

## A2FM (ISO) Bent Axis Motors -2022-

### ISO Mounting Flange High Pressure Bent Axis Motor

High Pressure Hydraulic Bent Axis Piston Motors, High Pressure, 450/500 BAR Working Pressure. High Rotational Speed, High Efficiency, Slim Design, Cast Iron Motor Body, Re-Designed in 2022.

#### Designation;

5cc, 10cc, 12cc, 18cc, 25cc, 32cc, 41cc, 50cc,  
56cc, 63cc, 80cc, 108cc, 125cc, 160cc, 180cc



Hidrapac **Store**

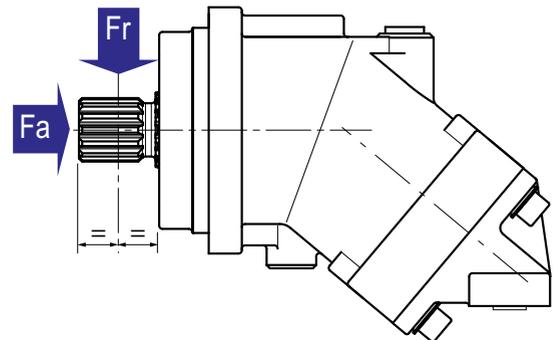
[www.HIDRAPAC.com.tr](http://www.HIDRAPAC.com.tr)

## Index

Cover.....	1
Index.....	2
A2FM Motors.....	3
Ordering Code of A2FM Motors.....	4
A2FM - <b>5 cc</b> (ISO) Bent Axis Motor.....	5
A2FM - <b>10 cc</b> (ISO) Bent Axis Motor.....	6
A2FM - <b>12 cc</b> (ISO) Bent Axis Motor.....	7
A2FM - <b>18 cc</b> (ISO) Bent Axis Motor.....	8
A2FM - <b>25 cc</b> (ISO) Bent Axis Motor.....	9
A2FM - <b>32 cc</b> (ISO) Bent Axis Motor.....	11
A2FM - <b>41 cc</b> (ISO) Bent Axis Motor.....	13
A2FM - <b>45 cc</b> (ISO) Bent Axis Motor.....	15
A2FM - <b>50 cc</b> (ISO) Bent Axis Motor.....	17
A2FM - <b>56 cc</b> (ISO) Bent Axis Motor.....	19
A2FM - <b>63 cc</b> (ISO) Bent Axis Motor.....	21
A2FM - <b>80 cc</b> (ISO) Bent Axis Motor.....	23
A2FM - <b>90 cc</b> (ISO) Bent Axis Motor.....	25
A2FM - <b>108 cc</b> (ISO) Bent Axis Motor.....	27
A2FM - <b>125 cc</b> (ISO) Bent Axis Motor.....	29
A2FM - <b>160 cc</b> (ISO) Bent Axis Motor.....	31
A2FM - <b>180 cc</b> (ISO) Bent Axis Motor.....	33
Special Shaft Drive.....	35
Direction of Rotation.....	36
Installation and Assemble Information.....	37
Formulas, Calculations.....	38
Complete Product Range.....	39
Contact Information.....	40

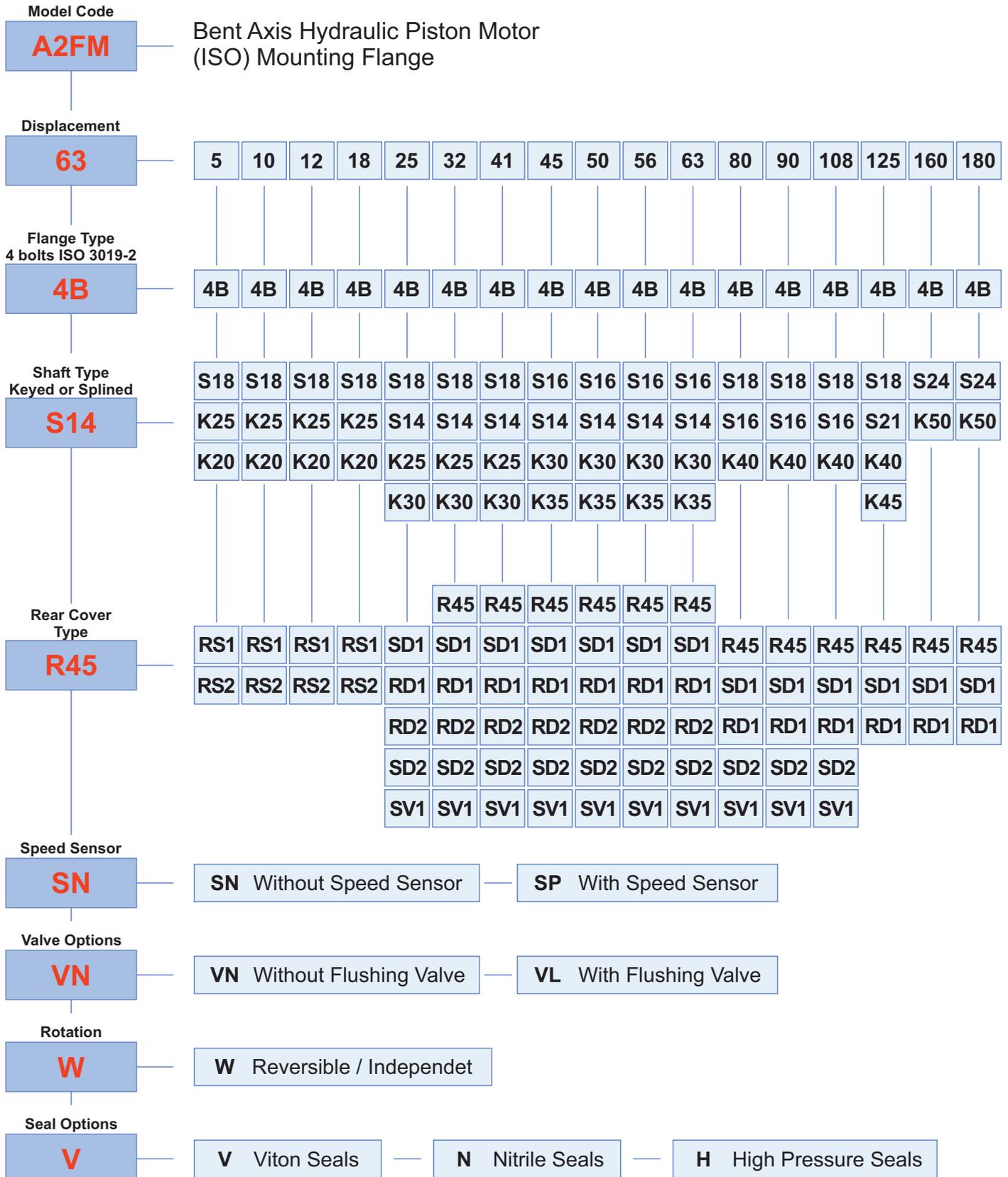
## Characteristics of the A2FM - ISO Flange Bent Axis Motors

MOTOR MODEL	DISPL. (cc)	CONTINUOUS MAX. SPEED (rpm)	INTERMITTENT MAX. SPEED (rpm)	MAX. FLOW ABSORBED (l/mn)	TORQUE BAR (m.N/bar)	TORQUE AT 350 BAR (m.N)	THEORETICAL MAX. POWER AT 400 BAR (HP / kW)	MAX. ALLOW PRESSURE CONTN./PEAK (bar)	WEIGHT (kg)
5 cc	5.1	8800	9600	45	0.09	46	64.1 / 48.2	400 / 450	5.2
10 cc	10.2	8600	9400	88	0.14	58	72.9 / 54.4	400 / 450	5.5
12 cc	12.0	8000	8800	96	0.19	67	85.5 / 64.4	400 / 450	5.5
18 cc	18.0	8000	8800	144	0.28	99	128.5 / 95.9	400 / 450	5.5
25 cc	25.0	6300	6900	158	0.40	139	140.0 / 104.4	400 / 450	11.4
32 cc	32.0	6300	6900	202	0.50	178	180.5 / 134.4	400 / 450	11.5
41 cc	41.0	5600	6200	230	0.65	228	205.2 / 153.1	400 / 450	11.6
45 cc	45.0	5600	6200	252	0.72	253	202.4 / 151.8	400 / 450	17.9
50 cc	50,3	5000	5500	252	0.80	280	224.1 / 167.5	400 / 450	18.1
56 cc	56,0	5000	5500	280	0.90	320	244.5 / 187.1	400 / 450	18.1
63 cc	63.0	5000	5500	315	1.00	351	281.6 / 209.1	400 / 450	18.2
80 cc	80,4	4500	5000	362	1.27	447	323.6 / 241.5	400 / 450	23.1
90 cc	90,1	4500	5000	405	1.43	500	361.5 / 269.9	400 / 450	23.2
108 cc	108	4000	4400	435	1.70	598	328.8 / 245.6	400 / 450	35.2
125 cc	125	3400	4400	428	2.00	698	382.6 / 284.6	400 / 450	38.8
160 cc	160	3400	4000	486	2.55	890	514.6 / 383.9	400 / 450	48.6
180 cc	180	3400	4000	612	2.86	1004	581.2 / 433.6	400 / 450	52.6



Motor model	5, 10, 12	18 cc	25 cc	32 cc	41, 45	50 cc	56, 63cc	80,90,108	125 cc	160, 180
Fr ( lbf )	630	900	1350	1462.5	1462.5	1686	2023	2812	3262	4500
Fr ( N/bar)	2800	4000	6000	6500	6500	7500	9000	12500	14500	20000
Fa ( lbf )	0.23	0.31	0.42	0.46	0.62	0.62	0.77	1.24	1.33	1.47
Fa ( N/bar)	(15)	(20)	(27)	(30)	(40)	(40)	(50)	(80)	(86)	(95)

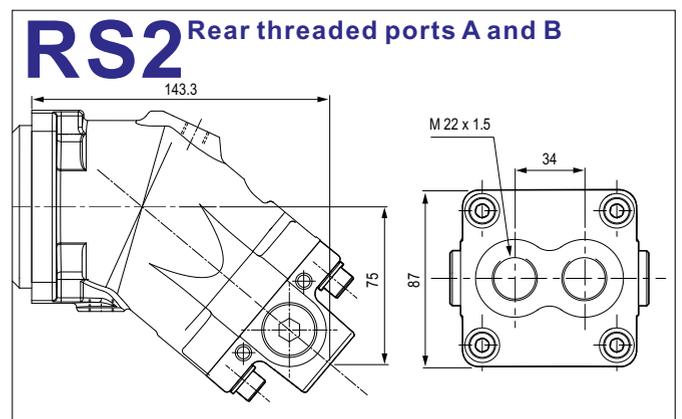
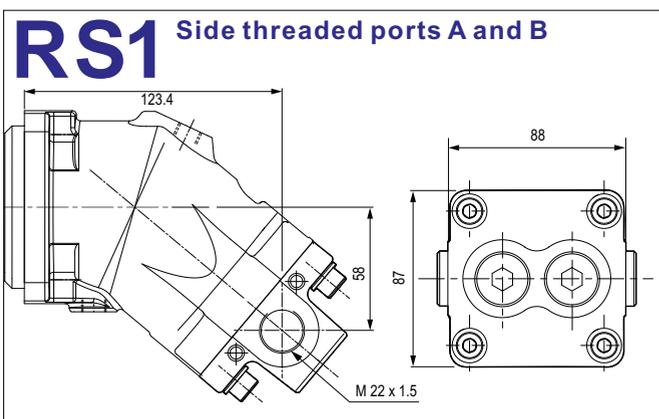
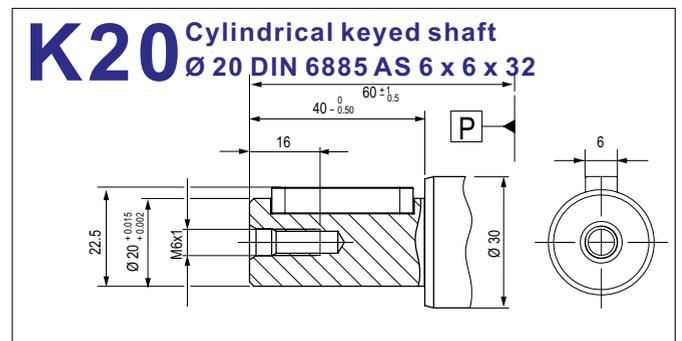
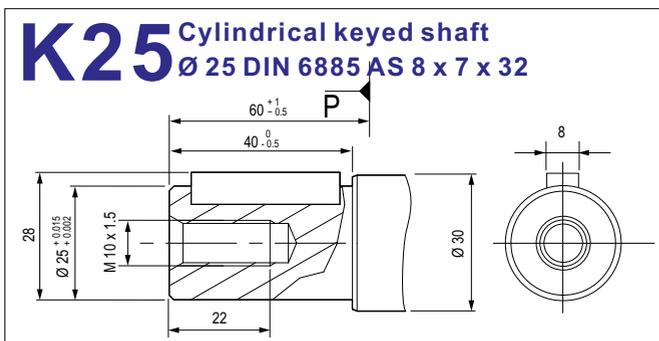
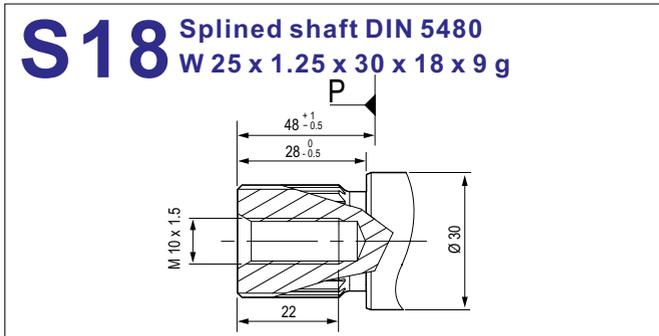
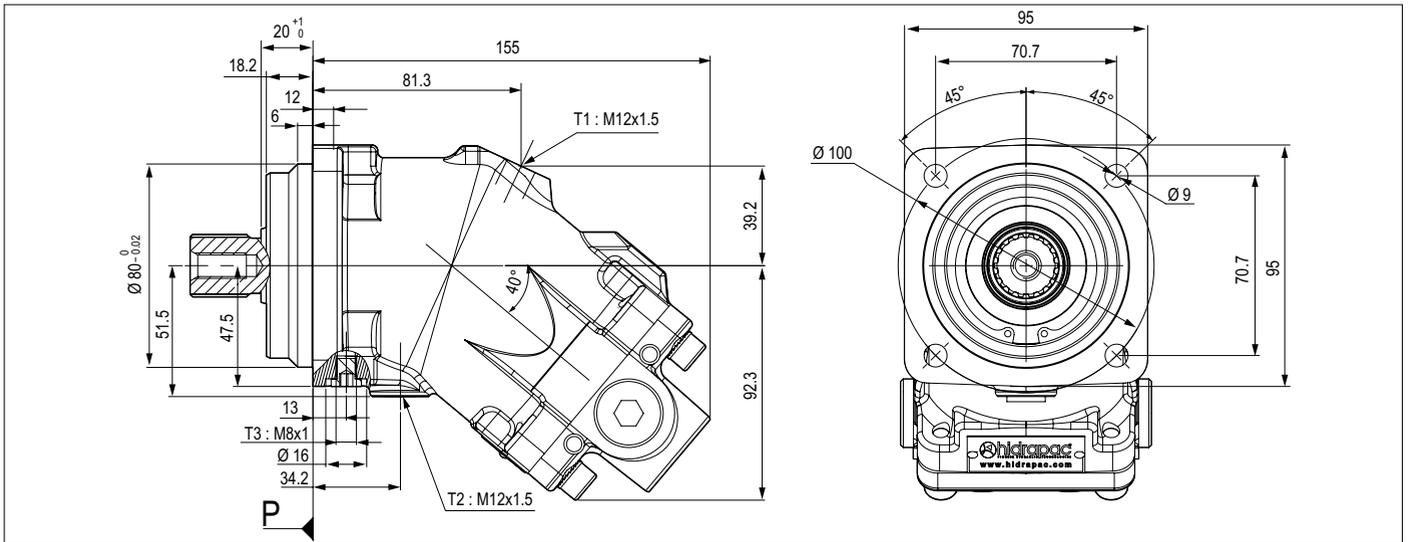
## Ordering Code; A2FM - ISO Flange Bent Axis Motors



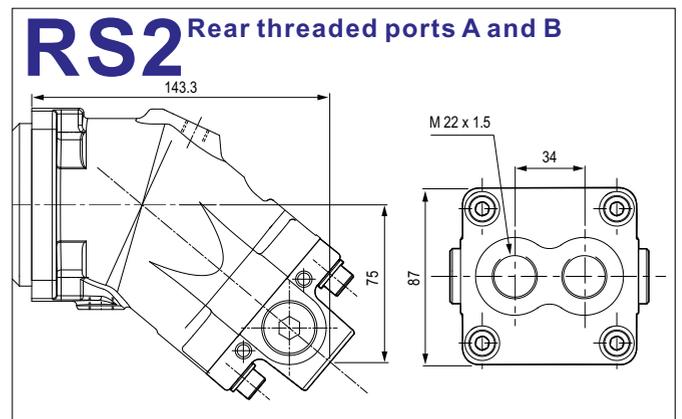
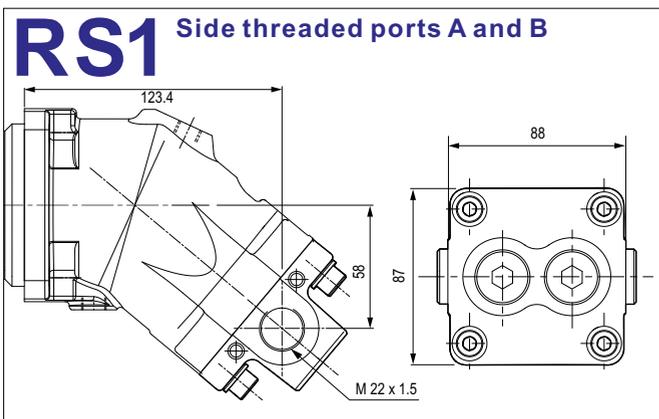
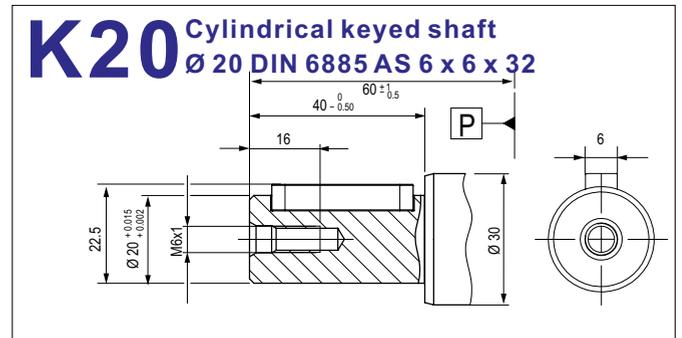
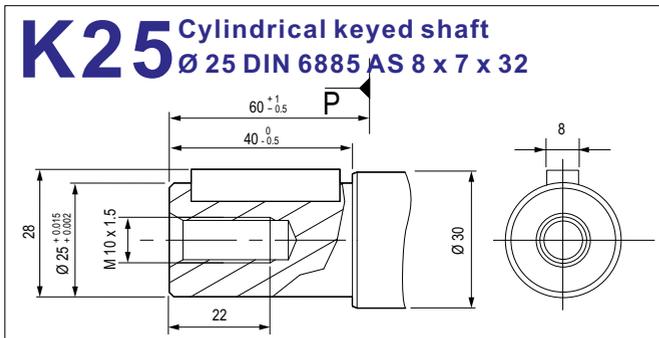
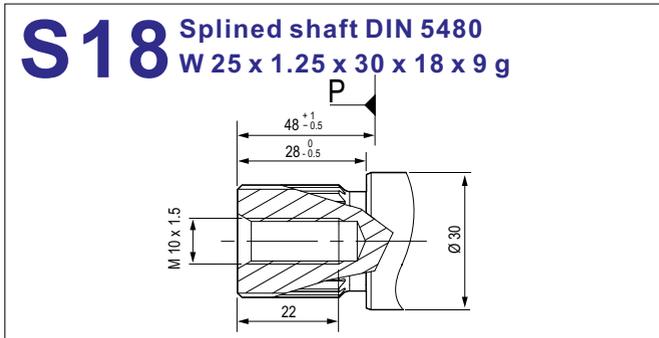
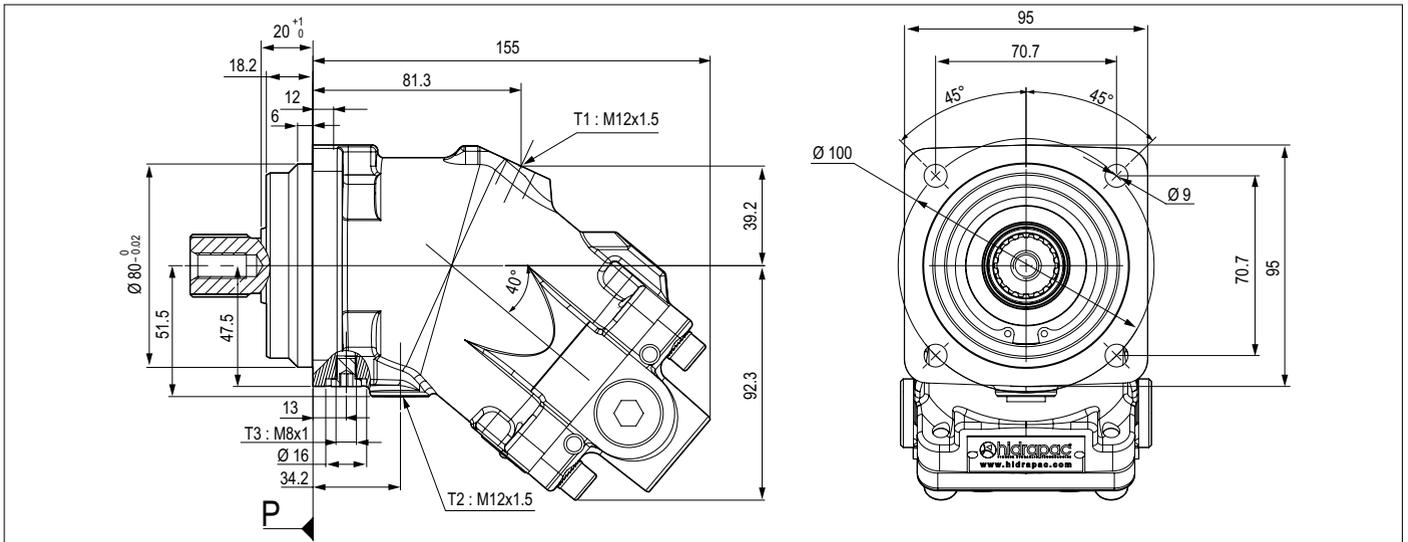




