wisAIR

Oil-free water-injected screw compressors

WIS 20 V, WIS 25 V, WIS 30 V, WIS 40 V

Instruction book

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Oil-free water-injected screw compressors

WIS 20 V, WIS 25 V, WIS 30 V, WIS 40 V

From following serial No. onwards: API 807 000

Instruction book

Original instructions

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

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1 Safety precautions

1.1 Safety icons

Explanation

	Danger for life
	Warning
	Important note

1.2 Safety precautions, general

General precautions

1. The operator must employ safe working practices and observe all related work safety requirements and regulations.
2. If any of the following statements does not comply with the applicable legislation, the stricter of the two shall apply.
3. Installation, operation, maintenance and repair work must only be performed by authorized, trained, specialized personnel.
4. Never use compressed air as breathing air without prior purification in accordance with local legislation and standards.
5. 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.
6. Never play with compressed air. Do not apply the air to your skin or direct an air stream at people. Never use the air to clean dirt from your clothes. When using the air to clean equipment, do so with extreme caution and wear eye protection.
7. The owner is responsible for maintaining the unit in safe operating condition. Parts and accessories shall be replaced if unsuitable for safe operation.
8. It is not allowed to walk or stand on the compressor or its components.

1.3 Safety precautions during installation

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

Precautions during installation

1. The machine must only be lifted using suitable equipment in accordance with local safety regulations. Loose or pivoting parts must be securely fastened before lifting. It is strictly forbidden to dwell or stay in the risk zone under a lifted load. Lifting acceleration and deceleration must be kept within safe limits. Wear a safety helmet when working in the area of overhead or lifting equipment.
2. 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 minimise the entry of moisture at the inlet air. Consult section Reference conditions and limitations.
3. Any blanking flanges, plugs, caps and desiccant bags must be removed before connecting the pipes.
4. 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.
5. The aspirated air must be free of flammable fumes, vapours and particles, e.g. paint solvents, that can lead to internal fire or explosion.
6. Arrange the air intake so that loose clothing worn by people cannot be sucked in.
7. Ensure that the discharge pipe from the compressor to the aftercooler or air net is free to expand under heat and that it is not in contact with or close to flammable materials.
8. No external force may be exerted on the air outlet valve. The connected pipe must be free of strain.
9. 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 that the isolating switch is open and locked before any maintenance or repair. As a further safeguard, 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 start equipment.
10. 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.
11. 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.
12. 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.
13. 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.
14. 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.

15. Piping or other parts with a temperature in excess of 80˚C (176˚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.
16. For water-cooled machines, the cooling water system installed outside the machine has to be protected by a safety device with set pressure according to the maximum cooling water inlet pressure.
17. If the ground is not level or can be subject to variable inclination, consult the manufacturer.

	Also consult following safety precautions: Safety precautions during operation and Safety precautions during maintenance.

1.4 Safety precautions during operation

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

Precautions during operation

1. Never touch any piping or components of the compressor during operation.
2. Use only the correct type and size of hose end fittings and connections. When blowing through a hose or air line, ensure that the open end is held securely. A free end will whip and may cause injury. Make sure that a hose is fully depressurized before disconnecting it.
3. Persons switching on remotely controlled machines shall take adequate precautions to ensure that there is no one checking or working on the machine. To this end, a suitable notice shall be affixed to the remote start equipment.
4. Never operate the machine when there is a possibility of taking in flammable or toxic fumes, vapors or particles.
5. Never operate the machine below or in excess of its limit ratings.
6. Keep all bodywork doors shut during operation. The doors may be opened for short periods only, e.g. to carry out routine checks. Wear ear protectors when opening a door.
7. People staying in environments or rooms where the sound pressure level reaches or exceeds 90 dB(A) shall wear ear protectors.
8. Periodically check that:
   - All guards are in place and securely fastened
   - All hoses and/or pipes inside the machine are in good condition, secure and not rubbing
   - There are no leaks
   - 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
9. If warm cooling air from compressors is used in air heating systems, e.g. to warm up a working area, take precautions against air pollution and possible contamination of the breathing air.
10. Do not remove any of, or tamper with, the sound dampening material.

11. Never remove or tamper with the safety devices, guards or insulation fitted to 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.
12. Be aware of possible blow off of safety valves during operation. For the location of the safety valves, consult the description in this instruction book.
13. Yearly inspect the air receiver. Minimum wall thickness as specified in the instruction book must be respected. Local regulations remain applicable if they are more strict.

	Also consult following safety precautions: Safety precautions during installation and Safety precautions during maintenance.

1.5 Safety precautions during maintenance or repair

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

Precautions during maintenance or repair

1. Always use the correct safety equipment such as safety glasses, gloves, safety shoes, etc.
2. Use only the correct tools for maintenance and repair work.
3. Use only genuine spare parts.
4. All maintenance work shall only be undertaken when the machine has cooled down.
5. A warning sign bearing a legend such as "Work in progress; do not start" shall be attached to the starting equipment.
6. Persons switching on remotely controlled machines shall take adequate precautions to ensure that there is no one checking or working on the machine. To this end, a suitable notice shall be affixed to the remote start equipment.
7. Close the compressor air outlet valve before connecting or disconnecting a pipe.
8. Before removing any pressurized component, effectively isolate the machine from all sources of pressure and relieve the entire system of pressure.
9. Never use flammable solvents or carbon tetrachloride for cleaning parts. Take safety precautions against toxic vapours of cleaning liquids.
10. Scrupulously observe cleanliness during maintenance and repair. Keep dirt away by covering the parts and exposed openings with a clean cloth, paper or tape.
11. Never weld or perform any operation involving heat near any oil system. Oil tanks must be completely purged, e.g. by steam-cleaning, before carrying out such operations. Never weld on, or in any way modify, pressure vessels.
12. Whenever there is an indication or any suspicion that an internal part of a machine is overheated, the machine shall be stopped but no inspection covers shall be opened before sufficient cooling time has elapsed to avoid spontaneous ignition of the oil vapour (if applicable) when air is admitted.
13. Never use a light source with open flame for inspecting the interior of a machine, pressure vessel, etc.
14. Make sure that no tools, loose parts or rags are left in or on the machine.

15. All regulating and safety devices shall be maintained with due care to ensure that they function properly. They may not be put out of action.
16. Before clearing the machine for use after maintenance or overhaul, check that operating pressures, temperatures and time settings are correct. Check that all control and shut-down devices are fitted and that they function correctly. If removed, check that the coupling guard of the compressor drive shaft has been reinstalled.
17. Protect the motor, air filter, electrical and regulating components, etc. to prevent moisture from entering them, e.g. when steam-cleaning.
18. Make sure that all sound-damping material, e.g. 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.
19. Never use caustic solvents which can damage materials of the air net, e.g. polycarbonate bowls.
20. **The following safety precautions are stressed when handling refrigerant:**
    - Never inhale refrigerant vapours. 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.
21. Protect hands to avoid injury from hot machine parts, e.g. during draining of oil.
22. Be aware of eventual sharp edges on certain parts of the machine.

	Also consult following safety precautions: Safety precautions during installation and Safety precautions during operation.

2 General description

2.1 Introduction

Description

WIS compressors are stationary, water-injected, single-stage screw compressors, driven by an electric motor.

The motor of the compressors described in this book is powered by a frequency converter. The controller adjusts the motor speed automatically, depending on the compressed air demand and the pressure in the net.

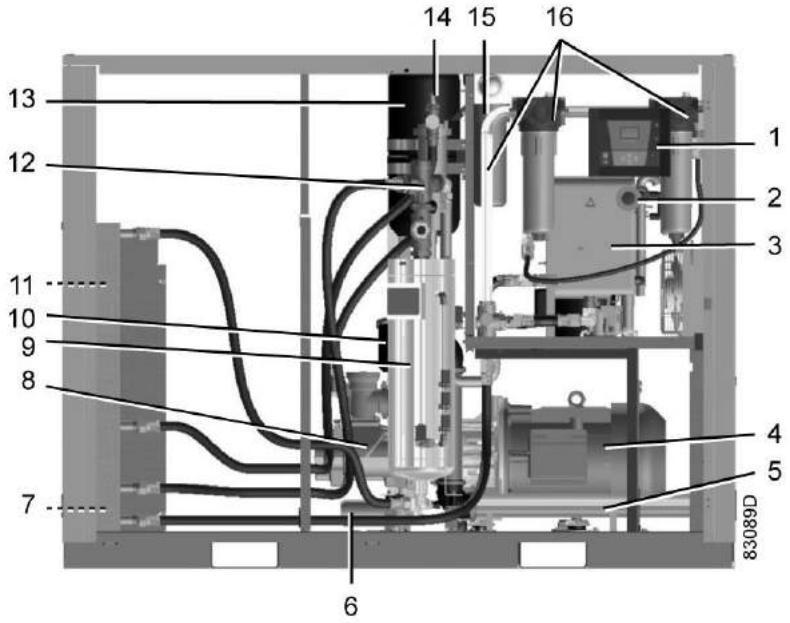
The compressors are enclosed in a sound-insulating bodywork and are available in air-cooled and water-cooled version and with or without integrated air dryer. An automatic condensate drain system is also provided.

The front panel comprises the electronic control module with the start and the stop button and an emergency stop button. The electric cabinet, comprising fuses, transformers, etc., is located behind this panel.

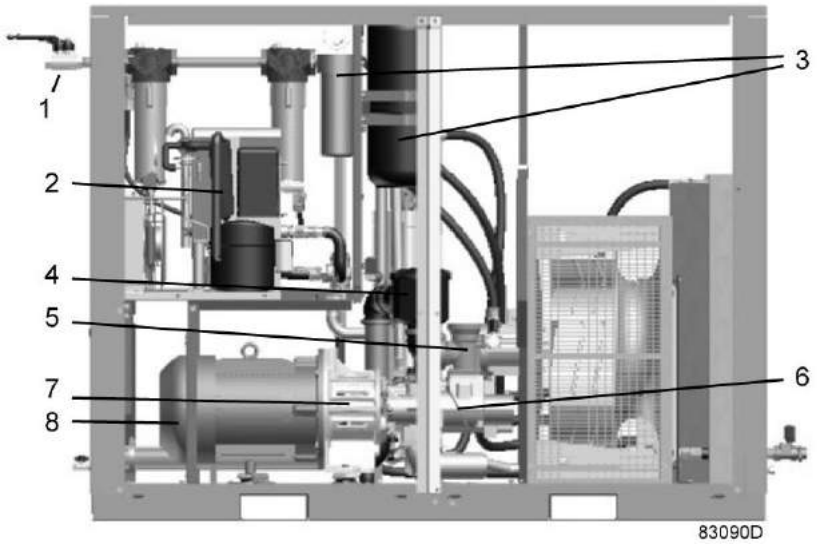
General view

References	Name
1	Controller
S3	Emergency stop button
AV	Outlet valve

Main components



Reference	Designation
1	Controller
2	Emergency stop button
3	Dryer (only on compressors with integrated dryer)
4	Motor
5	Compressor inlet pipe (option *flanged inlet*)
6	Booster pump (option)
7	Air cooler
8	Compressor element
9	Water separator vessel
10	Air filter
11	Water cooler
12	Minimum pressure valve
13	Reverse osmosis (RO) storage tank
14	Breather valve
15	Reverse osmosis (RO) filter
16	Dryer bypass (option)

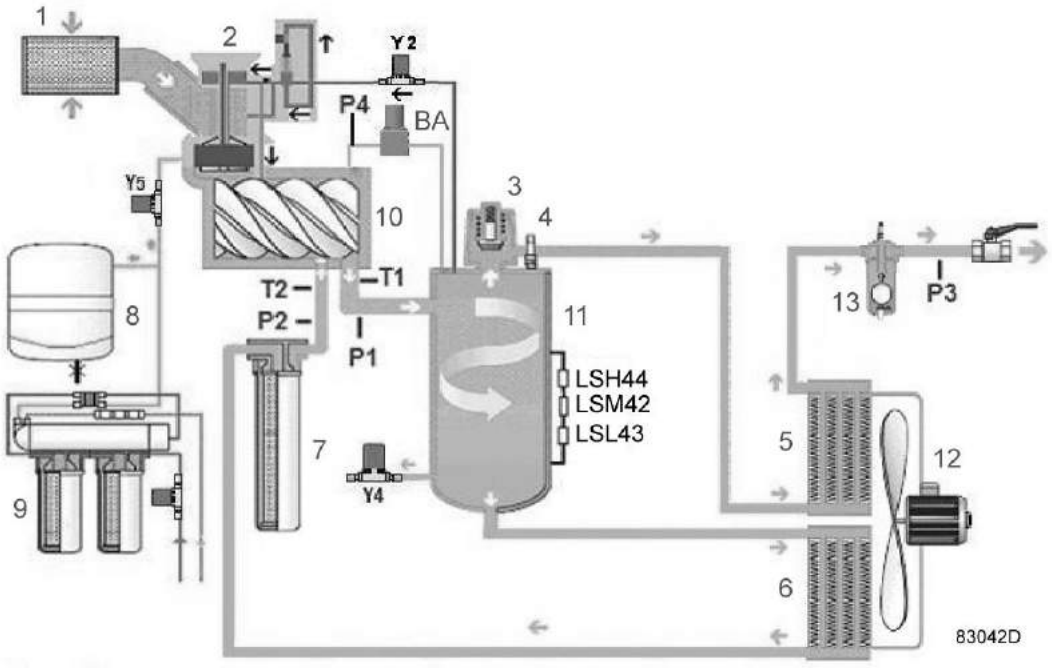


Rear view, air-cooled compressor with integrated dryer

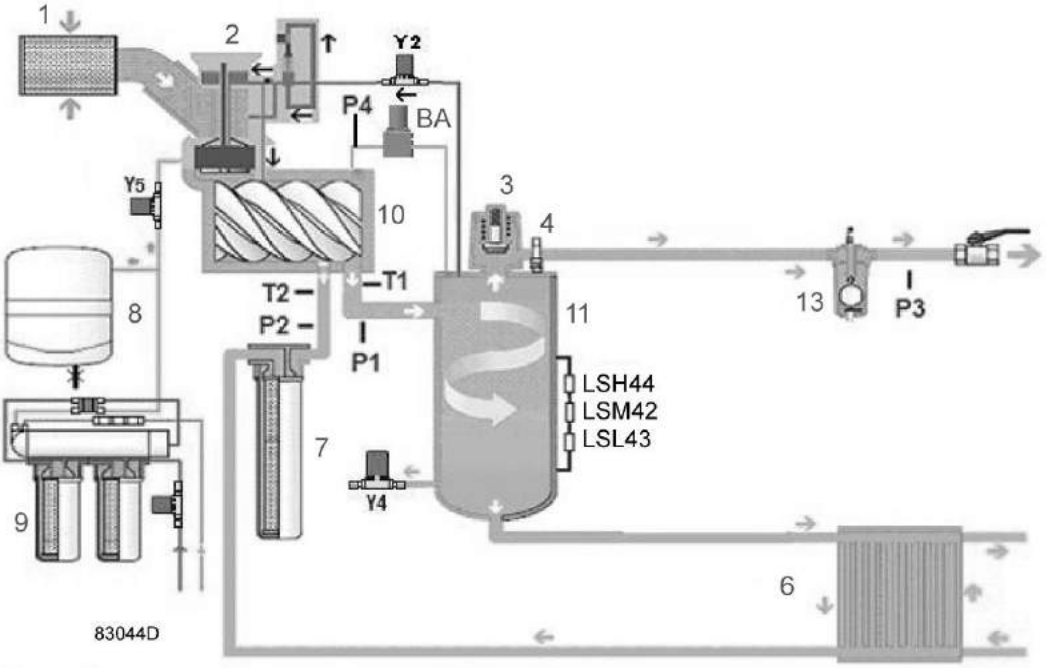
References	Description
1	Compressed air outlet
2	Dryer
3	Reverse Osmosis (RO) unit
4	Air filter
5	Inlet valve (unloading valve)
6	Compressor element
7	Coupling
8	Motor

2.2 Air flow

Compressors without integrated dryer



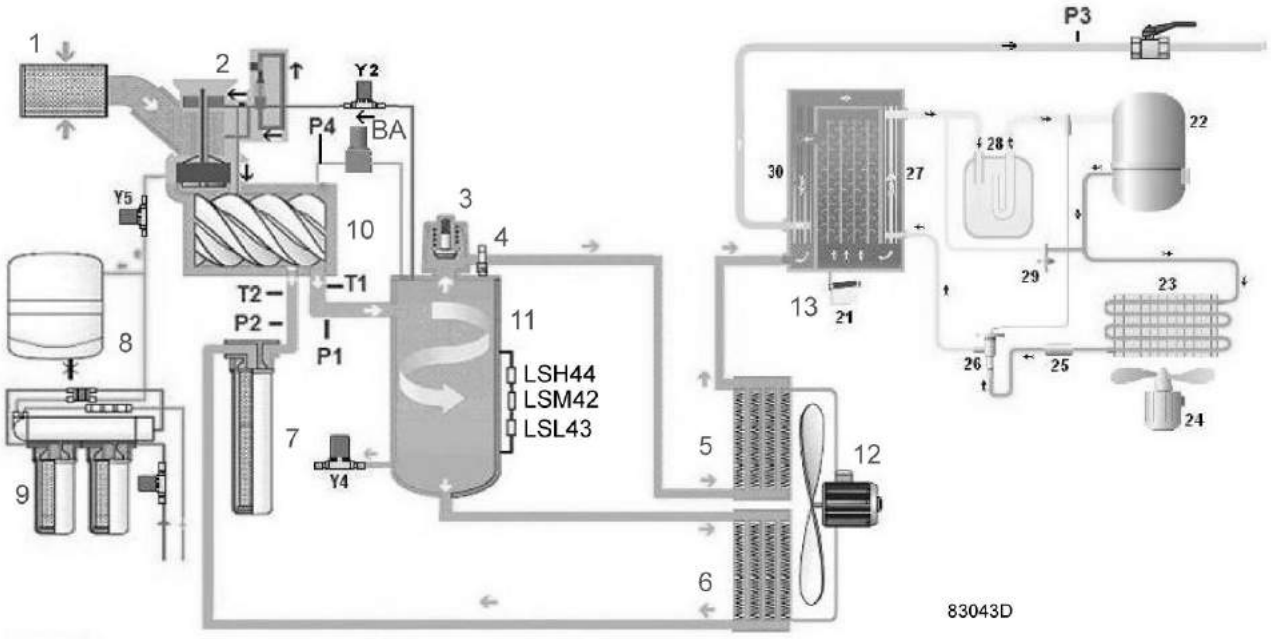
Air-cooled compressors



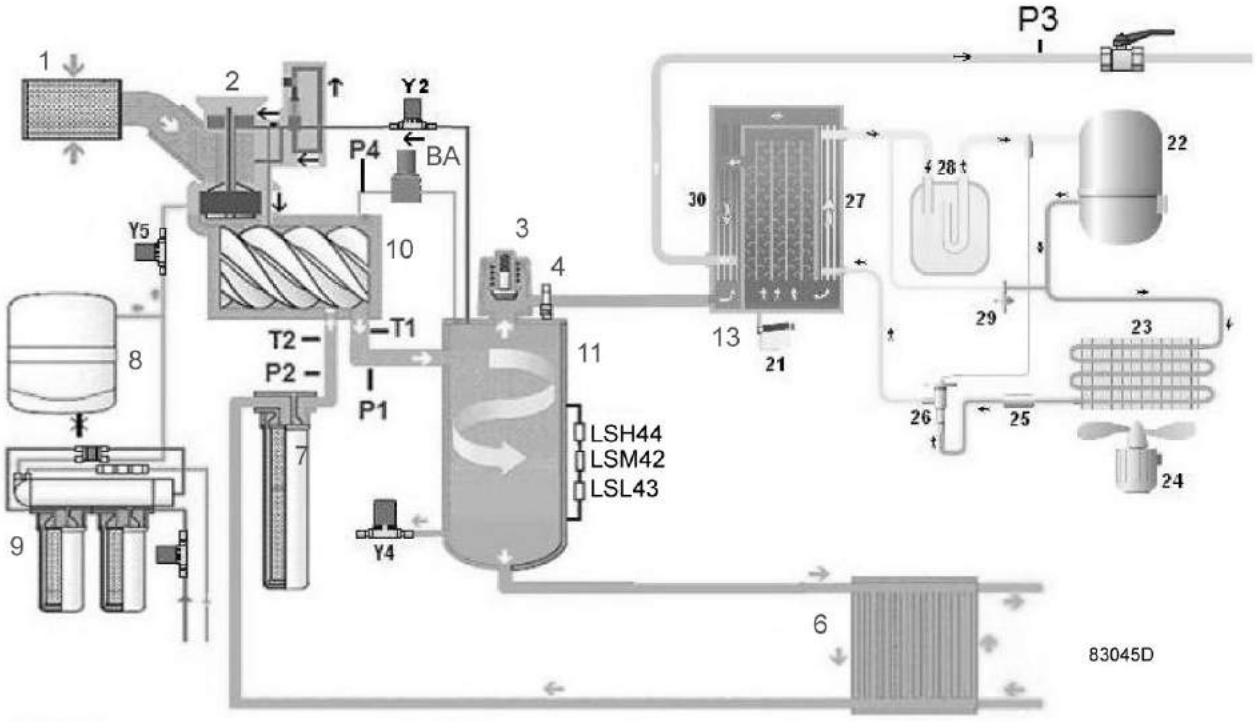
Water-cooled compressors

Reference	Description
1	Air filter
2	Inlet valve (unloading valve)
3	Minimum pressure valve
4	Safety valve
5	Air cooler (only on air-cooled compressors)
6	Water cooler
7	Water filter
8	Reverse Osmosis (RO) storage tank
9	Reverse Osmosis (RO) unit
10	Compressor element
11	Water separator vessel
12	Fan (only on air-cooled compressors)
13	Condensate trap
Y2	Load/unload solenoid valve
Y4	Solenoid valve, waste water
Y5	Solenoid valve, water supply
Ba	Blocking air regulator

Compressors with integrated dryer



Air-cooled compressors



Water-cooled compressors

Reference	Description
1	Air filter
2	Inlet valve (unloading valve)
3	Minimum pressure valve
4	Safety valve
5	Air cooler (only on air-cooled compressors)
6	Water cooler
7	Water filter
8	Reverse Osmosis (RO) storage tank
9	Reverse Osmosis (RO) unit
10	Compressor element
11	Water separator vessel
12	Fan (only on air-cooled compressors)
13	Condensate trap
22	Refrigerant compressor
23	Condenser
24	Condenser fan
25	Refrigerant dryer/filter
26	Expansion valve
27	Heat exchanger/evaporator
28	Liquid separator
29	Hot gas bypass valve

Reference	Description
Y2	Load/unload solenoid valve
Y4	Solenoid valve, waste water
Y5	Solenoid valve, water supply
Ba	Blocking air regulator

Description

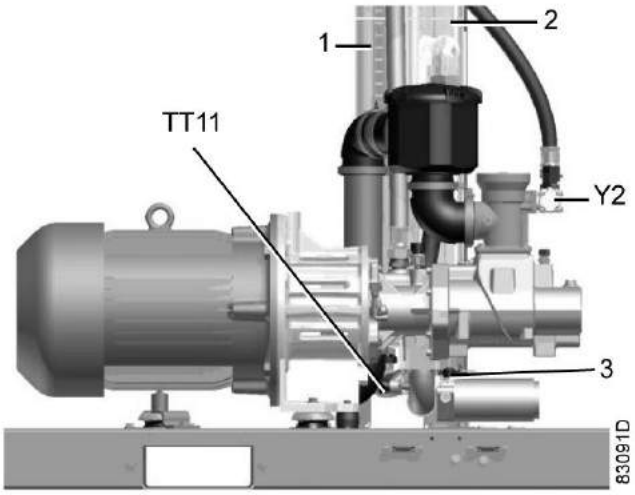
Air drawn through air filter (1) and inlet valve (2) is compressed in compressor element (12) while water is injected. The air/water mixture is tangentially injected into the water separator vessel (13), where the water is separated again from the air/water mixture.

