

## Multiple pumps type PFEX, PFRX, PVPCX2E

vane, piston, fixed or variable displacement

Multiple pumps are compact groups made by single pumps factory assembled in modular execution, designed to be driven by a single motor. They are suitable to perform control logics such as high / low flow circuits or for applications where each individual stage of the pump feeds a specific line of the hydraulic circuit.

Multiple pumps are available in execution with double or triple fixed displacement vane pumps, or single vane pumps coupled to fixed displacement radial piston pumps or variable displacement axial piston pumps.

**Multiple vane pumps, fixed displacement** - see section 1

**PFEX2** double pump made by two vane pumps type **PFE**

**PFEX3** triple pump made by three vane pumps type **PFE**

**PFEXD** triple pump made by one vane pump type **PFE** coupled with double vane pump type **PFED**

**Multiple radial piston + vane pumps, fixed displacement** - see section 2

**PFRX2E** double pump made by radial piston pumps type **PFR** coupled with one vane pumps type **PFE**

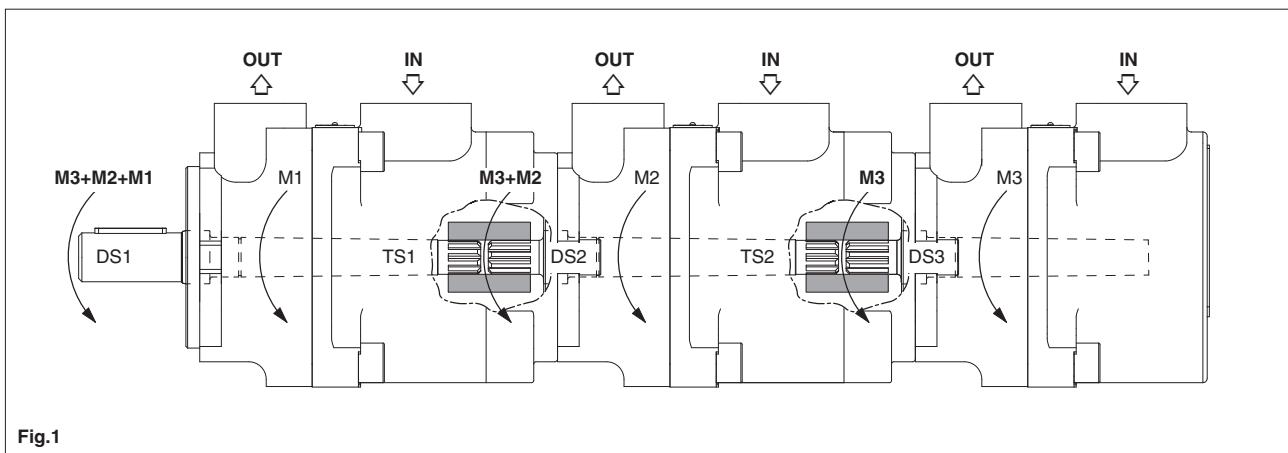
**PFRX3E** triple pump made by radial piston pumps type **PFR** coupled with two vane pumps type **PFE**

**PFRXE** triple pump made by one vane pump type **PFR** coupled with double vane pump type **PFED**

**Multiple axial piston, variable displacement + vane pump, fixed displacement** - see section 3

**PVPCX2E** double pump made by one axial piston pumps type **PVPC** coupled with one vane pump type **PFE**

**Note:** for tech. tables of single pumps see section 4



### Sizing criteria

The total torque applied to the drive shaft of the first pumps is the sum of the single torque required to operate each single pump.

- It must be verified that the total torque applied to the drive shaft of the first pumps does not exceed the max allowed limit specified in the tech table of the specific pump
- It must be verified that the max torque applied on each single drive shaft and on each single through shaft are not higher than the max allowed limit specified in the tech table of each single pump

With reference to above Fig.1:

**M1, M2, M3** = torque required to operate each single pump

**DS1, DS2, DS3** = limits of torque for drive shafts

**TS1, TS2** = limits of torque at the end of through shafts

The following conditions must be verified:

- $M3 \leq TS2$
- $M3 + M2 \leq DS2$
- $M3 + M2 \leq TS1$
- $M3 + M2 + M1 \leq DS1$

**1 MODEL CODE OF PFEX\***

**1.1 MODEL CODE OF PFEX2, PFEX3**

<b>PFEX</b>	<b>2</b>	-	<b>42</b>	/	<b>045</b>	/	<b>31028</b>	/	<b>31016</b>	/	<b>3</b>	<b>D</b>	<b>T</b>	<b>*</b>	/	<b>*</b>
Fixed displacement multiple vane pump														Series number		<b>Seals material:</b> - = NBR (mineral oil & water glycol) <b>PE</b> = FPM
<p><b>Execution</b>  <b>2</b> = double pump (two pumps type PFE)  <b>3</b> = triple pump (three pumps type PFE)</p> <p><b>Size of first pump:</b>  <b>31, 41, 51, 32, 42, 52</b></p> <p><b>Displacement of first pump</b>  for PFE 31: <b>010, 016, 022, 028, 036, 044</b>  for PFE 41: <b>029, 037, 045, 056, 070, 085</b>  for PFE 51: <b>090, 110, 129, 150</b>  for PFE 32: <b>016, 022, 028, 036</b>  for PFE 42: <b>045, 056, 070, 085</b>  for PFE 52: <b>090, 110, 129, 150</b></p> <p>Size and displacement of second pump - see first pump <b>(1)</b></p> <p>Size and displacement of third pump - see first pump <b>(1)</b></p>																
<p><b>Port orientation</b>, see section 1.4</p> <p><b>Direction of rotation</b> viewed at the shaft end:  <b>D</b> = clockwise (supplied standard)  <b>S</b> = counterclockwise  Note: PFE are not reversible</p> <p><b>Drive shaft</b>  cylindrical keyed:  <b>1</b> = (only for PFE-31, 41, 51) standard  <b>2</b> = (only for PFE-41 and PFE-51) according to ISO/DIN 3019  <b>3</b> = for high torque applications</p> <p>splined  <b>5</b> = standard  <b>6</b> = for high torque applications  for PFEX*-3 according to SAE B 16/32 DP, 13 teeth;  for PFEX*-4 according to SAE C 12/24 DP, 14 teeth;</p>																

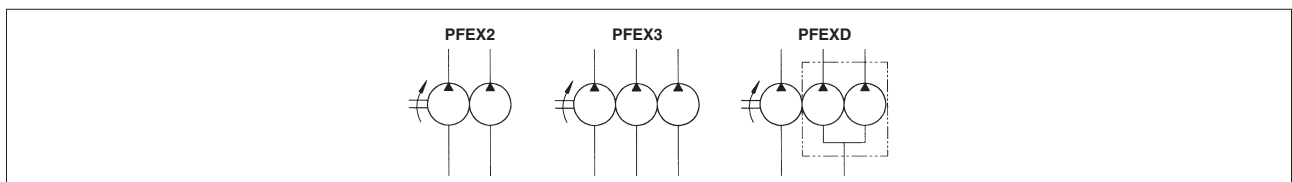
**(1)** Second and third pumps must be selected with equal or smaller size than the first pump

