

Gear Pumps - AP05



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1 General information

1.1 Introduction to the product

Gear pumps are widely used in modern hydraulic systems due to their high performance, long service life and low purchase and maintenance costs.

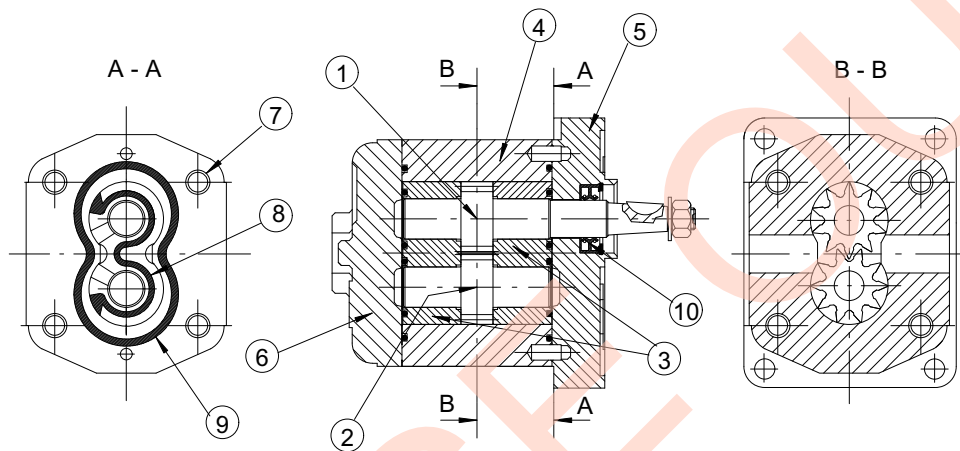
Product development has made it possible to achieve high operating pressures, excellent volumetric and mechanical efficiency, and lower noise levels, in operation, by means of:

- meticulous CAD design of the gear teeth and balancing areas
- an exacting choice of high-performance materials

- carefully controlled heat treatments
- increasingly tight coupling tolerances, and a high standard of surface finish.

Bucher Hydraulics S.p.A. has achieved these results by constantly improving its design, control, and manufacturing techniques in line with the latest technological developments, while simultaneously introducing a Quality Control System which ensures that every single product offers the same high standards.

Product description



1. Drive gear
2. Driven gear
3. Balancing
4. Pump body
5. Front cover

6. Rear cover
7. Mounting tie rod
8. Balancing seal
9. Oil seal
10. Shaft seal

Referring to the pump shown in the figure, the drive gear (1) drives round the driven gear (2), transferring the oil from the suction port to the pressure port as it turns round.

The gears are made from high strength steel alloy.

The bushings (3) serve a dual purpose:

- to act as a bearing for the gears
- to balance axial and radial thrust in proportion to the change in operating pressure.

The gears-bushings assembly is fitted inside the pump body (4), in which generally the suction and pressure ports are formed.

The pump body is made of high strength extruded aluminium alloy.

The front cover (5), which also acts as a mounting flange, and the rear cover (6) are connected to one another by mounting tie rods (7).

The pump assembly is completed by a series of seals:

- Balancing seals (8) can be fitted in recesses in the bushings as shown in the figure, or in the covers. Their purpose is to delimit the longitudinal balancing area separating the suction and pressure zones.
- Oil seals (9) prevent oil from leaking out.

- An oil retaining ring with the dual purpose of preventing oil leaks from the drive gear shaft and preventing dust or other pollutants from entering the pump itself. Unless otherwise specified, the seals are in nitrilic compound offering high mechanical strength and heat resistance.

- Viton seals are available on request.

(see 2.2 Recommended fluids/Allowed temperatures).

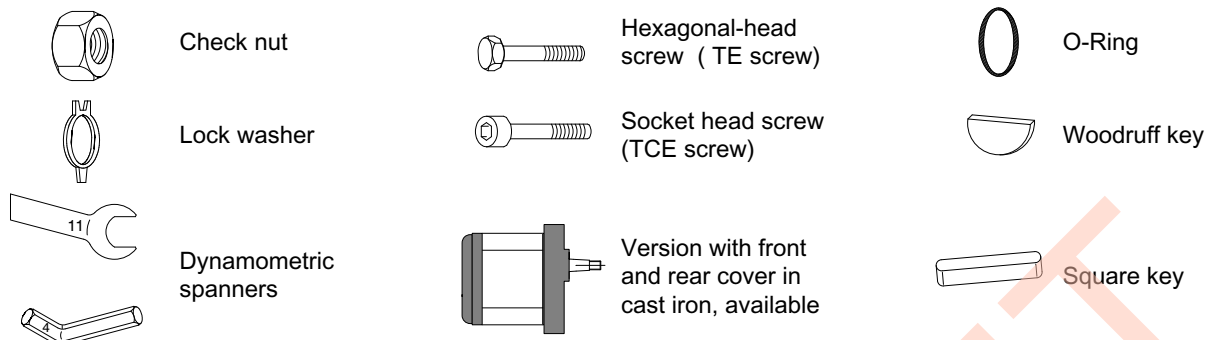
Versions available

The Bucher Hydraulics S.p.A. product range includes single pumps of groups 05-100-200-300 (corresponding to the common group denominations: 05-1-2-3) and several combinations of double pumps, triple pumps, and so on, that can be assembled together according to versions of displacement, flanging, and auxiliary valves indicated in this catalogue.

Bucher Hydraulics S.p.A. will examine any request for special versions, features, and customisations not shown in this catalogue.

To make such a request, please contact our Sales Department.

1.2 Non-standard symbols used in the text



2 Technical information

2.1 Identifying the rotation direction

The rotation direction of a gear pump is identified by looking at the pump from the front and with the drive gear turned upwards (see figures below).

Pumps with clockwise rotation (D) have a drive gear which turns clockwise, with the suction port on the left and the pressure port on the right.

Pumps with counterclockwise rotation (S) have a drive gear which turns counterclockwise, with the suction port on the right and the pressure port on the left.

The figure also shows the pressure flow inside the pumps as the oil is transferred from the suction port to the pressure port.

As regards reversible pumps (R), the ports are alternatively for suction and pressure.

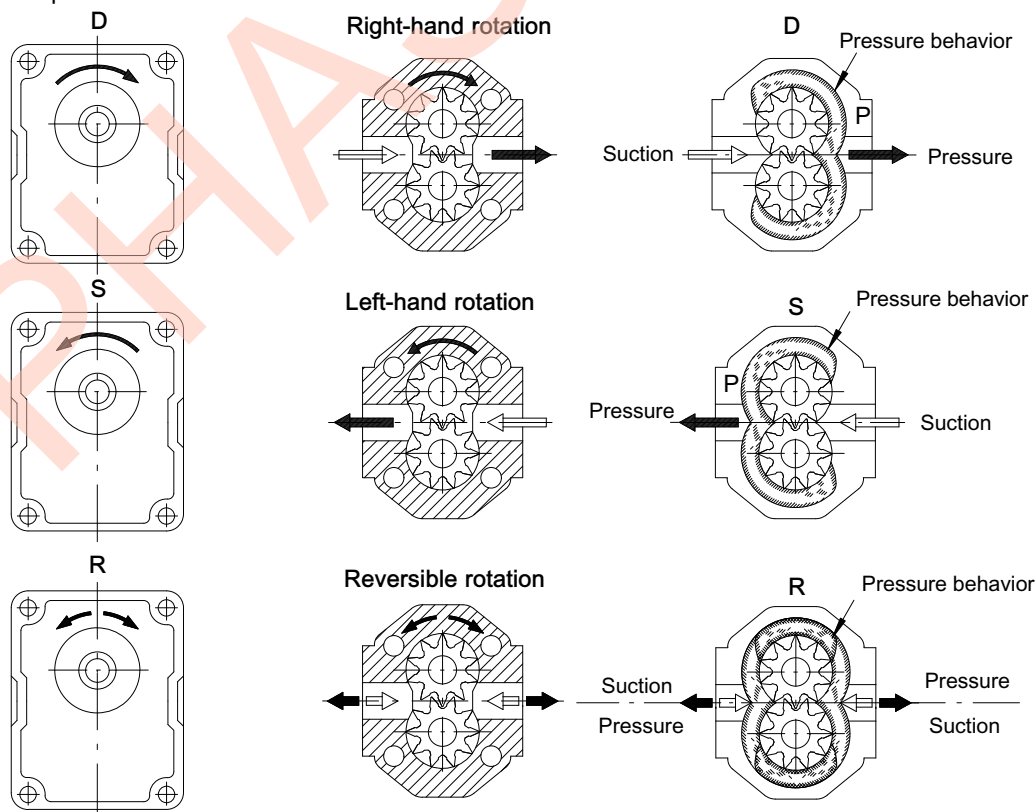
Pumps with a unidirectional rotation (D or S) have the denomination AP.

Pumps with reversible rotation have the denomination APR.

It is possible to change the rotation direction of the entire range of pumps without having to replace any component, except for the AP100 group, for which it is necessary to replace the front cover.

To ensure a good technical result, we recommend in any case that such inversion be carried out at our factory.

Technical descriptions are available on request, which show the correct procedure for the pump rotation inversion.



2.2 Recommended fluids/Allowed temperatures

We recommend using only mineral oil-based hydraulic fluids that comply with the ISO/DIN standards.

Viscosity range:

recommended $20 \div 120 \text{ mm}^2/\text{s}$ (cSt)

permitted up to $700 \text{ mm}^2/\text{s}$ (cSt)

Operating temperature

Type of seals	Temperature
	AP05-APR05
Buna N	$-15 \div 65 \text{ }^\circ\text{C}$
Viton*	$-10 \div 80 \text{ }^\circ\text{C}$



Attention: Use of pumps at temperatures above 80°C must always be agreed upon with our Technical Office, and in any case this can cause a significant worsening in the volumetric efficiency. For use under conditions different from those indicated in this catalogue, please contact our Sales Department

2.3 Suction

The absolute suction pressure must be $P_{in} \geq 0.75 \text{ bar}$ (11 PSI); therefore, the following must be avoided:

- large height differences between pump and tank
- long stretches of piping
- special features such as:
 - bends
 - reductions in diameter
 - quick couplings
 - etc.

It is also advisable to choose a filter of a suitable size to minimise any pressure drop and to take measures to prevent gradual clogging over time.

(Example 1)

In certain cases, the suction pressure can exceed 1 bar (14.3 PSI), or atmospheric pressure.

Please contact our Sales Department, solution for $P_{in} \leq 3.5 \text{ bar}$ (50 PSI), are available.

If in a particular application the P_{in} pressure is higher than the recommended value, contact our Sales Office.

The diameter of the suction pipe should ensure that the oil speed will fall within the range: $v = 0.6 - 1.2 \text{ m/s}$.

(Example 2)

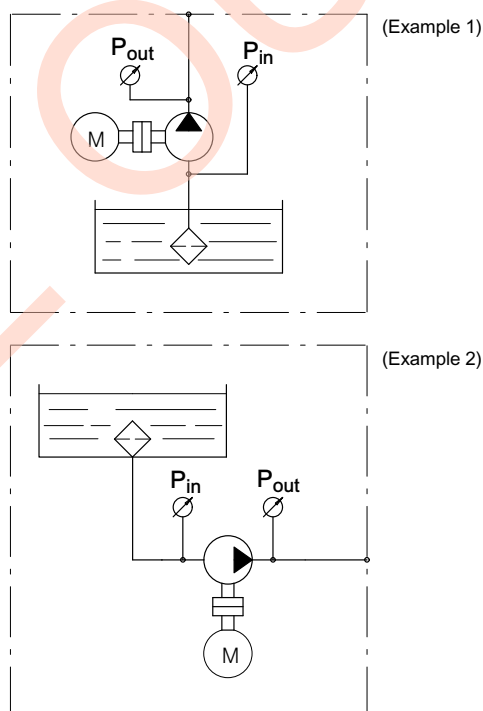
2.4 Filtration

A short service life of a gear pump is normally due to the presence of impurities in the oil.

It is therefore essential to have an effective filter in the system and to carry out regular maintenance to ensure a long, trouble-free service life.

When possible and compatible with the hydraulic circuit installed, Bucher Hydraulics S.p.A. recommends that the system have total filtration (suction, pressure, return).

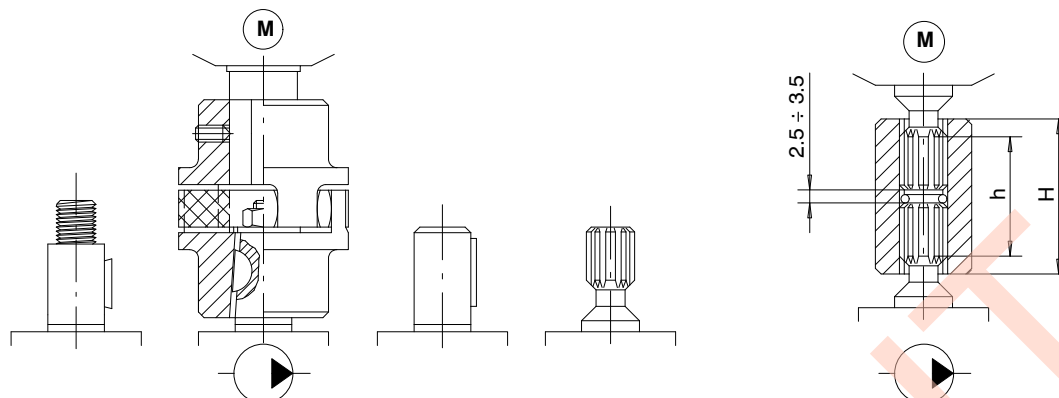
In any case, the filtering system must constantly ensure an oil contamination class equal to or less than those shown in the following table.



Operating pressure	> 170 bar 2430 PSI	< 170 bar 2430 PSI
Contamination class NAS 1638	9	10
Contamination class ISO 4406	18/15	19/16
Obtain wit filter $\beta_x = 75$	20	25

We also recommend that an adequate air filter be installed on the tank to prevent contaminating substances such as dust, sand, etc. from getting into the oil, as these substances can enter the tank through the air flow caused by the level variations in the tank itself.

2.5 Motor-pump coupling



Absolutely no radial or axial forces should be transmitted to the drive shaft in the motor-pump coupling.

Such forces cause rapid and irregular wear on the balancing surface of the bushings and gear support, with a consequent worsening in pump performance.

The coupling joint must be able to absorb any discrepancies in the coaxial alignment of the motor-pump shafts without placing any load on the pump shaft.

In the couplings between splined shafts, the connecting sleeve must be free to move along its axis.

The length of the sleeve must be sufficient to cover the splined sections of the motor-pump shafts completely in any position.

The distance between the ends of the shafts must be between 2.5 ÷ 3.5 mm (.10" ÷ .14").

Make sure that the splined coupling is suitably lubricated to protect it against rapid deterioration.

If there are radial and/or axial loads on the drive shaft, such as when it is driven by a V-belt and pulley or pair of gear wheels, it should be fitted with a front cover with supporting bearings.

2.6 General precaution

In addition to the recommendations regarding fluids, filtration, coupling, etc., we suggest the following:

- Always check the rotation direction of the pump's drive shaft; it must be compatible with the rotation direction of the pump itself.
- Be particularly careful in cleaning and make sure, when connecting the suction and pressure piping, that no chips, rag threads, teflon tape, etc. get into the pump circulation system.
- Check the tightness of the suction and pressure fittings, the correct positioning of the O-Ring, and make sure there is no dirt between the flange and the pump body.
- The first pump start-up can be facilitated by manually filling the suction piping and the pump itself with oil. To facilitate air bleeding, start the pump with the circuit not pressurised.

- To ensure the best heat distribution inside the tank, make sure the return pipe is not too close to the pump's suction piping. The pipings themselves should be below oil tank level to prevent the formation of foam.
- Do not subject the pumps to operating conditions different from those indicated in section 2.8 ; for extreme operations, always contact our Technical Department.
- Never use fluids different from those indicated in section 2.2.
- In the event of pump painting, do not use solvents or paints that are incompatible with the material of the seals. Do not bake paint with excessively high temperatures. Do not paint over the product identification plate; the warranty will not be valid if this plate is illegible.

2.6.1 Directives and standards

Atex



Attention: The equipment and protective systems of these catalogue ARE NOT intended for use in potentially explosive atmospheres that is to say where there is an explosive atmosphere referred to in Article 2 of the Directive 99/92/EC and referred to Article 1.3 of the Directive 94/9/EC

Machinery safety

Hydraulic pumps are excluded by Directive 2006/42/EC

- ISO 9001: 2008 / ISO 14001:2004

Bucher Hydraulics S.p.A. is certified for research, development and production of directional control valves, gear pumps and motors, power units, electro pumps, cartridge valves and integrated manifolds for hydraulic applications.

2.7 Pressure

Pressure levels:

P1 = continuous pressure

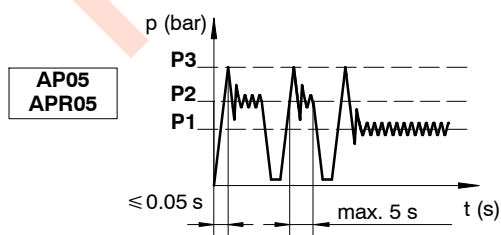
P2 = intermittent pressure

P3 = peak pressure

The recommended oil speed in the pressure pipes is:

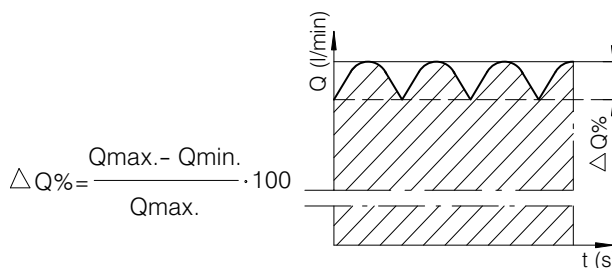
$v = 2 \text{ to } 5 \text{ m/s}$

The characteristic data of each pump is given in the tables on the following pages.



Pressure flow rate surging

Pump	z	$\Delta Q\%$
AP05 - APR05	13	13



2.8 Calculating the specification of a gear pump

The following parameters are defined:

V_c = (cm³/r) pump displacement;

n = (r/min) no. of rpms of the drive shaft;

Q = (l/min) flow rate;

p = (bar) operating pressure;

T = (Nm) drive torque;

N = (kW) power;

η_v = (%) volumetric efficiency;

η_m = (%) mechanical efficiency;

η_t = (%) total efficiency

$$Q = \frac{V_c \cdot n}{100000} \cdot \eta_v$$

$$T = 1.59 \cdot \frac{p \cdot V_c}{\eta_m}$$

$$N = \frac{Q \cdot p}{6.12 \cdot \eta_t}$$

Example

AP05/0.9 $V_c = 0.9$ cm³/r $n = 1500$ r/min $p = 200$ bar $\eta_v = 94\%$ $\eta_m = 90\%$ $\eta_t = 84.6\%$

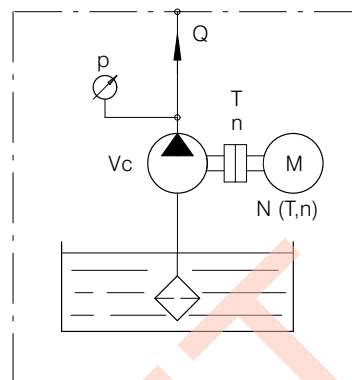
$$Q = \frac{0.9 \cdot 1500}{100000} \cdot 94 = 1.27 \text{ l/min.}$$

$$T = 1.59 \cdot \frac{200 \cdot 0.9}{90} = 3.18 \text{ Nm}$$

$$N = \frac{1.27 \cdot 200}{6.12 \cdot 84.6} = 0.49 \text{ kW}$$



Important: Please contact our Sales Department if even one of the operating limits indicated in the tables below (temperature, pressure, rpm) is exceeded, as well as in the case of two or more maximum values at the same time, or for applications with particularly heavy-duty cycles.

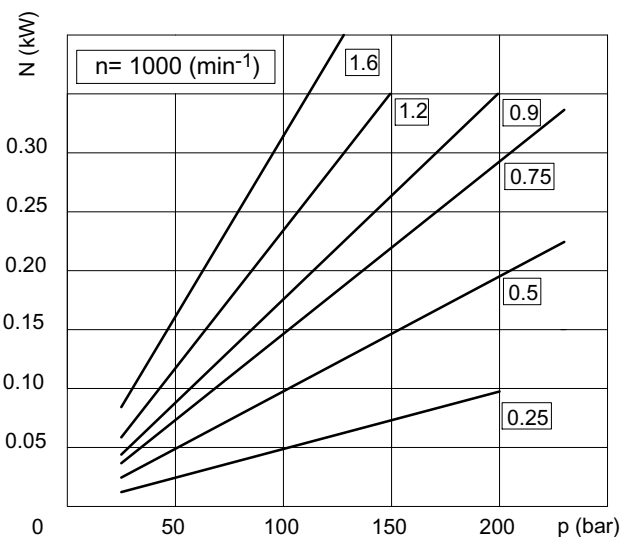
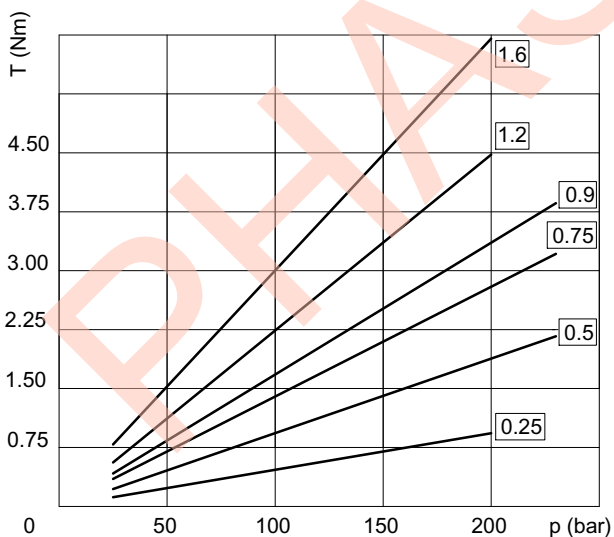
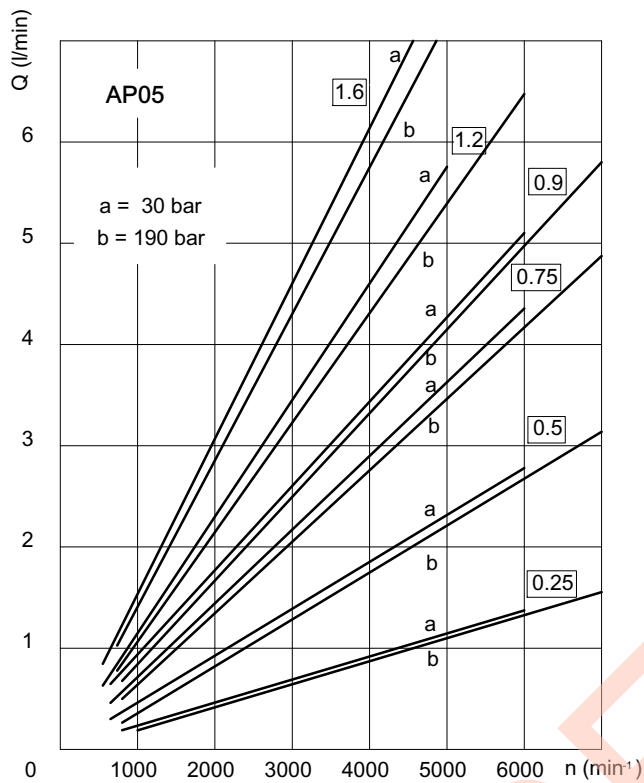


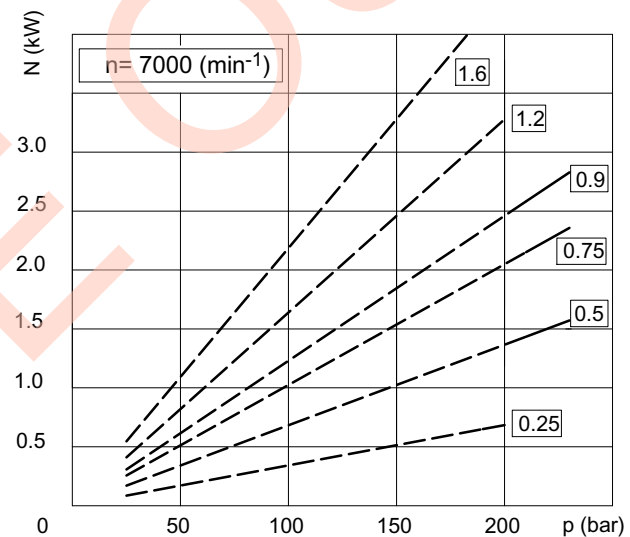
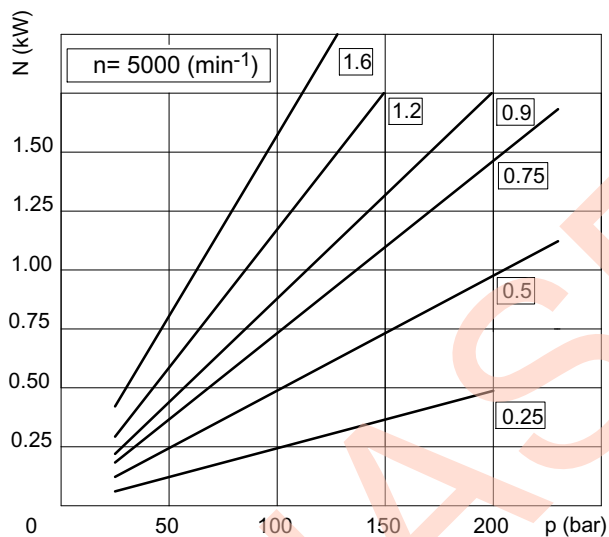
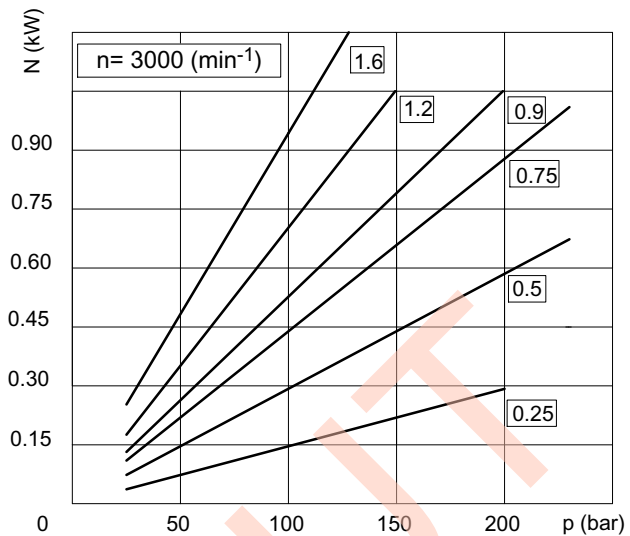
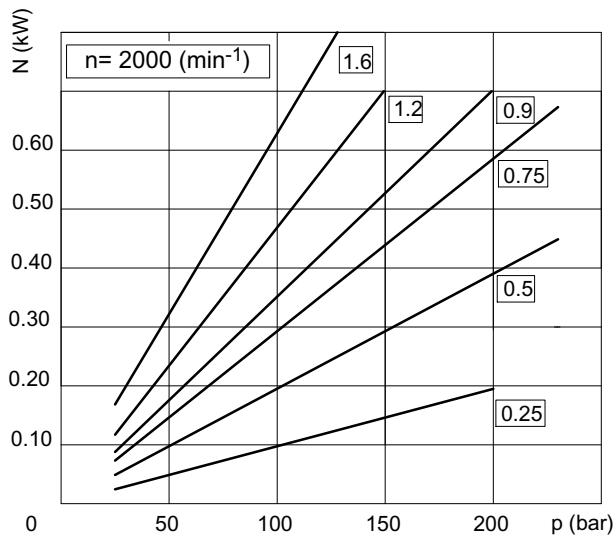
AP/APR05 Type	Displacement		Max. pressure						n.min.		n.max.
	cm ³ /rev	Cu.In.P.R.	P1		P2		P3		P < 100	P > 100	
			bar	P.S.I.	bar	P.S.I.	bar	P.S.I.	bar	bar	
AP05/0.25	0.25	.015	170	2400	180	2600	200	2900	800	3000	7000
AP05/0.5	0.5	.030	190	2700	210	3000	230	3300	650	3000	7000
AP05/0.75	0.75	.045	190	2700	210	3000	230	3300	650	1500	7000
AP05/0.9	0.9	.055	190	2700	210	3000	230	3300	650	1500	7000
AP05/1.2	1.2	.073	170	2400	180	2600	200	2900	550	1500	6000
AP05/1.6	1.6	.097	170	2400	180	2600	200	2900	550	1500	6000
AP05/2.3	2.3	.139	150	2150	160	2300	180	2600	550	1500	4500
APR05/0.25	0.25	.015	150	2200	160	2300	180	2600	800	3000	7000
APR05/0.5	0.5	.030	170	2400	190	2700	210	3000	650	3000	7000
APR05/0.75	0.75	.045	170	2400	190	2700	210	3000	650	1500	7000
APR0.5/0.9	0.9	.055	170	2400	190	2700	210	3000	650	1500	7000
APR05/1.2	1.2	.073	150	2200	160	2300	180	2600	550	1500	6000

2.9 Diagrams

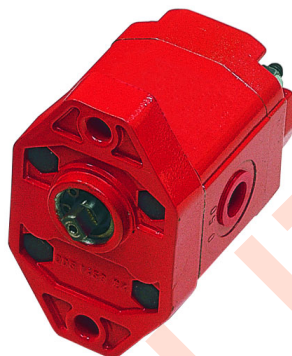
Oil viscosity: 37 mm²/s

Oil temperature: 40° C

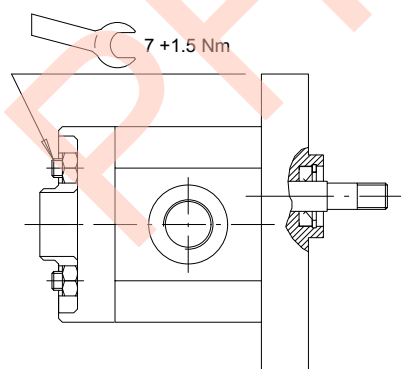




3 Gear pump group AP05



AP/APR05 Type	Displacement		Max. pressure						n.min.		n.max.
	cm ³ /rev	Cu.In.P.R.	P1		P2		P3		P < 100	P > 100	
			bar	P.S.I.	bar	P.S.I.	bar	P.S.I.	bar	bar	
AP05/0.25	0.25	.015	170	2400	180	2600	200	2900	800	3000	7000
AP05/0.5	0.5	.030	190	2700	210	3000	230	3300	650	3000	7000
AP05/0.75	0.75	.045	190	2700	210	3000	230	3300	650	1500	7000
AP05/0.9	0.9	.055	190	2700	210	3000	230	3300	650	1500	7000
AP05/1.2	1.2	.073	170	2400	180	2600	200	2900	550	1500	6000
AP05/1.6	1.6	.097	170	2400	180	2600	200	2900	550	1500	6000
AP05/2.3	2.3	.139	150	2150	160	2300	180	2600	550	1500	4500
APR05/0.25	0.25	.015	150	2200	160	2300	180	2600	800	3000	7000
APR05/0.5	0.5	.030	170	2400	190	2700	210	3000	650	3000	7000
APR05/0.75	0.75	.045	170	2400	190	2700	210	3000	650	1500	7000
APR0.5/0.9	0.9	.055	170	2400	190	2700	210	3000	650	1500	7000
APR05/1.2	1.2	.073	150	2200	160	2300	180	2600	550	1500	6000



Max torque allowed to the shaft



T max = 13 Nm



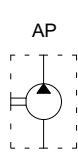
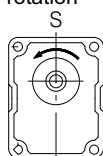
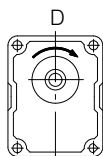
T max = 5 Nm

**9

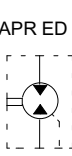
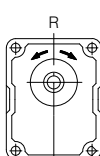
Last number of pump code

**0

Clockwise (D) Counter-clockwise (S)
rotation



Reversible rotation

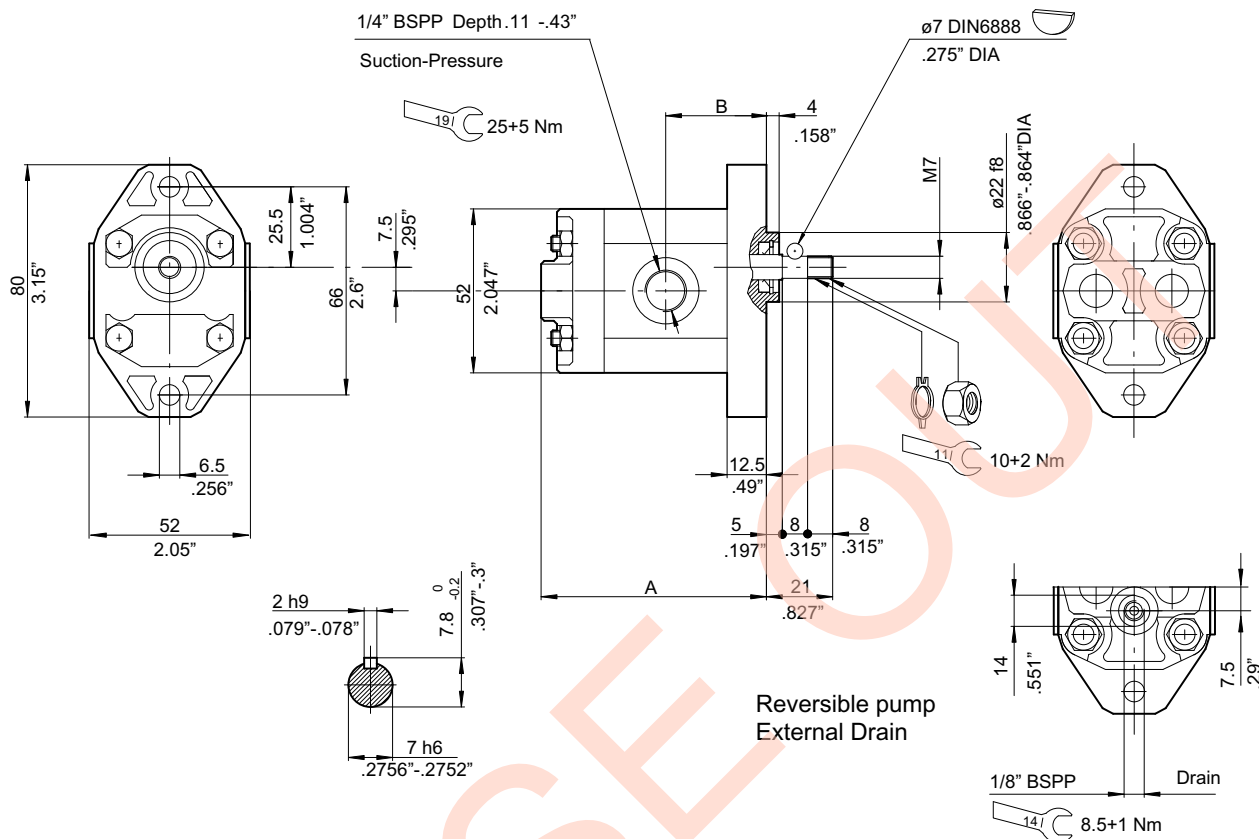


Notes:

- For uses at the operating limits, see note in section 2.8

- For the types of pumps without ordering code, contact our Sales Dept.

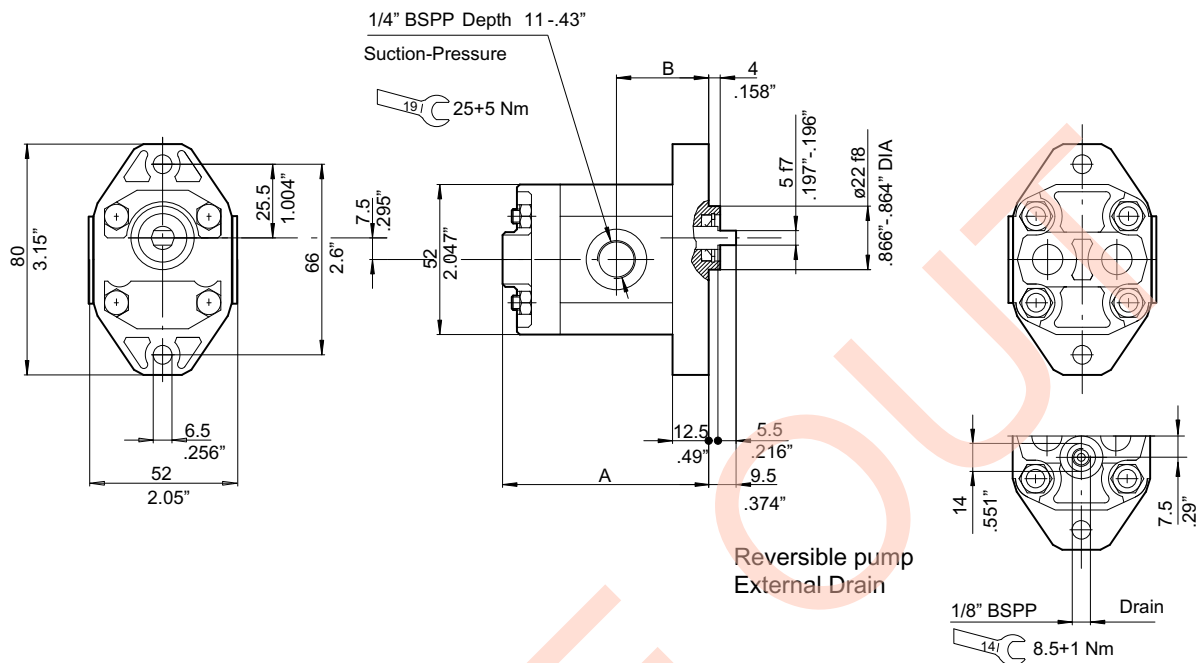
Group **AP05**
APR05 Code **810**



Type	Displacement cm ³ /rev	Dimensions			
		A	B		
		mm	inch.	mm	inch.
AP05/0.25	0.25	64.5	2.54	29	1.41
AP05/0.5	0.5	67	2.64	30.5	1.2
AP05/0.75	0.75	69	2.72	31.5	1.24
AP05/0.9	0.9	70.5	2.77	32	1.26
AP05/1.2	1.2	73	2.87	33.5	1.32

Clockwise rotation: D		Counter-clockwise rotation: S		Reversible pump - External Drain	
Type	Order Code	Type	Order Code	Type	Order Code
AP05/0.25 D 810	200100261204	AP05/0.25 S 810	200100261302	APR05/0.25 810	200100261101
AP05/0.5 D 810	200100361202	AP05/0.5 S 810	200100361302	APR05/0.5 810	200100361101
AP05/0.75 D 810	200100461202	AP05/0.75 S 810	200100461302	APR05/0.75 810	200100461101
AP05/0.9 D 810	200100561202	AP05/0.9 S 810	200100561302	APR05/0.9 810	200100561101
AP05/1.2 D 810	200100661202	AP05/1.2 S 810	200100661302	APR05/1.2 810	200100661101

Group AP05 Code 819
APR05



Type	Displacement cm ³ /rev	Dimensions			
		A		B	
		mm	inch.	mm	inch.
AP05/0.25	0.25	64.5	2.54	29	1.41
AP05/0.5	0.5	67	2.64	30.5	1.2
AP05/0.75	0.75	69	2.72	31.5	1.24
AP05/0.9	0.9	70.5	2.77	32.3	1.26
AP05/1.2	1.2	73	2.87	33.5	1.32
AP05/1.6	1.6	77	3.03	35.5	1.40

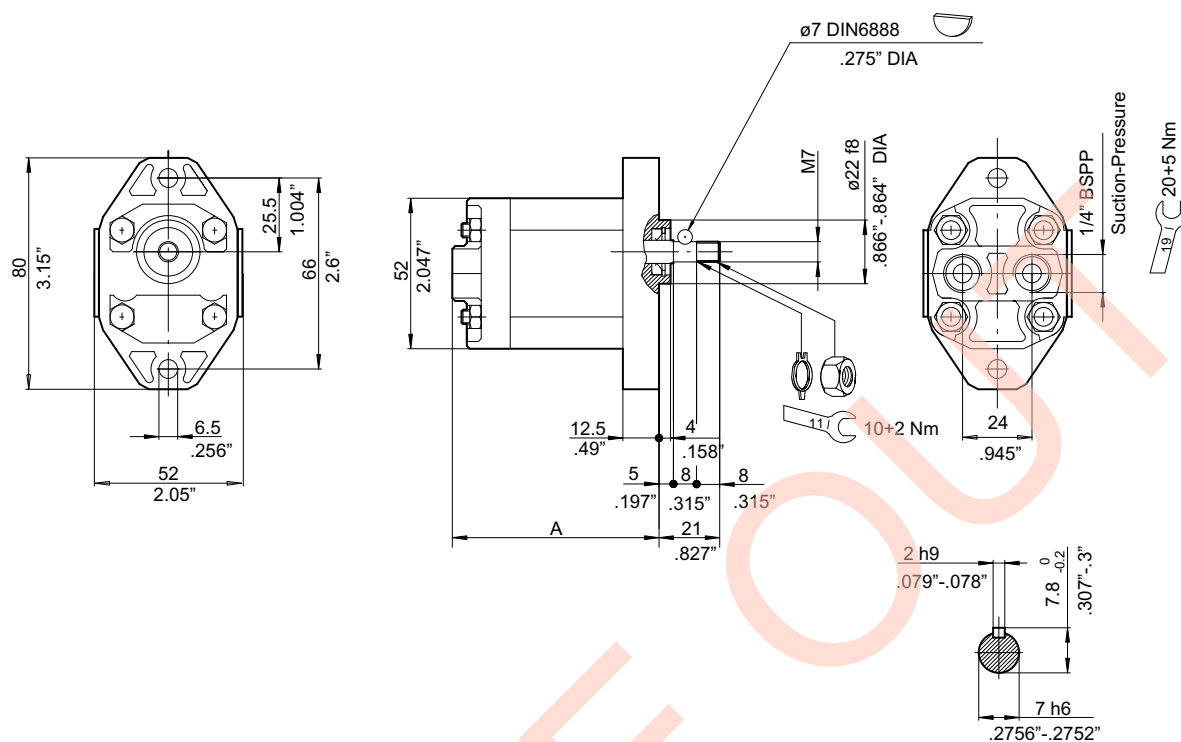
Clockwise rotation: D		Counter-clockwise rotation: S		Reversible pump - External Drain	
Type	Order Code	Type	Order Code	Type	Order Code
AP05/0.25 D 819	200100264208	AP05/0.25 S 819	200100264304	APR05/0.25 819	
AP05/0.5 D 819	200100364202	AP05/0.5 S 819	200100364302	APR05/0.5 819	200100364101
AP05/0.75 D 819	200100464202	AP05/0.75 S 819	200100464302	APR05/0.75 819	
AP05/0.9 D 819	200100564204	AP05/0.9 S 819	200100564304	APR05/0.9 819	200100564101
AP05/1.2 D 819	200100664202	AP05/1.2 S 819	200100664302	APR05/1.2 819	200100664101
AP05/1.6 D 819	200100864202	AP05/1.6 S 819	200100864301	APR05/1.6 819	

Group

AP05

Code

310



Type	Displacement cm ³ /rev	Dimensions	
		A	
		mm	inch.
AP05/0.25	0.25	64.5	2.54
AP05/0.5	0.5	67	2.64
AP05/0.75	0.75	69	2.72
AP05/0.9	0.9	70.5	2.77
AP05/1.2	1.2	73	2.87

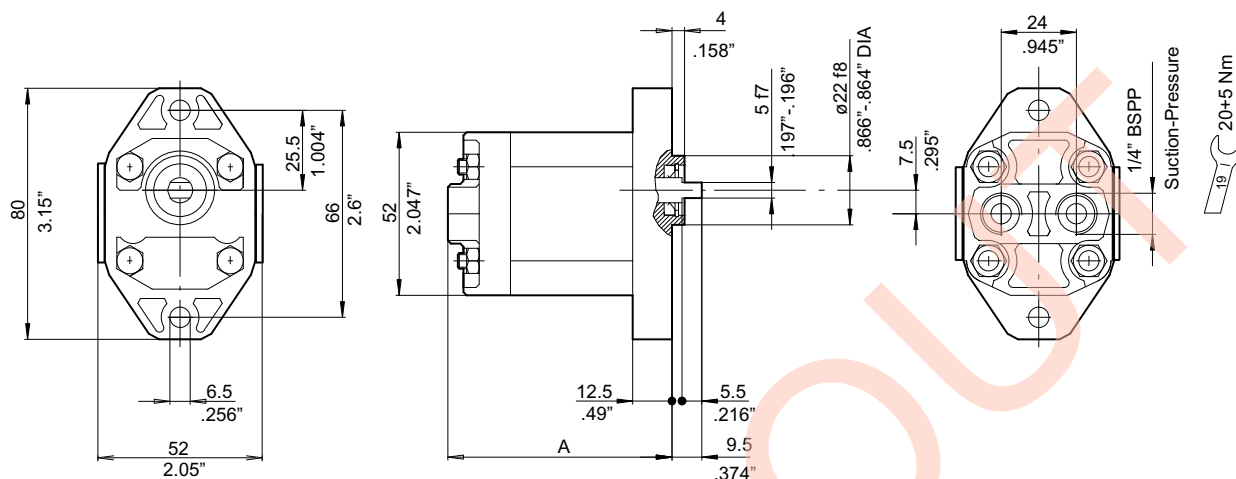
Clockwise rotation: D		Counter-clockwise rotation: S	
Type	Order Code	Type	Order Code
AP05/0.25 D 310	200100261201	AP05/0.25 S 310	200100261301
AP05/0.5 D 310	200100361201	AP05/0.5 S 310	200100361301
AP05/0.75 D 310	200100461201	AP05/0.75 S 310	200100461301
AP05/0.9 D 310	200100561201	AP05/0.9 S 310	200100561301
AP05/1.2 D 310	200100661201	AP05/1.2 S 310	200100661301

Group

AP05

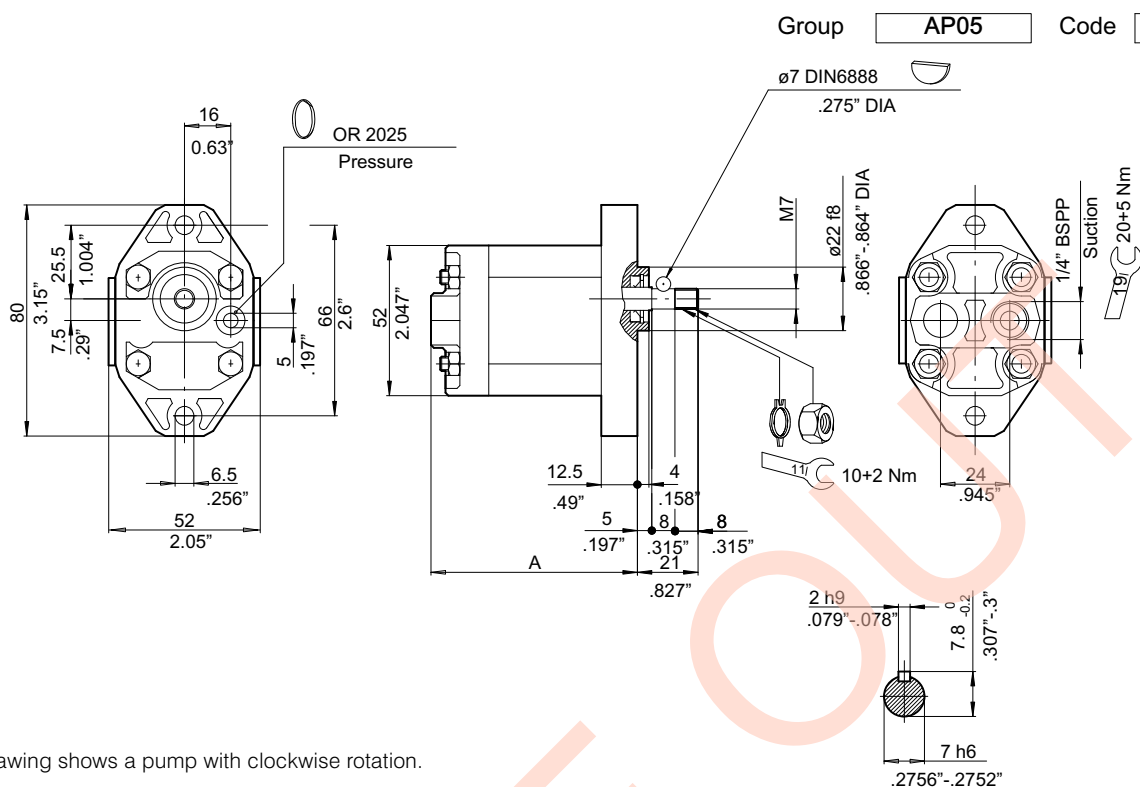
Code

319



Type	Displacement cm ³ /rev	Dimensions	
		A	
		mm	inch.
AP05/0.25	0.25	64.5	2.54
AP05/0.5	0.5	67	2.64
AP05/0.75	0.75	69	2.72
AP05/0.9	0.9	70.5	2.77
AP05/1.2	1.2	73	2.87

Clockwise rotation: D		Counter-clockwise rotation: S	
Type	Order Code	Type	Order Code
AP05/0.25 D 319	200100214202	AP05/0.25 S 319	200100214301
AP05/0.5 D 319	200100314201	AP05/0.5 S 319	200100314301
AP05/0.75 D 319	200100414201	AP05/0.75 S 319	200100414301
AP05/0.9 D 319	200100514201	AP05/0.9 S 319	200100514301
AP05/1.2 D 319	200100614201	AP05/1.2 S 319	200100614301
AP05/1.6 D 319	200100814201	AP05/1.6 S 319	200100814301



The drawing shows a pump with clockwise rotation.

