procedures

7.1 Air filter

Procedure

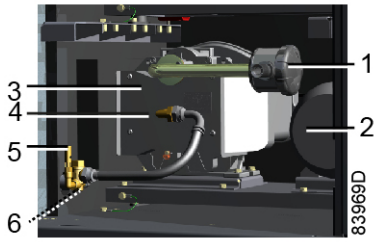


Figure 25: 3.7 kW compressor module

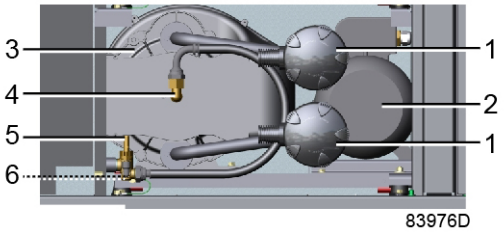


Figure 26: 5.5 kW compressor module

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

7.2 Air cooler

Cleaning

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

7.3 Drive motor

Instructions

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

Keep the motor free from dust for optimal cooling.

7.4 Safety valve

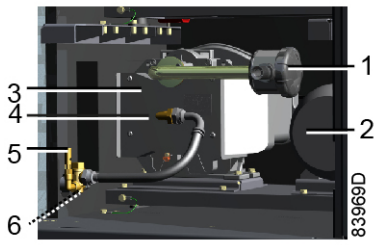


Figure 27: 3.7 kW compressor module

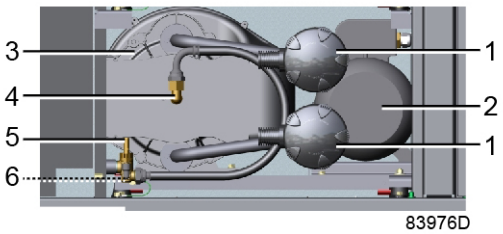


Figure 28: 5.5 kW compressor module

Operating

Operate the safety valve (5) by unscrewing the knurled cap one or two turns. Retighten the cap.

Testing

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

If the safety valve does not open at the specified pressure, it must be replaced.

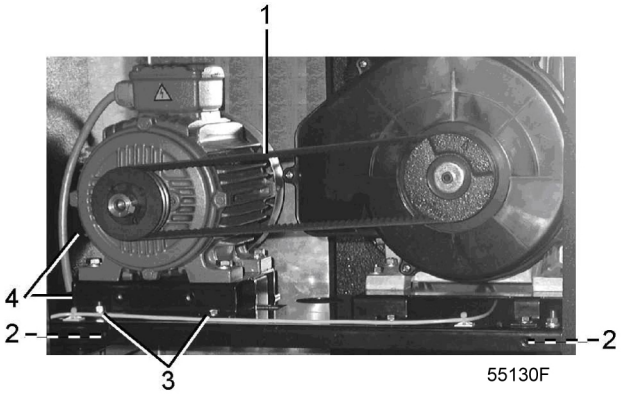
Danger: No adjustments are allowed. Never run the compressor without safety valve.

7.5 Belt set exchange and tensioning

Important

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

Procedure



1. Loosen motor hold-down bolts (3).
2. Loosen the belt tension by screwing bolts (4) equally and take off the belts (1).
3. Install new belts.
4. Tension the belts by screwing bolts (4) equally.

   The tension is correct if the deflection is between 5 mm and 7 mm when exerting a force of 25 N on the belt midway between the pulleys. Make sure that the pulleys remain aligned. The maximum out-of-line is:

   - Maximum parallel out-of-line: 0.5 mm
   - Maximum angular out-of-line: 0.5 degrees
5. Tighten bolts (3).
6. Check the belt tension after the first 500 running hours.

7.6 Cleaning the compressor element

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

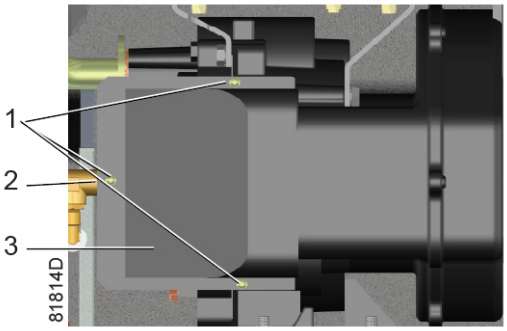
Warning: Do not clean the cooling channels with organic solvent since this will damage the surface treatment.

