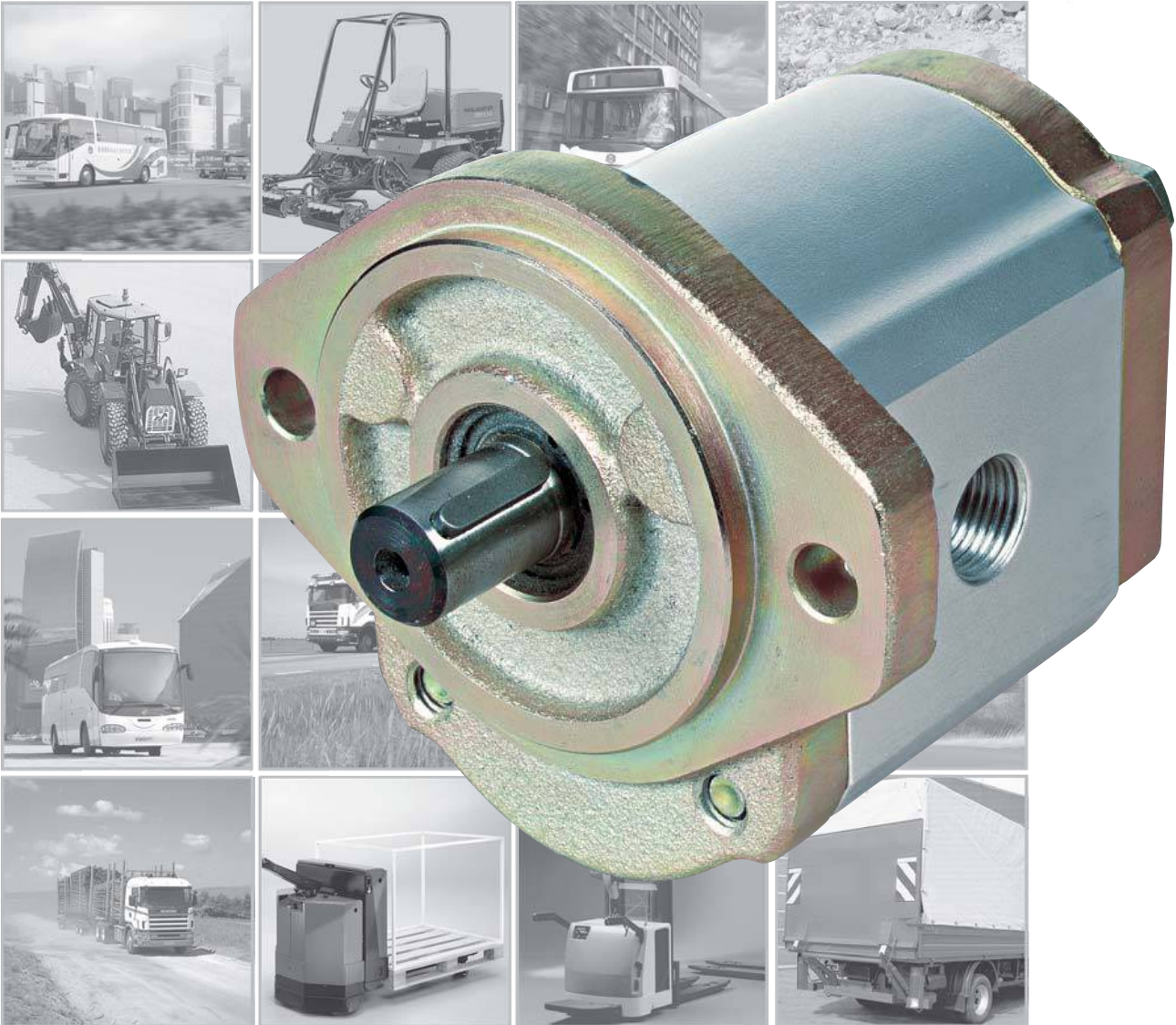
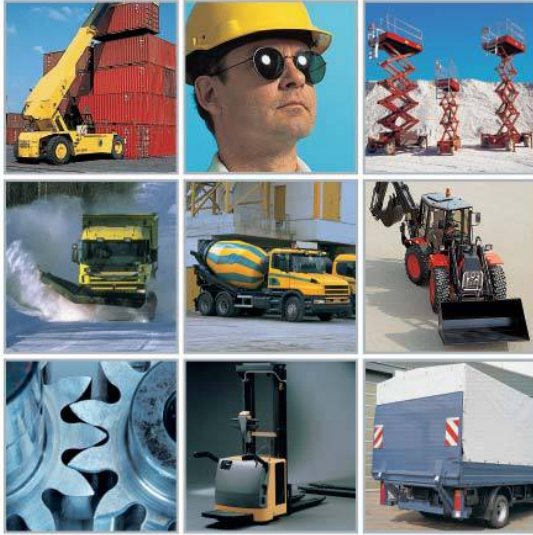




**HIGH PRESSURE GEAR MOTOR WM900**


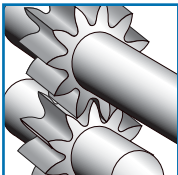




## THE POWER OF THE WM900 A SERIES

Concentric is one of the world's leading manufacturers of hydraulic pumps and motors. In recent years we have focused on important markets, such as materials handling and vehicles, and now the result is in a series of high-performance hydraulic motors. The WM900 series builds on the versatile technical platform represented by the W series.

WM900 High Pressure Gear Motors are optimised for demanding work, with harsh weather conditions, rugged operations and long service intervals. The WM900 series is a range of cost-efficient group II motors for all applications in which the customer's demands for quality and reliability are particularly high.

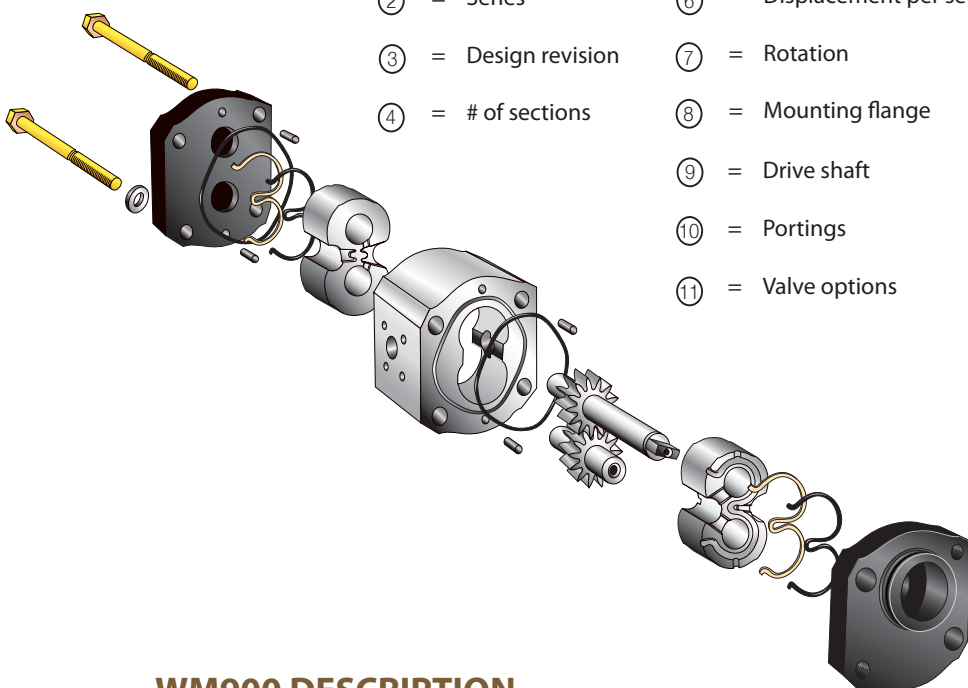
	<b>WM900 DESCRIPTION &amp; DATA</b>	<b>3</b>
	<b>FLANGE CODE 03, 06, 07, 07-001M, 07-001V, 10</b>	<b>4 - 9</b>
	<b>PORT SIZE SPECIFICATION</b>	<b>10 - 11</b>
	<b>PERFORMANCE CURVES</b>	<b>12 - 13</b>
	<b>DRAIN PORT &amp; SHAFT CAPABILITY</b>	<b>14</b>
	<b>INTEGRATED VALVE OPTIONS</b>	<b>15</b>

Model code example for a single motor

WM 09 A 1 C 080 R 03 BA 150 N

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪

- ① = Type
- ② = Series
- ③ = Design revision
- ④ = # of sections
- ⑤ = Seal material
- ⑥ = Displacement per section
- ⑦ = Rotation
- ⑧ = Mounting flange
- ⑨ = Drive shaft
- ⑩ = Portings
- ⑪ = Valve options



## WM900 DESCRIPTION

The WM900 motors are part of the W-family of gear motors, which represent the most advanced motor design from Concentric.

The basic motor is of a three-piece modular design. The motor body is manufactured from high strength aluminium alloy.

