



G00002

- 1 -



166166

5 Rotary piston compressor with
an axial direction of delivery

The invention relates to a rotary piston
compressor with an axial direction of delivery from the
10 top downwards, in particular of screw spindle-type
construction, with cooling ducts for the motors,
bearings and sensors, through which ducts a cooling
fluid flows, and with a cooling device for the pump
space.

15 A known rotary piston compressor
(DE 19522559 A1) of this kind has two screw spindles
which intermesh and are driven synchronously by motors.
Here, the angles of rotation and speeds of rotation of
the two screw spindles or rotors are detected by
20 sensors. The motors are synchronized electronically by
means of the signals of these sensors. In the case of
such rotary piston compressors, there is, on the one
hand, the need to cool the motors, bearings and
sensors, and they should be cooled to as low
25 temperatures as possible, e.g. 20°C, although, of
course, they should not be cooled down to such an
extent that condensation forms. The pump space, which
is heated up due to the compression of the medium
delivered, must likewise be cooled. However, the pump
30 space must be cooled to a higher temperature of, for
example, 60°C to avoid the pumped medium condensing.

In the case of the known rotary piston
compressor, the motors, bearings and sensors are cooled
by a cooling fluid which flows through cooling ducts.
35 Although the pump space is cooled primarily by internal
cooling of the screw spindles, provision has also been
made in one embodiment for the casing of the pump space
to be cooled. However, the corresponding cooling fluid
must be at a higher temperature than the cooling fluid

- 2 -

for the motors, bearings and sensors, making it necessary to have two separate cooling circuits. If the rotary piston compressor is to be serviced or repaired, two cooling circuits have to be divided and emptied.

5 The cooling system is therefore complex and requires a considerable amount of work when disassembling the rotary piston compressor.

The object of the invention is to provide a rotary piston compressor by means of which it is
10 possible in a particularly simple manner to cool the motors, bearings and sensors to a relatively low temperature and to cool the pump space to a considerably higher temperature, with the pump space at the same time being cooled to a greater extent on the
15 delivery side than on the intake side.

The fact that the delivery side should be cooled to a greater extent than the intake side is likewise known from the prior art. According to the invention, the solution to the object, including this
20 secondary problem, is achieved by virtue of the fact that the casing of the pump space has a closed annular space which is partially filled with a liquid, which is cooled by the cooling fluid via heat exchanger surfaces.

25 The pump space is thus cooled by a liquid which is contained within a closed annular space. In an advantageous embodiment, this annular space extends over the entire height of the casing of the pump space. The liquid contained in it is cooled by the cooling
30 fluid for the motors, bearings and sensors. In this context, the rate of flow and size of the heat exchanger surfaces can be selected so that, although the motors, bearings and sensors are cooled to approximately 20°C, the casing of the pump space is
35 cooled to a temperature of approximately 60°C. Since the annular space is only partially filled with liquid, cooling is less effective at the top, i.e. the intake zone, in line with the fact that there should be less cooling here. Moreover, since the annular space is only

- 3 -

partially filled with liquid, this liquid can expand as it heats up. The liquid in the annular space does not have to be drained off when the casing is disassembled but remains in it. All that is required is to divide
5 the circuit for the cooling fluid for the motors, bearings and sensors and, where appropriate, partially drain it.

In an embodiment which is particularly expedient and simple to produce, the annular space has
10 a cooling coil through which cooling fluid flows.

It is expedient if the liquid in the annular space is a water/glycol mixture, which allows effective cooling but is not subject to the risk of freezing when the pump is unused at low temperatures.

15 It is expedient to use cooling water as the cooling fluid.

It is expedient here to make provision for the cooling fluid to flow through the cooling ducts for the motors, bearings and sensors first and then to flow
20 through the cooling coil.

It is advantageous if the cooling ducts and the annular space are closed off, i.e. are not connected to the pump space, eliminating the need for a seal - with the familiar problems associated with it - which would
25 otherwise be necessary.

The invention is described below by means of an advantageous embodiment with reference to the attached drawing, which shows a rotary piston compressor according to the invention in section.

30 The rotary piston compressor has a motor casing 1 and a casing 2 belonging to the pump space 3. In the pump space there are two screw spindles 4, which are cantilever-mounted by shafts 5 supported by bearings 6, 7. The screw spindles 4 are driven in synchronous
35 rotation by motors 8. For this purpose, the respective angular position of the shafts and screw spindles is determined with the aid of sensors 9 for angles of rotation, in which case electronic synchronization takes place, thus preventing the screw spindles 4 from

- 4 -

touching one another. To prevent the intermeshing screw
spindles 4 from touching one another in the event of
adverse operating conditions and poor or completely
absent synchronization, intermeshing gearwheels 10, the
5 angular backlash of which is less than that of the
screw spindles 4, are provided at the bottom on the
shafts 5.

By virtue of the rotary motion, fluid to be
delivered is drawn in at the top through an intake
10 opening 11 and expelled downwards through an outlet
opening (not shown).

The motors 8, bearings 6, 7 and sensors 9 are
cooled by cooling water which is passed through cooling
ducts 12 and enters these ducts 12 through an opening
15 13 and leaves the cooling ducts 12 again through an
opening 14.

The casing 2 of the pump space 3 has an annular
space 15 which is filled with a water/glycol mixture up
to a level 16. The annular space 15 also contains a
20 cooling coil 18, which is cooled by the cooling water,
which leaves the motor casing 1 through the opening 14
and is passed into the cooling coil 18 via a line 17
and then flows out again through the line 19. The
casing 2 is thus cooled by the liquid in the annular
25 space 15, which in turn is cooled by the cooling water,
which has first of all cooled the motors 8, bearings 6,
7 and sensors 9. Since the annular space 15 is filled
with cooling liquid only up to level 16, this liquid
can expand when heated. The pump space on the (lower)
30 delivery side is cooled to a greater extent than on the
(upper) intake side. Since the cooling liquids are in
enclosed spaces 12, 15, sealing with respect to the
pump space 3 is not necessary. The familiar problems
with such seals are therefore avoided.

- 5 -

Patent claims

1. Rotary piston compressor with an axial direction of delivery from the top downwards, in particular of screw spindle-type construction, with cooling ducts (12) for the motors (8), bearings (6, 7) and sensors (9), through which ducts a cooling fluid flows, and with a cooling device for the pump space (3), characterized in that the casing (2) of the pump space (3) has a closed annular space (15) which is partially filled with a liquid, which is cooled by the cooling fluid via heat exchanger surfaces (18).
2. Rotary piston compressor according to Claim 1, characterized in that an annular space (15) has a cooling coil (18), through which cooling fluid flows.
3. Rotary piston compressor according to Claim 1 or 2, characterized in that the liquid in the annular space (15) is a water/glycol mixture.
4. Rotary piston compressor according to Claims 1 to 3, characterized in that the cooling fluid is cooling water.
5. Rotary piston compressor according to Claims 1 to 4, characterized in that the cooling fluid flows through the cooling ducts (12) for the motors (8), bearings (6, 7) and sensors (9) first and then flows through the cooling coil (18).
6. Rotary piston compressor according to Claims 1 to 5, characterized in that the annular space (15) extends essentially over the entire height of the casing (2) of the pump space (3).
7. Rotary piston compression according to one of Claims 1 to 6, characterized in that the cooling ducts (12) and the annular space (15) are closed off from the pump space (3).