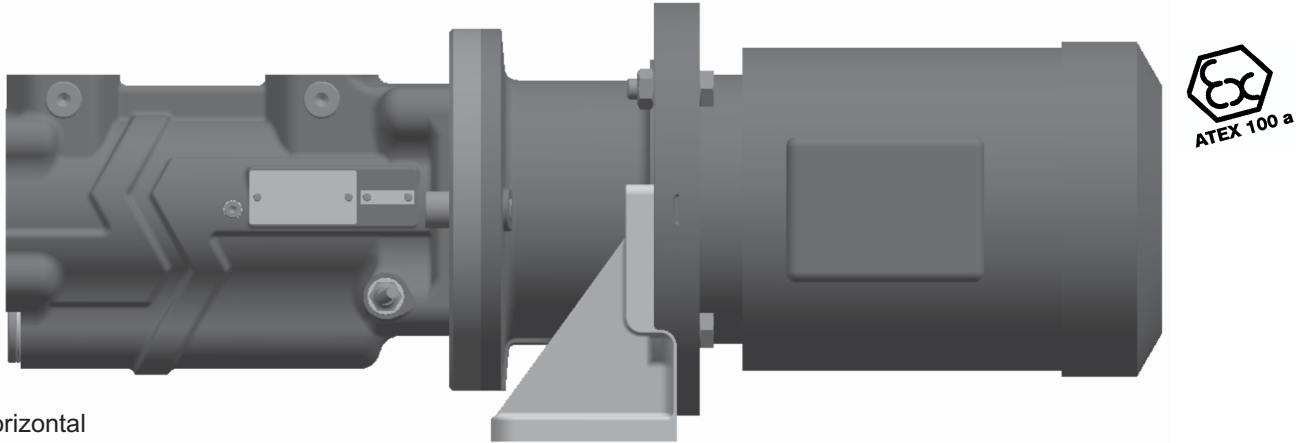
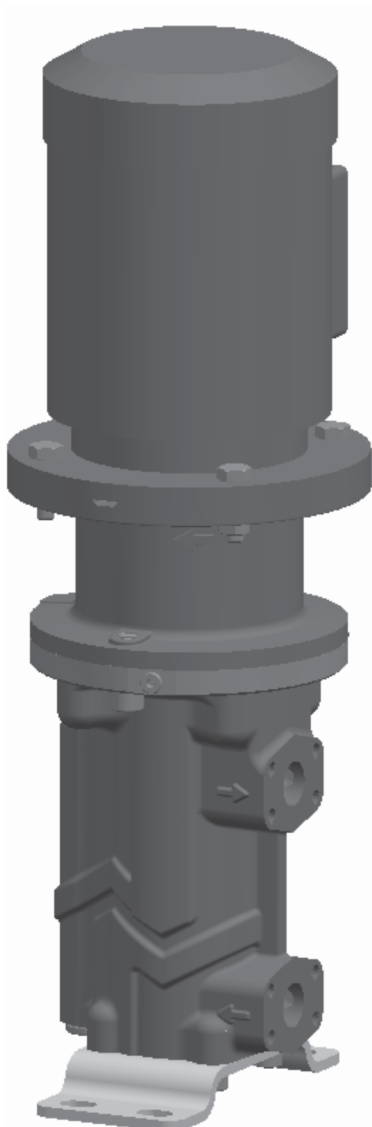


Screw Pump Series ALLFUEL® AFI



AFI horizontal



AFI vertical

Utilization

For pumping heating oils, lubrication oils, hydraulic oils or other lubricating liquids. The pumped liquids may not contain any abrasive components nor chemically attack the pump material.

Main field of application

ALLFUEL Injection (AFI) pumps are employed as transfer, booster and burner operation pumps in oil-fired systems, as feeder and filling pumps in tank systems and as lube-oil pumps in virtually all areas of industry. They are also used to generate pressure in oil-hydraulic systems of all types.

Design

Single pump/motor assembly in compact design; vertical and horizontal configuration without integrated filter.

