RE 93 010/06.98

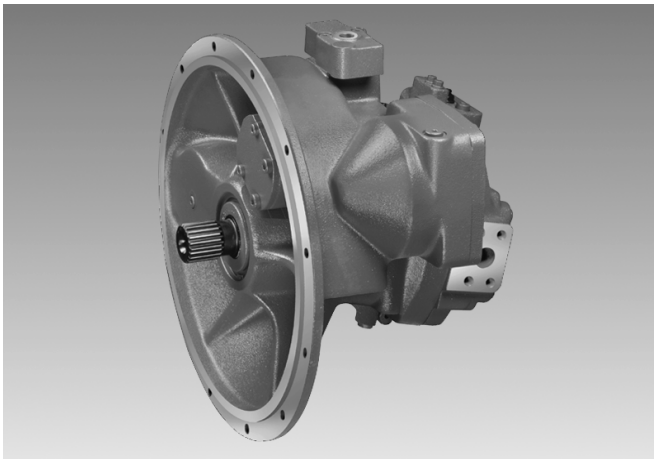
replaces: 03.97

engineering
mannesmann
Rexroth

Variable Double Pump A8VO

for open circuits

Sizes 28...160
Series 6
Nominal pressure 350 bar
Peak pressure 400 bar



A8VO...SR

Index

Features

- Variable double pump with two axial tapered piston rotary groups of bent axis design, for open circuit hydraulic drives.
- One common suction port
- Flow is proportional to drive speed and displacement and is infinitely variable between $q_{V\,max}$ and $q_{V\,min} = 0$
- Comprehensive program of control devices available
- The pump is suitable for direct mounting to flywheel housing of the diesel engine
- The drive shaft bearing (tandem taper roller bearing) is designed to meet the requirement for long service life and high working pressures
- Summation power control (mechanically coupled) and individual power control
- Power take-off, for mounting of axial piston and gear pumps
- Integral auxiliary pump with pressure relief valve, optional additionally with pressure reducing valve
- External adjustment of control possible while in operation

Brueninghaus
Hydromatik

Ordering Code

Hydraulic fluid

Mineral oil (no code)	

Axial piston unit

Variable bent axis design	**A8V**

Operation

Pump in open circuits	**O**

Size

≙ Displacement $V_{g\,max}$ (cm³), per rotary group	**28**	**55**	**80**	**107**	**160**

Control device				**28**	**55**	**80**	**107**	**160**	
Summation power control (mech. coupled), hyperbolic regulator	**SR**			●	●	●	●	–	**SR**
with three circuit power control (3rd pump fixed pump)	**SR3**			●	●	●	●	–	**SR3**
with three circuit power control (3rd pump LR-variable pump)	**SRC**			●	●	●	●	–	**SRC**
with load limiting control	**SG1**			●	●	●	●	–	**SG1**
with on-off switching	**SRZ**			●	●	●	●	–	**SRZ**
with three circuit power control (fixed pump) and on-off switching	**SR3Z**			●	●	●	●	–	**SR3Z**
with three circuit power control (LR-variable pump) and on-off switching	**SRCZ**			●	●	●	●	–	**SRCZ**
with load limiting control and on-off switching	**SG1Z**			●	●	●	●	–	**SG1Z**
Individual power control, hyperbolic regulator									
with three circuit power control	**LR3**		**H2**	–	●	●	●	–	**LR3H2**
with cross sensing control	**LRC**		**H2**	–	●	●	●	–	**LRCH2**
with three circuit power control and cross sensing control	**LR3C**		**H2**	–	●	●	●	–	**LR3CH2**
with load limiting control	**LG1**		**H2**	–	●	●	●	–	**LG1H2**
with hydraulic stroke limiter, positive control H2									
Individual power control with load limiting control, spring regulator									
with hydraulic stroke limiter, negative control	**LA1**	**H1**		–	●	●	●	●	**LA1H1**
with hydraulic stroke limiter, positive control	**LA1**		**H2**	–	●	●	●	●	**LA1H2**
with hydraulic coupling and hydraulic stroke limiter H1	**LA1K**	**H1**		–	●	●	●	●	**LA1KH1**
with hydraulic stroke limiter, negative control H1									
with hydraulic stroke limiter, positive control H2									

Series

	6

Index	**28**	**55**	**80**	**107**	**160**	
	●	–	–	–	–	**0**
	–	●	●	●	●	**1**

Direction of rotation

viewed on shaft end: clockwise	**R**

Gear ratio (n_{input} / $n_{rotary\ groups}$)	**28**	**55**	**80**	**107**	**160**	
i = 1	–	●	●	●	●	**1**
i = 0,73	●	–	–	–	–	**3**

Seals	**28**	**55**	**80**	**107**	**160**	
NBR (nitril-caoutchouc), shaft seal in FKM (fluor-caoutchouc)	●	●	●	●	●	**N**

Shaft end	**28**	**55**	**80**	**107**	**160**	
Splined shaft DIN 5480	●	●	●	●	●	**Z**

A8V	O			/	6		R		–	N	Z	G	05				

Axial piston unit

Operation

Size

Control device

Series

Index

Direction of rotation

Gear ratio

Seals

Shaft end

Mounting flange	**28**	**55**	**80**	**107**	**160**	
SAE J617c (to fit flywheel housing of internal combustion engine)	●	●	●	●	●	**G**

Service line connections

Pressure ports Suction port	SAE at side (metric threads) SAE at rear (metric threads)	**05**

Auxiliary pump	**28**	**55**	**80**	**107**	**160**	
without integral auxiliary pump, without power take-off (PTO)	●	●	●	●	●	**K00**
with integral auxiliary pump, without power take-off (PTO)	–	●	●	●	●	**F00**
without integral auxiliary pump, with power take-off (PTO)	●	●	●	●	●	**K...**
with integral auxiliary pump, with power take-off (PTO)	–	●	●	●	●	**F...**

Power take-off	flange/centering dia.	hub					
	SAE A, 2-hole/ø82	SAE A ($N^5/_8$"-9T 16/32DP)	●	●	●	●	●	**...01**
	SAE B, 2-hole/ø101	SAE B ($N^7/_8$"-13T 16/32DP)	●	●	●	●	●	**...02**
	SAE B, 2-hole/ø101	SAE B-B (N1"-15T 16/32DP)	–	●	●	●	●	**...04**
	SAE C, 2-hole/ø127	SAE C ($N1^1/_4$"-14T 12/24DP)	–	❍	●	●	●	**...07**
	SAE D, 4-hole/ø152	SAE D ($N1^3/_4$"-13T 8/16DP)	–	–	–	❍	●	**...17**
	ISO, 4-hole/ø80	N20, DIN 5480	–	❍	●	❍	❍	**...28**
	ISO, 4-hole/ø80	N25, DIN 5480	–	●	●	●	❍	**...41**
	ISO, 4-hole/ø100	N25, DIN 5480	–	●	●	●	❍	**...29**
	ISO, 4-hole/ø100	N30, DIN 5480	–	❍	❍	❍	❍	**...60**
	ISO, 4-hole/ø125	N30, DIN 5480	–	●	●	●	●	**...30**
	ISO, 4-hole/ø125	N35, DIN 5480	–	–	❍	●	❍	**...32**
	ISO, 4-hole/ø140	N35, DIN 5480	–	–	❍	●	❍	**...36**
	ISO, 4-hole/ø140	N40, DIN 5480	–	–	❍	❍	❍	**...33**

Valve	without/with auxiliary pump:	**K..**	**F..**	
without valve (only for model without auxiliary pump, K..)		● [1]	–	**0**
with pressure relief valve (only for model with auxiliary pump, F..)		– [1]	●	**1**
with pressure relief valve and pressure reducing valve, U=12 V (only for model with auxiliary pump, F..)		–	●	**3**
with pressure relief valve and pressure reducing valve, U=24 V (only for model with auxiliary pump, F..)		–	●	**4**

[1]) Size 28 is delivered in the variations without PTO and with SAE A-PTO **with** pressure relief valve as standard design (K001, K011), in the variation with SAE B-PTO **without** pressure relief valve as standard design (K020),

● = available ❍ = available on enquiry – = not available

Technical Data

Fluid

We request that before starting a poject 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 the circuit temperature (closed circuit).

Viscosity limits

The limiting values for viscosity are as follows:

ν_{min} = 5 mm²/s

short term at a max. permissible temp. of t_{max} = 115°C.

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

ν_{max} = 1600 mm²/s

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

At temperatures of -25°C up to -40°C special measures are required. Please contact us for further information.

Notes on the selection of the hydraulic fluid

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

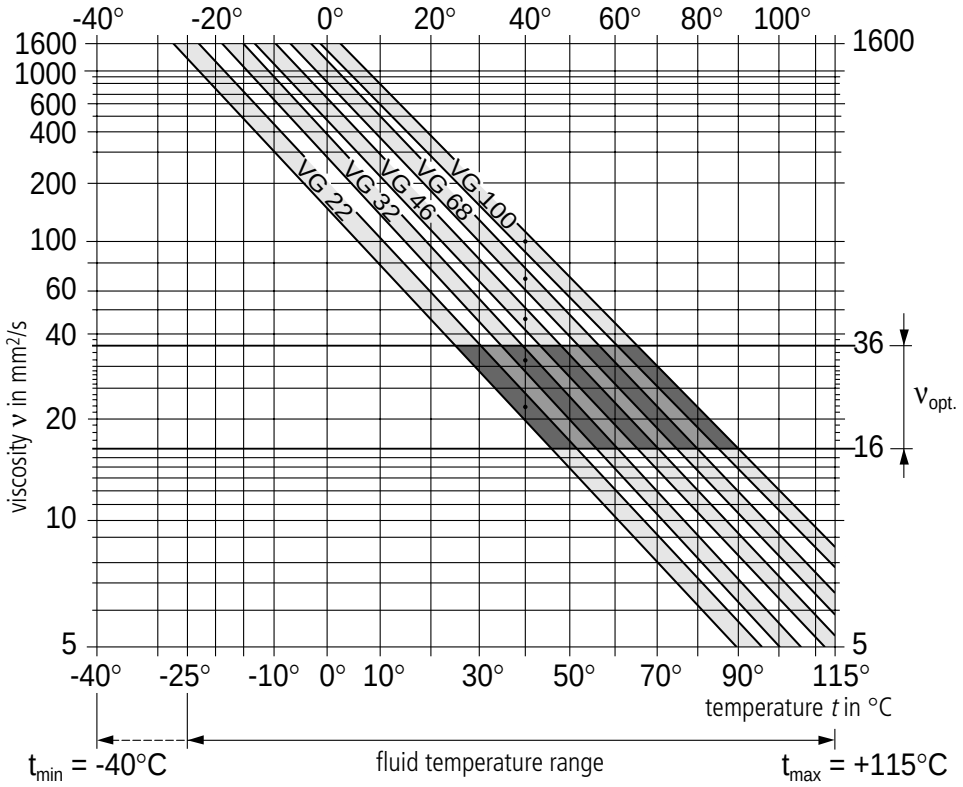
The hydraulic fluid should be selected so that within the operating temperature range, the operating viscosity lies within the optimum range ($\nu_{opt.}$) (see shaded section of the selection diagram). We recommend that the highest possible viscosity range should be chosen in each case.

Example: At an ambient temperature of X°C the operating temperature in the tank 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.

If it is not possible to comply with the above conditions because of extreme operating parameters or high ambient temperatures please consult us.

Selection diagram



Technical Data

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 minumum purity grade of

9 to NAS 1638

6 to SAE

18/15 to ISO/DIS 4406 is necessary.

At very high temperatures of the hydraulic fluid (90°C to max. 115°C) 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.

Temperature range of the radial shaft seal

The FKM shaft seal is admissible for a housing temperature range from -25°C to +115°C.

Note:
For applications below -25°C a NBR shaft seal is necessary (admissible temperature range -40°C to +90°C).
When ordering, please state in clear text: with NBR shaft seal

Working pressure range - inlet

Absolute pressure at port S (suction inlet)

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

$p_{abs\ max}$ 1,5 bar

Working pressure range - outlet

Pressure at port A_1 or A_2

nominal pressure $p_n = 350$ bar

peak pressure $p_{max} = 400$ bar

Case drain

The drain oil chamber is connected to the suction and gear chambers. A drain line to tank is not required.

Installation position

With the drive shaft in horizontal position; alternative mounting positions are possible - please consult us.

The pump housing must be filled with fluid prior the commissioning, and must remain full whenever it is operating.

For extensive information on installation position, please consult our data sheet RE 90270 before completing your design work.

Direction of rotation

Clockwise, viewed on drive shaft

Input

Via flexible coupling

Technical Data

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

Size of double pump		size		28	55	80	107	160
Displacement		$V_{g\,max}$	cm^3	28,1	54,8	80	107	160
		$V_{g\,min}$	cm^3	0	0	0	0	0
Gear ratio	$i = n_{input}/n_{rotary\ groups}$			0,738	1,0	1,0	1,0	1,0
Max. input speed [1])	at $V_{g\,max}$	$n_{0\,max\,1}$	rpm	2300	2500	2240	2150	1900
Max. perm. input speed (speed limit) with increased inlet pressure p_{abs} at suction port S (see diagram)		$n_{0\,max\,perm.}$	rpm	2630	3000	2750	2450	2100
Max. flow [2])	at $n_{0\,max\,1}$ ($V_{g\,max}$)	$q_{V\,0\,max\,1}$	L/min	2 x 85	2 x 133	2 x 174	2 x 223	2 x 295
Max. input power	at $\Delta p_1 + \Delta p_2 = 700$ bar and at $q_{V\,0\,max\,1}$	$P_{0\,max\,1}$	kW	72,5 [3])	160	209	268	304 [4])
Max. input torque	at $V_{g\,max}$ and at $\Delta p_1 + \Delta p_2 = 700$ bar	$T_{0\,max\,1}$	Nm	218 [3])	611	891	1192	1528 [4])
Moment of inertia		J	kgm^2	0,015	0,017	0,027	0,044	0,067
Weight (approx.)		m	kg	60	78	100	115	220

[1]) The values shown are valid for an absolute pressure (p_{abs}) 1 bar at the suction inlet S and when operated on mineral oil. By increasing the inlet pressure ($p_{abs} > 1$ bar), pump speeds can be increased up to the "max. perm. speed (speed limit)" (see diagram, page 7)

[2]) 3 % volumetric loss included

[3]) $\Delta p_1 + \Delta p_2 = 500$ bar (size 28)

[4]) $\Delta p_1 + \Delta p_2 = 600$ bar (size 160)

Variation: with integral auxiliary pump, F00, F..

Size of double pump	size			28	55	80	107	160
Displacement of integral auxiliary pump		$V_{g\,max}$	cm^3	–	8,2	8,2	10	19
Input speed of integral auxiliary pump	$n_{aux.\ pump} = \frac{n_{input}}{i}$	i (gear ratio)		–	0,887	0,780	0,843	0,831

Variation: with PTO, K.., F..

Size of double pump	size		28	55	80	107	160
Max. torque on PTO	T_{max}	Nm	150	250	350	500	640
Input speed of PTO	$n_{sec.\ PTO} = \frac{n_{input}}{i}$	i (gear ratio)	0,738	1,0	1,0	1,0	0,831

Calculation of size

Output flow $q_v = \frac{V_g \bullet n \bullet \eta_v}{1000}$ in L/min

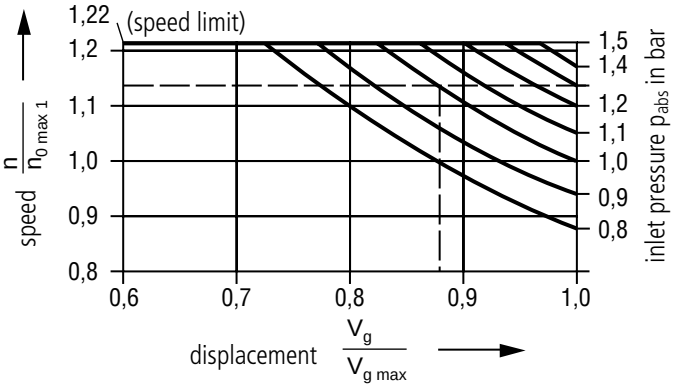
Torque $T = \frac{1{,}59 \bullet V_g \bullet \Delta p}{100 \bullet \eta_{mh}} = \frac{V_g \bullet \Delta p}{20 \bullet \pi \bullet \eta_{mh}}$ in Nm

Power $P = \frac{T \bullet n}{9549} = \frac{2\,\pi \bullet T \bullet n}{60\,000} = \frac{q_v \bullet \Delta p}{600 \bullet \eta_t}$ in kW

V_g = displacement per revolution in cm^3
Δp = differential pressure in bar
n = speed in rpm
η_v = volumetric efficiency
η_{mh} = mechanical-hydraulic efficiency
η_t = overall efficiency

Technical Data

Calculation of the inlet pressure p_{abs} at suction inlet S or of the reduction in flow with increased speed.



Example:

Given: size 80, input speed 2560 rpm

Required: necessary pressure p_{abs} at suction inlet S

Solution: speed ratio $\frac{n}{n_{0\ max\ 1}} = \frac{2560}{2240} = 1{,}14$

gives an inlet pressure p_{abs} = 1,3 bar
at full swivel angle ($V_{g\ max}$).

If free inlet flow can only be achieved, for example,

with p_{abs} = 1 bar, then the pump displacement must be reduced to 0,88 • $V_{g\ max}$.

Inportant: Max. perm. speed $n_{0\ max\ perm.}$ (speed limit).
Min. and max. perm. pressure at port S.

SR Summation Power Control (hyperbolic regulator, sizes 28-107)

The summation power control SR is a pressure dependent pilot operated control which steplessly adjusts the coupled rotary groups, thus varying the displacement. The swivel range is from $V_{g\ max}$ to $V_{g\ min} = 0$.

The flow is varied as a function of the system pressures so as to produce a constant drive torque on the prime mover.

For example, if one pump requires little power, the remaining power becomes available to the other pump. In extreme cases, either pump can be supplied with maximum power.

Summation power control means control by means of the summated pressures ($p_{B1} + p_{B2}$).

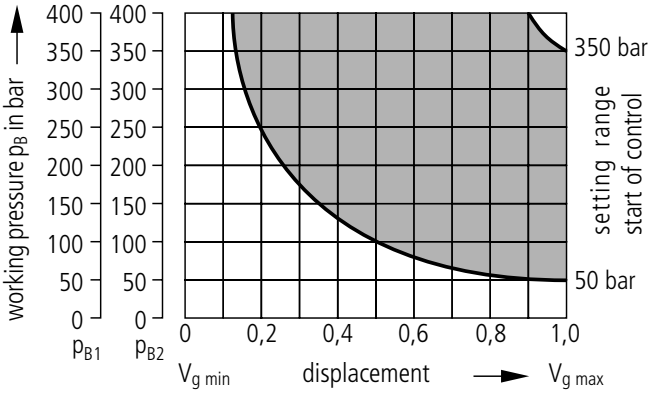
The sum of the two working pressures is halved via the pressure transducer. This half summated pressure acts on a rocker arm via the measuring area of the control spool in the control piston. An externally adjustable spring force acts on the other side of the rocker arm and determines the torque setting.

If pressure rises beyond the set spring force, the control valve is operated and the double pump swivels towards $V_{g\ min}$ until a torque balance on the rocker arm is restored.

When not under pressure, the double pump is swivelled back to its starting position ($V_{g\ max}$) by means of a control spring.

The precise control to the hyperbolic curve gives optimum power utilisation.