For optimum strength, gears and shafts are precision machined as one piece. The 13-tooth gear geometry has been optimised for low noise level. The patented axial pressure compensation ensures an excellent volumetric efficiency at all regular operating conditions (especially for motor applications in series).

Controlled internal oil flow results in continuous lubrication and heat exchange. This enables operation across a wide speed range at very high loads. All shaft-bearing surfaces are Teflon® coated and sizes are calculated for long service life. They also require low pressure to start the motor operation.

For applications with high radial loads and/or axial loads at the drive shaft motors are available with reinforced front bearings.

A wide range of mounting flanges and port sizes are available to meet European and international standards.

### General Data

Displacement V	6 - 31 cc/rev
Speed n	500 - 4000 rpm
Pressure	
rated pressure $P_I$	up to 276 bar
intermittent pressure $P_{II}$	up to 300 bar
peak pressure $P_{III}$	up to 330 bar
Operating temperatures t	up to 105° C
Average volumetric efficiency	97 %
The maximum values for n, $P_I$ and t for a given motor specification may be applied simultaneously dependent on selected motor and its specification.	

### Options

- SAE mounting flange, rectangular flanges, through bolt model
- Splined, tapered or straight shaft with key
- Threaded or flanged ports
- Reinforced front bearings
- Built-in valves and specials
- Fan drive motor

## PERFORMANCE DATA

### Operating pressure range

The motors will rotate also at differential pressure  $\Delta p < 25$  bar according to actual conditions. However, for specified motor performance data a continuous differential pressure of  $\Delta p > 25$  bar is required from inlet to outlet.

### Maximum pressure at inlet port

Type	Pressure (bar)		
	Rated. $p_I$	Intermitt. $p_{II}$	Peak $p_{III}$
WM09A1-060	276	300	330
WM09A1-080	276	300	330
WM09A1-110	276	300	330
WM09A1-140	276	300	330
WM09A1-160	276	300	330
WM09A1-190	276	300	330
WM09A1-230	221	245	265
WM09A1-270	185	203	220
WM09A1-310	170	185	200

Motors specified for *only one* direction (codes R or L) with internal drain cannot be loaded at their outlet port by back pressures which exceed the following limits:

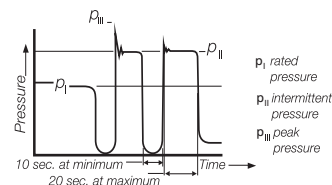
- $P = 1$  bar continuous (Buna),
- $P = 8$  bar short time (Viton).

If these pressure limits cannot be met you must use bi-directional motors (code B) with external

drain. For the external drain port the above mentioned back-pressure limits are still valid. Lead the drain line directly to the oil reservoir. Do not connect it to the return line with filters because of possible back-pressure peaks.

The bi-direction (code B) specified motors have an external drain port as standard, the above mentioned back-pressure limits are also valid for these motors.

Product has been tested to 1.000.000 cycles at  $p_I$ . Intermittent pressure  $p_{II}$  is permitted at max. 20 sec loaded following 10 sec minimum unloaded. Product has been tested to 500.000 cycles at  $p_{III}$ . Above represents performance, which can be expected from units incorporating flange port styles.



### Speed range

**Minimum speed for all motor sizes**  $n = 500$  rpm at  $\Delta p > 25$  bar.

**Maximum speed** depends on both motor size and selected ports (see charts from page 4 onwards).

### Noise performance

Data according to DIN 45 635.

Typical levels at 200 bar and 2300 rpm using mineral oil with viscosity of 40 mm<sup>2</sup>/s and at a temperature of 50° C:

WM09A1-080	WM09A1-160	WM09A1-230
60 dB(A)	65 dB(A);	68 dB(A)

### Hydraulic fluids

The use of HL- or HLP-hydraulic oils according to DIN 51 524 is recommended.

The permissible viscosity for all WM09 motors ranges from 750 to 10 mm<sup>2</sup>/s.

The recommended operating viscosity range is from 40 to 16 mm<sup>2</sup>/s. The permissible cold start viscosity is 2000 mm<sup>2</sup>/s. We recommend contacting Concentric before using fire resistant or bio-degradable fluids.

### Temperature range

Ambient temperature, min. -15° C  
max. +80° C

Fluid temperature,  
cont. operation, max. +90° C  
short term operation, max. +105° C

### Please note

Viscosity, when operating at above temperature limits, has to remain within the range specified under "Hydraulic Fluids".

### Fluid cleanliness

Fluid cleanliness according to ISO 4406/1986 Code 18/14 or better is required in order to assure the motor's high level of efficiency over a long period.

### Power take off

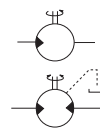
Flexible couplings are preferred for direct drives. For higher outboard side loads the motors are available with reinforced front bearing. See pages 7 and 8 as well as page 14.

### Mounting position

As required.

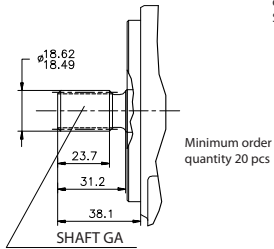
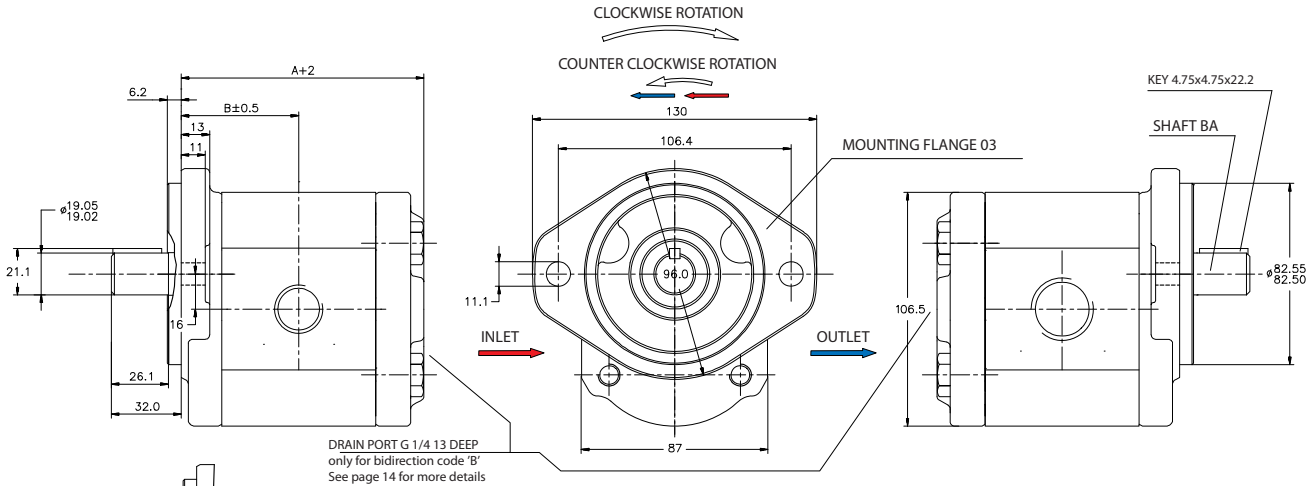
### Symbols

Single motor uni-directional  
Single motor bi-directional

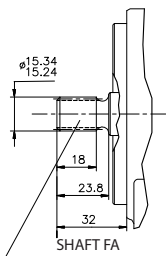




## FLANGE CODE 03 (SAE A 2 BOLT)



EXTERNAL INVOLUTE SPLINE  
16/32 DP, 11 TEETH,  
FLAT ROOT SIDE FIT



EXTERNAL INVOLUTE SPLINE  
16/32 DP, 9 TEETH,  
FLAT ROOT SIDE FIT  
MAX. TORQUE 87 NM

Model code example for a single motor

WM 09 A 1 C 080 R 03 BA 150 N  
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪

- ① = Type WM - Motor
- ② = Series 09 - 900
- ③ = Design revision A
- ④ = # of sections 1 - Single  
2 - Duplex
- ⑤ = Seal material C - Buna/Viton
- ⑥ = Displacement per section  
(See Code Displ. below)
- ⑦ = Rotation  
R - Clockwise  
L - Counter clockwise  
B - Bi-directional
- ⑧ = Mounting flange  
03 SAE A 2-bolt
- ⑨ = Drive shaft  
BA SAE A key Ø 0,75"  
GA SAE A Spline 11-t  
FA SAE A Spline 9-t
- ⑩ = Portings  
see page 10, 11
- ⑪ = Valve options N - None  
Options see page 15

