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# 2.5MB

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## Aluminium gear motors

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### Technical Catalogue

E0.138.0417.02.00IM04





**GEAR MOTORS**

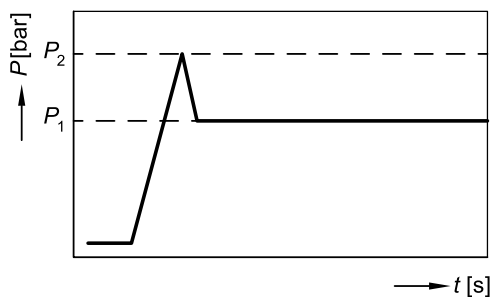
- Displacements from 2.8 cm<sup>3</sup>/rev to 73.4 cm<sup>3</sup>/rev (from 0.17 cu.in./rev to 4.48 cu.in./rev).
- Rated pressure up to 250 bar (3625psi).
- Back pressure capability up to 120 bar (1740 psi) only in bi-directional release.
- Speed up to 4500 rpm.
- Flanges, shafts and ports for ISO, DIN and SAE standards.
- Available in uni and bi-directional version for all the sizes, displacements and configurations.
- High volumetric efficiency thanks to an innovative design and an accurate control of machining tolerances.
- Axial compensation achieved by the use of floating bushes that allow high volumetric efficiency throughout the working pressure range.
- DU bearings to ensure high pressure capability.
- 12 teeth integral gear and shaft.
- Aluminium body.
- Cast iron flange and cover.
- Double shaft seals in all motor series. The one which faces the internal side is reinforced.
- Nitrile seals as standard and Viton seals in high temperature applications.
- Available with different valves and circuit configurations built-in rear cover.
- All motors are hydraulically tested after assembly to ensure the highest standard performance.

**TECHNICAL DATA**

- Minimum operating fluid viscosity	12 mm <sup>2</sup> /sec
- Permitted viscosity range	12 - 800 mm <sup>2</sup> / sec
- Recommended viscosity range	20 - 80 mm <sup>2</sup> / sec
- Permitted viscosity for starting	2000 mm <sup>2</sup> / sec
- Fluid operating temperature range	-25 to 85 °C
- Fluid operating temperature range with FPM seals	-20 to 110°C
- Fluid operating temperature range with HNBR seals*	-30 to 110°C
- Hydraulic fluid	mineral oil

\*Available on request

**DEFINITION OF PRESSURES**

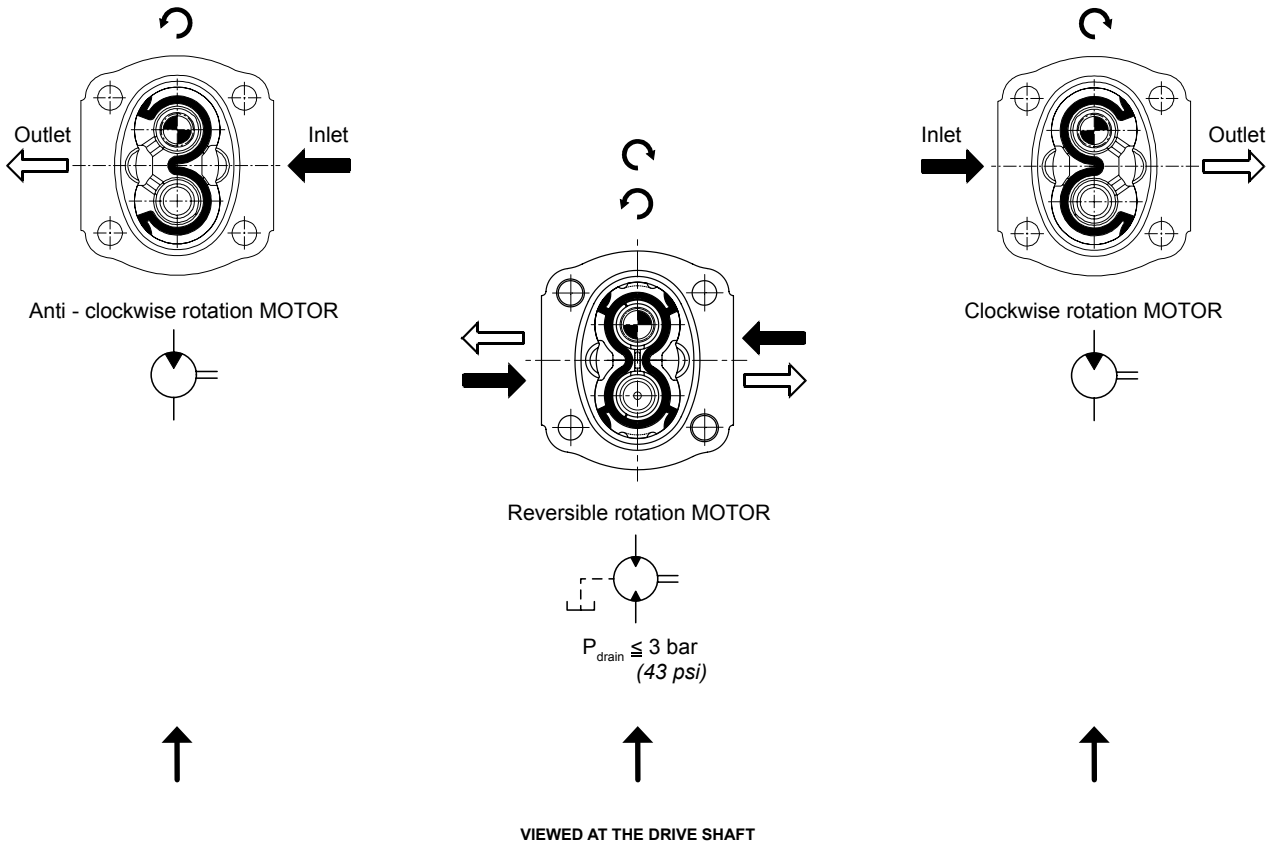


$P_1$  max. continuous pressure  
 $P_2$  starting pressure (depending on the application, this must be taken into consideration when setting the pressure of the hydraulic system's pressure-relief valve).

## DRIVE SHAFTS

Radial and axial loads on the shafts must be avoided since they reduce the life of the unit. In order to avoid misalignment during the assembly with the primary engine, a connection with "Oldham" coupling (or coupling having convex toothed hub) is recommended.

## ROTATION



## HYDRAULIC PIPE LINE

To calculate hydraulic pipe line size, the designer can use; as an approximate guide, the following fluid speed figures:

From 6 to 10 m/sec on pressure pipe line

From 19.7 to 32.8 ft/sec on pressure pipe line

The lowest fluid speed values in pipe lines is recommended when the operating temperature range is high and/or for continuous duty.

The highest value is recommended when the temperature difference is low and/or for intermittent duty.

In case of reversible motor allowance must be made to ensure the motor is not drained, through the case drain, when stationary.