At constant input speed, constant input power is therefore obtained.



p_{B1}= pressure from pump 1

p_{B2}= pressure from pump 2

Pressure range at start of control 100 - 700 bar summated pressure

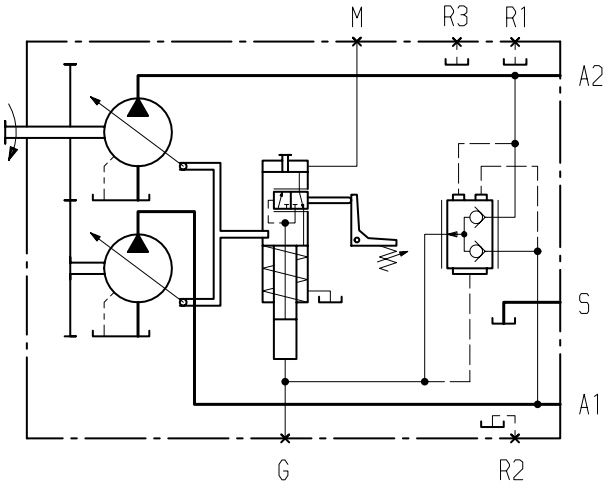
The output power curve is influenced by the efficiency of the double pump.

When ordering, state in clear text:

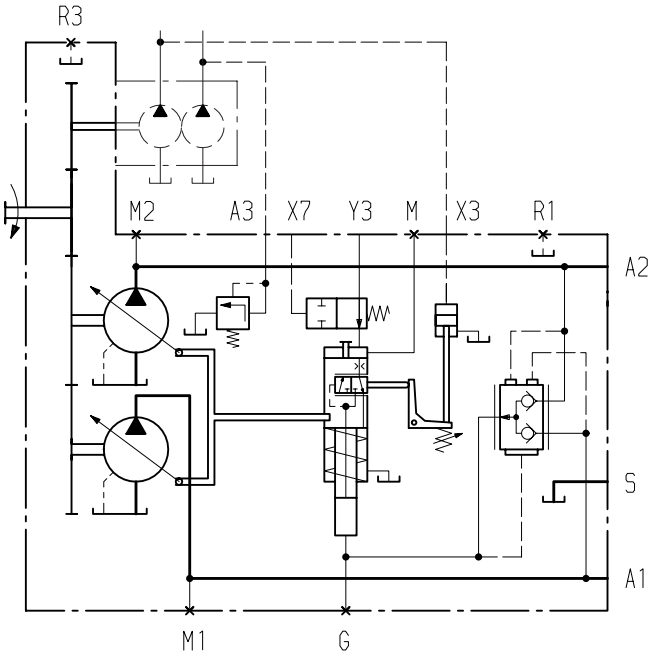
- input power P (kW)
- input speed n (rpm)
- max. output flow $q_{V\ max}$ (L/min)

After all technical details have been clarified, a power diagram can be produced by computer.

Summation power control SR, sizes 55-107
(without power take-off and without auxiliary pump)



Summation power control with three circuit power control and hydraulic on-off switching SR3Z, size 28
(with power take-off and with pressure relief valve)



Variation: hydraulic on-off switching, Z

When not under pressure double pump is swivelled back to a minimum displacement ($V_{g\ min}$) by means of a positioning pressure at the port Y_3.

If the port X_7 is loaded with control pressure the 2-way valve is switched, the hydraulic on-off switching being deactivated.

Permissible pilot pressure at port X_7:

$p_{St\ min}$ _____ 5 bar
$p_{St\ max}$ _____ 50 bar

At port Y_3 an external control pressure of 30 bar is needed for the control.

SR Summation Power Control ...

Override of the power setting

Variation: three circuit power control SR3, SRC

Depending on the working pressure of the pump mounted at the PTO, the power adjustment of the summation power controls is changed (port X_3).

Thus the summation power control can be set to 100% of the total power. The power setting of the summation power control will only be reduced if the working pressure of the pump mounted at the PTO increases dependent on load. The required power drop is brought about by adaption of the measuring area of the three circuit valve to the size of the third pump.

SR3 _____ high pressure signal from fixed pump

SRC _____ high pressure signal from power controlled variable pump

Variation: load limiting control SG1

In contrast to three circuit power control load limiting control works by loading the power control with an external *pilot pressure*. This pilot pressure acts on the adjustment spring of the summation power control via port X_3.

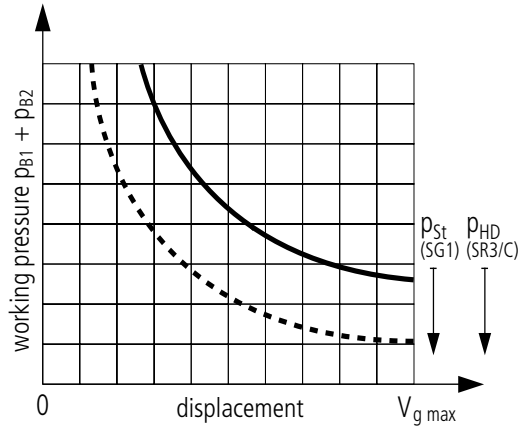
The force resulting from the pilot pressure is acting against the adjustment spring of the power regulator, i.e. increasing the pilot pressure reduces the power output (load limiting control with negative power override).

The mechanical adjusted basic power setting can be varied by means of different pilot pressures, enabling different power mode settings. If the pilot pressure signal is then varied by means of a load limiting controller the total hydraulic power is equal to the drive input power. The pilot pressure used for power control is generated by an *external control element* or by the built-on pressure reducing valve. The electrical signal for the input control of the pressure reducing valve must be produced by an *external control electronic*. For this purpose the microcontroller MC7 is available in connection with the software GLB (electronic load limiting control for excavators).

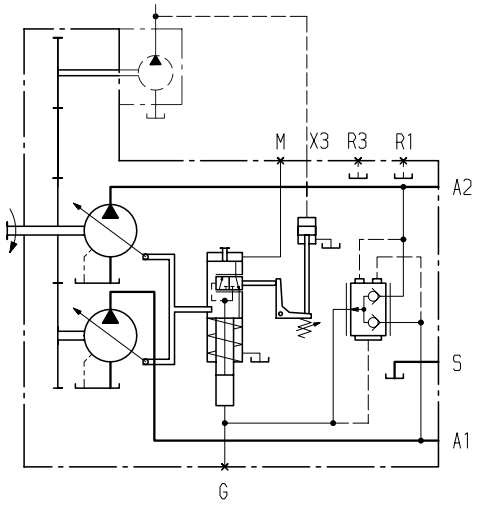
Further informations:

– Microcontroller MC _____ RE 95050

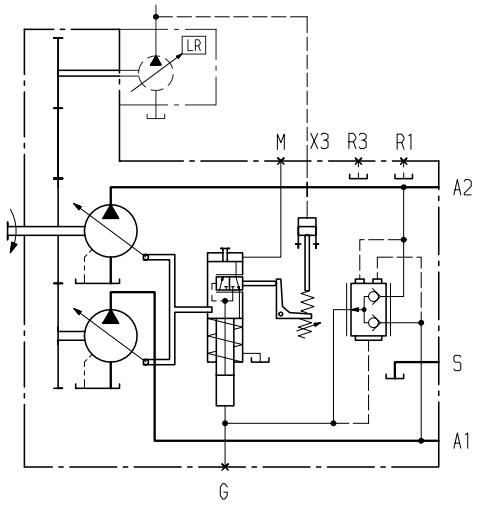
– Electronic load limiting control for excavators, GLB ___ RE 95072



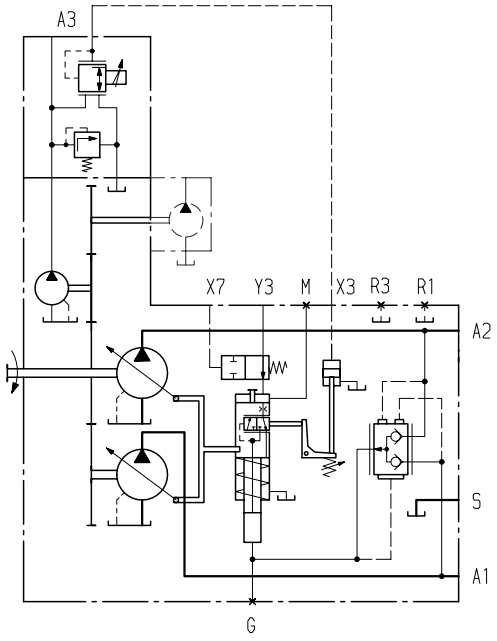
Summation power control with three circuit power control SR3
(high pressure signal from fixed pump)



Summation power control with three circuit power control SRC
(high pressure signal from power controlled variable pump)



Load limiting control with hydraulic on-off switching SG1Z
(with power take-off, pressure relief valve and pressure reducing valve)



LR Individual Power Control (hyperbolic regulator, sizes 55-107)

Unlike the summation power control, on the variable double pump with individual power control LR the two rotary groups are not mechanically coupled, i.e. each rotary group has its own individual control.

The constant power control controls the output volume of the pump in relation to the working pressure so that, at a constant input speed, the preset input power is not exceeded.

$$p_B \bullet V_g = \text{constant}$$

p_B = working pressure

V_g = displacement

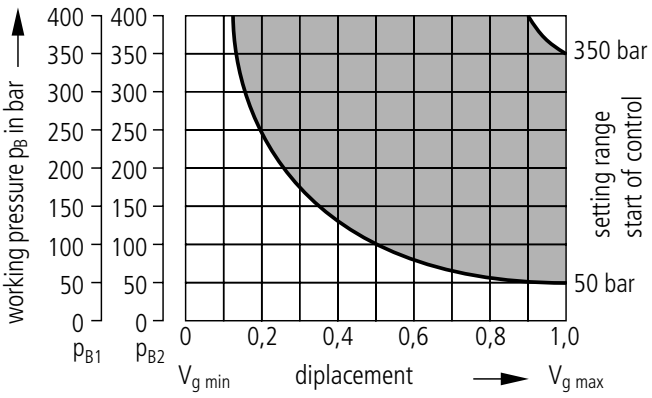
The power setting of each control is carried out separately and need not be the same, but the sum of the two settings must not exceed the drive power.

Optimum power usage is obtained by accurately following the power hyberbola.

Working pressure applies a force on a piston within the control piston on to a rocker arm. An externally adjustable spring force is applied to the other side of the rocker arm to determine the power setting.

Should the working pressure exceed the set spring force, the pilot control valve is operated via the rocker arm, allowing the pump to swivel towards zero output. This in turn reduces the effective moment on the arm of the rocker, thus allowing the working pressure to rise in the same ratio by which the output flow is reduced ($p_B \bullet V_g$ = constant).

When not under pressure, the double pump is swivelled back to its starting position ($V_{g\,max}$) by means at a control spring.



The output power curve is influenced by the efficiency of the double pump.

When ordering, state in clear text:

– input power P (kW)
– input speed n (rpm)
– max. output flow $q_{V\,max}$ (L/min)

After all technical details have been clarified, a power diagram can be produced by computer.

Override of the power setting

Variation: cross sensing control, LRC

The cross sensing control is in principle a summation power control, although the flows of the two rotary groups can be different. Each rotary group can transmit up to 100% of the total drive power, if the other requires little or no power.

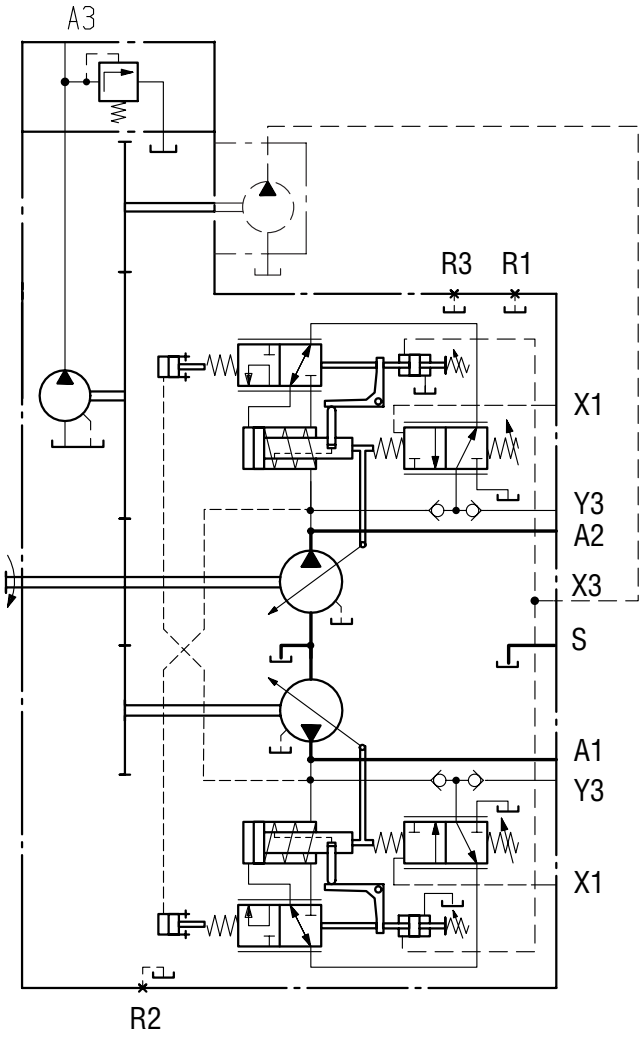
Via cross coupling arrangement the working pressures act via a measuring spool on the opposite pump and adjust the force of the adjustment spring (power setting).

With increasing working pressures, the power of each pump is reduced to 50% of the total drive power.

If one pump is working at less than 50% of the total drive power, the second pump can automatically utilise the remaining power – in extreme cases up to 100% of the total drive power.

Power made available via the pressure cut-off function or other overriding controls is not taken into account.

Individual power control with three circuit power control, cross sensing control and hydraulic stroke limiter, positive control, LR3CH2



LR Individual Power Control ...

Override of the power setting

Variation: three circuit power control, LR3

Depending on the working pressure of the pump mounted at the PTO, the power adjustment of the individual power controls is changed (port X_3).

Thus the individual power control can be set to 100% of the total power. The power setting of the individual power control will only be reduced if the working pressure of the pump mounted at the PTO increases dependent on load. The required power drop is brought about by adaption of the measuring area of the three circuit valve to the size of the third pump.

Variation: load limiting control, LG1

In contrast to three circuit power control load limiting control works by loading the power control with an external *pilot pressure*. This pilot pressure acts on the adjustment spring of the individual power control via the ports X_3. The force resulting from the pilot pressure is acting against the adjustment spring of the power regulator, i.e. increasing the pilot pressure reduces the power output (load limiting control with negative power override).

The mechanical adjusted basic power setting can be varied by means of different pilot pressures, enabling different power mode settings. If the pilot pressure signal is then varied by means of a load limiting controller the total hydraulic power is equal to the drive input power. The pilot pressure used for power control is generated by an *external control element* or by the built-on pressure reducing valve. The electrical signal for the input control of the pressure reducing valve must be produced by an *external control electronic*. For this purpose the microcontroller MC7 is available in connection with the software GLB (electronic load limiting control for excavators). Further informations microcontroller MC: RE 95050, software GLB: RE 95072.

Hydraulic stroke limiter, LR.H2 / LG1H2
Function: $V_{g\,min}$ to $V_{g\,max}$ (positive control)

The hydraulic stroke limiter allows the maximum displacement to be infinitely varied or limited as required.

Control range $V_{g\,max}$ to $V_{g\,min}$.

The displacement is set by means of the pilot pressure applied at port X_1 (max. 40 bar).

The hydraulic stroke limiter is overriden by the constant power control, i.e. below the power curve (power hyperbola), displacement is adjusted in relation to pilot pressure. If the set flow or the working pressure is such that the power curve is exceeded, the constant power control overrides the stroke limiter and reduces displacement until the power hyperbola is restored.

As pilot pressure increases the pump swivels towards *higher* displacement.

Starting position at zero pressure: $V_{g\,max}$

At working pressure > 20 bar the pump swivels from $V_{g\,max}$ to $V_{g\,min}$ (pilot pressure < start of control)

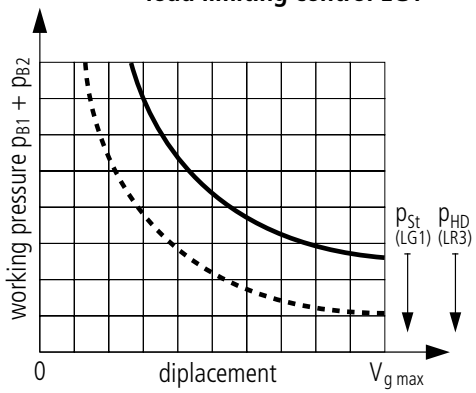
Start of control (at $V_{g\,min}$), settable _____ 4 – 15 bar

When ordering, please state required start of control in clear text.

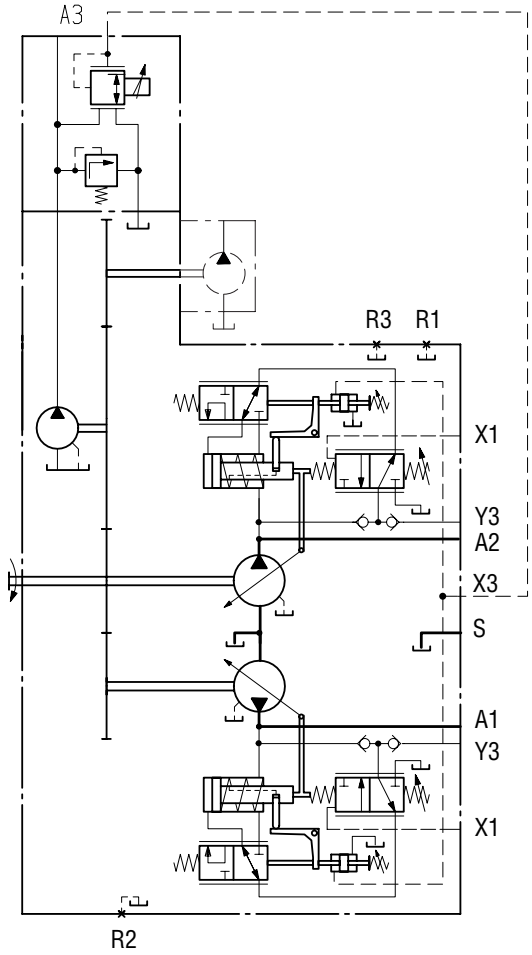
Pilot pressure increase ($V_{g\,min} - V_{g\,max}$) _____ Δp = 25 bar

A pressure of 20 bar is needed for the control. The oil required for this is taken either from the high pressure or from the external control pressure at port Y_3 (≥ 20 bar).

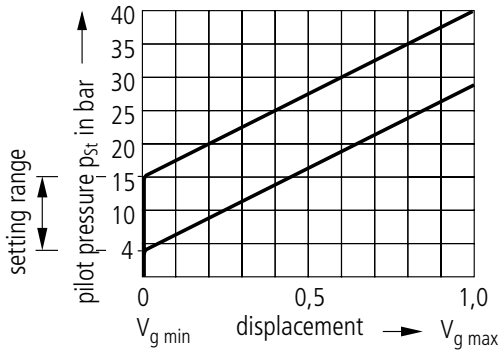
Characteristic curve: three circuit power control LR3, load limiting control LG1



Individual power control with load limiting control and hydraulic stroke limiter, positive control, LG1H2



Characteristic curve: hydraulic stroke limiter, H2



LA1 Individual Power Control (spring regulator, sizes 55-160)

The variable displacement double pump with constant power control LA1 has no mechanical linkage of the two rotary groups. Each rotary group is equipped with an individual constant power control. The constant power control regulates the pump displacement according to the working pressure so that a defined input power will not be exceeded.