**1.2 MODEL CODE OF PFEXD**

<b>PFEX</b>	<b>D</b>	-	<b>42</b>	/	<b>045</b>	/	<b>43037</b>	/	<b>022</b>	/	<b>3</b>	<b>D</b>	<b>T</b>	<b>*</b>	/	<b>*</b>
Fixed displacement multiple vane pump														Series number		<b>Seals material:</b> - = NBR (mineral oil & water glycol) <b>PE</b> = FPM
<p><b>Execution</b>  <b>D</b> = triple pump (one pump type PFE and one pump type PFED)</p> <p><b>Size of first pump:</b>  <b>41, 51, 42, 52</b></p> <p><b>Displacement of first pump</b>  for PFE 41: <b>029, 037, 045, 056, 070, 085</b>  for PFE 51: <b>090, 110, 129, 150</b>  for PFE 42: <b>045, 056, 070, 085</b>  for PFE 52: <b>090, 110, 129, 150</b></p> <p><b>Size and displacement of PFED first element</b>  for PFED <b>43: 029, 037, 045, 056, 070, 085</b>  for PFED <b>54: 090, 110, 129, 150</b></p> <p><b>Displacement of PFED second element</b>  for PFED 43: <b>016, 022, 028, 036, 044</b>  for PFED 54: <b>029, 037, 045, 056, 070, 085</b></p>																
<p><b>Port orientation</b>, see section 1.4</p> <p><b>Direction of rotation</b> viewed at the shaft end:  <b>D</b> = clockwise (supplied standard)  <b>S</b> = counterclockwise  Note: PFE are not reversible</p> <p><b>Drive shaft</b>  cylindrical keyed:  <b>1</b> = (only for PFE-31, 41, 51) standard  <b>2</b> = (only for PFE-41 and PFE-51) according to ISO/DIN 3019  <b>3</b> = for high torque applications</p> <p>splined  <b>5</b> = standard  <b>6</b> = for high torque applications  for PFEX*-3 according to SAE B 16/32 DP, 13 teeth;  for PFEX*-4 according to SAE C 12/24 DP, 14 teeth;</p>																

**(1)** PFEXD-41 and 42 can be coupled only with PFED-43

**1.3 HYDRAULIC SYMBOL**

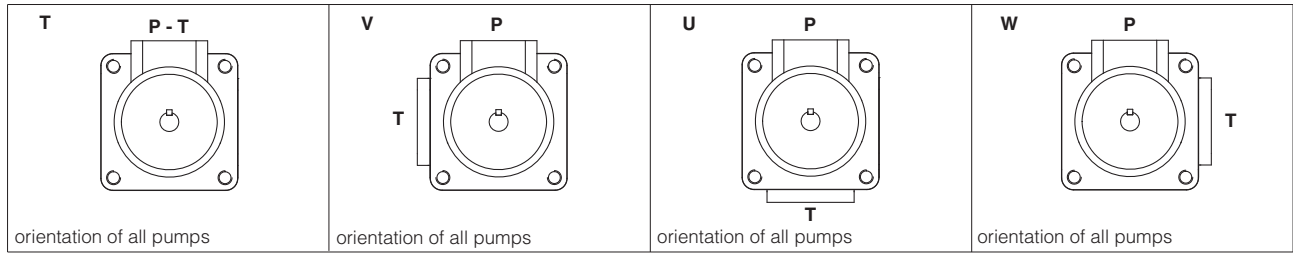


### 1.4 PORT ORIENTATION

#### -PFE<sub>X2</sub>, PFE<sub>X3</sub>

Pumps can be supplied with oil ports oriented in different configurations viewed from shaft end, as below indicated. The port orientation is defined by code **T, U, V, W** and it is the same for first, second (third) pumps. Ports orientation can be easily changed by rotating the pump body that carries inlet port.

Model code example: PFE<sub>X2</sub>-42045/41037/5DT



**P** = outlet port; **T** = inlet port

#### -PFE<sub>XD</sub>

Pumps can be supplied with oil ports oriented in different configurations viewed from shaft end, as below indicated. In PFE<sub>XD</sub>, the ports orientation of second / third pump (PFED), can be selected according following table. The ports orientation of first pump depends to the selected orientation of second / third pumps.

Model code example: PFE<sub>XD</sub>-42045/43037/016/5D<sub>TO</sub>

1 <sup>st</sup> PUMP PFE <sub>X</sub> *	2 <sup>nd</sup> / 3 <sup>th</sup> PUMP PFED*								
	<b>TO</b> P2-T2-P3	<b>TA</b> P2-T2 P3	<b>TB</b> P2-T2 P3	<b>TC</b> P2-T2 P3	<b>TD</b> P2-T2 P3	<b>TE</b> P2-T2 P3	<b>TF</b> P2-T2 P3	<b>TG</b> P2-T2 P3	
	<b>WO</b> P2-P3 T2	<b>WA</b> P2 P3 T2	<b>WB</b> P2 P3 T2	<b>WC</b> P2 P3 T2	<b>WD</b> P2 P3 T2	<b>WE</b> P2 P3 T2	<b>WF</b> P2 P3 T2	<b>WG</b> P2 P3 T2	
	<b>UO</b> P2-P3 T2	<b>UA</b> P2 P3 T2	<b>UB</b> P2 P3 T2	<b>UC</b> P2 P3 T2	<b>UD</b> P2 P3 T2	<b>UE</b> P2 P3 T2	<b>UF</b> P2 P3 T2	<b>UG</b> P2 P3 T2	
	<b>VO</b> P2-P3 T2	<b>VA</b> P2 P3 T2	<b>VB</b> P2 P3 T2	<b>VC</b> P2 P3 T2	<b>VD</b> P2 P3 T2	<b>VE</b> P2 P3 T2	<b>VF</b> P2 P3 T2	<b>VG</b> P2 P3 T2	

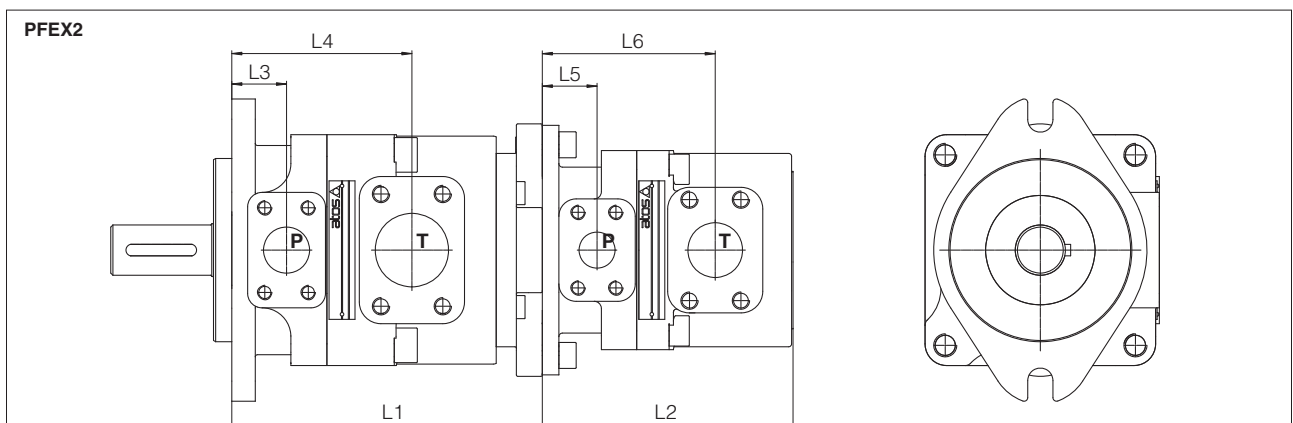
**P1** outlet port of first element; **P2** outlet port of second element; **P3** outlet port of third element; **T1** inlet port of first element; **T2** inlet port of second element

