Atlas Copco Stationary Air Compressor

ZR-55, ZR-75, ZR-90, ZT-55, ZT-75, ZT-90

Instruction book

www.atlascopco.com

Atlas Copco

Atlas Copco Stationary Air Compressors

Instrction book

ZR 55, ZR 75, ZR 90, ZT 55, ZT 75, ZT 90

From serial No. onwards :

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1 Safety precautions

1.1 Safety icons

Explanation

	Danger for life
	Warning
	Important note

1.2 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.

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 authorised, trained, specialised personnel.
4. The compressor is not considered capable of producing air of breathing quality. For air of breathing quality, the compressed air must be adequately purified according to the applicable legislation and standards.
5. Before any maintenance, repair work, adjustment or any other non-routine checks, stop the compressor, press the emergency stop button, switch off the voltage and depressurise 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.

Precautions during installation

1. The machine must only be lifted using suitable equipment in accordance with the applicable safety regulations. Loose or pivoting parts must be securely fastened before lifting. It is strictly forbidden to

dwell or stay in the risk zone under a lifted load. Lifting acceleration and deceleration must be kept within safe limits. Wear a safety helmet when working in the area of overhead or lifting equipment.

2. 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.
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. Pipework 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 pipework 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. These precautions apply to machinery processing or consuming air or inert gas. Processing of any other gas requires additional safety precautions typical to the application which are not included herein. Some precautions are general and cover several machine types and equipment; hence some statements may not apply to your machine.

1.3 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.

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 authorised, trained, specialised personnel.
4. The compressor is not considered capable of producing air of breathing quality. For air of breathing quality, the compressed air must be adequately purified according to the applicable legislation and standards.
5. Before any maintenance, repair work, adjustment or any other non-routine checks, stop the compressor, press the emergency stop button, switch off the voltage and depressurise 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.

Precautions during operation

1. 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.
2. 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.
3. Never operate the machine when there is a possibility of taking in flammable or toxic fumes, vapours or particles.
4. Never operate the machine below or in excess of its limit ratings.
5. 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.
6. People staying in environments or rooms where the sound pressure level reaches or exceeds 90 dB(A) shall wear ear protectors.
7. 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
8. If warm cooling air from compressors is used in air heating systems, e.g. to warm up a workroom, take precautions against air pollution and possible contamination of the breathing air.

9. Do not remove any of, or tamper with, the sound-damping material.
10. Never remove or tamper with the safety devices, guards or insulations fitted on the machine. Every pressure vessel or auxiliary installed outside the machine to contain air above atmospheric pressure shall be protected by a pressure-relieving device or devices as required.

	Also consult following safety precautions: Safety precautions during installation and Safety precautions during maintenance. These precautions apply to machinery processing or consuming air or inert gas. Processing of any other gas requires additional safety precautions typical to the application which are not included herein. Some precautions are general and cover several machine types and equipment; hence some statements may not apply to your machine.

1.4 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.

General precautions

1. The operator must employ safe working practices and observe all related local 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 authorised, trained, specialised personnel.
4. The compressor is not considered capable of producing air of breathing quality. For air of breathing quality, the compressed air must be adequately purified according to 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 depressurise 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.

Precautions during maintenance or repair

1. Always wear safety glasses.
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 the oil system. Oil tanks must be completely purged, e.g. by steam-cleaning, before carrying out such operations. Never weld on, or in any way modify, pressure vessels.
12. Whenever there is an indication or any suspicion that an internal part of a machine is overheated, the machine shall be stopped but no inspection covers shall be opened before sufficient cooling time has elapsed; this to avoid the risk of spontaneous ignition of the oil vapour 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 and vibration dampers, e.g. damping material on the bodywork and in the air inlet and outlet systems of the compressor, is in good condition. If damaged, replace it by genuine material from the manufacturer to prevent the sound pressure level from increasing.
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.

	Also consult following safety precautions: Safety precautions during installation and Safety precautions during operation. These precautions apply to machinery processing or consuming air or inert gas. Processing of any other gas requires additional safety precautions typical to the application which are not included herein. Some precautions are general and cover several machine types and equipment; hence some statements may not apply to your machine.

2 General description

2.1 Introduction

Description

This unit is a two-stage screw compressor driven by an electric motor. The compressor delivers oil-free, pulsation-free air.

ZR compressors are water-cooled.

ZT compressors are air-cooled.

Full-Feature compressors are aditionally provided with an air dryer which removes moisture from the compressed air. The dryer is integrated in the bodywork of the compressor.

Views of ZR

General view of ZR 55 up to ZR 90 Pack, ZR 55 up to ZR 90 Full-Feature and ZR 55 up to ZR 90 Pack with Energy Recovery

General view of ZR 55 up to ZR 90 Full-Feature with Energy Recovery

Front view of ZR 55 up to ZR 90 Pack

Rear view of ZR 55 up to ZR 90 Pack

Front view of ZR 55 up to ZR 90 Full-Feature with Energy Recovery

Views of ZT

General view of ZT 55 up to ZT 90 Pack

General view of ZT 55 up to ZT 90 Full-Feature

General view

Rear view

Main components

Ref	Name
AF	Air filter
AO	Air outlet
AS	Silencer
BV	By-pass valve, oil cooler
Ca1	Pre-aftercooler
Ca Ca2	Aftercooler
Ci	Intercooler
Co	Oil cooler
Daa	Automatic condensate outlet, aftercooler
Dai	Automatic condensate outlet, intercooler
Dmo	Oil drain valve, gear casing
Eh	High-pressure compressor element
El	Low-pressure compressor element
ER	Energy recovery system
ERwi	Water inlet, energy recovery system
ERwo	Water outlet, energy recovery system
EWDa	Electronic water drain, aftercooler

Ref	Name
EWDi	Electronic water drain, intercooler
E1	Elektronikon regulator
FC	Oil filler cap
FN	Cooling fan
IMD/IND	Integrated dryer
M1	Drive motor
M25	Fan motor
MTa	Moisture trap, aftercooler
MTi	Moisture trap, intercooler
OF	Oil filter
S2	Emergency stop button
SG	Oil level sight-glass
SVd	Safety valve, dryer
SVh	High-pressure safety valve
SVl	Low-pressure safety valve
TV	Load/no-load valve
US	Silencer
WI	Cooling water inlet
WO	Cooling water outlet
Y1	Loading solenoid valve
1	Flange, connection to MD dryer
2	Flange, access to silica gel bags

Optional equipment

Following equipment is available as an option:

Full-Feature

The compressor is additionally provided with an IMD adsoption dryer. The dryer is integrated in the bodywork and removes moisture from the compressed air.

Connections

This compressor can be provided on the compressed air outlet and water pipes with:

ANSI flanges

Motor temperature protection

Thermistors are embedded in the windings of the drive motor to warn the operator if the temperature becomes too high and to shut down the compressor, thereby protecting the motor from overheating.

Teflon-free compressor elements

The rotors of the compressor elements have an epoxy-based coating.

Automatic water shut-off

A water shut-off valve is provided in the cooling water system to shut off the system when the compressor is not in operation.

Energy recovery

The compressor is provided with an Atlas Copco energy recovery system to recover the major part of the compression heat in the form of hot water.

SPM monitoring

A number of vibration sensors are provided on the drive motor and compressor elements. The readings can be called up on the display of the Elektronikon regulator.

High ambient temperature (HAT)

The compressor is specially designed for continuous operation under humid and high ambient temperature conditions. The maximum ambient temperature is 50˚C (122˚F).

Prepared for MD dryer with or without Pressure Dewpoint Sensor and/or Low load heater

The compressor is prepared for easy connection of an MD dryer. Plug in the connectors and connect the piping to the MD dryer and the compressor/MD combination is ready to start. The proper piping, the wiring and the connectors will be delivered with the MD dryer.

The settings and parameters for the MD dryer are downloaded in the Elektronikon regulator of the compressor.

Anchor pads

Steel plates, fitting in the forklift slots, and bolts are shipped loose with the compressor. With these plates and bolts, the compressor frame can be fixed to the floor.

Anti-condensation heaters

Electric heaters are installed in the motor windings and connected to the compressor cubicle. When the compressor is stopped, the heaters are automatically switched on. The heaters in the motor will prevent condensation during stand-still.

PDP sensor

The pressure dewpoint of the compressed air leaving the IMD dryer is continuously shown on the display of the Elektronikon regulator. This allows to monitor the performance of the dryer and to make sure that the compressed air is dry enough for the application.

Low load compensator

The low load installation allows the dryer to be operated in low load conditions of the compressor. At these conditions (compressor in unload) the pressure dewpoint is maintained by purging a small amount of heated, dryed air through the rotor of the dryer.

The low load compensator is needed when the load cycle of the compressor is below 40 %.

Full-Feature ND

The Z Full-Feature ND compressor has an integrated heat of compression rotary drum dryer. The regeneration air passes over a heater. The heater maintains a preset regeneration temperature to a have guaranteed dew point at stated conditions. A thermostatic control puts on the heater and shuts it off automatically based on the regeneration temperature requirements.

2.2 Air flow

Flow diagram, ZR

Flow diagram, ZR Full-Feature

Flow diagram, ZR Full-Feature ND and ZR Full-Feature with Low Load option

Flow diagram, ZT

Flow diagram, ZT Full-Feature

Flow diagram, ZT Full-Feature ND and ZT Full-Feature with Low Load option

Ref	Name
(1)	Air inlet
(2)	Air flow
(3)	Oil flow
(4)	Air outlet
(5)	Water flow

Air flow

Air drawn through filter (AF) is compressed in low-pressure compressor element (El) and discharged to intercooler (Ci). The cooled air is further compressed in high-pressure compressor element (Eh) and discharged through silencer (AS) and aftercoolers. A check valve (CV) is provided downstream of the silencer.

The wet air from the aftercooler enters water separator (18) via the nozzle of ejector (14). In demister (19), the water droplets are removed from the air. The air is then led through rotor (12), which adsorbs the water vapour.

The compressed air leaves the compressor via the air outlet.

Regenerating circuit of the dryer

Hot regeneration air is branched off from the aftercooler. The regeneration air passes through shut-off valve (8), throttle valve (9) and strainer (10), and is blown through the wet rotor channels.

The hot saturated air is then cooled down in regeneration air cooler (11). The regeneration air is then mixed with the wet compressed air from the compressor aftercooler.

2.3 Condensate drain system

Flow diagram, ZR

Flow diagram, ZT

Explanation of arrows

Ref	Name
(1)	Air inlet
(2)	Air flow
(3)	Oil flow
(4)	Air outlet
(5)	Water flow

Description

Two condensate traps are installed: one downstream of the intercooler (MTi) to prevent condensate from entering compressor element (Eh) and one downstream of the aftercooler (MTa) to prevent condensate from entering the air outlet pipe. The condensate traps are connected to Electronic Water Drains (EWDi and EWDa respectively).

The condensate enters the electronic water drain via inlet (1) and accumulates in collector (2). A capacitive sensor (3) continuously measures the liquid level. As soon as the collector is filled up to a certain level, pilot valve (4) is activated and diaphragm (5) opens outlet (6), discharging the condensate. When the collector has been emptied, the outlet closes quickly without wasting compressed air.

When the controller registers a malfunction, the red alarm LED starts flashing and the electronic drain valve will automatically change to the alarm mode, opening and closing the valve according to a sequence as shown below.

This condition continues until the fault is remedied. If the fault is not remedied automatically, maintenance is required.

Testing the Electronic water drain

Functional test

Briefly press the TEST button and check that the valve opens for condensate discharge.

Checking the alarm signal

- Press the test button for at least 1 minute.
- Check that the alarm LED flashes.
- Release the test button.

2.4 Oil system

Flow diagram, ZR

Flow diagram, ZT

Explanation of arrows

Ref	Name
(1)	Air inlet
(2)	Air flow
(3)	Oil flow
(4)	Water flow
(4) (5)	Air outlet

Oil system

On ZR compressors, oil is circulated by pump (OP) from the sump of the gear casing to cooler (Co). From there, the oil flows through filter (OF) towards the bearings and timing gears.

On ZT compressors, oil is circulated by pump (OP) from the sump of the gear casing to cooler (Co). Then, the oil flows through the cooling jackets of compressor elements (El and Eh). From there, the oil flows through filter (OF) towards the bearings and timing gears.

Valve (BV) opens if the oil pressure should rise above a given value.

2.5 Cooling system

Flow diagram, ZR

Flow diagram, ZR Full-Feature

Flow diagram, ZT

Flow diagram, ZT Full-Feature

Explanation of arrows

Ref	Name
(1)	Air inlet
(2)	Air flow
(3)	Oil flow
(4)	Air outlet
(5)	Water flow

Cooling system, ZR compressors

The cooling system has two circuits:

- One for the oil cooler (Co) and the cooling jackets of both compressor elements (Eh and El).
- One for intercooler (Ci) and aftercooler (Ca).

Full-Feature compressors have an extra cooling circuit for the regeneration cooler of the integrated dryer.

Cooling system, ZT compressors

The compressors are provided with an air-cooled oil cooler (Co), intercooler (Ci), pre-aftercooler (Ca1) and aftercooler (Ca2). An electric motor-driven fan (FN) generates the cooling air.

Full-Feature compressors have an aditional regeneration air cooler (11); the cooling air for this cooler is generated by an extra fan (13).