The power setting can be adjusted individual for each regulator with different values, whereby each pump can be set at 100% input power.

The hyperbolic control curve is adjusted for a new defined value by 2 measuring springs. The working pressure operates on measuring surface of a step piston against a spring and a spring force externally adjustable, which determins the power setting.

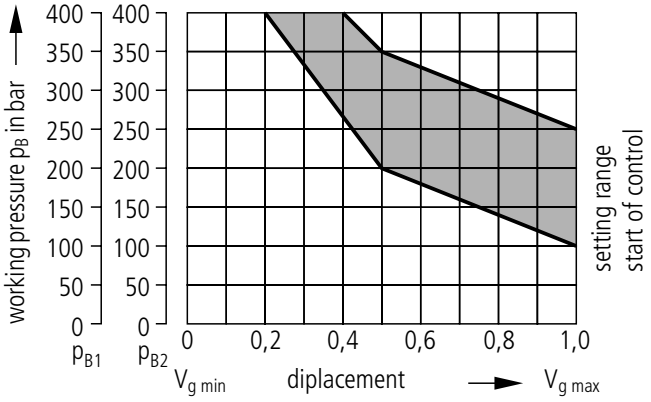
Load limiting control

The second measuring surface of the step piston is louded by an external pilot pressure (port X_3), the adjusted power can be lowered (load limiting control with negative power override).

If the summation of the hydraulic forces exceeds the spring force, control oil is supplied the control piston which swivels the pump back to lower flow value.

The mechanical adjusted basic power setting can be varied by means of different pilot pressures, enabling different power mode settings. If the pilot pressure signal is then varied by means of a load limiting controller the total hydraulic power is equal to the drive input power. The pilot pressure used for power control is generated by an *external control element* or by the built-on pressure reducing valve. The electrical signal for the input control of the pressure reducing valve must be produced by an *external control electronic*. For this purpose the microcontroller MC7 is available in connection with the software GLB (electronic load limiting control for excavators). Further informations microcontroller MC: RE 95050, software GLB: RE 95072.

When not under pressure, the double pump is swivelled back to its starting position ($V_{g\,max}$) by means at a control spring.



The output power curve is influenced by the efficiency of the double pump.

When ordering, state in clear text:
- input power P (kW)
- input speed n (rpm)
- max. output flow $q_{V\,max}$ (L/min)

After all technical details have been clarified, a power diagram can be produced by computer.

Hydraulic stroke limiter, LA1H...

The hydraulic stroke limiter allows the displacement to be infinitely varied or limited as required. Control range $V_{g\,max}$ to $V_{g\,min}$.

The displacement is set by means of the pilot pressure applied at port X_1 (max. 40 bar).

The hydraulic stroke limiter is overriden by the constant power control, i.e. below the power curve, displacement is adjusted in relation to pilot pressure. If the set flow or the working pressure is such that the power curve is exceeded, the constant power control overrides the stroke limiter and reduces displacement until the power curve is restored.

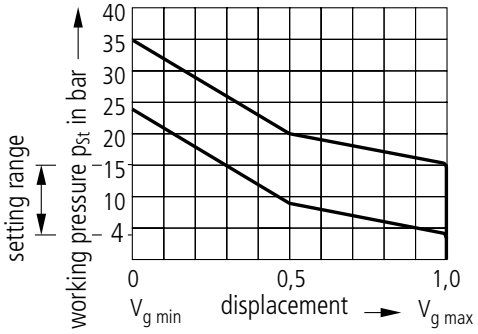
H1 → Function: $V_{g\,max}$ to $V_{g\,min}$ (negative control)

As pilot pressure increases the pump swivels towards *lower* displacement.

Starting position at zero pressure: $V_{g\,max}$

Start of control (at $V_{g\,max}$), settable _____ 4 – 15 bar
When ordering please state requires start of control in clear text.

Pilot pressure increase ($V_{g\,max} - V_{g\,min}$) _____ Δp = 20 bar



H2 → Function: $V_{g\,min}$ to $V_{g\,max}$ (positive control)

As pilot pressure increases the pump swivels towards *higher* displacement.

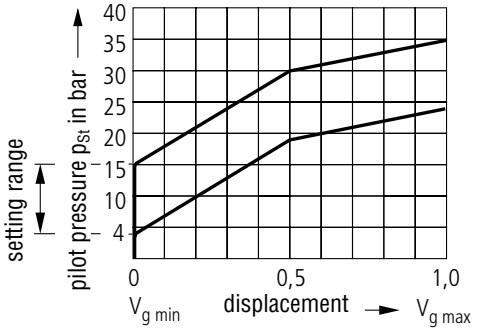
Starting position at zero pressure: $V_{g\,max}$

At working pressure >20 bar the pump swivels from $V_{g\,max}$ to $V_{g\,min}$ (pilot pressure < start of control)

Start of control (at $V_{g\,min}$), settable _____ 4 – 15 bar
When ordering, please state required start of control in clear text.

Pilot pressure increase ($V_{g\,min} - V_{g\,max}$) _____ Δp = 20 bar

A pressure of 20 bar is needed for the control. The oil required for this is taken either from the high pressure or from the external control pressure at port Y_3 (≥ 20 bar).

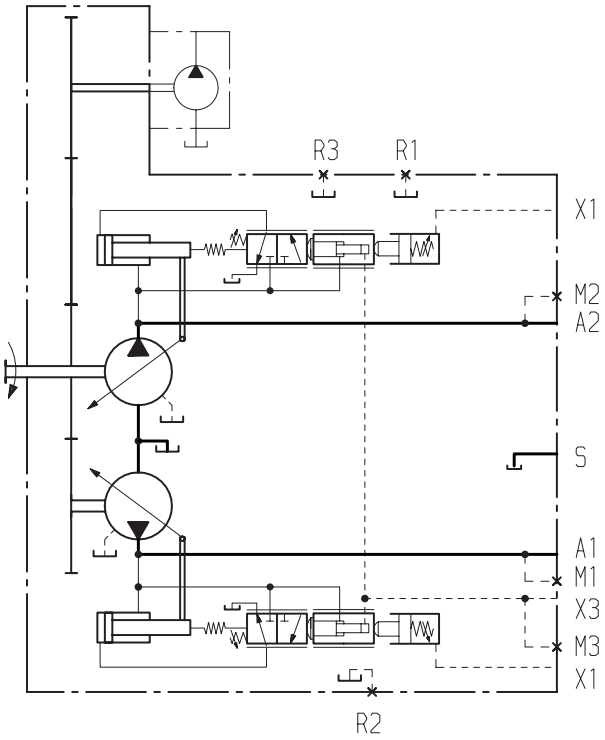


Please note: The H1/H2 characteristic curve is influence by the setting of the power control

LA1 Individual Power Control ...

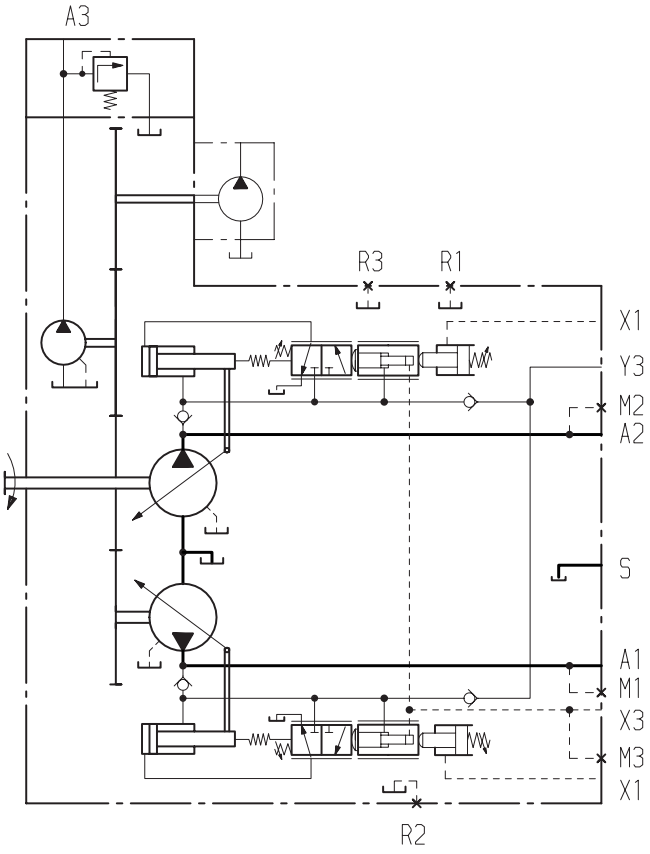
Individual power control with load limiting control and hydraulic stroke limiter, negative control, LA1H1

(with power take-off, without auxiliary pump)



Individual power control with load limiting control and hydraulic stroke limiter, positive control, LA1H2

(with power take-off, auxiliary pump and pressure relief valve)



Variation: hydraulic coupling, LA1K

By means of the hydraulic coupling the two individual power regulators principally become one summation power control. The two rotary groups, however, are not coupled mechanically but hydraulically.

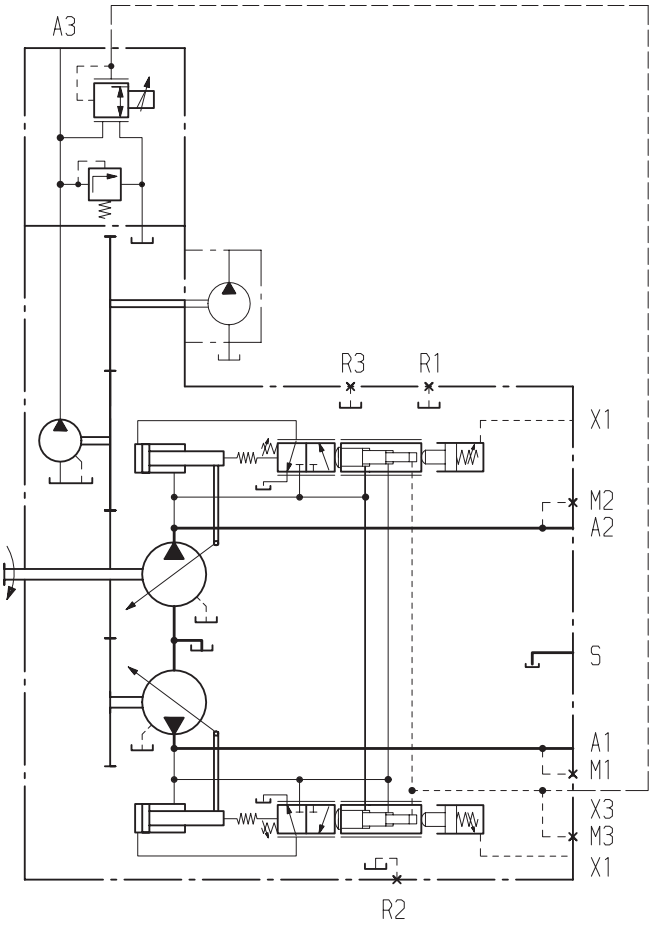
The working pressures of both circuits take each their effect onto the differential piston of the two individual regulators, causing a common swivelling out and swivelling back of both rotary groups.

If one pump is working at less than 50% of the total drive power, the second pump can automatically utilise the remaining power – in extreme cases up to 100% of the total drive power.

The hydraulic coupling can be overridden with the supplementary function hydraulic stroke limitation H1, i.e. depending on the pilot pressure at port X1 one of the two rotary groups can be swivelled back to $V_{g\,min}$.

Individual power control with load limiting control, hydraulic coupling and hydraulic stroke limiter, negative control, LA1KH1

(with power take-off, auxiliary pump, pressure relief valve and pressure reducing valve)

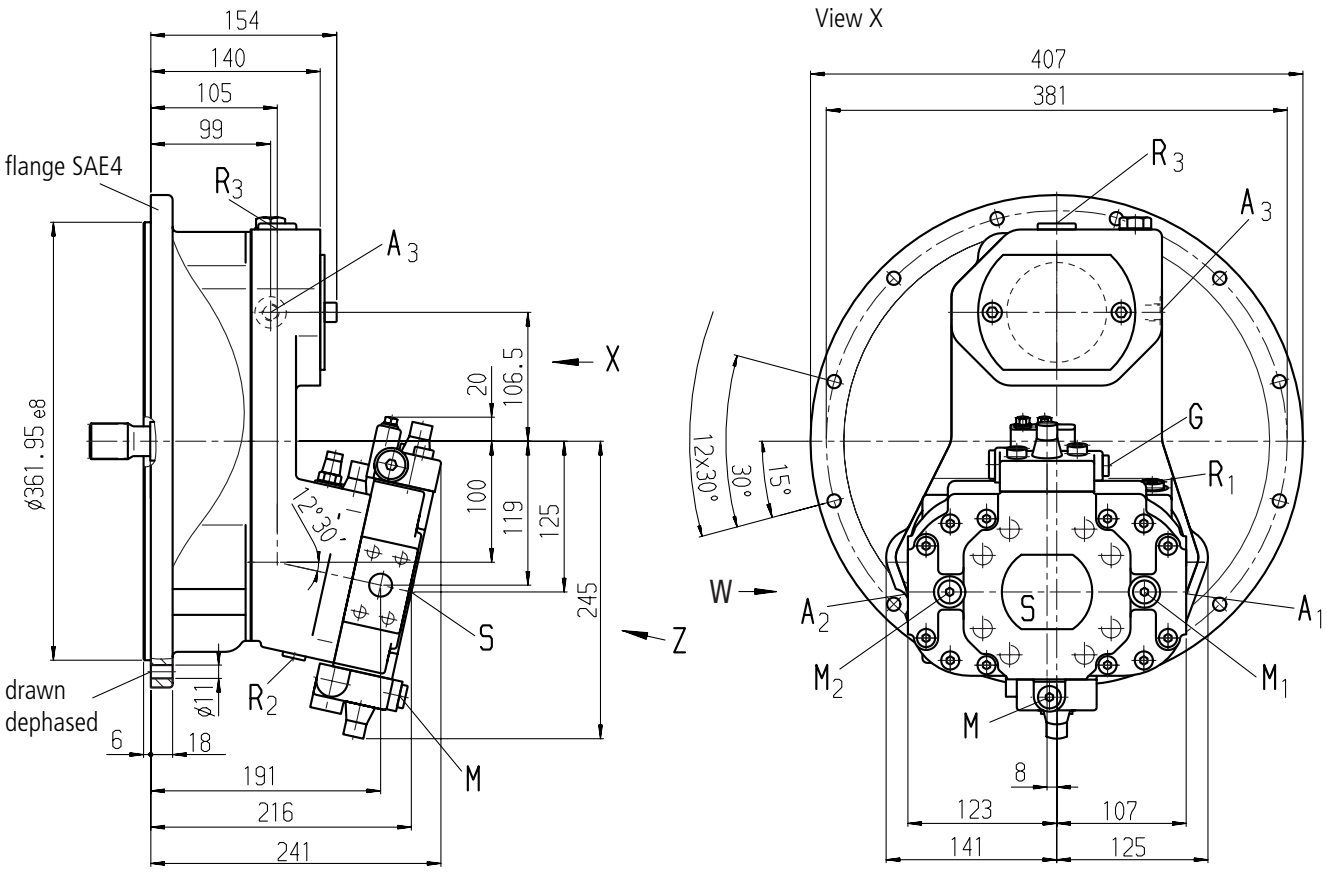


Please note: Gauge ports M_1 and M_2 are not available for size 55.

Unit Dimensions, Size 28

Before finalising your design, please request a certified drawing.

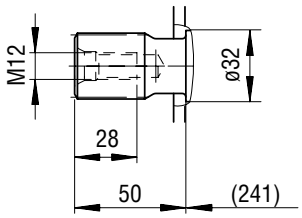
Summation power control, SR



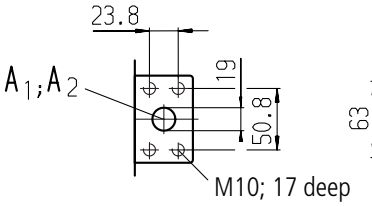
Shaft ends

Z

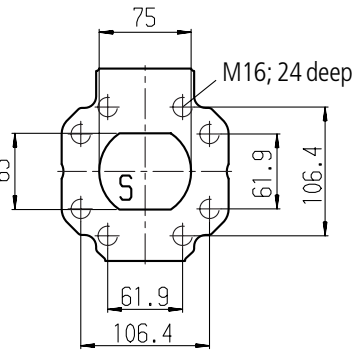
Splined shaft
W 30x2x30x14x9g
DIN 5480



Detail W



Detail Z



Connections

A_1, A_2	Service line ports	SAE 3/4" 420 bar (6000 psi) high pressure series
S	Suction port	SAE 3" 140 bar (2000 psi) standard series
R_1	Bleed port	M14x1,5 (plugged)
R_2	Oil drain	M14x1,5 (plugged)
R_3	Bleed port	M26x1,5 (plugged)
G	Control pressure port	M12x1,5 (plugged)
A_3	Pilot pressure port (pressure relief valve)	M14x1,5
M_1, M_2	Gauge ports for high pressure	M14x1,5 (plugged)
M	Gauge port for control pressure	M14x1,5 (plugged)
X_3	Pilot pressure port (SR3/SRC)	M14x1,5
X_7	Pilot pressure port for on-off switching (SRZ)	M14x1,5
Y_3	External control pressure port (SRZ)	M14x1,5

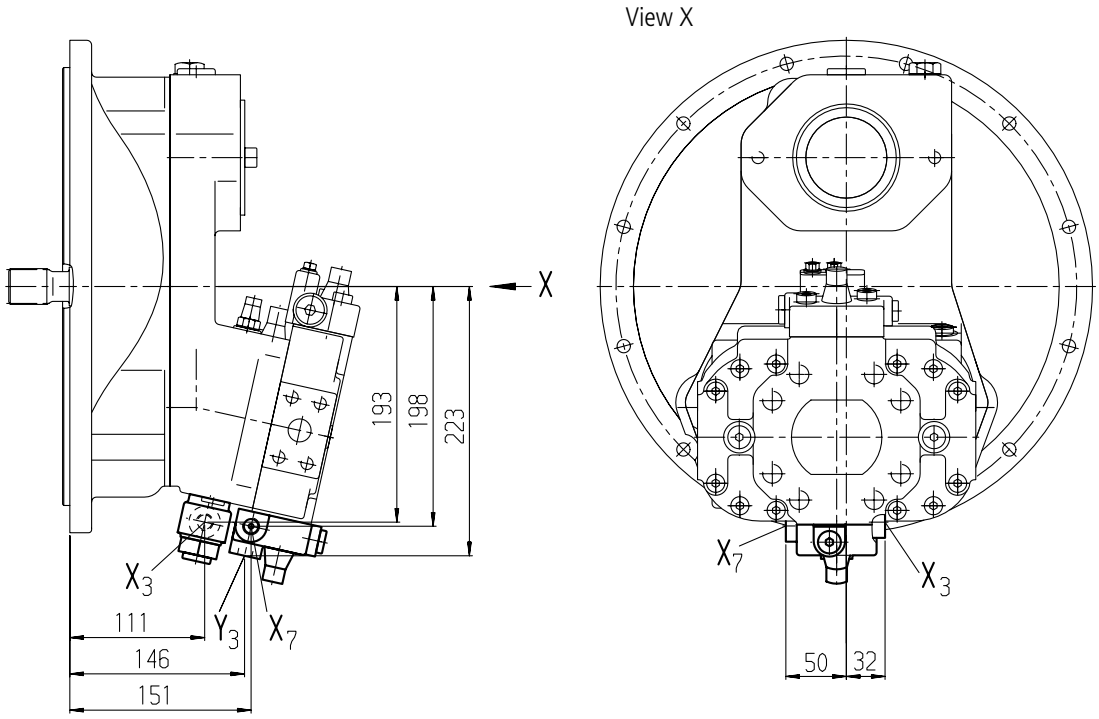
Please note:

Use suction port with flat contact surface!