### 1.5 OPERATING CHARACTERISTICS OF PFE<sub>X</sub>\*

See technical table of single pumps:

**A005** for PFE-31, 41, 51      **A007** for PFE-32, 42, 52

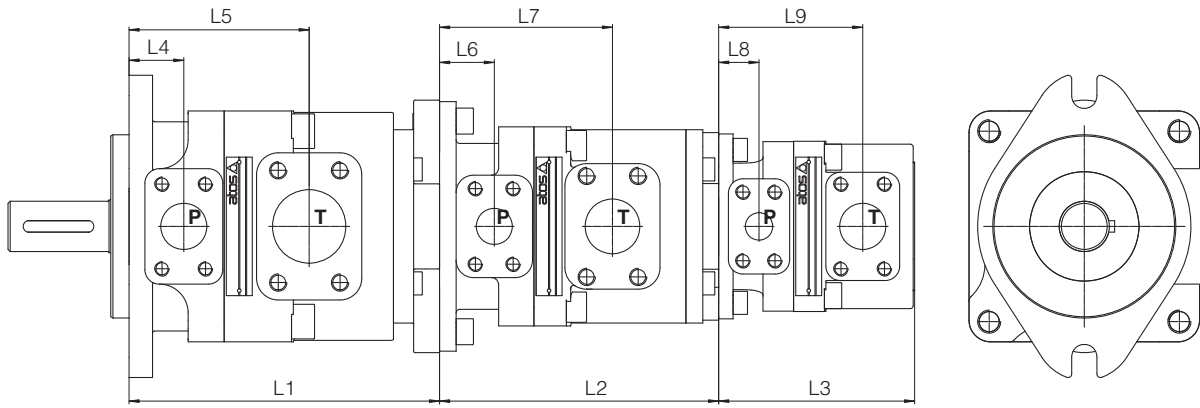
### 1.6 DIMENSIONS OF PFE<sub>X</sub>\* [mm]



For missing details see tab. A005 and A007

Model code	First pump	Second pump	L1	L2	L3	L4	L5	L6
PFE <sub>X2</sub> -32***/31***/*	PFEXA-32***/*	PFE-31***/5	164	134,5	27,5	98,5	27,5	98,5
PFE <sub>X2</sub> -42***/31***/*	PFEXA7-42***/*	PFE-31***/7	194	134,5	38	120	27,5	98,5
PFE <sub>X2</sub> -42***/41***/*	PFEXB7-42***/*	PFE-41***/7	203	160	38	120	38	120
PFE <sub>X2</sub> -52***/31***/*	PFEXA7-52***/*	PFE-31***/7	206	134,5	38	125	27,5	98,5
PFE <sub>X2</sub> -52***/41***/*	PFEXB7-52***/*	PFE-41***/7	215,5	160	38	125	38	120
PFE <sub>X2</sub> -52***/51***/*	PFEXC-52***/*	PFE-51***/5	230	186,5	38	125	38	125

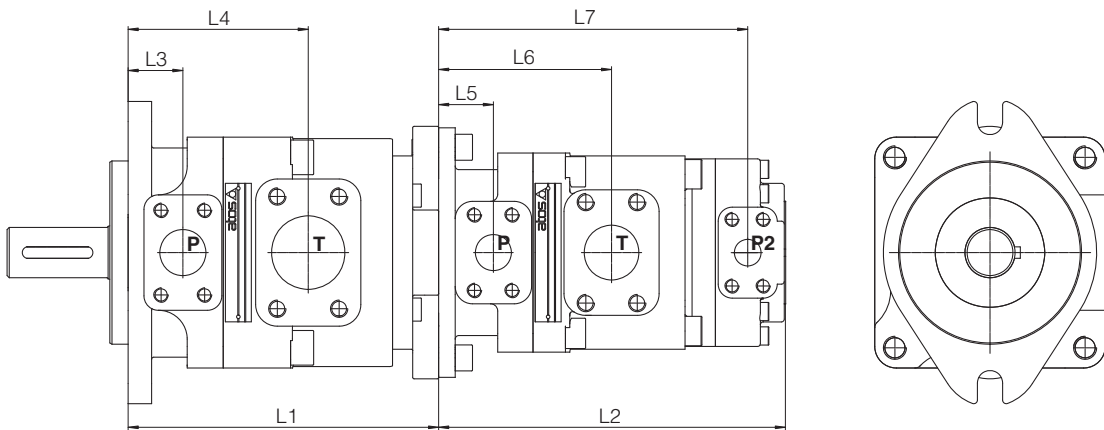
**PFEX3**



For missing details see tab. A005 and A007

Model code	First pump	Second pump	Third pump	L1	L2	L3	L4	L5	L6	L7	L8	L9
PFEX3-32***/31***/31***/*	PFEXA-32***/*	PFEXA-31***/5	PFE-31***/5	164	164	134,5	27,4	98,5	27,4	98,5	24,7	98,5
PFEX3-42***/31***/31***/*	PFEXA7-42***/*	PFEXA-31***/7	PFE-31***/5	203	164	134,5	38	120	27,4	98,5	24,7	98,5
PFEX3-42***/41***/31***/*	PFEXB7-42***/*	PFEXA7-41***/7	PFE-31***/7	203	194	134,5	38	120	38	120	24,7	98,5
PFEX3-42***/41***/41***/*	PFEXB7-42***/*	PFEXB7-41***/7	PFE-41***/7	203	203	160	38	120	38	120	38	120
PFEX3-52***/31***/31***/*	PFEXA7-52***/*	PFEXA-31***/7	PFE-31***/5	206	164	134,5	38	125	24,7	98,5	24,7	98,5
PFEX3-52***/41***/31***/*	PFEXB7-52***/*	PFEXA7-41***/7	PFE-31***/7	215,5	194	134,5	38	125	38	120	24,7	98,5
PFEX3-52***/41***/41***/*	PFEXB7-52***/*	PFEXB7-41***/7	PFE-41***/7	215,5	203	160	38	125	38	120	38	120
PFEX3-52***/51***/31***/*	PFEXC-52***/*	PFEXA7-51***/5	PFE-31***/7	230	206	134,5	38	125	38	125	24,7	98,5
PFEX3-52***/51***/41***/*	PFEXC-52***/*	PFEXB7-51***/5	PFE-41***/7	230	206	160	38	125	38	125	38	120
PFEX3-52***/51***/51***/*	PFEXC-52***/*	PFEXC-51***/5	PFE-51***/5	230	230	186,5	38	125	38	125	38	125

**PFEXD**



For missing details see tab. A005 and A007, A180

Model code	First pump	Second pump	L1	L2	L3	L4	L5	L6	L7
PFEXD-42***/43***/0**	PFEXB7-42***	PFED-43***/0**/7	203	256	38	120	38	139,6	227,7
PFEXD-52***/43***/0**	PFEXB7-52***	PFED-43***/0**/7	215,5	256	38	125	38	199,6	227,7
PFEXD-52***/54***/0**	PFEXC-52***	PFED-54***/0**/5	230	288	38	125	38	152,3	261,8

