



# SIGMA PUMPY HRANICE



WATER RING ROTARY  
VACUUM PUMPS AND  
COMPRESSORS

## RV, RK

**SIGMA PUMPY HRANICE, s.r.o.**

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## Applications

The water ring rotary vacuum pumps of RV serie are frequently used in many industrial branches using vacuum equipments, especially in lines for production of porcelain and various constructional materials. They are also used for vacuum condensation or vacuum drying during production of various substances as well as final products in food industry (production of jams, malt extracts, dried milk, dehydrated fruit, yeast and soap).

They are often used as a part of machine milking in cowsheds.

The vacuum pumps also find their applications in air evacuation and flooding of pumps as well as suction lines.

They can be also supplied with evacuation vessel fitted either with electrode switch or float switch. Such automatic evacuation stations are enable to control operations of main pumps in industry, water pumping works, fire water stations and water house siphons or to ensure a permanent vacuum necessary for some industrial productions.

The water ring vacuum pump RV can be also used as a low pressure compressor RK reaching maximum overpressure 12 m.

## Description

There are two sizes of the water ring vacuum pumps produced by our factory:

- two-stages RV-248
- single-stage RV-558

The RV-248 vacuum pump has got two radial impellers that run inside casings of stages with properly modified channels. The single-stage vacuum pump RV-558 has got one radial impeller the working space of which is separated from body of the vacuum pump by guide plate with suction and discharge channels.

The shaft is supported on ball bearings at both sides of both types of the vacuum pumps. The bearings are easy exchangeable.

The shaft is sealed with mechanical seals.

Working liquid is clean cold water.

## Material Execution

Suction casings, discharge casings, stage bodies and bearing housings are made from grey cast iron.

Impellers are made of bronze.

Shafts are made of stainless steel.

## Operation of the Vacuum Pumps

The impellers of the vacuum pump are of curved blades design and are mounted eccentrically in the stator. The vacuum pump is fed with cooling ( working ) water during its operation continuously. The water is drifted with the blades of the impellers and a water ring is formed on the periphery. Chambers limited with the blades and water are created due to this water ring. When the rotor rotates volume of the chambers starts to increase at first stage. Due to gas is sucked. Then the volume of the chambers is decreased and the gas is discharged. An adequate volume of cooling water flows out with the pumped gas through discharge branch. Outlet temperature of the cooling water must conform to vacuum required.

The clean working water serves for sealing and for removal of heat resulted from friction and compression. The highest attainable vacuum depends on the temperature of the working water and on barometric pressure.

## Comments for Project

In order to save costs for the working water it is possible to use an open circulation tank which the working water from the vacuum pump is cooled in. It is necessary to replenish this water circulation tank with clean cold water.

When using the vacuum pump as the compressor RK it is also necessary to feed it with clean working water. A water separator has to be connected to discharge branch of the compressor. Basically it is a pressure vessel with pressure gauge, water separation element, water level gauge, safety valve, etc.