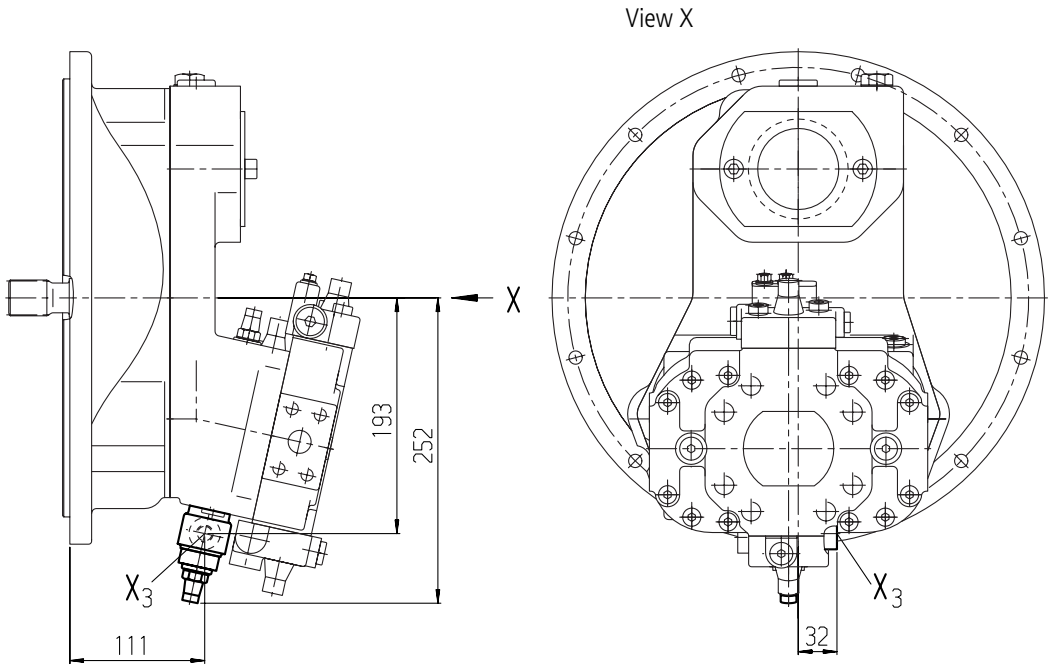
Unit Dimensions, Size 28

Before finalising your design, please request a certified drawing.

Summation power control with three circuit power control and hydraulischer on-off switching, SR3Z
(high pressure signal from fixed displacement pump)



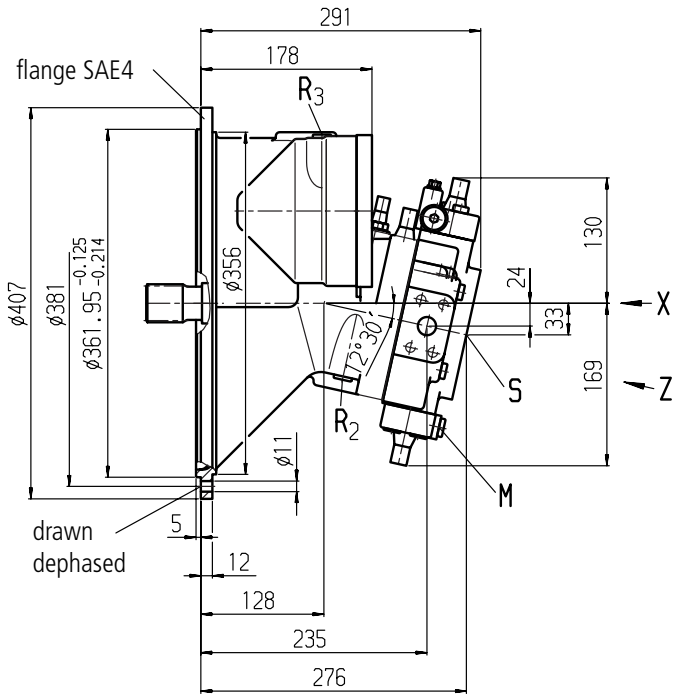
Summation power control with three circuit power control, SRC
(high pressure signal from power controlled variable displacement pump)

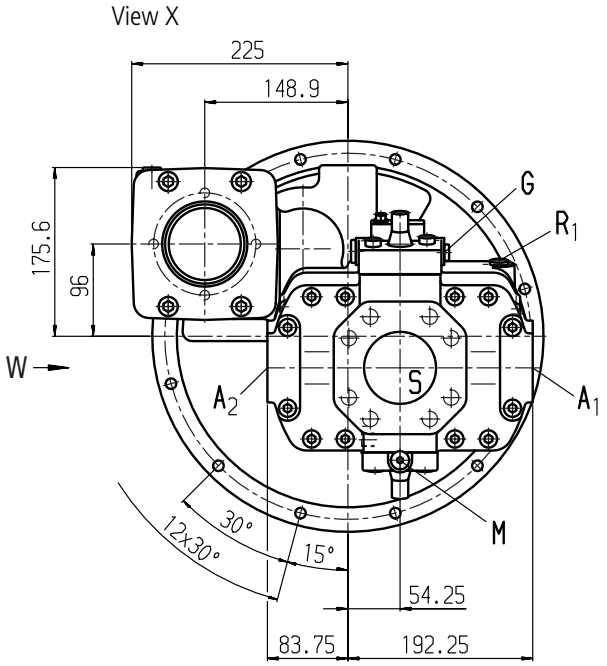


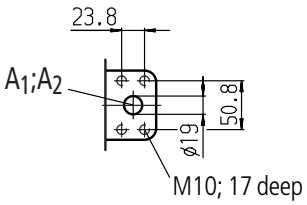
Unit Dimensions, Size 55

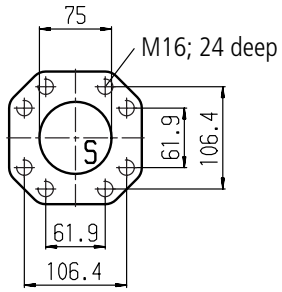
Before finalising your design, please request a certified drawing.

Summation power control, SR





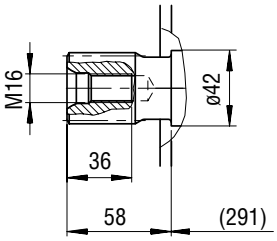




Shaft ends

Z

Splined shaft
W40x2x30x18x9g
DIN 5480



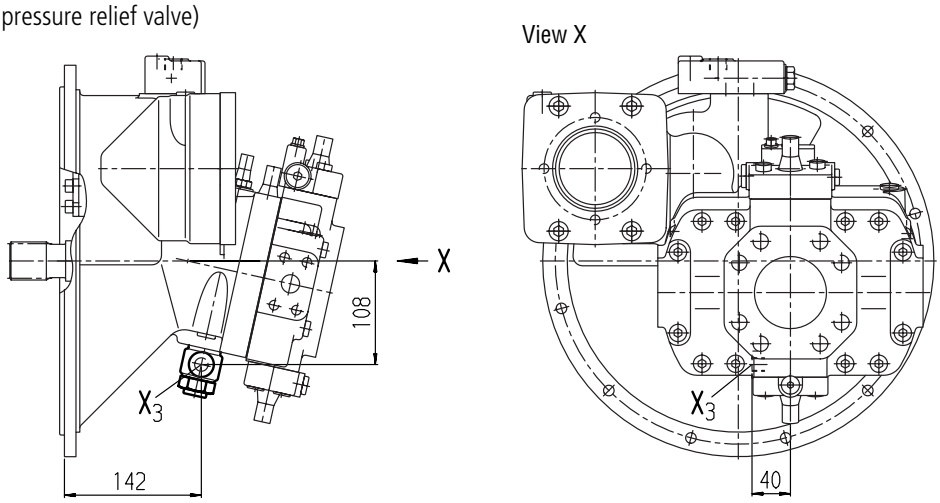
Connections

A_1, A_2	Service line ports	SAE 3/4" 420 bar (6000 psi) high pressure series
S	Suction port	SAE 3" 140 bar (2000 psi) standard series
A_3	Service line port (auxiliary pump)	M18x1,5
R_1,R_3	Bleed port	M14x1,5 (plugged)
R_2	Oil drain	M14x1,5 (plugged)
G	Control pressure port (SR)	M12x1,5 (plugged)
M	Gauge port for control pressure (SR)	M14x1,5 (plugged)
M_3	Gauge port for load limiting control (LA1)	M14x1,5 (plugged)
X_1	Pilot pressure port for hydraulic stroke limiter	M14x1,5
X_3	Pilot pressure port for three circuit power-/load limiting control	M14x1,5
X_7	Pilot pressure port for on-off switching (SRZ)	M14x1,5
Y_3	External control pressure (SRZ, LR3, LG1, LA1H2)	M14x1,5 (plugged)

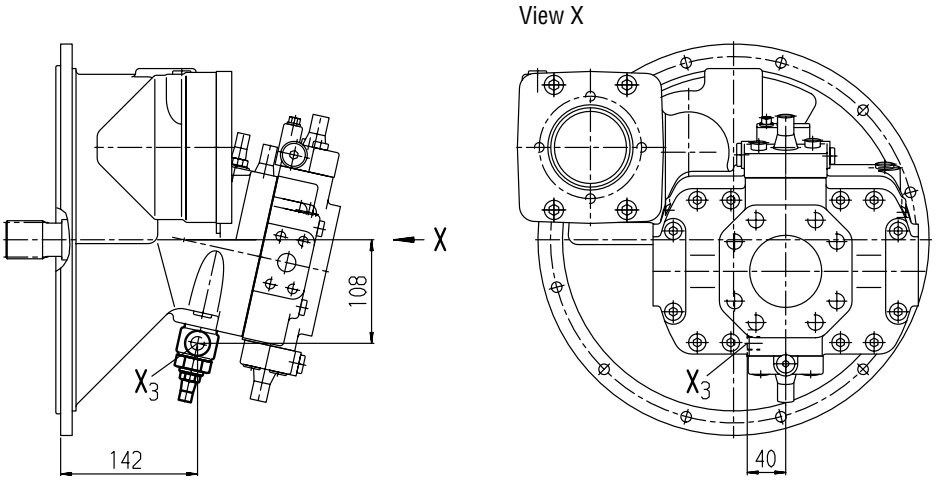
Unit Dimensions, Size 55

Before finalising your design, please request a certified drawing.

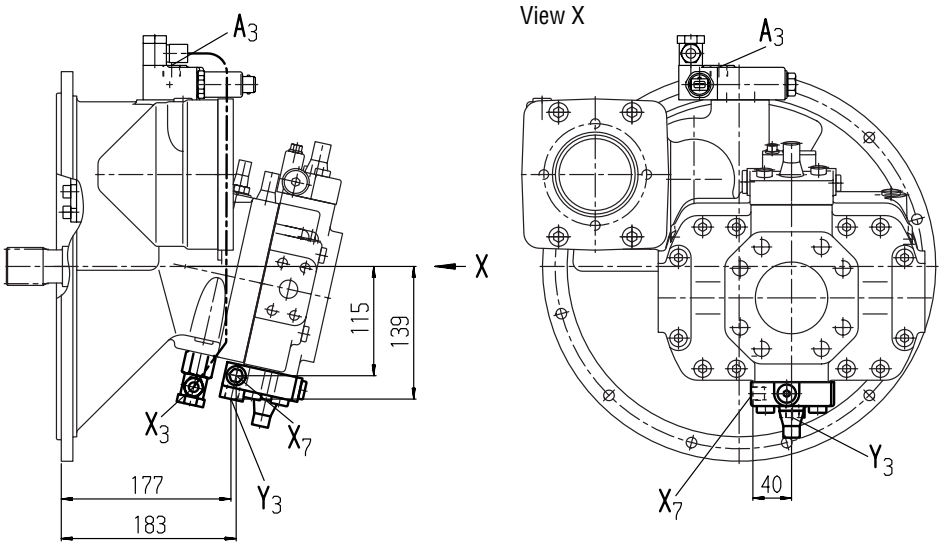
Summation power control with three circuit power control, SR3
(high pressure signal from fixed displacement pump;
with pressure relief valve)



Summation power control with three circuit power control, SRC
(high pressure signal from power controlled variable displacement pump)



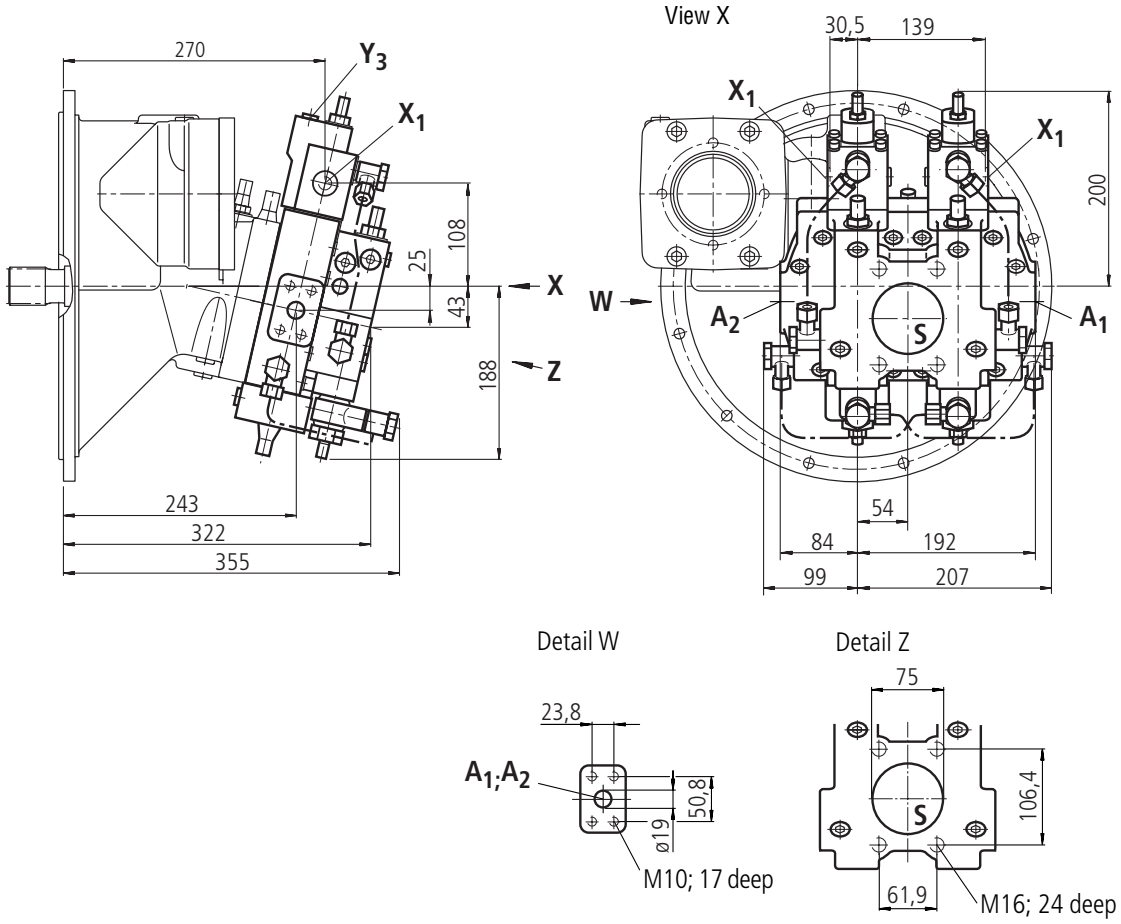
Summation power control with load limiting control and hydraulischer on-off switching, SG1Z
(with pressure relief valve and pressure reducing valve)



Unit Dimensions, Size 55

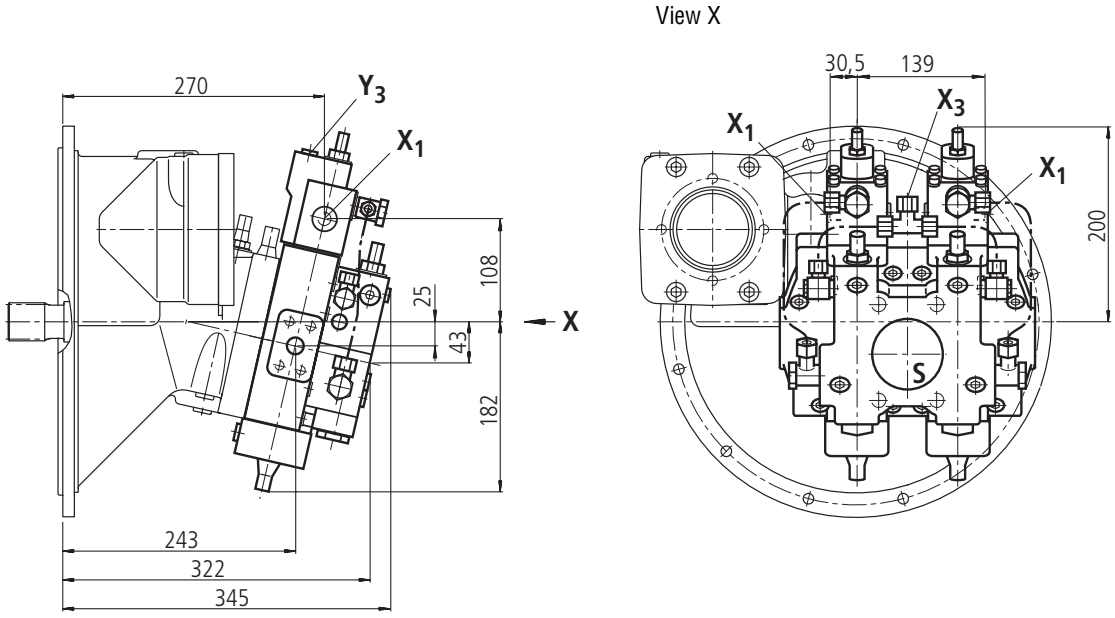
Before finalising your design, please request a certified drawing.