Abbreviation

	AFI	10	R	38	G	19US	W195	E
Series (Injection)	_____	_____	_____	_____	_____	_____	_____	_____
Size ①	_____	_____	_____	_____	_____	_____	_____	_____
Spindel pitch direction (R = right)	_____	_____	_____	_____	_____	_____	_____	_____
Spindel pitch angle (degrees)	_____	_____	_____	_____	_____	_____	_____	_____
Bearing type ②	_____	_____	_____	_____	_____	_____	_____	_____
Shaft seal ③	_____	_____	_____	_____	_____	_____	_____	_____
Material code	_____	_____	_____	_____	_____	_____	_____	_____
Heating ④	_____	_____	_____	_____	_____	_____	_____	_____

① Theoretical capacity Q [l/min] at 1.450 1/min and 46-degree pitch angle

② G = internal plain bearing; U = antifriction bearing

③ Unheated, uncooled mechanical shaft seal

④ Version with electric heating of mechanical seal available at additional charge

Structural design

Internal-bearing, three-screw, self-priming screw pump. Hardened and polished spindles run in an exchangeable casing insert. The drive spindle is hydraulically balanced. A special starting screw absorbs the axial thrust of the idler screws. It is hydraulically driven. Only the torque resulting from liquid friction is transferred to the thread flanks. The thread flanks are therefore virtually free of loads and are not subject to wear. The pumped liquid lubricates all sliding parts and can be categorized as full fluid friction. In sizes 10 and 20 a balancing piston running in the bearing ring provides radial and axial bearing of the drive spindle; in size 40 a groove ball bearing fulfils this role. A maintenance-free mechanical seal seals the shaft. A return bore connects the seal chamber and the suction area to each other. As a result, only suction pressure acts on the shaft seal, regardless of discharge pressure. When a complete pump/motor assembly is delivered, a pump bracket connects the pump to the drive motor.

Functionality

Specially-shaped thread flanks cause the three spindles to form sealed chambers; rotation of the spindles then causes the contents of the chambers to move continuously in the axial direction from the pump's suction side to its pressure side. Despite rotation of the spindles, no turbulence results. The uniform chamber volumes eliminate crushing forces.

Performance data

Capacity ①	Q	up to	112 l/min
Suction pressure	p _s	up to	5 bar
Discharge pressure ②	p _d	up to	40 bar
Liquid temperature ③	t	up to	150 °C
Viscosity range	ν	3 up to	750 mm ² /s

- ① At n = 2900 1/min and ν = 750 mm²/s
- ② Refer to the individual reference curves for the achievable pump pressure in relation to viscosity and rotational speed. Pressure specifications are applicable only to nearly static pressure loads. Please inquire about dynamically alternating pressure loads.
- ③ Consultation required if temperatures higher

Filter and twin units

A separate system filter is essential when pumping oil with these no-filter AFI pumps. However, these pumps are also available with an integrated radial screen filter (AFI-F version) for protection against contamination. Filter mesh size 0,4 mm. Refer to document number 488 082 for more information. Twin units (version AFI-T) are provided when a reserve pump is required. Refer to document number 488 082 for more information.

Installation

To avoid air bubbles inside the pump, the pump may not be installed with the flanges pointing down. When installed vertically, a "motor down" arrangement is not permitted for safety reasons. In addition, the vent screw (160) may not point down.

Heating

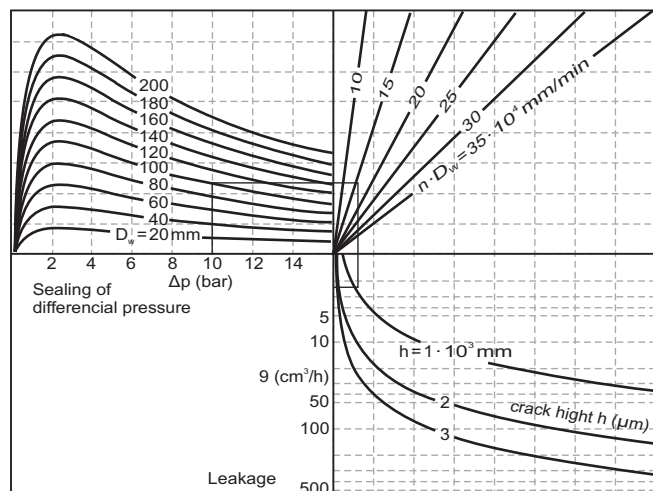
If heating is required, these pumps can be delivered with electric heating cartridges for the mechanical seal chamber (subject to additional cost).

