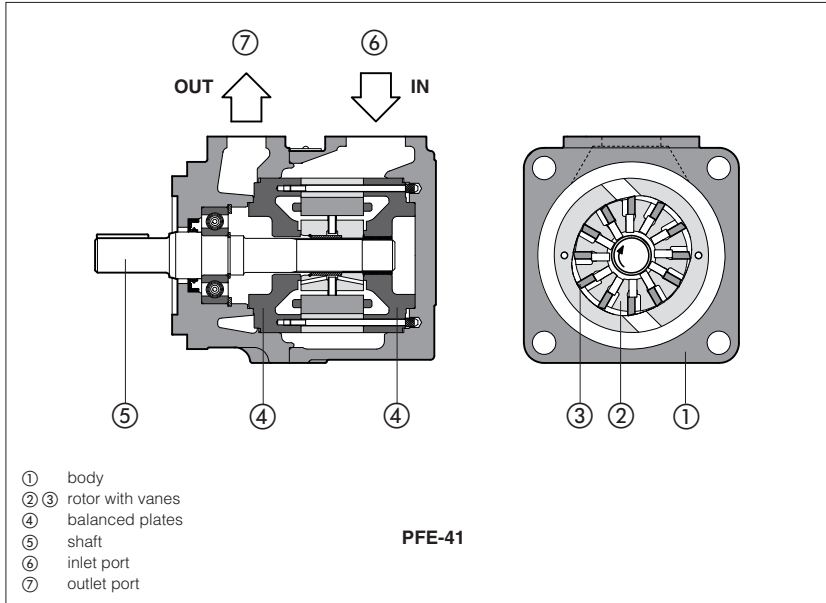


Vane pumps type PFE-31, PFE-41, PFE-51

fixed displacement - cartridge design



PFE-*1 are fixed displacement-twelve-vane pumps, ② ③ cartridge design with integral hydraulic balancing ④ for high pressure operation, long service life and low noise level.

They are available in three different sizes with max displacements up to 44, 85 and 150 cm³/rev and single, multiple or with through-shaft configurations.

Mounting flange according to SAE J744 standard.

Inlet and outlet ports can be oriented in four different positions to match any installation requirement.

Simplified maintenance as the pumping cartridge can be easily replaced.

Max pressure 210 bar.

1 MODEL CODE

| | | | | | | | | | |
|---|-----------|-------------|------------|---------------|------------|----------|----------|--|---|
| PFE | X2 | - 31 | 036 | /31028 | / 1 | D | T | ** | /* |
| Fixed displacement vane pump | | | | | | | | | Seals material: omit for NBR (mineral oil & water glycol) PE = FPM |
| <p>Additional suffix for multiple pumps: X2 = double pump composed of single vane pumps X3 = triple pump composed of single vane pumps</p> <p>Eventual suffix for pumps with through shaft: XA = for coupling one PFE-31 XB = for coupling one PFE-41 (only for PFE-41 and PFE-51) XC = for coupling one PFE-51 (only for PFE-51) XO = with through shaft, without rear flange</p> <p>Note: multiple pumps are assembled in decreasing order of size. See also tab. A190.</p> | | | | | | | | <p>Series number</p> | |
| <p>Size, see section ②: 31, 41, 51</p> | | | | | | | | <p>Port orientation, see section ⑤: T = standard U, V, W = on request</p> | |
| <p>Displacement [cm³/rev], see section ② for PFE 31: 010, 016, 022, 028, 036, 044 for PFE 41: 029, 037, 045, 056, 070, 085 for PFE 51: 090, 110, 129, 150</p> | | | | | | | | <p>Direction of rotation (viewed from the shaft end): D = clockwise (supplied standard if not otherwise specified) S = counterclockwise Note: PFE are not reversible</p> | |
| <p>Only for multiple pumps PFE*: type of second (and third) pump</p> | | | | | | | | <p>Drive shaft, see section ⑥ and ⑦: cylindrical, keyed for single and multiple pump (only first position) 1 = standard 2 = long version (only for PFE-41 and PFE-51) 3 = for high torque applications splined 5 = for single and multiple pumps (any position) 6 = for single and multiple pumps (only first position) 7 = for second and third position in multiple pumps } only for PFE-31 and PFE-41</p> | |

