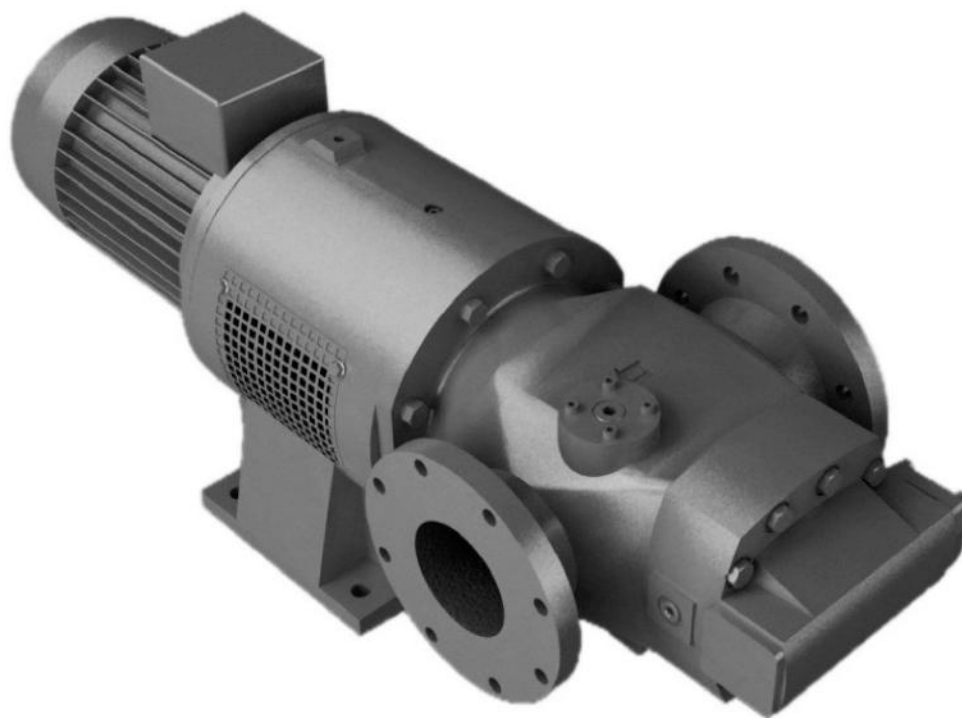


ACF5 Std Line



Product Description



| | |
|-----------------------------------|--|
| Flow volume: | 310 - 2900 l/min |
| Max differential pressure: | 16 bar |
| Applications: | Circulation, lubrication and transfer |

ALSO VALID FOR PUMP SERIES UCF Generation 5

1.1 Functionality

The ACF/UCF pumps are used for a number of different fluids:

Lubrication oil, fuel oil, vegetable oil, hydraulic oil and any non-aggressive fluid with sufficient lubricating properties.

If requested, the ACF/UCF pump may be certified according to any of following classification societies: DNV, BV, LRS, ABS, RS, GL, RINA, KR, NK, RMR or CCS.

Accuracy of performance according to VDMA 28284 group 2.

1.2 Applications

Typical applications are:

- Lubrication of diesel engines, gears, gas and steam turbines, hydro turbines and paper machines
- Main and pre-lube for diesel engines
- Circulation for cooling and filtration in large machineries and hydraulic systems
- Transformer oil for insulation in transformers
- Transfer onboard vessels, in power plants, oil factories, refineries, tank farms etc
- Filling of pressure chambers in hydraulic presses

1.3 Use in potentially explosive areas

The pump fulfils the requirements according to EU explosion-protection directive 2014/34/EU (ATEX 100a) for devices in device class II, category 2G.

Classification into temperature classes according to DIN EN 80079-36 depends on the temperature of the pumped liquid.

Refer to the proposal or order documentation for the maximum permissible liquid temperature for the respective temperature classes.

Note: When operating the pump in category 2, suitable measures must be provided to prevent impermissible warming of the pump surfaces in the event of disturbance.

1.4 Installation

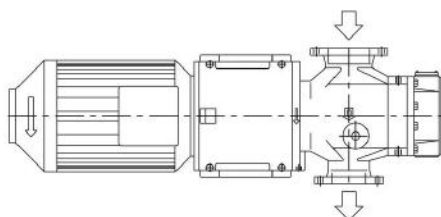
The pump is designed to be flange-mounted to its electric motor via a connecting frame and a flexible shaft coupling. By the connecting frame, the pump may be installed both horizontally and vertically. For vertical installations, feet can be supplied.

For pipe connections, standard for ACF series is DIN-type. For UCF, the standard is ANSI.

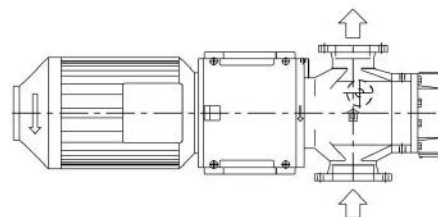
Note that for UCF, a version for horizontal installation with feet are available (version xxFx). See section Pump Model code

As standard the pump is delivered with the discharge side to the left when seen from the pump rear end (see below).

