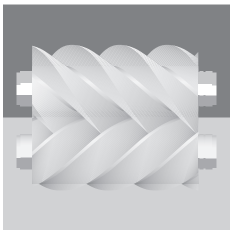


Instruction book for
stationary compressors

GA50 (W) VSD and GA90 (W) VSD

Important: This book must be used together with the "User manual for Elektronikon® regulator for GA50 VSD and GA90 VSD compressors"

Registration code
Collection: APC G VSD
Tab: 38
Sequence: 980

Replaces
No. 2920 1190 04

This instruction book meets the requirements for instructions specified by the machinery directive 89/392/EEC and is valid for CE as well as non-CE labelled machines

No. 2920 1190 05

1997-06

Atlas Copco Industrial Air Division - B-2610 Wilrijk - Belgium

* 2 9 2 0 1 1 9 0 0 5 *

This instruction book describes how to handle the machines to ensure safe operation, optimum efficiency 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 machine in good condition.

Keep the book available for the operator and make sure that the machine is operated and that maintenance is carried out according to the instructions. Record all operating data, maintenance performed, etc. in an operator's logbook available from Atlas Copco. Follow all relevant safety precautions, including those mentioned on the cover of this book.

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

In all correspondence always 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.

Contents

1 Leading particulars

1.1 General description

GA50 (W) VSD and GA90 (W) VSD (Variable Speed Drive motor) are stationary, single-stage, oil-injected screw compressors driven by an electric motor.

The compressors are enclosed in a sound-insulated bodywork. The front panel comprises an Elektronikon control module including the start and stop buttons. An isolator switch is also provided. An electric cabinet comprising the motor start and speed control system is located behind this panel.

1.1.1 Air flow (Figs. 2)

Air drawn through filter (AF) and check valve (CV) into compressor element (E) is compressed. Compressed air and oil flow into air receiver/oil separator (AR). The air is discharged through outlet valve (AV) via minimum pressure valve (Vp), air cooler (Ca) and moisture trap (MT).

Minimum pressure valve (Vp) prevents the receiver pressure from dropping below a minimum pressure.

AV. Air outlet valve
E1. Elektronikon control module
S0. Isolator switch

Fig. 1. General view of GA90 VSD

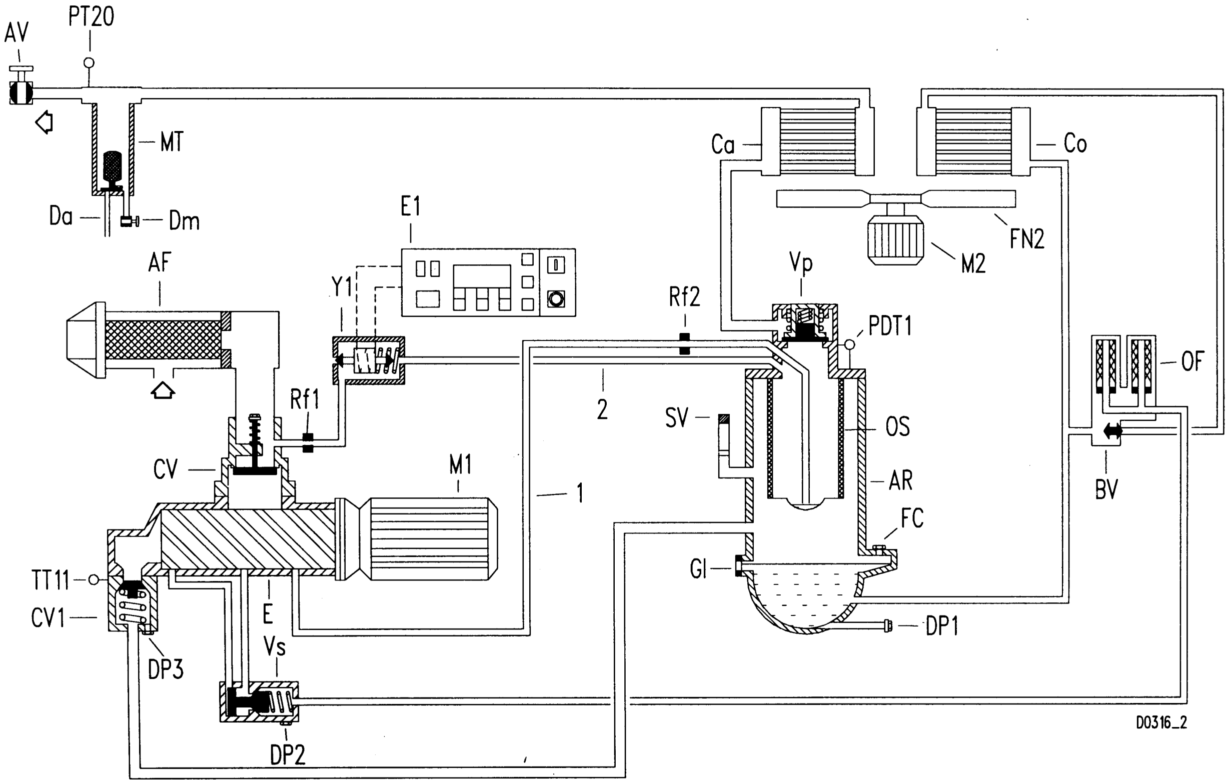


Fig. 2a. Flow diagram of air-cooled GA VSD compressor, compressor stopped and isolator switch switched off

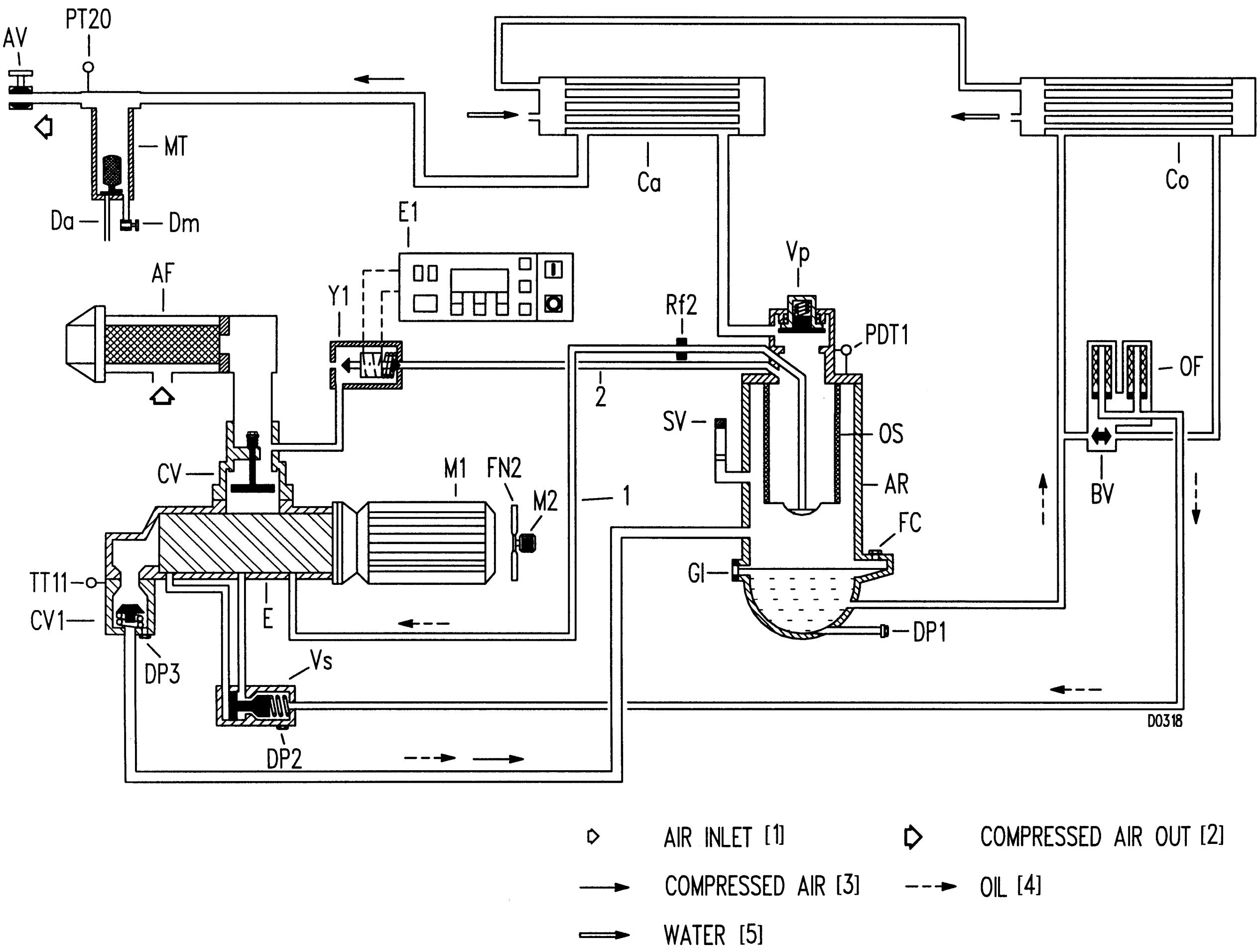


Fig. 2b. Flow diagram of water-cooled GA VSD compressor, compressor running

AF.	Air filter	DP2.	Oil drain plug, oil stop valve	PDT1.	Differential pressure sensor, oil separator
AR.	Air receiver/oil separator	DP3.	Oil drain plug, compressor element	PT20.	Pressure sensor, air outlet
AV.	Air outlet valve	E.	Compressor element	Rf1.	Nozzle, **only for GA50 VSD**
BV.	Oil cooler by-pass valve	E1.	Elektronikon control module	Rf2.	Restrictor
Ca.	Air cooler	FC.	Oil filler plug	SV.	Safety valve
Co.	Oil cooler	FN2.	Fan, compressor coolers	TT11.	Temperature sensor, compressor element outlet
CV.	Check valve	Gl.	Oil level gauge	Vp.	Minimum pressure valve
CV1.	Check valve	MT.	Air cooler moisture trap	Vs.	Oil stop valve
Da.	Automatic condensate drain, air cooler moisture trap	M1.	Compressor motor	Y1.	Solenoid valve, blow off
Dm.	Manual condensate drain, air cooler moisture trap	M2.	Fan motor, compressor coolers	1.	Oil scavenging line
DP1.	Oil drain plug, air receiver	OF.	Oil filter	2.	Blow-off air flexible
		OS.	Oil separator element		

Figs. 2. Flow diagrams

1.1.2 Oil system (Figs. 2)

In air receiver/oil separator (AR), most of the oil is removed from the air/oil mixture centrifugally. The balance is removed by oil separator element (OS). The oil collects in the lower part of air receiver/oil separator (AR), which serves as oil tank.

The oil system is provided with a by-pass valve (BV). When the oil temperature is below 60°C (140°F), by-pass valve (BV) shuts off the oil supply from oil cooler (Co). Air pressure forces the oil from air receiver/oil separator (AR) through oil filter(s) (OF) and oil stop valve (Vs) to compressor element (E) and its lubrication points. Oil cooler (Co) is by-passed.

By-pass valve (BV) starts opening the oil supply from cooler (Co) when the oil temperature has increased to the above-mentioned value. At approx. 75°C (167°F) all the oil flows through the oil cooler.

1.1.3 Cooling and condensate drain systems (Figs. 3 and 4)

The cooling system comprises air cooler (Ca) and oil cooler (Co). GA50 VSD and GA90 VSD are air-cooled compressors, the cooling air is generated by fan (FN). GA50 W VSD and GA90 W VSD are water-cooled compressors.

A moisture trap (MT) is provided in the air outlet system. The trap is equipped with a valve for automatic condensate draining during operation (Da-Fig. 5) and a manually operated valve for draining after stopping the compressor (Dm-Fig. 5).

1.2 Regulating system

If the air consumption is less than the air output of the compressor, the net pressure increases. When the net pressure differs from the setpoint (desired net pressure), the regulator will decrease the motor speed. If the net pressure keeps on rising when the motor runs at minimum speed, the regulator will stop the motor. If the motor is stopped automatically and the net pressure approaches the setpoint, the regulator will restart the motor.

1.3 Electrical system

The system comprises (Figs. 6):

1. Compressor motor (M1) and fan motor (M2)
2. Elektronikon control module (Fig. 7a)
3. Compressor start button (I) and stop button (O)
4. Isolator switch (S0)
5. Electric cabinet (Figs. 8)
6. Sensors for the compressor element outlet temperature (TT11), for the pressure difference over the oil separator (PDT1) and for the air outlet pressure (PT20). Water-cooled compressors are also provided with a sensor for the cooling water outlet temperature (TT51).

1.4 Elektronikon control module

The control module consists of an Elektronikon regulator and a control panel.

