



IGP

INTERNAL GEAR PUMPS

SERIES 11

OPERATING PRINCIPLE

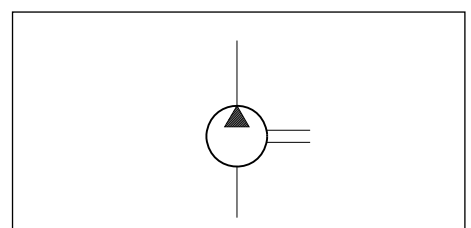
- IGP pumps are volumetric displacement pumps with internal gears, available in five sizes, each divided into a range of different displacement.
- The pumps feature high volumetric performance levels, thanks to both radial and axial compensation in proportion to operating pressure, in addition to low noise levels.
- Optimal load distribution and special friction bearings enable continuous duty at high pressures and ensure extended pump lifetime.
- IGP pumps are also available in multiple versions which can be combined to make multi-flow groups.

TECHNICAL SPECIFICATIONS

PUMP SIZE		3	4	5	6	7
Displacement range	cm ³ /rev	3,6 ÷ 10,2	13,3 ÷ 32,6	33,1 ÷ 64,9	64,1 ÷ 126,2	125,8 ÷ 251,7
Flow rate range (at 1500 rpm)	l/min	5,4 ÷ 15,3	19,9 ÷ 48,9	49,6 ÷ 97,3	96,1 ÷ 189,3	188,7 ÷ 377,5
Operating pressures	bar	see table 2 - performances				
Rotation speed	rpm	see table 2 - performances				
Rotation direction		clockwise or counterclockwise				
Loads on the shaft		refer to our technical dept. for permitted axial and radial loads				
Hydraulic connections		SAE J518 c fittings, flanged (see par. 9)				
Mounting flange type		SAE J744 - ISO 3019-1				
Mass (single pump)	kg	4 ÷ 4,8	8,6 ÷ 11	15,5 ÷ 18,7	29,2 ÷ 35	46,5 ÷ 59

Ambient temperature range	°C	-20 / +60
Fluid temperature range	°C	-20 / +80
Degree of fluid contamination		see section 3.2
Recommended viscosity	cSt	25 ÷ 100

HYDRAULIC SYMBOL



1 - IDENTIFICATION CODE

1.1 - Single pump

	I	G	P	-	-		5	/	11	/	
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Internal gear pump

Pump size
3 = from 3,6 to 10,2 cm³/rev
4 = from 13,3 to 32,6 cm³/rev
5 = from 33,1 to 64,9 cm³/rev
6 = from 64,1 to 126,2 cm³/rev
7 = from 125,8 to 251,7 cm³/rev

Nominal delivery (see performances table, par. 2)

Rotation direction (seen from the shaft side)
R = clockwise (**standard**)
L = counterclockwise

Mounting flange
0 = SAE-2 / ISO 3019-1 (for IGP3, IGP4, IGP5 and IGP6)
1 = SAE-4 / ISO 3019-1 (for IGP7 only)
 other flanges types are available upon request

Option:
F = through drive shaft
 Omit if not required

Seals:
N= NBR seals for mineral oils (for IGP3, IGP4, IGP5 and IGP6 pumps, the front shaft seal is in Viton)
 Version in complete Viton (**V**) available upon request
(not available for IGP7)

Series No.
 (from 10 to 19 sizes and mounting dimensions remain unchanged.)

Shaft end type:
 cylindrical keyed
 (other shaft ends are available upon request)

NOTE: No through-drive shaft inside standard single pumps

1.2 - Multiple pumps

	I	G	P	-	/	-		5	/	11	
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Internal gear pump

Front pump size
3 = from 3,6 to 10,2 cm³/rev
4 = from 13,3 to 32,6 cm³/rev
5 = from 33,1 to 64,9 cm³/rev
6 = from 64,1 to 126,2 cm³/rev
7 = from 125,8 to 251,7 cm³/rev

Rear pump size
3 = from 3,6 to 10,2 cm³/rev
4 = from 13,3 to 32,6 cm³/rev
5 = from 33,1 to 64,9 cm³/rev
6 = from 64,1 to 126,2 cm³/rev
7 = from 125,8 to 251,7 cm³/rev

Nominal delivery of the front pump (see performance table, par. 2)

Nominal delivery of the secondary/rear pump (see performance table, par. 2)

Rotation direction (seen from the shaft side)
R = clockwise (**standard**)
L = counterclockwise

Seals:
N= NBR seals for mineral oils (for IGP3, IGP4, IGP5 and IGP6 pumps, the front shaft seal is in Viton)
 Version in complete Viton (**V**) available upon request
(not available for IGP7)

Series No.
 (from 10 to 19 sizes and mounting dimensions remain unchanged.)

Shaft end type:
 cylindrical keyed
 (other shaft ends are available upon request)

Mounting flange
0 = SAE-2 / ISO 3019-1 (for IGP3, IGP4, IGP5 and IGP6)
1 = SAE-4 / ISO 3019-1 (for IGP7 only)
 other flange types are available upon request

NOTE: Secondary / rear pumps are available as spare parts. All secondary pumps are provided with through drive shaft. The coupling is not included.
 To order, put the code together by adding an **R** at the end of the identification code, after the size, delivery, direction of rotation, series and seals.
 Code example: **IGP4-020-R/11N/R**



2 - PERFORMANCES

(obtained with mineral oil with viscosity within 25 ÷ 100 cSt)

PUMP SIZE	NOMINAL DELIVERY	DISPLACEMENT	MAX. FLOW RATE.	PRESSURE		ROTATION SPEED	
		[cm ³ /rev] NOTE 2	[l/min] (at 1500 rpm)	[bar] NOTE 3 steady	peak	[rpm] NOTE 4 max	min
IGP3	003	3,6	5,4	330	345	3600	400
	005	5,2	7,8				
	006	6,4	9,6				
	008	8,2	12,3				
	010	10,2	15,3				
IGP4	013	13,3	19,9	330	345	3600	400
	016	15,8	23,7			3400	
	020	20,7	31,0			3200	
	025	25,4	38,1	300	330	3000	
	032	32,6	48,9	250	280	2800	
IGP5	032	33,1	49,6	315	345	3000	400
	040	41	61,5			2800	
	050	50,3	75,4	280	315	2500	
	064	64,9	97,3	230	250	2200	
IGP6	064	64,1	96,1	300	330	2600	400
	080	80,7	121,0	280	315	2400	
	100	101,3	151,9	250	300	2100	
	125	126,2	189,3	210	250	1800	
IGP7	125	125,8	188,7	300	330	2200	400
	160	160,8	241,2	280	315	2000	
	200	202,7	304,0	250	300	1800	
	250	251,7	377,5	210	250		

NOTE 1: Under continuous operating conditions, the allowed suction pressure range is 0.8 ÷ 3 bar abs. For shorter time, a minimum suction pressure of 0,6 bar abs is allowed.

NOTE 2: Production tolerances can reduce the displacement by 1,5% max. The flow rate at 1500 rpm shown in the table, considers operation with pressure of 10 bar.

NOTE 3: The continuous and peak pressures are valid for rotation speeds between 400 and 1500 rpm. For speeds of more than 1500 rpm the peak pressure must be reduced. The peak pressure is applicable for 15% of the operating time, with a maximum cycle time of 1 minute.

NOTE 4: Variable speeds require pressure limitations if they are out of 400 ÷ 1500 rpm range. Contact our technical department for applications of this kind.

3 - HYDRAULIC FLUID

3.1 - Fluid type

Use mineral oil based hydraulic fluids with anti-foam and antioxidant additives. Limitations apply with other fluid types. See the table below or consult our Technical Department for authorization of use.

FLUID TYPE	NOTES
HFC (water glycol solutions with proportion of water $\leq 40\%$)	<ul style="list-style-type: none"> - The pumps are tested with mineral oil. An appropriate cleaning cycle is required. - The values shown in the performance table must be reduced by at least 20% - The maximum speed of the fluid in the suction line must not exceed 1 m/s. - The suction pressure must not be less than 0,8 bar absolute. - The maximum fluid temperature must be at less than 50°C
HFD (phosphate esters)	NOT ALLOWED

3.2 - Fluid viscosity

The operating fluid viscosity must be within the following range:

minimum viscosity	10 cSt	referred to the maximum fluid temperature of 80 °C
optimum viscosity	25 ÷ 100 cSt	referred to the fluid working temperature in the tank
maximum viscosity	2000 cSt	limited to the start-up phase of the pump only

When selecting the fluid type, be sure that the true viscosity is within the range specified above at the operating temperature.

3.3 - Degree of fluid contamination

The maximum degree of fluid contamination must be according to ISO 4406:1999 class 20/18/15; therefore, use of a filter with $\beta_{20} \geq 75$ is recommended.

A degree of maximum fluid contamination according to ISO 4406:1999 class 18/16/13 is recommended for optimum endurance of the pump. Hence, we recommend the use of a filter with $\beta_{10} \geq 100$.

If there is a filter installed on the suction line, be sure that the pressure at the pump inlet is not lower than the values specified in **NOTE 1** of the table in paragraph 2.

The suction filter must be equipped with a by-pass valve and, if possible, with a clogging indicator.

4 - CHARACTERISTIC CURVES

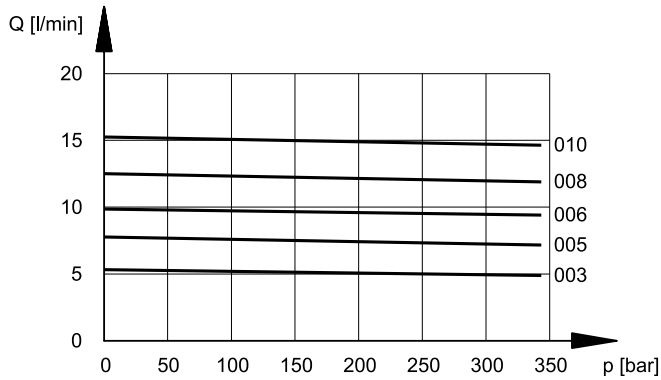
(values obtained with mineral oil with viscosity of 46 cSt at 40°C)

The data shown in the diagrams were noted with pump rotation speed = 1500 rpm.

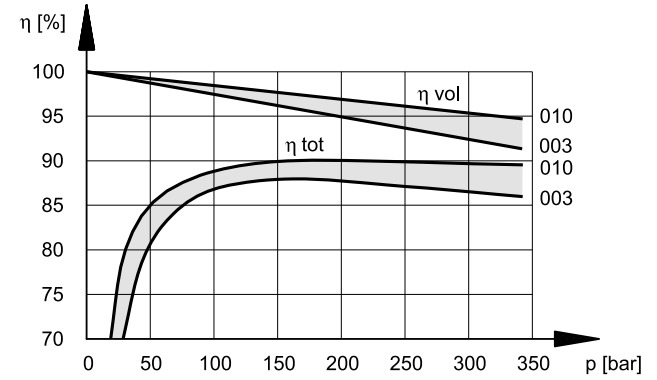
Noise pressure levels were measured in a semi-anechoic room, at an axial distance of 1 m from the pump. The shown values must be reduced by 5 dB(A) if they are to be considered in a completely anechoic room.