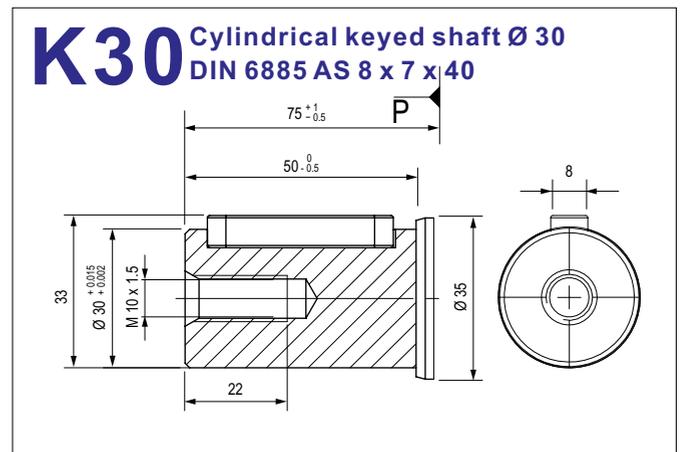
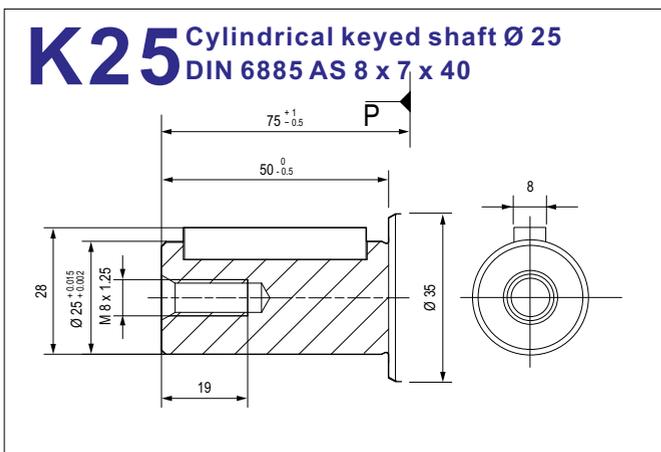
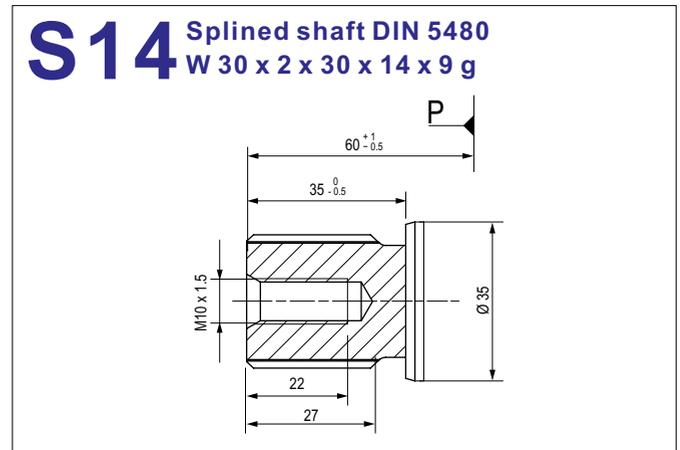
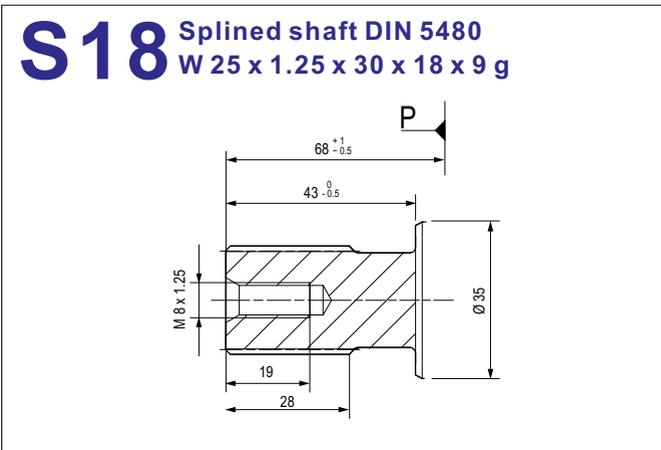
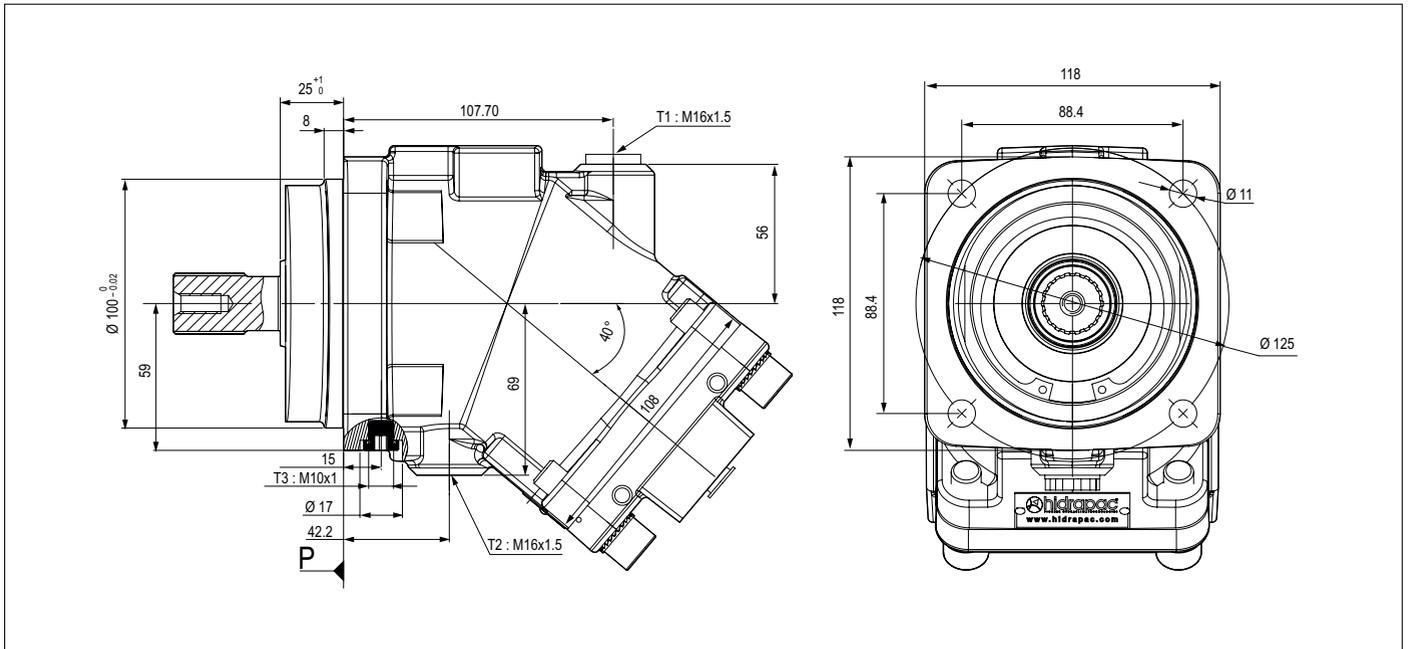
# A2FM - 12 cc (ISO) Bent Axis Motor

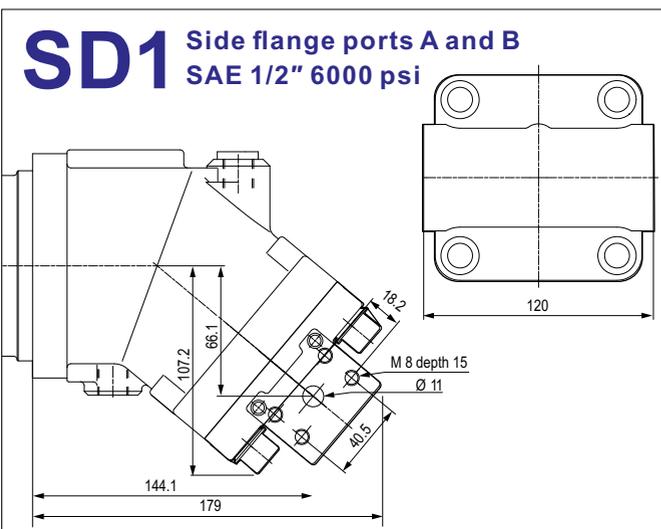
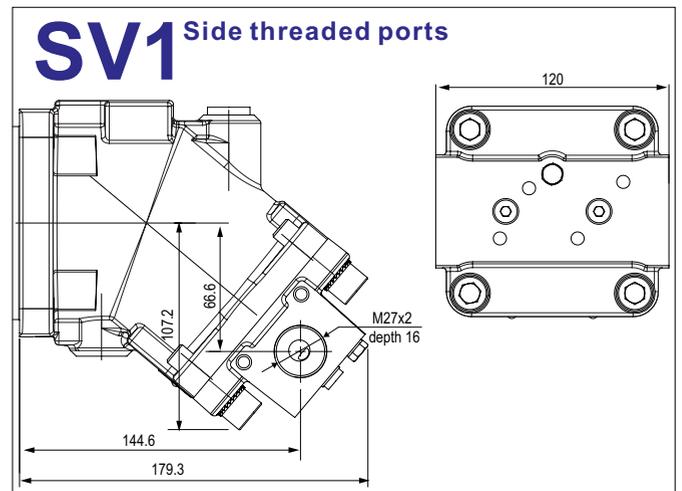
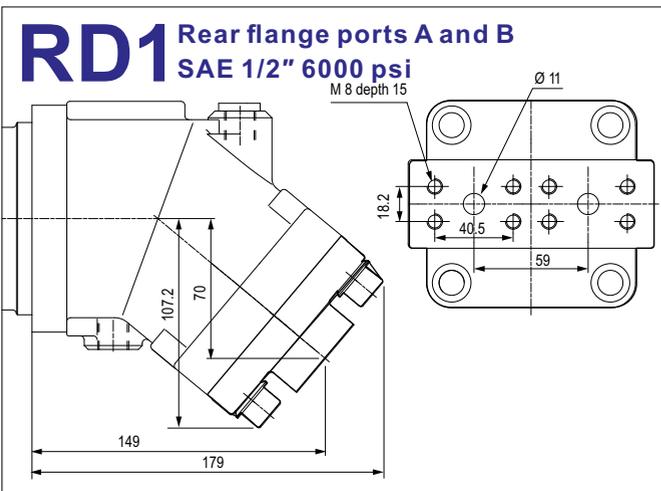
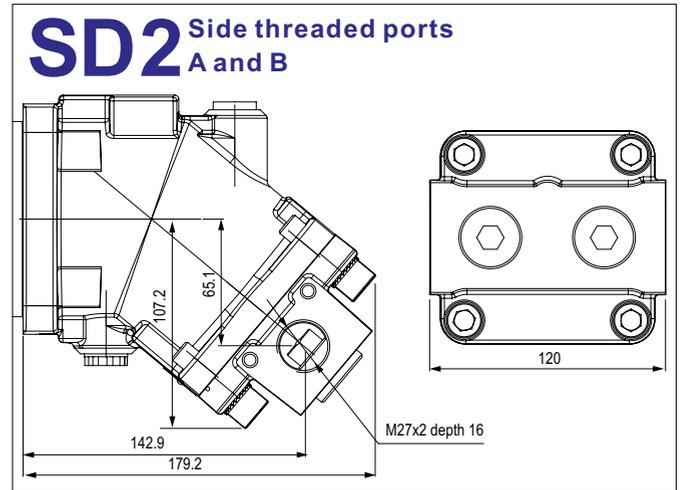
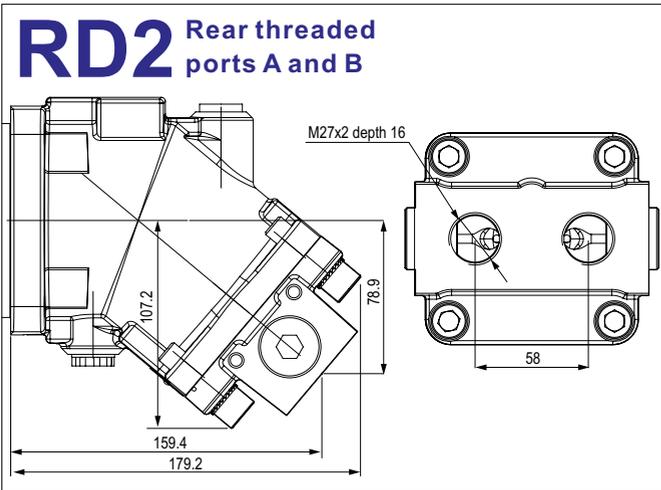


# A2FM - 18 cc (ISO) Bent Axis Motor

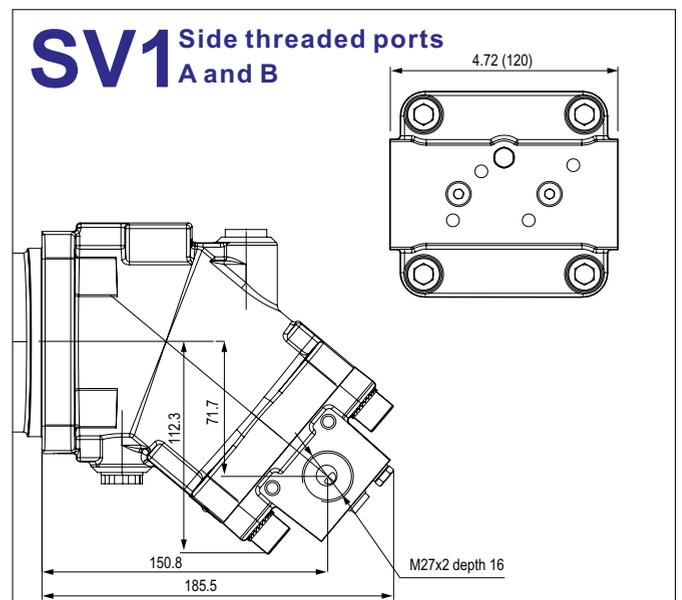
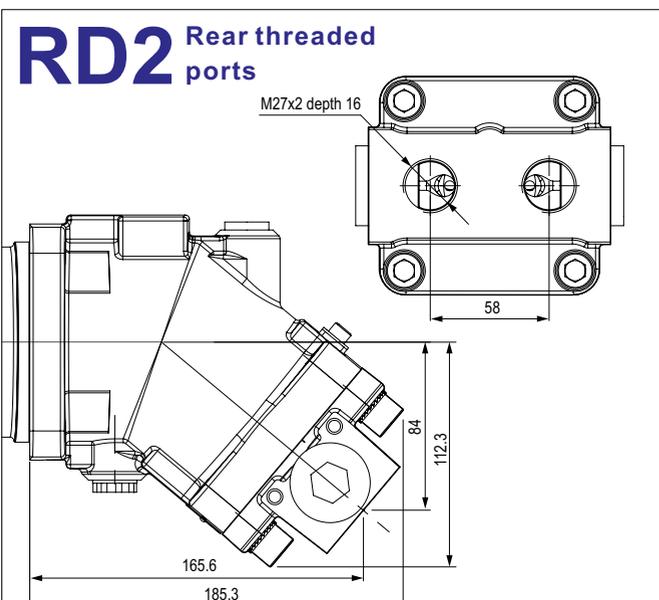
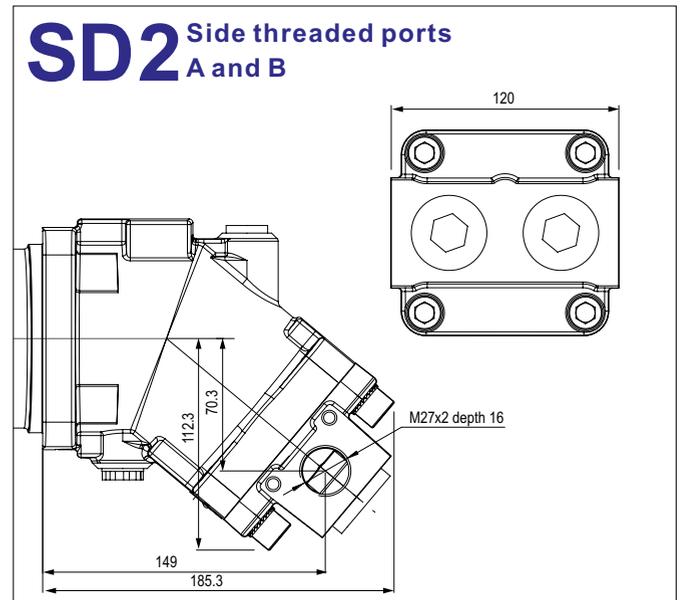
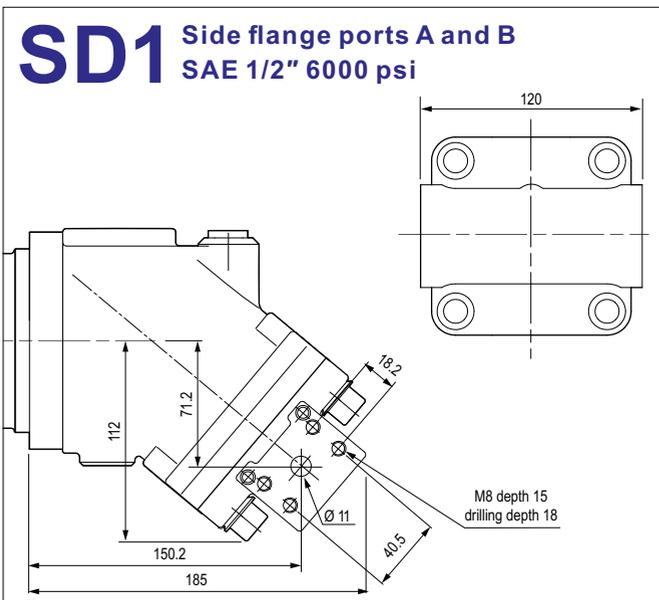
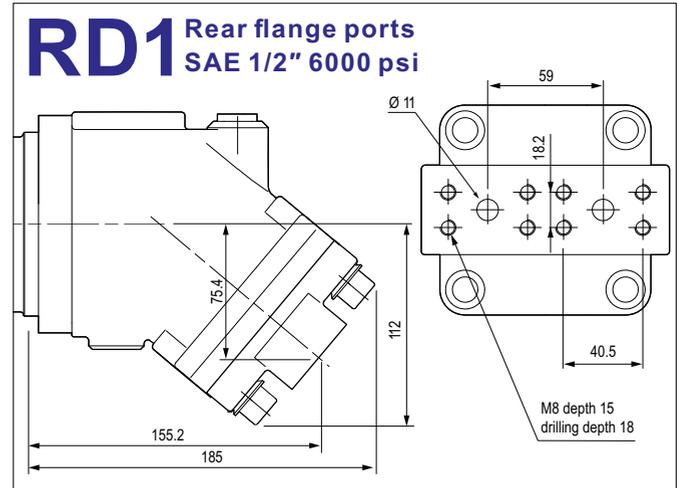
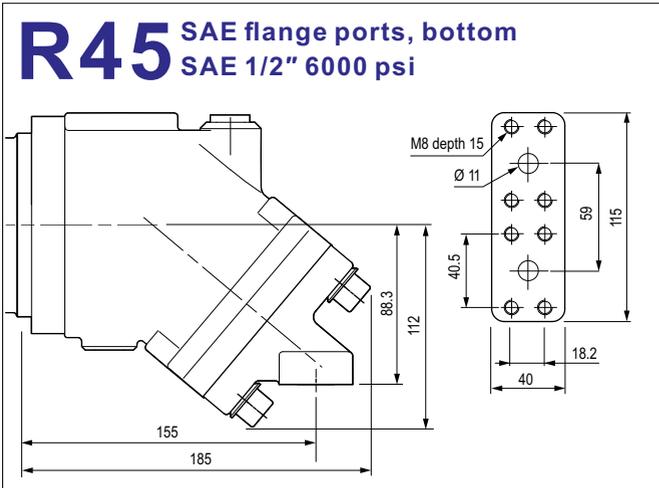