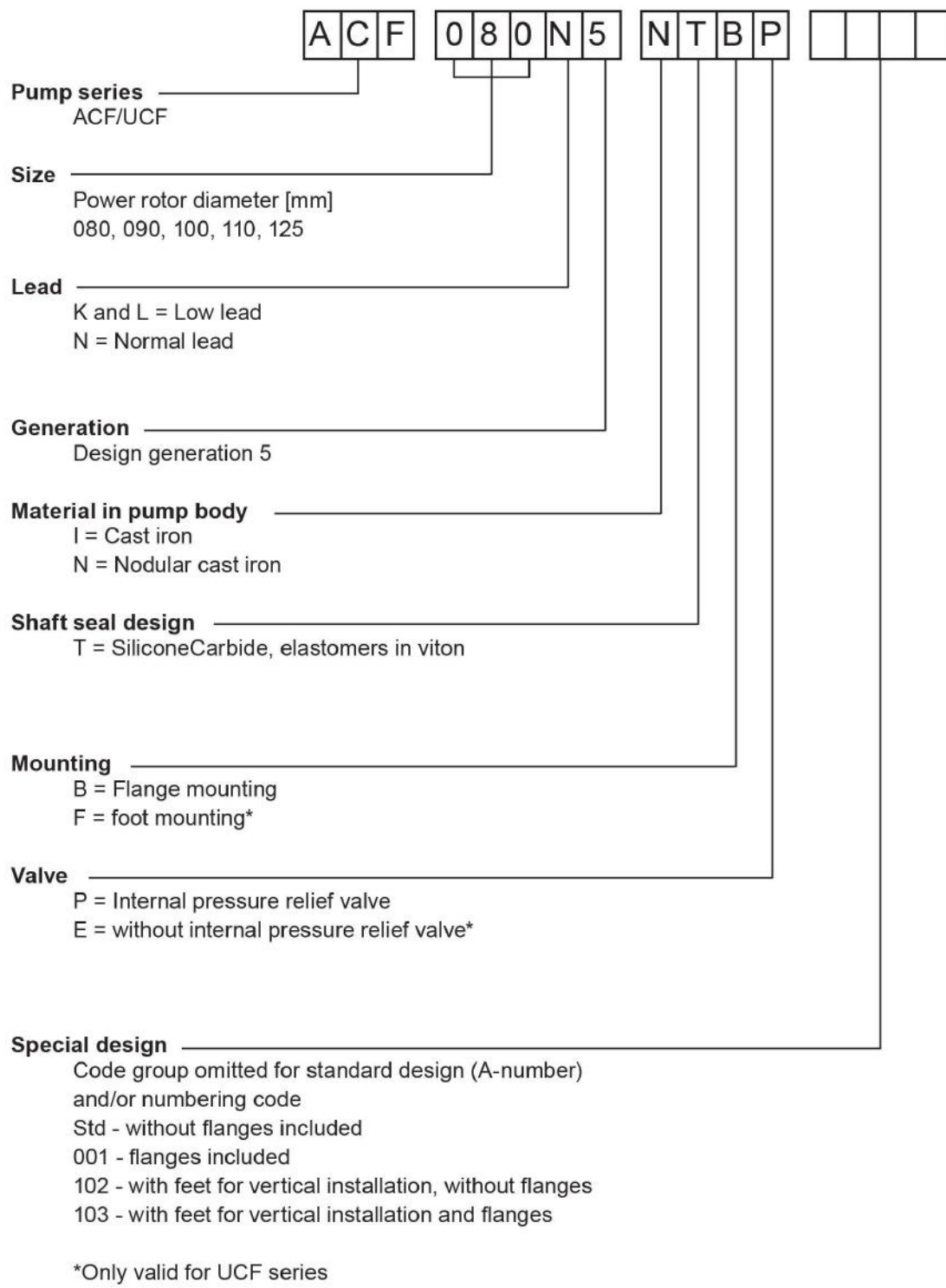
For more information about installation, see Installation and Start-up instruction for low pressure pumps.



Mounting standard picture M93-0.



On request the pump can be delivered with opposite flow direction, M39-0.



ACF5 1103.02 en-GB, ID-No.: 901920172, 160-452/A

3.1 Pressure Information

Pressure relief valve

The pump is equipped with an internal pressure relief valve with internal return, limiting the differential pressure across the pump and protecting the pump. Should the discharge line be blocked, the relief valve will open by the pressure. The valve is adjustable for different opening pressures.

The value of the pressure limit can be set at the factory and should be adjusted at installation (see Installation & Start-up instruction for low-pressure pumps).

The maximum pressure accumulation varies with pump size, speed and viscosity, but will normally not exceed 5 bar.

The valve has a maximum set pressure of 16 bar.

Inlet pressure

Minimum inlet pressure (suction capability) is dependent on fluid viscosity and rotation speed. It increases with decreasing viscosity and decreasing speed. Information about minimum inlet pressure for each individual duty case can be obtained from IMO AB or pump selection software WinPump.

Maximum inlet pressure is 7 bar.

Discharge pressure

Maximum discharge pressure is 16 bar.

Differential pressure

Maximum differential pressure is 16 bar but reduced at low viscosities according to table below

| | | | | | |
|---------------------------|-----|---|-----|-----|-----|
| Viscosity [cSt] | 1,4 | 2 | 6 | 10 | >38 |
| Max. diff. pressure [bar] | 4,3 | 5 | 7,7 | 9,5 | 16 |

Refer to your IMO representative or use the pump selection software WinPump to determine the exact operating limits.

3.2 Driver information

Driver type

The pump is designed to be connected to an electrical motor via a flexible shaft coupling.

Under certain conditions, other types of drive can be permitted, e.g. gear or pulley drives, which create radial loads onto the shaft end.

For radial load requirements, contact IMO AB.

Speed

The maximum speed is 1800 rpm. Maximum operating speed may be reduced depending on inlet conditions. Contact IMO or use the pump selection software WinPump to find a corresponding speed limit in order to avoid cavitation problems. For information about cavitation see section IMO Tuning.

Rotation

The pump is designed to operate in one rotational direction only, as standard clockwise when facing the shaft end. Pumps for CCW operation can be delivered on special request.

For shorter periods of time, a few minutes for emptying a discharge line, the pump may be operated in reverse direction, provided the back pressure is limited to 3 bar.

3.3 Sound level

Typical pump sound levels refer to free field conditions at a distance of 1 m from the pump. Noise of driver excluded in the quoted figures. The sound levels are measured at a discharge pressure of 7 bar, speed 1450 rpm and viscosity 37 cSt.

| | | | | | |
|-------------------|-----|-----|-----|-----|-----|
| Pump Size | 080 | 090 | 100 | 110 | 125 |
| Sound level dB[A] | 73 | 74 | 75 | 76 | 77 |

3.4 Moment of Inertia

| | | | | | |
|--------------------------------------|-----|-----|------|------|------|
| Size | 080 | 090 | 100 | 110 | 125 |
| [10 ⁻³ kgm ²] | 5,3 | 8,2 | 17,2 | 24,6 | 43,9 |

3.5 Fluid viscosity

1,4 – 5000 cSt.

3.6 Fluid temperature

Cast Iron version (Ixxx): -20 – +90 °C

Nodular Cast Iron version (Nxxx): -20 – +130 °C

4.1 Ball bearing

The pump is fitted with internal ball bearing which continuously is being greased by the handling media.