Individual power control (hyperbolic regulator) cross sensing control and hydraulic stroke limiter, positive control, LRCH2



Individual power control (hyperbolic regulator) with three circuit power control and hydraulic stroke limiter, positive control, LR3H2

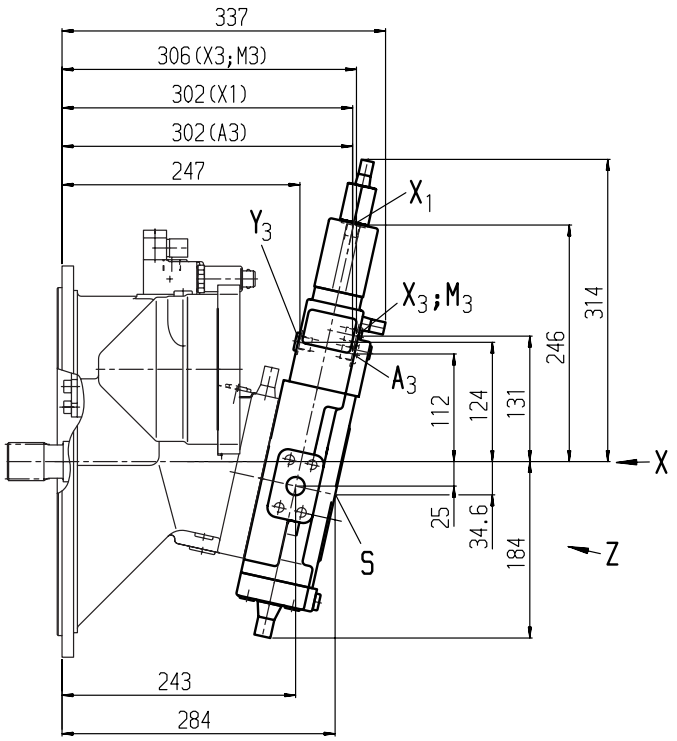
Individual power control (hyperbolic regulator) with load limiting control and hydraulic stroke limiter, positive control, LG1H2

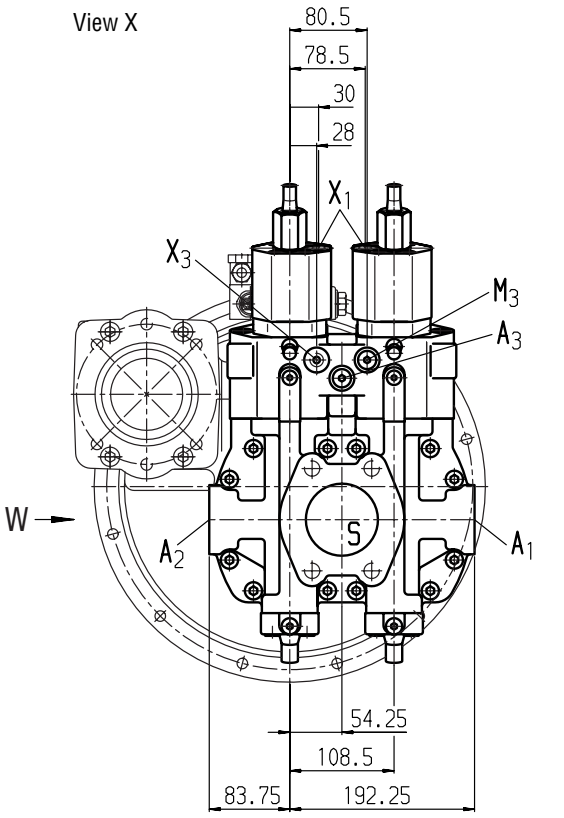


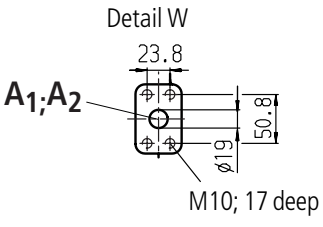
Unit Dimensions, Size 55

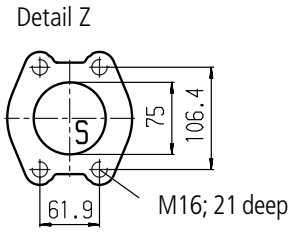
Before finalising your design, please request a certified drawing.

Individual power control (spring regulator) with load limiting control and hydraulic stroke limiter, positive control, LA1H2





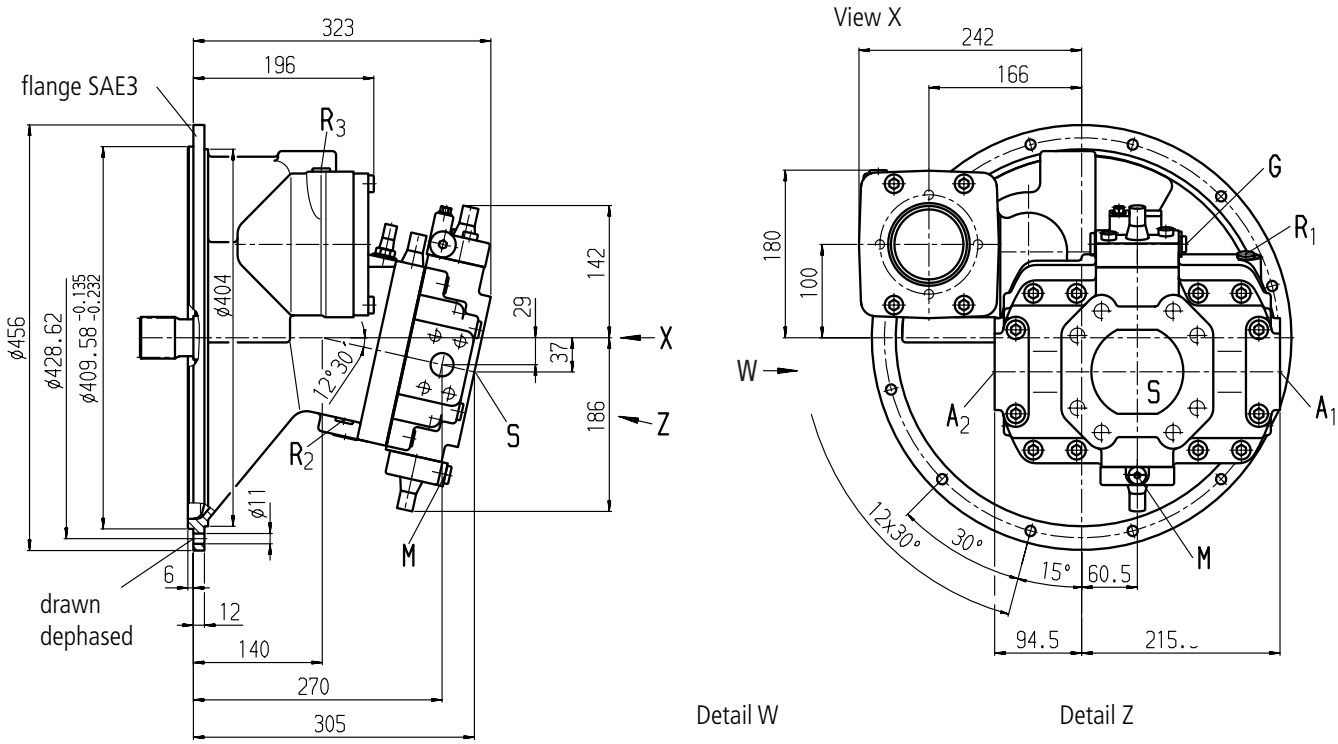


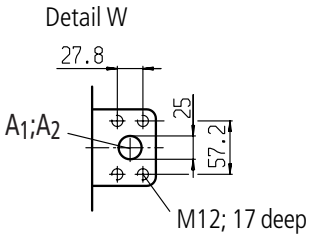


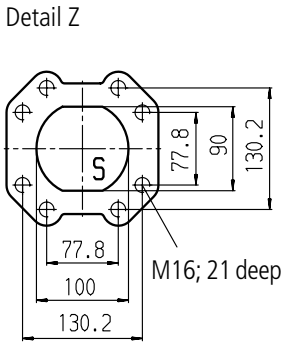
Unit Dimensions, Size 80

Before finalising your design, please request a certified drawing.

Summation power control, SR



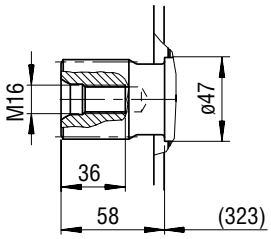




Shaft ends

Z

Splined shaft
W45x2x30x21x9g
DIN 5480



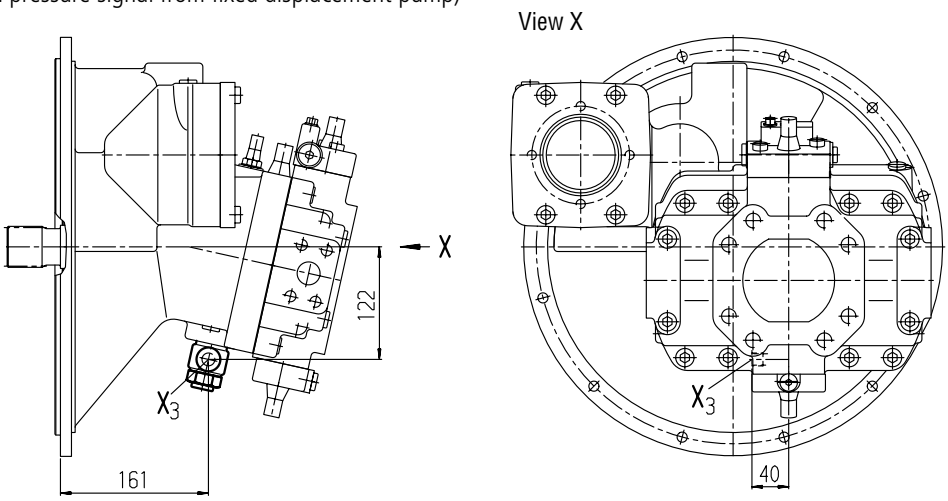
Connections

A_1, A_2	Service line ports	SAE 1" 420 bar (6000 psi) high pressure series
S	Suction port (SR, LR) Suction port (LA1)	SAE 4" 35 bar SAE 3 1/2" 35 bar (500 psi) standard series
A_3	Service line port (auxiliary pump)	M18x1,5
R_1, R_3	Bleed port	M14x1,5 (plugged)
R_2	Oil drain	M14x1,5 (plugged)
G	Control pressure port (SR)	M12x1,5 (plugged)
M_1, M_2	Gauge port A1, A2 (LA1)	M14x1,5 (plugged)
M	Gauge port for control pressure (SR)	M14x1,5 (plugged)
M_3	Gauge port for load limiting control	M14x1,5 (plugged)
X_1	Pilot pressure port for hydraulic stroke limiter	M14x1,5
X_3	Pilot pressure port for three circuit power-/load limiting control	M14x1,5
X_7	Pilot pressure port for on-off switching (SRZ)	M14x1,5
Y_3	External control pressure (SRZ, LR3, LG1)	M14x1,5

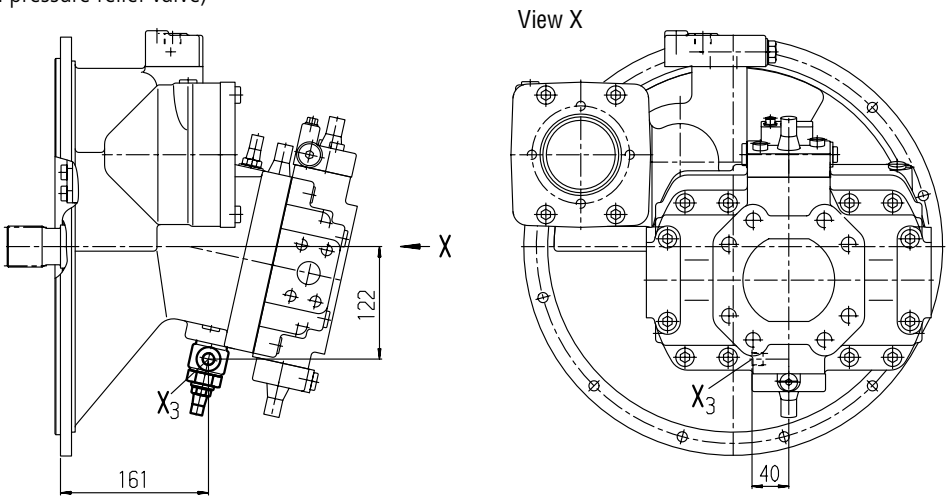
Unit Dimensions, Size 80

Before finalising your design, please request a certified drawing.

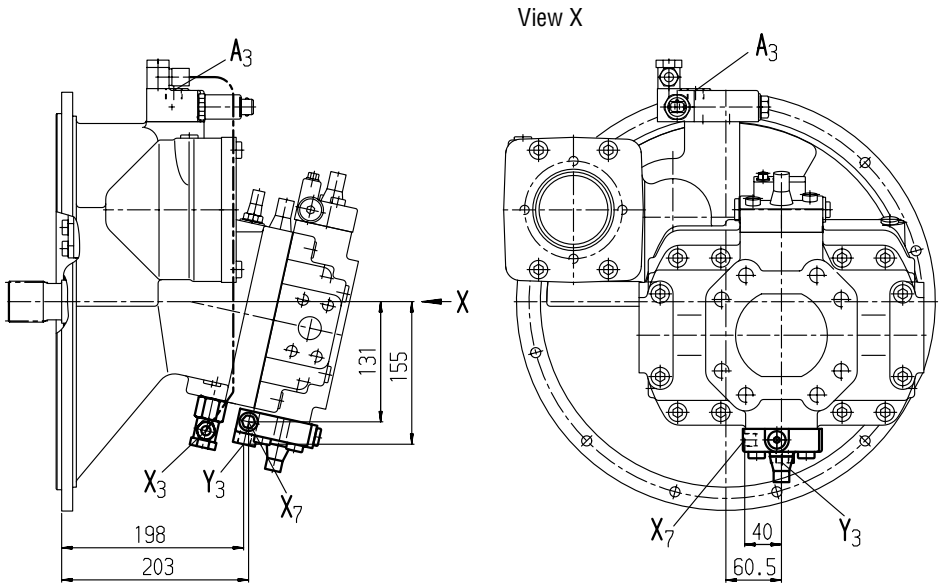
Summation power control with three circuit power control, SR3
high pressure signal from fixed displacement pump)



Summation power control with three circuit power control, SRC
(high pressure signal from power controlled variable displacement pump;
with pressure relief valve)



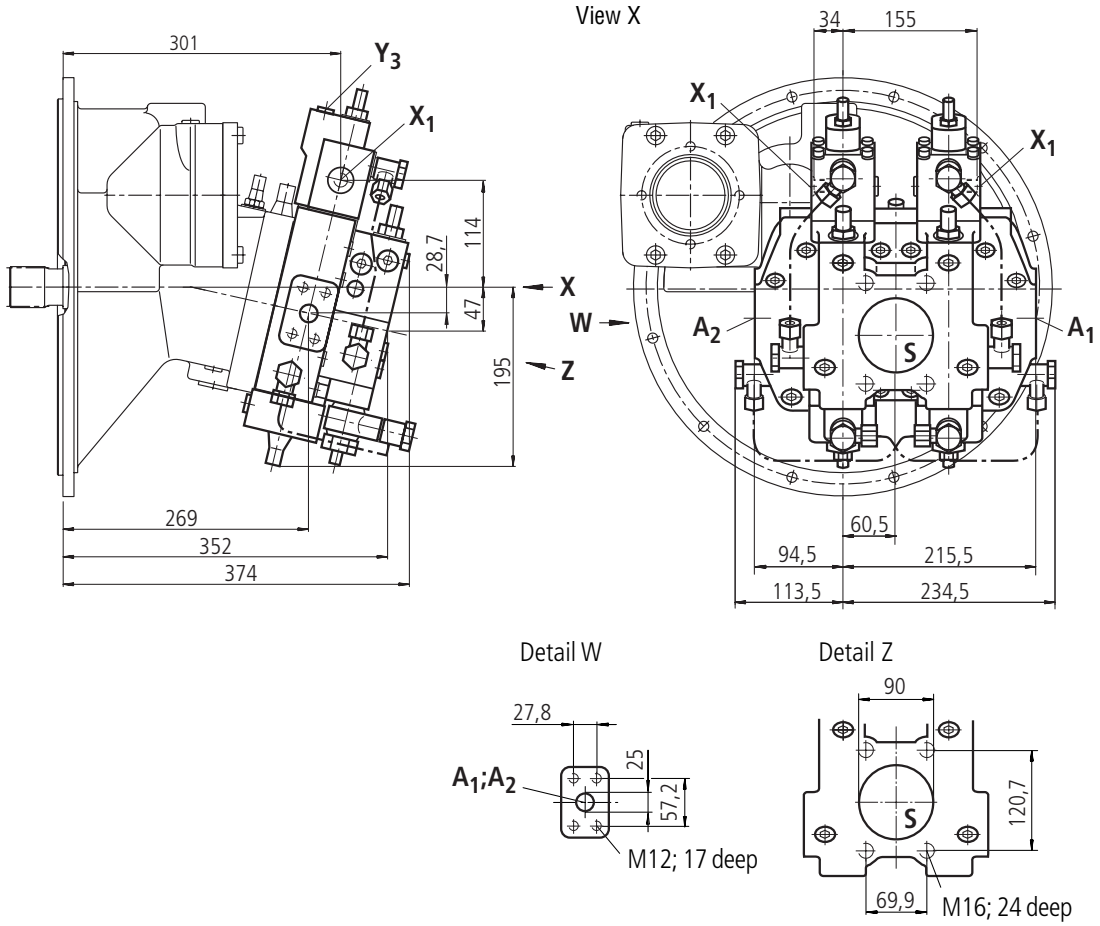
Summation power control with load limiting control and hydraulic on-off switching, SG1Z
(with pressure relief valve and pressure reducing valve)



Unit Dimensions, Size 80

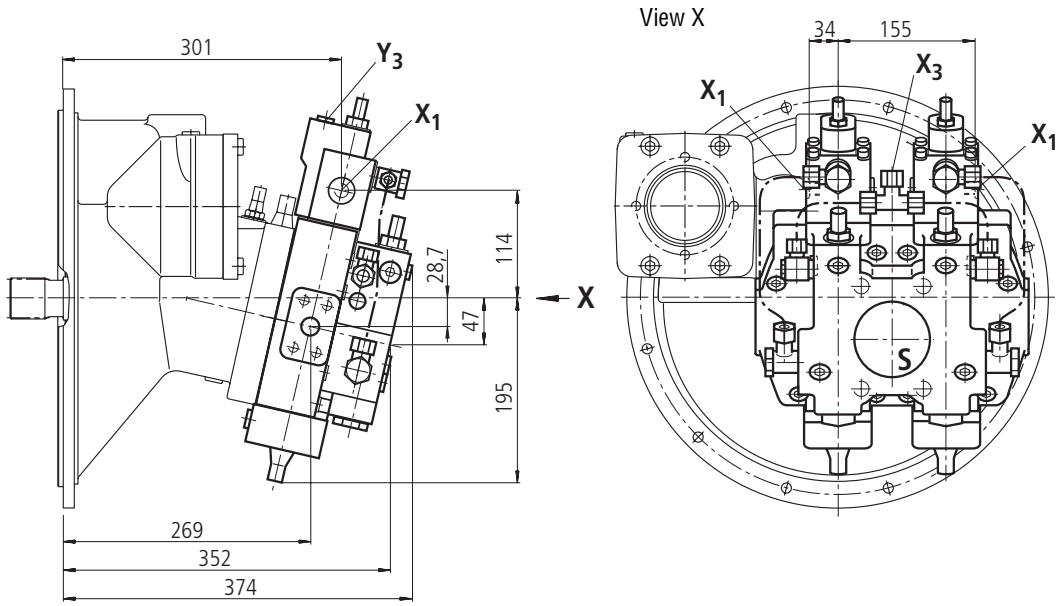
Before finalising your design, please request a certified drawing.

