Original instructions

BG00311267 A.001.1 2014-04-23

DC120/DC121R/DC122R Compressor and Pneumatic Circuit

SANDVIK

Table of Contents

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1 GENERAL

1.1 GENERAL

This document describes the components, operating principle, and troubleshooting of the DC120/DC121/DC122 pneumatic circuit.

Control devices and warning lights are described in the operator's manual, in the chapter entitled 'Control devices'.

DC rigs are equipped with a pneumatic circuit that produces pressurised air for the following purposes:

- flushing the drill hole;
- lubricating the shank;
- cleaning dust collector filters;
- cleaning dust collector filters; operating the dust collector cut--off cylinder;
- adjusting the diesel engine's speed.

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2 SAFETY

2.1 Safety

⚠ WARNING	
 	**IGNORING INSTRUCTIONS HAZARD!** **False service and repair methods could cause death or severe injury.** **Always follow the safety instructions and be careful with your work.** **Only people who have been given specific service training are allowed to undertake service, adjustment and repair procedures. Read the instructions before undertaking any servicing, adjusting or repairing.**

⚠ WARNING	
	**ENTANGLEMENT HAZARD!** **Getting entangled with the moving or rotating parts of the machine could cause death or severe injury.** **Carry out service and repair work onky when the rig is not running. Make sure that the rig cannot be accidentally started or moved when you are carrying out the service.**

⚠ WARNING	
	**HIGH PRESSURE INJECTION HAZARD!** **Compressed air jets could cause severe injury.** **Release pressure before opening the filling caps or the compressed air connectors.**

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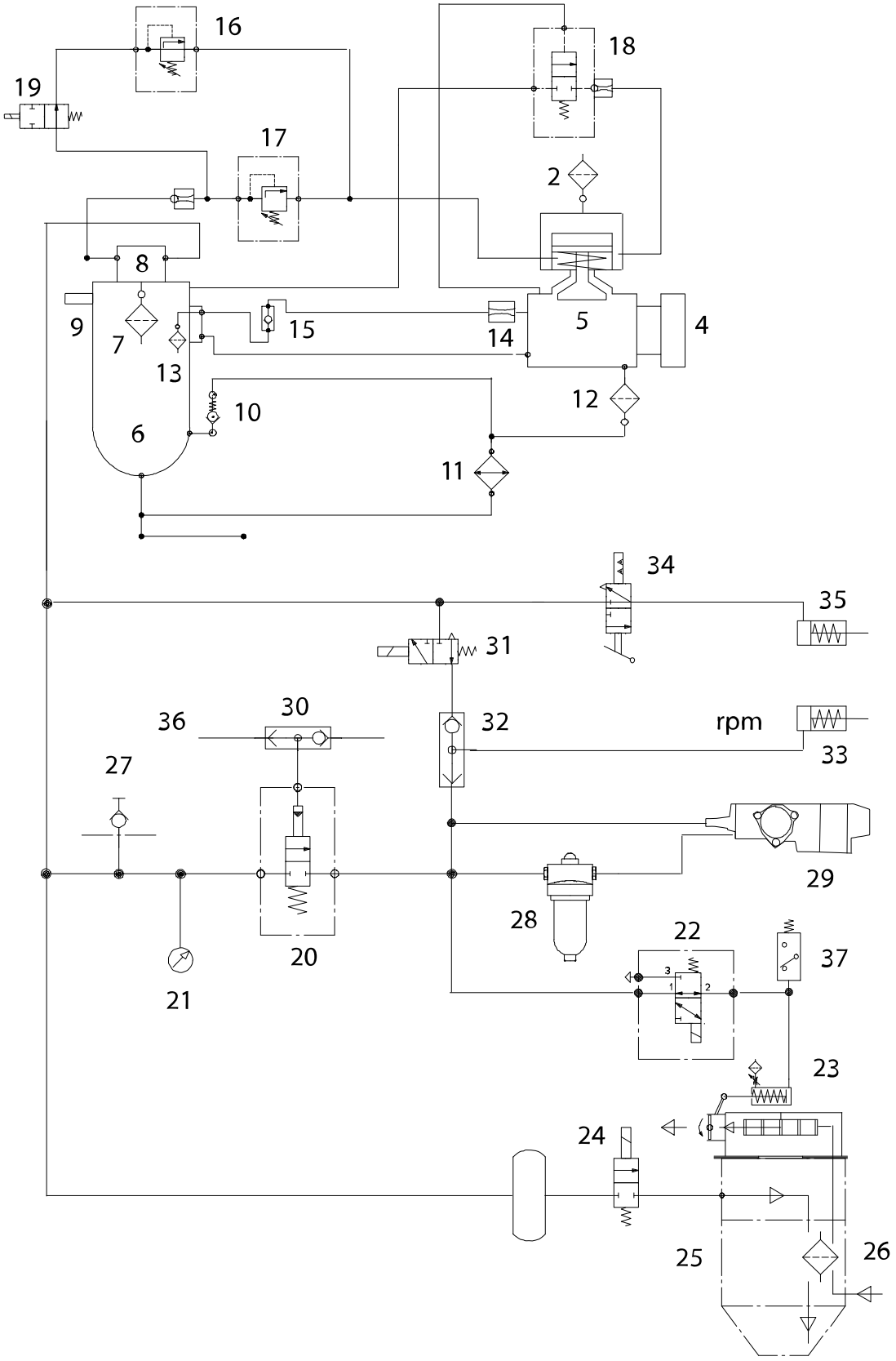
3 PNEUMATIC CIRCUIT DIAGRAM AND COMPONENTS

3.1 Pneumatic circuit diagram and components of DC 120



DC120/DC121R/DC122R Compressor and Pneumatic Circuit

1	*Air pre–cleaner**	*2*	*Compressor air filter*
3	*Air filter service indicator**	*4*	*Air end, screw compressor*
5	*Intake valve*	*6*	*Oil/air receiver*
7	*Oil separator element*	*8*	*Minimum pressure valve*
9	*Safety relief valve*	*10*	*Thermostat*
11	*Oil cooler*	*12*	*Oil filter*
13	*Strainer (in the oil regeneration line)*	*14*	*Orifice (in the oil regeneration line)*
15	*Non–return valve (in the oil regeneration line)*	*16*	*Pressure regulator, 4 – 7 bar*
17	*Pressure regulator, 8 bar*	*18*	*Blow–down valve*
19	*Pressure selector valve*	*20*	*Flushing valve*
21	*Flushing pressure gauge*	*22*	*Suction cut–off valve*
23	*Dust collector cut–off cylinder*	*24*	*Blow–out valve*
25	*Dust collector*	*26*	*Dust collector filters*
27	*Air output connection*	*28*	*Shank lubrication unit*
29	*Rock drill*	*30*	*Flushing control (hydraulic)*
31	*Diesel engine's RPM selector valve*	*32*	*RPM shuttle valve*
33	*Rpm cylinder*	*34*	*Drill steel retainer valve*
35	*Drill steel retainer cylinder*	*36*	*Percussion pressure line*
37	*Blow–out and hour meter pressure switch*		

* = not on the chart

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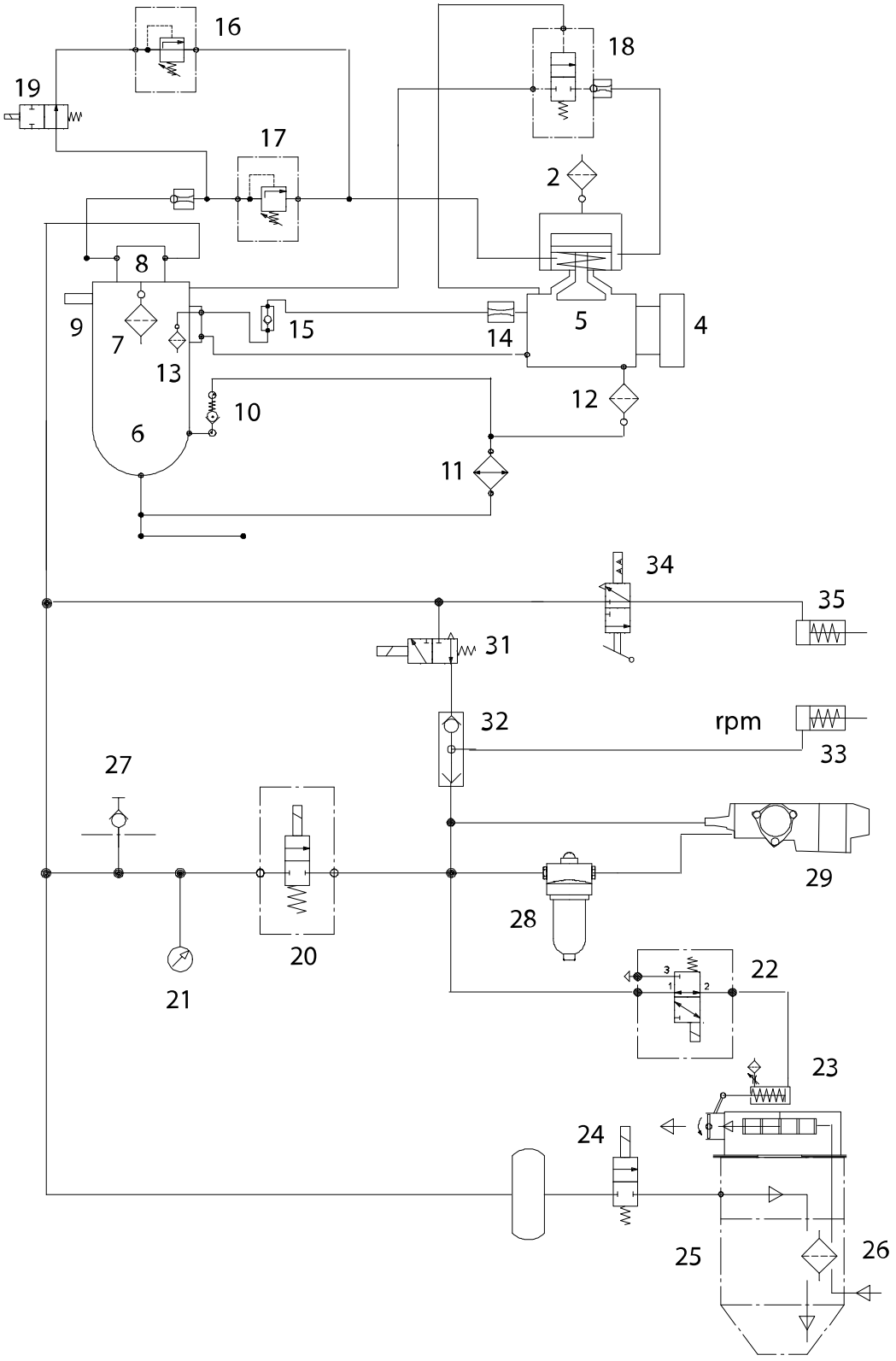
3.2 Pneumatic circuit diagram and components of DC 121R, DC 122R and DC 125R



