

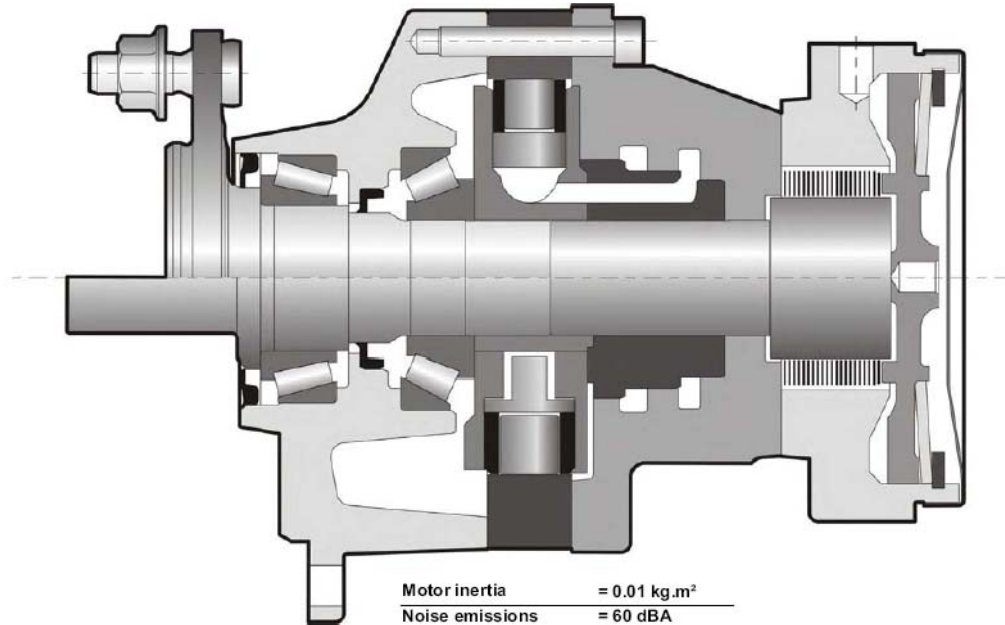


# MS MOTORS



## MS/MSE02. HYDRAULIC MOTOR.

### CHARACTERISTICS

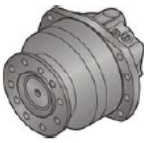






	C	①		Theoretical torque		Max. power			Max. speed			Pression max. bar [PSI]	
		①	②	①		①	②		M	① ②			
				at ΔP 100 bar	at ΔP 1000 PSI		preferred	non-preferred		tr/min [RPM]	tr/min [RPM]		
		cm <sup>3</sup> /tr [cu.in/rev]	cm <sup>3</sup> /tr [cu.in/rev]	Nm	[lb.ft]	kW [HP]	kW [HP]	kW [HP]	tr/min [RPM]	tr/min [RPM]	tr/min [RPM]		
Cams with equal lobes	MS02	8	172 [10,5]	86 [5,2]	273	[139]	18 [24]	12 [16]	9 [12]	590*	580*	590*	450 [6 527]
		0	213 [13,0]	107 [6,5]	339	[172]				470*	470*	475*	
		1	235 [14,3]	118 [7,2]	374	[190]				430*	425*	430*	
		2	255 [15,6]	128 [7,8]	405	[206]				395*	390*	395*	
Cams with unequal lobes	MS02	A	213 [13,0]	86 [5,2]	339	[172]	18 [24]	12 [16]	9 [12]	-	390*	395*	450 [6 527]
		N		192 [11,7]						85 [5,2]	305	[155]	
		A	332 [20,2]	107 [6,5]	528	[268]				-	270*	285*	
Cams with unequal lobes	MSE02	A	332 [20,2]	133 [8,1]	528	[268]	22 [30]	16,5 [22]	11 [15]	-	270*	285*	400 [5 802]
				199 [12,1]									

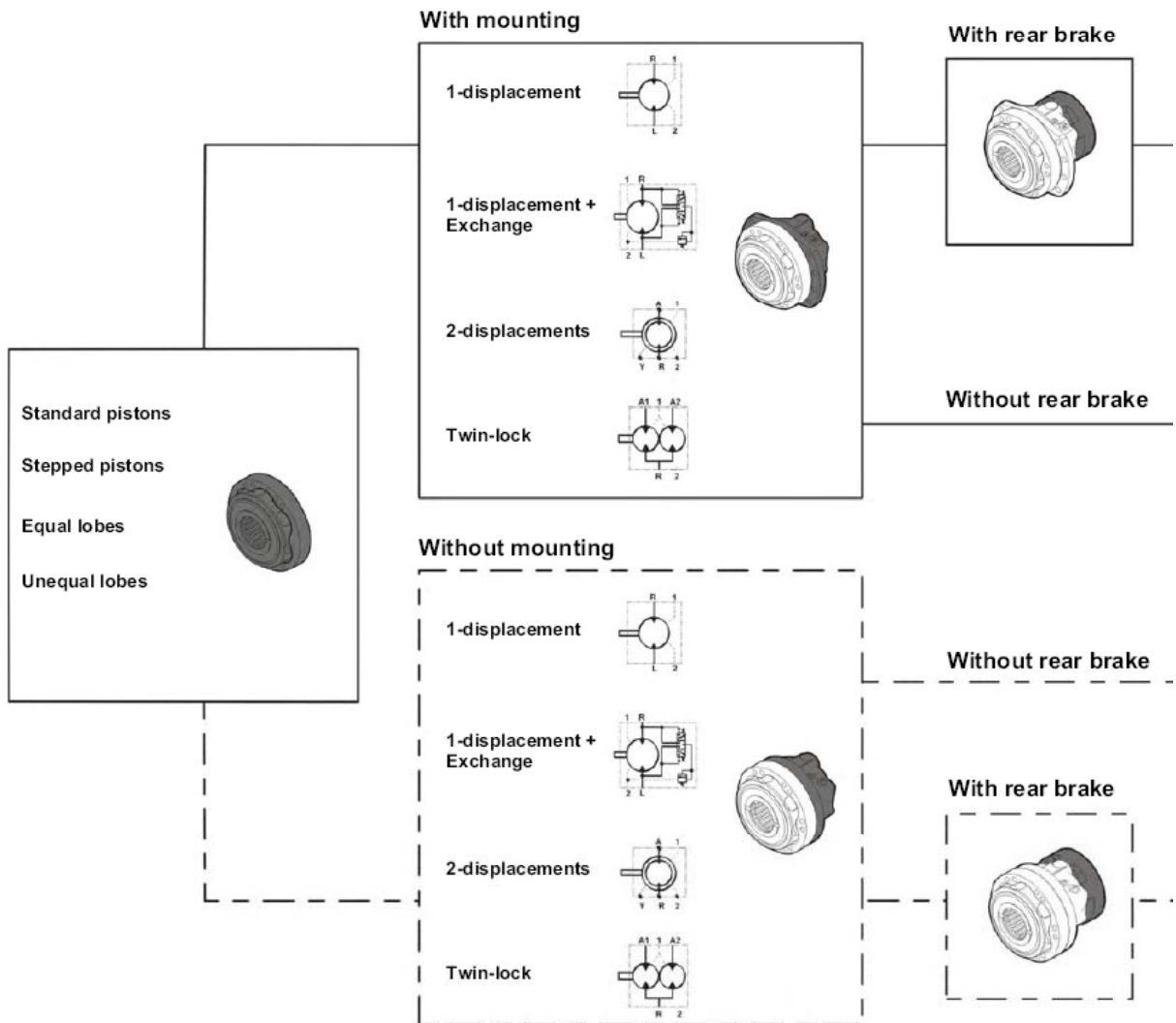
\* See option "M" for higher speed or lower charge pressure.