Type	Displacement cm ³ /rev	Dimensions	
		A	
		mm	inch.
AP05/0.25	0.25	64.5	2.54
AP05/0.5	0.5	67	2.64
AP05/0.75	0.75	69	2.72
AP05/0.9	0.9	70.5	2.77
AP05/1.2	1.2	73	2.87

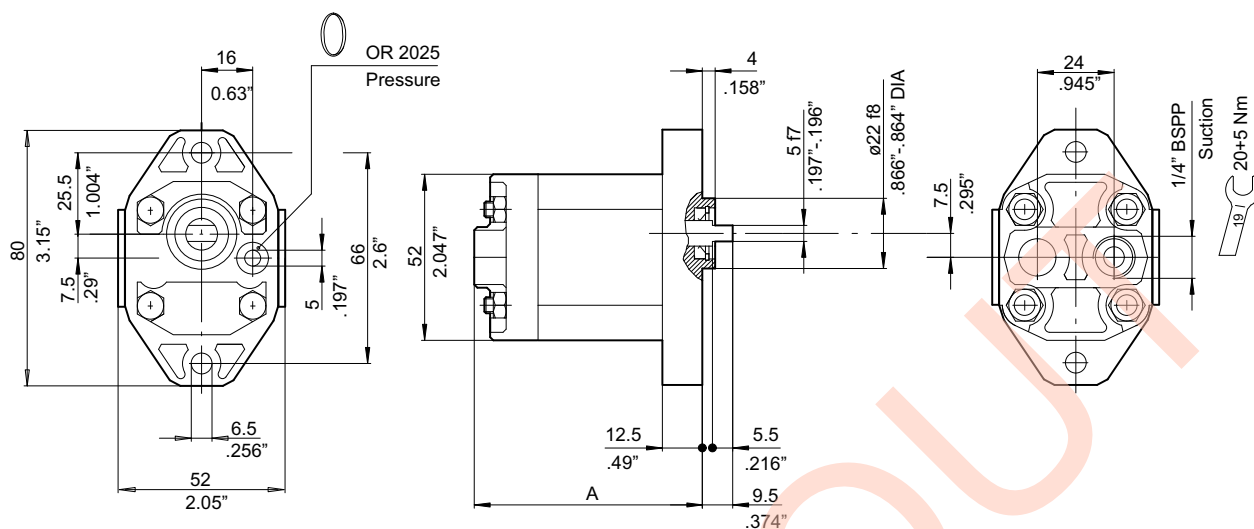
Clockwise rotation: D		Counter-clockwise rotation: S	
Type	Order Code	Type	Order Code
AP05/0.25 D 410	200100261204	AP05/0.25 S 410	200100261304
AP05/0.5 D 410	200100361202	AP05/0.5 S 410	200100361304
AP05/0.75 D 410	200100461202	AP05/0.75 S 410	200100461302
AP05/0.9 D 410	200100561204	AP05/0.9 S 410	200100561302
AP05/1.2 D 410	200100661202	AP05/1.2 S 410	200100661302

Group

AP05

Code

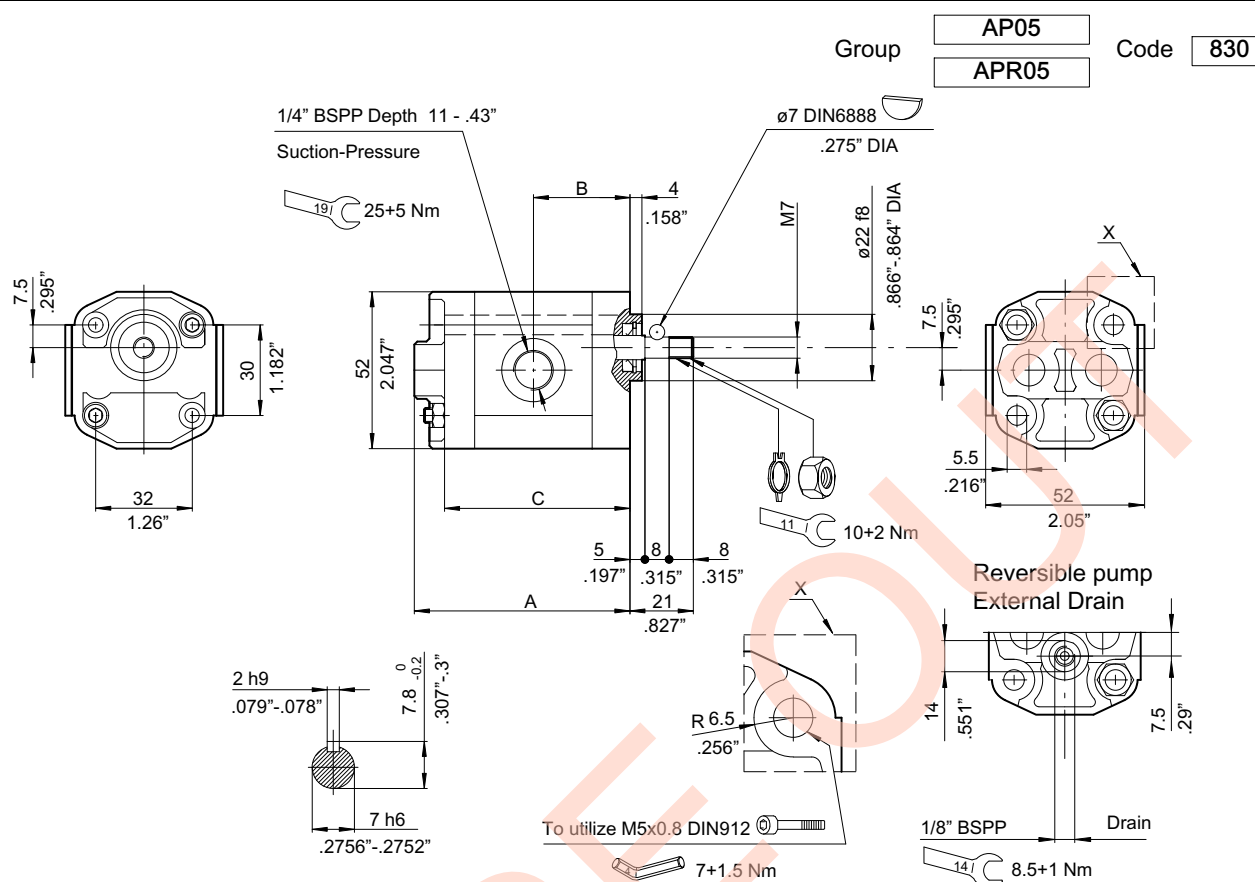
419



The drawing shows a pump with clockwise rotation.

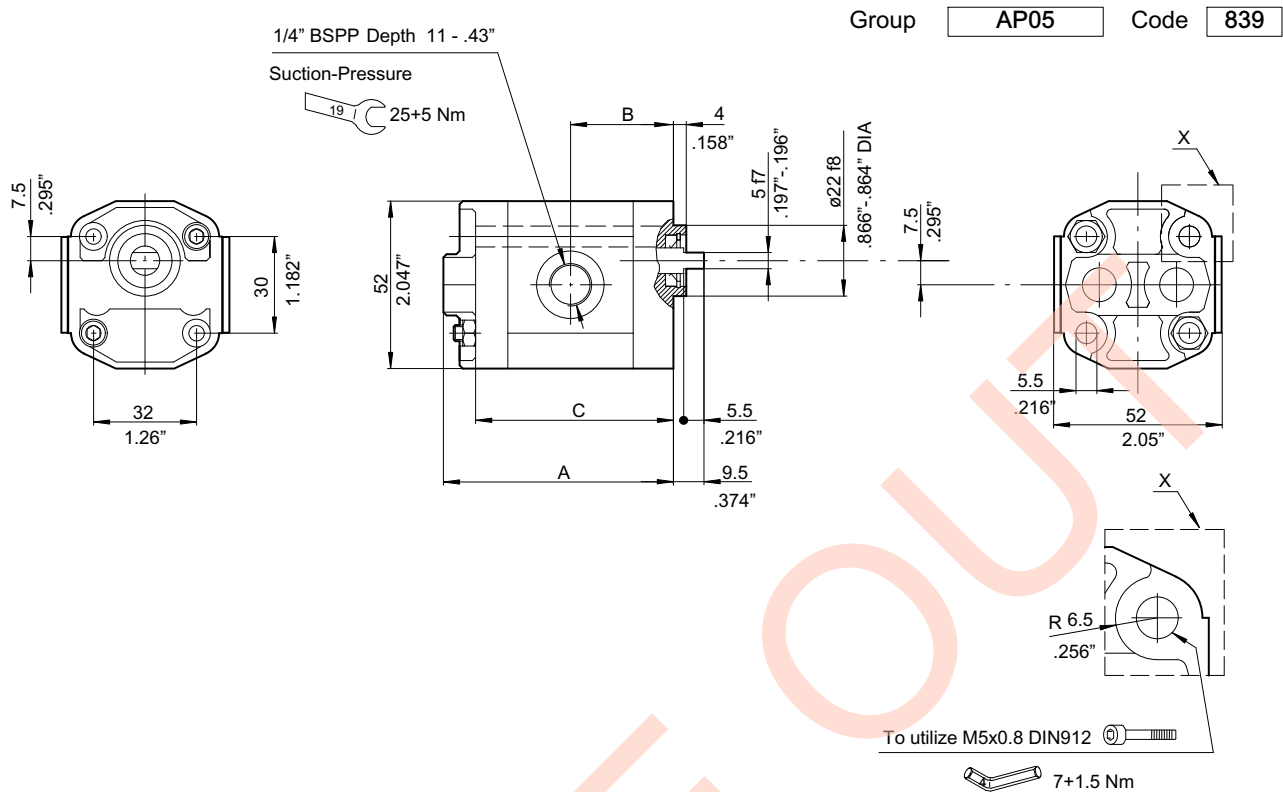
Type	Displacement cm ³ /rev	Dimensions	
		A	
		mm	inch.
AP05/0.25	0.25	64.5	2.54
AP05/0.5	0.5	67	2.64
AP05/0.75	0.75	69	2.72
AP05/0.9	0.9	70.5	2.77
AP05/1.2	1.2	73	2.87
AP05/1.6	1.6	77	3.03

Clockwise rotation: D		Counter-clockwise rotation: S	
Type	Order Code	Type	Order Code
AP05/0.25 D 419		AP05/0.25 S 419	
AP05/0.5 D 419	200100364203	AP05/0.5 S 419	200100364304
AP05/0.75 D 419		AP05/0.75 S 419	200100464303
AP05/0.9 D 419		AP05/0.9 S 419	
AP05/1.2 D 419		AP05/1.2 S 419	
AP05/1.6 D 419		AP05/1.6 S 419	200100864302



Type	Displacement cm ³ /rev	Dimensions					
		A		B		C	
		mm	inch.	mm	inch.	mm	inch.
AP05/0.25	0.25	64.5	2.54	29	1.41	53.5	2.11
AP05/0.5	0.5	67	2.64	30.5	1.2	56	2.20
AP05/0.75	0.75	69	2.72	31.5	1.24	58	2.28
AP05/0.9	0.9	70.5	2.77	32	1.26	59.5	2.34
AP05/1.2	1.2	73	2.87	33.5	1.32	62	2.44

Clockwise rotation: D		Counter-clockwise rotation: S		Reversible pump - External Drain	
Type	Order Code	Type	Order Code	Type	Order Code
AP05/0.25 D 830	200100230201	AP05/0.25 S 830	200100230301	APR05/0.25 830	
AP05/0.5 D 830		AP05/0.5 S 830	200100330301	APR05/0.5 830	200100330101
AP05/0.75 D 830		AP05/0.75 S 830	200100430301	APR05/0.75 830	
AP05/0.9 D 830		AP05/0.9 S 830	200100530301	APR05/0.9 830	200100530101
AP05/1.2 D 830		AP05/1.2 S 830	200100631301	APR05/1.2 830	



Type	Displacement cm ³ /rev	Dimensions					
		A		B		C	
		mm	inch.	mm	inch.	mm	inch.
AP05/0.25	0.25	64.5	2.54	29	1.41	53.5	2.11
AP05/0.5	0.5	67	2.64	30.5	1.2	56	2.20
AP05/0.75	0.75	69	2.72	31.5	1.24	58	2.28
AP05/0.9	0.9	70.5	2.77	32	1.26	59.5	2.34
AP05/1.2	1.2	73	2.87	33.5	1.32	62	2.44
AP05/1.6	1.6	77	3.03	35.5	1.40	66	2.60

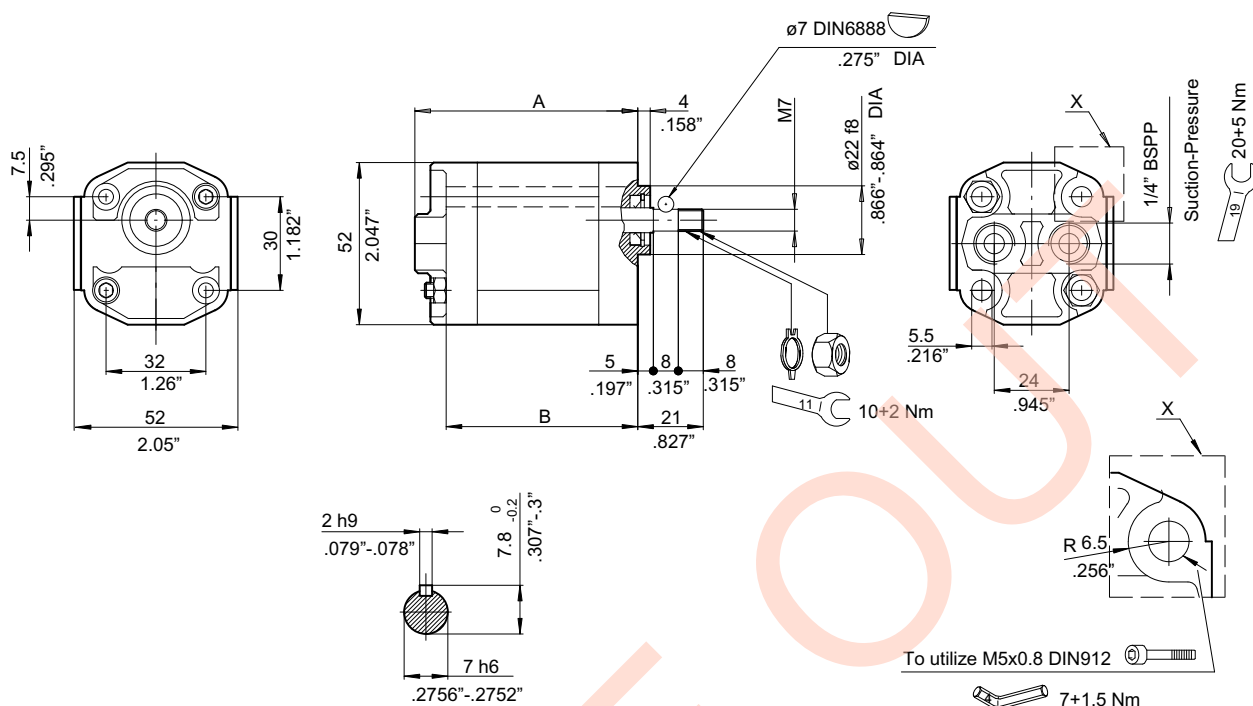
Clockwise rotation: D		Counter-clockwise rotation: S	
Type	Order Code	Type	Order Code
AP05/0.25 D 839		AP05/0.25 S 839	
AP05/0.5 D 839	200100334201	AP05/0.5 S 839	
AP05/0.75 D 839	200100434201	AP05/0.75 S 839	200100434304
AP05/0.9 D 839	200100534201	AP05/0.9 S 839	200100534302
AP05/1.2 D 839	200100634204	AP05/1.2 S 839	200100634301
AP05/1.6 D 839	200100834201	AP05/1.6 S 839	200100834301

Group

AP05

Code

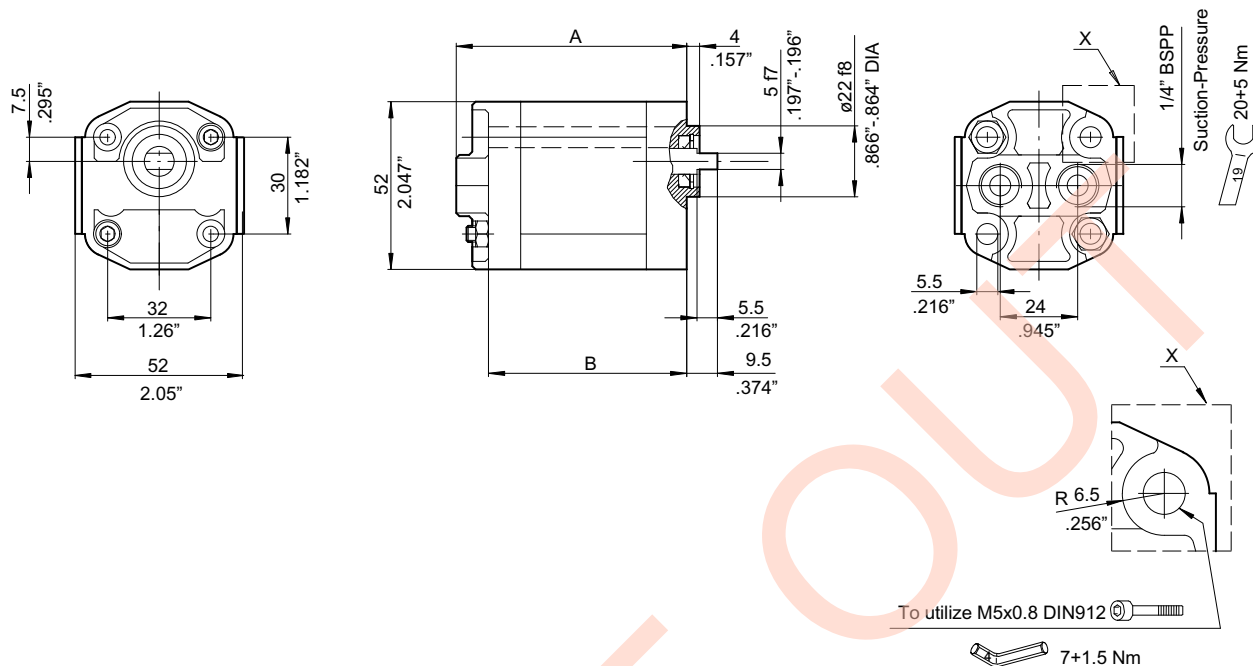
330



Type	Displacement cm ³ /rev	Dimensions			
		A		B	
		mm	inch.	mm	inch.
AP05/0.25	0.25	64.5	2.54	53.5	2.11
AP05/0.5	0.5	67	2.64	56	2.20
AP05/0.75	0.75	69	2.72	58	2.28
AP05/0.9	0.9	70.5	2.77	59.5	2.34
AP05/1.2	1.2	73	2.87	62	2.44

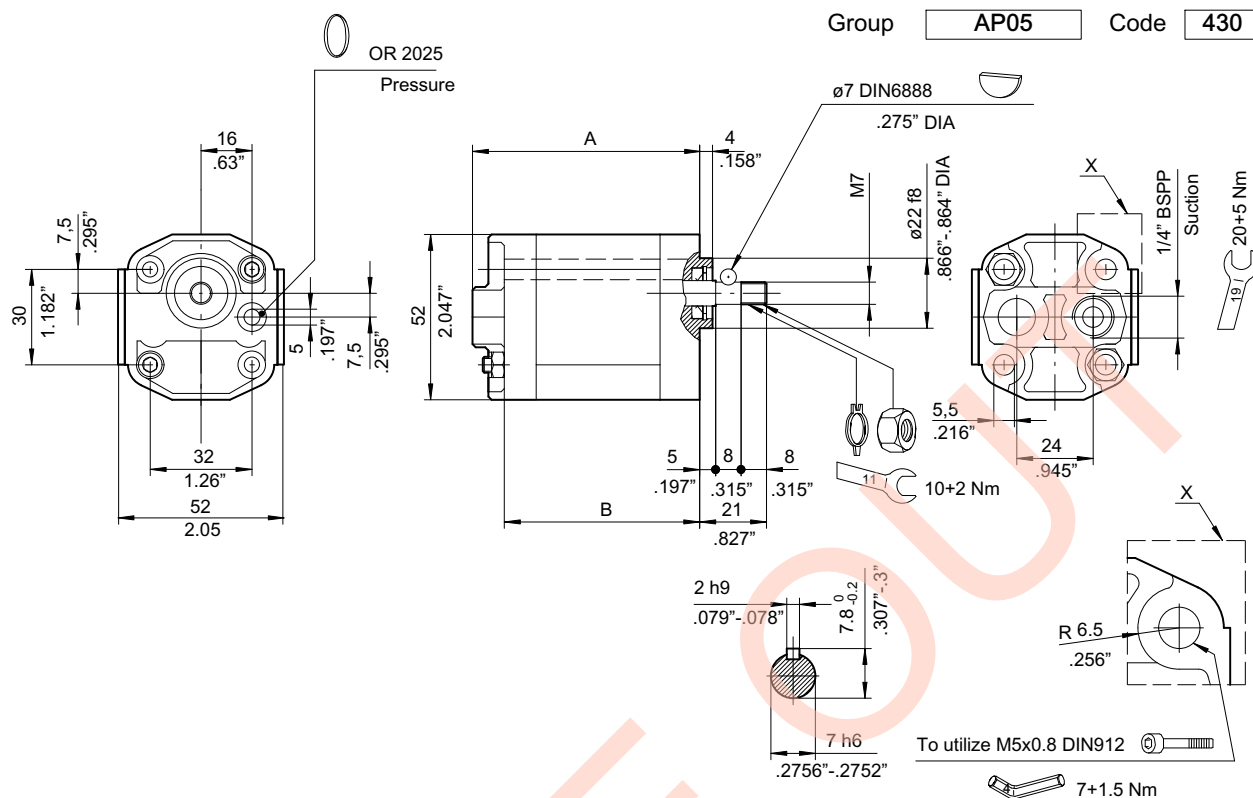
Clockwise rotation: D		Counter-clockwise rotation: S	
Type	Order Code	Type	Order Code
AP05/0.25 D 330		AP05/0.25 S 330	
AP05/0.5 D 330		AP05/0.5 S 330	
AP05/0.75 D 330		AP05/0.75 S 330	
AP05/0.9 D 330	200100531201	AP05/0.9 S 330	
AP05/1.2 D 330		AP05/1.2 S 330	

Group **AP05** Code **339**



Type	Displacement cm ³ /rev	Dimensions			
		A		B	
		mm	inch.	mm	inch.
AP05/0.25	0.25	64.5	2.54	53.5	2.11
AP05/0.5	0.5	67	2.64	56	2.20
AP05/0.75	0.75	69	2.72	58	2.28
AP05/0.9	0.9	70.5	2.77	59.5	2.34
AP05/1.2	1.2	73	2.87	62	2.44
AP05/1.6	1.6	77	3.03	66	2.60

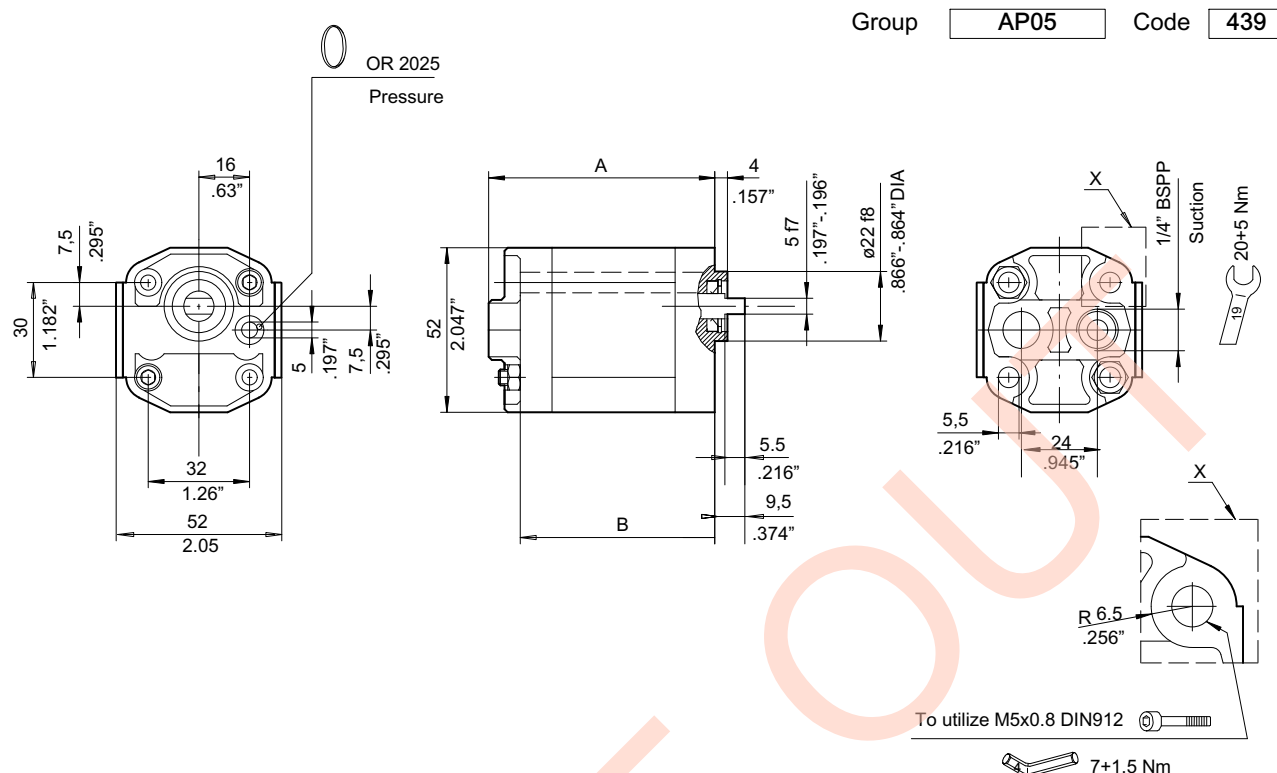
Clockwise rotation: D		Counter-clockwise rotation: S	
Type	Order Code	Type	Order Code
AP05/0.25 D 339	200100234201	AP05/0.25 S 339	200100234303
AP05/0.5 D 339	200100334203	AP05/0.5 S 339	200100334303
AP05/0.75 D 339	200100434202	AP05/0.75 S 339	200100434302
AP05/0.9 D 339	200100534203	AP05/0.9 S 339	200100534303
AP05/1.2 D 339	200100634203	AP05/1.2 S 339	200100634303
AP05/1.6 D 339	200100834202	AP05/1.6 S 339	200100834302



The drawing shows a pump with clockwise rotation.

Type	Displacement cm ³ /rev	Dimensions			
		A		B	
		mm	inch.	mm	inch.
AP05/0.25 D	0.25	64.5	2.54	53.5	2.11
AP05/0.5 D	0.5	67	2.64	56	2.20
AP05/0.75 D	0.75	69	2.72	58	2.28
AP05/0.9 D	0.9	70.5	2.77	59.5	2.34
AP05/1.2 D	1.2	73	2.87	62	2.44

Clockwise rotation: D		Counter-clockwise rotation: S	
Type	Order Code	Type	Order Code
AP05/0.25 D 430	200100231201	AP05/0.25 S 430	
AP05/0.5 D 430	200100331201	AP05/0.5 S 430	
AP05/0.75 D 430		AP05/0.75 S 430	
AP05/0.9 D 430		AP05/0.9 S 430	
AP05/1.2 D 430		AP05/1.2 S 430	



The drawing shows a pump with clockwise rotation.

Type	Displacement cm ³ /rev	Dimensions			
		A		B	
		mm	inch.	mm	inch.
AP05/0.25 D	0.25	64.5	2.54	53.5	2.11
AP05/0.5 D	0.5	67	2.64	56	2.20
AP05/0.75 D	0.75	69	2.72	58	2.28
AP05/0.9 D	0.9	70.5	2.77	59.5	2.34
AP05/1.2 D	1.2	73	2.87	62	2.44
AP05/1.6 D	1.6	77	3.03	66	2.60

Clockwise rotation: D		Counter-clockwise rotation: S	
Type	Order Code	Type	Order Code
AP05/0.25 D 439	200100234202	AP05/0.25 S 439	200100234302
AP05/0.5 D 439	200100334202	AP05/0.5 S 439	200100334302
AP05/0.75 D 439	200100434204	AP05/0.75 S 439	200100434303
AP05/0.9 D 439	200100534202	AP05/0.9 S 439	
AP05/1.2 D 439	200100634202	AP05/1.2 S 439	200100634305
AP05/1.6 D 439		AP05/1.6 S 439	

3.1 Pumps seal kit NBR standard type

AP05	
Pump code	Seal kit
AP05/810	200974000180
AP05/819	
AP05/310	
AP05/319	
AP05/830	
AP05/839	

AP05/839	200974000180
AP05/330	
AP05/339	
AP05/410	200974000280
AP05/419	
AP05/430	
AP05/439	

4 Composition of product code

4.1 Single pumps

Type	Rotation	Code
AP05/**	*	****
APR05/**	*	****

Examples

AP05/0.75 D 819

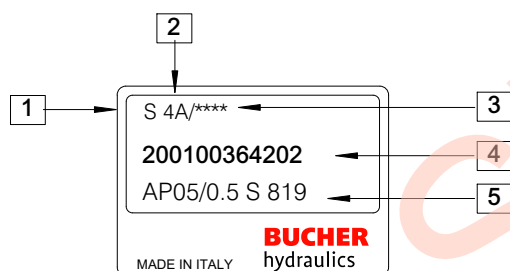
APR05/0.5 810

Order Code

200100464202

200100361101

4.2 Product identification plate



1 : Rotation (D= Clockwise rotation - S= Counterclockwise rotation)

2 : Manufacturing year and month

3 : Progressive identification no. (optional)

4 : Bucher Hydraulics S.p.A. product code

5 : Description

4.3 Single pump weight

AP-APR05	
Pump	Weight Kg
AP-APR05/0.25	0.45
AP-APR05/0.5	0.45
AP-APR05/0.75	0.45
AP-APR05/0.9	0.48
AP-APR05/1.2	0.50
AP-APR05/1.6	0.50

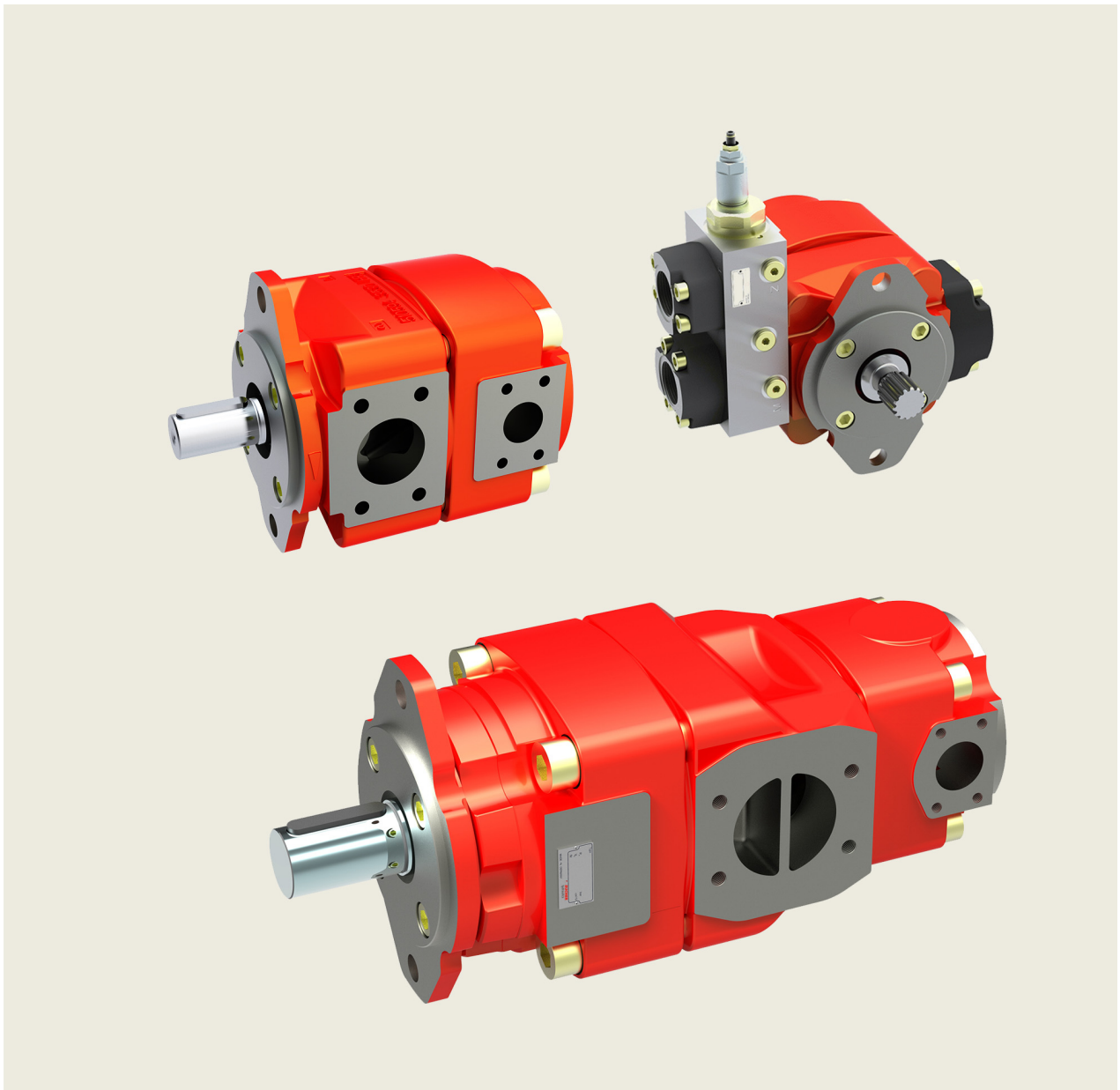
N.B.: The weight refers to pumps with version code 810 (AP05)

Limited weight variations are possible for pumps having a different code.

Manufacturing month	Manufacturing year					
	2014	2015	2016	2017	2018	2019
January	4A	5A	6A	7A	8M	9M
February	4B	5B	6B	7B	8N	9N
March	4C	5C	6C	7C	8P	9P
April	4D	5D	6D	7D	8Q	9Q
May	4E	5E	6E	7E	8R	9R
June	4F	5F	6F	7F	8S	9S
July	4G	5G	6G	7G	8T	9T
August	4H	5H	6H	7H	8U	9U
September	4I	5I	6I	7I	8V	9V
October	4J	5J	6J	7J	8Z	9Z
November	4K	5K	6K	7K	8X	9X
December	4L	5L	6L	7L	8Y	9Y

Internal Gear Pumps

Series QX



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1 General

1.1 Product description

The QX pumps are the 5th generation of Bucher internal gear pumps, which have proven themselves in thirty years of service around the world. Numerous improvements have been made to the straightforward and robust design.

Advances in the manufacturing process have made it possible without making higher demands on individual components to build pumps that are considerably lighter and more compact.

A new tooth profile, conceived and optimised with the help of CAE, has yielded another significant reduction in noise levels. Large sealing areas result in higher efficiencies.

The internal ring gear is supported by a hydrodynamic / hydrostatic lubrication film, which allows operation at low viscosities or low and high speeds. QX pumps are therefore suitable for use with variable speed drives, where they can provide variable flow rates.

1.3 ATEX compliant explosion protection

The internal gear pumps QX are suitable for application in hazardous areas and complies with the following guidelines:

ATEX directive 2014/34/EU
group II
equipment category 3
atmosphere G
temperature class T3 and T4

1.2 Advantages

- extremely long service life
- volumetric efficiency up to 98%
- suitable for use with variable speed drivers
- can be used with fire resistant fluids (HFB, HFC and HFD = QXV), fuels, biodegradable and low-viscosity fluids
- certifications by ATEX 2, ABS, DNV, GL, LR, NK, ...
- low flow and pressure pulsations



II 3 G EEx c II T4
-20°C ≤ Ta ≤ +40°C



II 3 G EEx c II T3
-20°C ≤ Ta ≤ +80°C

2 Technical data

2.1 General (deviating values according manufacturer's specification)

General characteristics	Unit	Description, value
Installation attitude		unrestricted
Mounting method (standard)		oval 2-hole flange to ISO 3019/1 (SAE): QX 3-6 oval 2-hole flange to ISO 3019/2 (metric) QX 2+8
Direction of rotation		CW or CCW
Pump drive method		in-line, through a flexible coupling
Volumetric efficiency η_v		up to 98%
Fluids		HLP mineral oils to DIN 51524, Part, HFC fluids to VDMA 24317
Maximum admissible level of contamination of the hydraulic fluid		ISO 4406 code 20/18/15 (see section 9)
Operating viscosity	mm ² /s	10 ... 100 *
Starting viscosity		10 ... 300 * *other values on request
Fluid temperature range	°C	HLP-mineral oils -20 min. / +80 max. / HFC +50 max. range for max. long life cycle +30 ... +60 (considering viscosity field)
Inlet pressure maximum minimum	bar	1.5 absolute (without external drain connection) 0.5 ... 0.98 absolute (dependent on pump frame size and speed, see example in section 3.3.2)
Startup against pressure	bar	max. 20 (other values on request)
Seal material		NBR = standard, FKM (Viton) = option 09

IMPORTANT: The main characteristics are valid for hydraulic oils DIN 51524 with a viscosity of 20 ... 50mm²/s.
The operating pressure at the pump outlet side is specified also for fire-resistant fluids (HFC).

2.2 Main characteristics for pressure range 1

Displacement	Flow rate	Maximum speed	Code	Max. operating pressure at the pump outlet side				Torque	Power consumption
effective	1450 min ⁻¹ p = 0 bar			continuous [bar]		intermittent [bar] ²⁾			
[cm ³ /U] ¹⁾ [cm ³ /rev] ¹⁾	[l/min]	[rpm]		Mineral oil	HFC	Mineral oil	HFC	[Nm] ³⁾	[kW] ⁴⁾
10,3	14,9	3600	QX21-010	160	130	210	180	26	4,0
12,6	18,3	3600	QX21-012	125	100	160	135	25	3,8
15,9	23,0	3600	QX21-016	100	80	125	100	25	3,9
20,0	29,0	3000	QX31-020	160	130	210	180	51	7,7
25,3	36,7	3000	QX31-025	125	100	160	135	50	7,7
31,2	45,2	3000	QX31-032	100	80	125	100	50	7,5
40,7	59,0	3000	QX41-040	160	130	210	180	104	15,7
50,3	72,9	2600	QX41-050	125	100	160	135	100	15,2
64,7	93,8	2300	QX41-063	100	80	125	100	103	15,6
78,6	114	2300	QX51-080	160	130	210	180	200	30,4
101,1	146	2100	QX51-100	125	100	160	135	201	30,5
127,3	184	1800 ⁵⁾	QX51-125	100	80	125	100	203	30,8
160,5	232	1800 ⁶⁾	QX61-160	160	130	210	180	409	62,0
202,1	293	1800 ⁶⁾	QX61-200	125	100	160	135	402	61,0
249,7	362	1800 ⁶⁾	QX61-250	100	80	125	100	397	60,4
326,0	472	1750 ⁶⁾	QX81-315	160	130	210	180	830	126,0
402,6	583	1750 ⁶⁾	QX81-400	125	100	160	135	801	121,6
498,5	722	1500 ⁶⁾	QX81-500	100	80	125	100	793	120,5

1) Due to manufacturing tolerances, there may be slight variations in the displacement.

2) max. 20 second and not more than 10% of the duty cycle

3) theoretical value at the max. permitted continuous pressure for mineral oil

4) theoretical value at the max. permitted continuous pressures for mineral oil at n = 1450 rpm

5) for speeds > 1450 rpm, the min. permissible inlet pressure is 0.95 bar absolute. For HFC application a second suction port may be required

6) max. speed only possible with a second suction port, see section 2.2.1.

2.2.1 Suction arrangements for pump types QX61 and QX81

IMPORTANT: Minimum inlet pressure is 0.95 bar absolute with viscosity 10 ... 100 mm²/s
(other values on request).

Type	Speed 1500 rpm Suction height		Speed 1800 rpm Suction height	
	up to 150 mm	over 150 mm	up to 150 mm	over 150 mm
QX61-160	I	I	I	II
QX61-200	I	I	I	II
QX61-250	I	II	II	II
QX81-315	I	II	II	II
QX81-400	II	II	II	-
QX81-500	II	II	-	-

I = standard pump with one suction port

II = model with two suction ports

All pump types coded II can be used without the second suction port up to 1200 rpm

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روبروی پالایشگاه نفت پارس، پلاک ۱۲

2.3 Main characteristics for pressure range 2

Displacement	Flow rate	Maximum speed	Code	Max. operating pressure at the pump outlet side				Torque	Power consumption
effective	1450 min ⁻¹ p = 0 bar			continuous [bar]		intermittent [bar] ²⁾			
[cm ³ /rev] ¹⁾	[l/min]	[rpm]		Mineral oil	HFC	Mineral oil	HFC	[Nm] ³⁾	[kW] ⁴⁾
5,1 6,3 8,0	7,4 9,1 11,5	3600	QX22-005 QX22-006 QX22-008	210	180	250	210	17 21 27	2,6 3,2 4,0
10,0 12,6 15,6	14,5 18,3 22,6	3400	QX32-010 QX32-012 QX32-016	210	180	250	210	34 42 52	5,1 6,4 7,9
20,4 25,1 32,4	29,5 36,4 46,8	3200	QX42-020 QX42-025 QX42-032	210	180	250	210	68 84 108	10,4 12,7 16,5
39,3 50,6 63,7	56,9 73,2 92,1	2800	QX52-040 QX52-050 QX52-063	210	180	250	210	132 170 213	19,9 25,7 32,3
80,2 101,0 124,8	116 146 181	2500 ⁵⁾ 2300 ⁵⁾ 2000 ⁵⁾	QX62-080 QX62-100 QX62-125	210	180	250	210	268 338 417	40,7 51,2 63,4
163,0 201,3 249,2	236 291 361	1800 ⁵⁾ 1750 ⁵⁾ 1500 ⁵⁾	QX82-160 QX82-200 QX82-250	210	180	250	210	544 672 833	82,7 102,1 126,5

2.4 Main characteristics for pressure range 3

Displacement	Flow rate	Maximum speed	Code	Max. operating pressure at the pump outlet side				Torque	Power consumption
effective	1450 min ⁻¹ p = 0 bar			continuous [bar]		Intermittent [bar] ²⁾			
[cm ³ /rev] ¹⁾	[l/min]	[rpm]		Mineral oil	HFC	Mineral oil	HFC	[Nm] ³⁾	[kW] ⁴⁾
5,1 6,3 8,0	7,4 9,1 11,5	3600	QX23-005 QX23-006 QX23-008	320	280	400	350	26 32 41	4,0 4,9 6,2
10,0 12,6 15,6	14,5 18,3 22,6	3400	QX33-010 QX33-012 QX33-016	320	280	400	350	51 64 80	7,7 9,7 12,1
20,4 25,1 32,4	29,5 36,4 46,8	3200	QX43-020 QX43-025 QX43-032	320	280	400	350	104 128 165	15,8 19,4 25,0
39,3 50,6 63,7	56,9 73,2 92,1	2800	QX53-040 QX53-050 QX53-063	320	280	400	350	200 258 321	30,4 39,1 49,3
80,2 101,0 124,8	116 146 181	2500 ⁵⁾ 2300 ⁵⁾ 2000 ⁵⁾	QX63-080 QX63-100 QX63-125	320	280	400	350	409 514 636	62,0 78,1 96,5
163,0 201,3 249,2	236 291 361	1800 ⁵⁾ 1750 ⁵⁾ 1500 ⁵⁾	QX83-160 QX83-200 QX83-250	320	280	400	350	830 1025 1270	126,0 155,7 192,7

1) Due to manufacturing tolerances, there may be slight variations in the displacement.