2 OPERATING CHARACTERISTICS at 1450 rpm (based on mineral oil ISO VG 46 at 50°C)

| Model | Displacement cm ³ /rev | Max pressure (1) | Speed range rpm (2) | 7 bar (3) | | 70 bar (3) | | 140 bar (3) | | 210 bar (3) | | |
|-----------|--------------------------------------|---------------------|------------------------|-----------|----------|------------|-----|-------------|-----|-------------|-----|------|
| | | | | l/min | kW | l/min | kW | l/min | kW | l/min | kW | |
| PFE-31010 | 10,5 | 210 bar | 800-2400 | 15 | 0,2 | 13,5 | 2 | 12 | 5 | - | - | |
| PFE-31016 | 16,5 | | | 23 | 0,5 | 21 | 3 | 19 | 5 | 16 | 8,3 | |
| PFE-31022 | 21,6 | | | 800-2800 | 30 | 0,6 | 28 | 4 | 26 | 7 | 23 | 10,8 |
| PFE-31028 | 28,1 | | | | 40 | 0,8 | 38 | 5,5 | 36 | 10 | 33 | 14 |
| PFE-31036 | 35,6 | | | | 51 | 1 | 49 | 7 | 46 | 12,5 | 43 | 17,8 |
| PFE-31044 | 43,7 | | | 800-2500 | 63 | 1,3 | 61 | 8 | 58 | 15,5 | 55 | 22 |
| PFE-41029 | 29,3 | | | | 41 | 0,8 | 39 | 5,5 | 37 | 10 | 34 | 14,7 |
| PFE-41037 | 36,6 | | | | 52 | 1 | 50 | 7 | 48 | 12,5 | 45 | 18,3 |
| PFE-41045 | 45,0 | | | | 64 | 1,3 | 62 | 8,5 | 60 | 16 | 57 | 22,6 |
| PFE-41056 | 55,8 | | | | 80 | 1,6 | 78 | 11 | 75 | 21 | 72 | 28 |
| PFE-41070 | 69,9 | | | | 101 | 2 | 98 | 13,5 | 95 | 26 | 91 | 35 |
| PFE-41085 | 85,3 | | | 800-2000 | 124 | 2,4 | 121 | 16 | 118 | 32 | 114 | 43 |
| PFE-51090 | 90,0 | | | | 128 | 2,7 | 124 | 17 | 119 | 33 | 114 | 45 |
| PFE-51110 | 109,6 | | | | 800-2200 | 157 | 3,2 | 152 | 21 | 147 | 40 | 141 |
| PFE-51129 | 129,2 | | | 186 | | 3,7 | 180 | 25 | 174 | 47 | 168 | 65 |
| PFE-51150 | 150,2 | 800-1800 | 215 | 4,2 | | 211 | 29 | 204 | 55 | 197 | 75 | |

- (1) Max pressure is 160 bar for /PE version and water glycol fluid
- (2) Max speed is 1800 rpm for /PE versions; 1500 rpm for water glycol fluid
- (3) Flow rate and power consumption are proportional to the rotation speed, see section ④

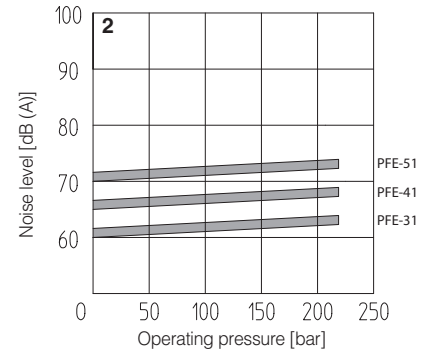
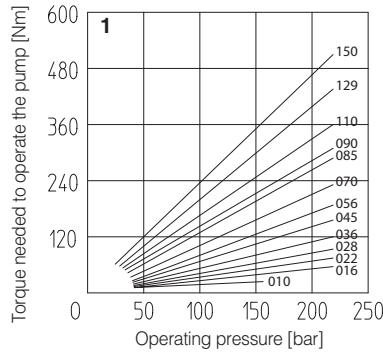
3 MAIN CHARACTERISTICS OF VANE PUMPS TYPE PFE-*1