The compressed air is discharged via minimum pressure valve (4) and air cooler (6) into the air net. The minimum pressure valve closes automatically if the air pressure drops below 3.5 bar(e) (50.76 psig).

On compressors with integrated dryer the air flows through the dryer before it reaches the outlet valve.

A condensate trap is provided (21). During normal operation of the compressor, the condensate from the condensate trap will automatically be recycled.

2.3 Water flow



References	Description
1	Water separator vessel
2	Water filter
3	Compressor element drain valve
Y2	Load/unload solenoid valve
TT11	Temperature sensor, compressor element outlet

Description

In the water separator vessel, the water is separated from the compressed air and is collected at the bottom of the vessel. Differential pressure forces the water from the water separator vessel to the water cooler.

Next, the cooled water passes the water filter and is re-injected into the compressor element.

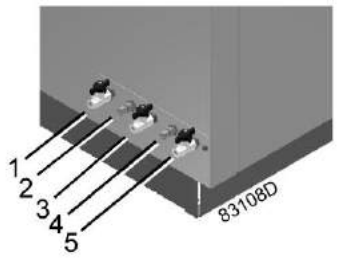
The water level is controlled by three capacitive level sensors.

If the water level in the separator becomes too high (above LSH44 level), drain valve (Y4) will discharge the excess water. If the water level in the separator vessel is too low (below LSM42 level), valve Y5 will open and water from the water treatment system is added via the suction side of the compressor element (unloading valve) during loaded operation.

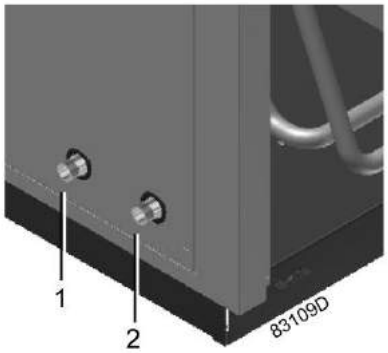
If the water level is below the LSL43 level, the unit will not be able to restart after shutdown (automatic or manual).

2.4 Water and automatic drain system

View of drain connections



Reference	Description
1	Manual drain, dryer bypass (option)
2	Automatic drain, Reverse Osmosis system (waste water)
3	Valve, tap water supply (Reverse Osmosis system)
4	Automatic drain, water separator vessel
5	Manual drain valve, electronic water drain



Reference	Description
1	Cooling water outlet (secondary water circuit) (Only on water-cooled units)
2	Cooling water inlet (secondary water circuit) (Only on water-cooled units)

Primary water circuit (Reverse Osmosis water system)

Tap water from the customer will be connected to valve (4). The tap water will be filtered by the Reverse Osmosis unit (see section Water treatment system), stored in the storage tank and fed to the primary water circuit whenever this is required.

Waste water produced by the RO membrane (see section Water treatment system) will be drained at the side panel of the compressor.

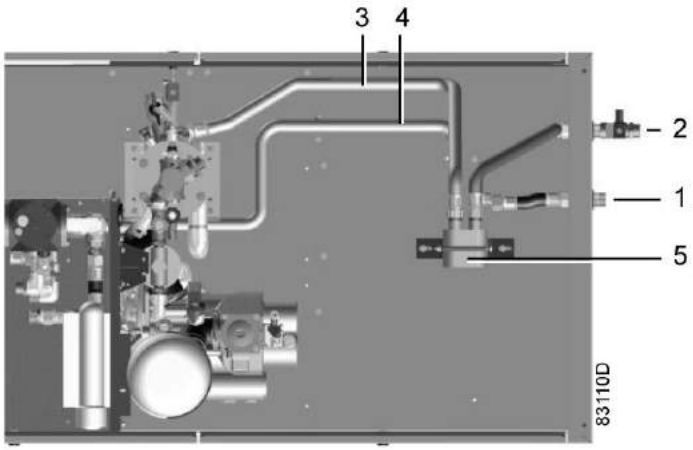
If the water level in the water separator vessel exceeds the highest level (LSH44), the excess water will be removed and drained at the side panel of the compressor.

Cooling (air-cooled compressors)

The fan will cool down the water of the primary water circuit and the compressed air.

Cooling (water-cooled compressors)

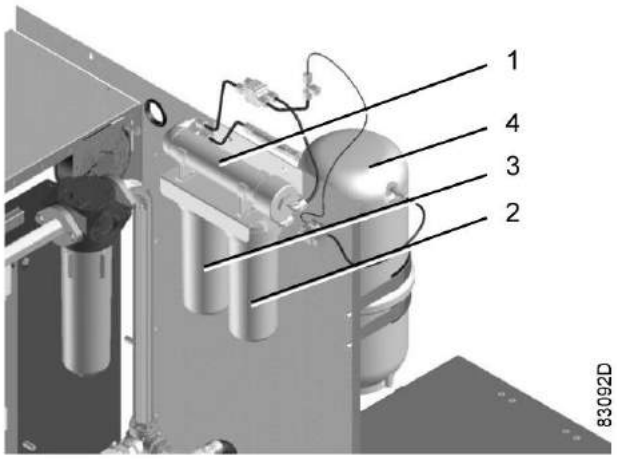
The secondary (cooling) water, connected to connections (1) and (2), cools down the water of the primary water circuit and (indirectly) also the compressed air.



References	Description
1	Cooling water outlet (secondary water circuit)
2	Cooling water inlet (secondary water circuit)
3	Inlet, primary water circuit
4	Outlet, primary water circuit
5	Cooler

2.5 Water treatment system

View of Reverse Osmosis (RO) unit



References	Description
1	RO membrane unit
2	Sediment filter
3	Carbon filter
4	RO water storage tank

Description

The compressors have an internal water treatment system which is based on the principle of Reverse Osmosis (RO). The system comprises a sediment filter (2), a carbon filter (3), a membrane (1) and a water storage tank (4). It produces pure high-quality water which will be used in the water circulation system of the compressor (primary water circuit).

The water treated by the RO unit will be stored in the storage tank. In this tank the production of RO water is regulated by a membrane, which will maintain a balance between the quantity of RO water and the supply of tap water.

The sediment filter is connected to the water mains (tap water). The water flows successively through the sediment filter, the carbon filter and the membrane. The clean water flows to the storage tank and will be supplied towards the suction side of the compressor element.

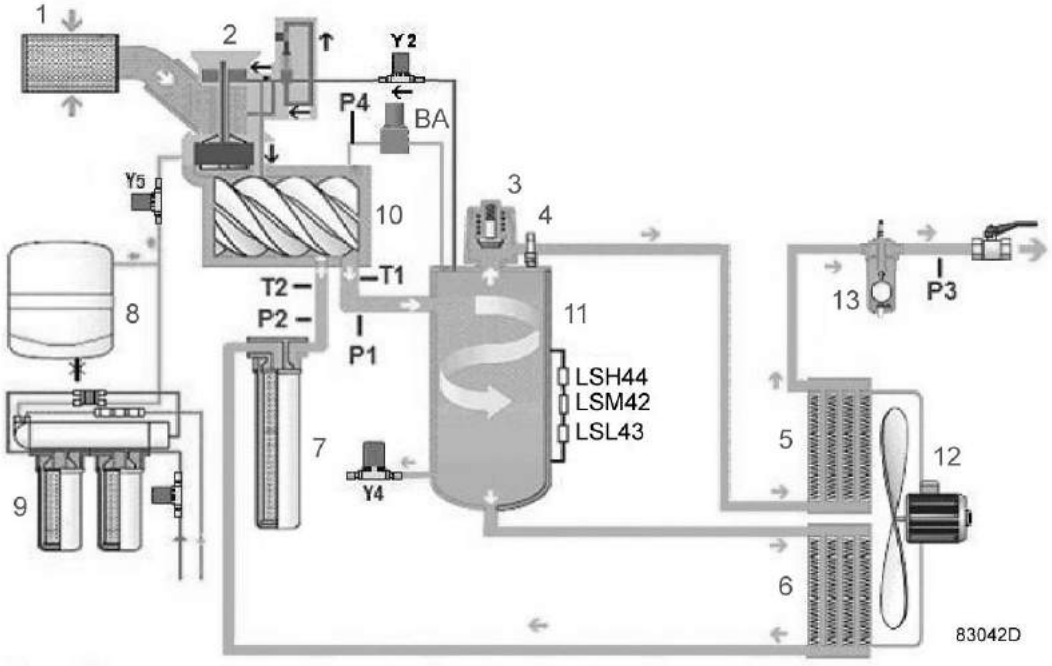
The membrane filters the tap water for 30 %: from 10 litres (2.64 US gal / 2.20 Imp gal) of tap water, 3 litres (0.79 US gal / 0.66 Imp gal) of pure water will be filtered (this depends on the tap water pressure and the condition of the membrane). When there is sufficient water and pressure in the storage tank, the pressure before and after the membrane is equal and the production of pure water stops.

Whenever water is needed, it will be supplied from the storage tank and the production of pure filtered water is automatically started.

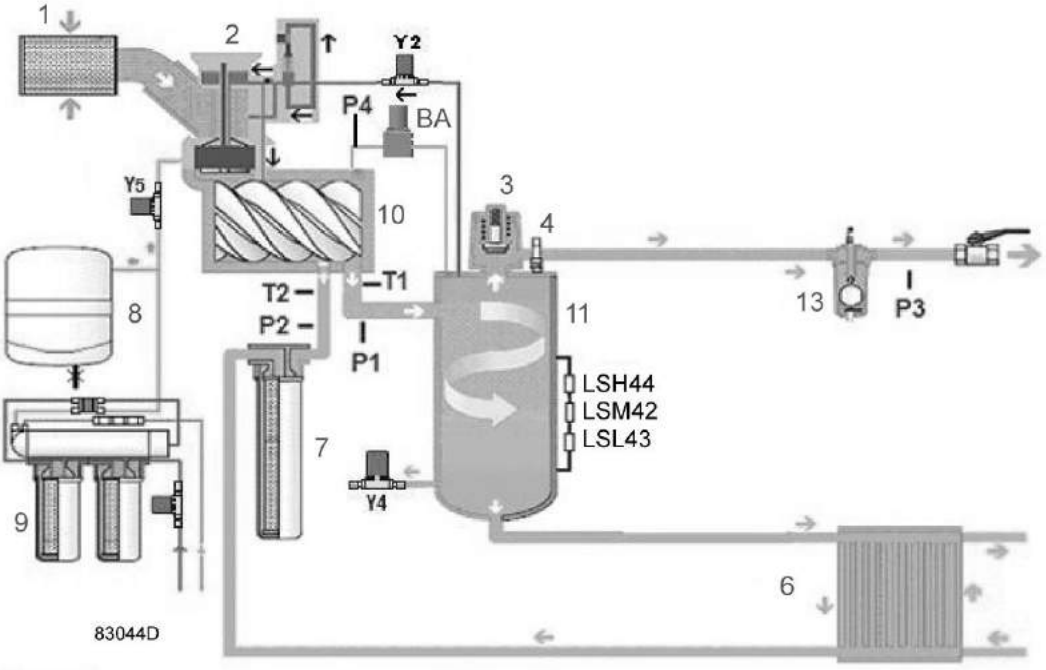
Waste water generated by the membrane will be drained, see section Water and Automatic Drain System.

2.6 Regulating system of variable speed units

Flow diagram



Air-cooled compressors



Water-cooled compressors

Starting

If the pressure in the air net is below the loading pressure, the compressor will start. As soon as there is pressure in the system, there will also be a water flow.

The compressor will run at low speed during a few seconds before going to minimum speed and to load condition to reach the preset setpoint.

Speed regulation - unloading

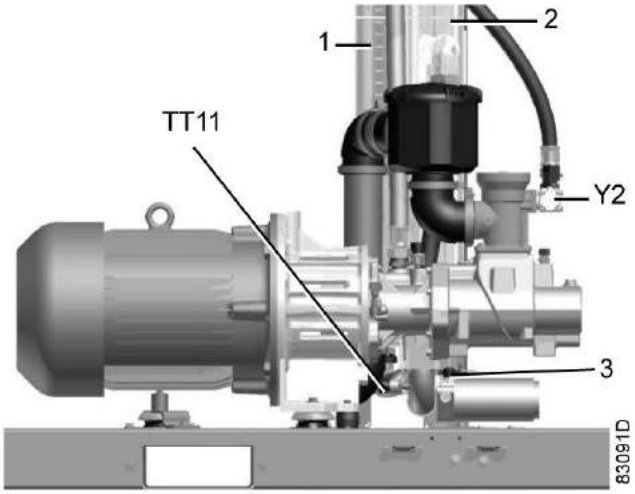
When the net pressure differs from the setpoint (desired net pressure), the electronic regulator will vary the motor speed.

If the air net pressure keeps on rising with the motor running at minimum speed, the compressor will switch to unloaded condition. After approx. 60 seconds of unloaded operation, the compressor will stop. If the motor is stopped automatically and the net pressure approaches the setpoint, the regulator will restart the motor.

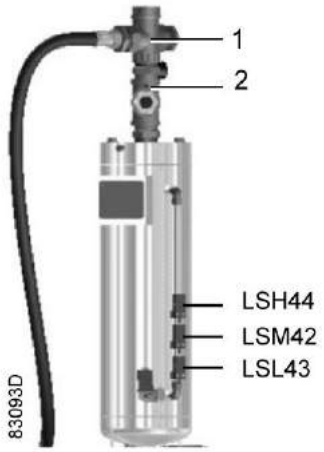
2.7 Protection and safety equipment

Views

In addition to the protection and warning circuits described in section Controller, following protection devices and settings have been provided.



Reference	Designation
TT11	Temperature sensor, element outlet
3	Element drain valve



Reference	Designation
1	Minimum pressure valve
2	Safety valve
LSH44	High level sensor
LSM42	Middle level sensor
LSL43	Low level sensor

Safety valve

The valve opens in case the pressure in the separator vessel exceeds the opening pressure of the valve.

Blow-off system

Whenever the compressor stops, the pressure in the water separator vessel is automatically released via the unloader. This ensures that the compressor is always restarted in unloaded condition. If the pressure in the water separator vessel is higher than 2 bar(e) (29.01 psig), the compressor will not start.

Minimum pressure valve

The minimum pressure valve remains closed until the minimum pressure of approx. 3.5 bar(e) (50.76 psig) is reached. This ensures a rapid pressure build-up when the compressor starts and also ensures sufficient water injection during starting and unloaded operation. When the compressor shuts down, it functions as a non-return valve.

Temperature protection

Two temperature sensors are mounted on the compressor element. One probe registers the water injection temperature TT41 (1) and one probe registers the element outlet temperature TT11.

First safety: an alarm message is generated when the temperature difference (TT11-TT41) between the two sensors reaches 20 ˚C (36 ˚F). The compressor is stopped (“shut-down level”) when the temperature difference reaches 25 ˚C (45 ˚F).

The second safety prevents the element outlet temperature TT11 from rising above the maximum discharge temperature:

- Shut-down level air-cooled compressors: 75˚C (167 ˚F)
- Shut-down level water-cooled compressors, variable speed: 63 ˚C (145 ˚F)

Pressure safety

The element is protected against too low a water injection pressure by a pressure sensor PT42 (2). After each compressor start-up, the water injection pressure must be sufficiently high. If the pressure remains below this value, the compressor will be shut down.

Low water level

If the water level in the water separator vessel is below the level of sensor LSL43 for at least 60 s, the compressor will be shut down.

Permissive start

During start-up the water injection pressure (PT 42) must reach 2.0 bar(e) (29 psig) within 15 seconds.

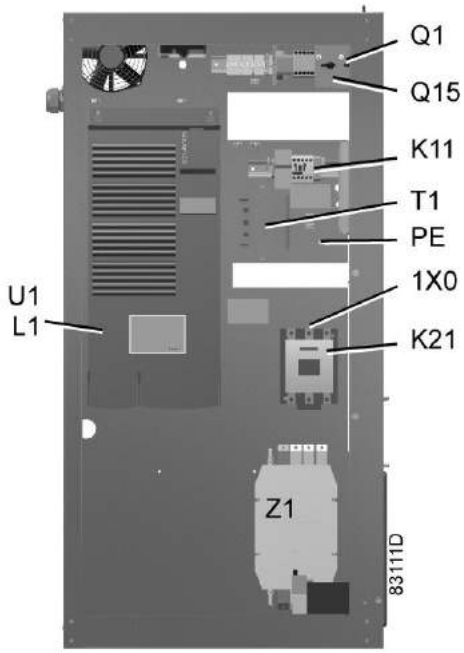
Motor protection

The compressor will stop in case of:

- Overload of the drive motor

2.8 Electrical system

Electric cabinet



Electric cubicle, typical view

References	Description
1X0	Supply line terminals
F	Fuses

References	Description
K11	Contactor, dryer (Only for units with dryer)
K21	Main contactor
PE	Earthing terminal (supply cables)
Q15	Circuit breaker, fan (air-cooled units)
T1	Transformer

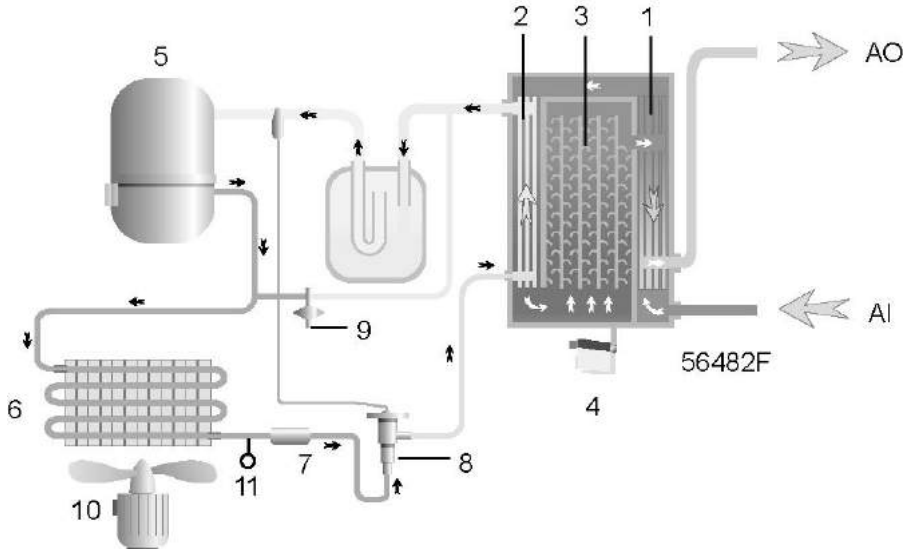
The electric cabinet mainly comprises transformers, fuses and contactors. The electronic regulator and emergency stop button are fitted on the front side of the cabinet.

Converter cabinet on variable speed units

The electric cabinet comprises the start and speed regulation unit. The parameters of the start and speed regulation unit are factory-set. Do not change these parameters as it may damage the compressor; consult your Customer Centre.

2.9 Air dryer

Flow diagram



Air dryer

Reference	Name
AI	Air inlet
AO	Air outlet
1	Air/air heat exchanger
2	Air/refrigerant heat exchanger (evaporator)
3	Condensate separator
4	Condensate outlet

Reference	Name
5	Refrigerant compressor
6	Refrigerant condenser
7	refrigerant dryer/filter
8	Thermostatic expansion valve
9	Hot gas by-pass valve
10	Condenser cooling fan
11	Pressure switch, fan control

Compressed air circuit

Compressed air enters heat exchanger (1) and is cooled by the outgoing, cold, dried air. Water in the incoming air starts to condense. The air then flows through heat exchanger/evaporator (2) where the refrigerant evaporates causing the air to be cooled further to close to the evaporating temperature of the refrigerant. More water in the air condenses. The cold air then flows through separator (3) where all the condensate is separated from the air. The condensate is automatically drained through outlet (4).

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

Refrigerant circuit

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

The liquid refrigerant flows through liquid refrigerant dryer/filter (7) to thermostatic expansion valve (8). The refrigerant leaves the thermostatic expansion valve 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 (5).

By-pass valve (9) regulates the refrigerant flow. Fan (10) is switched on or off by switch (11) depending on the loading degree of the refrigerant circuit.

3 Graphic controller

3.1 Controller

View of the AIRLOGIC² controller

Introduction

The electronic controller has following functions:

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

Automatic control of the compressor

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

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

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

Protecting the compressor

Shut-down

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

Example: If the compressor element outlet temperature exceeds the programmed shut-down level, the compressor will be stopped. This will be indicated on the display of the controller. The compressor will also be stopped in case of overload of the drive motor.

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

	Before remedying, consult the section Safety precautions.

Shut-down warning

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

If one of the measurements exceeds the programmed shut-down warning level, this will also be indicated to warn the operator before the shut-down level is reached.

The message disappears as soon as the warning condition disappears.

Warning

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

Service warning

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

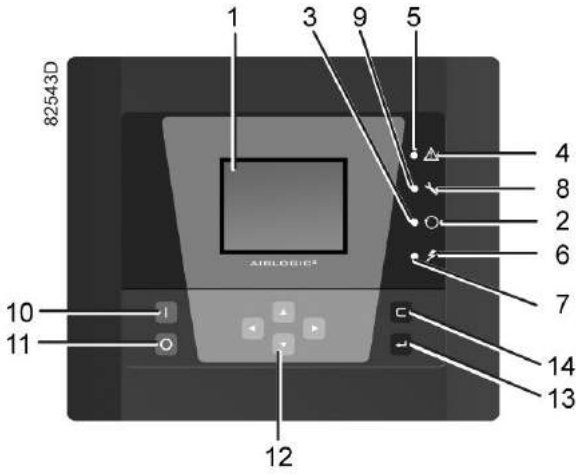
Automatic restart after voltage failure

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

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

3.2 Control panel

Detailed description



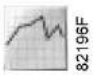
Function keys of the controller

Reference	Designation	Function
1	Display	Shows icons and operating conditions.
2	Automatic operation symbol	
3	LED, Automatic operation	Indicates that the regulator is automatically controlling the compressor: the compressor is loaded, unloaded, stopped and restarted depending on the air consumption and the limitations programmed in the regulator.
4	Warning symbol	
5	LED, Warning	Flashes in case of a shut-down, is lit in case of a warning condition.
6	Voltage symbol	
7	LED, Voltage on	Indicates that the voltage is switched on.
8	Service symbol	
9	LED, Service	Is lit when service is needed.
10	Start button	This button starts the compressor. Automatic operation LED (3) lights up. The controller is operative.
11	Stop button	This button is used to stop the compressor. Automatic operation LED (3) goes out.
12	Scroll buttons	Use these buttons to scroll through the menu.
13	Enter button	Use this button to confirm the last action.
14	Escape button	Use this button to go to previous screen or to end the current action.

