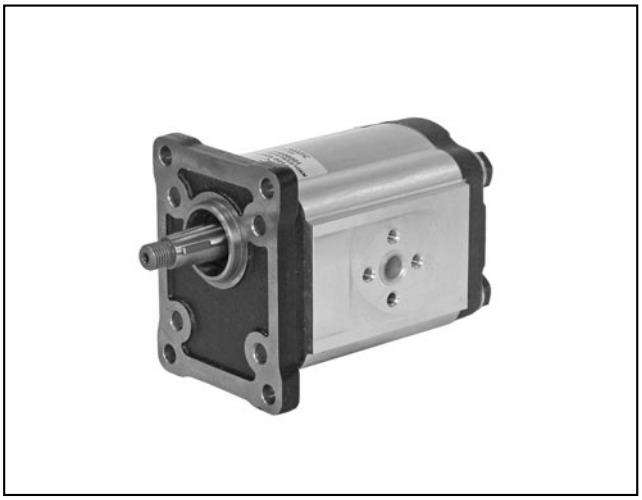
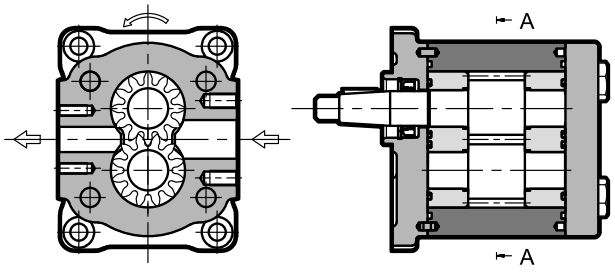


GPA*

EXTERNAL GEAR PUMPS

SERIES 10

OPERATING PRINCIPLE



— The GPA* pumps are external gear pumps with fixed displacement and axial clearance compensation.

— They give high volumetric efficiency even with high operating pressures, a low noise level, and they have a high endurance thanks to the balancing system of the loads on the guide bushings.

— They are available with four holes european flange and tapered shaft end 1:8, with clockwise or anticlockwise rotation.

— They are divided into three size groups, with displacements of up to 7.5, 31.7 and 61 cm^3/rev respectively, and with operating pressures of up to 260 bar continuous pressure.

— They are available as single, tandem or multiple pumps.

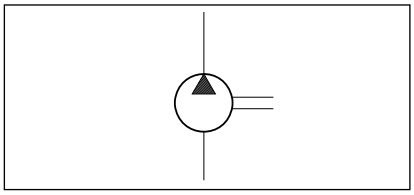
TECHNICAL SPECIFICATIONS

PUMP		GPA1	GPA2	GPA3
Displacement range	cm^3/rev	1 ÷ 7.5	4.5 ÷ 31.7	22 ÷ 61
Continuous operating pressure (**NOTE**)	bar	up to 260	up to 260	up to 250
Max rotation speed (**NOTE**)	rpm	4000	4000	3000
Rotation direction		clockwise or anticlockwise		
Loads on the shaft		radial and axial load are not allowed		
Max torque applicable to the shaft		see point 11.1		
Hydraulic connections		european flanged or BSPP threaded		
Type of mounting		4-holes flange - rectangular type		
Mass	kg	1.3 ÷ 1.9	3.3 ÷ 4.6	5.8 ÷ 8.8

NOTE: See details for each displacement at point 2.

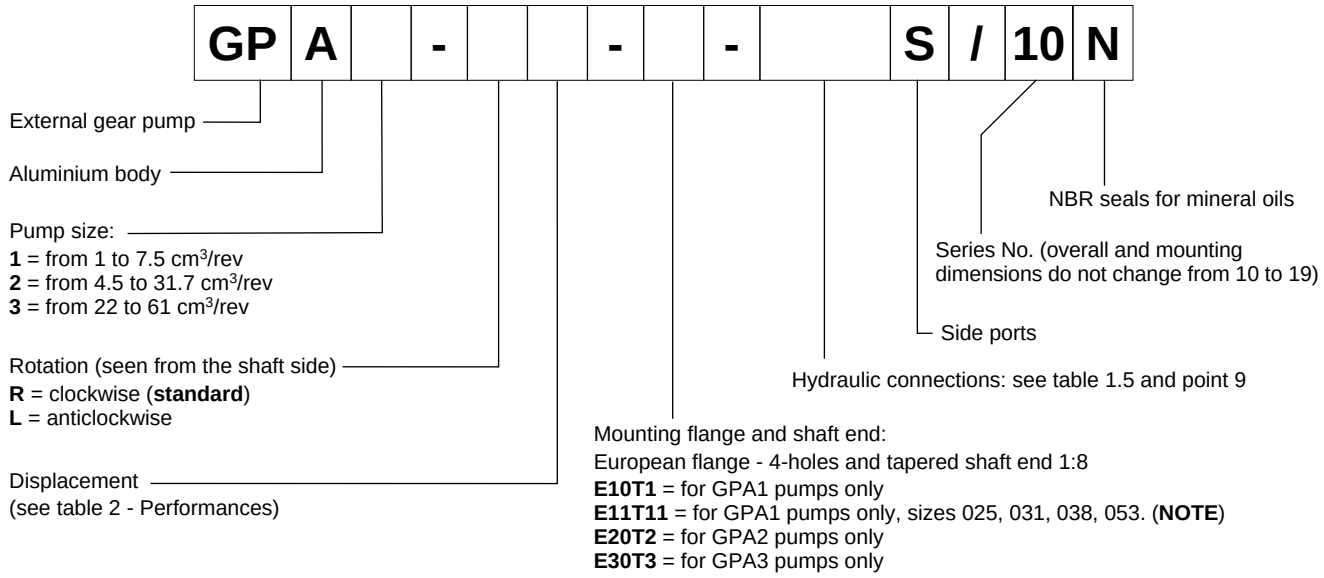
Ambient temperature range	°C	-20 / +50
Fluid temperature range	°C	-25 / +80
Fluid viscosity range	see point 5.2	
Fluid contamination degree	see point 5.3	
Recommended viscosity	cSt	10 ÷ 750