Individual power control (hyperbolic regulator) cross sensing control and hydraulic stroke limiter, positive control, LRCH2



Individual power control (hyperbolic regulator) with three circuit power control and hydraulic stroke limiter, positive control, LR3H2

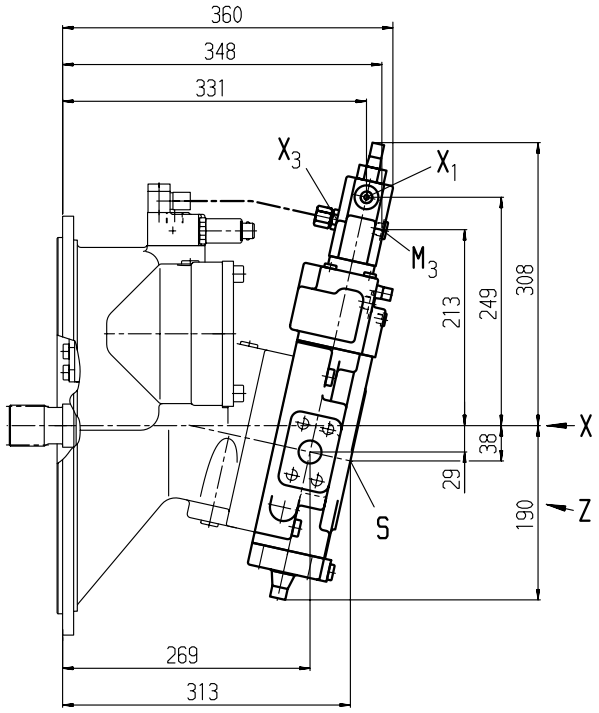
Individual power control (hyperbolic regulator) with load limiting control and hydraulic stroke limiter, positive control, LG1H2

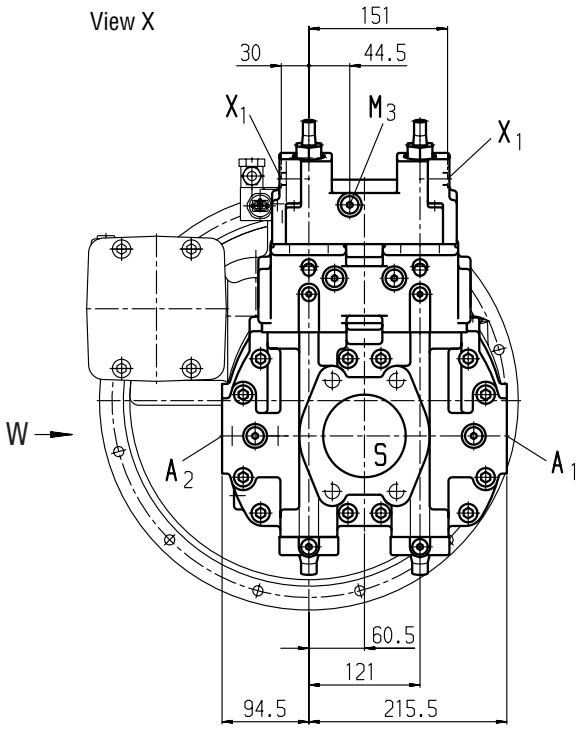


Unit Dimensions, Size 80

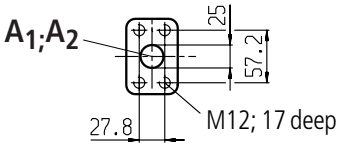
Before finalising your design, please request a certified drawing.

Individual power control (spring regulator) with load limiting control, hydraulic coupling and hydraulic stroke limiter, negative control, LA1KH1

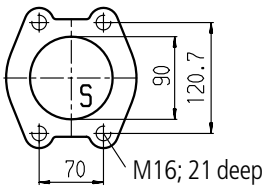




Detail W



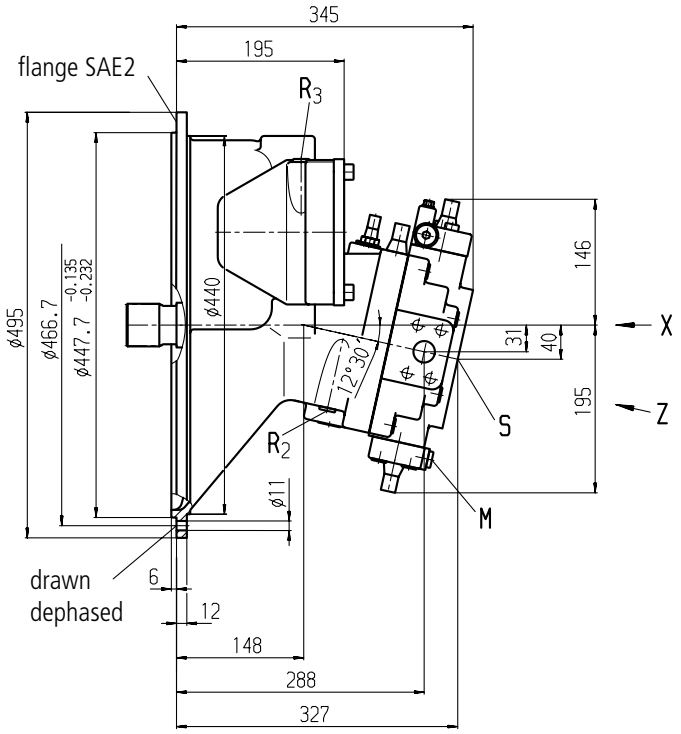
Detail Z

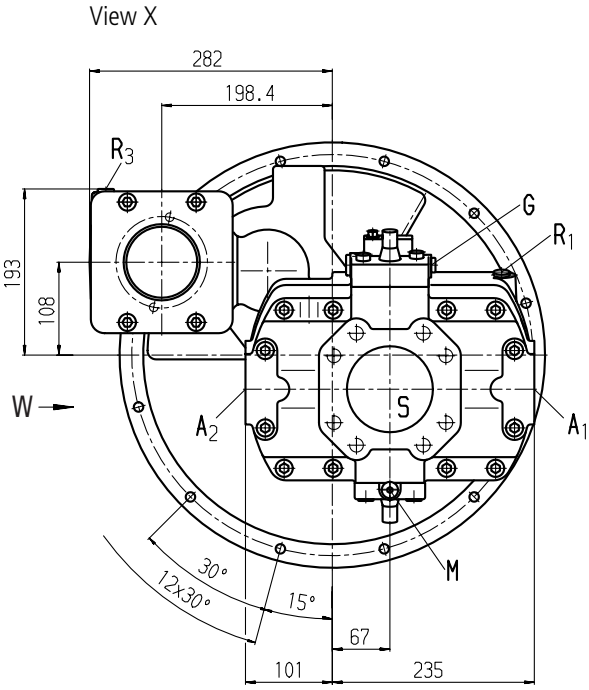


Unit Dimensions, Size 107

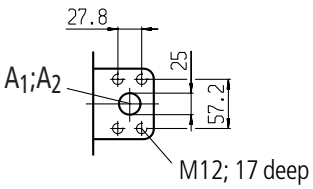
Before finalising your design, please request a certified drawing.

Summation power control, SR

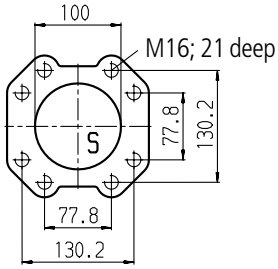




Detail W



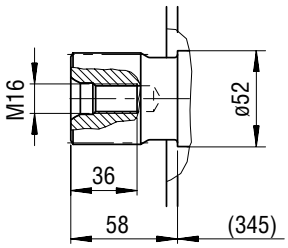
Detail Z



Shaft ends

Z

Splined shaft
W50x2x30x24x9g
DIN 5480



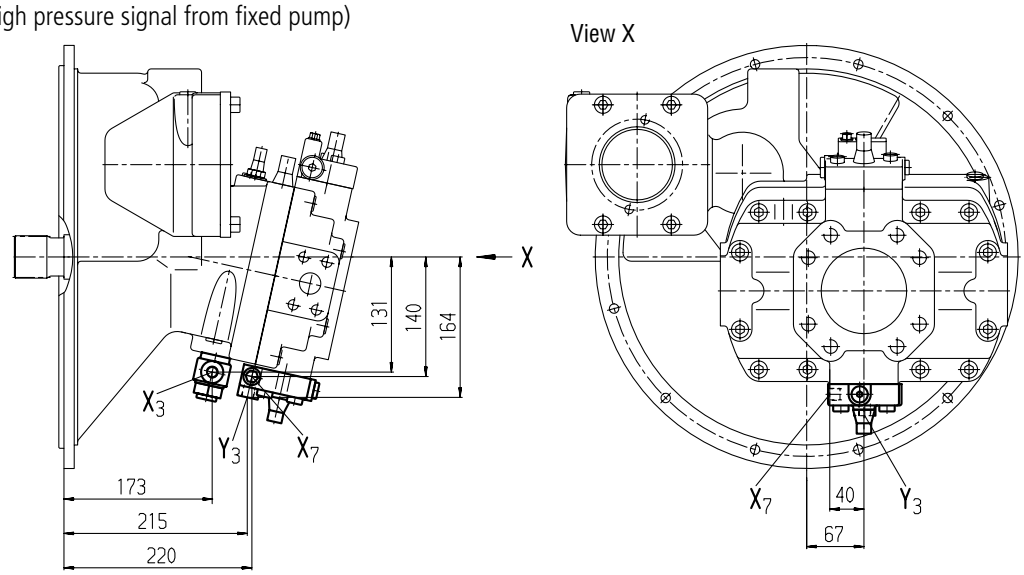
Connections

A_1, A_2	Service line ports	SAE 1" 420 bar (6000 psi) high pressure series
S	Suction port	SAE 4" 35 bar (500 psi) standard series
A_3	Service line port (auxiliary pump)	M18x1,5
R_1, R_3	Bleed port	M14x1,5 (plugged)
R_2	Oil drain	M14x1,5 (plugged)
G	Control pressure port (SR)	M12x1,5 (plugged)
M_1, M_2	Gauge port A1, A2 (LA1)	9/16-18UNF-2B (plugged)
M	Gauge port for control pressure (SR)	M14x1,5 (plugged)
M_3	Gauge port for load limiting control	M14x1,5 (plugged)
X_1	Pilot pressure port for hydraulic stroke limiter	M14x1,5
X_3	Pilot pressure port for three circuit power-/load limiting control	M14x1,5
X_7	Pilot pressure port for on-off switching (SRZ)	M14x1,5
Y_3	External control pressure (SRZ, LR3, LG1)	M14x1,5

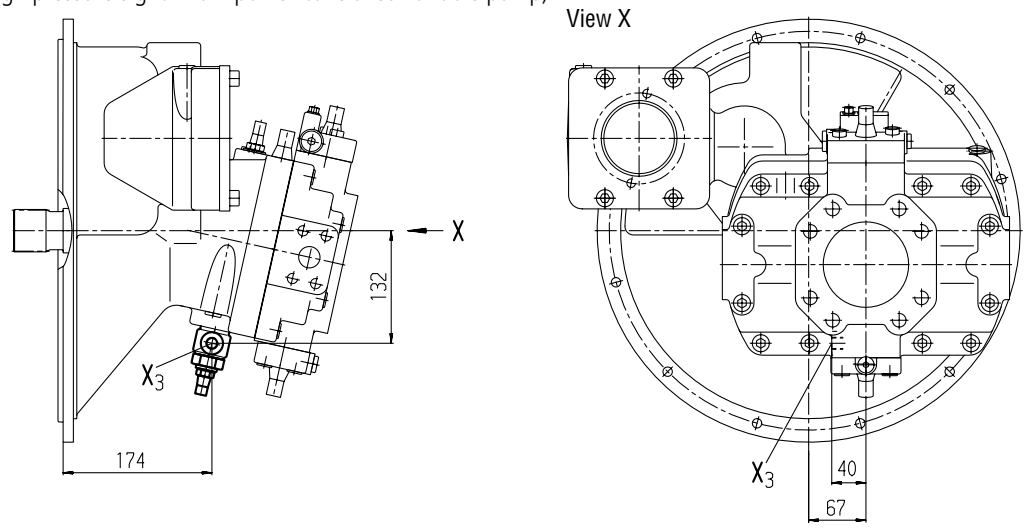
Unit Dimensions, Size 107

Before finalising your design, please request a certified drawing.

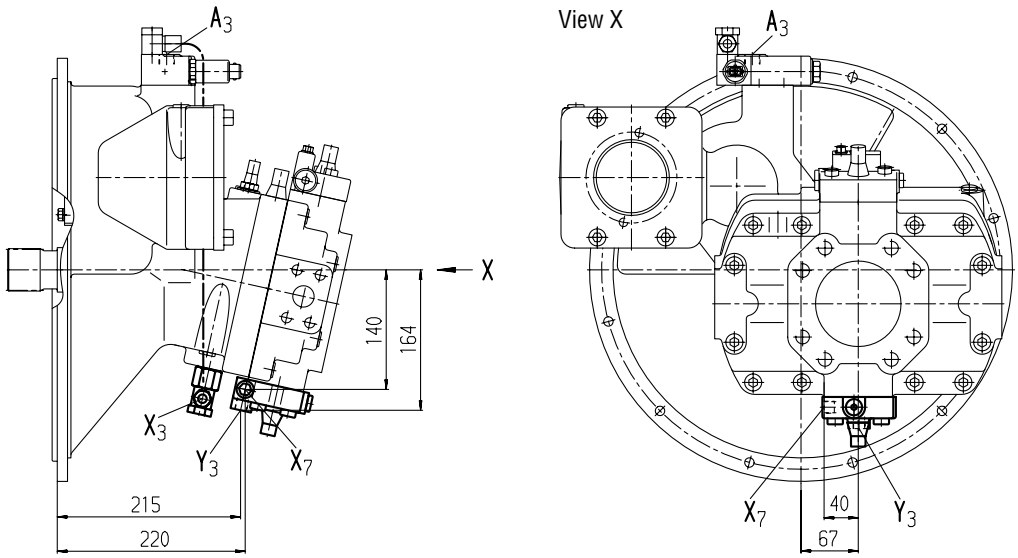
Summation power control with three circuit power control and hydraulic on-off switching, SR3Z
(high pressure signal from fixed pump)



Summation power control with three circuit power control, SRC
(high pressure signal from power controlled variable pump)



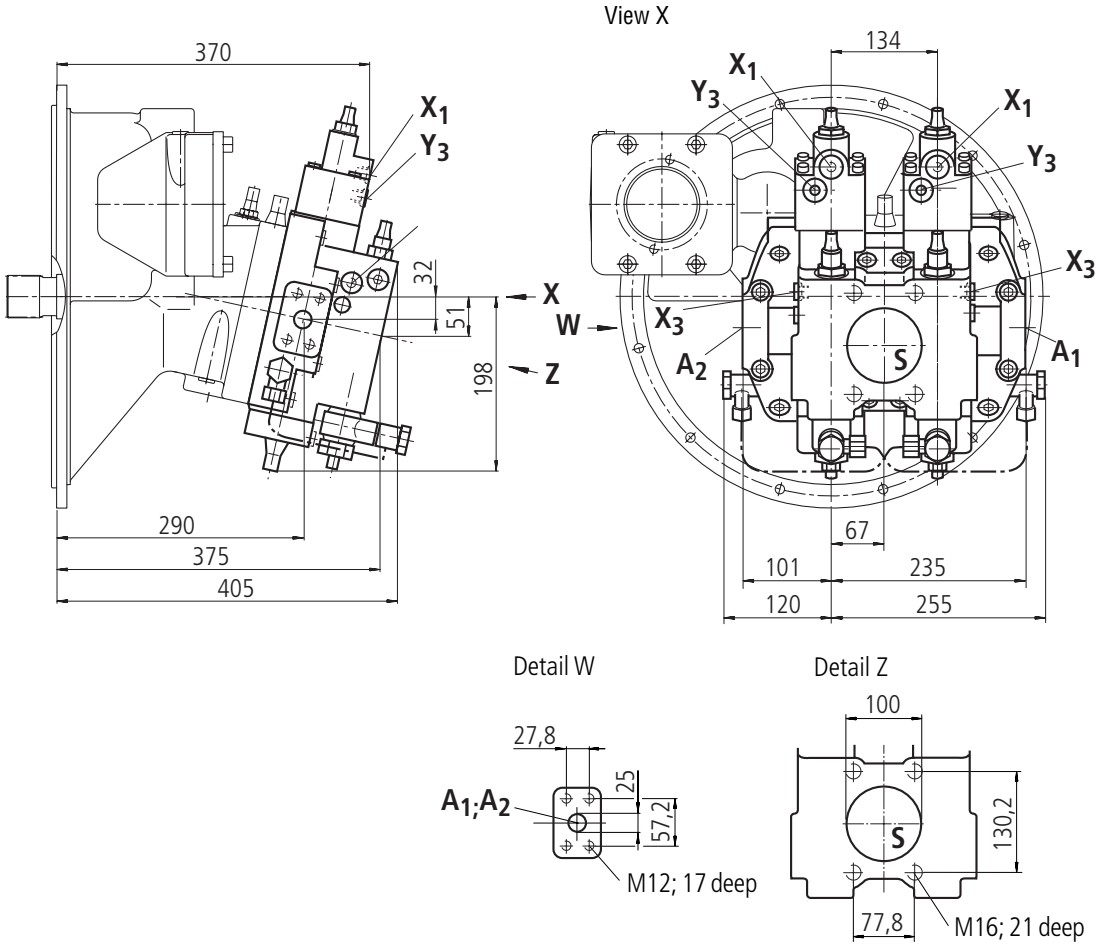
Summation power control with load limiting control and hydraulic on-off switching, SG1Z
(with pressure relief valve and pressure reducing valve)



Unit Dimensions, Size 107

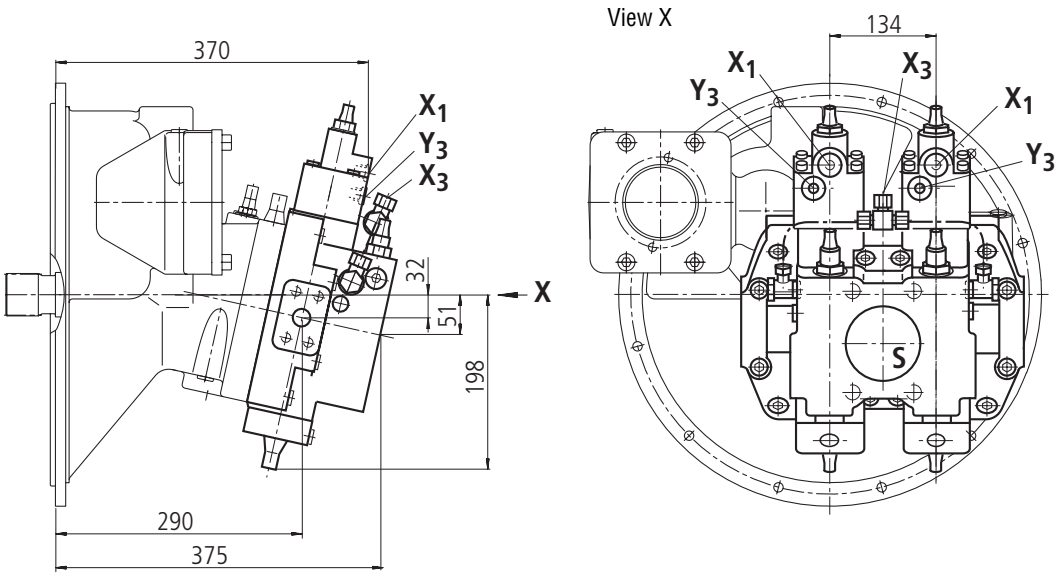
Before finalising your design, please request a certified drawing.