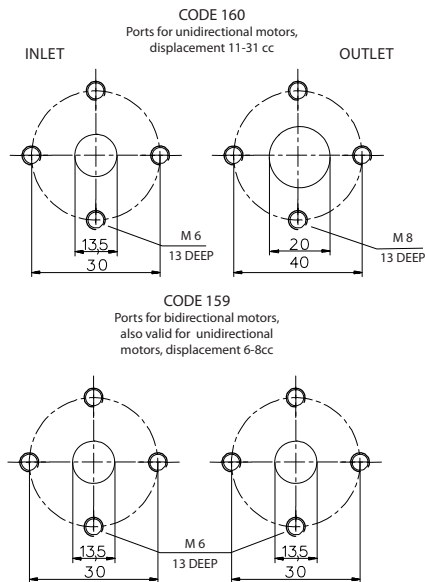
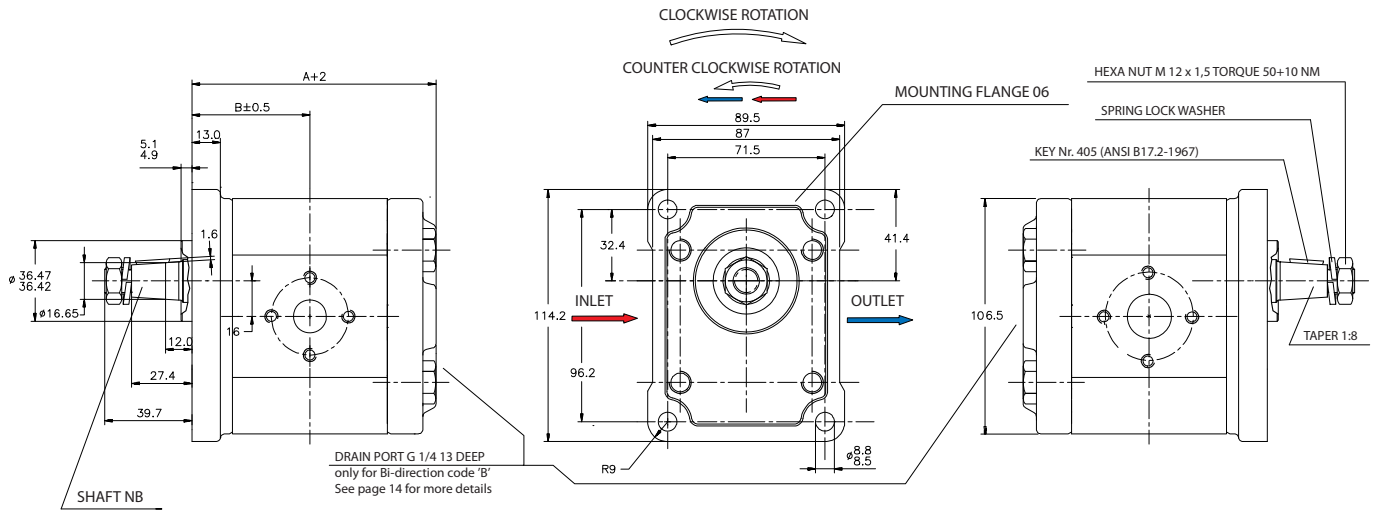
See page 14 for allowable external shaft load

Size	Differential pressure*		Torque at $\Delta p=10$ bar $M_i$ (Nm)	Speed Max/min n [rpm]	Flow, geom at n=1000 rpm Q (litre/min)	Dimensions		Weight (approx.) [kg]
	Max $\Delta p_i$ (bar)					A [mm]	B [mm]	
060 - 6,0cc	276	0.905	4000/500	6	91.6	44.0	3,8	
080 - 8,0cc	276	1.16	4000/500	8	94.6	45.5	3,9	
110 - 11,0cc	276	1.6	3600/500	11	99.0	47.7	4,1	
140 - 14,0cc	276	2.07	3500/500	14	103.5	50.0	4,2	
160 - 16,0cc	276	2.35	3300/500	16	106.4	51.4	4,3	
190 - 19,0cc	276	2.86	3300/500	19	110.9	53.7	4,4	
230 - 23,0cc	221	3.36	3000/500	23	116.8	56.6	4,6	
270 - 27,0cc	185	4.05	2800/500	27	122.7	59.6	4,8	
310 - 31,0cc	170	4.41	2500/500	31	128.7	62.6	5,0	

\* PLEASE NOTE: On threaded ports max pressure is limited to 210 bar for size 6,0 cc - 23,0 cc displ



## FLANGE CODE 06 (RECTANGULAR - SMALL PILOT DIA)



Model code example for a single motor

WM 09 A 1 C 080 R 06 NB 160 N  
 ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪

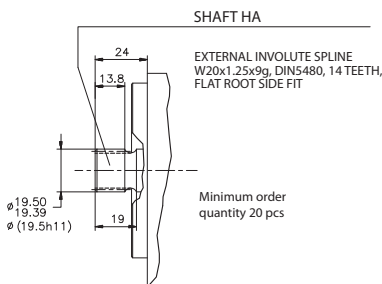
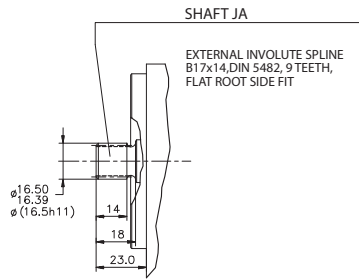
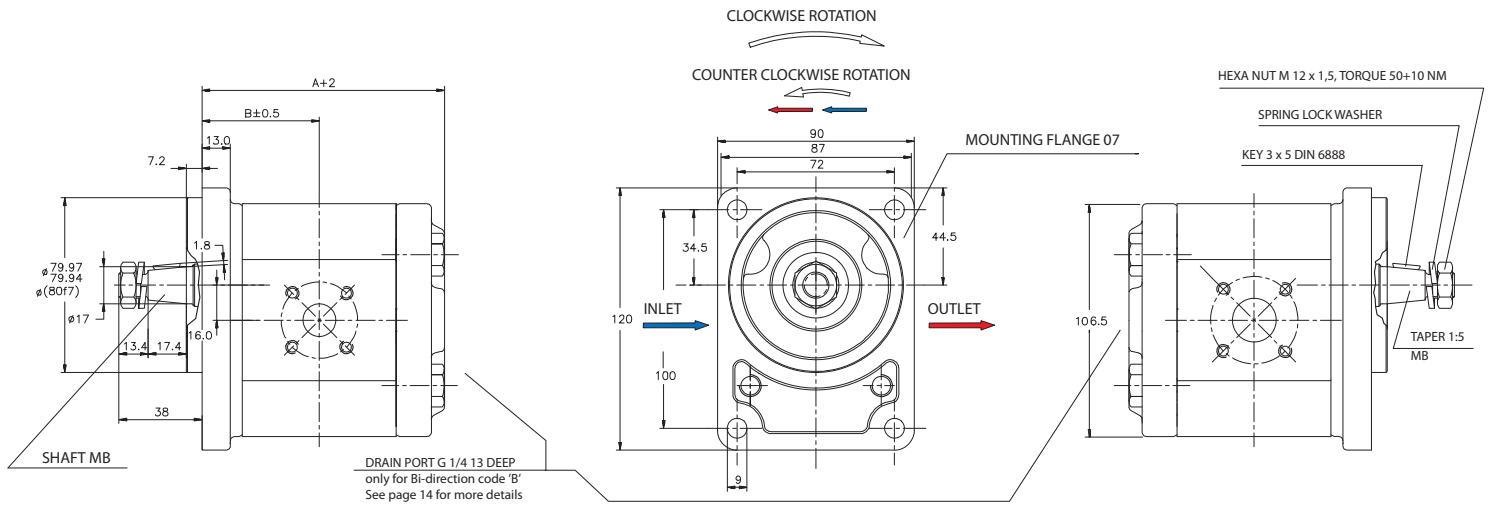
- ① = Type WM - Motor
- ② = Series 09 - 900
- ③ = Design revision A
- ④ = # of sections 1 - Single  
2 - Duplex
- ⑤ = Seal material C - Buna/Viton
- ⑥ = Displacement per section  
(See Code Displ. below)
- ⑦ = Rotation  
R - Clockwise  
L - Counter clockwise  
B - Bi-directional
- ⑧ = Mounting flange  
06 Rect. Ø 36,5 mm pilot
- ⑨ = Drive shaft  
NB European Tapered shaft 1:8
- ⑩ = Portings  
see page 10, 11
- ⑪ = Valve options N – None  
Options see page 15

See page 14 for allowable external shaft load

Size	Differential pressure		Torque at $\Delta p=10$ bar $M_t$ (Nm)	Speed Max/min $n$ [rpm]	Flow, geom at $n=1000$ rpm $Q$ (litre/min)	Dimensions		Weight (approx.) [kg]
	Max $\Delta p_1$ (bar)					A [mm]	B [mm]	
060 - 6,0cc	276		0.905	4000/500	6	91.6	44.0	3,8
080 - 8,0cc	276		1.16	4000/500	8	94.6	45.5	3,9
110 - 11,0cc	276		1.6	3600/500	11	99.0	47.7	4,1
140 - 14,0cc	276		2.07	3500/500	14	103.5	50.0	4,2
160 - 16,0cc	276		2.35	3300/500	16	106.4	51.4	4,3
190 - 19,0cc	276		2.86	3300/500	19	110.9	53.7	4,4
230 - 23,0cc	221		3.36	3000/500	23	116.8	56.6	4,6
270 - 27,0cc	185		4.05	2800/500	27	122.7	59.6	4,8
310 - 31,0cc	170		4.41	2500/500	31	128.7	62.6	5,0



