RE 91 172/07.98

Replaces : 05.95

engineering mannesmann Rexroth

Fixed displacement motor A10FM
Fixed displacement plug-in motor A10FE

for open and closed circuit applications

Size 23 - 63
Series 5
Nominal pressure 280 bar
Peak pressure 350 bar

A10FM

Contents

Features

- Fixed displacement motor, axial piston in swashplate design for hydrostatic transmissions in open and closed circuit applications
- Output speed directly proportional to the inlet flow rate and inversely proportional to the motor displacement
- Output torque increases with the pressure gradient between high and low-pressure sides
- For mobile and stationary use
- Long service life
- High permissible output speed
- Tried-and-tested A10 power unit technology
- Favourable power/weight ratio – compact size
- Low noise
- Mechanical and hydraulic connections to SAE standards
- 2-hole special mounting flange for A10FE

- Further information:

Fixed displacement motor A10FSM Size 18	RE 91 180
Variable displacement motor A10VM/E Size 28 - 60	RE 91 703
Hydrostatic fan drives for vehicles	RE 98 065

Ordering code / standard range

A10F			/	5	2	W	–	V					

Hydraulic fluid

Mineral oil (without abbreviation)	

Axial piston pump

Swashplate design, fixed displacement, nominal press. 280 bar, peak press. 350 bar	**A10F**

Operating mode

Motor	**M**
Plug-in motor	**E**

Size

≙ Motor displacement V_g in cm³	**23***	**28***	**37***	**45***	**63**	**80**
	●	●	●	●	●	❍

Series

	5

Index

	2

Direction of rotation (Viewing onto shaft end)

changing	**W**

Seal

FPM (fluororubber to DIN ISO 1629)	**V**

Shaft end	**23**	**28**	**37**	**45**	**63**	
SAE splined shaft	●	●	●	●	❍	**R**
SAE splined shaft	❍	❍	●	●	●	**W**
Tapered with threaded pin and feather key	●	●	●	●	❍	**C**

Mounting flange

SAE 2-hole flange for A10FM	●	●	●	●	●	**C**
Special 2-hole flange for A10FE	●	●	●	●	❍	**F**

Ports for service lines	**23**	**28**	**37**	**45**	**63**	
Ports A/B at side - same side; SAE, UNC fixing screws	●	●	●	●	●	**60N00**
Ports A/B at side - same side; SAE, metric fixing screws	●	●	●	●	●	**10N00**
Ports A/B at side - same side; metric screw connection	❍	❍	❍	❍	❍	**16N00**
Ports A/B at side - same side; UNF screw connection	❍	❍	❍	❍	❍	**66N00**
Ports A/B at rear; SAE, UNC fixing screws	❍	❍	❍	❍	❍	**61N00**
Ports A/B at rear; SAE, metric fixing screws	❍	❍	❍	❍	❍	**11N00**
Ports A/B at rear; UNF screw connection	❍	❍	❍	❍	❍	**64N00**

Valves

Without valves	●	●	●	●	●	**0**
Integrated flushing valve, only with ports at side (60N00, 10N00, 16N00 and 66N00)	●	●	●	●	❍	**7**

Speed monitoring

Without speed sensing (no code)	**–**
Prepared for speed sensing, A10FM only	**D**

*** Planning note for sizes 23, 28, 37 and 45**
Replacement service for **pressure range 250/315 bar**
with previous mounting patterns on request

● = available ❍ = in preparation

Technical data

Hydraulic fluid

Please refer to our catalogue sheets RE 90220 (mineral oil) and RE 90221 (environmentally friendly hydraulic fluids) for detailed information on selecting hydraulic fluids and on service conditions before the project planning stage.

Operation with environmentally friendly hydraulic fluids may result in modifications to the technical specifications; please consult us if necessary (the hydraulic fluid used must be clearly stated in the order).

Operating viscosity range

We recommend selecting the service viscosity (at operating temperature) in the range of

ν_{opt} = opt. service viscosity 16...36 mm²/s

for optimum efficiency and useful life, referred to the circulation temperature - closed circuit or tank temperature for open circuit.

Limiting viscosity range

Service limits are set at the following values:

ν_{min} = 5 mm²/s

briefly at max. permissible leakage oil temperature of t_{max} = 115 °C.

Note that the maximum fluid temperature must not exceed 115 °C at any point (e.g. around bearings).

ν_{max} = 1600 mm²/s

briefly on cold start (t_{min} = -40 °C).

Special precautions are required at temperatures between -25 °C and -40 °C, depending on the installation conditions. Please consult the manufacturer.

Hydraulic fluid filtering

The more efficient the filtration, the cleaner the fluid becomes and the longer the service life of the unit.

To ensure operational reliability, the service fluid must conform to at least purity class 9 to NAS 1638

18/15 to ISO/DIS 4406.

Please consult the manufacturer if the above classes cannot be maintained.

Comment on selecting hydraulic fluid

The service temperature in the circuit - for closed circuit, for open circuit - the tank temperature must be known as a function of the ambient temperature in order to choose the correct hydraulic fluid.

