

CVN
Horizontal multistage medium-pressure pumps

APPLICATION AND DESIGN

APPLICATION

Pumps of Series „CVN“ are intended for pumping of clean service and/or potable water, condensate or water being polluted partly with sludge and other impurities up to 1 volume percent, with max. grain sizes up to 0,5 mm.

Max. temperature of pumped liquid	80-CVN	130 °C
	100 - 250-CVN	80 °C
Values pH of pumped liquid	from 6,5 to 9 pH	

Pump size 250-CVN is intended for direct pumping from a condenser vacuum space and it may work as the second boosting stage of condensate circuits of power generation units from 200 to 500 MW.

Pumps „CVN“ may be applied in water management of various industrial branches, in mining auxiliary services, and so on.

CONSTRUCTION

Pumps „CVN“ are of centrifugal horizontal multistage design with tandem arrangement of impellers into pressure stages.

Rotor

Is double-sided supported on rolling-contact bearings lubricated with oil being cooled with water from an external supply. Residual axial thrust is absorbed by one of journal bearings, with smaller sizes. With sizes 150-CVN and 250-CVN there is residual axial thrust absorbed with the aid of a separate thrust bearing, oil filling of which is also cooled with water.

Seals

Both seals of a pump are provided with gland packing. The seal on the discharge side is pressure-relieved up to values of suction

pressure with continuous transfer of a pumped liquid from a gap being provided in front of the seal back onto the pump suction side. With pumping liquids with temperatures above 80 °C it is necessary to cool the seals with water (only with the 80-CVN).

Seal modification according to a pumped liquid:

a) **with pumping clean liquids** liquids there a seal on the discharge side is pressure-relieved with transfer of that liquid penetration/leakage through an external pipe (C) backward, in front of the seal on the suction side, that is, it is flooded (closed) against air suction with types 125-CVN and 150-CVN in case of pumping from underpressure – with the exception of the type 100-CVN, suction seal closure of which is provided from the pump 1st stage through the transfer pipe (d3);

b) **with pumping polluted liquids** there a seal on the discharge side is also pressure-relieved, however with the aid of an external pipe (C1) into the suction space, while both seals demand a special hydraulic protective closure, using clean pressure water being supplied from an external supply (d3, d4) to prevent them against impurities penetration and excessive wear. Simultaneously, the seal on the suction side may be flooded (closed) like that, to prevent it against suction of atmospheric air in case of simultaneous pumping from underpressure.

ORIENTATION OF BRANCHES

Suction branch

is oriented horizontally on the pump side. The basic position is **to the right (S-90)** as viewed the pump from a drive. On special request there suction branch may be arranged to the left (S-270).

Discharge branch

Is always directed upwards above the pump longitudinal axis (T-0).

MATERIAL VERSIONS

Size 80-CVN

Is supplied in material options „LC“ with most of constructional parts of grey cast iron and carbon steel or the „LB“ with parts being the same as with the „LC“ option, exclusive of impellers made of bronze. Discharge casing for PN 40 is of cast steel.

Sizes 100-CVN and 150-CVN

Are supplied in material option „OU“ with stator parts of cast carbon steel or alloy steel; rotor parts in contact with a pumped liquid are of chrome steel and carbon steel.