## FLANGE CODE 07 (RECTANGULAR - LARGE PILOT DIA)



Model code example for a single motor

WM 09 A 1 C 060 R 07 MB 150 N  
 ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪

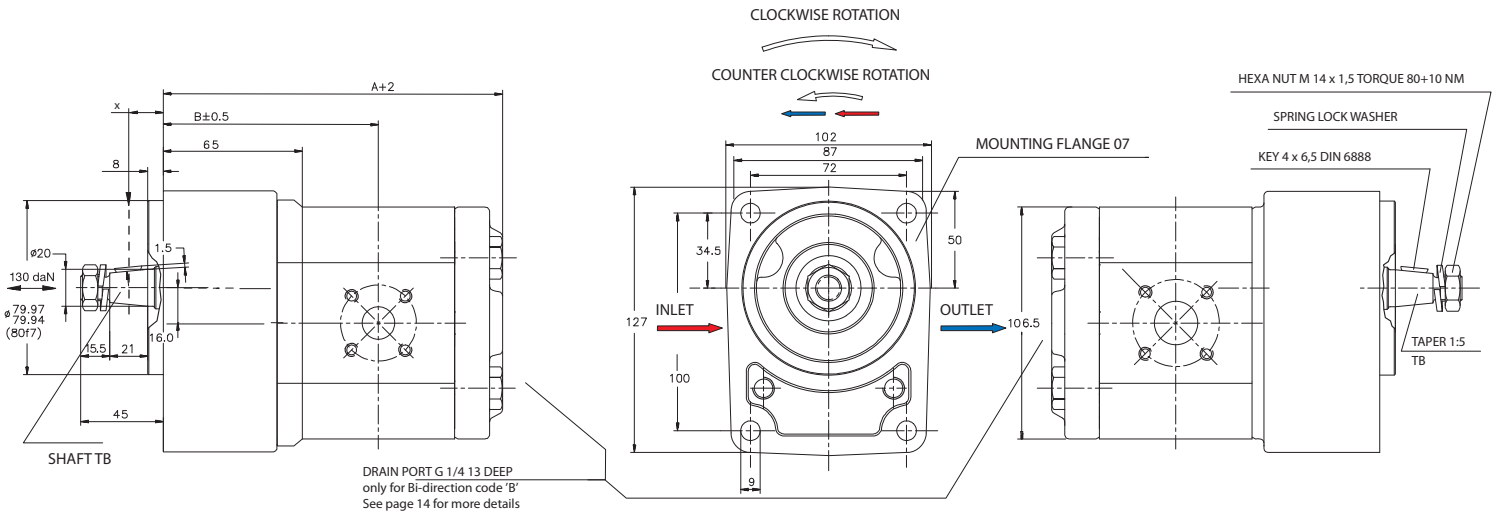
- ① = Type WM - Motor
- ② = Series 09 - 900
- ③ = Design revision A
- ④ = # of sections 1 - Single  
2 - Duplex
- ⑤ = Seal material C - Buna/Viton
- ⑥ = Displacement per section (See Code Displ. below)
- ⑦ = Rotation  
R - Clockwise  
L - Counter clockwise  
B - Bi-directional
- ⑧ = Mounting flange  
07 Rect.  $\phi$  80 mm pilot
- ⑨ = Drive shaft  
MB European Tapered shaft 1:5  
JA DIN 5482 Spline 9-t  
HA DIN 5480 Spline 14-t
- ⑩ = Portings  
see page 10, 11
- ⑪ = Valve options N - None  
Options see page 15

See page 14 for allowable external shaft load

Size	Differential pressure		Torque at $\Delta p=10$ bar $M_t$ (Nm)	Speed Max/min n [rpm]	Flow, geom at n=1000 rpm Q (litre/min)	Dimensions		Weight (approx.) [kg]
		Max $\Delta p_1$ (bar)				A [mm]	B [mm]	
060 - 6,0cc		276	0.905	4000/500	6	91.6	44.0	3,8
080 - 8,0cc		276	1.16	4000/500	8	94.6	45.5	3,9
110 - 11,0cc		276	1.6	3600/500	11	99.0	47.7	4,1
140 - 14,0cc		276	2.07	3500/500	14	103.5	50.0	4,2
160 - 16,0cc		276	2.35	3300/500	16	106.4	51.4	4,3
190 - 19,0cc		276	2.86	3300/500	19	110.9	53.7	4,4
230 - 23,0cc		221	3.36	3000/500	23	116.8	56.6	4,6
270 - 27,0cc		185	4.05	2800/500	27	122.7	59.6	4,8
310 - 31,0cc		170	4.41	2500/500	31	128.7	62.6	5,0



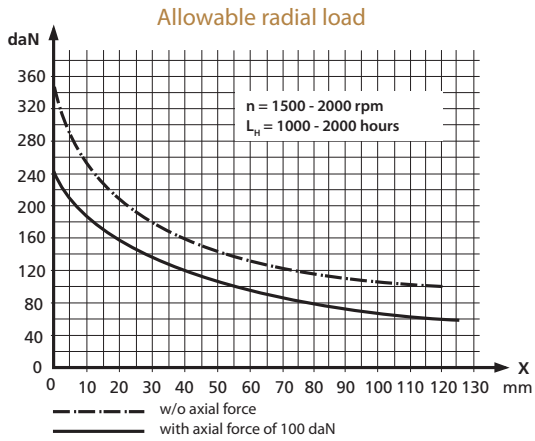
## FLANGE CODE 07 MODEL WITH REINFORCED FRONT BEARING, CODE 001M



Model code example for a single motor

WM 09 A 1 C 060 R 07 TB 150 N 001M  
 ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫

- ① = Type WM - Motor
- ② = Series 09 - 900
- ③ = Design revision A
- ④ = # of sections 1 - Single  
2 - Duplex
- ⑤ = Seal material C - Buna/Viton
- ⑥ = Displacement per section (See Code Displ. below)
- ⑦ = Rotation  
R - Clockwise  
L - Counter clockwise  
B - Bi-directional
- ⑧ = Mounting flange  
07 Rect. Ø 80 mm pilot
- ⑨ = Drive shaft  
TB European Tapered shaft 1:5
- ⑩ = Portings  
see page 10, 11
- ⑪ = Valve options N - None  
Options see page 15
- ⑫ = Reinforced front bearing 001M