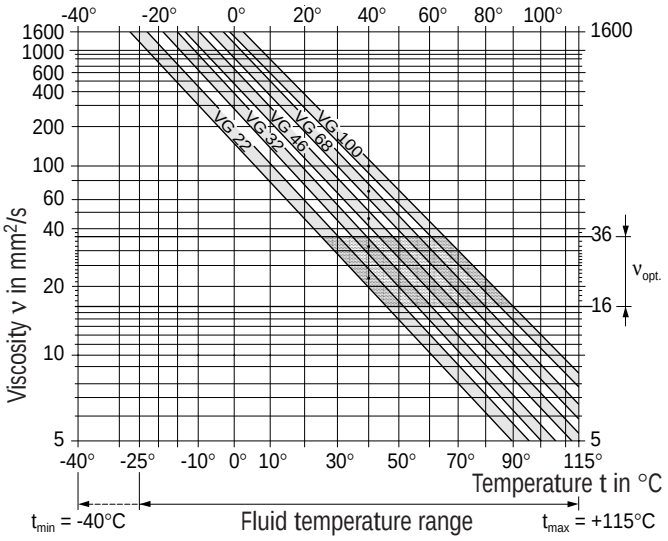
The hydraulic fluid must be selected in such a way that service viscosity lies within the optimum range (ν_{opt}) for the operating temperature span, see shaded area in the chart. We recommend selecting the next higher viscosity class in each case.

Example: A service temperature of 60 °C is established in the circuit at an ambient temperature of X °C. Given the optimum service viscosity range (ν_{opt}; shaded area), this will require viscosity classes VG 46 or VG 68; class to select: VG 68.

Note: The leakage oil temperature depends on the pressure and speed and is always higher than the temperature in circulation/tank. However, temperature must not exceed 115 °C anywhere in the system.

Please contact us if it is not possible to meet the above conditions due to extreme service parameters or high ambient temperature.

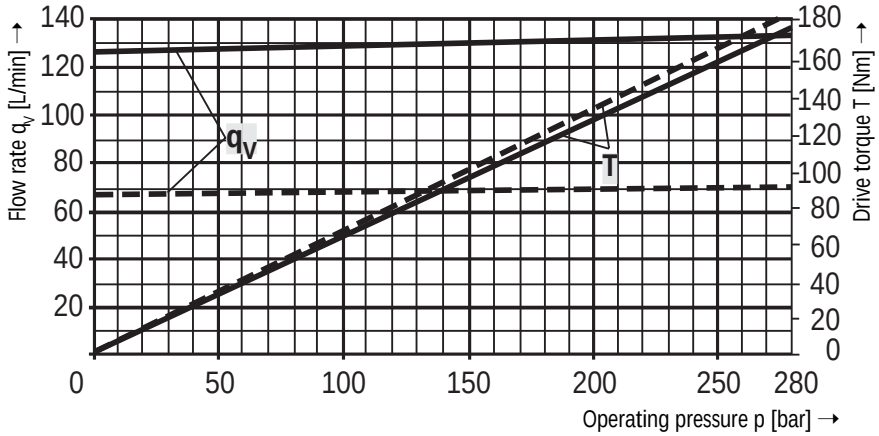
Selection chart



Flow rate and drive torque

(Operating fluid: hydraulic oil to ISO VG 46 DIN 51519, t=50 °C)

Example:
Size 45
Displacement V_g = 45 cm³
$p_{ND\ abs}$ =1 bar
n= 1500 min⁻¹ ------
n= 2800 min⁻¹ ——



Other sizes on request

Technical data

Operating pressure range

Pressure at port A or B
(Pressure data to DIN 24312)

Nominal pressure p_N ____ 280 bar
Peak pressure p_{max} ____ 350 bar

The sum of the pressures at ports A and B may not exceed 560 bar.

Case drain pressure

Maximum permissible leakage fluid pressure at ports L and L_1

$p_{abs\ max}$ ____ 2 bar abs.

Installation position

Any. The motor housing must be filled with hydraulic fluid when starting up and during operation. The drain line must be arranged so that the housing does not empty itself when the motor is stationary. The end of the line must enter the tank below the minimum oil level.

The port, located at the highest point must be used in all installation positions to fill the housing and to connect the drain line.

Direction of rotation

Pressure in A = Clockwise rotation
Pressure in B = Anti-clockwise rotation

Symbol

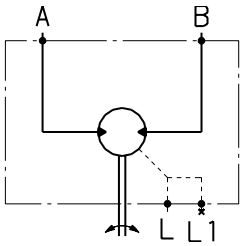
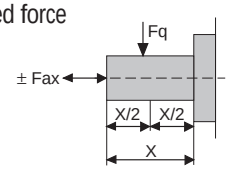


Table of values (theoretical values, without considering η_{mh} and η_v: values rounded)

Size					23	28	37	45	63
Motor displacement			$V_{g\ max}$	cm^3	23.5	28.5	36.7	44.5	63.1
Max. speed [1])			n_{max}	rpm	4900	4700	4200	4000	3400
Max. inlet flow rate	at n_{max}		$q_{v\ max}$	L/min	115	134	154	178	215
Max. power	at n_{max}	Δp = 280 bar	P_{max}	kW	43.6	62.5	71.8	83.1	100,1
Max. torque	at $V_{g\ max}$	Δp = 280 bar	T_{max}	Nm	105	127	163	198	281
Mass moment of inertia (about the output shaft)			J	kgm^2	0.0017	0.0017	0.0033	0.0033	0.0056
Filling volume, approx.				L	0.6	0.6	0.7	0.7	0.8
Weight, approx.			m	kg	12	12	17	17	22
Permissible load on output shaft, max. perm. axial force			$F_{ax\ max}$	N	1000	1000	1500	1500	2000
Max. perm. radial force			$F_{q\ max}$	N	1200	1200	1500	1500	1700
Actual starting torque at n = 0 rpm		Δp = 280 bar		Nm	58	85	92	138	182

[1]) The low pressure of 18 bar must be present for max. speed.