2 MODEL CODE OF PFRX\*E

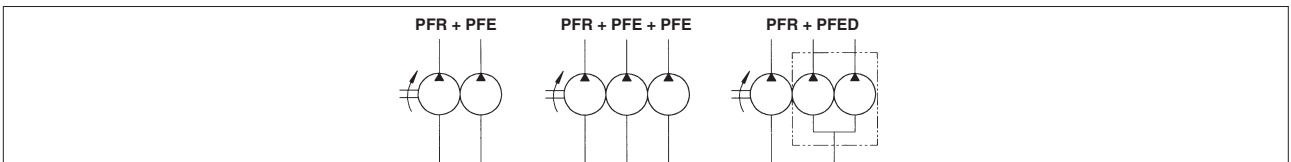
2.1 MODEL CODE OF PFRX2E, PFRX3E

<b>PFRX</b>	<b>2E</b>	-	<b>3</b>	/	<b>08</b>	/	<b>31044</b>	/	<b>31028</b>	/	<b>D</b>	/	<b>*</b>	/	<b>*</b>	/	<b>*</b>
Multiple fixed displacement radial piston/vane pump															Series number		<b>Seals material:</b> - = NBR (mineral oil & water glycol) <b>PE = FPM</b>
<b>Execution</b>																	
2E = double: PFR + PFE 3E = triple: PFR + PFEX2																	
<b>Size of first pump type PFR</b>																	
3																	
<b>Displacement of first pump type PFR [cm³/rev]</b>																	
for PFR-3: 08, 11, 15																	
<b>Size and displacement of PFE second (and third) pump</b>																	
for PFE 31: 010, 016, 022, 028, 036, 044 for PFE 41: 029, 037, 045, 056, 070, 085 for PFE 51: 090, 110, 129 for PFE 32: 016, 022, 028, 036 for PFE 42: 045, 056, 070, 085 for PFE 52: 090, 110, 129																	
<b>Size and displacement of PFE third pump</b>																	
for PFE 31: 010, 016, 022, 028, 036, 044 for PFE 41: 029, 037, 045, 056, 070, 085 for PFE 51: 090, 110, 129 for PFE 32: 016, 022, 028, 036 for PFE 42: 045, 056, 070, 085 for PFE 52: 090, 110, 129																	
<b>Port orientation</b> , see section 2.4																	
<b>Direction of rotation</b> viewed at the shaft end: <b>D</b> = clockwise (supplied standard if not otherwise specified) <b>S</b> = counter clockwise Note: PFRX*E are not reversible																	

2.2 MODEL CODE OF PFRXDE

<b>PFRX</b>	<b>DE</b>	-	<b>3</b>	/	<b>08</b>	/	<b>43045</b>	/	<b>036</b>	/	<b>D</b>	/	<b>*</b>	/	<b>*</b>	/	<b>*</b>
Multiple fixed displacement radial piston/vane pump															Series number		<b>Seals material:</b> - = NBR (mineral oil & water glycol) <b>PE = FPM</b>
<b>Execution</b>																	
DE = triple: PFR + PFED																	
<b>Size of first pump type PFR</b>																	
3																	
<b>Displacement of first pump type PFR [cm³/rev]</b>																	
for PFR-3: 08, 11, 15																	
<b>Size and displacement of PFED first element [cm³/rev]</b>																	
for PFED 43: 029, 037, 045, 056, 070, 085 for PFED 54: 090, 110, 129																	
<b>Displacement of PFED second element [cm³/rev]</b>																	
for PFED 43: 016, 022, 028, 036, 044 for PFED 54: 029, 037, 045, 056, 070, 085																	
<b>Port orientation</b> , see section 2.4																	
<b>Direction of rotation</b> viewed at the shaft end: <b>D</b> = clockwise (supplied standard if not otherwise specified) <b>S</b> = counter clockwise Note: PFRX*E are not reversible																	

2.3 HYDRAULIC SYMBOL

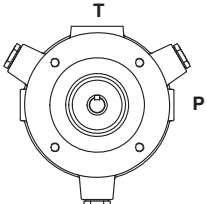
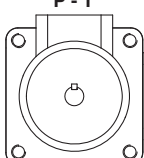
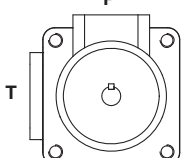
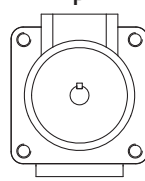
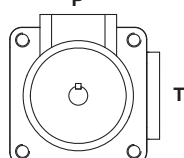


**2.4 PORT ORIENTATION**

**-PFRX2E, PFRX3E**

Pumps can be supplied with oil ports oriented in different configurations viewed from shaft end, as below indicated. Referred to the first element (PFRX\*), in second / third pumps the ports can be oriented as indicated in the picture. The third pump is always oriented as the second pump.

Model code example: PFRX2E-315/31044/DT

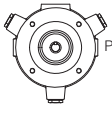
































1 <sup>st</sup> PUMP PFRX*	2 <sup>nd</sup> / 3 <sup>th</sup> PUMP PFE			
				

P = outlet port; T = inlet port

**-PFRXDE**

Pumps can be supplied with oil ports oriented in different configurations viewed from shaft end, as below indicated. The port orientation of second and third pump (PFED) is defined by codes T\*, W\*, U\*, V\* as per below table

Model code example: PFRXDE-315/43045/022/DT0

1 <sup>st</sup> PUMP PFRX*	2 <sup>nd</sup> / 3 <sup>th</sup> PUMP PFED*							
								
								
								
								

P1 outlet port of first element; P2 outlet port of second element; P3 outlet port of third element; T1 inlet port of first element; T2 inlet port of second element

## 2.5 OPERATING CHARACTERISTICS OF PFRX2E

(at 1450 rpm and based on mineral oil ISO VG46 at 50° C)

Model code (1)	Speed range [rpm] (2)	RADIAL PISTON PUMP			VANE PUMP			Total flow [l/min]
		Displacement [cm <sup>3</sup> /rev]	Flow [l/min] (3)	Max pressure [bar] (4)	Displacement [cm <sup>3</sup> /rev]	Flow [l/min] (3)	Max pressure [bar] (5)	
PFRX2E-308/31010	600-1800	8	12,6	350	10,5	15	160	27,6
PFRX2E-308/31016					16,5	23		35,6
PFRX2E-308/31022					21,6	30		42,6
PFRX2E-308/31028					28,1	40		52,6
PFRX2E-308/31036					36,5	51		63,6
PFRX2E-308/31044					43,7	63		75,6
PFRX2E-308/41029					29,3	41		53,6
PFRX2E-308/41037					36,6	52		64,6
PFRX2E-308/41045					45	64		76,6
PFRX2E-308/41056					55,8	80		92,6
PFRX2E-308/41070					69,9	101		113,6
PFRX2E-308/41085					85,3	124		136,6
PFRX2E-308/51090					90	128		140,6
PFRX2E-308/51110					109,6	157		169,6
PFRX2E-308/51129		129,2	186	198,6				
PFRX2E-311/31044		11,4	16,5	350	43,7	63	210	79,5
PFRX2E-311/41070					69,9	101		117,5
PFRX2E-311/41085					85,3	124		140,5
PFRX2E-311/51110					109,6	157		173,5
PFRX2E-311/51129					129,2	186		202,5
PFRX2E-315/41056					14,7	21,5		350
PFRX2E-315/41070		69,9	101	122,5				
PFRX2E-315/51110		109,6	157	178,5				
PFRX2E-315/51129		129,2	186	207,5				

(1) Further composition of PFR and PFE double pumps are available on request. Other composition of PFRX2E must subject to verification of max torque limits allowed by the drive shafts of PFR and PFE and by the through shaft of PFR (320 Nm).