- ① First displacement
- ② Second displacement

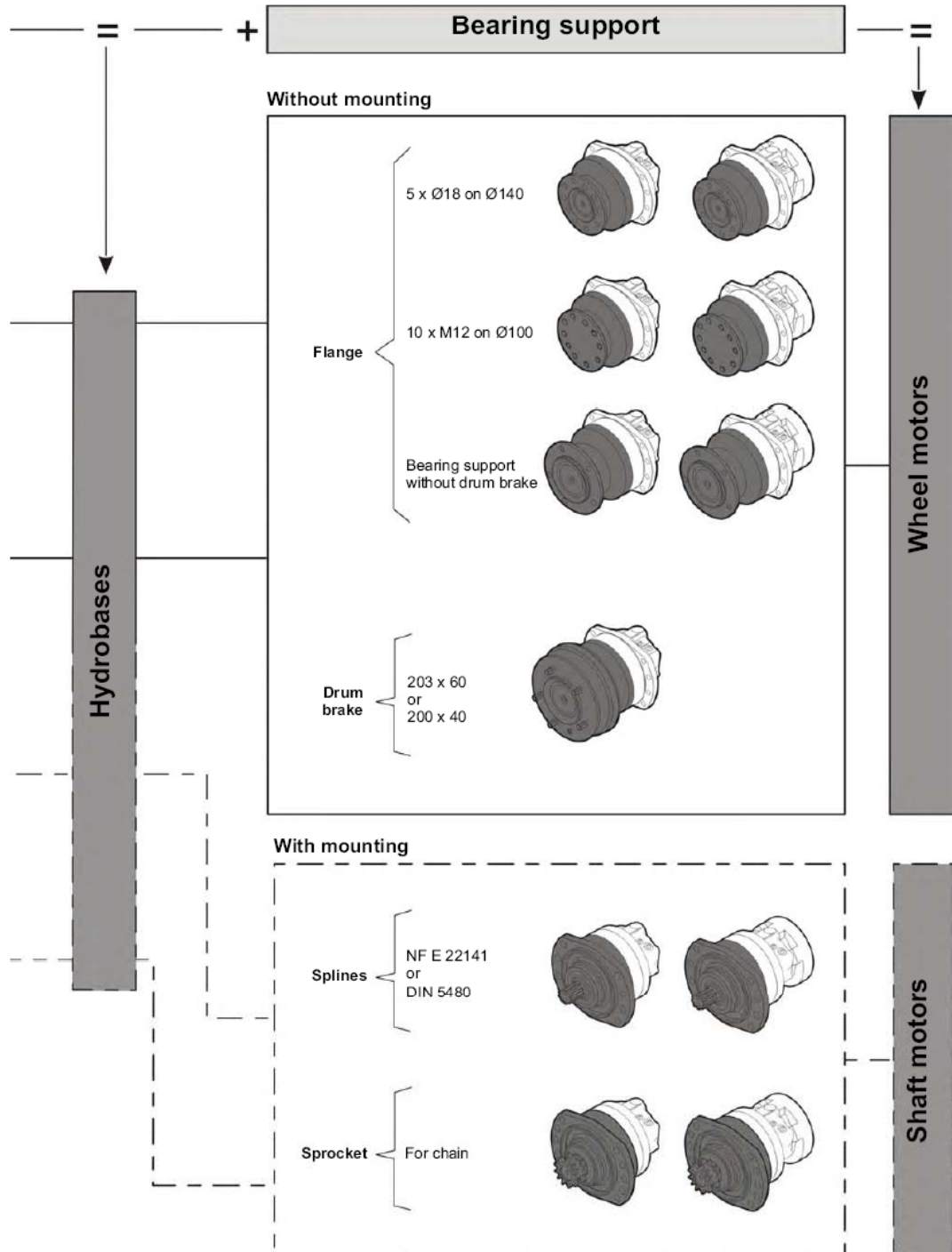
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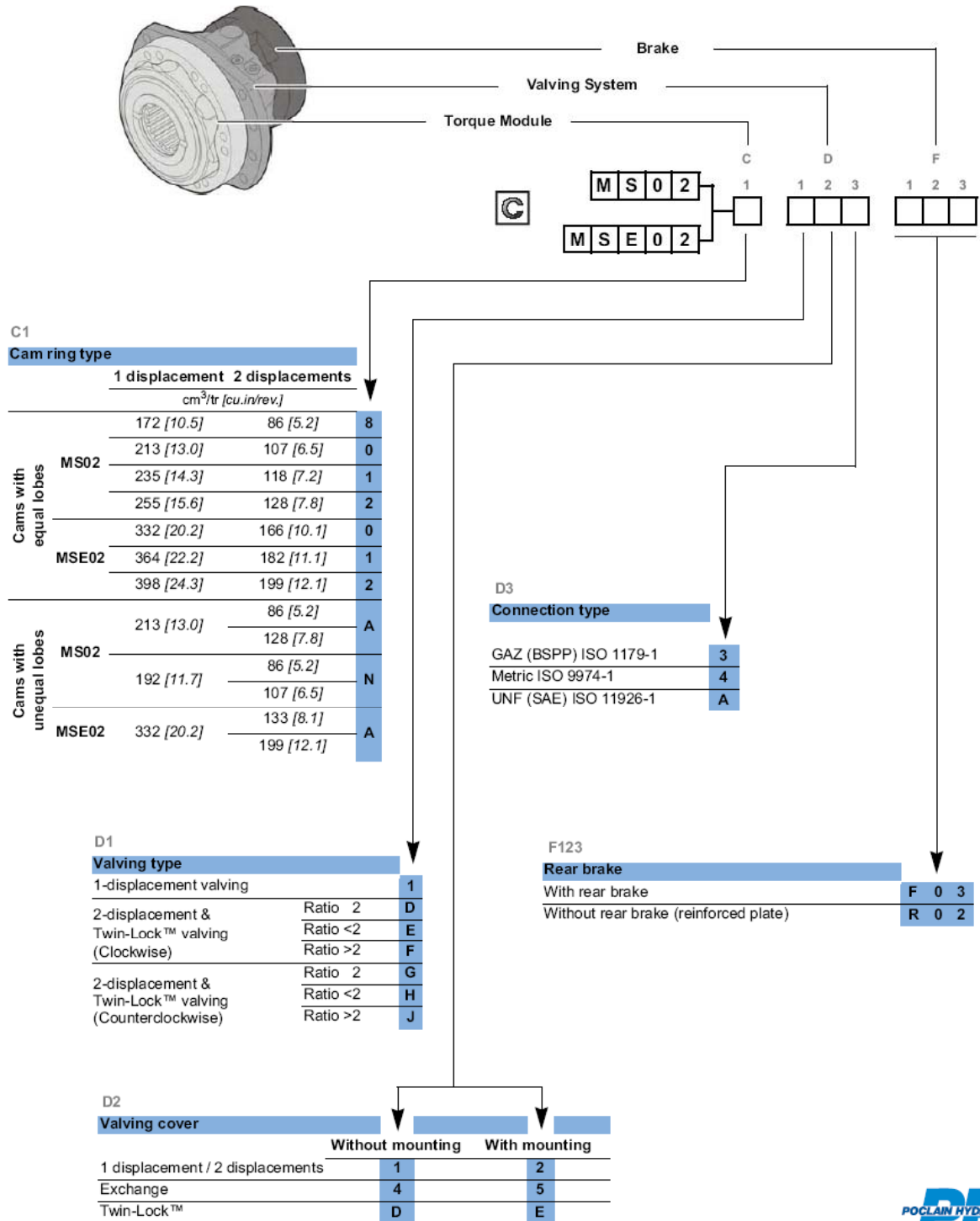
MODULARITY



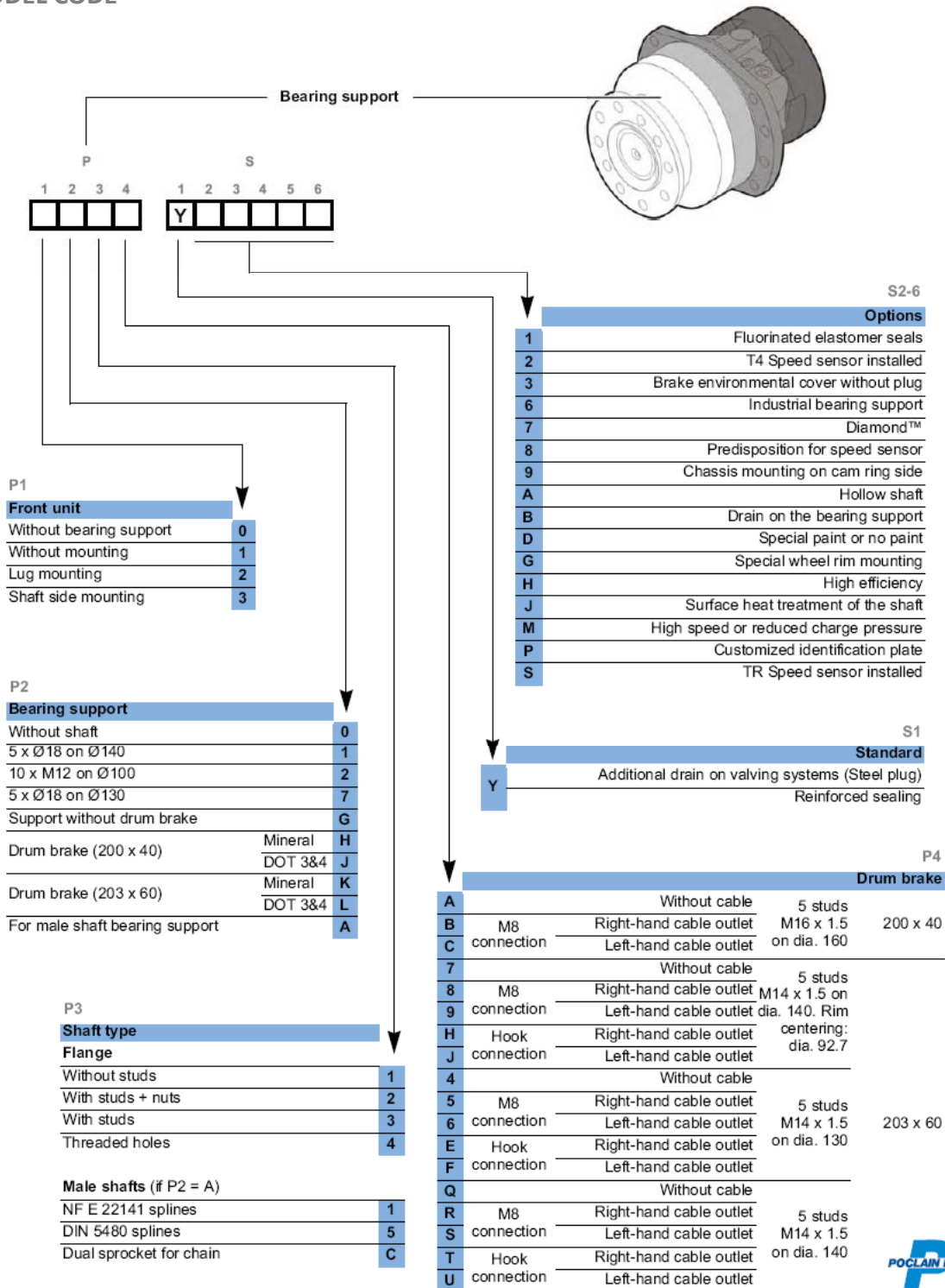
MODULARITY



MODEL CODE



## MODEL CODE



**Methodology :**

This document is intended for manufacturers of machines that incorporate Poclairn Hydraulics products. It describes the technical characteristics of Poclairn Hydraulics products and specifies installation conditions that will ensure optimum operation. This document includes important comments concerning safety. They are indicated in the following way:



Safety comment.

This document also includes essential operating instructions for the product and general information. These are indicated in the following way:



Essential instructions.



General information .



Information on the model number. Information on the model code.



Weight of component without oil.



Volume of oil.



Units.



Tightening torque.



Screws.



Information intended for Poclairn-Hydraulics personnel.

The views in this document are created using metric standards.