2) max. 20 second and not more than 10% of the duty cycle

3) theoretical value at the max. permitted continuous pressure for mineral oil

4) theoretical value at the max. permitted continuous pressures for mineral oil at n = 1450 rpm

5) for speeds > 1450 rpm, the min. permissible inlet pressure is 0.95 bar absolute. For HFC application a second suction port may be required

2.5 Main characteristics for pressure range 4

Displacement	Flow rate	Maximum speed	Code	Max. operating pressure at the pump outlet side				Torque	Power consumption
effective	1450 min ⁻¹ p = 0 bar			continuous [bar]		Intermittent [bar] ²⁾			
[cm ³ /rev] ¹⁾	[l/min]	[rpm]		Mineral oil	HFC	Mineral oil	HFC	[Nm] ³⁾	[kW] ⁴⁾
3,3 4,2	4,8 6,2	3600	QX24-003 QX24-004	320	280	400	350	17 21	2,6 3,2
5,1 6,3 8,0	7,4 9,1 11,5	3600	QX24-005 QX24-006 QX24-008	360	320	400	350	29 36 46	4,4 5,5 7,0
10,0 12,6 15,6	14,5 18,3 22,6	3600	QX34-010 QX34-012 QX34-016	360	320	400	350	57 72 89	8,7 11,0 13,6
20,4 25,1 32,4	29,5 36,4 46,8	3600	QX44-020 QX44-025 QX44-032	360	320	400	350	117 144 186	17,7 21,8 28,2
39,3 50,6 63,7	56,9 73,2 92,1	3000	QX54-040 QX54-050 QX54-063	340	280	400	350	213 274 345	32,3 41,6 52,3
80,2 101,0 124,8	116 146 181	2500 ⁵⁾ 2300 ⁵⁾ 2000 ⁵⁾	QX64-080 QX64-100 QX64-125	330	280	400	350	421 530 655	64,0 80,5 99,5
163,0 201,3 249,2	236 291 361	1800 ⁵⁾ 1750 ⁵⁾ 1500 ⁵⁾	QX84-160 QX84-200 QX84-250	330	280	400	350	856 1057 1309	130,0 160,5 198,7

1) Due to manufacturing tolerances, there may be slight variations in the displacement.

2) max. 20 second and not more than 10% of the duty cycle

3) theoretical value at the max. permitted continuous pressure for mineral oil

4) theoretical value at the max. permitted continuous pressures for mineral oil at n = 1450 rpm

5) for speeds > 1450 rpm, the min. permissible inlet pressure is 0.95 bar absolute.

3 Performance graphs

IMPORTANT: The performance graphs shown are valid for the specified pump models.
For other pump sizes, contact Bucher Hydraulics GmbH.

3.1 Noise level (L_p)

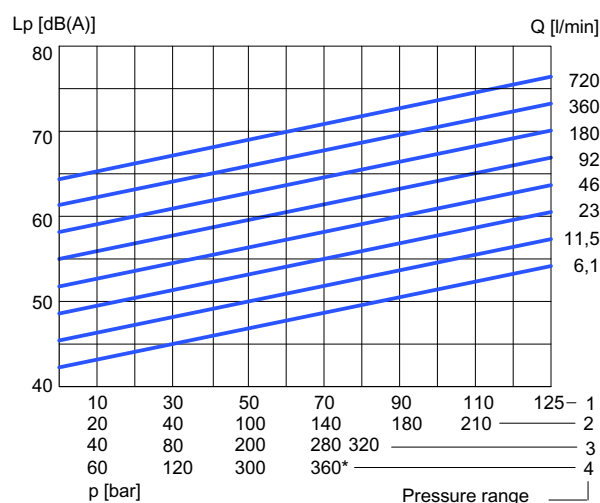
measured to DIN 45635, Part 26, in Stuttgart University's low-echo noise

measurement chamber:

measurement distance 1 m

speed n = 1500 rpm

viscosity = 42 mm²/s



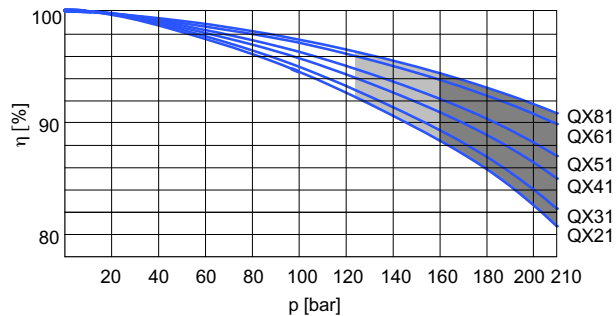
*Max. continuous operating pressure for pressure range 4 see section 2.5

3.2 Efficiency (η)

measured at speed 1450 rpm, viscosity 42 mm²/s

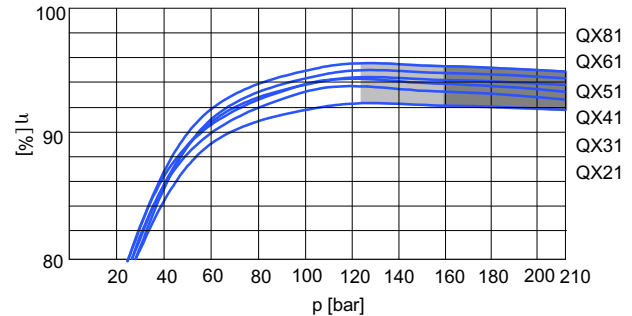
3.2.1 Pressure range 1

3.2.1.1 Volumetric efficiency



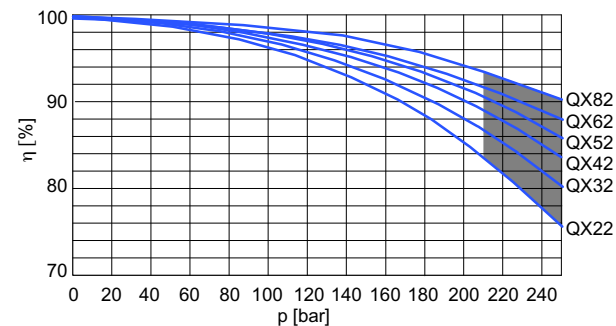
intermittent operating pressure as a function of displacement (see section 2.2)

3.2.1.2 Hydromechanical efficiency



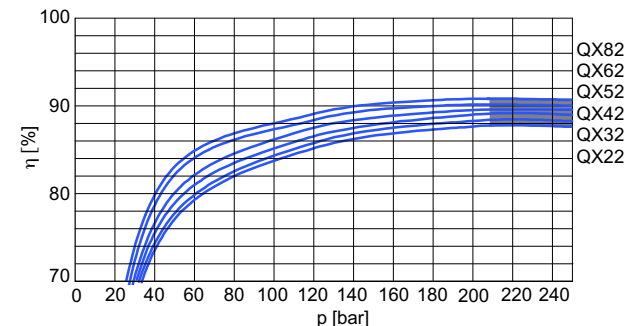
3.2.2 Pressure range 2

3.2.2.1 Volumetric efficiency



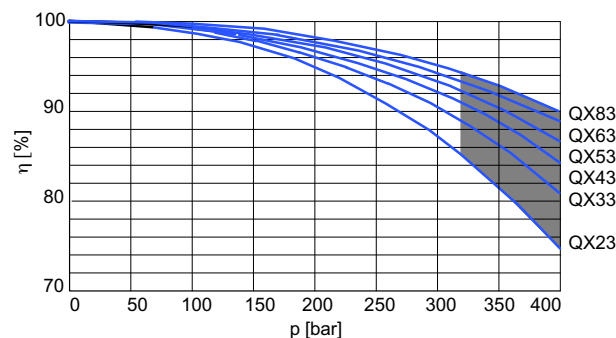
intermittent operating pressure

3.2.2.2 Hydromechanical efficiency



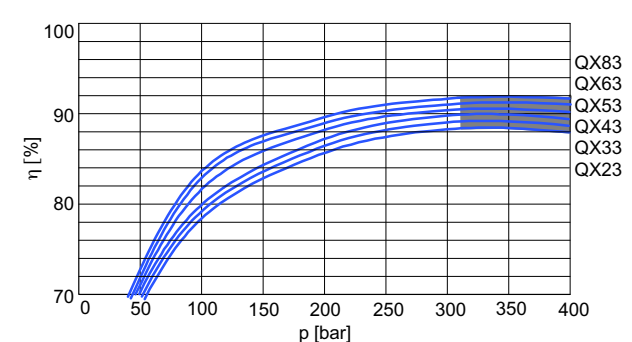
3.2.3 Pressure range 3

3.2.3.1 Volumetric efficiency



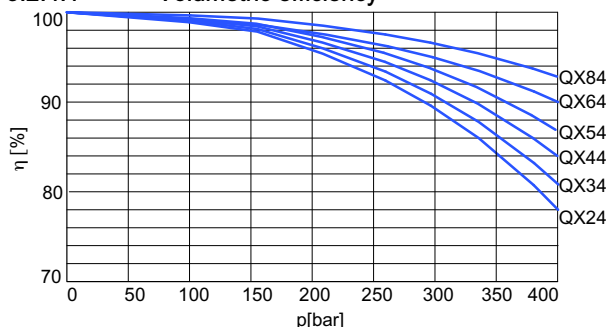
intermittent operating pressure

3.2.3.2 Hydromechanical efficiency

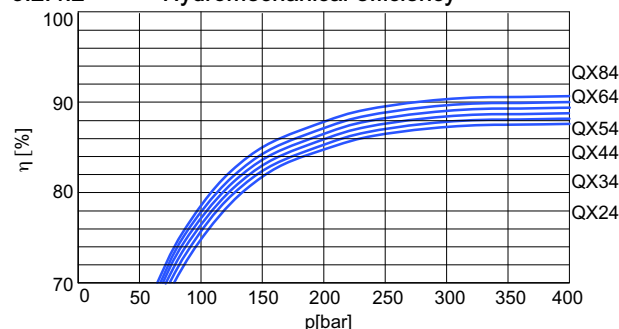


3.2.4 Pressure range 4

3.2.4.1 Volumetric efficiency



3.2.4.2 Hydromechanical efficiency

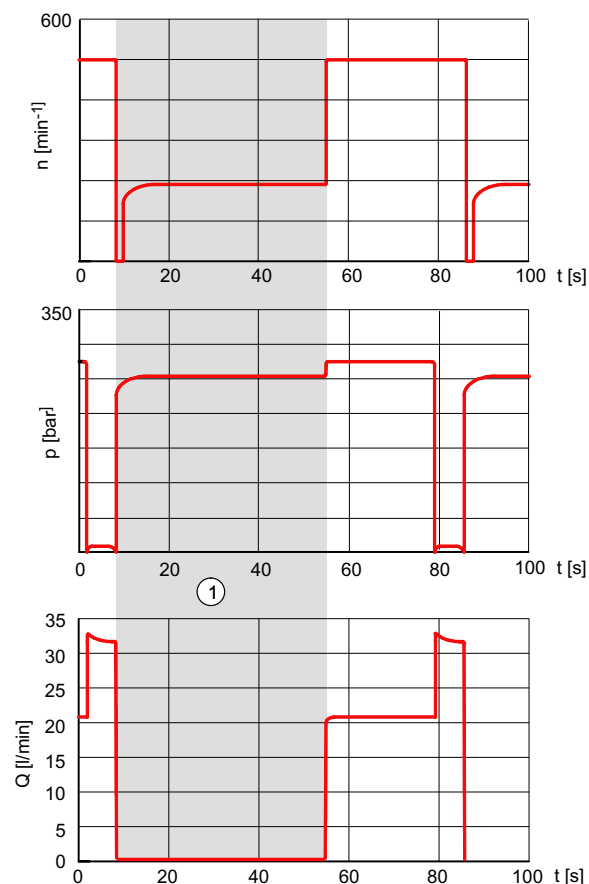


3.3 Operation with variable-speed drives

IMPORTANT: The following main characteristics are to be understood as examples only. They are valid only for the specified pump models and parameters. We would be very happy to advise you on the layout of your drive. QX pumps with variable-speed drive all contain an external drain port.

3.3.1 Typical loading cycle for a QX pump with variable-speed drive

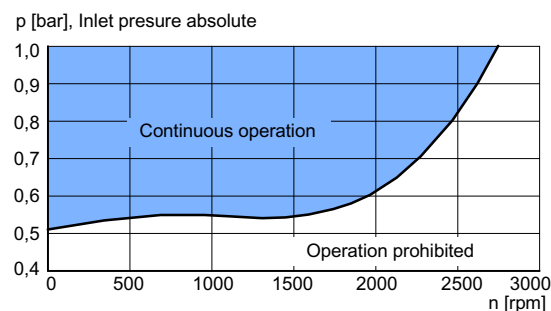
Pump QX53-063 with viscosity 20 mm²/s



1 pressure-holding operation
Q = 0 l/min for up to 60 s

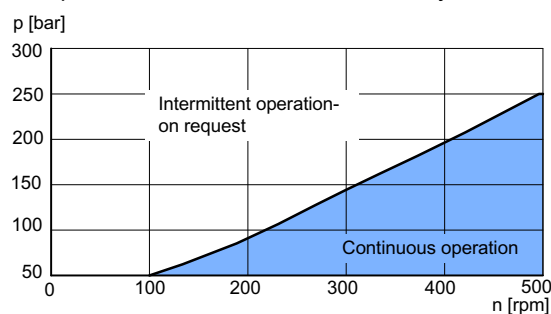
3.3.2 Minimum pressure at suction port as a function of speed

Pump QX53-063 measured: with viscosity 42 mm²/s



3.3.3 Minimum speed as a function of pressure

Pump QX53-063 measured with viscosity 42 mm²/s



4 Single pumps

4.1 Dimensions frame size 2 - 4

Frame size		2				3				4			
Pressure range		1	2	3	4 ⁵⁾	1	2	3	4	1	2	3	4
Suction port: to SAE J518 ¹⁾	S	G1“ ³⁾ thread				G1 ¼” ³⁾ thread				1½”			
Pressure port: to SAE J518 ¹⁾	P	G ½” ³⁾ ⁴⁾ thread				G ¾” ³⁾ ⁴⁾ thread				1”			
External drain port (option 06) pressure range 1-3 optional pressure range 4 standard		G ¼”				G ¼”				G ¼”			
Mounting: oval 2-hole flange to ISO 3019/1 (SAE) ISO 3019/2 (metric)	A	118				132				170			
	B (SAE)	-				106				146			
	B (Metr.)	100				109				140			
	C	9				11				14			
	N (SAE)	-				82,55 _{-0,05}				101,6 _{-0,05}			
	N (Metr.)	63 h8				80 h8				100 h8			
	O	8,5				8,5				10,5			
	V	6				6				7			
4-hole flange ISO 3019/2	X (Metr.)	9				9				12			
	Y (Metr.)	85				103				125			
Shaft end: parallel, to ISO/R775 ²⁾	D	20 j6				25 j6				32 j6			
	E	36				42				58			
	F	6				8				10			
	G	22,5				28				35			
	I	45				50				68			
Housing	K	38			37,5	44				52			52,5
	L	136	118	153	192	164	144	189	232,5	202	176	232	286
	M	-	55	90	125	-	70	114	159,5	-	87	143	199
	T1	43				54			53,5	67			
	T2	43				54	60			67	70		
	Z	100				120				125			
	W	80				100				136			
Weight	kg	6	6	7	8	10	10	13	15	20	18	22	27

1) Pipe flange dimensions, SAE J518 code 61 / ISO 6162-1.

- high pressure type up to 420 bar (see section 12.2)
- low pressure type for up to 16 bar (see section 12.3)

2) For other shaft ends, contact Bucher Hydraulics GmbH.

3) Threaded port to DIN 3852, Part 2.

4) Pressure port to SAE J518 code 61 / ISO 6162-1 can be supplied for pressure ranges 2 + 3.

5) The dimensions are not valid for low-flow capability pumps (3,3 cm³/U and 4,2 cm³/U, see chapter 4.7).

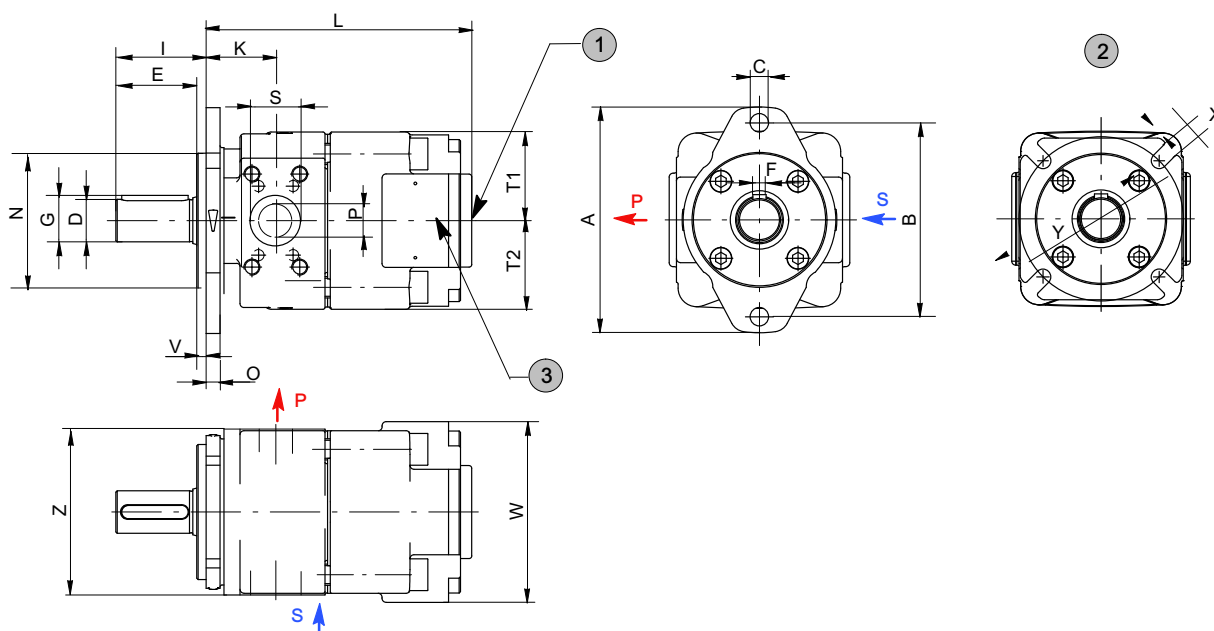
4.2 Dimensions frame size 5 - 8

Frame size		5				6				8			
Pressure range		1	2	3	4	1	2	3	4	1	2	3	4
Suction port: to SAE J518 ¹⁾	S	2"				2½"				3"			
Pressure port: to SAE J518 ¹⁾	P	1¼"				1½"				2"			
External drain port (option 06) pressure range 1-3 optional pressure range 4 standard	①	G ¼"				G ⅜"				G ½"			
Mounting: oval 2-hole flange to ISO 3019/1 (SAE) ISO 3019/2 (metric)	A	212				267				330			
	B (SAE)	181				229				-			
	B (Metr.)	180				224				280			
Mounting: oval 2-hole flange to ISO 3019/1 (SAE) ISO 3019/2 (metric)	C	18				22				26			
	N (SAE)	127 -0,05				152,4 -0,05				-			
	N (Metr.)	125 h8				160 h8				200 h8			
	O	12,5				16,5				20			
	V	7				7				9			
4-hole flange ISO 3019/2	X (Metr.)	14				18				22			
	Y (Metr.)	160				200				250			
Shaft end: parallel, to ISO/R775 ²⁾	D	40 j6				50 j6				63 j6			
	E	82				82				105			
	F	12				14				18			
	G	43				53,5				67			
	I	92				92				117			
Housing	K	60			60,5	74				90			
	L	242	210	280	349	288	248	338	429	361	331	446	446
	M	-	102	172	242	-	119	209	299	-	151	266	266
	T1	89				107	110			137	138		
	T2	89				107	110			137	138		
	Z	156				195	197			250			
	W	165				203				256			
Weight	kg	36	32	41	50	64	57	77	90	130	118	160	200

1) Pipe flange dimensions, SAE J518 code 61 / ISO 6162-1.
 - high pressure type up to 420 bar (see section 12.2)
 - low pressure type for up to 16 bar (see section 12.3)

2) For other shaft ends, contact Bucher Hydraulics GmbH.

4.3 Pressure range 1

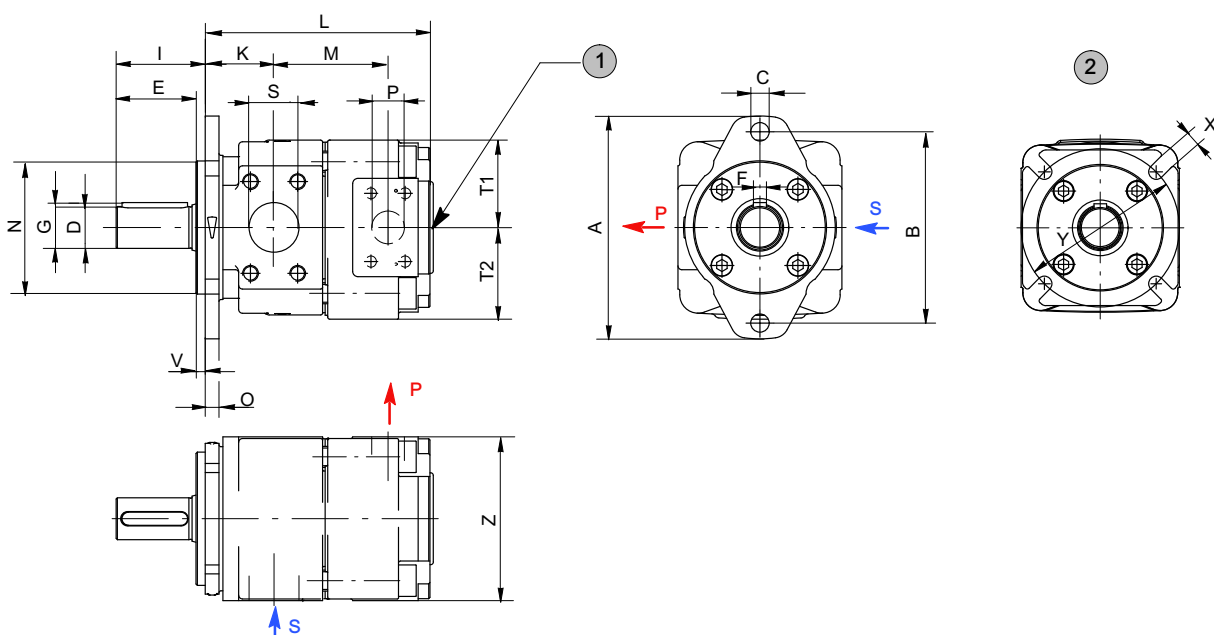


1 option 06 = external drain port

2 option 66 = special model 4-hole flange ISO 3019/2

3 depending on operating conditions, a second suction port may be required on:
QX51=SAE 1 1/4", QX61=SAE 2",
QX81=SAE 2 1/2" - see section 2.2.1

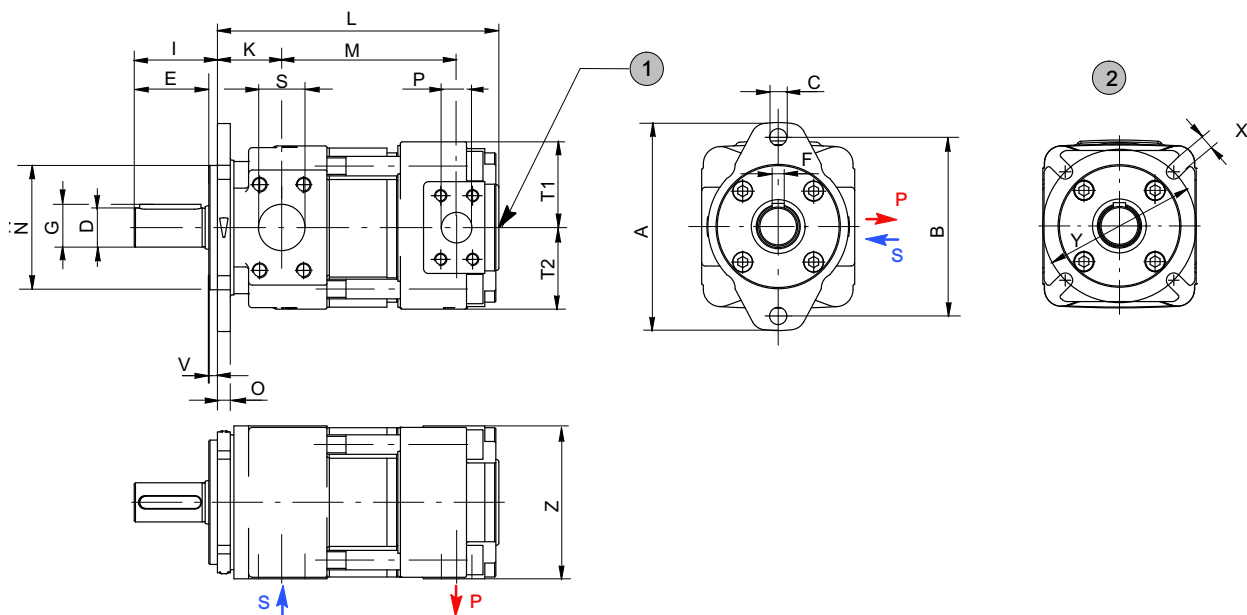
4.4 Pressure range 2



1 option 06 = external drain port

2 option 66 = special model 4-hole flange ISO 3019/2

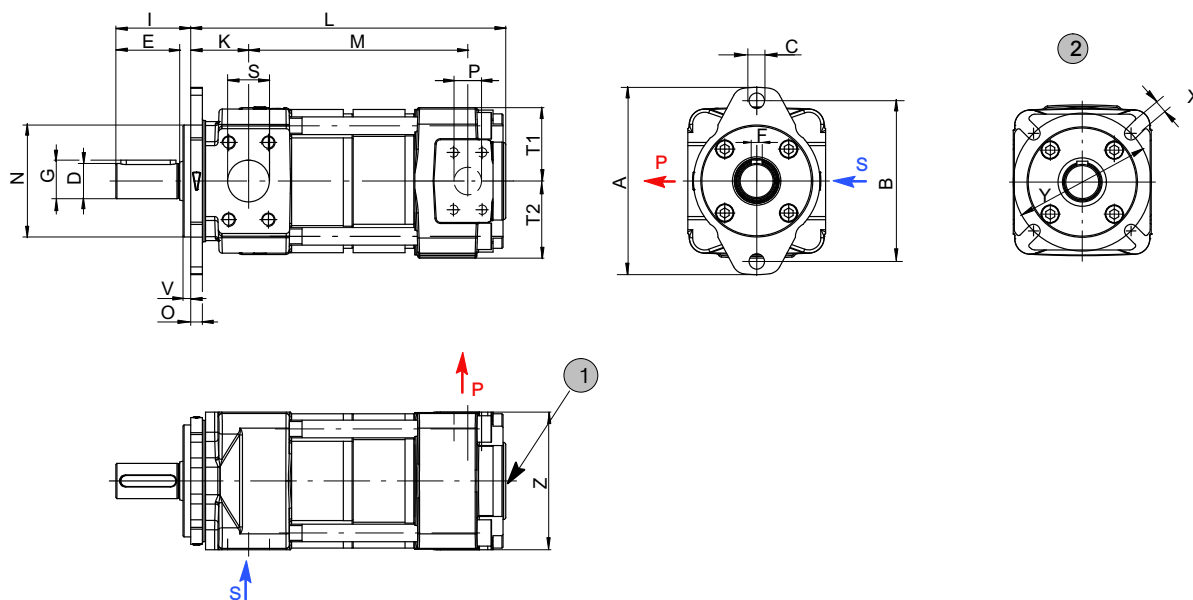
4.5 Pressure range 3



1 external drain port - see special feature 06

2 option 66 = special model 4-hole flange ISO 3019/2

4.6 Pressure range 4

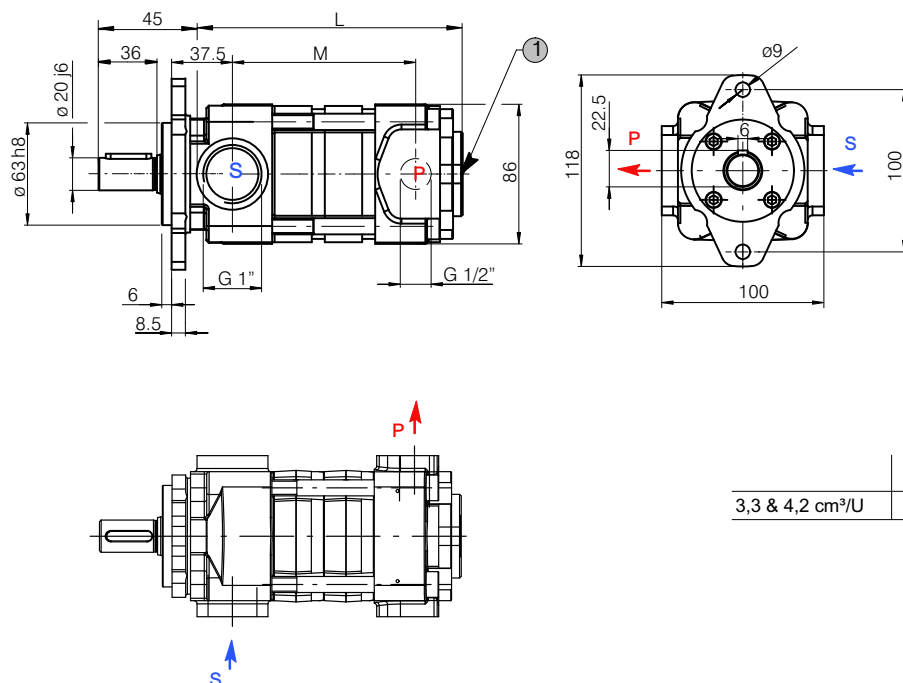


1 external drain port - see special feature 06

2 option 66 = special model 4-hole flange ISO 3019/2

4.7 Pressure range 4 with low-flow capability

QX24 with displacements from 3 and 4 cm³/U.



	L	M
3,3 & 4,2 cm ³ /U	179,5	113

1 external drain port G¹/₄\"

4.8 Ordering code for single pumps

[illegible]

4.8.1 Ordering example:

Required: single pump
Displacement: 40 cm³/rev
Continuous pressure: 300 bar
for use with mineral oil

Ordering code: QX53-040R

4.8.2 Standard configuration

- direction of rotation - right (CW)
- 2-hole mounting flange to ISO 3019/1 (SAE): sizes QX 3-6
- 2-hole mounting flange to ISO 3019/2 (metr.): sizes QX 2+8
- Nitrile seals
- cylindrical shaft end to ISO R775
- black priming, flange without priming

4.8.3 Option

-O = without priming

06 = external drain port in the pump rear cover

QX 2-5 = G 1/4"

QX 6 = G $\frac{3}{8}$ "

QX 8 = G 1/2"

09 = FKM (Viton) seals and without priming

12 = 2-hole mounting flange to ISO 3019/2 (metric):
size QX 3-6

29 = for HFB and HFC fluids, frame sizes 2-5,
without priming

66 = 4-hole mounting flange to ISO 3019/2 (metric)

83 = second suction port on:

QX51 = SAE 1 1/4"

QX61 = SAE 2"

QX81 = SAE 2½"

86 = for HFB and HFC fluids, frame sizes 6+8,
without priming

117 = pressure port to SAE J518 code 61 / ISO 6162-1
can be supplied for frame size 2+3 with pressure
ranges 2+3

Further options on request.

5 Double pumps

QX double pumps consist of two single pumps mounted on a common drive shaft. Hydraulically, the two pumps operate independently of one another but they share a common suction port in the pump's centre section. The larger pump of the combination is situated at the shaft end (the drive side) and is referred to as pump 1. With equal frame sizes, the pump with the larger displacement is situated at the drive side.

Double pumps can be combined as shown in the following table. If a letter is shown at the intersection point of the two pumps, the letter identifies the page in section 5.2 that contains the relevant dimensional drawing. If there is no letter at the intersection point, then that pump combination is not possible.

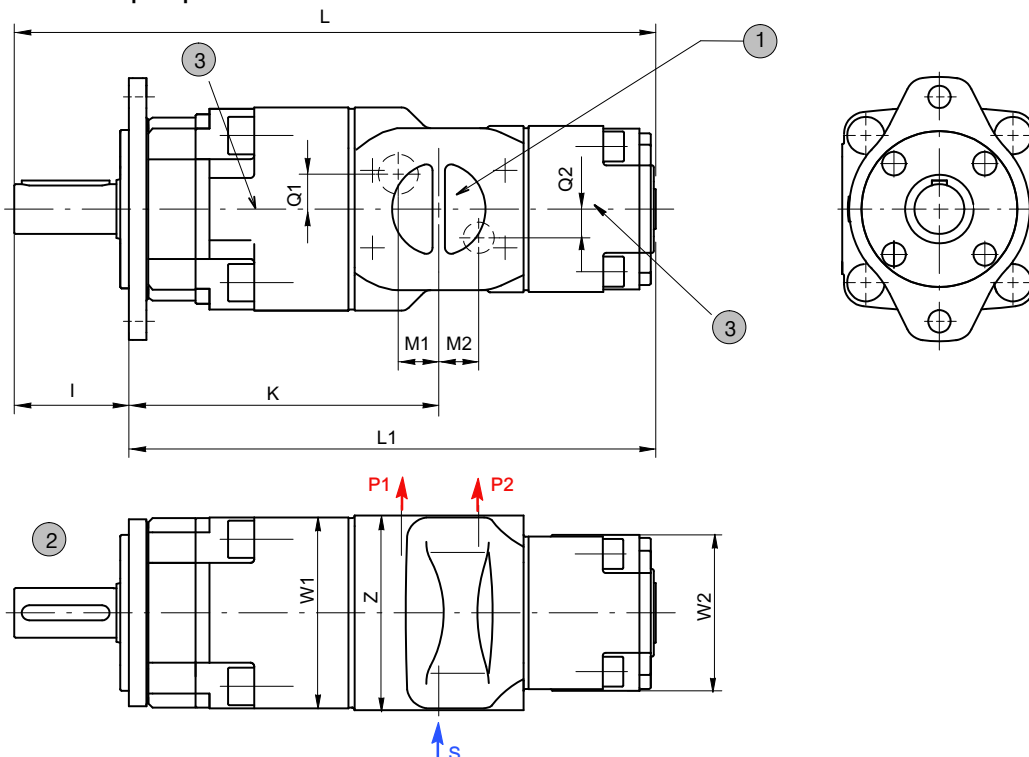
IMPORTANT: Double pumps with pressure range 4 on request.

5.1 Selection table

			Pump 2																				Maximum permissible torque [Nm] drive side
			Displacement [cm³/rev]																				
			5/6/8		10/12/16		20/25/32		40/50/63		80/100/125		160/200/250		315 400 500								
			Maximum pressure [bar]																				
			250	400	125 160 210	250	400	125 160 210	250	400	125 160 210	250	400	125 160 210	250	400	125 160 210	250	400	125 160 210			
			QX22..	QX23..	QX21...	QX32...	QX33...	QX31...	QX42...	QX43...	QX41...	QX52...	QX53...	QX51...	QX62...	QX63...	QX61...	QX82...	QX83...	QX81...			
Pump 1	5/6/8	250	QX22..	E																	65		
		400	QX23..	H	I																		
	10/12/16	125/160 210	QX21..	B	C	A															130		
		250	QX32..	E	F	D	E																
	400	QX33..	H	I	G	H	I													260			
	20/25/32	125/160 210	QX31..	B	C	A	B	C	A														
		250	QX42..	E	F	D	E	F	D	E													
	40/50/63	400	QX43..	H	I	G	H	I	G	H	I										520		
		125/160 210	QX41..	B	C	A	B	C	A	B	C	A											
	80/100/125	250	QX52..	E	F	D	E	F	D	E	F	D	E								1050		
		400	QX53..	H	I	G	H	I	G	H	I	G	H	I									
	160/200/250	125/160 210	QX51..	B	C	A	B	C	A	B	C	A	B	C	A						2100		
		250	QX62..				E	F	D	E	F	D	E	F	D	E							
	315 400 500	400	QX63..				H	I	G	H	I	G	H	I	G	H	I						
		125/160 210	QX61..				B	C	A	B	C	A	B	C	A	B	C	A					
			250	QX82..						E	F	D	E	F	D	E	F	D	E				
			400	QX83..						H	I	G	H	I	G	H	I	G	H	I			
			125/160 210	QX81..						B	C	A	B	C	A	B	C	A	B	C	A		

5.2 Dimensions

A Double pumps QX.1/1



1 S = common suction port

2 shaft and mounting dimensions see section 4

3 depending on operating conditions, a second suction port may be required - see section 2.2.1
QX51=SAE 1 1/4", QX61=SAE 2",
QX81=SAE 2 1/2"

Type	L	L1	K	M1	M2	Q1	Q2	I	Z	W1	W2	S	P1	P2
QX21/21	296	251	141	18	18			45	100	80	80	G 1 1/4" 1)	G 1/2" 1) 2)	G 1/2" 1) 2)
QX31/21	343	293		26	30			50	120	100	80	G 1 1/2" 1)	G 3/4" 1) 2)	G 3/4" 1) 2)
QX31/31	358	308	171		26	-	-			100	100			G 1/2" 1) 2)
QX41/21	396	328		19	35	15		68	125	136	80	SAE 2"	SAE 1"	G 3/4" 1) 2)
QX41/31	411	343	201		33	15	15			136	100			SAE 1"
QX41/41	449	381	208	26	26	23	23			136	136			
QX51/21	468	376		23	43	15	-			165	80	SAE 2 1/2"		G 1/2" 1) 2)
QX51/31	483	391	241		39	15	15	92	156	165	100		SAE 1 1/4"	G 3/4" 1) 2)
QX51/41	521	429		30	32	28	23			165	136	SAE 3"		SAE 1"
QX51/51	547	455	249		30	28	28			165	165			SAE 1 1/4"
QX61/31	541	449		24	47	17	14			203	100			G 3/4" 1) 2)
QX61/41	564	472	287	27	39	26	27	92	195	203	136		SAE 1 1/2"	SAE 1"
QX61/51	601	509		32	40	35	28			203	165			SAE 1 1/4"
QX61/61	628	536	292		32	35	35			203	203	SAE 3 1/2"		SAE 1 1/2"
QX81/41	679	562		35	51	25	25			250	136			SAE 1"
QX81/51	705	588			47	30	30	117	250	250	165		SAE 2"	SAE 1 1/4"
QX81/61	732	615	359	38	45	40	35			250	203			SAE 1 1/2"
QX81/81	774	657			38	40	40			256	256	SAE 4"		SAE 2"

1) threaded port to DIN 3852, Part 2

2) pressure port to SAE J518 code 61 / ISO 6162-1 can be supplied for pressure ranges 2+3

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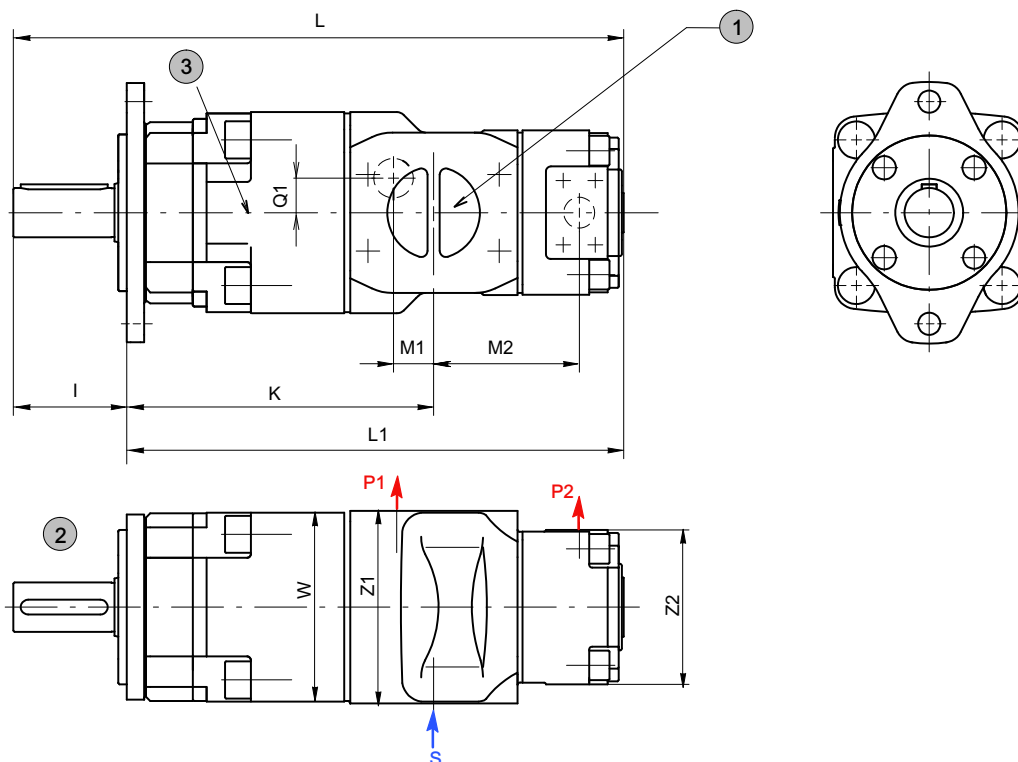
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Fax: ۰۲۱-۴۴۹۹۴۶۴۲

تهران، کیلومتر ۲۱ بزرگراه لشگری (جاده مخصوص کرج)

روبروی پالایشگاه نفت پارس، پلاک ۱۳

B Double pumps QX.1/2



1 S = common suction port

2 shaft and mounting dimensions see section 4

3 depending on operating conditions, a second suction port may be required - see section 2.2.1:
QX51=SAE 1 1/4", QX61=SAE 2",
QX81=SAE 2 1/2"

Type	L	L1	K	M1	M2	Q1	I	Z1	Z2	W	S	P1	P2
QX21/22	278	233	141	18	67	-	45	100	100	80	G 1¼“ 1)	G ½“ 1) 2)	G ½“ 1) 2)
QX31/22	325	275	171	26	79		50	120		100	G 1½“ 1)	G ¾“ 1) 2)	
QX31/32	338	288			87								
QX41/22	378	310	201	19	84	15	68	125	100	136	SAE 2”	SAE 1”	G ½“ 1) 2)
QX41/32	391	323			92				120				G ¾“ 1) 2)
QX41/42	423	355	208	26	111	23	92	156	125	165	SAE 2½“	SAE 1¼“	SAE 1”
QX51/22	450	358	241	23	92	15			100				G ½“ 1) 2)
QX51/32	463	371			100				120				G ¾“ 1) 2)
QX51/42	495	403	249	30	118	28			125				SAE 3”
QX51/52	515	423			127				156		SAE 1½“		
QX61/32	521	429	287	24	112	17	92	195	120	203	SAE 3½“	SAE 2”	G ¾“ 1) 2)
QX61/42	538	446		27	123	26			125				SAE 1”
QX61/52	569	477	292	32	137	35			156				SAE 1¼“
QX61/62	588	496			149				197				SAE 1½“
QX81/42	653	536	359	35	141	25	117	250	125	256	SAE4”	SAE 2”	SAE 1”
QX81/52	673	556			150				156				SAE 1¼“
QX81/62	692	575		38	162	40			197				SAE 1½“
QX81/82	724	607			179				250				SAE 2”

1) threaded port to DIN 3852, Part 2

2) pressure port to SAE J518 code 61 / ISO 6162-1 can be supplied for pressure ranges 2+3

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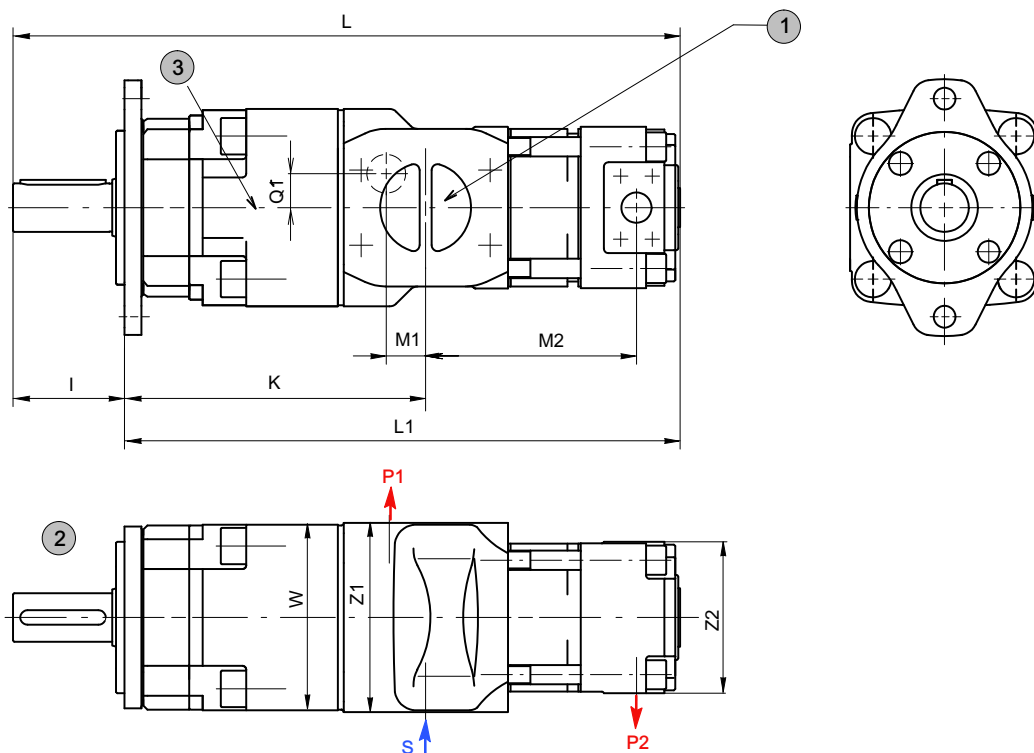
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C Double pumps QX.1/3



1 S = common suction port

2 shaft and mounting dimensions see section 4

3 depending on operating conditions, a second suction port may be required - see section 2.2.1:
QX51=SAE 1 1/4", QX61=SAE 2",
QX81=SAE 2 1/2"

Type	L	L1	K	M1	M2	Q1	I	Z1	Z2	W	S	P1	P2
QX21/23	313	268	141	18	102	-	45	100	100	80	G 1 1/4" 1)	G 1/2" 1) 2)	G 1/2" 1) 2)
QX31/23	360	310	171	26	114	-	50	120	120	100	G 1 1/2" 1)	G 3/4" 1) 2)	G 3/4" 1) 2)
QX31/33	383	333	201	19	119	15	68	125	120	136	SAE 2"	SAE 1"	G 1/2" 1) 2)
QX41/23	413	345	208	26	137	23	92	156	125	165	SAE 2 1/2"	SAE 1 1/4"	G 3/4" 1) 2)
QX41/33	436	368	241	23	132	15	92	156	120	165	SAE 2 1/2"	SAE 1 1/4"	G 3/4" 1) 2)
QX41/43	479	411	249	30	137	28	92	156	125	165	SAE 2 1/2"	SAE 1 1/4"	G 3/4" 1) 2)
QX51/23	485	393	287	24	127	17	92	195	120	203	SAE 3"	SAE 1 1/2"	G 3/4" 1) 2)
QX51/33	508	416	292	27	145	26	92	195	125	203	SAE 3"	SAE 1 1/2"	SAE 1"
QX51/43	551	459	359	32	174	35	117	250	156	256	SAE 3 1/2"	SAE 2"	SAE 1 1/4"
QX51/53	585	493	359	35	197	40	117	250	197	256	SAE 3 1/2"	SAE 2"	SAE 1 1/2"
QX61/33	566	474	359	38	207	40	117	250	250	256	SAE 4"	SAE 2"	SAE 2"
QX61/43	594	502	359	38	239	40	117	250	250	256	SAE 4"	SAE 2"	SAE 2"
QX61/53	637	545	359	38	252	40	117	250	250	256	SAE 4"	SAE 2"	SAE 2"
QX61/63	678	586	359	38	294	40	117	250	250	256	SAE 4"	SAE 2"	SAE 2"
QX81/43	709	592	359	38	294	40	117	250	250	256	SAE 4"	SAE 2"	SAE 2"
QX81/53	743	626	359	38	294	40	117	250	250	256	SAE 4"	SAE 2"	SAE 2"
QX81/63	782	665	359	38	294	40	117	250	250	256	SAE 4"	SAE 2"	SAE 2"
QX81/83	839	722	359	38	294	40	117	250	250	256	SAE 4"	SAE 2"	SAE 2"