4.1 - IGP3

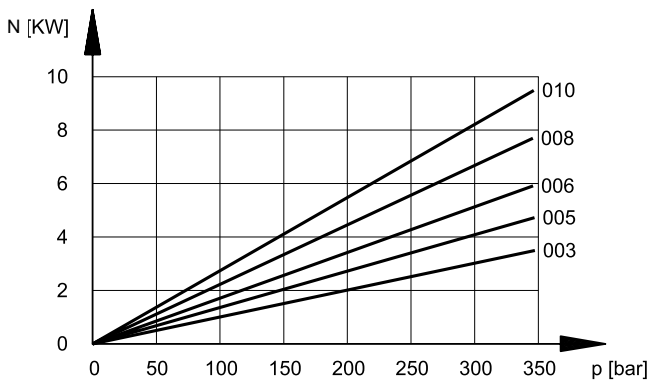
FLOW RATE/PRESSURE CURVES



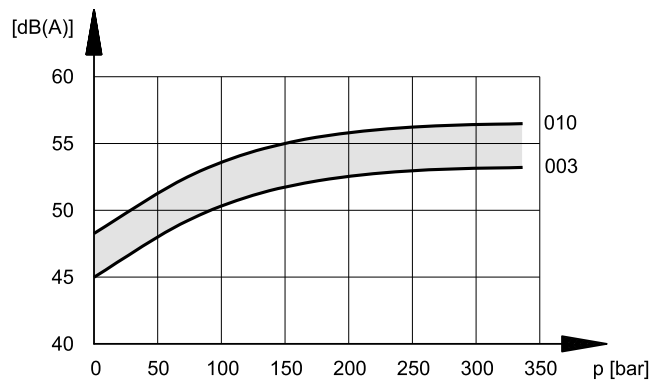
VOLUMETRIC AND TOTAL EFFICIENCY



ABSORBED POWER



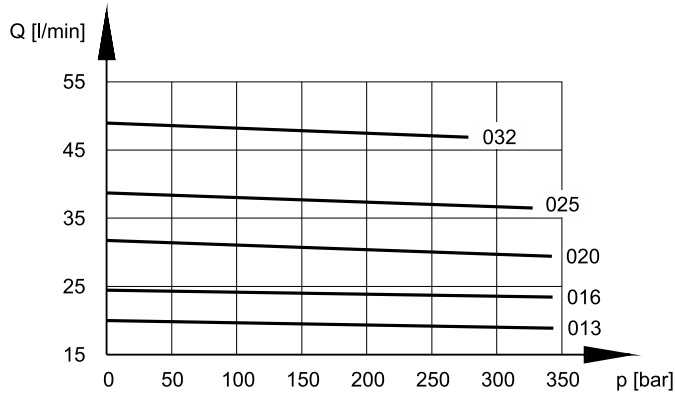
NOISE LEVEL



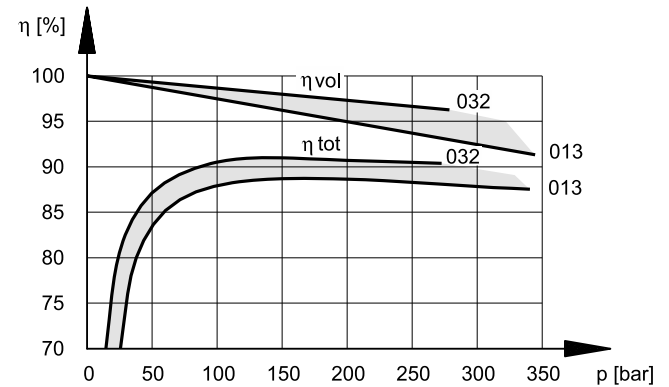


4.2 - IGP4

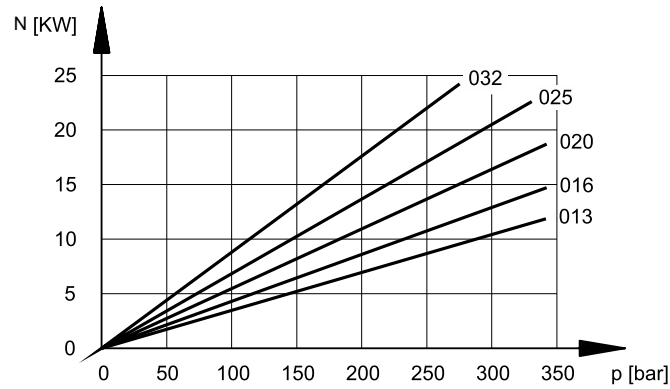
FLOW RATE/PRESSURE CURVES



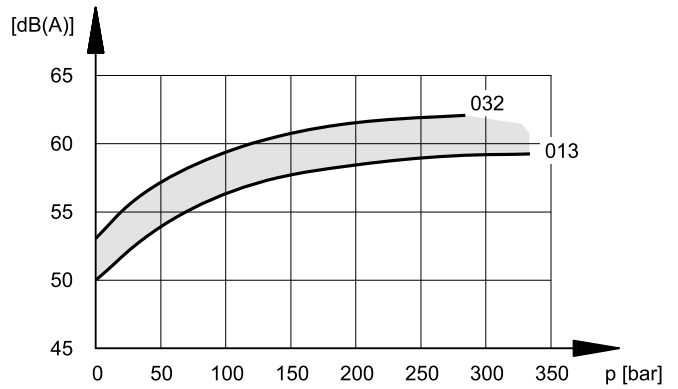
VOLUMETRIC AND TOTAL EFFICIENCIES



ABSORBED POWER