**FILTRATION INDEX RECOMMENDED**

Working pressure	>200 bar/2900 psi	<200 bar/2900 psi
Contamination class NAS 1638	9	10
Contamination class ISO 4406	19/18/15	20/19/16
Achieved with filter $\beta_x=75$	15 $\mu\text{m}$	25 $\mu\text{m}$

**FIRE RESISTENT FLUID**

Type	Description	Max pressure	Max speed (rpm)	Temperature
HFB	Oil emulsion with 40% water	130 bar/1880 psi	2500	3°C+65°C
HFC	Water glycol	180 bar/2600 psi	1500	-20°C+65°C
HFD	Phosphate esters		1750	-10°C+80°C

**COMMON FORMULAS FOR MOTORS**

Based on SI units

Input flow:  $Q = \frac{V \cdot n}{1000 \cdot \eta_v}$  l/min

Output torque:  $M = \frac{V \cdot \Delta p \cdot \eta_m}{20 \cdot \pi}$  Nm

Output power:  $P = \frac{M \cdot n}{9550} = \frac{Q \cdot \Delta p \cdot \eta_t}{600}$  kW

Variables: SI units [US units]

Based on US units

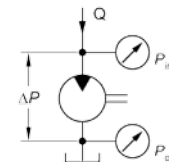
Input flow:  $Q = \frac{V \cdot n}{231 \cdot \eta_v}$  [US gal/min]

Output torque:  $M = \frac{V \cdot \Delta p \cdot \eta_m}{2 \cdot \pi}$  [lbf·in]

Output power:  $P = \frac{M \cdot n}{63\,025} = \frac{Q \cdot \Delta p \cdot \eta_t}{1714}$  [hp]

LEGENDA

- V = Displacement cm<sup>3</sup>/rev [in<sup>3</sup>/rev]
- $P_{out}$  = Outlet pressure bar [psi]
- $P_{in}$  = Inlet pressure bar [psi]
- $\Delta P$  =  $P_{out} - P_{in}$  (system pressure) bar [psi]
- n = Speed min<sup>-1</sup> (rpm)
- $\eta_v$  = Volumetric efficiency
- $\eta_m$  = Mechanical efficiency
- $\eta_t$  = Overall efficiency ( $\eta_v \cdot \eta_m$ )



**IDENTIFICATION LABEL**

**salami**  
FLUID POWER SYSTEMS

Made in Italy

Salami part number **613011042**

Product short description **3PE55D -R55S3-POMPA**

**WO0132803 013 2013/09**

Salami part number \_\_\_\_\_  
Product short description \_\_\_\_\_

↑  
Rotation sense

Product code (for Salami management) \_\_\_\_\_

\_\_\_\_\_  
Month and year of made  
\_\_\_\_\_  
Number of assembling

EO.100.0417.02.001M01



## WORKING CONDITIONS

GROUP 1.5 - E SERIES	Displacement		Max. continuous pressure P <sup>1</sup>		Max. starting pressure P <sup>2</sup>		Max. speed	Min. speed
	cm <sup>3</sup> /rev	cu.in/rev	bar	psi	bar	psi		
1.5ME - 2.8	2.8	0.17	250	3625	270	3915	4500	700
1.5ME - 3.5	3.5	0.21	250	3625	270	3915	4500	700
1.5ME - 4.1	4.1	0.25	250	3625	270	3915	4000	700
1.5ME - 5.2	5.2	0.32	230	3335	250	3625	4000	700
1.5ME - 6.2	6.2	0.38	230	3335	250	3625	3600	600
1.5ME - 7.6	7.6	0.46	200	2900	220	3190	3300	600
1.5ME - 9.3	9.3	0.57	180	2610	200	2900	3000	600
1.5ME - 11	11	0.67	170	2465	190	2755	3000	600

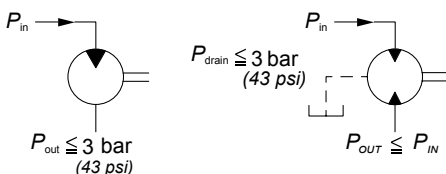
GROUP 2 - E SERIES	Displacement		Max. continuous pressure P <sup>1</sup>		Max. starting pressure P <sup>2</sup>		Max. speed	Min. speed
	cm <sup>3</sup> /rev	cu.in/rev	bar	psi	bar	psi		
2ME - 4.5	4.6	0.27	250	3625	280	4060	4000	600
2ME - 6.5	6.5	0.4	250	3625	280	4060	4000	600
2ME - 8.3	8.2	0.5	250	3625	280	4060	3600	500
2ME - 10.5*	10.6	0.65	250	3625	280	4060	3500	500
2ME - 11.3	11.5	0.68	250	3625	280	4060	3500	500
2ME - 12.5*	12.7	0.77	250	3625	280	4060	3400	500
2ME - 13.8	13.8	0.84	250	3625	280	4060	3400	500
2ME - 16	16.6	1.01	250	3625	280	4060	3200	450
2ME - 19	19.4	1.15	220	3190	240	3480	3200	450
2ME - 22.5	22.9	1.37	200	2900	220	3190	3000	450
2ME - 26	25.8	1.58	180	2610	200	2900	2850	450

\*Available for quantity

GROUP 2.5 - B SERIES	Displacement		Max. continuous pressure P <sup>1</sup>		Max. starting pressure P <sup>2</sup>		Max. speed	Min. speed
	cm <sup>3</sup> /rev	cu.in/rev	bar	psi	bar	psi		
2.5MB - 16	16	0.97	250	3625	280	4060	3000	600
2.5MB - 19	19.3	1.17	250	3625	280	4060	3000	600
2.5MB - 22	22.2	1.35	250	3625	280	4060	3000	500
2.5MB - 25	25.2	1.53	250	3625	280	4060	3000	500
2.5MB - 28	27.6	1.68	250	3625	280	4060	3000	500
2.5MB - 32	32.4	1.97	230	3330	250	3625	3000	500
2.5MB - 38	38.1	2.32	200	2900	220	3190	2750	400
2.5MB - 44	44.2	2.69	170	2465	190	2755	2500	400

GROUP 3 - E SERIES	Displacement		Max. continuous pressure P <sup>1</sup>		Max. starting pressure P <sup>2</sup>		Max. speed	Min. speed
	cm <sup>3</sup> /rev	cu.in/rev	bar	psi	bar	psi		
3ME - 27	27	1.65	250	3625	280	4060	3000	600
3ME - 33	33.5	2.04	250	3625	280	4060	3000	600
3ME - 38	38.7	2.36	250	3625	280	4060	2750	500
3ME - 46	46.9	2.86	250	3625	270	3915	2750	500
3ME - 55	54.1	3.3	220	3190	240	3480	2500	400
3ME - 65	63.1	3.85	200	2900	220	3190	2500	400
3ME - 75*	73.4	4.48	180	2610	200	2900	2500	400

\*Available for quantity



The values shown in the picture represents the standard working situation.  
 Max drain pressure is influenced by rotational speed of the unit.  
 For pressure higher than 3 bar please contact sales department.  
**On request available shaft seal for high P drain (20 bar).**

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**Final revised edition-April 2017**

The data in this catalogue refers to the standard product.

The policy of Salami S.p.A. consists of a continuous improvement of its products. It reserves the right to change the specifications of the different products whenever necessary and without giving prior information.

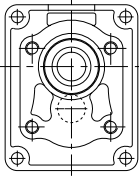
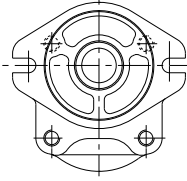
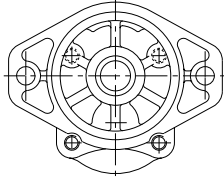
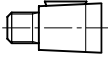




***If any doubts, please get in touch with our sales department.***





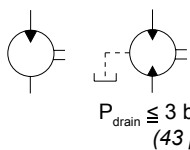


**SHAFTS AND FLANGES COMBINATION**

<b>2.5MB</b>			
	CODE <b>P2</b> European standard	CODE <b>S2</b> SAE A 2 Bolts	CODE <b>S3</b> SAE B 2 Bolts
 CODE <b>38</b> - Tapered 1:8	38P2		
 CODE <b>53</b> - SAE A splined 10T		53S2	
 CODE <b>54</b> - SAE A splined 11T		54S2	
 CODE <b>55</b> - SAE B splined 13T		55S2	55S3
 CODE <b>87</b> - SAE B parallel		87S2	87S3