3.3 Icons used

Status icons

Name	Icon	Description
Stopped / Running	 57786F	When the compressor is stopped, the icon stands still. When the compressor is running, the icon is rotating.
Compressor status	 57787F	Motor stopped
	 57788F	Running unloaded
	 57789F	Running loaded
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

Name	Icon	Description
Active protection functions		Emergency stop
		Shutdown
		Warning
Service		Service required
Main screen display		Value lines display icon
		Chart display icon
General icons		No communication / network problem
		Not valid

Input icons

Icon	Description
	Pressure
	Temperature
	Digital input
	Special protection

System icons

Icon	Description
	Compressor element (LP, HP, ...)
	Dryer
	Fan
	Frequency converter
	Drain
	Filter
	Motor
	Failure expansion module
	Network problem
	General alarm

Menu icons

Icon	Description
	Inputs
	Outputs
	Alarms (Warnings, shutdowns)
	Counters

Icon	Description
 or 	Test
	Settings
	Service
	Event history (saved data)
	Access key / User password
	Network
	Setpoint
	Info

Navigation arrows

Icon	Description
	Up
	Down

3.4 Main screen

Function

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

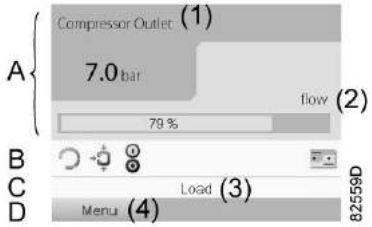
Typically, 5 different main screen views can be chosen:

1. Two value lines
2. Four value lines

3. Chart (High resolution)
4. Chart (Medium resolution)
5. Chart (Low resolution)

Two and four value lines screens

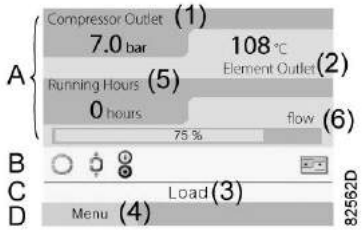
This type of Main screen shows the value of 2 or 4 parameters (see section Inputs menu).



Typical Main screen (2 value lines)

Text on figures

(1)	Compressor Outlet
(2)	Flow (compressors with frequency converter)
(3)	Load, shutdown, ... (text varies upon the compressors actual condition)
(4)	Menu



Typical Main screen (4 value lines)

Text on figures

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

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

These icons are always shown in the main screen and cannot be selected by the cursor (e.g. Compressor stopped or running, Compressor status (running, running unloaded or motor stopped).
- Optional icons
  These icons are only shown if their corresponding function is activated (e.g. week timer, automatic restart after voltage failure , etc.)
- Pop up icons
  These icons pop up if an abnormal condition occurs (warnings, shutdowns, service,...)

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

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

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

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

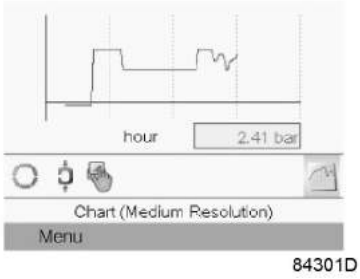
To activate an action button, highlight the button by using the Scroll keys and press the Enter key.
To go back to the previous menu, press the Escape key.

Chart views

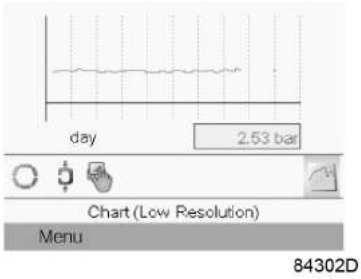
Instead of viewing values, it is also possible to view a graph of one of the input signals (see section Inputs menu) in function of the time.

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

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



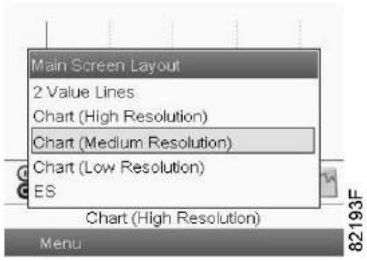
When the Chart (Medium Resolution) is selected, the chart shows the variation of the selected input per hour. The screen shows the last 4 hours.



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

Selection of a main screen view

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



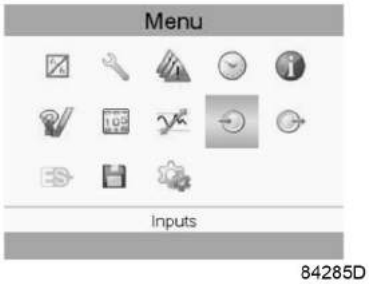
Select the layout required and press the Enter key. See also section Inputs menu.

3.5 Calling up menus

Description

When the voltage is switched on, the main screen is shown automatically:

- To go to the Menu screen, highlight the Menu button (4), using the Scroll keys.
- Press the Enter key to select the menu. Following screen appears:



- The screen shows a number of icons. Each icon indicates a menu item. By default, the Pressure Settings (Regulation) icon is selected. The status bar shows the name of the menu that corresponds with the selected icon.
- Use the Scroll keys to select an icon.
- Press the Escape key to return to the Main screen.

3.6 Inputs menu

Menu icon, Inputs

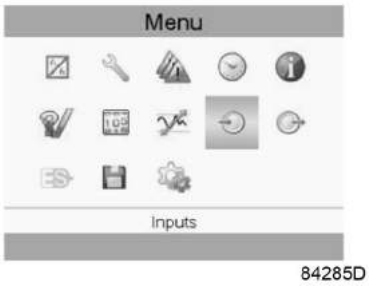
Function

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

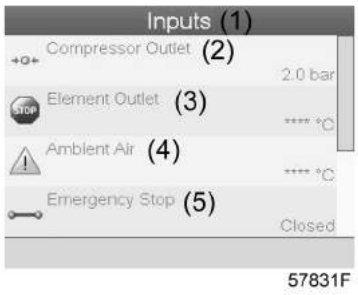
Procedure

Starting from the main screen,

- Move the cursor to the action button Menu and press the Enter key.
- Using the Scroll keys, move the cursor to the Inputs icon, as shown in the following screen:



- Press the Enter key. A screen similar to the one below appears:



Text on image

(1)	Inputs
(2)	Compressor outlet
(3)	Element outlet
(4)	Ambient air
(5)	Emergency stop

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

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

Selecting another input signal as main chart signal

With the Modify button active (light grey background in above screen), press the Enter button on the controller. A screen similar to the one below appears:

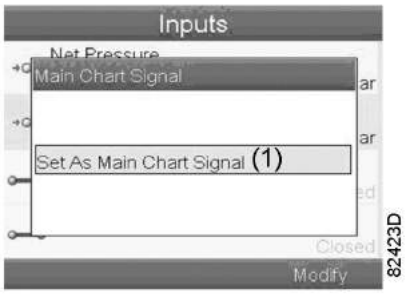
The first item in the list is highlighted. In this example, the Net Pressure is selected (chart icon).

To change, press the Enter button again: a pop-up window opens:

Press Enter again to remove this input from the chart. Another confirmation pop-up opens:

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

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



(1): Set as main chart signal

3.7 Outputs menu

Menu icon, Outputs

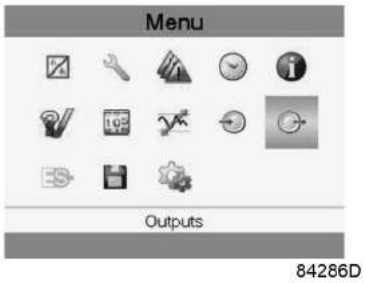
Function

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

Procedure

Starting from the Main screen,

- Move the cursor to the action button Menu and press the Enter key.
- Move the cursor to the Outputs icon (see below).



- Press the Enter key. A screen similar to the one below appears:

Outputs screen (typical)

Text on image

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

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

3.8 Counters

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,

- Move the cursor to the action button Menu and press the Enter key.
- Using the Scroll keys, move the cursor to the Counters icon (see below)

- Press the Enter key. A screen similar to the one below appears:

Text on image

(1)	Counters
(2)	Running hours
(3)	Motor starts
(4)	Load relay
(5)	VSD 1-20 % rpm in % (the percentage of the time during which the motor speed was between 1 and 20 %) (compressors with frequency converter)

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.

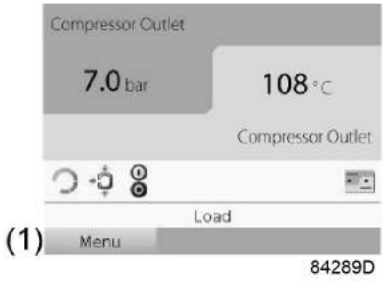
3.9 Control mode selection

Function

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

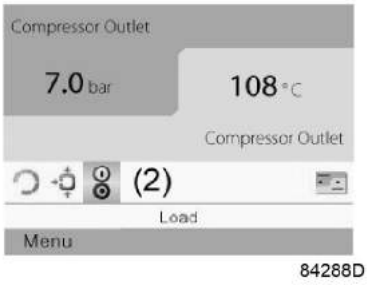
Procedure

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



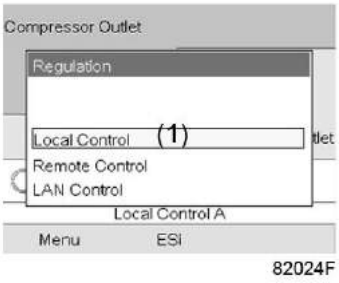
Next, use the scroll buttons to go to the Status icons (see section Main screen) and select the Regulation icon (2). When the icon is active, this icon is highlighted with a grey background colour.

Press the enter button:



There are 3 possibilities:

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



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

3.10 Service menu

Menu icon, Service

Function

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

Procedure

Starting from the Main screen,

- Move the cursor to the action button Menu and press the Enter key.
- Using the Scroll keys, move the cursor to the Service icon (see below).

84290D

- Press the Enter key. Following screen appears:

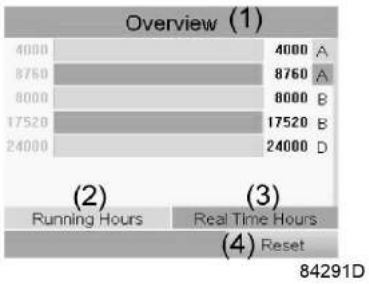
57847F_1

Text on image

(1)	Service
(2)	Overview
(3)	Service plan
(4)	Next service
(5)	History

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

Overview



Text on image

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

Example for service level (A):

The figures at the left are the programmed service intervals. For Service interval A, the programmed number of running hours is 4000 hours (upper row) and the programmed number of real time hours is 8760 hours, which corresponds to one year (second row). This means that the controller will launch a service warning when either 4000 running hours or 8760 real hours are reached, whichever comes first. Note that the real time hours counter keeps counting, also when the controller is not powered.

The figures at the end of the bars are the number of hours to go till the next service intervention. In the example above, the compressor was just started up, which means it still has 4000 running hours or 8299 hours to go before the next Service intervention.

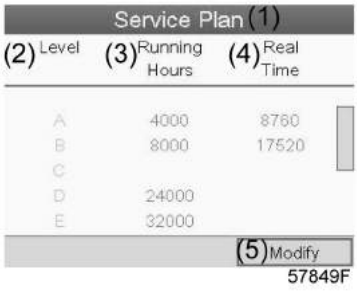
Service plans

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

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

After carrying out the service actions related to the indicated levels, the timers must be reset.

From the Service menu above, select Service plan (3) and press Enter. Following screen appears:

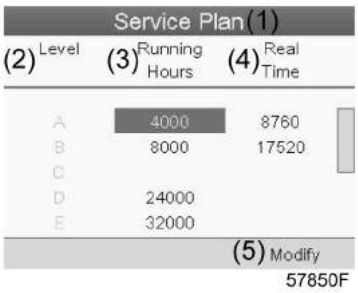


Text on image

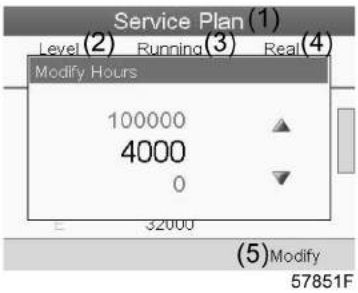
(1)	Service plan
(2)	Level
(3)	Running hours
(4)	Real time hours
(5)	Modify

Modifying a service plan

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



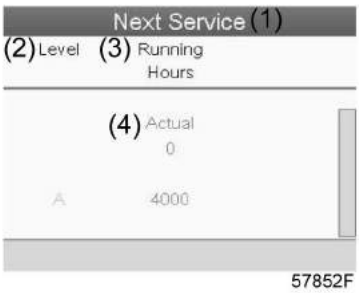
Press the Enter key. Following screen appears:



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

Note: Running hours can be modified in steps of 100 hours, real time hours can be modified in steps of 1 hour.

Next Service



Text on image

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

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

History

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

3.11 Modifying the setpoint

Menu icon, Setpoint

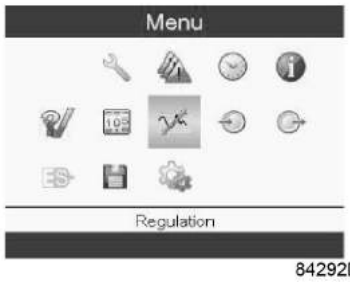
Function

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

Procedure

Starting from the Main screen,

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



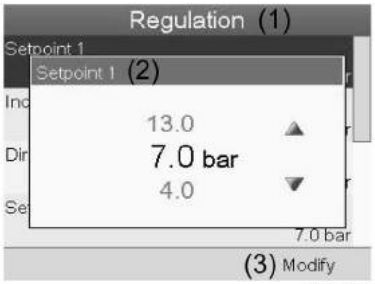
- Activate the menu by pressing the enter key. A screen similar to the one below appears:

Text on image

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

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

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



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

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

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

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

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

3.12 Event history menu

Menu icon, Event History

Function

To call up the last shut-down and last emergency stop data.

Procedure

Starting from the Main screen,

- Move the cursor to the action button Menu and press the Enter key.
- Using the Scroll keys, move the cursor to the Event History icon (see below).

- Press the Enter key.
  The list of last shut-down and emergency stop cases is shown.

Example of Event History screen

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

3.13 Modifying general settings

Menu icon, Settings

Function

To display and modify a number of settings.

Procedure

Starting from the Main screen,

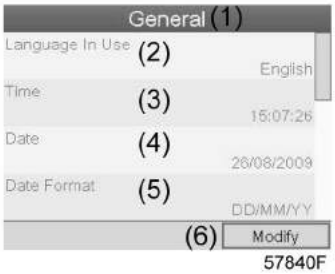
- Move the cursor to the action button Menu and press the Enter key.
- Using the Scroll keys, move the cursor to the Settings icon (see below).

- Press the Enter key. A second menu screen appears:

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

- Access level
- Elements
- Dryer
- Fan
- Converter(s)
- Filter(s)
- Motor/Starter
- General
- Automatic restart after voltage failure (ARAVF)
- Network
- Regulation
- Remote

For adapting certain parameters, a password may be necessary.
Example: Selecting the General Settings icon gives the possibility to change e.g. the language, the date, the date format, etc.:



Text on image

(1)	General
(2)	Language used
(3)	Time
(4)	Date
(5)	Date format
(6)	Modify

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

3.14 Week timer menu

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,

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

84296D

- Press the Enter key. Following screen appears:

81486D

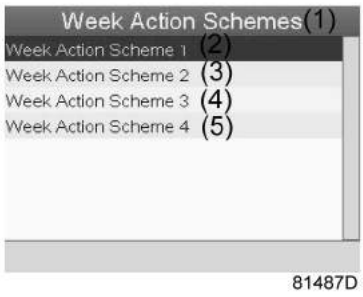
Text on image

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

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

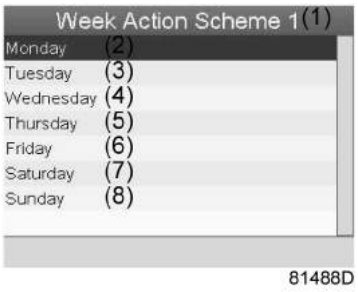
Programming week schemes

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



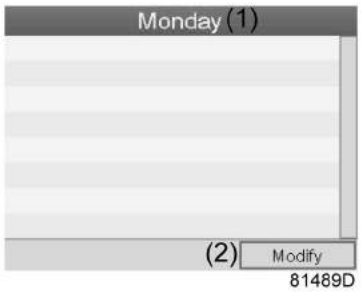
(1)	Week Action Schemes
(2)	Week Action Scheme 1
(3)	Week Action Scheme 2
(4)	Week Action Scheme 3
(5)	Week Action Scheme 4

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



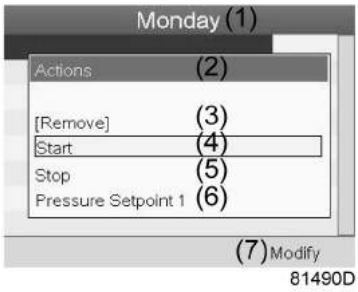
(1)	Week Action Scheme 1
(2)	Monday
(3)	Tuesday
(4)	Wednesday
(5)	Thursday
(6)	Friday
(7)	Saturday
(8)	Sunday

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



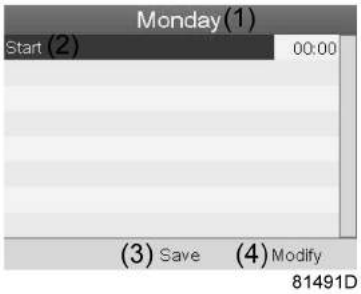
(1)	Monday
(2)	Modify

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



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

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



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

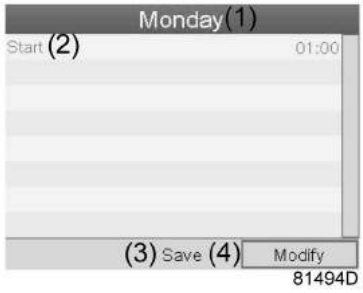
- To adjust the time, use the Scroll keys on the controller and press the Enter key to confirm.

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

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

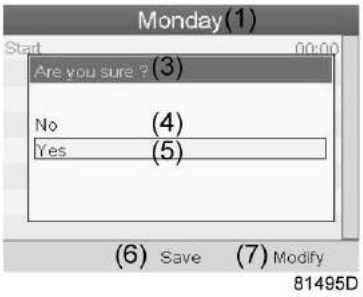
(1)	Monday
(2)	Time
(3)	Save
(4)	Modify

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



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

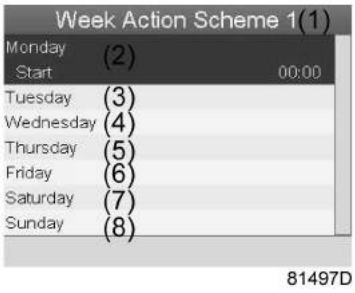
- A new pop-up window opens. Use the Scroll keys on the controller to select the correct actions. Press the Enter key to confirm.



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

Press the Escape key to leave this window.

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



(1)	Week Action Scheme 1

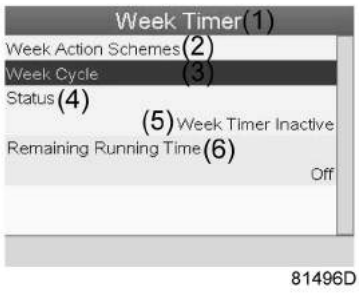
(2)	Monday - Start
(3)	Tuesday
(4)	Wednesday
(5)	Thursday
(6)	Friday
(7)	Saturday
(8)	Sunday

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

Programming the week cycle

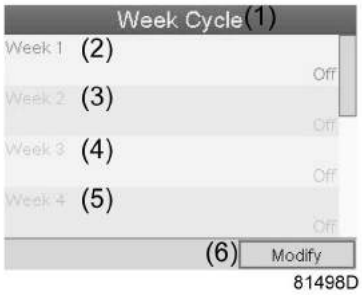
A week cycle is a sequence of 10 weeks. For each week in the cycle, one of the four programmed week schemes can be chosen.

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



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

- A list of 10 weeks is shown.

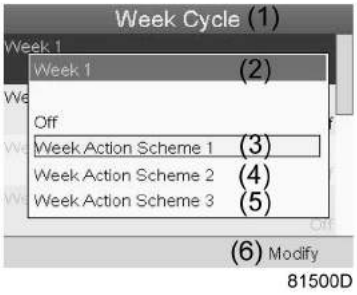


(1)	Week Cycle
(2)	Week 1
(3)	Week 2

(4)	Week 3
(5)	Week 4
(6)	Modify

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

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

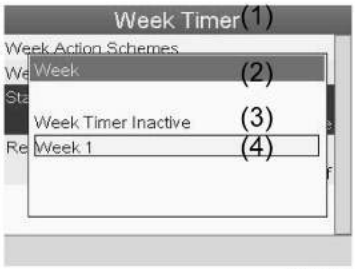


(1)	Week Cycle
(2)	Week 1
(3)	Week Action Scheme 1
(4)	Week Action Scheme 2
(5)	Week Action Scheme 3
(6)	Modify

- 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.

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

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



(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.

(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.

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

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

(1)	Week Timer
(2)	Week action schemes
(3)	Remaining Running Time

3.15 Test menu

Menu icon, Test

Function

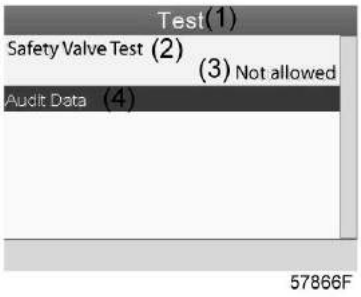
- To carry out a display test, i.e. to check whether the display and LEDs are still intact.

Procedure

Starting from the Main screen,

- Move the cursor to the action button Menu and press the Enter key.
- Using the scroll keys, move the cursor to the Test icon (see below).

- Press the Enter key, following screen appears:



Text on image

(1)	Test
(2)	Safety Valve Test
(3)	Not allowed
(4)	Audit Date

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

3.16 User password menu

Menu icon, Password

Function

The end customer can activate and choose a personal password. Once the password option activated, it is impossible for not authorized persons to modify any setting.

Procedure

Starting from the submenu screen (see Modifying general settings),

- Using the Scroll keys, move the cursor to the User Password icon (see below)

- Press the Enter key. Next screen appears.

- Select the Activate button and press the Enter key.
- Next, fill in the User Password and press the Enter key, a confirmation window opens.
- Fill in the password again and press the enter key to confirm.

Text on figure

(1)	User Password
(2)	Not activated
(3)	Activate

3.17 Access key menu

Menu icon, Access Key

Function

Only a number of basic Icons will be displayed in the Menu screen. Using the Access Key with the proper access code allows the user to see more Icons, or have access to more parameters.

Procedure

Starting from the submenu screen (see Modifying general settings),

- Using the Scroll keys, move the cursor to the Access Key icon (see below)

- Three Access levels are possible.
  - **0** : A basic set of parameters is visualized, no password is required.
  - **1** : A basic set of parameters can be modified.
  - **2** : Extra parameters will be visualized and can be modified.
- Changing the Access level can be done through the Modify button. A new pop-up window will be activated asking to enter an Access Key.