| | | | | | | | | | |
|------------------------------------|---|-------------------|------------------------|------------------------------------|------------------------|-------------------|-----------------------|--|-----------------------|
| Installation position | Any position | | | | | | | | |
| Loads on the shaft | Axial and radial loads are not allowed on the shaft. The coupling should be sized to absorb the power peak. | | | | | | | | |
| Ambient temperature | from -20°C to +70°C | | | | | | | | |
| Fluid | Hydraulic oil as per DIN 51524...535; for other fluids see section I | | | | | | | | |
| Recommended viscosity | <table border="0"> <tr> <td>max at cold start</td> <td>800 mm²/s</td> </tr> <tr> <td>max at full power during operation</td> <td>100 mm²/s</td> </tr> <tr> <td>min at full power</td> <td>24 mm²/s</td> </tr> <tr> <td></td> <td>10 mm²/s</td> </tr> </table> | max at cold start | 800 mm ² /s | max at full power during operation | 100 mm ² /s | min at full power | 24 mm ² /s | | 10 mm ² /s |
| max at cold start | 800 mm ² /s | | | | | | | | |
| max at full power during operation | 100 mm ² /s | | | | | | | | |
| min at full power | 24 mm ² /s | | | | | | | | |
| | 10 mm ² /s | | | | | | | | |
| Fluid contamination class | ISO 4401 class 21/19/16 NAS 1638 class 10 (filters at 25 μm value with β ₂₅ ≥ 75 recommended) | | | | | | | | |
| Fluid temperature | -20°C +60°C -20°C +50°C (water glycol) -20°C +80°C (/PE seals) | | | | | | | | |
| Recommended pressure on inlet port | from -0,15 to 1,5 bar for speed up to 1800 rpm; from 0 to +1,5 bar for speed over 1800 rpm | | | | | | | | |

4 DIAGRAMS (based on mineral oil ISO VG 46 at 50°C)

1 = Torque versus pressure diagram

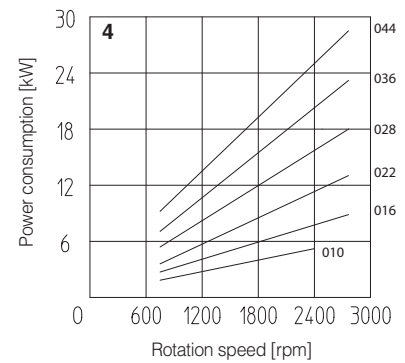
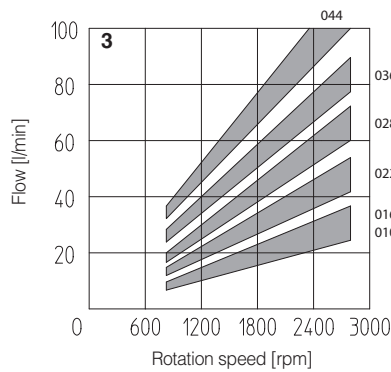
2 = Ambient noise levels measured in compliance with ISO 4412-1 oleohydraulics -Test procedure to define the ambient noise level - Pumps Shaft speed: 1450 rpm.



PFE-31:

3 = Flow versus speed diagram with pressure variation from 7 bar to 210 bar.

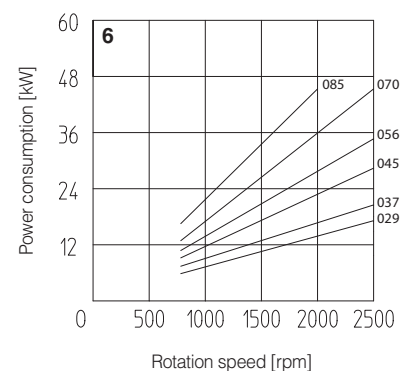
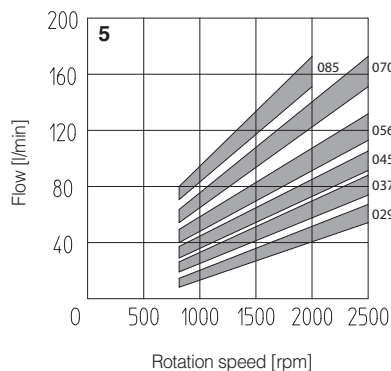
4 = Power consumption versus speed diagram at 140 bar. Power consumption is proportional to operating pressure.



PFE-41:

5 = Flow versus speed diagram with pressure variation from 7 bar to 210 bar.

