2.5MB

Aluminium gear motors

Technical Catalogue

E0.138.0219.02.00IM05

salami®

GEAR MOTORS

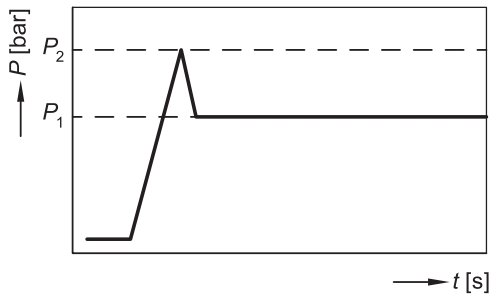
•Displacements from 2.8 cm³/rev to 73.4 cm³/rev *(from 0.17 cu.in./rev to 4.48 cu.in./rev).*
•Rated pressure up to 250 bar (3625psi).
•Speed up to 4500 rpm.
•Flanges, shafts and ports for ISO, DIN and SAE standards.
•Available in uni and bi-directional version for all the sizes, displacements and configurations.
•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.

WORKING CONDITIONS

- Max pressure drain	20 bar (290 psi)
- Minimum operating fluid viscosity	12 mm²/sec
- Permitted viscosity range	12 - 800 mm² / sec
- Recommended viscosity range	20 - 80 mm² / sec
- Permitted viscosity for starting	2000 mm² / sec
- Fluid operating temperature range	-20 to 80 °C
- Fluid operating temperature range with FPM seals	-15 to 110°C
- Fluid operating temperature range with HNBR seals*	-30 to 110°C
- Hydraulic fluid	Mineral oil according to DIN 51524. Other hydraulic fluids on request.

*Available on request

DEFINITION OF PRESSURES

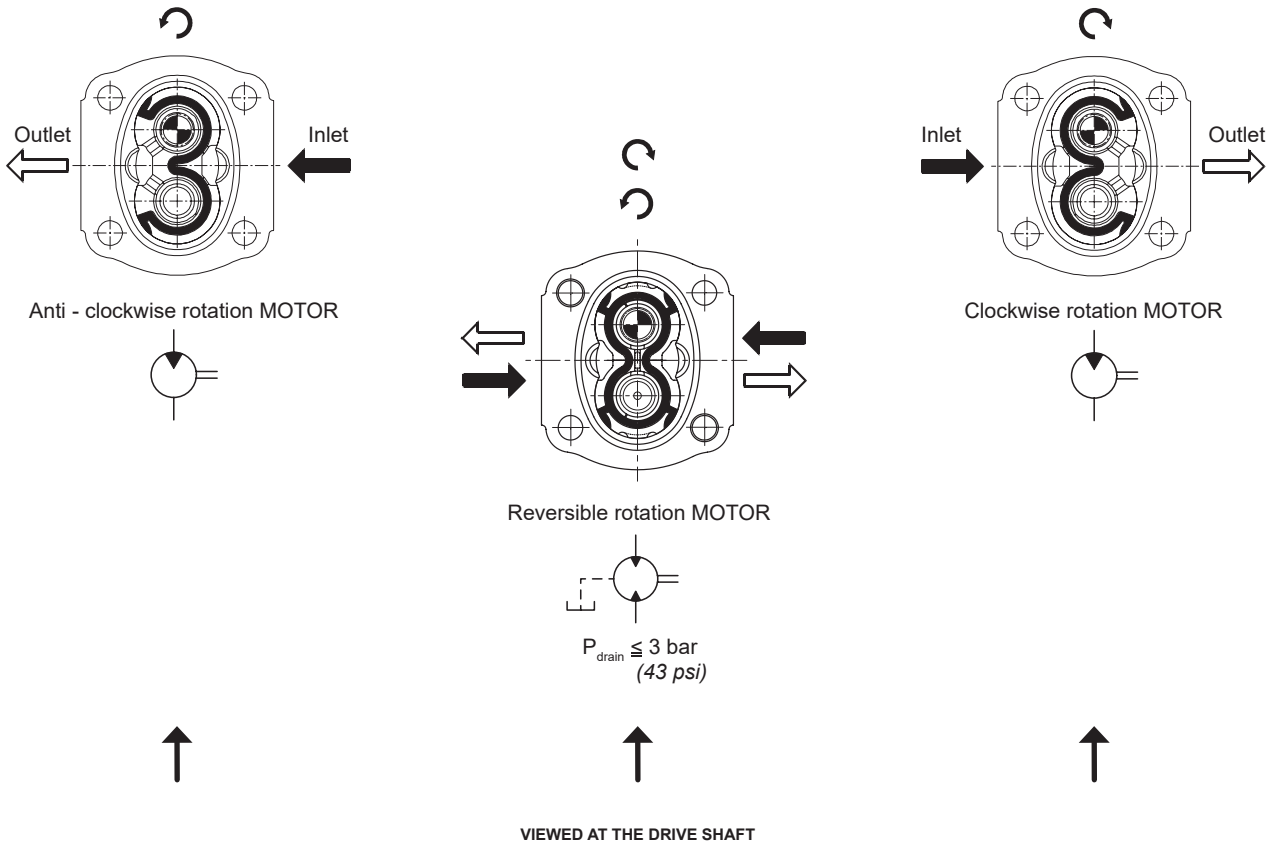


P_1 max. continuous pressure
P_2 starting pressure (depending on the application, this must be taken into consideration when setting the pressure of the hydraulic system’s pressure-relief valve).

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.

E0.100.0821.02.00IM03

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 β_x=75	15 µm	25 µm

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

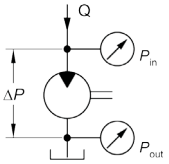
Input flow: $Q = \frac{V \cdot n}{231 \cdot \eta_v}$ [US gal/min]

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

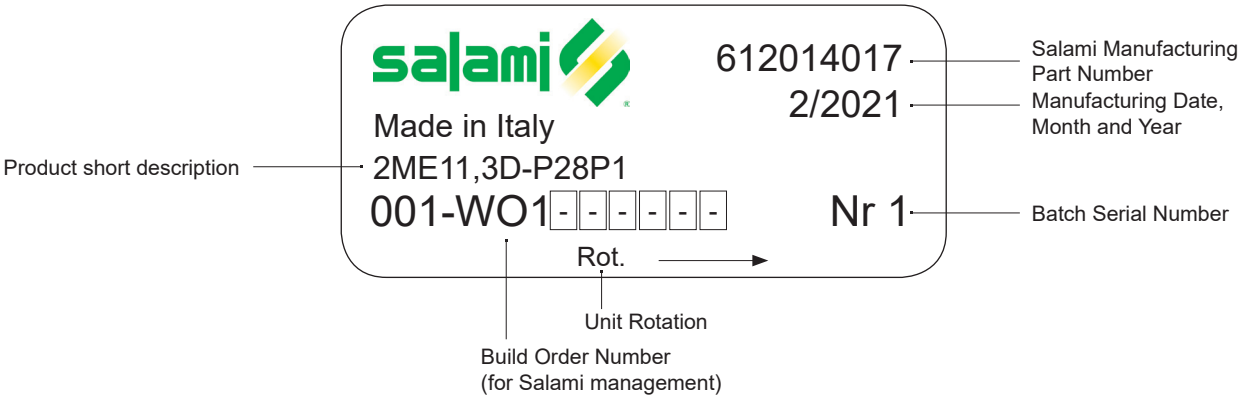
Output power: $P = \frac{M \cdot n}{63\,025} = \frac{Q \cdot \Delta p \cdot \eta_t}{1714}$ [hp]