3.18 Web server

All Electronic 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.

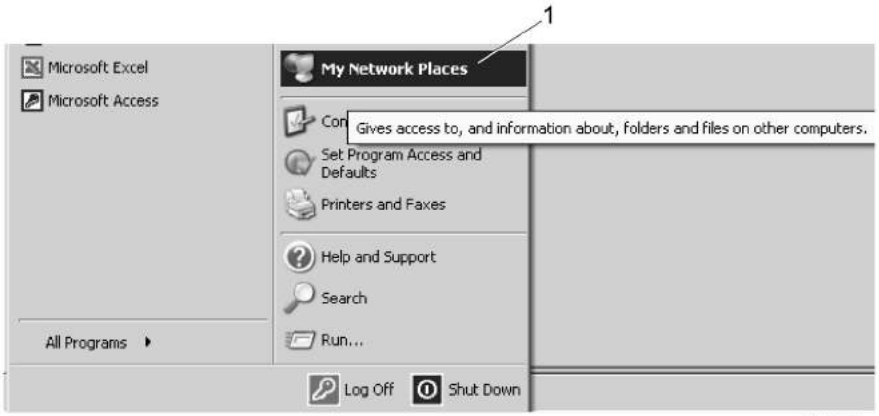
- Use the internal network card from your computer or a USB to LAN adapter (see picture below).

USB to LAN adapter

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

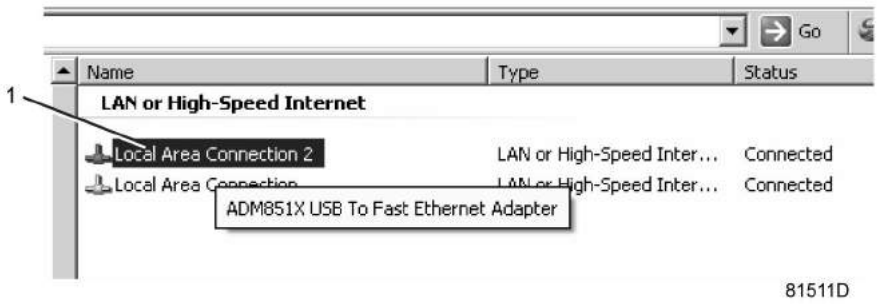
Configuration of the network card

- Go to My Network places (1).

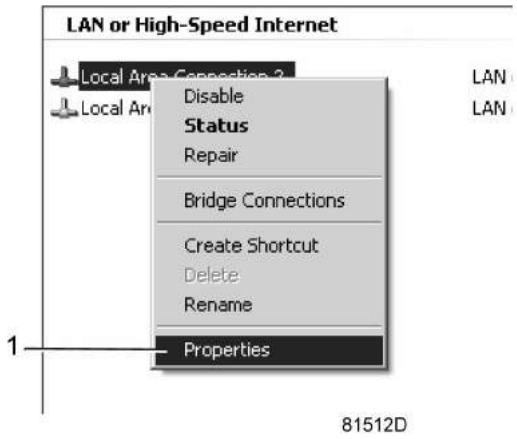


- Click on View Network connections (1).

- Select the Local Area connection (1), which is connected to the controller.



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



- Use the checkbox Internet Protocol (TCP/IP) (1) (see picture). To avoid conflicts, de-select other properties if they are selected. After selecting TCP/IP, click on the Properties button (2) to change the settings.

- Use the following settings:
  - IP Address 192.168.100.200
  - Subnetmask 255.255.255.0

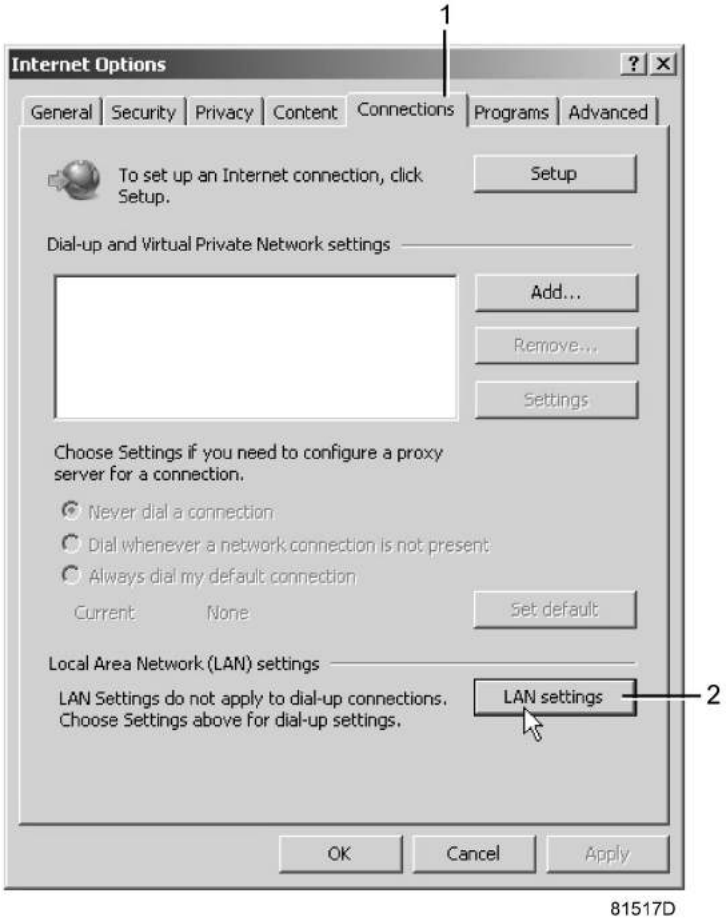
  Click OK and close network connections.

Configuration of the web server

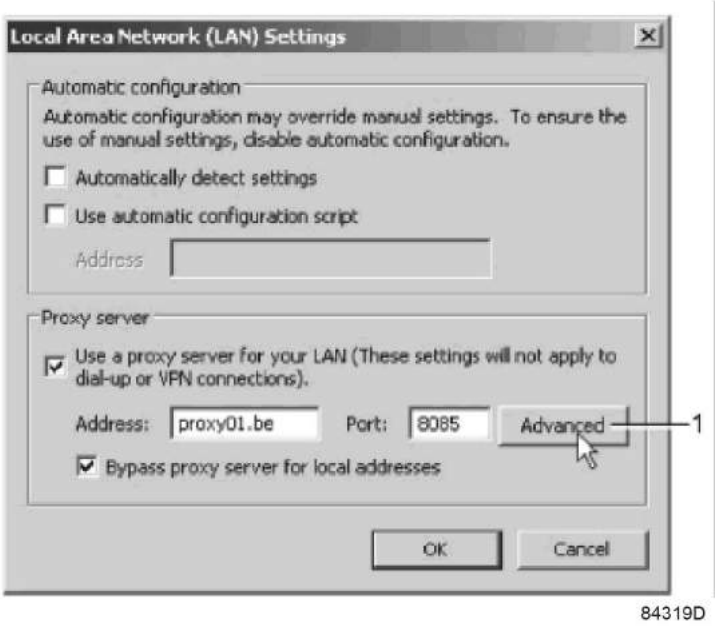
Configure the web interface

	The internal web server is designed and tested for Microsoft® Internet Explorer. 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.

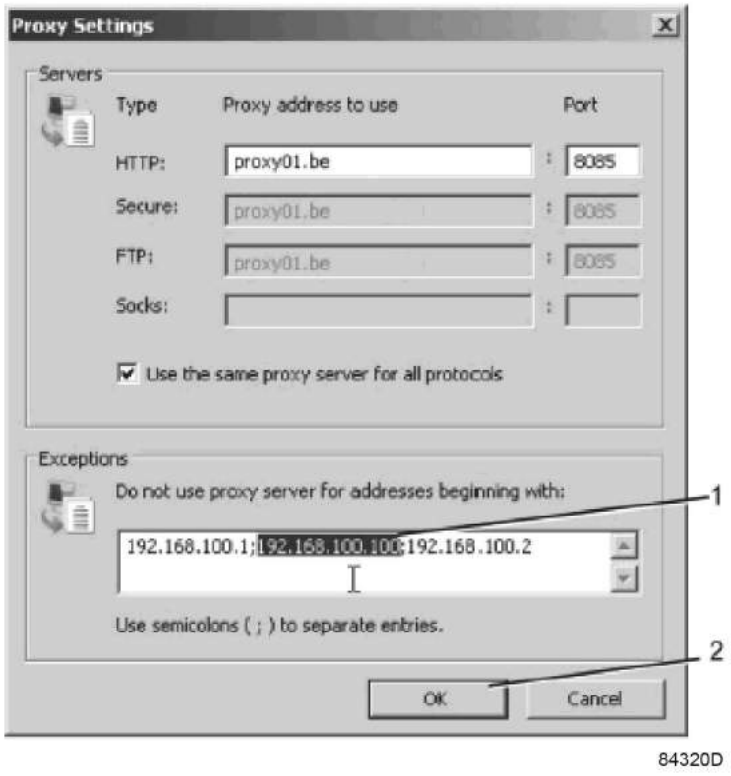
- When using Internet Explorer:
  Open Internet Explorer and click on Tools - Internet options.
- Click on the Connections tab (1) and then click on the LAN settings button (2).



- In the Proxy server Group box, click on the Advanced button (1).



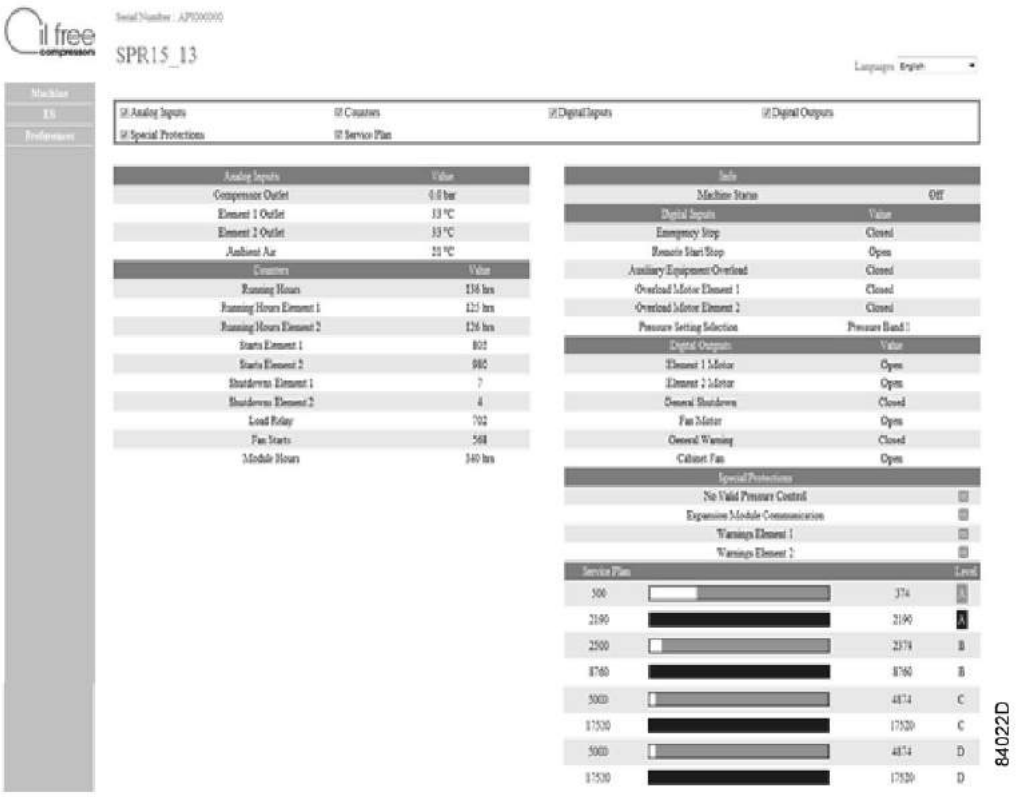
- In the Exceptions Group box, enter the IP address of your controller. Multiple IP addresses can be given but they must be separated with semicolons (;).
  Example: Suppose that you already added two IP addresses (192.168.100.1 and 192.168.100.2). Now you add 192.168.100.100 and separate the 3 IP addresses by putting semicolons between them (1) (see picture).
  Click OK (2) to close the window.



Viewing the controller data

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

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



Screen shot (typical example)

Navigation and options

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

Compressor settings

All compressor 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.

Analog inputs

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

Counters

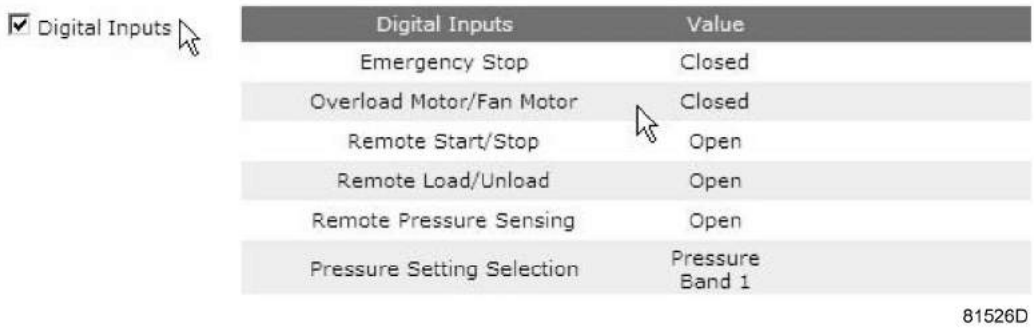
Lists all current counter values from controller and compressor.

Info status

Machine status is always shown on the web interface.

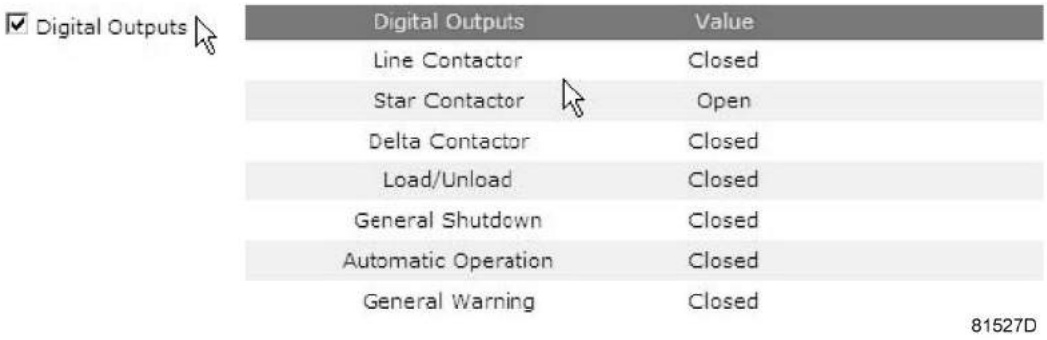
Digital inputs

Lists all Digital inputs and their status.



Digital outputs

Lists all Digital outputs and their status.



Special protections

Lists all special protections of the compressor.

Service plan

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

3.19 Programmable settings

		Minimum setting	Factory setting	Maximum setting
Set-point 1 and 2	bar	4	7	13
Set-point 1 and 2	psi	58	101.5	188.5

		Minimum setting	Factory setting	Maximum setting
Proportional band	%	6	10	15
Integration time	s	5	6	10
Minimum speed	rpm	2500	2500	3000
Maximum speed reduction	%	75	100	100

		Minimum setting	Indirect (factory setting)	Direct (factory setting)	Maximum setting
Stop level (offset)	bar	0.1	0.3	1	1.5
Stop level (offset)	psi	1.45	4.35	14.5	21.76

		Minimum setting	Factory setting	Maximum setting
Fan motor starts	starts/day	--	240	--
Minimum stop time	sec	20	20	99
Communication time-out	sec	10	30	60

Protections

		Minimum setting	Factory setting	Maximum setting
Compressor outlet pressure (maximum level, shut-down)	bar(e)	13.7	13.8	14
Compressor outlet pressure (maximum level, shut-down)	psig	198.7	200.1	203.0
Water injection pressure, element (warning)	bar(e)	2	2.1	2.5
Water injection pressure, element (warning)	psig	29.01	30.46	36.26
Water injection pressure, element (delay at signal)	sec	0	10	60
Blocking air pressure (warning)	bar(e)	0.4	0.6	1.0
Blocking air pressure (warning)	psig	5.8	8.7	14.5
Blocking air pressure (shut-down)	bar(e)	0.4	0.5	1.0
Blocking air pressure (shut-down)	psig	5.8	7.25	14.5
Blocking air pressure (delay at signal)	sec	0	10	60
Element outlet temperature, air-cooled (warning)	˚C	65	70	75
Element outlet temperature, air-cooled (warning)	˚F	149	158	167
Element outlet temperature, water-cooled compressors (warning)	˚C	45	58	63
Element outlet temperature, water-cooled compressors (warning)	˚F	113	136.4	145.4
Element outlet temperature, air-cooled compressors (shut-down)	˚C	65	75	75
Element outlet temperature, air-cooled compressors (shut-down)	˚F	149	167	167
Element outlet temperature, water-cooled compressors (shut-down)	˚C	45	63	63
Element outlet temperature, water-cooled compressors (shut-down)	˚F	113	145.4	145.4
Ambient temperature (warning) (only for compressors with integrated dryer)	˚C	40	40	46
Ambient temperature (warning) (only for compressors with integrated dryer)	˚F	104	104	114.8

		Minimum setting	Factory setting	Maximum setting
Delta T, element (warning)	˚C	10	20	25
Delta T, element (warning)	˚F	50	36	77
Delta T, element (shut-down)	˚C	10	25	25
Delta T, element (shut-down)	˚F	50	77	77
Water injection/separator pressure with setpoint 4 bar (warning)	bar	0.5	0.8	0.8
Water injection/separator pressure with setpoint 58 psi (warning)	psi	7.25	11.6	11.6
Water injection/separator pressure with setpoint 7.5 bar (warning)	bar		0.75	
Water injection/separator pressure with setpoint 108.7 psi (warning)	psi		10.88	
Water injection/separator pressure with setpoint 13.5 bar (warning)	bar		0.65	
Water injection/separator pressure with setpoint 195.8 psi (warning)	psi		9.43	
Water injection/separator pressure with setpoint 4 bar (shut-down)	bar		0.75	
Water injection/separator pressure with setpoint 58 psi (shut-down)	psi		10.88	
Water injection/separator pressure with setpoint 7.5 bar (shut-down)	bar		0.7	
Water injection/separator pressure with setpoint 108.7 psi (shut-down)	psi		10.15	
Water injection/separator pressure with setpoint 13.5 bar (shut-down)	bar		0.6	
Water injection/separator pressure with setpoint 195.8 psi (shut-down)	psi		8.7	
Water injection/separator pressure (delay at start)	sec	0	3	10
Water injection/separator pressure (delay at signal)	sec	0	3	10
Fan overload (delay at start)	sec	0	0	0
Fan overload (delay at signal)	sec	1	1	1
Water level low switch (delay at signal)	sec	0	60	120

For compressors with integrated dryer also:

		Minimum setting	Factory setting	Maximum setting
Dryer LAT (warning)	˚C	0	25	99
Dryer LAT (warning)	˚F	32	77	210.2
Dryer LAT (delay at start)	sec	0	255	600
Dryer LAT (delay at signal)	sec	0	3	255

Service plan

		Minimum setting	Factory setting	Maximum setting
Service plan A (operating hours)	hrs	See remark	4000	See remark
Service plan B (operating hours)	hrs	See remark	8000	See remark

Remark

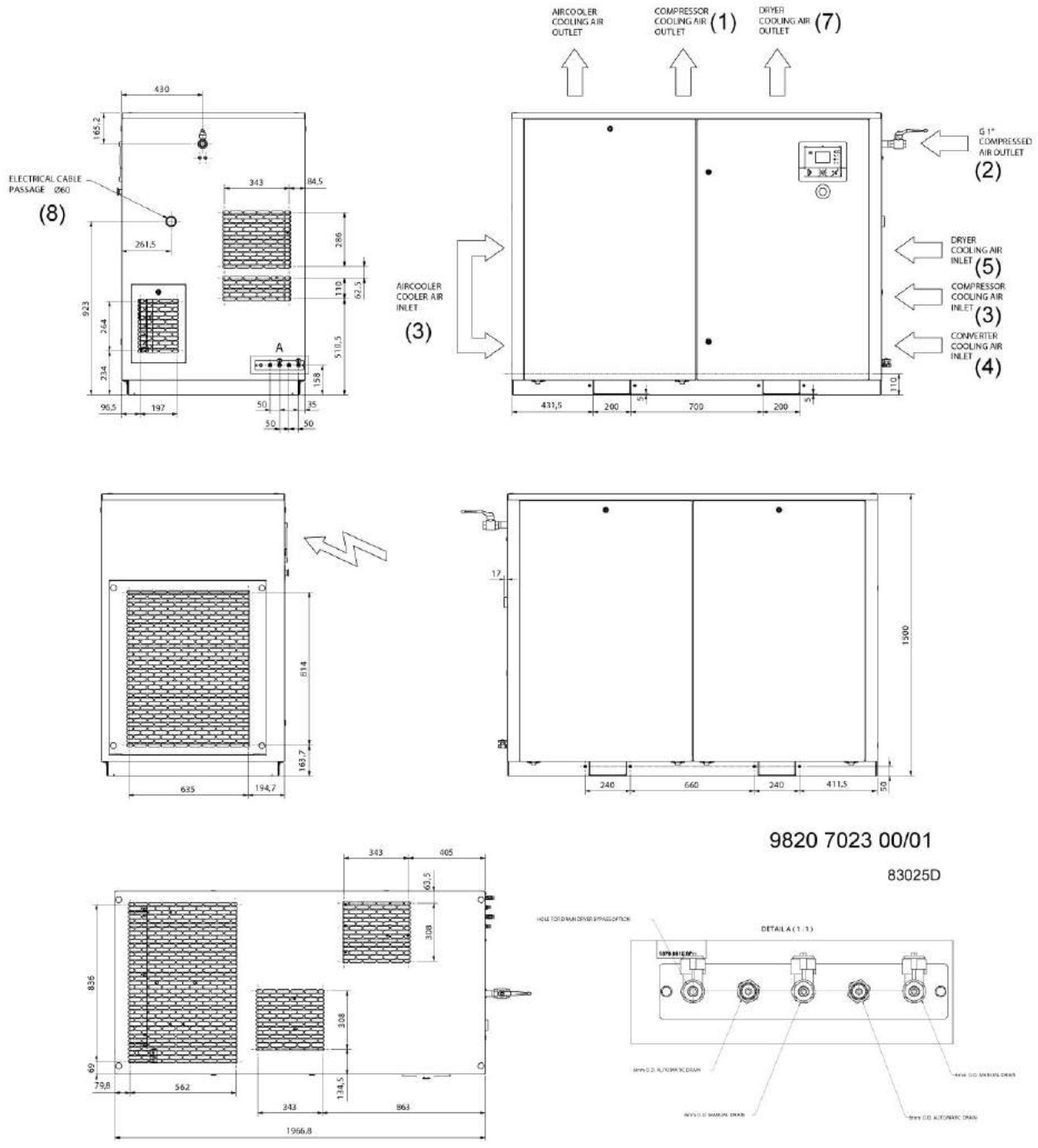
A number of service operations are grouped (Level A, Level B, ...). Each level stands for a number of service operations to be carried out at the programmed intervals. Consult your Customer Centre.

