ACF5
Std Line

CIRCOR

IMO®

Product Description

ATEX-compliance

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

ALSO VALID FOR PUMP SERIES UCF Generation 5

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

1. Applications

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 prelube 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.

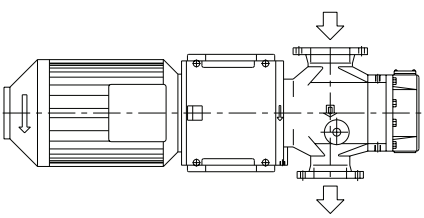
1.4 Installation

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.

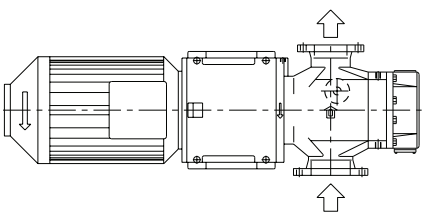
For pipe connections, standard for ACF series is DIN-type. For UCF, the standard is ANSI.
Note that for UCF, a version for horizontal installation with feet are available (version xxFx). See section Pump Model code

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.

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2. Pump model code

Pump series
ACF/UCF

Size
Power rotor diameter [mm]
080, 090, 100, 110, 125

Lead
K and L = Low lead
N = Normal lead

Generation
Design generation 5

Material in pump body
I = Cast iron
N = Nodular cast iron

Shaft seal design
T = SiliconeCarbide, elastomers in viton

Mounting
B = Flange mounting
F = foot mounting*

Valve
P = Internal pressure relief valve
E = without internal pressure relief valve*

Special design
Code group omitted for standard design (A-number)
and/or numbering code
Std - without flanges included
001 - flanges included
102 - with feet for vertical installation, without flanges
103 - with feet for vertical installation and flanges

*Only valid for UCF series

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3. Technical Data

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 pully 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.

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3. Technical Data

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

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4. Design

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 aggresive to above materials, consult IMO AB.

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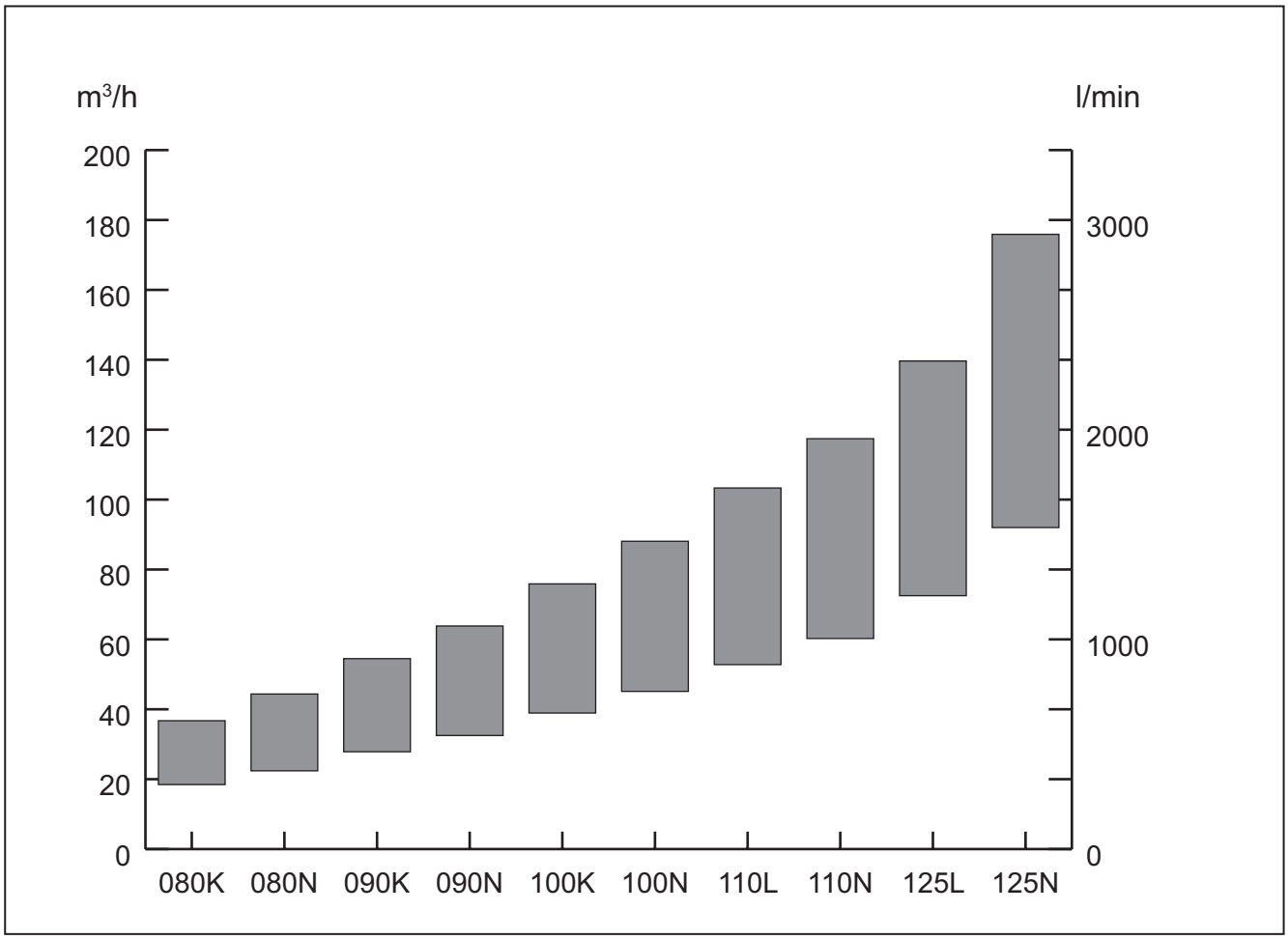
5. Performance Guide