HYDRAULIC SYMBOL



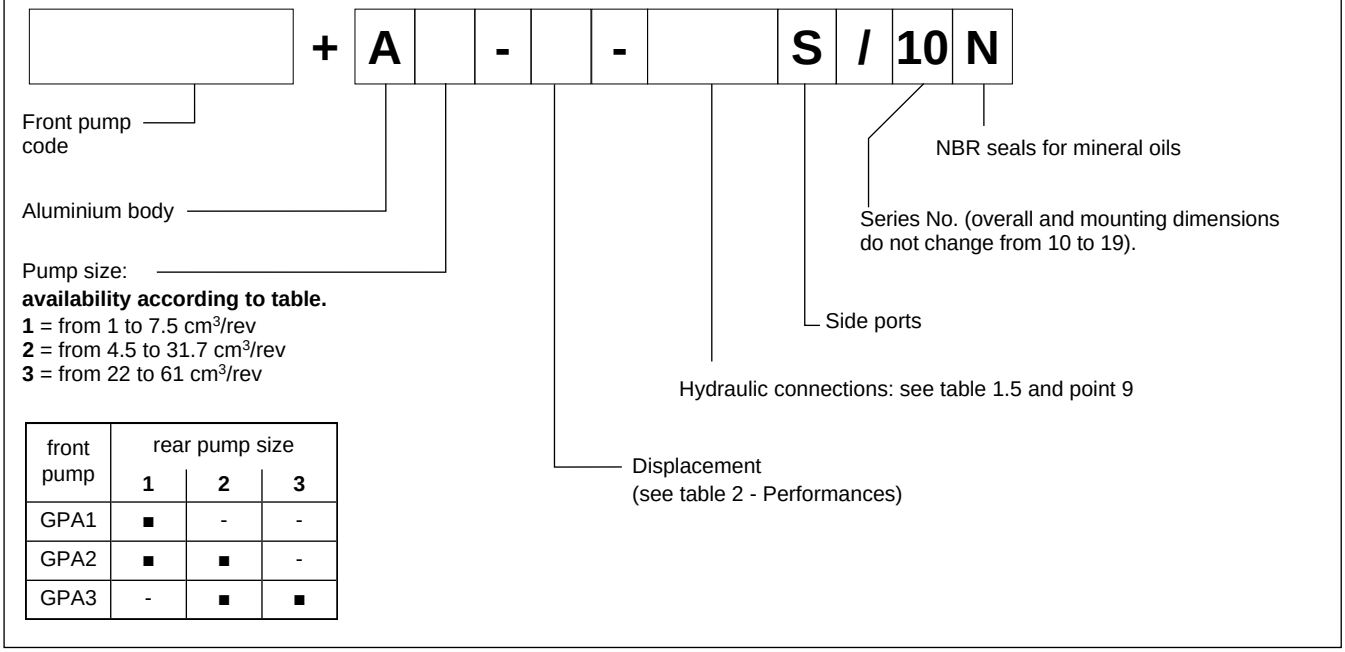
1 - IDENTIFICATION CODE

1.1 - Single pumps



NOTE: The E11T11 mounting is interchangeable with that of GP1-**97, cat. 11 100. See point 6.2.

1.2 - Tandem and multiple pumps



front pump	rear pump size		
	1	2	3
GPA1	■	-	-
GPA2	■	■	-
GPA3	-	■	■

1.3 - Codes examples

Single pump: GPA2-R082-E20T2-FE3/2S/10N

Assebled pump: double pump GPA2-R082-E20T2-FE3/2S/10N + A2-065-FE3/2S/10N

multiple pump GPA2-R113-E20T2-FE3/2S/10N + A1-047-FE2/2S/10N

1.4 - Loose intermediate pumps

Intermediate pumps are available loose only. See point 11.

1.5 - Available hydraulic connections

pump	ports type	**hydraulic connection code**	inlet	outlet	available for displacements
GPA1	European flanged	**FE2/2**	Ø13 mm	Ø13 mm	031 to 075
	BSPP threaded (ISO 228)	**B15/15**	3/8" BSPP	3/8" BSPP	010 to 038
		B2/15	1/2" BSPP	3/8" BSPP	047 to 075
GPA2	European flanged	**FE2/2**	Ø13 mm	Ø13 mm	045 to 082
		FE3/2	Ø20 mm	Ø13 mm	113 to 317
	BSPP threaded (ISO 228)	**B2/2**	1/2" BSPP	1/2" BSPP	045 to 113
		B3/2	3/4" BSPP	1/2" BSPP	146 to 317
GPA3	European flanged	**FE4/3**	Ø27 mm	Ø20 mm	220 to 520
		FE5/4	Ø33 mm	Ø27 mm	610
	BSPP threaded (ISO 228)	**B4/3**	1" BSPP	3/4" BSPP	220 to 520
		B5/4	1 1/4" BSPP	1" BSPP	610

2 - PERFORMANCE RATINGS

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

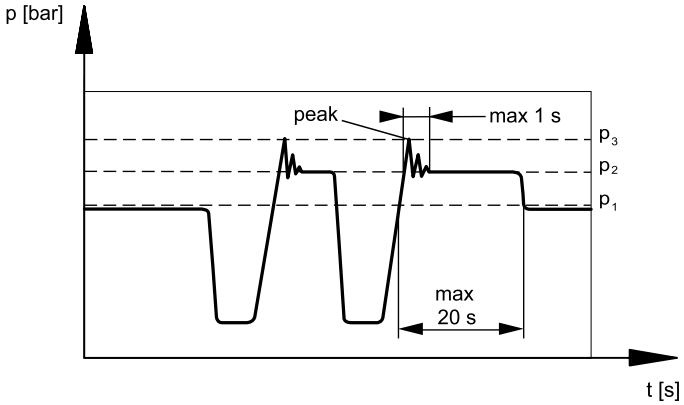
PUMP	**NOMINAL SIZE**	**DISPLACEMENT** [cm^3/rev]	**FLOW RATE** at 1500 rpm [l/min]	**MAX PRESSURE** at 1500 rpm [bar]			**SPEED** [rpm]	
				continuous operating (p1)	**intermittent** (p2)	**peak** (p3)	**max**	**min**
GPA1	**010**	1	1.5	250	270	290	4000	650
	015	1.5	2.2	260	280	300		
	019	1.9	2.9					
	025	2.5	3.8					
	031	3.1	4.7					
	038	3.8	5.7					
	047	4.7	7.1	240	260	280		
	053	5.3	8.0					
	063	6.3	9.5	230	250	270	3500	
	075	7.5	11.3	180	200	220		
GPA2	**045**	4.5	6.8	260	290	310	4000	600
	065	6.5	9.7					
	082	8.2	12.3					
	113	11.3	16.9					
	146	14.6	21.9				3500	500
	169	16.9	25.4				3200	
	201	20.1	30.2	250	280	300	3000	
	220	22	33	250	280	300	2700	
	252	25.2	37.8	210	240	260	2500	
	280	28	42	200	230	250	2200	
	317	31.7	47.6	180	210	230	2000	

PUMP	NOMINAL SIZE	DISPLACEMENT [cm³/rev]	FLOW RATE at 1500 rpm [l/min]	MAX PRESSURE at 1500 rpm [bar]			SPEED [rpm]	
				continuous operating (p1)	intermittent (p2)	peak (p3)	max	min
GPA3	**220**	22	33	250	270	280	3000	500
	270	27	40.5					
	330	33	49.5	240	260	270		
	390	39	58.5					
	440	44	66	230	250	260		
	480	48	72	210	230	240	2500	
	520	52	78					
	610	61	91.5	190	210	220		

2.1 - Pressures definitions

GPA* pumps can operate at the max continous pressure P1 at the delivery, with no pressure on suction.