Pump size	Connection for	Heating cartridge output (Pressure side)
10	230 V	160 W
20	230 V	200 W

Heating capacity is dimensioned so that the heater must operate for at least 60 minutes in order to achieve an outlet temperature of 20 °C. When temperatures are lower (below 0 °C), a correspondingly longer heat-up time will be required. Heating is not designed to achieve noticeably higher liquid temperatures during operation.

Leaks

Formation of a lubricating film between the sliding surfaces is the most important factor in the functionality of a mechanical seal. This film is formed by the liquid being sealed. Due to elevated pressure inside the suction chamber, a small amount of liquid/lubricant will be continuously pushed out through the sliding surfaces. This "standard leak" of a few ml/h is essential for maintaining lubrication of the sliding surfaces. Absence or inadequate formation of a lubricating film is a common cause of damage.



Theoretical average leak rate depending on mechanical oscillations, fluid properties, condition of the sliding surfaces, etc. (Source: Burgmann ABC der Gleitringdichtungen)

When pumping liquids with low volatility, such as HFO, the user must therefore expect increasing deposits on the atmosphere side as time passes. As a result, it is physically not possible to achieve a 100% seal with a mechanical seal. If this is not acceptable, the magnetically-coupled version of ALLFUEL will be the right choice.

Flanges and connections

Feed and pressure ports as counter flange based on SAE (SAE J518C, hole pattern 3000 PSI).

- Connections at present:
- E7 Venting of pump
 - H7 Heating cartridge
 - M1, M2, pressure gauge

Shaft seal

The shaft is sealed with a maintenance-free, unbalanced mechanical seal.

Part name	Material design
Rotating ring	silicon carbide
Counter ring	silicon carbide
Seal ring	FPM (Viton)
Spring	CrNiMo steel
Metal parts	CrNiMo steel

Noise level and pulsation

The design and operation of the screw pump enable a very low noise level and virtually pulsation-free pumping.

Overload protection

A pressure-relief valve is integrated into each pump as a means of overload protection. Its standard trigger pressure is set to approximately 10% above the working pressure. Please make sure your order specifies if a different trigger pressure is desired.

Drive

A motor bracket facilitates connection of a wide variety of electric motors or other drive units.

The following motor versions are normally provided with delivery of complete pump/motor assemblies:

Surface-cooled three-phase squirrel-cage motors, IMV 1 design type, IP 55 protection class according to IEC standard, insulation class F utilized according to B,

output and main dimensions according to DIN 42 677. Motors configured for 50 Hz may also be operated in 60 Hz networks.

- Voltage/connection:

Frequency [Hz]	Voltage [V]	Areas of usage
50	220-240/380-420	Europe
50	380-420/660-720	Europe
50	500	Europe
60	254-277/440-480	USA
60	440-480	USA
60	318-346/550-600	Canada
60	220-240/380-420	Asia, S.-Am.

Power is transferred over an elastic coupling. Additional radial forces may not act on the drive spindle.

Explosion protection



The pump fulfills the requirements according to EU explosion-protection directive 94/9/EC (ATEX 100a) for devices in device class II, category

2 G. Classification into temperature classes according to EN 13463-1 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.

Materials

Denomination	Material design			
	W195	W196	W197	W198 ①
Pump casing	EN-GJL-250	EN-GJS-400-15	EN-GJL-250	EN-GJS-400-15
Casing insert	AlMgSi1	AlMgSi1	EN-GJL-250 tenifer.	EN-GJL-250 tenifer.
Pump cover, drive side	EN-GJL-250	EN-GJS-400-15	EN-GJL-250	EN-GJS-400-15
Bush	AlMgSi1	AlMgSi1	EN-GJL-250	EN-GJL-250
Drive screw	16MnCrS5	16MnCrS5	16MnCrS5	16MnCrS5 tenifer.
Idler screw				