# Water Ring Rotary Vacuum Pumps and Compressors RV, RK

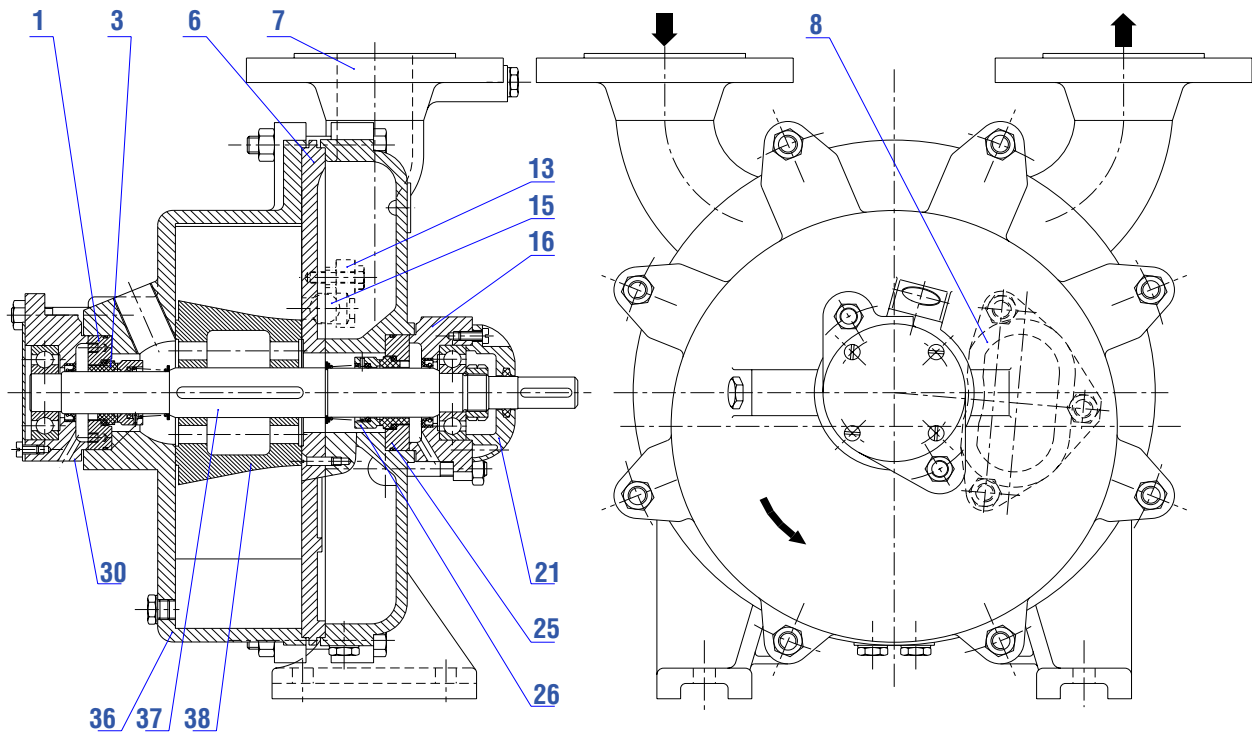
## Technical Data

Type		RV-248				RV-558			
Capacity of sucked rarefied air Q	l.s <sup>-1</sup>	10.5	10	9.2	7.5	33.4	31.6	29	25
	m <sup>3</sup> h <sup>-1</sup>	37.8	36	33	27	120	114	105	90
At absolute pressure in suction branch	kPa	25	20	15	10	25	20	15	10
Maximum attainable absolute pressure in suction branch when the suction branch is closed (blinded)	kPa	5				5			
Output of electric motor	kW	3				5.5			
Capacity of working (cooling) water	m <sup>3</sup> h <sup>-1</sup>	0.48				1.5			
Revolutions	R.P.M.	1430				1430			
Power input of the vacuum pump	kW	2.08	2.2	2.26	2.38	4.10	4	3.85	3.7
DN of suction and discharge branches (air)		G 1 1/4				G2			
DN of working water connection		G 1/4 *				G 3/4			
Pressure of the working water	MPa	0.01				0.01			
Approx. weight of complete unit	kg	cca 148				cca 185			

The parameters stated above are valid for temperature of air  $T = 20\text{ }^{\circ}\text{C}$ , temperature of working (cooling) water  $T = 15\text{ }^{\circ}\text{C}$  and barometric pressure 101.3 kPa.

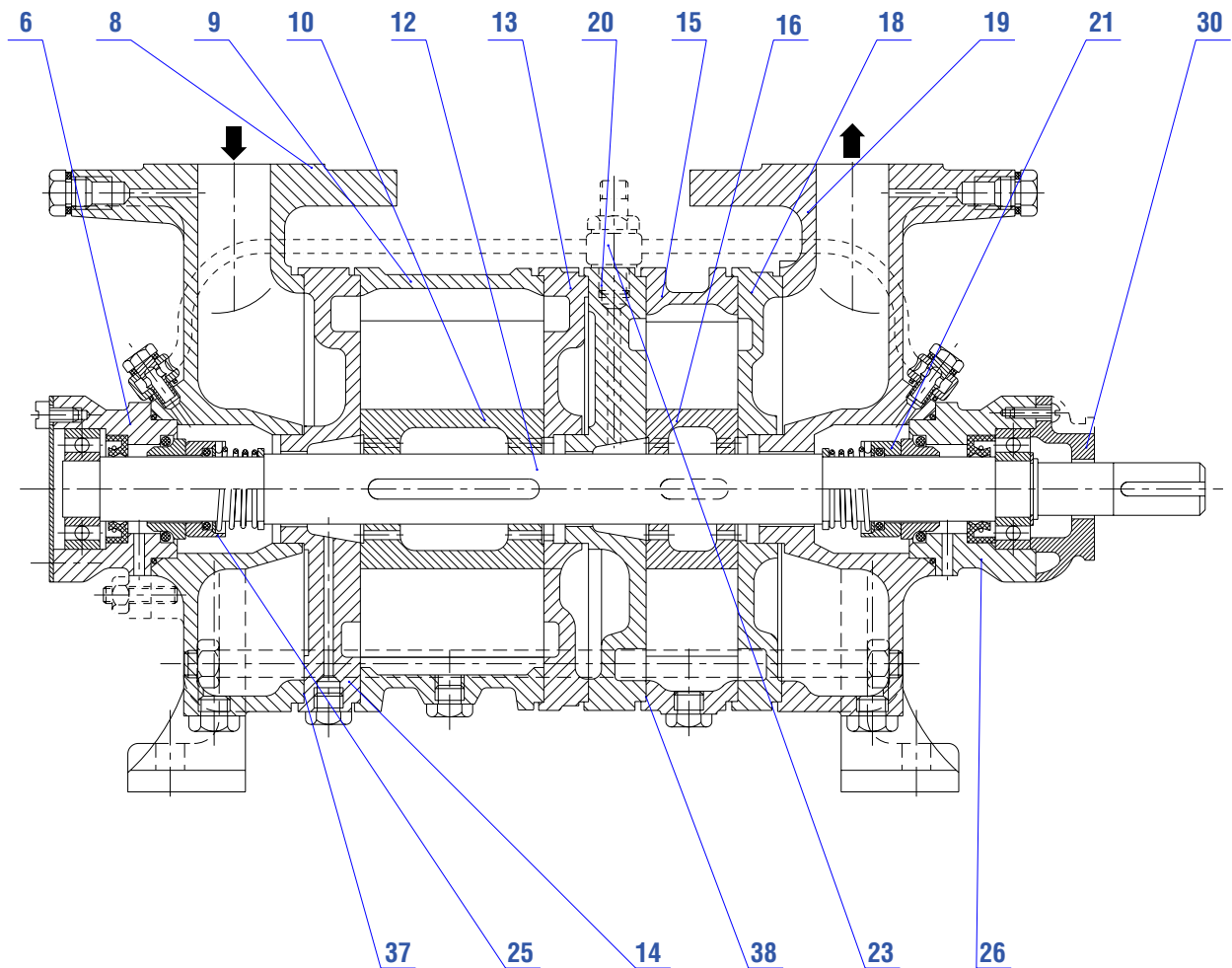
\* The connection G 1/4" is used when water is supplied from pressure water main permanently. When using a circulating tank, so that the vacuum pump must suck the working water, the connection of working (cooling) water must be reduced on diameter G 3/8".