The max time given for the peak (P3) and its extinction is 1 second as it is intended as the intervention time of the pressure relief valve of the system.



p_1 Max. continuous pressure (duty cycle 100%)

p_2 Max. intermittent pressure for a working cycle of 60 sec.

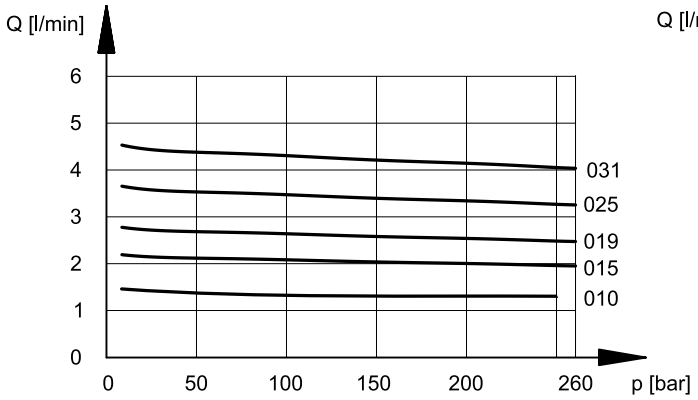
p_3 Max. pressure peak

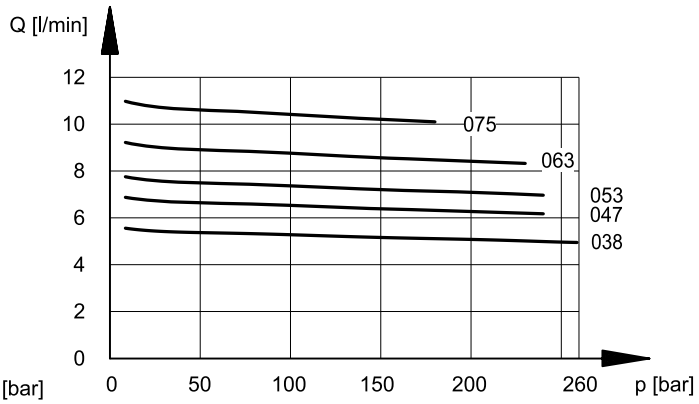
3 - CURVES AND CHARACTERISTIC DATA

(values obtained with mineral oil with viscosity of 46 cSt at 40 °C, at 1500 rpm)

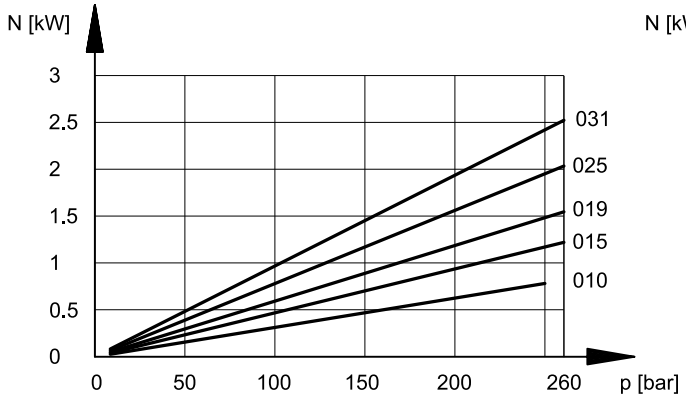
Absorbed powers are theoretical, taking into account average efficiencies.