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

Procedure:

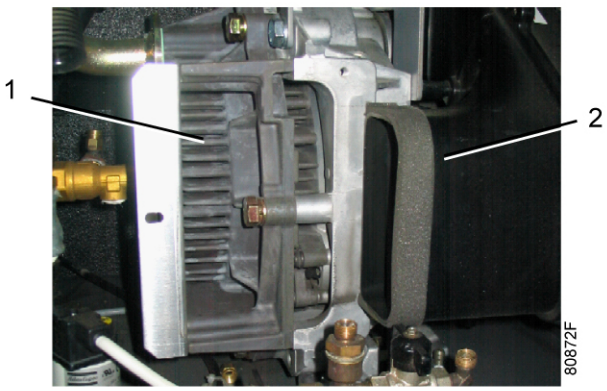
1. Stop the compressor and switch off the power.
2. Close the air outlet valve and depressurise the compressor.
3. Remove the fan duct:

   - Unscrew the 3 bolts (1).
   - Remove clip (2) (if applicable).



- Remove fan duct (3).

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



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

7.7 Dryer maintenance

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

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

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

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

Danger: Local legislation may stipulate that:

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

General

The following remarks should be kept in mind:

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

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

Device settings

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

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

8 Problem solving

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

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

For detailed instructions, see the next sections.

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

Compressor

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

Refrigerant dryer

For compressors with a built-in refrigerant dryer also:

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

9 Technical data

9.1 Electric cable size and fuses

Warning: We only refer to existing norms or calculation methods but don't take any responsibility about them or the completeness of information, this is the responsibility of the customer. Failing to supply correct power or protection can void the warranty.

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.

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.

Currents and fuses

Compressor type				**I_{tot} (1)**	**Max fuse (1)**	**I_{tot} (2)**	**Max fuse (2)**	**Q21/Q22**
SF 8+	IEC	60 HZ	380 V	18.5 A	20 A	22 A	25 A	7.3 A
SF 8+	IEC	50 HZ	400 V	17.7 A	20 A	21 A	25 A	7 A
SF 8+	IEC	50 HZ	400 V+N	17.7 A	20 A	22 A	25 A	7 A
SF 8+	IEC	60 HZ	230 V	31 A	35 A	35 A	40 A	12.2 A
SF 8+	IEC	60 HZ	460 V	14.5 A	20 A	18 A	20 A	6.1 A

Compressor type				**I_{tot} (1)**	**Max fuse (1)**	**I_{tot} (2)**	**Max fuse (2)**	**Q21/Q22**
SF 11+	IEC	60 HZ	380 V	27 A	32 A	31 A	40 A	10.7 A
SF 11+	IEC	50 HZ	400 V	22.5 A	25 A	25.5 A	32 A	10 A

Compressor type				I_{tot} (1)	Max fuse (1)	I_{tot} (2)	Max fuse (2)	Q21/Q22
SF 11+	IEC	50 HZ	400 V+N	22.5 A	25 A	26.5 A	32 A	10 A
SF 11+	IEC	60 HZ	230 V	45 A	50 A	48 A	60 A	17.8 A
SF 11+	IEC	60 HZ	460 V	22.5 A	25 A	25.5 A	30 A	8.9 A

I_{tot} (1): maximum current in the supply lines at maximum load and nominal voltage for compressors without integrated dryer.

Max fuse (1): maximum fuse size in case of compressors without integrated dryer.

I_{tot} (2): maximum current in the supply lines at maximum load and nominal voltage for compressors with integrated dryer.