## Informative Sectional Drawing RV, RK - 558



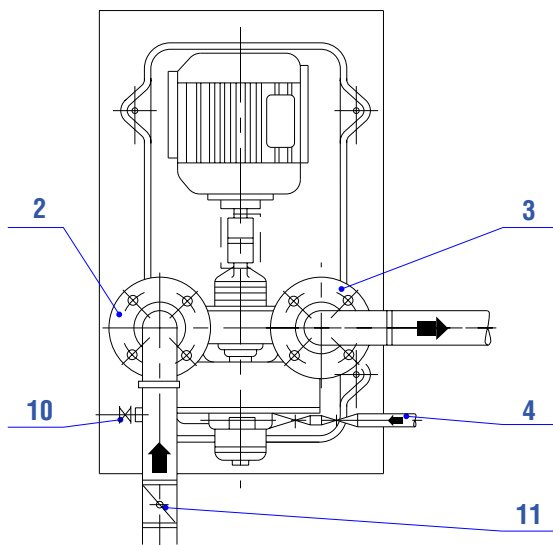
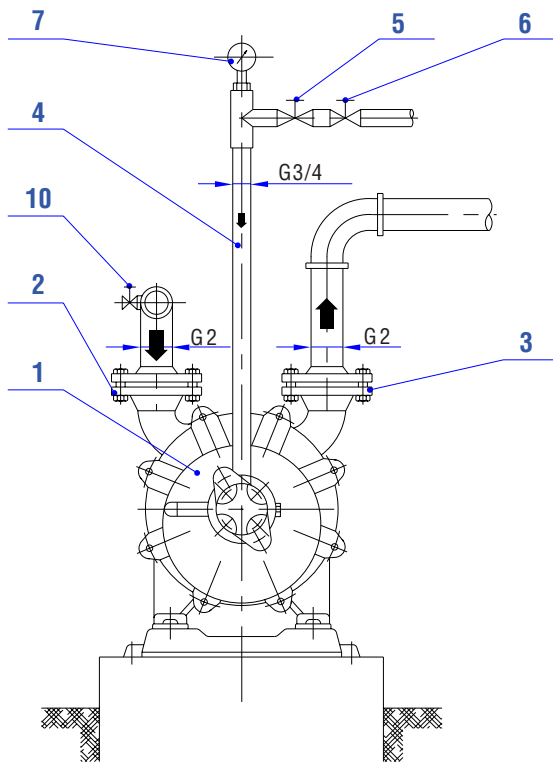
- 1 Mechanical seal cover
- 3 Mechanical seal
- 6 Insert
- 7 Body
- 8 Lid
- 13 Valve plate
- 15 Ball
- 16 Bearing housing
- 21 Bearing cover
- 25 Mechanical seal cover
- 26 Mechanical seal
- 30 Bearing housing
- 36 Cover of body
- 37 Shaft
- 38 Impeller

