Atlas Copco Stationary Air Compressors

ZT15, ZT18, ZT22, ZT30, ZT37, ZT45
ZR30, ZR37, ZR45

Instruction book

Copyright 2004, Atlas Copco Airpower n.v., Antwerp, Belgium.
Any unauthorized use or copying of the contents or any part thereof is prohibited. This applies in particular to trademarks, model denominations, part numbers and drawings.

This instruction book meets the requirements for instructions specified by the machinery directive 98/37/EC and is valid for CE as well as non-CE labelled machines

No. 2920 1472 03
Replaces 2920 1472 02

Registration code: APC Z<55 + VSD / 38 / 392

2004-05 www.atlascopco.com

This instruction book describes how to handle and operate the subject machine(s) to ensure safe operation, optimum working economy and long service life.

Read this book before putting the machine into operation to ensure correct handling, operation and proper maintenance from the beginning. The maintenance schedule comprises measures for keeping the compressor in good repair.

Keep the book available for the operator(s) and make sure that the compressor is operated and that maintenance is carried out according to the instructions. Record all operating data, maintenance work effected, etc. in an operator's logbook available from Atlas Copco. Follow all applicable safety precautions, amongst others those mentioned in this book.

Repairs must be carried out by trained personnel from Atlas Copco who can also be contacted for any further information.

In all correspondence mention the type and the serial number, shown on the data plate.

For all data not mentioned in the text, see sections "Preventive maintenance schedule" and "Principal data".

The company reserves the right to make changes without prior notice.

1 LEADING PARTICULARS

1.1 General description

ZT15 up to ZT45 and ZR30 up to ZR45 are two-stage tooth compressors, driven by an electric motor. The compressors deliver oil-free air. **ZT** are air-cooled and **ZR** are water-cooled.

The compressors are enclosed in a sound-insulated bodywork and include mainly (Figs. 1.2 up to 1.4):
- Air filter (AF)
- Load/no-load valve (TV)
- Low-pressure compressor element (El)
- Intercooler (Ci)
- High-pressure compressor element (Eh)
- Aftercooler (Ca)
- Electric motor (M1)
- Drive coupling
- Gear casing
- Elektronikon® regulator (1-Fig. 1.2)
- Safety valves (SVh/SVl)

Full-Feature compressors are additionally provided with an air dryer (Figs. 1.3/1.5), which removes moisture from compressed air. See section 1.6.

WorkPlace Air System compressors operate at a very low noise level.

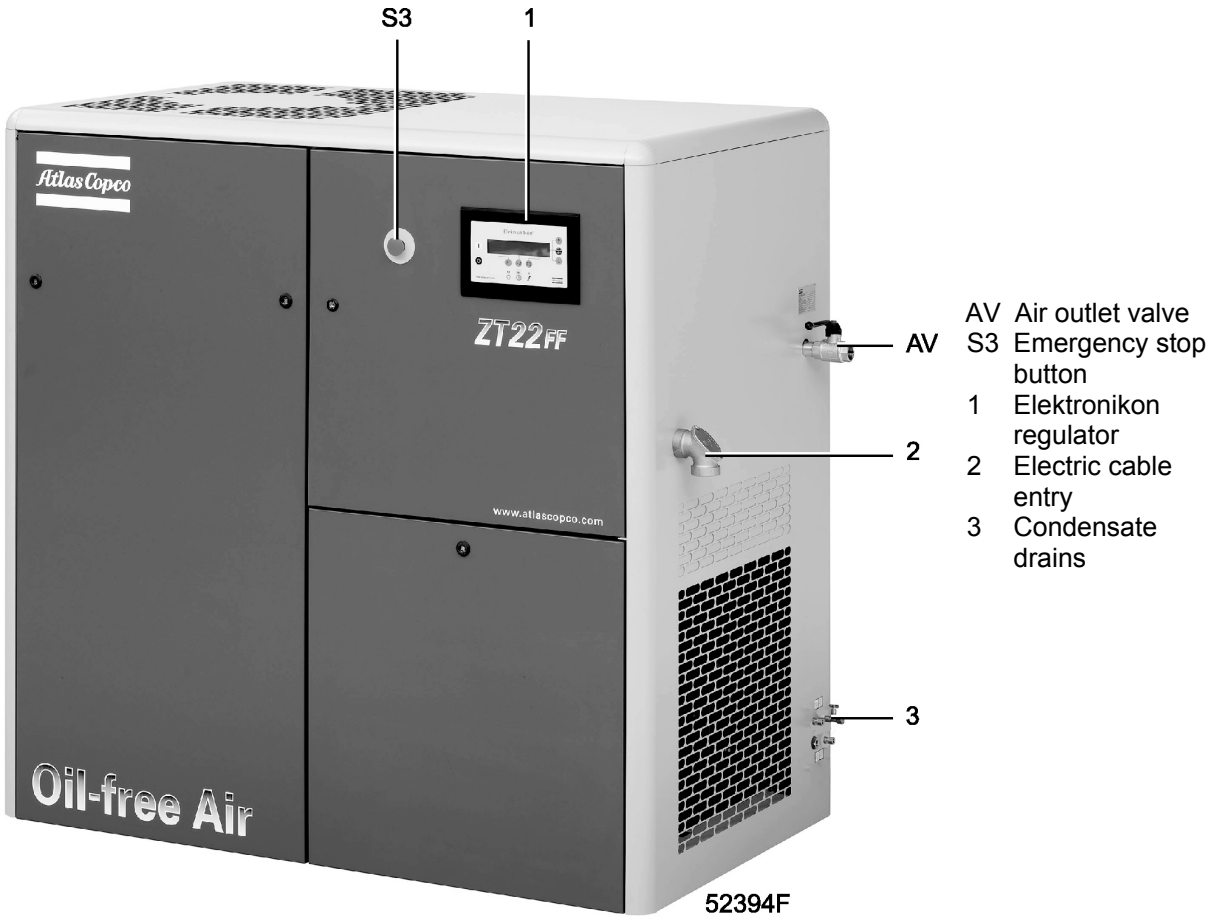
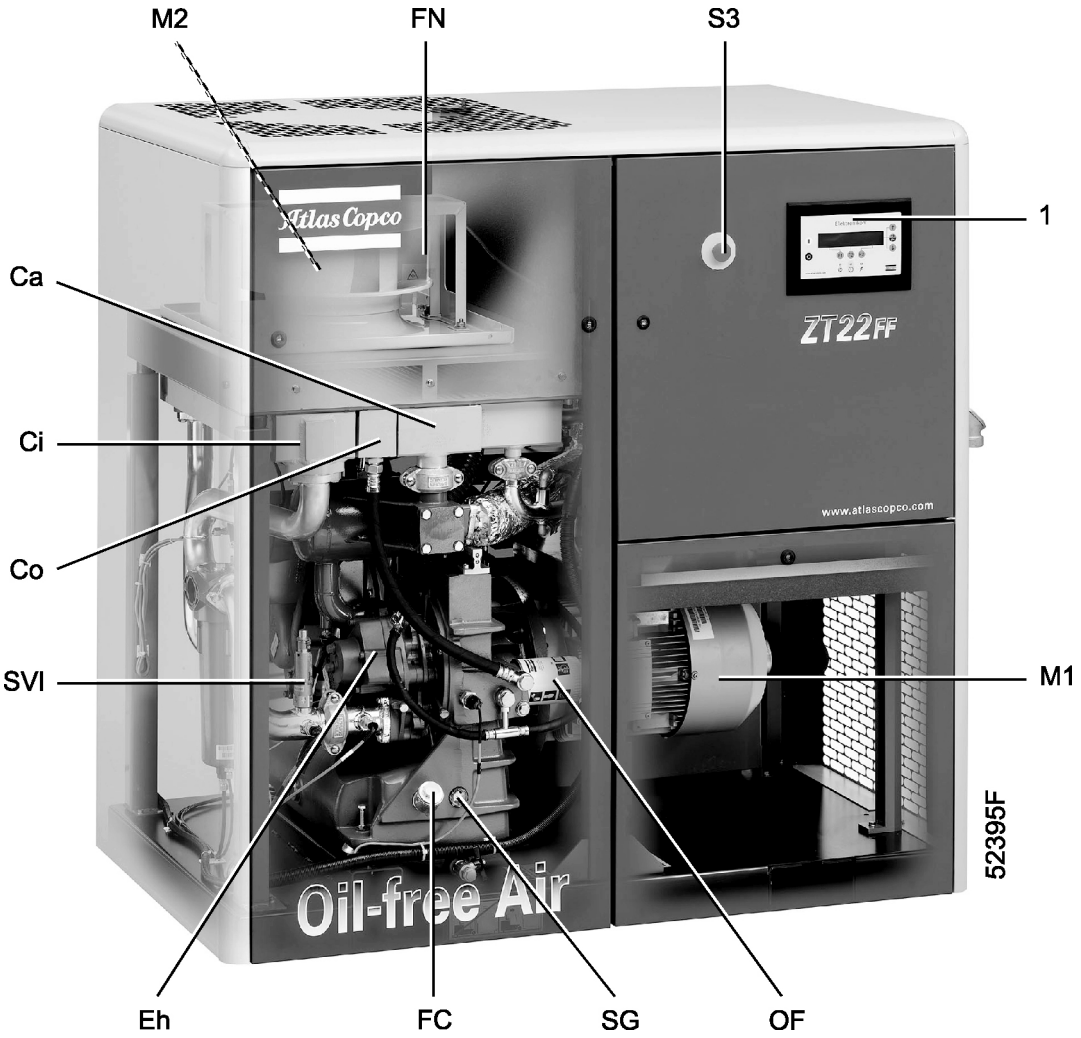
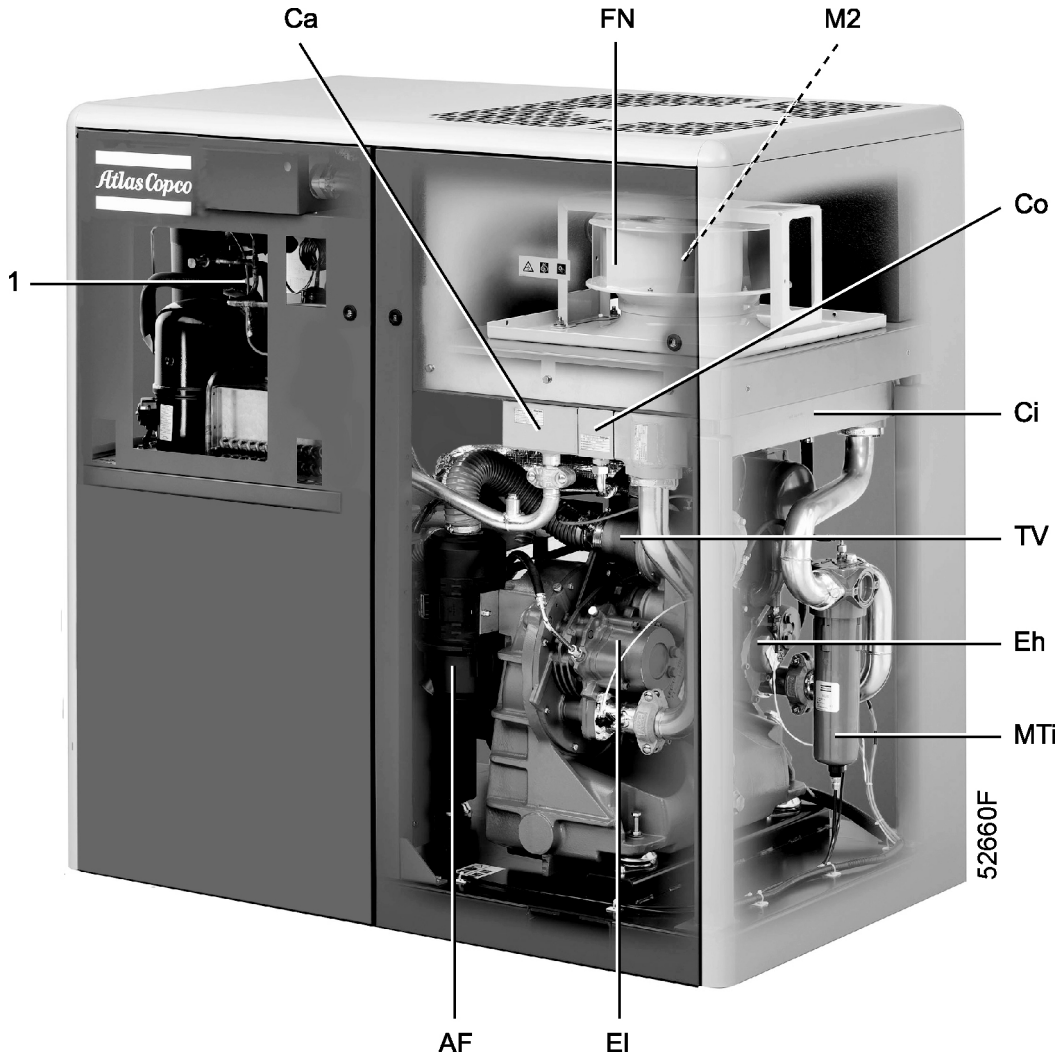


Fig. 1.1 General view



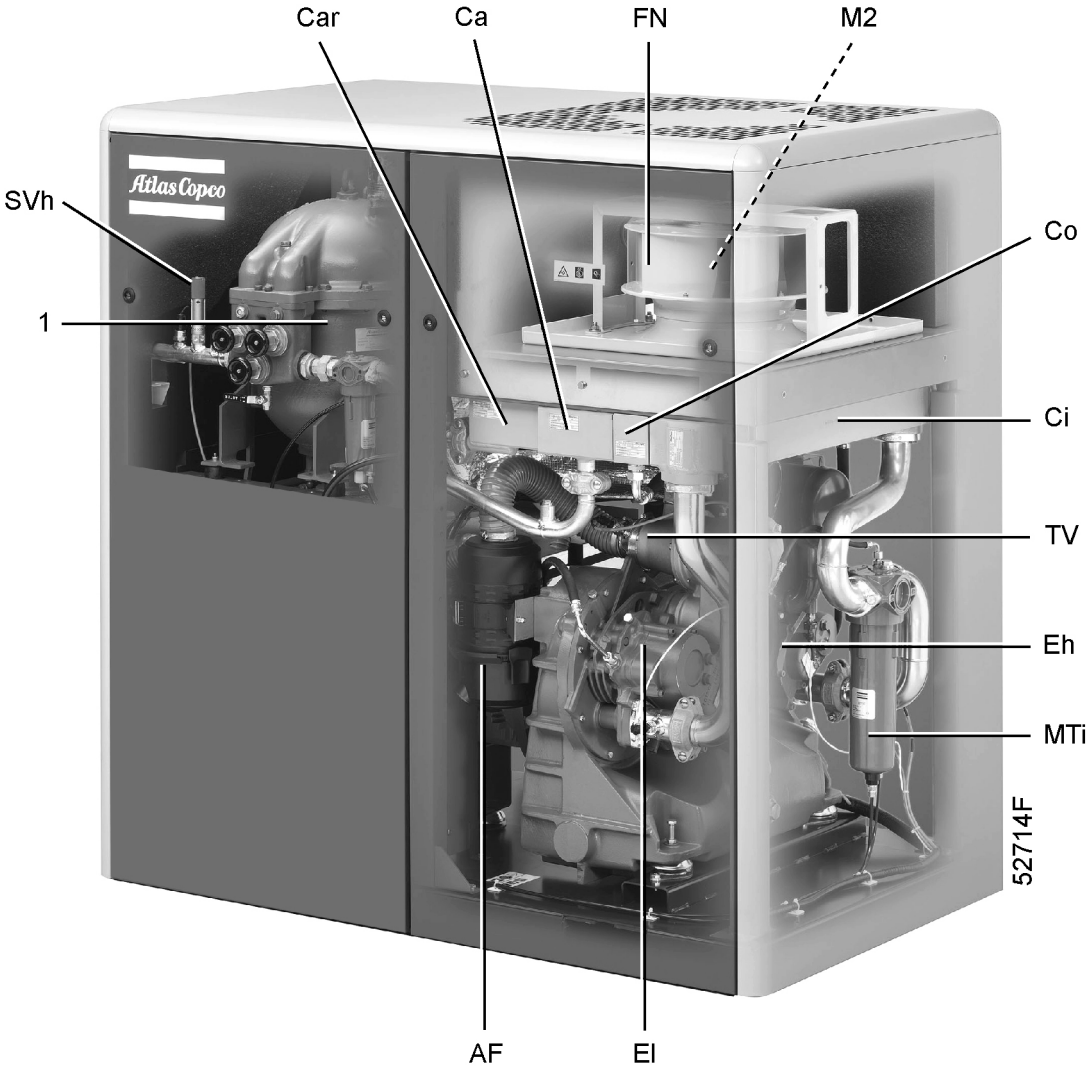
Ca	Aftercooler
Ci	Intercooler
Co	Oil cooler
Eh	High-pressure compressor element
FC	Oil filler plug
FN	Fan
M1	Drive motor
M2	Fan motor
OF	Oil filter
SG	Oil level sight-glass
SVl	Low-pressure safety valve
S3	Emergency stop button
1	Elektronikon regulator

Fig. 1.2 Front view



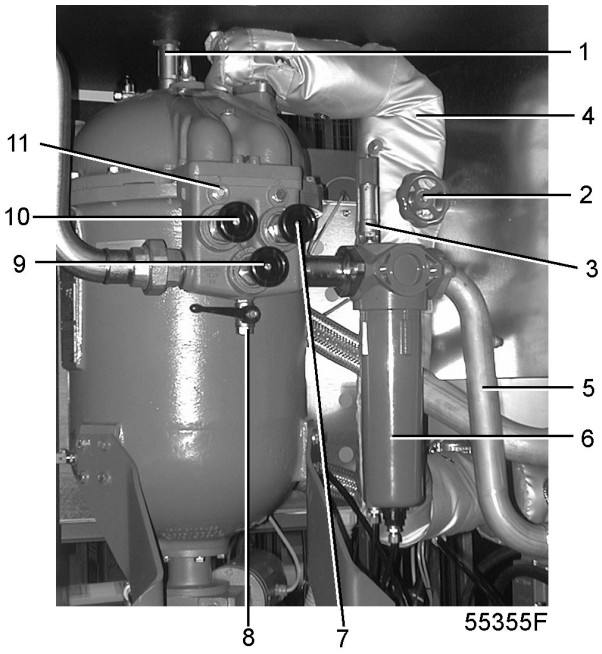
AF	Air filter
Ca	Aftercooler
Ci	Intercooler
Co	Oil cooler
Eh	High-pressure compressor element
El	Low-pressure compressor element
FN	Cooling fan
MTi	Condensate trap, intercooler
M2	Fan motor
TV	Load/no-load valve
1	ID dryer

Fig. 1.3 Rear view, Full-Feature (ID dryer)



AF	Air filter
Ca	Aftercooler
Car	Cooler, regeneration air
Ci	Intercooler
Co	Oil cooler
Eh	High-pressure compressor element
El	Low-pressure compressor element
FN	Cooling fan
MTi	Condensate trap, intercooler
M2	Fan motor
SVh	High-pressure safety valve
TV	Load/no-load valve
1	IMD dryer

Fig. 1.4 Rear view, Full-Feature (IMD dryer)



1 Safety valve
2 Shut-off valve, regeneration air
3 Safety valve
4 Inlet regeneration air
5 Inlet pipe, wet compressed air
6 Condensate trap, aftercooler
7 Dryer inlet valve
8 Manual drain valve
9 Dryer by-pass valve
10 Dryer outlet valve
11 Moisture indicator

Fig. 1.5 IMD dryer

1.2 Air flow (Figs. 1.6/1.7)

Air drawn through filter (AF) is compressed in low-pressure compressor element (El) and discharged to intercooler (11). The cooled air is further compressed in high-pressure compressor element (Eh) and discharged through pulsation damper (AS) and aftercooler (15). A check valve (CV) is provided downstream of the pulsation damper.