2.6 Energy recovery

General

The system recovers the major part of the compression heat. The percentage of shaft input power available for recovery is between 80 and 95, depending on the operating conditions.

If an MD dryer is installed downstream of the compressor, this percentage is reduced to approx. 70 of the shaft input instead of approx. 90, as part of the heat in the compressed air is used for regeneration in the drying process.

A complete energy recovery system includes:

- Compressor with modified cooling system (ZR)
- A pump unit (PU) to transfer the recovered energy from the compressor cooling system to the heat consumer (HC)
- The heat consumer (HC), i.e. the equipment to transfer the energy to the industrial process

Modified cooling water system

The compressor cooling system has been modified to achieve both high cooling water temperatures and sufficient cooling for the compressor.

The cooling water enters the oil cooler and then flows through the high-pressure compressor element, the low-pressure compressor element and finally the intercooler and the aftercooler. This sequence ensures optimal temperature differences with relation to the heat transfer in the individual components.

On Full-Feature compressors, additional connections are provided for the water circuit of the additional aftercooler and the cooler of the IMD dryer. To ensure that the MD dryer works properly, low-temperature cooling water should be used for this cooling water circuit. The heat of this cooling water circuit is not recovered by the energy recovery system.

Pump unit

Atlas Copco supplies pump units to transfer the energy recovered from the compressor to the heat consumer (HC). The pump unit constitutes a closed water circuit with the compressor cooling system.

Two water pumps (WP1/2) are fitted. One pump circulates the hot cooling water from the compressor through the heat consumer and back to the compressor. The other is a stand-by pump. Check valves (CV1/2) at the delivery side of the pumps prevent backflow of water in the stand-by pump. The pump unit is fitted with a make-up water connection, an air trap with automatic de-aeration device (AT), a pressure and temperature gauge (PI and TI), a safety valve (SV) and an expansion tank (ET).

Cooling water requirements

Closed recirculating water systems minimise make-up water requirements. Therefore, it is economically feasible to use softened water to eliminate the problem of scaling deposits.

Corrosion control is important. The best results are obtained by adding corrosion inhibitors as used in engine cooling systems.

Using anti-freeze products is an alternative solution to avoid problems, e.g. adding 20 % to 30 % ethylene-glycol based anti-freeze to the tap water.

For open cooling water systems (e.g. boiler feed water preparation), consult the Atlas Copco Customer Centre to avoid problems related to deposit control, corrosion control and microbiological growth control.

Water flow regulation through heat exchangers

Depending on the amount of energy transferred in the heat consumer (HC), the heat exchanger (HE) of the pump unit is completely or partly by-passed by means of a thermostatic valve (RV2). The valve is normally adjusted to achieve a cooling water temperature of 40 ˚C (corresponding to the maximum allowable temperature at the compressor inlet). It is advisable to adjust the setting of the valve as close as possible to the temperature of the cooling water returning from the heat consumer (HC).

Depending on the amount of energy transferred in the heat consumer (HC), the heat exchanger (HE) of the pump unit is completely or partly by-passed by means of a thermostatic valve (RV2). The valve is normally adjusted to achieve a cooling water temperature of 104 ˚F (corresponding to the maximum allowable temperature at the compressor inlet). It is advisable to adjust the setting of the valve as close as possible to the temperature of the cooling water returning from the heat consumer (HC).

Sufficient low-temperature cooling water must be available for the heat exchanger to achieve a water temperature that does not exceed 40 ˚C/104 ˚F.

Electrical system

The pumps (WP1 and WP2) are driven by an electric motor. Each motor is equipped with manual starting equipment including a circuit breaker.

The first time it is started, check that the rotation direction matches the direction indicated by the arrows on the motor flanges. If necessary, stop the unit, switch off the voltage and reverse two incoming electric lines.

Important remarks

Compressed air quality and reliability of any compressor, dryer or other equipment should never be made subordinate to the energy recovery system. In some cases, especially installations where air dryers are installed, an additional aftercooler is required to reduce the compressor air outlet temperature to a level at which the dryers operate at maximum efficiency. This aftercooler and the dryer (if water-cooled) need to be cooled separately by low-temperature water. Consult the Atlas Copco Customer Centre.

The general temperature level of compressors with a modified cooling system for energy recovery is approx. 20 to 25 ˚C (68 to 77 ˚F) higher than the level of compressors with a standard cooling system, resulting in a slight decrease in free air delivery and a slight increase in shaft power.

In case the compressors operate in high ambient temperatures and with high water inlet temperatures, the maximum working pressure is 0.5 bar (7.25 psi) lower than for standard compressors. Consult the Atlas Copco Customer Centre.

Settings - limitations

Item	Setting
Maximum cooling water temperature at compressor outlet	90 ˚C (85 ˚C if MD dryer is fitted) 194 ˚F (185 ˚F if MD dryer is fitted)
Maximum cooling water temperature at compressor inlet	40 ˚C 104 ˚F
Safety valve opening pressure	2.5 bar(e) 36.3 psig

2.7 Low load compensator

Description

Reference	Name
1	Low load during unload cycle
2	Heater
3	Air net
4	Rotor
5	Motor
6	Cooler
7	Solenoid valve
8	Silencer
9	Air outlet (compressor)
10	Mechanical link
11	Drain
12	Water
13	No air flow
14	Air flow
15	Flow direction

Reference	Name
16	Regeneration air (compressor)

Using the low load installation will allow the dryer to operate in low load conditions of the compressor. At these conditions (compressor in unload) the PDP is maintained by purging a small amount of heated, dryed air through the rotor (4).

This is needed when the load cycle is below 40 % (consult your Atlas Copco Customer Centre).

2.8 Electrical system

Main components

The electrical system mainly includes:

- Elektronikon® regulator
- Emergency stop button (S2)
- Electric cabinet
- Drive motor (M1)
- Pressure and temperature sensors

Elektronikon regulator (1) and emergency stop button (S2)

Electric cabinet

Typical example

Typical example

Drive motor (M1)

Drive motor (M1)

3 Elektronikon regulator

3.1 Elektronikon® regulator

Control panel

Introduction

In general, the Elektronikon regulator has following functions:

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

Automatic control of compressor operation

The regulator maintains the net pressure between programmable limits by automatically loading and unloading the compressor. A number of programmable settings, e.g. the unloading and loading pressures, the minimum stop time and the maximum number of motor starts are taken into account.

The regulator 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 these measurements exceeds the programmed shut-down level, the compressor will be stopped. This will be indicated on display (1) and general alarm LED (2) will blink.

Remedy the trouble and reset the message. See also the Status data menu.

⚠	Before remedying, consult the 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, a message will appear on display (1) and general alarm LED (2) will light up, to warn the operator that the shut-down warning level is exceeded.

The message disappears as soon as the warning condition disappears.

Service warning

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

Automatic restart after voltage failure

The regulator has a built-in function to automatically restart the compressor if the voltage is restored after voltage failure. For compressors leaving the factory, this function is made inactive. If desired, the function can be activated. Consult the Atlas Copco Customer Centre.

⚠	If 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 within a programmed time period. The power recovery time (the period within which the voltage must be restored to have an automatic restart) can be set between 1 and 3600 seconds or to “Infinite”. If the power recovery time is set to “Infinite”, the compressor will always restart after a voltage failure, no matter how long it takes to restore the voltage. A restart delay can also be programmed, allowing e.g. two compressors to be restarted one after the other.

3.2 Control panel

Elektronikon regulator

Control panel

Parts and functions

Reference	Designation	Function
1	Start button	Button to start the compressor. LED (8) lights up indicating that the Elektronikon regulator is operative.
2	Display	Shows messages about the compressor operating condition, a service need or a fault.
3	Scroll keys	Keys to scroll upwards or downwards through the display.
4	Tabulator key	Key to select the parameter indicated by the horizontal arrow. Only the parameters followed by an arrow pointing to the right can be modified.
5	Function keys	Keys to control and program the compressor.
6	Voltage on LED	Indicates that the voltage is switched on.
7	General alarm LED	Is lit if a shut-down warning condition exists.
7	General alarm LED	Flashes if a shut-down condition exists, if an important sensor is out of order or after an emergency stop.
8	Automatic operation LED	Indicates that the regulator is automatically controlling the compressor.
9	Stop button	Button to stop the compressor. LED (8) goes out.
S2	Emergency stop button	Push button to stop the compressor immediately in the event of an emergency. After remedying the trouble, unlock the button by pulling it out.

3.3 Function keys

Control panel

Function keys

The keys (1) are used:

- To manually load/unload the compressor (not for VSD compressors)
- To call up or to program settings
- To reset a motor overload, shut-down or service message, or an emergency stop
- To access all data collected by the regulator

The functions of the keys vary depending on the displayed menu. The actual function is indicated just above the relevant key. The most common functions are listed below:

Designation	Function
“Add”	To add compressor start/stop commands (day/hour)
“Back”	To return to a previously shown option or menu
“Cancel”	To cancel a programmed setting when programming parameters
“Delete”	To delete compressor start/stop commands
“Help”	To find the Atlas Copco internet address
“Limits”	To show limits for a programmable setting
“Load”	To load the compressor manually
“Mainscreen”	To return from a menu to the main screen
“Menu”	Starting from the main screen, to have access to the submenus
“Menu”	Starting from a submenu, to return to a previous menu
“Modify”	To modify programmable settings
“Program”	To program modified settings
“Reset”	To reset a timer or message
“Return”	To return to a previously shown option or menu
“Unload”	To unload the compressor manually
“Extra”	To find the module configuration of the regulator

3.4 Scroll keys

Control panel

The keys (1) allow the operator to scroll through the display.

As long as a downwards pointing arrow is shown at the utmost right position of the display, the scroll key with the same symbol can be used to see the next item.

As long as an upwards pointing arrow is shown at the utmost right position of the display, the scroll key with the same symbol can be used to see the previous item.

When the scroll key is kept pressed, the scrolling is continued.

3.5 Emergency stop button

Control panel

In case of emergency, press button (S2) to stop the compressor immediately.

At the occurrence of an emergency stop, the compressor element is stopped immediately and the solenoid valve will be deactivated by Elektronikon ® regulator. No unload status is reached. The check valve prevents oil flow back from reversed rotation of the compressor element.

⚠	Before starting any maintenance or repairs, 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 depressurize the air system.
	Apply all relevant Safety precautions.

3.6 Control programs

Description

In order to facilitate programming and controlling, menu-driven control programs have been implemented in the regulator.

Menu flow for ZR/ZT 55 up to ZR/ZT 90 (simplified)

Main menu

Program	Function
Main screen	Shows in short the operation status of the compressor. Is the gateway to all functions.
“Status data”	Calls up the status of the compressor protection functions (shut-down, shut-down warning, service warning and warning). Resets a shut-down, motor overload and service condition.

Program	Function
“Measured data”	Calls up the data currently measured and the status of a number of inputs.
“Counters”	Calls up the running hours, regulator (module) hours and number of motor starts.
“Test”	Display test.
“Modify parameters”	**Modifies the settings for:** • Parameters (e.g. loading and unloading pressures) • Protections (e.g. temperature shut-down level) • Service plans (timers for service plans) • Clock functions (automatic compressor start/stop/pressure band commands) • Configuration (time, date, display language,...)
“Service”	Calls up service plans and resets the timers after carrying out the service actions belonging to a plan.
“Saved data”	Calls up the saved data: last shut-down, last emergency stop data.
“Unload/Load”	Loads and unloads the compressor manually.

3.7 Calling up menus

Description

Control panel

When the voltage is switched on, the Main screen is shown automatically.

Example of Main screen of ZR/ZT 55 up to ZR/ZT 90

“Compressor Outlet”		7.5 bar	
.			
“Automatically Loaded”			↓
“Menu”		“Unload”	
F1	F2	F3	

After pressing the “Menu” (F1) key, the option “Status Data” will be followed by a horizontal arrow:

- Either press the tabulator key (2) to select this menu,
- or use the arrow down key (1) until the desired submenu is followed by a horizontal arrow and then press the tabulator key (2) to select this menu.

The arrow down key (1) can be used for a quick look at the actual compressor status.

3.8 Main screen menu

Function

Control panel

The Main screen menu shows the status of the compressor operation and is the gateway to all functions implemented in the regulator.

Procedure

The Main screen is shown automatically when the voltage is switched on.

If the function or arrow keys (1, 2 and 3) are not used for some minutes, the regulator will automatically return to the Main screen.

Whenever displayed on a submenu screen, press the “Mainscreen” (F1) key to return to the Main screen.

Example of Main screen of ZR/ZT 55 up to ZR/ZT 90

“Compressor Outlet”		7.5 bar	
.			
“Automatically Loaded”			↓
“Menu”		“Unload”	
F1	F2	F3	

The display indicates:

- The name of the sensor and its actual reading
- Messages regarding the compressor operating condition
- Just above the function keys (3), the actual functions of these keys

3.9 Status data menu

Warning

	Before starting any maintenance or repairs, press the stop button (4), wait until the compressor has stopped, press the red emergency stop button and open the isolating switch (customer's installation) to switch off the voltage to the compressor.
	Close the air outlet valve and depressurize the air system.

Function

Control panel

The Status data submenu gives information regarding the status of the compressor protection functions (shut-down, shut-down warning and service warning) and allows resetting of a shut-down, motor overload and service condition.