4.2 Material & design

| Model | Material pump | Material rotor | Material idler | Material seal | Material Elastomers |
|-----------------|--------------------------------|--------------------------------------|--------------------------------------|-----------------------------|---------------------|
| ACF I/ UCF I | Grey cast iron | Structural steel, surface treated | Structural steel, surface treated | SiliconCarbide (SiC/SiC) | Viton |
| ACF N/ UCF N | Nodular (ductile) cast iron | Structural steel, surface treated | Structural steel, surface treated | SiliconCarbide (SiC/SiC) | Viton |

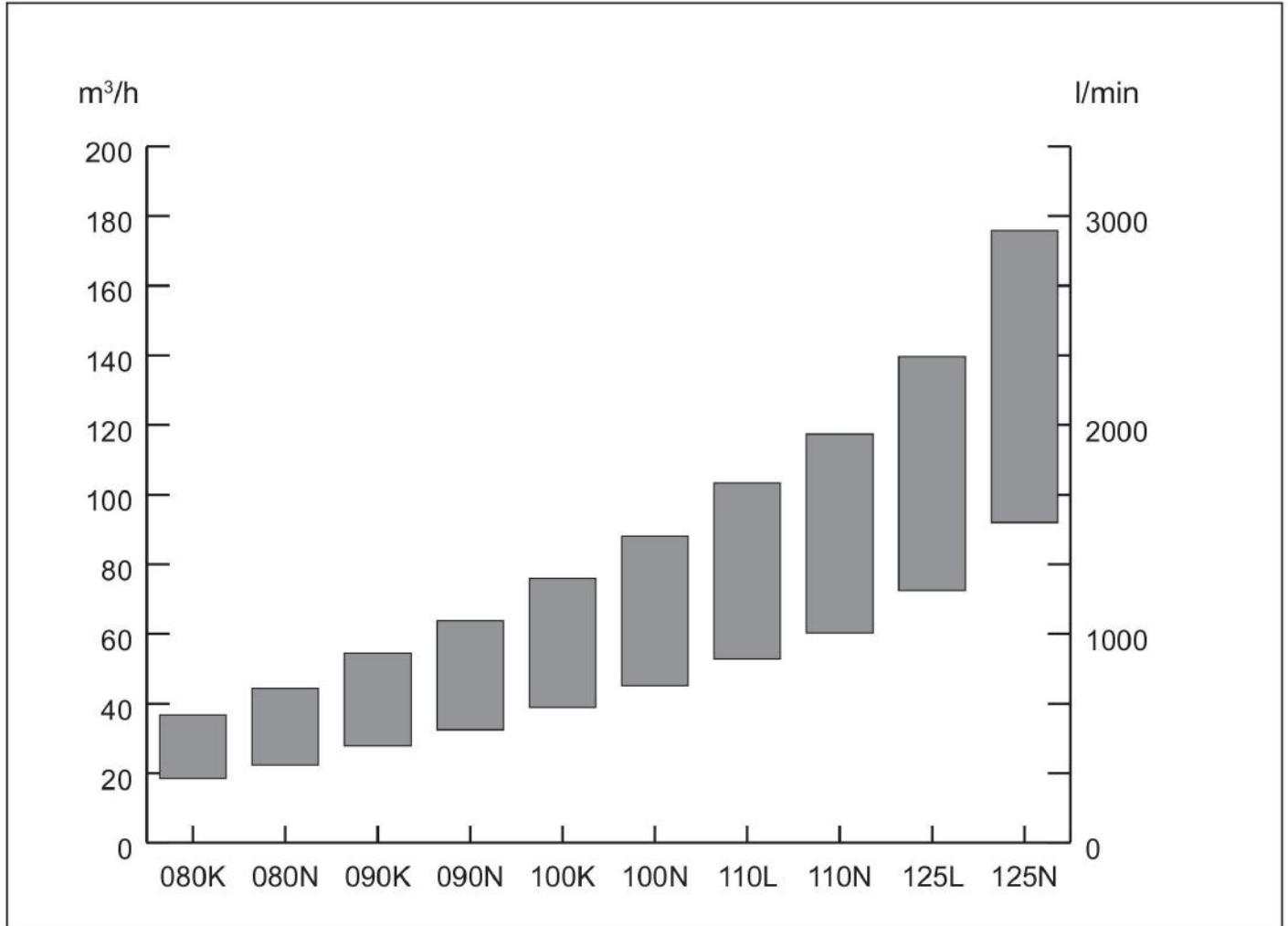
For handling of fluids which may be aggressive to above materials, consult IMO AB.

5. Performance Guide

Typical performance values at 5 bar

Flow calculated at 26 cSt, power at 260 cSt.