Typical performance values at 5 bar
Flow calculated at 26 cSt, power at 260 cSt.
Pump performance established according to EN 14343.



rpm	080K l/min	kW	080N l/min	kW	090K l/min	kW	090N 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 l/min	kW	100N l/min	kW	110L l/min	kW	110N 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 l/min	kW	125N 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

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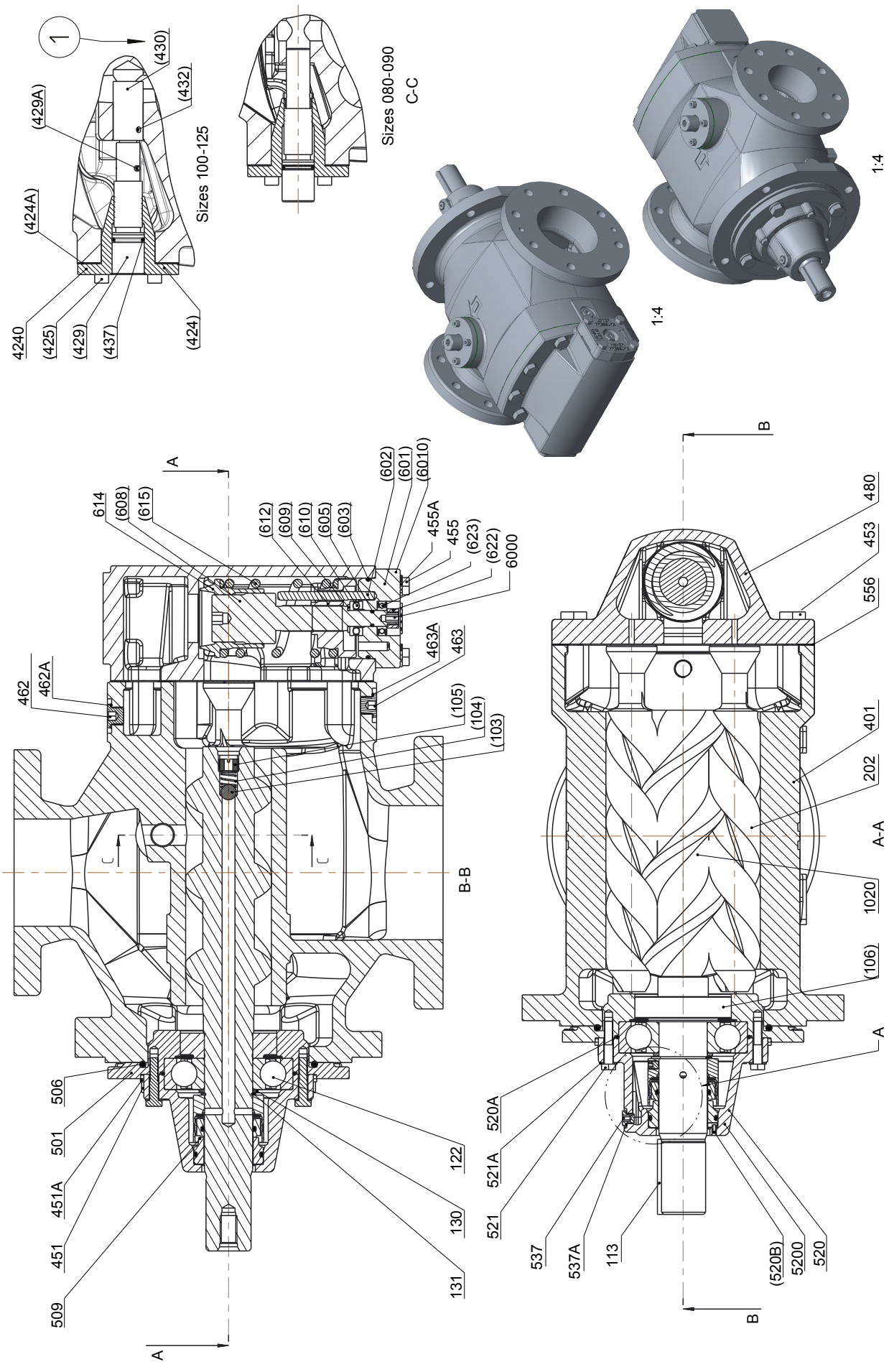
6. Sectional view