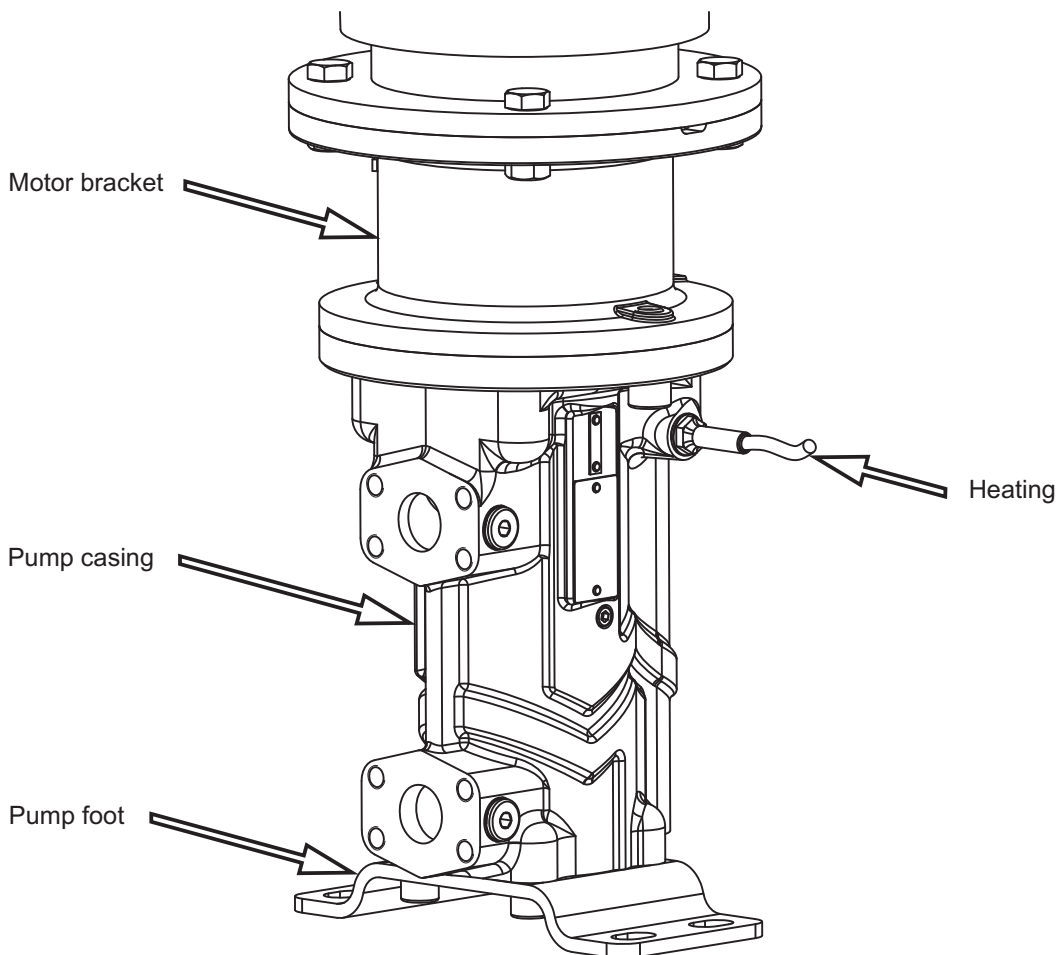
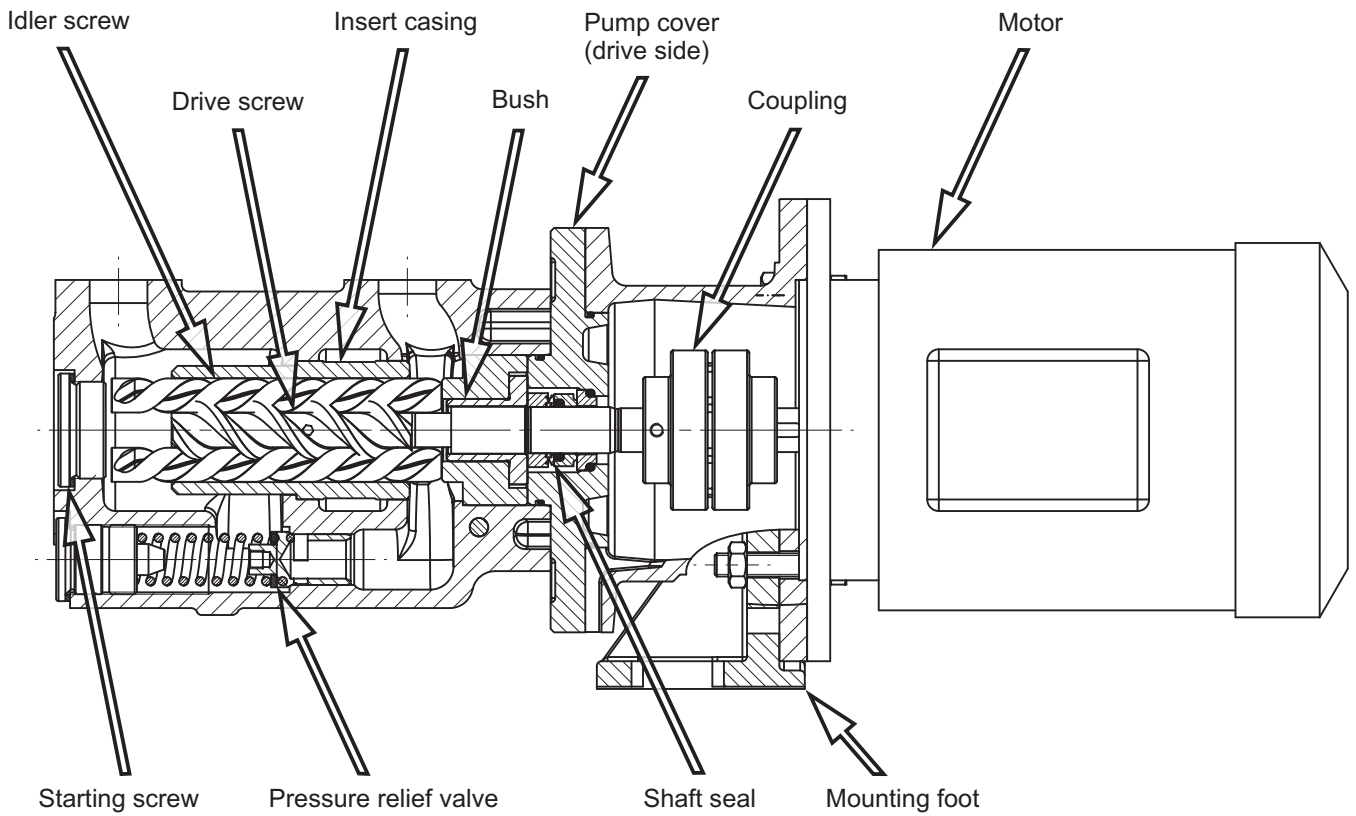
① Recommended material for critical liquids

