MANNESMANN REXROTH

Brueninghaus Hydromatik

Variable Displacement Double Pump A20VO

Series 1, for open circuits
Axial piston - swashplate design, Back to back - design

Sizes 60...260 | Nominal Pressure up to 350 bar | Peak Pressure up to 400 bar

RE 93100/02.97

Preliminary issue

Variable displacement pump with two axial piston rotary groups in swashplate design for use in open circuit hydrostatic drives.

One suction port, two service line ports

Designed principally for use in mobile applications.

The pump operates under self-priming condition, with tank pressurisation or with charge pump (sizes 130...260).

A wide variety of controls are available.
Setting of the constant power control is possible via external adjustments, even when the unit is operating.

The pump is available with a through drive to accept a gear pump or a second axial piston pump.

Output flow is proportional to drive speed and pump displacement and is steplessly variable between maximum and zero.

Ordering Code

A20V		O			/	1	0		–			D	24	

Operating Fluid

Mineral oil (no code)	

Axial piston unit

Variable displacement, swashplate design (Back to back - design)	A20V

Charge pump (impeller)

	60	75	95	130	190	260	
without charge pump (no code)	●	○	●	○	–	–	
with charge pump	–	–	–	○	●	●	L

Mode of operation

Double pump in open circuit	O

Size

≙ Displacement $V_{g\,max}$ (cm^3) per rotary group	60	75	95	130	190	260

Control device

	60	75	95	130	190	260	
Power control, with load limiting control, hydaulic override, negative control with pressure cut-off and hydraulic stroke limiter, neg. control, Δp = 25 bar	–	○	●	○	●	●	LG1DH1
Power control, with load limiting control, hydaulic override, negative control with pressure cut-off, Cross-Sensing control hydraulic stroke limiter, negative control, Δp = 25 bar	–	○	●	○	●	●	LG1DCH1
Power control, with load limiting control, hydaulic override, negative control with pressure cut-off and Cross-Sensing control	–	○	●	○	●	●	LG1DC
Power control, with load limiting control, hydaulic override, negative control with Cross-Sensing control and Load-Sensing control	–	○	●	○	●	●	LG1CS
Electronic pressure, flow and power control	●	–	–	–	–	–	EDP

Series

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Direction of rotation

viewed on shaft end	clockwise	R
	anti-clockwise	L

Seals

NBR (nitril-caoutchouc), shaft seal in FPM (fluor-caoutchouc)	N

Shaft end

	60	75	95	130	190	260	
Splined shaft DIN 5480	–	○	●	○	●	●	Z
Splined shaft SAE	●	–	●	○	–	–	S
	–	○	–	–	●	●	T

Mounting flange

SAE 4-hole (SAE-diesel motor flange on demand)	●	○	●	○	●	●	D

Service line connections

Pressure and suction port SAE on side, opposite side (1 suction port, 2 pressure ports)	●	○	●	○	●	●	24

Through drive

hub	flange						
–	–	●	○	●	○	●	●	N00
SAE A (N 5/8"-9T 16/32 DP)	SAE A, 2-hole	●	○	●	○	●	●	K01
SAE B (N 7/8"-13T 16/32 DP)	SAE B, 2-hole	–	○	●	○	●	●	K02
SAE B-B (N 1"-15T 16/32 DP)	SAE B, 2-hole	–	○	●	○	●	●	K04
SAE C (N 1 1/4"-14T 12/24 DP)	SAE C, 2-hole	–	–	●	○	●	●	K07
SAE C-C (N 1 1/2"-17T 12/24 DP)	SAE C, 2-hole	–	–	●	○	●	●	K24
SAE D (N 1 3/4"-13T 8/16 DP)	SAE D, 4-hole	–	–	–	–	●	●	K17

Technical Data

Fluid

We request that before starting a project detailed information about the choice of pressure fluids and application conditions are taken from our catalogue sheets RE 90220 (mineral oil), RE 90221 (environmentally acceptable hydraulic fluids) and RE 90223 (fire resistant hydraulic fluids, HF).
When using HF- or environmentally acceptable hydraulic fluids possible limitations for the technical data have to be taken into consideration. If necessary please consult our technical department (please indicate type of the hydraulic fluid used for your application on the order sheet). The operation with HFA-, HFB- and HFC- hydraulic fluids requires additional special measures.

Operating viscosity range

In order to obtain optimum efficiency and service life, we recommend that the operating viscosity (at operating temperature) be selected from within the range:

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

referred to tank temperature (open circuit).