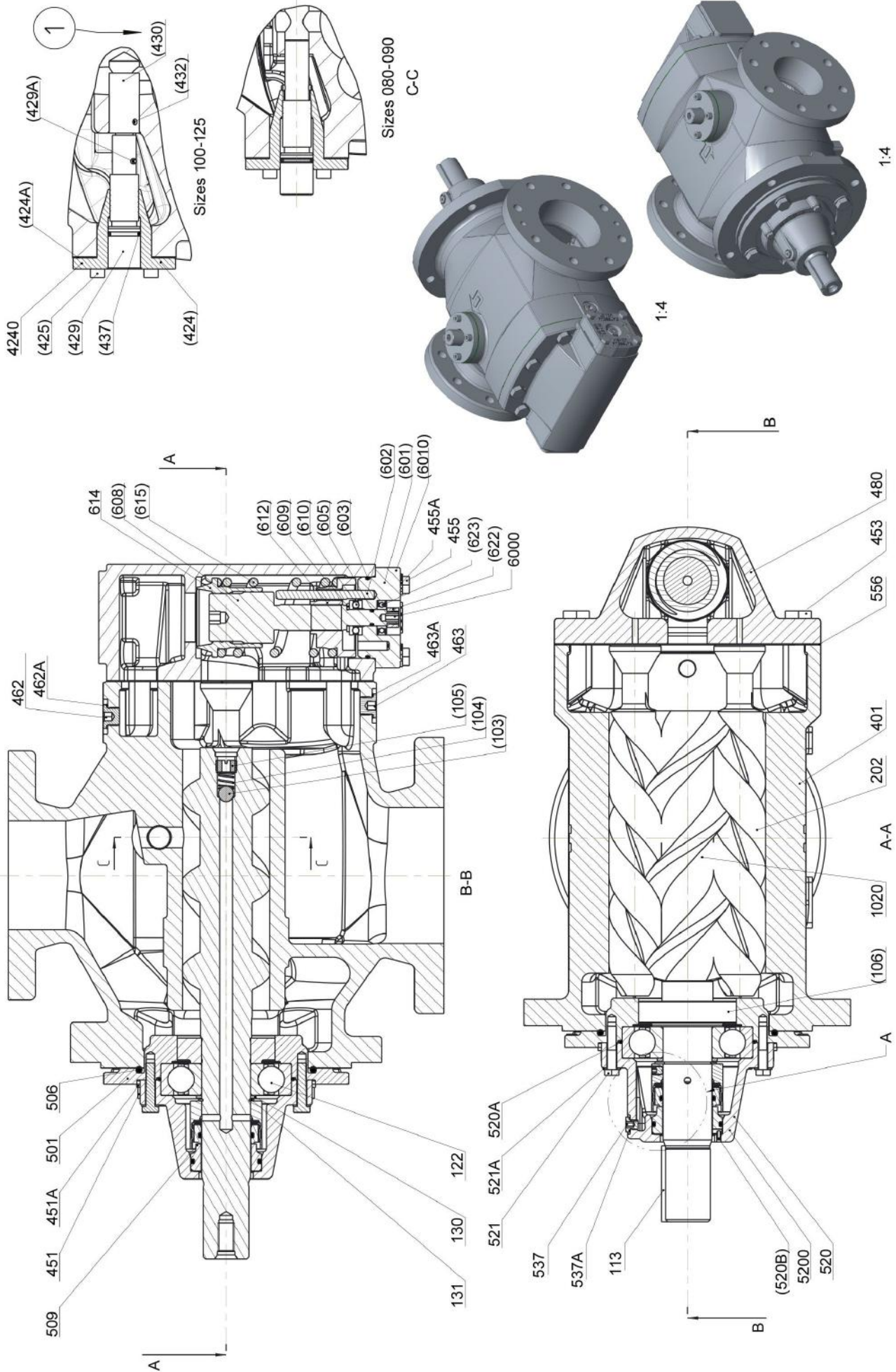
Pump performance established according to EN 14343.



| rpm | 080K | | 080N | | 090K | | 090N | |
|------|-------|-----|-------|------|-------|------|-------|------|
| | l/min | kW | l/min | kW | l/min | kW | l/min | kW |
| 950 | 308 | 4,7 | 373 | 5,7 | 464 | 6,9 | 541 | 8,1 |
| 1150 | 384 | 5,9 | 465 | 7,1 | 575 | 8,6 | 672 | 10,2 |
| 1450 | 498 | 7,8 | 602 | 9,4 | 742 | 11,4 | 868 | 13,4 |
| 1750 | 612 | 9,8 | 739 | 11,8 | 908 | 14,3 | 1 064 | 16,8 |

| rpm | 100K | | 100N | | 110L | | 110N | |
|------|-------|------|-------|------|-------|------|-------|------|
| | l/min | kW | l/min | kW | l/min | kW | l/min | kW |
| 950 | 649 | 9,5 | 752 | 11,1 | 880 | 9,5 | 1 004 | 11,1 |
| 1150 | 803 | 12,0 | 931 | 13,9 | 1 090 | 12,0 | 1 242 | 13,9 |
| 1450 | 1 034 | 15,8 | 1 200 | 18,4 | 1 406 | 15,8 | 1 600 | 18,4 |
| 1750 | 1 265 | 19,9 | 1 468 | 23,1 | 1 722 | 19,9 | 1 957 | 23,1 |

| rpm | 125L | | 125N | |
|------|-------|------|-------|------|
| | l/min | kW | l/min | kW |
| 950 | 1 208 | 9,5 | 1 533 | 11,1 |
| 1150 | 1 488 | 12,0 | 1 883 | 13,9 |
| 1450 | 1 908 | 15,8 | 2 407 | 18,4 |
| 1750 | 2 328 | 19,9 | 2 932 | 23,1 |