Applied force



Calculating size

Inlet flow rate $q_v = \dfrac{V_g \bullet n}{1000 \bullet \eta_v}$ in L/min

Torque $T = \dfrac{1{,}59 \bullet V_g \bullet \Delta p \bullet \eta_{mh}}{100}$ in Nm

Output power $P = \dfrac{T \bullet n}{9549} = \dfrac{q_v \bullet \Delta p \bullet \eta_t}{600}$ in kW

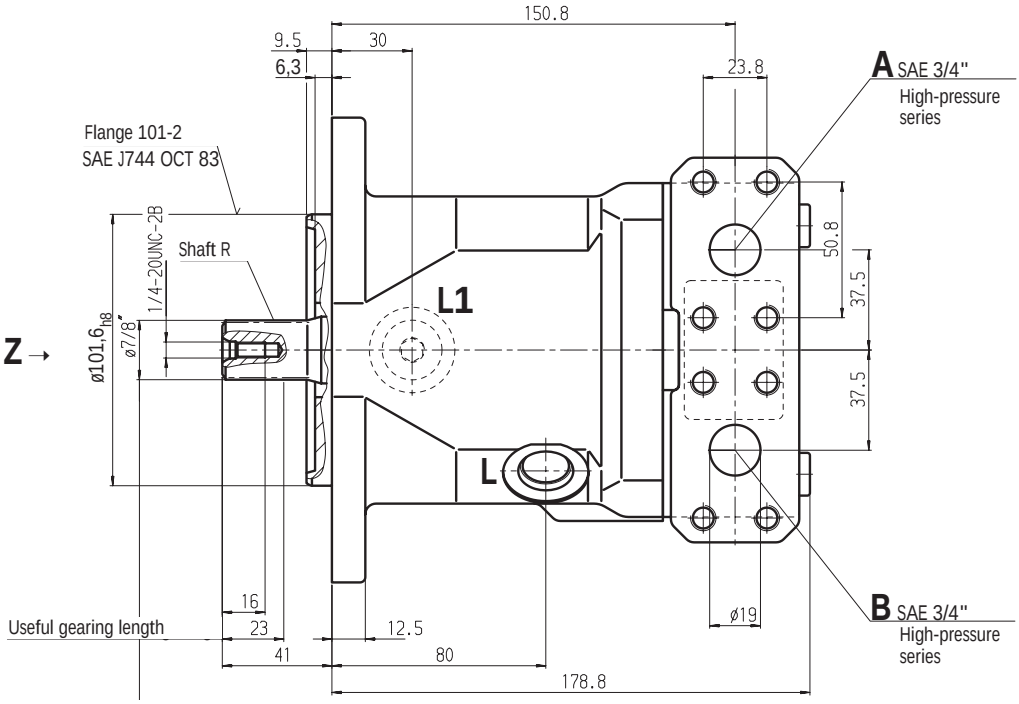
Output speed $n = \dfrac{q_v \bullet 1000 \bullet \eta_v}{V_g}$ in rpm

V_g = geometric motor displacement per revolution in cm^3
Δp = pressure differential in bar
n = speed in rpm
η_v = volumetric efficiency
η_{mh} = mechanical-hydraulic efficiency
η_t = total efficiency ($\eta_t = \eta_v \bullet \eta_{mh}$)

Unit dimensions A10FM; sizes 23 and 28

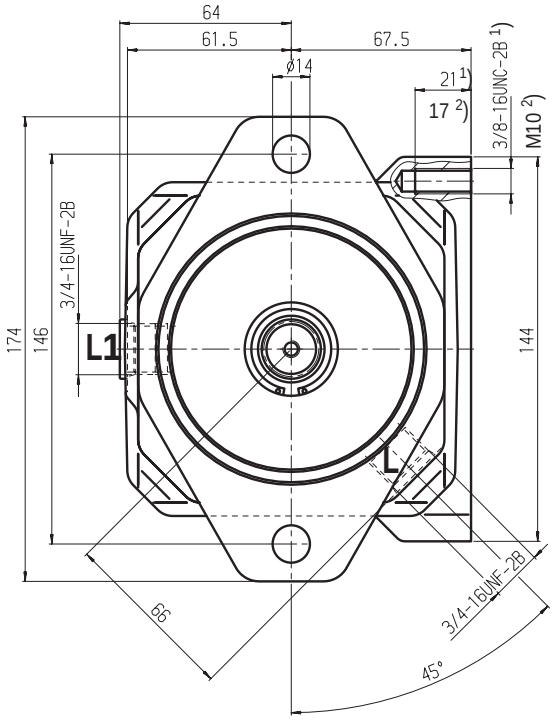
Before finalising your design, please request certified assembly drawing.

Port plates 60 / 10
Shaft R



Shaft 22-4; SAE J744 OCT 83
7/8" dia. splined shaft; 30° pressure angle; 13 teeth;
16/32 pitch; flat base; flank centering;
fit class 5; ANSI B92. 1a-1976

