

HG series

SINGLE AND DOUBLE INTERNAL
GEAR PUMPS



hydrout

HG SERIES

SINGLE AND DOUBLE INTERNAL GEAR PUMPS



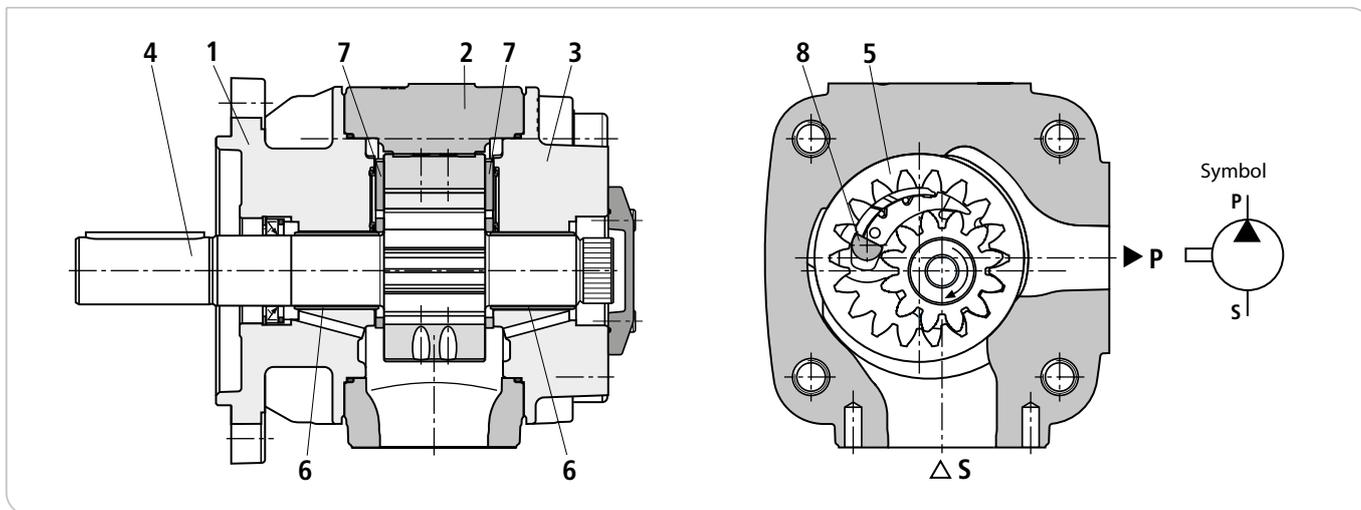
MODEL CODE – SINGLE PUMPS

		HG	1	-40	-01	R	-V	P	C
PUMP									
Internal gear pump	HG								
CODE									
Displacement 8...20	0								
Displacement 25...63	1								
Displacement 80...160	2								
SIZE									
Displacement (cc/rev)									
8	10	13	16	20	25	32	40	50	63
80	100	125	145	160					
CODE									
		01							
DIRECTION OF ROTATING (VIEWED ON SHAFT END)									
CW		R							
SEAL TYPE									
FKM - Viton standard		V							
NBR		W							
SHAFT									
Key shaft		P							
Splined shaft		S							
MOUNTING FLANGE									
SAE 2 holes		C							

SPECIFICATION: STRUCTURE

Hydraulic pumps of type HG are gap-compensated internal gear pumps with fixed displacement. They mainly consist of: Mounting flange (1), housing (2), cover with through-drive (3), pinion shaft (4), internal gear (5), sliding

bearings (6), axial washers (7) and stop pin (8) as well as the radial compensation consisting of segment (9), segment support (10) and the seal rolls (11).

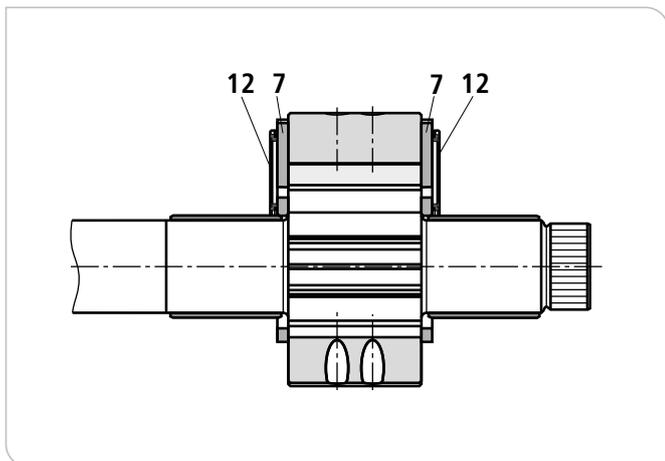


Suction and displacement procedure

The hydro-dynamically mounted pinion shaft (4) drives the toothed internal gear (5) in the direction of rotation shown. The tooth clearances opening in the suction area prime the fluid. The fluid is transported into the tooth clearances of pinion and internal gear, from the suction area (S) into the pressure area (P). There, the fluid is displaced from the closing tooth clearances and delivered into the pressure port (P). Suction and discharge area are separated by the radial compensation elements (9 to 11) and the tooth engagement between internal gear and pinion shaft.

Axial compensation

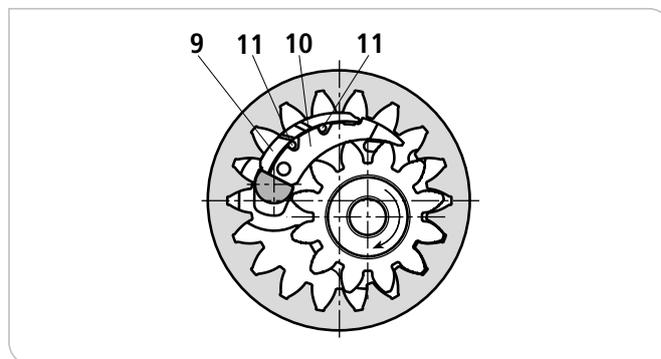
The displacement chamber in the pressure area is axially sealed by axial washers (7).



The sides of the axial washers facing away from the displacement area are backed by a pressure field (12). These fields balance the axial washers vis-à-vis the displacement area, which results in a perfect sealing with low mechanical losses.

Radial compensation

The radial compensation elements consist of segment (9), segment support (10) and seal rolls (11). Segment (9) and segment support (10) are arranged in the pressure field so that the resulting compressive force is basically accepted by the stop pin.



A small compressive force component presses segment and Segment support onto the tooth tips of pinion shaft and internal gear and in this way provides for the separation of the pressure area from the suction area with automatic clearance adjustment. This is the prerequisite for constantly high volumetric efficiency during the entire operating time. The clearance adjustment of segment and segment support is made possible by the seal rolls located in between.

Hydro-dynamic and hydrostatic mounting

The pinion shaft (4) is accepted by hydro-dynamically lubricated radial sliding bearings (6). The internal gear (5) is mounted hydrostatically in the housing.

Gearing

The gearing with involute edges has a large meshing length for little flow and pressure pulsation and thus guarantees low noise running.

TECHNICAL DATA

General	
Design	Internal gear pump - gap compensated
Mounting flange	SAE 2 Hole flange according to ISO 3019-1
Line connection	Flanged port
Shaft Load	Radial and axial forces (e.g. belt pulley) only after coordination
Direction of rotation (looking at the shaft end)	Clockwise or Counterclockwise (on request) - not bidirectional
Hydraulic	
Hydraulic fluid	HLP – mineral oil according to DIN 51524 part 2 HFC – water polymer solutions according to DIN EN ISO 12922 ^{1) 2)} Seal design W HEES – fluids according to DIN ISO 15380 ¹⁾ HFD-U – fluids according to VDMA 24317 ¹⁾ , DIN EN ISO 12922 ¹⁾
Hydraulic fluid temperature range	HLP Fluid °C ... –10 to +80; for other temperatures please consult us! Special fluid °C ... –10 to +50; for other temperatures please consult us!
Ambient temperature range °C	–20 to +60
Viscosity range mm ² /s	10 to 300 (to n = 2000rpm) / 10 to 100 (to n = 3000rpm)
Max. admissible level of contamination of the hydraulic fluid cleanliness class according to ISO 4406 (c)	Class 20/18/15 ³⁾

1) **Attention!** To these media, the limitations for special fluids apply

2) Hydraulic fluid HFC: Input speed n_{max} = 2000 min⁻¹

3) The cleanliness classes specified for the components

must be adhered to in hydraulic systems. Efficient filtration prevents failures and simultaneously increases the service life of the components.

Frame size	HG0				
Size	8	10	13	16	20
Weight kg	4.6	4.8	4.9	5.2	5.6
Speed range ¹⁾ ... Nmin rpm	600	600	600	600	600
Nmax rpm	3000	3000	3000	3000	3000
Displacement cm ³	8.2	10.2	13.3	16.0	20.0
Flow l/min ²⁾	12.2	15.1	19.7	23.7	29.6
Moment of inertia (around drive axis) J kgm ²	0.00018	0.00019	0.00025	0.00027	0.00037
Operating pressure, absolute – Input p bar	0.8 to 2 (shortly, upon start 0.6 bar)				
Nominal pressure pN bar – Output, continuous HLP fluid	315	315	315	315	250
Special fluid ³⁾	220	220	220	220	175
Max intermittent pressure ⁴⁾ pmax bar - HLP fluid	350	350	350	350	300
Special fluid ³⁾	245	245	245	245	210

Frame size	HG1				
Size	25	32	40	50	63
Weight kg	14.5	15	16	17	18.5
Speed range ¹⁾ ... Nmin rpm	200	200	200	200	200
Nmax rpm	3000	3000	3000	3000	3000
Displacement cm ³	25.3	32.7	40.1	50.7	63.7
Flow l/min ²⁾	37.5	48.5	60.9	75.1	94.4
Moment of inertia (around drive axis) J kgm ²	0.00045	0.00055	0.00066	0.00081	0.00237
Operating pressure, absolute – Input p bar	0.8 to 2 (shortly, upon start 0.6 bar)				
Nominal pressure pN bar – Output, continuous HLP fluid	315	315	315	315	315
Special fluid ³⁾	220	220	220	220	220
Max intermittent pressure ⁴⁾ pmax bar - HLP fluid	350	350	350	350	350
Special fluid ³⁾	245	245	245	245	245

Frame size	HG2				
Size	80	100	125	145	160
Weight kg	43.5	45.5	48	50	52
Speed range ¹⁾ ... Nmin rpm	200	200	200	200	200
Nmax rpm	3000	3000	3000	3000	3000
Displacement cm ³	81.4	100.2	125.3	145.2	162.8
Flow l/min ²⁾	120.6	148.5	185.7	215.2	241.3
Moment of inertia (around drive axis) J kgm ²	0.0028	0.00329	0.00407	0.00442	0.00506
Operating pressure, absolute – Input p bar	0.8 to 2 (shortly, upon start 0.6 bar)				
Nominal pressure pN bar – Output, continuous HLP fluid	315	315	315	250	210
Special fluid ³⁾	220	220	220	175	260
Max intermittent pressure ⁴⁾ pmax bar - HLP fluid	350	350	350	280	n/a
Special fluid ³⁾	245	245	245	195	n/a

1) Hydraulic fluid HFC: Input speed n_{max} = 2000 min⁻¹

2) Measured with n = 1450 min⁻¹, p = 10 bar and = 30 mm²/s

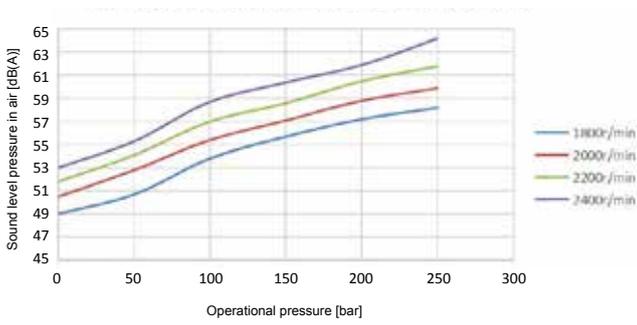
3) **Attention!** To these media, the limitations for special fluids apply