7. List of Components

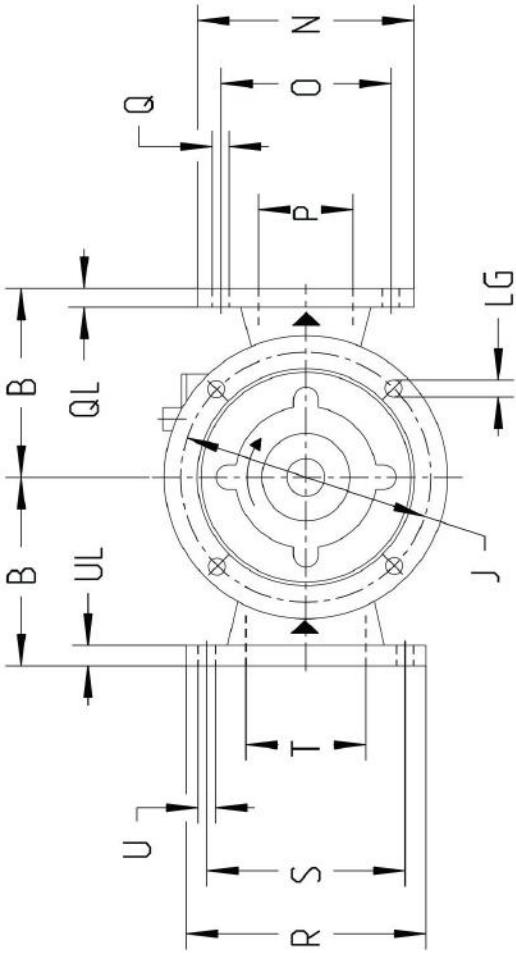
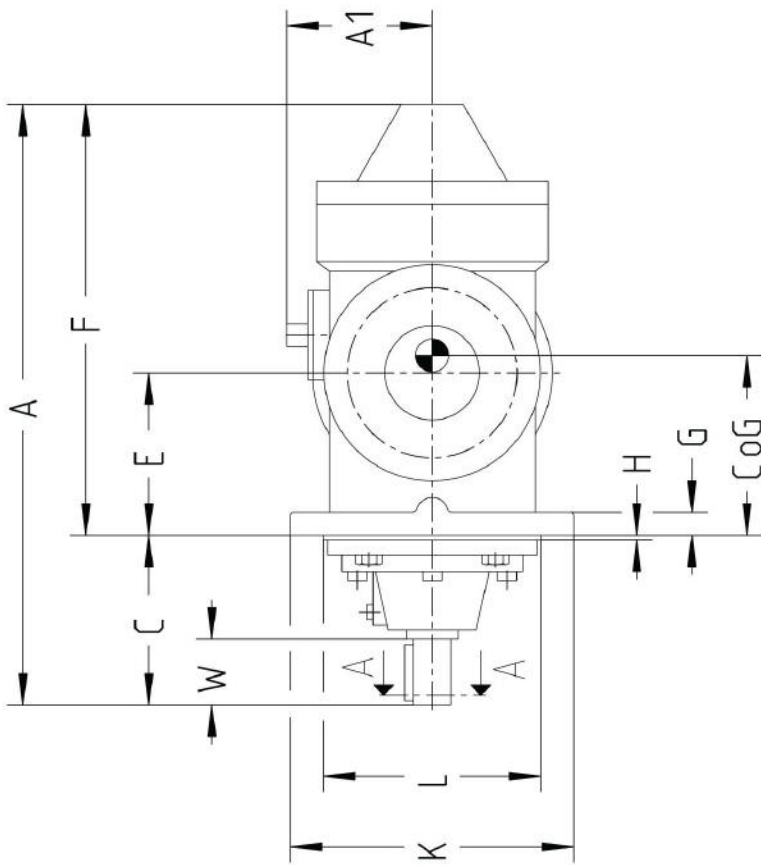
| Pos No | Denomination | Pos No | Denominat | Pos No | Denomination |
|--------|-------------------------|--------|------------------------|--------|------------------------|
| 1020 | Complete power rotor | 451 | Screw | (520B) | Tension pin |
| (103) | Ball | 451A | Washer | (537) | Deaeration plug |
| (104) | Spring | 453 | Screw | (537A) | Sealing washer |
| (105) | Hole | 455 | Screw | 520A | O-ring |
| (106) | Balancing piston | 455A | Washer | 521 | Screw |
| 113 | Key | 462 | Plug | 521A | Washer |
| 122 | Ball bearing | 462A | Sealing washer | 556 | Gasket |
| 130 | Support ring | 463 | Plug | 6000 | Complete valve element |
| 131 | Retaining ring | 463A | Sealing washer | (6010) | Complete valve cover |
| 202 | Idle rotor | 480 | Valve housing | (602) | Pin |
| 401 | Pump body | 501 | Front cover | (603) | O-ring |
| 4240 | Complete tuning element | 506 | O-ring | (605) | O-ring |
| (424) | Cover | 509 | Complete shaft seal | (608) | Valve spindle |
| (424A) | Gasket | S1 | Stationary seat | (609) | Washer |
| (425) | Screw | S2 | Stationary seat O-ring | (610) | Ball bearing |
| (429) | Guiding screw | S4 | Seal ring | (612) | Regulating nut |
| (429A) | Tension pin | S5 | Seal ring carrier | (614) | Valve piston |
| (430) | Piston | S6 | Seal ring O-ring | (615) | Valve spring |
| (432) | Tension pin | 5200 | Complete cover | (622) | Nut |
| (437) | O-ring | (520) | Cover | (623) | Ball Bearing |

Drawing remarks:

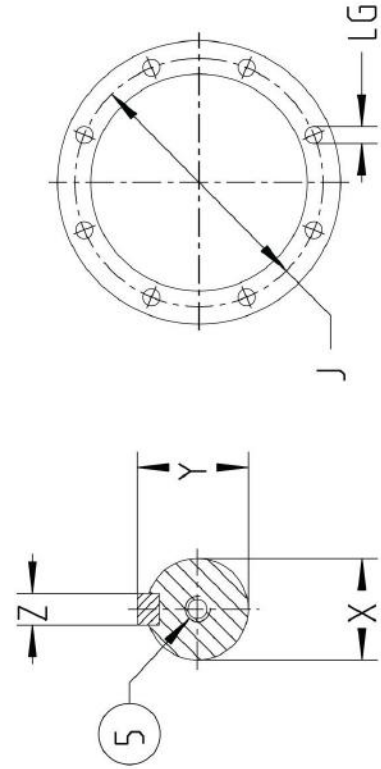
(1) Applicable for sizes 100-125

Notes:

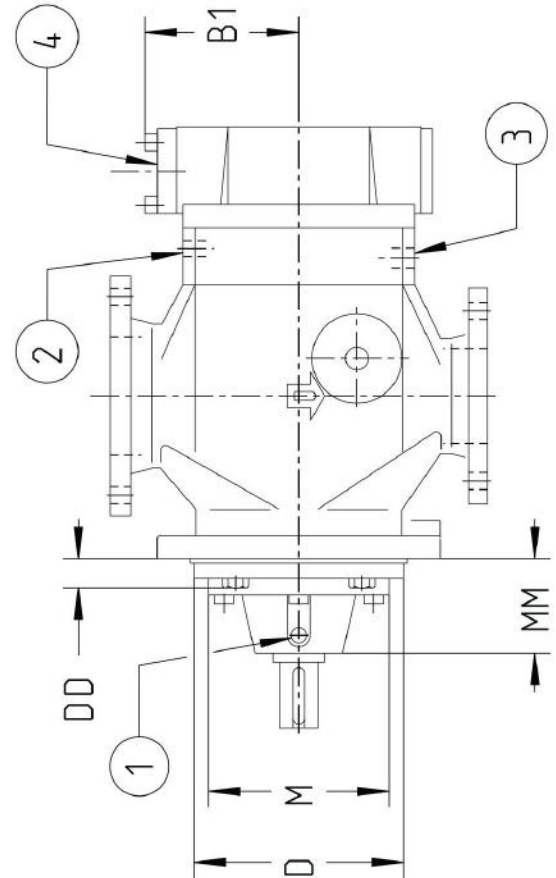
- Components with Pos No within parenthesis are parts of subassembly