View Z



1) for port plate **60**
2) for port plate **10**

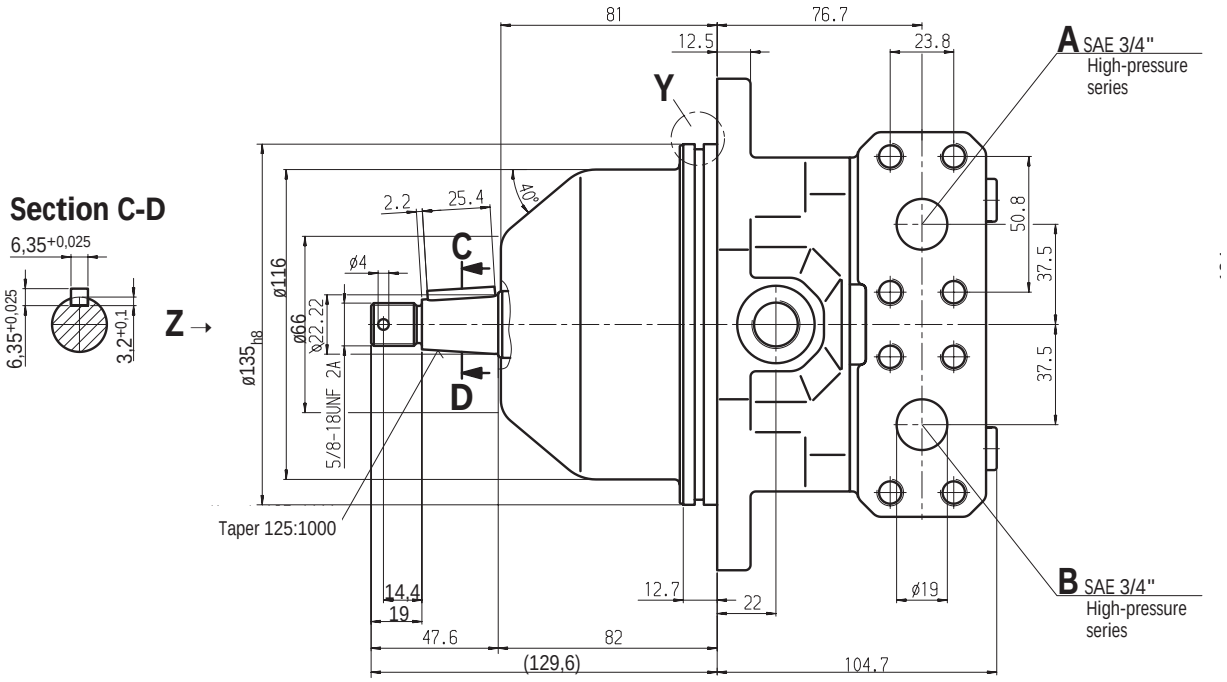
Ports

A,B	Pressure ports	SAE 3/4 ", high-pressure series
L, L_1	Drain ports	7/8 - 14 UNF - 2B

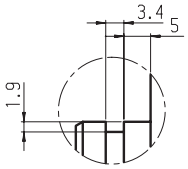
Unit dimensions A10FE; sizes 23 and 28

Before finalising your design, please request certified assembly drawing.

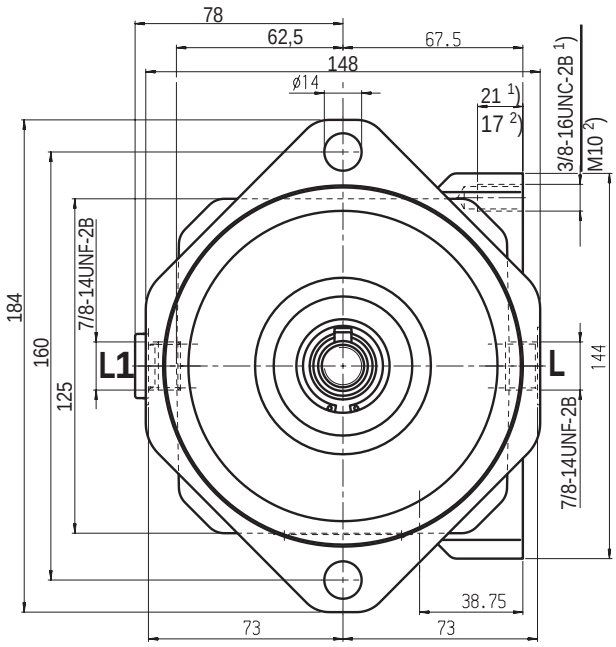
Port plates 60 / 10
Shaft C



Detail Y



View Z



1) for port plate **60**
2) for port plate **10**

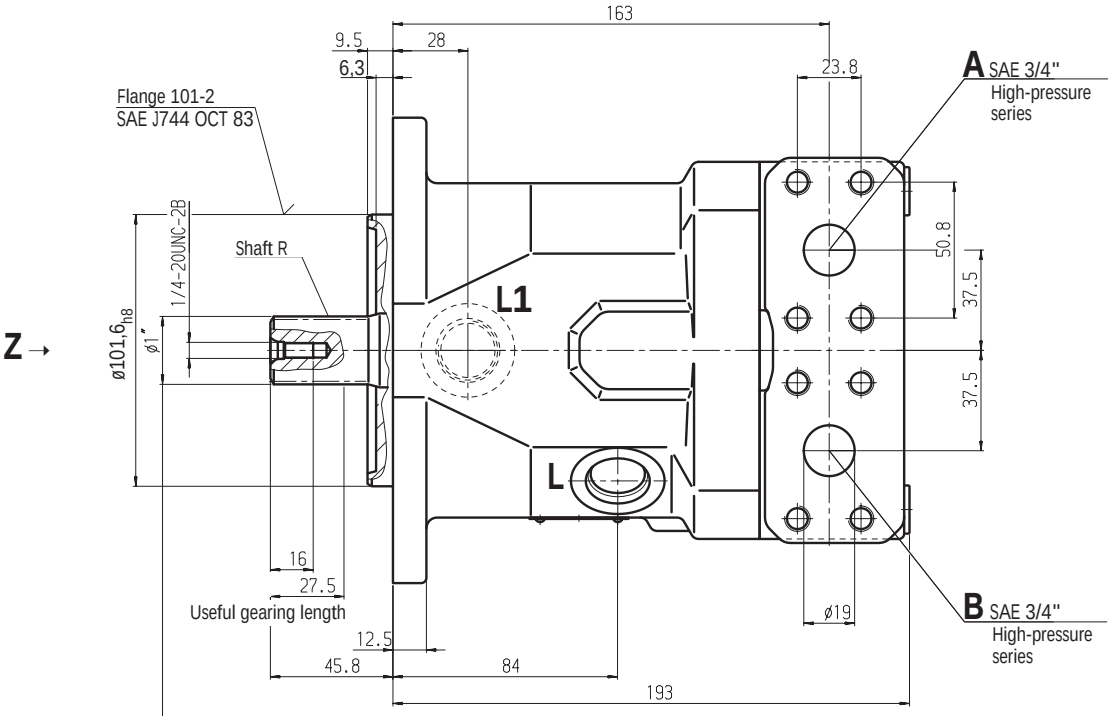
Ports

A,B	Pressure ports	SAE 3/4 ", High-pressure series
L, L_1	Drain ports	7/8 - 14 UNF - 2B

