Instruction book for Piston Compressors

LE/LT5, -6, -7, -8, -9, -11, -12
LT530, -730, -930, -1230
LE7N, LE9N
LE/LT7, -8, -9, -11, -12 Pack

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

Replaces
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Atlas Copco
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No. 2920 5997 03

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 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

LE, LEN and LT are two-cylinder, air-cooled, single-acting piston compressors. LE and LEN are single-stage compressors; LT are two-stage compressors. LEN are oil-less compressors delivering oil-free air.

LE and LEN are built for effective working pressures up to 10 bar. LT5 up to -12 are built for effective working pressures up to 20 bar; LT530, -730, -930 and -1230 up to 30 bar.

To avoid large enumerations in the text, following abbreviations are used:

LEN stands for LE7N and LE9N
LE/LT5, -6 stands for LE5, LE6, LT5, LT6 and LT530.
LE/LT7 up to -12 stands for LE7, LE8, LE9, LE11, LE12, LT7, LT8, LT9, LT11, LT12, LT730, LT930 and LT1230.

1.1.1 Compressor variants

The compressor block includes besides the crankcase and cylinders (Fig. 1a):
- air intake filter (2) and silencer (3)
- fan (34)
- air cooler(s) (25)
- unloader (22, for LE/LT7 up to -12)
- relief valve (27, for LT7 up to -12)

It can also be supplied with a V-belt pulley and an extra support.

The power pack consists of (Fig. 1b):
- For LE/LT5, -6: the compressor block as described above, with flanged-on electric motor (M), a check valve (8-Fig. 1c) and an air pressure switch (PSR19-Fig. 1c).
- For LE/LT7 up to -12: the compressor block as described above, with flanged-on electric motor (M), a solenoid valve (Y1-Fig. 1d) and an air pressure switch (PSR19-Fig. 1d). The motor starter is not included.

The complete unit (Figs. 1c and 1d) is the power pack mounted on an air receiver (9) with air outlet valve (15), pressure gauge (13), safety valve (12) and condensate drain cock (10).

LE/LT5, -6 are equipped with a direct-on-line motor starter. LE/LT7 and -8 may be equipped with a direct-on-line or a star-delta motor starter which is considered being standard for further description. LE/LT9 up to -12 and LE7N/LE9N are equipped with a star-delta motor starter.

An optional sound-insulated hood is available.

The Pack unit (Fig. 1e) is the power pack with its regulating equipment and a small air receiver enclosed in a sound-insulated bodywork. The motor starter is mounted at the rear. The bodywork has a hinged top and service panel to allow easy access for maintenance.

1) For Pack units and for units with an optional silencing hood the air is drawn through the air filter via the fan guard.

1.2 Air flow

1.2.1 LE and LEN (Fig. 2a)

Air drawn through air filter (2) 1), intake silencer (1) and inlet valves into cylinders (8) is compressed, then discharged through the delivery valves to discharge collector (7) and temperature reducer (6), where the compressed air is cooled. The compressed air is discharged via check valve (13) into air receiver (16).

1.2.2 LT (Fig. 2b)

Air drawn through air filter (2) 1), intake silencer (1) and inlet valve into LP cylinder (8) is compressed, then discharged through the delivery valve to intercooler (23).

The cooled air then flows via pulsation damper (26) and the inlet valve to HP cylinder (24), where it is further compressed and discharged through the delivery valve to temperature reducer (22), where the compressed air is cooled. The compressed air is discharged via check valve (13) into air receiver (16).

1.3 Regulating system

1.3.1 LE/LT5 and -6 (Fig. 2a)

The regulating system includes:
- Check valve (13)
- Air pressure switch (PSR19) with pressure release valve (20) and ON/OFF buttons (S1-O and S1-I). The pressure switch also incorporates an overload relay (e1).

Operation
Air pressure switch (PSR19) opens and closes its contacts at pre-set pressures. During loaded operation, the contacts are closed; the motor is running.

When the pressure in the air receiver reaches the pre-set maximum pressure, the contacts as well as pressure release valve (20) are opened. Under this condition, the motor stops, the air at the delivery side of the compressor is vented to atmosphere and check valve (13) closes to prevent venting of the receiver.

When the pressure in the air receiver decreases to the pre-set minimum pressure, the air pressure switch trips to its original position, pressure release valve (20) closes and the motor restarts.

1.3.2 LE/LT7 up to -12 and LEN (Fig. 2b) 2)

The regulating system mainly comprises:
- Motor starter
- Air pressure switch (PSR19)
- Solenoid valve (Y1)
- Unloader (29)

Operation
Air pressure switch (PSR19) opens and closes its contacts at pre-set pressures.

2) LE/LT7 and -8, equipped with a direct-on-line motor starter, have the same regulating system as described in section 1.3.1.

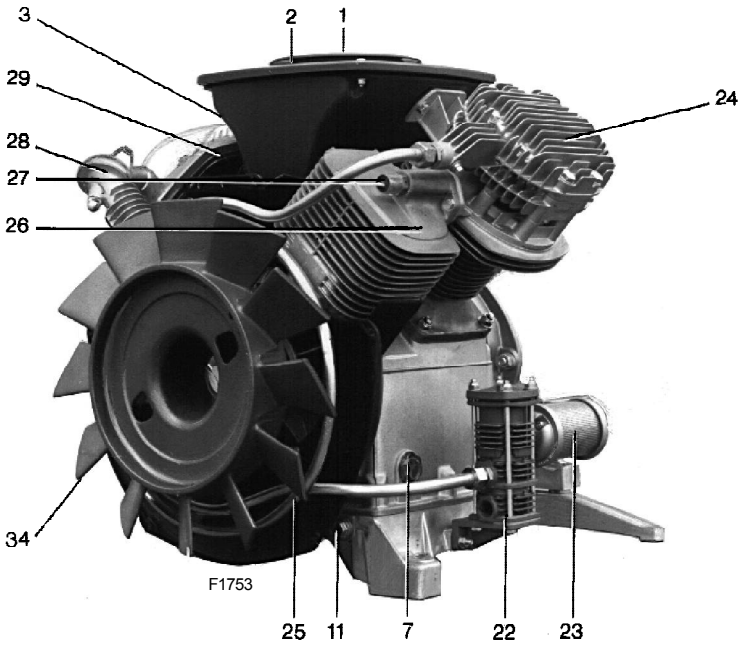


Fig. 1a. LT9, compressor block, fan guard removed

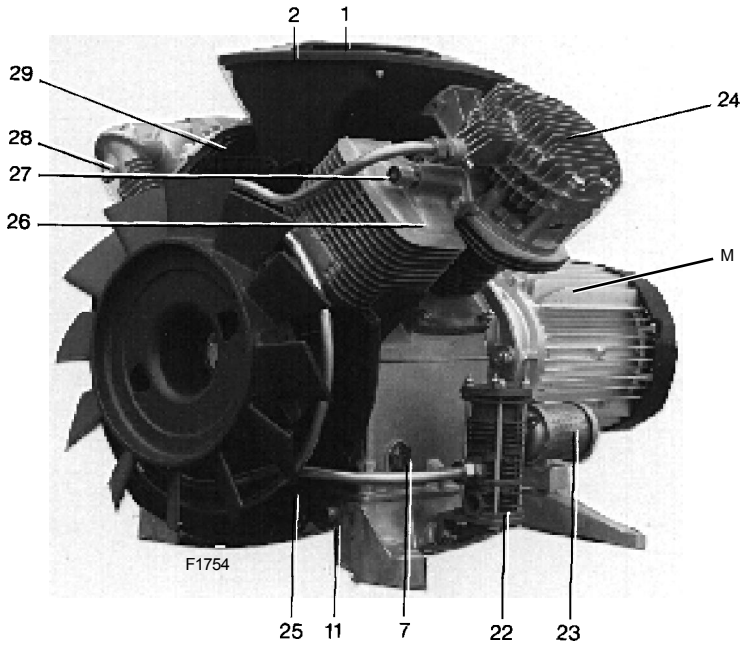


Fig. 1b. LT9, power pack, fan guard removed

M.	Motor
PSR19.	Air pressure switch
P1.	Hourmeter
S1.	Selector switch, operation mode
S1-I.	Start button
S1-O.	Stop button
Y1.	Loading solenoid valve
1.	Oil filler cap
2.	Air filter
3.	Air intake silencer
4.	Cylinder
5.	Connecting block
6.	Temperature reducer outlet
7.	Oil level sight-glass
8.	Check valve
9.	Air receiver
10.	Condensate drain cock
11.	Oil drain plug
12.	Safety valve
13.	Air pressure gauge
14.	Pressure release valve
15.	Air outlet valve
16.	Label, electrical diagram
17.	Fan guard
18.	Crankcase breather
19.	Motor starter
20.	Transport brackets (must be removed)
21.	Hose, compressed air from check valve to air receiver
22.	Unloader
23.	Muffler
24.	HP cylinder head
25.	Temperature reducer
26.	Pulsation damper
27.	Relief valve
28.	Intercooler
29.	LP cylinder head
30.	Air intake
31.	Hinged top
32.	Service panel
33.	Oil drain flexible
34.	Fan

Figs. 1. General views

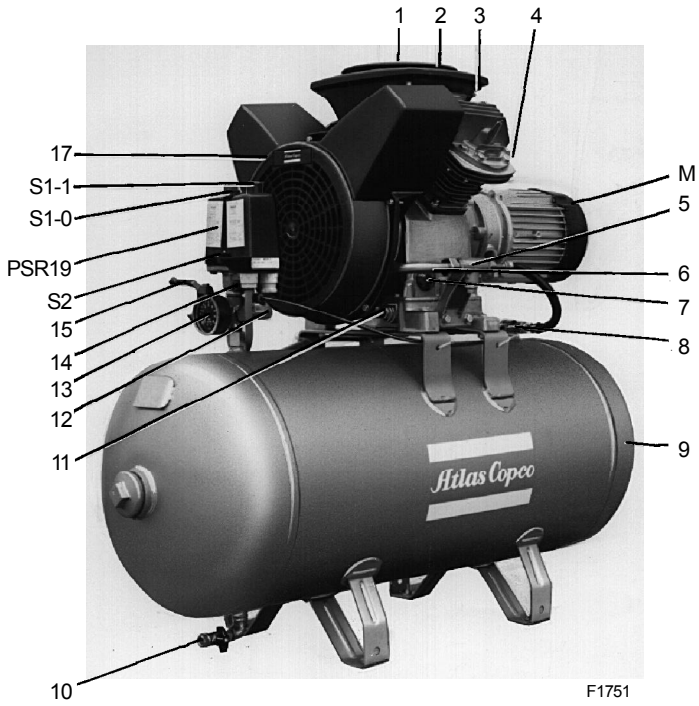


Fig. 1c. LE6, complete unit

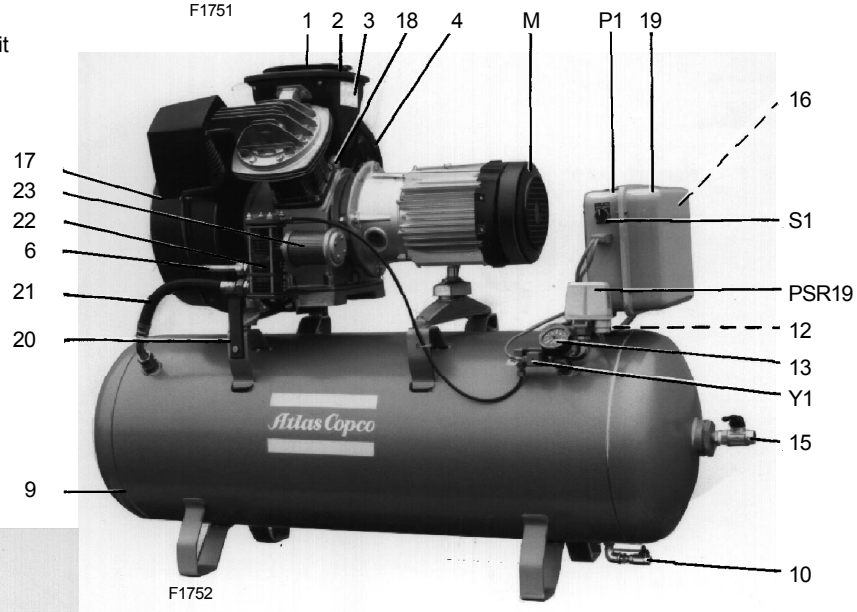


Fig. 1d. LE7, complete unit

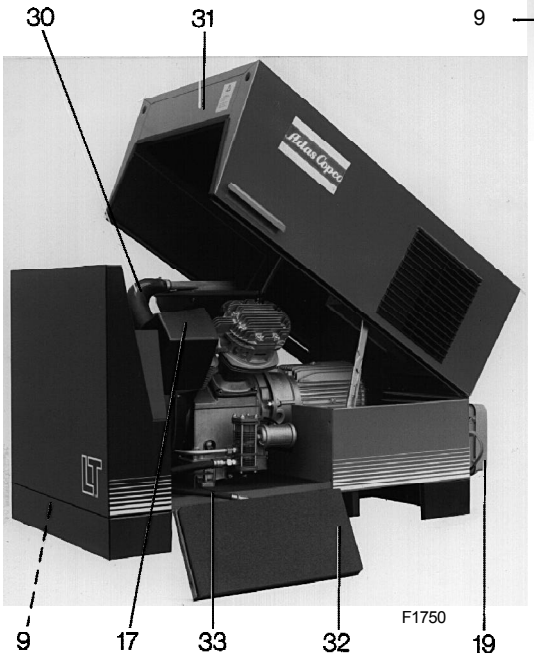


Fig. 1e. LT8 Pack

e1. Motor overload relay
M. Motor
PSR19. Air pressure switch
S1-I. Start button
S1-O. Stop button
Y1. Loading solenoid valve
1. Air intake silencer
2. Air filter
3. Oil filler pipe (not on LEN)
4. Crankcase breather
5. Cooling fan
6. Temperature reducer
7. Finned discharge collector
8. LP cylinder(s)
9. Oil level sight-glass or crankcase breather on LEN
10. Oil drain plug/flexible or crankcase breather on LEN
11. Check valve assembly
13. Check valve
14. Air pressure gauge
15. Safety valve
16. Air receiver
17. Air outlet valve
18. Manual drain cock (not on Pack unit)
20. Pressure release valve