LEGENDA

V	=	Displacement	cm³/rev [in³/rev]
P_{out}	=	Outlet pressure	bar [psi]
P_{in}	=	Inlet pressure	bar [psi]
ΔP	=	$P_{out} - P_{in}$ (system pressure)	bar [psi]
n	=	Speed	min⁻¹ (rpm)
η_v	=	Volumetric efficiency	
η_m	=	Mechanical efficiency	
η_t	=	Overall efficiency ($\eta_v \cdot \eta_m$)	



IDENTIFICATION LABEL



TECHNICAL DATA

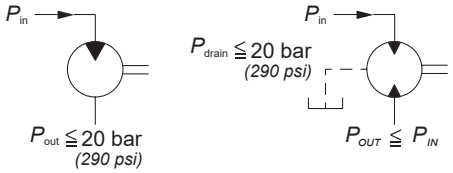
	Displacement		Max. continuous pressure P1		Max. starting pressure P2		Max. speed at P2	Min. speed at P1
GROUP 1.5 - E SERIES	cm³/rev	*cu.in/rev*	bar	*psi*	bar	*psi*	rpm	
1.5ME - 2.8	2.8	*0.17*	250	*3625*	270	*3915*	4500	700
1.5ME - 3.5	3.5	*0.21*	250	*3625*	270	*3915*	4500	700
1.5ME - 4.1	4.1	*0.25*	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	cm³/rev	*cu.in/rev*	bar	*psi*	bar	*psi*	rpm	
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	26.6	*1.62*	180	*2610*	200	*2900*	2850	450

*Available for quantity

GROUP 2.5 - B SERIES	cm³/rev	*cu.in/rev*	bar	*psi*	bar	*psi*	rpm	
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	cm³/rev	*cu.in/rev*	bar	*psi*	bar	*psi*	rpm	
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



The Motors are equipped with HPD shaft seal (20bar),
on request is available also for motor with outrigger bearing.
Max drain pressure is influenced by rotational speed of the unit.

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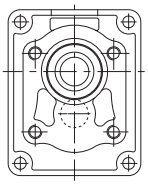
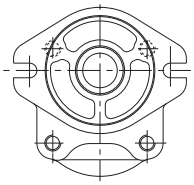
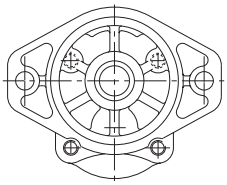
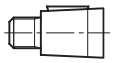
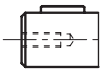
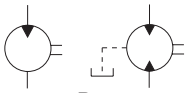
Final revised edition - February 2019

SHAFTS AND FLANGES COMBINATION

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



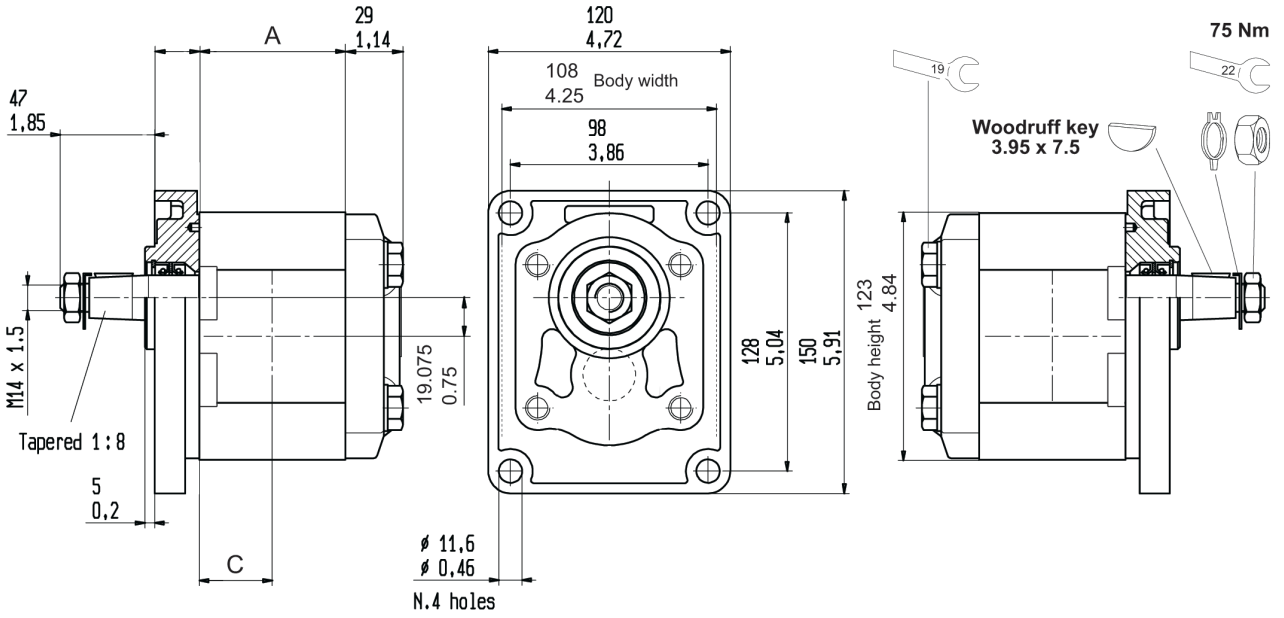
$P_{drain} \leqq 20$ bar
(290 psi)

GEAR MOTORS

Displacements up to 44.2 cm³/rev
Pressure up to 300 bar

ASSEMBLING DIMENSIONS AND WORKING CONDITIONS

Type			16	19	22	25	28	32	38	44
Displacement	cm³/rev *cu.in./rev*		16 *0.97*	19.3 *1.17*	22.2 *1.35*	25.2 *1.53*	27.6 *1.68*	32.4 *1.97*	38.1 *2.32*	44.2 *2.69*
Dimension A	mm *in*		63 *2.45*	66.5 *2.59*	70 *2.73*	72.5 *2.82*	85 *3.31*	90.5 *3.52*	96.5 *3.76*	103 *4.06*
Dimension C	mm *in*		31.5 *1.20*	33.25 *1.29*	35 *1.36*	36.25 *1.41*	42.5 *1.65*	45.25 *1.76*	48.25 *1.88*	51.5 *2.03*
Max continuous pressure	P[1]	bar *psi*	250 *3625*	250 *3625*	250 *3625*	250 *3625*	250 *3625*	230 *3335*	200 *2900*	170 *2465*
Max starting pressure	P[2]	bar *psi*	280 *4060*	280 *4060*	280 *4060*	280 *4060*	280 *4060*	250 *3625*	220 *3190*	190 *2755*
Max speed		rpm	3000	3000	3000	3000	3000	3000	2750	2500
Min speed		rpm	600	600	500	500	500	500	400	400
Weight		kg *lbs*	3.40 7.48	3.60 *7.92*	3.80 *8.36*	4.10 *9.02*	4.50 *9.92*	4.75 *10.47*	5.00 *11.00*	5.30 *11.66*