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DC120/DC121R/DC122R Compressor and Pneumatic Circuit

1	*Air pre–cleaner**	*2*	*Compressor air filter*
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19	*Pressure selector valve*	*20*	*Flushing valve*
21	*Flushing pressure gauge*	*22*	*Suction cut–off valve*
23	*Dust collector cut–off cylinder*	*24*	*Blow--out valve*
25	*Dust collector*	*26*	*Dust collector filters*
27	*Air output connection*	*28*	*Shank lubrication unit*
29	*Rock drill*	*30*	*Flushing control (hydraulic)*
31	*Diesel engine's rpm selector valve*	*32*	*Rpm shuttle valve*
33	*Rpm cylinder*	*34*	*Drill steel retainer valve*
35	*Drill steel retainer cylinder*		

* = not on the chart

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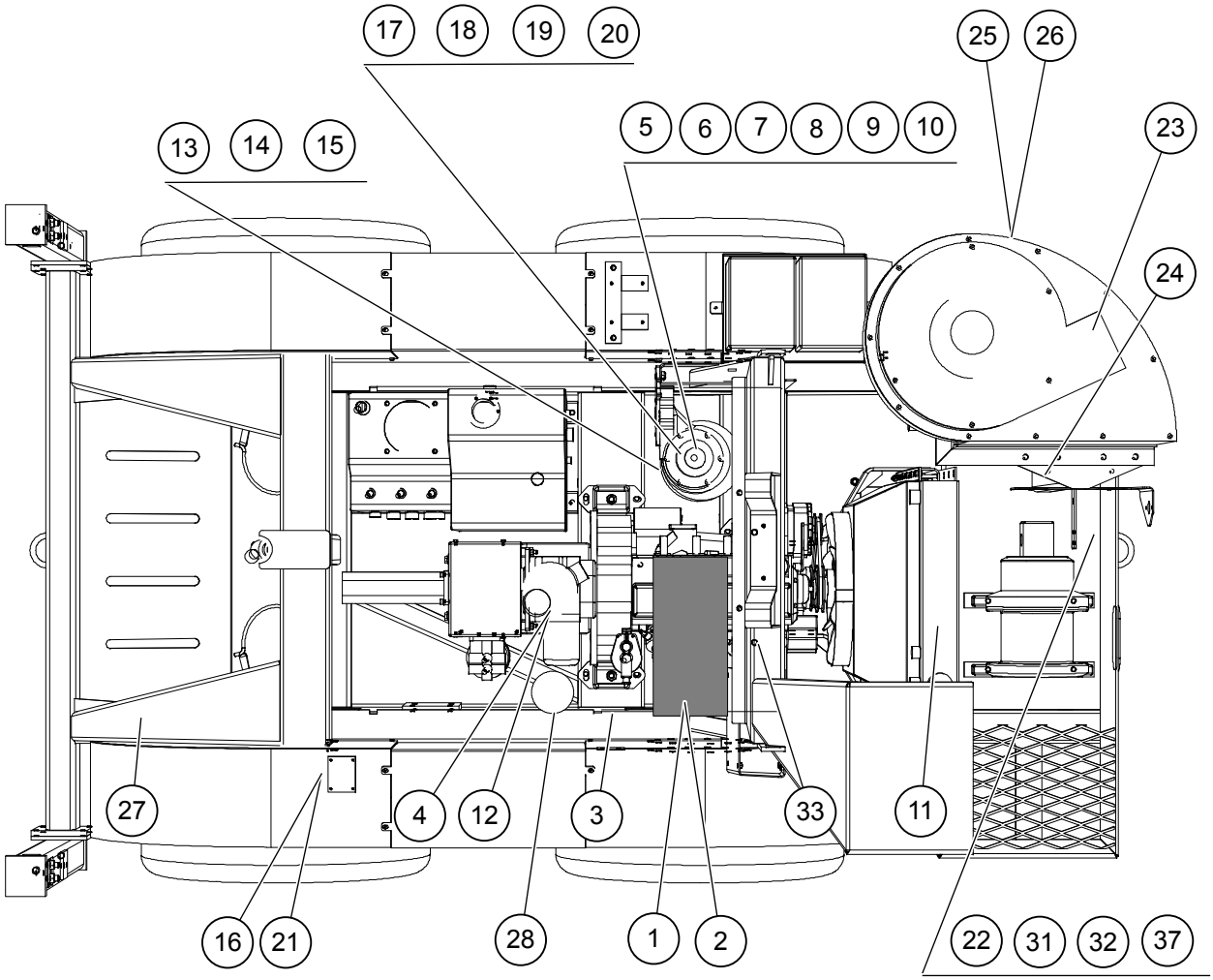
4 LOCATION OF COMPONENTS

4.1 Location of components



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DC120/DC121R/DC122R Compressor and Pneumatic Circuit

1	*Air pre--cleaner**	*2*	*Compressor air filter*
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7	*Oil separator elements*	*8*	*Minimum pressure valve*
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37	*Blow--out and hour meter pressure switch*		

* = not on the chart

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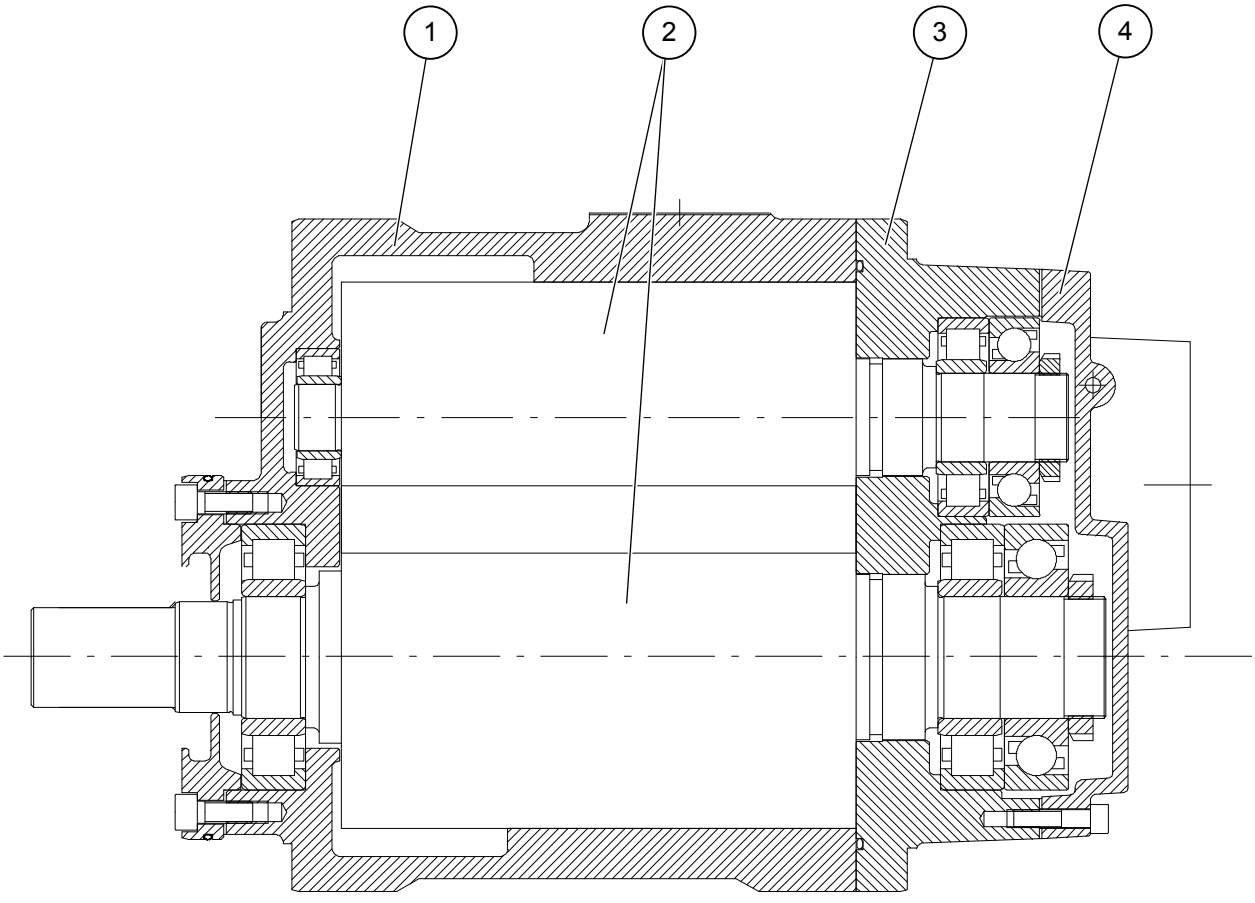
5 AIR END

5.1 Technical data

Type	Enduro 3
Max. ambient temperature	40...45°C
Thermal switch	115°C
Output	1.2 m³/min
Max. operating pressure	8 bar
Bearings	Roller bearings

5.2 Air end main components

The most important part of the compressor is the air end, which includes the following components:



1 Housing
2 Rotors
3 Outlet cover
4 Bearing housing cover

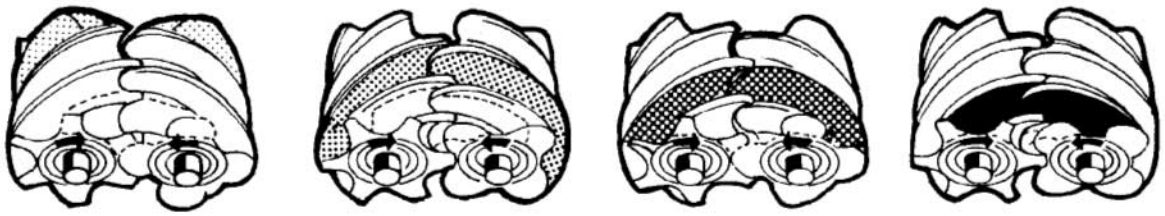
5.3 Compressing principle

Together with the housing, the two meshing rotors form the compression chamber. The rotating rotors take air into the housing through the intake port as the grooves of the rotors pass the intake port.