## Informative Sectional Drawing RV, RK - 248



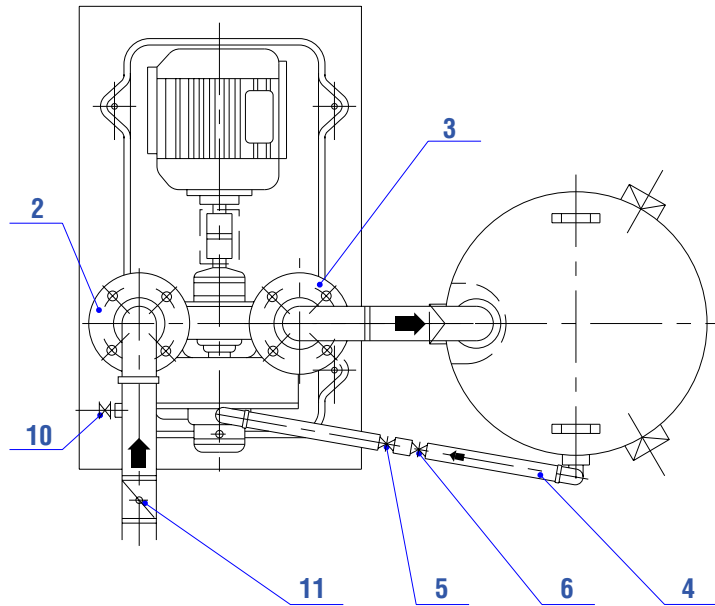
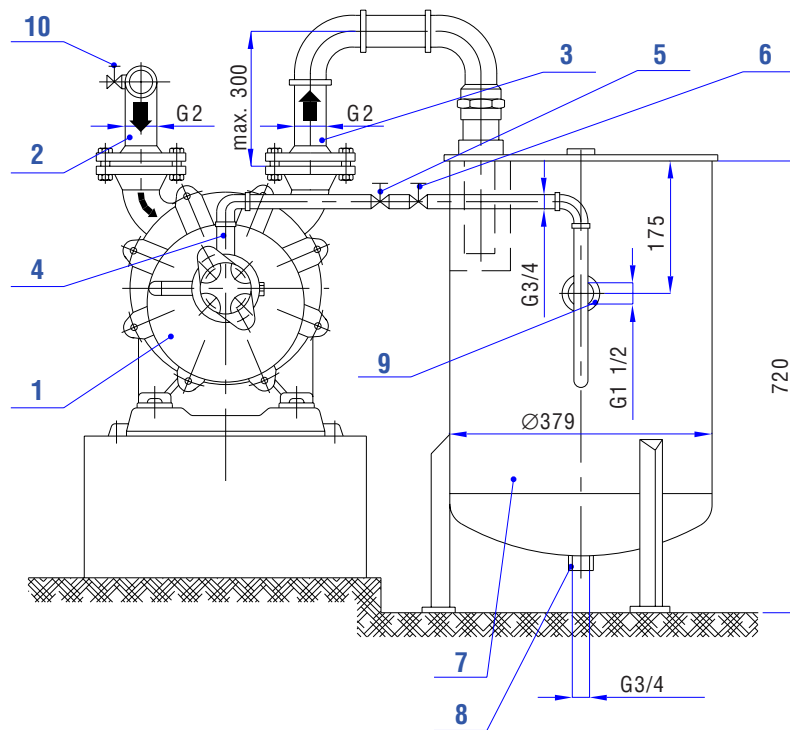
- |    |                                 |    |                                   |
|----|---------------------------------|----|-----------------------------------|
| 6  | Bearing housing at suction side | 18 | Inter-wall right                  |
| 8  | Suction casing                  | 19 | Discharge casing                  |
| 9  | Diffuser L=80                   | 20 | Inter-wall left                   |
| 10 | Impeller L=80                   | 21 | Mechanical seal - right           |
| 12 | Shaft                           | 23 | Flooding piping                   |
| 13 | Inter-wall right                | 25 | Mechanical seal - left            |
| 14 | Inter-wall left                 | 26 | Bearing housing at discharge side |
| 15 | Diffuser L=40                   | 30 | Bearing cover                     |
| 16 | Impeller L=40                   | 38 | Sealing of stages                 |