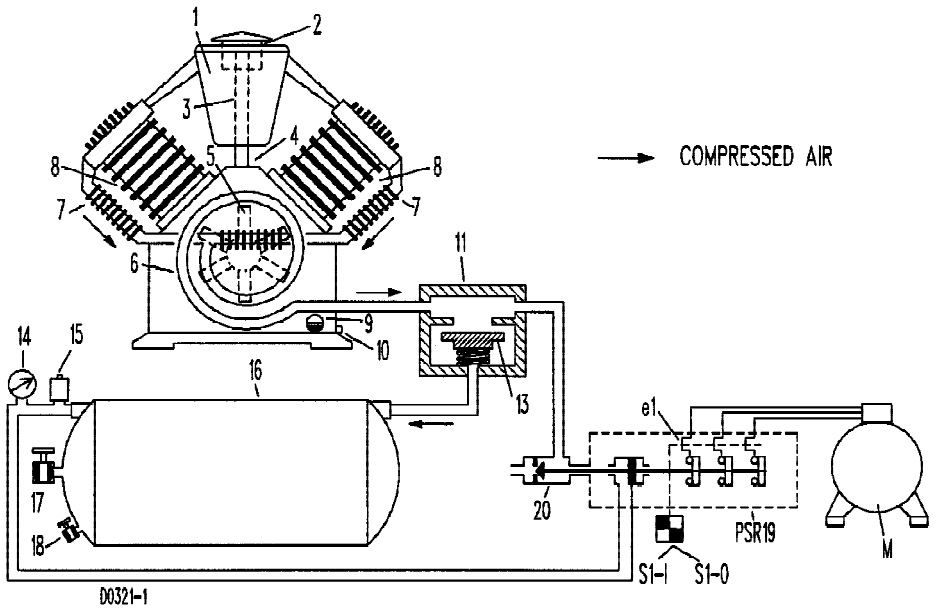


Fig. 2a. Air flow of LE(N) and regulating system of LE/LT5 and -6

22. Temperature reducer
23. Intercooler
24. HP cylinder
25. Relief valve
26. Pulsation damper
28. Muffler, unloading air
29. Unloader
30. Unloader plunger
31. Piston ring
33. Spring
34. Unloader valve

Figs. 2. Air flow and regulating systems

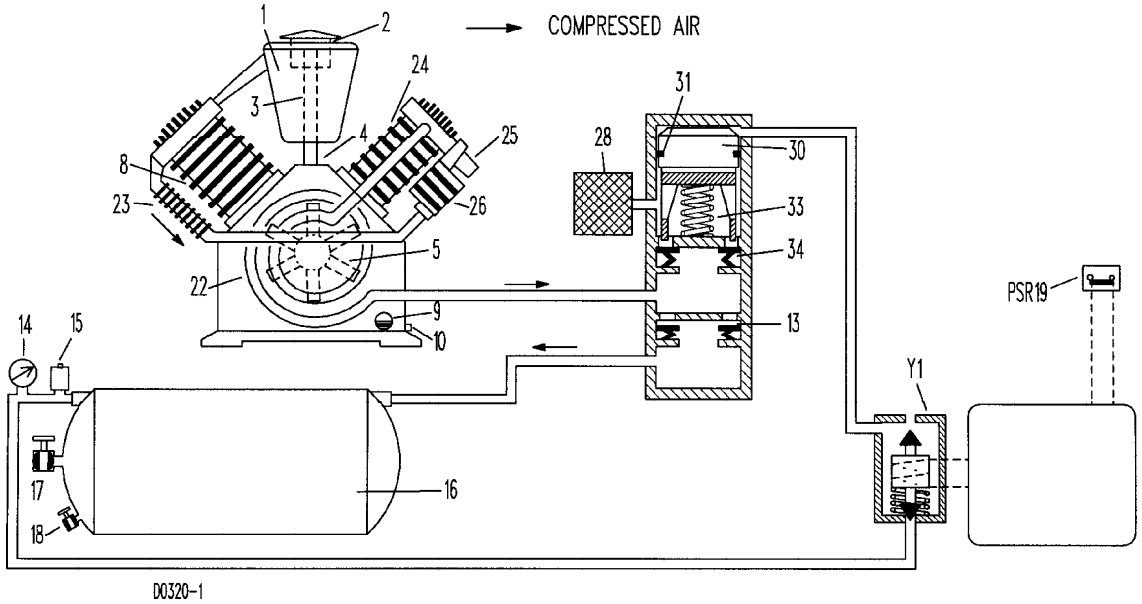


Fig. 2b. Air flow of LT and regulating system of LE/LT7 up to -12, LE7N and LE9N

During loaded operation, the circuit to solenoid valve (Y1) is closed preventing the compressed air from flowing to unloader (29).

When the pressure in air receiver (16) reaches the maximum or unloading pressure, pressure switch (PSR19) de-energizes solenoid valve (Y1). Compressed air from the receiver will flow via the solenoid valve to the upper side of unloader plunger (30), which opens unloader valve (34). The compressed air from the compressor is now blown off to atmosphere through muffler (28). Check valve (13) closes and prevents venting of the air receiver.

When the pressure in the air receiver decreases to the pre-set loading or starting pressure, pressure switch (PSR19) closes the circuit to solenoid valve (Y1); control air from the unloader plunger chamber is vented to atmosphere. Unloader valve (34) closes, check valve (13) opens and the compressed air is supplied to the receiver again.

The selector switch (S1-Fig. 1d) on the motor starter (starter equipped with hourmeter) permits the selection of two operating modes, i.e. semi-automatic (1/2 AUTO) or fully automatic (AUTO) operation.

Semi-automatic operation: the motor runs without interruption. The compressed air is either discharged into the receiver or blown off to atmosphere, depending on the air consumption. This operating mode is selected when the air consumption is more or less steady and the total unloading time per hour comparatively small.

Fully automatic operation: the electric motor stops and restarts at the pre-set upper and lower limits of the air pressure switch respectively. This operating mode is selected when the air consumption is at times steady and at times irregular with long interruptions. The number of starts must not exceed 15 per hour.

2 Installation

Install the compressor horizontally, in a cool but frost-free and well-ventilated room. Place the compressor as level as possible; however, it can be operated with an angular deviation below 15° in any direction. The air should be clean.

A Pack unit must be installed away from walls to allow easy maintenance. Keep the ventilation openings free.

A condensate drain facility must be installed downstream of the compressor in the lowest part of the air net. If any further information is required, consult Atlas Copco.

2.1 Electrical connections

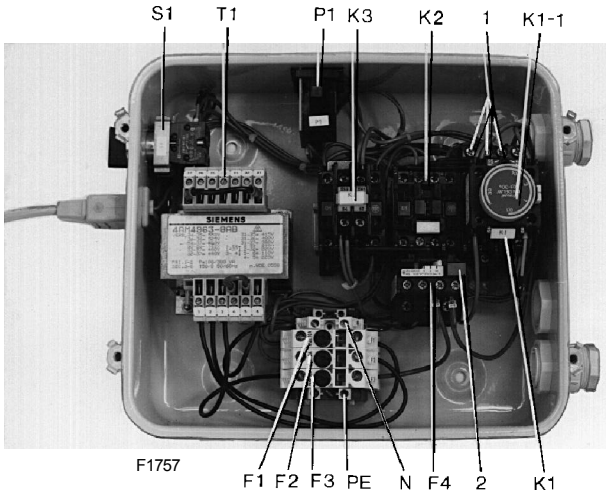
The electrical installation must be carried out by an electrician and correspond to the local codes.

The indications on the motor data plate must correspond to the mains supply voltage and frequency. The mains supply and earthing lines must be of suitable size. The installation must include an isolating switch in the power line near to the unit and be protected against short-circuits by fuses of the inert type in each phase. In case the overload protection is not supplied with the unit, a circuit breaker instead of an isolating switch and fuses must be installed.

For LE/LT7 up to -12 and LEN, connect the power supply to terminals L1, L2 and L3 of line contactor (K1-Fig. 3). Connect the earth conductor to connector (PE) and the neutral conductor (if provided) to connector (N) on the terminal strip. For LE/LT5, -6, consult the electrical diagrams (Figs. 10 and 11).

The electrical diagram is stuck on or in the motor starter. The diagram shows the electrical connections, the settings of the overload relay and the maximum fuse rating with regard to the short-circuit protection of the starter. The cable section used may require fuses of a smaller value.

Never operate the unit without an earth conductor.



F1/2.	Fuses, transformer (T1) primary side	PE.	Earth conductor connector
F3.	Fuse, transformer (T1) secondary side	P1.	Hourmeter
F4.	Motor overload relay	S1.	ON-OFF/selector switch
K1.	Line contactor	T1.	Transformer
K1-1.	Star-delta timer	1.	Power supply terminals: L1, L2 and L3
K2.	Delta contactor	2.	Reset knob, overload relay
K3.	Star contactor		
N.	Neutral conductor connector		

Fig. 3. Detail of motor starter (typical example)

3 Operating instructions

Safety precautions

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

3.1 Initial start-up

1. Remove the transport brackets (20-Fig. 1d) and wooden blocks under compressor and motor feet.
2. Check the electrical installation, which must be in accordance with the instructions given in section 2.1.
3. Check the setting of the thermal overload relay.
4. Star-delta timer (K1-1-Fig. 3) is factory-set between 6 and 10 seconds for LT and LEN units; for LE units, it is set at 20 seconds. Check and adjust if necessary.
5. LE/LT are delivered with P.A.O. (polyalphaolefine) compressor oil. Check that the oil level is still in the middle of the sight-glass (7-Figs. 1). Top up, if necessary (see section 4.2).
   Warning: Never use oil in the crankcase of LEN.
6. 1) Switch on the voltage. Start and stop the motor. Check for correct direction of rotation of the fan as indicated by an arrow on the crankcase and fan cover. Switch off the voltage and reverse two of the input line connections if the motor turns in the wrong direction.
7. Check the operation of the air pressure switch. Adjust, if necessary (see section 5.4).

3.2 Starting

1. On LE/LT, check the oil level, which must be in the lower half of the sight-glass (7-Figs. 1). Top up, if necessary.
   Warning: Never use oil in the crankcase of LEN.
2. Switch on the voltage.
3. On LE/LT5, -6: press start button (S1-I-Fig. 1c) (or turn start switch).
   On LE/LT7 up to -12 and LEN: start the unit and select the required operating mode (consult section 1.3.2) by means of selector switch (S1-Fig. 1d).
4. Open the compressor air outlet valve.

3.3 Stopping

1. On LE/LT5, -6: press stop button (S1-O-Fig. 1c) (or turn start switch).
   On LE/LT7 up to -12 and LEN: move selector switch (S1-Fig. 1d) to "O".
2. Close the air outlet valve.
3. Switch off the voltage.

If a compressor with a direct-on-line starter stops during operation through a power failure, the pressure from the compressor discharge side must be released by pressing the stop button or moving the start switch on the air pressure switch to OFF, this to avoid that the compressor restarts against back-pressure when the power becomes live again.

1) Only necessary for LE/LT9 up to -12 and LEN.

4 Maintenance

4.1 Preventive maintenance schedule

The schedule contains 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. Consult Atlas Copco for available maintenance kits.

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

Period 1)	Running hours 1)	Operation	Consult section	See note	Preventive maintenance kit No.
Daily	------	Check oil level (not on LEN)	3.2	1	--
Weekly	------	Drain condensate from air receiver by opening drain cock (10-Figs. 1)	--	--	--
Monthly	------	Operate safety valve by turning its knurled cap or by lifting its central plunger with a screwdriver	--	2	--
"	------	Check that regulating system operates properly	--	--	--
"	------	Inspect air filter. Replace if necessary	5.3	4	2-Fig. 4
3-monthly	------	Clean unit. Remove dirt from cooling fins by air jet	--	3	--
Yearly	------	Test safety valve	5.5	--	--
"	------	If provided, test relief valve	5.6	--	--
"	400	On LE/LT9/12, replace air filter	5.3	4	2-Fig. 4
"	500	On LE/LT7/8, replace air filter	5.3	4	2-Fig. 4
"	700	On LE/LT5/6, replace air filter	5.3	4	2-Fig. 4
"	1000	Change muffler element on LE/LT7 up to -12 and LEN	--	--	2-Fig. 4
"	1000	Check tension of transmission belt(s) (if equipped with)	--	5	--
"	2000	Change oil if mineral oil is used (not on LEN)	4.2	--	--
"	2000	Inspect for carbon deposits in air receiver; clean if necessary	--	--	--
2-yearly	3000	Change oil if Atlas Copco approved P.A.O. oil is used (not on LEN)	4.2	--	5-Fig. 4
-----	3000 to 4000	Change check valve on LE/LT5/6 or unloader on LE/LT7 up to -12 and LEN	5.1	--	3,4-Fig. 4
-----	4000	Change valves. For possible earlier replacement consult section 5.2	5.2	--	1-Fig. 4

1) Whichever interval comes first. The local Sales Company may overrule the maintenance schedule, especially the service intervals, depending upon the environmental and working conditions of the compressor.