Individual power control (hyperbolic regulator) with three circuit power control, cross sensing control and hydraulic stroke limiter, positive control, LR3CH2



Individual power control (hyperbolic regulator) with three circuit power control and hydraulic stroke limiter, positive control, LR3H2

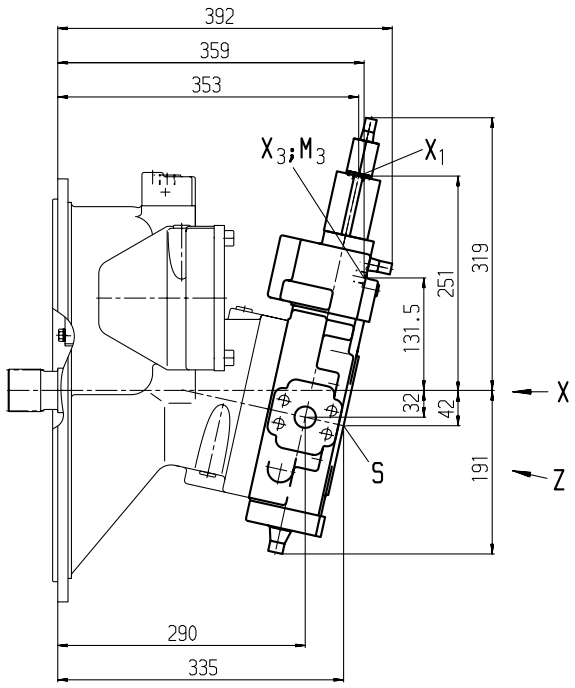
Individual power control (hyperbolic regulator) with load limiting control and hydraulic stroke limiter, positive control, LG1H2

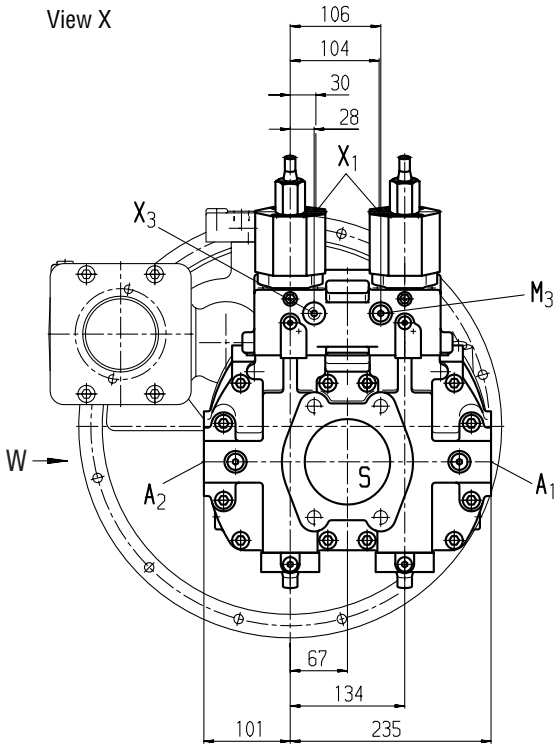


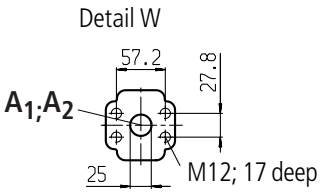
Unit Dimensions, Size 107

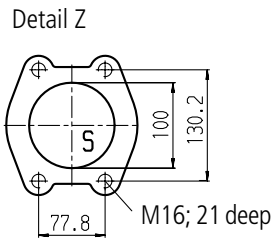
Before finalising your design, please request a certified drawing.

Individual power control (spring regulator) with load limiting control and hydraulic stroke limiter, positive control, LA1H2

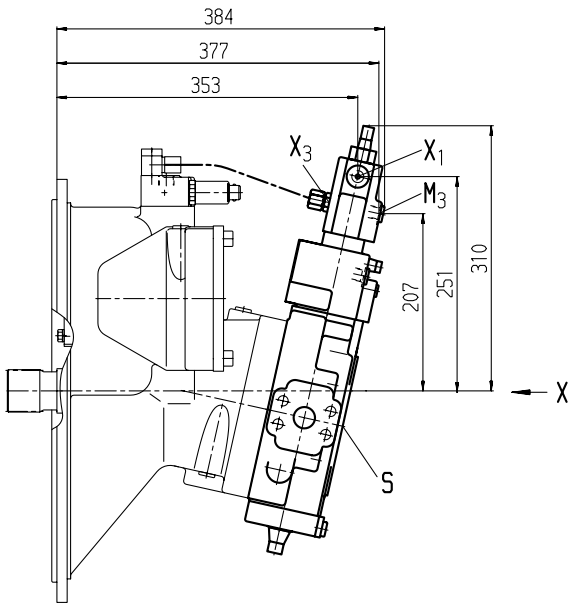


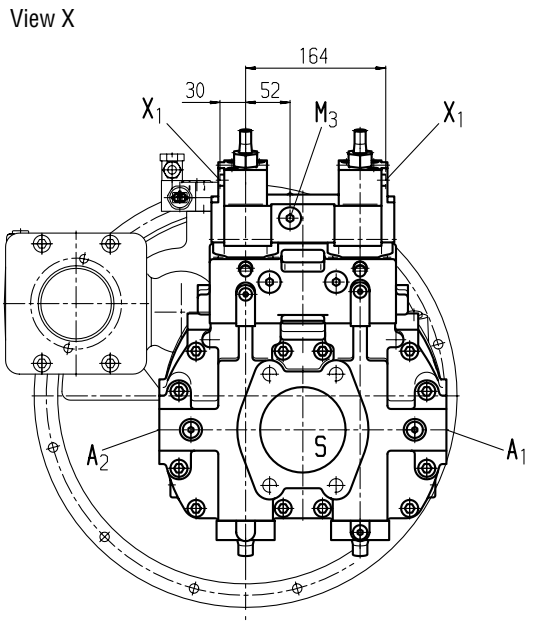






Individual power control (spring regulator) with load limiting control, hydraulic coupling and hydraulic stroke limiter, negative control, LA1KH1

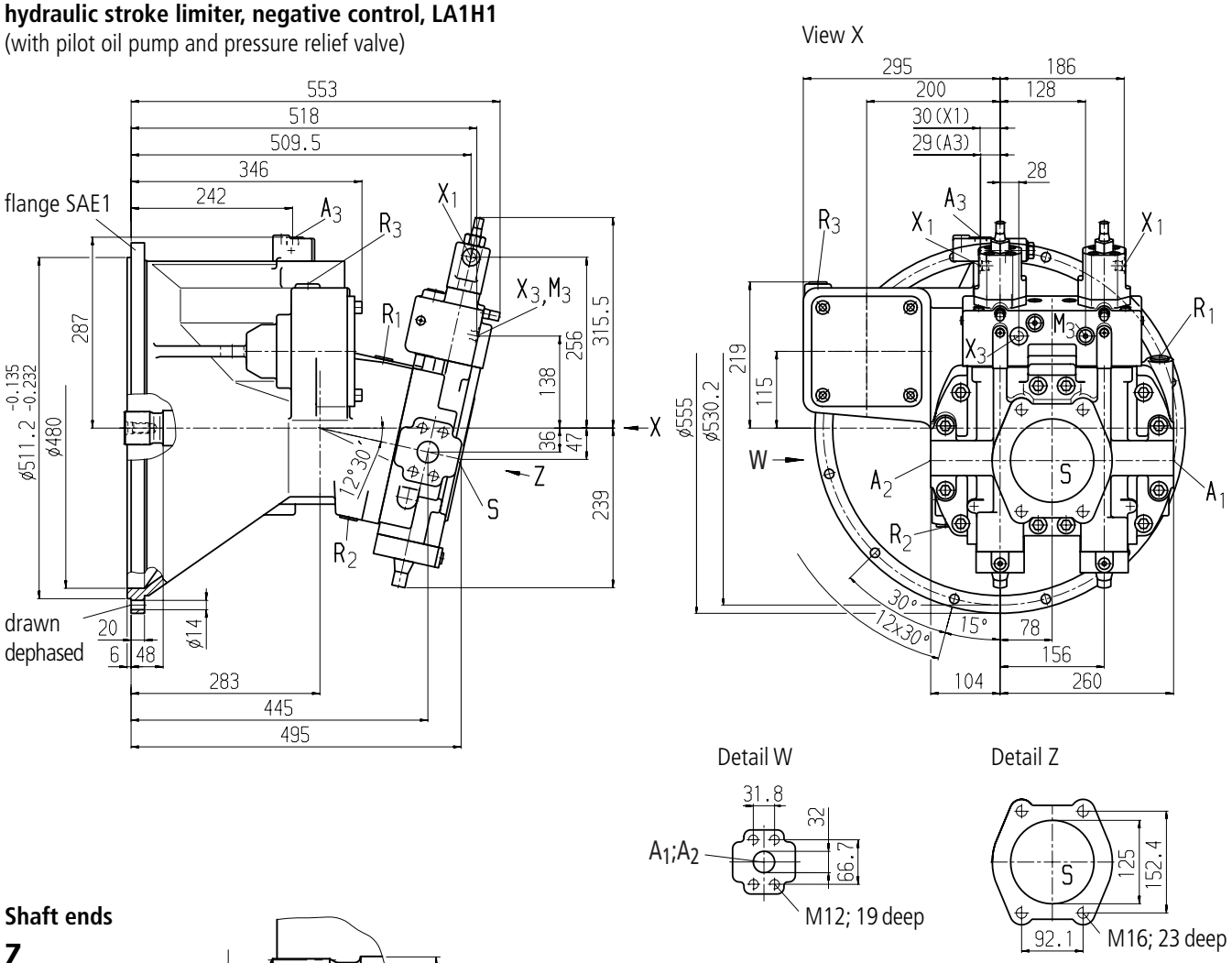




Unit Dimensions, Size 160

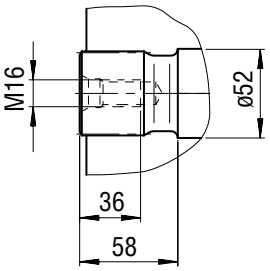
Before finalising your design, please request a certified drawing.

Individual power control (spring regulator) with load limiting control and hydraulic stroke limiter, negative control, LA1H1
(with pilot oil pump and pressure relief valve)



Shaft ends

Z
Splined shaft
W50x2x30x24x9g
DIN 5480



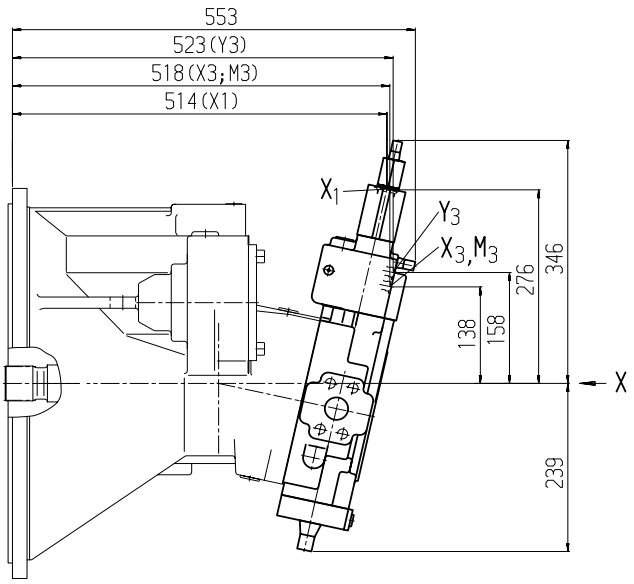
Connections

A_1, A_2	Service line ports	SAE 1 1/4" 420 bar (6000 psi) high pressure series
S	Suction port	SAE 5" 35 bar (500 psi) standard series
A_3	Service line port (auxiliary pump)	M18x1,5
R_1, R_3	Bleed port	M22x1,5 (plugged)
R_2	Oil drain	M22x1,5 (plugged)
M_3	Gauge port for load limiting control	M14x1,5 (plugged)
X_1	Pilot pressure port for hydraulic stroke limiter	M14x1,5
X_3	Pilot pressure port for load limiting control	M14x1,5
Y_3	External control pressure (LA1H2)	M14x1,5

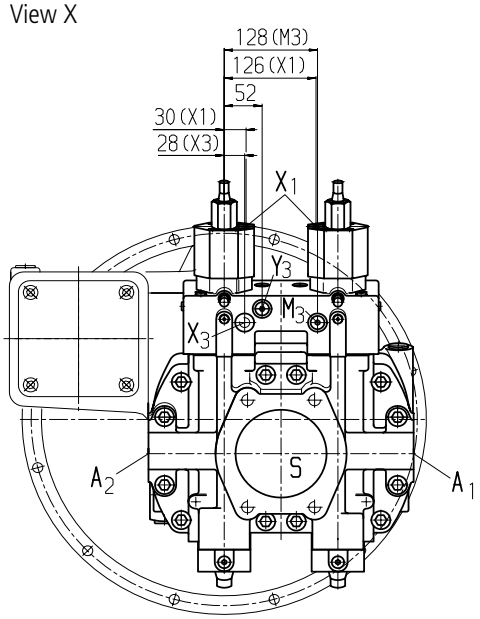
Unit Dimensions, Size 160

Before finalising your design, please request a certified drawing.

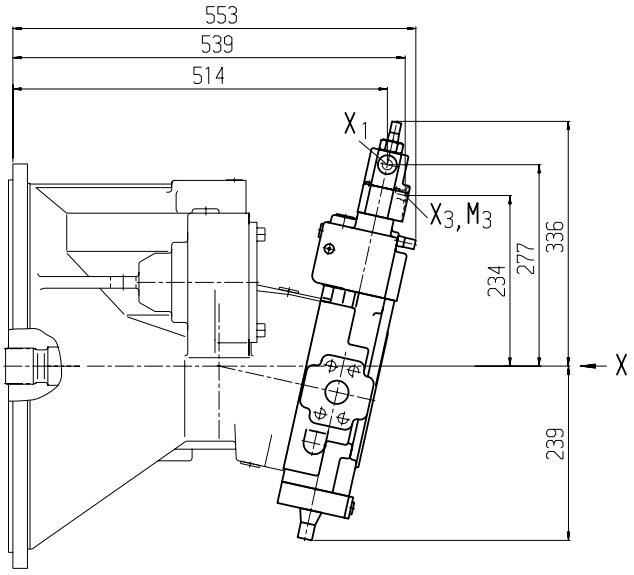
Individual power control (spring regulator) with load limiting control and hydraulic stroke limiter, positive control, LA1H2



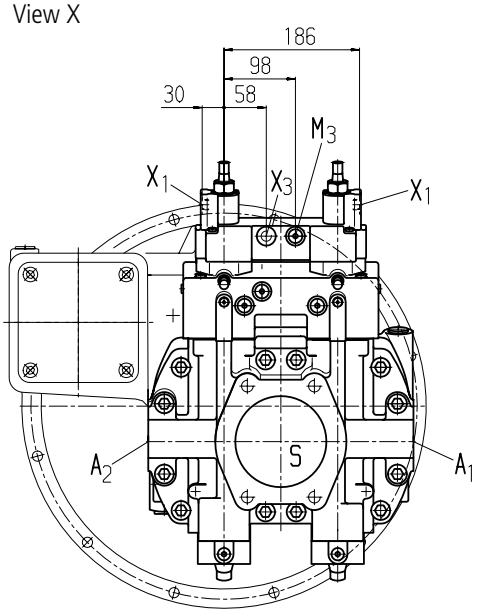
View X



Individual power control (spring regulator) with load limiting control, hydraulic coupling and hydraulic stroke limiter, negative control, LA1KH1



View X

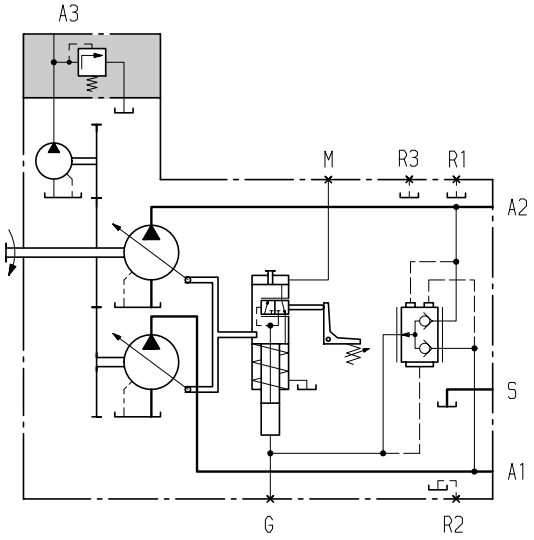


Power Take-Off, Auxiliary Pump and Valves (sizes 55-160)

Variation:
without power take-off, with integral auxiliary pump (pilot oil pump) and pressure relief valve, F001

See table, page 6, for technical data.

The pressure relief valve installed to protect the integral auxiliary pump has a fixed setting of 30 bar.

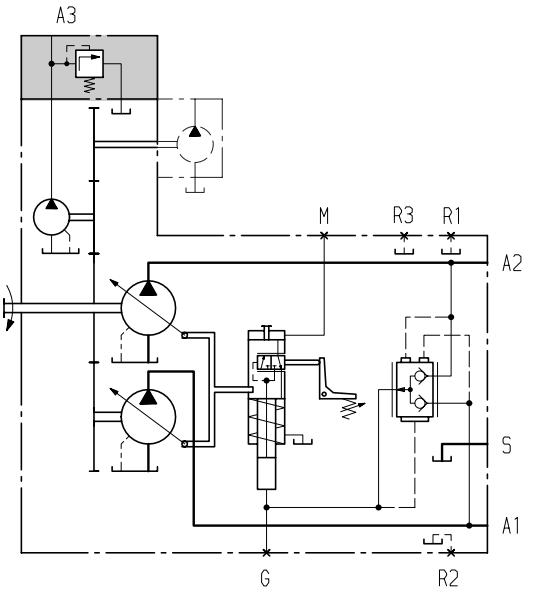


Variation:
with power take-off, with integral auxiliary pump (pilot oil pump) and pressure relief valve, F..1

See table, page 6, for technical data.

The pressure relief valve installed to protect the integral auxiliary pump has a fixed setting of 30 bar.

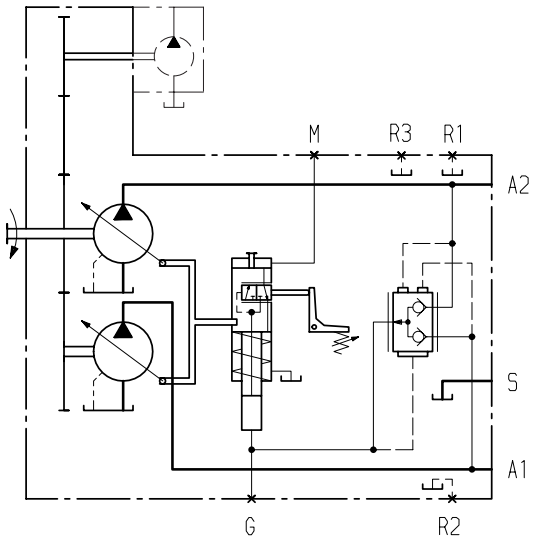
For mounting on PTO:
Gear pumps and axial piston pumps



Variation:
with power take-off, without integral auxiliary pump, K..0

See table, page 6, for technical data.

For mounting on PTO:
Gear pumps and axial piston pumps



Variation:
with power take-off, with integral auxiliary pump (pilot oil pump), pressure relief valve and pressure reducing valve, F..3/F..4

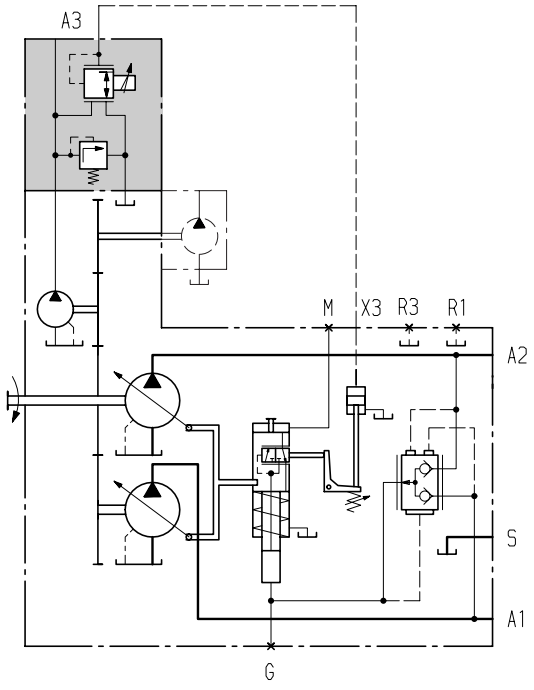
See table, page 6, for technical data.