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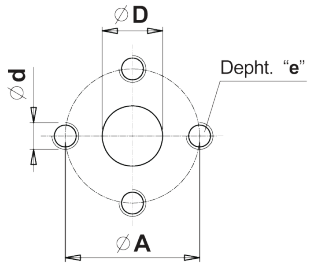
FLANGED and THREADED PORTS



code P

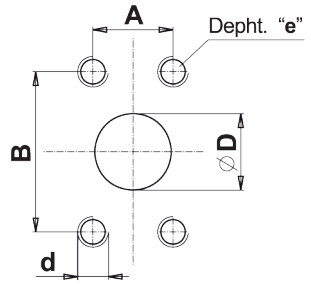
Flanged ports
european standard

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	18 *(0.70")*

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	16 *(0.62")*

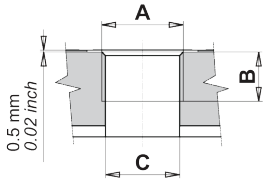


code S

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")*	20 *(0.78")*

BI-DIRECTIONAL MOTORS

TYPE	OUTLET			INLET		
	A	B	ØC	A	B	ØC
From16 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")*	23 *(0.91")*

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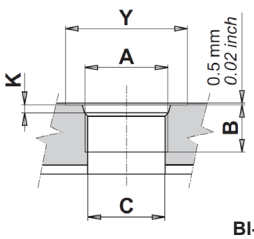


code R

Threaded ports
SAE (ODT)

UNI-DIRECTIONAL MOTORS

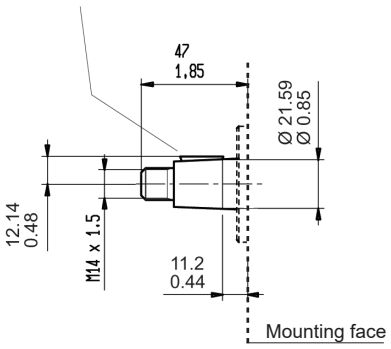
TYPE	OUTLET					INLET				
	A	B	ØC	Y	K	A	B	ØC	Y	K
From 16 to 22	1-1/16-12 UN (SAE 12)	19 *(0.74")*	20 *(0.78")*	41 *(1.61")*	3.3 *(0.12")*	7/8-14 UNF (SAE 10)	14 *(0.54")*	15 *(0.59")*	34 *(1.32")*	2.5 *(0.10")*
From 25 to 44	1-5/16-12 UN (SAE 16)		23 *(0.91")*	49 *(1.93")*		1-1/16-12 UN (SAE 12)	19 *(0.74")*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

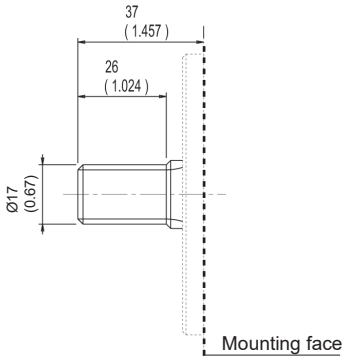
DRIVE SHAFTS

Woodruff Key (3.95x7.5)



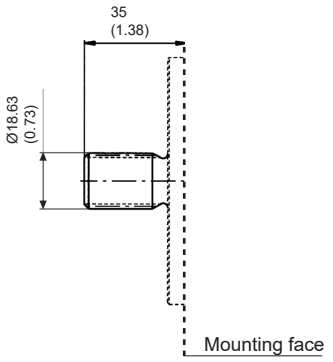
code 38 Max torque 250 Nm (2213 lbf in)

Tapered 1:8



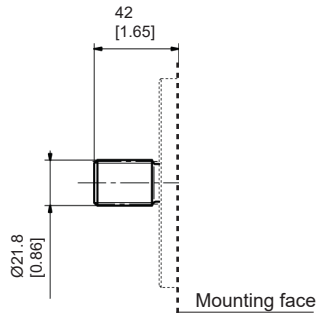
code 53 Max torque 125 Nm (1106 lbf in)

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



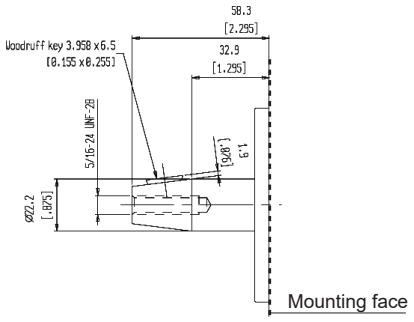
code 54 Max torque 150 Nm (1327 lbf in)

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



code 55 Max torque 320 Nm (2830 lbf in)

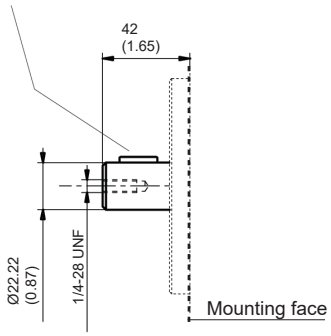
Splined SAE B 13T-16/32DP Ansi B92 1a 1976



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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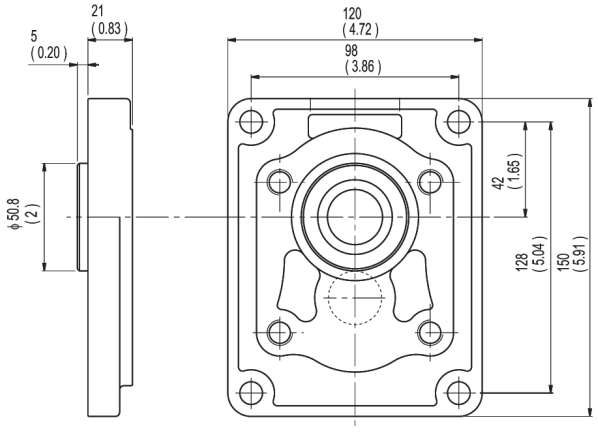
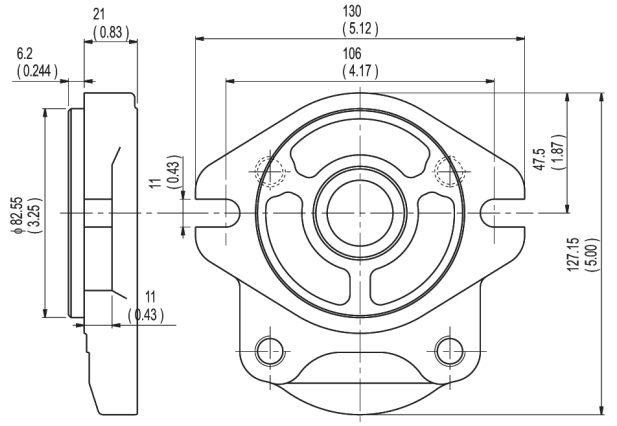
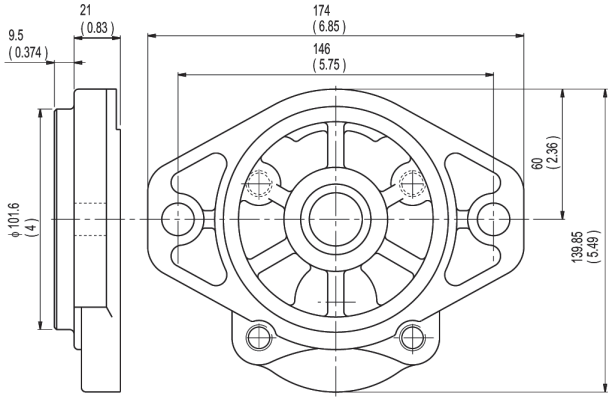
MOUNTING FLANGES



