SIGMA PUMPY HRANICE

MODERN TECHNOLOGIES AND LONG - TERM EXPERIENCE

ZUS

LOW - PRESSURE GEAR PUMPS

SIGMA PUMPY HRANICE, s.r.o.
Tovární č.p. 605, 753 01 Hranice I - Město, Czech Republic
phone: +420 581 661 111, fax: +420 581 661 785
e-mail: sigmapumpy@sigmapumpy.com
www.sigmapumpy.com

426	21.07
4.09	

Application

The ZUS gear pumps are designed for handling viscous and dense liquids with lubricating characteristics, not containing any solid particles (as sand, ash, crystals etc.) up to a temperature of 100 °C and pressure differences up to 0,5MPa.
They are used to advantage for pumping a wide range of viscous liquids and fluids in chemical, petrochemical and other industries, such as oils, tar with phenolated water, water-glass, varnishes, soap, glues, grease,etc.
They are used to advantage due to their low speeds for handling in food and sugar installations to pump sugar products, molasses and sirobs.

Description

The external gear ZUS pumps are low-speed type. In particular they are intended to pump viscous and dense liquids at low speeds.

Design

The ZUS gear pumps are of user friendly design, which is simple in principle, consists of the following main parts: pump body, front shield, gland packing shield, driving and driven shafts and pair of gear wheels. The gear wheels with external involute toothing, which revolve in mutual engagement in the pump casing, are firmly pressed on to the shafts. The upper shaft is the driving one. Both the shafts are supported on plain bearings being pressed into the shields. The bearings are lubricated with the pumped liquid.
The shaft is sealed with gland packing rings.
In the bottom of the pump body is a plugged hole for dewatering and at the top is a hole for flushing or steaming the pump if solidifying liquids are pumped.
The ZUS pumps have no inbuilt safety valve. They must, therefore, be protected against an excessive pressure (e.g. In the case of discharge piping choking or clogging) by the safety valve installed behind the pump. Any closing element cannot be installed between the safety valve and pump.

Materials

Stator parts are made of grey cast iron, gear wheels and shafts are of constructional steel. The shafts are surface hardened at the area of contact with stator parts.

Drive and direction of rotation

The pumps ZUS can rotate clockwise or counter-clockwise (when viewed from the driving motor). The sense of rotation needed is determined by the layout of the suction and discharge piping. The reverse run of the pump is possible. With the change of the direction of rotation the direction of the liquid flow will be changed, too.
The pumps are designed for the drive by geared motor or via gear box only. The pumping set is mounted on common base frame.