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Pos No	Denomination
1020	Complete power rotor
(103)	Ball
(104)	Spring
(105)	Hole
(106)	Balancing piston
113	Key
122	Ball bearing
130	Support ring
131	Retaining ring
202	Idler rotor
401	Pump body
4240	Complete tuning element
(424)	Cover
(424A)	Gasket
(425)	Screw
(429)	Guiding screw
(429A)	Tension pin
(430)	Piston
(432)	Tension pin
(437)	O-ring

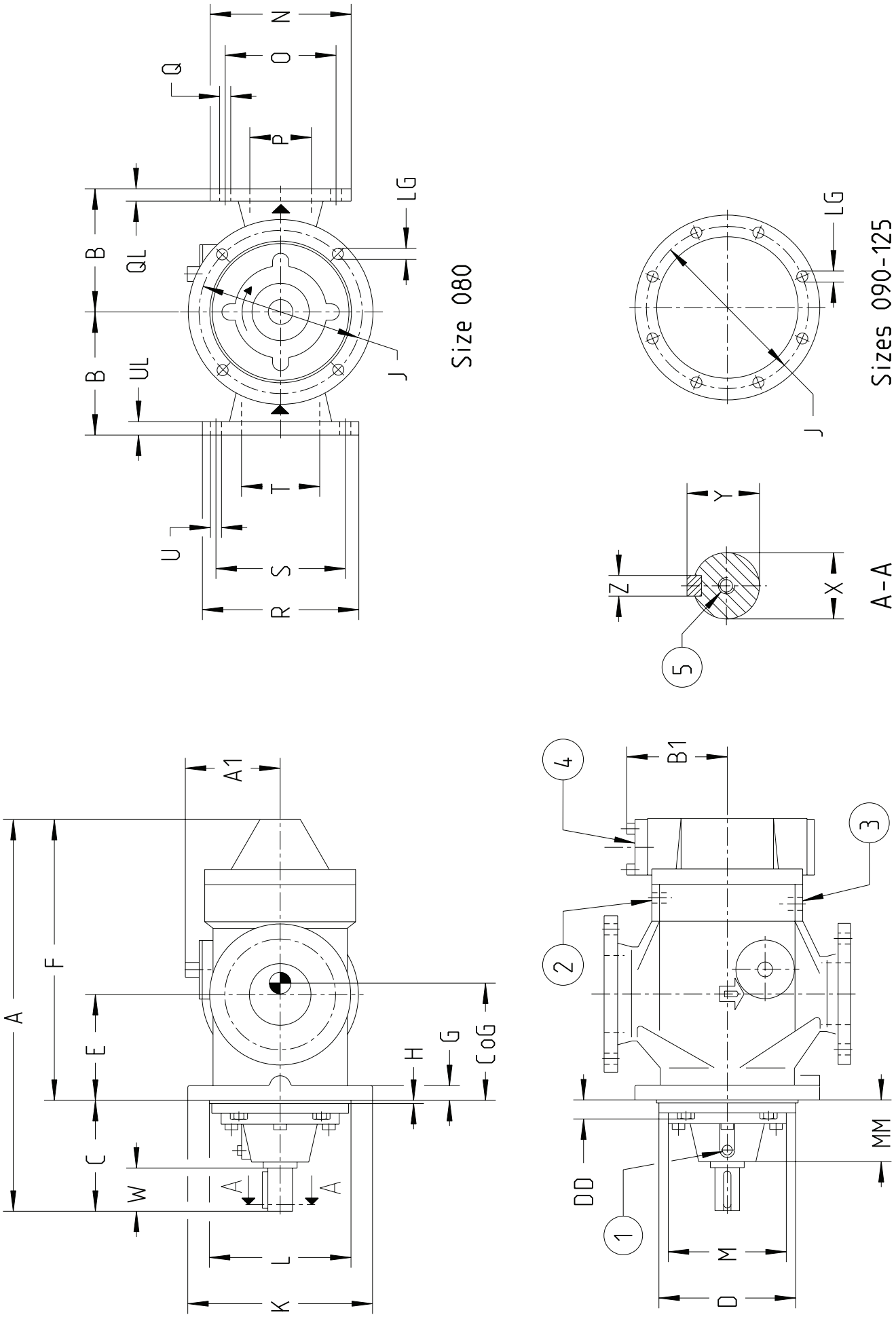
Pos No	Denominat
451	Screw
451A	Washer
453	Screw
455	Screw
455A	Washer
462	Plug
462A	Sealing washer
463	Plug
463A	Sealing washer
480	Valve housing
501	Front cover
506	O-ring
509	Complete shaft seal
S1	Stationary seat
S2	Stationary seat O-ring
S4	Seal ring
S5	Seal ring carrier
S6	Seal ring O-ring
5200	Complete cover
(520)	Cover