P2	European standard
With shaft code 38	



S2	SAE A 2 bolts
With shaft code 53-54-55-87	



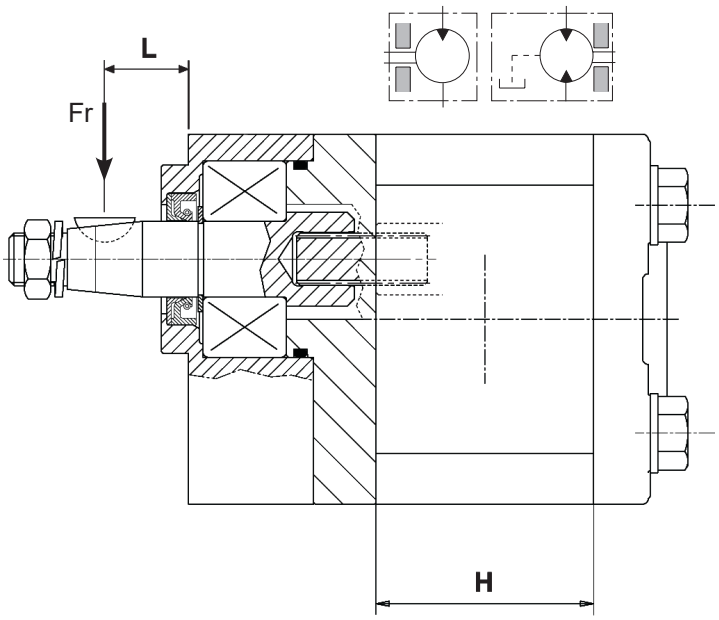
S3	SAE B 2 bolts
With shaft code 55-87	

OUTRIGGER BEARING

The following diagrams show radial load capability of the bearing.
Calculation according to ISO 281 at 10 cSt.

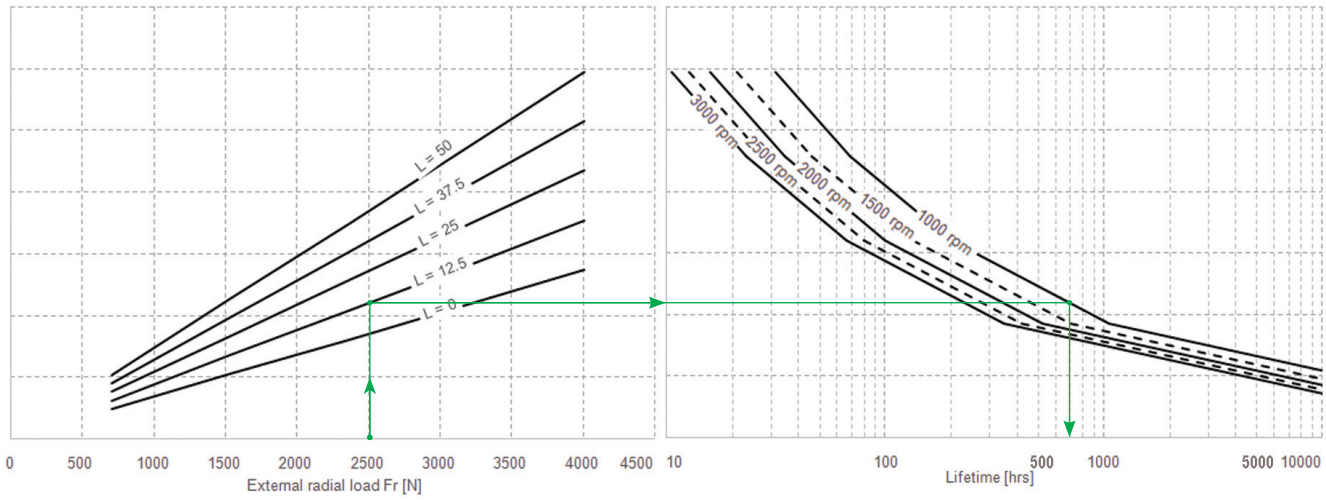
TYPE	H
16	63 (2.45")
19	66.5 (2.59")
22	70 (2.73")
25	72.5 (2.82")
28	85 (3.31")
32	90.5 (3.52")
38	96.5 (3.76")
44	103 (4.06")