Terminology

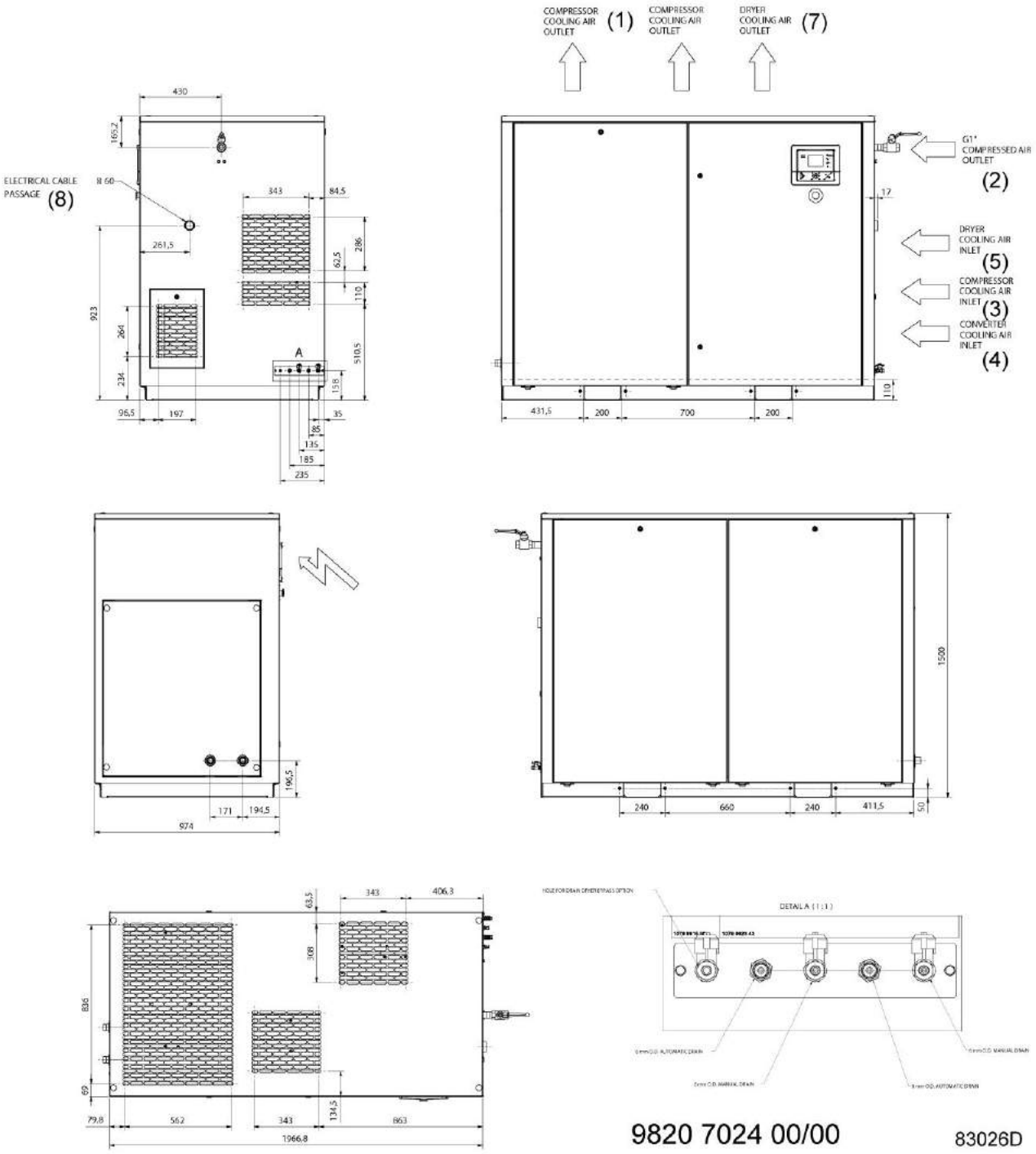
Terminology	Explanation
Compressor element outlet	The regulator does not accept illogical settings, e.g. if the warning level is programmed at 65 ˚C (149 ˚F), the minimum limit for the shut-down level changes to 66 ˚C (150.8 ˚F). The recommended difference between the warning level and shut-down level is 5 ˚C (9 ˚F).
Delay at warning signal	Is the time period during which the warning signal must exist before the warning message appears.
Delay at shut-down signal	Is the time for which the signal must exist before the compressor is shut down. If it is required to program this setting to another value, consult your Customer Centre.
Delay at start	Is the time period after starting which must expire before generating a warning. The setting should be less than the setting for the delay at signal.
Minimum stop time	Once the compressor has automatically stopped, it will remain stopped for the minimum stop time (approx. 20 seconds), whatever happens with the net air pressure. Consult your Customer Centre if a setting lower than 20 seconds should be required
Proportional band and integration time	The settings for the Proportional band and integration time are determined by experiment. Altering these settings may damage the compressor. Consult your Customer Centre.

4 Installation

4.1 Dimension drawings



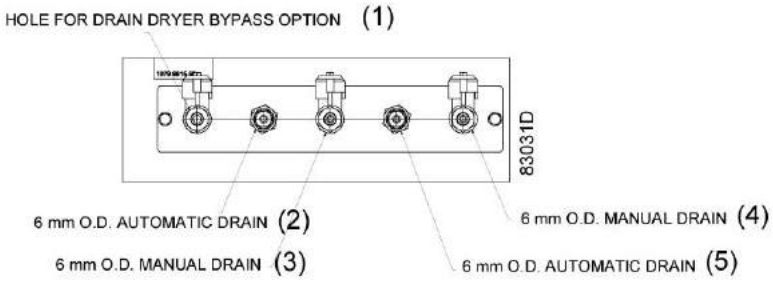
Air-cooled compressors



Water-cooled compressors

Reference	Designation
(1)	Compressor cooling air outlet
(2)	Compressed air outlet
(3)	Cooling air inlet (air-cooled version)
(4)	Converter cooling air inlet (variable speed units only)
(5)	Dryer cooling air inlet

Reference	Designation
(6)	Air filter inlet
(7)	Dryer cooling air outlet
(8)	Electric cable passage

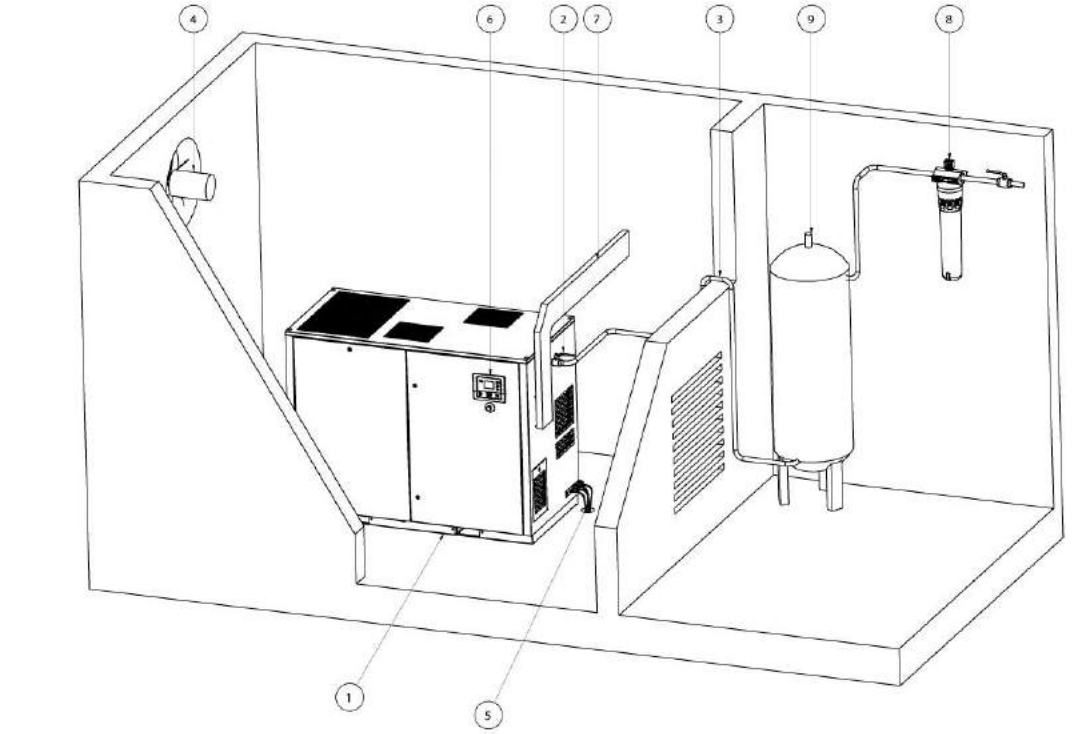


Reference	Designation
(1)	Hole for drain (dryer bypass option)
(2)	Connection, automatic drain
(3)	Connection, manual drain
(4)	Connection, manual drain
(5)	Connection, automatic drain

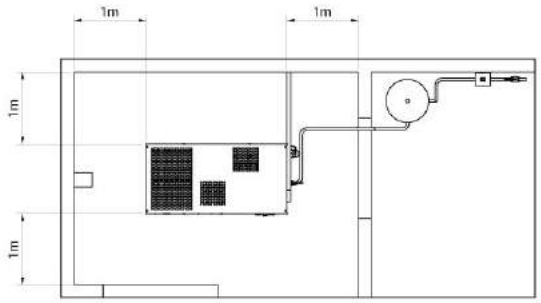
4.2 Installation proposal

Compressor room example

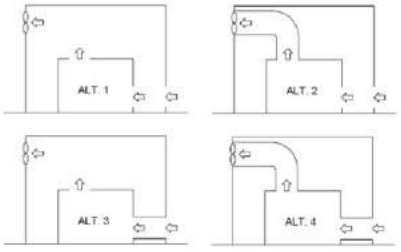
⚠	Compressors equipped with frequency converters are intended to be installed indoors only, with adequate ventilation and filtration to limit the dust load from the environment. If such a compressor is to be installed in an environment where conductive dust is present, the appropriate measures should be taken in either the installation or adaptation of the machine. Please contact your customer centre.



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



Ventilation proposals (2)



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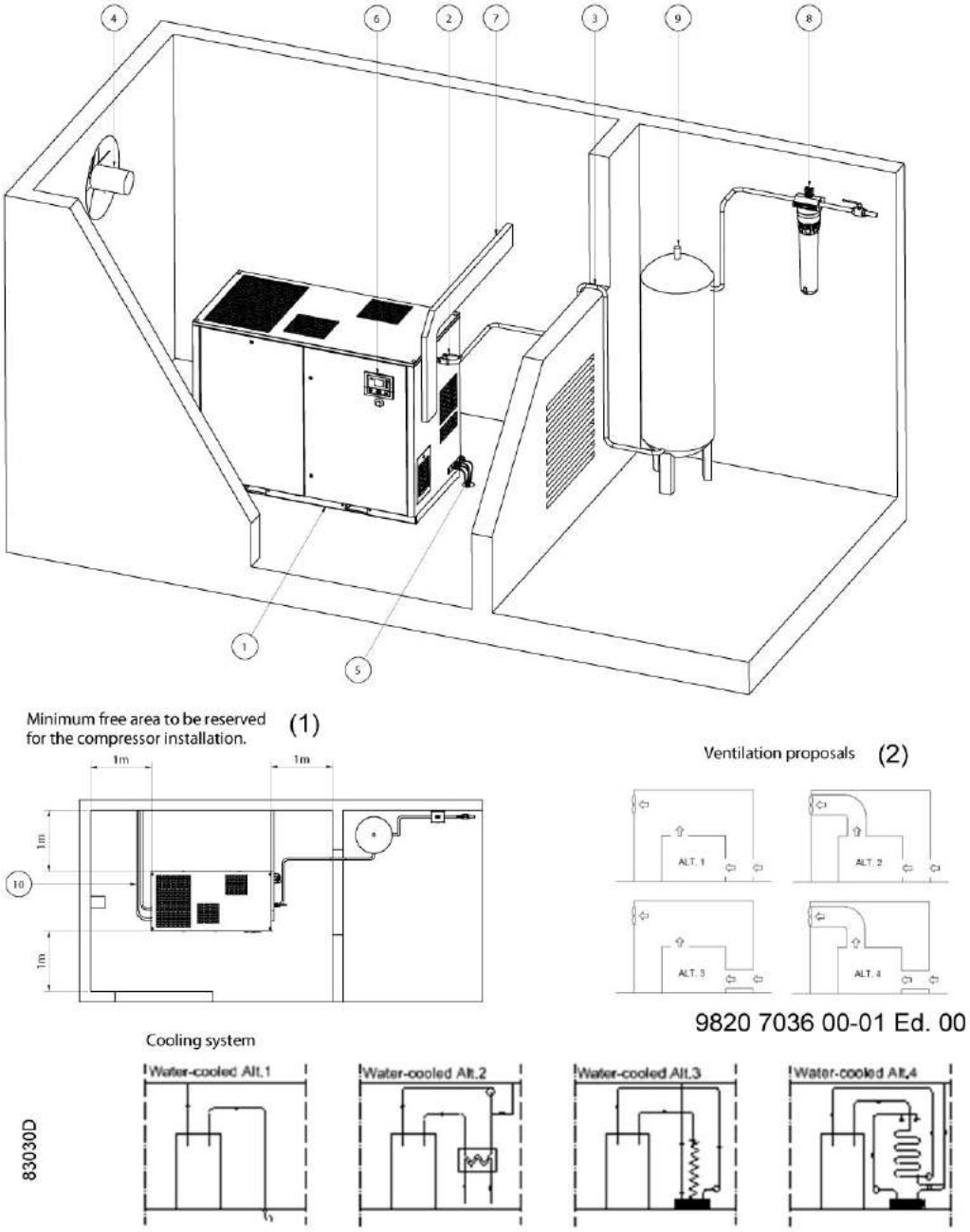
Air-cooled compressors



Water-cooled compressors

Text on drawing

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

Description/recommendations

1. **Install the compressor in a frost-free room** on a level floor, suitable for taking the weight of the compressor.
2. Position of the compressed air outlet valve.
3. 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 grids and ventilation fan should be installed in such a way that any recirculation of cooling air to the compressor is avoided. The air velocity to the grids must be limited to 5 m/s (16.4 ft/s). The maximum air temperature at the compressor intake opening is 40 ˚ C (104 ˚ F), the minimum temperature is 0˚C (32 ˚ F).
   The required ventilation capacity to limit the compressor room temperature can be calculated from:
   - $Q_v = 1.10\ N/\Delta t$ for air cooled units without dryer
   - $Q_v = (1.10\ N + 2.62)/\Delta t$ for air cooled units with integrated dryer
   - $Q_v = 0.08\ N/\Delta t$ for water cooled units without dryer
   - $Q_v = (0.08\ N + 2.62)/\Delta t$ for water cooled units with integrated dryer

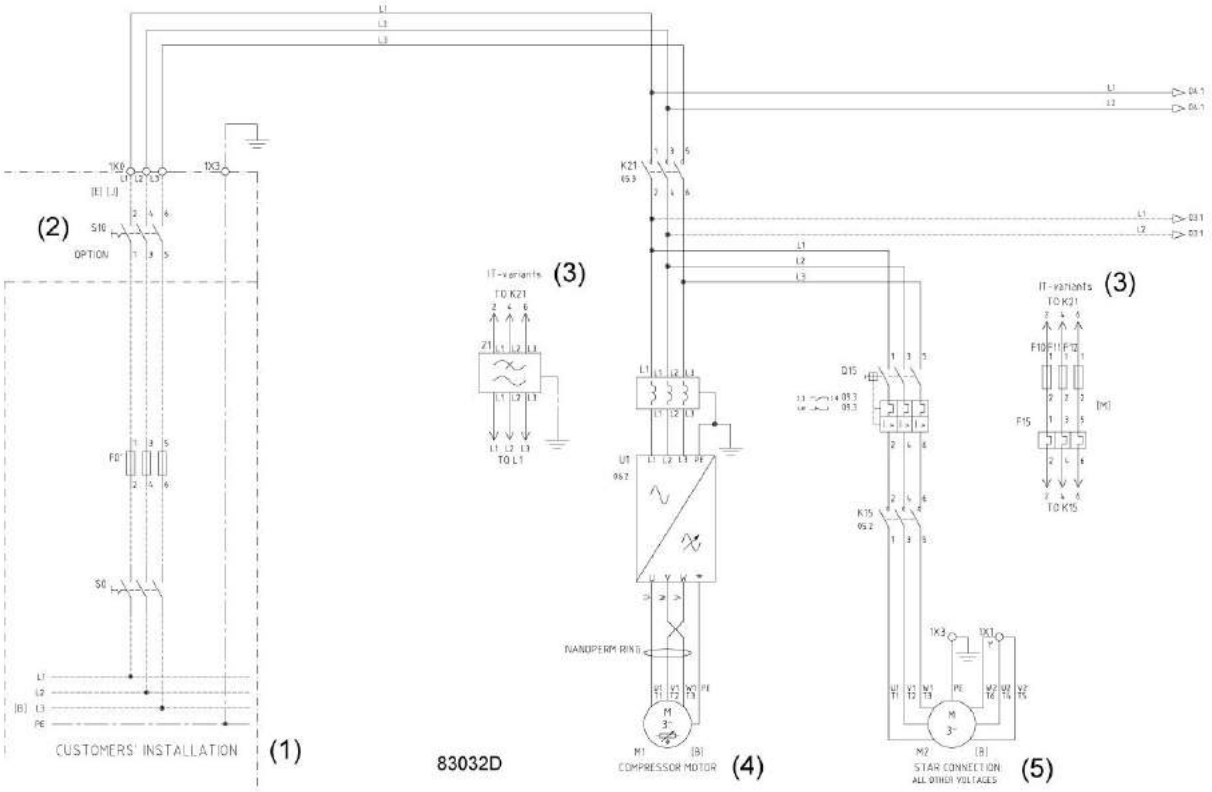
   Q_v = required cooling air flow in m^3/s
   N = nominal motor power input of compressor in kW
   Δt = temperature increase in compressor room in °C
5. The drain pipes to the drain collector must not dip into the water of the drain collector.
6. Position of control panel.
7. Power supply cable to be sized and installed by a qualified electrician.

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

8. Filter, type DD for general purpose (optional). The filter traps solid particles down to 1 micron. A high efficiency filter, type PD (optional), may be installed downstream of a DD filter. This filter traps solid particles down to 0.01 micron.
   It is recommended to provide bypass pipes and valves across the filters in order to isolate the filters during maintenance without disturbing the compressor.
9. Safety valve
10. Cooling air grating air cooler
    Cooling water supply: see diagrams
    Water flow and pressure to be adjusted depending upon local conditions. For cooling water quality: see Section 4.4

	All pipes to be connected stress-free to the compressor unit.

4.3 Electrical connections



Mains connections

Reference	Designation
(1)	Customer's installation
(2)	Main switch (option)
(3)	IT variants
(4)	Compressor motor
(5)	Fan motor

Recommendations for variable speed units

	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.

1. Provide an isolating switch in the voltage supply line. Before starting any maintenance, adjustments or repair, this switch must be opened to switch off the voltage to the compressor.
2. Check that the motor cables and wires inside the electric cabinet are clamped tight to their terminals.
3. Check the fuses and the setting of the circuit breakers. See section Settings of overload relay and fuses

4. Connect the power supply to the terminals of contactor (K21). Connect the earth conductor to connector (PE). Consult section Cable sizing.

Power distribution systems (TN, TT and IT)

According to IEC 60950 there are three main types of power distribution systems: TN, TT and IT. The electrical installation instruction depends on the network type of the customer power supply. If in any doubt of the network type, consult your Customer Centre.

General

The electrical equipment of the Compressor is designed according to the safety regulations described in IEC60204-1 or CENELEC EN60204. It is the responsibility of the customers to install the compressor unit according to the safety regulation in order to protect persons against electric shock from direct or indirect contact.

In drives with frequency converter, leakage currents occur along the RFI filter and the cable capacities, especially during the motor start. Class A leakage detection protections would switch off the machine. Therefore, it is not recommended to use class A detection systems on frequency converters.

Installation instruction TN, TT and IT

In each network system (TN, TT or IT), the customer has to protect the installation using:

- overcurrent protection by fuses
  or
- automatic circuit breaker protection

Depending on the power distribution system an additional installation instruction is given:

- **Network type TN (TN-S, TN-C and TN-C-S):**
  No additional protections have to be installed. If customers want to or have to install a leakage detection device, it should be of type B and comply with IEC755 Amendment 2 (General requirements for residual current operated protective devices). It is advised to install the following earth-leakage detection device: BENDER RCMA 470LY with external current transformer.
- **Network type TT:**
  In case of TT-systems, safety regulations mostly impose the use of an earth-leakage circuit breaker (e.l.c.b). In combination with frequency converters, type B residual current operated protective devices should be used. It is advised to install the following earth-leakage detection device: BENDER RCMA 470LY with external current transformer.
- **Network type IT**
  In IT-network systems, it is permissible that the power supply is continued in case of a first earth leakage fault of a motor phase. However, the customer has to detect the first earth leakage fault. The fault has to be indicated as an alarm. Otherwise, the first earth fault has to initiate an automatic disconnection of the power supply (EN 60204-1 par.: 6.3). However, the high frequency capacitive leakage currents which are caused by frequency converters cannot be detected by standard earth-leakage detection systems. It is advised to install: BENDER IRDH 275/435.

Note

	It is strongly recommended not to connect the neutral conductor from the power supply to the compressor unit. The exposed conductive parts of the installation have to be earthed locally (EN 60204-1 par.: 7.2.3).

4.4 Water requirements

Primary water system (water treatment)

The water treatment system must be supplied with tap water. **Tap water means water from a drinking-water installation (e.g. according to NEN1006) and water quality in accordance with the directive 80/778/EEC. If in any doubt, consult your Customer Centre.**

Secondary cooling water system (for water-cooled units)

General

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

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

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

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

Cooling water parameters

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

Type of cooling system	Materials	pH
Single pass	Containing copper	**6.8** - **9.3**
	Stainless steel with carbon steel and / or cast iron	**6.8** - 9.3
	Stainless steel only	**6** - 9.3
Recirculating (with tower)	Containing copper	**6.8** - **9.3**
	Stainless steel with carbon steel and / or cast iron	**6.8** - 9.3
	Stainless steel only	**6** - 9.3

Type of cooling system	Materials	pH
Closed loop	Containing copper	**7.5** - **9.3**
	Stainless steel with carbon steel and / or cast iron	**7.5** - 9.3
	Stainless steel only	**6** - 9.3

The values in **bold** are rejection limits.
When the system contains Zn or Al, the pH must be < 8.5.