Procedure

Starting from the Main screen (see Main screen menu):

- Press the key “Menu” (F1): the option “Status Data” will be followed by a horizontal arrow.
- Press the tabulator key (2).

No message exists

- General alarm LED (1) is out and the message on the display will indicate that all conditions are normal:

“All Conditions Are OK”			
.			
.			
“Menu”	“Help”		
F1	F2	F3	

A shut-down message exists

- In case the compressor is shut down, LED (1) will blink.
- In case of a shut-down due to too high a temperature at the outlet of the compressor element:

“Element Outlet”		114˚C	
.			
“Shutdown”	“Maximum”	110˚C	
“Menu”***	“Help”	***”Reset”	
F1	F2	F3	

- The indicators (***) are blinking. The screen shows the actual reading and the shut-down setting.
- It remains possible to scroll through other menus, e.g. to check the values of other parameters. When returning to the “Status Data” menu, the option “Shutdowns” will blink. This option can be selected by pressing the tabulator key (2) to return to the above shut-down screen.

Shut-down reset

- Switch off the voltage and remedy the trouble. After remedying and when the shut-down condition has disappeared, switch on the voltage and press the key “Reset” (F3).
- Press the keys “Menu” and “Mainscreen” to return to the Main screen and restart the compressor by means of start button (3).

A shut-down warning message exists

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

- If a shut-down warning exists, LED (1) is alight. The Main screen will change into a screen similar to the one below:

“Compressor Outlet”		7.0 bar	
.			
***	“Shutdown Warning”	***	↓
“Menu”***		***”Unload”	
F1	F2	F3	

- The message “Shutdown Warning” appears.
- Press the key “Menu” (F1) and the tabulator key (2) to select the “Status data” menu; the option “Protection” is blinking.
- Scroll to this option and select it by pressing the tabulator key (2). A screen similar to the one below appears:

“Element 1 Outlet”		103˚C	
.			
“Shutd. Warn.” “Maximum”		100˚C	
“Menu”***		***	
F1	F2	F3	

- The screen indicates that the temperature at the outlet of compressor element 1 exceeds the programmed shut-down warning level.
- If necessary, stop the compressor by means of stop button (4) and wait until it has stopped.
- Switch off the voltage, inspect and remedy.
- The warning message will disappear automatically as soon as the warning condition disappears.

A service warning exists

- LED (1) is alight. The Main screen will change into a screen similar to the one below:

“Compressor Outlet”		7.0 bar	
.			
“*Service Required*”			
“Menu”***		***”Unload”	
F1	F2	F3	

- The indicators (***) are blinking and the service warning message appears.
- Press the key Menu (F1) and the tabulator key (2) to select the “Status data” menu: the option “Service” is blinking.
- Scroll to this option and select it by pressing the tabulator key (2); two options may blink:
  - “Inputs”: if the programmed service level of a component is exceeded (e.g. the maximum pressure drop of the air filter).
  - “Plan”: if a service plan interval is exceeded.
- Stop the compressor and switch off the voltage.
- In case the service message was referring to “Inputs” (air filter): replace the filter, switch on the voltage, scroll in the “Status Data” menu to “Inputs” and press the “Reset” key to reset the service message.
- In case the service message was referring to “Plan”: carry out the service actions related to the indicated plans. Reset the timers of the related plans. Contact your Atlas Copco Customer Centre. See Service menu.

3.10 Measured data menu

Control panel

Function

To call up information regarding the actually measured data and the status of some inputs such as the motor overload protection. Consult the menu flow in section Control programs.

Procedure

Starting from the Main screen (see Main screen menu):

- Press the key “Menu” (F1).
- Press the arrow down key (1) until “Measured Data” is followed by a horizontal arrow.
- Activate the menu by pressing the tabulator key (2).
- By pressing the scroll keys (1), a number of actually measured data can be found.
- If one of the sensors is linked to a shut-down, service or warning function, both the actually measured value as well as the corresponding shut-down, warning or service level can be called up by pressing key (2).

3.11 Counters menu

Control panel

Function

To call up:

- The running hours
- The loaded hours
- The number of motor starts
- The number of hours the regulator (module) has been under tension
- The number of load cycles

Procedure

Starting from the Main screen (see Main screen menu):

- Press the key “Menu” (F1).
- Press the arrow down key (1) until “Counters” is followed by a horizontal arrow.
- Press the tabulator key (2) to activate the menu.
- By pressing the arrow key (1), the above-mentioned data can be found.

Example of a Counters screen

.			
“Running Hours”		2455 “hrs”	
“Loaded Hours”		1973 “hrs”	
“Motor Starts”		945	↓
“Menu”			
F1	F2	F3	

3.12 Test menu

Control panel

Function

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

Procedure

- Starting from the Main screen (see Main screen menu), press the “Menu” (F1) key.
- Press arrow down key (1) until “Test” is followed by a horizontal arrow.
- Activate the menu by pressing the key (2).

To perform a display test:

- If necessary, scroll through the menu until “Display Test” is followed by a horizontal arrow.
- Press the key (2).
- During testing, the regulator will generate a series of patterns on the display which enable the operator to check that each pixel still functions normally; the LEDs are lit at the same time.
- Press the “Menu” key (F1) to return to the submenu.

3.13 Modify parameters menu

Function

To modify a number of programmable settings:

- Parameters (see section Modifying parameters).
- Protections (see section Modifying protections).
- Service plan settings (see section Modifying service plan settings).
- Clock function settings (see section Modifying clock function settings).
- Configuration settings (see section Modifying configuration settings).

3.14 Modifying parameters

Control panel

Function

To modify a number of parameters. Consult the menu flow in section Control programs.

Procedure

Starting from the Main screen (see Main screen menu):

- Press the key “Menu” (F1).
- Press the arrow down key (1) until “Modify Parameters” is followed by a horizontal arrow.
- Activate the menu by pressing the tabulator key (2).
- The first item “Parameters” will be followed by a horizontal arrow.
- Press the tabulator key (2): the first items and their settings will appear.
- Press the arrow down key (1) until the parameter to be modified is followed by a horizontal arrow.

Modifying the loading pressure setpoint

If desired, the operator can program two pressure bands (Loading pressure/Unloading pressure and Loading pressure 2/Unloading pressure 2).

- Consult the section Procedure to select “Loading Pressure”.

- The screen shows the current setting. To modify this setting, press the key “Modify” (F2); the setting will blink.
- The key “Limits” (F2) can be used to find out the limitations for the parameter.
- Use the scroll keys (1) to change the setting.
- Press the key ”Program” (F1) to program the new value or the key “Cancel” (F3) to cancel the modification operation.
- The procedure to modify other parameters pressure is similar.

	The regulator will not accept new values beyond the limitations. Press the key “Limits” to check the limitations for the parameter. Consult Programmable settings for the most important settings.

3.15 Modifying regulation settings

Control panel (compressor)

Function

To modify the low load operation mode of the dryer.

Procedure

Starting from the Main screen:

- Press the key “Menu” (F1).
- Press the arrow down key (1) until “Modify Parameters” is followed by a horizontal arrow.
- Activate the menu by pressing the tabulator key (2).
- The first item “Parameters” will be followed by a horizontal arrow.
- Press the tabulator key (2) to activate the menu.
- Press the arrow down key (1) until the option “Low Load” is followed by a horizontal arrow.
- Press the tabulator key (2); the following screen appears:

“Low Load”			↑
“Unconditionally Activated”			
.			
“Menu”	“Modify”		
F1	F2	F3	

- The screen shows that the low load setting is “Unconditionally Activated”. To modify this setting, press the “Modify” key (F2); the setting wil blink.
- Use the scroll keys to change the setting.
- Press the “Program” key (F1) to program the new mode or the “Cancel” key (F3) to cancel the modification operation.

It is possible to program three operation settings:

- “Unconditionally Activated” (standard setting): Low load option always on.
- “Automatically Activated”: Calculates the load cycle in a window of an hour. If the load cycle is lower than 40 %, the low load option is activated. After the low load cycle reaches 60 %, the low load option will be deactivated.
- “Disabled”: On compressors with Low load option or compressors with IND dryer, always set this option to off.

3.16 Modifying protection settings

Control panel

Function

To modify protection settings:

- “Shutdown”, e.g. for the compressor element outlet temperature
- “Shutdown warning”, e.g. for the compressor element outlet temperature
- “Warning”, e.g. for the dew-point temperature
- “Service warning”, e.g. for the maximum pressure drop over the air filter

To check various compressor conditions, e.g. the status of the emergency stop button. Some parameters cannot be modified.

Procedure

Starting from the Main screen (see Main screen menu):

- Press the “Menu” (F1) key.
- Press the arrow down key (1) until “Modify parameters” is followed by a horizontal arrow.
- Activate the menu by pressing the tabulator key (2).
- Press the arrow down key (1) until “Protections” is followed by a horizontal arrow.
- Press the tabulator key (2): the first items will appear.
- Press the arrow down key (1) until the item to be modified is followed by a horizontal arrow and press the tabulator key (2).

Modifying settings for the compressor element temperature

- Consult the section Procedure above to select the parameter “Element 1 outlet”.
- The screen (see example below) shows the current temperature on the first line and the shut-down setting on the third line. To modify the setting, press the “Modify” (F2) key; the setting will flash.
- The “Limits” (F2) key can be used to find out the limits for the parameter.
- Use the scroll keys (1) to change the setting.
- Press ”Program” (F1) to program the new value or “Cancel” (F3) to cancel the modification operation.
- The screen (see example below) shows a horizontal arrow indicating that the shut-down warning value can be modified (the procedure is similar to the description above).
- The procedure to modify other items is similar. For some settings, a delay can be programmed.

Example of the screen for ZR/ZT compressors

“Element 1 outlet”		178˚C	
			→
“Shutdown”	“Maximum”	235˚C	
“Menu”	“Modify”		
F1	F2	F3	

	The regulator will not accept new values beyond the limits. Press the key “Limits” to check the limits for the parameter. Consult Programmable settings for the most important settings.

3.17 Modifying service plans

Function

To modify the hour intervals for the service levels.

Service plans

The service actions to be carried out are grouped in plans called Service level A, B, C or D. When reaching an interval, a message will appear on the screen indicating which Service plans are to be carried out.

	Always consult your Atlas Copco Customer Centre in case any timer should be changed. The intervals must not exceed the programmed nominal values.

3.18 Programming clock function

Control panel

Function

To program:

- Time-based start/stop commands for the compressor
- Time-based change-over commands for the net pressure band

Programming start, stop and pressure band commands

In this example, the compressor will be programmed as follows:

- On Monday at 06:15 starting in pressure band 1
- On Friday at 18:00 changing over to pressure band 2
- On Saturday at 18:00 stopping

Starting from the Main screen (see Main screen menu):

- Press the key “Menu” (F1).
- Press the arrow down key (1) until “Modify Parameters” is followed by a horizontal arrow.
- Activate the menu by pressing tabulator key (2).
- Use the arrow down key (1) to scroll until the option “Clock Function” is followed by a horizontal arrow.
- Activate the menu by pressing tabulator key (2); following screen appears:

“Clock Function”			→
		“Not Activated”	
.			
“Menu”	“Modify”	“Delete”	
F1	F2	F3	

- Press the tabulator key (2), following screen appears:

“Monday”			→
“Tuesday”			
“Wednesday”			↓
“Menu”		“Delete”	
F1	F2	F3	

- Use the scroll keys (1) until the day on which a command must be programmed is followed by a horizontal arrow. Press the tabulator key (2); following screen appears:

--:--	----------		→
--:--	----------		
--:--	----------		↓
“Menu”	“Modify”	“Delete”	
F1	F2	F3	

- Press the key “Modify” (F2). The first two dashes will flash. Use the scroll keys (1) to enter “06”. Press the tabulator key (2) to jump to the following two dashes. Use the scroll keys to enter “15”. Press the tabulator key to jump to the row of dashes. Use the scroll keys to enter the command “Start Compressor”.
- Press the key “Program” to program the command : “06:15 Start Compressor”.
- Press the arrow down key (1): the horizontal arrow indicates that the second line is accessible. Press the key “Modify” and modify this line in a similar way to the following command: ”06:15 Pressure Band 1”.
- Press the key “Menu” (F1) and scroll to “Friday”:

“Thursday”			↑
“Friday”			→
“Saturday”			↓
“Menu”		“Delete”	
F1	F2	F3	

- Programming the command to change over at 18 o’clock to “Pressure Band2” is carried out in a similar way as described above.
- Press the key “Menu” (F1) and scroll to “Saturday”. Programming the command “18:00 Compressor Stop” is carried out in a similar way as described above.

Activating/deactivating the timer

- The timer can only be activated if at least one start/stop command is programmed.
- Starting from the Main screen, press the key “Menu” (F1).
- Use arrow down key (1) until the option “Modify Parameters” is followed by a horizontal arrow.

- Press the tabulator key (2) to activate the menu.
- Use the arrow down key until the option “Clock Function” is followed by a horizontal arrow, press the tabulator key (2), following screen appears:

“Clock Function”			→
		“Not Activated”	
.			
“Menu”	“Modify”	“Delete”	
F1	F2	F3	

- Press the key “Modify”, “Not Activated” starts blinking.
- Press the arrow down key (1) “Not Activated” changes to “Activated”.
- Press the key “Program”.