1.3 Condensate drain system (Figs. 1.6/1.7)

Two condensate traps are installed: one downstream of the intercooler (MTi) to prevent condensate from entering the high-pressure compressor element (Eh) and one downstream of the aftercooler (MTa) to prevent condensate from entering the air outlet pipe. The condensate traps are provided with a float valve to automatically drain condensate and with a manual drain valve.

For Full-Feature compressors with an ID dryer (Figs. 1.6), the condensate trap downstream the aftercooler is replaced by a condensate trap (5) in the dryer.

Full-Feature compressors with an IMD dryer (Figs. 1.7) have three additional electronic water drains:
- One on the IMD
- One upstream and downstream the regeneration air cooler

1.4 Oil system (Figs. 1.6/1.7)

Oil is circulated by pump (OP) from the sump of the gear casing through cooler (16) and oil filter (OF) towards the bearings and timing gears.

The oil system is protected by a valve that opens if the oil pressure should rise above a given value. The valve is located in the oil filter housing.

1.5 Cooling system (Figs. 1.6/1.7)

ZT compressors
The compressors are provided with an air-cooled oil cooler (16), intercooler (11) and aftercooler (15). An electric motor-driven fan (FN) generates the cooling air.

ZR compressors
The oil cooler, intercooler and aftercooler are water-cooled.
The water system includes three parallel circuits:
- One for the oil cooler and intercooler.
- One for the aftercooler.
- One circuit is only for compressors with an IMD dryer and contains the regeneration cooler.

Each of these circuits has a separate regulating valve (see section 3.1)

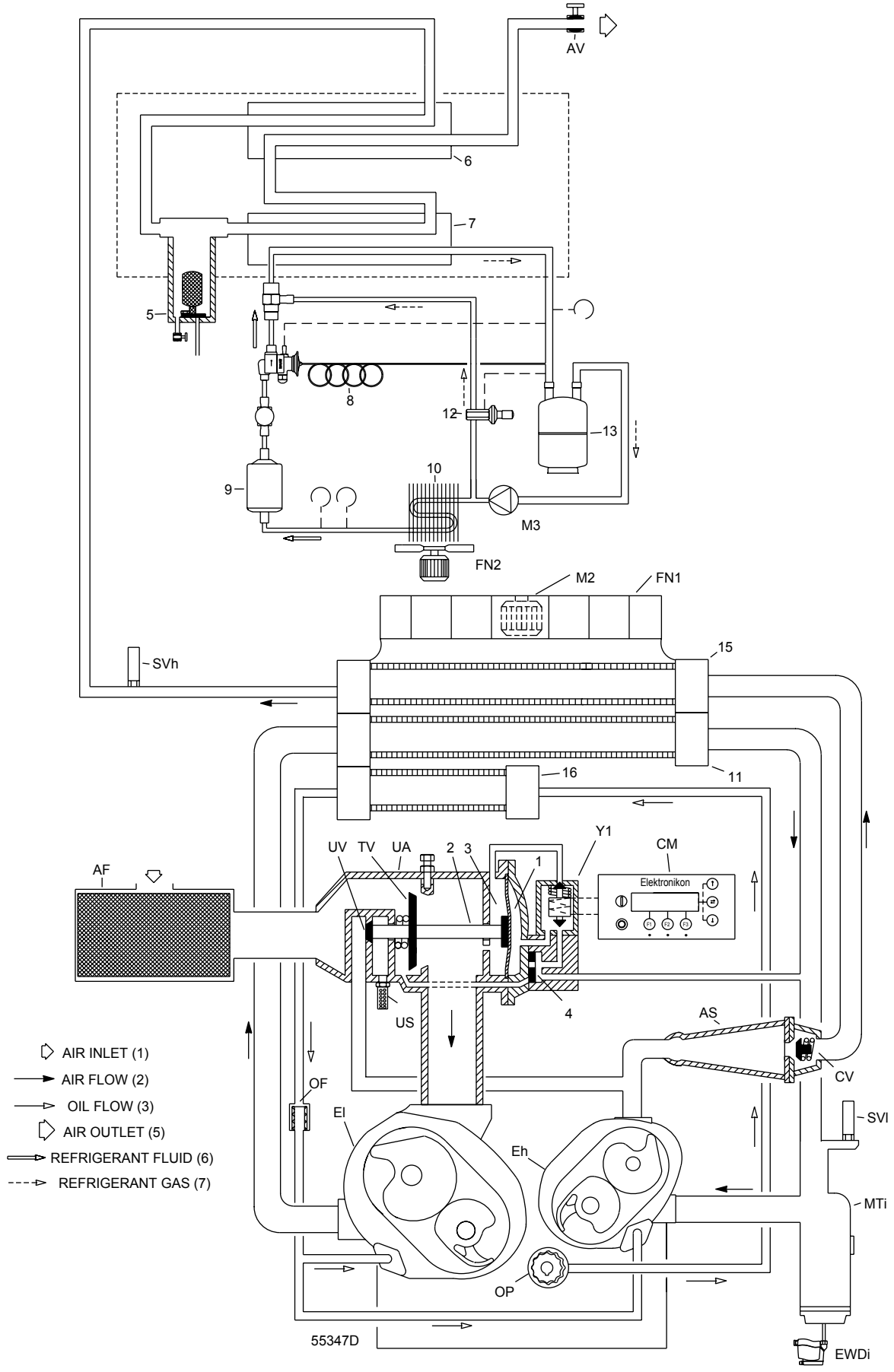


Fig. 1.6a ZT compressors with an ID dryer

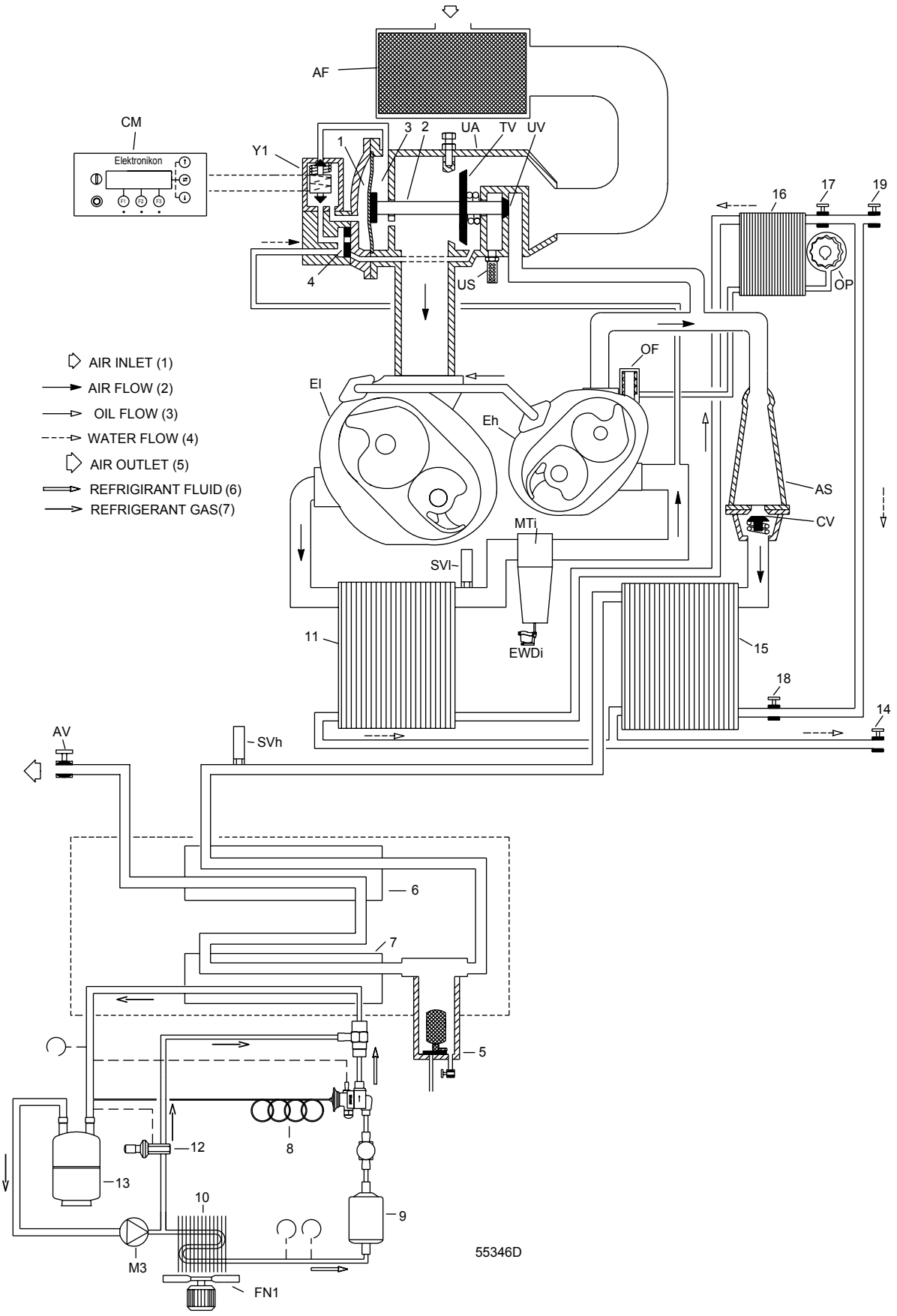


Fig. 1.6b ZR compressors with an ID dryer

AF	Air filter
AS	Pulsation damper
AV	Air outlet valve (customer's installation)
CM	Control module
CV	Check valve
Eh	High-pressure compressor element
El	Low-pressure compressor element
EWDi	Electronic drain, low-pressure element
FN1	Fan, compressor coolers
FN2	Fan, condenser
M2	Fan motor, compressor coolers
M3	Refrigerant compressor
MTi	Condensate trap, intercooler
OF	Oil filter
OP	Oil pump
SVh	Safety valve, high-pressure element
SVi	Safety valve, low-pressure element
TV	Load/no-load valve
UA	Unloader
US	Silencer
Y1	Loading solenoid valve
1	Chamber
2	Plunger
3	Chamber
4	Diaphragm
5	Condensate trap, dryer
6	Air/air heat exchanger
7	Air/refrigerant heat exchanger/evaporator
8	Capillary tube
9	Accumulator
10	Refrigerant condenser
11	Intercooler
12	Hot-gas by-pass valve
13	Liquid refrigerant filter/dryer
14	Water outlet valve (customer's installation)
15	Aftercooler
16	Oil cooler
17	Regulating valve, oil cooler and intercooler water circuit
18	Regulating valve, aftercooler water circuit
19	Water inlet valve (customer's installation)

Note: References 14 up to 19 apply to ZR compressors only

Figs. 1.6 Flow diagrams/regulating systems for Full-Feature compressors with ID dryer

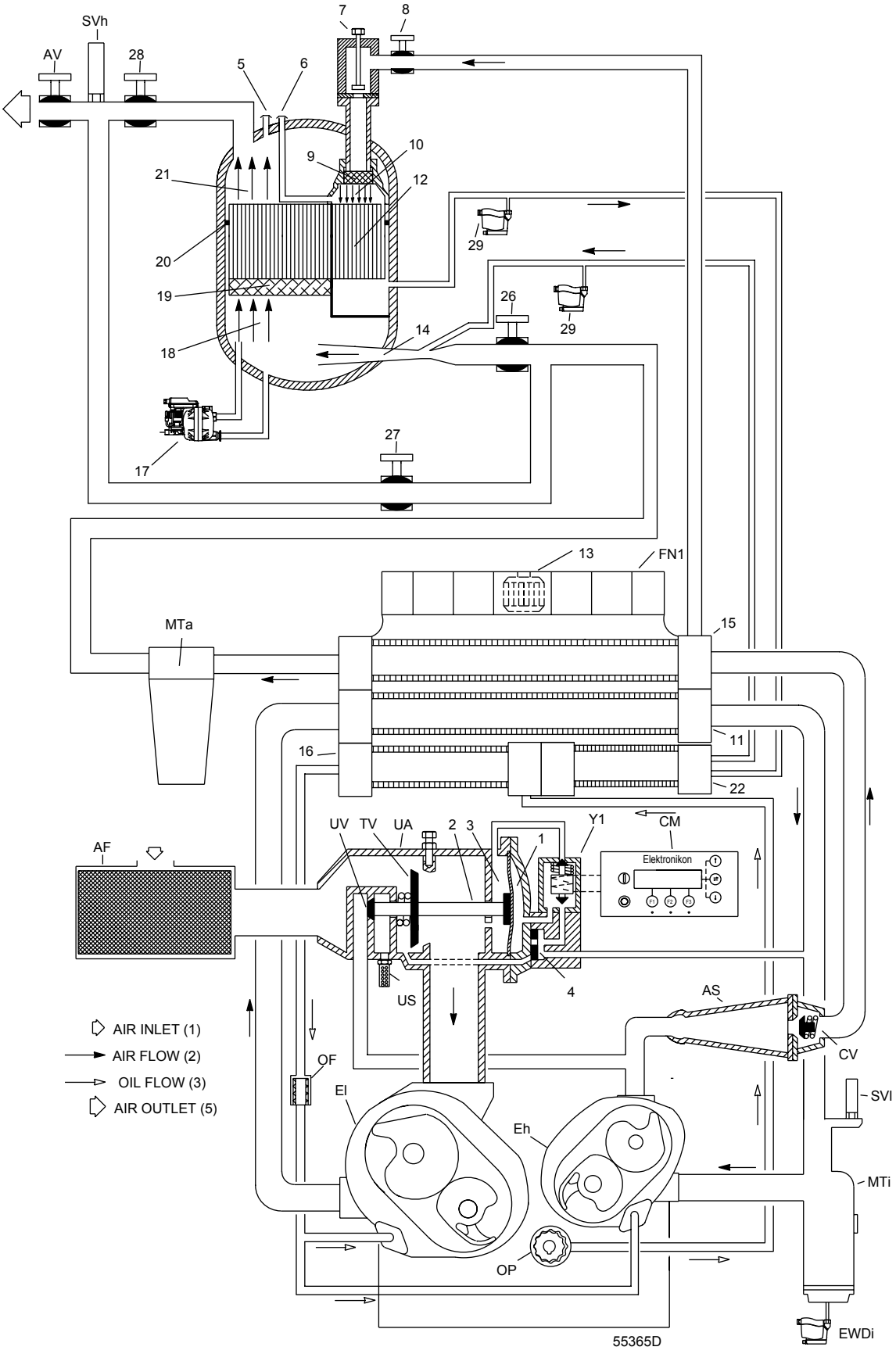


Fig. 1.7a ZT compressor with IMD dryer

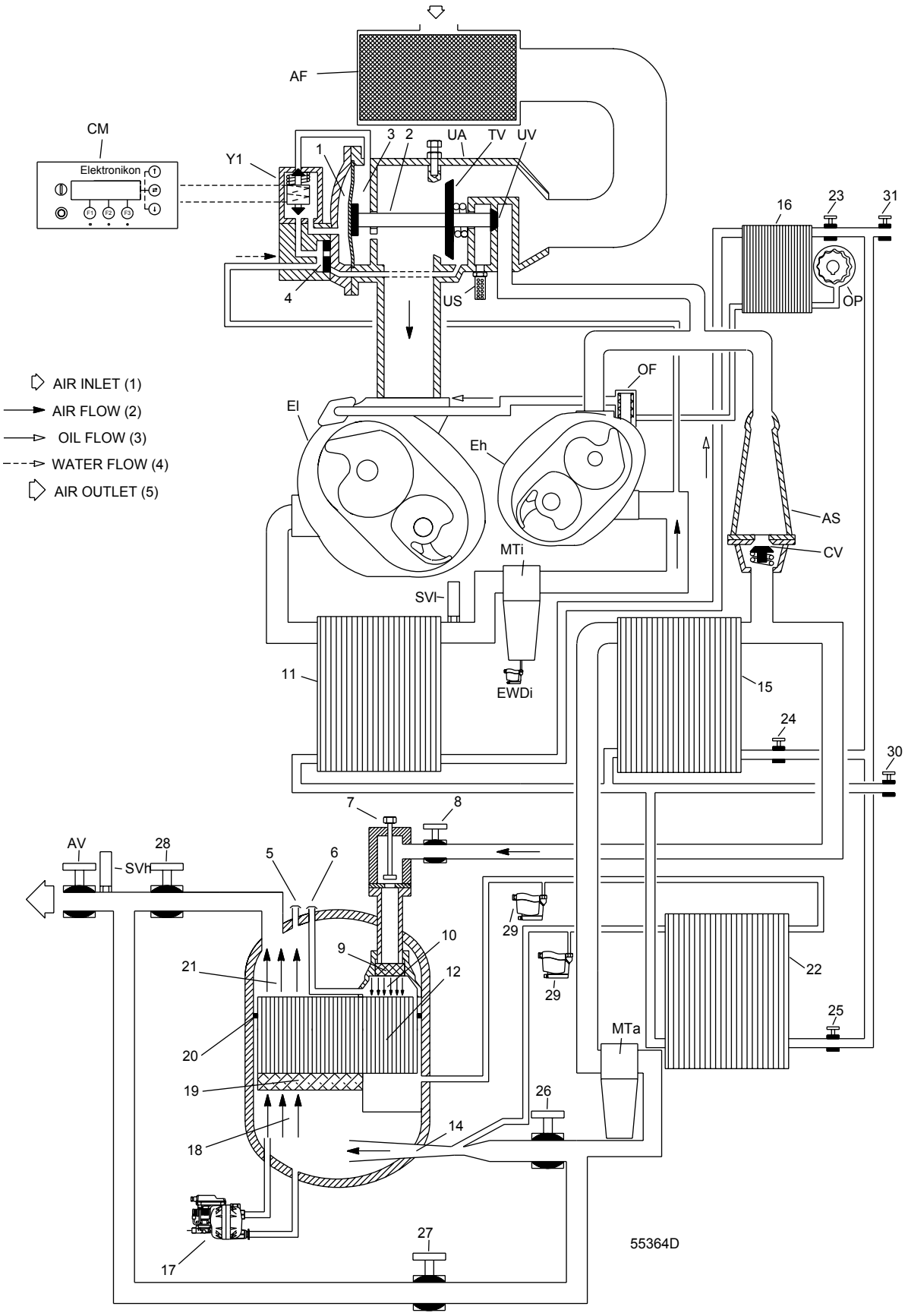


Fig. 1.7b ZR compressor with IMD dryer

AF	Air filter
AS	Pulsation damper
AV	Air outlet valve (customer’s installation)
CM	Elektronikon regulator
CV	Check valve
Eh	High-pressure compressor element
El	Low-pressure compressor element
EWDi	Electronic water drain, intercooler
FN1	Cooling fan
MTa	Condensate trap, aftercooler
MTi	Condensate trap, intercooler
OF	Oil filter
OP	Oil pump
SVh	High-pressure safety valve
SVl	Low-pressure safety valve
TV	Load/no-load valve
UA	Unloader
US	Silencer
UV	Unloading valve
Y1	Loading solenoid valve
1	Chamber
2	Plunger
3	Chamber
4	Diaphragm
5	Valve for (+) connection, pressure difference gauge
6	Valve for (-) connection, pressure difference gauge
7	Throttle valve, regeneration inlet air
8	Shut-off valve, hot regeneration inlet air
9	Strainer
10	Sealing sector, regeneration air inlet (unsaturated side)
11	Intercooler
12	Rotor
13	Fan motor, air coolers
14	Ejector
15	Aftercooler
16	Oil cooler
17	Electronic water drain, inlet air
18	Water separator, inlet air
19	Demister
20	Rotor sealing arrangement
21	Dry air outlet compartment
22	Regeneration air cooler
23	Regulating valve, oil cooler and intercooler water circuit
24	Regulating valve, aftercooler water circuit
25	Regulating valve, regeneration air cooler water circuit
26	IMD air inlet valve
27	IMD by-pass valve
28	IMD outlet valve
29	Electronic drains, regeneration air cooler
30	Water shut-off valve, water outlet (customer’s installation)
31	Shut-off valve, water inlet (customer’s installation)

Figs. 1.7 Flow diagram/regulating system, ZT Full-Feature with IMD dryer

1.6 Air dryer on Full-Feature

Full-Feature compressors are provided with a dryer which removes moisture from compressed air. Two dryer types are available: a refrigerant-type dryer (ID dryer) and an adsorption-type dryer (IMD dryer).