Viscosity limits

The limiting values for viscosity are as follows:

size 60

ν_{min} = 10 mm²/s
short term at a max. permissible leakage oil temp. of t_{max} = 90°C

ν_{max} = 1000 mm²/s,
short term on cold start (t_{min} = -25°C)

sizes 75...260

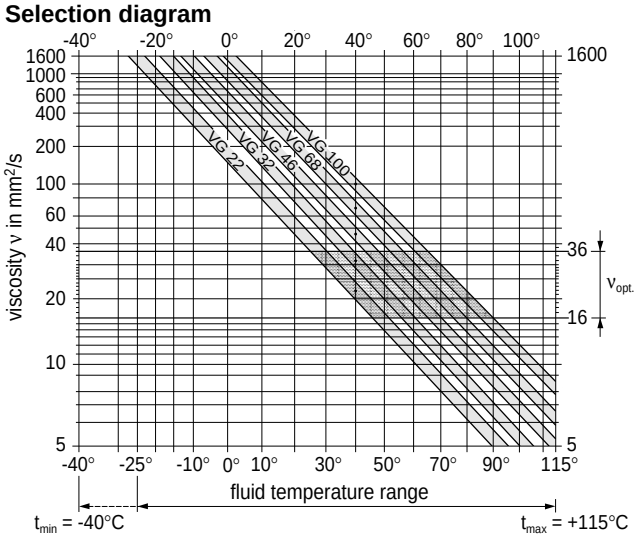
ν_{min} = 5 mm²/s,
short term at a max. permissible temperature of t_{max} = 115°C

ν_{max} = 1600 mm²/s, short term on cold start (t_{min} = -40°C)

Please note that the max. fluid temperature is also not exceeded in certain areas (for instance bearing area).

At temperatures of -25°C up to -40°C special measures may be required for certain installation positions. Please contact us for further information.

Selection diagram



In order to select the correct fluid, it is necessary to know the operating temperature in the tank (open circuit) in relation to the ambient temperature.

The hydraulic fluid should be selected so that within the operating temperature range, the operating viscosity lies within the optimum range (ν_{opt}) (see shaded section of the selection diagram). We recommend that the highest possible viscosity range should be chosen in each case.
Example: At an ambient temperature of X°C tank temperature is 60°C. Within the operating viscosity range (ν_{opt}; shaded area), this corresponds to viscosity ranges VG 46 or VG 68. VG 68 should be selected.
Important: The leakage oil (case drain oil) temperature is influenced by pressure and pump speed and is always higher than the tank temperature. However, at no point in the circuit may the temperature exceed 115°C for sizes 75...260 and 90°C for size 60.
If it is not possible to comply with the above conditions because of extreme operating parameters or high ambient temperatures please consult us.

Filtration

The finer the filtration the better the achieved purity grade of the pressure fluid and the longer the life of the axial piston unit. To ensure the functioning of the axial piston unit a minimum purity grade of:

9 to NAS 15, 38
6 to SAE
18/15 to ISO/DIS 4406 is necessary.

In this case we recommend, depending on system and application filter element $\beta_{20} \geq 100$ for the A20VO.
With the rising differential pressure at the filter element the β-value must not decrease.

At very high temperatures of the hydraulic fluid (90°C to max. 115°C, not permissible for size 60!) at least cleanless class

8 to NAS 1638
5 to SAE
17/14 to ISO/DIS 4406 is necessary.

If above mentioned grades cannot be maintained please consult supplier.

Operating pressure range – inlet

Absolute pressure at port S (suction port)

Design *without charge pump*

$p_{abs\ min}$ 0,8 bar
$p_{abs\ max}$ 30 bar

Design *with charge pump*

$p_{abs\ min}$ 0,6 bar
$p_{abs\ max}$ 2 bar

Operating pressure range – outlet

Pressure at port A or B

Size 60

Nominal pressure p_N = 250 bar
Peak pressure p_{max} = 315 bar

Sizes 75...260

Nominal pressure p_N = 350 bar
Peak pressure p_{max} = 400 bar

Case drain pressure

Permissible case drain pressure at ports T_1 or T_2

p_L 2 bar abs.

A leakage line from one of the four ports T to the tank is necessary.

Technical Data

Mounting position
With the drive shaft to horizontal position; alternative mounting positions are possible, please consult us.
The pump housing must be filled with fluid during commissioning and during normal operation.
For extensive information on the installation position, please read our data sheet RE 90270.

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

Size		*without* charge pump *with* charge pump		**60**	**75**	**95**	**130**	**130**	**190**	**260**
Displacement (per rotary group)		$V_{g\,max}$	cm³	60	74	93,8	130	130	192,7	260
		$V_{g\,min}$	cm³	0	0	0	0	0	0	0
Max. speed [1])	at $V_{g\,max}$	n_{max}	rpm	2700	2550	2350	2100	2500	2500	2300
Max. perm. speed (speed limit) with increased inlet pressure p_{abs} at suction port S or at $V_g \le V_{g\,max}$ ($q_V \le q_{V\,max}$) (see diagram below)		$n_{max\,zul.}$	rpm	3200	3000	2780	2500	2500	2500	2300
Max. output flow	at n_{max}($V_{g\,max}$) [2])	$q_{V\,max}$	L/min	2x157	2x183	2 x 214	2 x 265	2 x 315	2 x 467	2 x 580
Max. drive power	at $q_{V\,max}$ (Δp = 350 bar)	P_{max}	kW	135	220	258	318	380	560	696
Perm torque at $V_{g\,max}$	continuous duty (Δp = 350 bar)	T_N	Nm	477	824	1044	1446	1446	2145	2894
	max. perm. intermit. (Δp = 400 bar)	T_{max}	Nm	601	942	1193	1652	1652	2451	3307
Moment of inertia about drive axis		J	kgm²	0,0113	0,0230	0,0346	0,0636	0,0674		
Weight (approx.)		m	kg	44						