	It is necessary to program the start/stop commands in successive order timewise. Program the commands from Monday till Sunday, e.g.: • 07.30 Start Compressor • 07.30 Pressure Band 1 • 08.30 Pressure Band 2 • 18.00 Stop Compressor
	Make sure that the timer function is activated (“Activated”). If not, the programmed start/stop commands will not be executed.
	The timer can be deactivated again. In this case, the programmed start/stop commands will not be executed (but remain in the memory of the regulator).

Modifying a command

Suppose the command to stop the compressor on Saturday 18:00 is to be modified, i.e. stopping at 17 o'clock instead of 18 o'clock.

- Starting from the Main screen, press the key “Menu” (F1), press the arrow down key (1) until the option “Modify Parameters” is followed by a horizontal arrow.
- Activate the menu by pressing the tabulator key (2).
- Use the arrow down key (1) to scroll until the option “Clock Function” is followed by a horizontal arrow. Press the tabulator key, following screen appears:

“Clock Function”			→
		“Not Activated”	
.			
“Menu”	“Modify”	“Delete”	
F1	F2	F3	

- Press the tabulator key (2), following screen appears:

“Monday”			→
“Tuesday”			
“Wednesday”			↓
“Menu”		“Delete”	
F1	F2	F3	

- Scroll through the display until “Saturday” is followed by a horizontal arrow. Press the tabulator key (2). If necessary, scroll through the commands until the command to be modified is followed by a horizontal arrow. Press the key “Modify”, the first two digits of the command start blinking. Modify as required using the scroll keys, i.e. in the example above change “18” into “17” using the arrow up key (1).
- If necessary, press the tabulator key (2) to go to the next field to be modified, the minutes indication and the start/stop/pressure band indication.
- Press the key “Program” to program the new command or the key “Cancel” to quit without reprogramming.

Adding a command at the end of an existing list

- Starting from the Main screen, press the key “Menu” (F1), press the arrow down key until the option “Modify Parameters” is followed by a horizontal arrow.
- Activate the menu by pressing the tabulator key (2).
- Use the arrow down key (1) to scroll until the option “Clock Function” is followed by a horizontal arrow. Press the tabulator key, following screen appears:

“Clock Function”			→
		“Not Activated”	
.			
“Menu”	“Modify”	“Delete”	
F1	F2	F3	

Suppose the command to stop the compressor at 18:00 must be added to the list of Monday

- Press the tabulator key (2), following screen appears:

“Monday”			→
“Tuesday”			
“Wednesday”			↓
“Menu”		“Delete”	
F1	F2	F3	

- Scroll through the display until “Monday” is followed by a horizontal arrow. Press the tabulator key (2). Scroll through the compressor start/stop/pressure band commands until the first empty command line is indicated by the horizontal arrow.
- Press the key “Modify”; the first two digits start blinking. Enter “18:00 Compressor Stop” using the scroll keys (1) to modify a field and the tabulator key (2) to jump from one field to another.
- Press the key “Program” to program the new command or the key “Cancel” to quit without reprogramming.

Adding a command between two existing commands

Suppose the command “17:00 Pressure Band 2” must be added to the following list:

- 06:00 Start Compressor

- 06:00 Pressure Band 1
- 18:00 Stop Compressor

The regulator does not allow to enter a new command which is situated before the last command in the list timewise.

Scroll through the display until the command before which the new command must be entered is followed by a horizontal arrow (in the example above: “18:00 Stop Compressor”) and press the key “Modify”.

Change this command to the new command (in the example above “17:00 Pressure Band 2”)

Press the arrow down key and add the last command of the list (in the example above “18:00 Stop Compressor” and press the key “Program”.

Deleting a command

- Starting from the Main screen, press the key “Menu” (F1), press the arrow down key until the option “Modify Parameters” is followed by a horizontal arrow.
- Activate the menu by pressing the tabulator key (2).
- Use the scroll keys (1) to scroll until the option “Clock Function” is followed by a horizontal arrow. Press the tabulator key, following screen appears:

“Clock Function”			→
		“Not Activated”	
.			
“Menu”	“Modify”	“Delete”	
F1	F2	F3	

Deleting all commands

- Press the key “Delete” in the screen above. A question to confirm the deleting operation will appear.

Deleting all commands of a specific day

- Scroll through the display until the desired day is followed by a horizontal arrow. Press the key “Delete”, a question to confirm the deleting operation will appear.

Deleting a specific command

- Scroll through the display until the command to be deleted is followed by a horizontal arrow. Press the key “Delete”, a question to confirm the deleting operation will appear.

3.19 Modifying configuration settings

Control panel

Function

To modify a number of parameters. Consult the menu flow in section Control programs.

Procedure

Starting from the Main screen (see Main screen menu):

- Press the key “Menu” (F1).
- Press the arrow down key (1) until “Modify Parameters” is followed by an arrow pointing to the right.
- Activate the menu by pressing tabulator key (2).
- Press the arrow down key (1) to scroll until “Configuration” is followed by a horizontal arrow.
- Activate the menu by pressing tabulator key (2): the first item will appear. Scroll through the display until the option to be modified is followed by a horizontal arrow. Select the option by pressing the tabulator key (2).
- In case of the option “Time”, the second line on the screen indicates the actual setting, e.g. “14:30”. To modify this setting, press the key “Modify” (F2); the first field “14” will blink.
- Use the scroll keys (1) to change the setting, then press the tabulator key (2) to go to the next field “30”. The setting of this field can now be modified using the scroll keys (1).
- Press the key ”Program” (F1) to program the new value or the key “Cancel” (F3) to cancel the modification operation (the original value will be retained).
- The procedure to modify other parameters is similar.

Programming compressor control modes

The compressor can be controlled locally, remotely or via a local area network (LAN).

Procedure

- Activate the menu “Configuration” as described above.
- Scroll through the display until the option “C.C.M.” is indicated and press the “Modify” key. Following screen appears:

.			
“C.C.M.”		“Local Control”	
.			
“Program”		“Cancel”	
F1	F2	F3	

- “Local Control” is blinking, use the scroll keys (1) to select the desired control mode.
- Press the key “Program” to program the new control mode or “Cancel” to quit without reprogramming.

3.20 Service menu

Control panel

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 previously.

Service plans

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

When a service plan interval is reached, a message will appear on the screen, see section Status data. After carrying out the service actions related to the indicated levels, the timers are to be reset.

Example

Service plans	Intervals
Service plan A	Every 4000 running hours
Service plan B	Every 8000 running hours
Service plan C	Every 16000 running hours

Service actions according to	Intervals
Service plan A	4000 running hours
Service plan A and B	8000 running hours
Service plan A	12000 running hours
Service plan A, B and C	16000 running hours
...	...

Procedure

Starting from the Main screen (see Main screen menu):

- Press the key “Menu” (F1).
- Press the arrow down key (1) until “Service” is followed by a horizontal arrow.
- Activate the menu by pressing tabulator key (2).
- A screen similar to the one below appears:

“Service Timer”			
“Running Hours”			→
		7971 “hrs”	↓
“Menu”		“Reset”	
F1	F2	F3	

- The screen shows that the total compressor running time is 7971 hours.
- Press the tabulator key (2), following screen appears:

“Next Timer”			
“Level”		A B	
		8000 “hrs”	↓
“Back”		“Reset”	
F1	F2	F3	

- The screen shows that the next service plans to be carried out are plans A and B and that these plans are to be carried out every 8000 running hours.
- Press the arrow down key (1) to find out which service plans were carried out previously, following screen appears:

“Previous Timer”			↑
“Level”		A	
		4008 “hrs”	
“Back”			
F1	F2	F3	

- The screen shows that plan A was carried out at 4008 running hours.
- Stop the compressor, switch off the voltage and carry out the service operations related to the indicated service plans, see section Preventive maintenance schedule.
- Switch on the voltage and scroll to the “Next Timer” service screen.
- Press the “Reset” button (F3). Confirm the question for resetting.

	The “Reset” button only appears when the “Next Timer” level is almost reached.
	After pressing the arrow down key in the “Service Timer” screen, the “Life Time” hours are shown, i.e. the number of hours elapsed since initial programming ex-factory. This timer is not taken into account.

3.21 Saved data menu

Control panel

Function

To call up some data saved by the regulator. These data are:

- Last shut-down data
- Last emergency stop data

Procedure

Starting from the Main screen (see Main screen menu):

- Press the key “Menu” (F1).
- Press the arrow down key (1) until “Saved Data” is followed by a horizontal arrow.
- Activate the menu by pressing the tabulator key (2).
- The first option is shown “Last shutdown 1”.
- Press the tabulator key (2) to find out the date, time and other data reflecting the status of the compressor at the last shut-down.
- If desired, scroll through the other items.

3.22 Programmable settings

Parameters

		Minimum setting	Factory setting	Maximum setting
Motor running time in star	sec	10	10	30
Load delay time (star-delta)	sec	10	10	30
Number of motor starts	starts/day	0	240	240
Minimum stop time	sec	20	20	99
Programmed stop time	sec	3	3	20
Power recovery time (ARAVF)	sec	15	15	3600
Restart delay	sec	0	3	255
Communication time-out	sec	10	20	60
Unloading pressure	bar(e)	4.5	7.0	7.25
Unloading pressure	psig	65	101.5	105.2
Unloading pressure	bar(e)	4.5	7.0	7.5
Unloading pressure	psig	65	101.5	108.8
Unloading pressure	bar(e)	4.5	8.0	8.6
Unloading pressure	psig	65	116	124.7
Unloading pressure	bar(e)	4.5	8.0	9.0
Unloading pressure	psig	65	116	130.5
Unloading pressure	bar(e)	4.5	9.0	10..0
Unloading pressure	psig	65	130.5	145
Unloading pressure	bar(e)	4.5	9.0	10.4
Unloading pressure	psig	65	130.5	150.8
Loading pressure	bar(e)	4.5	6.5	7.25
Loading pressure	psig	65	94.3	105.2
Loading pressure	bar(e)	4.5	6.5	7.5
Loading pressure	psig	65	94.3	108.8
Loading pressure	bar(e)	4.5	7.5	8.6
Loading pressure	psig	65	108.8	124.7
Loading pressure	bar(e)	4.5	7.5	9.0
Loading pressure	psig	65	108.8	130.5
Loading pressure	bar(e)	4.5	8.0	10..0
Loading pressure	psig	65	116	145
Loading pressure	bar(e)	4.5	8.0	10.4
Loading pressure	psig	65	116	150.8

Protections

		Minimum setting	Factory setting	Maximum setting
Oil pressure (shut-down warning level)	bar(e)	1.0	1.3	1.9
Oil pressure (shut-down warning level)	psig	14.5	19	27.5
Oil pressure (shut-down level)	bar(e)	1.0	1.2	1.9
Oil pressure (shut-down level)	psig	14.5	17.4	27.5
Delay at start, oil pressure	sec	15	15	20
Delay at signal, oil pressure	sec	0	6	9
Compressor element 1 outlet temperature (shut-down warning level)	˚C	100	210	220
Compressor element 1 outlet temperature (shut-down warning level)	˚F	212	410	428
Compressor element 1 outlet temperature (shut-down level)	˚C	211	220	220
Compressor element 1 outlet temperature (shut-down level)	˚F	412	428	428
Compressor element 1 outlet temperature (shut-down warning level)	˚C	100	225	235
Compressor element 1 outlet temperature (shut-down warning level)	˚F	212	437	455
Compressor element 1 outlet temperature (shut-down level)	˚C	226	235	235
Compressor element 1 outlet temperature (shut-down level)	˚F	439	455	455
Compressor element 2 outlet temperature (shut-down warning level)	˚C	100	210	220
Compressor element 2 outlet temperature (shut-down warning level)	˚F	212	410	428
Compressor element 2 outlet temperature (shut-down level)	˚C	211	220	220
Compressor element 2 outlet temperature (shut-down level)	˚F	412	428	428
Compressor element 2 outlet temperature (shut-down warning level)	˚C	100	225	235
Compressor element 2 outlet temperature (shut-down warning level)	˚F	212	437	455
Compressor element 2 outlet temperature (shut-down level)	˚C	226	235	235
Compressor element 2 outlet temperature (shut-down level)	˚F	439	455	455
Compressor element 2 inlet temperature (shut-down warning level)	˚C	40	65	80
Compressor element 2 inlet temperature (shut-down warning level)	˚F	104	149	176
Compressor element 2 inlet temperature (shut-down level)	˚C	66	70	80

		Minimum setting	Factory setting	Maximum setting
Compressor element 2 inlet temperature (shut-down level)	˚F	151	158	176
Oil temperature (shut-down warning level)	˚C	40	65	80
Oil temperature (shut-down warning level)	˚F	104	149	176
Oil temperature (shut-down level)	˚C	40	70	80
Oil temperature (shut-down level)	˚F	104	158	176
Service warning level for DP, air filter	mbar	100	44	44
Service warning level for DP, air filter	psi	1.45	0.6	0.6
Delay at signal, DP air filter	sec	0	60	255
Dryer inlet temperature (warning level)	˚C	53	53	58
Dryer inlet temperature (warning level)	˚F	127	127	136
Dryer regeneration air inlet temperature (warning level)	˚C	100	110	110
Dryer regeneration air inlet temperature (warning level)	˚F	212	230	230
Calculated Delta T, dryer element (warning level)	˚C	90	100	100
Calculated Delta T, dryer element (warning level)	˚F	194	212	212

Service plans

		Minimum setting	Factory setting	Maximum setting
Service plan A (running hours)	hr	See remark	4000	See remark
Service plan A (running hours)	hr	See remark	3600	See remark
Service plan B (running hours)	hr	See remark	8000	See remark
Service plan C (running hours)	hr	See remark	16000	See remark
Service plan I (running hours)	hr	See remark	2000	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 intervals programmed. Consult your Atlas Copco Service Centre.