1.6.1 Compressors with an ID dryer (Figs. 1.6)

Compressed air circuit of the dryer
Compressed air enters heat exchanger (6) and is cooled by the outgoing dried air. Water in the incoming air starts to condense. The air then flows through heat exchanger/evaporator (7) where the refrigerant evaporates, causing the air to be further cooled to close to the evaporating temperature of the refrigerant. More water in the air condenses. The cold air then flows through condensate trap (5), where all the condensate is separated from the air. The condensate collects in the condensate trap and is automatically drained. The cold, dried air flows through heat exchanger (6), where it is warmed up by the incoming air.

Refrigeration circuit of the dryer
Compressor (M3) delivers high-pressure refrigerant gas, which flows through condenser (10) where most of the refrigerant condenses.

The liquid flows through liquid refrigerant dryer/filter (13) to capillary tube (8). The refrigerant leaves the capillary tube at evaporating pressure.

The refrigerant enters evaporator (7) where it withdraws heat from the compressed air by further evaporation at constant pressure. The heated refrigerant leaves the evaporator and is sucked in by the compressor.

1.6.2 Compressors with an IMD dryer (Figs. 1.7)

Air drying circuit of the dryer
Wet air from the aftercooler (15) enters the dryer through inlet valve (26) and the nozzle of ejector (14). The air leaving the aftercooler is normally saturated.

In the demister (18), water droplets are removed from the air. The air is then led through rotor (19), which adsorbs the water vapour. The dried air leaves the dryer through outlet valve (28).

Regeneration air circuit of the dryer
Hot unsaturated regeneration air flows through shut-off valve (8) and throttle valve (7) through the wet rotor channels (12). Since the hot air has a lower vapour pressure than the wet rotor channels, it will dry the rotor.

The hot saturated air is then cooled down in regeneration air cooler (22) and led to the suction chamber of ejector (14), where it is mixed with the wet compressed air from the compressor aftercooler.

Drain system of the dryer
The condensate is collected in three EWD (Electronic Water Drains-Fig. 1.8). A sensor continuously measures the liquid level. As soon as the collector is filled up to a certain level, the outlet opens, discharging the condensate. When the collector has been emptied, the outlet closes quickly without wasting compressed air.

If the controller registers a malfunction, the red alarm LED (Fig. 1.8) starts flashing and the electronic drain valve will automatically change to the alarm mode, opening and closing the valve according to a built-in sequence. This condition continues until the fault is remedied. If the fault is not remedied automatically, maintenance is required. Consult your Atlas Copco Customer Centre.

Testing the EWD

Functional test
Briefly press the TEST button (Fig. 1.8) 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.

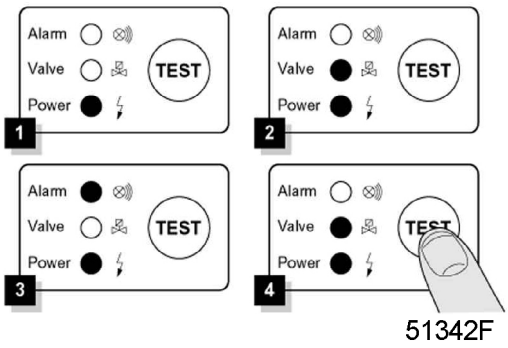
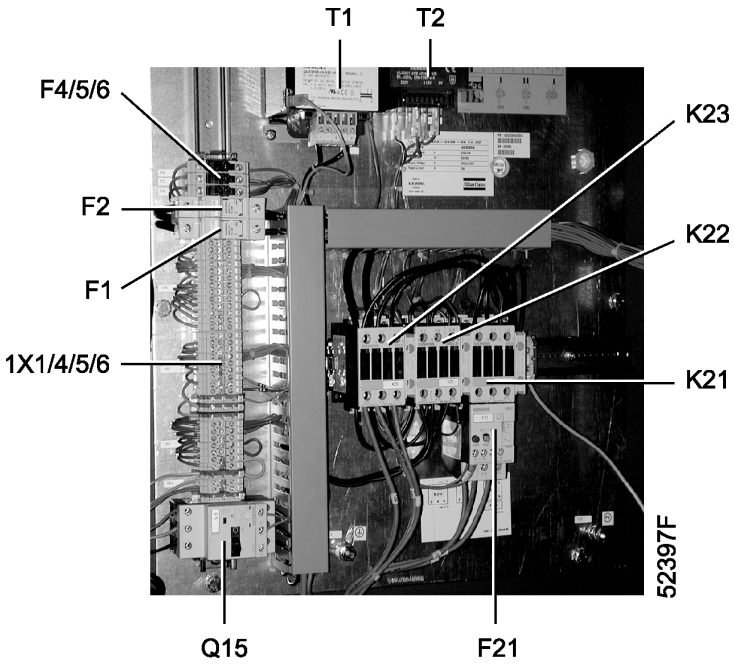


Fig. 1.8 Control panel of Electronic Water Drain (EWD)

1.7 Electrical system

The system mainly includes:

- Elektronikon regulator (1-Fig. 1.1)
- Emergency stop button (S3-Fig. 1.1)
- Electric cabinet (Fig. 1.9)
- Drive motor (M1-Fig. 1.2)
- Pressure and temperature sensors



F1/2	Fuses
F4/5/6	Fuses
F21	Overload relay, drive motor
K21	Line contactor
K22	Star contactor
K23	Delta contactor
Q15	Circuit breaker, fan motor (on ZT)
T1	Main transformer
T2	Transformer, control circuit
1X1/4/5/6	Terminal strips

Fig. 1.9 Electric cabinet, typical example

1.8 Elektronikon control system

In general, the Elektronikon regulator has following functions:
- automatic control of the compressor
- protecting the compressor
- monitoring components - service warning
- automatic restart after voltage failure

1.8.1 Automatic control of the compressor

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 stopping period is too short, the compressor is kept running to prevent too-short standstill periods.

Warning
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.

1.8.2 Protecting the compressor

Shut-down and motor overload
Several temperature and pressure sensors are provided on the compressor. If one of these measurements (temperature at LP element outlet, temperature at HP element outlet, intercooler pressure as well as oil pressure) exceeds the programmed shut-down level, the compressor will be stopped. This will be indicated on the control display.

The compressor will also be stopped in case of overload of the drive motor.

Consult the safety precautions as mentioned in section 4 and remedy the trouble. See also the User manual for Elektronikon regulator, section “Status data menu”.

Shut-down warning
If the regulator detects a temperature or pressure just below the programmed shut-down level, this will be indicated on the control panel to warn the operator before the shut-down level is reached.

The message disappears as soon as the warning condition disappears.

1.8.3 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 (2-Fig. 1.10) to warn the operator to carry out the service actions belonging to that level. See section 4.

1.8.4 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 Atlas Copco.

Warning
If activated and provided the module 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 255 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.

1.9 Control panel

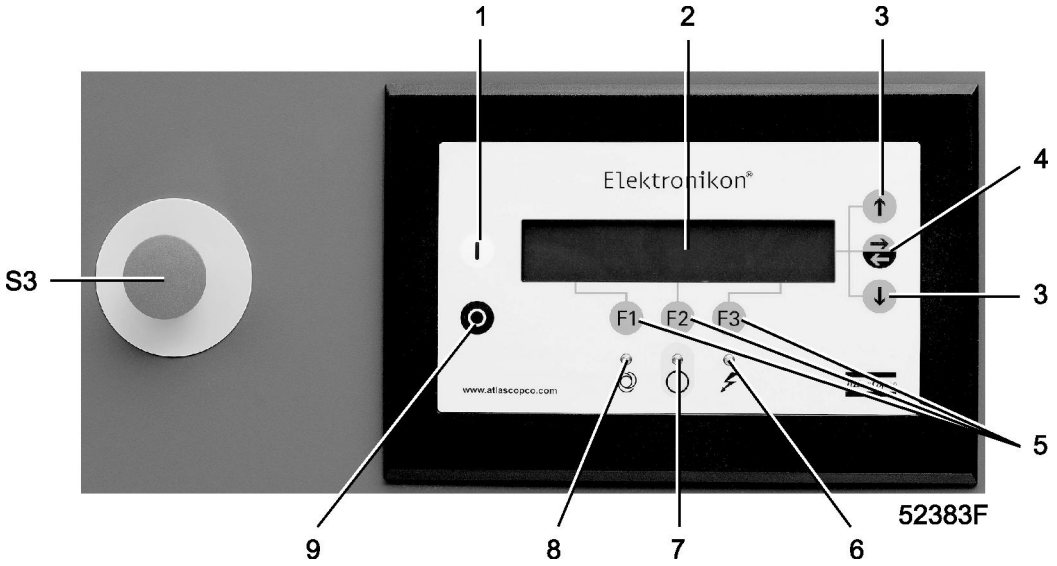


Fig. 1.10 Control panel

1.9.1 LEDs/buttons/keys

Ref.	Designation	Function
1	Start button	Push button to start the compressor. LED (8) lights up, indicating that the Elektronikon regulator is operative.
2	Display	Indicates messages concerning 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 a horizontal arrow. Only the parameters followed by an arrow pointing to the right are accessible for modifying.
5	Function keys	Keys to control and program the compressor. See section 1.9.3.
6	Voltage on LED	Indicates that the voltage is switched on.
7	General alarm LED	Is alight if a shut-down warning condition exists. See section 1.8.2.
7	General alarm LED	Blinks if a shut-down condition exists, if an important sensor is out of order or after an emergency stop. See section 1.8.2.
8	Automatic operation LED	Indicates that the regulator is automatically controlling the compressor.
9	Stop button	Push button to stop the compressor. LED (8) goes out.
S3	Emergency stop button	Push button to stop the compressor immediately in case of emergency. After remedying the trouble, unlock the button by pulling it out.

1.9.2 Display

The following is a typical example of the main screen, showing in short the status of the compressor:

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

Fig. 1.11 Example of the main screen

1.9.3 Function keys (5-Fig. 1.10)

The keys are used:
- to call up or program settings
- to reset an active motor overload, shut-down or service message, or an emergency stop
- to have access to all data collected by the regulator

The functions of the keys vary, depending on the displayed menu. The actual function is indicated on the bottom line of the display 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 (Fig. 1.11)
Menu	Starting from the main screen (Fig. 1.11), to have access to 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 information regarding the installed modules

1.9.4 Emergency stop button (S3-Fig. 1.10)

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

Pressing the button breaks the circuit to the drive motor. The circuit to the control circuit and other electrical components is not broken.

Warning
Before starting any maintenance or repairs:
- Stop the compressor and close the air outlet valve.
- Press the test buttons (Fig. 1.8) on top of the electronic water drains to depressurize the air system and open the drain valve (1-Fig. 3.5). If an IMD dryer is installed, open drain valve (8-Fig. 1.5).
- Open the isolating switch (customer's installation) to switch off the voltage to the compressor.

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

1.10 Menu-driven control programs

To facilitate programming and controlling the compressor, menu-driven programs are implemented in the electronic module.

A simplified menu flow is shown in Fig. 1.13.

1.10.1 Function of control programs

Program/Function	Description
Main screen	Shows in short the operation status of the compressor. It is the gateway to all functions. See Fig. 1.13.
Status data	Calling up the status of the compressor protection functions: - shut-down - shut-down warning - service warning Resetting of a shut-down, motor overload and service condition.
Measured data	Calling up: - actually measured data - the status of a number of inputs
Counters	Calling up the: - running hours - number of motor starts - regulator (module) hours
Test	Allows a display test.
Modify parameters	Modifying the settings for: - parameters: loading and unloading pressures,… - protections: compressor element outlet temperature,… - service plans: timers for service plans - clock functions: automatic start/stop/pressure band commands - configuration: time, date, display language, …
Service	Calling up service plans and resetting the timers after carrying out the service actions belonging to a plan. See section 4.
Saved data	Calling up the saved data: last shut-down, last emergency stop data

1.10.2 Main screen

When the voltage is switched on, the main screen is shown automatically, showing in short the operation status of the compressor.

Compressor Outlet		7.0 bar	
Automatically Loaded			↓
Menu			
F1	F2	F3	

Fig. 1.12 Main screen, typical example

If the function keys or arrow keys are not used for some minutes, the display will automatically return to the Main screen.

Whenever displayed on a submenu screen, press the Mainscreen key to return to the Main screen.

1.10.3 External compressor status indication

Terminal strip (1X7-Fig. 2.8) may be provided as an option. The strip has auxiliary contacts for external indication of:

Indication	**Relay**	**Terminals on strip 1X7**	**Max. load**
Automatic operation	K07	71-72	10 A / 230 V AC
Warning	K08	73-74	10 A / 230 V AC
Shut-down	K09	75-76	10 A / 230 V AC
Compressor running	K21	77-78	6 A / 230 V AC
Compressor loaded	K14	79-80	6 A / 230 V AC

Warning
Before connecting external equipment, stop the compressor and apply the safety precautions as mentioned in section 4.

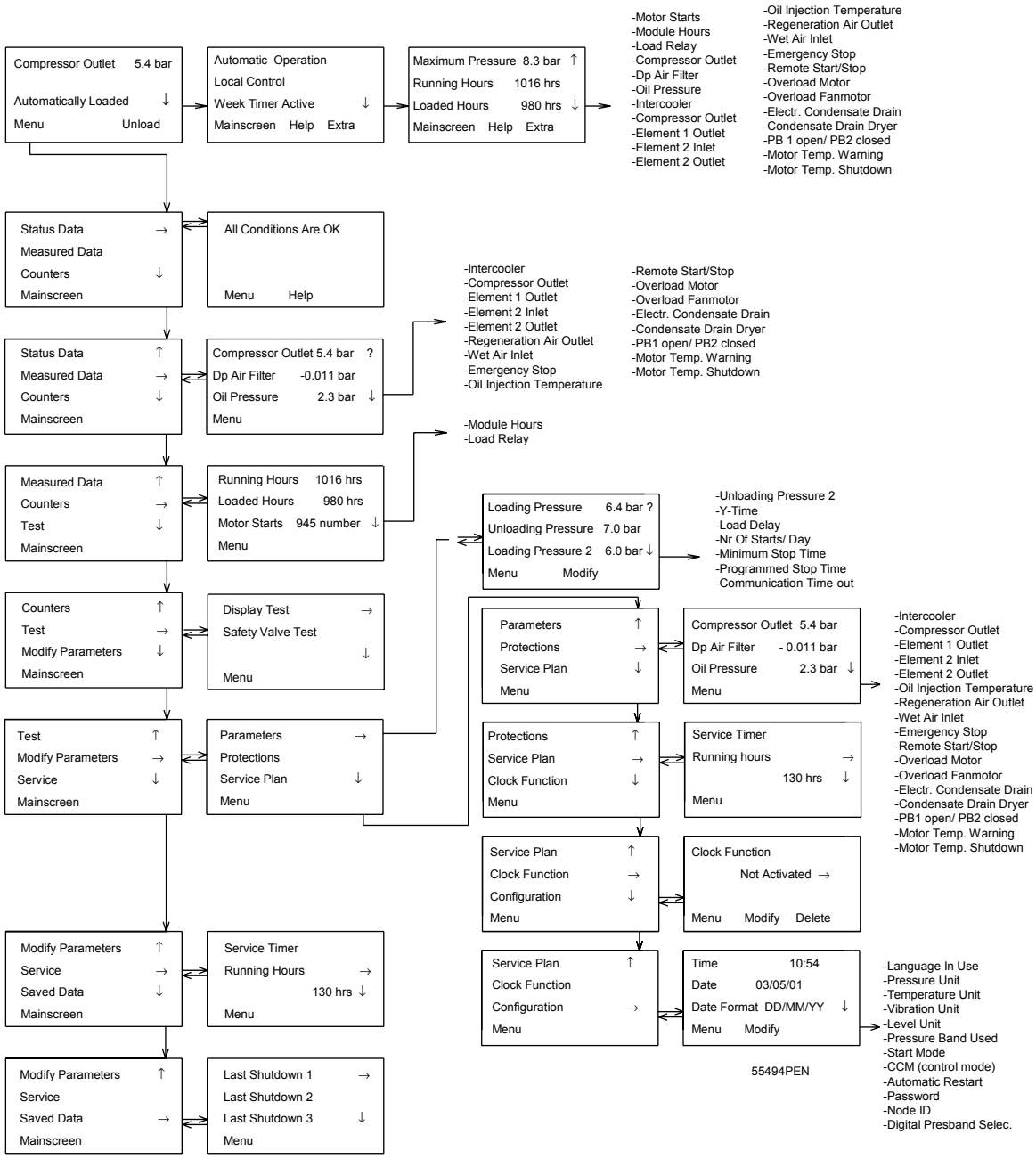
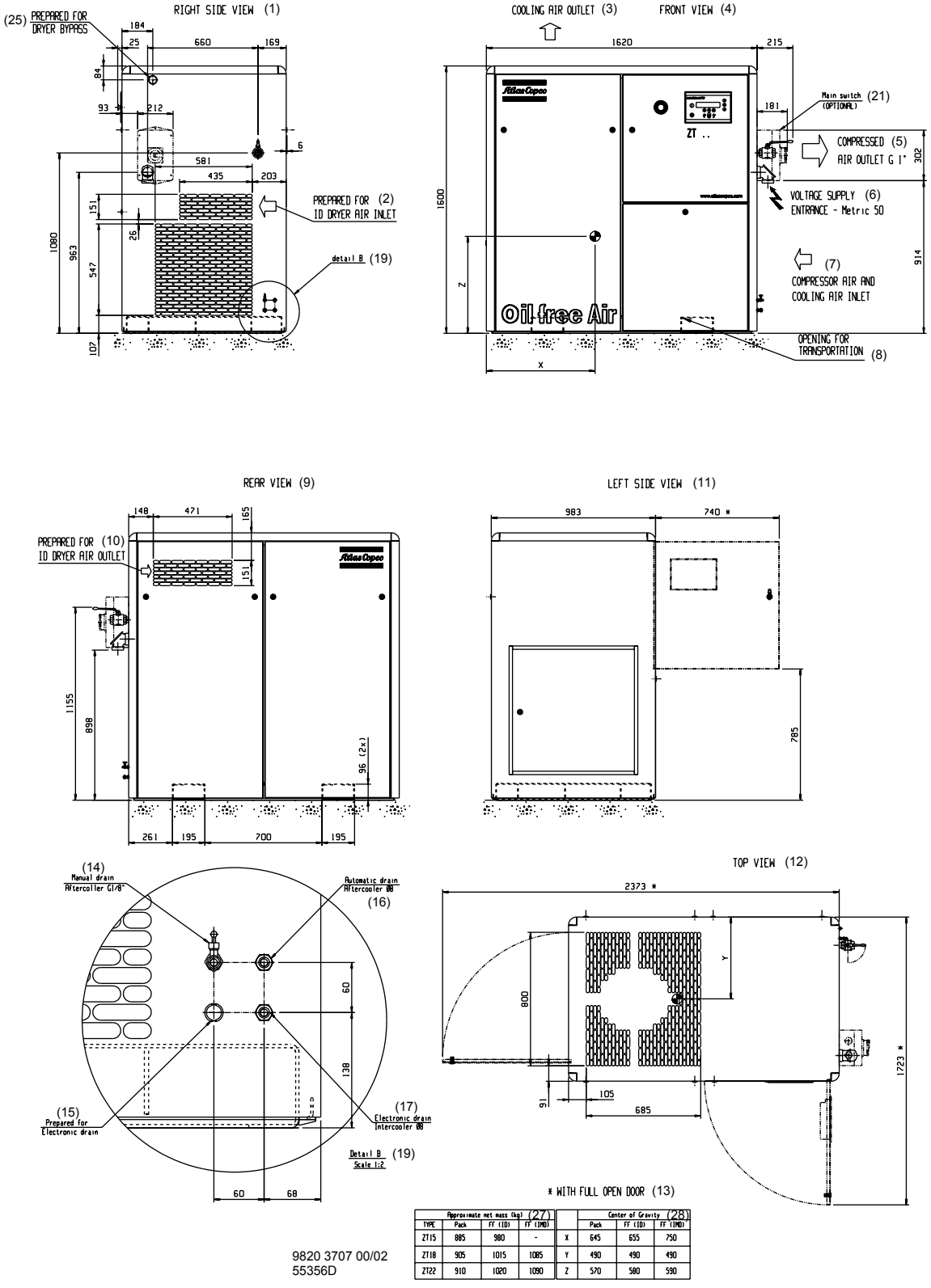