The pressure relief valve installed to protect the integral auxiliary pump has a fixed setting of 30 bar.

An electrical adjustable pressure reducing valve can be used for override the power setting (load limiting control).

Control voltage of pressure reducing valve:
F..**3** ➔ 12 V DC, F..**4** ➔ 24 V DC

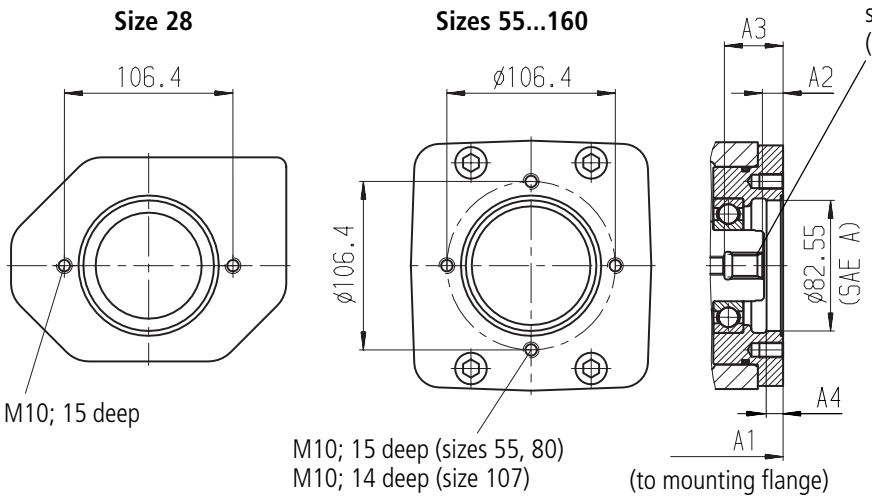
For mounting on PTO:
Gear pumps and axial piston pumps



Dimensions for Power Take-Off (SAE)

Before finalising your design, please request a certified drawing.

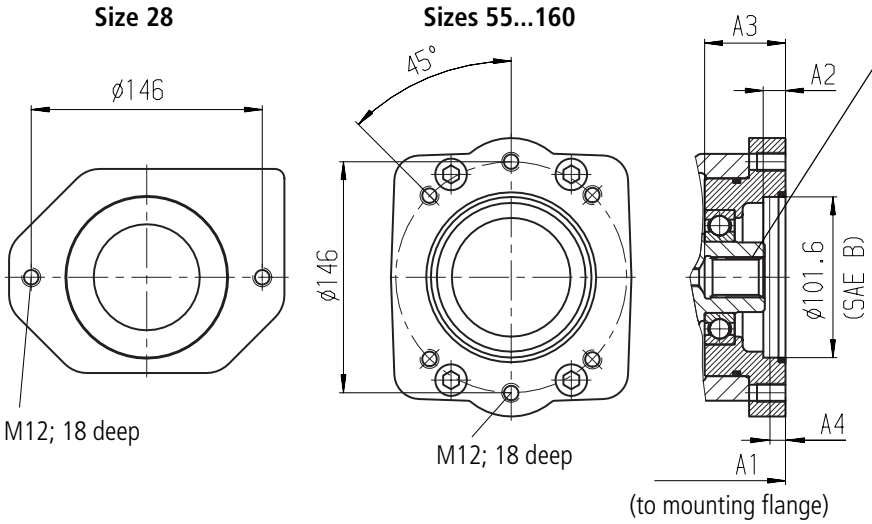
Power take-off: SAE A (F01/K01)



Size	A1	A2	A3	A4
28	140	12	32	8
55	178	10,1	35,1	10,1
80	190	12	37	10,1
107	195	11	36	10,1
160	357	13	38	10

suitable for connection of:
- gear pump G2 (RE10030)
- variable pump A10VSO10 (RE92713)
- variable pump A10VSO18 (RE 92712)

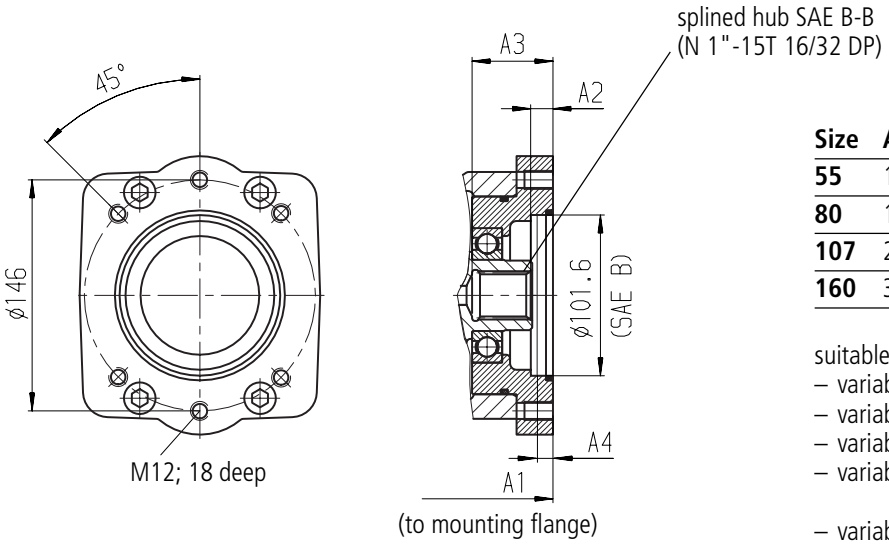
Power take-off: SAE B (F02/K02)



Size	A1	A2	A3	A4
28	141	13	42	10
55	185	13,1	48,1	10
80	197	13,1	48,1	10
107	206	13,1	48,1	10
160	346	14	49	6,8

suitable for connection of:
- gear pumpe G3 (RE 10038)
- gear pump G4 (RE 10042)
- variable pump A10VG18 (RE 92750)
- variable pump A10VO28 (RE 92701/ RE 92703)

Power take-off: SAE B-B (F04/K04)



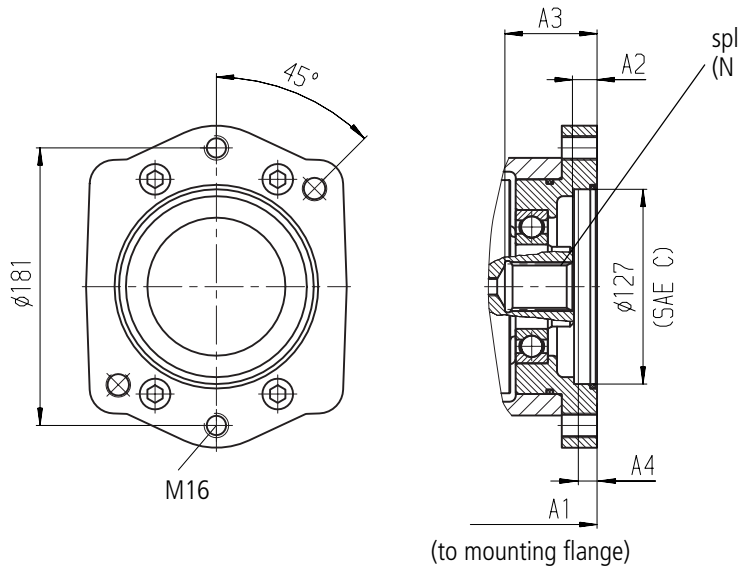
Size	A1	A2	A3	A4
55	185	13,1	51,1	10
80	197	13,1	49	10
107	206	13,1	49	10
160	346	14	52	10

suitable for connection of:
- variable pump A4VG28 (RE 92003)
- variable pump A10VG28 (RE 92750)
- variable pump A10VG45 (RE 92750)
- variable pump A10VO45 (RE 92701/ RE 92703)
- variable pump A11VO40 (RE 92500)

Dimensions for Power Take-Off (SAE)

Before finalising your design, please request a certified drawing.

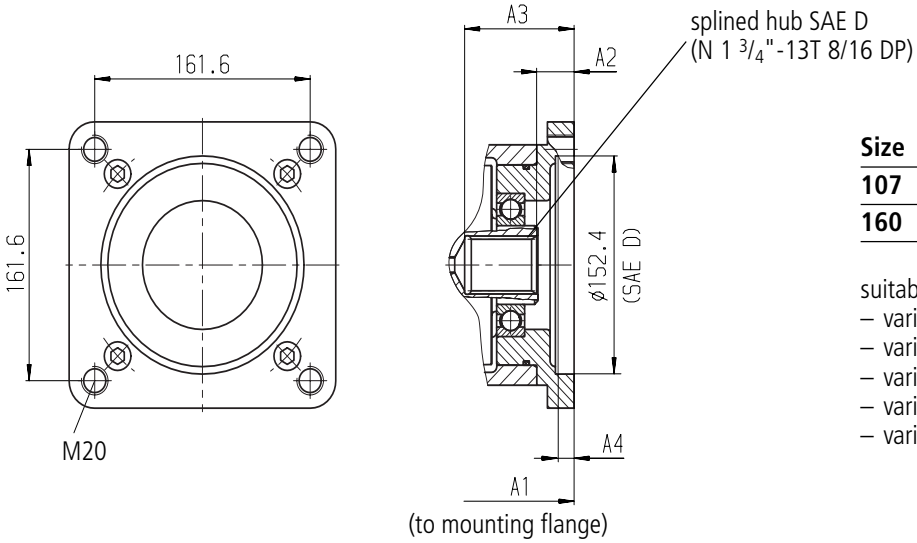
Power take-off: SAE C (F07/K07)



Size	A1	A2	A3	A4
55				
80	197	26,1	66,1	13
107	206	15,1	60,1	13
160	347	14	59	13

suitable for connection of:
- variable pump A4VG40 (RE 92003)
- variable pump A4VG56 (RE 92003)
- variable pump A4VG71 (RE 92003)
- variable pump A10VO71 (RE 92701)
- variable pump A11VO60 (RE 92500)

Power take-off: SAE D (F17/K17)



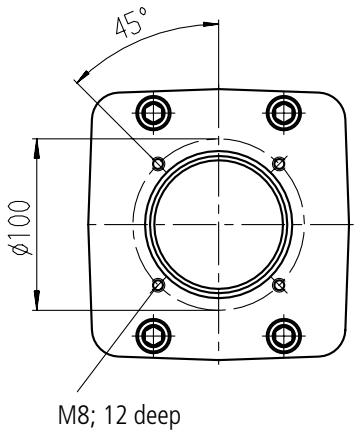
Size	A1	A2	A3	A4
107				
160	352	19	81	14

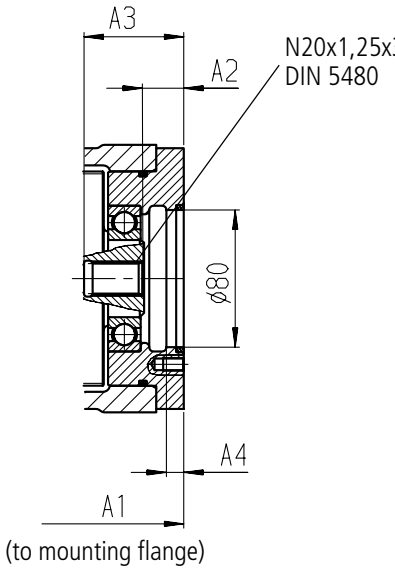
suitable for connection of:
- variable pump A4VG90 (RE 92003)
- variable pump A4VG125 (RE 92003)
- variable pump A10VO140 (RE 92701)
- variable pump A11VO95 (RE 92500)
- variable pump A11VO130 (RE 92500)

Dimensions for Power Take-Off (ISO)

Before finalising your design, please request a certified drawing.

Power take-off:
Flange ISO 4-hole/ø80, hub N20 (F28/K28)

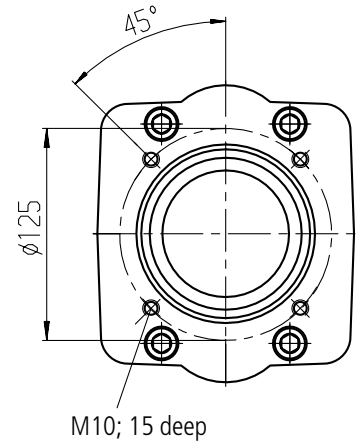


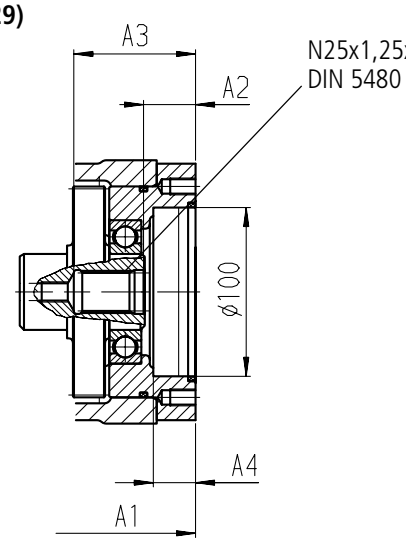


Size	A1	A2	A3	A4
55				
80	190	23	59	10
107				
160				

suitable for connection of:
– fixed pump A2FO10 (RE 91401)
– fixed pump A2FO12 (RE 91401)

Power take-off:
Flange ISO 4-hole/ø100, hub N25 (F29/K29)

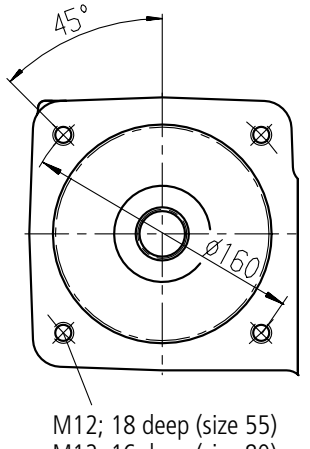


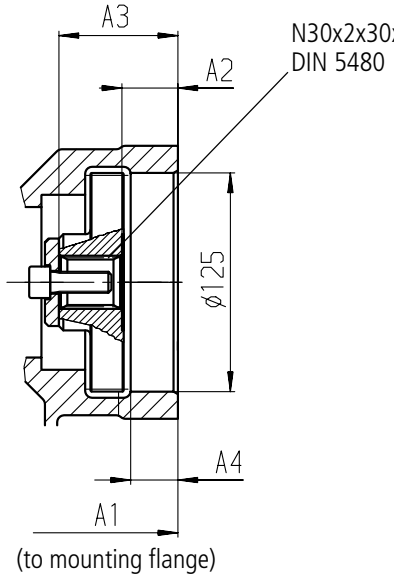


Size	A1	A2	A3	A4
55	185	30	70	10
80	197	30,1	70	10
107	206	29,1	78,1	7,7
160				

suitable for connection of:
– fixed pump A2FO23 (RE 91401)
– fixed pump A2FO28 (RE 91401)

Power take-off:
Flange ISO 4-hole/ø125, hub N30 (F30/K30)





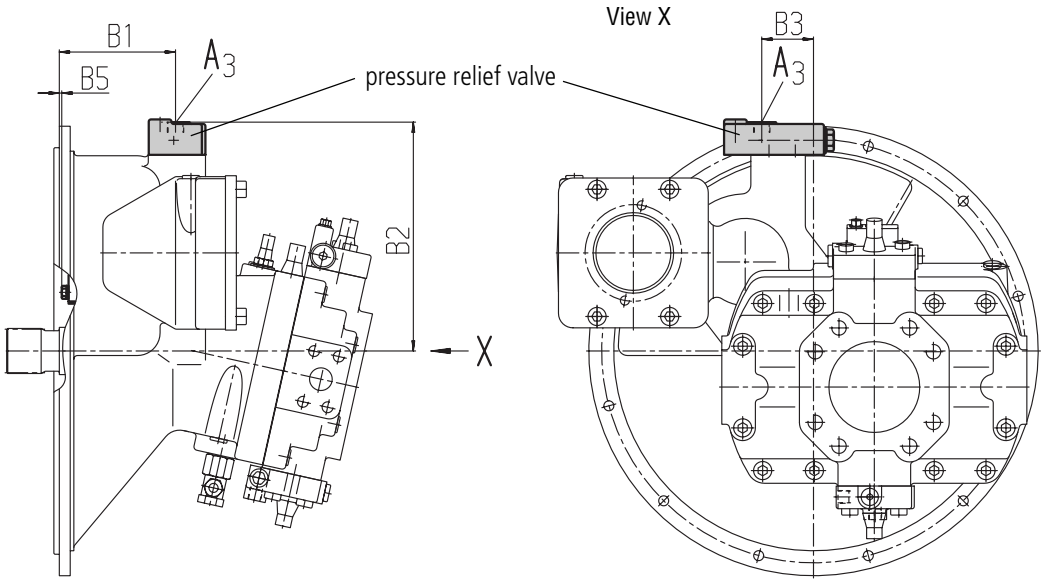
Size	A1	A2	A3	A4
55	162	32	67	27
80	174	32	67	27
107	183			
160	324			

suitable for connection of:
– fixed pump A2FO45 (RE 91401)
– fixed pump A2FO56 (RE 91401)
– variable pump A7VO55 (RE 92202)

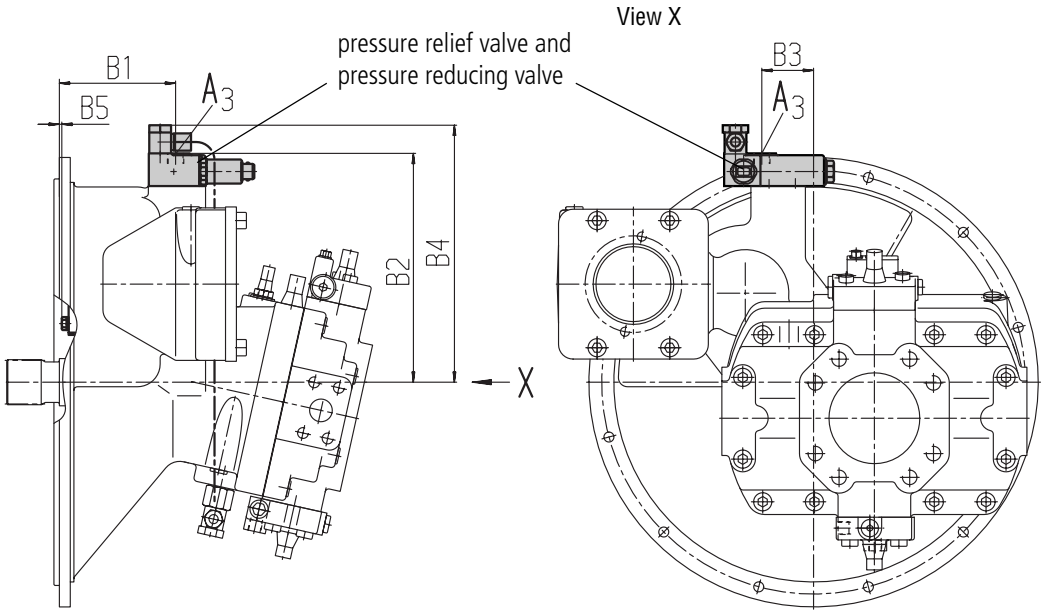
Dimensions for Valves

Before finalising your design, please request a certified drawing.

Design with pressure relief valve: F..1



Design with pressure relief valve and pressure reducing valve: F..3, F..4



Size	B1	B2	B3	B4	B5
55	113	210	22	241	1,4
80	122	232	33	263	3,4
107	128	252	57	283	1
160	242	287	29	318	–

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The specified data is for product description purposes only and may not be deemed to be guaranteed unless expressly confirmed in the contract.