*Note: other versions available, see shafts and flanges information.*

Displacements up to 2.69 cu.in./rev  
Pressure up to 4350 psi

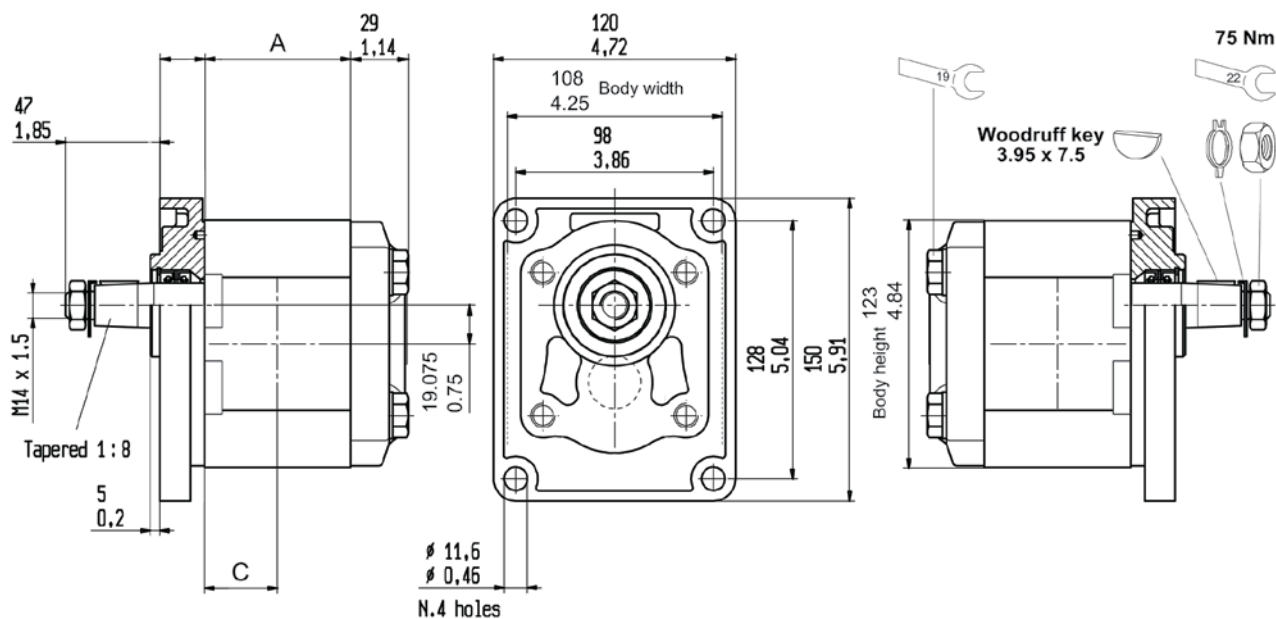


GEAR MOTORS

Displacements up to 44.2 cm<sup>3</sup>/rev  
Pressure up to 300 bar

## ASSEMBLING DIMENSIONS AND WORKING CONDITIONS

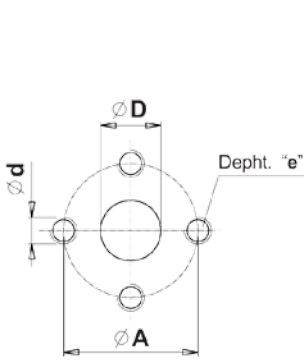
Type		16	19	22	25	28	32	38	44
Displacement	cm <sup>3</sup> /rev	16	19.3	22.2	25.2	27.6	32.4	38.1	44.2
	cu.in./rev	0.97	1.17	1.35	1.53	1.68	1.97	2.32	2.69
Dimension A	mm	63	66.5	70	72.5	85	90.5	96.5	103
	in	2.45	2.59	2.73	2.82	3.31	3.52	3.76	4.06
Dimension C	mm	31.5	33.25	35	36.25	42.5	45.25	48.25	51.5
	in	1.20	1.29	1.36	1.41	1.65	1.76	1.88	2.03
Max continuous pressure	P <sup>1</sup> bar	250	250	250	250	250	230	200	170
	psi	3625	3625	3625	3625	3625	3335	2900	2465
Max starting pressure	P <sup>2</sup> bar	280	280	280	280	280	250	220	190
	psi	4060	4060	4060	4060	4060	3625	3190	2755
Max speed at	P <sup>2</sup> rpm	3000	3000	3000	3000	3000	3000	2750	2500
	P <sup>1</sup> rpm	600	600	500	500	500	500	400	400
Weight	kg	3.40	3.60	3.80	4.10	4.50	4.75	5.00	5.30
	lbs	7.48	7.92	8.36	9.02	9.92	10.47	11.00	11.66



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**FLANGED and THREADED PORTS**

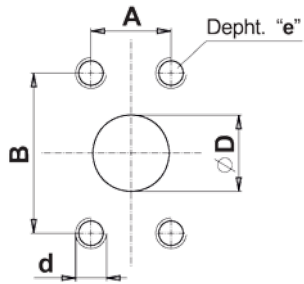


**code P**

Flanged ports  
European standard

UNI-DIRECTIONAL MOTORS	TYPE	OUTLET				INLET			
		Ø D	Ø A	d	e	Ø D	Ø A	d	e
From 16 to 19		20 (0.79")	40 (1.57")	M8	13 (0.51")	13 (0.51")	30 (1.18")	M6	13 (0.51")
		From 22 to 44	25 (0.97")	51 (2.01")	M10	16 (0.62")	18 (0.70")	40 (1.56")	M8

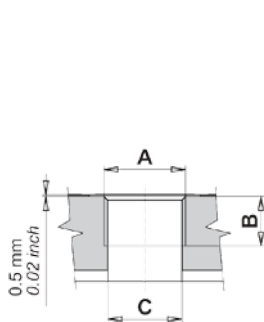
BI-DIRECTIONAL MOTORS	TYPE	OUTLET				INLET			
		Ø D	Ø A	d	e	Ø D	Ø A	d	e
From 16 to 25		20 (0.79")	40 (1.57")	M8	13 (0.51")	20 (0.78")	40 (1.56")	M8	13 (0.51")
		From 28 to 44	25 (0.97")	51 (2.01")	M10	16 (0.62")	25 (0.97")	51 (2.01")	M10



**code S**

Flanged ports  
SAE J518  
AMERICAN STANDARD  
THREAD

UNI-DIRECTIONAL MOTORS	TYPE	OUTLET					INLET				
		Ø D	B	A	d	e	Ø D	B	A	d	e
From 16 to 44		25 (0.97")	52.4 (2.06")	26.2 (1.02")	3/8 16 unc	16 (0.62")	18 (0.70")	47.6 (1.87")	22.2 (0.86")	3/8 16 unc	16 (0.62")



**code G**

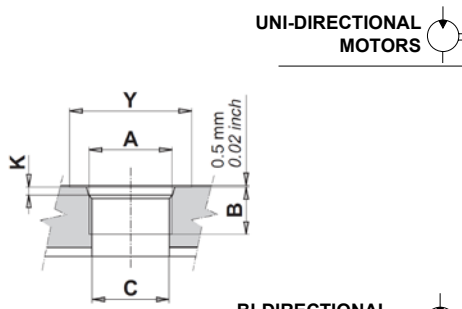
Threaded ports  
GAS (BSPP)

UNI-DIRECTIONAL MOTORS	TYPE	OUTLET			INLET		
		A	B	ØC	A	B	ØC
From 16 to 22		G3/4	16 (0.62")	20 (0.78")	G1/2	15 (0.59")	
		From 25 to 44	G1	19 (0.74")	23 (0.91")	G3/4	16 (0.62")

BI-DIRECTIONAL MOTORS	TYPE	OUTLET			INLET		
		A	B	ØC	A	B	ØC
From 16 to 25		G3/4	16 (0.62")	20 (0.78")	G3/4	16 (0.62")	20 (0.78")
		From 28 to 44	G1	19 (0.74")	23 (0.91")	G1	19 (0.74")

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**code R**

Threaded ports  
SAE (ODT)

UNI-DIRECTIONAL MOTORS

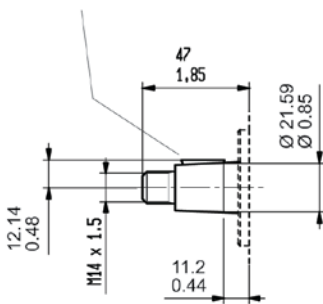
TYPE	OUTLET					INLET				
	A	B	ØC	Y	K	A	B	ØC	Y	K
From 16 to 22	1-1/16-12 UN (SAE 12)	19 (0.74")	20 (0.78")	41 (1.61")	3.3 (0.12")	7/8-14 UNF (SAE 10)	14 (0.54")	15 (0.59")	34 (1.32")	2.5 (0.10")
From 25 to 44	1-5/16-12 UN (SAE 16)		23 (0.91")	49 (1.93")		1-1/16-12 UN (SAE 12)	19 (0.74")	20 (0.78")	41 (1.61")	3.3 (0.12")