2. **Total dissolved solids (TDS) and conductivity**
   The conductivity is expressed in µS/cm, the TDS in ppm.
   Both parameters are related with each other. The conductivity is convenient for quick monitoring of general water quality, but the TDS is required for calculating the RSI. If only one of both parameters is measured, an estimation can be obtained by using a theoretical conversion factor (0.67):
   TDS = conductivity x 0.67
3. **Hardness**
   Different types of hardness are in relation with each other and together with the pH and the alkalinity of the water they determine the equilibrium situation of the water, determined and specified by the RSI.
   In addition, the calcium hardness must be limited to:

Type of cooling system	Ca (ppm Ca CO_3)
Single pass	< 500
Recirculating (with tower)	< 500
Closed loop	< 1000

4. **The Ryznar Stability Index (RSI)**
   The Ryznar Stability Index is a parameter for predicting whether water will tend to dissolve or precipitate calcium carbonate. The adhesion of scaling depositions and their effect are different on different materials, but the equilibrium of the water (scaling or corrosive) is only determined by its actual pH value and by the saturation pH value (pH_s). The saturation pH value is determined by the relationship between the calcium hardness, the total alkalinity, the total solids concentration and the temperature.
   The Ryznar Stability Index is calculated as follows:
   $RSI = 2*pH_s - pH$,
   in which
   - pH = measured pH (at room temp) of the water sample
   - pH_s= pH at saturation

   pH_s is calculated from:
   $pH_s = (9.3 + A + B) - (C + D)$,
   in which
   - A : depends on the total solids concentration
   - B : depends on the water temperature at the outlet of the heat exchanger
   - C : depends on the calcium hardness ($CaCO_3$)
   - D : depends on the HCO_3^- concentration or M-alkalinity

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

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

Interpretation of the values obtained:

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

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

5. **Free chlorine (Cl_2)**
   Disinfecting with chlorine is **not done in closed systems, neither in energy recovery systems**.
   A continuous level of 0.5 ppm should not be exceeded. For shock treatments, a maximum limit of 2 ppm for maximum 30 minutes/day applies.
6. **Chlorides (Cl^-)**
   Chloride ions will create pitting corrosion on stainless steel. Their concentration should be limited, depending from the RSI value.

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

7. **Sulphates (SO_4^{2-})**

Type of cooling system	Sulphate (ppm)
Single pass	< 1000
Recirculating (with tower)	< 1000
Closed loop	< 400

8. **Iron and Manganese**

Type of cooling system	Dissolved iron (ppm)	Dissolved manganese (ppm)
Single pass	< 1	< 0.2
Recirculating (with tower)	< **1**	< **0.2**
Closed loop	< 1	< 0.2

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

9. **Copper**

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

10. **Ammonium**
    The limit of **0.5 ppm** is a rejection limit.
    The limitation only applies for copper containing systems.
11. **Suspended solids**
    Large particles (size > 10 µm) should not be present as they can be filtered out.
    Small particles (< 0.5 µm) are not taken into account.
    For particles between 0.5 µm and 10 µm, the following limits apply:

Type of cooling system	Suspended solids (ppm)
Single pass	< 10
Recirculating (with tower)	< 10
Closed loop	< 10

12. **Oil or grease**
    < **1 ppm** (rejection value)
13. **Biology**
    If biology is present, it must be aerobic. Anaerobic biology (in closed systems) must be avoided.

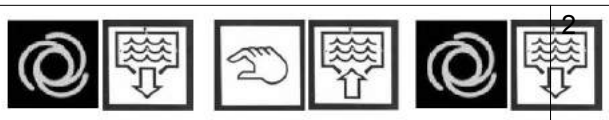
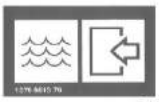
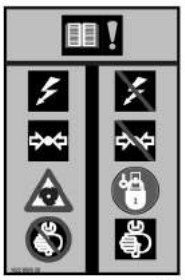
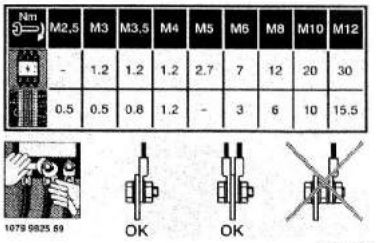
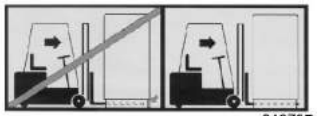
Type of cooling system	Biology (CFU/ml)
Single pass	< 10^5 / **< 10^7**
Recirculating (with tower)	< 10^5 / **< 10^7**
Closed loop	< 10^3 / **< 10^5**

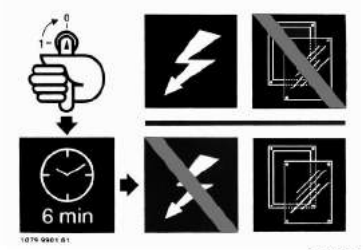
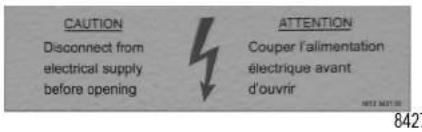
The table shows the recommended values. The values in **bold** are rejection limits.

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

4.5 Pictographs

Overview

1		2	 84222D
3	 84223D	4	 84224D
5	 84238D	6	 84229D
7	 84273D	8	 84227D
9	 84234D	10	 84274D

11	 84228D	12	 84225D
13	 84276D	15	 84145D

Reference	Designation
1	Condensate drains and RO water supply
2	Cooling water inlet (For water-cooled units only)
3	Cooling water outlet (For water-cooled units only)
4	Warning: Always read the manual, switch off the voltage, depressurise compressor and lock out/ tag out before repairing.
5	Consult Instruction book before greasing
6	Torques for steel (Fe) or brass (CuZn) bolts
7	Make sure that the forks protrude from the other side of the frame
8	Compressor remains pressurized for 180 seconds after switching off the voltage
9	Warning, voltage
10	Earthing connection
11	Before connecting the compressor electrically, consult the Instruction book for the motor rotation direction (For fixed speed units only)
12	Switch off the voltage and wait for at least 6 minutes before removing the screen (For variable speed units only)
15	Automatic Restart After Voltage Failure (ARAVF)

5 Operating instructions

5.1 Before initial start-up

Safety

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

Altitude operation

Consult your Customer Centre if operating above 1000 m (3300 ft).

Moving/lifting

The compressor can be moved by a lift truck using the slots in the frame. Take care not to damage the bodywork during lifting or transport. Before lifting, reinstall the transport securing bolts; see section Initial start-up. Make sure that the forks protrude from the other side of the frame. The compressor can also be lifted after inserting beams into the slots. Make sure that the beams cannot slide and that they protrude from the frame equally. The chains must be held parallel to the bodywork by chain spreaders in order not to damage the compressor. The lifting equipment must be placed in such a way that the compressor will be lifted perpendicularly. Lift smoothly and avoid twisting.

5.2 Commissioning

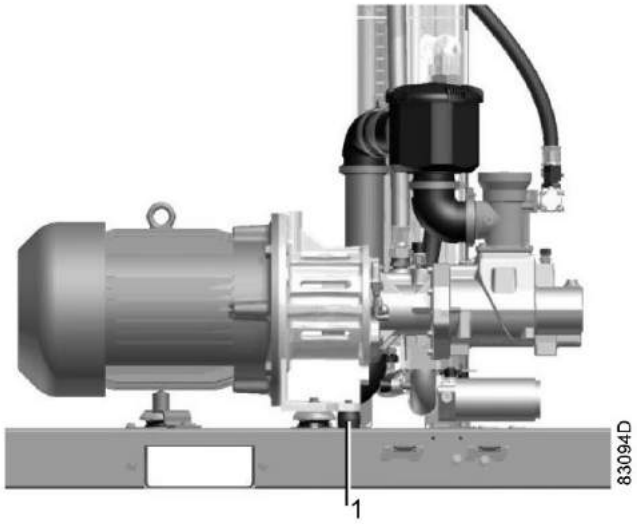
Important

	When commissioning a new compressor, or re-commissioning a unit which has been overhauled or out of service, the flushing and filling procedure must be carried out before starting. Commissioning must be carried out by your Customer Centre. A commissioning report must be kept with the documentation of the unit.

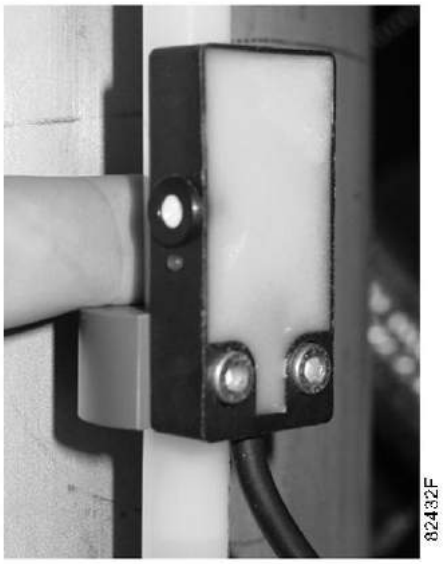
	The compressors are delivered without any water in the primary water circuit of the compressor (compressor element, water separator vessel, filter). **The system must be filled before initial start-up**.

Commissioning

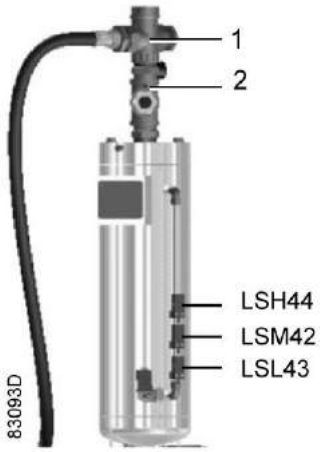
1. Remove the red transport braces (at the motor, element and water separator).



2. Let the unit attain the ambient temperature by letting it rest for 24 hours in the room where it later shall be used. Do not start the compressor during this time.
3. Check all electrical connections.
4. With the supply voltage switched on, check if the level sensors on the water separator vessel have the right sensitivity and adjust if necessary (see instruction 9820 3903 00). If the sensitivity is adjusted correctly, the LED is on when you place a finger on the support (see picture).



5. Dismount the water filter and fill the housing completely with distilled or demineralised water. Then mount it again using the new supplied o-ring.
6. Open the nipple at the inlet of the water filter and the nipple above the water separator vessel.
7. Fill the unit with distilled or demineralised water, using a plastic hose (Ø 6 x 4 mm) connected to the tee before the water filter. Be sure to insert the hose downwards so water flows towards the cooler. Pay attention not to spill any water in the cubicle!
8. The water level in the tube attached parallel to the separator vessel must be just above the lowest level sensor.



9. Next, put the plastic filling hose in the cross on top of the vessel. Be sure to put the hose downwards so the water flows into the vessel. Fill with distilled or demineralised water until the LED of the top water level sensor (LSH44) is lit.
10. Close the nipples before the water filter and above the vessel (step 6).
11. Loosen the flexible hose after the water filter and pour 1 l distilled or demineralised water in it, to moisten the element. Assemble the flexible again when done.
12. Open the valve on the RO storage vessel.
13. Check if the tap water supply is connected and if the supply valve is open.
14. Check the in- and outlet connections of the secondary cooling water circuit; check if the valves are open.
15. Check that the valve of the manual drain/condensate trap is closed.
16. Check if the waste water drain of the separator vessel and the RO unit are provided with drain lines. The drain lines must be separately connected to a drain point.
17. On air-cooled units: Check the rotation direction of the cooling fan. The correct direction is indicated by an arrow on the fan housing.
18. Run the compressor and adjust the pressure regulator valve to achieve a blocking air pressure of 1 bar (see the reading on the Electronic Regulator).
19. Measure the conductivity of the water at following places and fill in the conductivity here:
    - Tap water: _____ µS
    - RO water: _____ µS
    - Water in the separator vessel: _____ µS

    The conductivity should be lower than 100 µS. If this is not the case, drain the unit and fill it again as explained above.

Blocking air

The compressor element is provided with hydro-dynamic/hydro-static bearings. Water will be supplied to the bearings through the internal water circuit of the compressor element. There is no external lubrication.

The drive shaft of the compressor element has special seals. The pressure of the blocking air supplied to these seals will be adjusted to approx. 1.0 bar (14.50 psi) by the service technician of your Service Centre during commissioning.

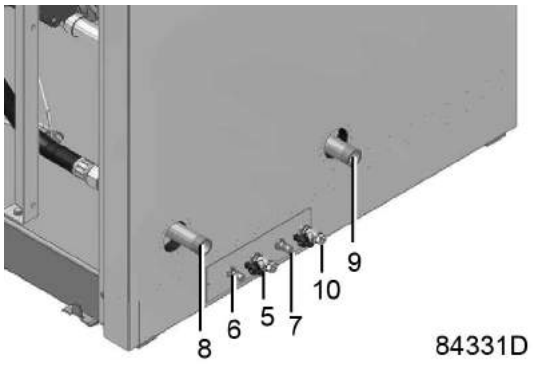
	This setting must not be altered. Incorrect blocking air supply pressure may damage the machine and causes shut-down.

5.3 Initial start-up

Safety

	The operator must apply all relevant Safety precautions during operation.
	For the position of the air outlet valve and the drain connections, see sections Introduction and Water and automatic drain system.
	Consult also sections Cable sizing, Installation proposals and Dimension drawings

Procedure



Drains and water supply

1. The compressor element, water separator vessel and motor are secured to the frame, immobilizing the vibration dampers during transport.
   - Remove the four bolts and bushes (1) immobilizing the vibration dampers of the water separator vessel.
   - Remove the two bolts and bushes (2) immobilizing the vibration dampers of the compressor element.
   - Remove the two bolts (4) and remove transport support (3) of the drive motor.
2. Check that the electrical connections correspond to the local codes and that all wires are clamped tightly to their terminals. The installation must be earthed and protected against short circuit by fuses in all phases. An isolating switch must be installed in the voltage supply line.
3. Check the voltage selecting wires at the primary side of transformer (T1) and the setting of overload relays or circuit breakers.
   On air-cooled units, also check the setting of circuit breaker (Q15).
   Check that the switch on the circuit breaker(s) is in position **I**.
4. Fit the air outlet valve to the air outlet pipe.
   Close the valve.
   Connect the air net to the valve.
5. Connect the drain outlets (6 and 7) to a drain collector.
   See section Installation proposal.
6. Connect the tap water supply (see section Water requirements) to valve (5).
   Open the valve.
7. Connect the drain valve (10) to a separate drain collector.
8. **For water-cooled units:**

Check the cooling water quality (see section Cooling water requirements). Provide a water flow regulating valve and shut-off valves in the cooling water piping (secondary water circuit).
Connect the cooling water piping to the secondary circuit .
Open the water regulating valve and shut-off valves (customer's installation).

9. **Checking motor rotation direction**
   Check the rotation direction of the drive motor; the correct direction is indicated by an arrow on the coupling housing.
   For variable speed units: Start the compressor and stop it. If the rotation direction is wrong, switch off the voltage, open the isolating switch in the voltage supply line and reverse two of the drive motor (M1) cables (see Electrical Connections).
   For air-cooled units: switch on the voltage again, start and stop the compressor and check again the rotation direction of water pump, cooling fan and drive motor.
   For water-cooled units: switch on the voltage, start and stop the compressor and check again the rotation direction of both water pump and drive motor.
10. Check the programmed settings.
11. Start the compressor and run it for a few minutes. Check that the compressor operates normally.

5.4 Before starting

Remark

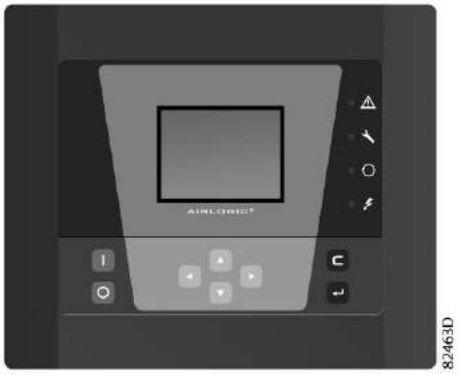
	If the compressor has not run for the past 6 months, special precautions must be taken (contact your Customer Centre).

5.5 Starting

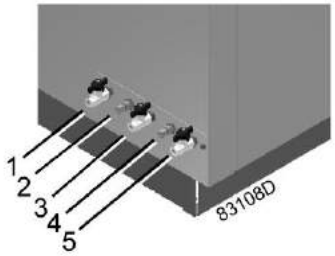
Important

	For units with integrated dryer, switch on the voltage 4 hours before starting to energize the crankcase heater of the refrigerant compressor.

Procedure

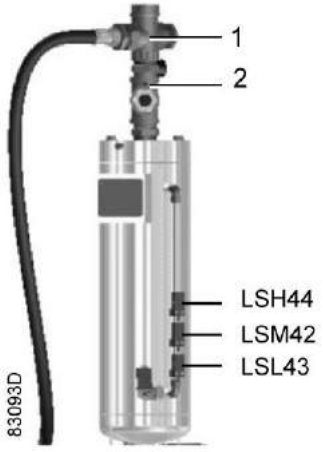


AIRLOGIC² controller



Drains and water supply connections

Reference	Description
1	Manual drain, dryer bypass (option)
2	Automatic drain, water separator vessel
3	Valve, tap water supply (Reverse Osmosis system)
4	Automatic drain, Reverse Osmosis system (waste water)
5	Manual drain valve, electronic water drain



Separator vessel with level sensors

1. Switch on the voltage.
   Check that voltage on LED (2) lights up.
2. Open the compressed air outlet valve of the compressor.
3. Check the water level in the water separator vessel. The level should be between level sensors LSM42 and LSH44.
4. Check that the tap water supply valve is open.
   For water-cooled units: open the cooling water shut-off valves (customer's installation) in the cooling water supply line. Open the water flow regulating valve (customer's installation). This step can be skipped if, after previous operation, the setting of the valve has not been disturbed.
5. Press the start button **I** (1) on the regulator.
   Automatic operation LED (3) lights up and the drive motor starts running.
6. **For water-cooled, variable speed units:** Regulate the cooling water flow with the compressor running at maximum speed.
   Adjust the water flow; see section Compressor data. For optimum operation, the cooling water outlet temperature must never exceed the value specified in section Reference conditions and limitations.

5.6 During operation

Warnings

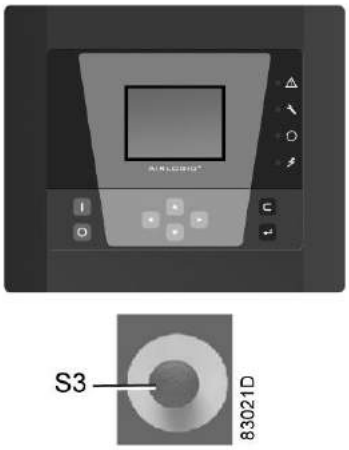
AIRLOGIC² controller

⚠	Before starting any maintenance or repairs, stop the compressor, wait until the compressor has stopped and open the isolating switch (customer's installation) to switch off the voltage to the compressor.
	Close the air outlet valve and open the manual condensate drain valves to depressurise the air system.
	If automatic operation LED (3) is lit, the electronic regulator is automatically controlling the compressor: starting, loading, unloading and stopping the compressor whenever necessary. On variable speed units, the electronic regulator is also matching the compressor speed to the compressed air consumption.
	On variable speed units: • Repairs inside the start and speed regulation cabinet may only be carried out by your Customer Centre. • Wait at least 6 minutes before starting any electrical repairs as hazardous high voltage remains on the condensers of the start and speed regulation unit for 6 minutes after the voltage is switched off.
	Keep all doors closed during operation.

In order to ensure sufficient motor cooling, the doors must be closed during operation and may be opened for short periods only to carry out routine checks.

5.7 Checking the display

Procedure



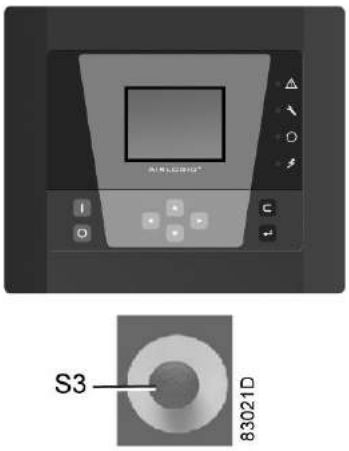
Checking the display

- Daily check the display for readings and messages. Normally, the main screen is shown, indicating the compressor outlet pressure, the status of the compressor and the functions of the keys below the display. See section Main screen.
- Always check the display and remedy the trouble if the alarm LED is alight or blinks.
- The display will show a service message if a service plan interval has been exceeded or if a service level for a monitored component has been exceeded. Carry out the service actions of the indicated plans or replace the component and reset the relevant timer. Consult your Customer Centre. See also section Preventive maintenance schedule.
- Regularly check the actual compressor status by pressing the arrow down key from the main screen.

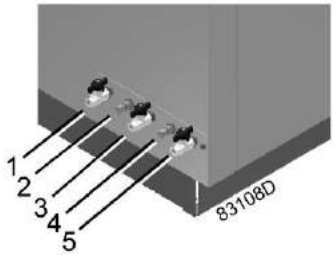
	Before starting any maintenance or repairs: • Stop the compressor and close the air outlet valve. • Open the isolating switch (customer's installation) to switch off the voltage to the compressor. Apply all relevant safety precautions, including those mentioned in this book.

5.8 Stopping

Procedure



Air outlet valve



Drain and supply water connections

1. Press The Stop button. The automatic operation LED goes out. The compressor runs unloaded for 60 seconds and then stops.
2. To stop the compressor in case of emergency, press button (S3).
   - Remedy the problem cause and unlock the button by pulling it out.
   - Navigate to the Stop icon on the display by means of the navigation keys and press the Select key.
   - Press reset.

   Do not use emergency stop button for normal stopping!
3. Close the compressor air outlet valve and switch off the voltage.
4. Open the manual drain valves.
   For water-cooled units: close the water supply of the secondary cooling water system.
5. **If freezing temperatures may be expected, completely drain all water.** See section Storage after installation.

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

5.9 Taking out of operation

Procedure

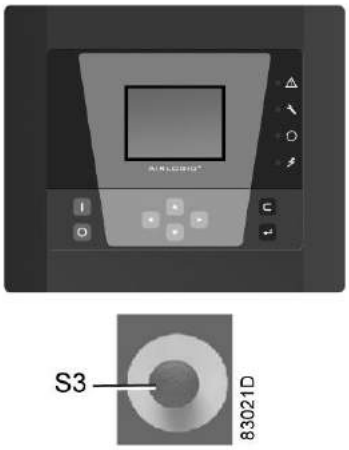
At the end of the service life of the compressor, proceed as follows:

1. Stop the compressor and close the air outlet valve.
2. Switch off the voltage and disconnect the compressor from the mains.
3. Shut off and depressurise the part of the air net which is connected to the outlet valve. Disconnect the compressor air outlet pipe from the air net.
4. **For water-cooled units:** isolate and disconnect the water system from the cooling water net.
5. Drain the water and condensate circuits.
6. Disconnect the condensate piping.

6 Maintenance

6.1 Preventive maintenance schedule of the compressor

Control panel



Warning

⚠	**Before carrying out any maintenance, repair work or adjustments, proceed as follows:** • Stop the compressor. • Press emergency stop button (S3). Open the isolating switch in the compressor voltage supply line. • Close the air outlet valve and open the manual condensate drain valves. • Depressurise the air system. Follow all relevant instructions given in the section Safety precautions during maintenance or repair.

The air outlet valve can be locked as follows:

- Close the valve.
- Remove the bolt fixing the handle to the valve.
- Lift the handle and turn it until the slot fits over the blocking edge.
- Fix the handle to the valve, using the special bolt and wrench delivered loose with the compressor.