# A2FM - 25 cc (ISO) Bent Axis Motor

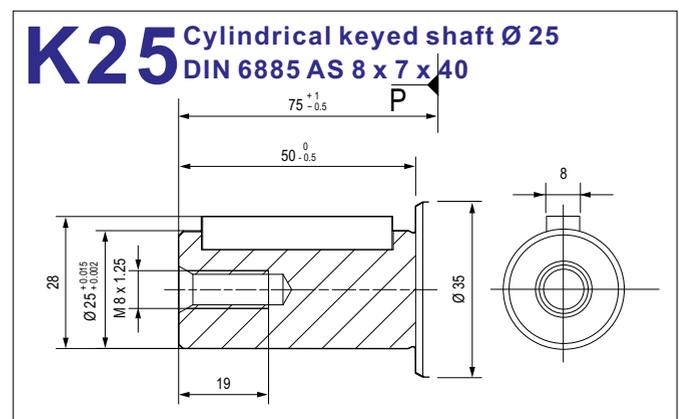
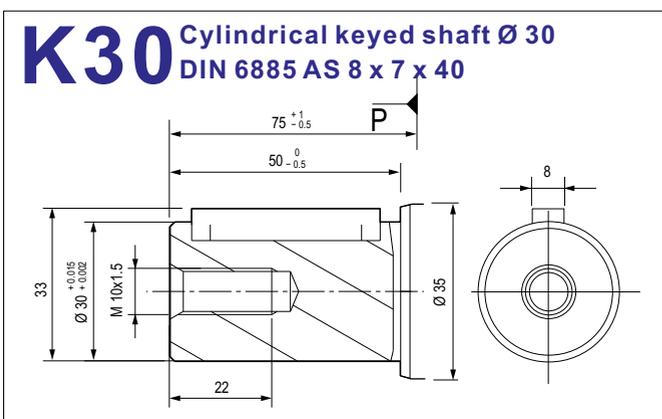
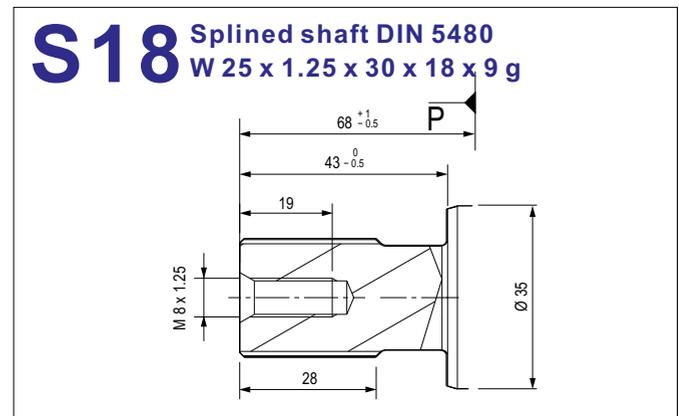
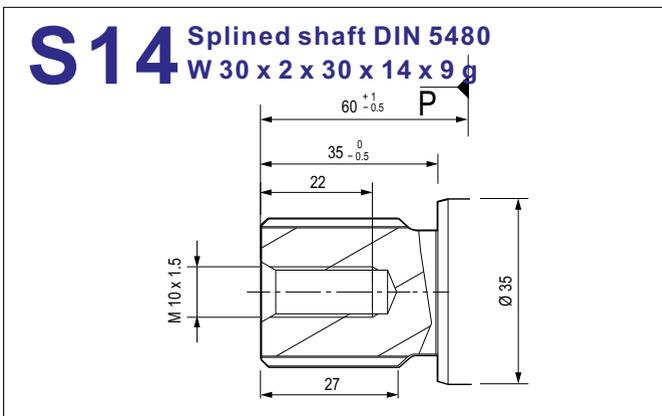
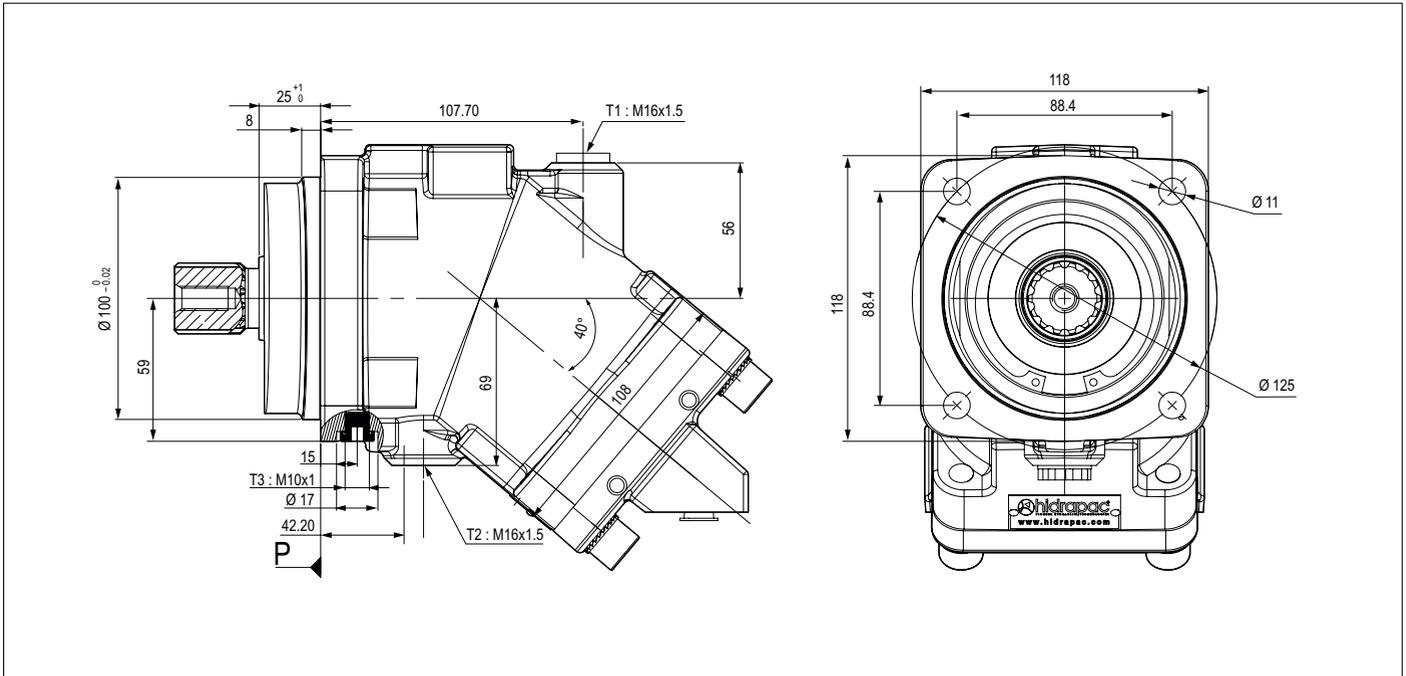


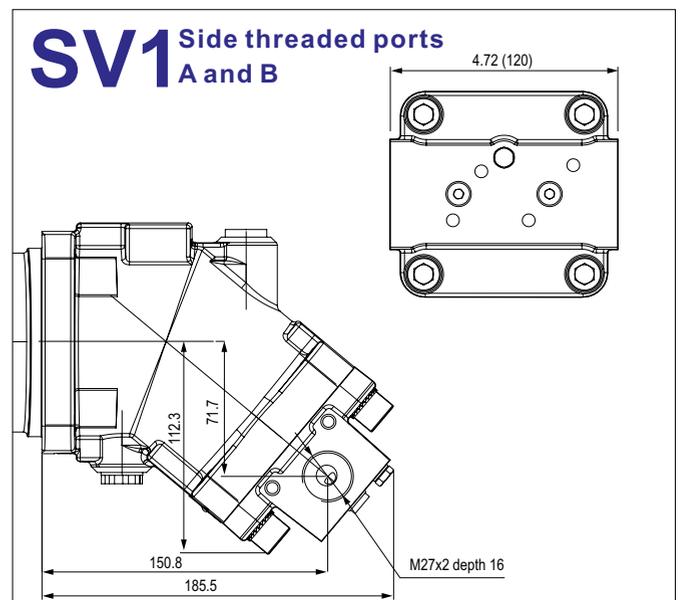
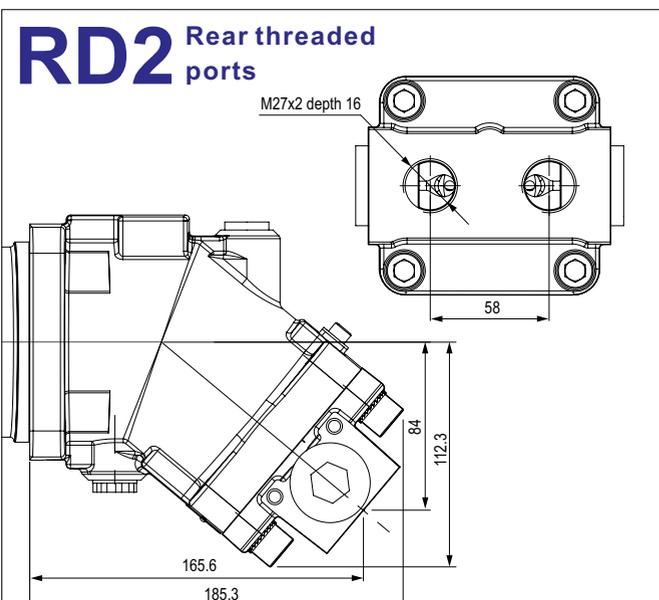
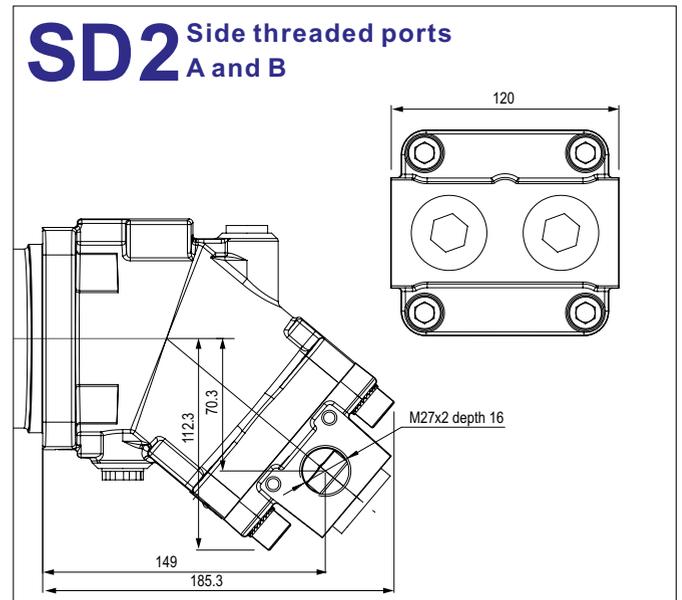
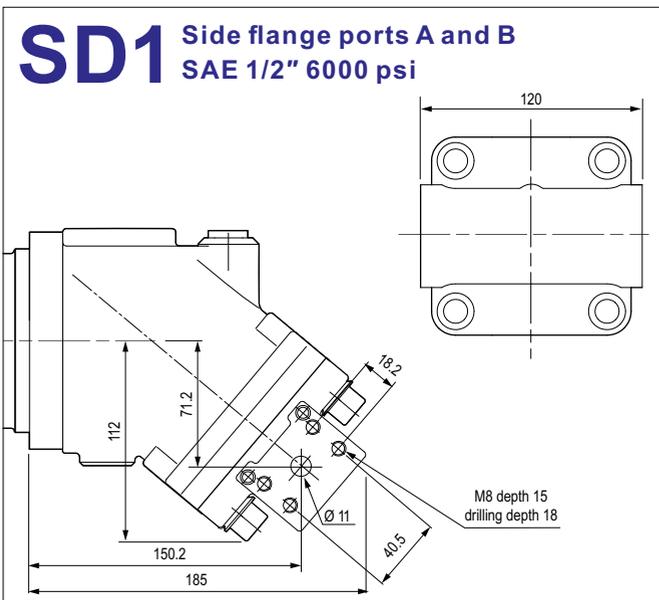
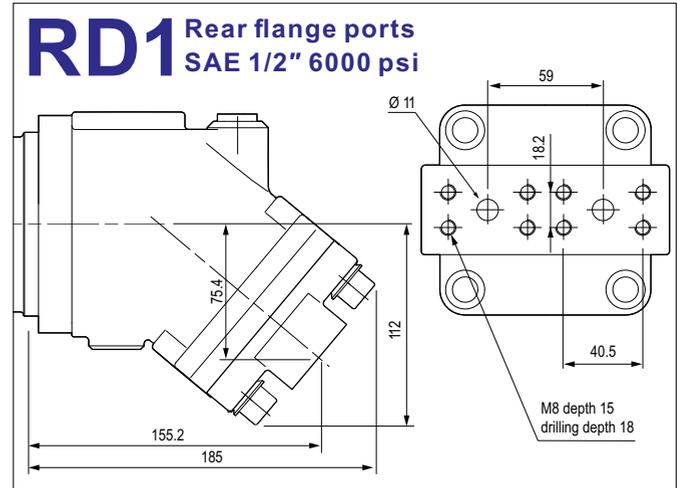
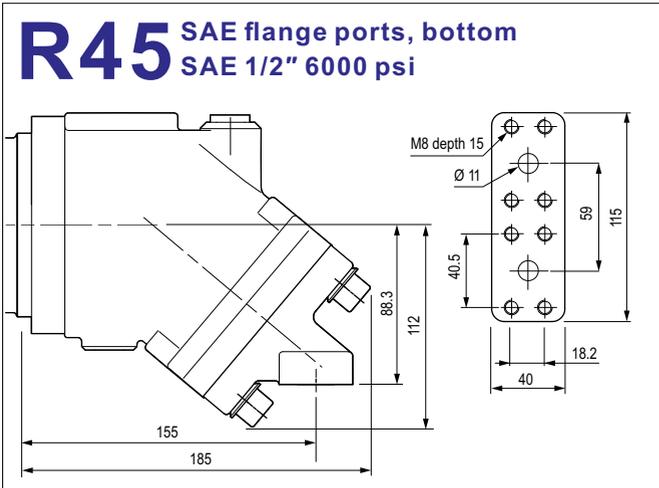




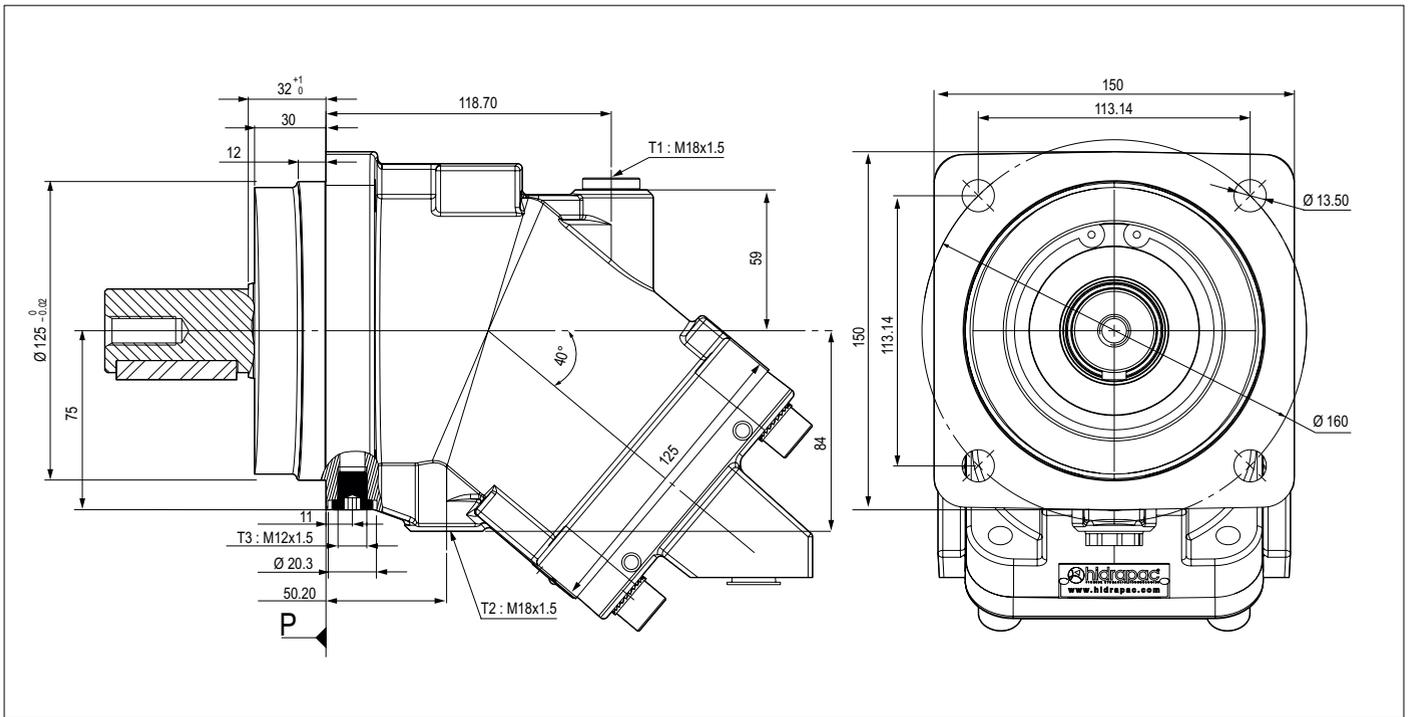


# A2FM - 41 cc (ISO) Bent Axis Motor

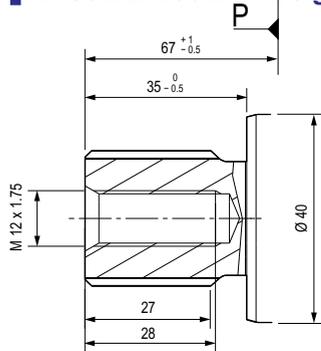




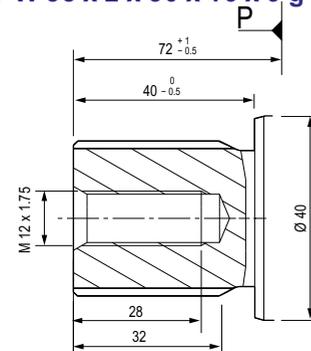
# A2FM - 45 cc (ISO) Bent Axis Motor



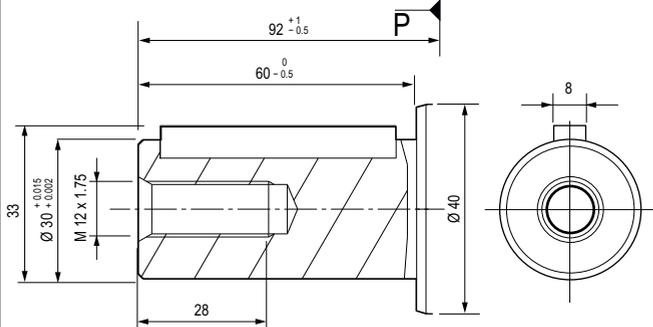
## S14 Splined shaft DIN 5480 W 30 x 2 x 30 x 14 x 9 g