Size 080



Sizes 090-125



8. Pump Dimensions

| Pump Size | Main Dimensions | | | | | | | | | | Flange Dimensions | | | | | Outlet | | | | | Inlet | | | | | Shaft | | | Weight | | |
|-----------|-----------------|-----|-----|-----|-----|-----|----|-----|-----|-----|-------------------|----|---|-----|-----|------------------|-----------|-----|-----|-----|-------|----|-----|-----|-----|-------|----|------------------|--------|-----|-----|
| | A | A1 | B | B1 | C | D | DD | E | F | M | MM | G | H | J | K | L ⁽¹⁾ | LG | N | O | P | Q | QL | R | S | T | UL | W | X ⁽²⁾ | Y | Z | CoG |
| 080 | 638 | 154 | 200 | 169 | 180 | 227 | 32 | 172 | 458 | 158 | 107 | 24 | 5 | 265 | 300 | 230 | 4x ∅18 | 229 | 180 | 191 | 100 | 25 | 254 | 210 | 125 | 70 | 42 | 45 | 12 | 180 | 100 |
| 090 | 669 | 157 | 225 | 193 | 180 | 237 | 32 | 188 | 489 | 158 | 107 | 24 | 5 | 300 | 350 | 250 | 8x ∅18 | 254 | 210 | 216 | 125 | 27 | 285 | 240 | 150 | 27 | 80 | | | 130 | 130 |
| 100 | 769 | | 250 | 193 | | | | 209 | 549 | 137 | 30 | | | 350 | 400 | 300 | 8x ∅22 | 285 | 240 | 241 | 150 | 23 | 343 | 295 | 200 | 31 | 85 | 59 | 16 | 235 | 165 |
| 110 | 816 | 198 | 260 | 193 | 220 | 290 | 32 | 240 | 596 | 210 | 129 | 5 | 5 | 350 | 400 | 300 | 8x ∅18 | 285 | 240 | 241 | 150 | 23 | 343 | 295 | 200 | 31 | 85 | 59 | 16 | 255 | 205 |
| 125 | 921 | | 265 | 213 | | | | 270 | 701 | 127 | 35 | | | | | | 8x ∅22 | 285 | 240 | 241 | 150 | 23 | 343 | 295 | 200 | 31 | 85 | 59 | 16 | 300 | 275 |

Drawing remarks:

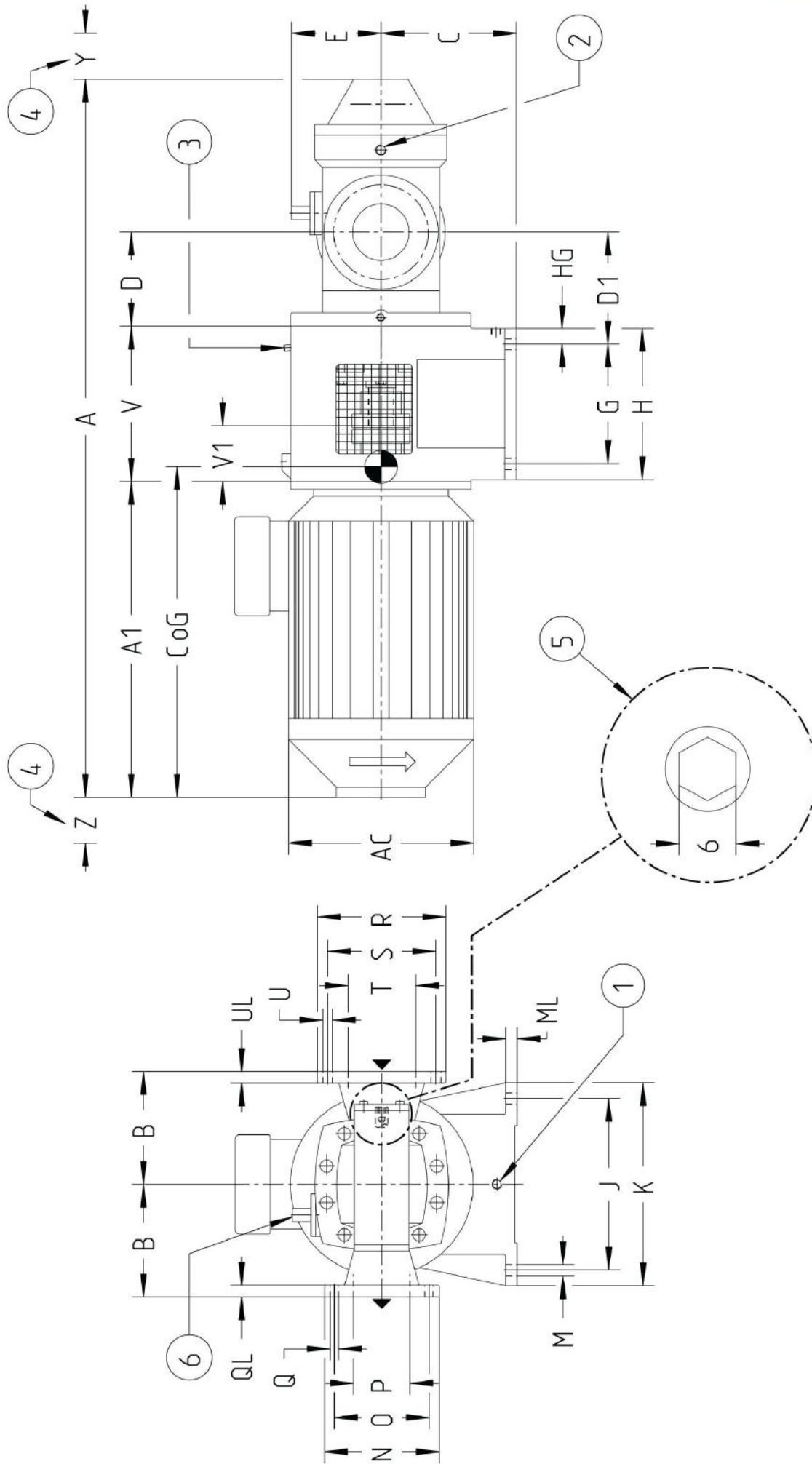
- (1) Deaeration plug
- (2) Inlet gauge. ISO G3/8
- (3) Outlet gauge. ISO G3/8