As the rotors turn, the meshing point closes the passage to the intake port and the air is trapped in the chamber.

As rotation continues, the volume of the chamber between the two rotors becomes smaller and the pressure increases.

When the desired and most economical operational pressure is reached, the compressed air flows through the outlet port into the receiver.



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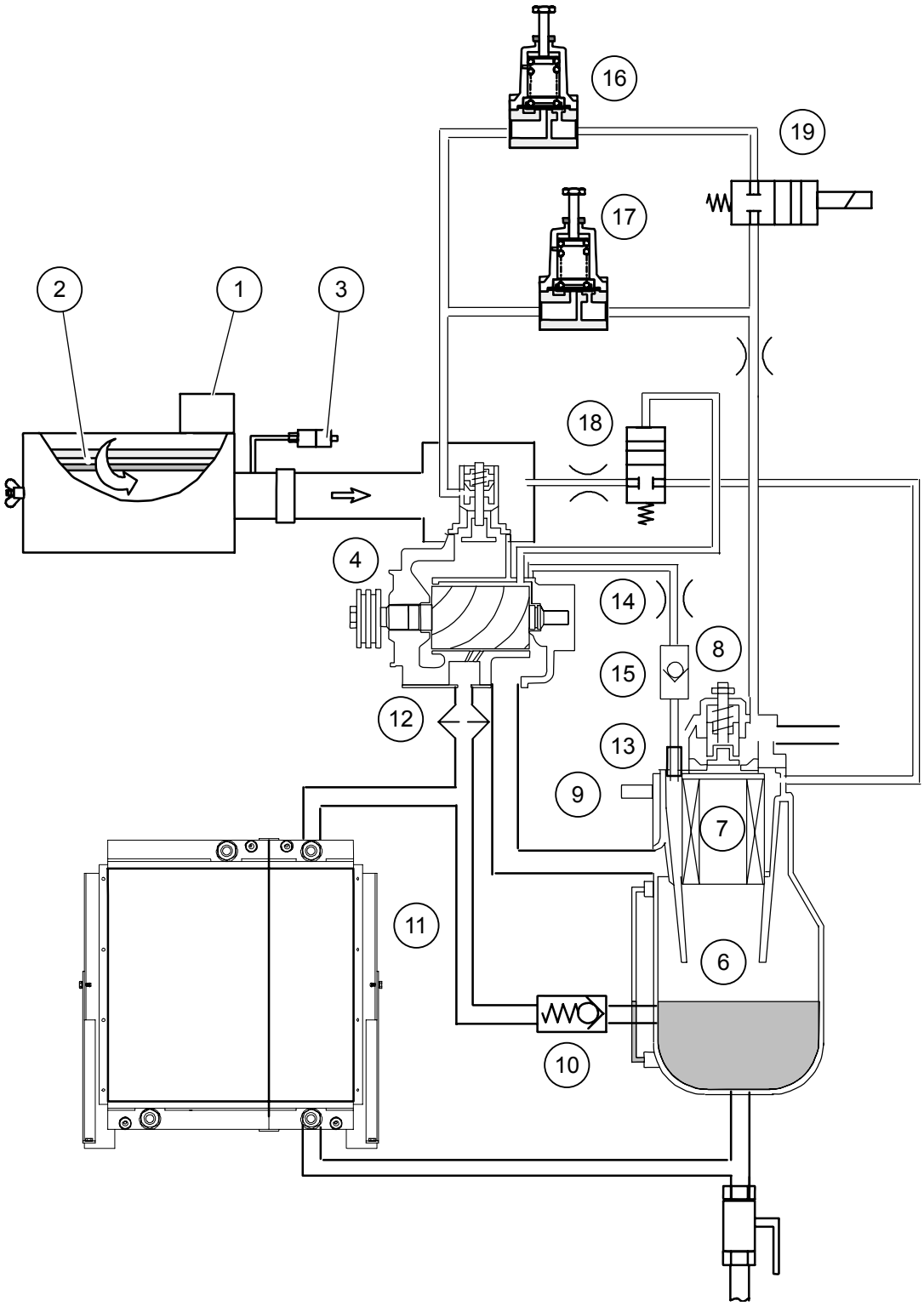
DC120/DC121R/DC122R Compressor and Pneumatic Circuit



The components are shown under normal operating conditions when compressed air is being produced.

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6 OPERATING PRINCIPLE OF THE COMPRESSOR CIRCUIT

6.1 General

The built--in air end (4) produces the pressurised air used by the drilling rig. From the air end the air is led into the oil/air receiver (6), where the oil is separated from the air.

The pressure regulator (16) or (17) adjusts the intake valve (5) that regulates the intake port according to the air consumption.

6.2 Description of components

1. **Air pre--cleaner**
   - The intake air is forced into a whirling motion inside the air filter housing, and centrifugal force separates the coarsest impurities from the air.
2. **Compressor air filter**
   - From the pre--cleaner the air flows through the filter unit (2), where it passes first through the air filter and then through the safety filter.
3. **Air filter service indicator**
   - The filter element must be changed whenever the service indicator shows red. It locks into this position. The indicator must be checked daily by pressing the button on the top, and the red warning colour must show. (For filter servicing instructions, refer to the carrier manual and maintenance schedules.)
4. **Screw compressor**
   - The filtered intake air is compressed by the rotating rotors. Oil is used to cool the air. It also seals the clearances between the rotors and the housing, and it lubricates the unit.
5. **Intake valve**
   - Suction acting on the valve disc opens the intake valve when the compressor is started. The intake valve also acts as an air end underload valve by restricting the intake flow whenever the compressor output exceeds the air consumption. The disc valve acts as a non--return valve when the rotors are stopped. This prevents the oil in the rotor chamber from entering the intake duct through the compressor.
6. **Oil/air receiver**
   - The receiver functions as an air and oil receiver as well as an oil separator.
7. **Oil separator**
   - The oil separator separates out the oil that is mixed with the compressed air.
8. **Minimum pressure valve**
   - The minimum pressure valve maintains a pressure of at least at 2.5 bar in the receiver while the compressor is running. This pressure ensures oil circulation in the compressor.
9. **Safety relief valve**
   - Restricts the maximum pressure in the receiver to 11.7 bar.

10. **Thermostat**
    - The thermostat directs the oil below 55°C past the oil cooler. The thermostat starts to close when the oil temperature exceeds 55 – 58°C, allowing some of the oil to flow through the cooler. When the oil temperature exceeds 58°C, the thermostat closes and all of the oil flows through the oil cooler.
11. **Oil cooler**
    - The system includes cooling cores for the hydraulics and for the compressor oil circuit.
12. **Oil filter**
    - The oil filter is located at the side of the air end.
13. **Strainer**
    - Prevents impurities from entering the air end.
14. **Orifice**
    - Restricts the oil flow in the oil regeneration line.
15. **Non--return valve**
    - Prevents the oil/air mixture from entering the air end oil/air receiver when stopping. The screw unit remains pressurised until the pressure in the oil/air receiver is released.
16. **Pressure regulator**
    - The pressure regulator controls the intake valve on the basis of the air consumption, maintaining the desired pressure. By adjusting the valve spring, one may adjust the compressor output pressure, which can be between 4 and 7 bar.
17. **Pressure regulator**
    - The pressure regulator controls the intake valve on the basis of the air consumption, maintaining the desired pressure. By adjusting the valve spring, the compressor output pressure can be regulated up to 8 bar.
18. **Blow--down valve**
    - The blow--down valve automatically releases the pressure from the oil/air receiver when the compressor is stopped. The pressure is released through a valve.
19. **Pressure level selector valve**
    - Selects a higher or lower pressure.
20. **Flushing valve**
    - The flushing valve opens and flushing is started automatically when percussion is initiated.
21. **Flushing pressure gauge**
    - Displays the flushing pressure.
22. **Dust collector’s suction cut--off valve**
    - The dust collector suction can be shut off easily and quickly by closing the valve: the pressure stops affecting the cut--off cylinder and the exhaust port flap is closed by the spring.
23. **Dust collector cut--off cylinder**
    - Closes the dust collector cut--off when: -- drilling is stopped -- the suction cut--off valve is activated

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24. **Blow--out valve**
    - Allows pressure to the dust collector filters.
25. **Dust collector**
26. **Dust collector filters**
27. **Air output connection and valve**
28. **Shank lubrication unit**
    - Air/oil mist is used for lubrication of the rock drill's front end. The amount of oil is adjusted by an oil flow regulator valve.
29. **Rock drill**
30. **Shuttle valve**
    - Directs the percussion pressure to flushing valve 20; the flushing valve opens.
31. **Shuttle valve**
    - When flushing valve 20 opens, the compressed air flows into the compressed air cylinder through shuttle valve 31.
32. **Rpm control valve**
    - Selects maximum speed for the diesel engine.
33. **Rpm cylinder**
    - Adjusts the engine's accelerator lever position.
34. **Drill steel retainer valve**
    - Allows pressure to the drill steel retainer cylinder.
35. **Drill steel retainer cylinder**
36. **Percussion pressure line**
    - Controls the flushing valve (DC120).
37. **Blow--out and hour meter pressure switch**
    - Percussion pressure control (DC120).

6.3 Air circulation

The intake air is forced into a whirling motion inside the air filter housing, and centrifugal force separates the coarsest impurities from the air.

The pre--cleaned air flows through the air filter (2) into the air end (4). The intake and non--return valve (5) on top of the air end open when the air end is started. The intake valve (5) is controlled by the pressure from the pressure regulator (16) or (17).

After compression, the compressed oil/air mixture is led from the screw compressor into the spiral duct of the oil/air receiver (6), where most of the oil is separated from the air and falls to the bottom of the receiver. The rest of the oil in the air is separated out when the air flows through the oil separator element (7). The oil from the bottom of the separator chamber is forced through the pipe to the intake side of the compressor unit, taking advantage of the pressure difference. The pipe includes the strainer (13) and orifice (14) (on top of the oil/air receiver), which must be cleaned regularly. As soon as the air pressure in the receiver exceeds the opening pressure of the minimum pressure valve (8), the clean, oil--free air is fed outward for hole flushing and other pneumatic devices.