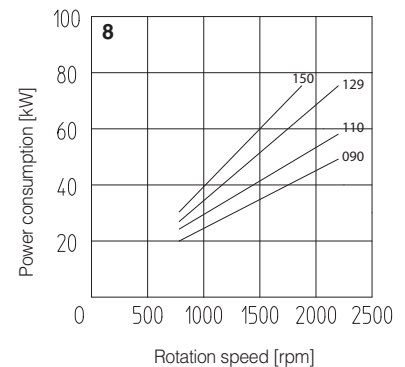
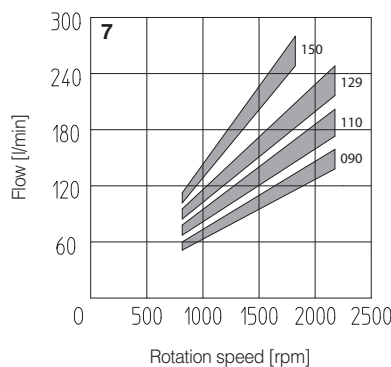
6 = Power consumption versus speed diagram at 140 bar. Power consumption is proportional to operating pressure.



PFE-51:

7 = Flow versus speed diagram with pressure variation from 7 bar to 210 bar.

8 = Power consumption versus speed diagram at 140 bar. Power consumption is proportional to operating pressure.

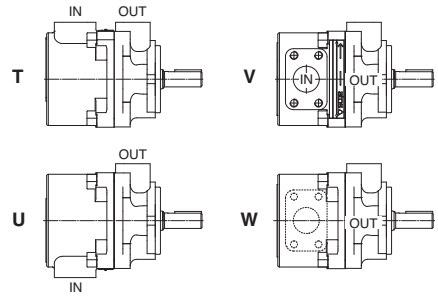


5 PORT ORIENTATION

Single pumps can be supplied with oil ports oriented in different configuration in relation to the drive shaft, as follows (viewed from the shaft end);

- T** = inlet and outlet ports on the same axis (standard)
- U** = outlet orientated 180° with respect to the inlet
- V** = outlet oriented 90° with respect to the inlet
- W** = outlet oriented 270° with respect to the inlet

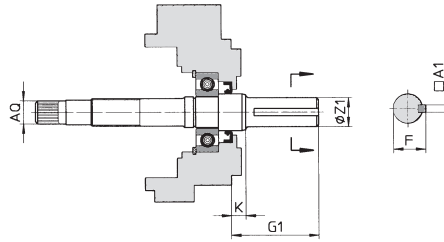
In multiple pumps inlet ports and outlet ports are in line.
Ports orientation can be easily changed by rotating the pump body that carries inlet port.



6 DRIVE SHAFT

CYLINDRICAL SHAFT KEYED

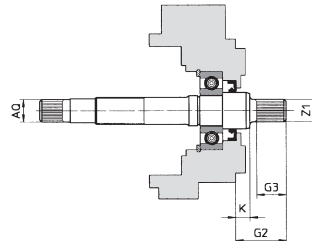
- 1** = for single and multiple pumps (only first position) supplied as standard if not specified in the model code
- 2** = for single and multiple pumps (only first position) long version (only for PFE-41 and PFE-51)
- 3** = for single and multiple pumps (only first position) for high torque applications



| Model | Keyed shaft type 1 (standard) | | | | | | Keyed shaft type 2 | | | | | | Keyed shaft type 3 | | | | | |
|--------|-------------------------------|-------|-------|-------|-------|---------------|--------------------|-------|-------|------|-------|---------------|--------------------|-------|-------|-------|-------|---------------|
| | A1 | F | G1 | K | ØZ1 | Ø AQ | A1 | F | G1 | K | ØZ1 | Ø AQ | A1 | F | G1 | K | ØZ1 | Ø AQ |
| PFE-31 | 4,78 | 21,11 | 56,00 | 8,00 | 19,05 | SAE 16/32-9T | - | - | - | - | - | - | 4,78 | 24,54 | 56,00 | 8,00 | 22,22 | SAE 16/32-9T |
| | 4,75 | 20,94 | | | 19,00 | | | | | | | | 4,75 | 24,41 | | | 22,20 | |
| PFE-41 | 4,78 | 24,54 | 59,00 | 11,40 | 22,22 | SAE 32/64-24T | 6,36 | 25,03 | 71,00 | 8,00 | 22,22 | SAE 32/64-24T | 6,38 | 28,30 | 78,00 | 11,40 | 25,38 | SAE 32/64-24T |
| | 4,75 | 24,41 | | | 22,20 | | 6,35 | 24,77 | | | 22,20 | | 6,35 | 28,10 | | | 25,36 | |
| PFE-51 | 7,97 | 35,33 | 73,00 | 14 | 31,75 | SAE 16/32-13T | 7,95 | 35,33 | 84,00 | 8,10 | 31,75 | SAE 16/32-13T | 7,97 | 38,58 | 84,00 | 14 | 34,90 | SAE 16/32-13T |
| | 7,94 | 35,07 | | | 31,70 | | 7,94 | 35,07 | | | 31,70 | | 7,94 | 38,46 | | | 34,88 | |