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

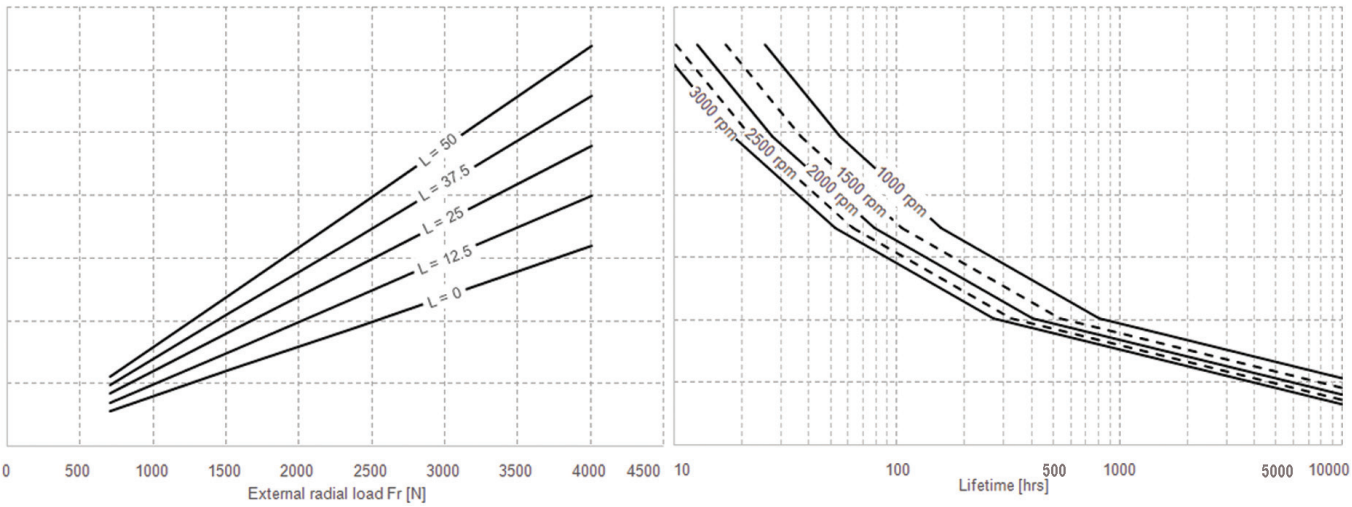


Example:
Fr = 2500 N
L = 12.5
Speed = 1000 rpm
→ Expected life: 700 hrs

For Code CP



For Code Z1



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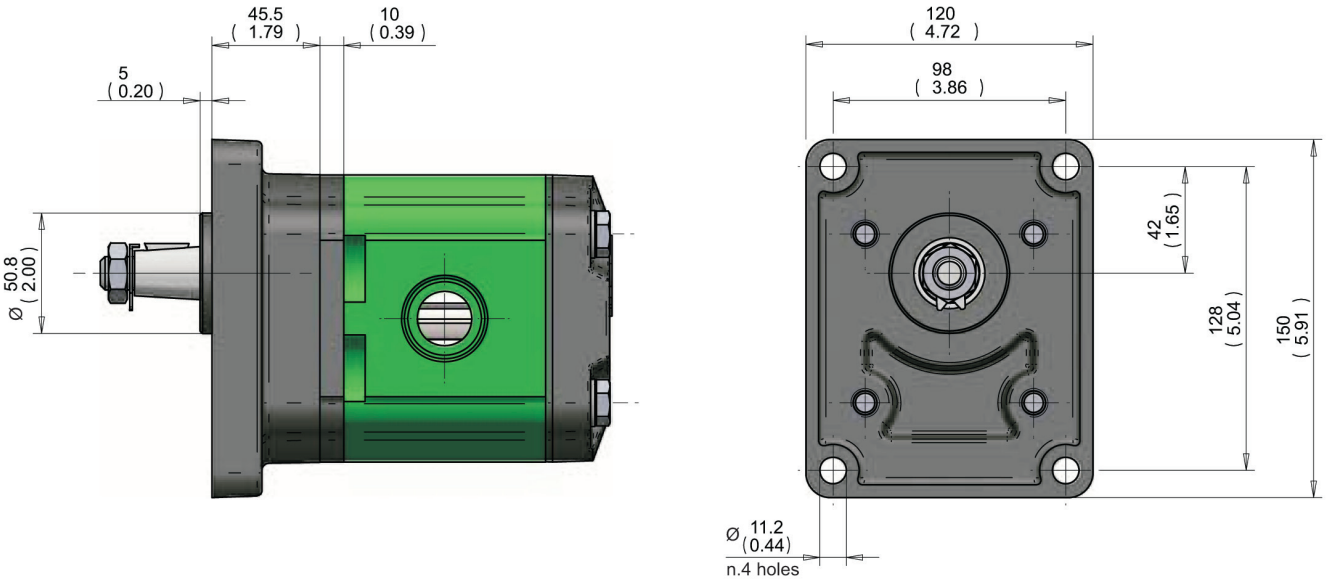
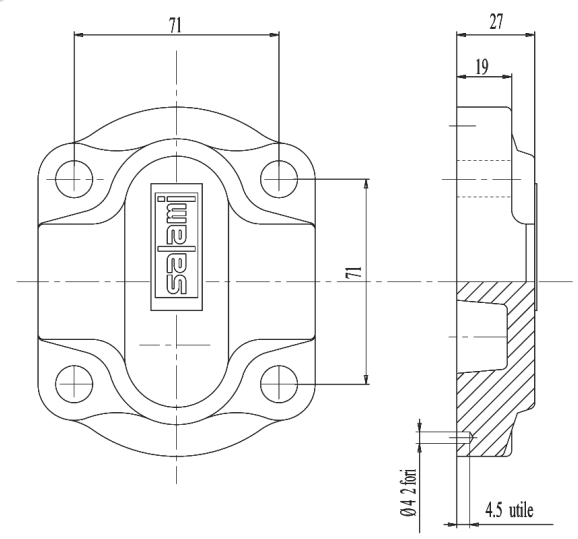
MOUNTING FLANGES WITH BEARING

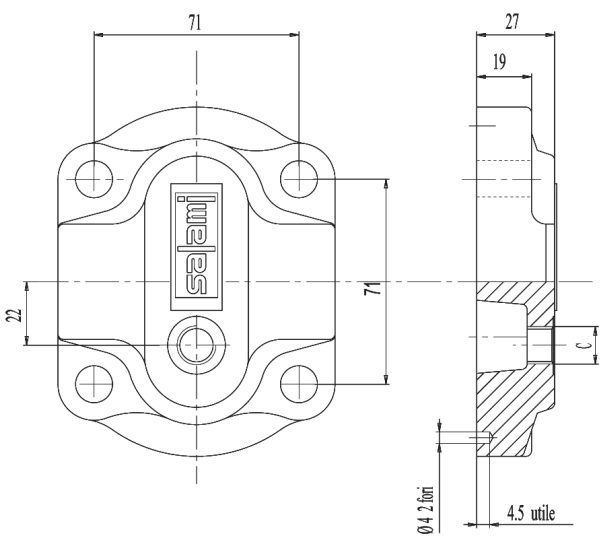


CP	**European standard mounting flange**
With shaft code 38 (see page 180)	