Terminology

Term	Explanation
ARAVF	Automatic restart after voltage failure.See Elektronikon regulator.
Compressor element 1/2	Element 1 stands for the low-pressure compressor element; element 2 stands for the high-pressure compressor element. The regulator does not accept illogical settings, e.g. if the warning level is programmed at 205 ˚C, the minimum limit for the shut-down level changes into 206 ˚C. The recommended difference between the warning level and shut-down level is 10 ˚C.

Term	Explanation
Compressor element 1/2	Element 1 stands for the low-pressure compressor element; element 2 stands for the high-pressure compressor element. The regulator does not accept illogical settings, e.g. if the warning level is programmed at 401 ˚F, the minimum limit for the shut-down level changes into 402 ˚F. The recommended difference between the warning level and shut-down level is 18 ˚F.
Required stop period/Minimum stop time	Once the compressor is automatically stopped, it will remain stopped for the minimum stop time (approx. 20 seconds), whatever happens with the air net pressure. In automatic operation, the compressor will not be stopped by the regulator until a standstill period of at least the sum of the minimum stop time and required stop period is expected. However, if the decrease in air net pressure should require a new start of the compressor, the regulator will start the compressor after the minimum stop time.
Power recovery time	Is the period within which the voltage must be restored to have an automatic restart. Is accessible if the automatic restart is activated. To activate the automatic restart function, consult Atlas Copco.
Unloading/ Loading pressure	The regulator does not accept illogical settings, e.g. if the unloading pressure is programmed at 7.0 bar(e), the maximum limit for the loading pressure changes into 6.9 bar(e). The recommended minimum pressure difference between loading and unloading is 0.6 bar.
Unloading/ Loading pressure	The regulator does not accept illogical settings, e.g. if the unloading pressure is programmed at 101 psig, the maximum limit for the loading pressure changes into 100 psig. The recommended minimum pressure difference between loading and unloading is 9 psig.
Delay at shut-down signal	Is the period during which the signal must exist before the compressor is shut down. If it should be required to program this setting at another value, consult Atlas Copco.

4 Installation

4.1 Dimension drawings

Dimension drawing, ZR Pack

Dimension drawing, ZR Pack with energy recovery

Dimension drawing, ZR Full-Feature

ZR 55-90 FF	MASS
ZR 55 FF	1890 kg
ZR 75 FF	1965 kg
ZR 90 FF	2030 kg

Dimension drawing, ZR Full-Feature with energy recovery

Dimension drawing, ZT Pack

(11)

ZT 55-90	MASS
ZT 55	3880 lb
ZT 75	4045 lb
ZT 90	4189 lb

Dimension drawing, ZT Full-Feature

Text on drawing

Ref	Name
(1)	Voltage supply entry
(2)	Compressed air outlet
(3)	Cooling air outlet
(4)	Opening for transportation
(5)	4 slotted holes only for horizontally pulling unit out of container

Ref	Name
(6)	Cooling air inlet
(7)	Hole pattern ducting
(8)	Automatic drain, aftercooler
(9)	Automatic drain, intercooler
(10)	Compressed air outlet, compensator
(11)	Mass
(12)	Water in/out compensator
(13)	Water out
(14)	Water in
(15)	Automatic drain, dryer inlet
(17)	Automatic drain, dryer outlet
(18)	Cooling Full-Feature air outlet
(19)	Cooling Full-Feature air inlet
(20)	If option: Prepared for MD
(21)	Cable box included for EC variants
(22)	Cable box not included for CSA/UL variants
(23)	Automatic drain, regeneration outlet
(24)	Low load drain (optional)
(25)	Automatic drain, extra aftercooler

4.2 Installation proposals

Installation proposal, ZR Pack, ZR Full-Feature and ZR Pack with energy recovery

Installation proposal, ZR Full-Feature with energy recovery

Installation proposal, ZT Pack

Installation proposal, ZT Full-Feature

Text on figures

Ref	Name
(1)	Minimum free area to be reserved
(2)	Ventilation proposal
(3)	Cooling air outlet

Ref	Name
(4)	Cooling air inlet
(5)	Cooling Full-Feature air outlet
(6)	Cooling Full-Feature air inlet

Description

Ref	Description
1	Install the compressor on a level floor suitable for taking the weight of the compressor. Recommended minimum distance between the top of the bodywork and the ceiling: 1200 mm (46.80 in).
2	Remove the plastic plug or cap (if provided) from the compressor air outlet pipe and install an air outlet valve. Close the valve and connect it to the air net.
3	The pressure drop over the delivery pipe can be calculated as follows: $dp = (L \times 450 \times Qc^{1.85}) / (d^5 \times P)$ • dp = pressure drop (recommended maximum = 0.1 bar) • L = length of outlet pipe in m • d = inner diameter of the delivery pipe in mm • P = absolute pressure at the compressor outlet in bar(a) • Qc = free air delivery of the compressor in l/s The connection of the compressor air delivery pipe should be made on top of the main air net pipe to minimize carry-over of possible remainder of condensate.
4	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 should be limited to 5 m/s (195 in/s). The required ventilation capacity (per compressor installed) to limit the compressor room temperature can be calculated as follows: On ZR compressors: $Qv = 0.1\ N / dT$ On ZT compressors: $Qv = 0.92\ N/ dT$ • Qv = required ventilation capacity in m^3/s • N = shaft input of the compressor in kW • dT = temperature rise over ambient in ˚C If cooling air ducts are installed, the maximum allowable pressure drop over the ducts is 30 Pa. Common ducting for several compressors is not allowed.
5	Lay out the drain piping from automatic condensate outlets (EWD) towards the condensate collector. The drain pipes must not dip into the water of the collector. It is recommended to provide a funnel to allow visual inspection of the condensate flow.
6	Elektronikon control system with control panel.
7	See Electric cables for the recommended cable size of the supply cables. Check that the electrical connections correspond to the local codes. The installation must be earthed and protected against short circuits by fuses in all phases. An isolating switch must be installed near the compressor.
8	Provide a condensate drain valve in the lowest part of the pipe between the compressor outlet valve and the air net.
9	Remove the plastic plugs (if provided) from the compressor water pipes and connect the pipes to the cooling water circuit. Provide a valve in the compressor water inlet pipe and outlet pipe.

4.3 Electric cables

Remarks

	• The cable sizes below are applicable for the MAINS + EARTH CABLE • The cable size is valid at maximum ambient temperature of 40 ˚C. The cable size is valid at maximum ambient temperature of 104 ˚F.

50Hz IEC

Pack and Full-Feature compressors

	400 V
ZT/ZR55	3 x 50 + 25 mm^2
ZT/ZR75	3 x 95 + 50 mm^2
ZT/ZR90	3 x 120 + 70 mm^2

Full-Feature ND compressors

	400 V
ZT/ZR55	3 x 70 + 35 mm^2
ZT/ZR75	3 x 70 + 35 mm^2
ZT/ZR90	2x (3 x 50 + 50 $mm)^2$

Full-Feature ND compressors

	380 V	440-460 V
ZT/ZR55	3 x 70 + 35 mm^2	3 x 70 + 35 mm^2
ZT/ZR75	2x (3 x 50+ 35 $mm)^2$	3 x 70 + 35 mm^2
ZT/ZR90	2x (3 x 70+ 35) mm^2	2x (3 x 50 + 25 $mm)^2$

4.4 PANEL GA ZR 55 - 90 PACK

DESCRIPTION OF COMPONENT	COMPRESSOR MOTOR		
MOTOR	M1		
CONTACTOR	K22	K23	K21
RELAY	F21		
MCB			

Y-D STARTER
MAIN MOTOR
CUBICLE
FAN
LOAD/UNLOAD
REGULATION
2PH
415 V
50 Hz
FROM
Q1 (MCB)
230V 50, 250VA
T1
T2
230V
24V
M5
LSHL17
LSHL28
Y17
Y28
Y2
F3
2A
F4
2A
F5
2A
F17
2A
K01
K02
K03
K04
K11
K21
K22
K23
S2
VOLTAGE FREE CONTACTS
AUTOMATIC OPERATION
230V AC, 10A
GENERAL WARNING
230V AC, 10A
GENERAL SHUTDOWN
230V AC, 10A
LOAD/UNLOAD
230V AC, 15
MOTOR RUNNING
230V AC, 6A AC15
REMOTE EMERGENCY STOP PB
S2 EMERGENCY STOP PB

EMERGENCY STOP
REMOTE START/STOP
REMOTE LOAD/UNLOAD (CLOSED = LOAD)
REMOTE SET POINT CHANGE
(AUXILARY INPUTS)
OVERLOAD DRIVE MOTOR
STARTER FEEDBACK
REMOTE SETPOINT CHANGE
AUTO. CONDESATE DRAIN
2X9
24 VAC
SUPPLY
2X11
K04 L/UL
K05 APL/APH
K06 DRYER (+FAN) /START
2X10
K01 BLOCKING
K02 Y
K03 D
2X12
Elektronikon
MKIV D
K07 AUT.OPERATION
K08 G. WARNING
K09 G. SHUTDOWN
F1
F2
F3
E1
2X3 I/O
2X2 RS 485
2X1 LAN
2X5
2X6
2X7
2X8
20A
02/10
03/08

PT 29
PT 45
PDT 02
COMPR.OUTLET PR. TRANSDUCER
OIL PR. TRANSDUCER
DP AIR FILTER PR.TRANSDUCER
TT 11
TT18
TT21
TT 44
TT 51
TT59
PT1000
ELEMENT-1 OUTLET TEMP. SENSOR
ELEMENT-2 INLET TEMP. SENSOR
OIL TEMP. SENSOR
COOLING WATER IN TEMP.SENSOR

K01	
K02	Aux. relay Y-co
K03	Aux. relay D-contactor
K04	Aux. relay load/unload
K05	Air Press.High/Air Press.Low relay
K06	Dryer (+fan) start
K07	Automatic operation relay
K08	General warning
K09	General shut-down relay
2X1	LAN

Start button

Programmed Stop button

CUSTOMER'S INSTALLATION

S1'	Remote start/stop button
S2'	Remote emergency stop button
S4'	Remote load/unload button
S5'	Remote setpoint change

NOTES

[a] Max.fuse with regard to short-circuit protection of starter. Cable section may impose a fuse of smaller value.

[e] For connections of transformer : see label on transformer

T1 (VA)			F17	F41
	(A)	-)	(A)	(A)

IEC /CSA-UL				IEC CSA/UL	
	4	4	0.5	1	2
3	6	4	0.5	1	2

[g] When remote stop button is installed, the bridges should be removed on the corresponding terminals of 1X4 and 1X6.

[i] Pressure tranducer

1 : supply voltage
2 : ground
3 : output
4 : sealed with dummy

[m] For terminal numbers, for heater connection : see label inside motor terminal box.

[o] For field wiring : USE COPPER WIRE ONLY
tightening torque for bolts :
metric thread size M5 : 5Nm (4 lbft)
metric thread size M6 : 8Nm (6 lbft)
metric thread size M8 : 20Nm (15 lbft)
metric thread size M10: 40Nm (29 lbft)

C.P.E. = Customer Provided Equipment

[r] Bridges to be removed if options are installed

[s] Plugs to be removed if options are installed

Ref	Name
(15)	To be installed by the customer

4.5 Cooling water requirements

Recommendations

The cooling water quality must meet certain minimum requirements.

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.

Only non-treated water must be used.

This recommendation is a general guide line for acceptable coolant quality.

Type of system

First, it is important to consider whether you are dealing with a closed system or an open system. In a closed system, the same cooling water circulates through a system without contact with air.

An open system is a pass-through system, or a circulating system with a cooling tower. In the latter case, the composition of the water that enters the cooler must be considered, and not the composition of the make-up water. Due to the evaporative effect in the cooling tower, much higher concentrations of ions can be obtained in the circulating water than in the make-up water.

Ryznar stability index (RSI)

The Ryznar Stability Index (RSI) is a parameter for predicting whether water will tend to dissolve or precipitate calcium carbonate. The adhesion of scaling deposits 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 Index is calculated as follows :

$RSI = 2*pH_s - pH$

Symbol	Explanation
pH	Measured pH (at room temperature) of water sample
pH_s	pH at saturation

The pH_s is calculated by using :

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

Symbol	Explanation
A	Depends on the total solids concentration (mg/l)
B	Depends on the highest cooling water temperature (˚C/˚F), (T=65 ˚C/149 ˚F)
C	Depends on the calcium hardness (ppm $CaCO_3$)
D	Depends on the HCO_3^- concentration or M-alkalinity (mval/l)

The values of A, B, C and D can be found in the following table.