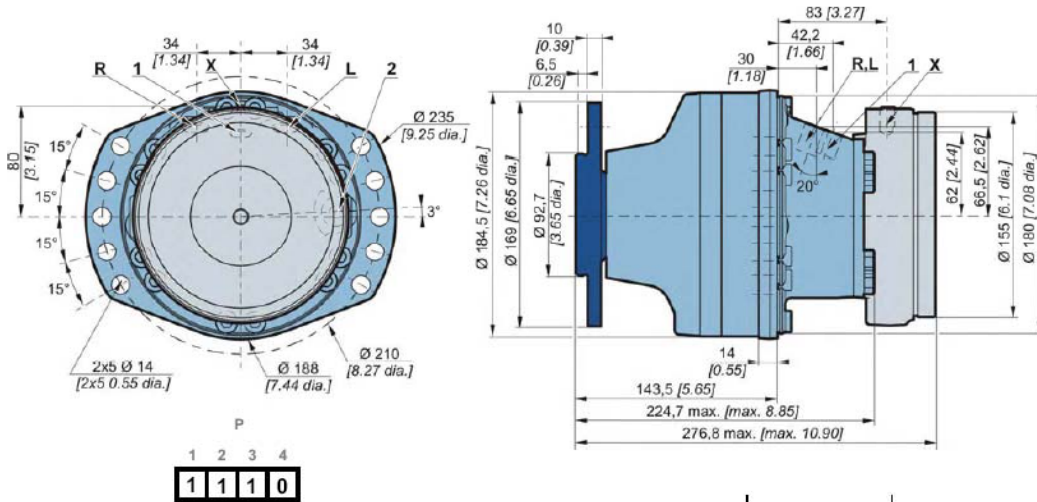
The dimensional data is given in mm and in inches (inches are between brackets and italic)





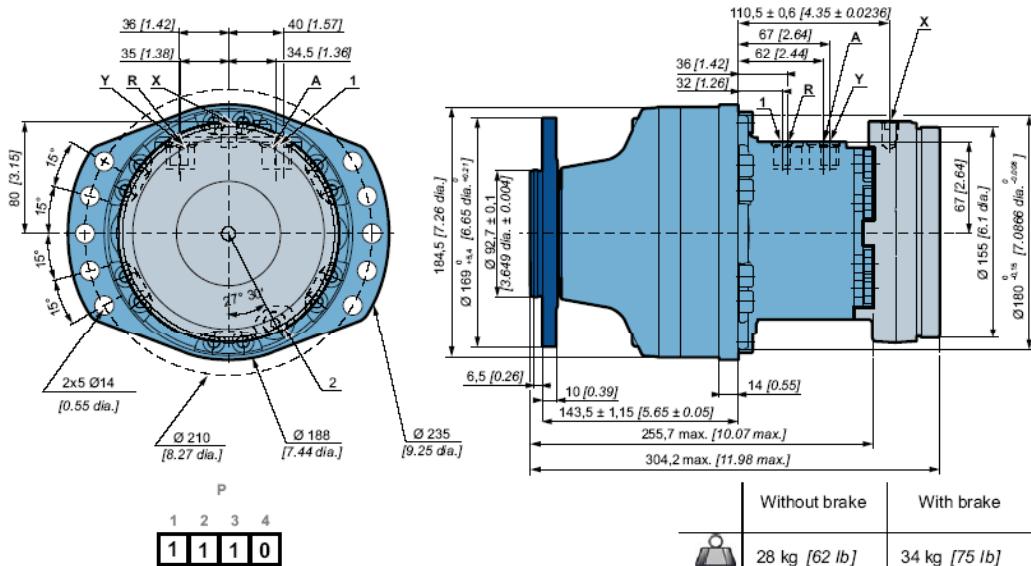
WHEEL MOTOR

Dimensions for standard 1-displacement motor



	Without brake	With brake
	26 kg [57 lb]	32 kg [70 lb]
	0,80 L [48 cu.in.]	0,70 L [42 cu.in.]

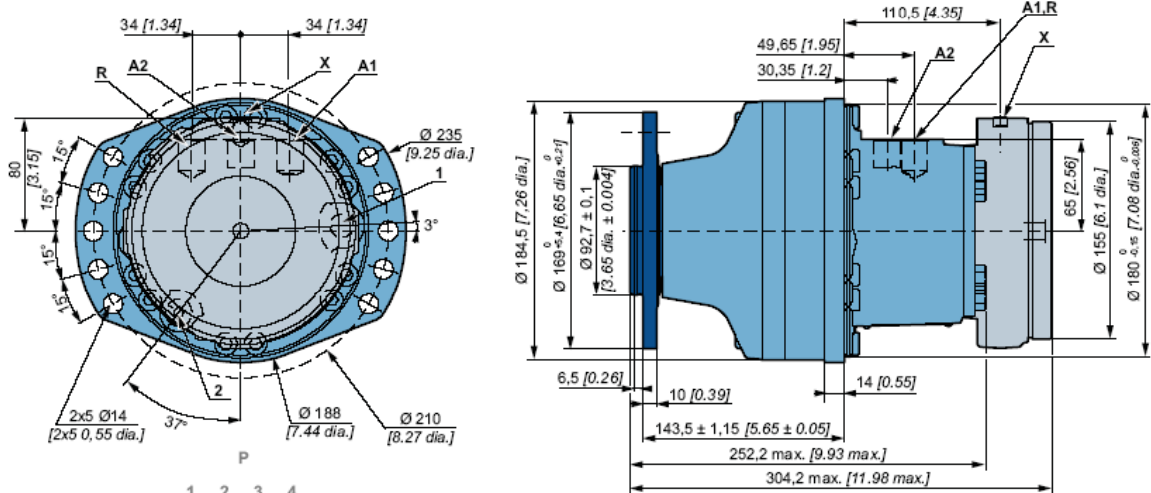
Dimensions for standard 2-displacements motor



	Without brake	With brake
	28 kg [62 lb]	34 kg [75 lb]
	1,00 L [60 cu.in.]	1,00 L [60 cu.in.]

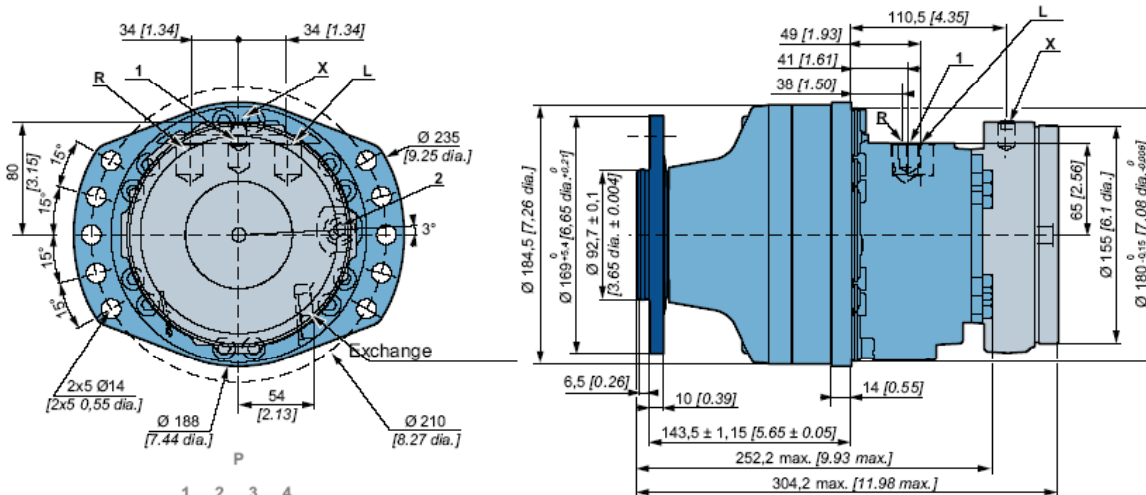


**Dimensions for standard Twin-Lock™ motor**



	Without brake	With brake
	28 kg [62 lb]	34 kg [75 lb]
	1,00 L [60 cu.in]	1,00 L [60 cu.in]

**Dimensions for standard motor with exchange**



	Without brake	With brake
	28 kg [62 lb]	34 kg [75 lb]
	1,05 L [63 cu.in]	1,05 L [63 cu.in]

**Support types**



	A mm [in]	B mm [in]	C mm [in]	D mm [in]	E mm [in]	N mm [in]	Wheel rim mountings	L mm [in]	
<b>1 1 1 0</b> 1 2 3 4 P	Ø 92,7 [3,65 dia.]	Ø 140 [5,51 dia.]	Ø 169 [6,65 dia.]	143,4 [5,65]	Ø 184,5 [7,26 dia.]	Ø 18 [0,71 dia.]	5 x M14x1.5	10 [0,39]	
<b>1 7 1 0</b> 1 2 3 4 P	Ø 77,6 [3,06 dia.]	Ø 130 [5,12 dia.]	Ø 169 [6,65 dia.]	140,6 [5,54]	Ø 184,5 [7,26 dia.]	Ø 18 [0,71 dia.]	5 x M14x1.5	10 [0,39]	
<b>1 2 4 0</b> 1 2 3 4 P	-	Ø 100 [3,94 dia.]	Ø 120 [4,72 dia.]	142,9 [5,63]	Ø 184,5 [7,26 dia.]	10 x M12x1.75	-	11,25 [0,44]	
<b>1 G 1 0</b> 1 2 3 4 P	Ø 92,7 [3,65 dia.]	Ø 140 [5,51 dia.]	Ø 168 [6,61 dia.]	185,5 [7,30]	Ø 184,5 [7,26 dia.]	Ø 18 [0,71 dia.]	5 x M14x1.5	12 [0,47]	
<b>1 H 3</b> <b>1 J 3</b> 1 2 3 4 P	-	Ø 160 [6,30 dia.]	Ø 221 [8,70 dia.]	193 [7,60]			5 x M16x1.5	30,5 [1,20]	
<b>1 K 3</b> <b>1 L 3</b> 1 2 3 4 P	Ø 92,7 [3,65 dia.]	Ø 140 [5,51 dia.]	Ø 221 [8,70 dia.]	193 [7,60]			5 x M14x1.5	25,5 [1,00]	
Also see 'Brakes' section (thumbnail opposite).									

**Studs**

	P mm [in]	C min. mm [in]	C max. mm [in]	D mm [in]	Class	N.m [lb.ft]	N.m [lb.ft]
Standard studs	M14x1.5	45 [1.77]	5 [0.20]	18 [0.71]	12,9	200 [147.5]	250 [184.4]

(\*) The tightening torques are given for the indicated loads.  
 (1) **Wheel rim** : Suggested tightening torque for wheel rim mountings (Re steel disc > 240 N/mm<sup>2</sup> / >34 800 PSI).  
 (2) **Standard** : Suggested tightening torque in other cases (Re steel flange 360 > N/mm<sup>2</sup> / >52 215 PSI)

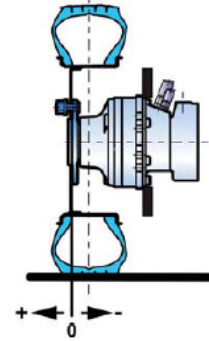
See option G for non standard studs.

See generic installation motors N°801478197L.

**Radial load and service life of bearings curves**



The service life of the components is influenced by the pressure. You must check that the combination of forces applied (Axial load / Radial load) is compatible with the permissible loads for the components, and that the resulting service lives of these components complies with the application's specifications. For an accurate calculation, consult your Poclairn Hydraulics application engineer.



**Permissible radial loads**

Max. permissible loads: 0 tr/min [0 RPM]; 0 bar [0 PSI].

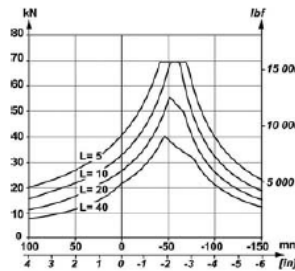
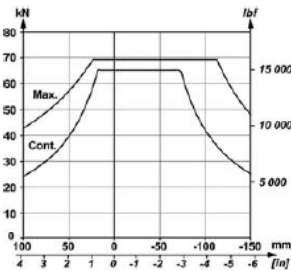
Continuous permissible loads: > 0 tr/min [> 0 RPM]; 275 bar [3 988 PSI].