## Connection of the Vacuum Pump RV-558 without Circulation Tank



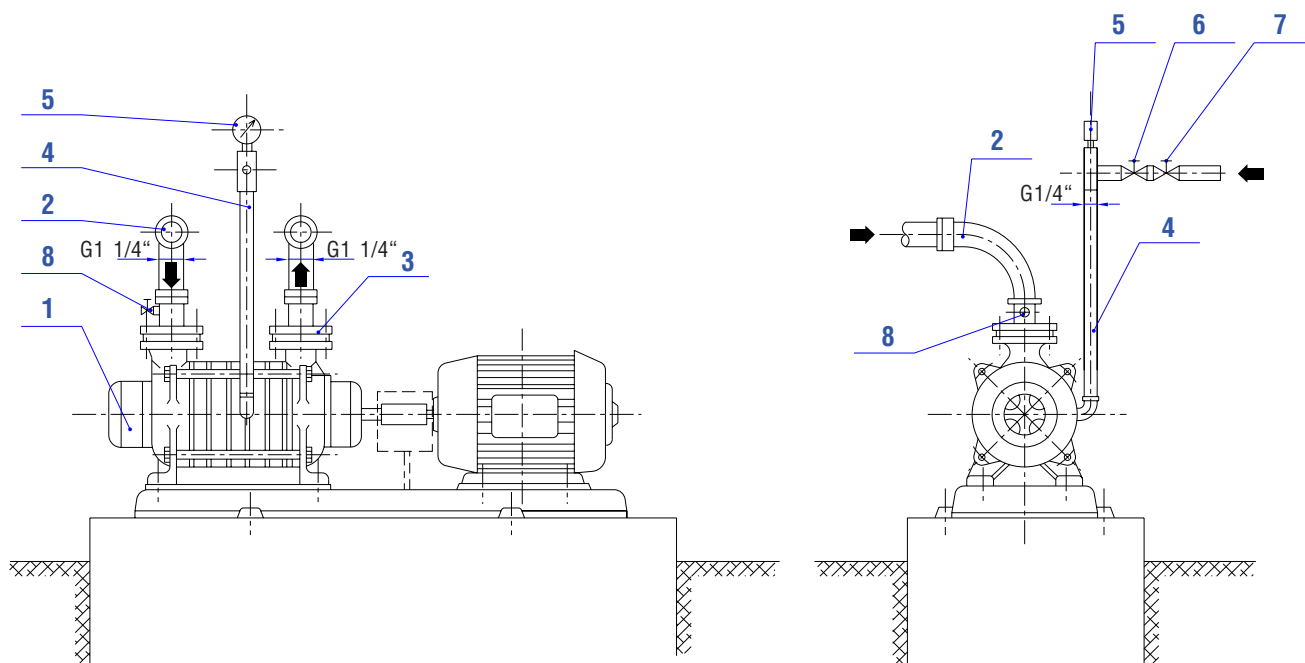
- 1 Vacuum pump
- 2 Suction branch
- 3 Discharge branch
- 4 Working (cooling) water connection
- 5 Regulating valve
- 6 Closing valve
- 7 Pressure-vacuum gauge
- 10 Suction-on valve
- 11 Non-return valve

## Connection of the Vacuum Pump RV-558 with Circulation Tank



- |                                      |                     |
|--------------------------------------|---------------------|
| 1 Vacuum pump                        | 7 Circulation tank  |
| 2 Suction branch                     | 8 Drainage outlet   |
| 3 Discharge branch                   | 9 Overflow hole     |
| 4 Working (cooling) water connection | 10 Suction-on valve |
| 5 Regulating valve                   | 11 Non-return valve |
| 6 Closing valve                      |                     |

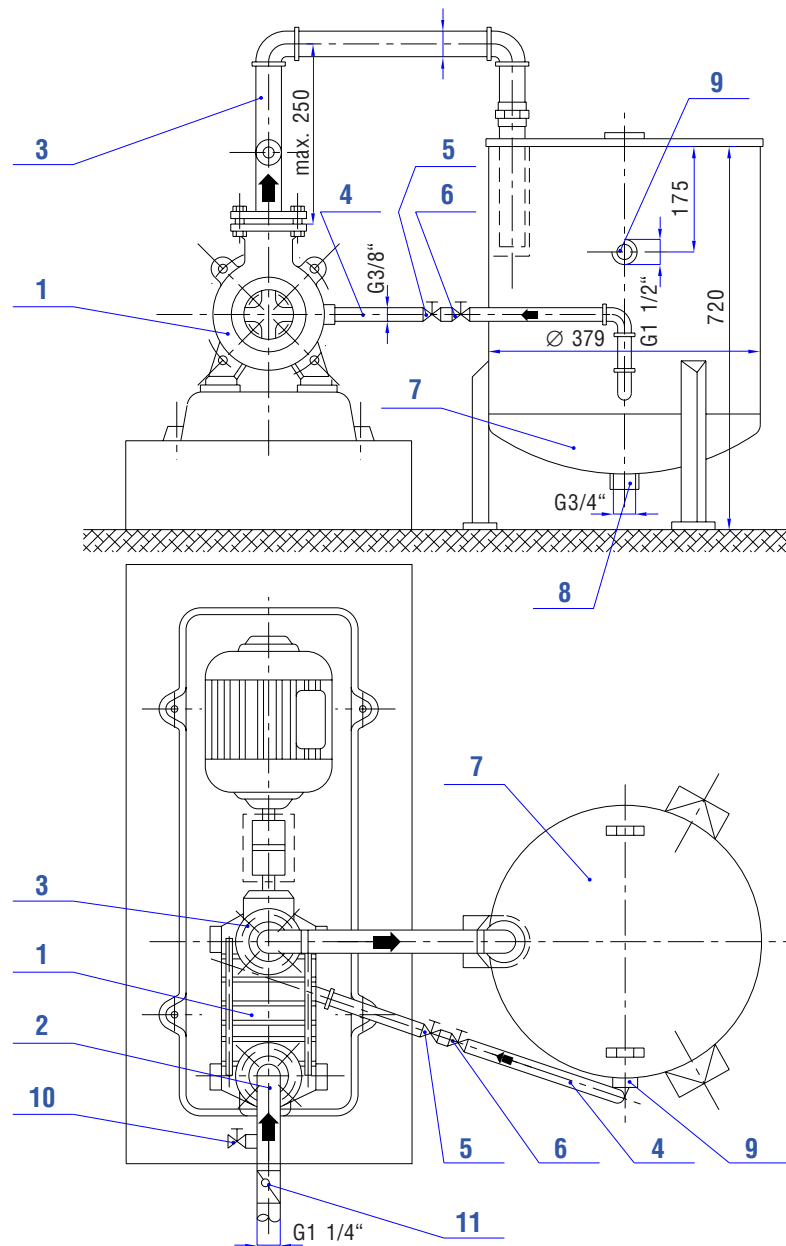
## Connection of the Vacuum Pump RV-248 without Circulation Tank