Total dissolved solids (mg/l)	A	Temperature (˚C)	B	Ca-hardness (ppm $CaCO_3$)	C	M-alkalinity (mval/l)	D
50 - 300	0.1	0 - 1	2.6	10 - 11	0.6	0.20 - 0.22	1.0
400-1000	0.2	2 - 6	2.5	12 - 13	0.7	0.24 - 0.26	1.1
		7 - 9	2.4	14 - 17	0.8	0.28 - 0.34	1.2
		10 - 13	2.3	18 - 22	0.9	0.36 - 0.44	1.3
		14 - 17	2.2	23 - 27	1.0	0.46 - 0.54	1.4
		18 - 21	2.1	28 - 34	1.1	0.56 - 0.70	1.5
		22 - 27	2.0	35 - 43	1.2	0.72 - 0.88	1.6
		28 - 31	1.9	44 - 55	1.3	0.90 - 1.10	1.7
		32 - 37	1.8	56 - 69	1.4	1.12 - 1.38	1.8
		38 - 44	1.7	70 - 87	1.5	1.40 - 1.76	1.9
		45 - 50	1.6	88 - 110	1.6	1.78 - 2.20	2.0
		51 - 56	1.5	111 - 138	1.7	2.22 - 2.78	2.1
		57 - 63	1.4	138 - 174	1.8	2.80 - 3.54	2.2
		64 - 71	1.3	175 - 220	1.9	3.54 - 4.40	2.3
		72 - 80	1.2	230 - 270	2.0	4.6 - 5.4	2.4
				280 - 340	2.1	5.6 - 7.0	2.5
				350 - 430	2.2	7.2 - 8.8	2.6
				440 - 550	2.3	9.0 - 11.0	2.7
				560 - 690	2.4	11.2 - 13.8	2.8
				700 - 870	2.5	14.0 - 17.6	2.9
				880 - 1000	2.6	17.8 - 20.0	3.0

Interpretation of the value obtained

RSI	Water condition	Action
RSI<3.9	Very high scale formation	Water cannot be used.
4.0<RSI<5.5	High boiler scale formation	Regular inspection and descaling operation necessary.
5.6<RSI<6.2	Slight boiler scale formation	Water treatment not necessary. Occasional inspection recommended.
6.3<RSI<6.8	Neutral water	Water treatment not necessary. Occasional inspection recommended.
6.9<RSI<7.5	Slight corrosion at higher temperature	Water treatment not necessary. Occasional inspection recommended.

RSI	Water condition	Action
7.6<RSI<9.0	Strong corrosion	Regular inspection necessary, use of corrosion inhibitor recommended.
9.1<RSI<11	Very strong corrosion	Regular inspection necessary, use of corrosion inhibitor required.
RSI>11	Very strong corrosion in complete water system	Water should not be used.

The table indicates that distilled or demineralised water should never be used, as their RSI is > 11.

The RSI only indicates the equilibrium of scaling - descaling. A cooling water showing good RSI conditions can still be unsuitable due to other factors.

From the table above, the RSI index should be between 5.6 and 7.5; otherwise, contact a specialist.

pH

The effect of pH is already calculated in the Ryznar index, but the pH itself has some additional limitations : 6.8 < pH < 8.5

Total dissolved solids (TDS)

This is the sum of all the ions in the water. It can be derived from the dry residue after evaporation (but not including suspended solids), or it can be estimated from the electrical conductivity.

In a closed system, the following limits apply : TDS < 3000 mg/l (< 3800 microS/cm)

For an open system, the following limits apply : TDS < 750 mg/l (< 960 microS/cm)

Chlorides (Cl^-)

Chloride ions will create pitting corrosion on stainless steel. Their concentration should be limited:

Closed cooling system : chlorides < 500 ppm

Open cooling system : chlorides < 150 ppm

However, if the water is scaling, lower limits should be used. (See The Ryznar stability index (RSI)).

Free chlorine (Cl_2)

A level of 0.5 ppm should not be exceeded for long periods.

For shock treatments, a maximum limit of 2 ppm for maximum 30 minutes/day applies.

Sulphates (SO_4^{--})

Closed cooling system : sulphates < 400 ppm

Open cooling system : sulphates < 150 ppm

Carbonate hardness

Closed cooling system : 50-1000 ppm $CaCO_3$

Open cooling system : 50-500 ppm $CaCO_3$

HCO_3^- / SO_4^{2-} should be > 1

Ammonia

< 0.5 ppm

Copper

< 1 ppm

Iron and manganese

< 1 ppm

Organics

No algae

No oil

Suspended solids

Non-soluble particles, size < 1 mm.

< 10 ppm

4.6 Pictographs

Explanation of pictographs

Ref	Name
1	Start
2	Scroll keys
3	Tabulator key
4	Voltage on
5	Alarm
6	Automatic operation
7	Stop
8	Automatic condensate outlet, intercooler
9	Automatic condensate outlet, aftercooler
10	Warning: under tension
11	Read Instruction book before starting the compressor
12	Switch off the voltage and depressurize the compressor before maintenance or repair
13	Before connecting the compressor electrically, consult the Instruction book for the motor rotation direction
14	Torques for steel (Fe) or brass (CuZn) bolts
15	Consult the Instruction book before greasing
16	Switch off the voltage before removing the protecting cover inside the electric cabinet
17	Oil the gaskets, screw on the filters and tighten by hand (approx. one half turn)
18	Consult the Instruction book before maintenance or repair
19	Cooling water inlet
20	Cooling water outlet
S2	Emergency stop

Additional pictographs on Full-Feature compressors

1

2

3

4

Reference	Name
1	Arrow, indicating rotation direction
2	Warning, voltage
3	Instruction for delta P reading Purge internal impulse line before any reading of delta P on U-tube (close isolation valves of U-tube)
4	Indication for correct adjusting of the U-tube water level

5 Operating instructions

5.1 Operation introduction

Warning

⚠	The operator must apply all relevant “Safety precautions”.

Ambient conditions

Consult “Limits” for the limits with regard to the ambient conditions and altitude operation.

Moving/lifting

In order not to damage the frame, the compressor must be moved either by a lift truck or by using lifting equipment as described below.

When moving the compressor with a lift truck, use the slots in the frame. Make sure that the forks protrude from the other side of the frame. When moving the compressor with a lifting device, insert beams in the slots. Make sure that the beams cannot slide and that they protrude from the frame equally. The chains must be held parallel to the bodywork by chain spreaders in order not to damage the compressor. The lifting equipment must be placed in such a way that the compressor is lifted perpendicularly. Lift gently and avoid twisting.

5.2 Initial start-up

Procedure

- Consult Electric cables, Installation proposals and Dimension drawings.
- A sticker dealing in short with the operation instructions is delivered with the literature set. Affix the sticker next to the control panel.
- A number of VCI (Volatile Corrosion Inhibitor) plates are provided inside the bodywork to protect the compressor against corrosion. Remove the plates.
- The compressor and motor are secured to the frame immobilizing the vibration dampers during transport:
  - At the motor side, loosen nut (1), remove bolts (2) and turn bracket (3) 90˚. Tighten nut (1).

- On ZR compressors, remove support (1) at the gear casing side.

- On ZT compressors, remove bolts (1) and supports (2) immobilizing the vibration dampers of the coolers. Remove support (3), immobilizing the vibration dampers of the gear casing.

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- Remove flange (1) and take out the silica gel bags installed in the intercooler at the condensate drain receiver side. Refit the flange.

Position of silica gel bags on ZT compressors

Position of silica gel bags on ZR compressors

- On Full-Feature compressors with Low-Load option and Full-Feature ND compressors, the nozzle type depends on the working pressure. Install the correct nozzle according to the table below.

Compressor	Nozzle at 4 bar (58 psi)	Nozzle at 7 bar (102 psi)	Nozzle at 8.6 bar (125 psi)	Nozzle at 10 bar (145 psi)
Z 55 FF	1617 7572 00	1617 7571 00	1617 7571 00	1617 7571 00
Z 75 FF	1617 7573 00	1617 7571 00	1617 7571 00	1617 7571 00
Z 90 FF	1617 7440 00	1617 7572 00	1617 7572 00	1617 7571 00

- The setpoint of the dryer heater depends on the working conditions, consult the Atlas Copco Customer Centre to have the setpoint adjusted.
- On ZR compressors, fit the water drain plugs (1, DP1, DP2, DP3) that are fixed to the water pipe of one of the compressor elements (Eh, El) in a plastic bag. The plugs are painted green and their positions are shown below.

El
1
53295F

Eh
1
53296F

52284F

53297F

- On ZR compressors, check that the cooling water drain valves (customer's installation) in the inlet and outlet lines are closed. Open the water inlet valve and outlet valve (customer's installation) and check for water flow.
- On ZR Full-Feature, the inlet and outlet valves of the cooling water circuit of the regeneration cooler must be opened completely.
- Check that the gear casing is filled with oil: the level should be in the middle of sight-glass (SG).

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- Check that the electrical connections correspond to the local codes. The installation must be earthed and protected by fuses in all phases. An isolating switch must be provided.
- Check the connections at the primary sides of transformers (T1 and T2).

Typical example

Typical example

- Switch on the voltage. Start the compressor and stop it immediately. Check for correct direction of rotation while the motor is coasting to a stop. An arrow on the gear casing indicates the correct rotation direction. If the rotation direction is wrong, switch off the voltage and reverse two incoming electric lines.
- On ZT compressors, remove panel (1) and check the rotation direction of the fan motor. If the rotation direction is wrong, switch off the voltage and reverse two connections at terminals 221 up to 226 of terminal strip (1X1).
  On ZT Full-Feature compressors, also check the rotation of the fan motor of the regeneration cooler (Cr), the correct rotation direction is indicated by an arrow on the fan motor.

- Run the compressor for a few minutes and check that it operates normally.
- Stop the compressor. If necessary, top up the gear casing with oil to the middle of sight-glass (SG).

Adjustment of the pressure difference of the dryer compartments

Delta P indicator

View of PDP sensor

View of throttle valve

To start up the unit for the first time or after a long period of standstill, proceed as follows:

1. **Check if U-tube is filled halfway with water. If not, continue as follows:**
   - Close the valves (9 and 10) and open valve (6).
   - Remove the plugs (8) of the two vent valves (7) of the delta P indicator and open the valves.
   - Fill the U-tube halfway with water, close the valves (7) and refit the plugs.
2. On compressors equipped with a PDP sensor, close valve (11) to this sensor.
3. For dryers with low load option: Check that circuit breaker (F 32, compressor cubicle) is in the "I" position.
4. Close the manual drain valve of the aftercooler drain trap of the compressor.
5. On ZR compressors, check for water flow.
6. Switch on the voltage at the mains.
7. Start and load the compressor.
8. Open the valve (if installed) to the air net or air receiver and blow off some air from the air net to keep the compressor running loaded.
9. Open valves (9 and 10). Open valve (6) slightly, while monitoring the water levels in the U-tube.
   There are two possible conditions:
   - The water level in the leg marked (+) rises. Close valve (6) at once, decrease the regeneration air inlet pressure (see next step). Do this as often as necessary until the water level drops.
   - The water level in the leg marked (-) rises, which should normally be the case. If the level in this leg rises 30 mm above the level in the leg marked (+), close valve (6) at once, as there is a risk that the water will escape the U-tube and disappear into the pressure vessel. Increase the regeneration air inlet pressure (see next step) and open valve (6) again.
10. **Once the water column has stabilised, adjust the pressure differential as follows:**
    - Remove the protective cap from the adjusting screw of throttle valve (12).
    - Loosen its check nut (13) and turn the screw to alter the pressure differential.
    - Monitor the water level for about 10 minutes.
    - Tighten the check nut and reinstall the protective cap.
11. Check the dryer connections for air leaks.
12. On compressors equipped with a PDP sensor, open valve (11) to the PDP sensor 15 minutes after the dryer is in operation.

13. Check that the pressure dewpoint is OK after 1 hour.
14. Close the blow-off valve of the air net, unload and stop the compressor. Close the air outlet valve of the dryer.
15. Switch off the voltage.
16. Depressurize the dryer, see section Maintenance instructions.

5.3 Before starting

Safety

⚠	The operator must apply all related “Safety precautions”. In case the water system was drained, close the drain valves and fit the drain plugs.

Procedure

Step	Action
1	Check the oil level, which must be in the middle of sight-glass (SG). Top up, if necessary, with the correct type of oil.
2	Open the water inlet valve and outlet valve (customer's installation). Opening of the water outlet valve can be overlooked if, after previous operation, the setting of this valve has not been disturbed.

Position of oil sight-glass on ZR compressors

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Position of oil sight-glass on ZT compressors

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5.4 Starting

Control panel

Procedure

Step	Action
1	Open the air outlet valve (customer's installation).
2	Switch on the voltage and check that voltage on LED (2) lights up.
3	Press start button (1). The compressor starts running and automatic operation LED (3) lights up.
4	Regulate the water flow with the compressor running loaded. See “Compressor data” for the cooling water temperature and cooling water consumption.
⚠	• When the compressor is stopped and automatic operation LED (3) is alight, the compressor may start automatically. • If the start/stop timer is active, the compressor may start automatically, even if it was stopped manually.

5.5 During operation

Control panel

Procedure

When automatic operation LED (1) is alight, the Elektronikon regulator is automatically controlling the compressor: the air delivery is matched to the air consumption, the compressor will start and stop whenever necessary.