Pos No	Denomination
(520B)	Tension pin
(537)	Deaeration plug
(537A)	Sealing washer
520A	O-ring
521	Screw
521A	Washer
556	Gasket
6000	Complete valve element
(6010)	Complete valve cover
(602)	Pin
(603)	O-ring
(605)	O-ring
(608)	Valve spindle
(609)	Washer
(610)	Ball bearing
(612)	Regulating nut
(614)	Valve piston
(615)	Valve spring
(622)	Nut
(623)	Ball Bearing

Drawing remarks:
(1) Applicable for sizes 100-125

Notes:
- Components with Pos No within parenthesis are parts of subassembly

8. Pump Dimensions



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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	ACF O	UCF O	P	ACF Q	UCF Q	QL	R	ACF S	UCF S	T	ACF U	UCF U	UL	W	X [2]	Y	Z	CoG	kg
080	638	154	200	169	180	227	32	172	458	158	107	24	5	265	300	230	4x Ø18	229	180	191	100	8x Ø18	8x Ø19	25	254	210	216	125	8x Ø18	8x Ø22	27	70	42	45	12	180	100
090	669	157	225			237		188	489					300	350	250	8x Ø18	254	210	216	125		8x Ø22	27	285	240	241	150	8x Ø22						195	130
100	769	198	250	193	220	290	32	209	549	210	137	30	5	350	400	300		254	210	216	125	8x Ø18			285	240	241	150	8x Ø22	8x Ø22		80	55	59	16	235	165
110	816		260					240	596		129						8x Ø18	285	240	241	150	8x Ø22	8x Ø22	27	343	295	298	200	12x Ø22		31	85				255	205
125	921		265	213				270	701		127	35												23							27	90				300	275