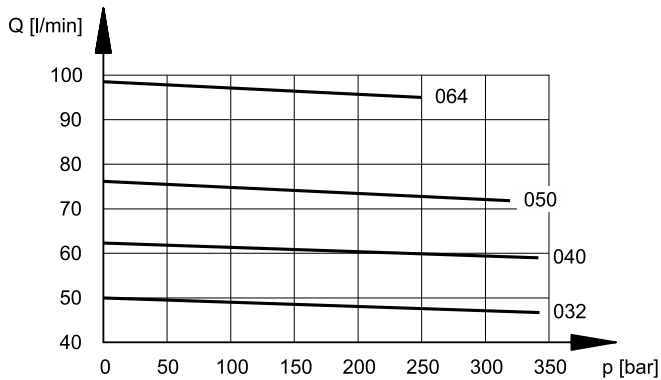


NOISE LEVEL

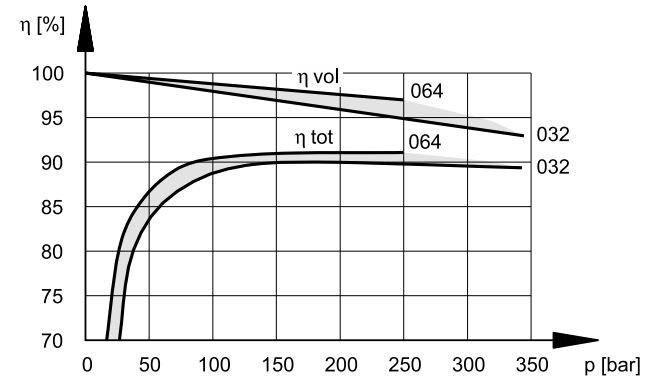


4.3 - IGP5

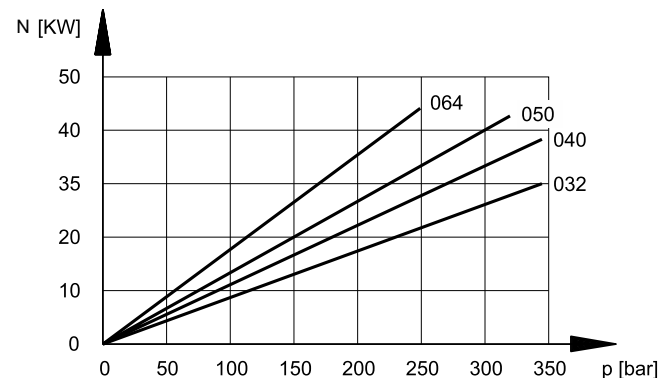
FLOW RATE/PRESSURE CURVES



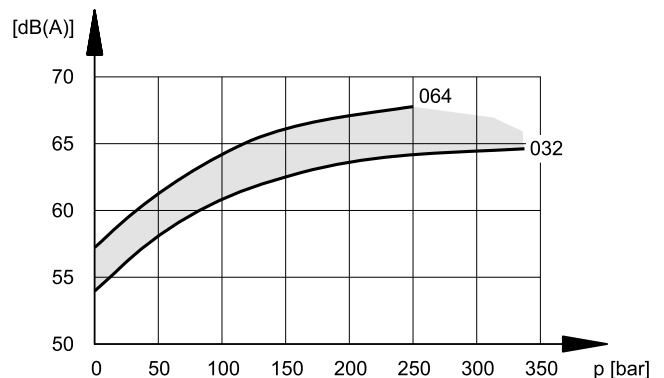
VOLUMETRIC AND TOTAL EFFICIENCIES



ABSORBED POWER



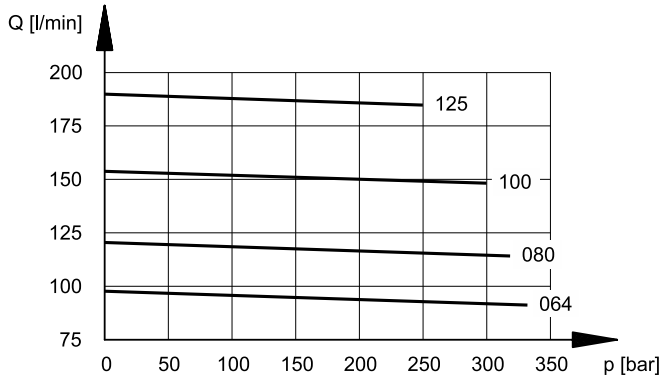
NOISE LEVEL



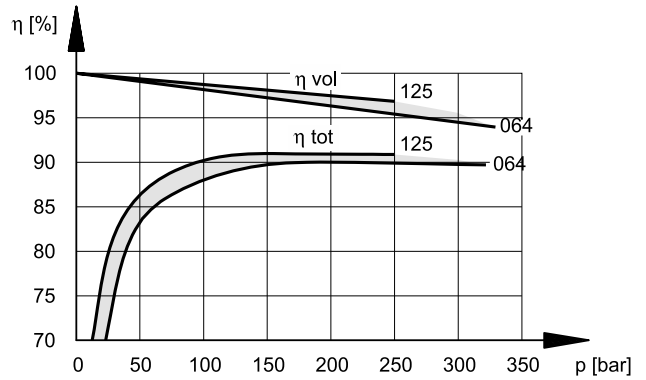


4.4 IGP6

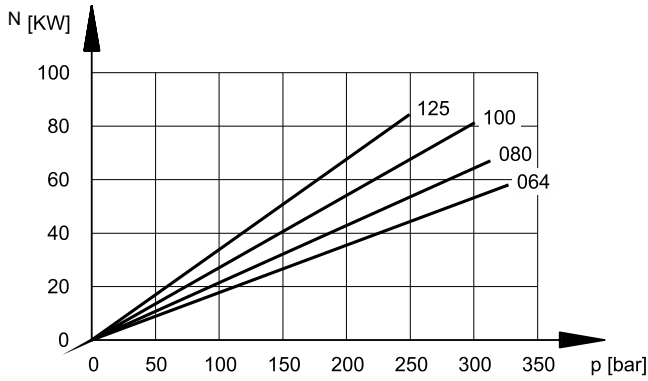
FLOW RATE/PRESSURE CURVES