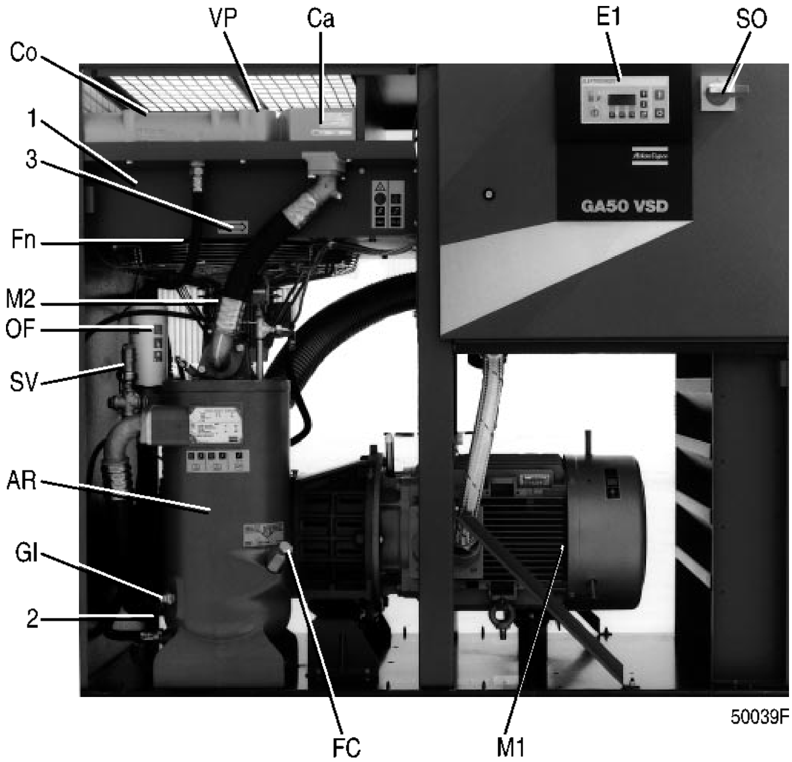


Fig. 3a. Front view of GA50 VSD

AR. Air receiver/oil separator
AV. Air outlet valve
Ca. Air cooler
Co. Oil cooler
CV. Check valve
E. Compressor element
E1. Elektronikon control module
FC. Oil filler plug
FN. Fan, compressor coolers
Gl. Oil level gauge
M1. Compressor motor
M2. Fan motor
OF. Oil filter
S0. Isolator switch
SV. Safety valve
VP. Venting plug, oil cooler
1. Cooler plate
2. Flexible, oil drain
3. Arrow, rotation direction of fan motor

Figs. 3. Front views

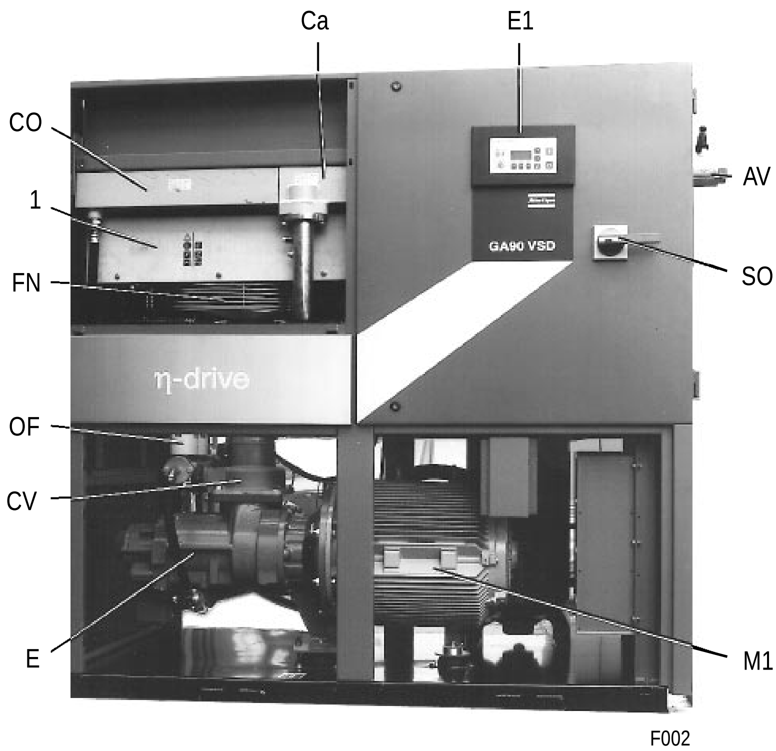
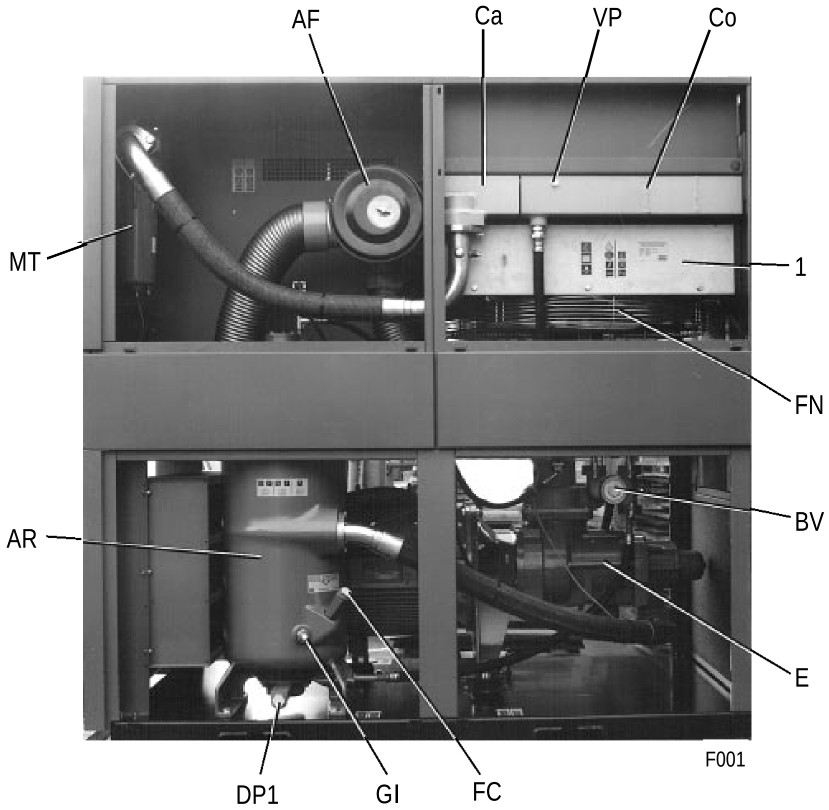
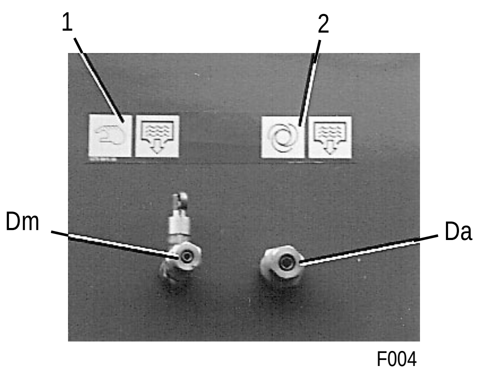


Fig. 3b. Front view of GA90 VSD



AF. Air filter
AR. Air receiver/oil separator
BV. Oil cooler by-pass valve
Ca. Air cooler
Co. Oil cooler
DP1. Oil drain plug, air receiver
E. Compressor element
FC. Oil filler plug
FN. Fan, compressor coolers
Gl. Oil level gauge
MT. Air cooler moisture trap
VP. Venting plug, oil cooler
1. Cooler plate

Fig. 4. Rear view of GA90 VSD



Da. Automatic condensate drain, air cooler moisture trap
Dm. Manual condensate drain, air cooler moisture trap
1. Pictograph, manual condensate drain
2. Pictograph, automatic condensate drain

Fig. 5. Condensate outlets

PDT1. Differential pressure sensor, oil separator
PT20. Pressure sensor, air outlet
TT11. Temperature sensor, compressor element outlet
TT51. Temperature sensor, cooling water outlet (only on water-cooled compressors)
Y1. Solenoid valve, blow off

MOTORS
M1. Compressor motor
M2. Fan motor, compressor coolers

ELECTRIC CABINET
A1. R.F.I. filter (optional)
E1. Elektronikon control module
E4. Communication module
F1/F4. Fuses
K15. Contactor, fan motor
K35. Thermistor relay, motor temperature
L1. Inductor
Q15. Circuit breaker, fan motor
Q16. Circuit breaker, invertor
S0. Isolator switch
T1. Transformer
U1. Invertor
1X1. Terminal strip

CONTROL MODULE (E1)
I. Start button
K01. Auxiliary relay, fan motor
K02. Auxiliary relay
K03. Auxiliary relay
K04. Auxiliary relay, service
K05. Auxiliary relay, invertor shut-down
K06. Auxiliary relay
K07. Auxiliary relay, general warning
K08. Auxiliary relay, general shut-down
K10. Auxiliary relay
O. Stop button

Figs. 6. Electrical diagrams

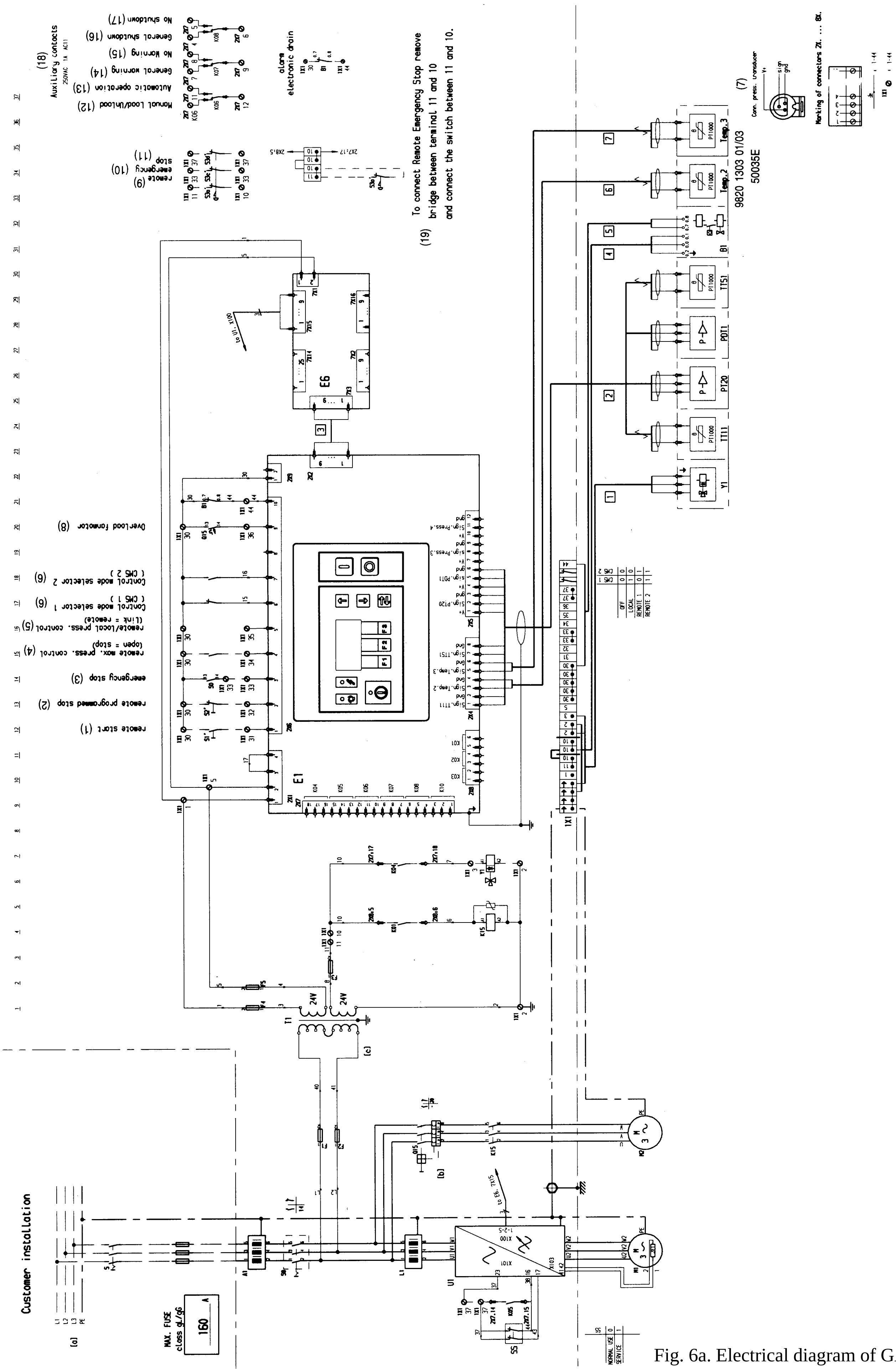


Fig. 6a. Electrical diagram of GA50 VSD

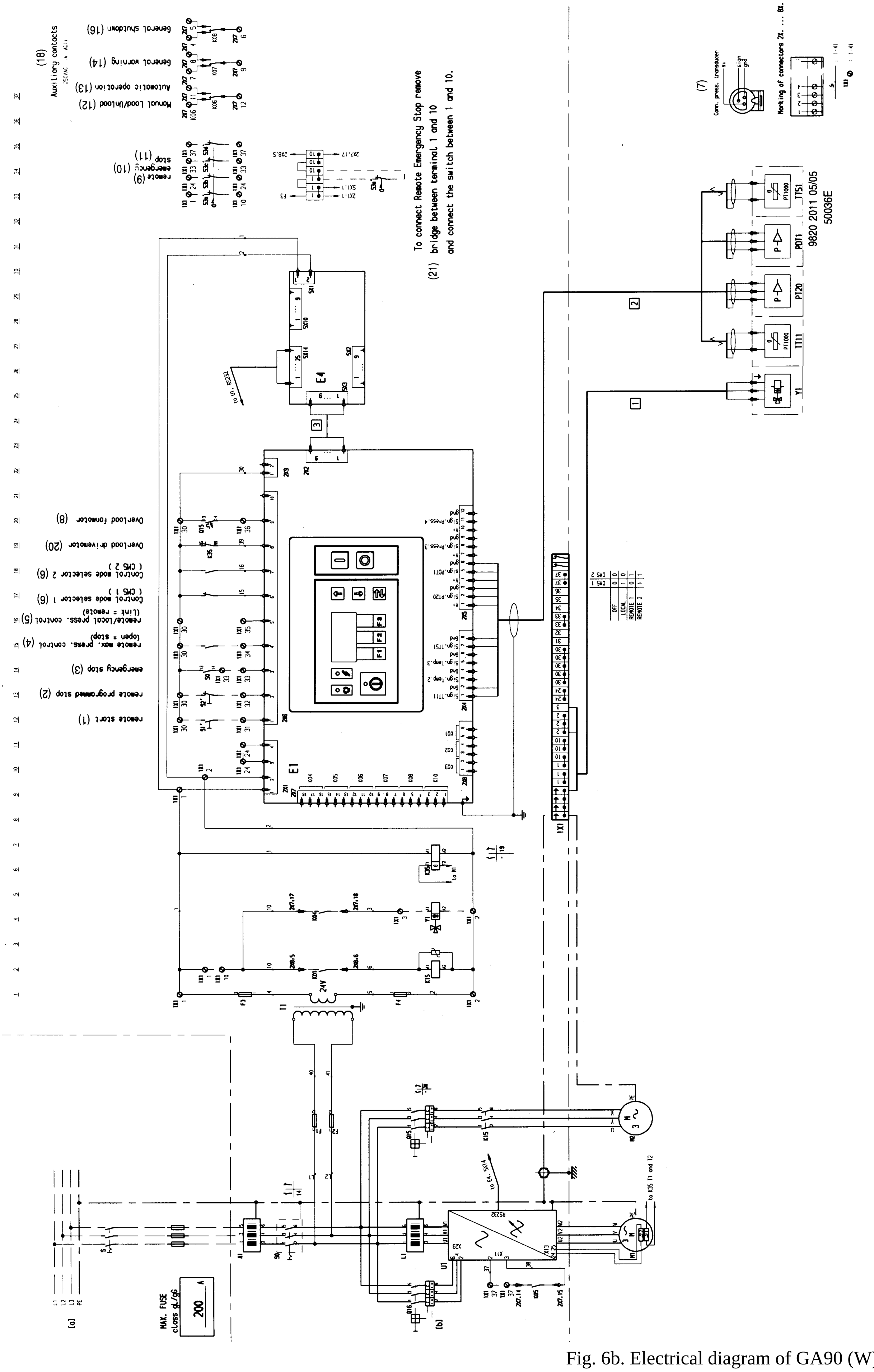


Fig. 6b. Electrical diagram of GA90 (W) VSD

1.4.1 Elektronikon regulator (E1-Figs. 6)

The regulator has following functions:

Controlling the compressor
The regulator matches the compressor output to the air consumption by speed regulation of the motor.