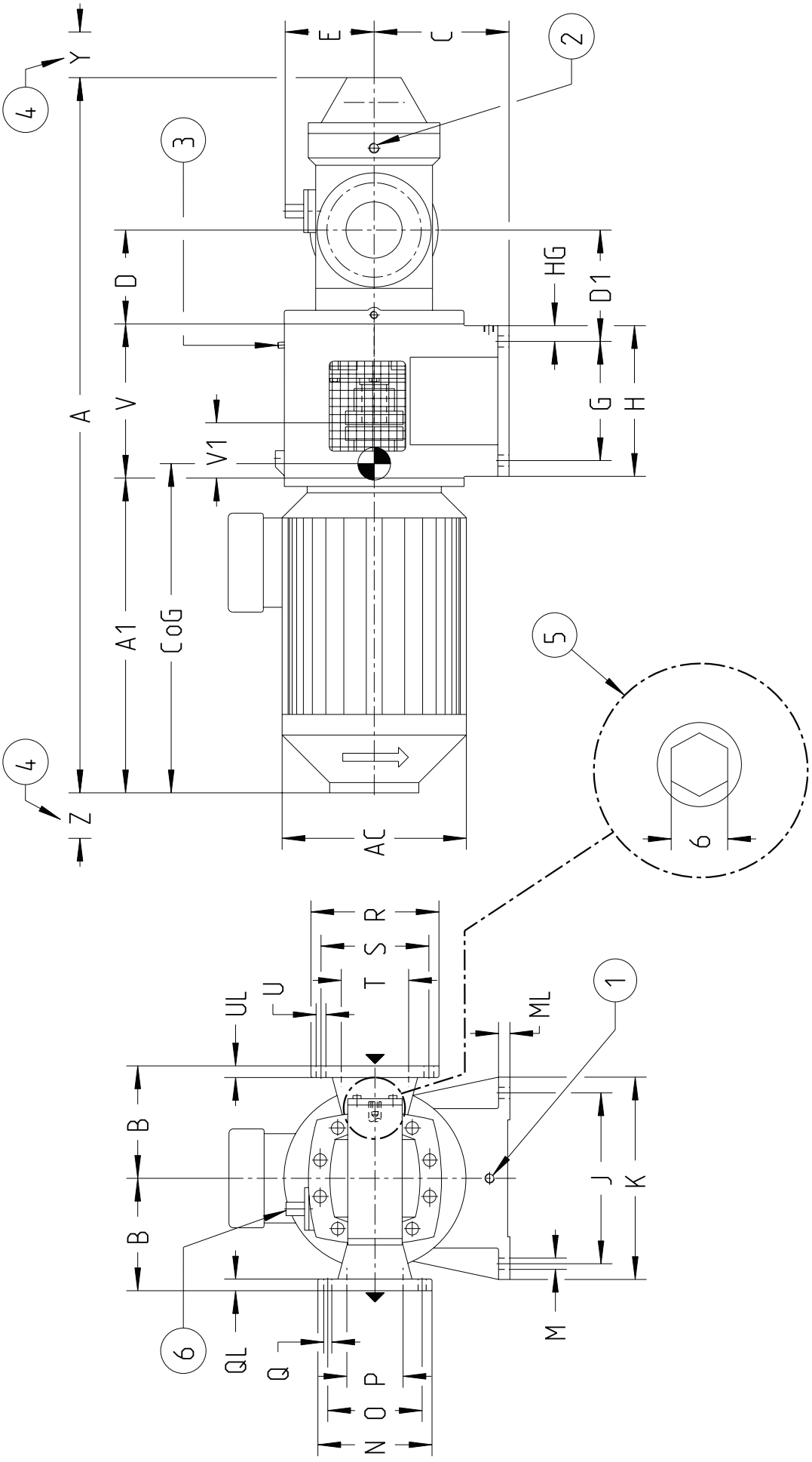
Drawing remarks:
(1) Deaeration plug
(2) Inlet gauge. ISO G3/8
(3) Outlet gauge. ISO G3/8
(4) Relief valve. Turn clockwise to increase opening pressure
(5) 5/8" UNC. Depth 32

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



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Pump Size	IEC No	Frame 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 O	UCF O	P	ACF Q	UCF Q	QL	R	ACF S	UCF S	T	ACF U	UCF U	UL	Y	Z	CoG	kg
080	132	F265	1102	371	255	200	250	172	214	154	273	93	190	260	35	340	400	22	25	229	180	191	100	8x Ø18	8x Ø19	25	254	210	216	125	8x Ø18	8x Ø22	27	200	115	600	175
	160	F300	1256	495	314						303	123	220	290																					145	630	220
	180		1318	557	358																															650	260
	200	F350	1438	677	381																															640	420
090	160	F300	1287	495	314	225	250	188	234	157	303	123	220	288	35	340	400	22	25	254	210	216	125	8x Ø18	8x Ø22	27	285	240	241	150	8x Ø22		27	200	145	675	250
	180		1349	557	358																															690	285
	200	F350	1469	677	381																															835	450
	225	F400	1587	775	448						323	143	230	300																					165	770	535
100	160	F300	1387	495	314	250	300	209	248	198	343	123	265	335	35	380	450	25	25	254	210	216	125	8x Ø18	8x Ø22	27	285	240	241	150	8x Ø22		27	240	145	770	295
	180		1449	557	358																															760	330
	200	F350	1569	677	381																															730	490
	225	F400	1687	775	448						363	143	285	355		430	500		35																165	790	590
	250	F500	1777	845							383	163		375																					185	700	635
	280		1862	930	508																															750	875
110	160	F300	1434	495	314	260	300	240	279	198	343	123	265	335	35	380	450	25	25	285	240	241	150	8x Ø22		27	343	295	298	200	12x Ø22	8x Ø22	31	240	145	810	340
	180		1496	557	358																															820	370
	200	F350	1616	677	381																															770	510
	225	F400	1734	775	448						363	143	285	355		430	500		35																165	805	630
	250	F500	1824	845	448						383	163		375																					185	780	660
	280		1909	930	508																															780	900
125	160	F300	1539	495	314	265	300	270	309	198	343	123	265	335	35	380	450	25	25	285	240	241	150	8x Ø22		23	343	295	298	200	12x Ø22	8x Ø22	27	240	145	840	415
	180		1601	557	358																															900	435
	200	F350	1721	677	381																															860	600
	225	F400	1839	775	448						363	143	285	355		430	500		35																165	890	700
	250	F500	1929	845							383	163		375																					185	980	750
	280		2014	930	508																															800	975