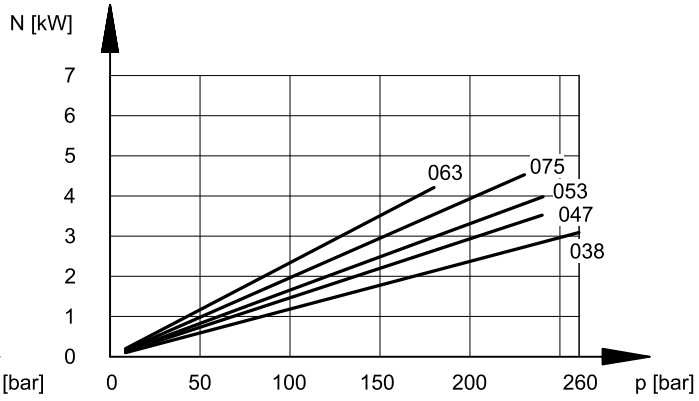
3.1 - GPA1 flow rate / pressure curve



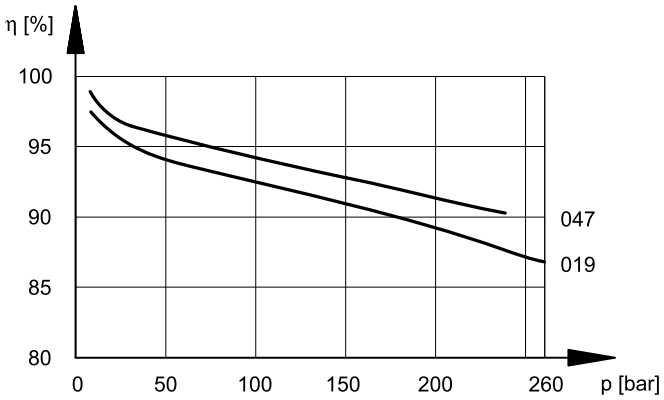


3.2 - GPA1 absorbed power

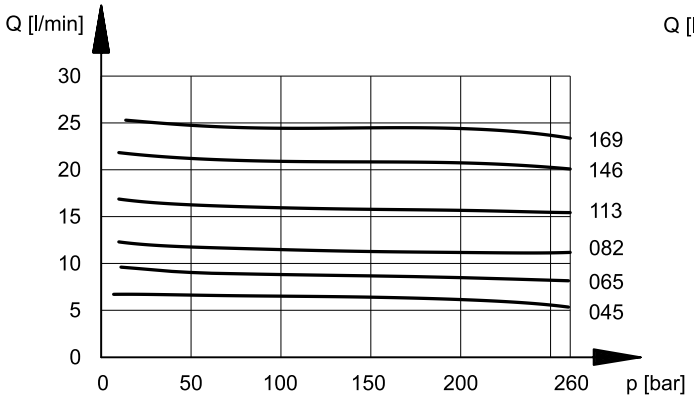


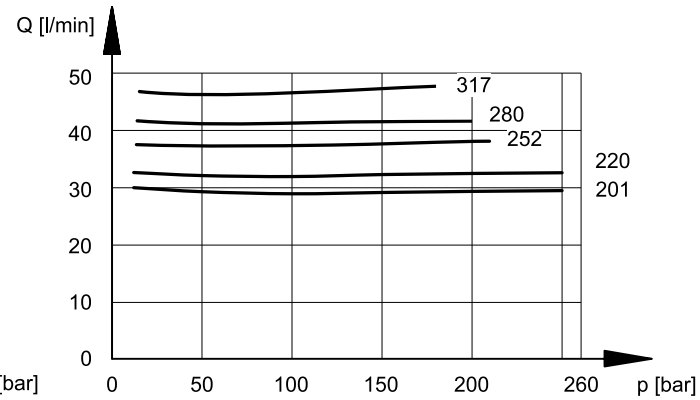


3.3 - GPA1 volumetric efficiency

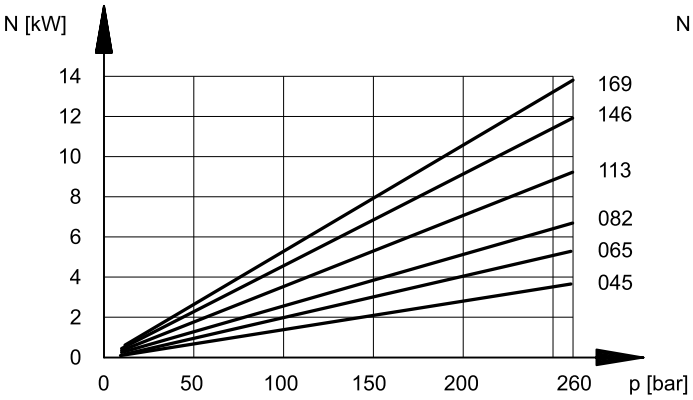


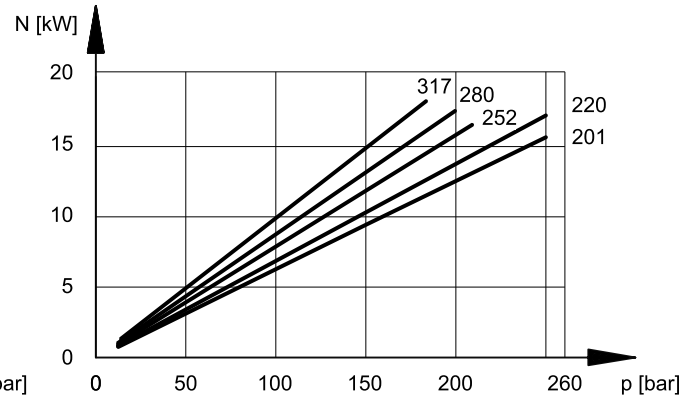
3.4 - GPA2 flow rate / pressure curve



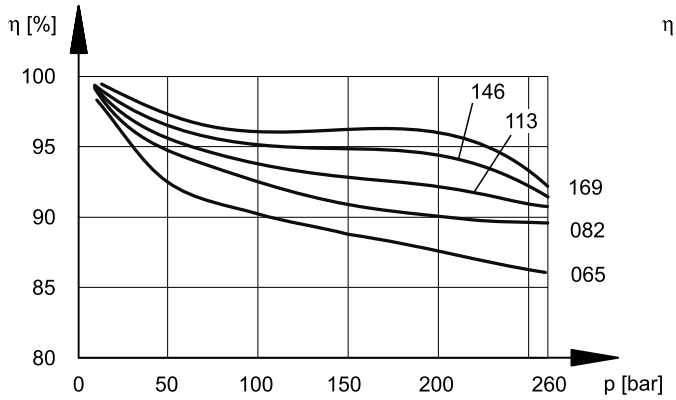


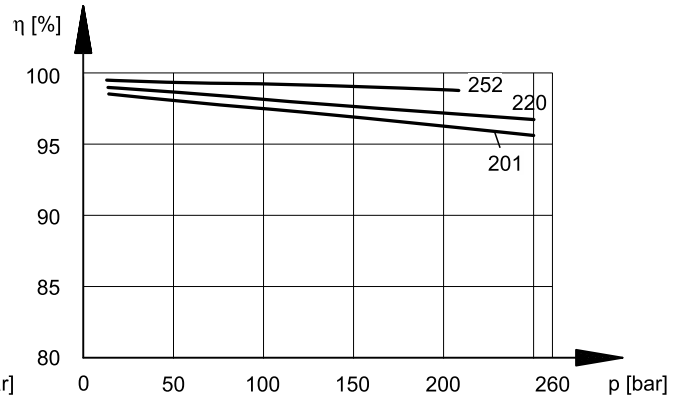
3.5 - GPA2 absorbed power



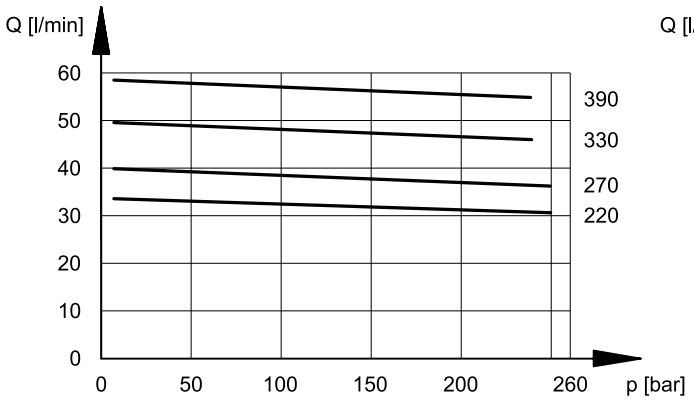


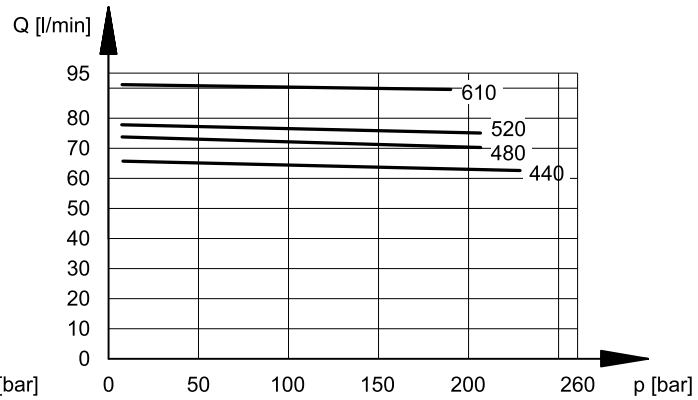