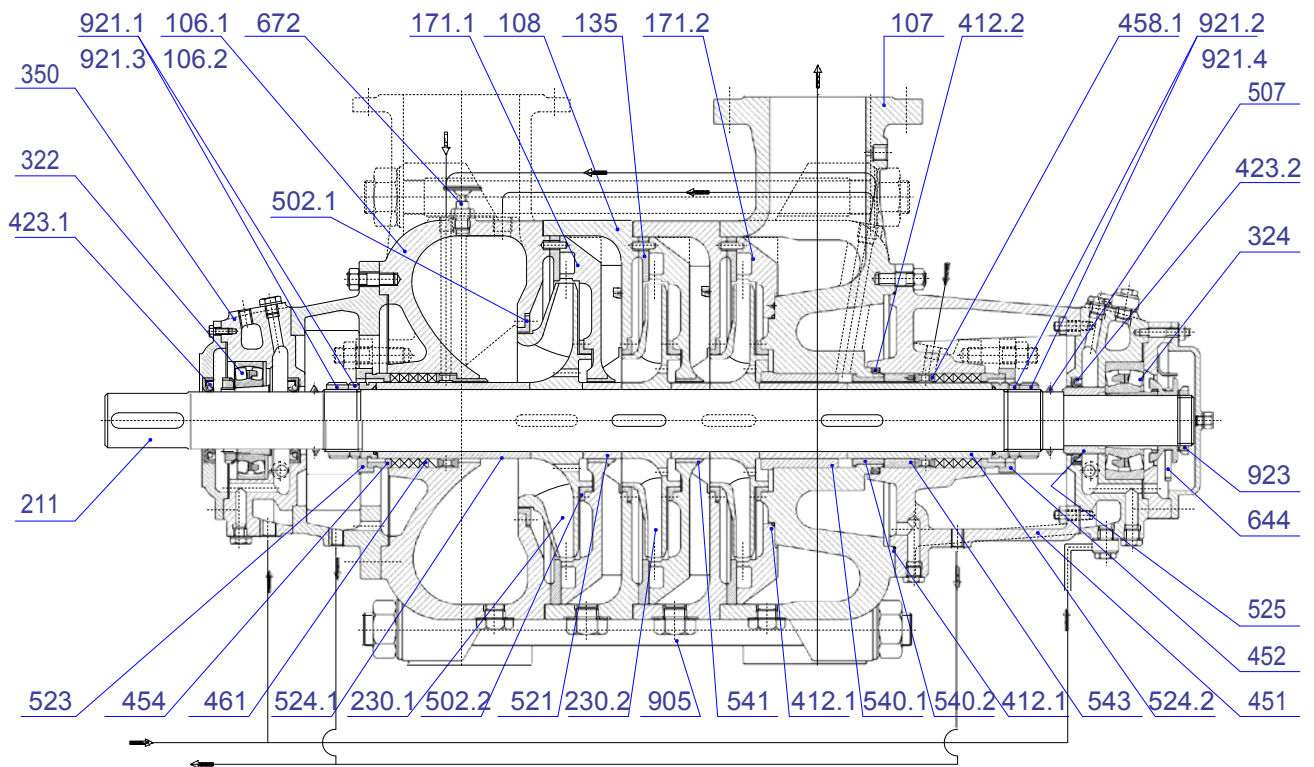
Size 250-CVN

Is supplied in material option „OY“ with stator parts of cast carbon steel or alloy steel; rotor parts in contact with a pumped liquid are of chrome-nickel steel; tightening bolts are of fine carbon steel.

SENSE OF ROTATION AND DRIVE

Pump sizes from 80-CVN to 150-CVN rotate **clockwise**; the pump 250-CVN rotates **counterclockwise**, as viewed from a drive. Those pumps may be driven by an electric motor, an internal combustion engine or even by a gas turbine. Transfer of a torque from an electric motor is through a flexible coupling.