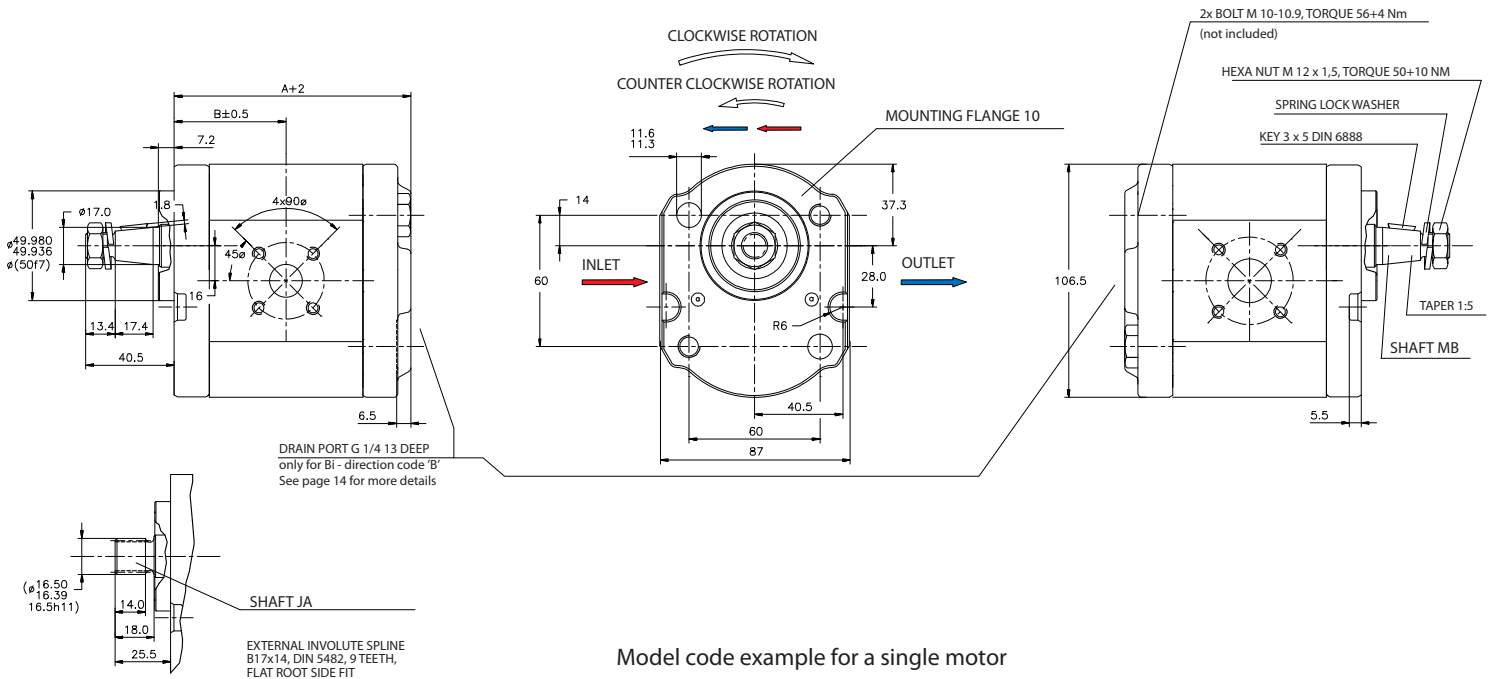


Size	Differential pressure		Torque at $\Delta p=10$ bar $M_t$ (Nm)	Speed Max/min n [rpm]	Flow, geom at n=1000 rpm Q (litre/min)	Dimensions		Weight (approx.) [kg]
	Max $\Delta p_1$ (bar)					A [mm]	B [mm]	
060 - 6,0cc	276		0.905	4000/500	6	123.1	75.5	3,8
080 - 8,0cc	276		1.16	4000/500	8	126.1	77.0	3,9
110 - 11,0cc	276		1.6	3600/500	11	130.5	79.2	4,1
140 - 14,0cc	276		2.07	3500/500	14	135.0	81.5	4,2
160 - 16,0cc	276		2.35	3300/500	16	137.9	82,9	4,3
190 - 19,0cc	276		2.86	3300/500	19	142.4	85.2	4,4
230 - 23,0cc	221		3.36	3000/500	23	148.3	88.1	4,6
270 - 27,0cc	185		4.05	2800/500	27	154.2	91.1	4,8
310 - 31,0cc	170		4.41	2500/500	31	160.2	94.1	5,0





## FLANGE CODE 10 THROUGH - BOLT



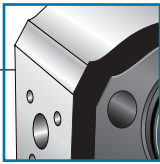
Model code example for a single motor

**WM 09 A 1 C 060 R 10 MB 150 N**  
 ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪

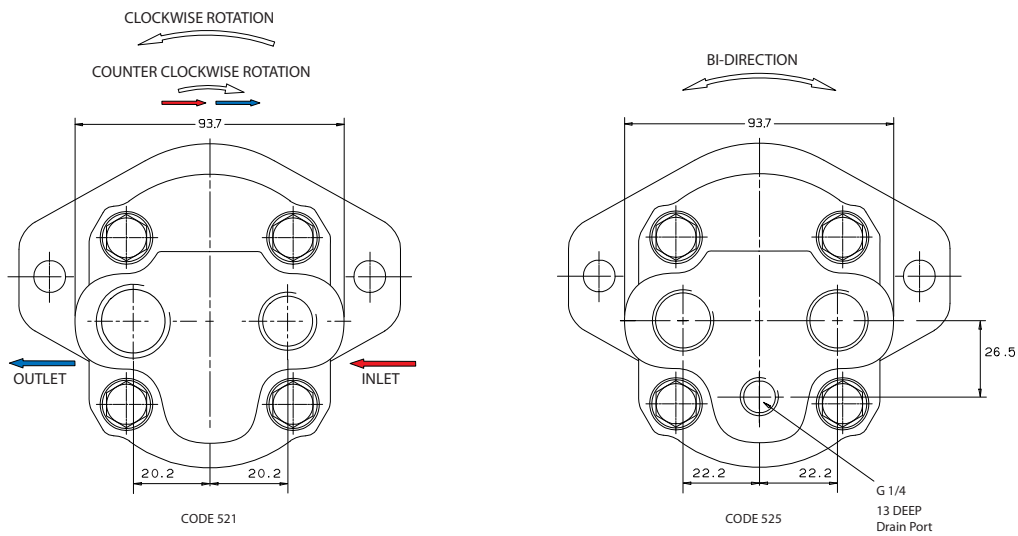
- ① = Type WM - Motor
- ② = Series 09 - 900
- ③ = Design revision A
- ④ = # of sections 1 - Single  
2 - Duplex
- ⑤ = Seal material C - Buna/Viton
- ⑥ = Displacement per section  
(See Code Displ. below)
- ⑦ = Rotation  
R - Clockwise  
L - Counter clockwise  
B - Bi-directional
- ⑧ = Mounting flange  
10 Through-bolt Ø 50 mm pilot
- ⑨ = Drive shaft  
MB European Tapered shaft 1:5  
JA DIN 5482 Spline 9-t
- ⑩ = Portings  
see page 10, 11
- ⑪ = Valve options N - None  
Options see page 15

See page 14 for allowable external shaft load

Size	Differential pressure		Torque at $\Delta p=10$ bar $M_t$ (Nm)	Speed Max/min $n$ [rpm]	Flow, geom at $n=1000$ rpm $Q$ (litre/min)	Dimensions		Weight (approx.) [kg]
	Max $\Delta p_i$ (bar)					A [mm]	B [mm]	
060 - 6,0cc	276	0.905	4000/500	6	89,1	41,5	3,6	
080 - 8,0cc	276	1.16	4000/500	8	92,1	43,0	3,7	
110 - 11,0cc	276	1.6	3600/500	11	96,5	45,2	3,9	
140 - 14,0cc	276	2.07	3500/500	14	101,0	47,5	4,2	
160 - 16,0cc	276	2.35	3300/500	16	103,9	48,9	4,3	
190 - 19,0cc	276	2.86	3300/500	19	108,4	51,2	4,4	
230 - 23,0cc	221	3.36	3000/500	23	114,3	54,1	4,6	
270 - 27,0cc	185	4.05	2800/500	27	120,2	57,1	4,8	
310 - 31,0cc	170	4.41	2500/500	31	126,2	60,1	5,0	



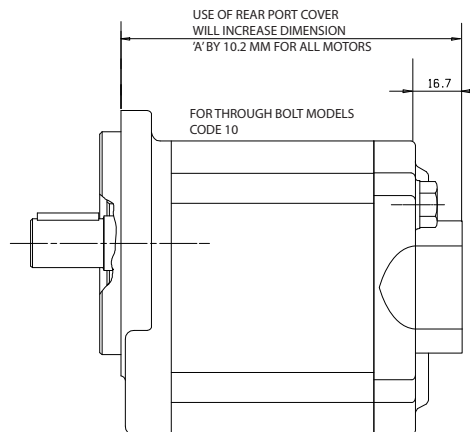
## DIMENSIONS FOR REAR PORTS



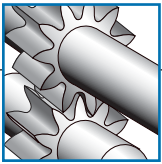
Rear port end cover can be combined with all flange and shaft options.

All technical data from the preceding and following pages apply to this model, except maximum speed (see table below).

Note always maximum pressure dependent on type, shaft and specials.



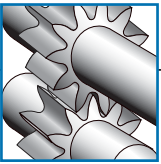
Size	Rated pressure (bar)	Maximum speed (rpm) Port code 521/525	Weight (approx.) [kg]
060 - 6,0cc	can be taken from Tables on pages 4-8	4000	4,0
080 - 8,0cc		4000	4,1
110 - 11,0cc		3600	4,3
140 - 14,0cc		3300	4,4
160 - 16,0cc		3000	4,5
190 - 19,0cc		3000	4,6
230 - 23,0cc		2800	4,8
270 - 27,0cc		2600	5,0
310 - 31,0cc		2300	5,4