Test conditions: code 0 displacement, without axial load, shaft treated (option J), class 10.9 and 12.9 chassis mountings class 12.9 wheel rim mountings.

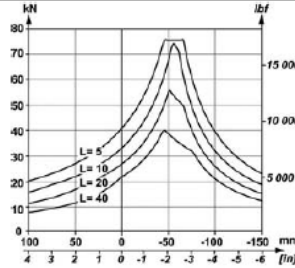
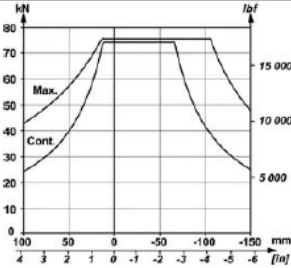
**Service life of bearings**

L : Millions B10 revolutions at 150 bars (average pressure), with 25 cSt fluid.

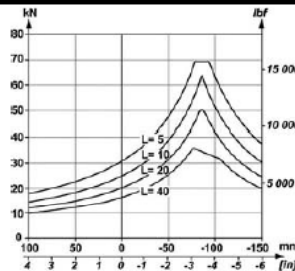
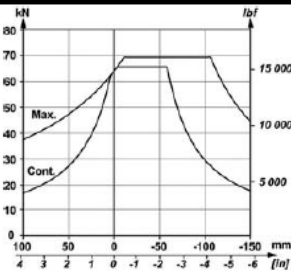
P			
1	2	3	4
1	1	1	0
1	7	1	0



P			
1	2	3	4
1	2	4	0

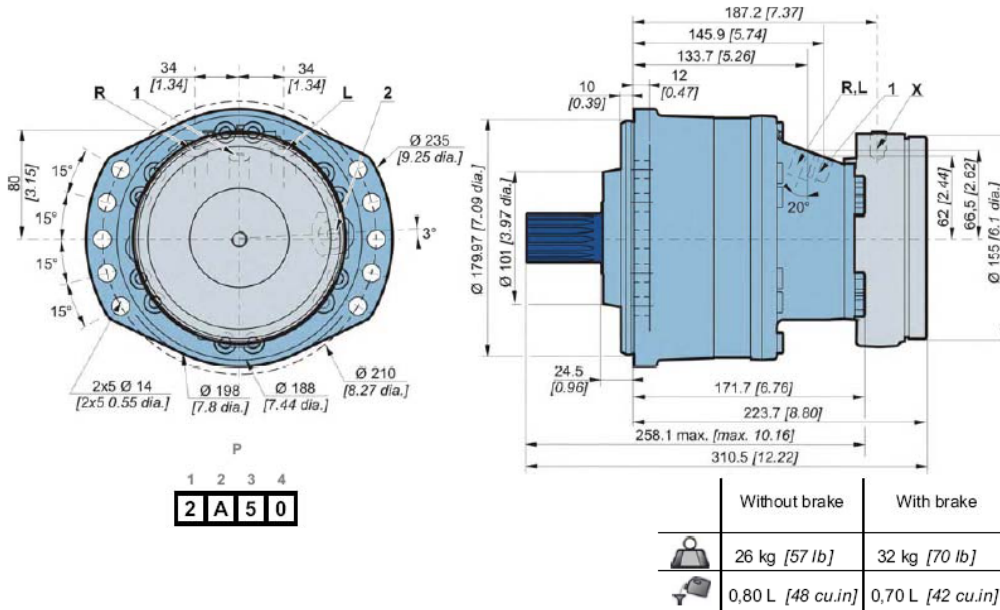


P			
1	2	3	4
1	G	1	
1	H	3	
1	J	3	
1	K	3	
1	L	3	

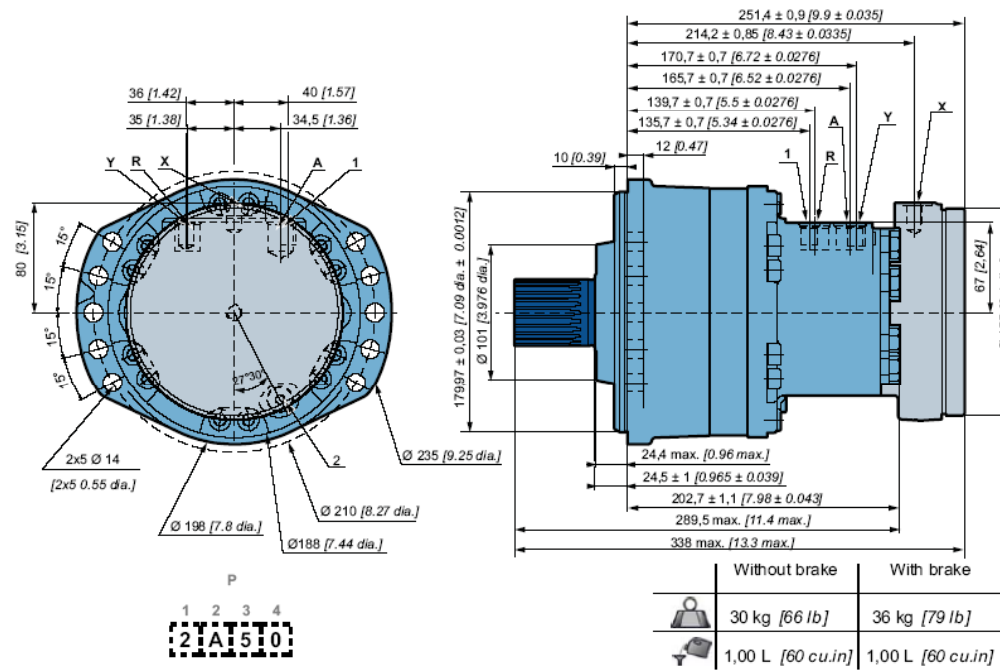


SHAFT MOTOR

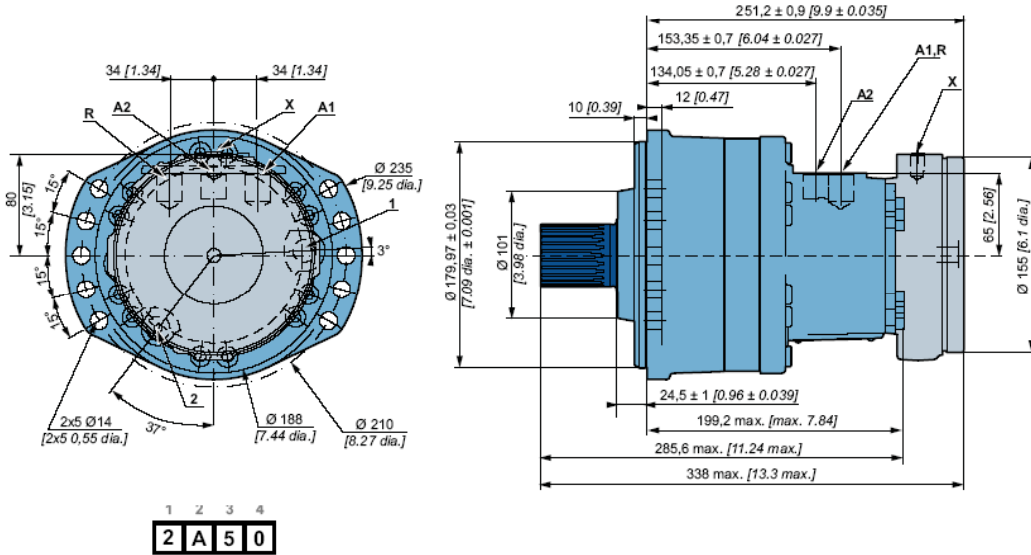
Dimensions for standard 1-displacement motor



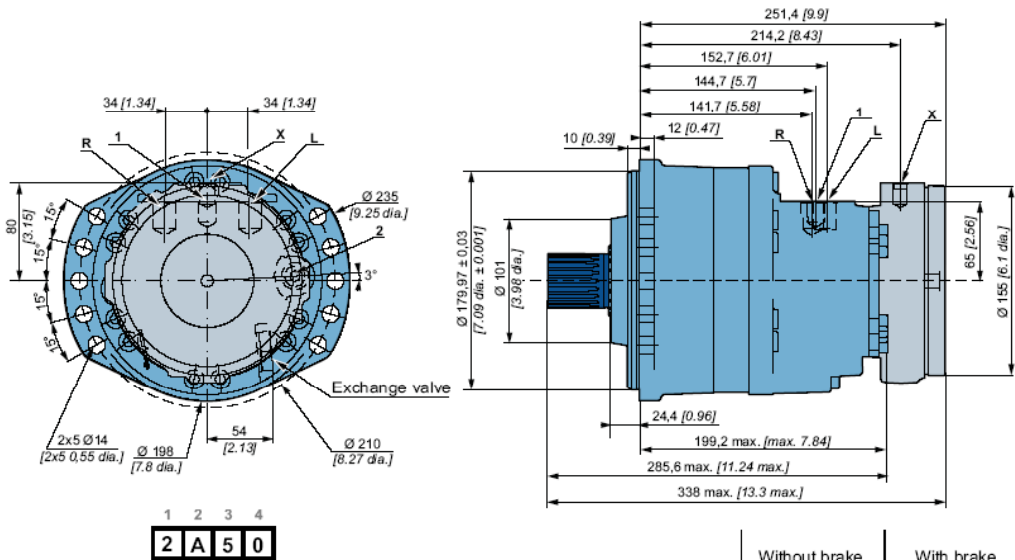
Dimensions for standard 2-displacements motor



**Dimensions for standard Twin-Lock™ motor**



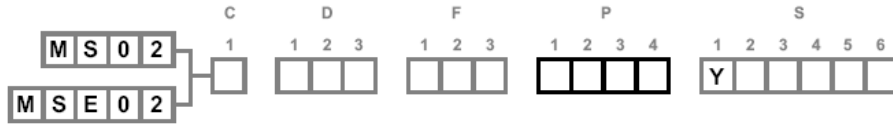
**Dimensions for standard motor with exchange**



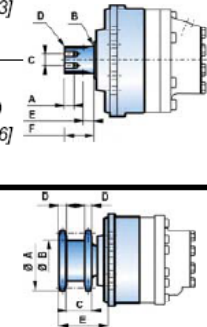
	Without brake	With brake
	30 kg [66 lb]	36 kg [79 lb]
	1,05 L [63 cu.in]	1,05 L [63 cu.in]