[1]) [1]) The values shown are valid for an absolute pressure (p_{abs}) of 1 bar for design without charge pump and of 0,8 bar for design with charge pump at the suction inlet S and when operated on mineral oil.
[2]) 3 % volumetric loss included
[3]) Δp = 250 bar (continuous duty) and 315 bar (intermittant)

Calculation of size

Output flow (per rotary group): $q_V = \dfrac{V_g \cdot n \cdot \eta_v}{1000}$ in L/min

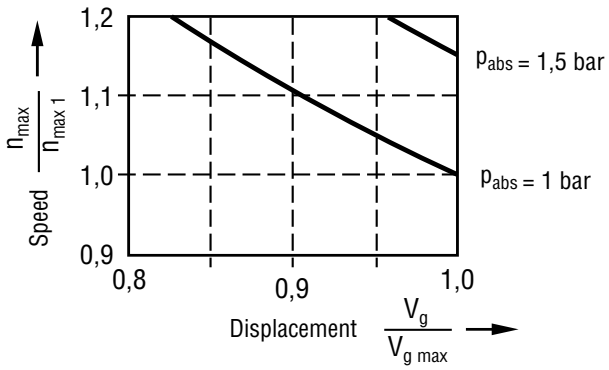
Drive torque: $T = \dfrac{1{,}59}{100 \cdot \eta_{mh}} \cdot (V_{g,1} \cdot \Delta p_1 + V_{g,2} \cdot \Delta p_2)$ in Nm

Drive power: $P = \dfrac{2\pi \cdot T \cdot n}{60000} = \dfrac{(q_{V1} \cdot \Delta p_1 + q_{V2} \cdot \Delta p_2)}{600 \cdot \eta_t}$ in kW

V_g = geom. displacement per rev. in cm³
Δp = differential pressure in bar
n = speed in rpm
η_v = volumetric efficiency
η_{mh} = mech-hyd. efficiency
η_t = overall efficiency ($\eta_t = \eta_v \bullet \eta_{mh}$)

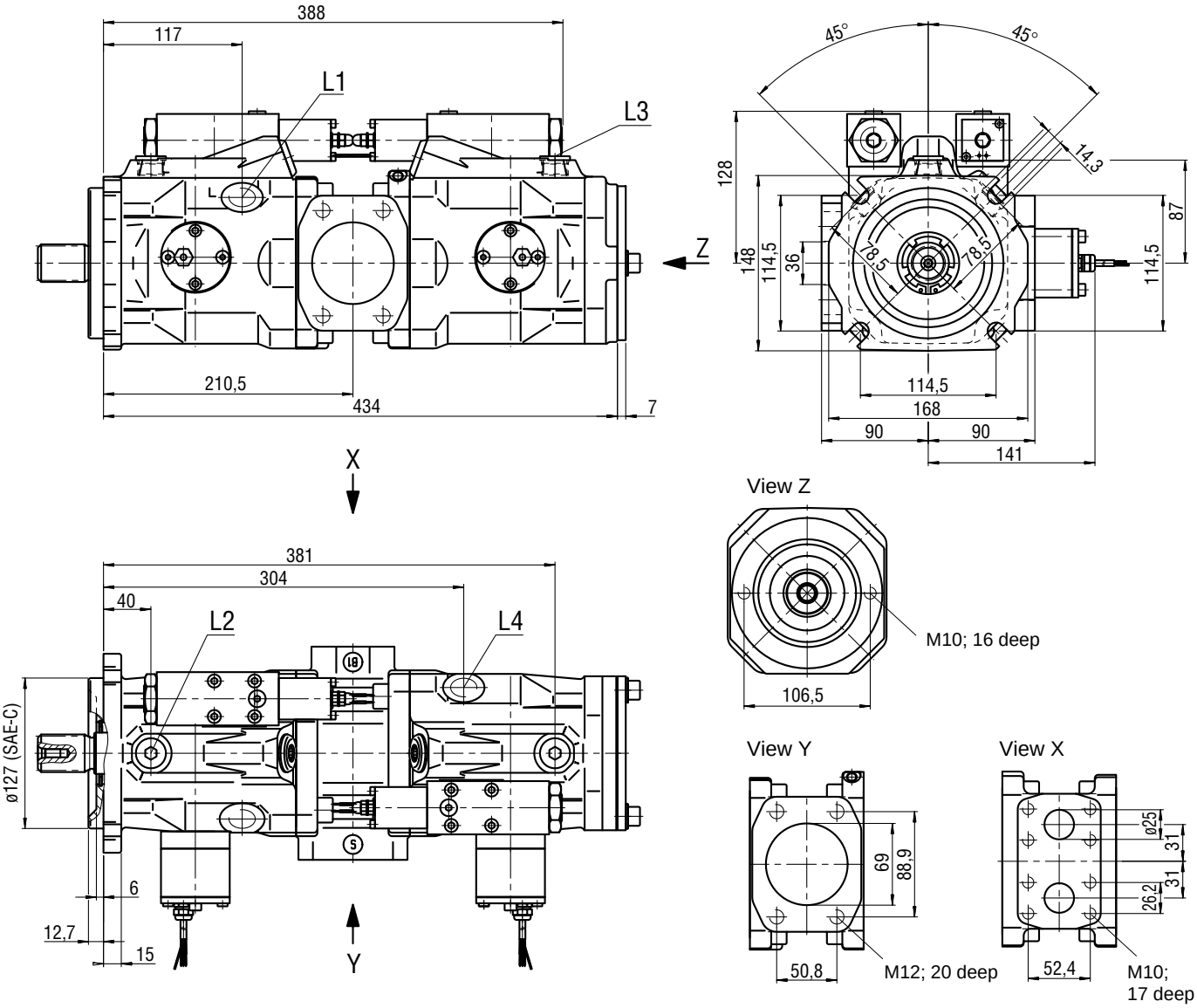
Max. perm. speed n_{max} with increased inlet pressure p_{abs} at suction port S or at $V_g \le V_{g\,max}$ (Design without charge pump)