1) threaded port to DIN 3852, Part 2

2) pressure port to SAE J518 code 61 / ISO 6162-1 can be supplied for pressure ranges 2+3

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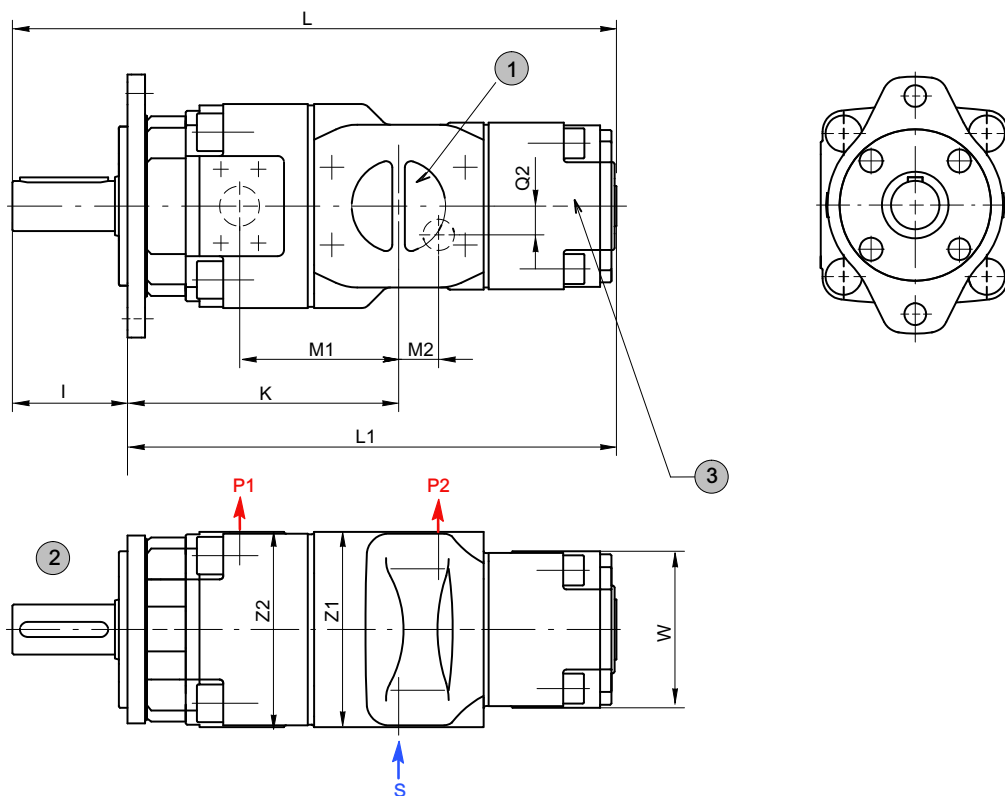
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D Double pumps QX.2/1



1 S = common suction port

2 shaft and mounting dimensions see section 4

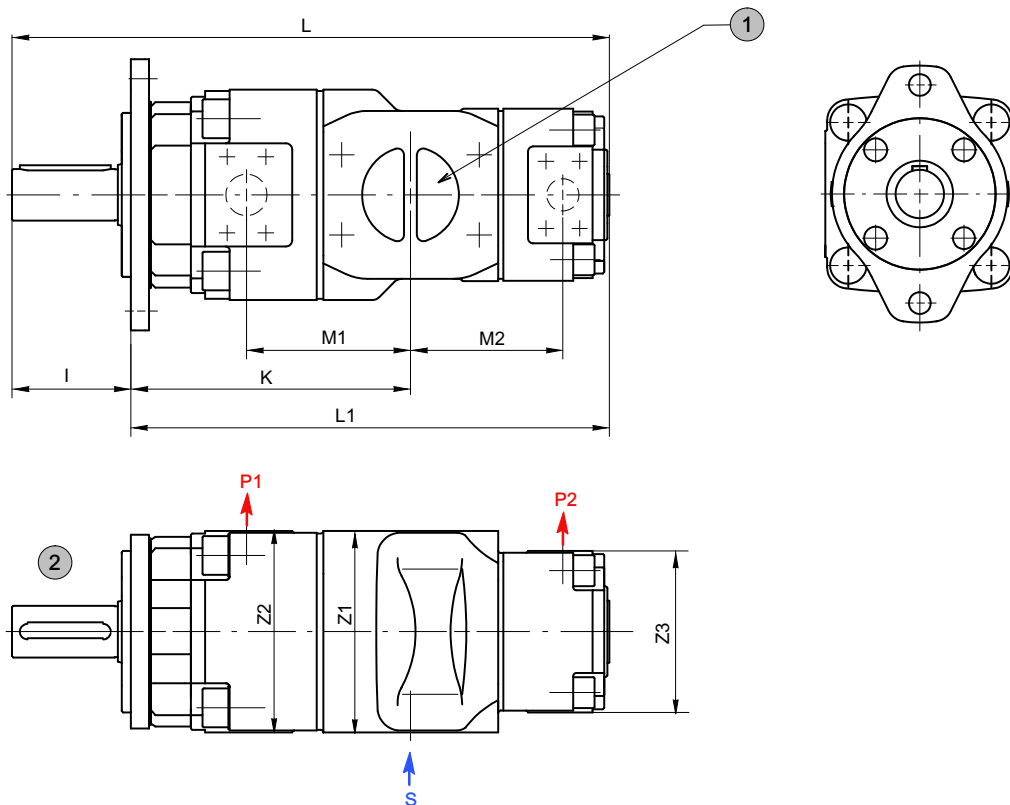
3 depending on operating conditions, a second suction port may be required - see section 2.2.1:
QX51=SAE 1 1/4", QX61=SAE 2"

Type	L	L1	K	M1	M2	Q2	I	Z1	Z2	W	S	P1	P2
QX32/21	323	273	151	87	30	-	50	120	120	80	G 1 1/2" 1)	G 3/4" 1) 2)	G 1/2" 1) 2)
QX42/21	370	302	175	103	35	-	68	125	125	100	SAE 2"	SAE 1"	G 3/4" 1) 2)
QX42/31	385	317	209	120	33	15	92	156	156	80	SAE 2 1/2"	SAE 1 1/4"	G 1/2" 1) 2)
QX52/21	436	344	217	127	43	-	92	195	197	100	SAE 3"	SAE 1 1/2"	G 3/4" 1) 2)
QX52/31	451	359	247	144	39	15	117	250	250	136	SAE 3 1/2"	SAE 2"	SAE 1"
QX52/41	489	397	252	149	47	14	165	250	250	165	SAE 4"	SAE 2"	SAE 1 1/4"
QX62/31	501	409	309	179	39	27	203	250	250	136	SAE 4"	SAE 2"	SAE 1 1/2"
QX62/41	524	432	309	179	40	28	203	250	250	165	SAE 4"	SAE 2"	SAE 1 1/2"
QX62/51	561	469	309	179	51	25	203	250	250	165	SAE 4"	SAE 2"	SAE 1 1/2"
QX82/41	629	512	309	179	47	30	203	250	250	165	SAE 4"	SAE 2"	SAE 1 1/2"
QX82/51	655	538	309	179	45	35	203	250	250	203	SAE 4"	SAE 2"	SAE 1 1/2"
QX82/61	682	565	309	179	45	35	203	250	250	203	SAE 4"	SAE 2"	SAE 1 1/2"

1) threaded port to DIN 3852, Part 2

2) pressure port to SAE J518 code 61 / ISO 6162-1 can be supplied for pressure ranges 2+3

E Double pumps QX.2/2



1 S = common suction port

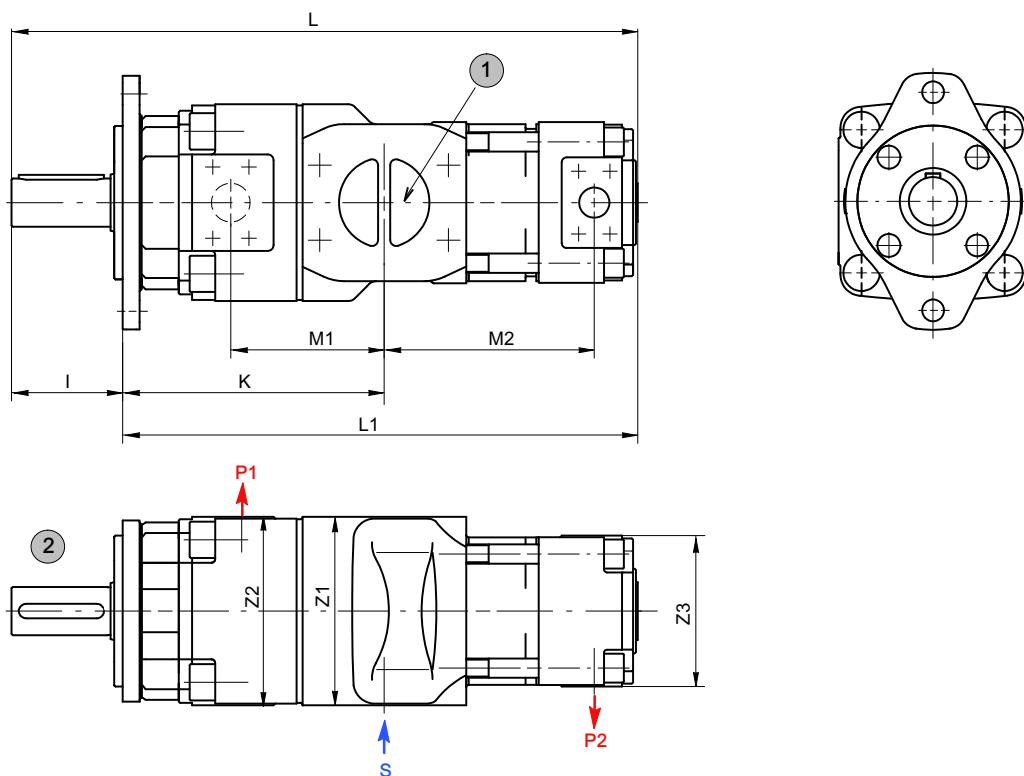
2 shaft and mounting dimensions - see section 4

Type	L	L1	K	M1	M2	I	Z1	Z2	Z3	S	P1	P2
QX22/22	260	215	123	67	67	45	100		100	G 1¼" ¹⁾	G ½" ^{1) 2)}	G ½" ^{1) 2)}
QX32/22	305	255	151	87	79	50	120		120	G 1½" ¹⁾	G ¾" ^{1) 2)}	G ¾" ^{1) 2)}
QX32/32	318	268			87							
QX42/22	352	284	175	103	84	68	125		100	SAE 2"	SAE 1"	G ½" ^{1) 2)}
QX42/32	365	297			92				120			G ¾" ^{1) 2)}
QX42/42	397	329	182	111	111				125			SAE 1"
QX52/22	418	326	209	120	92	92	156		100	SAE 2½"	SAE 1¼"	G ½" ^{1) 2)}
QX52/32	431	339			100				120			G ¾" ^{1) 2)}
QX52/42	463	371	217	127	118				125	SAE 3"		SAE 1"
QX52/52	483	391			127				156			SAE 1¼"
QX62/32	481	389	247	144	112	92	195	197	120		SAE 1½"	G ¾" ^{1) 2)}
QX62/42	498	406			123				125			SAE 1"
QX62/52	529	437	252	149	137				156	SAE 3½"		SAE 1¼"
QX62/62	548	456			149				197			SAE 1½"
QX82/42	603	486	309	179	141	117	250		125		SAE 2"	SAE 1"
QX82/52	623	506			150				156			SAE 1¼"
QX82/62	642	525			162				197	SAE 4"		SAE 1½"
QX82/82	674	557			179				250			SAE 2"

1) threaded port to DIN 3852, Part 2

2) pressure port to SAE J518 code 61 / ISO 6162-1 can be supplied for pressure ranges 2+3

F Double pumps QX.2/3



1 S = common suction port

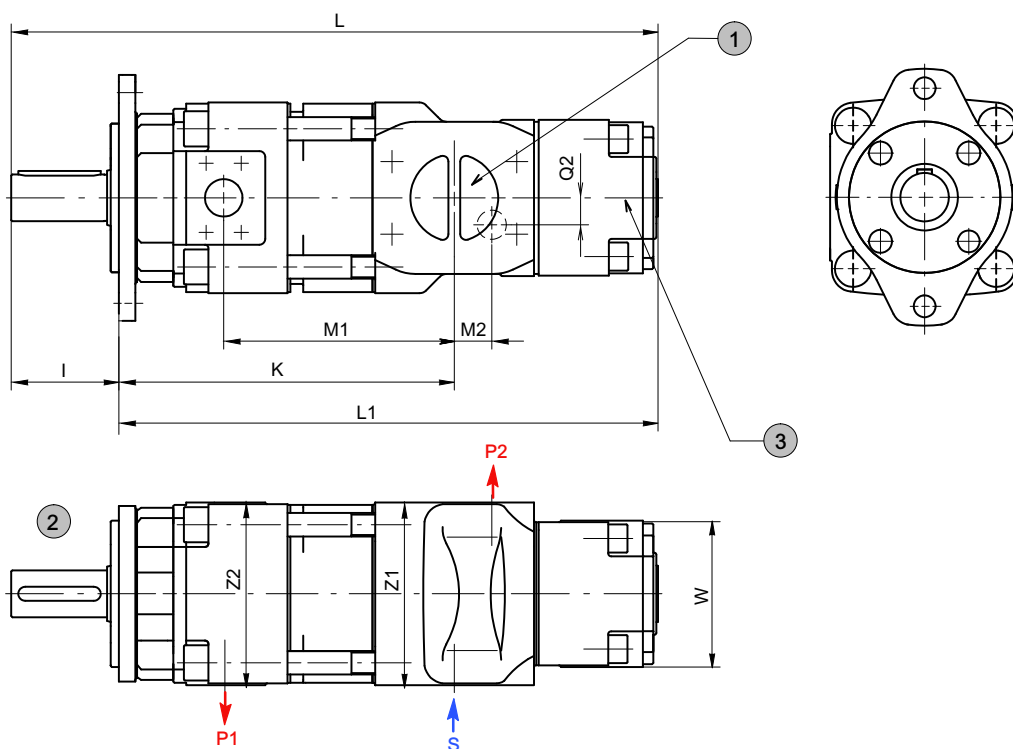
2 shaft and mounting dimensions - see section 4

Type	L	L1	K	M1	M2	I	Z1	Z2	Z3	S	P1	P2
QX32/23	340	290	151	87	114	50	120		100	G 1½" 1)	G ¾" 1) 2)	G ½" 1) 2)
QX42/23	387	319	175	103	119	68	125		120	SAE 2"	SAE 1"	G ¾" 1) 2)
QX42/33	410	342			137							
QX52/23	453	361	209	120	127	92	156		100	SAE 2½"	SAE 1¼"	G ½" 1) 2)
QX52/33	476	384			145				120			G ¾" 1) 2)
QX52/43	519	427	217	127	174				125	SAE 3"		SAE 1"
QX62/33	526	434	247	144	157	92	195	197	120		SAE 1½"	G ¾" 1) 2)
QX62/43	554	462			179				125			SAE 1"
QX62/53	599	507	252	149	207				156			SAE 1¼"
QX82/43	659	542			197	117	250		125	SAE 3½"		SAE 1"
QX82/53	693	576	309	179	220				156		SAE 2"	SAE 1¼"
QX82/63	732	615			252				197	SAE 4"		SAE 1½"

1) threaded port to DIN 3852, Part 2

2) pressure port to SAE J518 code 61 / ISO 6162-1 can be supplied for pressure ranges 2+3

G Double pumps QX.3/1



1 S = common suction port

2 shaft and mounting dimensions - see section 4

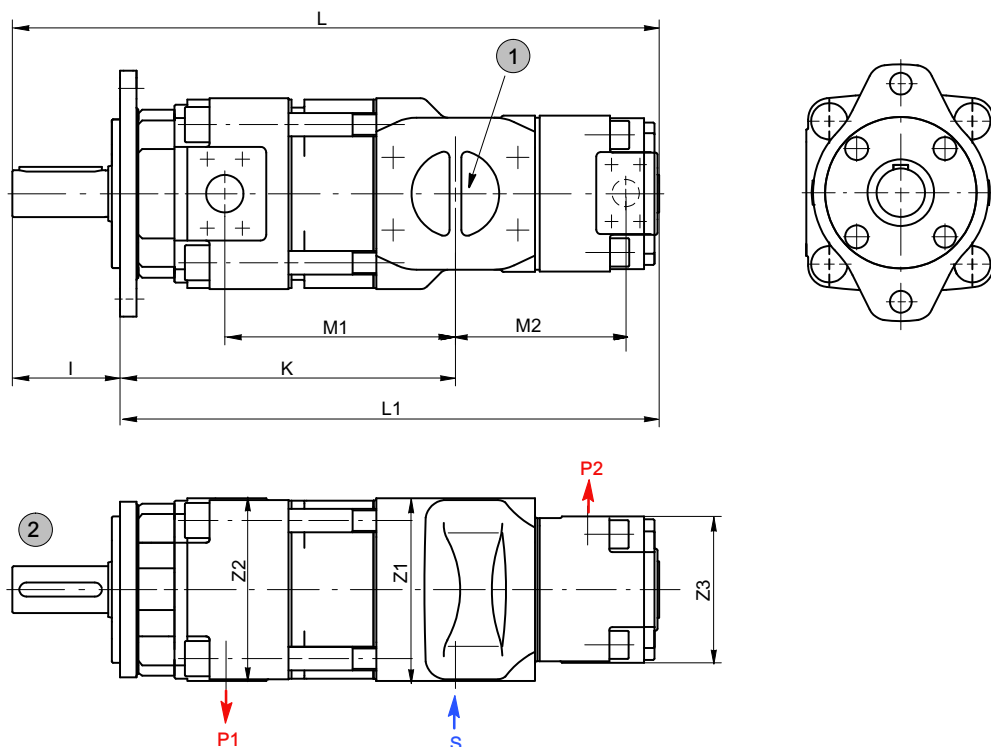
3 depending on operating conditions, a second suction port may be required - see section 2.2.1 QX61=SAE 2"

Type	L	L1	K	M1	M2	Q2	I	Z1	Z2	W	S	P1	P2
QX33/21	368	318	196	132	30	-	50	120	120	80	G 1½" ¹⁾	G ¾" ^{1) 2)}	G ½" ^{1) 2)}
QX43/21	426	358	231	159	35	-	68	125	125	100	SAE 2"	SAE 1"	G ¾" ^{1) 2)}
QX43/31	441	373			33	15							G ¾" ^{1) 2)}
QX53/21	506	414	279	190	43	-	92	156	156	80	SAE 2½"	SAE 1¼"	G ½" ^{1) 2)}
QX53/31	521	429			39	15				100			G ¾" ^{1) 2)}
QX53/41	559	467	287	197	32	23	92	195	197	136	SAE 3"	SAE 1½"	SAE 1"
QX63/31	591	499	337	234	47	14				100			G ¾" ^{1) 2)}
QX63/41	614	522			39	27				136			SAE 1"
QX63/51	651	559	342	239	40	28				165	SAE 3½"	SAE 2"	SAE 1¼"
QX83/41	744	627	424	294	51	25	117	250	250	136			SAE 1"
QX83/51	770	653			47	30				165			SAE 1¼"
QX83/61	797	680			45	35				203	SAE 4"		SAE 1½"

1) threaded port to DIN 3852, Part 2

2) pressure port to SAE J518 code 61 / ISO 6162-1 can be supplied for pressure ranges 2+3

H Double pumps QX.3/2



1 S = common suction port

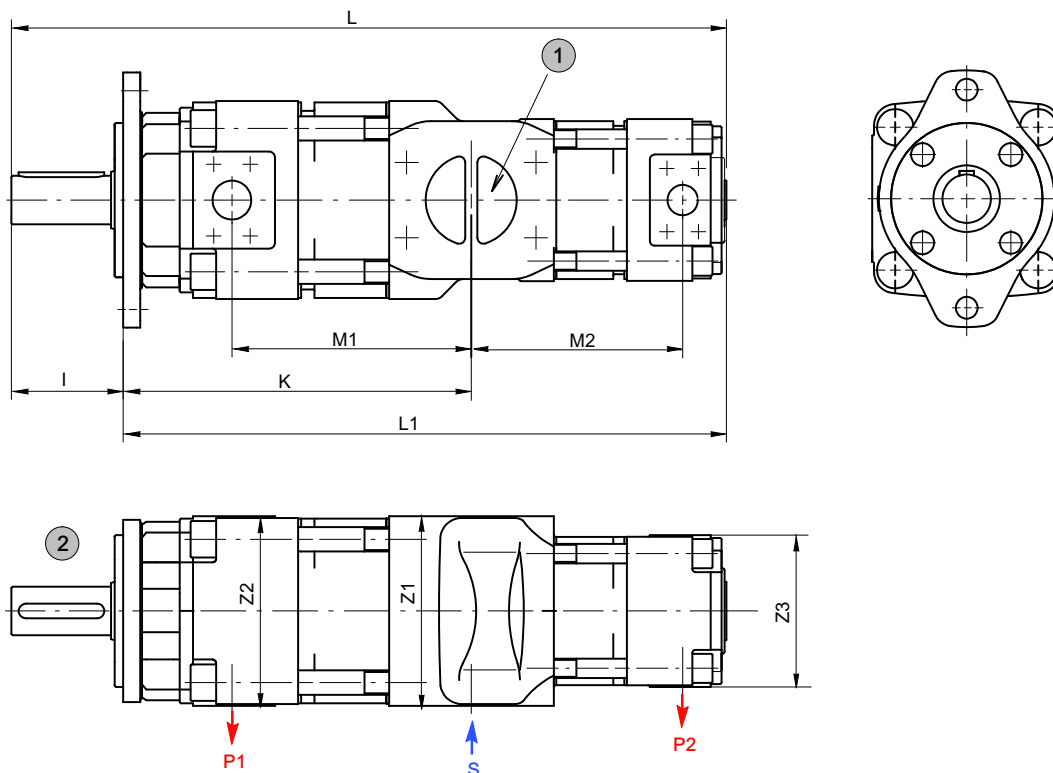
2 shaft and mounting dimensions - see section 4

Type	L	L1	K	M1	M2	I	Z1	Z2	Z3	S	P1	P2
QX23/22	295	250	158	102	67	45	100		100	G 1 1/4" 1)	G 1/2" 1) 2)	G 1/2" 1) 2)
QX33/22	350	300	196	132	79	50	120		120	G 1 1/2" 1)	G 3/4" 1) 2)	G 3/4" 1) 2)
QX33/32	363	313			87				100			G 1/2" 1) 2)
QX43/22	408	340	231	159	84	68	125		120	SAE 2"	SAE 1"	G 3/4" 1) 2)
QX43/32	421	353			92				125			SAE 1"
QX43/42	453	385	238	167	111				100	SAE 2 1/2"	SAE 1 1/4"	G 1/2" 1) 2)
QX53/22	488	396	279	190	92	92	156		120			G 3/4" 1) 2)
QX53/32	500	408			100				125			SAE 1"
QX53/42	533	441	287	197	118				156	SAE 3"		SAE 1 1/4"
QX53/52	553	461			127				120			G 3/4" 1)
QX63/32	571	479	337	234	112	92	195	197	125		SAE 1 1/2"	SAE 1"
QX63/42	588	496			123				156			SAE 1 1/4"
QX63/52	619	527	342	239	137				197	SAE 3 1/2"		SAE 1 1/2"
QX63/62	638	546			149				125			SAE 1"
QX83/42	718	601	424	294	141	117	250		156		SAE 2"	SAE 1 1/4"
QX83/52	738	621			150				197			SAE 1 1/2"
QX83/62	757	640			162				250	SAE 4"		SAE 2"
QX83/82	789	672			179							

1) threaded port to DIN 3852, Part 2

2) pressure port to SAE J518 code 61 / ISO 6162-1 can be supplied for pressure ranges 2+3

I Double pumps QX.3/3



1 S = common suction port

2 shaft and mounting dimensions - see section 4

Type	L	L1	K	M1	M2	I	Z1	Z2	Z3	S	P1	P2
QX23/23	330	285	158	102	102	45	100		100	G 1 1/4" 1) 2)	G 1/2" 1) 2)	G 1/2" 1) 2)
QX33/23	385	335	196	132	114	50	120		120	G 1 1/2" 1) 2)	G 3/4" 1) 2)	G 3/4" 1) 2)
QX33/33	408	358			132							
QX43/23	442	374	231	159	119	68	125		100	SAE 2"	SAE 1"	G 1/2" 1) 2)
QX43/33	466	398			137				120			G 3/4" 1)
QX43/43	509	441	238	167	167				125			SAE 1"
QX53/23	523	431	279	190	127	92	156		100	SAE 2 1/2"	SAE 1 1/4"	G 1/2" 1) 2)
QX53/33	546	454			145				120			G 3/4" 1) 2)
QX53/43	589	497	287	197	174				125	SAE 3"		SAE 1"
QX53/53	623	531			197				156			SAE 1 1/4"
QX63/33	616	524	337	234	157	92	195	197	120		SAE 1 1/2"	G 3/4" 1) 2)
QX63/43	644	552			179				125			SAE 1"
QX63/53	689	597	342	239	207				156	SAE 3 1/2"		SAE 1 1/4"
QX63/63	728	636			239				197			SAE 1 1/2"
QX83/43	774	657	424	294	197	117	250		125		SAE 2"	SAE 1"
QX83/53	808	691			220				156			SAE 1 1/4"
QX83/63	847	730			252				197	SAE 4"		SAE 1 1/2"
QX83/83	904	787			294				250			SAE 2"

1) threaded port to DIN 3852, Part 2

2) pressure port to SAE J518 code 61 / ISO 6162-1 can be supplied for pressure ranges 2+3

5.3 Ordering code for double pumps

[illegible]

1) Pressure range 4 on request.

5.3.1 Ordering example:

Required: double pump

Pump 1

Displacement:	80 cm ³ /rev
Continuous pressure:	300 bar
Type:	63-080

Pump 2

Displacement: 20 cm³/rev
Continuous pressure: 160 bar
Type: 31-020

for use with mineral oil

Ordering code: QX63-080/31-020R

5.3.2 Standard configuration

- direction of rotation - right (CW)
- 2-hole mounting flange to ISO 3019/1 (SAE): sizes QX 3-6
- 2-hole mounting flange to ISO 3019/2 (metr.): sizes QX 2+8
- Nitrile seals
- parallel shaft end to ISO/R775
- black priming, flange without priming

5.3.3 Options

- O = without priming
- 06 = external drain port in the pump rear cover
 - QX 2-5 = G 1/4"
 - QX 6 = G 3/8"
 - QX 8 = G 1/2"
- 09 = FKM (Viton) seals and without priming
- 12 = 2-hole mounting flange to ISO 3019/2 (metric): size QX 3-6
- 29 = for HFB and HFC fluids, frame sizes 2-5, without priming
- 66 = 4-hole mounting flange to ISO 3019/2 (metric)
- 83 = second suction port on:
 - QX51=SAE 1 1/4", QX61=SAE 2", QX81=SAE 2 1/2"
- 86 = for HFB and HFC fluids, frame sizes 6+8, without priming
- 117 = pressure port to SAE J518 code 61 / ISO 6162-1 can be supplied for frame size 2+3 with pressure ranges 2+3

Further options on request.

6 Triple pumps

The following table shows the triple-pump combinations that can be supplied (other triple-pumps on request). The individual pumps 1, 2 and 3 must be specified in accordance with the main characteristics shown in section 2.

The largest pump of the combination is situated at the shaft end and is referred to as Pump 1. For equal frame sizes, the pump with the larger displacement is situated at the drive side. Pumps 2 and 3 have a common suction port.

IMPORTANT: Triple pumps with pressure range 4 on request.

6.1 Selection table

Frame size of pump 1

QX2.	QX3.	QX4.	QX5.	QX5.	QX6.	QX8.
QX21/21/21	QX31/21/21	QX41/21/21	QX51/22/23	QX52/52/31	QX61/31/33	QX81/42/23
QX21/21/22	QX31/21/22	QX41/21/23	QX51/23/23	QX52/52/42	QX61/41/21	QX82/42/43
QX21/21/23	QX31/21/23	QX41/22/22	QX52/23/23	QX52/52/43	QX61/41/42	QX82/51/53
QX21/22/22	QX31/22/22	QX41/23/23	QX53/22/22	QX52/52/52	QX61/42/23	QX83/51/53
QX21/22/23	QX31/22/23	QX42/22/22	QX51/31/33	QX52/52/53	QX61/42/43	QX81/61/61
QX21/23/23	QX31/23/22	QX43/22/22	QX51/33/33	QX52/53/31	QX61/43/43	QX81/62/63
QX22/22/22	QX31/23/23	QX43/23/22	QX51/41/23	QX52/53/53	QX62/41/22	QX81/63/33
QX22/22/23	QX32/22/22	QX43/23/23	QX51/41/42	QX53/53/23	QX62/42/42	QX82/61/61
QX23/23/23	QX32/22/23	QX41/31/33	QX51/41/43	QX53/53/33	QX62/43/43	QX82/62/62
	QX32/23/23	QX41/33/22	QX51/42/22		QX63/43/22	QX82/63/31
	QX33/21/22	QX41/33/33	QX51/42/43		QX61/52/53	QX83/61/61
	QX33/21/23	QX42/31/32	QX51/43/21		QX61/53/23	QX83/63/43
	QX33/23/23	QX42/32/32	QX51/43/22		QX61/53/31	QX83/63/61
	QX31/31/21	QX42/33/32	QX51/43/23		QX62/52/32	QX81/81/61
	QX31/31/22	QX43/31/31	QX51/43/43		QX62/52/52	QX81/81/81
	QX31/31/23	QX43/33/33	QX52/42/23		QX62/53/22	QX82/82/52
	QX31/31/31	QX41/41/33	QX52/42/42		QX62/53/23	QX82/82/62
	QX31/31/33	QX41/42/21	QX52/43/22		QX62/53/31	QX82/82/63
	QX31/32/22	QX41/42/23	QX52/43/23		QX62/53/33	QX83/83/53
	QX31/33/33	QX41/42/42	QX52/43/43		QX63/51/51	
	QX32/32/22	QX41/43/21	QX53/41/22		QX63/53/53	
	QX32/32/23	QX41/43/22	QX53/41/23		QX61/61/31	
	QX32/32/32	QX41/43/23	QX53/42/22		QX61/61/33	
	QX32/32/33	QX42/42/22	QX53/42/43		QX61/61/41	
	QX33/33/23	QX42/42/23	QX53/43/23		QX61/61/53	
	QX33/33/33	QX42/42/31	QX51/51/21*		QX61/62/42	
		QX42/42/32	QX51/51/32		QX61/62/63	
		QX42/42/33	QX51/51/33		QX61/63/32	
		QX42/42/42	QX51/52/32		QX61/63/33	
		QX42/42/43	QX51/52/33		QX61/63/41	
		QX43/43/43	QX51/52/42		QX61/63/42	
			QX51/52/43		QX62/62/33	
			QX51/53/22		QX62/62/43	
			QX51/53/23		QX62/62/53	
			QX51/53/31		QX62/62/62	
			QX51/53/33		QX62/62/63	
			QX51/53/41		QX62/63/63	
			QX51/53/43		QX63/63/32	
			QX51/53/52		QX63/63/43	
			QX52/52/23		QX63/63/53	
65	130	260	520	520	1050	2100

Max. permissible drive shaft torque [Nm]

* this pump is used as the ordering example in section 6.2

6.2 Ordering code for triple pumps

Triple pumps can only be supplied after consulting Bucher Hydraulics GmbH.

Series = QX

Frame size = 2 / 3 / 4 / 5 / 6 / 8

Pressure range = 1 / 2 / 3 / 4 ¹⁾

Displacement [cm³/rev] = 005 - 500

Frame size = 2 / 3 / 4 / 5 / 6 / 8

Pressure range = 1 / 2 / 3 / 4 ¹⁾

Displacement [cm³/rev] = 005 - 500

Frame size = 2 / 3 / 4 / 5 / 6 / 8

Pressure range = 1 / 2 / 3 / 4 ¹⁾

Displacement [cm³/rev] = 005 - 500

Rotation (viewed from shaft end) right (CW) = R (standard)
left (CCW) = L

Option see section 6.2.3

1) Pressure range 4 on request.

6.2.1 Ordering example:

Required: triple pump

Pump 1

Displacement:	125 cm ³ /rev
Continuous pressure:	80 bar
Type:	51-125

Pump 2

Displacement:	80 cm ³ /rev
Continuous pressure:	150 bar
Type:	51-080

Pump 3

Displacement:	12 cm ³ /rev
Continuous pressure:	125 bar
Type:	21-012

For use with mineral oil

Referring to the selection table in sect. 6.1, QX51/51/21 is an obtainable combination.

Ordering code: QX51-125/51-080/21-012R

6.2.2 Standard configuration

- direction of rotation - right (CW)
- 2-hole mounting flange to ISO 3019/1 (SAE): sizes QX 3-6
- 2-hole mounting flange to ISO 3019/2 (metr.): sizes QX 2+8
- nitrile seals
- parallel shaft end to ISO/R775
- black priming, flange without priming

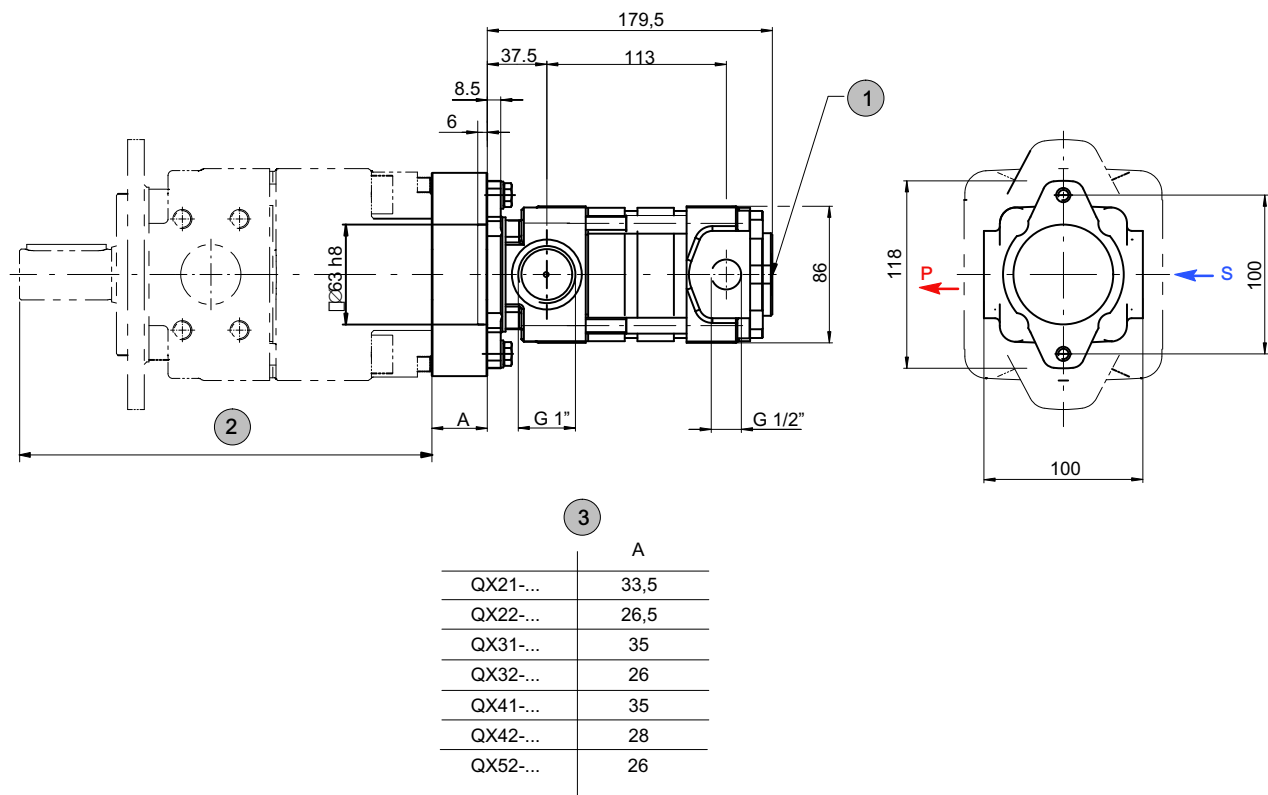
6.2.3 Options

- O = without priming
- 06 = external drain port in the pump rear cover
QX 2-5 = G1/4", QX 6 = G3/8", QX 8 = G1/2"
- 09 = FKM (Viton) seals and without priming
- 12 = 2-hole mounting flange to ISO 3019/2 (metric):
size QX 3-6
- 29 = for HFB and HFC fluids, frame sizes 2-5,
without priming
- 66 = 4-hole mounting flange to ISO 3019/2 (metric)
- 83 = second suction port on:
QX51=SAE 1 1/4", QX61=SAE 2", QX81=SAE 2 1/2"
- 86 = for HFB and HFC fluids, frame sizes 6+8,
without priming
- 117 = pressure port to SAE J518 code 61 / ISO 6162-1
can be supplied for frame size 2+3 with pressure
ranges 2+3

Further options on request.

7 Low-flow capability pump in combination with other QX-single pumps

7.1 Dimensions



1	external drain port G 1/4"
2	dimensions see section 4

3	dimension A depends on the driving QX pump model (2)
---	--

7.2 Ordering code

[illegible]

7.2.1 Ordering example:

Required:	Double pump		
Pump 1		Pump 2	
Displacement:	40 cm ³ /rev	Displacement:	4 cm ³ /rev
Continuous pressure:	160 bar	Continuous pressure:	250 bar
Type:	41 - 040	Type:	24 - 004
For use with mineral oil:			
Ordering code:	QX41-040//24-004R06-ME		

8 Fluid

QX pumps require fluid with a minimum cleanliness level of ISO 4406 code 20/18/15.

We recommend the use of fluids that contain anti-wear additives for mixed-friction operating conditions. Fluids without appropriate additives can reduce the service life of pumps and motors. The user is responsible for maintaining, and regularly checking, the fluid quality. Bucher Hydraulics recommends a load capacity of $\geq 30 \text{ N/mm}^2$ to Brugger DIN 51347-2.

9 Fluid cleanliness class

Cleanliness class (RK) onto ISO 4406 and NAS 1638

Code ISO 4406	Number of particles / 100 ml			
	$\geq 4 \mu\text{m}$	$\geq 6 \mu\text{m}$	$\geq 14 \mu\text{m}$	NAS 1638
23/21/18	8000000	2000000	250000	12
22/20/18	4000000	1000000	250000	-
22/20/17	4000000	1000000	130000	11
22/20/16	4000000	1000000	64000	-
21/19/16	2000000	500000	64000	10
20/18/15	1000000	250000	32000	9
19/17/14	500000	130000	16000	8
18/16/13	250000	64000	8000	7
17/15/12	130000	32000	4000	6
16/14/12	64000	16000	4000	-
16/14/11	64000	16000	2000	5
15/13/10	32000	8000	1000	4
14/12/9	16000	4000	500	3
13/11/8	8000	2000	250	2

10 Operational reliability

To guarantee the reliable operation and a long service life of the pump, a maintenance schedule must be prepared for the power unit, machine or system. The maintenance schedule must make sure that the provided or permissible operating conditions of the pump are adhered to over the period of use.

In particular, compliance with the following operating parameters must be ensured:

- required oil cleanliness
- operating temperature range
- fluid level

Moreover, the pump and the system must be inspected at regular intervals for changes in the following parameters:

- Vibration
- Noise
- Differential temperature of pump – fluid in the tank
- Foaming in the tank
- Leak tightness

Changes in these parameters indicate wear of components (e.g. drive motor, coupling, pump, etc.). The cause must be immediately pinpointed and eliminated.

To provide high operational reliability of the pump in the machine or system, we recommend continuous, automatic checks of the above parameters and an automatic shut-down in the case of changes that exceed the usual fluctuations within the provided operating range.

Make sure that the plastic components of the coupling will be exchanged regularly (no later than 5 years). The manufacturer's instructions must be given priority.

11 Note

This catalogue is intended for users with specialist knowledge. The user must check the suitability of the equipment described here in order to ensure that all of the conditions necessary for the safety and proper functioning of the system are fulfilled. If you have any doubts or questions concerning the use of these pumps, please consult Bucher Hydraulics GmbH.

12 Accessories

12.1 Bolt-on valves - SAE J518 code 61 / ISO 6162-1 pattern

Pressure relief valve A S DF	Pressure relief valve solenoid control A S DA	Accumulator charging valve AGSF
Technical data sheet 100-P-000123	Technical data sheet 100-P-000119	Technical data sheet 100-P-0000124

12.1.1 Examples for Bolt-on valves, mounted on QX Internal Gear Pumps

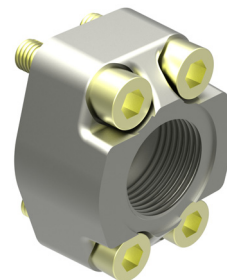
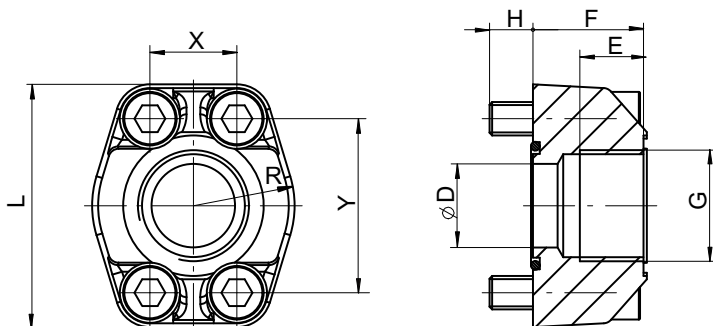
Bolt-on valve with threaded ports AGDF	Bolt-on valves with pipe flanges SAE ¹⁾ ASDF+RF	Bolt-on valve with pipe flanges SAE + RVSAE ²⁾ ASDF+RF+RVSAE+DPSAE+ZPSAE

1) Pipe flange see section 12.2 and 12.3

2) Please ask Bucher Hydraulics GmbH for check valves

IMPORTANT: For detailed informations on Bolt-on valves see www.bucherhydraulics.com

12.2 Pipe flanges - high pressure type



- Max. operating pressure 420 bar
- Flange size SAE J518 code 61 / ISO 6162-1

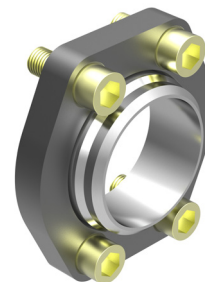
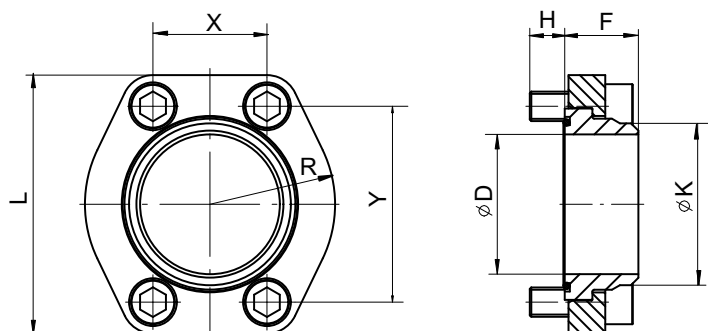
Threaded pipe flanges are spot-faced for DIN 2353 pipe fittings

Material: ST37 / for Viton seals, contact Bucher Hydraulics GmbH

Ordering-number	Ordering code	Size	DØ	E	F	H	L	R	X	Y	Viton seal 90 Shore A	Retaining screws DIN912-12.9 / [Nm]	
100037000	RF 01-R08	G 1/2"	12,5	16	27	13	54	23	17,5	38	20,24x2,62	M8x30	30
100037010	RF 02-R10	G 3/4"	20	18	30	12	65	26	22,2	47,6	26,65x2,62	M10x30	60
100037020	RF 03-R11	G 1"	25	20	34	13	70	29	26,2	52,4	32,99x2,62	M10x35	60
100037030	RF 04-R12	G 1 1/4"	32	22	38	14	80	36	30,2	58,6	40,86x3,53	M10x40	60
100037040	RF 05-R13	G 1 1/2"	38	24	41	19	94	41	35,7	70	44,04x3,53	M12x45	120
100037050	RF 06-R14	G 2"	50	26	45	20	102	48	42,9	77,8	59,92x3,53	M12x50	120
100055470*	RF 07-R16	G 2 1/2" *	63	30	50	18	114	57	50,8	89	72,62x3,53	M12x45	120

* at RF07 only to 210 bar be allowed

12.3 Pipe flanges - low pressure type



- Max. operating pressure 16 bar
- Flange size SAE J518 code 61 / ISO 6162-1

Material: HST37 / for Viton seals, contact Bucher Hydraulics GmbH

Ordering number	Ordering code	SAE flange Size	D	K	F	H	L	R	X	Y	Viton seal 90 Shore 'A'	Retaining screws DIN 912-8.8 Torque [Nm]		pipe ¹⁾ O/dia. approx.
100062450	RN 07-S	2½"	63	75	35	14	120	57	51	89	69,44x3,53	M12 x 30	70	75
100063880	RN 08-S	3"	76	88			140,5	68	62	106,5	85,32x3,53	M16 x 40	180	88
100063890	RN 09-S	3½"	89	100	40	19	158,5	73	70	120,3	98,02x3,53	M16 x 40	180	100
100063900	RN 10-S	4"	103	115			168	79	78	130	110,72x3,53	M16 x 40	180	115

1) We recommend the use of seamless precision steel tube to DIN 2391 with wallthick. max 6 mm

Gear Pumps - AP05



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1 General information

1.1 Introduction to the product

Gear pumps are widely used in modern hydraulic systems due to their high performance, long service life and low purchase and maintenance costs.