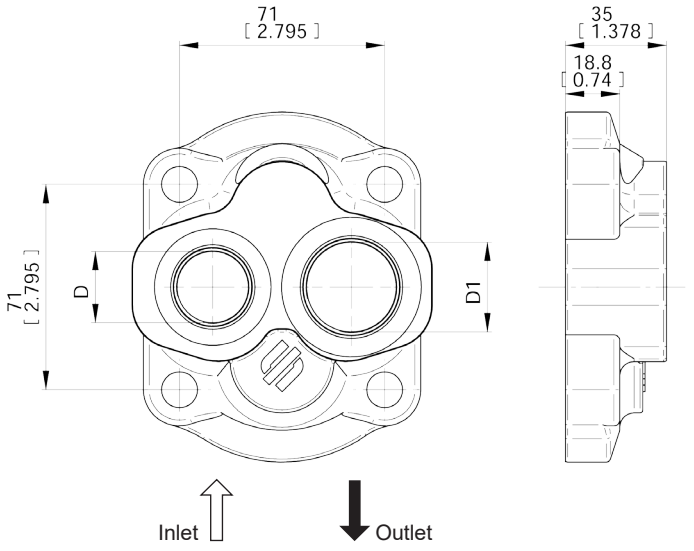
REAR COVERS

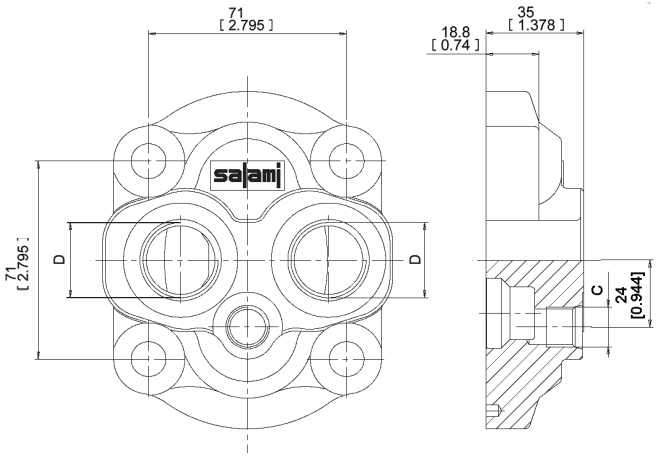


Standard rear cover
for unidirectional motors



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

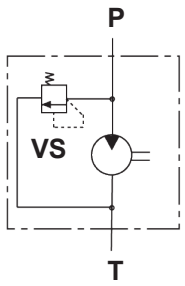
In phase of order please specify D and C dimensions.

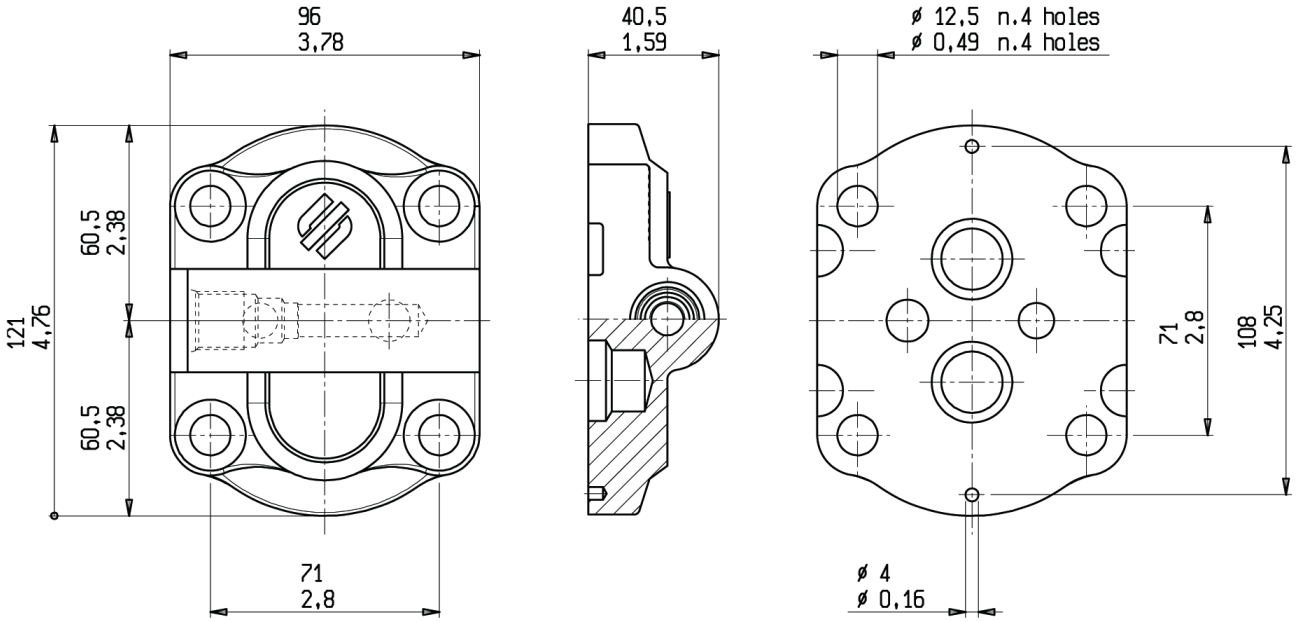
E0.138.0219.02.00IM05

REAR COVERS WITH RELIEF VALVE

code VS

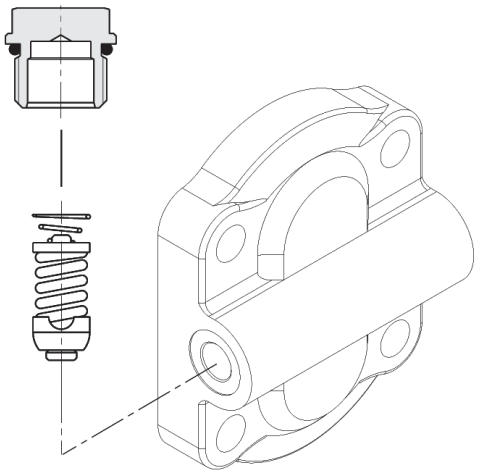
With main relief valve
with internal unloading line.
Rear cover with fixed setting main relief valve.





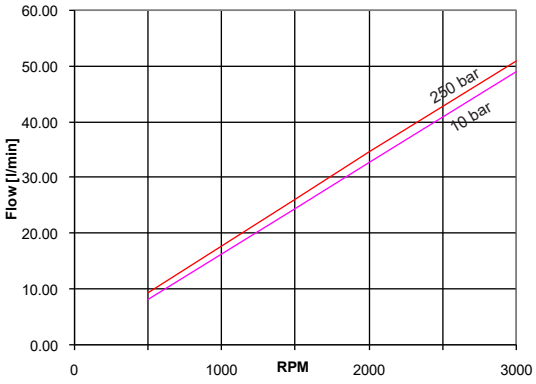
Available values of fixed setting

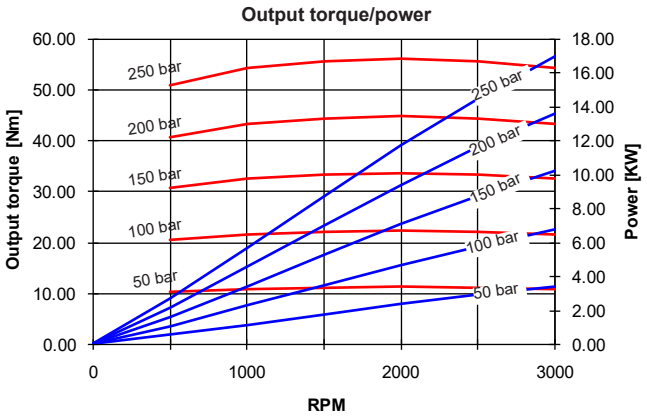
bar	*psi*	bar	*psi*
25	*362*	160	*2320*
32	*464*	175	*2538*
40	*580*	190	*2756*
50	*725*	210	*3046*
63	*914*	230	*3336*
80	*1160*	250	*3626*
100	*1450*	280	*4061*
125	*1813*	315	*4569*
140	*2030*	350	*5076*