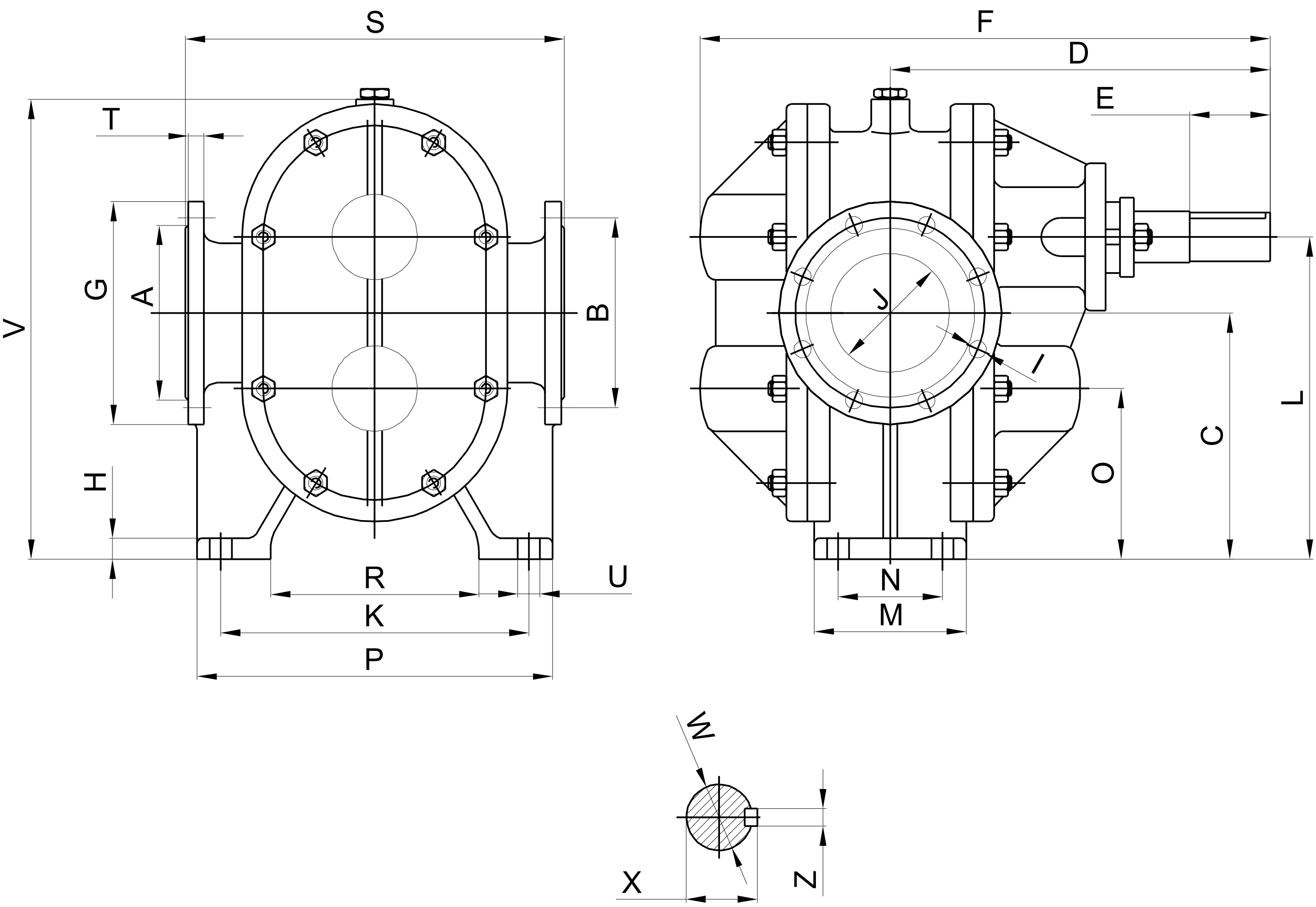
Branches layout

Both branches are located on the sides of the pump in horizontal position, opposite each other. They are dimensioned identically and the direction of rotation of the driving shaft determines their operation as a suction or a discharge branch.
The suction branch of the clockwise pump is on the left-hand side and in the case of counter-clockwise pump is on the right-hand side – when viewed from the driving motor.
The discharge branch of the clockwise pump is on the right-hand side and in the case of counter-clockwise pump is on the left-hand side – when viewed from the driving motor.

Pump selection

Within selection or design of the pumps it is inevitable to respect the general principles valid for positive displacement pump proper functioning but also some of their specific characteristics and working demands.
1.It is necessary to equip delivery piping with a safety(relief) valve, considering real operational conditions.
2.Pump must not be started up with closed suction or discharge,
3.With low temperatures of a pumped liquid its viscosity is increased and thus the pump running-in conditions may worsen. Such conditions should be considered with the pump drive dimensioning, speed selection or running-in method to ensure the pump right function.
4.In no case the pump may run dry, due to possibility of its damage or seizure, so it is necessary to prime the pump with a liquid even before its each and every starting-up.
5.The pump speeds are same for all the pump sizes regardless viscosity of pumped liquid or pressure difference.

