SIGMA PUMPY HRANICE

HIGH-PRESSURE HORIZONTAL PISTON PUMP

PVA

SIGMA PUMPY HRANICE, s.r.o.
Tovární 605, 753 01 Hranice, Czech Republic
tel.: +420/642/261 267, fax: +420/642/203 019
Email: sigmahra@sigmahra.cz

426
2.98
25.31

Applications

The high-pressure piston pumps series 40-PVA-3-90/100/ are designed to pump water and the other chemical nonactive liquids and solutions having pH values in range of 6 - 8, with maximum capacity 1% of volume quantity of nonabrasive admixtures with maximum grain size up to 120 μm and the temperature up to 50°C.
The pumps are suitable as a source of pressure medium in hydraulic circuits of pressure stations and in mobile equipments for cleaning and saving works with the high-pressure aquatic ray with output up to 55 kW.

Description

The pumps are three-plungers, horizontal, with crank mechanism and with inbuilt gearbox.
Basic is the mechanical part consisting of robust teaming crankcase in which three times crank crankshaft is placed on two rolling bearings. A part of crank case is universal joint conducting in which the universal joints with piston rods adapters are rotating. These together with crank shaft and connecting rods form the whole crank mechanism which transfers the crank shaft rotary moving on pistons direct regression one.
The crank shaft is driven through the pair of gear sets with direct teeth from a counter shaft placed corn-wise in two rolling bearings over or under the crank shaft. Gear number of this gear is 3,92.
An auxiliary shaft in a special execution for driving another equipment is mounted into crankcase.
Lubricating of gearing, the crankshaft and countershaft bearings prospectively the auxiliary shaft bearings, universal joints and connecting rods is secured by spraying from crankcase.
The own working part of the pump consists of hydraulic part containing the steel-iron casing with cylinders channals for both suction and delivery valves and for exchangeable piston cylinders.
Both suction and delivery valves are plated ones vertically placed above themselves in the hydraulic casing. Exchangeable piston is horizontally placed into hydraulic casing. It consists of exchangable cylinder and built-up piston. Cylinder presses the dust packing casing to the crankcase. Piston sealing is a special textile-rubber nippers fitted to the piston rod.
The pump is supplied together with safety valve which protects from prospectively overrunning of a transporting pressure.

Material design

Generality parts of mechanical part are castings from grey cast iron, prospectively alluminium alloy, shafts are made from structural steel. Hydraulic casing is a casting from steel-iron.
Valves are made from anticorrosive steel,exchangeable cylinder is from structural steel, inner surface is hardly chromium-plated, piston parts are zinc-galvanized.