- (4) Relief valve. Turn clockwise to increase opening pressure
- (5) 5/8" UNC. Depth 32

Notes:

- Dimensions in mm
- Dimension A1 is a maximal value
- Weight is an approximate value
- Counter flanges according to:

- ACF = DIN2633/ND16
- UCF = ASME B16.5 150#
- ¹⁾ Tolerances ISO h7
- ²⁾ Tolerances ISO j6



9. Pump Unit dimensions

| Pump Size | IEC No | F _{name} Size | Main Dimensions | | | | | | | | | | | | | Flange Dimensions | | | | | | | | | | | Outlet | | | | | | | | | | Inlet | | | | | | | Dism. | | Weight | |
|-----------|--------|------------------------|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|-----|-----|-------------------|----|-----|-----|-----|-----------|-----------|-----------|------------|-----|-----------|-----------|-----------|----|-----|-----|-----------------|-----|-----|-----|-----|-------|--|--|--|--|--|--|-------|--|--------|--|
| | | | A | A1 | AC | B | C | D | D1 | E | V | V1 | G | H | HG | J | K | M | ML | N | ACF UCF O | ACF UCF P | ACF UCF Q | ACF UCF QL | R | ACF UCF S | ACF UCF T | ACF UCF U | UL | Y | Z | C _{0G} | kg | | | | | | | | | | | | | | |
| 080 | 132 | F265 | 1102 | 371 | 255 | | | | 273 | 93 | 190 | 260 | | | | | | | | | | | | | | | | | | | 115 | 600 | 175 | | | | | | | | | | | | | | |
| | 160 | F300 | 1256 | 495 | 314 | 200 | 172 | 214 | 303 | 123 | 220 | 290 | 35 | 340 | 400 | 22 | 25 | 229 | 100 | 180 | 191 | 100 | 8x Ø18 | 254 | 210 | 216 | 125 | 8x Ø18 | 27 | 200 | 145 | 630 | 220 | | | | | | | | | | | | | | |
| | 180 | F350 | 1318 | 557 | 358 | | | | 303 | 123 | 220 | 290 | | | | | | | | | | | | | | | | | | | | 145 | 650 | 260 | | | | | | | | | | | | | |
| | 200 | F350 | 1438 | 677 | 381 | | | | 323 | 143 | 230 | 300 | | | | | | | | | | | | | | | | | | | | | 640 | 420 | | | | | | | | | | | | | |
| 090 | 160 | F300 | 1287 | 495 | 314 | | | | 303 | 123 | 220 | 288 | 35 | 340 | 400 | 22 | 25 | 254 | 125 | 210 | 216 | 125 | 8x Ø18 | 27 | 240 | 241 | 150 | 8x Ø22 | 27 | 200 | 145 | 690 | 285 | | | | | | | | | | | | | | |
| | 180 | F350 | 1349 | 557 | 358 | | | | 323 | 143 | 230 | 300 | | | | | | | | | | | | | | | | | | | | | 835 | 450 | | | | | | | | | | | | | |
| | 200 | F350 | 1469 | 677 | 381 | | | | 343 | 123 | 265 | 335 | 35 | 340 | 400 | 22 | 25 | 254 | 125 | 210 | 216 | 125 | 8x Ø18 | 27 | 240 | 241 | 150 | 8x Ø22 | 27 | 200 | 145 | 770 | 535 | | | | | | | | | | | | | | |
| | 225 | F400 | 1587 | 775 | 448 | | | | 363 | 143 | 285 | 375 | | | | | | | | | | | | | | | | | | | | | 770 | 295 | | | | | | | | | | | | | |
| 100 | 160 | F300 | 1387 | 495 | 314 | | | | 343 | 123 | 265 | 335 | | 380 | 450 | | 25 | | | | | | | | | | | | | | | | 770 | 295 | | | | | | | | | | | | | |
| | 180 | F350 | 1449 | 557 | 358 | | | | 363 | 143 | 285 | 375 | | 380 | 450 | 25 | 35 | | | | | | | | | | | | | | | | 760 | 330 | | | | | | | | | | | | | |
| | 200 | F350 | 1569 | 677 | 381 | 250 | 300 | 209 | 248 | 198 | | | | | | | | | | | | | | | | | | | | | | | 730 | 490 | | | | | | | | | | | | | |
| | 225 | F400 | 1687 | 775 | 448 | | | | 383 | 163 | 285 | 375 | | | | | | | | | | | | | | | | | | | | | | 790 | 590 | | | | | | | | | | | | |
| 110 | 250 | F500 | 1777 | 845 | 448 | | | | 383 | 163 | 285 | 375 | | | | | | | | | | | | | | | | | | | | | | 700 | 635 | | | | | | | | | | | | |
| | 280 | F500 | 1862 | 930 | 508 | | | | 343 | 123 | 265 | 335 | | | | | | | | | | | | | | | | | | | | | | 750 | 875 | | | | | | | | | | | | |
| | 160 | F300 | 1434 | 495 | 314 | | | | 343 | 123 | 265 | 335 | | 380 | 450 | | 25 | | | | | | | | | | | | | | | | 810 | 340 | | | | | | | | | | | | | |
| | 180 | F350 | 1496 | 557 | 358 | | | | 363 | 143 | 285 | 375 | | | | | | | | | | | | | | | | | | | | | | 820 | 370 | | | | | | | | | | | | |
| 125 | 200 | F350 | 1616 | 677 | 381 | 260 | 300 | 240 | 279 | 198 | | | | | | | | | | | | | | | | | | | | | | | | 770 | 510 | | | | | | | | | | | | |
| | 225 | F400 | 1734 | 775 | 448 | | | | 363 | 143 | 285 | 375 | | | | | | | | | | | | | | | | | | | | | | | 805 | 630 | | | | | | | | | | | |
| | 250 | F500 | 1824 | 845 | 448 | | | | 383 | 163 | 285 | 375 | | | | | | | | | | | | | | | | | | | | | | | 780 | 660 | | | | | | | | | | | |
| | 280 | F500 | 1909 | 930 | 508 | | | | 343 | 123 | 265 | 335 | | | | | | | | | | | | | | | | | | | | | | | 840 | 900 | | | | | | | | | | | |
| 125 | 160 | F300 | 1539 | 495 | 314 | | | | 343 | 123 | 265 | 335 | | 380 | 450 | | 25 | | | | | | | | | | | | | | | | | 840 | 415 | | | | | | | | | | | | |
| | 180 | F350 | 1601 | 557 | 358 | | | | 363 | 143 | 285 | 375 | | | | | | | | | | | | | | | | | | | | | | | 900 | 435 | | | | | | | | | | | |
| | 200 | F350 | 1721 | 677 | 381 | 265 | 300 | 270 | 309 | 198 | | | | | | | | | | | | | | | | | | | | | | | | | 860 | 600 | | | | | | | | | | | |
| | 225 | F400 | 1839 | 775 | 448 | | | | 363 | 143 | 285 | 375 | | | | | | | | | | | | | | | | | | | | | | | 890 | 700 | | | | | | | | | | | |
| 250 | F500 | 1929 | 845 | 448 | | | | 383 | 163 | 285 | 375 | | | | | | | | | | | | | | | | | | | | | | | | 980 | 750 | | | | | | | | | | | |
| 280 | F500 | 2014 | 930 | 508 | | | | 383 | 163 | 285 | 375 | | | | | | | | | | | | | | | | | | | | | | | | 800 | 975 | | | | | | | | | | | |