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

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

10. Accessories

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

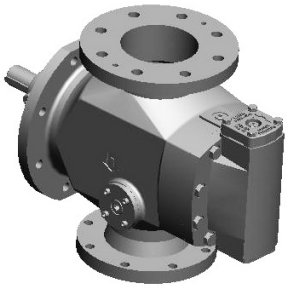

Fig. 1 Bare shaft pump

Fig. 2 Set of counter flanges

Fig. 3 Connecting frame

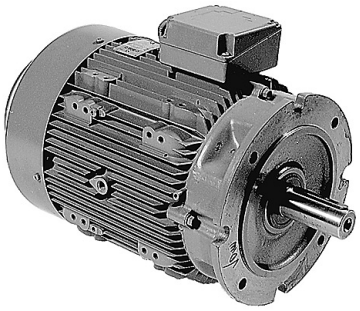

Fig. 4 Electric motor

Fig. 5 Shaft coupling

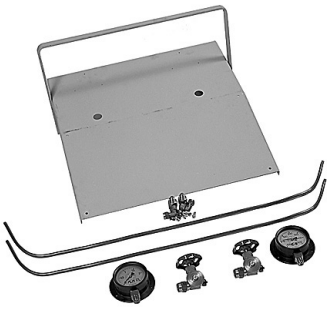

Fig. 6 Gauge panel

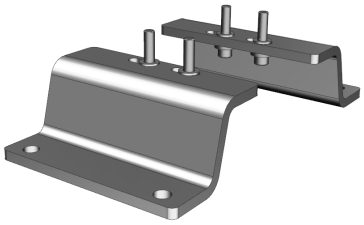

Fig. 7 Feet for vertical installation

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.

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12. IMO AB Tuning

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.

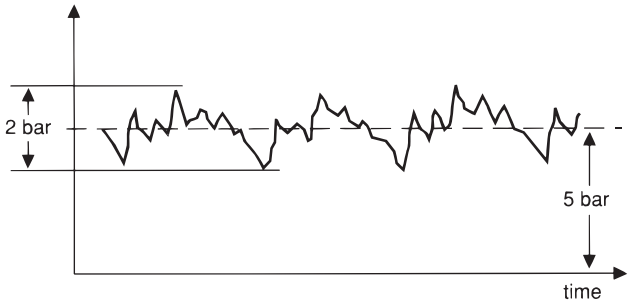
Low volume lube oil systems and additives that prolong deaeration time are the main reasons for having an excessive amount of free air in the oil. Free air is the main source of vibration and noise in pump systems as the air entrained oil is compressible and air bubbles expands and decreases in size 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

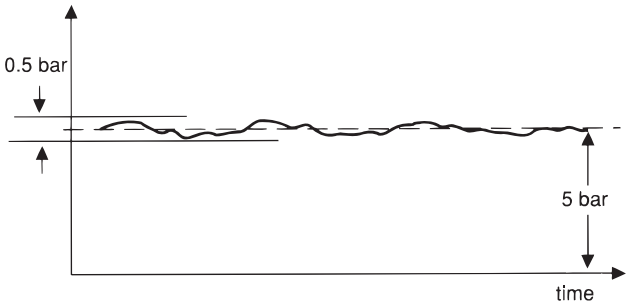
Without tuning

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.

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Adress:

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