NPSH [m]

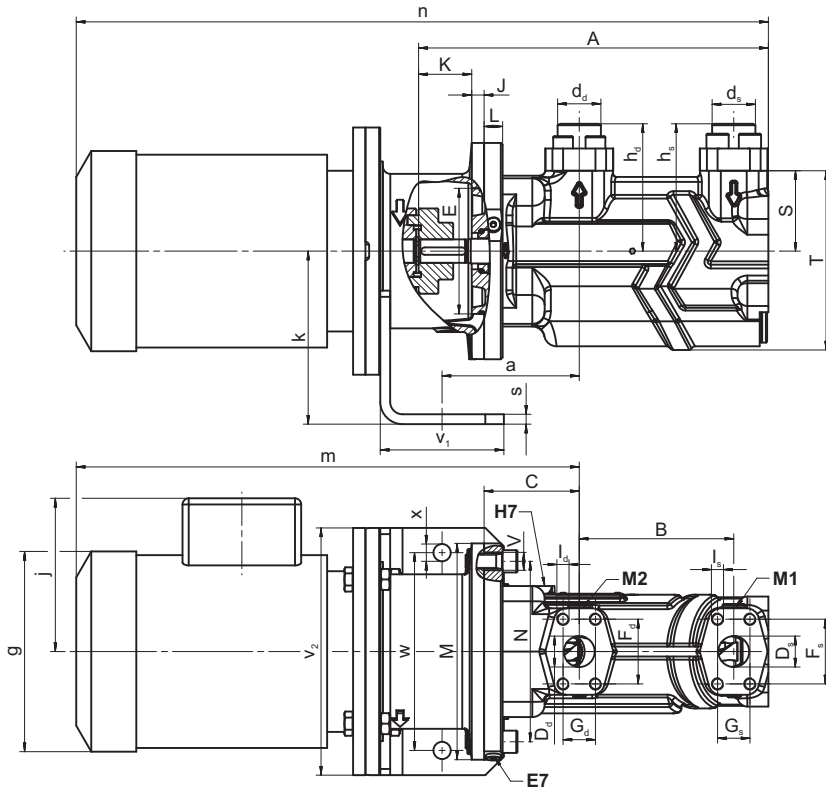
NPSH req. for the pump without filter

AFI	Speed 1/min											
	950 / 1.140			1.450 / 1.750			2.900			3.400		
	Kinematic viscosity mm ² /s											
	3-40	150	750	3-40	150	750	3-40	150	750	3-40	150	750
10-28	2,5	2,8	3,2	2,5	2,9	3,6	2,5	2,9	4,2	2,5	3,0	4,2
10-38	2,5	2,8	3,6	2,5	2,9	3,9	2,5	3,1	4,6	2,5	3,2	5,0
10-46	2,5	2,9	3,9	2,5	3,0	4,2	2,6	3,3	5,1	2,7	3,4	6,4
10-56	2,5	2,9	4,3	2,5	3,1	4,5	2,8	3,7	7,3	3,0	4,0	6,8
20-38	2,5	2,9	3,9	2,5	2,9	4,1	2,5	3,2	5,0	2,6	3,4	5,4
20-46	2,5	2,9	4,2	2,5	3,1	4,4	2,7	3,5	6,2	2,9	3,8	6,8
20-56	2,5	3,0	4,5	2,5	3,3	5,1	3,2	4,1	7,2	3,5	4,5	8,8
40-38	2,5	2,9	3,8	2,5	3,1	4,3	2,7	3,5	5,6	2,8	3,7	6,1
40-46	2,5	3,0	4,2	2,6	3,3	4,8	3,0	4,0	6,8	3,3	4,3	7,6
40-54	2,5	3,2	4,8	2,7	3,6	5,4	3,6	4,7	8,2	4,1	5,3	9,4

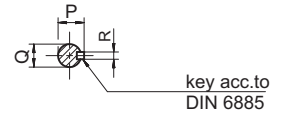
Assembly AFI



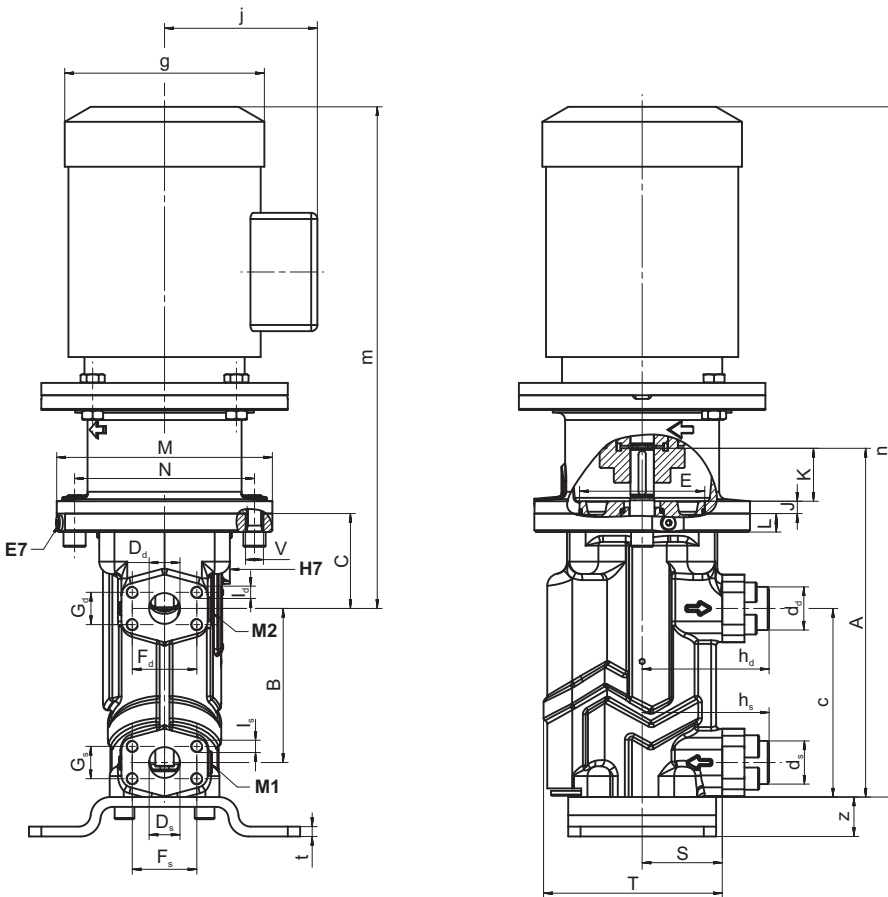
Main dimensions AFI
AFI horizontal configuration