6.4 Oil circulation

While the compressor is running, the minimum pressure valve (8) ensures that the pressure in the oil/air receiver does not fall below 2.5 bar. This pressure forces the oil from the receiver into the oil circuit. The oil circulation is based on the pressure difference between the receiver and the intake side of the compressor.

The oil flows to the thermostat (10) through the connection at the bottom of the air/oil receiver.

Oil temperature below 55°C

The cold oil flows directly through the thermostat valve (10) and the oil filter (12) to the compressor (4).

Oil temperature 55--58°C

The bimetallic spring in the thermostat valve (10) expands and starts closing the thermostat valve, and some of the oil flows through the oil cooler (11).

Oil temperature over 58°C

The thermostat valve is fully closed and all of the oil flows through the oil cooler (11).

From the oil cooler the oil flows to the oil filter (12). The filter has a built--in bypass valve that allows the oil to flow past the filter if the filter is clogged or if the oil is too thick when it is cold. The pressure required for the bypass valve to open is 3.5 bar.

From the filter the oil is led into the lubricating channels at the intake side of the screw compressor (4). At the beginning of the single--phase compression, oil is injected onto the rotors to cool down the air and to seal the clearances between the rotors and the housing. Oil is also led through other channels to lubricate the bearings and the shaft gasket.

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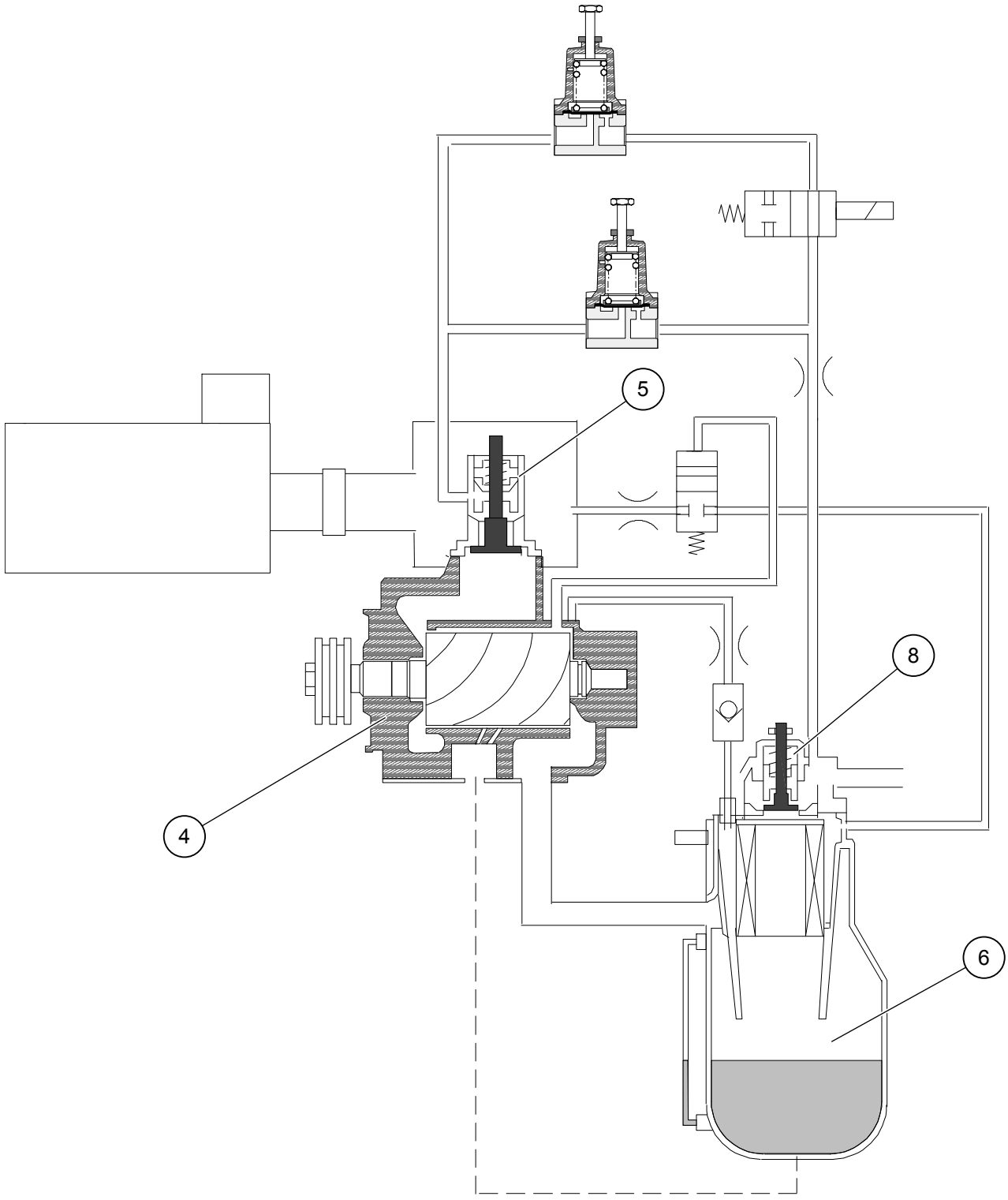
6.5 Compressor regulating system

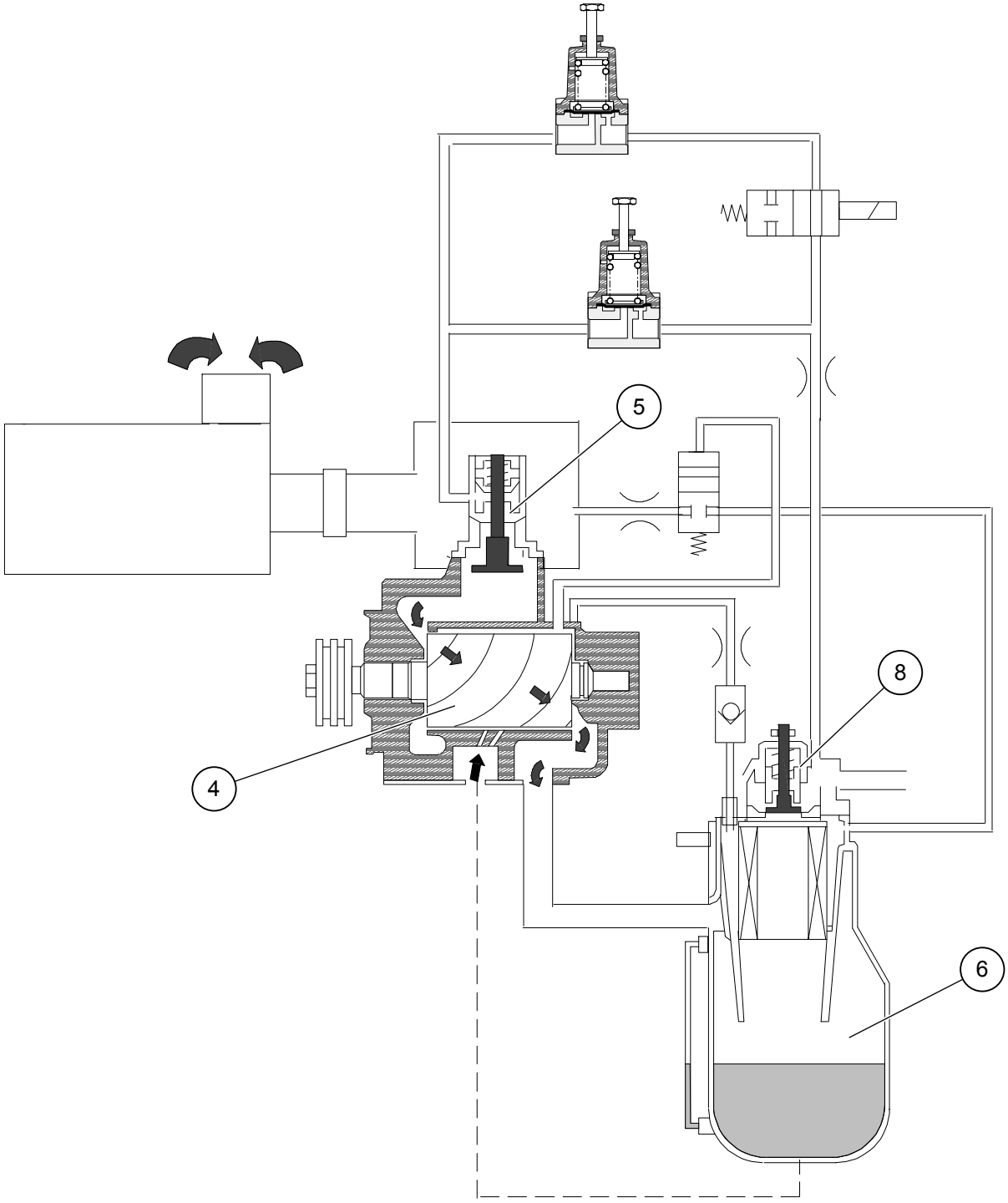
6.5.1 Before starting

The system is not pressurised. The air end (4) is not running and the intake valve (5) is closed, preventing oil from entering the intake duct from the compressor. The minimum pressure valve (8) at the top of the oil/air receiver (6) is also closed.



6.5.2 Start-up

When the compressor (4) starts running, it creates suction that opens the spring--loaded intake valve (5), letting air enter the unit. At the same time, the compressor sucks oil from the oil/air receiver (6). The rotating rotors compress the oil and air, and the mixture is led into the receiver. In the receiver the oil is separated from the air with oil separators. Since the pressure in the receiver is below the opening pressure of the minimum pressure valve (8) during starting, the valve remains closed.