Remark
For partial or complete overhaul, service kits, exchange compressors, etc. are available. Consult Atlas Copco.

Notes
1. Maintain the level in the lower half of the sight-glass.
2. Always wear gloves.
3. Wear safety glasses.
4. For normal operation in clean surroundings. More frequently when operating in dusty environment.
5. Correct adjustment is obtained when each V-belt can be pushed inwards 15 mm per m distance between the two pulley centres when a force of 20 N is exerted midway.

4.2 Lubrication (not for LEN)

It is strongly recommended to use the Atlas Copco approved P.A.O. (polyalphaolefine) compressor oil to keep the compressor in excellent operating condition.

If this oil is not available:

- at normal operating conditions, a good-quality, mineral motor oil (not multigrade) with a viscosity grade of SAE 10 W 20 can be used. The oil must meet the requirements of the API (American Petroleum Institute) classification code SE-CC, SE-CD or better. If mineral oil is used, the oil must be changed more frequently (see section 4.1). Mineral oil can be mixed with P.A.O. oil, but the excellent P.A.O. lubrication properties are reduced.
- at extreme operating conditions (high ambient temperature, high loading factor, high pressure), a special diester synthetic lubricant should be used. Consult Atlas Copco for the specifications and change interval.

Note
The crankcase is connected to the air intake silencer or suction line through a breather valve. Faulty operation of this valve or clogging of the calibrated hole will result in too high a crankcase pressure and promote oil consumption.

5 Servicing and adjustment procedures

Warning: Release the pressure from the compressor before starting repair or maintenance works. Isolate the compressor from the mains.

5.1 Unloader or check valve

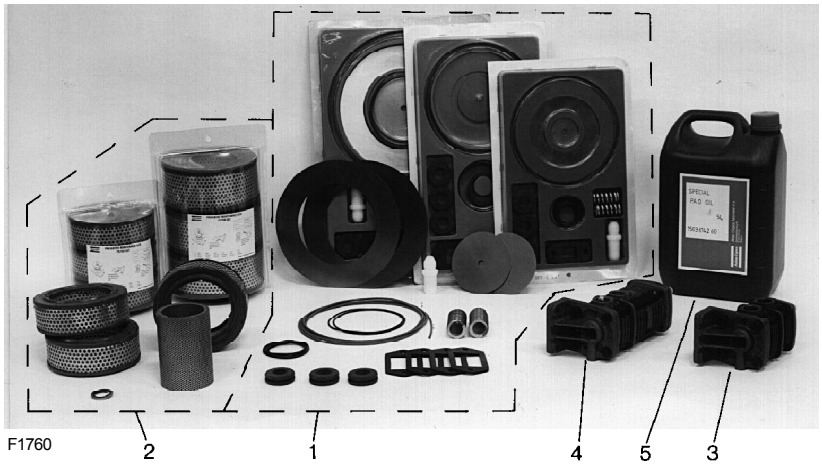
Dirt, condensate, coke formation and oxidation influence the proper operation of the valve. Depending on the working conditions (ambient temperature, working pressure, load cycle, oil type), it is recommended to replace the unloader or check valve assembly after 3000 to 4000 running hours. Replacement instructions are included in the maintenance kits (4 and 3-Fig. 4).

5.2 Valves

A faulty valve must be replaced immediately. A faulty valve can be discovered as stated in section 6, points 1 and 4. It is highly recommended to replace the valves and gaskets each time the cylinder heads are disassembled, because a new position of old valves results in accelerated wear.

Replacement of valve disks (Figs. 5)

LE5-9 LT5-11 LP LE7N	LE11 LE/LT12 LT5-11 HP LE9N	Operation sequence
•	•	Remove the fan guard, unscrew cap (1-Figs. 1) and remove the cover, air filter and cover of the air intake silencer.
•		Disconnect cylinder head cover (11) from the inlet and outlet pipe flanges. Remove cover (11).
	•	Remove cylinder head cover (11). Disconnect outlet and inlet caps (15 and 14) from the flanges and/or pipe coupling. Remove the caps.
•	•	Remove spring (10), outlet valve guard (9) and outlet valve disk (8).
•	•	Lift off valve seat (7) and remove inlet valve disk (6). Do not remove guide pins (2).
•	•	Remove and discard all O-rings and rubber joints.
•	•	If necessary, remove the carbon deposits from the inlet valve guard at the cylinder top. Take care that no dirt drops into the cylinder.
•	•	Clean and inspect all parts.
•	•	Fit a new joint (3). Do not stretch the rubber while inserting it in its groove; the ends should meet. Some vaseline facilitates assembling.
•	•	Put a new inlet valve disk (6) into place and install valve seat (7).
•	•	Fit a new O-ring (5) and joint (1).
•	•	Install a new outlet valve disk (8), guard (9) and spring (10).
•		Install cylinder head cover (11). Use new flange gaskets, if necessary. Fit the flange and cylinder head bolts and tighten them alternately.
	•	Fit a new O-ring (13) and joint (12). Reinstall inlet and outlet caps (14 and 15) and cover (11). Clamp the cylinder head assembly securely into place. Secure the flanges and/or reconnect the pipe coupling.
•	•	Reinstall the fan guard, cover of the air intake silencer, air filter, cover and cap (1-Figs. 1).



1. Valve kit
2. Filter kit
3. Check valve assembly
4. Unloader valve assembly
5. P.A.O. oil, 5 l can

Fig. 4. Preventive maintenance kits 1)

1) For correct part numbers of kits, consult ASL (parts list)

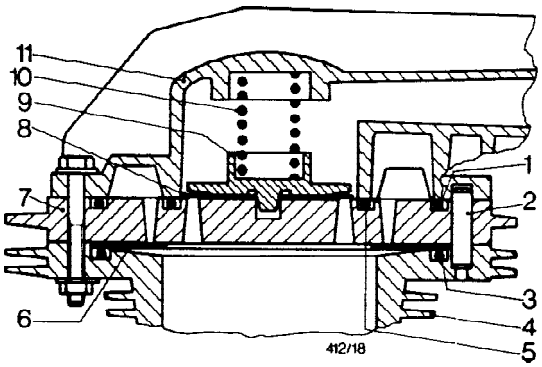


Fig. 5a. LE5 to -9, LE7N and low-pressure side of LT5 to -11

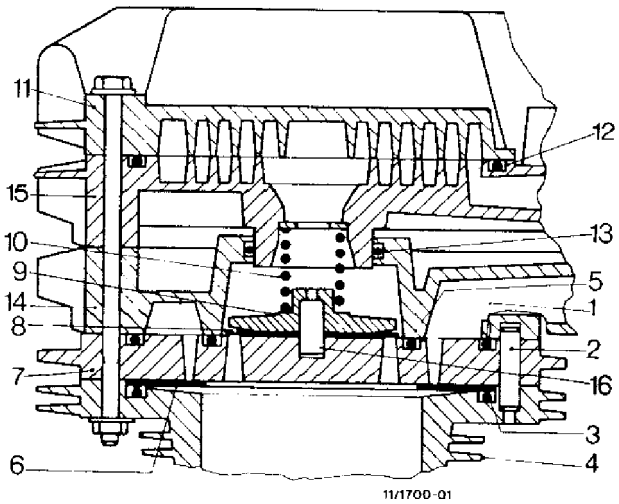


Fig. 5b. LE11, LE/LT12, LE9N and high-pressure side of LT5 to -11

1.	Rubber cord joint	5.	O-ring	9.	Outlet valve guard	13.	O-ring
2.	Guide pin (2 off)	6.	Inlet valve disk	10.	Spiral spring	14.	Inlet cap
3.	Rubber cord joint	7.	Valve seat	11.	Cylinder head cover	15.	Outlet cap
4.	Cylinder	8.	Outlet valve disk	12.	Rubber cord joint	16. 1)	Pin

1) Outlet valve guard with central pin as drawn in Fig. 5b: only on LE9, -11, -12 and on low-pressure side of LT9, -11, -12

Figs. 5. Cylinder head valve assemblies

Torque values
M6: 10 Nm
M8: 23 Nm
M10: 45 Nm

5.3 Air filter

Notes
- Never remove the element while the compressor is running.
- Never use damaged elements.

Servicing
1. Unscrew cap (1-Figs. 1). Lift off the cover of the filter element and the element. Take care that no dirt drops inside the suction silencer.
2. Using a damp cloth, clean the filter chamber and cover.
3. Install the new element, cover and cap.

5.4 Setting of the air pressure switch (PSR19-Figs. 1)

The adjustment of the maximum or stopping pressure of the compressor is effected by means of the air pressure switch. The switch also controls the pressure drop, i.e. the difference between the maximum pressure (stopping pressure) and that at which compression is resumed (starting pressure).

Caution
Adjust the air pressure switch while it is pressurized.

Switch off the voltage before removing the cover of the switch; reinstall it after an adjustment has been made and before the voltage is switched on again.

5.4.1 Air pressure switch MDR5 (Fig. 6)

The switch incorporates the motor starter and mostly the overload protection.

The maximum pressure is controlled by adjusting knob (1).

Turn the knob clockwise to raise the maximum or stopping pressure, anti-clockwise to lower it.

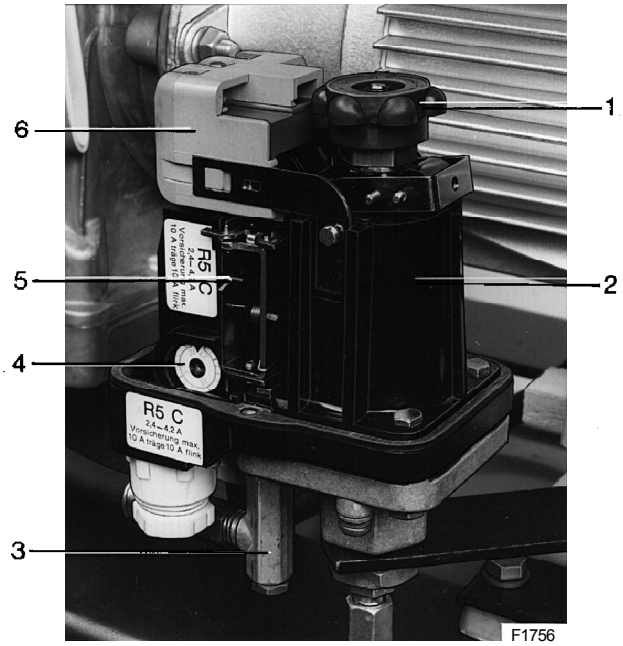
The pressure difference is adjusted by means of the same knob.

Push down the knob and turn it clockwise to reduce the difference between the stopping and starting pressures, i.e. to increase the starting pressure. Turn the knob anti-clockwise to increase the pressure difference. The adjustment range is shown in the diagrams (Figs. 7).

5.4.2 Air pressure switch MDR4 (Fig. 8)

The maximum pressure is controlled by adjusting screw (2). Turn the screw clockwise to raise the maximum or stopping pressure, anti-clockwise to lower it.

The pressure difference is adjusted by means of screw (3). To reduce the difference between the stopping and starting pressures, i.e. increase the starting pressure, turn the screw anti-clockwise. To increase the pressure difference, turn the screw clockwise. The adjustment range is shown in the diagrams (Figs. 9).



1. Adjusting knob for stopping and starting pressures
2. Spring housing, air pressure switch
3. Pressure release valve
4. Setting dial, overload relay
5. Motor overload relay
6. Three-pole switching mechanism

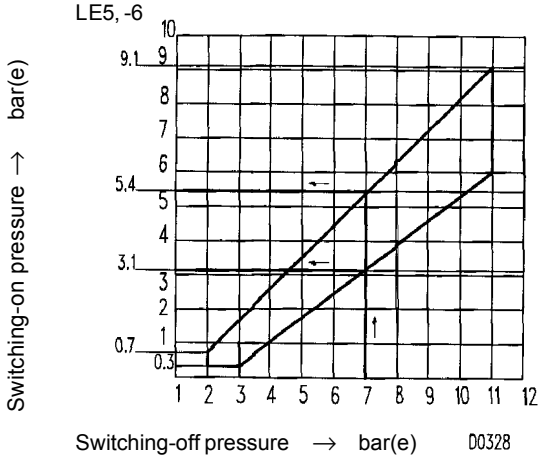
Fig. 6. Air pressure switch, type MDR5 with ON/OFF switch

5.5 Safety valve (12-Figs. 1)

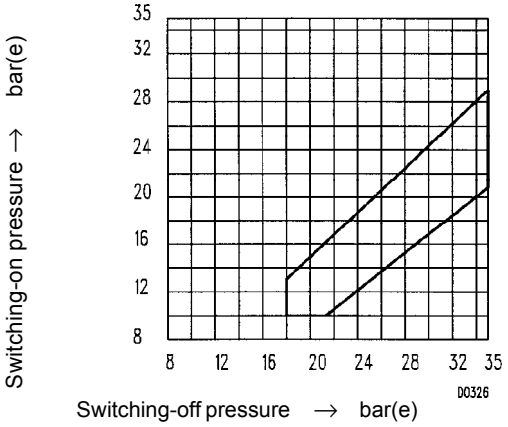
The safety valve must be tested yearly. Replace the valve if it does not open at the correct pressure. No adjustments are allowed.