Before mechanical maintenance

⚠	Open manual condensate drain valve and wait for at least 30 seconds (time needed for the compressor to depressurize). For location of components, see section Water and automatic drain system

Before electrical maintenance

	On variable speed units, wait for at least 6 minutes before starting maintenance as hazardous high voltage remains on the condensers of the start and speed regulation unit for 6 minutes after switching off the voltage.

Warranty - Product Liability

Use only original authorised spare parts. Any damage or malfunction caused by the use of unauthorised parts is not covered by Warranty or Product Liability.

Service kits

For overhauling or carrying out preventive maintenance, service kits are available (see section Service kits).

Service contracts

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

General

The schedule comprises a summary of the maintenance instructions. Read the respective section before taking maintenance measures. When servicing, replace all removed gaskets, O-rings and washers.

Intervals

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

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

Service plans

A number of service operations are grouped in plans, called Service plans A, B, ... as specified in the schedule below.

Each plan has a programmed time interval at which all service actions belonging to that plan are to be carried out. When reaching the interval, a message will appear on the screen indicating which service plans are to be carried out; see section Service menu. After servicing, the intervals must be reset; see section Service menuService menu.

Preventive maintenance schedule

Period	Running hours	Service plan	Operation
Daily	--	--	Check for leaks.
“	--	--	Check readings on display for warnings or shut-downs.
Weekly	--	--	Drain condensate from air receiver, if installed.
3-monthly	--	--	Check coolers and condenser of dryer; clean if necessary.

Period	Running hours	Service plan	Operation
“	--	--	Remove air filter element and inspect. Clean by air jet if necessary. More frequently when operating in a dusty atmosphere.
“	--	--	Check filter pad of converter cabinet; replace if necessary. More frequently when operating in a dusty atmosphere.
“	--	--	Operate safety valve
Yearly	--	--	Test safety valve
--	--	--	Test temperature shut-down protection Decrease the shut-down warning level and shut-down level for the compressor element outlet temperature to the minimum settings. Run the compressor: when reaching the setting, the unit must shut down. Afterwards, reset the warning and shut-down levels to their original values.
--	--	--	Check operation of condensate drain
--	4000	A	Replace air and water filter elements Use genuine parts.
--	4000	A	Replace sediment and carbon filters Use genuine parts.
--	4000	A	Re-grease motor bearings Check breather valve Replace unloader solenoid
--	4000	A	Check for possible air or water leaks
--	4000	A	Replace filter pad of converter cabinet
--	4000	A	Take service readings
2-yearly	8000	B	Replace RO membrane element
--	8000	B	Overhaul unloading valve: replace inner part
--	8000	B	Minimum pressure valve: replace inner parts
--	8000	B	
Every 5 years	24000	--	Replace flexible hoses

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.
- 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.

Important

- Always consult your Customer Centre if a timer setting has to be changed.
- Replace damaged or heavily contaminated elements.
- See section Programmable settings before modifying the temperature protection settings.
- Any leakage should be attended to immediately. Damaged flexibles or flexible joints must be replaced.

6.2 Drive motor

Attention

	The lubrication points are marked. Never mix greases of different brands or types.

Recommended grease:

Use Klüberquiet BQH72-102. Quantity: 16 g (0.56 oz) per bearing.

	During greasing, let the motor run in the “Regreasing” program mode. Do not use more grease than prescribed!

6.3 Compressor element bearings and sealing of shaft

Description

The compressor element is provided with water lubricated hydro-dynamic/hydro-static bearings. Water will be supplied to the bearings through the internal water circuit of the compressor element. There is no external lubrication.

The drive shaft of the compressor element has special seals, to which a constant pressure (the blocking air pressure) is applied. This pressure is monitored by the electronic regulator.

Attention

	• The blocking air pressure supplied to the shaft seals will be adjusted by the service technician of your Customer Centre during commissioning of the machine. • **This setting must not be altered.** • **Incorrect blocking air supply pressure may damage the machine.**

6.4 Water change and manual draining

Description

No water change is needed during normal operation.

If the conductivity of the water exceeds 100 mS (micro Siemens), the water must be replaced

Manual draining should be performed before long periods of stand-still; see section Storage after installation. **Before re-starting, the compressor must be re-filled**; see section Commissioning.

6.5 Water filter change

Description

The water filter element should be replaced at the intervals mentioned in section Preventive maintenance schedule.

Reset the service warning; see section Service menu.

6.6 Changing sediment and carbon filters

Description

The sediment and carbon filter elements should be replaced at the intervals mentioned in section Preventive maintenance schedule.

Reset the service warning; see section Service menu.

Attention

	• Clean filters will extend the lifetime of the RO membrane. • Rinse the filter elements with normal water before installing.

6.7 Changing RO membrane

Description

The membrane has been designed to operate with water as specified in section Cooling water requirements.

Reset the service warning; see section Service menu.

Attention

	Using water of lower quality can result in a limited service life of the RO filters.

6.8 Maintenance of RO system

Description

The maintenance of the Reverse Osmosis (RO) system strongly depends on the water quality that is fed to the system. Use water from a drinking-water installation; see section Cooling water requirements.

To check the water quality in the RO storage tank, the service technician of your Customer Centre will measure the conductivity during every service visit. If the conductivity of the water reaches 100 mS (micro Siemens), it is recommended to change the membrane.

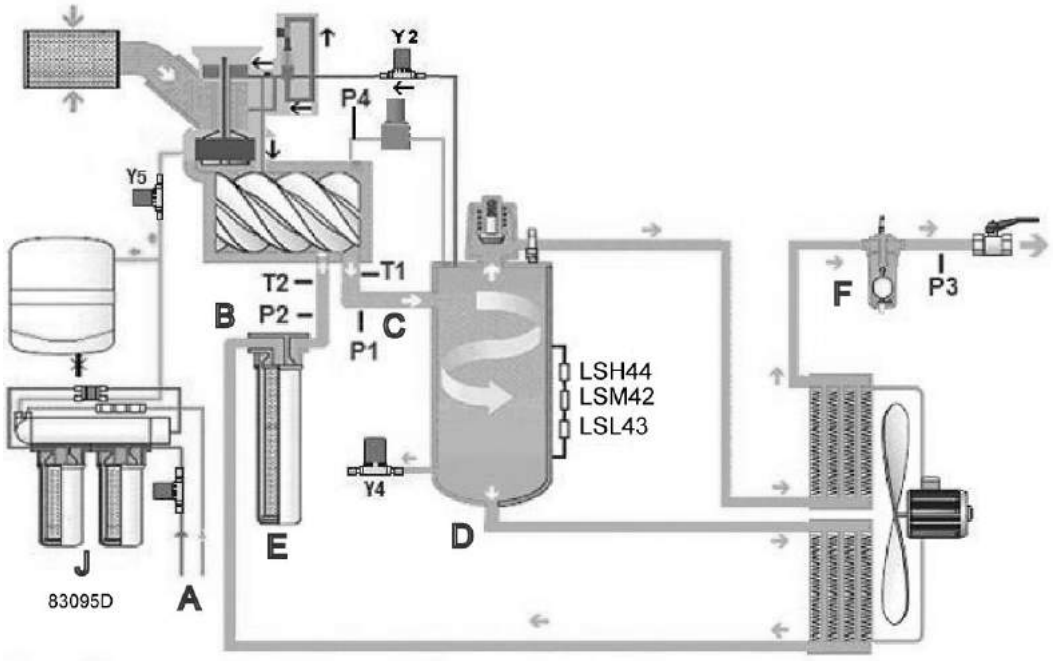
Note

	Keep the measured conductivity values in a logbook to allow easy follow-up of the water quality.

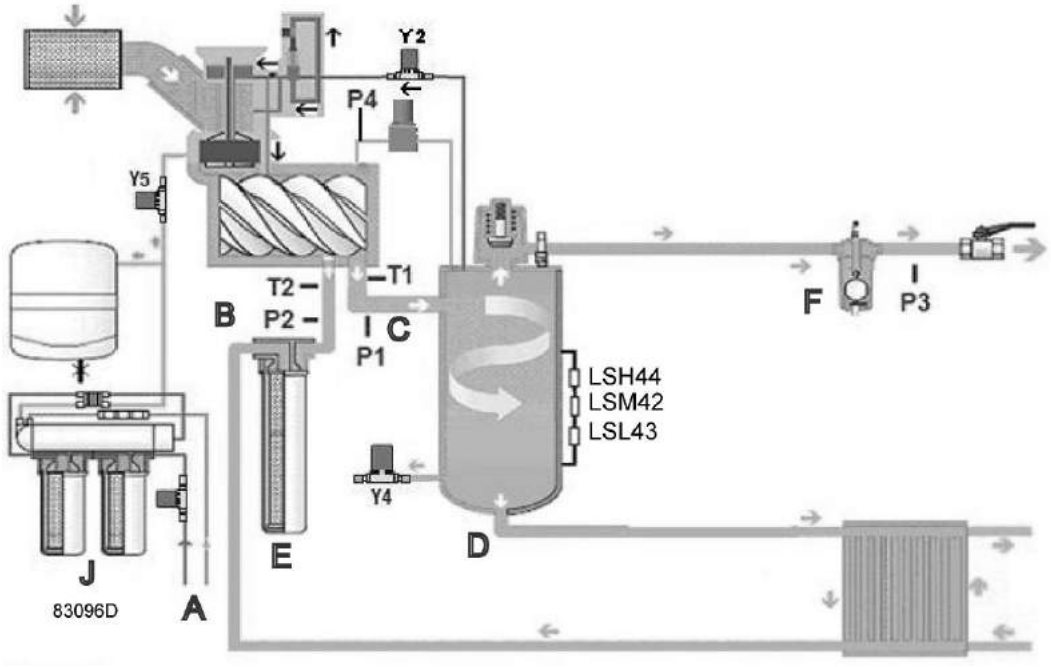
6.9 Storage after installation

	If the compressor is to be taken out of service and temporarily stored, precautions must be taken against **freezing**. **All water must be drained completely.** Therefore, please follow below described method.

Draining instruction

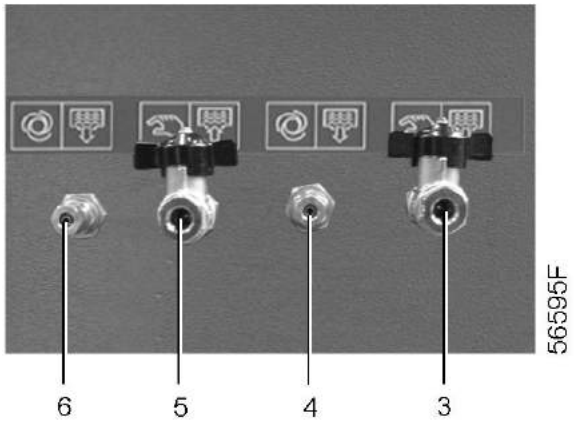


Air-cooled version

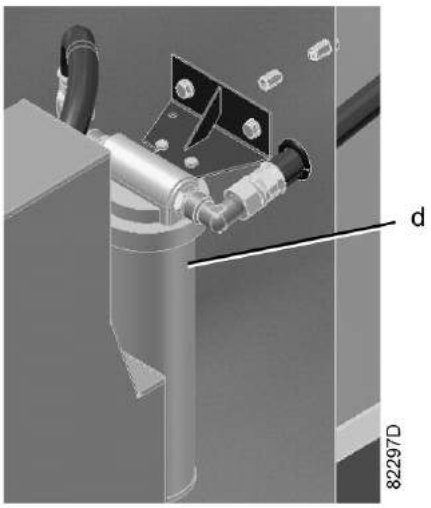


Water-cooled version

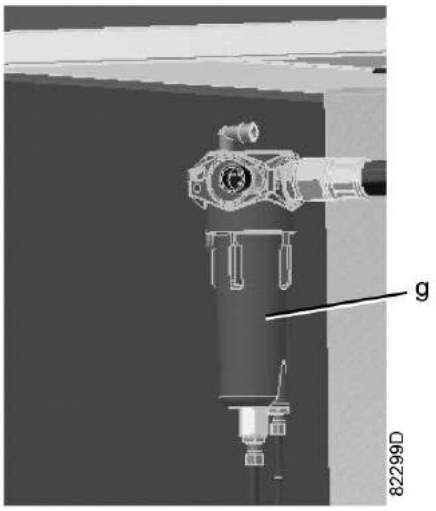
1. Stop the compressor and disconnect it from the mains.
2. Depressurize the compressor.
3. Close all water connections and disconnect the unit entirely
4. Open all drain valves ((A) in diagram, (5) and (3) below).



5. Open the plug at the inlet of the water filter (B in flow diagram)
6. Open the compressor element drain valve (C in flow diagram) and drain the water.
7. Open the valve under the water separator vessel (D in flow diagram) and drain the vessel completely.
8. Put dry oil free compressed air at the inlet of the water filter (B in flow diagram) to drain the water circuit and cooler completely. Then turn off the compressed air.
9. Close the valve under the water vessel.
10. Remove the water filter housing (E in flow diagram, d below) and poor away the water inside it. Reassemble the housing, using a new water filter and a new seal. Torque the housing at 27 Nm.



11. Put dry oil free compressed air at the inlet of the water filter (B in flow diagram) again. Keep draining until no water comes out of the element through the valve under the element (C in flow diagram). This can take 3 to 5 minutes to make sure as much water as possible is drained. Then turn off the compressed air.
12. Normally the Electronic Water Drain (EWD) should not be drained. This should already have been drained during load or testing. To make sure, check if this is done. If not, drain the EWD manually. The WSD (F in Flow diagram), g below)) should be drained during load or testing through the EWD. If not, this should be drained when there's pressure again on the system.



13. (Only aircooled unit) Disconnect the hoses on the aftercooler and put oil free compressed air onto the inlet of the aftercooler. A water vacuum cleaner can be connected on the outlet for extra draining. Drain the aftercooler completely. Keep on blowing air through for 3 to 5 minutes to make sure as much water as possible is drained. Then turn off the compressed air and disconnect.
14. (Only watercooled unit) Draining of the secondary circuit of the water cooler. Disconnect the connections of the water cooler at the secondary circuit of the customer (G and H in the diagram), put oil free compressed air on the top connection (H). Wait until the secondary circuit of the water cooler is completely drained. Then disconnect everything.
15. Open the valve of the RO system (j), disconnect the flexible on the supply valve (Y5) and then let this part drain. Connect again and close the valve.

16. Remove the housings and filters of the RO system (J in flow diagram, k above) and empty them completely. Afterwards remount the filters and housings.
17. Finally connect again all hoses and connections and close all drain valves.
18. Close the valve under the element (C in diagram) and close all drain valves.

6.10 Service kits

Description

Service kits are available offering the benefit of genuine parts while keeping the maintenance budget low. The kits comprise all parts needed for servicing. Consult the Parts list for part numbers.

7 Adjustments and servicing procedures

7.1 Air filter

Important

	• Never remove the element while the compressor is running. • Replace the dirty element by a new one. • Discard the element if damaged.

Servicing

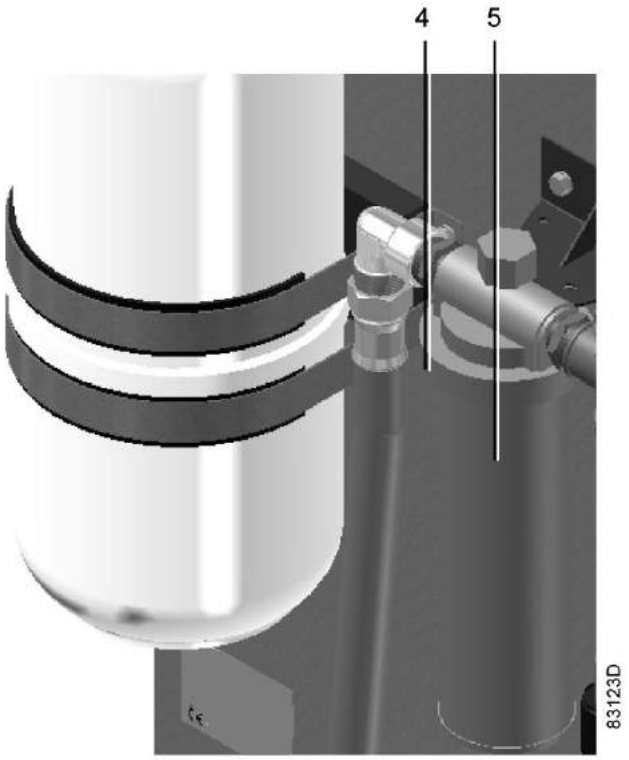
1. Stop the compressor.
2. Switch off the voltage.
3. Remove the cover and take out the filter element.
4. Discard the old filter element.
5. Refit the new element and the cover.
6. Reset the service indicator (in case it shows “red”) by pushing its knob.
7. After carrying out the service actions of the respective service plan, the service warning must be reset. See section Service menu.

7.2 Water filter

Important

	• Never remove the element while the compressor is running. • Replace the dirty element by a new one. • Discard the element if damaged.

Servicing



Procedure:

1. Stop the compressor.
2. Switch off the voltage.
3. Remove the filter housing opening nut using a wrench.
4. Remove the filter element from the housing, but leave the water in the housing.
5. Fit the new element.
6. Screw on the filter to its head.
7. After carrying out the service actions of the respective service plan, the service warning must be reset. See section Service menu.

7.3 Coolers

Important

	Keep the coolers clean to maintain the cooling efficiency.

Cleaning instructions for air-cooled compressors:

- Stop the compressor, close the air outlet valve and switch off the voltage.
- Cover all parts under the coolers.
- Remove any dirt from the coolers with a fibre brush. Never use a wire brush or metal objects.
- Then clean with an air jet in the reverse direction to normal flow.
- If it is necessary to wash the coolers with a cleaning agent, consult your supplier.

For cleaning the coolers of water-cooled compressors: consult your supplier.

7.4 Safety valve

Operating

Operate the safety valve (1) by unscrewing the cap one or two turns and retighten it.

Testing

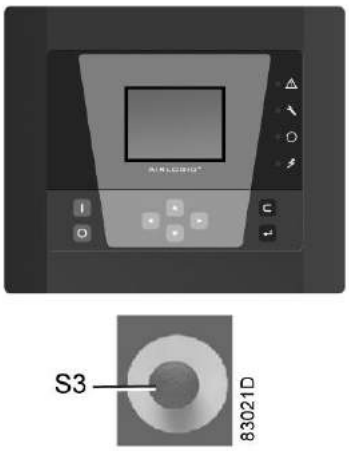
The valve can be tested on a separate compressed air line. If the valve does not open at the pressure specified in section Settings of safety valve, consult your Customer Centre.

Warning

	No adjustments are allowed.

8 Faults and remedies

Control panel



Warning

⚠	**Before carrying out any maintenance, repair work or adjustments, proceed as follows:** • Stop the compressor. • Press emergency stop button (S3). Open the isolating switch in the compressor voltage supply line. • Close the air outlet valve and open the manual condensate drain valves. • Depressurise the air system. Follow all relevant instructions given in the section Safety precautions during maintenance or repair.

The air outlet valve can be locked as follows:

- Close the valve.
- Remove the bolt fixing the handle to the valve.
- Lift the handle and turn it until the slot fits over the blocking edge.
- Fix the handle to the valve, using the special bolt and wrench delivered loose with the compressor.

Before mechanical maintenance

⚠	Wait for at least 30 seconds (time needed for the compressor to depressurize). For location of components, see section Water and automatic drain system.

Before electrical maintenance on variable speed units

⚠	Wait for at least 6 minutes before starting maintenance as hazardous high voltage remains on the condensers of the start and speed regulation unit for 6 minutes after switching off the voltage.

Faults and remedies

Condition	Fault	Remedy
High element outlet temperature	• High inlet/ambient temperature • Improper ventilation	Ventilate the area
	• Poor cooling medium/ temperature • Improper cooling water flow • Cooler internally/externally dirty	Check cooling water temperatures and flow
	Bad temperature switch/sensor set incorrectly	Check if sensor is working properly and setting is OK
	• Fan blade defective • Fan running backwards	Check if the fan is running and in the right direction
	Loose/bad electrical connections	Check connections of the sensors and fan
	Intake restriction	Remove any obstacle in front of the air ventilation holes
	Injection restriction	Check injection
	Aftercooler blocked	Check pressure drop in aftercooler
	The temperature at the element outlet (T el out) is too high	Check the air-cooled heat exchanger and/or element
High Delta T, element	The temperature difference over the element is too high	• Check ambient temperature • Check temperature sensor • Check flow of the cooling water (water-cooled units)
	Water flow	• Check water inlet filter • Check pressure drop of the heat exchanger
	Water level of water separator	• Check water level in water separator • Check function RO water treatment
	The temperature difference between the inlet and the outlet temperature is too high	• Check the ambient temperature • Check the heat exchanger • Check the water flow
Main motor	Thermal overload set incorrectly	Set to the correct value
	Malfunctioning thermal overload	Replace
	Compressor element failure	Contact your supplier for changing the element
	Malfunctioning motor	Replace
	Element full with water	Drain water (valve at the bottom of the element)
	Unloading valve open	Close the unloading valve manually
Fan motor fault	Incorrectly set motor safety switch	Check value settings
	Malfunctioning motor safety switch	Replace

Condition	Fault	Remedy
	Fan motor jammed	Free fan motor
	Defective fan motor	Replace
Sensor error	Defective pressure sensor or sensor not connected	• Replace or connect • Adjust pressure
	Defective temperature sensor or sensor not connected	Replace or connect
	The compressor is running with a pressure that is too high	• Set correct maximum outlet pressure • Check pressure transmitter
	Defective temperature sensor of the water injection or sensor not connected	Replace or connect
	Sensor, earth, screening, electrical wiring	Screening of sensor not attached to frame, sensor gives too low value, adjust screening
Low water	Low level in water separator during more than 60 s	• Check operation of sensors • Check operation of RO unit • Check position of level sensors
Blocking air pressure too low	Sensor, pressure regulator, blocking air	Adjust pressure regulator to the optimal blocking air pressure.
No load condition	Solenoid valve Y2	Solenoid valve Y2 has loose wiring, unload valve does not open because of this, software version, electrical wiring
Water level in separator not correct	Solenoid valves not working	• Y4 en Y5 wrongly connected in cubicle • Dirt in valve • Check connecting diagram and function
	Water supply RO unit not OK	Check water supply and the water treatment system
	Level sensors	Check connecting diagram and function
	Water vessel level tube dirty	Clean or replace
	Leakage in water circuit	Solve leakage in water circuit
Overpressure	Regulation failure	Check external pressure regulator
	Compressor outlet pressure too high	External pressure customer too high
	Separator pressure too high	Minimum pressure valve leaking. Pressure must be below 2 bar
P inj/separator	Injection pressure to low	Measure injection pressure in load and unload condition
	Calculated value below shutdown value	Injection pressure low because of blocked water filter
	Water filter	Check water filter operation
	Cooler blocked	Check cooler
	Air in system	Refill system with water and start again

Condition	Fault	Remedy
Water in compressed air, or dryer LAT	Water in compressed air	• Check function of dryer • Check function of water separator
	Dryer	Check operation of dryer
	Fan not running	Check dryer fan

	Solve any possible failure by solving the cause, reset the electronic regulator and try to start. If the unit does not start after this first failure, do not try to start again. First remove the water from the element, check the water level and try to start again.