Fig. 1.13 Menu flow (typical example)

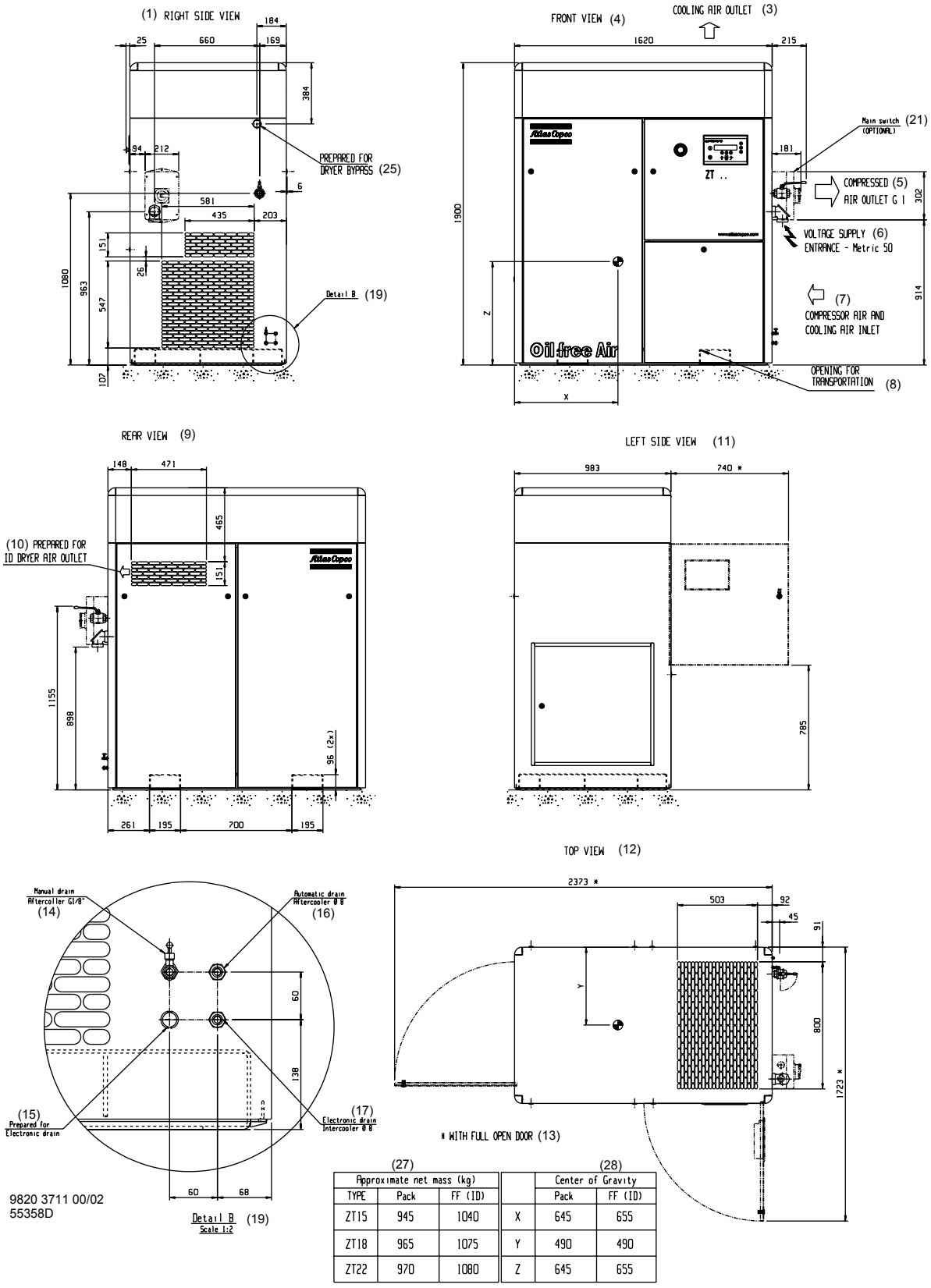
2 INSTALLATION

2.1 Dimension drawings



See page 30 for the list of texts on this figure.

Fig. 2.1 Dimension drawing, ZT15 up to -22

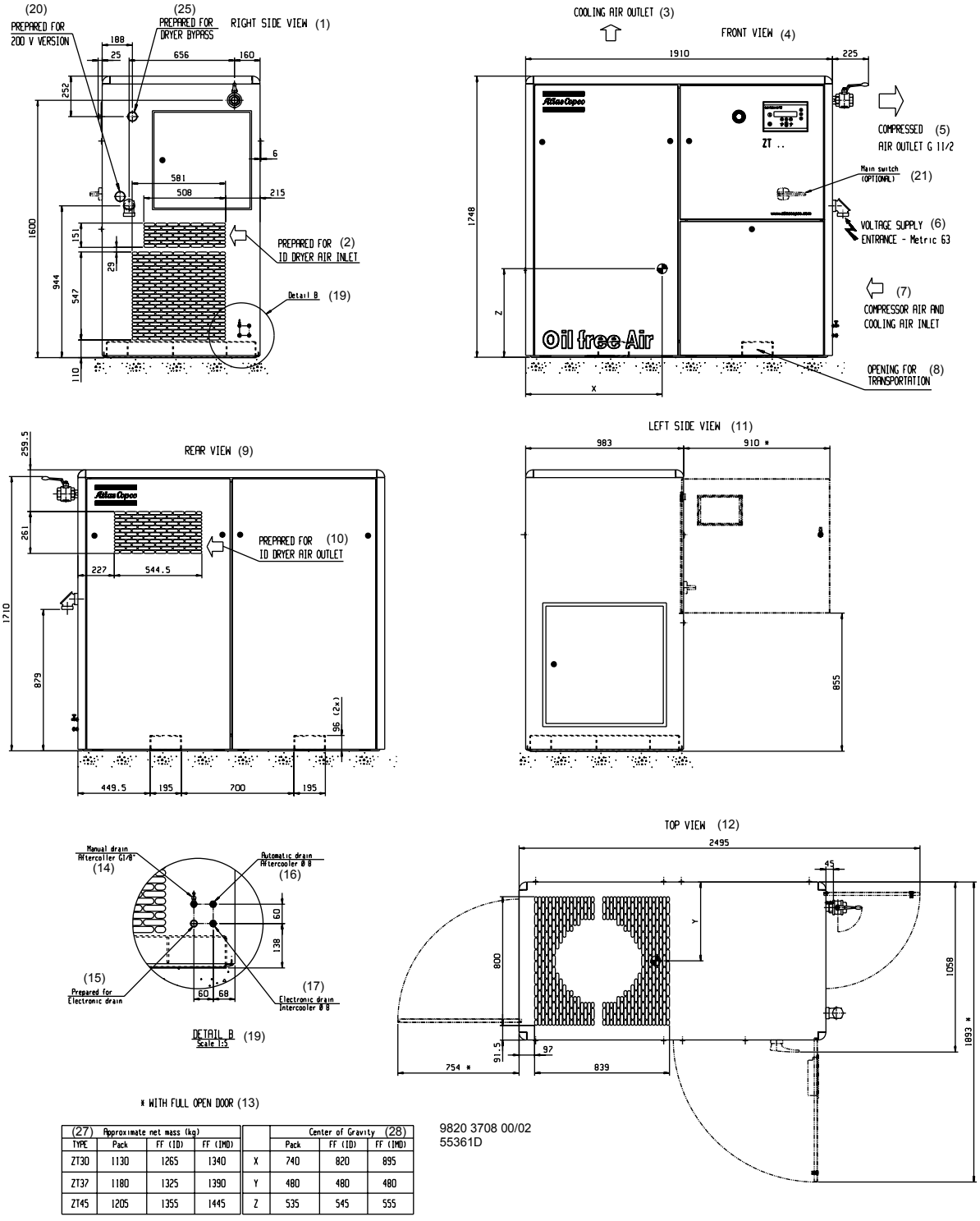


(27)

Approximate net mass (kg)				(28) Center of Gravity	
TYPE	Pack	FF (ID)		Pack	FF (ID)
ZT15	945	1040	X	645	655
ZT18	965	1075	Y	490	490
ZT22	970	1080	Z	645	655

See page 30 for the list of texts on this figure.

Fig. 2.2 Dimension drawing, ZT15 up to -22 WorkPlace Air System



(27) Approximate net mass (kg)

TYPE	Pack	FF (ID)	FF (IMD)
ZT30	1130	1265	1340
ZT37	1180	1325	1390
ZT45	1205	1355	1445

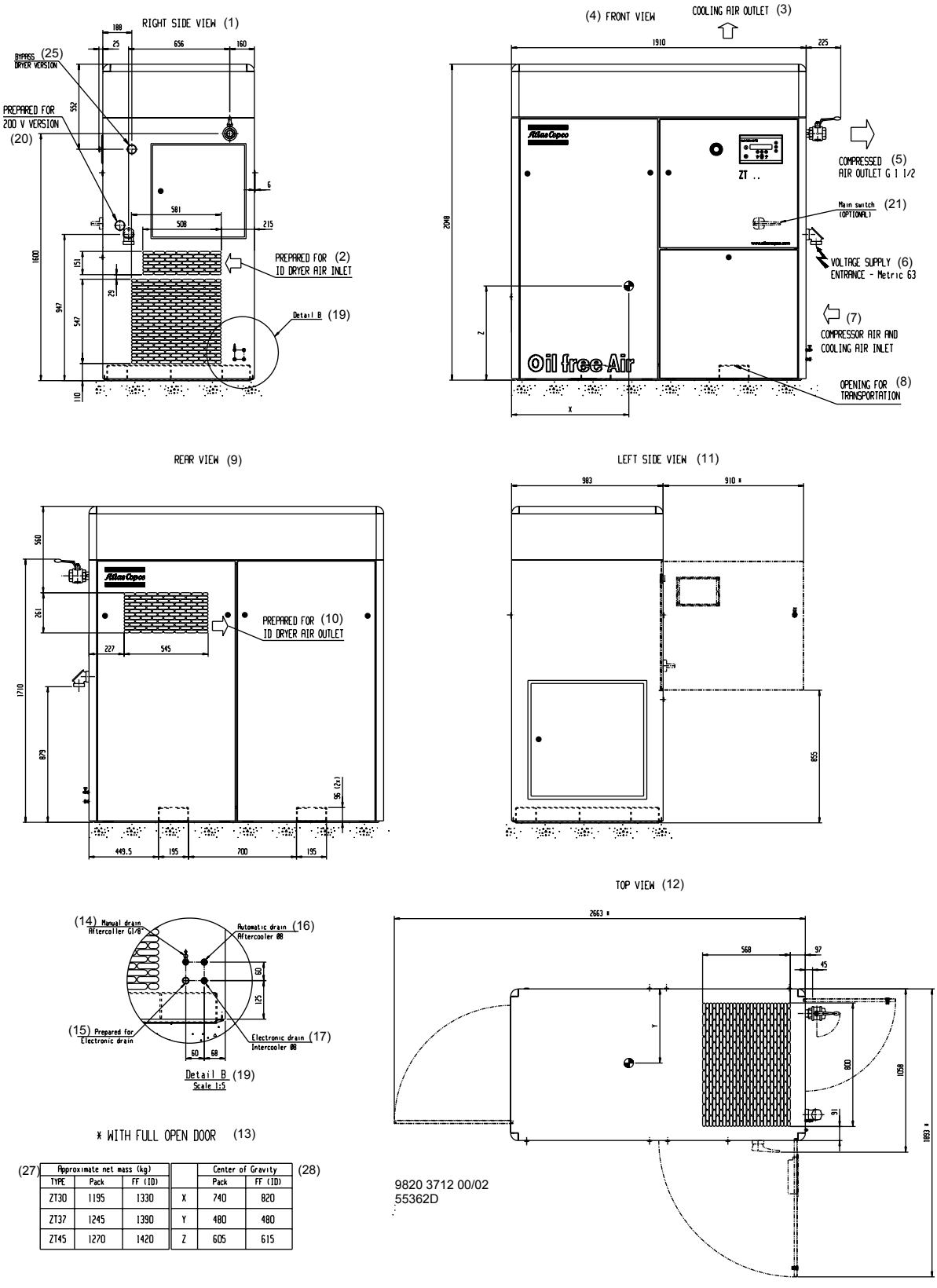
Center of Gravity (28)

	Pack	FF (ID)	FF (IMD)
X	740	820	895
Y	480	480	480
Z	535	545	555

9820 3708 00/02
55361D

See page 30 for the list of texts on this figure.

Fig. 2.3 Dimension drawing, ZT30 up to -45



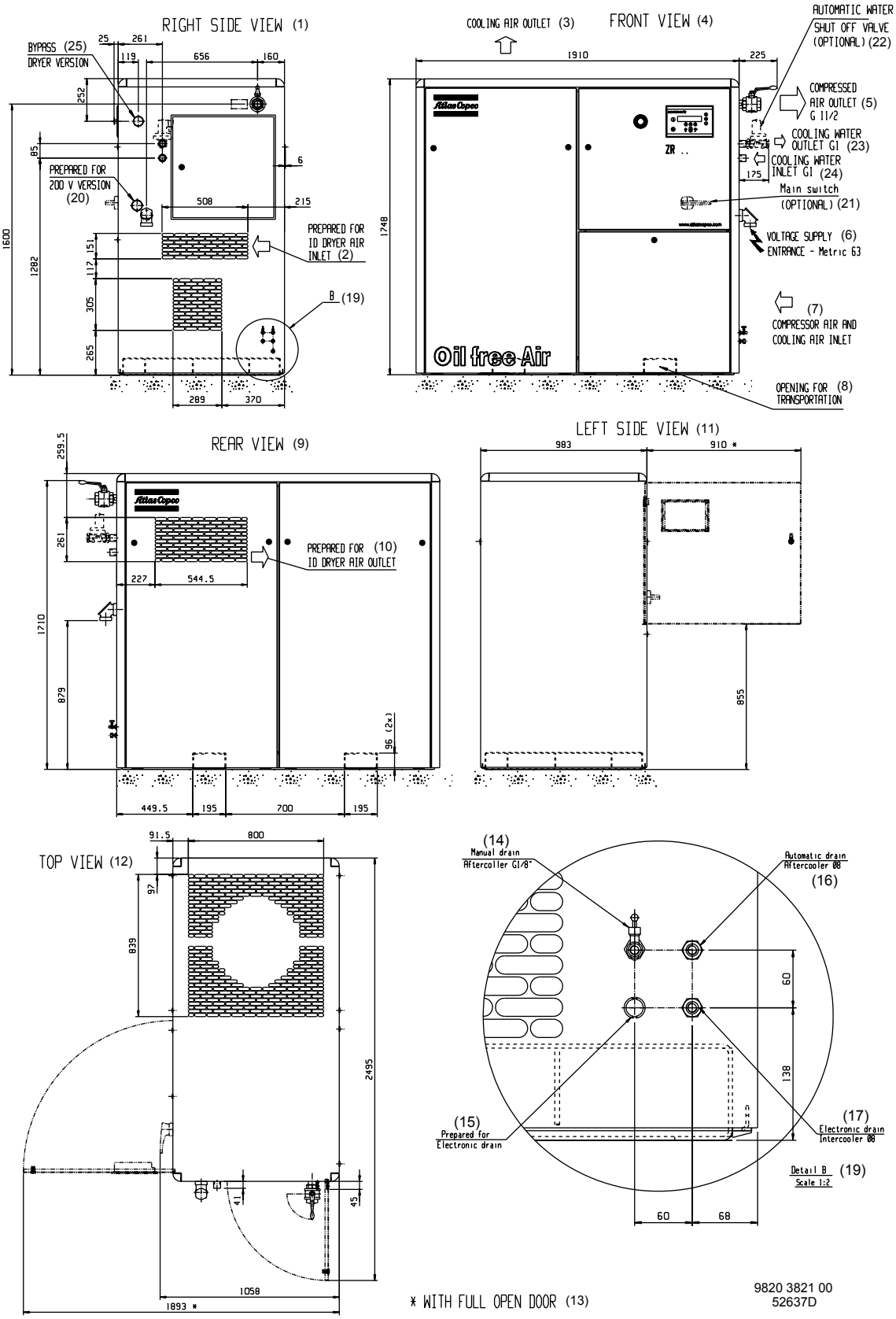
(27)

Approximate net mass (kg)				Center of Gravity	
TYPE	Pack	FF (ID)		Pack	FF (ID)
ZT30	1195	1330	X	740	820
ZT37	1245	1390	Y	480	480
ZT45	1270	1420	Z	605	615

(28)

See page 30 for the list of texts on this figure.