3.6 - GPA2 volumetric efficiency



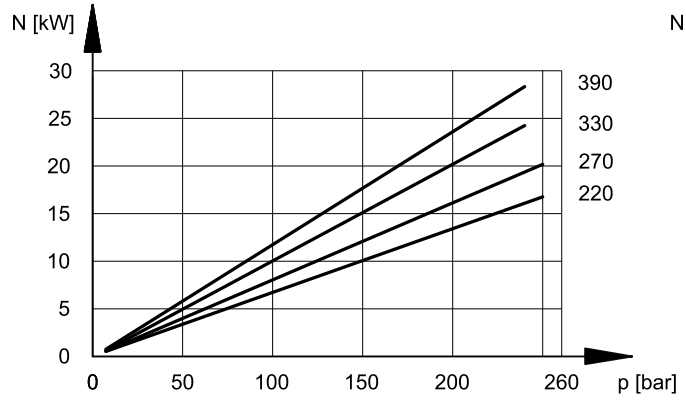


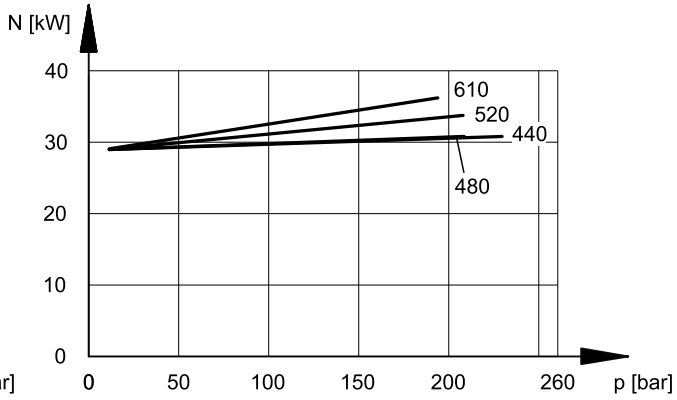
3.7 - GPA3 flow rate / pressure curve



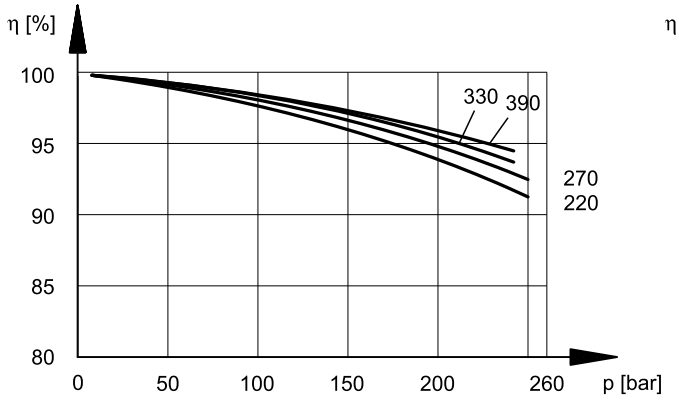


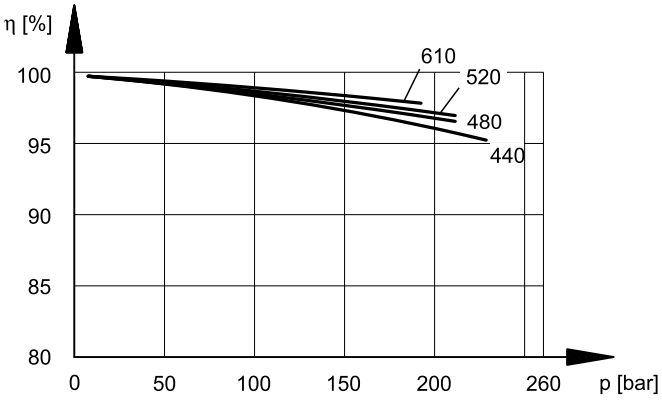
3.8 - GPA3 absorbed power





3.9 - GPA3 volumetric efficiency



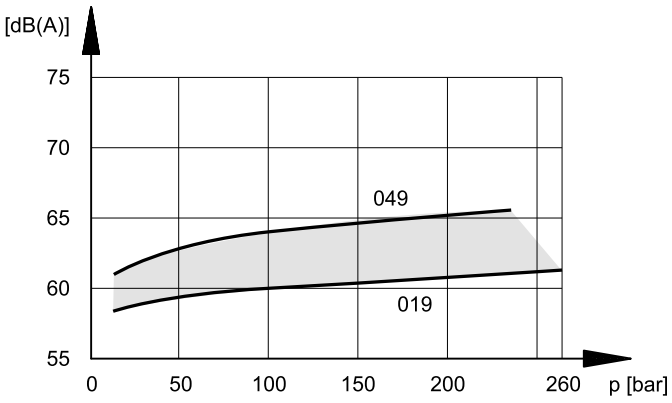


4 - NOISE LEVEL

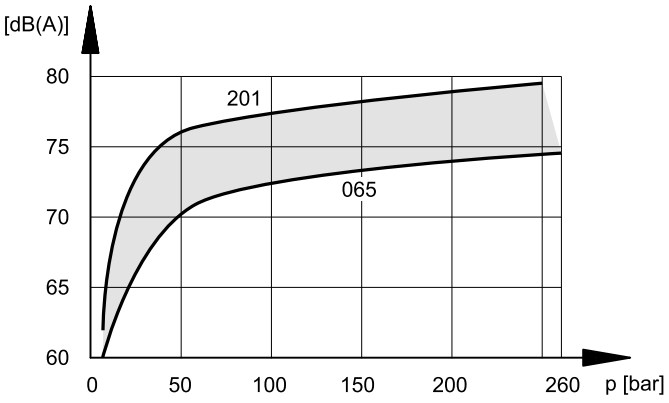
The data shown in the diagrams were noted with pump rotation speed = 1500 rpm.

Noise pressure levels were measured in a semi-anechoic room, at an axial distance of 1 m from the pump.