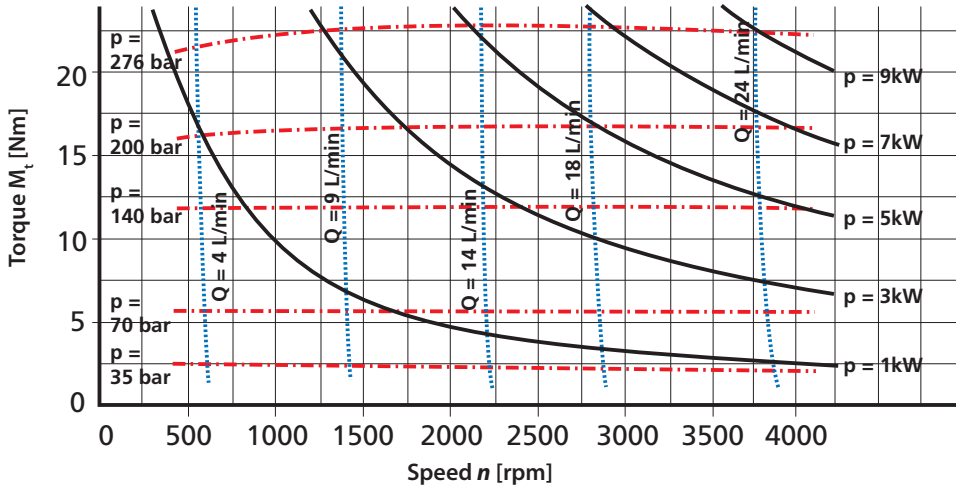
## PORT SIZE SPECIFICATION

Mounting flanges	Motor version	
	Bi-direction Code B	Direction Code R or L
	<p>Drain port</p> <p>G 1/4 13 DEEP</p>	<p>w/o drain port</p>
	<p>● INLET (is equal to) OUTLET ●</p>	<p>● INLET ● OUTLET</p>
03 07 10	<p><b>CODE 161</b></p> <p>WM09A1-060 WM09A1-080 WM09A1-110 WM09A1-140 WM09A1-160 WM09A1-190 WM09A1-230 optional*</p>	<p><b>CODE 150</b></p>
	<p>WM09A1-230 optional** WM09A1-270 WM09A1-310</p>	<p><b>CODE 151</b></p>
03	<p>WM09A1-060 WM09A1-080 WM09A1-110 WM09A1-140 WM09A1-160 WM09A1-190 WM09A1-230 optional*</p> <p><b>CODE 125***)</b></p>	<p><b>CODE 121***)</b></p>
	<p>WM09A1-230 optional** WM09A1-270 WM09A1-310</p> <p><b>CODE 126***)</b></p>	
03 06 07 10	<p><b>Rear ports</b></p> <p>WM09A1-060 WM09A1-080 WM09A1-110 WM09A1-140 WM09A1-160 WM09A1-190 WM09A1-230 WM09A1-270 WM09A1-310</p> <p><b>CODE 525</b></p> <p>Bi-direction Code B</p>	<p><b>CODE 521</b></p> <p>Direction Code R or L</p>

\*) up to  $n = 2800$  rpm    \*\*) up to  $n = 3500$  rpm    \*\*\*) threaded side ports can affect the fatigue lifetime of motor housings. Do not use fittings with metal sealing edge. Do not overtorque the fitting.

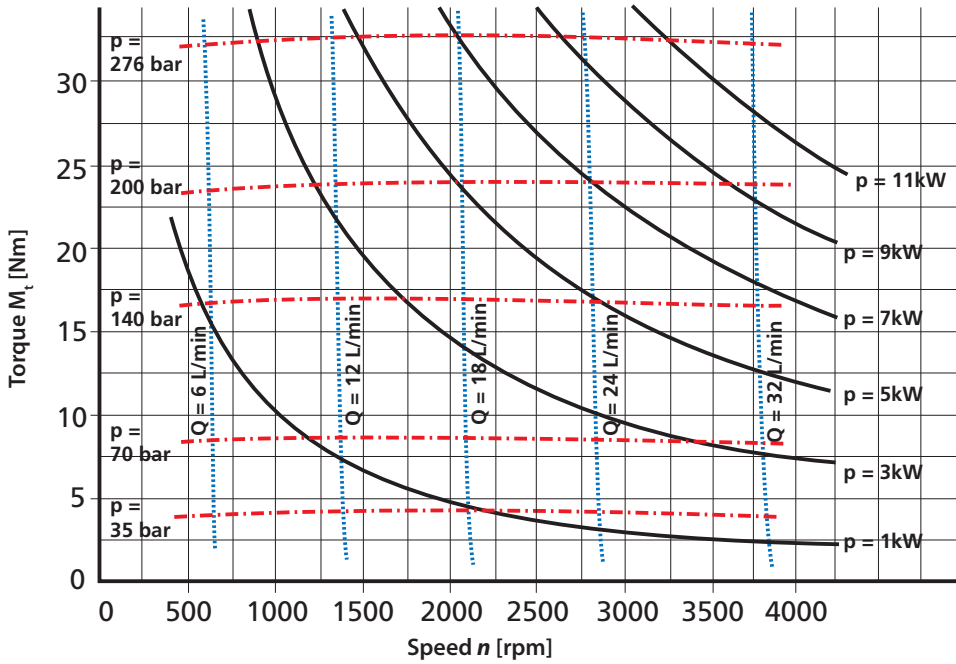


## PERFORMANCE CURVES



### WM09A1-060

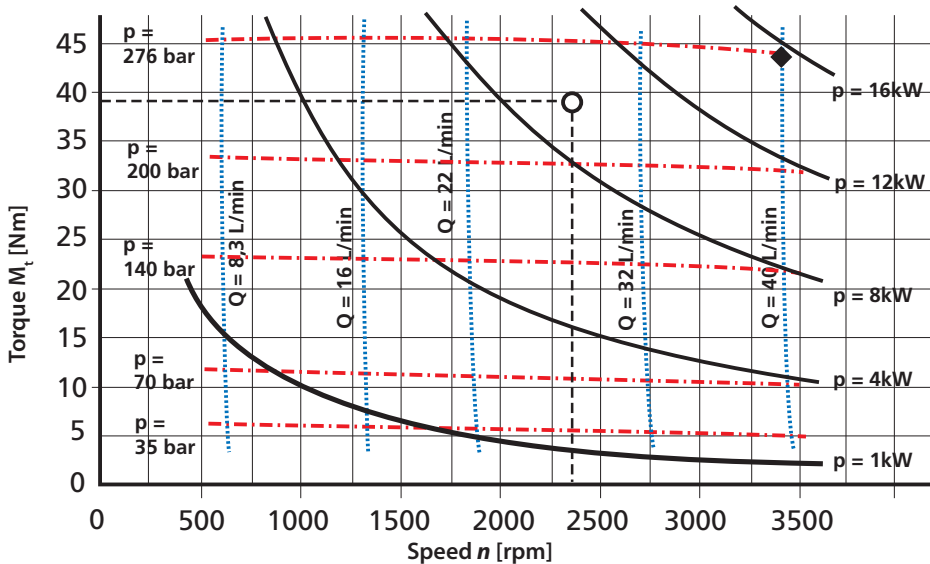
All curves on page 12 and 13 refer to an oil viscosity of  $30\text{ mm}^2/\text{s}$  at an oil temperature of  $t = 50^\circ\text{C}$



### WM09A1-080

See page 15 for formulas to calculate

- Torque
- Performance
- Flow
- Speed
- Differential pressure



### WM09A1-110

#### Example ○

given:  $n = 2300\text{ rpm}$   
 $P = 9\text{kW}$

selected displacement:  
 $V = 11\text{ cm}^3$

obtained by diagram:

$Q = \text{approx. } 27\text{ ltr/min}$   
 $\Delta p = \text{approx. } 245\text{ bar}$   
 $M_t = 39\text{ Nm}$

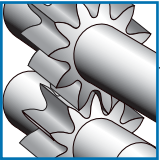
#### Example ◆

$M_t = 44\text{ Nm}$   
 $\Delta p = \text{approx. } 276\text{ bar}$   
 $n = 3400\text{ min}^{-1}$

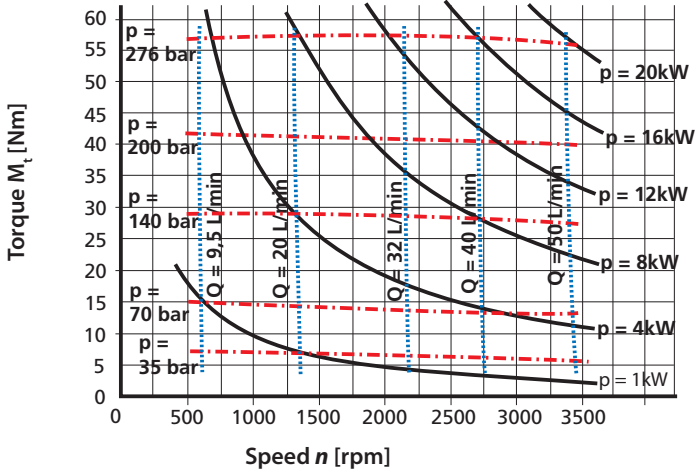
selected displacement:  
 $V = 11\text{ cm}^3$

obtained by diagram:

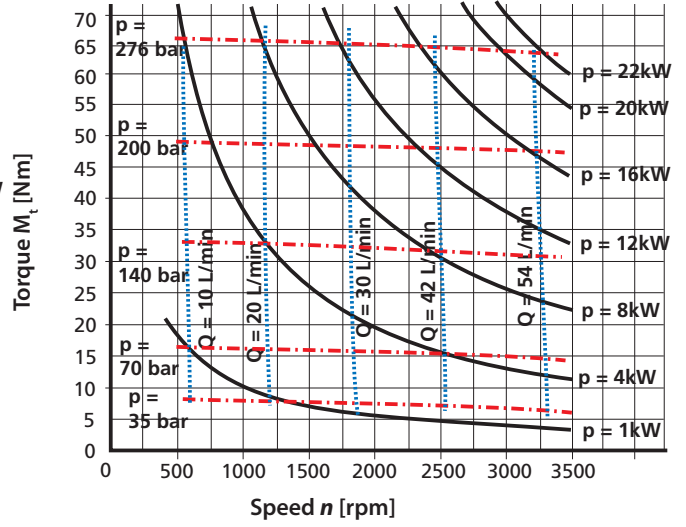
$P = \text{approx. } 15\text{ kW}$   
 $Q = \text{approx. } 40\text{ ltr/min}$