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- 3 Discharge branch
- 4 Working (cooling) water connection
- 5 Pressure-vacuum gauge
- 6 Regulating valve
- 7 Closing valve
- 8 Suction-on valve

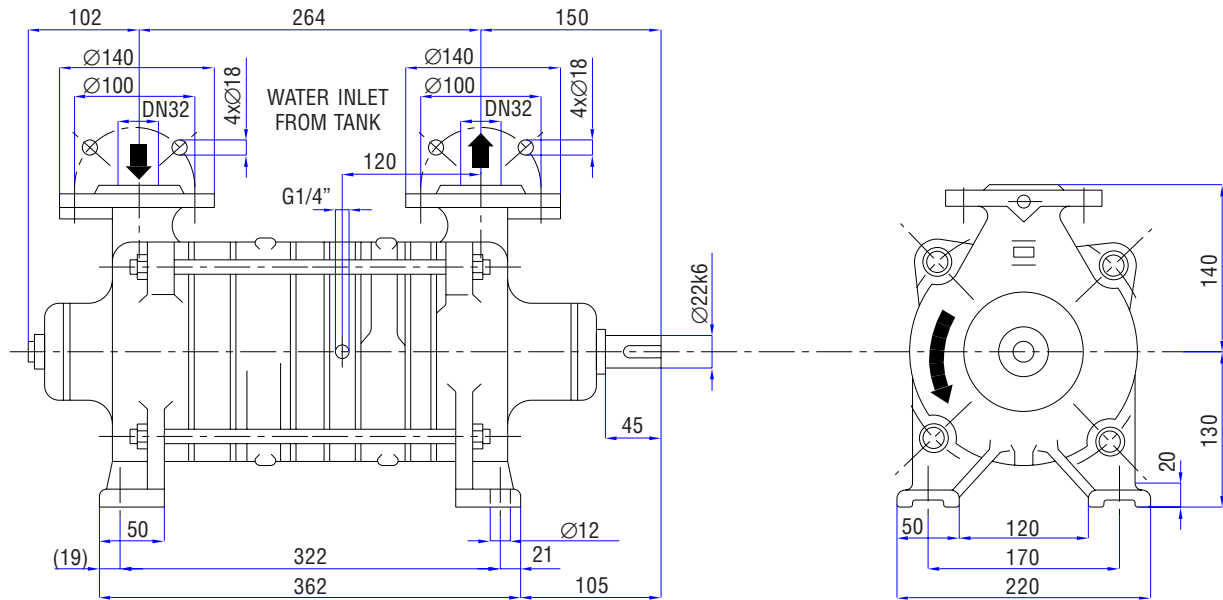