SPLINED SHAFT

- 5** = for single and multiple pumps (any position) for PFE-31 according to SAE A 16/32 DP, 9 teeth; for PFE-41 according to SAE B 16/32 DP, 13 teeth; for PFE-51 according to SAE C 12/24 DP, 14 teeth;
- 6** = for single and multiple pumps (only first position) for PFE-31 and PFEX*-31 according to SAE B 16/32 DP, 13 teeth; for PFE-41 and PFEX*-41 according to SAE C 12/24 DP, 14 teeth;
- 7** = for second and third position pump in multiple configuration: for PFEX*-31 according to SAE B 16/32 DP, 13 teeth; for PFEX*-41 according to SAE C 12/24 DP, 14 teeth;



| Model | Splined shaft type 5 | | | | | Splined shaft type 6 | | | | | Splined shaft type 7 | | | | |
|--------|----------------------|-------|------|---------------|---------------|----------------------|----|------|---------------|---------------|----------------------|----|------|---------------|---------------|
| | G2 | G3 | K | Z1 | Ø AQ | G2 | G3 | K | Z1 | Ø AQ | G2 | G3 | K | Z1 | Ø AQ |
| PFE-31 | 32,00 | 19,50 | 6,50 | SAE 16/32-9T | SAE 16/32-9T | 41,00 | 28 | 8,00 | SAE 16/32-13T | SAE 16/32-9T | 32,00 | 19 | 8,00 | SAE 16/32-13T | SAE 16/32-9T |
| PFE-41 | 41,25 | 28 | 8,00 | SAE 16/32-13T | SAE 32/64-24T | 55,60 | 42 | 8,00 | SAE 12/24-14T | SAE 32/64-24T | 41,60 | 28 | 8,00 | SAE 12/24-14T | SAE 32/64-24T |
| PFE-51 | 56,00 | 42 | 8,10 | SAE 12/24-14T | SAE 16/32-13T | - | - | - | - | - | - | - | - | - | - |

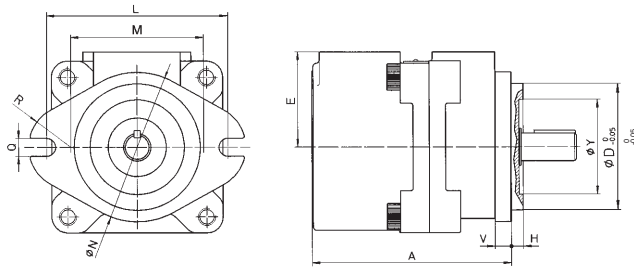
7 LIMITS OF SHAFT TORQUE

| Pump model | Maximum driving torque [Nm] | | | | | | Maximum torque available at the end of the through shaft [Nm] |
|------------|-----------------------------|--------------|--------------|--------------|--------------|--------------|---|
| | Shaft type 1 | Shaft type 2 | Shaft type 3 | Shaft type 5 | Shaft type 6 | Shaft type 7 | Any type of shaft |
| PFE-31 | 160 | - | 240 | 110 | 240 | 240 | 130 |
| PFE-41 | 250 | 250 | 400 | 200 | 400 | 400 | 250 |
| PFE-51 | 500 | 500 | 850 | 450 | - | - | 400 |

The values of torque required to operate the pumps are shown for each type on the "torque versus pressure" diagram at section 4. In multiple pumps the total torque applied to the shaft of the first element (drive shaft) is the sum of the single torque needed for operating each single pump and it is necessary to verify that this total torque applied to the drive shaft is not higher than the values indicated in the table.

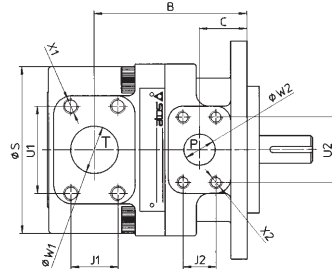
8 DIMENSIONS OF SINGLE PUMPS [mm]

T = inlet port
P = outlet port



SAE FLANGES

PFE-31: port T = 1 1/4"; port P = 3/4"
PFE-41: port T = 1 1/2"; port P = 1"
PFE-51: port T = 2; port P = 1 1/4"