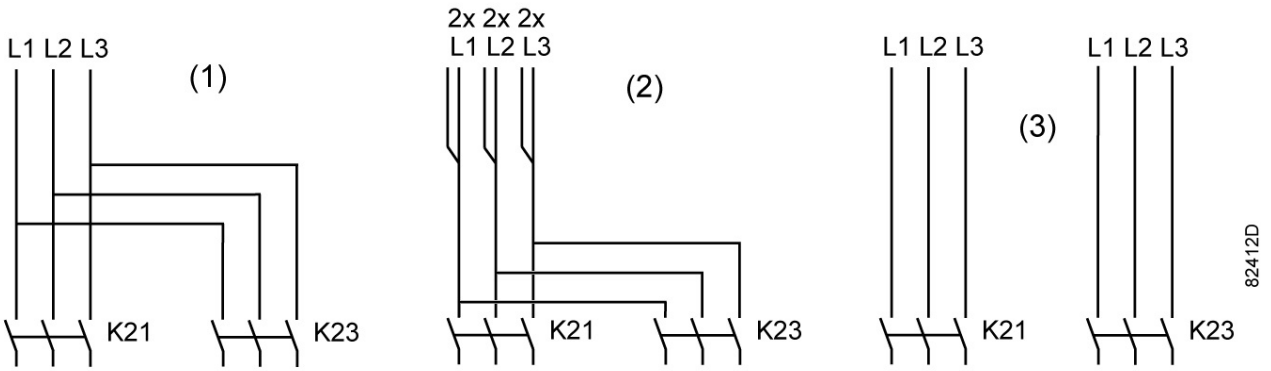
Max fuse (2): maximum fuse size in case of compressors with integrated dryer.

IEC fuses: class gL/gG

UL fuses:class K5; CSA: HRC form II

Possible configurations

There are 3 possible cabling layouts:

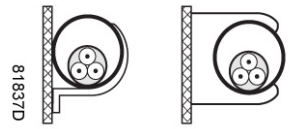


- (1): Single supply cables (for DOL variants, only K21 is used)
- (2): Parallel supply cables (for DOL variants, only K21 is used)
- (3) is only valid for Y-D versions

Cable sizing according IEC

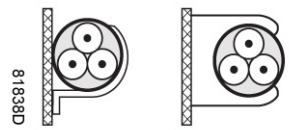
The tables below indicate the current carrying capacities of cables for 3 commonly used installation methods, calculated according to standard 60364-5-52 - electrical installations of buildings part 5 - selection and erection equipment and section 52 - current carrying capacities in wiring systems.

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. Multicore cable in conduit on a wooden wall

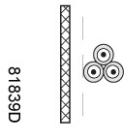
	Ambient temperature				
Cable section	**30 °C**	**40 °C**	**45 °C**	**50 °C**	**55 °C**
4 mm²	< 27 A	< 23 A	< 21 A	< 19 A	< 16 A
6 mm²	< 34 A	< 30 A	< 27 A	< 24 A	< 21 A
10 mm²	< 46 A	< 40 A	< 36 A	< 33 A	< 28 A
16 mm²	< 62 A	< 54 A	< 49 A	< 44 A	< 38 A
25 mm²	< 80 A	< 70 A	< 63 A	< 57 A	< 49 A
35 mm²	< 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

Table 2: Maximum allowed current in function of the ambient temperature for installation method B2

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

	Ambient temperature				
Cable section	**30 °C**	**40 °C**	**45 °C**	**50 °C**	**55 °C**
4 mm²	< 32 A	< 28 A	< 25 A	< 23 A	< 20 A
6 mm²	< 41 A	< 36 A	< 32 A	< 29 A	< 25 A
10 mm²	< 57 A	< 50 A	< 45 A	< 40 A	< 35 A
16 mm²	< 76 A	< 66 A	< 60 A	< 54 A	< 46 A
25 mm²	< 96 A	< 84 A	< 76 A	< 68 A	< 59 A
35 mm²	< 119 A	< 104 A	< 94 A	< 84 A	< 73 A
50 mm²	< 144 A	< 125 A	< 114 A	< 102 A	< 88 A
70 mm²	< 184 A	< 160 A	< 145 A	< 131 A	< 112 A
95 mm²	< 223 A	< 194 A	< 176 A	< 158 A	< 136 A
120 mm²	< 259 A	< 225 A	< 205 A	< 184 A	< 158 A

Table 3: Maximum allowed current in function of the ambient temperature for installation method C

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

	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

Table 4: Maximum allowed current in function of the ambient temperature for installation method F

Calculation method for IEC:

- Single supply cables (3 phases + PE - configuration (1)):
  - Add 10 % to the total current (I_{tot} 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 current (I_{tot} 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 current (I_{tot} 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: use following rule of thumb:
  - For supply cables up to 16 mm²: same size as supply wires
  - For supply cables between 16 mm² and 35 mm²: 16 mm²
  - 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: For SF 11 FF 380 V 60 Hz IEC, I_{tot} = 30 A, ambient temperature is 40 °C, recommended fuse: maximum 40 A

- In case of single supply cables (3 phases + PE - configuration (1)):
  - I = 34 A + 10 % = 34 x 1.1 = 37.4 A
  - The table for installation method B2 allows a maximum current of 30 A for a 6 mm² cable at 40 °C ambient temperature. For a cable of 10 mm², the maximum allowed current is 40 A, which is sufficient. Therefore, use a 3 x 10 + 10 mm² cable.

If method C is used, 6 mm² is also insufficient (maximum 36 A at 40 °C). Use a 3 x 10 + 10 mm² cable.
    - Install 40 A fuses.
- In case of parallel supply cables (2 x 3 phases + PE - configuration (2)):
    - I = (34 A + 10 %)/2 = (34 x 1.1)/2 = 18.7 A
    - For a cable of 4 mm² and installation method B2, the maximum allowed current is 23 A x 0.8 = 18.4 A at 40 °C. So take 2 parallel cables of 3 x 6 + 6 mm².

      In case of installation method C, the maximum current of a 4 mm² cable at 40 °C is 28 A x 0.8 = 22.4 A. 2 parallel cables of 3 x 4 + 4 mm² will be sufficient.
    - Install 20 A fuses on each cable.

Cable sizing according UL/cUL

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

AWG or kcmil	Maximum current
14	20 A
12	25 A
10	35A
8	50 A
6	65 A
4	85 A
3	100 A
2	115 A
1	130 A

Table 5: Maximum allowed current in function of the wire size (NFPA70 table 310.16)

Ambient temperature	Correction factor
21-25 °C (70-77 °F)	1.05
26-30 °C (78-86 °F)	1.00
31-35 °C (87-95 °F)	0.94
36-40 °C (96-104 °F)	0.88

Table 6: Correction factors

Calculation method for UL:

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

- Add 25 % to the total current (I_{tot} from the tables) and divide by √3
- Multiply the ampacity of the cables with 0.8 (see UL 508A table 28.1 continued)
- Fuse size: the recommended maximum fuse size divided by √3 on each cable.

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

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

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

Example of supply cable calculation: I_{tot} = 28 A, maximum ambient temperature is 40°C, recommended fuse = 40 A

- Single supply cables (3 phases + 1 PE - configuration (1)):
  - I = 28 A + 25 % = 28 x 1.25 = 35 A
  - For AWG8, the maximum current at 40 °C is 50 A x 0.88 = 44 A, which is sufficient => use AWG8.
  - Install the prescribed maximum fuse (40 A) on each cable
- Parallel supply cable (2 x 3 phases + 2 PE - configuration (2)):
  - I = (28 A + 25%)/2 = (28 x 1.25)/2 = 17.5 A
  - For a AWG14, the maximum current at 40 °C is 20 A x 0.88 x 0.8 = 14.1 A, which is insufficient. For an AWG14, the maximum current is 25 x 0.88 x 0.8 = 17.6 A. So 2 parallel cables of 3 x AWG12 + 2 x AWG12 are sufficient.
  - Install 20 A fuses on each cable.

9.2 Reference conditions and limitations

Reference conditions

Air inlet pressure (absolute)	bar	1
Air inlet pressure (absolute)	psi	14.5
Air inlet temperature	ºC	20
Air inlet temperature	ºF	68
Relative humidity	%	0
Working pressure		See section *Compressor data*