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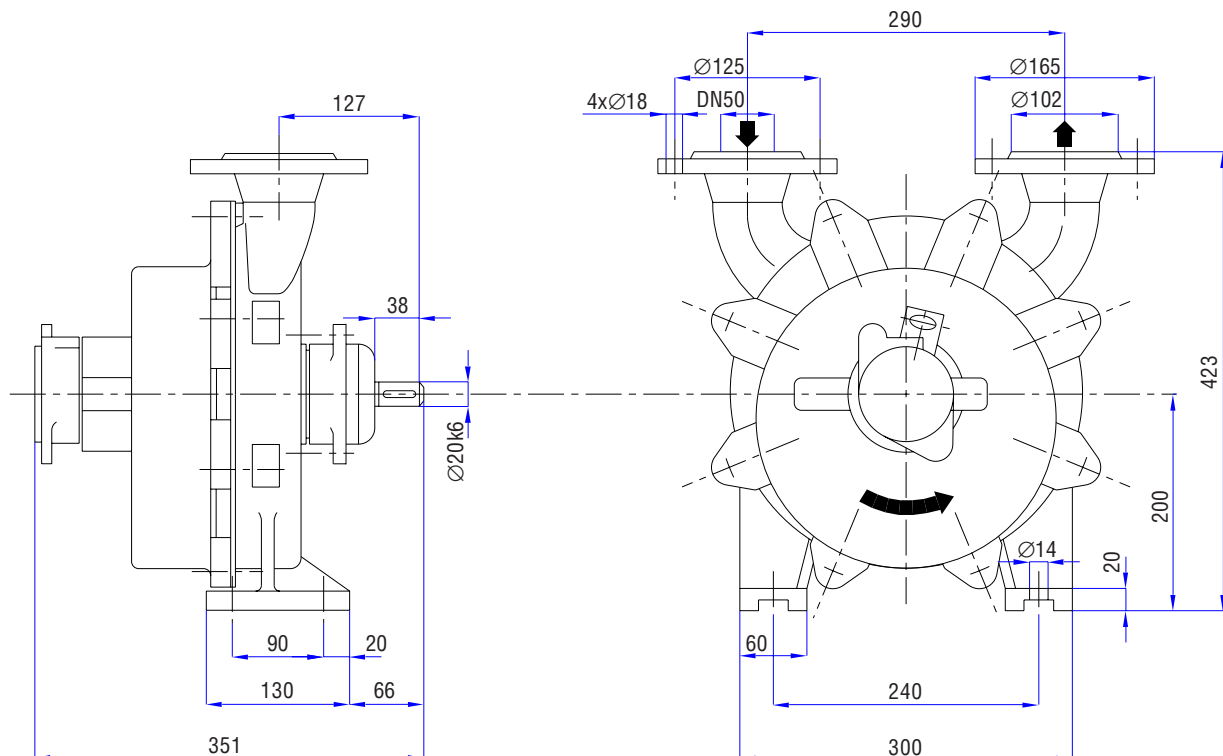


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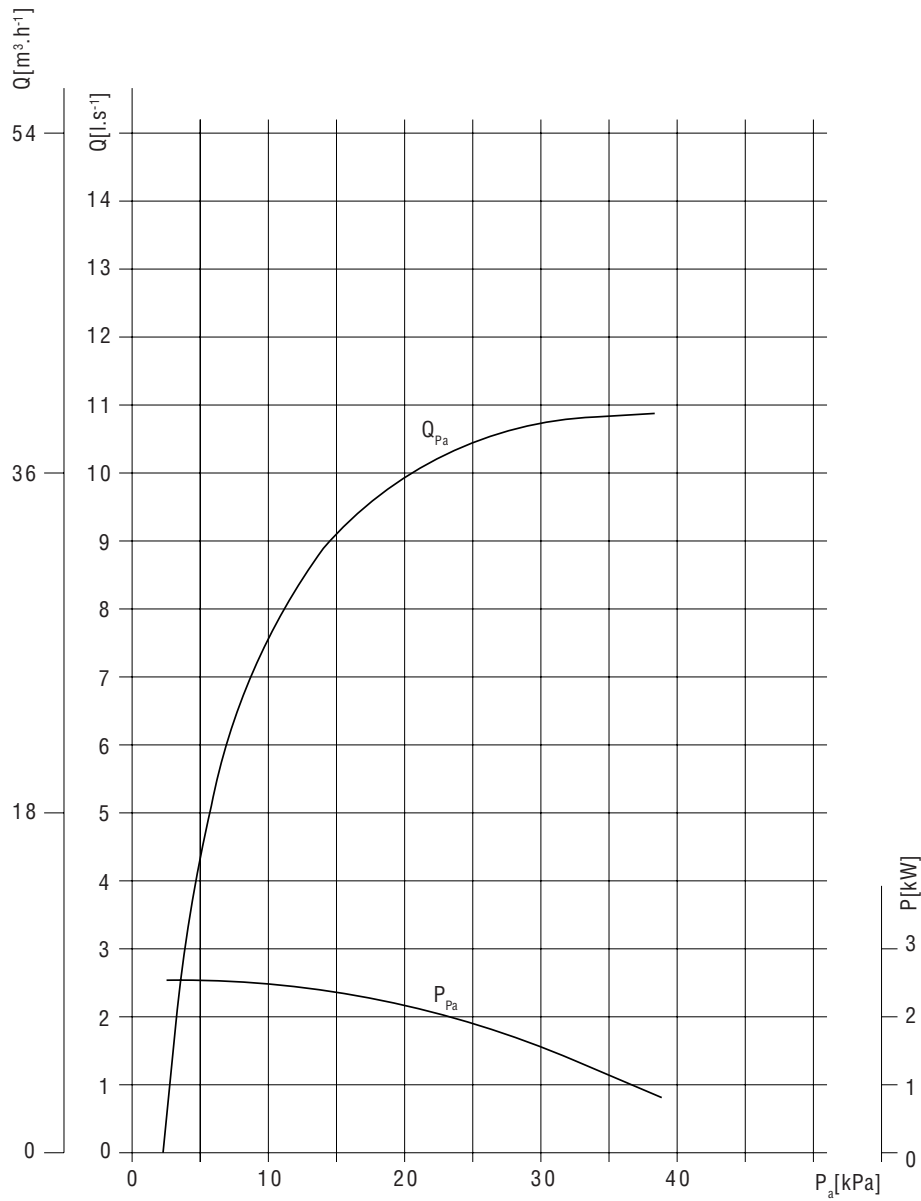
## Dimensional Drawing RV-248