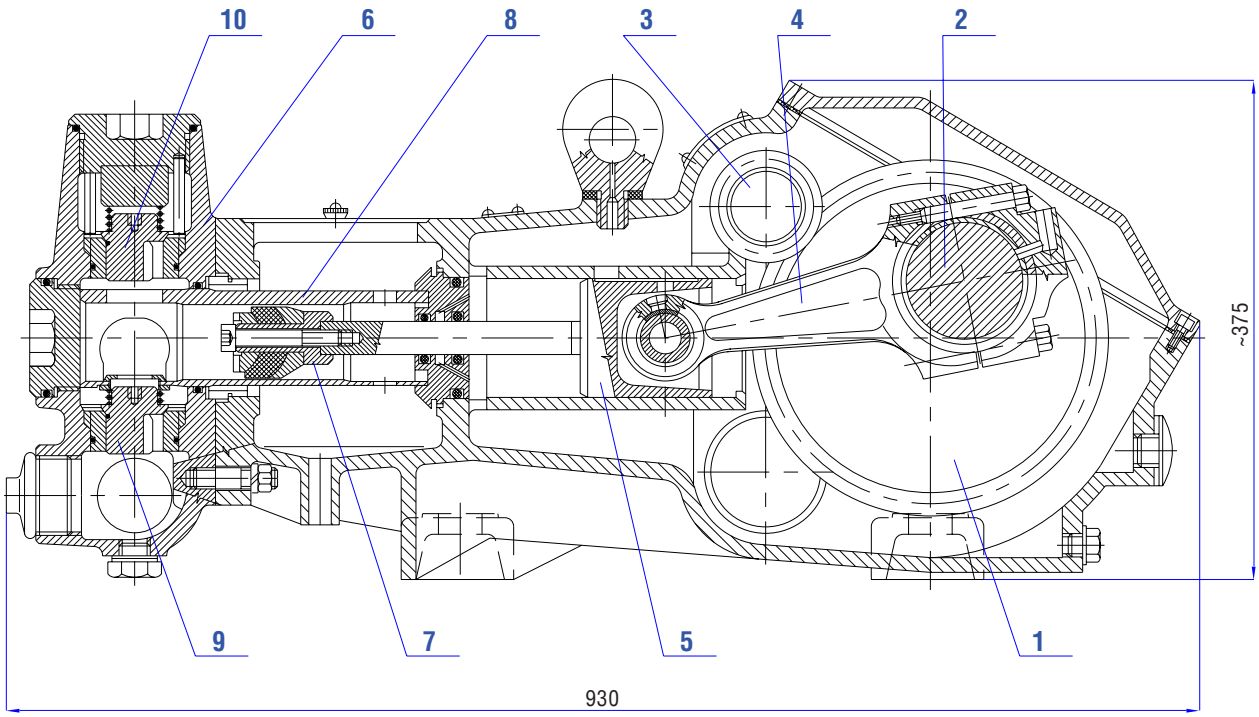
Driven, sense of rotation, regulation

The pump driven could be solved by direct drive from the driving engine (electric motor, burning motor, hydromotor...) through flexible coupling. In a case of request to have another different pump speeds is possible to put the arbitrary external gear-box between driving set and the pump, casely is possible also the driven by vee-belts. The total gear number is then a product of inbuilt gear-box's gear number and of external gear's one. In such a case it's important to secure that the crank shaft speeds must be in the range from 100-400 min.- ^{1}. Required low speeds of the pump it's important to consultant with manufacturer in advance.
The pumps are supplied either in the left execution (free cylinder shaft end is led to the left) or in the right one (free cylinder shaft end is led to the right.)
Both left and right sides are appreciated always viewing from the mechanical part toward to hydraulic one. Sense of rotation of the left execution is clockwise direction. The led free counter-shaft end is placed corn-wise over or under the crankshaft.
The pump flow regulation is possible made by continously change of driving-unit speeds, casely by the external regulating fitting with partial flow by-pass.

Flange placements

Suction and delivery cannals are led symmetrically both on the right and on the left sides of hydraulic part. Delivery flange is possible to place on the right and on the left pump sides abstractedly from each other. Suction connecting is possible to place on the right side and on the left side, prospectively also to the middle of hydraulic casing.
For greater pump flows and for some working specific cases is reccomanded to install the suction pipings from the both sides of hydraulic part in order to secure the sufficient filling of the pump. Safety valve is mostly joined on the opposite side of delivery flange and on connecting of the pump delivery pipings.

Informative drawing of a pump



1. Crankcase
2. Crank shaft
3. Counter shaft
4. Connecting rod
5. Universal joint with piston rod
6. Hydraulic part casing
7. Exchangeable piston
8. Piston bush
9. Suction valve
10. Delivery valve

Specification

40 - PVA - 3 - 90

Construction execution			All		-27		-07, -17, -27			
Inlet speeds		[min^{-1}]	392		580		975		1475	
Gear ratio		[-]	3.92		3.92		3.92		3.92	
Crank shaft speeds		[min^{-1}]	100		148		249		376	
Middle piston speed		[m.s^{-1}]	0.30		0.44		0.75		1.13	
Pump designation	Plunger diameter [mm]	Max. pressure [bar]	Qt [l/min]	Pt [kW]	Qt [l/min]	Pt [kW]	Qt [l/min]	Pt [kW]	Qt [l/min]	Pt [kW]
PVA-3-90-45	45	160	43	11	64	17	107	28	162	43
PVA-3-90-50	50	140	53	12	78	18	132	31	199	47
PVA-3-90-56	56	110	67	12	98	18	165	30	250	46
PVA-3-90-63	63	90	84	13	125	19	209	31	317	48