4) Max 10 s, max. 50 % of the duty cycle

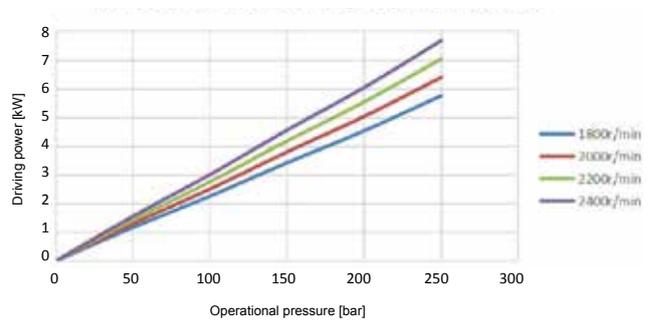
DIAGRAMS INTERNAL GEAR PUMPS

HG0

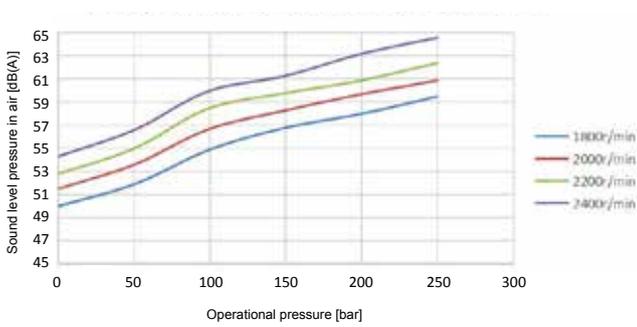
HG0-08 Sound level pressure in air



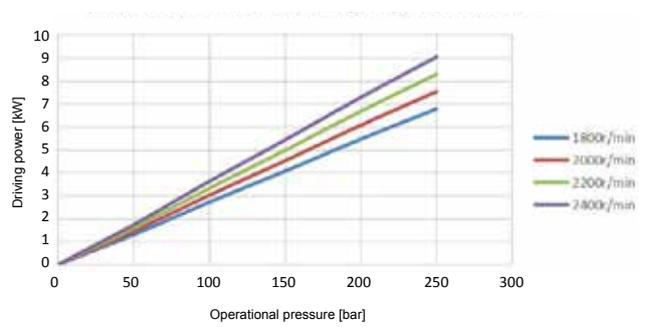
HG0-08 Driving power



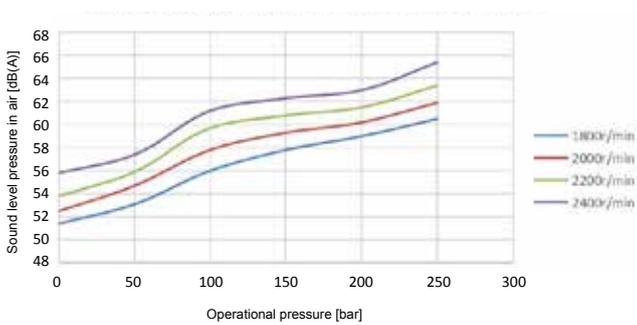
HG0-10 Sound level pressure in air



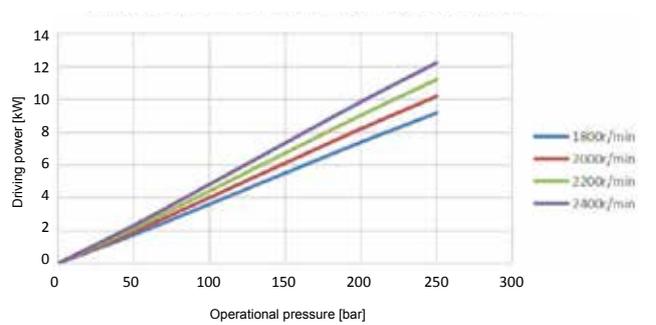
HG0-10 Driving power



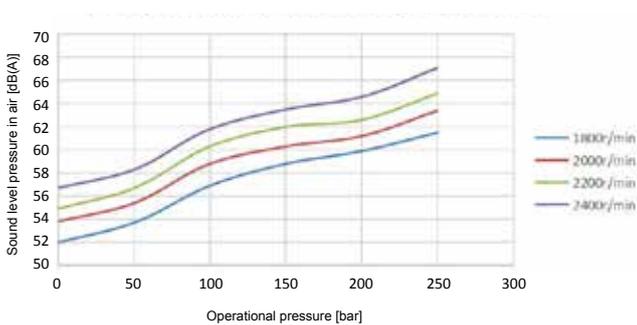
HG0-13 Sound level pressure in air



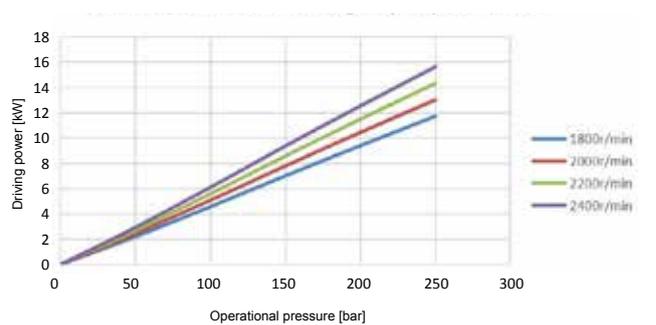
HG0-13 Driving power



HG0-16 Sound level pressure in air

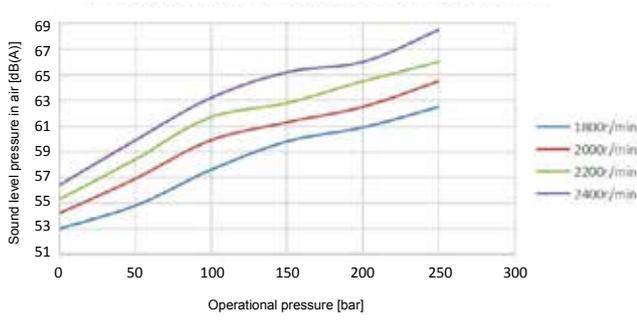


HG0-16 Driving power

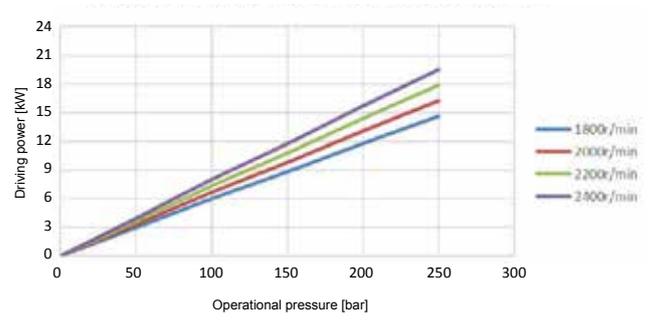


DIAGRAMS INTERNAL GEAR PUMPS

HG0-20 Sound level pressure in air

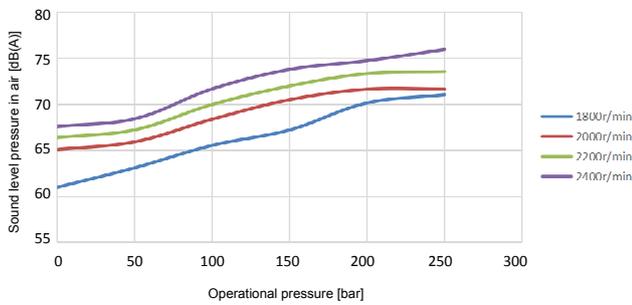


HG0-20 Driving power

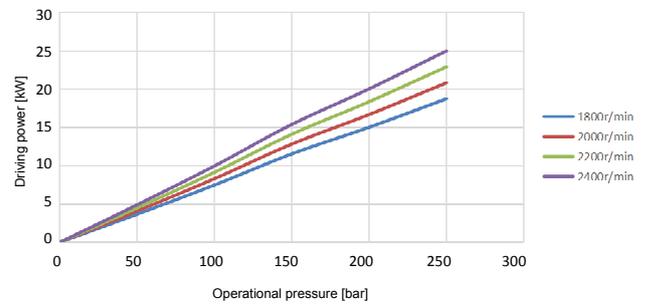


HGI

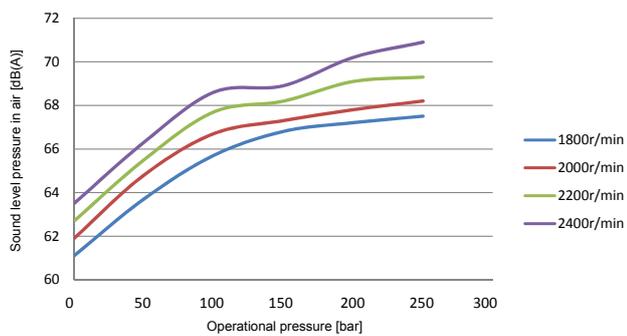
HGI-25 Sound level pressure in air



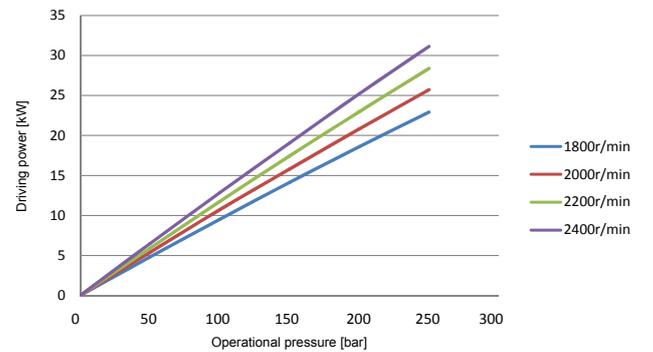
HGI-25 Driving power



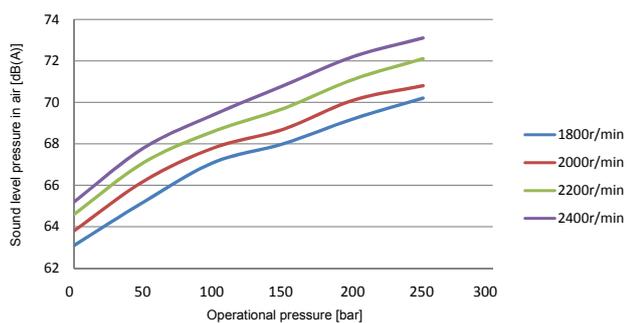
HGI-32 Sound level pressure in air



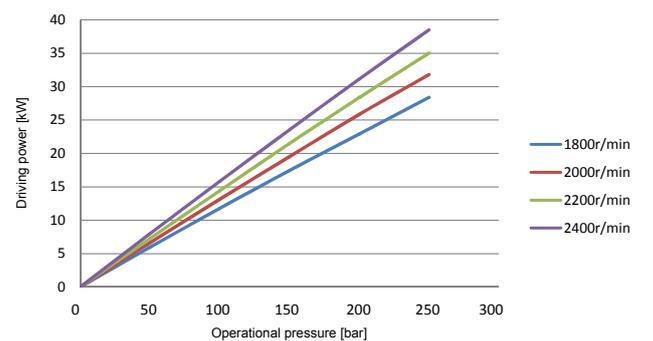
HGI-32 Driving power



HGI-40 Sound level pressure in air

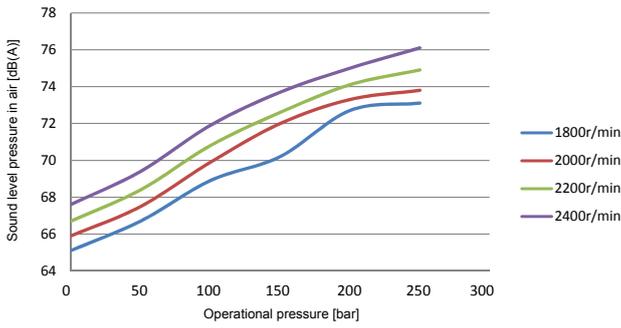


HGI-40 Driving power

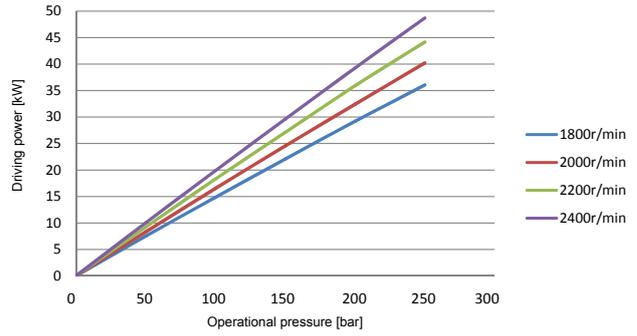


DIAGRAMS INTERNAL GEAR PUMPS

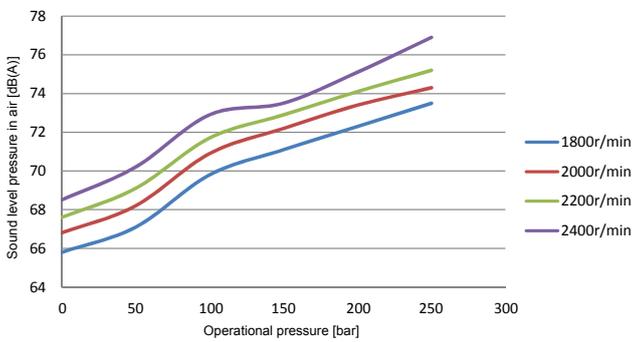
HGI-50 Sound level pressure in air



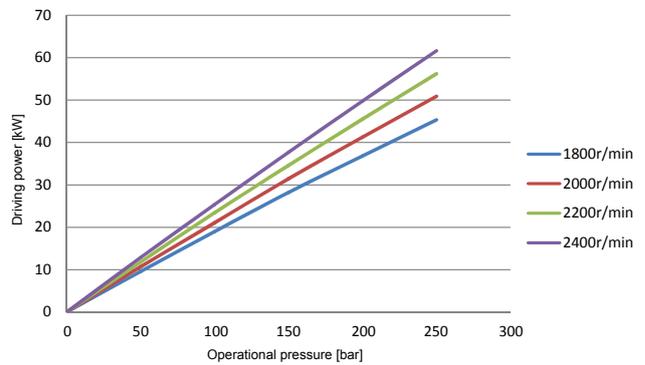
HGI-50 Driving power



HGI-63 Sound level pressure in air

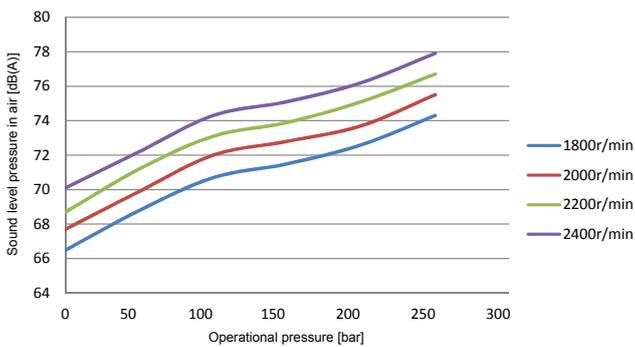


HGI-63 Driving power

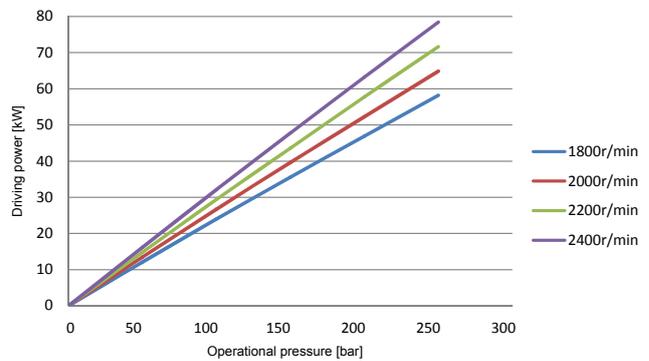