Fig. 2.4 Dimension drawing, ZT30 up to -45 WorkPlace Air System



See page 30 for the list of texts on this figure.

Fig. 2.5 Dimension drawing, ZR30 up to -45

Text on figures 2.1 up to 2.5

(1) Right side view
(2) Prepared for ID dryer air inlet
(3) Cooling air outlet
(4) Front view
(5) Compressed air outlet
(6) Voltage supply entrance
(7) Compressor air and cooling air inlet
(8) Opening for transportation
(9) Rear view
(10) Prepared for ID dryer air outlet
(11) Left side view
(12) Top view
(13) With full open door
(14) Manual drain, aftercooler
(15) Prepared for electronic drain
(16) Automatic drain, aftercooler
(17) Electronic, intercooler
(18) Automatic drain, intercooler
(19) Detail B
(20) Prepared for 200 V version
(21) Main switch (optional)
(22) Automatic water shut-off valve (optional)
(23) Cooling water outlet
(24) Cooling water inlet
(25) Prepared for dryer by-pass
(26) Prepared for electronic drain
(27) Approximate net mass (kg)
(28) Centre of gravity

2.2 Installation proposal (Figs. 2.6/2.7)

Ref. Description

1. Install the compressor on a level floor, suitable for taking its weight. Recommended minimum distance between the top of the bodywork and the ceiling: 1200 mm.

2. Remove the plastic plug (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 delivery 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. The required ventilation capacity (per compressor installed) to limit the compressor room temperature can be calculated as follows:

   Qv = 1.16 N / dT for ZT15 up to ZT22
   Qv = (1.16 N + 3.2) / dT for ZT15 up to ZT22 Full-Feature
   Qv = 1.09 N / dT for ZT30 up to ZT45
   Qv = (1.09 N + 5.5) / dT for ZT30 up to ZT45 Full-Feature
   Qv = 0.21 N / dT for ZR30 up to ZR45
   Qv = (0.21 N + 5.5) / dT for ZR30 up to ZR45 Full-Feature

   Qv = required ventilation capacity in m^3/s
   N = shaft input of the compressor in kW
   dT = temperature rise over ambient

   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 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.

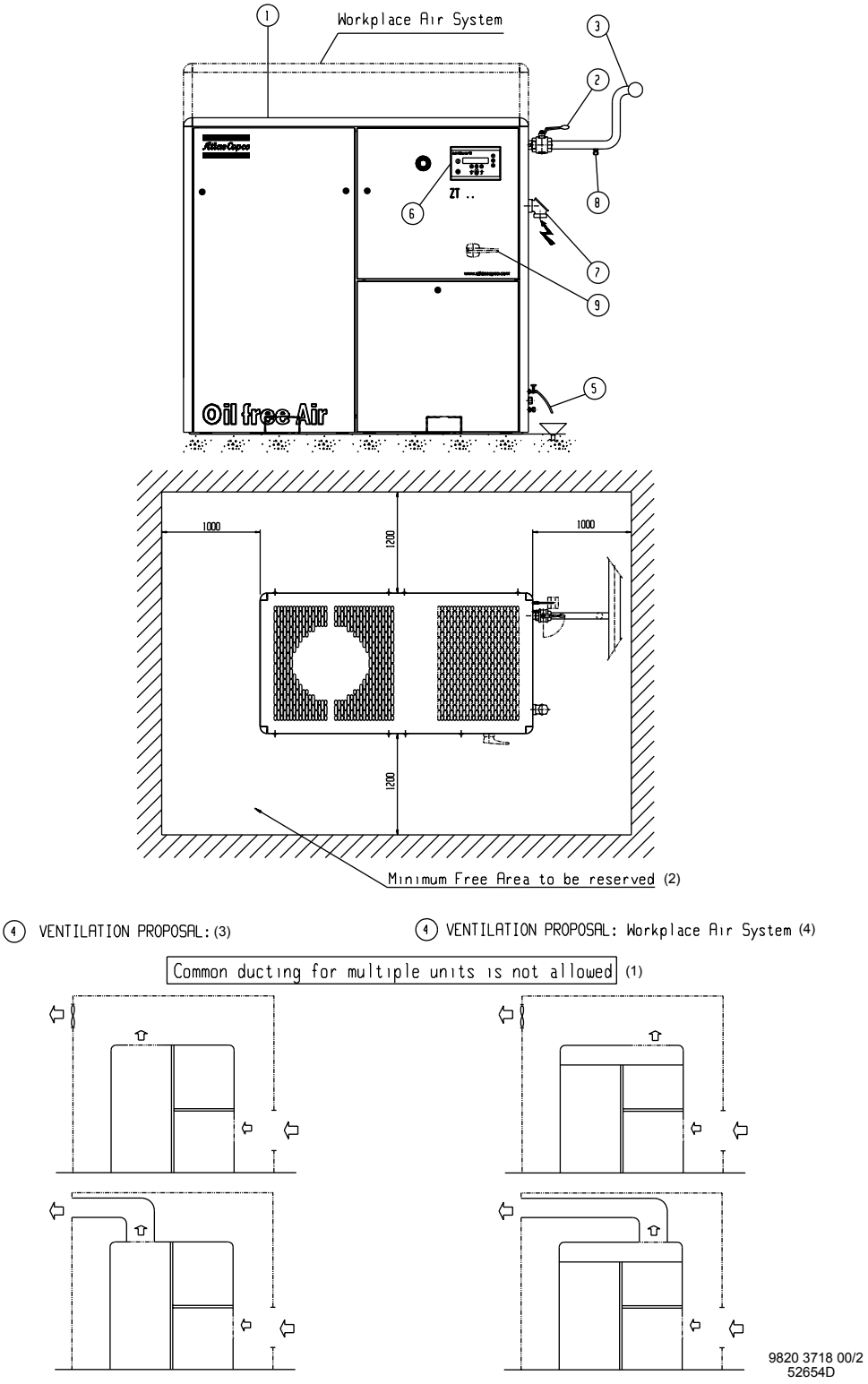
6. Elektronikon control system with control panel.

7. See section 2.3 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. **On ZT**: optional main switch.

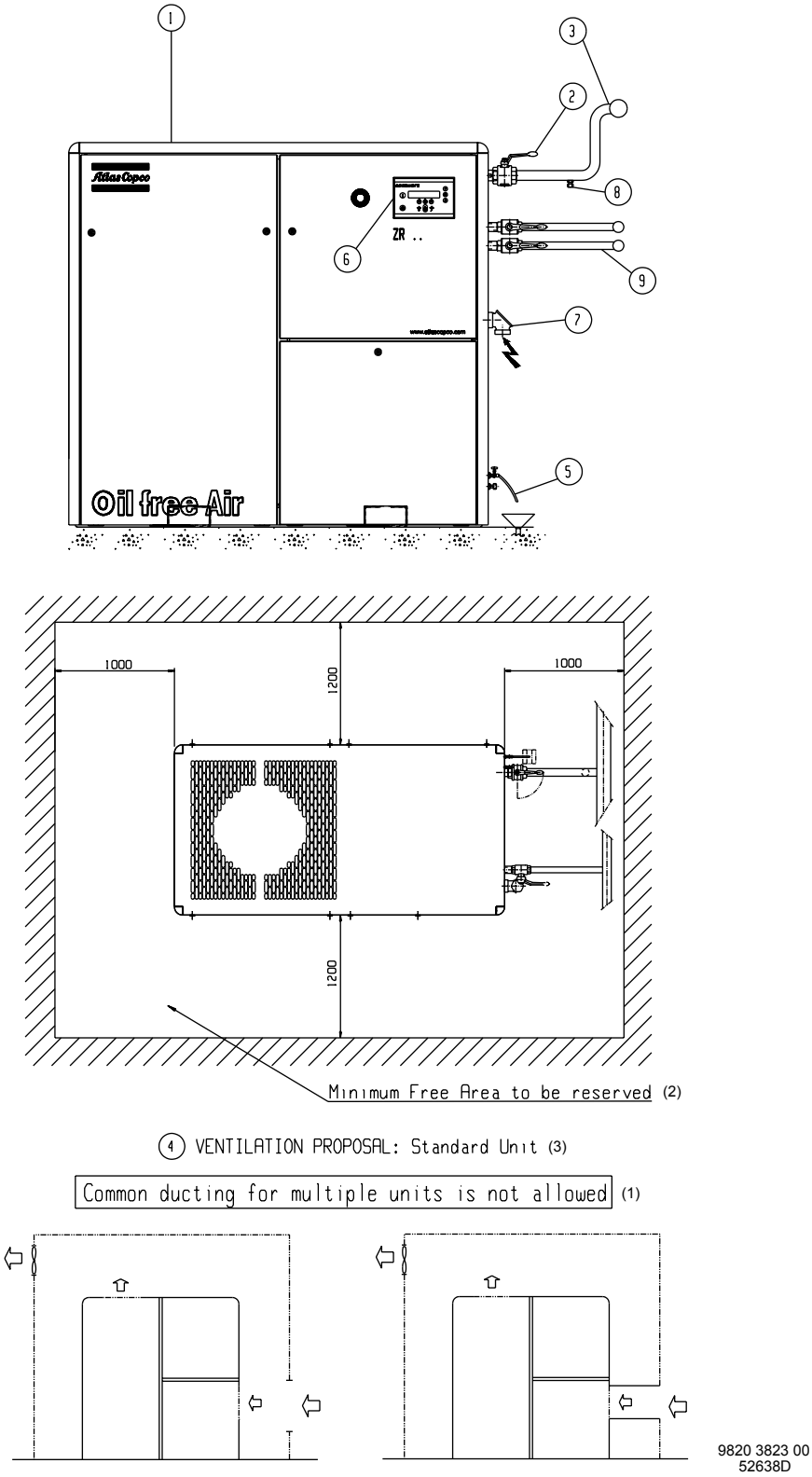
9. **On ZR30 up to ZR45**: position of cooling water pipes. Remove the plastic plugs (if provided) from the compressor water pipes and connect the pipes to the cooling water circuit. Provide a valve in the compressor water inlet pipe and outlet pipe.



Text on figure 2.6

(1) Common ducting for multiple units is not allowed
(2) Minimum free area
(3) Ventilation proposal
(4) Ventilation proposal for WorkPlace Air System

Fig. 2.6 Installation proposal, ZT



Text on figure 2.7

(1) Common ducting for multiple units is not allowed
(2) Minimum free area
(3) Ventilation proposal

Fig. 2.7 Installation proposal, ZR30 up to ZR45

2.3 Electric cables

Mains + earth cable

2.3.1 ZT15 up to ZT22 IEC

Compressor	Voltage	Frequency	Supply cables
ZT15	200/220V	50/60 Hz	25 mm²
ZT15	230V	50/60 Hz	25 mm²
ZT15	380V	60 Hz	10 mm²
ZT15	400V	50 Hz	10 mm²
ZT15	460V	60 Hz	10 mm²
ZT15	500V	50 Hz	10 mm²
ZT15	690V	50 Hz	4 mm²
ZT18	200/220V	50/60 Hz	35 mm²
ZT18	230V	50/60 Hz	35 mm²
ZT18	380V	60 Hz	16 mm²
ZT18	400V	50 Hz	16 mm²
ZT18	460V	60 Hz	10 mm²
ZT18	500V	50 Hz	10 mm²
ZT18	690V	50 Hz	6 mm²
ZT22	200/220V	50/60 Hz	50 mm²
ZT22	230V	50/60 Hz	50 mm²
ZT22	380V	60 Hz	25 mm²
ZT22	400V	50 Hz	25 mm²
ZT22	460V	60 Hz	16 mm²
ZT22	500V	50 Hz	16 mm²
ZT22	690V	50 Hz	10 mm²

2.3.2 ZT15 up to ZT22 CSA/UL

Compressor	Voltage	Frequency	Supply cables
ZT15	200V	60 Hz	AWG3
ZT15	230V	60 Hz	AWG3
ZT15	460V	60 Hz	AWG6
ZT15	575V	60 Hz	AWG8
ZT18	200V	60 Hz	AWG1
ZT18	230V	60 Hz	AWG2
ZT18	460V	60 Hz	AWG6
ZT18	575V	60 Hz	AWG8
ZT22	200V	60 Hz	AWG2/0
ZT22	230V	60 Hz	AWG1
ZT22	460V	60 Hz	AWG4
ZT22	575V	60 Hz	AWG6

2.3.3 ZT/ZR30 up to ZT/ZR45 IEC

Compressor	Voltage	Frequency	Supply cables
ZT/ZR30	200/220V	50/60 Hz	70 mm²
ZT/ZR30	230V	50/60 Hz	70 mm²
ZT/ZR30	380V	60 Hz	35 mm²
ZT/ZR30	400V	50 Hz	35 mm²
ZT/ZR30	460V	60 Hz	25 mm²
ZT/ZR30	500V	50 Hz	25 mm²
ZT/ZR30	690V	50 Hz	10 mm²
ZT/ZR37	200/220V	50/60 Hz	95 mm²
ZT/ZR37	230V	50/60 Hz	95 mm²
ZT/ZR37	380V	60 Hz	50 mm²
ZT/ZR37	400V	50 Hz	35 mm²
ZT/ZR37	460V	60 Hz	35 mm²
ZT/ZR37	500V	50 Hz	25 mm²
ZT/ZR37	690V	50 Hz	16 mm²
ZT/ZR45	200/220V	50/60 Hz	120 mm²
ZT/ZR45	230V	50/60 Hz	120 mm²
ZT/ZR45	380V	60 Hz	50 mm²
ZT/ZR45	400V	50 Hz	50 mm²
ZT/ZR45	460V	60 Hz	50 mm²
ZT/ZR45	500V	50 Hz	35 mm²
ZT/ZR45	690V	50 Hz	25 mm²

2.3.4 ZT/ZR30 up to ZT/ZR45 CSA/UL

Compressor	Voltage	Frequency	Supply cables
ZT/ZR30	200V	60 Hz	AWG000 or 2xAWG3
ZT/ZR30	230V	60 Hz	AWG000 or 2xAWG3
ZT/ZR30	460V	60 Hz	AWG3
ZT/ZR30	575V	60 Hz	AWG4
ZT/ZR37	200V	60 Hz	2xAWG1
ZT/ZR37	230V	60 Hz	2xAWG1
ZT/ZR37	460V	60 Hz	AWG2
ZT/ZR37	575V	60 Hz	AWG3
ZT/ZR45	200V	60 Hz	2xAWG0
ZT/ZR45	230V	60 Hz	2xAWG0
ZT/ZR45	460V	60 Hz	AWG1
ZT/ZR45	575V	60 Hz	AWG2

Remarks

- Local regulations remain applicable if they are stricter than the values proposed below.
- For 50 Hz compressors, the size is valid for cable PVC with insulation 70°C at ambient temperature of 40°C.
- For 60 Hz compressors, the size is valid for cable with insulation 90°C at ambient temperature of 40°C.

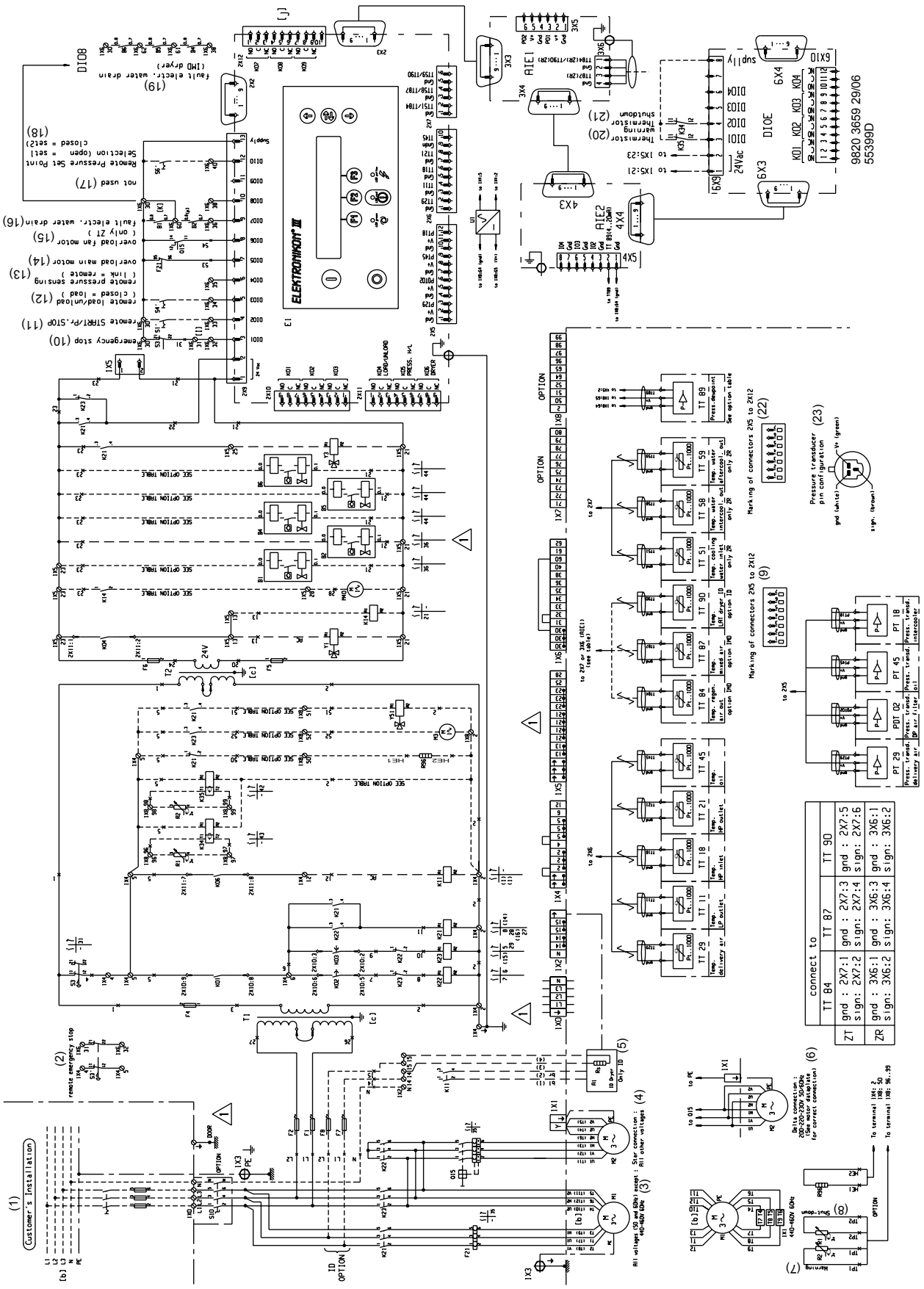


Fig. 2.8 Electrical diagram

Text on figure 2.8

(1) Customer's installation
(2) Remote emergency stop
(3) All voltages (50 and 60 Hz) except: 440-460 V 60 Hz
(4) Star connection: all other voltages
(5) ID dryer
(6) Delta connection: 200-220-230 V 50/60 Hz (see motor data plate for correct connection)
(7) Warning
(8) Shut-down
(9) Marking of connectors 2X5 to 2X12
(10) Emergency stop
(11) Remote start/Programmed stop
(12) Remote load/unload (closed = load)
(13) Remote pressure sensing (link = remote)
(14) Overload, main motor
(15) Overload, fan motor (only ZT)
(16) Fault, electronic water drain
(17) Not used
(18) Remote Pressure Set Point Selection (open = set 1 / closed = set 2)
(19) Fault, electronic water drain (IMD dryer)
(20) Thermistor warning
(21) Thermistor shut-down
(22) Marking of connectors 2X5 to 2X12
(23) Pressure transducer, pin configuration