Testing
1. Close the air outlet valve, depressurize and disconnect the hose or pipe from the valve.
2. Start the compressor and run it until it unloads or stops automatically.
3. Stop the compressor (if necessary) and switch off the voltage. Remove the cover from the air pressure switch and, with the air receiver now under pressure, turn the adjusting knob or screw one turn clockwise to increase the stopping pressure. Reinstall the cover.
4. Switch on the voltage, slightly open the outlet valve and start the compressor.

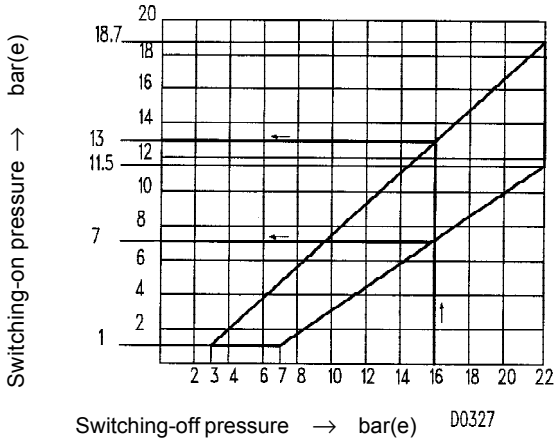
LE5, -6



LT530 up to -1230



LT5, -6

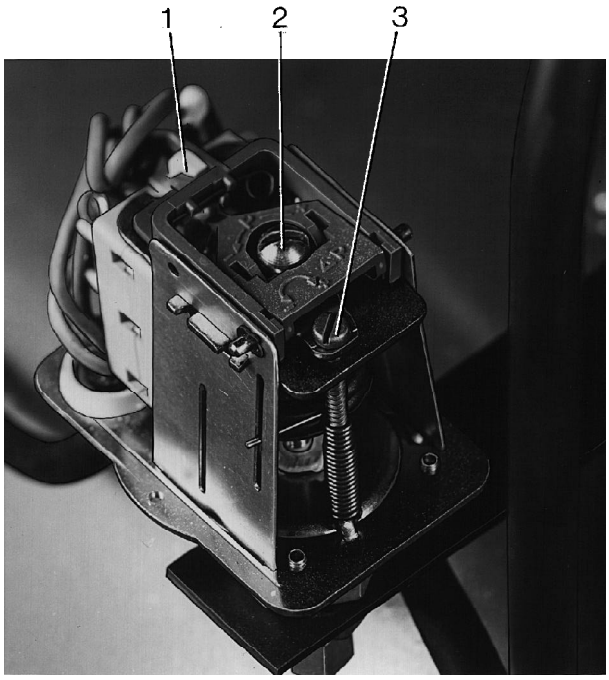


Example: LE5, -6
Stopping pressure: 7 bar(e)
Starting pressure: adjustable between 3.1 and 5.4 bar(e)

Example: LT5, -6
Stopping pressure: 16 bar(e)
Starting pressure: adjustable between 7 and 13 bar(e)

Figs. 7. Diagrams, pressure differential adjustment range

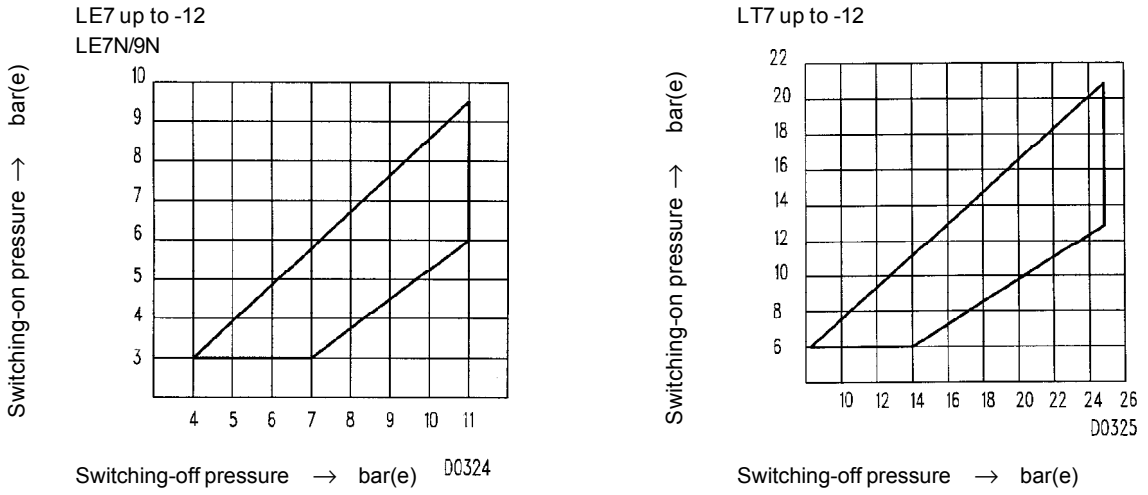
5. Gradually close the outlet valve while checking the air pressure gauge. If the safety valve has not opened at the pressure specified in section 7, it must be replaced by a new one. If the compressor unloads before the specified opening pressure is reached, repeat the procedure as mentioned from step 3.
6. Readjust the unloading pressure as described in sections 5.4.1 and 5.4.2.
7. Reconnect the hose or pipe to the closed air outlet valve.



F1755

1. Contact housing
2. Adjusting screw for stopping pressure
3. Adjusting screw for pressure difference

Fig. 8. Air pressure switch, type MDR4



Figs. 9. Diagrams, pressure differential adjustment range

5.6 Relief valve (27-Figs. 1) (only LT)

The relief valve protects the LP side of the compressor. It is fitted on the air inlet pulsation damper of the HP cylinder. The valve must be tested yearly.

Remove the relief valve and fit a 3/8" B.S.P. plug instead. Remove the safety valve from the air receiver and replace it by the relief valve. The latter can then be tested at increasing air receiver pressure after the compressor has been started with open air outlet valve. If the valve has not opened at the pressure specified in section 7, it must be replaced by a new one. Reinstall the valves in their respective places after testing.

6 Problem solving

Explanation about the table below:
- Conditions of the unit, always preceded by a number, are printed in bold.
- Each possible fault is followed by its related suggested remedy and both are preceded by the same letter.

1. Insufficient air pressure
a. Air leak(s)
a. Check and correct as necessary
b. Air filter choked
b. Replace filter
c. Air pressure switch incorrectly set
c. Adjust switch
d. Air consumption exceeds maximum output of compressor
d. Check equipment connected
e. Damaged valve(s)
e. Inspect valves and replace parts where necessary
f. Pressure gauge defective
f. Check and replace, if necessary
g. 1) Release valve of air pressure switch not airtight during loading
g. Check mechanism of valve. If necessary, replace valve
h. 2) Unloader plunger jammed or unloader valve or spring broken
h. Inspect unloader and replace parts where necessary
i. 2) Solenoid valve out of order
i. Remove and check valve. Replace if necessary

2. Unit does not speed up
a. Voltage drop at motor terminals
a. Consult power supplier. Change to larger cross-section cable, if necessary
b. 1) Pressure release valve of air pressure switch malfunctioning
b. Check operation of valve, replace if necessary
c. 2) Unloader plunger jammed
c. See 1h
d. 2) Solenoid valve out of order

d. See 1i
e. 2) Muffler choked
e. Replace muffler element

3. Air receiver pressure rises above maximum and causes safety valve to blow
a. Air pressure switch incorrectly set or out of order
a. Set switch to unload compressor at rated maximum pressure. Replace switch if it does not respond
b. 2) Solenoid valve defective
b. See 1i
c. 2) Unloader plunger jammed
c. See 1h
d. 2) Muffler choked
d. Replace muffler element

4. 3) Relief valve blows
a. Defective inlet valve in HP cylinder head
a. Inspect and replace part(s) as necessary
b. Relief valve not airtight
b. Replace valve

5. Receiver does not hold pressure
a. Check valve leaks
a. Check for broken valve and springs
b. Air leaks
b. Check and correct as necessary

6. Too frequent starting/too short operating periods
a. Air pressure switch incorrectly set
a. Increase pressure difference
b. Check valve leaks
b. See 5a

7. 4) High oil consumption
a. Oil level too high
a. Do not overfill crankcase. Keep level within lower half of sight-glass
b. Breather valve malfunctioning
b. Replace breather valve
c. Piston ring(s) worn or broken
c. Have condition of piston rings checked

8. Unit does not start
a. Electrical failure
a. Check or have electrical system checked. Check fuses in motor starter
b. Overload relay cut out
b. Reset overload relay by means of knob (2-Fig. 3). If the relay cuts out again after starting, see point 9 or 10
c. Air pressure above pre-set starting pressure
c. Compressor will start when air pressure is lower than pre-set starting pressure of air pressure switch

9. Thermal overload relay cuts out during starting
a. Overload relay incorrectly set
a. Check and adjust. Reset relay
b. 2) Star-delta timer incorrectly set
b. Check setting, which should be 6 to 10 seconds
c. 2) Solenoid valve out of order
c. See 1i
d. 2) Unloader plunger jammed
d. See 1h
e. 2) Muffler choked
e. Replace muffler element

10. Thermal overload relay cuts out during operation
a. Overload relay incorrectly set
a. See 9a
b. One phase of mains supply line interrupted
b. Check fuses and line terminals for tightness. Check voltage across motor line terminals
c. Supply voltage variations exceed normal tolerances
c. Consult power supplier
d. Ambient temperature too high
d. Improve ventilation of room
e. Motor stops and starts too frequently
e. See 6
f. Overcurrent due to motor or compressor failure
f. Measure motor line current in the three phases. If currents exceed rated motor current, have compressor inspected; if currents are not equal, have motor inspected

Notes
1) only LE/LT5, -6
2) not for LE/LT5, -6
3) only LT
4) not for LEN

7 Principal data

Reference conditions

1. Inlet pressure (absolute)	bar	1
2. Relative air humidity	%	0
3. Air inlet temperature	°C	20

Limitations

1. Minimum inlet temperature	°C	0
2. Maximum inlet temperature	°C	40
3. Maximum unloading pressure	bar(e)	See below

Type	FAD 2)	FAD 2)	Max. unloading pressure	Piston displacement	Piston displacement	Recommended motor size	Recommended motor size	Speed	Speed	Crankcase oil capacity
	50 Hz l/s	60 Hz l/s	bar(e)	50 Hz l/s	60 Hz l/s	50 Hz kW	60 Hz kW	50 Hz r/min	60 Hz r/min	l
LE5	2.58	3.00	10	6.33	7.6	1.5	1.8	1500	1800	1.60
LE6	3.70	4.08	10	9.62	11.5	2.2	2.64	1500	1800	1.60
LE6 A	4.77	5.72	10	9.62	11.5	3	3.6	1500	1800	1.60
LE6 C	6.30	--	10	11.8	--	--	--	1500	--	1.70
LE7	6.87	7.67	10	17.2	20.6	4	4.8	1500	1800	2.80
LE7 Pack	6.87	7.67	10	17.2	20.6	4	4.8	1500	1800	2.80
LE8	8.83	10.3	10	23.9	28.7	5.5	6.6	1500	1800	2.80
LE8 C	13.0	--	10	25.6	--	--	--	1500	--	3.20
LE8 Pack	8.83	10.3	10	23.9	28.7	5.5	6.6	1500	1800	2.80
LE9	11.2	13.7	10	33.2	39.8	7.5	9	1500	1800	5.10
LE9 Pack	11.2	13.7	10	33.2	39.8	7.5	9	1500	1800	5.10
LE11	18.8	22.7	10	46.5	55.7	11	13.2	1500	1800	5.10
LE11 Pack	18.8	22.7	10	46.5	55.7	11	13.2	1500	1800	5.10
LE12	26.0	-	10	57.1	-	15	-	1500	-	5.10
LE12 Pack	26.0	-	10	57.1	-	15	-	1500	-	5.10
LE7N 1)	6.65	-	10	16.17	-	4	-	1500	-	-
LE9N 1)	11.6	-	10	33.75	-	7.5	-	1500	-	-
LT5	2.17	2.70	20	3.17	3.8	1.5	1.8	1500	1800	1.60
LT6	3.07	3.63	20	4.82	5.78	2.2	2.64	1500	1800	1.60
LT7	5.63	6.78	20	8.58	10.3	4	4.8	1500	1800	2.80
LT7 Pack	5.63	6.78	20	8.58	10.3	4	4.8	1500	1800	2.80
LT8	7.68	9.12	20	11.9	14.3	5.5	6.6	1500	1800	2.80
LT8 Pack	7.68	9.12	20	11.9	14.3	5.5	6.6	1500	1800	2.80
LT9	10.2	11.9	20	16.6	19.9	7.5	9	1500	1800	5.10
LT9 Pack	10.2	11.9	20	16.6	19.9	7.5	9	1500	1800	5.10
LT11	15.1	17.7	20	23.2	27.9	11	13.2	1500	1800	5.10
LT11 Pack	15.1	17.7	20	23.2	27.9	11	13.2	1500	1800	5.10
LT12	18.0	20.9	20	28.6	34.3	15	18.5	1500	1800	5.10
LT12 Pack	18.0	20.9	20	28.6	34.3	15	18.5	1500	1800	5.10
LT530	1.98	2.50	30	3.17	3.8	2.2	2.64	1500	1800	1.60
LT730	5.27	6.30	30	8.58	10.3	5.5	6.6	1500	1800	2.80
LT930	9.28	11.1	30	16.6	19.9	11	13.2	1500	1800	5.10
LT1230	17.0	19.7	30	28.6	34.3	15	18.5	1500	1800	5.10