HG2

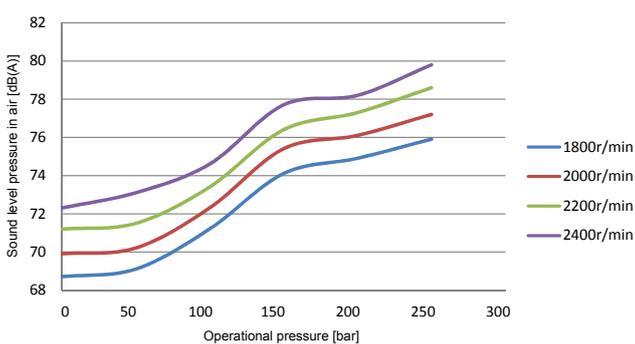
HG2-80 Sound level pressure in air



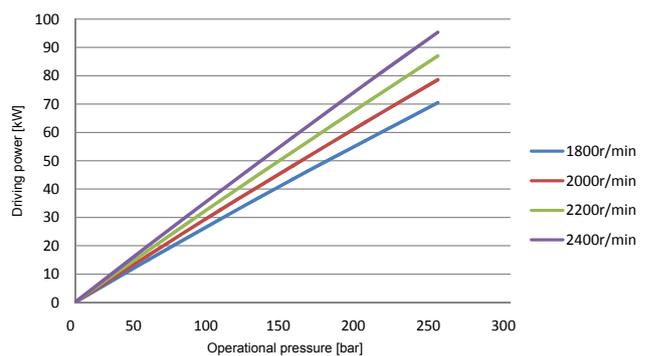
HG2-80 Driving power



HG2-100 Sound level pressure in air

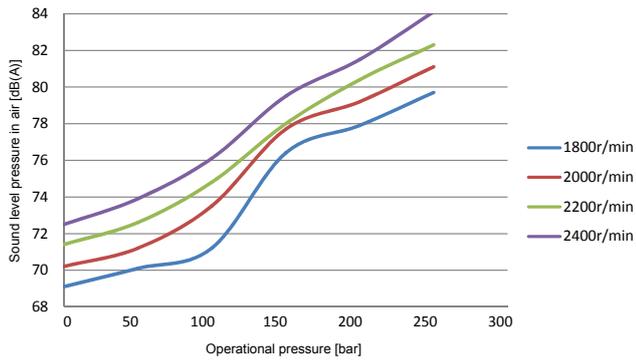


HG2-100 Driving power

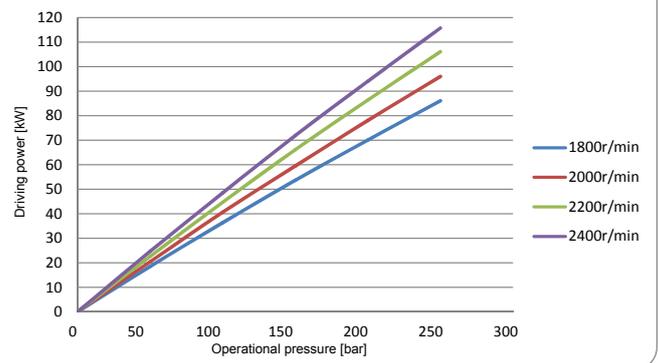


DIAGRAMS INTERNAL GEAR PUMPS

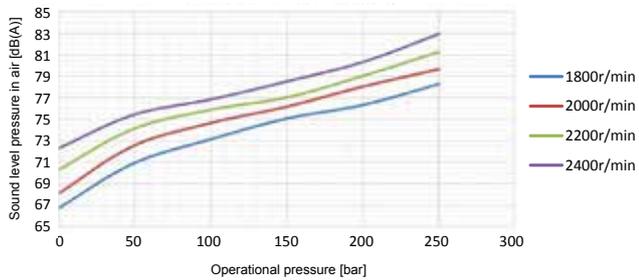
HG2-I25 Sound level pressure in air



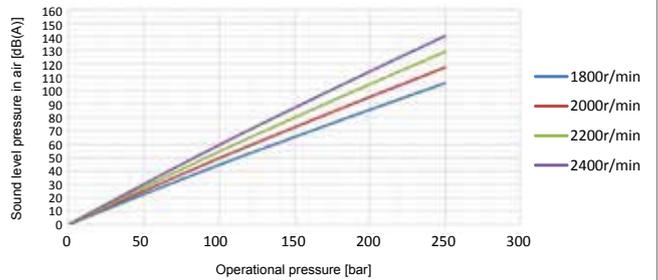
HG2-I25 Driving power



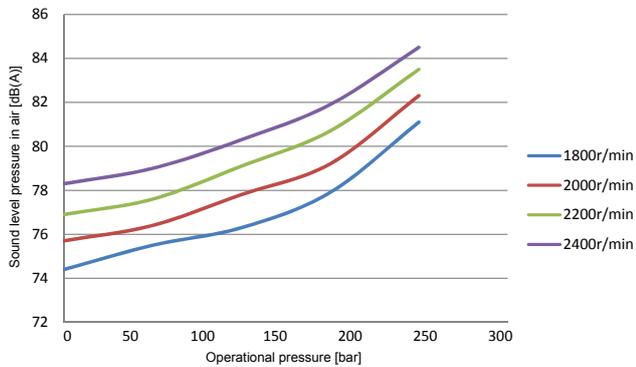
HG2-I45 Sound level pressure in air



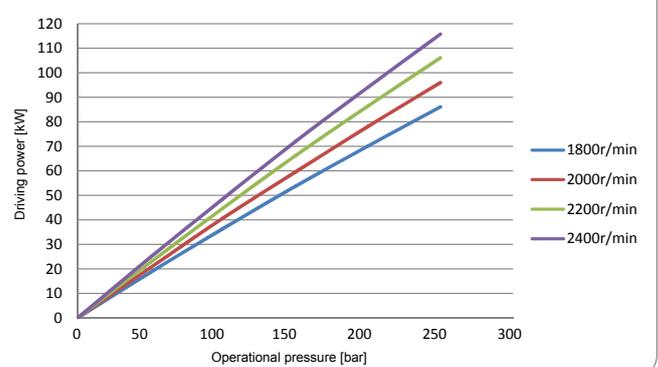
HG2-I45 Driving power



HG2-I60 Sound level pressure in air



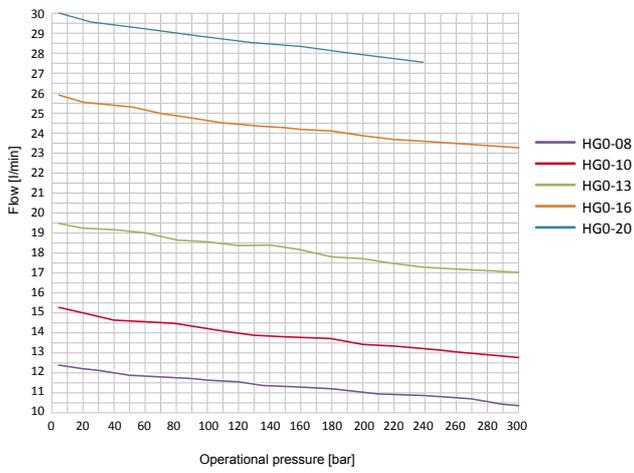
HG2-I60 Driving power



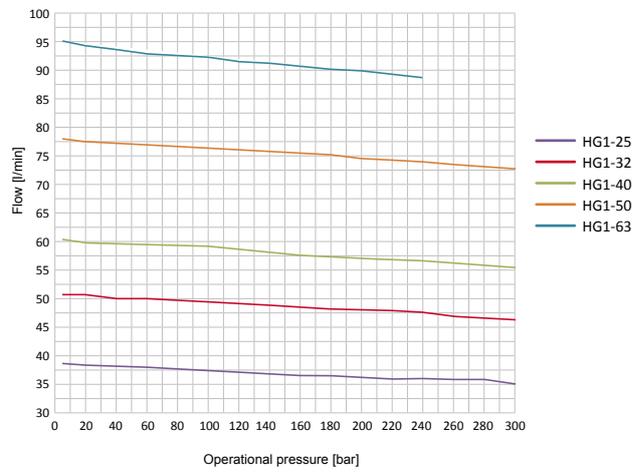
DIAGRAMS INTERNAL GEAR PUMPS

HG0 / HGI / HG2

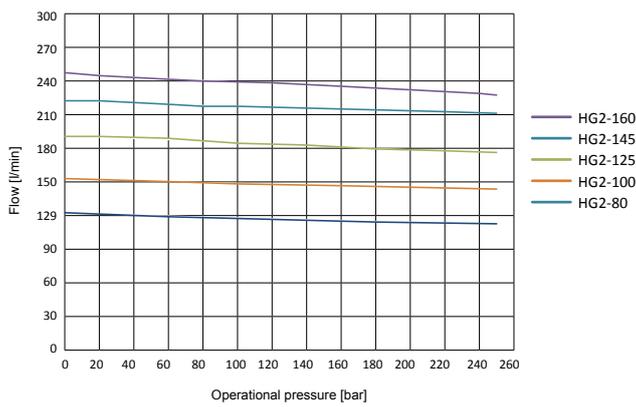
HG0 internal gear pump flow diagram



HGI internal gear pump flow diagram

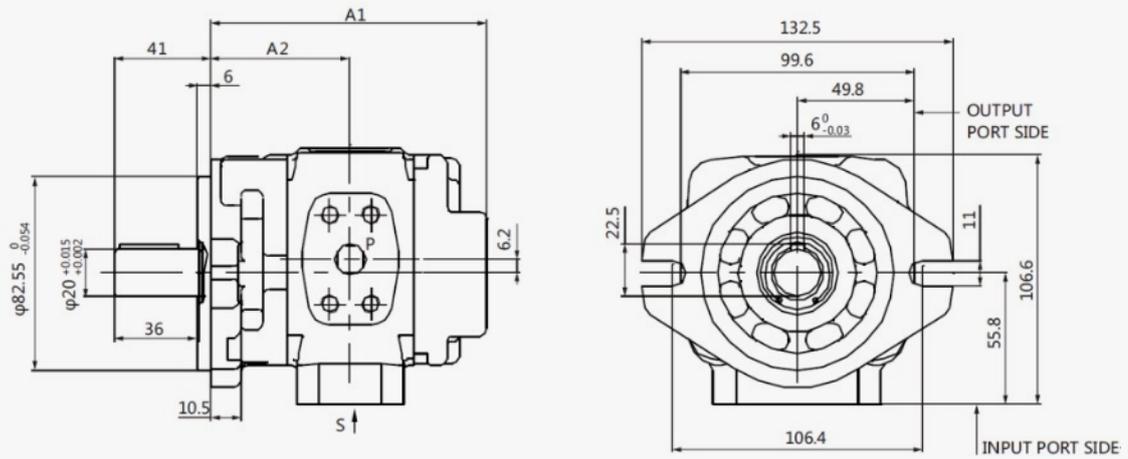


HG2 internal gear pump flow diagram



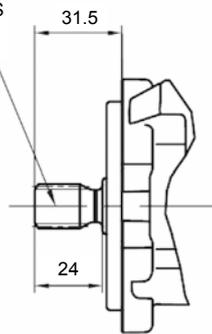
INSTALLATION DIMENSIONS: HG0-01R-V

P SHAFT



S SHAFT

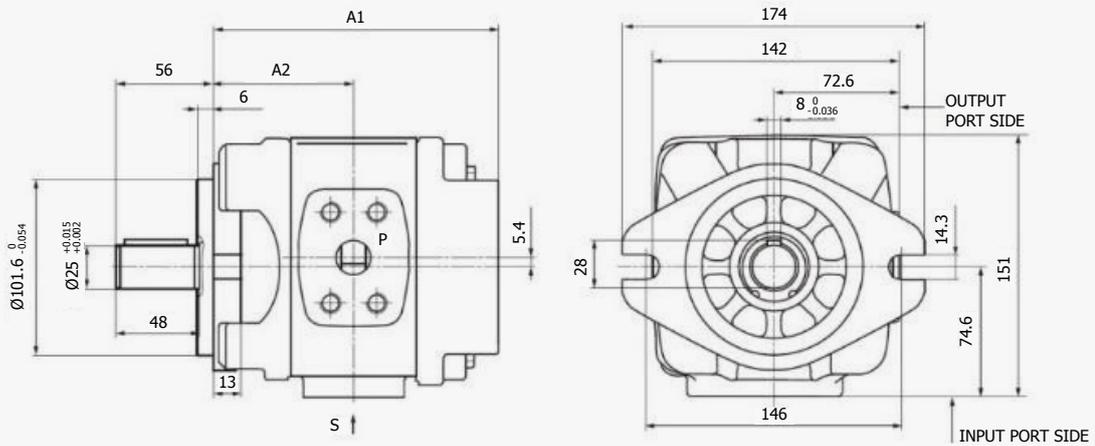
SPLINED SHAFT S
ANSI B92.1
9T 16/32DP 30°



HG0				
Series	A1	A2	S	P
8	102,5	54	SAE 3000 3/4"	SAE 3000 1/2"
10	106,5	56	SAE 3000 1"	
13	113	59,3		
16	118,5	62	SAE 3000 1"1/4	SAE 3000 3/4"
20	126,5	66		

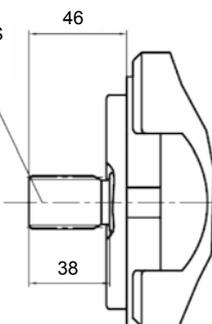
INSTALLATION DIMENSIONS: HG1-01R-V

P SHAFT



S SHAFT

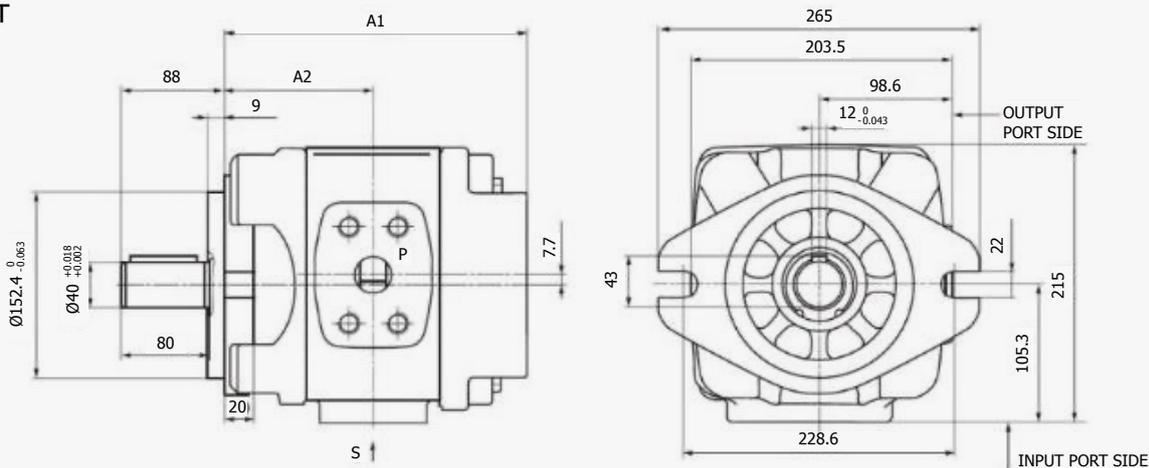
SPLINED SHAFT S
ANSI B92.1
17T 12/24DP 30°



HG1				
Series	A1	A2	S	P
25	139	73	SAE 3000 1"1/4	SAE 3000 3/4"