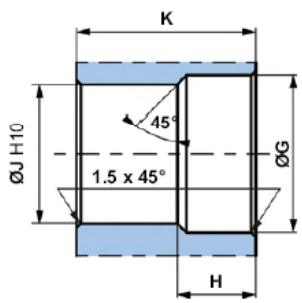
**Support types**



		A	B	mm	mm	mm	mm												
		mm [in]	mm [in]	[in]	[in]	[in]	[in]												
<b>C</b> <table border="1"> <tr><td>2</td><td>A</td><td>1</td><td>0</td></tr> <tr><td>1</td><td>2</td><td>3</td><td>4</td></tr> <tr><td colspan="4">P</td></tr> </table>	2	A	1	0	1	2	3	4	P				NF E22-141 splines	15	R2	23,8	2 x M10	19	49
	2	A	1	0															
	1	2	3	4															
P																			
Nominal Ø	40 [1,57]	[0,59]	[R 0,08]	[0,94]		[0,75]	[1,93]												
Module	1,667																		
	Number of teeth	22																	
<table border="1"> <tr><td>2</td><td>A</td><td>5</td><td>0</td></tr> <tr><td>1</td><td>2</td><td>3</td><td>4</td></tr> <tr><td colspan="4">P</td></tr> </table>	2	A	5	0	1	2	3	4	P				DIN 5480 splines	15	R2,5	23,8	2 x M10	22	60
	2	A	5	0															
	1	2	3	4															
P																			
Nominal Ø	50 [1,97]	[0,59]	[R 0,10]	[0,94]		[0,87]	[2,36]												
Module	2																		
	Number of teeth	24																	
<table border="1"> <tr><td>2</td><td>A</td><td>C</td><td>0</td></tr> <tr><td>1</td><td>2</td><td>3</td><td>4</td></tr> <tr><td colspan="4">P</td></tr> </table>	2	A	C	0	1	2	3	4	P				ANSI B29-1 or ISO 606 pinion	Ø126,5	Ø84	51,6	14,6	99,5	-
	2	A	C	0															
	1	2	3	4															
	P																		
Chain no.	80	[4,98 dia.]	[3,31 dia.]	[2,03]	[0,57]	[3,92]													
Number of teeth	14																		
Pitch	25,4																		
	Pitch Ø	114,2 [4,49]																	



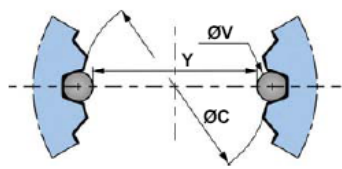
**Splined coupling**



**Standard NF E 22-141**  
 Pressure angle 20°. Centering on flanks. Slide adjustment (7H quality).

**Standard DIN 5480**  
 Pressure angle 30°. Centering on flanks. Slide adjustment (7H quality).

N : Nominal Ø.  
 Mo : Module.  
 Z : Number of teeth.



<b>C</b> <table border="1"> <tr><td>2</td><td>A</td><td>1</td><td>0</td></tr> <tr><td>1</td><td>2</td><td>3</td><td>4</td></tr> <tr><td colspan="4">P</td></tr> </table>	2	A	1	0	1	2	3	4	P				Ø G	H	Ø J	K	N	Mo	Z	Offset	(H10)	Ø V	Y	Tolerance (Y)
	2	A	1	0																				
1	2	3	4																					
P																								
	mm [in]	mm [in]	mm [in]	mm [in]	mm [in]				mm [in]	mm [in]	mm [in]	µm [µin]												
	41,3	20	36,7	48,3	40	1,667	22	-	36,7	3,5	33,446	+86 / 0												
	[1,62]	[0,79]	[1,44]	[1,90]	[1,57]				[1,44]	[0,14]	[1,32]	[+3.385 / 0]												
	51,5	23	46	59	50	2	24	-0,1	46	3,5	42,6	+72 / 0												
	[2,03]	[0,91]	[1,81]	[2,32]	[1,97]			[-0,0039]	[1,81]	[0,14]	[1,68]	[+2.832 / 0]												

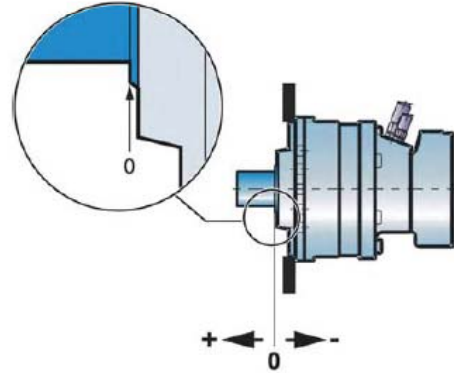
General tolerances : ± 0.25 [±0.0098].  
 Material: Ex: 42CrMo4.  
 Hardening treatment to obtain R = 800 to 900 N/mm² [R = 116 030 to 130 533 PSI].



**Radial load and service life of bearings curves**



The service life of the components is influenced by the pressure. You must check that the combination of forces applied (Axial load / Radial load) is compatible with the permissible loads for the components, and that the resulting service lives of these components complies with the application's specifications. For an accurate calculation, consult your Poclairn Hydraulics application engineer.



**Permissible radial loads**

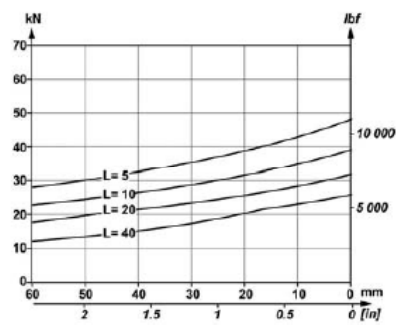
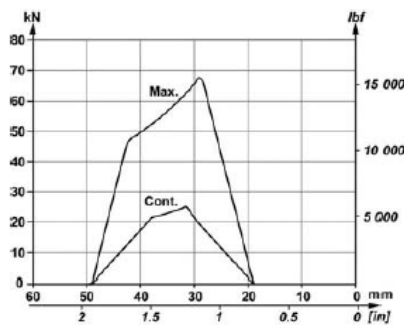
Max. permissible loads: 0 tr/min [0 RPM]; 0 bar [0 PSI].  
 Continuous permissible loads: > 0 tr/min [> 0 RPM]; 275 bar [3 988 PSI].

**Service life of bearings**

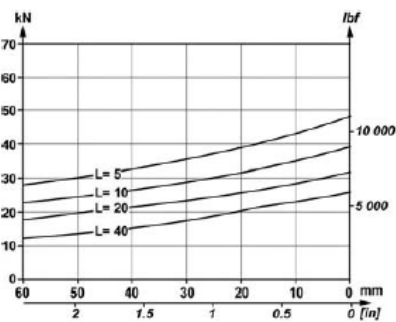
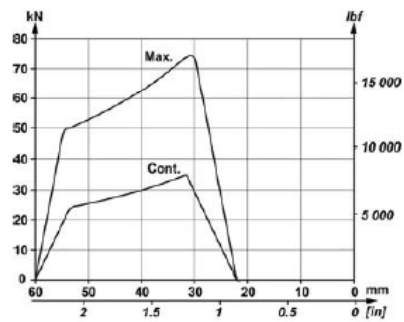
L : Millions B10 revolutions at 150 bars (average pressure), with 25 cSt fluid.

Test conditions: code 0 displacement, without axial load, shaft treated (option J), class 10.9 and 12.9 chassis mountings.

**2 A 1 0**  
 1 2 3 4  
 P



**2 A 5 0**  
 1 2 3 4  
 P

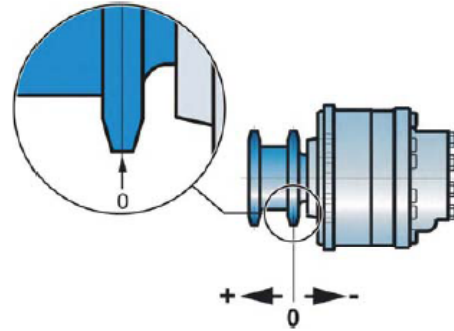




**Radial load and service life of bearings curves**



The service life of the components is influenced by the pressure. You must check that the combination of forces applied (Axial load / Radial load) is compatible with the permissible loads for the components, and that the resulting service lives of these components complies with the application's specifications. For an accurate calculation, consult your Poclain Hydraulics application engineer.



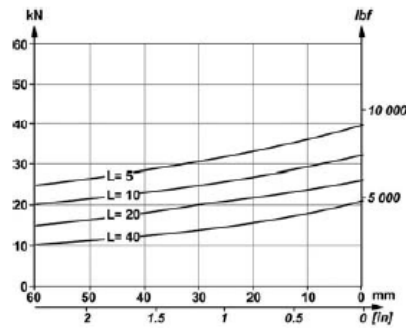
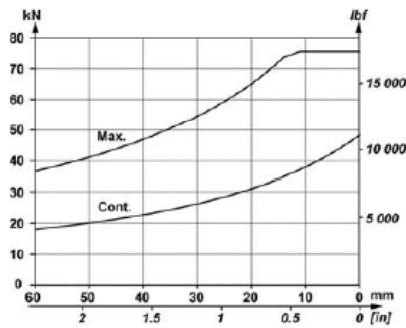
**Permissible radial loads**

Max. permissible loads: 0 tr/min [0 RPM]; 0 bar [0 PSI].  
 Continuous permissible loads: > 0 tr/min [> 0 RPM]; 275 bar [3 988 PSI].

**Service life of bearings**

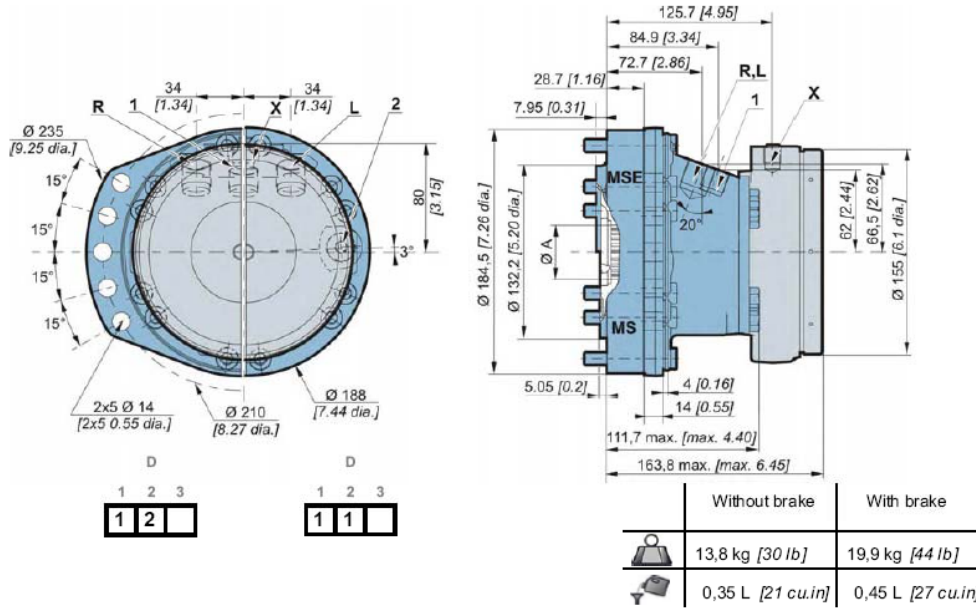
L : Millions B10 revolutions at 150 bars (average pressure), with 25 cSt fluid.