Avoid short compressor loading periods (minimum 50% load) and operation at very low working pressures as otherwise the performance of the dryer will diminish. Avoid operation at too low a regeneration air temperature (minimum 130˚C /266˚F)

Keep all doors closed during operation.

Step	Action
1	Daily check the display (2) for readings and messages. Normally, the main screen is shown (see below), indicating the compressor outlet pressure, the status of the compressor and the functions of the keys below the display.
2	Always check the display and remedy the trouble if alarm LED (3) is alight or blinks. See “Elektronikon control system”.
3	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 Atlas Copco Customer Centre. See also “Preventive maintenance schedule”.
4	Regularly check the actual compressor status by pressing the down key from the main screen.
⚠	• Before starting any maintenance or repairs, stop the compressor, wait until it has stopped. • Close the air outlet valve and press the test buttons on top of the electronic water drains to depressurize the air system. • Open the isolating switch (customer's installation) to switch off the voltage to the compressor.

Example of the main screen

Compressor Outlet		7.0 bar	
Automatically Loaded			↓
Menu		Unload	
F1	F2	F3	

5.6 Stopping

Control panel

Procedure

Position of water drain plug on LP compressor element

Position of water drain plug on HP compressor element

Position of water drain plug of oil cooler

Position of water drain plugs of cooler block

⚠	Frequently stopping the compressor using the emergency stop button may damage the compressor, only use the emergency stop button in case of emergency.

Step	Action
1	Press the test button on top of the electronic water drains while the compressor is running loaded.
2	Press stop button (1): the compressor will stop and LED (2) will go out.
3	Close the air outlet valve.
4	To stop the compressor immediately, press emergency stop button (S2).
5	Close the cooling water inlet valve.
6	If the compressor is installed in a room where freezing temperatures are expected, drain the cooling system completely: • By opening the main drain valves in the water inlet and outlet pipes (customer's installation). • By removing drain plug (1) underneath the LP compressor element (El). • By removing drain plug (1) underneath the HP compressor element (Eh). • By removing drain plug (DP1) on the oil cooler. • By removing drain plugs (DP2 and DP3) underneath the cooler block (1).

5.7 Taking out of operation

Procedure

Step	Action
1	Close the air outlet valve and stop the compressor.
2	Switch off the voltage. 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	Drain oil and condensate circuits.
5	Disconnect the compressor condensate piping from the condensate drain net.
6	Drain the cooling water circuit and disconnect the cooling water pipes from the compressor.

6 Maintenance

6.1 Maintenance warnings

Warnings

⚠	**Before starting any maintenance or repairs:** • Stop the compressor. Close the air outlet valve. • Press the test buttons on top of the electronic water drains to depressurize the air system. • Press the emergency stop button (S2). • Open the isolating switch (customer's installation) to switch off the voltage to the compressor.

Warranty-Product Liability

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

6.2 Preventive maintenance schedule

Regular service operations

To ensure safe operation and long service life, carry out following operations at the interval (period or running hours) which comes first. The "longer interval" checks must also include the "shorter interval" checks.

The local Atlas Copco Customer Centre may overrule the maintenance schedule depending on the environmental and working conditions of the compressor.

Period	Running hours	Operation
--	At initial start	Check the pressure differential of the rotor compartments of the integrated dryer. Adjust if necessary.
Daily	8	Check readings on display.
Daily	8	Check that condensate is discharged during loading.
Daily	--	Check oil level. Before starting, the level should be in the middle of the sight-glass.
Weekly	50	Check that the moisture indicator of the integrated dryer shows blue.
Monthly	--	On Full-Feature ND compressors and Full-Feature compressors with Low load option, check that air is purged from the low load system. Clean nozzle if necessary.
3-monthly	--	Clean compressor.
3-monthly	--	Check for possible leaks.
3-monthly	500	Check coolers, clean if necessary.

Period	Running hours	Operation
Yearly	--	On compressors with Low Load option, check nozzle and solenoid valve of the purge assembly.
2-yearly	16000	Replace the demister sponge of the integrated dryer.
When displayed	--	Carry out the service actions according to the displayed service plans.

6.3 Service kits

Service kits

Atlas Copco Customer Centres will be glad to provide you with a wide range of service kits. Service kits comprise all parts needed for servicing components and offer the benefits of genuine Atlas Copco parts while keeping the maintenance budget low. All service kits are mentioned in the relevant Parts Lists.

6.4 Service agreements

Atlas Copco Customer Centres have a range of service agreements to suit your needs:

- An Inspection plan.
- A Preventive maintenance plan.
- A Total responsibility plan.

Contact your Customer Centre to agree on a tailor-made service agreement. It will ensure optimum operational efficiency, minimize downtime and reduce the total life cycle costs.

6.5 Service plan

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

When reaching a level, a message will appear on the screen. After carrying out all service actions, the interval timers are to be reset using the key "Reset" in menu "Service". Consult your Atlas Copco Customer Centre.

6.6 Motor greasing

Fan motor of ZT compressors

The bearings of the fan motor are greased for life. Contact your Customer Centre for the replacement interval of the motor bearings.

Drive motor (M1) of ZR compressor

Drive motor (M1) of ZT compressor

Motor grease

	Do not mix greases of different types.

The recommended motor grease is KLÜBERQUIET BQH 72-102. Contact your Customer Centre for the greasing quantity and interval for the motor bearings.

6.7 Oil specifications

Oil type

Use Atlas Copco Roto-Z oil which has been specially developed for oil-free rotary compressors. This oil has a long service life and ensures optimum lubrication.

⚠	Never mix oils of different brands or types.

Atlas Copco Roto-Z oil

Atlas Copco Roto-Z oil can be ordered in following quantities:

Quantity	Ordering number
20 l can 5.28 Us gal can 4.40 Imp gal can 0.70 cu.ft can	2908 8501 01
209 l drum 55.18 Us gal drum 45.98 Imp gal drum 7.32 cu.ft drum	2908 8500 00

6.8 Storage after installation

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

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

7 Servicing procedures

7.1 Air filter (AF)

Location of the air filter on ZR compressors

Location of the air filter on ZT compressors

Procedure

Step	Action
1	Stop the compressor and switch off the voltage to the compressor.
2	Remove the filter.
3	Fit the new filter.
4	After carrying out the service actions of the related service plan, the service warning must be reset. See also “Preventive maintenance schedule”.

7.2 Oil and oil filter change

Control panel

Oil system components, ZR

Oil system components, ZT

Procedure

Step	Action
1	Run the compressor until warm.
2	Press stop button (1), wait until the compressor has stopped, press emergency stop button (S2) and switch off the voltage to the compressor.
3	Remove filler plug (FC). Drain the compressor sump by opening drain valve (Dmo). Close the valve after draining. Drain the oil cooler by removing its drain plug and vent plug. Drain the oil of the compressor elements. Yellow-painted drains plugs are provided on both elements.
4	Remove the oil filter (OF). Clean the filter seat, oil the gasket of the new filter and screw it into place until the gasket contacts the seat. Then tighten by hand.
5	Fill the compressor sump to the middle of the oil level sight-glass (SG) with oil as specified in “Oil specifications”. Reinstall the filler plug.
6	Switch on the voltage. Unlock the emergency stop button.
7	Run the compressor for a few minutes. Stop the compressor. If necessary, top up the gear casing with oil to the middle of the sight-glass (SG).
8	After carrying out the maintenance operations of the related service plan, the service warning must be reset. See also “Preventive maintenance schedule”.

7.3 Safety valves

Testing

The valves can be tested on a separate compressed air line. If a valve does not open at the pressure specified in “Settings of safety valves”, consult Atlas Copco.

⚠	• Never run the compressor without safety valves. • No adjustments are allowed.

8 Problem solving

8.1 Faults and remedies

Warnings

⚠	• Before starting any maintenance or repairs, stop the compressor, wait until it has stopped. • Close the air outlet valve and press the test button on top of the electronic water drains to depressurize the air system. • Open the isolating switch (customer's installation) to switch off the voltage to the compressor. • Apply all relevant “Safety precautions”.

Problem solving, compressor

Condition	Fault	Remedy
Compressor capacity or working pressure lower than normal	Air consumption exceeds capacity of compressor	Check pneumatic plant
	Safety valves leaking	Remove leaking valve and have it inspected
Oil pressure too low	Oil level too low	Top up level to the middle of the oil level sight-glass
	Oil filter clogged	Replace filter
Air temperature above normal	Inlet temperature too high due to bad room ventilation or recirculation of cooling air	Improve ventilation of compressor room and avoid cooling air recirculation
	Air filter clogged	Replace filter
	Insufficient cooling water flow	Check water temperature and increase cooling water flow
	Restriction in cooling water system due to formation of scale or settling down of dirt	Consult Atlas Copco
Condensate is not discharged from condensate traps during operation	Discharge flexible clogged	Check and correct as necessary
	Electronic water drain malfunctioning	Consult Atlas Copco
LED's of electronic water drain do not light up	Compressor is running unloaded	LED's will light up when the compressor is loaded again.
	Power supply to EWD's faulty	Check power supply. Compare power supply with voltage mentioned on data label of EWD
	Power supply board defective	Check and replace as necessary
No condensate discharged when pressing test button on EWD	System pressure lower than 0.8 bar(e)/11.6 psig	Load the compressor; as soon as the system pressure exceeds 0.8 bar(e), condensate will be discharged

Condition	Fault	Remedy
	Condensate inlet and/or outlet blocked	Check and correct as necessary
	Control board defective	Check and replace if necessary
	Solenoid valve defective	Check and replace if necessary
Condensate only discharged when test button is pressed	Sensor dirty	Clean sensor
	Air pressure below minimum pressure	Increase air pressure
EWD continuously discharges air	Control air blocked	Check and correct as necessary
	Sensor dirty	Clean sensor

Problem solving, dryer

Condition	Fault	Remedy
Pressure dewpoint too high	Compressor loading periods repeatedly too short	Take necessary action to increase duration of loading periods
	Incorrect pressure difference between dryer compartments	Check pressure difference which should be within the range specified in section Initial start-up. Never operate the dryer with a pressure difference beyond the specified range. Always be sure that the connections of the U-tube are airtight
	Operating pressure too low	Do not operate dryer at a pressure less than 4 bar(e)
	Rotor does not turn	Consult Atlas Copco
	Rotor compartment sealing ring, sealing sectors and rotor need inspection	Consult Atlas Copco
	Aftercooler air outlet temperature too high Regeneration cooler air outlet temperature too high	On water cooled compressor, check cooling water inlet temperature and increase water flow. If temperature cannot be decreased sufficiently, consult Atlas Copco On air-cooled compressors, clean cooler externally. If temperature cannot be decreased sufficiently, consult Atlas Copco
	Regeneration cooler air outlet temperature too low	Consult Atlas Copco
	Drain system malfunctioning	Inspect system and replace parts where necessary
Dryer air inlet temperature is higher than aftercooler air outlet temperature	Regeneration cooler air outlet temperature too high	On water-cooled dryers, increase water flow through regeneration air cooler On air-cooled dryers, clean cooler externally

Condition	Fault	Remedy
	On water-cooled dryers, cooling water temperature too high	Arrange so as to decrease temperature
	Regeneration cooler clogged internally	Consult Atlas Copco
Only on water-cooled dryers, water flows from one or both electronic water drains during unloaded operation and after dryer has been stopped	Regeneration air cooler core tube broken	Remove cooler, plug broken tube or replace cooler core
Regeneration air inlet temperature too low	Hot-air shut off valve closed	Open the valve
	Compressor loading periods too short	Take necessary action to increase duration of loading periods
	Nozzle of ejector partly obstructed	Remove and clean nozzle. Investigate cause

9 Principal data

9.1 Readings on display

Display

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Reference	Unit	Reading
Outlet pressure	bar(e)	Depends on pressure setpoint.
Maximum working pressure	bar(e)	See “Compressor data”.