The regulator stops the compressor whenever necessary:
- Indirect stop: i.e. the compressor runs at minimum speed and the net pressure rises to the indirect stop level
- Direct stop: i.e. the compressor runs at a speed in between minimum and maximum and the net pressure rises above the direct stop setpoint.

Both settings are programmable; consult the "User manual for Elektronikon regulator", section "Modify settings submenu".

Note: to prevent the safety valve from opening too frequently on 13 bar compressors, the setting of the direct stop setpoint should never be more than 1bar.

Protecting the compressor
If the compressor element outlet temperature exceeds the programmed shut-down level, the compressor will be stopped. This will be indicated on the control panel (Fig. 7a). The compressor will also be stopped in case of overload of fan motor (M2-Figs. 2).

If the compressor element outlet temperature exceeds a programmed value below the shut-down level, this will also be indicated to warn the operator before the shut-down level is reached.

Protecting the motor
GA50 (W) VSD
If the motor temperature should rise above the setting of the regulator, the regulator will stop the motor.

GA90 (W) VSD
If the motor temperature should rise above the warning setting of the regulator, the regulator will temporary reduce the motor speed until the temperature has decreased again. A warning appears on the display. If the temperature should not drop below the warning level after the regulator has decreased the motor speed, the regulator will stop the motor.

Monitoring components subject to service
The regulator continuously monitors the oil, oil filter, oil separator, air filter and motor regreasing. Each input is compared to programmed time intervals. If these limits are exceeded, a message will appear on display (4-Fig. 7a) to warn the operator to service the indicated component.

Automatic restart 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 (this time period is called the* ***power recovery time).***

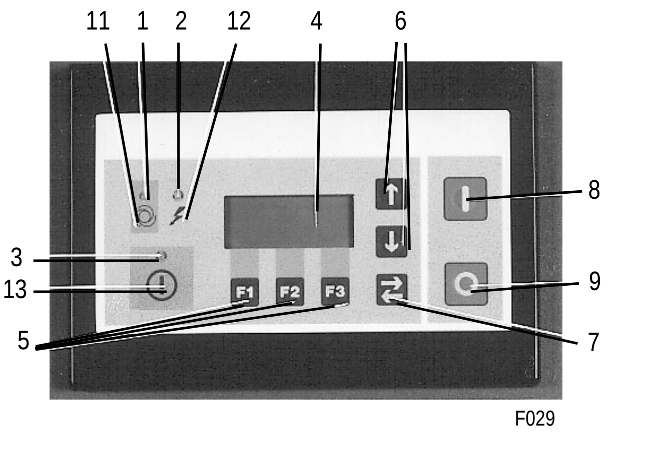
The power recovery time ***can be set between 1 and 254 or to symbol 00!. If the power recovery time is set to 00!, the compressor will always restart after a voltage failure, no matter how long it takes to restore the voltage.***

1.4.2 Control panel (Fig. 7a)

To control the compressor and to read and modify programmable parameters, the regulator is provided with a panel including:

Ref.	Designation	Function
1	Automatic operation LED	Indicates that the regulator is automatically controlling the compressor.
2	Voltage on LED	Indicates that the voltage is switched on.
3	General alarm LED	Is normally out. Is alight or blinks in case of an abnormal condition. See below.
4	Display	Indicates: - the name of the sensor of which the actual reading is displayed - the unit of measurement and actual reading - messages regarding the motor speed, a sensor error, a service need or a fault
5	Function keys	Keys to control and program the compressor. The actual function of each key is abbreviated and indicated on the bottom line. The most common ones are listed below.
6	Scroll keys	As long as an arrow is shown on the right side of the display, the key with the same symbol can be used to scroll through the display.
7	Tabulator key	Key to go to the next field of the display.

Ref.	Designation	Function
8	Start button	Push button to start the compressor. LED (1) lights up indicating that the regulator is operative (in automatic operation).
9	Stop button	Push button to stop the compressor. LED (1) goes out.
S0	Isolator switch	Switch to isolate the compressor from the mains or to stop the compressor immediately in case of emergency. The compressor will be depressurized automatically when the isolator switch is switched off.



1. LED, automatic operation
2. LED, voltage on
3. LED, general alarm
4. Display
5. Function keys
6. Scroll keys
7. Tabulator key
8. Start button
9. Stop button
11. Pictograph, automatic operation
12. Pictograph, voltage on
13. Pictograph, alarm

Fig. 7a. Control panel

Delivery air		
bar	7.0	
rpm	2500	
Menu	More	
F1	F2	F3

Fig. 7b. Example of the main display

Status data		
Main	Slct	
F1	F2	F3

Fig. 7c. Example of a main menu

Figs. 7. Displays

1.4.2.1 General alarm LED (3-Fig. 7a) 1)

- The LED blinks in case of a shut-down (due to too high a compressor element outlet temperature, too high a motor temperature, too high a temperature of the start and speed control unit, overload of the fan motor, etc.); at the same time the shut-down screen appears. After eliminating the cause of the trouble and when the abnormal condition has disappeared, press function key (5) below Rset.
- The LED blinks and the compressor is shut down if the sensor of the compressor element (TT11-Fig. 9b) is out of order; at the same time the display will show a fault message. Depressurize the compressor by switching off the isolator switch, close the air outlet valve and open manual drain valve. Check the sensor and its wiring.
- The LED also blinks in case of a system failure (due to hardware, software or communication problems). Consult the "User manual for Elektronikon regulator" section "System failures".
- The LED is alight in case of a shut-down warning; at the same time a warning message appears. Remedy; see section 6.

1.4.2.2 Selecting a menu

To facilitate controlling the compressor, menu-driven programs are implemented in the Elektronikon module. Use the function keys (5) to select the menus in order to program and monitor the compressor. The "User manual for Elektronikon regulator" deals elaborately with all regulator functions.

1) Consult the "User manual for Elektronikon regulator", section "Status data submenu".

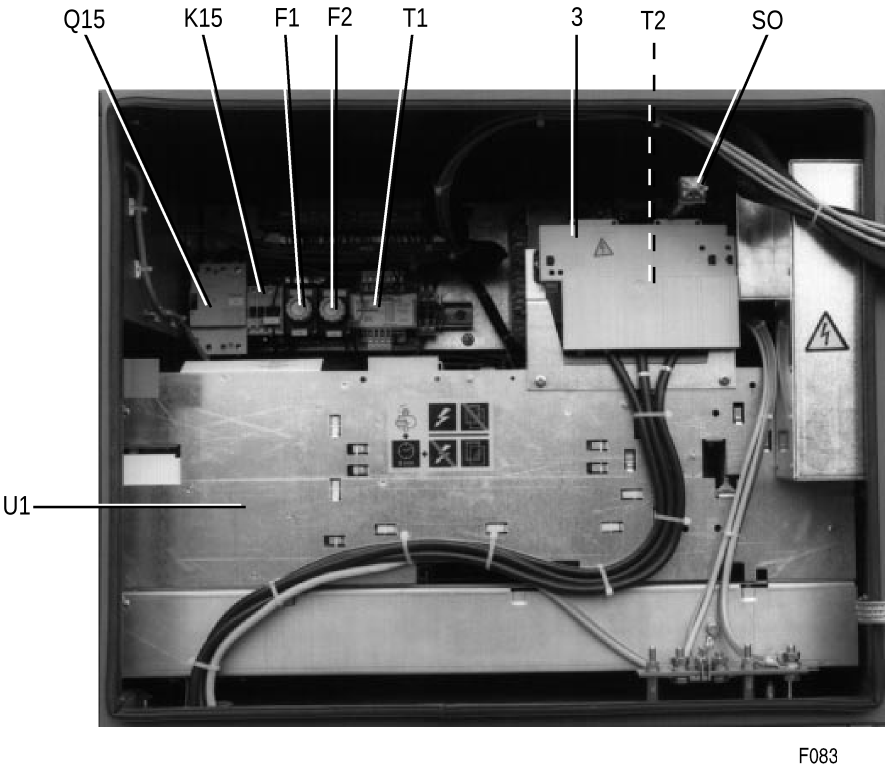
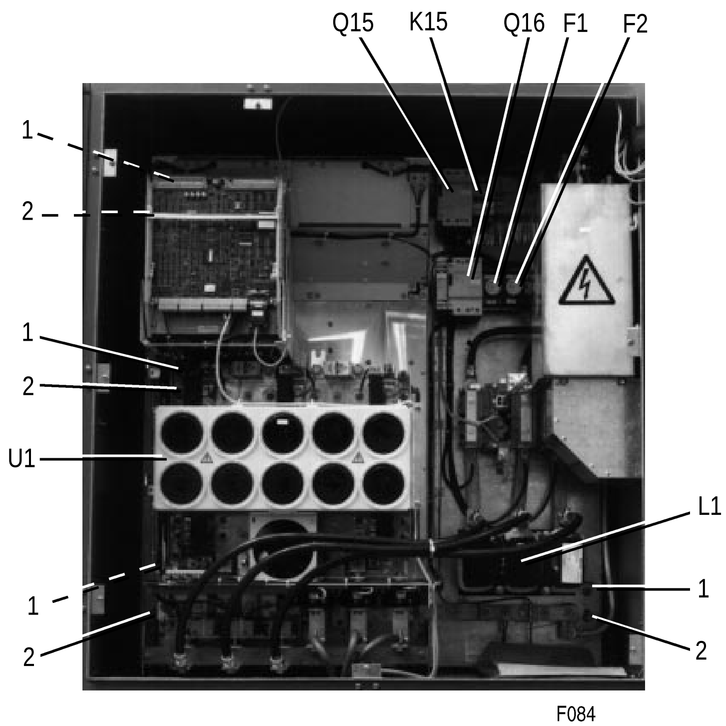


Fig. 8a. Electric cabinet of GA50 VSD



F1/F4. Fuses
K15. Contactor, fan motor
L1. Inductor
Q15. Circuit breaker, fan motor
Q16. Circuit breaker, invertor
S0. Isolator switch
T1. Transformer
T2. Transformer
U1. Invertor
1. Vibration damper
2. Nut (to be removed)
3. Cover

Figs. 8. Electric cabinets

Fig. 8b. Electric cabinet of GA90 (W) VSD

1.4.2.3 Function keys

Abbre-viation	Desig-nation	Function
Add	Add	To add compressor start/stop commands (day/hour)
Canc	Cancel	To cancel a programmed setting when programming parameters
Del	Delete	To delete compressor start/stop commands
Lim	Limits	To show limits for a programmable setting
List	List	To list programmed start/stop commands (day/hour)
Main	Main	To return from a menu to the main display (Fig. 7b)
Menu	Menu	Starting from the main display (Fig. 7b), to initiate the main menu (Fig. 7c) which gives access to submenus Starting from a submenu, to return to the main menu (Fig. 7c)
Mod	Modify	To modify programmable settings
More	More	To have a quick look at the compressor status
Prog	Program	To program modified settings
Rset	Reset	To reset a timer or message
Rtrn	Return	To return to a previously shown option or menu
Slct	Select	To select a submenu or to read more details of a selection shown on display

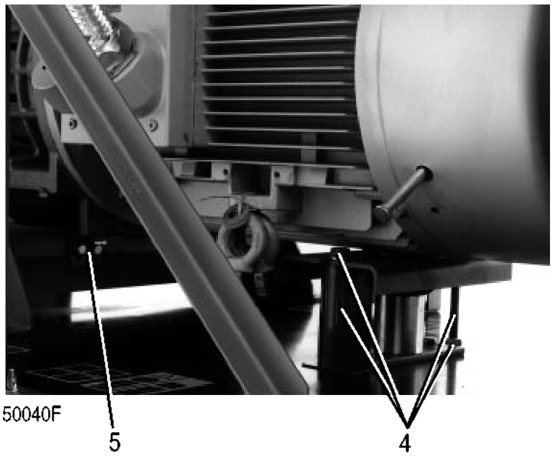


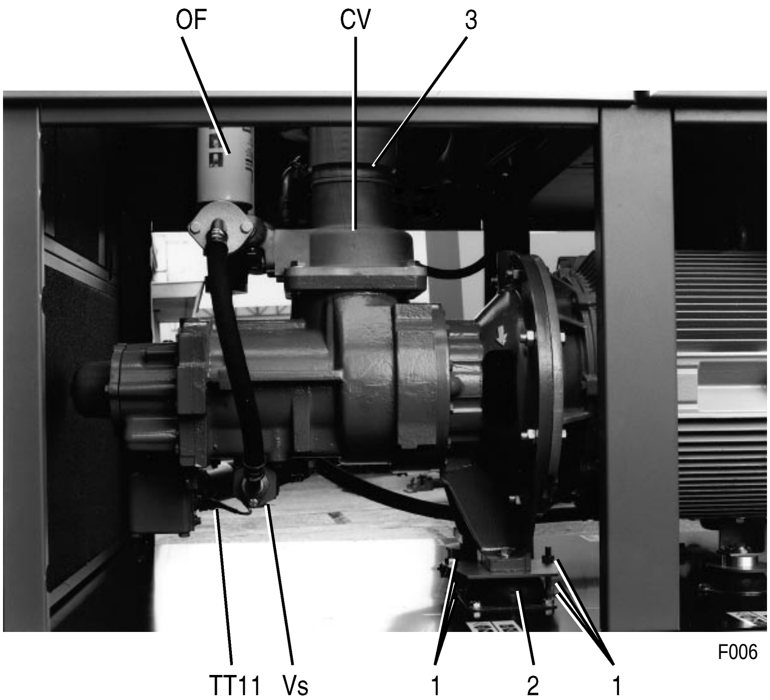
Fig. 9a. Transport bolts of GA50 VSD

1.5 Electric cabinet (Figs. 8)

The cabinet comprises electric components such as the start and speed regulation unit of the motor (U1), a transformer (T1) and fuses (F1/F4) as well as the start contactor (K15) for the fan motor. A fan motor circuit breaker (Q15) is also provided.