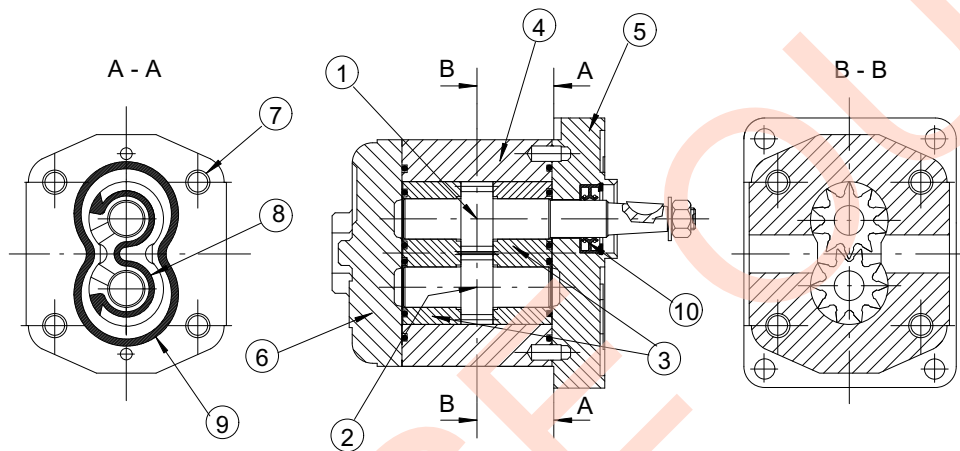
Product development has made it possible to achieve high operating pressures, excellent volumetric and mechanical efficiency, and lower noise levels, in operation, by means of:

- meticulous CAD design of the gear teeth and balancing areas
- an exacting choice of high-performance materials

- carefully controlled heat treatments
- increasingly tight coupling tolerances, and a high standard of surface finish.

Bucher Hydraulics S.p.A. has achieved these results by constantly improving its design, control, and manufacturing techniques in line with the latest technological developments, while simultaneously introducing a Quality Control System which ensures that every single product offers the same high standards.

Product description



1. Drive gear
2. Driven gear
3. Balancing
4. Pump body
5. Front cover

6. Rear cover
7. Mounting tie rod
8. Balancing seal
9. Oil seal
10. Shaft seal

Referring to the pump shown in the figure, the drive gear (1) drives round the driven gear (2), transferring the oil from the suction port to the pressure port as it turns round.

The gears are made from high strength steel alloy.

The bushings (3) serve a dual purpose:

- to act as a bearing for the gears
- to balance axial and radial thrust in proportion to the change in operating pressure.

The gears-bushings assembly is fitted inside the pump body (4), in which generally the suction and pressure ports are formed.

The pump body is made of high strength extruded aluminium alloy.

The front cover (5), which also acts as a mounting flange, and the rear cover (6) are connected to one another by mounting tie rods (7).

The pump assembly is completed by a series of seals:

- Balancing seals (8) can be fitted in recesses in the bushings as shown in the figure, or in the covers. Their purpose is to delimit the longitudinal balancing area separating the suction and pressure zones.
- Oil seals (9) prevent oil from leaking out.

- An oil retaining ring with the dual purpose of preventing oil leaks from the drive gear shaft and preventing dust or other pollutants from entering the pump itself. Unless otherwise specified, the seals are in nitrilic compound offering high mechanical strength and heat resistance.

- Viton seals are available on request.

(see 2.2 Recommended fluids/Allowed temperatures).

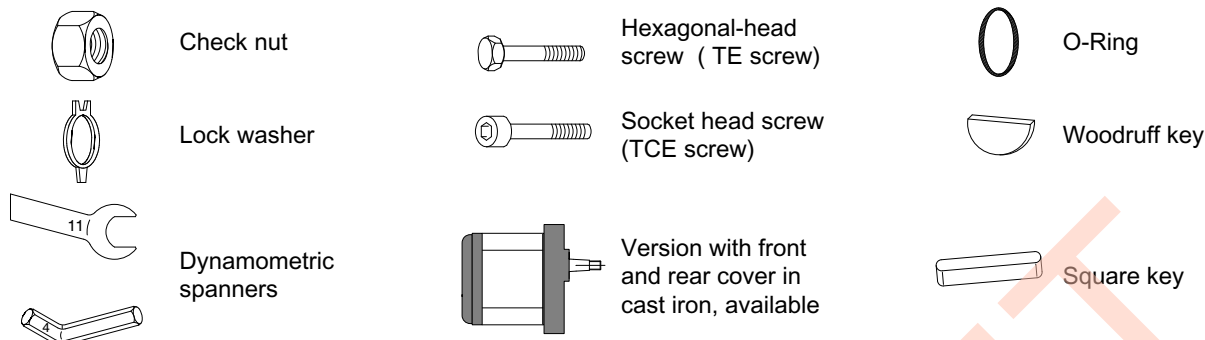
Versions available

The Bucher Hydraulics S.p.A. product range includes single pumps of groups 05-100-200-300 (corresponding to the common group denominations: 05-1-2-3) and several combinations of double pumps, triple pumps, and so on, that can be assembled together according to versions of displacement, flanging, and auxiliary valves indicated in this catalogue.

Bucher Hydraulics S.p.A. will examine any request for special versions, features, and customisations not shown in this catalogue.

To make such a request, please contact our Sales Department.

1.2 Non-standard symbols used in the text



2 Technical information

2.1 Identifying the rotation direction

The rotation direction of a gear pump is identified by looking at the pump from the front and with the drive gear turned upwards (see figures below).

Pumps with clockwise rotation (D) have a drive gear which turns clockwise, with the suction port on the left and the pressure port on the right.

Pumps with counterclockwise rotation (S) have a drive gear which turns counterclockwise, with the suction port on the right and the pressure port on the left.

The figure also shows the pressure flow inside the pumps as the oil is transferred from the suction port to the pressure port.

As regards reversible pumps (R), the ports are alternatively for suction and pressure.

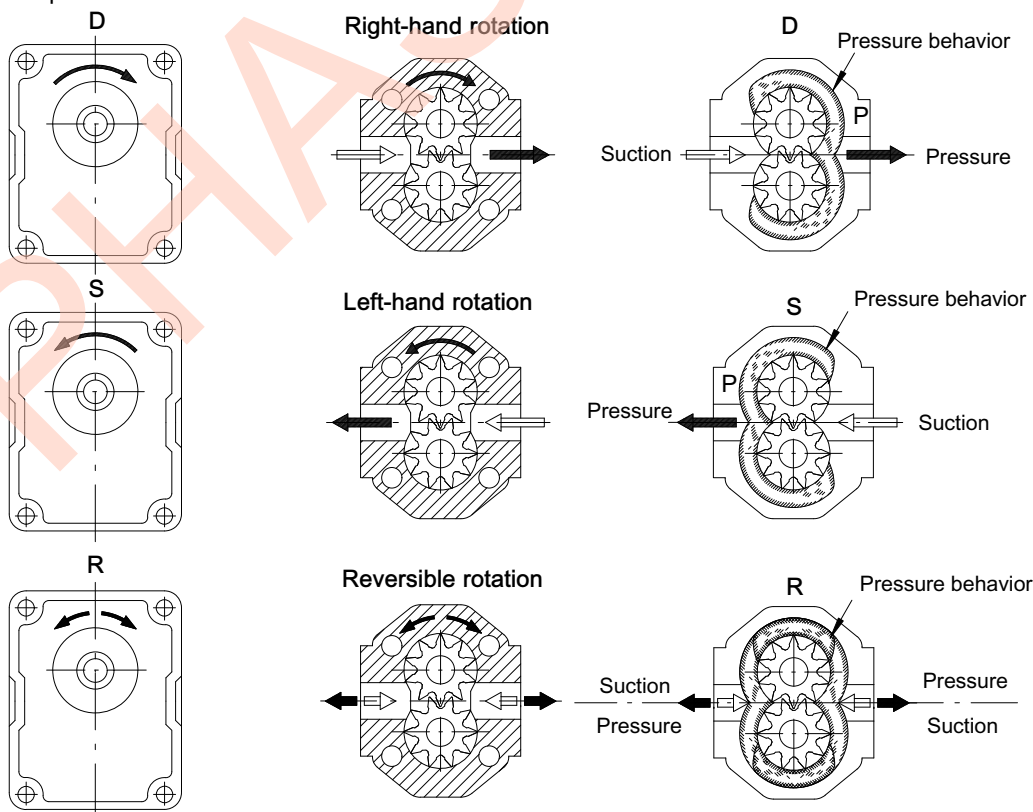
Pumps with a unidirectional rotation (D or S) have the denomination AP.

Pumps with reversible rotation have the denomination APR.

It is possible to change the rotation direction of the entire range of pumps without having to replace any component, except for the AP100 group, for which it is necessary to replace the front cover.

To ensure a good technical result, we recommend in any case that such inversion be carried out at our factory.

Technical descriptions are available on request, which show the correct procedure for the pump rotation inversion.



2.2 Recommended fluids/Allowed temperatures

We recommend using only mineral oil-based hydraulic fluids that comply with the ISO/DIN standards.

Viscosity range:

recommended $20 \div 120 \text{ mm}^2/\text{s}$ (cSt)

permitted up to $700 \text{ mm}^2/\text{s}$ (cSt)

Operating temperature

Type of seals	Temperature
	AP05-APR05
Buna N	$-15 \div 65 \text{ }^{\circ}\text{C}$
Viton*	$-10 \div 80 \text{ }^{\circ}\text{C}$



Attention: Use of pumps at temperatures above 80°C must always be agreed upon with our Technical Office, and in any case this can cause a significant worsening in the volumetric efficiency. For use under conditions different from those indicated in this catalogue, please contact our Sales Department

2.3 Suction

The absolute suction pressure must be $P_{in} \geq 0.75 \text{ bar}$ (11 PSI); therefore, the following must be avoided:

- large height differences between pump and tank
- long stretches of piping
- special features such as:
 - bends
 - reductions in diameter
 - quick couplings
 - etc.

It is also advisable to choose a filter of a suitable size to minimise any pressure drop and to take measures to prevent gradual clogging over time.

(Example 1)

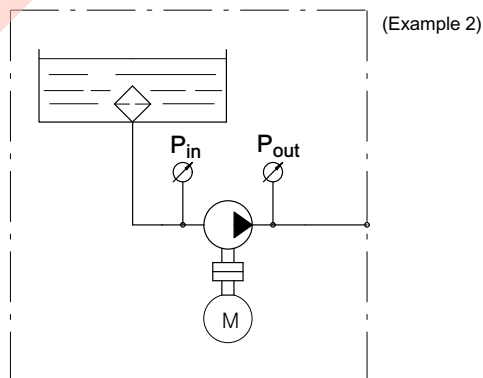
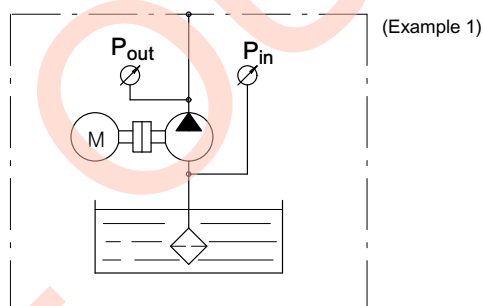
In certain cases, the suction pressure can exceed 1 bar (14.3 PSI), or atmospheric pressure.

Please contact our Sales Department, solution for $P_{in} \leq 3.5 \text{ bar}$ (50 PSI), are available.

If in a particular application the P_{in} pressure is higher than the recommended value, contact our Sales Office.

The diameter of the suction pipe should ensure that the oil speed will fall within the range: $v = 0.6 - 1.2 \text{ m/s}$.

(Example 2)



2.4 Filtration

A short service life of a gear pump is normally due to the presence of impurities in the oil.

It is therefore essential to have an effective filter in the system and to carry out regular maintenance to ensure a long, trouble-free service life.

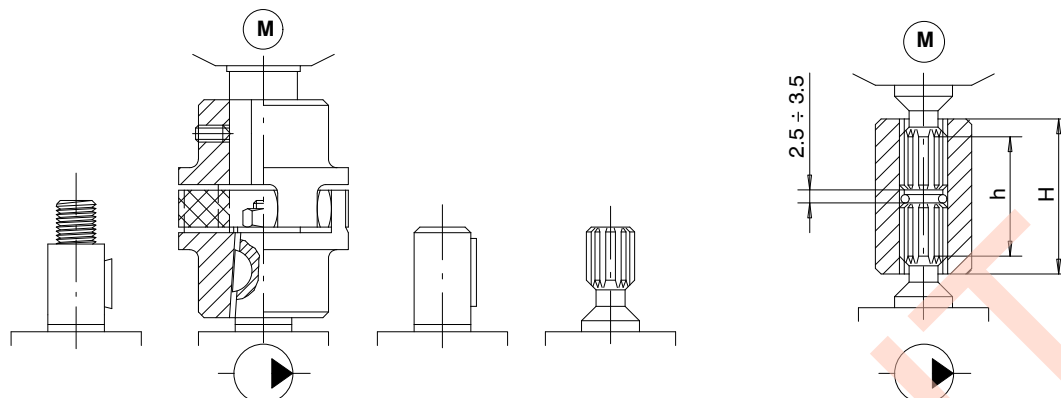
When possible and compatible with the hydraulic circuit installed, Bucher Hydraulics S.p.A. recommends that the system have total filtration (suction, pressure, return).

In any case, the filtering system must constantly ensure an oil contamination class equal to or less than those shown in the following table.

Operating pressure	> 170 bar 2430 PSI	< 170 bar 2430 PSI
Contamination class NAS 1638	9	10
Contamination class ISO 4406	18/15	19/16
Obtain wit filter $\beta_x = 75$	20	25

We also recommend that an adequate air filter be installed on the tank to prevent contaminating substances such as dust, sand, etc. from getting into the oil, as these substances can enter the tank through the air flow caused by the level variations in the tank itself.

2.5 Motor-pump coupling



Absolutely no radial or axial forces should be transmitted to the drive shaft in the motor-pump coupling.

Such forces cause rapid and irregular wear on the balancing surface of the bushings and gear support, with a consequent worsening in pump performance.

The coupling joint must be able to absorb any discrepancies in the coaxial alignment of the motor-pump shafts without placing any load on the pump shaft.

In the couplings between splined shafts, the connecting sleeve must be free to move along its axis.

The length of the sleeve must be sufficient to cover the splined sections of the motor-pump shafts completely in any position.

The distance between the ends of the shafts must be between $2.5 \div 3.5$ mm (.10" ÷ .14").

Make sure that the splined coupling is suitably lubricated to protect it against rapid deterioration.

If there are radial and/or axial loads on the drive shaft, such as when it is driven by a V-belt and pulley or pair of gear wheels, it should be fitted with a front cover with supporting bearings.

2.6 General precaution

In addition to the recommendations regarding fluids, filtration, coupling, etc., we suggest the following:

- Always check the rotation direction of the pump's drive shaft; it must be compatible with the rotation direction of the pump itself.
- Be particularly careful in cleaning and make sure, when connecting the suction and pressure piping, that no chips, rag threads, teflon tape, etc. get into the pump circulation system.
- Check the tightness of the suction and pressure fittings, the correct positioning of the O-Ring, and make sure there is no dirt between the flange and the pump body.
- The first pump start-up can be facilitated by manually filling the suction piping and the pump itself with oil. To facilitate air bleeding, start the pump with the circuit not pressurised.

- To ensure the best heat distribution inside the tank, make sure the return pipe is not too close to the pump's suction piping. The pipings themselves should be below oil tank level to prevent the formation of foam.
- Do not subject the pumps to operating conditions different from those indicated in section 2.8 ; for extreme operations, always contact our Technical Department.
- Never use fluids different from those indicated in section 2.2.
- In the event of pump painting, do not use solvents or paints that are incompatible with the material of the seals. Do not bake paint with excessively high temperatures. Do not paint over the product identification plate; the warranty will not be valid if this plate is illegible.

2.6.1 Directives and standards

Atex



Attention: The equipment and protective systems of these catalogue ARE NOT intended for use in potentially explosive atmospheres that is to say where there is an explosive atmosphere referred to in Article 2 of the Directive 99/92/EC and referred to Article 1.3 of the Directive 94/9/EC

Machinery safety

Hydraulic pumps are excluded by Directive 2006/42/EC

- ISO 9001: 2008 / ISO 14001:2004

Bucher Hydraulics S.p.A. is certified for research, development and production of directional control valves, gear pumps and motors, power units, electro pumps, cartridge valves and integrated manifolds for hydraulic applications.

2.7 Pressure

Pressure levels:

P1 = continuous pressure

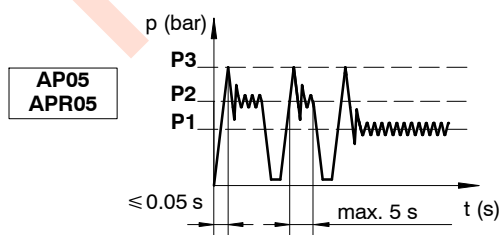
P2 = intermittent pressure

P3 = peak pressure

The recommended oil speed in the pressure pipes is:

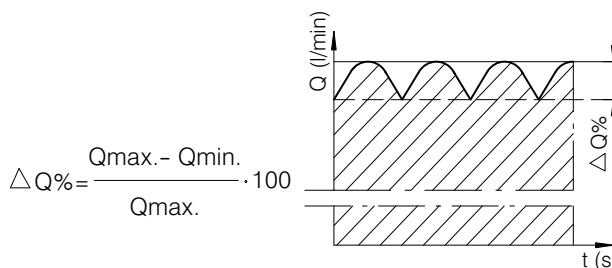
$v = 2 \text{ to } 5 \text{ m/s}$

The characteristic data of each pump is given in the tables on the following pages.



Pressure flow rate surging

Pump	z	$\Delta Q\%$
AP05 - APR05	13	13



2.8 Calculating the specification of a gear pump

The following parameters are defined:

V_c = (cm³/r) pump displacement;

n = (r/min) no. of rpms of the drive shaft;

Q = (l/min) flow rate;

p = (bar) operating pressure;

T = (Nm) drive torque;

N = (kW) power;

η_v = (%) volumetric efficiency;

η_m = (%) mechanical efficiency;

η_t = (%) total efficiency

$$Q = \frac{V_c \cdot n}{100000} \cdot \eta_v$$

$$T = 1.59 \cdot \frac{p \cdot V_c}{\eta_m}$$

$$N = \frac{Q \cdot p}{6.12 \cdot \eta_t}$$

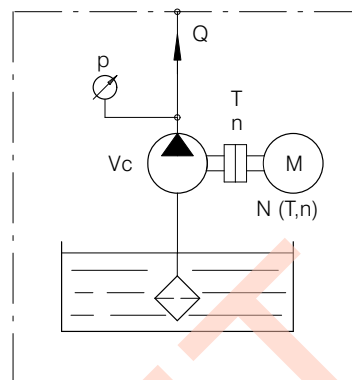
Example

AP05/0.9 $V_c = 0.9$ cm³/r $n = 1500$ r/min $p = 200$ bar $\eta_v = 94\%$ $\eta_m = 90\%$ $\eta_t = 84.6\%$

$$Q = \frac{0.9 \cdot 1500}{100000} \cdot 94 = 1.27 \text{ l/min.}$$

$$T = 1.59 \cdot \frac{200 \cdot 0.9}{90} = 3.18 \text{ Nm}$$

$$N = \frac{1.27 \cdot 200}{6.12 \cdot 84.6} = 0.49 \text{ kW}$$



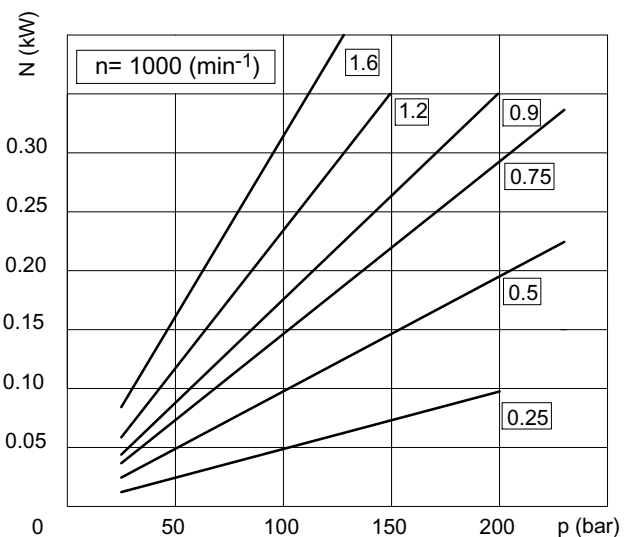
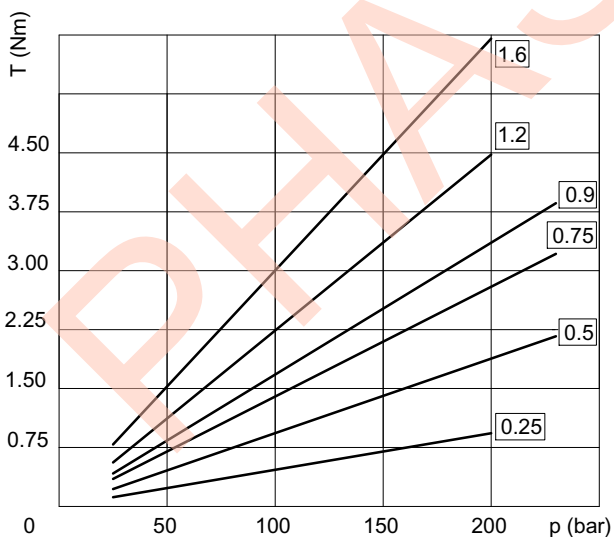
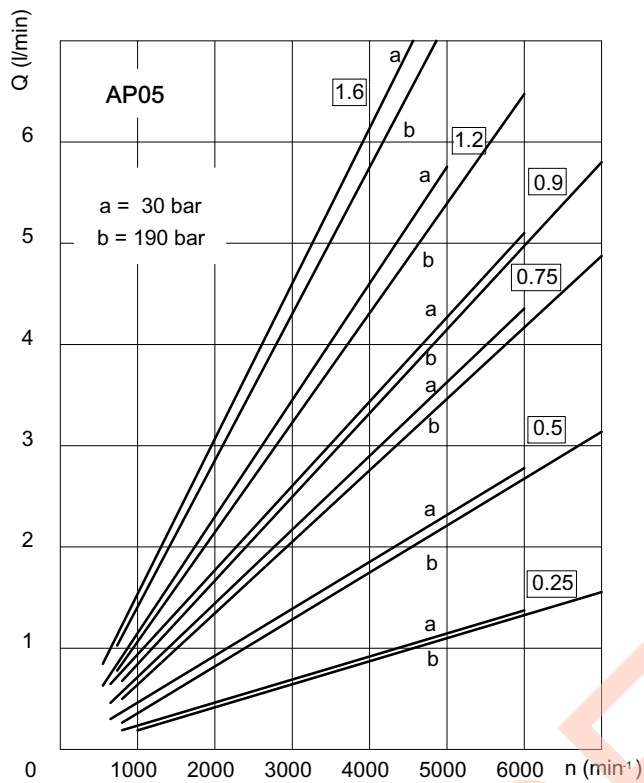
 Important: Please contact our Sales Department if even one of the operating limits indicated in the tables below (temperature, pressure, rpm) is exceeded, as well as in the case of two or more maximum values at the same time, or for applications with particularly heavy-duty cycles.

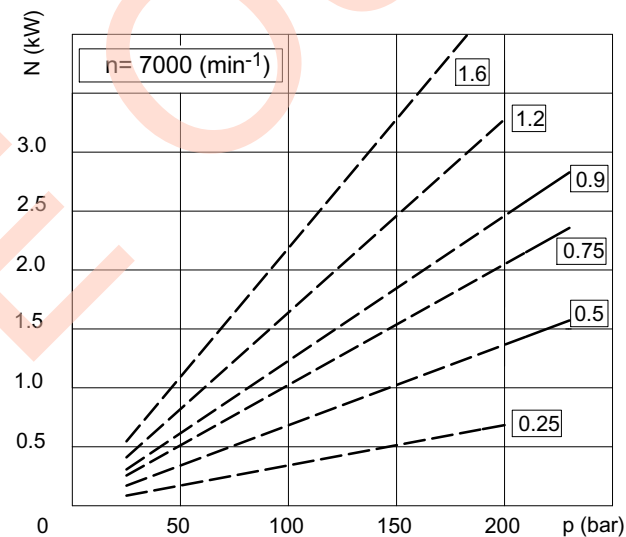
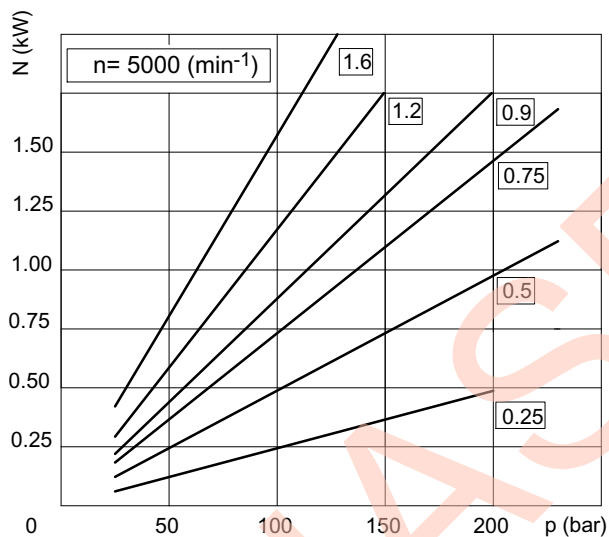
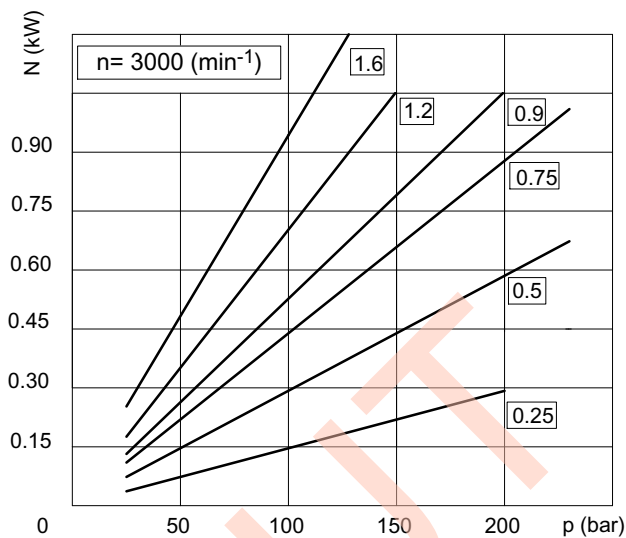
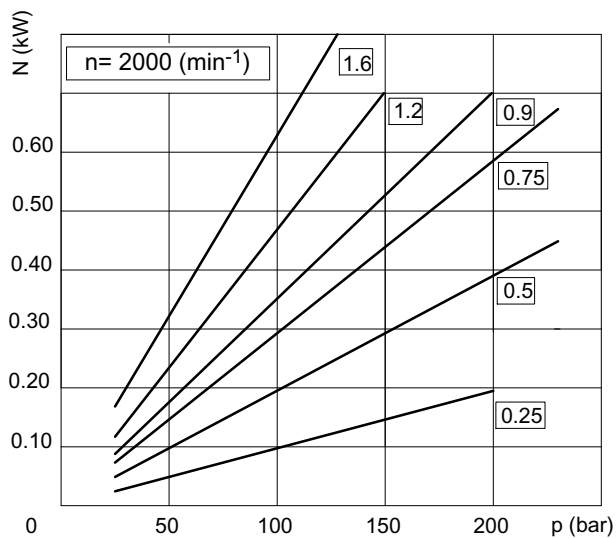
AP/APR05 Type	Displacement		Max. pressure						n.min.		n.max.
	cm ³ /rev	Cu.In.P.R.	P1		P2		P3		P < 100	P > 100	
			bar	P.S.I.	bar	P.S.I.	bar	P.S.I.	bar	bar	
AP05/0.25	0.25	.015	170	2400	180	2600	200	2900	800	3000	7000
AP05/0.5	0.5	.030	190	2700	210	3000	230	3300	650	3000	7000
AP05/0.75	0.75	.045	190	2700	210	3000	230	3300	650	1500	7000
AP05/0.9	0.9	.055	190	2700	210	3000	230	3300	650	1500	7000
AP05/1.2	1.2	.073	170	2400	180	2600	200	2900	550	1500	6000
AP05/1.6	1.6	.097	170	2400	180	2600	200	2900	550	1500	6000
AP05/2.3	2.3	.139	150	2150	160	2300	180	2600	550	1500	4500
APR05/0.25	0.25	.015	150	2200	160	2300	180	2600	800	3000	7000
APR05/0.5	0.5	.030	170	2400	190	2700	210	3000	650	3000	7000
APR05/0.75	0.75	.045	170	2400	190	2700	210	3000	650	1500	7000
APR0.5/0.9	0.9	.055	170	2400	190	2700	210	3000	650	1500	7000
APR05/1.2	1.2	.073	150	2200	160	2300	180	2600	550	1500	6000

2.9 Diagrams

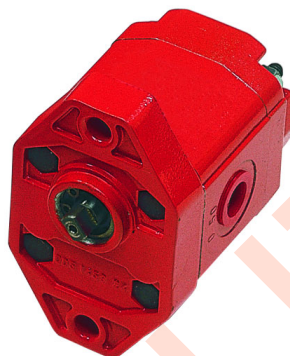
Oil viscosity: 37 mm²/s

Oil temperature: 40° C

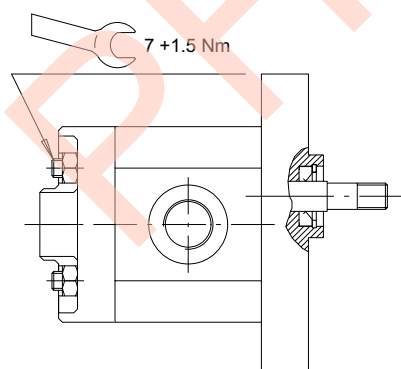




3 Gear pump group AP05



AP/APR05 Type	Displacement		Max. pressure						n.min.		n.max.
	cm ³ /rev	Cu.In.P.R.	P1		P2		P3		P < 100	P > 100	
			bar	P.S.I.	bar	P.S.I.	bar	P.S.I.	bar	bar	
AP05/0.25	0.25	.015	170	2400	180	2600	200	2900	800	3000	7000
AP05/0.5	0.5	.030	190	2700	210	3000	230	3300	650	3000	7000
AP05/0.75	0.75	.045	190	2700	210	3000	230	3300	650	1500	7000
AP05/0.9	0.9	.055	190	2700	210	3000	230	3300	650	1500	7000
AP05/1.2	1.2	.073	170	2400	180	2600	200	2900	550	1500	6000
AP05/1.6	1.6	.097	170	2400	180	2600	200	2900	550	1500	6000
AP05/2.3	2.3	.139	150	2150	160	2300	180	2600	550	1500	4500
APR05/0.25	0.25	.015	150	2200	160	2300	180	2600	800	3000	7000
APR05/0.5	0.5	.030	170	2400	190	2700	210	3000	650	3000	7000
APR05/0.75	0.75	.045	170	2400	190	2700	210	3000	650	1500	7000
APR0.5/0.9	0.9	.055	170	2400	190	2700	210	3000	650	1500	7000
APR05/1.2	1.2	.073	150	2200	160	2300	180	2600	550	1500	6000



Max torque allowed to the shaft



T max = 13 Nm



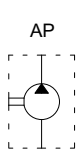
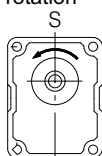
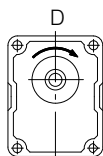
T max = 5 Nm

**9

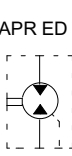
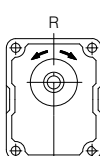
Last number of pump code

**0

Clockwise (D) Counter-clockwise (S)
rotation



Reversible rotation

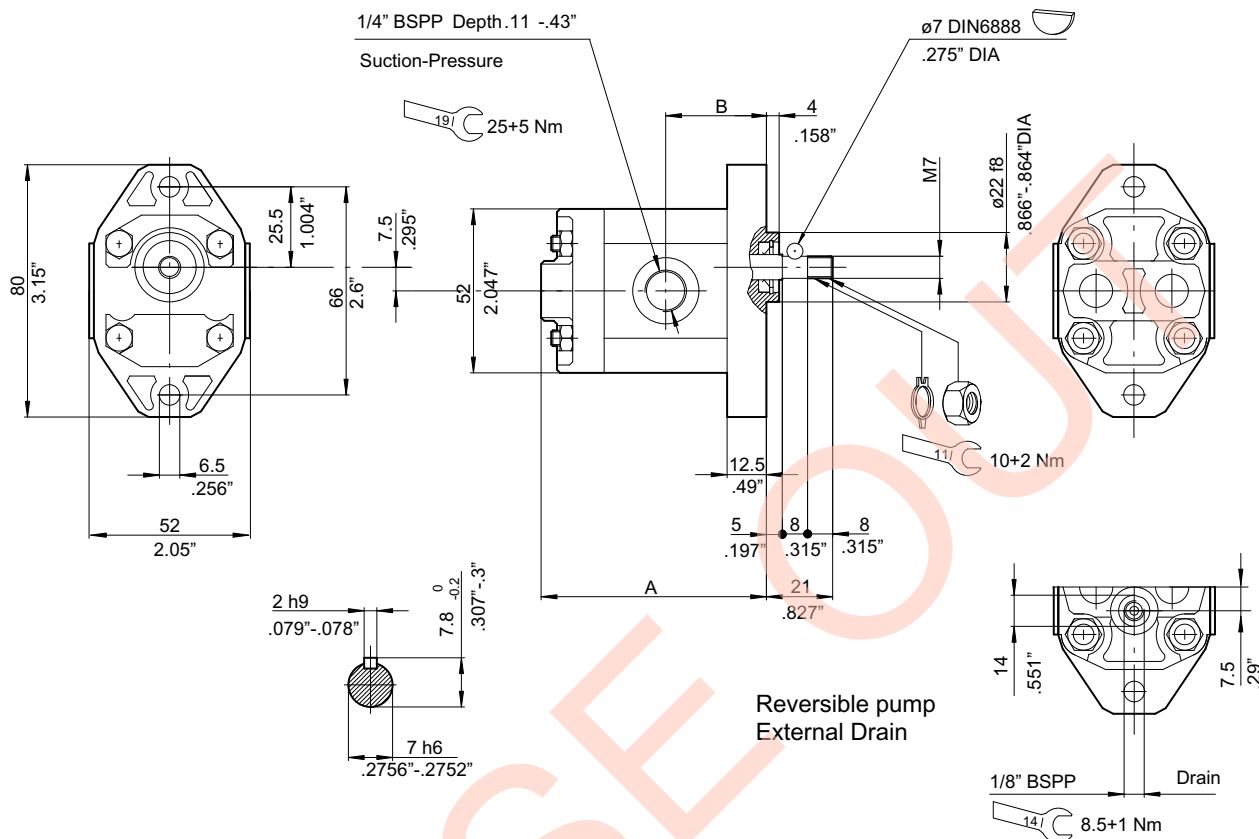


Notes:

- For uses at the operating limits, see note in section 2.8

- For the types of pumps without ordering code, contact our Sales Dept.

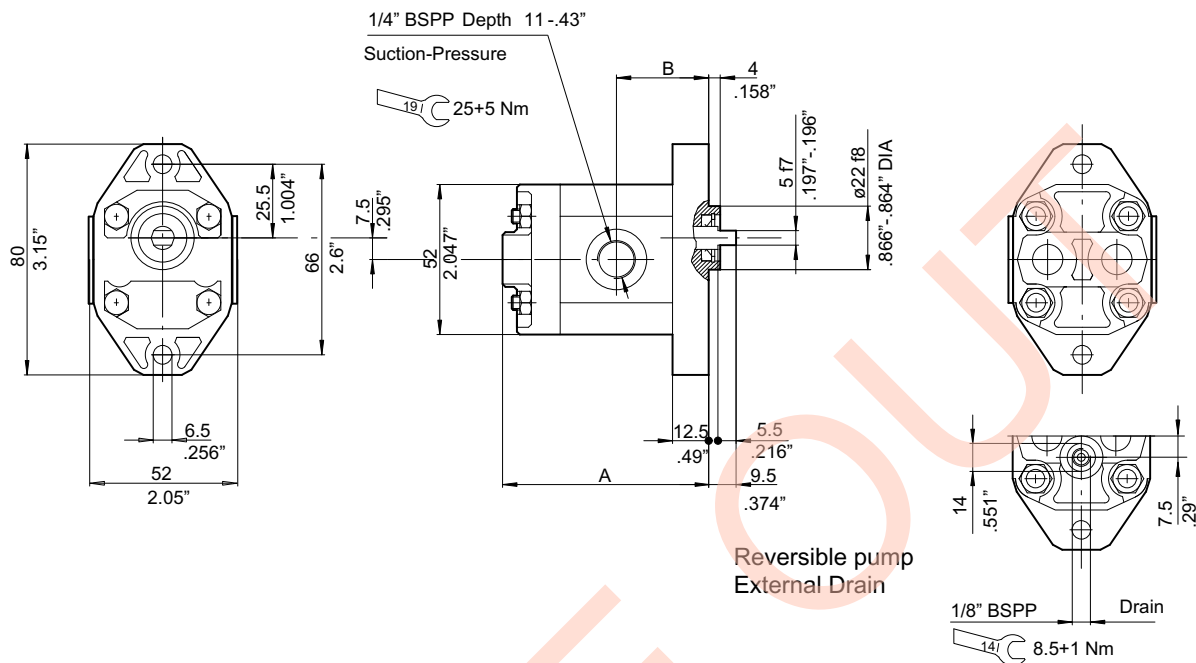
Group **AP05**
APR05 Code **810**



Type	Displacement cm ³ /rev	Dimensions			
		A	B		
		mm	inch.	mm	inch.
AP05/0.25	0.25	64.5	2.54	29	1.41
AP05/0.5	0.5	67	2.64	30.5	1.2
AP05/0.75	0.75	69	2.72	31.5	1.24
AP05/0.9	0.9	70.5	2.77	32	1.26
AP05/1.2	1.2	73	2.87	33.5	1.32

Clockwise rotation: D		Counter-clockwise rotation: S		Reversible pump - External Drain	
Type	Order Code	Type	Order Code	Type	Order Code
AP05/0.25 D 810	200100261204	AP05/0.25 S 810	200100261302	APR05/0.25 810	200100261101
AP05/0.5 D 810	200100361202	AP05/0.5 S 810	200100361302	APR05/0.5 810	200100361101
AP05/0.75 D 810	200100461202	AP05/0.75 S 810	200100461302	APR05/0.75 810	200100461101
AP05/0.9 D 810	200100561202	AP05/0.9 S 810	200100561302	APR05/0.9 810	200100561101
AP05/1.2 D 810	200100661202	AP05/1.2 S 810	200100661302	APR05/1.2 810	200100661101

Group AP05 Code 819
APR05



Type	Displacement cm ³ /rev	Dimensions			
		A		B	
		mm	inch.	mm	inch.
AP05/0.25	0.25	64.5	2.54	29	1.41
AP05/0.5	0.5	67	2.64	30.5	1.2
AP05/0.75	0.75	69	2.72	31.5	1.24
AP05/0.9	0.9	70.5	2.77	32.3	1.26
AP05/1.2	1.2	73	2.87	33.5	1.32
AP05/1.6	1.6	77	3.03	35.5	1.40

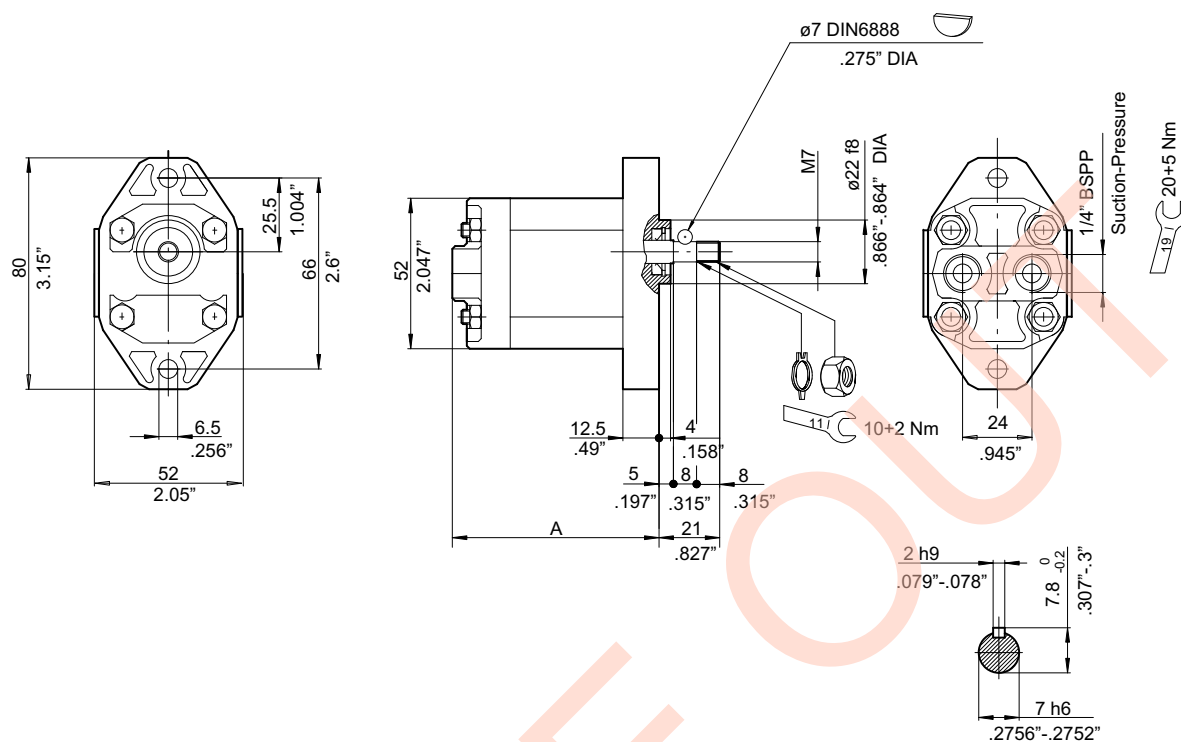
Clockwise rotation: D		Counter-clockwise rotation: S		Reversible pump - External Drain	
Type	Order Code	Type	Order Code	Type	Order Code
AP05/0.25 D 819	200100264208	AP05/0.25 S 819	200100264304	APR05/0.25 819	
AP05/0.5 D 819	200100364202	AP05/0.5 S 819	200100364302	APR05/0.5 819	200100364101
AP05/0.75 D 819	200100464202	AP05/0.75 S 819	200100464302	APR05/0.75 819	
AP05/0.9 D 819	200100564204	AP05/0.9 S 819	200100564304	APR05/0.9 819	200100564101
AP05/1.2 D 819	200100664202	AP05/1.2 S 819	200100664302	APR05/1.2 819	200100664101
AP05/1.6 D 819	200100864202	AP05/1.6 S 819	200100864301	APR05/1.6 819	

Group

AP05

Code

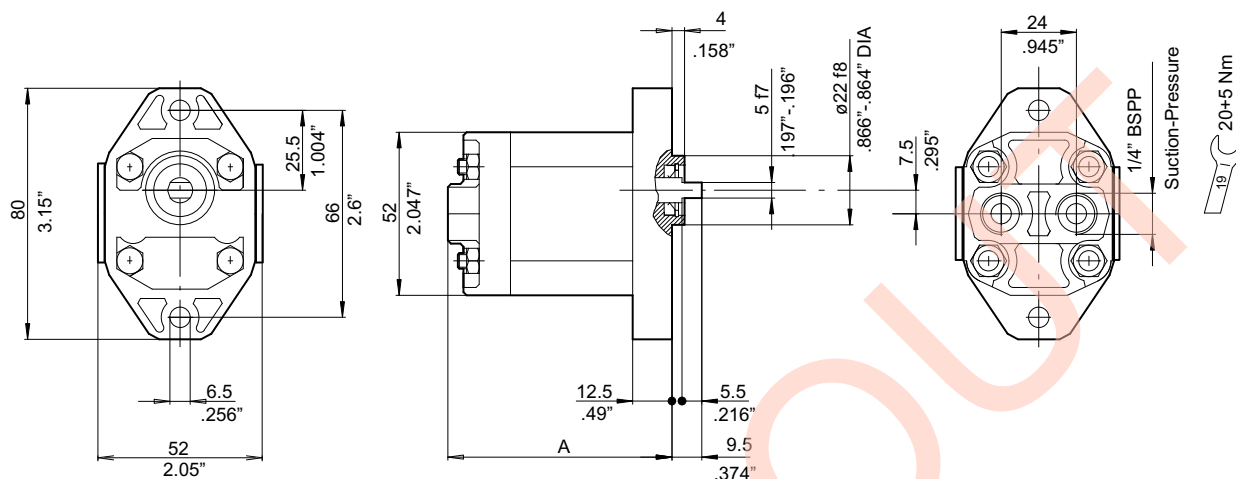
310



Type	Displacement cm ³ /rev	Dimensions	
		A	
		mm	inch.
AP05/0.25	0.25	64.5	2.54
AP05/0.5	0.5	67	2.64
AP05/0.75	0.75	69	2.72
AP05/0.9	0.9	70.5	2.77
AP05/1.2	1.2	73	2.87

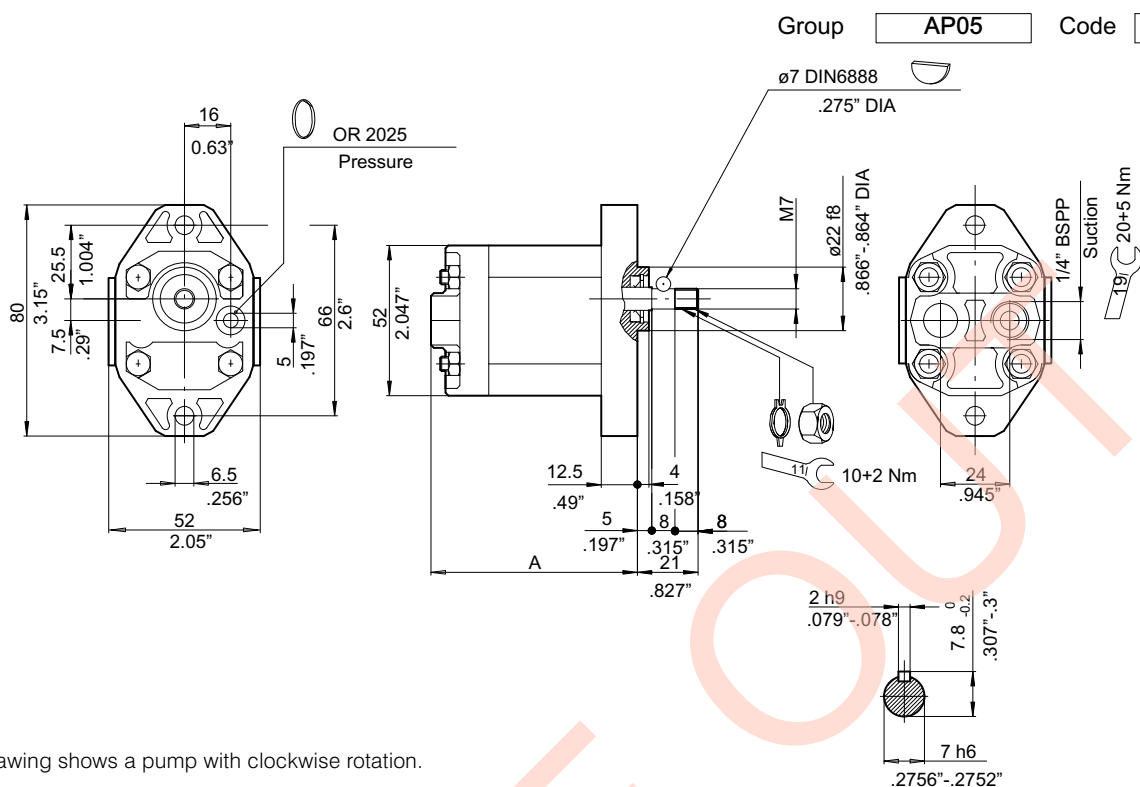
Clockwise rotation: D		Counter-clockwise rotation: S	
Type	Order Code	Type	Order Code
AP05/0.25 D 310	200100261201	AP05/0.25 S 310	200100261301
AP05/0.5 D 310	200100361201	AP05/0.5 S 310	200100361301
AP05/0.75 D 310	200100461201	AP05/0.75 S 310	200100461301
AP05/0.9 D 310	200100561201	AP05/0.9 S 310	200100561301
AP05/1.2 D 310	200100661201	AP05/1.2 S 310	200100661301

Group **AP05** Code **319**



Type	Displacement cm ³ /rev	Dimensions	
		A	
		mm	inch.
AP05/0.25	0.25	64.5	2.54
AP05/0.5	0.5	67	2.64
AP05/0.75	0.75	69	2.72
AP05/0.9	0.9	70.5	2.77
AP05/1.2	1.2	73	2.87

Clockwise rotation: D		Counter-clockwise rotation: S	
Type	Order Code	Type	Order Code
AP05/0.25 D 319	200100214202	AP05/0.25 S 319	200100214301
AP05/0.5 D 319	200100314201	AP05/0.5 S 319	200100314301
AP05/0.75 D 319	200100414201	AP05/0.75 S 319	200100414301
AP05/0.9 D 319	200100514201	AP05/0.9 S 319	200100514301
AP05/1.2 D 319	200100614201	AP05/1.2 S 319	200100614301
AP05/1.6 D 319	200100814201	AP05/1.6 S 319	200100814301



The drawing shows a pump with clockwise rotation.