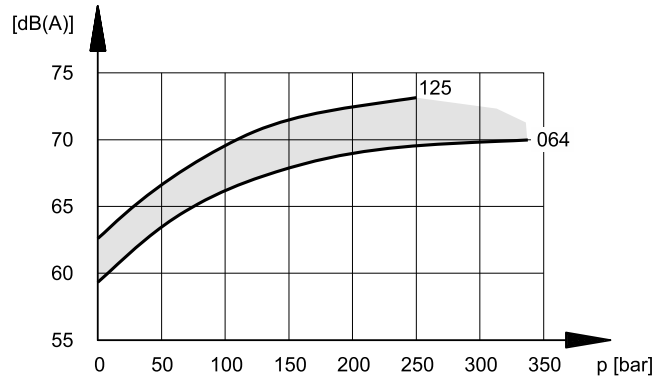
VOLUMETRIC AND TOTAL EFFICIENCIES



ABSORBED POWER

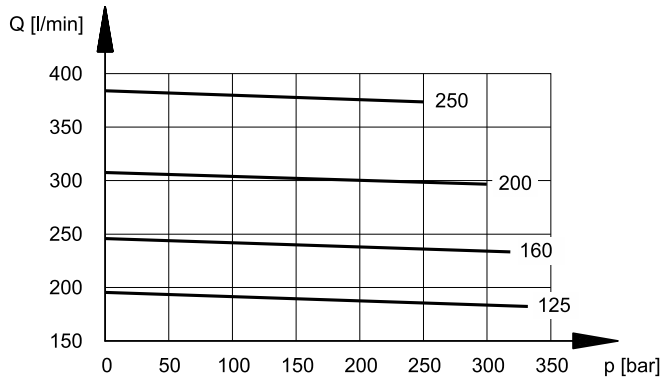


NOISE LEVEL

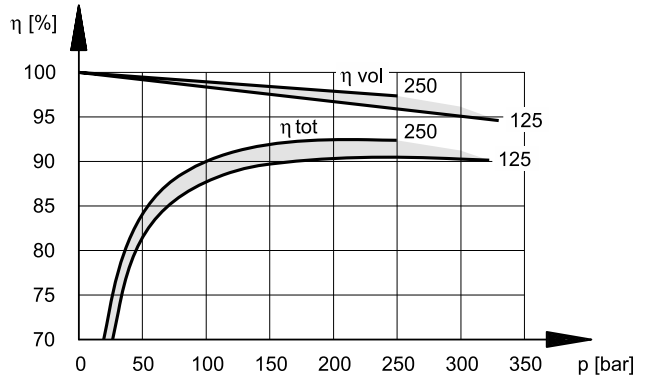


4.5 - IGP7

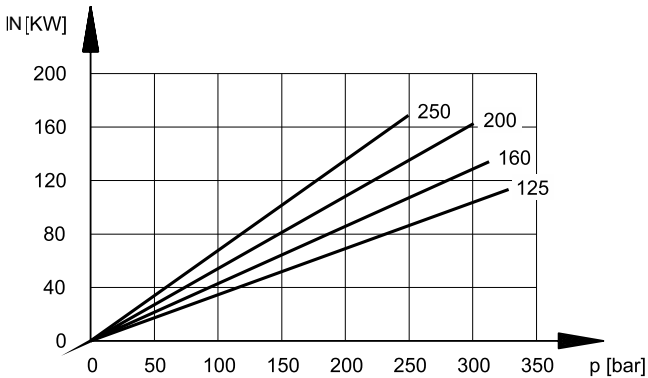
FLOW RATE/PRESSURE CURVES



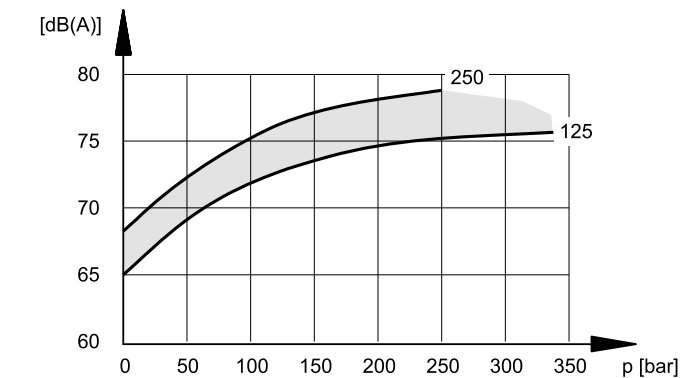
VOLUMETRIC AND TOTAL EFFICIENCIES



ABSORBED POWER

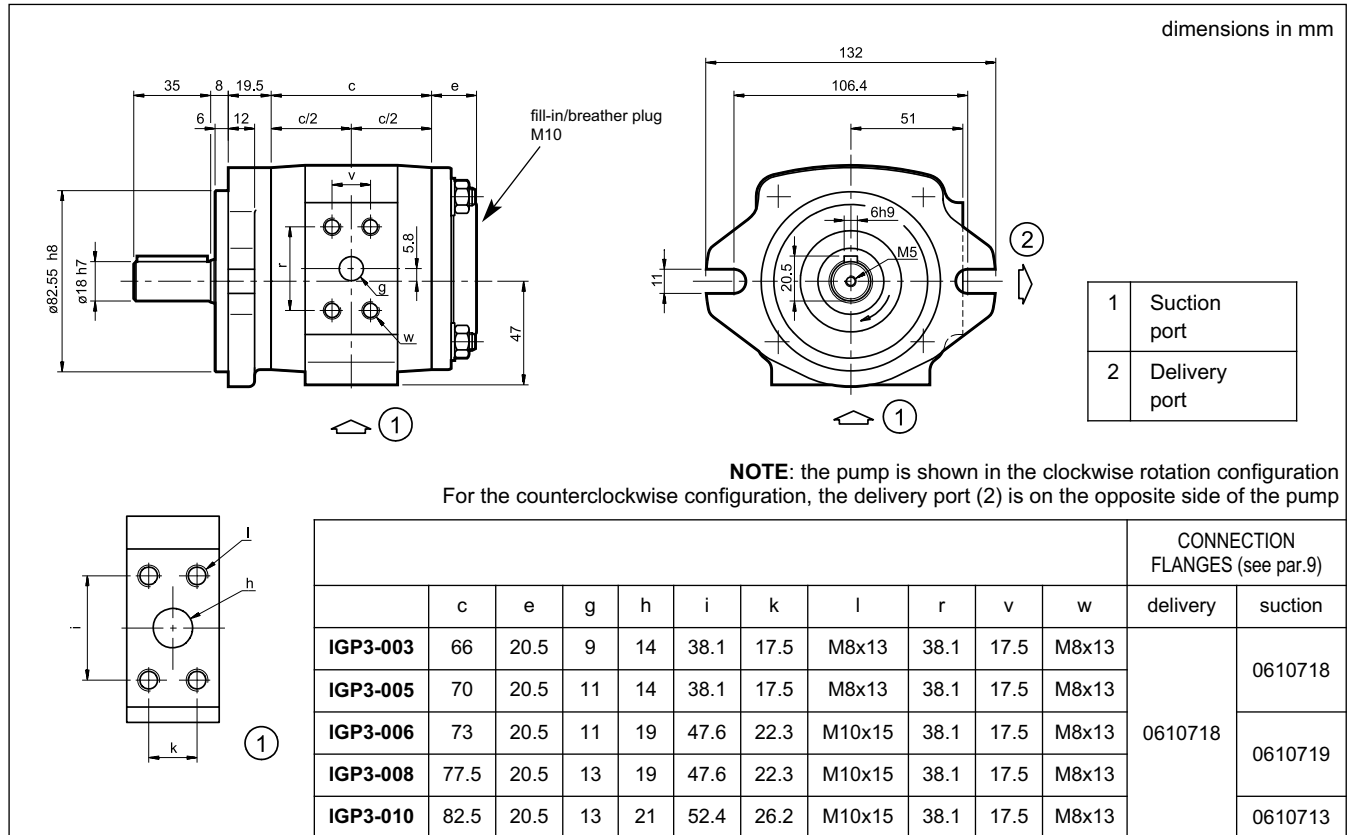


NOISE LEVEL