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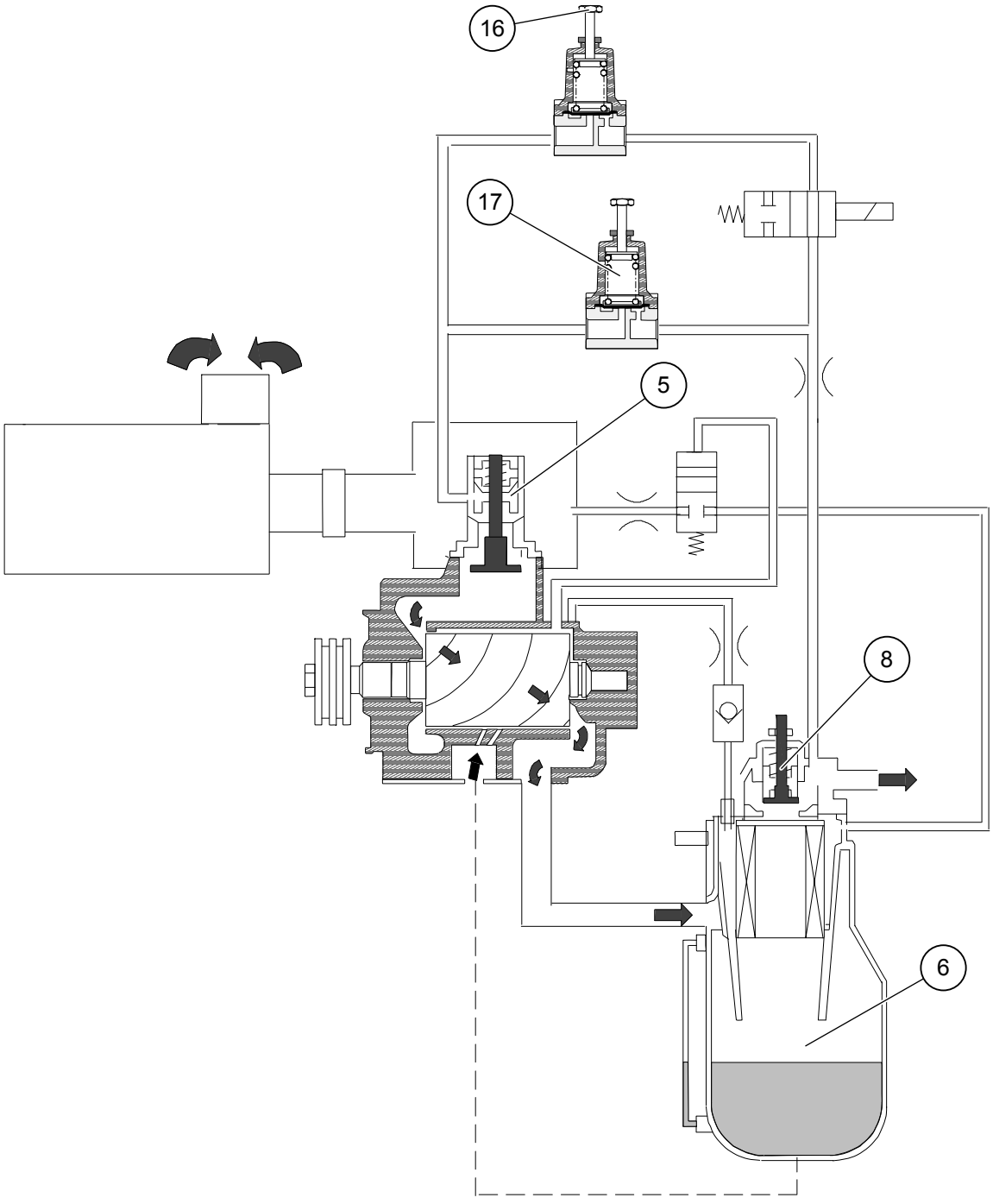
6.5.3 Output

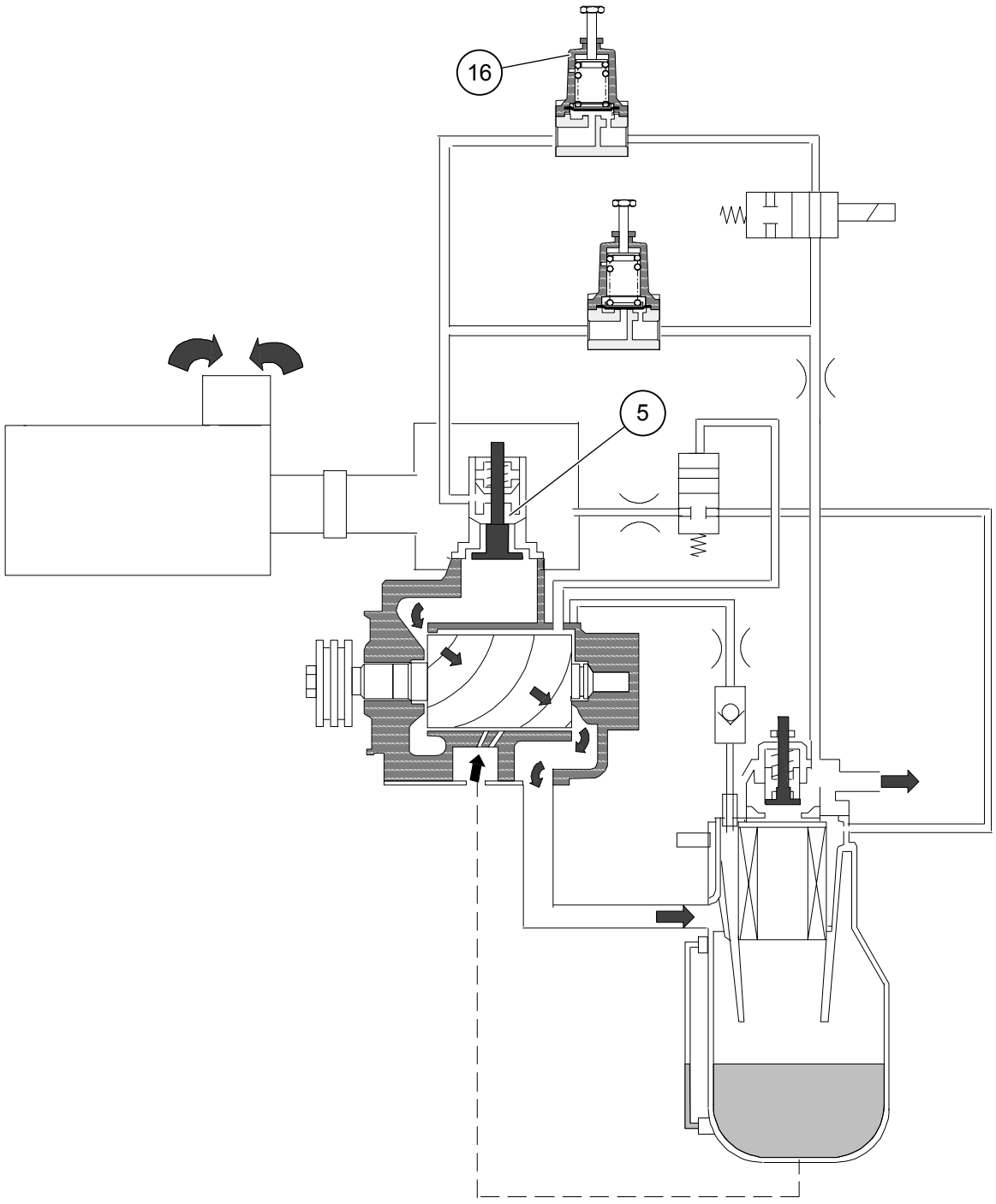
The intake valve (5) is fully open and the pressure in the oil/air receiver (6) starts rising. When the pressure reaches 2.5 bar, the air receiver's minimum pressure valve (8) opens. The pressure regulators (16, 17) are used to select the desired output pressure for the compressor. Normally, the pressure is adjusted with a valve (17) so that the intake valve starts closing at 7 bar and is fully closed at 8 bar. During drilling, the valve (16) is used to adjust the flushing air pressure to 4 -- 7 bar, as needed. The intake valve operates steplessly between 3 and 8 bar. The oil separated out in the separators is fed into the air end through the regeneration line. The line includes the orifice, non--return valve, and strainer.



6.5.4 Throttling

When the system pressure reaches the pressure setting indicated by the regulator (16), the regulator opens, allowing the air to enter the intake valve (5). The pressure pushes the valve's piston and partially closes the air intake port, thus restricting airflow to the compressor.

The intake valve (5) operates steplessly over a 1--bar range (for example, it starts to close at 7 bar and is completely closed at 8 bar). The normal pressure setting for the system is 7 bar, but it is adjustable between 3 and 8 bar.