Test conditions: code 0 displacement, without axial load, shaft treated (option J), class 10.9 and 12.9 chassis mountings.

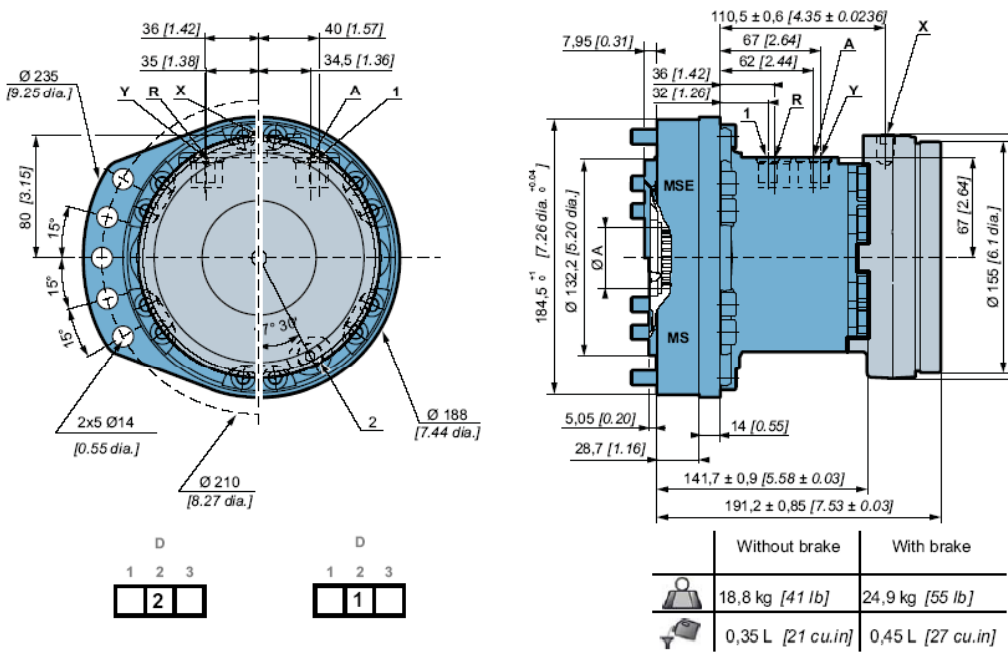


## HYDROBASES

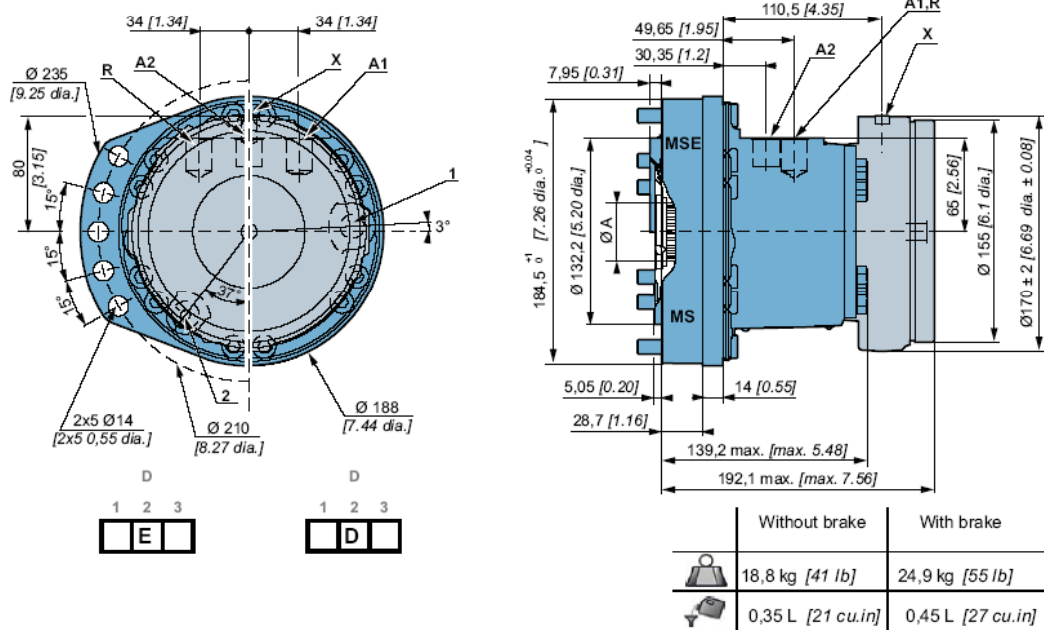
### Dimensions for 1-displacement hydrobase



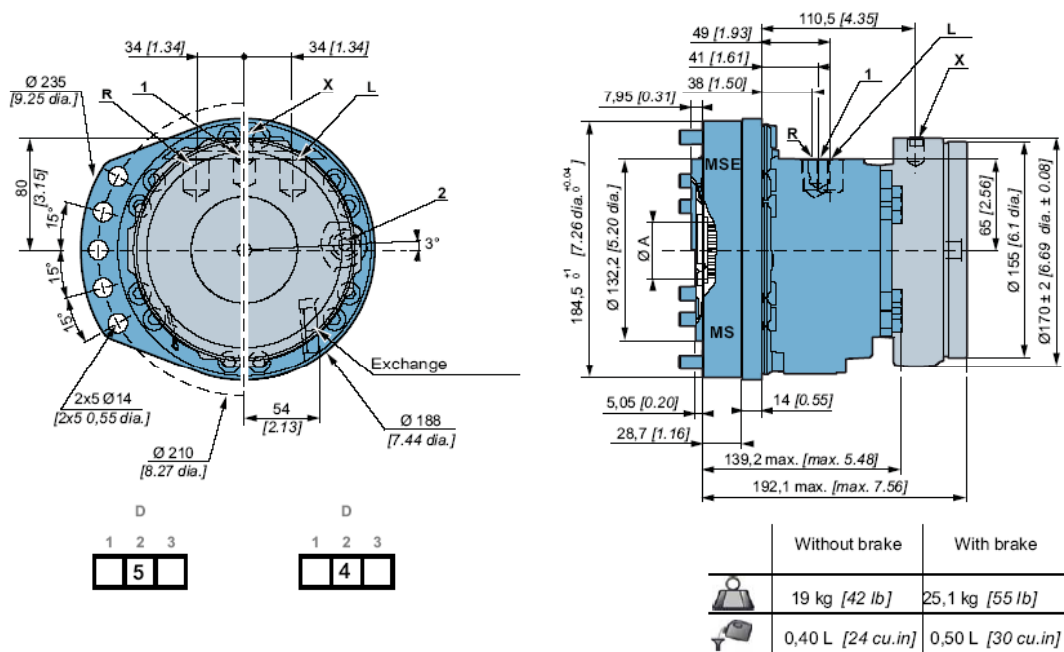
### Dimensions for 2-displacements hydrobase



**Dimensions for Twin-Lock™ hydrobase**



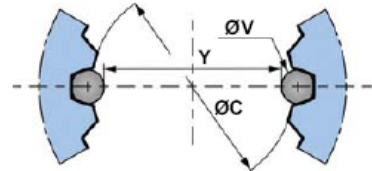
**Dimensions for hydrobase with exchange**



## Cylinder block splines

(as per standard NF E22-141)

ØA	Module	z	Dimension on 2 pins		ØC
			Y	ØV	
40 [1,575]	1,667	22	33,446 [1,317]	3,33 [0,131]	36,72 [1,446]



You are advised to have the installation validated by your Poclairn Hydraulics application engineer before using the hydraulic unit in an application.



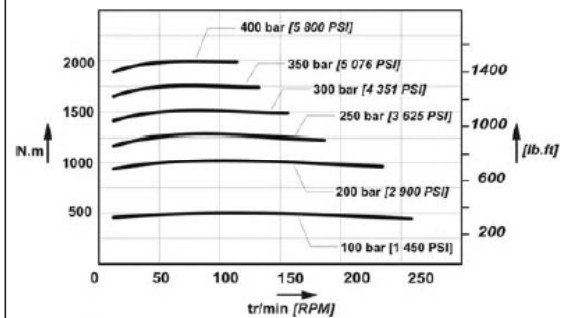
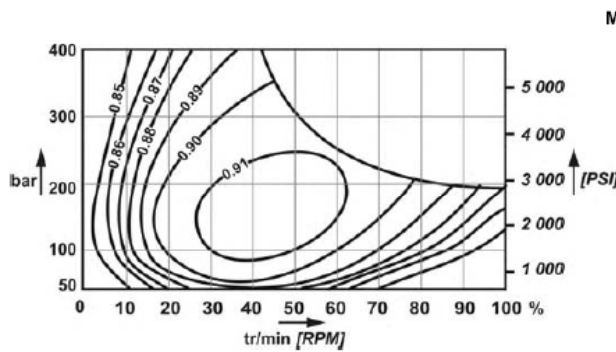
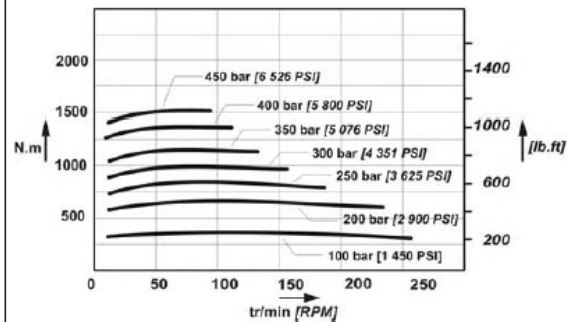
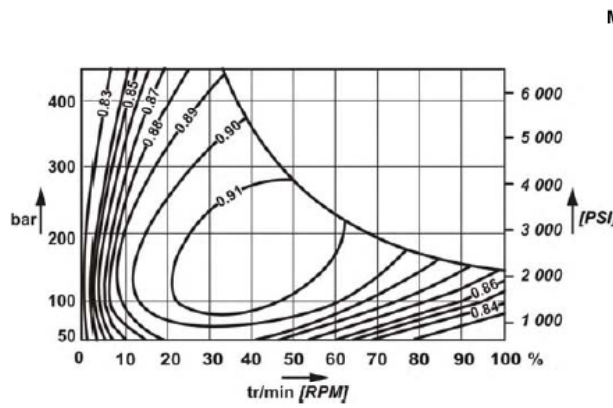
We must provide you with a detailed plan of the interface for any hydraulic unit use, consult your Poclairn Hydraulics sales engineer.