9 Technical data

9.1 Readings on display

Important

	The readings below are valid when operating at reference conditions. See section Reference conditions.

For the maximum working pressure, consult section Compressor data.

Pressure reading

Item	Reading
Air outlet pressure	Depends on the setpoint (desired net pressure)

Temperature readings

Item	Reading	Reading
Compressor element outlet temperature	Approx. 20 ˚C above ambient temperature	Approx. 36 ˚F above ambient temperature
Cooling water outlet temperature (Only for water-cooled units)	Below 40 ˚C	Below 104 ˚F
Dewpoint temperature (Full-Feature units)	Approx. 3 ˚C	Approx. 37.4 ˚F

9.2 Electric cable size and fuses

Important

	• The voltage on the compressor terminals must not deviate more than 10% of the nominal voltage. It is however highly recommended to keep the voltage drop over the supply cables at nominal current below 5% of the nominal voltage (IEC 60204-1). • If cables are grouped together with other power cables, it may be necessary to use cables of a larger size than those calculated for the standard operating conditions. • Use the original cable entry. See section Dimension drawings. **To preserve the 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.

Currents and fuses

Type	V	Hz	Approval	I_{nom}(1)	I_{nom}(1)	Max fuse (3)	Q15 (A)(4)	F15 (A) (4)
WIS 20 V	400	50	IEC	36.7 A	39.6 A	50 A	1.76	1.76
WIS 20 V	460	60	IEC	32.2 A	35.6 A	50 A	1.76	1.76
WIS 20 V	460	60	UL/cUL	32.2 A	35.6 A	50 A	1.76	1.76
WIS 25 V	400	50	IEC	45.9 A	48.7 A	50 A	1.76	1.76
WIS 25 V	460	60	IEC	40.1 A	43.6 A	50 A	1.76	1.76
WIS 25 V	460	60	UL/cUL	40.1 A	43.6 A	50 A	1.76	1.76
WIS 30 V	400	50	IEC	52.9 A	58.0 A	63 A	1.76	1.76
WIS 30 V	460	60	IEC	46.2 A	51.4 A	63 A	1.76	1.76
WIS 30 V	460	60	UL/cUL	46.2 A	51.4 A	63 A	1.76	1.76
WIS 40 V	400	50	IEC	71.1 A	76.5 A	80 A	1.76	1.76
WIS 40 V	460	60	IEC	62.1 A	68.3 A	80 A	1.76	1.76
WIS 40 V	460	60	UL/cUL	62.1 A	68.3 A	80 A	1.76	1.76

(1): Current in the supply lines at maximum load and nominal voltage (compressors without integrated dryer).

(2): Current in the supply lines at maximum load and nominal voltage (compressors with integrated dryer).

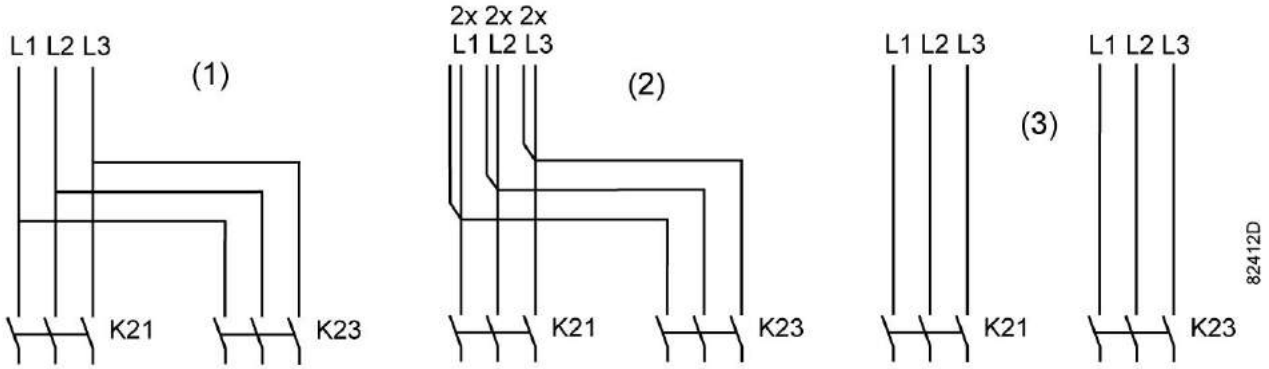
(3): Maximum fuses value with regard to cubicle protection.

(4): Setting of motor circuit breaker (Q15) or fan overload relay (F15)

Possible configurations

There are 3 possible configurations:

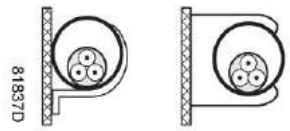
- (1): Single supply cables.
- (2): Parallel supply cables
- (3) is only valid for Y-D versions



Cable sizing according IEC

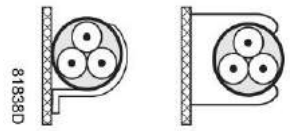
The tables below indicate the current carrying capacities of cables for 3 commonly used installation methods, calculated according to standard 60364-5-52 - electrical installations of buildings part 5 - selection and erection equipment and section 52 - current carrying capacities in wiring systems.

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. Multi-core cable in conduit on a wooden wall

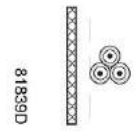
Maximum allowed current in function of the ambient temperature for installation method B2

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

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

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

	Ambient temperature				
Cable section	**30 °C**	**40 °C**	**45 °C**	**50 °C**	**55 °C**
4 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

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

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

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

Calculation method for IEC:

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

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

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

- Single supply cables (3 phases + PE - configuration (1)):
  - I = 89 A + 10 % = 89 x 1.1 = 97.9 A
  - The table for B2 and ambient temperature = 45 ° C allows a maximum current of 93 A for a 50 mm² cable. For a cable of 70 mm², the maximum allowed current is 118 A, which is sufficient. Therefore, use a 3 x 70 mm² + 35 mm² cable.
    If method C is used, 50 mm² is suffficient. (35 mm² for method F) => cable 3 x 50 mm² + 25 mm².
- Parallel supply cable (2 x 3 phases + PE - configuration (2)):
  - I = (89 A + 10 %)/2 = (89 x 1.1)/2 = 49 A
  - For a cable of 25 mm², B2 at 45 °C, the maximum current is 63 A x 0.8 = 50.4 A. So 2 parallel cables of 3 x 25 mm² + 25 mm² are sufficient.
  - Install 50 A fuses on each cable instead of 100 A.

Fuse calculations for IEC are done according to 60364-4-43 electrical installations of buildings, part 4: protection for safety- section 43: protection against overcurrent. Fuse sizes are calculated in order to protect the cable against short circuit. Fuse type aM is recommended but gG/gL is also allowed.

Cable sizing according CSA

Calculation method according CEC part 1, table 2 column 3: allowable ampacities for not more than 3 copper conductors in raceway or cable (based on an ambient temperature of 30 °C (86 °F). Correction factors for other temperatures table 5A column 3.

Maximum allowed current in function of the ambient temperature

	Ambient temperature				
Cable section (AWG or kcmil)	**30 °C (86 °F)**	**40 °C (104 °F)**	**45 °C (113 °F)**	**50 °C (122 °F)**	**55 °C (131 °F)**
10	< 30 A	< 26 A	< 25 A	< 23 A	< 20 A
8	< 45 A	< 40 A	< 37 A	< 34 A	< 29 A
6	< 65 A	< 57 A	< 53 A	< 49 A	< 42 A
4	< 85 A	< 75 A	< 70 A	< 64 A	< 55 A
3	< 100 A	< 88 A	< 82 A	< 75 A	< 65 A
2	< 115 A	< 101 A	< 94 A	< 86 A	< 75 A
1	< 130 A	< 114 A	< 107 A	< 98A	< 85 A
1/0	< 150 A	< 132 A	< 123 A	< 113 A	< 98 A
2/0	< 175 A	< 154 A	< 144 A	< 131 A	< 114 A
3/0	< 200 A	< 176 A	< 164 A	< 150 A	< 130 A

Calculation method for CSA

- Single supply cables (3 phases + PE - configuration (1)):
  - Add 10 % to the total compressor current (I_{tot}Pack or I_{tot}FF from the tables)
  - Install the prescribed fuse on each cable
- Parallel supply cable (2 x 3 phases + 2 PE - configuration (2)):
  - Add 10 % to the total compressor current (I_{tot}Pack or I_{tot}FF from the tables) and divide by 2
  - Multiply the ampacity of the cables with 0.8 (see CEC Part 1 table 5C)
  - 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 10 % to the total compressor current (I_{tot}Pack or I_{tot}FF from the tables) and divide by √3
  - Multiply the ampacity of the cables with 0.8 (see CEC Part 1 table 5C)
  - 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 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
< 400 A: use AWG3

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

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

- Single supply cables (3 phases + PE - configuration (1)):
  - I = 128 A + 10 % = 128 x 1.1 = 140.8 A
  - AWG2/0 allows a maximum current of 144 A at 45 °C (113 °F), which is sufficient.
  - Fuses: 150 A
- Parallel supply cables (2 x 3 phases + 2 PE - configuration (2)):
  - I = (128 A + 10 %)/2 = (128 x 1.1)/2 = 70.4 A

- For AWG3 at 45 °C (113 °F), the maximum current is 82 A x 0.8 = 65.6 A, which is insufficient. For an AWG2, the maximum current is 94 x 0.8 = 75.2 A. So 2 parallel cables of 3 x AWG2 + AWG8 are sufficient.
- Install fuses of 80 A instead of 150 A.

Fuse size is the max. fuse size in order to protect the motor against short circuit. For CSA fuse HRC form II, for UL fuse class RK5.

9.3 Settings of safety valve

Valve opening pressure

Type	Setting	Setting
For 13 bar compressors	14.5 bar(e)	210.31 psig
For 175 psi compressors	14.82 bar(e)	215 psig

9.4 Reference conditions and limitations

Reference conditions

Absolute air inlet pressure	bar(a)	1
Absolute air inlet pressure	psi(a)	14.5
Air inlet temperature	˚C	20
Air inlet temperature	˚F	68
Relative air humidity	%	0
Cooling water inlet temperature (water-cooled units)	˚C	20
Cooling water inlet temperature (water-cooled units)	˚F	68
Temperature rise, cooling water (water-cooled units)	˚C	10
Temperature rise, cooling water (water-cooled units)	˚F	18
Working pressure		See section Compressor data

Limitations

Maximum working pressure		See section Compressor data
Minimum working pressure	bar(e)	4
Minimum working pressure	psig	58
Maximum air inlet temperature	˚C	40
Maximum air inlet temperature	˚F	104
Minimum ambient temperature	˚C	2
Minimum air ambient temperature	˚F	35.6

Maximum cooling water outlet temperature (water-cooled units)	˚C	50
Maximum cooling water outlet temperature (water-cooled units)	˚F	122
Maximum cooling water inlet pressure (water-cooled units)	bar(e)	5
Maximum cooling water inlet pressure (water-cooled units)	psig	72.52
Maximum cooling water inlet temperature (water-cooled units)	˚C	40
Maximum cooling water inlet temperature (water-cooled units)	˚F	104
Maximum altitude operation (above sea level)	m	1000
Maximum altitude operation (above sea level)	ft	3280

9.5 Compressor data

All data specified below apply under reference conditions, see section Reference conditions and limitations.
Power input figures are based on total electric input power, i.e. including fan and dryer (if applicable).

	Unit	WIS 20 V	WIS 20 V with dryer	WIS 20 V	WIS 20 V with dryer
Number of compression stages		1	1	1	1
Frequency	Hz	50	50	60	60
Reference working pressure	bar(e)	7	7	7	7
Reference working pressure	psig	101.5	101.5	101.5	101.5
Maximum working pressure	bar(e)	13	12.75	12.5	12.25
Maximum working pressure	psig	189	185	181	178
Compressed air outlet temperature (° above ambient temperature)	°C	9	1	9	1
Compressed air outlet temperature (° above ambient temperature)	°F	48	36	48	36
Minimum motor shaft speed	rpm	2500	2500	2500	2500

	Unit	WIS 20 V	WIS 20 V with dryer	WIS 20 V	WIS 20 V with dryer
Maximum motor shaft speed at reference working pressure	rpm	4850	4786	4850	4786
Maximum motor shaft speed at maximum working pressure	rpm	3300	3319	3300	3319
Nominal motor power, drive motor	kW	15	15	15	15
Nominal motor power, drive motor	hp	20	20	20	20
Pressure dew point (LAT dryer)	°C		3		3
Pressure dew point (LAT dryer)	°F		37		37
Pressure drop over dryer	bar		0.2		0.2
Pressure drop over dryer	psi		3		3
Power consumption dryer at full load (a=20°C and RH=100 %)	kW		0.5		0.5
Cooling air flow, dryer	m³/min		20.4		20.4
Heat dissipated by the dryer cooling air at full load	kW		2.1		2.1
Refrigerant type			R134a		R134a
Refrigerant quantity	kg		0.47		0.47
Refrigerant quantity	lb		1.04		1.04
Cooling air flow referred to the air inlet grating of the compressor (air-cooled units)	m³/s	0.3	0.7	0.3	0.7
Cooling water consumption (water-cooled units)	l/min	30	30	30	30
Cooling water consumption (water-cooled units)	cfm	1.1	1.1	1.1	1.1
Water capacity (approx.)	l	20	20	20	20
Water capacity (approx.)	US gal	5.3	5.3	5.3	5.3

	Unit	WIS 20 V	WIS 20 V with dryer	WIS 20 V	WIS 20 V with dryer
Mean sound pressure level ISO 2151 (air-cooled units)	dB(A)	67/3	67/3	67/3	67/3
Mean sound pressure level ISO 2151 (water-cooled units)	dB(A)	64/3	64/3	64/3	64/3

	Unit	WIS 25 V	WIS 25 V with dryer	WIS 25 V	WIS 25 V with dryer
Number of compression stages		1	1	1	1
Frequency	Hz	50	50	60	60
Reference working pressure	bar(e)	7	7	7	7
Reference working pressure	psig	101.5	101.5	101.5	101.5
Maximum working pressure	bar(e)	13	12.75	12.5	12.25
Maximum working pressure	psig	189	185	181	178
Compressed air outlet temperature (° above ambient temperature)	°C	9	1	9	1
Compressed air outlet temperature (° above ambient temperature)	°F	48	36	48	36
Minimum motor shaft speed	rpm	2500	2500	2500	2500
Maximum motor shaft speed at reference working pressure	rpm	5600	5530	5600	5530
Maximum motor shaft speed at maximum working pressure	rpm	3900	3921	3900	3921
Nominal motor power, drive motor	kW	18	18	18	18
Nominal motor power, drive motor	hp	25	25	25	25
Pressure dew point (LAT dryer)	°C		3		3
Pressure dew point (LAT dryer)	°F		37		37

	Unit	WIS 25 V	WIS 25 V with dryer	WIS 25 V	WIS 25 V with dryer
Pressure drop over dryer	bar		0.2		0.2
Pressure drop over dryer	psi		3		3
Power consumption dryer at full load (a=20°C and RH=100 %)	kW		0.6		0.6
Cooling air flow, dryer	m³/min		22.2		22.2
Heat dissipated by the dryer cooling air at full load	kW		2.8		2.8
Refrigerant type			R134a		R134a
Refrigerant quantity	kg		air-cooled: 0.47 water-cooled: 0.61		air-cooled: 0.47 water-cooled: 0.70
Refrigerant quantity	lb		air-cooled: 1.04 water-cooled: 1.34		air-cooled: 1.04 water-cooled: 1.54
Cooling air flow referred to the air inlet grating of the compressor (air-cooled units)	m³/s	0.4	1.0	0.4	1.0
Cooling water consumption (water-cooled units)	l/min	30	30	30	30
Cooling water consumption (water-cooled units)	cfm	1.1	1.1	1.1	1.1
Water capacity (approx.)	l	20	20	20	20
Water capacity (approx.)	US gal	5.3	5.3	5.3	5.3
Mean sound pressure level ISO 2151 (air-cooled units)	dB(A)	69/3	69/3	69/3	69/3
Mean sound pressure level ISO 2151 (water-cooled units)	dB(A)	66/3	66/3	66/3	66/3

	Unit	WIS 30 V	WIS 30 V with dryer	WIS 30 V	WIS 30 V with dryer
Number of compression stages		1	1	1	1

	Unit	WIS 30 V	WIS 30 V with dryer	WIS 30 V	WIS 30 V with dryer
Frequency	Hz	50	50	60	60
Reference working pressure	bar(e)	7	7	7	7
Reference working pressure	psig	101.5	101.5	101.5	101.5
Maximum working pressure	bar(e)	13	12.75	12.5	12.25
Maximum working pressure	psig	189	185	181	178
Compressed air outlet temperature (° above ambient temperature)	°C	9	1	9	1
Compressed air outlet temperature (° above ambient temperature)	°F	48	36	48	36
Minimum motor shaft speed	rpm	2500	2500	2500	2500
Maximum motor shaft speed at reference working pressure	rpm	4850	4786	4850	4786
Maximum motor shaft speed at maximum working pressure	rpm	4700	4700	4700	4700
Nominal motor power, drive motor	kW	22	22	22	22
Nominal motor power, drive motor	hp	30	30	30	30
Pressure dew point (LAT dryer)	°C		3		3
Pressure dew point (LAT dryer)	°F		37		37
Pressure drop over dryer	bar		0.2		0.2
Pressure drop over dryer	psi		3		3
Power consumption dryer at full load (a=20°C and RH=100 %)	kW		0.5		0.5
Cooling air flow, dryer	m^3/min		22.6		22.6
Heat dissipated by the dryer cooling air at full load	kW		3.6		3.6

	Unit	WIS 30 V	WIS 30 V with dryer	WIS 30 V	WIS 30 V with dryer
Refrigerant type			R134a		R134a
Refrigerant quantity	kg		0.53		0.74
Refrigerant quantity	lb		1.17		1.63
Cooling air flow referred to the air inlet grating of the compressor (air-cooled units)	m³/s	2.8	3.2	2.8	3.2
Cooling water consumption (water-cooled units)	l/min	45	45	45	45
Cooling water consumption (water-cooled units)	cfm	1.6	1.6	1.6	1.6
Water capacity (approx.)	l	20	20	20	20
Water capacity (approx.)	US gal	5.3	5.3	5.3	5.3
Mean sound pressure level ISO 2151 (air-cooled units)	dB(A)	70/3	70/3	70/3	70/3
Mean sound pressure level ISO 2151 (water-cooled units)	dB(A)	67/3	67/3	67/3	67/3

	Unit	WIS 40 V	WIS 40 V with dryer	WIS 40 V	WIS 40 V with dryer
Number of compression stages		1	1	1	1
Frequency	Hz	50	50	60	60
Reference working pressure	bar(e)	7	7	7	7
Reference working pressure	psig	101.5	101.5	101.5	101.5
Maximum working pressure	bar(e)	13	12.75	12.5	12.25
Maximum working pressure	psig	189	185	181	178
Compressed air outlet temperature (° above ambient temperature)	°C	10	4	10	4
Compressed air outlet temperature (° above ambient temperature)	°F	48	36	48	36

	Unit	WIS 40 V	WIS 40 V with dryer	WIS 40 V	WIS 40 V with dryer
Minimum motor shaft speed	rpm	2500	2500	2500	2500
Maximum motor shaft speed at reference working pressure	rpm	6600	6600	6600	6600
Maximum motor shaft speed at maximum working pressure	rpm	8600	8517	8600	8517
Nominal motor power, drive motor	kW	30	30	30	30
Nominal motor power, drive motor	hp	20	20	20	20
Pressure dew point (LAT dryer)	°C		3		3
Pressure dew point (LAT dryer)	°F		37		37
Pressure drop over dryer	bar		0.2		0.2
Pressure drop over dryer	psi		3		3
Power consumption dryer at full load (a=20°C and RH=100 %)	kW		1.2		1.2
Cooling air flow, dryer	m³/min		40.6		40.6
Heat dissipated by the dryer cooling air at full load	kW		4.6		4.6
Refrigerant type			R134a		R134a
Refrigerant quantity	kg		0.54		0.66
Refrigerant quantity	lb		1.19		1.46
Cooling air flow referred to the air inlet grating of the compressor (air-cooled units)	m³/s	2.9	3.6	2.9	3.6
Cooling water consumption (water-cooled units)	l/min	45	45	45	45
Cooling water consumption (water-cooled units)	cfm	1.6	1.6	1.6	1.6
Water capacity (approx.)	l	20	20	20	20

	Unit	WIS 40 V	WIS 40 V with dryer	WIS 40 V	WIS 40 V with dryer
Water capacity (approx.)	US gal	5.3	5.3	5.3	5.3
Mean sound pressure level ISO 2151 (air-cooled units)	dB(A)	72/3	72/3	72/3	72/3
Mean sound pressure level ISO 2151 (water-cooled units)	dB(A)	69/3	69/3	69/3	69/3

10 Instructions for use

Instructions

1	This vessel can contain pressurised air; this can be potentially dangerous if the equipment is misused.
2	This vessel must only be used as a compressed air/water separator and must be operated within the limits specified on the data plate.
3	No alterations must be made to this vessel by welding, drilling or other mechanical methods without the written permission of the manufacturer.
4	Original bolts and new O-rings have to be used after opening for inspection. The maximum torque has to be taken into consideration: for M12 bolts 73 Nm (53.87 lbf.ft) (+/- 18).
5	The pressure and temperature of this vessel must be clearly indicated.
6	The safety valve must correspond with pressure surges of 1.1 times the maximum allowable operating pressure. It should guarantee that the pressure will not permanently exceed the maximum allowable operating pressure of the vessel.
7	Use only water as specified in section Water requirements to fill up the vessel.
8	This vessel has been designed and built to guarantee an operational lifetime in excess of 20 years and an infinite number of pressure load cycles. Therefore, there is no intrinsic need for a service inspection of the vessel when used within the design limits in its intended application. However, national legislation may require a service inspection.

11 Guidelines for inspection

Guidelines

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

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

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

12 Pressure equipment directives

Components subject to 97/23/EC Pressure Equipment Directive

Components subject to 97/23/EC Pressure Equipment Directive greater than or equal to category II

Description	PED Class
Safety valve	IV

Overall rating

The compressors conform to PED category < I (article 3, paragraph 3).

13 Declaration of conformity

EC 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.	Pressure equipment	97/23/EC		
b.	Machinery safety	2006/42/EC	EN ISO 12100 – 1 EN ISO 12100 – 2 EN 1012 – 1	
c.	Simple pressure vessel	2009/105/EC		
d.	Electromagnetic compatibility	2004/108/EC	EN 61000-6-2 EN 61000-6-4	
e.	Low voltage equipment	2006/95/EC	EN 60034 EN 60204-1 EN 60439	
f.	Outdoor noise emission	2000/14/EC		
g.	Equipment and protective systems in potentially explosive atmospheres	94/9/EC		
h.	Medical devices General	93/42/EEC	EN ISO 13845 EN ISO 14971 EN 737-3	
i.				

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

(Product company) 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	Product engineering	Manufacturing
Name		
Signature		
Date		

81679D

Typical example of a Declaration of Conformity document

(1): Contact address:

International Compressor Distribution NV

Boomsesteenweg 957

B-2610 Wilrijk (Antwerp)

Belgium

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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