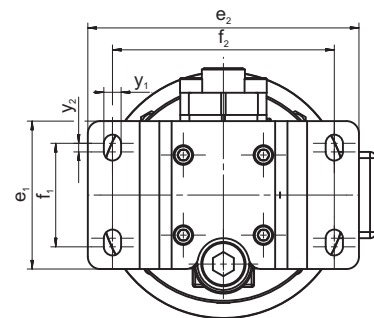
Shaft end



AFI vertical configuration



Pump foot



Main dimensions AFI

AFI size	Pump dimensions														
	A	B	C	E	J	K	L	M	N	P	Q	R	S	T	V
10	237	110	55	82,55 _{-0,05}	9	33	13	130	106	16	14 _{j6}	5	60	132	11
20	283	125	77	101,6 _{-0,05}	10	43	15	175	146	21,5	19 _{j6}	6	65	145	14
40	332	135											80	164	

AFI size	Motor size	Unit dimensions									
		a	c	e ₁	e ₂	f ₁	f ₂	g ^②	j ^②	k	m ^②
10	80	88	141	120	200	84	160	162	209	140	451
	90S	88						181	218	140	464
	90L	88						181	218	140	488
	100L	110						202	223	160	545
20	90S	151	153	120	220	84	180	181	218	140	526
	90L	151						181	218	140	550
	100L	129						202	223	160	563
	112M	129						227	238	160	570
	132S	141						266	278	170	682
40	90L	151	135	120	240	84	200	181	218	140	550
	100L	129						202	223	160	563
	112M	129						227	238	160	570
	132S	141						266	278	170	682
	132M	141						266	278	170	682
	160M	150/ 415 ^③						320	314	235	861

AFI size	Motor size	Unit dimensions										
		n ^②	s	t	v ₁	v ₂	w	x	y ₁	y ₂	z	
10	80	592	8	8	100	200	160	14	14	7	32	
	90S	605				200	160					
	90L	629				200	160					
	100L	686				250	200					
20	90S	679	8	8	100	200	160	14	14	7	32	
	90L	703			100	200	160					
	100L	716			100	250	200					
	112M	723			100	250	200					
	132S	835			120	300	250					14,5
40	90L	685	8	8	100	200	160	14	14	7	32	
	100L	698			100	250	200					
	112M	705			100	250	200					
	132S	817			120	300	250					
	132M	817			120	300	250					14,5
	160M	996			305	350	300					18 ^③

Connections

AFI size	Venting	Heating cartridge	Pressure gauge
	E7	H7	M1/M2
10	M8x1	M12x1	G 1/8
20 and 40			G 1/4

Dimensions in mm,
Direction of rotation:
Clockwise as seen from the
drive side

AFI size	Connection dimensions													
	SAE suction flange ①							SAE pressure flange ①						
	Inch.	D _s	F _s	G _s	I _s	d _s	h _s	Inch.	D _d	F _d	G _d	I _d	d _d	h _d
10	¾	22	47,63	22,23	4 x M10	28	96	¾	22	47,63	22,23	4 x M10	28	96
20	1	25	52,37	26,19		35	103	1	25	52,37	26,19		35	103
40	1 ¼	32	58,72	30,18		4 x M12	43	121	1	25	52,37		26,19	35

- ① SAE J518C, hole pattern 3.000 PSI
- ② Dimensions are reference only and may deviate depending on motor manufacturer
- ③ Foot-mounted design on pump size 40 for motor size 160M with 4 screws, see ALL2CAD for dimensions