Limits

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

Minimum ambient temperature	ºF	32

9.3 Compressor data

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

8 bar compressors, 50 Hz

Compressor type		SF 8+	SF 11+
Maximum working pressure (compressors without integrated dryer)	bar(e)	8	8
Maximum working pressure (compressors without integrated dryer)	psi(g)	116	116
Maximum working pressure (compressors with integrated dryer)	bar(e)	7.75	7.75
Maximum working pressure (compressors with integrated dryer)	psi(g)	112	112
Reference working pressure (compressors without integrated dryer)	bar(e)	7	7
Reference working pressure (compressors without integrated dryer)	psi(g)	101.5	101.5
Reference working pressure (compressors with integrated dryer)	bar(e)	6.75	6.75
Reference working pressure (compressors with integrated dryer)	psi(g)	98	98
Air temperature at outlet valve (compressors without integrated dryer)	°C	28	30
Air temperature at outlet valve (compressors without integrated dryer)	°F	82	86
Air temperature at outlet valve (compressors with integrated dryer)	°C	25	25
Air temperature at outlet valve (compressors with integrated dryer)	°F	77	77
Motor shaft speed	rpm	2900	2900
Nominal motor power	kW	2 x 3.7	2 x 5.5
Nominal motor power	hp	2 x 5	2 x 7.5
Sound pressure level (compressors without integrated dryer)	dB(A)	63	63
Refrigerant type (compressors with integrated dryer)		R134a	R134a
Dew point (compressors with integrated dryer)	°C	3	3
Dew point (compressors with integrated dryer)	°F	37	37

10 bar compressors, 50 Hz

Compressor type		SF 8+	SF 11+
Maximum working pressure (compressors without integrated dryer)	bar(e)	10	10
Maximum working pressure (compressors without integrated dryer)	psi(g)	145	145
Maximum working pressure (compressors with integrated dryer)	bar(e)	9.75	9.75
Maximum working pressure (compressors with integrated dryer)	psi(g)	141	141
Reference working pressure (compressors without integrated dryer)	bar(e)	9	9
Reference working pressure (compressors without integrated dryer)	psi(g)	130.5	130.5
Reference working pressure (compressors with integrated dryer)	bar(e)	8.75	8.75
Reference working pressure (compressors with integrated dryer)	psi(g)	127	127
Air temperature at outlet valve (compressors without integrated dryer)	°C	28	30
Air temperature at outlet valve (compressors without integrated dryer)	°F	82	86
Air temperature at outlet valve (compressors with integrated dryer)	°C	25	25
Air temperature at outlet valve (compressors with integrated dryer)	°F	77	77
Motor shaft speed	rpm	2900	2900
Nominal motor power	kW	2 x 3.7	2 x 5.5
Nominal motor power	hp	2 x 5	2 x 7.5
Sound pressure level (compressors without integrated dryer)	dB(A)	63	63
Refrigerant type (compressors with integrated dryer)		R134a	R134a
Dew point (compressors with integrated dryer)	°C	3	3
Dew point (compressors with integrated dryer)	°F	37	37

116 psi compressors, 60 Hz

Compressor type		SF 8+	SF 11+
Maximum working pressure (compressors without integrated dryer)	bar(e)	8	8
Maximum working pressure (compressors without integrated dryer)	psi(g)	116	116
Maximum working pressure (compressors with integrated dryer)	bar(e)	7.75	7.75
Maximum working pressure (compressors with integrated dryer)	psi(g)	112	112
Reference working pressure (compressors without integrated dryer)	bar(e)	7	7

Compressor type		SF 8+	SF 11+
Reference working pressure (compressors without integrated dryer)	psi(g)	101.5	101.5
Reference working pressure (compressors with integrated dryer)	bar(e)	6.75	6.75
Reference working pressure (compressors with integrated dryer)	psi(g)	98	98
Air temperature at outlet valve (compressors without integrated dryer)	°C	28	29
Air temperature at outlet valve (compressors without integrated dryer)	°F	82	84
Air temperature at outlet valve (compressors with integrated dryer)	°C	25	25
Air temperature at outlet valve (compressors with integrated dryer)	°F	77	77
Motor shaft speed	rpm	3505	3505
Nominal motor power	kW	2 x 3.7	2 x 5.5
Nominal motor power	hp	2 x 5	2 x 7.5
Sound pressure level (compressors without integrated dryer)	dB(A)	63	63
Refrigerant type (compressors with integrated dryer)		R134a	R134a
Dew point (compressors with integrated dryer)	°C	3	3
Dew point (compressors with integrated dryer)	°F	37	37