BI-DIRECTIONAL MOTORS

TYPE	OUTLET					INLET				
	A	B	ØC	Y	K	A	B	ØC	Y	K
From 16 to 25	1-1/16-12 UN (SAE 12)	19 (0.74")	20 (0.78")	41 (1.61")	3.3 (0.12")	1-1/16-12 UN (SAE 12)	19 (0.74")	20 (0.78")	41 (1.61")	3.3 (0.12")
From 28 to 44	1-5/16-12 UN (SAE 16)		23 (0.91")	49 (1.93")		1-5/16-12 UN (SAE 16)		23 (0.91")	49 (1.93")	

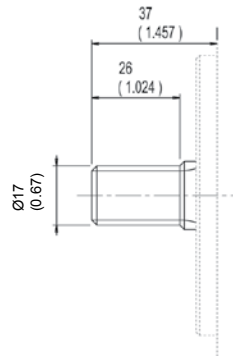
## DRIVE SHAFTS

Woodruff Key (3.95x7.5)



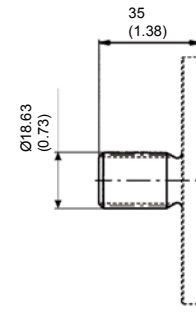
**code 38** Max torque 250 Nm (2213 lbf in)

Tapered 1:8



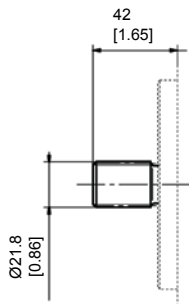
**code 53** Max torque 125 Nm (1106 lbf in)

**Splined SAE A 10T-16/32DP Ansi B92 1a 1976**



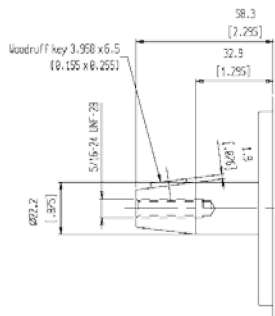
**code 54** Max torque 150 Nm (1327 lbf in)

**Splined SAE A 11T-16/32DP Ansi B92 1a 1976**



**code 55** Max torque 320 Nm (2830 lbf in)

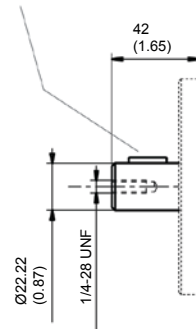
**Splined SAE B 13T-16/32DP Ansi B92 1a 1976**



**code 37** Max torque 200 Nm (1770 lbf in)

Tapered 1:4

Woodruff Key (6.35x6.35x17.7)



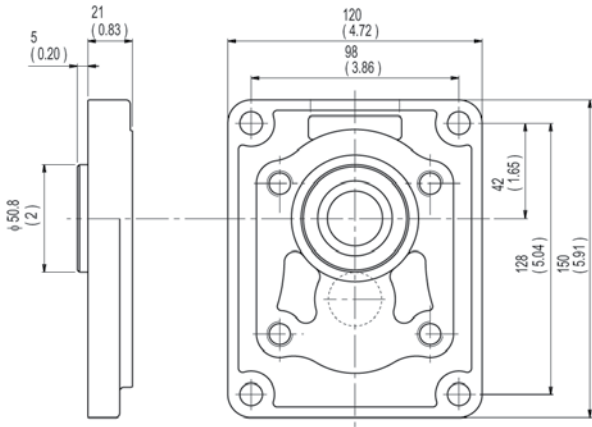
**code 87** Max torque 220 Nm (1950 lbf in)

**SAE B Parallel**

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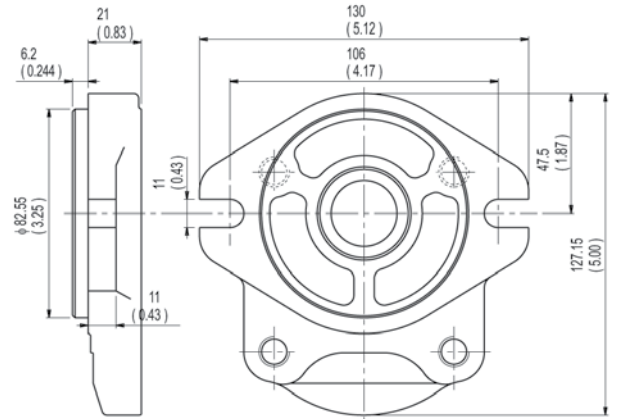
**MOUNTING FLANGES**



**P2**

**European standard**

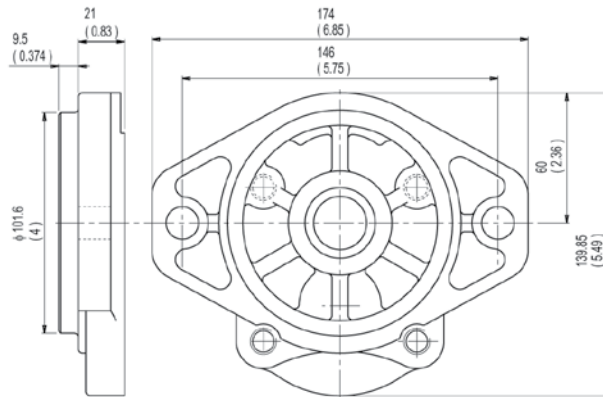
With shaft code 38



**S2**

**SAE A 2 bolts**

With shaft code 53-54-55-87



**S3**

**SAE B 2 bolts**

With shaft code 55-87

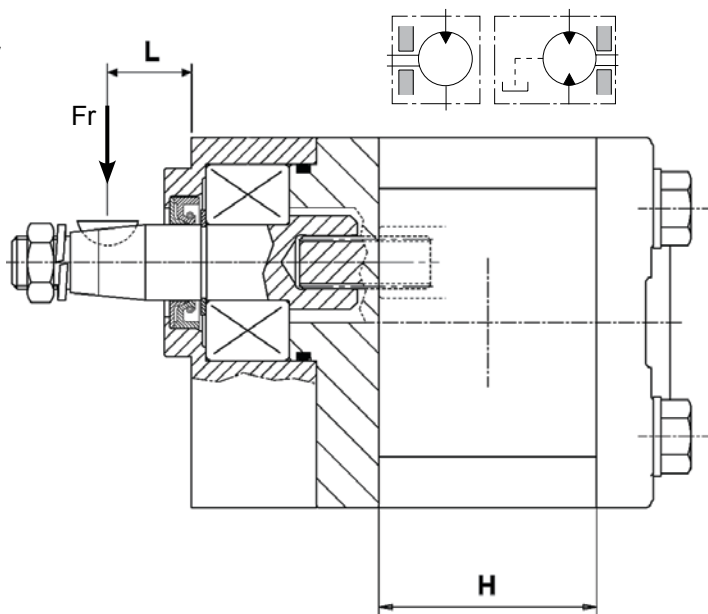
## OUTRIGGER BEARING

The following diagrams show radial load capability of the bearing.

Calculation according to ISO 281 at 10 cSt.