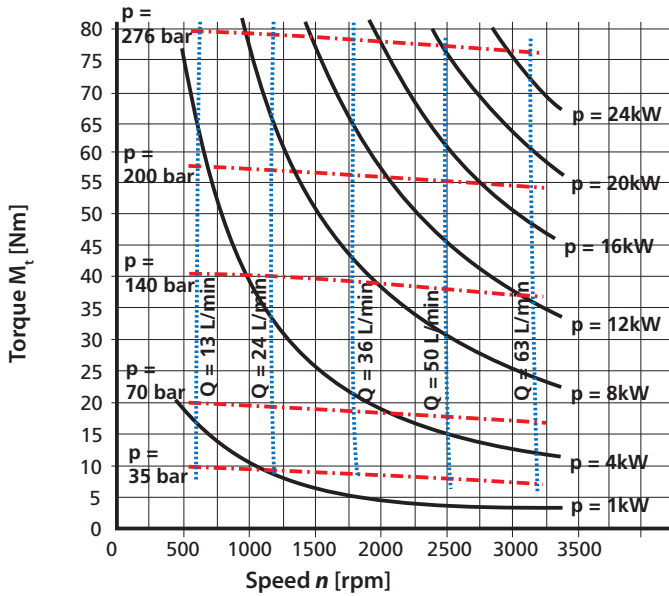
WM09A1-140



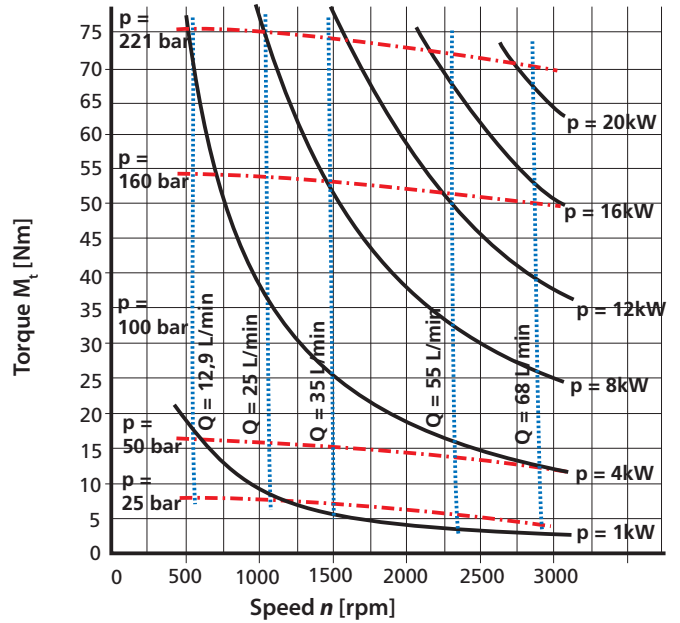
WM09A1-160



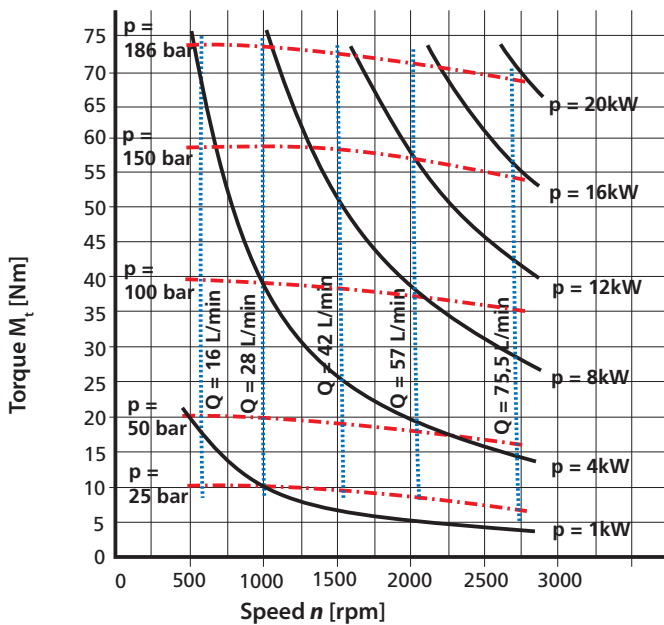
WM09A1-190



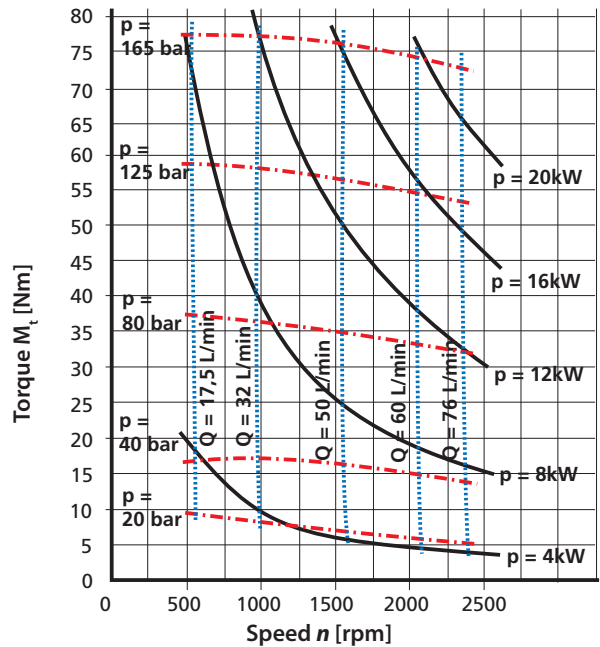
WM09A1-230

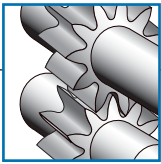


WM09A1-270



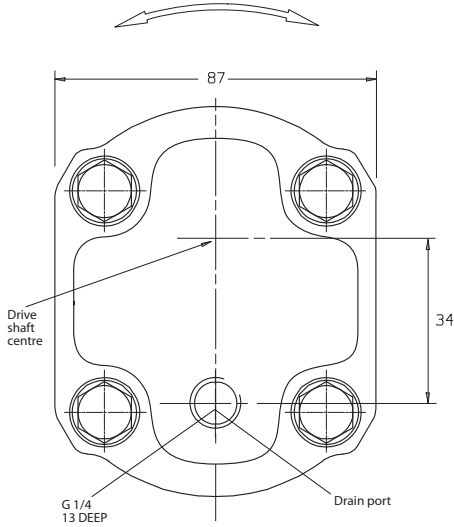
WM09A1-310



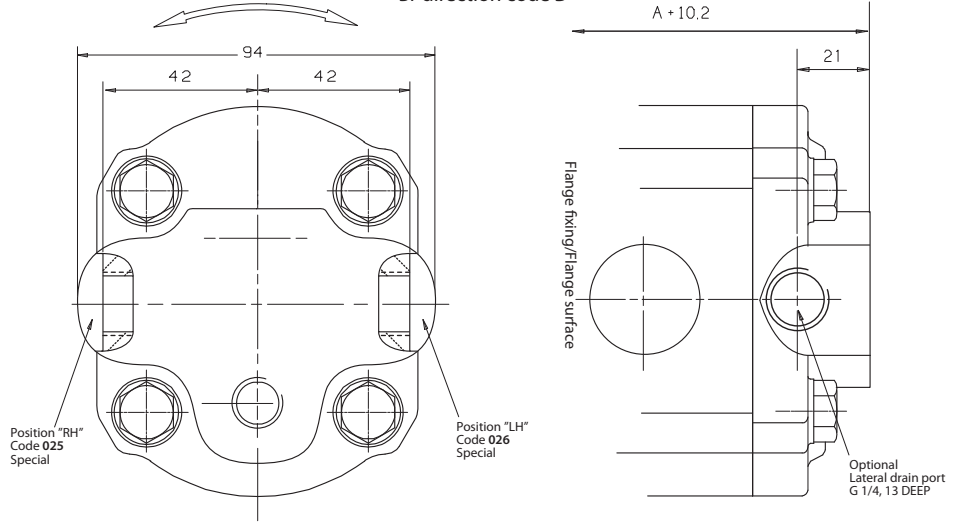


## DRAIN PORT POSITIONS FOR LATERAL INLET AND OUTLET

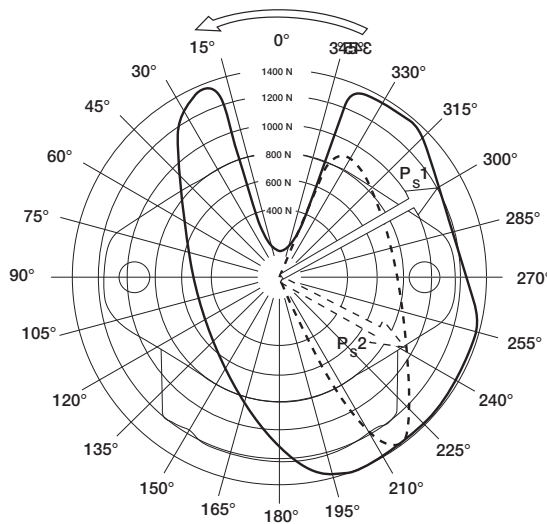
Drain port Standard position  
Bi-direction code B