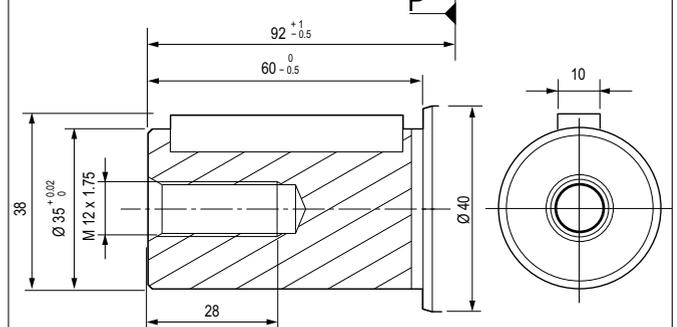
## S16 Splined shaft DIN 5480 W 35 x 2 x 30 x 16 x 9 g



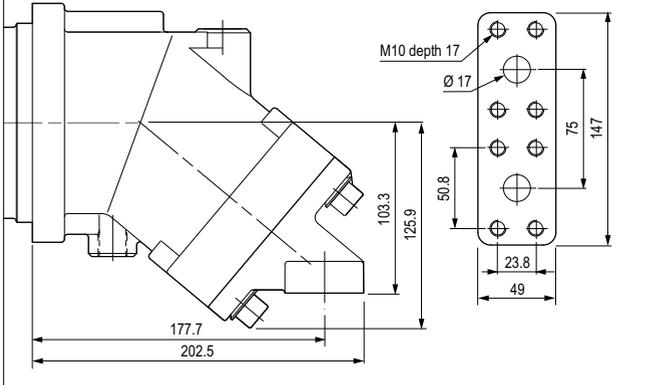
## K30 Cylindrical keyed shaft $\varnothing 30$ DIN 6885 AS 8 x 7 x 40



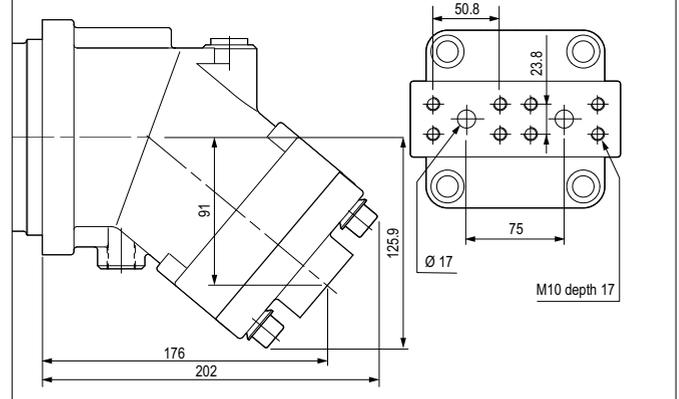
## K35 Cylindrical keyed shaft $\varnothing 35$ DIN 6885 AS 10 x 8 x 50



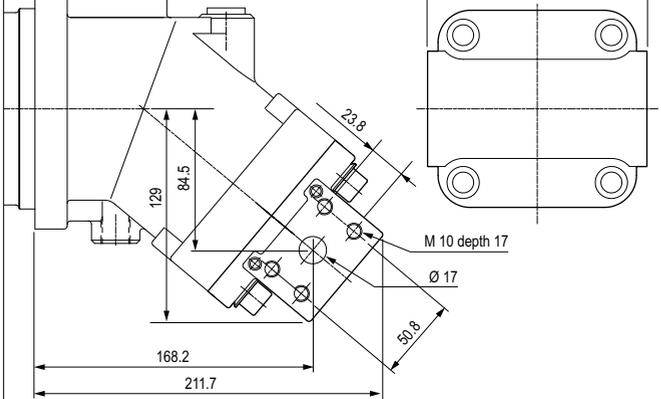
**R45** SAE flange ports, bottom  
SAE 3/4" 6000 psi



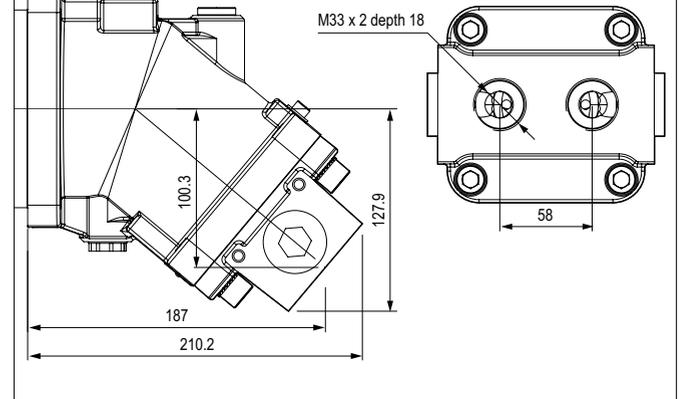
**RD1** SAE flange ports, rear  
SAE 3/4" 6000 psi



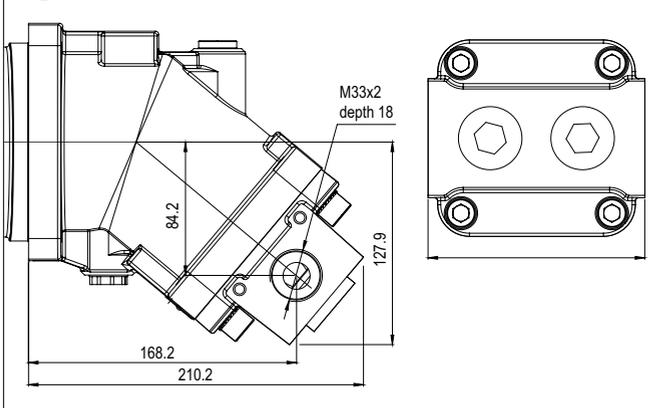
**SD1** SAE flange ports Side A and B  
SAE 3/4" 6000 psi



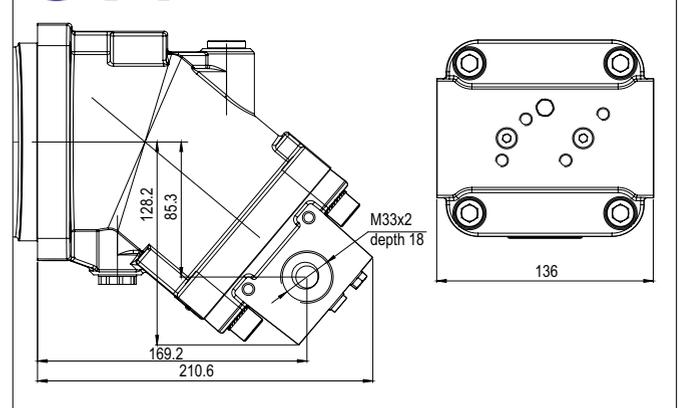
**RD2** Rear threaded ports



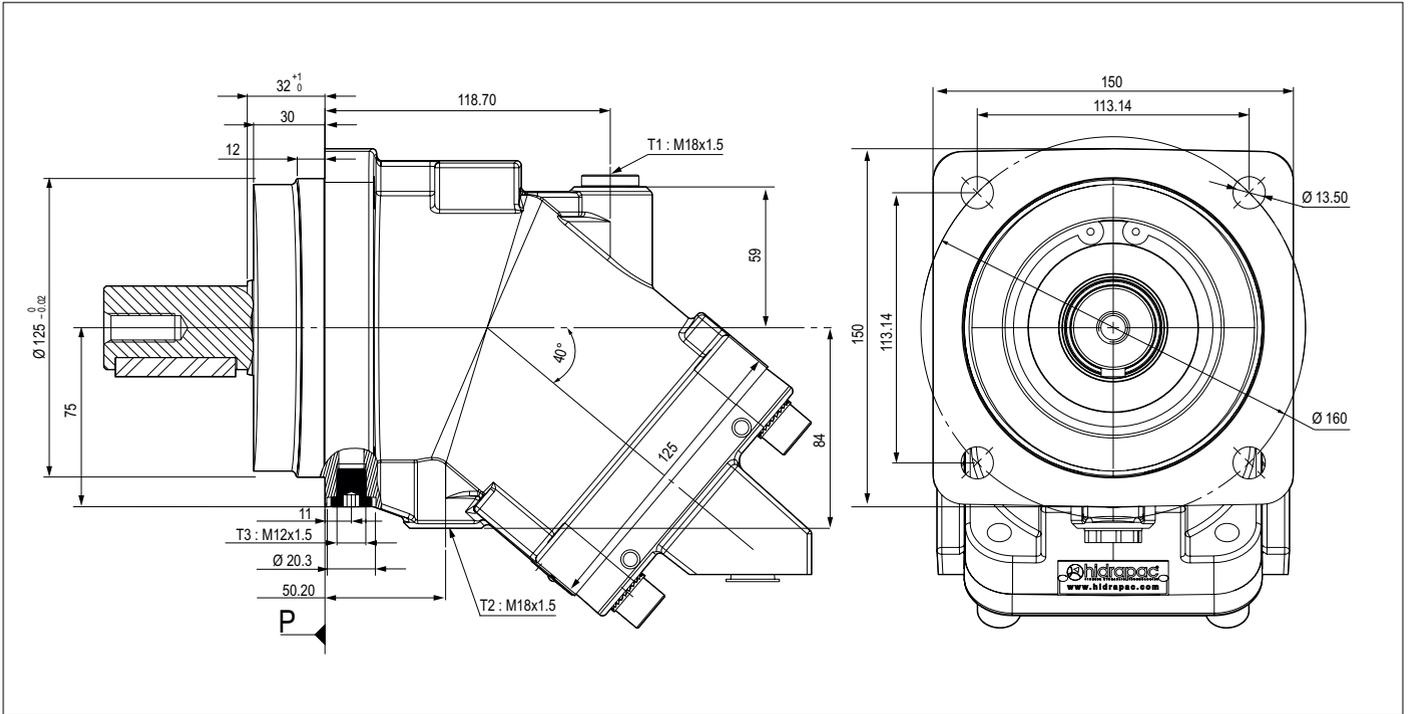
**SD2** Side threaded ports  
A and B



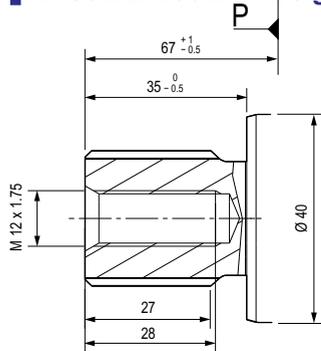
**SV1** Side threaded ports  
A and B



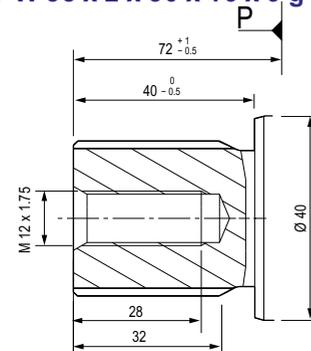
# A2FM - 50 cc (ISO) Bent Axis Motor



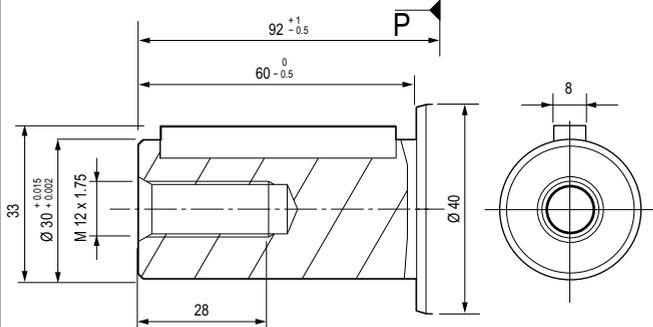
## S14 Splined shaft DIN 5480 W 30 x 2 x 30 x 14 x 9 g



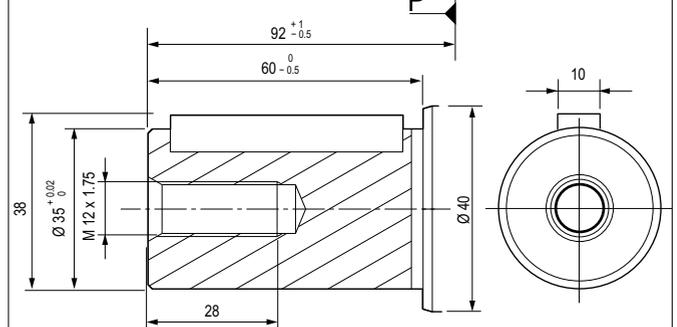
## S16 Splined shaft DIN 5480 W 35 x 2 x 30 x 16 x 9 g



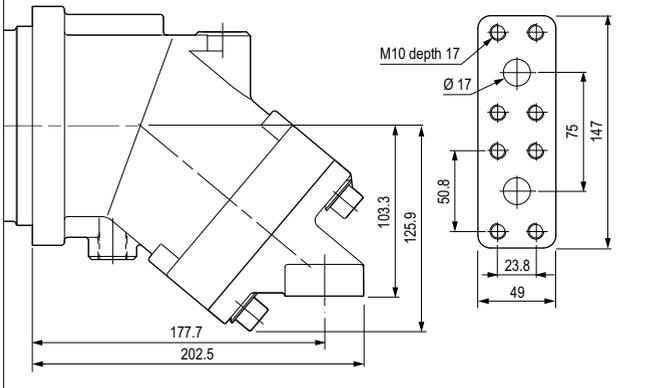
## K30 Cylindrical keyed shaft $\varnothing 30$ DIN 6885 AS 8 x 7 x 40



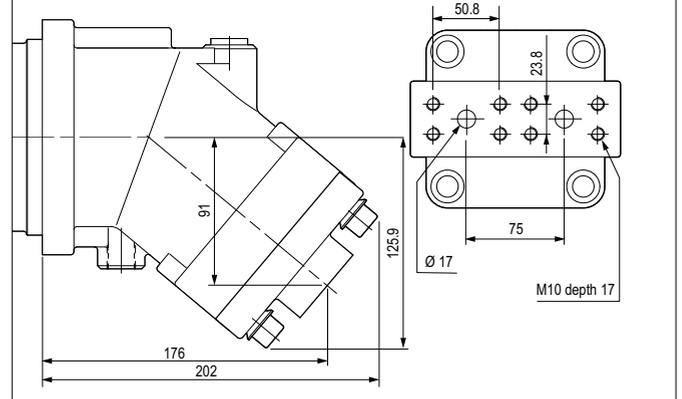
## K35 Cylindrical keyed shaft $\varnothing 35$ DIN 6885 AS 10 x 8 x 50



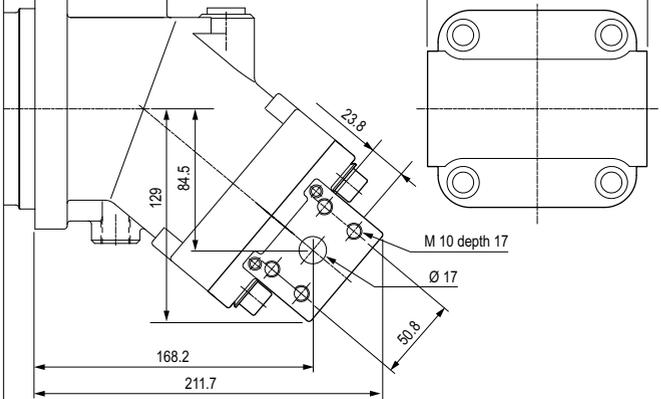
## R45 SAE flange ports, bottom SAE 3/4" 6000 psi



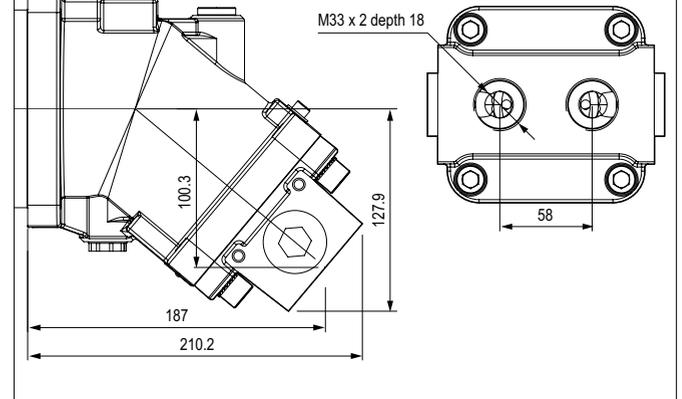
## RD1 SAE flange ports, rear SAE 3/4" 6000 psi



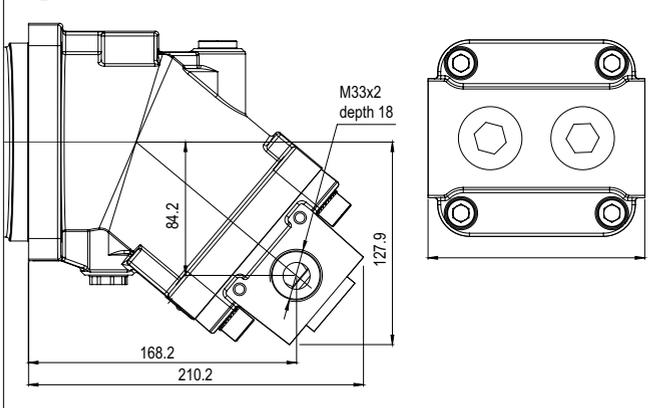
## SD1 SAE flange ports Side A and B SAE 3/4" 6000 psi



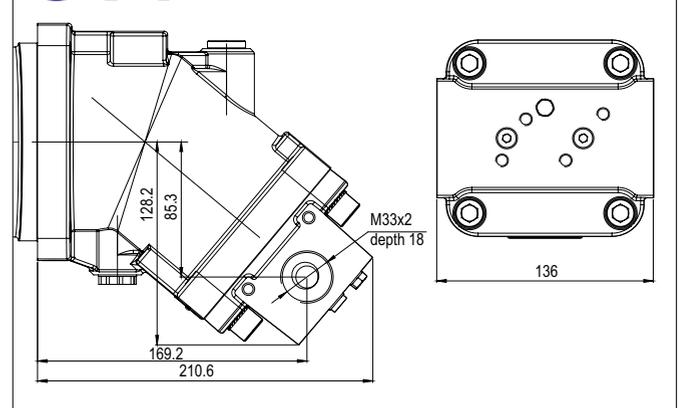
## RD2 Rear threaded ports



## SD2 Side threaded ports A and B

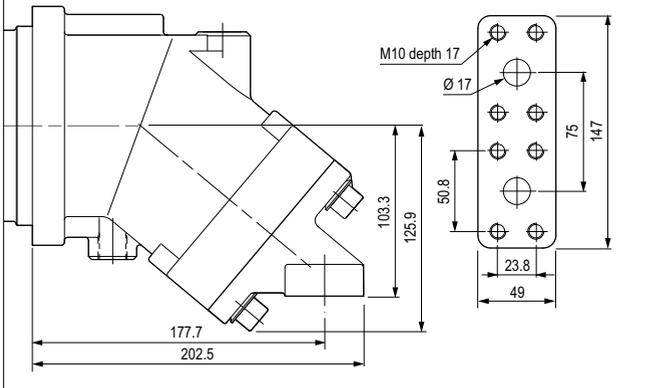


## SV1 Side threaded ports A and B

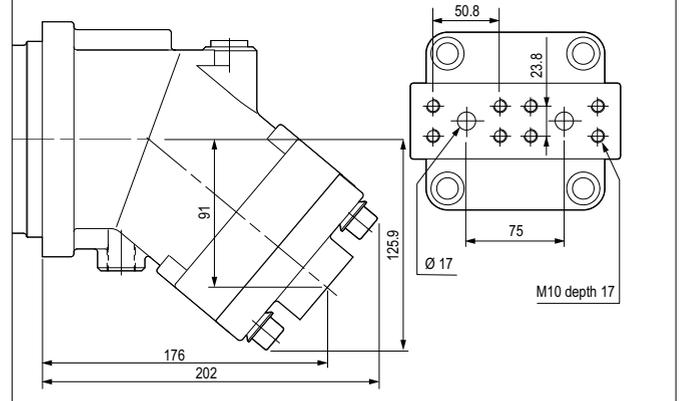




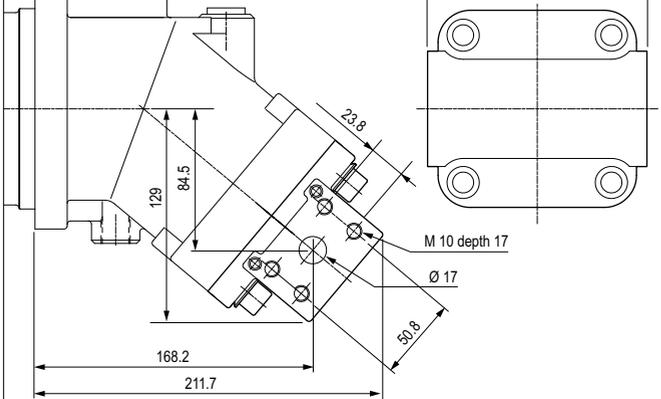
**R45** SAE flange ports, bottom  
SAE 3/4" 6000 psi