(2) Max speed is 1800 rpm for HFDD, HFDR fluids; 1000 rpm for HFC fluids

(3) Flow rate and power consumption are proportional to revolution speed

(4) Max pressure is 250 bar for HFDD, HFDR fluids, 175 bar for HFC fluids

(5) Max pressure is 160 bar for HFDD, HFDR, HFC fluids

The shaft of the PFR pump has an eccentric cam which rotates with the shaft generating the stroke of the pistons and thus generating the flow rate.

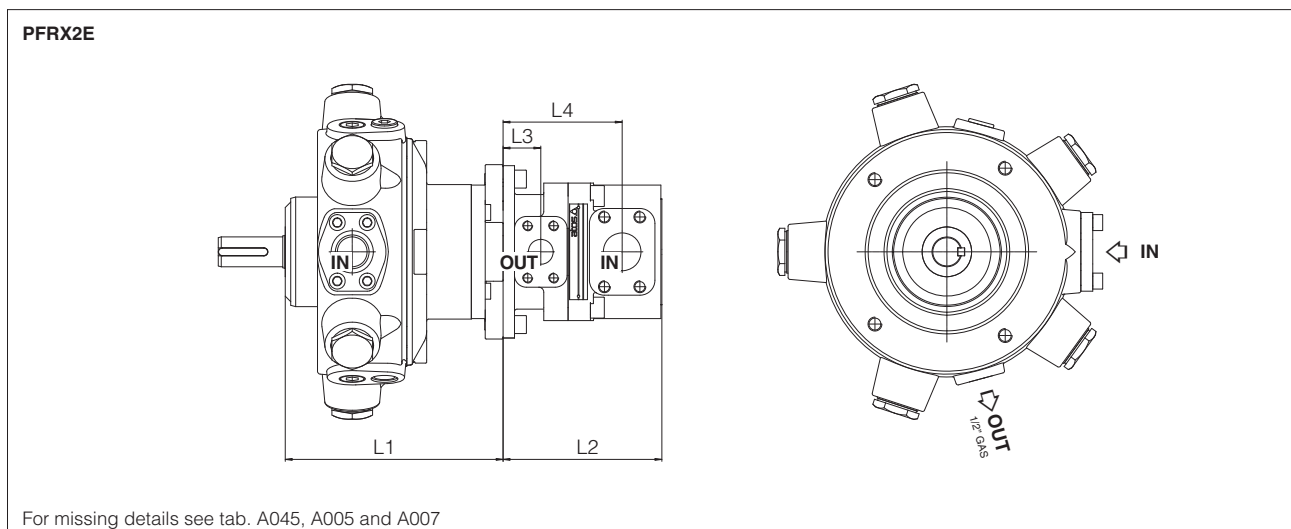
For best functioning a balanced coupling should be provided between the shaft of the motor and the shaft of the pump.

See tab. A045

## 2.6 TRIPLE PUMPS TYPE PFRX3E AND PFRXD E

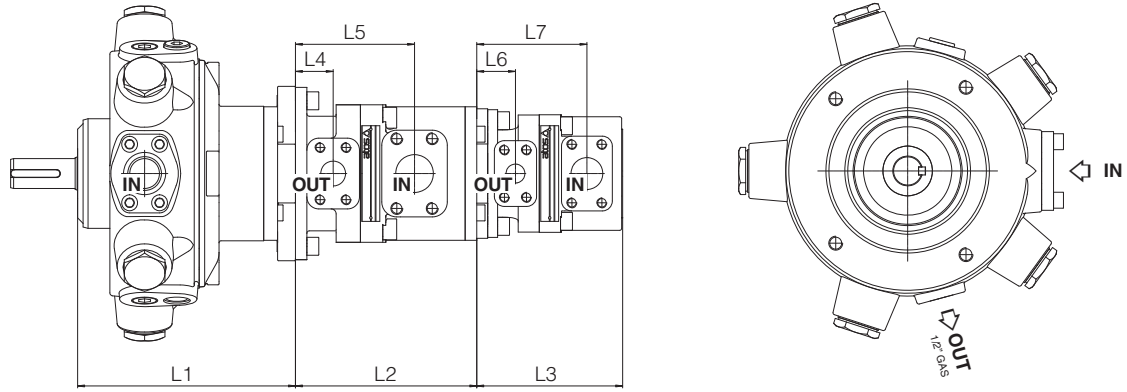
Many triple pump compositions PFRX3E = PFR + PFE<sub>X2</sub> or PFRXD E = PFR + PFE<sub>D</sub> can be realized but they must be subject to verification of max torque-limits allowed by drive shaft and through shaft of each individual basic pump according to description of first page.

## 2.7 DIMENSIONS OF PFRX\* [mm]



Model code	First element - piston pump -	Second element - vane pump -	L1	L2	L3	L4
PFRX2E-3**/31***	PFRXA-3**	PFE-31***	200	134,5	27,5	98,5
PFRX2E-3**/41***	PFRXB-3**	PFE-41***	209	160	38	120
PFRX2E-3**/51***	PFRXC-3**	PFE-51***	224	186,5	38	125

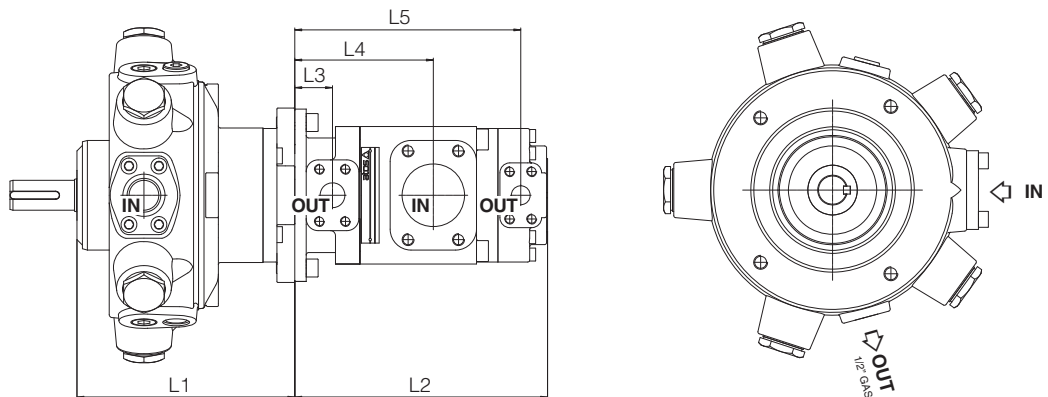
**PFRX3E**



For missing details see tab. A045, A005 and A007

Model code	First element - piston pump -	Second element - vane pump -	Third element - vane pump -	L1	L2	L3	L4	L5	L6	L7
PFRX3E-3**/31**/31***	PFRXA-3**	PFEXA-31***	PFE-31***	200	164	134,5	27,5	98,5	27,5	98,5
PFRX3E-3**/41***/31***	PFRXB-3**	PFEXA-41***	PFE-31***	209	194	134,5	38	120	27,5	98,5
PFRX3E-3**/41***/41***	PFRXB-3**	PFEXB-41***	PFE-41***	209	203	160	38	120	38	120
PFRX3E-3**/51***/31***	PFRXC-3**	PFEXA-51***	PFE-31***	224	206	134,5	38	125	27,5	98,5
PFRX3E-3**/51***/41***	PFRXC-3**	PFEXB-51***	PFE-41***	224	215,5	160	38	125	38	120
PFRX3E-3**/51***/51***	PFRXC-3**	PFEXC-51***	PFE-51***	224	230	186,5	38	125	38	125