**Efficiency and output torque**

**Overall efficiency**

Average values given for guidance for code 0 displacement after 100 hours of operation with HV46 hydraulic fluid at 50°C [122°F].

**Actual output torque**

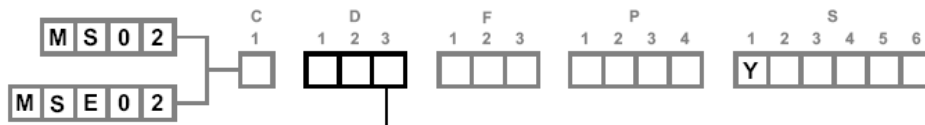
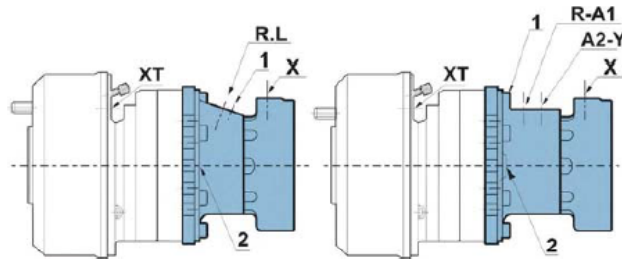


The starting torque is taken to be approximately 85% of the first value for available pressure. For a precise calculation, consult your Poclairn Hydraulics application engineer.



VALVING SYSTEMS

Hydraulic connections



		Standards	Power supply	Case drain	2 <sup>nd</sup> displacement control	Control of parking brake	Control of drum brake
			R-L	1 - 2		X	XT
	A	UNF (SAE) ISO 11 926-1	7/8"-14 UNF	3/4"-16 UNF		9/16"-18 UNF	
	3	Gaz (BSPP) ISO 1 179-1	G1/2	G3/8		G1/4	
	4	Metric ISO 9 974-1	M22x1.5	M18x1.5		M14x1.5	
			R-A	1 - 2	Y	X	
	A	UNF (SAE) ISO 11 926-1	7/8"-14 UNF	9/16"-18 UNF	9/16"-18 UNF	9/16"-18 UNF	
	3	Gaz (BSPP) ISO 1 179-1	G1/2	G1/4	G1/4	G1/4	
			R-A1-A2	1	2	X	
	A	UNF (SAE) ISO 11 926-1	7/8"-14 UNF	3/4"	9/16"	9/16"-18 UNF	
	3	Gaz (BSPP) ISO 1 179-1	G1/2	M18	M14	G1/4	
	4	Metric ISO 9 974-1	M22x1.5	G3/4	G1/4	M14x1.5	
		ISO 9 974-1					M10x1.0
Max. pressures		MS bar [PSI] MSE	450 [6 527] 400 [5 802]	2,5 [36]	30 [435]	30 [435]	120 [1 740]
Instantaneous pressure peaks resistance		bar [PSI]		15 [218]			

- You are strongly advised to use the fluids specified in brochure "Installation guide" N° 801478197L.
- To find the connections' tightening torques, see the brochure "Installation guide" N° 801478197L.



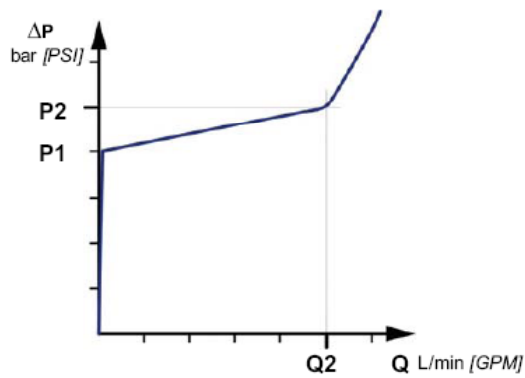
## Exchange



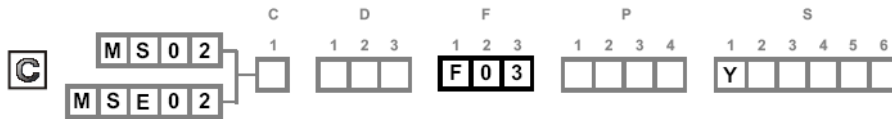
When a codification is requested, you must specify needed characteristics.

### - Fitted valve

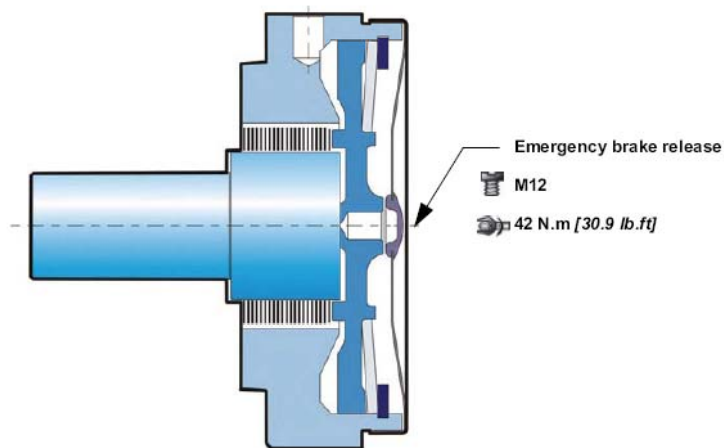
Opening pressure of selector bar [PSI]	P1 bar [PSI]	Q2 L/min [GPM]	P2 bar [PSI]
10,0±1,0 [145±14.5]	15 [218]	9,5±2,5 [2,51±0.66]	25 [363]
8,5±1,5 [123±21.75]	20 [290]	13,0±1,0 [3,43±0.26]	31 [450]
8,5±1,5 [123±21.75]	18 [261]	3,7±0,5 [0,98±0.13]	24 [348]



## BRAKES



## Rear brake



## Brake principle

This is a multidisc brake which is activated by a lack of pressure. The spring exerts a force on the piston, which presses on the fixed and mobile discs, and immobilizes the shaft. The braking torque decreases in linear proportion to the brake release pressure.

<b>C</b>	<b>F 0 3</b>
Parking brake torque at 0 bars on housing (new brake)	2 500 Nm [1 840 lb.ft]
Dynamic emergency braking torque at 0 bars on housing (max. 10 uses of emergency brakes)	1 625 Nm [1 200 lb.ft]
Residual parking braking at 0 bars on housing *	1 875 Nm [1 380 lb.ft]
Min. brake release pressure	12 bar [174 PSI]
Max. brake release pressure	30 bar [435 PSI]
Oil capacity	100 cm <sup>3</sup> [6,1 cu.in]
Volume for brake release	16 cm <sup>3</sup> [1,0 cu.in]
Max. energy dissipation	38 179 J

\* After emergency brake has been used



Do not run-in the multidisc brakes.

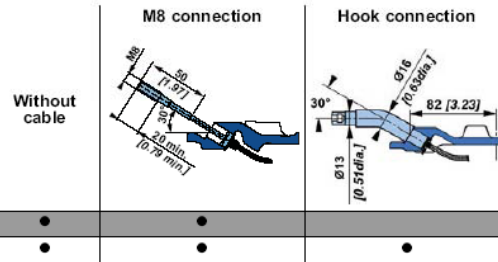
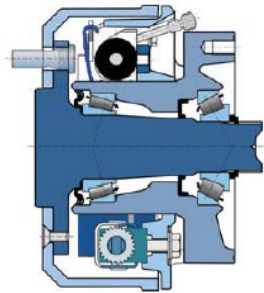
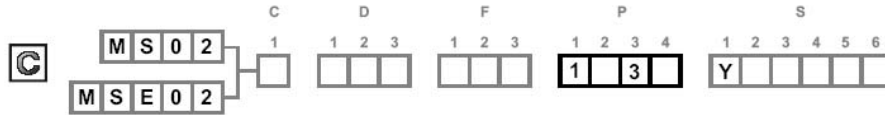


A functional check of the parking brake must be carried out each time it is used as an auxiliary brake (or emergency brake). For all vehicles capable of speeds over 25 km/hour, please contact your Poclairn Hydraulics application engineer.

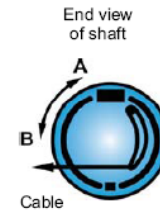


**Drum brake(200 x 40 or 203 x 60)**

Diameter of brake pads : Ø 200 [7.87 dia.] or Ø 203 [7.99 dia.]  
 Width of friction surface : 40 [1.57] or 60 [2.36]



Brake pads	200 x 40	203 x 60
Asbestos free material	BERAL 1106	BERAL 1117 or JURID 421
Compensation for wear	Automatic	Automatic
<b>Hydraulically controlled dynamic braking</b>		
Max. permissible continuous brake torque	780 N.m [575 lb.ft]	1 650 N.m [1 217 lb.ft]
Pressure to obtain max. permissible continuous brake torque	73 bar [1 059 PSI]	73 bar [1 059 PSI]
Max. permissible brake torque	1 300 N.m [959 lb.ft]	2 750 N.m [2 028 lb.ft]
Pressure to obtain max. permissible brake torque	120 bar [1 740 PSI]	120 bar [1 740 PSI]
<b>Fluid</b>		
Mineral	H Yes	K Yes
DOT 3/DOT4/SAE J1703	C J Yes	C L Yes
Max. volume required to bring pads into contact	1,2 cm <sup>3</sup> [0,07 cu.in]	2,3 cm <sup>3</sup> [0,14 cu.in]
<b>Mechanically controlled parking brake</b>		
Max. braking torque	1 300 N.m [959 lb.ft]	2 750 N.m [2 028 lb.ft]
Max permissible force on the cable	780 N [175 lb.ft]	1 650 N [371 lb.ft]
Force required to bring pads into contact	20 N [4 lb.ft]	37 N [8 lb.ft]
Stroke required to bring pads into contact	A 7,4 mm [0,29 "]	7,0 mm [0,28 "]
	B 8,5 mm [0,33 "]	8,5 mm [0,33 "]
Max. stroke before automatic brake adjustment	A 11,1 mm [0,44 "]	9,5 mm [0,37 "]
	B 12,8 mm [0,50 "]	10,5 mm [0,41 "]



The max. braking torque can only be obtained when the brake has been run in. Consult your Poclair Hydraulics application engineer.