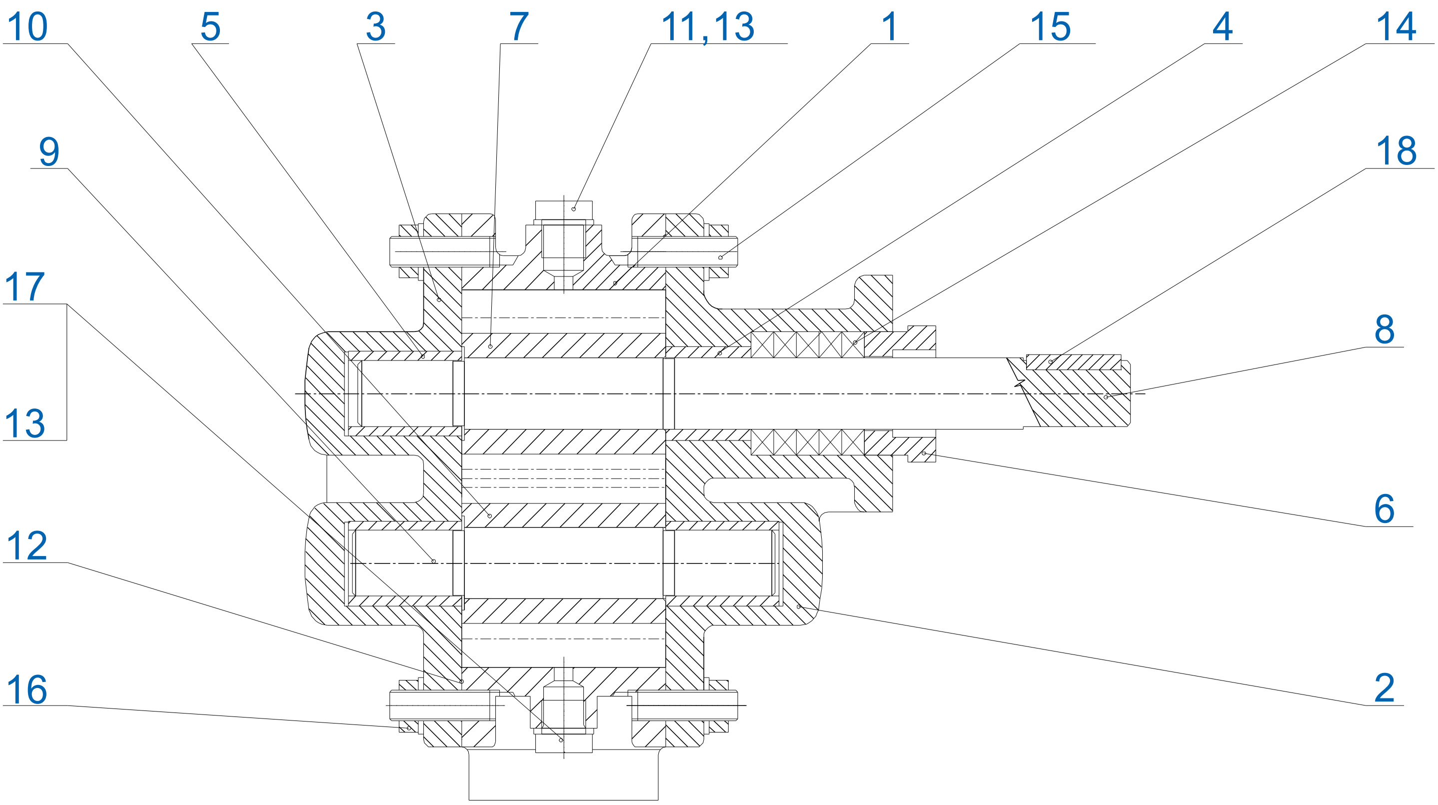
Dimensioned Drawing



PUMP	WEIGHT	U	V	A	B	C	D	E	F	G	H	I	J
ZUS 50	52,5	18	310	-	110	170	300	57	437	135	25	14	50
ZUS 65	91	18	422	-	130	230	317,5	75	465,5	155	20	14	65
ZUS 80	106,5	18	422	-	150	230	335	75	493	185	20	18	80
ZUS 100	143	18	455	148	170	230	389	85	577	210	22	18	100
ZUS 125	153	23	480	178	200	260	401	85	668	235	22	18	125
ZUS 150	184,5	23	489,5	202	225	257,5	440	95	660	260	20	18	150