32	146	76,5		
40	153	80		SAE 3000 1"
50	163	85		
63	177	92		

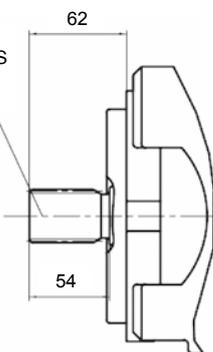
INSTALLATION DIMENSIONS: HG2-01R-V-C

P SHAFT



S SHAFT

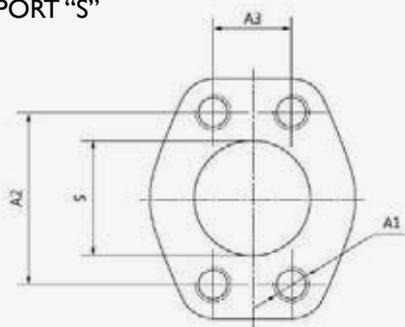
SPLINED SHAFT S
ANSI B92.1
17T 12/24DP 30°



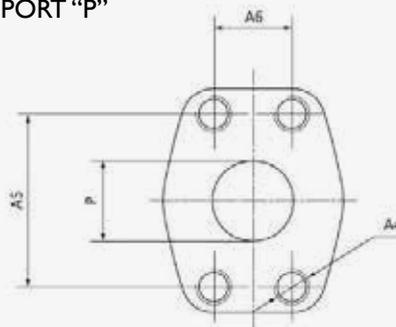
HG2				
Series	A1	A2	S	P
80	199	109,5	SAE 3000 2"	SAE 3000 1" 1/2
100	208	114		
125	220	120	SAE 3000 1"1/2	SAE 6000 1"1/2
145	229,5	125		
160	238	129	SAE 3000 3"	

PORT FLANGE DIMENSIONS

INPUT PORT "S"



OUTPUT PORT "P"



Series	Displacement	S	A1	A2	A3	P	A4	A5	A6								
HG0	8	SAE 3000 3/4"	M10 deep 15	52,4	26,2	SAE 3000 1/2"	M8 deep 13	38,1	17,5								
	10	SAE 3000 1"															
	13																
	16																
	20									M10 deep 15							
25	SAE 3000 1"1/4	M10 deep 17	47,6	22,2													
32																	
40																	
HG1	50	SAE 3000 2"	M12 deep 30	77,8	42,9	SAE 3000 1"1/2	M12 deep 20	69,9	35,7								
	63																
	80									SAE 3000 2" 1/2	M16 deep 30	88,9	50,8	SAE 6000 1"1/2	M16 deep 25	79,4	36,5
	100																
	125																
145																	
160	SAE 3000 3"		106,4	61,9													

MODEL CODE – DOUBLE PUMPS

HG

HG 2 1 -100 -50 01 R P V C 10

PUMP

Internal gear pump HG

CODE

Displacement 8...20	0
Displacement 25...63	1
Displacement 80...160	2

CODE

Displacement 8...20	0
Displacement 25...63	1
Displacement 80...160	2

SIZE

cc/rev					
8	10	13	16	20	0
25	32	40	50	63	1
80	100	125	145	180	2

SIZE

cc/rev					
8	10	13	16	20	0
25	32	40	50	63	1
80	100	125	145	180	2

CODE

01

DIRECTION OF ROTATING (VIEWED ON SHAFT END)