1) Direct drive
2) At maximum pressure

Type	Maximum ambient temperature	Safety valve opening pressure	Relief valve opening pressure	Hose connection
	°C	bar(e)	bar(e)	B.S.P. (in)
LE5	40	10.5	-	1/2
LE6	40	10.5	-	1/2
LE6 A	40	10.5	-	1/2
LE6 C	40	10.5	-	1/2
LE7	40	10.5	-	1/2
LE7 Pack	40	10.5	-	1/2
LE8	40	10.5	-	1/2
LE8C	40	10.5	-	1/2
LE8 Pack	40	10.5	-	1/2
LE9	40	10.5	-	1/2
LE9 Pack	40	10.5	-	1/2
LE11	40	10.5	-	1/2
LE11 Pack	40	10.5	-	1/2

Type	Maximum ambient temperature	Safety valve opening pressure	Relief valve opening pressure	Hose connection
	°C	bar(e)	bar(e)	B.S.P. (in)
LE12	40	10.5	12.5	1/2
LE12 Pack	40	10.5	12.5	1/2
LE7N 1)	40	10.5	-	1/2
LE9N 1)	40	10.5	-	1/2
LT5	40	21	6.5	1/2
LT6	40	21	6.5	1/2
LT7	40	21	6.5	1/2
LT7 Pack	40	21	6.5	1/2
LT8	40	21	6.5	1/2
LT8 Pack	40	21	6.5	1/2
LT9	40	21	6.5	1/2
LT9 Pack	40	21	6.5	1/2
LT11	40	21	6.5	1/2
LT11 Pack	40	21	6.5	1/2
LT12	40	21	6.5	1/2
LT12 Pack	40	21	6.5	1/2
LT530	40	31.5	6.5	1/2
LT730	40	31.5	6.5	1/2
LT930	40	31.5	6.5	1/2
LT1230	40	31.5	6.5	1/2

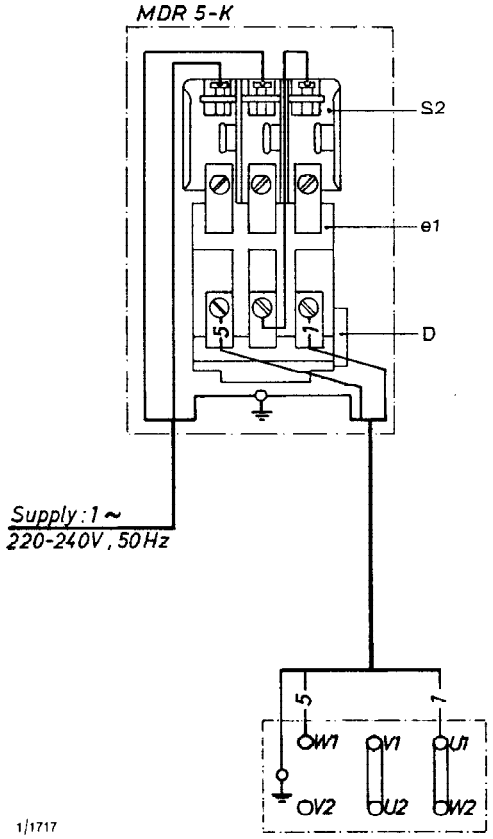
1) Direct drive

8 Conversion list of SI units into British 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 m 3/min = 35.315 cfm
1 mbar = 0.401 in wc
1 N = 0.225 lbf
1 Nm = 0.738 lbf.ft
x°C = (32 + 1.8 x)°F 1)

1) A temperature difference of 1°C = a temperature difference of 1.8°F

9 Electrical diagrams



D. Setting dial
e1. Motor overload relay
S2. Air pressure switch

Fig. 10. Electrical diagram of LE/LT5, -6 with monophase motor

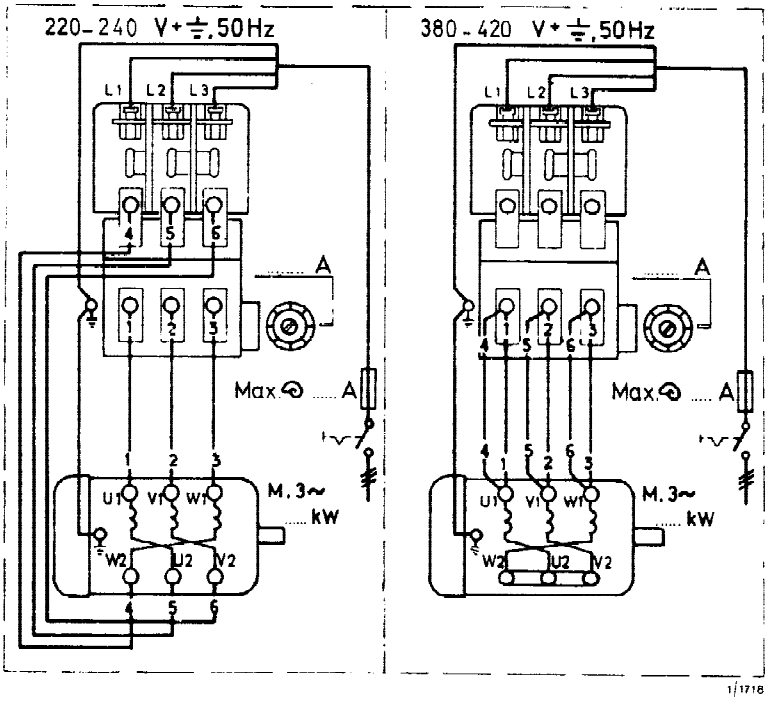


Fig. 11. Electrical diagrams of LE/LT5, -6 with three-phase motor

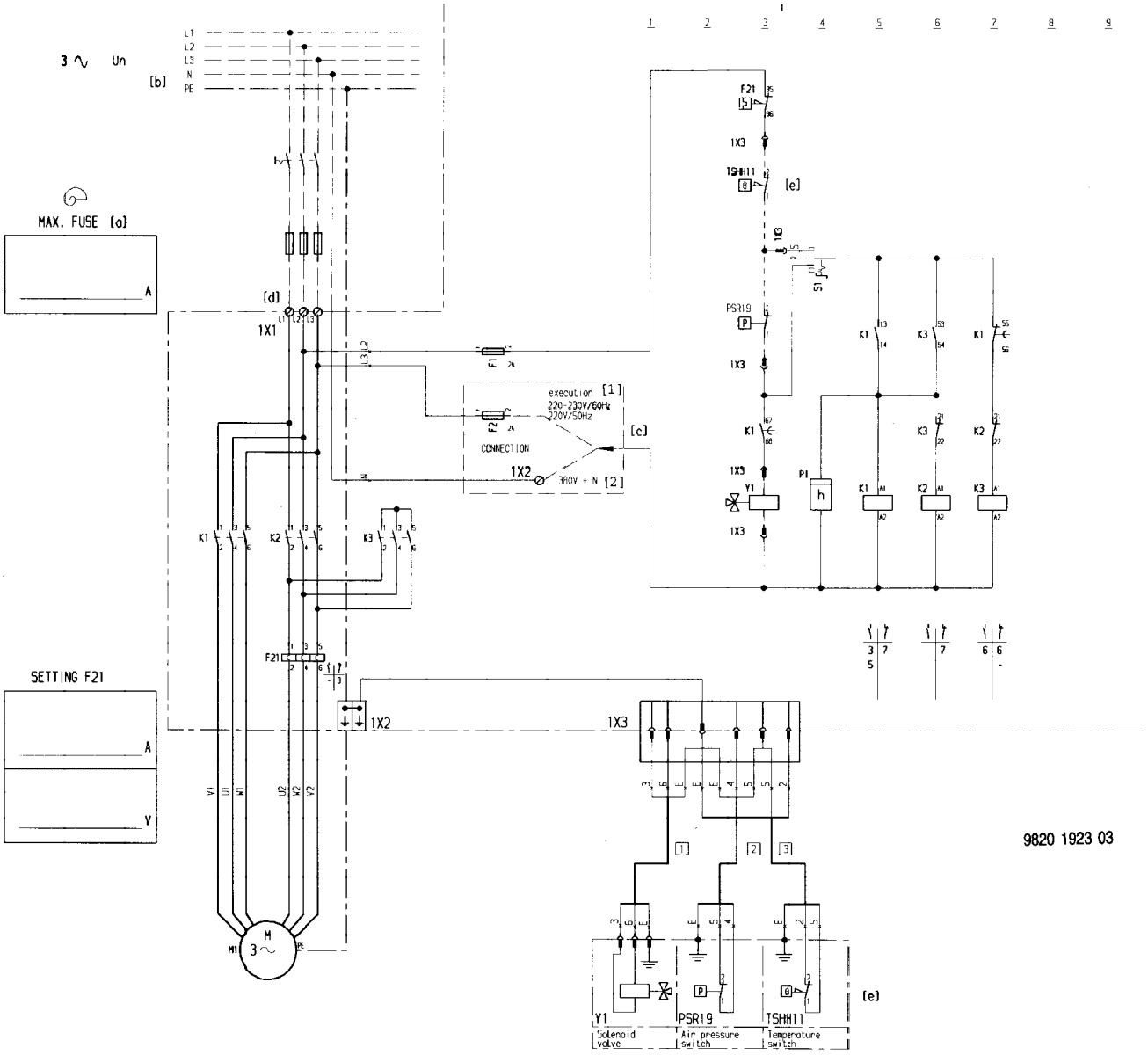


Fig. 12. Electrical diagram of LE/LT7 up to -12 and LEN without transformer

F1/3.	Fuses
F21.	Overload relay
K1.	Line contactor
K2.	Delta contactor
K3.	Star contactor
M1.	Compressor motor
PSR19.	Air pressure switch
P1.	Hourmeter
S1.	Selector switch: 1/2 AUTO - O - AUTO
TSHH11.	Temperature switch (not provided)
T1.	Transformer
1X1/2.	Terminal strips
1X3.	Plug
Y1.	Solenoid valve