CROSS-SECTION OF 125-CVN PUMP

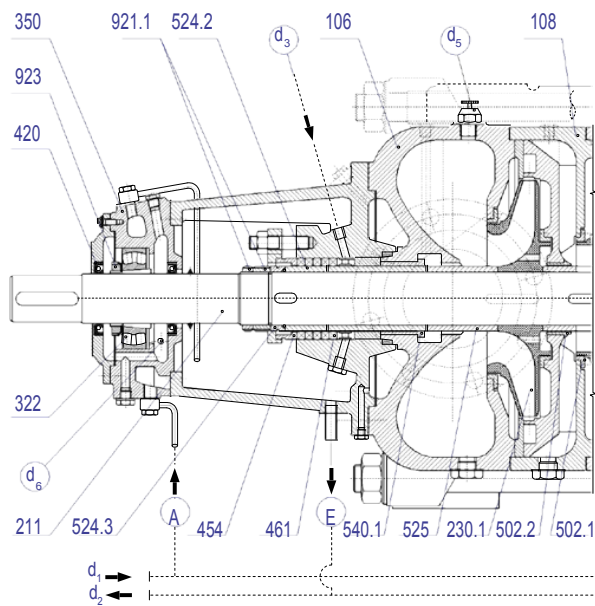


106.1	Suction casting
106.2	Suction casting
107	Discharge casting
108	Stage casting
135	Diffuser plate
171.1	Diffuser
171.2	Diffuser
211	Shaft
230.1	1st impeller
230.2	2nd impeller
322	Journal bearing
324	Thrust bearing
350	Bearing housing
412.1	Last diffuser sealing

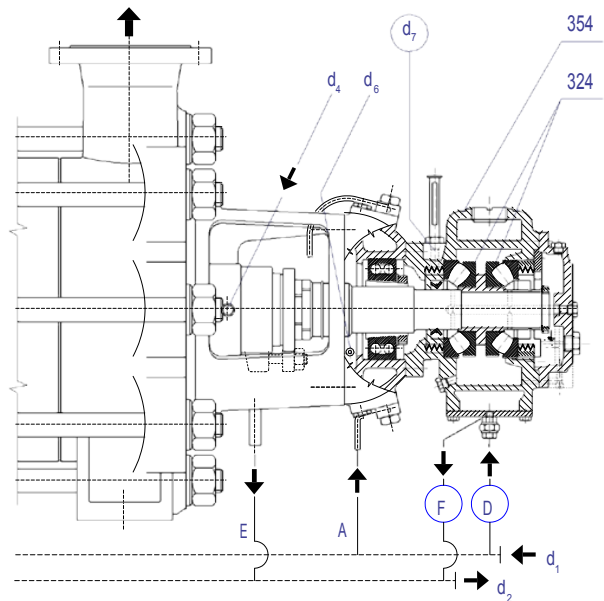
412.2	Discharge casing sealing
423.1	Radial lip seal
423.2	Radial lip seal
451	Stuffing box
452	Gland
454	Gland ring
461	Gland packing
502.1	1st stage wear ring
502.2	Wear ring
507	Thrower
521	Spacer sleeve
523	Cover sleeve
524.1	Stuffing box sleeve

524.2	Stuffing box sleeve
525	Thrust bearing spacer sleeve
540.1	Discharge casing bush
540.2	Bush
541	Stage bush
543	Gland bush
644	Lubricating ring
672	Air release valve
905	Connection bolt
921.1	Shaft nut, left
921.2	Shaft nut, right
921.3	Shaft nut, left
921.4	Shaft nut, right
923	Journal bearing nut

PARTIAL CROSS-SECTION OF 100-CVN AND 150-CVN PUMPS



Partial cross-section 100-CVN pump



Partial cross-section 150-CVN pump

106	Suction casing
107	Discharge casing
108	Stage casing
108.1	1st stage casing
171	Diffuser
173	Diffuser plate
211	Shaft
230	Impeller
230.1	1st stage impeller
321	Journal bearing
322	Journal bearing
324	Thrust bearing
350	Bearing housing
354	Thrust bearing housing
412.1	Stuffing box housing packing
412.2	Suction casing and discharge casing sealing
420	Radial lip seal
420.1	Radial lip seal
420.2	Radial lip seal
420.3	Radial lip seal