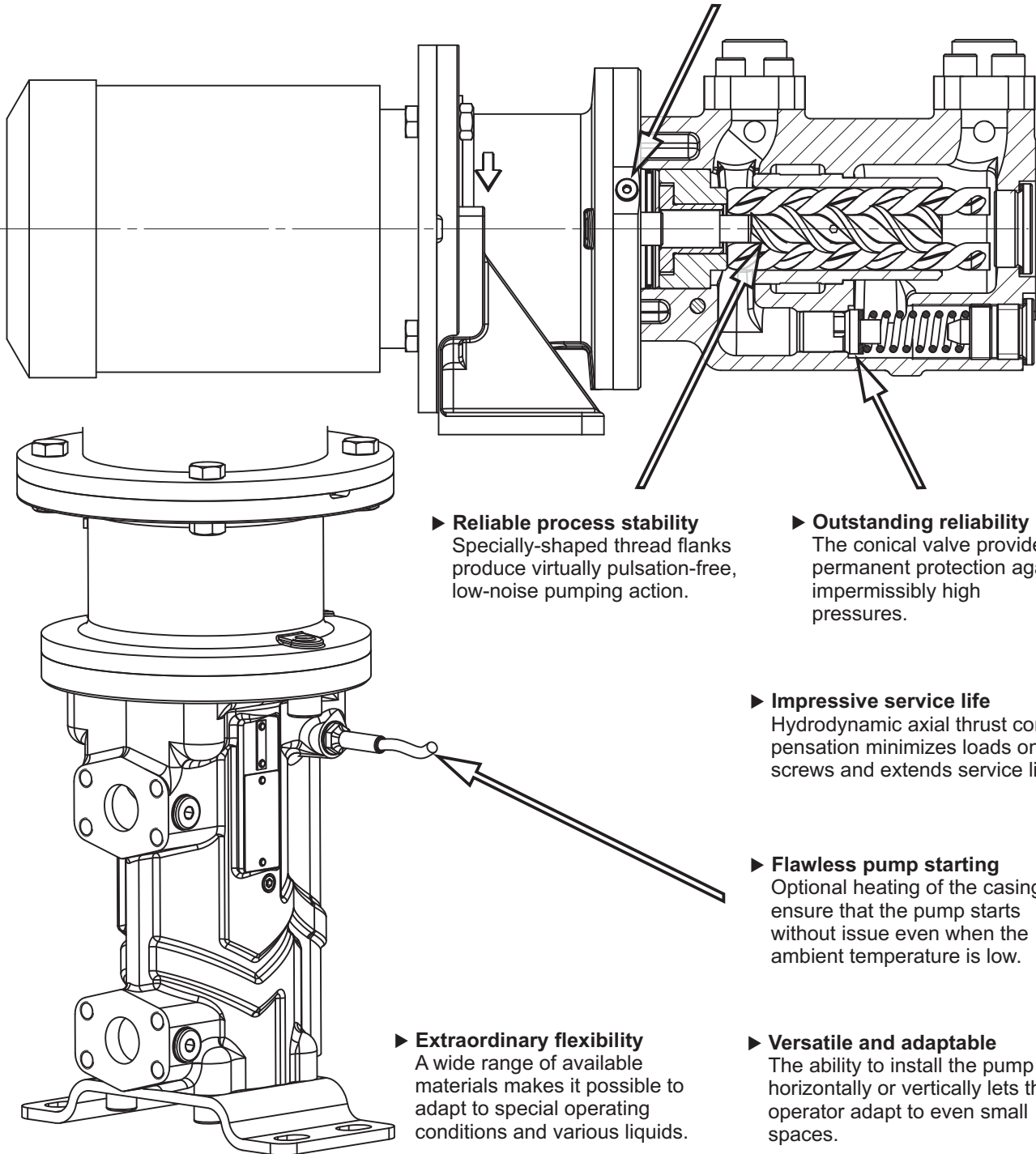
Benefits

► **Economical use of space**

The installed pump requires little space.

► **Flawless start-up**

The vent screw ensures the best possible venting of the mechanical seal chamber each time the pump is started, even when installed vertically.



► **Reliable process stability**

Specially-shaped thread flanks produce virtually pulsation-free, low-noise pumping action.

► **Outstanding reliability**

The conical valve provides permanent protection against impermissibly high pressures.

► **Impressive service life**

Hydrodynamic axial thrust compensation minimizes loads on the screws and extends service life.

► **Flawless pump starting**

Optional heating of the casing ensure that the pump starts without issue even when the ambient temperature is low.

► **Extraordinary flexibility**

A wide range of available materials makes it possible to adapt to special operating conditions and various liquids.

► **Versatile and adaptable**

The ability to install the pump horizontally or vertically lets the operator adapt to even small spaces.

Subject to alterations.