Unit dimensions A10FM; sizes 37 and 45

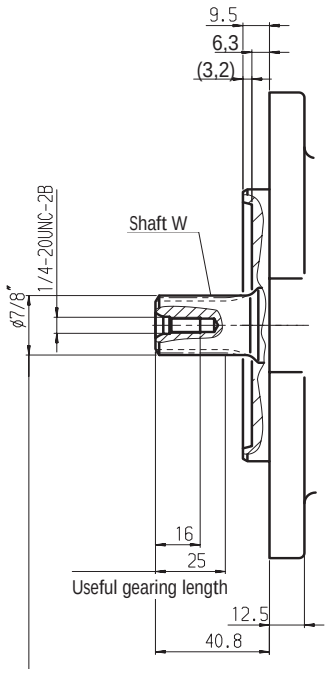
Before finalising your design, please request certified assembly drawing.

Port plates 60 / 10
Shaft R



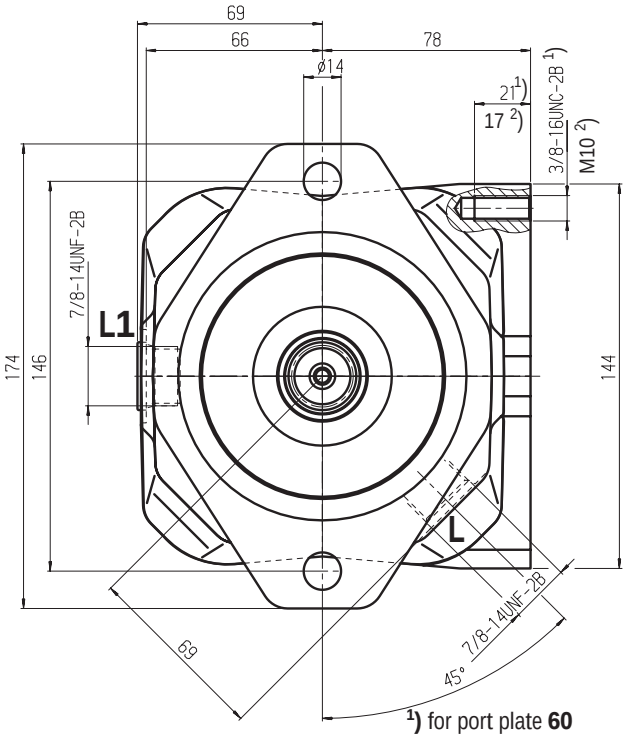
Shaft 25-4; SAE J744 OCT 83
1" dia. splined shaft; 30° pressure angle; 15 teeth;
16/32 pitch; flat base; flank centering;
fit class 5; ANSI B92. 1a-1976

Shaft W



Shaft 22-4; SAE J744 OCT 83
7/8" dia. splined shaft; 30° pressure angle; 13 teeth;
16/32 pitch; flat base; flank centering;
fit class 5; ANSI B92. 1a-1976