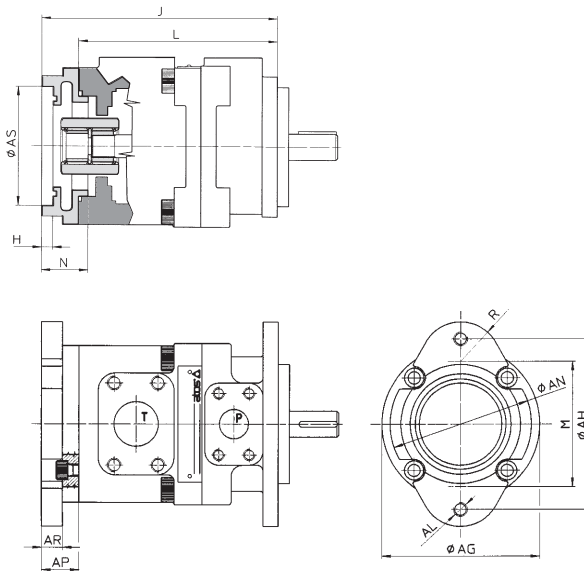
Mass:
PFE-31 = 9 kg
PFE-41 = 14 kg
PFE-51 = 25,5 kg

SAE flanges can be supplied with the pump, see www.sco da.it, tab. SK155

| Model | A | B | C | ØD | E | H | L | M | ØN | Q | R |
|--------|-------|------|------|-------|------|------|------|-------|--------|--------|------|
| PFE-31 | 136 | 100 | 28 | 82,5 | 70 | 6,4 | 106 | 73 | 95 | 11,1 | 28,5 |
| PFE-41 | 160 | 120 | 38 | 101,6 | 76,2 | 9,7 | 146 | 107 | 120 | 14,3 | 34 |
| PFE-51 | 186,5 | 125 | 38 | 127 | 82,6 | 12,7 | 181 | 143,5 | 148 | 17,5 | 35 |
| Model | ØS | U1 | U2 | V | ØW1 | ØW2 | J1 | J2 | X1 | X2 | ØY |
| PFE-31 | 114 | 58,7 | 47,6 | 10 | 32 | 19 | 30,2 | 22,2 | M10X20 | M10X17 | 47 |
| PFE-41 | 134 | 70 | 52,4 | 13 | 38 | 25 | 35,7 | 26,2 | M12X20 | M10X17 | 76 |
| PFE-51 | 160 | 77,8 | 58 | 15 | 51 | 32 | 42,9 | 30,2 | M12X20 | M10X20 | 76 |

9 DIMENSIONS OF PUMPS WITH THROUGH-SHAFT (FOR MULTIPLE PUMPS) [mm]

T = inlet port
P = outlet port



SAE FLANGES

PFEX-31: port T = 1 1/4"; port P = 3/4"
PFEX-41: port T = 1 1/2"; port P = 1"
PFEX-51: port T = 2; port P = 1 1/4"

For other dimensions, see section 8

| Model | Ø AG | Ø AH | AL | Tightening torque (Nm) ⁽¹⁾ | Ø AN | AP | AR | Ø AS | H | J | L | M | N | R |
|----------|------|------|--------|---------------------------------------|------|------|------|------------------|----------------|-------|-------|-------|----|------|
| PFEXA-31 | 114 | 106 | M10X17 | 70 | 95 | 33 | 25 | 82,57 82,63 | 6,42 6,47 | 165,5 | 132,5 | 79 | 32 | 28,5 |
| PFEXA-41 | 134 | 106 | M10X17 | 70 | 95 | 23 | 11 | 82,57 82,63 | 6,42 6,47 | 194 | 171 | 73 | 32 | 28,5 |
| PFEXB-41 | 134 | 146 | M12 | 125 | 120 | 32 | 18 | 101,62 101,68 | 9,73 9,78 | 203 | 171 | 107 | 41 | 34 |
| PFEXA-51 | 134 | 106 | M10X17 | 70 | 95 | 22,7 | 11 | 82,57 82,63 | 6,42 6,47 | 206,2 | 183,5 | 73 | 32 | 28,5 |
| PFEXB-51 | 134 | 146 | M12 | 125 | 120 | 32 | 18 | 101,62 101,68 | 9,73 9,78 | 215,5 | 183,5 | 107 | 41 | 34 |
| PFEXC-51 | 134 | 181 | M16 | 300 | 148 | 46,5 | 30,7 | 127,02 127,02 | 12,73 12,78 | 230 | 183,5 | 143,5 | 56 | 35 |

(1) Tightening torque for screw class 12.9