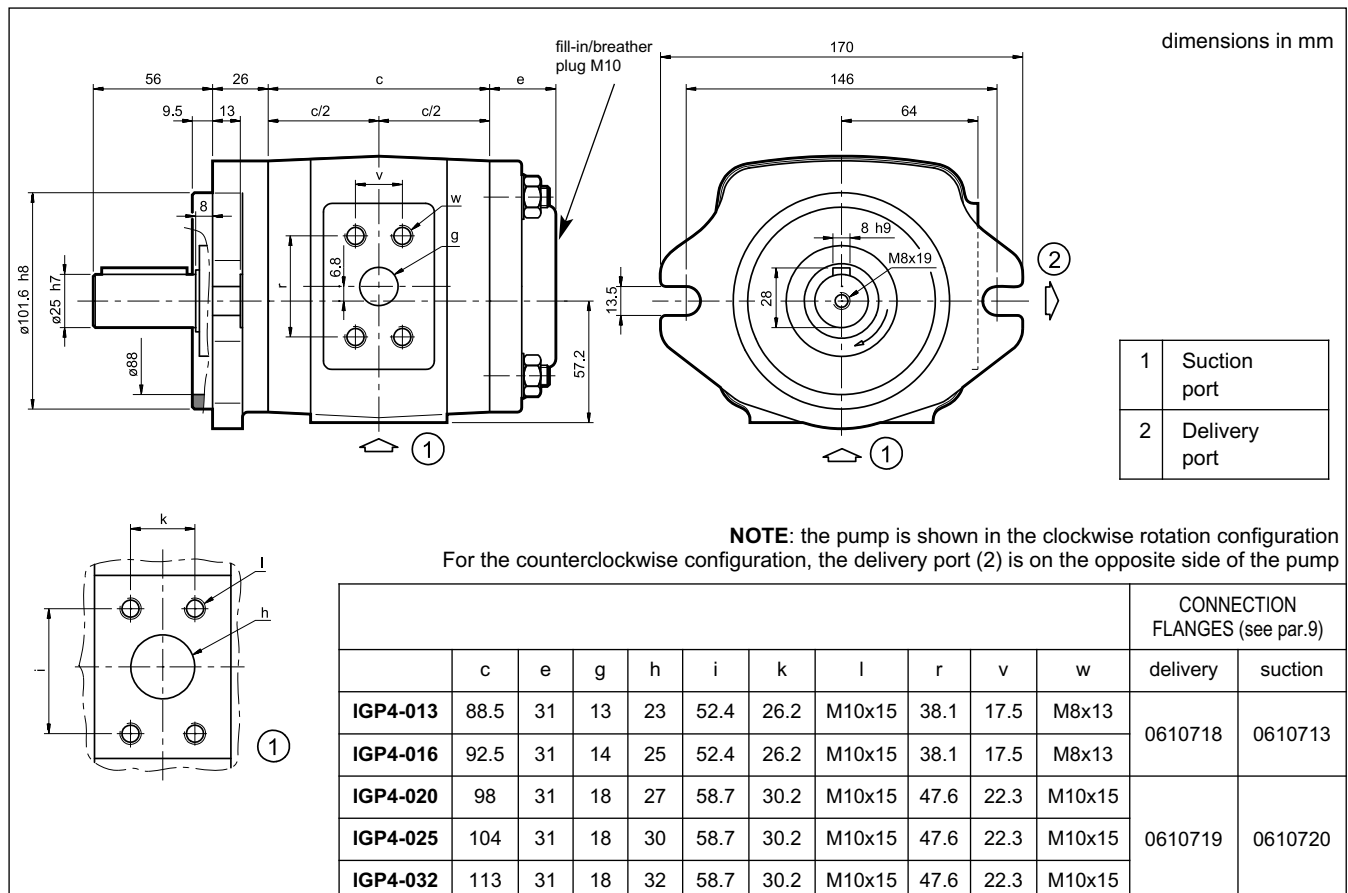


5 - OVERALL MOUNTING AND DIMENSIONS

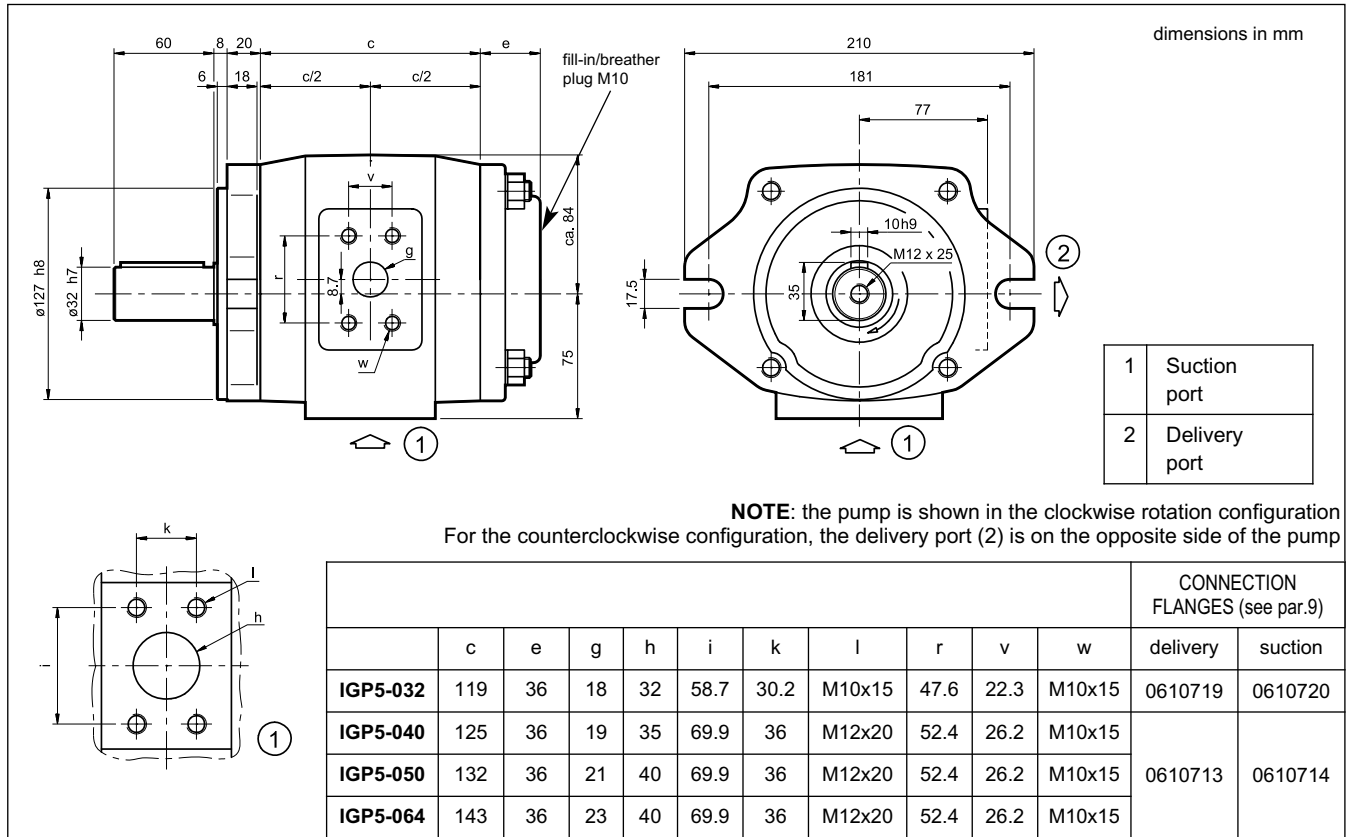
5.1 - IGP3



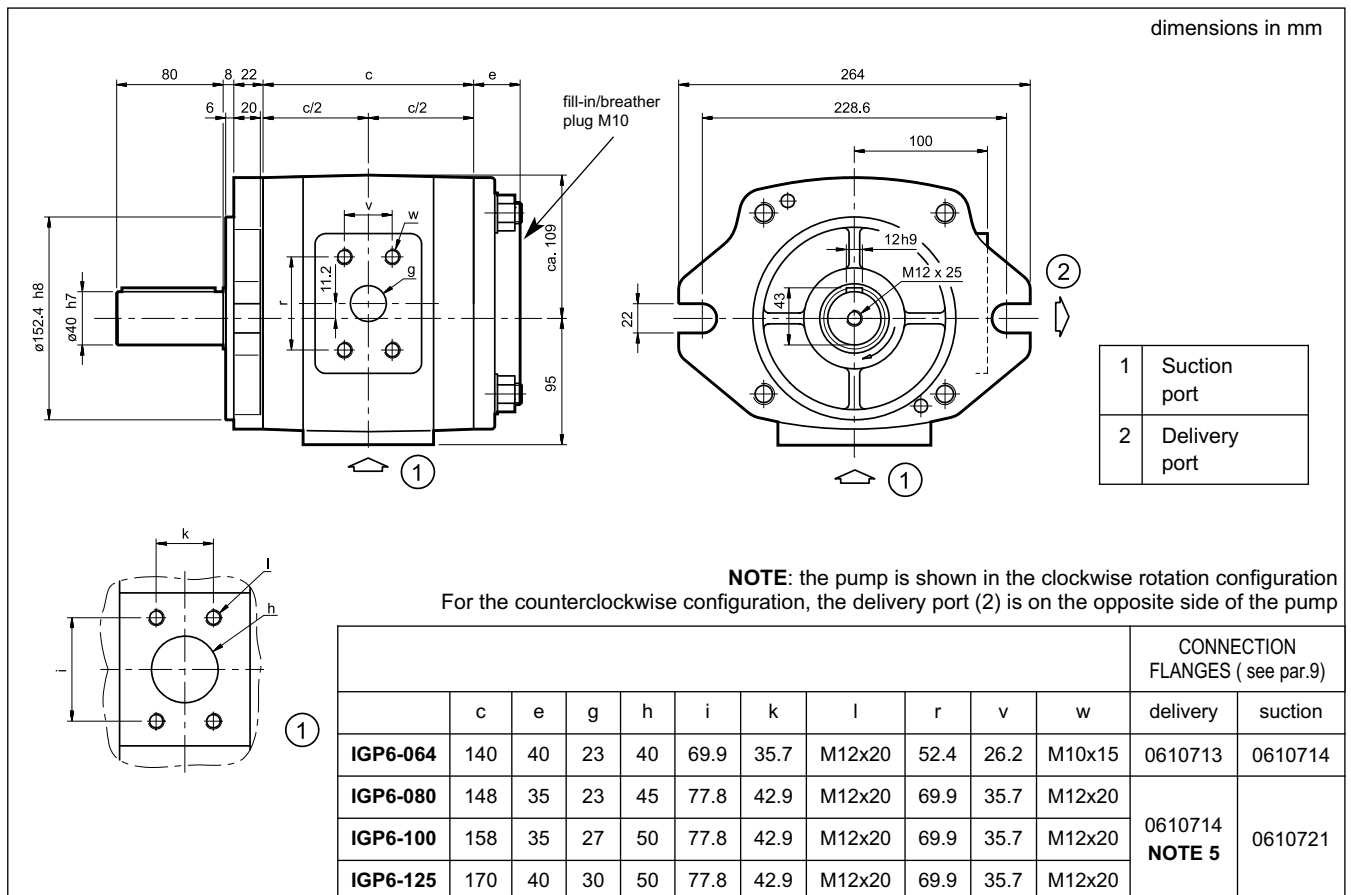
5.2 - IGP4



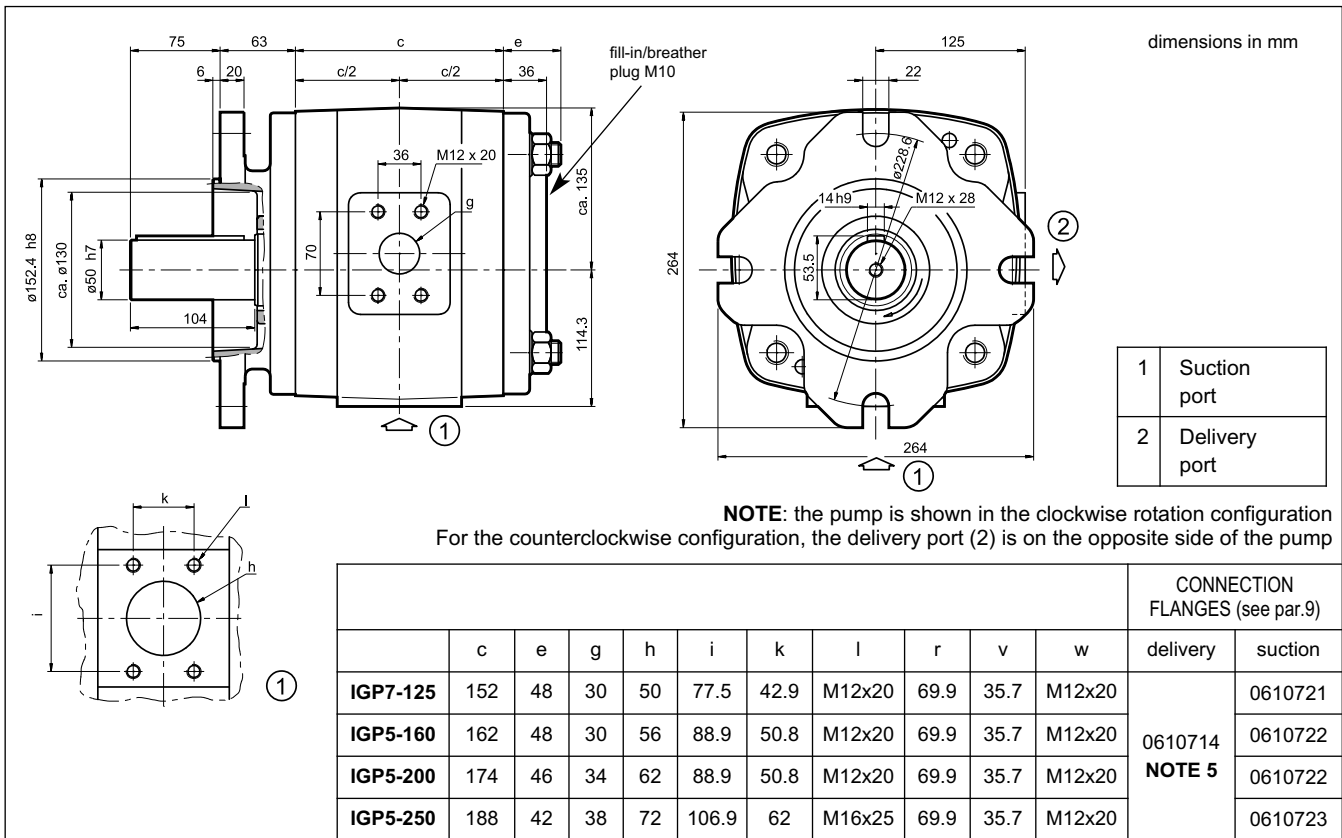
5.3 - IGP5



5.4 - IGP6



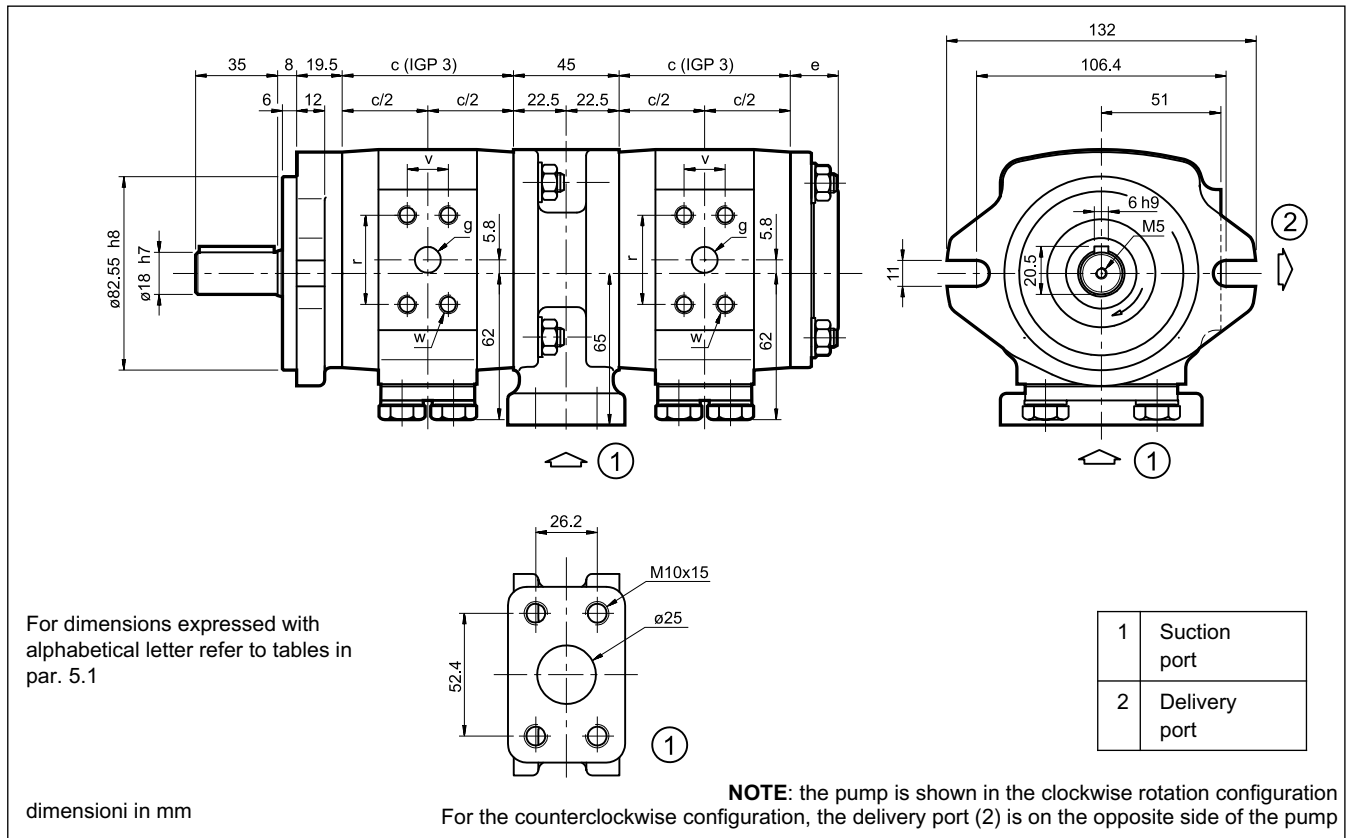
5.5 - IGP7



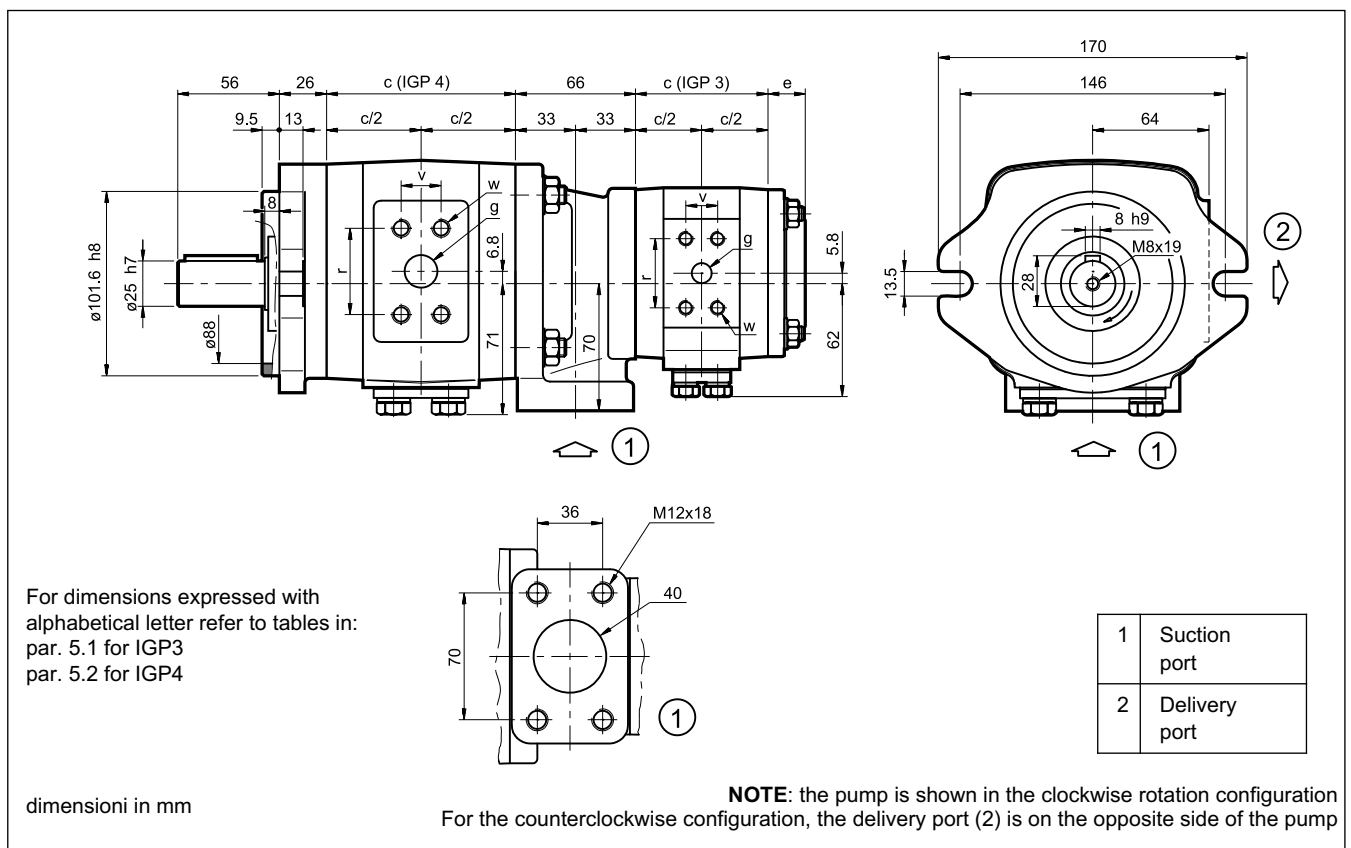
NOTE 5: For applications with delivery pressure > 200 bar, a special connection flange cod. 0610725 is required.