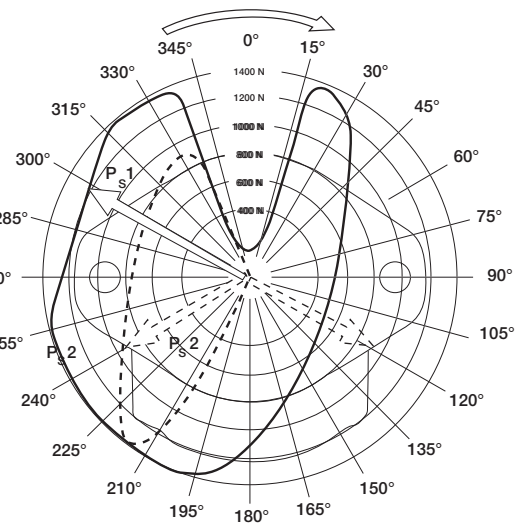
Option "Lateral drain port"  
Alternative position "RH" or "LH"  
Bi-direction code B



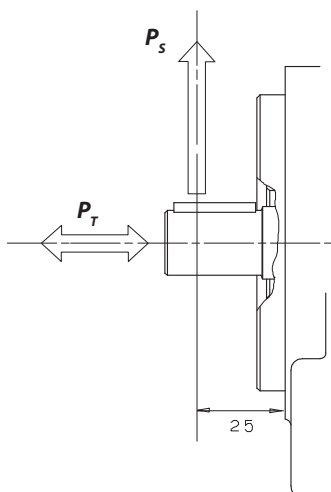
## ALLOWABLE RADIAL LOAD AND AXIAL LOAD AT DRIVE SHAFT (W/O REINFORCED FRONT BEARING)



Allowable radial load  $P_s$  dependent on direction of force related to motor for counter clockwise rotation, code L.



Allowable radial load  $P_s$  dependent on direction of force related to motor for clockwise rotation, code R.

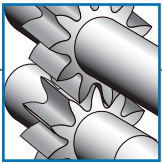


Maximum allowable axial force for both directions  
 $P_T = 700 \text{ N}$   
at viscosity of 10 cSt.

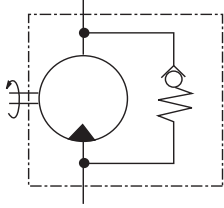
Sum of  $P_T + P_s$  does not exceed 1050 N if appear simultaneously.

Radial pre-load used at V-belt drive is not permissible for fluid motors w/o reinforced front bearing.

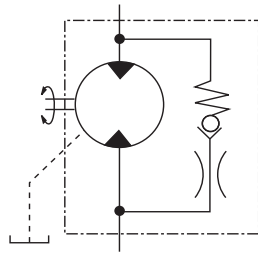
Size	Curve $P_{s1}$ < $\Delta p$ (bar)	Curve $P_{s2}$ > $\Delta p$ (bar)
060 - 6,0cc	276	-
080 - 8,0cc	276	-
110 - 11,0cc	276	-
140 - 14,0cc	200	200
160 - 16,0cc	200	200
190 - 19,0cc	160	160
230 - 23,0cc	160	160
270 - 27,0cc	125	125
310 - 31,0cc	100	100



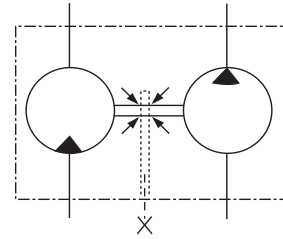
## MOTORS WITH BUILT-IN VALVE FEATURES FOR SPECIAL APPLICATIONS (options)



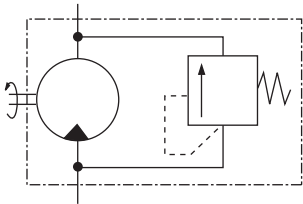
Hydraulic motor for one direction only with built-in anti-cavitation valve.



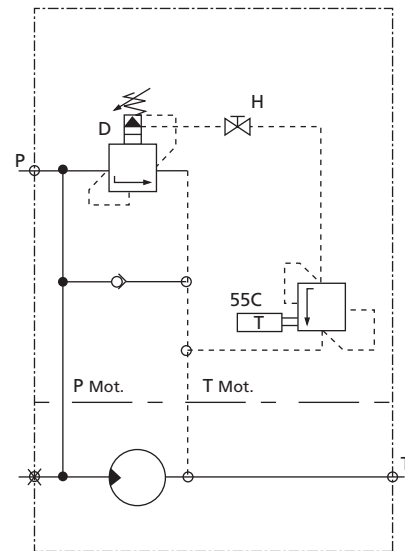
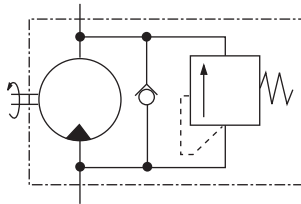
Hydraulic motor for one direction only with built-in anti-cavitation valve. Second direction with bypass-throttle.



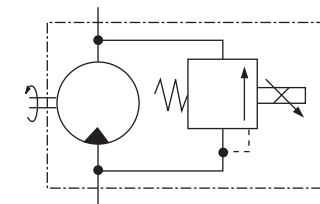
Solid motor-pump-unit for circuits for lubricant or coolant, if other pump drives are too sophisticated. Hydraulic fluid hermetically separated from others.



Hydraulic motor for one direction with built-in, non-adjustable pressure relief valve (left) and additional anti-cavitation valve (right). Both types are not released for serial circuits.



Hydraulic motor with thermo controlled bypass valve, pressure relief valve and anti-cavitation valve.



Hydraulic motor for one direction with internal proportional pressure relief valve and optional anti-cavitation valve.

## Formulas for calculating data of hydraulic motors

Torque  $M_{t_{eff}}$  [Nm]

$$M_{t_{eff}} = \frac{1,59 \cdot V [\text{cm}^3] \cdot p [\text{bar}] \cdot \eta_{\text{mech}}}{100}$$

Performance  $P$  [kW]

$$P = \frac{Q [\text{litre/min}] \cdot p [\text{bar}] \cdot \eta_{\text{total}}}{612}$$

Flow  $Q_{eff}$  [litre/min]

$$Q_{eff} = \frac{V [\text{cm}^3] \cdot n [\text{rpm}]}{\eta_{\text{volumetric}} \cdot 1000}$$

$V [\text{cm}^3]$  = geometric displacement, see charts

**PRODUCT RANGE**
**HE Powerpacks**

12/24/48 VDC 0.3 – 4.5 kW and  
0.75 – 3 kW AC modular power packs

**HE Box Powerpacks**

12/24/48 VDC modular powerpacks  
in weatherproof boxes

**Pressure Switches**

5 - 350 bar, connecting/disconnecting

**W100 Hydraulic pumps**

0,5 - 2,0 cc 227 bar

**W300 Hydraulic pumps**

0,8 – 5,7 cc 230 bar

**W600 Hydraulic pumps / motors**

3 – 12 cc 276 bar

**W900 Hydraulic pumps / motors**

5 – 31 cc/section 276 bar

**Calma The new quiet pumps**

6,2 - 23,7 cc/section 250 bar

**WQ900 The quiet pumps**

5 - 23 cc/section 230 bar

**WP900X Hydraulic pumps**

16 - 31 cc/section 276 bar

**W1500 Hydraulic pumps / motors**

19 - 50 cc/section 276 bar

**F12 FERRA Heavy duty pumps**

16 - 41 cc/section 276 bar

**F15 FERRA Heavy duty pumps**

19 - 50 cc/section 276 bar

**F20/F30 (LS) Hydraulic pumps / motors**

23 – 161 cc/section 276 bar

**GPA Internal Gear pumps**

1,7 – 63 cc/section 100 bar

**GC Hydraulic pumps / motors**

1,06 – 11,65 cc/section 276 bar

**D Hydraulic pumps**

3,8 – 22,9 cc/section 207 bar

**H Hydraulic pumps**

9,8 – 39,4 cc/section 207 bar

**II-Stage Hydraulic pumps**

4,2 – 22,8 cc/section 276 bar

**Rotary Flow Dividers**

3,8 – 13,3 cc/section 300 bar

**Transmission pumps**

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