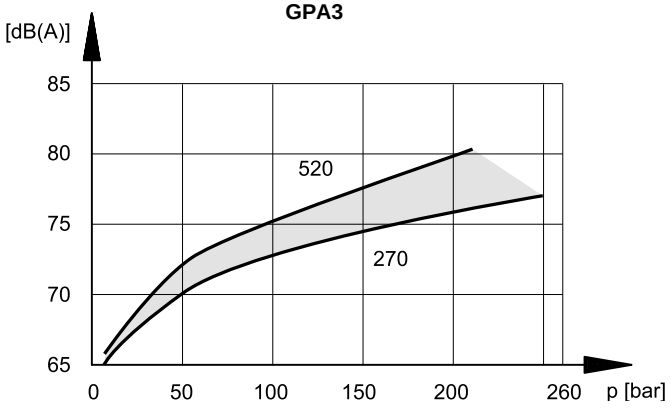
GPA1



GPA2



GPA3



5 - HYDRAULIC FLUID

5.1 - Type of fluid

Use mineral oil based hydraulic fluids with anti-foam and antioxidant additives, in conformity with the requisites of the following standards:
FZG test - 11th stage; DIN 51525; VDMA 24317

For use with other types of fluid (water glycol, phosphate esters and others), consult our technical dept. Operation with fluid at a temperature greater than 80°C causes a premature deterioration of the fluid quality and of the seals. The physical and chemical properties of the fluid must be maintained.

5.2 - Fluid viscosity

The operating fluid viscosity must be within the following range:

ideal viscosity	10 ÷ 100 cSt	
recommended viscosity	up to 750 cSt	
maximum viscosity	1000 cSt	(limited to only the start-up phase of the pump)

5.3 - Degree of fluid contamination

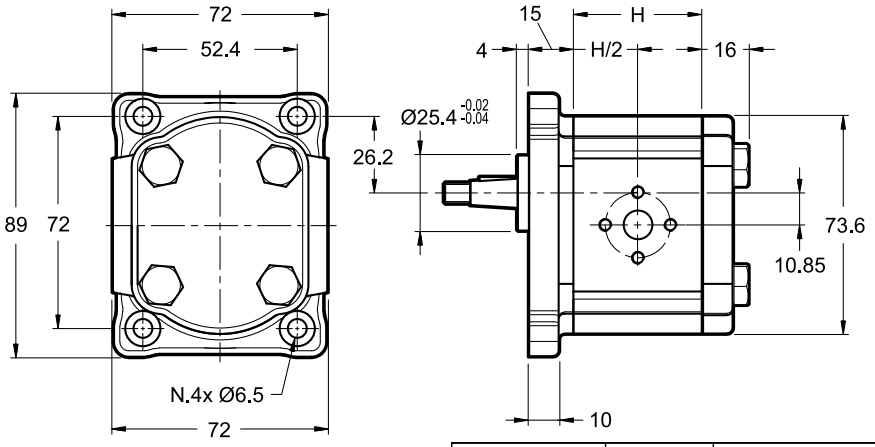
Working pressure bar (psi)	Δp < 140 (2030)	140 (2030) < Δp < 210 (3040)	Δp > 210 (3040)
Class contamination NAS 1638	10	9	8
Class contamination ISO 4406:1999	21/19/16	20/18/15	19/17/14

If there is a filter installed on the suction line, be sure that the pressure at the pump inlet must be 0.7 ÷ 3 bar. The suction filter must be equipped with a by-pass valve and, if possible, with a clogging indicator.

6 - GPA1 PUMPS - OVERALL AND MOUNTING DIMENSIONS

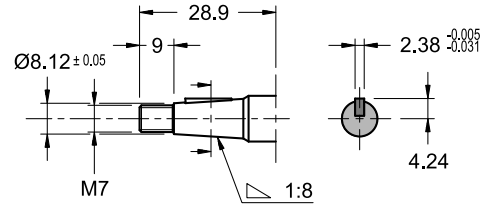
6.1 - E10T1 mounting flange and shaft end

dimensions in mm



Pump displacement	H	flanged ports		BSPP ports	
	[mm]	suction	pressure	suction	pressure
010	35.7	not available		3/8”	3/8”
015	37.5				
019	39				
025	41.3				
031	43.5	Ø13	Ø13		
038	46.1				
047	49.5			1/2”	
053	51.7				
063	55.5				
075	59.2				

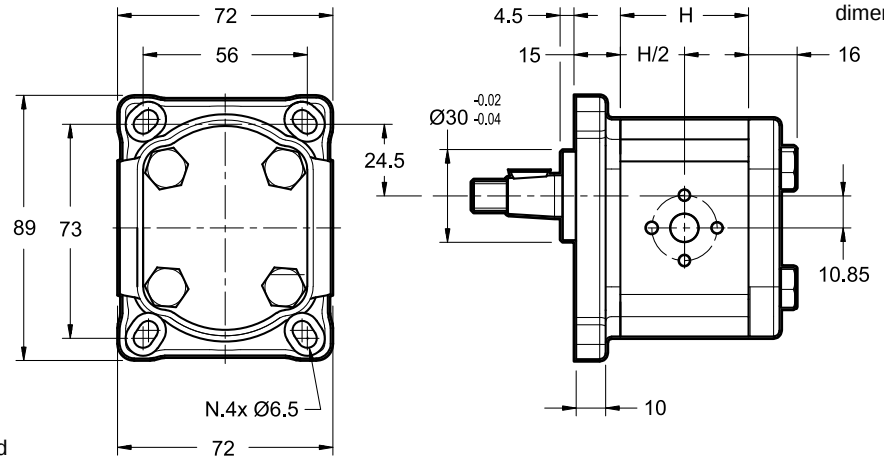
tapered shaft end with thread



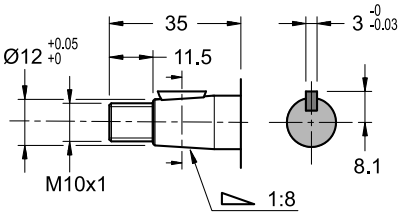
NOTE: Hydraulic connections are reversed on pumps with anticlockwise rotation.