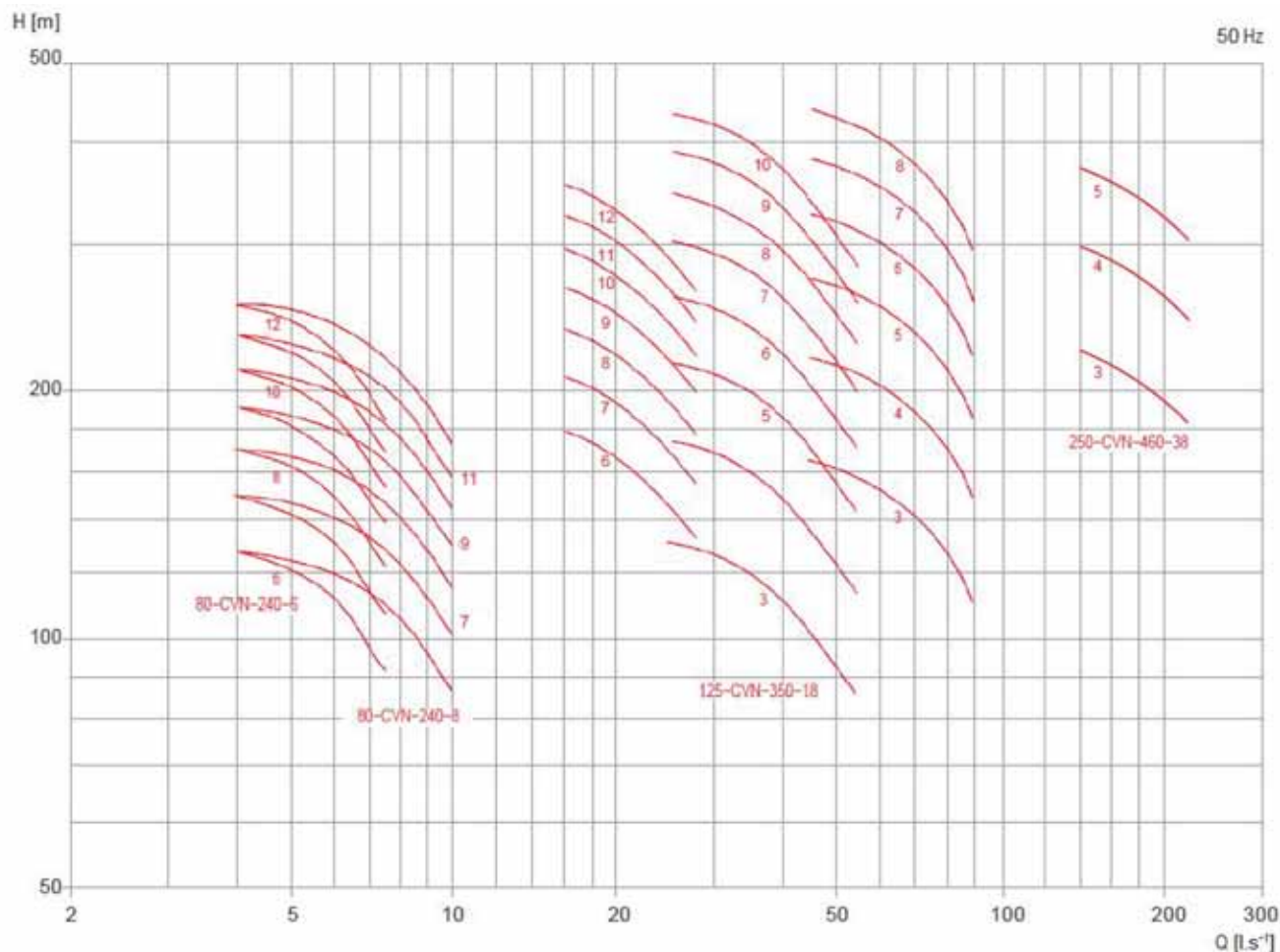
451	Stuffing box housing
452	Gland
459	Gland packing ring
454	Injection/flooding bush
461	Gland packing
502.1	Wear ring
502.2	Stage bush
507	Thrower
524.1	Shaft sleeve
524.2	Stuffing box sleeve
524.3	Cover sleeve
525	Spacer sleeve
540	Discharge casing bush
540.1	Stuffing box bush, suction side
644	Lubrication ring
912	Drain plug
921.1	Shaft nut, left
921.2	Shaft nut, right
923	Journal bearing nut
940.1	Coupling key