**Control**

The drum brakes can be controlled hydraulically (service brake) and by a cable (mechanical control for parking brake).

Do not use hydraulic and mechanical brake controls simultaneously.

See also 'Wheel motor' section (thumbnail opposite)

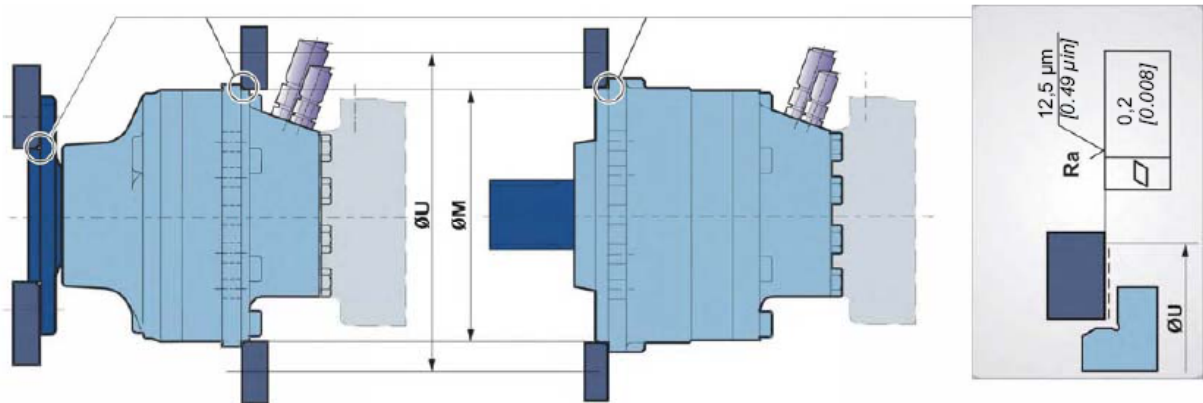


When making a codification request, you must indicate the following information:  
 - The material of the brake linings,  
 - Fill out the technical questionnaire for validation of the brake.





## INSTALLATION

### Customer's chassis and wheel rim mountings



Take care over the immediate environment of the connections.

ØU mm [in]	ØM <sup>(1)</sup> mm [in]		Class	 *
240,00 [9,45]	180,25 [7,10]	10 M12 x 1,75	10.9	120 N.m [89 lb.ft]
			12.9	145 N.m [107 lb.ft]

(1) +0,3 [+0,012]  
-0,2 [-0,008]

\* : Min. values for torque and load to be transmitted



You don't need to chamfer your chassis and wheel rim.



For more information see technical catalogue "Installation guide N° 801478197L.

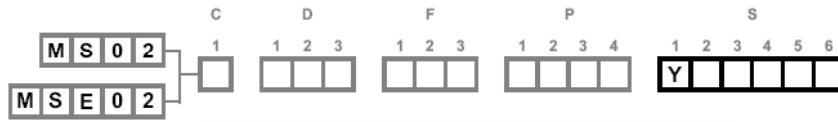


You are strongly advised to use the fluids specified in brochure "Installation guide" N° 801478197L.



To find the connections' tightening torques, see the brochure "Installation guide" N° 801478197L.

OPTIONS

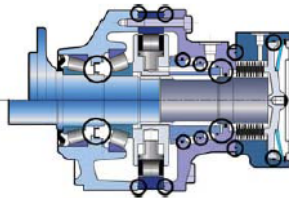


You can accumulate more than one optional part. Consult your Poclain Hydraulics sales engineer.

**Y Additional drain on valving systems (Steel plug) and Reinforced sealing**

**1 Fluorinated elastomer seals**

Nitrile seals marked in the figure below replaced by fluorinated elastomer seals.

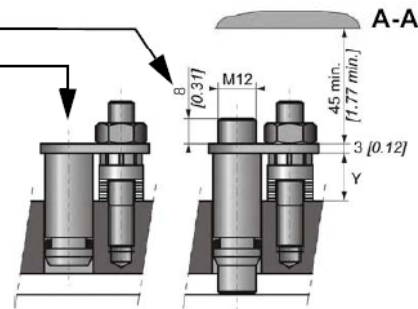
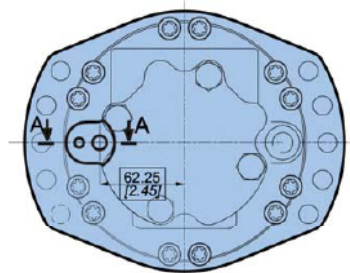


Consult your Poclain Hydraulics sales engineer.

**2 S 8 Installed speed sensor or predisposition**

Designation

T4 Speed sensor installed	2
TR Speed sensor installed (direction of rotation)	S
Predisposition for speed sensor	8



Max. length Y = 21,5 [0.85]  
Standard number of pulses per revolution = 40



Look at the "Mobile Electronic" N° A01889D technical catalogue for the sensor specifications and its connection.

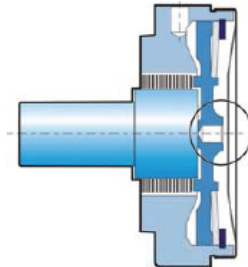


To install the sensor, see the "Installation guide" brochure No. 801478197L.



**3 Brake environmental cover without plug**

No plug or hole in the cover.



**6 Industrial support**

Reduction of around 50% from the rated value in the bearings' preload value. Without external loads, increases the lifetime of the bearing support.



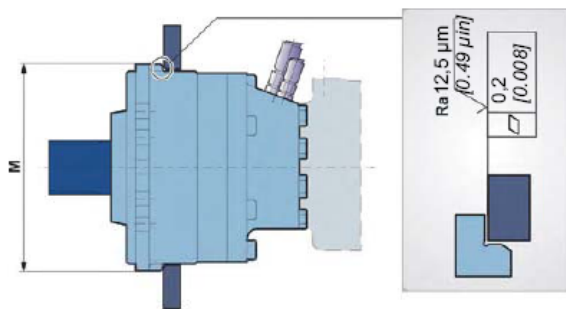
For a precise calculation, consult your Poclain Hydraulics application engineer.

**7 Diamond™**

Special treatment of the motor core which considerably increases its strength, making the motor much more tolerant to temporary instances of the operating conditions being exceeded.

**9 Chassis mounting on cam ring side**

Only available for shaft motors.

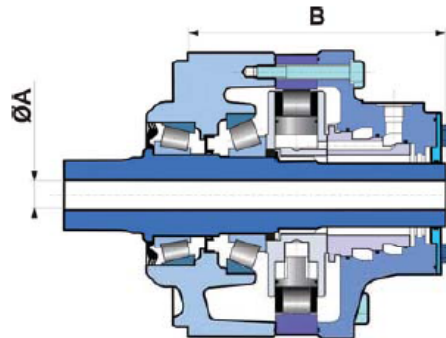


ØM <sup>(1)</sup>	10	Class	*
190,30 [7,49]	M12 x 1,75	10.9	120 N.m [89 lb.ft]
		12.9	145 N.m [107 lb.ft]

<sup>(1)</sup> +0,3 [+0,012]  
-0,2 [-0,008]

\* : Min. values for torque and load to be transmitted

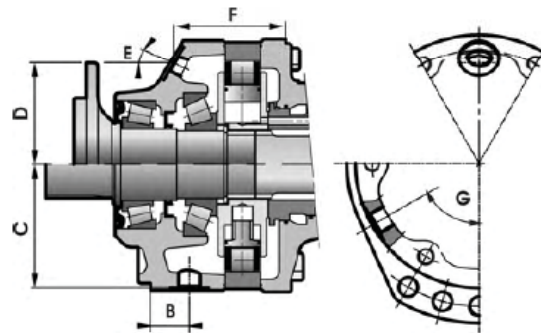
**A** Hollow shaft



A	B
mm [in]	mm [in]
Ø 15 [0,59 dia.]	175,2 ± 1,25 [6,90] ± [0,05]

Radial load x 0.75  
No torque transmittable to the rear

**B** Drain on the bearing support



	GAZ (BSPP) ISO 1179-1	B	C	D	E	F	G
		mm [in]	mm [in]	mm [in]		mm [in]	
Wheel motor	G1/4	—	—	73,1±0.5 [2,88±0.019]	25°	76,1±0.9 [3,00±0.035]	-
Shaft motor	G3/8	33±0.5 [1,3±0.019]	90±0.5 [3,54±0.019]	—	-	—	60°

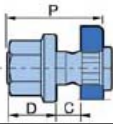
**D** Special paint or no paint

The motors are delivered with Poclairn Hydraulics yellow ochre primer as standard.



Consult your Poclairn Hydraulics application engineer for other colors of primer or topcoat.

### G Special wheel rim mounting



		P mm [in]	C min. mm [in]	C max. mm [in]	D mm [in]	Class	(1)* N.m [lb.ft]	(2)* N.m [lb.ft]
Various studs	M14x1.5	50 [1,97]	5 [0,20]	23 [0,91]	16,5 [0,65]	12.9	200 [147,5]	250 [184,4]
	M14x1.5	62 [2,44]		33 [1,30]				
	M16x1.5	50 [1,97]		23 [0,91]				
Screws	M10x1.25					10.9	73 [53,8]	
	M12x1.75					10.9	120 [88,5]	



Consult your Poclair Hydraulics sales engineer.

### H High efficiency

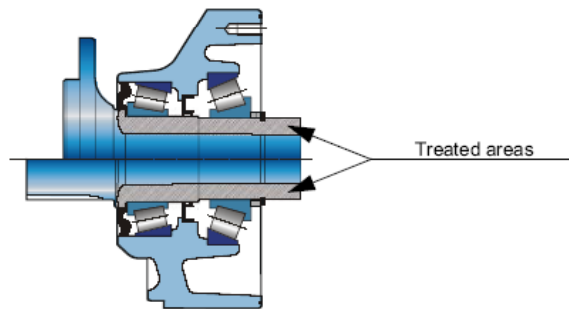
Reinforced piston sealing to improve volumetric efficiency.



For a precise calculation, consult your Poclair Hydraulics application engineer.

### J Treated shaft

Heat treatment on the indicated bearing radius and splines.



### M High speed or reduced charge pressure

Option M leads to:

- In the case of MS02: Reduction in charge pressure.
- In the case of MSE02: An increase in speed and a reduction in charge pressure.



For a precise calculation, consult your Poclair Hydraulics application engineer.



**P Customized identification plate**

Your part number can be engraved on the plate.



**Consult your Poclair Hydraulics application engineer for other possibilities.**