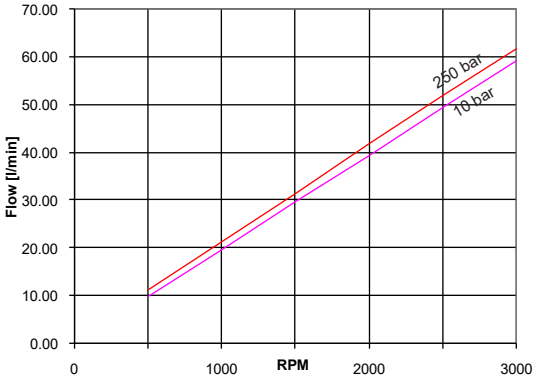
PERFORMANCE CURVES

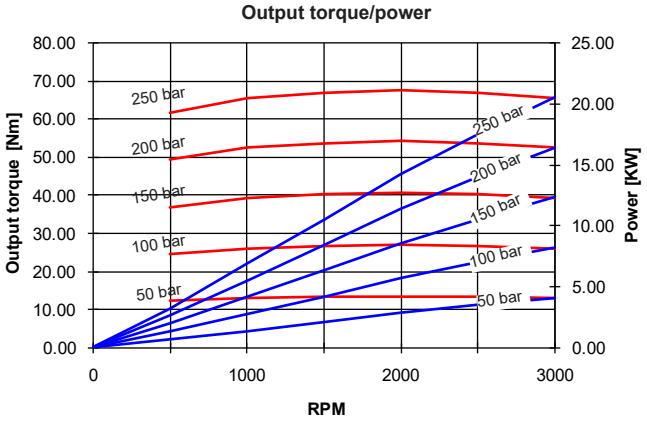
Performance curves carried out with oil viscosity at 21 cSt and oil temperature at 50°C



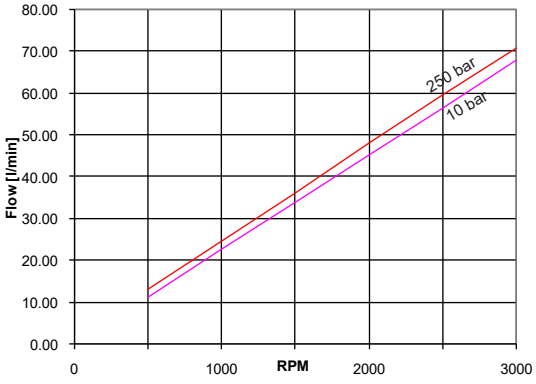


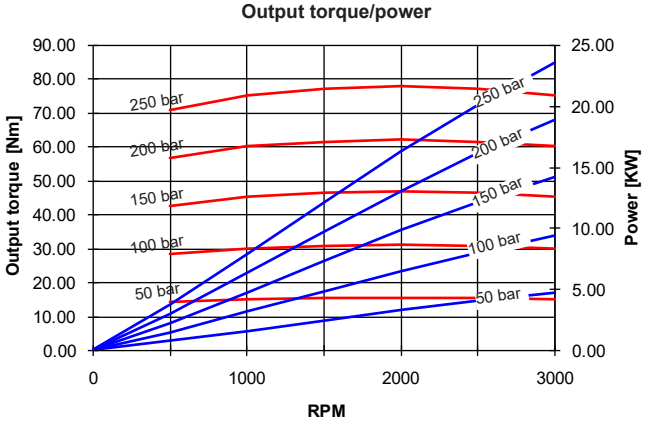
2.5MB - 16





2.5MB - 19



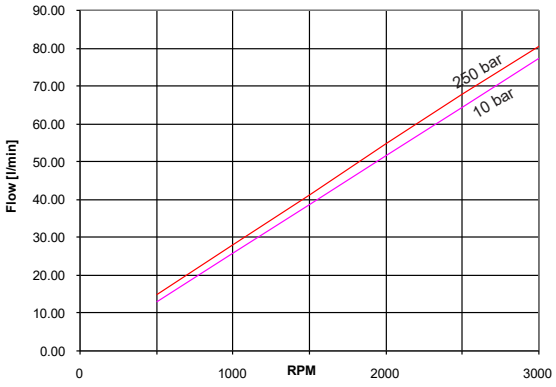


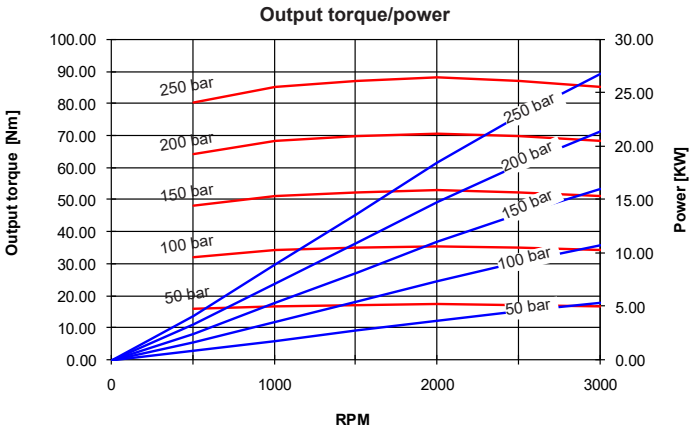
2.5MB - 22

E0.138.0219.02.00IM05

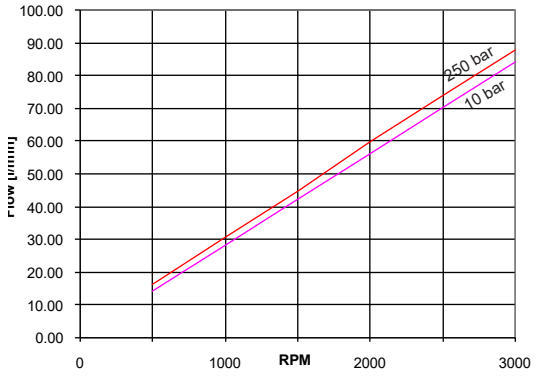
PERFORMANCE CURVES

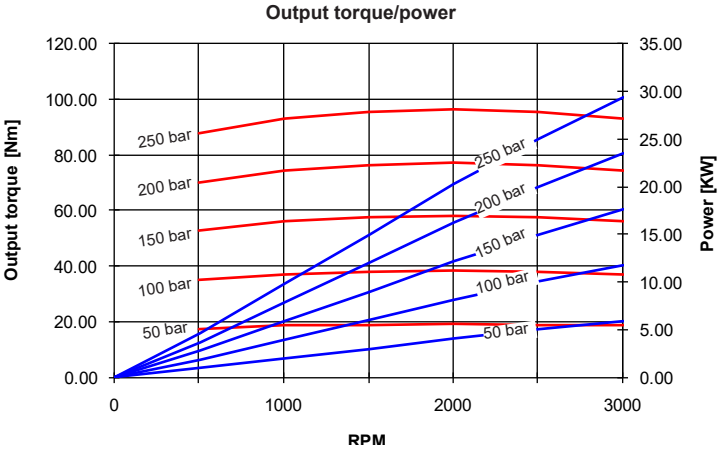
Performance curves carried out with oil viscosity at 21 cSt and oil temperature at 50°C