CW R

SEAL TYPE

FKM - Viton standard	V
NBR	W

SHAFT

Key shaft	P
Splined shaft	S

MOUNTING FLANGE

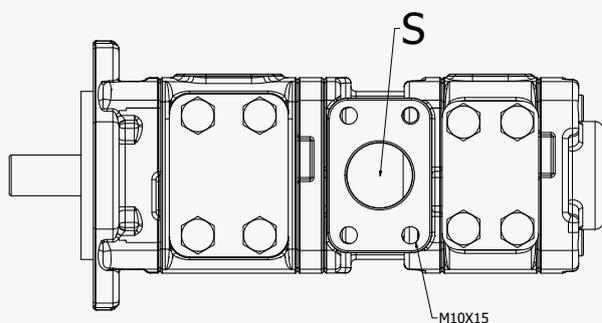
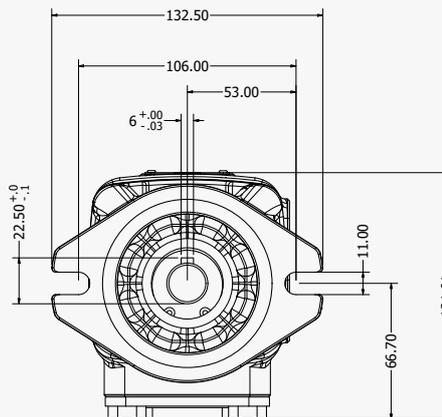
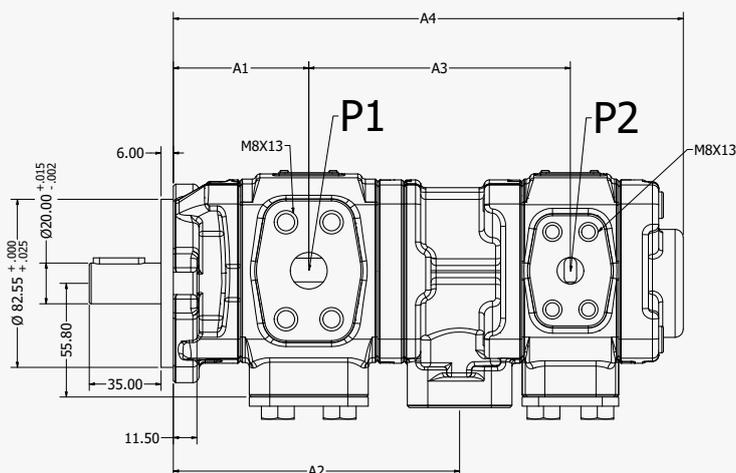
SAE 2 holes C

DOUBLE PUMP STYLE

Intermediate housing with common or separate suction ports	-
Separate suction ports w/o intermediate housing	S

INSTALLATION DIMENSIONS: HG00-※※※※※

Intermediate housing with common or separate suction ports



Available configurations with separate or common suction port.
In case of separate suction ports, ports sizes are the same as for the single version

HG

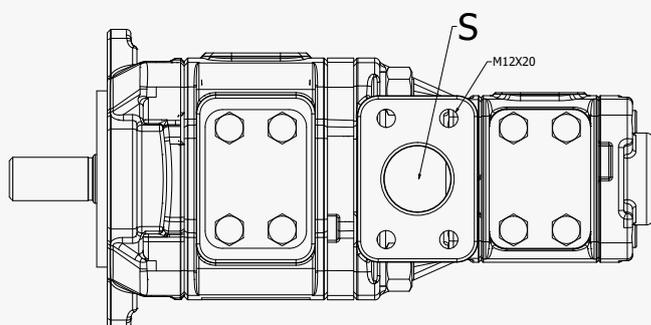
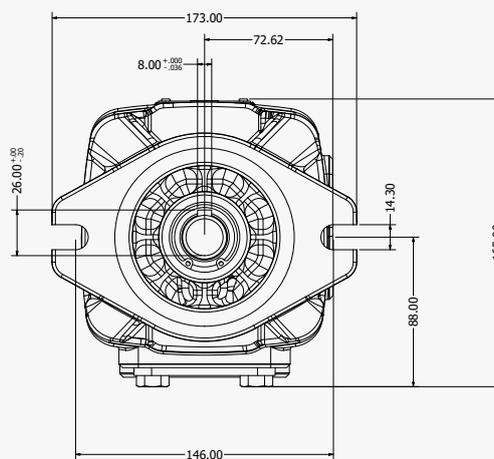
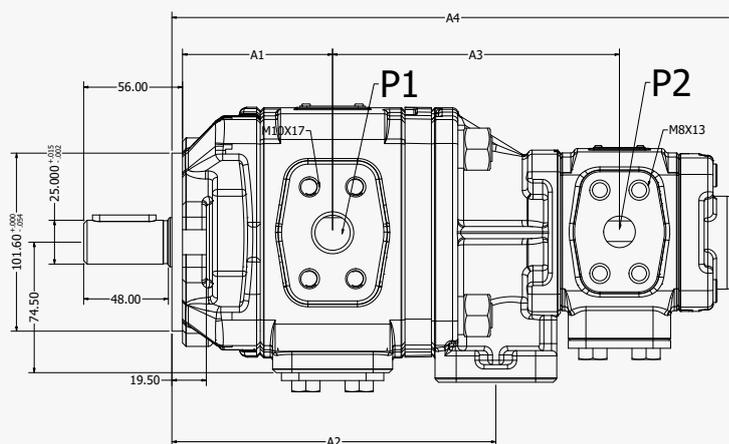
DIMENSIONS

SIZE P1	A1	A2	SIZE P2									
			8		10		13		16		20	
			A3	A4	A3	A4	A3	A4	A3	A4	A3	A4
mm												
8	58,2	118,75	118,3	232,5	120	237	122,8	237	123,3	242,5	127,3	250,5
10	60,75	128,75	118,2	237,5	121,2	242,5	123,2	242	124,6	247,5	128,6	255,5
13	61	129,75	119,3	238,5	122,5	242	124,5	241,5	125,5	248,5	129,6	249,5
16	62	133,25	120,5	243,5	123,5	247,5	125,5	247	126,5	254	130,5	255
20	66	141,25	121	247,5	127,5	248,5	129,5	255	130,1	260,5	137,5	268,5

PORTS DIMENSIONS		
SIZE	P1/P2	S
8	SAE 3000 1/2"	SAE 3000 1 1/4"
10		
13		
16		
20	SAE 3000 3/4"	

INSTALLATION DIMENSIONS: HG10-※-※※※※

Intermediate housing with common or separate suction ports



Available configurations with separate or common suction port.
In case of separate suction ports, ports sizes are the same as for the single version

DIMENSIONS

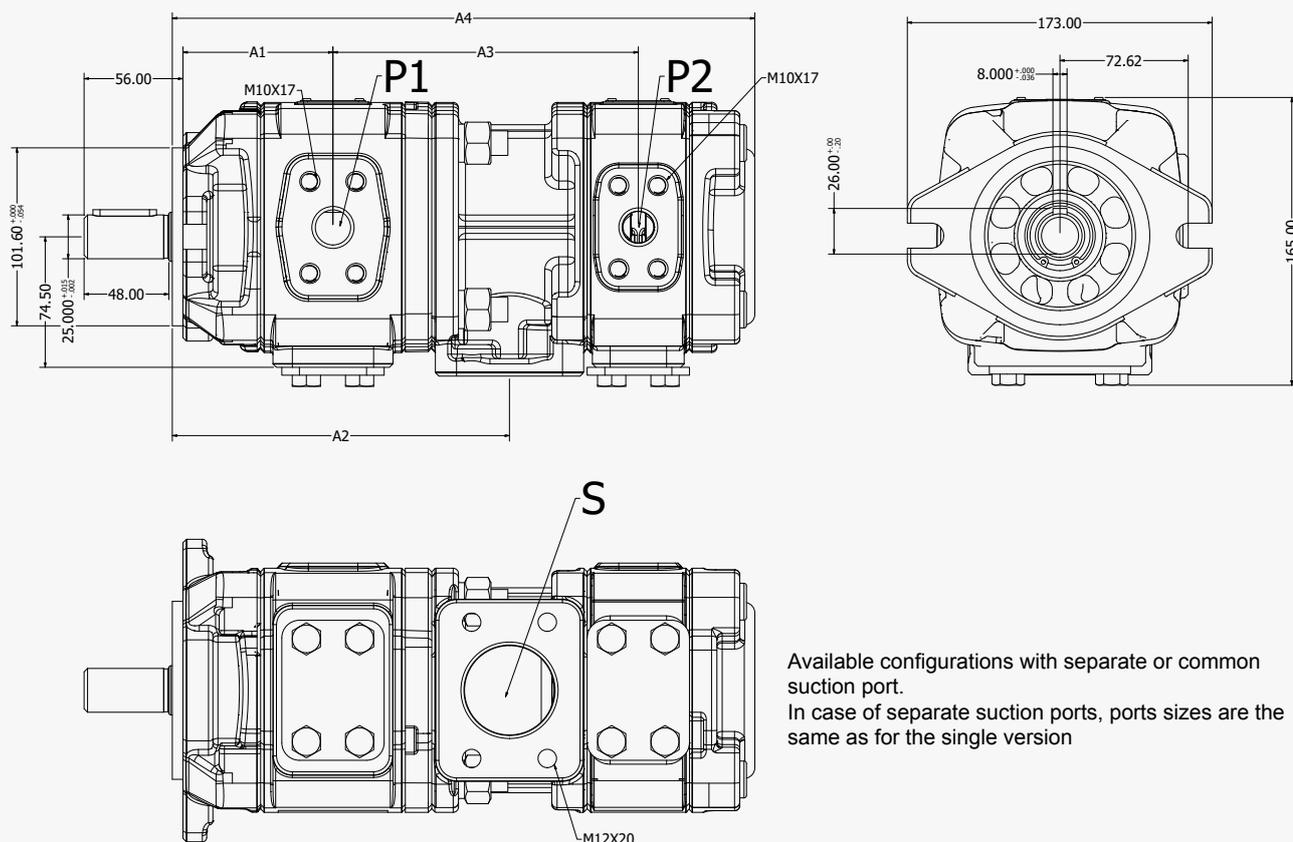
SIZE P1	A1	A2	SIZE P2									
			8		10		13		16		20	
			A3	A4	A3	A4	A3	A4	A3	A4	A3	A4
mm												
32	76,5	158,5	225,5	364	216	357	143,3	278	146	283,5	150	291,5
40	80	165,5	232,5	374,5	223	367,5	146,8	285	149,5	290,5	153,5	298,5
50	85	175,5	242,5	389,5	233	382,5	151,8	295	154,5	300,5	158,5	308,5
63	92	189,5	244,5	398,5	247	403,5	158,8	309	161,5	314,5	165,5	322,5

PORTS DIMENSIONS		
SIZE	P1	S
25	SAE 3000 3/4 "	SAE 3000 1 1/2"
32		
40		
50	SAE 3000 1 "	
63		

PORTS DIMENSIONS	
SIZE	P2
8	SAE 3000 1/2 "
10	
13	
16	SAE 3000 3/4 "
20	

INSTALLATION DIMENSIONS: HG11-※※※※※

Intermediate housing with common or separate suction ports



Available configurations with separate or common suction port.
In case of separate suction ports, ports sizes are the same as for the single version