6 - DOUBLE PUMPS OVERALL MOUNTING AND DIMENSIONS

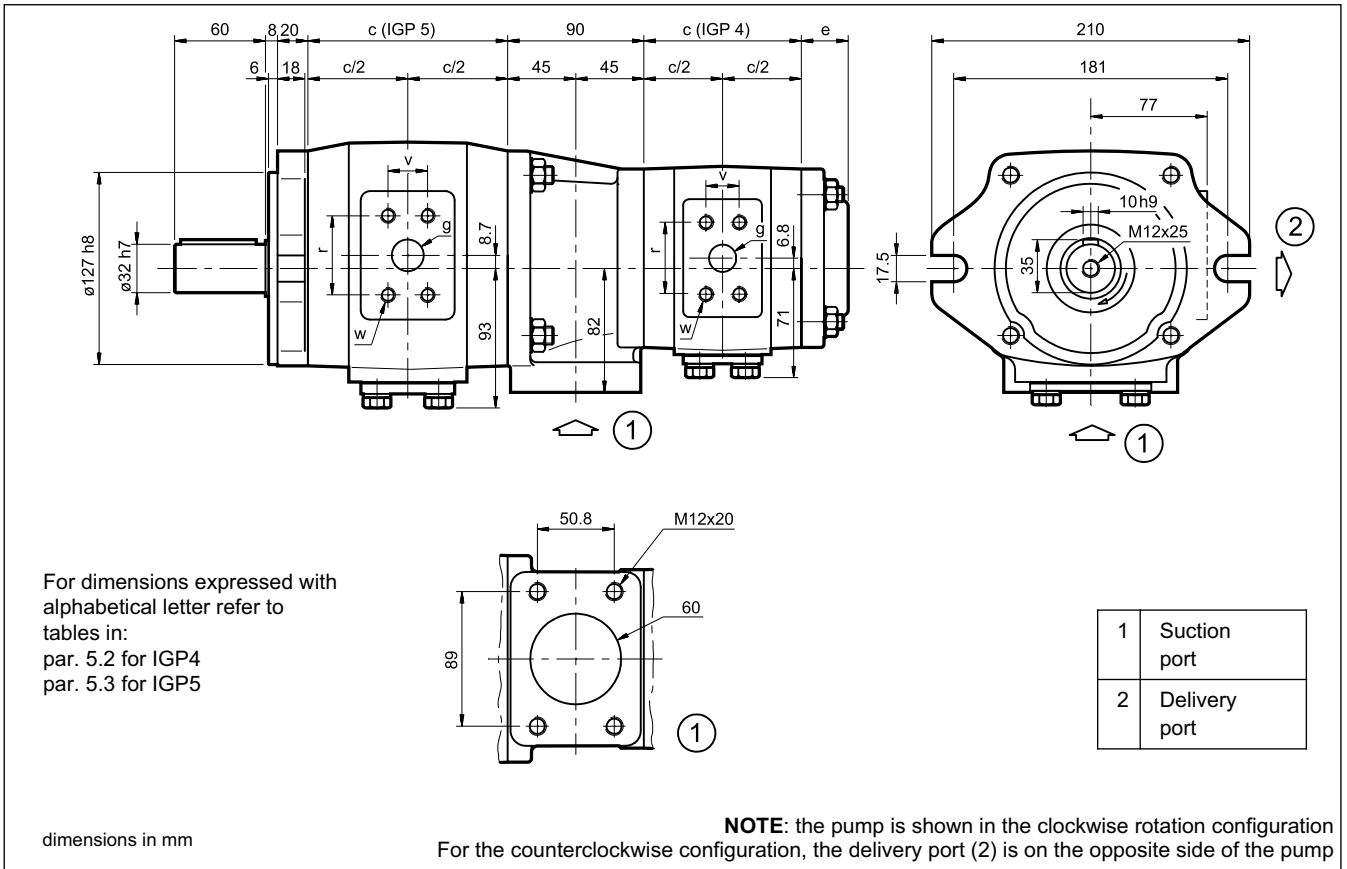
6.1 - IGP33



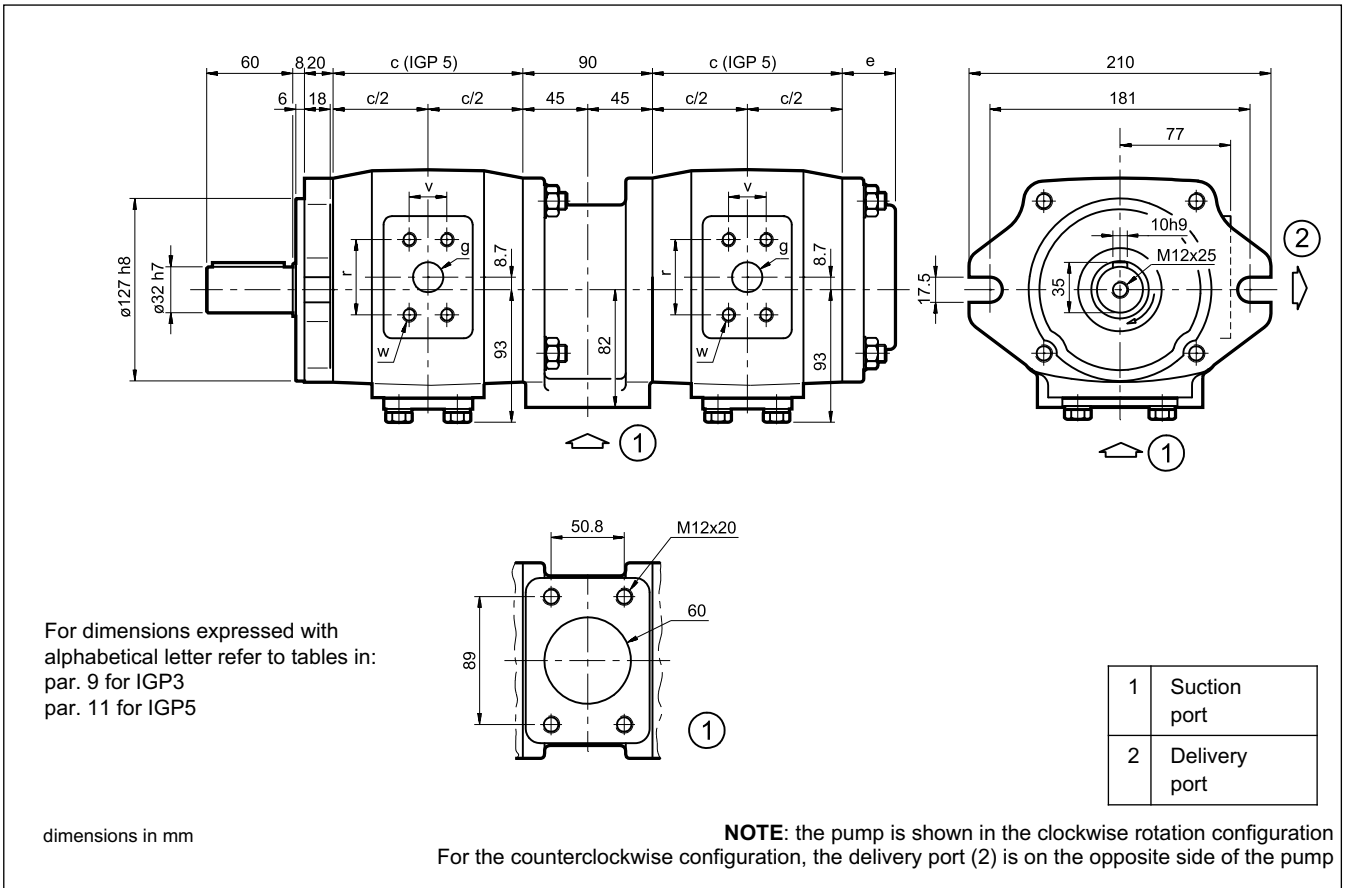
6.2 - IGP43



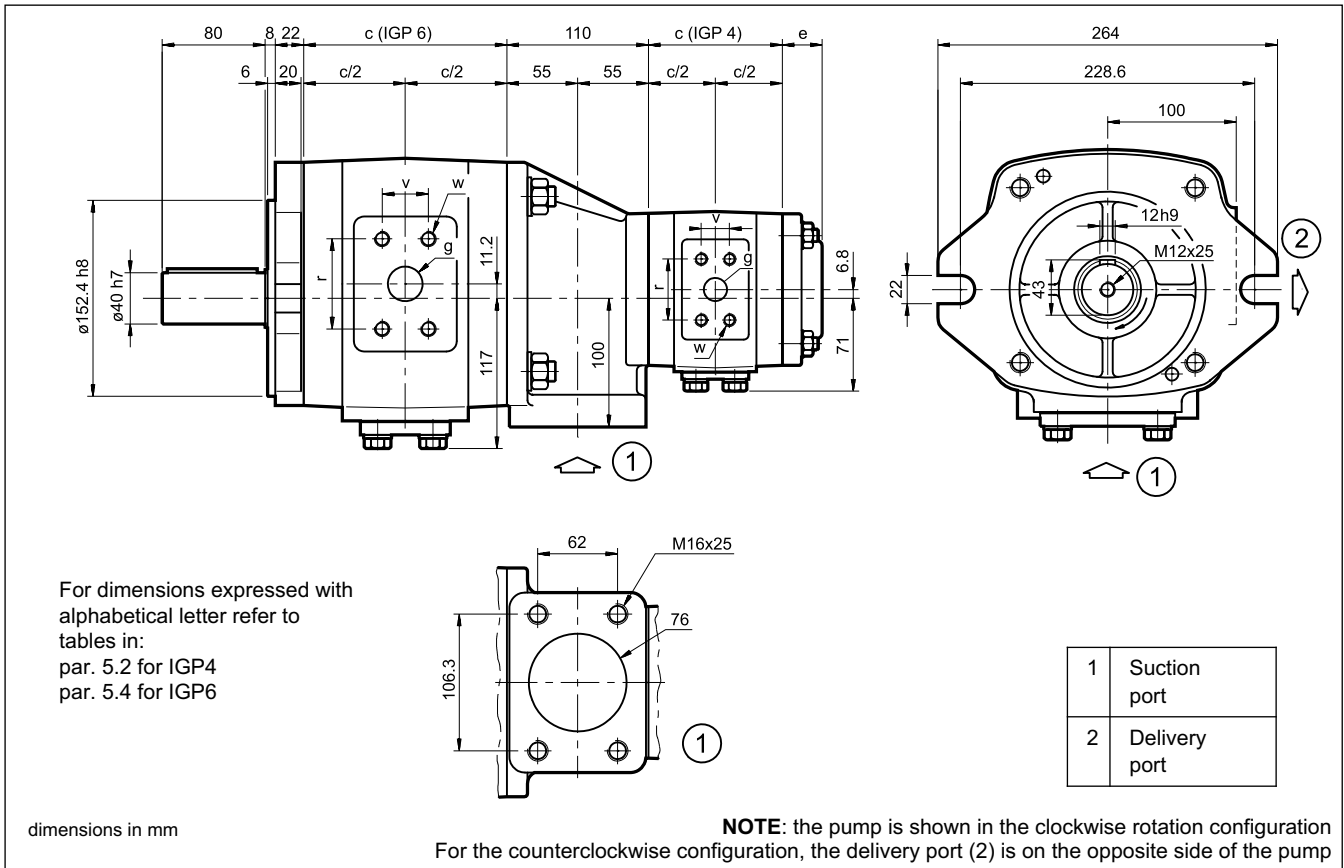
6.4 - IGP54



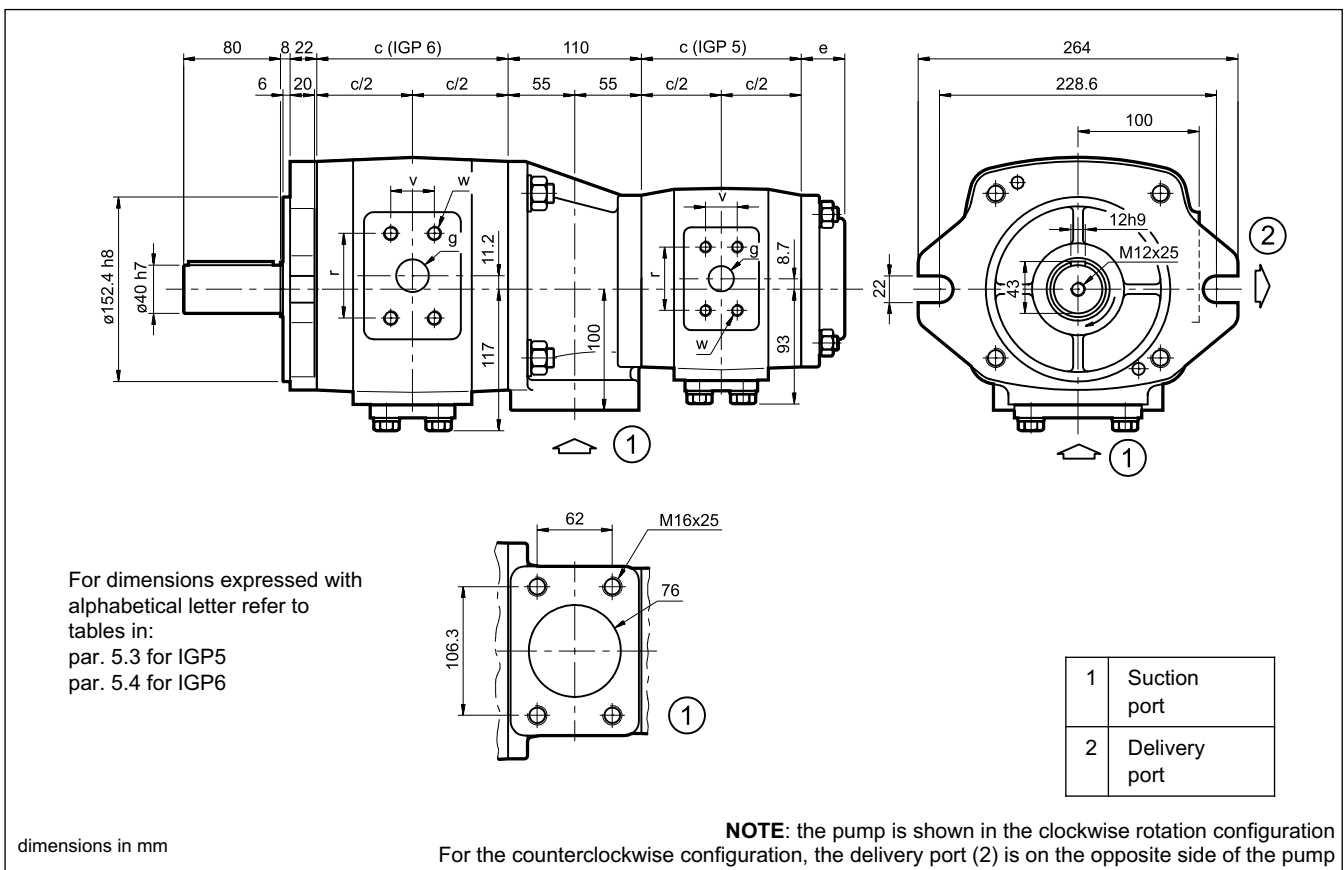
6.6 - IGP55



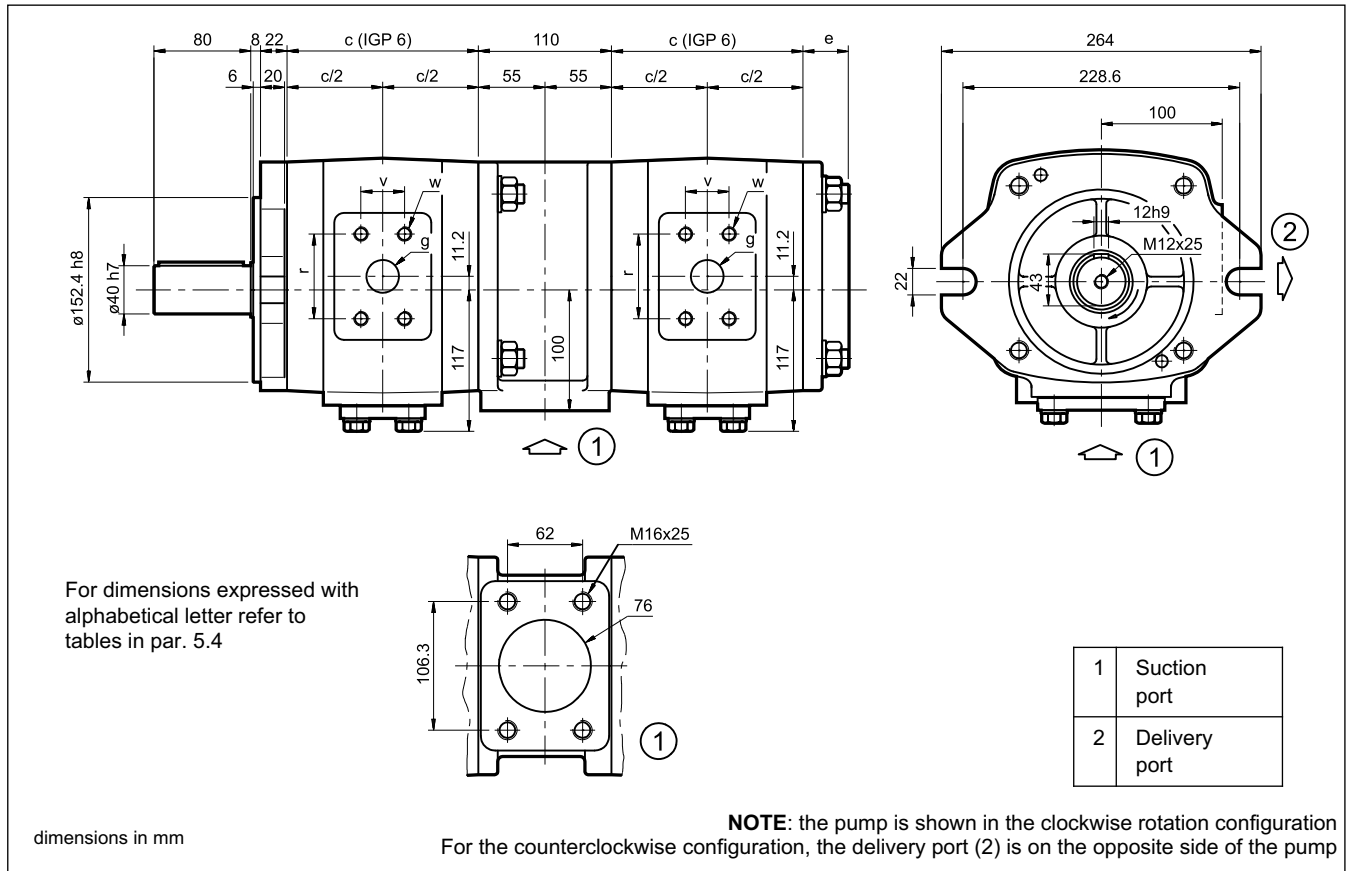
6.7 IGP64



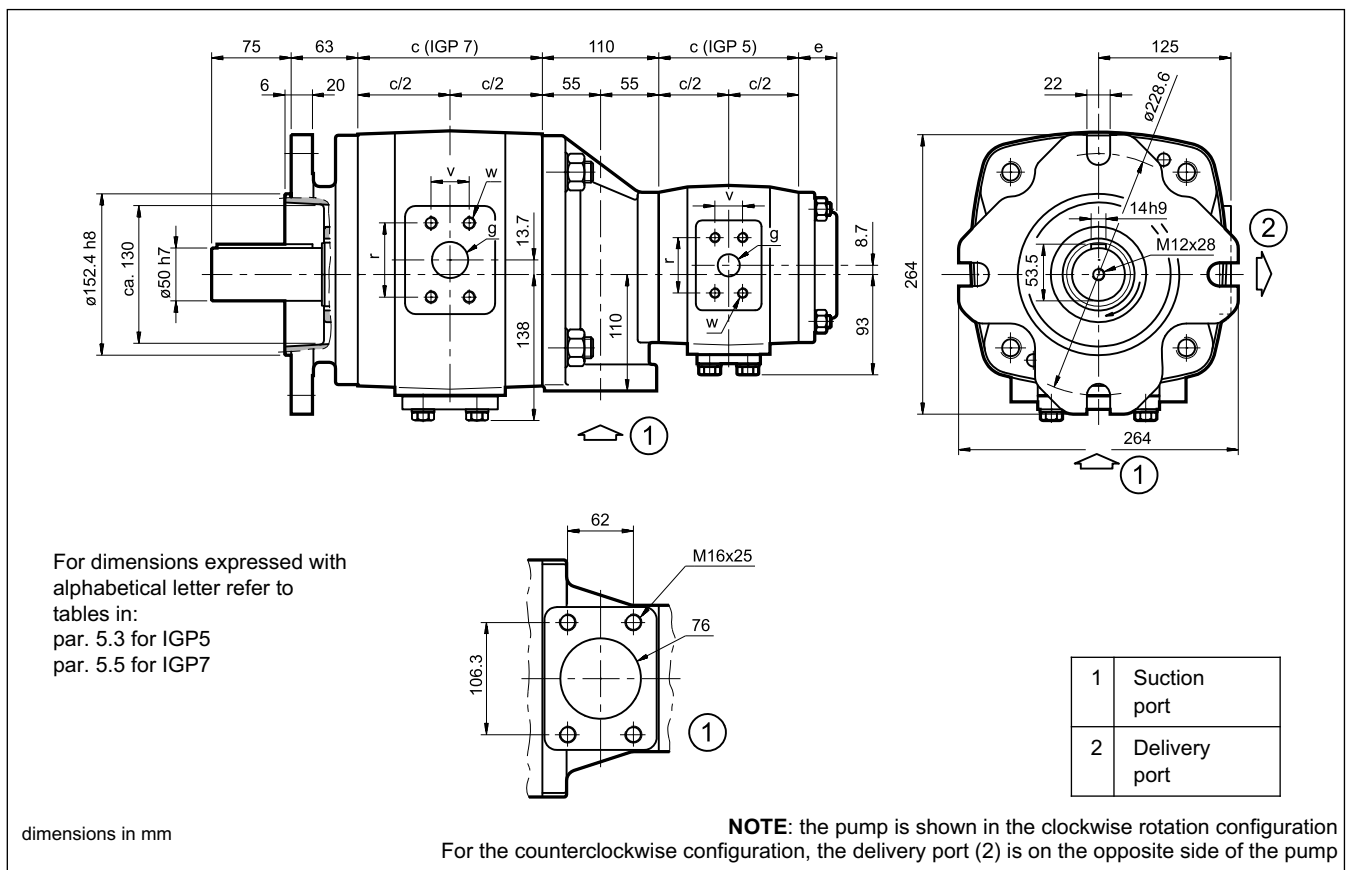
6.8 - IGP65



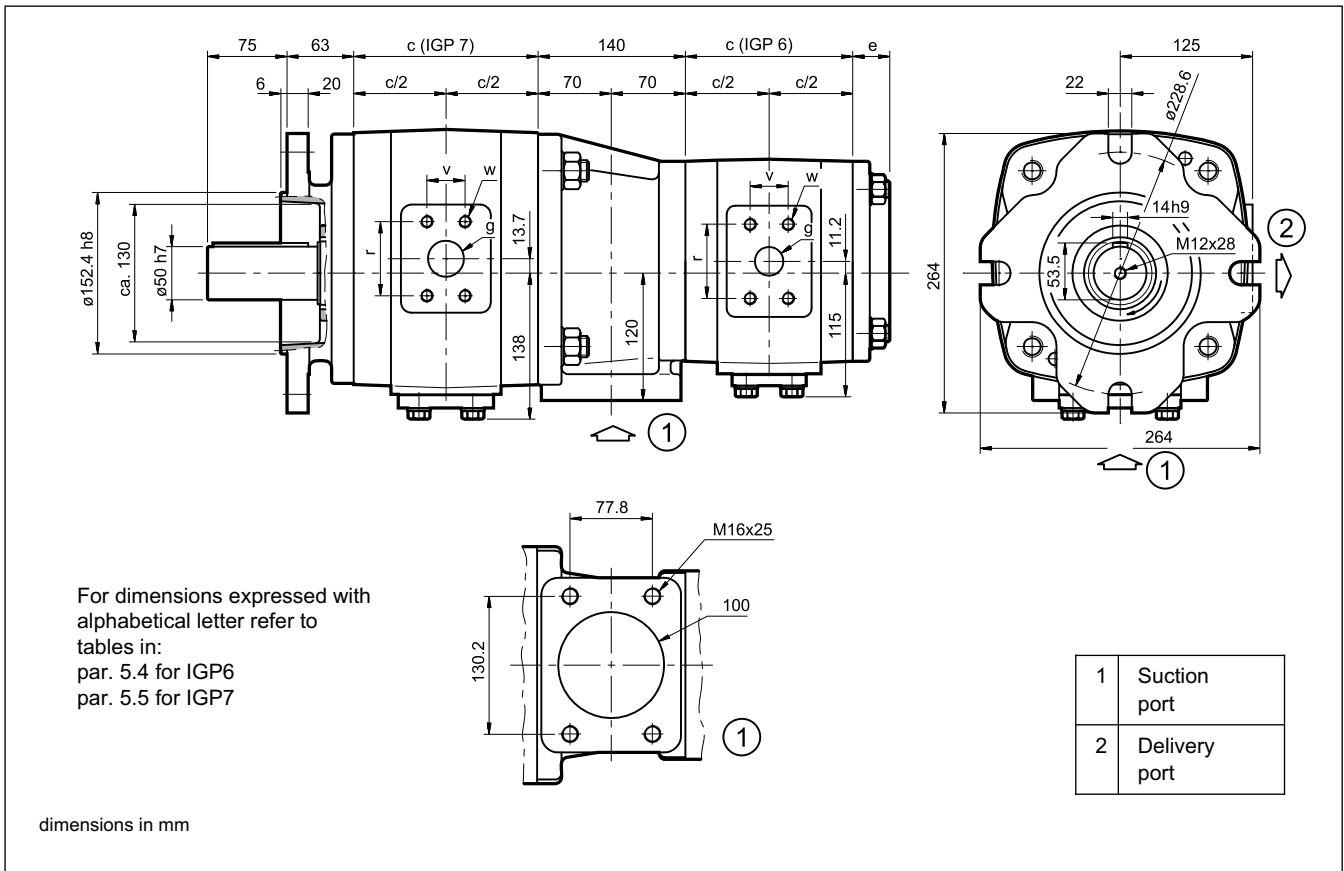
6.9 - IGP66



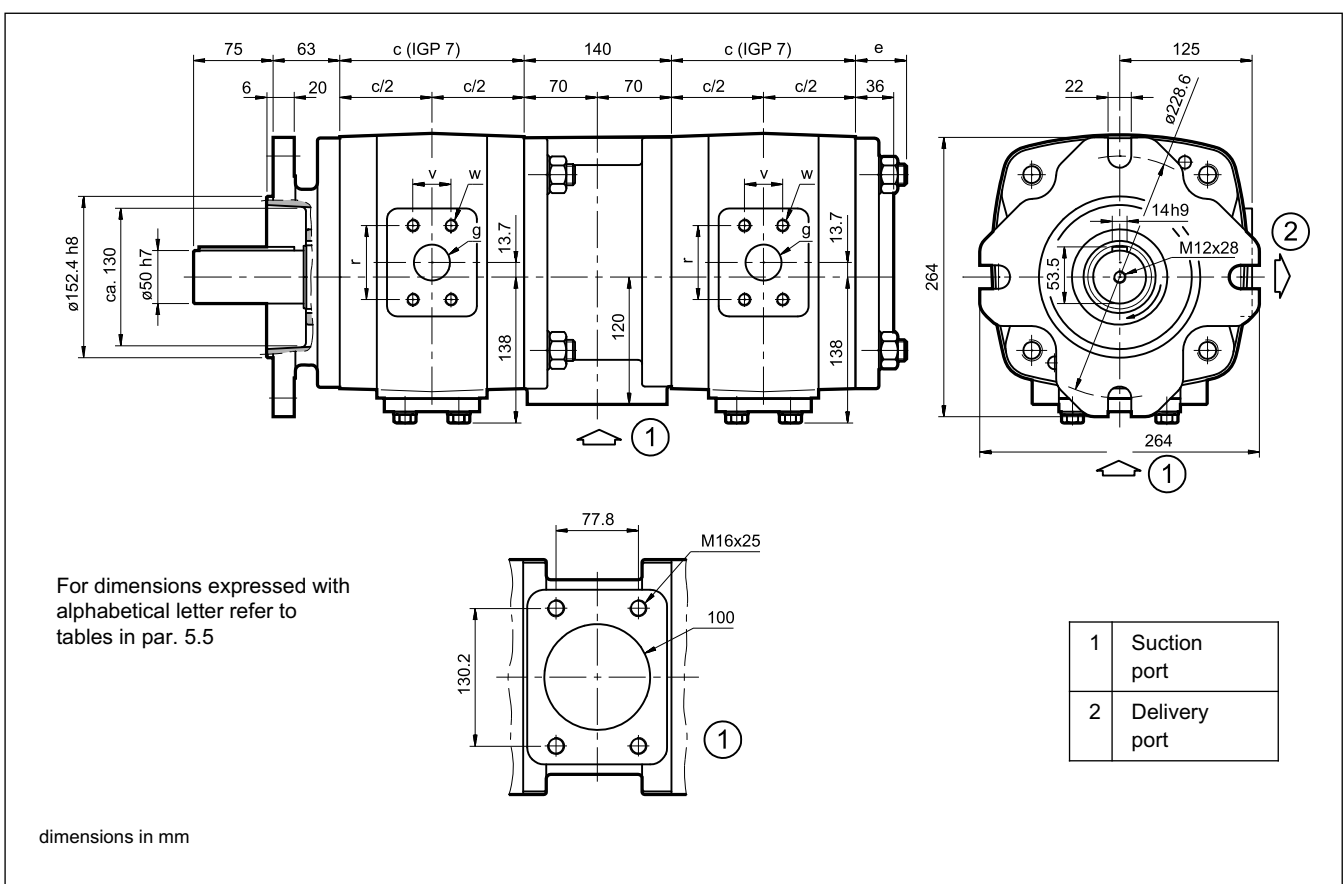
6.10 - IGP75



6.11 - IGP76



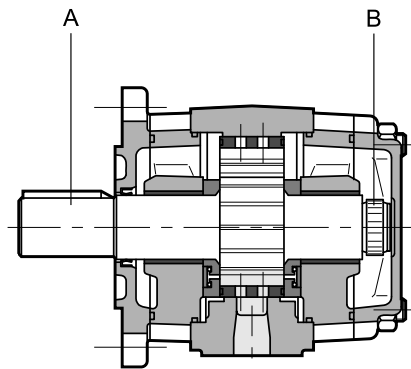
6.12 - IGP77



7 - INSTALLATION

- The IGP pumps can be installed in any position.
- Before putting the pump into operation, check that the rotation direction of the motor is according to the direction of the arrow marked on the pump body.
- The suction line must be sized so that the speed of the fluid does not exceed 1 m/s (1,5 m/s with positive pressure at the pump inlet) and must be placed in the tank at least at 50 mm below the minium oil level.
 Any bends and restrictions or an excessive line length can impair correct working of the pump.
 The height of suction from the bottom of the tank must not be less than 50 mm.
- The IGP pumps are self-priming in the entire operating speed range specified. At the first start-up of the pump, it is necessary to vent the air from the delivery line. The pump starting operation, especially at low temperatures, must be undertaken at the minimum pressure inside the system.
- There is a plug M10 (SW5) on the pump, for the filling or the breathing of the pump casing, according to the installation position.