Note: Max. perm. speed $n_{max\,perm.}$ (speed limit)



Unit Dimensions, Size 60

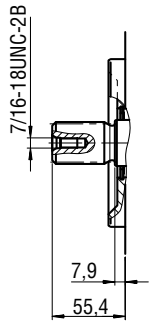
Electronic pressure, flow and power control EDP



Shaft ends

S

Splined shaft SAE C, $1^1/_4$"
30° pressure angle, 14T-12/24 pitch
flat root, side fit
tolerance class 5, ANSI B92.1a/1976



Connections

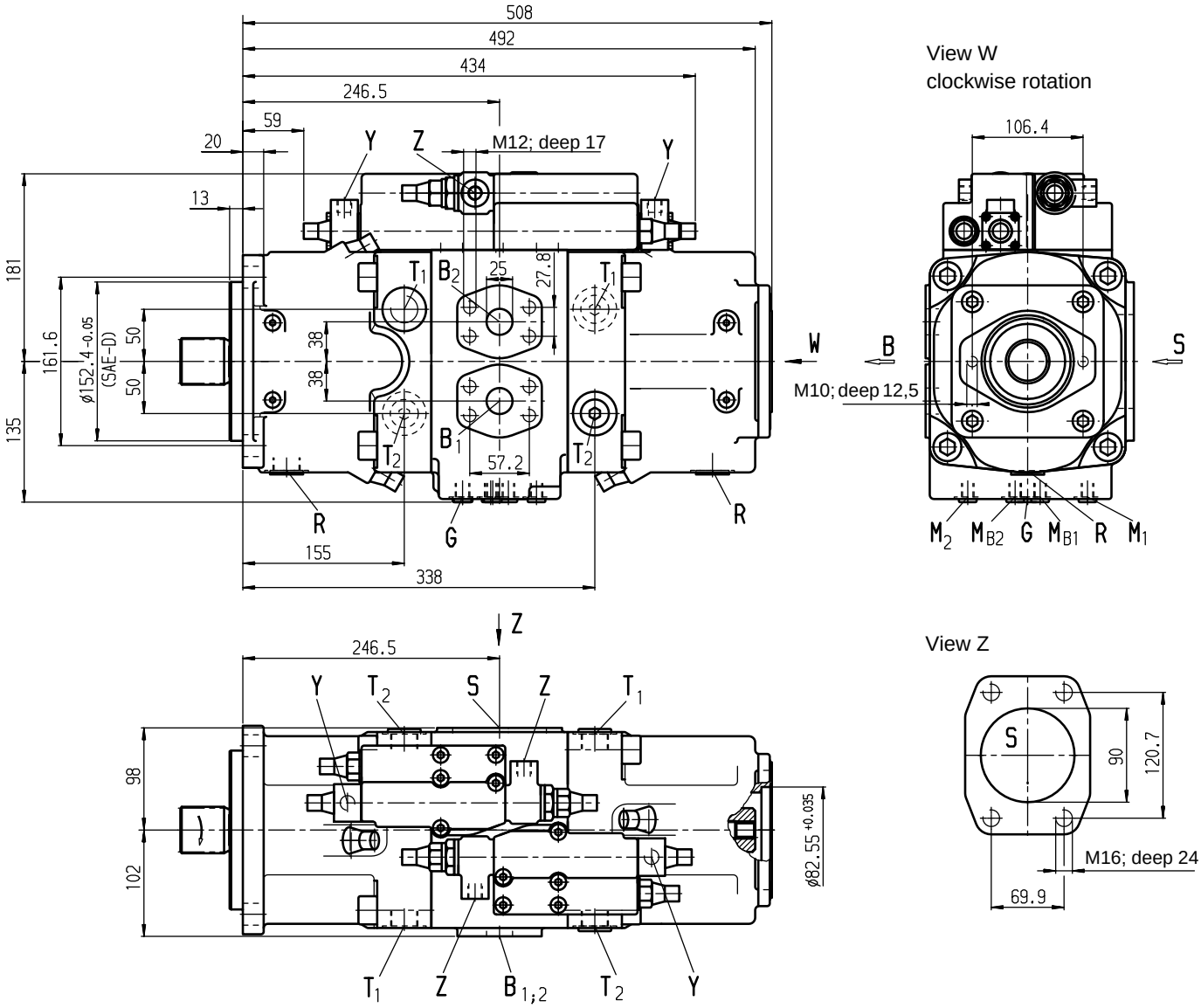
B_1, B_2	Service line ports	SAE 1" standardpressure series
S	Suction port	SAE 2 1/2" standardpressure series
L_1,L_2,L_3,L_4	Air bleed, tank	7/8-14UNF-2B