**PFRXDE**



For missing details see tab. A045 and A180

Model code	First element - piston pump -	Second element - vane pump -	L1	L2	L3	L4	L5
PFRXDE-3**/43***/0**	PFRXB-3**	PFED-43***/0**	209	256,5	38	139,6	227,7
PFRXDE-3**/54***/0**	PFRXC-3**	PFED-54***/0**	224	288	38	152,3	261,8

PFRX\*E pumps are supplied with WFA-32 inlet flange for PFR, and set of inlet, outlet flanges for PFE or PFED;



### 3 MODEL CODE OF PVPCX2E

#### 3.1 MODEL CODE FOR PVPCX2E with mechanical controls

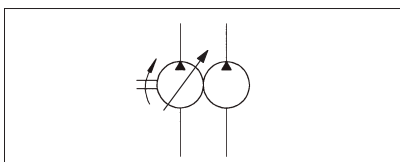
<b>PVPC</b>	<b>X2E</b>	<b>C</b>	<b>4046</b>	<b>31044</b>	<b>1</b>	<b>D</b>	<b>X</b>	<b>24DC</b>	<b>*</b>	<b>*</b>
Variable displacement axial piston pump	X2E = coupled with a fixed displacement pump type PFE (see tab. A005, A007)	<b>Type of control:</b> <b>C</b> = manual pressure compensator <b>CH</b> = manual pressure compensator, with venting <b>R</b> = remote pressure compensator <b>L</b> = load sensing (pressure & flow) <b>LW</b> = constant power (combined pressure & flow)	<b>Size and max displacement of axial piston pump:</b> <b>3029</b> = 29 cm <sup>3</sup> /rev <b>5073</b> = 73 cm <sup>3</sup> /rev <b>4046</b> = 46 cm <sup>3</sup> /rev <b>5090</b> = 88 cm <sup>3</sup> /rev	<b>Size and displacement of PFE second pump</b> for PFE 31: <b>010, 016, 022, 028, 036, 044</b> for PFE 32: <b>016, 022, 028, 036</b> for PFE 41: <b>029, 037, 045, 056, 070, 085</b> for PFE 42: <b>045, 056, 070, 085</b> for PFE 51: <b>090, 110, 129, 150</b> for PFE 52: <b>090, 110, 129, 150</b>	<b>Direction of rotation</b> viewed at the shaft end: <b>D</b> = clockwise <b>S</b> = counterclockwise	<b>Shaft (SAE Standard):</b> <b>1</b> = keyed (7/8" for 029 - 1" for 046 - 1 1/4" for 073 and 090) <b>5</b> = splined (13 teeth for 029 - 15 for 046 - 14 for 073 and 090)	<b>X</b> = without connector	<b>Coil voltage</b> - only CH version: 12DC    24/50AC 24DC    110/50AC 220/50AC	<b>Seals material:</b> - = NBR <b>PE</b> = FKM See notes under sect. 2	Series number

#### 3.2 MODEL CODE FOR PVPCX2E with electrohydraulic proportional controls

<b>PVPC</b>	<b>X2E</b>	<b>PERS-SP</b>	<b>BC</b>	<b>4046</b>	<b>31044</b>	<b>*</b>	<b>1</b>	<b>D</b>	<b>18</b>	<b>*</b>	<b>*</b>
Variable displacement axial piston pump	X2E = coupled with a fixed displacement pump type PFE (see tab. A005, A007)	<b>Type of control</b> <b>CZ</b> = proportional pressure control <b>LQZ</b> = proportional flow control (load sensing) <b>PES-SP</b> = closed loop integral digital P/Q driver <b>PERS-SP</b> = as PES plus sequence module	<b>Fieldbus interfaces</b> , USB port always present (Only for PES and PERS): <b>NP</b> = Not present <b>BC</b> = CANopen <b>EW</b> = POWERLINK <b>BP</b> = PROFIBUS DP <b>EI</b> = EtherNet/IP <b>EH</b> = EtherCAT <b>EP</b> = PROFINET RT/IRT	<b>Size and max displacement of axial piston pump:</b> <b>3029</b> = 29 cm <sup>3</sup> /rev <b>4046</b> = 46 cm <sup>3</sup> /rev <b>5073</b> = 73 cm <sup>3</sup> /rev <b>5090</b> = 88 cm <sup>3</sup> /rev	<b>Size and displacement [cm<sup>3</sup>/rev] of PFE second pump</b> for PFE 31: <b>010, 016, 022, 028, 036, 044</b> for PFE 32: <b>016, 022, 028, 036</b> for PFE 41: <b>029, 037, 045, 056, 070, 085</b> for PFE 42: <b>045, 056, 070, 085</b> for PFE 51: <b>090, 110, 129, 150</b> for PFE 52: <b>090, 110, 129, 150</b>	<b>Direction of rotation</b> viewed at the shaft end <b>D</b> = clockwise <b>S</b> = counterclockwise	<b>Shaft (SAE Standard):</b> <b>1</b> = keyed (7/8" for 029 - 1" for 046 - 1 1/4" for 073 and 090) <b>5</b> = splined (13 teeth for 029 - 15 for 046 - 14 for 073 and 090)	<b>Coil voltage</b> , for CZ, LQZ - see section 18: <b>18</b> = optional coil 18 Vdc for low current drivers instead of standard 12 Vdc	<b>Electronics options</b> , for PES and PERS (4): <b>C</b> = current feedback for pressure transducer 4±20 mA (omit for std voltage ±10Vdc) <b>I</b> = current reference input and monitor 4±20 mA (omit for std voltage ±10Vdc) <b>X</b> = on-board pressure transducer with pre-configured pressure settings (only for PERS) <b>S</b> = with 2 on-off inputs for multiple pressure PID selection for NP execution or double power supply for fieldbus execution, plus dedicated connector for remote pressure transducer	<b>Seals material:</b> - = NBR <b>PE</b> = FKM See notes under sect. 2	Series number

**Pressure setting**, only for PERS: **200** = 200 bar    **250** = 250 bar    **280** = 280 bar

#### 3.3 HYDRAULIC SYMBOL



PVPCX2E are double pumps composed by one variable displacement axial piston pump type PVPC and one vane pump type PFE. They have two separated inlet ports and two separated outlet ports.

For technical characteristics of PVPC pumps, see tab. A160;  
 for technical characteristics of PFE pumps see tab. A005 and A007.