40 - PVA - 3 - 100

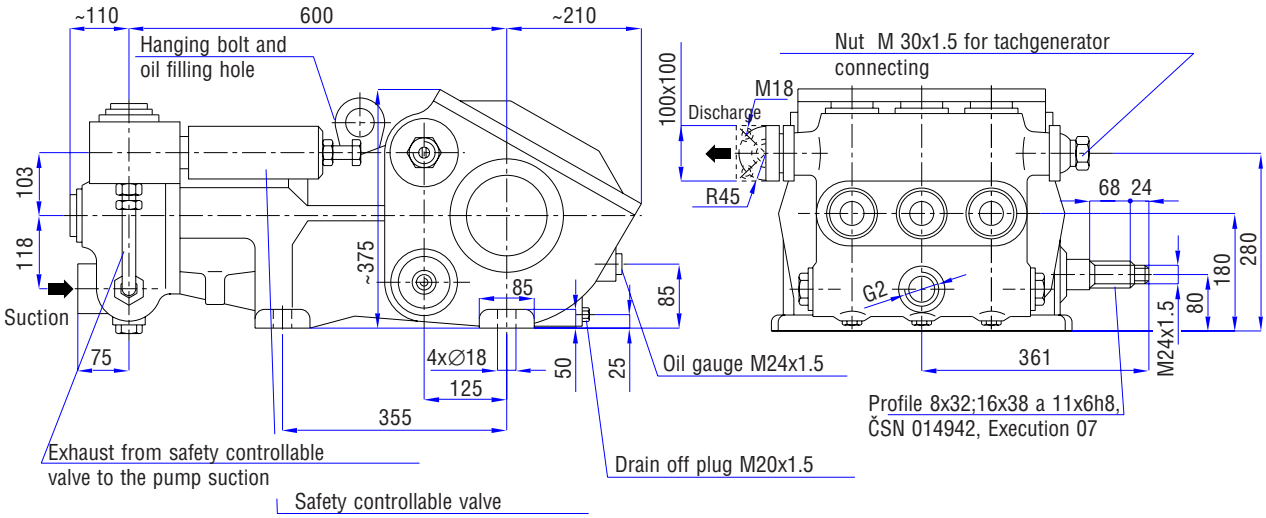
Construction execution			-07, -17					
Inlet speeds		[min^{-1}]	392		975		1475	
Gear ratio		[-]	3.92		3.92		3.92	
Crank shaft speeds		[min^{-1}]	100		249		376	
Middle piston speed		[m.s^{-1}]	0.33		0.83		1.25	
Pump designation	Plunger diameter [mm]	Max. pressure [bar]	Qt [l/min]	Pt [kW]	Qt [l/min]	Pt [kW]	Qt [l/min]	Pt [kW]
PVA-3-100-45	45	160	48	13	119	32	180	48
PVA-3-100-50	50	140	59	14	147	34	222	52
PVA-3-100-56	56	110	74	14	184	34	278	51
PVA-3-100-63	63	90	94	14	233	35	352	53

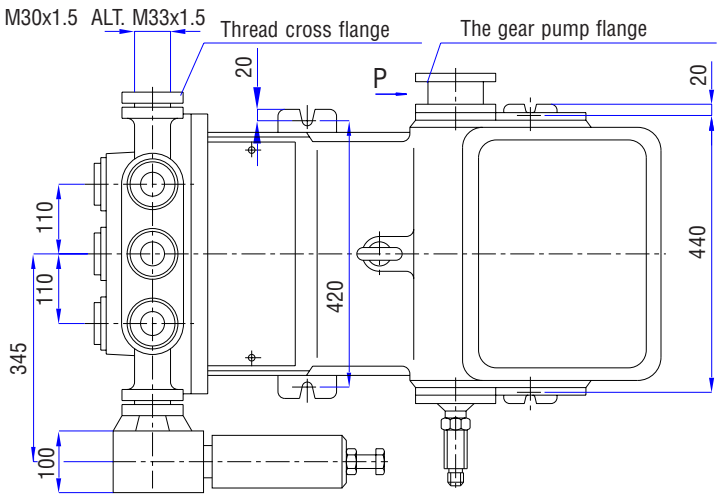
Q_1 ..... theoretical flow - flow calculated from the pump geometric characteristics and speeds, it doesn' t consider wrong chamber influence

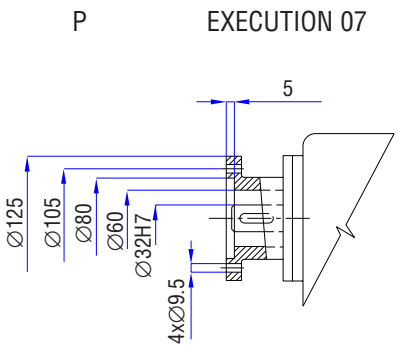
P_1 ..... theoretical output - theoretical hydraulic pump output calculated from maximum transporting pressure and theoretical flow

The pump weight including safety valve is 340 kg.