TYPE	H
16	63 (2.45")
19	66.5 (2.59")
22	70 (2.73")
25	72.5 (2.82")
28	85 (3.31")
32	90.5 (3.52")
38	96.5 (3.76")
44	103 (4.06")

**L**=Distance between mounting flange and radial force point of application.



Example:

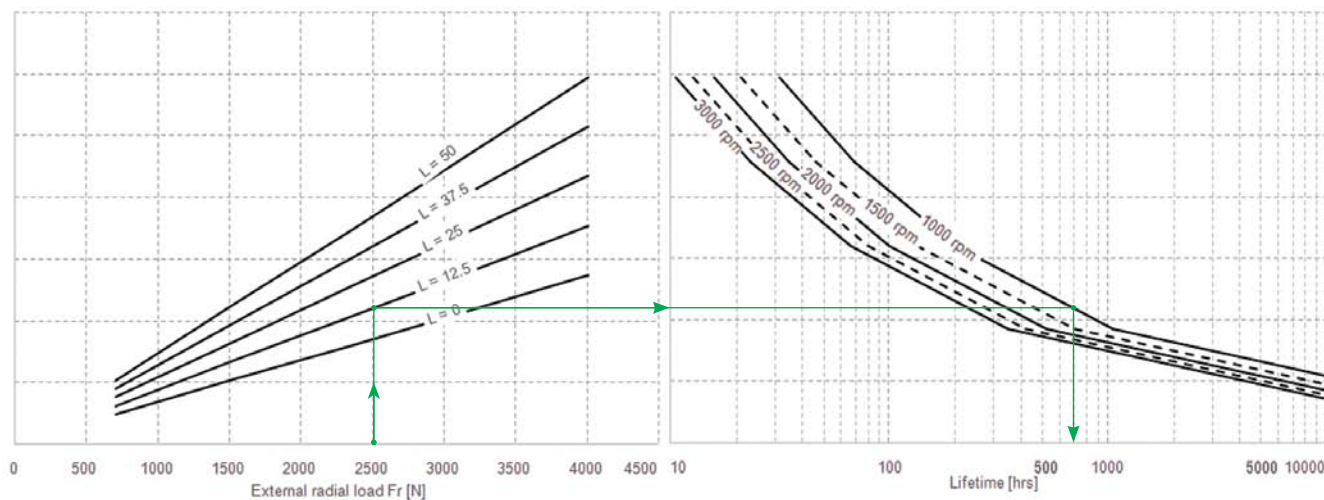
$F_r = 2500 \text{ N}$

$L = 12.5$

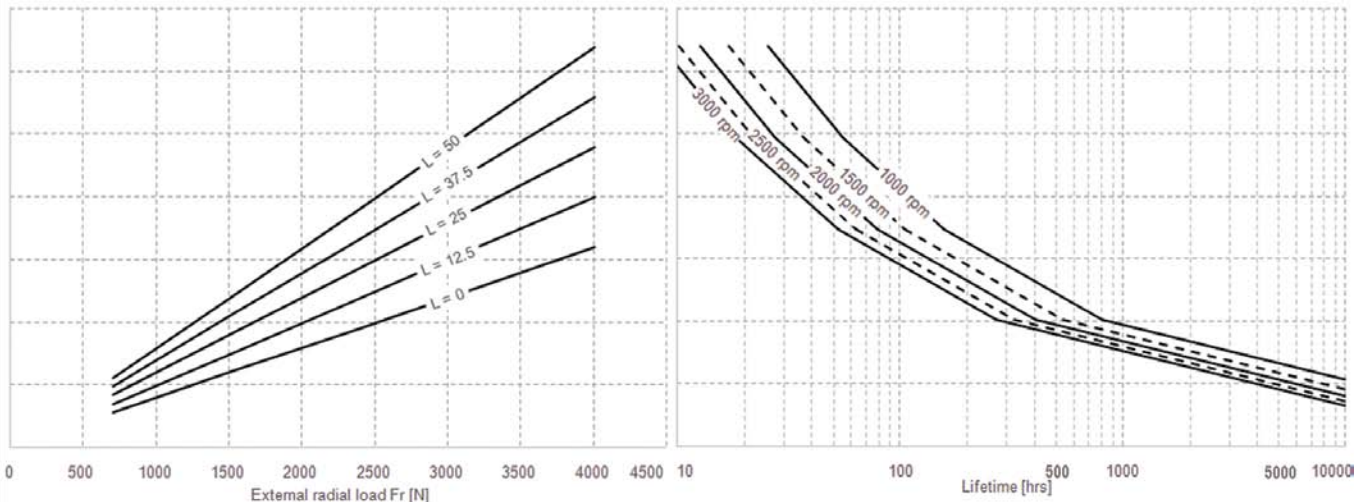
Speed = 1000 rpm

Expected life: 700 hrs

For Code CP



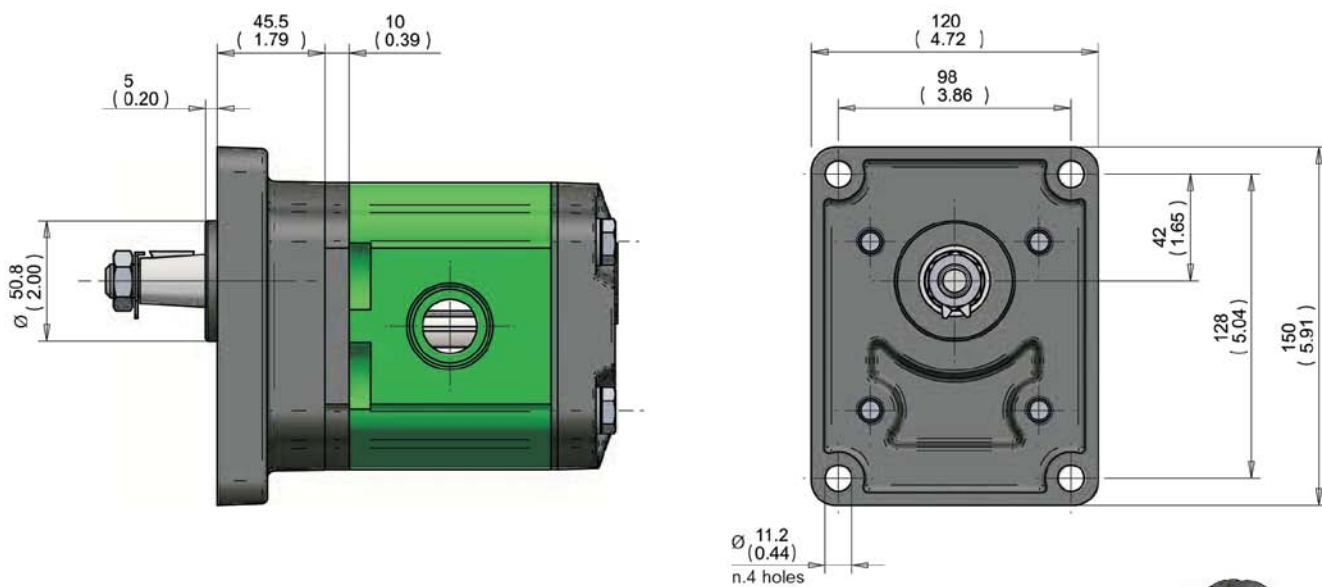
For Code Z1



E0.138.0417.02.00IM04



**MOUNTING FLANGES WITH BEARING**

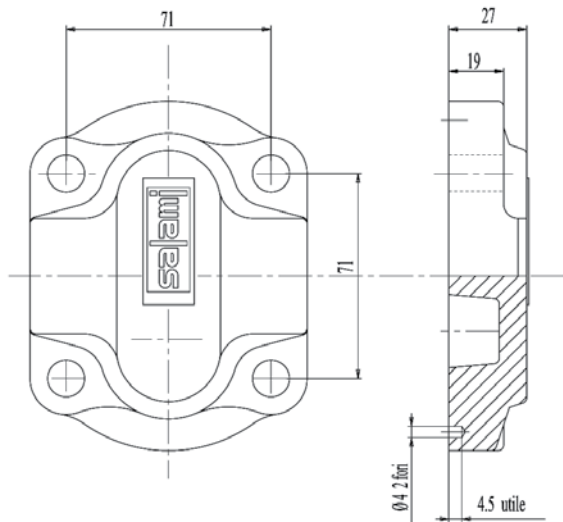


**CP** European standard mounting flange

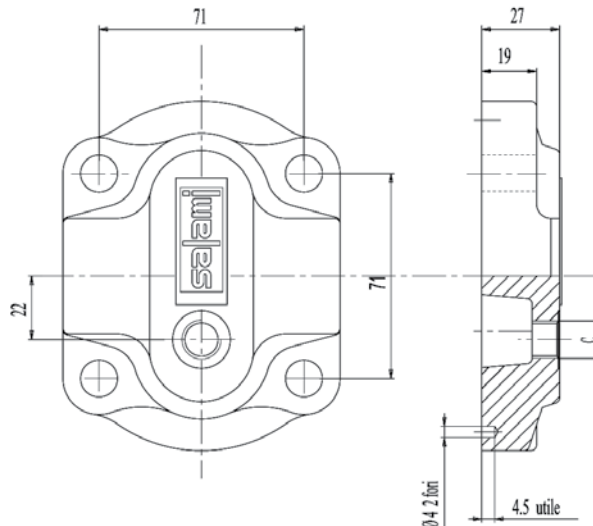
With shaft code 38

EO.138.0417.02.001M04

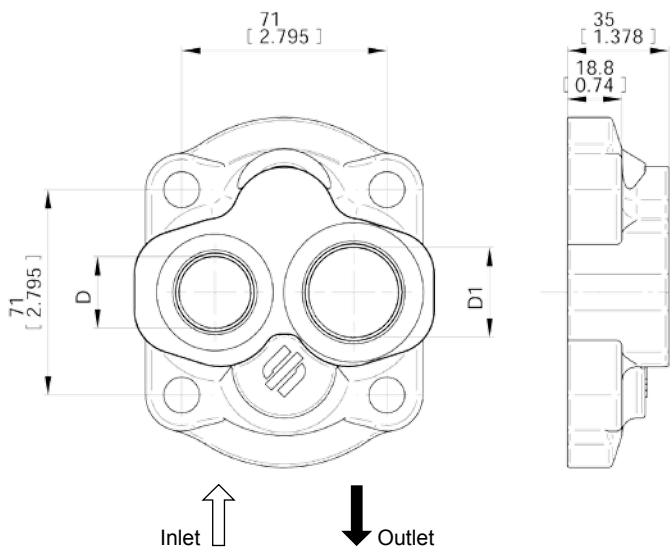
REAR COVERS



Standard rear cover for unidirectional motors