## Dimensional Drawing RV-558

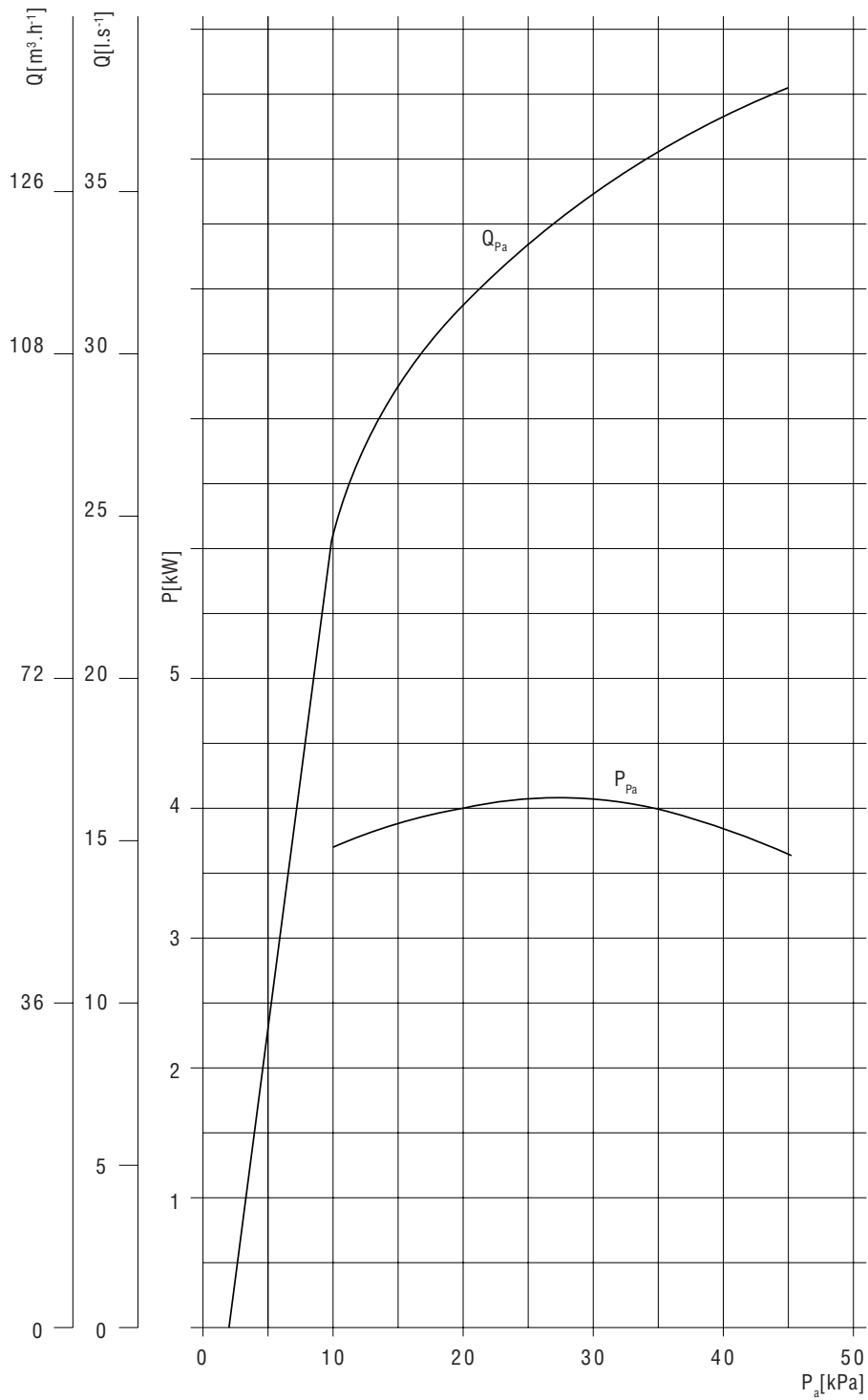


## Informative Performance Curve of the Vacuum Pump RV-248



The performance curves are valid for clean air of temperature  $T = 20\text{ }^\circ\text{C}$ , temperature of working (cooling) water  $T = 15\text{ }^\circ\text{C}$  and at barometric pressure 101.3 kPa.

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