Figs. 12 and 13. Electrical diagrams of LE/LT7 up to -12 and LEN

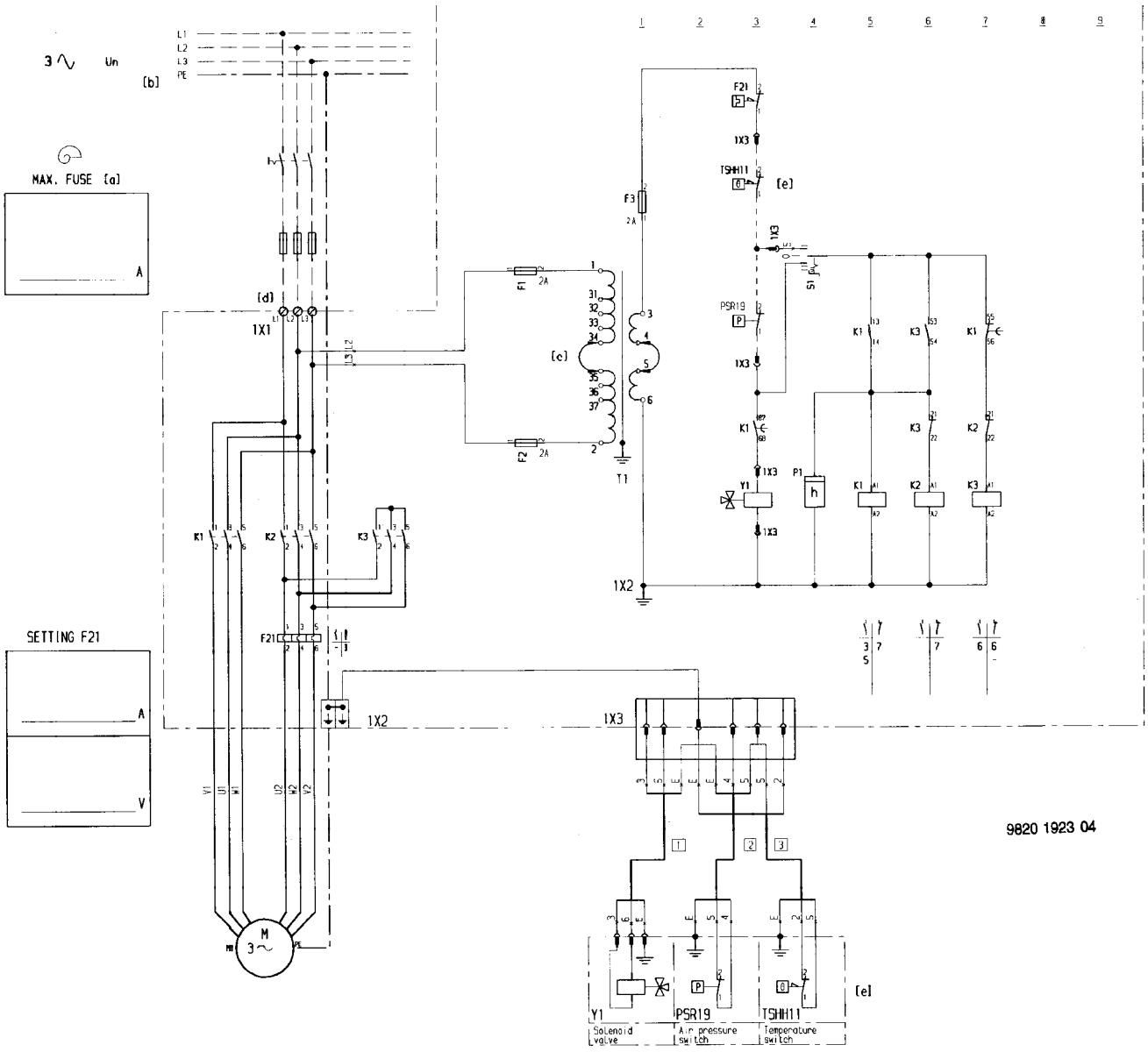
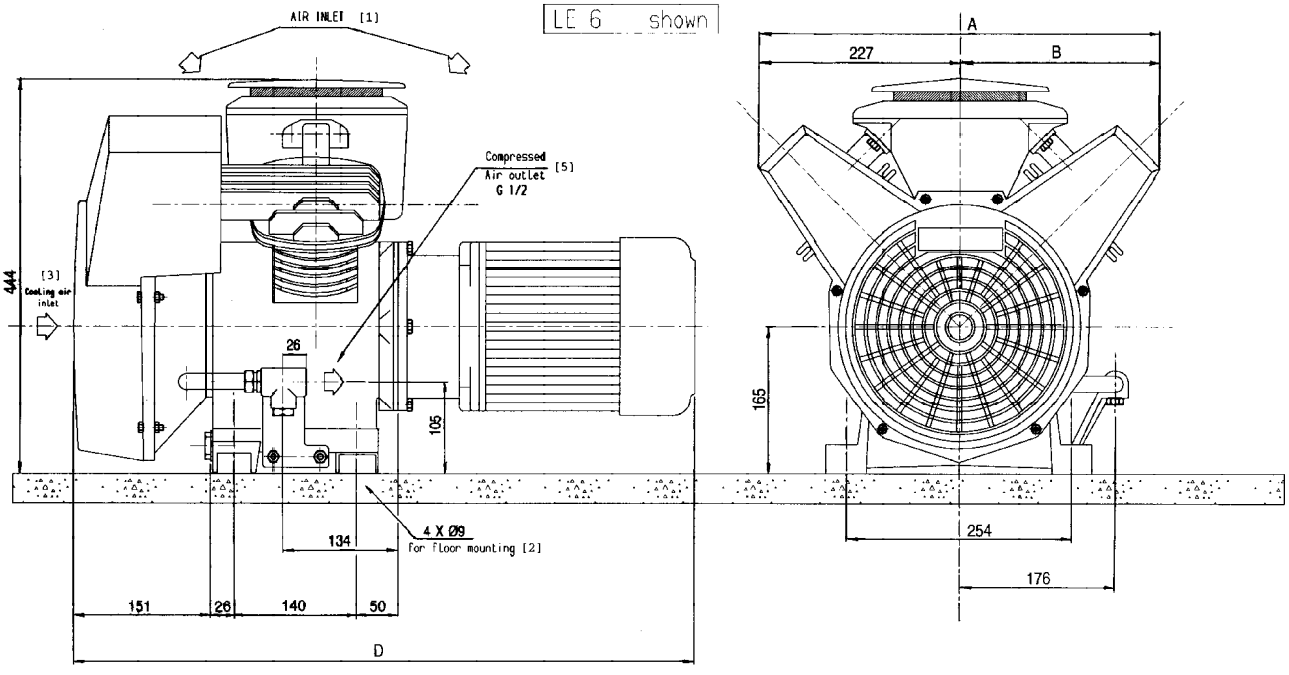


Fig. 13. Electrical diagram of LE/LT7 up to -12 and LEN with transformer

10 Dimension drawings

[1] Air inlet
[2] For floor mounting
[3] Cooling air inlet
[4] Net mass
[5] Compressed air outlet G 1/2
[6] Manual condensate drain
[7] Electric cable entry Pg 16
[8] Electric cable entry Pg 21 (on rear side)
[9] Cooling air outlet
[10] Air receiver must not be bolted on the floor without rubber pads
[11] Shown LE7/8 with 250 l EURO receiver and silencing hood
[12] Female air outlet G 1/2
[13] Compressor cooling air and air inlet
[14] Hole 15 x 24 (4 x), can be used for fixing without rubber pads

Figs. 14 up to 21. Dimension drawings



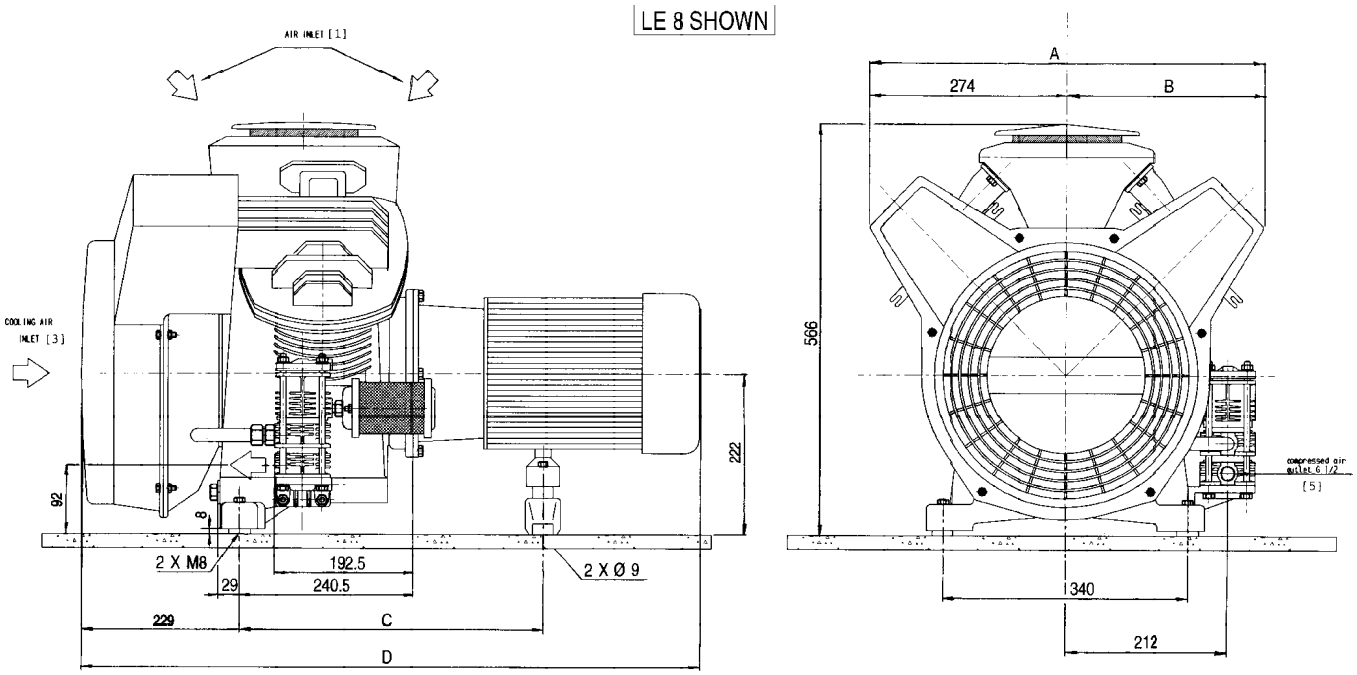
TYPE		A	B	D	NET MASS [4]
LE	5	454	227	671	42
	6	454	227	701	51
	6C	454	227	701	51
LT	5	486	259	671	45
	6	486	259	701	54
LT 530		486	259	701	52
LE 5 1 ph		454	227	727	49
LT 5 1 ph		486	259	727	52
LE 6 1 ph		454	227	727	58

POWER PACK

This drawing can not be used to measure not indicated dimensions

9821 0462 00/9

Fig. 14. LE5, -6, -6C/LT5, -6, -530 Power Pack



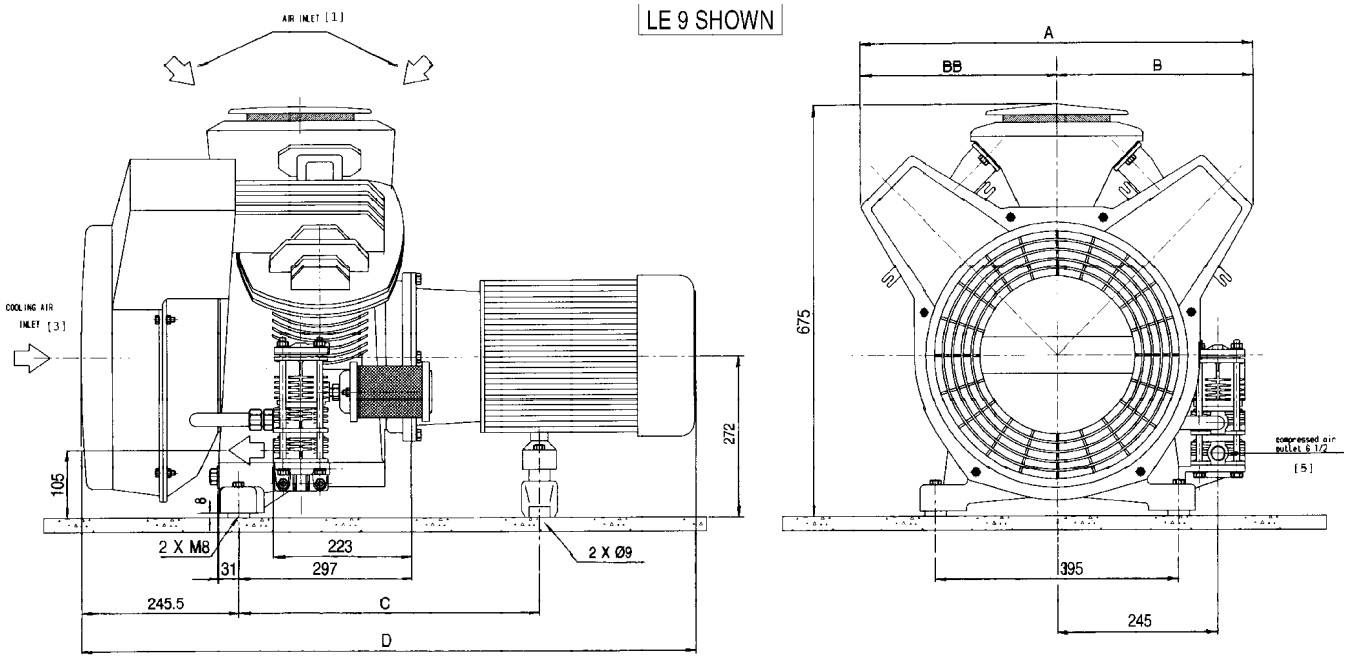
[4]

TYPE	NET MASS	A	B	C	D
LE 7	76	548	274	417	850
LE 8	84	548	274	423	869
LT 7	77	566	292	417	850
LT 8	85	566	292	423	869
LT 730	84	566	292	417	850
LE 7N	76	548	274	417	850
LE 8C	100	548	274	470	931