If it should be necessary to change the rotation direction of the fan motor (M2-Figs. 2), switch off the voltage and reverse two connections at the terminals of circuit breaker (Q15).

The parameters of the start and speed regulation unit (U1) are factory-set and need no adjustment. Changing parameters may damage the compressor; consult Atlas Copco.



CV. Check valve
OF. Oil filter
TT11. Temperature sensor, compressor element outlet
Vs. Oil stop valve
1. Studs and nuts (to be removed)
2. Vibration damper
3. Hose clip, air inlet hose
4. Studs and nuts (to be removed)

Figs. 9. Transport bolts

Fig. 9b. Transport bolts of GA90 (W) VSD

2 Installation

2.1 Dimension drawings (Figs. 10)

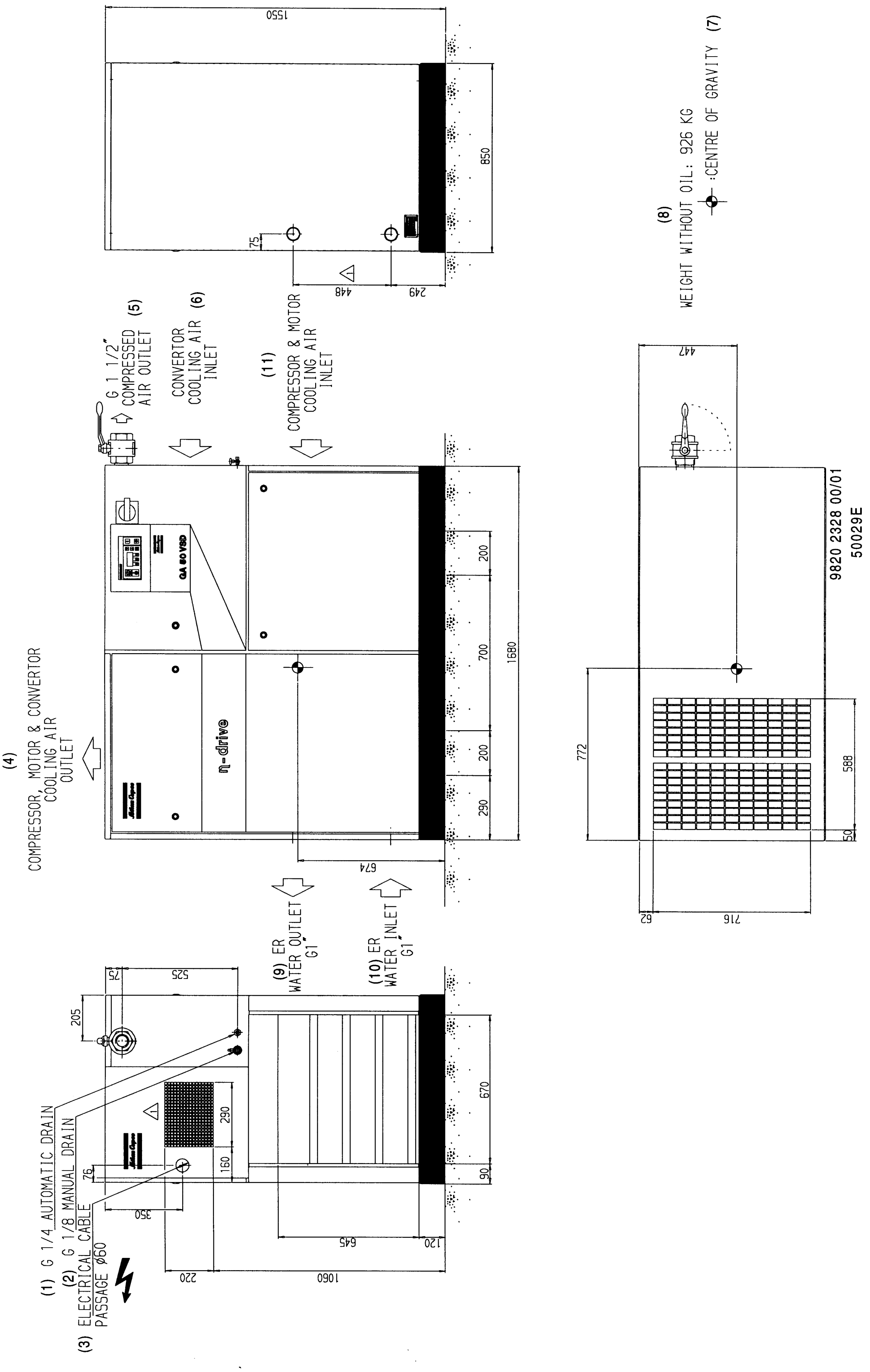


Fig. 10a. Dimension drawing of GA50 VSD

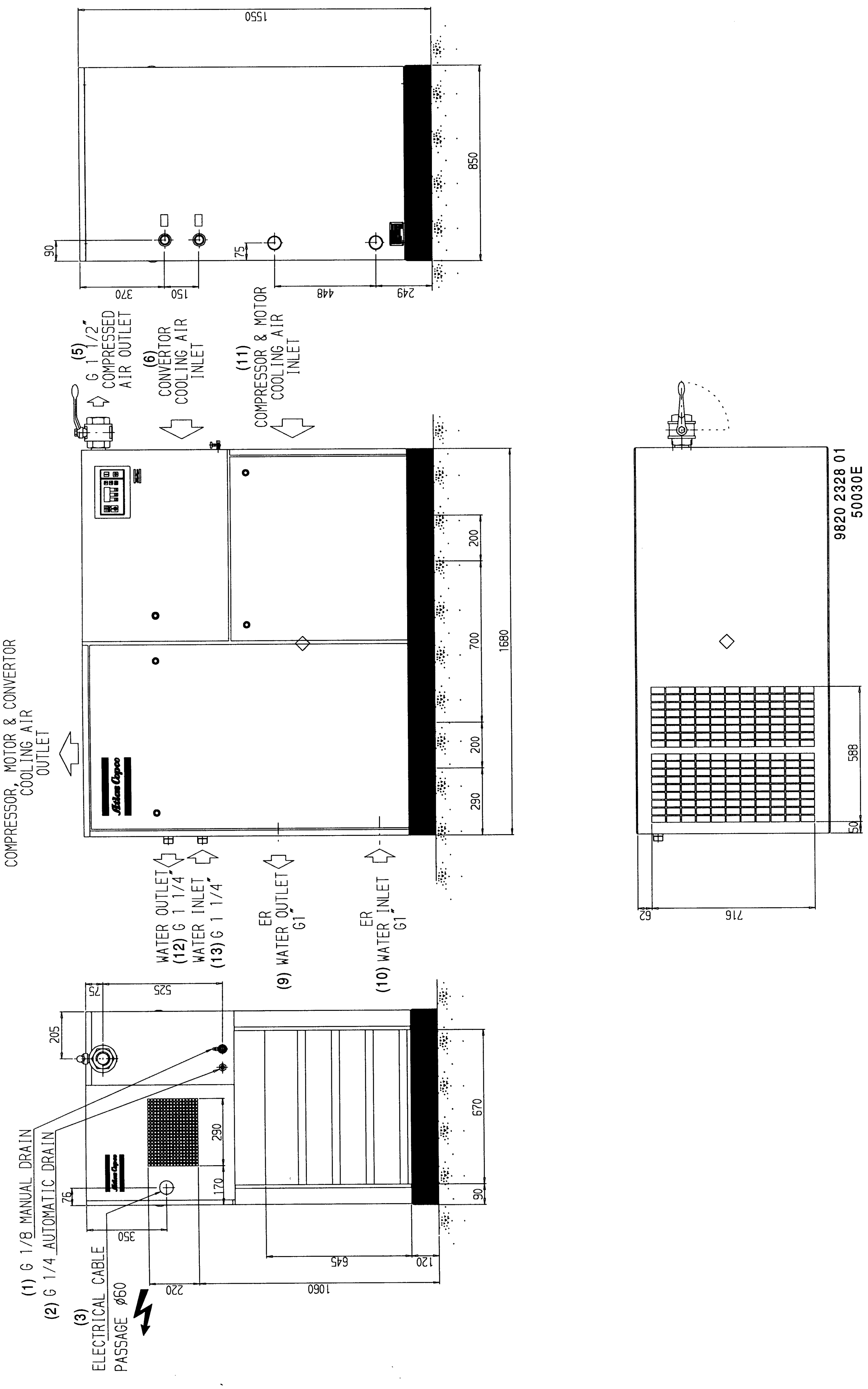


Fig. 10b. Dimension drawing of GA50 W VSD

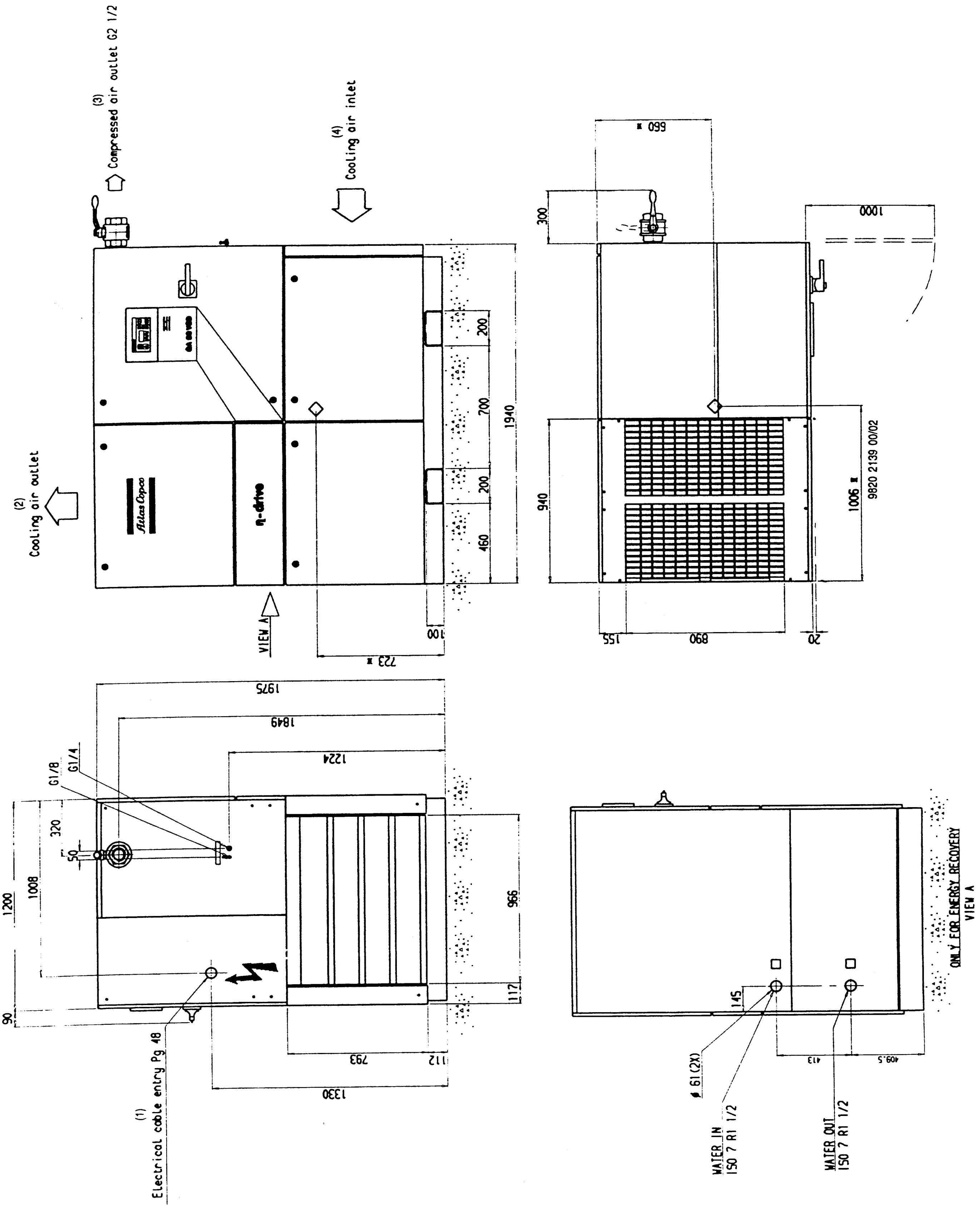


Fig. 10c. Dimension drawing of GA90 VSD

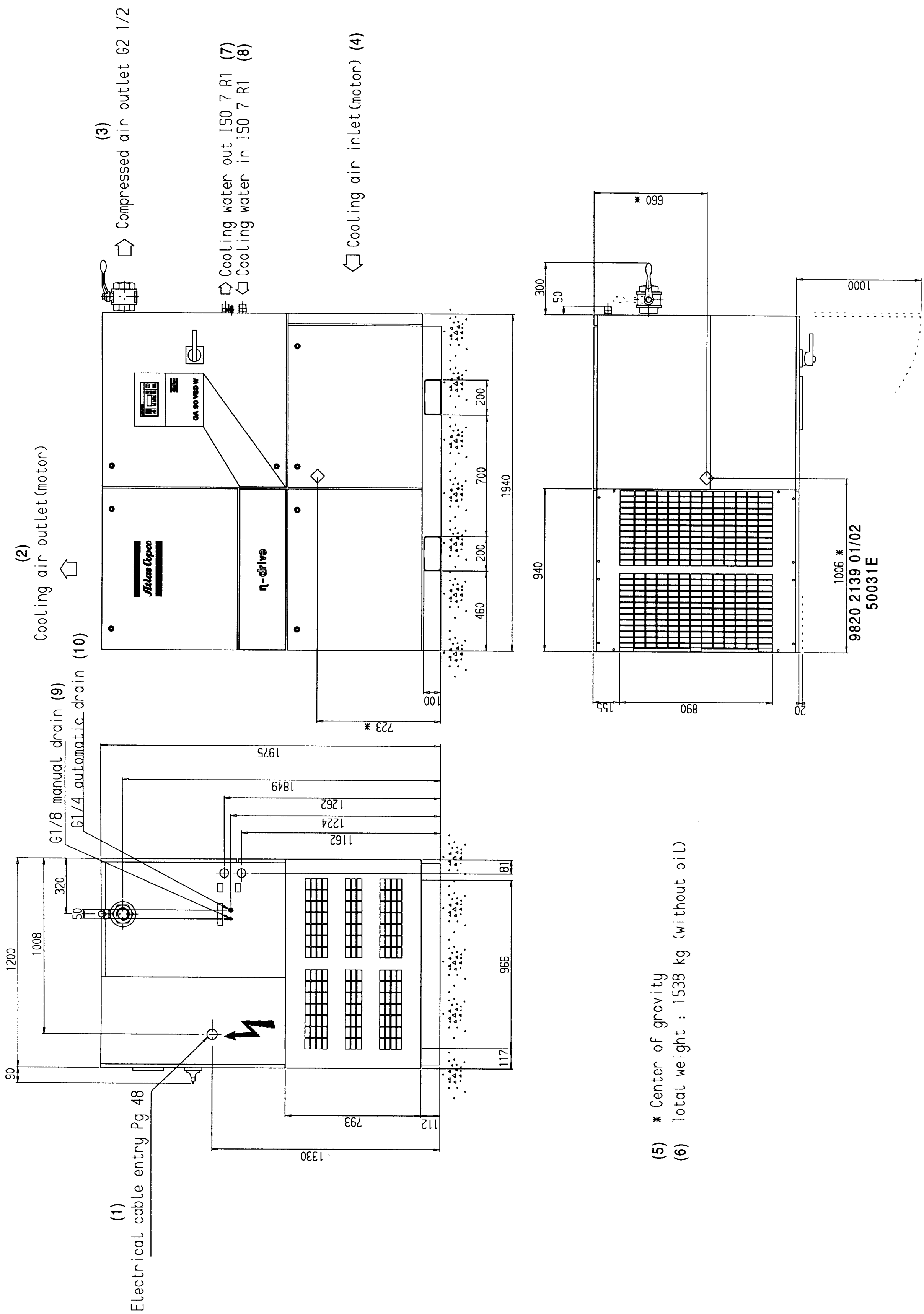


Fig. 10d. Dimension drawing of GA90 W VSD

2.2 Electric cable size

Attention

- Local regulations remain applicable if they are stricter than the values proposed below.
- The voltage drop shall not exceed 5% of the nominal voltage. It may be necessary to use cables with a larger size than those stated to comply with this requirement.
- Use the original cable entrance. In case additional holes must be provided in the cubicle, take care that nothing can drop into the start and speed regulation unit (U1).
- A ground fault circuit interrupter **must not be used** to connect GA VSD compressors.

Compressor type	GA50 (W) VSD	GA90 (W) VSD
Voltage (V)	380/460	400
Frequency (Hz)	50/60	50/60
Maximum line current (A)	160	200
Cable size (mm2/ AWG size)	50	95

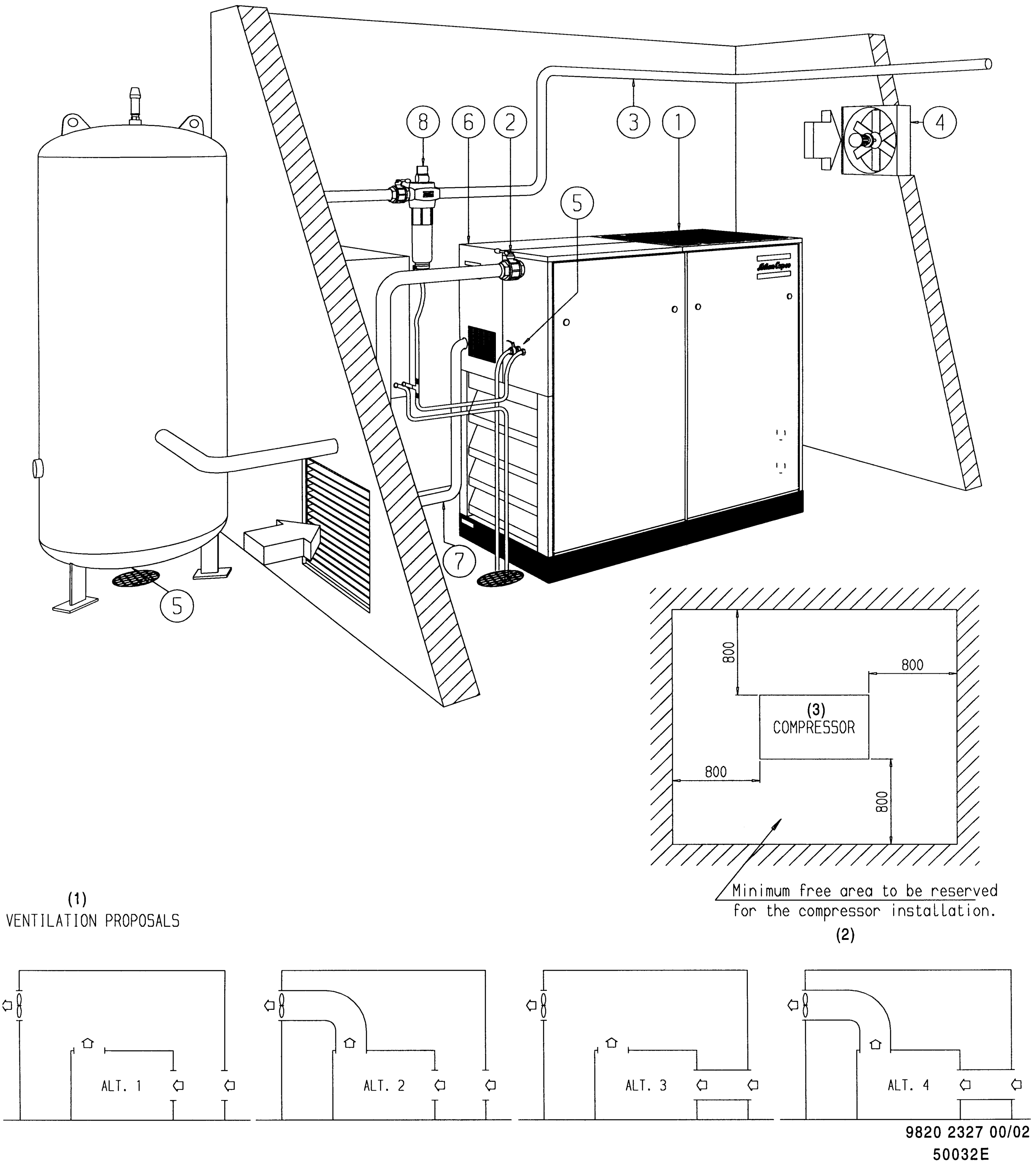


Fig. 11a. Installation proposal of GA50 VSD

2.3 Installation proposal (Figs. 11)

Ref.	Description/recommendation
1	Install the compressor on a level floor suitable for taking the weight of the compressor.
2	Compressed air outlet valve.