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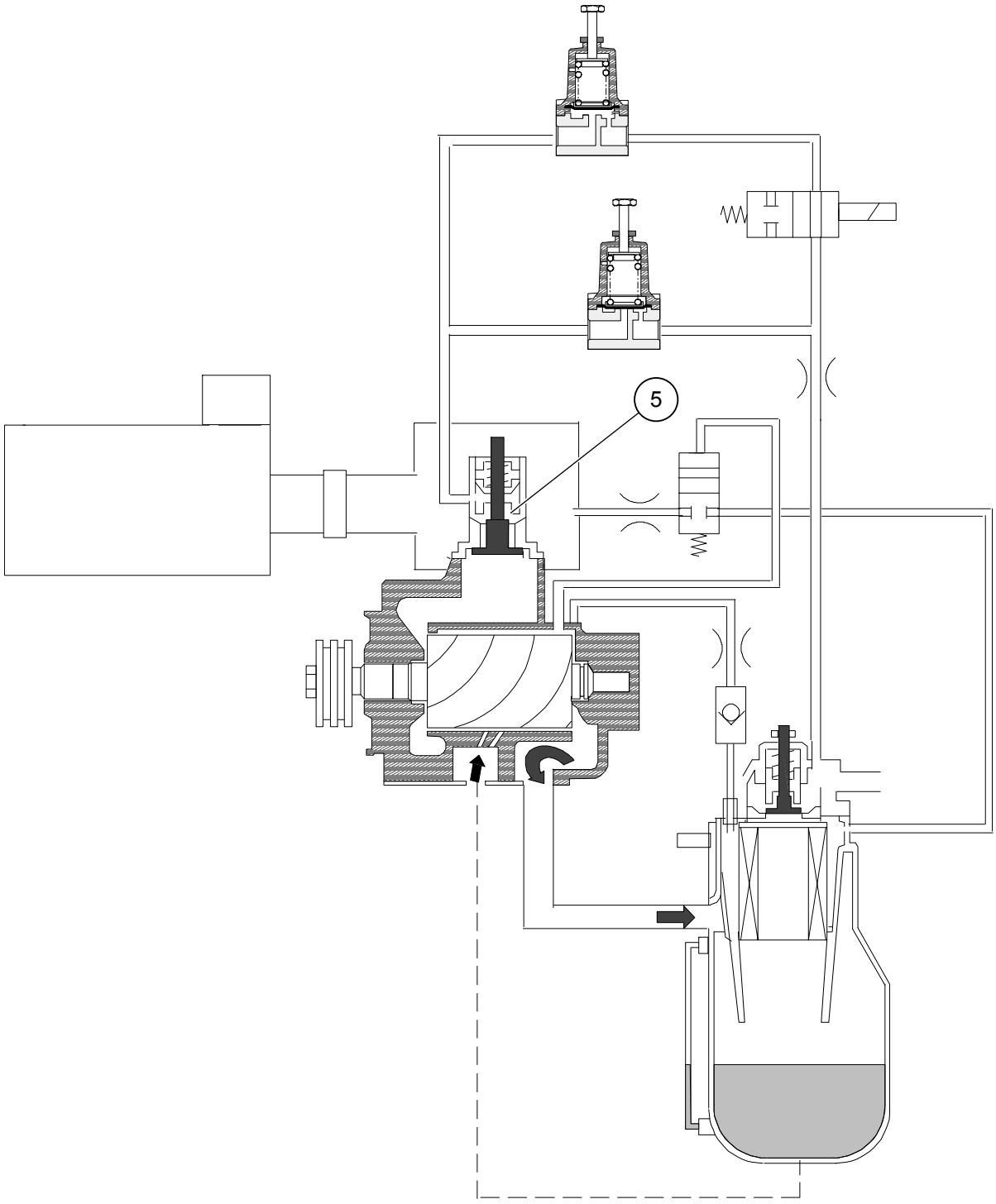
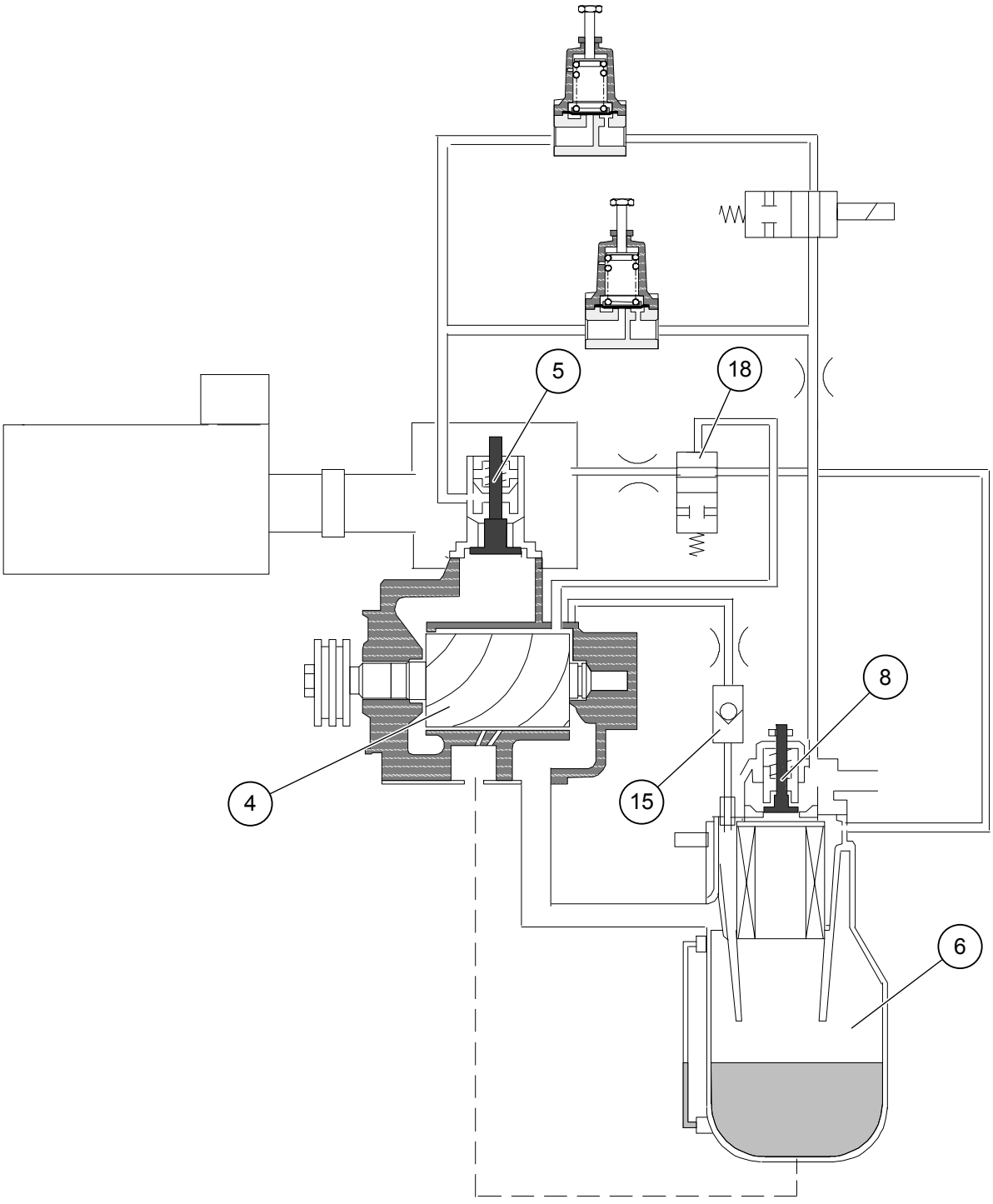
6.5.5 Idling

In this situation, the compressor output exceeds the air consumption. The only difference with throttling is that the intake valve (5) is now completely closed; only oil circulates in the compressor circuit.



6.5.6 Stopping

When the compressor stops rotating, it also ceases to suck in air. With no suction present, the intake valve (5) is closed by the spring. Because of the pressure in the oil/air receiver (6), the compressor (4) becomes pressurised through the delivery line. The line from the compressor to the blow--down valve (18) is pressurised. The valve opens and releases the pressure from the receiver. The non--return valve (15) prevents air from entering the screw compressor. When the system pressure drops below the pressure setting for the minimum pressure valve (8), it closes.



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WARNING! HIGH PRESSURE INJECTION HAZARD!
High pressure air spray could cause severe injury.
The line from the oil/air container remains pressurised when the minimum pressure valve has closed, unless air is still being used – e.g., for blowing clean the dust collector filters. Release the pressure before starting any maintenance or repair work.

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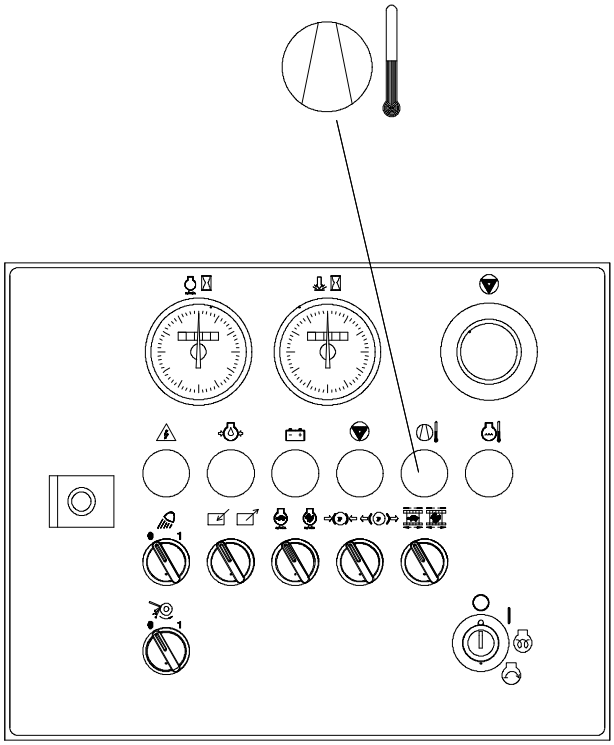
7 CONTROL INSTRUMENTS OF THE COMPRESSOR CIRCUIT

7.1 Compressor output air thermal switch

If the compressor temperature rises above 115°C, the diesel engine will stop and the indicator lamp on the instrument panel will light.



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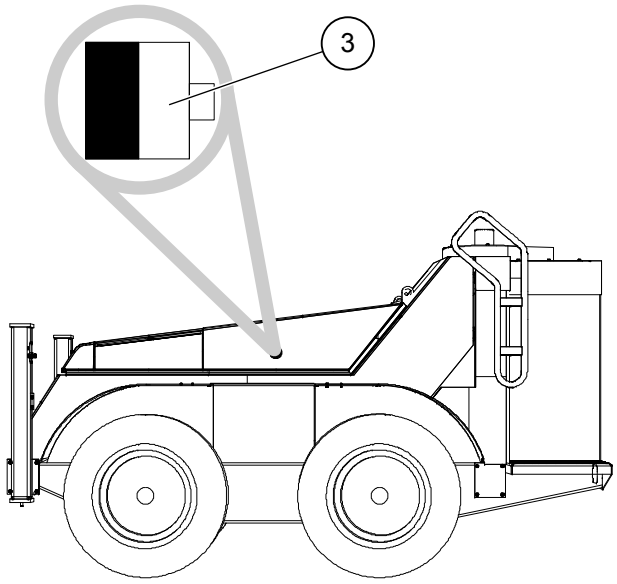
7.1.1 Air filter service indicator

The air filter element must be replaced whenever the service indicator (3) shows red. The air filter element must be replaced according to maintenance schedule or every six months. The safety filter must be replaced according to maintenance schedule.



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8 ADJUSTING PRESSURE

8.1 ADJUSTING PRESSURE

The task of the compressor's regulating system is to adjust the compressor output according to the amount of air required and to maintain as low a power consumption as possible for the amount of compressed air produced. The output adjustment range is stepless between the minimum pressure and full compressor output. The minimum pressure (2.5 bar) ensures adequate screw compressor lubrication.

The intake valve regulates the output. An automatic control valve takes care of opening and closing the intake valve. The control valve monitors the compressor pressure and keeps it within the selected range. This range is normally 1 bar; in other words, depending on consumption, this is the amount by which the compressor output pressure can fluctuate. The control valve (A) that regulates the higher pressure used has a ø 1.0 mm hole in its nipple to allow air to leak out. Intake valve control does not operate if this hole is clogged.