Standard rear cover for reversible motors, with external drain C.  
For the dimension C please see the table here below



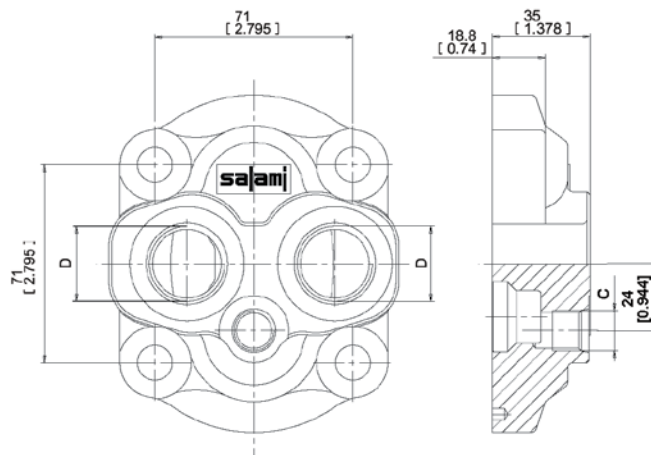
UNIDIRECTIONAL MOTORS

On request outlet port only.

D	D1
1-1/16-12 UN-2B (SAE12)	1-5/16-12 UN-2B (SAE16)
G3/4	G1

On request outlet port only.

code 1



BIDIRECTIONAL MOTORS

D	C
1-1/16-12 UN-2B (SAE12)	9/16-18 UNF-2B (SAE6)
G3/4	G3/8

In phase of order please specify D and C dimensions.

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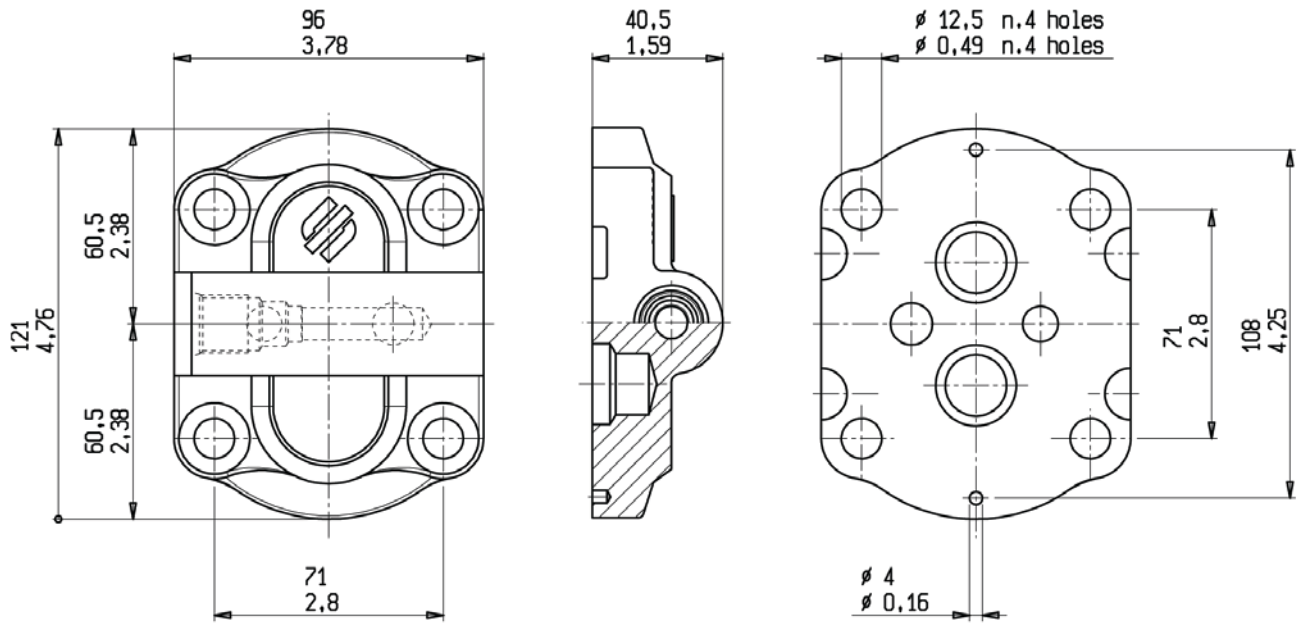
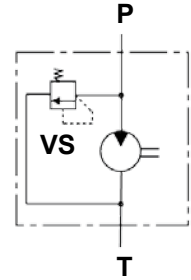




**REAR COVERS WITH RELIEF VALVE**

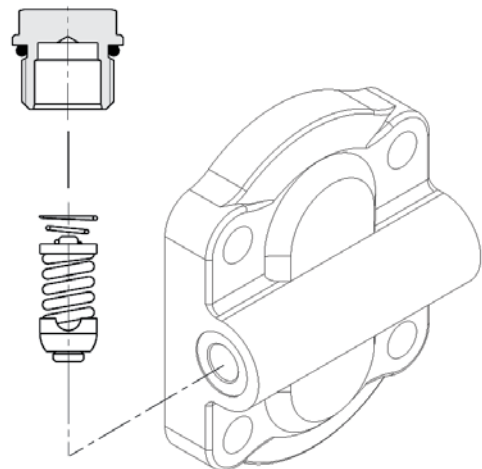
**code VS**

With main relief valve  
with internal unloading line.  
Rear cover with fixed setting main relief valve.