Electric components on figure 2.8

COMPRESSOR
A1 Dryer (Full-Feature with ID)
B1 Electronic water drain, aftercooler (optional)
B2 Electronic water drain, intercooler (optional)
B4/6 Electronic water drains, Full-Feature IMD
M1 Compressor motor
M2 Fan motor, compressor coolers
M40 Motor IMD dryer (Full-Feature IMD)
PDT02 Delta P switch, air filter
PT18 Pressure sensor, intercooler
PT29 Pressure sensor, delivery air
PT45 Pressure sensor, oil
Rs Crankcase heater (Full-Feature ID)
TT11 Temperature sensor, element 1 outlet
TT18 Temperature sensor, HP inlet
TT21 Temperature sensor, element 2 outlet
TT29 Temperature sensor, delivery air
TT45 Temperature sensor, oil injection
TT51 Temperature sensor, cooling water inlet (ZR)
TT58 Temperature sensor, intercooler cooling water out (ZR)
TT59 Temperature sensor, aftercooler cooling water out (ZR)
TT84 Temperature sensor, regeneration air out (Full-Feature IMD)
TT87 Temperature sensor, wet air in (Full-Feature IMD)
TT89 Pressure dewpoint sensor
Y1 Solenoid valve, load-unload valve
Y3 Solenoid valve, breather
Y51 Shut-off valve, cooling water (ZR - optional)

STARTER CUBICLE
E1 Elektronikon control module
F1/11 Fuses
F21 Overload relay, drive motor
K11 Contactor, Full-Feature ID
K14 Contactor, Full-Feature IMD dryer
K21 Line contactor
K22 Star contactor
K23 Delta contactor
Q15 Circuit breaker, fan motor (ZT)
S1’ Remote Start/Programmed Stop
S3 Emergency stop button
S3’ Remote emergency stop
S4’ Remote load/unload
S6’ Remote pressure set selection
T1/2 Transformers
1X1/8 Terminal strips

CONTROL MODULE (E1)
I Start button
K01 Blocking relay
K02 Auxiliary relay, star contactor
K03 Auxiliary relay, delta contactor
K04 Auxiliary relay, solenoid valve load/unload
K05 Auxiliary relay, air pressure high/low
K06 Auxiliary relay, dryer
K07 Auxiliary relay, manual/automatic operation
K08 Auxiliary relay, general warning
K09 Auxiliary relay, general shut-down
O Stop button

2.4 Pictographs (Figs. 2.9 and 2.10)

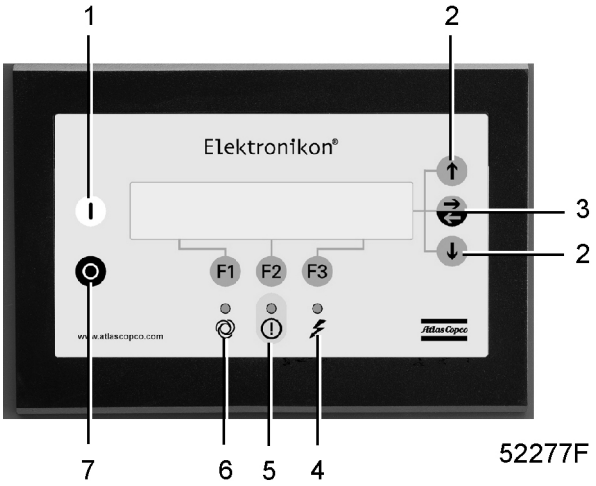


Fig. 2.9 Pictographs on control panel

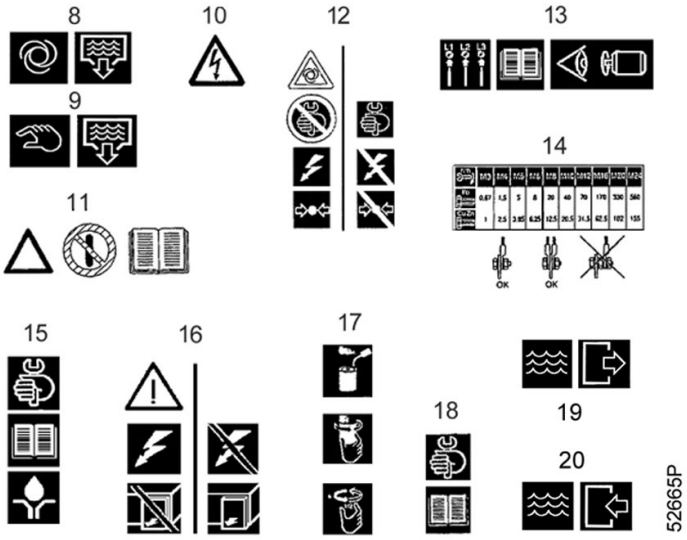


Fig. 2.10 Pictographs at other locations

Reference	Description
1	Start
2	Scroll keys
3	Tabulator key
4	Voltage on
5	Alarm
6	Automatic operation
7	Stop
8	Automatic condensate outlets
9	Manual condensate outlets
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

Reference	Description
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 outlet
20	Cooling water inlet

Figs. 2.9 and 2.10 Pictographs

2.5 Cooling water requirements

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.

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

2.5.1 Type of the system

Closed system
In a closed system, the same cooling water is circulating through a system without contact with air.

Open system
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.

2.5.2 Cooling water parameters

The Ryznar stability index (RSI)
The Ryznar 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 (pHs). 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:

$RSI = 2*pH_s - pH$

where pH = measured pH (at room temperature) of water sample
pH_s = pH at saturation

The pH_s is calculated by using :

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

A : depends on the total solids concentration (mg/l).

B : depends on the highest cooling water temperature (°C).
For Z units take T = 65°C

C : depends on the calcium hardness (ppm $CaCO_3$).

D : depends on the HCO_3^- concentration or M-alkalinity (mval/l).

The values from A, B, C and D are found in the table below.

Total dissolved solids		**Temperature**		**Ca-hardness**		**M-Alkalinity**	
(mg/l)	A	(°C)	B	(ppm CaCO3)	C	(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

The interpretation of the values obtained is :

RSI < 6 boiler scale formation
RSI 6 – 7 neutral water
RSI > 7 corrosive water

A more detailed interpretation follows below :

RSI	Tendency of the water	Action
RSI < 3.9	Very high scale formation	Water cannot be used
4.0 < RSI < 5.5	High boiler scale formation	Regular control 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
7.6 < RSI < 9.0	Strong corrosion	Regular control necessary, use of corrosion inhibitor recommended
9.1 < RSI < 11	Very strong corrosion	Regular control necessary, use of corrosion inhibitor required
RSI > 11	Very strong corrosion in complete water system	Water should not be used

This 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. 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:

Z-units 6.8 < pH < 8.5

Total dissolved solids (TDS)
This is the sum of all 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 :

All units TDS < 3000 mg/l (<3800 µS/cm)

For an open system, the following limits apply :

Z-units TDS < 750 mg/l (< 580 µS/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)
Continuously, a level of 0.5 ppm should not be exceeded.
For shock treatments, a maximum limit of 2 ppm for maximum 30 minutes/day applies.

Sulphates ($SO4^{--}$)
Closed cooling system: Sulphates < 400 ppm
Open cooling systems: 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.

3 OPERATING INSTRUCTIONS

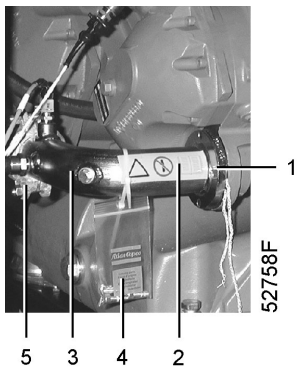
Safety precautions
The operator must apply all related safety precautions, including those mentioned in this book.

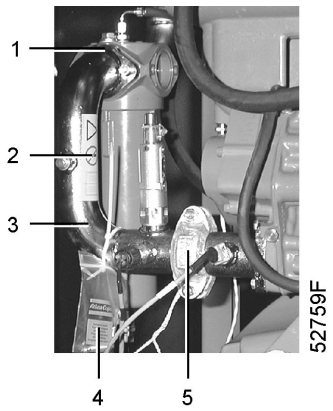
Ambient conditions
Consult section 7 for the limitations with regard to the ambient conditions and altitude operation.

Moving/lifting
The compressor can be moved by a lift truck using the slots in the frame. Make sure that the forks protrude from the other side of the frame. The compressor can also be lifted after inserting beams in the slots. Make sure that the beams cannot slide and that they protrude from the frame equally. The chains must be held parallel to the bodywork by chain spreaders in order not to damage the compressor. The lifting equipment must be placed in such a way that the compressor will be lifted perpendicularly. Lift smoothly and avoid twisting.

3.1 Initial start-up

1. Read the User manual for Elektronikon regulator to familiarize yourself with all regulator functions.
2. Consult section 2 for the electric cable size, installation proposals and dimension drawings.
3. A sticker dealing in short with the operation instructions is delivered with the literature set. Affix the sticker next to the control panel.
4. A number of VCI (Volatile Corrosion Inhibitor) plates may be provided inside the bodywork and electric cabinet to protect the compressor against corrosion. Remove the plates.
5. A silica gel bag is installed in the pipe (3-see figure below) between the intercooler condensate trap and the high-pressure compressor element (a label is stuck on the pipe). Unscrew the bolts of flange (1), remove coupling (5) and take out the bag. Reposition the pipe using a new O-ring, tighten the flange and reinstall the pipe coupling.





1 Flange
2 Label
3 Pipe
4 Bag with bolts/O-ring
5 Coupling

Location of silica gel bag (typical examples)

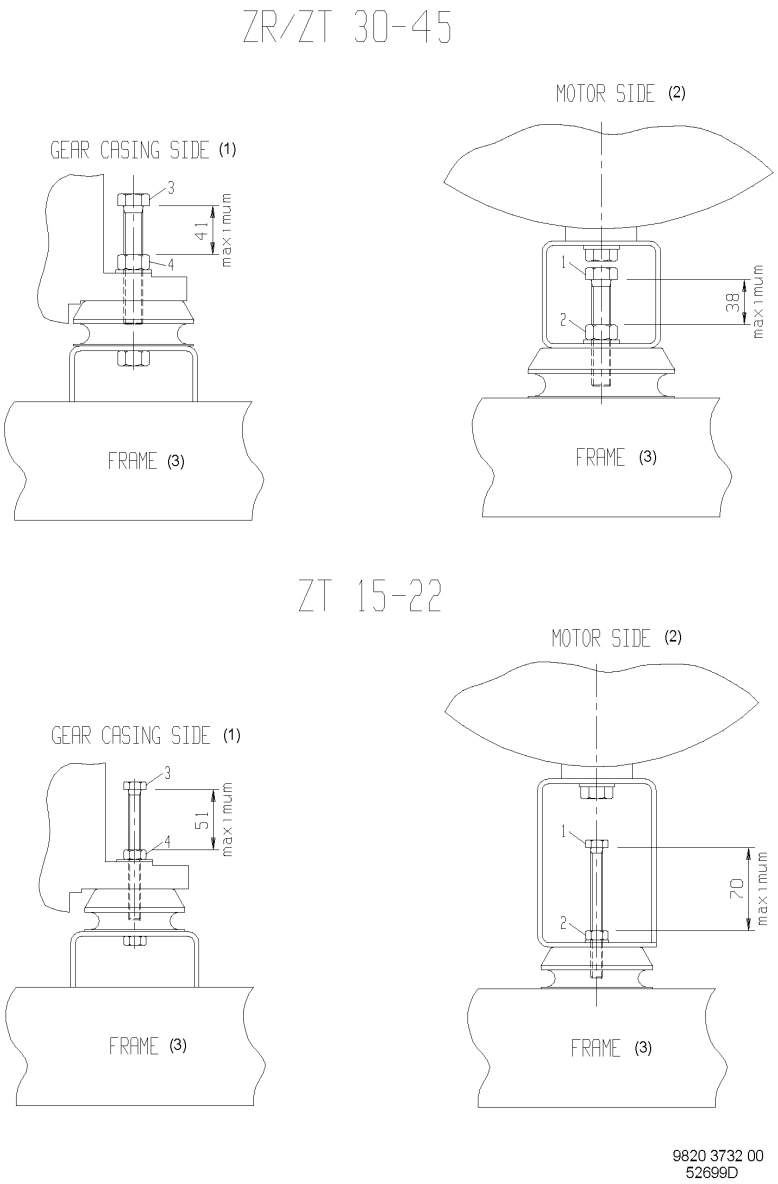


Fig. 3.1a Vibration dampers on earlier production units

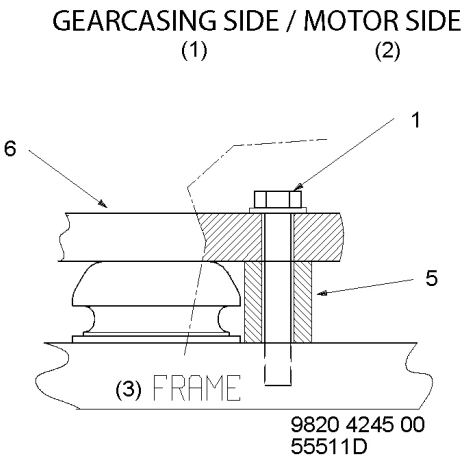


Fig. 3.1b Transport fixations on recent production units

Text on figures 3.1

(1)	Gear casing side
(2)	Motor side
(3)	Frame

Components

1	Bolt
2	Nut
3	Bolt
4	Nut
5	Bush
6	Motor support or gear casing

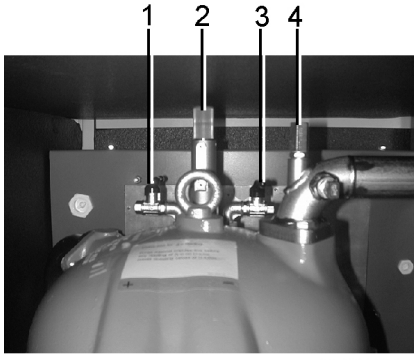
6. The compressor and motor are secured to the frame, immobilizing the vibration dampers during transport (Figs. 3.1). After installing the compressor:
   a **On earlier production units** (Fig. 3.1a) loosen the nuts (2 and 4) of the long central bolt of each damper, screw the bolts (1 and 3) as far out as indicated and tighten the nuts again.
   b **On recent production units**, remove the transport fixations (Fig. 3.1b), which are painted red. Unscrew bolt (1) and remove transport bush (5). Four transport fixations are provided: two at the gear casing side and two at the motor side.
7. Check that the gear casing is filled with oil: the level should be in the middle of sight-glass (SG-Fig. 3.3).
8. 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.
9. Check the connections at the primary sides of transformers (T1 and T2-Fig. 1.9). Check the settings of circuit breaker (Q15) and overload relay (F21).
10. Close the manual drain valve of the condensate trap (1-Fig. 3.5).

On ZR only:

11. Check that the cooling water drain valves (customer's installation) in the inlet and outlet lines are closed. Open the water inlet and outlet valves (customer's installation) and check for water flow. Open the water flow regulating valves (1 and 4-Fig. 3.6 and 7-Fig. 3.7 in case of IMD).

On compressors with an IMD dryer only:

12. Close the regeneration air inlet valve (2-Fig. 1.5), as well as the air inlet and outlet valves (7 and 10-Fig. 1.5). Open the by-pass valve (9-Fig. 1.5).
13. Close the valves (1 and 3-Fig. 3.2a). Fill a transparent tube halfway with water. Install the tube to these valves.
14. Close the manual drain valve (8-Fig. 1.5).



1 Valve for + connection, pressure differential gauge
2 Safety valve
3 Valve for - connection, pressure differential gauge
4 Adjusting screw

Fig. 3.2a Components of IMD dryer, new version

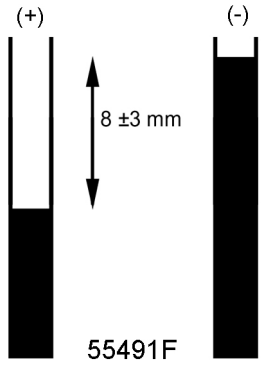


Fig. 3.2b U-Tube

On all compressors:

15. 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. Arrow (1-Fig. 3.3) 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**, check the rotation direction of the fan motor. Cooling air must be blown through the outlet grating on the roof. If the rotation direction is wrong, switch off the voltage and reverse two connections at the terminals of circuit breaker (Q15-Fig. 1.9).

On compressors with an IMD dryer only:

16. Open the valve (customer's installation) to the air net.
17. Start the compressor and blow off some air from the air net to keep the compressor running loaded.
18. **Slightly** open the dryer air inlet valve (7-Fig. 1.5) to pressurize the dryer. Fully open the valve after pressurizing.
19. Open the regeneration air inlet valve (2-Fig. 1.5) fully. Open dryer air outlet valve (10-Fig. 1.5) and close by-pass valve (9-Fig. 1.5).
20. Open valve (3-Fig. 3.2a) marked (-) of the U-tube. Slightly open valve (1-Fig. 3.2a) marked (+), while watching the water levels in the U-tube. Two conditions are possible:
    - The water level in the leg marked (+) rises. Close valve (1-Fig. 3.2a) at once, decrease the regeneration air inlet pressure (see step 21). 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 (1-Fig. 3.2a) at once, as there is a risk that the water will be ejected from the U-tube and disappear into the pressure vessel.
      Increase the regeneration air inlet pressure (see step 21) and open valve (1-Fig. 3.2a) again.
21. Once the water column has stabilized, adjust the pressure differential as follows:
    Remove the protecting cap form the adjusting screw (4-Fig. 3.2a), loosen its check nut and turn the screw in to increase or out to decrease the pressure differential. Tighten the check nut and reinstall the protection cap.

    The average difference between both legs must be 8 $\pm$ 3 mm. (Fig. 3.2b) The level in the leg marked (-) must always be above the level in the leg marked (+). In case of fluctuating water levels, the average difference can be set at a maximum of 11 mm to keep the level in the leg marked (-) at any time above the level in the leg marked (+). When the average difference is set at 11 mm and the level in the leg marked (-) does not stay at any time above the level in the leg marked (+), consult Atlas Copco.

22. Check the dryer connections for air leaks.
23. Check that the moisture indicator shows blue after approximately 30 minutes of operation.
24. **On ZR compressors with IMD dryer:** adjust the valve (5-Fig. 3.7) until the air inlet temperature of the high pressure element is at least 25°C and maximum 30°C higher than the water inlet temperature. The temperature can be found by taking the difference between two readings of the Elektronikon: "Element 2 Inlet" and "Cooling Water In".