The control valve (A) that regulates high pressure is adjacent to the compressor air/oil receiver, attached to the receiver bracket. The control valve (B) that regulates the lower pressure used is located on the front panel adjacent to the tramming valves. Before the control valves there is a ø 1.5 mm orifice that damps sudden pressure fluctuations and thus stabilises the operation of the control valves. The output pressure can be regulated using the adjusting screw on top of the control valve that regulates low pressure. By tightening the adjusting screw, the pressure is increased, and by loosening the screw, the pressure is decreased. The maximum pressure is regulated using the control valve that regulates high pressure. **Do not overload the diesel engine during pressure adjustment!** The pressure range is automatically selected using the pressure selector valve. The higher pressure is used when cleaning and separately flushing the dust collector.

When the power pack is stopped, the out--blow valve purges the pressure from the receiver. This way, when the diesel engine is started, the compressor is never rotated 'against pressure'. The task of the ø 1.0 mm orifice in the out--blow line is to prevent the pressure from decreasing too rapidly, and thus to prevent the oil from boiling over in the receiver.

1. The pressure is adjusted while the compressor is running.
2. Turn flushing off.
3. Screw the valve (16) shut. Adjust the flushing pressure to 8 bar by adjusting valve 17. Refer to the flushing pressure gauge for the pressure.

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9 TROUBLESHOOTING

9.1 Insufficient amount of air

POSSIBLE REASON	CHECK/PROCEDURE
Compressor belt broken or slipping.	Replace or tighten belt.
Clogged suction air filter.	Clean or replace the filter.
Incorrect intake valve position.	Check adjustment.
Clogged oil separator.	Replace oil separator.
Blow--down valve open.	Check the valve.
Output valve closed.	Check for jamming.
The ø 1.0 mm drain hole next to the control valve is clogged.	Check and clean.
Air consumption too high.	Check leaks and air--consuming devices (e.g., the blow--out valve and drill steel retainer).

9.2 The compressor overheats

POSSIBLE REASON	CHECK/PROCEDURE
Oil level too low.	Check oil level and top up if necessary.
Faulty thermostat (10). (Oil circulation through the cooler core is partially or completely obstructed.)	Check the operation and condition of the thermostat (10).
Dirty oil cooler core (11).	Clean the core.
Clogged oil filter (12). (Poor oil circulation – poor cooling efficiency)	Replace the oil filter (12). Also check the condition of the air filter and the tightness of the inlet duct!
Low output pressure. (Poor oil circulation with low receiver air pressure)	Increase the pressure by adjusting the pressure regulator (17). Low pressure may also be caused by excessive air consumption.
Oil viscosity is too high (oil too thick). (Poor oil circulation – poor cooling efficiency)	(Poor oil circulation – poor cooling efficiency)
Air in the oil cooler core. (Poor circulation)	Bleed the oil cooler core and switch to a different type of oil if foaming occurs.

9.3 Oil consumption too high

POSSIBLE REASON	CHECK / PROCEDURE
Clogged oil return line. (Too much oil in the separator chamber of the oil/air receiver – oil mixes with the output air)	Clean the orifice (14) (ø 1.0 mm) on top of the oil/air receiver as well as the strainer (13) and the non--return valve (15) located in the same line.
Faulty or loose oil separator element (7) or O–ring.	Check the oil separator element (7) and the O--ring (for, e.g., holes in the element).

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POSSIBLE REASON	CHECK / PROCEDURE
Oil separator clogged.	Replace oil separator.
Wrong oil in the compressor.	Change oil type (refer to oil recommendations).
Oil level too high.	Check the oil level and drain if necessary.
Foaming oil.	Check the oil grade –refer to the oil recommendations. Check the oil level.

9.4 Insufficient air output

POSSIBLE REASON	CHECK / PROCEDURE
Incorrectly adjusted or faulty pressure regulator (17).	Increase pressure with the pressure regulator. Check the condition of the regulator.
Leaking blow--down valve (18).	Clean the blow--down valve.
Clogged breather hole of the intake valve connecting nipple. (Pressure under the intake valve piston not released)	Clean the breather hole of the intake valve connecting nipple (intake line).
Leaking pneumatic circuit. (For example, a broken hose allows the air to escape)	Repair the leaks.
Faulty dust collector blow--out valve.	Turn the switch to the forced flushing position. The solenoid valve is not activated and it closes. Loosen the connector to the dust collector while the flushing is on. If air comes out through the connection, the solenoid valve is faulty.

9.5 Pressure too high

POSSIBLE REASON	CHECK/PROCEDURE
Leaking intake valve (5) piston seal or faulty intake valve. (The intake valve does not close properly)	If air escapes through the breather hole above the piston while the compressor is running and the intake valve is closed, the piston seals must be replaced.
Jammed or incorrectly adjusted pressure regulator (17).	Decrease the pressure with the pressure regulator. Check the condition of the regulator.
The shaft seal of the air end is leaking.	Replace shaft seal.

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Original instructions

BG00416212 A.001.1 2014-04-28

Shank lubricator

SANDVIK

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1 SHANK LUBRICATOR

1.1 General

1. Shank lubrication must **always** be used when drilling with a chain feed mounted rock drill. The lubricator mixes lubricating oil with compressed air. The oil mist lubricates the rock drill rotation mechanismand the shank. In addition to providing lubrication, the pressurized air prevents dirt from entering the rock drill through the front end. It is recommended that a water separator is always used in the air line.

   Shank lubrication air consumption . . 200 — 400 l/min/rock drill

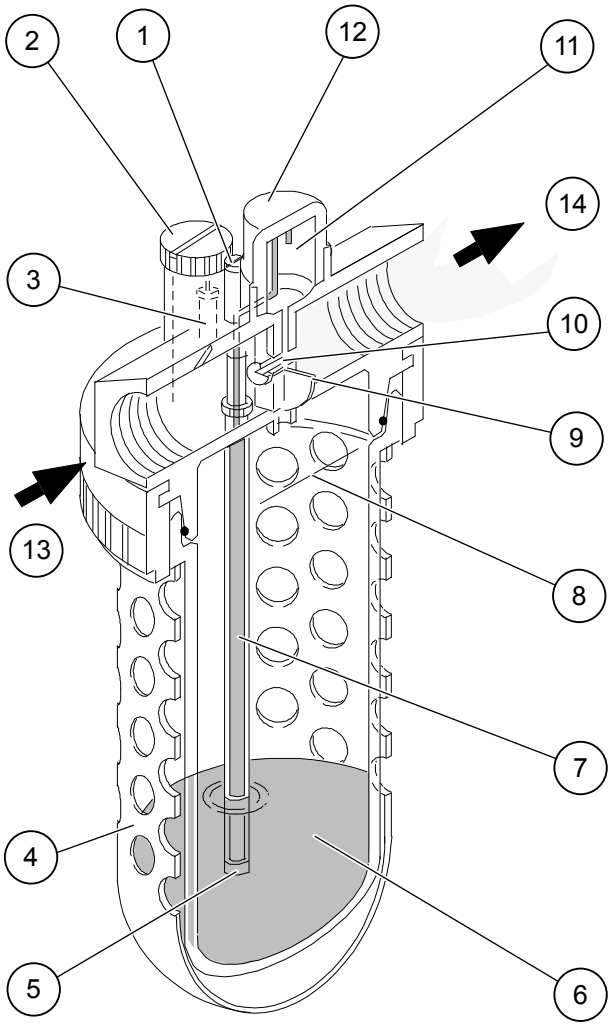
   Shank lubrication air pressure . . . . . 6 — 8 bar

   Shank lubrication oil consumption . . 50 — 100 g/h/rock drill

   (for precise information see your rock drill manual)

2. **NOTE!** In HE 122 rock drill the shank lubrication does not work if the flushing tube is broken.
3. Shank lubrication is extremely important when water flushing is used. Besides lubricating the shank, air maintains a positive pressure in the rock drill's front end, thus preventing the entrance of flushing water into the rock drill. In the rock drill front end, the air pressure has to be at least 1 bar (10 PSI) higher than the water pressure.
4. Use only recommended oil types in the shank lubricator. Oil type is chosen according to the ambient temperature. See Chapter 5 "Oil recommendations".
5. It is important that the oil is of sufficiently low viscosity to mix easily with the air. That is why you should use different oil grades during winter and summer. Use always clean oil and clean vessels.
6. Shank lubrication must always be on when the rock drill powerpack is running. In this way, the access of dirt into the rock drill is prevented.

1.2 Structure and Components



1	*Oil/air mixture ratio precision adjustment screw*	*2*	*Oil/air mixture ratio precision adjustment screw*
3	*Needle valve closes the bowl from pressure on filling–up*	*4*	*Bowl is protected with a metal shell*
5	*Oil filter keeps the drip pipe clean*	*6*	*Large oil reservoir makes long filling intervals possible*
7	*Flexible oil pipe enables the removal of the bowl even in restricted locations*	*8*	*The entire bowl volume can be used when adding oil*
9	*Oil/air mixture ratio automatic regulator*	*10*	*Oil mist generator*
11	*Drip pipe*	*12*	*Sight glass*
13	*AIR IN*	*14*	*AIR OUT*

1.3 Mounting

1. To minimize the danger of flying fragments in the event of glass bowl failure, the metal bowl guard should not be removed.
2. Mount the lubricator as close as possible to the rock drill.

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3. Mount the unit with the air flowing through the body in the direction indicated.
4. The minimum diameter for the shank lubrication hoses/adapters is 6 mm(¼").
5. Mount a separate lubricator for each rock drill.
6. The lubricator can be filled either through the filling plug or by removing the bowl.

1.4 Adjusting

Oil consumption is dependent on e.g. oil viscosity and air velocity. That is why the function of the lubricator must be observed daily.

1. By watching the drops falling from the drip pipe and turning the adjustment screw, adjust the lubricator to 30 --- 50 drops per minute per rock drill.

Note! ***When the shank lubrication is working properly it is normal, that the drill steel is oily up to about 25 cm (1 ft) from the rock drill.***

Make sure that air comes out through the shank lubrication exhaust hole (on the feed side of the front cover).