This drawing can not be used to measure not indicated dimensions

9821 0465 00/8

Fig. 15. LE7, -7N, -8, -8C/LT7, -8, -730 Power Pack



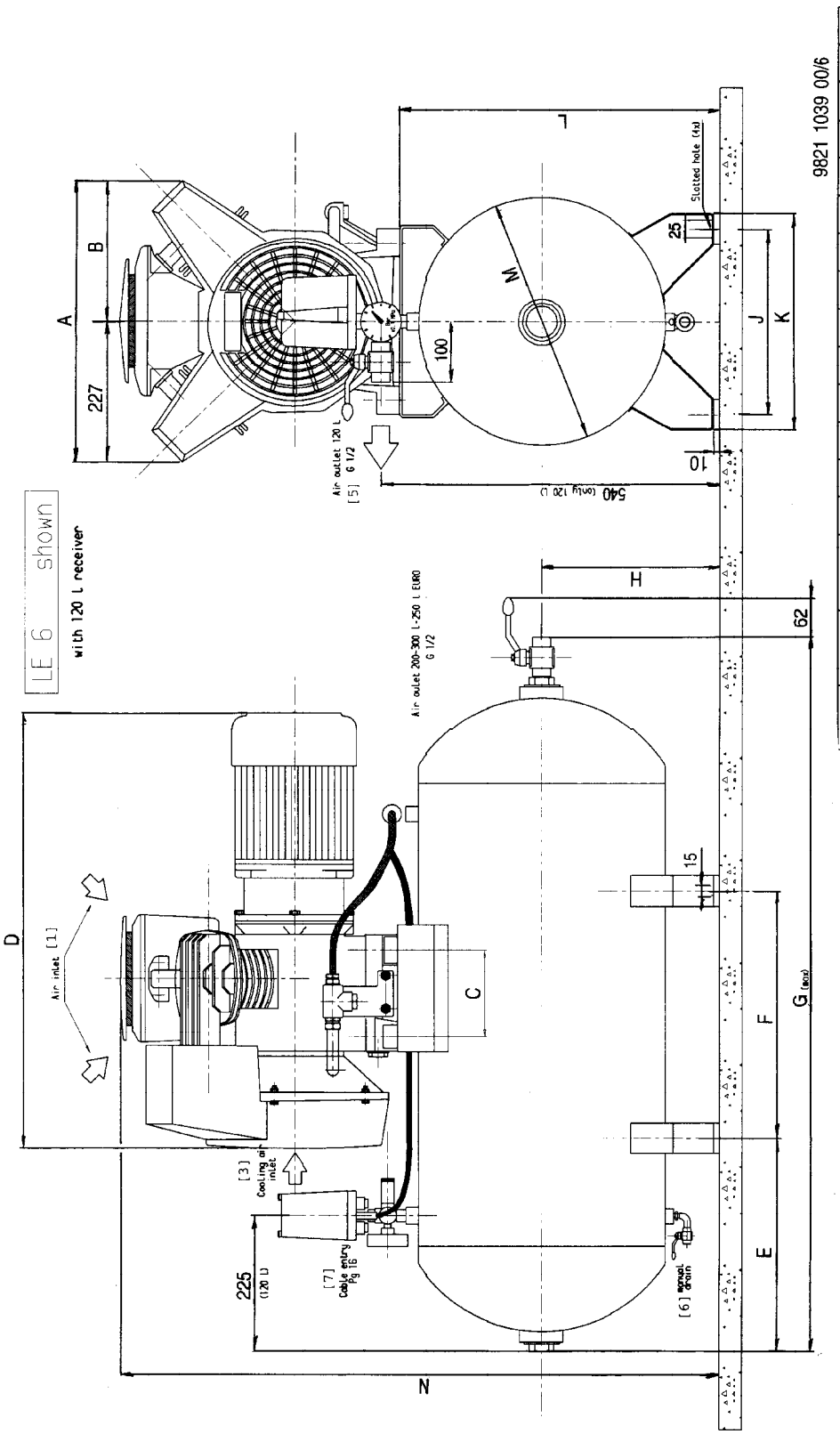
TYPE		A	B	BB	C	D	NET MASS [4]
LE	9	658	329	329	540	1024	134
	11	720	360	360		1053	164
	12					1103	189
LT	9	682	353	329		1024	135
	11					1053	166
	12	713	353	360		1103	194
LT 930		682	353	329		1053	165
LT 1230		713	353	360		1103	194
LE 9N		720	360	360		1024	135

This drawing can not be used to measure not indicated dimensions

POWER PACK

9821 0468 00/7

Fig. 16. LE9, -9N, -11, -12/LT9, -11, -12, -930, -1230 Power Pack

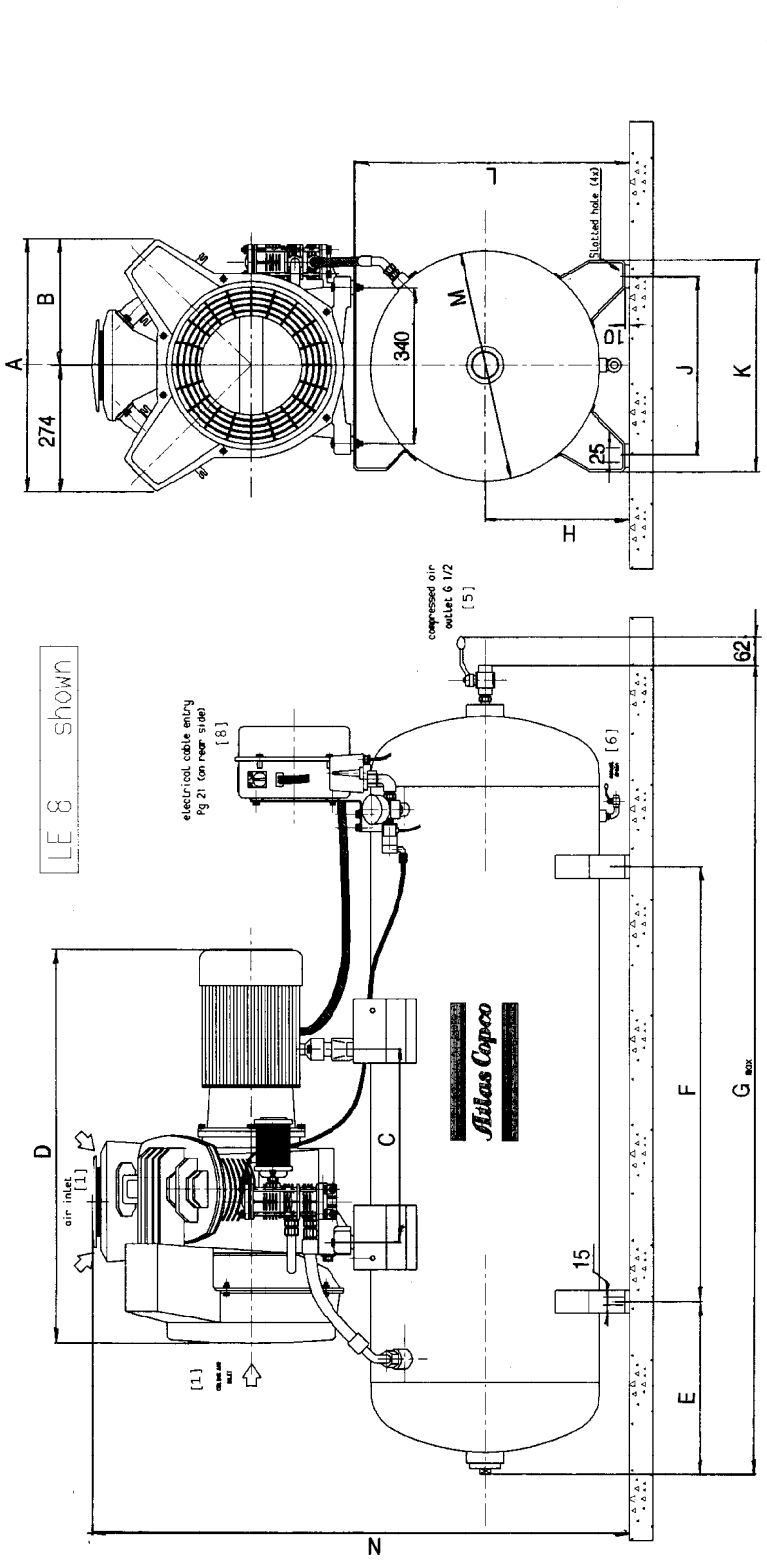


TYPE		EURO RECEIVER	NET MASS	A	B	C	D	E	F	G	H	J	K	L	M	N
LE	5	120	.	451	227	140	671	345	400	1161	290	304	350	522	402	966
		250	.	451	227	140	671	404	960	1839	310	336	382	560	450	1004
	6	120	.	451	227	140	701	345	400	1161	290	304	350	522	402	966
		250	.	451	227	140	701	404	960	1839	310	336	382	560	450	1004
	6C	120	.	451	227	140	701	345	400	1161	290	304	350	522	402	966
		250	.	451	227	140	701	404	960	1839	310	336	382	560	450	1004
LT	5	120	.	486	259	140	671	345	400	1161	290	304	350	522	402	966
		250	.	486	259	140	671	404	960	1839	310	336	382	560	454	1004
	6	120	.	486	259	140	701	345	400	1161	290	304	350	522	402	966
		250	.	486	259	140	701	404	960	1839	310	336	382	560	454	1004
LE 5 1ph		120	.	451	227	140	727	345	400	1161	290	304	350	522	402	966
		250	.	451	227	140	727	404	960	1839	310	336	382	560	450	1004
LE 6 1ph		120	.	451	227	140	727	345	400	1161	290	304	350	522	402	966
		250	.	486	259	140	727	404	960	1839	310	336	382	560	454	1004
LT 5 1ph		120	.	486	259	140	727	345	400	1161	290	304	350	522	402	966
		250	.	486	259	140	727	404	960	1839	310	336	382	560	454	1004

TYPE		RECEIVER	NET MASS	A	B	C	D	E	F	G	H	J	K	L	M	N
LE	5	120	.	454	227	140	671	348	400	1167	288	304	350	518	400	962
	6	120	.	454	227	140	701	348	400	1167	288	304	350	518	400	962
		200	.	454	227	140	701	339	750	1519	310	336	382	560	450	1004
	6A	120	.	454	227	140	701	348	400	1167	288	304	350	518	400	962
		200	.	454	227	140	701	339	750	1519	310	336	382	560	450	1004
		300	.	454	227	140	701	339	950	1699	315	410	460	593	500	1087
LT	5	120	.	486	259	140	671	348	400	1167	288	304	350	518	400	962
	6	120	.	486	259	140	701	348	400	1167	288	304	350	518	400	962
LE 5 1ph		120	.	486	259	140	724	348	400	1167	288	304	350	518	400	962
LT 5 1ph		120	.	486	259	140	724	348	400	1167	288	304	350	518	400	962

9821 1039 00/6

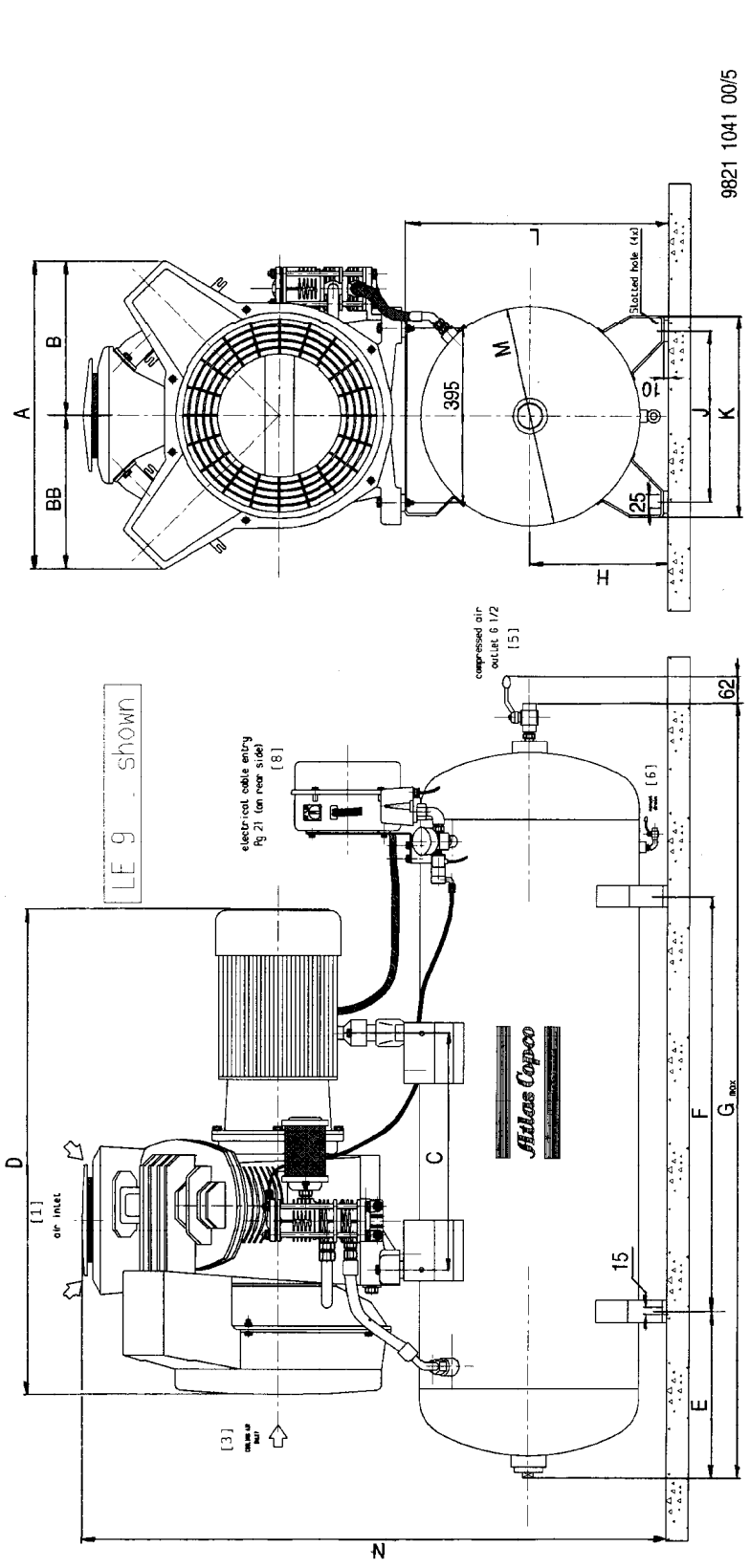
Fig. 17. LE5, -6, -6C/LT5, -6 Complete Unit