Unit Dimensions, Size 75 (without impeller)

In preparation

Unit Dimensions, Size 95 (without impeller)

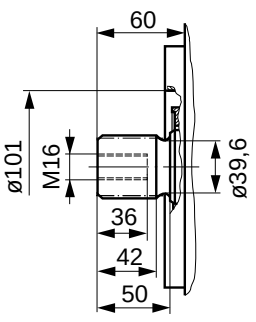
Power control, with load limiting control, hydaulic override with pressure cut-off and hydraulic stroke limiter (LG1DH1)
with through drive K01 (flange + hub: SAE A)



Shaft ends

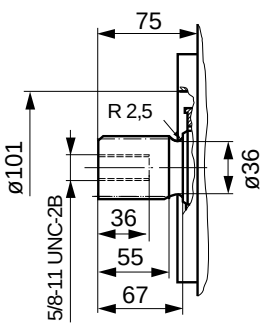
Z

Splined shaft, DIN 5480
W 45x2x30x21x9g



S

Splined shaft SAE D, 1 3/4"
pressure angle 30°, 13T-8/16 pitch
flat root, side fit
tolerance class 5, ANSI B92.1a/1976

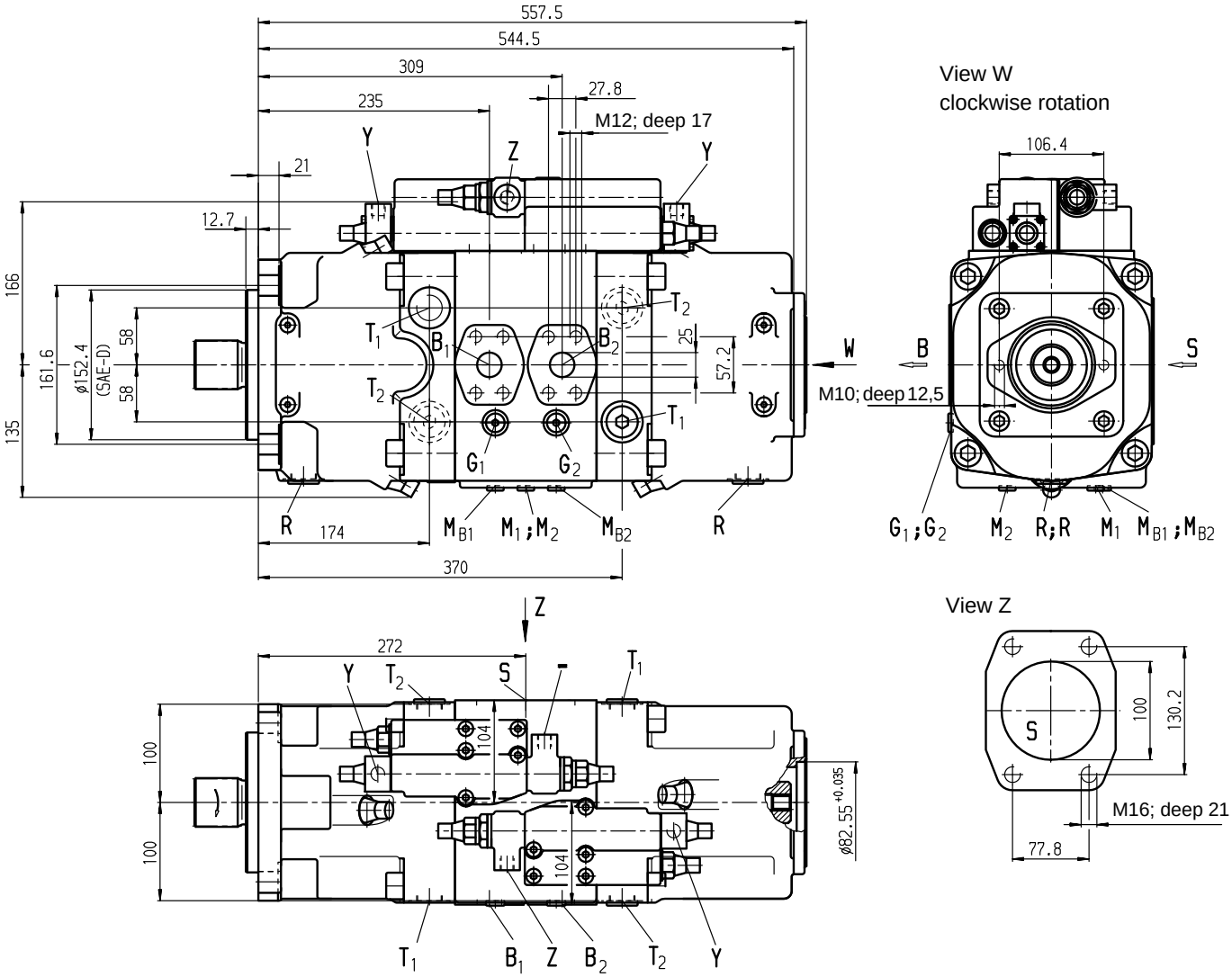


Connections

B_1, B_2	Service line ports	SAE 1" 420 bar (6000 psi) high pressure series
S	Suction port	SAE 3 1/2" 35 bar (500 psi) standard series
T_1	Air bleed, tank	M26x1,5; 14 deep