Full-Feature compressors

Temperature readings

Item	Reading (min - max)	Reading (min - max)
Dryer heater outlet (optional)	130 - 210 ˚C	266 - 410 ˚F
Dryer PDP (optional)	(-50) - 0˚C	(-58) - 32 ˚F
Dryer outlet	maximum 80 ˚C	maximum 176 ˚F
Regeneration air inlet	120 - 200 ˚C	248 - 392 ˚F
Regeneration air outlet	55 - 150 ˚C	131 - 302 ˚F
Dryer mix air	maximum 50 ˚C	maximum 122 ˚F
Dryer water out	0 - 50 ˚C	32 - 122 ˚F
Temperature difference, dryer outlet - inlet	maximum 25 ˚C	maximum 45 ˚F
Temperature difference, dryer regeneration air inlet - inlet	100 - 160 ˚C	180 - 288 ˚F
Temperature difference, dryer mix. - inlet	maximum 10 ˚C	maximum 18 ˚F
Temperature difference, dryer regeneration inlet - outlet	30 - 80 ˚C	54 - 144 ˚F
Dryer PDP - inlet temperature (optional)	-30 - (-60) ˚C	-22 - (-76) ˚F

Item	Reading (min - max)	Reading (min - max)
Temperature difference, dryer cooling water out	0 - 10 ˚C	0 - 18 ˚F

Other readings

Item	Reading
Dryer rotation speed	2 - 11 rph
Dryer direction	Anti-clockwise

9.2 Settings of safety valves

Settings

Reference	Value	Value
Low-pressure safety valve	3.7 bar(e)	54 psig
High-pressure safety valve, ZT/ZR55/75 7.25 bar/105 psi and ZT/ZR 7.5 bar/109 psi	9.3 bar(e)	135 psig
High-pressure safety valve, ZT/ZR90 7.25 bar/105 psi and ZT/ZR >7.5 bar/109 psi	11.0 bar(e)	160 psig

9.3 Circuit breakers and fuses

50Hz IEC

ZT/ZR 55

Voltage	F21 (A)	Q25 (A)	Q32 Pack and Full-Feature (A)	Q32 Full-Feature ND (A)	Q41 (A)	Q1 (A)	Fuses Type 2gG (A)
200 V	134	10.0	10.0	13.0	4.5	2.3	315
230 V	117	8.3	10.1	15.0	4.5	2.1	315
400 V	67	4.8	6.3	8.7	2.6	1.2	160

ZT/ZR75

Voltage	F21 (A)	Q25 (A)	Q32 Pack and Full-Feature (A)	Q32 Full-Feature ND	Q41 (A)	Q1 (A)	Fuses Type 2gG (A)
200 V	186	14.0	10.0	13.0	4.5	3.5	400
230 V	159	12.0	10.1	15.0	4.5	3.2	355
400 V	92	7.0	6.3	8.7	2.6	1.2	200

ZT/ZR90

Voltage	F21 (A)	Q25 (A)	Q32 Pack and Full-Feature (A)	Q32 Full-Feature ND	Q41 (A)	Q1 (A)	Fuses Type 2gG (A)
200 V	220	14.0	10.0	13.0	4.5	3.5	2x315
230 V	186	12.0	10.1	15.0	4.5	3.2	400
400 V	107	7.0	6.3	8.7	2.6	1.2/1.6	250
500 V	86	5.6	4.4	6.3	2.1	0.96	200

Location of components

	See “Electrical system” for location of components.

9.4 Reference conditions

Reference	Unit	Value
Absolute inlet pressure	bar(a)	1
Absolute inlet pressure	psi	14.50
Relative air humidity	%	0
Air inlet temperature	˚C	20
Air inlet temperature	˚F	68
Cooling water inlet temperature	˚C	20
Cooling water inlet temperature	˚F	68

9.5 Limitations

Limitations	Value	Value
Maximum air inlet temperature	40 ˚C	104˚F
Minimum air inlet temperature	0 ˚C	32 ˚F
Maximum cooling water temperature at inlet (at temperature rise 15 ˚C)	35 ˚C	95 ˚F
Maximum cooling water temperature at inlet (at temperature rise 8 ˚C)	42 ˚C	108 ˚F
Maximum cooling water temperature at outlet	50 ˚C	122 ˚F
Maximum temperature rise of cooling water	10 ˚C	18 ˚F

9.6 Compressor data

ZR - 7.5 bar - 50Hz

	Unit	ZR55	ZR75	ZR90
Nominal working pressure	bar	7	7	7
Nominal working pressure	psi	101.53	101.53	101.53
Maximum working pressure, ZR Pack	bar	7.5	7.5	7.5
Maximum working pressure, ZR Pack	psi	108.78	108.78	108.78
Maximum working pressure, ZR Full-Feature	bar	7.25	7.25	7.25
Maximum working pressure, ZR Full-Feature	psi	105.15	105.15	105.15
Power input at maximum working pressure, ZR Pack	kW	62.3	81.3	95.1
Power input at maximum working pressure, ZR Pack	hp	83.54	109.02	127.53
Power input at maximum working pressure, ZR Full-Feature	kW	61.3	80.8	94.4
Power input at maximum working pressure, ZR Full-Feature	hp	82.2	108.35	126.59
Oil capacity	l	35	35	35
Oil capacity	Us gal	9.24	9.24	9.24
Oil capacity	Imp gal	7.70	7.70	7.70
Oil capacity	cu.ft	1.23	1.23	1.23
Cooling water consumption at temperature rise of 15 ˚C, ZR Pack	l/s	0.9	1.2	1.4
Cooling water consumption at temperature rise of 27 ˚F, ZR Pack	l/s	0.9	1.2	1.4
Cooling water consumption at temperature rise of 15 ˚C, ZR Pack	cfm	1.91	2.54	2.96
Cooling water consumption at temperature rise of 27 ˚F, ZR Pack	cfm	1.91	2.54	2.96
Cooling water consumption at temperature rise of 15 ˚C, ZR Full-Feature	l/s	1.4	1.8	2.1
Cooling water consumption at temperature rise of 27 ˚F, ZR Full-Feature	l/s	1.4	1.8	2.1
Cooling water consumption at temperature rise of 15 ˚C, ZR Full-Feature	cfm	2.96	3.81	4.45

	Unit	ZR55	ZR75	ZR90
Cooling water consumption at temperature rise of 27 ˚F, ZR Full-Feature	cfm	2.96	3.81	4.45

ZR - 8.6 bar - 50Hz

	Unit	ZR55	ZR75	ZR90
Nominal working pressure	bar	8	8	8
Nominal working pressure	psi	116.03	116.03	116.03
Maximum working pressure, ZR Pack	bar	8.6	8.6	8.6
Maximum working pressure, ZR Pack	psi	124.73	124.73	124.73
Maximum working pressure, ZR Full-Feature	bar	8.35	8.35	8.35
Maximum working pressure, ZR Full-Feature	psi	121.11	121.11	121.11
Power input at maximum working pressure, ZR Pack	kW	61.5	83.4	96.7
Power input at maximum working pressure, ZR Pack	hp	82.47	111.84	129.67
Power input at maximum working pressure, ZR Full-Feature	kW	61.6	82.9	96.0
Power input at maximum working pressure, ZR Full-Feature	hp	82.61	111.17	128.74
Oil capacity	l	35	35	35
Oil capacity	Us gal	9.24	9.24	9.24
Oil capacity	Imp gal	7.70	7.70	7.70
Oil capacity	cu.ft	1.23	1.23	1.23
Cooling water consumption at temperature rise of 15 ˚C, ZR Pack	l/s	0.9	1.2	1.4
Cooling water consumption at temperature rise of 27 ˚F, ZR Pack	l/s	0.9	1.2	1.4
Cooling water consumption at temperature rise of 15 ˚C, ZR Pack	cfm	1.91	2.54	2.96
Cooling water consumption at temperature rise of 27 ˚F, ZR Pack	cfm	1.91	2.54	2.96
Cooling water consumption at temperature rise of 15 ˚C, ZR Full-Feature	l/s	1.4	1.8	2.1
Cooling water consumption at temperature rise of 27 ˚F, ZR Full-Feature	l/s	1.4	1.8	2.1

	Unit	ZR55	ZR75	ZR90
Cooling water consumption at temperature rise of 15 ˚C, ZR Full-Feature	cfm	2.96	3.81	4.45
Cooling water consumption at temperature rise of 27 ˚F, ZR Full-Feature	cfm	2.96	3.81	4.45

ZR - 10 bar - 50Hz

	Unit	ZR55	ZR75	ZR90
Nominal working pressure	bar	9	9	9
Nominal working pressure	psi	130.54	130.54	130.54
Maximum working pressure, ZR Pack	bar	10	10	10
Maximum working pressure, ZR Pack	psi	145.04	145.04	145.04
Maximum working pressure, ZR Full-Feature	bar	9.75	9.75	9.75
Maximum working pressure, ZR Full-Feature	psi	141.41	141.41	141.41
Power input at maximum working pressure, ZR Pack	kW	61.3	84.6	99.4
Power input at maximum working pressure, ZR Pack	hp	82.20	113.45	133.30
Power input at maximum working pressure, ZR Full-Feature	kW	60.8	84.0	98.7
Power input at maximum working pressure, ZR Full-Feature	hp	81.53	112.64	132.36
Oil capacity	l	35	35	35
Oil capacity	Us gal	9.24	9.24	9.24
Oil capacity	Imp gal	7.70	7.70	7.70
Oil capacity	cu.ft	1.23	1.23	1.23
Cooling water consumption at temperature rise of 15 ˚C, ZR Pack	l/s	0.9	1.2	1.5
Cooling water consumption at temperature rise of 27 ˚F, ZR Pack	l/s	0.9	1.2	1.5
Cooling water consumption at temperature rise of 15 ˚C, ZR Pack	cfm	1.91	2.54	3.18
Cooling water consumption at temperature rise of 27 ˚F, ZR Pack	cfm	1.91	2.54	3.18
Cooling water consumption at temperature rise of 15 ˚C, ZR Full-Feature	l/s	1.4	1.8	2.1

	Unit	ZR55	ZR75	ZR90
Cooling water consumption at temperature rise of 27 ˚F, ZR Full-Feature	l/s	1.4	1.8	2.1
Cooling water consumption at temperature rise of 15 ˚C, ZR Full-Feature	cfm	2.96	3.81	4.45
Cooling water consumption at temperature rise of 27 ˚F, ZR Full-Feature	cfm	2.96	3.81	4.45

ZT - 7.5 bar - 50Hz

	Unit	ZT55	ZT75	ZT90
Nominal working pressure	bar	7	7	7
Nominal working pressure	psi	101.53	101.53	101.53
Maximum working pressure, ZT Pack	bar	7.5	7.5	7.5
Maximum working pressure, ZT Pack	psi	108.78	108.78	108.78
Maximum working pressure, ZT Full-Feature	bar	7.25	7.25	7.25
Maximum working pressure, ZT Full-Feature	psi	105.15	105.15	105.15
Power input at maximum working pressure, ZT Pack	kW	64.9	86.2	102.1
Power input at maximum working pressure, ZT Pack	hp	87.03	115.59	136.92
Power input at maximum working pressure, ZT Full-Feature	kW	65.9	87.1	102.9
Power input at maximum working pressure, ZT Full-Feature	hp	88.37	116.8	137.99
Oil capacity	l	45	45	45
Oil capacity	Us gal	11.88	11.88	11.88
Oil capacity	Imp gal	9.90	9.90	9.90
Oil capacity	cu.ft	1.58	1.58	1.58

ZT - 8.6 bar - 50Hz

	Unit	ZT55	ZT75	ZT90
Nominal working pressure	bar	8	8	8
Nominal working pressure	psi	116.03	116.03	116.03
Maximum working pressure, ZT Pack	bar	8.6	8.6	8.6
Maximum working pressure, ZT Pack	psi	124.73	124.73	124.73
Maximum working pressure, ZT Full-Feature	bar	8.35	8.35	8.35
Maximum working pressure, ZT Full-Feature	psi	121.11	121.11	121.11
Power input at maximum working pressure, ZT Pack	kW	64.1	88.3	103.7
Power input at maximum working pressure, ZT Pack	hp	85.96	118.41	139.06
Power input at maximum working pressure, ZT Full-Feature	kW	65.1	89.2	104.4
Power input at maximum working pressure, ZT Full-Feature	hp	87.3	119.62	140.0
Oil capacity	l	45	45	45
Oil capacity	Us gal	11.88	11.88	11.88
Oil capacity	Imp gal	9.90	9.90	9.90
Oil capacity	cu.ft	1.58	1.58	1.58

ZT - 10 bar - 50Hz

	Unit	ZT55	ZT75	ZT90
Nominal working pressure	bar	9	9	9
Nominal working pressure	psi	130.54	130.54	130.54
Maximum working pressure, ZT Pack	bar	10	10	10
Maximum working pressure, ZT Pack	psi	145.04	145.04	145.04
Maximum working pressure, ZT Full-Feature	bar	9.75	9.75	9.75
Maximum working pressure, ZT Full-Feature	psi	141.41	141.41	141.41
Power input at maximum working pressure, ZT Pack	kW	63.9	89.0	104.7
Power input at maximum working pressure, ZT Pack	hp	85.69	119.35	140.4

	Unit	ZT55	ZT75	ZT90
Power input at maximum working pressure, ZT Full-Feature	kW	64.9	89.8	105.5
Power input at maximum working pressure, ZT Full-Feature	hp	87.03	120.42	141.48
Oil capacity	l	45	45	45
Oil capacity	Us gal	11.88	11.88	11.88
Oil capacity	Imp gal	9.90	9.90	9.90
Oil capacity	cu.ft	1.58	1.58	1.58

10 Pressure equipment directives

10.1 Pressure equipment directives

PED instructions

ZR/ZT 55 Pack up to ZR/ZT 90 Pack are pressure assemblies of cat. I according to 97/23/EC.

ZR/ZT 55 Full-Feature up to ZR/ZT 90 Full-Feature are pressure assemblies of cat. III according to 97/23/EC.

Parts of article 3.3 of 97/23/EC are subject to good engineering practice.

Parts of category I according to 97/23/EC are integrated into the machine and fall under the exclusion of article I, section 3.6.

Parts subject to the Simple Pressure Vessel Directive 87/404/EEC are excluded from 97/23/EC according to article I, section 3.3.

The following pressure bearing parts are of category higher than I :

- Safety valve: Category IV
  Design code: AD-Merkblätter, A2
- Vessel IMD260: Category III
  Design pressure 11 bar(e) (159.54 psig), content 91 l (24.02 US gal / 20.02 Imp gal / 3.19 cu.ft)
  Design standard: ASME section VIII div. 1.

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