 Be sure that the plug is closed (couple 10Nm) when the pump is operating. If a check valve with cracking pressure of >1 bar is installed on the delivery line, it is necessary to vent the air from the circuit branch between the check valve and the pump at the time of start-up.
- The motor-pump connection must be carried out directly with a flexible coupling.
 Consult our technical dept. for installations that generate axial or radial loads on the pump shaft.
 The coupling must be mounted without axially forcing the pump shaft. Be sure that the joint coupling diameter be made with a K7 tolerance.
- Refer to paragraph 3.3 for the characteristics and installation of the filtering elements.

8 - MAXIMUM APPLICABLE TORQUE



PUMP SIZE	MAX. TORQUE APPLIED TO THE SHAFT [Nm]	
	primary shaft A	secondary shaft B
IGP3	160	80
IGP4	335	190
IGP5	605	400
IGP6	1050	780
IGP7	1960	1200

NOTE: The pumps must be connected in decreasing order of displacement and size.

8.1 - Maximum applicable torque for double pumps

In case of double pumps, even of the same displacement, each pump can operate at the maximum PERFORMANCES specified in par. 2.

8.2 - Maximum applicable torque for multiple pumps

The torque (M) at the inlet of each pump is given by the following equation:

$$M = \frac{9549 \cdot N}{n} = [\text{Nm}]$$

where the absorbed power (N) is given by:

$$N = \frac{Q \cdot \Delta p}{600 \cdot \eta_{\text{tot}}} = [\text{kW}]$$

n = rotation speed [rpm]

Q = delivery [l/min]

Δp = differential pressure on the pump [bar]

η_{tot} = total efficiency (noted from the relative diagrams in par. 4)

or can be derived from the ABSORBED POWER diagrams (see par. 4).

In case of multiple pumps, the torque of the single pump must be added to the torque generated by the downstream pumps.

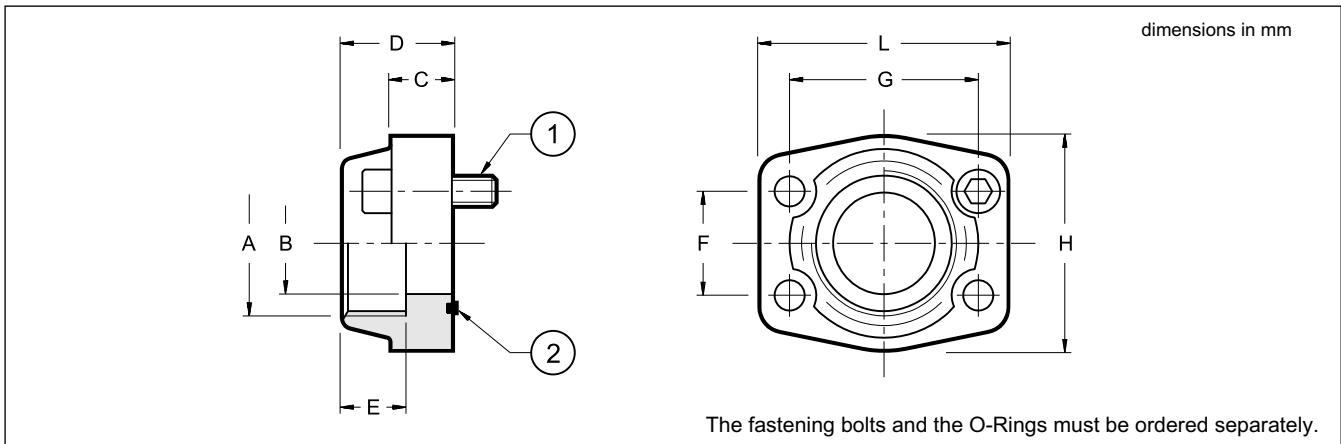