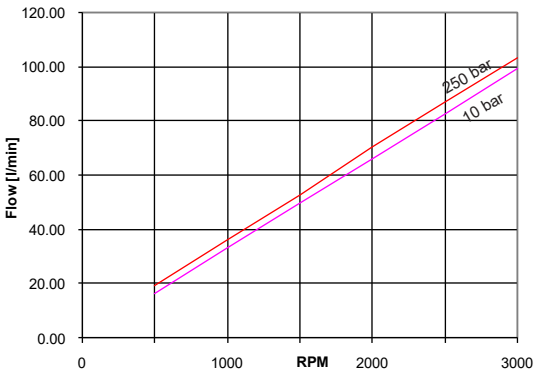


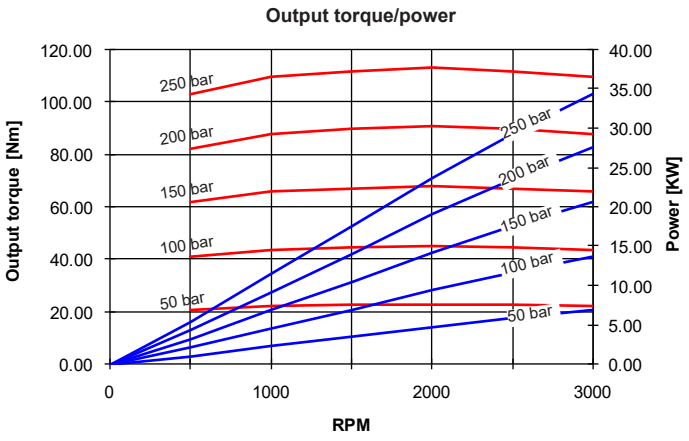
2.5MB - 25





2.5MB - 28

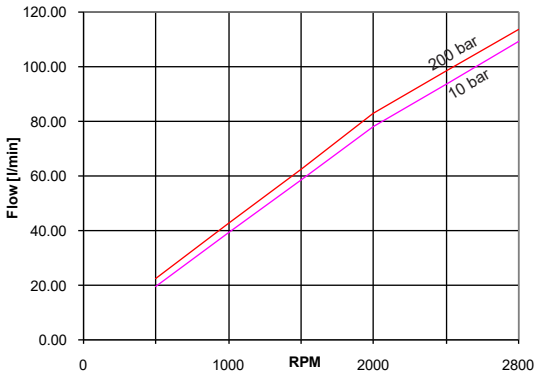


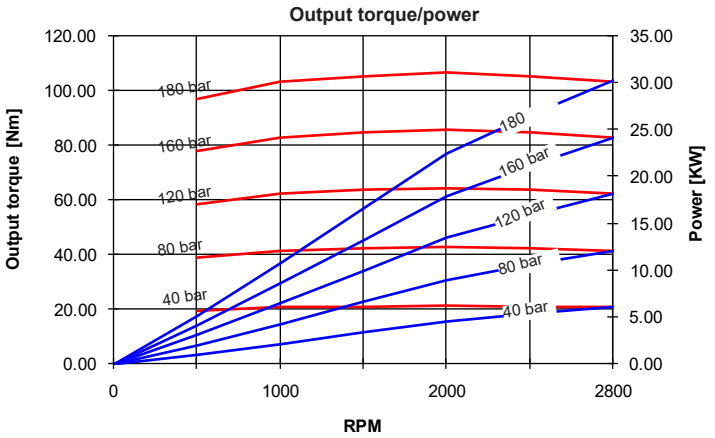


2.5MB - 32

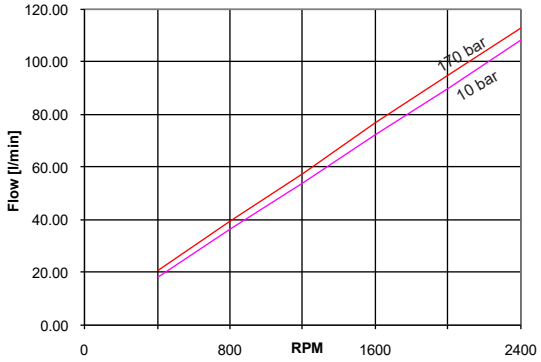
PERFORMANCE CURVES

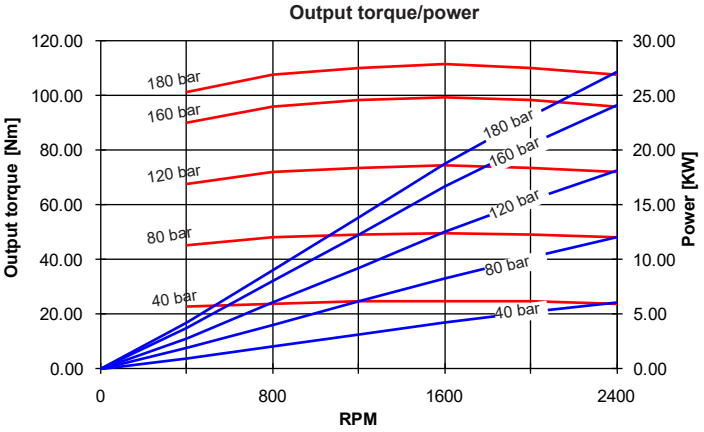
Performance curves carried out with oil viscosity at 21 cSt and oil temperature at 50°C





2.5MB - 38





2.5MB - 44

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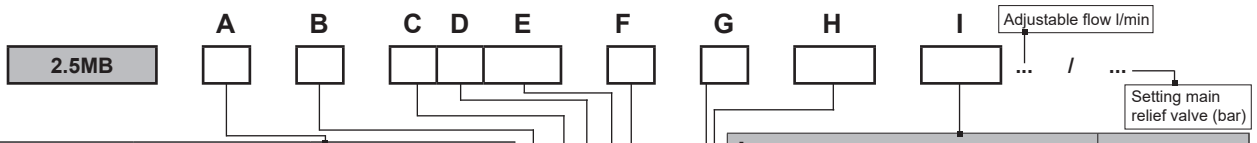
SINGLE MOTORS



DISPLACEMENTS		A CODES
11.76 cm³/rev.	*0.72 cu.in/rev.*	11.5
14.07 cm³/rev.	*0.86 cu.in/rev.*	13.8
16 cm³/rev.	*0.97 cu.in/rev.*	16
19.3 cm³/rev.	*1.17 cu.in/rev.*	19
22.2 cm³/rev.	*1.35 cu.in/rev.*	22
25.2 cm³/rev.	*1.53 cu.in/rev.*	25
27.6 cm³/rev.	*1.68 cu.in/rev.*	28
32.4 cm³/rev.	*1.97 cu.in/rev.*	32
38.1 cm³/rev.	*2.32 cu.in/rev.*	38
44.2 cm³/rev.	*2.69 cu.in/rev.*	44

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

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

DRIVE SHAFT (page 180)	D CODES
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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