T_2	Air bleed, tank	M26x1,5; 14 deep
M_1, M_2	Gauge point positioning chamber	M12x1,5; 12 deep
M_{B1}, M_{B2}	Gauge point for pressure port	M12x1,5; 12 deep
X	Port for Δp-control	M14x1,5; 12 deep
R	Air bleed, Oil drain	M26x1,5; 14 deep
G	Control pressure port at design with stroke limiter (H1) with fitting GE10 - PLM (in other case is port "G" closed)	M14x1,5; 12 deep

Unit Dimensions, Size 130 (without impeller)

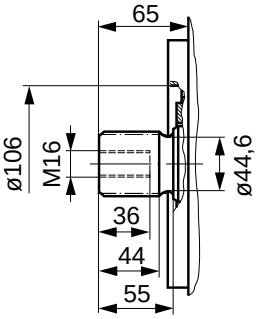
with through drive K01 (flange + hub: SAE A)



Shaft ends

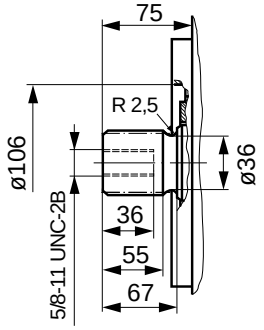
Z

Splined shaft, DIN 5480
W 50x2x30x24x9g



S

Splined shaft SAE D, 1 3/4"
pressure angle 30°, 13T-8/16 pitch
flat root, side fit
tolerance class 5, ANSI B92.1a/1976