PUMP	WEIGHT	K	L	M	N	O	P	R	S	T	W	X	Z
ZUS 50	52,5	190	215	100	60	125	235	125	260	16	35	38,3	10
ZUS 65	91	260	297,5	100	60	162,5	310	180	350	16	45	48,5	14
ZUS 80	106,5	265	297,5	140	90	162,5	310	175	350	20	45	48,5	14
ZUS 100	143	265	310	145	95	150	310	174	380	15	48	51,5	14
ZUS 125	153	325	340	160	110	180	375	220	400	20	52	55,8	16
ZUS 150	184,5	310	345	220	150	170	380	205	410	20	60	64,2	18

Informative cross section of the pump ZUS



1	Pump body	10	Driven gear wheel
2	Front shield	11	Upper plug
3	Gland packing shield	12	Gasket
4	Slide bearing-Stuffing box	13	Sealing ring
5	Slide bearing	14	Gland packing cord
6	Stuffing box lid	15	Shield bolt
7	Driving gear wheel	16	Nut
8	Driving shaft	17	Dewatering nut
9	Driven shaft	18	Key

Technical data

<table>
<tr><th rowspan="2">Pump size</th><th>DN -inside dia. of branches</th><th colspan="4">Performance data</th><th>Standard</th><th rowspan="2">Note</th></tr>
<tr><th>mm
suct/disch</th><th>Q_r
$l.s^{-1}$</th><th>Δp
MPa</th><th>$p_{s\ man}$
MPa</th><th>n
R.P.M.</th><th>electric motor
kW</th></tr>
<tr><td>ZUS-50</td><td>50/50</td><td>1,666</td><td rowspan="9">0,5</td><td rowspan="9">-0,02 to 0,5</td><td rowspan="9">190</td><td>3</td><td>-</td></tr>
<tr><td rowspan="2">ZUS-65</td><td rowspan="2">65/65</td><td rowspan="2">2,5</td><td rowspan="2">4</td><td>If ν < 2280 $mm^2.s^{-1}$, then max Δp =0,5 MPa</td></tr>
<tr><td>If ν > 2280 $mm^2.s^{-1}$, then max Δp =0,4 Mpa</td></tr>
<tr><td>ZUS-80</td><td>80/80</td><td>3,5</td><td>5,5</td><td>-</td></tr>
<tr><td>ZUS-100</td><td>100/100</td><td>6</td><td>7,5</td><td>-</td></tr>
<tr><td>ZUS-125</td><td>125/125</td><td>7</td><td>15</td><td>-</td></tr>
<tr><td rowspan="3">ZUS-150</td><td rowspan="3">150/150</td><td rowspan="3">10,5</td><td rowspan="2">15</td><td>If ν < 1520 $mm^2.s^{-1}$, then max Δp =0,5 MPa</td></tr>
<tr><td>If ν > 1520 $mm^2.s^{-1}$, then max Δp =0,4 Mpa</td></tr>
<tr><td>18,5</td><td>-</td></tr>
</table>

Q_r .... rated flow rate at Δ p =0,5 MPa and $p_{s\ man}$ = -0,02 MPa
Δp............... pressure difference
$p_{s\ man}$........... pressure in the inlet pump branch
n.................. shaft speeds