145 psi compressors, 60 Hz

Compressor type		SF 8+	SF 11+
Maximum working pressure (compressors without integrated dryer)	bar(e)	10	10
Maximum working pressure (compressors without integrated dryer)	psi(g)	145	145
Maximum working pressure (compressors with integrated dryer)	bar(e)	9.75	9.75
Maximum working pressure (compressors with integrated dryer)	psi(g)	141	141
Reference working pressure (compressors without integrated dryer)	bar(e)	9	9
Reference working pressure (compressors without integrated dryer)	psi(g)	130.5	130.5
Reference working pressure (compressors with integrated dryer)	bar(e)	8.75	8.75
Reference working pressure (compressors with integrated dryer)	psi(g)	127	127
Air temperature at outlet valve (compressors without integrated dryer)	°C	28	30
Air temperature at outlet valve (compressors without integrated dryer)	°F	82	86

Compressor type		SF 8+	SF 11+
Air temperature at outlet valve (compressors with integrated dryer)	°C	25	25
Air temperature at outlet valve (compressors with integrated dryer)	°F	77	77
Motor shaft speed	rpm	3495	3495
Nominal motor power	kW	2 x 3.7	2 x 5.5
Nominal motor power	hp	2 x 5	2 x 7.5
Sound pressure level (compressors without integrated dryer)	dB(A)	63	63
Refrigerant type (compressors with integrated dryer)		R134a	R134a
Dew point (compressors with integrated dryer)	°C	3	3
Dew point (compressors with integrated dryer)	°F	37	37

10 Guidelines for inspection

Guidelines

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

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

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

11 Pressure equipment directives

Components subject to 2014/68/EU Pressure Equipment Directive

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

Pressure version	Part number	Description	PED Class
8 bar	0830 1008 54	Safety valve	IV
10 bar	1092 0019 61	Safety valve	IV

The compressors conform to PED category I or smaller.

12 Declaration of conformity

Insert logo here

EU DECLARATION OF CONFORMITY

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

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

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

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

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

<1> is authorized to compile the technical file.

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

8435DD

Figure 29: Typical example of a Declaration of Conformity document

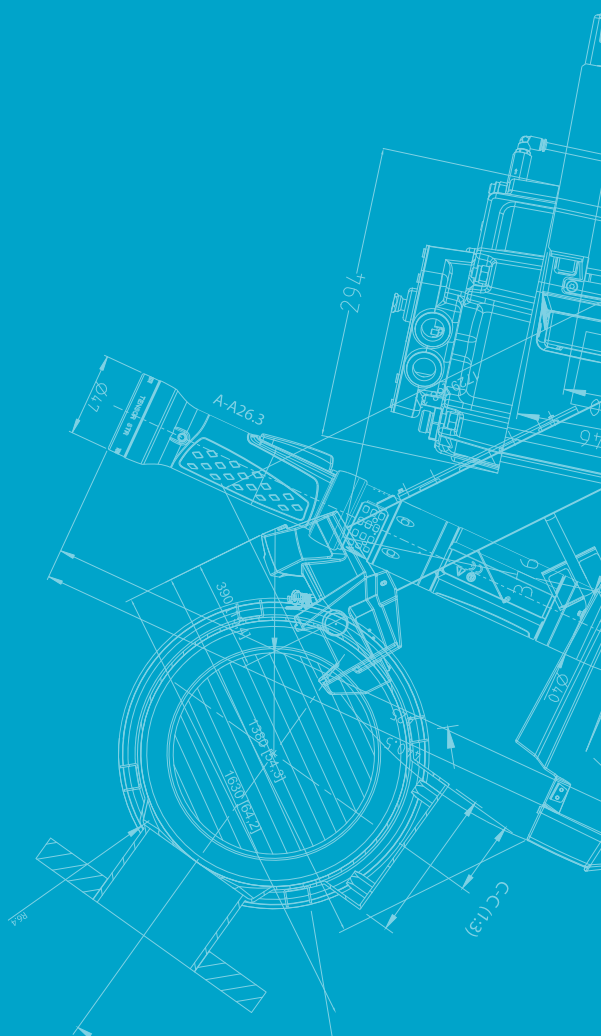
(1) Contact address:
Atlas Copco Airpower n.v.
P.O. Box 100
B-2610 Wilrijk (Antwerp)
Belgium

(2) Applicable directives

(3) Standards used

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

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



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