2. If the oil level in the oiler does not drop during drilling, the reason for this may be that:
   a) the oiler is incorrectly adjusted
   b) the oil pipe or oil filter is clogged up
   c) the filter is clogged or the oil is too stiff to pass through the filter
   d) the air pressure is not sufficient

1.5 Service

1. Given clean operating conditions, this unit virtually maintenance--- free. Chuck and shank will burn out rapidly in case of insufficient lubrication. Any fault found in the shank lubrication system should be repaired immediately.
2. Daily:
   a) check lubricator oil level and top up with rock drill oil if necessary
   b) adjust/clean if necessary
3. Every month:
   - Wash inside of lubricator

1.6 Oil recommendation

For rock drill shank lubrication, you should use the oils given in the following table, or other oils that meet the corresponding quality recommendations.

Use clean vessels!

1	9	10 −30 −20 −10 0 +10 +20 +30 +40 +50 +60
2	Torcula 100 Torcula 32 Tellus Oil R 10	
3	Arox 100 Arox 68 Arox 22	
4	Gulfstone 100 Gulfstone 46 Merit 15	
5	Almo 527 Almo 525 Gg Arctic Oil Light	
6	Energol RD−E 100 Energol RD−E 46 Energol RD 50 S	
7	Rock Drill Lube X68 Rock Drill Lube X32	
8	RD OIL 100 Hyspin VG 10	

1. Manufacturer
2. SHELL
3. ESSO
4. GULF
5. MOBIL
6. BP
7. TEXACO
8. CASTROL
9. Type
10. Ambient temperature °C

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Gardner Denver

TAMROTOR Compressors

Enduro 3
Repair instructions

List of contents

To the user

Enduro air end is an oil injected single stage screw, which is designed for industrial air compressors.

Each Enduro air end is designed for its own capacity range.

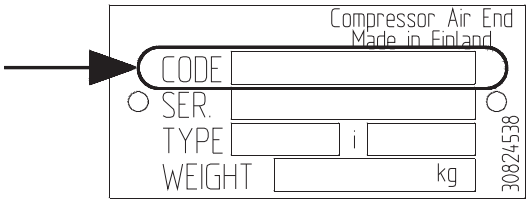
Don't exceed the max. pressure, power and rotation speed and don't use lower than the minimum rotation speed given in the technical data. The warranty of the air end is not valid if these values are exceeded.

Only the use of original spare parts guarantees long and reliable lifetime.

This instruction makes you acquainted with the repair of Enduro air end.

Read these instructions carefully before starting the repair work.

When ordering spare parts, please, give the codenumber from the plate connected to the air end.



Safety

Read always the safety instructions of the equipment, where the air end is used!

The cleanness in all repair work is of great importance. All the foreign particles in the air end shorten the life time of the bearings and the rotors.

Before starting the repair work

1. Disconnect the electric supply.
   (in diesel driven compressors take care that the motor cannot be started)
2. Make sure that there is no pressure in the oil receiver and close the valve between the compressor and the air line.
3. The air end and oil is hot immediately after the compressor has been stopped. Give time for cooling.

Before starting the compressor

1. Assure that the oil used is correct (see oil recommendation), and that the oil level is correct.
2. Make sure that the rotation direction is correct by starting the compressor momentarily. Ma ting time 2 seconds.

   Running the compressor unit in the wrong direction causes damage.

Technical specification

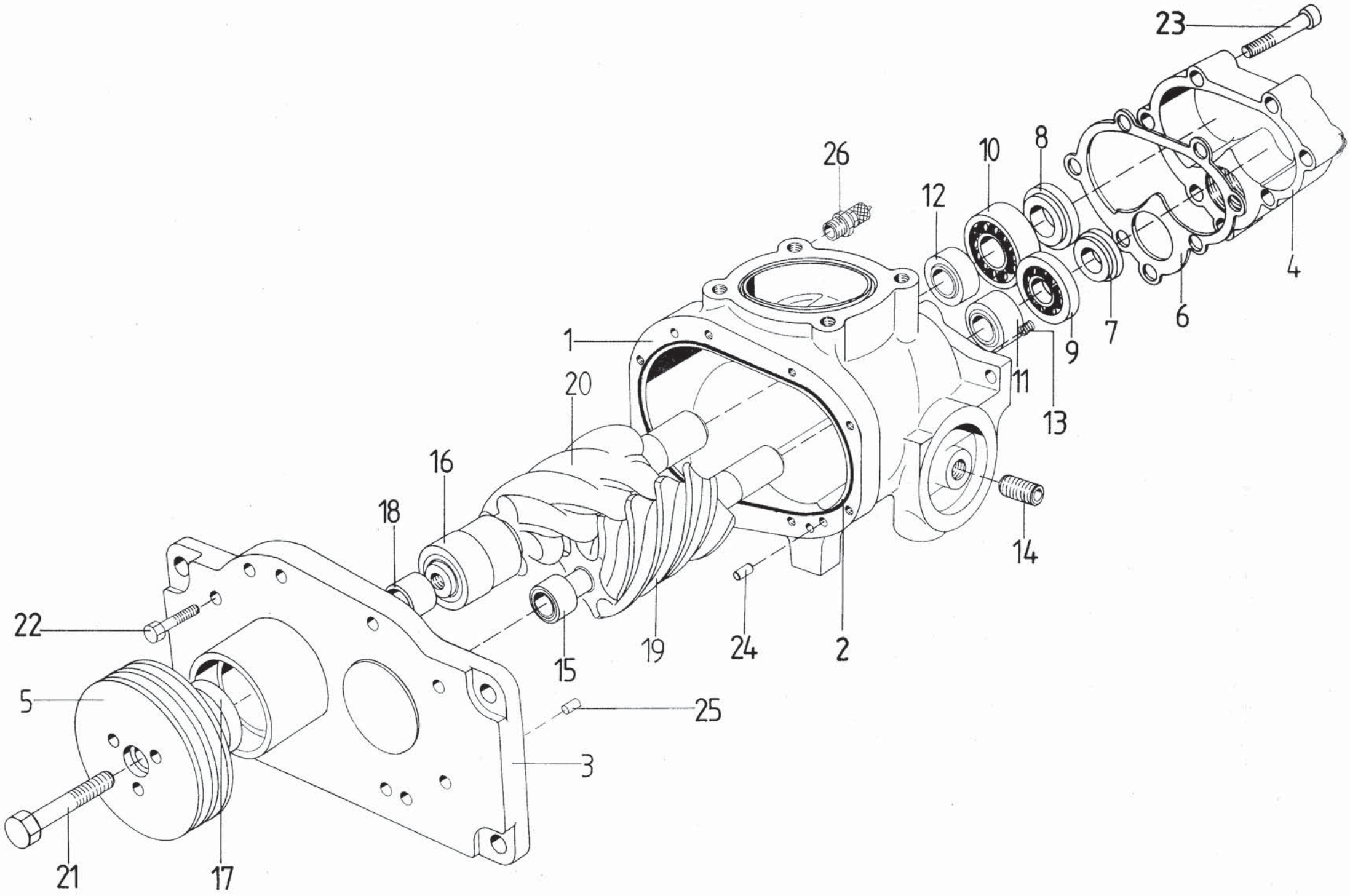
Rotor size		
- male ϕ	mm	74
- female ϕ	mm	61,6
Lobe combination		5/6
Male rotor driven		
Displacement volume	l/rev	0,263
Male rotor speed		
- min	rpm	2500
- max	rpm	10000
Tip speed (male)		
- min	m/s	10
- max	m/s	40
Input power		
- max	kW	15
Working pressure		
- min	bar	3
- max	bar	13
Oil injection quantity	l/min	15 - 30
Weight	kg	about 15,2

Disassembly

1. Clean the unit externally.
2. Open the locking screw of the pulley.
   Note! Left-handed thread.
3. Use a puller to remove the pulley.
   Note! Be careful not to damage the rotor shafts.
4. Use a drift to remove the inner ring of the shaft seal from the pulley.
5. Remove the intake and pressure end flanges.
   Note! The compound used on the threads may make the screws hard to undo.
6. Remove the shaft seal from the intake flange.
7. Remove the locking rings at the rotor ends with a puller.
   Note! Take care not to damage the rotors with the puller.
8. Remove the bearings from the body, the intake flange, and the rotors.
9. Also remove the two springs in the body under the ball bearing (part No. 13).
10. Remove all compound and sealing rests on the parts, and wash the parts clean.
11. Checking the parts:
    - The Rotors must not be used if following defects are noticed:
      - the rotors have scratches or dents
      - the rotor ends have seized
      - the bearing seats are worn
    - The Body must not be used if following defects are noticed:
      - the body has rotor contact marks on the inner surface
      - there are signs of overheating or seizing on the inside surface in the pressure end of the body
      - the sealing surfaces have dents or scratches
    - The intake flange must not be used following defects are noticed:
      - the flange has signs of rotor contact
      - the dowel pin holes are damaged
        Note! These holes must not be repaired.
      - the sealing surfaces have dents or scratches

Assembly

1. Press the inner bearing races into the rotor shafts.
2. Press the outer bearing races into the body and the intake flange, and the shaft seal into the intake flange.
3. Install the rotors into the body so that no clearance is left between the rotors and the body in the pressure end.
4. Insert the springs into their holes in the body.
5. Install the ball bearings to the pressure end of the rotors.
6. Insert two blade gauges (0.02 mm) between the bearing and the body on both sides of the bearing (this is to determine the pressure end clearance).
7. Warm up the locking rings to 300 degrees centigrade, and install them to the rotor. Allow them to cool down and check the pressure end clearance (should be 0.03 to 0.04 mm).
8. Check the oil injection hole of the intake flange. The jet must be properly in place and clean.
9. Clean the surfaces before applying the cement (Loctite 574, do not use excessively).
10. Install the intake flange and tighten the screws by hand. Then, tap the dowel pins in and tighten the screws to 10 Nm.
11. Use thred compound (Loctite 542) on the fittings and screws.
12. Clean the pulley pole and the inner ring of the shaft seal carefully.
13. Apply the glue, Loctite 601, on the pole and install the inner ring carefully on the pole.
14. Wipe away possible glue drops.
15. Mount the pulley carefully on the shaft, use a fastening screw, screw torque: 80Nm. **Note!** Left-handed thread.
16. Lubricate the unit with oil through the intake opening, and rotate the rotors a few revolutions by hand.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