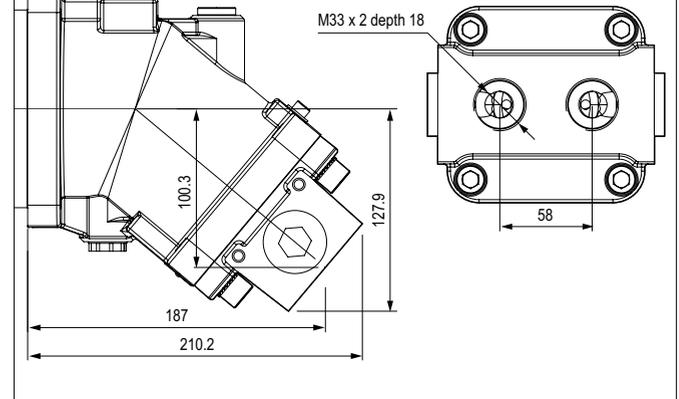
**RD1** SAE flange ports, rear  
SAE 3/4" 6000 psi



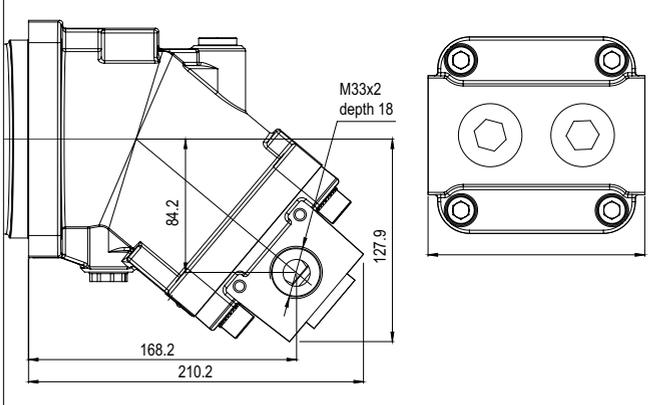
**SD1** SAE flange ports Side A and B  
SAE 3/4" 6000 psi



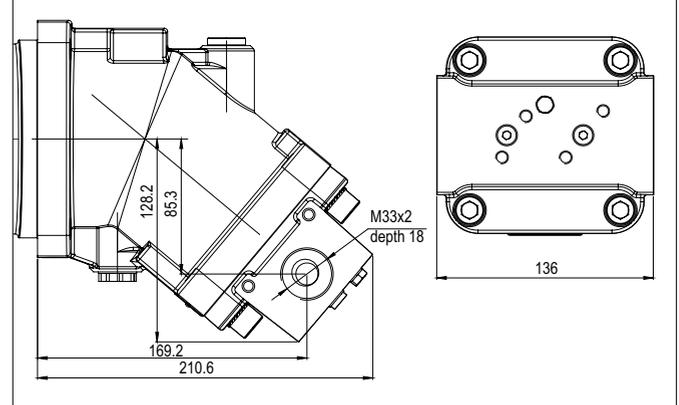
**RD2** Rear threaded ports



**SD2** Side threaded ports  
A and B

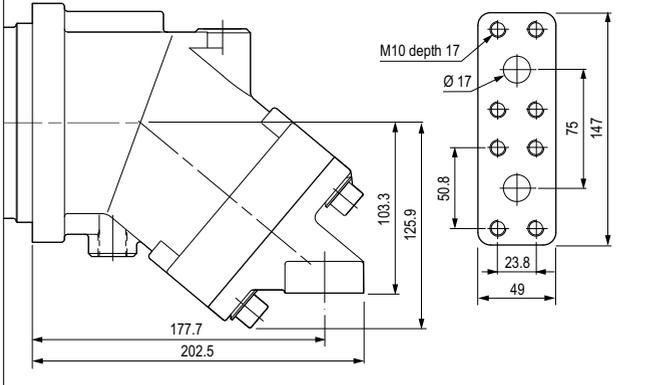


**SV1** Side threaded ports  
A and B

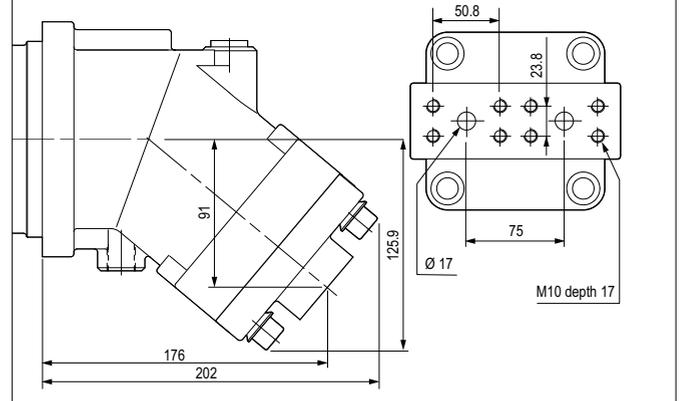




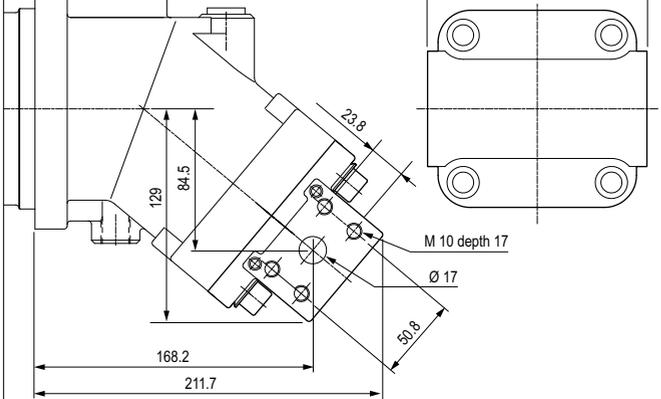
**R45** SAE flange ports, bottom  
SAE 3/4" 6000 psi



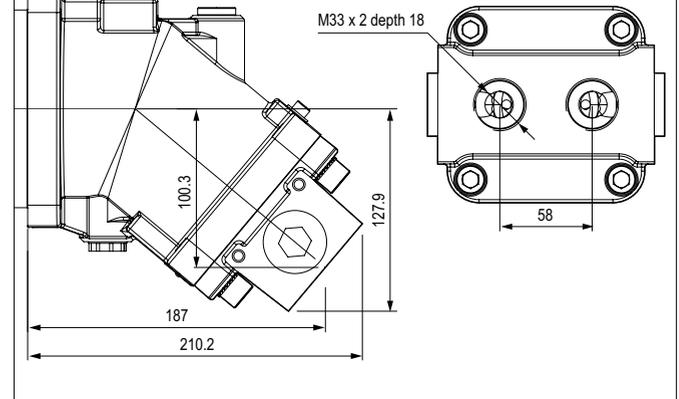
**RD1** SAE flange ports, rear  
SAE 3/4" 6000 psi



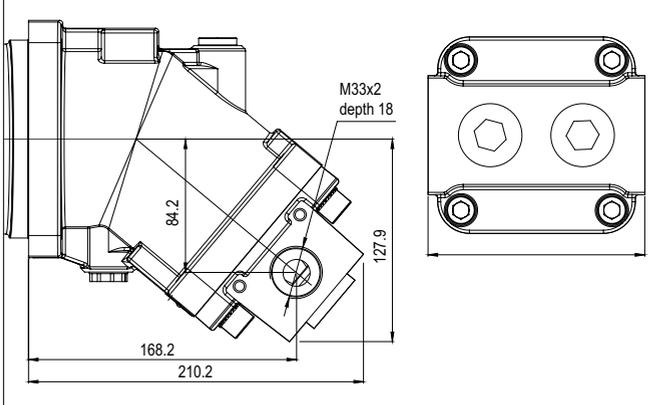
**SD1** SAE flange ports Side A and B  
SAE 3/4" 6000 psi



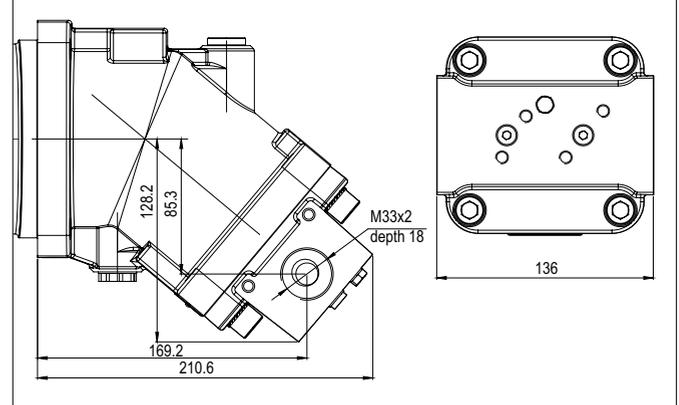
**RD2** Rear threaded ports



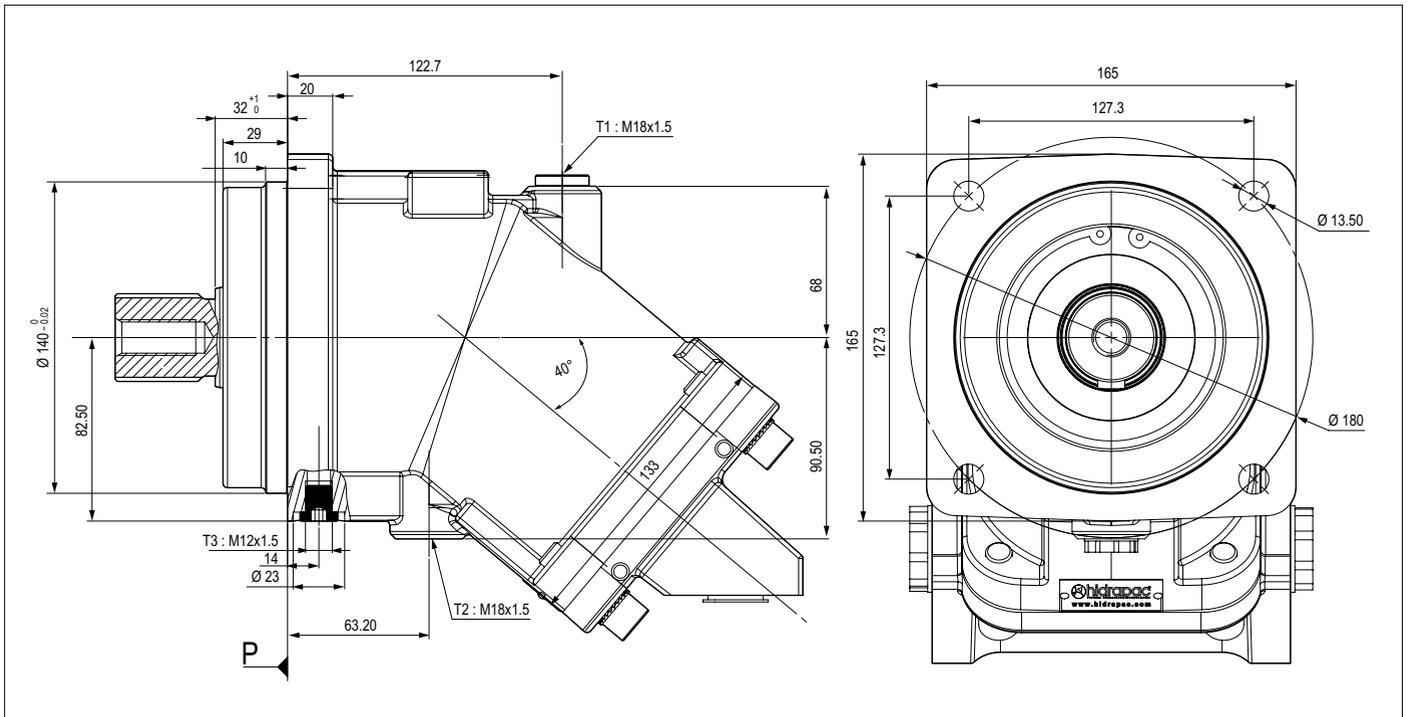
**SD2** Side threaded ports  
A and B



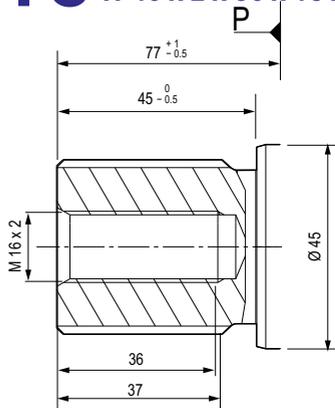
**SV1** Side threaded ports  
A and B



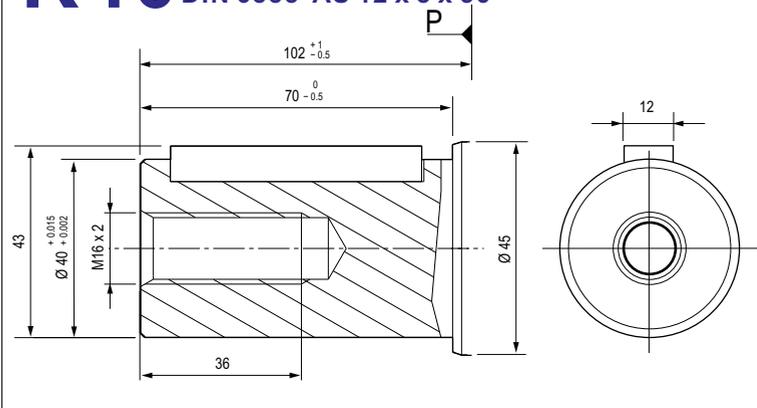
# A2FM - 80 cc (ISO) Bent Axis Motor



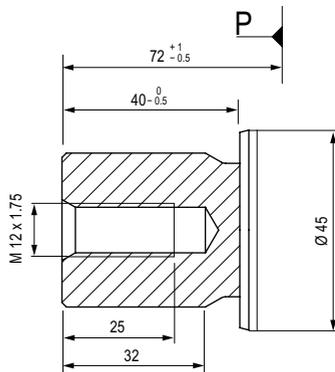
## S18 Splined shaft DIN 5480 W 40 x 2 x 30 x 18 x 9 g



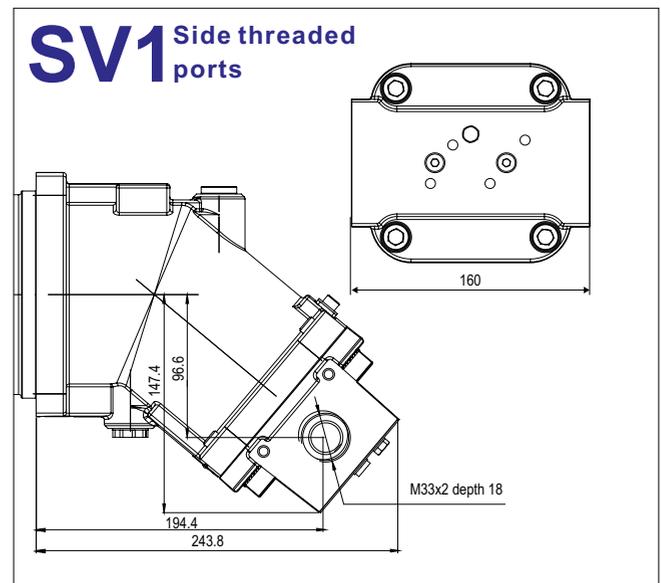
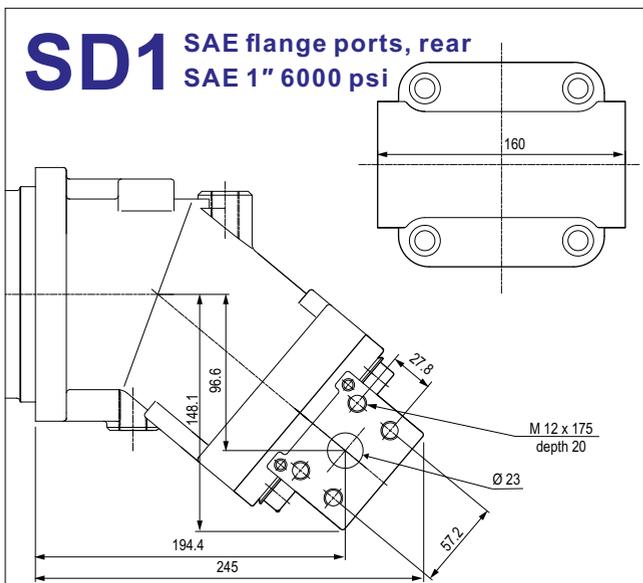
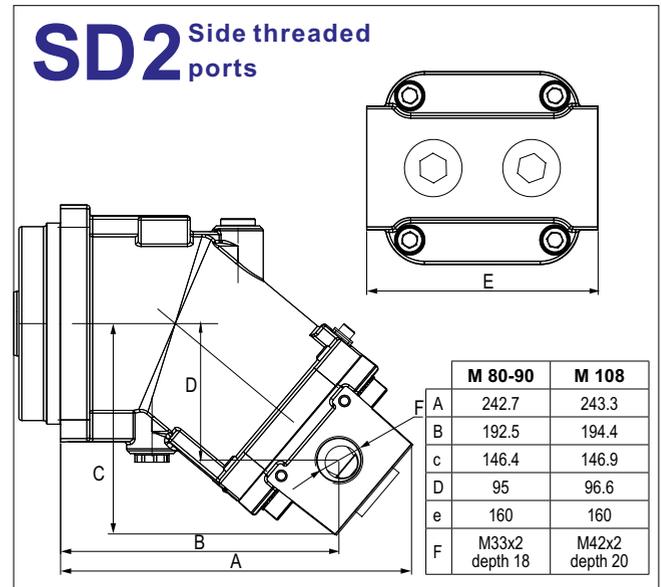
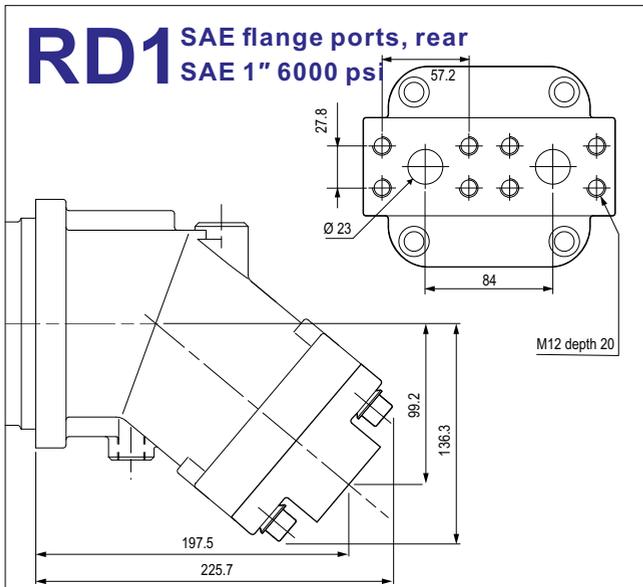
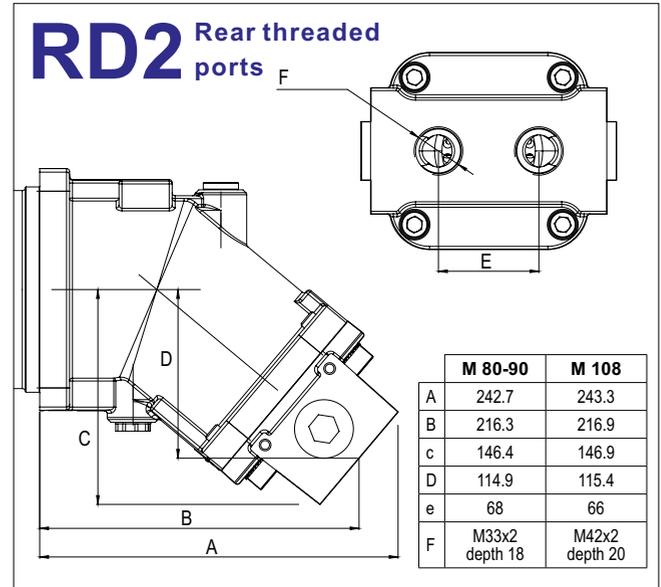
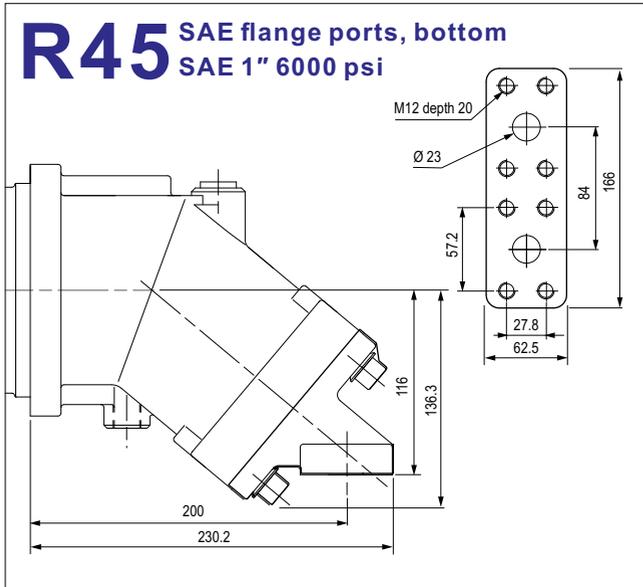
## K40 Cylindrical keyed shaft $\varnothing 40$ DIN 6885 AS 12 x 8 x 56