25. Open valves (6 and 7-Fig. 3.7).
    On ZR Pack compressors and compressors with ID dryer: Adjust the valve (1-Fig. 3.6) of the oil cooler and intercooler until the temperature drop over this circuit is between 12 to 15°C. The temperature can be found by taking the difference between two readings of the Elektronikon: "Cooling Water In" and "Cooling Water IC Out".
    On Pack compressors:
    Adjust the valve in the water circuit of the aftercooler (4-Fig. 3.6) until the temperature difference between air outlet and water inlet is maximum 8°C. This value can be found by taking the difference between two readings of the Elektronikon: "Compressor Outlet" and "Cooling Water In".

    On ZR-FF compressors with ID: open the valve (4-Fig. 3.6).

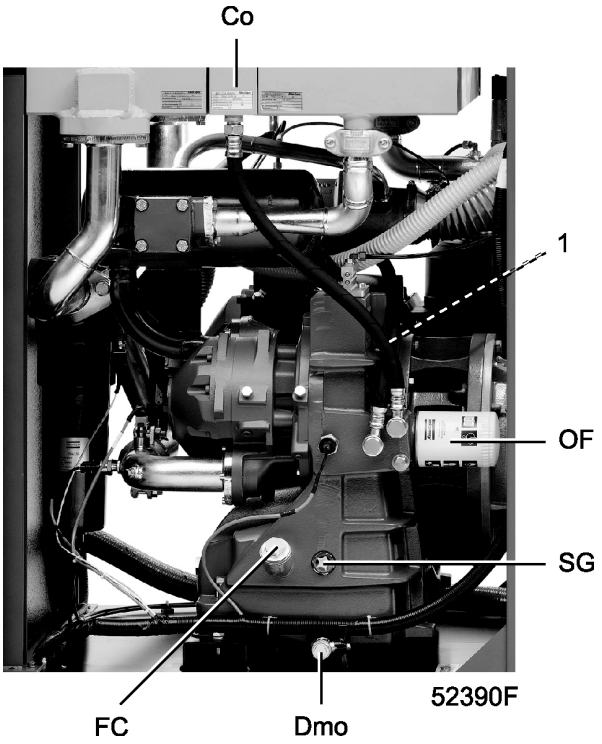
On all compressors:

26. Run the compressor for a few minutes and check that it operates normally.
27. Stop the compressor. If necessary, top up the gear casing with oil to the middle of sight-glass (SG-Fig. 3.3).

On compressors with an IMD dryer only:

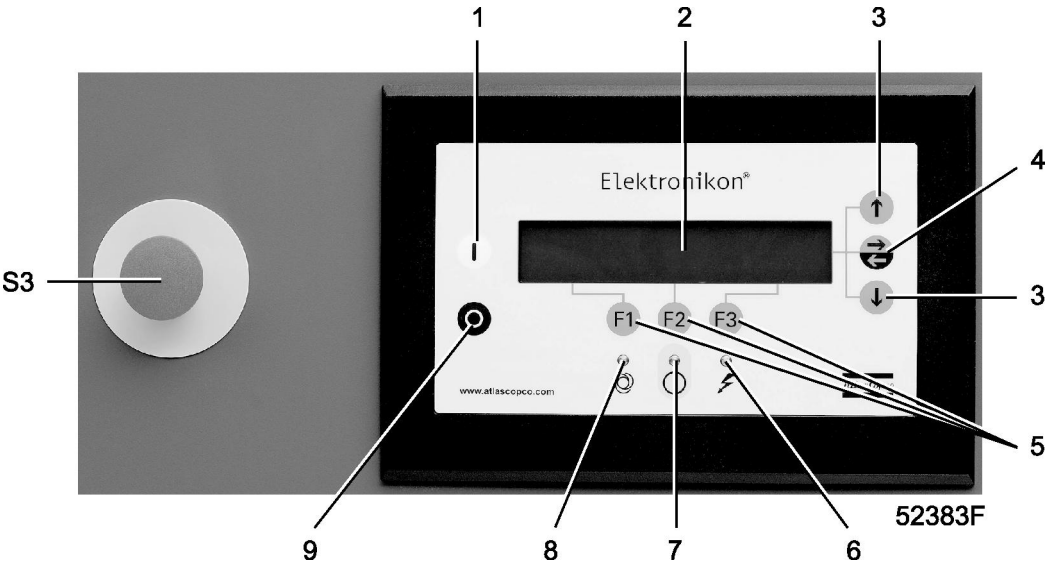
28. Close the blow-off valve of the air net. Close the air outlet valve of the dryer (10-Fig. 1.5).

29. Open drain valve (8-Fig. 1.5).



Co	Oil cooler
Dmo	Oil drain valve, gear casing
FC	Oil filler cap
OF	Oil filter
SG	Oil level sight-glass
1	Arrow, indicating correct rotation direction of drive motor

Fig. 3.3 Oil system components



1	Start button	6	Voltage on LED
2	Display	7	General alarm LED
3	Scroll keys	8	Automatic operation LED
4	Tabulator key	9	Stop button
5	Function keys	S3	Emergency stop button

Fig. 3.4 Control panel

3.2 Starting (Fig. 3.4)

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

1. **On compressors with an IMD dryer,** close drain valve (8-Fig. 1.5).
2. Check the oil level, which must be in the middle of sight-glass (SG-Fig. 3.3). Top up, if necessary, with the correct type of oil.
3. **On ZR**, check the setting of the valves (1 and 4-Fig. 3.6 or 5, 6 and 7-Fig. 3.7 in case of IMD dryer) as described in section 3.1. This can be overlooked if, after previous operation, the settings of these valves have not been disturbed.
4. Close the manual condensate drain (1-Fig. 3.5).
5. Open the air outlet valve (customer's installation).
6. Switch on the voltage and check that voltage on LED (6) lights up.
7. Press start button (1). The compressor starts running and automatic operation LED (8) lights up.
8. **On compressors with an IMD dryer,** open the air outlet valve of the dryer (10-Fig. 1.5) and close by-pass valve (9-Fig. 1.5).
9. **On 10 bar compressors,** check that the temperature difference between the outlet of both elements is not more than 5°C. If it exceeds the 5°C, check that the difference between the highest element temperature and the surrounding temperature does not exceed 185°C. If the value should be exceeded, contact Atlas Copco.

Warning
- When the compressor is stopped and automatic operation LED (8) 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. Consult the User manual for Elektronikon regulator, section “Programming Clock function”.

3.3 During operation (Fig. 3.4)

When automatic operation LED (8) 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.

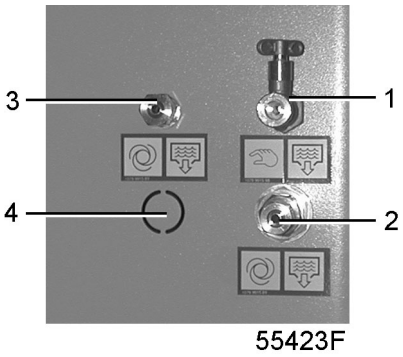
Keep all doors closed during operation.

3.3.1 Checking the display (2-Fig. 3.4)

1. Daily check the display for readings and messages. Normally, the main screen (Fig. 1.11) is shown, 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 (7) is alight or blinks. Consult section 1.8.
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 section 4.1.
4. Regularly check the actual compressor status by pressing the ↓ key from the main screen.

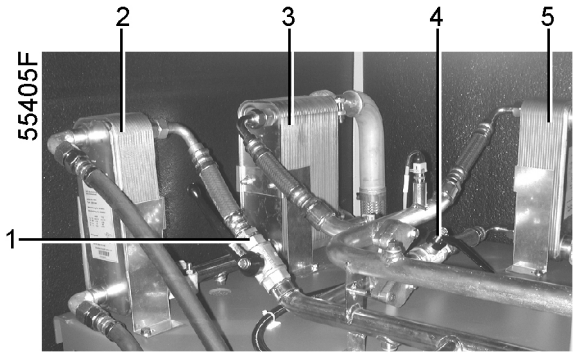
Warning
Before starting any maintenance or repairs:
- Stop the compressor and close the air outlet valve.
- Press the test buttons (Fig. 1.8) on top of the electronic water drains to depressurize the air system and open the drain valve (1-Fig. 3.5). If an IMD dryer is installed, open drain valve (8-Fig. 1.5).
- Open the isolating switch (customer's installation) to switch off the voltage to the compressor.

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



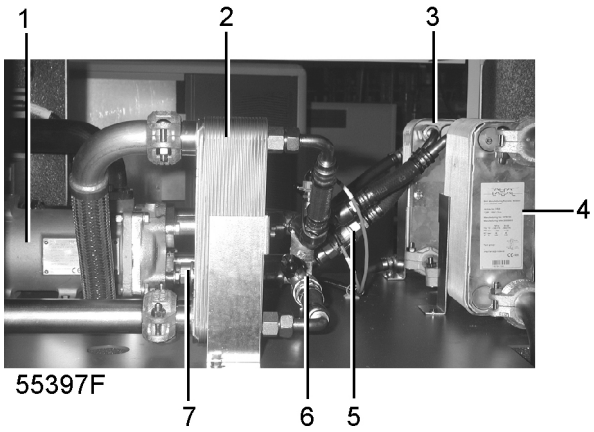
1 Manual condensate drain, aftercooler
2 Electronic condensate drain, intercooler
3 Automatic condensate drain, aftercooler
4 Prepared for electronic drain (only for IMD)

Fig. 3.5 Condensate drains



1 Water flow regulating valve, oil cooler and intercooler
2 Oil cooler
3 Intercooler
4 Water flow regulating valve, aftercooler
5 Aftercooler

Fig. 3.6 Water system on ZR compressors



1 Regeneration cooler
2 Aftercooler
3 Oil cooler
4 Intercooler
5 Regulating valve for the oil cooler and the intercooler
6 Regulating valve for the aftercooler
7 Regulating valve for the regeneration cooler

Fig. 3.7 Water system on ZR with IMD

3.3.2 On compressors with an IMD dryer (Fig. 1.5)

- The dewpoint of the air leaving the dryer will be higher than normal after starting. The normal operating condition will be reached after approx. 15 minutes.
- Avoid short loading periods and operation at very low working pressures as the performance of the dryer will diminish. Avoid operation at too low a regeneration air inlet temperature (minimum 130°C).

By-pass operation of the dryer

1. Stop the compressor and close the air outlet valve.
2. Close the dryer outlet valve (10-Fig. 1.5).
3. Open the dryer by-pass valve (9-Fig. 1.5).
4. Close the dryer inlet valve (7-Fig. 1.5).
5. Close the regeneration air shut-off valve (2-Fig. 1.5).
6. Depressurize the dryer by opening the drain valve (8-Fig. 1.5) and by pressing the test buttons (Fig. 1.8) on the electronic water drains until all air has escaped.
7. Start the compressor and open the compressor air outlet valve.

3.4 Stopping (Fig. 3.4)

1. Press the test button on top of the drains to discharge condensate.
2. Press stop button (9): the compressor will stop and LED (8) will go out.
3. **On compressors with an IMD dryer**, close the dryer outlet valve (10-Fig. 1.5).
4. Close the air outlet valve (customer's installation).
5. In case of emergency, press emergency stop button (S3) to stop the compressor immediately.
6. Open the manual condensate drain (1-Fig. 3.5). **On compressors with an IMD dryer**, also open drain valve (8-Fig. 1.5).
7. **On ZR**, close the cooling water inlet valve (customer's installation).

3.5 Taking out of operation

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

1. Close the air outlet valve and stop the compressor. Press the test buttons (Fig. 1.8) on top of the electronic water drains to depressurize and open the drain valve (1-Fig. 3.5). If an IMD dryer is installed, open drain valve (8-Fig. 1.5).
2. Switch off the voltage and disconnect the compressor from the mains.
3. Shut off and depressurize the part of the air net which is connected to the outlet valve.
4. Disconnect the compressor air outlet pipe from the air net.
5. Drain the oil and condensate circuits.
6. Disconnect the compressor condensate piping from the condensate drain net.
7. **On ZR**, drain the cooling water circuit and disconnect the cooling water pipes from the compressor.

4 MAINTENANCE

Warning
Before starting any maintenance or repairs:
- Stop the compressor and close the air outlet valve.
- Press the test buttons (Fig. 1.8) on top of the electronic water drains to depressurize the air system and open the drain valve (1-Fig. 3.5). If an IMD dryer is installed, open drain valve (8-Fig. 1.5).
- Open the isolating switch (customer's installation) to switch off the voltage to the compressor.

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

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.

4.1 Preventive maintenance schedule for the compressor

4.1.1 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
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
3-monthly	--	Clean compressor
3-monthly	--	Check for possible leaks
3-monthly	500	Check coolers, clean if necessary
--	--	A number of service operations are grouped. If the programmed service interval is reached, a message will appear on the display of the regulator to carry out these service actions (see section 4.1.4)
--	--	**On 10 bar compressors only:** Check at each service interval the element temperature as described in section 3.2

4.1.2 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. See also section 4.5.

4.1.3 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.

4.1.4 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.

4.2 Motor greasing

4.2.1 Fan motor (ZT)

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

4.2.2 Drive motor (M1-Fig. 1.2)

ZT15 up to ZT22

The bearings are greased for life; contact your Customer Centre for the replacement interval of the motor bearings.

ZT/ZR30 up to ZT/ZR45

Greasing interval	**4000 hrs (Level A)**
Quantity, drive end	15 g
Quantity, non-drive end	15 g
Recommended grease	Esso Unirex N3

Important
Never mix greases of different brands or types.

4.3 Oil specifications

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.

Important
Never mix oils of different brands or types.

4.4 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.

4.5 Service kits

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.

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

Quantity	Ordering number
5-litre can	2908 8503 00
20-litre can	2908 8501 01
209-litre drum	2908 8500 00

5 SERVICING PROCEDURES

5.1 Air filter (AF-Fig. 1.3)

5.1.1 Recommendations

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

5.1.2 Servicing

1. Stop the compressor and switch off the voltage.
2. Remove the air filter cover and remove the filter element.
3. Clean the cover. Discard the filter element.
4. Install a new element and the cover.
5. After carrying out the service actions of the related service plan, the service warning must be reset. See also section 4.1.

5.2 Oil and oil filter change (Fig. 3.3)

1. Run the compressor until warm.
2. Stop the compressor and switch off the voltage.
3. Remove filler plug (FC). Drain the compressor sump by opening drain valve (Dmo). Close the valve after draining.
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 section 4.3. Reinstall the filler plug.
6. Switch on the voltage.
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 section 4.1.

5.3 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 section 7.2, consult Atlas Copco.

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

6 PROBLEM SOLVING

Warning
Before starting any maintenance or repairs:
- Stop the compressor and close the air outlet valve.
- Press the test buttons (Fig. 1.8) on top of the electronic water drains to depressurize the air system and open the drain valve (1-Fig. 3.5). If an IMD dryer is installed, open drain valve (8-Fig. 1.5).
- Open the isolating switch (customer's installation) to switch off the voltage to the compressor.

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

1	**Compressor capacity or working pressure lower than normal**
a	Air consumption exceeds capacity of compressor
a	Check pneumatic plant
b	Safety valves leaking
b	Remove leaking valve and have it inspected

2	**Oil pressure too low**
a	Oil level too low
a	Top up level to the middle of the oil level sight-glass
b	Oil filter clogged
b	Replace filter

3	**Air temperature above normal**
a	Inlet temperature too high due to bad room ventilation or recirculation of cooling air
a	Improve ventilation of compressor room and avoid cooling air recirculation
b	Air filter clogged
b	Replace filter
c	**On ZR**, insufficient cooling water flow
c	Check water temperature and increase cooling water flow
d	**On ZR**, restriction in cooling water system due to formation of scale or settling down of dirt
d	Consult Atlas Copco

4	**Condensate is not discharged from condensate traps during operation**
a	Discharge flexible clogged
a	Check and correct as necessary
b	Electronic water drain malfunctioning
b	Consult Atlas Copco

7 PRINCIPAL DATA

7.1 Readings on display (2-Fig. 3.4)

Outlet pressure	bar(e)	Depends on pressure setpoint
Maximum working pressure	bar(e)	See section 7.4

7.1.1 ZT15 up to ZT22

	Unit	ZT15	ZT18	ZT22
Dp of air filter, approx.	bar	Below 0.050	Below 0.050	Below 0.050
Oil pressure	bar(e)	2.4	2.4	2.4
Intercooler pressure	bar(e)	2.4	2.4	2.5
Air outlet temperature	°C	27	29	33
Air temperature, low-pressure element out	°C	150	157	167
Air temperature, high-pressure element out	°C	130	145	166
Air temperature, high-pressure element in	°C	25	28	32

7.1.2 ZT30 up to ZT45

	Unit	ZT30	ZT37	ZT45
Dp of air filter, approx.	bar	Below 0.050	Below 0.050	Below 0.050
Oil pressure	bar(e)	2.4	2.4	2.5
Intercooler pressure	bar(e)	2.4	2.4	2.3
Air outlet temperature	°C	25	28	31
Air temperature, low-pressure element out	°C	170	185	190
Air temperature, high-pressure element out	°C	156	185	190
Air temperature, high-pressure element in	°C	29	34	35

7.1.3 ZR30 up to ZR45

	Unit	ZR30	ZR37	ZR45
Dp of air filter, approx.	bar	Below 0.050	Below 0.050	Below 0.050
Oil pressure	bar(e)	2.4	2.4	2.5
Intercooler pressure	bar(e)	2.4	2.4	2.3
Air outlet temperature	°C	25	28	31
Air temperature, low-pressure element out	°C	170	185	190
Air temperature, high-pressure element out	°C	156	185	190
Air temperature, high-pressure element in	°C	29	34	35

7.2 Settings of safety valves

Low-pressure safety valve	bar(e)	3.7
High-pressure safety valve	bar(e)	9.3
High-pressure safety valve (for 10 bar versions only)	bar(e)	11.5

7.3 Settings of overload relay - circuit breakers – fuses

7.3.1 ZT15 up to ZT22 IEC

Compressor type	Voltage supply	Frequency	Overload relay F21	Circuit breaker Q15	Main fuses (customer's installation) gL/gG (IEC)
ZT15	200 V	50 Hz	38.8 A	2.5 A	80 A
ZT15	200/220 V	60 Hz	36.7 A	2.6 A	80 A
ZT15	230 V	60 Hz	34.6 A	2.3 A	80 A
ZT15	230 V	50 Hz	33.6 A	2.2 A	80 A
ZT15	380 V	60 Hz	20.2 A	1.3 A	50 A
ZT15	400 V	50 Hz	19.4 A	1.3 A	50 A
ZT15	460 V	60 Hz	17.3 A	1.3 A	50 A
ZT15	500 V	50 Hz	15.6 A	1.0 A	50 A
ZT15	690 V	50 Hz	11.4 A	0.8 A	25 A
ZT18	200 V	50 Hz	47.1 A	2.5 A	100 A
ZT18	200/220 V	60 Hz	45.0 A	2.6 A	100 A
ZT18	230 V	60 Hz	42.6 A	2.3 A	100 A
ZT18	230 V	50 Hz	40.2 A	2.2 A	100 A
ZT18	380 V	60 Hz	24.9 A	1.3 A	63 A
ZT18	400 V	50 Hz	23.2 A	1.3 A	63 A
ZT18	460 V	60 Hz	21.3 A	1.3 A	50 A
ZT18	500 V	50 Hz	18.7 A	1.0 A	50 A
ZT18	690 V	50 Hz	13.7 A	0.8 A	35 A
ZT22	200 V	50 Hz	57.5 A	2.5 A	125 A
ZT22	200/220 V	60 Hz	53.3 A	2.6 A	125 A
ZT22	230 V	60 Hz	52.0 A	2.3 A	125 A
ZT22	230 V	50 Hz	49.9 A	2.2 A	125 A
ZT22	380 V	60 Hz	31.4 A	1.3 A	80 A
ZT22	400 V	50 Hz	28.8 A	1.3 A	80 A
ZT22	460 V	60 Hz	26.0 A	1.3 A	63 A
ZT22	500 V	50 Hz	22.9 A	1.0 A	63 A
ZT22	690 V	50 Hz	16.9 A	0.8 A	50 A