DIMENSIONS

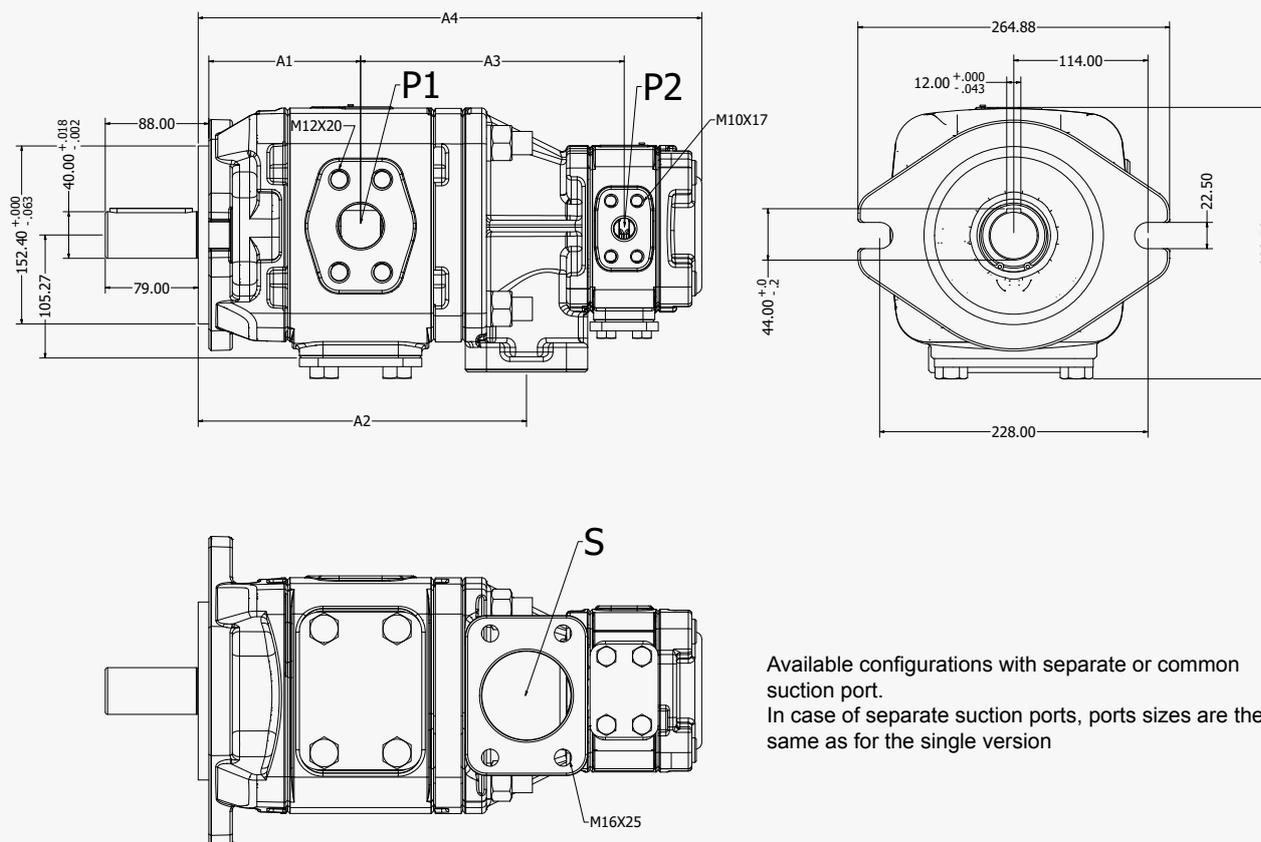
SIZE P1	A1	A2	SIZE P2									
			25		32		40		50		63	
			A3	A4	A3	A4	A3	A4	A3	A4	A3	A4
mm												
25	73	159	157	296	-	-	-	-	-	-	-	-
32	76,5	166	160,5	303	164	310	-	-	-	-	-	-
40	80	173	164	310	167,5	317	171	324	-	-	-	-
50	85	183	169	320	172,5	327	176	334	181	344	-	-
63	92	197	176	334	179,5	341	183	348	188	358	195	372

PORTS DIMENSIONS		
SIZE	P1	S
25	SAE 3000 3/4 "	SAE 3000 2"
32		
40	SAE 3000 1 "	
50		
63		

PORTS DIMENSIONS	
SIZE	P2
25	SAE 3000 3/4 "
32	
40	SAE 3000 1 "
50	
63	

INSTALLATION DIMENSIONS: HG21-※-※※※※

Intermediate housing with common or separate suction ports



Available configurations with separate or common suction port.
In case of separate suction ports, ports sizes are the same as for the single version

DIMENSIONS

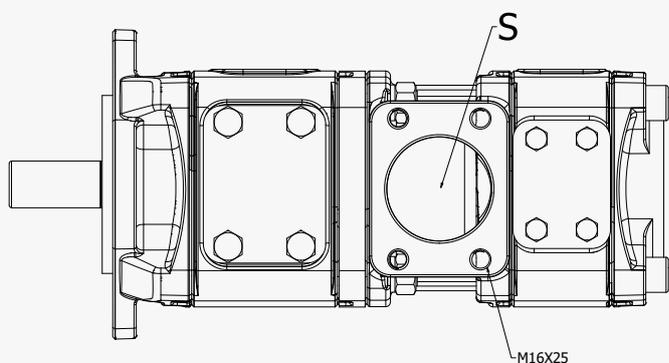
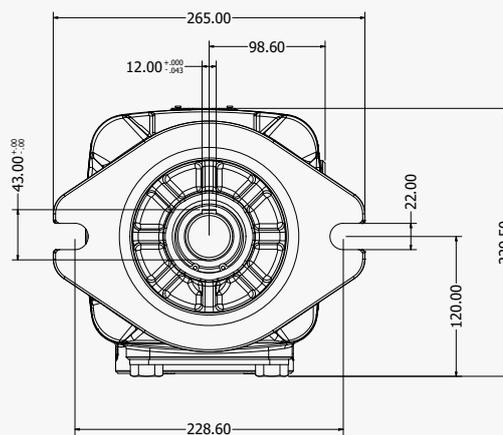
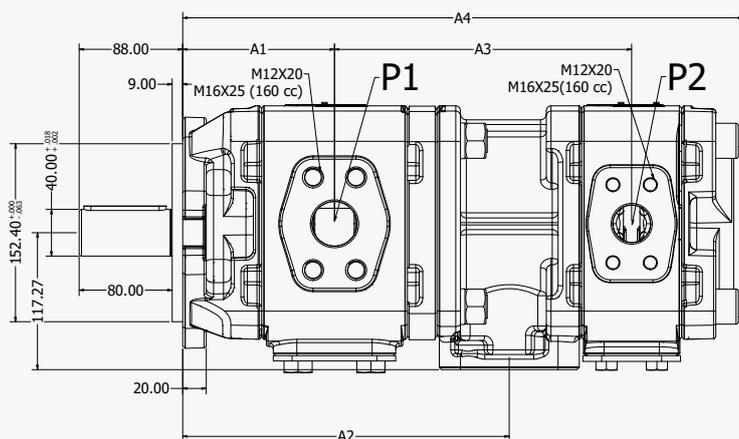
SIZE P1	A1	A2	SIZE P2									
			25		32		40		50		63	
			A3	A4	A3	A4	A3	A4	A3	A4	A3	A4
mm												
63	105,5	221	196,5	368	200	375	203,5	382	208,5	392	215,5	406
80	109,5	229	200,5	376	204	383	207,5	390	212,5	400	219,5	414
100	114	238	205	385	208,5	392	212	399	271	409	224	423
125	120	250	211	397	255,5	445	259	452	264	462	271	476
160	129	268	220	415	223,5	422	227	429	232	439	239	453

PORTS DIMENSIONS		
SIZE	P1	S
63	SAE 3000 1"	SAE 3000 3"
80	SAE 3000 1 1/2"	
100		
125	SAE 6000 1 1/2"	
160		

PORTS DIMENSIONS	
SIZE	P2
25	SAE 3000 3/4"
32	
40	
50	SAE 3000 1"
63	

INSTALLATION DIMENSIONS: HG22-※※※※※

Intermediate housing with common or separate suction ports



Available configurations with separate or common suction port.
In case of separate suction ports, ports sizes are the same as for the single version

HG

DIMENSIONS

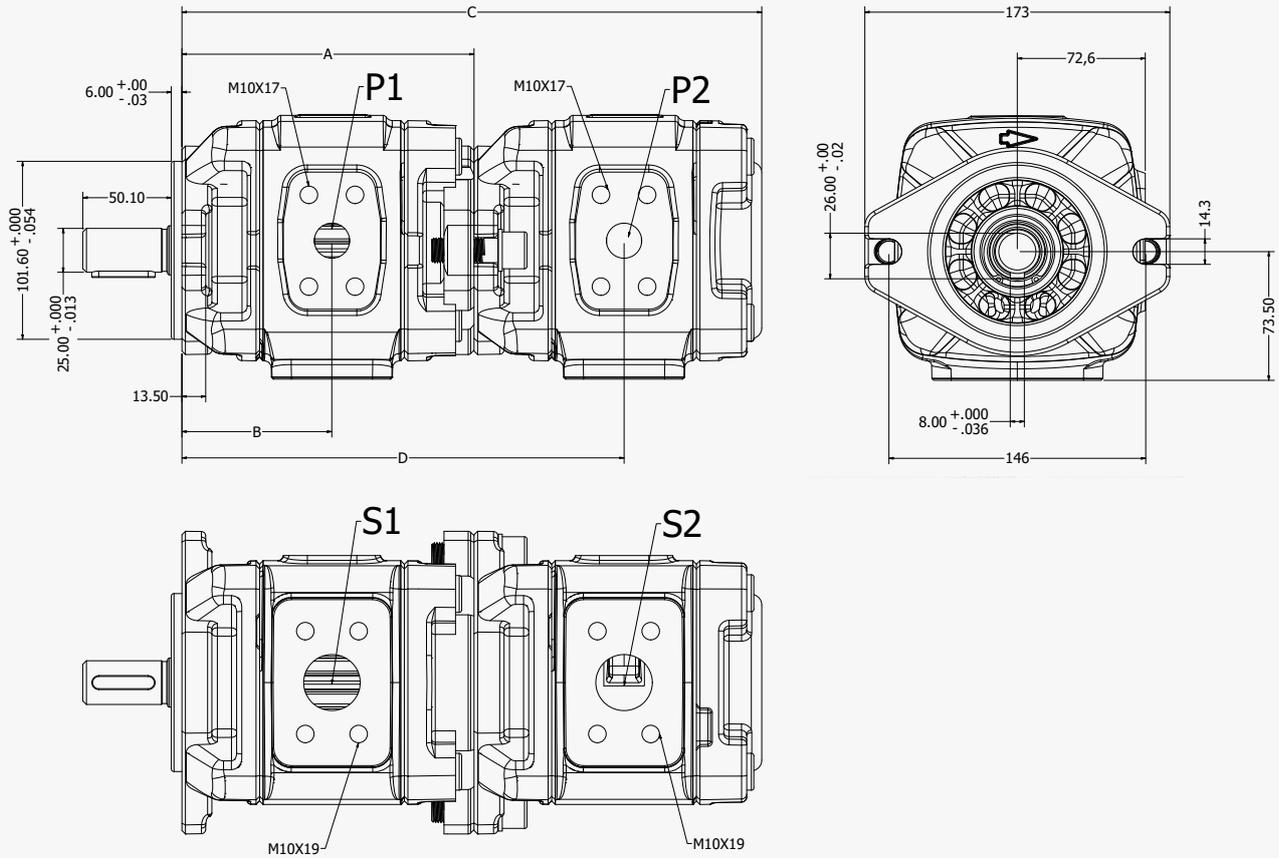
SIZE P1	A1	A2	SIZE P2											
			63		80		100		125		145		160	
			A3	A4	A3	A4	A3	A4	A3	A4	A3	A4	A3	A4
mm														
63	105,5	228,5	221	417	-	-	-	-	-	-	-	-	-	-
80	109,5	236,5	225	425	229	433	-	-	-	-	-	-	-	-
100	114	245,5	229,5	434	233,5	442	233,5	451	-	-	-	-	-	-
125	120	257,5	235,5	446	239,5	454	244	463	250	475	-	-	-	-
145	124,5	267	240,3	455,5	244,3	463,5	248,8	472,5	254,8	484,5	259,5	494	-	-
160	129	275,5	244,5	464	247,5	472	253	481	259	493	493	502,5	268	511