6.2 - E11T11 mounting flange and shaft end

dimensions in mm



tapered shaft end with thread

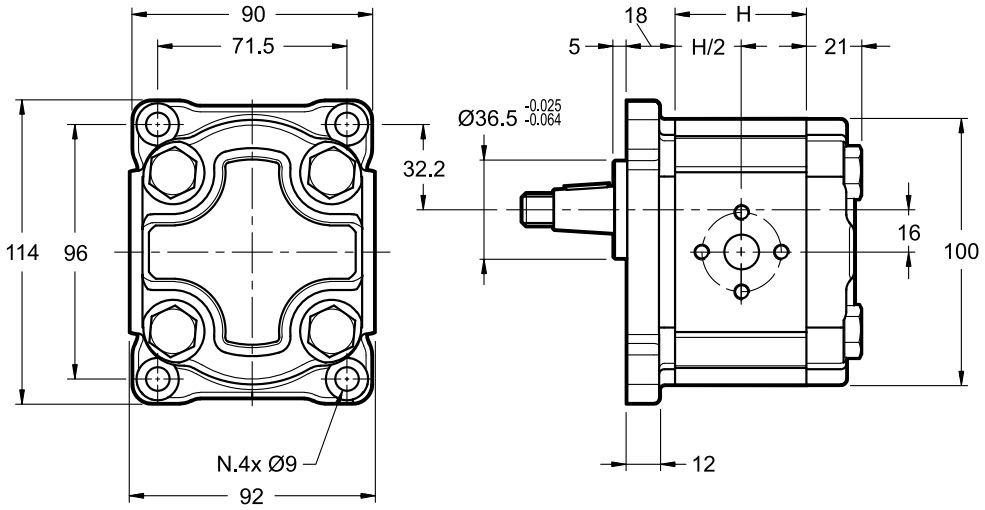


NOTE: Hydraulic connections are reversed on pumps with anticlockwise rotation.

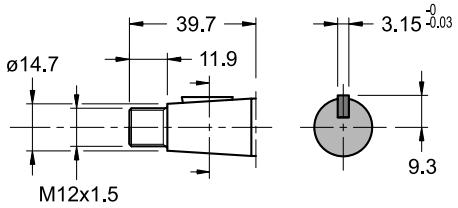
Pump displacement	H	flanged ports		BSPP ports	
	[mm]	suction	pressure	suction	pressure
025	41.3	not available		3/8”	3/8”
031	43.5	Ø13	Ø13		
038	46.1				
053	51.7			1/2”	

7 - GPA2 PUMPS - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm



tapered shaft end with thread

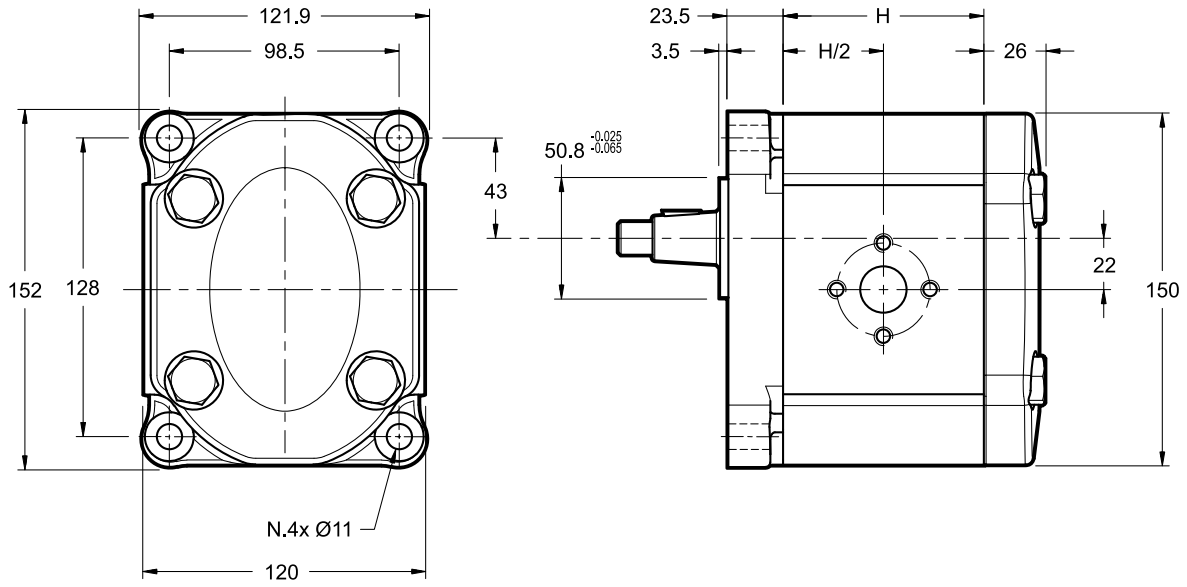


NOTE: Oil ports are reversed on pumps with anticlockwise rotation

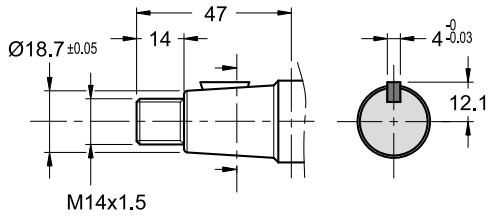
Pump displacement	H	flanged ports		BSPP ports	
	[mm]	suction	pressure	suction	pressure
045	48.6	Ø13	Ø13	1/2”	1/2”
065	51.5				
082	54.0				
113	58.4	Ø20		3/4”	
146	63.2				
169	66.6				
201	71.3				
220	82.0				
252	86.6				
280	91.0				
317	96.1				

8 - GPA3 PUMPS - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm



tapered shaft end with thread

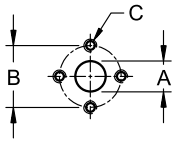


NOTE: Oil ports are reversed on pumps with anticlockwise rotation

Pump displacement	H	flanged ports		BSPP ports	
	[mm]	suction	pressure	suction	pressure
220	70.8	Ø27	Ø20	1”	3/4”
270	74.6				
330	79.2				
390	83.8				
440	87.6				
480	100.6				
520	103.7				
610	110.6	Ø33	Ø27	1 1/4”	1”

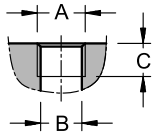
9 - HYDRAULIC CONNECTION PORTS

9.1 - European flanged (FE)



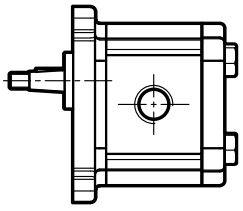
Code	Dimensions [mm]			Tightening torque [Nm]	
	A	B	C	low pressure	high pressure
2	Ø13	30	M6	8	8
3	Ø20	40	M8	15	15
4	Ø27	51	M10	20	30
5	Ø33	62	M12	25	50

9.2 - BSPP threaded (B)



Code	Dimensions [mm]			Tightening torque [Nm]	
	A	B	C	low pressure	high pressure
1	3/8”	15	12	15	25
2	1/2”	19	14	20	50
3	3/4”	24	18	30	80
4	1”	30	22	50	130
5	1 1/4”	39	22	60	170