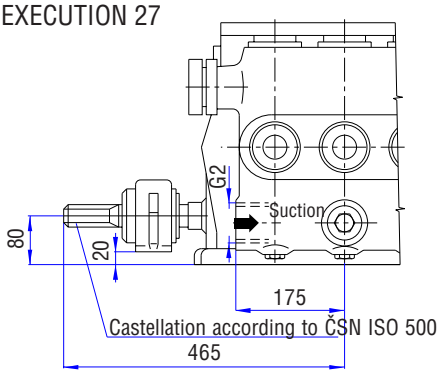
Dimensional drawing



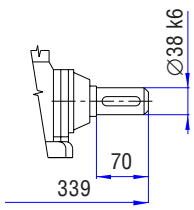




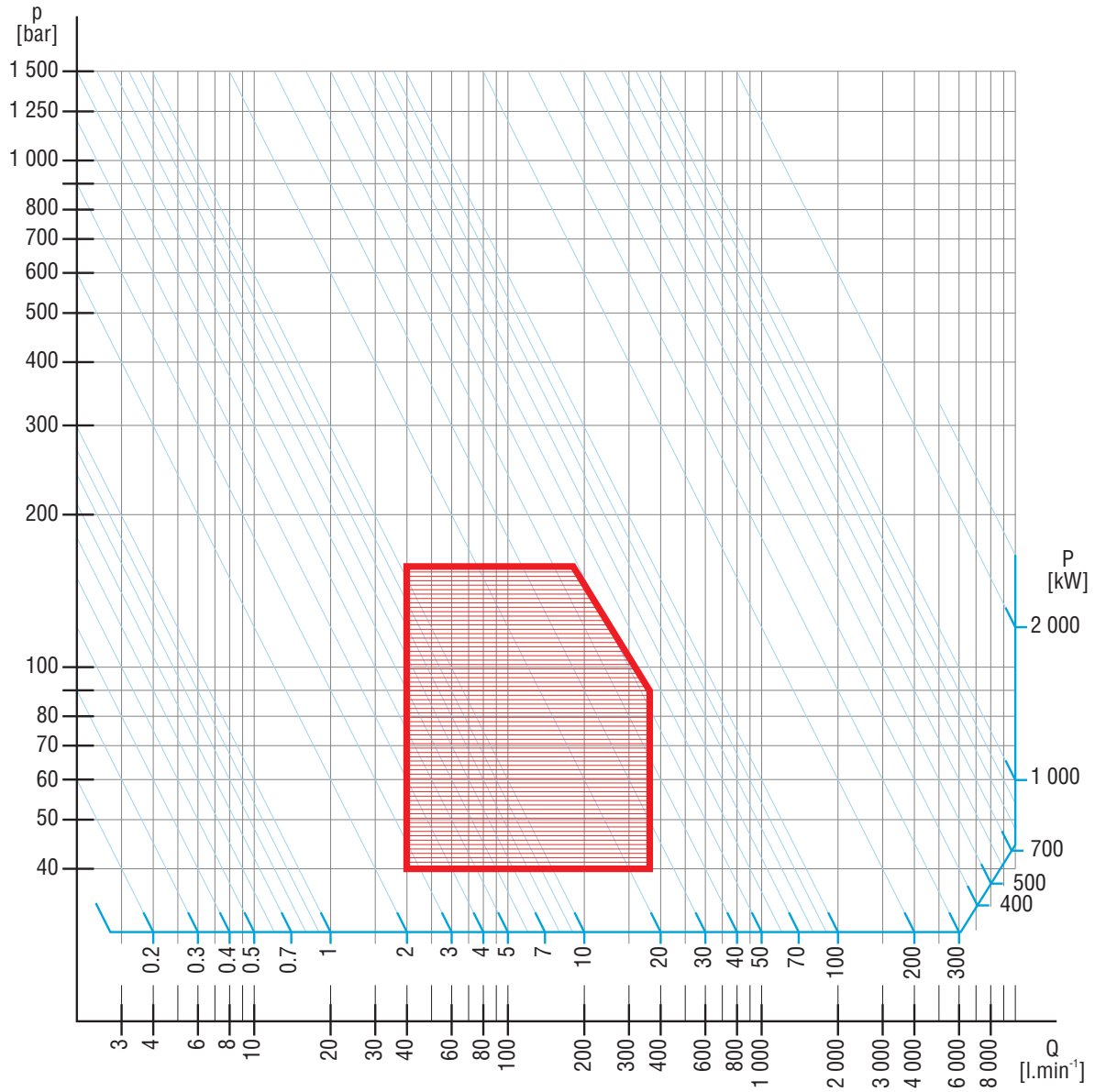
INLET SHAFT
EXECUTION 27



INLET SHAFT
EXECUTION 17,37



Informative sectional diagram of the pump



1 bar = 0.1 MPa = 14.5 PSI 1 l.min^{-1}=0.06 m^3.h^{-1} = 0.264 GPM 1 kW = 1.36 HP