The torque value thus calculated for each pump must be less than the relative value specified in the above table, taking what follows into account:

1st pump = refer to the specified values for primary shaft A

2nd, 3rd, 4th pump = refer to the specified values for secondary shaft B

In the event that the calculated torque values are higher than those shown in the table, it is necessary to reduce the operating pressure or to replace the overloaded pump with one that can support the required torque.

9 - CONNECTION FLANGES SAE J518



	Flange code	Flange description	P_{max} [bar]	$\varnothing A$	$\varnothing B$	C	D	E	F	G	H	L	1 bolts ISO 4762	2
SAE 3000	0610718	SAE - 1/2"	345	1/2" BSP	13	16	36	19	17.5	38.1	46	57	n° 4 - M8x30	OR 4075 (18.64x3.53)
	0610719	SAE - 3/4"	345	3/4" BSP	19	18	36	19	22.2	47.6	50	65	n° 4 - M10x35	OR 4100 (24.99x3.53)
	0610713	SAE - 1"	345	1" BSP	25	18	38	22	26.2	52.4	55	70	n° 4 - M10x35	OR 4131 (32.93x3.53)
	0610720	SAE - 1 1/4"	276	1 1/4" BSP	32	21	41	22	30.2	58.7	68	79	n° 4 - M10x35	OR 4150 (37.69x3.53)
	0610714	SAE - 1 1/2"	207	1 1/2" BSP	38	25	45	24	35.7	69.9	78	93	n° 4 - M12x40	OR 4187 (47.22x3.53)
	0610725	SAE - 1 1/2"	345	1 1/2" BSP	38	50	50	24	35.7	69.9	82	98	n° 4 - M12x55 class 10.9	OR 4187 (47.22x3.53)
	0610721	SAE - 2"	207	2" BSP	51	25	45	30	43	77.8	90	102	n° 4 - M12x40	OR 4225 (56.74x3.53)
	0610722	SAE - 2 1/2"	172	2 1/2" BSP	63	25	50	30	50.8	89.0	105	114	n° 4 - M12x45	OR 4275 (69.44x3.53)
	0610723	SAE - 3"	138	3" BSP	73	27	50	34	61.9	106.4	124	134	n° 4 - M16x50	OR 4337 (85.32x3.53)
	0610724	SAE - 4"	34	4" BSP	99	27	48	34	77.8	130.2	146	162	n° 4 - M16x50	OR 4437 (110.70x3.53)

NOTE: Flange code 0610725 is a special flange which differs from SAEJ518 standards.