## S16 Splined shaft DIN 5480 W 35 x 2 x 30 x 16 x 9 g

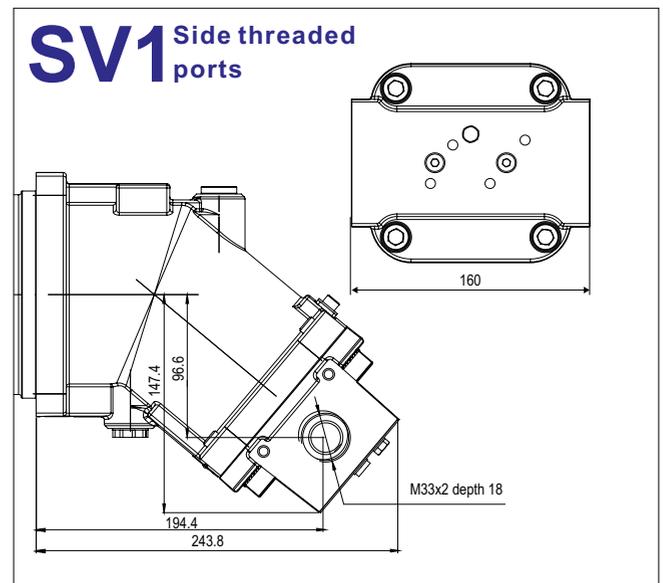
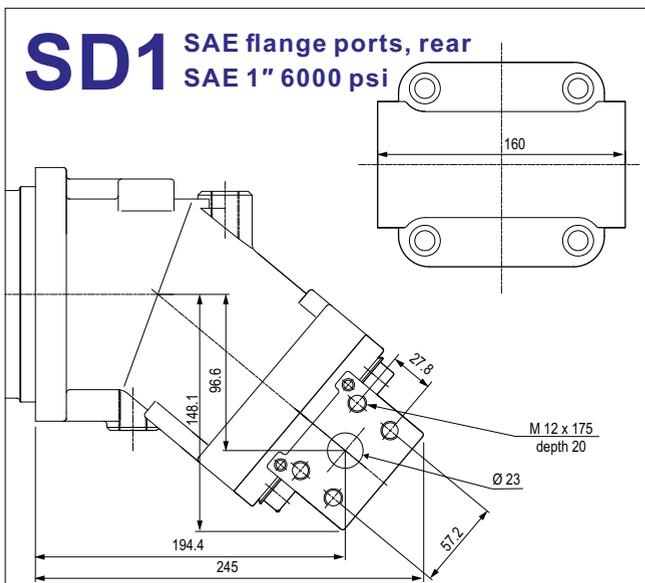
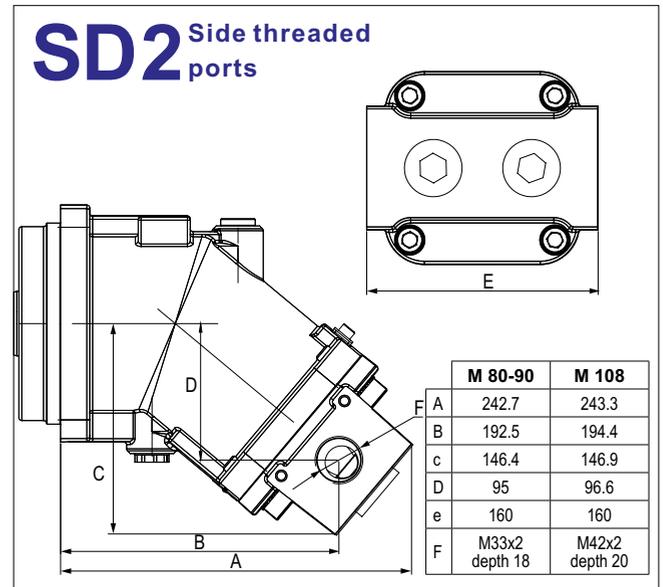
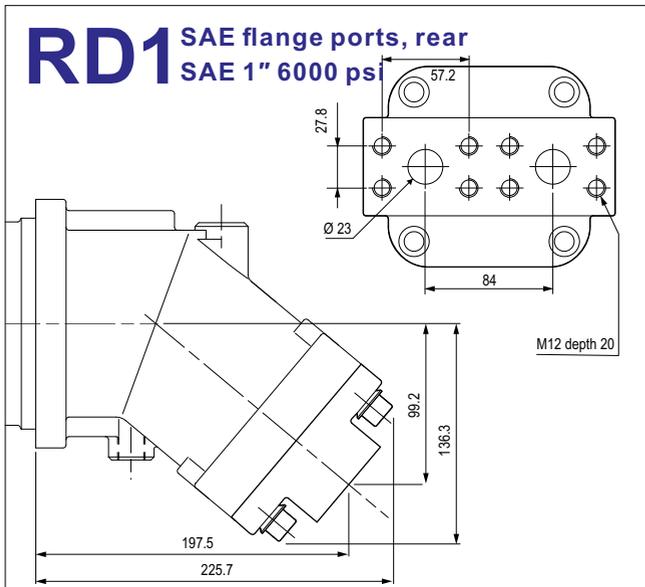
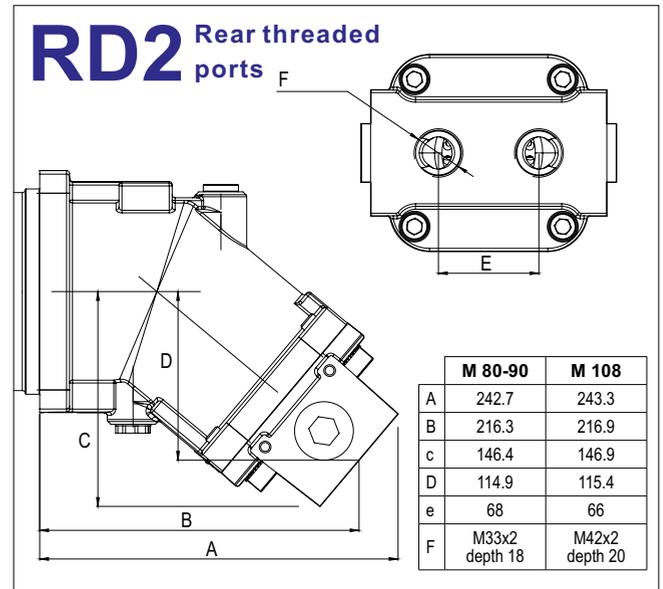
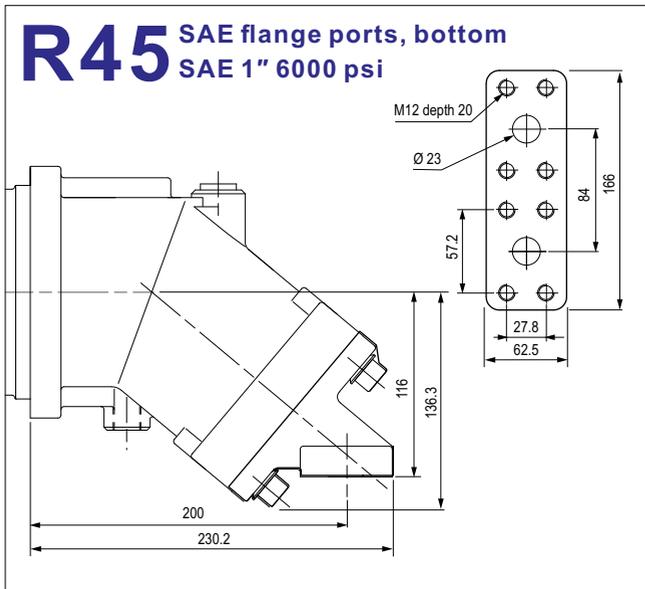


# A2FM - 80 cc (ISO) Bent Axis Motor

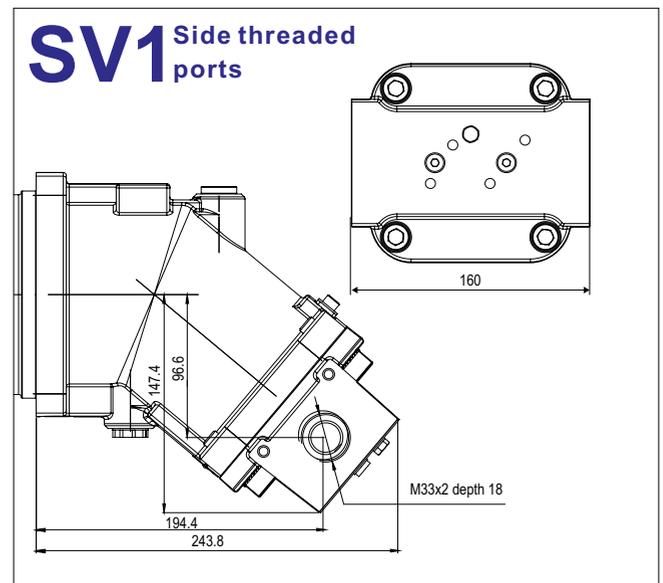
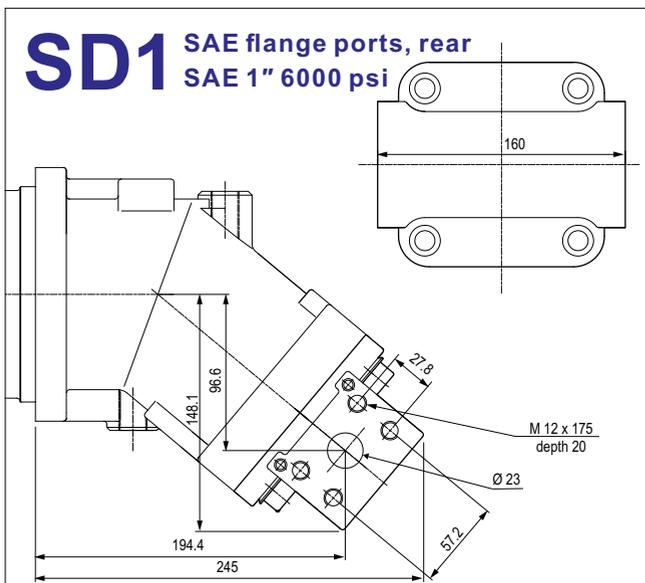
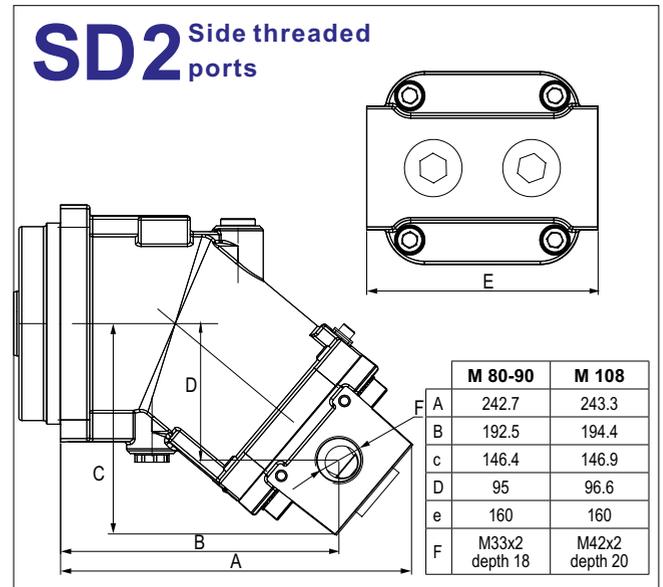
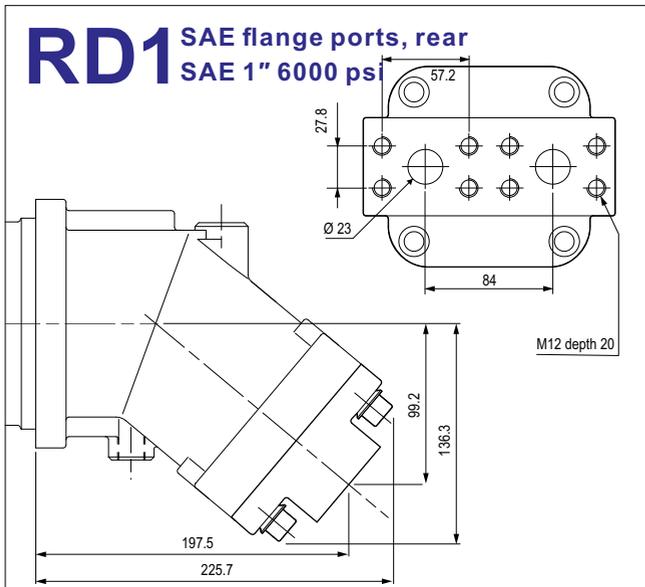
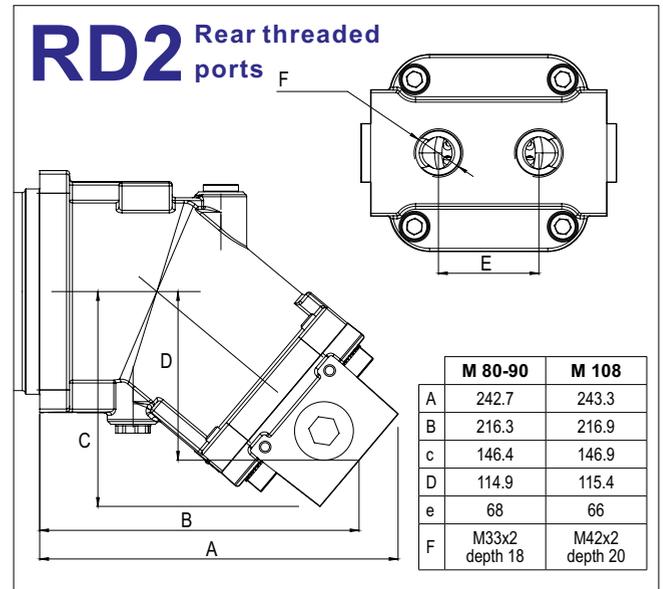
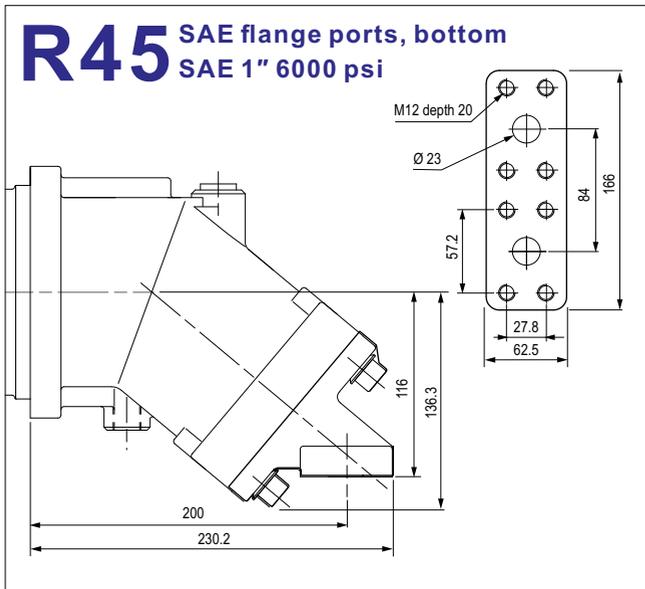




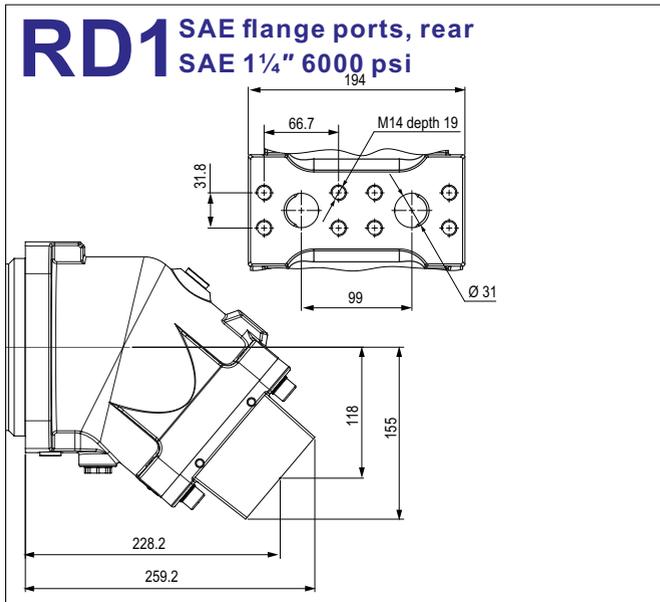
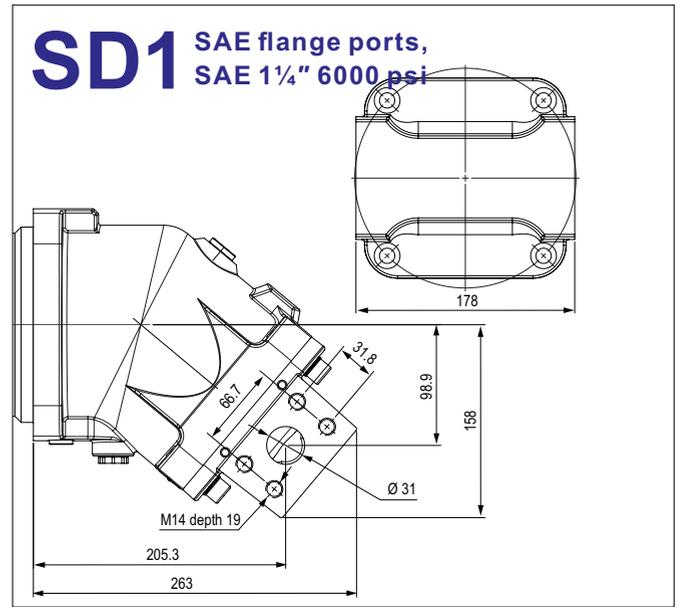
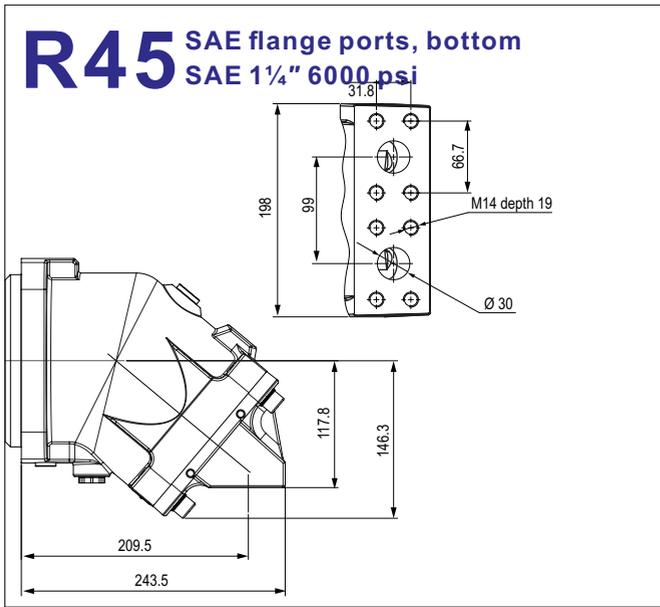
# A2FM - 90 cc (ISO) Bent Axis Motor