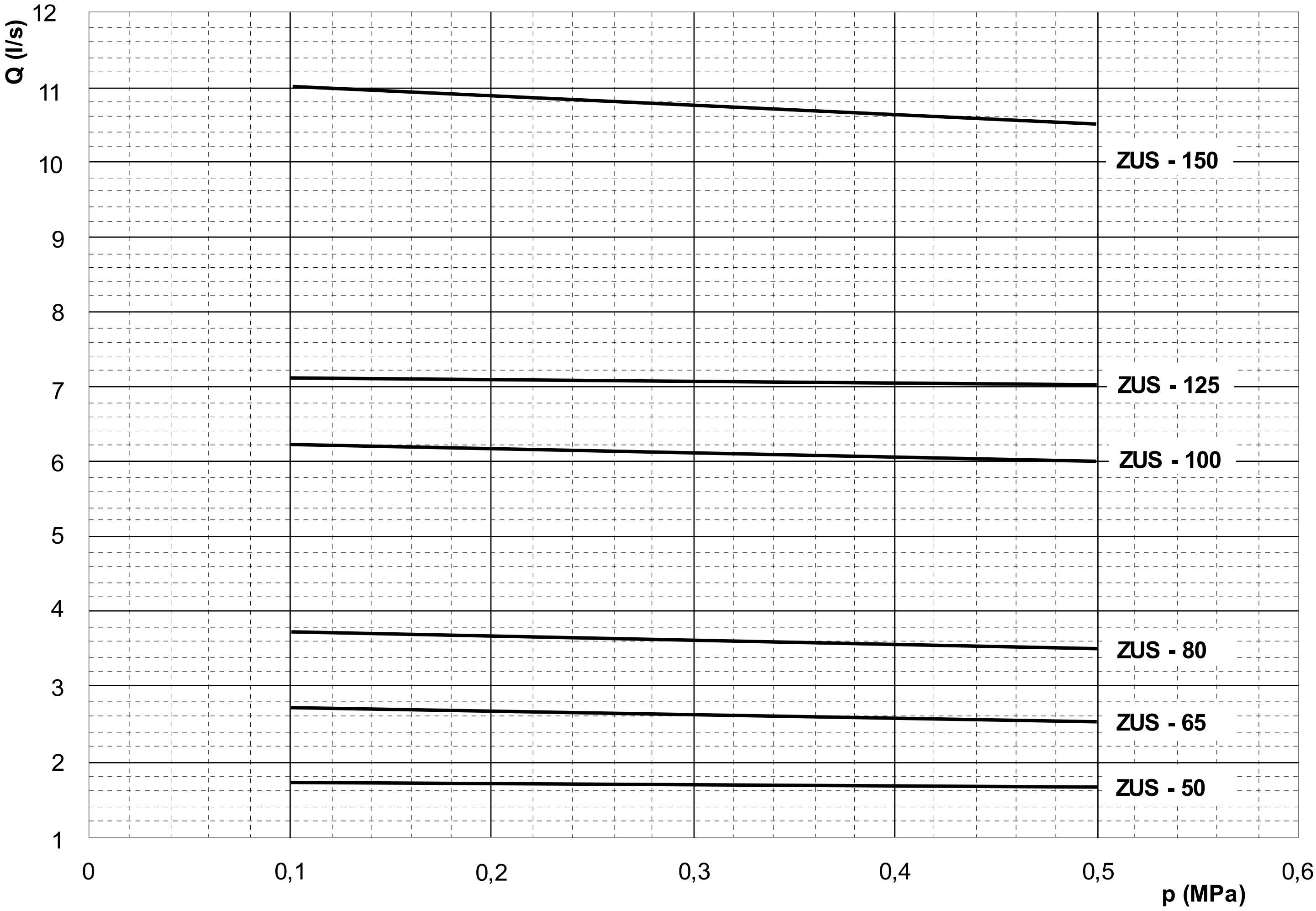
Maximum discharge pressure on the discharge branch up to 0,52MPa.

The values Q_r and Δp are understood at a kinematic viscosity 76 $mm^2.s^{-1}$ and inlet pressure $p_{s\ man}$= -0,02 MPa. The higher viscosity, the worse suction characteristics of the pump and thus an in-flow of the liquid to the pump (flooded suction) is necessary.

The given standard electric motors outputs, except the cases stated under the note in the technical data table, are sized in such a way to allow wide application for pumping liquids of viscosities up to 3040-3420 $mm^2.s^{-1}$ depending its kind and concentration..

At higher viscosities than stated above, an electric motor of adequately higher output should be used except the size ZUS-150 with motor of output 18,5kw being oversized even when for higher viscosities.
(1 $mm^2.s^{-1}$ = 1 cSt).

Performance curves



The values Q_r and p are understood at a kinematic viscosity 76 $mm^2.s^{-1}$ and inlet pressure $p_{s\ man}$= -0,02 Mpa for speeds 190 R.P.M.