3	The maximum total pipe length (including interconnecting piping between compressor and receiver) can be calculated as follows:

$$L = \frac{\Delta P \times d^5 \times P}{450 \times Qc^{1.85}}$$

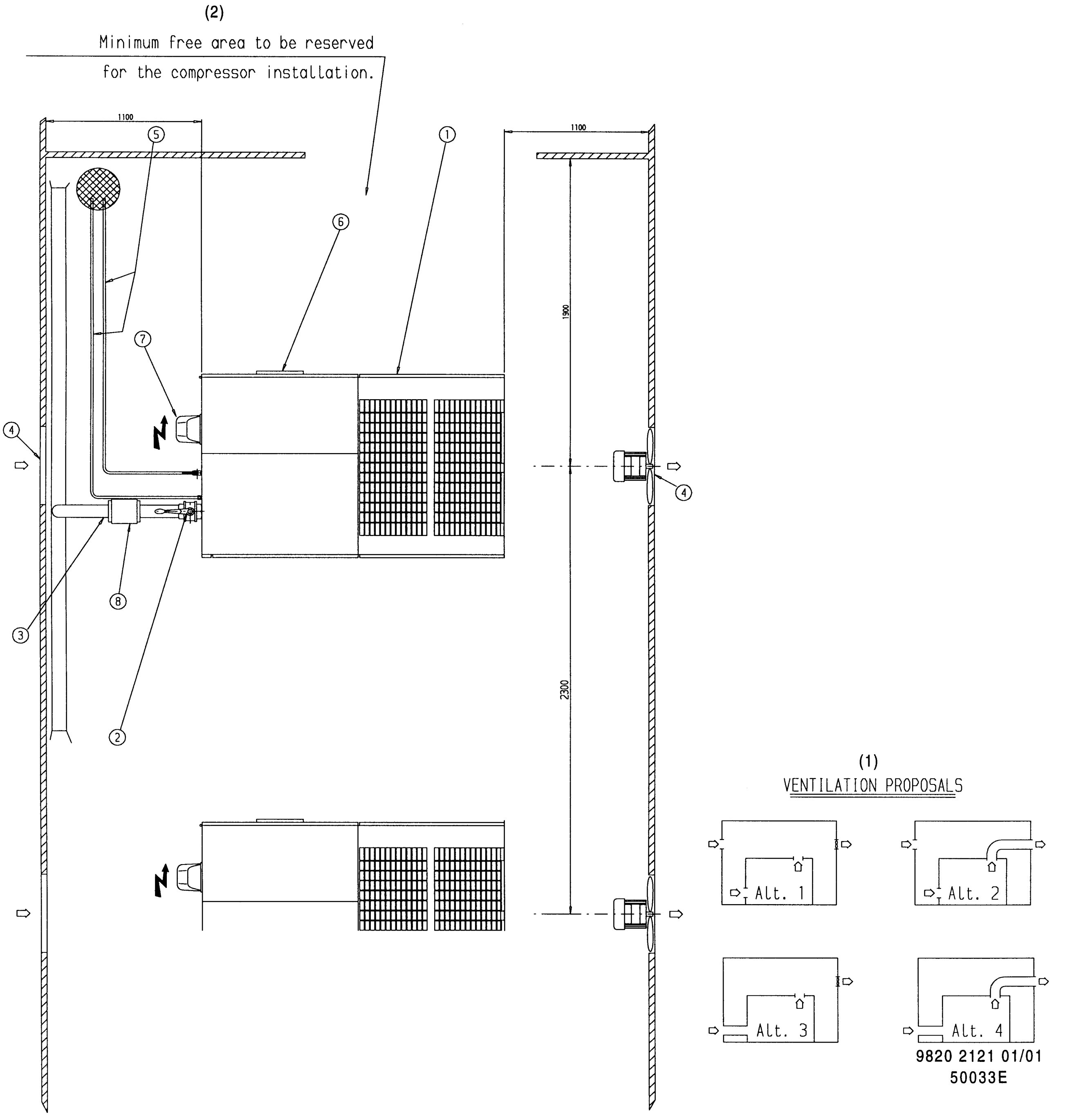


Fig. 11b. Installation proposal of GA90 VSD

Ref.	Description/recommendation
	L = pipe length in m ΔP = maximum allowable pressure drop (recommended 0.1 bar (1.45 psi)) d = inner diameter of pipe in mm P = compressor outlet pressure in bar absolute Qc = free air delivery of compressor in l/s
4	Ventilation: the inlet grids and ventilation fan should be installed in such a way that any recirculation of cooling air to the compressor is avoided. The air velocity to the grids must be limited to 5 m/s. The maximum allowable pressure drop over the cooling air ducts (air-cooled compressors) depends on the ambient temperature, consult Atlas Copco. The maximum air temperature at the compressor intake opening is 40°C (104°F) (minimum 0°C (32°F)). The required ventilation to limit the compressor room temperature can be calculated as follows: For alternatives 1 and 3: Qv = 0.92 N/ΔT Qv = required ventilation capacity in m^3/s **For air-cooled compressors:** N = shaft input of compressor in kW **For water-cooled compressors:** N = 10 kW ΔT = temperature increase in compressor room
5	The drain pipes to the drain collector must not dip into the water. For draining of pure condensate water, install an oil/water separator. Consult Atlas Copco.
6	Control module with monitoring panel.
7	Mains cables entry.
8	High-efficiency filter, type PD (optional). Filter traps solid particles down to 0.01 micron with max. oil carry-over of 0.01 mg/m^3. A PD filter must be installed downstream of a DD filter (optional). If oil vapour and odours are undesirable, a filter of the QD type (optional) should be installed downstream of the PD filter.

2.4 Electrical connections

General

1. Check the fuses and the setting of the circuit breaker(s). See section 7.3
2. Connect the power supply to terminals (L1, L2 and L3). Connect the earth conductor to connector (PE). Consult section 2.2.