Type	Displacement cm ³ /rev	Dimensions	
		A	
		mm	inch.
AP05/0.25	0.25	64.5	2.54
AP05/0.5	0.5	67	2.64
AP05/0.75	0.75	69	2.72
AP05/0.9	0.9	70.5	2.77
AP05/1.2	1.2	73	2.87

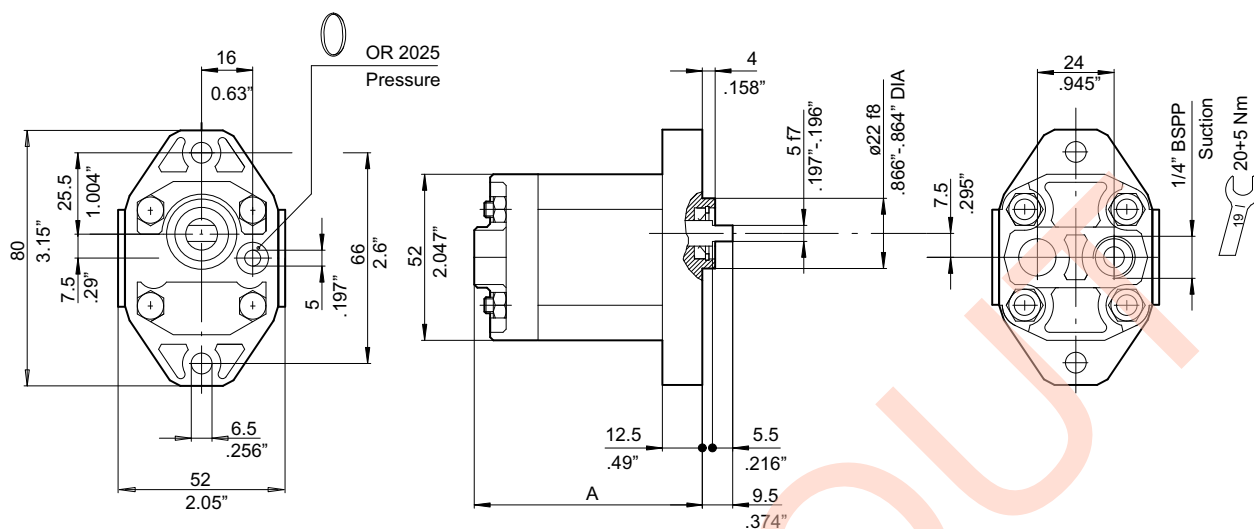
Clockwise rotation: D		Counter-clockwise rotation: S	
Type	Order Code	Type	Order Code
AP05/0.25 D 410	200100261204	AP05/0.25 S 410	200100261304
AP05/0.5 D 410	200100361202	AP05/0.5 S 410	200100361304
AP05/0.75 D 410	200100461202	AP05/0.75 S 410	200100461302
AP05/0.9 D 410	200100561204	AP05/0.9 S 410	200100561302
AP05/1.2 D 410	200100661202	AP05/1.2 S 410	200100661302

Group

AP05

Code

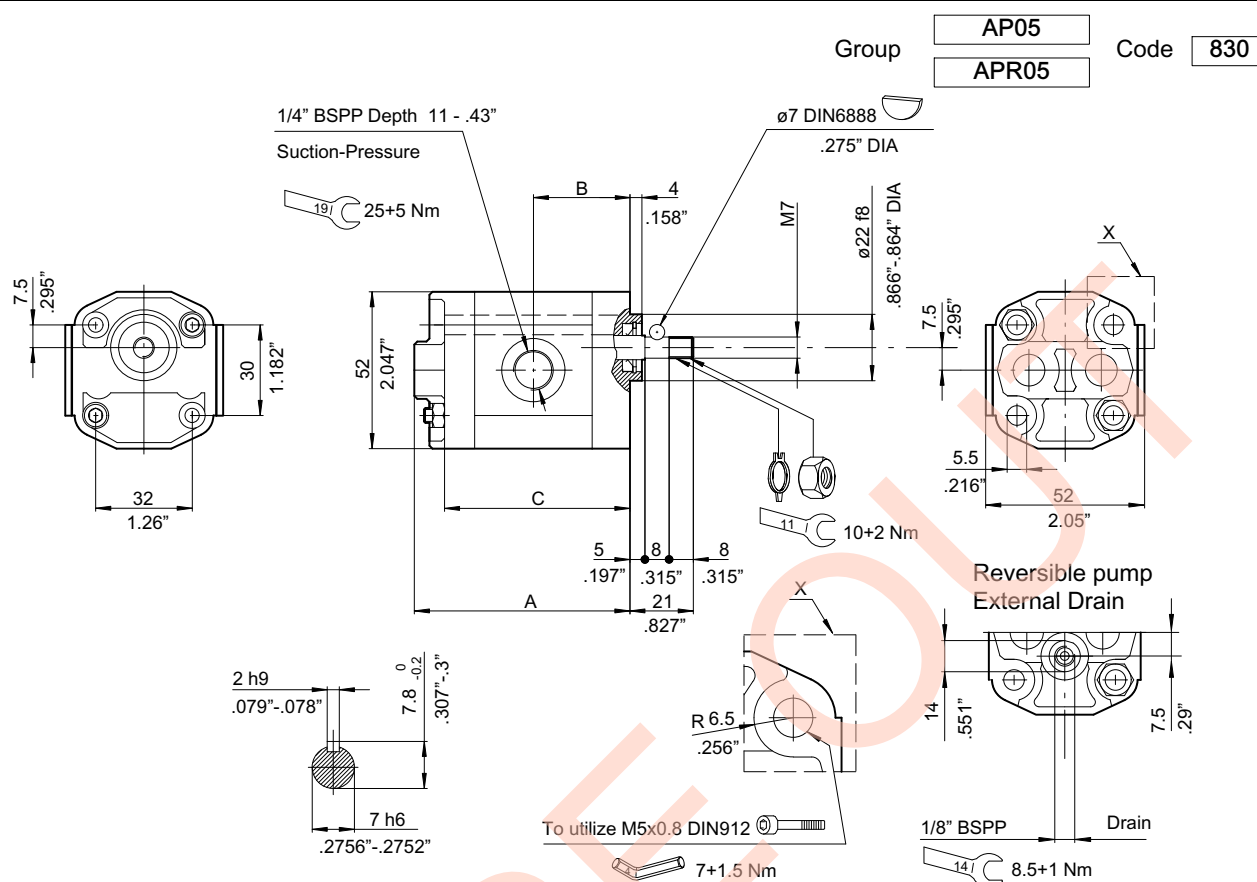
419



The drawing shows a pump with clockwise rotation.

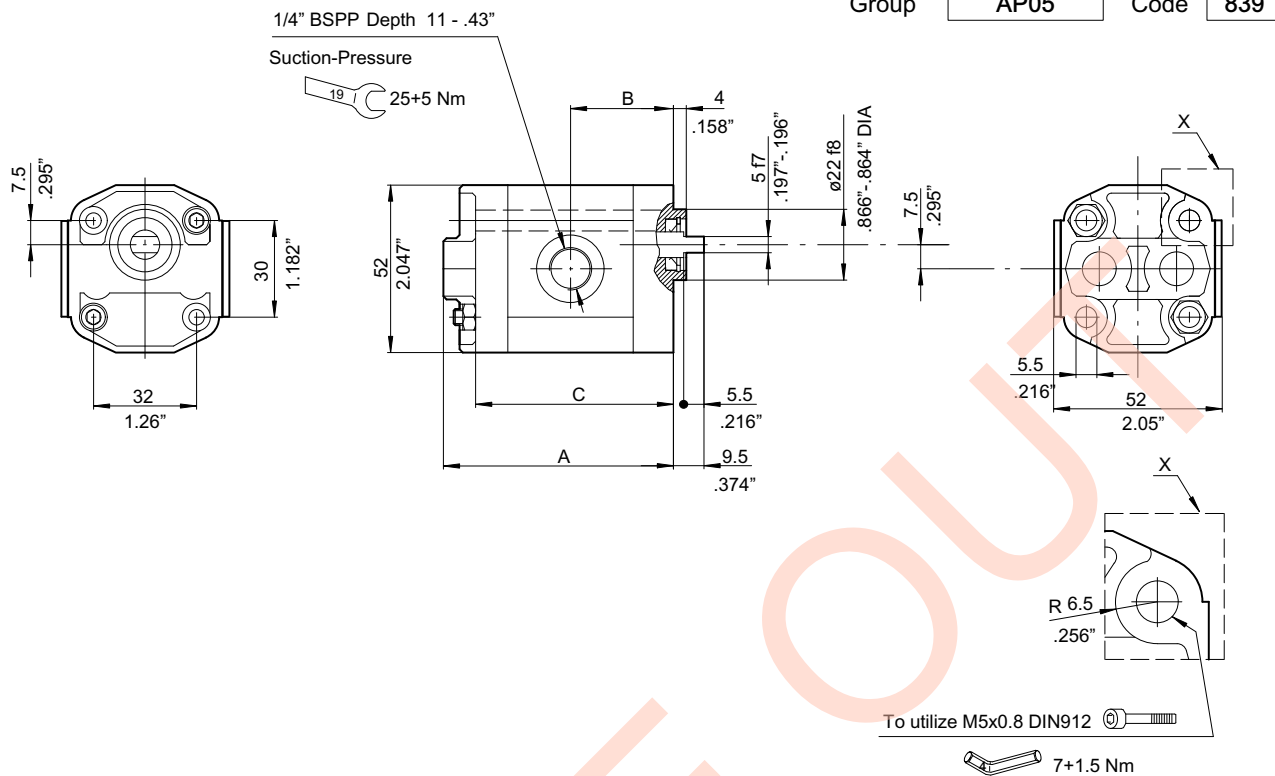
Type	Displacement cm ³ /rev	Dimensions	
		A	
		mm	inch.
AP05/0.25	0.25	64.5	2.54
AP05/0.5	0.5	67	2.64
AP05/0.75	0.75	69	2.72
AP05/0.9	0.9	70.5	2.77
AP05/1.2	1.2	73	2.87
AP05/1.6	1.6	77	3.03

Clockwise rotation: D		Counter-clockwise rotation: S	
Type	Order Code	Type	Order Code
AP05/0.25 D 419		AP05/0.25 S 419	
AP05/0.5 D 419	200100364203	AP05/0.5 S 419	200100364304
AP05/0.75 D 419		AP05/0.75 S 419	200100464303
AP05/0.9 D 419		AP05/0.9 S 419	
AP05/1.2 D 419		AP05/1.2 S 419	
AP05/1.6 D 419		AP05/1.6 S 419	200100864302



Type	Displacement cm ³ /rev	Dimensions					
		A		B		C	
		mm	inch.	mm	inch.	mm	inch.
AP05/0.25	0.25	64.5	2.54	29	1.41	53.5	2.11
AP05/0.5	0.5	67	2.64	30.5	1.2	56	2.20
AP05/0.75	0.75	69	2.72	31.5	1.24	58	2.28
AP05/0.9	0.9	70.5	2.77	32	1.26	59.5	2.34
AP05/1.2	1.2	73	2.87	33.5	1.32	62	2.44

Clockwise rotation: D		Counter-clockwise rotation: S		Reversible pump - External Drain	
Type	Order Code	Type	Order Code	Type	Order Code
AP05/0.25 D 830	200100230201	AP05/0.25 S 830	200100230301	APR05/0.25 830	
AP05/0.5 D 830		AP05/0.5 S 830	200100330301	APR05/0.5 830	200100330101
AP05/0.75 D 830		AP05/0.75 S 830	200100430301	APR05/0.75 830	
AP05/0.9 D 830		AP05/0.9 S 830	200100530301	APR05/0.9 830	200100530101
AP05/1.2 D 830		AP05/1.2 S 830	200100631301	APR05/1.2 830	



Type	Displacement cm ³ /rev	Dimensions					
		A		B		C	
		mm	inch.	mm	inch.	mm	inch.
AP05/0.25	0.25	64.5	2.54	29	1.41	53.5	2.11
AP05/0.5	0.5	67	2.64	30.5	1.2	56	2.20
AP05/0.75	0.75	69	2.72	31.5	1.24	58	2.28
AP05/0.9	0.9	70.5	2.77	32	1.26	59.5	2.34
AP05/1.2	1.2	73	2.87	33.5	1.32	62	2.44
AP05/1.6	1.6	77	3.03	35.5	1.40	66	2.60

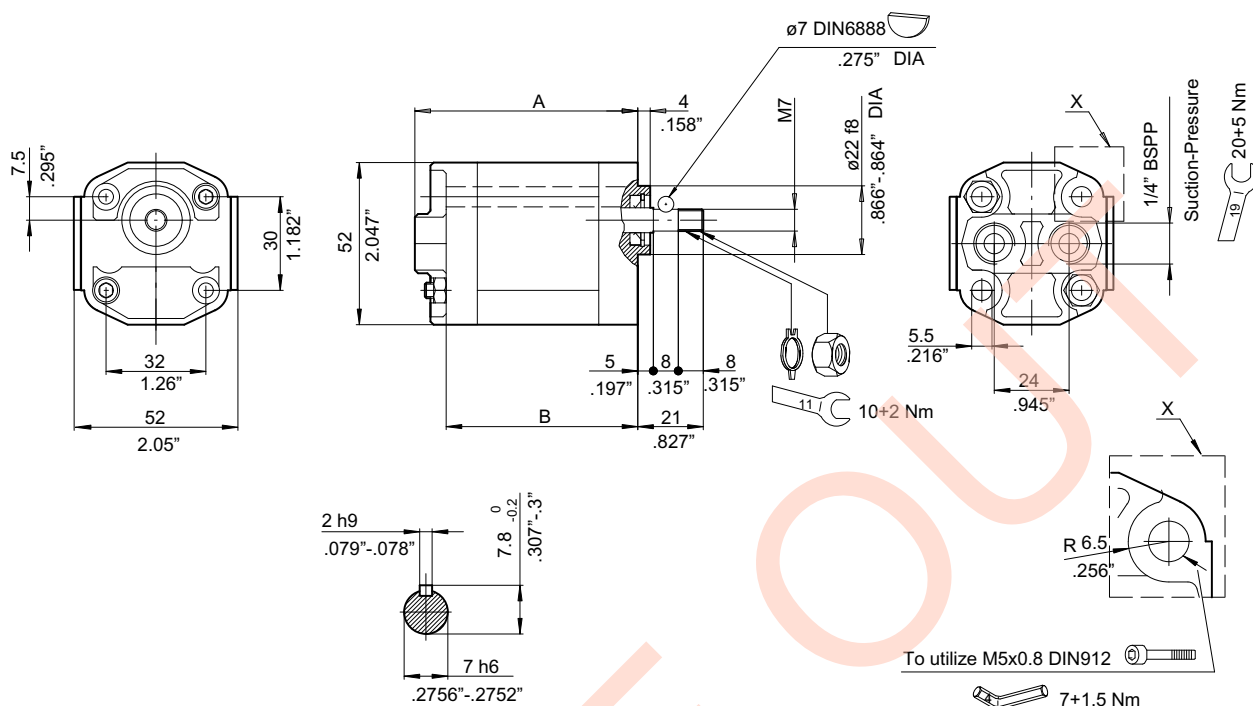
Clockwise rotation: D		Counter-clockwise rotation: S	
Type	Order Code	Type	Order Code
AP05/0.25 D 839		AP05/0.25 S 839	
AP05/0.5 D 839	200100334201	AP05/0.5 S 839	
AP05/0.75 D 839	200100434201	AP05/0.75 S 839	200100434304
AP05/0.9 D 839	200100534201	AP05/0.9 S 839	200100534302
AP05/1.2 D 839	200100634204	AP05/1.2 S 839	200100634301
AP05/1.6 D 839	200100834201	AP05/1.6 S 839	200100834301

Group

AP05

Code

330



Type	Displacement cm ³ /rev	Dimensions			
		A		B	
		mm	inch.	mm	inch.
AP05/0.25	0.25	64.5	2.54	53.5	2.11
AP05/0.5	0.5	67	2.64	56	2.20
AP05/0.75	0.75	69	2.72	58	2.28
AP05/0.9	0.9	70.5	2.77	59.5	2.34
AP05/1.2	1.2	73	2.87	62	2.44

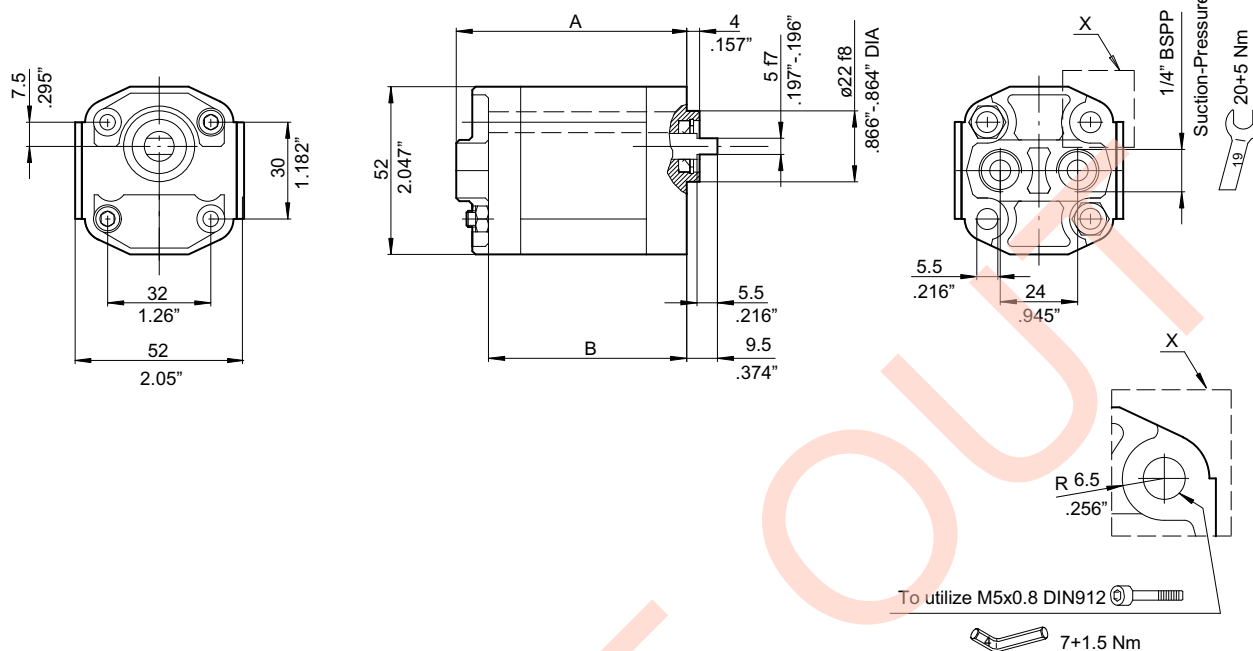
Clockwise rotation: D		Counter-clockwise rotation: S	
Type	Order Code	Type	Order Code
AP05/0.25 D 330		AP05/0.25 S 330	
AP05/0.5 D 330		AP05/0.5 S 330	
AP05/0.75 D 330		AP05/0.75 S 330	
AP05/0.9 D 330	200100531201	AP05/0.9 S 330	
AP05/1.2 D 330		AP05/1.2 S 330	

Group

AP05

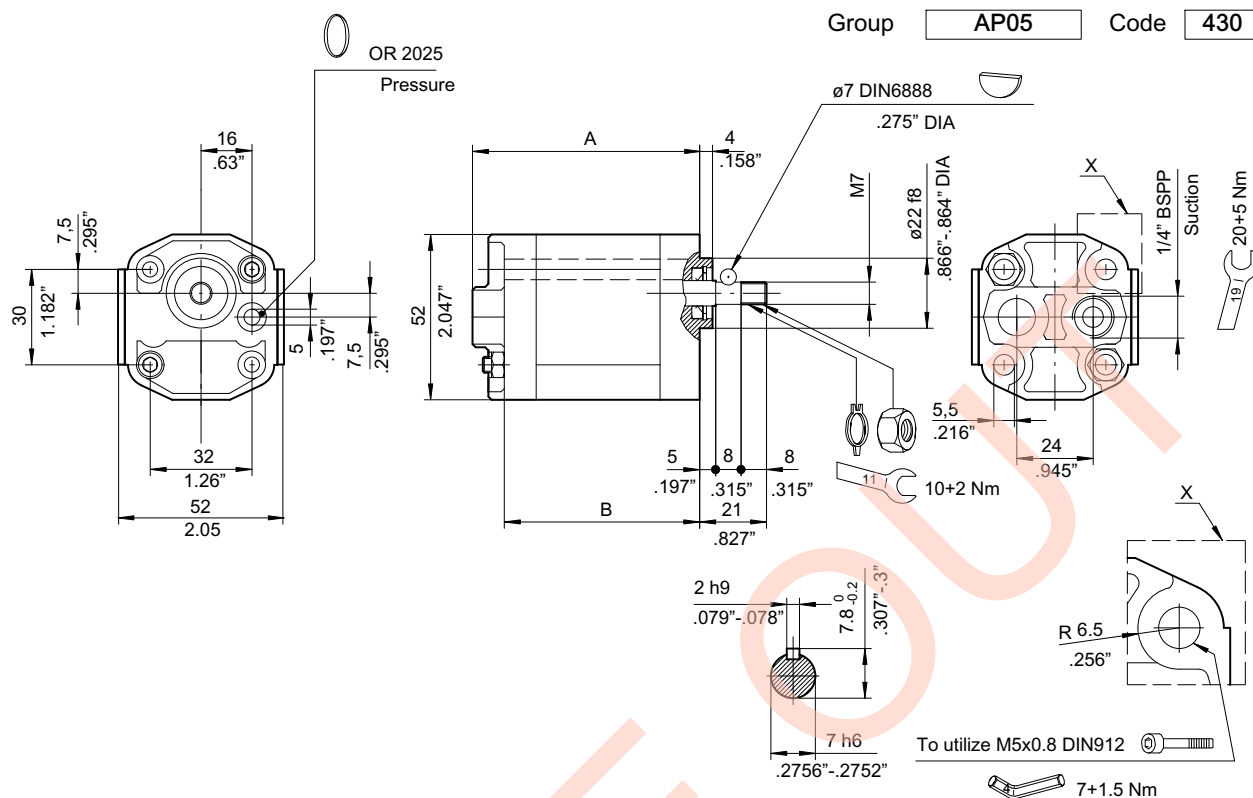
Code

339



Type	Displacement cm ³ /rev	Dimensions			
		A		B	
		mm	inch.	mm	inch.
AP05/0.25	0.25	64.5	2.54	53.5	2.11
AP05/0.5	0.5	67	2.64	56	2.20
AP05/0.75	0.75	69	2.72	58	2.28
AP05/0.9	0.9	70.5	2.77	59.5	2.34
AP05/1.2	1.2	73	2.87	62	2.44
AP05/1.6	1.6	77	3.03	66	2.60

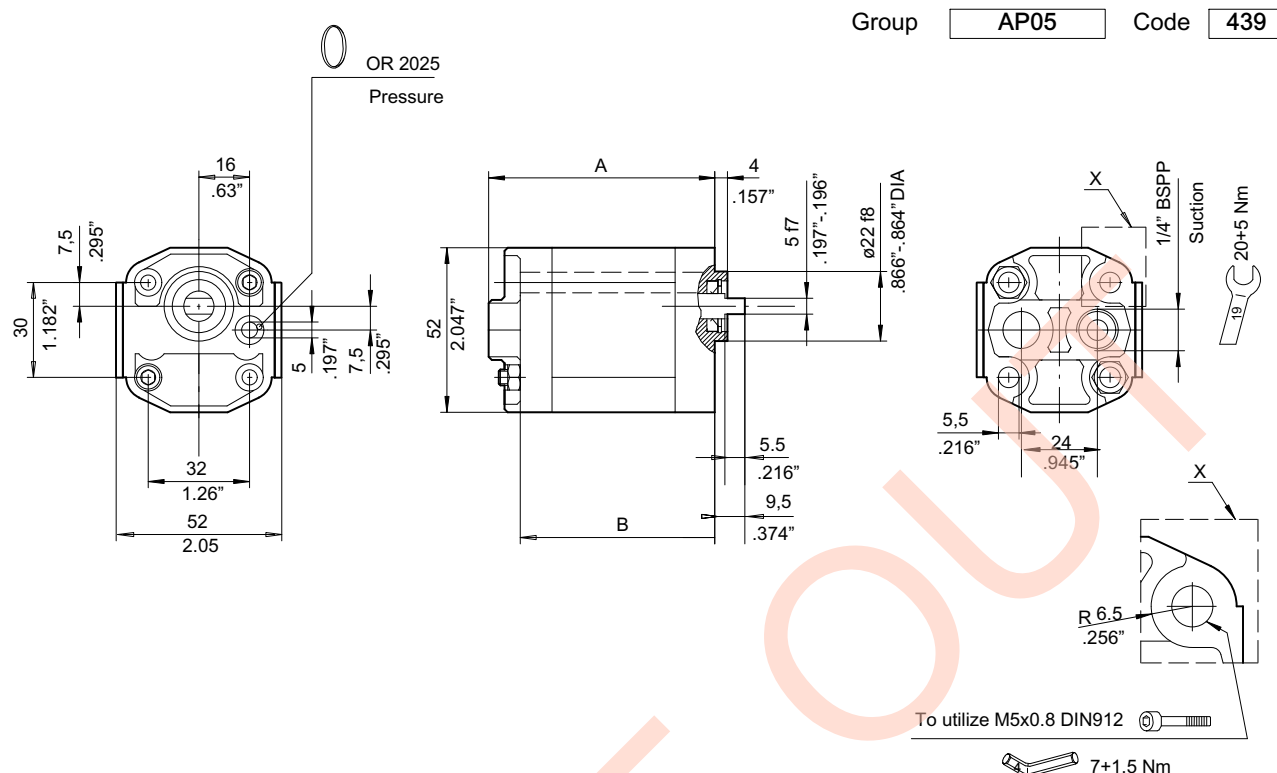
Clockwise rotation: D		Counter-clockwise rotation: S	
Type	Order Code	Type	Order Code
AP05/0.25 D 339	200100234201	AP05/0.25 S 339	200100234303
AP05/0.5 D 339	200100334203	AP05/0.5 S 339	200100334303
AP05/0.75 D 339	200100434202	AP05/0.75 S 339	200100434302
AP05/0.9 D 339	200100534203	AP05/0.9 S 339	200100534303
AP05/1.2 D 339	200100634203	AP05/1.2 S 339	200100634303
AP05/1.6 D 339	200100834202	AP05/1.6 S 339	200100834302



The drawing shows a pump with clockwise rotation.

Type	Displacement cm ³ /rev	Dimensions			
		A	B		
		mm	inch.	mm	inch.
AP05/0.25 D	0.25	64.5	2.54	53.5	2.11
AP05/0.5 D	0.5	67	2.64	56	2.20
AP05/0.75 D	0.75	69	2.72	58	2.28
AP05/0.9 D	0.9	70.5	2.77	59.5	2.34
AP05/1.2 D	1.2	73	2.87	62	2.44

Clockwise rotation: D		Counter-clockwise rotation: S	
Type	Order Code	Type	Order Code
AP05/0.25 D 430	200100231201	AP05/0.25 S 430	
AP05/0.5 D 430	200100331201	AP05/0.5 S 430	
AP05/0.75 D 430		AP05/0.75 S 430	
AP05/0.9 D 430		AP05/0.9 S 430	
AP05/1.2 D 430		AP05/1.2 S 430	



The drawing shows a pump with clockwise rotation.

Type	Displacement cm ³ /rev	Dimensions			
		A		B	
		mm	inch.	mm	inch.
AP05/0.25 D	0.25	64.5	2.54	53.5	2.11
AP05/0.5 D	0.5	67	2.64	56	2.20
AP05/0.75 D	0.75	69	2.72	58	2.28
AP05/0.9 D	0.9	70.5	2.77	59.5	2.34
AP05/1.2 D	1.2	73	2.87	62	2.44
AP05/1.6 D	1.6	77	3.03	66	2.60

Clockwise rotation: D		Counter-clockwise rotation: S	
Type	Order Code	Type	Order Code
AP05/0.25 D 439	200100234202	AP05/0.25 S 439	200100234302
AP05/0.5 D 439	200100334202	AP05/0.5 S 439	200100334302
AP05/0.75 D 439	200100434204	AP05/0.75 S 439	200100434303
AP05/0.9 D 439	200100534202	AP05/0.9 S 439	
AP05/1.2 D 439	200100634202	AP05/1.2 S 439	200100634305
AP05/1.6 D 439		AP05/1.6 S 439	

3.1 Pumps seal kit NBR standard type

AP05	
Pump code	Seal kit
AP05/810	200974000180
AP05/819	
AP05/310	
AP05/319	
AP05/830	
AP05/839	

AP05/839	200974000180
AP05/330	
AP05/339	
AP05/410	200974000280
AP05/419	
AP05/430	
AP05/439	

4 Composition of product code

4.1 Single pumps

Type	Rotation	Code
AP05/**	*	****
APR05/**	*	****

Examples

AP05/0.75 D 819

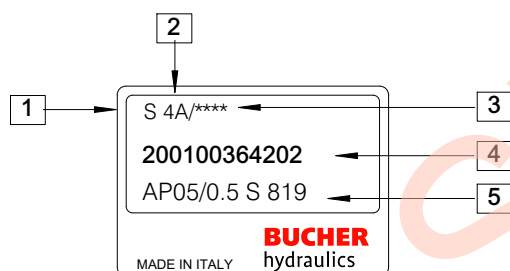
APR05/0.5 810

Order Code

200100464202

200100361101

4.2 Product identification plate



1 : Rotation (D= Clockwise rotation - S= Counterclockwise rotation)

2 : Manufacturing year and month

3 : Progressive identification no. (optional)

4 : Bucher Hydraulics S.p.A. product code

5 : Description

4.3 Single pump weight

AP-APR05	
Pump	Weight Kg
AP-APR05/0.25	0.45
AP-APR05/0.5	0.45
AP-APR05/0.75	0.45
AP-APR05/0.9	0.48
AP-APR05/1.2	0.50
AP-APR05/1.6	0.50

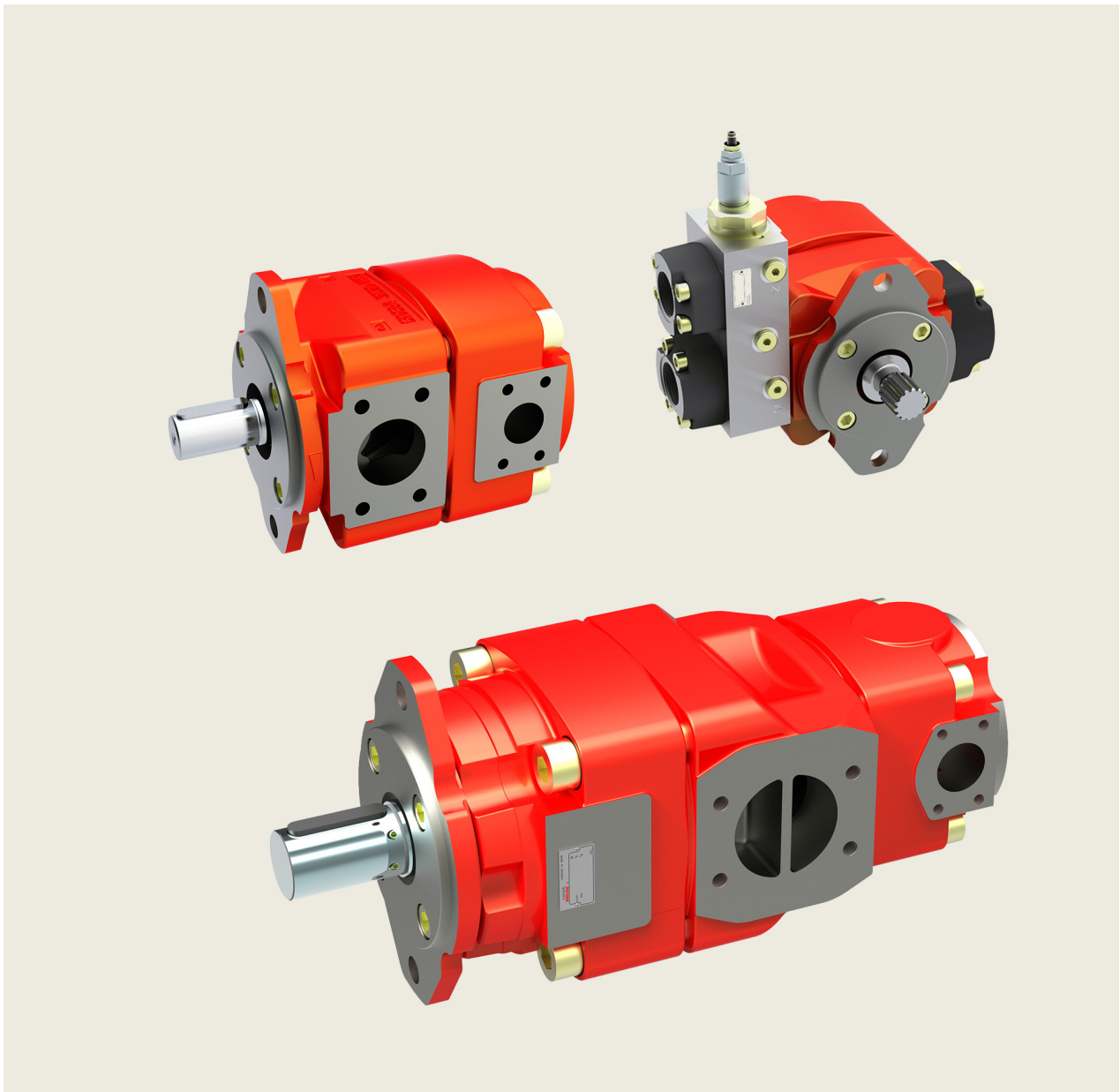
N.B.: The weight refers to pumps with version code 810 (AP05)

Limited weight variations are possible for pumps having a different code.

Manufacturing month	Manufacturing year					
	2014	2015	2016	2017	2018	2019
January	4A	5A	6A	7A	8M	9M
February	4B	5B	6B	7B	8N	9N
March	4C	5C	6C	7C	8P	9P
April	4D	5D	6D	7D	8Q	9Q
May	4E	5E	6E	7E	8R	9R
June	4F	5F	6F	7F	8S	9S
July	4G	5G	6G	7G	8T	9T
August	4H	5H	6H	7H	8U	9U
September	4I	5I	6I	7I	8V	9V
October	4J	5J	6J	7J	8Z	9Z
November	4K	5K	6K	7K	8X	9X
December	4L	5L	6L	7L	8Y	9Y

Internal Gear Pumps

Series QX



1	General	5
1.1	Product description	5
1.2	Advantages	5
1.3	ATEX compliant explosion protection	5
2	Technical data	5
2.1	General (deviating values according manufacturer's specification)	5
2.2	Main characteristics for pressure range 1	6
2.3	Main characteristics for pressure range 2	7
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1 General

1.1 Product description

The QX pumps are the 5th generation of Bucher internal gear pumps, which have proven themselves in thirty years of service around the world. Numerous improvements have been made to the straightforward and robust design.

Advances in the manufacturing process have made it possible without making higher demands on individual components to build pumps that are considerably lighter and more compact.

A new tooth profile, conceived and optimised with the help of CAE, has yielded another significant reduction in noise levels. Large sealing areas result in higher efficiencies.

The internal ring gear is supported by a hydrodynamic / hydrostatic lubrication film, which allows operation at low viscosities or low and high speeds. QX pumps are therefore suitable for use with variable speed drives, where they can provide variable flow rates.

1.3 ATEX compliant explosion protection

The internal gear pumps QX are suitable for application in hazardous areas and complies with the following guidelines:

ATEX directive 2014/34/EU
group II
equipment category 3
atmosphere G
temperature class T3 and T4

1.2 Advantages

- extremely long service life
- volumetric efficiency up to 98%
- suitable for use with variable speed drivers
- can be used with fire resistant fluids (HFB, HFC and HFD = QXV), fuels, biodegradable and low-viscosity fluids
- certifications by ATEX 2, ABS, DNV, GL, LR, NK, ...
- low flow and pressure pulsations



II 3 G EEx c II T4
-20°C ≤ Ta ≤ +40°C



II 3 G EEx c II T3
-20°C ≤ Ta ≤ +80°C

2 Technical data

2.1 General (deviating values according manufacturer's specification)

General characteristics	Unit	Description, value
Installation attitude		unrestricted
Mounting method (standard)		oval 2-hole flange to ISO 3019/1 (SAE): QX 3-6 oval 2-hole flange to ISO 3019/2 (metric) QX 2+8
Direction of rotation		CW or CCW
Pump drive method		in-line, through a flexible coupling
Volumetric efficiency η_v		up to 98%
Fluids		HLP mineral oils to DIN 51524, Part, HFC fluids to VDMA 24317
Maximum admissible level of contamination of the hydraulic fluid		ISO 4406 code 20/18/15 (see section 9)
Operating viscosity	mm ² /s	10 ... 100 *
Starting viscosity		10 ... 300 * *other values on request
Fluid temperature range	°C	HLP-mineral oils -20 min. / +80 max. / HFC +50 max. range for max. long life cycle +30 ... +60 (considering viscosity field)
Inlet pressure maximum minimum	bar	1.5 absolute (without external drain connection) 0.5 ... 0.98 absolute (dependent on pump frame size and speed, see example in section 3.3.2)
Startup against pressure	bar	max. 20 (other values on request)
Seal material		NBR = standard, FKM (Viton) = option 09

IMPORTANT: The main characteristics are valid for hydraulic oils DIN 51524 with a viscosity of 20 ... 50mm²/s.
The operating pressure at the pump outlet side is specified also for fire-resistant fluids (HFC).

2.2 Main characteristics for pressure range 1

Displacement	Flow rate	Maximum speed	Code	Max. operating pressure at the pump outlet side				Torque	Power consumption
effective	1450 min ⁻¹ p = 0 bar			continuous [bar]		intermittent [bar] ²⁾			
[cm ³ /U] ¹⁾ [cm ³ /rev] ¹⁾	[l/min]	[rpm]		Mineral oil	HFC	Mineral oil	HFC	[Nm] ³⁾	[kW] ⁴⁾
10,3	14,9	3600	QX21-010	160	130	210	180	26	4,0
12,6	18,3	3600	QX21-012	125	100	160	135	25	3,8
15,9	23,0	3600	QX21-016	100	80	125	100	25	3,9
20,0	29,0	3000	QX31-020	160	130	210	180	51	7,7
25,3	36,7	3000	QX31-025	125	100	160	135	50	7,7
31,2	45,2	3000	QX31-032	100	80	125	100	50	7,5
40,7	59,0	3000	QX41-040	160	130	210	180	104	15,7
50,3	72,9	2600	QX41-050	125	100	160	135	100	15,2
64,7	93,8	2300	QX41-063	100	80	125	100	103	15,6
78,6	114	2300	QX51-080	160	130	210	180	200	30,4
101,1	146	2100	QX51-100	125	100	160	135	201	30,5
127,3	184	1800 ⁵⁾	QX51-125	100	80	125	100	203	30,8
160,5	232	1800 ⁶⁾	QX61-160	160	130	210	180	409	62,0
202,1	293	1800 ⁶⁾	QX61-200	125	100	160	135	402	61,0
249,7	362	1800 ⁶⁾	QX61-250	100	80	125	100	397	60,4
326,0	472	1750 ⁶⁾	QX81-315	160	130	210	180	830	126,0
402,6	583	1750 ⁶⁾	QX81-400	125	100	160	135	801	121,6
498,5	722	1500 ⁶⁾	QX81-500	100	80	125	100	793	120,5

1) Due to manufacturing tolerances, there may be slight variations in the displacement.

2) max. 20 second and not more than 10% of the duty cycle

3) theoretical value at the max. permitted continuous pressure for mineral oil

4) theoretical value at the max. permitted continuous pressures for mineral oil at n = 1450 rpm

5) for speeds > 1450 rpm, the min. permissible inlet pressure is 0.95 bar absolute. For HFC application a second suction port may be required

6) max. speed only possible with a second suction port, see section 2.2.1.

2.2.1 Suction arrangements for pump types QX61 and QX81

IMPORTANT: Minimum inlet pressure is 0.95 bar absolute with viscosity 10 ... 100 mm²/s
(other values on request).

Type	Speed 1500 rpm Suction height		Speed 1800 rpm Suction height	
	up to 150 mm	over 150 mm	up to 150 mm	over 150 mm
QX61-160	I	I	I	II
QX61-200	I	I	I	II
QX61-250	I	II	II	II
QX81-315	I	II	II	II
QX81-400	II	II	II	-
QX81-500	II	II	-	-

I = standard pump with one suction port

II = model with two suction ports

All pump types coded II can be used without the second suction port up to 1200 rpm

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تهران، کیلومتر ۲۱ بزرگراه لشگری (جاده مخصوص کرج)

روبروی پالایشگاه نفت پارس، پلاک ۱۲

2.3 Main characteristics for pressure range 2

Displacement	Flow rate	Maximum speed	Code	Max. operating pressure at the pump outlet side				Torque	Power consumption
effective	1450 min ⁻¹ p = 0 bar			continuous [bar]		intermittent [bar] ²⁾			
[cm ³ /rev] ¹⁾	[l/min]	[rpm]		Mineral oil	HFC	Mineral oil	HFC	[Nm] ³⁾	[kW] ⁴⁾
5,1 6,3 8,0	7,4 9,1 11,5	3600	QX22-005 QX22-006 QX22-008	210	180	250	210	17 21 27	2,6 3,2 4,0
10,0 12,6 15,6	14,5 18,3 22,6	3400	QX32-010 QX32-012 QX32-016	210	180	250	210	34 42 52	5,1 6,4 7,9
20,4 25,1 32,4	29,5 36,4 46,8	3200	QX42-020 QX42-025 QX42-032	210	180	250	210	68 84 108	10,4 12,7 16,5
39,3 50,6 63,7	56,9 73,2 92,1	2800	QX52-040 QX52-050 QX52-063	210	180	250	210	132 170 213	19,9 25,7 32,3
80,2 101,0 124,8	116 146 181	2500 ⁵⁾ 2300 ⁵⁾ 2000 ⁵⁾	QX62-080 QX62-100 QX62-125	210	180	250	210	268 338 417	40,7 51,2 63,4
163,0 201,3 249,2	236 291 361	1800 ⁵⁾ 1750 ⁵⁾ 1500 ⁵⁾	QX82-160 QX82-200 QX82-250	210	180	250	210	544 672 833	82,7 102,1 126,5

2.4 Main characteristics for pressure range 3

Displacement	Flow rate	Maximum speed	Code	Max. operating pressure at the pump outlet side				Torque	Power consumption
effective	1450 min ⁻¹ p = 0 bar			continuous [bar]		Intermittent [bar] ²⁾			
[cm ³ /rev] ¹⁾	[l/min]	[rpm]		Mineral oil	HFC	Mineral oil	HFC	[Nm] ³⁾	[kW] ⁴⁾
5,1 6,3 8,0	7,4 9,1 11,5	3600	QX23-005 QX23-006 QX23-008	320	280	400	350	26 32 41	4,0 4,9 6,2
10,0 12,6 15,6	14,5 18,3 22,6	3400	QX33-010 QX33-012 QX33-016	320	280	400	350	51 64 80	7,7 9,7 12,1
20,4 25,1 32,4	29,5 36,4 46,8	3200	QX43-020 QX43-025 QX43-032	320	280	400	350	104 128 165	15,8 19,4 25,0
39,3 50,6 63,7	56,9 73,2 92,1	2800	QX53-040 QX53-050 QX53-063	320	280	400	350	200 258 321	30,4 39,1 49,3
80,2 101,0 124,8	116 146 181	2500 ⁵⁾ 2300 ⁵⁾ 2000 ⁵⁾	QX63-080 QX63-100 QX63-125	320	280	400	350	409 514 636	62,0 78,1 96,5
163,0 201,3 249,2	236 291 361	1800 ⁵⁾ 1750 ⁵⁾ 1500 ⁵⁾	QX83-160 QX83-200 QX83-250	320	280	400	350	830 1025 1270	126,0 155,7 192,7

1) Due to manufacturing tolerances, there may be slight variations in the displacement.