940.2	Impeller key
d ₁	Cooling water central supply
d ₂	Cooling water central drain
d ₃	Seal closure, suction side
d ₄	Seal closure, discharge side
d ₅	Release air valve
d ₆	Connection for journal bearing thermometer
d ₇	Connection for thrust bearing thermometer
A	Journal bearing cooling from central supply d ₁
B	Seal cooling from central supply d ₁ (on 80-CVN)
D	Thrust bearing cooling from central supply d ₁ (on 150-CVN and 250-CVN)
E	Drain from cooling of bearings, seals
F	Drain from thrust bearing cooling to central drain d ₂ (on 150-CVN and 250-CVN)

Within partial cross-sections there is a different version of suction side of 100-CVN – 250-CVN and thrust bearing of 150-CVN and 250-CVN depicted. In all other respects the pumps are identical.

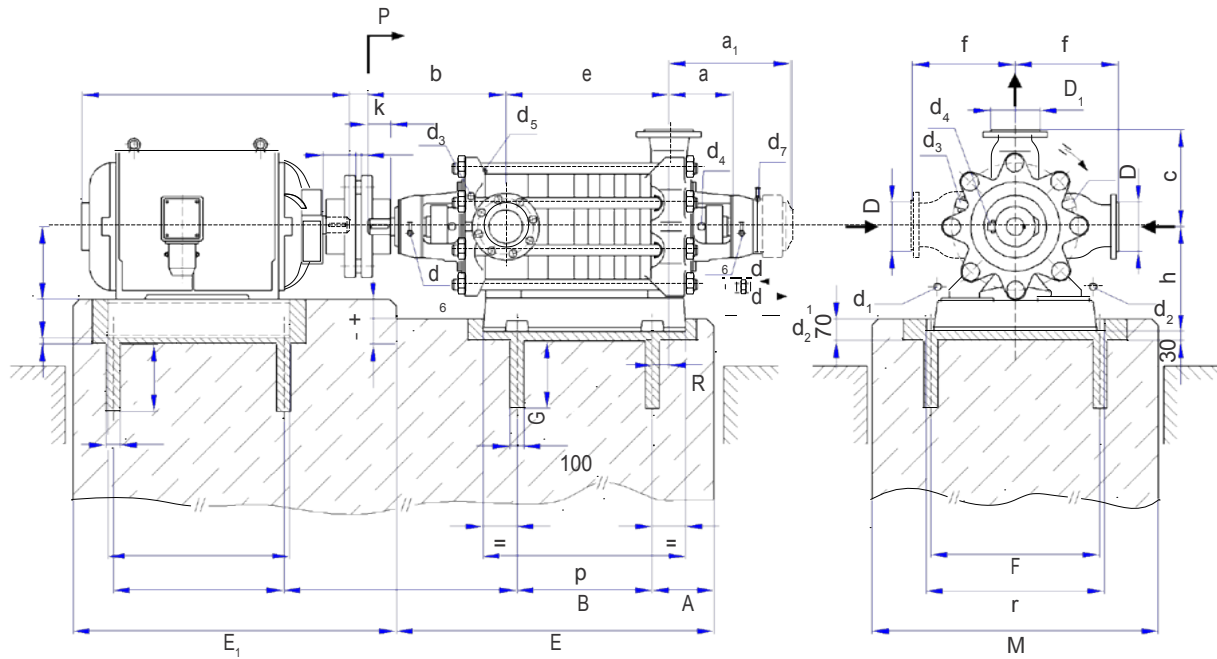
CVN PUMPS SELECTION CHART AND BRANCHES VERSIONS