TYPE	EURO RECEIVER	NET MASS	A	B	C	D	E	F	G	H	J	K	L	M	N
LE 7	250	.	548	274	417	850	404	960	1809	310	336	382	560	450	1126
	475	.	548	274	417	850	441	960	1913	395	476	530	735	602	1301
LE7N	250	.	548	274	417	850	404	960	1809	310	336	382	560	450	1126
LE 8	250	.	548	274	423	869	404	960	1889	310	336	382	560	450	1126
	475	.	548	274	423	869	441	960	1913	395	476	530	735	602	1301
LT 7	250	.	566	292	417	850	404	960	1889	310	336	382	560	450	1126
	475	.	566	292	417	850	441	960	1913	395	476	530	735	602	1301
LT 8	250	.	566	292	423	869	404	960	1889	310	336	382	560	450	1126
	475	.	566	292	423	869	441	960	1913	395	476	530	735	602	1301
LE8C	250	.	548	274	470	931	404	960	1889	310	336	382	560	450	1126
	475	.	548	274	470	931	441	960	1913	395	476	530	735	602	1301

TYPE	RECEIVER	NET MASS	A	B	C	D	E	F	G	H	J	K	L	M	N
LE 7	200	.	548	274	417	850	339	750	1519	310	336	382	560	450	1126
	300	.	548	274	417	850	339	950	1699	315	410	460	593	500	1159
LE 8	200	.	548	274	423	869	339	750	1519	310	336	382	560	450	1126
	300	.	548	274	423	869	339	950	1699	315	410	460	593	500	1159
	500	.	548	274	423	869	426	1090	2013	391	458	542	731	608	1297
LT 7	300	.	566	292	417	850	339	950	1699	315	410	460	593	500	1159
	500	.	566	292	417	850	426	1090	2013	391	458	542	731	608	1297
LT 8	300	.	566	292	423	869	339	950	1699	315	410	460	593	500	1159
	500	.	566	292	423	869	426	1090	2013	391	458	542	731	608	1297
LE8C	300	.	548	274	470	931	339	950	1699	315	410	460	593	500	1159
	500	.	548	274	470	931	426	1090	2013	391	458	542	731	608	1297

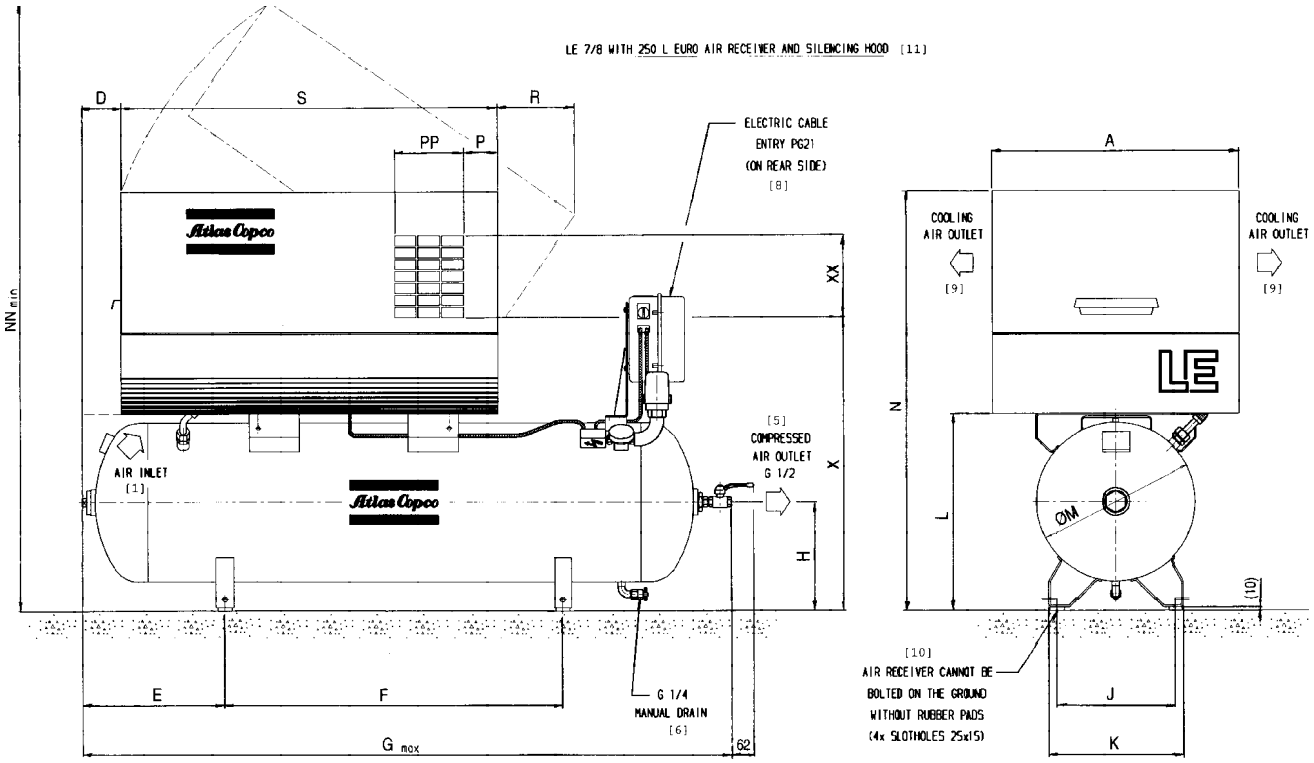
Fig. 18. LE7, -7N, -8, -8C/LT7, -8 Complete Unit



TYPE		EURO RECEIVER	NET MASS	A	B	BB	C	D	E	F	G	H	J	K	L	M	N
LE	9	250	.	658	329	329	540	1024	404	960	1839	310	336	382	560	450	1235
		475	.	658	329	329	540	1024	441	960	1913	395	476	530	735	602	1410
	11	250	.	720	360	360	540	1053	404	960	1839	310	336	382	560	450	1235
		475	.	720	360	360	540	1053	441	960	1913	395	476	530	735	602	1410
	12	250	.	720	360	360	540	1103	404	960	1839	310	336	382	560	450	1235
		475	.	720	360	360	540	1103	441	960	1913	395	476	530	735	602	1410
LT	9	250	.	682	353	329	540	1024	441	960	1839	310	336	382	560	454	1235
		475	.	682	353	329	540	1024	404	960	1913	395	476	530	735	602	1410
	11	250	.	682	353	329	540	1053	441	960	1839	310	336	382	560	454	1235
		475	.	682	353	329	540	1053	404	960	1913	395	476	530	735	602	1410
	12	250	.	713	353	360	540	1103	404	960	1839	310	336	382	560	454	1235
		475	.	713	353	360	540	1103	441	960	1913	395	476	530	735	602	1410
LE 9N		250	.	720	360	360	540	1024	404	960	1839	310	336	382	560	450	1235
		475	.	720	360	360	540	1024	441	960	1913	395	476	530	735	602	1410

TYPE		RECEIVER	NET MASS	A	B	BB	C	D	E	F	G	H	J	K	L	M	N
LE	9	300	.	658	329	329	540	1024	338	950	1699	315	410	460	593	500	1268
		500	.	658	329	329	540	1024	406	1090	2013	391	458	542	731	608	1406
	11	300	.	720	360	360	540	1053	338	950	1699	315	410	460	593	500	1268
		500	.	720	360	360	540	1053	406	1090	2013	391	458	542	731	608	1406
	12	300	.	720	360	380	540	1103	338	950	1699	315	410	460	593	500	1268
		500	.	720	360	360	540	1103	406	1090	2013	391	458	542	731	608	1406
LT	9	300	.	682	353	329	540	1024	338	950	1699	315	410	460	593	500	1268
		500	.	682	353	329	540	1024	406	1090	2013	391	458	542	731	608	1406
	11	300	.	682	353	329	540	1053	338	950	1699	315	410	460	593	500	1268
		500	.	682	353	329	540	1053	406	1090	2013	391	458	542	731	608	1406
	12	300	.	713	353	353	540	1103	338	950	1699	315	410	460	593	500	1268
		500	.	713	353	360	540	1103	406	1090	2013	391	458	542	731	608	1406

Fig. 19. LE9, -9N, -11, -12/LT9, -11, -12 Complete Unit



UNIT	RECEIVER	A	D	E	F	G	H	J	K	L	M	N	NN	P	PP	R	S	X	XX
LE/LT7-8	250 L	700	109	404	960	1839	310	336	382	560	450	1333	1770	100	191.5	258	1070	970	229.5
	475 L		51	441		1913	395	476	530	735	602	1508	1945					1145	
LE/LT9-11-12	250 L	830	74	404		1839	310	336	382	560	450	1425	1980	195	322.5	265	1360	1020	330
	475 L		16	441		1913	395	476	530	735	602	1600	2155					1195	

		250 L	475 L
LE	7	.	.
	8	.	.
	9	.	.
	11	.	.
	12	.	.
LT	7	.	.
	8	.	.
	9	.	.
	11	.	.
	12	.	.

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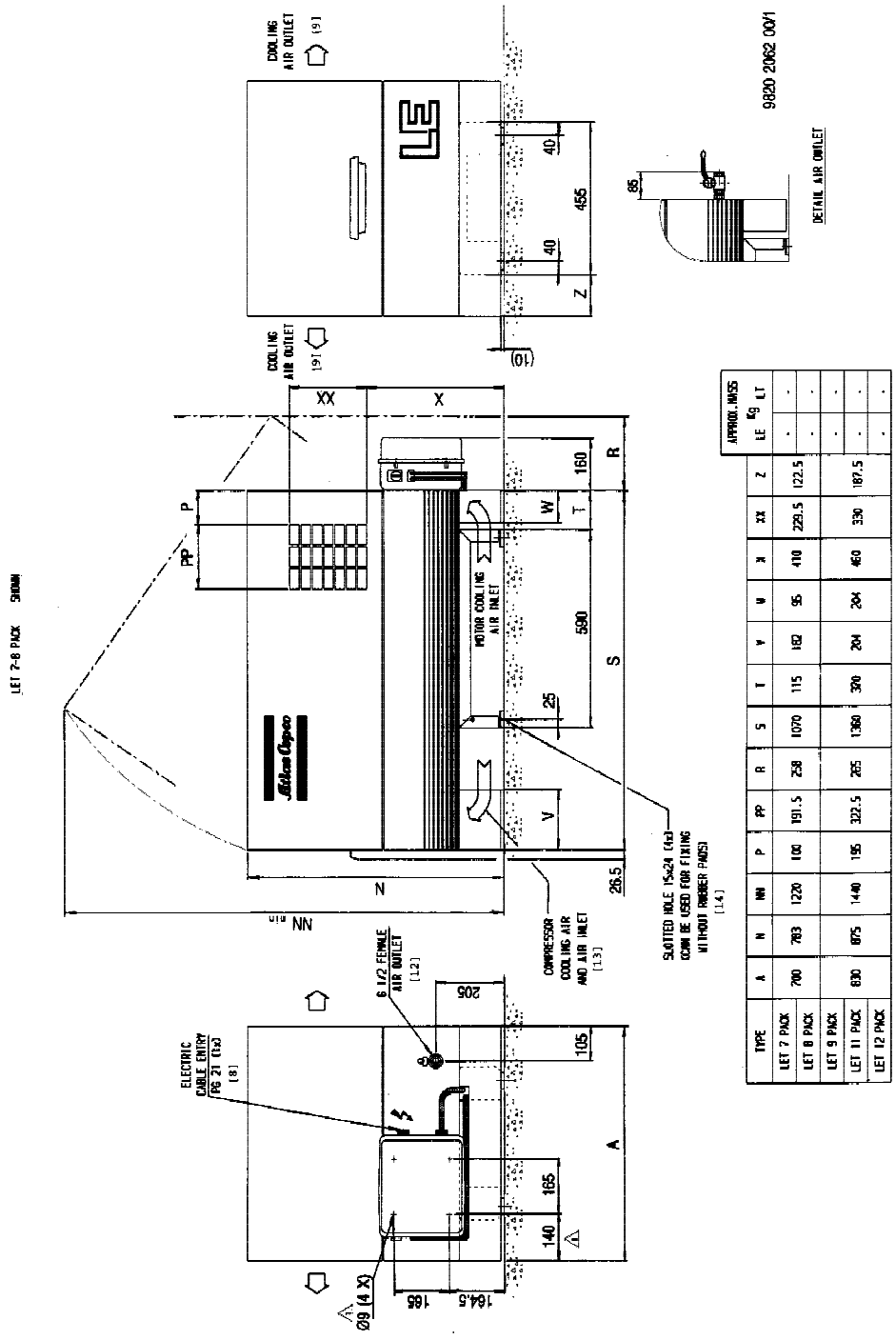
Fig. 20. LE/LT7, -8, -9, -11, -12 Complete Unit with optional silencing hood



TYPE	A	N	NN	P	PP	R	S	T	V	W	XX	Z	APPROX. MASS LE kg LT
LET 7 PACK	700	783	1220	100	191.5	258	1070	115	182	95	228.5	122.5	- -
LET 8 PACK													
LET 9 PACK													
LET 11 PACK	830	875	1440	195	322.5	265	1360	370	204	204	330	187.5	- -
LET 12 PACK													

Fig. 21. LE/LT7, -8, -9, -11, -12 Pack