BSPP ports version

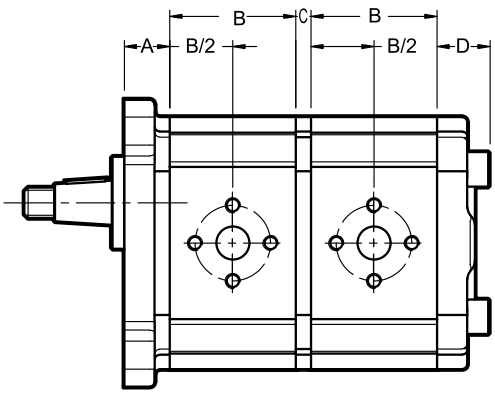


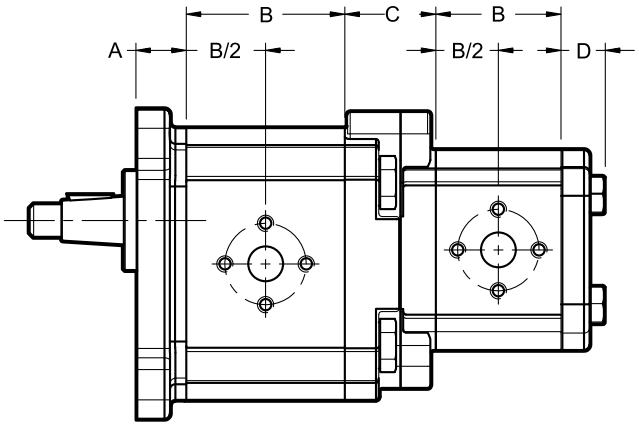
10 - TANDEM AND MULTIPLE PUMPS OVERALL DIMENSIONS

Dimensions below are for standard pumps. Please consult our Technical Dept. for different configurations, for common inlet and for overall dimensions of groups composed by three or more pumps.

Sum the values for flange, bodies and cover of the desired sizes and then add the coupling from the dedicated table to obtain the pump length. Missing dimensions can be taken from the overall dimensions drawings of the single pumps.

dimensions in mm





front pump	C (coupling) rear pump size 1	2	3
GPA1	5	-	-
GPA2	29	7	-
GPA3	-	41	21

Pump	Displacement	A (flange)	B (body)	D (cover)
GPA1	**010**	15	35.7	16
	015		37.5	
	019		39	
	025		41.3	
	031		43.5	
	038		46.1	
	047		49.5	
	053		51.7	
	063		55.5	
	075		59.2	
GPA2	**045**	18	48.6	25
	065		51.5	
	082		54.0	
	113		58.4	
	146		63.2	
	169		66.6	
	201		71.3	
	220		82.0	
	252		86.6	
	280		91.0	
	317		96.1	
GPA3	**220**	23.5	70.8	26
	270		74.6	
	330		79.2	
	390		83.8	
	440		87.6	
	480		100.6	
	520		103.7	
	610		110.6	

11 - MULTIPLE PUMPS

It is possible to create multi-flow groups with independent hydraulic circuits coupling several pumps together. The following conditions must be taken into account while sizing multiple pumps :

– Assembly can take place between pumps of the same group or as in table at point 1.2, in decreasing order of displacement.

– The max. rotation speed is determined by the pump with the lowest speed.

– The values of the max. applicable torque can not be exceeded.

11.1 - Maximum applicable torque

The input torque (M) is given for each pump by the following ratio:

$$M = \frac{9550 \cdot N}{n} = [Nm]$$

where the absorbed power (N) is given by:

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

n = rotation speed [rpm]

Q = flow rate [l/min]

Δp = differential pressure between the pump suction and delivery [bar]

η_{tot} = total efficiency

If several pumps are coupled, the torque of each single pump has to be added to the torque of subsequent pumps when they are loaded simultaneously.

The obtained torque value for each pump has to be lower than the value specified in the table below.

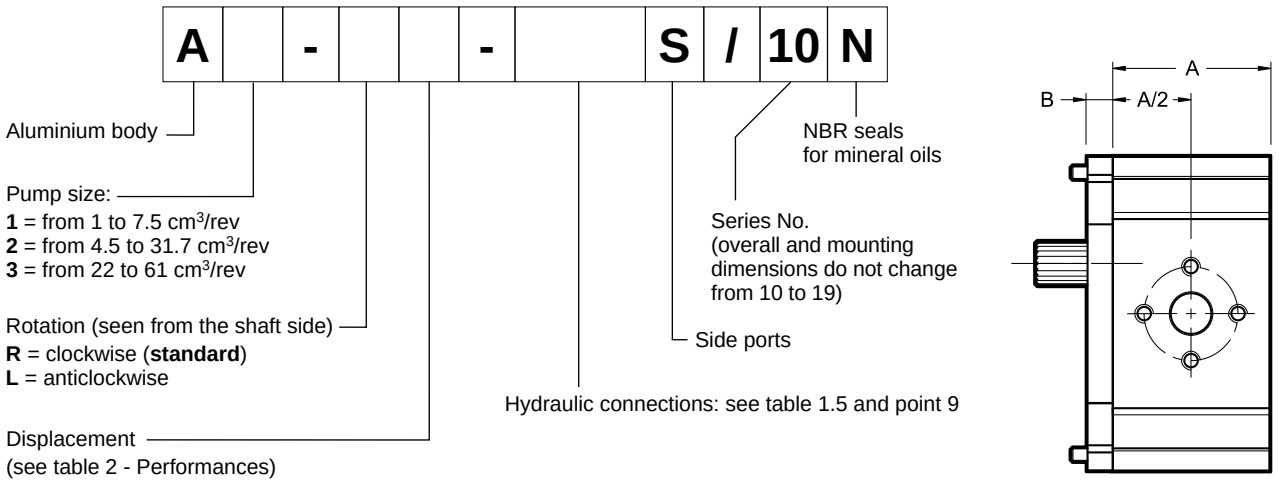
If the obtained torque values are higher than those stated in the table, reduce the working pressure value or replace the overloaded pump with a pump suitable to bear the required torque.

	MAX APPLICABLE TORQUE [Nm]	
	Front pump	Intermediate / rear pump
GPA1*-*E10T1	20	30
GPA1*-*E11T11	60	30
GPA2	140	100
GPA3	280	180

11.2 - Intermediate pumps identification code

Intermediate pumps can be purchased loose to create tandem pumps or multiple pumps, or as spare parts.

See document *MI 11 102_E_00 Overall Instruction.* Refer to the code at point 1.2 to buy assembled pump groups.



NOTE: Intermediate flange and coupling are included. Refer to the table at point 10 for dimensions.

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