2) max. 20 second and not more than 10% of the duty cycle

3) theoretical value at the max. permitted continuous pressure for mineral oil

4) theoretical value at the max. permitted continuous pressures for mineral oil at n = 1450 rpm

5) for speeds > 1450 rpm, the min. permissible inlet pressure is 0.95 bar absolute. For HFC application a second suction port may be required

2.5 Main characteristics for pressure range 4

Displacement	Flow rate	Maximum speed	Code	Max. operating pressure at the pump outlet side				Torque	Power consumption
effective	1450 min ⁻¹ p = 0 bar			continuous [bar]		Intermittent [bar] ²⁾			
[cm ³ /rev] ¹⁾	[l/min]	[rpm]		Mineral oil	HFC	Mineral oil	HFC	[Nm] ³⁾	[kW] ⁴⁾
3,3 4,2	4,8 6,2	3600	QX24-003 QX24-004	320	280	400	350	17 21	2,6 3,2
5,1 6,3 8,0	7,4 9,1 11,5	3600	QX24-005 QX24-006 QX24-008	360	320	400	350	29 36 46	4,4 5,5 7,0
10,0 12,6 15,6	14,5 18,3 22,6	3600	QX34-010 QX34-012 QX34-016	360	320	400	350	57 72 89	8,7 11,0 13,6
20,4 25,1 32,4	29,5 36,4 46,8	3600	QX44-020 QX44-025 QX44-032	360	320	400	350	117 144 186	17,7 21,8 28,2
39,3 50,6 63,7	56,9 73,2 92,1	3000	QX54-040 QX54-050 QX54-063	340	280	400	350	213 274 345	32,3 41,6 52,3
80,2 101,0 124,8	116 146 181	2500 ⁵⁾ 2300 ⁵⁾ 2000 ⁵⁾	QX64-080 QX64-100 QX64-125	330	280	400	350	421 530 655	64,0 80,5 99,5
163,0 201,3 249,2	236 291 361	1800 ⁵⁾ 1750 ⁵⁾ 1500 ⁵⁾	QX84-160 QX84-200 QX84-250	330	280	400	350	856 1057 1309	130,0 160,5 198,7

1) Due to manufacturing tolerances, there may be slight variations in the displacement.

2) max. 20 second and not more than 10% of the duty cycle

3) theoretical value at the max. permitted continuous pressure for mineral oil

4) theoretical value at the max. permitted continuous pressures for mineral oil at n = 1450 rpm

5) for speeds > 1450 rpm, the min. permissible inlet pressure is 0.95 bar absolute.

3 Performance graphs

IMPORTANT: The performance graphs shown are valid for the specified pump models.
For other pump sizes, contact Bucher Hydraulics GmbH.

3.1 Noise level (L_p)

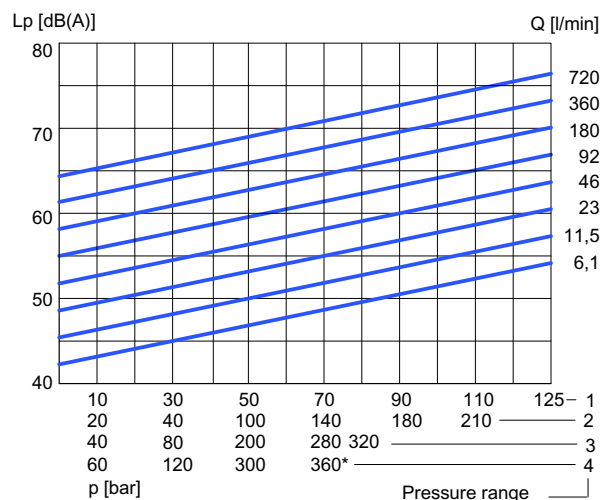
measured to DIN 45635, Part 26, in Stuttgart University's low-echo noise

measurement chamber:

measurement distance 1 m

speed n = 1500 rpm

viscosity = 42 mm²/s



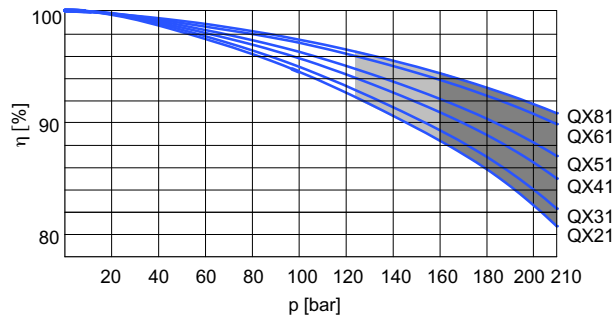
*Max. continuous operating pressure for pressure range 4 see section 2.5

3.2 Efficiency (η)

measured at speed 1450 rpm, viscosity 42 mm²/s

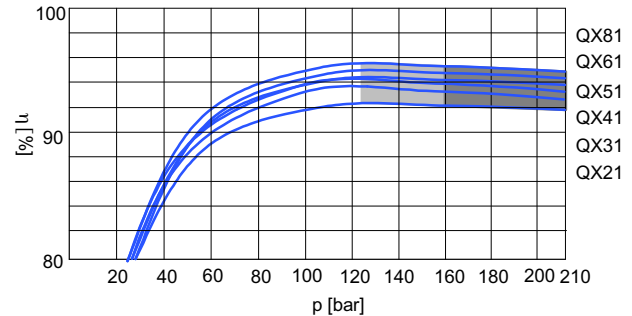
3.2.1 Pressure range 1

3.2.1.1 Volumetric efficiency



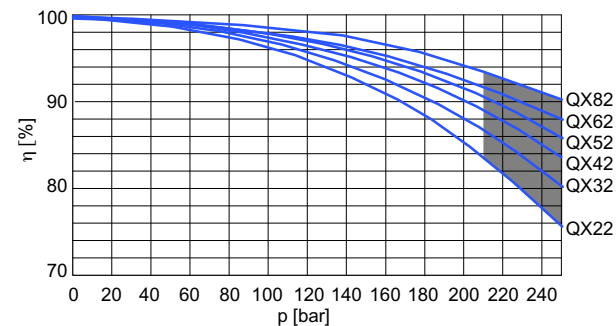
intermittent operating pressure as a function of displacement (see section 2.2)

3.2.1.2 Hydromechanical efficiency



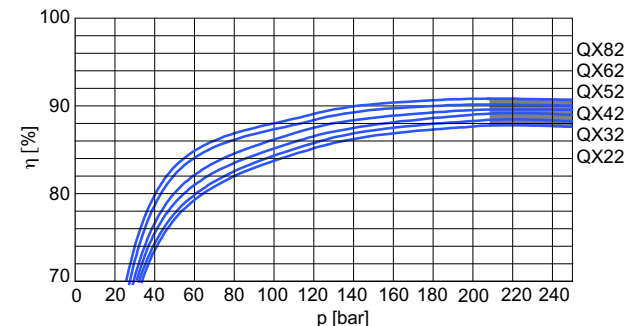
3.2.2 Pressure range 2

3.2.2.1 Volumetric efficiency



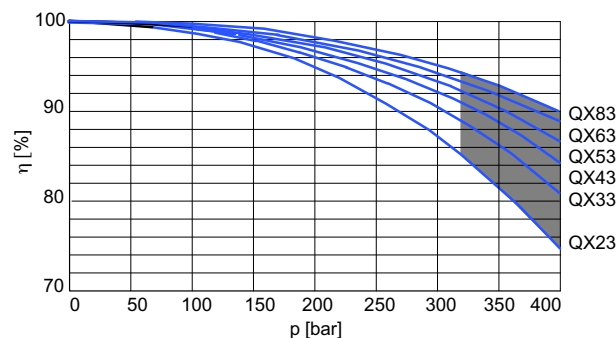
intermittent operating pressure

3.2.2.2 Hydromechanical efficiency



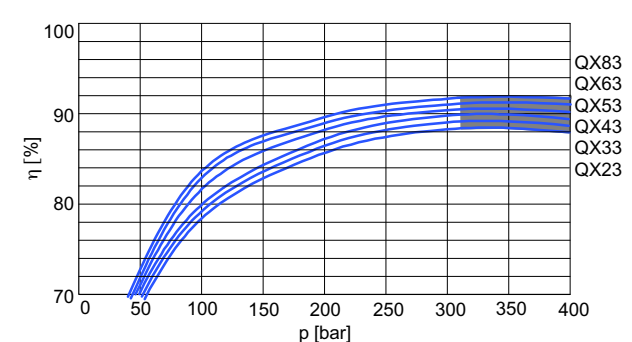
3.2.3 Pressure range 3

3.2.3.1 Volumetric efficiency



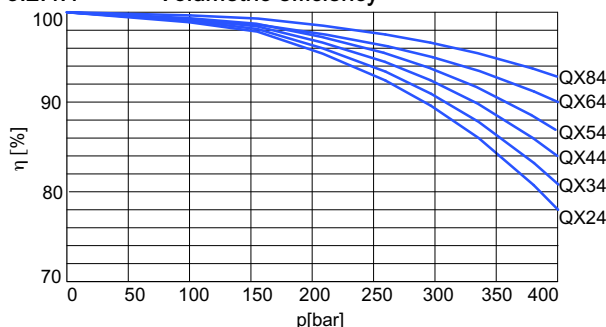
intermittent operating pressure

3.2.3.2 Hydromechanical efficiency

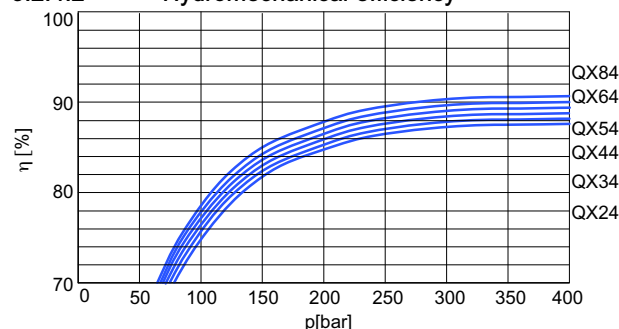


3.2.4 Pressure range 4

3.2.4.1 Volumetric efficiency



3.2.4.2 Hydromechanical efficiency

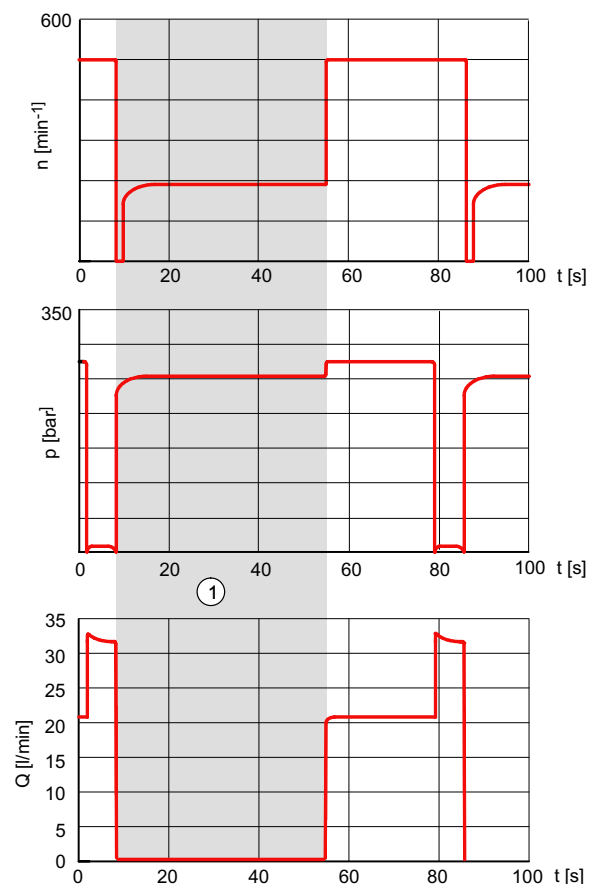


3.3 Operation with variable-speed drives

IMPORTANT: The following main characteristics are to be understood as examples only. They are valid only for the specified pump models and parameters. We would be very happy to advise you on the layout of your drive. QX pumps with variable-speed drive all contain an external drain port.

3.3.1 Typical loading cycle for a QX pump with variable-speed drive

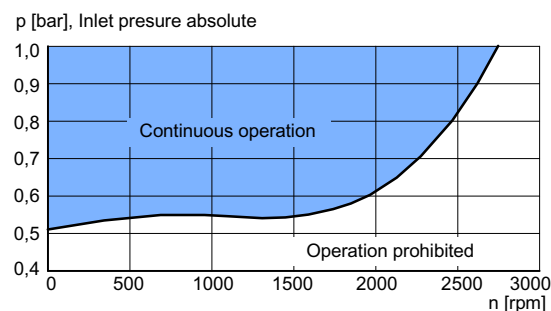
Pump QX53-063 with viscosity 20 mm²/s



1 pressure-holding operation
Q = 0 l/min for up to 60 s

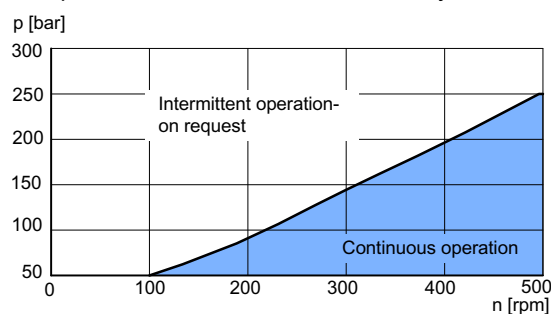
3.3.2 Minimum pressure at suction port as a function of speed

Pump QX53-063 measured: with viscosity 42 mm²/s



3.3.3 Minimum speed as a function of pressure

Pump QX53-063 measured with viscosity 42 mm²/s



4 Single pumps

4.1 Dimensions frame size 2 - 4

Frame size		2				3				4			
Pressure range		1	2	3	4 ⁵⁾	1	2	3	4	1	2	3	4
Suction port: to SAE J518 ¹⁾	S	G1“ ³⁾ thread				G1 ¼” ³⁾ thread				1½”			
Pressure port: to SAE J518 ¹⁾	P	G ½” ³⁾ ⁴⁾ thread				G ¾” ³⁾ ⁴⁾ thread				1”			
External drain port (option 06) pressure range 1-3 optional pressure range 4 standard		G ¼”				G ¼”				G ¼“			
Mounting: oval 2-hole flange to ISO 3019/1 (SAE) ISO 3019/2 (metric)	A	118				132				170			
	B (SAE)	-				106				146			
	B (Metr.)	100				109				140			
	C	9				11				14			
	N (SAE)	-				82,55 _{-0,05}				101,6 _{-0,05}			
	N (Metr.)	63 h8				80 h8				100 h8			
	O	8,5				8,5				10,5			
	V	6				6				7			
4-hole flange ISO 3019/2	X (Metr.)	9				9				12			
	Y (Metr.)	85				103				125			
Shaft end: parallel, to ISO/R775 ²⁾	D	20 j6				25 j6				32 j6			
	E	36				42				58			
	F	6				8				10			
	G	22,5				28				35			
	I	45				50				68			
Housing	K	38			37,5	44				52			52,5
	L	136	118	153	192	164	144	189	232,5	202	176	232	286
	M	-	55	90	125	-	70	114	159,5	-	87	143	199
	T1	43				54			53,5	67			
	T2	43				54	60			67	70		
	Z	100				120				125			
	W	80				100				136			
Weight	kg	6	6	7	8	10	10	13	15	20	18	22	27

1) Pipe flange dimensions, SAE J518 code 61 / ISO 6162-1.

- high pressure type up to 420 bar (see section 12.2)
- low pressure type for up to 16 bar (see section 12.3)

2) For other shaft ends, contact Bucher Hydraulics GmbH.

3) Threaded port to DIN 3852, Part 2.

4) Pressure port to SAE J518 code 61 / ISO 6162-1 can be supplied for pressure ranges 2 + 3.

5) The dimensions are not valid for low-flow capability pumps (3,3 cm³/U and 4,2 cm³/U, see chapter 4.7).

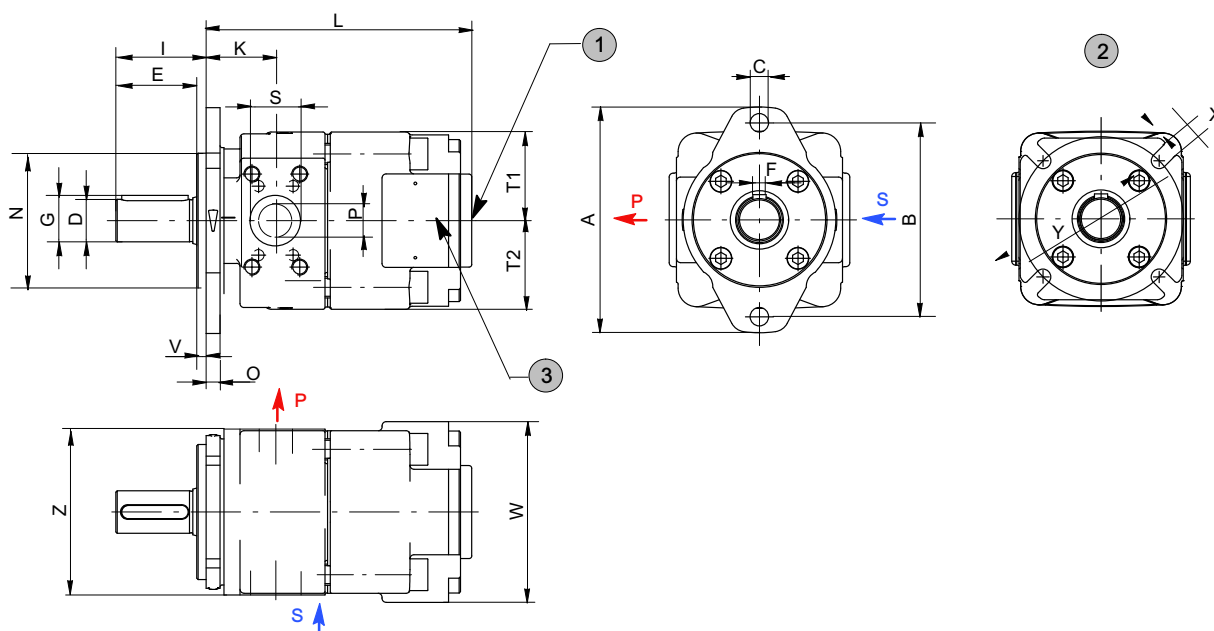
4.2 Dimensions frame size 5 - 8

Frame size		5				6				8			
Pressure range		1	2	3	4	1	2	3	4	1	2	3	4
Suction port: to SAE J518 ¹⁾	S	2"				2½"				3"			
Pressure port: to SAE J518 ¹⁾	P	1¼"				1½"				2"			
External drain port (option 06) pressure range 1-3 optional pressure range 4 standard	①	G ¼"				G ⅜"				G ½"			
Mounting: oval 2-hole flange to ISO 3019/1 (SAE) ISO 3019/2 (metric)	A	212				267				330			
	B (SAE)	181				229				-			
	B (Metr.)	180				224				280			
Mounting: oval 2-hole flange to ISO 3019/1 (SAE) ISO 3019/2 (metric)	C	18				22				26			
	N (SAE)	127 -0,05				152,4 -0,05				-			
	N (Metr.)	125 h8				160 h8				200 h8			
	O	12,5				16,5				20			
	V	7				7				9			
4-hole flange ISO 3019/2	X (Metr.)	14				18				22			
	Y (Metr.)	160				200				250			
Shaft end: parallel, to ISO/R775 ²⁾	D	40 j6				50 j6				63 j6			
	E	82				82				105			
	F	12				14				18			
	G	43				53,5				67			
	I	92				92				117			
Housing	K	60			60,5	74				90			
	L	242	210	280	349	288	248	338	429	361	331	446	446
	M	-	102	172	242	-	119	209	299	-	151	266	266
	T1	89				107	110			137	138		
	T2	89				107	110			137	138		
	Z	156				195	197			250			
	W	165				203				256			
Weight	kg	36	32	41	50	64	57	77	90	130	118	160	200

1) Pipe flange dimensions, SAE J518 code 61 / ISO 6162-1.
 - high pressure type up to 420 bar (see section 12.2)
 - low pressure type for up to 16 bar (see section 12.3)

2) For other shaft ends, contact Bucher Hydraulics GmbH.

4.3 Pressure range 1

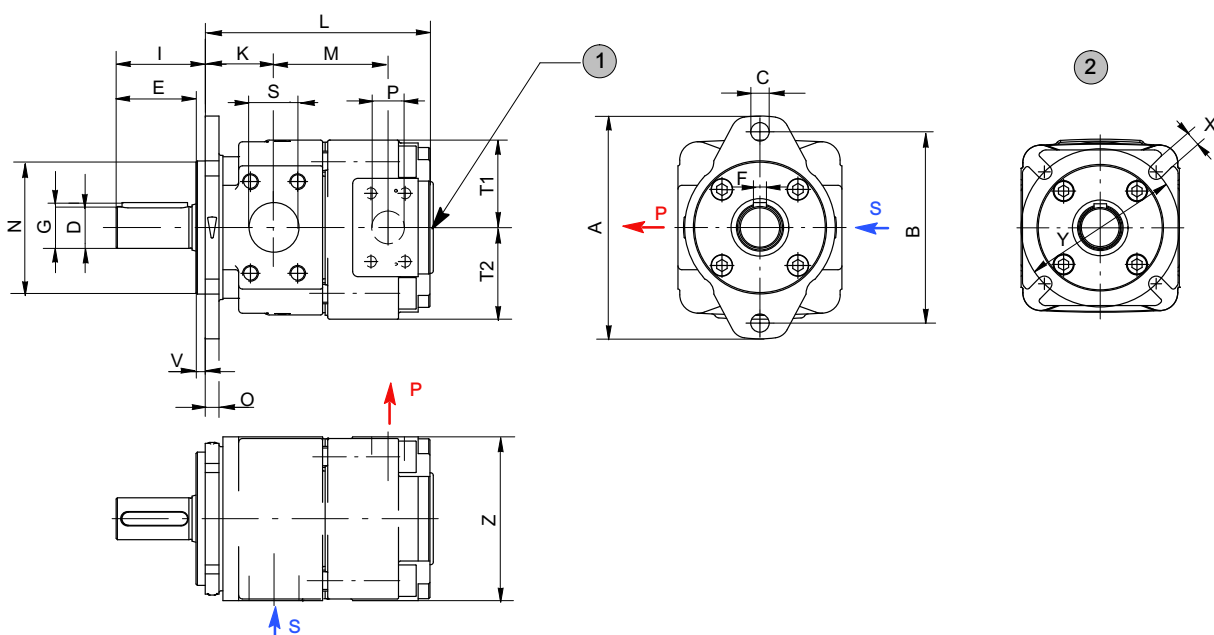


1 option 06 = external drain port

2 option 66 = special model 4-hole flange ISO 3019/2

3 depending on operating conditions, a second suction port may be required on:
QX51=SAE 1 1/4", QX61=SAE 2",
QX81=SAE 2 1/2" - see section 2.2.1

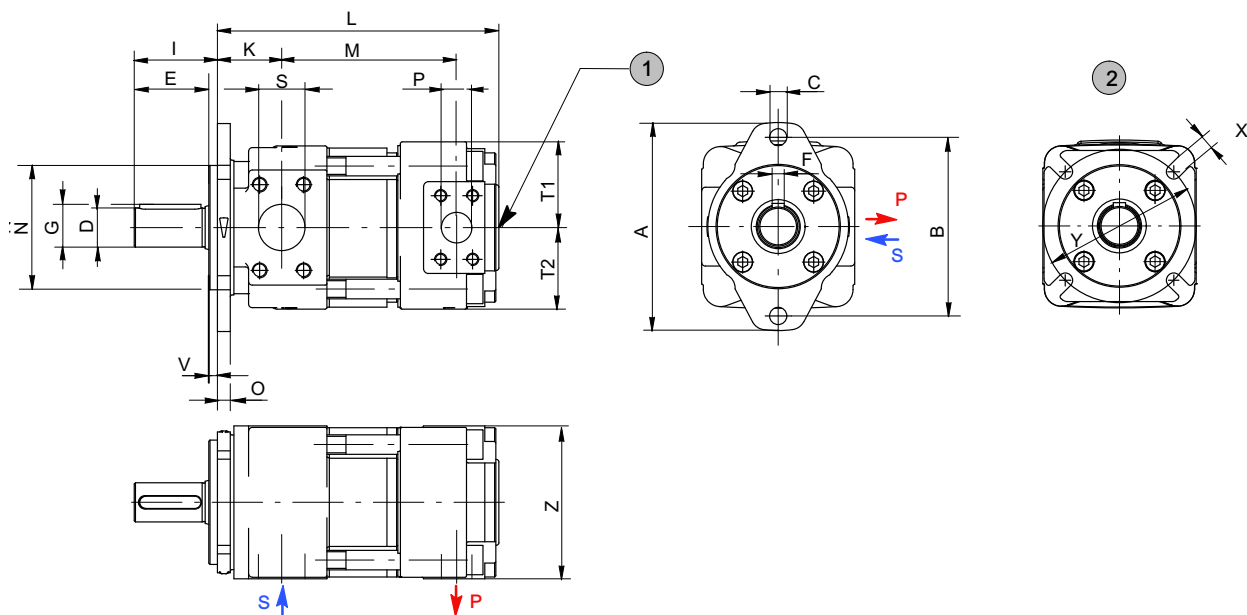
4.4 Pressure range 2



1 option 06 = external drain port

2 option 66 = special model 4-hole flange ISO 3019/2

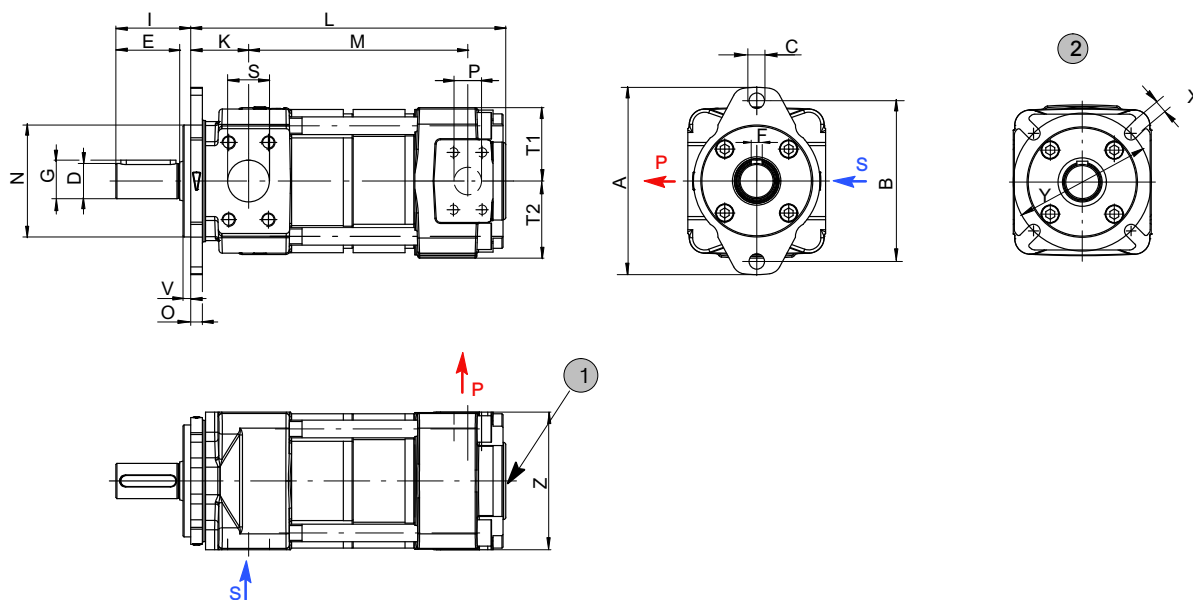
4.5 Pressure range 3



1 external drain port - see special feature 06

2 option 66 = special model 4-hole flange ISO 3019/2

4.6 Pressure range 4

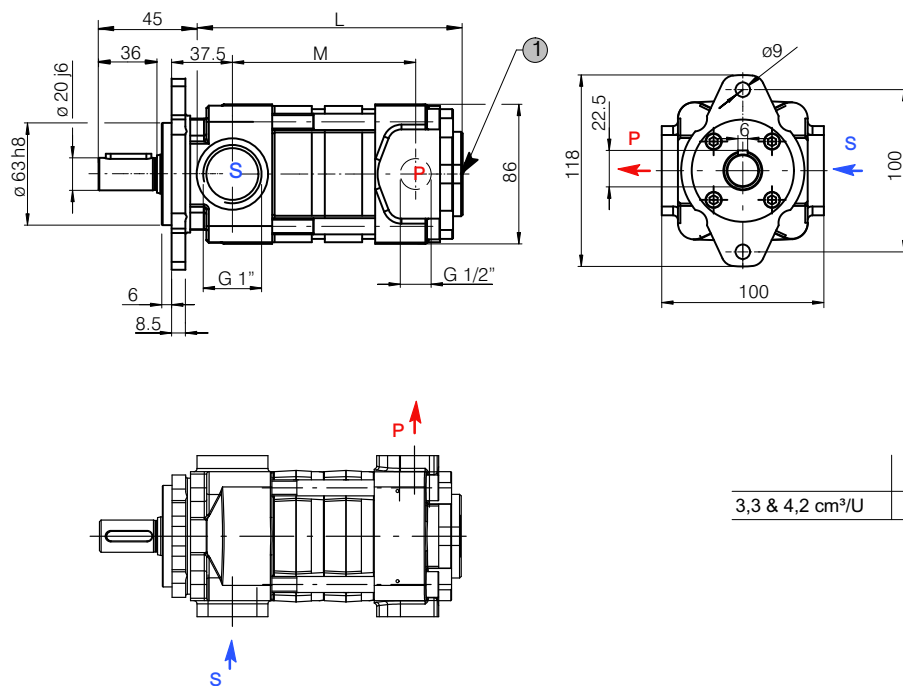


1 external drain port - see special feature 06

2 option 66 = special model 4-hole flange ISO 3019/2

4.7 Pressure range 4 with low-flow capability

QX24 with displacements from 3 and 4 cm³/U.



	L	M
3,3 & 4,2 cm ³ /U	179,5	113

1 external drain port G¹/₄\"

4.8 Ordering code for single pumps

		Q	X	5	3	-	0	4	0	R	*	*
Series	= QX											
Frame size	= 2 / 3 / 4 / 5 / 6 / 8											
Pressure range	= 1 / 2 / 3 / 4											
Displacement [cm³/rev]	= 003 - 500											
Rotation (viewed from shaft end)	right (CW) = R (standard) left (CCW) = L											
Option	see section 4.8.3											

4.8.1 Ordering example:

Required: single pump
Displacement: 40 cm³/rev
Continuous pressure: 300 bar
for use with mineral oil

Ordering code: QX53-040R

4.8.2 Standard configuration

- direction of rotation - right (CW)
- 2-hole mounting flange to ISO 3019/1 (SAE):
sizes QX 3-6
- 2-hole mounting flange to ISO 3019/2 (metr.):
sizes QX 2+8
- Nitrile seals
- cylindrical shaft end to ISO R775
- black priming, flange without priming

4.8.3 Option

-O = without priming

06 = external drain port in the pump rear cover

QX 2-5 = G 1/4"

QX 6 = G $\frac{3}{8}$ "

QX 8 = G 1/2"

09 = FKM (Viton) seals and without priming

12 = 2-hole mounting flange to ISO 3019/2 (metric):
size QX 3-6

29 = for HFB and HFC fluids, frame sizes 2-5,
without priming

66 = 4-hole mounting flange to ISO 3019/2 (metric)

83 = second suction port on:

QX51 = SAE 1 1/4"

QX61 = SAE 2"

QX81 = SAE 2½"

86 = for HFB and HFC fluids, frame sizes 6+8,
without priming

117 = pressure port to SAE J518 code 61 / ISO 6162-1
can be supplied for frame size 2+3 with pressure
ranges 2+3

Further options on request.

5 Double pumps

QX double pumps consist of two single pumps mounted on a common drive shaft. Hydraulically, the two pumps operate independently of one another but they share a common suction port in the pump's centre section. The larger pump of the combination is situated at the shaft end (the drive side) and is referred to as pump 1. With equal frame sizes, the pump with the larger displacement is situated at the drive side.

Double pumps can be combined as shown in the following table. If a letter is shown at the intersection point of the two pumps, the letter identifies the page in section 5.2 that contains the relevant dimensional drawing. If there is no letter at the intersection point, then that pump combination is not possible.

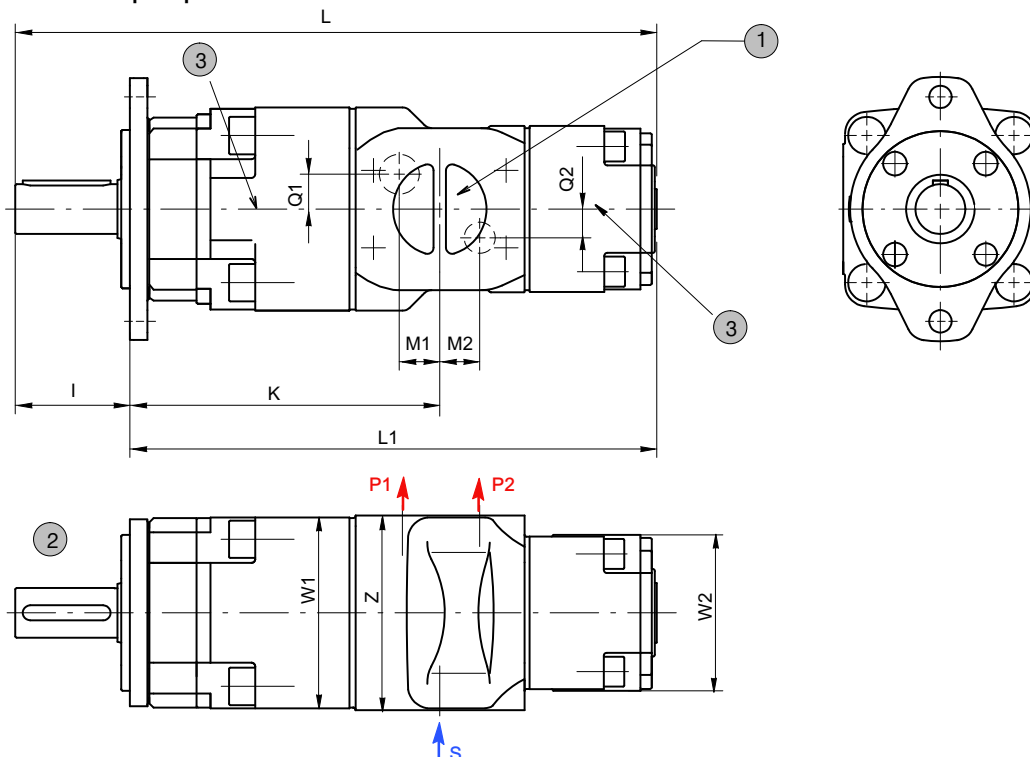
IMPORTANT: Double pumps with pressure range 4 on request.

5.1 Selection table

			Pump 2																				Maximum permissible torque [Nm] drive side
			Displacement [cm³/rev]																				
			5/6/8		10/12/16		20/25/32		40/50/63		80/100/125		160/200/250		315 400 500								
			Maximum pressure [bar]																				
			250	400	125 160 210	250	400	125 160 210	250	400	125 160 210	250	400	125 160 210	250	400	125 160 210	250	400	125 160 210			
			QX22..	QX23..	QX21...	QX32...	QX33...	QX31...	QX42...	QX43...	QX41...	QX52...	QX53...	QX51...	QX62...	QX63...	QX61...	QX82...	QX83...	QX81...			
Pump 1	5/6/8	250	QX22..	E																	65		
		400	QX23..	H	I																		
	10/12/16	125/160 210	QX21..	B	C	A															130		
		250	QX32..	E	F	D	E																
	20/25/32	400	QX33..	H	I	G	H	I													260		
		125/160 210	QX31..	B	C	A	B	C	A														
	40/50/63	250	QX42..	E	F	D	E	F	D	E											520		
		400	QX43..	H	I	G	H	I	G	H	I												
	80/100/125	125/160 210	QX41..	B	C	A	B	C	A	B	C	A									1050		
		250	QX52..	E	F	D	E	F	D	E	F	D	E										
	160/200/250	400	QX53..	H	I	G	H	I	G	H	I	G	H	I							2100		
		125/160 210	QX51..	B	C	A	B	C	A	B	C	A	B	C	A								
	315 400 500	250	QX62..				E	F	D	E	F	D	E	F	D	E							
		400	QX63..				H	I	G	H	I	G	H	I	G	H	I						
		125/160 210	QX61..				B	C	A	B	C	A	B	C	A	B	C	A					
		250	QX82..							E	F	D	E	F	D	E	F	D	E				
		400	QX83..							H	I	G	H	I	G	H	I	G	H	I			
		125/160 210	QX81..							B	C	A	B	C	A	B	C	A	B	C		A	

5.2 Dimensions

A Double pumps QX.1/1



1 S = common suction port

2 shaft and mounting dimensions see section 4

3 depending on operating conditions, a second suction port may be required - see section 2.2.1
QX51=SAE 1 1/4", QX61=SAE 2",
QX81=SAE 2 1/2"

Type	L	L1	K	M1	M2	Q1	Q2	I	Z	W1	W2	S	P1	P2
QX21/21	296	251	141	18	18			45	100	80	80	G 1 1/4" 1)	G 1/2" 1) 2)	G 1/2" 1) 2)
QX31/21	343	293		26	30			50	120	100	80	G 1 1/2" 1)	G 3/4" 1) 2)	G 3/4" 1) 2)
QX31/31	358	308	171		26	-	-			100	100			G 1/2" 1) 2)
QX41/21	396	328		19	35	15		68	125	136	80	SAE 2"	SAE 1"	G 3/4" 1) 2)
QX41/31	411	343	201		33	15	15			136	100			SAE 1"
QX41/41	449	381	208	26	26	23	23			136	136			
QX51/21	468	376		23	43	15	-			165	80	SAE 2 1/2"		G 1/2" 1) 2)
QX51/31	483	391	241		39	15	15	92	156	165	100		SAE 1 1/4"	G 3/4" 1) 2)
QX51/41	521	429		30	32	28	23			165	136	SAE 3"		SAE 1"
QX51/51	547	455	249		30	28	28			165	165			SAE 1 1/4"
QX61/31	541	449		24	47	17	14			203	100			G 3/4" 1) 2)
QX61/41	564	472	287	27	39	26	27	92	195	203	136		SAE 1 1/2"	SAE 1"
QX61/51	601	509		32	40	35	28			203	165			SAE 1 1/4"
QX61/61	628	536	292		32	35	35			203	203	SAE 3 1/2"		SAE 1 1/2"
QX81/41	679	562		35	51	25	25			250	136			SAE 1"
QX81/51	705	588			47	30	30	117	250	250	165		SAE 2"	SAE 1 1/4"
QX81/61	732	615	359		45	35	35			250	203			SAE 1 1/2"
QX81/81	774	657		38	38	40	40			256	256	SAE 4"		SAE 2"

1) threaded port to DIN 3852, Part 2

2) pressure port to SAE J518 code 61 / ISO 6162-1 can be supplied for pressure ranges 2+3

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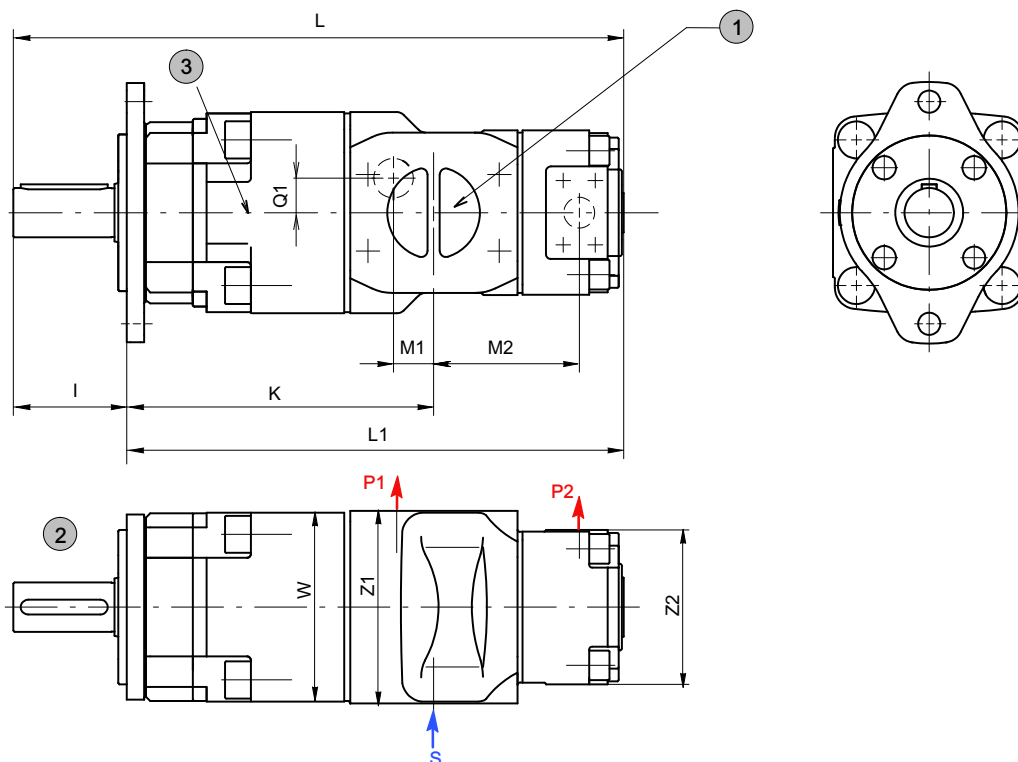
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B Double pumps QX.1/2



1 S = common suction port

2 shaft and mounting dimensions see section 4

3 depending on operating conditions, a second suction port may be required - see section 2.2.1:
QX51=SAE 1 1/4", QX61=SAE 2",
QX81=SAE 2 1/2"

Type	L	L1	K	M1	M2	Q1	I	Z1	Z2	W	S	P1	P2
QX21/22	278	233	141	18	67	-	45	100	100	80	G 1½" 1)	G ½" 1) 2)	G ½" 1) 2)
QX31/22	325	275	171	26	79		50	120		100	G 1½" 1)	G ¾" 1) 2)	
QX31/32	338	288			87								
QX41/22	378	310	201	19	84	15	68	125	100	136	SAE 2"	SAE 1"	G ½" 1) 2)
QX41/32	391	323			92				120				G ¾" 1) 2)
QX41/42	423	355	208	26	111	23	92	156	125	165	SAE 2½"	SAE 1¼"	SAE 1"
QX51/22	450	358	241	23	92	15			100				G ½" 1) 2)
QX51/32	463	371			100				120				G ¾" 1) 2)
QX51/42	495	403	249	30	118	28			125				SAE 1"
QX51/52	515	423			127				156		SAE 1¼"		
QX61/32	521	429	287	24	112	17	92	195	120	203	SAE 3"	SAE 1½"	G ¾" 1) 2)
QX61/42	538	446		27	123	26			125				SAE 1"
QX61/52	569	477	292	32	137	35			156				SAE 1¼"
QX61/62	588	496			149				197				SAE 1½"
QX81/42	653	536	359	35	141	25	117	250	125	256	SAE 3½"	SAE 2"	SAE 1"
QX81/52	673	556			150				156				SAE 1¼"
QX81/62	692	575		38	162	40			197				SAE 1½"
QX81/82	724	607			179				250				SAE 2"

1) threaded port to DIN 3852, Part 2

2) pressure port to SAE J518 code 61 / ISO 6162-1 can be supplied for pressure ranges 2+3

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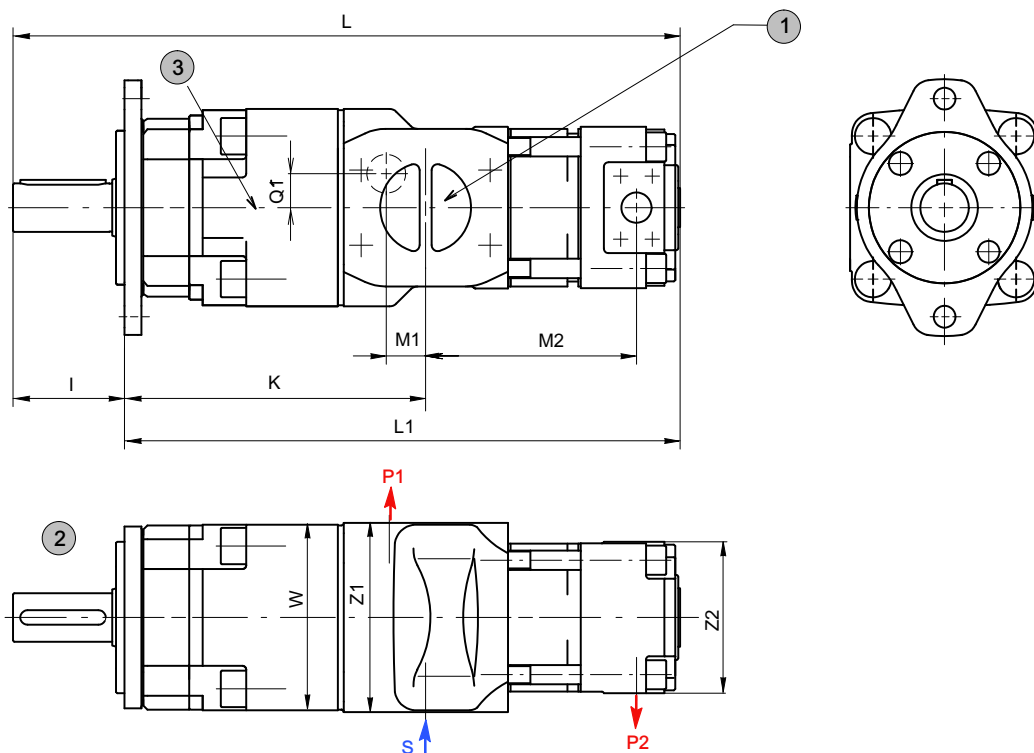
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C Double pumps QX.1/3



1 S = common suction port

2 shaft and mounting dimensions see section 4

3 depending on operating conditions, a second suction port may be required - see section 2.2.1:
QX51=SAE 1 1/4", QX61=SAE 2",
QX81=SAE 2 1/2"

Type	L	L1	K	M1	M2	Q1	I	Z1	Z2	W	S	P1	P2
QX21/23	313	268	141	18	102	-	45	100	100	80	G 1 1/4" 1)	G 1/2" 1) 2)	G 1/2" 1) 2)
QX31/23	360	310	171	26	114	-	50	120	120	100	G 1 1/2" 1)	G 3/4" 1) 2)	G 3/4" 1) 2)
QX31/33	383	333	201	19	119	15	68	125	120	136	SAE 2"	SAE 1"	G 1/2" 1) 2)
QX41/23	413	345	208	26	137	23	92	156	125	165	SAE 2 1/2"	SAE 1 1/4"	G 3/4" 1) 2)
QX41/33	436	368	241	23	132	15	92	156	120	165	SAE 2 1/2"	SAE 1 1/4"	G 3/4" 1) 2)
QX41/43	479	411	249	30	137	28	92	156	125	165	SAE 2 1/2"	SAE 1 1/4"	G 3/4" 1) 2)
QX51/23	485	393	287	24	127	17	92	195	120	203	SAE 3"	SAE 1 1/2"	G 3/4" 1) 2)
QX51/33	508	416	292	27	145	26	92	195	125	203	SAE 3"	SAE 1 1/2"	SAE 1"
QX51/43	551	459	359	32	174	35	117	250	156	256	SAE 3 1/2"	SAE 2"	SAE 1 1/4"
QX51/53	585	493	359	35	197	40	117	250	197	256	SAE 3 1/2"	SAE 2"	SAE 1 1/2"
QX61/33	566	474	359	38	207	40	117	250	250	256	SAE 4"	SAE 2"	SAE 2"
QX61/43	594	502	359	38	239	40	117	250	250	256	SAE 4"	SAE 2"	SAE 2"
QX61/53	637	545	359	38	252	40	117	250	250	256	SAE 4"	SAE 2"	SAE 2"
QX61/63	678	586	359	38	294	40	117	250	250	256	SAE 4"	SAE 2"	SAE 2"
QX81/43	709	592	359	38	294	40	117	250	250	256	SAE 4"	SAE 2"	SAE 2"
QX81/53	743	626	359	38	294	40	117	250	250	256	SAE 4"	SAE 2"	SAE 2"
QX81/63	782	665	359	38	294	40	117	250	250	256	SAE 4"	SAE 2"	SAE 2"
QX81/83	839	722	359	38	294	40	117	250	250	256	SAE 4"	SAE 2"	SAE 2"