2.5 Cooling water requirements

Following requirements are given as a general rule to prevent cooling water problems. If in any doubt, consult Atlas Copco.

Recommended maxima - mg/l	Recirculating system	Open system
Chloride (Cl^-)	< 600	< 150
Sulphate (SO_4^{--})	< 400	< 250
Total solids	< 3000	< 750
Suspended solids (as SiO_2)	< 10	< 10
Free chlorine (Cl_2)	< 4	< 2
Ammonia (NH_4^+)	< 0.5	< 0.5
Copper	< 0.5	< 0.5
Iron	< 0.2	< 0.2
Manganese	< 0.1	< 0.1
Oxygen	< 3	< 3
Carbonate hardness (as $CaCO_3$)	50-1000	50-500
Organics ($KMnO_4$ Consumption)	< 25	< 10

Remarks

- No algae nor oil.
- Chloride and sulphate are interactive. In open systems the sum of the squares of these values must not exceed 85,000. For recirculating systems with proper controls and treatment, the sum of the squares may be up to 520,000. Note that the sulphate value must include any sulphite present.

3 Operating instructions

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

Altitude operation
Consult Atlas Copco if operating above 1000 m.

Moving/lifting
The compressor can be moved by a lift truck using the slots in the frame. Before lifting, reinstall the transport securing bolts (see section 3.1). 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

Remarks
1. Read the "User manual for Elektronikon regulator" to familiarize yourself with all regulator functions.
2. Consult section 2 for the dimension drawings, electric cable size and installation proposal.

Start-up
1. The compressor element and motor are secured to the frame, immobilizing the vibration dampers (2-Figs. 9) during transport.
   On GA50 (W) VSD, remove the stud, support and nuts (4-Fig. 9a) on both sides of the motor support. Remove the transport supports from the compressor support.
   On GA90 (W) VSD, remove the stud and nuts (1-Figs. 9) of both compressor element supports, the start and speed control unit is secured to the rear panel of the regulator cabinet, immobilizing vibration dampers (1-Fig. 8b). Remove nuts (2-Fig. 8b).
2. Check that the electrical connections correspond to the local codes and that all wires are clamped tight to their terminals. The installation must be earthed and protected against short circuits by fuses of the inert type in all phases. An isolator switch must be installed near the compressor.
3. Check the voltage selecting wires at the primary side of transformer (T1-Figs. 8) and the setting of fan motor circuit breaker (Q15-Figs. 8). Check that the switch on the circuit breaker is in position "I".
   On GA50 (W) VSD, remove cover (3-Fig. 8a) and check the voltage selecting wires at the primary side of transformer (T2-Fig. 8a); correct as necessary.
4. Fit air outlet valve (AV-Fig. 1) to the air outlet pipe. Close the valve. Connect the air net to the valve.
5. Connect the manual and automatic condensate drain outlet to a drain collector as described in section 2.3.
6. Check the oil level. The pointer of the level gauge (Gl-Figs. 12) should register in the green or orange range. The bottle delivered loose with the compressor is filled with Atlas Copco Roto-injectfluid and can be used for topping up.
7. **For GA90 VSD,** a noise-damping kit is available as an option, including a cooling air outlet duct and baffle plates.
8. **On water-cooled compressors**: Close the cooling water drain valve. Open the cooling water inlet valve and the regulation valve.
9. A sticker dealing in short with the operating instructions and explaining the pictographs is delivered with the literature set. Affix the sticker next to the control panel. Make yourself familiar with the instructions and pictographs explained.

   Stick labels on an obvious place near the control panel, warning the operator that:
   - the compressor may automatically restart after voltage failure (see section 1.4.1)
   - the compressor is automatically started and stopped (see section 1.2)
   - the compressor may be remotely controlled (see section 3.2)

10. **On water-cooled compressors**: Check the cooling water quality (see section 2.5). A drain valve, a regulation valve and a shut-off valve should be installed by the customer in the cooling water piping.
11. **ON GA50 (W) VSD,** switch on the voltage. Open the air outlet valve and start the compressor. Check the rotation direction of the fan motor, the correct rotation direction is indicated by arrow (3-Fig. 3a). If the rotation direction is wrong, reverse two incoming connections on the terminals of circuit breaker (Q15-Fig. 8a). The compressor motor will always rotate in the correct direction.
    On GA90 (W) VSD, switch on the voltage. Open the air outlet valve and start the compressor. The start and speed regulation unit prevents the compressor motor from rotating in the wrong direction. In case of wrong direction of rotation following error code will appear on the display: **Convertor failure error 56 0 1**. If the compressor motor should not start and the fan motor rotates in the wrong direction, (the correct rotation direction is indicated on the fan housing) switch off the voltage and reverse two incoming electric lines. If the compressor motor starts and the fan motor rotates in the wrong direction, reverse two incoming connections on the terminals of circuit breaker (Q15-Fig. 8b). Reset the regulator as described in the "User manual for Elektronikon regulator" section "Shut-down reset".
12. Check the programmed settings. **1)**
13. Start and run the compressor for a few minutes. Check that the compressor operates normally.

1) Consult the "User manual for Elektronikon regulator", sections regarding the submenus "Measured data", "Service", "Modify settings", "Timer" and "Programmable settings".

3.2 Before starting

If the compressor has not run for the past 6 months:

- **Special precautions must be taken in order not to damage the convertor**. Consult Atlas Copco.
- **Improve the lubrication of the compressor element** at starting: loosen hose clip (3-Figs. 9b and 13) and lift the inlet hose. Open the check valve manually and **pour 3/4 l of oil into the compressor element**. Reinstall the inlet hose.

Check the oil level (Gl-Figs. 12). The pointer should be in the upper field of the green range or in the HIGH range. If the pointer registers in the LOW range, depressurize the oil system by **switching off the isolator switch, close the air outlet valve and open manual drain valve (Dm-Fig. 5). Wait until the compressor has depressurized. Unscrew oil filler plug (FC-Figs. 12) only one turn to permit any pressure in the system to escape**. Remove the filler cap and add oil until the level reaches the filler neck (adapter part included). Tighten the plug.

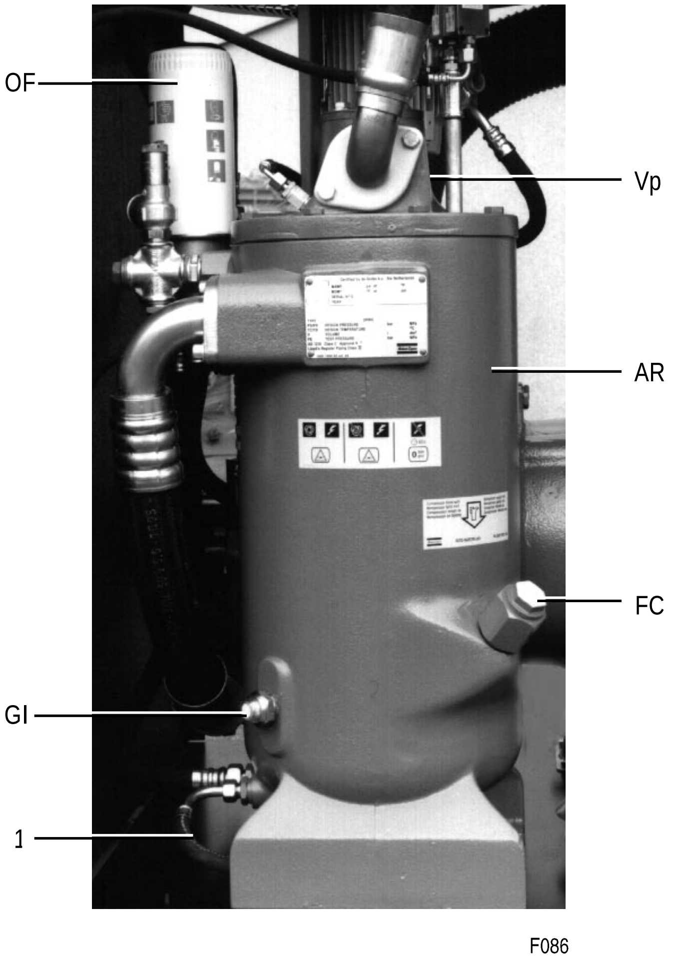


Fig. 12a. Oil system components of GA50 VSD

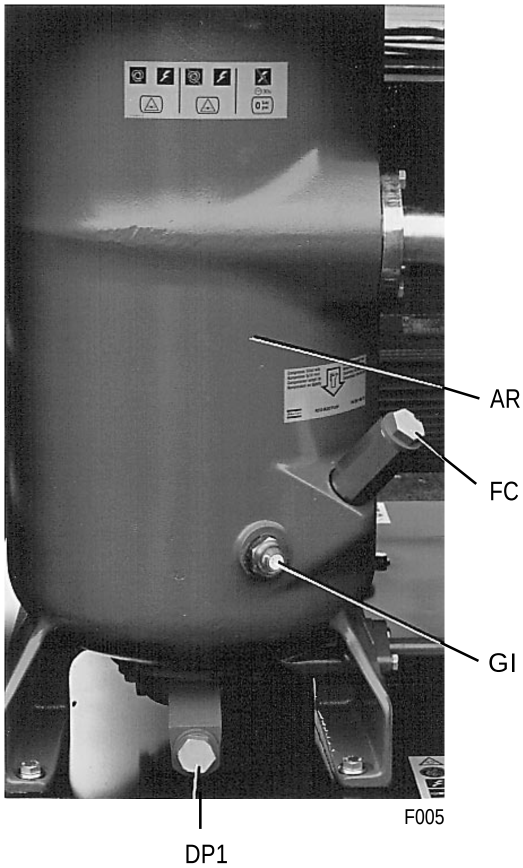


Fig. 12b. Oil system components of GA90 (W) VSD

AR.	Air receiver/oil separator	OF.	Oil filter
DP1.	Oil drain plug, air receiver	Vp.	Minimum pressure valve
FC.	Oil filler plug	1.	Flexible, oil drain
Gl.	Oil level gauge		

Figs. 12. Oil system components

Remark
It is possible to remotely control following functions:

Function	Action (see strip 1X1-Figs. 6)
Remote start/ programmed stop	Connect a remote start button (pulse command of minimum 500 ms) between terminals 30 and 31. Connect a remote stop button between terminals 30 and 32. Open switch CMS1 and close switch CMS2. The start and stop buttons (8 and 9-Fig. 7a) are made inactive.

Warning *After connecting as described above, the compressor is remotely controlled.*

3.3 Starting (Fig. 7a)

1. Switch on the voltage. Check that voltage on LED (2) lights up. The message **compressor off** appears.
2. Open air outlet valve (AV-Fig. 1).
3. Close condensate drain valve (Dm-Fig. 5).
4. **On water-cooled compressors**:
   - Check that the cooling water drain valve is closed and open the cooling water inlet valve.
   - Open the water flow regulation valve; this step can be overlooked if, after previous operation, the setting of this valve has not been disturbed.
5. Press start button **I** (8). The compressor starts running and automatic operation LED (1) lights up.
6. **On water-cooled compressors**: regulate the cooling water flow with the compressor running in normal operating conditions. Adjust the water flow to obtain the most suitable air temperature at the element outlet, i.e. between 2°C and 5°C above the relevant temperature in Fig. 15. Consult the example below Fig. 15.

   For optimum operation, the cooling water outlet temperature must never exceed the value specified in section 7.4.

3.4 During operation (Fig. 7a)

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

1. Check the oil level **during operation**: the pointer of the level indicator (Gl-Figs. 12) must register in the green range; if not, press button O (9), **switch off the isolator switch (S0-Figs. 1 and 3a), close air outlet valve (AV-Figs. 1 and 3b), open manual drain valve (Dm-Fig. 5) and wait until the compressor has depressurized. Unscrew oil filler plug (FC-Figs. 12) only one turn to permit any pressure in the system to escape**. Remove the filler plug and add oil until the level reaches the filler neck (adapter part included). Tighten the plug.
2. If automatic operation LED (1) is alight, the regulator is automatically controlling the compressor, i.e. matching the compressor speed to the net pressure, starting and stopping the compressor whenever necessary.

Warning *When the motors are stopped and LED (1) is alight, the motors may start automatically.*

3.4.1 Checking the display 1) (Fig. 7a)

1. Regularly check the display for readings and messages. Normally the main display (Fig. 7b) is shown, indicating the compressor outlet pressure, the motor speed and the abbreviations of the functions of the keys below the display. See section 1.4.
2. Always check the display (4) and remedy the trouble if alarm LED (3) is alight or blinks. See section 1.4.2.1.
3. The display (4) will show a service message if one of the monitored components is to be serviced; reset the relevant timer after servicing.
   Notes:
   - Whenever a shut-down, shut-down warning, service request, sensor error or fan motor overload message is displayed, the free spaces on the display between the function keys (5) are filled with blinking indicators (**).
   - When more than one message needs to be displayed (e.g. both warning and service), the messages are continuously displayed for 3 seconds each.

4. Regularly press the function key (5) below **More 2)** to call up information about the actual compressor condition:
   - the status of controlling the compressor (local or remote)
   - the status of the compressor start/stop timer (on or off) **3)**
   - the outlet pressure
   - the compressor element outlet temperature
   - the status of the fan motor overload protection (normal or not)
   - the total running hours
   - the cooling water outlet temperature

1) Consult the "User manual for Elektronikon regulator", sections "Status data submenu" and "Service submenu".
2) If the More function is not indicated on the bottom line of display (4-Fig. 7a), press function key (5) below **Menu** until function **Main** appears above key (F1), then press the function key below **Main.**
3) The compressor is automatically started and stopped if these start/stop commands are programmed and activated; consult the "User manual for Elektronikon regulator", section "Timer submenu".