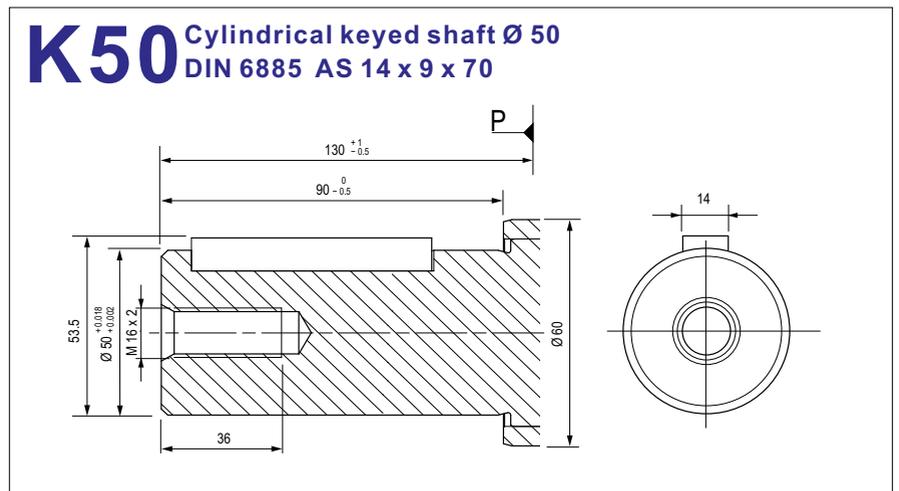
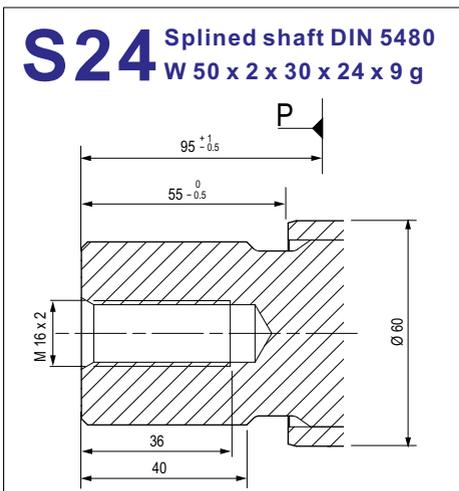
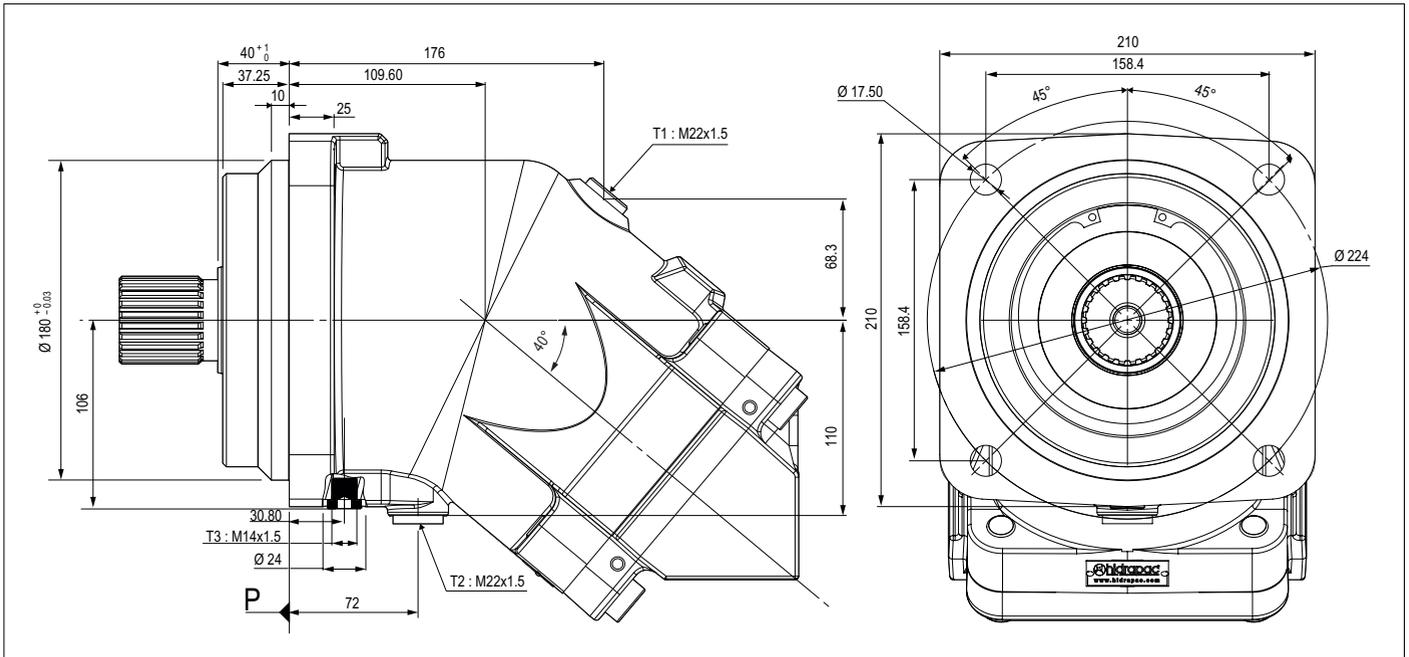


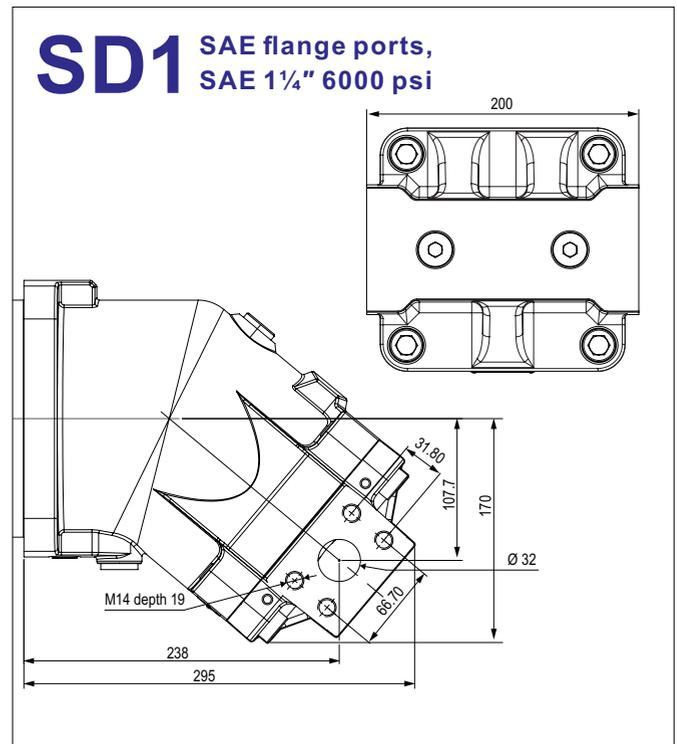
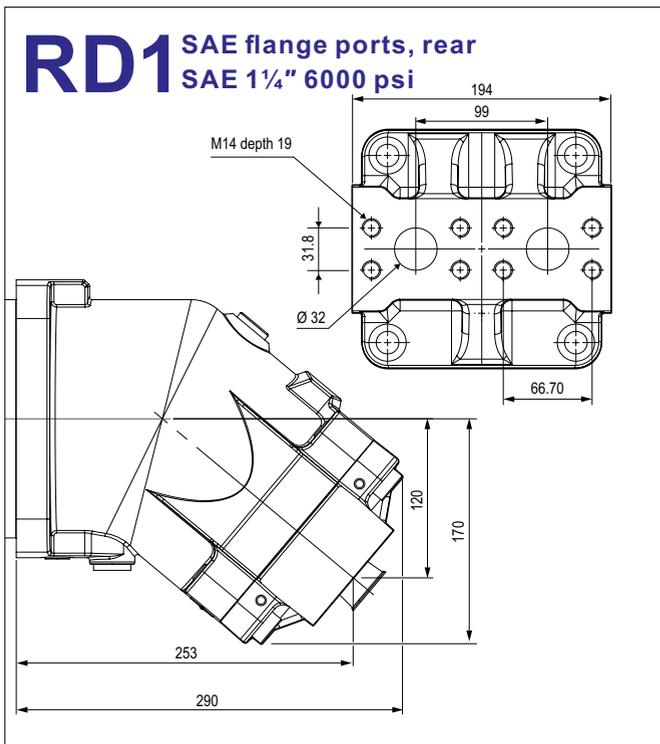
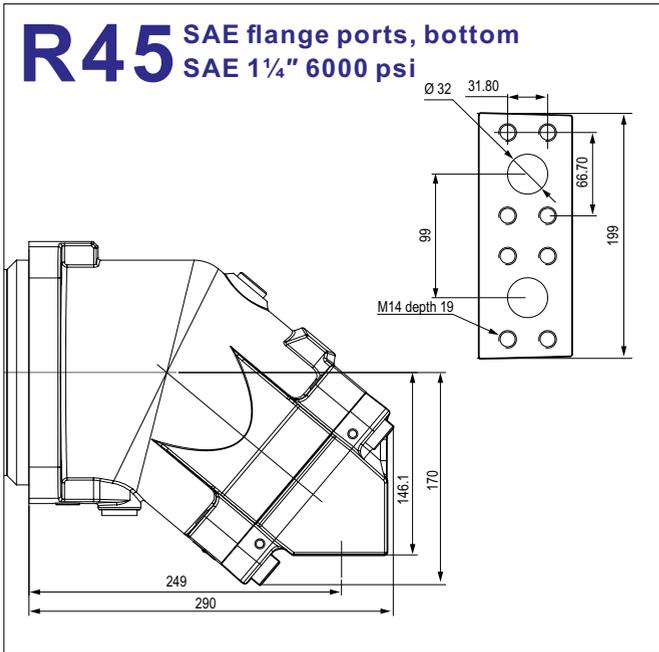




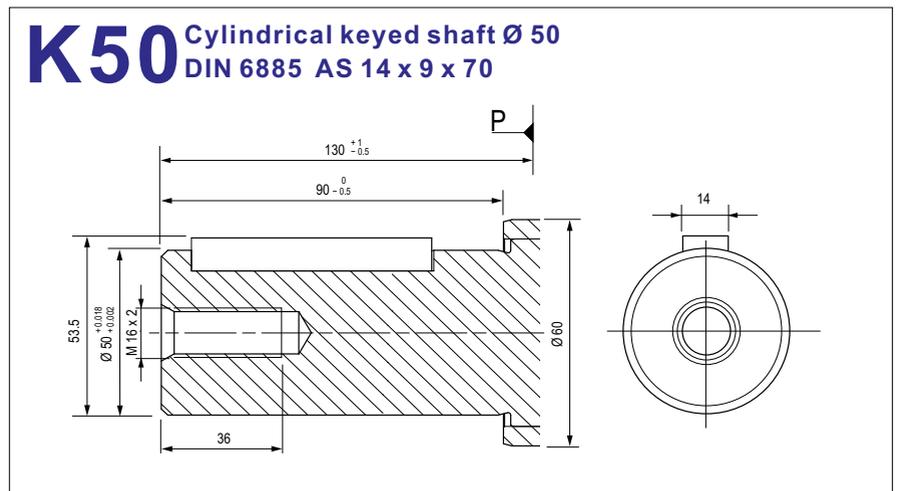
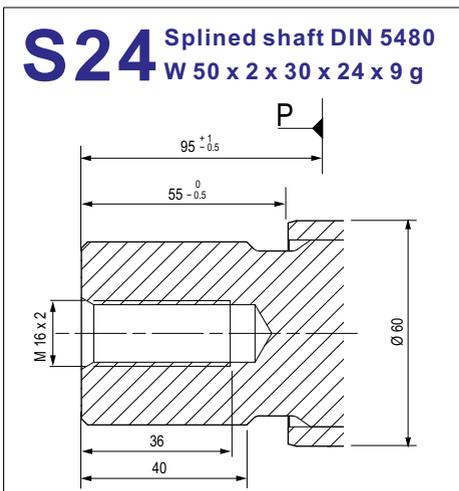
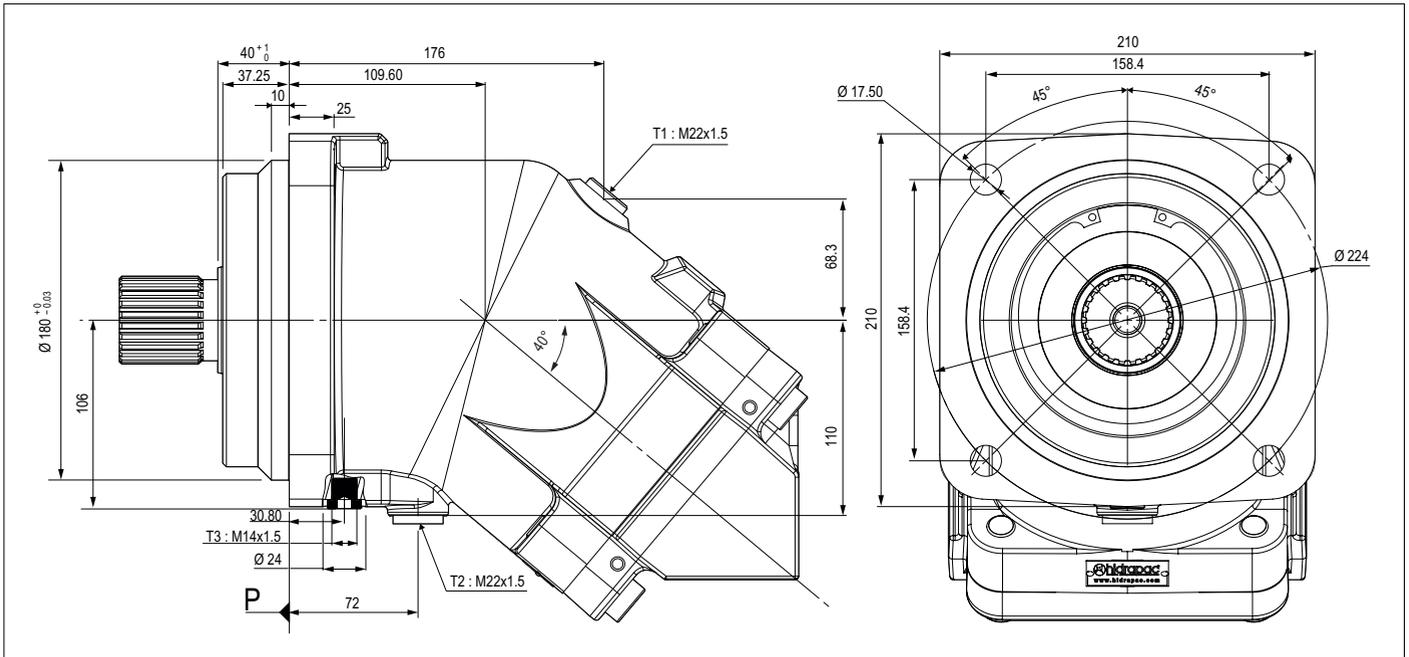


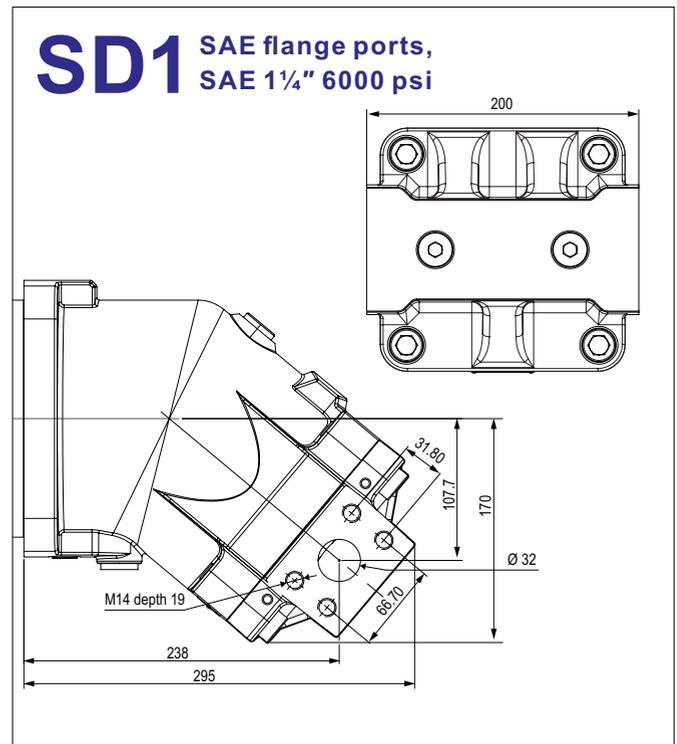
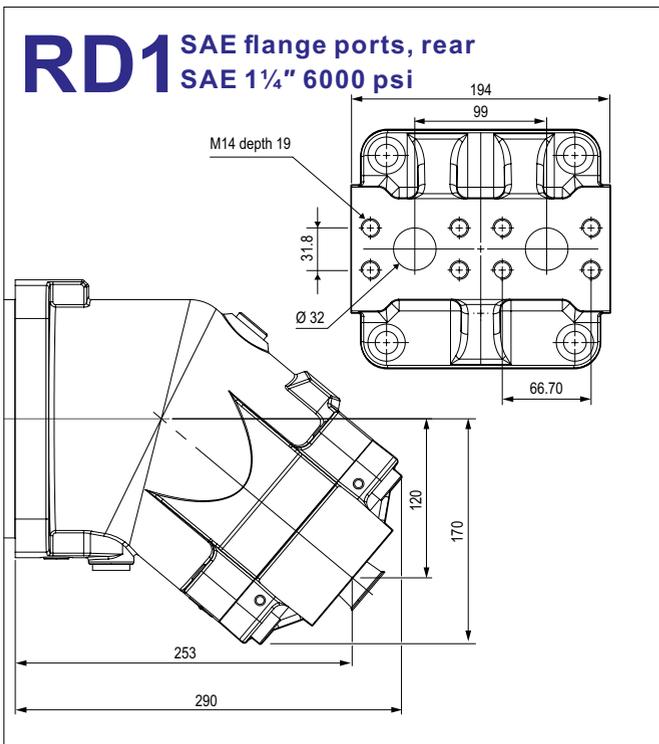
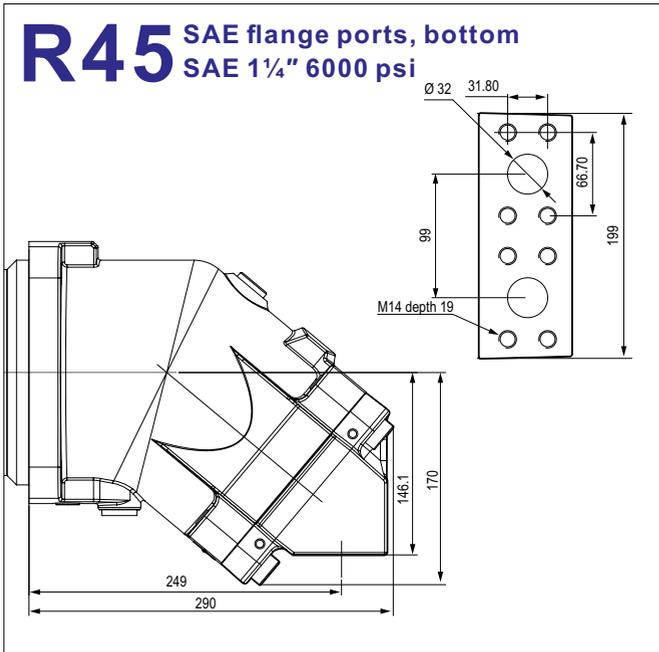
# A2FM - 160 cc (ISO) Bent Axis Motor