SELECTION CHART



BRANCHES VERSIONS

Pump type	Branches		
	Suction DN/PN	Discharge DN/PN	
80-CVN-240-68	80/10 ČSN 131202.0	80/25 ČSN 131204.0	80/40 ČSN 131213.0
100-CVN-305-13	150/10 ČSN 131211.0	100/64 ČSN 131214.1	100/40 ČSN 131213.0
125-CVN-350-18		125/64 ČSN 131214.1	
150-CVN-400-20	200/10 ČSN 131210.0	150/64 ČSN 131214.1	
250-CVN-460-38	300/16 ČSN 131211.0	250/40 ČSN 131213.0	250/64 ČSN 131214.1



Pump type	Branches		Pump							Shaft end		Base frame		Foundation							Connections								
	D ₁	D	a	a	b	c	e	f	h	d	k	p	r	A	B	E	F	G ₁	-M ₂	R	d ₁	d ₂	d ₃	d ₄	d ₅	d ₆	d ₇		
80-CVN-240-68	6						355					530		310	300	900				26,5									
	7						400							280						49									
	8						445													21,5	G	G	G	G	G				
	9	DN 80	DN 80	320	-	370	300	490	300	375	38	70	660	630		400	1000			800	44	1/2"	3/4"	3/8"	3/8"	1/2"			
	10						535								310						66,5								
	11						580								330						39								
100-CVN-305-13	6						693					830			500	1200				100									
	7						793													75									
	8						893					1030	760	300		650	1300			300									
	9	DN 150	DN 100	473	-	564	380	993	380	430	63	105								1100	50	1/2"	1"	3/8"	3/8"	1/2"			
	10						1093									900	1600				100								
	11						1193														150								
125-CVN-350-18	4						575					830			500	1200				37,5									
	5						690													21,5									
	6						805					1030	760	300		650	1300			300									
	7	DN 150	DN 125	510	-	461	420	920	420	465	70	110								1100	11,5	1/2"	1"	3/4"	3/8"	1/2"			
	8						1035									900	1600				69								
	9						1150														23,5								
150-CVN-400-20	3						540					830			500	1150				30									
	4						680													25									
	5						820					1030	760	300		650	1300			300									
	6	DN 200	DN 150	-	775	510	530	960	530	550	70	110								1200	40	3/4"	1 1/4"	3/4"	1/2"	1/2"			
	7						1100									900	1600				40								
	8						1240														30								
250-CVN-460-38	3						705					830			500	1400				81									
	4	DN 300	DN 250	-	688	619	600	880	600	625	80	125								1370	94	3/4"	1 1/2"	1/2"	1/2"	2"			
	5						1055					1030	930	650	650	1600	870	400		-5									

Foundation block dimensions for the whole pump-set not quoted there may be given after clarification of an individual contract, because they depend on type and size of an electric motor being selected individually.

Connections and their functions:

- d₁** Cooling water supply;
- d₂** Cooling water drain
- d₃** Hydraulic closure of a seal on the suction side with clean water from an external supply in case of pumping polluted water, or seal flooding with pumping from underpressure. With 250-CVN for a stand-by pump being connected into vacuum circuit;
- d₄** Hydraulic closure of a seal on the discharge side with clean water from an external supply in case of pumping polluted water. With 250-CVN
- for a stand-by pump being connected into a vacuum circuit;
- d₅** Air release valve; with using the 250-CVN in a condensate circuit of power units there is interconnection with an air space of a condenser for drawing-off gases out of a pump, provided the pump has been connected direct to a condensate bowl;
- d₆** Connection for journal bearing thermometer;
- d₇** Connection for thrust bearing thermometer.

Inlet piping and drain piping of cooling water within the pump face-to-face dimension, inclusive of control valves being placed on branches to single cooled spots and thermometers with pockets serving for visual inspection of bearing temperatures, are included in the scope of supply as a standard.



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