3.5 Stopping (Fig. 7a)

1. Press stop button O (9). LED (1) goes out. The compressor stops and the message **Programmed stop** appears on the screen. Five seconds later, the message changes from **Programmed stop** to **Compressor stopped**
2. **To stop the compressor in case of emergency**, switch off isolator switch (S0-Figs. 1 and 3a).
3. Close air outlet valve (AV-Fig. 1) and switch off the voltage.
4. Open condensate drain valve (Dm-Fig. 5).
5. **On water-cooled compressors**, close the cooling water inlet valve (customer's installation). **If freezing temperatures can be expected, drain the cooling system completely.**

3.6 Taking out of operation

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

1. Stop the compressor and close the air outlet valve.
2. Switch off the voltage and disconnect the compressor from the mains.
3. Wait until the compressor has depressurized. Unscrew plug (FC-Figs. 12) only one turn to permit any pressure in the system to escape. Open drain valve (Dm-Fig. 5).
4. Shut off and depressurize the part of the air net which is connected to the outlet valve. Disconnect the compressor air outlet pipe from the air net.
5. Isolate the compressor water system (only on water-cooled compressors) from the cooling water net.
6. Drain the oil, water and condensate circuits.
7. Disconnect the compressor condensate piping from the condensate drain net.

4 Maintenance

Attention: Before starting any maintenance, press stop button O (9-Fig. 7a), switch off the isolator switch (S0-Figs. 1 and 3a), close air outlet valve (AV-Fig. 1), open manual drain (Dm-Fig. 5) and switch off the voltage.

The air outlet valve can be locked as follows:
- Close the valve.
- Remove the bolt fixing the handle to the valve.
- Lift the handle and turn it until the slot fits over the blocking edge.
- Fix the handle to the valve using the special bolt and wrench delivered loose with the compressor.

Mechanical maintenance
Open drain valve (Dm-Fig. 5) and wait for at least 2 minutes (time needed for the compressor to depressurize) **before starting maintenance**.

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

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

4.1 Preventive maintenance schedule for the compressor 1)

Attention:
For overhauling or carrying out preventive maintenance, service kits are available. See section 4.9.
Atlas Copco also offers several types of Service contracts, relieving you of all preventive maintenance work. For more details, consult your nearest Atlas Copco representative.

The schedule comprises a summary of the maintenance instructions. Read the respective section before taking maintenance measures.

When servicing, replace all disengaged packings, e.g. gaskets, O-rings, washers.

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

Period 2)	Running hours 2)	See section	See note	Service Kit	Operation
Daily	**--**	3.2/3.4	--		Check oil level
"	**8**	3.4/7.1	--		Check readings on display
"	**8**	--	10		Check that condensate is discharged during operation (Da)
"	**--**	3.5	10		Drain condensate (Dm)
Monthly	**--**	--	--		Clean compressor
3-monthly	**--**	5.3	--		Operate safety valve (SV)
"	**--**	--	8		Carry out a LED/display test
"	**--**	--	--		Check for oil leaks
"	**500**	--	1		Clean cooling air openings of electric cabinet
"	**500**	5.2	1		Inspect coolers (Ca/Co); clean if necessary
"	**500**	--	1/7		Remove air filter element (AF), inspect
"	**500**	--	4		Check pressure difference over Atlas Copco prefilters or afterfilters (optional)
Yearly	**--**	5.3	--		Test safety valve (SV)
"	**--**	--	--		Have operation of electrical components tested
"	**--**	--	9		Test temperature shut-down protection
"	**1,000**	4.4/4.5/4.6	2/6		If mineral oil is used, change oil and oil filter (OF)
"	**1,000**	--	--		If mineral oil is used, inspect restrictor (Rf2) for cleanness
"	**2,000**	5.1	6	X	Replace air filter element (AF)
"	**2,000**	--	--	X	Remove, dismantle and clean float valve of moisture trap (MT)
"	**2,000**	--	--		If Roto-injectfluid is used, inspect restrictor (Rf2) for cleanness
"	**2,000**	4.6	2/6	X	If Roto-injectfluid is used, replace oil filters (OF)
"	**2,000 or 4,000**	4.4/4.5	3/5/6	X	If Roto-injectfluid is used, change oil
--	**4,000**	4.2	--	X	**On GA50 VSD**, regrease compressor motor bearings (M1)
--	**6,000**	4.7	6	X	Replace oil separator (OS)
3-yearly	**1,800,000 m³**	4.2	--	X	**On GA90 (W) VSD 10 bar**, regrease compressor motor bearings (M1)
"	**1,300,000 m³**	4.2	--	X	**On GA90 (W) VSD 13 bar**, regrease compressor motor bearings (M1)

1) **Use only authorized parts. Any damage or malfunction caused by the use of unauthorized parts is not covered by Warranty or Product Liability.**
2) **Whichever interval comes first**. The local Sales Company may overrule the maintenance schedule, especially the service intervals, depending on the environmental and working conditions of the compressor.

Remark: For overhauling valves or carrying out preventive maintenance, service kits are available. Consult the Parts list for the contents of the kits.

Notes

1. More frequently when operating in a dusty atmosphere.
2. Use only (an) oil filter(s) as specified in the Parts list. The part number is marked on the filter.
3. Special Atlas Copco oil for screw compressors keeping the compressor in excellent condition.
4. If the pressure drop reaches 0.5 bar, it is strongly recommended to change the filter element as its efficiency is decreasing. The filter element must be changed when the pressure drop reaches 1 bar.
5. It is strongly recommended to use Atlas Copco Roto-injectfluid. The change interval for this oil is 4,000 running hours or yearly if operating continuously at a compressor element outlet temperature below 100°C and 2,000 running hours or yearly if operating continuously close to or above 100°C.
6. Consult the "User manual for Elektronikon regulator" for resetting the service timer.
7. Replace the filter if damaged.
8. Consult the "User manual for Elektronikon regulator", section "Display test".
9. Consult the "User manual for Elektronikon regulator", section "Modify settings submenu" before modifying the temperature protection settings.
   Decrease the shut-down warning level and shut-down level for the compressor element outlet temperature to the minimum settings. Run the compressor: when reaching the setting, the compressor must shut down. Afterwards, reset the warning and shut-down levels to their original values.
10. Atlas Copco has oil separators to separate the major part of the oil from the condensate to ensure that the separated water meets the requirements of the environmental codes.

4.2 Compressor motor (M1-Figs. 3)

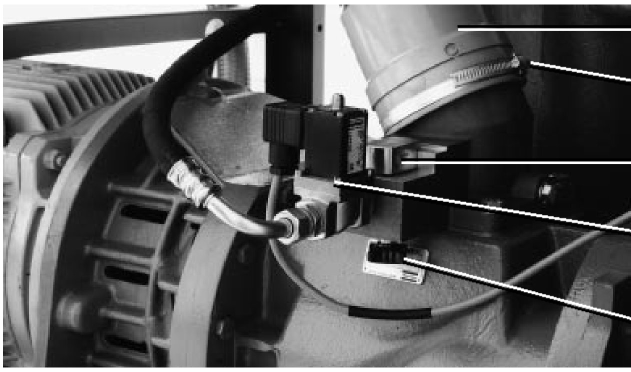
Tubes with the correct type of grease can be ordered from Atlas Copco (see section 4.9).

4.2.1 GA50 VSD

The bearings must be regreased with KLÜBER - ASONIC HQ 72 - 102. Quantity: 5 g (0.18 oz) per bearing. After regreasing the bearings, loosen wing nut (1-Fig. 13), lift nozzle (2-Fig. 13) and turn it 90° clockwise (automatic operation pictograph covered and grease pump pictograph visible); tighten the wing nut. Run the **Regreasing** program from the **Test** submenu on the regulator. During this program the compressor will run at a speed of 1200 rpm and the compressed air is blown off via solenoid valve (Y1-Fig. 13). When the regreasing program has finished, loosen the wing nut, lift the nozzle and turn it back into its original position (grease pump pictograph covered and automatic operation pictograph visible). The compressor can be put into operation again by pressing the start button. Reset the regulator as described in the "User manual for Elektronikon regulator" section "Service reset".
If the compressor should shut-down on "Over pressure" after regreasing the motor bearings, check that the nozzle is in the correct position.

4.2.2 GA90 (W) VSD

The bearings must be regreased with KLÜBER - ASONIC HQ 72 - 102. Quantity: 10 g (0.35 oz) per bearing. The regreasing interval depends on the operating conditions of the compressor. The parameter to determine the regreasing interval is indicated by the regulator. Every time the bearings have been regreased, the **Regreasing** program must be run from the **Test** submenu on the regulator. During this program the compressor will run at a speed of 1200 rpm and the compressed air is blown off via solenoid valve (Y1-Figs. 2). When the regreasing program has finished, the compressor can be put into operation again by pressing the start button. Reset the regulator as described in the "User manual for Elektronikon regulator" section "Service reset".



Y1. Solenoid valve
1. Wing nut
2. Blow-off nozzle
3. Hose clip, air inlet hose
4. Air inlet hose

Fig. 13. Blow-off nozzle of GA50 VSD

4.3 Oil and oil filter change interval

Consult section 4.1 for the change intervals and section 4.4 for the oil specifications.

4.4 Oil specifications

4.4.1 Atlas Copco Roto-injectfluid

It is strongly recommended to use Atlas Copco Roto-injectfluid. This is special oil for screw compressors which keeps the compressor in excellent condition.

Atlas Copco Roto-injectfluid can be ordered in following quantities:

Quantity	Ordering number
15-litre can	2901 0086 01
25-litre can	2901 0001 01
209-litre drum	2901 0045 01

The oil change interval depends on the working temperature. See note 5 below the maintenance schedule.

4.4.2 Mineral oil

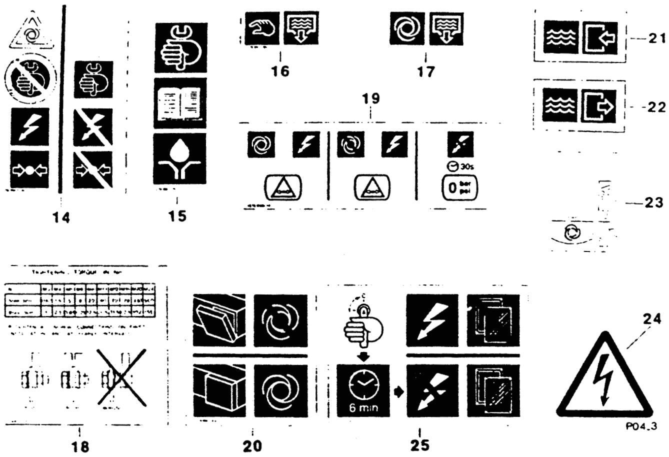
Although Roto-injectfluid is recommended, a high-quality mineral oil with oxidation inhibitors and anti-foam and anti-wear properties can also be used after taking some precautions. The oil system should first be drained and flushed. The viscosity grade must correspond to the ambient temperature and ISO 3448, as follows:

Ambient temperature	Viscosity grade	Viscosity index
Consistently above 25°C (77°F) .	ISO VG 68	Minimum 95
Between 25°C (77°F) and 0°C (32°F)	ISO VG 32 or 46	Minimum 95

Never mix oils of different brands or types. Use only non-toxic oils where there is a risk of inhaling delivered air.

4.5 Oil change (Figs. 12)

1. Run the compressor until warm. **Stop the compressor, switch off isolator switch (S0-Figs. 1 and 3a), close air outlet valve (AV-Fig. 1), open manual drain valve (Dm-Fig. 5) and wait until the compressor has depressurized.** Unscrew oil filler plug (FC) only one turn to permit any pressure in the system to escape.

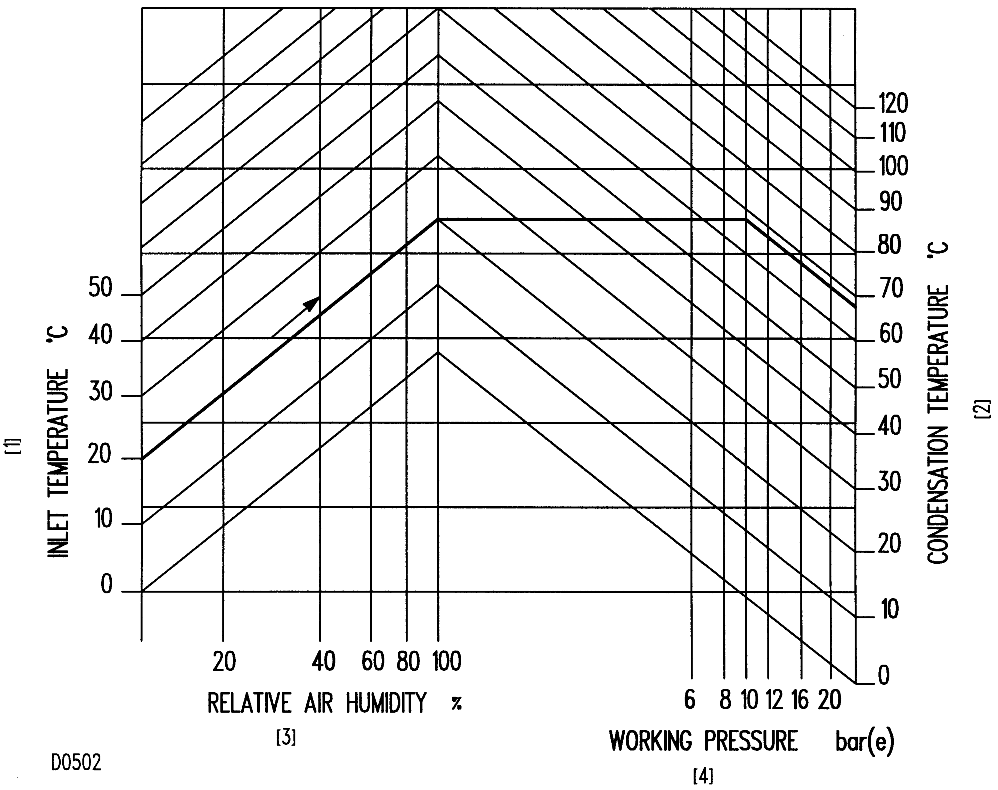


14. Switch off the voltage and depressurize the compressor before starting maintenance or repairs
15. Consult instruction book before greasing
16. Manual condensate drain
17. Automatic condensate drain
18. Torques for steel (Fe) or brass (CuZn) bolts
19. Compressor remains pressurized for 30 seconds after switching off the voltage
20. Keep the doors closed during operation
21. Cooling water inlet
22. Cooling water outlet
23. Nozzle position, regreasing or automatic operation
24. Warning, voltage
25. Switch off the voltage and wait for at least 6 minutes before removing the screen

Fig. 14. Pictographs

2. Remove vent plug (VP-Figs. 3a and 4). Drain the oil by removing drain plugs (DP1, DP2 and DP3-Figs. 2). Fit and tighten all plugs after draining. Collect the oil in a collector and deliver it to the oil collection service.
3. Fill air receiver (AR) with oil until the level reaches the filler neck. Take care that no dirt drops into the system. Reinstall and tighten filler plug (FC).
4. Run the compressor for a few minutes. **Stop the compressor and switch off the isolator switch to depressurize the compressor**. Wait a few minutes to allow the oil to settle. Unscrew oil filler plug (FC) only one turn to permit any pressure in the system to escape. Fill the air receiver with oil until the level reaches the filler neck (adapter part included). Tighten filler plug (FC).
5. Reset the oil service warning. **1)**

1) Consult the "User manual for Elektronikon regulator", section "Service submenu".