Available values of fixed setting

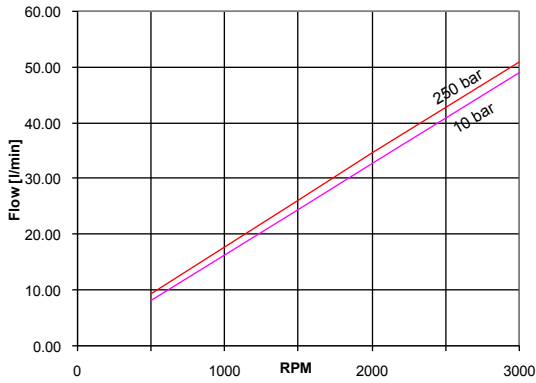
bar	psi	bar	psi
25	362	160	2320
32	464	175	2538
40	580	190	2756
50	725	210	3046
63	914	230	3336
80	1160	250	3626
100	1450	280	4061
125	1813	315	4569
140	2030	350	5076



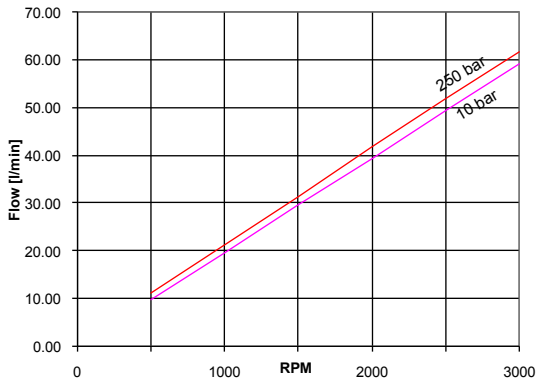
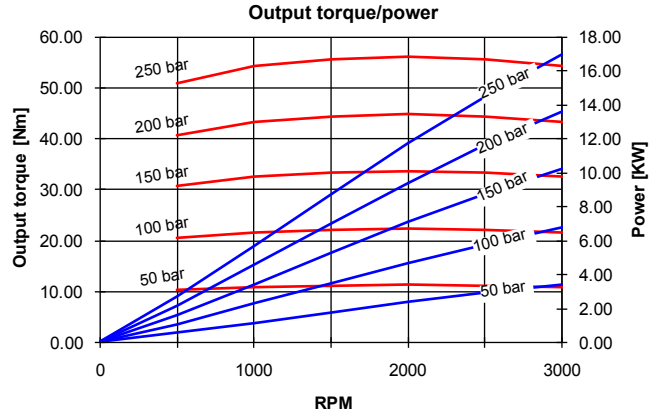
EO.138.0417.02.001M04

## PERFORMANCE CURVES

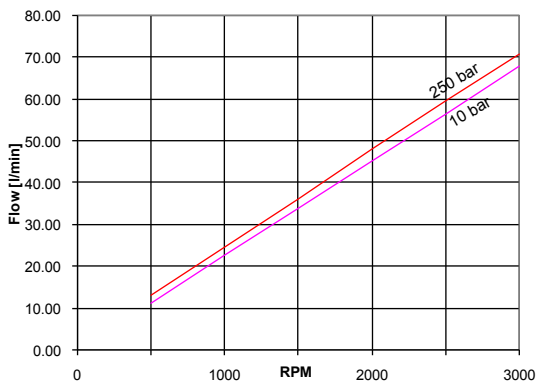
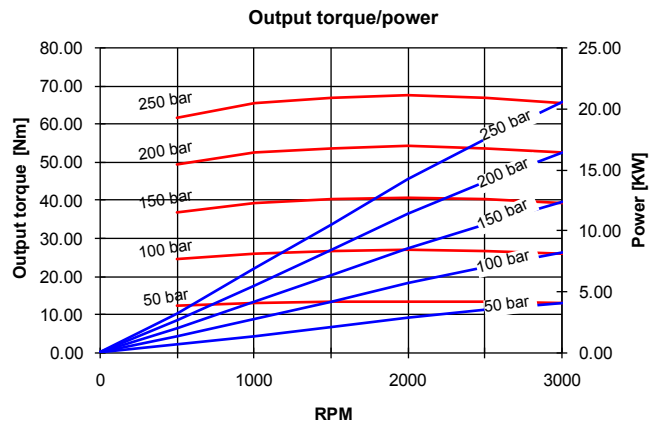
Performance curves carried out with oil viscosity at 21 cSt and oil temperature at 50°C



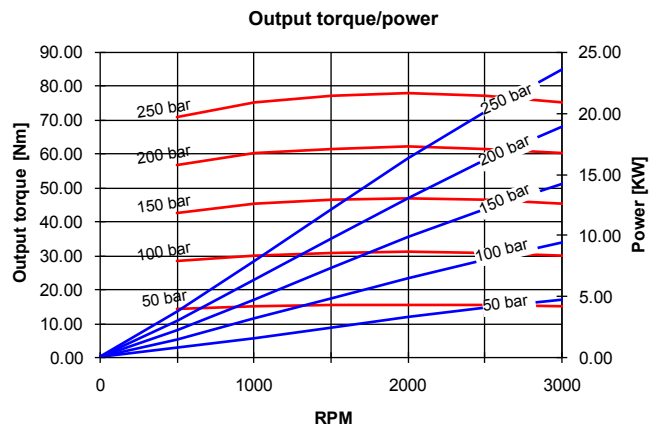
2.5MB - 16



2.5MB - 19



2.5MB - 22

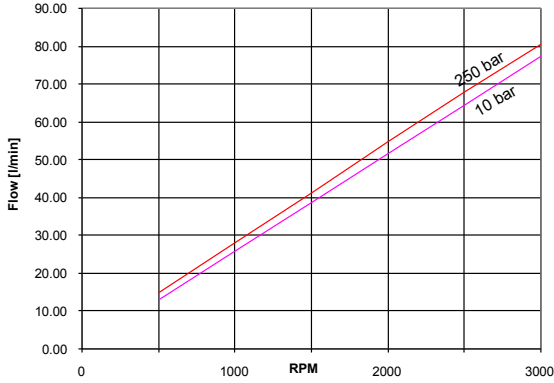


E0.138.0417.02.00IM04

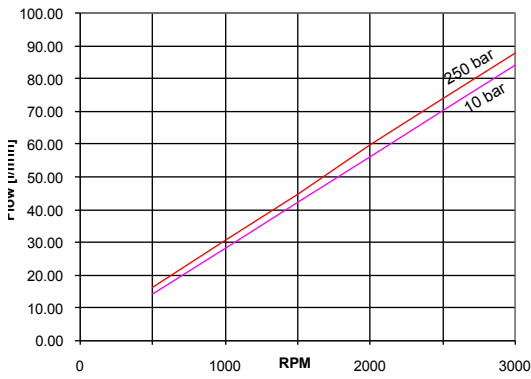
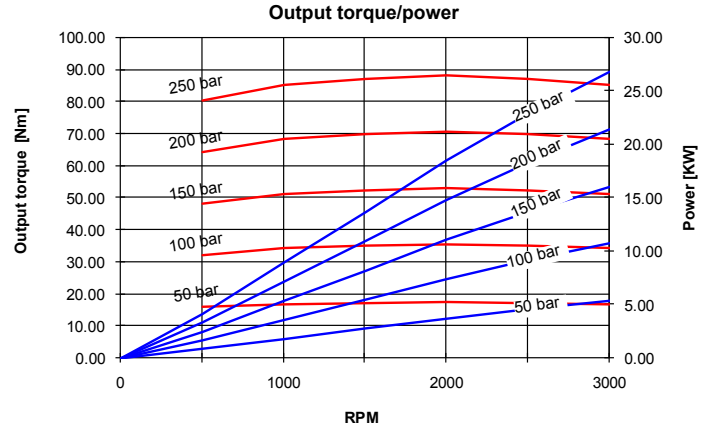


**PERFORMANCE CURVES**

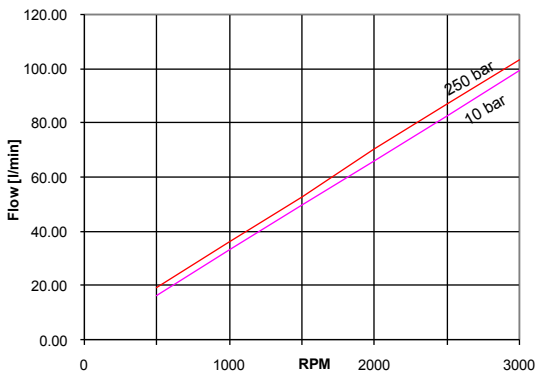
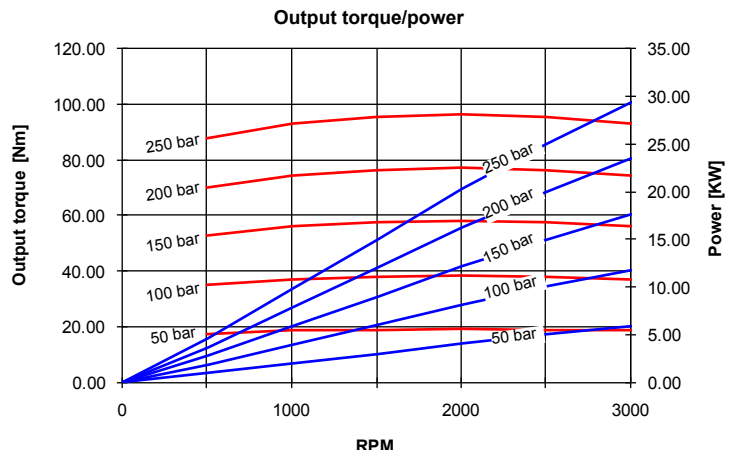
Performance curves carried out with oil viscosity at 21 cSt and oil temperature at 50°C