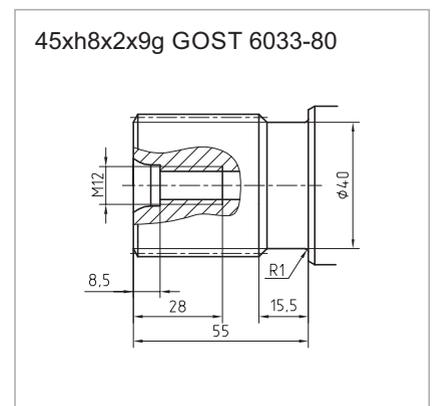
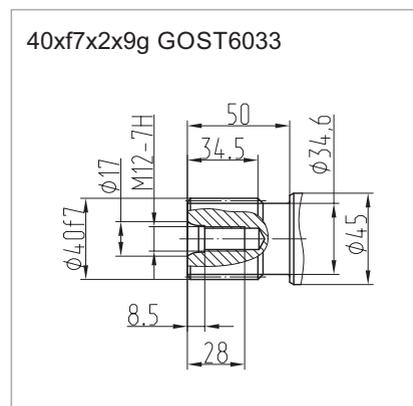
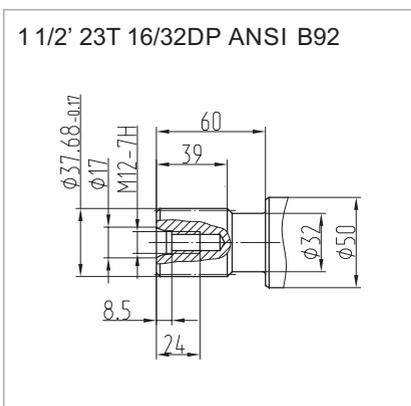
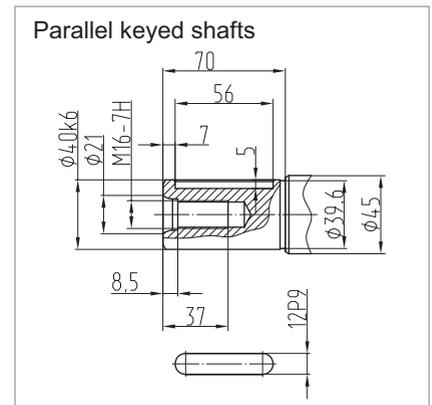
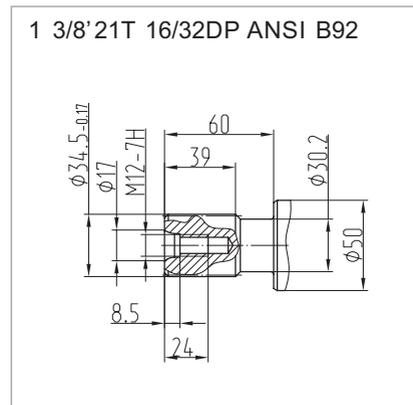
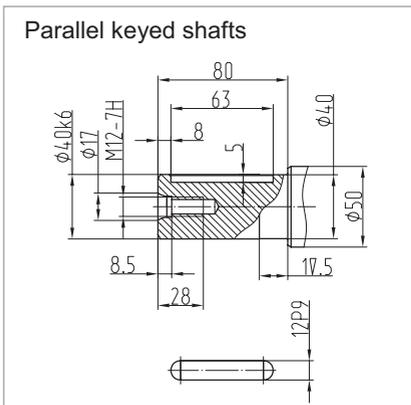
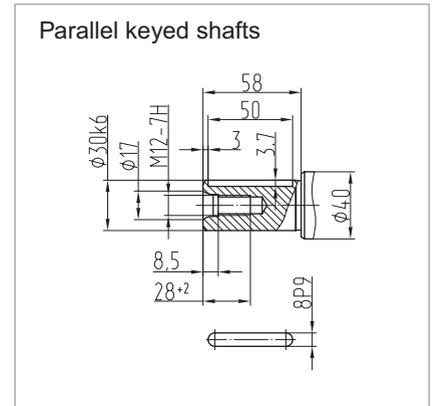
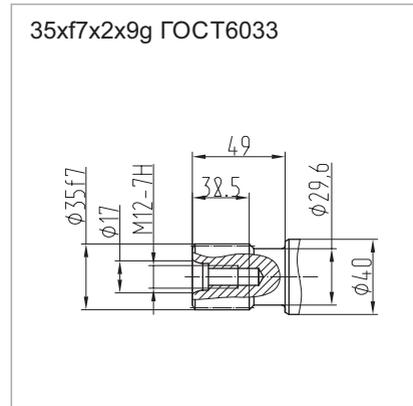
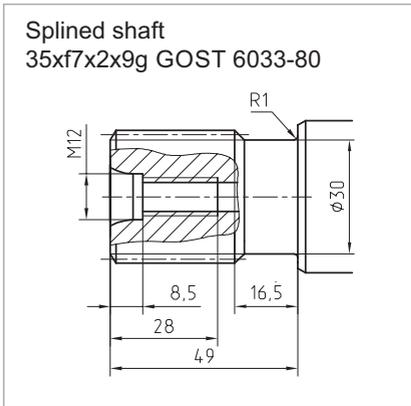
# A2FM - 180 cc (ISO) Bent Axis Motor





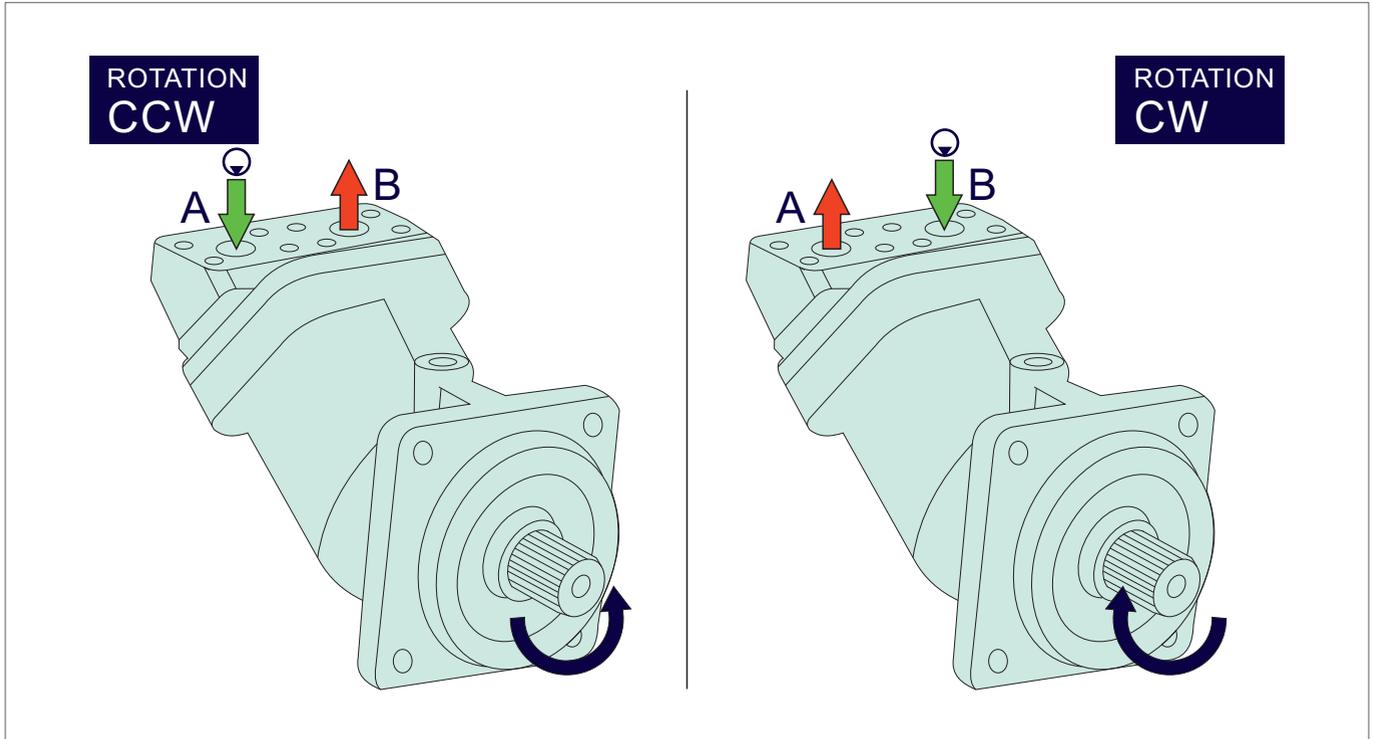
## Special Shaft Drive Options for A2FM Motors

For the Special applications, we produce Special Shaft Drive for the A2FM Motors.  
Details are listed in below.



## Direction of Rotation; Reversible

The motors rotate clockwise or counter-clockwise depending on the direction of hydraulic flow entering the motor.



Formulas			
<b>Pump Output Flow</b>	GPM	$GPM = (\text{Speed (rpm)} \times \text{disp. (cu. in.)}) / 231$	$GPM = (n \times d) / 231$
<b>Pump Input Horsepower</b>	HP	$HP = GPM \times \text{Pressure (psi)} / 1714 \times \text{Efficiency}$	$HP = (Q \times P) / 1714 \times E$
<b>Pump Efficiency</b>	E	Overall Efficiency = Output HP / Input HP	$E_{\text{Overall}} = \text{HP}_{\text{Out}} / \text{HP}_{\text{In}} \times 100$
		Overall Efficiency = Volumetric Eff. $\times$ Mechanical Eff.	$E_{\text{Overall}} = \text{EffVol.} \times \text{EffMech.}$
<b>Pump Volumetric Efficiency</b>	E	Volumetric Efficiency = Actual Flow Rate Output (GPM) / Theoretical Flow Rate Output (GPM) $\times$ 100	$\text{EffVol.} = \text{Q}_{\text{Act.}} / \text{Q}_{\text{Theo.}} \times 100$
<b>Pump Mechanical Efficiency</b>	E	Mechanical Efficiency = Theoretical Torque to Drive / Actual Torque to Drive $\times$ 100	$\text{EffMech} = \text{T}_{\text{Theo.}} / \text{T}_{\text{Act.}} \times 100$
<b>Pump Displacement</b>	CIPR	$\text{Dsplcmnt (In.}^3 \text{ / rev.)} = \text{Flow Rate (GPM)} \times 231 / \text{Pump RPM}$	$\text{CIPR} = \text{GPM} \times 231 / \text{RPM}$
<b>Pump Torque</b>	T	Torque = Horsepower $\times$ 63025 / RPM	$T = 63025 \times \text{HP} / \text{RPM}$
		Torque = Pressure (PSIG) $\times$ Pump Displacement (CIPR) / 2 $\pi$	$T = P \times \text{CIPR} / 6.28$

**Horsepower for driving a pump** : For every 1 hp of drive, the equivalent of 1 gpm @ 1500 psi can be produced.

**Horsepower for idling a pump** : To idle a pump when it is unloaded will require about 5% of it's full rated power

**Wattage for heating hydraulic oil** : Each watt will raise the temperature of 1 gallon of oil by 1° F. per hour.

**Flow velocity in hydraulic lines** : Pump suction lines 2 to 4 feet per second, pressure lines up to 500 psi - 10 to 15 ft./sec., pressure lines 500 to 3000 psi - 15 / 20 ft./sec.; all oil lines in air-over-oil systems; 4 ft./sec.

## Installation & Assemble Informations for Bent Axis Motors

### POSITION

ISO Flange Bent Axis Motors can be operate any position.

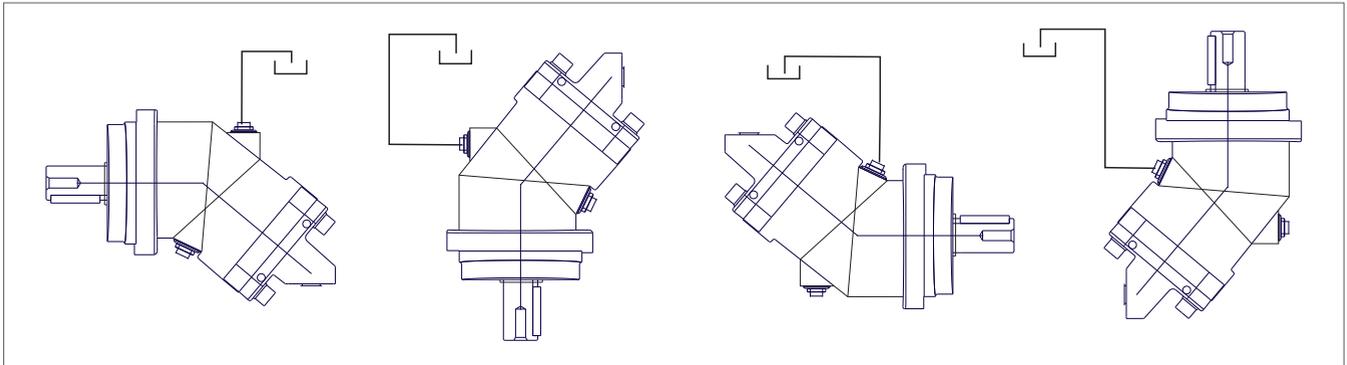
### DIRECTION OF ROTATION

ISO Flange Bent Axis Motors can be operate in both directions of rotation.

Before of Installation operation, the motor must be filled with hydraulic fluid and air bled.

### INSTALLATION POSITION

See following examples.

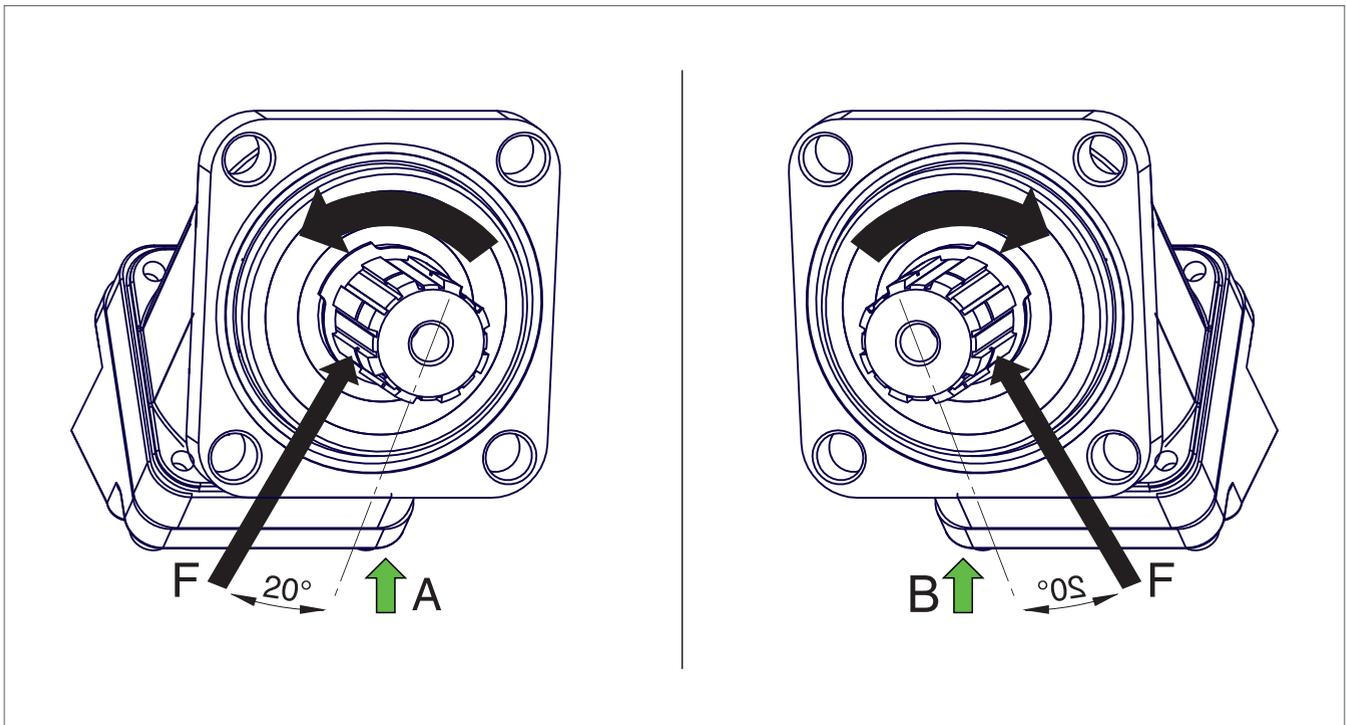


### HYDRAULIC FLUID

Recommended ;

Generally : between 15 and 200 cSt.

Maximum : between 5 and 1600 cSt.



### FOR USE;

Available via e-mail on request or each motor is supplied via Starting datasheet.

## Formulas, Calculations, Installation Guide

### Quick Calculation

Flow rate

$$Q = \frac{V_s \cdot n}{1000 \eta_v} \text{ (lpm)}$$

Torque

$$M = \frac{V_s \cdot \Delta p \cdot \eta_{mh}}{63} \text{ (Nm)}$$

Power

$$P = \frac{2\pi \cdot M \cdot n}{60000} = \frac{M \cdot n}{9549} = \frac{Q \cdot \Delta p \cdot \eta_t}{600} \text{ (kw)}$$

Speed

$$n = \frac{1000 \cdot Q \cdot \eta_v}{V_s} \text{ (lpm)}$$

- $V_s$  = Displacement (ccm/rev.)  
 $\Delta p$  = Diff. pressure (bar)  
 $n$  = Speed (rpm)  
 $Q$  = Flow (lpm)  
 $\eta_v$  = Volumetric efficiency  
 $\eta_{mh}$  = Mechanical-hydraulic efficiency  
 $\eta_t$  = Total efficiency ( $\eta_t = \eta_v \times \eta_{mh}$ )

New frame sizes to meet market requirements.

Optional by-pass valve.

For use in mobile & industrial and stationary applications areas.

The pump drive shaft bearings are designed to give the service life expected in these areas of operation. Interchangeable with other bent axis pumps & motors

40° bent axis design giving high power, small overall dimensions, optimum efficiency and economic design. Flange and shaft designed for direct mounting on truck gearbox PTO's. The fixed displacement bent axis pumps generates a hydraulic fluid flow. It is designed for use in trucks, commercial vehicles and all stationary hydraulic applications. The pump is a fixed pump with rotary group in bent-axis design open circuits. Flow is proportional to drive speed and displacement.

For axial piston units with bent-axis design, the Pistons are arranged diagonally with respect to the drive shaft. The pump motor covers the whole displacement range 5 to 130 cm<sup>3</sup>/rev. The pump has been developed with modern styling and design to satisfy market demand as to designed new generation plate and pistons with give high flow performance, high pressures with high efficiency and very small dimensions.

The pump is available both to DIN and SAE world standards and can be mounted either directly at the gear box or via a drive shaft. If necessary it can also be augmented with a by-pass valve.

Other brand bent axis pumps compatible and interchangeable with bent axis pumps motors. Refer to the data sheet and order confirmation for the technical data, operating conditions and operating limits of the bent axis piston pumps.

## Complete Product Range

### Bent Axis Piston Motors

K2FM (DIN) Bent Axis Motor  
K3FH (HYBRID) Bent Axis Motor  
A2MS (SAE) Bent Axis Motor  
A3MS (SAE2) Bent Axis Motor  
A2FM (ISO) Bent Axis Motor  
A2FE (Fixed Plugin) Bent Axis Motor  
A2FE (Two Speed) Bent Axis Motor  
A2FT 45 (Inline) Bent Axis Motor

### Bent Axis Piston Pumps

K2FA (DIN) Bent Axis Pump  
K2FH (HYBRID) Bent Axis Pump  
K2FL (Aluminum) Bent Axis Pump  
A2FS (SAE) Bent Axis Pump  
A3FS (SAE2) Bent Axis Pump  
A2FO (ISO) Bent Axis Pump  
A3FO (ISO2) Bent Axis Pump  
A2FP (Fixed Plugin) Bent Axis Pump

### Variable Displacement Motors

AXMV Variable Piston Motor  
AXMA Variable Piston Motor  
AXMI Variable Piston Motor

### Variable Displacement Pumps

AXVP Variable Piston Motor  
AXVA Variable Piston Motor  
AXVI Variable Piston Motor

### Dual Flow Piston Pumps

A2FD (DIN) Dual Flow Pumps  
A2FD (SAE) Dual Flow Pumps  
A2PD Axial Dual Output Pumps

### Axial Piston & Gear Pumps

A3PP Axial Piston Pumps  
A3PH High Pressure Pumps  
A2GP Gear Pumps  
A2GPT Tandem Gear Pumps  
A2GM Gear Motors  
A2GMT Tandem Gear Motors

### Valve (ByPass) (Flushing) (Cavitation)

Circulation Valve  
ByPass Valve  
Anti-Cavitation Valve  
Flushing Valve  
LS Valve  
AntiShock Valve  
Speed Sensor

### Hydraulic Spare Parts

Suction Fittings  
Couplars  
Adapters  
Flanges  
Power Take Off  
Monoblock Valve  
Section Valve

## Hydraulic Pumps, Motors

Bent Axis Hydraulic Piston Motors, Bent Axis Hydraulic Piston Pumps, Bent Axis Motors, Variable Displacement Piston Pumps, Variable Displacement Piston Motors, Axial Piston Pumps, High Pressure Piston Pumps, Gear Pumps, Gear Motors, Hydraulic Valve.

[www.HIDRAPAC.com](http://www.HIDRAPAC.com)

### Address;

#### HIDRAPAC HİDROLİK İÇ VE DIŞ TİC LTD ŞTİ

Address; Fevzicakmak Mah. Sıla Cad. Kobisan 3 San. Sit.  
No:73 / C Karatay – Konya, PO Code; 42050, Türkiye

Phone; +90 551 111 77 44

VAT Number; 462 077 9143

[www.HIDRAPAC.com](http://www.HIDRAPAC.com)

[MAIL@HIDRAPAC.com](mailto:MAIL@HIDRAPAC.com)

[INFO@HIDRAPAC.com](mailto:INFO@HIDRAPAC.com)

Hidrapac **Store**

[www.HIDRAPAC.com.tr](http://www.HIDRAPAC.com.tr)

Hidrapac **Premium**

[www.HIDRAPACHYDRAULIC.com](http://www.HIDRAPACHYDRAULIC.com)