PORTS DIMENSIONS		
SIZE	P1	S
63	SAE 3000 1"	SAE 3000 2 1/2"
80	SAE 3000 1 1/2"	
100		
125	SAE 6000 1 1/2"	
145		
160		

PORTS DIMENSIONS	
SIZE	P2
63	SAE 3000 1"
80	SAE 3000 1 1/2"
100	
125	SAE 6000 1 1/2"
145	
160	

INSTALLATION DIMENSIONS: HG11-**-***-S

Separate suction ports without intermediate housing



DIMENSIONS

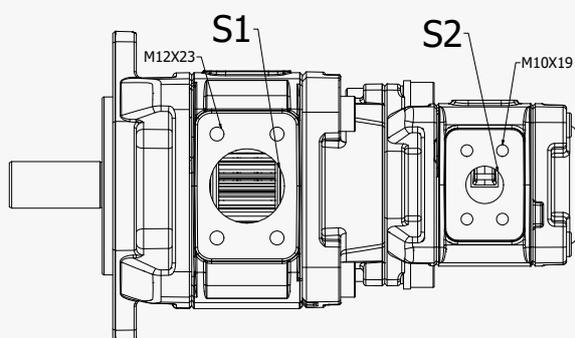
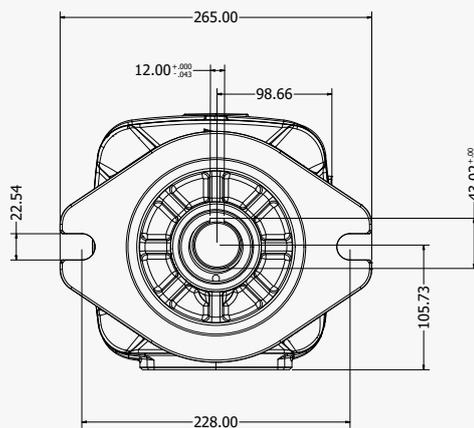
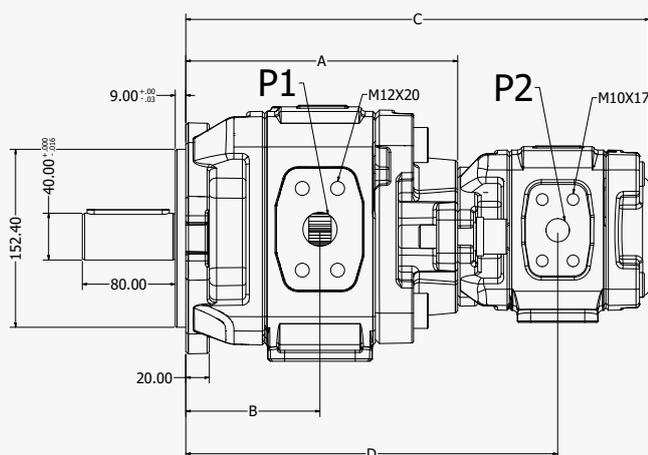
SIZE P1	A	B	SIZE P2									
			25		32		40		50		63	
			C	D	C	D	C	D	C	D	C	D
mm												
25	142,5	73	282	215,5	-	-	-	-	-	-	-	-
32	149,5	76,5	289	222,5	296	226	-	-	-	-	-	-
40	156,5	80	296	229,5	303	233	310	236,5	-	-	-	-
50	166,5	85	306	239,5	313	243	320	246,5	330	251,5	-	-
63	180,5	92	320	253,5	327	257	334	260,5	344	265,5	358	272,5

PORTS DIMENSIONS		
SIZE	P1	S1
25	SAE 3000 3/4"	SAE 3000 1 1/4"
32		
40	SAE 3000 1"	
50		
63		

PORTS DIMENSIONS		
SIZE	P2	S2
25	SAE 3000 3/4"	SAE 3000 1 1/4"
32	SAE 3000 3/4"	
40	SAE 3000 1"	
50		
63		

INSTALLATION DIMENSIONS: HG21-~~25~~~~32~~~~40~~~~50~~~~63~~-S

Separate suction ports without intermediate housing



HG

DIMENSIONS

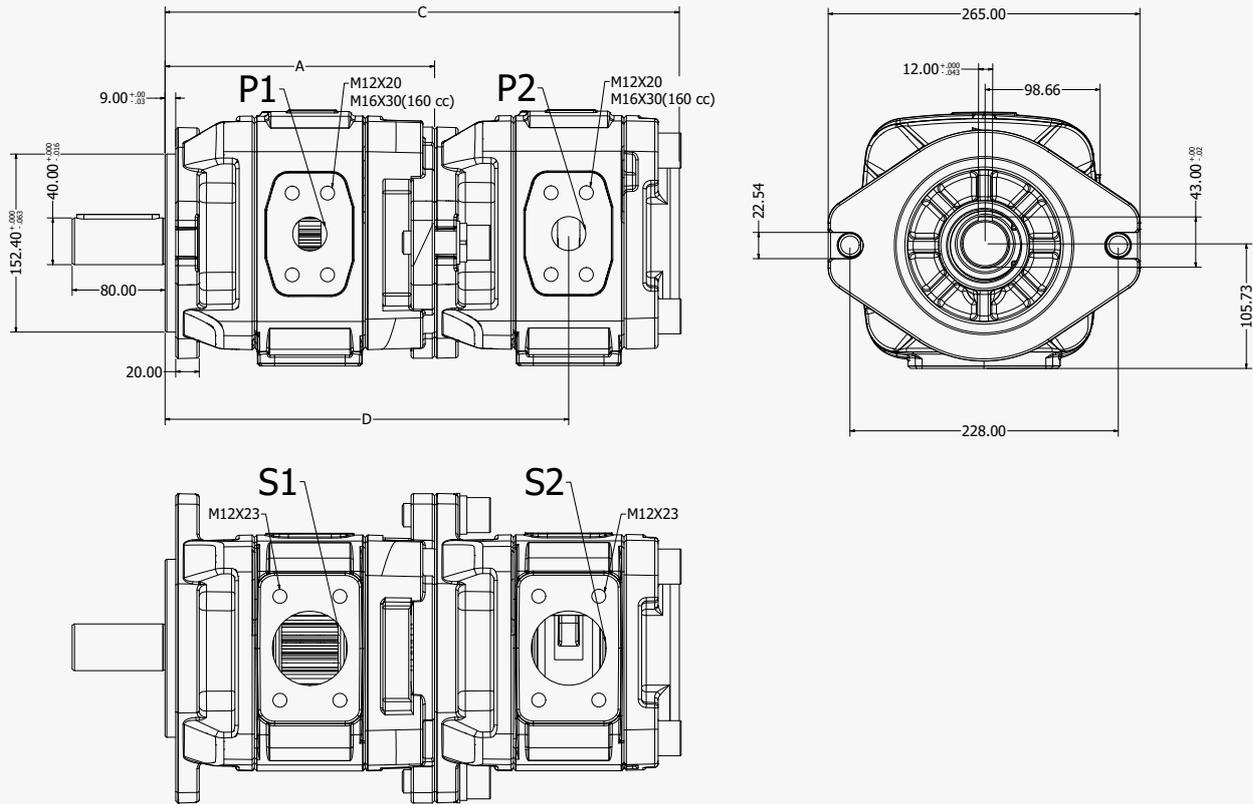
SIZE P1	A	B	SIZE P2									
			25		32		40		50		63	
			C	D	C	D	C	D	C	D	C	D
mm												
80	220,5	109,5	359,5	293,5	346,5	297	373	300,5	383,5	305,5	397,5	312,5
100	229,5	114	368,5	302,5	375,5	306	382,5	309,5	392,5	314,5	406,5	321,5
125	241,5	120	380,5	314,5	387,5	318	394,5	321,5	404,5	326,5	418,5	330,5
145	251	124,8	390	324	397	327,5	404	331	414	336	428	343
160	259,5	129	398,5	332,5	405,5	336	412,5	339,5	422,5	344,5	436,5	351,5

PORTS DIMENSIONS		
SIZE	P1	S1
80	SAE 3000 1 1/2"	SAE 3000 2"
100		
125	SAE 6000 1 1/2"	SAE 3000 2 1/2"
145		
160		SAE 3000 3"

PORTS DIMENSIONS		
SIZE	P2	S2
25	SAE 3000 3/4"	SAE 3000 1 1/4"
32		
40	SAE 3000 1"	
50		
63		

INSTALLATION DIMENSIONS: HG22-※-※※※※-S

Separate suction ports without intermediate housing



DIMENSIONS

SIZE P1	A1	B	SIZE P2								
			80		100		125		145		160
			C	D	C	D	C	D	C	D	C
mm											
80	211	109,5	410	319,5	-	-	-	-	-	-	-
100	220	114	419	329,5	428	334	-	-	-	-	-
125	232	120	431	341,5	440	346	452	352	-	-	-
145	241,5	124,8	440,5	351	449,5	355,5	461,5	361,5	471	366	-
160	250	129	449	359,5	458	364	470	370	479,5	374,5	488

PORTS DIMENSIONS		
SIZE	P1	S1
80	SAE 3000 1 1/2"	SAE 3000 2"
100		
125	SAE 6000 1 1/2"	SAE 3000 2 1/2"
145		
160		SAE 3000 3"

PORTS DIMENSIONS		
SIZE	P2	S2
80	SAE 3000 1 1/2"	SAE 3000 2"
100		
125	SAE 6000 1 1/2"	SAE 3000 2 1/2"
145		
160		SAE 3000 3"

General notes

These pages refer to the specific properties of the HG internal gear pump.

Intended use

HG internal gear pumps are intended for the setup of hydraulic drive systems in the fields of machine and plant construction. During project planning, the basic principles of the EU Machinery Directive or comparable national regulations outside the EU have to be observed.

For safety reasons the pumps must not be used in explosive environments in accordance with ATEX 94/9/EC directive.

Technical information

Compliance with the admissible technical data and operating conditions has to be ensured by the system or machine manufacturer. The pump itself does not contain a device to prevent operation outside the admissible data. All mentioned technical features are average values and are applicable for the specified boundary conditions. In case of changes to the boundary conditions (e.g. viscosity), the technical data may change as well. Tolerances corresponding to the relevant state-of-the-art are possible.

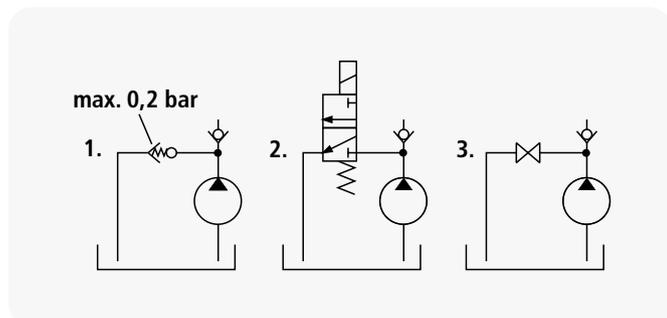
Hydraulic project planning

Bleeding option for commissioning

For HG internal gear pumps a manual, switchable or automatic bleeding option is to be provided for the initial commissioning or re-commissioning after maintenance and repair works. As bleeding point, the measurement port (M) available at the pump can be used. Otherwise, the bleeding point has to be put into the pressure line in front of the first valve or check valve. Bleeding may be effected with a maximum counter-pressure of 0.2 bar.

Instances of bleedings circuits:

1. Automatic bleeding via automatic bleeding valve.
2. Switchable bleeding.
3. Manually operated bleeding.



Suction line

The line cross-sections have to be dimensioned for the designed flows in a manner that an ideal suction speed of 0.6 to 1.2 m/s is achieved on average. The suction speed must not exceed a maximum value of 2 m/s.