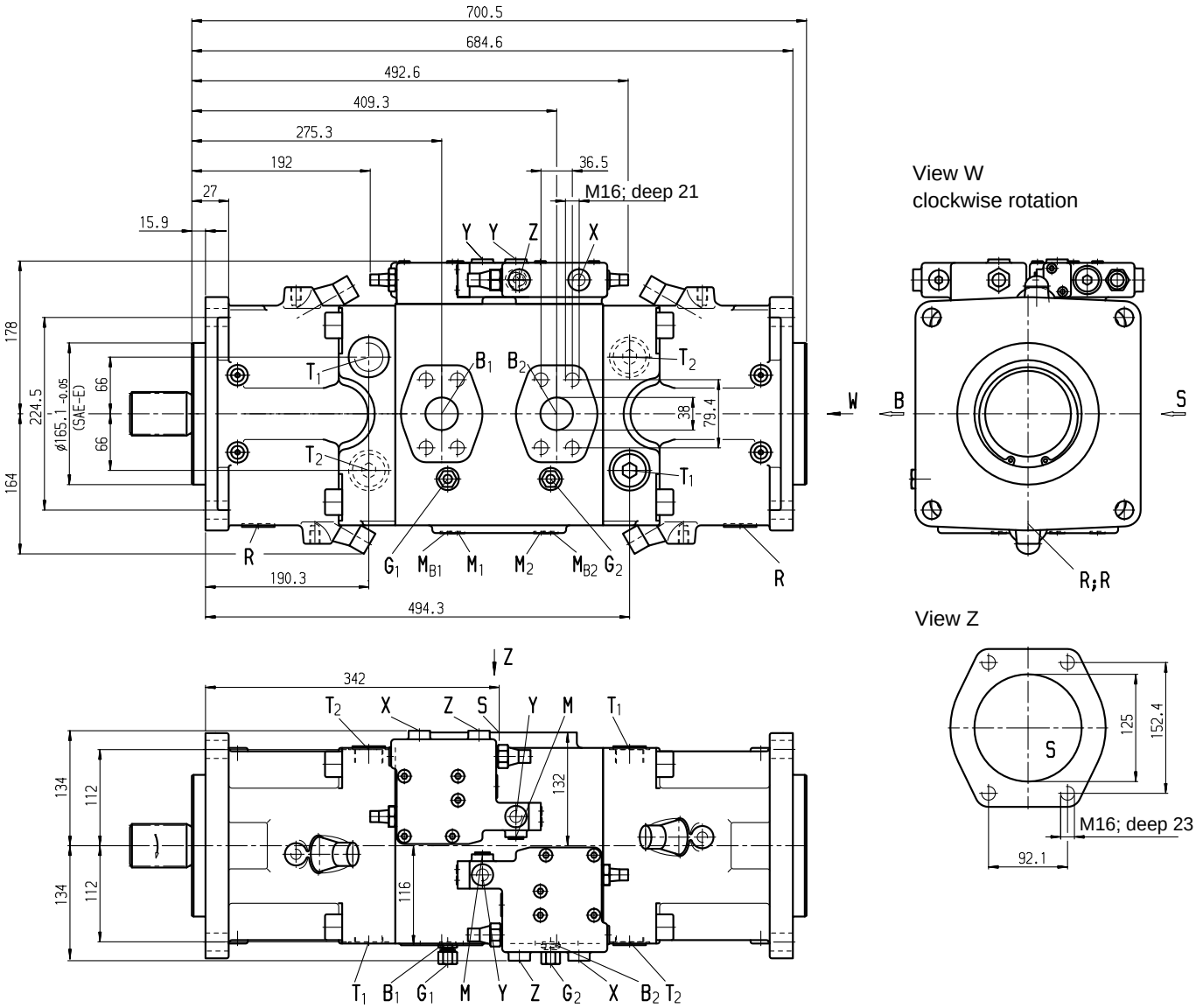


Connections

B_1, B_2	Service line ports	SAE 1" 420 bar (6000 psi) high pressure series
S	Suction port (without impeller)	SAE 3 1/2" 35 bar (500 psi) standard series
T_1	Air bleed, tank	M26x1,5; 14 deep
T_2	Air bleed, tank	M26x1,5; 14 deep
M_1, M_2	Gauge point positioning chamber	M12x1,5; 12 deep
M_{B1}, M_{B2}	Gauge point for pressure port	M12x1,5; 12 deep
X	Port for Δp-control	M14x1,5; 12 deep
R	Air bleed, Oil drain	M26x1,5; 14 deep
G	Control pressure port	M14x1,5; 12 deep

at design with stroke limiter (H1) with fitting GE10 - PLM
(in other case is port "G" closed)

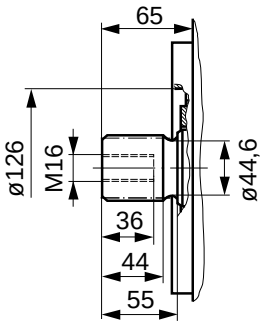
Unit Dimensions, Size 190 (with impeller)



Shaft ends

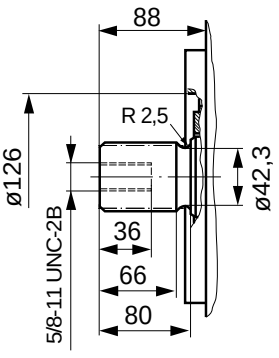
Z

Splined shaft, DIN 5480
W 50x2x30x24x9g



T

Splined shaft SAE F, 2"
pressure angle 30°, 15T-8/16 pitch
flat root, side fit
tolerance class 5, ANSI B92.1a/1976