Notes:

- Dimensions in mm
- Dimensions valid for standard motors from IMO AB
- Weight is an approximate value

Drawing remarks:

- (1) Drain connection. ISO G1/2
- (2) Outlet gauge ISO G3/8.
Other side: Inlet gauge ISO G3/8
- (3) Deaeration plug
- (4) Space for dismantling
- (5) Relief valve. Turn clockwise to increase opening pressure.
Use hexagon head socket screw key= 6 mm
- (6) Control for Tuning

10. Accessories

A bare shaft pump (Fig. 1) can be ordered with the accessories in fig. 2-7.



Fig. 1 Bare shaft pump



Fig. 2 Set of counter flanges

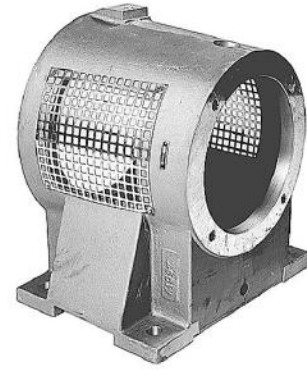


Fig. 3 Connecting frame

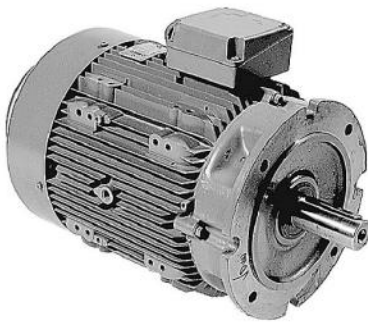


Fig. 4 Electric motor



Fig. 5 Shaft coupling



Fig. 6 Gauge panel

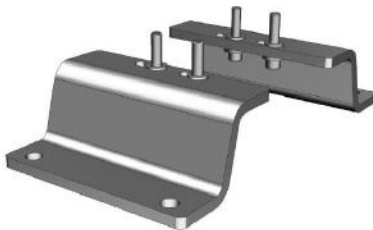


Fig. 7 Feet for vertical installation

11. Maintenance and Service

Spare parts for these pumps are easily available from stock. For detailed information and know-how about service, see the Maintenance & Service Instruction for ACF5/UCF5 pumps or contact IMO AB.

The tuning® valves, which are standard on the ACF/UCF series, make it possible to pump oil containing free air, with a minimum of disturbing vibration noise.

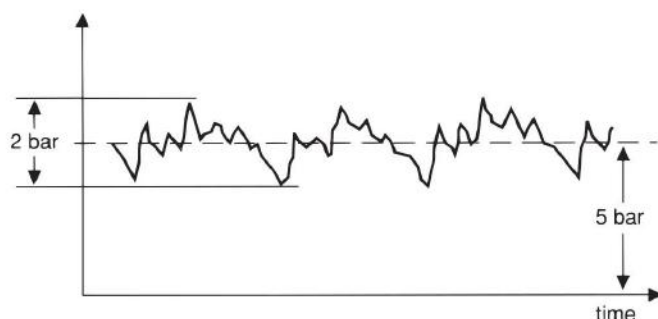
Low volume lube oil systems and additives that prolong deaeration time are the main reasons for having an excessive amount of free air in the oil. Free air is the main source of vibration and noise in pump systems as the air entrained oil is compressible and air bubbles expands and decreases in size very rapidly. By throttling the tuning® valve, the correct amount of fluid, depending on air content and pressure, is fed from the pressure side into the rotor bores.

The effect this has on the air bubbles is that they will gradually decrease in size rather than collapse when exposed to the full pressure on the discharge side.

12.1 Effect of tuning® Pressure fluctuations

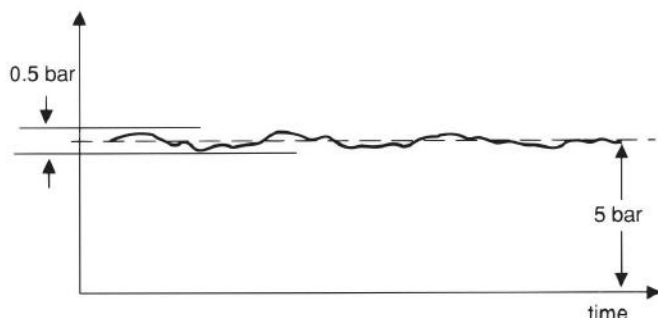
Without tuning

Pressure fluctuations are rapid and cover a wide band which produces a loud ratting noise.



With tuning

Pressure fluctuations are highly reduced in speed and magnitude leading to low noise level. Diagram refers to tests at 1800 rpm, delivery pressure 5 bar, inlet pressure -0,5 bar, viscosity 75 cSt and 6 % free air.



The two tuning® valves on the pump are easily adjusted individually (by turning the tuning spindles with an Allen key to a position where the noise level comes to a minimum) while the pump is working under normal operating conditions.

Adress:

IMO AB

PO Box 42090, 126 14 Stockholm
Sweden