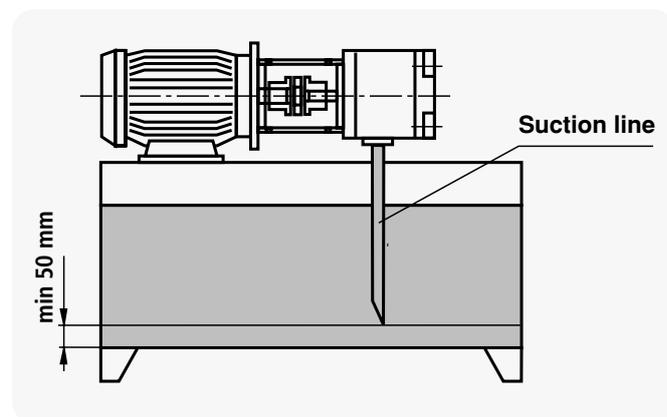
The suction cross-sections at the pump itself are dimensioned for the maximum flow and thus are a reference only. In case of continuous operation with speeds lower than the admissible maximum speed, the suction tube diameter is to be dimensioned smaller than the suction port of the pump in accordance with the actual suction speed.

All in all, the suction line has to be designed in a way that the admissible inlet operating pressure is complied with (0.8 to 2 bar absolute). Bends and a combination of the suction tubes of several pumps must be avoided. If suction filters have to be used, it has to be ensured on the system side that the lowest

admissible inlet operating pressure is not exceeded even when the filter is contaminated.

Make sure air tightness of the transitions and dimensional stability of the suction hose as regards to the external air pressure.

The suction tube immersion depth should be selected as large as possible. Depending on the internal reservoir pressure, the viscosity of the operating medium, and the flow ratios within the reservoir, no vortex must be formed even during maximum flow. Otherwise, there is the risk of sucking in air. We recommend selecting suction tubes according to AB 23-03.



Pressure line

With pressure lines, sufficient bursting resistance of the tubes, hoses and connection elements has to be ensured. The cross-sections should be based on the maximum flow in order to avoid additional excessive load of the pump due to backpressure. In this connection, you must also consider the pipe losses across the entire pressure line length and other line resistances (e.g. bends, pressure filters).

Pressure limitation

The internal gear pump HG is not equipped with devices for compliance with the maximum operating pressure. Setting and limiting the admissible operating pressure has to be ensured on the system side.

The pressure relief valves necessary for that purpose are to be designed considering the maximum flow and the existing pressure increase speed so that the admissible intermittent operating pressure is not exceeded.

Pressure holding function

In the variable-speed drive, the pump can also temporarily be operated below the specified minimum speed, in the pressure holding function.

The holding time and the related necessary speed result from

the operating viscosity and the pressure level.

In the deactivated condition (speed = 0), a leakage flow flows through the pump back into the reservoir, depending on the load pressure. If this is to be securely prevented, a check valve has to be used.

Mechanical project planning

Installation and disassembly option

For installing and disassembling the pump on or from the drive, accessibility has to be provided for on the system side by means of suitable lifting gear. Please consider especially the own weight of frame size HG2.

Screws of the property class 8.8 or 10.9 have to be provided for mounting purposes.

Mounting

On the machine side, the screws have to be accessible in a way that the required tightening torque can be applied. The tightening torque is based on the operating conditions and involved elements of the screw connection and has to be specified by the manufacturer in the power unit, machine or system project planning.

Reservoir

In the reservoir construction or the selection of suitable standard reservoirs, the following requirements are to be observed:

- Selection of the largest reservoir volume possible, depending on the continuous or average flow, in order to allow for the separation of air bubbles by means of enough dwell time of the medium in the reservoir. In this connection, the air separation capability of the fluid used is also important.
- Provision of settling zones for the fluid in the reservoir in order to allow for air separation.
- Provision of guiding plates in order to allowing for the deposit of contamination at the reservoir bottom outside the pump suction area.
- Large dimensioning of the reservoir surfaces depending on the heat output to be dissipated via the reservoir walls.

Required power unit functions

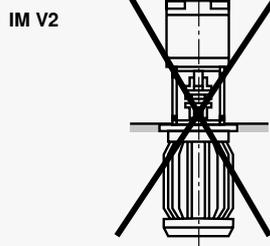
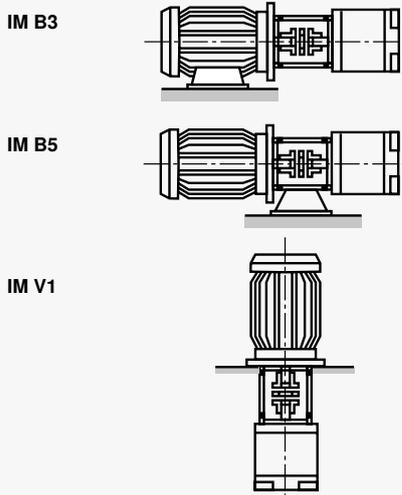
Hydraulic power units should at least be equipped with the following features:

- Reservoirs, the internal pressure of which corresponds to the ambient pressure in accordance with the design, have to be equipped with ventilation filters for pressure compensation purposes.
- The fluid should be filled by means of filling connections only excluding filling with unfiltered fluid.
- Pollution or humidity must be prevented from getting into the system. When using the pump in a highly polluted environment, the reservoir is to be pre-tensioned by means of air pressure for this. If cleansing of the external reservoir side is intended or to be expected during the period of use, reservoir fittings for tubes, lines, or hoses have to be selected, which ensure safe seal against external pressurization with water jet.

Place of installation and ambient conditions

With places of installation from a geodetic height of more than 1000 m, the pump is to be arranged in or below the reservoir or the reservoir is to be pre-tensioned by means of compressed air in order to comply with the admissible minimum inlet pressure. The suction line is to be selected short and with a large cross-section, bends should not be used. When installing the pump more than 10 m below the reservoir, the reduction of the inlet pressure to the maximum admissible value has to be ensured by means of additional measures. When operating the pump in salt-containing or corrosive environments or when pressurization with strongly abrasive substances is possible, it has to be ensured on the system side that the shaft seal ring and the sealing area of the shaft do not make direct contact with the environment.

Determining the size



Please note

Installation position motor at bottom and pump at top (e.g. IM V2) is not admissible.

PROJECT PLANNING DATA

Pump combinations

It has to be ensured with pump combinations that the operating data admissible for the relevant pump type is complied with in every stage.

- The combined pumps must all have the same direction of rotation.
- The pump with the largest torque, variable displacement pumps or pumps with intermittent load are to be provided as first stage in the pump combination.
- The maximum through-drive torque must be checked by the project planner for every application. This also applies to already existing (encoded) pump combinations.
- A pump stage drive torque is calculated as follows:

$$T = \frac{\Delta p \cdot V \cdot 0.0159}{\eta_{hydr. - mech.}}$$

T: Torque in Nm
 Δp: Operating pressure in bar
 V: Displacement in cm³
 η: Hydraulic-mechanical efficiency

Maximum admissible torques in Nm:

Type	Drive torque		Output torque
	Cylindrical shaft ...P	Splined shaft ...S	
HG0	100	155	75
HG1	450	450	280
HG2	1100	1400	700

- The total of the torques in a pump combination must not exceed the max. drive torque.
- Joint aspiration is not possible.
- For reasons of stability, we recommend the ISO 4-hole mounting flange according to VDMA "E4" for combinations of three and more pumps.
- Before operating pump combinations with different mediums, please contact us.
- Central and back pumps must have the shaft design "R" (splined).

Maintenance schedule and operational safety

For safe operation and a long service life of the pump, a maintenance schedule has to be developed for the power unit, the machine, or the system.

The maintenance schedule has to ensure that the intended or admissible operating conditions of the pump are complied with during the period of use.

In particular, compliance with the following operating parameters has to be ensured:

- The required oil cleanliness.
- The operating temperature range.
- The level of the operating medium.

Furthermore, the pump and the system have to be checked for modifications of the following parameters on a regular basis:

- Vibrations.
- Noise levels.
- Temperature difference pump - fluid in the reservoir.
- Foam formation in the reservoir
- Leak-proofness.

Modifications of these parameters indicate wear of components (e.g. drive motor, coupling, pump, etc.).

The cause has to be determined and remedied immediately.

In order to achieve high operational safety of the pump in the machine or system, we recommend checking the parameters mentioned above continuously and automatically and shutting the system down automatically in case of modifications exceeding the usual fluctuations in the intended operating range.

Plastic components of drive couplings should be replaced regularly, however, after 5 years at the latest. The corresponding information of the manufacturer is to be observed.

For preventive maintenance of the pump, we recommend having the seals replaced after a maximum operating period of 5 years.

Accessories

SAE connection flanges

We recommend selecting the SAE flanges for suction and pressure port according to AB 22-15 (with welded connection) or AB 22-13 (with threaded connection).

Other accessories

To install the HG internal gear pump on electric motors, we recommend selecting the pump mounting brackets according to AB 41-20 and torsionally flexible couplings according to AB 33-22.

Preparation

- Check whether the system has been installed carefully and cleanly.
- Only fill in hydraulic fluid in through a filter with the required minimum retention rate.
- Via suction or pressure pipe, fill the pump completely with the hydraulic fluid.
- Check the direction of rotation for compliance with the direction of rotation according to the pump type.

Bleeding

- Open the bleed port at the system or switch to circulation at zero pressure, according to the system operating instructions. During bleeding, discharge of enclosed air at zero pressure must be guaranteed.
- For bleeding the pump, switch the pump on and immediately off again (jog mode). This process is to be repeated until complete bleeding of the pump is ensured.
- Close the manually opened bleed ports again.

Commissioning

- If complete bleeding of the pump has been ensured, switch on the motor. Let the pump run at zero pressure until the system is completely bled. For the bleeding of the system, the system operating instructions are to be observed.
- Commission the system according to the system operating instructions and load the pump.
- After some operating time, check the hydraulic fluid in the reservoir for bubble or foam formation at the surface.

Operation

- Pay attention to changes in the noise characteristic during operation. Due to heating of the operating medium, minor noise increases are normal. Considerable increase in the noise or random short-term changes in the noise may be an indication of the aspiration of air. If the suction tubes are too short or the operating medium filling levels are too low, air can also be sucked in via a vortex.
- Changes in operating speeds, temperatures, noise increase or power consumption are an indication of wear or damage at the system or the pump.

Re-commissioning

- Check the pump and the system for leakage. Leaks are an indication of leakage below the hydraulic fluid level. An increased hydraulic fluid level in the reservoir is an indication of leakage above the hydraulic fluid level.
- If the pump is arranged above the hydraulic fluid level, the pump may run empty due to leakage, e.g. a worn shaft seal. In this case, the system must be bled once again during re-commissioning. Provide for repair.
- After repair and maintenance works, you must bleed the system once again.
- If the system is intact, switch on the motor.

General

- The pumps supplied by us have been tested for function and performance. Modifications of any type at the pump are not permitted since this would result in the invalidation of warranty claims.
- Repairs may only be carried out by the manufacturer or their authorized dealers and agencies. Repairs carried out by the customer are not covered by a warranty.

Important notes

- The pump may only be installed, maintained and repaired by authorized, trained and instructed personnel.
- The pump may only be operated within the admissible data.
- The pump may only be operated if it is in an unobjectionable condition.
- When carrying out any work on the pump, depressurize the system.
- Unauthorized conversions or modifications, which affect safety and function are not permitted.
- Protective devices (e.g. coupling protection) are to be attached and/or existing protective devices must not be removed.
- Make sure that all mounting screws are always properly tightened! (Observe the prescribed tightening torque.)
- The generally valid safety and accident prevention regulations must imperatively be complied with.