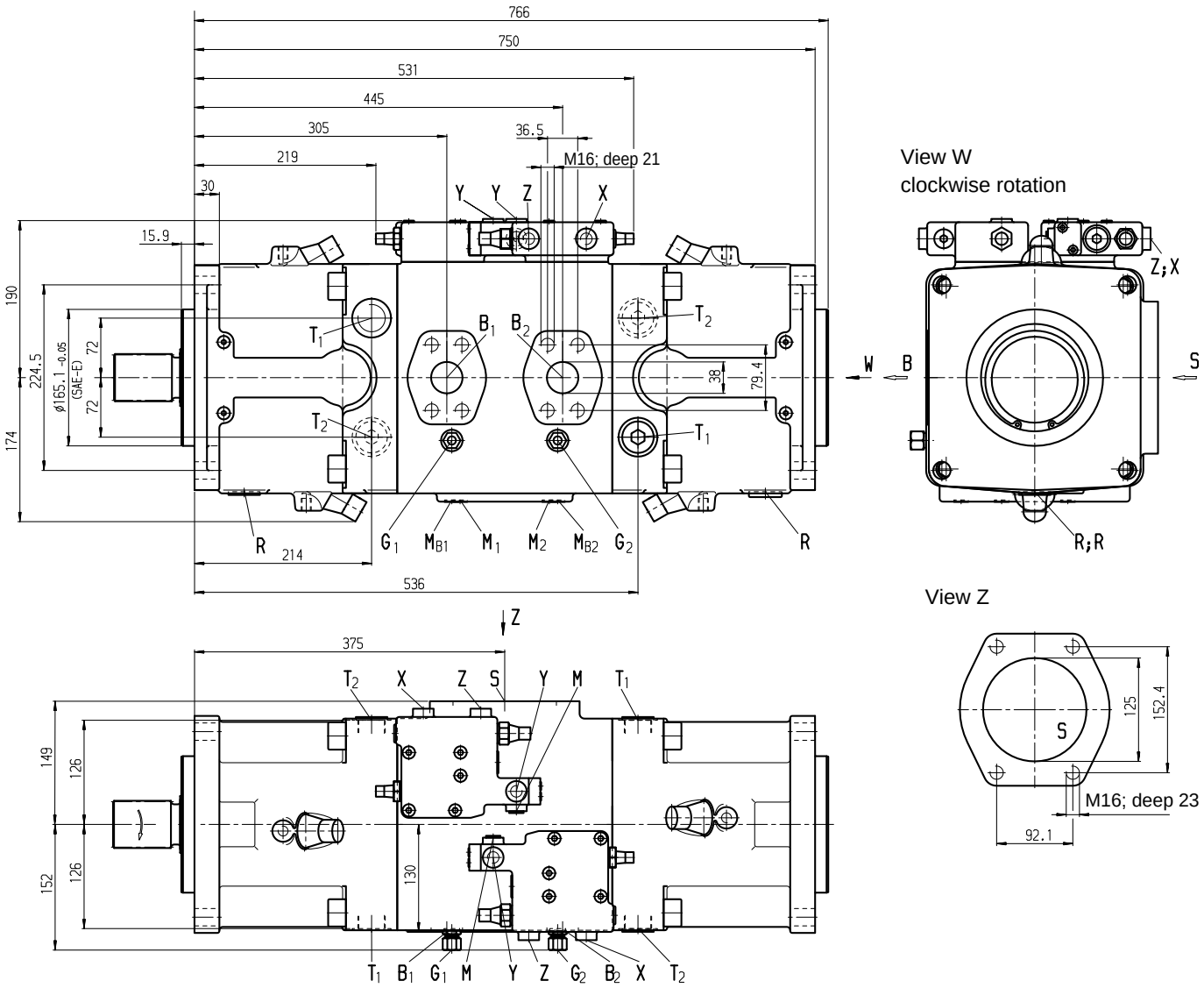


Connections

B_1, B_2	Service line ports	SAE 1 1/2" 420 bar (6000 psi) high pressure series
S	Suction port	SAE 5" 35 bar (500 psi) standard series
T_1	Air bleed, tank	M33x2; 18 deep
T_2	Air bleed, tank	M33x2; 18 deep
X	Port for Δp-control	M14x1,5; 12 deep
M_{B1}, M_{B2}	Gauge point for pressure port	M12x1,5; 12 deep
M_1, M_2	Gauge point positioning chamber	M12x1,5; 12 deep
R	Air bleed, Oil drain	M33x2; 16 deep
G	Control pressure port	M14x1,5; 12 deep

at design with stroke limiter (H1) with fitting GE10 - PLM
(in other case is port "G" closed)

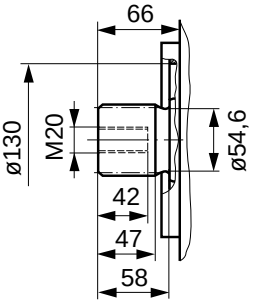
Unit Dimensions, Size 260 (with impeller)



Shaft ends

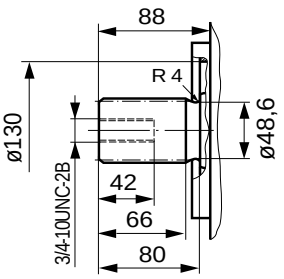
Z

Splined shaft, DIN 5480
W 60x2x30x28x9g



T

Splined shaft SAE $2^1/_4$"
pressure angle 30°, 17T-8/16 pitch
flat root, side fit
tolerance class 5, ANSI B92.1a/1976



Connections

B_1, B_2	Service line ports	SAE 1 1/2" 420 bar (6000 psi) high pressure series
S	Suction port	SAE 5" 35 bar (500 psi) standard series
T_1	Air bleed, tank	M33x2; 18 deep
T_2	Air bleed, tank	M33x2; 18 deep
X	Port for Δp-control	M14x1,5; 12 deep
M_{B1}, M_{B2}	Gauge point for pressure port	M12x1,5; 12 deep
M_1, M_2	Gauge point positioning chamber	M12x1,5; 12 deep
R	Air bleed, Oil drain	M33x2; 18 deep
G	ontrol pressure port	M14x1,5; 12 deep

at design with stroke limiter (H1) with fitting GE10 - PLM
(in other case is port "G" closed)

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