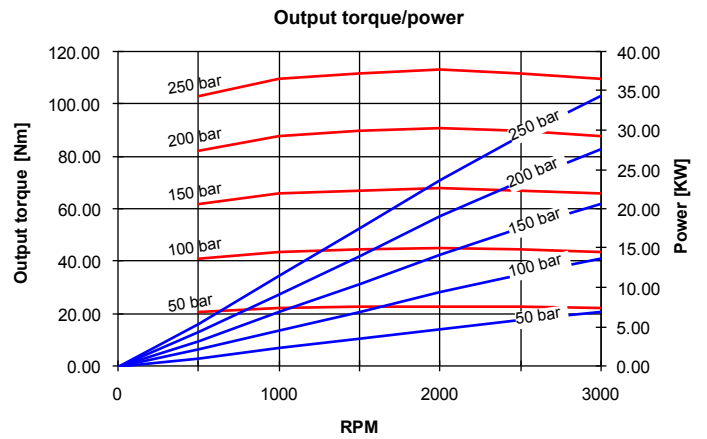
**2.5MB - 25**



**2.5MB - 28**



**2.5MB - 32**

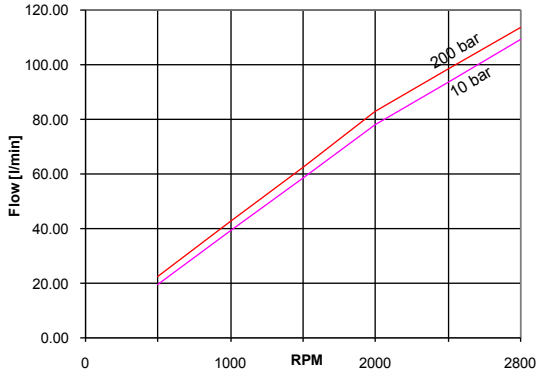


EO.138.0417.02.001M04

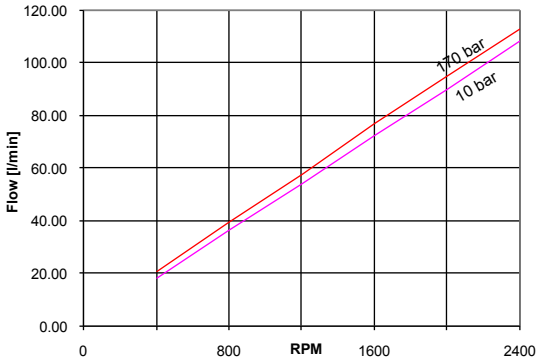
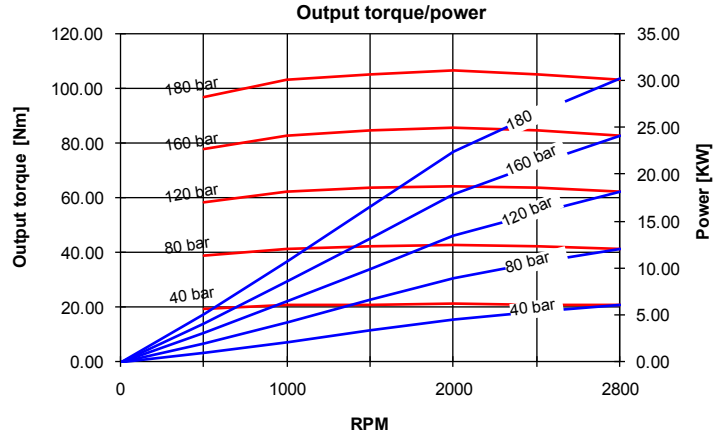


PERFORMANCE CURVES

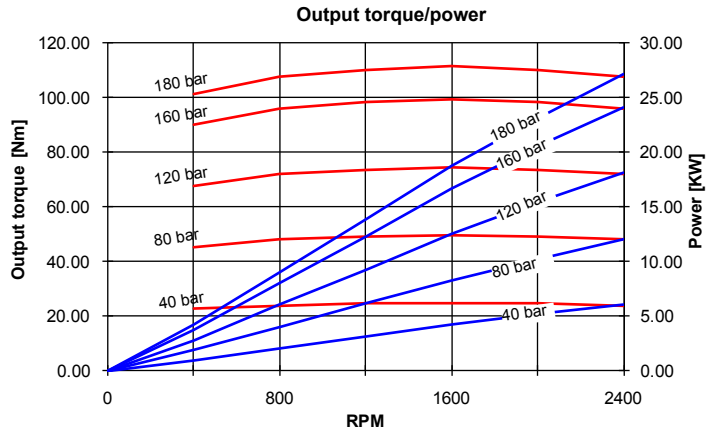
Performance curves carried out with oil viscosity at 21 cSt and oil temperature at 50°C



2.5MB - 38



2.5MB - 44



E0.138.0417.02.00IM04



**SINGLE MOTORS**

2.5MB    A 28    B D    C P 38    D P2    E    F V    G 1    H CP    I VS    Adjustable flow l/min / ... / ...    Setting main relief valve (bar)

TYPE	DISPLACEMENTS	
11.5	11.76 cm <sup>3</sup> /rev.	0.72 cu.in/rev.
13.8	14.07 cm <sup>3</sup> /rev.	0.86 cu.in/rev.
16	16 cm <sup>3</sup> /rev.	0.97 cu.in/rev.
19	19.3 cm <sup>3</sup> /rev.	1.17 cu.in/rev.
22	22.2 cm <sup>3</sup> /rev.	1.35 cu.in/rev.
25	25.2 cm <sup>3</sup> /rev.	1.53 cu.in/rev.
28	27.6 cm <sup>3</sup> /rev.	1.68 cu.in/rev.
32	32.4 cm <sup>3</sup> /rev.	1.97 cu.in/rev.
38	38.1 cm <sup>3</sup> /rev.	2.32 cu.in/rev.
44	44.2 cm <sup>3</sup> /rev.	2.69 cu.in/rev.

ROTATION (page 132)	CODES	B
Clockwise	D	
Anti-clockwise	S	
Reversible	R	

PORTS (page 179)	CODES	C
Flanged ports european standard	P	
Flanged ports SAE (UNC)	S	
Threaded ports GAS (BSPP)	G	
Threaded ports SAE (ODT)	R	

DRIVE SHAFT (page 180)	CODES	D
Tapered 1:8	38	
SAE A splined 10T	53	
SAE A splined 11T	54	
SAE B splined 13T	55	
Tapered 1:4	37	
7/8" SAE B parallel shaft Ø22.22	87	

I VALVES IN THE COVER (page 185)	CODE
Fixed main relief valve	VS

H OUTRIGGER BEARING (page 182)	CODE
European standard	CP

G PORTS POSITION	CODE
Lateral ports standard	
Rear ports (page)	1

F SEAL	CODE
Buna standard	
Viton	V

E MOUNTING FLANGES (page 181)	CODES
European standard	P2
SAE A 2 bolts	S2
SAE B 2 bolts	S3

Order example 2.5MB 19D, ports european standard (P), drive shaft (55), mounting flange (S2) with valve in the cover (VS 190 bar)  
**2.5MB19D-P55S2-VS190**

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