Example
If operating at a pressure of 10 bar(e) in an ambient temperature of 20°C and at a relative air humidity of 100 %, the minimum temperature to prevent condensate from forming is 68°C. Regulate the cooling water flow during loaded operation to obtain a temperature between 70°C and approx. 75°C at the outlet of the compressor element.

Fig. 15. Minimum allowable air temperature at outlet of compressor element (water-cooled compressors only)

4.6 Oil filter change (Figs. 12)

1. Close the air outlet valve (AV-Fig. 1) and let the compressor run at minimum speed for 3 minutes. **Stop the compressor, switch off isolator switch (S0-Figs. 1 and 3a) and open manual drain valve (Dm-Fig. 5). Wait until the compressor has depressurized. Unscrew oil filler plug (FC) only one turn to permit any pressure in the system to escape.**
2. Remove vent plug (VP-Figs. 3a and 4), wait 5 minutes, remove the drain plug in the oil filter housing and catch the oil in a receptacle.
3. Remove oil filter(s) (OF-Figs. 9b and 12a).
4. Clean the filter seat(s) on the manifold. Oil the gaskets of the new elements. Screw the elements into place and tighten them firmly by hand.
5. Fill the receiver (AR) with oil until the level reaches the filler neck (adapter part included).
6. Tighten plug (FC). Tighten the plug in the oil filter housing and vent plug (VP-Figs. 3a and 4).
7. Reset the oil filter service warning. **1)**

4.7 Oil separator change

1. **Stop the compressor, switch off the isolator switch, close the air outlet valve (AV-Fig. 1) and open manual drain valve (Dm-Fig. 5). Wait until the compressor has depressurized. Unscrew oil filler plug (FC-Figs. 12) only one turn to permit any pressure in the system to escape.**
2. Disconnect the flexibles from the minimum pressure valve (Vp-Fig. 12a) and air receiver cover.

1) Consult the "User manual for Elektronikon regulator", section "Service submenu".

3. Remove the air receiver cover with scavenging line. Take care not to distort the scavenging line.
4. Fit the new separator and cover using new O-rings which are included in the oil separator kit (see section 4.9).
5. Reconnect the flexibles.
6. Tighten filler plug (FC).
7. Reset the oil separator service warning. **1)**

4.8 Storage after installation

Run the compressor twice a week until warm.

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

4.9 Service kits

Service kits are available offering you the benefits of genuine Atlas Copco parts while keeping the maintenance budget low. The kits comprise all parts needed for servicing.

Compressor type Service kit for:	**GA50 (W) VSD Ordering number**	**GA90 (W) VSD Ordering number**
Oil filters and air filter:	2901 0326 00	2901 0050 00
Oil separator:	2901 0213 00	2901 0070 00
Motor regreasing:	2901 0338 00	2901 0338 00

5 Adjustments and servicing procedures

5.1 Air filter

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

5.1.2.1 GA50 (W) VSD

1. Release the snap clips and remove the dust trap. Remove the filter element and clean the filter chamber.
2. Install the new element and the dust trap.
3. Reset the air filter service indicator. Reset the air filter service warning. **1)**

5.1.2.2 GA90 (W) VSD (AF-Fig. 4)

1. Unscrew the wing nut of the filter cover. Remove the filter element and clean the filter chamber.
2. Install the new element and the filter cover.
3. Reset the air filter service indicator. Reset the air filter service warning. **1)**

5.2 Coolers

Keep the coolers clean to maintain the cooling efficiency.

Air-cooled compressors
To facilitate external cleaning of the coolers, side panels (1-Figs. 3 and 4) can be removed.

Remove any dirt from the coolers with a fibre brush. Never use a wire brush or metal objects. Then clean by air jet in reverse direction of normal flow.

Refit the side panels.

Water-cooled compressors
Consult Atlas Copco.

5.3 Safety valve

Operating
Operate the safety valve by unscrewing the cap one or two turns and retightening it.

Testing
The valve can be tested on a separate compressed air line. If the valve does not open at the pressure specified in section 7.2, consult Atlas Copco. **No adjustments are allowed.**

1) Consult the "User manual for Elektronikon regulator", section "Service submenu".

6 Problem solving

- Before starting repairs, press stop button O (9-Fig. 7a), wait until the compressor has stopped, switch off isolator switch (S0-Figs. 1 and 3a) and switch off the voltage. Close air outlet valve (AV-Fig. 1), the air outlet valve can be locked as described in section 4. **Open manual drain valve (Dm-Fig. 5) and wait for at least 2 minutes** (time needed for the compressor to depressurize) **before starting any mechanical repairs. Wait at least 6 minutes before starting any electrical repairs as hazardous high voltage remains on the condensers of the start and speed regulation unit for 6 minutes after switching off the voltage.** Furthermore, apply all relevant safety precautions, including those mentioned in this book.

- The chart helps to solve mechanical problems. An electrical fault must be traced by an electrician. Check that the wires are not damaged and that they are clamped tight to their terminals.

- Consult the "User manual for Elektronikon regulator" if a service message or fault message appears on the display (4-Fig. 7a) or when alarm LED (3-Fig. 7a) is alight or blinks.

Mechanical faults and suggested remedies (Figs. 2)
Explanation of the table below:
- Conditions of the compressor, always preceded by a number, are printed in bold.
- Each possible fault is followed by its relevant suggested remedy and both are preceded by the same letter.

1. Condensate is not discharged from moisture trap during operation
   a. Discharge flexible clogged
   a. Check and correct as necessary
   b. Float valve malfunctioning
   b. Remove float valve assembly, clean and check

2. Compressor air output or pressure below normal
   a. Air consumption exceeds air output of compressor
   a. Check equipment connected
   b. Choked air inlet filter element (AF)
   b. Replace filter element
   c. Solenoid valve (Y1) malfunctioning
   c. Remove and check valve, replace if necessary
   d. Oil separator element (OS) clogged
   d. Replace element
   e. Air leakage
   e. Check and correct as necessary
   f. Safety valve (SV) leaking
   f. Remove and check. Replace if not airtight after reinstalling
   g. Compressor element (E) out of order
   g. Consult Atlas Copco
   Only on GA50 VSD:
   h. Nozzle (Rf1) in wrong position
   h. Correct the position of the restrictor, consult section 4.2.1

3. Safety valve (SV) blows
   a. Minimum pressure valve (Vp) malfunctioning
   a. Remove and check. Replace defective parts
   b. Oil separator element (OS) clogged
   b. Replace element
   c. Safety valve (SV) out of order
   c. Remove and check. Replace if not airtight after reinstalling

4. Element outlet 1) or air outlet temperature above normal
   a. **On air-cooled compressors:** insufficient cooling air or cooling air temperature too high
   a. Check for cooling air restriction or improve ventilation of compressor room. Avoid recirculation of cooling air. If installed, check capacity of compressor room fan
   b. **On water-cooled compressors**: insufficient cooling water flow or cooling water temperature too high
   b. Decrease temperature, if possible, or increase water flow
   c. Oil level too low
   c. Check and correct as necessary
   d. Oil cooler (Co) clogged
   d. Clean cooler
   e. By-pass valve (BV) malfunctioning
   e. Remove and test valve
   f. Air cooler (Ca) clogged
   f. Clean cooler
   g. **On water-cooled compressors**: restriction of cooling water system due to dirt or formation of scale
   g. Consult Atlas Copco
   h. Compressor element (E) out of order
   h. Consult Atlas Copco

5. Motor temperature above normal
   a. Insufficient cooling air or cooling air temperature too high
   a. Check for cooling air restriction or improve ventilation of compressor room. Avoid recirculation of cooling air. If installed, check capacity of compressor room fan
   b. Insufficient sealing of door panels
   b. Check that all doors are closed, check seals of door panels.

1) A warning message will appear on display (4-Fig. 7a).

7 Principal data

7.1 Readings on display (4-Fig. 7a) 1)

Ref.:	**Air outlet pressure**
Reading:	Depends on the setpoint (desired net pressure)
Shown:	On main display (Fig. 7b), when: - switching on voltage - selecting main display with function keys (5) below **Menu** and **Main** - keys of module are not used for four minutes
Sensor:	PT20-Figs. 2

Ref.:	**Compressor element outlet temperature**
Reading:	Approx. 60°C/108°F above cooling air temperature (cooling water temperature on water-cooled compressors)
Shown:	When using the function key (5) below **More** on the main display (Fig. 7b)
Sensor:	TT11-Fig. 9b

Ref.:	**Cooling water outlet temperature** (water cooled compressors)
Reading:	Below 50°C
Shown:	When using the function key (5) below **More** on the main display (Fig. 7b)
Sensor:	TT51-Figs. 6

7.2 Settings of safety valve

GA50 (W) VSD	14.5 bar(e)
GA90 (W) VSD	14.5 bar(e)

7.3 Settings of circuit breakers

7.3.1 GA50 (W) VSD

Circuit breaker	Supply voltage	Fre-quency	Maximum setting
Fan motor (Q15-Fig. 8a)	400 V	50 Hz	4.2 A

7.3.2 GA90 (W) VSD

Circuit breaker	Supply voltage	Fre-quency	Maximum setting
Fan motor (Q15-Fig. 8b)			
- **Air-cooled** compressors	400 V	50 Hz	10 A
- **Water-cooled** compressors	400 V	50 Hz	1.2 A
Invertor (Q16-Fig. 8b)	400 V	50 Hz	Minimum setting of circuit breaker

7.4 Compressor specifications

7.4.1 Reference conditions

Air inlet pressure (absolute)	bar	1
Air inlet temperature	°C	20
Relative humidity	%	0
For water-cooled compressors also:		
Cooling water inlet temperature	°C	20

1) See "User manual for Elektronikon regulator for GA90 VSD compressors", sections "Modify settings submenu" and "More function"

7.4.2 Specific data of GA50 (W)VSD 1)

Working pressure	bar(e)	7	9.5	12.5
Frequency	Hz	50/60	50/60	50/60
Number of compression stages		1	1	1
Maximum speed	rpm	4800	4260	3615
Minimum working pressure	bar(e)	4	4	4
Maximum air inlet temperature	°C	40	40	40
Minimum air inlet temperature	°C	0	0	0
Maximum cooling water outlet temperature **6)**	°C	50	50	50
Maximum cooling water inlet pressure **6)**	bar(e)	5	5	5
Recommended cooling water flow **6)**				
- cooling water inlet temperature below 25°C **7)**	l/min	50	50	50
- cooling water inlet temperature between 25°C and 40°C **8)**	l/min	75	75	75
Temperature of air leaving air outlet valve, approx.	°C	34	33	32
Electric power input	kW	63.2	63.0	60.0
Oil capacity, approx.				
- air cooled compressors	l	18	18	18
- water cooled compressors	l	17	17	17
Sound pressure level **3) 4)**	dB(A)	75	75	75

7.4.3 Specific data of GA90 (W) VSD 1)

Working pressure	bar(e)	7	9.5	12.5
Frequency	Hz	50/60	50/60	50/60
Number of compression stages		1	1	1
Maximum speed	rpm	4820	4230	3600
Minimum working pressure	bar(e)	4	4	4
Maximum air inlet temperature	°C	40	40	40
Minimum air inlet temperature	°C	0	0	0
Maximum cooling water outlet temperature **6)**	°C	50	50	50
Maximum cooling water inlet pressure **6)**	bar(e)	5	5	5
Recommended cooling water flow **6)**				
- cooling water inlet temperature below 25°C **7)**	l/s	1.5	1.5	1.5
- cooling water inlet temperature between 25°C and 40°C	l/s	2.2	2.2	2.2
Temperature of air leaving air outlet valve, approx.	°C	30	30	30
Oil capacity, approx. **5)**				
- air cooled compressors	l	28	28	28
- water cooled compressors	l	22	22	22
Electric power input				
- air cooled compressors	kW	105.5	105	102
- water cooled compressors	kW	102	101.1	98.5
Sound pressure level **3) 4)**				
- air cooled compressors	dB(A)	85	85	85
- water cooled compressors	dB(A)	78	78	78
Sound pressure level **2) 3) 5)**	dB(A)	76	76	76

7.5 Conversion list of SI units into British units

1 bar = 14.504 psi	1 kW = 1.341 hp (UK and US)	1 m = 3.281 ft	1 N = 0.225 lbf
1 g = 0.035 oz	1 l = 0.264 US gal	1 mm = 0.039 in	1 Nm = 0.738 lbf.ft
1 kg = 2.205 lb	1 l = 0.220 Imp gal (UK)	1 m^3/min = 35.315 cfm	x°C = (32 + 1.8x) °F
1 km/h = 0.621 mile/h	1 l = 0.035 cu.ft	1 mbar = 0.401 in wc	Δt 1°C = Δt 1.8 °F

1) At reference conditions
2) With silencing kit and outlet duct (optional)
3) According to PNEUROP/CAGI PN8NTC2
4) Free field conditions
5) Air-cooled compressors
6) Water-cooled compressors
7) Δt=15°C
8) Δt=10°C