1) threaded port to DIN 3852, Part 2

2) pressure port to SAE J518 code 61 / ISO 6162-1 can be supplied for pressure ranges 2+3

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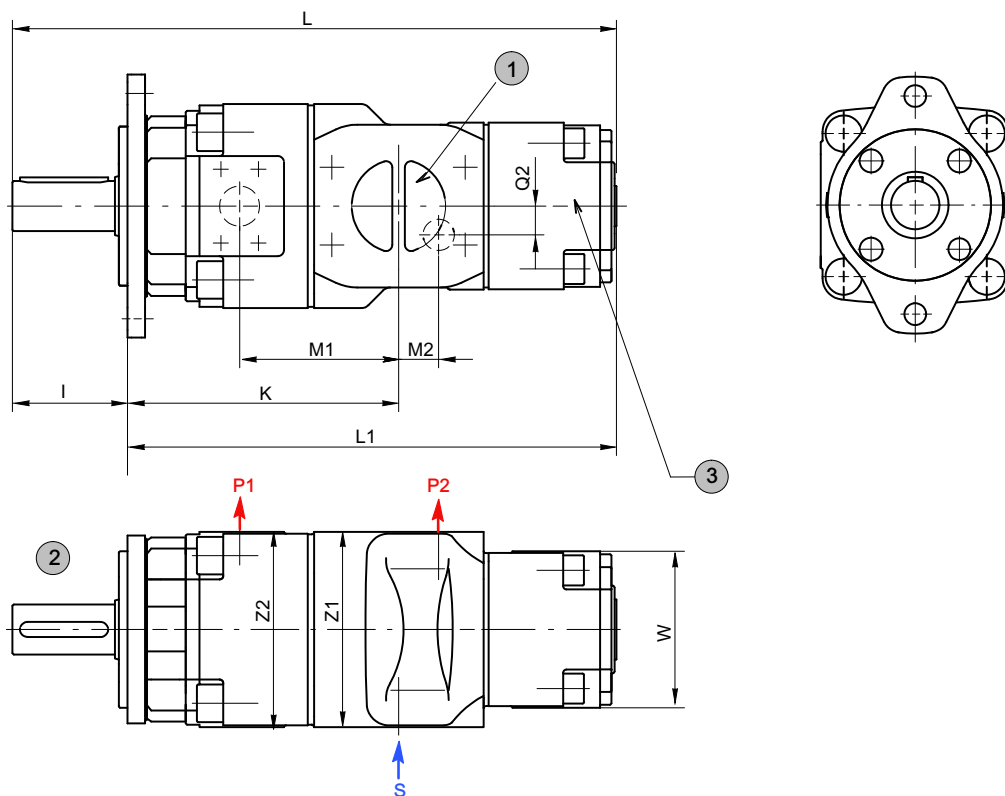
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D Double pumps QX.2/.1



1 S = common suction port

2 shaft and mounting dimensions see section 4

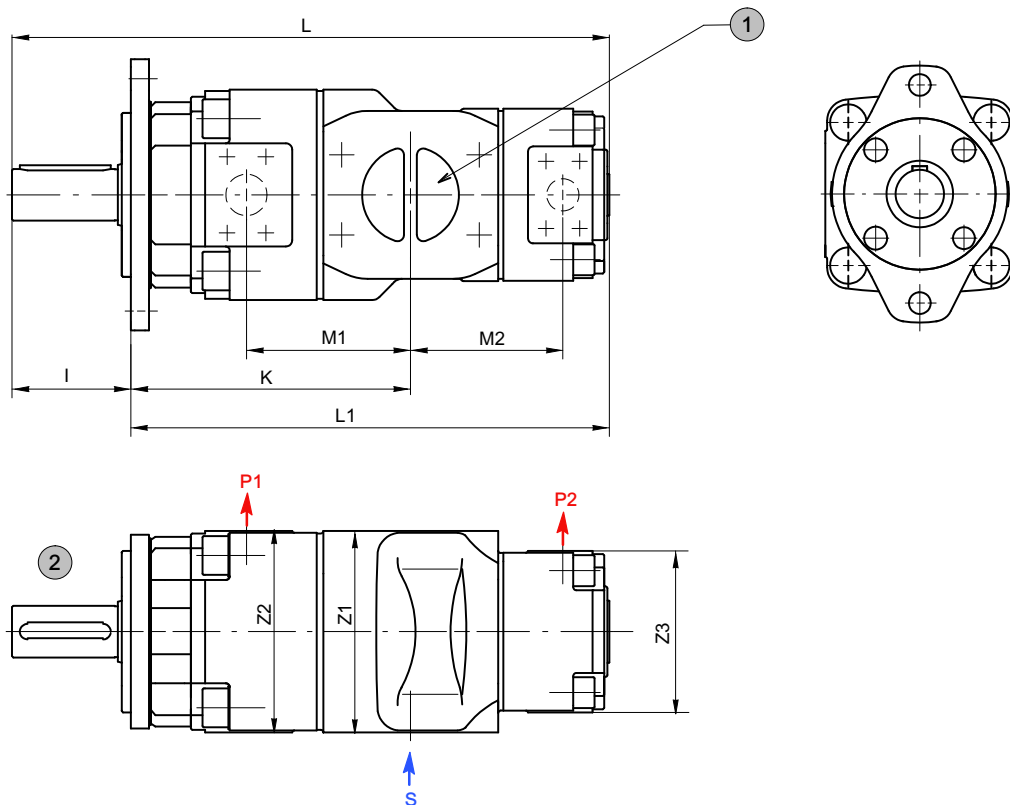
3 depending on operating conditions, a second suction port may be required - see section 2.2.1:
QX51=SAE 1 1/4", QX61=SAE 2"

Type	L	L1	K	M1	M2	Q2	I	Z1	Z2	W	S	P1	P2
QX32/21	323	273	151	87	30	-	50	120	120	80	G 1 1/2" 1)	G 3/4" 1) 2)	G 1/2" 1) 2)
QX42/21	370	302	175	103	35	-	68	125	125	100	SAE 2"	SAE 1"	G 3/4" 1) 2)
QX42/31	385	317	209	120	33	15	92	156	156	80	SAE 2 1/2"	SAE 1 1/4"	G 1/2" 1) 2)
QX52/21	436	344	217	127	43	-	92	195	197	100	SAE 3"	SAE 1 1/2"	G 3/4" 1) 2)
QX52/31	451	359	247	144	39	15	117	250	250	136	SAE 3 1/2"	SAE 2"	SAE 1"
QX52/41	489	397	252	149	47	14	165	203	203	165	SAE 4"	SAE 1 1/4"	SAE 1 1/4"
QX62/31	501	409	309	179	47	30	203	250	250	165	SAE 4"	SAE 1 1/4"	SAE 1 1/4"
QX62/41	524	432	309	179	45	35	203	250	250	203	SAE 4"	SAE 1 1/4"	SAE 1 1/4"
QX62/51	561	469	309	179	45	35	203	250	250	203	SAE 4"	SAE 1 1/4"	SAE 1 1/4"
QX82/41	629	512	309	179	45	35	203	250	250	203	SAE 4"	SAE 1 1/4"	SAE 1 1/4"
QX82/51	655	538	309	179	45	35	203	250	250	203	SAE 4"	SAE 1 1/4"	SAE 1 1/4"
QX82/61	682	565	309	179	45	35	203	250	250	203	SAE 4"	SAE 1 1/4"	SAE 1 1/4"

1) threaded port to DIN 3852, Part 2

2) pressure port to SAE J518 code 61 / ISO 6162-1 can be supplied for pressure ranges 2+3

E Double pumps QX.2/2



1 S = common suction port

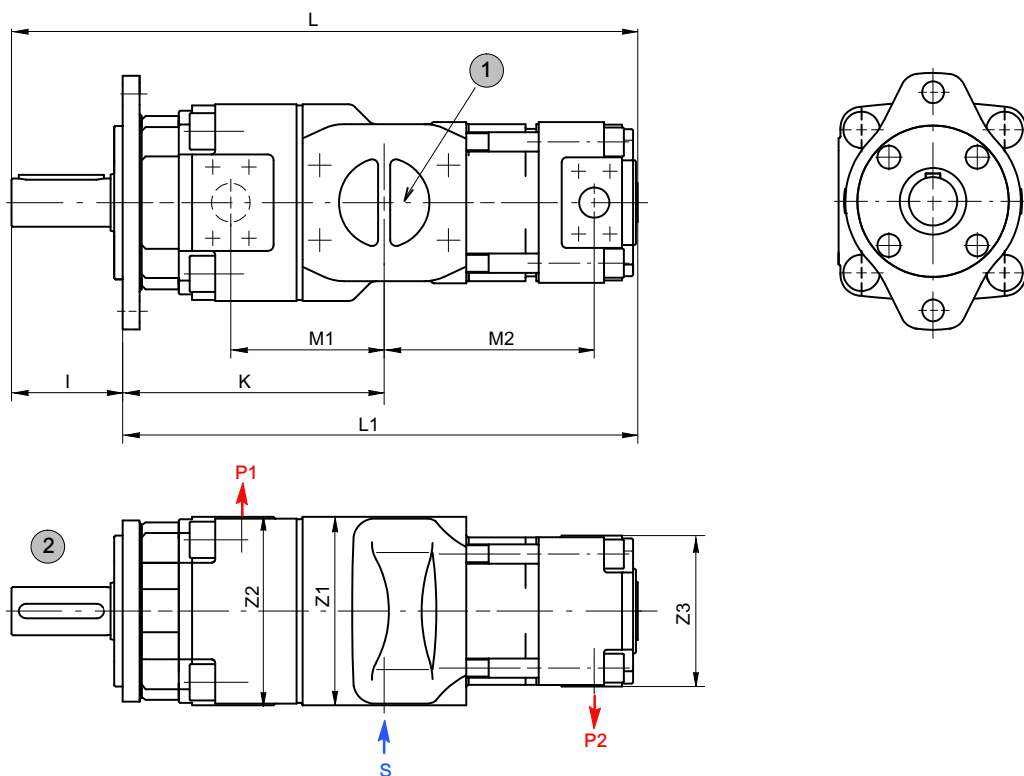
2 shaft and mounting dimensions - see section 4

Type	L	L1	K	M1	M2	I	Z1	Z2	Z3	S	P1	P2
QX22/22	260	215	123	67	67	45	100		100	G 1¼" ¹⁾	G ½" ^{1) 2)}	G ½" ^{1) 2)}
QX32/22	305	255	151	87	79	50	120		120	G 1½" ¹⁾	G ¾" ^{1) 2)}	G ¾" ^{1) 2)}
QX32/32	318	268			87							
QX42/22	352	284	175	103	84	68	125		100	SAE 2"	SAE 1"	G ½" ^{1) 2)}
QX42/32	365	297			92				120			G ¾" ^{1) 2)}
QX42/42	397	329	182	111	111				125			SAE 1"
QX52/22	418	326	209	120	92	92	156		100	SAE 2½"	SAE 1¼"	G ½" ^{1) 2)}
QX52/32	431	339			100				120			G ¾" ^{1) 2)}
QX52/42	463	371	217	127	118				125	SAE 3"		SAE 1"
QX52/52	483	391			127				156			SAE 1¼"
QX62/32	481	389	247	144	112	92	195	197	120		SAE 1½"	G ¾" ^{1) 2)}
QX62/42	498	406			123				125			SAE 1"
QX62/52	529	437	252	149	137				156	SAE 3½"		SAE 1¼"
QX62/62	548	456			149				197			SAE 1½"
QX82/42	603	486	309	179	141	117	250		125		SAE 2"	SAE 1"
QX82/52	623	506			150				156			SAE 1¼"
QX82/62	642	525			162				197	SAE 4"		SAE 1½"
QX82/82	674	557			179				250			SAE 2"

1) threaded port to DIN 3852, Part 2

2) pressure port to SAE J518 code 61 / ISO 6162-1 can be supplied for pressure ranges 2+3

F Double pumps QX.2/3



1 S = common suction port

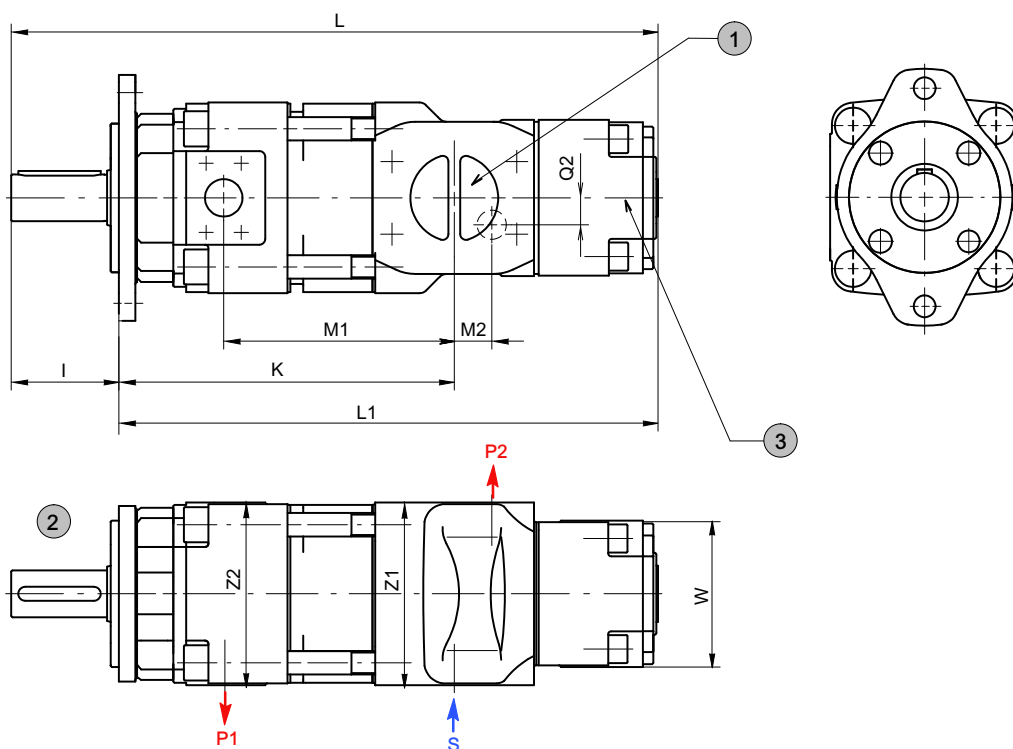
2 shaft and mounting dimensions - see section 4

Type	L	L1	K	M1	M2	I	Z1	Z2	Z3	S	P1	P2
QX32/23	340	290	151	87	114	50	120		100	G 1½" 1)	G ¾" 1) 2)	G ½" 1) 2)
QX42/23	387	319	175	103	119	68	125		120	SAE 2"	SAE 1"	G ¾" 1) 2)
QX42/33	410	342			137							
QX52/23	453	361	209	120	127	92	156		100	SAE 2½"	SAE 1¼"	G ½" 1) 2)
QX52/33	476	384			145				120			G ¾" 1) 2)
QX52/43	519	427	217	127	174				125	SAE 3"		SAE 1"
QX62/33	526	434	247	144	157	92	195	197	120		SAE 1½"	G ¾" 1) 2)
QX62/43	554	462			179				125			SAE 1"
QX62/53	599	507	252	149	207				156			SAE 1¼"
QX82/43	659	542			197	117	250		125	SAE 3½"		SAE 1"
QX82/53	693	576	309	179	220				156		SAE 2"	SAE 1¼"
QX82/63	732	615			252				197	SAE 4"		SAE 1½"

1) threaded port to DIN 3852, Part 2

2) pressure port to SAE J518 code 61 / ISO 6162-1 can be supplied for pressure ranges 2+3

G Double pumps QX.3/1



1 S = common suction port

2 shaft and mounting dimensions - see section 4

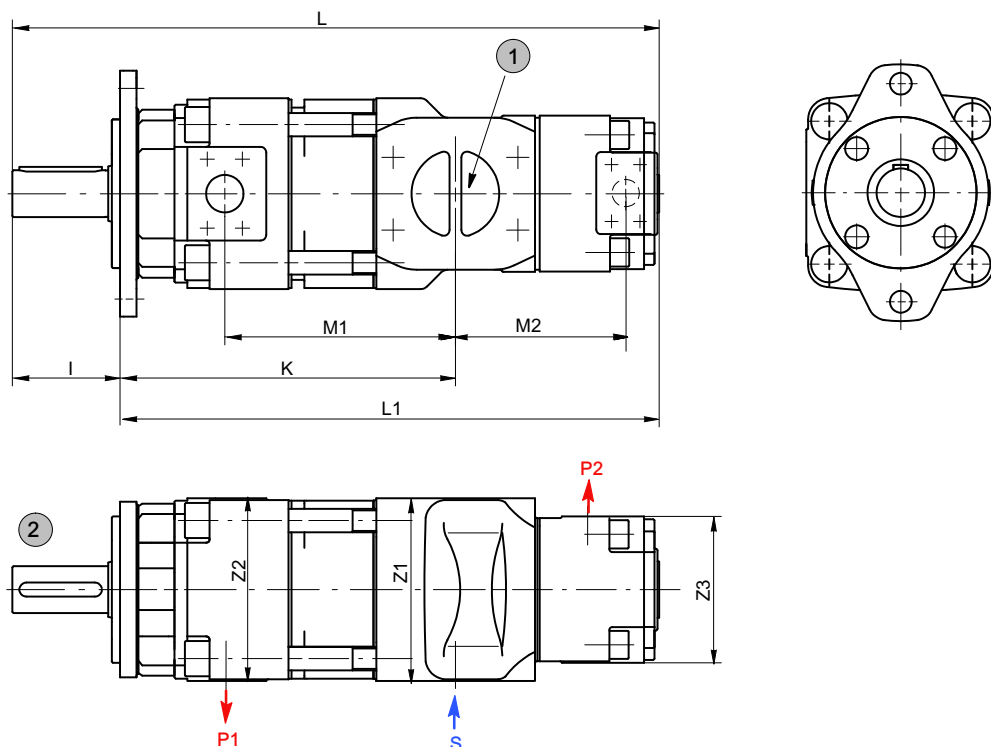
3 depending on operating conditions, a second suction port may be required - see section 2.2.1 QX61=SAE 2"

Type	L	L1	K	M1	M2	Q2	I	Z1	Z2	W	S	P1	P2
QX33/21	368	318	196	132	30	-	50	120	120	80	G 1½" ¹⁾	G ¾" ^{1) 2)}	G ½" ^{1) 2)}
QX43/21	426	358	231	159	35	-	68	125	125	100	SAE 2"	SAE 1"	G ¾" ^{1) 2)}
QX43/31	441	373			33	15							G ¾" ^{1) 2)}
QX53/21	506	414	279	190	43	-	92	156	156	80	SAE 2½"	SAE 1¼"	G ½" ^{1) 2)}
QX53/31	521	429			39	15				100			G ¾" ^{1) 2)}
QX53/41	559	467	287	197	32	23	92	195	197	136	SAE 3"	SAE 1½"	SAE 1"
QX63/31	591	499	337	234	47	14				100			G ¾" ^{1) 2)}
QX63/41	614	522			39	27				136			SAE 1"
QX63/51	651	559	342	239	40	28				165	SAE 3½"	SAE 2"	SAE 1¼"
QX83/41	744	627	424	294	51	25	117	250	250	136			SAE 1"
QX83/51	770	653			47	30				165			SAE 1¼"
QX83/61	797	680			45	35				203	SAE 4"		SAE 1½"

1) threaded port to DIN 3852, Part 2

2) pressure port to SAE J518 code 61 / ISO 6162-1 can be supplied for pressure ranges 2+3

H Double pumps QX.3/2



1 S = common suction port

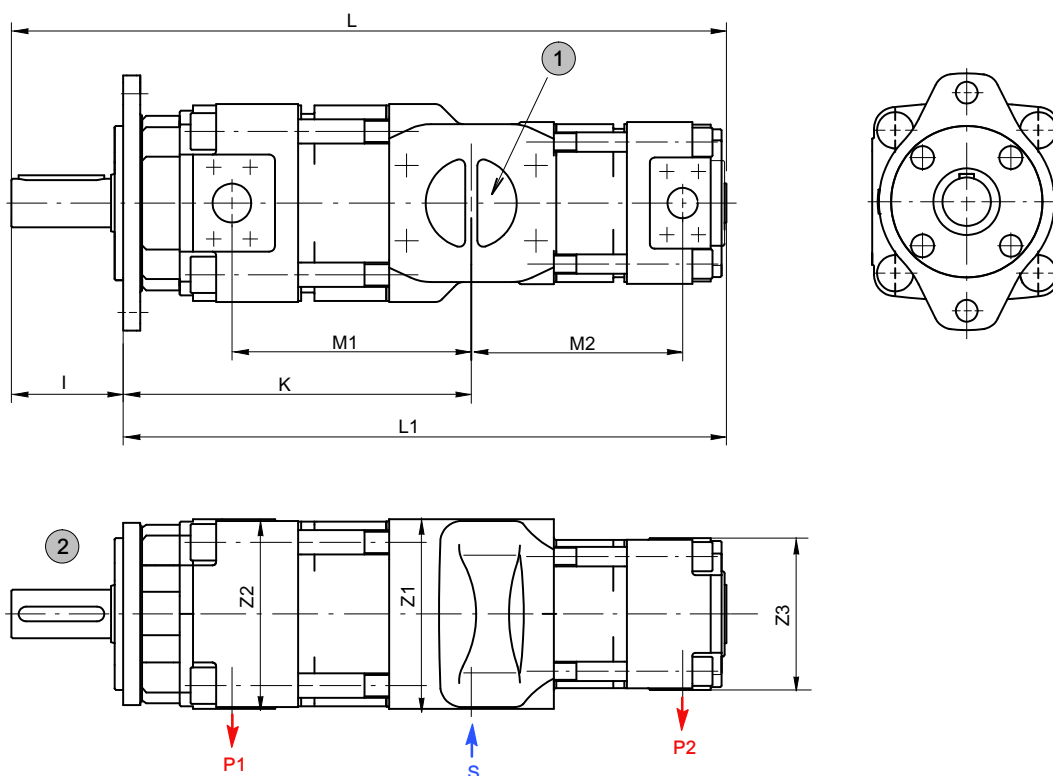
2 shaft and mounting dimensions - see section 4

Type	L	L1	K	M1	M2	I	Z1	Z2	Z3	S	P1	P2
QX23/22	295	250	158	102	67	45	100		100	G 1 1/4" 1)	G 1/2" 1) 2)	G 1/2" 1) 2)
QX33/22	350	300	196	132	79	50	120		120	G 1 1/2" 1)	G 3/4" 1) 2)	G 3/4" 1) 2)
QX33/32	363	313			87				100			G 1/2" 1) 2)
QX43/22	408	340	231	159	84	68	125		120	SAE 2"	SAE 1"	G 3/4" 1) 2)
QX43/32	421	353			92				125			SAE 1"
QX43/42	453	385	238	167	111				100	SAE 2 1/2"	SAE 1 1/4"	G 1/2" 1) 2)
QX53/22	488	396	279	190	92	92	156		120			G 3/4" 1) 2)
QX53/32	500	408			100				125			SAE 1"
QX53/42	533	441	287	197	118				156	SAE 3"		SAE 1 1/4"
QX53/52	553	461			127				120			G 3/4" 1)
QX63/32	571	479	337	234	112	92	195	197	125		SAE 1 1/2"	SAE 1"
QX63/42	588	496			123				156			SAE 1 1/4"
QX63/52	619	527	342	239	137				197	SAE 3 1/2"		SAE 1 1/2"
QX63/62	638	546			149				125			SAE 1"
QX83/42	718	601	424	294	141	117	250		156		SAE 2"	SAE 1 1/4"
QX83/52	738	621			150				197			SAE 1 1/2"
QX83/62	757	640			162				250	SAE 4"		SAE 2"
QX83/82	789	672			179							

1) threaded port to DIN 3852, Part 2

2) pressure port to SAE J518 code 61 / ISO 6162-1 can be supplied for pressure ranges 2+3

I Double pumps QX.3/3



1 S = common suction port

2 shaft and mounting dimensions - see section 4

Type	L	L1	K	M1	M2	I	Z1	Z2	Z3	S	P1	P2
QX23/23	330	285	158	102	102	45	100		100	G 1 1/4" 1) 2)	G 1/2" 1) 2)	G 1/2" 1) 2)
QX33/23	385	335	196	132	114	50	120		120	G 1 1/2" 1) 2)	G 3/4" 1) 2)	G 3/4" 1) 2)
QX33/33	408	358			132							
QX43/23	442	374	231	159	119	68	125		100	SAE 2"	SAE 1"	G 1/2" 1) 2)
QX43/33	466	398			137				120			G 3/4" 1)
QX43/43	509	441	238	167	167				125			SAE 1"
QX53/23	523	431	279	190	127	92	156		100	SAE 2 1/2"	SAE 1 1/4"	G 1/2" 1) 2)
QX53/33	546	454			145				120			G 3/4" 1) 2)
QX53/43	589	497	287	197	174				125	SAE 3"		SAE 1"
QX53/53	623	531			197				156			SAE 1 1/4"
QX63/33	616	524	337	234	157	92	195	197	120		SAE 1 1/2"	G 3/4" 1) 2)
QX63/43	644	552			179				125			SAE 1"
QX63/53	689	597	342	239	207				156	SAE 3 1/2"		SAE 1 1/4"
QX63/63	728	636			239				197			SAE 1 1/2"
QX83/43	774	657	424	294	197	117	250		125		SAE 2"	SAE 1"
QX83/53	808	691			220				156			SAE 1 1/4"
QX83/63	847	730			252				197	SAE 4"		SAE 1 1/2"
QX83/83	904	787			294				250			SAE 2"

1) threaded port to DIN 3852, Part 2

2) pressure port to SAE J518 code 61 / ISO 6162-1 can be supplied for pressure ranges 2+3

5.3 Ordering code for double pumps

[illegible]

1) Pressure range 4 on request.

5.3.1 Ordering example:

Required: double pump

Pump 1

Displacement:	80 cm ³ /rev
Continuous pressure:	300 bar
Type:	63-080

Pump 2

Displacement: 20 cm³/rev
Continuous pressure: 160 bar
Type: 31-020

for use with mineral oil

Ordering code: QX63-080/31-020R

5.3.2 Standard configuration

- direction of rotation - right (CW)
- 2-hole mounting flange to ISO 3019/1 (SAE): sizes QX 3-6
- 2-hole mounting flange to ISO 3019/2 (metr.): sizes QX 2+8
- Nitrile seals
- parallel shaft end to ISO/R775
- black priming, flange without priming

5.3.3 Options

- O = without priming
- 06 = external drain port in the pump rear cover
 - QX 2-5 = G 1/4"
 - QX 6 = G 3/8"
 - QX 8 = G 1/2"
- 09 = FKM (Viton) seals and without priming
- 12 = 2-hole mounting flange to ISO 3019/2 (metric): size QX 3-6
- 29 = for HFB and HFC fluids, frame sizes 2-5, without priming
- 66 = 4-hole mounting flange to ISO 3019/2 (metric)
- 83 = second suction port on:
 - QX51=SAE 1 1/4", QX61=SAE 2", QX81=SAE 2 1/2"
- 86 = for HFB and HFC fluids, frame sizes 6+8, without priming
- 117 = pressure port to SAE J518 code 61 / ISO 6162-1 can be supplied for frame size 2+3 with pressure ranges 2+3

Further options on request.

6 Triple pumps

The following table shows the triple-pump combinations that can be supplied (other triple-pumps on request). The individual pumps 1, 2 and 3 must be specified in accordance with the main characteristics shown in section 2.

The largest pump of the combination is situated at the shaft end and is referred to as Pump 1. For equal frame sizes, the pump with the larger displacement is situated at the drive side. Pumps 2 and 3 have a common suction port.

IMPORTANT: Triple pumps with pressure range 4 on request.

6.1 Selection table

Frame size of pump 1

QX2.	QX3.	QX4.	QX5.	QX5.	QX6.	QX8.
QX21/21/21	QX31/21/21	QX41/21/21	QX51/22/23	QX52/52/31	QX61/31/33	QX81/42/23
QX21/21/22	QX31/21/22	QX41/21/23	QX51/23/23	QX52/52/42	QX61/41/21	QX82/42/43
QX21/21/23	QX31/21/23	QX41/22/22	QX52/23/23	QX52/52/43	QX61/41/42	QX82/51/53
QX21/22/22	QX31/22/22	QX41/23/23	QX53/22/22	QX52/52/52	QX61/42/23	QX83/51/53
QX21/22/23	QX31/22/23	QX42/22/22	QX51/31/33	QX52/52/53	QX61/42/43	QX81/61/61
QX21/23/23	QX31/23/22	QX43/22/22	QX51/33/33	QX52/53/31	QX61/43/43	QX81/62/63
QX22/22/22	QX31/23/23	QX43/23/22	QX51/41/23	QX52/53/53	QX62/41/22	QX81/63/33
QX22/22/23	QX32/22/22	QX43/23/23	QX51/41/42	QX53/53/23	QX62/42/42	QX82/61/61
QX23/23/23	QX32/22/23	QX41/31/33	QX51/41/43	QX53/53/33	QX62/43/43	QX82/62/62
	QX32/23/23	QX41/33/22	QX51/42/22		QX63/43/22	QX82/63/31
	QX33/21/22	QX41/33/33	QX51/42/43		QX61/52/53	QX83/61/61
	QX33/21/23	QX42/31/32	QX51/43/21		QX61/53/23	QX83/63/43
	QX33/23/23	QX42/32/32	QX51/43/22		QX61/53/31	QX83/63/61
	QX31/31/21	QX42/33/32	QX51/43/23		QX62/52/32	QX81/81/61
	QX31/31/22	QX43/31/31	QX51/43/43		QX62/52/52	QX81/81/81
	QX31/31/23	QX43/33/33	QX52/42/23		QX62/53/22	QX82/82/52
	QX31/31/31	QX41/41/33	QX52/42/42		QX62/53/23	QX82/82/62
	QX31/31/33	QX41/42/21	QX52/43/22		QX62/53/31	QX82/82/63
	QX31/32/22	QX41/42/23	QX52/43/23		QX62/53/33	QX83/83/53
	QX31/33/33	QX41/42/42	QX52/43/43		QX63/51/51	
	QX32/32/22	QX41/43/21	QX53/41/22		QX63/53/53	
	QX32/32/23	QX41/43/22	QX53/41/23		QX61/61/31	
	QX32/32/32	QX41/43/23	QX53/42/22		QX61/61/33	
	QX32/32/33	QX42/42/22	QX53/42/43		QX61/61/41	
	QX33/33/23	QX42/42/23	QX53/43/23		QX61/61/53	
	QX33/33/33	QX42/42/31	QX51/51/21*		QX61/62/42	
		QX42/42/32	QX51/51/32		QX61/62/63	
		QX42/42/33	QX51/51/33		QX61/63/32	
		QX42/42/42	QX51/52/32		QX61/63/33	
		QX42/42/43	QX51/52/33		QX61/63/41	
		QX43/43/43	QX51/52/42		QX61/63/42	
			QX51/52/43		QX62/62/33	
			QX51/53/22		QX62/62/43	
			QX51/53/23		QX62/62/53	
			QX51/53/31		QX62/62/62	
			QX51/53/33		QX62/62/63	
			QX51/53/41		QX62/63/63	
			QX51/53/43		QX63/63/32	
			QX51/53/52		QX63/63/43	
			QX52/52/23		QX63/63/53	
65	130	260	520	520	1050	2100

Max. permissible drive shaft torque [Nm]

* this pump is used as the ordering example in section 6.2

6.2 Ordering code for triple pumps

Triple pumps can only be supplied after consulting Bucher Hydraulics GmbH.

	Q	X	5	1	-	1	2	5	/	5	1	-	0	8	0	/	2	1	-	0	1	2	R	*	*
Series = QX																									
Frame size = 2 / 3 / 4 / 5 / 6 / 8																									
Pressure range = 1 / 2 / 3 / 4 ¹⁾																									
Displacement [cm ³ /rev] = 005 - 500																									
pump 1																									
Frame size = 2 / 3 / 4 / 5 / 6 / 8																									
Pressure range = 1 / 2 / 3 / 4 ¹⁾																									
Displacement [cm ³ /rev] = 005 - 500																									
pump 2																									
Frame size = 2 / 3 / 4 / 5 / 6 / 8																									
Pressure range = 1 / 2 / 3 / 4 ¹⁾																									
Displacement [cm ³ /rev] = 005 - 500																									
pump 3																									
Frame size = 2 / 3 / 4 / 5 / 6 / 8																									
Pressure range = 1 / 2 / 3 / 4 ¹⁾																									
Displacement [cm ³ /rev] = 005 - 500																									
Rotation (viewed from shaft end)	right (CW)	=	R (standard)																						
	left (CCW)	=	L																						
Option	see section 6.2.3																								

1) Pressure range 4 on request.

6.2.1 Ordering example:

Required: triple pump

Pump 1

Displacement: 125 cm³/rev
Continuous pressure: 80 bar
Type: 51-125

Pump 2

Displacement: 80 cm³/rev
Continuous pressure: 150 bar
Type: 51-080

Pump 3

Displacement: 12 cm³/rev
Continuous pressure: 125 bar
Type: 21-012

For use with mineral oil

Referring to the selection table in sect. 6.1,
QX51/51/21 is an obtainable combination.

Ordering code: QX51-125/51-080/21-012R

6.2.2 Standard configuration

- direction of rotation - right (CW)
- 2-hole mounting flange to ISO 3019/1 (SAE): sizes QX 3-6
- 2-hole mounting flange to ISO 3019/2 (metric): sizes QX 2+8
- nitrile seals
- parallel shaft end to ISO/R775
- black priming, flange without priming

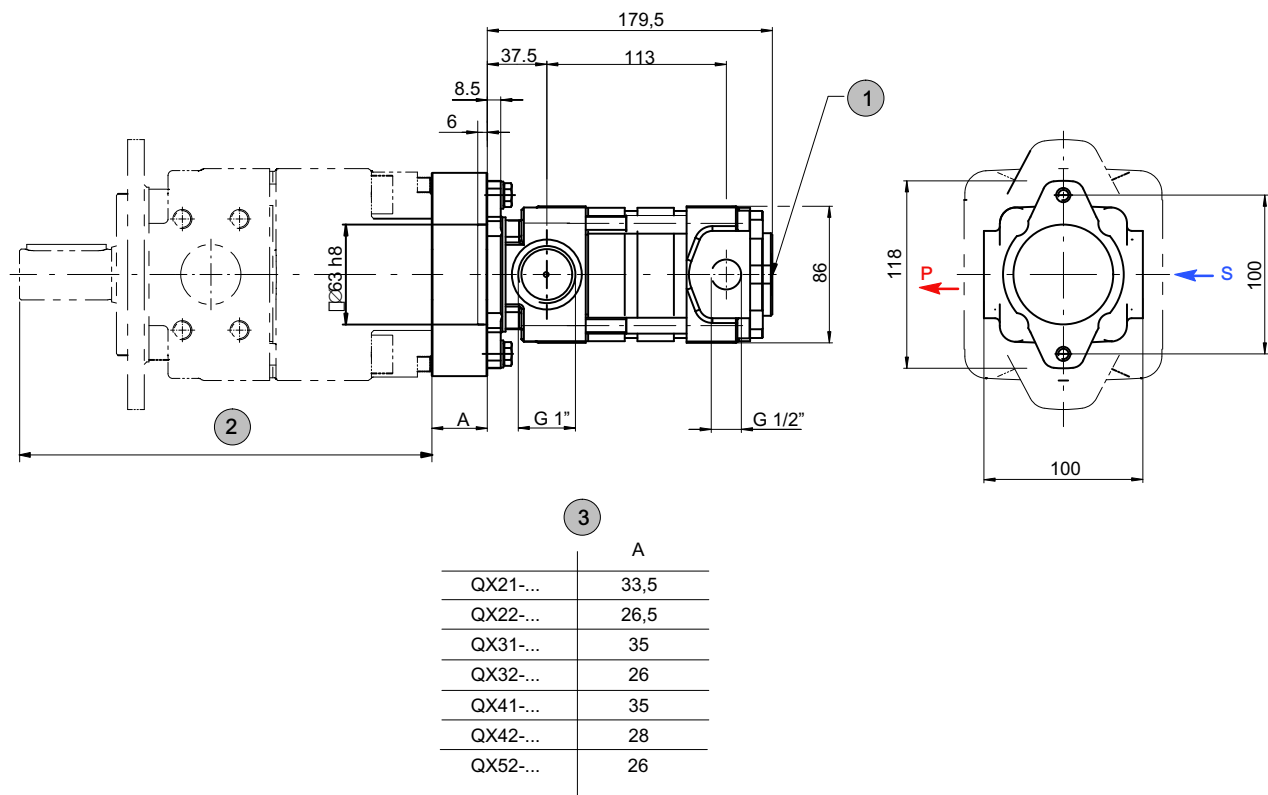
6.2.3 Options

- O = without priming
- 06 = external drain port in the pump rear cover
QX 2-5 = G1/4", QX 6 = G3/8", QX 8 = G1/2"
- 09 = FKM (Viton) seals and without priming
- 12 = 2-hole mounting flange to ISO 3019/2 (metric): size QX 3-6
- 29 = for HFB and HFC fluids, frame sizes 2-5, without priming
- 66 = 4-hole mounting flange to ISO 3019/2 (metric)
- 83 = second suction port on:
QX51=SAE 1 1/4", QX61=SAE 2", QX81=SAE 2 1/2"
- 86 = for HFB and HFC fluids, frame sizes 6+8, without priming
- 117 = pressure port to SAE J518 code 61 / ISO 6162-1
can be supplied for frame size 2+3 with pressure ranges 2+3

Further options on request.

7 Low-flow capability pump in combination with other QX-single pumps

7.1 Dimensions



1	external drain port G 1/4"
2	dimensions see section 4

3	dimension A depends on the driving QX pump model (2)
---	--

7.2 Ordering code

[illegible]

7.2.1 Ordering example:

Required:	Double pump		
Pump 1		Pump 2	
Displacement:	40 cm ³ /rev	Displacement:	4 cm ³ /rev
Continuous pressure:	160 bar	Continuous pressure:	250 bar
Type:	41 - 040	Type:	24 - 004
For use with mineral oil:			
Ordering code:	QX41-040//24-004R06-ME		

8 Fluid

QX pumps require fluid with a minimum cleanliness level of ISO 4406 code 20/18/15.

We recommend the use of fluids that contain anti-wear additives for mixed-friction operating conditions. Fluids without appropriate additives can reduce the service life of pumps and motors. The user is responsible for maintaining, and regularly checking, the fluid quality. Bucher Hydraulics recommends a load capacity of $\geq 30 \text{ N/mm}^2$ to Brugger DIN 51347-2.

9 Fluid cleanliness class

Cleanliness class (RK) onto ISO 4406 and NAS 1638

Code ISO 4406	Number of particles / 100 ml			
	$\geq 4 \mu\text{m}$	$\geq 6 \mu\text{m}$	$\geq 14 \mu\text{m}$	NAS 1638
23/21/18	8000000	2000000	250000	12
22/20/18	4000000	1000000	250000	-
22/20/17	4000000	1000000	130000	11
22/20/16	4000000	1000000	64000	-
21/19/16	2000000	500000	64000	10
20/18/15	1000000	250000	32000	9
19/17/14	500000	130000	16000	8
18/16/13	250000	64000	8000	7
17/15/12	130000	32000	4000	6
16/14/12	64000	16000	4000	-
16/14/11	64000	16000	2000	5
15/13/10	32000	8000	1000	4
14/12/9	16000	4000	500	3
13/11/8	8000	2000	250	2

10 Operational reliability

To guarantee the reliable operation and a long service life of the pump, a maintenance schedule must be prepared for the power unit, machine or system. The maintenance schedule must make sure that the provided or permissible operating conditions of the pump are adhered to over the period of use.

In particular, compliance with the following operating parameters must be ensured:

- required oil cleanliness
- operating temperature range
- fluid level

Moreover, the pump and the system must be inspected at regular intervals for changes in the following parameters:

- Vibration
- Noise
- Differential temperature of pump – fluid in the tank
- Foaming in the tank
- Leak tightness

Changes in these parameters indicate wear of components (e.g. drive motor, coupling, pump, etc.). The cause must be immediately pinpointed and eliminated.

To provide high operational reliability of the pump in the machine or system, we recommend continuous, automatic checks of the above parameters and an automatic shut-down in the case of changes that exceed the usual fluctuations within the provided operating range.

Make sure that the plastic components of the coupling will be exchanged regularly (no later than 5 years). The manufacturer's instructions must be given priority.

11 Note

This catalogue is intended for users with specialist knowledge. The user must check the suitability of the equipment described here in order to ensure that all of the conditions necessary for the safety and proper functioning of the system are fulfilled. If you have any doubts or questions concerning the use of these pumps, please consult Bucher Hydraulics GmbH.

12 Accessories

12.1 Bolt-on valves - SAE J518 code 61 / ISO 6162-1 pattern

Pressure relief valve A S DF	Pressure relief valve solenoid control A S DA	Accumulator charging valve AGSF
Technical data sheet 100-P-000123	Technical data sheet 100-P-000119	Technical data sheet 100-P-0000124

12.1.1 Examples for Bolt-on valves, mounted on QX Internal Gear Pumps

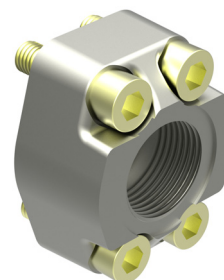
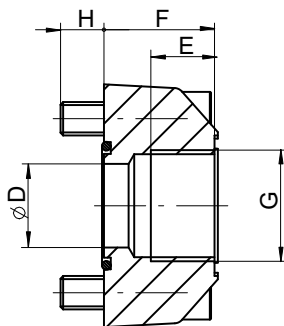
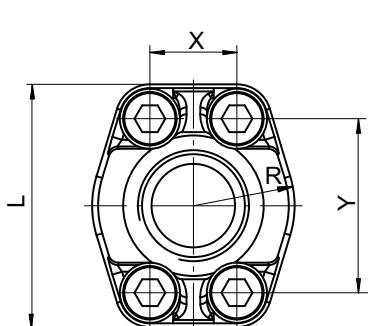
Bolt-on valve with threaded ports AGDF	Bolt-on valves with pipe flanges SAE ¹⁾ ASDF+RF	Bolt-on valve with pipe flanges SAE + RVSAE ²⁾ ASDF+RF+RVSAE+DPSAE+ZPSAE

1) Pipe flange see section 12.2 and 12.3

2) Please ask Bucher Hydraulics GmbH for check valves

IMPORTANT: For detailed informations on Bolt-on valves see www.bucherhydraulics.com

12.2 Pipe flanges - high pressure type



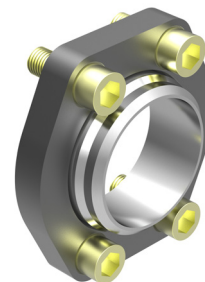
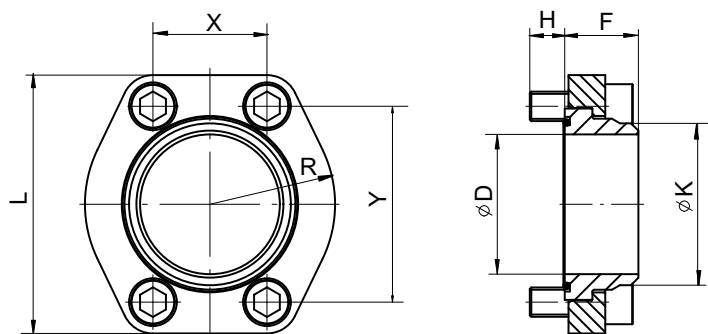
- Max. operating pressure 420 bar
- Flange size SAE J518 code 61 / ISO 6162-1

Threaded pipe flanges are spot-faced for DIN 2353 pipe fittings
Material: ST37 / for Viton seals, contact Bucher Hydraulics GmbH

Ordering-number	Ordering code	Size	DØ	E	F	H	L	R	X	Y	Viton seal 90 Shore A	Retaining screws DIN912-12.9 / [Nm]	
100037000	RF 01-R08	G 1/2"	12,5	16	27	13	54	23	17,5	38	20,24x2,62	M8x30	30
100037010	RF 02-R10	G 3/4"	20	18	30	12	65	26	22,2	47,6	26,65x2,62	M10x30	60
100037020	RF 03-R11	G 1"	25	20	34	13	70	29	26,2	52,4	32,99x2,62	M10x35	60
100037030	RF 04-R12	G 1 1/4"	32	22	38	14	80	36	30,2	58,6	40,86x3,53	M10x40	60
100037040	RF 05-R13	G 1 1/2"	38	24	41	19	94	41	35,7	70	44,04x3,53	M12x45	120
100037050	RF 06-R14	G 2"	50	26	45	20	102	48	42,9	77,8	59,92x3,53	M12x50	120
100055470*	RF 07-R16	G 2 1/2" *	63	30	50	18	114	57	50,8	89	72,62x3,53	M12x45	120

* at RF07 only to 210 bar be allowed

12.3 Pipe flanges - low pressure type



- Max. operating pressure 16 bar
- Flange size SAE J518 code 61 / ISO 6162-1

Material: HST37 / for Viton seals, contact Bucher Hydraulics GmbH

Ordering number	Ordering code	SAE flange Size	D	K	F	H	L	R	X	Y	Viton seal 90 Shore 'A'	Retaining screws DIN 912-8.8 Torque [Nm]		pipe ¹⁾ O/dia. approx.
100062450	RN 07-S	2½"	63	75	35	14	120	57	51	89	69,44x3,53	M12 x 30	70	75
100063880	RN 08-S	3"	76	88			140,5	68	62	106,5	85,32x3,53	M16 x 40	180	88
100063890	RN 09-S	3½"	89	100	40	19	158,5	73	70	120,3	98,02x3,53	M16 x 40	180	100
100063900	RN 10-S	4"	103	115			168	79	78	130	110,72x3,53	M16 x 40	180	115

1) We recommend the use of seamless precision steel tube to DIN 2391 with wallthick. max 6 mm