### 3.4 OPERATING CHARACTERISTICS OF DOUBLE PUMPS TYPE PVPCX2E (with PFE-31, 41 and 51)

(at 1450 rpm and based on mineral oil ISO VG46 at 40° C)

Model code	Speed range [rpm] (1)	AXIAL PISTON PUMP			VANE PUMP			Total flow [l/min]				
		Displacement [cm <sup>3</sup> /rev]	Flow [l/min] (2)	Max pressure [bar] (3)	Displacement [cm <sup>3</sup> /rev]	Flow [l/min] (2)	Max pressure [bar] (4)					
PVPCX2E*-3029/31010	800-2400	29	42	280/350	10,5	15	210	57				
PVPCX2E*-3029/31016	800-2800				16,5	23		65				
PVPCX2E*-3029/31022					21,6	30		72				
PVPCX2E*-3029/31028					28,1	40		82				
PVPCX2E*-3029/31036					35,6	51		93				
PVPCX2E*-3029/31044	800-2500				43,7	63		105				
PVPCX2E*-3029/41029					29,3	41		83				
PVPCX2E*-3029/41037					36,6	52		94				
PVPCX2E*-3029/41045					45,0	64		106				
PVPCX2E*-3029/41056					55,8	80		122				
PVPCX2E*-3029/41070					69,9	101		143				
PVPCX2E*-3029/41085	800-2000				85,3	124		166				
PVPCX2E*-4046/31010	800-2400				46	66,7		280/350	10,5	15	210	81,7
PVPCX2E*-4046/31016	800-2600								16,5	23		89,7
PVPCX2E*-4046/31022		21,6	30	92,7								
PVPCX2E*-4046/31028		28,1	40	102,7								
PVPCX2E*-4046/31036		35,6	51	113,7								
PVPCX2E*-4046/31044	800-2500	43,7	63	129,7								
PVPCX2E*-4046/41029		29,3	41	107,7								
PVPCX2E*-4046/41037		36,6	52	118,7								
PVPCX2E*-4046/41045		45,0	64	130,7								
PVPCX2E*-4046/41056		55,8	80	146,7								
PVPCX2E*-4046/41070		69,9	101	167,7								
PVPCX2E*-4046/41085	800-2000	85,3	124	190,7								
PVPCX2E*-5073/31010	800-2400	73	105,8	280/350			10,5		15	210		120,8
PVPCX2E*-5073/31016	800-2200						16,5		23			128,8
PVPCX2E*-5073/31022					21,6	30	135,8					
PVPCX2E*-5073/31028					28,1	40	145,8					
PVPCX2E*-5073/31036					35,6	51	156,8					
PVPCX2E*-5073/31044	800-2200				43,7	63	168,8					
PVPCX2E*-5073/41029					29,3	41	146,8					
PVPCX2E*-5073/41037					36,6	52	157,8					
PVPCX2E*-5073/41045					45,0	64	169,8					
PVPCX2E*-5073/41056					55,8	80	185,8					
PVPCX2E*-5073/41070					69,9	101	206,8					
PVPCX2E*-5073/41085	800-2000				85,3	124	229,8					
PVPCX2E*-5073/51090	800-2200				90,0	128	233,8					
PVPCX2E*-5073/51110					109,6	157	262,8					
PVPCX2E*-5073/51129		129,2	186	291,8								
PVPCX2E*-5073/51150		150,2	215	320,8								
PVPCX2E*-5090/31010	800-2400	88	127,6	250/315	10,5	15	210	142,6				
PVPCX2E*-5090/31016	800-2200				16,5	23		150,6				
PVPCX2E*-5090/31022					21,6	30		157,6				
PVPCX2E*-5090/31028					28,1	40		167,6				
PVPCX2E*-5090/31036					35,6	51		178,6				
PVPCX2E*-5090/31044	800-2200				43,7	63		190,6				
PVPCX2E*-5090/41029					29,3	41		168,6				
PVPCX2E*-5090/41037					36,6	52		179,6				
PVPCX2E*-5090/41045					45,0	64		191,6				
PVPCX2E*-5090/41056					55,8	80		207,6				
PVPCX2E*-5090/41070					69,9	101		228,6				
PVPCX2E*-5090/41085	800-2000				85,3	124		251,6				
PVPCX2E*-5090/51090	800-2200				90,0	128		255,6				
PVPCX2E*-5090/51110					109,6	157		284,6				
PVPCX2E*-5090/51129		129,2	186	313,6								
PVPCX2E*-5090/51150		150,2	215	342,6								

(1) Max speed is 1800 rpm for HFDD, HFDR fluids; 1000 rpm for HFC fluids

(2) Flow rate and power consumption are proportional to revolution speed

(3) Max pressure is 190 bar for HFDD, HFDR fluids, 160 bar for HFC fluids

(4) Max pressure is 160 bar for HFDD, HFDR, HFC fluids

### 3.5 OPERATING CHARACTERISTICS OF STANDARD DOUBLE PUMPS TYPE PVPCX2E (with PFE-32, 42 and 52)

(at 1450 rpm and based on mineral oil ISO VG46 at 40° C)

Standard model	Speed range [rpm] (1)	AXIAL PISTON PUMP			VANE PUMP			Total flow [l/min]
		Displacement [cm <sup>3</sup> /rev]	Flow [l/min] (2)	Max pressure [bar] (3)	Displacement [cm <sup>3</sup> /rev]	Flow [l/min] (2)	Max pressure [bar] (4)	
PVPCX2E*-3029/32016	1200-2500	29	42	280/350	16,5	23	210	65
PVPCX2E*-3029/32022					21,6	30	300	72
PVPCX2E*-3029/32028					28,1	40		82
PVPCX2E*-3029/32036					35,6	51		93
PVPCX2E*-3029/42045	1000-2200	29	42	280/350	45,0	64	280	106
PVPCX2E*-3029/42056					55,8	80		122
PVPCX2E*-3029/42070					69,9	101		143
PVPCX2E*-3029/42085	800-2000				85,3	124		166
PVPCX2E*-4046/32016	1200-2500	46	66,7	280/350	16,5	23	210	89,7
PVPCX2E*-4046/32022					21,6	30	300	92,7
PVPCX2E*-4046/32028					28,1	40		102,7
PVPCX2E*-4046/32036					35,6	51		113,7
PVPCX2E*-4046/42045	1000-2200	46	66,7	280/350	45,0	64	280	130,7
PVPCX2E*-4046/42056					55,8	80		146,7
PVPCX2E*-4046/42070					69,9	101		167,7
PVPCX2E*-4046/42085	800-2000				85,3	124		190,7
PVPCX2E*-5073/32016	1200-2500	73	105,8	280/350	16,5	23	210	128,8
PVPCX2E*-5073/32022					21,6	30	300	135,8
PVPCX2E*-5073/32028					28,1	40		145,8
PVPCX2E*-5073/32036					35,6	51		156,8
PVPCX2E*-5073/42045	1000-2200	73	105,8	280/350	45,0	64	280	169,8
PVPCX2E*-5073/42056					55,8	80		185,8
PVPCX2E*-5073/42070					69,9	101		206,8
PVPCX2E*-5073/42085	800-2000				85,3	124		229,8
PVPCX2E*-5073/52090	800-2000	73	105,8	280/350	90,0	128	250	233,8
PVPCX2E*-5073/52110					109,6	157		262,8
PVPCX2E*-5073/52129					129,2	186		291,8
PVPCX2E*-5073/52150	800-1800				150,2	215	210	320,8
PVPCX2E*-5090/32016	1200-1850	88	127,6	280/350	16,5	23	210	150,6
PVPCX2E*-5090/32022					21,6	30	300	157,6
PVPCX2E*-5090/32028					28,1	40		167,6
PVPCX2E*-5090/32036					35,6	51		178,6
PVPCX2E*-5090/42045	1000-1850	88	127,6	280/350	45,0	64	280	191,6
PVPCX2E*-5090/42056					55,8	80		207,6
PVPCX2E*-5090/42070					69,9	101		228,6
PVPCX2E*-5090/42085	800-1850				85,3	124		251,6
PVPCX2E*-5090/52090	1000-1850	88	127,6	280/350	90,0	128	250	255,6
PVPCX2E*-5090/52110					109,6	157		284,6
PVPCX2E*-5090/52129					129,2	186		313,6
PVPCX2E*-5090/52150	800-1800				150,2	215	210	342,6