7.3.2 ZT15 up to ZT22 CSA/UL

Compressor type	Voltage supply	Frequency	Overload relay F21	Circuit breaker Q15	Main fuses (customer's installation) CSA HRC/UL RK5
ZT15	200 V	60 Hz	66.3 A	2.6 A	110 A
ZT15	230 V	60 Hz	60.0 A	2.3 A	100 A
ZT15	460 V	60 Hz	30 A	1.3 A	50 A
ZT15	575 V	60 Hz	23.1 A	1.1 A	40 A
ZT18	200 V	60 Hz	82.5 A	2.6 A	150 A
ZT18	230 V	60 Hz	73.8 A	2.3 A	125 A
ZT18	460 V	60 Hz	36.9 A	1.3 A	70 A
ZT18	575 V	60 Hz	28.1 A	1.1 A	45 A
ZT22	200 V	60 Hz	103.8 A	2.6 A	175 A
ZT22	230 V	60 Hz	90 A	2.3 A	175 A
ZT22	460 V	60 Hz	45 A	1.3 A	80 A
ZT22	575 V	60 Hz	36.3 A	1.1 A	70 A

7.3.3 ZT/ZR30 up to ZT/ZR45 IEC

Compressor type	Voltage supply	Frequency	Overload relay F21	Circuit breaker Q15 (ZT only)	Main fuses (customer's installation) gL/gG (IEC)
ZT/ZR30	200 V	50 Hz	77.7 A	5.4 A	160 A
ZT/ZR30	200/220 V	60 Hz	71.6 A	5.5 A	160 A
ZT/ZR30	230 V	60 Hz	68.2 A	4.5 A	160 A
ZT/ZR30	230 V	50 Hz	67.2 A	4.7 A	160 A
ZT/ZR30	380 V	60 Hz	40.9 A	2.4 A	100 A
ZT/ZR30	400 V	50 Hz	38.8 A	2.7 A	100 A
ZT/ZR30	460 V	60 Hz	34.1 A	2.4 A	80 A
ZT/ZR30	500 V	50 Hz	31.1 A	2.2 A	80 A
ZT/ZR37	200 V	50 Hz	90.5 A	5.4 A	200 A
ZT/ZR37	200/220 V	60 Hz	86.5 A	5.5 A	200 A
ZT/ZR37	230 V	60 Hz	81.7 A	4.5 A	200 A
ZT/ZR37	230 V	50 Hz	79.0 A	4.7 A	200 A
ZT/ZR37	380 V	60 Hz	48.3 A	2.4 A	125 A
ZT/ZR37	400 V	50 Hz	45.6 A	2.7 A	100 A
ZT/ZR37	460 V	60 Hz	40.9 A	2.4 A	100 A
ZT/ZR37	500 V	50 Hz	36.1 A	2.2 A	80 A
ZT/ZR45	200 V	50 Hz	112.1 A	8.0 A	250 A
ZT/ZR45	200/220 V	60 Hz	106.1 A	11.0 A	250 A
ZT/ZR45	230 V	60 Hz	100.0 A	9.7 A	250 A
ZT/ZR45	230 V	50 Hz	97.3 A	8.0 A	200 A
ZT/ZR45	380 V	60 Hz	59.1 A	6.6 A	125 A
ZT/ZR45	400 V	50 Hz	56.1 A	4.7 A	125 A
ZT/ZR45	460 V	60 Hz	50.0 A	5.6 A	125 A
ZT/ZR45	500 V	50 Hz	44.9 A	3.8 A	100 A

7.3.4 ZT/ZR30 up to ZT/ZR45 CSA/UL

Compressor type	Voltage supply	Frequency	Overload relay F21	Circuit breaker Q15 (ZT only)	Main fuses (customer's installation) CSA HRC/UL RK5
ZT/ZR30	200 V	60 Hz	71.6 A	5.5 A	200 A / 2x100 A
ZT/ZR30	230 V	60 Hz	68.2 A	4.5 A	200 A / 2x100 A
ZT/ZR30	460 V	60 Hz	34.1 A	2.4 A	100 A / 90 A
ZT/ZR30	575 V	60 Hz	27.0 A	1.9 A	80 A / 70 A
ZT/ZR37	200 V	60 Hz	86.5 A	5.5 A	225 A / 2x110 A
ZT/ZR37	230 V	60 Hz	81.7 A	4.5 A	225 A / 2x110 A
ZT/ZR37	460 V	60 Hz	40.9 A	2.4 A	110 A / 100 A
ZT/ZR37	575 V	60 Hz	32.1 A	1.9 A	100 A / 90 A
ZT/ZR45	200 V	60 Hz	106.1 A	11.0 A	250 A / 2x125 A
ZT/ZR45	230 V	60 Hz	100.0 A	9.7 A	250 A / 2x125 A
ZT/ZR45	460 V	60 Hz	50.0 A	5.6 A	150 A / 125 A
ZT/ZR45	575 V	60 Hz	39.2 A	4.5 A	125 A / 100 A

Notes
- For 50 Hz compressors, according to Directive 73/23/EEC (low-voltage directive) EN 60204
- For 60 Hz compressors, according to CSA standards C22,2 Nos. 0; 0.4; 0.5; 0.12; 14; 68; and UL508

7.4 Compressor specifications

7.4.1 Reference conditions

Absolute inlet pressure	bar(a)	1
Relative air humidity	%	0
Air inlet temperature	°C	20
Cooling water inlet temperature	°C	20

7.4.2 Limitations

Maximum air inlet temperature	°C	40
Maximum air inlet temperature for hot air version (HAV)	°C	50
Minimum ambient temperature	°C	0
Maximum altitude operation	m	1000
Maximum cooling water temperature at inlet **(on ZR)**	°C	40
Maximum cooling water temperature at outlet, open circuit **(on ZR)**	°C	50
Maximum cooling water temperature at outlet, closed circuit **(on ZR)**	°C	60
Maximum cooling water inlet pressure **(on ZR)**	bar(e)	7

7.4.3 Specific data of ZT15 up to ZT22

	Unit	**ZT15 -7.5**	**ZT15 -8.6**	**ZT15 -10**	**ZT18 -7.5**	**ZT18 -8.6**	**ZT18 -10**	**ZT22 -7.5**	**ZT22 -8.6**	**ZT22 -10**
Nominal working pressure	bar(e)	7	8	9.5	7	8	9.5	7	8	9.5
Maximum working pressure	bar(e)	7.5	8.6	10	7.5	8.6	10	7.5	8.6	10
Maximum working pressure, Full-Feature	bar(e)	7.25	8.35	9.75	7.25	8.35	9.75	7.25	8.35	9.75
Minimum working pressure	bar(e)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Installed motor power	kW	15	15	15	18.5	18.5	18.5	22	22	22
Oil capacity	l	25	25	25	25	25	25	25	25	25
Sound pressure level **1)**	dB(A)	69	69	69	71	71	71	73	73	73
Sound pressure level, WorkPlace Air System **1)**	dB(A)	65	65	65	67	67	67	69	69	69

7.4.4 Specific data of ZT30 up to ZT45

	Unit	ZT30-7.5	ZT30-8.6	ZT37-7.5	ZT37-8.6	ZT45-7.5	ZT45-8.6
Nominal working pressure	bar(e)	7	8	7	8	7	8
Maximum working pressure	bar(e)	7.5	8.6	7.5	8.6	7.5	8.6
Maximum working pressure, Full-Feature	bar(e)	7.25	8.35	7.25	8.35	7.25	8.35
Minimum working pressure	bar(e)	4.0	4.0	4.0	4.0	4.0	4.0
Installed motor power	kW	30	30	37	37	45	45
Oil capacity	l	25	25	25	25	25	25
Sound pressure level **1)**	dB(A)	69	69	71	71	73	73
Sound pressure level, WorkPlace Air System **1)**	dB(A)	66	66	68	68	70	70

7.4.5 Specific data of ZR30 up to ZR45

	Unit	ZR30-7.5	ZR30-8.6	ZR37-7.5	ZR37-8.6	ZR45-7.5	ZR45-8.6
Nominal working pressure	bar(e)	7	8	7	8	7	8
Maximum working pressure	bar(e)	7.5	8.6	7.5	8.6	7.5	8.6
Maximum working pressure, Full-Feature	bar(e)	7.25	8.35	7.25	8.35	7.25	8.35
Minimum working pressure	bar(e)	4.0	4.0	4.0	4.0	4.0	4.0
Installed motor power	kW	30	30	37	37	45	45
Oil capacity	l	25	25	25	25	25	25
Cooling water consumption at temperature rise of 15°C	l/s	0.55	0.55	0.7	0.7	0.83	0.83
Sound pressure level **1)**	dB(A)	66	66	68	68	70	70

7.5 Conversion list of SI units into British/American units

1 bar = 14.504 psi
1 g = 0.035 oz
1 kg = 2.205 lb
1 km/h = 0.621 mile/h
1 kW = 1.341 hp (UK and US)
1 l = 0.264 US gal
1 l = 0.220 Imp gal (UK)
1 l = 0.035 cu.ft
1 m = 3.281 ft
1 mm = 0.039 in
1 m³/min = 35.315 cfm
1 mbar = 0.401 in wc
1 N = 0.225 lbf
1 Nm = 0.738 lbf.ft
x degrees Celsius = (32 + 1.8 x) degrees Fahrenheit **2)**

Footnotes chapter 7

1) According to ISO 2151 at operator's position.
2) A temperature difference of 1°C = a temperature difference of 1.8°F.

8 INSTRUCTIONS FOR USE OF PULSATION DAMPER

1. This vessel can contain pressurized air; be aware of its potential danger in case of misuse.
2. This vessel shall only be used as compressed air pulsation damper and be operated within the specified limits as mentioned on the data plate.
3. No alterations shall be made to this vessel by welding, drilling or any other mechanical methods without written permission of the manufacturer.
4. Devices for pressure and temperature control must be attached to this vessel or its piping system. The devices must protect the vessel against circumstances other than mentioned on the data plate.
5. These devices must be designed so that the pressure will not permanently exceed the maximum allowable pressure PS, except for short pressure surges of 1.1 times the design pressure.
6. This vessel has been designed and built to guarantee an operational lifetime in excess of 20 years and an infinite number of pressure load cycles. Therefore, there is no intrinsic need for in service inspection of the vessel when used within the design limits and in its intended application. However, national legislation may require in service inspection.

9 PED

9.1 Components subject to 97/23/EC Pressure Equipment Directive

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

Part number	Description	PED Class
0830 1008 32	Safety valve	IV
0830 1008 30	Safety valve	IV
0830 1000 78	Safety valve	IV

9.2 Overall rating

The compressors are conform to PED category I.

Notes:

Notes:

OWNERSHIP DATA

Compressor type: .....
Air dryer type: .....
Motor type: .....
Delivery date: .....
Service Plan: .....

Unit serial No. compressor: .....
Unit serial No. dryer: .....
Motor serial No.: .....
First start-up date: .....
Owner's machine No.: .....

Selected lubricants

Compressor: .....
Bearing grease type, electric motor: .....
Dryer gearbox .....

Capacity: .....

Capacity .....

Printed Matter Nos.

Atlas Copco compressor instruction book: .....
Atlas Copco compressor parts list: .....
Atlas Copco logbook: .....

Atlas Copco air dryer instruction book: .....
Atlas Copco air dryer parts list: .....

Local Atlas Copco Representative

Name: .....
Address: .....
Telephone: .....
Telex: .....
E-mail .....

Contact persons:

Service: .....
Parts: .....

SAFETY PRECAUTIONS

To be read attentively and acted accordingly before installing, operating or repairing the unit.

These recommendations 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.

In addition to normal safety rules which should be observed with stationary air compressors and equipment, the following safety directions and precautions are of special importance.

When operating this unit, the operator must employ safe working practices and observe all related local work safety requirements and ordinances.

The owner is responsible for maintaining the unit in a safe operating condition. Parts and accessories shall be replaced if unsuitable for safe operation.

Installation, operation, maintenance and repair shall only be performed by authorized, trained, competent personnel.

Normal ratings (pressures, temperatures, time settings, etc.) shall be durably marked.

Any modification on the compressor or air dryer shall only be performed in agreement with Atlas Copco and under supervision of authorized, competent personnel.

If any statement in this book, especially with regard to safety, does not comply with local legislation, the stricter of the two shall apply.

These precautions are general and cover several machine types and equipment; hence some statements may not apply to the unit(s) described in this book.

Installation

Apart from general engineering practice in conformity with the local safety regulations, the following directives are specially stressed:

1. A compressor or air dryer shall be lifted only with adequate equipment in conformity with local safety rules.

   Loose or pivoting parts shall be securely fastened before lifting. It is strictly forbidden to dwell or stay in the risk zone under a lifted load. Lifting acceleration and retardation shall be kept within safe limits.

   Wear a safety helmet when working in the area of overhead or lifting equipment.

2. Any blanking flanges, plugs, caps and desiccant bags shall be removed before connecting up the pipes. Distribution pipes and connections shall be of correct size and suitable for the working pressure.

3. Place the unit where the ambient air is as cool and clean as possible. If necessary, install a suction duct. Never obstruct the air inlet. Care shall be taken to minimize the entry of moisture with the inlet air.

4. The aspirated air shall be free from flammable fumes or vapours, e.g. paint solvents, that can lead to internal fire or explosion.

5. Air-cooled units shall 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 inlet.

6. Arrange the air intake so that loose clothing of people cannot be sucked in.

7. Ensure that the discharge pipe from the compressor to the aftercooler, air dryer or air net is free to expand under heat and that it is not in contact with or close to flammable material.

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 unit shall bear an obvious sign reading:

   DANGER: This machine is remotely controlled and may start without warning.

   As a further safeguard, persons switching on remotely controlled units 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. On units with automatic start-stop system, a sign stating "This machine may start without warning" shall be attached near the instrument panel.

11. In multiple compressor systems manual valves shall be installed to isolate each compressor. Non-return valves (check valves) shall not be relied upon for isolating pressure systems.

12. Never remove or tamper with the safety devices, guards or insulations fitted on the unit. Every pressure vessel or auxiliary installed outside the unit to contain air above atmospheric pressure shall be protected by a pressure-relieving device or devices as required.

13. Pipework or other parts with a temperature in excess of 80 degrees celsius and which may be accidentally touched by personnel in normal operation shall be guarded or insulated. Other high-temperature pipework shall be clearly marked.

(continued on inside of cover)

14. If the ground is not level or can be subject to variable inclination, consult Atlas Copco.

15. The electrical connections shall correspond to the local codes. The units shall be grounded and protected against short circuits by fuses.

Operation

1. Air hoses shall be of correct size and suitable for the working pressure. Never use frayed, damaged or deteriorated hoses. 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.

   Never play with compressed air. Do not apply it to your skin or direct an air stream at people. Never use it to clean dirt from your clothes. When using it to clean equipment, do so with extreme caution and use eye protection.

2. The compressor is not considered as capable of producing air of breathing quality. For breathing air quality, the compressed air must be adequately purified according to local legislation and standards.

3. Never operate the units when there is a possibility of taking in flammable or toxic fumes.

4. Never operate the units at pressures below or in excess of their limit ratings as indicated on the Principal Data sheet.

5. Keep all bodywork doors shut during operation. The doors may be opened for short periods only, e.g. to carry out 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:
   a. All guards are in place and securely fastened
   b. All hoses and/or pipes inside the unit are in good condition, secure and not rubbing
   c. There are no leaks
   d. All fasteners are tight
   e. All electrical leads are secure and in good order
   f. Safety valves and other pressure-relief devices are not obstructed by dirt or paint
   g. 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.

Maintenance

Maintenance and repair work shall only be carried out under supervision of someone qualified for the job.

1. Use only the correct tools for maintenance and repair work.

2. Use only genuine spare parts.

3. All maintenance work, other than routine attention, shall only be undertaken when the unit is stopped, the main power supply is switched off and the machine has cooled down. Take positive precaution to ensure that the unit cannot be started inadvertently.

   In addition, a warning sign bearing a legend such as "work in progress; do not start" shall be attached to the starting equipment.

4. Before removing any pressurized component, effectively isolate the unit from all sources of pressure and relieve the entire system of pressure.

5. Never use flammable solvents or carbon tetrachloride for cleaning parts. Take safety precautions against toxic vapours of cleaning liquids.

6. Scrupulously observe cleanliness during maintenance and repair. Keep dirt away by covering the parts and exposed openings with a clean cloth, paper or tape.

7. Never weld or perform any operation involving heat near the oil system. Oil tanks must be completely purged, e.g. by steam-cleaning, before carrying out such operations.

   Never weld on, or in any way modify, pressure vessels.

   Whenever there is an indication or any suspicion that an internal part of a machine is overheated, the machine shall be stopped but no inspection covers shall be opened before sufficient cooling time has elapsed; this to avoid the risk of spontaneous ignition of the oil vapour when air is admitted.

   Never use a light source with open flame for inspecting the interior of a machine, pressure vessel, etc.

8. Make sure that no tools, loose parts or rags are left in or on the unit.

9. Before clearing the unit for use after maintenance or overhaul, check that operating pressures, temperatures and time settings are correct and that the control and shut-down devices function correctly. If removed, check that the coupling guard of the compressor drive shaft has been reinstalled.

10. Every time the separator element is renewed, examine the discharge pipe and the inside of the oil separator vessel for carbon deposits; if excessive, the deposits should be removed.

11. Protect the motor, air filter, electrical and regulating components, etc. to prevent moisture from entering them, e.g. when steam-cleaning.

12. Make sure that all sound-damping material, e.g. on the bodywork and in the air inlet and outlet systems of the compressor, is in good condition. If damaged, replace it by genuine Atlas Copco material to prevent the sound pressure level from increasing.

13. Never use caustic solvents which can damage materials of the air net, e.g. polycarbonate bowls.

14. The following safety precautions are stressed when handling refrigerant:

    a. Never inhale refrigerant vapours. Check that the working area is adequately ventilated; if required, use breathing protection.

    b. 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.

    c. Always wear safety glasses.

15. Protect hands to avoid injury from hot machine parts, e.g. during draining of oil.

Note: With stationary machine units driven by an internal combustion engine, allowance has to be made for extra safety precautions, e.g. spark arrestors, fuelling care, etc. Consult Atlas Copco.

All responsibility for any damage or injury resulting from neglecting these precautions, or by non-observance of ordinary caution and due care required in handling, operating, maintenance or repair, even if not expressly mentioned in this book, will be disclaimed by Atlas Copco.