View Z



1) for port plate **60**
2) for port plate **10**

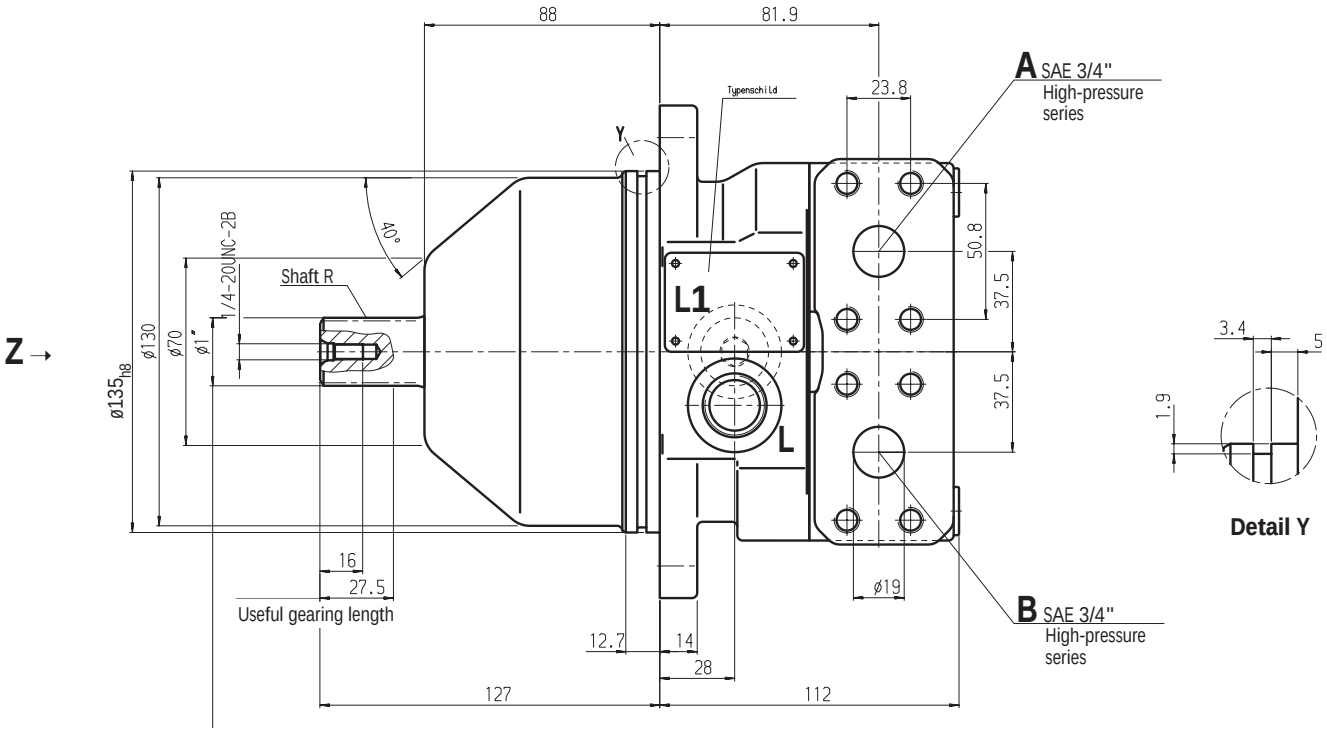
Ports

A,B	Pressure ports	SAE 3/4 ", High-pressure series
L, L_1	Drain ports	7/8 - 14 UNF - 2B

Unit dimensions A10FE sizes 37 and 45

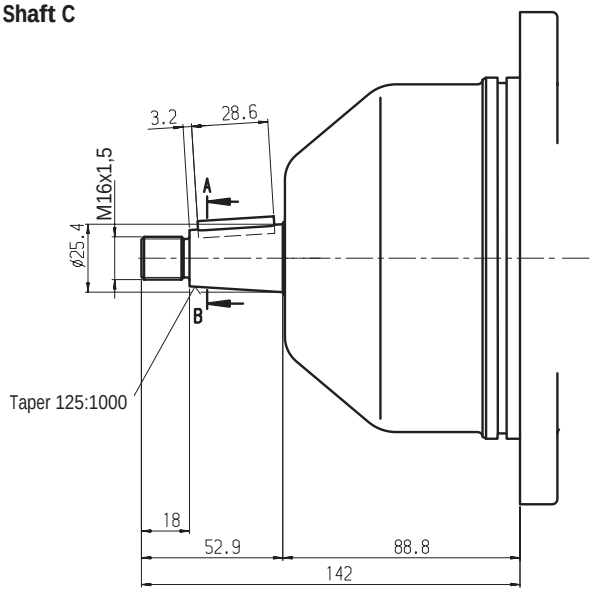
Before finalising your design, please request certified assembly drawing.

Port plates 60 / 10
Shaft R

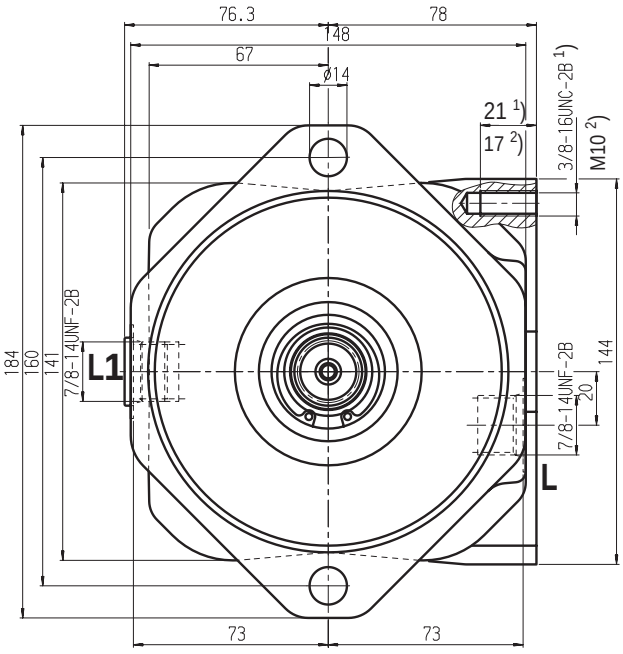


Shaft 25-4; SAE J744 OCT 83
1" dia. splined shaft; 30° pressure angle; 15 teeth;
16/32 pitch; flat base; flank centering;
fit class 5; ANSI B92. 1a-1976