(1) Max speed is 1800 rpm for HFDD, HFDR versions; 1500 rpm for HFC fluids

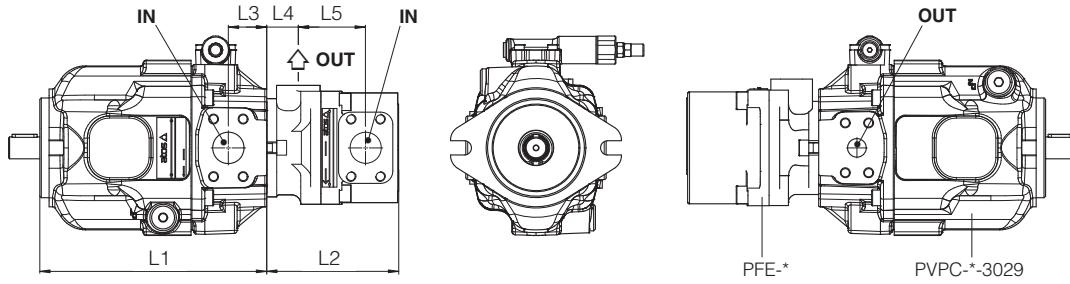
(2) Flow rate and power consumption are proportional to revolution speed

(3) Max pressure is 190 bar for HFDD, HFDR fluids, 160 bar for HFC fluids

(4) Max pressure is 160 bar for HFDD, HFDR, HFC fluids

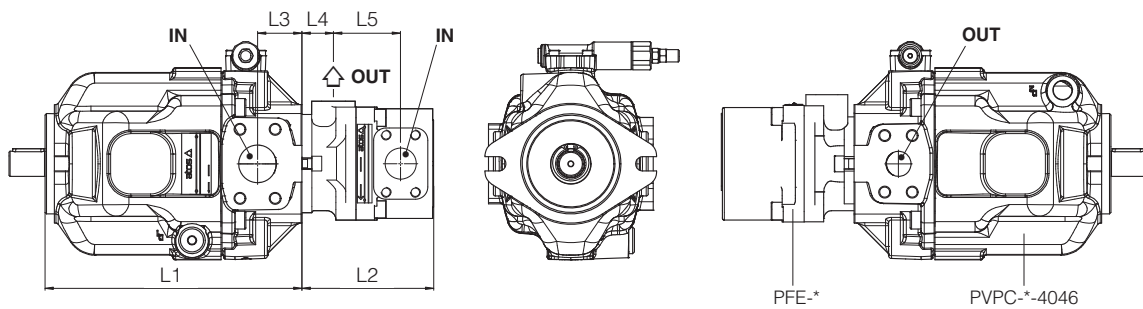
### 3.6 DIMENSIONS OF MULTIPLE PUMPS TYPE PVPCX2E [mm]

#### PVPCX2E-\*-3029



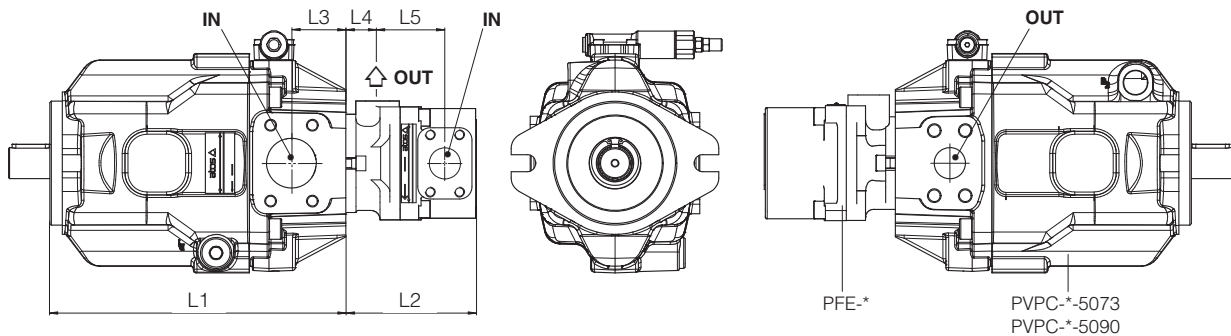
Model code	First element - piston pump -	Second element - vane pump -	L1	L2	L3	L4	L5
PVPCX2E-*-3029/3****	PVPCXA-*-3029	PFE-3****	231,2	134,5	39	27,5	71
PVPCX2E-*-3029/4****	PVPCXB-*-3029	PFE-4****	231,2	160	39	38	82

#### PVPCX2E-\*-4046



Model code	First element - piston pump -	Second element - vane pump -	L1	L2	L3	L4	L5
PVPCX2E-*-4046/3****	PVPCXA-*-4046	PFE-3****	259	134,5	45	27,5	71
PVPCX2E-*-4046/4****	PVPCXB-*-4046	PFE-4****	259	160	45	38	82

#### PVPCX2E-\*-5073 PVPCX2E-\*-5090



Model code	First element - piston pump -	Second element - vane pump -	L1	L2	L3	L4	L5
PVPCX2E-*-5073/3****	PVPCXA-*-5073	PFE-3****	303,6	134,5	55,7	27,5	71
PVPCX2E-*-5073/4****	PVPCXB-*-5073	PFE-4****	303,6	160	55,7	38	82
PVPCX2E-*-5073/5****	PVPCXC-*-5073	PFE-5****	303,6	186,5	55,7	38	87
PVPCX2E-*-5090/3****	PVPCXA-*-5090	PFE-3****	303,6	134,5	55,7	27,5	71
PVPCX2E-*-5090/4****	PVPCXB-*-5090	PFE-4****	303,6	160	55,7	38	82
PVPCX2E-*-5090/5****	PVPCXC-*-5090	PFE-5****	303,6	186,5	55,7	38	87

#### 4 RELATED DOCUMENTATION

<b>A005, A007</b>	Vane pumps type PFE	<b>A160, AS170</b>	Axial piston pumps type PVPC
<b>A180</b>	Double vane pumps type PFED	<b>A900</b>	Operating and maintenance information for pumps
<b>A045</b>	Radial piston pumps type PFR		