Shaft C

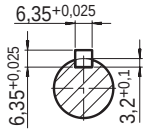


View Z



1) for port plate **60**
2) for port plate **10**

Section C-D



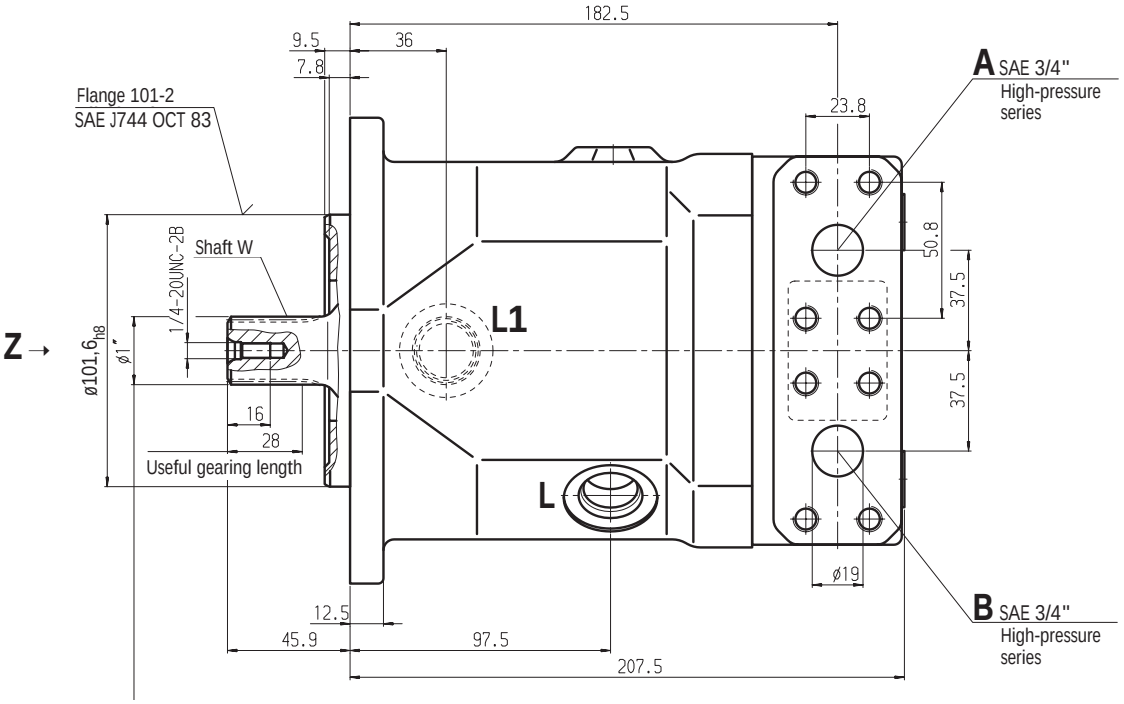
Ports

A,B	Pressure ports	SAE 3/4 ", High-pressure series
L, L_1	Drain ports	7/8 - 14 UNF - 2B

Unit dimensions A10FM; size 63

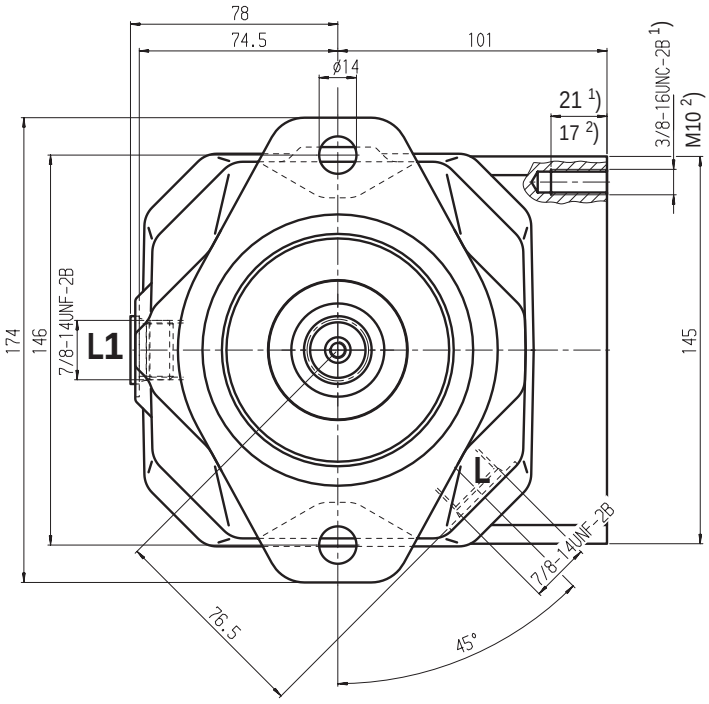
Before finalising your design, please request certified assembly drawing.

Port plates 60 / 10
Shaft W



Shaft 25-4; SAE J744 OCT 83
1" dia. splined shaft; 30° pressure angle; 15 teeth;
16/32 pitch; flat base; flank centering;
fit class 5; ANSI B92. 1a-1976

View Z



1) for port plate **60**
2) for port plate **10**

Ports

A,B	Pressure ports	SAE 3/4 ", High-pressure series
L, L_1	Drain ports	7/8 - 14 UNF - 2B

Integrated flushing and boost pressure valve

Before finalising your design, please request certified assembly drawing.

Flushing and boost pressure valve N007

The flushing and boost pressure valve is used in closed circuit applications to avoid any excessive build-up of heat and to safeguard the minimum boost pressure (16 bar, invariable). The valve is integrated into the port plate.

A fixed flow, determined by an orifice, is flushed out of the low-pressure side and discharged into the motor housing. Together with the leakage oil, it flows via the drain port to the tank. The fluid withdrawn from circulation in this way must be replaced with cooled oil from the boost pump.

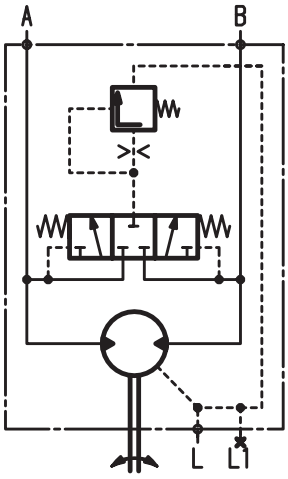
Standard flushing flow

At low pressure of 25 bar and orifice dia. of 1.6 mm the flushing flow amounts to

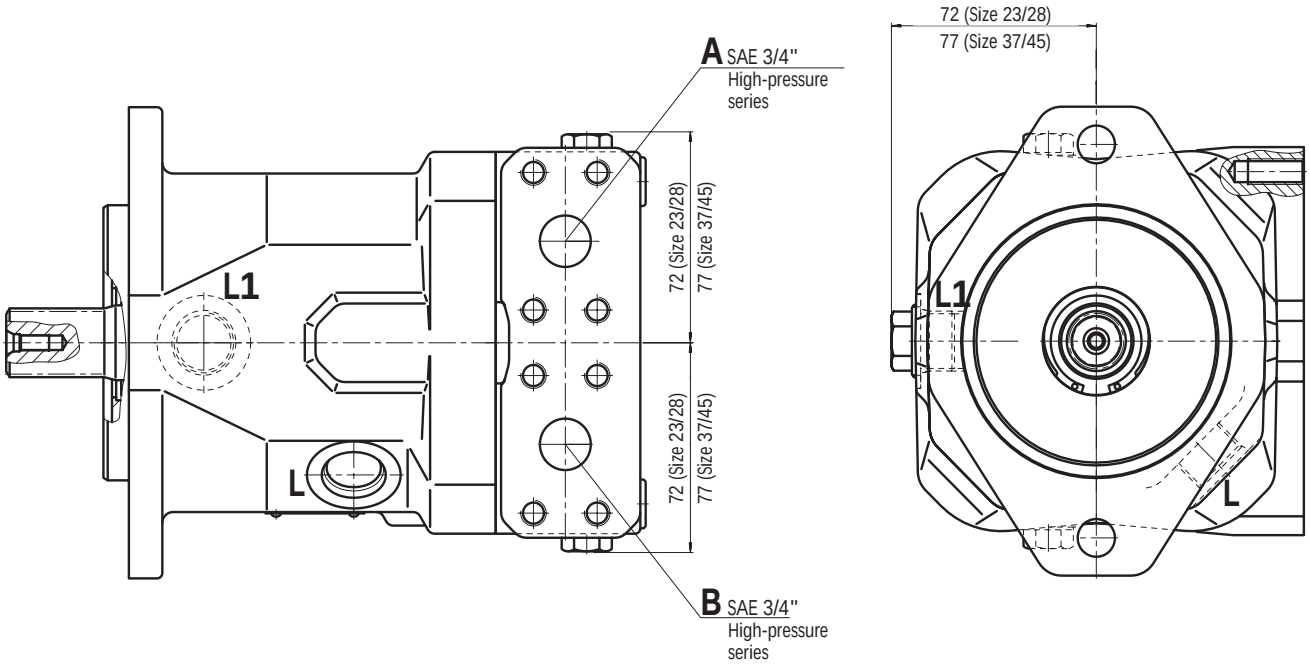
6.5 L/min (sizes 23 - 63)

Other flushing flows available on request

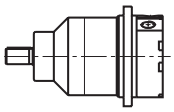
Circuit diagram



Unit dimensions A10FM with integrated flushing and boost pressure valve



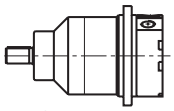
Other motors in series A10



RE 91180

Fixed displacement motor
A10FSM
Series 31

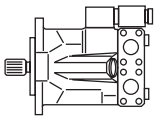
Size:
18 cm³



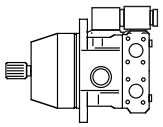
RE 91175

Fixed displacement motor
A10FP
Series 52

Size:
18 cm³



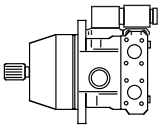
Dual displacement motor
A10VM
Series 52



RE 91703
(in preparation)

Dual displacement plug-in motor
A10VE
Series 52

Size:
28 cm³ 45 cm³ 60 cm³

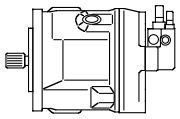


RE 91710

Dual displacement motor
with integrated valves
A10VEC
Series 52

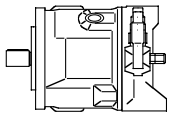
Size:
45 cm³ 60 cm³ 80 cm³

The A10 series of pumps



RE 92701

Variable displacement pump A10VO Series 31



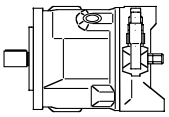
RE 92711

Variable displacement pump A10VSO Series 31

Size:
28 cm³ 45 cm³ 71 cm³ 100 cm³ 140 cm³

Control devices:

DG	Two-point control, directly controlled
DR	Pressure controller
DFR	Pressure and flow controller
DFLR	Pressure, flow and power controller
DFSR	Pressure, flow and total power controller
FHD	Flow controller, dependent on pilot pressure, with pressure control
FE1	Flow controller, electronic
DFE1	Pressure and flow controller, electronic



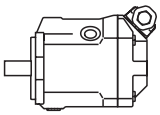
RE 92712

Variable displacement pump A10VSO Series 31

Size:
18 cm³

Control devices:

DR	Pressure controller
DRG	Pressure controller, remote-controlled
DFR	Pressure and flow controller
DFR1	Pressure and flow controller, channel X plugged
DFE1	Pressure and flow controller, electronic



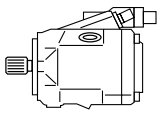
RE 92713

Variable displacement pump A10VSO Series 52

Size:
10 cm³

Control devices:

DR	Pressure controller
DRG	Pressure controller, remote-controlled
DFR	Pressure and flow controller
DFR1	Pressure and flow controller, channel X plugged



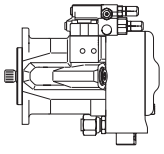
RE 92703

Variable displacement pump A10VO Series 52

Size:
28 cm³ 45 cm³ 60 cm³ 85 cm³

Control devices:

DR	Pressure controller
DRG	Pressure controller, remote-controlled
DFR	Pressure and flow controller
DFR1	Pressure and flow controller, channel X plugged



RE 92730

Compact unit A10CO Series 52

Size:
45 cm³

Control devices:

DR	Pressure controller
DRG	Pressure controller, remote-controlled
DFR	Pressure and flow controller
DFR1	Pressure and flow controller, channel X plugged

Brueninghaus Hydromatik GmbH

Plant Horb
An den Kelterwiesen 14 • D–72160 Horb
Telefon +49 (0) 74 51 / 92-0
Telefax +49 (0) 74 51 / 82 21

The data in this document is quoted solely for purposes of product description and should not be considered to constitute guaranteed and legally binding properties.